Braun Intertec Corporation
2908 Morrison Avenue
Bismarck, ND 58504

Phone: 701.255.7180
Fax: 701.255.7208
Web: braunintertec.com

April 8, 2024 Project B22404521

Jerad Daul, PE
SRF Consulting Group, Inc.
1 North Second Street Case Plaza, Suite 102
Fargo. ND 58102

Re: Borrow Evaluation
Highway 31
1-031(021)078; PCN 23324
New Salem, North Dakota

Dear Mr. Daul:

We are pleased to present this Borrow Evaluation Letter for the proposed minor rehabilitation, sliver grading and overlay on Highway 31 from Interstate 94 north to the junction of ND Highway 25. The project was completed in accordance with our proposal and subsequent authorization on May 9, 2023. The purpose of the borrow evaluation is to assist SRF Consulting Group, Inc. (SRF) and the North Dakota Department of Transportation (NDDOT) with the evaluation of the borrow source. A boring location sketch, the linear soils report, log of boring sheets, grain size accumulation curves and modified Proctor reports are enclosed with this letter.

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Scope of Services

Our scope of services in the above referenced proposal consisted of the following tasks and subtasks related to the borrow evaluation:

- Engineering and Project Management:
  - Kickoff meeting.
  - Prepare drilling instructions.
  - Drilling oversight.
  - Laboratory testing oversight.
  - Prepare boring logs.
  - Communications.
  - Prepare this summary of the results and procedures.
  - Overall project management of drilling, laboratory testing, and engineering.

- Drilling:
  - Drill 30 flight auger borings to depth of 15 feet for two borrow areas.
  - Coordinate with utility companies to locate buried utilities.

- Laboratory Testing:
  - Perform moisture content tests on each sample, and perform one Atterberg Limits, one grain size analysis, and one modified Proctor per soil type per boring (assumed one major soil type per boring).

Boring Logs

The locations of our borings are shown on the enclosed Boring Location Sketch. Log of Boring sheets for our borings also accompany this letter. The logs identify and describe the geologic materials that were penetrated, present the results of laboratory tests performed on samples retrieved from them, and note the locations of groundwater measurements.

Strata boundaries were inferred from changes in the auger cuttings. The strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may also occur as gradual rather than abrupt transitions.

We staked the new exploration locations and acquired the surface elevations and locations with a Trimble Catalyst GPS device, which has an estimated horizontal and vertical accuracy of +/- 10 centimeters. The locations of the two borrow site boundaries were provided to us by SRF. The south borrow site included boring B-01 to B-16 and the north borrow site included borings B-17 to B-30. Coordinates and elevations of each boring are presented on the Log of Boring sheets.

Site Conditions

The borrow sites are located in a field adjacent to Highway 31. The south boring site is to the west of Highway 31 and the north boring site is to the east of Highway 31. The boring locations are further illustrated on the attached boring location sketch and annotated with boring numbers. The topography of the borrow site was generally gently sloping.

Soil Classification and Comments

We collected a total of 30 bulk samples and 390 moisture content samples from the borrow borings. Our borings were extended to 15 feet deep. The results of our laboratory testing are summarized in Tables 1 and 2 below, on the enclosed boring logs and graphs, and on the Linear Soils Summary report.

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Table 1. Summary of Classification, Moisture Content and Maximum Dry Unit Weight

BORROW SITE 1						
AASHTO Classifications	Quantity	In Place Moisture Range (%)		In Place Moisture Average (%)	AASHTO T-180 Optimum Moisture Average (%)	AASHTO T-180 Maximum Dry Unit Weight Average (pcf)
		Min	Max			
A-7-6	14	12	37	22	13.2	118
A-6	2	17	31	21	11.9	120

BORROW SITE 2						
AASHTO Classifications	Quantity	In Place Moisture Range (%)		In Place Moisture Average (%)	AASHTO T-180 Optimum Moisture Average (%)	AASHTO T-180 Maximum Dry Unit Weight Average (pcf)
		Min	Max			
A-7-6	13	10	67	25	14.5	115
A-6	1	9	28	21	12.8	121

Table 2 shows the soils encountered at the borrow site, on average, are near or above their optimum moisture contents as determined by AASHTO T-180.

Table 2. Borrow Site, Summary of Atterberg Limits Testing

BORROW SITE 1										
AASHTO Classifications	Quantity	Liquid Limit Range (%)		Liquid Limit Average (%)	Plastic Limit Range (%)		Plastic Limit Average (%)	Plastic Index Range (%)		Plastic Index Average (%)
		Min	Max		Min	Max		Min	Max	
A-7-6	14	42	61	51	14	17	15	27	45	36
A-6	2	39	39	39	14	14	14	25	25	25

BORROW SITE 2										
AASHTO Classifications	Quantity	Liquid Limit Range (%)		Liquid Limit Average (%)	Plastic Limit Range (%)		Plastic Limit Average (%)	Plastic Index Range (%)		Plastic Index Average (%)
		Min	Max		Min	Max		Min	Max	
A-7-6	13	42	74	55	14	20	16	27	54	39
A-6	1	37	37	37	15	15	15	22	22	22

The soils classified had plastic indices (PI) ranging from 22 to 54 with an average PI of 36, indicating high swell potential. The soils encountered in all the borings across the borrow sites are considered frost-susceptible. The soils encountered are generally considered fair to poor subgrade materials. A group index of 20 or greater indicates very poor subgrade materials. The group index of the soils ranged from 10 to 60 with an average group index of 32.

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Groundwater

We did not observe groundwater while advancing our borings. Therefore, it appears that groundwater is below the depths explored. Seasonal and annual fluctuations in groundwater levels should be anticipated. The borings were backfilled immediately after drilling.

Recommendations

The soils encountered in the borrow borings are typical soils in the region and we anticipate they are similar to those under the existing roadway. The soils are judged suitable for reuse as borrow for the proposed construction. Contractors must understand that moisture conditioning may be necessary to achieve the requirements for moisture control for embankment construction per Section 203.04.E of the NDDOT Standard Specifications.

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Remarks

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, expressed or implied, is made.

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please call Carey Yoder at 701.425.4409.

Sincerely,

BRAUN INTERTEC CORPORATION

Professional Certification:
I hereby certify that this plan, specification or 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.

Carey C. Yoder, PE
Project Engineer
Registration Number: PE-7129
April 8, 2024

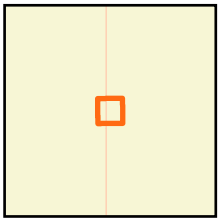
Steven P. Nagle, PE
Vice President, Principal Engineer

Attachments:
Boring Location Sketch
Linear Soils Report
Log of Boring Sheets
Descriptive Terminology
Grain Size Accumulation Curves
Proctor Test Results

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Soil Boring

N

0 150 300 '

SCALE: 1" = 300'

Source: Google Earth Imagery

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The Science You Build On.

1502 Grumman Ln
Bismarck, ND 58504
701.204.8875
braunintertec.com

Project No:	B2304521
Drawing No:	Boring Location Sketch
Drawn By:	ZS
Date Drawn:	4/4/2024
Checked By:	CY
Last Modified:	4/4/2024

Borrow Site 1 and Borrow Site 2

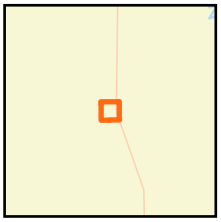
North Dakota Highway 31

Morton and Oliver County, North Dakota

Boring Location Sketch

F:\2023\B2304521\GIS\B2304521\B2304521.aprx





Soil Boring

N

0 110 220 '

SCALE: 1" = 220'

Source: Google Earth Imagery

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Project No:	B2304521
Drawing No:	Boring Location Sketch
Drawn By:	ZS
Date Drawn:	4/4/2024
Checked By:	CY
Last Modified:	4/4/2024

Borrow Site 1 and Borrow Site 2

North Dakota Highway 31

Morton and Oliver County, North Dakota

Boring Location Sketch

Linear Report of Tests on Soil Samples

PROJECT NO: B2404521
PROJECT: 1-031(021)078
PCN: 23324
ND Highway 31
New Salem, North Dakota

Braun Intertec Corporation
1502 Grumman Lane
Bismarck, ND
701.355.5401

BRAUN INTERTEC

Boring Number	B-01	B-02	B-03	B-04	B-05	B-06	B-07
Latitude	46.905648	46.906441	46.907229	46.908012	46.905648	46.906441	46.907229
Longitude	-101.429263	-101.429263	-101.429263	-101.429263	-101.430419	-101.430419	-101.430419
Sample Depth	2'-15'	2'-15'	2'-15'	2'-15'	2'-15'	2'-15'	2'-15'
% Passing 3/8" Sieve	100	100	100	100	100	100	100
% Passing No. 4 Sieve	100	100	100	100	99	100	100
% Passing No. 10 Sieve	99	99	99	100	99	99	99
% Coarse Sand (-No. 10, +No. 40)	1	0	1	0	1	1	3
% Fine Sand (-No. 40, +No. 200)	37	3	9	1	6	11	27
% Silt (0.075 - 0.002 mm)	29	40	50	45	43	33	32
% Clay (<0.002 mm)	68	56	41	54	48	55	37
% Finer than 0.02 mm	87	80	62	78	68	70	49
Frost Group	F3	F3	F3	F3	F3	F3	F3
Liquid Limit (-No. 40)	60	51	43	61	54	56	39
Plastic Limit (-No. 40)	17	14	15	16	15	15	14
Plasticity Index (-No. 40)	43	37	28	45	39	41	25
Soil Color	Brown	Brown	Brown	Brown	Brown	Brown	Dark Brown
USCS Classification	CH	CH	CL	CH	CH	CH	CL
Soil Classification (AASHTO M-15)	A-7-6(24)	A-7-6(37)	A-7-6(25)	A-7-6(49)	A-7-6(37)	A-7-6(37)	A-6(15)
Optimum Moisture (%)	16.4	12.4	13.5	13.4	13.5	13.6	11.8
Maximum Dry Density (pcf)	111.0	119.0	116.0	116.0	116.0	116.0	120.0

Depth (ft)	Moisture (%)													
2.0	20	2.0	24	2.0	21	2.0	26	2.0	19	2.0	22	2.0	17
3.0	24	3.0	23	3.0	22	3.0	24	3.0	19	3.0	20	3.0	19
4.0	23	4.0	19	4.0	22	4.0	28	4.0	24	4.0	18	4.0	21
5.0	20	5.0	22	5.0	24	5.0	28	5.0	20	5.0	24	5.0	19
6.0	19	6.0	22	6.0	18	6.0	24	6.0	18	6.0	25	6.0	26
7.0	21	7.0	22	7.0	25	7.0	25	7.0	20	7.0	24	7.0	18
8.0	22	8.0	21	8.0	24	8.0	24	8.0	22	8.0	25	8.0	21
9.0	20	9.0	21	9.0	20	9.0	26	9.0	17	9.0	26	9.0	19
10.0	21	10.0	21	10.0	24	10.0	24	10.0	21	10.0	25	10.0	18
11.0	19	11.0	21	11.0	22	11.0	22	11.0	21	11.0	23	11.0	20
12.0	17	12.0	25	12.0	23	12.0	20	12.0	22	12.0	23	12.0	18
13.0	18	13.0	26	13.0	24	13.0	19	13.0	26	13.0	22	13.0	24
14.0	17	14.0	33	14.0	23	14.0	18	14.0	25	14.0	22	14.0	23
Avg. Moisture of Sample Depth	20	23	22	24	21	23	20

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Linear Report of Tests on Soil Samples

PROJECT NO: B2404521
PROJECT: 1-031(021)078
PCN: 23324
ND Highway 31
New Salem, North Dakota

Braun Intertec Corporation
1502 Grumman Lane
Bismarck, ND
701.355.5401

BRAUN INTERTEC

Boring Number	B-08	B-09	B-10	B-11	B-12	B-13	B-14
Latitude	46.908012	46.905648	46.906441	46.907229	46.908012	46.905648	46.906441
Longitude	-101.430419	-101.431563	-101.431563	-101.431563	-101.431563	-101.432703	-101.432703
Sample Depth	2'-15'	2'-15'	2'-15'	2'-15'	2'-15'	2'-15'	2'-15'
% Passing 3/8" Sieve	100	100	100	100	100	100	100
% Passing No. 4 Sieve	100	100	100	100	100	100	100
% Passing No. 10 Sieve	100	100	99	100	100	99	100
% Coarse Sand (-No. 10, +No. 40)	1	1	1	0	0	1	1
% Fine Sand (-No. 40, +No. 200)	3	19	23	5	5	8	5
% Silt (0.075 - 0.002 mm)	44	43	45	56	52	44	48
% Clay (<0.002 mm)	53	37	31	40	43	47	47
% Finer than 0.02 mm	78	54	45	57	64	65	69
Frost Group	F3	F3	F3	F3	F3	F3	F3
Liquid Limit (-No. 40)	52	42	39	46	51	48	48
Plastic Limit (-No. 40)	16	15	14	15	15	15	16
Plasticity Index (-No. 40)	36	27	25	31	36	33	32
Soil Color	Brown	Brown	Brown	Brown	Brown	Brown	Brown
USCS Classification	CH	CL	CL	CL	CH	CL	CL
Soil Classification (AASHTO M-15)	A-7-6(37)	A-7-6(21)	A-6(17)	A-7-6(31)	A-7-6(36)	A-7-6(31)	A-7-6(32)
Optimum Moisture (%)	12.5	12.4	11.9	12.0	12.6	12.4	12.8
Maximum Dry Density (pcf)	118.0	121.0	120.0	120.0	120.0	119.0	118.0

Depth (ft)	Moisture (%)													
2.0	21	2.0	20	2.0	17	2.0	24	2.0	23	2.0	19	2.0	21
3.0	20	3.0	20	3.0	17	3.0	21	3.0	21	3.0	16	3.0	24
4.0	22	4.0	20	4.0	18	4.0	19	4.0	15	4.0	15	4.0	22
5.0	22	5.0	21	5.0	19	5.0	20	5.0	18	5.0	21	5.0	23
6.0	21	6.0	18	6.0	21	6.0	20	6.0	19	6.0	23	6.0	22
7.0	20	7.0	17	7.0	22	7.0	17	7.0	22	7.0	20	7.0	22
8.0	28	8.0	19	8.0	31	8.0	16	8.0	22	8.0	19	8.0	22
9.0	31	9.0	18	9.0	27	9.0	17	9.0	20	9.0	19	9.0	25
10.0	26	10.0	19	10.0	27	10.0	18	10.0	20	10.0	19	10.0	22
11.0	25	11.0	17	11.0	23	11.0	24	11.0	21	11.0	20	11.0	21
12.0	24	12.0	17	12.0	22	12.0	32	12.0	19	12.0	21	12.0	22
13.0	21	13.0	16	13.0	22	13.0	24	13.0	20	13.0	21	13.0	23
14.0	23	14.0	17	14.0	20	14.0	27	14.0	22	14.0	21	14.0	20
Avg. Moisture of Sample Depth	23	18	22	21	20	20	22

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Linear Report of Tests on Soil Samples

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PROJECT: 1-031(021)078
PCN: 23324
ND Highway 31
New Salem, North Dakota

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1502 Grumman Lane
Bismarck, ND
701.355.5401

BRAUN INTERTEC

Boring Number	B-15	B-16	B-17	B-18	B-19	B-20	B-21
Latitude	46.907229	46.908012	47.046613	47.046011	47.046011	47.045409	47.044807
Longitude	-101.432703	-101.432703	-101.425296	-101.425296	-101.424293	-101.425296	-101.425296
Sample Depth	2'-15'	2'-15'	2'-15'	2'-15'	2'-15'	2'-15'	2'-15'
% Passing 3/8" Sieve	100	100	100	98	100	99	99
% Passing No. 4 Sieve	100	100	100	98	100	98	99
% Passing No. 10 Sieve	100	100	100	97	100	97	99
% Coarse Sand (-No. 10, +No. 40)	1	0	0	2	1	3	2
% Fine Sand (-No. 40, +No. 200)	6	2	7	11	6	23	21
% Silt (0.075 - 0.002 mm)	33	42	33	17	20	29	31
% Clay (<0.002 mm)	59	56	59	68	73	42	45
% Finer than 0.02 mm	80	82	80	79	84	56	61
Frost Group	F3	F3	F3	F3	F3	F3	F3
Liquid Limit (-No. 40)	51	50	55	60	64	42	45
Plastic Limit (-No. 40)	15	15	17	18	20	15	15
Plasticity Index (-No. 40)	36	35	38	42	44	27	30
Soil Color	Brown	Brown	Brown to gray	Brown	Gray	Brown	Brown and gray
USCS Classification	CH	CH	CH	CH	CH	CL	CL
Soil Classification (AASHTO M-15)	A-7-6(35)	A-7-6(37)	A-7-6(37)	A-7-6(37)	A-7-6(45)	A-7-6(17)	A-7-6(21)
Optimum Moisture (%)	13.2	13.6	16.2	17.2	16.6	13.3	13.0
Maximum Dry Density (pcf)	117.0	119.0	112.0	108.0	108.0	117.0	119.0
Depth (ft) / Moisture (%)	2.0 12	2.0 20	2.0 26	2.0 29	2.0 30	2.0 19	2.0 27
	3.0 18	3.0 18	3.0 25	3.0 25	3.0 31	3.0 18	3.0 29
	4.0 21	4.0 28	4.0 23	4.0 22	4.0 31	4.0 19	4.0 27
	5.0 21	5.0 21	5.0 23	5.0 26	5.0 23	5.0 25	5.0 21
	6.0 21	6.0 20	6.0 23	6.0 31	6.0 22	6.0 27	6.0 24
	7.0 21	7.0 23	7.0 24	7.0 23	7.0 21	7.0 31	7.0 25
	8.0 18	8.0 21	8.0 24	8.0 24	8.0 23	8.0 29	8.0 24
	9.0 18	9.0 20	9.0 24	9.0 21	9.0 24	9.0 25	9.0 26
	10.0 20	10.0 20	10.0 24	10.0 22	10.0 23	10.0 24	10.0 25
	11.0 23	11.0 24	11.0 21	11.0 21	11.0 21	11.0 22	11.0 26
	12.0 25	12.0 23	12.0 19	12.0 20	12.0 21	12.0 22	12.0 67
	13.0 25	13.0 37	13.0 18	13.0 21	13.0 23	13.0 21	13.0 67
	14.0 27	14.0 28	14.0 19	14.0 21	14.0 22	14.0 20	14.0 61
Avg. Moisture of Sample Depth	21	23	23	24	24	23	35

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Linear Report of Tests on Soil Samples

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ND Highway 31
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BRAUN INTERTEC

Boring Number	B-22	B-23	B-24	B-25	B-26	B-27	B-28
Latitude	47.044205	47.043603	47.043001	47.046613	47.045409	47.044807	47.044205
Longitude	-101.425296	-101.425296	-101.425296	-101.424293	-101.424293	-101.424293	-101.424293
Sample Depth	2'-15'	2'-15'	2'-15'	2'-15'	2'-15'	2'-15'	2'-15'
% Passing 3/8" Sieve	100	100	100	100	100	100	100
% Passing No. 4 Sieve	100	100	100	100	100	100	100
% Passing No. 10 Sieve	100	99	99	99	100	100	100
% Coarse Sand (-No. 10, +No. 40)	2	2	2	1	1	1	0
% Fine Sand (-No. 40, +No. 200)	39	24	17	2	15	3	1
% Silt (0.075 - 0.002 mm)	26	34	35	41	32	32	26
% Clay (<0.002 mm)	33	39	44	56	52	64	73
% Finer than 0.02 mm	46	55	59	79	68	85	92
Frost Group	F3	F3	F3	F3	F3	F3	F3
Liquid Limit (-No. 40)	37	45	44	53	54	61	74
Plastic Limit (-No. 40)	15	14	14	16	15	16	20
Plasticity Index (-No. 40)	22	31	30	37	39	45	54
Soil Color	Brown	Brown	Brown	Brown and gray	Brown	Brown to gray	Brown and gray
USCS Classification	CL	CL	CL	CH	CH	CH	CH
Soil Classification (AASHTO M-15)	A-6(10)	A-7-6(21)	A-7-6(23)	A-7-6(39)	A-7-6(33)	A-7-6(47)	A-7-6(60)
Optimum Moisture (%)	12.8	13.0	12.3	15.9	14.3	14.8	18.3
Maximum Dry Density (pcf)	121.0	119.0	119.0	113.0	115.0	116.0	108.0
Depth (ft) / Moisture (%)	2.0 / 9	2.0 / 19	2.0 / 20	2.0 / 20	2.0 / 19	2.0 / 24	2.0 / 38
	3.0 / 9	3.0 / 23	3.0 / 18	3.0 / 18	3.0 / 22	3.0 / 23	3.0 / 39
	4.0 / 11	4.0 / 17	4.0 / 18	4.0 / 20	4.0 / 25	4.0 / 26	4.0 / 25
	5.0 / 28	5.0 / 21	5.0 / 19	5.0 / 22	5.0 / 25	5.0 / 26	5.0 / 27
	6.0 / 26	6.0 / 21	6.0 / 21	6.0 / 22	6.0 / 24	6.0 / 26	6.0 / 26
	7.0 / 23	7.0 / 22	7.0 / 23	7.0 / 22	7.0 / 25	7.0 / 26	7.0 / 26
	8.0 / 24	8.0 / 25	8.0 / 23	8.0 / 24	8.0 / 26	8.0 / 26	8.0 / 25
	9.0 / 24	9.0 / 20	9.0 / 23	9.0 / 26	9.0 / 26	9.0 / 26	9.0 / 25
	10.0 / 26	10.0 / 17	10.0 / 22	10.0 / 25	10.0 / 26	10.0 / 25	10.0 / 24
	11.0 / 23	11.0 / 11	11.0 / 25	11.0 / 23	11.0 / 23	11.0 / 25	11.0 / 24
	12.0 / 24	12.0 / 13	12.0 / 25	12.0 / 24	12.0 / 26	12.0 / 25	12.0 / 24
	13.0 / 24	13.0 / 10	13.0 / 26	13.0 / 26	13.0 / 26	13.0 / 25	13.0 / 24
	14.0 / 22	14.0 / 13	14.0 / 27	14.0 / 35	14.0 / 26	14.0 / 26	14.0 / 23
Avg. Moisture of Sample Depth	21	18	22	24	25	25	27

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Linear Report of Tests on Soil Samples

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ND Highway 31
New Salem, North Dakota

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Bismarck, ND
701.355.5401

Boring Number		B-29	B-30					
Latitude		47.043603	47.043001					
Longitude		-101.424293	-101.424293					
Sample Depth		2'-15'	2'-15'					
% Passing 3/8" Sieve		100	100					
% Passing No. 4 Sieve		100	100					
% Passing No. 10 Sieve		100	99					
% Coarse Sand (-No. 10, +No. 40)		0	2					
% Fine Sand (-No. 40, +No. 200)		3	20					
% Silt (0.075 - 0.002 mm)		21	33					
% Clay (<0.002 mm)		76	44					
% Finer than 0.02 mm		93	62					
Frost Group		F3	F3					
Liquid Limit (-No. 40)		71	46					
Plastic Limit (-No. 40)		18	15					
Plasticity Index (-No. 40)		53	31					
Soil Color		Brown	Brown					
USCS Classification		CH	CL					
Soil Classification (AASHTO M-15)		A-7-6(57)	A-7-6(23)					
Optimum Moisture (%)		16.5	12.4					
Maximum Dry Density (pcf)		109.0	117.0					
Depth (ft)	**Moisture (%)**	2.0	31	2.0	18			
		3.0	31	3.0	19			
		4.0	32	4.0	20			
		5.0	27	5.0	26			
		6.0	24	6.0	25			
		7.0	28	7.0	26			
		8.0	22	8.0	27			
		9.0	23	9.0	29			
		10.0	23	10.0	29			
		11.0	24	11.0	27			
		12.0	24	12.0	29			
		13.0	24	13.0	31			
		14.0	24	14.0	31			
Avg. Moisture of Sample Depth		26		26				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-01**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90565 LONGITUDE: -101.42926
DRILLER: A.Horner LOGGED BY: C.Yoder START DATE: 01/22/24 END DATE: 01/22/24
SURFACE ELEVATION: 2083.1 ft RIG: 7521 METHOD: 3 1/4" HSA SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2082.1		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL)					
1.0		FAT CLAY (CH), little Sand, brown, moist, A-7-6 (24)				17	
						20	Bulk sample obtained from 2 to 15 feet
						24	
5						23	
						20	
				AU		19	LL=60, PL=17, PI=43
						21	P200=96%
						22	OMC= 16%
							MDD= 111 pcf
10						20	
						21	
						19	
						17	
						18	
2068.1							
15.0		END OF BORING				17	Water not observed while drilling.
		Boring then backfilled with auger cuttings					
20							
25							
30							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-02**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90644 LONGITUDE: -101.42926
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2084.1 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2083.1		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL)					
1.0		FAT CLAY (CL), trace Sand, brown, moist, A-7-6(37)				24	
						24	Bulk sample obtained from 2 to 15 feet
						23	
5						19	
						22	
				AU		22	LL=51, PL=14, PI=37
						22	P200=95%
						21	OMC= 12%
							MDD= 119 pcf
10						21	
						21	
						21	
						25	
						26	
2069.1							
15.0		END OF BORING				33	Water not observed while drilling.
15		Boring then backfilled with auger cuttings					
20							
25							
30							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-03**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90723 LONGITUDE: -101.42926
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2087.6 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2086.6		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL)					
1.0		LEAN CLAY (CL), little Sand, A-7-6(25), brown, moist				25	
						21	Bulk sample obtained from 2 to 15 feet
						22	
						22	
						24	
				AU		18	LL=43, PL=15, PI=28
						25	P200=90%
						24	OMC= 14%
						20	MDD= 116 pcf
						24	
						22	
						23	
						24	
2072.6						23	Water not observed while drilling.
15.0		END OF BORING					
		Boring then backfilled with auger cuttings					

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-04**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90801 LONGITUDE: -101.42926
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2087.7 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2087.0		SANDY LEAN CLAY (CL), dark brown, moist					
0.7		FAT CLAY (CH), trace Sand, brown, moist, A-7-6(49)				23	
						26	Bulk sample obtained from 2 to 15 feet
						24	
						28	
						28	
				AU		24	LL=61, PL=16, PI=45
						25	P200=99%
						24	OMC= 13%
						26	MDD= 116 pcf
						24	
						22	
						20	
						19	
2072.7						18	Water not observed while drilling.
15.0		END OF BORING					
		Boring then backfilled with auger cuttings					

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-05**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90565 LONGITUDE: -101.43042
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2083.5 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2083.0							
0.5		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL)					
		FAT CLAY (CH), trace Gravel, little Sand, brown, moist, A-7-6(37)				23	Bulk sample obtained from 2 to 15 feet
						19	
						19	
5						24	
						20	
						18	LL=54, PL=15, PI=39
				AU		20	P200=91%
						22	OMC= 14%
							MDD= 116 pcf
10						17	
						21	
						21	
						22	
						26	
2068.5							
15.0		END OF BORING				25	Water not observed while drilling.
		Boring then backfilled with auger cuttings					
20							
25							
30							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-06**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90644 LONGITUDE: -101.43042
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2096.3 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2095.1		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL)					
1.2		FAT CLAY (CH), little Sand, trace Gravel, brown, moist, A-7-6(37)				22	
						22	Bulk sample obtained from 2 to 15 feet
						20	
5						18	
						24	
				AU		25	LL=56, PL=15, PI=41
						24	P200=88%
						25	OMC= 14%
							MDD= 116 pcf
10						26	
						25	
						23	
						23	
						22	
2081.3							
15.0		END OF BORING				22	Water not observed while drilling.
		Boring then backfilled with auger cuttings					
20							
25							
30							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-07**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90723 LONGITUDE: -101.43042
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2103.0 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2102.2		SANDY LEAN CLAY with GRAVEL (CL), dark brown, moist (TOPSOIL)					
0.8		SANDY LEAN CLAY (CL), dark brown, moist, A-6(15)				17	
						17	Bulk sample obtained from 2 to 15 feet
						19	
5						21	
						19	
				AU		26	LL=39, PL=14, PI=25
						18	P200=69%
						21	OMC= 12%
							MDD= 120 pcf
10						19	
						18	
						20	
						18	
						24	
2088.0							
15.0		END OF BORING				23	Water not observed while drilling.
		Boring then backfilled with auger cuttings					
20							
25							
30							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-08**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90801 LONGITUDE: -101.43042
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2098.4 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2097.6		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL)					
0.8		FAT CLAY (CH), trace Sand, trace Gravel, brown, moist, A-7-6(37)				23	Bulk sample obtained from 2 to 15 feet
						21	
						20	
5						22	
						22	
				AU		21	LL=52, PL=16, PI=36
						20	P200=96%
						28	OMC= 13%
10						31	MDD= 118 pcf
						26	
						25	
						24	
2083.4						21	
15.0		END OF BORING				23	Water not observed while drilling.
15		Boring then backfilled with auger cuttings					
20							
25							
30							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-09**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90565 LONGITUDE: -101.43156
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2080.0 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2079.5							
0.5		SANDY LEAN CLAY (CL), very dark (TOPSOIL)					
		LEAN CLAY with SAND (CL), brown, moist, A-7-6(21)				22	Bulk sample obtained from 2 to 15 feet
						20	
						20	
5						20	
						21	
				AU		18	LL=42, PL=15, PI=27 P200=80% OMC= 12% MDD= 121 pcf
						17	
						19	
10						18	
						19	
						17	
						17	
						16	
2065.0							
15.0		END OF BORING				17	Water not observed while drilling.
		Boring then backfilled with auger cuttings					
20							
25							
30							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-10**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90644 LONGITUDE: -101.43156
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2096.5 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2095.7		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL)					
0.8		LEAN CLAY with SAND (CL), Gravel, brown, moist, A-6(17)				25	
						17	Bulk sample obtained from 2 to 15 feet
						17	
						18	
						19	
				AU		21	LL=39, PL=14, PI=25
						22	P200=76%
						31	OMC= 12%
						27	MDD= 120 pcf
						27	
						23	
						22	
						22	
2081.5						20	
15.0		END OF BORING					Water not observed while drilling.
		Boring then backfilled with auger cuttings					

5
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-11**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90723 LONGITUDE: -101.43156
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2101.3 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2100.6		SANDY LEAN CLAY (CL), dark brown, moist					
0.7		(TOPSOIL)					
		LEAN CLAY (CL), trace Sand, brown, moist, A-7-6(31)				13	Bulk sample obtained from 2 to 15 feet
						24	
						21	
5						19	
						20	
				AU		20	LL=46, PL=15, PI=31 P200=95% OMC= 12% MDD= 120 pcf
						17	
						16	
10						17	
						18	
						24	
						32	
						24	
2086.3						27	Water not observed while drilling.
15.0		END OF BORING					
		Boring then backfilled with auger cuttings					
20							
25							
30							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-12**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90801 LONGITUDE: -101.43156
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2102.2 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2101.0		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL)					
1.2		FAT CLAY (CH), Sand, brown, moist, A-7-6(36)				23	
						23	Bulk sample obtained from 2 to 15 feet
						21	
5						15	
						18	
						19	LL=51, PL=15, PI=36
				AU		22	P200=95%
						22	OMC= 13%
							MDD= 120 pcf
10						20	
						20	
						21	
						19	
						20	
2087.2							
15.0		END OF BORING				22	Water not observed while drilling.
		Boring then backfilled with auger cuttings					
20							
25							
30							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-13**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90565 LONGITUDE: -101.43270
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2078.3 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2077.5		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL)					
0.8		LEAN CLAY (CL), little Sand, brown, moist, iron oxide staining, A-7-6(31)				23	
						19	Bulk sample obtained from 2 to 15 feet
						16	
						15	
						21	
						23	LL=48, PL=15, PI=33
				AU		20	P200=91%
						19	OMC= 12%
						19	MDD= 119 pcf
						19	
						20	
						21	
						21	
2063.3							
15.0		END OF BORING				21	Water not observed while drilling.
		Boring then backfilled with auger cuttings					

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-14**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90644 LONGITUDE: -101.43270
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2089.1 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2087.9		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL)					
1.2		LEAN CLAY (CL), little Sand, brown, moist, A-7-6(32)				21	
						21	Bulk sample obtained from 2 to 15 feet
						24	
5						22	
						23	
				AU		22	LL=48, PL=16, PI=32
						22	P200=94%
						22	OMC= 13%
							MDD= 118 pcf
10						25	
						22	
						21	
						22	
						23	
2074.1							
15.0		END OF BORING				20	Water not observed while drilling.
15		Boring then backfilled with auger cuttings					
20							
25							
30							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-15**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90723 LONGITUDE: -101.43270
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2101.2 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2100.2		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL)					
1.0		FAT CLAY (CH), little Sand, brown, moist, A-7-6 (35)				17	
						12	Bulk sample obtained from 2 to 15 feet
						18	
5						21	
						21	
				AU		21	LL=51, PL=15, PI=36
						21	P200=93%
						18	OMC= 13%
10						18	MDD= 117 pcf
						20	
						23	
						25	
						25	
2086.2							
15.0		END OF BORING				27	Water not observed while drilling.
		Boring then backfilled with auger cuttings					
20							
25							
30							

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-16**
LOCATION:
DATUM: WGS 84
LATITUDE: 46.90801 LONGITUDE: -101.43270
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: A.Horner LOGGED BY: C.Yoder
SURFACE ELEVATION: 2099.7 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2098.2		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL)					
1.5		FAT CLAY (CH), trace Sand, brown, moist, A-7-6(37)				24	Bulk sample obtained from 2 to 15 feet
						20	
						18	
5						28	
						21	
				AU		20	LL=50, PL=15, PI=35
						23	P200=98%
						21	OMC= 14%
							MDD= 119 pcf
10						20	
						20	
						24	
						23	
						37	
2084.7							
15.0		END OF BORING				28	Water not observed while drilling.
		Boring then backfilled with auger cuttings					
20							
25							
30							

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Highway 31
New Salem, North Dakota

BORING: **B-17**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04661 LONGITUDE: -101.42530
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: J.Tatro LOGGED BY: C.Yoder
SURFACE ELEVATION: 2149.6 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2147.6		SANDY LEAN CLAY (CL), black, moist (TOPSOIL)					
2.0		FAT CLAY (CH), little Sand, dark brown to gray, moist, iron oxide staining, A-7-6(37)				26	
						26	Bulk sample obtained from 2 to 15 feet
						25	
5						23	
						23	
				AU		23	LL=55, PL=17, PI=38
						24	P200=92%
						24	OMC= 16%
							MDD= 112 pcf
10						24	
						24	
						21	
						19	
						18	
2134.6							
15.0		END OF BORING				19	Water not observed while drilling.
		Boring then backfilled with auger cuttings					
20							
25							
30							

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Highway 31
New Salem, North Dakota

BORING: **B-18**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04601 LONGITUDE: -101.42530
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: J.Tatro LOGGED BY: C.Yoder
SURFACE ELEVATION: 2163.8 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2163.7 0.1		SANDY LEAN CLAY (CL), black, moist (TOPSOIL)					
		FAT CLAY with SAND (CH), trace Gravel, brown, moist, A-7-6(37)				28 29 25	Bulk sample obtained from 2 to 15 feet
		Lignite seams from 6 to 7 feet		AU		22 26 31 23 24 21 22 21 20 21	LL=60, PL=18, PI=42 P200=85% OMC= 17% MDD= 108 pcf
2148.8 15.0		END OF BORING Boring then backfilled with auger cuttings				21	Water not observed while drilling.

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Highway 31
New Salem, North Dakota

BORING: **B-19**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04541 LONGITUDE: -101.42530
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: J.Tatro LOGGED BY: C.Yoder
SURFACE ELEVATION: 2163.6 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2162.9		SANDY LEAN CLAY (CL), black, moist					
0.7		FAT CLAY (CH), Sand, gray, moist, iron oxide staining, A-7-6(45)				30	
						30	Bulk sample obtained from 2 to 15 feet
						31	
						31	
						23	
				AU		22	LL=64, PL=20, PI=44
						21	P200=93%
						23	OMC= 17%
						24	MDD= 108 pcf
						23	
						21	
						21	
						23	
2148.6						22	
15.0		END OF BORING					Water not observed while drilling.
		Boring then backfilled with auger cuttings					

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Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-20**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04481 LONGITUDE: -101.42530
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: J.Tatro LOGGED BY: C.Yoder
SURFACE ELEVATION: 2170.2 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2169.7		SANDY LEAN CLAY (CL), black, moist					
0.5		(TOPSOIL)					
		LEAN CLAY with SAND (CL), brown, moist, A-7-6(17)				19	
						19	Bulk sample obtained from 2 to 15 feet
						18	
						19	
						25	
				AU		27	LL=42, PL=15, PI=27
						31	P200=71%
						29	OMC= 13%
						25	MDD= 117 pcf
						24	
						22	
						22	
						21	
2155.2							
15.0		END OF BORING				20	Water not observed while drilling.
		Boring then backfilled with auger cuttings					

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Project Number B2304521
Geotechnical Evaluation
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Highway 31
New Salem, North Dakota

BORING: **B-21**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04420 LONGITUDE: -101.42530
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: J.Tatro LOGGED BY: C.Yoder
SURFACE ELEVATION: 2163.7 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
~~2163.4~~ 0.3		SANDY LEAN CLAY (CL), black, moist (TOPSOIL)					
		LEAN CLAY with SAND (CL), brown and gray, moist, A-7-6(21)				23	
						27	Bulk sample obtained from 2 to 15 feet
						29	
5						27	
						21	
				AU		24	LL=45, PL=15, PI=30
						25	P200=76%
						24	OMC= 13% MDD= 119 pcf
10						26	
						25	
						26	
						67	
						67	
2148.7 15.0		END OF BORING				61	Water not observed while drilling.
		Boring then backfilled with auger cuttings					
20							
25							
30							

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Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-22**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04360 LONGITUDE: -101.42530
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: J.Tatro LOGGED BY: C.Yoder
SURFACE ELEVATION: 2154.3 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2153.6		SANDY LEAN CLAY (CL), black, moist					
0.7		(TOPSOIL)					
		SANDY LEAN CLAY (CL), brown, moist, A-6 (10)				13	
						9	Bulk sample obtained from 2 to 15 feet
						9	
						11	
						28	
				AU		26	LL=37, PL=15, PI=22
						23	P200=59%
						24	OMC= 13%
						24	MDD= 121 pcf
						26	
						23	
						24	
						24	
2139.3						22	
15.0		END OF BORING					Water not observed while drilling.
		Boring then backfilled with auger cuttings					

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Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-23**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04300 LONGITUDE: -101.42530
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: J.Tatro LOGGED BY: C.Yoder
SURFACE ELEVATION: 2148.8 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2148.1		SANDY LEAN CLAY (CL), black, moist					
0.7		(TOPSOIL)					
		LEAN CLAY with SAND (CL), brown, moist, A-7-6(21)				23	Bulk sample obtained from 2 to 15 feet
						19	
						23	
						17	
						21	
				AU		21	LL=45, PL=14, PI=31
						22	P200=73%
						25	OMC= 13%
						20	MDD= 119 pcf
						17	
						11	
						13	
						10	
2133.8						13	Water not observed while drilling.
15.0		END OF BORING					
		Boring then backfilled with auger cuttings					

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Project Number B2304521
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Highway 31
New Salem, North Dakota

BORING: **B-24**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04661 LONGITUDE: -101.42429
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: J.Tatro LOGGED BY: C.Yoder
SURFACE ELEVATION: 2146.1 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2144.1		SANDY LEAN CLAY (CL), black, moist (TOPSOIL)				28	
2.0		LEAN CLAY with SAND (CL), brown, moist, A-7-6(23)				20	Bulk sample obtained from 2 to 15 feet
						18	
			5			18	
						19	
				AU		21	LL=44, PL=14, PI=30
						23	P200=79%
						23	OMC= 12% MDD= 119 pcf
			10			23	
						22	
						25	
						25	
						26	
2131.1			15			27	Water not observed while drilling.
15.0		END OF BORING Boring then backfilled with auger cuttings					
			20				
			25				
			30				

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Project Number B2304521
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Highway 31
New Salem, North Dakota

BORING: **B-25**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04601 LONGITUDE: -101.42429
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: J.Tatro LOGGED BY: C.Yoder
SURFACE ELEVATION: 2158.6 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
~~2158.3~~ 0.4		SANDY LEAN CLAY (CL), dark brown, moist (TOPSOIL)					
		FAT CLAY (CH), Sand, brown and gray, moist, iron oxide staining, A-7-6(39)				21	Bulk sample obtained from 2 to 15 feet
						20	
						18	
5						20	
						22	
				AU		22	LL=53, PL=16, PI=37 P200=97% OMC= 16% MDD= 113 pcf
						22	
						24	
10						26	
						25	
						23	
						24	
						26	
2143.6 15.0		END OF BORING				35	Water not observed while drilling.
15							
		Boring then backfilled with auger cuttings					
20							
25							
30							

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Project Number B2304521
Geotechnical Evaluation
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, North Dakota

BORING: **B-26**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04541 LONGITUDE: -101.42429
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: J.Tatro LOGGED BY: C.Yoder
SURFACE ELEVATION: 2143.1 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2142.3		SANDY LEAN CLAY (CL), black, moist					
0.8		(TOPSOIL)					
		FAT CLAY with SAND (CH), brown, moist, A-7-6(33)				20	Bulk sample obtained from 2 to 15 feet
						19	
						22	
5						25	
						25	
				AU		24	LL=54, PL=15, PI=39
						25	P200=84%
						26	OMC= 14%
							MDD= 115 pcf
10						26	
						26	
						23	
						26	
						26	
2128.1							
15.0		END OF BORING				26	Water not observed while drilling.
		Boring then backfilled with auger cuttings					
20							
25							
30							

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Project Number B2304521
Geotechnical Evaluation
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Highway 31
New Salem, North Dakota

BORING: **B-27**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04481 LONGITUDE: -101.42429
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: J.Tatro LOGGED BY: C.Yoder
SURFACE ELEVATION: 2146.2 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2145.5		SANDY LEAN CLAY (CL), black, moist					
0.7		(TOPSOIL)					
		FAT CLAY (CH), trace Sand, brown, moist, A-7-6(47)				25	
						24	Bulk sample obtained from 2 to 15 feet
						23	
						26	
						26	
						26	LL=61, PL=16, PI=45
				AU		26	P200=96%
						26	OMC= 15%
						26	MDD= 116 pcf
						25	
						25	
						25	
						25	
2131.2							
15.0		END OF BORING				26	Water not observed while drilling.
		Boring then backfilled with auger cuttings					

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Project Number B2304521
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Highway 31
New Salem, North Dakota

BORING: **B-28**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04420 LONGITUDE: -101.42429
START DATE: 02/28/24 END DATE: 02/28/24
DRILLER: J.Tatro LOGGED BY: C.Yoder
SURFACE ELEVATION: 2152.7 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2151.8		SANDY LEAN CLAY (CL), black, moist (TOPSOIL)					
0.9		FAT CLAY (CH), trace Sand, brown and gray, moist, A-7-6(60)				24	
						38	Bulk sample obtained from 2 to 15 feet
						39	
						25	
						27	
				AU		26	LL=74, PL=20, PI=54
						26	P200=99%
						25	OMC= 18%
						25	MDD= 108 pcf
						24	
						24	
						24	
						24	
2137.7						23	Water not observed while drilling.
15.0		END OF BORING					
		Boring then backfilled with auger cuttings					

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Highway 31
New Salem, North Dakota

BORING: **B-29**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04360 LONGITUDE: -101.42429

DRILLER: J.Tatro | LOGGED BY: C.Yoder | START DATE: 02/28/24 | END DATE: 02/28/24
SURFACE ELEVATION: 2154.2 ft | RIG: 7521 | METHOD: 3 1/4" HSA | SURFACING: Stubble | WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
~~2153.9~~ 0.3		SANDY LEAN CLAY (CL), black, moist (TOPSOIL)					
		FAT CLAY (CH), trace Sand, brown, moist, A-7-6(57)				32	
						31	Bulk sample obtained from 2 to 15 feet
						31	
5						32	
						27	
				AU		24	LL=71, PL=18, PI=53
						28	P200=97%
						22	OMC= 17%
10						23	MDD= 109 pcf
						23	
						24	
						24	
						24	
2139.2 15.0		END OF BORING				24	Water not observed while drilling.
		Boring then backfilled with auger cuttings					
20							
25							
30							

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Project Number B2304521
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Highway 31
New Salem, North Dakota

BORING: **B-30**
LOCATION:
DATUM: WGS 84
LATITUDE: 47.04300 LONGITUDE: -101.42429
START DATE: 02/29/24 END DATE: 02/29/24
DRILLER: J.Tatro LOGGED BY: C.Yoder
SURFACE ELEVATION: 2147.7 ft RIG: 7521 METHOD: 3 1/4" HSA
SURFACING: Stubble WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
2147.1		SANDY LEAN CLAY (CL), black, moist					
0.6		(TOPSOIL)					
		LEAN CLAY with SAND (CL), brown, moist, A-7-6(23)				17	Bulk sample obtained from 2 to 15 feet
						18	
						19	
						20	
						26	
				AU		25	LL=46, PL=15, PI=31
						26	P200=78%
						27	OMC= 12%
						29	MDD= 117 pcf
						29	
						27	
						29	
						31	
2132.7						31	Water not observed while drilling.
15.0		END OF BORING					
		Boring then backfilled with auger cuttings					

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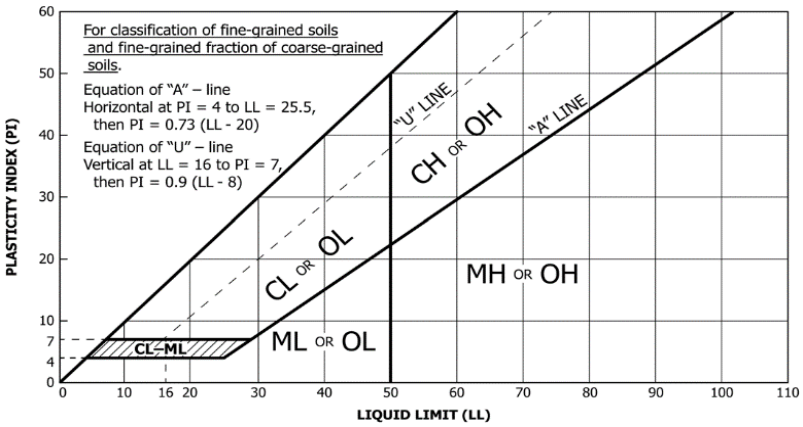
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Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(Unified Soil Classification System)

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

A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
N. PI ≥ 4 and plots on or above "A" line.
O. PI < 4 or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
  Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
  Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions[L, M]

trace..... 0 to 5%
little..... 6 to 14%
with..... ≥ 15%

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft	0 to 1 BPF	< 0.25 tsf
Soft	2 to 4 BPF	0.25 to 0.5 tsf
Medium	5 to 8 BPF	0.5 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (▼).

Laboratory Tests

DD	Dry density, pcf	**OC**	Organic content, %	**LL**	Liquid limit
WD	Wet density, pcf	**q_p**	Pocket penetrometer strength, tsf	**PL**	Plastic limit
P200	% Passing #200 sieve	**MC**	Moisture content, %	**PI**	Plasticity index
		q_U	Unconfined compression test, tsf		

DRAFT

Hydrometer And Sieve Analysis

ASTM D7928

02/14/2024

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Suite 3
Bismarck, ND 58504
Phone: 701-255-7180

Client:

SRF Consulting Group, Inc.
3701 Wayzata Boulevard
Suite 100
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Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

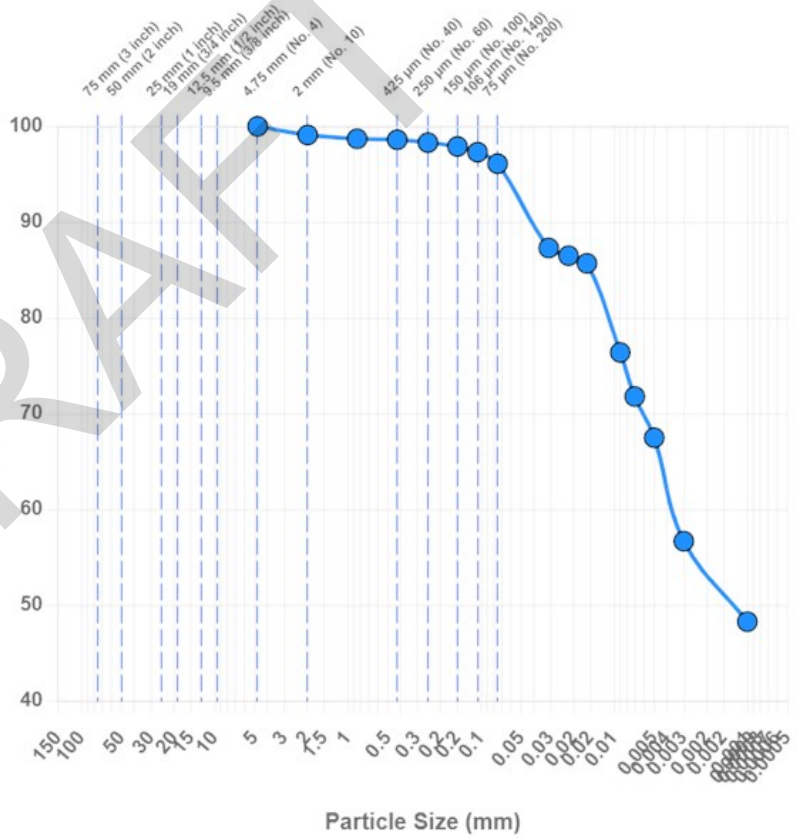
Sample Information

Sample Number: 577226
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-01
Location Details: Boring B-01
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/09/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	99.1	-
850 µm (No. 20)	98.7	-
425 µm (No. 40)	98.6	-
250 µm (No. 60)	98.3	-
150 µm (No. 100)	97.9	-
106 µm (No. 140)	97.3	-
75 µm (No. 200)	96.1	-
31.4 (µm)	87.3	-
22.3 (µm)	86.5	-
15.9 (µm)	85.7	-
8.9 (µm)	76.4	-
6.5 (µm)	71.8	-
4.8 (µm)	67.5	-
2.6 (µm)	56.7	-
1.1 (µm)	48.3	-



Soil Classification: CH Fat Clay, Brown, A-7-6(24)

Gravel (%): 0.0 **Sand (%):** 3.9 **Silt (%):** 28.6 **Clay (%):** 67.5

D_{60} (µm): 3.611

General

LL=60, PL=17, PI=43

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Sample Information

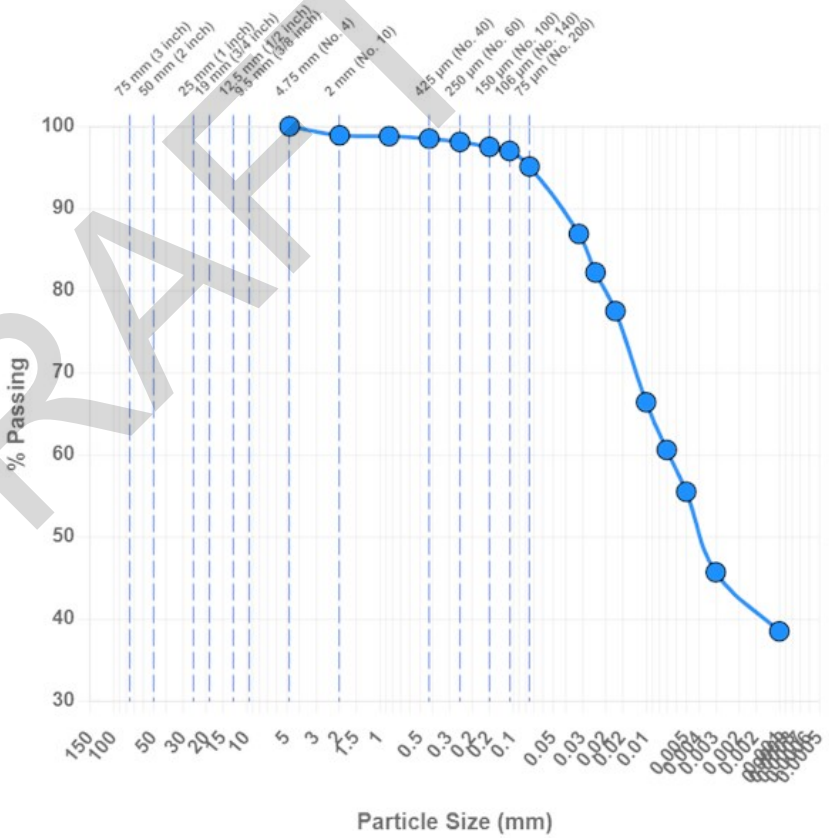
Sample Number: 577228
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-02
Location Details: Boring B-02
Sample Date: 01/22/2024
Received Date: 01/23/2024
Tested Date: 02/09/2024

Depth (ft): 2'-15'
Sampled By: Drill Crew
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	98.9	-
850 µm (No. 20)	98.8	-
425 µm (No. 40)	98.5	-
250 µm (No. 60)	98.1	-
150 µm (No. 100)	97.5	-
106 µm (No. 140)	97.0	-
75 µm (No. 200)	95.1	-
31.9 (µm)	86.9	-
23.5 (µm)	82.2	-
17.3 (µm)	77.5	-
9.7 (µm)	66.4	-
7.1 (µm)	60.6	-
5.2 (µm)	55.5	-
2.7 (µm)	45.7	-
1.2 (µm)	38.5	-



Soil Classification: CH Fat Clay, Brown, A-7-6(37)

Gravel (%): 0.0 **Sand (%):** 4.9 **Silt (%):** 39.6 **Clay (%):** 55.5

D_{60} (µm): 6.765

General

LL=51, PL=14, PI=37

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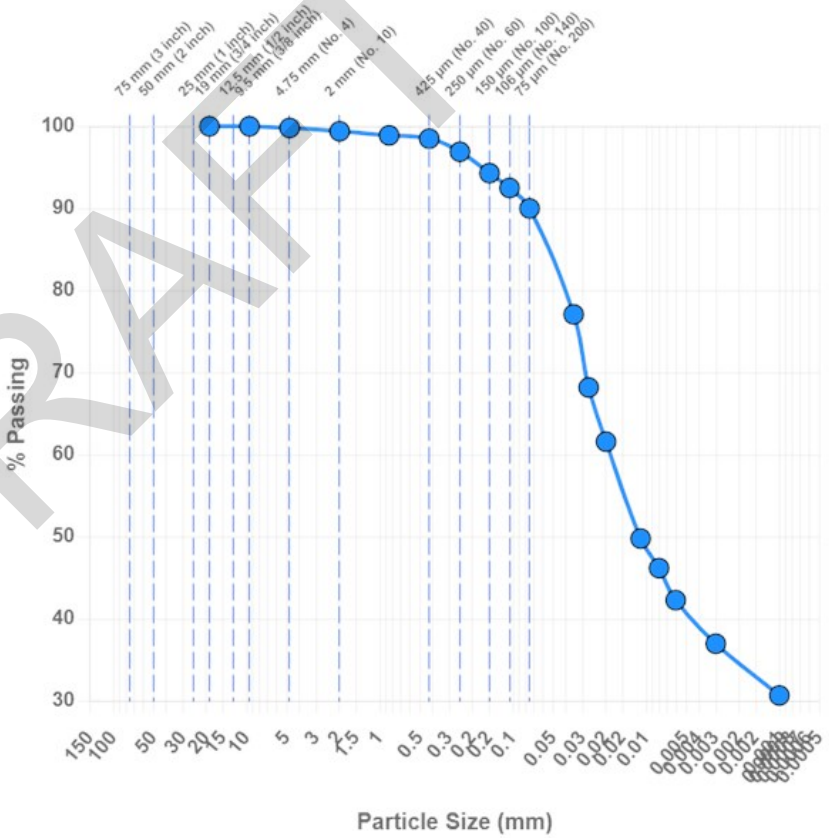
Sample Number: 577229
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-03
Location Details: Boring B-03
Sample Date: 01/22/2024
Received Date: 01/23/2024
Tested Date: 02/09/2024

Depth (ft): 2'-15'
Sampled By: Drill Crew
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	100.0	-
4.75 mm (No. 4)	99.8	-
2 mm (No. 10)	99.4	-
850 µm (No. 20)	98.9	-
425 µm (No. 40)	98.5	-
250 µm (No. 60)	96.9	-
150 µm (No. 100)	94.3	-
106 µm (No. 140)	92.5	-
75 µm (No. 200)	90.0	-
35.4 (µm)	77.1	-
26.6 (µm)	68.2	-
19.6 (µm)	61.6	-
10.8 (µm)	49.8	-
7.8 (µm)	46.2	-
5.6 (µm)	42.3	-
2.9 (µm)	37.0	-
1.2 (µm)	30.7	-



Soil Classification: CL Lean clay, Brown, A-7-6(25)

Gravel (%): 0.2 **Sand (%):** 9.8 **Silt (%):** 49.5 **Clay (%):** 40.5

D_{60} (µm): 18.780

General

LL=43, PL=15, PI=28

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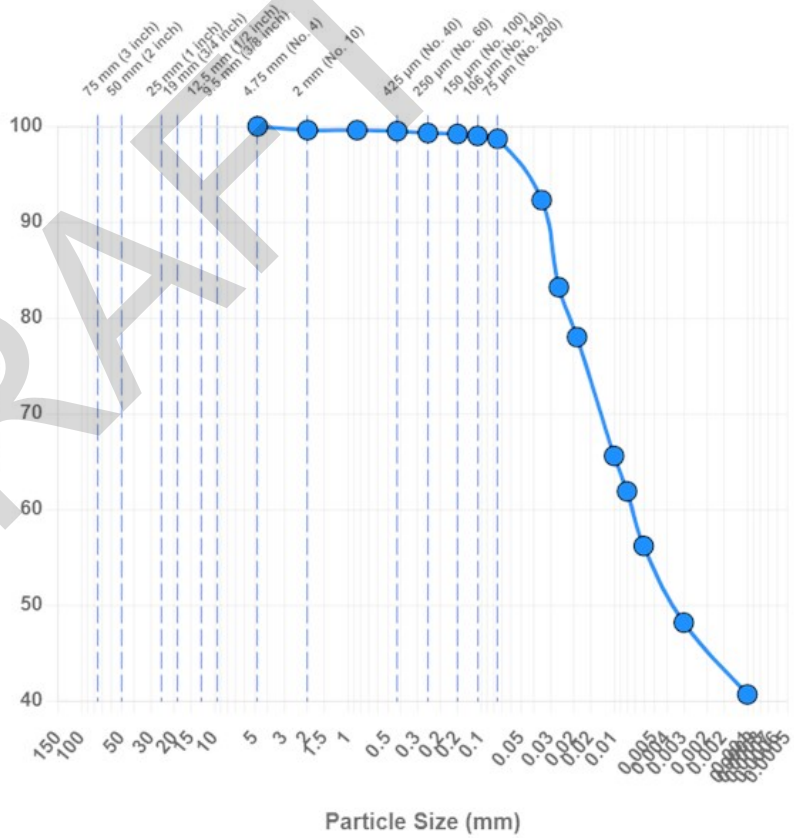
Sample Information

Sample Number: 577230
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-04
Location Details: Boring B-04
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/09/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	99.6	-
850 µm (No. 20)	99.6	-
425 µm (No. 40)	99.5	-
250 µm (No. 60)	99.3	-
150 µm (No. 100)	99.2	-
106 µm (No. 140)	99.0	-
75 µm (No. 200)	98.7	-
34.9 (µm)	92.3	-
26.1 (µm)	83.2	-
19.0 (µm)	78.0	-
10.4 (µm)	65.6	-
7.5 (µm)	61.9	-
5.5 (µm)	56.2	-
2.8 (µm)	48.2	-
1.2 (µm)	40.7	-



Soil Classification: CH Fat Clay, Brown, A-7-6(49)

Gravel (%): 0.0 **Sand (%):** 1.3 **Silt (%):** 45.2 **Clay (%):** 53.5

D_{60} (µm): 7.333

General

LL=61, PL=16, PI=45

DRAFT

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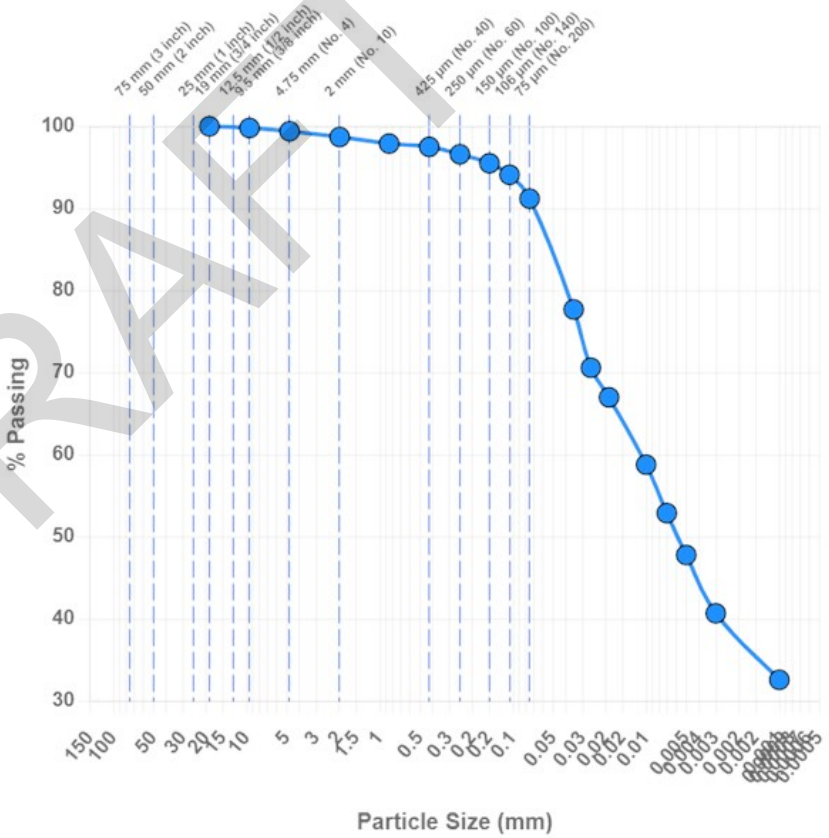
Sample Information

Sample Number: 577232
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-05
Location Details: Boring B-05
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	99.8	-
4.75 mm (No. 4)	99.4	-
2 mm (No. 10)	98.7	-
850 µm (No. 20)	97.9	-
425 µm (No. 40)	97.5	-
250 µm (No. 60)	96.6	-
150 µm (No. 100)	95.5	-
106 µm (No. 140)	94.1	-
75 µm (No. 200)	91.2	-
34.5 (µm)	77.7	-
25.8 (µm)	70.6	-
18.7 (µm)	67.0	-
10.2 (µm)	58.8	-
7.4 (µm)	52.9	-
5.4 (µm)	47.8	-
2.8 (µm)	40.7	-
1.2 (µm)	32.6	-



Soil Classification: CH Fat Clay, Brown, A-7-6(37)

Gravel (%): 0.6 **Sand (%):** 8.2 **Silt (%):** 43.4 **Clay (%):** 47.8

D_{60} (µm): 11.317

General

LL=54, PL=15, PI=39

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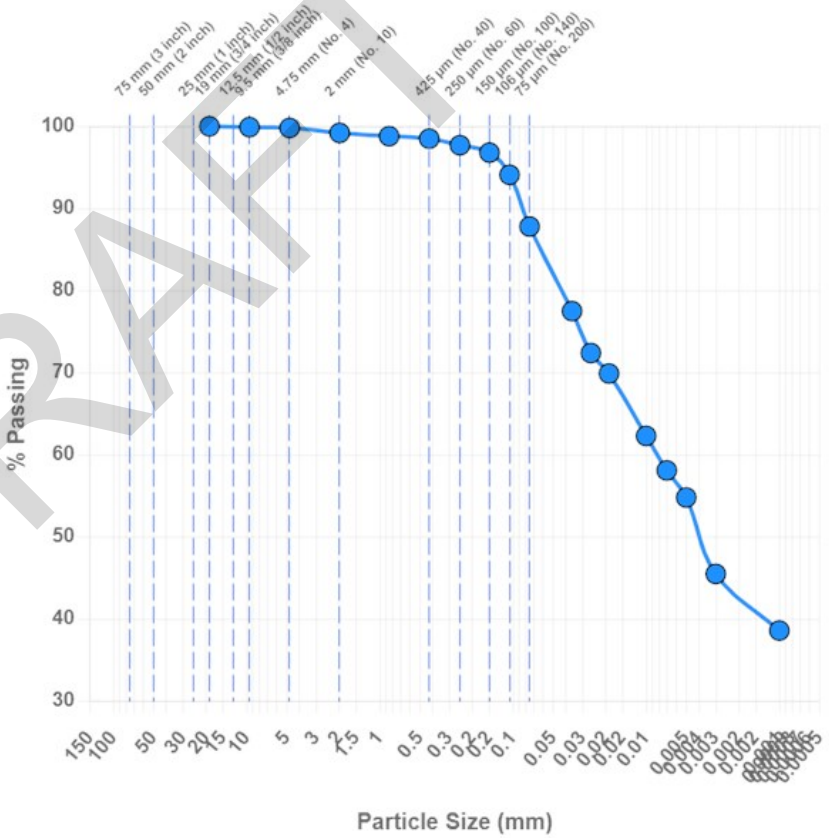
Sample Information

Sample Number: 577233
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-06
Location Details: Boring B-06
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	99.9	-
4.75 mm (No. 4)	99.8	-
2 mm (No. 10)	99.2	-
850 µm (No. 20)	98.8	-
425 µm (No. 40)	98.5	-
250 µm (No. 60)	97.7	-
150 µm (No. 100)	96.8	-
106 µm (No. 140)	94.1	-
75 µm (No. 200)	87.8	-
36.0 (µm)	77.5	-
26.3 (µm)	72.4	-
18.9 (µm)	69.9	-
10.2 (µm)	62.3	-
7.4 (µm)	58.1	-
5.3 (µm)	54.8	-
2.8 (µm)	45.5	-
1.2 (µm)	38.6	-



Soil Classification: CH Fat Clay, Brown, A-7-6(37)

Gravel (%): 0.2 **Sand (%):** 12.0 **Silt (%):** 33.0 **Clay (%):** 54.8

D_{60} (µm): 8.357

General

LL=56, PL=15, PI=41

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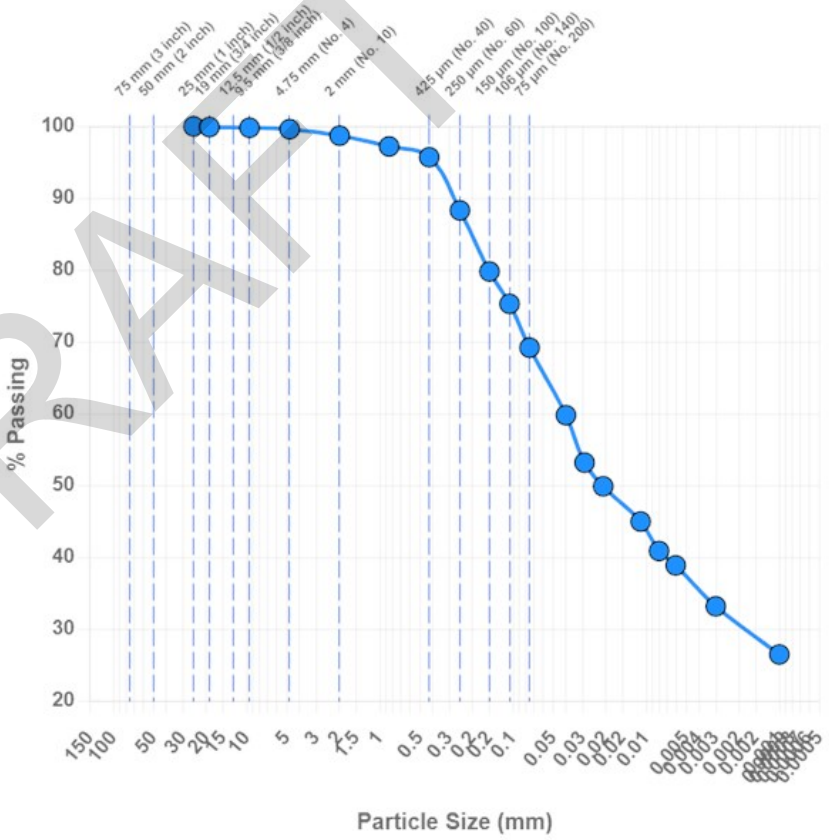
Sample Number: 577234
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-07
Location Details: Boring B-07
Sample Date: 01/22/2024
Received Date: 01/23/2024
Tested Date: 02/12/2024

Depth (ft): 2'-15'
Sampled By: Drill Crew
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
25 mm (1 inch)	100.0	-
19 mm (3/4 inch)	99.9	-
9.5 mm (3/8 inch)	99.8	-
4.75 mm (No. 4)	99.6	-
2 mm (No. 10)	98.7	-
850 µm (No. 20)	97.2	-
425 µm (No. 40)	95.7	-
250 µm (No. 60)	88.3	-
150 µm (No. 100)	79.8	-
106 µm (No. 140)	75.3	-
75 µm (No. 200)	69.2	-
39.7 (µm)	59.8	-
29.1 (µm)	53.2	-
21.0 (µm)	49.9	-
11.1 (µm)	45.0	-
8.0 (µm)	40.9	-
5.7 (µm)	38.9	-
2.9 (µm)	33.2	-
1.2 (µm)	26.5	-



Soil Classification: CL Sandy lean clay, Dark Brown, A-6(15)

Gravel (%): 0.4 **Sand (%):** 30.4 **Silt (%):** 32.2 **Clay(%):** 37.0

D_{60} (µm): 40.745 **D_{30} (µm):** 2.045

General

LL=39, PL=14, PI=25

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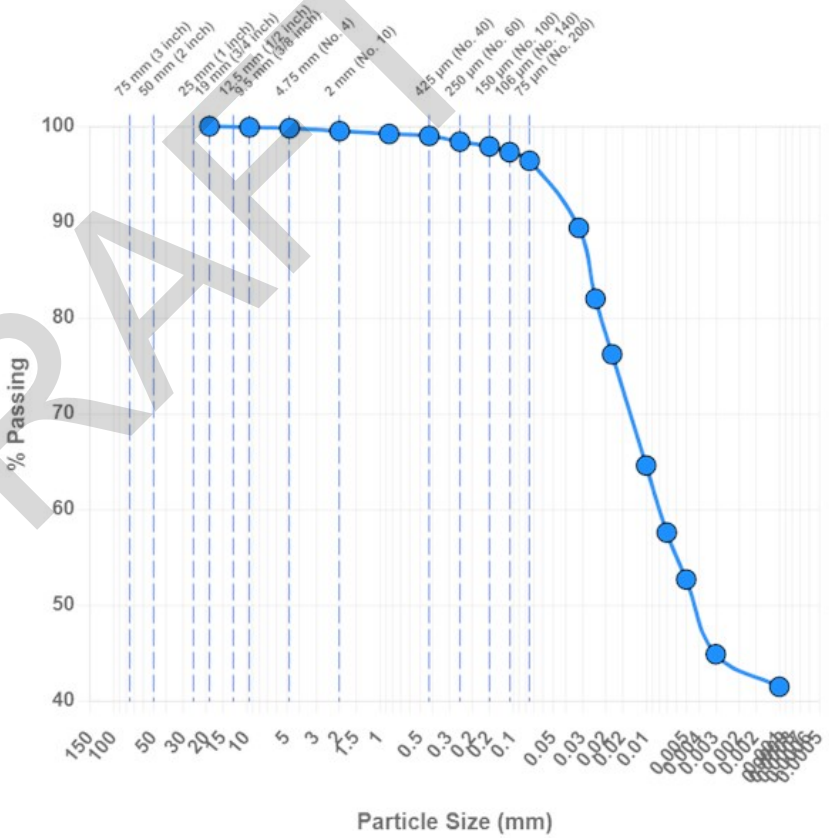
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Sampling Method: Auger Boring ASTM D1452
Boring Number: B-08
Location Details: Boring B-08
Sample Date: 01/22/2024
Received Date: 01/23/2024
Tested Date: 02/12/2024

Depth (ft): 2'-15'
Sampled By: Drill Crew
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	99.9	-
4.75 mm (No. 4)	99.8	-
2 mm (No. 10)	99.5	-
850 µm (No. 20)	99.2	-
425 µm (No. 40)	99.0	-
250 µm (No. 60)	98.4	-
150 µm (No. 100)	97.9	-
106 µm (No. 140)	97.3	-
75 µm (No. 200)	96.4	-
32.3 (µm)	89.4	-
24.3 (µm)	82.0	-
17.9 (µm)	76.2	-
10.0 (µm)	64.6	-
7.3 (µm)	57.6	-
5.3 (µm)	52.7	-
2.8 (µm)	44.9	-
1.2 (µm)	41.5	-



Soil Classification: CH Fat Clay, Brown, A-7-6(37)

Gravel (%): 0.2 **Sand (%):** 3.4 **Silt (%):** 43.7 **Clay (%):** 52.7

D_{60} (µm): 8.029

General

LL=52, PL=16, PI=36

DRAFT

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Hydrometer And Sieve Analysis

ASTM D7928

02/14/2024

2908 Morrison Ave.
Suite 3
Bismarck, ND 58504
Phone: 701-255-7180

Client:

SRF Consulting Group, Inc.
3701 Wayzata Boulevard
Suite 100
Minneapolis, MN 55416

Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

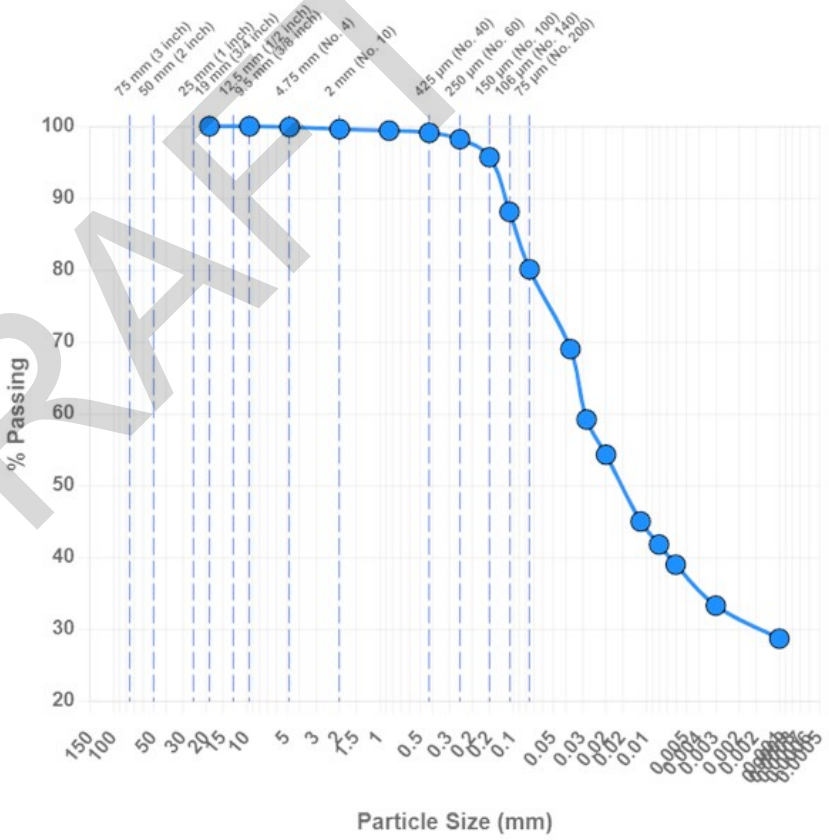
Sample Information

Sample Number: 577236
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-09
Location Details: Boring B-09
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	100.0	-
4.75 mm (No. 4)	99.9	-
2 mm (No. 10)	99.6	-
850 µm (No. 20)	99.4	-
425 µm (No. 40)	99.1	-
250 µm (No. 60)	98.2	-
150 µm (No. 100)	95.7	-
106 µm (No. 140)	88.1	-
75 µm (No. 200)	80.1	-
37.3 (µm)	69.0	-
28.0 (µm)	59.2	-
20.4 (µm)	54.3	-
11.1 (µm)	45.0	-
7.9 (µm)	41.8	-
5.7 (µm)	39.0	-
2.9 (µm)	33.3	-
1.2 (µm)	28.7	-



Soil Classification: CL Lean clay with sand, Brown, A-7-6(21)

Gravel (%): 0.1 **Sand (%):** 19.8 **Silt (%):** 43.0 **Clay(%):** 37.1

D_{60} (µm): 28.735 **D_{30} (µm):** 1.565

General

LL=42, PL=15, PI=27

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Sample Information

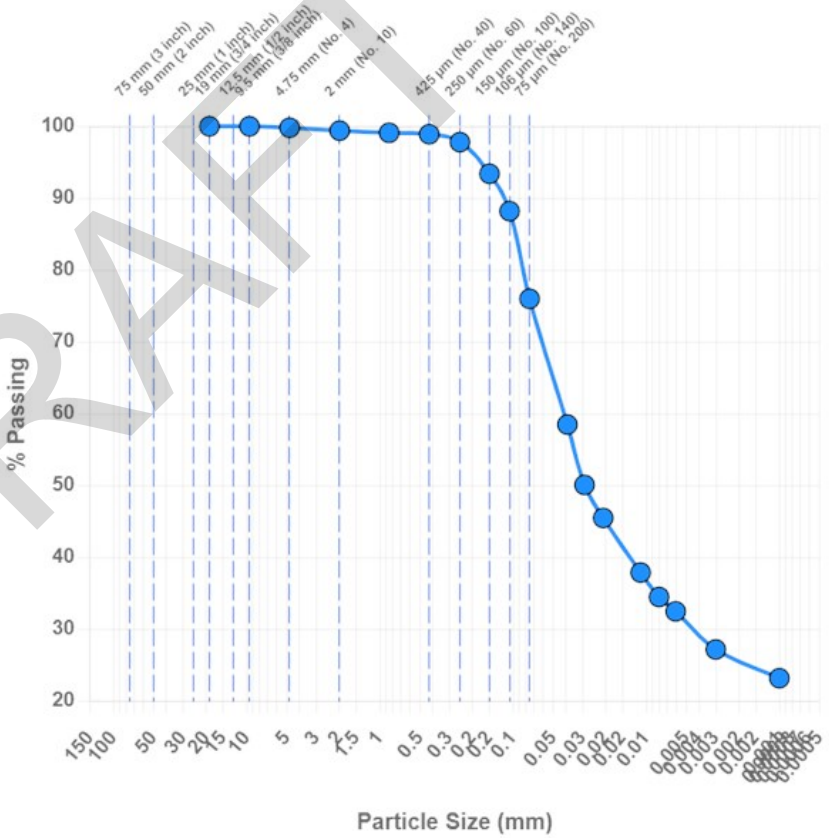
Sample Number: 577237
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-10
Location Details: Boring B-10
Sample Date: 01/22/2024
Received Date: 01/23/2024
Tested Date: 02/12/2024

Depth (ft): 2'-15'
Sampled By: Drill Crew
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	100.0	-
4.75 mm (No. 4)	99.8	-
2 mm (No. 10)	99.4	-
850 µm (No. 20)	99.1	-
425 µm (No. 40)	98.9	-
250 µm (No. 60)	97.8	-
150 µm (No. 100)	93.4	-
106 µm (No. 140)	88.2	-
75 µm (No. 200)	76.0	-
39.1 (µm)	58.5	-
29.1 (µm)	50.1	-
21.1 (µm)	45.5	-
11.4 (µm)	37.9	-
8.2 (µm)	34.5	-
5.8 (µm)	32.5	-
3.0 (µm)	27.2	-
1.2 (µm)	23.2	-



Soil Classification: CL Lean clay with sand, Brown, A-6(17)

Gravel (%): 0.2 **Sand (%):** 23.8 **Silt (%):** 45.3 **Clay(%):** 30.7

D_{60} (µm): 42.086 **D_{30} (µm):** 4.585

General

LL=39, PL=14, PI=25

DRAFT

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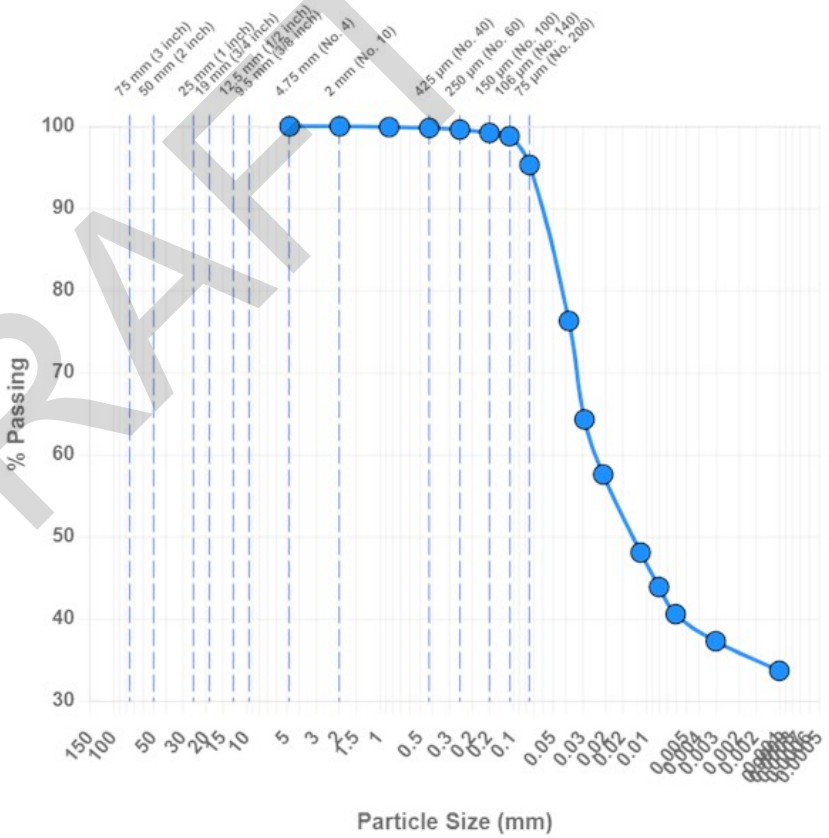
Sample Number: 577238
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-11
Location Details: Boring B-11
Sample Date: 01/22/2024
Received Date: 01/23/2024
Tested Date: 02/12/2024

Depth (ft): 2'-15'
Sampled By: Drill Crew
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	100.0	-
850 µm (No. 20)	99.9	-
425 µm (No. 40)	99.8	-
250 µm (No. 60)	99.6	-
150 µm (No. 100)	99.2	-
106 µm (No. 140)	98.8	-
75 µm (No. 200)	95.3	-
38.4 (µm)	76.3	-
28.8 (µm)	64.3	-
21.0 (µm)	57.6	-
11.3 (µm)	48.1	-
8.1 (µm)	43.9	-
5.8 (µm)	40.6	-
2.9 (µm)	37.3	-
1.2 (µm)	33.7	-



Soil Classification: CL Lean clay, Brown, A-7-6(31)

Gravel (%): 0.0 **Sand (%):** 4.7 **Silt (%):** 55.8 **Clay (%):** 39.5

D_{60} (µm): 23.866

General

LL=46, PL=15, PI=31

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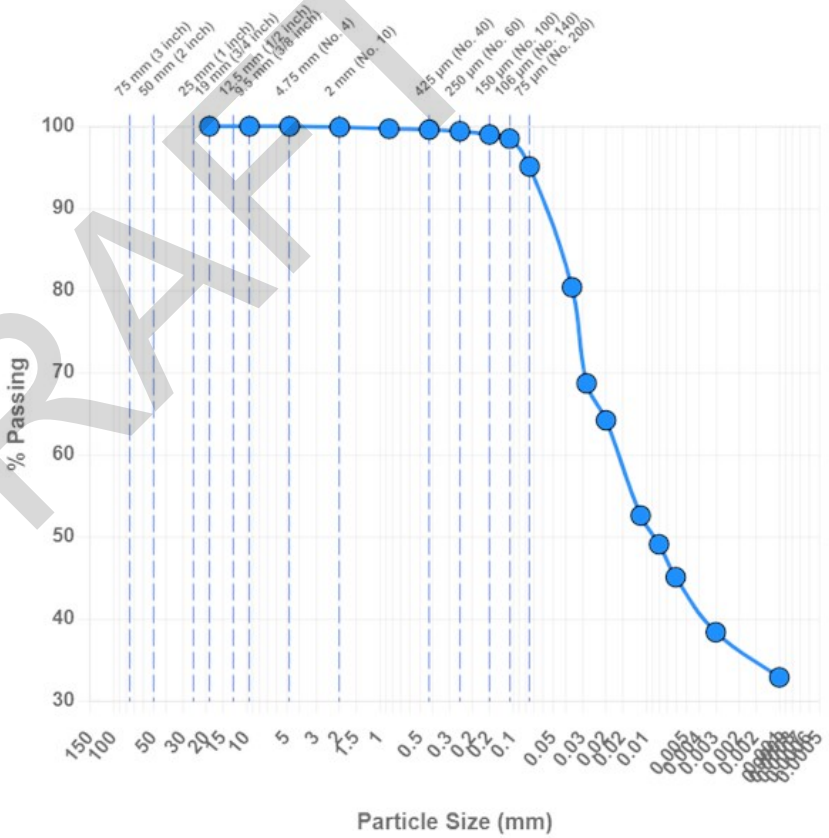
Sample Information

Sample Number: 577239
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-12
Location Details: Boring B-12
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	100.0	-
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	99.9	-
850 µm (No. 20)	99.7	-
425 µm (No. 40)	99.6	-
250 µm (No. 60)	99.4	-
150 µm (No. 100)	99.0	-
106 µm (No. 140)	98.5	-
75 µm (No. 200)	95.1	-
36.4 (µm)	80.4	-
27.6 (µm)	68.7	-
20.0 (µm)	64.2	-
10.9 (µm)	52.6	-
7.8 (µm)	49.1	-
5.6 (µm)	45.1	-
2.9 (µm)	38.4	-
1.2 (µm)	32.9	-



Soil Classification: CH Fat Clay, Brown, A-7-6(36)

Gravel (%): 0.0 **Sand (%):** 4.9 **Silt (%):** 52.2 **Clay (%):** 42.9

D_{60} (µm): 16.741

General

LL=51, PL=15, PI=36

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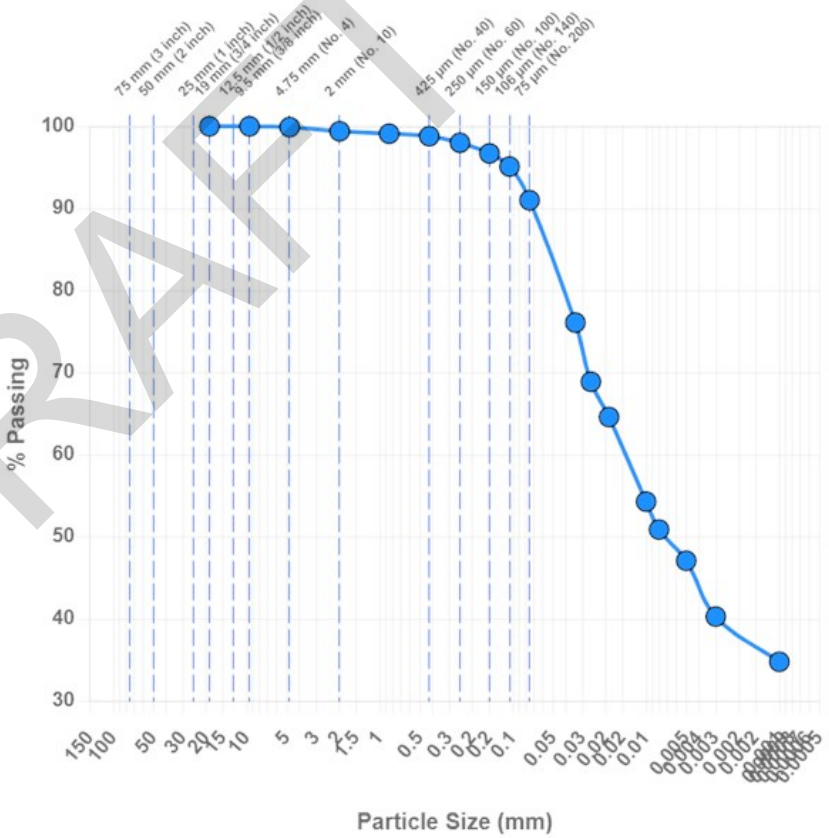
Sample Information

Sample Number: 577240
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-13
Location Details: Boring B-13
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	100.0	-
4.75 mm (No. 4)	99.9	-
2 mm (No. 10)	99.4	-
850 µm (No. 20)	99.1	-
425 µm (No. 40)	98.8	-
250 µm (No. 60)	98.0	-
150 µm (No. 100)	96.7	-
106 µm (No. 140)	95.1	-
75 µm (No. 200)	91.0	-
34.4 (µm)	76.1	-
25.7 (µm)	68.9	-
18.8 (µm)	64.6	-
10.4 (µm)	54.3	-
7.5 (µm)	50.9	-
5.4 (µm)	47.1	-
2.8 (µm)	40.3	-
1.2 (µm)	34.8	-



Soil Classification: CL Lean clay, Brown, A-7-6(31)

Gravel (%): 0.1 **Sand (%):** 8.9 **Silt (%):** 43.9 **Clay (%):** 47.1

D_{60} (µm): 14.981

General

LL=48, PL=15, PI=33

DRAFT

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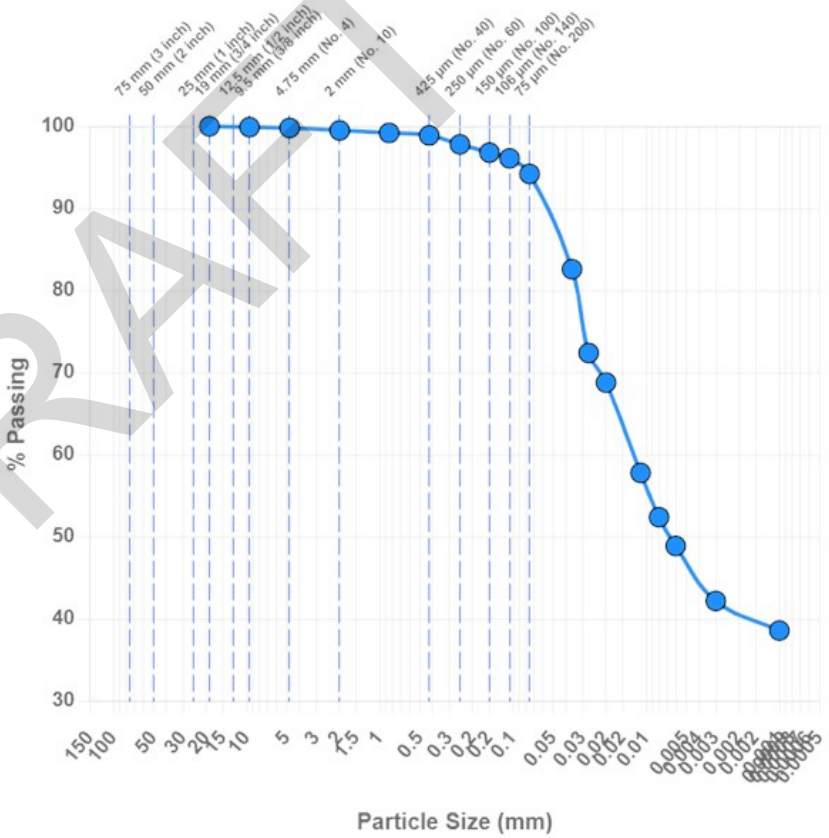
Sample Information

Sample Number: 577242
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-14
Location Details: Boring B-14
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	99.9	-
4.75 mm (No. 4)	99.8	-
2 mm (No. 10)	99.5	-
850 µm (No. 20)	99.2	-
425 µm (No. 40)	98.9	-
250 µm (No. 60)	97.8	-
150 µm (No. 100)	96.8	-
106 µm (No. 140)	96.1	-
75 µm (No. 200)	94.2	-
36.0 (µm)	82.6	-
27.1 (µm)	72.4	-
19.5 (µm)	68.8	-
10.7 (µm)	57.8	-
7.7 (µm)	52.4	-
5.6 (µm)	48.9	-
2.9 (µm)	42.2	-
1.2 (µm)	38.6	-



Soil Classification: CL Lean clay, Brown, A-7-6(32)

Gravel (%): 0.2 **Sand (%):** 5.6 **Silt (%):** 47.5 **Clay (%):** 46.7

D_{60} (µm): 12.800

General

LL=48, PL=16, PI=32

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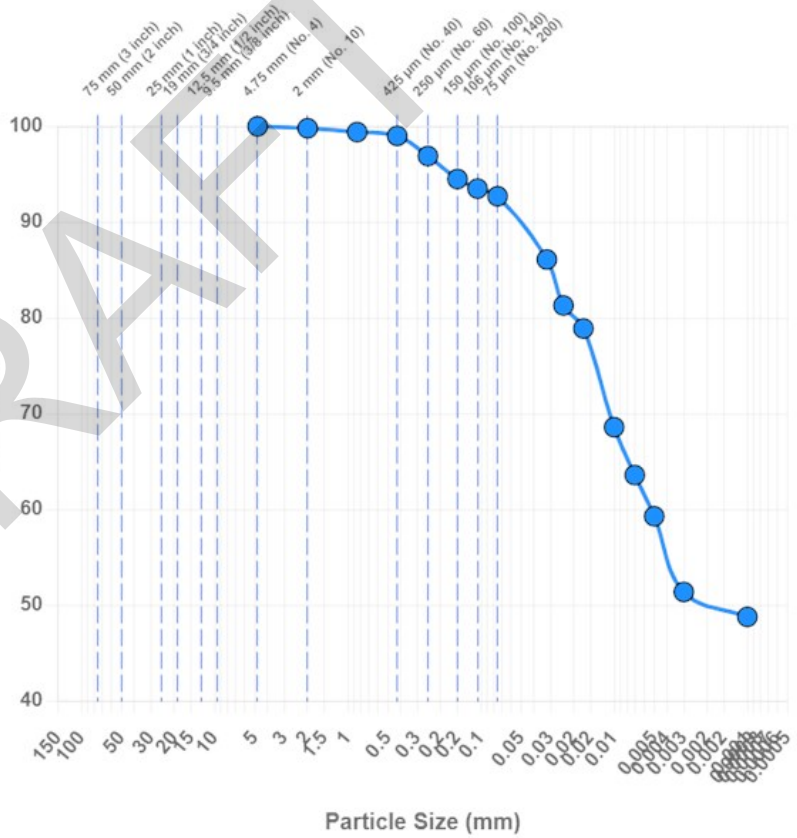
Sample Information

Sample Number: 577244
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-15
Location Details: Boring B-15
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	99.8	-
850 µm (No. 20)	99.4	-
425 µm (No. 40)	99.0	-
250 µm (No. 60)	96.9	-
150 µm (No. 100)	94.5	-
106 µm (No. 140)	93.5	-
75 µm (No. 200)	92.7	-
32.4 (µm)	86.1	-
23.9 (µm)	81.3	-
17.2 (µm)	78.9	-
9.6 (µm)	68.6	-
7.0 (µm)	63.6	-
5.1 (µm)	59.3	-
2.7 (µm)	51.4	-
1.1 (µm)	48.8	-



Soil Classification: CH Fat Clay, Brown, A-7-6(35)

Gravel (%): 0.0 **Sand (%):** 7.3 **Silt (%):** 33.4 **Clay (%):** 59.3

D_{60} (µm): 5.326

General

LL=51, PL=15, PI=36

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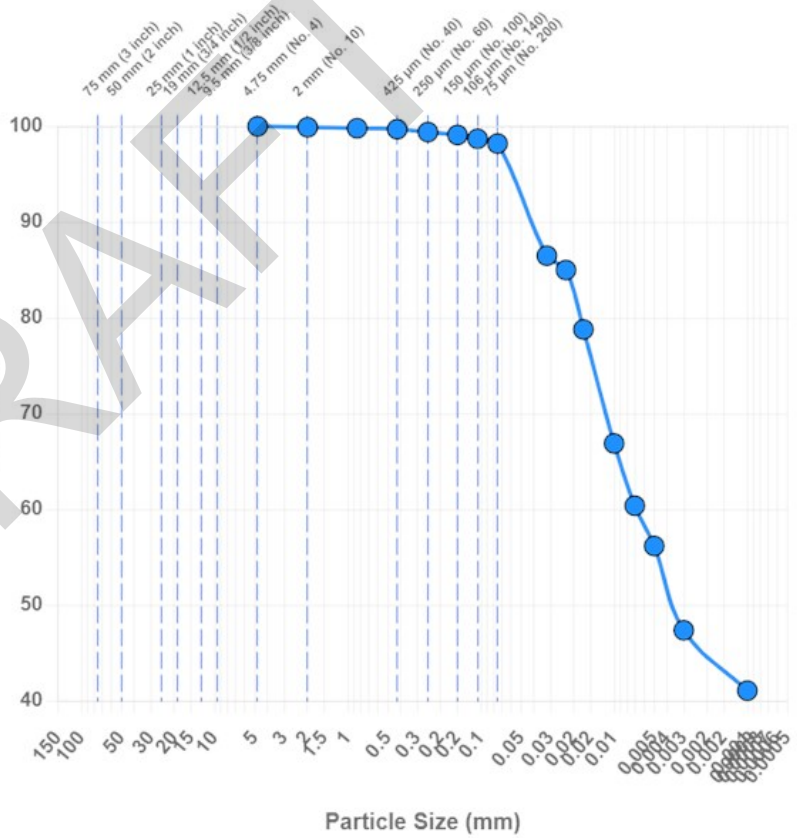
Sample Information

Sample Number: 577245
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-16
Location Details: Boring B-16
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	99.9	-
850 µm (No. 20)	99.8	-
425 µm (No. 40)	99.7	-
250 µm (No. 60)	99.4	-
150 µm (No. 100)	99.1	-
106 µm (No. 140)	98.7	-
75 µm (No. 200)	98.2	-
31.5 (µm)	86.5	-
22.6 (µm)	85.0	-
16.9 (µm)	78.8	-
9.6 (µm)	66.9	-
7.1 (µm)	60.4	-
5.1 (µm)	56.2	-
2.7 (µm)	47.4	-
1.1 (µm)	41.1	-



Soil Classification: CH Fat Clay, Brown, A-7-6(37)

Gravel (%): 0.0 **Sand (%):** 1.8 **Silt (%):** 42.0 **Clay (%):** 56.2

D_{60} (µm): 6.810

General

LL=50, PL=15, PI=35

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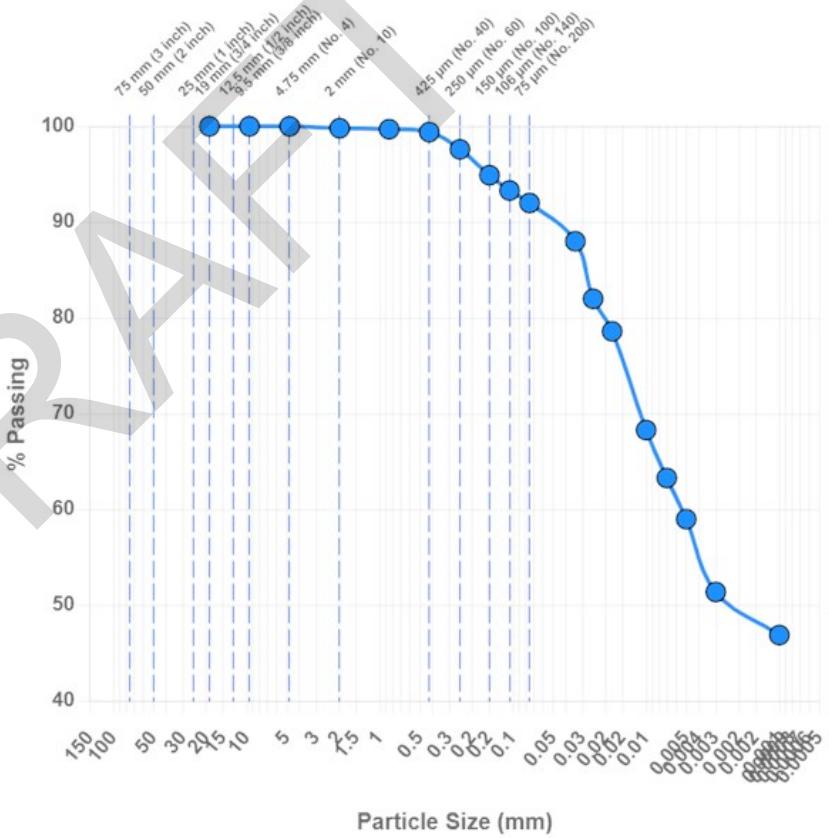
Sample Information

Sample Number: 577246
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-17
Location Details: Boring B-17
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	100.0	-
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	99.8	-
850 µm (No. 20)	99.7	-
425 µm (No. 40)	99.4	-
250 µm (No. 60)	97.6	-
150 µm (No. 100)	94.9	-
106 µm (No. 140)	93.3	-
75 µm (No. 200)	92.0	-
33.7 (µm)	88.0	-
24.9 (µm)	82.0	-
18.0 (µm)	78.6	-
9.9 (µm)	68.3	-
7.2 (µm)	63.3	-
5.2 (µm)	59.0	-
2.7 (µm)	51.4	-
1.1 (µm)	46.9	-



Soil Classification: CH Fat Clay, Brown to Gray, A-7-6(37)

Gravel (%): 0.0 **Sand (%):** 8.0 **Silt (%):** 33.0 **Clay (%):** 59.0

D_{60} (µm): 5.465

General

LL=55, PL=17, PI=38

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Phone: 701-255-7180

Client:

SRF Consulting Group, Inc.
3701 Wayzata Boulevard
Suite 100
Minneapolis, MN 55416

Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

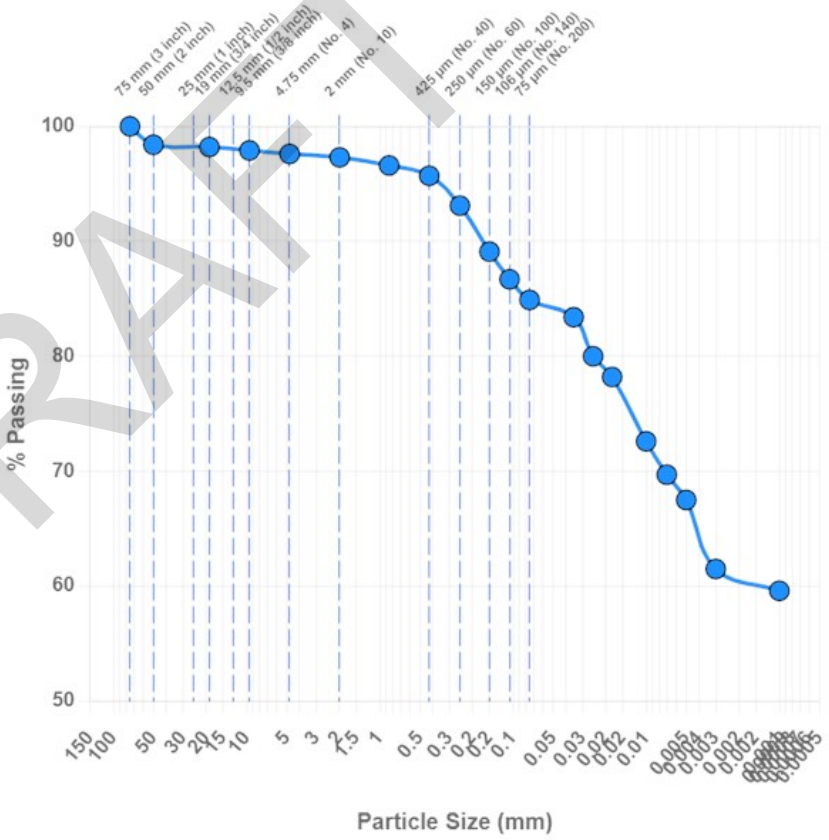
Sample Information

Sample Number: 577247
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-18
Location Details: Boring B-18
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
75 mm (3 inch)	100.0	-
50 mm (2 inch)	98.4	-
19 mm (3/4 inch)	98.2	-
9.5 mm (3/8 inch)	97.9	-
4.75 mm (No. 4)	97.6	-
2 mm (No. 10)	97.3	-
850 µm (No. 20)	96.6	-
425 µm (No. 40)	95.7	-
250 µm (No. 60)	93.1	-
150 µm (No. 100)	89.1	-
106 µm (No. 140)	86.7	-
75 µm (No. 200)	84.9	-
35.1 (µm)	83.4	-
25.4 (µm)	80.0	-
18.2 (µm)	78.2	-
9.7 (µm)	72.6	-
7.0 (µm)	69.7	-
5.0 (µm)	67.5	-
2.6 (µm)	61.5	-
1.1 (µm)	59.6	-



Soil Classification: CH Fat clay with sand, Brown, A-7-6(37)

Gravel (%): 2.4 **Sand (%):** 12.7 **Silt (%):** 17.4 **Clay (%):** 67.5

D_{60} (µm): 1.421

General

LL=60, PL=18, PI=42

DRAFT

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Hydrometer And Sieve Analysis

ASTM D7928

02/14/2024

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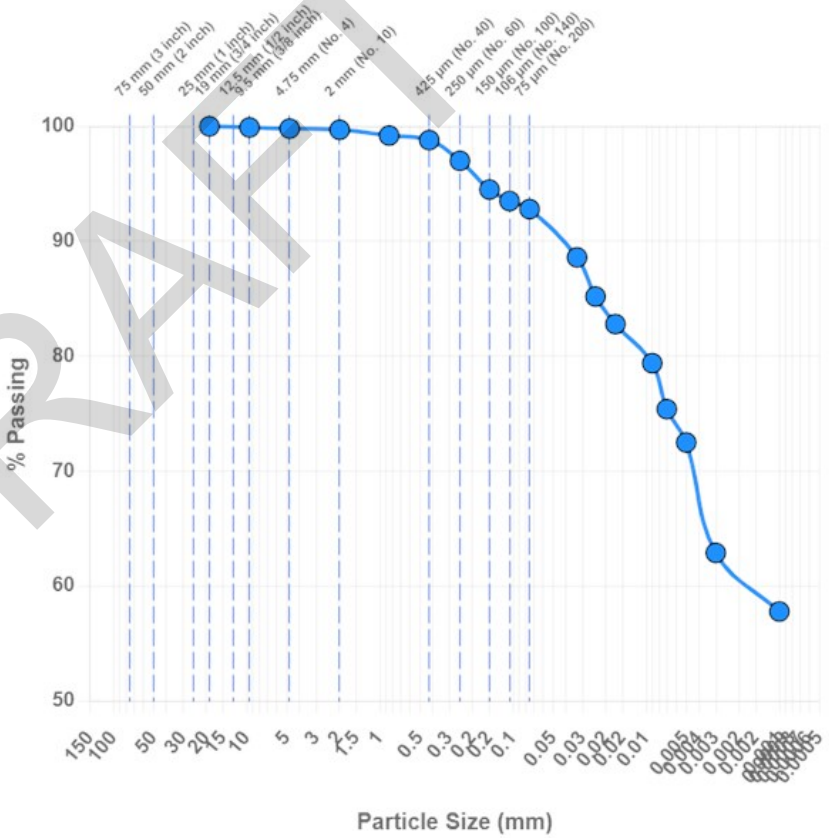
Sample Information

Sample Number: 577248
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-19
Location Details: Boring B-19
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	99.9	-
4.75 mm (No. 4)	99.8	-
2 mm (No. 10)	99.7	-
850 µm (No. 20)	99.2	-
425 µm (No. 40)	98.8	-
250 µm (No. 60)	97.0	-
150 µm (No. 100)	94.5	-
106 µm (No. 140)	93.5	-
75 µm (No. 200)	92.8	-
32.9 (µm)	88.6	-
23.9 (µm)	85.2	-
17.2 (µm)	82.8	-
9.1 (µm)	79.4	-
6.6 (µm)	75.4	-
4.8 (µm)	72.5	-
2.5 (µm)	62.9	-
1.1 (µm)	57.8	-



Soil Classification: CH Fat Clay, Gray, A-7-6(45)

Gravel (%): 0.2 **Sand (%):** 7.0 **Silt (%):** 20.3 **Clay (%):** 72.5

D_{60} (µm): 1.863

General

LL=64, PL=20, PI=44

DRAFT

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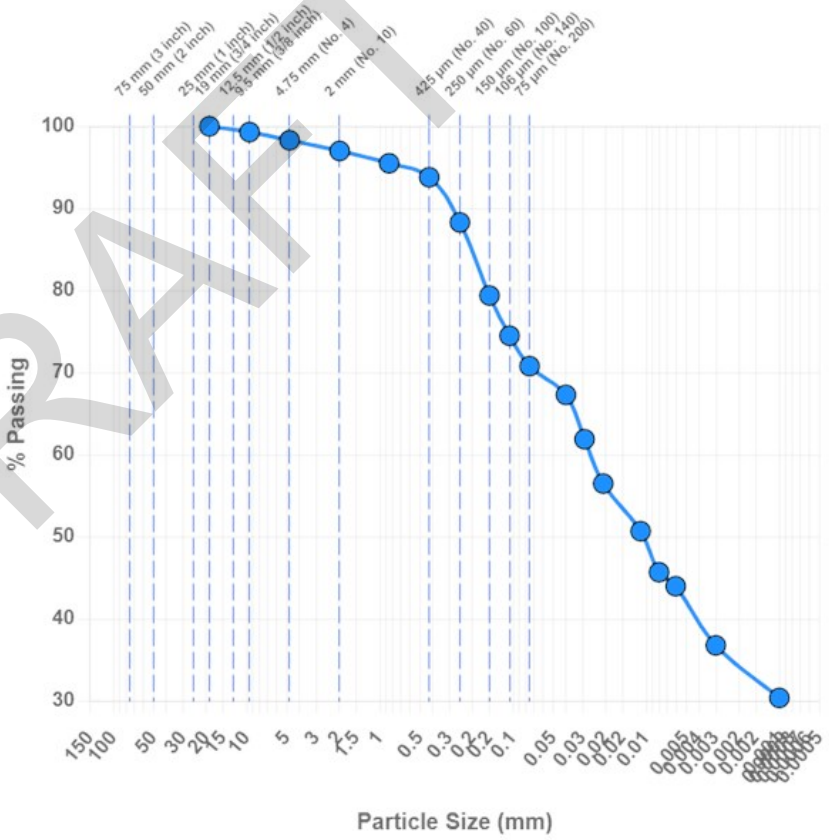
Sample Number: 577249
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-20
Location Details: Boring B-20
Sample Date: 01/22/2024
Received Date: 01/23/2024
Tested Date: 02/12/2024

Depth (ft): 2'-15'
Sampled By: Drill Crew
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	99.3	-
4.75 mm (No. 4)	98.3	-
2 mm (No. 10)	97.0	-
850 µm (No. 20)	95.5	-
425 µm (No. 40)	93.8	-
250 µm (No. 60)	88.3	-
150 µm (No. 100)	79.4	-
106 µm (No. 140)	74.5	-
75 µm (No. 200)	70.8	-
39.5 (µm)	67.3	-
28.7 (µm)	61.9	-
20.9 (µm)	56.5	-
11.1 (µm)	50.7	-
8.0 (µm)	45.7	-
5.7 (µm)	44.0	-
2.9 (µm)	36.8	-
1.2 (µm)	30.4	-



Soil Classification: CL Lean clay with sand, Brown, A-7-6(17)

Gravel (%): 1.7 **Sand (%):** 27.5 **Silt (%):** 29.2 **Clay (%):** 41.6

D_{60} (µm): 26.185

General

LL=42. PL=15, PI=27

DRAFT

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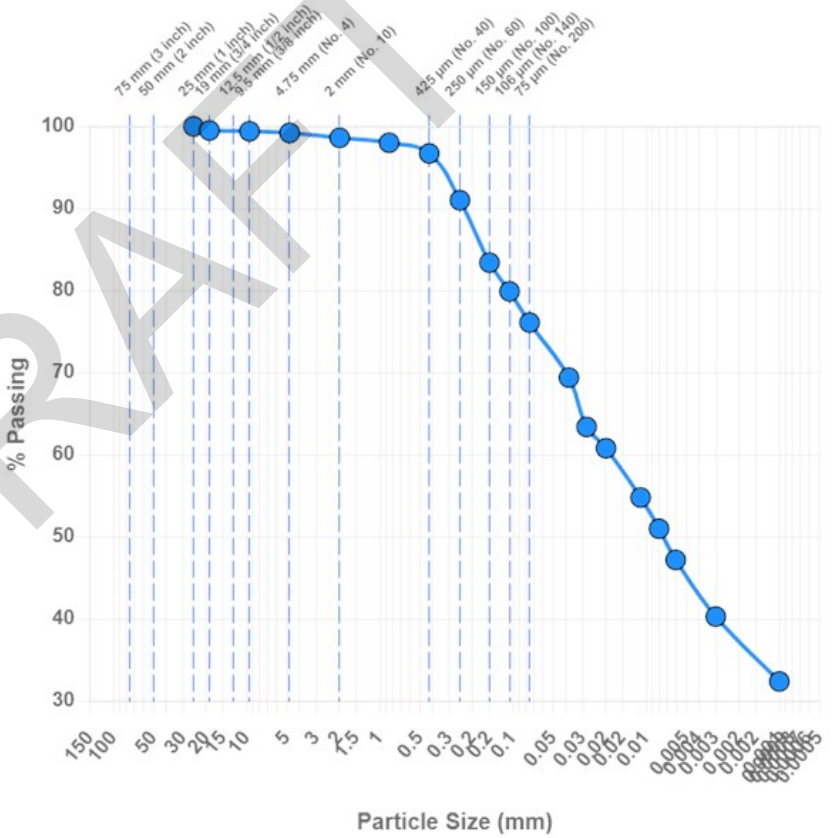
Sample Number: 577250
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-21
Location Details: Boring B-21
Sample Date: 01/22/2024
Received Date: 01/23/2024
Tested Date: 02/12/2024

Depth (ft): 2'-15'
Sampled By: Drill Crew
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
25 mm (1 inch)	100.0	-
19 mm (3/4 inch)	99.5	-
9.5 mm (3/8 inch)	99.4	-
4.75 mm (No. 4)	99.2	-
2 mm (No. 10)	98.6	-
850 µm (No. 20)	98.0	-
425 µm (No. 40)	96.7	-
250 µm (No. 60)	91.0	-
150 µm (No. 100)	83.4	-
106 µm (No. 140)	79.9	-
75 µm (No. 200)	76.1	-
38.3 (µm)	69.4	-
28.0 (µm)	63.4	-
20.1 (µm)	60.8	-
10.7 (µm)	54.8	-
7.7 (µm)	51.0	-
5.6 (µm)	47.2	-
2.9 (µm)	40.3	-
1.2 (µm)	32.4	-



Soil Classification: CL Lean clay with sand, Brown & Gray, A-7-6(21)

Gravel (%): 0.8 **Sand (%):** 23.1 **Silt (%):** 31.2 **Clay (%):** 44.9

D_{60} (µm): 18.800

General

LL=45, PL=15, PI=30

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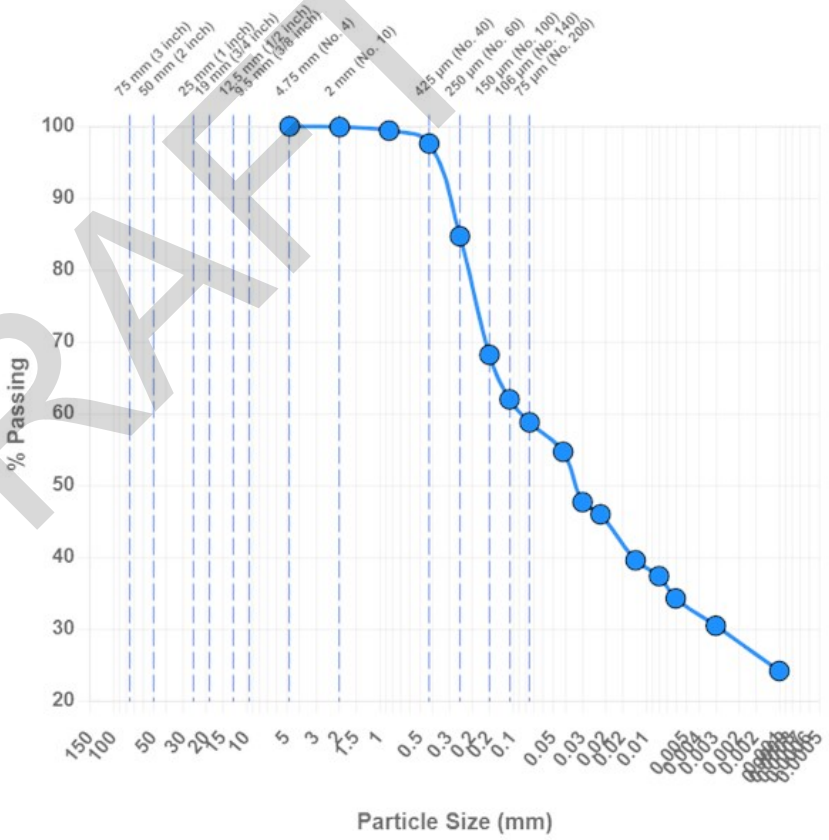
Sample Number: 577251
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-22
Location Details: Boring B-22
Sample Date: 01/24/2024
Received Date: 01/23/2024
Tested Date: 02/12/2024

Depth (ft): 2'-15'
Sampled By: Drill Crew
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	99.9	-
850 µm (No. 20)	99.4	-
425 µm (No. 40)	97.6	-
250 µm (No. 60)	84.7	-
150 µm (No. 100)	68.2	-
106 µm (No. 140)	62.0	-
75 µm (No. 200)	58.8	-
41.6 (µm)	54.7	-
30.4 (µm)	47.7	-
21.7 (µm)	46.0	-
11.5 (µm)	39.6	-
8.2 (µm)	37.4	-
5.9 (µm)	34.3	-
3.0 (µm)	30.5	-
1.2 (µm)	24.2	-



Soil Classification: CL Sandy lean clay, Brown, A-6(10)

Gravel (%): 0.0 **Sand (%):** 41.2 **Silt (%):** 25.8 **Clay (%):** 33.0

D_{60} (µm): 86.625 **D_{30} (µm):** 2.841

General

LL=37, PL=15, PI=22

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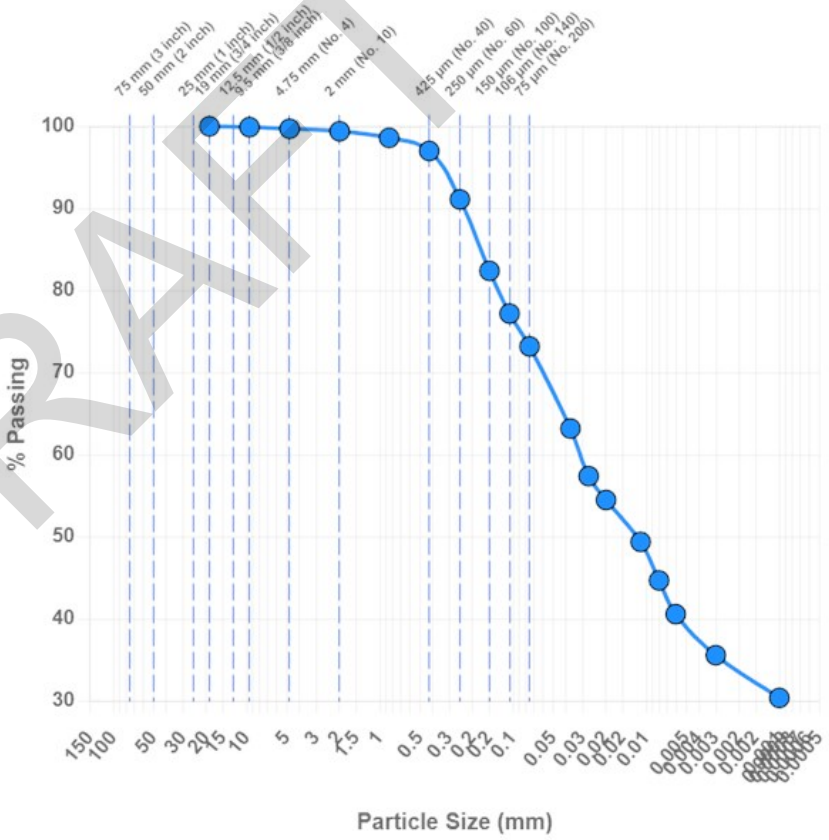
Sample Information

Sample Number: 577252
Sampling Method: Auger Boring ASTM D1452
Boring Number: B-23
Location Details: Boring B-23
Sample Date: 01/24/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	99.9	-
4.75 mm (No. 4)	99.7	-
2 mm (No. 10)	99.4	-
850 µm (No. 20)	98.6	-
425 µm (No. 40)	97.0	-
250 µm (No. 60)	91.1	-
150 µm (No. 100)	82.4	-
106 µm (No. 140)	77.2	-
75 µm (No. 200)	73.2	-
37.0 (µm)	63.2	-
27.3 (µm)	57.4	-
19.7 (µm)	54.5	-
10.5 (µm)	49.4	-
7.6 (µm)	44.7	-
5.5 (µm)	40.6	-
2.8 (µm)	35.6	-
1.2 (µm)	30.4	-



Soil Classification: CL Lean clay with sand, Brown, A-7-6(21)

Gravel (%): 0.3 **Sand (%):** 26.5 **Silt (%):** 34.3 **Clay (%):** 38.9

D_{60} (µm): 31.483

General

LL=45, PL=14, PI=31

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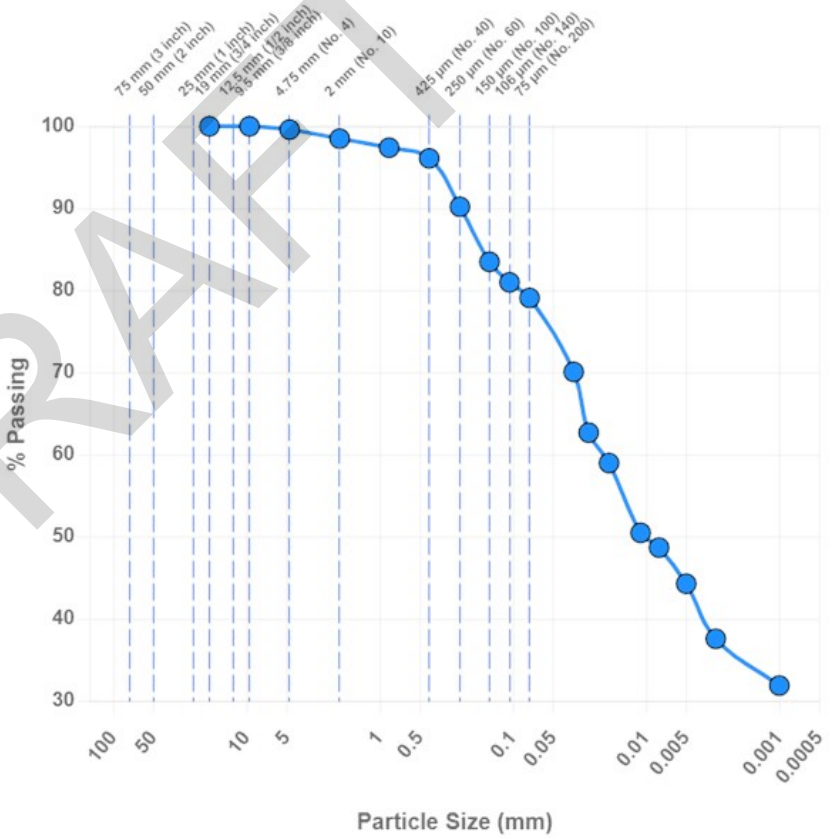
Sample Information

Sample Number: 580172
Sampling Method: Auger Boring ASTM D1452
Boring Number: ST-24
Location Details: Boring ST-24
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
19 mm (3/4 inch)	100.0	-
9.5 mm (3/8 inch)	100.0	-
4.75 mm (No. 4)	99.6	-
2 mm (No. 10)	98.5	-
850 µm (No. 20)	97.4	-
425 µm (No. 40)	96.1	-
250 µm (No. 60)	90.2	-
150 µm (No. 100)	83.5	-
106 µm (No. 140)	81.0	-
75 µm (No. 200)	79.1	-
35.4 (µm)	70.1	-
26.5 (µm)	62.7	-
19.2 (µm)	59.0	-
10.5 (µm)	50.5	-
7.5 (µm)	48.7	-
5.4 (µm)	44.3	-
2.8 (µm)	37.6	-
1.2 (µm)	31.9	-



Soil Classification: CL Lean clay with sand, Brown, A-7-6(23)

Gravel (%): 0.4 **Sand (%):** 20.5 **Silt (%):** 34.8 **Clay (%):** 44.3

D_{60} (µm): 21.162

General

LL=44, PL=14, PI=30

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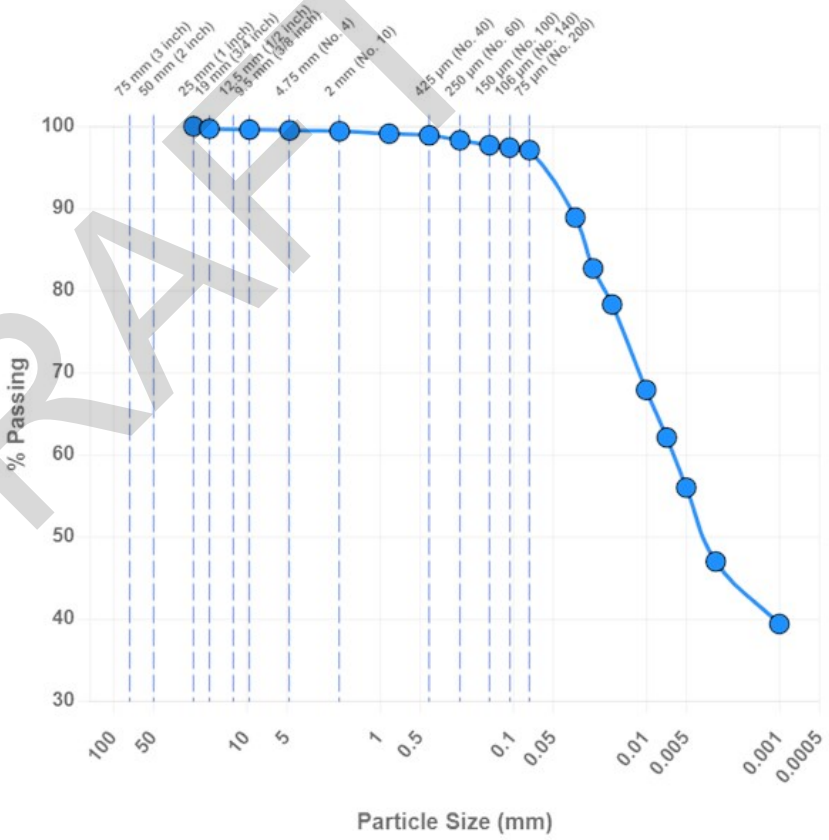
Sample Information

Sample Number: 580173
Sampling Method: Auger Boring ASTM D1452
Boring Number: ST-25
Location Details: Boring ST-25
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
25 mm (1 inch)	100.0	-
19 mm (3/4 inch)	99.7	-
9.5 mm (3/8 inch)	99.6	-
4.75 mm (No. 4)	99.5	-
2 mm (No. 10)	99.4	-
850 µm (No. 20)	99.1	-
425 µm (No. 40)	98.9	-
250 µm (No. 60)	98.3	-
150 µm (No. 100)	97.7	-
106 µm (No. 140)	97.4	-
75 µm (No. 200)	97.1	-
34.2 (µm)	88.9	-
25.3 (µm)	82.7	-
18.4 (µm)	78.3	-
10.1 (µm)	67.9	-
7.4 (µm)	62.1	-
5.4 (µm)	56.0	-
2.8 (µm)	47.0	-
1.2 (µm)	39.4	-



Soil Classification: CH Fat Clay, Brown & Gray, A-7-6(39)

Gravel (%): 0.5 **Sand (%):** 2.4 **Silt (%):** 41.1 **Clay (%):** 56.0

D_{60} (µm): 6.311

General

LL=53, PL=16, PI=37

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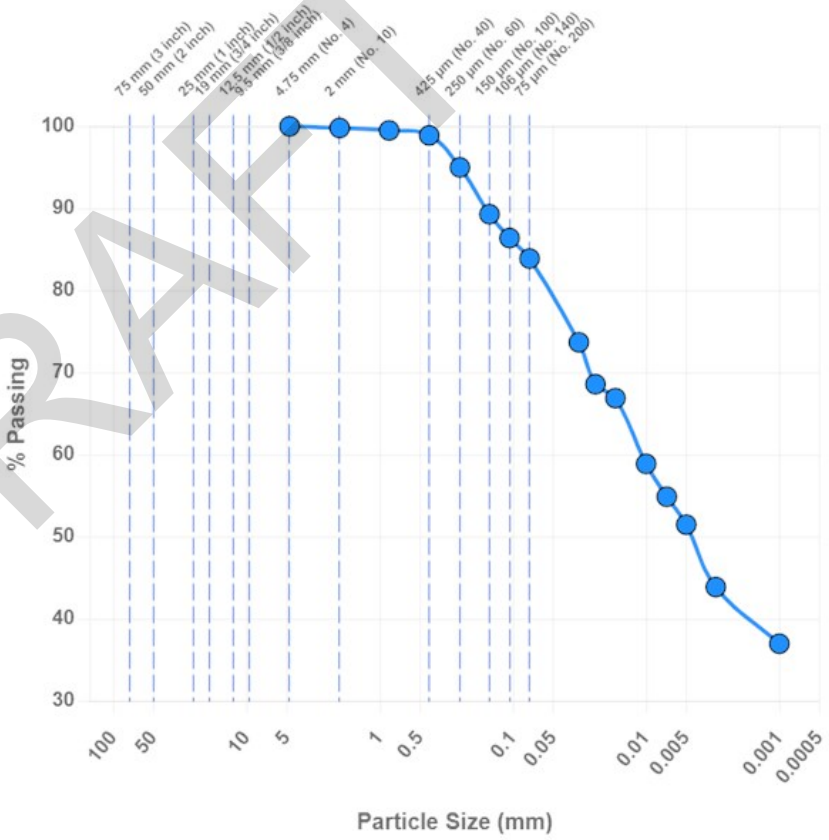
Sample Information

Sample Number: 580174
Sampling Method: Auger Boring ASTM D1452
Boring Number: ST-26
Location Details: Boring ST-26
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	99.8	-
850 µm (No. 20)	99.5	-
425 µm (No. 40)	98.9	-
250 µm (No. 60)	95.0	-
150 µm (No. 100)	89.3	-
106 µm (No. 140)	86.4	-
75 µm (No. 200)	83.9	-
32.3 (µm)	73.7	-
24.0 (µm)	68.6	-
17.3 (µm)	66.9	-
9.6 (µm)	58.9	-
7.0 (µm)	54.9	-
5.1 (µm)	51.5	-
2.7 (µm)	43.9	-
1.1 (µm)	37.0	-



Soil Classification: CH Fat clay with sand, Brown, A-7-6(33)

Gravel (%): 0.0 **Sand (%):** 16.1 **Silt (%):** 32.4 **Clay(%):** 51.5

D_{60} (µm): 10.963

General

LL=54, PL=15, PI=39

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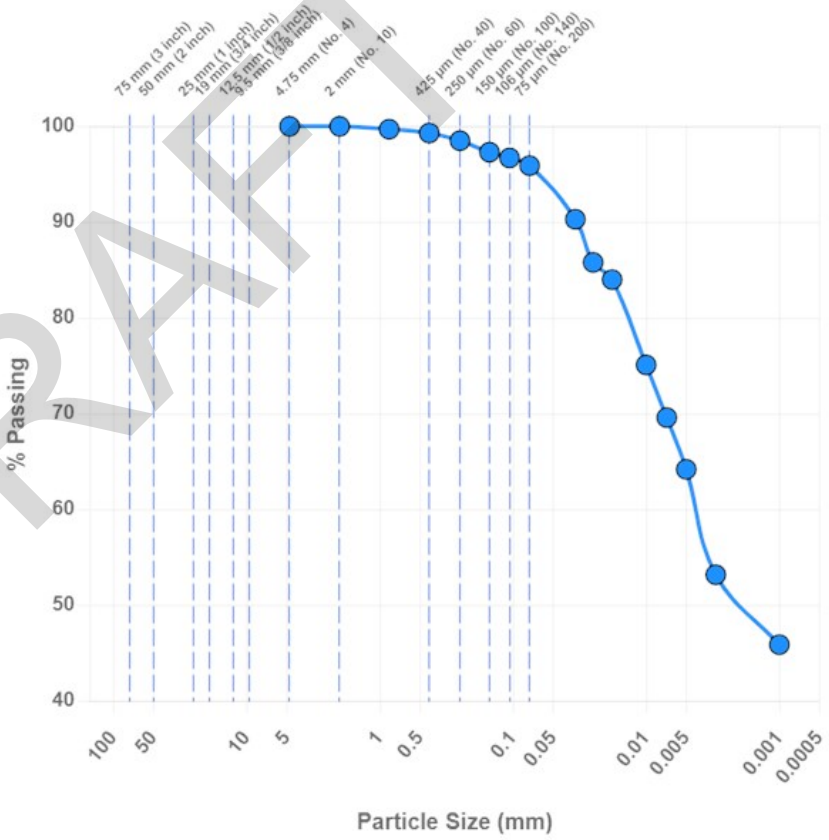
Sample Information

Sample Number: 580175
Sampling Method: Auger Boring ASTM D1452
Boring Number: ST-27
Location Details: Boring ST-27
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	100.0	-
850 µm (No. 20)	99.7	-
425 µm (No. 40)	99.3	-
250 µm (No. 60)	98.5	-
150 µm (No. 100)	97.3	-
106 µm (No. 140)	96.7	-
75 µm (No. 200)	95.9	-
34.3 (µm)	90.3	-
25.0 (µm)	85.8	-
17.9 (µm)	84.0	-
9.8 (µm)	75.1	-
7.1 (µm)	69.6	-
5.2 (µm)	64.2	-
2.7 (µm)	53.2	-
1.2 (µm)	45.9	-



Soil Classification: CH Fat Clay, Brown to Gray, A-7-6(47)

Gravel (%): 0.0 **Sand (%):** 4.1 **Silt (%):** 31.7 **Clay (%):** 64.2

D_{60} (µm): 4.236

General

LL=61, PL=16, PI=45

DRAFT

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Hydrometer And Sieve Analysis

ASTM D7928

03/18/2024

2908 Morrison Ave.
Suite 3
Bismarck, ND 58504
Phone: 701-255-7180

Client:

SRF Consulting Group, Inc.
3701 Wayzata Boulevard
Suite 100
Minneapolis, MN 55416

Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

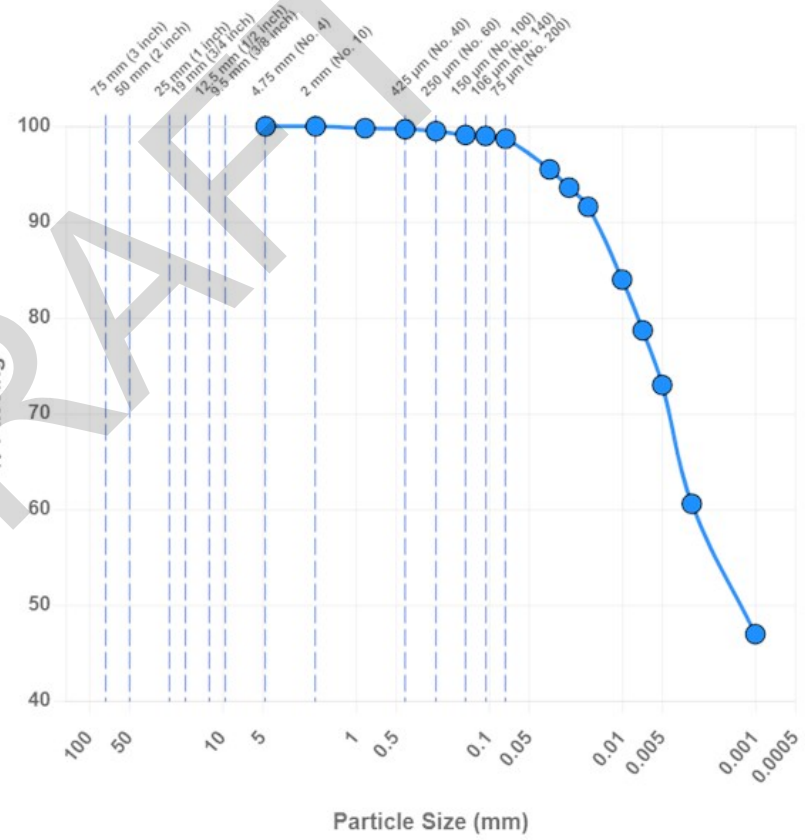
Sample Information

Sample Number: 580176
Sampling Method: Auger Boring ASTM D1452
Boring Number: ST-28
Location Details: Boring ST-28
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	100.0	-
850 µm (No. 20)	99.8	-
425 µm (No. 40)	99.7	-
250 µm (No. 60)	99.5	-
150 µm (No. 100)	99.1	-
106 µm (No. 140)	99.0	-
75 µm (No. 200)	98.7	-
34.5 (µm)	95.5	-
24.7 (µm)	93.6	-
17.7 (µm)	91.6	-
9.6 (µm)	84.0	-
7.0 (µm)	78.7	-
5.1 (µm)	73.0	-
2.7 (µm)	60.6	-
1.2 (µm)	47.0	-



Soil Classification: CH Fat Clay, Brown & Gray, A-7-6(60)

Gravel (%): 0.0 **Sand (%):** 1.3 **Silt (%):** 25.7 **Clay (%):** 73.0

D_{60} (µm): 2.912

General

LL=74, PL=20, PI=54

DRAFT

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Hydrometer And Sieve Analysis

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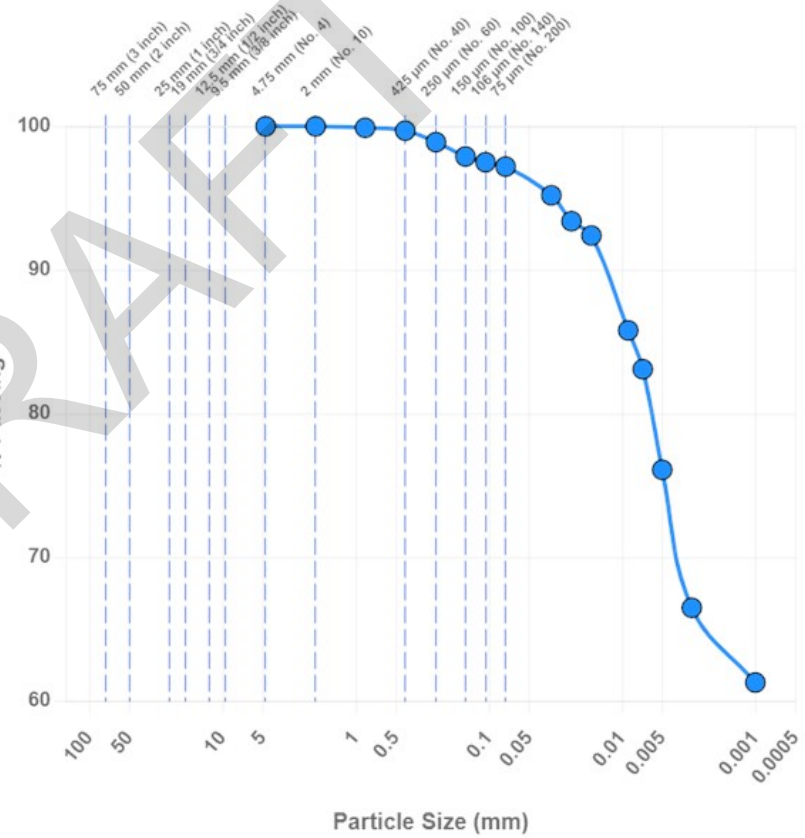
Sample Information

Sample Number: 580177
Sampling Method: Auger Boring ASTM D1452
Boring Number: ST-29
Location Details: Boring ST-29
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
4.75 mm (No. 4)	100.0	-
2 mm (No. 10)	100.0	-
850 µm (No. 20)	99.9	-
425 µm (No. 40)	99.7	-
250 µm (No. 60)	98.9	-
150 µm (No. 100)	97.9	-
106 µm (No. 140)	97.5	-
75 µm (No. 200)	97.2	-
34.1 (µm)	95.2	-
24.4 (µm)	93.4	-
17.4 (µm)	92.4	-
9.3 (µm)	85.8	-
6.7 (µm)	83.1	-
4.9 (µm)	76.1	-
2.6 (µm)	66.5	-
1.1 (µm)	61.3	-



Soil Classification: CH Fat Clay, Brown, A-7-6(57)

Gravel (%): 0.0 **Sand (%):** 2.8 **Silt (%):** 21.1 **Clay (%):** 76.1

General

LL=71, PL=18, PI=53

DRAFT

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Highway 31
New Salem, ND

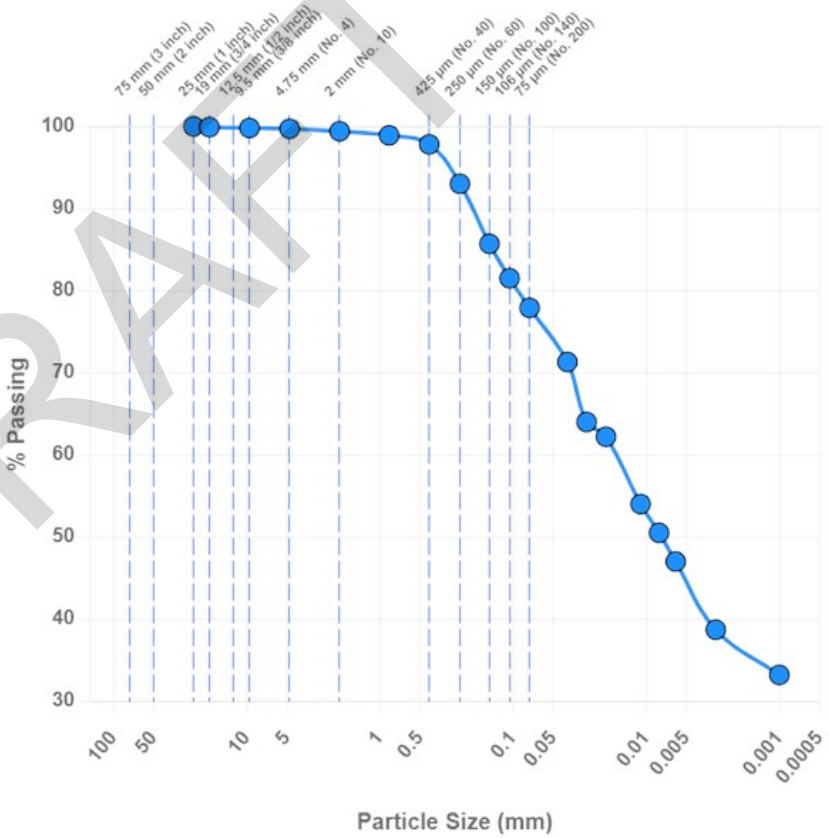
Sample Information

Sample Number: 580178
Sampling Method: Auger Boring ASTM D1452
Boring Number: ST-30
Location Details: Boring ST-30
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Austin, Jon

Laboratory Data

Sieve-Hydrometer Analysis

Particle Size	% Passing	Specification
25 mm (1 inch)	100.0	-
19 mm (3/4 inch)	99.9	-
9.5 mm (3/8 inch)	99.8	-
4.75 mm (No. 4)	99.7	-
2 mm (No. 10)	99.4	-
850 µm (No. 20)	98.9	-
425 µm (No. 40)	97.8	-
250 µm (No. 60)	93.0	-
150 µm (No. 100)	85.7	-
106 µm (No. 140)	81.5	-
75 µm (No. 200)	77.9	-
38.6 (µm)	71.3	-
28.4 (µm)	64.0	-
20.2 (µm)	62.2	-
10.9 (µm)	54.0	-
7.8 (µm)	50.5	-
5.6 (µm)	47.0	-
2.9 (µm)	38.7	-
1.2 (µm)	33.2	-



Soil Classification: CL Lean clay with sand, Brown, A-7-6(23)

Gravel (%): 0.3 **Sand (%):** 21.8 **Silt (%):** 33.7 **Clay(%):** 44.2

D_{60} (µm): 17.585

General

LL=46, PL=15, PI=31

DRAFT

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ND T 180

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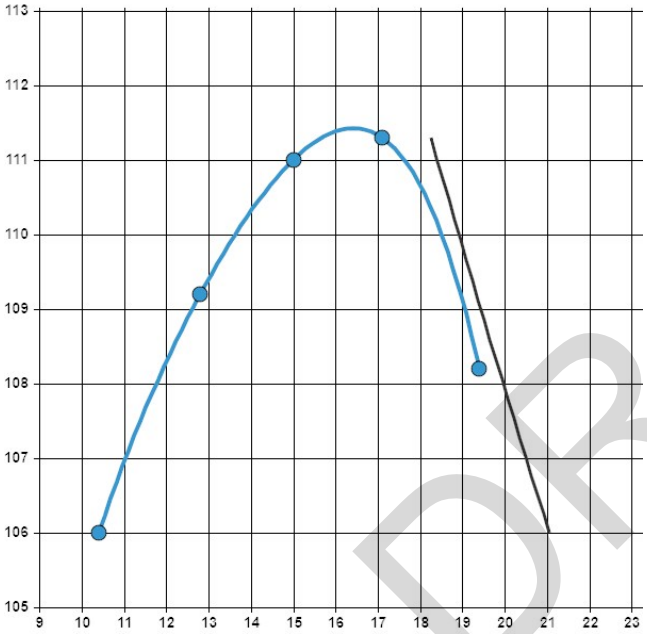
Project:

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SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577226
Boring Number: B-01
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-01
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/09/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-01
Maximum Dry Density (pcf):	111.0
Optimum Moisture (%):	16.4
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	60
Plastic Limit:	17
Plastic Index:	43
Passes #200 (%):	96.1
Retained on #200:	3.9
Retained On #4 (%):	0.0
Mold Mass (gr):	4143.3
Mold Volume (cc):	941.5

Visual Manual Classification: CH Fat Clay, Brown, A-7-6(24)

DRAFT

General

Results: The test is for informational purposes.

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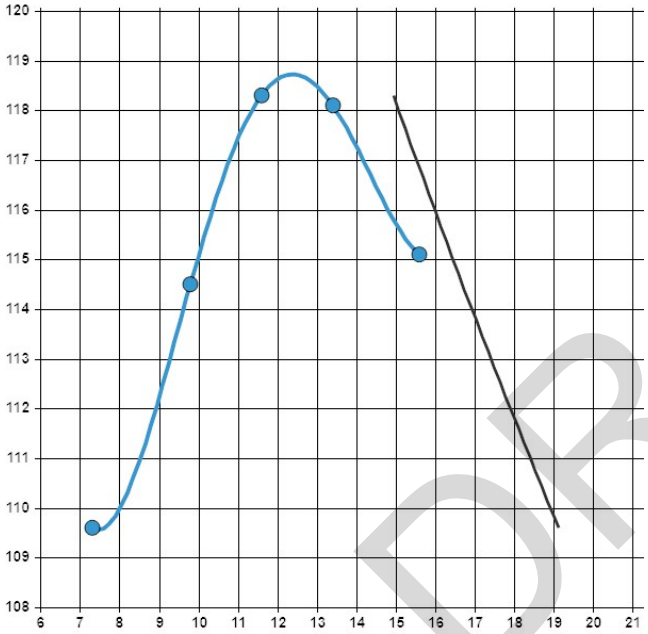
Project:

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Highway 31
New Salem, ND

Sample Information

Sample Number: 577228
Boring Number: B-02
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-02
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/09/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-02
Maximum Dry Density (pcf):	119.0
Optimum Moisture (%):	12.4
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	51
Plastic Limit:	14
Plastic Index:	37
Passes #200 (%):	95.1
Retained on #200:	4.9
Retained On #4 (%):	0.0
Mold Mass (gr):	4145.8
Mold Volume (cc):	940.5

Visual Manual Classification: CH Fat Clay, Brown, A-7-6(37)

DRAFT

General

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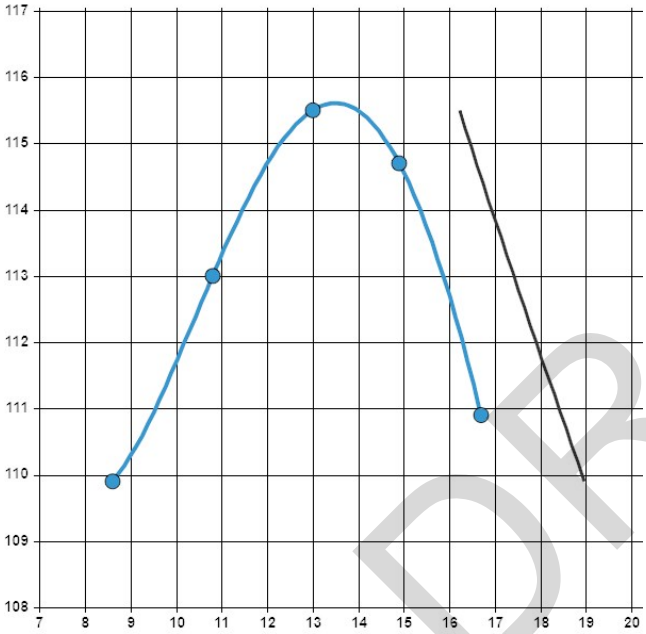
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577229
Boring Number: B-03
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-03
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/09/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-03
Maximum Dry Density (pcf):	116.0
Optimum Moisture (%):	13.5
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	43
Plastic Limit:	15
Plastic Index:	28
Passes #200 (%):	90.0
Retained on #200:	10.0
Retained On #4 (%):	0.2
Mold Mass (gr):	4146.0
Mold Volume (cc):	940.5

Visual Manual Classification: CL Lean clay, Brown, A-7-6(25)

DRAFT

General

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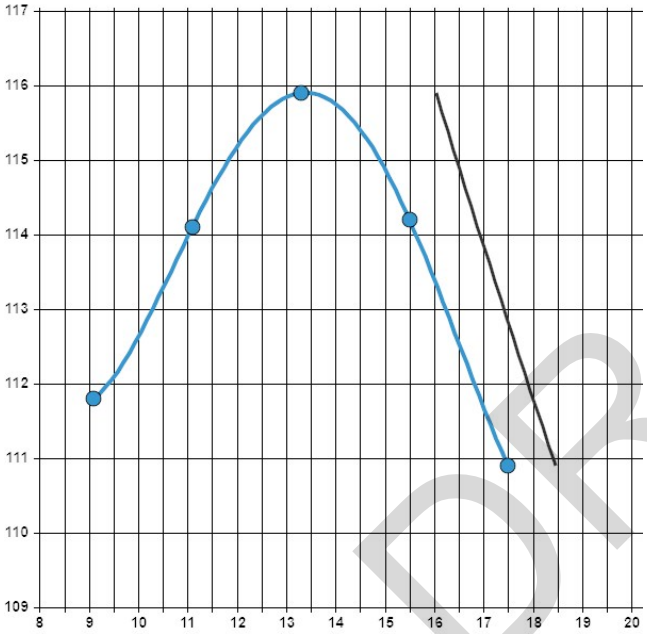
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577230
Boring Number: B-04
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-04
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/09/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-04
Maximum Dry Density (pcf):	116.0
Optimum Moisture (%):	13.4
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	61
Plastic Limit:	16
Plastic Index:	45
Passes #200 (%):	98.7
Retained on #200:	1.3
Retained On #4 (%):	0.0
Mold Mass (gr):	4143.1
Mold Volume (cc):	941.5

Visual Manual Classification: CH Fat Clay, Brown, A-7-6(49)

DRAFT

General

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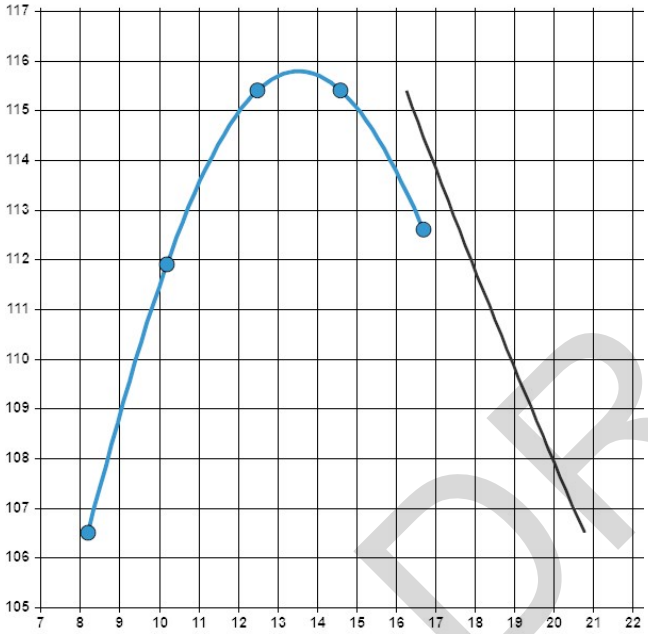
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SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577232
Boring Number: B-05
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-05
Sample Date: 01/22/2024
Depth (ft): 2'15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-05
Maximum Dry Density (pcf):	116.0
Optimum Moisture (%):	13.5
Method:	Method A
Rammer Type:	Manual Round
Specific Gravity:	2.65
Liquid Limit:	54
Plastic Limit:	15
Plastic Index:	39
Passes #200 (%):	91.2
Retained on #200:	8.8
Retained On #4 (%):	0.6
Mold Mass (gr):	4141.4
Mold Volume (cc):	941.5

Visual Manual Classification: CH Fat Clay, Brown, A-7-6(37)

DRAFT

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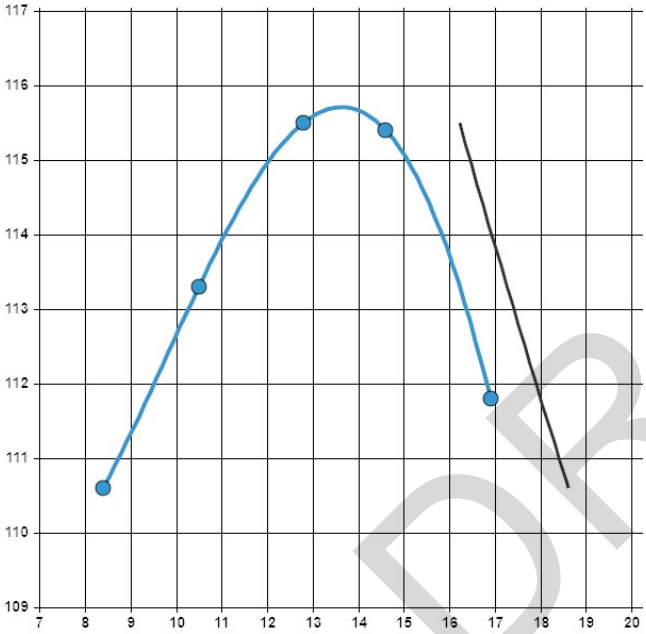
Project:

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SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577233
Boring Number: B-06
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-06
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-06
Maximum Dry Density (pcf):	116.0
Optimum Moisture (%):	13.6
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	56
Plastic Limit:	15
Plastic Index:	41
Passes #200 (%):	87.8
Retained on #200:	12.2
Retained On #4 (%):	0.2
Mold Mass (gr):	4145.3
Mold Volume (cc):	940.5

Visual Manual Classification: CH Fat Clay, Brown, A-7-6(37)

DRAFT

General

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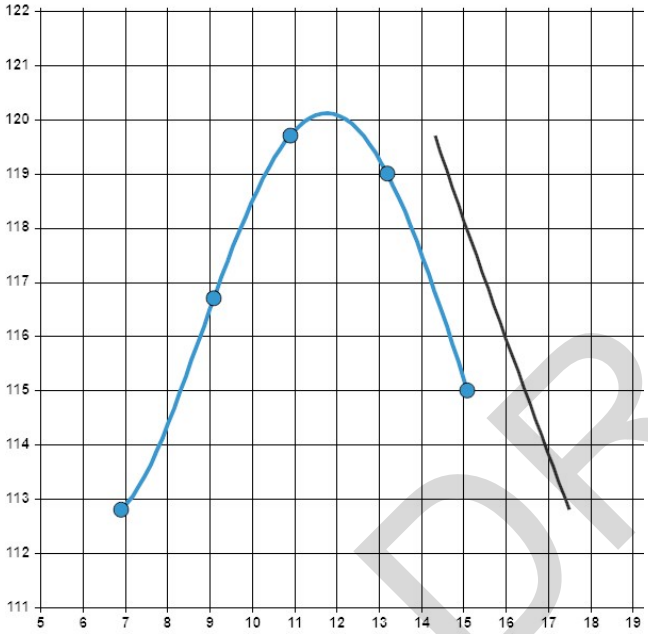
Project:

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SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577234
Boring Number: B-07
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-07
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-07
Maximum Dry Density (pcf):	120.0
Optimum Moisture (%):	11.8
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	39
Plastic Limit:	14
Plastic Index:	25
Passes #200 (%):	69.2
Retained on #200:	30.8
Retained On #4 (%):	0.4
Mold Mass (gr):	4144.9
Mold Volume (cc):	943.9

DRAFT

Visual Manual Classification: CL Sandy lean clay, Dark Brown, A-6(15)

General

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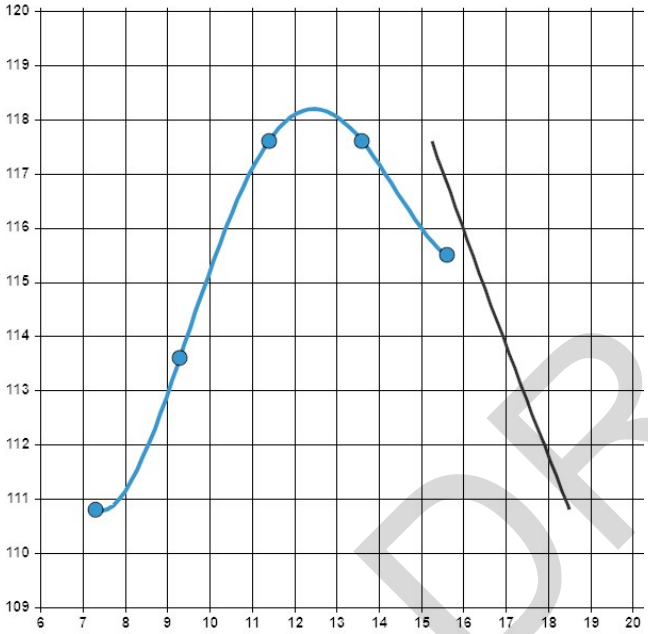
Project:

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SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577235
Boring Number: B-08
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-08
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-08
Maximum Dry Density (pcf):	118.0
Optimum Moisture (%):	12.5
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	52
Plastic Limit:	16
Plastic Index:	36
Passes #200 (%):	96.4
Retained on #200:	3.6
Retained On #4 (%):	0.2
Mold Mass (gr):	4143.2
Mold Volume (cc):	941.5

Visual Manual Classification: CH Fat Clay, Brown, A-7-6(37)

DRAFT

General

Results: The test is for informational purposes.

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Modified Proctor M-D Relationship

ND T 180

02/14/2024

2908 Morrison Ave.
Suite 3
Bismarck, ND 58504
Phone: 701-255-7180

Client:

SRF Consulting Group, Inc.
3701 Wayzata Boulevard
Suite 100
Minneapolis, MN 55416

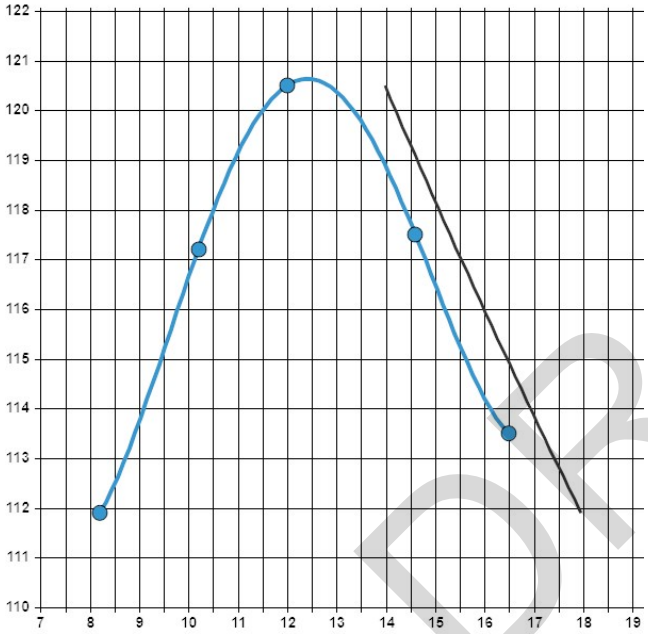
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577236
Boring Number: B-09
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-09
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-09
Maximum Dry Density (pcf):	121.0
Optimum Moisture (%):	12.4
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	42
Plastic Limit:	15
Plastic Index:	27
Passes #200 (%):	80.1
Retained on #200:	19.9
Retained On #4 (%):	0.1
Mold Mass (gr):	4145.8
Mold Volume (cc):	940.5

Visual Manual Classification: CL Lean clay with sand, Brown, A-7-6(21)

DRAFT

General

Results: The test is for informational purposes.

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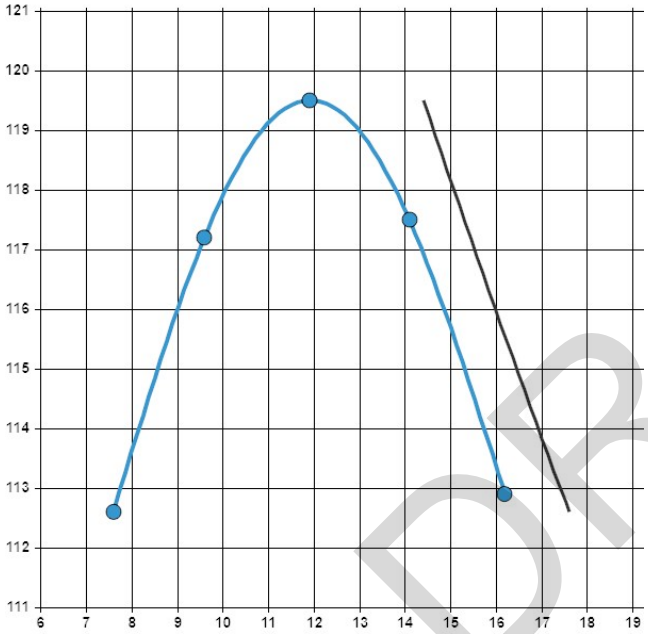
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577237
Boring Number: B-10
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-10
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-10
Maximum Dry Density (pcf):	120.0
Optimum Moisture (%):	11.9
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	39
Plastic Limit:	14
Plastic Index:	25
Passes #200 (%):	76.0
Retained on #200:	24.0
Retained On #4 (%):	0.2
Mold Mass (gr):	4146.8
Mold Volume (cc):	940.5

DRAFT

Visual Manual Classification: CL Lean clay with sand, Brown, A-6(17)

General

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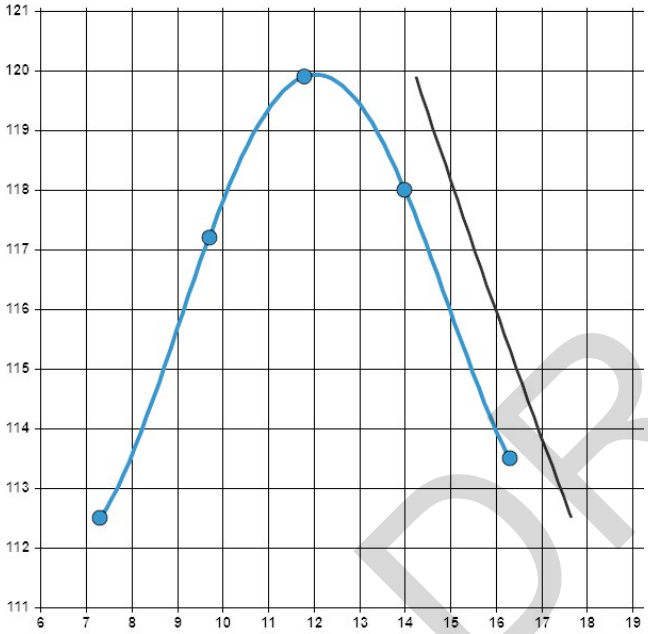
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577238
Boring Number: B-11
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-11
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-11
Maximum Dry Density (pcf):	120.0
Optimum Moisture (%):	12.0
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	46
Plastic Limit:	15
Plastic Index:	31
Passes #200 (%):	95.3
Retained on #200:	4.7
Retained On #4 (%):	0.0
Mold Mass (gr):	4145.3
Mold Volume (cc):	940.5

Visual Manual Classification: CL Lean clay, Brown, A-7-6(31)

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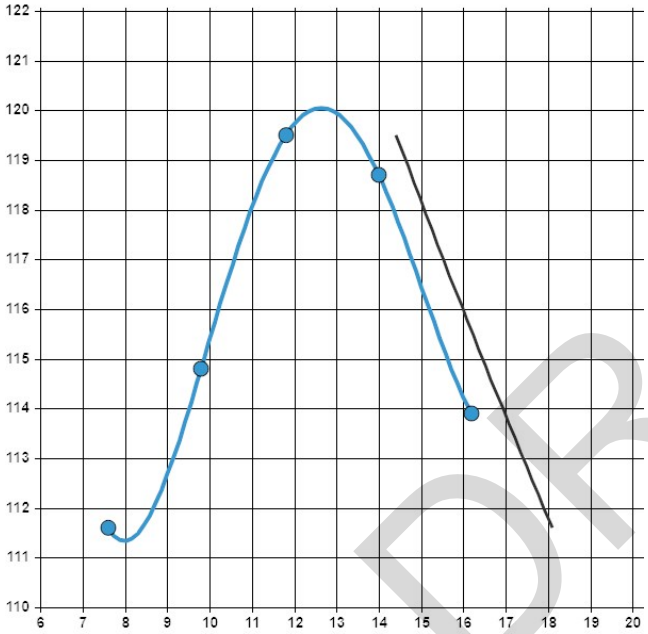
Project:

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SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577239
Boring Number: B-12
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-12
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-12
Maximum Dry Density (pcf):	120.0
Optimum Moisture (%):	12.6
Method:	Method A
Rammer Type:	Manual Round
Specific Gravity:	2.65
Liquid Limit:	51
Plastic Limit:	15
Plastic Index:	36
Passes #200 (%):	95.1
Retained on #200:	4.9
Retained On #4 (%):	0.0
Mold Mass (gr):	4146.0
Mold Volume (cc):	940.5

Visual Manual Classification: CH Fat Clay, Brown, A-7-6(36)

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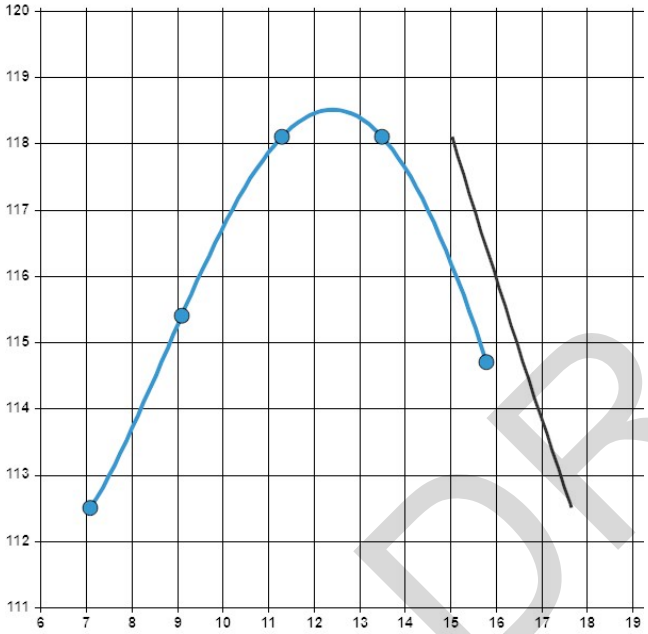
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577240
Boring Number: B-13
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-13
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-13
Maximum Dry Density (pcf):	119.0
Optimum Moisture (%):	12.4
Method:	Method A
Rammer Type:	Manual Round
Specific Gravity:	2.65
Liquid Limit:	48
Plastic Limit:	15
Plastic Index:	33
Passes #200 (%):	91.0
Retained on #200:	9.0
Retained On #4 (%):	0.1
Mold Mass (gr):	4143.8
Mold Volume (cc):	941.5

Visual Manual Classification: CL Lean clay, Brown, A-7-6(31)

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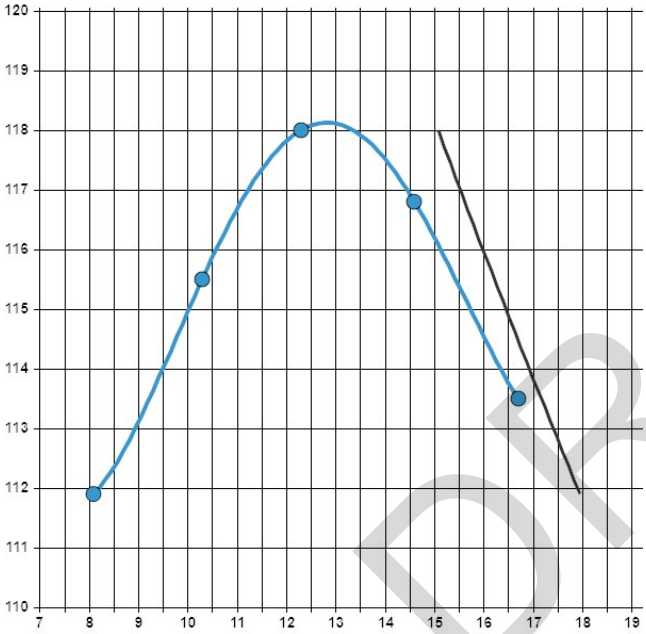
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577242
Boring Number: B-14
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-14
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-14
Maximum Dry Density (pcf):	118.0
Optimum Moisture (%):	12.8
Method:	Method A
Rammer Type:	Manual Round
Specific Gravity:	2.65
Liquid Limit:	48
Plastic Limit:	16
Plastic Index:	32
Passes #200 (%):	94.2
Retained on #200:	5.8
Retained On #4 (%):	0.2
Mold Mass (gr):	4143.1
Mold Volume (cc):	941.5

DRAFT

Visual Manual Classification: CL Lean clay, Brown, A-7-6(32)

General

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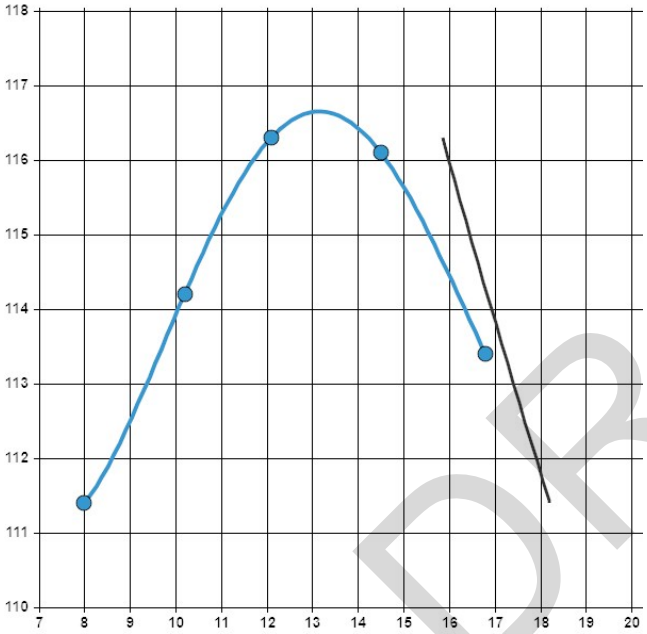
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577244
Boring Number: B-15
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-15
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-15
Maximum Dry Density (pcf):	117.0
Optimum Moisture (%):	13.2
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	51
Plastic Limit:	15
Plastic Index:	36
Passes #200 (%):	92.7
Retained on #200:	7.3
Retained On #4 (%):	0.0
Mold Mass (gr):	4145.2
Mold Volume (cc):	940.5

Visual Manual Classification: CH Fat Clay, Brown, A-7-6(35)

DRAFT

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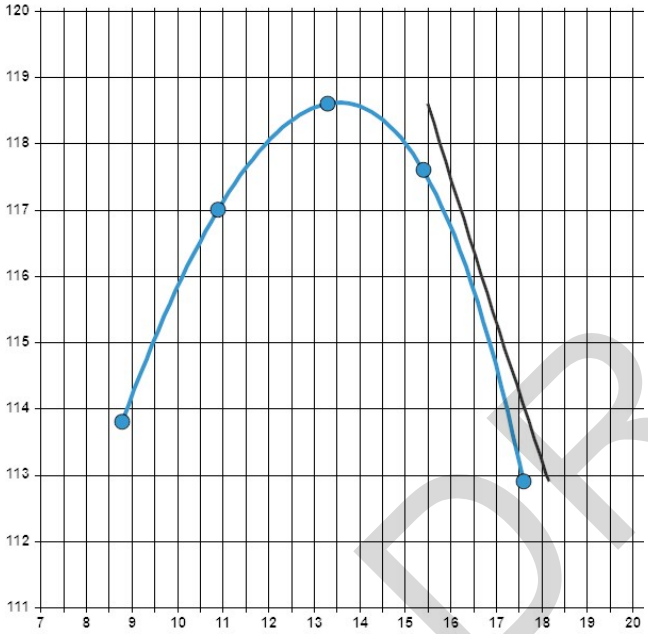
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577245
Boring Number: B-16
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-16
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-16
Maximum Dry Density (pcf):	119.0
Optimum Moisture (%):	13.6
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.70
Liquid Limit:	50
Plastic Limit:	15
Plastic Index:	35
Passes #200 (%):	98.2
Retained on #200:	1.8
Retained On #4 (%):	0.0
Mold Mass (gr):	4143.8
Mold Volume (cc):	941.5

Visual Manual Classification: CH Fat Clay, Brown, A-7-6(37)

General

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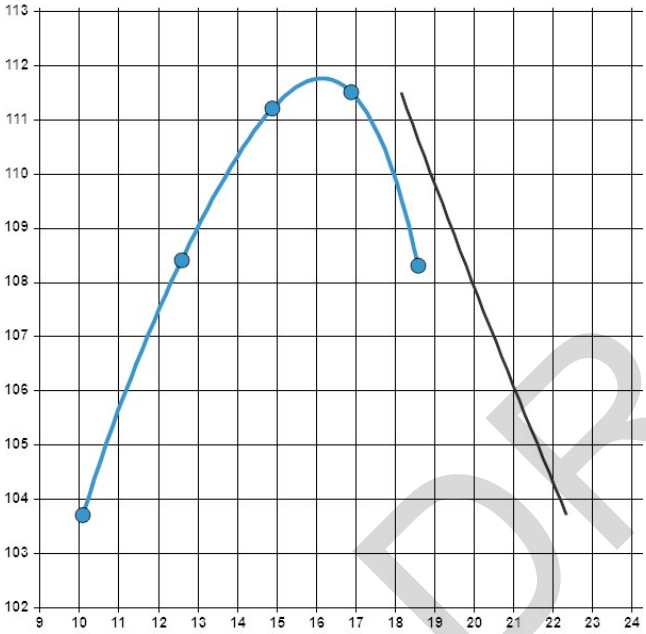
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577246
Boring Number: B-17
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-17
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-17
Maximum Dry Density (pcf):	112.0
Optimum Moisture (%):	16.2
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	55
Plastic Limit:	17
Plastic Index:	38
Passes #200 (%):	92.0
Retained on #200:	8.0
Retained On #4 (%):	0.0
Mold Mass (gr):	4146.2
Mold Volume (cc):	940.5

DRAFT

Visual Manual Classification: CH Fat Clay, Brown to Gray, A-7-6(37)

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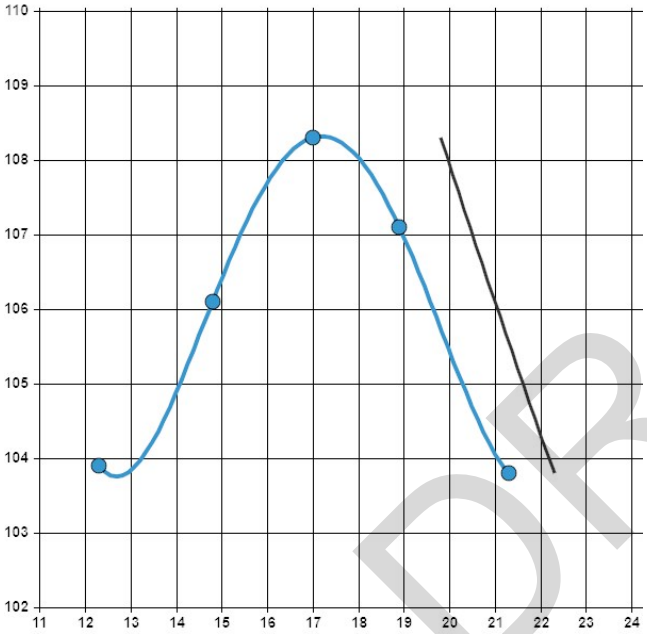
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577247
Boring Number: B-18
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-18
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-18
Maximum Dry Density (pcf):	108.0
Optimum Moisture (%):	17.2
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	60
Plastic Limit:	18
Plastic Index:	42
Passes #200 (%):	84.9
Retained on #200:	15.1
Retained On #4 (%):	2.4
Mold Mass (gr):	4143.1
Mold Volume (cc):	941.5

Visual Manual Classification: CH Fat clay with sand, Brown, A-7-6(37)

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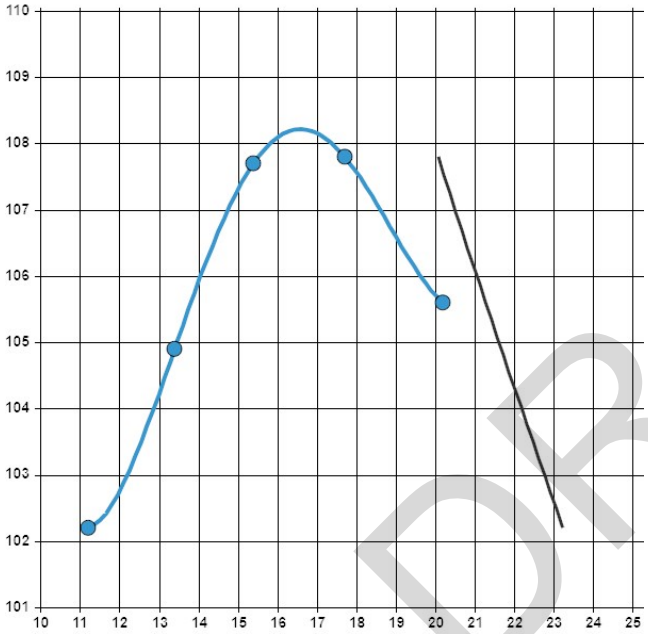
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577248
Boring Number: B-19
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-19
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-19
Maximum Dry Density (pcf):	108.0
Optimum Moisture (%):	16.6
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	64
Plastic Limit:	20
Plastic Index:	44
Passes #200 (%):	92.8
Retained on #200:	7.2
Retained On #4 (%):	0.2
Mold Mass (gr):	4143.1
Mold Volume (cc):	941.5

Visual Manual Classification: CH Fat Clay, Gray, A-7-6(45)

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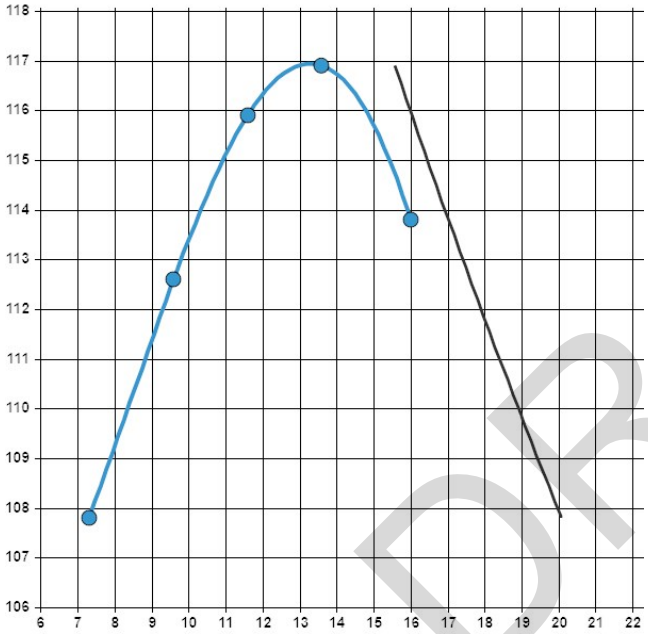
Project:

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SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577249
Boring Number: B-20
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-20
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-20
Maximum Dry Density (pcf):	117.0
Optimum Moisture (%):	13.3
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	42
Plastic Limit:	15
Plastic Index:	27
Passes #200 (%):	70.8
Retained on #200:	29.2
Retained On #4 (%):	1.7
Mold Mass (gr):	4148.5
Mold Volume (cc):	940.5

Visual Manual Classification: CL Lean clay with sand, Brown, A-7-6(17)

DRAFT

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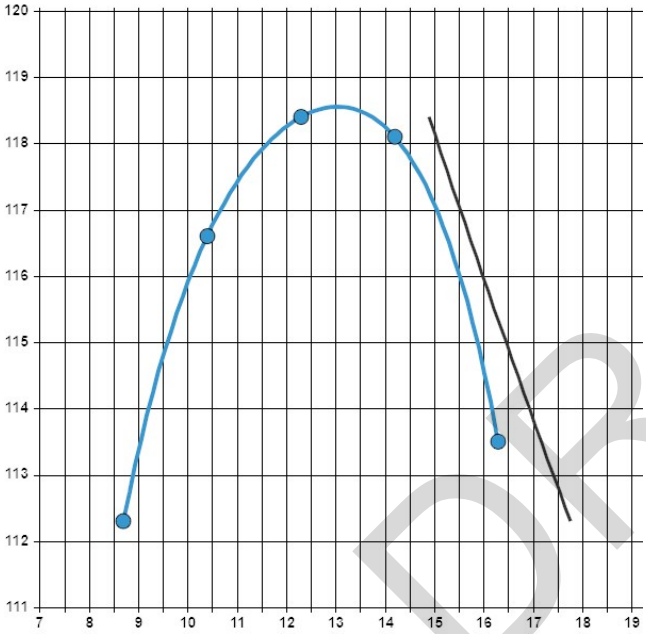
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577250
Boring Number: B-21
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-21
Sample Date: 01/22/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-21
Maximum Dry Density (pcf):	119.0
Optimum Moisture (%):	13.0
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	45
Plastic Limit:	15
Plastic Index:	30
Passes #200 (%):	76.1
Retained on #200:	23.9
Retained On #4 (%):	0.8
Mold Mass (gr):	4143.3
Mold Volume (cc):	941.5

DRAFT

Visual Manual Classification: CL Lean clay with sand, Brown & Gray, A-7-6(21)

General

Results: The test is for informational purposes.

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Modified Proctor M-D Relationship

ND T 180

02/14/2024

2908 Morrison Ave.
Suite 3
Bismarck, ND 58504
Phone: 701-255-7180

Client:

SRF Consulting Group, Inc.
3701 Wayzata Boulevard
Suite 100
Minneapolis, MN 55416

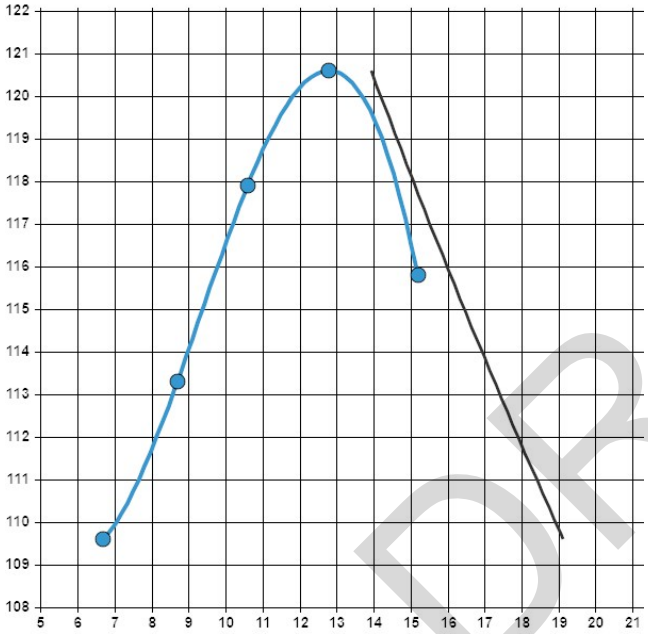
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577251
Boring Number: B-22
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-22
Sample Date: 01/24/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-22
Maximum Dry Density (pcf):	121.0
Optimum Moisture (%):	12.8
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	37
Plastic Limit:	15
Plastic Index:	22
Passes #200 (%):	58.8
Retained on #200:	41.2
Retained On #4 (%):	0.0
Mold Mass (gr):	4144.9
Mold Volume (cc):	943.9

Visual Manual Classification: CL Sandy lean clay, Brown, A-6(10)

DRAFT

General

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Client:

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Minneapolis, MN 55416

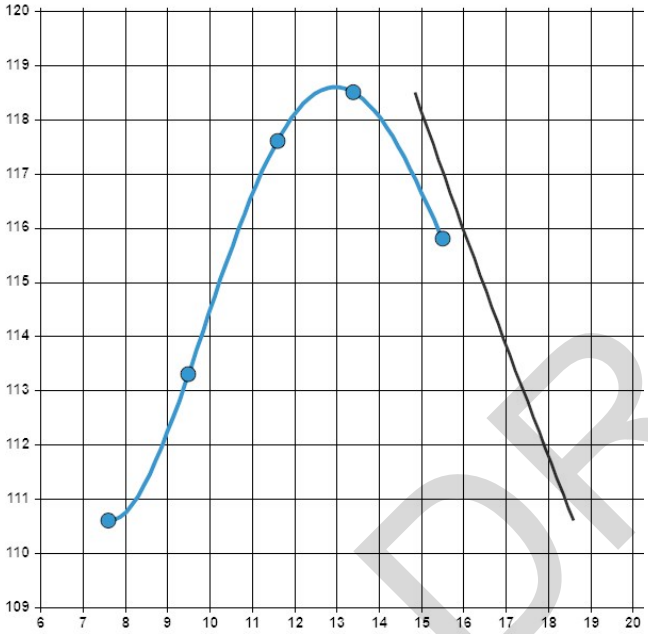
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 577252
Boring Number: B-23
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring B-23
Sample Date: 01/24/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 01/23/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 02/12/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-23
Maximum Dry Density (pcf):	119.0
Optimum Moisture (%):	13.0
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	45
Plastic Limit:	14
Plastic Index:	31
Passes #200 (%):	73.2
Retained on #200:	26.8
Retained On #4 (%):	0.3
Mold Mass (gr):	4143.0
Mold Volume (cc):	941.5

DRAFT

Visual Manual Classification: CL Lean clay with sand, Brown, A-7-6(21)

General

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Modified Proctor M-D Relationship

ND T 180

03/18/2024

2908 Morrison Ave.
Suite 3
Bismarck, ND 58504
Phone: 701-255-7180

Client:

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3701 Wayzata Boulevard
Suite 100
Minneapolis, MN 55416

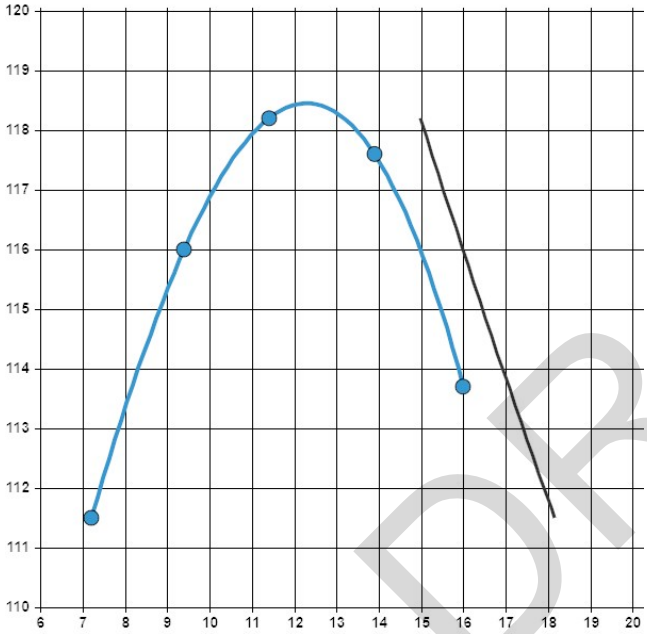
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 580172
Boring Number: ST-24
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring ST-24
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-24
Maximum Dry Density (pcf):	119.0
Optimum Moisture (%):	12.3
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	44
Plastic Limit:	14
Plastic Index:	30
Passes #200 (%):	79.1
Retained on #200:	20.9
Retained On #4 (%):	0.4
Mold Mass (gr):	4144.3
Mold Volume (cc):	943.9

Visual Manual Classification: CL Lean clay with sand, Brown, A-7-6(23)

DRAFT

General

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Modified Proctor M-D Relationship

ND T 180

03/18/2024

Client:

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3701 Wayzata Boulevard
Suite 100
Minneapolis, MN 55416

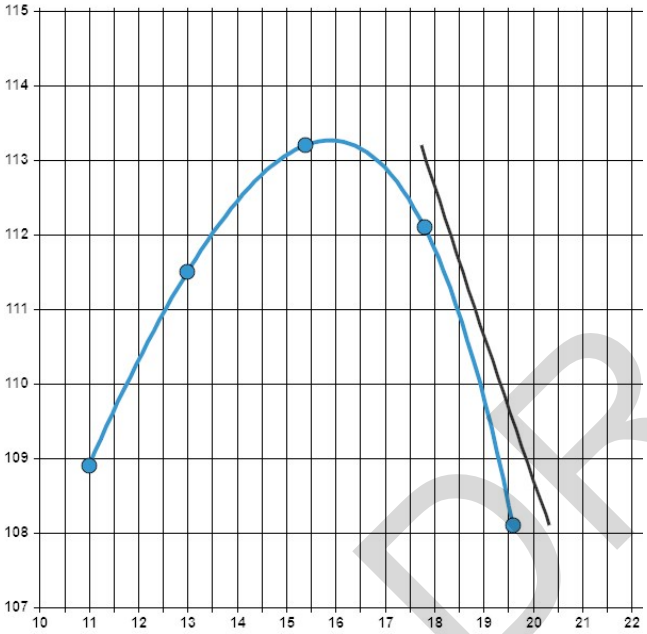
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 580173
Boring Number: ST-25
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring ST-25
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-25
Maximum Dry Density (pcf):	113.0
Optimum Moisture (%):	15.9
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.68
Liquid Limit:	53
Plastic Limit:	16
Plastic Index:	37
Passes #200 (%):	97.1
Retained on #200:	2.9
Retained On #4 (%):	0.5
Mold Mass (gr):	4144.2
Mold Volume (cc):	943.9

Visual Manual Classification: CH Fat Clay, Brown & Gray, A-7-6(39)

DRAFT

General

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Modified Proctor M-D Relationship

ND T 180

03/18/2024

Client:

SRF Consulting Group, Inc.
3701 Wayzata Boulevard
Suite 100
Minneapolis, MN 55416

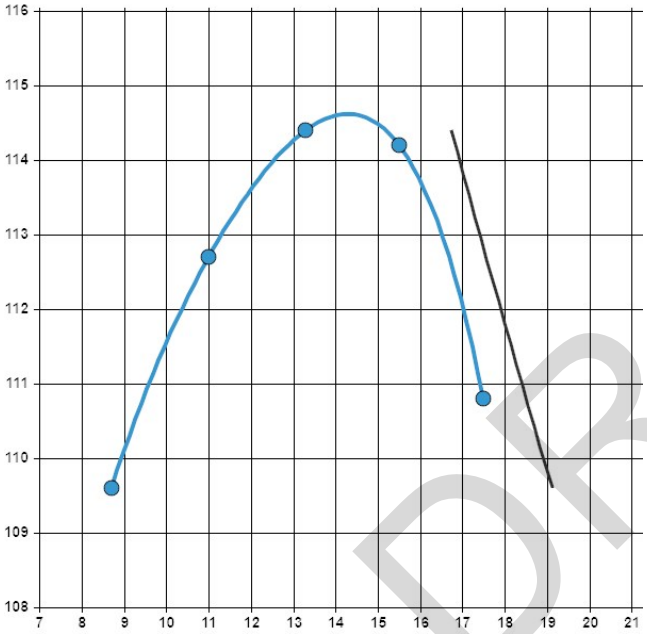
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 580174
Boring Number: ST-26
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring ST-26
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-26
Maximum Dry Density (pcf):	115.0
Optimum Moisture (%):	14.3
Method:	Method A
Rammer Type:	Manual Round
Specific Gravity:	2.65
Liquid Limit:	54
Plastic Limit:	15
Plastic Index:	39
Passes #200 (%):	83.9
Retained on #200:	16.1
Retained On #4 (%):	0.0
Mold Mass (gr):	4144.1
Mold Volume (cc):	943.9

Visual Manual Classification: CH Fat clay with sand, Brown, A-7-6(33)

DRAFT

General

Results: The test is for informational purposes.

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Modified Proctor M-D Relationship

ND T 180

03/18/2024

Client:

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3701 Wayzata Boulevard
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Minneapolis, MN 55416

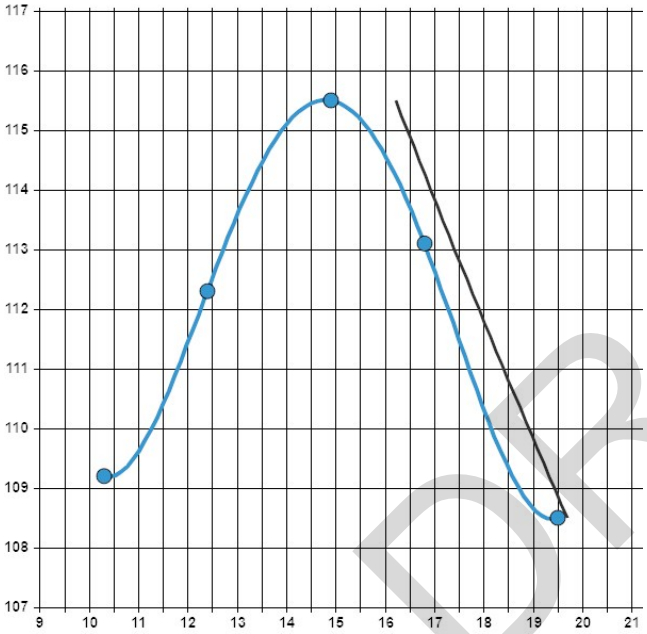
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 580175
Boring Number: ST-27
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring ST-27
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-27
Maximum Dry Density (pcf):	116.0
Optimum Moisture (%):	14.8
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	61
Plastic Limit:	16
Plastic Index:	45
Passes #200 (%):	95.9
Retained on #200:	4.1
Retained On #4 (%):	0.0
Mold Mass (gr):	4144.2
Mold Volume (cc):	943.9

Visual Manual Classification: CH Fat Clay, Brown to Gray, A-7-6(47)

General

Results: The test is for informational purposes.

DRAFT

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2908 Morrison Ave.
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Modified Proctor M-D Relationship

ND T 180

03/18/2024

Client:

SRF Consulting Group, Inc.
3701 Wayzata Boulevard
Suite 100
Minneapolis, MN 55416

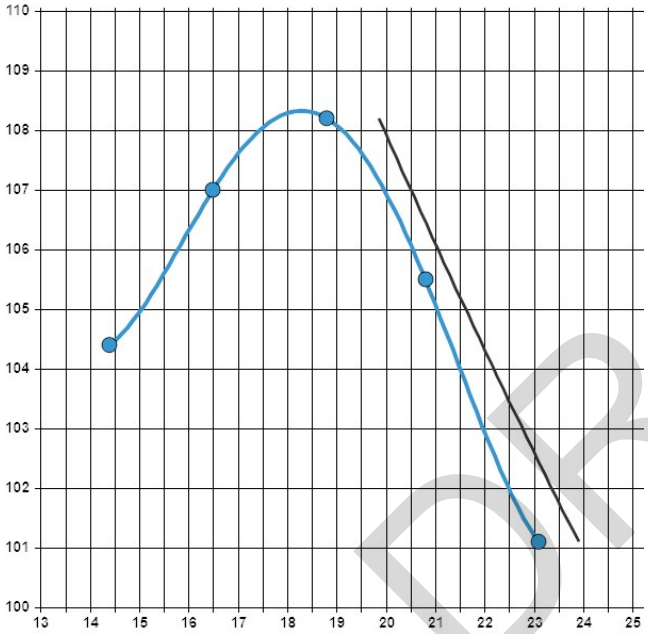
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 580176
Boring Number: ST-28
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring ST-28
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-28
Maximum Dry Density (pcf):	108.0
Optimum Moisture (%):	18.3
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	74
Plastic Limit:	20
Plastic Index:	54
Passes #200 (%):	98.7
Retained on #200:	1.3
Retained On #4 (%):	0.0
Mold Mass (gr):	4144.1
Mold Volume (cc):	943.9

Visual Manual Classification: CH Fat Clay, Brown & Gray, A-7-6(60)

DRAFT

General

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ND T 180

03/18/2024

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Suite 3
Bismarck, ND 58504
Phone: 701-255-7180

Client:

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3701 Wayzata Boulevard
Suite 100
Minneapolis, MN 55416

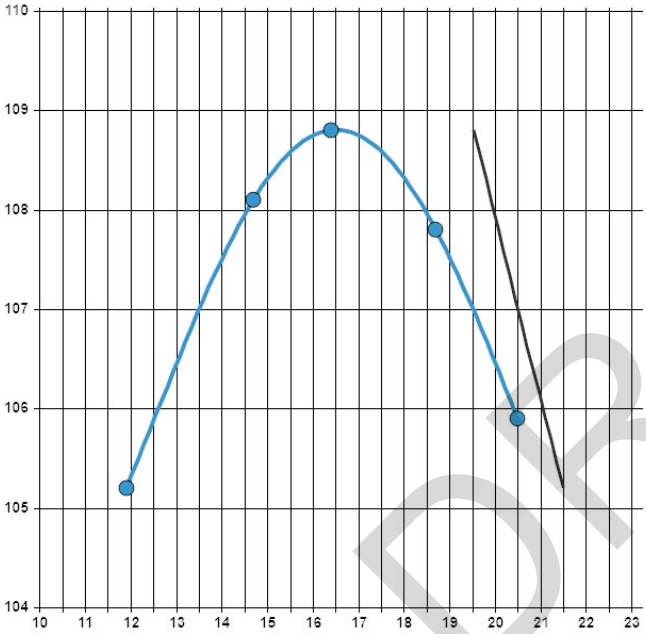
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 580177
Boring Number: ST-29
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring ST-29
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-29
Maximum Dry Density (pcf):	109.0
Optimum Moisture (%):	16.5
Method:	Method A
Rammer Type:	Manual Round
Specific Gravity:	2.65
Liquid Limit:	71
Plastic Limit:	18
Plastic Index:	53
Passes #200 (%):	97.2
Retained on #200:	2.8
Retained On #4 (%):	0.0
Mold Mass (gr):	4144.2
Mold Volume (cc):	943.9

Visual Manual Classification: CH Fat Clay, Brown, A-7-6(57)

DRAFT

General

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Modified Proctor M-D Relationship

ND T 180

03/18/2024

Client:

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3701 Wayzata Boulevard
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Minneapolis, MN 55416

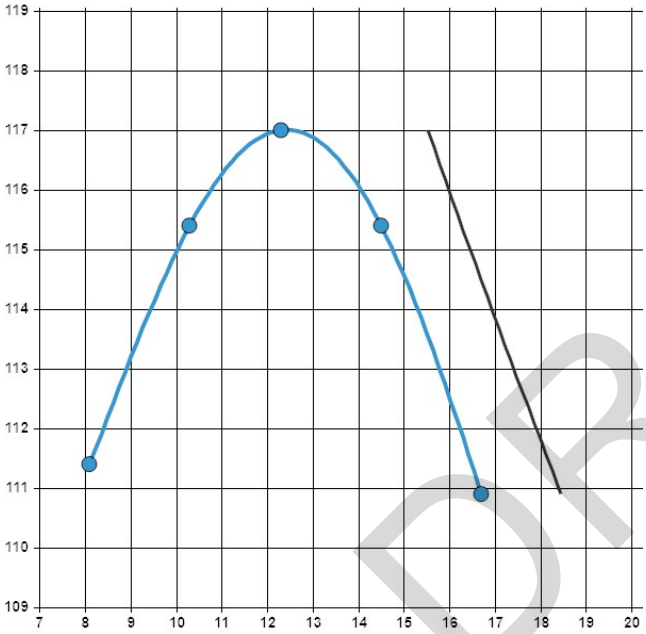
Project:

B2304521
SS-1-031(021)078; PCN 23324
Highway 31
New Salem, ND

Sample Information

Sample Number: 580178
Boring Number: ST-30
Sampling Method: Auger Boring ASTM D1452
Location Details: Boring ST-30
Sample Date: 02/29/2024
Depth (ft): 2'-15'
Sampled By: Drill Crew
Received Date: 03/01/2024
Lab: 2908 Morrison Ave. Suite 3, Bismarck, ND
Tested Date: 03/13/2024
Tested By: Ficek, Kevin

Laboratory Data



Proctor ID:	P-30
Maximum Dry Density (pcf):	117.0
Optimum Moisture (%):	12.4
Method:	Method A
Rammer Type:	Mechanical Round
Specific Gravity:	2.65
Liquid Limit:	46
Plastic Limit:	15
Plastic Index:	31
Passes #200 (%):	77.9
Retained on #200:	22.1
Retained On #4 (%):	0.4
Mold Mass (gr):	4144.0
Mold Volume (cc):	943.9

DRAFT

Visual Manual Classification: CL Lean clay with sand, Brown, A-7-6(23)

General

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