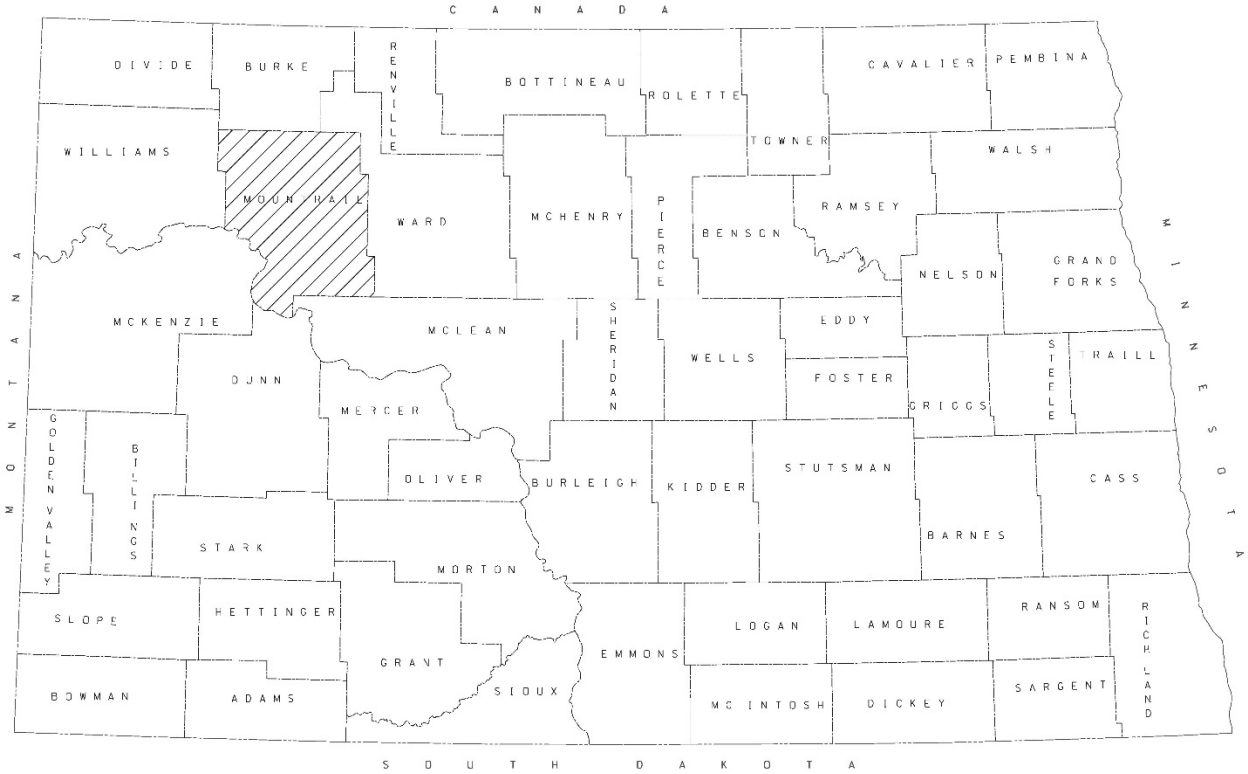
Borrow Site Report

PROJECT NO. SS-SOIB-7-804(050)248

PCN 20326

COUNTY Mountrail

ND Highway 1804 From RP 248.615 to RP 267.349



PREPARED BY: Jordan M. Nehls, P.E.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH DIVISION

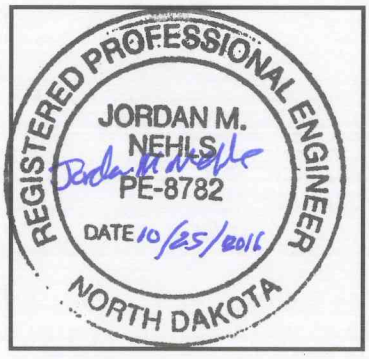
October 2016

SS-SOIB-7-804(050)248

Highway 1804 From New Town Truck Reliever Route to 16 Miles East of Junction Tioga Road

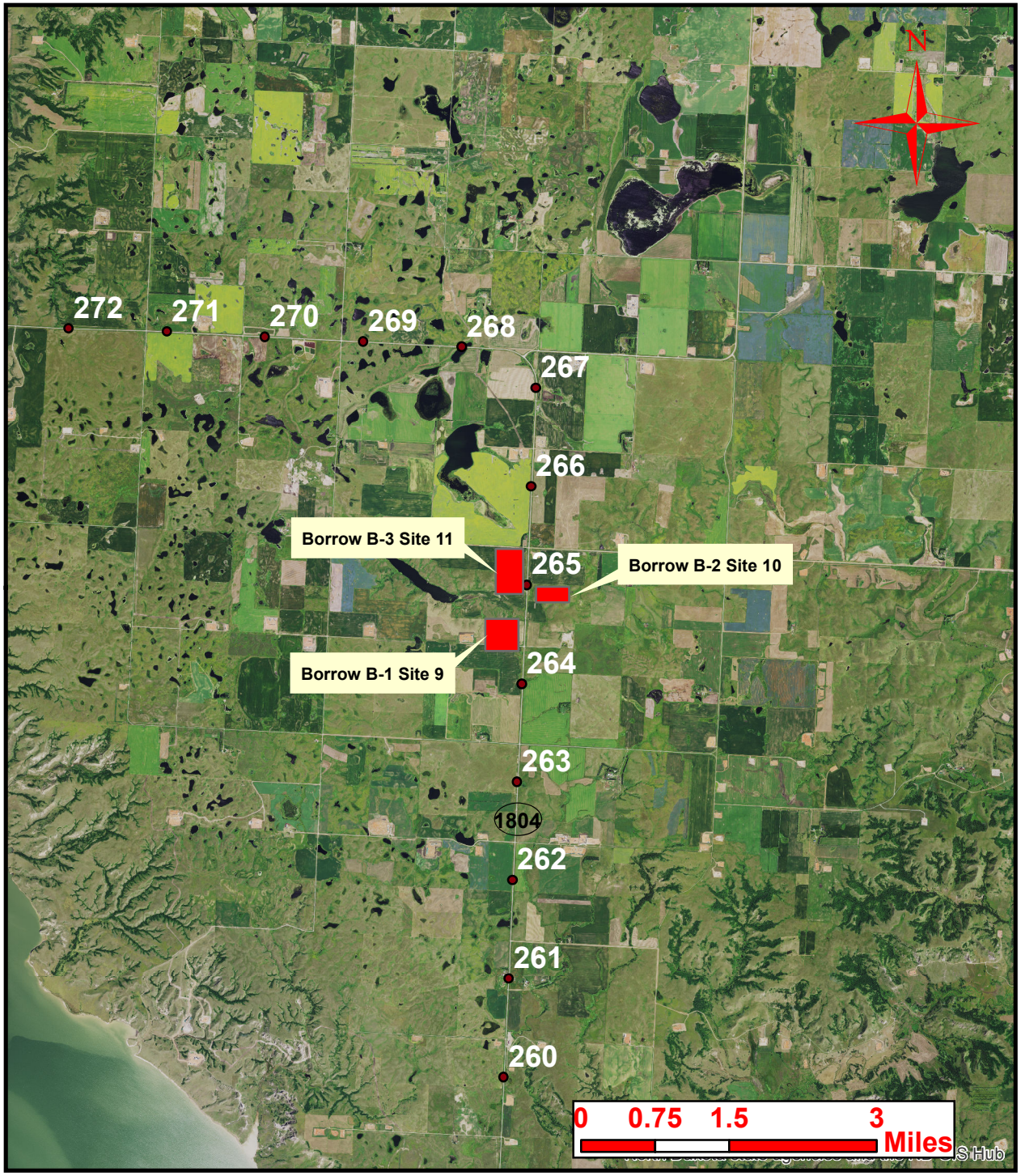
CERTIFICATION

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the State of North Dakota. This document was originally issued and sealed by Jordan M. Nehls, Registration number PE-8782 on 10/25/2016 and the original document is stored at the North Dakota Department of Transportation.



Jordan M. Nehls
Jordan M. Nehls, P.E.

10/25/2016
Date



Borrow Site Investigation

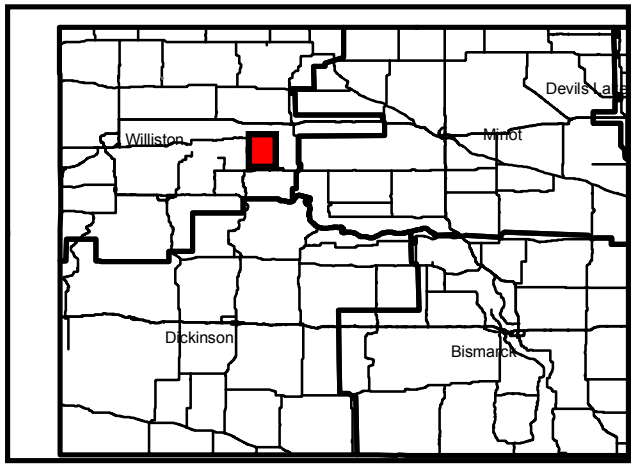
Project: SS-SOIB-7-804(050)248

PCN: 20326

Scope: Grade, Hot Bituminous Surfacing, Aggregate Base

Length:18.50 Miles

Location: Highway 1804 From New Town Truck Reliever Route To 16 Miles East of Junction Tioga Road



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Introduction

This report includes the investigation of the borrow sites on project SS-SOIB-7-804(050)248. The field and subsurface investigation was conducted on 9/26/2016 and 9/27/2016 in order to develop this report.

Sampling and Testing Procedures:

Borings were conducted with a six inch solid flight auger. Soil samples were taken at each boring location. Borings that had significant changes in soil type were split into separate samples. Moisture content samples were taken at 1 foot intervals.

The samples were submitted to the laboratory for determination of AASHTO classification, moisture content, dry density, sieve analysis, and Atterberg limits.

Borrow B-1 Site 9

This borrow site was drilled on 9/26/2016. A total of 29 borings were conducted at this location. Based on the similarity of the soils the samples were paired back and some were only tested for moisture content. Additional testing was run on the borings listed below. A summary of the boring data is shown in Table 1. Detailed data is in Appendix B.

Table 1 - Summary of Borrow B-1 Site 9

Boring Number	Lab Number	NDDOT Textural Class	AASHTO Class	Depth of Sample	Average In Place Moisture Content	Optimum Moisture Content T-180	Max Dry Density
				feet	%	%	lb/ft^3
2	1157	CLY LM	A-6(8)	2.3–5.0	8.0	10.2	125.9
4	1159	CLY	A-6(13)	0.7-5.0	14.0	10.5	126.1
6	1161	CLY	A-6(14)	0.9-5.0	16.2	10.9	123.4
7	1162	CLY	A-6(14)	0.9-5.0	11.9	10.5	125.5
8	1163	CLY	A-7-6(18)	0.9-5.0	17.9	12.2	121.2
9	1164	CLY	A-7-6(16)	0.8-5.0	12.3	11.3	122.9
11	1166	SNDY CLY LM	A-6(4)	1.0-5.0	10.4	9.5	127.4
13	1168	CLY	A-7-6(17)	0.9-5.0	13.1	10.6	125.6
14	1169	CLY	A-6(14)	0.8-5.0	13.6	10.8	125.6
15	1170	CLY	A-7-6(16)	1.2-5.0	12.0	11.6	121.9
16	1171	CLY	A-7-6(20)	0.8-5.0	14.1	12.7	119.1
17	1172	CLY	A-7-6(21)	0.9-10.0	14.5	12.4	121.2
18	1173	CLY	A-7-6(27)	1.1-5.0	17.3	13.8	115.9
21	1176	CLY	A-7-6(18)	0.8-5.0	18.7	11.8	123.4
23	1178	CLY	A-7-6(18)	0.9-5.0	17.6	13.0	119
24	1179	CLY	A-7-6(22)	0.8-5.0	19.7	13.2	118.5
25	1180	CLY	A-7-6(20)	1.2-5.0	16.3	12.5	120.3
27	1182	CLY	A-7-6(17)	0.9-5.0	16.5	12.5	120.9
29	1184	CLY	A-7-6(23)	0.9-5.0	14.7	12.0	121.7

Borrow B-2 Site 10

This borrow site was drilled on 9/27/2016. A total of 22 borings were conducted at this location. Based on the similarity of the soils the samples were paired back and some were only tested for moisture content. Additional testing was run on the borings listed below. A summary of the boring data is shown in Table 2. Detailed data is in Appendix C.

Table 2 - Summary of Borrow B-2 Site 10

Boring Number	Lab Number	NDDOT Textural Class	AASHTO Class	Depth of Sample	Average In Place Moisture Content	Optimum Moisture Content T-180	Max Dry Density
				feet	%	%	lb/ft^3
1	1185	CLY	A-6(12)	1.0–5.0	10.8	8.9	126.8
3	1187	CLY	A-6(14)	0.9–5.0	13.9	11.0	125.5
5	1189	CLY	A-7-6(19)	0.9–5.0	14.2	12.4	122.3
7	1191	CLY	A-7-6(12)	0.9–5.0	14.7	11.0	124.0
8	1192	CLY	A-7-6(20)	0.9–5.0	16.0	12.4	120.4
10	1194	CLY	A-7-6(18)	0.8–5.0	11.0	12.2	121.6
12	1196	CLY	A-7-6(17)	0.9–5.0	13.5	11.6	122.6
14	1198	CLY	A-7-6(24)	0.6–5.0	14.3	13.0	120.1
16	1200	CLY	A-7-6(14)	0.8–5.0	14.1	11.1	124.2
17	1201	CLY	A-7-6(16)	0.8–5.0	13.9	10.5	124.2
18	1202	CLY	A-7-6(14)	0.8–5.0	15.7	12.3	118.8
21	1205	CLY	A-7-6(24)	0.7–5.0	14.7	11.9	121.3
22	1206	CLY	A-7-6(23)	0.7–10.0	19.6	12.6	121.6

Borrow B-3 Site 11

This borrow site was drilled on 9/27/2016. A total of 23 borings were conducted at this location. Based on the similarity of the soils the samples were paired back and some were only tested for moisture content. Additional testing was run on the borings listed below. A summary of the boring data is shown in Table 3. Detailed data is in Appendix D.

Table 3 - Summary of Borrow B-3 Site 10

Boring Number	Lab Number	NDDOT Textural Class	AASHTO Class	Depth of Sample	Average In Place Moisture Content	Optimum Moisture Content T-180	Max Dry Density
				feet	%	%	lb/ft^3
1	1207	CLY	A-6(13)	0.8–5.0	14.8	11.8	121.6
2	1208	CLY	A-7-6(19)	0.6–5.0	16.6	11.9	121.8
4	1210	CLY	A-7-6(13)	0.7–5.0	11.1	11.0	123.3
6	1212	CLY	A-7-6(15)	0.7–5.0	12.0	10.3	125.0
8	1214	CLY	A-7-6(14)	0.7–5.0	10.3	10.8	123.9
10	1216	CLY	A-7-6(13)	0.6–5.0	8.0	10.7	123.6

Boring Number	Lab Number	NDDOT Textural Class	AASHTO Class	Depth of Sample	Average In Place Moisture Content	Optimum Moisture Content T-180	Max Dry Density
				feet	%	%	lb/ft^3
12	1218	CLY	A-7-6(15)	0.7–5.0	17.0	10.4	126.1
13	1219	CLY	A-7-6(14)	0.7–5.0	13.5	11.1	124.0
14	1220	SNDY CLY	A-6(4)	0.7–5.0	10.7	8.9	130.3
16	1222	CLY	A-6(12)	0.8–5.0	14.1	11.4	124.1
17	1223	CLY	A-7-6(15)	0.7–5.0	13.6	10.3	126.6
18	1224	CLY	A-6(11)	0.7–10.0	12.7	10.4	126.0
20	1226	CLY	A-7-6(24)	0.8–5.0	14.8	11.8	121.5
22	1228	CLY	A-6(12)	0.8–5.0	14.2	11.6	121.1

Summary and Recommendations

Borrow B-1 Site 9 Recommendation

All of the soils encountered in Borrow B-1 Site 9 were classified as A-6 or A-7-6 soils with marginal swell potential and low group index on average. The soils generally have a moisture content 0-6% over optimum. The soils appear to be fairly uniform throughout the borrow pit.

The material in this borrow site will perform adequately as subgrade material.

Borrow B-2 Site 10 Recommendation

All of the soils encountered in Borrow B-2 Site 10 were classified as A-6 or A-7-6 soils with low to marginal swell potential and low group index on average. The soils generally have a moisture content 0-6% over optimum. The soils appear to be fairly uniform throughout the borrow pit.

The material in this borrow site will perform adequately as subgrade material.

Borrow B-3 Site 11 Recommendation

All of the soils encountered in Borrow B-3 Site 11 were classified as A-6 or A-7-6 soils with low to marginal swell potential and low group index on average. The soils generally have a moisture content 0-6% over optimum. The soils appear to be fairly uniform throughout the borrow pit.

The material in this borrow site will perform adequately as subgrade material.

Moisture and Density Controls

Moisture and Density for all borrow material shall be in accordance with AASHTO T-180.

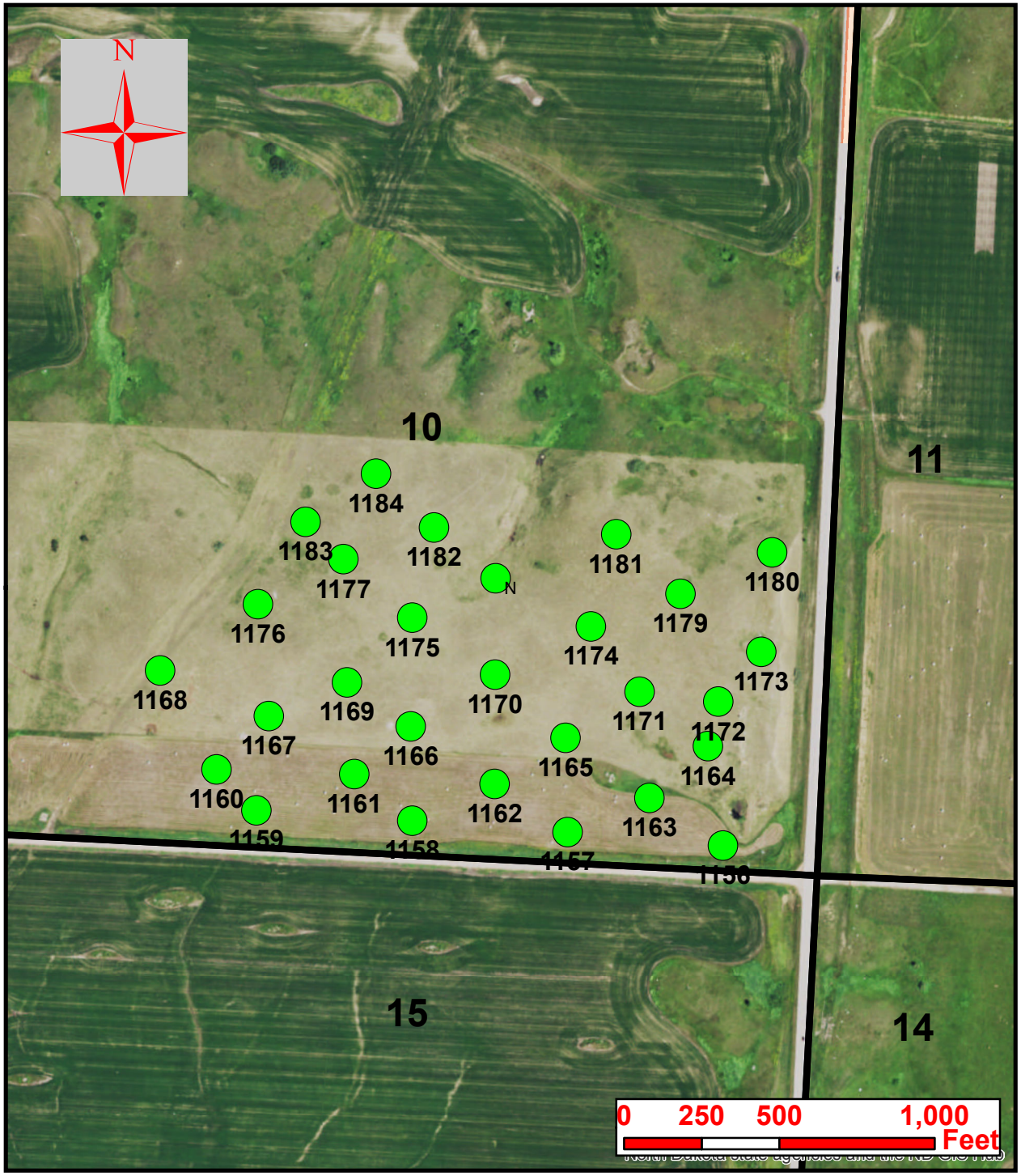
APPENDIX A

Map of Boring Locations

Borrow B-1 Site 9

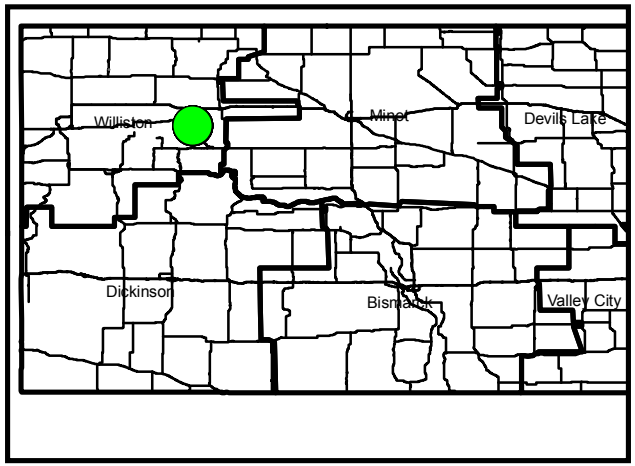
Project: SS-SOIB-7-804(050)248
PCN: 20326

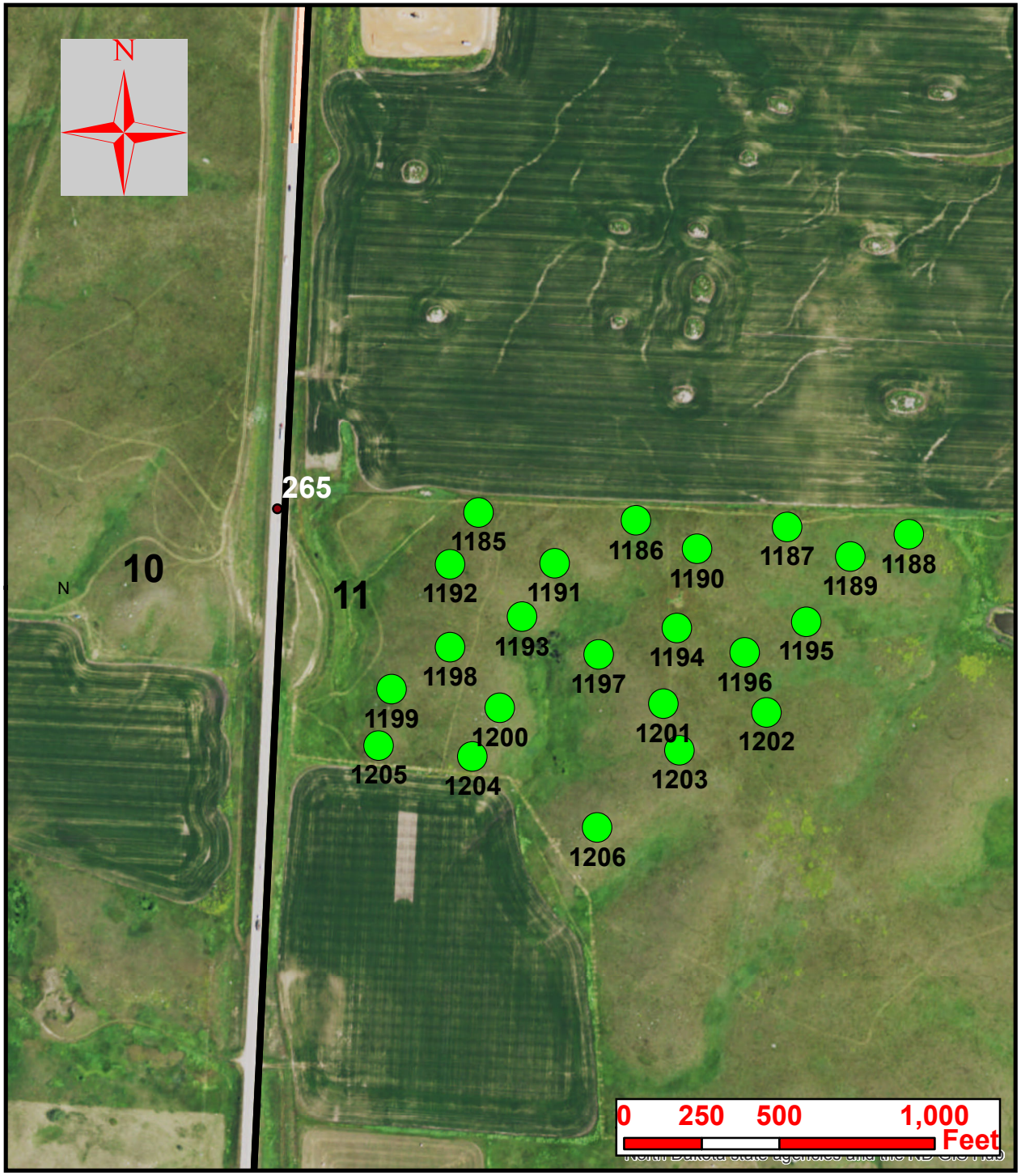
Location: SE 1/4
Sec10, T.154N, R.93W



Legend

Boring Location





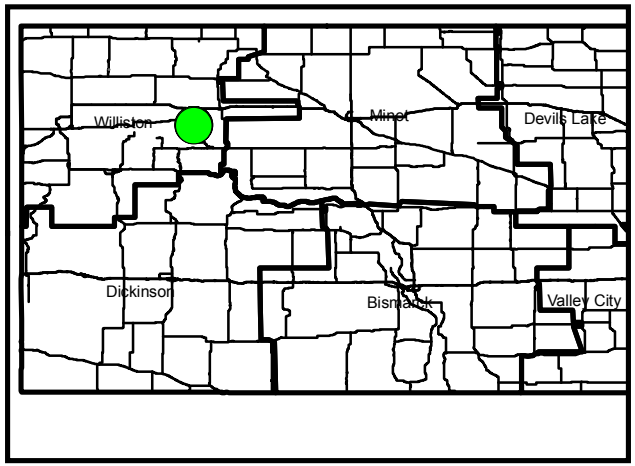
Borrow B-2 Site 10

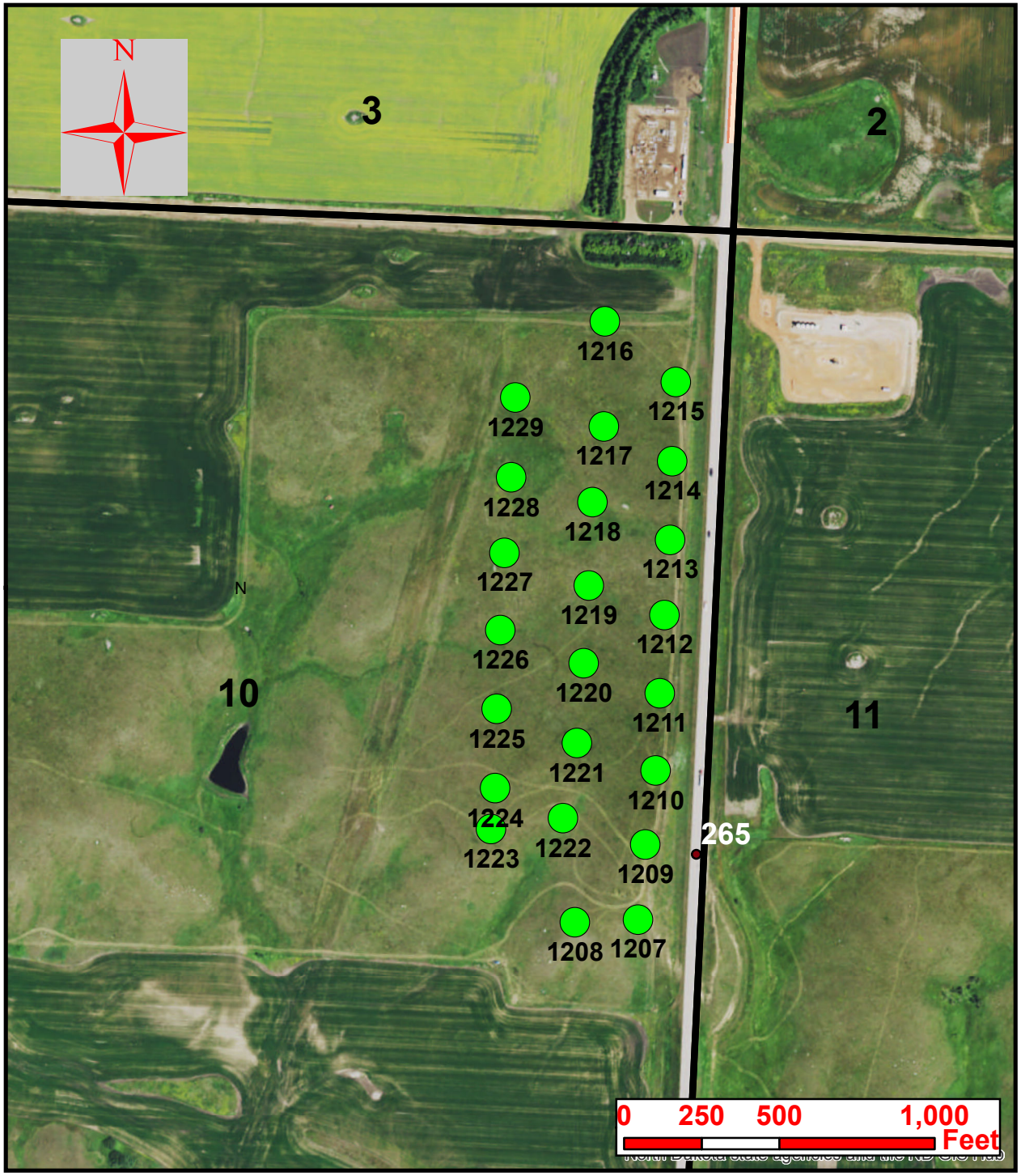
Project: SS-SOIB-7-804(050)248
PCN: 20326

Location: S 1/2, NW 1/4, N 1/2, SW 1/4
Sec11, T.154N, R.93W

Legend

Boring Location





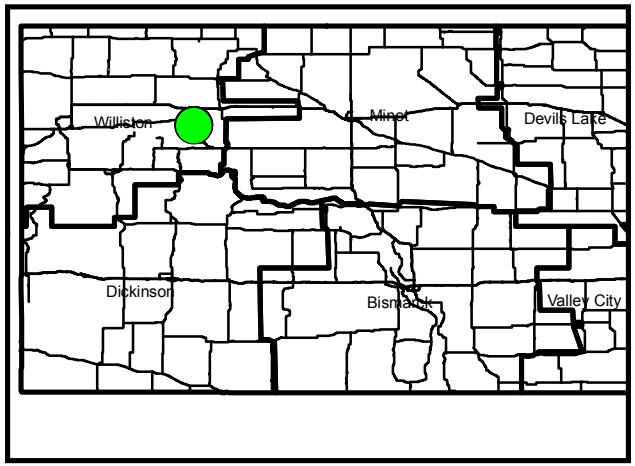
Borrow B-3 Site 11

Project: SS-SOIB-7-804(050)248
PCN: 20326

Location: E 1/2, NE 1/4
Sec10, T.154N, R.93W

Legend

Boring Location



APPENDIX B

Summary and Lab Results For Borrow B-1 Site 9

Project No.:

PCN:

Color Key

Swell Potential:	Low	Marginal	High	Moisture Content:	Below PL / 0-5% Over PL / >5% Over PL
Group Index:	GI≤20	GI>20		Ave. In-Place: Moisture Content	MC < Opt. / 0 ≤ MC < 6% Over opt. / 6 ≤ MC < 10% Over opt. / 10 ≤ MC < 16% Over opt. / MC >16% Over opt.

Lab No.	STA	Offset	Depth of Sample (ft)	Plastic Limit (PL)	AASHTO Class	Group Index	Optimum Moisture	Swell Potential (PI)	Ave. In-Place Moisture	Moisture Content @ Depth (ft) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Frost Class
			0-0						7.3	9.2	-22.0	11.8	14.0																					
			0-0						12.2	9.2	9.0	9.4	11.8																					
			0-0						14.2	13.1	11.2	12.0	11.5																					
			0-0						11.9	7.6	8.9	8.9	10.4																					
			0-0						13.5	11.7	11.0	11.0	12.8																					
			0-0						20.5	19.0	16.8	23.8	19.8																					
			0-0						12.6	9.1	9.0	9.6	9.5																					
			0-0						16.4	13.7	13.7	16.4	17.3																					
			0-0						7.9	-31.8	16.0	16.1	16.4																					
1157	264+2090	Lt 856 WB	2.3-5	15.6	A-6(8)	8	10.2	21	12.5	17.0	6.3	8.6	9.3																					F3
1158	264+2090	Lt 1356 WB	1.1-5	0.0				0	10.6	10.5	2.6	5.1	6.2																					
1159	264+2090	Lt 1856 WB	0.7-5	14.5	A-6(13)	13	10.5	25	13.9	10.1	11.0	11.6	11.9																					F3
1161	264+2215	Lt 1571 EB	0.9-5	15.4	A-6(14)	14	10.9	24	16.2	11.6	12.6	13.6	13.8																					F3

Project No.: SS-7-804(050)248 B1 Site 9

PCN: 20326

Color Key

Swell Potential:	Low	Marginal	High	Moisture Content:	Below PL	0-5% Over PL	>5% Over PL	
Group Index:	GI≤20	GI>20		Ave. In-Place: Moisture Content	MC < Opt.	0 ≤ MC < 6% Over opt.	6 ≤ MC < 10% Over opt.	10 ≤ MC < 16% Over opt.	MC >16% Over opt.

Lab No.	STA	Offset	Depth of Sample (ft)	Plastic Limit (PL)	AASHTO Class	Group Index	Optimum Moisture	Swell Potential (PI)	Ave. In-Place Moisture	Moisture Content @ Depth (ft)																									Frost Class
										2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		
1162	264+2215	Lt 1119 EB	0.9-5	14.3	A-6(14)	14	10.5	25	11.9	8.6	8.6	9.3	9.1																						F3
1163	264+2215	Lt 619 EB	0.9-5	16.6	A-7-6(18)	18	12.2	27	17.8	10.8	12.6	15.2	16.1																						F3
1164	264+2340	Lt 400 EB	0.8-5	16.5	A-7-6(16)	16	11.3	26	12.2	9.7	10.8	7.6	12.3																						F3
1166	264+2340	Lt 1350 NB	1-5	13.5	A-6(4)	4	9.5	20	10.5	4.5	5.5	8.9	10.2																						F3
1168	264+2465	Lt 2132 NB	0.9-5	15.0	A-7-6(17)	17	10.6	28	13.1	10.4	12.0	12.1	13.4																						F3
1169	264+2465	Lt 1546 EB	0.8-5	14.6	A-6(14)	14	10.8	24	13.6	9.8	9.4	12.0	12.4																						F3
1170	264+2465	Lt 1046 EB	1.2-5	15.7	A-7-6(16)	16	11.6	26	15.3	16.5	10.0	10.9	10.9																						F3
1171	264+2465	Lt 604 EB	0.8-5	18.2	A-7-6(20)	20	12.7	28	14.2	10.6	11.7	12.2	14.2																						F3
1172	264+2465	Lt 335 EB	0.9-10	16.9	A-7-6(21)	21	12.4	29	14.4	12.7	12.6	12.4	14.0	12.1	13.8	14.9	13.4	14.2																	F3
1173	264+2600	Lt 150 EB	1.1-5	20.6	A-7-6(27)	27	13.8	34	19.2	17.4	16.5	18.6	16.7																						F3
1176	264+2600	Lt 1815 EB	0.8-5	15.7	A-7-6(18)	18	11.8	27	18.7	21.5	13.9	14.8	17.2																						F3
1178	264+2725	Lt 1115 EB	0.9-5	18.5	A-7-6(18)	18	13.0	28	17.6	21.4	7.5	13.4	17.4																						F3
1179	264+2725	Lt 600 EB	0.8-5	19.7	A-7-6(22)	22	13.2	30	19.6	19.1	18.3	16.3	19.2																						F3

Project No.: SS-7-804(050)248 B1 Site 9

PCN: 20326

Color Key

Swell Potential:	Low	Marginal	High		
Moisture Content:	Below PL	0-5% Over PL	>5% Over PL		
Group Index:	GI≤20	GI>20			
Ave. In-Place: Moisture Content	MC < Opt.	0 ≤ MC < 6% Over opt.	6 ≤ MC < 10% Over opt.	10 ≤ MC < 16% Over opt.	MC >16% Over opt.

Lab No.	STA	Offset	Depth of Sample (ft)	Plastic Limit (PL)	AASHTO Class	Group Index	Optimum Moisture	Swell Potential (PI)	Ave. In-Place Moisture	Moisture Content @ Depth (ft)																									Frost Class
										2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		
1180	264+2910	Lt 230 NB	1.2-5	18.4	A-7-6(20)	20	12.5	28	19.6	11.0	17.6	18.5	18.0																						F3
1182	264+2910	Lt 1350 WB	0.9-5	16.3	A-7-6(17)	17	12.5	25	16.5	16.3	12.4	16.5	15.9																						F3
1184	264+3204	Lt 1550 EB	0.9-5	17.1	A-7-6(23)	23	12.0	31	14.7	9.7	11.0	14.1	16.7																						F3

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-56-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B1 Site 9
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1156	1157	1158	1159
Reference Pt + Feet	264+2090	264+2090	264+2090	264+2090
Distance From CenterLine (Ft.)	Lt 258 WB	Lt 856 WB	Lt 1356 WB	Lt 1856 WB
Depth, Ft.	0.7 - 5.0	2.3 - 5.0	1.1 - 5.0	0.7 - 5.0
Field Sample No.	1156	1157	1158	1159
% Pass. 3/8" Sieve		89	0	96
% Pass. No. 4 Sieve		86	0	94
% Pass. No. 10 Sieve		82	0	92
% Coarse Sand (-No. 10 + No. 40)		9		7
% Fine Sand (-No. 40 + No. 200)		19		19
% Silt (0.074 - 0.005 mm)		25	0	28
% Clay (-0.005 mm)		30	0	37
Liquid Limit (-No. 40)		36	0	39
Plasticity Index (-No. 40)		21	NP	25
Plastic Limit		16	0	15
Soil Color	BRN/TAN	BRN	BRN	BRN/TAN
Textural Class		CLY LM		CLY
Soil Class (AASHTO M-145)		A-6(8)		A-6(13)
Frost Class		F3		F3
Optimum Moisture (%)		10.2		10.5
Maximum Dry Density (pcf)		125.9		126.1
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 23.3	1 | 21.2	1 | 28.4	1 | 25.1
	2 | 13.1	2 | 17.0	2 | 10.5	2 | 10.1
	3 | 11.2	3 | 6.3	3 | 2.6	3 | 11.0
	4 | 12.0	4 | 8.6	4 | 5.1	4 | 11.6
	5 | 11.5	5 | 9.3	5 | 6.2	5 | 11.9
Avg. Moisture of Sample Depth	14.2	8.0	6.0	14.0

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-56-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B1 Site 9
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1160	1161	1162	1163
Reference Pt + Feet	264+2215	264+2215	264+2215	264+2215
Distance From CenterLine (Ft.)	Lt 1856 WB	Lt 1571 EB	Lt 1119 EB	Lt 619 EB
Depth, Ft.	0.7 - 5.0	0.9 - 5.0	0.9 - 5.0	0.9 - 5.0
Field Sample No.	1160	1161	1162	1163
% Pass. 3/8" Sieve		95	98	100
% Pass. No. 4 Sieve		94	96	98
% Pass. No. 10 Sieve		92	94	96
% Coarse Sand (-No. 10 + No. 40)		7	7	4
% Fine Sand (-No. 40 + No. 200)		19	19	20
% Silt (0.074 - 0.005 mm)		30	31	29
% Clay (-0.005 mm)		37	37	43
Liquid Limit (-No. 40)		40	39	44
Plasticity Index (-No. 40)		24	25	27
Plastic Limit		15	14	17
Soil Color	BRN/TAN	BRN	BRN/TAN	BRN/TAN
Textural Class		CLY	CLY	CLY
Soil Class (AASHTO M-145)		A-6(14)	A-6(14)	A-7-6(18)
Frost Class		F3	F3	F3
Optimum Moisture (%)		10.9	10.5	12.2
Maximum Dry Density (pcf)		123.4	125.5	121.2
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 25.8	1 | 29.2	1 | 23.9	1 | 34.5
	2 | 9.1	2 | 11.6	2 | 8.6	2 | 10.8
	3 | 9.0	3 | 12.6	3 | 8.6	3 | 12.6
	4 | 9.6	4 | 13.6	4 | 9.3	4 | 15.2
	5 | 9.5	5 | 13.8	5 | 9.1	5 | 16.1
Avg. Moisture of Sample Depth	12.6	16.2	11.9	17.9

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-56-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B1 Site 9
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1164	1165	1166	1167
Reference Pt + Feet	264+2340	264+2340	264+2340	264+2340
Distance From CenterLine (Ft.)	Lt 400 EB	Lt 850 EB	Lt 1350 NB	Lt 1800 NB
Depth, Ft.	0.8 - 5.0	1.0 - 5.0	1.0 - 5.0	0.9 - 5.0
Field Sample No.	1164	1165	1166	1167
% Pass. 3/8" Sieve	97		76	
% Pass. No. 4 Sieve	94		73	
% Pass. No. 10 Sieve	90		69	
% Coarse Sand (-No. 10 + No. 40)	8		8	
% Fine Sand (-No. 40 + No. 200)	14		17	
% Silt (0.074 - 0.005 mm)	34		21	
% Clay (-0.005 mm)	34		24	
Liquid Limit (-No. 40)	43		33	
Plasticity Index (-No. 40)	26		20	
Plastic Limit	17		14	
Soil Color	BRN/TAN	BRN/BLK	BRN/BLK	BRN/TAN
Textural Class	CLY		SNDY CLY LM	
Soil Class (AASHTO M-145)	A-7-6(16)		A-6(4)	
Frost Class	F3		F3	
Optimum Moisture (%)	11.3		9.5	
Maximum Dry Density (pcf)	122.9		127.4	
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 20.8	1 | 23.6	1 | 23.2	1 | 21.7
	2 | 9.7	2 | 7.6	2 | 4.5	2 | 9.2
	3 | 10.8	3 | 8.9	3 | 5.5	3 | 9.0
	4 | 7.6	4 | 8.9	4 | 8.9	4 | 9.4
	5 | 12.3	5 | 10.4	5 | 10.2	5 | 11.8
Avg. Moisture of Sample Depth	12.3	11.9	10.4	12.2

Scott W. Wutzke, Testing Lab Supervisor
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Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-56-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B1 Site 9
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1168	1169	1170	1171
Reference Pt + Feet	264+2465	264+2465	264+2465	264+2465
Distance From CenterLine (Ft.)	Lt 2132 NB	Lt 1546 EB	Lt 1046 EB	Lt 604 EB
Depth, Ft.	0.9 - 5.0	0.8 - 5.0	1.2 - 5.0	0.8 - 5.0
Field Sample No.	1168	1169	1170	1171
% Pass. 3/8" Sieve	97	100	97	97
% Pass. No. 4 Sieve	95	99	94	96
% Pass. No. 10 Sieve	93	96	92	96
% Coarse Sand (-No. 10 + No. 40)	7	8	6	3
% Fine Sand (-No. 40 + No. 200)	18	20	17	19
% Silt (0.074 - 0.005 mm)	31	30	30	33
% Clay (-0.005 mm)	37	38	39	41
Liquid Limit (-No. 40)	43	39	42	47
Plasticity Index (-No. 40)	28	25	26	28
Plastic Limit	15	15	16	18
Soil Color	BRN/TAN	BRN	BRN/BLK	BRN/TAN
Textural Class	CLY	CLY	CLY	CLY
Soil Class (AASHTO M-145)	A-7-6(17)	A-6(14)	A-7-6(16)	A-7-6(20)
Frost Class	F3	F3	F3	F3
Optimum Moisture (%)	10.6	10.8	11.6	12.7
Maximum Dry Density (pcf)	125.6	125.6	121.9	119.1
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 17.6	1 | 24.4	1 | 28.1	1 | 22.1
	2 | 10.4	2 | 9.8	2 | 16.5	2 | 10.6
	3 | 12.0	3 | 9.4	3 | 10.0	3 | 11.7
	4 | 12.1	4 | 12.0	4 | 10.9	4 | 12.2
	5 | 13.4	5 | 12.4	5 | 10.9	5 | 14.2
Avg. Moisture of Sample Depth	13.1	13.6	12.0	14.1

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-56-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B1 Site 9
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1172	1173	1174	1175
Reference Pt + Feet	264+2465	264+2600	264+2600	264+2600
Distance From CenterLine (Ft.)	Lt 335 EB	Lt 150 EB	Lt 750 EB	Lt 1315 EB
Depth, Ft.	0.9 - 10.0	1.1 - 5.0	0.8 - 5.0	0.9 - 5.0
Field Sample No.	1172	1173	1174	1175
% Pass. 3/8" Sieve	100	95		
% Pass. No. 4 Sieve	100	94		
% Pass. No. 10 Sieve	98	93		
% Coarse Sand (-No. 10 + No. 40)	4	3		
% Fine Sand (-No. 40 + No. 200)	20	12		
% Silt (0.074 - 0.005 mm)	33	25		
% Clay (-0.005 mm)	42	53		
Liquid Limit (-No. 40)	46	55		
Plasticity Index (-No. 40)	29	34		
Plastic Limit	17	21		
Soil Color	BRN/TAN	BRN/BLK	BRN/TAN	BRN
Textural Class	CLY	CLY		
Soil Class (AASHTO M-145)	A-7-6(21)	A-7-6(27)		
Frost Class	F3	F3		
Optimum Moisture (%)	12.4	13.8		
Maximum Dry Density (pcf)	121.2	115.9		
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 24.0	1 | 27.0	1 | 21.2	1 | 23.6
	2 | 12.7	2 | 17.4	2 | 11.7	2 | 9.2
	3 | 12.6	3 | 16.5	3 | 11.0	3 | 9.9
	4 | 12.4	4 | 18.6	4 | 11.0	4 | 11.8
	5 | 14.0	5 | 16.7	5 | 12.8	5 | 14.0
	6 | 12.1	17.3	13.5	13.7
	7 | 13.8			
	8 | 14.9			
	9 | 13.4			
	10 | 14.2			
Avg. Moisture of Sample Depth	14.5			

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-56-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B1 Site 9
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1176	1177	1178	1179
Reference Pt + Feet	264+2600	264+2725	264+2725	264+2725
Distance From CenterLine (Ft.)	Lt 1815 EB	Lt 1615 EB	Lt 1115 EB	Lt 600 EB
Depth, Ft.	0.8 - 5.0	0.8 - 5.0	0.9 - 5.0	0.8 - 5.0
Field Sample No.	1176	1177	1178	1179
% Pass. 3/8" Sieve	100		99	100
% Pass. No. 4 Sieve	99		97	100
% Pass. No. 10 Sieve	97		94	99
% Coarse Sand (-No. 10 + No. 40)	6		7	4
% Fine Sand (-No. 40 + No. 200)	19		18	20
% Silt (0.074 - 0.005 mm)	29		27	25
% Clay (-0.005 mm)	43		42	49
Liquid Limit (-No. 40)	43		47	50
Plasticity Index (-No. 40)	27		28	30
Plastic Limit	16		19	20
Soil Color	BRN	BRN	BRN/TAN	BRN
Textural Class	CLY		CLY	CLY
Soil Class (AASHTO M-145)	A-7-6(18)		A-7-6(18)	A-7-6(22)
Frost Class	F3		F3	F3
Optimum Moisture (%)	11.8		13.0	13.2
Maximum Dry Density (pcf)	123.4		119.0	118.5
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 26.3	1 | 22.9	1 | 28.2	1 | 25.3
	2 | 21.5	2 | 19.0	2 | 21.4	2 | 19.1
	3 | 13.9	3 | 16.8	3 | 7.5	3 | 18.3
	4 | 14.8	4 | 23.8	4 | 13.4	4 | 16.3
	5 | 17.2	5 | 19.8	5 | 17.4	5 | 19.2
Avg. Moisture of Sample Depth	18.7	20.4	17.6	19.7

Scott W. Wutzke, Testing Lab Supervisor
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Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-56-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B1 Site 9
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1180	1181	1182	1183
Reference Pt + Feet	264+2910	264+2910	264+2910	264+2910
Distance From CenterLine (Ft.)	Lt 230 NB	Lt 730 WB	Lt 1350 WB	Lt 1600 WB
Depth, Ft.	1.2 - 5.0	0.9 - 5.0	0.9 - 5.0	0.9 - 5.0
Field Sample No.	1180	1181	1182	1183
% Pass. 3/8" Sieve	100		100	
% Pass. No. 4 Sieve	99		99	
% Pass. No. 10 Sieve	97		99	
% Coarse Sand (-No. 10 + No. 40)	4		5	
% Fine Sand (-No. 40 + No. 200)	16		19	
% Silt (0.074 - 0.005 mm)	32		33	
% Clay (-0.005 mm)	45		42	
Liquid Limit (-No. 40)	46		41	
Plasticity Index (-No. 40)	28		25	
Plastic Limit	18		16	
Soil Color	BRN/BLK	BRN	BRN	BRN
Textural Class	CLY		CLY	
Soil Class (AASHTO M-145)	A-7-6(20)		A-7-6(17)	
Frost Class	F3		F3	
Optimum Moisture (%)	12.5		12.5	
Maximum Dry Density (pcf)	120.3		120.9	
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 32.9	1 | 21.0	1 | 21.2	1 | 22.7
	2 | 11.0	2 | 13.7	2 | 16.3	2 | 16.2
	3 | 17.6	3 | 13.7	3 | 12.4	3 | 16.0
	4 | 18.5	4 | 16.4	4 | 16.5	4 | 16.1
	5 | 18.0	5 | 17.3	5 | 15.9	5 | 16.4
Avg. Moisture of Sample Depth	16.3	16.5	16.5	17.5

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-56-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B1 Site 9
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1184
Reference Pt + Feet	264+3204
Distance From CenterLine (Ft.)	Lt 1550 EB
Depth, Ft.	0.9 - 5.0
Field Sample No.	1184
% Pass. 3/8" Sieve	99
% Pass. No. 4 Sieve	99
% Pass. No. 10 Sieve	98
% Coarse Sand (-No. 10 + No. 40)	3
% Fine Sand (-No. 40 + No. 200)	19
% Silt (0.074 - 0.005 mm)	37
% Clay (-0.005 mm)	39
Liquid Limit (-No. 40)	48
Plasticity Index (-No. 40)	31
Plastic Limit	17
Soil Color	BRN
Textural Class	CLY
Soil Class (AASHTO M-145)	A-7-6(23)
Frost Class	F3
Optimum Moisture (%)	12.0
Maximum Dry Density (pcf)	121.7
% Organic Content	

Depth (Ft.)	**Moisture (%)**
1	22.1
2	9.7
3	11.0
4	14.1
5	16.7

Avg. Moisture of Sample Depth	14.7

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/12/2016**		**1157**

Density

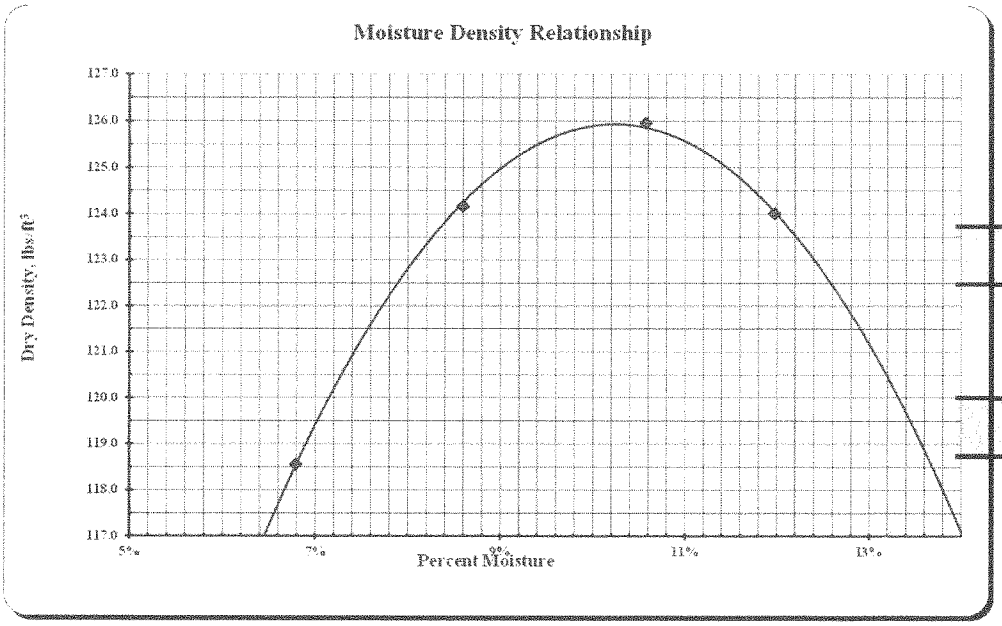
			Test Count	4				
	Determination No.		1	2	3	4	5	6
A	Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
		lbs.	8.64	8.92	9.06	9.05		
C	Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D	Weight of Compacted Soil = B - C	lbs.	4.22	4.49	4.64	4.62		
E	Wet Density = D / A	lbs./cu.ft.	126.6	134.8	139.3	138.9		
F	Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**118.6**	**124.2**	**126.0**	**124.0**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

	Container No.		1	2	3	4		
G	Wet Weight / Container	grams	164.0	166.2	156.3	150.8		
H	Dry Weight / Container	grams	155.9	156.0	144.9	138.6		
I	Moisture Loss = G - H	grams	8.1	10.2	11.4	12.2		
J	Tare Weight of Container	grams	36.6	37.3	37.1	36.7		
K	Dry Soil = H - J	grams	119.3	118.7	107.8	101.9		
L	%Moisture = (I / K) x 100	%	**6.8%**	**8.6%**	**10.6%**	**12.0%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

125.9 lbs./cu.ft.

Optimum Moisture

10.2%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/12/2016**		**1159**

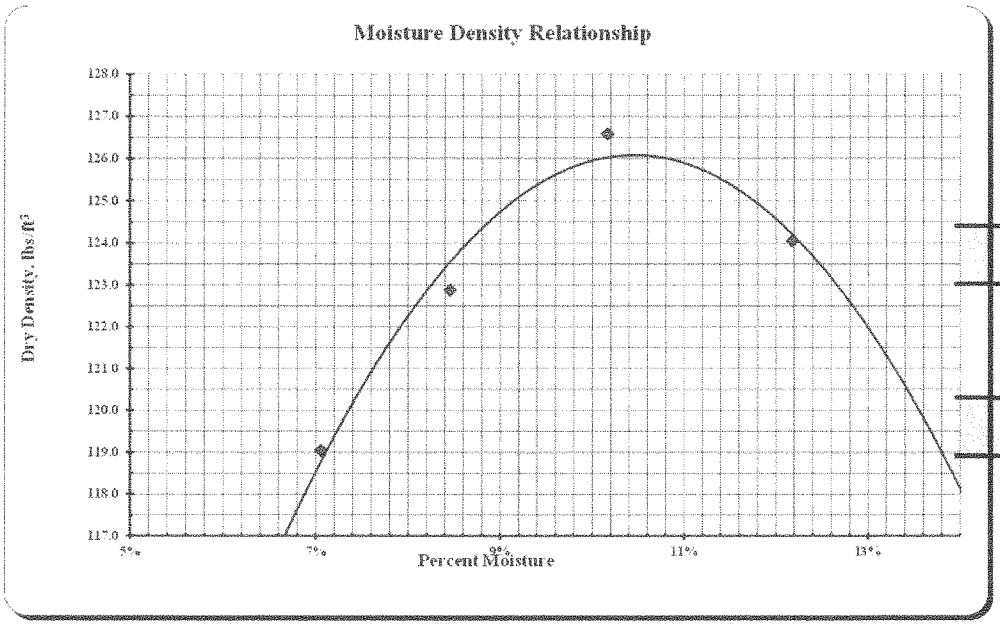
Density		Test Count	4				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.67	8.87	9.07	9.06		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.24	4.44	4.64	4.63		
E Wet Density = D / A	lbs./cu.ft.	127.4	133.3	139.5	139.2		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**119.0**	**122.9**	**126.6**	**124.1**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		61	62	63	64		
G Wet Weight / Container	grams	163.2	147.9	156.5	167.2		
H Dry Weight / Container	grams	154.9	139.3	145.5	153.1		
I Moisture Loss = G - H	grams	8.3	8.6	11.0	14.1		
J Tare Weight of Container	grams	37.3	37.6	37.3	37.3		
K Dry Soil = H - J	grams	117.6	101.7	108.2	115.8		
L %Moisture = (I / K) x 100	%	**7.1%**	**8.5%**	**10.2%**	**12.2%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

126.1 lbs./cu.ft.

Optimum Moisture

10.5%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation	Date		
T-180	**10/12/2016**		**1161**

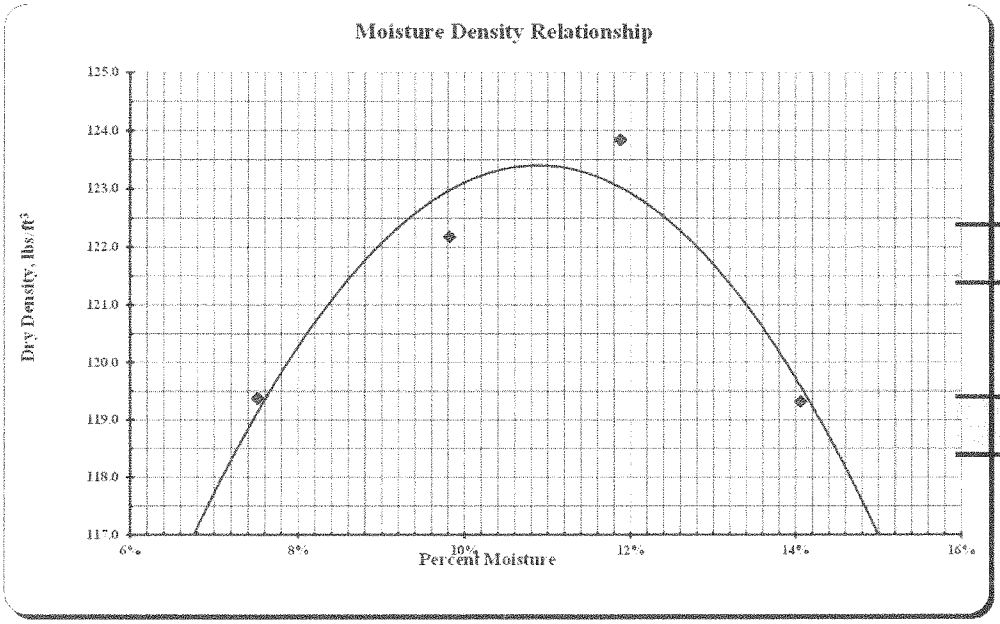
Density		Test Count	4				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.70	8.90	9.04	8.96		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.27	4.47	4.61	4.53		
E Wet Density = D / A	lbs./cu.ft.	128.3	134.2	138.6	136.1		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**119.4**	**122.2**	**123.8**	**119.3**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		5	6	7	8		
G Wet Weight / Container	grams	167.3	156.8	167.2	151.4		
H Dry Weight / Container	grams	158.2	146.1	153.3	137.3		
I Moisture Loss = G - H	grams	9.1	10.7	13.9	14.1		
J Tare Weight of Container	grams	37.1	37.1	36.3	37.0		
K Dry Soil = H - J	grams	121.1	109.0	117.0	100.3		
L %Moisture = (I / K) x 100	%	**7.5%**	**9.8%**	**11.9%**	**14.1%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

123.4 lbs./cu.ft.

Optimum Moisture

10.9%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/12/2016**		**1162**

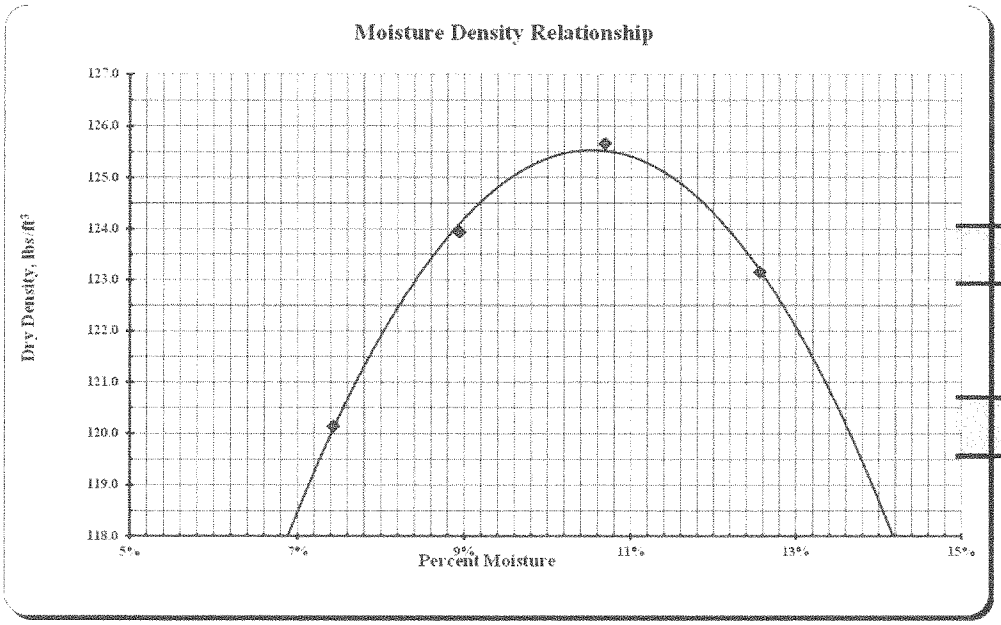
Density		Test Count	4				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.72	8.93	9.06	9.04		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.30	4.50	4.63	4.62		
E Wet Density = D / A	lbs./cu.ft.	129.1	135.0	139.1	138.6		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**120.1**	**123.9**	**125.7**	**123.2**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		65	66	67	68		
G Wet Weight / Container	grams	166.5	141.3	154.2	157.1		
H Dry Weight / Container	grams	157.6	132.8	142.9	143.7		
I Moisture Loss = G - H	grams	8.9	8.5	11.3	13.4		
J Tare Weight of Container	grams	37.8	37.7	37.2	37.0		
K Dry Soil = H - J	grams	119.8	95.1	105.7	106.7		
L %Moisture = (I / K) x 100	%	**7.4%**	**8.9%**	**10.7%**	**12.6%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

125.5 lbs./cu.ft.

Optimum Moisture

10.5%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation: T-180	Date: 10/12/2016		1163

Density

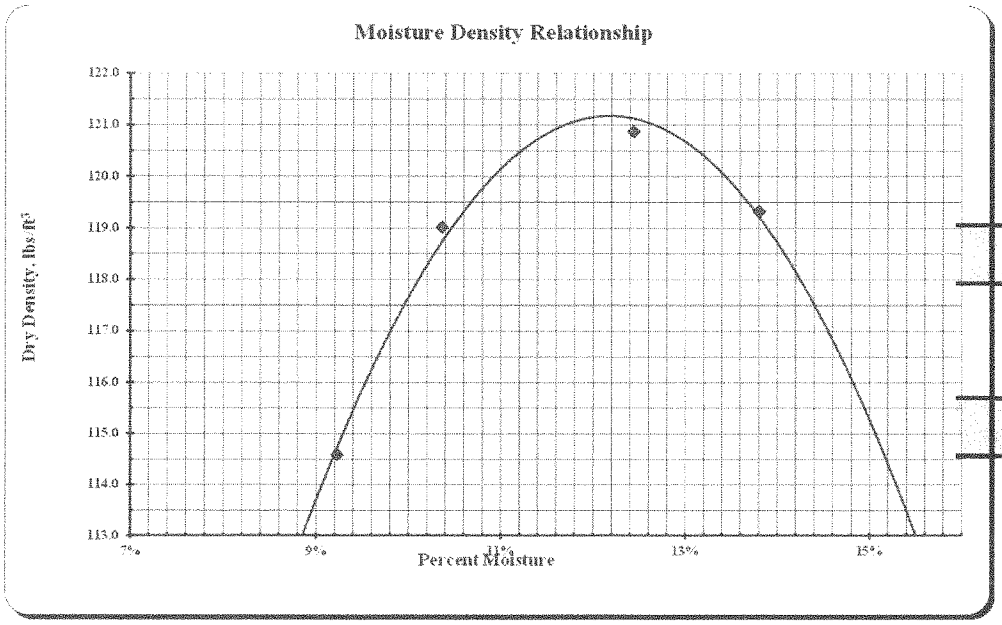
			Test Count	4				
	Determination No.		1	2	3	4	5	6
A	Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
		lbs.	8.59	8.80	8.95	8.95		
C	Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D	Weight of Compacted Soil = B - C	lbs.	4.17	4.37	4.53	4.52		
E	Wet Density = D / A	lbs./cu.ft.	125.2	131.4	135.9	135.8		
F	Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**114.6**	**119.0**	**120.9**	**119.3**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

	Container No.		9	10	11	12		
G	Wet Weight / Container	grams	153.2	164.5	158.3	152.3		
H	Dry Weight / Container	grams	143.4	152.5	144.9	138.3		
I	Moisture Loss = G - H	grams	9.8	12.0	13.4	14.0		
J	Tare Weight of Container	grams	37.2	36.7	37.2	36.9		
K	Dry Soil = H - J	grams	106.2	115.8	107.7	101.4		
L	%Moisture = (I / K) x 100	%	**9.2%**	**10.4%**	**12.4%**	**13.8%**		

ASTM D4643 AASHTO T217 or T265 Tested by: dt



Max Dry Density

121.2 lbs./cu.ft.

Optimum Moisture

12.2%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/12/2016**		**1164**

Density

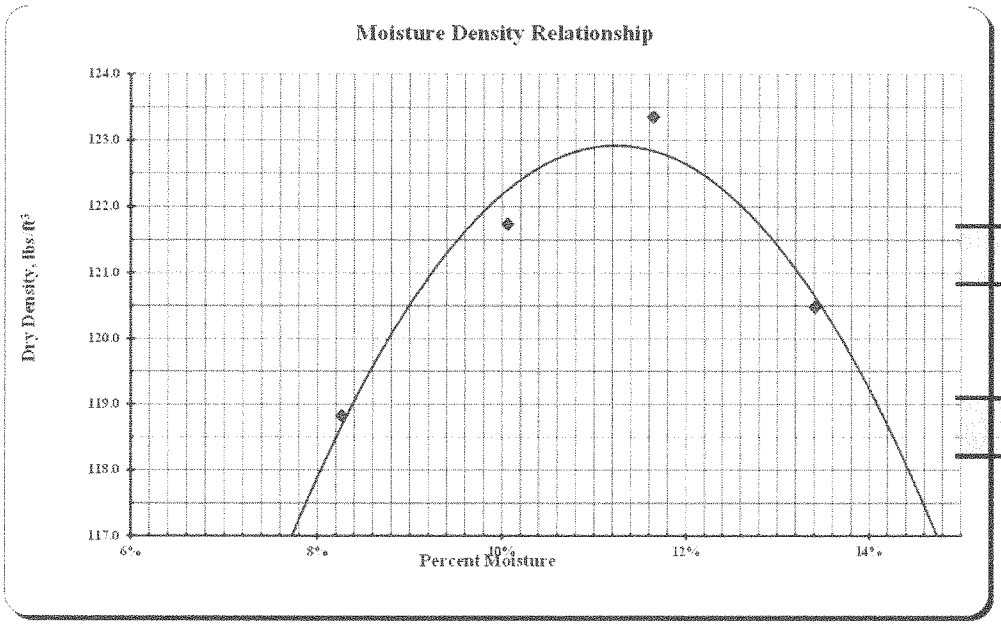
		Test Count	4				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.71	8.89	9.01	8.98		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.28	4.46	4.59	4.55		
E Wet Density = D / A	lbs./cu.ft.	128.6	134.0	137.7	136.6		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**118.8**	**121.7**	**123.4**	**120.5**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		69	70	71	72		
G Wet Weight / Container	grams	155.6	165.6	162.8	145.8		
H Dry Weight / Container	grams	146.6	153.9	149.7	132.9		
I Moisture Loss = G - H	grams	9.0	11.7	13.1	12.9		
J Tare Weight of Container	grams	37.7	37.6	37.2	36.7		
K Dry Soil = H - J	grams	108.9	116.3	112.5	96.2		
L %Moisture = (I / K) x 100	%	**8.3%**	**10.1%**	**11.6%**	**13.4%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

122.9 lbs./cu.ft.

Optimum Moisture

11.3%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/12/2016**		**1166**

Density — Test Count: 4

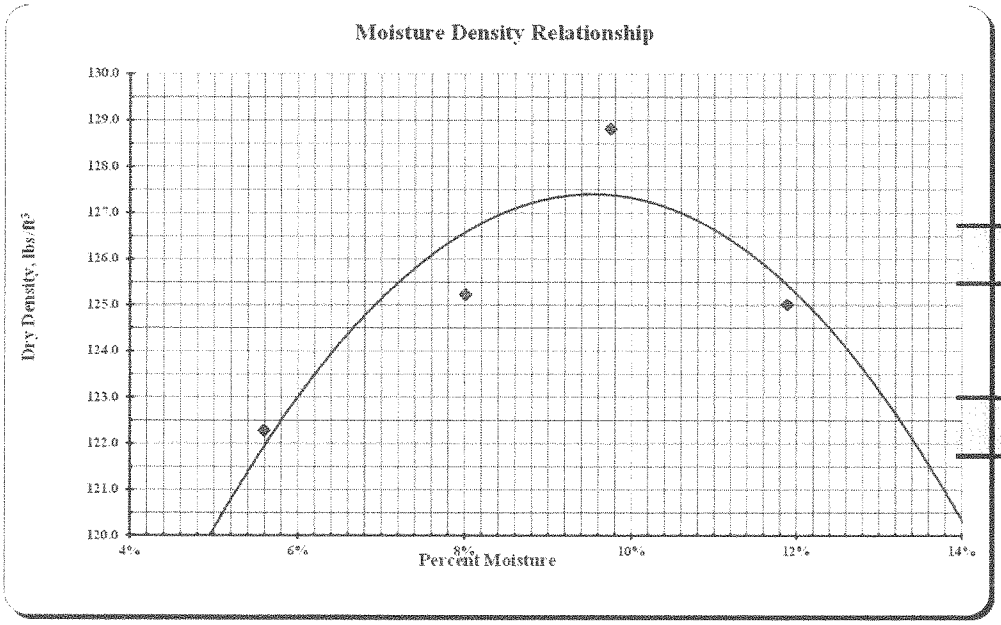
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.73	8.93	9.13	9.08		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.30	4.50	4.71	4.66		
E Wet Density = D / A	lbs./cu.ft.	129.1	135.3	141.4	139.9		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**122.3**	**125.2**	**128.8**	**125.0**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		13	14	15	16		
G Wet Weight / Container	grams	174.9	159.3	151.0	155.8		
H Dry Weight / Container	grams	167.6	150.3	140.9	143.2		
I Moisture Loss = G - H	grams	7.3	9.0	10.1	12.6		
J Tare Weight of Container	grams	37.1	37.9	37.3	37.2		
K Dry Soil = H - J	grams	130.5	112.4	103.6	106.0		
L %Moisture = (I / K) x 100	%	**5.6%**	**8.0%**	**9.7%**	**11.9%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

127.4 lbs./cu.ft.

Optimum Moisture

9.5%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/12/2016**		**1168**

Density

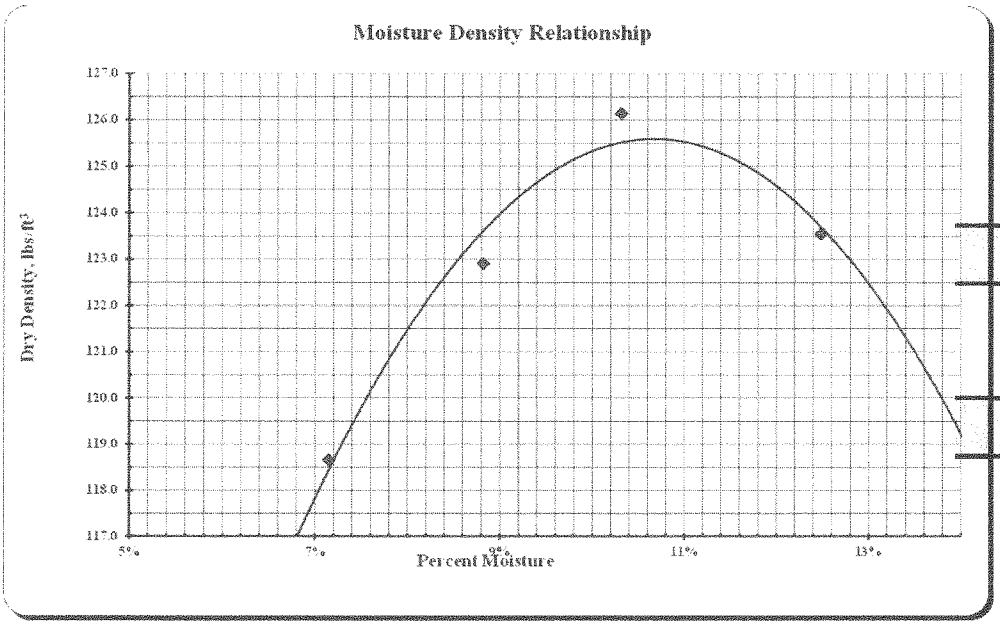
			Test Count	4				
	Determination No.		1	2	3	4	5	6
A	Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
		lbs.	8.66	8.88	9.06	9.05		
C	Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D	Weight of Compacted Soil = B - C	lbs.	4.23	4.45	4.63	4.63		
E	Wet Density = D / A	lbs./cu.ft.	127.1	133.8	139.2	139.0		
F	Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**118.7**	**122.9**	**126.1**	**123.6**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

	Container No.		73	74	75	76		
G	Wet Weight / Container	grams	161.8	158.3	142.1	147.9		
H	Dry Weight / Container	grams	153.5	148.5	132.3	135.7		
I	Moisture Loss = G - H	grams	8.3	9.8	9.8	12.2		
J	Tare Weight of Container	grams	37.4	37.4	37.3	38.0		
K	Dry Soil = H - J	grams	116.1	111.1	95.0	97.7		
L	%Moisture = (I / K) x 100	%	**7.1%**	**8.8%**	**10.3%**	**12.5%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

125.6 lbs./cu.ft.

Optimum Moisture

10.6%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation	Date		
T-180	10/12/2016		1169

Density

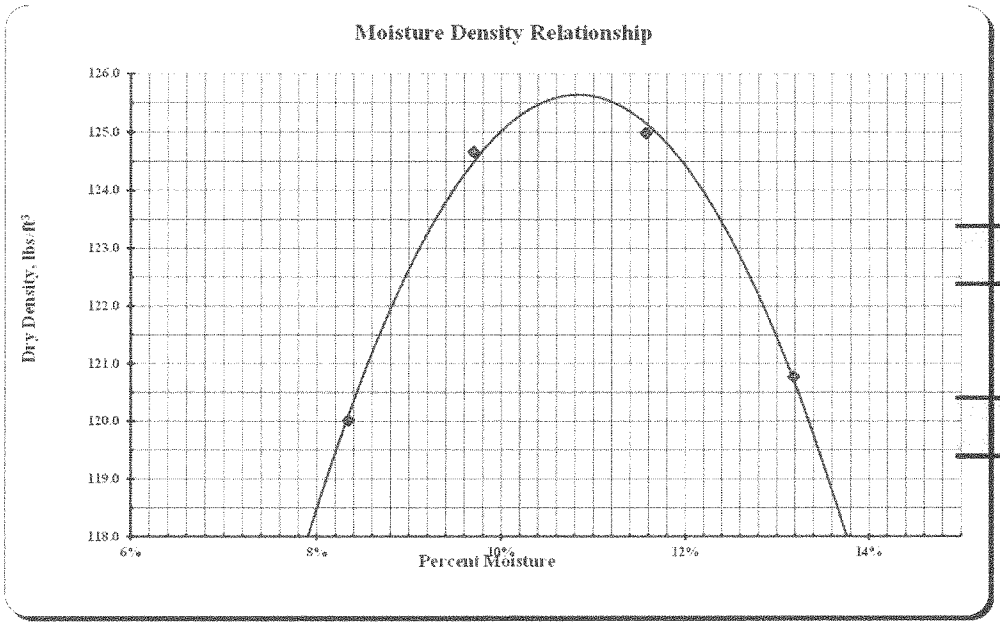
			Test Count	4				
	Determination No.		1	2	3	4	5	6
A	Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
		lbs.	8.76	8.98	9.07	8.98		
C	Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D	Weight of Compacted Soil = B - C	lbs.	4.33	4.55	4.64	4.55		
E	Wet Density = D / A	lbs./cu.ft.	130.0	136.8	139.5	136.7		
F	Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**120.0**	**124.7**	**125.0**	**120.8**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

	Container No.		17	18	19	20		
G	Wet Weight / Container	grams	155.0	160.4	159.5	152.4		
H	Dry Weight / Container	grams	145.9	149.5	146.8	138.9		
I	Moisture Loss = G - H	grams	9.1	10.9	12.7	13.5		
J	Tare Weight of Container	grams	36.8	37.1	37.1	36.5		
K	Dry Soil = H - J	grams	109.1	112.4	109.7	102.4		
L	%Moisture = (I / K) x 100	%	**8.3%**	**9.7%**	**11.6%**	**13.2%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

125.6 lbs./cu.ft.

Optimum Moisture

10.8%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation	Date		
T-180	**10/12/2016**		**1170**

Density

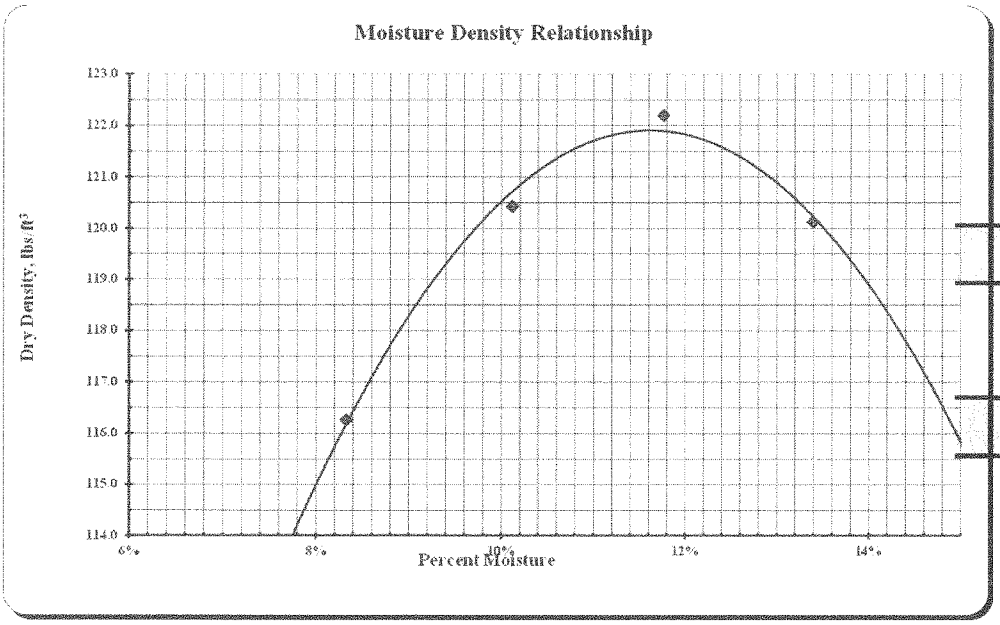
		Test Count	4				
	Determination No.		1	2	3	4	5	6
A	Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
		lbs.	8.62	8.85	8.97	8.96		
C	Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D	Weight of Compacted Soil = B - C	lbs.	4.19	4.42	4.55	4.54		
E	Wet Density = D / A	lbs./cu.ft.	125.9	132.6	136.6	136.2		
F	Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**116.3**	**120.4**	**122.2**	**120.1**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

	Container No.		77	78	79	80		
G	Wet Weight / Container	grams	156.5	150.4	143.5	157.3		
H	Dry Weight / Container	grams	147.3	140.0	132.3	143.1		
I	Moisture Loss = G - H	grams	9.2	10.4	11.2	14.2		
J	Tare Weight of Container	grams	36.8	37.2	37.1	37.1		
K	Dry Soil = H - J	grams	110.5	102.8	95.2	106.0		
L	%Moisture = (I / K) x 100	%	**8.3%**	**10.1%**	**11.8%**	**13.4%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

121.9 lbs./cu.ft.

Optimum Moisture

11.6%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/12/2016**		**1171**

Density

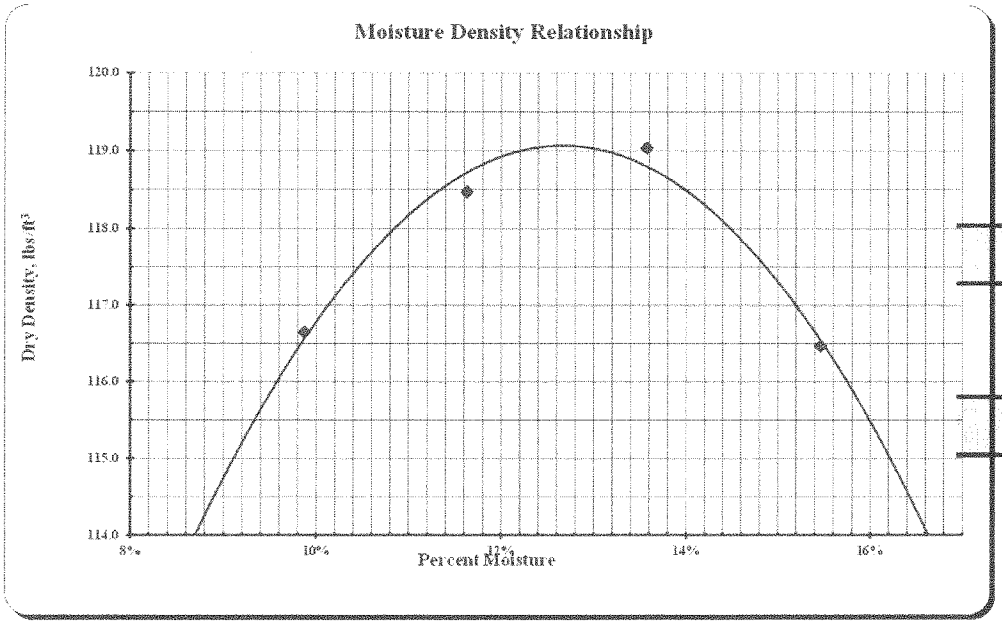
		Test Count	4				
	Determination No.	1	2	3	4	5	6
A	Volume of Mold cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.69	8.83	8.93	8.90		
C	Weight of Mold lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D	Weight of Compacted Soil = B - C lbs.	4.27	4.40	4.50	4.48		
E	Wet Density = D / A lbs./cu.ft.	128.2	132.3	135.2	134.5		
F	Dry Density = (E x 100) / (100 + L) lbs./cu.ft.	**116.6**	**118.5**	**119.0**	**116.5**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

	Container No.	21	22	23	24		
G	Wet Weight / Container grams	159.5	157.0	153.7	150.7		
H	Dry Weight / Container grams	148.5	144.5	139.8	135.5		
I	Moisture Loss = G - H grams	11.0	12.5	13.9	15.2		
J	Tare Weight of Container grams	37.1	37.0	37.4	37.2		
K	Dry Soil = H - J grams	111.4	107.5	102.4	98.3		
L	%Moisture = (I / K) x 100 %	**9.9%**	**11.6%**	**13.6%**	**15.5%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

119.1 lbs./cu.ft.

Optimum Moisture

12.7%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/12/2016**		**1172**

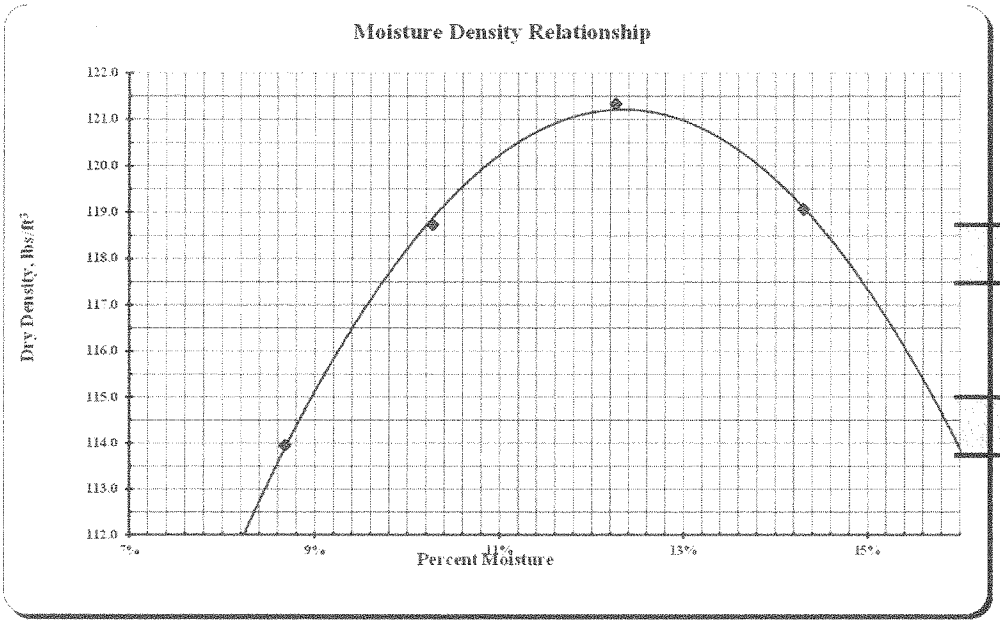
Density		Test Count	4				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.55	8.79	8.96	8.96		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.12	4.36	4.54	4.53		
E Wet Density = D / A	lbs./cu.ft.	123.8	130.9	136.2	136.1		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**114.0**	**118.7**	**121.3**	**119.1**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		81	82	83	84		
G Wet Weight / Container	grams	158.0	155.5	155.3	150.4		
H Dry Weight / Container	grams	148.4	144.5	142.4	136.2		
I Moisture Loss = G - H	grams	9.6	11.0	12.9	14.2		
J Tare Weight of Container	grams	37.8	37.4	37.2	36.9		
K Dry Soil = H - J	grams	110.6	107.1	105.2	99.3		
L %Moisture = (I / K) x 100	%	**8.7%**	**10.3%**	**12.3%**	**14.3%**		

ASTM D4643 AASHTO T217 or T265 Tested by: mi



Max Dry Density

121.2 lbs./cu.ft.

Optimum Moisture

12.4%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation	Date		
T-180	**10/12/2016**		**1173**

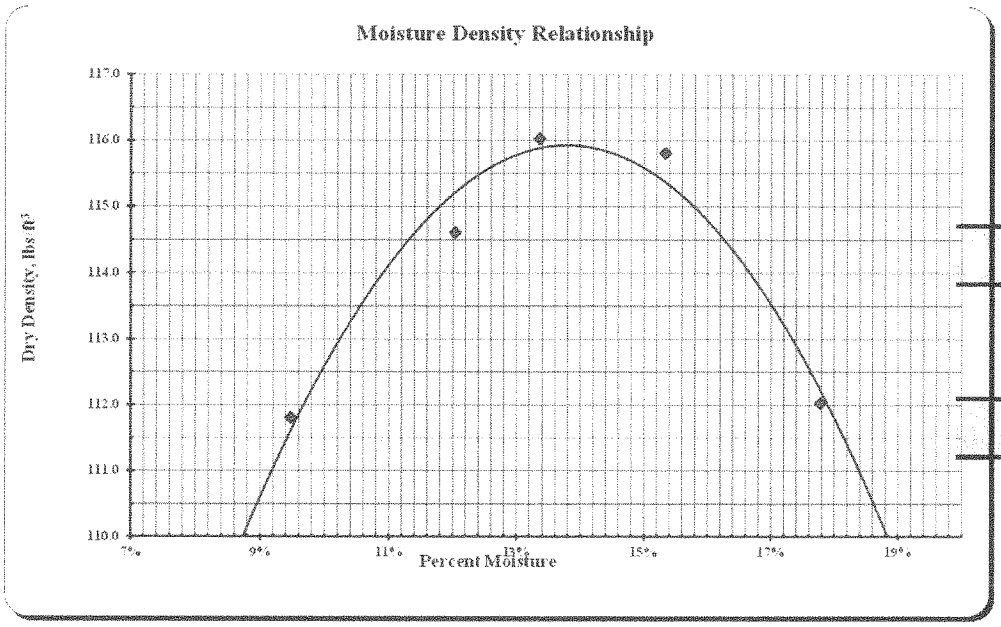
Density		Test Count	5				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.50	8.71	8.81	8.87	8.82	
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.08	4.28	4.38	4.45	4.39	
E Wet Density = D / A	lbs./cu.ft.	122.4	128.4	131.5	133.6	132.0	
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**111.8**	**114.6**	**116.0**	**115.8**	**112.0**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		25	26	27	28	29	
G Wet Weight / Container	grams	159.7	157.0	160.6	145.5	141.2	
H Dry Weight / Container	grams	149.1	144.1	146.0	131.1	125.5	
I Moisture Loss = G - H	grams	10.6	12.9	14.6	14.4	15.7	
J Tare Weight of Container	grams	37.2	36.9	36.7	37.2	37.2	
K Dry Soil = H - J	grams	111.9	107.2	109.3	93.9	88.3	
L %Moisture = (I / K) x 100	%	**9.5%**	**12.0%**	**13.4%**	**15.3%**	**17.8%**	

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

115.9 lbs./cu.ft.

Optimum Moisture

13.8%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/12/2016**		**1176**

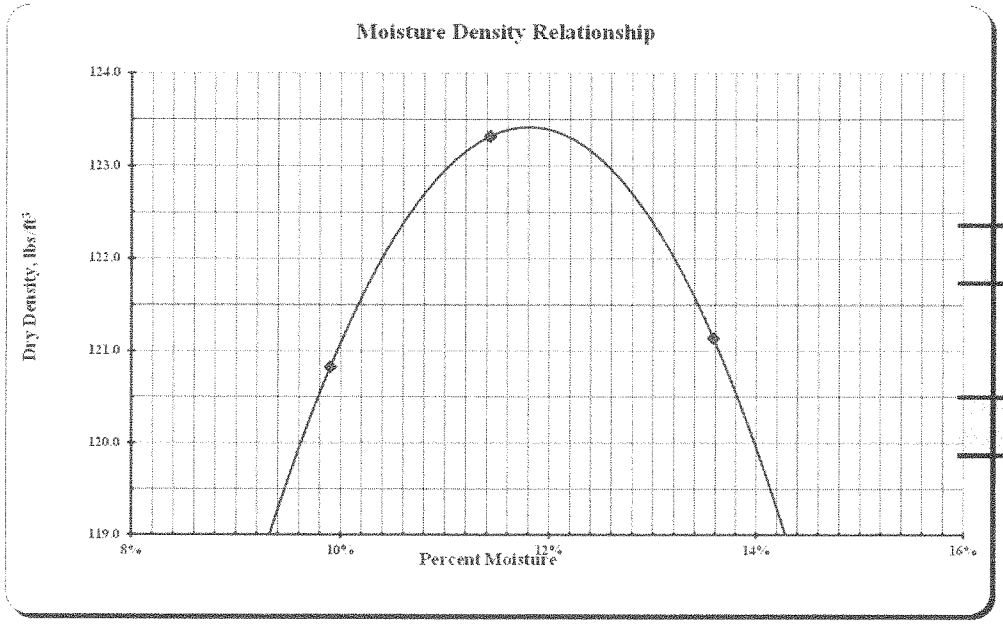
Density		Test Count	3				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.85	9.01	9.01			
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.42	4.58	4.58			
E Wet Density = D / A	lbs./cu.ft.	132.8	137.4	137.6			
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**120.8**	**123.3**	**121.1**	**#VALUE!**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		85	86	87			
G Wet Weight / Container	grams	149.9	153.6	152.9			
H Dry Weight / Container	grams	139.8	141.7	139.1			
I Moisture Loss = G - H	grams	10.1	11.9	13.8			
J Tare Weight of Container	grams	37.8	37.6	37.5			
K Dry Soil = H - J	grams	102.0	104.1	101.6			
L %Moisture = (I / K) x 100	%	**9.9%**	**11.4%**	**13.6%**			

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

123.4 lbs./cu.ft.

Optimum Moisture

11.8%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation	Date		
T-180	**10/12/2016**		**1178**

Density

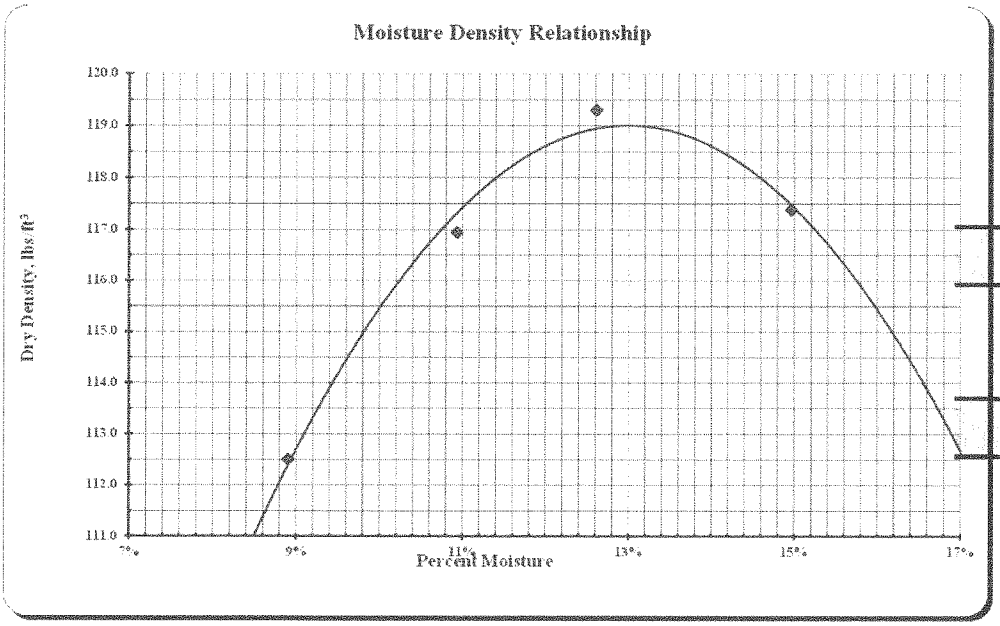
			Test Count	4				
	Determination No.		1	2	3	4	5	6
A	Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
		lbs.	8.51	8.75	8.90	8.92		
C	Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D	Weight of Compacted Soil = B - C	lbs.	4.08	4.32	4.47	4.49		
E	Wet Density = D / A	lbs./cu.ft.	122.5	129.7	134.4	135.0		
F	Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**112.5**	**116.9**	**119.3**	**117.4**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

	Container No.		88	89	90	91		
G	Wet Weight / Container	grams	149.1	147.2	150.4	146.7		
H	Dry Weight / Container	grams	140.0	136.4	137.8	132.5		
I	Moisture Loss = G - H	grams	9.1	10.8	12.6	14.2		
J	Tare Weight of Container	grams	37.8	37.6	37.9	37.6		
K	Dry Soil = H - J	grams	102.2	98.8	99.9	94.9		
L	%Moisture = (I / K) x 100	%	**8.9%**	**10.9%**	**12.6%**	**15.0%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

119.0 lbs./cu.ft.

Optimum Moisture

13.0%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/12/2016**		**1179**

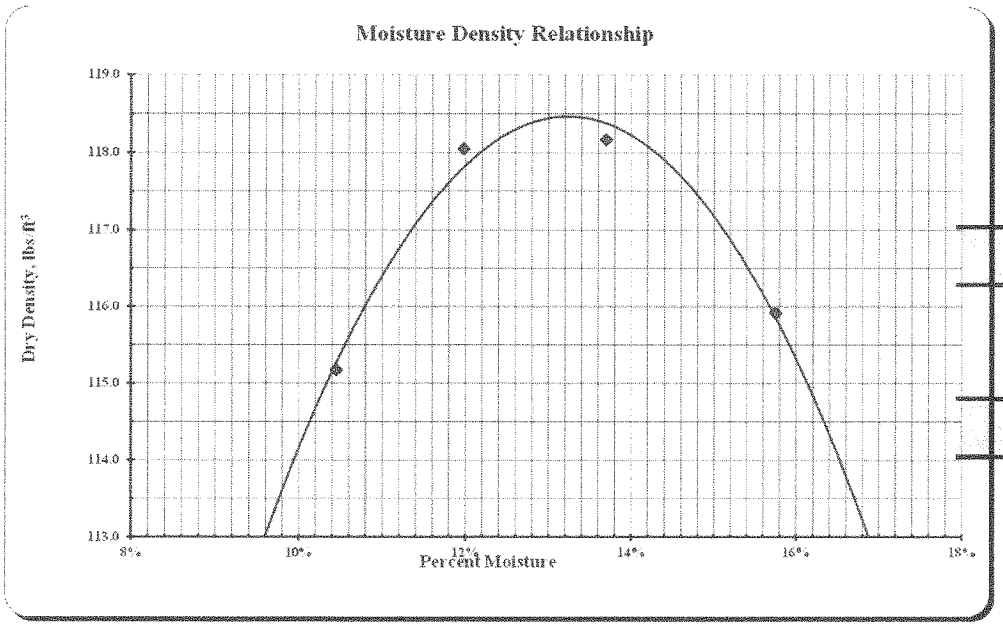
Density		Test Count	4				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.66	8.83	8.90	8.89		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.24	4.40	4.47	4.47		
E Wet Density = D / A	lbs./cu.ft.	127.2	132.2	134.4	134.2		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**115.2**	**118.1**	**118.2**	**115.9**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		30	31	32	33		
G Wet Weight / Container	grams	155.5	152.0	149.8	140.0		
H Dry Weight / Container	grams	144.3	139.7	136.2	126.0		
I Moisture Loss = G - H	grams	11.2	12.3	13.6	14.0		
J Tare Weight of Container	grams	37.1	37.0	36.9	37.1		
K Dry Soil = H - J	grams	107.2	102.7	99.3	88.9		
L %Moisture = (I / K) x 100	%	**10.4%**	**12.0%**	**13.7%**	**15.7%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

118.5 lbs./cu.ft.

Optimum Moisture

13.2%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/12/2016**		**1180**

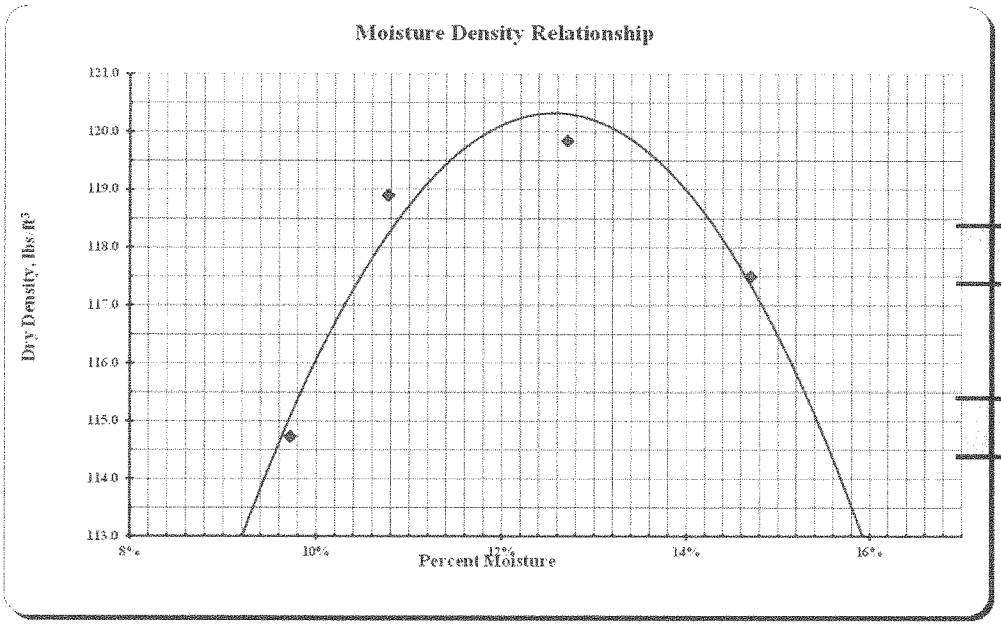
Density		Test Count	4				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.62	8.82	8.92	8.91		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.19	4.39	4.50	4.49		
E Wet Density = D / A	lbs./cu.ft.	125.9	131.7	135.1	134.8		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**114.7**	**118.9**	**119.8**	**117.5**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		92	93	94	95		
G Wet Weight / Container	grams	154.8	156.9	159.2	160.0		
H Dry Weight / Container	grams	144.4	145.3	145.5	144.3		
I Moisture Loss = G - H	grams	10.4	11.6	13.7	15.7		
J Tare Weight of Container	grams	37.4	37.6	37.7	37.5		
K Dry Soil = H - J	grams	107.0	107.7	107.8	106.8		
L %Moisture = (I / K) x 100	%	**9.7%**	**10.8%**	**12.7%**	**14.7%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

120.3 lbs./cu.ft.

Optimum Moisture

12.5%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation	Date		
T-180	**10/12/2016**		**1182**

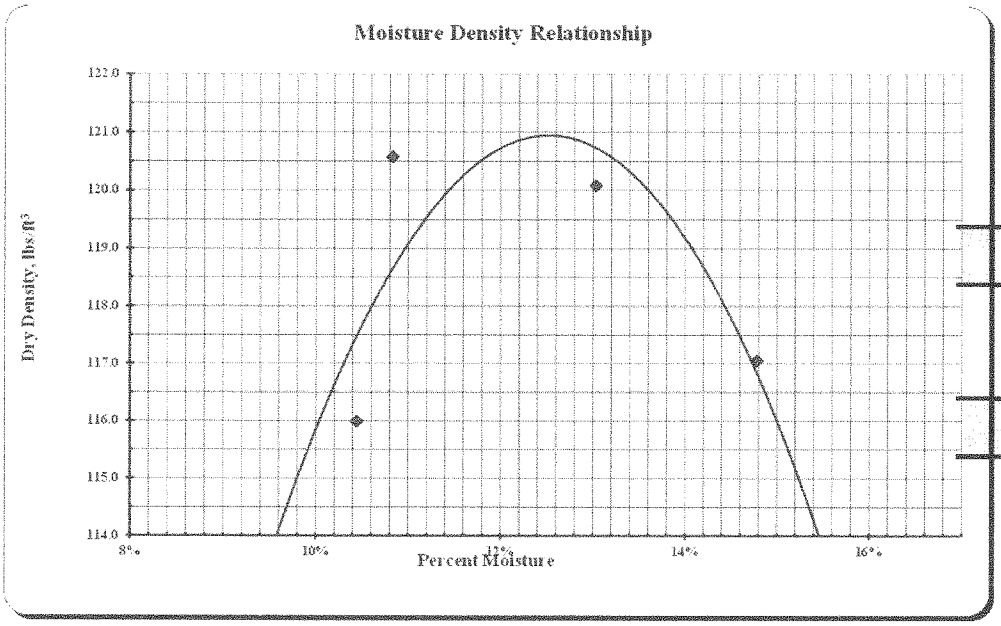
Density		Test Count	4				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.69	8.88	8.95	8.90		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.27	4.45	4.52	4.47		
E Wet Density = D / A	lbs./cu.ft.	128.1	133.6	135.7	134.4		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**116.0**	**120.6**	**120.1**	**117.1**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		34	35	36	37		
G Wet Weight / Container	grams	159.6	156.2	156.0	153.0		
H Dry Weight / Container	grams	148.1	144.6	142.3	138.1		
I Moisture Loss = G - H	grams	11.5	11.6	13.7	14.9		
J Tare Weight of Container	grams	38.0	37.5	37.2	37.3		
K Dry Soil = H - J	grams	110.1	107.1	105.1	100.8		
L %Moisture = (I / K) x 100	%	**10.4%**	**10.8%**	**13.0%**	**14.8%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

120.9 lbs./cu.ft.

Optimum Moisture

12.5%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/13/2016**		**1184**

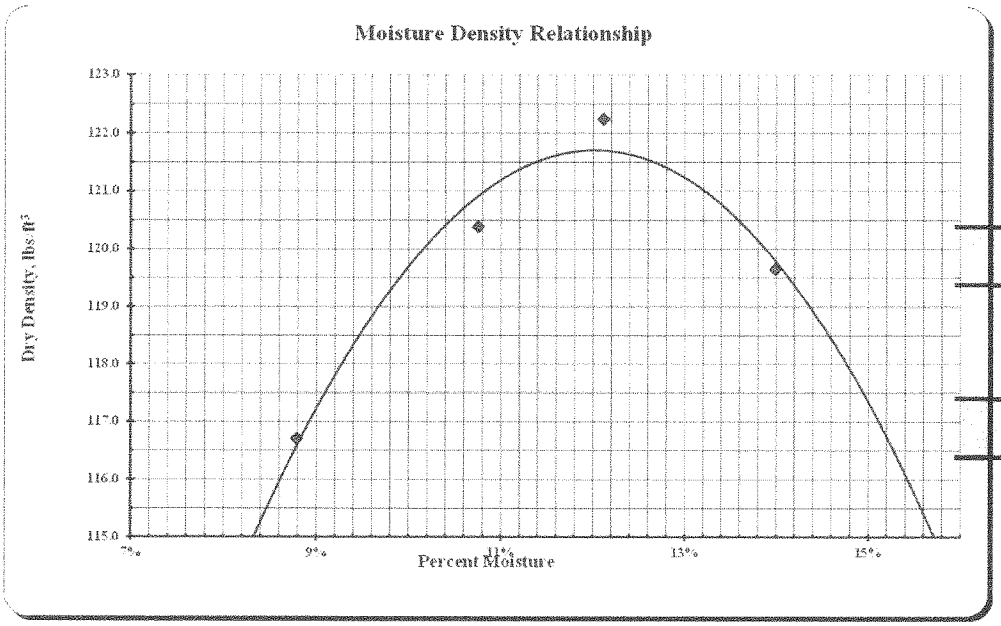
Density		Test Count	4				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.65	8.87	8.99	8.97		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.23	4.44	4.56	4.54		
E Wet Density = D / A	lbs./cu.ft.	127.0	133.3	137.1	136.4		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**116.7**	**120.4**	**122.2**	**119.7**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		96	97	98	99		
G Wet Weight / Container	grams	144.9	151.0	151.3	164.7		
H Dry Weight / Container	grams	136.2	140.0	139.0	149.1		
I Moisture Loss = G - H	grams	8.7	11.0	12.3	15.6		
J Tare Weight of Container	grams	37.2	37.7	37.5	37.6		
K Dry Soil = H - J	grams	99.0	102.3	101.5	111.5		
L %Moisture = (I / K) x 100	%	**8.8%**	**10.8%**	**12.1%**	**14.0%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

121.7 lbs./cu.ft.

Optimum Moisture

12.0%

APPENDIX C

Summary and Lab Results For Borrow B-2 Site 10

Project No.:

PCN:

Color Key

Swell Potential:	Low	Marginal	High	Moisture Content:	Below PL	0-5% Over PL	>5% Over PL	
Group Index:	GI≤20	GI>20		Ave. In-Place: Moisture Content	MC < Opt.	0 ≤ MC < 6% Over opt.	6 ≤ MC < 10% Over opt.	10 ≤ MC < 16% Over opt.	MC >16% Over opt.

Lab No.	STA	Offset	Depth of Sample (ft)	Plastic Limit (PL)	AASHTO Class	Group Index	Optimum Moisture	Swell Potential (PI)	Ave. In-Place Moisture	Moisture Content @ Depth (ft) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Frost Class
			0-0						14.3	9.8	10.8	12.6	14.0																					
			0-0						13.4	9.5	11.1	14.8	14.7																					
			0-0						15.3	10.7	15.0	15.6	14.3																					
			0-0						16.4	12.6	14.7	14.9	15.8																					
			0-0						12.4	8.7	8.3	9.4	10.6																					
			0-0						15.8	10.5	13.4	16.2	13.8																					
			0-0						16.2	13.2	17.2	14.3	10.8																					
			0-0						22.2	7.3	65.3	8.2	8.8																					
			0-0						11.6	11.4	10.6	7.7	14.2																					
1206	264+4350	Rt 1150 WB	0.7-10	20.0	A-7-6(23)	23	12.6	30	19.7	17.4	17.6	17.2	9.0	18.5	24.0	28.1	17.3	18.2																F3
1205	264+4615	Rt 350 WB	0.7-5	17.3	A-7-6(24)	24	11.9	31	14.8	10.4	12.8	13.9	13.3																					F3
1200	264+4745	Rt 725 EB	0.8-5	17.3	A-7-6(14)	14	11.1	24	14.1	9.1	13.2	13.7	15.3																					F3
1201	264+4745	Rt 1230 EB	0.8-5	14.9	A-7-6(16)	16	10.5	26	13.9	9.5	8.2	13.6	15.7																					F3

Project No.: SS-7-804(050)248 B2 Site 10

PCN: 20326

Color Key

Swell Potential:	Low	Marginal	High	Moisture Content:	Below PL	0-5% Over PL	>5% Over PL	
Group Index:	GI≤20	GI>20		Ave. In-Place: Moisture Content	MC < Opt.	0 ≤ MC < 6% Over opt.	6 ≤ MC < 10% Over opt.	10 ≤ MC < 16% Over opt.	MC >16% Over opt.

Lab No.	STA	Offset	Depth of Sample (ft)	Plastic Limit (PL)	AASHTO Class	Group Index	Optimum Moisture	Swell Potential (PI)	Ave. In-Place Moisture	Moisture Content @ Depth (ft)																								Frost Class
										2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
1202	264+4745	Rt 1520 EB	0.8-5	19.6	A-7-6(14)	14	12.3	24	15.8	8.3	10.5	12.6	13.1																					F3
1196	264+4870	Rt 1500 EB	0.9-5	17.1	A-7-6(17)	17	11.6	27	13.5	9.8	13.1	13.1	12.7																					F3
1198	264+4870	Rt 500 EB	0.6-5	17.3	A-7-6(24)	24	13.0	34	14.3	8.2	12.0	14.0	12.9																					F3
1194	264+5025	Rt 1250 EB	0.8-5	16.5	A-7-6(18)	18	12.2	28	11.0	7.5	7.3	11.6	12.3																					F3
1189	264+5150	Rt 1850 WB	0.9-5	18.6	A-7-6(19)	19	12.4	27	14.1	9.2	13.0	13.1	11.8																					F3
1191	264+5150	Rt 840 WB	0.9-5	18.5	A-7-6(12)	12	11.0	23	14.7	9.6	11.0	15.5	15.9																					F3
1192	264+5150	Rt 500 WB	0.9-5	16.9	A-7-6(20)	20	12.4	30	16.0	13.7	13.4	14.8	15.3																					F3
1185	265+0000	Rt 650 EB	1-5	14.0	A-6(12)	12	8.9	26	10.8	9.4	7.1	6.7	7.9																					F3
1187	265+0000	Rt 1650 EB	0.9-5	14.6	A-6(14)	14	11.0	25	13.9	8.9	15.9	11.1	12.6																					F3

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-57-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B2 Site 10
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1206	1203	1204	1205
Reference Pt + Feet	264+4350	264+4615	264+4615	264+4615
Distance From CenterLine (Ft.)	Rt 1150 WB	Rt 1300 WB	Rt 700 WB	Rt 350 WB
Depth, Ft.	0.7 - 10.0	0.7 - 5.0	0.7 - 5.0	0.7 - 5.0
Field Sample No.	1206	1203	1204	1205
% Pass. 3/8" Sieve	100			100
% Pass. No. 4 Sieve	99			100
% Pass. No. 10 Sieve	98			99
% Coarse Sand (-No. 10 + No. 40)	4			3
% Fine Sand (-No. 40 + No. 200)	17			17
% Silt (0.074 - 0.005 mm)	36			37
% Clay (-0.005 mm)	40			42
Liquid Limit (-No. 40)	50			48
Plasticity Index (-No. 40)	30			31
Plastic Limit	20			17
Soil Color	BRN	BRN	BRN	BRN
Textural Class	CLY			CLY
Soil Class (AASHTO M-145)	A-7-6(23)			A-7-6(24)
Frost Class	F3			F3
Optimum Moisture (%)	12.6			11.9
Maximum Dry Density (pcf)	121.6			121.3
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 29.3	1 | 20.9	1 | 17.1	1 | 23.4
	2 | 17.4	2 | 10.7	2 | 9.5	2 | 10.4
	3 | 17.6	3 | 15.0	3 | 11.1	3 | 12.8
	4 | 17.2	4 | 15.6	4 | 14.8	4 | 13.9
	5 | 9.0	5 | 14.3	5 | 14.7	5 | 13.3
	6 | 18.5	15.3	13.5	14.7
	7 | 24.0			
	8 | 28.1			
	9 | 17.3			
	10 | 18.2			
Avg. Moisture of Sample Depth	19.6			

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-57-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B2 Site 10
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1199	1200	1201	1202
Reference Pt + Feet	264+4745	264+4745	264+4745	264+4745
Distance From CenterLine (Ft.)	Rt 350 EB	Rt 725 EB	Rt 1230 EB	Rt 1520 EB
Depth, Ft.	0.7 - 5.0	0.8 - 5.0	0.8 - 5.0	0.8 - 5.0
Field Sample No.	1199	1200	1201	1202
% Pass. 3/8" Sieve		100	99	94
% Pass. No. 4 Sieve		98	98	94
% Pass. No. 10 Sieve		95	96	91
% Coarse Sand (-No. 10 + No. 40)		5	7	6
% Fine Sand (-No. 40 + No. 200)		24	20	21
% Silt (0.074 - 0.005 mm)		31	32	28
% Clay (-0.005 mm)		35	38	37
Liquid Limit (-No. 40)		41	41	44
Plasticity Index (-No. 40)		24	26	24
Plastic Limit		17	15	20
Soil Color	BRN	BRN	BRN	BRN
Textural Class		CLY	CLY	CLY
Soil Class (AASHTO M-145)		A-7-6(14)	A-7-6(16)	A-7-6(14)
Frost Class		F3	F3	F3
Optimum Moisture (%)		11.1	10.5	12.3
Maximum Dry Density (pcf)		124.2	124.2	118.8
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 24.2	1 | 19.1	1 | 22.3	1 | 34.3
	2 | 12.6	2 | 9.1	2 | 9.5	2 | 8.3
	3 | 14.7	3 | 13.2	3 | 8.2	3 | 10.5
	4 | 14.9	4 | 13.7	4 | 13.6	4 | 12.6
	5 | 15.8	5 | 15.3	5 | 15.7	5 | 13.1
Avg. Moisture of Sample Depth	16.4	14.1	13.9	15.7

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-57-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B2 Site 10
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1196	1197	1198	1193
Reference Pt + Feet	264+4870	264+4870	264+4870	264+5025
Distance From CenterLine (Ft.)	Rt 1500 EB	Rt 1000 EB	Rt 500 EB	Rt 750 EB
Depth, Ft.	0.9 - 5.0	0.5 - 5.0	0.6 - 5.0	0.7 - 5.0
Field Sample No.	1196	1197	1198	1193
% Pass. 3/8" Sieve	100		99	
% Pass. No. 4 Sieve	99		98	
% Pass. No. 10 Sieve	98		97	
% Coarse Sand (-No. 10 + No. 40)	4		3	
% Fine Sand (-No. 40 + No. 200)	24		19	
% Silt (0.074 - 0.005 mm)	29		32	
% Clay (-0.005 mm)	42		43	
Liquid Limit (-No. 40)	44		51	
Plasticity Index (-No. 40)	27		34	
Plastic Limit	17		17	
Soil Color	BRN	BRN/TAN	BRN	BRN
Textural Class	CLY		CLY	
Soil Class (AASHTO M-145)	A-7-6(17)		A-7-6(24)	
Frost Class	F3		F3	
Optimum Moisture (%)	11.6		13.0	
Maximum Dry Density (pcf)	122.6		120.1	
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 18.8	1 | 25.2	1 | 24.4	1 | 14.3
	2 | 9.8	2 | 10.5	2 | 8.2	2 | 11.4
	3 | 13.1	3 | 13.4	3 | 12.0	3 | 10.6
	4 | 13.1	4 | 16.2	4 | 14.0	4 | 7.7
	5 | 12.7	5 | 13.8	5 | 12.9	5 | 14.2
Avg. Moisture of Sample Depth	13.5	15.8	14.3	11.6

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-57-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B2 Site 10
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1194	1195	1189	1190
Reference Pt + Feet	264+5025	264+5025	264+5150	264+5150
Distance From CenterLine (Ft.)	Rt 1250 EB	Rt 1700 EB	Rt 1850 WB	Rt 1350 WB
Depth, Ft.	0.8 - 5.0	0.8 - 5.0	0.9 - 5.0	0.9 - 5.0
Field Sample No.	1194	1195	1189	1190
% Pass. 3/8" Sieve	100		99	
% Pass. No. 4 Sieve	98		98	
% Pass. No. 10 Sieve	96		96	
% Coarse Sand (-No. 10 + No. 40)	5		5	
% Fine Sand (-No. 40 + No. 200)	21		17	
% Silt (0.074 - 0.005 mm)	32		33	
% Clay (-0.005 mm)	39		42	
Liquid Limit (-No. 40)	45		45	
Plasticity Index (-No. 40)	28		27	
Plastic Limit	17		19	
Soil Color	BRN/TAN	BRN/TAN	BRN/TAN	BRN/TAN
Textural Class	CLY		CLY	
Soil Class (AASHTO M-145)	A-7-6(18)		A-7-6(19)	
Frost Class	F3		F3	
Optimum Moisture (%)	12.2		12.4	
Maximum Dry Density (pcf)	121.6		122.3	
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 16.3	1 | 24.2	1 | 23.6	1 | 21.2
	2 | 7.5	2 | 9.8	2 | 9.2	2 | 7.3
	3 | 7.3	3 | 10.8	3 | 13.0	3 | 65.3
	4 | 11.6	4 | 12.6	4 | 13.1	4 | 8.2
	5 | 12.3	5 | 14.0	5 | 11.8	5 | 8.8
Avg. Moisture of Sample Depth	11.0	14.2	14.2	22.2

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-57-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B2 Site 10
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1191	1192	1185	1186
Reference Pt + Feet	264+5150	264+5150	265+0000	265+0000
Distance From CenterLine (Ft.)	Rt 840 WB	Rt 500 WB	Rt 650 EB	Rt 1150 EB
Depth, Ft.	0.9 - 5.0	0.9 - 5.0	1.0 - 5.0	1.0 - 5.0
Field Sample No.	1191	1192	1185	1186
% Pass. 3/8" Sieve	96	100	91	
% Pass. No. 4 Sieve	94	99	89	
% Pass. No. 10 Sieve	91	99	86	
% Coarse Sand (-No. 10 + No. 40)	8	4	8	
% Fine Sand (-No. 40 + No. 200)	20	23	18	
% Silt (0.074 - 0.005 mm)	30	34	25	
% Clay (-0.005 mm)	33	38	35	
Liquid Limit (-No. 40)	42	47	40	
Plasticity Index (-No. 40)	23	30	26	
Plastic Limit	19	17	14	
Soil Color	BRN/TAN	BRN	BRN/BLK	BRN/BLK
Textural Class	CLY	CLY	CLY	
Soil Class (AASHTO M-145)	A-7-6(12)	A-7-6(20)	A-6(12)	
Frost Class	F3	F3	F3	
Optimum Moisture (%)	11.0	12.4	8.9	
Maximum Dry Density (pcf)	124.0	120.4	126.8	
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 21.5	1 | 23.0	1 | 22.8	1 | 25.0
	2 | 9.6	2 | 13.7	2 | 9.4	2 | 8.7
	3 | 11.0	3 | 13.4	3 | 7.1	3 | 8.3
	4 | 15.5	4 | 14.8	4 | 6.7	4 | 9.4
	5 | 15.9	5 | 15.3	5 | 7.9	5 | 10.6
Avg. Moisture of Sample Depth	14.7	16.0	10.8	12.4

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-57-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B2 Site 10
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1187			1188		
Reference Pt + Feet	265+0000			265+0000		
Distance From CenterLine (Ft.)	Rt 1650 EB			Rt 2030 EB		
Depth, Ft.	0.9 - 5.0			0.9 - 5.0		
Field Sample No.	1187			1188		
% Pass. 3/8" Sieve	98					
% Pass. No. 4 Sieve	97					
% Pass. No. 10 Sieve	94					
% Coarse Sand (-No. 10 + No. 40)	7					
% Fine Sand (-No. 40 + No. 200)	21					
% Silt (0.074 - 0.005 mm)	30					
% Clay (-0.005 mm)	36					
Liquid Limit (-No. 40)	40					
Plasticity Index (-No. 40)	25					
Plastic Limit	15					
Soil Color	BRN/TAN			BRN		
Textural Class	CLY					
Soil Class (AASHTO M-145)	A-6(14)					
Frost Class	F3					
Optimum Moisture (%)	11.0					
Maximum Dry Density (pcf)	125.5					
% Organic Content						
Depth (Ft.) | Moisture (%)	1	|	21.1	1	|	25.3
	2	|	8.9	2	|	13.2
	3	|	15.9	3	|	17.2
	4	|	11.1	4	|	14.3
	5	|	12.6	5	|	10.8
Avg. Moisture of Sample Depth	13.9			16.2		

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/13/2016**		**1185**

Density

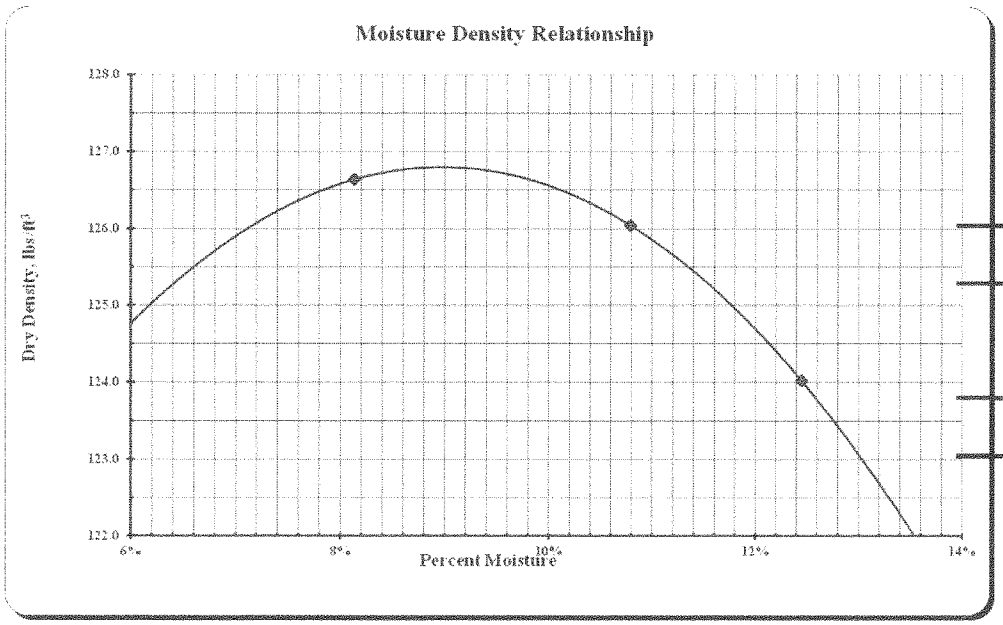
			Test Count	3				
	Determination No.		1	2	3	4	5	6
A	Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
		lbs.	8.99	9.08	9.07			
C	Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D	Weight of Compacted Soil = B - C	lbs.	4.56	4.65	4.64			
E	Wet Density = D / A	lbs./cu.ft.	136.9	139.6	139.5			
F	Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**126.6**	**126.0**	**124.0**	**#VALUE!**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

	Container No.		38	39	40			
G	Wet Weight / Container	grams	163.2	151.5	149.1			
H	Dry Weight / Container	grams	153.7	140.4	136.7			
I	Moisture Loss = G - H	grams	9.5	11.1	12.4			
J	Tare Weight of Container	grams	36.9	37.5	37.1			
K	Dry Soil = H - J	grams	116.8	102.9	99.6			
L	%Moisture = (I / K) x 100	%	**8.1%**	**10.8%**	**12.4%**			

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

126.8 lbs./cu.ft.

Optimum Moisture

8.9%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/13/2016**		**1187**

Density

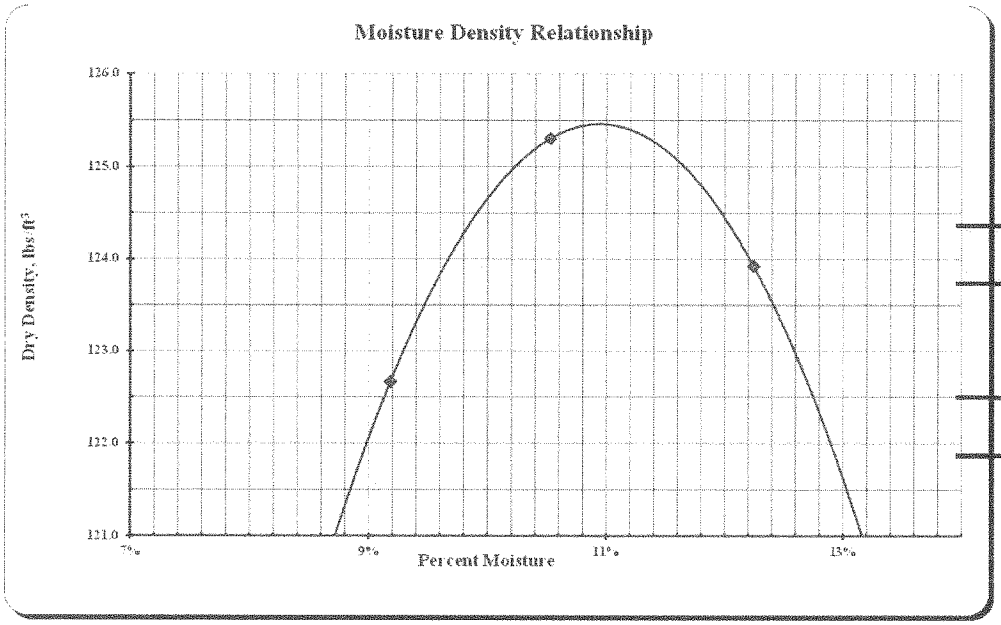
		Test Count	3				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.89	9.04	9.06			
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.46	4.61	4.63			
E Wet Density = D / A	lbs./cu.ft.	133.9	138.5	139.1			
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**122.7**	**125.3**	**123.9**	**#VALUE!**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		100	101	102			
G Wet Weight / Container	grams	156.1	146.8	153.2			
H Dry Weight / Container	grams	146.1	136.4	140.6			
I Moisture Loss = G - H	grams	10.0	10.4	12.6			
J Tare Weight of Container	grams	37.2	37.6	37.7			
K Dry Soil = H - J	grams	108.9	98.8	102.9			
L %Moisture = (I / K) x 100	%	**9.2%**	**10.5%**	**12.2%**			

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

125.5 lbs./cu.ft.

Optimum Moisture

11.0%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation	Date		
T-180	**10/13/2016**		**1189**

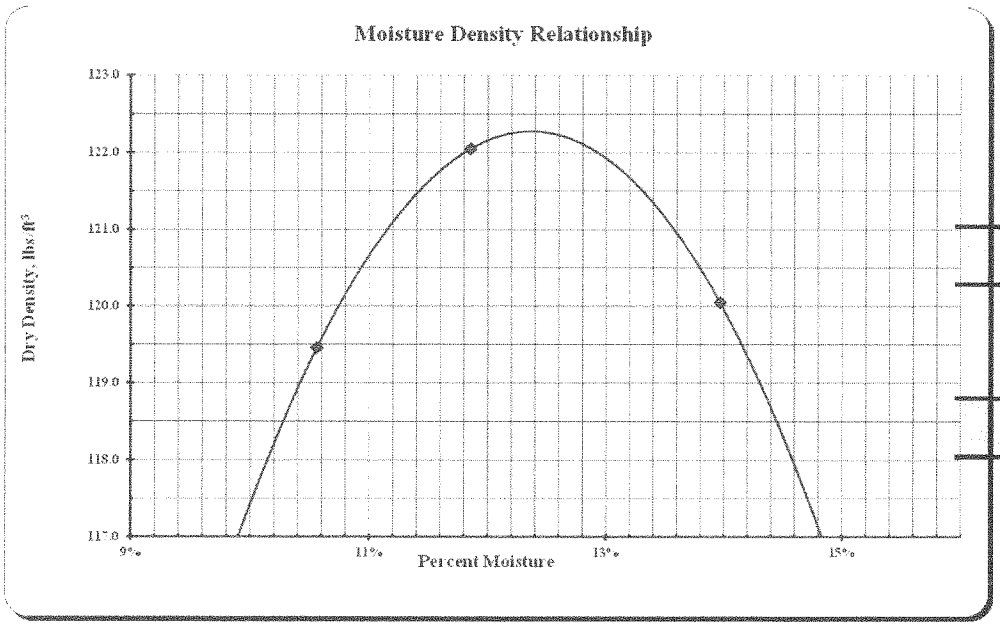
Density		Test Count	3				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.82	8.98	8.98			
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.40	4.55	4.56			
E Wet Density = D / A	lbs./cu.ft.	132.1	136.5	136.8			
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**119.5**	**122.0**	**120.0**	**#VALUE!**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		41	42	43			
G Wet Weight / Container	grams	153.4	155.6	154.5			
H Dry Weight / Container	grams	142.3	143.0	140.1			
I Moisture Loss = G - H	grams	11.1	12.6	14.4			
J Tare Weight of Container	grams	37.2	36.7	37.0			
K Dry Soil = H - J	grams	105.1	106.3	103.1			
L %Moisture = (I / K) x 100	%	**10.6%**	**11.9%**	**14.0%**			

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

122.3 lbs./cu.ft.

Optimum Moisture

12.4%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation	Date		
T-180	**10/13/2016**		**1191**

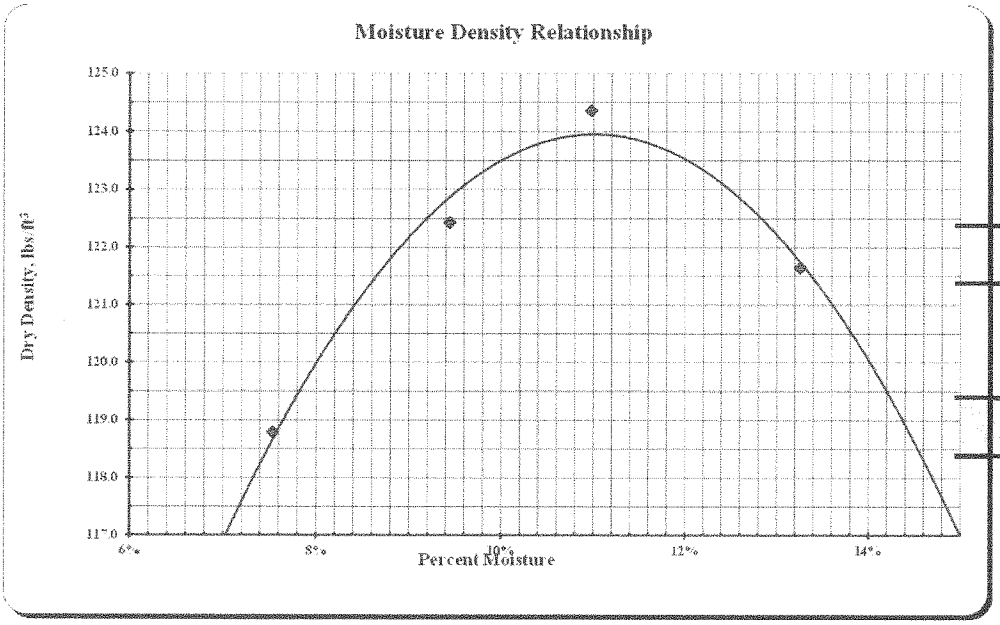
Density		Test Count	4				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.68	8.89	9.02	9.01		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.25	4.46	4.60	4.59		
E Wet Density = D / A	lbs./cu.ft.	127.7	134.0	138.0	137.8		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**118.8**	**122.4**	**124.4**	**121.7**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		103	104	105	106		
G Wet Weight / Container	grams	159.9	164.7	149.7	155.4		
H Dry Weight / Container	grams	151.3	153.7	138.6	141.6		
I Moisture Loss = G - H	grams	8.6	11.0	11.1	13.8		
J Tare Weight of Container	grams	37.2	37.2	37.5	37.5		
K Dry Soil = H - J	grams	114.1	116.5	101.1	104.1		
L %Moisture = (I / K) x 100	%	**7.5%**	**9.4%**	**11.0%**	**13.3%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

124.0 lbs./cu.ft.

Optimum Moisture

11.0%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation	Date		
T-180	**10/13/2016**		**1192**

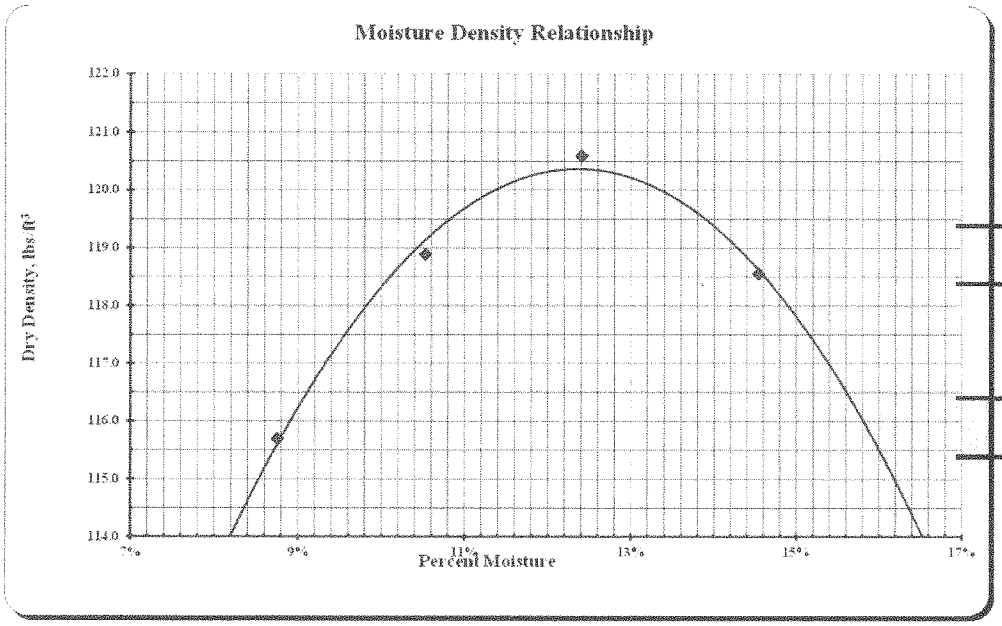
Density		Test Count	4				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.62	8.81	8.94	8.95		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.19	4.38	4.51	4.52		
E Wet Density = D / A	lbs./cu.ft.	125.8	131.4	135.6	135.8		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**115.7**	**118.9**	**120.6**	**118.6**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		44	45	46	47		
G Wet Weight / Container	grams	169.9	162.5	155.8	145.7		
H Dry Weight / Container	grams	159.2	150.6	142.7	131.9		
I Moisture Loss = G - H	grams	10.7	11.9	13.1	13.8		
J Tare Weight of Container	grams	37.0	37.6	37.1	37.0		
K Dry Soil = H - J	grams	122.2	113.0	105.6	94.9		
L %Moisture = (I / K) x 100	%	**8.8%**	**10.5%**	**12.4%**	**14.5%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

120.4 lbs./cu.ft.

Optimum Moisture

12.4%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/13/2016**		**1194**

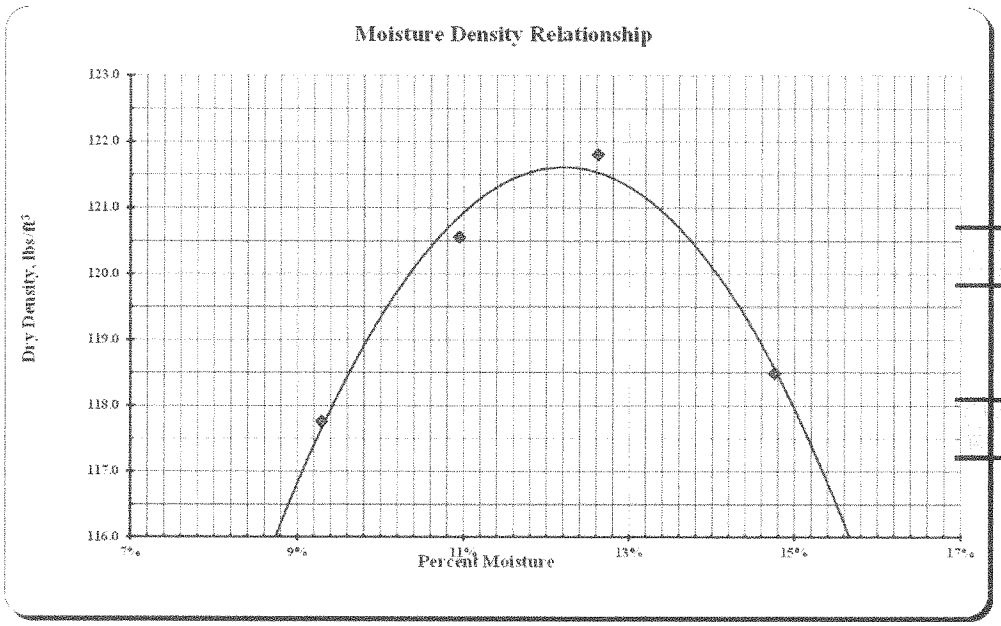
Density		Test Count	4				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.71	8.88	8.99	8.95		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.29	4.45	4.57	4.53		
E Wet Density = D / A	lbs./cu.ft.	128.7	133.8	137.2	136.0		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**117.8**	**120.6**	**121.8**	**118.5**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		107	108	109	110		
G Wet Weight / Container	grams	150.0	160.8	156.5	152.2		
H Dry Weight / Container	grams	140.4	148.6	143.2	137.4		
I Moisture Loss = G - H	grams	9.6	12.2	13.3	14.8		
J Tare Weight of Container	grams	37.1	37.1	37.8	37.1		
K Dry Soil = H - J	grams	103.3	111.5	105.4	100.3		
L %Moisture = (I / K) x 100	%	**9.3%**	**10.9%**	**12.6%**	**14.8%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

121.6 lbs./cu.ft.

Optimum Moisture

12.2%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/13/2016**		**1196**

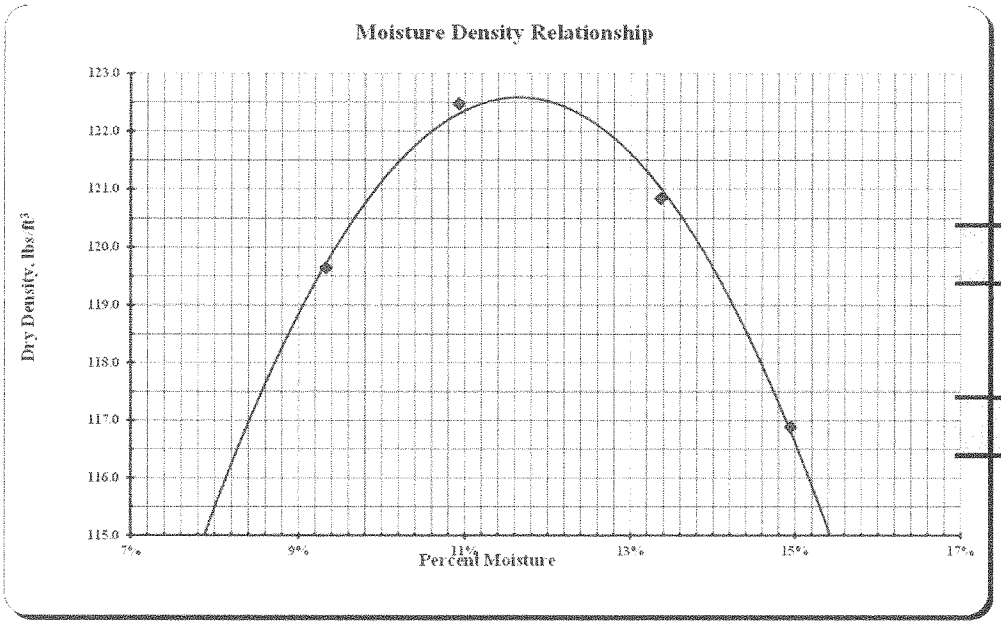
Density		Test Count	4				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.78	8.95	8.99	8.90		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.36	4.52	4.56	4.47		
E Wet Density = D / A	lbs./cu.ft.	130.8	135.9	137.0	134.4		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**119.6**	**122.5**	**120.8**	**116.9**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		48	49	50	51		
G Wet Weight / Container	grams	161.3	161.2	153.2	159.5		
H Dry Weight / Container	grams	150.7	149.0	139.5	143.6		
I Moisture Loss = G - H	grams	10.6	12.2	13.7	15.9		
J Tare Weight of Container	grams	37.1	37.3	37.0	37.2		
K Dry Soil = H - J	grams	113.6	111.7	102.5	106.4		
L %Moisture = (I / K) x 100	%	**9.3%**	**10.9%**	**13.4%**	**14.9%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

122.6 lbs./cu.ft.

Optimum Moisture

11.6%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

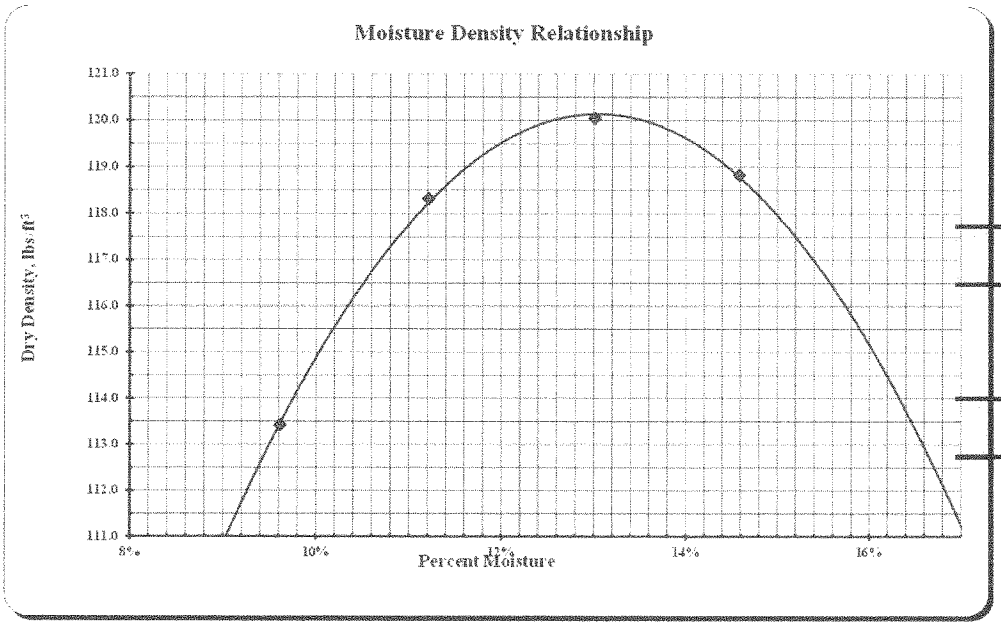
Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/13/2016**		**1198**

Density		Test Count	4				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.57	8.81	8.94	8.96		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.14	4.38	4.52	4.53		
E Wet Density = D / A	lbs./cu.ft.	124.3	131.6	135.7	136.2		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**113.4**	**118.3**	**120.1**	**118.8**	**#VALUE!**	**#VALUE!**

Moisture Content AASHTO T99 or T180 Tested by:

Container No.		111	112	113	114		
G Wet Weight / Container	grams	159.9	146.6	148.3	152.9		
H Dry Weight / Container	grams	149.2	135.6	135.6	138.2		
I Moisture Loss = G - H	grams	10.7	11.0	12.7	14.7		
J Tare Weight of Container	grams	37.9	37.5	38.0	37.4		
K Dry Soil = H - J	grams	111.3	98.1	97.6	100.8		
L %Moisture = (I / K) x 100	%	**9.6%**	**11.2%**	**13.0%**	**14.6%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

120.1 lbs./cu.ft.

Optimum Moisture

13.0%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/13/2016**		**1200**

Density

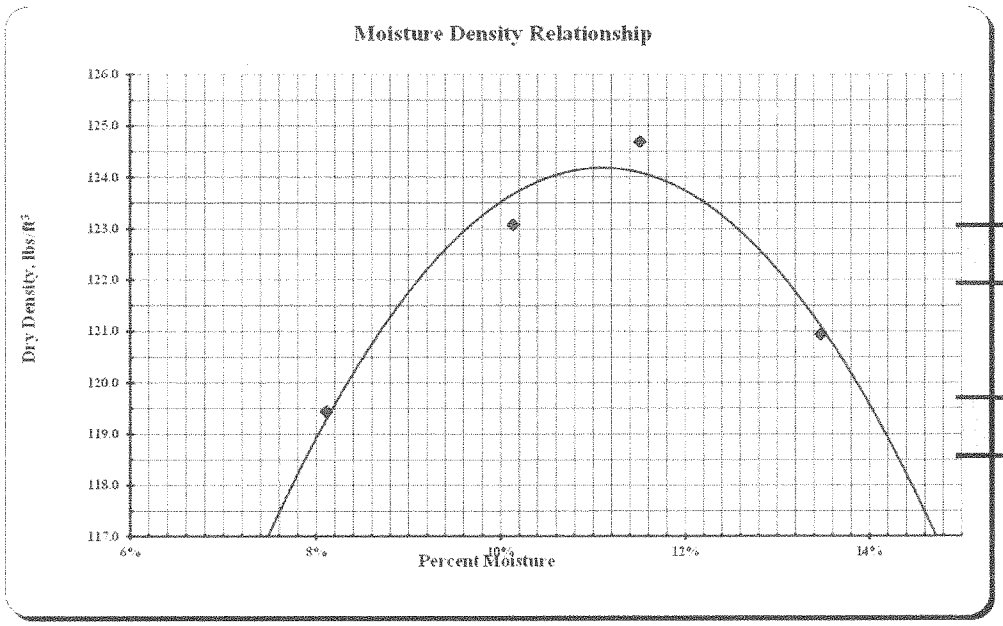
	Test Count	4				
Determination No.	1	2	3	4	5	6
A Volume of Mold cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
lbs.	8.73	8.94	9.06	9.00		
C Weight of Mold lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C lbs.	4.30	4.51	4.63	4.57		
E Wet Density = D / A lbs./cu.ft.	129.1	135.6	139.0	137.2		
F Dry Density = (E x 100) / (100 + L) lbs./cu.ft.	**119.4**	**123.1**	**124.7**	**120.9**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.	52	53	54	55		
G Wet Weight / Container grams	163.9	158.8	155.2	148.6		
H Dry Weight / Container grams	154.4	147.6	143.0	135.3		
I Moisture Loss = G - H grams	9.5	11.2	12.2	13.3		
J Tare Weight of Container grams	37.3	37.1	37.0	36.6		
K Dry Soil = H - J grams	117.1	110.5	106.0	98.7		
L %Moisture = (I / K) x 100 %	**8.1%**	**10.1%**	**11.5%**	**13.5%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

124.2 lbs./cu.ft.

Optimum Moisture

11.1%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/13/2016**		**1201**

Density

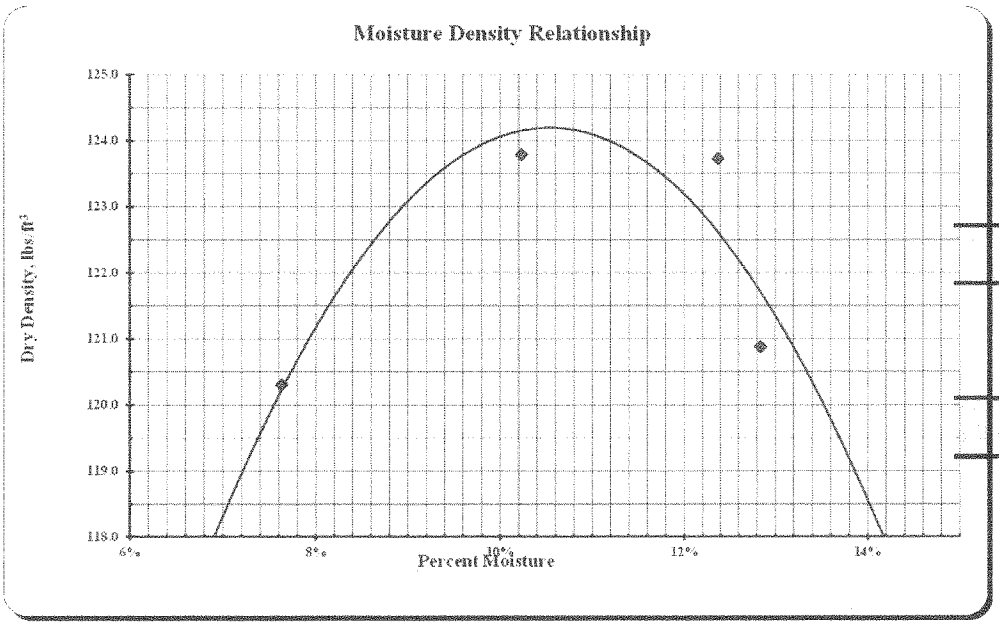
			Test Count	4				
	Determination No.		1	2	3	4	5	6
A	Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
		lbs.	8.74	8.97	9.06	8.97		
C	Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D	Weight of Compacted Soil = B - C	lbs.	4.31	4.54	4.63	4.54		
E	Wet Density = D / A	lbs./cu.ft.	129.5	136.5	139.0	136.4		
F	Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**120.3**	**123.8**	**123.7**	**120.9**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

	Container No.		56	57	58	59		
G	Wet Weight / Container	grams	158.6	155.8	157.6	166.4		
H	Dry Weight / Container	grams	150.0	144.8	144.3	151.7		
I	Moisture Loss = G - H	grams	8.6	11.0	13.3	14.7		
J	Tare Weight of Container	grams	37.3	37.3	36.8	37.2		
K	Dry Soil = H - J	grams	112.7	107.5	107.5	114.5		
L	%Moisture = (I / K) x 100	%	**7.6%**	**10.2%**	**12.4%**	**12.8%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

124.2 lbs./cu.ft.

Optimum Moisture

10.5%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation	Date		
T-180	**10/13/2016**		**1202**

Density

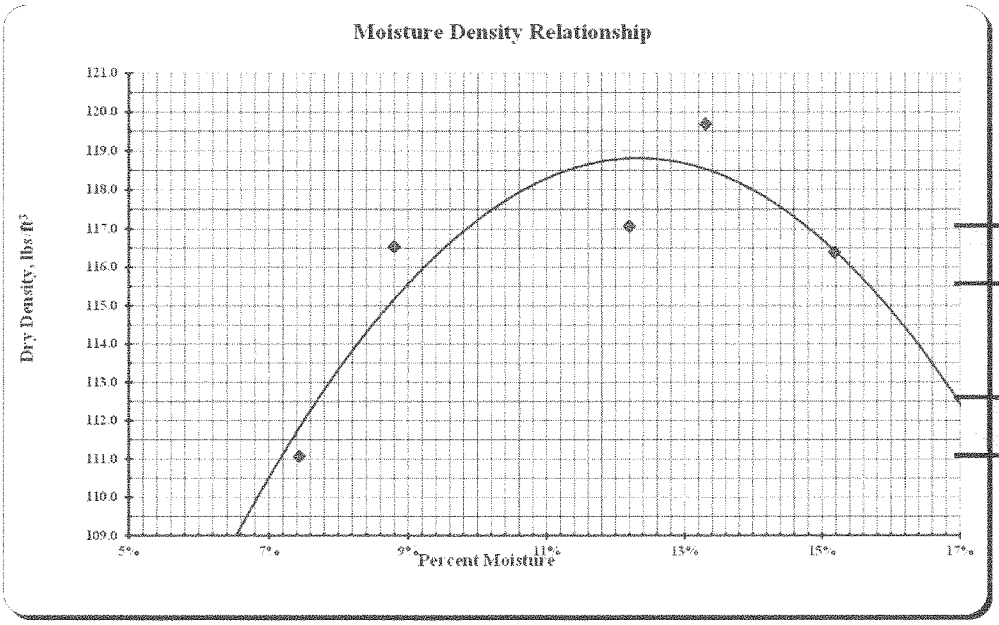
	Test Count	5				
Determination No.	1	2	3	4	5	6
A Volume of Mold cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
lbs.	8.40	8.65	8.80	8.94	8.89	
C Weight of Mold lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C lbs.	3.97	4.22	4.37	4.52	4.46	
E Wet Density = D / A lbs./cu.ft.	119.3	126.8	131.4	135.6	134.1	
F Dry Density = (E x 100) / (100 + L) lbs./cu.ft.	**111.1**	**116.5**	**117.1**	**119.7**	**116.4**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.	60	1	2	3	4	
G Wet Weight / Container grams	160.2	157.8	153.2	157.2	149.0	
H Dry Weight / Container grams	151.7	148.0	140.6	143.1	134.2	
I Moisture Loss = G - H grams	8.5	9.8	12.6	14.1	14.8	
J Tare Weight of Container grams	37.4	36.6	37.3	37.1	36.7	
K Dry Soil = H - J grams	114.3	111.4	103.3	106.0	97.5	
L %Moisture = (I / K) x 100 %	**7.4%**	**8.8%**	**12.2%**	**13.3%**	**15.2%**	

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

118.8 lbs./cu.ft.

Optimum Moisture

12.3%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/13/2016**		**1205**

Density

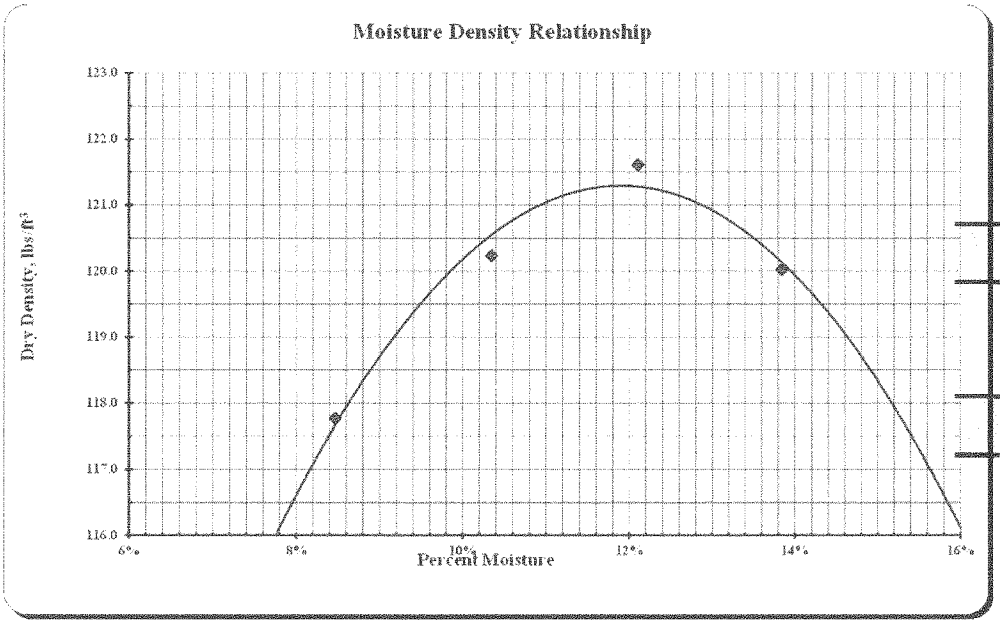
			Test Count	4				
	Determination No.		1	2	3	4	5	6
A	Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
		lbs.	8.68	8.85	8.97	8.98		
C	Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D	Weight of Compacted Soil = B - C	lbs.	4.25	4.42	4.54	4.55		
E	Wet Density = D / A	lbs./cu.ft.	127.7	132.7	136.3	136.6		
F	Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**117.8**	**120.2**	**121.6**	**120.0**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

	Container No.		5	6	7	8		
G	Wet Weight / Container	grams	149.8	161.9	153.9	150.5		
H	Dry Weight / Container	grams	141.0	150.2	141.2	136.7		
I	Moisture Loss = G - H	grams	8.8	11.7	12.7	13.8		
J	Tare Weight of Container	grams	37.1	37.1	36.3	37.0		
K	Dry Soil = H - J	grams	103.9	113.1	104.9	99.7		
L	%Moisture = (I / K) x 100	%	**8.5%**	**10.3%**	**12.1%**	**13.8%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

121.3 lbs./cu.ft.

Optimum Moisture

11.9%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1206**

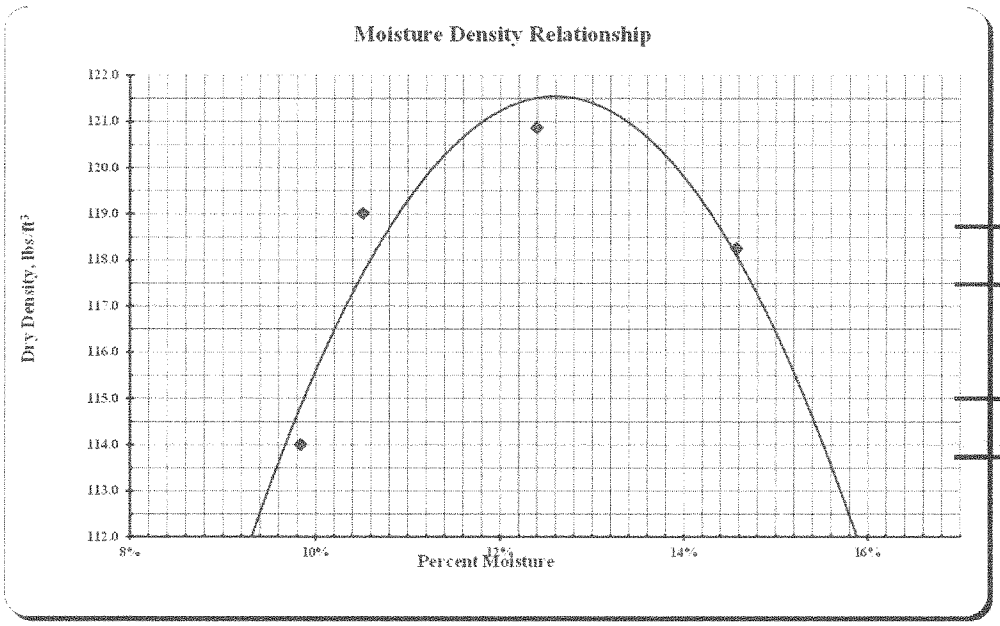
Density		Test Count	4				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.59	8.80	8.95	8.94		
C Weight of Mold	lbs.	4.42	4.42	4.42	4.42	4.42	4.42
D Weight of Compacted Soil = B - C	lbs.	4.17	4.38	4.52	4.51		
E Wet Density = D / A	lbs./cu.ft.	125.2	131.5	135.9	135.5		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**114.0**	**119.0**	**120.9**	**118.3**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		61	62	63	64		
G Wet Weight / Container	grams	140.0	154.3	156.1	157.6		
H Dry Weight / Container	grams	130.8	143.2	143.0	142.3		
I Moisture Loss = G - H	grams	9.2	11.1	13.1	15.3		
J Tare Weight of Container	grams	37.3	37.6	37.3	37.3		
K Dry Soil = H - J	grams	93.5	105.6	105.7	105.0		
L %Moisture = (I / K) x 100	%	**9.8%**	**10.5%**	**12.4%**	**14.6%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

121.6 lbs./cu.ft.

Optimum Moisture

12.6%

APPENDIX D

Summary and Lab Results For Borrow B-3 Site 11

Project No.:

PCN:

Color Key

Swell Potential:	Low	Marginal	High	Moisture Content:	Below PL	0-5% Over PL	>5% Over PL	
Group Index:	GI≤20	GI>20		Ave. In-Place: Moisture Content	MC < Opt.	0 ≤ MC < 6% Over opt.	6 ≤ MC < 10% Over opt.	10 ≤ MC < 16% Over opt.	MC >16% Over opt.

Lab No.	STA	Offset	Depth of Sample (ft)	Plastic Limit (PL)	AASHTO Class	Group Index	Optimum Moisture	Swell Potential (PI)	Ave. In-Place Moisture	Moisture Content @ Depth (ft) 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Frost Class
			0-0						11.4	9.7	7.6	7.5	9.0																					
			0-0						13.3	8.1	11.9	13.4	12.6																					
			0-0						9.9	6.9	8.5	7.3	9.0																					
			0-0						11.4	7.9	9.8	9.5	10.8																					
			0-0						8.1	7.0	7.9	7.9	7.6																					
			0-0						11.0	8.1	9.4	9.9	11.8																					
			0-0						12.0	7.6	10.7	12.6	13.1																					
			0-0						15.1	9.2	10.6	16.1	16.9																					
			0-0						13.4	9.4	10.6	9.5	11.9																					
1207	264+5070	Lt 240 WB	0.8-5	18.1	A-6(13)	13	11.8	21	14.9	11.4	12.2	16.1	12.7																					F3
1208	264+5070	Lt 427 WB	0.6-10	19.4	A-7-6(19)	19	11.9	29	16.7	14.8	16.1	16.1	14.9	16.8	16.0	16.3	15.7	13.3																F3
1223	265+0000	Lt 750 SB	0.7-7	16.6	A-7-6(15)	15	10.3	24	13.6	8.3	11.1	11.2	12.0	12.1	15.5																			F3
1222	265+0110	Lt 500 SB	0.8-5	18.0	A-6(12)	12	11.4	20	14.0	9.9	10.0	11.1	15.1																					F3

Project No.: SS-7-804(050)248 B3 Site 11

PCN: 20326

Color Key

Swell Potential:	Low	Marginal	High	Moisture Content:	Below PL	0-5% Over PL	>5% Over PL	
Group Index:	GI≤20	GI>20		Ave. In-Place: Moisture Content	MC < Opt.	0 ≤ MC < 6% Over opt.	6 ≤ MC < 10% Over opt.	10 ≤ MC < 16% Over opt.	MC >16% Over opt.

Lab No.	STA	Offset	Depth of Sample (ft)	Plastic Limit (PL)	AASHTO Class	Group Index	Optimum Moisture	Swell Potential (PI)	Ave. In-Place Moisture	Moisture Content @ Depth (ft)																								Frost Class
										2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
1224	265+0125	Lt 750 NB	0.7-10	16.6	A-6(11)	11	10.4	20	12.7	10.4	10.2	10.9	12.8	11.6	12.3	12.8	11.0	12.5																F3
1210	265+0250	Lt 250 NB	0.7-5	17.5	A-7-6(13)	13	11.0	26	11.2	10.4	8.8	7.9	7.7																					F3
1220	265+0618	Lt 500 SB	0.7-5	17.1	A-6(4)	4	8.9	18	10.6	6.3	5.4	7.3	11.5																					F3
1226	265+0625	Lt 750 NB	0.8-5	19.2	A-7-6(24)	24	11.8	32	14.7	12.2	11.9	13.2	13.3																					F3
1212	265+0750	Lt 250 NB	0.7-5	16.7	A-7-6(15)	15	10.3	25	11.9	9.3	9.8	10.5	11.1																					F3
1219	265+0868	Lt 500 SB	0.7-5	17.8	A-7-6(14)	14	11.1	23	13.4	18.1	9.8	11.5	12.6																					F3
1228	265+1100	Lt 750 NB	0.8-5	18.7	A-6(12)	12	11.6	20	14.2	11.6	11.3	10.3	15.2																					F3
1218	265+1110	Lt 500 SB	0.7-5	16.4	A-7-6(15)	15	10.4	26	17.0	13.8	16.3	15.2	15.3																					F3
1214	265+1250	Lt 250 NB	0.7-5	18.0	A-7-6(14)	14	10.8	24	10.2	8.4	8.1	6.4	8.5																					F3
1216	265+1680	Lt 500 SB	0.6-5	18.2	A-7-6(13)	13	10.7	24	8.0	6.5	6.8	7.2	8.3																					F3

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-58-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B3 Site 11
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1207	1208	1209	1223
Reference Pt + Feet	264+5070	264+5070	265+0000	265+0000
Distance From CenterLine (Ft.)	Lt 240 WB	Lt 427 WB	Lt 250 NB	Lt 750 SB
Depth, Ft.	0.8 - 5.0	0.6 - 10.0	0.7 - 5.0	0.7 - 7.0
Field Sample No.	1207	1208	1209	1223
% Pass. 3/8" Sieve	100	100		100
% Pass. No. 4 Sieve	99	98		98
% Pass. No. 10 Sieve	98	96		95
% Coarse Sand (-No. 10 + No. 40)	3	4		6
% Fine Sand (-No. 40 + No. 200)	25	22		20
% Silt (0.074 - 0.005 mm)	33	34		33
% Clay (-0.005 mm)	37	37		36
Liquid Limit (-No. 40)	40	48		41
Plasticity Index (-No. 40)	21	29		24
Plastic Limit	18	19		17
Soil Color	BRN/TAN	BRN	BRN	BRN
Textural Class	CLY	CLY		CLY
Soil Class (AASHTO M-145)	A-6(13)	A-7-6(19)		A-7-6(15)
Frost Class	F3	F3		F3
Optimum Moisture (%)	11.8	11.9		10.3
Maximum Dry Density (pcf)	121.6	121.8		126.6
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 21.9	1 | 26.7	1 | 10.2	1 | 25.1
	2 | 11.4	2 | 14.8	2 | 7.0	2 | 8.3
	3 | 12.2	3 | 16.1	3 | 7.9	3 | 11.1
	4 | 16.1	4 | 16.1	4 | 7.9	4 | 11.2
	5 | 12.7	5 | 14.9	5 | 7.6	5 | 12.0
Avg. Moisture of Sample Depth	14.8	6 | 16.8	8.2	6 | 12.1
		7 | 16.0		7 | 15.5
		8 | 16.3		13.6
		9 | 15.7		
		10 | 13.3		
		16.6		

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

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County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B3 Site 11
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1222	1224	1210	1221
Reference Pt + Feet	265+0110	265+0125	265+0250	265+0360
Distance From CenterLine (Ft.)	Lt 500 SB	Lt 750 NB	Lt 250 NB	Lt 500 SB
Depth, Ft.	0.8 - 5.0	0.7 - 10.0	0.7 - 5.0	0.7 - 5.0
Field Sample No.	1222	1224	1210	1221
% Pass. 3/8" Sieve	99	95	89	
% Pass. No. 4 Sieve	98	93	87	
% Pass. No. 10 Sieve	93	90	85	
% Coarse Sand (-No. 10 + No. 40)	5	6	6	
% Fine Sand (-No. 40 + No. 200)	19	18	17	
% Silt (0.074 - 0.005 mm)	31	32	29	
% Clay (-0.005 mm)	37	35	33	
Liquid Limit (-No. 40)	38	37	43	
Plasticity Index (-No. 40)	20	20	26	
Plastic Limit	18	17	18	
Soil Color	BRN/TAN	BRN	BRN	BRN/TAN
Textural Class	CLY	CLY	CLY	
Soil Class (AASHTO M-145)	A-6(12)	A-6(11)	A-7-6(13)	
Frost Class	F3	F3	F3	
Optimum Moisture (%)	11.4	10.4	11.0	
Maximum Dry Density (pcf)	124.1	126.0	123.3	
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 24.1	1 | 22.4	1 | 21.0	1 | 23.0
	2 | 9.9	2 | 10.4	2 | 10.4	2 | 9.7
	3 | 10.0	3 | 10.2	3 | 8.8	3 | 7.6
	4 | 11.1	4 | 10.9	4 | 7.9	4 | 7.5
	5 | 15.1	5 | 12.8	5 | 7.7	5 | 9.0
Avg. Moisture of Sample Depth	14.1	6 | 11.6	11.1	11.4
		7 | 12.3		
		8 | 12.8		
		9 | 11.0		
		10 | 12.5		
		12.7		

Scott W. Wutzke, Testing Lab Supervisor
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Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-58-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B3 Site 11
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1225	1211	1220	1226
Reference Pt + Feet	265+0375	265+0500	265+0618	265+0625
Distance From CenterLine (Ft.)	Lt 750 NB	Lt 250 NB	Lt 500 SB	Lt 750 NB
Depth, Ft.	0.9 - 5.0	0.7 - 5.0	0.7 - 5.0	0.8 - 5.0
Field Sample No.	1225	1211	1220	1226
% Pass. 3/8" Sieve			89	98
% Pass. No. 4 Sieve			82	98
% Pass. No. 10 Sieve			74	96
% Coarse Sand (-No. 10 + No. 40)			12	3
% Fine Sand (-No. 40 + No. 200)			17	17
% Silt (0.074 - 0.005 mm)			24	32
% Clay (-0.005 mm)			22	45
Liquid Limit (-No. 40)			35	51
Plasticity Index (-No. 40)			18	32
Plastic Limit			17	19
Soil Color	BRN	BRN/TAN	BRN	BRN/TAN
Textural Class			SNDY CLY LM	CLY
Soil Class (AASHTO M-145)			A-6(4)	A-7-6(24)
Frost Class			F3	F3
Optimum Moisture (%)			8.9	11.8
Maximum Dry Density (pcf)			130.3	121.5
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 22.6	1 | 17.9	1 | 22.7	1 | 23.1
	2 | 9.2	2 | 6.9	2 | 6.3	2 | 12.2
	3 | 10.6	3 | 8.5	3 | 5.4	3 | 11.9
	4 | 16.1	4 | 7.3	4 | 7.3	4 | 13.2
	5 | 16.9	5 | 9.0	5 | 11.5	5 | 13.3
Avg. Moisture of Sample Depth	15.1	9.9	10.7	14.8

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-58-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B3 Site 11
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1212	1219	1227	1213
Reference Pt + Feet	265+0750	265+0868	265+0875	265+1000
Distance From CenterLine (Ft.)	Lt 250 NB	Lt 500 SB	Lt 750 NB	Lt 250 NB
Depth, Ft.	0.7 - 5.0	0.7 - 5.0	0.8 - 5.0	0.7 - 5.0
Field Sample No.	1212	1219	1227	1213
% Pass. 3/8" Sieve	100	99		
% Pass. No. 4 Sieve	97	97		
% Pass. No. 10 Sieve	94	94		
% Coarse Sand (-No. 10 + No. 40)	7	7		
% Fine Sand (-No. 40 + No. 200)	20	19		
% Silt (0.074 - 0.005 mm)	34	31		
% Clay (-0.005 mm)	34	38		
Liquid Limit (-No. 40)	42	41		
Plasticity Index (-No. 40)	25	23		
Plastic Limit	17	18		
Soil Color	BRN/TAN	BRN	BRN	BRN/TAN
Textural Class	CLY	CLY		
Soil Class (AASHTO M-145)	A-7-6(15)	A-7-6(14)		
Frost Class	F3	F3		
Optimum Moisture (%)	10.3	11.1		
Maximum Dry Density (pcf)	125.0	124.0		
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 18.9	1 | 15.2	1 | 25.4	1 | 20.3
	2 | 9.3	2 | 18.1	2 | 9.4	2 | 8.1
	3 | 9.8	3 | 9.8	3 | 10.6	3 | 11.9
	4 | 10.5	4 | 11.5	4 | 9.5	4 | 13.4
	5 | 11.1	5 | 12.6	5 | 11.9	5 | 12.6
Avg. Moisture of Sample Depth	12.0	13.5	13.3	13.2

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-58-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B3 Site 11
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1228	1218	1214	1217
Reference Pt + Feet	265+1100	265+1110	265+1250	265+1340
Distance From CenterLine (Ft.)	Lt 750 NB	Lt 500 SB	Lt 250 NB	Lt 500 SB
Depth, Ft.	0.8 - 5.0	0.7 - 5.0	0.7 - 5.0	0.6 - 5.0
Field Sample No.	1228	1218	1214	1217
% Pass. 3/8" Sieve	100	98	98	
% Pass. No. 4 Sieve	99	97	95	
% Pass. No. 10 Sieve	97	93	93	
% Coarse Sand (-No. 10 + No. 40)	4	7	7	
% Fine Sand (-No. 40 + No. 200)	25	20	18	
% Silt (0.074 - 0.005 mm)	35	32	30	
% Clay (-0.005 mm)	33	35	38	
Liquid Limit (-No. 40)	39	42	42	
Plasticity Index (-No. 40)	20	26	24	
Plastic Limit	19	16	18	
Soil Color	BRN/TAN	BRN	BRN/TAN	BRN/TAN
Textural Class	CLY	CLY	CLY	
Soil Class (AASHTO M-145)	A-6(12)	A-7-6(15)	A-7-6(14)	
Frost Class	F3	F3	F3	
Optimum Moisture (%)	11.6	10.4	10.8	
Maximum Dry Density (pcf)	121.1	126.1	123.9	
% Organic Content				
Depth (Ft.) | Moisture (%)	1 | 22.4	1 | 24.2	1 | 19.8	1 | 15.9
	2 | 11.6	2 | 13.8	2 | 8.4	2 | 7.6
	3 | 11.3	3 | 16.3	3 | 8.1	3 | 10.7
	4 | 10.3	4 | 15.2	4 | 6.4	4 | 12.6
	5 | 15.2	5 | 15.3	5 | 8.5	5 | 13.1
Avg. Moisture of Sample Depth	14.2	17.0	10.3	12.0

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

Borrow Area Laboratory Analysis

Department of Transportation, Materials and Research Division
300 Airport Road, Bismarck ND 58504 (701) 328-6900

Report Number	SS-58-2016	**Date Reported**	10/4/2016	**District**	Bismarck
County	MOUNTRAIL	**Submitted By**	Naumann	**Project Number**	SS-7-804(050)248 B3 Site 11
		AASHTO Test Method		**PCN**	20326

Comments

Lab Number	1229	1215	1216
Reference Pt + Feet	265+1350	265+1500	265+1680
Distance From CenterLine (Ft.)	Lt 750 NB	Lt 250 NB	Lt 500 SB
Depth, Ft.	0.9 - 5.0	0.6 - 5.0	0.6 - 5.0
Field Sample No.	1229	1215	1216
% Pass. 3/8" Sieve			94
% Pass. No. 4 Sieve			92
% Pass. No. 10 Sieve			89
% Coarse Sand (-No. 10 + No. 40)			6
% Fine Sand (-No. 40 + No. 200)			18
% Silt (0.074 - 0.005 mm)			31
% Clay (-0.005 mm)			34
Liquid Limit (-No. 40)			42
Plasticity Index (-No. 40)			24
Plastic Limit			18
Soil Color	BRN	BRN	BRN
Textural Class			CLY
Soil Class (AASHTO M-145)			A-7-6(13)
Frost Class			F3
Optimum Moisture (%)			10.7
Maximum Dry Density (pcf)			123.6
% Organic Content			
Depth (Ft.) | Moisture (%)	1 | 15.7	1 | 18.8	1 | 11.1
	2 | 8.1	2 | 7.9	2 | 6.5
	3 | 9.4	3 | 9.8	3 | 6.8
	4 | 9.9	4 | 9.5	4 | 7.2
	5 | 11.8	5 | 10.8	5 | 8.3
Avg. Moisture of Sample Depth	11.0	11.4	8.0

Scott W. Wutzke, Testing Lab Supervisor
Date Printed: 10/26/2016

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1207**

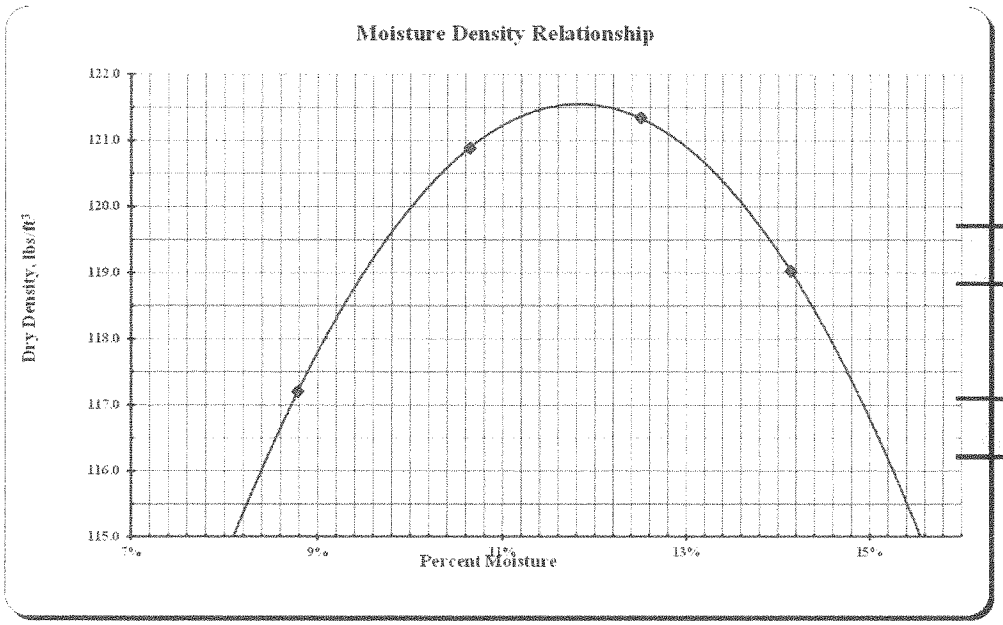
Density		Test Count	4				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.67	8.87	8.97	8.95		
C Weight of Mold	lbs.	4.42	4.42	4.42	4.42	4.42	4.42
D Weight of Compacted Soil = B - C	lbs.	4.25	4.45	4.55	4.52		
E Wet Density = D / A	lbs./cu.ft.	127.5	133.8	136.5	135.9		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**117.2**	**120.9**	**121.3**	**119.0**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		65	66	67	68		
G Wet Weight / Container	grams	151.7	161.4	148.8	147.6		
H Dry Weight / Container	grams	142.5	149.5	136.4	133.9		
I Moisture Loss = G - H	grams	9.2	11.9	12.4	13.7		
J Tare Weight of Container	grams	37.8	37.7	37.2	37.0		
K Dry Soil = H - J	grams	104.7	111.8	99.2	96.9		
L %Moisture = (I / K) x 100	%	**8.8%**	**10.6%**	**12.5%**	**14.1%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

121.6 lbs./cu.ft.

Optimum Moisture

11.8%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

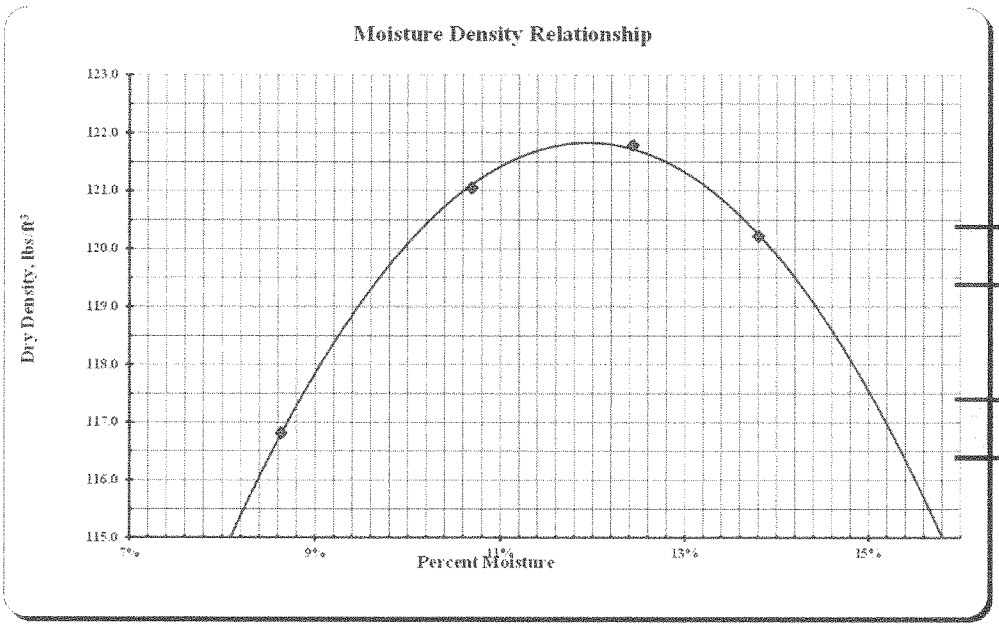
Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1208**

Density		Test Count	4				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.65	8.88	8.98	8.98		
C Weight of Mold	lbs.	4.42	4.42	4.42	4.42	4.42	4.42
D Weight of Compacted Soil = B - C	lbs.	4.23	4.46	4.56	4.56		
E Wet Density = D / A	lbs./cu.ft.	126.9	134.0	136.9	136.8		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**116.8**	**121.1**	**121.8**	**120.2**	**#VALUE!**	**#VALUE!**

Moisture Content AASHTO T99 or T180 Tested by:

Container No.		69	70	71	72		
G Wet Weight / Container	grams	157.2	151.5	152.9	161.2		
H Dry Weight / Container	grams	147.7	140.5	140.1	146.1		
I Moisture Loss = G - H	grams	9.5	11.0	12.8	15.1		
J Tare Weight of Container	grams	37.7	37.6	37.2	36.7		
K Dry Soil = H - J	grams	110.0	102.9	102.9	109.4		
L %Moisture = (I / K) x 100	%	**8.6%**	**10.7%**	**12.4%**	**13.8%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

121.8 lbs./cu.ft.

Optimum Moisture

11.9%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1210**

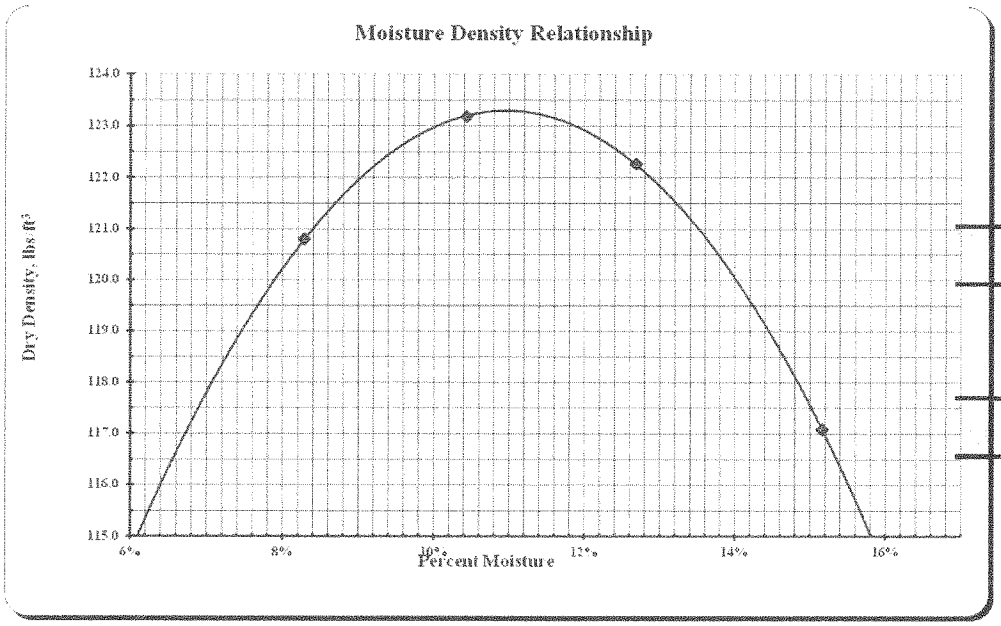
Density		Test Count	4				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.78	8.96	9.01	8.92		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.36	4.53	4.59	4.49		
E Wet Density = D / A	lbs./cu.ft.	130.8	136.0	137.8	134.8		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**120.8**	**123.2**	**122.3**	**117.1**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		9	10	11	12		
G Wet Weight / Container	grams	150.9	154.2	151.8	159.2		
H Dry Weight / Container	grams	142.2	143.1	138.9	143.1		
I Moisture Loss = G - H	grams	8.7	11.1	12.9	16.1		
J Tare Weight of Container	grams	37.2	36.7	37.2	36.9		
K Dry Soil = H - J	grams	105.0	106.4	101.7	106.2		
L %Moisture = (I / K) x 100	%	**8.3%**	**10.4%**	**12.7%**	**15.2%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

123.3 lbs./cu.ft.

Optimum Moisture

11.0%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1212**

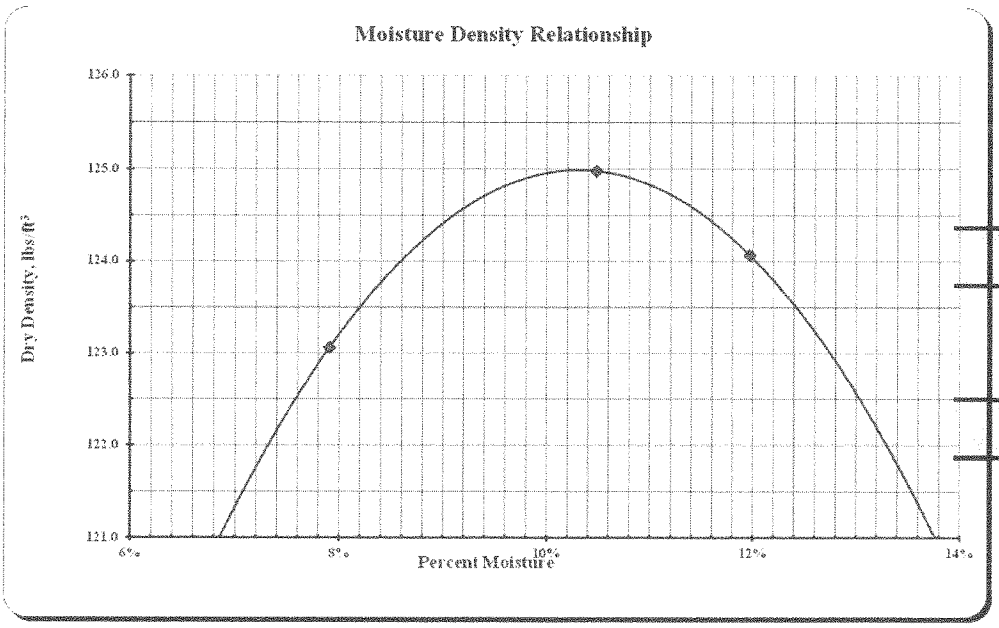
Density		Test Count	3				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.85	9.02	9.05			
C Weight of Mold	lbs.	4.42	4.42	4.42	4.42	4.42	4.42
D Weight of Compacted Soil = B - C	lbs.	4.42	4.60	4.63			
E Wet Density = D / A	lbs./cu.ft.	132.8	138.1	138.9			
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**123.1**	**125.0**	**124.1**	**#VALUE!**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		73	74	75			
G Wet Weight / Container	grams	149.3	152.3	156.1			
H Dry Weight / Container	grams	141.1	141.4	143.4			
I Moisture Loss = G - H	grams	8.2	10.9	12.7			
J Tare Weight of Container	grams	37.4	37.4	37.3			
K Dry Soil = H - J	grams	103.7	104.0	106.1			
L %Moisture = (I / K) x 100	%	**7.9%**	**10.5%**	**12.0%**			

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

125.0 lbs./cu.ft.

Optimum Moisture

10.3%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1214**

Density

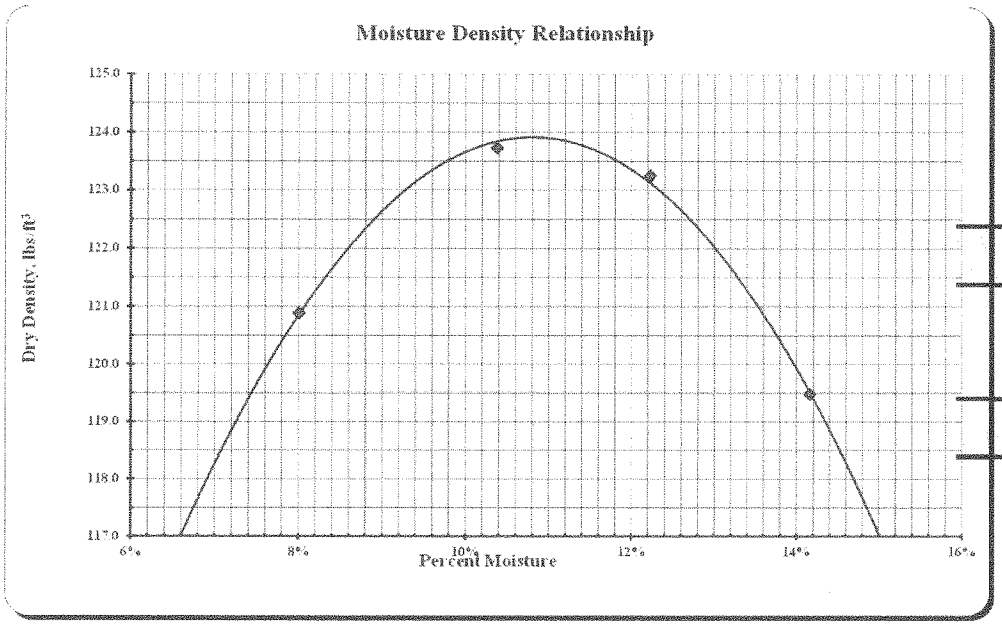
		Test Count	4				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.77	8.97	9.03	8.97		
C Weight of Mold	lbs.	4.42	4.42	4.42	4.42	4.42	4.42
D Weight of Compacted Soil = B - C	lbs.	4.35	4.55	4.61	4.54		
E Wet Density = D / A	lbs./cu.ft.	130.6	136.6	138.3	136.4		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**120.9**	**123.7**	**123.2**	**119.5**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

	Container No.	76	77	78	79		
G Wet Weight / Container	grams	164.8	144.2	150.1	152.4		
H Dry Weight / Container	grams	155.4	134.1	137.8	138.1		
I Moisture Loss = G - H	grams	9.4	10.1	12.3	14.3		
J Tare Weight of Container	grams	38.0	36.8	37.2	37.1		
K Dry Soil = H - J	grams	117.4	97.3	100.6	101.0		
L %Moisture = (I / K) x 100	%	**8.0%**	**10.4%**	**12.2%**	**14.2%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

123.9 lbs./cu.ft.

Optimum Moisture

10.8%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1216**

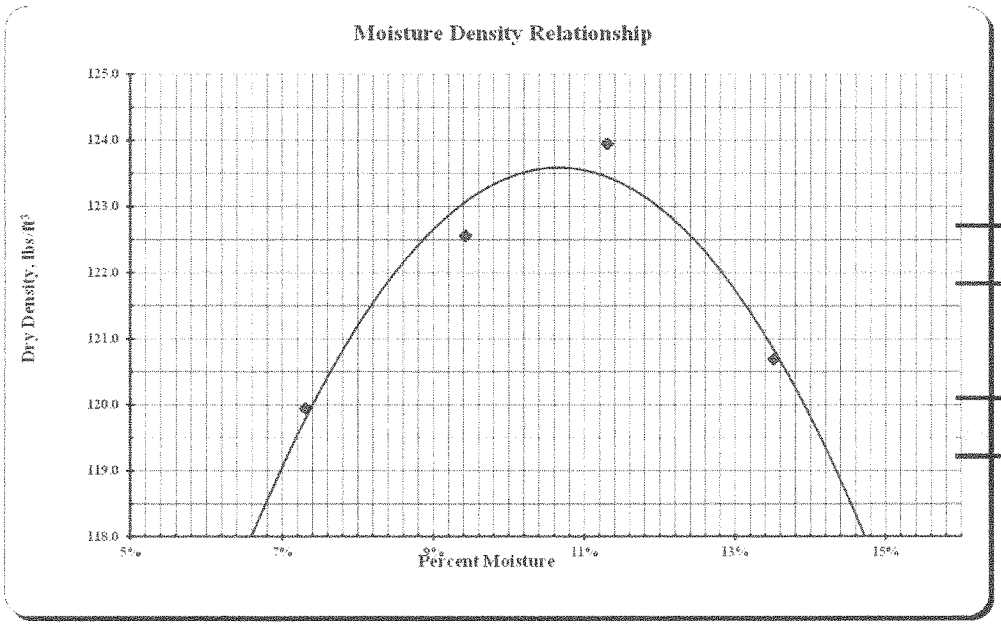
Density		Test Count	4				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.71	8.90	9.02	8.99		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.29	4.47	4.59	4.56		
E Wet Density = D / A	lbs./cu.ft.	128.7	134.1	138.0	137.0		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**119.9**	**122.6**	**123.9**	**120.7**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		13	14	15	16		
G Wet Weight / Container	grams	154.6	148.2	166.3	164.9		
H Dry Weight / Container	grams	146.6	138.7	153.2	149.7		
I Moisture Loss = G - H	grams	8.0	9.5	13.1	15.2		
J Tare Weight of Container	grams	37.1	37.9	37.3	37.2		
K Dry Soil = H - J	grams	109.5	100.8	115.9	112.5		
L %Moisture = (I / K) x 100	%	**7.3%**	**9.4%**	**11.3%**	**13.5%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

123.6 lbs./cu.ft.

Optimum Moisture

10.7%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1218**

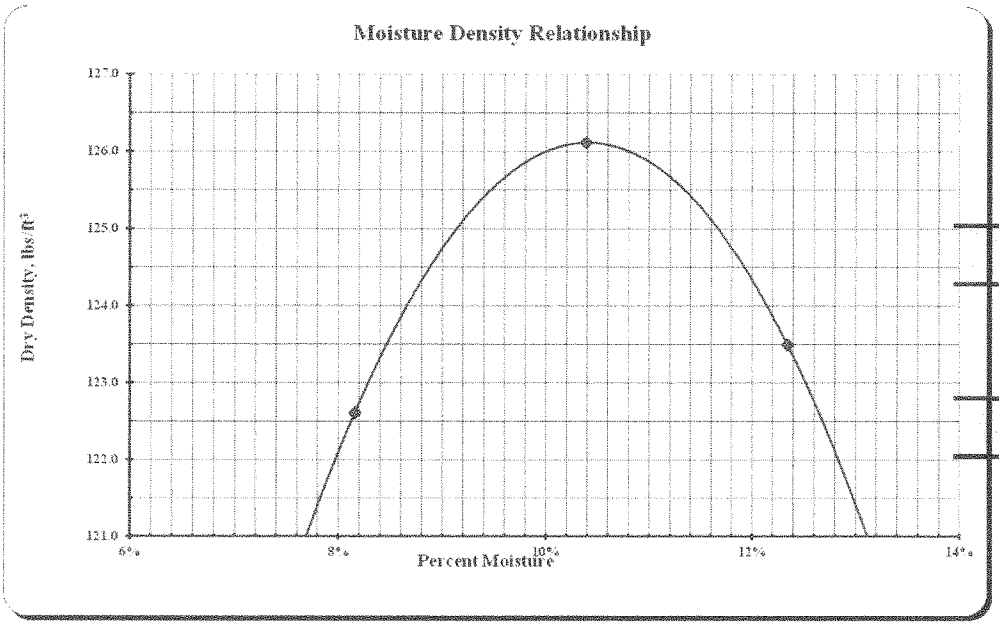
Density		Test Count	3				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.84	9.06	9.04			
C Weight of Mold	lbs.	4.42	4.42	4.42	4.42	4.42	4.42
D Weight of Compacted Soil = B - C	lbs.	4.42	4.64	4.62			
E Wet Density = D / A	lbs./cu.ft.	132.6	139.2	138.7			
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**122.6**	**126.1**	**123.5**	**#VALUE!**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		80	81	82			
G Wet Weight / Container	grams	165.7	153.6	163.0			
H Dry Weight / Container	grams	156.0	142.7	149.2			
I Moisture Loss = G - H	grams	9.7	10.9	13.8			
J Tare Weight of Container	grams	37.1	37.8	37.4			
K Dry Soil = H - J	grams	118.9	104.9	111.8			
L %Moisture = (I / K) x 100	%	**8.2%**	**10.4%**	**12.3%**			

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

126.1 lbs./cu.ft.

Optimum Moisture

10.4%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1219**

Density

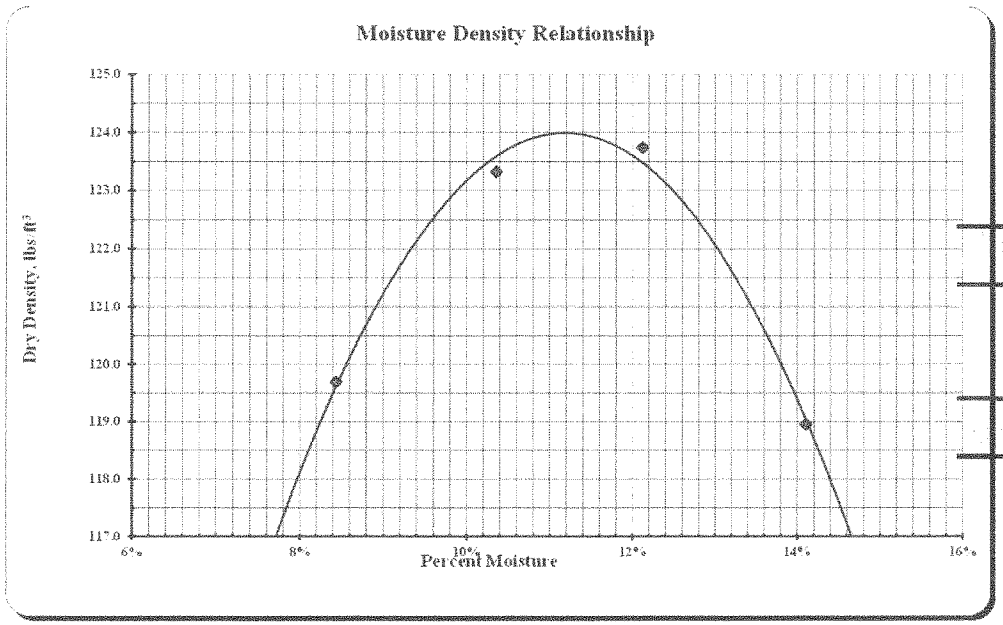
			Test Count	4				
	Determination No.		1	2	3	4	5	6
A	Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
		lbs.	8.75	8.96	9.05	8.95		
C	Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D	Weight of Compacted Soil = B - C	lbs.	4.32	4.53	4.62	4.52		
E	Wet Density = D / A	lbs./cu.ft.	129.8	136.1	138.7	135.7		
F	Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**119.7**	**123.3**	**123.7**	**119.0**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

	Container No.		17	18	19	20		
G	Wet Weight / Container	grams	160.2	158.6	151.8	163.5		
H	Dry Weight / Container	grams	150.6	147.2	139.4	147.8		
I	Moisture Loss = G - H	grams	9.6	11.4	12.4	15.7		
J	Tare Weight of Container	grams	36.8	37.1	37.1	36.5		
K	Dry Soil = H - J	grams	113.8	110.1	102.3	111.3		
L	%Moisture = (I / K) x 100	%	**8.4%**	**10.4%**	**12.1%**	**14.1%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

124.0 lbs./cu.ft.

Optimum Moisture

11.1%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1220**

Density

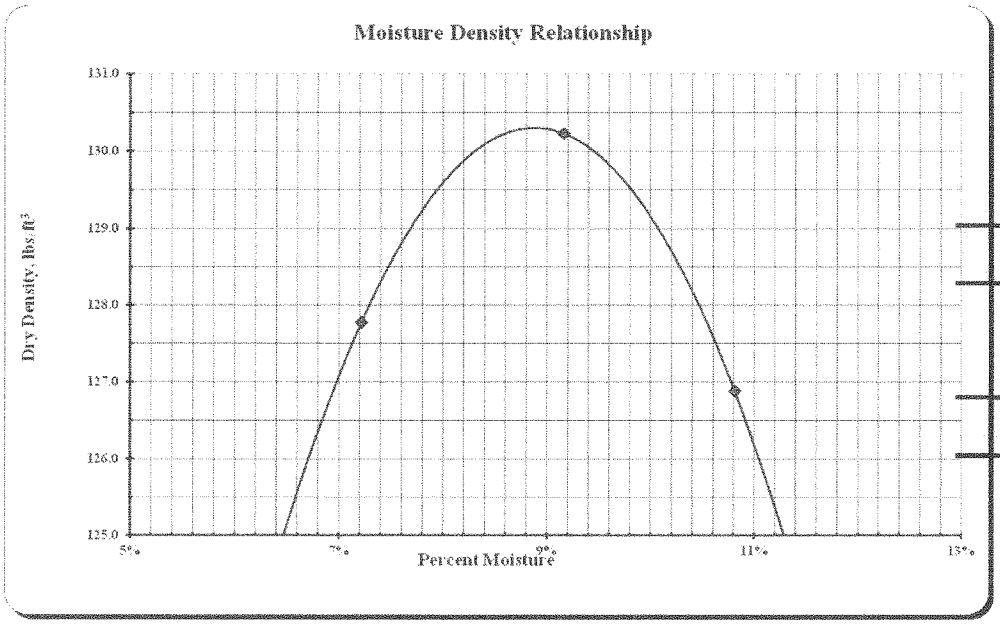
			Test Count	3				
	Determination No.		1	2	3	4	5	6
A	Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
		lbs.	8.99	9.15	9.11			
C	Weight of Mold	lbs.	4.42	4.42	4.42	4.42	4.42	4.42
D	Weight of Compacted Soil = B - C	lbs.	4.56	4.73	4.68			
E	Wet Density = D / A	lbs./cu.ft.	137.0	142.2	140.6			
F	Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**127.8**	**130.2**	**126.9**	**#VALUE!**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

	Container No.		83	84	85			
G	Wet Weight / Container	grams	151.6	159.6	157.7			
H	Dry Weight / Container	grams	143.9	149.3	146.0			
I	Moisture Loss = G - H	grams	7.7	10.3	11.7			
J	Tare Weight of Container	grams	37.2	36.9	37.8			
K	Dry Soil = H - J	grams	106.7	112.4	108.2			
L	%Moisture = (I / K) x 100	%	**7.2%**	**9.2%**	**10.8%**			

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

130.3 lbs./cu.ft.

Optimum Moisture

8.9%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1222**

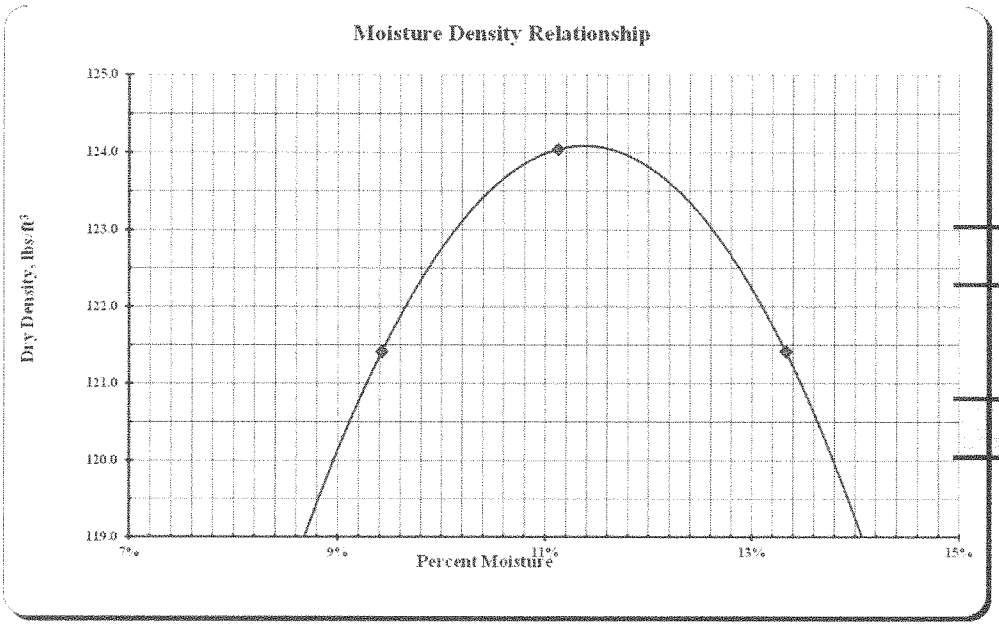
Density		Test Count	3				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.85	9.02	9.01			
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.42	4.59	4.58			
E Wet Density = D / A	lbs./cu.ft.	132.9	137.8	137.6			
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**121.4**	**124.0**	**121.4**	**#VALUE!**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		21	22	23			
G Wet Weight / Container	grams	154.4	150.9	152.2			
H Dry Weight / Container	grams	144.3	139.5	138.7			
I Moisture Loss = G - H	grams	10.1	11.4	13.5			
J Tare Weight of Container	grams	37.1	37.0	37.4			
K Dry Soil = H - J	grams	107.2	102.5	101.3			
L %Moisture = (I / K) x 100	%	**9.4%**	**11.1%**	**13.3%**			

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

124.1 lbs./cu.ft.

Optimum Moisture

11.4%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1223**

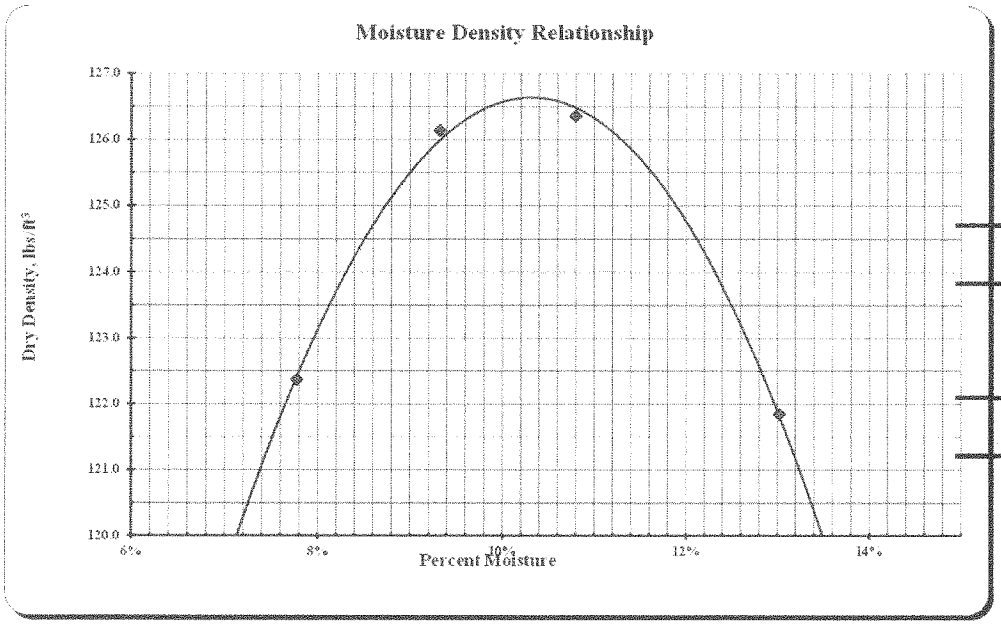
Density		Test Count	4				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.82	9.01	9.09	9.01		
C Weight of Mold	lbs.	4.42	4.42	4.42	4.42	4.42	4.42
D Weight of Compacted Soil = B - C	lbs.	4.39	4.59	4.66	4.59		
E Wet Density = D / A	lbs./cu.ft.	131.9	137.9	140.0	137.7		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**122.4**	**126.1**	**126.4**	**121.8**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		86	87	88	89		
G Wet Weight / Container	grams	152.6	150.1	151.7	153.9		
H Dry Weight / Container	grams	144.3	140.5	140.6	140.5		
I Moisture Loss = G - H	grams	8.3	9.6	11.1	13.4		
J Tare Weight of Container	grams	37.6	37.5	37.8	37.6		
K Dry Soil = H - J	grams	106.7	103.0	102.8	102.9		
L %Moisture = (I / K) x 100	%	**7.8%**	**9.3%**	**10.8%**	**13.0%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

126.6 lbs./cu.ft.

Optimum Moisture

10.3%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1224**

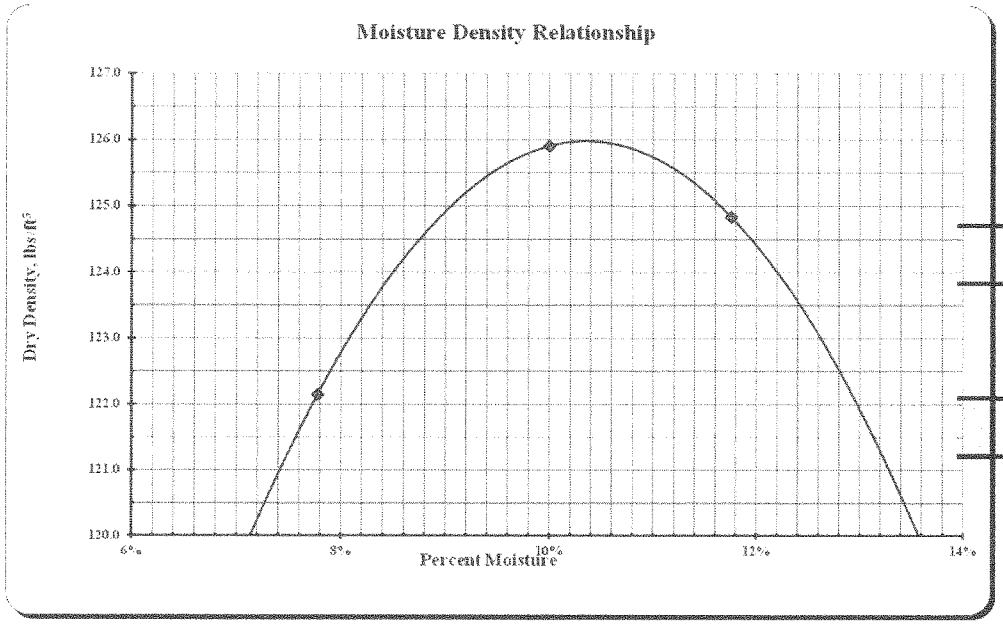
Density		Test Count	3				
	Determination No.	1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.81	9.04	9.07			
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.38	4.61	4.65			
E Wet Density = D / A	lbs./cu.ft.	131.7	138.5	139.5			
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**122.2**	**125.9**	**124.8**	**#VALUE!**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		24	25	26			
G Wet Weight / Container	grams	153.6	158.2	157.6			
H Dry Weight / Container	grams	145.2	147.2	144.9			
I Moisture Loss = G - H	grams	8.4	11.0	12.7			
J Tare Weight of Container	grams	37.2	37.2	36.9			
K Dry Soil = H - J	grams	108.0	110.0	108.0			
L %Moisture = (I / K) x 100	%	**7.8%**	**10.0%**	**11.8%**			

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

126.0 lbs./cu.ft.

Optimum Moisture

10.4%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1226**

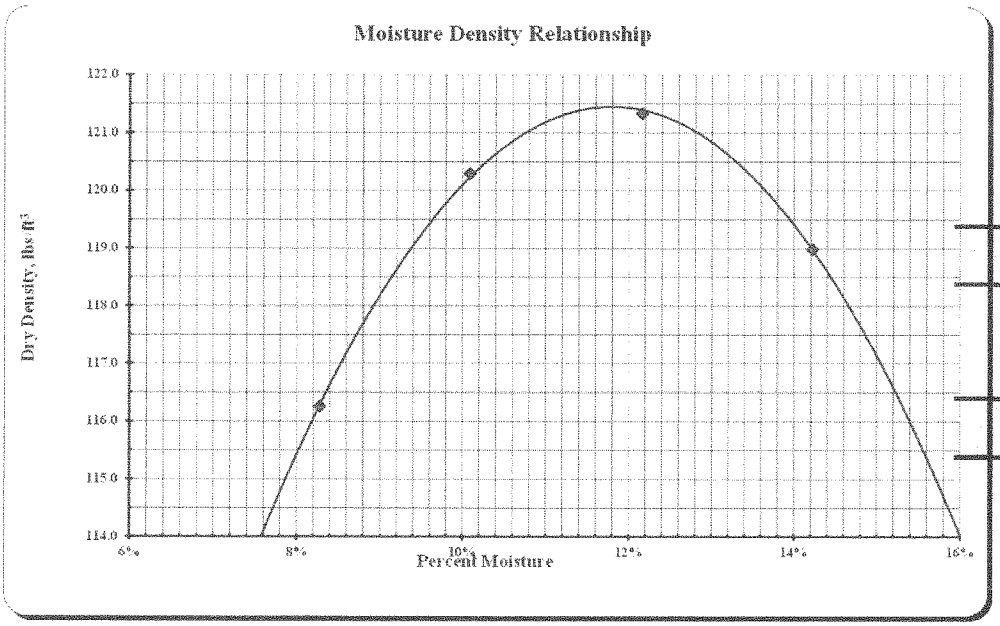
Density		Test Count	4				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.62	8.83	8.96	8.95		
C Weight of Mold	lbs.	4.42	4.42	4.42	4.42	4.42	4.42
D Weight of Compacted Soil = B - C	lbs.	4.19	4.41	4.53	4.53		
E Wet Density = D / A	lbs./cu.ft.	125.9	132.4	136.1	135.9		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**116.3**	**120.3**	**121.3**	**119.0**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		90	91	92	93		
G Wet Weight / Container	grams	155.6	164.2	161.9	146.8		
H Dry Weight / Container	grams	146.6	152.6	148.4	133.2		
I Moisture Loss = G - H	grams	9.0	11.6	13.5	13.6		
J Tare Weight of Container	grams	37.9	37.6	37.4	37.6		
K Dry Soil = H - J	grams	108.7	115.0	111.0	95.6		
L %Moisture = (I / K) x 100	%	**8.3%**	**10.1%**	**12.2%**	**14.2%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ml



Max Dry Density

121.5 lbs./cu.ft.

Optimum Moisture

11.8%

MOISTURE-DENSITY RELATIONS OF SOILS

North Dakota Department Of Transportation, Materials & Research Division

SFN 10063 (Rev. 03-2006)

Project No.	PCN	Station	Depth Below Grade
SOIB-7-804(050)248			
Offset From Centerline		Type of Soil	
AASTHO Designation **T-180**	Date **10/17/201**		**1228**

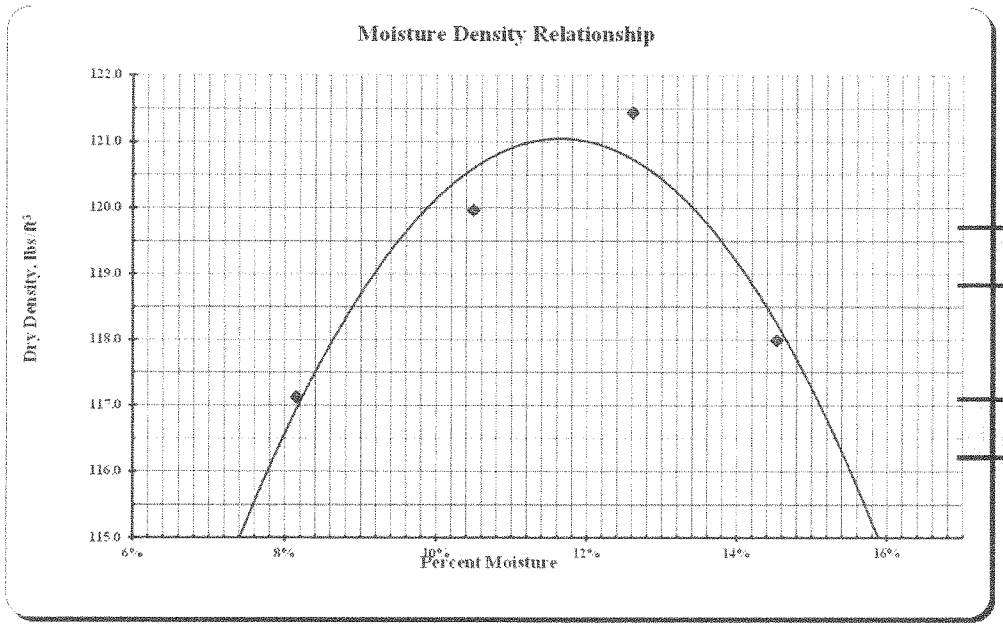
Density		Test Count	4				
Determination No.		1	2	3	4	5	6
A Volume of Mold	cu. ft.	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333
	lbs.	8.64	8.84	8.98	8.93		
C Weight of Mold	lbs.	4.43	4.43	4.43	4.43	4.43	4.43
D Weight of Compacted Soil = B - C	lbs.	4.22	4.41	4.55	4.50		
E Wet Density = D / A	lbs./cu.ft.	126.7	132.6	136.8	135.1		
F Dry Density = (E x 100) / (100 + L)	lbs./cu.ft.	**117.1**	**120.0**	**121.4**	**118.0**	**#VALUE!**	**#VALUE!**

Moisture Content

AASHTO T99 or T180 Tested by:

Container No.		27	28	29	30		
G Wet Weight / Container	grams	162.8	154.1	152.4	157.7		
H Dry Weight / Container	grams	153.3	143.0	139.5	142.4		
I Moisture Loss = G - H	grams	9.5	11.1	12.9	15.3		
J Tare Weight of Container	grams	36.7	37.2	37.2	37.1		
K Dry Soil = H - J	grams	116.6	105.8	102.3	105.3		
L %Moisture = (I / K) x 100	%	**8.1%**	**10.5%**	**12.6%**	**14.5%**		

ASTM D4643 AASHTO T217 or T265 Tested by: ss



Max Dry Density

121.1 lbs./cu.ft.

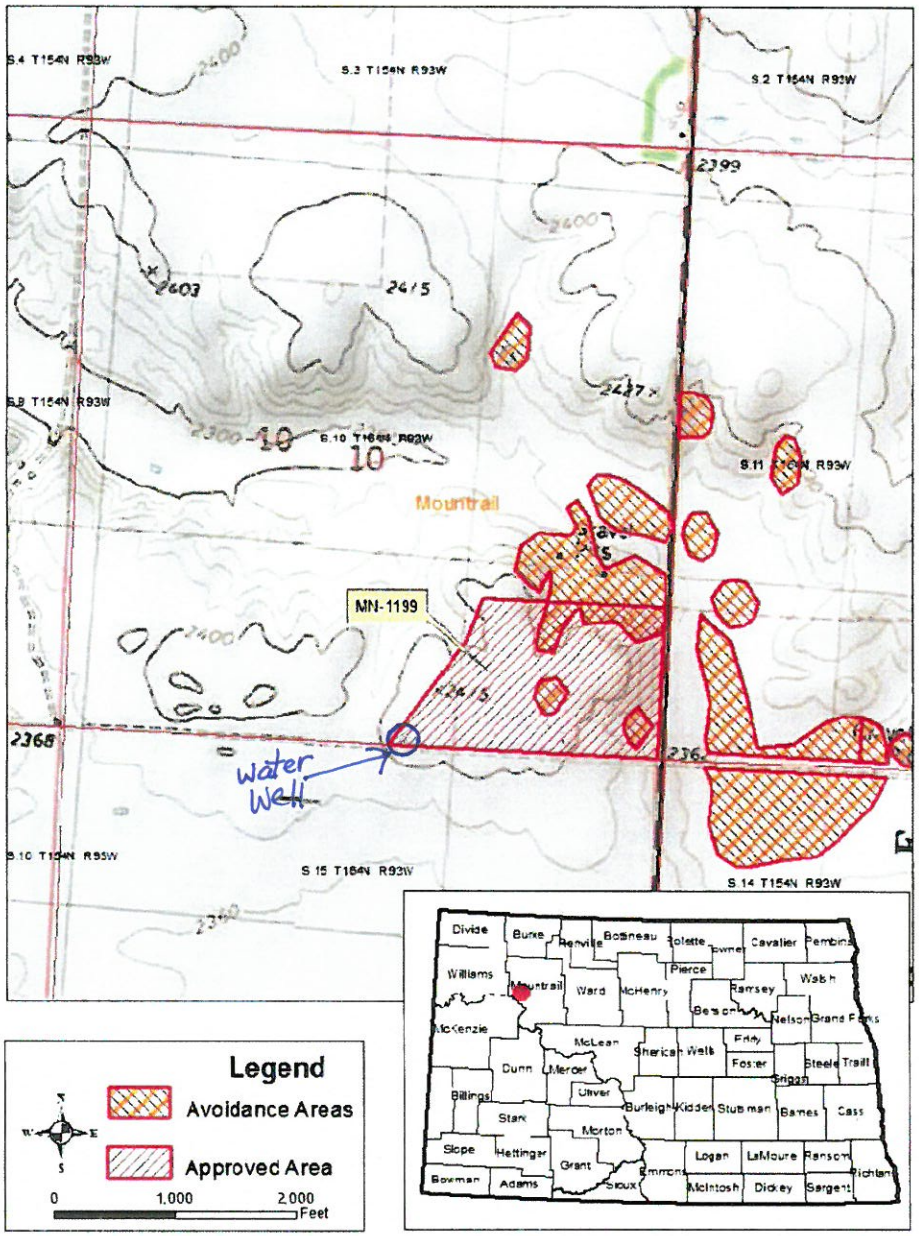
Optimum Moisture

11.6%

APPENDIX E

NDDOT Material Source Certificate of Approvals

NDDOT Material Source Certificate of Approval



Expires December 31st

2017

MN-1199

Pit Name: Site 9

SE1/4 S. 10 T. 154 N, R 93 W

County: Mountrail

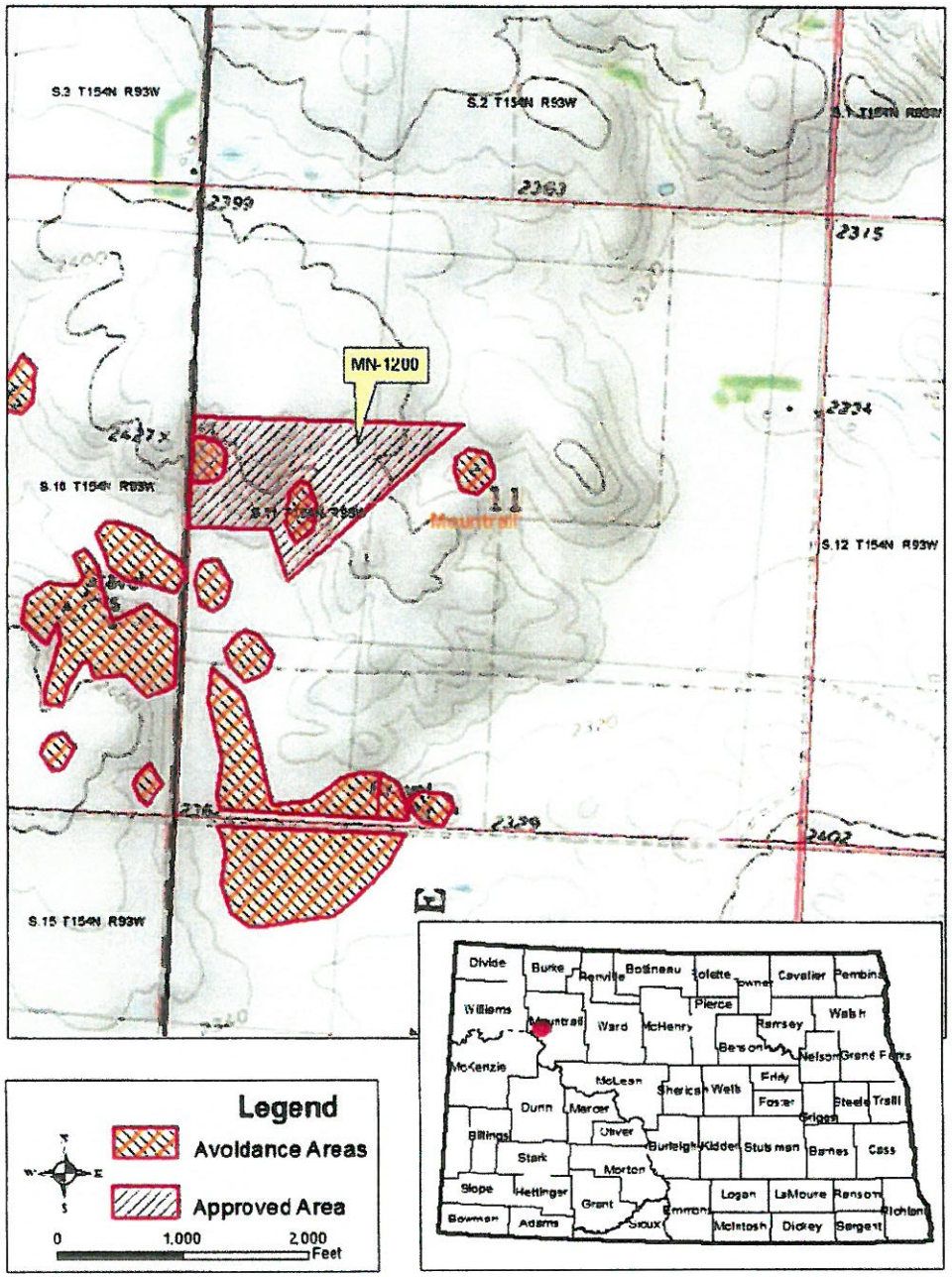
Conditions:

This location is approved for use, provided all avoidance areas shown on the map are avoided, and any Conditions listed above are complied with. NDDOT advises that all applicants (contractors or their representatives) may be subject to meeting certain legal responsibilities pursuant to one or more of the following authorities administered by the USFWS: Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703 et seq.); Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.); and Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250). It is unclear at this time what effects, if any, material source activities may have on plants, fish, and/or wildlife species protected by the above-mentioned Acts. It is the responsibility of the applicants and/or any individual conducting activities at any approved site to fulfill the requirements of these Acts.

This approval does not imply landowner permission to acquire material at this location. An agreement with the landowner is still necessary. The contractor will be responsible for any impacts to wetlands, including permitting those impacts and mitigating the loss of the wetlands. As with all projects, if cultural artifacts and/or features (e.g., stone tools, fire hearths, stone circles, burials) are encountered, provisions outlined in Section 107.04 of the Standard Specifications for Road and Bridge Construction shall be followed.

If you have any questions regarding material sources please email materialsource@nd.gov

NDDOT Material Source Certificate of Approval



Expires December 31st

2017

MN-1200

Pit Name: Site 10

SNW, NNSW S. 11 T. 154 N, R 93 W

County: Mountrail

Conditions:

This location is approved for use, provided all avoidance areas shown on the map are avoided, and any Conditions listed above are complied with. NDDOT advises that all applicants (contractors or their representatives) may be subject to meeting certain legal responsibilities pursuant to one or more of the following authorities administered by the USFWS: Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703 et seq.); Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.); and Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250). It is unclear at this time what effects, if any, material source activities may have on plants, fish, and/or wildlife species protected by the above-mentioned Acts. It is the responsibility of the applicants and/or any individual conducting activities at any approved site to fulfill the requirements of these Acts.

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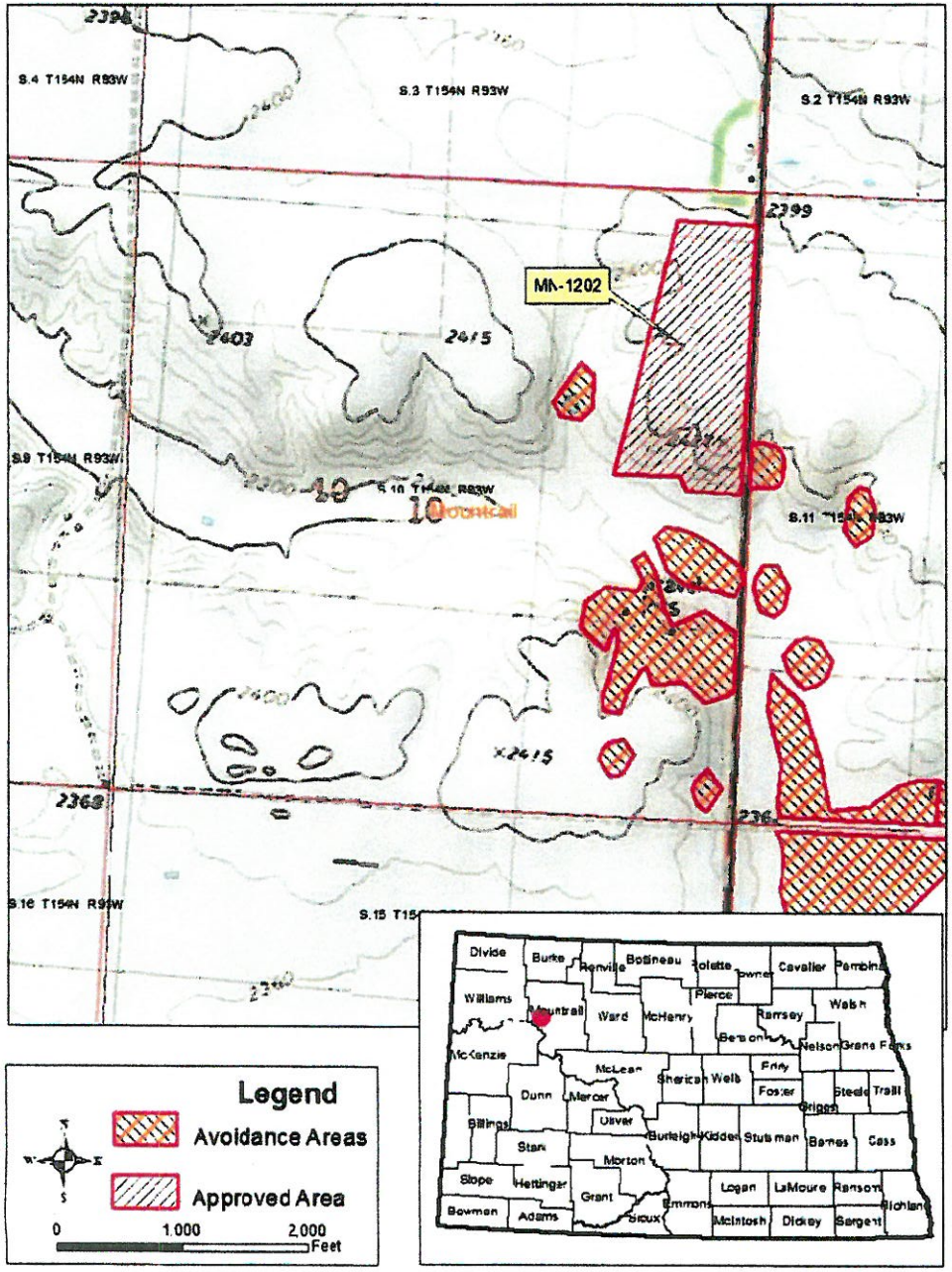
If you have any questions regarding material sources please email materialsource@nd.gov

NDDOT Material Source Certificate of Approval



Expires December 31st

2017

MN-1202

Pit Name: Site 11

ENE S. 10 T. 154 N, R 93 W

County: Mountrail

Conditions:

This location is approved for use, provided all avoidance areas shown on the map are avoided, and any Conditions listed above are complied with. NDDOT advises that all applicants (contractors or their representatives) may be subject to meeting certain legal responsibilities pursuant to one or more of the following authorities administered by the USFWS: Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703 et seq.); Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.); and Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250). It is unclear at this time what effects, if any, material source activities may have on plants, fish, and/or wildlife species protected by the above-mentioned Acts. It is the responsibility of the applicants and/or any individual conducting activities at any approved site to fulfill the requirements of these Acts.

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