NORTHERN TECHNOLOGIES, INC.
6588 141st Avenue NW, Ramsey, MN 55303 763-433-9175 763-323-4739 Fax

May 24, 2011

City of Becker
P.O. Box 250
Becker, Minnesota 55308

Attention: Mr. Nick Ziegelmann

Subject: Becker Industrial Park
Becker, Minnesota
NTI Project No. 11.50565.100

INTRODUCTION

At your request, Northern Technologies, Inc. (NTI) completed twenty (20) soil borings in two parcels for the future Becker Industrial Park in Becker, Minnesota. The purpose of the borings was to provide an indication of subsurface conditions and the suitability of the soils in the proposed development area for future construction. The borings and our services were completed in general accordance with our proposal of February 28, 2011.

The southern parcel is a plowed agricultural field and the northern parcel is undeveloped land with minimal surface vegetation. The parcels may be divided into smaller lots during development of the industrial park. We anticipate the future construction will consist of large commercial and/or industrial buildings founded on shallow concrete foundations, with above grade masonry or precast concrete bearing walls and structural steel framing. We have assumed that site grades will remain relatively close to the existing grade.

Summary of Soil Borings

We drilled twenty (20) soil borings, ten in each parcel, to nominal depths of fifteen (15) feet at the approximate locations shown on the attached boring location diagram.

Our borings penetrated approximately 6 to 10 inches of sandy topsoil. Below the topsoil, we encountered native Coarse Alluvium (CA) soils extending beyond the termination depth of 15 feet. The CA soils consist of sand and sand with silt with varying amounts of gravel. The sand is very loose to very dense in relative density based on Standard Penetration N-Values of 2 to 33. The N-Values tend to increase with depth.

Our drill crew did not observe free groundwater during or after drilling operations. The sand soils at this site are conducive to groundwater flow. We do not anticipate groundwater to affect the proposed construction at this site.

Opinions & Recommendations

In our opinion, the two parcels are well suited for the proposed construction. Prior to construction, the topsoil should be stripped and removed from the building pad and pavement areas. Our borings indicate that the topsoil extends to approximately 6 to 10 inches below existing grade.

The soil borings performed at this time were for preliminary information purposes only. We recommend that project specific geotechnical exploration(s) be performed prior to construction at the parcels.

Remarks & Standard of Care

The conclusions in this correspondence represent our professional opinion(s), based on our interpretation of the site conditions and information provided to us by others. These opinions were arrived at in accordance with currently accepted engineering practices at this time and location. Other than this, no warranty is implied or intended.

Call if you have any questions concerning this correspondence. We may be reached at (763) 433-9175.

Northern Technologies Inc.

Anthony Francis, P.E.
Project Engineer

Stephen Johnston, P.E.
Principal Engineer

Attachments

APPENDIX A

Geotechnical Evaluation of Recovered Soils Samples

Field Exploration Procedures

General Notes

Ground Water Issues

Soil Boring Diagram

Soil Boring Logs

GEOTECHNICAL EVALUATION OF RECOVERED SOIL SAMPLES

Soil samples recovered during exploration were visually examined to estimate distribution of grain sizes, plasticity, consistency, moisture condition, color, presence of lenses and seams, and apparent geologic origin. We then classified the soils according to type using the Unified Soil Classification System (ASTM D2488). A chart describing the classification system and general notes explaining soil sampling procedures are presented within other report appendices.

Note that the stratification depth lines between soil types on the logs are estimated based on the available data. Insitu, the transition between soil types may be distinct or gradual in either the horizontal or vertical directions. The soil conditions have been established at our specific boring locations only. Variations in the soil stratigraphy may occur between and around the borings, with the nature and extent of such change not readily evident until exposed by excavation. These variations must be properly assessed when utilizing the information presented on the boring logs.

We request that you, your design team or other contractors contact NTI immediately if local site conditions differ from those assumed by this report, as we would need to review how such changes impact our report recommendations. Such contact would also allow us to revise our recommendations as necessary to account for the changed site conditions.

FIELD EXPLORATION PROCEDURES

Soil Sampling – Standard Penetration Boring:

Soil sampling was performed according to the procedures described by ASTM D-1586. Using this procedure, a 2 inch O.D. split barrel sampler is driven into the soil by a 140 pound weight falling 30 inches. After an initial set of six inches, the number of blows required to drive the sampler an additional 12 inches is recorded (known as the penetration resistance (i.e. "N-value") of the soil at the point of sampling. The N-value is an index of the relative density of cohesionless soils and an approximation of the consistency of cohesive soils.

Soil Sampling – Power Auger Boring:

The boring(s) was/were advanced with a 6 inch nominal diameter continuous flight auger. As a result, samples recovered from the boring are disturbed, and our determination of the depth, extend of various stratum and layers, and relative density or consistency of the soils is approximate.

Soil Classification:

Soil samples were visually and manually classified by the crew chief in general conformance with ASTM D-2488 as they were removed from the respective sampler(s). Representative fractions of soil samples were then sealed within respective containers and returned to the laboratory for further examination and verification of the field classification. In addition, select samples were submitted to a program of laboratory tests. Individual sample information, identification of sampling methods, method of advancement of the samples and other pertinent information concerning the soil samples are presented on boring logs and related report attachments.

General Notes

DRILLING & SAMPLING SYMBOLS			LABORATORY TEST SYMBOLS	
SYMBOL	**DEFINITION**		**SYMBOL**	**DEFINITION**
C.S.	Continuous Sampling		W	Moisture content-percent of dry weight
P.D.	2-3/8" Pipe Drill		D	Dry Density-pounds per cubic foot
C.O.	Cleanout Tube		LL, PL	Liquid and plastic limits determined in accordance with ASTM D 423 and D 424
3 HSA	3 ¼" I.D. Hollow Stem Auger		Q_u	Unconfined compressive strength-pounds per square foot in accordance with ASTM D 2166-66
4 FA	4" Diameter Flight Auger			
6 FA	6" Diameter Flight Auger			
2 ½ C	2 ½" Casing			
4 C	4" Casing		**Additional insertions in Qu Column**	
D.M.	Drilling Mud		Pq	Penetrometer reading-tons/square foot
J.W.	Jet Water		S	Torvane reading-tons/square foot
H.A.	Hand Auger		G	Specific Gravity – ASTM D 854-58
NXC	Size NX Casing		SL	Shrinkage limit – ASTM 427-61
BXC	Size BX Casing		pH	Hydrogen ion content-meter method
AXC	Size AX casing		O	Organic content-combustion method
SS	2" O.D. Split Spoon Sample		M.A.*	Grain size analysis
2T	2" Thin Wall Tube Sample		C*	One dimensional consolidation
3T	3" Thin Wall Tube Sample		Q_c*	Triaxial Compression
				* See attached data Sheet and/or graph

Water Level Symbol

Water levels shown on the boring logs are the levels measured in the borings at the time and under the conditions indicated. In sand, the indicated levels can be considered reliable ground water levels. In clay soils, it is not possible to determine the ground water level within the normal scope of a test boring investigation, except where lenses or layers of more pervious water bearing soil is present and then a long period of time may be necessary to reach equilibrium. Therefore, the position of the water level symbol for cohesive or mixed soils may not indicate the true level of the ground water table. The available water level information is given at the bottom of the log sheet.

Descriptive Terminology

DENSITY		CONSISTENCY	
TERM	**"N" VALUE**	**TERM**	**"N" VALUE**
Very Loose	0-4	Soft	0-4
Loose	5-8	Medium	5-8
Medium Dense	9 – 15	Rather Stiff	9 – 15
Dense	16 – 30	Stiff	16 – 30
Very Dense	Over 30	Very Stiff	Over 30

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch OD split spoon.

Relative Proportions

TERMS	RANGE
Trace	0-5%
A little	5-15%
Some	15-30%
With	30-50%

Particle Sizes

Boulders		Over 3"
Gravel -	Coarse	¾" – 3"
	Medium	#4 – ¾"
Sand -	Coarse	#4 - #10
	Medium	#10 - #40
	Fine	#40 - #200
Silt and Clay		Determined by plasticity characteristics.

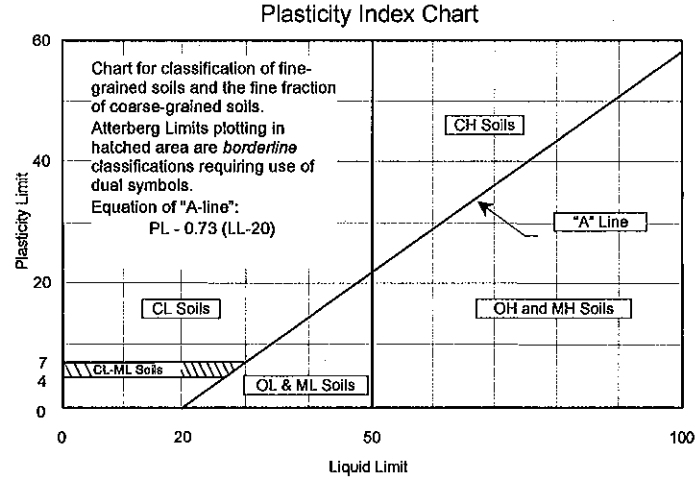
Note: Sieve sizes are U.S. Standard.

Classification of Soils for Engineering Purposes

ASTM Designation D-2487 and D 2488 (Unified Soil Classification System)

Major Divisions			Group Symbols	Typical Names	Classification Criteria		
Course Grained Soils More than 50% retained on No. 200 sieve *	***Gravels*** 50% or more of coarse fraction retained on No. 4 sieve.	Clean Gravels	**GW**	Well –graded gravels and gravel-sand mixtures, little or no fines.	***Classification on basis of percentage of fines.*** Less than 5% passing No. 200 Sieve: GW, GP, SW, SP; More than 12% passing No. 200 Sieve: GM, GC, SM, SC; From 5% to 12% passing No. 200 Sieve: Borderline Classification requiring use of duel symbols.	$C_u = D_{60} / D_{10}$ greater than 4. $C_z = (D_{30})^2 / (D_{10} \times D_{60})$ between 1 & 3.	
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines.		Not meeting both criteria for GW materials.	
		Gravels with Fines	**GM**	Silty gravels, gravel-sand-silt mixtures.		Atterberg limits below "A" line, or P.I. less than 4.	Atterberg limits plotting in hatched area are *borderline* classifications requiring use of dual symbols.
			GC	Clayey gravels, gravel-sand-clay mixtures.		Atterberg limits above "A" line with P.I. greater than 7.	
	Sands More than 50% of coarse fraction passes No 4 sieve.	Clean Sands	**SW**	Well-graded sands and gravelly sands, little or no fines.		$C_u = D_{60} / D_{10}$ greater than 6. $C_z = (D_{30})^2 / (D_{10} \times D_{60})$ between 1 & 3.	
			SP	Poorly-graded sands and gravelly sands, little or no fines.		Not meeting both criteria for SW materials.	
		Sands with Fines	**SM**	Silty sands, sand-silt mixtures.		Atterberg limits below "A" line, or P.I. less than 4.	Atterberg limits plotting in hatched area are *borderline* classifications requiring use of dual symbols.
			SC	Clayey sands, sand-clay mixtures.		Atterberg limits above "A" line with P.I. greater than 7.	
Fine Grained Soils More than 50% passes No. 200 sieve *	***Silts and Clays*** Liquid Limit of 50% or less		**ML**	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands.			
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.			
			OL	Organic silts and organic silty clays of low plasticity.			
	Silts and Clays Liquid Limit greater than 50%.		**MH**	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts.			
			CH	Inorganic clays of high plasticity, fat clays.			
			OH	Organic clays of medium to high plasticity.			
	Highly Organic Soils		**Pt**	Peat, muck and other highly organic soils.			

Plasticity Index Chart



* Based on the material passing the 3 inch (76mm) sieve.

GROUND WATER ISSUES

The following presents additional comment and soil specific issues related to measurement of ground water conditions at your project site.

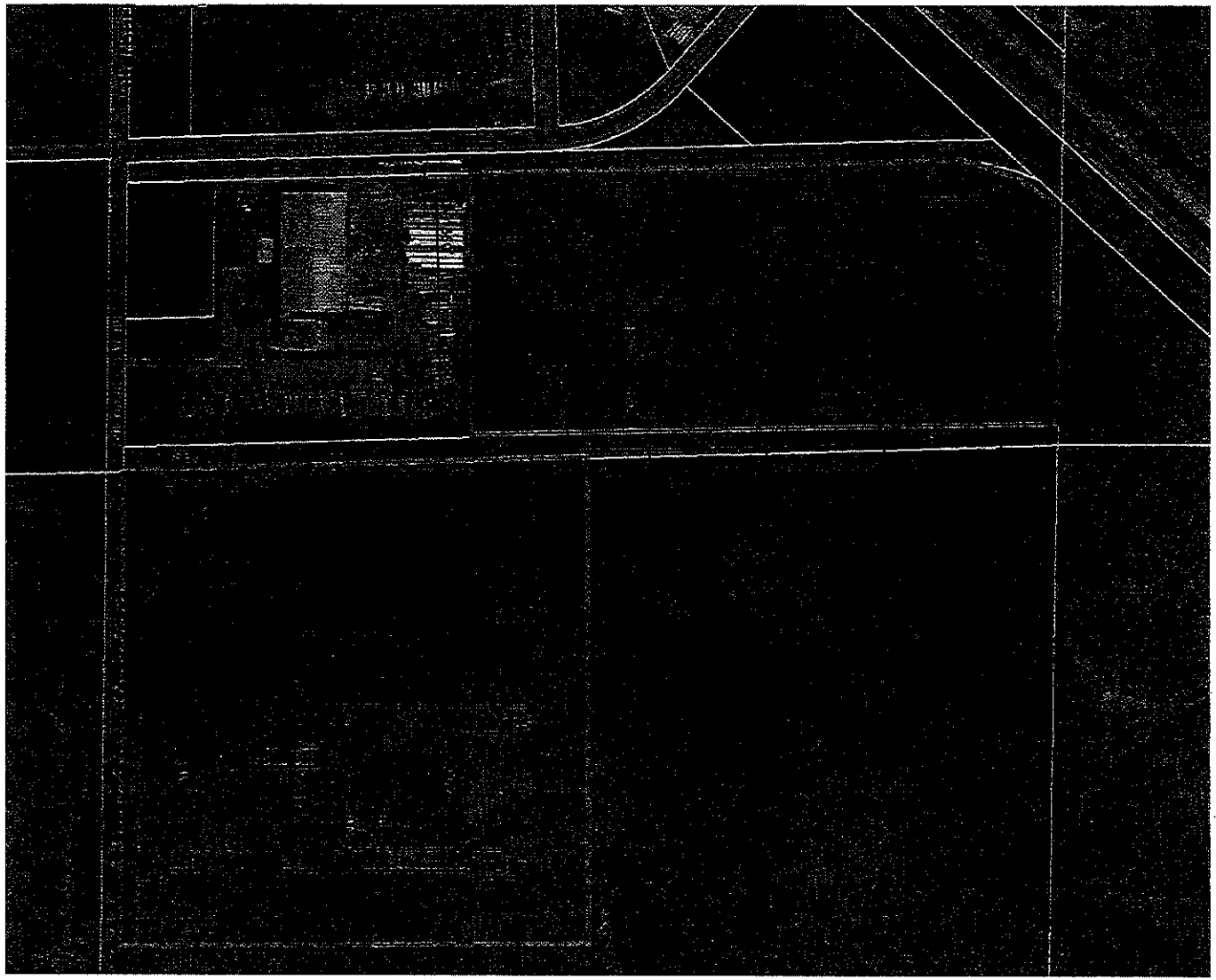
Note that our ground water measurements, or lack thereof, will vary depending on the time allowed for equilibrium to occur in the borings. Extended observation time was not available during the scope of the field exploration program and, therefore, ground water measurements as noted on the borings logs may or may not accurately reflect actual conditions at your site.

Seasonal and yearly fluctuations of the ground water level, if any, occur. Perched ground water may be present within sand and silt lenses bedded within cohesive soil formations. Groundwater typically exists at depth within cohesive and cohesionless soils.

Documentation of the local ground water surface and any perched ground water conditions at the project site would require installation of temporary piezometers and extended periods of monitoring due to the relatively low permeability exhibited by the site soils. We have not performed such ground water evaluation due to the scope of services authorized for this project.

We anticipate pumps installed within temporary sumps should control subsurface seepage from perched conditions. However, we caution such seepage from such formations and any water entry from excavations below the ground water table may be heavy and will vary based on seasonal and annual precipitation, and ground related impacts in the vicinity of the project.

SOIL BORING LOCATION MAP



LEGEND

B-1 SOIL BORING

NORTH

0 300 600

SCALE IN FEET

PROJECT 11.50565.100
MAY 25, 2011

NORTHERN TECHNOLOGIES, INC.

BECKER INDUSTRIAL LAND
BECKER, MN

Northern Technologies, Inc
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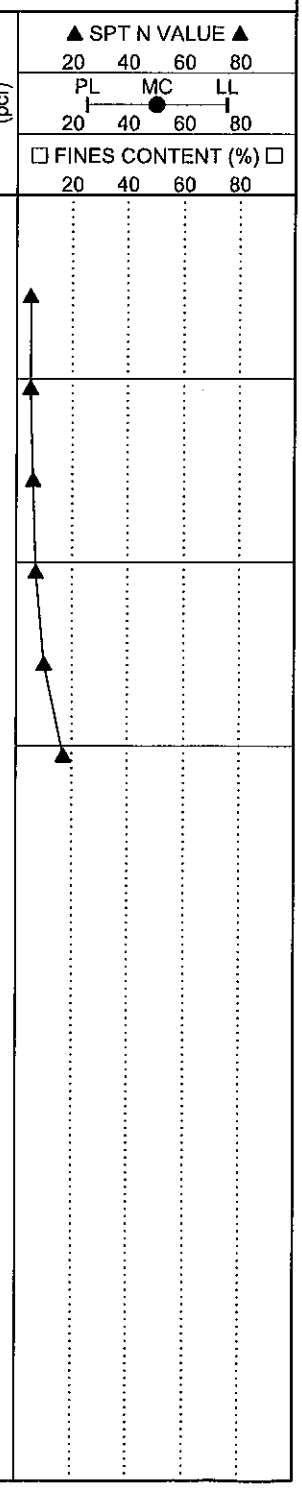
Fax: 763-323-4739

BORING NUMBER 1

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/3/11 **COMPLETED** 5/3/11
GROUND ELEVATION ---- **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SILTY SAND - SM-OL, fine to medium grained, trace organics, brown. (6" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, brown, moist, loose. (Coarse Alluvium)	SS 2	78	2-2-3 (5)		
5			SS 3	94	2-2-3 (5)		
		Trace gravel at 7'.	SS 4	67	1-2-4 (6)		
10		SAND - SP, fine to medium grained, trace gravel, grayish brown, moist, loose. (Glacial Till)	SS 5	100	3-3-4 (7)		
		SAND - SP, fine to coarse grained, trace gravel, brown, moist, medium dense to dense. (Coarse Alluvium)	SS 6	89	4-4-6 (10)		
15			SS 7	100	6-7-10 (17)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



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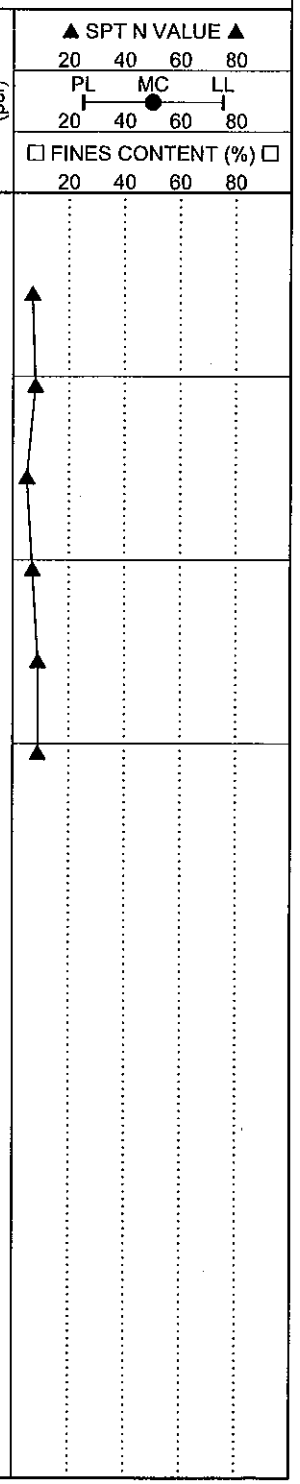
BORING NUMBER 2

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/3/11 **COMPLETED** 5/3/11
GROUND ELEVATION ---- **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING --
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6'. Hole dry at completion.
AFTER DRILLING --

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SILTY SAND - SM, fine to medium grained, trace roots, dark brown. (Coarse Alluvium)	AU 1				
		SAND - SP, fine to medium grained, brown, moist, loose. (Coarse Alluvium)	SS 2	83	2-3-4 (7)		
5		SAND - SP, fine to medium grained, trace gravel, brown, moist, loose to medium dense. (Coarse Alluvium)	SS 3	83	2-3-5 (8)		
			SS 4	56	2-3-2 (5)		
10			SS 5	94	3-3-4 (7)		
			SS 6	83	4-4-5 (9)		
15			SS 7	89	3-4-5 (9)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



GEOTECH BH PLOTS BECKER IND PARK LOGS.GPJ GINT US.GDT 5/25/11

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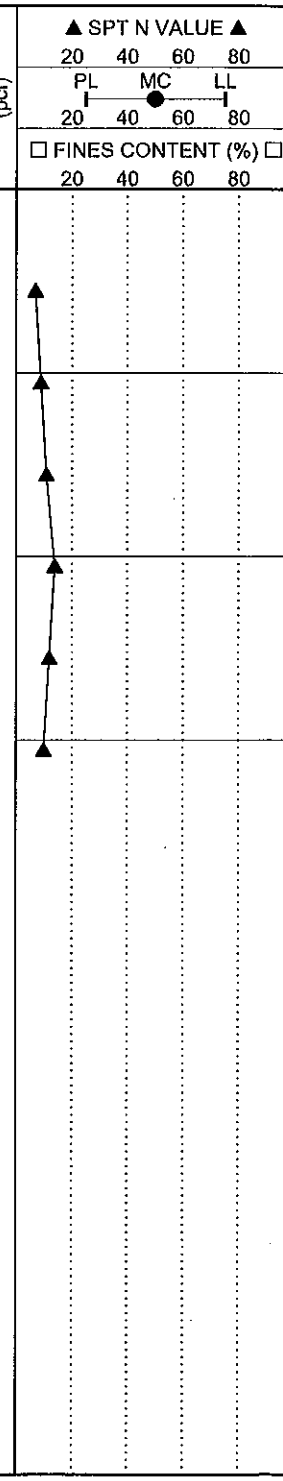
BORING NUMBER 3

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/3/11 **COMPLETED** 5/3/11
GROUND ELEVATION ____ **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6.5'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SILTY SAND - SM-OL, fine to medium grained, trace organics, dark brown. (6" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace gravel, brown, moist, loose to medium dense. (Coarse Alluvium)	SS 2	78	2-3-4 (7)		
5			SS 3	89	4-4-5 (9)		
			SS 4	67	4-6-5 (11)		
10			SS 5	50	6-6-8 (14)		
			SS 6	89	6-5-7 (12)		
15			SS 7	83	4-4-6 (10)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



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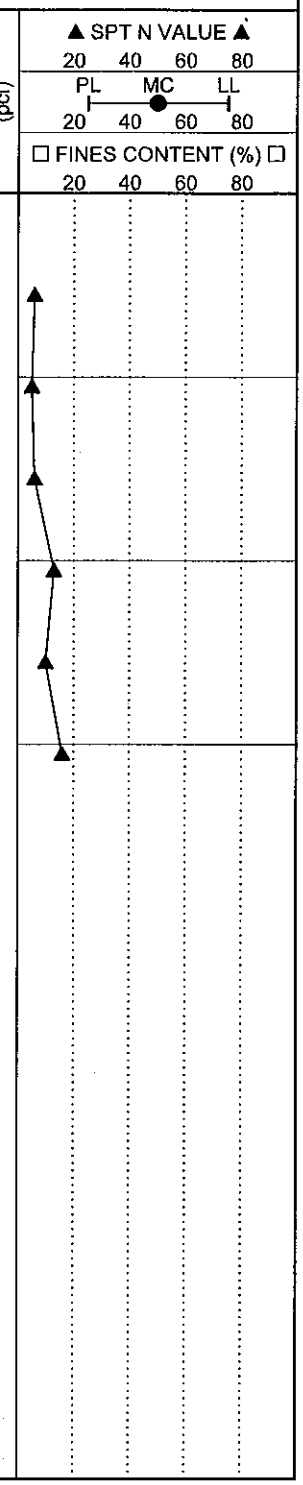
BORING NUMBER 4

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/3/11 **COMPLETED** 5/3/11
GROUND ELEVATION ____ **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6.5'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SILTY SAND - SM-OL, fine to medium grained, trace organics, dark brown. (6" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace to a little gravel, brown, moist, loose to medium dense. (Coarse Alluvium)	SS 2	94	3-2-4 (6)		
5			SS 3	56	2-2-3 (5)		
			SS 4	83	3-4-2 (6)		
10			SS 5	72	6-7-6 (13)		
			SS 6	89	3-4-6 (10)		
15		SAND - SP, fine to coarse grained, trace gravel, brown, moist, medium dense. (Coarse Alluvium)	SS 7	89	8-9-7 (16)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



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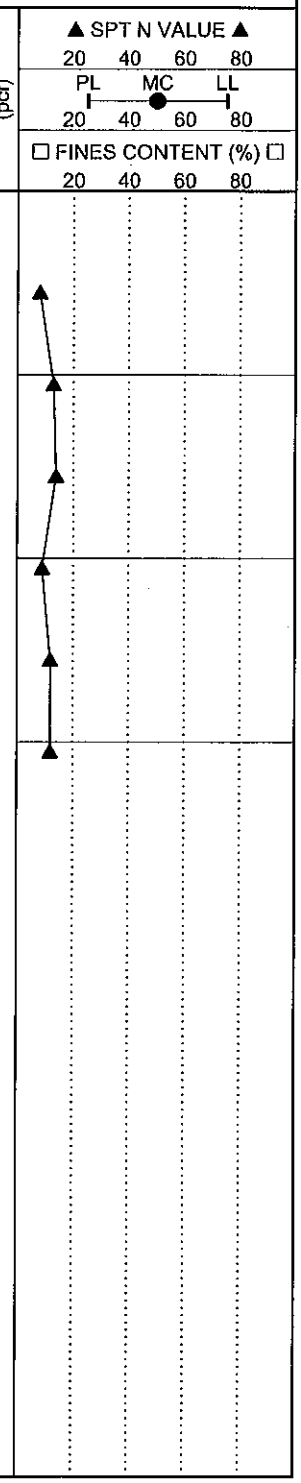
BORING NUMBER 5

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/6/11 **COMPLETED** 5/6/11
GROUND ELEVATION ____ **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 4'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		ORGANIC SILTY SAND - OL-SM, fine grained, black. (8" Topsoil)	AU 1				
		SAND with SILT - SP-SM, fine to medium grained, trace gravel, brown, moist, loose to medium dense. (Coarse Alluvium)	SS 2	100	2-3-5 (8)		
5			SS 3	83	8-7-6 (13)		
			SS 4	89	8-7-7 (14)		
10		SAND - SP, fine to coarse grained, trace to a little gravel, brown, moist, medium dense. (Coarse Alluvium)	SS 5	100	3-4-5 (9)		
			SS 6	100	5-5-7 (12)		
15			SS 7	89	5-6-6 (12)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



GEOTECH BH PLOTS BECKER IND PARK LOGS.GPJ GINT US.GDT 5/25/11

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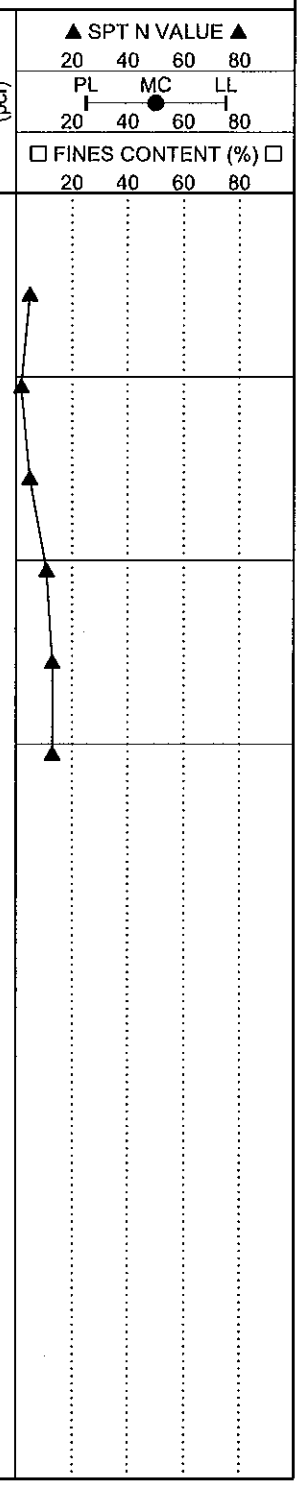
BORING NUMBER 6

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/11/11 **COMPLETED** 5/11/11
GROUND ELEVATION ---- **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6.5'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SAND with SILT- SP-SM, fine to medium grained, trace organics, dark brown. (6" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace gravel, brown, moist, very loose to medium dense. (Coarse Alluvium)	SS 2	83	2-2-3 (5)		
5			SS 3	89	1-1-1 (2)		
			SS 4	83	3-2-3 (5)		
10			SS 5	89	4-5-6 (11)		
			SS 6	89	5-7-6 (13)		
15			SS 7	94	4-6-7 (13)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



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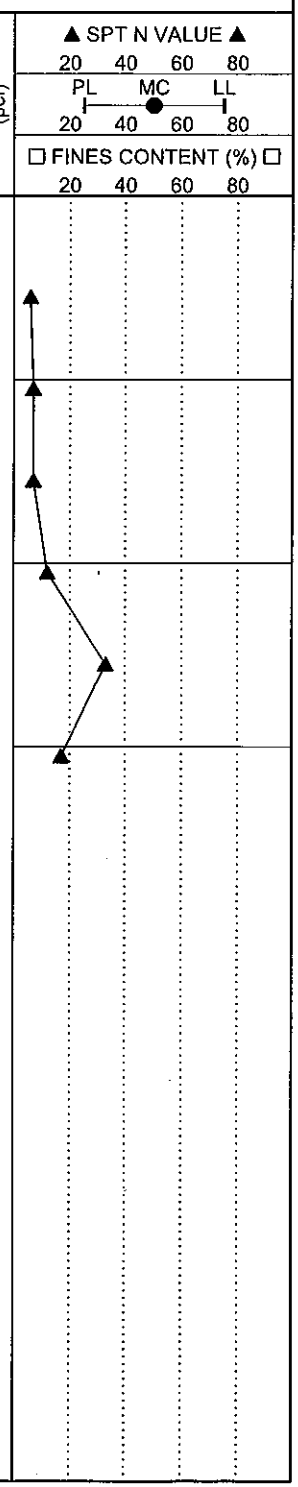
BORING NUMBER 7

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/11/11 **COMPLETED** 5/11/11
GROUND ELEVATION ____ **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING --
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6'. Hole dry at completion.
AFTER DRILLING --

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SILTY SAND - SM-OL, fine to medium grained, trace organics, dark brown. (8" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace gravel, brown, moist, loose to very dense. (Coarse Alluvium)	SS 2	78	2-2-4 (6)		
5			SS 3	89	3-3-4 (7)		
			SS 4	89	2-2-5 (7)		
10			SS 5	94	5-5-7 (12)		
			SS 6	78	15-16-17 (33)		
15		SAND - SP, fine to coarse grained, a little gravel, brown, dense. (Coarse Alluvium)	SS 7	89	10-7-10 (17)		

Borehole backfilled with auger cuttings.
Bottom of hole at 16.0 feet.



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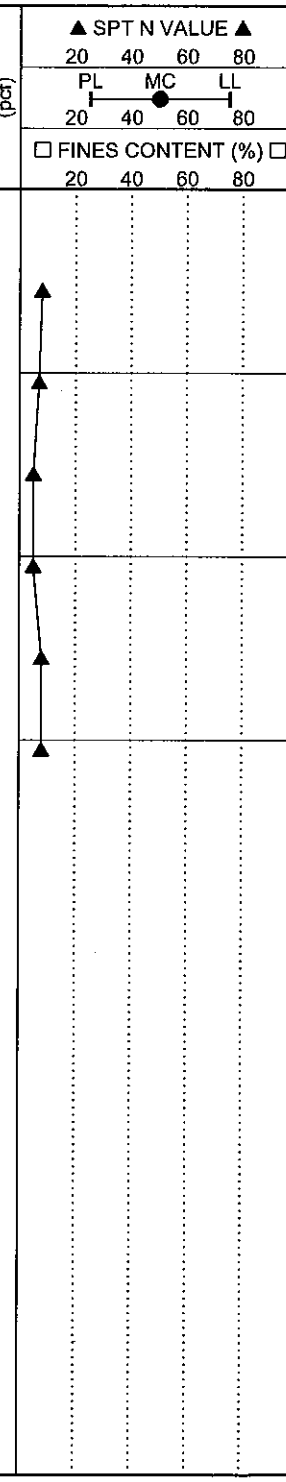
BORING NUMBER 8

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/11/11 **COMPLETED** 5/11/11
GROUND ELEVATION ____ **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 7'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		ORGANIC SILTY SAND - OL-SM, fine grained, black. (8" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace to a little gravel, brown, moist, loose. (Coarse Alluvium)	SS 2	78	2-4-4 (8)		
5			SS 3	94	3-3-4 (7)		
			SS 4	67	2-2-3 (5)		
10			SS 5	72	2-2-3 (5)		
			SS 6	78	3-4-4 (8)		
15			SS 7	78	2-3-5 (8)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



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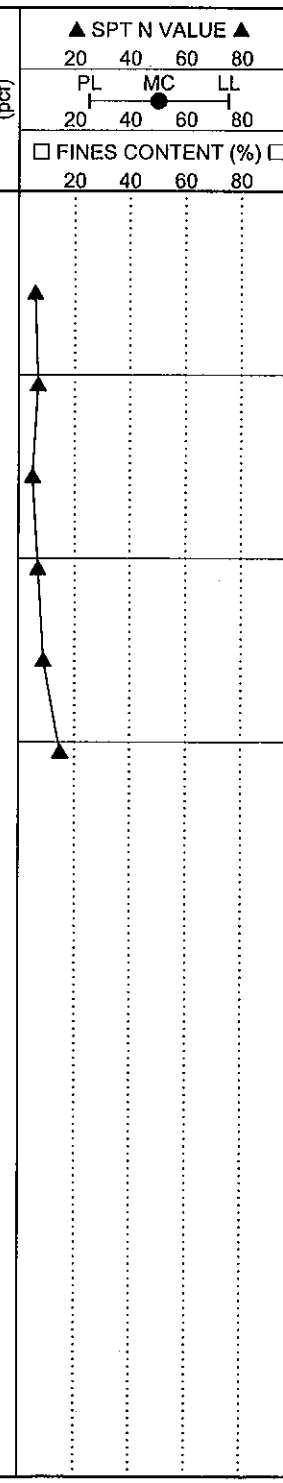
BORING NUMBER 9

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/11/11 **COMPLETED** 5/11/11
GROUND ELEVATION ____ **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		ORGANIC SILTY SAND - OL-SM, fine grained, black. (8" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace gravel, brown, moist, loose to medium dense. (Coarse Alluvium)	SS 2	56	1-2-4 (6)		
5			SS 3	100	3-3-4 (7)		
			SS 4	56	2-2-3 (5)		
10			SS 5	78	2-3-4 (7)		
			SS 6	100	4-4-5 (9)		
15			SS 7	100	5-5-10 (15)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



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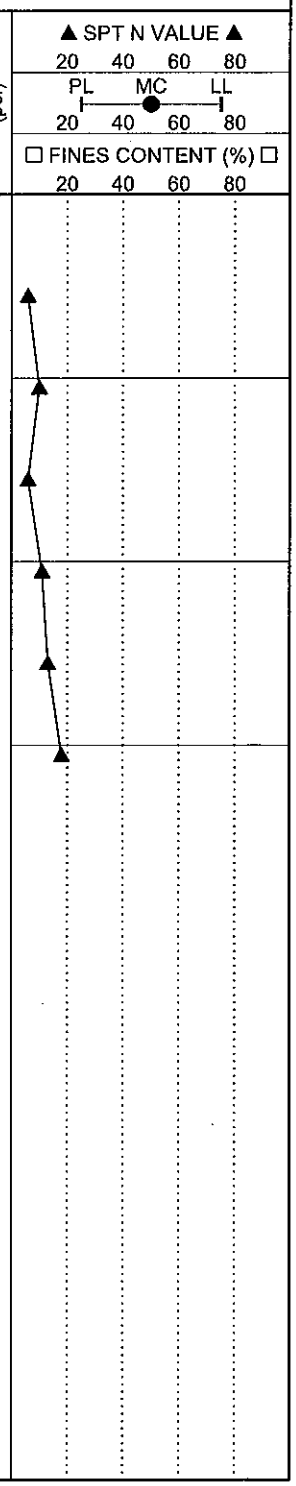
BORING NUMBER 10

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/11/11 **COMPLETED** 5/11/11
GROUND ELEVATION ____ **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6.5'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SITLY SAND - SM-OL, fine grained, trace organics, dark brown. (8" Topsoil)	AU 1				
		SAND with SILT - SP-SM, fine to medium grained, trace gravel, brown, moist, loose. (Coarse Alluvium)	SS 2	89	2-3-3 (6)		
5		SAND - SP, fine to medium grained, trace gravel, brown, moist, loose to medium dense. (Coarse Alluvium)	SS 3	94	3-5-5 (10)		
			SS 4	67	2-3-3 (6)		
10			SS 5	72	5-5-6 (11)		
			SS 6	78	4-5-8 (13)		
15		SAND - SP, fine to coarse grained, a little gravel, brown, moist, dense. (Coarse Alluvium)	SS 7	83	7-8-10 (18)		

Borehole backfilled with auger cuttings.
Bottom of hole at 16.0 feet.



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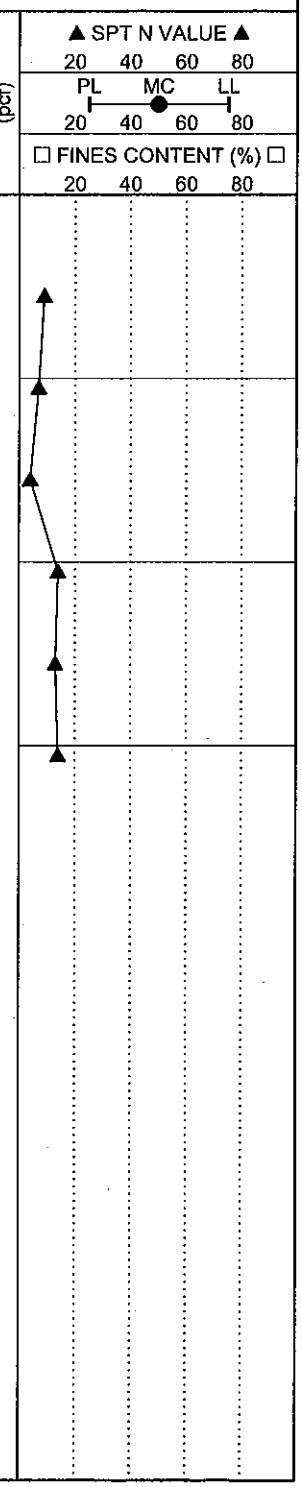
BORING NUMBER 11

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/2/11 **COMPLETED** 5/2/11
GROUND ELEVATION ____ **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 5'. Hole dry at completion.
AFTER DRILLING --

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SITLY SAND - SM-OL, fine grained, trace organics, dark brown. (8" Topsoil)	AU 1				
			SS 2	83	2-4-5 (9)		
5		SAND - SP, fine to medium grained, trace gravel, brown, moist, very loose to medium dense. (Coarse Alluvium)	SS 3	94	4-3-4 (7)		
			SS 4	78	1-1-3 (4)		
10			SS 5	94	6-6-8 (14)		
			SS 6	83	6-6-7 (13)		
15			SS 7	78	7-7-7 (14)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



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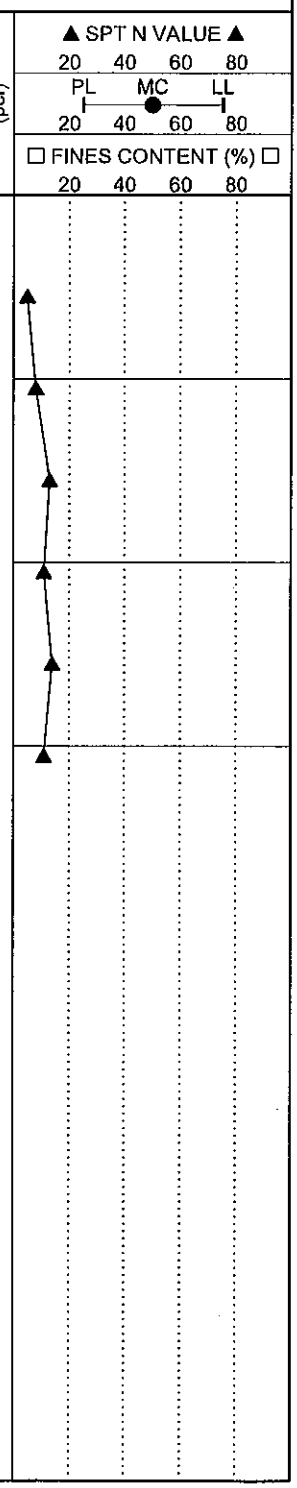
BORING NUMBER 12

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/2/11 **COMPLETED** 5/2/11
GROUND ELEVATION **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 5.5'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SITLY SAND - SM-OL, fine grained, trace organics, dark brown. (6" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace gravel, brown, moist, loose to medium dense. (Coarse Alluvium)	SS 2	44	2-2-3 (5)		
5			SS 3	78	3-4-4 (8)		
			SS 4	83	7-7-6 (13)		
10			SS 5	106	6-6-5 (11)		
			SS 6	94	7-7-7 (14)		
15		SAND - SP, fine to coarse grained, a little gravel, brown, moist, medium dense. (Coarse Alluvium)	SS 7	94	7-6-5 (11)		

Borehole backfilled with auger cuttings.
Bottom of hole at 16.0 feet.



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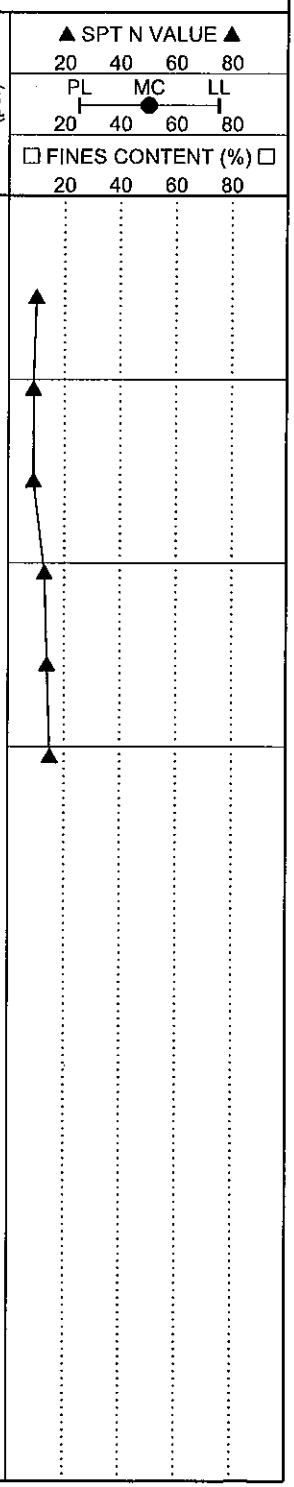
BORING NUMBER 13

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/2/11 **COMPLETED** 5/2/11
GROUND ELEVATION ____ **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 7'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SITLY SAND - SM-OL, fine grained, trace organics, dark brown. (10" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace gravel, brown, moist, medium dense. (Coarse Alluvium)	SS 2	67	3-5-5 (10)		
5			SS 3	100	4-5-4 (9)		
			SS 4	56	2-4-5 (9)		
10		SAND - SP, fine to coarse grained, a little gravel, brown, moist, medium dense. (Coarse Alluvium)	SS 5	83	6-6-7 (13)		
			SS 6	56	4-8-6 (14)		
15			SS 7	67	10-9-6 (15)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



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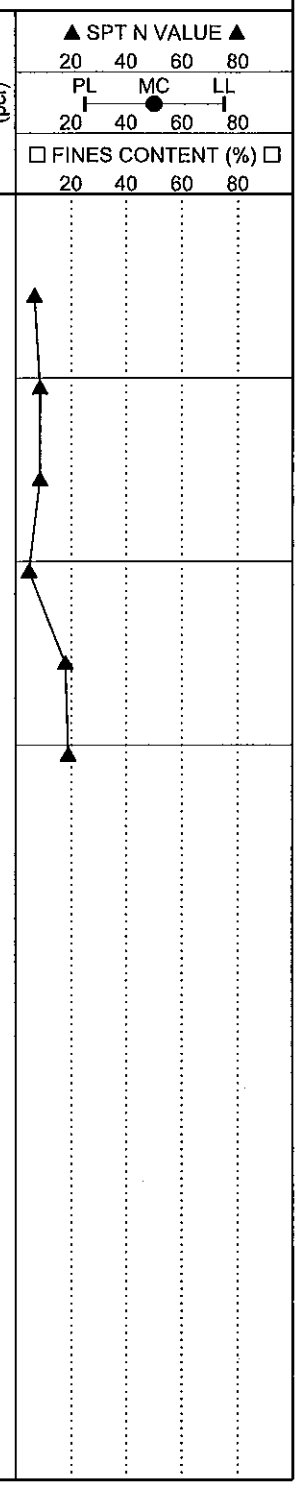
BORING NUMBER 14

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/2/11 **COMPLETED** 5/2/11
GROUND ELEVATION ---
HOLE SIZE 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6.5'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SITLY SAND - SM-OL, fine grained, trace organics, dark brown. (8" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace gravel, brown, moist, loose to dense. (Coarse Alluvium)	SS 2	100	3-3-4 (7)		
5			SS 3	100	6-4-5 (9)		
			SS 4	100	5-5-4 (9)		
10			SS 5	100	2-3-2 (5)		
			SS 6	100	7-7-11 (18)		
15		SAND - SP, fine to coarse grained, a little gravel, brown, moist, dense. (Coarse Alluvium)	SS 7	94	10-9-10 (19)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



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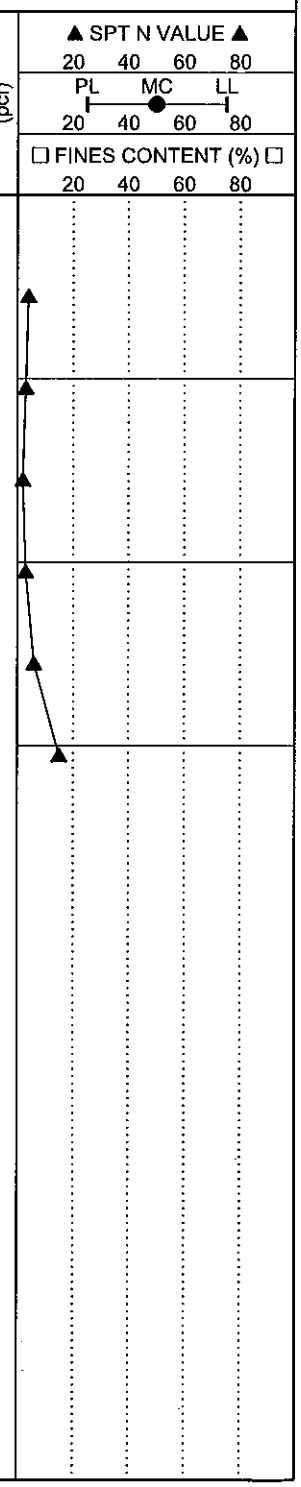
BORING NUMBER 15

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/2/11 **COMPLETED** 5/2/11
GROUND ELEVATION ---
HOLE SIZE 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 7.5'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SITLY SAND - SM-OL, fine grained, trace organics, dark brown. (8" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace gravel, brown, moist, very loose to loose. (Coarse Alluvium)	SS 2	11	2-2-2 (4)		
5			SS 3	100	1-1-2 (3)		
			SS 4	94	1-1-1 (2)		
10			SS 5	100	1-1-2 (3)		
			SS 6	100	1-2-4 (6)		
15		SAND - SP, fine to coarse grained, a little gravel, brown, moist, medium dense. (Coarse Alluvium)	SS 7	100	7-8-7 (15)		

Borehole backfilled with auger cuttings.
Bottom of hole at 16.0 feet.



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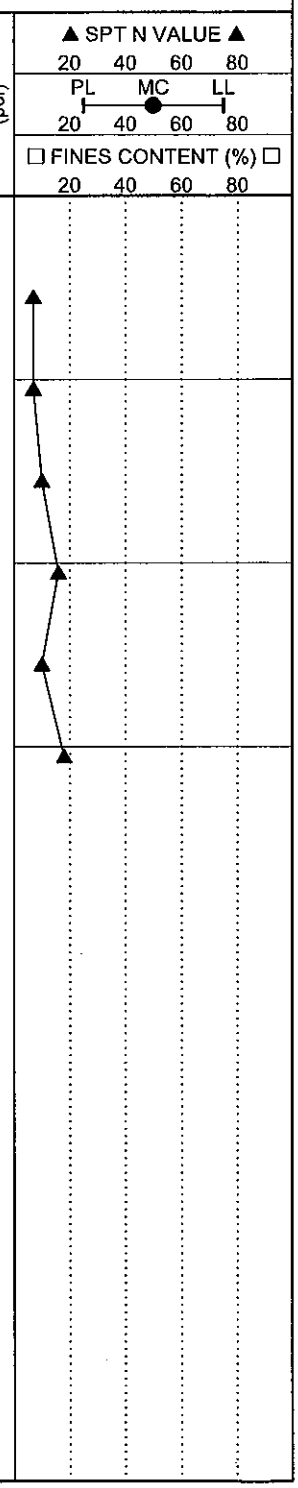
BORING NUMBER 16

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/2/11 **COMPLETED** 5/2/11
GROUND ELEVATION ____ **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SITLY SAND - SM-OL, fine grained, trace organics, dark brown. (8" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace gravel, brown, moist,loose to medium dense. (Coarse Alluvium)	SS 2	78	3-4-3 (7)		
5			SS 3	100	4-4-3 (7)		
			SS 4	100	4-5-5 (10)		
10			SS 5	56	9-9-7 (16)		
			SS 6	100	4-4-6 (10)		
15		SAND - SP, fine to coarse grained, a little gravel, brown, moist, dense. (Coarse Alluvium)	SS 7	100	4-8-10 (18)		

Borehole backfilled with auger cuttings.
Bottom of hole at 16.0 feet.



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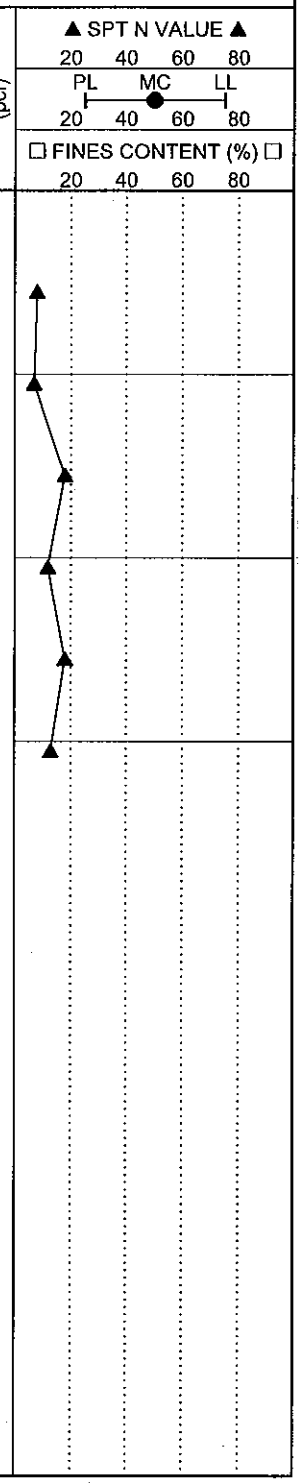
BORING NUMBER 17

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/2/11 **COMPLETED** 5/2/11
GROUND ELEVATION ____ **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6.5'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SITLY SAND - SM-OL, fine grained, trace organics, dark brown. (8" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace gravel, brown, moist, loose. (Coarse Alluvium)	SS 2	100	3-3-5 (8)		
5			SS 3	94	3-3-4 (7)		
		SAND - SP, fine to coarse grained, a little gravel, brown, moist, medium dense to dense. (Coarse Alluvium)	SS 4	89	3-10-8 (18)		
10			SS 5	94	5-5-7 (12)		
			SS 6	100	8-8-10 (18)		
15			SS 7	100	5-5-8 (13)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



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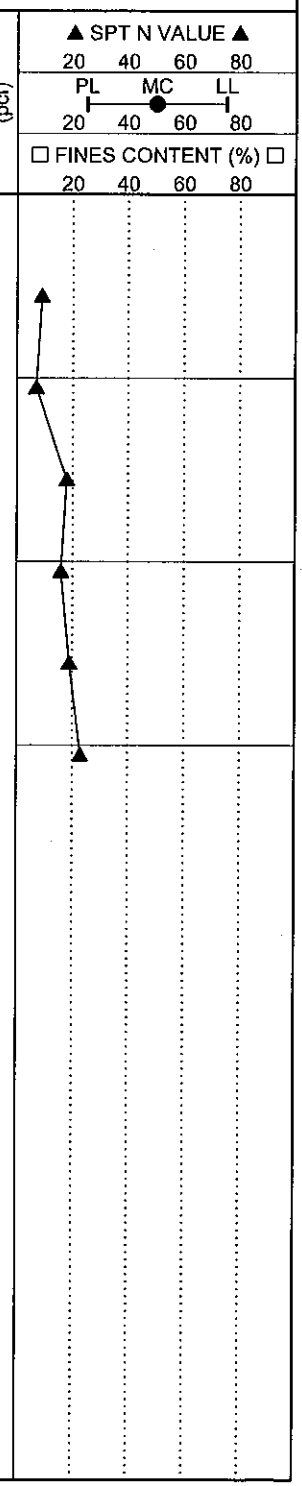
BORING NUMBER 18

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/2/11 **COMPLETED** 5/2/11
GROUND ELEVATION ---- **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6.5'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SITLY SAND - SM-OL, fine grained, trace organics, dark brown. (8" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace gravel, brown, moist, very loose to medium dense. (Coarse Alluvium)	SS 2	89	4-4-5 (9)		
5			SS 3	94	4-3-4 (7)		
			SS 4	50	4-6-12 (18)		
10			SS 5	67	3-7-9 (16)		
		SAND - SP, fine to coarse grained, a little gravel, brown, moist, medium dense. (Coarse Alluvium)	SS 6	78	6-8-11 (19)		
15			SS 7	72	6-10-13 (23)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



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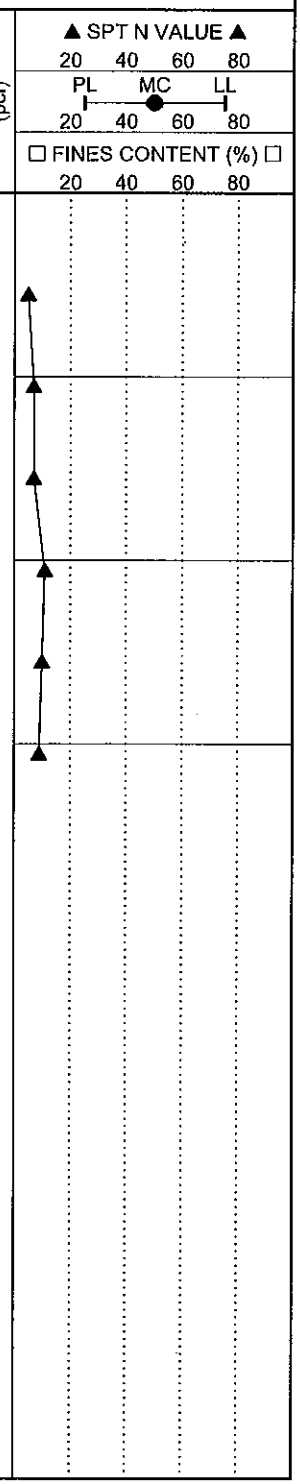
BORING NUMBER 19

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/2/11 **COMPLETED** 5/2/11
GROUND ELEVATION ---
HOLE SIZE 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6.5'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SITLY SAND - SM-OL, fine grained, trace organics, dark brown. (8" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace gravel, brown, moist, loose. (Coarse Alluvium)	SS 2	78	2-2-3 (5)		
5			SS 3	100	3-3-4 (7)		
		SAND - SP, fine grained, grayish brown, moist, loose to medium dense. (Coarse Alluvium)	SS 4	100	2-3-4 (7)		
10			SS 5	100	5-5-6 (11)		
		SAND - SP, fine to medium grained, trace gravel, brown, moist, medium dense. (Coarse Alluvium)	SS 6	56	2-4-6 (10)		
15		SAND - SP, fine to coarse grained, a little gravel, brown, moist, medium dense. (Coarse Alluvium)	SS 7	94	4-4-5 (9)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



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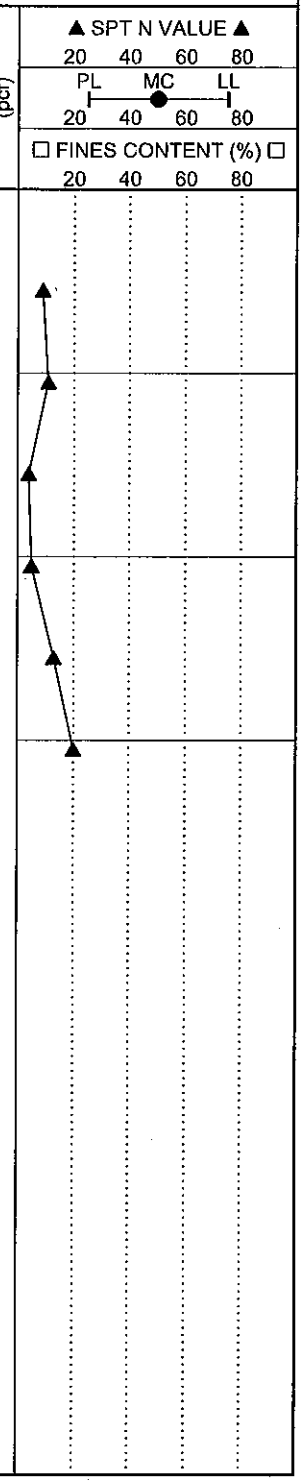
BORING NUMBER 20

CLIENT City of Becker
PROJECT NAME Becker Industrial Park
PROJECT NUMBER 11.50565.100
PROJECT LOCATION Becker, MN
DATE STARTED 5/2/11 **COMPLETED** 5/2/11
GROUND ELEVATION ____ **HOLE SIZE** 8" O.D.
DRILLING CONTRACTOR NTI
GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY BC **CHECKED BY** AF
AT END OF DRILLING ---
NOTES Cave in depth = 6'. Hole dry at completion.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0		SITLY SAND - SM-OL, fine grained, trace organics, dark brown. (8" Topsoil)	AU 1				
		SAND - SP, fine to medium grained, trace gravel, brown, moist, very loose to medium dense. (Coarse Alluvium)	SS 2	94	3-4-5 (9)		
5			SS 3	100	5-5-6 (11)		
			SS 4	72	1-2-2 (4)		
10			SS 5	89	4-3-2 (5)		
		SAND - SP, fine to coarse grained, a little gravel, brown, moist, medium dense to dense. (Coarse Alluvium)	SS 6	100	6-7-6 (13)		
15			SS 7	89	10-9-11 (20)		
		Borehole backfilled with auger cuttings. Bottom of hole at 16.0 feet.					



GEOTECH BH PLOTS BECKER IND PARK LOGS.GPJ GINT US.GDT 5/25/11