

PW-101 BORING NO.

PROJECT

PROJECT NO.

GSWA: Spring Hill Camp Phase III

SHEET 1 OF 8

Osceola Township, MI LOCATION 4065-005

COORDINATES N 228,508.7 E 19,441,303.9 **Steve Smith** LOGGED BY SURFACE ELEVATION 1151.45 DATUM USGS

Ste DRIL Ca DRIL	LING CO earns LING ME ble Too LING STA	THOD	E(E	QUIP)	rie 22-W	LOCATION DESCRIPTION: See attached Site Diagram for location.				
	SAND CLAY GRAVEL	ST	RATA	KEY							
S Depth feet		Samp Typ	le Bl		Rec-		DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
5		©GR.				fine Gra quartz, I Gravel i primarily Light bro	brown, medium SAND, trace coarse Sand, trace vel, poorly graded, and damp. Sand is ~85% nighly spherical, sub-rounded to rounded. Fine is sub-angular to sub-rounded, low sphericity, rock fragments. Down, fine to medium SAND, trace Gravel, trace Silt, raded, and damp. Approximately 85% quartz, high try, sub-rounded to well rounded, low sphericity in gments.	SP			1151.45 1147.45 1143.45
- - -		® GR.	∕В			Clay, po	own, fine to medium SAND, trace Gravel, trace orly graded, and damp. Approximately 85% high sphericity, sub-rounded, low sphericity in rock ts.	SP			1134.45



SURFACE ELEVATION 1151.45

COORDINATES N 228,508.7 E 19,441,303.9

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111

Fax: (517) 337-0417

DATUM USGS

BORING NO. PW-101

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 2 OF 8

LOCATION Osceola Township, MI

PROJECT NO. 4065-005
LOGGED BY Steve Smith

					T			ī	
	AMPLE			ON Rec-	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
Depth feet		Sample Type	Blow Counts	overy %			ί		Ele [,] F
		<u>e</u>				SP	e, de robe.		
-		®GRA£	3		Brown, CLAY, some Silt, some fine Sand, trace medium Sand, moderately plastic. Sand is sub-rounded to well rounded, high sphericity, >75% quartz.	CL		Increasing Clay in last bail at 21' bgl.	1130.45
25		 GRA⊩	3		CLAY	CL		Sample based on muddy cuttings. Driller indicates presence of Clay.	1127.45
30-		GRA E			Brown, CLAY, some Silt, some fine Sand, trace medium Sand, moderately plastic, and soft. Sand is sub-rounded to well rounded, high sphericity, >75% quartz.	CL			1123.45
35-		® GRAE	3		CLAY	CL		Clay sample at 34' bgl taken from drill bit. Water in MW-103 (~20' offset) at ~35' bgl.	1117.45
-		® GRA⊩	3		Brown, fine SAND, some Silt, trace to little Clay, trace medium Sand, poorly graded. Sand is rounded to well rounded, highly spherical, >85% quartz.	SP-SM			1114.45
40		[©] GRA!			Brown, very fine SAND, and Silt, little Clay, poorly graded. Sand is rounded to well rounded, highly spherical, >85% quartz. Clay occurs as 1/2" diameter clasts and is moderately plastic.	SM			1111.45



COORDINATES N 228,508.7 E 19,441,303.9

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PW-101 BORING NO.

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GSWA: Spring Hill Camp Phase III

SHEET 3 OF 8

Osceola Township, MI LOCATION

4065-005 PROJECT NO.

S	AMPLE INFO	ORMATI	ON					u
Depth feet	Lab Samp Sample Typ		Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
50	♥GR.	AΒ		Brown, very fine to fine SAND, some Silt, little Clay, trace medium Sand, poorly graded. Very fine to fine Sand is rounded to well rounded, highly spherical, >85% quartz. Medium Sand is sub-angular to sub-rounded, moderately spherical, >50% quartz. Clay occurs as 1/2" diameter clasts and is moderately plastic.	SM		Driller confirms rig and cuttings indicate silty fine Sand.	1104.45
	®GR. ®GR.			Brown, fine SAND, little to some Silt, little to some Clay, little medium Sand, poorly graded. Fine Sand is rounded to well rounded, highly spherical, >85% quartz. Medium Sand is sub-angular to sub-rounded, moderately spherical, >50% quartz. Clay occurs as 1 to 3" elongated, flat clasts. Brown, fine SAND, little Silt, little Clay, little medium Sand, poorly graded. Fine Sand is rounded to well rounded, highly spherical, >85% quartz. Medium Sand is sub-angular to sub-rounded, moderately spherical, >50%	SC-SM SC-SM			1094.45 1093.45 1091.45
65 —	© GR.	AВ		quartz. Clay occurs as 1 to 3" elongated, flat clasts. Brown, CLAY, little fine Sand, moderate plasticity, medium stiff. Brown, fine SAND, some medium Sand, little Silt, little Clay, poorly graded. Fine Sand is rounded to well rounded, highly spherical, >85% quartz. Medium Sand is sub-angular to sub-rounded, moderate sphericity, >50% quartz. Clay occurs as 1/4 to 1/2" diameter clasts, and has moderate plasticity.	CL SP-SC			1089.45
-	® GR.	∤В		Brown, fine SAND, some medium Sand, little Silt, little Clay, trace coarse Sand and fine Gravel, poorly graded. Fine Sand is rounded to well rounded, highly spherical, >85% quartz. Medium Sand is sub-angular to sub-rounded, moderate sphericity, >50% quartz. Coarse Sand and fine Gravel is sub-rounded to angular, low to moderate sphericity, <50% quartz. Clay occurs as 1/4 to 1/2"	SP-SC		08:00 4-10-01 Water in drilling pipe at 10.45' bgl, and hole open 4' out the end of drilling pipe. Indicates still in confining unit.	1084.45 1082.45
70	®GR. ® GR.			Idiameter clasts. Brown, fine to medium SAND, trace coarse Sand, trace Silt, poorly graded. Fine to medium Sand is sub-rounded to well rounded, highly spherical, >80% quartz. Coarse Sand is angular to sub-rounded, moderately spherical, <50% quartz. Brown, fine to medium SAND, trace to little coarse Sand, trace Silt, poorly graded. Fine Sand is sub-rounded to well	SP SP		pattern bailer to dart valve bailer at 69' bgl.	1079.45



COORDINATES N 228,508.7 E 19,441,303.9

SURFACE ELEVATION 1151.45 DATUM USGS

PW-101 BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 4 OF 8

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

00.1	FACE ELE	. ٧/ (١١Ο)	1 11	71.43	DATUM USUS				
S	SAMPLE INFORMATION						ıta		tion
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
_		(M)			rounded, highly spherical, >80% quartz. Medium Sand is sub-angular to sub-rounded, low to high sphericity, >70%	SP			1077.45
75-		®GRAB			quartz. Coarse Sand is angular to sub-rounded, low to high sphericity, <50% quartz.	SP			
-		®GRAB			Brown, fine to medium SAND, trace to little coarse Sand, little Silt, poorly graded. Fine to medium Sand is sub-rounded to well rounded, high to moderate sphericity, >75% quartz. Coarse Sand is angular to sub-rounded, low to moderate sphericity, <50% quartz. Brown, fine to medium SAND, and coarse Sand, little fine Gravel, trace Silt, well graded. Fine Sand is rounded to well rounded, high sphericity, >85% quartz. Medium to coarse Sand is angular to sub-rounded, low to moderate sphericity, <75% quartz. Fine Gravel is sub-angular to	SW			1076.45
80-		®GRAB			sub-rounded, ~1/4" diameter. Brown, fine to coarse SAND, little fine Gravel, trace coarse Gravel, trace Silt, well graded. Fine Sand is rounded to well rounded, high sphericity, >85% quartz. Medium to coarse Sand is sub-angular to rounded, low to moderate sphericity, <75% quartz. Coarse Gravel is ~1" diameter.	sw			1072.45
85 —		[®] GRAB			Brown, fine to coarse SAND, trace fine Gravel, trace Silt, well graded. Fine Sand is rounded to well rounded, high sphericity, >85% quartz. Medium to coarse Sand is angular to sub-rounded, low to moderate sphericity, <80% quartz. Fine Gravel is sub-angluar to sub-rounded, moderate sphericity, and primarily rock fragments.	SW			1069.45
-		[®] GRAB			Brown, fine to coarse SAND, trace Silt, trace fine Gravel, well graded. Fine to medium Sand is sub-angular to rounded, >80% quartz. Fine Sand is highly spherical, medium Sand is moderately shperical. Coarse Sand is angular to sub-rounded, low sphericity, and primarily rock	sw			1065.45
90-		 GRAB			fragments. Brown, fine to medium SAND, little coarse Sand, trace fine Gravel, trace Silt, poorly graded. Fine to medium Sand is sub-angular to rounded, high to moderate sphericity, >80% quartz. Coarse Sand is angular to sub-rounded, low to moderate sphericity, and primarily rock fragments.	SP			1063.45
-		[®] GRAB			Brown, fine to medium SAND, and coarse Sand, trace Silt, trace fine Gravel, moderately graded. Fine to medium Sand is sub-angular to sub-rounded, moderate to high sphericity, >80% quartz. Coarse Sand is angular to sub-rounded, low to moderate sphericity, and primarily rock fragments.	SP-SW	1. <i>1</i>	Heave at 91' bgl, switch to flat pattern bailer.	1060.45
		®GRAB							
95-		 GRAB			Brown, fine SAND, some medium Sand, trace Silt, poorly graded. Sand is rounded to well rounded, highly spherical, >85% quartz.	SP		Switch back to dart valve bailer.	1057.45
- -		GRAB			Brown, fine to medium SAND, trace coarse Sand, trace Silt, trace organic wood matter, poorly graded. Fine to medium Sand is rounded to well rounded, highly spherical, >85% quartz. Coarse Sand is angular to sub-rounded, low to moderate sphericity, and <65% quartz.	SP			1054.45



COORDINATES N 228,508.7 E 19,441,303.9

SURFACE ELEVATION 1151.45 DATUM USGS

PW-101 BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 5 OF 8

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

SUK	FACE ELI	LVATIO	N 11.	01.40	DATUM USGS EGGED BT				
s	AMPLE	INFO	RMATI				草		tion
Depth feet	l	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
_		en,			Brown, fine to medium SAND, trace Silt, poorly graded.	SP			1049.45
-		®GRAE	3		Sand is sub-rounded to well rounded, highly spherical, >85% quartz.	SP			
105 —		 GRAE			Brown, fine to medium SAND, trace Silt, trace coarse Sand poorly graded. Fine to medium Sand is sub-rounded to well rounded, highly spherical, >85% quartz.	SP		Heave in drilling pipe even though driller keeping head of water in drill pipe. Ground water gradient upward at this depth and location.	1046.45
110		® GRAE			Brown, fine to medium SAND, little coarse Sand, trace Silt, trace fine to coarse Gravel, poorly graded. Fine to medium Sand is sub-rounded to well rounded, highly spherical, >85% quartz. Coarse Sand and fine Gravel are angular to sub-rounded, low to moderate sphericity, <60% quartz. Coarse Gravel is ~1" diameter, sub-angular, and moderately spherical.	SP			1042.45
115—		 GRAE	3		Brown, fine to medium SAND, and Clay, little coarse Sand, little fine Gravel, trace Silt, poorly graded. Fine to medium Sand is sub-rounded to rounded, highly spherical, >85% quartz. Clay occurs as 1/2 to 1.5" diameter clasts. Coarse Sand is angular to sub-rounded, low sphericity, primarily rock fragments.	sc			1038.45
		® GRAE			Brown, fine to medium SAND, some coarse Sand, trace Silt, trace fine Gravel, poorly graded. Fine to medium Sand is sub-rounded to rounded, highly spherical, >85% quartz. Coarse Sand is angular to sub-rounded, low sphericity, primarily rock fragments.	SP			1035.45
-		♥GRAE	3		Brown, fine to medium SAND, trace Silt, trace coarse Sand poorly graded. Fine to medium Sand is sub-rounded to well rounded, highly spherical, >85% quartz. Coarse Sand is angular to sub-rounded, low sphericity, primarily rock fragments.	SP			1030.45
125-		®GRAE			Silty CLAY.	CL-ML		No recovery 124-125' bgl. Description based on hole staying open 2'	1027.45
-		8 7				SP		past end of drill pipe and grey fines in water	1026.45



COORDINATES N 228,508.7 E 19,441,303.9

SURFACE ELEVATION 1151.45 DATUM USGS

PW-101 BORING NO.

PROJECT

LOCATION

GSWA: Spring Hill Camp Phase III

SHEET 6 OF 8

Osceola Township, MI

PROJECT NO. 4065-005

COIN	FACE ELE	VATIO	1 11	71.43	DATONI U3G3 = ================================				
S	SAMPLE INFORMATION						ıta		tion
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-	8	GRAB			Brown, fine to medium SAND, little Silt, little coarse Sand, trace fine Gravel, poorly graded. Fine to medium Sand is rounded to well rounded, highly spherical, >85% quartz. Coarse Sand and fine Gravel are sub-angular to sub-rounded, moderate sphericity, <50% quartz. (continued)	SP		Substantial recovery 125-130' bgl.	
130 - - -	8	[®] GRAB			Brown, fine to medium SAND, little coarse Sand, trace Silt, trace fine Gravel, poorly graded. Fine to medium Sand is rounded to well rounded, highly spherical, >85% quartz. Coarse Sand and fine Gravel are sub-angular to sub-rounded, low to moderate sphericity, <50% quartz.	SP		Substantial Recovery 130-134' bgl.	1021.45
	4	[®] GRAB			Brown, fine to medium SAND, little coarse Sand, little Silt, little Clay, trace fine to coarse Gravel, poorly graded. Fine	SC-SM			1017.45
135 - -	8	®GRAB			to medium Sand is rounded to well rounded, highly spherical, >85% quartz. Coarse Sand and fine Gravel are sub-angular to sub-rounded, low to moderate sphericity, <50% quartz. Clay occurs as 1/4 to 1.25" diameter clasts, moderate plasticity , firm. Brown, fine to medium SAND, little coarse Sand, trace fine Gravel, trace Clay, poorly graded. Fine to medium Sand is rounded to well rounded, highly spherical, >85% quartz. Coarse Sand is angular to sub-rounded, low to moderate sphericity, and primarily rock fragments. Clay occurs as 1/2" diameter clasts.	SP			1016.45
140 - -	4	**GRAB			Brown, fine to coarse SAND, some fine Gravel, trace coarse Gravel, trace Silt, well graded. Fine to medium Sand is rounded to well rounded, highly spherical, >85% quartz. Coarse Sand and fine Gravel are angular to sub-rounded, moderately spherical, primarily rock fragments. Coarse Gravel is ~1.25" diameter.	sw			1011.45
-	*	[®] GRAB			Brown, fine to coarse SAND, trace to little fine Gravel, trace Silt, well graded. Fine to medium Sand is rounded to well rounded, highly spherical, >85% quartz. Coarse Sand is angular to sub-rounded, moderate to low sphericity, primarily rock fragments.	SW			1008.45
145 — - - -	1	[®] GRAB			Brown, fine to medium SAND, trace coarse Sand, trace Silt, poorly graded. Fine to medium Sand is rounded to well rounded, highly spherical, >85% quartz. Coarse Sand is sub-angular to sub-rounded, low to moderate sphericity, primarily rock fragments.	SP	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		1006.45
150 — - -	1	[®] GRAB			Brown, fine to medium SAND, trace coarse Sand, trace Silt, trace fine Gravel, poorly graded. Fine to medium Sand is rounded to well rounded, highly spherical, >85% quartz. Coarse Sand and fine Gravel are sub-angular, moderate sphericity, and primarily rock fragments.	SP			1001.45



SURFACE ELEVATION 1151.45

COORDINATES N 228,508.7 E 19,441,303.9

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417

DATUM USGS

PW-101 BORING NO.

GSWA: Spring Hill Camp Phase III

SHEET **7** OF **8**

Osceola Township, MI

PROJECT NO. 4065-005

Steve Smith LOGGED BY

PROJECT

LOCATION

S	AMPLE	INFC	RMA	ION			м		on
Depth feet			e Blow Coun	OVERV	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-		_@ GRA	В		Brown, fine to medium SAND, trace coarse Sand, trace Silt, poorly graded. Fine to medium Sand is rounded to well rounded, highly spherical, >85% quartz. (continued)	SP		Sand heaving up into drilling pipe, due to high pore pressure.	998.45
155 - - -		®GRA	В		Brown, fine to medium SAND, little coarse Sand, trace fine Gravel, trace Silt, poorly graded. Fine to medium Sand is rounded to well rounded, highly spherical, >85% quartz. Coarse Sand is sub-angular to sub-rounded, low to moderate sphericity, and primarily rock fragments. Fine Gravel is sub-angular to sub-rounded, with moderate sphericity.	SP		Switch to dart valve bailer at 156' bgl.	996.45
160 - - -		 GRA	В		Brown, fine to medium SAND, little coarse Sand, trace fine Gravel, trace Silt, poorly graded. Fine to medium Sand is sub-rounded to rounded, highly spherical, >85% quartz. Coarse Sand is angular to sub-rounded, low to moderate sphericity, and primarily rock fragments.	SP		Switch to flat pattern bailer at 160' bgl.	991.45
105		®GRA	В		Brown, fine to medium SAND, some coarse Sand, some fine Gravel, trace Silt, trace coarse Gravel, well graded.	sw			987.45
165 -		®GRA	В		Fine to medium Sand is sub-rounded to rounded, highly spherical, >85% quartz. Coarse Sand is angular to sub-rounded, low to moderate sphericity, and primarily rock	sw-gw			986.45
- - - 170 —		® GRA	В		fragments. Gravel is sub-angular to sub-rounded, moderately spherical. Coarse Gravel is ~2" in diameter. Brown, medium to coarse SAND, and fine Gravel, little fine Sand, little coarse Gravel, well graded. Medium to coarse Sand is angular to rounded, moderately spherical, ~75% quartz. Fine Gravel is sub-rounded, moderately spherical. Coarse Gravel is 0.75-2.5" in diameter. Brown, medium to coarse SAND, and fine Gravel, little coarse Gravel, trace fine Sand, moderately graded. Medium to coarse Sand is angular to rounded, moderately spherical, ~75% quartz. Fine Gravel is sub-angular to sub-rounded, moderately spherical. Coarse Gravel is	sw-gw			985.45
-		 GRA	В		0.75-1.5" in diameter. Brown, medium to coarse SAND, little fine Sand, little fine Gravel, trace Silt, moderately graded. Medium to coarse Sand is angular to rounded, moderately spherical, ~65% quartz. Fine Sand is sub-rounded to rounded, highly spherical, and ~90% quartz Fine Gravel is angular to sub-rounded, with low sphericity.	SP-SW			980.45
175 — - -		% GRA	В		Brown, medium to coarse SAND, some fine Sand, trace fine Gravel, trace Silt, trace Clay, well graded. Medium to coarse Sand is sub-angular to rounded, moderate to high sphericity, ~65% quartz. Clay occurs as grey fines in water. Fine Gravel is ~20 mm in diameter, angular to sub-angular, low to moderate sphericity, and primarily rock fragments.	SW			976.45
-		® GRA	В		Brown, coarse SAND, and fine GRAVEL, some Clay, little medium Sand, trace fine Sand, trace Silt. Coarse Sand is angular to sub-rounded, moderately spherical, and primarily rock fragments. Clay and Silt occur as grey fines in water.	SC-GC		Drilling change at 177.5' bgl. Hole is staying open past drilling casing, which indicates presence of	973.45



COORDINATES N 228,508.7 E 19,441,303.9

SURFACE ELEVATION 1151.45 DATUM USGS

PW-101 BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 8 OF 8

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

SUK	FACE ELI	EVATIO	v 11.	71.45	DATUM USGS					
S Depth	AMPLE Lab	INFOF Sample		Rec-	DESCRIPTION	ON	USCS	Strata	REMARKS	Elevation Feet
feet			Counts	overy %				0)		EI
		6 3					sc-gc	<u> </u>	Clay.	
-		[®] GRAE			Brown, coarse SAND, some fine GR Sand, trace Silt, well graded. Coars sub-rounded, moderately spherical, Medium Sand is sub-rounded to rou >75% quartz. Fine Gravel is angula moderately spherical.	e Sand is angular to and <60% quartz. nded, highly spherical,	sw		Hole stayed open past drilling pipe to 181' bgl. Sand starts at 181' bgl.	970.45
- 185 — - - -		® GRAE			Brown, coarse SAND, some mediun GRAVEL, trace Clay, trace Silt, well is angular to sub-rounded, moderate primarily rock fragments. Grey, Clay diamter clay clasts, with some fine to moderately plastic, and hard.	graded. Coarse Sand ely spherical, and occurs as 1/4 to 1/2"	SW		End of drilling casing at 187' bgl. Hole stays open past casing, indicating Clay or Silt. Bailed sample does not indicate Clay or Silt.	967.45
190		 GRAE			Grey, Clay, some fine to coarse Sar plastic, and hard. Sand is matrix su	d, little Silt, moderately poported.	CL		Till	961.45
-		®GRAE			Grey, Clay, and fine to coarse Sand Silt, moderately plastic, and hard. S supported.	, little fine Gravel, little and is matrix	CL			959.45
195 —									End of boring - 195' bgl	956.45



BORING NO. PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 1 OF 2

Osceola Township, MI

TW-1

Joel Henry

7) 337-0417 LOCATION **Osceola** **

8 2 PROJECT NO. **4065-005**

COORDINATES **N 227,159.9 E 19,440,658.2** PROJECT NO. SURFACE ELEVATION **1099.13** DATUM **USGS** LOGGED BY

_	LING CO earns	NTRA	.CT	OR			LOCATION DESCRIPTION:				
10	LING ME 1/4" HS LING ST <i>I</i> /00	A					See attached Site Diagram for location.				
D[4]	OAND	ST	RA	TA KEY							
	SAND				SILT						
	CLAY GRAVEL				CLAYEY SILTY S						
						I					
S Depth feet	AMPLE Lab Sample	Samp	ple	Blow Counts	Rec-		DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
		${\sf T}$	\dashv		70		oam (TOPSOIL).	SM	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Stratigraphic	1099.13
_						Red, ME	EDIUM TO FINE SAND, little silt.	SM		information taken from MW-1d boring log.	1098.13
-							own, FINE TO MEDIUM SAND, little silt, moist.	SM		TW-1 drilled approx. 15' from MW-1d.	1096.13
5 -							own, FINE TO MEDIUM SAND, little silt, trace fine um gravel, poorly sorted, round and spherical, wet.	SM		Hand auger to 8' bgl to clear utilities.	1095.13 ¥
10-						gravel, l	own, FINE TO MEDIUM SAND, little fine to medium ittle silt,poorly sorted, round and spherical, loose, .5'- 2" clayey gravel and silt seam.	SP		0.25" clay seam at 9.6' bgl	1091.13
15—							brown, CLAY, trace silt and fine sand, medium y, firm to hard, dry to moist clay.	CL		Driller notes change at 12.5' bgl.	1086.53
20-							brown, MEDIUM SAND, some silt and clay, sand is nd spherical, very loose, moist to wet.	sc		Soft from 18-19.5' bgl per driller and blow counts. Fairly low K. Interbedded/gradation band per driller.	1082.13
25-						medium sandier	brown, FINE SAND, some silt,trace medium sand, density, round and spherical, moist with wet seams, 1/4" seam of clay at 22.75', gray 1" seam of b',1" seam of medium sand with little silt at 23.5'.	SM		per driller and blow counts. Fairly low K.	1076.63
30-							ght brown, MEDIUM TO COARSE SAND, few fine um gravel, subrounded and spherical, loose, wet.	SP		Driller notes change at 26' bgl. Sample looks like outwash or glaciofluvial deposits.	1073.13
35 -						gravel, s Buff, ME gravel, f to elong Buff, ME	EDIUM TO COARSE SAND, few fine to medium subrounded and spherical, loose, wet. EDIUM TO COARSE SAND, few fine to medium ew medium angular gravel, subrounded, spherical ate, loose, wet. EDIUM SAND, little coarse sand, few fine gravel,	SP SP		Granite fragments.	1066.13 1065.63 1062.13
-							round and spherical, gravel is subangular and e, loose, poorly sorted, wet.	SP			



COORDINATES N 227,159.9 E 19,440,658.2

SURFACE ELEVATION 1099.13 DATUM USGS

TW-1 BORING NO.

PROJECT

LOCATION

GSWA: Spring Hill Camp Phase III

SHEET 2 OF 2

Osceola Township, MI

4065-005 PROJECT NO. Joel Henry **LOGGED BY**

S	AMPLE	IN	FOF	RMATI	ON			·		on
Depth feet	Lab Sample	ı	mple ype	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-						Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is subangular and elongate, loose, poorly sorted, wet. <i>(continued)</i>	SP			
45 -						Buff, MEDIUM SAND, few fine sand, round and spherical, poorly sorted, loose, wet. Buff, MEDIUM TO COARSE SAND, little coarse sand, few fine gravel, subrounded and subspherical, poorly sorted,	SP SP		Outwash or glaciofluvial.	1055.63 1054.63
50-						loose, wet. Buff, COARSE SAND, little medium sand, few fine gravel, round and subspherical, poorly sorted, loose, wet.	SP		Outwash or glaciofluvial.	1051.13
55 -						Buff, MEDIUM TO COARSE SAND, little fine to medium sand, few coarse sand, trace fine gravel, round and spherical, poorly sorted, loose, wet.	SP		Bail approx. 3.25' heave from augers.	1046.13
60-						Buff, MEDIUM TO COARSE SAND, little coarse sand, few fine sand, trace fine gravel, round and spherical, poorly sorted, loose, wet.	SP			1041.13
65 —						Buff, MEDIUM SAND, little medium to coarse sand, few fine sand, trace coarse sand, round and very spherical, poorly sorted, loose, wet.	SP		Bail approx. 3' heave from augers.	1036.13
70 —						Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP		Bail approx. 2' heave from augers.	1031.13
75—						Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, trace fine gravel, round and very spherical, sorted, very loose, wet.	SP		Bail approx. 2.5' heave from augers.	1026.13
80-						Buff, FINE TO MEDIUM SAND, trace fine to medium sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP		Bail approx. 1.9' heave from augers.	1021.13
85-						Buff, FINE TO MEDIUM SAND, few fine sand, round and spherical, sorted, very loose, wet.	SP		End of boring - 85' bgl.	1016.13



BORING NO. **MW-1d** PROJECT **GSWA**:

GSWA: Spring Hill Camp Phase III

SHEET 1 OF 3

LOCATION Osceola Township, MI

COORDINATES N 227,166.0 E 19,440,642.4

PROJECT NO. 4065-005

SURFACE ELEVATION	√ 1099.43	DATUN	M USGS	LOGGED BY	nen E	vers	
DRILLING CONTRACT Stearns	OR		LOCATION DESCRIP	TION:			
DRILLING METHOD 4 1/4" HSA	EQUIPMENT CME 1050		See attached S	Site Diagram for location.			
DRILLING STARTED 6/26/00	ENDED 6/27/00						
STRA	TA KEY						
SAND	SILT						
CLAY	CLAYEY	'SAND					
GRAVEL	SILTY S	AND					
SAMPLE INFO	RMATION						

	GRAVEL			SILTY S	AND					
S Depth feet	Lab Sample	INFOI Sample Type		Rec-		DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
5—		Hand Augel			Red, Mi Light br Light br	coam (TOPSOIL). EDIUM TO FINE SAND, little silt. cown, FINE TO MEDIUM SAND, little silt, moist. cown, FINE TO MEDIUM SAND, little silt, trace fine cum gravel, poorly sorted, round and spherical, wet.	SM SM SM		Hand auger to 8' bgl to clear utilities.	1099.43 1098.43 1096.43 1095.43
10 - 		SSS	3-4 7-7	100	gravel,	own, FINE TO MEDIUM SAND, little fine to medium ittle silt,poorly sorted, round and spherical, loose, .5'- 2" clayey gravel and silt seam.	SP		0.25" clay seam at 9.6' bgl	1091.43
- 15 - -		SSS	3-6 10-11	95	plasticit	brown, CLAY, trace silt and fine sand, medium y, firm to hard, dry to moist clay.	CL		12.5' bgl.	1086.83
20 -		SSS	1-0 1-6	100		brown, MEDIUM SAND, some silt and clay, sand is nd spherical, very loose, moist to wet.	SC		Soft from 18-19.5' bgl per driller and blow counts. Fairly low K. Interbedded/gradation band per driller.	1082.43
25 -		sss	10-13 15-16	100	medium	brown, FINE SAND, some silt,trace medium sand, density, round and spherical, moist with wet seams, 1/4" seam of clay at 22.75', gray 1" seam of b',1" seam of medium sand with little silt at 23.5'.	SM		Soft from 18-19.5' bgl per driller and blow counts. Fairly low K.	1076.93
30-		SSS	1-1 8-6	100		ight brown, MEDIUM TO COARSE SAND, few fine um gravel, subrounded and spherical, loose, wet.	SP		Driller notes change at 26' bgl. Sample looks like outwash or glaciofluvial deposits.	1073.43
35-		SSS	3-0 3-5	75	gravel, s Buff, MI gravel, to elong Buff, MI	EDIUM TO COARSE SAND, few fine to medium subrounded and spherical, loose, wet. EDIUM TO COARSE SAND, few fine to medium few medium angular gravel, subrounded, spherical ate, loose, wet. EDIUM SAND, little coarse sand, few fine gravel,	SP SP		Granite fragments.	1066.43 1065.93 1062.43
_		sss	2-4 8-10	75		round and spherical, gravel is subangular and e, loose, poorly sorted, wet.	SP			



COORDINATES N 227,166.0 E 19,440,642.4

SURFACE ELEVATION 1099.43 DATUM USGS

MW-1d BORING NO.

PROJECT

LOCATION

GSWA: Spring Hill Camp Phase III

SHEET 2 OF 3

Osceola Township, MI

PROJECT NO. 4065-005

Ken Ewers LOGGED BY

	AMDLE	INITOI		ON					
Depth feet		Sample		Rec-	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-					Buff, MEDIUM SAND, little coarse sand, few fine gravel, sand is round and spherical, gravel is subangular and elongate, loose, poorly sorted, wet. (continued)	SP			
45 - -		SSS	1-4 5-8	88	Buff, MEDIUM SAND, few fine sand, round and spherical, poorly sorted, loose, wet. Buff, MEDIUM TO COARSE SAND, little coarse sand, few fine gravel, subrounded and subspherical, poorly sorted, loose, wet.	SP SP		Outwash or glaciofluvial.	1055.93 1054.93
50 -		SSS	5-6 6-3	60	Buff, COARSE SAND, little medium sand, few fine gravel, round and subspherical, poorly sorted, loose, wet.	SP		Outwash or glaciofluvial.	1051.43
- 55 - -		SSS	8-6 4-5	50	Buff, MEDIUM TO COARSE SAND, little fine to medium sand, few coarse sand, trace fine gravel, round and spherical, poorly sorted, loose, wet.	SP		Bail approx. 3.25' heave from augers.	1046.43
60-		SSS	4-5 9-8	80	Buff, MEDIUM TO COARSE SAND, little coarse sand, few fine sand, trace fine gravel, round and spherical, poorly sorted, loose, wet.	SP			1041.43
65 —		SSS	4-5 5-11	85	Buff, MEDIUM SAND, little medium to coarse sand, few fine sand, trace coarse sand, round and very spherical, poorly sorted, loose, wet.	SP		Bail approx. 3' heave from augers.	1036.43
70-		SSS	0-2 5-9	70	Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP		Bail approx. 2' heave from augers.	1031.43
75—		SSS	0-0 0-0	90	Buff, MEDIUM SAND, trace medium to coarse sand, trace fine sand, trace fine gravel, round and very spherical, sorted, very loose, wet.	SP		Bail approx. 2.5' heave from augers.	1026.43
80-		SSS	1-5 12-13	50	Buff, FINE TO MEDIUM SAND, trace fine to medium sand, trace fine sand, round and very spherical, sorted, loose, wet.	SP		Bail approx. 1.9' heave from augers.	1021.43
85 -		SSS	1-0 1-0	55	Buff, FINE TO MEDIUM SAND, few fine sand, round and spherical, sorted, very loose, wet.	SP		Bail approx. 2.5' heave from augers.	1016.43
90-		SSS	5-15 20-27	90	Buff, FINE SAND, round and spherical, well sorted, loose, medium density, wet. Gray, VERY FINE SANDY SILT, trace fine to medium gravel, poorly sorted, moist to wet.	SP SM		Possible till at 89' bgl. Bail approx. 1.0' heave from augers.	1011.43 1010.43
ш-		Н			 	<u> </u>	<u></u>		<u>+</u>



COORDINATES N 227,166.0 E 19,440,642.4

SURFACE ELEVATION 1099.43 DATUM USGS

MW-1d BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 3 OF 3

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

Ken Ewers LOGGED BY

SUR	FACE ELE	=V/	AHOr	V 108	99.43	DATUM USGS	LOGGED B1	TOIL E	1010		
s	SAMPLE INFORMATION								큡		tion
Depth feet			ample Type	Blow Counts	Rec- overy %	DESCRIPTI	ON	USCS	Strata	REMARKS	Elevation Feet
95 -		LLI	SSS	9-17 44-59	100	Gray, SILTY CLAY, trace fine sand gravel, low to medium plasticity, ha (continued)	rd, dry to moist.	CL		Varved 93-95' bgl.	1006.43
- - 100 - -		1111	SSS	5-12 11-12	25	Brown to gray, FINE TO MEDIUM Sclay, loose, round and spherical, we	SAND, trace silt and st.	SP		Driller notes change at 97' bgl.	1002.43
- 105 - - -		1111	SSS	3-4 10-11	90	Buff, MEDIUM TO COARSE SAND coarse sand, trace gray sand and c spherical, poorly sorted, loose, wet.	lay, round and	SP		Bail approx. 1.0' heave from augers.	996.33
- - 110- - -		1111	SSS	4-12 18-28	100	Buff, MEDIUM TO COARSE SAND fine gravel, subrounded and elonga sorted, loose, wet, 1" gray clay strir 110' bgl.	te to spherical, poorly	SP		Bail approx. 0.5' heave from augers.	991.43
- 115 <i>-</i>		777	SSS	6-5 29-52	95	Buff, MEDIUM TO COARSE SAND fine gravel, subrounded and subsph loose, wet. Gray, SILT, little medium sand, den	nerical, poorly sortyed,	SP —SM		End of boring - 115' bgl.	986.43 984.93
		Ш									



COORDINATES N 227,171.9 E 19,440,645.7

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111

Fax: (517) 337-0417

MW-1i BORING NO. PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 1 OF 1

Osceola Township, MI

PROJECT NO. 4065-005 **Ken Ewers** LOGGED BY

LOCATION

SURFACE ELEVATION	N 1100.16	DATUM	USGS	LOGGE	D BY	Ken Ewers
DRILLING CONTRACT Stearns	OR	L	OCATION DESC	RIPTION:		
DRILLING METHOD 4 1/4" HSA	EQUIPMENT CME 1050		See attac	hed Site Diagram for locati	ion.	
DRILLING STARTED 6/26/00	ENDED 6/27/00					
STRA	TA KEY					
SAND	SILT					
CLAY	CLAYEY S	SAND				
GRAVEL	SILTY SAI	ND				

	CLAY			CLAYEY						
2	GRAVEL			SILTY S	AND					
Depth feet		Sample Type	1	Rec-		DESCRIPTION	uscs	Strata	REMARKS	Elevation Feet
5-	-			76	Red,me Light bro Light bro	oam (TOPSOIL). dium to fine SAND,little silt. own,fine to medium SAND,little silt,moist. own,fine to medium SAND,little silt,trace fine to gravel,poorly sorted,round and spherical,wet.	SM SM SM	¥) ¥)	Stratigraphic information taken from MW-1d boring log. MW-1i drilled approx. 10' from MW-1d.	1100.16 1099.16 1097.16 1096.16
10-					gravel,li	own,fine to medium SAND,little fine to medium ttle silt,poorly sorted,round and al,loose,wet,at 9.5'- 2" clayey gravel and silt seam.	SP		0.25" clay seam at 9.6' bgl	1092.16
15-	- - - -				Gray to plasticity	brown,CLAY,trace silt and fine sand,medium y,firm to hard,dry to moist clay.	CL		Driller notes change at 12.5' bgl.	1087.56
20-	- - - - - -					brown,medium SAND,some silt and clay,sand is nd spherical,very loose,moist to wet.	sc		Soft from 18-19.5' bgl per driller and blow counts. Fairly low K. Interbedded/gradation band per driller.	1083.16
25-	- - -				sand,me sandier	brown,fine SAND,some silt,trace medium edium density,round and spherical,moist with wet seams,1/4" seam of clay at 22.75',gray 1" seam of t',1" seam of medium sand with little silt at 23.5'.	SM		per driller and blow counts. Fairly low K.	1077.66
20]					ght brown,medium to coarse SAND,few fine to gravel,subrounded and spherical,loose,wet.	SP		Driller notes change at 26' bgl. Sample looks like outwash or glaciofluvial deposits.	1074.16
30-	_									
35-	_				gravel,s Buff,me gravel,fe elongate	dium to coarse SAND, few fine to medium ubrounded and spherical, loose, wet. dium to coarse SAND, few fine to medium ew medium angular gravel, subrounded, spherical to e, loose, wet.	SP SP		Granite fragments.	1067.16 1066.66
					Buff,me is round	dium SAND, little coarse sand, few fine gravel, sand and spherical, gravel is subangular and e, loose, poorly sorted, wet.	SP		End of boring - 39' bgl.	1063.16



SURFACE ELEVATION 1098.93

COORDINATES N 227,160.9 E 19,440,643.2

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111

Fax: (517) 337-0417

DATUM USGS

MW-1s BORING NO.

PROJECT

LOGGED BY

SHEET 1 OF 1 **GSWA: Spring Hill Camp Phase III**

LOCATION

Osceola Township, MI

4065-005 PROJECT NO. M.B. & J.H.

	LING CO	NTRACT	OR			LOCATION DESCRIPTION:				
Ha ı DRIL	LING ME nd Augo LING STA 9/00	∍r	EQUIF Aug ENDEI 6/29	er D		See attached Site Diagram for location.				
	SAND CLAY GRAVEL	STRA		Y SILT CLAYEY SILTY S						
S	AMPLE	INFOR	RMATI	ON						L
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %		DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
- - 5 - -					Red, ME Light bro Light bro to medio	pam (TOPSOIL). EDIUM TO FINE SAND, little silt. Down, FINE TO MEDIUM SAND, little silt, moist. Down, FINE TO MEDIUM SAND, little silt, trace fine Jum gravel, poorly sorted, round and spherical, wet.	SM SM SM		Stratigraphic information taken from MW-1d boring log. MW-1s drilled approx. 10' from MW-1s. Hand auger to 8' bgl to clear utilities.	1098.93 1097.93 1095.93 1094.93
					Light brogravel, I	own, FINE TO MEDIUM SAND, little fine to medium ittle silt, poorly sorted, round and spherical, loose.	SP		End of boring - 8.4' bgl.	1090.93



COORDINATES N 227,038.7 E 19,440,679.4

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111

Fax: (517) 337-0417

MW-3 BORING NO.

GSWA: Spring Hill Camp Phase III

SHEET 1 OF 3

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

PROJECT

SURFACE ELEVATION	N 1108.77	DATUM	USGS	LOGGED BY	Ken Ewers	
DRILLING CONTRACT Stearns	TOR	L	OCATION DESC	CRIPTION:		
DRILLING METHOD 4 1/4" HSA	EQUIPMENT CME 1050		See atta	ched Site Diagram for location.		
DRILLING STARTED 6/28/00	ENDED 6/28/00					
STRA	TA KEY					
SAND	SILT					
CLAY	CLAYEY	SAND				
° GRAVEI	∭ SILTY SA	ND I				

٥,-	GRAVEL			SILTY S	AND					
\vdash	AMPLE			ON Rec-		DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sampl Type		ovorv					KLIVIAKKO	
-					- TOPSO Medium	IL. reddish brown, SANDY CLAY,slightly moist.	CL	<u> </u>		– <u>1108.77</u> 1108.27
5-		AUG	e e		Light bro	own FINE TO COARSE SAND.	SP			1105.77
-					Dog Control	ah alla di ancara (fina la cara CAND citta la cara	SP SP			4400 77
10-		SSS	5-5 4-4	100		brbedded lenses of fine to coarse SAND, with lenses andy clay and clayey sand.	SP			1100.77
-		SSS	2-3	400	Medium	buff,clayey SAND/sandy CLAY,soft,damp,could roll				1095.77
15-		558	6-7	100	to about	5",trace fine rounded gravel,	sc			$oldsymbol{ abla}$
-		SSS	5-6	100	Medium	buff,clayey SAND,hard,damp to moist,(till?).				1090.77
20							sc			
25 -		SSS	2-3 4-4	80	Medium medium	buff,clayey SAND,hard,damp to moist,stringers of to coarse saturated sand				1085.77
-							SC			
30-		SSS	3-3	100	Medium gravel, (gray,clayey SAND,hard,damp,trace fine rounded till?).	SC			1080.77
-			F 7		Medium	gray,clayey SAND,hard,damp,trace fine rounded				1075.77
35-		SSS	5-7 7-8	100	gravel,(t	g.s., 15.3, 5, 5, 11.5, 11.11.15, 11.11.15, 11.11.15 iii. 15.11.15 ii. 15.11.15 iii. 1	SC			
-			5-9	100	Medium	gray,clayey SAND,hard,damp,trace fine rounded	80			1070.77
		∑ SSS	10-12	100	gravel,(t	ili?).	SC			



COORDINATES N 227,038.7 E 19,440,679.4

SURFACE ELEVATION 1108.77 DATUM USGS

MW-3 BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 2 OF 3

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

Ken Ewers LOGGED BY

-									T	
s	SAMPLE INFORMATION							_		۾
Depth feet	Lab Sample		ample ype	Blow Counts	Rec- overy %	DESCRIPTION	uscs	Strata	REMARKS	Elevation Feet
-						Buff,clayey fine to medium SAND,soft,trace gravel.			Rock wedged in tip of 43-45' sample.	1068.77
45 - -			SSS	6-4 4-4	10		SC			
50 -		1111	SSS	1-2 2-2	100	Buff,clayey fine to medium SAND,soft,few rounded gravel,saturated.	SC		48-50' sample is much softer than 43-45' sample.	1060.77
55 -		τιι	SSS	1-2 1-6	100	Buff,clayey fine to medium SAND,soft,few rounded gravel,saturated.	SC			1055.77
60-		Γίζι	SSS	1-1 1-1	20	Buff,medium SAND,loose,trace fine and coarse sand,trace fine rounded gravel,rounded to subrounded,saturated .	SP			1050.77
65 -		τιία	SSS	1-1 3-2	100	Buff,medium SAND,loose,trace fine and coarse sand,trace clay,rounded to subrounded,saturated.	SP			1045.77
70 -		τιία	SSS	1-1 2-2	100	Buff,fine to medium SAND,trace coarse sand and fine gravel,loose,rounded to subrounded,saturated.	SP			1040.77
- - 75 - -		1111	SSS	1-4 2-7	40	Buff,medium SAND,trace fine and coarse sand,loose,rounded to subrounded,saturated.	SP			1035.77
- 80 - -		1111	SSS	3-3 4-5	90	Buff,fine to medium SAND,loose,saturated,trace coarse sand and silt,trace fine gravel.	SP			1030.77
- 85 - -		ιτι	SSS	1-2 2-3	100	Buff,medium SAND,loose,rounded to subrounded,saturated,with lenses of fine and coarse sand. Coarse to very coarse SAND,fine to medium gravel,little medium sand.	SP SP			1025.77 1024.27
90-		τιτη	SSS	2-2 2-3	100	Buff,fine to medium SAND,loose,rounded to subrounded,saturated,trace coarse sand.	SP			1020.77
		Ц								



SURFACE ELEVATION 1108.77

COORDINATES N 227,038.7 E 19,440,679.4

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417

DATUM USGS

PROJECT LOCATION

BORING NO.

GSWA: Spring Hill Camp Phase III

SHEET 3 OF 3

Osceola Township, MI

PROJECT NO. 4065-005 **Ken Ewers LOGGED BY**

MW-3

S	AMPLE	INFO	RMATI	ON					uc
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
95 -		sss	6-7 7-9	100	Buff,fine to medium SAND,loose,rounded to subrounded,saturated,trace coarse sand. (continued)	SP			
- - 100 -		SSS	7-9	100	Mix of coarse SAND and fine GRAVEL seams in fine to medium sand, very saturated, trace clay. Gray, fine SAND, hard, few clay and silt (till?). Gray, fine to medium SAND, medium hardness, silt, clay till.	SP SP SP		End of boring - 102'	1010.77 1009.77 1008.77
_			10 10						



SURFACE ELEVATION 1149.05

COORDINATES N 227,422.3 E 19,440,738.9

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417

DATUM USGS

BORING NO.

MW-7

SHEET 1 OF 3

PROJECT LOCATION **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI

PROJECT NO. 4065-005 Jeff Groncki **LOGGED BY**

	LING CON	ΝTΙ	RACT	OR			LOCATION DESCRIPTION:				
4 1 / DRIL	LING META /4" HSA LING STA 8/00				1 050		See attached Site Diagram for location.				
	SAND CLAY GRAVEL	(STRA		, SILT CLAYEY SILTY S						
	AMPLE	IN	NFOF	RMATI	ON						
Depth feet			ample ype	Blow Counts	Rec- overy %		DESCRIPTION	uscs	Strata	REMARKS	Elevation Feet
5-		111	SSS	2-3 4-4	75	Brown.	stiff CLAY, dry-moist.				1144.05
-		Ţ				2.6,		CL			
10-		111	SSS	4-7 9-10	40	Light bromedium	own FINE TO VERY FINE SAND, with trace a to coarse sand, dry.	SP			1139.05
- 15 - -		1111	SSS	4-6 10-10	75	Light bro	own, medium SAND, large to medium gravel, sand, dry.	SP			1135.05
20-		1111	SSS	2-4 8-9	80	Brown,	stiff to very stiff CLAY, dry.	CL			1129.05
25 - -		1111	SSS	5-7 12-13	60	Light bro gravel, l	own, medium to fine SAND, some medium to fine little coarse gravel.	SP	<u></u>		1124.85
30-		1111	SSS	6-10 14-21	60	gravel, l	own, medium to fine SAND, some medium to fine little coarse gravel, two 1/4" clay lenses, one at 29 one at 31.5 ft. bgl.	SP			1120.05
35 - -		1111	SSS	24-28 18-32	5	Light brogravel.	own, medium SAND, some coarse sand, fine	SP		Driller comment: Pushed stone 34-36 ft. bgl.	1115.05
_				7-12				SM			1110.05



COORDINATES N 227,422.3 E 19,440,738.9

SURFACE ELEVATION 1149.05 DATUM USGS

MW-7 BORING NO.

SHEET 2 OF 3

GSWA: Spring Hill Camp Phase III PROJECT Osceola Township, MI LOCATION

PROJECT NO. 4065-005

Jeff Groncki **LOGGED BY**

S	AMPLE	۱N	NFOF	RMATI	ON			n		ion
Depth feet	Lab Sample		ample Type	Blow Counts	Rec- overy %	DESCRIPTION	uscs	Strata	REMARKS	Elevation Feet
-		ζq	SSS	28-26	90	Brown clay 2", Light brown, fine silty sand 2", Light brown very FINE SAND, very dry. (continued)	SM			
45		1111	SSS	7-12 17-45	90	Brown clay 2", Light brown, fine silty sand 2", Light brown very FINE SAND, very dry.	SM			1105.05
50		1111	SSS	10-11 14-16	90	Light brown VERY FINE SILTY SAND, 6" very stiff brown CLAY, brown VERY FINE CLAYEY SAND, with many thin (1/8-1/4") clay lenses.	sc		Driller comment: Hard drilling 52-53 ft. bgl.	1100.05 ¥
1 †		H		7-14		Brown FINE CLAYEY SAND, wet.	sc			1095.05
55		N	SSS	15-18	90	Brown CLAY, wet, trace fine sand.	CL		Wet at 59' bgl.	1094.05
- - -						Light brown FINE SAND, brown wet clay with little fine to very fine sand.	SP		vvet at 59 bgi.	1093.55
60-		777	SSS	1-2 4-7	60	Light brown MEDIUM SAND, with some coarse and fine sand and little fine gravel. 1/2" of brown clay at approx. 61 ft. bgl.	SP		Cond bailed augus	1090.05 1088.05
			SSS	3-4 7-9	100	FINE GRAVEL, with some medium gravel and coarse sand.	GP		Sand bailed auger.	
65 - - -		LLIL	SSS	5-5 9-13	70	Light brown MEDIUM TO FINE SAND, with some coarse sand, trace fine gravel. 2" brown clay approx. 65.6 ft. bgl., light brown medium to coarse sand approx. 66 ft. bgl.	SP		Sand bailed auger.	1085.05
70 - - - -		τιι	SSS	4-9 15-18	90	Light brown MEDIUM SAND, with some coarse and fine sand, little fine gravel, becomes clayey approx. 71' bgl.	SP		Sand bailed auger.	1080.05
75 - - - -		1111	SSS	11-13 16-18	90	Light brown MEDIUM TO COARSE SAND, with some fine gravel and little to trace fine sand and medium gravel. 6" gravel seam approx. 75 ft. bgl.	SP		Sand bailed auger.	1075.05
80-		lll	SSS	8-21 18-23	90	Brown CLAYEY SAND, with coarse gravel.	SC		Driller comment: Easier drilling 83-84' bgl.	1069.05
85 -		1111	SSS	4-7 14-20	80	Light brown MEDIUM SAND, with little to some coarse sand. 3/4" brown clay with some fine sand approx 86 ft. bgl.	SP			1065.05 1063.55
						Light brown MEDIUM TO COARSE SAND, trace fine to medium gravel. Light brown MEDIUM SAND, little to some coarse sand.	SP		Sand bailed auger.	1060.05
90 -		717	SSS	6-11 13-15	80	Light brown MEDIOM SAND, little to some coarse sand. Light brown COARSE SAND, with some fine gravel and trace medium gravel and medium sand.	SP SP		Janu balleu auger.	1058.55



COORDINATES N 227,422.3 E 19,440,738.9

SURFACE ELEVATION 1149.05 DATUM USGS

MW-7 BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 3 OF 3

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

Jeff Groncki LOGGED BY

SUR	FACE ELE	-VAII	ON	114	9.05	DATUM USGS LOGGED BY	JEII	Gi	OHCKI		
S Depth	AMPLE Lab	INF(\neg	MATIO Blow	Rec-	DESCRIPTION	US	cs	Strata	REMARKS	Elevation Feet
feet	Sample	Тур	e C	ounts	overy %				A0A00A0A0		Ξ
95 - -		SS	s 1	2-16 27-0	50	Light brown MEDIUM TO COARSE SAND, with 2" fine to medium gravel. Brown CLAY, alternating with gravel.	SI			Sand bailed auger.	1055.05 1053.55
- 100 <i>-</i> -		ss	s ;	5-11 32-0		Light brown MEDIUIM SAND, with some fine to coarse sand, trace fine gravel.	SI	— - P	 	End of boring - 101' bgl.	1050.05



MW-12d BORING NO. **PROJECT**

GSWA: Spring Hill Camp Phase III

SHEET 1 OF 3

Osceola Township, MI

PROJECT NO. 4065-005

LOCATION

COORDINATES N 229,063.8 E 19,44	41,312.0	PROJECT NO.	4065-0	05		
SURFACE ELEVATION 1162.56 DA	DATUM USGS	LOGGED BY	J.Henr	y/G.Fc	x	
DRILLING CONTRACTOR Stearns	LOCATION DESCRIPTION:					
DRILLING METHOD EQUIPMENT 4 1/4" HSA CME 1050 DRILLING STARTED ENDED 7/24/00 7/25/00	See attached Site Diagram	for location.				
STRATA KEY SAND SILT CLAY CLAYEY SAN GRAVEL SILTY SAND						
SAMPLE INFORMATION Depth Lab Sample Blow covery Counts %	DESCRIPTION		USCS	Strata	REMARKS	Elevation
						1158 56

-								
5 -	SSS	3-3 5-6	50	Moderate reddish-brown, cohesive CLAYEY FINE TO COARSE SAND, clast supported, dry to moist.	SC		1158.56	
10-	SSS	7-1 3-5	70	Moist to wet, soft CLAYEY FINE TO COARSE SAND, cohesive, trace fine gravel.	SC		1153.56	
15 -	SSS	3-2 1(12")	100	Moist to wet, semi-cohesive, light yellow brown MEDIUM SAND, trace coarse sand, trace gravel, trace clay. Saturated, very loose, light yellow brown FINE TO MEDIUM SAND, trace silt, trace clay.	SP		1148.56 1147.56	
20-	SSS	1-0 0-6	100	Saturated, very loose, MEDIUM TO COARSE SAND, light yellow brown, trace coarse gravel, trace silt. Moist, stiff to hard moderate yellow brown CLAY, with trace medium sand, very cohesive.	SP CL		1143.56 1142.56	
25 - - -	SSS	5-8 16-27	75	Dry, light buff MEDIUM SAND, trace fine sand, trace coarse sand, trace gravel, rounded to subrounded.	SP		 1138.56	
30-	SSS	8-15 33-28	75	Dry, light buff MEDIUM SAND, dense, well packed, light/dark banding at 30.5 ft. bgl (light buff to medium buff, 1/4" bands).	SP	ententer	1133.56	
35 - - - -	SSS	8-8 16-25	75	Dry, light buff, MEDIUM SAND, medium dense, subrounded.	SP		1128.56	

Dry, light buff, MEDIUIM SAND, loose.

SP

1123.56



COORDINATES N 229,063.8 E 19,441,312.0

SURFACE ELEVATION 1162.56 DATUM USGS

MW-12d BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 2 OF 3

Osceola Township, MI LOCATION

4065-005 PROJECT NO.

J.Henry/G.Fox **LOGGED BY**

S	AMPLE	INFO	RMATI	ON			a		uo
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	uscs	Strata	REMARKS	Elevation Feet
-		7 SSS	24-29	75	Dry, light buff, FINE SAND, loose. (continued)				1123.06
-						SP			
- 45 -		sss	5-8 14-19	75	Saturated light yellow brown MEDIUM SAND, trace coarse sand, trace silt and clay.	SP			1118.56
-					Dry to moist, stiff, moderate yellow brown SILTY CLAY.	CL			<u>‡</u> 117.06
50 - 50 -		SSS	5-8 9-9	75	Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel, trace clay, rounded to subrounded.	SP			1113.56
55 -		SSS	3-6 9-13	60	Saturated, loose, light yellow brown MEDIUM SAND, trace coarse sand, trace fine sand.	SP			1108.56
60-		SSS	5-5 16-23	60	Saturated, loose, light yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace fine gravel, rounded to subrounded, subangular gravel.	SP			1103.56
65 -		SSS	6-18 50(4")	100	Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel. Saturated, loose, light yellow brown FINE TO VERY FINE SAND, some silt.	SP	****		1098.56 1097.56
-					SAIND, SUITIE SIII.	SM		<u></u>	
70 - -		SSS	10-14 30-34	100	Saturated, loose, light yellow brown, interbedded layers of MEDIUM TO COARSE SAND, and FINE SAND.	SP			1093.56
75		SSS	23-50	100	Saturated loose, light yellow brown MEDIUM TO COARSE	SP			1088.56
75 - - -			(6")	100	SAND (probably fallback). Wet, stiff and very hard, light yellow brown CLAYEY MEDIUM SAND.	SP-SC			1087.56
- 80 - -		SSS	6-26 50 (5"0	50	Wet, stiff, dense, MEDIUM SAND, with few clay, cohesive.	SP			1083.56
-			28-50		Saturated light yellow brown MEDIUM SAND.	SP			1078.56
85 -		SSS	(6")	60	Saturated, rounded to subrounded, FINE GRAVEL, trace medium sand.	GP	rain drain drain		1077.56
90-		SSS		100	Light yellow brown MEDIUM SAND, saturated, loose, medium dense. Three inches coarse sand and fine to medium rounded gravel lens at 90 ft. bgl. Interbedded light yellow brown, saturated, FINE TO MEDIUM SAND, with moderate yellow brown dry to moist	SP SP		Did not get blow counts, rig line blew. Very hard drilling 90-93' bgl.	1073.56 1072.56



COORDINATES N 229,063.8 E 19,441,312.0

SURFACE ELEVATION 1162.56 DATUM USGS

MW-12d BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 3 OF 3

Osceola Township, MI LOCATION

4065-005 PROJECT NO.

J.Henry/G.Fox LOGGED BY

00.1	FACE ELL	_ v /	11101	, ,,,	02.50	DATUM USGS EGGED BT	•	J		
S	SAMPLE INFORMATION		ON					no		
Depth feet	1		mple ype	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation
95 - -			SSS	8-12 18-18	80	silt. Lenses approx. 3-5" each. Interbedded light yellow brown, saturated FINE SAND, and light yellow brown dry silt. Light yellow brown FINE TO MEDIUM SAND, few silt, wet, soft.	SP SP			1068.56 1068.06
- 100 - - -		7777	SSS	13-17 28-32	100	Light yellow brown FINE TO MEDIUM SAND, trace coarse sand, few silt, saturated, dense, semi-cohesive.	SP			1063.56
- 105 - -		777	SSS	24-50 (6")	50	Moderate gray brown, moist SILTY CLAY, not varved. Light yellow brown moist SILT.	CL-ML	<u> </u>		
- 110 - -		וווע	SSS	2-6 16-17	50	Light yellow brown FINE TO COARSE SAND, one lens varved gray/brown, moist silt at 109.8 ft. bgl.	SP			1053.56
115			\$\$\$	14-32 50 (5")	75	Light yellow brown FINE TO MEDIUM SAND, saturated, increasing silt content and density from 115 to 115.5 ft. bgl.	SP	Tade and A	End of boring - 115.5' bgl.	1048.56



COORDINATES N 229,055.9 E 19,441,312.1

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417

MW-12i BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 1 OF 2

Osceola Township, MI LOCATION

PROJECT NO. 4065-005 LOGGED BY **Grea Fox**

SURFACE ELEVATION	N 1161.92	DATUM	USGS		LOGGED BY	Greg Fox
DRILLING CONTRACT Stearns	FOR	L	OCATION DES	SCRIPTION:		
DRILLING METHOD 4 1/4" HSA	EQUIPMENT CME 1050		See at	tached Site Diagrai	n for location.	
DRILLING STARTED 7/27/00	ENDED 7/27/00					
STRA	TA KEY					
SAND	SILT					
CLAY	CLAYEY S	SAND				

0	GRAVEL			SILTY S	AND					
S Depth feet	AMPLE Lab Sample		RMATI Blow Counts	Rec- overy		DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-		.,,,,,		%		te reddish-brown, cohesive CLAYEY FINE TO			Stratigraphic	1157.92
5					Moist to	SE SAND, clast supported, dry to moist. In wet, soft CLAYEY FINE TO COARSE SAND, e, trace fine gravel.	SC		information taken from MW-12d boring log. MW-12i drilled approx. 10' from MW-12d.	1152.92
-						wet, semi-cohesive, light yellow brown MEDIUM	SC SP	evener		1147.92
15 - - -					Saturate SAND, t	trace coarse sand, trace gravel, trace clay. ed, very loose, light yellow brown FINE TO MEDIUM trace silt, trace clay. ed, very loose, MEDIUM TO COARSE SAND, light	SP	ু শাক্তি ক ুকোন্ড		1146.92 1142.92
20-					Vellow b Moist, s medium	prown, trace coarse gravel, trace silt. tiff to hard moderate yellow brown CLAY, with trace a sand, very cohesive.	SP CL			1141.92
25 - - -					Dry, light coarse s	nt buff MEDIUM SAND, trace fine sand, trace sand, trace sand, trace gravel, rounded to subrounded.	SP			1137.92
30-					Dry, ligh light/dar 1/4" bar	nt buff MEDIUM SAND, dense, well packed, rk banding at 30.5 ft. bgl (light buff to medium buff, ands).	SP	iato sato sato		1132.92
35 -					Dry, ligh subroun	nt buff, MEDIUM SAND, medium dense, nded.	SP			1127.92
					Dry, ligh	nt buff, MEDIUIM SAND, loose.	SP	·		1122.92



PROJECT LOCATION

BORING NO.

GSWA: Spring Hill Camp Phase III

SHEET 2 OF 2

Osceola Township, MI

MW-12i

COORDINATES N 229	9,055.9 E 1	9,441,312	2.1	PROJECT NO.	4065-005
SURFACE ELEVATION	1161.92	DATUM	USGS	LOGGED BY	Greg Fox

	THOL LL			01102	B/(Tolki CCC				
SAMPLE INFORMATION		ON			_		L C		
Depth feet		Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
_					Dry, light buff, FINE SAND, loose. (continued)				1122.42
-						SP			
- - 45-					Saturated light yellow brown MEDIUM SAND, trace coarse sand, trace silt and clay.	SP			1117.92
- -					sand, trace silt and clay. Dry to moist, stiff, moderate yellow brown SILTY CLAY.	CL			1116.42
50 50					Saturated, loose, light yellow brown MEDIUM TO COARSE SAND, trace gravel, trace clay, rounded to subrounded.	SP			1112.92
55 -					Saturated, loose, light yellow brown MEDIUM SAND, trace coarse sand, trace fine sand.	SP			1107.92
60-					Saturated, loose, light yellow brown FINE TO MEDIUM SAND, trace coarse sand, trace fine gravel, rounded to subrounded, subangular gravel.	SP		End of boring - 62'	1102.92



MW-101D BORING NO. PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 1 OF 4

Osceola Township, MI LOCATION

4065-005

PROJECT NO.

COORDINATES N 228,682.3 E 19,440,042.4 **Phil Odenkirk** LOGGED BY DATUM USGS

SURF	SURFACE ELEVATION 1155.82				DATUN	M USGS	LOGGED BY	Phil Oc	denkirl	K	
Ste	LING COI arns LING ME ⁻			PMENT		LOCATION DESCRIPT	ION:				
4 1/	ING ME / 4" HSA LING STA			1050		See attached S	ite Diagram for location.				
11/	1/00		11/2	/00							
	SAND	STRA	TA KEY	/ SILT							
	CLAY			CLAYEY	SAND						
0 (GRAVEL			SILTY S	AND						
S	AMPLE	INFOF	RMATI	ON					æ		uo
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %		DESCRIF	PTION	USCS	Strata	REMARKS	Elevation Feet
- - -		C SSS	1-1 2-2	100	poorly g rounded shows s	raded, somewhat stratifi I, highly spherical, and 8	t, trace Clay, very loose, ed, MOIST. Sand is well 0-90% quartz. Spoon lts in top 3" and an organic	SP		MW-101D sample and lithology information is based on MW-101L boring log.	1155.82
5 - - -		SSS	4-5 7-7	75	Dark bro medium	own, fine SAND, some C	lay, trace medium Sand, nassive , MOIST. Sand is nd 60-80% quartz.	sc			1152.32
10-		SSS	7-8 9-10	75	Gravel, ı Sands a		ace Silt, trace medium raded, massive, MOIST. ed with medium sphericity	SP	= : 		1147.82
- 15 - -		SSS	25-13 10-10	50	Silt, trac massive and 80-9	e medium Gravel, mediu		SP) O O O		1142.82
20-		SSS	14-15 17-25	75	clasts, tr	own fine to medium SAN race Silt, trace medium (raded, massive, MOIST. oherical, and 80-90% qu	Sand is well rounded,	SP	0 2 0		1136.82
25 -		SSS	7-11 15-24	75	throughous diameter Brown S very stiff	out the sample interval a r. BILT , little to some fine S		ML			1133.82
30-		SSS	11-17 18-18	75	dense, p well rour		ratified, MOIST. Sand is ical, and 80-100% quartz.	SP			11 <u>27.</u> 82
35 -		SSS	6-8 11-15	62	medium well rour		lay clasts, trace Silt, nassive, MOIST. Sand is cal, and 80-90% quartz.	SP	, O		1121.82
-			8-11					SP	,		1117.82



COORDINATES N 228,682.3 E 19,440,042.4

SURFACE ELEVATION 1155.82 DATUM USGS

MW-101D BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 2 OF 4

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

3011	FACE ELL	VATIO	V 115	00.82	DATUM USGS LOGGED		<u> </u>		
S	AMPLE	INFOF	RMATI				ta ta		tion et
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USC	Strata	REMARKS	Elevation Feet
-		SSS	14-16	62	Light brown, fine SAND, trace Silt, medium dense, pograded, massive, MOIST. Sand is well rounded with sphericity and 80-100% quartz. (continued)		•		V7
45 - - - -		SSS	11-10 12-13	62	Light brown, fine to medium SAND, trace Silt, trace C clasts, medium dense, poorly graded, massive, WET Sand is well rounded with high sphericity and 80-100 quartz. Clay clasts are ~1/8" diameter.	·		Water encountered at 44' BLS	¥ 1111.82
50 - -		SSS	12-7 7-9	62	Light brown, fine SAND, trace Clay, trace Silt, mediu dense, poorly graded, massive, WET. Sand is well rounded, highly spherical, and 80-100% quartz. Clay occurs as 1.5" seam at 51' bgl.)		1106.82
55 - - -		SSS	7-8 12-13	75	Light brown, fine SAND, trace Clay, trace Silt, mediu dense, poorly graded, massive, WET. Sand is well rounded, highly spherical, and 80-90% quartz.	m SF)		1101.82
60-		SSS	2-7 9-12	75	Light brown, fine SAND, trace Silt, loose, poorly grad massive, WET. Sand is well rounded, highly spheric 80-90% quartz.)		1096.82
65 - -		SSS	3-3 7-10	62	Light brown, fine to medium SAND, trace Clay, trace loose, poorly graded, massive, WET. Sand is well rounded, highly spherical, and 80-100% quartz.	Silt,)		1091.82
70 -		SSS	4-7 9-11	75	Light brown, fine to coarse SAND, little Gravel, trace trace Silt, medium dense, poorly graded, statified, W Fine to medium sand is well rounded, highly spherica 80-100% quartz. Coarse sand and gravels are angu sub-rounded with low sphericity and 60-80% quartz. thick gravel seam at 71' bgl.	ET. al, and SF llar to			1086.82 1082.82
- 75 - -		SSS	5-15 17-20	100	Gray-brown, fine to medium SAND, little Silt, trace C dense, poorly graded, stratified, WET. Sand is well rounded, highly spherical, and 80-90% quartz. 1" thi sandier layers occur through out spoon.	er.			1002.02
80-		SSS	2-4 8-10	25	Light brown, fine to medium SAND, little Silt, trace C medium dense, poorly graded, slightly stratified, WE Sand is well rounded, moderately spherical, and 70-squartz.	T			1077.82
85 - -		SSS	4-12 16-24	25	Brown, fine to medium SAND, trace coarse Sand, trac Clay, dense, poorly graded, stratified, WET. Fine to medium sand is well rounded with medium to high sphericity and 80-90% quartz. Coarse sand is round with medium to low sphericity. Clayey layers occur throughout the spoon comprising up to ~40 % of one	led SP-9	SC		1071.82
90-		SSS	4-11 18-18	75	¬ thick seam. Brown, fine to medium SAND, few coarse Sand, trac dense, poorly graded, massive, WET. Fine to mediu sand is well rounded with high sphericity and 80-90% quartz. Coarse sand is sub-rounded with low spheric	ım %			1066.82



COORDINATES N 228,682.3 E 19,440,042.4

DATUM USGS SURFACE ELEVATION 1155.82

MW-101D BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 3 OF 4

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

S	AMPLE	INFOF	RMATI	ON					uc
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	uscs	Strata	REMARKS	Elevation Feet
95 — - -		SSS	12-20 13-15	62	and 60-70% quartz. Brown, fine to medium SAND, trace coarse Sand, trace Silt, dense, poorly graded, stratified, WET. Fine to medium sand is well rounded with high sphericity and 80-90% quartz. Coarse sand is sub-rounded with low sphericity and 60-70% quartz. 3" thick clayey layer occurs at 95.3'.	SP-SC			1061.82
100 - - -		SSS	15-17 37-42	75	Brown, fine to medium SAND, trace coarse Sand, trace Silt, very dense, poorly graded, massive WET. Fine to medium sand is well rounded, highly spherical, and 80-90% quartz. Coarse sand is angular with low sphericity and 70-80% quartz.	SP			1056.82
105 - - -		SSS	22-26 35-50/3'	100	Brown, fine to medium SAND, trace coarse Sand, trace Silt, very dense, poorly graded, massive, WET. Fine to medium sand is well rounded with high sphericity and 80-90% quartz. Coarse sand is angular with low sphericity and 70-80% quartz. Gray brown, fine to medium SAND, with some Clay, trace	SP SC			1051.82 1050.82
110 - - - -		SSS	14-16 23-27	62	fine Gravel, very dense, poorly graded, massive, WET. Sand is well rounded, highly spherical, and 80-90% quartz. Gravel is sub-rounded and moderately spherical. Brown, fine to medium SAND, little Clay, trace Silt, very dense, poorly graded, stratified, WET. Sand is well rounded, moderately spherical, and 80-90% quartz. 3" thick clay seam at 109.7".	SC			1046.82
115		SSS	15-13 23-35	100	Brown, fine to medium SAND, little to some Clay, trace fine to coarse Gravel, very dense, poorly graded, stratified, WET. Sand is well rounded, moderately spherical, and 80-90% quartz. 3" clay seam at 115'. Gravel is well rounded, moderately spherical, and 50-60% quartz.	sc			1041.82
120 - - -		SSS	15-23 42-50	100	Gray to brown, CLAY, little fine to medium Sand, trace fine to medium Gravel, hard, low plasticity, massive, WET. Sand is well rounded, moderately spherical, and 80-90% quartz. Gravel is well rounded with high sphericity.	CL			1035.82 1032.82
- 125 - -		SSS	9-27 33-40	62	Brown, fine to medium SAND, some Silt, trace coarse Sand, trace fine Gravel, trace Clay, dense, poorly graded, stratified, WET to MOIST. Sand is interbedded with 2-3" thick siltier layers.	SM			1032.02
130 - - - -		SSS	5-19 44	67	Brown, fine to medium SAND, trace coarse Sand, trace Clay clasts, trace Silt, very dense, poorly to moderately graded, massive, WET. Fine to medium sand is well rounded, highly spherical, and 80-90% quartz. Coarse sand is sub-angular with low sphericity and 60-70% quartz. Clay clasts are ~1" in diameter.	SP			1027.82
- 135 - - - -		SSS	8-33 50/3"	100	Light brown, fine to medium SAND, trace Clayey Silt clasts, very dense, poorly graded, massive, WET. Sand is well rounded with high sphericity, 80-90% quartz. Silt clasts are ~1" in diameter.	SP			1021.82
- 140 - - -		SSS	4-17 28-47	83	Light brown, fine to medium SAND, trace Silt, dense, poorly graded, massive, WET. Sand is well rounded with high sphericity and 80-90% quartz.	SP			1016.82
- 145 <i>-</i> - -		SSS	2-20 48-50/5'		Light brown fine to medium SAND, trace Silt, dense, poorly graded, massive, WET. Sand is well rounded with high sphericity and 80-90% quartz.	SP			1011.82



COORDINATES N 228,682.3 E 19,440,042.4

SURFACE ELEVATION 1155.82 DATUM USGS

MW-101D BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 4 OF 4

Osceola Township, MI LOCATION

4065-005 PROJECT NO.

SUR	FACE EL	EVAT	ION	115	55.82	DATUM USGS LOGGED BY	Р	nii Oc	ienkir	K	
S Depth feet		Samı Typ	ple		Rec- overy	DESCRIPTION		USCS	Strata	REMARKS	Elevation Feet
- - 150 - -		SS	SS	6-12 27-50	%	Light brown, fine to medium SAND, trace coarse Sand, trace Silt, dense, poorly graded, massive, WET. Fine to medium Sand is well rounded with high sphericity and 80-90% quartz. Coarse sand is sub-angular with low sphericity and 60-70% quartz.		SP SP			1006.82
- - 155 - - -		SS	SS	15-35 50/3"		Light brown, fine to medium SAND, trace coarse Sand, trace Silt, very dense, poorly graded, massive, WET. Fine to medium Sand is well rounded with high sphericity and 80-90% quartz. Coarse sand is sub-angular with low sphericity and 70-80% quartz.	Э	SP			1001.82
- - 160 —						Light brown, fine to medium SAND, little to some coarse Sand, little fine to medium Gravel, trace Silt, trace coarse Sand, very dense, poorly graded, massive, WET. Fine to medium sand is well rounded with high sphericity and 80-90% quartz. Coarse sand is sub-angular with low sphericity and 70-80% quartz.		SP		End of boring - 160'	996.82



COORDINATES N 228,693.8 E 19,440,782.1

8-11

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417

BORING NO. **MW-101I**PROJECT **GSWA: Spring H**i

SP

GSWA: Spring Hill Camp Phase III

SHEET 1 OF 2

1141.47

LOCATION Osceola Township, MI

PROJECT NO. **4065-005**

Phil Calculi

Phil Odenkirk LOGGED BY SURFACE ELEVATION 1179.47 DATUM USGS LOCATION DESCRIPTION: DRILLING CONTRACTOR **Stearns** DRILLING METHOD **EQUIPMENT** See attached Site Diagram for location. 4 1/4" HSA **CME 1050** DRILLING STARTED ENDED 11/17/00 11/17/00 STRATA KEY |||| SILT SAND CLAY **CLAYEY SAND** SILTY SAND **GRAVEL** SAMPLE INFORMATION Elevation Feet USCS Rec-DESCRIPTION REMARKS Lab Sample Blow Depth overy feet Sample Type Counts % Dark brown, fine SAND, little Silt, trace Clay, very loose, poorly graded, somewhat stratified, MOIST. Sand is well MW-101I sample and 1179.47 1-1 SSS 100 lithology information is 2-2 SP rounded, highly spherical, and 80-90% quartz. Spoon based on MW-101L shows some stratification with silts in top 3" and an organic boring log. rich 2" thick layer at the bottom. 1175.97 Dark brown, fine SAND, some Clay, trace medium Sand, 5 SSS 75 medium dense, poorly graded, massive, MOIST. Sand is SC well rounded, highly spherical, and 60-80% quartz. Brown, fine to medium SAND, trace Silt, trace medium Gravel, medium dense, poorly graded, massive, MOIST. 7-8 SSS 75 Sands are angular to sub-rounded with medium sphericity 10 9-10 SP and ~80-90% quartz. Light brown, fine to medium SAND, trace clay clasts, trace 1166.47 Silt, trace medium Gravel, medium dense, poorly graded, 25-13 SSS 50 massive, MOIST. Sand is well rounded, highly spherical, 15 10-10 and 80-90% quartz. Clay clasts occur throughout the sample interval and are ~1/4" in diameter. SP 0 0 0 Light brown fine to medium SAND, trace Gravel size clay 1160.47 14-15 SSS 75 20 clasts, trace Silt, trace medium Gravel, medium dense, 0 SP poorly graded, massive, MOIST. Sand is well rounded, 0 highly spherical, and 80-90% quartz. Clay clasts occur 1157.47 throughout the sample interval and are ~1/4" to 1/2" in diameter Brown SILT, little to some fine Sand, little to some Clay, 7-11 SSS 75 very stiff, massive, MOIST. Spoon shows red and black ML 25 15-24 mottling and blocky structure. Light brown, fine SAND, little to some Clay, trace Silt, 1151.47 dense, poorly graded, slightly stratified, MOIST. Sand is 11-17 well rounded, moderately spherical, and 80-100% quartz. 30 SSS 75 18-18 1-2" thick Clay layers occur throughout spoon. SP 1145.47 Light brown, fine SAND, trace Clay clasts, trace Silt, 6-8 SSS 35 62 medium dense, poorly graded, massive, MOIST. Sand is 11-15 well rounded, moderately spherical, and 80-90% quartz. SP 0 Clay clasts are ~1" in diameter. 0



COORDINATES N 228,693.8 E 19,440,782.1

SURFACE ELEVATION 1179.47 DATUM USGS

MW-101I BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 2 OF 2

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

SUR	FACE ELI	EVATIO	N 11	79.47	DATUM USGS LOGGED BY	PIIII O	1611VIII	N.	
S	AMPLE	INFO	RMATI		DECODIDATION		ata		ution et
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-		SSS	14-16	62	Light brown, fine SAND, trace Silt, medium dense, poorly graded, massive, MOIST. Sand is well rounded with high sphericity and 80-100% quartz. (continued)	SP			
45 - -		SSS	11-10 12-13	62	Light brown, fine to medium SAND, trace Silt, trace Clay clasts, medium dense, poorly graded, massive, WET. Sand is well rounded with high sphericity and 80-100% quartz. Clay clasts are ~1/8" diameter.	SP		Water encountered at 144' BLS	135.47
50-		SSS	12-7 7-9	62	Light brown, fine SAND, trace Clay, trace Silt, medium dense, poorly graded, massive, WET. Sand is well rounded, highly spherical, and 80-100% quartz. Clay occurs as 1.5" seam at 51' bgl.	SP			1130.47
55 - - -		SSS	7-8 12-13	75	Light brown, fine SAND, trace Clay, trace Silt, medium dense, poorly graded, massive, WET. Sand is well rounded, highly spherical, and 80-90% quartz.	SP			1125.47
60		SSS	2-7 9-12	75	Light brown, fine SAND, trace Silt, loose, poorly graded, massive, WET. Sand is well rounded, highly spherical, and 80-90% quartz.	SP			1120.47
65 —		SSS	3-3 7-10	62	Light brown, fine to medium SAND, trace Clay, trace Silt, loose, poorly graded, massive, WET. Sand is well rounded, highly spherical, and 80-100% quartz.	SP			1115.47
70 - -		SSS	4-7 9-11	75	Light brown, fine to coarse SAND, little Gravel, trace Clay, trace Silt, medium dense, poorly graded, statified, WET. Fine to medium sand is well rounded, highly spherical, and 80-100% quartz. Coarse sand and gravels are angular to sub-rounded with low sphericity and 60-80% quartz. 2"	SP			1110.47
75 <i>-</i>					thick gravel seam at 71' bgl. Gray-brown, fine to medium SAND, little Silt, trace Clay, dense, poorly graded, stratified, WET. Sand is well rounded, highly spherical, and 80-90% quartz. 1" thick sandier layers occur through out spoon.	SP		End of boring - 75' bgl	1106.47 1104.47



SURFACE ELEVATION 1155.86

COORDINATES N 228,691.7 E 19,440,040.7

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417

BORING NO. **PROJECT**

MW-101L

SHEET 1 OF 5 **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

DATUM USGS

Phil Odenkirk LOGGED BY LOCATION DESCRIPTION:

DRILLING CONTRACTOR Stearns							LOCATION DESCRIPTION:				
DRIL 41 DRIL	LING ME [*] / 4" HS A LING STA 30/00	١		EQUIP CME ENDED	1050		See attached Site Diagram for location.				
		•	STRA	TA KEY	<u>'</u>						
	SAND				SILT						
	CLAY				CLAYEY	'SAND					
0	GRAVEL				SILTY S	AND					
S	AMPLE	IN	IFOF	RMATI	ON						n
Depth feet	Lab Sample		mple ype	Blow Counts	Rec- overy %		DESCRIPTION	uscs	Strata	REMARKS	Elevation Feet
-		1111	SSS	1-1 2-2	100	poorly g rounded shows s	own, fine SAND, little Silt, trace Clay, very loose, raded, somewhat stratified, MOIST. Sand is well I, highly spherical, and 80-90% quartz. Spoon ome stratification with silts in top 3" and an organic	SP			1155.86
5 - -		1111	SSS	4-5 7-7	75	Dark bro	nick layer at the bottom. Dwn, fine SAND, some Clay, trace medium Sand, dense, poorly graded, massive, MOIST. Sand is nded, highly spherical, and 60-80% quartz.	sc			1152.36
10-		1111	SSS	7-8 9-10	75	Gravel, Sands a	fine to medium SAND, trace Silt, trace medium medium dense, poorly graded, massive, MOIST. Ire angular to sub-rounded with medium sphericity 1-90% quartz.	SP			1147.86
- 15 - -		1111	SSS	25-13 10-10	50	Silt, trace massive and 80-	own, fine to medium SAND, trace clay clasts, trace to medium Gravel, medium dense, poorly graded, the MOIST. Sand is well rounded, highly spherical, 90% quartz. Clay clasts occur throughout the interval and are ~1/4" in diameter.	SP	000		1142.86
20-		1111	SSS	14-15 17-25	75	clasts, t poorly g highly s	own fine to medium SAND, trace Gravel size clay race Silt, trace medium Gravel, medium dense, raded, massive, MOIST. Sand is well rounded, oherical, and 80-90% quartz. Clay clasts occur out the sample interval and are ~1/4" to 1/2" in	SP	0 0		1136.86 1133.86
25-		1111	SSS	7-11 15-24	75	very stif	r. SILT , little to some fine Sand, little to some Clay, f, massive, MOIST. Spoon shows red and black and blocky structure.	ML			
30-		1111	SSS	11-17 18-18	75	dense, p well rou	own, fine SAND, little to some Clay, trace Silt, poorly graded, slightly stratified, MOIST. Sand is nded, moderately spherical, and 80-100% quartz. k Clay layers occur throughout spoon.	SP			1127.86
35— -		1111	SSS	6-8 11-15	62	medium well rou	own, fine SAND, trace Clay clasts, trace Silt, dense, poorly graded, massive, MOIST. Sand is nded, moderately spherical, and 80-90% quartz. sts are ~1" in diameter.	SP	, , ,		1121.86
-								SP			1117.86
		Ы		8-11					1. W. W. W.		



COORDINATES N 228,691.7 E 19,440,040.7

SURFACE ELEVATION 1155.86 DATUM USGS

MW-101L BORING NO.

GSWA: Spring Hill Camp Phase III

SHEET 2 OF 5

PROJECT Osceola Township, MI LOCATION

PROJECT NO. 4065-005

SUR	FACE ELE	EVATIO	N II	55.86	DATUM USGS LOGGED BY	FIIII O	a C i i i (i i		
S	AMPLE	INFO	RMATI				Ita		tion
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
- - -		SSS	14-16	62	Light brown, fine SAND, trace Silt, medium dense, poorly graded, massive, MOIST. Sand is well rounded with high sphericity and 80-100% quartz. (continued)	SP			
45 — - - -		SSS	11-10 12-13	62	Light brown, fine to medium SAND, trace Silt, trace Clay clasts, medium dense, poorly graded, massive, WET. Sand is well rounded with high sphericity and 80-100% quartz. Clay clasts are ~1/8" diameter.	SP		Water encountered at 44' BLS	1111.86
50 - - -		SSS	12-7 7-9	62	Light brown, fine SAND, trace Clay, trace Silt, medium dense, poorly graded, massive, WET. Sand is well rounded, highly spherical, and 80-100% quartz. Clay occurs as 1.5" seam at 51' bgl.	SP			1106.86
55 - - -		SSS	7-8 12-13	75	Light brown, fine SAND, trace Clay, trace Silt, medium dense, poorly graded, massive, WET. Sand is well rounded, highly spherical, and 80-90% quartz.	SP			1101.86
60-		SSS	2-7 9-12	75	Light brown, fine SAND, trace Silt, loose, poorly graded, massive, WET. Sand is well rounded, highly spherical, and 80-90% quartz.	SP			1096.86
65 - -		SSS	3-3 7-10	62	Light brown, fine to medium SAND, trace Clay, trace Silt, loose, poorly graded, massive, WET. Sand is well rounded, highly spherical, and 80-100% quartz.	SP			1091.86
70 - - -		SSS	4-7 9-11	75	Light brown, fine to coarse SAND, little Gravel, trace Clay, trace Silt, medium dense, poorly graded, statified, WET. Fine to medium sand is well rounded, highly spherical, and 80-100% quartz. Coarse sand and gravels are angular to sub-rounded with low sphericity and 60-80% quartz. 2"	SP			1086.86
75 - -		SSS	5-15 17-20	100	thick gravel seam at 71' bgl. Gray-brown, fine to medium SAND, little Silt, trace Clay, dense, poorly graded, stratified, WET. Sand is well rounded, highly spherical, and 80-90% quartz. 1" thick sandier layers occur through out spoon.	SP			1082.86
80-		SSS	2-4 8-10	25	Light brown, fine to medium SAND, little Silt, trace Clay, medium dense, poorly graded, slightly stratified, WET. Sand is well rounded, moderately spherical, and 70-90% quartz.	SP			1077.86
85 — - -		SSS	4-12 16-24	25	Brown, fine to medium SAND, trace coarse Sand, trace Clay, dense, poorly graded, stratified, WET. Fine to medium sand is well rounded with medium to high sphericity and 80-90% quartz. Coarse sand is rounded with medium to low sphericity. Clayey layers occur throughout the spoon comprising up to ~40 % of one 3"	SP-SC			1071.86
90 		SSS	4-11 18-18	75	hthick seam. Brown, fine to medium SAND, few coarse Sand, trace Silt, dense, poorly graded, massive, WET. Fine to medium sand is well rounded with high sphericity and 80-90% quartz. Coarse sand is sub-rounded with low sphericity	SP			1066.86



COORDINATES N 228,691.7 E 19,440,040.7

SURFACE ELEVATION 1155.86 DATUM USGS

MW-101L BORING NO.

GSWA: Spring Hill Camp Phase III

SHEET 3 OF 5

PROJECT Osceola Township, MI LOCATION

PROJECT NO. 4065-005

3011	FACE ELE	- ۷۸110	N 115	JJ.00	DATOM 0303			- -	
S	AMPLE	INFO	RMATI	ON			g		ion
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
95 - -		SSS	12-20 13-15	62	and 60-70% quartz. Brown, fine to medium SAND, trace coarse Sand, trace Silt, dense, poorly graded, stratified, WET. Fine to medium sand is well rounded with high sphericity and 80-90% quartz. Coarse sand is sub-rounded with low sphericity and 60-70% quartz. 3" thick clayey layer occurs at 95.3'.	SP-SC			1061.86
- 100 - - -		SSS	15-17 37-42	75	Brown, fine to medium SAND, trace coarse Sand, trace Silt, very dense, poorly graded, massive WET. Fine to medium sand is well rounded, highly spherical, and 80-90% quartz. Coarse sand is angular with low sphericity and 70-80% quartz.	SP			1056.86
-		sss	22-26	400	Brown, fine to medium SAND, trace coarse Sand, trace Silt,	SP			1051.86
105 - - -			35-50/3'	100	very dense, poorly graded, massive, WET. Fine to medium sand is well rounded with high sphericity and 80-90% quartz. Coarse sand is angular with low sphericity and 70-80% quartz. Gray brown, fine to medium SAND, with some Clay, trace	sc			1050.86
110 - - - -		SSS	14-16 23-27	62	fine Gravel, very dense, poorly graded, massive, WET. Sand is well rounded, highly spherical, and 80-90% quartz. Gravel is sub-rounded and moderately spherical. Brown, fine to medium SAND, little Clay, trace Silt, very dense, poorly graded, stratified, WET. Sand is well rounded, moderately spherical, and 80-90% quartz. 3"	SC			1046.86
- 115 - - - -		SSS	23-35	100	thick clay seam at 109.7'. Brown, fine to medium SAND, little to some Clay, trace fine to coarse Gravel, very dense, poorly graded, stratified, WET. Sand is well rounded, moderately spherical, and 80-90% quartz. 3" clay seam at 115'. Gravel is well rounded, moderately spherical, and 50-60% quartz.	sc			1041.86
120 - - - -		SSS	15-23 42-50	100	Gray to brown, CLAY, little fine to medium Sand, trace fine to medium Gravel, hard, low plasticity, massive, WET. Sand is well rounded, moderately spherical, and 80-90% quartz. Gravel is well rounded with high sphericity.	CL			1035.86 1032.86
- 125 - - -		SSS	9-27 33-40	62	Brown, fine to medium SAND, some Silt, trace coarse Sand, trace fine Gravel, trace Clay, dense, poorly graded, stratified, WET to MOIST. Sand is interbedded with 2-3" thick siltier layers.	SM			1002.00
- 130 - - -		SSS	5-19 44	67	Brown, fine to medium SAND, trace coarse Sand, trace Clay clasts, trace Silt, very dense, poorly to moderately graded, massive, WET. Fine to medium sand is well rounded, highly spherical, and 80-90% quartz. Coarse sand is sub-angular with low sphericity and 60-70% quartz. Clay clasts are ~1" in diameter.	SP			1027.86
- 135 - - -		SSS	8-33 50/3"	100	Light brown, fine to medium SAND, trace Clayey Silt clasts, very dense, poorly graded, massive, WET. Sand is well rounded with high sphericity, 80-90% quartz. Silt clasts are ~1" in diameter.	SP	a i		1021.86
- 140 - - -		SSS	4-17 28-47	83	Light brown, fine to medium SAND, trace Silt, dense, poorly graded, massive, WET. Sand is well rounded with high sphericity and 80-90% quartz.	SP			1016.86
- 145 - -		SSS	2-20 48-50/5'		Light brown fine to medium SAND, trace Silt, dense, poorly graded, massive, WET. Sand is well rounded with high sphericity and 80-90% quartz.	SP			1011.86



COORDINATES N 228,691.7 E 19,440,040.7

SURFACE ELEVATION 1155.86 DATUM USGS

MW-101L BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 4 OF 5

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

301	FACE ELI	_ v	ATIO	V 11.	05.60	DATUM USGS EGGED BT					
s	AMPLE	۱N	NFOF	RMATI	ON				g		ion
Depth feet			-	Blow Counts	Rec- overy %	DESCRIPTION		USCS	Strata	REMARKS	Elevation Feet
- - 150 — - -		1111	SSS	6-12 27-50		Light brown, fine to medium SAND, trace coarse Sand, trace Silt, dense, poorly graded, massive, WET. Fine to medium Sand is well rounded with high sphericity and 80-90% quartz. Coarse sand is sub-angular with low sphericity and 60-70% quartz.		SP SP			1006.86
- 155 - - -		1111	SSS	15-35 50/3"		Light brown, fine to medium SAND, trace coarse Sand, trace Silt, very dense, poorly graded, massive, WET. Fito medium Sand is well rounded with high sphericity and 80-90% quartz. Coarse sand is sub-angular with low sphericity and 70-80% quartz.		SP			1001.86
- 160 - - -		1111	SSS	12-30 50/2"		Light brown, fine to medium SAND, little to some coarse Sand, little fine to medium Gravel, trace Silt, trace coarse Sand, very dense, poorly graded, massive, WET. Fine to medium sand is well rounded with high sphericity and 80-90% quartz. Coarse sand is sub-angular with low sphericity and 70-80% quartz.	e	SP	. 4 4 4 . 4 4		996.86 992.86
165 - -		1111	SSS	10-37 50/2"		Light brown fine to coarse SAND, trace Silt, very dense, well graded, massive, WET. Sand is well rounded with high sphericity and 80-90% quartz.		SW			992.00
- 170 - - -		וווו	SSS	35-50/6' 		Light brown, fine to medium SAND, little coarse Sand, tr Silt, very dense, poorly graded, massive, WET. Fine to medium sand is well rounded with high sphericity 80-909 quartz. Coarse sand is sub-angular with low sphericity a 70-80% quartz.	%	SP		No sample obtained 174-176', due to heaving sands. Driller attempted to overdrill and the sample spoon dropped to 179', where the next sample was	987.86
175 - -		1111	SSS		0	Dark gray, CLAY, some Silt, trace fine to coarse Sand,				collected.	978.36
180 — - - - -		1111	SSS	25-50/6' 	25	hard, moderate plasticity, MOIST. Sand is well rounded with low sphericity and 60-70% quartz.		CL			970.30
- 185 - - -		וווו	SSS	41-50/5' 		Dark gray, CLAY, some Silt, trace fine to coarse Sand, trace fine to medium Gravel, hard, moderate plasticity, MOIST. Sand is rounded with moderate sphericity and 70-80% quartz. Gravel is sub-rounded, moderately spherical, and 60-70% quartz.		CL			971.86
190 - -		ιιι	SSS	20-50/5' 	62	Light brown, fine to medium SAND, trace Silt, very dense massive, WET. Sand is well rounded with high sphericity and 80-90% quartz.		SP	=====		965.86
-		Ц		4.5=		Light brown, fine to medium SAND, trace fine to medium Gravel, trace Clay, very dense, poorly graded, stratified,		SP			962.86
195 - - -		(((SSS	4-25 50/5"	56	WET. Clay occurs at 194'. Gravels occur below clay wi 4" thickness and are rounded, with low sphericity. Sand well rounded with high sphericity, 80-90% quartz. GRAVEL, well graded. Light brown, fine to medium SAND, trace coarse Sand,	th is	GW SP	<u>, , , , , , , , , , , , , , , , , , , </u>		961.36 960.86
				30-32		trace fine to medium Gravel, trace Clay, very dense, poo	ліу				



COORDINATES N 228,691.7 E 19,440,040.7

SURFACE ELEVATION 1155.86 DATUM USGS

MW-101L BORING NO.

PROJECT

SHEET 5 OF 5 **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

Phil Odenkirk LOGGED BY

SURFACE ELEVATION 1133.80				1 110	73.00	DATOM 0303				
s	AMPLE	IN	IFOF	RMATI	ON			g		ion
Depth feet	Lab Sample			Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-		Tq	SSS	50/6"	75	graded, massive, WET. Sand is well rounded, highly spherical, ~80-90% quartz. Gravel is sub-angular, low sphericity, ~70-80% quartz. Dark gray, CLAY, trace fine to coarse Sand, medium plasticity, massive, MOIST. Sand is well rounded with high /	CL			955.86 952.86
205 		1111	SSS	15-18 25-29	50	sphericity and 80-90% quartz. Gray-brown SILT , little fine to medium Sand, little Clay, hard, moderately plastic, massive, MOIST. Sand is well rounded with high sphericity and 80-90% quartz.	ML			
- 210 - - - -		(((SSS	10-22 23-21	50	Gray-brown SILT, little fine to medium Sand, little Clay, hard, moderately plastic, massive, MOIST. Sand is well rounded with high sphericity and 80-90% quartz.	ML			946.86
- 215 — - -		1111	SSS	7-11 13-13	38	Gray-brown SILT , little fine to medium Sand, little to some Clay, very hard, moderately plastic, massive, MOIST. Sand is well rounded with high sphericity and 80-90% quartz.	ML			941.86
220 - -		τιι	SSS	21-8 50/4"	0	Light brown, fine to medium SAND, trace Silt, very dense, poorly graded, massive, WET. Sand is well rounded with high sphericity and 80-90% quartz.	CD.		No recovery in 219-221' sample. Sand is likely.	937.86
- 225 - - -		7777	SSS	8-50 50/3"			SP			
- 230 - - -		1111	SSS			Light brown, fine to medium SAND, trace Silt, very dense, poorly graded, massive, WET. Sand is well rounded with high sphericity and 80-90% quartz.	SP	-		926.86
235 - - - -		(((SSS			Light brown, fine to medium SAND, trace Silt, very dense, poorly graded, massive, WET.			No recovery in 234-236' sample. Sand is likely. After driving split spoon, had	919.86
240 - - -			SSS	24-30 50/3"	33		SP		trouble removing spoon; add water and remove.	
- 245 - -			SSS	-12 20-50 for 4"	20	Multicolored GRAVEL, some fine to coarse Sand, trace Silt, very dense, well graded, massive, WET. Gravel is sub-rounded with low-sphericity and 70-80% quartz. Sand is rounded, moderately spherical, ~90% quartz.	GW		End of boring - 246' bgl	912.86



COORDINATES N 228,682.9 E 19,440,788.1

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417

MW-102D BORING NO.

GSWA: Spring Hill Camp Phase III

SHEET 1 OF 5

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

PROJECT

SURFACE ELEVATION	N 1179.73 DATU	м USGS	LOGGED BY	Mike Brennan
DRILLING CONTRACT	TOR	LOCATION DESCR	IPTION:	
Stearns DRILLING METHOD 4 1/4" HSA	EQUIPMENT CME 1050	See attache	ed Site Diagram for location.	
DRILLING STARTED 10/30/00	ENDED 10/31/00			
STRA	TA KEY			
SAND	SILT			
CLAY	CLAYEY SAND			
GRAVEL	SILTY SAND			

٥٠	GRAVEL				SILTY S	AND				_	
	AMPLE	1			ON Rec-		DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
Depth feet	Lab Sample	Sam Typ		Blow Counts	overy %				St	11211111111111	
-		S	SS	1-1 1-1			own to brown, fine to medium SAND, poorly graded, nded, and MOIST.	SP			1179.73
-				2-2			o orange brown, fine to medium SAND, trace Silt, raded, MOIST. Sand is well rounded.	SP	٠		1176.73
5-		S:	SS	2-2		Light bro	own, fine to medium SAND, poorly graded, MOIST Sand is well rounded.	SP			1174.73
-		7	_	0-0		Light bro MOIST	own, fine to medium SAND, trace to little Silt, to WET.	SP			1172.23
10-		S	SS	3-6		Light bro	own, fine to medium SAND, and SILT, WET. nal millimeter scale clay laminations.	SM		Very hard drilling at ~11' bgs.	1169.23
-			SS	50/5"	400		SILT, and fine to coarse SAND, little to some Clay, little Gravel, MOIST.			Drilling became easier at ~18' bgs.,no gravel in cuttings.	1167.23
15 <i></i> -		[] S.	55		100			SM			
-				5-8			own, fine to medium SAND, trace coarse Sand, e Gravel, poorly graded, MOIST.	 			1161.73
20-		(S	SS	22-21				SP			
-				8-13			own, fine to medium SAND, trace coarse Sand, e Gravel, poorly graded, MOIST.				1157.23
25-		∑ S	SS	21-23				SP			
-				10.15		coarse S	own, fine to medium SAND, trace to little very Sand to very fine Gravel, poorly graded, MOIST. well rounded with high sphericity.	SP		L Jordan logged(0-26');M Brennan took over at	1152.23
30-	1	∠ S:	SS	10-15 21-13	90			SF		26' bgs.	4440.00
-							own, fine to medium SAND, poorly graded, MOIST. well rounded with high sphericity.	SP			1148.23
35-		S	SS	10-17 23-27	100						
-							own, medium to coarse SAND, trace to little fine poorly graded, MOIST. Sand is well rounded with pericity.	SP			1143.23
				10-17		<u> </u>	·				



COORDINATES N 228,682.9 E 19,440,788.1

SURFACE ELEVATION 1179.73 DATUM USGS

MW-102D BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 2 OF 5

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

COIN	FACE ELI	- 17 1110	1 111	9.13	DATON USGS = ================================			-	
s	AMPLE	INFO	RMATI	ON			g		ion
Depth feet	Lab Sample	Sample Type	Counts	%	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-		sss	27-32	100		SP			
-					Light brown, fine to medium SAND, poorly graded, MOIST. Sand is well rounded with high sphericity.				1137.23
45 -		sss	15-22 25-30	100		SP			
-					Light brown, fine to medium SAND, poorly graded, MOIST. Sand is well rounded with high sphericity.				1132.23
50 -		sss	10-15 32-40	100		SP			
-					Light brown, fine to medium SAND, poorly graded, MOIST. Sand is angular to well rounded with high sphericity.				1127.23
55 -		sss	12-15 20-24	90		SP			
-					Light brown SILT , little very fine Sand, MOIST.	 			1122.23
60 -		sss	11-20 24-24	100		ML			
-					Light brown, medium to coarse SAND, poorly graded, MOIST. Sand is well rounded with high sphericity.	SP			1117.23
65 -		sss	10-12 14-16	100	Light brown SILT , little very fine Sand, MOIST.	ML		Rods wet at ~67' bgl.	<u>♥</u> 1114.73
-					Light brown, fine to medium SAND, little coarse Sand, trace very coarse Sand, well graded, WET. Sand is well rounded	 			1112.23
70 -		sss	5-8 10-13	30	with high sphericity.	SW			
-					Light brown, fine SAND, little very fine Sand, trace Silt, poorly graded, WET. Sand is well rounded with high	SP			1107.23
75 -		sss	3-5 7-8	75	sphericity. Light brown, coarse to very coarse SAND, trace fine Gravel, well graded, WET. Sand is sub-angular to			No recovery (79-81');No change in	1104.23
-					sub-rounded with high sphericity.	sw		drilling over lost interval.	
80-		sss	3-5 7-7	0		300			
-					Light brown, medium to coarse SAND, little very coarse Sand, trace fine Gravel, well graded, WET. Sand is				1097.23
85 -		sss	1-1 2-3	60	sub-angular to well rounded with high sphericity.	sw			
-					Light brown, medium to coarse SAND, little very coarse Sand to fine Gravel, well graded, WET. Sand is well				1092.23
90-		SSS	2-2 6-7	30	rounded with high sphericity; ~1" diameter chunk of brown clay and silt, some very coarse sand.	sw			
-						SW			1087.23



COORDINATES N 228,682.9 E 19,440,788.1

SURFACE ELEVATION 1179.73 DATUM USGS

MW-102D BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 3 OF 5

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

JUK	FACE ELE	VATIO	V 111	9.13	DATUM U3G3				
S	AMPLE	INFO	RMATI	ON			Ø		t
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
95 - -		SSS	5-5 10-15	100	Light brown, medium to coarse SAND, little fine Gravel, well graded, WET. Sand is well rounded with high sphericity. (continued) Light brown SILT, some very fine Sand, WET. Light brown to gray, Silty CLAY, MOIST.	SW - ML CL-ML		Tip had silty clay.	- <u>1084.73</u> 1084.23
100-		SSS	3-3	80	Light brown, medium to coarse SAND, little fine Sand, well graded, WET. Sand is well rounded with high sphericity.	sw			1082.23
-			4-3		Light brown, Clayey SILT, thinly laminated, MOIST. Light brown, CLAY, some fine to medium Sand, MOIST.	MH — — — -			1079.73 1077.23
105-		sss	2-4 7-8	60	Light brown, CLAT, some line to medium Sand, MOIST. Light brown to gray, CLAY, some fine to medium Sand,	CL CL			1077.23
-			7-0		laminated, MOIST. Light brown, CLAY, some fine to medium Sand, MOIST. Sand is well rounded with high sphericity.	CL 		Bailed heave.	1074.73 1074.23
- 110 <i>-</i> -		SSS	4-5 6-6	100	Light brown to gray, fine SAND, and CLAY, trace fine Gravel, WET.	sc			
- - 115 <i>-</i>		sss	0-0 1-3	80	Light brown, fine to medium SAND, little to some Silt, little very coarse Sand, trace fine Gravel, WET. Sand is well rounded with high sphericity.	SM			1067.23
-					Light brown, medium to coarse SAND, little to some Silt, well graded, WET. Sand is sub-angular to well rounded			 	1062.23
120 - -		SSS	2-3 3-4	10	with high sphericity.	sw			4057.00
- 125 <i>-</i> -		SSS	7-10 17-24	40	Light brown, medium to coarse SAND, little very coarse Sand, trace fine Gravel, well graded, WET. Sand is sub-angular to well rounded with high sphericity.	SW			1057.23
-		7	5-7		Light brown, medium to coarse SAND, little very coarse Sand, trace fine gravel, well graded, WET. Sand is sub-angular to well rounded with high sphericity.			Bailed ~2' heave.	1052.23
130		SSS	12-10	80		SW			
135 - -		SSS	7-11 20-24	0	Light brown, fine to medium SAND, little to some Silt, WET. Sand is well rounded with high sphericity.	SM		Bailed ~2' heave.	1044.73
140 - -		SSS	0-0 7-14	10					
- - 145 <i>-</i> -		SSS	3-5 7-11	50	Light brown SILT , some fine to coarse Sand, trace Clay, WET.	ML		Silty clay found in tip;bailed ~2' heave.	1037.23



COORDINATES N 228,682.9 E 19,440,788.1

SURFACE ELEVATION 1179.73 DATUM USGS

MW-102D BORING NO.

GSWA: Spring Hill Camp Phase III

SHEET 4 OF 5

PROJECT

Osceola Township, MI

PROJECT NO. 4065-005

LOCATION

S	AMPLE	١N	NFOI	RMATI	ON					_
Depth feet	Lab Sample		ample Type	Blow Counts	Rec- overy %	DESCRIPTION	uscs	Strata	REMARKS	Elevation Feet
		П				Light brown, fine to medium SAND, trace Silt, poorly	_ <u>M</u> L		Bailed ~1' heave.	1032.23
- 150 <i>-</i> -			SSS	0-1 2-6	50	graded, WET. Sand is well rounded with high sphericity.	SP		Builde T Heave.	1002.20
- - 155 - -		1111	SSS	7-13 15-18	60	Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity.	SP		Stopped drilling (10/30) bailed ~2' heave. Resumed (10/31) bailed ~5' heave. Measure DTW=62' bgl.	1027.23
- 160 <i>-</i> -		1111	SSS	7-10 14-21	30	Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity.	SP		First split spoon attemp 159-161' bgl, no recovery.	1020.73
165-		((SSS	3-9 23-34	80	Light brown, fine to medium SAND, few very fine Sand, poorly graded, WET. Sand is well rounded with high sphericity.	SP		Bailed ~2' heave.	1017.23
-		A		23-34		Light brown SILT , some Clay, WET.	МН		Bailed ~3' heave.	1013.93
-						Light brown, fine to medium SAND, trace very fine Sand, poorly graded, WET. Sand is rounded and spherical.				1012.23
170-		1111	SSS	0-10 22-24/3'	40		SP			
- 175 —		777	sss	4-6 24-30	30	Light brown, fine to medium SAND, few very fine Sand, trace coarse Sand, poorly graded, WET. Sand is well rounded with high sphericity.	SP		Two spoon attempts before recovery;bailed ~2' heave.	1007.23
-		7		2-7		Light brown, fine to medium SAND, little to some very fine Sand, few coarse Sand, well graded, WET. Sand is well rounded with high sphericity.			Had to log heave due to both spoon attempts failing to recover	1002.23
180-		77	SSS	15-33	0	Tourided with high spriencity.	SW		sample;bailed ~4' heave.	
-		7		1.7		Light brown, fine to medium SAND, few coarse Sand, trace very fine Sand, well graded, WET. Sand is sub-angular to well rounded with high sphericity.			Bailed ~3' heave.	997.23
185 -			SSS	1-7 22-25/3'	15	was radiada war nigii aprionoty.	SW			
-				0-0		Light brown, fine to medium SAND, little coarse Sand, trace very fine Sand, moderately to poorly graded, WET. Sand is sub-angular to well rounded with high sphericity.			Bailed ~2' heave.	992.23
190 - -			SSS	10-27	40	angular to well rounded with high spriencity.	SP/SW			
- 195 -			SSS	0-8	40	Light brown, fine to medium SAND, trace to little coarse Sand, trace very fine Sand, poorly graded, WET. Sand is sub-angular to well rounded with high sphericity.	SP		Bailed ~1' heave.	987.23
- Les		\		20-38	40	Light brown, medium to coarse SAND, little to some very coarse Sand, trace fine Sand, moderately to poorly graded, WET. Sand is angular to well rounded with high sphericity.	SP/SW		Had to log heave due to both spoon attempts failing to recover	982.23



COORDINATES N 228,682.9 E 19,440,788.1

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417

GSWA: Spring Hill Camp Phase III Osceola Township, MI LOCATION

MW-102D

SHEET 5 OF 5

4065-005 PROJECT NO.

BORING NO.

PROJECT

SUR	FACE ELI			117	79.73	DATUM USGS LOGGED BY	Mike	Brenna	n	
S	AMPLE	INI	OF	RMATI	ON					LC.
Depth feet	Lab Sample	l		Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-			SSS	34-40/4'	0	Light brown, fine to coarse SAND, well graded, WET. Sa is angular well rounded with high sphericity; Some wet fin		V	sample. Bailed ~1/2' heave.	977.23
- 205 - - -		(((SSS	0-15 15-19	20	gravel in bottom half of sample. Light brown, medium to coarse SAND, little fine Sand, we	SW		Bailed ~2' heave.	972.23
- 210 - -			SSS	12-17 25-30/3'	40	graded, WET. Sand is angular to well rounded with high sphericity; Little fine gravel beginning at ~210' 10".	sw		Driller feele ground at	967.23
- 215 <i>-</i>			200	0-8	80	Light brown, fine to medium SAND, some coarse Sand, trace Silt, well graded, WET. Sand is sub- to well rounder with high sphericity.			Driller feels gravel at 215' bgl; bailed ~1/2' heave.	
-		卢	,00	0-8 41-50/3'	00	Light brown, fine SAND, some Silt, WET. Light brown,, SILT, some Sand, WET.	SM			964.73 963.83
-				0.0		Light brown, fine to medium SAND, some coarse Sand, trace Silt, trace fine Gravel, well graded, WET. Sand is angular to well rounded with high sphericity.	ML			962.23
220 - -			SSS	0-0 10-40	20		SW			
- - 225 -			sss	0-10	75	Light brown, fine to medium SAND, some coarse Sand, trace Silt, well graded, WET. Sand is angular to well rounded with high sphericity.	sw		Bailed ~1' heave.	957.23
-		4		17-26	73	Light brown to gray, fine to medium SAND, some Clay, trace to some fine Gravel, MOIST.	sc		Driller feels clay lens at 227' bgl.	
- 230			222	0-20	100	Light brown, fine to medium SAND, trace coarse Sand, poorly graded, WET. Sand is well rounded with high sphericity.	SP		Bailed ~1' heave.	952.23
-			,	0-20 41-40/5"	100	Light brown to grey, CLAY, some Silt, trace to few fine Gravel, stiff, high plasticity, MOIST. Few light brown to grey clay and gravel lenses.	CL		Auger bit had grey, clay, few fine sand, trace fine gravel, soft, moderately plastic, moist. End of boring - 231' bgl	949.73 948.73



COORDINATES N 228,693.8 E 19,440,782.1

1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417

MW-102I BORING NO.

SHEET 1 OF 4

GSWA: Spring Hill Camp Phase III PROJECT Osceola Township, MI LOCATION

PROJECT NO. 4065-005

SURFACE ELEVATION	N 1179.47 DATU	м USGS	LOGGED BY	Mike Brennan
DRILLING CONTRACT	TOR	LOCATION DESCR	RIPTION:	
Stearns				
DRILLING METHOD 4 1/4" HSA	EQUIPMENT CME 1050	See attach	ed Site Diagram for location.	
DRILLING STARTED 11/1/00	ENDED 11/2/00			
STRA	TA KEY			
SAND	SILT			
CLAY	CLAYEY SAND			
GRAVEL	SILTY SAND			

_	CLAY			CLAYEY						
, -	GRAVEL			SILTY S	AND I		1	1	Γ	
	SAMPLE		1	ON Rec-		DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
Depth feet		Sampl Type		overy %				St		
-	-	SSS	3 1-1 1-1			own to brown, fine to medium SAND, poorly graded, and MOIST.	SP		No samples taken during MW-102I drilling. Lithology and sample information	1179.47
-			2-2			o orange brown, fine to medium SAND, trace Silt, raded, MOIST. Sand is well rounded.	SP	•	based on MW-102D boring log.	1176.47
5-		533	2-2		Light bro	own, fine to medium SAND, poorly graded, MOIST Sand is well rounded.	SP			1174.47
-					Light bro	own, fine to medium SAND, trace to little Silt, to WET.	SP			1171.97
10 -	-	SSS	3-6			own, fine to medium SAND, and SILT, WET. nal millimeter scale clay laminations.	SM		Very hard drilling at ~11' bgs.	1168.97
-			50/5"		Brown S trace to	ILT, and fine to coarse SAND, little to some Clay, little Gravel, MOIST.			Drilling became easier at ~18' bgs.,no gravel	1166.97
15 - -	- - -	SSS	50/5"	100			SM		in cuttings.	
- - 20-		SSS	5-8			own, fine to medium SAND, trace coarse Sand, e Gravel, poorly graded, MOIST.		#-!J -# - 		1161.47
-	_		22-21				SP			
-	-		8-13			own, fine to medium SAND, trace coarse Sand, e Gravel, poorly graded, MOIST.				1156.97
25-	1	SSS	21-23				SP			
-					coarse	own, fine to medium SAND, trace to little very Sand to very fine Gravel, poorly graded, MOIST.			L Jordan logged(0-26');M	1151.97
30-	-	SSS	3 10-15 21-13	90		well rounded with high sphericity.	SP		Brennan took over at 26' bgs.	
-	 					own, fine to medium SAND, poorly graded, MOIST. well rounded with high sphericity.	0.0			1147.97
35-	-	SSS	10-17 23-27	100			SP			
-	-				Light bro Gravel, high sph	own, medium to coarse SAND, trace to little fine coorly graded, MOIST. Sand is well rounded with ericity.	SP			1142.97
	2 10-17									



COORDINATES N 228,693.8 E 19,440,782.1

SURFACE ELEVATION 1179.47 DATUM USGS

MW-102I BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 2 OF 4

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

COIN	FACE ELE	- 17 (1101	<u> </u>	3.41	DATON USGS = ================================			-	
S	AMPLE	INFO	RMATI	ON					uo .
Depth feet	Lab Sample		Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-		TSSS	27-32	100		SP			
-					Light brown, fine to medium SAND, poorly graded, MOIST. Sand is well rounded with high sphericity.				1136.97
45 -		SSS	15-22 25-30	100		SP			
-					Light brown, fine to medium SAND, poorly graded, MOIST. Sand is well rounded with high sphericity.				1131.97
50-		SSS	10-15 32-40	100		SP			
_					Light brown, fine to medium SAND, poorly graded, MOIST. Sand is angular to well rounded with high sphericity.				1126.97
55 -		SSS	12-15 20-24	90	Gara to angular to non-real accounting to option only.	SP			
-					Light brown SILT , little very fine Sand, MOIST.				1121.97
60-		SSS	11-20 24-24	100		ML			
-			10-12		Light brown, medium to coarse SAND, poorly graded, MOIST. Sand is well rounded with high sphericity.	SP			1116.97
65 -		SSS	14-16	100	Light brown SILT , little very fine Sand, MOIST.	ML		Rods wet at ~67' bgl.	1114.47
_					Light brown, fine to medium SAND, little coarse Sand, trace very coarse Sand, well graded, WET. Sand is well rounded				1111.97
70-		SSS	5-8 10-13	30	with high sphericity.	sw			
-					Light brown, fine SAND, little very fine Sand, trace Silt, poorly graded, WET. Sand is well rounded with high	SP			1106.97
75 - -		SSS	3-5 7-8	75	sphericity. Light brown, coarse to very coarse SAND, trace fine Gravel, well graded, WET. Sand is sub-angular to sub-rounded with high sphericity.			No recovery (79-81');No change in	1103.97
-			2.5		sub-rounded with high spriencity.	SW		drilling over lost interval.	
80-		SSS	3-5 7-7	0					
-					Light brown, medium to coarse SAND, little very coarse Sand, trace fine Gravel, well graded, WET. Sand is				1096.97
85 -		SSS	1-1 2-3	60	sub-angular to well rounded with high sphericity.	SW			
-					Light brown, medium to coarse SAND, little very coarse Sand to fine Gravel, well graded, WET. Sand is well				1091.97
90-		SSS	2-2 6-7	30	rounded with high sphericity; ~1" diameter chunk of brown clay and silt, some very coarse sand.	SW			
_						SW			1086.97



COORDINATES N 228,693.8 E 19,440,782.1

SURFACE ELEVATION 1179.47 DATUM USGS

MW-102I BORING NO.

PROJECT

GSWA: Spring Hill Camp Phase III

SHEET 3 OF 4

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

301	FACE ELI	- ۷۸1101	N 111	13.41	DATOW 0303				
s	AMPLE	INFO	RMATI	ON			a		uo
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
95-		SSS	5-5 10-15	100	Light brown, medium to coarse SAND, little fine Gravel, well graded, WET. Sand is well rounded with high sphericity. (continued) Light brown SILT, some very fine Sand, WET. Light brown to gray, Silty CLAY, MOIST. Light brown, medium to coarse SAND, little fine Sand, well	SW ML CL-ML		Tip had silty clay.	1084.47 1083.97
- 100 <i>-</i>		SSS	3-3 4-3	80	graded, WET. Sand is well rounded with high sphericity. Light brown, Clayey SILT, thinly laminated, MOIST.	SW			1079.47
-			2.4		Light brown, CLAY, some fine to medium Sand, MOIST.	CL	<u></u>		1076.97
105 - - -		SSS	2-4 7-8	60	Light brown to gray, CLAY, some fine to medium Sand, laminated, MOIST. Light brown, CLAY, some fine to medium Sand, MOIST. Sand is well rounded with high sphericity.	CL CL		Bailed heave.	1074.47 1073.97 1071.97
- 110 <i>-</i> - -		SSS	4-5 6-6	100	Light brown to gray, fine SAND, and CLAY, trace fine Gravel, WET.	SC			
- 115 <i>-</i> -		SSS	0-0 1-3	80	Light brown, fine to medium SAND, little to some Silt, little very coarse Sand, trace fine Gravel, WET. Sand is well rounded with high sphericity.	SM			1066.97
- - 120 <i>-</i>		sss	2-3 3-4	10	Light brown, medium to coarse SAND, little to some Silt, well graded, WET. Sand is sub-angular to well rounded with high sphericity.	SW			1061.97
- - -			7-10		Light brown, medium to coarse SAND, little very coarse Sand, trace fine Gravel, well graded, WET. Sand is sub-angular to well rounded with high sphericity.				1056.97
125 - - - -		SSS	17-24	40	Light brown, medium to coarse SAND, little very coarse	SW		Bailed ~2' heave.	1051.97
- 130 - - -		SSS	5-7 12-10	80	Sand, trace fine gravel, well graded, WET. Sand is sub-angular to well rounded with high sphericity.	SW			
- 135 — - - -		SSS	7-11 20-24	0	Light brown, fine to medium SAND, little to some Silt, WET. Sand is well rounded with high sphericity.	SM		Bailed ~2' heave.	1044.47
- 140 - -		SSS	0-0 7-14	10	Light brown SILT , some fine to coarse Sand, trace Clay,	·		Silty clay found in	
- 145 <i>-</i> -		SSS	3-5 7-11	50	WET.	ML		tip;bailed ~2' heave.	1030.97



COORDINATES N 228,693.8 E 19,440,782.1

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MW-102I BORING NO.

PROJECT

LOCATION

GSWA: Spring Hill Camp Phase III

SHEET 4 OF 4

Osceola Township, MI

PROJECT NO. 4065-005

FACE ELE	ΞV	OITA	v 117	79.47	DATUM USGS	LOGGED BY	Mike B	renna	n	
1	Г			ON Rec-	DESCRIPT	ION	USCS	trata	REMARKS	Elevation Feet
Sample				overy %			l MI	Ó		Ele Fle
		000	0-1	F0	Light brown, fine to medium SAND graded, WET. Sand is well rounded	, trace Silt, poorly ed with high sphericity.			Bailed ~1' heave.	1031.97
		555	2-6	50	Light have good fine to good fines CAND	tunna Cilt manulu	55		Chan and drilling	4000 0
	1111	SSS	7-13 15-18	60	graded, WET. Sand is well rounde	, trace Silt, poorly and with high sphericity.	SP		(10/30) bailed ~2' heave. Resumed (10/31) bailed ~5' heave. Measure DTW=62' bgl.	1026.97
	1111	SSS	7-10 14-21	30	Light brown, fine to medium SAND graded, WET. Sand is well rounded	, trace Silt, poorly d with high sphericity.	SP		First split spoon attemp 159-161' bgl, no recovery.	1020.47
					Light brown, fine to medium SAND poorly graded, WET. Sand is well sphericity.	, few very fine Sand, rounded with high	_ SP		Bailed ~2' heave. End of boring - 163' bgl	1016.97 1016.47
	AMPLE Lab	AMPLE IN Lab Sa Sample 1	AMPLE INFOR	AMPLE INFORMATION Lab Sample Blow Type Counts SSS 0-1 2-6 SSS 7-13 15-18	AMPLE INFORMATION Lab Sample Blow Counts very 9% SSS 0-1 2-6 50 SSS 7-13 60	AMPLE INFORMATION Lab Sample Type Counts Provery Counts Provery Sample Sample Counts Provery Sample Sample Counts Provery Sample Counts Prove Counts Prove Sample Counts Prove Sa	AMPLE INFORMATION Lab Sample Blow Type Counts 9/6 Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. SSS 0-1 2-6 50 Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. SSS 7-13 15-18 60 Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. Light brown, fine to medium SAND, few very fine Sand, poorly graded, WET. Sand is well rounded with high	AMPLE INFORMATION Lab Sample Blow Type Counts % Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. SSS 7-13 15-18 60 Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. SP Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. SP Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. SP Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. SP Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. SP	AMPLE INFORMATION Lab Sample Blow Type Counts % Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. SSS 7-13 15-18 60 Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. SP SSS 7-10 14-21 30 Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. SP SSS 7-10 14-21 30 Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. Light brown, fine to medium SAND, trace Silt, poorly graded, WET. Sand is well rounded with high sphericity. SP SSS 7-10 14-21 30 Light brown, fine to medium SAND, few very fine Sand, poorly graded, WET. Sand is well rounded with high	AMPLE INFORMATION Lab Sample Type Counts



MW-103D BORING NO. **PROJECT**

LOCATION

SHEET 1 OF 5 **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI

4065-005 PROJECT NO.

COORDINATES N 228,511.9 E 19,441,342.2 **GF/BM LOGGED BY** SURFACE ELEVATION 1147.73 DATUM USGS LOCATION DESCRIPTION:

DRILLING CONTRACTOR Stearns							LOCATION DESCRIPTION:						
4 1 DRIL	LING ME /4" HS# LING ST# 30/00			CME ENDER	95		See attached Site Diagram for location.						
10/	30/00		CTD A	TA KEY									
	SAND		SIKA		SILT								
	CLAY			F	CLAYEY	' SAND							
	GRAVEL				SILTY S	AND							
S	AMPLE	١N	NFOF	RMATI	ON						L C		
Depth feet	Lab Sample		ample Type	Blow Counts	Rec- overy %		DESCRIPTION	uscs	Strata	REMARKS	Elevation		
_		П	SSS	2-2	75	Dark bro Gravel,	own Silty very fine to medium SAND, trace fine	SM			1147.73		
_				2-2			own very fine to medium SAND, little Silt, MOIST.	SM			1146.73		
5-))	SSS	2-4	100	Light bro	own, very fine to medium SAND, poorly graded,	SP			1144.73		
-		Q Q	000	6-6	100	Dark bro	own, fine to medium SAND, some Silt, MOIST.	SM			1142.23		
-						Light br	own, fine to medium SAND, poorly graded, MOIST.	†	۔ باب انجانے		1140.23		
10-		111	SSS	3-3 4-3	75			SP					
-		Ų				Light br	own, fine to medium SAND, poorly graded, DRY.	SP			1135.23		
15-		1111	SSS	2-3 5-6	75	Light br	own, very fine to fine SAND, poorly graded, MOIST.	SP			1132.73		
-		7		3-4			own, fine SAND, trace Silt, poorly graded, DRY. sub-angular to sub-rounded.	SP			1130.23		
20 -		ΙÌ	SSS	6-9	100	Light bro	own, Clayey SILT with occasional Sand stringers,	ML-CL			1127.73		
-)				Brown,	medium to coarse SAND, poorly graded.	SP			1125.73		
25 -		((SSS		75	Light br	Silty, CLAY, thinly laminated (varved). bwn, fine SAND, trace Silt, poorly graded, DRY.	CL-ML SP			— <u>1123.23</u> 1122.73		
-						Light br	well rounded and sub-spherical. own, fine to medium SAND, poorly graded, coarser	35			1120.23		
30-		1111	SSS	5-10 27-20	75	with dep	oth. Sand is well rounded, spherical.	SP					
-		7		5-7		Light br	own, Silty fine SAND, trace Clay, loose, WET.	SM			1115.23		
35-		111	SSS	8-10		poorly g	own, medium SAND, trace fine Sand, trace Silt, raded, WET. Quartz grains are well rounded and pherical.	SP		WET at 35' bgl.	112.73		
-		_		3-5				SP	-11		1110.23		
				J-J						ļ.			



COORDINATES N 228,511.9 E 19,441,342.2

SURFACE ELEVATION 1147.73 DATUM USGS

MW-103D BORING NO.

GSWA: Spring Hill Camp Phase III

SHEET 2 OF 5

Osceola Township, MI

PROJECT NO. 4065-005

GF/BM **LOGGED BY**

PROJECT

LOCATION

SAMPLE INFORMATION							æ		uo
Depth feet			Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-		SSS	9-16		Brown, medium SAND, trace fine Sand, poorly graded, WET. Sand is well rounded, highly spherical, and approximately 80% quartz. (continued)	SP			
45 -		SSS	3-4 8-14			, o.			
50-		SSS	4-6 9-12		Brown, fine to coarse SAND, trace Silt, WET. Fine to medium component is well rounded, highly spherical, and approximately 80% quartz. Coarse sand component is sub-angular and sub-rounded.	sw			1100.23
-					Brown, fine SAND, trace to some Silt, WET.	SP			1097.23
55 -		sss	6-17 26-24		Brown and gray mottled Silty, CLAY, thinly laminated	CL-ML			1093.23
- -		4	20 24		\(\(\text{varved}\), stiff, MOIST. Brown, fine SAND, trace Silt, poorly graded, WET. Sand is well rounded, highly spherical, and approximately 80% quartz.	SP			1092.48
60 -		SSS SSS	10-14 38-30		Brown, fine to medium SAND, trace Silt, poorly graded, WET. Quartz component (approx. 80%) is well rounded and highly spherical. Non-quartz component is sub-angular to sub-rounded.	SP			
65		SSS	18-27 100 / 5"		Gray Clayey fine to medium SAND, trace coarse Sand, trace Gravel, occasional seams (~1 inch thick) of medium Sand. Brown, medium to coarse SAND, trace fine Sand, poorly	SC		Driller noted change in	1082.73
70		SSS			graded, WET. Sand is well rounded, highly spherical, and approximately 70% quartz.	SP		lithology.	
75 -		SSS	12-60 65		Brown, fine to coarse GRAVEL, trace fine to coarse Sand, and WET.	GW), d), d), d		1072.23
80 - 80 - -		SSS	6-8 12-30		Brown, medium to coarse SAND, trace fine Sand, occasional fine to medium Gravel layers, poorly graded, WET. Sand is well rounded, highly spherical, and approximately 80% quartz.	SP			1070.23
85 - -		SSS			Brown, fine to coarse SAND, and SILT, trace fine Gravel, and WET.	SM			1063.23
90-		SSS	5-7 12-16		Brown, fine to coarse SAND, trace to some fine to medium Gravel, trace Silt, well graded, and WET. Sand and gravel are well rounded and highly spherical. Sand is compositionally mature.	SW			1060.23
_						SP			1055.23



COORDINATES N 228,511.9 E 19,441,342.2

DATUM USGS SURFACE ELEVATION 1147.73

MW-103D BORING NO.

PROJECT

LOCATION

GSWA: Spring Hill Camp Phase III

SHEET 3 OF 5

Osceola Township, MI

4065-005 PROJECT NO.

GF/BM **LOGGED BY**

S	AMPLE	INFO	RMATI	NC					uo
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
95 -		SSS	5-17 12-15		Brown, fine to coarse SAND, trace fine Gravel, trace Silt, poorly graded, and WET. Sand is well rounded, highly spherical, and ~70-80% quartz. (continued)	SP			
100 -		SSS	5-51 60 / 3"		Brown, medium to coarse SAND, trace fine Sand, trace Silt, poorly graded, and WET. Sand is well rounded, highly spherical, and 70-80% quartz.	SP		Last sample on 10/30/00	1050.23
- - -			6-8		Brown, medium to coarse SAND, trace fine Sand, trace Silt, poorly graded, and WET. Sands are well rounded, highly spherical, and 70-80% quartz.			Began drilling @ 07:15, 10/31/00. No recovery on first	1045.23
105 - - - -		SSS	12-21		Brown, medium SAND, trace to some fine Sand, poorly	SP		attempt.	1040.23
110 - -		SSS	4-4 12-28		graded, and WET. Sand is well rounded, highly spherical, and 70-80% quartz,	SP			
115		SSS	5-3 10-23		Medium brown, fine to coarse SAND, trace to some fine to medium Gravel, well graded, massive, and WET. Fine to med. sands are well rounded, highly spherical, and 70-80% quartz. Coarser component is sub-angular to sub-rounded and less than 10% quartz.	SW			1035.23
- - 120-		SSS	3-10 30-50		Medium brown, fine to medium SAND, some coarse Sand, trace to some fine Gravel, well graded, massive, and WET. Fine to medium sands are well rounded, highly spherical, and 70-80% quartz. Coarse component is ~80% quartz.	SW			1030.23
- - -					Medium brown, fine to medium SAND, some coarse Sand, trace fine Gravel, well graded, massive, and WET. Fine to				1025.23
125 - - -		SSS	3-8 21-25		med. sands are well rounded, highly spherical, and ~70 to 80% quartz. Coarse component is ~30-50% quartz. Medium brown, medium SAND, trace to some fine Sand,	SW			1020.23
130 -		SSS	4-7 9-17		trace to some coarse Sand, poorly graded, massive, and WET. Fine and med. sands are well rounded, highly spherical, and ~70-80% quartz. Coarser component is sub-rounded, sub-spherical, and ~30-40% quartz.	SP			1020.23
135-		SSS	4-7		Medium brown, medium SAND, trace to some fine Sand, trace to some coarse Sand, poorly graded, massive, and WET. Fine to med. sands are well rounded, highly	SP			1015.23
-			9-17		Shherical, and ~70-80% quartz. Coarser component is sub-rounded, sub-spherical, and ~30-40% quartz. Brown, fine SAND and, SILT grading to gray, CLAY, and SILT that is thinly laminated. Clay is interbedded with fine	SM		Depth of lithology change (SM to SP)	1012.73 1010.73
140 - - -		SSS	5-12 38-50 / 3"		SAND and, SILT. Medium brown, medium SAND, trace to some fine Sand, trace to some coarse Sand, poorly graded, massive, and WET. Fine and med. sands are well rounded, highly spherical, and 70-80% quartz. Coarser components are sub-rounded to sub-angular and 20-30% quartz.	SP		was noted by driller. Clay layers are interbeded with sands in bottom inch of sample. Occasional 1 inch thick	1005 23
145 -		SSS	4-7 10-38		Medium brown, fine to medium SAND, trace to some coarse Sand, poorly graded, massive, and WET. Fine and med. sands are well rounded, highly spherical, and 70-80% quartz. Coarser components are sub-rounded to	SP		Clay layers occur throughout sample.	



COORDINATES N 228,511.9 E 19,441,342.2

DATUM USGS SURFACE ELEVATION 1147.73

MW-103D BORING NO.

GSWA: Spring Hill Camp Phase III

SHEET 4 OF 5

Osceola Township, MI LOCATION

PROJECT NO. 4065-005

GF/BM LOGGED BY

PROJECT

S	AMPLE	IN	1FOI	RMATI	ON					L
Depth feet	Lab Sample	ı	ample Type	Blow Counts	Rec- overy %	DESCRIPTION	uscs	Strata	REMARKS	Elevation Feet
150 —		1111	SSS	10-13 21-38		sub-angular and 20-30% quartz. Medium brown, fine to medium SAND, trace to some coarse Sand, poorly graded, massive, and WET. Fine and med. sands are well rounded, highly spherical and 70-80% quartz. Coarser components are sub-rounded, sub-spherical, and 20-30% quartz.	SP SP			1000.23
- 155 - -		1111	SSS	4-11 23-50		Medium brown, fine to medium SAND, trace to some coarse Sand, poorly graded, massive, and WET. Fine and med. sands are well rounded, moderately spherical, and 70-80% quartz. Coarser components are sub-rounded to sub-angular and 20-30% quartz.	SP			995.23
160 —		1111	SSS	18-27 50 / 4"		Medium brown, medium to coarse SAND, trace fine Sand, well graded, massive, and WET. Medium sand is well rounded, highly spherical and 80-90% quartz. Coarse sand is sub-rounded with low sphericity and 10-20% quartz.	SW			990.23
- - 165 —		1111	SSS	10-15 32-50 /3"		Medium brown, medium to very coarse SAND and fine to coarse GRAVEL, trace fine Sand, trace Silt, well graded, and WET, with occasional very coarse Sand lenses. Fine and medium sand is well rounded, highly spherical, and 60-70% quartz. Coarser components are sub-rounded to angular, sub-spherical, and ~10-20% quartz.	SW-GW		Driller indicates lithology change.	986.23
- - 170 — -		1111	SSS	11-17 28-42		Medium brown, medium to very coarse SAND, and fine to coarse GRAVEL, trace fine Sand, trace Silt, well graded, and WET. Fine gravel and coarse sand occur in layers. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. Coarser components are sub-angular, sub-spherical, and ~10-20% quartz.	SW-GW			980.23
- 175 —		1111	SSS	10-23 62		Brown to gray, Silty, CLAY and fine to coarse SAND, medium stiff, moderately plastic, and WET. Grades to brown to gray SAND, and CLAY, trace to some Gravel.	CL-SC		Elevation of change in lithology was noted by driller.	974.73
180-		1111	SSS	31-42 60 / 3"		Brown, medium to very coarse SAND, and fine to medium Gravel, trace fine Sand, trace Silt, well graded, massive, and WET. All components are sub-angular to sub-rounded with low sphericity and are compositionally moderately mature.	SW-GW		Elevation of change in lithology was noted by driller.	970.73
185 — - - 185 —		1111	SSS	4-7 17-35		Brown, medium to very coarse SAND and fine to medium GRAVEL, trace fine Sand and Silt, well graded, massive, and WET. Fine and medium sands are well rounded, highly spherical, and compositionally mature (70-80% quartz). Coarser component is sub-angular, sub-spherical, and 10-15% quartz.	SW-GW			965.23
190-		1111	SSS	4-3 28-60		Gray brown Silty, CLAY, some fine to very coarse (matrix supported) Sand, very stiff, and MOIST.	CL-ML			957.73
- 195 <i>-</i> -		1111	SSS	12-18 70 / 3"		Brown Silty fine SAND, dense, massive, and WET.	SM		Drilling change @192.5'	955.23
-		((Dark gray Silty, CLAY with fine to coarse Sand and fine Gravel (coarse material is matrix supported), very hard and MOIST to DRY.	CL-ML		Heave to 195' in augers, 3"spoon to clean auger, gray fine	950.23