

BORING NO. PROJECT

LOCATION

MW-106D SHEET 2 OF 5 **GSWA: Spring Hill Camp Phase III**

1111.75

1106.25

1101.25

1097.25

Elevation of change in _1097.95

Elevation of change in 1091.25

drillers.

Elevation of change in

lithology indicated by

drillers.

Osceola Township, MI

4065-005

SM

SM

SP

CL-ML

SP

SM

+++

~

1-1

1-1

1-1 1-1

1-1

1-1

1-2

2-3

SSS

SSS

SSS

SSS

75

80

85

90

75

100

100

100

quartz.

~60-70% quartz.

COO	RDINATE	ESN2	229,930	6.2 E	19,442,633.1	PROJECT NO.	4065-0	05		
SURF	ACE ELE	Ενατιοι	N 118	33.75	DATUM USGS	LOGGED BY	GF/PO			
Depth	AMPLE Lab Sample	Sample	1	Rec- overy	DESCRIP	ΓΙΟΝ	USCS	Strata	REMARKS	Elevation Feet
			30-27	% 100	sphericity and ~70-80% quartz. (sub-rounded with low sphericity a		sw	an da tabar		
- - 45		(SSS	7-9 12-15	100	Light brown, fine to medium SAN Sand, trace fine Gravel, trace Silt massive, DRY. Fine to medium S moderate sphericity and ~70-80% is sub-rounded with low sphericity	, loose, well graded, Sand is well rounded with 9 quartz. Coarse fraction	sw			1141.25
50-		(SSS	8-9 10-15	100	Light brown, fine SAND, trace me Gravel, trace Silt, loose, well grac sand is well rounded with modera ~70-80% quartz. Coarse fraction sphericity and ~10% quartz.	led, massive, DRY. Fine te sphericity and	sw			1136.25
- 55 - -		(SSS	3-5 7-7	100	Light brown, medium SAND, trac- Silt, trace coarse Sand, loose, we medium sand is well rounded with ~70-80% quartz. Coarse fraction sphericity, ~10% quartz, and occu seams.	Il graded, DRY. Fine to moderate sphericity and is sub-rounded with low	sw		Elevation of change in lithology indicated by drillers.	1131.2
- 60 - - - -		(SSS	2-3 3-2	100	Light brown, fine SAND and, SIL loose, WET. Brown, fine to medium SAND, tra trace Silt, well to poorly graded, V sand is well rounded with modera ~70-80% quartz. Coarse fraction sphericity and ~10% quartz.	ce to some coarse Sand, /ET. Fine to medium te sphericity and	SM SW-SP		Elevation of change in lithology indicated by drillers. Wet at ~58' bgl.	1125.78 1123.78
65 - - -		SSS	2-2 2-3	100	Brown, fine to medium SAND, tra		SM		replace basket-collapsed to 58';elevation of change	1118.75
		SSS	1-1 1-1	100	trace Silt, loose, well to poorly gra to medium sand is well rounded v and ~70-80% quartz. Coarse fra- low sphericity and ~10% quartz. Brown SILT and fine SAND, trac	Ided, massive, WET. Fine vith moderate sphericity ction is sub-rounded with	SW-SP	 इ.स.च.	by drillers.	1111.75

Brown SILT and fine SAND, trace medium Sand, trace

~70-80% quartz.

sphericity and ~60-70% quartz.

organic matter, trace coarse Sand, loose, massive, WET. Fine sand is well rounded with moderate sphericity and

Brown SILT and fine SAND, trace medium Sand, loose,

massive, WET. Fine sand is sub-angular with moderate

Brown, fine to medium SAND, trace coarse Sand, trace Silt,

loose, poorly graded, massive, WET. Fine to medium sand

is sub-angular to with moderate sphericity and ~60-70%

Brown to red, fine to medium SAND, trace coarse Sand,

trace Silt, loose, poorly graded, massive, WET. Fine to medium sand is sub-angular with low sphericity and

Brown Silty, CLAY, trace fine Sand, soft, moderate plasticity, MOIST.



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

BORING NO. PROJECT LOCATION MW-106D SHEET 3 OF 5 GSWA: Spring Hill Camp Phase III

Osceola Township, MI

COORDINATES N 229,936.2 E 19,442,633.1

DATUM USGS

PROJECT NO.	4065-005
LOGGED BY	GF/PO

1err Sample 1pe Units % 95 558 2-3 100 Brown to gray, fine SAND and, SiLT, trace medium Sand, local states Sand,	S	AMPLE	١N	NFOF	RMATI	ON			g		ion t
95 SSS 2-3 4-4 100 loose, maskive, WET. (continued) SM drillers. 100 SSS 1-2 100 100 SSS 100 SSS SW SW SW SW 100 105 SSS 2-1 2-4 100 SSS 2-1 10 100 SSS SW SW SW SW SW 100 110 SSS 2-1 2-4 50 SSS SW				•		overy		USCS	Strata		Elevation Feet
100 SSS 1-2 3-5 100 100 SSS 1-2 3-5 100 105 SSS 2-1 4 100 106 SSS 2-1 4 100 110 SSS 2-1 5 100 110 SSS 2-1 4 50 110 SSS 2-1 5 50 110 SSS 2-1 5 50 110 SSS 2-1 5 50 110 SSS 2-1 5 50 111 SSS 3-3 5 100 Inderset status to some fine Sand, medium stdr, inderset shperioting and -50% quartz. Coarse sand socurus as occasional lenses of coarse sand, south race ship,	95 - -			SSS		100		SM			
105 2.4 100 trace Silt, trace Coarse Sand, loose, well graded, WET. SW 110 2.5SS 2.4 100 filter to coarse Sand, loose, well graded, WET. SW 110 2.5SS 2.1 50 for Coarse Sand Sub-rounded with moderate sphericity and -50-60% quartz. Coarse Sand, loose, well graded. Filter to coarse sand, loose, well graded. Trace Silt, trace Silt, cocasional lenses. SW SW 110 2.5SS 2.1 50 for Coarse Sand, loose, well graded. Trace Silt, booty graded, well graded. Trace Silt, booty graded, well graded. Trace Silt, booty graded, well graded, massive, WET. Fine to some fine To medium Sand, trace Silt, booty graded, wet. Fine to coarse sand is sub-angular. SW CL-ML 115 2.5SS 4.14 75 sphericity and conspeed almost tentiley of rock fragments. Light brown, fine to medium SAND, trace fine Gravel, trace fine Sand, poorly graded, wet. Fine to medium sand fine Gravel, well graded, massive, WET. Fine to coarse sand, sub-angular, trace Silt, poorly graded, wet. Silt, poorly gr	- - 100 -		וווו	SSS		100	trace Silt, trace coarse Sand, loose, well graded, WET. Fine to coarse sand is rounded with moderate sphericity	sw			1086.25
110 SSS 2-4 50 115 SSS 3-3 100 115 SSS 3-3 100 Town, medium to coarse SAND, trace to some fine 3and, trace Sit, poorty graded, wet. Fine to medium suff, race fine Sand, poorty graded, wet. Fine to medium sand its well rounded with high sphericity and -80-90% quartz. SP 120 SSS 4-14 75 Coarse fraction is well rounded with high sphericity and -80-90% quartz. SP Last sample of 11/3/00. Dillers Augeret to 124. 120 SSS 8-38 100 To Carse fraction and fine Gravel, trace fine Sand, trace well well well well well rounded, well medium and its well rounded, well well well well well well well wel	- - 105 -			SSS		100	trace Silt, trace coarse Sand, loose, well graded, WET. Fine to coarse sand is sub-rounded with moderate sphericity and ~50-60% quartz. Coarse Sand occurs as	SW			1081.25
110 SSS 2-4 50 and -50-60% quartz. Coarse sand occurs as occasional limbology indicated by guess. Brown, Silty, CLAY, trace to some fine Sand, medium stiff, medium for coarse SAND, trace to some fine Sand, trace Silt, poorly graded, measile, MOIST. CL-ML Image: Single of single s	-		ļ		2-1		occasional lenses of coarse Sand, loose, well graded. Fine	sw			1076.25
115 Brown, medium to coarse SAND, trace to some fine some fi	110- - -		נוח	SSS		50	and ~50-60% quartz. Coarse sand occurs as occasional lenses. Brown, Silty, CLAY, trace to some fine Sand, medium stiff, moderately plastic, MOIST.	CL-ML		lithology indicated by drillers.	1073.75 1071.75
120 SSS 4-14 27-35 75 trace fine Sand, poorly graded, wet. Fine to medium sand is well rounded with high sphericity and -80-90% quartz. Coarse fraction is well rounded with low to moderate sphericity and composed almost entirely of rock fragments. Light brown, fine to medium SAND, trace coarse Sand, trace Sitt, poorly graded, wet. All material is well rounded with high sphericity and -90% quartz. SP SP over logging from 119' on. 125 SSS 8-38 87-50 100 GRAVEL, trace coarse Sand, and fine Gravel, well graded, and WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. Coarse component is 15-10% quartz. Coarse sand and fine gravel occurs as 15-10% quartz. Coarse sand and fine gravel occurs as 130 SW-GW 0 0 130 SSS 5-14 44-40 100 Smown, fine to very coarse SAND, trace to some fine and coarse rounded with low sphericity, and 10-20% quartz. SP SP 130 SSS 53-30 95- 100 SP SP SP 140 SSS 4-3 4-8 25 SSN derived massive, WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. SM SM 140 SSS 4-3 4-8 25 Brown, fine to coarse SAND, trace solit, poorly graded, more locarse SAND and fine GRAVEL, trace Sit, well graded, massive, WET. Fine to medium sand is well SM SW 140 SSS	- 115 -		וננת	SSS		100	Brown, medium to coarse SAND, trace to some fine to medium Gravel, trace to some fine Sand, trace Silt, poorly graded, massive, WET. Fine to coarse sand is sub-angular	SP		11/2/00.	
Light brown, fine to medium SAND, trace coarse Sand, trace Silt, poorly graded, wet. All material is well rounded / Indeed to 124'. (New driller - 100) (Dennis); water level at 0755 11/3/00 is 68 A/Segin at 124' on and WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. Coarse component is 5-10% quartz. Coarse component is and, trace very coarse SAND, trace Silt, poorly graded, WET. Fine to medium sand is well rounded, highly spherical, and 60-70% quartz. Coarse component is angular, spherical, and 70-80% quartz. Brown, fine to very coarse SAND, trace Silt, poorly graded, WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. Brown fine to coarse SAND, trace Silt, poorly graded, WET. Fine to medium sand is well rounded, highly spherical, and 50-70% quartz. Brown fine to coarse SAND, trace Silt, poorly graded, WET. Fine to medium sand is well rounded, spherical, and 50-70% quartz. Brown fine to coarse SAND and fine GRAVEL, trace Silt, well graded, massive, WET. Fine to medium sand is well rounded, highly spherical, and 50-70% quartz. Brown, fine to coarse SAND and fine GRAVEL, trace Silt, well graded, massive, WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. Brown, fine to coarse SAND and fine GRAVEL, trace Silt, well graded, massive, WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. Brown, fine to medium SAND, trace Silt, poorly graded, Brown, fine to me	- - 120		ווו	SSS		75	trace fine Sand, poorly graded, wet. Fine to medium sand is well rounded with high sphericity and ~80-90% quartz. Coarse fraction is well rounded with low to moderate	SP		over logging from 119' on.	1066.25 1063.75
125 SSS 87-50 100 GRAVEL, trace coarse Sand and fine Gravel, well graded, and WET. Fine to medium sand is well rounded, highly 68.4':begin at 124' on 116/00. 130 SSS 5-14 100 GRAVEL, trace coarse sand and fine gravel occurs as is well rounded, highly Flexation of change in 100 130 SSS 5-14 100 Brown, medium SAND, trace to some fine and coarse SP 130 SSS 5-14 100 Brown, medium SAND, trace to some fine and coarse SP 130 SSS 5-14 100 Brown, medium sand is well rounded, highly SP 130 SSS 5-14 100 Brown, fine to very coarse SAND, trace Silt, poorly graded, massive, WET. Fine to medium sand is well rounded, highly SP 135 SSS 53-30 95 100 WET. Fine to medium sand is well rounded, highly SP 140 SSS 4-3 25 100 Brown, fine to coarse SAND, trace Silt, poorly graded, massive, WET. Fine to medium sand is well SM SM 104 140 SSS 4-3 25 Brown, fine to coarse SAND and fine GRAVEL, trace Silt, poorly graded, massive, WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. SW-GW	-		q				Light brown, fine to medium SAND, trace coarse Sand, trace Silt, poorly graded, wet. All material is well rounded / \with high sphericity and ~90% quartz.		0	Augered to 124'. New driller (Dennis);water level at	1061.25
130 Iseams of less than 0.1 feet. Brown, medium SAND, trace to some fine and coarse Sand, trace very coarse Sand, poorly graded, massive, WET. Fine to medium sand is well rounded, highly spherical, and 60-70% quartz. Coarse component is rounded with low sphericity, and 10-20% quartz. Brown, fine to very coarse SAND, trace Silt, poorly graded, WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. Coarse component is angular, spherical, and ~10-20% quartz. Brown SILT and fine SAND, trace medium Sand, non-plastic, massive, WET. Fine to medium sand is well rounded, spherical, and 50-70% quartz. Brown, fine to coarse SAND and fine GRAVEL, trace Silt, well graded, massive, WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. SM 104 140 SSS 4-3 4-8 25 Brown, fine to medium SAND, trace Silt, poorly graded, well rounded, highly spherical, and 70-80% quartz. SW-GW 0 140 SSS 4-3 4-8 25 Brown, fine to medium SAND, trace Silt, poorly graded, Brown, fine to medium SAND, trace Silt, poorly graded, SW-GW 0	125 - -		וווח	SSS	87-50	100	GRAVEL, trace coarse Sand and fine Gravel, well graded, and WET. Fine to medium sand is well rounded, highly pspherical, and 70-80% quartz. Coarse component is	SW-GW)	68.4';begin at 124' on 11/6/00. Elevation of change in	1057.25
Brown, fine to very coarse SAND, trace Silt, poorly graded, WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. Brown SILT and fine SAND, trace medium Sand, non-plastic, massive, WET. Fine to medium sand is well rounded, spherical, and 50-70% quartz. Brown, fine to coarse SAND and fine GRAVEL, trace Silt, well graded, massive, WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. Brown, fine to medium SAND, trace Silt, poorly graded, Brown, fine to medium SAND, trace Silt, poorly graded, Brown, fine to medium SAND, trace Silt, poorly graded, Brown, fine to medium SAND, trace Silt, poorly graded,	- - 130 -		וננע	SSS		100	Seams of less than 0.1 feet. Brown, medium SAND, trace to some fine and coarse Sand, trace very coarse Sand, poorly graded, massive, WET. Fine to medium sand is well rounded, highly spherical, and 60-70% quartz. Coarse component is	SP			
Image: Section of change in fine to medium SAND, trace Silt, poorly graded, fine to medium stand fine to medium SAND, trace Silt, poorly graded, fine to medium stand fine to medium SAND, trace Silt, poorly graded, fine to medium stand fine to medium s	- 135 -			SSS		100	Brown, fine to very coarse SAND, trace Silt, poorly graded, WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. Coarse component is	SP			1051.25
140 - Image: SSS 4-3 4-8 25 well graded, massive, WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz. SW-GW Image: SW-GW Image: SSS 4-8 25 Image: Brown, fine to medium SAND, trace Silt, poorly graded, Image: SW-GW SW-GW Image: SW-GW I	-			-	95		Brown SILT and fine SAND, trace medium Sand, non-plastic, massive, WET. Fine to medium sand is well rounded, spherical, and 50-70% quartz.	SM	↓ ↓		1048.25 1046.25
	140 - - -		ינול	SSS		25	well graded, massive, WET. Fine to medium sand is well rounded, highly spherical, and 70-80% quartz.	sw-gw	0 0		
A control of the second of the	- - 145			SSS	7-14 20-23	100	massive, WET. Sand is well rounded, highly spherical, and 80-90% quartz. Brown SILT and very fine SAND, trace medium Sand,	SP SM		lithology indicated by drillers (layers of fine	1041.25 1039.25



1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 BORING NO. PROJECT LOCATION

PROJECT NO.

MW-106D SHEET 4 OF 5 GSWA: Spring Hill Camp Phase III

lessele Teurobin MI

Osceola Township, MI 4065-005

COORDINATES N 229,936.2 E 19,442,633.1

DATUM USGS

LOGGED BY **GF/PO**

S	AMPLE	IN	IFOF	RMATI	ON			а		ion t
Depth feet	Lab Sample		mple ype	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
- - 150 -			SSS	3-4 13-21		40 degrees. Brown, fine to medium SAND, trace Gravel, poorly graded. Sand is well rounded and highly spherical, and ~70-80% quartz.	<u>SM</u>			1036.25
- - 155 -		ιτι	SSS			Brown, fine to very coarse SAND and fine GRAVEL, trace Silt, well graded, WET. Brown SILT and CLAY, trace fine to coarse Sand, trace very coarse Sand, stiff, low plasticity, MOIST. Upper contact at oblique(40 degree) angle.	SW-GW		Elevation of change in lithology indicated by drillers. Elevation of change in lithology indicated by	1031.25 1029.25
- - 160 -		ιτι	SSS	0-1 4-7	75	Grayish brown, fine to coarse SAND, little to some Clay, trace fine Gravel, very loose, massive, WET. Fine to coarse sands are rounded, spherical, 80-90% quartz. Fine gravel is sub-rounded, sub-spherical, and 60-70% quartz.	sc		drillers. 	1025.75
- - 165 -			SSS	3-7 13-19	66	Brown, fine to coarse SAND, little Clay, medium dense, poorly graded, massive, WET. Fine to medium sands are well rounded, spherical, and 80-90% quartz. Coarse sand is rounded, sub-spherical, and 60-70% quartz.	SP			1021.25
- - 170 - -			SSS	4-17 40-44	66	Light brown, fine to coarse SAND, trace Silt and Gravel, very dense, poorly graded, massive, WET. Fine to medium sands are well rounded, highly spherical, and 80-90% quartz. Coarse sand is well rounded, sub-spherical, and 70-80% quartz. Brown to light gray, fine to coarse SAND, trace Silt and Gravel, very dense, poorly graded, massive, wet. Fine to	SP SP		Color change from light brown to light gray and brown at 170'. Fine sands are likely	1016.25 1013.75 1011.25
- 175 - -		ιτι	SSS	3-8 26-35	17	medium sands are well rounded, highly spherical, and 80-90% quartz. Coarse sand is well rounded, subspherical, and 70-80% quartz. Multicolored to brown, very coarse SAND, trace fine Sand and Gravel, very dense, poorly graded, massive, WET. Coarse sand is rounded to sub-rounded, low sphericity, and 60-70% quartz. Fine sand is well rounded, highly	SP		only slough; driller says it is likely that we hit large gravels and thus low recovery. 179-181' first sample attemp, no recovery.	1006.25
- 180 - -		ιτι	SSS	3-8 26-35	50	spherical, and 80-90% quartz. Light brown, fine to medium SAND, trace Silt, medium dense, poorly graded, massive, WET. Sand is well rounded with high sphericity and 80-90% quartz.	SP	· ·	Likely due to Gravel.	1001.05
- - 185 -		ιτι	SSS	2-3 10-13	50	Light brown, fine to medium SAND, trace Silt, medium dense, poorly graded, massive, WET. Sand is well rounded and highly spherical, and ~80-90% quartz.	SP			1001.25
- - 190-			SSS	0-3 7-12	50	Light brown, fine to medium SAND, trace Silt, medium dense, poorly graded, massive, WET. Sand is well rounded and highly spherical, and ~80-90% quartz.	SP			996.25
- - 195		ιι	SSS	3-4 14-16		Light brown, fine to medium SAND, trace Silt, medium dense, poorly graded, massive, WET. Sand is well rounded and highly spherical, and ~80-90% quartz.	SP			991.25
-				3-6			SP		199-201' first sampling attempt, no recovery.	986.25



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DATUM **USGS**

BORING NO. PROJECT LOCATION MW-106D SHEET 5 OF 5 GSWA: Spring Hill Camp Phase III

Coccele Township MI

Osceola Township, MI

COORDINATES N 229,936.2 E 19,442,633.1

17

PROJECT NO.	4065-005
LOGGED BY	GF/PO

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SAMPLE INFORMATION					ON			_		u
Depth feet	Lab Sample		ample Гуре	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-			SSS	10-17	50	Light brown, fine to medium SAND, trace Silt, medium dense, poorly graded, massive, WET. Sand is well rounded and highly spherical, and ~80-90% quartz. <i>(continued)</i>	SP			
205		, ((I	SSS	3-5 9-10				n 1920 - Ang		
- - 210-		וננע	SSS	18-52 97	25	Light brown,fine to medium SAND, trace Silt, dense, poorly graded, massive, WET. Fine sand is rounded to sub-rounded with high sphericity and 85-95% quartz. Medium sand is angular, sub-spherical, and 80-90% quartz.	SP			976.25
-			SSS			Light brown, fine to coarse SAND, trace Silt, dense, well graded, massive, WET. Fine sand is sub-angular to well rounded with high sphericity and 85-95% quartz. Medium	SW			971.25
215 - -		, (222			and coarse sand is angular with low sphericity and 75-85% quartz. Silt occurs as one ~1/4" very soft gray clast. Light gray to brown, fine to medium SAND, some Silt,				966.25
220-		וננת	SSS	25-57 110	42	dense, massive, WET. Sand is well rounded with high sphericity and 85-95% quartz. Silt occurs in ~3" thick lenses dispersed throughout the sample.	SM			000.20
- 225		וננו	SSS	6-21 44-65		Light brown, fine to medium SAND, trace to little Silt, dense, poorly graded, massive, WET. Sand is well rounded with high sphericity and 85-95% quartz.	SP	· ·		961.25
- - 230-		וני	SSS	13-68 100 for		Light brown, fine to 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 angular, sub-spherical, and 60-70% guartz.	SP			956.25
-		, L		3"		Light brown, fine to medium SAND, trace Silt, dense, poorly graded, massive, WET. Fine sand is well rounded with			Sampled with sand bailer.	951.25
- 235 -		E.	GRAB			high sphericity and 80-90% quartz. Medium sand is angular with low sphericity and 60-70% quartz.	SP		Dallel.	
- - 240		ווו	SSS	21-72 100 for	42	Light brown, fine to medium SAND, trace Silt and fine Gravel, very dense, well graded, masssive, WET. Fine to medium sand is well rounded with high sphericity and 80-90% quartz. Gravel is angular to sub-rounded and	sw			946.25
-		4		4" 		50-60% quartz.			End of boring - 241'.	942.75

COC SURI	DRDINATE FACE ELE	ES EV/	N 2	2 30,06 0 N 118		East La Telepho Fax: (5 19,440,4	bbott Road, Suite 210 Insing, MI 48823 Dne: (517) 337-0111 17) 337-0417 69.3 M USGS LOCATION DESCRIPTION:	MW-107D SHEET 1 OF 0 GSWA: Spring Hill Camp Phase III Osceola Township, MI 4065-005 Phil Odenkirk					
Ste DRIL 41/ DRIL	arns LING MET /4" HSA LING STA 2/00	ΓH	OD		5 1050		See attached Site Diag	am for location.					
Ē	SAND CLAY GRAVEL	1	STRA		Y SILT CLAYEY SILTY S				-1				
S Depth feet	AMPLE Lab Sample	Sa	ample	RMATI Blow Counts	ON Rec- overy %		DESCRIPTION		USCS	Strata	REMARKS	Elevation Feet	
							own, SAND, little Clay, trace Silt , and MOIST.	, slightly plastic,	SP-SC			1180.68	
5			SSS	1-1 1-1	75	∖graded, ∖ <u>spherica</u> Brown, f MOIST.	own, fine to medium SAND, trac massive, and MOIST. Sand is II, and 90% quartz. ine to coarse SAND, little Clay, Fine sand is well rounded, and sand is angular, and 70-80% qu	well rounded, massive, and I 80-90% quartz.	SP SC			1176.18 1175.48	
10			SSS	10-25 50/6"	75	massive	own, fine to coarse SAND, trace , and MOIST. Fine to medium . Coarse sand is angular.	e Silt, poorly graded, sand is well	SP			1170.68	
- 15 - -			SSS	7-7 14-15	83	somewh	own, fine to coarse SAND, poor at stratified, and MOIST. Sand	is rounded.	SP			1166.68	
- 20 -			SSS	7-8 12-16	67	massive rounded sub-rour	ine to coarse SAND, trace Silt, , and MOIST. Fine to medium , spherical, and 70-80% quartz. nded, sub-spherical, and 50-60°	sands are well Coarse sand is % quartz.	SW			1162.68	
- 25 -		ιτιτ	SSS	8-16 25-28	67	graded,	own, fine to medium SAND, trac massive, and MOIST. Fine to r and spherical with ~70-80% qu	medium sand is well	SP			1158.18	
		ll		7-8					SP			1151.68	



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BORING NO. PROJECT LOCATION

PROJECT NO.

MW-107D SHEET 2 OF 6 **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI

COORDINATES N 230,060.0 E 19,440,469.3

DATUM **USGS**

4065-005 Phil Odenkirk LOGGED BY

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SAMPLE INFORMATION								ø		t t
Depth feet	Lab Sample	Ту	·	Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-			SSS	20-21	67	Light brown, fine to medium SAND, trace Silt, poorly graded, massive, and MOIST. Sand is well rounded, spherical, and 80-90% quartz. <i>(continued)</i>	SP			
- 35 - -		IIII	SSS	7-12 17-20	67	Light brown, fine to medium SAND, trace Silt, trace fine Gravel, poorly graded, and MOIST. Sands are well rounded, spherical, and 80-90% quartz. Gravel occurs as a 3" seam of fine Gravel at 35' bgl. Gravel is sub-rounded, 50-60% quartz.	SP			1146.68
-						Light brown, fine to coarse SAND, some fine to medium Gravel, trace Silt, well graded, massive, and MOIST. Fine to medium sand is sub-rounded, highly spherical, and				1143.18
40		ווא	SSS	7-12 18-21	67	80-90% quartz, Gravel is angular, and 50-60% quartz.	SW			
-						Light brown, fine to medium SAND, trace Silt, poorly graded, massive, and MOIST. Sand is sub-rounded, spherical, and 80-90% quartz.				1138.18
45		IIIS	SSS	7-21 31-38	75		SP			
-		~				Light brown, fine to medium SAND, trace Silt, poorly graded, massive, and MOIST. Sand is well rounded, spherical, and 80-90% quartz.	SP			1133.18
50 - -		TIL	SSS	7-16 22-24	67	Brown, fine to coarse SAND, some fine to medium Gravel, trace Silt, well graded, massive and MOIST. Sands are sub-rounded, spherical, and 80-90% quartz. Gravel is angular and 50-60% quartz.	sw			1130.68
- 55 -		IT S	SSS	4-8 10-13	67	Brown, fine to coarse SAND, some fine to medium Gravel, trace Silt, well graded, massive, and MOIST. Sand is sub-rounded with low sphericity and 80-90% quartz. Light brown, fine to coarse SAND, trace Gravel, trace Silt,	sw		Water encountered at	¥126.68 1125.18
-						poorly graded, massive, and WET. Fine to medium sand is sub-rounded, sub-spherical, and 60-80% quartz. Coarse sand is angular and 50-60% quartz. 1-1.25" Gravel is angular with low sphericity, and composed of white to gray chert.	SP		55.5' bgl during drilling.	
60 -		ILLE	SSS	7-12 10-14	67					
-						Light brown, fine to coarse SAND, trace Silt, poorly graded, massive, and WET. Sand is sub-angular to sub-rounded, sub-spherical, and 60-70% quartz.				1118.18
65		i s	SSS	2-3 7-8	63		SP			
-						Light brown, fine to coarse SAND, some medium Gravel, trace Silt, well graded, massive, and WET. Sand is sub-angular to sub-rounded, sub-spherical, and 60-70%	sw			1113.18
		Ы		12-23		quartz. Gravel is sub-angular to sub-rounded, and 20-30%		1		



1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 BORING NO. PROJECT LOCATION PROJECT NO.

LOGGED

MW-107D SHEET 3 OF 6 GSWA: Spring Hill Camp Phase III

Osceola Township, MI 4065-005

COORDINATES N 230,060.0 E 19,440,469.3

DATUM **USGS**

BY	Phil	Odenkirk	

SAMPLE INFORMATION					ON					
Depth feet	Lab Sample	Sa	ample Type		Rec- overy %	REMARKS	Elevation Feet			
-			SSS	18-20	58	quartz. Light brown, fine to coarse SAND, trace Silt, trace fine to medium Gravel, well graded, and WET. Sands are	sw			1108.1
75-		ווווו	SSS	8-9 23-30	33	sub-rounded, sub-spherical, and 70-80% quartz. Gravel is rounded, sub-spherical, and approximately 50% quartz.	SW			
-		1		8-16		Light brown, fine to medium SAND, trace Silt, poorly graded, massive, and WET. Sand is rounded, spherical, and 70-80% quartz.				1103.1
80		ווו	SSS	21-27	75		SP	n an an T		
- 85-			SSS	3-8 21-22	83	Light brown, fine to medium SAND, trace Silt, trace fine Gravel, poorly graded, and WET. Sand is rounded, highly spherical, and 75-85% quartz. Fine Gravel occurs as 3" lens at 85.6' bgl, and is sub-rounded and 60-70% quartz.	SP			1098.1
-						Brown, fine to coarse SAND, some fine to medium Gravel, well graded, massive, and WET. Sand is angular to rounded, sub-spherical, and 70-80% quartz. Gravel is				1093.1
90		ווון	SSS	5-11 20-25	75	rounded, sub-spherical, and 70-80% quartz.	SW			
-						Multicolored, fine to coarse SAND, some fine to medium Gravel, trace Silt, well graded, massive, and WET. Sand is angular to rounded, sub-spherical, and 70-80% quartz.	sw			1088.1
95		נננק	SSS	10-25 27-30	42	Gravel is rounded, sub-spherical, and 70-80% quartz. Multicolored, fine GRAVEL, little medium Gravel, poorly graded, massive, and WET. Gravel is well rounded wtih low sphericity and 60-70% quartz.	GP			1085.1
-						Light brown, fine to medium GRAVEL, trace to some fine to coarse Sand, trace Silt, well graded, and WET. Sand and Gravel is sub- to well rounded with low to high sphericity. ⊃ Sand is ~50% quartz and ~50% rock fragments. Gravel is	GW			1083.1
00		נוו	SSS	20-25 31-35	67	entirely rock fragments. Contact between SP and GW is sharp at 99.5'. Light brown, fine to medium SAND, trace coarse Sand, poorly graded, and WET. Sand is well rounded with moderate to high sphericity and ~95% quartz.	<u>SP</u> GW			<u>1081.1</u> 1080.7 <u>1078.1</u>
- - 05			SSS	10-25 27-29	75	Light brown, fine to medium GRAVEL, trace to some fine to coarse Sand, trace Silt, well graded, and WET. Sand and gravel are sub- to well rounded with low to high sphericity. Sand is ~50% quartz and ~50% rock fragments. Gravel is entirely rock fragments.	SP	· ·		1070.1
-						Light brown, fine to medium SAND, little to some fine to coarse Sand, poorly graded, occasional 1-2" thick lenses of fine to coarse Gravel, poorly graded, and WET. Sand is well rounded with moderate sphericity and is composed of ~80-90% quartz and 10-20% rock fragments.	SP			1073.1
		A		10-15		Light brown, fine to medium SAND, trace fines, massive, poorly graded, and WET. Sand is rounded with low				



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BORING NO. PROJECT LOCATION

PROJECT NO.

MW-107D SHEET 4 OF 6

GSWA: Spring Hill Camp Phase III

Osceola Township, MI

COORDINATES N 230,060.0 E 19,440,469.3

DATUM USGS

LOGGED BY Phil Odenkirk

4065-005

JUK	FACE EL		ATION		00.00	DATUM USUS ECOCED BT	•		-	
SAMPLE INFORMATION								a a		Б.,
Depth feet				Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-			SSS	16-16	50	sphericity and 70-80% quartz Multicolored, fine to medium GRAVEL, trace Sand, well graded. Gravel is rounded.	GW			1070.18
- - 15-		ιτιτ	SSS	3-8 13-13	63	Light brown, fine to medium SAND, trace coarse Sand and fine Gravel, trace Silt, well graded, massive, and WET. Fine to medium sand is well rounded with medium to high sphericity and 80-90% quartz. Coarse sand and gravel is sub-angular to sub-rounded with low to medium sphericity and 70% rock fragments.	sw			1068.18
-				11.26		Light brown, fine to medium SAND, trace coarse Sand and Silt, poorly graded, and WET. Fine to medium sand is well rounded with medium to high sphericity and 85-95% quartz.				1063.18
20 - - -			SSS	11-36 50 for 3"	50	Coarse sand is sub-angular to rounded with low to medium sphericity and is primarily rock fragments.	SP			
-				15.01		Light brown, fine SAND, little Silt, massive, and WET. Sand is well rounded with high sphericity and 80-90% quartz. Top 8" grades into fine Sand and Silt with occasional Clay seams (<1 cm thick) at bottom 8".	+			1058.1
25 - -		. (((SSS	15-21 50/6"	67		SM			
-			SSS	19-50/6'		Light brown, fine to medium SAND, trace coarse Sand and Gravel, trace Silt, poorly graded, and WET. Fine to medium Sand is well rounded with high sphericity and 80-90% quartz. Coarse sand and gravel is sub-rounded	SP			1053.1
30 - -		((()	555		75	with low to medium sphericity and is composed of rock fragments, quartz, and occasional 1" diameter Clay clasts.	58			
-				4-11		Light brown, fine to medium SAND, trace Silt, poorly graded, and WET. Sand is well rounded with high sphericity and 80-90% quartz.				1048.1
35 - -		(((SSS	18-19	67		SP			
-				16-50/6'		Light brown, fine to medium SAND, trace coarse Sand and fine Gravel, trace Silt, poorly graded, massive, and WET. Sand and gravel are well rounded with high sphericity and 80-90% quartz.				1043.1
40			SSS	16-50/6' 	67		SP			
-				45.40		Light brown, fine to medium SAND, trace Silt and coarse Sand, poorly graded, massive, and WET. Sand is well rounded with high sphericity and 80-90% quartz.			1240:Drillers stop drilling for weekend.	1038.1
45		יננע	SSS	15-16 19-21	67		SP			
-						Light brown, fine to medium SAND, trace coarse Sand, poorly graded, massive, and WET. Sand is well rounded with high sphericity and 80-90% quartz.	SP		Larry Jordan logging (11/6/00).	1033.1
		Ы		10-14						



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DATUM **USGS**

BORING NO. PROJECT LOCATION MW-107D SHEET 5 OF 6 GSWA: Spring Hill Camp Phase III

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Osceola Township, MI

COORDINATES N 230,060.0 E 19,440,469.3

PROJECT NO. LOGGED BY

0. **4065-005 Phil Odenkirk**

S	AMPLE	IN	IFOF	RMATI	ON			ŋ		ion t
Depth feet	Lab Sample	Т		Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-			SSS	16-21	100	Light brown, fine to medium SAND, trace coarse Sand, poorly graded, massive, and WET. Sand is well rounded with high sphericity and 80-90% quartz. <i>(continued)</i>	SP			
155 - - -		IIII	SSS	3-7 10-14	100					
- 160			SSS	4-4 8-11	50	Light brown, fine to medium SAND, trace coarse Sand, poorly graded, and WET. Fine to medium sand is well rounded with high sphericity and >90% quartz. Coarse fraction is sub- to well rounded with low to high sphericity and ~90% rock fragments.	SP			1023.18
-		Ι	SSS	10-25	100	Light brown, medium to coarse SAND, trace fine Sand and fine Gravel, poorly graded, massive, and WET. Sand is well rounded with high sphericity and 70-80% quartz. Gravel is sub- to well rounded with medium sphericity and	SP		5' heave in augers. 164-166' sample, pushed through 12" heave.	1018.18
165 -		וו	222		100	~80% rock fragments. Light brown, fine GRAVEL and medium to coarse SAND, well graded, and WET. Sand is well rounded with high	GW			1014.98
- - 170 -		ιττι	SSS	6-12 	75	sphericity and 60-70% quartz. Gravel is sub- to well rounded with medium to high sphericity and >90% rock fragments. Light brown, fine to medium SAND, trace coarse Sand, poorly graded, massive, and WET. Fine to medium sand is well rounded with high sphericity and ~70-80% quartz. Coarse fraction is sub- to well rounded with medium to high sphericity and ~80% rock fragments.	SP	<u>60</u>	5' heave in augers. 169-171' sample, pushed through 12" heave.	- 1013.18
-		ιι		12-28		Light brown, fine to medium SAND, trace coarse Sand, poorly graded, and WET. Fine to medium sand is well rounded with high sphericity and ~70-80% quartz. Coarse fraction is angular to sub-angular with low sphericity and	SP		5' heave in augers. 174-176' sample, pushed through 12" heave.	1008.18
175 - -		נוח	SSS		10	~90% rock fragments. Light brown, fine to medium SAND, trace coarse Sand,	58			1003.18
- 180 — -		וווו	SSS	16-50/6' 	75	poorly graded, and WET. Majority of fine to medium sand is well rounded and highly spherical. Fraction of fine and medium sand has low sphericity. High sphericity material is ~90% quartz; low sphericity material is >80% rock fragments. Coarse sand is sub- to well rounded with medium sphericity. Gravel has low to medium sphericity.	SP <u>(SP/GP</u> SP	<u>e </u>		<u>1000.68</u> 1000.38
-						Sand is predominantly quartz. Gravel is ~90% rock fragments. Light brown, medium to coarse SAND and GRAVEL. Sand is highly spherical and predominantly quartz. Gravel has low to medium sphericity and ~90% quartz. All material is			Bailed 5' heave.	998.18
185 - -		נוו	SSS	11-50/6' 	100	well rounded. Light brown, fine SAND, little medium Sand, poorly graded, and WET. Sand is well rounded, highly spherical, and ~90% quartz. Light brown, fine to medium SAND, trace coarse Sand and	SP			993.18
-				11-50/6'		fine Gravel, poorly graded, massive, and WET. Fine to medium sand is well rounded, highly spherical, and ~80% quartz. Coarse sand is ~80% rock fragments. Gravel is angular to sub-rounded with low sphericity and >90% rock	SP			993.18



BORING NO. PROJECT

LOCATION

MW-107D SHEET 6 OF 6 **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI

COORDINATES N 230,060.0 E 19,440,469.3

SURFACE ELEVATION 1180.68 DATUM **USGS** PROJECT NO.

4065-005 Phil Odenkirk LOGGED BY

301	FACE ELI	LVA	HON		60.08	DATUM USGS					
S	AMPLE		FOR	RMATI					ita		ltion et
Depth feet		Ту	/pe	Blow Counts	Rec- overy %	DESCRIPTI	ON	USCS	Strata	REMARKS	Elevation Feet
-			sss		50	fragments. Overall spoon coarsens Light brown, fine to medium SAND, fine Gravel, poorly graded, and WE sand is well rounded, highly spheric Coarse fraction is sub-angular to su sphericity and ~90% rock fragment fine to medium Gravel. (continued)	trace coarse Sand and T. Fine to medium cal, and 80-90% quartz. ub-rounded with medium s. At 190' bgl, 2" lens of	SP	a, dan dag a, dan dag	5' heave in augers. 189-191' sample, pushed through 12"	988.18
195 - -		ווא	SSS	16-21 	35	Light brown, fine to medium SAND, poorly graded, massive, and WET. sub-rounded, highly spherical, and Coarse sand is sub-angular with low rock fragments.	Fine to medium sand is ~90-95% quartz. w sphericity and ~80%	SP		heave.	
- - 200			SSS	6-14 30	50	Light brown, fine to medium SAND, poorly graded, massive, and WET. well rounded, highly spherical, and Coarse sand is ~90% rock fragmen sub-angular to sub-rounded with lo	Fine to medium sand is ~80-90% quartz. ts. Gravel is	SP		5' heave	983.1
-		נת		50		Light brown, fine to medium SAND,				5' heave	978.18
- 205 -		IT S	SSS	16-50/5' 	75	poorly graded, massive, and WET. well rounded, highly spherical, and Coarse sand is ~90% rock fragmer sub-rounded with medium sphericit GRAVEL and fine to coarse SAND	Fine to medium Sand is ~80-90% quartz. ts, sub-angular to y. ~2" thick lense of fine	SP			
-				12-16		Light brown, fine to medium SAND, Sand, trace fine Gravel, poorly grac Fine to medium sand is sub- to wel spherical, with ~70-80% quartz. Co	led, massive, and WET. I rounded and highly	SP			973.1
210			SSS		75	to sub-rounded with low sphericity a fragments.				End of boring - 211'.	969.6

COC SURI DRIL Ste DRIL 4 1/ DRIL 11/	DRDINATE FACE ELE LING COM arns LING MET 4" HSA LING STA 16/00 SAND CLAY		N 2 ATION RACT OD TED	230,06(118 OR EQUIP CME ENDER 11/10 TA KEY	0.5 E ² 30.75 MENT 1050 0 6/00	East La Telepho Fax: (5 19,440,4 DATUN	bbott Road, Suite 210 ansing, MI 48823 one: (517) 337-0111 517) 337-0417 58.6 M USGS LOCATION DESCRIPTION: See attached Site Diagra	BORING NO. PROJECT LOCATION PROJECT NO. LOGGED BY		: Sprir la Tow 05	SHEET ng Hill Camp Pha nship, MI k	1 OF 3 ase III
<u> </u>	GRAVEL				SILTY S							
S	AMPLE	١N	IFOF	RMATI	ON					-		uc
Depth feet	Lab Sample		•	Blow Counts	Rec- overy %		DESCRIPTION		USCS	Strata	REMARKS	Elevation Feet
-							own, SAND, little Clay, trace Silt, , and MOIST.	slightly plastic,	SP-SC			1180.75
5			SSS	1-1 1-1	75	graded, spherica Brown, f MOIST.	own, fine to medium SAND, trac massive, and MOIST. Sand is v al, and 90% quartz. fine to coarse SAND, little Clay, Fine sand is well rounded, and sand is angular, and 70-80% qu	well rounded, massive, and 80-90% quartz.	SP SC			<u>1176.25</u> 1175.55
10 - -		ווון	SSS	10-25 50/6"	75	Light bro massive	own, fine to coarse SAND, trace a, and MOIST. Fine to medium s l. Coarse sand is angular.	Silt, poorly graded,	SP			1170.75
 15 - -			SSS	7-7 14-15	83	somewh	own, fine to coarse SAND, poorly at stratified, and MOIST. Sand i	s rounded.	SP			1166.75
- 20 - -			SSS	7-8 12-16	67	massive rounded sub-roui	fine to coarse SAND, trace Silt, v a, and MOIST. Fine to medium s l, spherical, and 70-80% quartz. Inded, sub-spherical, and 50-60%	ands are well Coarse sand is 6 quartz.	sw			1162.75
- 25 -			SSS	8-16 25-28	67	graded,	own, fine to medium SAND, trace massive, and MOIST. Fine to n I and spherical with ~70-80% qu	nedium sand is well	SP			1158.25
- 30 -			SSS	7-8 20-21	67	graded,	own, fine to medium SAND, trace massive, and MOIST. Sand is v al, and 80-90% quartz.		SP			1151.75
- 35 -			SSS	7-12 17-20	67	Gravel, rounded a 3" sea	own, fine to medium SAND, trac poorly graded, and MOIST. Sar I, spherical, and 80-90% quartz. m of fine Gravel at 35' bgl. Grav	ds are well Gravel occurs as	SP			1146.75
-				7-12			quartz. own, fine to coarse SAND, some trace Silt, well graded, massive,		SW			1143.25



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BORING NO. PROJECT

LOCATION

MW-107I SHEET 2 OF 3 **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI

4065-005

COORDINATES N 230,060.5 E 19,440,458.6

SURFACE ELEVATION 1180.75

DATUM **USGS**

PROJECT NO. **Phil Odenkirk** LOGGED BY

S	AMPLE	IN	IFOF	RMATI	ON			a		u
Depth feet	Lab Sample	Т		Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-			SSS	18-21	67	to medium sand is sub-rounded, highly spherical, and 80-90% quartz, Gravel is angular, and 50-60% quartz. Light brown, fine to coarse SAND, some fine to medium Gravel, trace Silt, well graded, massive, and MOIST. Fine to medium sand is sub-rounded, highly spherical, and	SW			1138.25
45			SSS	7-21 31-38	75	80-90% quartz, Gravel is angular, and 50-60% quartz. (continued) Light brown, fine to medium SAND, trace Silt, poorly graded, massive, and MOIST. Sand is sub-rounded, spherical, and 80-90% quartz.	SP			1133.25
- 50 - -			SSS	7-16 22-24	67	Light brown, fine to medium SAND, trace Silt, poorly graded, massive, and MOIST. Sand is well rounded, spherical, and 80-90% quartz. Brown, fine to coarse SAND, some fine to medium Gravel, trace Silt, well graded, massive and MOIST. Sands are sub-rounded, spherical, and 80-90% quartz. Gravel is angular and 50-60% quartz.	SP SW			1130.75
- 55 - -			SSS	4-8 10-13	67	Brown, fine to coarse SAND, some fine to medium Gravel, trace Silt, well graded, massive, and MOIST. Sand is sub-rounded with low sphericity and 80-90% quartz. Light brown, fine to coarse SAND, trace Gravel, trace Silt, poorly graded, massive, and WET. Fine to medium sand is	SW		Water encountered at 55.5' bgl during drilling.	1126.75 1125.25
- 60 - -			SSS	7-12 10-14	67	sub-rounded, sub-spherical, and 60-80% quartz. Coarse sand is angular and 50-60% quartz. 1-1.25" Gravel is angular with low sphericity, and composed of white to gray chert.	SP			
- 65 - -			SSS	2-3 7-8	63	Light brown, fine to coarse SAND, trace Silt, poorly graded, massive, and WET. Sand is sub-angular to sub-rounded, sub-spherical, and 60-70% quartz.	SP			1118.25
- - 70-			SSS	12-23 18-20	58	Light brown, fine to coarse SAND, some medium Gravel, trace Silt, well graded, massive, and WET. Sand is sub-angular to sub-rounded, sub-spherical, and 60-70% quartz. Gravel is sub-angular to sub-rounded, and 20-30% quartz.	SW			1113.25
- - 75			SSS	8-9 23-30	33	Light brown, fine to coarse SAND, trace Silt, trace fine to medium Gravel, well graded, and WET. Sands are sub-rounded, sub-spherical, and 70-80% quartz. Gravel is rounded, sub-spherical, and approximately 50% quartz.	SW			1108.25
- - 80-			SSS	8-16 21-27	75	Light brown, fine to medium SAND, trace Silt, poorly graded, massive, and WET. Sand is rounded, spherical, and 70-80% quartz.	SP			1103.25
- - 85 — -			SSS	3-8 21-22	83	Light brown, fine to medium SAND, trace Silt, trace fine Gravel, poorly graded, and WET. Sand is rounded, highly spherical, and 75-85% quartz. Fine Gravel occurs as 3" lens at 85.6' bgl, and is sub-rounded and 60-70% quartz.	SP			1098.25
- - 90 —			SSS	5-11 20-25	75	Brown, fine to coarse SAND, some fine to medium Gravel, well graded, massive, and WET. Sand is angular to rounded, sub-spherical, and 70-80% quartz. Gravel is rounded, sub-spherical, and 70-80% quartz.	SW			1093.25
-							SW			1088.25



BORING NO. PROJECT

LOCATION

MW-107I SHEET 3 OF 3 **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI

4065-005

COORDINATES N 230,060.5 E 19,440,458.6

SURFACE ELEVATION 1180.75

DATUM **USGS**

PROJECT NO. Phil Odenkirk LOGGED BY

SUR	FACE ELL	EVA	HON	I I I C	50.75	DATUM USGS	•		N	
s	AMPLE	INF	FOF	RMATI	ON			g		ion t
Depth feet			nple /pe	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
- 95		s	SSS	10-25 27-30	42	Multicolored, fine to coarse SAND, some fine to medium Gravel, trace Silt, well graded, massive, and WET. Sand is $_{\rm D}$ angular to rounded, sub-spherical, and 70-80% quartz.	sw			1085.25
-						Gravel is rounded, sub-spherical, and 70-80% quartz. (continued) Multicolored, fine GRAVEL, little medium Gravel, poorly graded, massive, and WET. Gravel is well rounded wtih	GP GW			1083.25
- 100-		źs	SSS	20-25 31-35	67	, low sphericity and 60-70% quartz. Light brown, fine to medium GRAVEL, trace to some fine to	SP			<u>1081.25</u> 1080.85
-						coarse Sand, trace Silt, well graded, and WET. Sand and Gravel is sub- to well rounded with low to high sphericity. Sand is ~50% quartz and ~50% rock fragments. Gravel is	GW			1000.00
- 105 - -			SSS	10-25 27-29	75	entirely rock fragments. Contact between SP and GW is sharp at 99.5'. Light brown, fine to medium SAND, trace coarse Sand, poorly graded, and WET. Sand is well rounded with	SP			
-						Imoderate to high sphericity and ~95% quartz. Light brown, fine to medium GRAVEL, trace to some fine to coarse Sand, trace Silt, well graded, and WET. Sand and gravel are sub- to well rounded with low to high sphericity.	SP	ay da subay		1073.25
110 -			SSS	10-15 16-16	50	Sand is ~50% quartz and ~50% rock fragments. Gravel is entirely rock fragments. Light brown, fine to medium SAND, little to some fine to coarse Sand, poorly graded, occasional 1-2" thick lenses of	GW			1070.25
- - 115-			SSS	3-8	63	fine to coarse Gravel, poorly graded, accasional 1-2 intervenses of well rounded with moderate sphericity and is composed of ~80-90% quartz and 10-20% rock fragments.	SW			1068.25
				13-13		Light brown, fine to medium SAND, trace fines, massive, poorly graded, and WET. Sand is rounded with low sphericity and 70-80% quartz Multicolored, fine to medium GRAVEL, trace Sand, well graded. Gravel is rounded. Light brown, fine to medium SAND, trace coarse Sand and fine Gravel, trace Silt, well graded, massive, and WET. Fine to medium sand is well rounded with medium to high sphericity and 80-90% quartz. Coarse sand and gravel is sub-angular to sub-rounded with low to medium sphericity and 70% rock fragments.			End of boring - 116' bgl	1064.75

COC SURI DRIL DRIL 4 1/ DRIL 11/9	FACE ELE LING COM Parns LING MET /4" HSA LING STA 9/00 SAND		N 2 ATION RACT	28,52 <u>113</u> OR EQUIP CME ENDEL 11/14 TA KEY	5.6 E ² 32.99 MENT 95 95 4/00 SILT	East La Telepho Fax: (5 19,439,5 DATUN	bbott Road, Suite 210 Insing, MI 48823 Ione: (517) 337-0111 IST7) 337-0417 73.3 INCATION DESCRIPTION: See attached Site Diagr	BORING NO. PROJECT LOCATION PROJECT NO. LOGGED BY		: Sp la T 05	ow	ng Hill Camp Phase /nship, MI	OF 4 e III
<u> </u>	CLAY GRAVEL				CLAYEY SILTY S								
12	AMPLE	IN	FOF										
Depth feet		Sa	mple		Rec- overy %		DESCRIPTION		USCS	Strata		REMARKS	Elevation Feet
			SSS	3-4 7-9	75	massive	own SILT, some Clay, little fine 5 , and MOIST. Sand is well rour 4.25' bgl.	Sand, low plasticity, nded. Organic rich	ML				1132.99
- - 10			SSS	5-8 9-9	67	Sand, lo highly s	own SILT, some fine Sand, trace w plasticity, MOIST. Sand is we oherical. Sand is concentrated i ed throughout rest of sample.	ell rounded and	ML			8' bgl: Rig rythmically bouncing on fine gravels.	1125.49
- - 15 -			SSS	7-9 12-14		coarse S rounded	own SILT, some very fine Sand, Sand, very stiff, massive, and Mo and highly spherical.	OIST. Sand is well	ML				1120.49
-		_		4-7		Brown C plastic, s	CLAY, trace Silt, trace very fine S stiff, massive, and MOIST.	Sand, moderately	CL				1115.49
20			SSS	11-24		well rou	own, fine to medium SAND, poo nded, highly spherical, clean Sa GRAVEL.	rly graded. Sand is nd.	SP GP				1112.39
- 25			SSS	5-7 7-9		plasticity Fine to r rounded	own CLAY, trace Silt, trace Grav , stiff, and MOIST. nedium SAND, poorly graded. , spherical, 80-90% quartz. own SILT.		CL SP		<u></u>		1108.74 1107.24 1105.49
30-			SSS	4-6 12-18	83	Grey, C	LAY, low plasticity, massive.		ML 			Silt grades into Clay in 29-31' split spoon sample.	
35-			SSS	8-15 18-25	50	plastic, v	AY, some Silt, trace coarse Sar very stiff, massive, and MOIST. I, sub-spherical, and matrix supp	Sand is well	CL			sampic.	1100.49
-				1-3		trace Sil	own, fine to medium SAND, trac t, loose, poorly graded, massive um sand is well rounded, spheric	e, and MOIST. Fine	SP	f= <u>-</u> -		+	1095.49



BORING NO. PROJECT

LOCATION

MW-108I SHEET 2 OF 4 **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI

COORDINATES N 228,525.6 E 19,439,573.3

SURFACE ELEVATION 1132.99

DATUM **USGS**

PROJECT NO. **Phil Odenkirk** LOGGED BY

4065-005

SUR	FACE ELI	EVA	TIOP		52.99	DATUM USGS LOGGLD BI	•		-	
	AMPLE				ON Rec-	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
Depth feet	Lab Sample		•	Blow Counts	overy %			5		Elev
-		Ħ	SSS	7-10	50	quartz. Coarse sand occurs as 2" seam @39', is well rounded, highly spherical, and 60-70% quartz.	SP	e, de color		
- - 45-		7.	SSS	1-2	33	Brown, fine to coarse SAND, trace fine Gravel, trace Silt, loose, well graded, massive, and MOIST. Sand is well rounded, spherical, and 80-90% quartz. Gravel occurs in	sw			1090.49
-				8-19		2" seam and is well rounded, spherical, and 60-70% quartz. Brown, fine to coarse SAND, little fine Gravel, trace Silt,				1085.4
- 50		<u> </u>	SSS	1-2 5-8	42	loose, well graded, massive, and MOIST. Sand is well rounded, spherical, and 80-90% quartz. Gravel is well rounded, spherical, and 60-70% quartz.	sw			1065.4
-						Brown, SAND, trace Gravel, trace Silt, loose, well graded,				1080.4
- 55		2	SSS	2-2 3-4		massive, and MOIST. Sand is well rounded, spherical, 80-90% quartz. Gravel is well rounded, spherical, and \60-70% quartz. /	SW		Wet at 55' bgl.	1077.9
-						Gray CLAY, little fine Sand, moderately plastic, massive, and MOIST to WET. Gray-brown CLAY, some fine to coarse Sand, trace fine	CL	 		1075.4
- 60		रिर्	SSS	2-2 3-4	58	Gravel, firm, moderately plastic, massive and WET. Fine to medium sand is well rounded, spherical, 80-90% quartz, coarse sand is well rounded, spherical, 60-70% quartz, all sand is clay matrix supported.	CL			¥
-						Gray CLAY, little fine to medium Sand, trace coarse Sand, very stiff, medium plastic, massive, and WET. Fine to				1070.4
65 - - -		נוע	SSS	5-9 11-14	58	medium sand is well rounded, spherical, and 80-90% quartz. Coarse sand is sub-spherical, rounded, and 60-70% quartz.	CL			
- 70-		7	SSS	6-10 12-14	100	Brown, fine to medium SAND, trace Clay, medium dense,				1062.9
-						poorly graded, massive, and WET. Sand is well rounded, spherical, and 80-90% quartz. Brown CLAY and SAND, trace fine Gravel, WET.	SP			1060.4
75-			SSS	5-9 11-15	83					
-							CL/SP			
80-			SSS	3-5 9-11	100	Light brown, fine to coarse SAND, little Clay, medium dense, well graded, massive, and WET. Fine sand is well rounded, highly spherical, and 80-90% guartz. Medium to	sw			1052.9
						coarse sand is angular with low sphericity, and 60-70% quartz. Brown, fine to coarse SAND, trace Silt, trace Clay clasts,				1050.4
85 - -			SSS	5-6 8-13	75	medium dense, WET. Fine sand is well rounded, highly spherical, and ~80-90% quartz. Medium to coarse sand is sub-rounded to angular, sub-spherical, and 60-70% quartz. Clay clasts are ~1/8" diameter.	SW			1045.4
- - 90			SSS	2-3 4-4	33	Light brown, fine to medium SAND, trace coarse Sand, trace Clay clasts, loose, poorly graded, massive, WET. Fine to medium sand is well rounded, spherical, 80-90% quartz. Coarse sand is angular to sub-angular with low	SP			1045.4
-						sphericity and 60-70% quartz. Clay clasts are 0.5-1" diameter.	SP			1040.4



BORING NO. PROJECT

LOCATION

MW-108I SHEET 3 OF 4 **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI

COORDINATES N 228,525.6 E 19,439,573.3

SURFACE ELEVATION 1132.99

DATUM **USGS**

PROJECT NO.	4065-005
LOGGED BY	Phil Odenkirk

SUR	FACE ELL	EVA	HON		32.99	DATUM USGS LOOGED BT			1	
S	AMPLE	INF	FOF	RMATI	ON			ŋ		ion t
Depth feet			nple pe	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
- 95 - -		s	SS	5-9 13-23	63	Light brown, fine to medium SAND, trace Silt, medium dense, poorly graded, massive, and WET. Fine sand is well rounded, highly spherical, and 80-90% quartz. Medium sand is angular with low sphericity and 60-70% quartz. <i>(continued)</i>	SP	na dan dari Kalèn dari Kalèn dari		1005 10
- - 100- - -		((q	SS	1-2 4-5	42	Brown, fine to coarse SAND, trace fine Gravel, trace Clay, loose, well graded, bedded, and WET. Clay occurs as 1" seam @ 99.3' bgl and is moderately plastic. Fine sand is well rounded, highly spherical, and 70-80% quartz. Medium to coarse sand and gravel is sub-angular with low sphericity, and 60-70% quartz.	sw			1035.49
- - 105- - -		(() S	SS			Brown, fine to coarse SAND, trace fine Gravel, trace Silt, well graded, and WET. Fine sand is well rounded, highly spherical, and 80-90% quartz. Coarse sand and fine gravel are sub-rounded with low sphericity and 60-70% quartz. Coarse sand and gravel are concentrated in 3-4" thick lenses ~3-4" apart, with mostly fine to medium sand	sw			1030.49
- - 110 - -			SS	3-6 8-19	67	between the coarse layers. Light brown, fine to coarse SAND, trace fine Gravel, trace Clay, medium dense, well graded, massive, and WET. Clay occurs as brown, moderately plastic 2" thick lenses @111'. Fine sand is well rounded, highly spherical, and 80-90% quartz. Coarse sand and gravel are rounded with low sphericity, and 60-70% quartz.	sw			1025.49
- - 115 -		((q	SS	3-5 9-15	63	Light brown, fine to medium SAND, trace fine Gravel, trace Silt, medium dense, poorly graded, massive, and WET. Sand is well rounded, spherical, and 80-90% quartz.	SP			1020.49
- - 120— -		((q	SS	2-3 6-9	83	Light brown, fine to medium SAND, trace Gravel, trace Clay, loose, poorly graded, massive, and WET. Sand is well rounded, spherical, and 80-90% quartz. Clay occurs as 2.5" lense @ 120.2' with 1.75" diameter Gravel directly above Clay. Gravel is well rounded, highly spherical, and quartz.	SP			1015.49
- - 125— -		((q	SS	2-3 5-7		Light brown SAND, trace Clay, trace Gravel, loose, poorly graded, massive, and WET. Sand is well rounded, spherical, 80-90% quartz, Clay occurs as 2-1.5" lenses @ 125.6' bgl.	SP			1010.49
- - 130— -			SS	3-6 7-11	63	Brown, fine to coarse SAND, little Clay, trace fine Gravel, loose, well graded, massive, and WET. Sand is well rounded, spherical, 80-90% quartz. Clay is in 2" lenses.	sw			1005.49
- - 135— -		((q	SS	2-4 5-7	63	Brown, fine to medium SAND, trace Silt, trace coarse Sand, loose, poorly graded, massive, and WET. Sand is sub-rounded to rounded, moderately spherical, and 80-90% quartz.	SP			1000.49
- - 140-			SS	2-3 5-7	42	Gray CLAY, little fine Sand, moderately plastic, massive. Trace coarse Sand in a 3" lens.	 CL			995.49
- - 145-		- - -	SS	0-0	75	Gray CLAY, little fine Sand, trace coarse Sand, moderately plastic, massive. Sand is well rounded, spherical, and 80-90% quartz.	CL			990.49
- 145— -		((((SS	0-0 0-0	75		CL			



1500 Abbott Road, Suite 210 East Lansing, MI 48823 Telephone: (517) 337-0111 Fax: (517) 337-0417 BORING NO. PROJECT LOCATION PROJECT NO. MW-108I SHEET 4 OF 4 GSWA: Spring Hill Camp Phase III

Osceola Township, MI

4065-005

COORDINATES N 228,525.6 E 19,439,573.3

DATUM USGS

LOGGED BY Phil Odenkirk

s	epth Lab Sample Blow			Lab Sample Blow Rec-				ON					ç
Depth feet			•		Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet			
- - 150—			SSS	1-3 3-4	50	Gray CLAY, little fine Sand, firm, moderately plastic, massive, and WET. Sand is well rounded, spherical, and 80-90%. quartz.	CL			985.49			
- - 155 — -		ιιι	SSS	0-0 0-0	50	Gray CLAY, little fine Sand, very soft, moderately plastic, massive. Sand is well rounded, spherical, and 80-90% quartz.	CL		11/13/2000 17:00 - Stop drilling for day.	980.49			
- - 160		ιιι	SSS	0-0 3-4	75	Gray CLAY, little fine Sand, soft, low plasticity, and MOIST to WET, interbedded with SAND and CLAY. Sand is well rounded, spherical, and 80-90% quartz.	CL-SP			975.49			
- - 165 -		ιιι	SSS	0-0 2-2	33	Gray CLAY, little fine Sand, soft, low plasticity, MOIST to WET, interbedded with SAND and CLAY. Sand is well rounded, spherical, and 80-90% quartz.	CL-SP		Driller feels interbedded sands and clays.	970.49			
- - 170-			SSS	2-5 8-11	33	Gray CLAY, little fine to medium Sand, stiff, low plasticity, MOIST to WET, interbedded with SAND and CLAY. Sand is well rounded with medium sphericity and 80-90% quartz.	CL-SP			965.49			
- - 175-			SSS	6-12 14-21	50	Gray CLAY, little fine Sand, very stiff, moderately plastic, MOIST to WET. Vertical somewhat "clean" Sand seams 1-2" in length. Sand is well rounded, spherical, and 80-90% quartz.			Driller feels sample drive like hard clay.	960.49			
		4 L	SSS	7-18		Gray CLAY, little Sand, very stiff, moderately plastic, MOIST. Sand is well rounded, spherical, and 80-90% quartz.	CL			955.49			
180			555	22-26				 	End of Boring - 181' bgs.	951.99			

COO SURF DRILL DRILL 4 1/ DRILL 11/7	DRDINATE FACE ELE LING COM arns LING MET 4" HSA LING STA 7/00	S V/ NTI	N 2 ATION RACT OD	229,688 111 TOR EQUIP CME ENDEL 11/8/ TA KEY	B.3 E ² 18.77 MENT 1050 0 700	East La Telepho Fax: (5 I9,439,0 DATUN	bbott Road, Suite 210 ansing, MI 48823 one: (517) 337-0111 517) 337-0417 59.6 M USGS LOCATION DESCRIPTION: See attached Site Diagra	BORING NO. PROJECT LOCATION PROJECT NO. LOGGED BY		:: Spi la Tc 05	w	SHEET	1 OF 5 se III
	CLAY GRAVEL				SILTY S	-							
	AMPLE	IN	IFOF								T		c
Depth feet		Sa	mple	Blow Counts	Rec- overy %		DESCRIPTION		USCS	Strata		REMARKS	Elevation Feet
-							own SILT and fine to coarse SA trace Clay, non-plastic, and WET		ML				1118.77
5		וווח	SSS	3-4 5-2	75	coarse S medium ~80% g	to brown, fine to medium SAND Sand, poorly graded, massive, a sand is well rounded with high s uartz. Coarse fraction is angular ts. @5.3 feet there is a 3" lens of	nd WET. Fine to sphericity, and rand ~80% rock	SP		- - - -		1114.47
10-			SSS	4-5 8-2	10	Gravel. Brown, 1	fine to medium GRAVEL, and fin ded, and WET.		GW		$\sim \sim$		1111.27
- - 15			SSS	8-6 2-2	70	slightly players.	LT, and fine to medium SAND, li plastic, laminated, and WET. Oc Occasional laminations are at ~3 al. Spoon coarsens downward o	ccasional Clay 30 degrees with	 ML			Very hard drilling at 12.5' bgl	1106.27
-						coarse \$	SILT, and fine to medium SAND, Sand, trace fine Gravel, slightly p	plastic, massive,					1101.27
20		, וות	SSS	2/24"	100	primarily	T. Gravel and coarse sand are rock fragments.		ML				1096.27
25-		ιιι	SSS	2-2 2-3	100	fine Gra	SILT, and CLAY, some fine to co vel, moderately plastic, and WE ⁻ I with low sphericity.		ML-CL				1096.27
-						trace co	SILT, and fine to medium Sand, t arse Sand, trace fine Gravel, slig		ML		-		1091.27
30		יוו	SSS	2/24"	100	Light bro poorly g well rou Sand is	e, and WET. bwn, fine to medium SAND, trace raded, massive, and WET. Fine nded with high sphericity and >8 well rounded with low to high sp means of the sp	to medium Sand is 0% guartz. Coarse		· ·			1089.37
35-		ιιι	SSS	2-6 6-6	25	massive high sph Light bro	own, fine to medium SAND, pool e, and WET. All components are hericity and >85% quartz. own, fine to coarse SAND, some	well rounded with Gravel, well	SP SW	. 0	~ 0		1083.77
-				1-1		spherici	and WET. Sands are well round ty and ~70-80% quartz. Gravel i nded and >90% rock fragments.	is sub-angular to	SP		~		1081.27



BORING NO. PROJECT

LOCATION

MW-109D SHEET 2 OF 5 **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI

COORDINATES N 229,688.3 E 19,439,059.6

PROJECT NO. 4065-005 LOGGED BY

SUR	ACE ELE	EVATIO	N 11	18.77	DATUM USGS	LOGGED BY	Larry J	lordan		
S	AMPLE	INFC	RMATI					ata		ation et
epth feet	Lab Sample	Туре		%	DESCRIPTION		USCS	Strata	REMARKS	Elevation Feet
-			5 5-5	100	Light brown, fine to medium SAND, tra poorly graded, massive, and WET. Fir sub- to well rounded with high sphericit (continued) Brown, fine to medium SAND, some Si	e to medium Sand is y and >80% quartz.	SM		At 40.5' bgl, grades into Sand, some Silt.	1078.2 1076.2
45		i sse	5-5 7-10	70	moderately plastic, and WET. Light brown, fine to medium SAND, tra trace fine Gravel, Silt content increases from 44-45 feet bgs, well graded, grade WET. @45 feet there is a 0.4 feet thick	s from trace to little ed bedding, and k lens of Silty-Clay.	SM			1071.2
- 50 -		SSS SSS	5 4-7 8-9	70	Below the lens Clay and Silt content de Sand is well rounded with high spheric <u>quartz.</u> Light brown, fine to coarse SAND, trac graded, massive, and WET. Fine to m rounded with high sphericity and >80%	ity and 70-80%	SP			
- - 55		SSS	\$	90	sand is sub- to well rounded and prima Light brown, fine to medium SAND, tra coarse Sand, trace fine Gravel, well gr WET. Fine to medium sand is sub-ang	rily rock fragments. ce to little Silt, trace aded, massive, and	SP	alian Robert Robert States Robert States		1066.:
-					with high sphericity and ~70-90% quar angular to well rounded and primarily r Light brown, fine to medium SAND, littl Gravel, poorly graded, massive, and W	ock fragments. e coarse Sand, trace /ET. Fine to medium		a, sa sa.		1061.:
60 - - -		SSS C	2-12 6-6	100	sand is sub- to well rounded with high ~80-90% quartz. Coarse fraction is su sub-rounded with high sphericity and ~ fragments. Spoon coarsens downward Light brown, fine to medium SAND, littl	b-angular to 70-80% rock I. e coarse Sand, little	SP			1056.
- 65 -		SS	6-9	50	fine Gravel, well graded, graded beddii to medium sand is well rounded with hi ~80% quartz. Coarse fraction is sub-a rounded with low to high sphericity and fragments.	gh sphericity and ngular to well I >80% rock	SW			
- - 70		SS:	3-3 4-6	100	Light brown, fine to medium SAND, tra trace fine Gravel, poorly graded, massi to medium sand is sub-rounded with hi >90% quartz. Coarse fraction is sub-a rounded with moderate to high spheric fragments.	ve, and WET. Fine gh sphericity and ngular to well	SP			1051.
-					Gray SILT, some fine Sand, trace med occasional 1mm thick fine to medium S	ium to coarse Sand, and laminations,				1046.2
75 - -		⊂ SSS	4-5 16-17	30			ML			1041
- - 80		sss	4-7 8-8	100	Gray, fine to medium SAND, little coars trace fine Gravel, poorly graded, massi to medium Sand is sub-angular to well sphericity and ~70-90% quartz. Coars	ve, and WET. Fine rounded with high e sand and fine	SP			1041.
-					gravel is sub-angular to sub-rounded w sphericity and ~80% rock fragments. Light gray, fine SAND, little medium Sa coarse Sand, trace Gravel, poorly grad	and, little Silt, trace				1036.:
85 - -		SSS	2-2 2-4		WET. Fine to medium Sand is primaril rounded with a few angular grains. Co sub-angular. Sands are mostly quartz. rock fragments. @85.1' there is a 3" th	y sub-angular to well arser fraction is Gravel is primarily iick Gravel lense.	SP			1024
- - 90		SS	1-1 12-14	30	Gray SILT, little fine to medium Sand, t slight to moderate plasticity, massive, a content increases with depth.	race to some Clay, and MOIST. Clay	ML			1031.
-							ML			1026.2



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BORING NO. PROJECT LOCATION

MW-109D SHEET 3 OF 5 **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI

COORDINATES N 229,688.3 E 19,439,059.6

DATUM **USGS**

PROJECT NO. 4065-005 Larry Jordan LOGGED BY

0011								1	-
S	AMPLE	INFO	RMATI				ta		tion
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
95		SSS	1-5 7-12	100	Gray SILT, little fine to medium Sand, trace coarse Sand, massive, and MOIST. Fine to medium sand is sub-rounded with low sphericity. Coarse sand is sub-rounded and >80% rock fragments. <i>(continued)</i> Gray SILT, some fine to coarse Sand, little Clay, trace	ML			1021.27
- 100 -		SSS	6-7 9-10	100	Gravel, slightly plastic, massive, and MOIST.	ML			
- - 105 -		(SSS	7-8 13-13		Gray SILT, some fine to coarse Sand, trace to little Clay, trace Gravel, slighlty plastic, massive, and MOIST.	ML			1016.27
- - 110		SSS	4-4 7-16		Gray, fine to medium SAND, some Silt, little Clay, trace coarse Sand, trace Gravel, well graded, slightly plastic, massive, and WET. Sand is sub-angular to sub-rounded, highly spherical, and ~60-80% quartz.	sc	- <u>.</u>		1011.27
- - 115 -		(SSS	2-2 3-5		Gray, fine to medium SAND, some Silt, little Clay, trace coarse Sand, trace fine Gravel, massive, well graded, slightly plastic, and WET. Sand is sub-angular to sub-rounded and predominantly quartz. Occasional 1" thick Gravel lenses. Gravel is angular to sub-rounded.	SC			1006.27
- - 120-		(SSS	1/24"		Light gray, fine to medium SAND, little Clay, little Silt, trace coarse Sand, trace Gravel, massive, poorly graded, and WET. Fine to medium sand is sub-angular to sub-rounded with low to high sphericity and ~70-80% quartz. Coarse sand is angular to sub-rounded, has low sphericity, and is	SP			1001.27
- - 125-		SSS	1/24"		primarily rock fragments. Light brown, fine SAND, trace medium Sand, poorly graded, massive, and WET. Sand is well rounded with high sphericity and ~80% quartz.	SP			996.27
- - 130-		sss	1-1 1-1		Light brown, fine to medium SAND, trace coarse Sand, trace Gravel, poorly graded, massive, and WET. Sand is sub- to well rounded with high sphericity and ~80-90% quartz.	SP			991.27
- - 135-		- - - SSS	1/24"		Brown, fine SAND, some Silt, little Clay, trace medium to coarse Sand, poorly graded, massive, and WET. Occasional sand layers.	SP			986.27
-					Brown, fine SAND, some Clay, little Silt, poorly graded, massive, and WET. Occasional <1" thick Sand and Gravel lenses.			Did not drive sample, as it dropped 2' under weight of rods.	981.27
140 - -		SSS C	WH/24"			SP		Did not sample, due to	976.27
- 145 -						SP		problems with heave.	



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

DATUM **USGS**

BORING NO. PROJECT LOCATION MW-109D SHEET 4 OF 5 GSWA: Spring Hill Camp Phase III

Osceola Township, MI

4065-005

COORDINATES N 229,688.3 E 19,439,059.6

PROJECT NO. 4065-005 LOGGED BY Larry Jordan

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S	AMPLE	١N	IFOF	RMATI	ON			_		Б
Depth feet	Lab Sample		imple ype	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-						Brown, fine SAND, some Clay, little Silt, massive, and WET. Occasional Sand seams.	SP			971.27
150 - -			SSS	2/24"			SP			
- 155		ιτι	SSS	2-2 2-2		Gray to brown, very fine to fine SAND, some Clay, trace coarse Sand, trace fine Gravel, and WET. Sand is well rounded with medium to high sphericity. Some thin (~1/8" thick), soft gray Clay layers, and moderately plastic.	SP			966.27
-						Light brown SILT and very fine Sand, trace fine Sand, trace Clay, trace coarse Sand, trace fine Gravel, massive, stiff,	+			961.27
160		ווון	SSS	6-6 50/5"		and MOIST. Gravel is matrix supported.	ML			
-						Grayish brown SILT, some very fine Sand, laminated, and MOIST.	ML			956.27
165 - - -			222	31-50/4'	55	Brown to gray CLAY, trace Silt, hard, and MOIST.	CL			953.07
170-			SSS	6-6 18-29	75	Brown to gray SILT and very fine Sand, WET, interbedded with two to four inch layers of brown to gray CLAY and Silt, very stiff, and MOIST.	ML-CL		- - - -	951.27
-						Gray to brown SILT, some Clay, little very fine Sand, hard, massive, and WET. Sand is well rounded with high				946.27
175		ιιι	SSS	6-17 29-39	75	sphericity. Silty material is interbedded with more Clayey layers.	ML-CL			
- - 180			SSS	25-25	85	Gray to brown, very fine SAND, some Silt, trace Clay, poorly graded, massive, and WET. Clay occurs as a 1" inch seam, three inches from the bottom of the spoon.	SM			941.27
- 100			555	50/5"	00	Gray to brown, very fine to fine SAND, little to some Silt,	SIVI			936.27
- 185 -			SSS	19-50/4'	75	some Clay clasts, massive, and WET. Sand is rounded with high sphericity. Clay clasts are ~1/8" to 1/2" in diameter.	SM			930.27
-						Gray to brown CLAY, trace to some Silt, hard, laminated, and MOIST.	 CL			931.27
190 - -		, ל ל ל	SSS	15-30 50/4"	75	Gray to brown, very fine to fine SAND, little Silt, poorly graded, and WET. Sand is well rounded with high sphericity.	SM		- - -	928.77
- - 195			SSS	19-22		Gray to brown CLAY, trace coarse Sand, hard, and MOIST.	CL			926.27
-			200	50/6"		Gray to brown CLAY, trace fine to coarse Sand, hard, and				921.27
		H		6-17		MOIST.	CL			521.21



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BORING NO. PROJECT LOCATION PROJECT NO. 4065-005

MW-109D SHEET 5 OF 5 **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI

COORDINATES	N 229,688.3	E 19,439,059.6
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					19,439,05							
SUR	FACE ELE	EVATIO	N 11 ′	18.77	DATUM	USGS	5	LOGGED BY	Larry J	ordan		
S Depth feet		Sample	1	Rec- overy			DESCRIPTION		USCS	Strata	REMARKS	Elevation Feet
		Туре	Counts	overv						Ţ	End of boring - 201' bgs.	917.77

coc		≣S	N 2	27,779		East La Telepho Fax: (5		BORING NO. PROJECT LOCATION PROJECT NO.	Osceo 4065-0	: Sprin Ia Tow 05	SHEET Ig Hill Camp Pha nship, MI	1 of 4 ase III
SURF	FACE ELE	VA	TION	116	67.08	DATUN		LOGGED BY	Larry .	Jordan		
Ste DRIL 4 1/ DRIL	LING COM arns LING MET /4" HSA LING STA 13/00	THC	D	EQUIP	1050		LOCATION DESCRIPTION: See attached Site Diagr	am for location.				
	SAND CLAY GRAVEL	S	TRA		, SILT CLAYEY SILTY S.							
S.	AMPLE	IN	FOF	RMATI	ON							E
Depth feet	Lab Sample		nple /pe	Blow Counts	Rec- overy %		DESCRIPTION		USCS	Strata	REMARKS	Elevation Feet
- - - 5			SSS	2-2 2-2	75	poorly g rounded interbed	own fine to medium SAND, trace raded, interbedded, and MOIST I with high sphericity, >70% qua ded with light brown fine to med Clay, well graded, massive, sli	. Sand is well rtz and is lium SAND, some	SP			1167.08
- - - 10 -			SSS	3-4 6-7	75	Gravel,	own CLAY and Silt, trace fine to moderately plastic, laminated, a lternate with Clayey Silt layers.		CL			1159.58
- - 15-			SSS	8-12 13-13	5	Light bro slightly p	own, fine to medium SAND and plastic, and WET.	SILT, little Clay,	SM			<u>1154.5</u> 8
- 20 -			SSS	5-7 9-14	100	trace Gr	own CLAY and SILT, trace fine t avel, moderately plastic, lamina nterbedded with Clayey Silt.		CL			
						trace Gr	own, CLAY and SILT, trace fine avel, plastic, laminated, and WE		CL			1144.58
25 - -			SSS		100	Light bro	Silt is interbedded. own fine to coarse SAND, some and MOIST.	Gravel, well	sw			1142.08
30-			SSS	6-9 18-18	90	poorly g	own, fine SAND, trace coarse Sa raded, massive, and MOIST. own, fine SAND, little Silt, trace		SP			1137.00 1134.50
- 35			SSS	14-22 31-30	90	Sand, tra Sand is	ace Gravel, poorly graded, lami sub-angular to sub-rounded, hig uartz, and is laminated with mm	nated, and MOIST. ghly spherical,	SP			
				19-21		trace to	own, fine to medium SAND, trac little Silt, poorly graded, laminat sub- to well rounded with high s	ed, and MOIST.	SP			1129.58



Depth

feet

45

50

55

60

65

70

75

80

85

90

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sphericity and is primarily rock fragments.

fragments. Occassional Gravel lenses.

with high sphericity and >80% quartz.

Light brown, fine to coarse SAND, little to some Gravel,

well graded, and WET. Sand is well rounded with high sphericity and >50% quartz. Gravel is angular to

Light brown, fine to medium SAND, trace coarse Sand,

poorly graded, massive, and WET. Sand is well rounded

Light brown, fine to medium SAND, some Silt, trace coarse

Sand, trace Gravel, trace Clay, well graded, interbedded, and WET. Fine to medium sand is sub- to well rounded

with high sphericity and >70% quartz. Coarse fraction is

sub-angular to sub-rounded. More Gravelly lens at 84.5'

Light brown, fine to medium SAND, trace to little Gravel,

>80% guartz. Coarse fraction is sub-angular to well

rounded with low sphericity and >80% rock fragments.

trace coarse Sand, well graded, massive, and WET. Fine to medium sand is well rounded with high sphericity and

sub-rounded with low to medium sphericity and is 90% rock

BORING NO. PROJECT

LOCATION

MW-110D SHEET 2 OF 4 **GSWA: Spring Hill Camp Phase III**

Bailed heave.

Bailed heave.

Bailed heave.

Bailed heave.

Bailed heave.

SW

SP

SM

SW

SW

1094.58

1089.58

1084.58

1079.58

1074.58

Osceola Township, MI

COORE

6-7

7-9

5-5

10-10

7-19

22-32

8-11

22-25

100

100

100

75

(4" thick).

Gravel lens at 89.8'.

SSS

SSS

SSS

SSS

cod	ORDINAT	ES N2	227,77	9.8 E [.]	19,440,962.8	PROJECT NO.	4065-0	05		
UR	FACE ELE		N 110	67.08	DATUM USGS	LOGGED BY	Larry J	lordan		
S	AMPLE	INFO	RMATI					ą		ion t
epth eet	Lab Sample	Sample Type	Blow Counts	%	DESCRIP	TION	USCS	Strata	REMARKS	Elevation Feet
-			26-28	100	quartz. Interbedded with 2" thick Silt.	layers with trace to little	SP	an da suban An da suban		
-					Light brown, fine to medium SAN trace to little Silt, poorly graded, i	nterbedded, and MOIST.				1124.58
5		SSS	7-14 21-29	100	Sand is sub- to well rounded with ~80-90% quartz. Silt content var layer to layer. Some layers show	ies from trace to little from	SP			
-			7-15		Light brown, fine to medium SAN trace to little Silt, poorly graded, i Sand is sub- to well rounded with	nterbedded, and MOIST.				1119.58
-0 - -		SSS S	25-21	100	80-90% quartz. Silt content varie Some laminations are at an angle (cross-bedding).	es from layer to layer. e with horizontal	SP			
-			5-16		Light brown, very fine SAND, trac medium Sand, cross bedded, po Sand is well rounded with high sp	orly graded, and MOIST.				1114.58
5-		SSS	28-29	100			SP			
-					Light brown, fine to medium SAN bedded, and MOIST. Sand is su	b- to well rounded with				1109.58
-0 -		sss	8-12 23-40		high sphericity and >80% quartz.		SP			7
-					Light brown, fine to medium SAN massive, and WET. Sand is sub				Water between 61 and 64'.	<u>*</u> 1104.58
65		SSS (9-10 11-18		medium to high sphericity and >8	0% quartz.	SP			
-					Light brown, fine to medium SAN trace Gravel, poorly graded, mas					1099.58
- 0-		Sss	5-6 10-16		medium sand is well rounded wit >80% quartz. Coarse fraction is	h high sphericity and	SP			



BORING NO. PROJECT LOCATION MW-110D SHEET 3 OF 4 GSWA: Spring Hill Camp Phase III

Osceola Township, MI

COORDINATES N 227,779.8 E 19,440,962.8

SURFACE ELEVATION **1167.08** DATUM

DATUM USGS

PROJECT NO. 4065-005 LOGGED BY Larry Jordan

S	AMPLE	INFO	RMATI				ta		tion
Depth feet	Lab Sample	Sample Type	Blow Counts	Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
- 95 - - -		SSS	2-4 7-10	40	Light brown, fine to coarse SAND, trace fine Gravel, well graded, massive, and WET. Fine to medium sand is well rounded with high sphericity and >80% quartz. Coarse fraction is sub-angular to sub-rounded with low to moderate sphericity and >90% rock fragments. <i>(continued)</i> Light brown, fine to medium SAND, trace coarse Sand, trace fine Gravel, poorly graded, interbedded, and WET,	sw		Bailed heave. Stop drilling for day	1069.58
- - 100 - -		SSS	4-4 10-17	75	interbedded with fine to medium GRAVEL and medium to coarse Sand. Fine to medium Sand is well rounded with high sphericity and >80% quartz. Coarse fraction is sub-angular to sub-rounded with low to moderate sphericity and >90% rock fragments. Gravel lenses are ~2" thick.	SP		11/13/00 15:40. Began drilling	1064.58
- - 105 - -		(SSS	5-20 50/6"		Brown, coarse SAND, some fine to medium Sand, trace Gravel, poorly graded, graded bedding, and WET. Fine to medium Sand is well rounded with high sphericity and >70% quartz. Coarse fraction is sub-angular to sub-rounded with low to high sphericity and >80% rock fragments.	SP		11/14/00, 07:42. Drilled hole prior to pounding spoon.	1050 59
- - 110- - -		(SSS	14-26 50/4"		Light brown, fine to medium SAND, little coarse Sand, trace fine to medium Gravel, well graded, massive, and WET. Fine to medium sand is sub- to well rounded with moderate to high sphericity and >80% quartz. Coarse fraction is sub-angular to well-rounded with low to moderate sphericity and >90% rock fragments.	sw		Bailed well.	1059.58
- - 115 - -		SSS (10-18 50/6"		Light brown, fine to medium SAND, trace coarse Sand, trace fine Gravel, poorly graded, massive, and WET. Fine to medium Sand is well-rounded, with moderate to high sphericity and >80% quartz. Coarse fraction is sub-angular to sub-rounded with moderate sphericity and >70% rock fragments. Gray to brown, fine to medium SAND, little Silt, little coarse	SP	च, जि.स. व		1004.00
- 120- - -		(SSS	21-25 28-50/6'	75	Sand, little Gravel, well graded, massive, and WET. Fine to medium sand is sub- to well rounded with high sphericity and >80% quartz. Coarse fraction is angular to well-rounded with low to moderate sphericity and predominantly rock fragments.	SM			
- - 125 -		(sss	18-22 50/4"	50	Gray to brown, fine to medium SAND, little Silt, little coarse Sand, well graded, interbedded, and WET; interbedded with gray CLAY and SILT, moderately plastic, and WET. Sample is varved with Sandy layers varying from 1-3 cm and Clay from 0.5 to 1.5 cm in thickness.	SM			1044.58
- - 130-		(sss	15-26 50/6"		Gray to brown, fine to medium SAND, some Silt, little coarse Sand to Gravel, well graded, massive, and WET. Fine to medium sand is sub-angular to well rounded with moderate to high sphericity and >80% quartz. Coarse fraction is sub-angular to well-rounded with low to moderate sphericity and >80% rock fragments.	SM			1039.58
- - 135 — - -		(SSS	6-17 50/4"		Gray to brown, fine to medium SAND, some Silt, little coarse Sand, trace Gravel, well graded, Silty laminations, and WET. Fine to medium sand is sub-angular to well rounded with moderate to high sphericity and >80% quartz. Coarse fraction is sub-angular to well-rounded with low to moderate sphericity and >80% rock fragments. Occasional 1cm thick Clay layers.	SM			1034.58
- - 140 -		SSS (7-16 50/6"	75	Gray to brown, fine to medium SAND, some Silt, trace coarse Sand, trace fine Gravel, well graded, laminated, and WET. Occasional mm-scale Clay layers. Fine to medium sand is sub-angular to sub-rounded with moderate to high sphericity and >70% quartz. Coarse fraction is sub-angular to sub-rounded with moderate to high sphericity and	SM			1029.58
- - 145 -		(SSS	3-6 6-9	50	Light brown, fine to medium SAND, trace coarse Sand, poorly graded, massive, and WET. Fine to medium sand is well-rounded with high sphericity and >80% quartz. Coarse	SP			1024.58



BORING NO. PROJECT

LOCATION

MW-110D SHEET 4 OF 4 **GSWA: Spring Hill Camp Phase III**

Osceola Township, MI

4065-005

COORDINATES N 227,779.8 E 19,440,962.8

SURFACE ELEVATION 1167.08

DATUM USGS

PROJECT NO. Larry Jordan LOGGED BY

s	AMPLE	INFC	RMATI	ON			E		ы
Depth feet	Lab Sample	Samp Type		Rec- overy %	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-					fraction is sub-angular to sub-rounded with moderate to high sphericity and >70% rock fragments. Light brown, fine to medium SAND, trace coarse Sand, trace fine to medium Gravel, poorly graded, and WET.	SP			1019.58
150 - - -		(SS:	6-11	50	Occasional Gravel size Silty Clay clasts. Also occasional cm-scale Clay layers toward 151'. Fine to medium sand is well-rounded with high sphericity and >90% quartz. Coarse fraction is sub-angular to well-rounded with low to moderate sphericity and >70% rock fragments.	SP			1014.58
155 - -			2-3 6-10	50	Light brown, fine to medium SAND, trace coarse Sand, poorly graded, massive, and WET. Sand is well-rounded with high sphericity and >80% quartz.	SP			
- - 160 -			3 4-4 5-10	90	Light brown, fine to medium SAND, trace coarse Sand, poorly graded, massive, and WET. Fine to medium sand is well-rounded with high sphericity and >80% quartz. Coarse fraction is sub-angular to sub-rounded with moderate sphericity and >70% rock fragments.	SP		Split spoon caught down hole. Drillers pump water down hole. Bailed augers.	1009.58
- - 165			5 18-21 50/5"	10	Light brown, fine SAND, trace medium Sand, poorly graded, massive, and WET. Sand is well-rounded with low to moderate sphericity and >80% quartz.	SP		Bailed augers.	1004.58
-					Light brown, fine to medium SAND, poorly graded, massive, and WET. Sand is sub- to well rounded with high				999.58
170 - -		(SS:	2-9 25/6"	25	sphericity and >80% quartz.	SP			004 50
- - 175			6 8-27/6"	0	Light brown, fine to medium SAND, trace coarse Sand, poorly graded, massive, and WET. Sand is well-rounded with high sphericity and >80% quartz. Coarse fraction is primarily rock fragments.	SP		Sampled heave from bailer.	994.58
-			7-18		Light brown, fine to medium SAND, trace coarse Sand, poorly graded, massive, and WET. Fine to medium Sand is well-rounded with high sphericity and >80% guartz. Coarse	0.5		No recovery on first spoon. Bailed and respooned.	989.58
180		(SS:	50/6"	75	fraction is sub-angular and primarily rock fragments.	SP	्रान्स्		984.58
- 185 - -			8-23 38-44	90	coarse Sand, trace Gravel, trace Clay, non-plastic, massive, and WET. Sand is sub-angular to sub-rounded with high sphericity. Fine to medium Sand is >80% quartz. Coarse fraction is >80% rock fragments. Gravel is sub-angular to sub-rounded and 100% rock fragments.	SM			
- - 190		ຼິ ເງິຣຣ:	25-41 50/4"	100	Gray SILT, some fine to coarse Sand, little Clay, little Gravel, slight to moderate plasticity, and MOIST (Till).	ML			979.58
-			30/4					End of Boring - 191' bgs.	976.08

COC SURF DRILL Ste DRILL 11/2 C	ACE ELE EACE ELE LING CON arns LING MET 4" HSA LING STA 21/00 SAND CLAY GRAVEL	ES N VATIO ITRAC	231,92 DN 119 TOR EQUIF CME ENDEI 11/2 ATA KEY 	9.8 E 2 98.32 PMENT E 1050 D 2/00	East La Telepho Fax: (5 19,442,6 DATUN	bbott Road, Suite 210 ansing, MI 48823 one: (517) 337-0111 517) 337-0417 54 8.2 A USGS LOCATION DESCRIPTION: See attached Site Diagra	BORING NO. PROJECT LOCATION PROJECT NO. LOGGED BY		: Sprir Ia Tow 05	ng Hill Camp Phase /nship, Ml	OF 4 ≇ Ⅲ
S. Depth feet	AMPLE Lab Sample	INFC Sampl Type	e Blow	Rec-		DESCRIPTION		USCS	Strata	REMARKS	Elevation Feet
- - - - - - - - - - - - - - - - - - -					Sand, tr medium to high s Orange Sand, tr medium to high s Orange Sand, tr	to brown, fine to medium SAND, ace Gravel, poorly graded, MOIS sand is sub-angular to sub-rour sphericity and 70% quartz. to brown, fine to medium SAND ace Gravel, poorly graded, MOIS sand is sub-angular to sub-rour sphericity and 70% quartz. to brown, fine to medium SAND ace Gravel, poorly graded, MOIS sand is sub-angular to sub-rour sphericity and 70% quartz.	ST. Fine to aded with moderate , trace coarse ST. Fine to aded with moderate , trace coarse ST. Fine to	SP SP		 Drillers augered to 29 feet before sampling. Drillers noted gravel from 0-1' bgs. 0-10' lithological description based on cutting. 10-20' lithological description based on cuttings. 20-29' lithological description based on cuttings. 	1198.32 1188.32 1178.32
			0-8	50	poorly g is sub-a spherici Light bro Gravel, sub-ang spherici fraction Light bro Gravel,	own, fine to medium SAND, trace raded, massive, and MOIST. Fi ngular to sub-rounded with mode ty and 60-80% quartz. own, fine to coarse SAND, some well graded, massive, and MOIS ular to well rounded with modera ty. Fine to medium sand is >70% is primarily rock fragments. own, fine to medium SAND, little well graded, bedded, and MOIS rangular to well rounded with mo	ne to medium sand erate to high fine to medium ST. All material is ate to high % quartz. Coarse coarse Sand, trace T. All components	SP SW SW			1169.32 1165.82 1160.82



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BORING NO. PROJECT

LOCATION PROJECT NO. MW-114I SHEET 2 OF 4 GSWA: Spring Hill Camp Phase III

Osceola Township, MI

COORDINATES N 231,929.8 E 19,442,648.2

DATUM **USGS**

PROJECT NO. 4065-005 LOGGED BY Larry Jordan

						-			-
S	AMPLE	INFO	RMATI	ON					c.
Depth feet	Lab Sample	Sample Type	Counts	%	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
-			4.7	75	sphericity. Fine to medium sand is >70% quartz. Coarse fraction is primarily rock fragments. 1" thick Silt seam at 40.0'. 3" Gravel lens at 40.2'. Light brown, fine SAND, trace medium Sand, poorly graded, massive, and MOIST. Fine to medium sand is sub-rounded with moderate to high sphericity and >80%	SW	ay dan day ay dan day		1155.82
45		SSS S	10-16	75	quartz. Light brown, fine SAND, trace medium Sand, poorly	SP			1150.82
50-		(SSS	7-8 9-9	75	graded, bedded, and MOIST. Fine to medium sand, poorly sub-rounded with moderate to high sphericity and >80% quartz. 1" thick Silty Sand lens at 49.8 feet bgs.	SP			1100.02
- - 55 -		(SSS	3-7 8-10	75	Light brown, fine SAND, trace medium Sand, poorly graded, massive, and MOIST. Fine to medium sand is sub-rounded with moderate to high sphericity and >80% quartz.	SP			1145.82
- - 60		(sss	5-9 14-16	90	Light brown, fine SAND, trace medium Sand, poorly graded, massive, and MOIST. Fine to medium sand is sub-rounded with moderate to high sphericity and >80% quartz.	SP			1140.82
65-		Sss	5-10	50	Light brown, fine SAND, trace medium Sand, poorly graded, massive, and MOIST. Fine to medium sand is sub-rounded with moderate to high sphericity and >80%	SP		Wet at 66' bgl during drilling.	1135.82
-			13-16	50	quartz. Brown, fine to medium SAND, little coarse SAND, poorly graded, massive, and WET. Fine to medium sand is				¥ 1130.82
70		(SSS	4-6 9-10	100	sub-rounded with medium to high sphericity and 80% quartz. Coarse sand is angular to sub-rounded with low sphericity and is primarily rock fragments.	SP			
75					Brown, fine to medium SAND, little coarse SAND, poorly graded, massive, and WET. Fine to medium sand is sub-rounded with medium to high sphericity and 80% quartz. Coarse sand is angular to sub-rounded with low sphericity and is primarily rock fragments.				1123.32
80 - -		(SSS	2-6 9-10	25		SP			
- 85 - -					Brown, fine to medium SAND, little coarse SAND, poorly graded, massive, and WET. Fine to medium sand is sub-rounded with medium to high sphericity and 80% quartz. Coarse sand is angular to sub-rounded with low sphericity and is primarily rock fragments.			Bailed heave before sampling from 80-181' bgl.	1113.32
90		SSS (10-12 16-28			SP			



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DATUM **USGS**

BORING NO. PROJECT LOCATION MW-114I SHEET 3 OF 4 GSWA: Spring Hill Camp Phase III

Osceola Township, MI

COORDINATES N 231,929.8 E 19,442,648.2

LOGGED BY	Larry Jordan
LOGGED BY	Larry Jordan

4065-005

				0.JZ	DATUM 0303				
Depth	AMPLE Lab Sample	Sample		Rec- overy	DESCRIPTION	USCS	Strata	REMARKS	Elevation Feet
95		SSS	2-3 6-7	%	Brown, fine to medium SAND, trace coarse SAND, trace fine Gravel, poorly graded, massive, and WET. Fine to medium sand is sub-rounded with medium to high sphericity and 80% quartz. Coarse sand is angular to sub-rounded with low sphericity and is primarily rock fragments.	SP			1103.3
- 05 - - -					Brown, fine to medium SAND, little coarse SAND, trace fine Gravel, poorly graded, laminated, and WET.	SP			1093.3
10- - - 15- - - -		SSS (1-2 5-8	100	Silty fine SAND Brown, fine to medium SAND, little coarse Sand, poorly graded, graded bedding, WET. Fine to medium sand is sub- to well rounded with moderate to high sphericity and >80% quartz. Coarse fraction is angular to sub-rounded with low to moderate sphericity and is primarily rock fragments. Brown, fine to medium SAND, some coarse Sand, trace Gravel, well graded, massive, and wet. Fine to medium sand is sub-rounded with moderate to low sphericity, and is >80% quartz. Coarse fraction is angular to sub-rounded	SP		Stopped drilling for the day.	1088. 1088. 1083.
 20 - - -		(SSS	5-7 10-14	100	with low to moderate sphericity and is primarily rock fragments.	sw			
25 - - -			8.10		Light brown, fine to medium SAND, some coarse SAND, little fine Gravel, poorly graded, graded bedding, and WET. Fine to medium sand is well rounded with high sphericity and >70% quartz. Coarse fraction is sub-angular to sub-rounded with low to high sphericity and ~70-90% rock fragments.				1073.
30 - - -		(SSS	8-10 10-16	75		SP			
35 - - -			7-12		Light brown, fine to medium SAND, little to some coarse Sand, trace fine Gravel, poorly graded, bedded, and wet. Fine to medium sand is well rounded with high sphericity and >70% quartz. Coarse fraction is sub-angular to sub-rounded with low to high sphericity and ~70-90% rock fragments. 4" thick lens of coarser material showing				1063.
40 - - -		C SSS	13-12	75	graded bedding at 139.8 feet bgs.	SP			
145-						SP			1053.

			231,929	9.8 E	East Lansing, MI 48823PROJECTTelephone: (517) 337-0111PROJECTFax: (517) 337-0417LOCATION19,442,648.2PROJECT NO.			MW-114I SHEET 4 OF 4 GSWA: Spring Hill Camp Phase III Osceola Township, MI 4065-005						
	FACE ELE			98.32	DATUM USGS	LOGGED BY		Jordan						
S Depth		INFO Sample		ON Rec-				Strata	REMARKS	Elevation Feet				
feet	Sample		Counts	overy %				0		Ш Ш				
- - 150 — -		sss	8-10 14-16	75	Light brown, fine to medium SAND, little Sand, trace fine Gravel, poorly graded, Fine to medium sand is well rounded w and 70% quartz. Coarse fraction is sub sub-rounded with low to high sphericity fragments. <i>(continued)</i>	massive, and WET. ith high sphericity o-angular to		an da saban An da saban An da saban An da saban						
- - 155 - -							SP	n da sidan Anglar dan Anglar dan						
- - 160 -		sss	16-50/6'	25	Light brown, fine to medium SAND, little with SILT, some Clay, slight to moderat WET.	e Silt, interbedded te plasticity, and	SM		Drillers noted change in lithology at 158'	1040.32				
-					Brown, fine to medium SAND, trace Silt graded, massive, and WET. Silt clasts	t clasts, poorly are gravel sized.			Drillers noted change in lithology at 161'	1037.3				
65 - -														
- - 170		(sss	16-24 50/6"	10			SP	a, da suba, T						
-								1, 21 - 24, 						
175 - -					Brown, fine to medium SAND, trace Silt graded, massive, and WET. Silt clasts					1023.3				
- - 180		(sss	4-27 30/3"	25			SP							
									End of boring - 181' bgl	1017.3				

COOR SURFA DRILLII Maic DRILLII Hanc DRILLII 6/27/	ACE ELE NG CON colm Pi NG MET d Auge NG STA	ES N 2 VATIOI ITRACT ITRACT ITRACT ITRACT ITRACT ITRACT ITRACT	226,960 N 108 TOR EQUIP Hand ENDEL 6/27/ ATA KEY	0.6 E ² 38.04 MENT d Auge	East La Teleph Fax: (5 19,440,8 DATUM	Abbott Road, Suite 210 ansing, MI 48823 one: (517) 337-0111 517) 337-0417 B73.6 M USGS LOCATION DESCRIPTION: See attached Site Diagr	BORING NO. PROJECT LOCATION PROJECT NO. LOGGED BY		: Sprir Ia Tow 05	ng Hill Camp Phase vnship, Ml	OF 1 e III
CLAY CLAYEY											
Depth	MPLE Lab Sample	INFO Sample Type		Rec-		DESCRIPTION		USCS	Strata	REMARKS	Elevation Feet
5		[®] GRAE				n to fine SAND, with some coarse trace medium to coarse Gravel.	e Sand and fine	SP		End of boring - 5' bgl	1088.04 1087.04 1083.04