

APPENDIX E  
BETA SITE DRILLING  
INVESTIGATION (BS 3,4,5,6)  
BORING LOGS

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW3A [847052]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS			SHEET 1 OF 13
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1530
BORING DEPTH: 250 ft bgs				FINISH TIME: 1815
GROUND SURFACE ELEVATION: 910.51 ft AMSL		WATER LEVEL		DATE: 01-06-20
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 01-08-20
COMMENTS: Northing: 4979696.86 Easting: 507372.86		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
			SM	1		SILTY SAND, fine to coarse (65% fine, 10% medium), well-rounded, silt (20%), trace organic material (5%); dry, 10YR 4/2		<p>Grout (neat cement) (0'-228' bgs)</p> <p>4" LC Steel Casing (0'-230' bgs)</p>
			CL	2				
			SC	3		CLAY, low plasticity, trace sand, fine (5%), well-rounded, trace organic material (5%); dry, 10YR 4/2		
			SP	4		CLAYEY SAND, fine to medium (32.5% fine, 32.5% medium), well-rounded, clay (20%), with gravel, fine to medium (10% fine, 5% medium), sub-angular to sub-rounded; dry to moist, 10YR 3/2		
				5		SAND, medium to coarse (45% medium, 40% coarse), sub-rounded, poorly graded, with gravel, fine to coarse (12% fine, 3% coarse), sub-angular to sub-rounded; dry to moist, 10YR 4/3		
				6		SAND, medium to coarse (45% medium, 40% coarse), sub-rounded, poorly graded, with gravel, fine to coarse (12% fine, 3% coarse), sub-angular to sub-rounded; dry to moist, 10YR 4/3		
			CL	7		SILTY CLAY, low to no plasticity, trace gravel, medium to coarse (2% medium, 1% coarse), angular; dry, 10YR 4/3		
				8				
				9				
			ML	10				
				11		SILT, with clay (15%), with gravel, medium (10%), angular to sub-angular; dry to moist, 10YR 4/4		
				12				
				13				
				14				
			SP	15		SILT, with clay (25%), with gravel, fine (10%), sub-rounded; dry to moist, 10YR 5/4		
				16				
				17				
			SP	18		SILT, with sand, fine (15%), well-rounded, trace clay (5%), trace gravel, coarse (2%), sub-rounded; dry to moist, 2.5Y 4/4		
				19		SAND, fine to medium (15% fine, 70% medium), sub-angular to sub-rounded, poorly graded, with silt		

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PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW3A [847052]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS			SHEET 2 OF 13
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1530
BORING DEPTH: 250 ft bgs				FINISH TIME: 1815
GROUND SURFACE ELEVATION: 910.51 ft AMSL		WATER LEVEL		DATE: 01-06-20
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 01-08-20
COMMENTS: Northing: 4979696.86 Easting: 507372.86		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				21		(10%), trace gravel, fine (5%), sub-angular to sub-rounded; moist, 2.5Y 4/4		Grout (neat cement) (0'-228' bgs)
			SP	22		SAND, medium to coarse (15% medium, 70% coarse), sub-rounded, poorly graded, with gravel, fine to coarse (5% fine, 5% coarse), sub-angular, trace cobbles (5%); moist, 2.5Y 3/3		
				23		SAND, coarse (70%), sub-rounded, poorly graded, with gravel, fine to medium (22% fine, 3% medium); dry to moist, 10YR 4/4		4" LC Steel Casing (0'-230' bgs)
				24		SAND, fine to medium (15% fine, 70% medium), sub-angular, poorly graded, trace silt (5%); dry, 10YR 4/4		
				25		SAND, medium to coarse (20% medium, 50% coarse), sub-angular, poorly graded, with gravel, fine to coarse (25% fine, 5% medium), sub-rounded; dry, 10YR 4/4		
			SM	26		SILT SAND, fine to medium (60% fine, 20% medium), sub-rounded, silt (20%); dry, 10YR 5/4		
				27		SILT SAND, fine to medium (65% fine, 10% medium), sub-rounded, silt (25%); dry, 10YR 4/4		Grout (neat cement) (0'-228' bgs)
				28		SILT SAND, fine to medium (70% fine, 10% medium), sub-rounded to well-rounded, silt (20%); wet, 10YR 5/4		
				29				
			SP	30		SAND, medium to coarse (25% medium, 75% coarse), sub-angular to well-rounded, poorly graded; wet, 10YR 4/3		
				31		SAND, fine (90%), well-rounded, poorly graded, with clay (10%), low plasticity; wet, 2.5Y 5/3		
				32		SAND, fine to coarse (60% fine, 35% medium, 10% coarse), sub-rounded to well-rounded, well graded, trace silt (5%); moist to wet, 10YR 4/3		
			SW	33		CLAY, medium plasticity; dry, 10YR 5/3		
				34		SAND, fine to coarse (60% fine, 30% medium, 10% coarse), sub-rounded to well-rounded, well graded; moist to wet, 10YR 5/4		
			SW	35		GRAVEL, fine (75%), sub-rounded to well-rounded, poorly graded, with sand, coarse (25%), well-rounded; moist to wet, 2.5Y 5/3		
			GP	36		SAND, fine to coarse (33% fine, 33% medium, 33%		
			SW	37				

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PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW3A [847052]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS			SHEET 3 OF 13
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1530
BORING DEPTH: 250 ft bgs				FINISH TIME: 1815
GROUND SURFACE ELEVATION: 910.51 ft AMSL		WATER LEVEL		DATE: 01-06-20
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 01-08-20
COMMENTS: Northing: 4979696.86 Easting: 507372.86		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				41		coarse), sub-angular to well-rounded, well graded; moist to wet, 2.5Y 4/3		4" LC Steel Casing (0'-230' bgs)
			SP	42		SAND, fine to medium (50% medium, 50% coarse), sub-rounded, poorly graded; wet, 2.5Y 5/2		
				43		SAND, medium to coarse (45% medium, 45% coarse), sub-angular to well-rounded, poorly graded, with gravel, fine (10%), sub-angular; moist to wet, 2.5Y 4/2		4" LC Steel Casing (0'-230' bgs)
			SP	44		SAND, fine to coarse (5% fine, 15% medium, 60% coarse), sub-rounded, poorly graded, with gravel, fine (20%), sub-angular to sub-rounded; wet, 2.5Y 4/2		
				45		GRAVEL, fine to coarse (55% fine, 20% medium, 5% coarse), sub-angular to well-rounded, poorly graded, with sand, medium to coarse (10% medium, 10% coarse), sub-rounded; wet, 2.5Y 4/2		4" LC Steel Casing (0'-230' bgs)
			GP	46		SAND, medium to coarse (15% medium, 70% coarse), sub-rounded to well-rounded, poorly graded, with gravel, fine (15%), sub-angular to sub-rounded; dry to moist, 2.5Y 4/2		
				47		SAND, fine to medium (80% fine, 15% medium), sub-angular to sub-rounded, poorly graded, trace silt (5%); dry to moist, 2.5Y 4/2		4" LC Steel Casing (0'-230' bgs)
			SP	48		SAND, fine to medium (75% fine, 15% medium), sub-angular, poorly graded, trace gravel, fine (5%),		
				49		GRAVEL, fine to medium (70% fine, 5% medium), angular to sub-angular, poorly graded, with sand, coarse (25%), sub-angular to sub-rounded; dry to moist, 2.5Y 4/1		4" LC Steel Casing (0'-230' bgs)
			GP	50		SAND, fine to medium (75% fine, 15% medium), sub-angular, poorly graded, trace gravel, fine (5%),		
				51		SAND, fine to medium (75% fine, 15% medium), sub-angular, poorly graded, trace gravel, fine (5%),		4" LC Steel Casing (0'-230' bgs)
			SP	52		SAND, fine to medium (75% fine, 15% medium), sub-angular, poorly graded, trace gravel, fine (5%),		
				53		SAND, fine to medium (75% fine, 15% medium), sub-angular, poorly graded, trace gravel, fine (5%),		4" LC Steel Casing (0'-230' bgs)
			SP	54		SAND, fine to medium (75% fine, 15% medium), sub-angular, poorly graded, trace gravel, fine (5%),		
				55		SAND, fine to medium (75% fine, 15% medium), sub-angular, poorly graded, trace gravel, fine (5%),		4" LC Steel Casing (0'-230' bgs)
			SP	56		SAND, fine to medium (75% fine, 15% medium), sub-angular, poorly graded, trace gravel, fine (5%),		
				57		SAND, fine to medium (75% fine, 15% medium), sub-angular, poorly graded, trace gravel, fine (5%),		4" LC Steel Casing (0'-230' bgs)
			SP	58		SAND, fine to medium (75% fine, 15% medium), sub-angular, poorly graded, trace gravel, fine (5%),		
				59		SAND, fine to medium (75% fine, 15% medium), sub-angular, poorly graded, trace gravel, fine (5%),		4" LC Steel Casing (0'-230' bgs)
			SP	60		SAND, fine to medium (75% fine, 15% medium), sub-angular, poorly graded, trace gravel, fine (5%),		

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PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW3A [847052]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS			SHEET 4 OF 13
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1530
BORING DEPTH: 250 ft bgs				FINISH TIME: 1815
GROUND SURFACE ELEVATION: 910.51 ft AMSL		WATER LEVEL		DATE: 01-06-20
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 01-08-20
COMMENTS: Northing: 4979696.86 Easting: 507372.86		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
			SP	61		sub-angular, trace silt (5%); moist, 2.5Y 5/2		<p>Grout (neat cement) (0'-228' bgs)</p> <p>4" LC Steel Casing (0'-230' bgs)</p>
			SW	62		SAND, fine to coarse (5% fine, 20% medium, 70% coarse), sub-rounded to well-rounded, poorly graded, trace gravel, fine (5%), sub-angular to sub-rounded; dry to moist, 2.5Y 5/2		
			SP	63		SAND, fine to coarse (15% fine, 50% medium, 35% coarse), sub-rounded to well-rounded, well graded, trace gravel, medium (2%), sub-angular; dry to moist, 2.5Y 5/2		
				64		SAND, medium to coarse (50% medium, 20% coarse), sub-angular to sub-rounded, poorly graded, with gravel, fine to medium (5% fine, 25% medium), sub-angular to sub-rounded; dry to moist, 2.5Y 4/1		
				65				
			SM	66		SILTY SAND, fine to medium (65% fine, 20% medium), sub-angular to sub-rounded, silt (15%); dry, 2.5Y 4/2		
				67				
			SW	68		SAND, fine to coarse (15% fine, 25% medium, 45% coarse), sub-angular to sub-rounded, well graded, with gravel, medium (10%), sub-angular to sub-rounded, trace silt (5%); dry to moist, 2.5Y 4/2		
				69				
				70		GRAVEL, fine to coarse (65% fine, 10% medium, 3% coarse), sub-angular to sub-rounded, poorly graded, with sand, coarse (17%), sub-rounded to well-rounded, trace silt (5%); moist, 2.5Y 4/2		
			GP	71				
				72				
				73				
				74		DOLOSTONE, not competent, very weathered and broken, dolomitic precipitate (30%), trace glauconite grains/smear (2-3%); 10YR 5/6 (dolomitic precipitate), 10YR 5/4		
				75		DOLOSTONE, not competent, very weathered and broken, dolomitic precipitate (30%), trace glauconite grains/smear (2-3%); 10YR 5/6 (dolomitic precipitate), 10YR 5/4		
				76		DOLOSTONE, not competent, very weathered and broken, dolomitic precipitate (30%), trace glauconite grains/smear (2-3%); 10YR 5/6 (dolomitic precipitate), 10YR 5/4		
				77		DOLOSTONE, not competent, very weathered and broken, dolomitic precipitate (30%), trace glauconite grains/smear (2-3%); 10YR 5/6 (dolomitic precipitate), 10YR 5/4		
				78		DOLOSTONE, competent, fine grained, massive, dolomitic precipitate (10-15%), trace sand, fine (3%), well-rounded, trace glauconite smears (1%); 10YR 5/4		
				79				

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PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW3A [847052]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS			SHEET 5 OF 13
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1530
BORING DEPTH: 250 ft bgs				FINISH TIME: 1815
GROUND SURFACE ELEVATION: 910.51 ft AMSL		WATER LEVEL		DATE: 01-06-20
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 01-08-20
COMMENTS: Northing: 4979696.86 Easting: 507372.86		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				81		DOLOSTONE, moderately competent, massive, dolomitic precipitate (10-15%), trace glaucomite (5%), trace quartz precipitation (2%); 2.5Y 6/6		Grout (neat cement) (0'-228' bgs)
				82		SANDY DOLOSTONE, not competent, apparent bedding, sand (20-30%), dolomitic precipitate (20%), vugs (5-10%), trace chert (5%); 2.5Y 6/3		
				83		DOLOSTONE, moderately competent, massive, trace sand (2%), 2.5Y 6/3		4" LC Steel Casing (0'-230' bgs)
				84		SANDY DOLOSTONE, competent, massive, sand, fine (20-30%), well-rounded, dolomitic precipitate (15-20%), trace vugs (5%), trace chert (2.5%), trace iron staining (2%) trace quartz; 2.5Y 6/4		
				85		SANDY DOLOSTONE, moderately competent, massive, dolomitic precipitate (20%), sand, fine (20%), well-rounded, trace quartz precipitate (5%), trace chert (5%); 2.5Y 6/3		Grout (neat cement) (0'-228' bgs)
				86		DOLOSTONE, not competent, massive, iron staining along fractures; 2.5Y 6/4		
				87		DOLOSTONE, not competent, massive, dolomitic precipitate (5-10%), trace iron staining (5%) - half of the staining on dolomitic precipitate, trace glauconite (5%); 2.5Y 6/3		Grout (neat cement) (0'-228' bgs)
				88		DOLOSTONE, not competent, iron staining (10%), manganese staining (10%); 2.5Y 5/3, clay observed		
				89		SANDY DOLOSTONE, moderately competent, sand (20%), massive manganese staining (5-10%), trace 1 mm lamellae bands (5%), trace reworked clasts (3%); 2.5Y 6/3, clay observed		Grout (neat cement) (0'-228' bgs)
				90		DOLOSTONE, moderately competent, patchy manganese/iron staining along fractures (20%), trace sand, medium (5%); 2.5Y 6/3, clay observed		
			ML	91		SILT, with weathered dolostone pieces (25%), with sand, fine (15%); 10YR 4/4, silt and clay not observed in the video log - may have been the result of drilling		Grout (neat cement) (0'-228' bgs)
				92		DOLOSTONE, very weathered, dolostone rock fragments (60%), with clay (30%), medium plasticity, firm, trace iron staining (5%), trace sand, fine to medium (5%); 2.5Y 6/2, silt and clay not observed in the video log - may have been the result of drilling		
				93				
				94				
				95				
				96				
				97				
				98				
				99				

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PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW3A [847052]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS			SHEET 6 OF 13
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1530
BORING DEPTH: 250 ft bgs				FINISH TIME: 1815
GROUND SURFACE ELEVATION: 910.51 ft AMSL		WATER LEVEL		DATE: 01-06-20
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 01-08-20
COMMENTS: Northing: 4979696.86 Easting: 507372.86		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				101		DOLOSTONE, not competent, iron staining/banding (5-10%), trace vugs (5%), trace dendritic manganese staining (1%); 2.5Y 6/2	
				102		DOLOSTONE, not competent, dolomitic precipitate (10-15%), iron staining/banding (10%), with sand, fine (10%), well-rounded, trace glauconite (2%); 2.5Y 4/3	
				103		SANDY DOLOSTONE, not competent, massive, sand, fine (20%), well-rounded, dolomitic precipitate (15%), vugs (10%), trace iron staining (5%); 2.5Y 6/4	
				104			
				105		DOLOSTONE, competent, massive, dolomitic precipitate (15%), vugs (5-10%), trace iron staining along fractures (5%), trace sand, fine (5%), well-rounded; 2.5Y 6/4	
				106			
				107		DOLOSTONE, moderately competent, bedded, dolomitic precipitate (15%), iron staining along fractures (15%), with sand, fine (15%), well-rounded, dendritic manganese staining (5-10%); 2.5Y 8/3	
				108			
				109		DOLOSTONE, competent, massive, dolomitic precipitate (30%), vugs (10-15%), trace iron staining on dolomitic precipitate (5%), trace sand, fine (2%), well-rounded; 2.5Y 5/3	
				110		DOLOSTONE, moderately competent, vuggy texture (10%), with sand, medium (10%), trace manganese staining on fractures (5%); 2.5Y 6/3, clay observed	
				111			
				112			
				113		DOLOSTONE, moderately competent, dendritic manganese staining along fractures/bedding (10-20%), fractures (10%), banded iron staining (5-10%), trace sand, fine (5%); 2.5Y 7/4, 6" clay lense @ 113' bgs	
				114			
				115		DOLOSTONE, competent, iron staining (5-10%), trace dendritic manganese staining (3%), trace dark red iron/manganese staining along fractures (3%), trace sand, medium (3%); 2.5Y 7/4, clay observed	
				116			
				117			
				118		DOLOSTONE, competent, with sand, fine to medium (5-10%), trace vugs (5%), trace iron staining (5%), trace dendritic manganese staining (2%); 2.5Y 6/3, clay observed	
				119			

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PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW3A [847052]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS			SHEET 7 OF 13
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1530
BORING DEPTH: 250 ft bgs				FINISH TIME: 1815
GROUND SURFACE ELEVATION: 910.51 ft AMSL		WATER LEVEL		DATE: 01-06-20
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 01-08-20
COMMENTS: Northing: 4979696.86 Easting: 507372.86		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				121		DOLOSTONE, moderately competent, massive, very fine grained, dolomitic precipitate (10%), vugs (5-10%); 2.5Y 6/3	<p>Grout (neat cement) (0'-228' bgs)</p> <p>4" LC Steel Casing (0'-230' bgs)</p>
				122			
				123		DOLOSTONE, not competent, dolomitic precipitate (20-30%), vugs (15%), trace iron staining (1-2%); 2.5Y 5/3	
				124			
				125			
				126		DOLOSTONE, moderately competent, massive, dolomitic precipitate (10-15%), vugs (10%), trace iron staining on dolomitic precipitate (5%); 2.5Y 5/3, fine grained dolomitic precipitate at 129-130' bgs	
				127			
				128			
				129			
				130		DOLOSTONE, moderately competent, vugs (10-15%), trace granular dolomitic precipitate (5%), trace iron staining (4%), trace sand, fine (2%), trace glauconite (1%); 2.5Y 5/3	
				131			
				132			
				133		DOLOSTONE, moderately competent, massive, dolomitic precipitate (5-10%), trace vugs (5%), trace sand, fine (1%), well-rounded; 2.5Y 5/3	
				134			
				135		DOLOSTONE, moderately competent, dolomitic precipitate (15%), trace iron banding along fractures (5%), trace sand, fine (1%), well-rounded; 2.5Y 5/4	
				136			
				137		DOLOSTONE, not competent, trace dolomitic precipitate (5%), trace iron staining on rock and dolomitic precipitate (5%); 2.5Y 6/3	
				138		DOLOSTONE, moderately competent, dolomitic precipitation (15%), iron staining/banding along dolomitic precipitate (10%); 2.5Y 6/3	
				139		SANDY DOLOSTONE, moderately competent,	



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LOGGED BY: AS/AEL	CHECKED BY: AEL/AS			SHEET 8 OF 13
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1530
BORING DEPTH: 250 ft bgs				FINISH TIME: 1815
GROUND SURFACE ELEVATION: 910.51 ft AMSL		WATER LEVEL		DATE: 01-06-20
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 01-08-20
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SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				141		quartz precipitates, sand, fine to medium (20%), well-rounded; 2.5Y 4/4	Grout (neat cement) (0'-228' bgs)
				142		DOLOSTONE, moderately competent, massive iron staining along fractures (20%), trace dendritic manganese staining (5%), trace sand, fine (2%); 2.5Y 6/4, clay observed	
				143		DOLOSTONE, not competent, very weathered, 5-15 mm dolostone pieces, 6" silt lense; 10YR 6/4	4" LC Steel Casing (0'-230' bgs)
				144		DOLOSTONE, moderately competent, massive, dolomitic precipitate (15%), iron staining/banding (15%), with sand, fine (10-15%), well-rounded, trace vugs (5%), trace chert (2%); 10YR 5/4	
				145		SANDY DOLOSTONE, moderately competent, weathered, platy, iron staining (20-30%), sand, fine to medium (15% fine, 5% medium), well-rounded, dolomitic precipitate (10%), trace dendritic manganese staining (5%); 10YR 6/6	
				146		SANDY DOLOSTONE, not competent, very weathered, inter-bedded, platy, sand, fine (20-25%), well-rounded, iron staining (10%), dendritic manganese staining along fractures (10%), dolomitic precipitation (10-15%); 2.5Y 7/4	
				147		DOLOSTONE, moderately competent, weathered, massive, fine grained, iron staining (20-30%), dolomitic precipitate (10%), trace dendritic manganese staining (5%); 2.5Y 6/3	
				148		DOLOSTONE, moderately competent, dolomitic precipitate (10%), with sand, fine to medium (5% fine, 5% medium), trace glauconite grains (3%); 10YR 6/6	
				149		SANDY DOLOSTONE, competent, sand, fine to medium (30%), oolitic texture (20%), vugs (15%); 2.5Y 6/3	
				150		DOLOSTONE, moderately competent, oolitic texture (30%), chert (15-20%), trace glauconite (2%), trace iron staining (2%); 2.5Y 6/4	
				151		DOLOSTONE, moderately competent, bedding visible, platy, manganese staining along fractures and core surface (20-30%), dolomitic precipitate (5-10%), trace iron staining on dolomitic precipitate (5%); 5Y 7/2	
				152		SANDY DOLOSTONE, not competent, very weathered, platy, sand, fine to medium (20-25%),	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW3A [847052]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS			SHEET 9 OF 13
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1530
BORING DEPTH: 250 ft bgs				FINISH TIME: 1815
GROUND SURFACE ELEVATION: 910.51 ft AMSL		WATER LEVEL		DATE: 01-06-20
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 01-08-20
COMMENTS: Northing: 4979696.86 Easting: 507372.86		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	GROUND SURFACE CONDITIONS:	WELL DIAGRAM
						Grass	
LITHOLOGIC DESCRIPTION							
				161		well-rounded, dendritic manganese staining (10%), trace chert (5%); 2.5Y 6/4	4" LC Steel Casing (0'-230' bgs)
				162		CHERT, moderately competent, dendritic manganese staining (10-15%), trace iron staining (1%); 2.5Y 6/1	
				163		DOLOSTONE, moderately competent, oolitic texture (10-15%), with sand, fine to medium (5% fine, 5% medium), trace chert (5%), trace vugs (3%), trace glauconite (3%); 2.5Y 6/3	4" LC Steel Casing (0'-230' bgs)
				164			
				165		DOLOSTONE, moderately competent, dolomitic precipitate (5-10%), trace sand, fine (2%), well-rounded, trace glauconite (2%); 2.5Y 5/3	4" LC Steel Casing (0'-230' bgs)
				166			
				167			4" LC Steel Casing (0'-230' bgs)
				168		DOLOSTONE, competent, massive, dolomitic precipitate (15%), trace vugs (5%), trace dendritic manganese staining (2%); 2.5Y 6/4, trace sand (5%) @ 167.75-168' bgs	
				169			4" LC Steel Casing (0'-230' bgs)
				170		DOLOSTONE, not competent, weathered, iron staining on dolomitic precipitate (20%), dolomitic precipitate (15-20%), trace sand, fine (3%), well-rounded; 2.5Y 5/4	
				171			4" LC Steel Casing (0'-230' bgs)
				172			
				173		DOLOSTONE, not competent, very weathered, reworked, dolomitic precipitate (25-30%), dendritic manganese staining (10%); 2.5Y 6/6, some precipitate stained dark red at fractures	4" LC Steel Casing (0'-230' bgs)
				174			
				175		DOLOSTONE, competent, massive, vugs (20%), dolomitic precipitate (10%), trace iron staining (1%); 2.5Y 6/3	4" LC Steel Casing (0'-230' bgs)
				176			
				177		DOLOSTONE, moderately competent, massive, dolomitic precipitate (20%), vugs (15%), iron staining (5%); 2.5Y 6/2	4" LC Steel Casing (0'-230' bgs)
				178			
				179			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW3A [847052]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS			SHEET 10 OF 13
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1530
BORING DEPTH: 250 ft bgs				FINISH TIME: 1815
GROUND SURFACE ELEVATION: 910.51 ft AMSL		WATER LEVEL		DATE: 01-06-20
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 01-08-20
COMMENTS: Northing: 4979696.86 Easting: 507372.86		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				181		DOLOSTONE, moderately competent, vugs (15-20%), dolomitic precipitate (10-15%), trace oolitic texture (5%), trace iron staining (4%); 2.5Y 7/4, 40x10 mm quartz nodule	<p>Grout (neat cement) (0'-228' bgs)</p> <p>4" LC Steel Casing (0'-230' bgs)</p>
				182		DOLOSTONE, competent, dolomitic precipitate (5-10%), trace chert (5%); 2.5Y 6/3	
				183			
				184			
				185		DOLOSTONE, moderately competent, massive iron staining, trace banded iron staining (5%); 10YR 6/8, clay observed	
				186			
				187		DOLOSTONE, competent, massive, fine grained dolomitic precipitate (15-20%), trace iron staining (5%); 2.5Y 6/3	
				188			
				189			
				190		DOLOSTONE, competent, massive, vugs (10%), trace fractures (5%), trace reworked clasts (2%); 2.5Y 6/4	
				191			
				192			
				193		DOLOSTONE, competent, massive, manganese staining along fractures/vugs (5-10%), trace fractures (3%), trace vugs (1%); 2.5Y 6/6	
				194			
				195		DOLOSTONE, competent, massive, very fine grained, vugs (15%), manganese staining (10%); 2.5Y 6/3	
				196			
				197		DOLOSTONE, moderately competent, massive, manganese staining (5-10%), trace dolomitic precipitate (5%), trace iron banding (2%); 2.5Y 6/3	
				198			
				199		DOLOSTONE, moderately competent, massive, trace dolomitic precipitate (5%), trace manganese staining (3%), trace iron banding (2%); 2.5Y 6/2	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW3A [847052]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS			SHEET 11 OF 13
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1530
BORING DEPTH: 250 ft bgs				FINISH TIME: 1815
GROUND SURFACE ELEVATION: 910.51 ft AMSL		WATER LEVEL		DATE: 01-06-20
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 01-08-20
COMMENTS: Northing: 4979696.86 Easting: 507372.86		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				201		DOLOSTONE, moderately competent, banded iron staining (10-15%), dolomitic precipitate (5-10%), trace vugs (5%); 2.5Y 6/3		Grout (neat cement) (0'-228' bgs)
				202				
				203		DOLOSTONE, moderately competent, dolomitic precipitate (15%), trace iron staining (3%), trace chert (3%); 2.5Y 7/3		4" LC Steel Casing (0'-230' bgs)
				204				
				205		DOLOSTONE, moderately competent, massive, dolomitic precipitate (20%), trace iron staining (3%), trace vugs (3%); 10YR 6/3		
				206				
				207				
				208		DOLOSTONE, competent, massive, dolomitic precipitate (10%), trace fractures (5%), trace vugs (5%); 10YR 5/2, fractures parallel to bedding		
				209				
				210		DOLOSTONE, not competent, weathered, massive, banded iron staining (30%), trace sand (1%); 10YR 6/6		
				211		CHERT, dolomitic precipitate (10%); 2.5Y 6/3		
				212		DOLOSTONE, moderately competent, dendritic iron staining (15%), dendritic manganese staining along fractures (5-10%); 2.5Y 7/3		
				213				
				214		DOLOSTONE, moderately competent, trace glauconite (2%), trace vugs (1%); 2.5Y 7/2, clay observed		Grout (neat cement) (0'-228' bgs)
				215		DOLOSTONE, competent, banded iron staining (10%), trace fine grained dolomitic precipitate (5%); 2.5Y 7/4		
				216				
				217				
				218		DOLOSTONE, competent, banded iron staining (10%), fine grained dolomitic precipitate (10%); 10YR 6/4		
				219				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW3A [847052]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS			SHEET 12 OF 13
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1530
BORING DEPTH: 250 ft bgs				FINISH TIME: 1815
GROUND SURFACE ELEVATION: 910.51 ft AMSL		WATER LEVEL		DATE: 01-06-20
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 01-08-20
COMMENTS: Northing: 4979696.86 Easting: 507372.86		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				221		SANDY DOLOSTONE, not competent, weathered, sand, coarse (50%), well-rounded, iron staining (30%); 10YR 6/4		4" LC Steel Casing (0'-230' bgs) Grout Basket (221' bgs)
			Cj	222		QUARTZ ARENITE, fine to coarse (10% fine, 70% medium, 20% coarse), well-rounded; 2.5Y 8/3		
				223		QUARTZ ARENITE, fine to coarse (10% fine, 75% medium, 15% coarse), well-rounded; 2.5Y 8/2		Grout (neat cement) (0'-228' bgs) 4" LC Steel Casing (0'-230' bgs)
			Cj	224		QUARTZ ARENITE, fine to coarse (10% fine, 75% medium, 15% coarse), well-rounded; 2.5Y 8/2		
				225		QUARTZ ARENITE, medium to coarse (70% medium, 30% coarse), well-rounded, iron staining (5-15%); 2.5Y 6/6		1.5' pellet seal on top of 0.5' pea rock (228'-230' bgs)
			Cj	226		QUARTZ ARENITE, medium to coarse (70% medium, 30% coarse), well-rounded, pieces of well cemented bedrock (5-10%), massive iron staining; 2.5Y 6/6		
				227		QUARTZ ARENITE, medium to coarse (55% medium, 45% coarse), well-rounded, massive iron staining; 10YR 5/6		7" Open Hole (230'-250' bgs)
			Cj	228		QUARTZ ARENITE, medium to coarse (65% medium, 45% coarse), well-rounded; 2.5Y 8/1		
				229		QUARTZ ARENITE, medium to coarse (65% medium, 45% coarse), well-rounded; 2.5Y 8/1		
				230		QUARTZ ARENITE, medium to coarse (65% medium, 45% coarse), well-rounded; 2.5Y 8/1		
				231		QUARTZ ARENITE, medium to coarse (65% medium, 45% coarse), well-rounded; 2.5Y 8/1		
				232		QUARTZ ARENITE, medium to coarse (65% medium, 45% coarse), well-rounded; 2.5Y 8/1		
				233		QUARTZ ARENITE, medium to coarse (65% medium, 45% coarse), well-rounded; 2.5Y 8/1		
				234		QUARTZ ARENITE, medium to coarse (65% medium, 45% coarse), well-rounded; 2.5Y 8/1		
				235		QUARTZ ARENITE, medium to coarse (65% medium, 45% coarse), well-rounded; 2.5Y 8/1		
				236		QUARTZ ARENITE, medium to coarse (65% medium, 45% coarse), well-rounded; 2.5Y 8/1		
				237		QUARTZ ARENITE, medium to coarse (65% medium, 45% coarse), well-rounded; 2.5Y 8/1		
				238		QUARTZ ARENITE, medium to coarse (65% medium, 45% coarse), well-rounded; 2.5Y 8/1		
				239		QUARTZ ARENITE, medium to coarse (65% medium, 45% coarse), well-rounded; 2.5Y 8/1		



# ENVIRONMENTAL BORING LOG

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW3A [847052]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS			SHEET 13 OF 13
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1530
BORING DEPTH: 250 ft bgs				FINISH TIME: 1815
GROUND SURFACE ELEVATION: 910.51 ft AMSL		WATER LEVEL		DATE: 01-06-20
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 01-08-20
COMMENTS: Northing: 4979696.86 Easting: 507372.86		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:	WELL DIAGRAM
						Grass	
						LITHOLOGIC DESCRIPTION	
				241	[Dotted Pattern]	QUARTZ ARENITE, medium to coarse (85% medium, 15% coarse), well-rounded; 2.5Y 8/3	<p>7" Open Hole (230'-250' bgs)</p>
				242	[Dotted Pattern]	QUARTZ ARENITE, fine to coarse (10% fine, 80% medium, 10% coarse), well-rounded, trace well-cemented bedrock (5%); 2.5Y 7/4	
				243	[Dotted Pattern]	QUARTZ ARENITE, fine to coarse (5% fine, 85% medium, 10% coarse), well-rounded, trace well-cemented bedrock (3%); 2.5Y 8/4	
			Cj	244	[Dotted Pattern]		
				245	[Dotted Pattern]		
				246	[Dotted Pattern]	QUARTZ ARENITE, fine to medium (5% fine, 95% medium), well-rounded; 2.5Y 8/1	
				247	[Dotted Pattern]		
				248	[Dotted Pattern]	QUARTZ ARENITE, fine to coarse (5% fine, 75% medium, 20% coarse), well-rounded, iron staining (5-15%), trace well-cemented bedrock (5%); 7.5Y 6/4	
				249	[Dotted Pattern]		
				250	[Dotted Pattern]	E.O.B. @250' bgs, no refusal	
				251	[Dotted Pattern]		
				252	[Dotted Pattern]		
				253	[Dotted Pattern]		
				254	[Dotted Pattern]		
				255	[Dotted Pattern]		
				256	[Dotted Pattern]		
				257	[Dotted Pattern]		
				258	[Dotted Pattern]		
				259	[Dotted Pattern]		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN				
PROJECT: Project 1007		DRILLING METHOD: Sonic				BORING NO. MW3B [847053]	
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags				SHEET 1 OF 7	
DRILLING CONTR.: Traut							
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL				DRILLING	
BORING DEPTH: 130 ft bgs						START TIME	FINISH TIME
GROUND SURFACE ELEVATION: 910.40 ft AMSL		16.5'	22'	39.6'	21.5'	1100	1830
DATUM: NAD 83 UTM 15 (meters)		TIME	1130	1230	1545	1635	
COMMENTS: Northing: 4979693.32 Easting: 507372.01		DATE	01-13-20	01-13-20	01-13-20	01-13-20	
		CASING DEPTH	19'	35'	45'	55'	01-13-20

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass				WELL DIAGRAM	
						LITHOLOGIC DESCRIPTION					
MW3B-SOIL 15-16.5  MW3B-SOIL 16.5-19  MW3B-GW 16.5-19			CL	1		CLAY, low plasticity, medium stiff, trace organics (5%); 10YR 4/3		Grout (neat cement) (0'-108' bgs)	4" LC Steel Casing (0'-110' bgs)		
			SM	2		SILTY SAND, medium to coarse (60% medium, 15% coarse), sub-rounded, silt (20%), trace organics (5%); dry, 10YR 4/4					
				3							
				4							
				5		SILTY SAND, fine to medium (50% fine, 15% medium), sub-rounded, silt (30%), trace clay (5%); dry to moist, 10YR 4/3					
				6							
			SC	7		SANDY CLAY, low plasticity, stiff, sand, fine to medium (10% fine, 5% medium), sub-angular to sub-rounded; dry to moist, 10YR 4/4					
				8							
				9							
			CL ML	10		SANDY SILTY CLAY, low plasticity, silt (30%), sand, fine to coarse (20% fine, 10% medium, 10% coarse), sub-rounded to well-rounded; dry, 10YR 5/4					
				11							
				12							
				13		SANDY SILTY CLAY, low plasticity, silt (27%), sand, fine to medium (20% fine, 5% medium), sub-rounded to well-rounded, trace gravel, medium (3%), sub-angular; dry, 10YR 5/6					
				14							
			SW	15		SANDY SILTY CLAY, low plasticity, silt (27%), sand, fine to medium (20% fine, 5% medium), sub-rounded to well-rounded, trace gravel, medium (3%), sub-angular; dry, 10YR 5/6					
				16							
			SM	17		SAND, fine to coarse (20% fine, 50% medium, 17% coarse), sub-angular to sub-rounded, well graded, with clay (10%), low plasticity, trace gravel, medium to coarse (3%), sub-angular to sub-rounded; moist, 10YR 5/6					
				18							
			GP	19		SILTY SAND, fine (60%), well-rounded, silt (30%), with gravel, coarse (10%), sub-rounded; moist, 10YR 5/4					

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic				BORING NO. MW3B [847053]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags				SHEET 2 OF 7
DRILLING CONTR.: Traut						DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL				START TIME
BORING DEPTH: 130 ft bgs		16.5'	22'	39.6'	21.5'	FINISH TIME
GROUND SURFACE ELEVATION: 910.40ft AMSL		TIME	1130	1230	1545	1635
DATUM: NAD 83 UTM 15 (meters)		DATE	01-13-20	01-13-20	01-13-20	01-13-20
COMMENTS: Northing: 4979693.32 Easting: 507372.01		CASING DEPTH	19'	35'	45'	55'
						01-13-20 01-14-20

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
						Grass	LITHOLOGIC DESCRIPTION	
MW3B-SOIL 31-35			SP	21		GRAVEL, fine to medium (70% fine, 10% medium), sub-angular to sub-rounded, poorly graded, with sand, coarse (20%), sub-angular, moist to wet, 10YR 4/4		<p>Grout (neat cement) (0'-108' bgs)</p> <p>4" LC Steel Casing (0'-110' bgs)</p> <p>Grout (neat cement) (0'-108' bgs)</p>
				22		SAND, fine to coarse (5% fine, 30% medium, 50% coarse), sub-angular to sub-rounded, poorly graded, with gravel, fine (10%), sub-angular, trace silt (5%); wet, 10YR 5/4		
				23		SAND, medium to coarse (45% medium, 45% coarse), sub-rounded, poorly graded, trace gravel, fine (5%), well-rounded, trace silt (5%); moist, 10YR 5/3		
				24		SAND, medium to coarse (45% medium, 50% coarse), sub-rounded, poorly graded, trace gravel, coarse (5%), sub-angular; moist, 10YR 5/3		
			SW	25		SAND, medium to coarse (25% medium, 70% coarse), sub-rounded, poorly graded, trace gravel, fine (5%), sub-angular; moist, 10YR 5/4		
				26		SAND, fine to coarse (15% fine, 50% medium, 25% coarse), sub-angular to sub-rounded, well graded, trace gravel, fine (5%), sub-rounded, trace silt (5%); moist, 10YR 5/3		
			SP	27		SAND, medium to coarse (25% medium, 65% coarse), sub-rounded, poorly graded, with gravel, fine (10%), sub-angular; moist, 10YR 5/3		
				28		SAND, fine to medium (70% fine, 25% medium), sub-rounded to well-rounded, poorly graded, trace silt (5%); dry to moist, 10YR 5/3		
			SW	29		SAND, fine to coarse (20% fine, 55% medium, 10% coarse), sub-rounded to well-rounded, well graded, with gravel, fine to coarse (5% fine, 10% coarse), sub-angular; dry to moist, 10YR 5/4		
				30		SAND, fine to coarse (70% fine, 15% medium, 5% coarse), sub-rounded, poorly graded, trace gravel, coarse (5%), sub-angular, trace silt (5%); moist, 10YR 5/3		
			SP	31		SAND, fine to coarse (30% fine, 60% medium, 10% coarse), sub-rounded to well-rounded, well graded; wet, 10YR 5/4		
				32		SAND, fine to coarse (5% fine, 50% medium, 40% coarse), sub-rounded, poorly graded, trace gravel, fine (5%), angular to sub-angular; wet, 10YR 5/3		
			SW	33		SAND, medium to coarse (25% medium, 55% coarse), sub-rounded to well-rounded, poorly		
				34				
			SP	35				
				36				
				37				
			SW	38				
				39				



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN					
PROJECT: Project 1007		DRILLING METHOD: Sonic				BORING NO. MW3B [847053]		
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags				SHEET 3 OF 7		
DRILLING CONTR.: Traut						DRILLING		
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL				START	FINISH	
BORING DEPTH: 130 ft bgs		16.5'	22'	39.6'	21.5'	TIME	TIME	
GROUND SURFACE ELEVATION: 910.40ft AMSL		TIME	1130	1230	1545	1635	1100	1830
DATUM: NAD 83 UTM 15 (meters)		DATE	01-13-20	01-13-20	01-13-20	01-13-20	DATE	DATE
COMMENTS: Northing: 4979693.32 Easting: 507372.01		CASING DEPTH	19'	35'	45'	55'	01-13-20	01-14-20

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
MW3B-SOIL 41-42			SP	41		graded, with gravel, fine to coarse (5% fine, 5% coarse), sub-angular, with cobbles (10%); moist, 10YR 5/2		4" LC Steel Casing (0'-110' bgs)
MW3B-GW 41-45				42		SAND, fine to coarse (30% fine, 60% medium, 5% coarse), sub-rounded to well-rounded, poorly graded, trace gravel, fine (5%), well-rounded; moist, 10YR 5/2		
MW3B-SOIL 44-45				43		SAND, medium to coarse (20% medium, 70% coarse), sub-rounded to well-rounded, poorly graded, with gravel, fine (10%), sub-rounded; moist, 10YR 4/1		
				44		SAND, fine to coarse (30% fine, 60% medium, 5% coarse), sub-rounded to well-rounded, poorly graded, trace gravel, medium (5%), sub-angular to sub-rounded; dry to moist, 10YR 5/2		
				45		SAND, fine to coarse (65% fine, 30% medium, 5% coarse), sub-angular to sub-rounded, poorly graded; dry to moist, 10YR 6/2		
				46		SAND, fine to coarse (5% fine, 75% medium, 15% coarse), sub-rounded, poorly graded, trace gravel, medium (5%), sub-angular; dry to moist, 10YR 5/2		
			47	SAND, medium to coarse (10% medium, 60% coarse), sub-rounded to well-rounded, poorly graded, with gravel, fine (25%), sub-rounded, trace cobbles (5%); dry to moist, 10YR 4/1		Grout (neat cement) (0'-108' bgs)		
MW3B-SOIL 51-53			48	SAND, fine to coarse (10% fine, 30% medium, 45% coarse), sub-angular to sub-rounded, well graded, with gravel, fine (15%), sub-angular; moist, 10YR 4/1				
MW3B-SOIL 53-55			SW	49		SAND, fine to coarse (25% fine, 65% medium, 10% coarse), sub-rounded to well-rounded, well graded; moist, 10YR 5/1		
				50		SAND, medium to coarse (15% medium, 70% coarse), sub-angular to sub-rounded, poorly graded, with gravel, fine (15%), sub-angular; moist, 2.5Y 5/2		
MW3B-GW 51-55			SP	51		SAND, fine to coarse (40% fine, 55% medium, 5% coarse), sub-angular to sub-rounded, poorly graded; moist to wet, 2.5Y 6/3		4" LC Steel Casing (0'-110' bgs)
				52		SAND, medium to coarse (10% medium, 60% coarse), sub-angular to sub-rounded, poorly graded,		
				53				
				54				
			55					
			56					
			57					
			58					
			59					

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN				
PROJECT: Project 1007		DRILLING METHOD: Sonic				BORING NO. MW3B [847053]	
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags				SHEET 4 OF 7	
DRILLING CONTR.: Traut							
DRILLER: Dan Pflipsen	EQUIP.: Sonic	DRILLING				START TIME: 1100	
BORING DEPTH: 130 ft bgs		WATER LEVEL	16.5'	22'	39.6'	21.5'	FINISH TIME: 1830
GROUND SURFACE ELEVATION: 910.40ft AMSL		TIME	1130	1230	1545	1635	DATE
DATUM: NAD 83 UTM 15 (meters)		DATE	01-13-20	01-13-20	01-13-20	01-13-20	DATE
COMMENTS: Northing: 4979693.32 Easting: 507372.01		CASING DEPTH	19'	35'	45'	55'	01-13-20 01-14-20

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
MW3B-GW 75-79			SP	61		with gravel, fine to medium (25% fine, 5% medium), sub-rounded; moist, 2.5Y 5/3		
				62		SAND, fine to coarse (5% fine, 15% medium, 70% coarse), sub-angular to sub-rounded, poorly graded, with gravel, fine (10%), angular to sub-angular; dry to moist, 2.5Y 5/2		
				63		SAND, medium to coarse (15% medium, 70% coarse), sub-rounded to well-rounded, poorly graded, with gravel, fine to medium (10% fine, 5% medium), angular to sub-rounded; dry to moist, 2.5Y 5/3		
				64		SAND, medium to coarse (10% medium, 75% coarse), well-rounded, poorly graded, with gravel, fine to medium (10% fine, 5% medium), angular; moist, 2.5Y 5/2		
				65		SAND, medium to coarse (10% medium, 45% coarse), well-rounded, poorly graded, with gravel, fine to coarse (20% fine, 15% medium, 5% coarse), angular to well-rounded, trace cobbles (5%); moist, 2.5Y 5/2		
				66		SANDY SILT, sand, fine (35%), sub-angular to sub-rounded; moist, 2.5Y 5/3		
				67		SAND, fine to medium (60% fine, 35% medium), sub-rounded to well-rounded, poorly graded, trace silt (5%); moist, 2.5Y 6/1		
				68				
				69				
				70				
				71				
MW3B-SOIL 75-79			SP	72		DOLOSTONE, not competent, heavily weathered, fine grained dolomitic precipitate (10%), with sand,		<p>Grout (neat cement) (0'-108' bgs)</p> <p>4" LC Steel Casing (0'-110' bgs)</p>
				73				
				74				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic				BORING NO. MW3B [847053]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags				SHEET 5 OF 7
DRILLING CONTR.: Traut						DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	START TIME	FINISH TIME			
BORING DEPTH: 130 ft bgs		1100	1830			
GROUND SURFACE ELEVATION: 910.40ft AMSL		DATE	01-13-20	01-13-20	01-13-20	01-13-20
DATUM: NAD 83 UTM 15 (meters)		CASING DEPTH	19'	35'	45'	55'
COMMENTS: Northing: 4979693.32 Easting: 507372.01						

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass				WELL DIAGRAM
						LITHOLOGIC DESCRIPTION				
				81		fine (10%); 10YR 6/6, clay observed				Grout (neat cement) (0'-108' bgs)
				82		DOLOSTONE, moderately competent, iron staining (10%), trace green smears on rock (5%); 10YR 6/6, green silt observed				
				83		SANDY DOLOSTONE, moderately competent, fine to coarse sand (20% fine, 20% medium, 10% coarse); 10YR 6/3				4" LC Steel Casing (0'-110' bgs)
				84		DOLOSTONE, competent, vugs (10%), trace iron staining (5%), trace sand, medium (5%); 10YR 5/3				
				85		SANDY DOLOSTONE, competent, sand, medium (20%), manganese staining along fractures (5-10%), trace vugs (3%); 10YR 6/4				Grout (neat cement) (0'-108' bgs)
				86		DOLOSTONE, moderately competent, iron staining (10%), trace sand, medium (5%); 10YR 7/3, green silt observed				
				87						
				88		DOLOSTONE, moderately competent, iron staining (10%), trace sand, medium (5%); 10YR 7/3, green silt observed				
				89						
				90		SANDY DOLOSTONE, moderately competent, sand, medium to coarse (20% medium, 15% coarse); 10YR 4/2				
				91						
				92		DOLOSTONE, moderately competent, iron staining (15%), with sand, medium (10%), trace chert (5%); 10YR 5/3				
				93						
				94		DOLOSTONE, moderately competent, iron staining (15%), with sand, medium (10%), manganese staining (10%), trace glauconite (5%); 10YR 5/4				
				95						
				96		DOLOSTONE, not competent, weathered, iron staining (10%), trace sand, fine to medium (5%), trace dolomitic precipitate (5%); 10YR 6/3, silt and clay observed				
				97						
				98						
				99						

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic				BORING NO. MW3B [847053]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags				SHEET 6 OF 7
DRILLING CONTR.: Traut						DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	START TIME	FINISH TIME			
BORING DEPTH: 130 ft bgs		1100	1830			
GROUND SURFACE ELEVATION: 910.40ft AMSL		DATE	01-13-20	01-13-20	01-13-20	01-13-20
DATUM: NAD 83 UTM 15 (meters)		CASING DEPTH	19'	35'	45'	55'
COMMENTS: Northing: 4979693.32 Easting: 507372.01						01-13-20 01-14-20

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
						Grass	LITHOLOGIC DESCRIPTION	
				101	[Brick pattern]	SANDY DOLOSTONE, not competent, weathered, sand, medium to coarse (15%), reworked 3-5 mm clasts (5-10%); 10YR 4/6		<p>4" LC Steel Casing (0'-110' bgs)</p> <p>Grout (neat cement) (0'-108' bgs)</p> <p>4" LC Steel Casing (0'-110' bgs)</p> <p>1.5' pellet seal on top of 0.5' pea rock (108'-110' bgs)</p> <p>7" Open Hole (110'-130' bgs)</p>
				102	[Brick pattern]	DOLOSTONE, moderately competent, dolomitic precipitate (10%), trace massive iron staining (5%), trace sand, medium (5%), trace manganese staining (5%); 10YR 5/6		
				103	[Brick pattern]			
				104	[Brick pattern]			
				105	[Brick pattern]	SANDY DOLOSTONE, competent, sand, fine (15%), trace massive iron staining (5%); 10YR 5/4		
				106	[Brick pattern]	SANDY DOLOSTONE, competent, sand, fine (15%), trace massive iron staining (5%); 10YR 5/4		
				107	[Brick pattern]	SANDY DOLOSTONE, competent, sand, fine to medium (20%), trace iron staining (5%), trace vugs (5%); 10YR 7/2		
				108	[Brick pattern]			
				109	[Brick pattern]			
				110	[Brick pattern]			
				111	[Brick pattern]	DOLOSTONE, competent, dendritic manganese staining (25%), cross bedding (10%), trace iron staining in 1-3mm bands (4%); 10YR 7/2, iron banding horizontal across "core disks"		
				112	[Brick pattern]			
				113	[Brick pattern]			
				114	[Brick pattern]			
				115	[Brick pattern]			
				116	[Brick pattern]	DOLOSTONE, moderately competent, iron staining (10%), trace sand, medium (5%), trace dendritic manganese staining (5%); 10YR 6/3		
				117	[Brick pattern]			
				118	[Brick pattern]			
				119	[Brick pattern]			



# ENVIRONMENTAL BORING LOG

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW3B [847053]	
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS				SHEET 7 OF 7	
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic				START	FINISH
BORING DEPTH: 130 ft bgs		WATER LEVEL	16.5'	22'	39.6'	21.5'
GROUND SURFACE ELEVATION: 910.40ft AMSL		TIME	1130	1230	1545	1635
DATUM: NAD 83 UTM 15 (meters)		DATE	01-13-20	01-13-20	01-13-20	01-13-20
COMMENTS: Northing: 4979693.32 Easting: 507372.01		CASING DEPTH	19'	35'	45'	55'
						01-13-20 01-14-20

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				121		DOLOSTONE, moderately competent, fine to coarse grained dolomitic precipitate (10-15%), with sand, fine (5-10%), trace vugs (5%); 10YR 6/3	<p>7" Open Hole (110'-130' bgs)</p>
				122			
				123		DOLOSTONE, moderately competent, trace fine grained dolomitic precipitate (5%), trace iron staining (5%); 10YR 6/2	
				124			
				125		DOLOSTONE, moderately competent, banded iron staining (15%), medium grained dolomitic precipitate (5-10%); 10YR 6/4	
				126			
				127		DOLOSTONE, competent, fine grained dolomitic precipitate (5-10%), trace iron staining (5%); 10YR 6/3	
				128			
				129			
				130		E.O.B. @ 130' bgs, no refusal	
				131			
				132			
				133			
				134			
				135			
				136			
				137			
				138			
				139			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW4A [847054]
LOGGED BY: JM/AEL/AS	CHECKED BY: AEL/AS			SHEET 1 OF 9
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 0800
BORING DEPTH: 160 ft bgs				FINISH TIME: 1700
GROUND SURFACE ELEVATION: 890.06 ft AMSL		WATER LEVEL		DATE: 12-13-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-16-19
COMMENTS: Northing: 4980608.11 Easting: 508614.01		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
MW4A-SOIL 8-8.5			OL	0-1		SILT, organic matter, low plasticity; 10YR 2/2		<p>Grout (neat cement) (0'-138' bgs)</p> <p>4" LC Steel Casing (0'-140' bgs)</p>
			CL	1-2		CLAY, medium plasticity, firm; dry, 10YR 4/3		
			SW	2-3		SAND, fine to coarse (10% fine, 60% medium, 20% coarse), angular to sub-rounded, well graded, with gravel, medium (10%), well-rounded; dry, 10YR 4/2		
				3-5		SAND, fine to coarse (20% fine, 35%, 30% coarse), angular to sub-rounded, well graded, with gravel, medium (15%), well-rounded; dry, 10YR 4/3		
				5-6		SAND, fine to coarse (20% fine, 35%, 30% coarse), angular to sub-rounded, well graded, with gravel, medium (15%), well-rounded; dry, 10YR 4/3		
			6-8		SANDY CLAY, medium plasticity, soft, sand, fine to coarse (16% fine, 8% medium, 8% coarse), sub-angular to sub-rounded, with gravel, coarse (12%), well-rounded; dry, 10YR 4/3			
			8-9	CL		SANDY CLAY, medium plasticity, soft, sand, fine to coarse (16% fine, 8% medium, 8% coarse), sub-angular to sub-rounded, with gravel, coarse (12%), well-rounded; dry, 10YR 4/3		
			9-10	SW		SANDY CLAY, medium plasticity, soft, sand, fine to coarse (16% fine, 8% medium, 8% coarse), sub-angular to sub-rounded, with gravel, coarse (12%), well-rounded; dry, 10YR 4/3		
			SP	10-11		SAND, fine to coarse (20% fine, 30% medium, 40% coarse), sub-angular to well-rounded, well graded, with gravel, fine (10%), well-rounded; wet, 10YR 4/3		
				11-12		SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded, poorly graded, trace silt (5%), trace clay (5%); moist, 10YR 5/2		
				12-13		SAND, fine to coarse (20% fine, 30% medium, 30% coarse), sub-angular to well-rounded, poorly graded, with gravel, medium (15%), sub-angular to well-rounded, trace silt (5%); moist, 10YR 5/2		
			13-14	SP		SAND, fine to medium (50% fine, 40% medium), sub-angular to well-rounded, poorly graded, trace gravel, coarse (5%), well-rounded, trace silt (5%); moist, 10YR 4/1		
			14-15			SAND, fine to medium (50% fine, 40% medium), sub-angular to well-rounded, poorly graded, trace gravel, coarse (5%), well-rounded, trace silt (5%); moist, 10YR 4/1		
			SP	15-16		SAND, fine to medium (50% fine, 40% medium), sub-angular to well-rounded, poorly graded, trace gravel, coarse (5%), well-rounded, trace silt (5%); moist, 10YR 4/1		
				16-17		SAND, fine to medium (50% fine, 40% medium), sub-angular to well-rounded, poorly graded, trace gravel, coarse (5%), well-rounded, trace silt (5%); moist, 10YR 4/1		
			SM	17-18		SAND, fine to coarse (30% fine, 30% medium, 30% coarse), sub-angular to well-rounded, well graded, with gravel, coarse (10%), well-rounded; moist, 10YR 4/2		
				18-19		SILTY SAND, fine, sub-rounded to well-rounded, silt (40%); moist, 10YR 4/4		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW4A [847054]
LOGGED BY: JM/AEL/AS	CHECKED BY: AEL/AS			SHEET 2 OF 9
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 0800
BORING DEPTH: 160 ft bgs				FINISH TIME: 1700
GROUND SURFACE ELEVATION: 890.06 ft AMSL		WATER LEVEL		DATE: 12-13-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-16-19
COMMENTS: Northing: 4980608.11 Easting: 508614.01		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
MW4A-SOIL 20-21			SW	21		SAND, fine to coarse (25% fine, 25% medium, 25% coarse), sub-angular to well-rounded, well graded, with gravel, fine (15%), angular to well-rounded; moist, 10YR 5/3		Grout (neat cement) (0'-138' bgs)
MW4A-SOIL 20-23			SC	22		CLAYEY SAND, fine, well-rounded, clay (50%); moist, 10YR 5/3		
			SP	23		SAND, fine to coarse (35% fine, 35% medium, 5% coarse), sub-rounded to well-rounded, poorly graded, with gravel, coarse (15%), angular, with silt (10%); moist, 10YR 5/3		4" LC Steel Casing (0'-140' bgs)
			SC	24		CLAYEY SAND, fine to medium (50% fine, 15% medium), sub-rounded to well-rounded, poorly graded, clay (30%), trace gravel, coarse (5%); moist, 10YR 5/3		
			SC	25		CLAYEY SAND, fine to medium (50% fine, 15% medium), sub-rounded to well-rounded, poorly graded, clay (30%), trace gravel, coarse (5%), well-rounded; moist, 10YR 5/3		
			SC	26		CLAYEY SAND, fine to medium (50% fine, 15% medium), sub-rounded to well-rounded, poorly graded, clay (30%), trace gravel, coarse (5%), well-rounded; moist, 10YR 5/3		
			SC	27		CLAYEY SAND, fine to medium (50% fine, 15% medium), sub-rounded to well-rounded, poorly graded, clay (30%), trace gravel, coarse (5%), well-rounded; moist, 10YR 5/3		Grout (neat cement) (0'-138' bgs)
			SC	28		CLAYEY SAND, fine to medium (50% fine, 15% medium), sub-rounded to well-rounded, poorly graded, clay (30%), trace gravel, coarse (5%), well-rounded; moist, 10YR 5/3		
MW4A-SOIL 31-32			SC	29		CLAYEY SAND, fine, well-rounded, poorly graded, clay (30%), with gravel, fine to coarse (5% fine, 5% coarse), well-rounded; moist to wet, 10YR 4/4		Grout (neat cement) (0'-138' bgs)
			SC	30		CLAYEY SAND, fine, well-rounded, poorly graded, clay (30%), with gravel, fine to coarse (5% fine, 5% coarse), well-rounded; moist to wet, 10YR 4/4		
			SC	31		CLAYEY SAND, fine, well-rounded, poorly graded, clay (30%), with gravel, fine to coarse (5% fine, 5% coarse), well-rounded; moist to wet, 10YR 4/4		Grout (neat cement) (0'-138' bgs)
			SC	32		CLAYEY SAND, fine, well-rounded, poorly graded, clay (30%), with gravel, fine to coarse (5% fine, 5% coarse), well-rounded; moist to wet, 10YR 4/4		
			CL	33		CLAY, medium plasticity, stiff, trace sand, fine (5%), well-rounded, trace gravel, fine (3%), well-rounded; moist, 10YR 4/2		Grout (neat cement) (0'-138' bgs)
			CL	34		CLAY, medium plasticity, stiff, trace sand, fine (5%), well-rounded, trace gravel, fine (3%), well-rounded; moist, 10YR 4/2		
MW4A-SOIL 37-38			SW	35		SAND, fine to coarse (15% fine, 35% medium, 45% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine (5%), well-rounded; wet, 10YR 5/3		Grout (neat cement) (0'-138' bgs)
			SW	36		SAND, fine to coarse (15% fine, 35% medium, 45% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine (5%), well-rounded; wet, 10YR 5/3		
MW4A-SOIL				37		SAND, fine to coarse (15% fine, 35% medium, 45% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine (5%), well-rounded; wet, 10YR 5/3		
				38		SAND, fine to coarse (15% fine, 35% medium, 45% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine (5%), well-rounded; wet, 10YR 5/3		
				39		SAND, fine to coarse (15% fine, 35% medium, 45% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine (5%), well-rounded; wet, 10YR 5/3		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW4A [847054]
LOGGED BY: JM/AEL/AS	CHECKED BY: AEL/AS			SHEET 3 OF 9
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 0800
BORING DEPTH: 160 ft bgs				FINISH TIME: 1700
GROUND SURFACE ELEVATION: 890.06 ft AMSL		WATER LEVEL		DATE: 12-13-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-16-19
COMMENTS: Northing: 4980608.11 Easting: 508614.01		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
MW4A-SOIL 51-52			SW	41		SAND, fine to coarse (30% fine, 35% medium, 30% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine (5%), well-rounded; wet, 10YR 5/2		
				42				
				43				
				44				
			SW	45		SAND, fine to coarse (30% fine, 35% medium, 30% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine (5%), well-rounded; wet, 10YR 5/2		
				46				
				47				
				48				
			SP	49		SAND, fine to medium (60% fine, 30% medium), sub-rounded to well-rounded, poorly graded, with silt (10%); moist, 10YR 5/2		
				50				
			SW	51		SAND, fine to coarse (30% fine, 50% medium, 10% coarse), sub-rounded to well-rounded, well graded, with silt (10%); wet, 10YR 5/2		
				52				
				53				
				54				
		55						
			56					
			57					
			58					
			59					



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW4A [847054]
LOGGED BY: JM/AEL/AS	CHECKED BY: AEL/AS			SHEET 4 OF 9
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 0800
BORING DEPTH: 160 ft bgs				FINISH TIME: 1700
GROUND SURFACE ELEVATION: 890.06 ft AMSL		WATER LEVEL		DATE: 12-13-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-16-19
COMMENTS: Northing: 4980608.11 Easting: 508614.01		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
MW4A-SOIL 60-62			SW	61-62	[Dotted pattern]	SAND, fine to coarse (30% fine, 30% medium, 40% coarse), sub-rounded to well-rounded, well graded; wet, 10YR 5/2		<p>Grout (neat cement) (0'-138' bgs)</p> <p>4" LC Steel Casing (0'-140' bgs)</p>
MW4A-SOIL 68-70			SP	67	[Dotted pattern]	SAND, fine to coarse (20% fine, 30% medium, 40% coarse), sub-angular to well-rounded, well graded, with cobbles (10%); moist, 10YR 4/3		
				68-69	[Dotted pattern]	SAND, fine to coarse (45% fine, 45% medium, 5% coarse), sub-angular to well-rounded, poorly graded, trace cobbles (5%), well-rounded; moist, 10YR 4/2		
MW4A-SOIL 74-75			SW	70	[Dotted pattern]	SAND, fine to medium (60% fine, 35% medium), sub-rounded to well-rounded, poorly graded, trace silt (5%); wet, 10YR 5/3		
				71-73	[Dotted pattern]	SAND, fine to coarse (33% fine, 33% medium, 33% coarse), sub-rounded to well-rounded, well graded, trace silt (1%); wet, 10YR 5/3		
			SW	74	[Dotted pattern]	SAND, fine to coarse (40% fine, 25% medium, 25% coarse), sub-angular to well-rounded, well graded, with gravel, fine (7%), well-rounded, trace cobbles (3%), well-rounded; moist, 10YR 5/1		
				75-76	[Dotted pattern]	SAND, fine to coarse (10% fine, 30% medium, 30% coarse), angular to well-rounded, well graded, with gravel, coarse (30%), angular to well-rounded; wet, 10YR 4/1		
			SP	77	[Dotted pattern]	SAND, fine to coarse (10% fine, 30% medium, 30% coarse), angular to well-rounded, well graded, with gravel, coarse (30%), angular to well-rounded; wet, 10YR 4/1		
				78	[Dotted pattern]	COBBLES, well-rounded, with sand, fine to coarse (10% fine, 15% medium, 15% coarse), sub-angular to well-rounded; wet, 10YR 6/1		
			GP	79	[Block pattern]	DOLOSTONE, weathered, medium plasticity, stiff.		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW4A [847054]
LOGGED BY: JM/AEL/AS	CHECKED BY: AEL/AS			SHEET 5 OF 9
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 0800
BORING DEPTH: 160 ft bgs				FINISH TIME: 1700
GROUND SURFACE ELEVATION: 890.06 ft AMSL		WATER LEVEL		DATE: 12-13-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-16-19
COMMENTS: Northing: 4980608.11 Easting: 508614.01		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
MW4A-SOIL 80-81			GP	81		iron banding (10-25%), clay observed; 10YR 6/3		
				82		GRAVEL, medium to coarse (60% medium, 10% coarse), sub-rounded to well-rounded, poorly graded, with sand, fine to coarse sand (10% fine, 10% medium, 10% coarse), sub-rounded to well-rounded; wet, 10YR 5/3		
MW4A-SOIL 85-86			SP	85		SAND, fine to medium (50% fine, 45% medium), sub-rounded to well-rounded, poorly graded, trace gravel, medium (5%), well-rounded; moist, 10YR 5/3		4" LC Steel Casing (0'-140' bgs)
				86		SAND, fine to coarse (15% fine, 15% medium, 20% coarse), sub-angular to well-rounded, well graded, with gravel, fine (20%), sub-rounded to well-rounded, with dolostone, cobbles (30%), weathered; moist, 10YR 5/3		
MW4A-SOIL 88-89			SW	87				
				88				
				89				
				90		DOLOSTONE, not competent, vugs (10%), trace iron staining (3%), dendritic manganese staining (2%), clay observed; 10YR 5/3		Grout (neat cement) (0'-138' bgs)
			91					
				92				
				93				
				94		DOLOSTONE, moderately competent, trace sand, medium (5%), trace oolitic texture (3-5%), trace glauconite (2%); 10YR 5/2		Grout (neat cement) (0'-138' bgs)
			95					
				96				
				97		DOLOSTONE, not competent, iron staining (5-10%), trace sand, fine to medium (5%), trace oolitic texture (5%), trace glauconite (1%), clay observed; 10YR 5/3		
			98					
				99				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW4A [847054]
LOGGED BY: JM/AEL/AS	CHECKED BY: AEL/AS			SHEET 6 OF 9
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 0800
BORING DEPTH: 160 ft bgs				FINISH TIME: 1700
GROUND SURFACE ELEVATION: 890.06 ft AMSL		WATER LEVEL		DATE: 12-13-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-16-19
COMMENTS: Northing: 4980608.11 Easting: 508614.01		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				101		DOLOSTONE, moderately competent, oolitic texture (5-10%), reworked ~4mm clasts (5%), trace sand, fine to medium (3%), trace dendritic manganese staining along 1mm fractures (1%); 10YR 6/2		4" LC Steel Casing (0'-140' bgs)              Grout (neat cement) (0'-138' bgs)              4" LC Steel Casing (0'-140' bgs)
				102				
				103		DOLOSTONE, moderately competent, iron staining (15%), reworked clasts (10%), chert (5-10%), trace sand, medium (3%); 10YR 5/3		
				104				
				105		DOLOSTONE, moderately competent, iron staining (15%), reworked clasts (10%), chert (5-10%), trace sand, medium (3%); 10YR 5/3		
				106				
				107				
				108		DOLOSTONE, competent, oolitic texture (5-10%), trace vugs (5%), trace sand, medium (3-5%); 10YR 5/3		
				109				
				110		DOLOSTONE, competent, with sand, fine (20%), well-rounded, vugs (10%), dolomitic precipitate (10%); 10YR 6/2		
				111		DOLOSTONE, moderately competent, with sand, fine (5-10%), well-rounded, dendritic manganese (15%), dolomitic precipitate (5-10%); 2.5Y 7/2		
				112				
				113				
				114		DOLOSTONE, moderately competent, oolitic texture (30%), dolomitic precipitate (10%); 10YR 6/2		
				115		DOLOSTONE, moderately competent, ooids (20%), iron staining (10%), trace sand, fine (5%), well-rounded; 2.5 Y 6/3		
				116		DOLOSTONE, not competent, oolitic texture (20-30%), with sand, fine (10-15%), well-rounded, trace iron banding (2%), trace dendritic manganese staining (2%); 2.5Y 8/2		
				117				
				118		DOLOSTONE, moderately competent, iron staining (20%), vugs (15%), dolomitic precipitate (15%); 10YR 6/3		
				119		DOLOSTONE, not competent, oolitic texture (20-30%), ooids (10%), dolomitic precipitate		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW4A [847054]
LOGGED BY: JM/AEL/AS	CHECKED BY: AEL/AS			SHEET 7 OF 9
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 0800
BORING DEPTH: 160 ft bgs				FINISH TIME: 1700
GROUND SURFACE ELEVATION: 890.06 ft AMSL		WATER LEVEL		DATE: 12-13-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-16-19
COMMENTS: Northing: 4980608.11 Easting: 508614.01		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				121		(5-10%), with sand (5-10%), trace iron staining (5%), trace dendritic manganese staining (5%); 2.5Y 7/2		<p>Grout (neat cement) (0'-138' bgs)</p> <p>4" LC Steel Casing (0'-140' bgs)</p> <p>Grout (neat cement) (0'-138' bgs)</p> <p>4" LC Steel Casing (0'-140' bgs)</p> <p>1.5' pellet seal on top of 0.5' pea rock (138'-140' bgs)</p>
				122		DOLOSTONE, competent, with sand, fine (30%), well-rounded, dendritic manganese (10-15%), trace iron banding (5%), trace stiff medium plasticity clay (2%); 5Y 7/2		
				123		DOLOSTONE, not competent, oolitic texture (30%), dolomitic precipitate (10%), trace iron banding (2%), trace dendritic manganese staining (2%); 2.5Y 7/4		
				124				
				125		DOLOSTONE, moderately competent, dolomitic precipitate (15%), trace sand, fine (5%), well-rounded, trace iron banding (2%); 5Y 7/1		
				126		DOLOSTONE, competent, with sand, fine (10%), dolomitic precipitates (10%); 2.5Y 7/3		
				127		SANDY DOLOSTONE, competent, sand (20-30%), well-rounded, dolomitic precipitate (15%), vugs (10%), trace oolitic texture (5%), trace iron banding (2%); 2.5Y 7/2		
				128				
				129		DOLOSTONE, competent, dolomitic precipitate (15%), vugs (10%), with sand (5-10%), trace iron banding (2%); 2.5Y 7/2		
				130		DOLOSTONE, moderately competent, massive, dolomitic precipitate (10%), vugs (10%), with sand @ 132-133 (5-10%), trace iron staining (2%); 2.5Y 7/1		
				131				
				132				
				133		DOLOSTONE, moderately competent, massive, dolomitic precipitate (10%), vugs (10%), trace iron staining (2%); 2.5Y 7/2		
				134		DOLOSTONE, not competent, oxidized fine grained dolomitic precipitate (20-30%), vugs (20-30%), trace silt (2%); 2.5Y 7/2		
				135		DOLOSTONE, not competent, oxidized fine grained dolomitic precipitate (20-30%), vugs (20-30%), trace silt (2%); 2.5Y 7/2		
				136				
				137		DOLOSTONE, moderately competent, massive, fine grained dolomite precipitate (15%), trace vugs (2%), trace dark precipitate (2%); 2.5Y 7/2		
				138				
				139				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW4A [847054]
LOGGED BY: JM/AEL/AS	CHECKED BY: AEL/AS			SHEET 8 OF 9
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 0800
BORING DEPTH: 160 ft bgs				FINISH TIME: 1700
GROUND SURFACE ELEVATION: 890.06 ft AMSL		WATER LEVEL		DATE: 12-13-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-16-19
COMMENTS: Northing: 4980608.11 Easting: 508614.01		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				141		DOLOSTONE, moderately competent, massive, iron staining with dendritic manganese along fractures (15%), dendritic manganese staining on surface (10%); 2.5Y 7/3	Grout Basket (140' bgs)
				142		DOLOSTONE, moderately competent, massive, dolomitic precipitates (30%), vugs (15-20%), iron staining (2%), 2.5Y 6/2	
				143			7" Open Hole (140'-160' bgs)
				144			
				145		DOLOSTONE, not competent, massive, dolomitic precipitate (40-50%), vugs (30%), trace iron staining (2%); 2.5Y 6/3	
				146			
				147		DOLOSTONE, moderately competent, massive, dolomitic precipitate (10%), trace iron staining (2-3%); 2.5Y 7/2	
				148		DOLOSTONE, competent, ~5 mm vugs (15-20%), dolomitic precipitate (10-15%), trace iron banding (5%); 2.5Y 7/2	
				149			
				150		DOLOSTONE, competent, massive, dolomitic precipitate (20%), vugs (10%), trace dendritic manganese staining (2%); 2.5Y 7/2	
				151			
				152			
				153			7" Open Hole (140'-160' bgs)
				154			
				155		DOLOSTONE, moderately competent, massive, dolomitic precipitate (15-20%), iron staining and banding (10%); 2.5Y 7/3	
				156			
				157		DOLOSTONE, not competent, platy, dolomitic precipitate (75-100%); 2.5Y 7/3	
				158			
				159			



# ENVIRONMENTAL BORING LOG


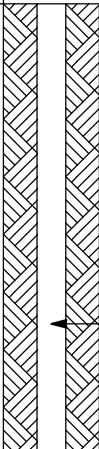

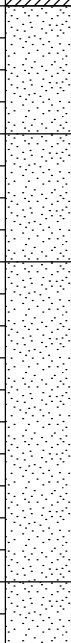
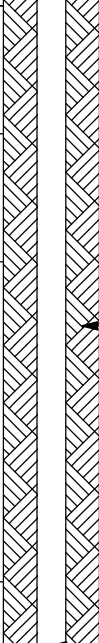
CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW4A [847054]
LOGGED BY: JM/AEL/AS	CHECKED BY: AEL/AS			SHEET 9 OF 9
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME 0800
BORING DEPTH: 160 ft bgs				FINISH TIME 1700
GROUND SURFACE ELEVATION: 890.06 ft AMSL		WATER LEVEL		DATE 12-13-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE 12-16-19
COMMENTS: Northing: 4980608.11 Easting: 508614.01		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
						EOB @ 160' bgs, no refusal	
				161			
				162			
				163			
				164			
				165			
				166			
				167			
				168			
				169			
				170			
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				177			
				178			
				179			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW5A [847056]
LOGGED BY: AEL/AS/MGD/HT/CK	CHECKED BY: AEL/AS			SHEET 1 OF 12
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1345
BORING DEPTH: 220 ft bgs				FINISH TIME: 1800
GROUND SURFACE ELEVATION: 908.05 ft AMSL		WATER LEVEL		DATE: 12-02-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-04-19
COMMENTS: Northing: 4980840.19 Easting: 508682.95		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
			CL	1		SANDY CLAY, medium plasticity, sand, fine to medium (5% fine, 15% medium), sub-rounded, with gravel, medium to coarse (5% medium, 5% coarse), sub-angular; wet, 10YR 3/6	<p>Grout (neat cement) (0'-208' bgs)</p> <p>4" LC Steel Casing (0'-210' bgs)</p>
			SW	2		SAND, fine to coarse (15% fine, 30% medium, 30% coarse), sub-rounded, well graded, with gravel, medium to coarse (10% medium, 10% coarse), sub-angular, trace clay (5%), low plasticity; wet, 10YR 4/6	
			CL	4		CLAY, low plasticity, with sand, medium (10%), sub-rounded, trace gravel, medium to coarse (2%), sub-angular, trace cobbles (1%); moist to wet, 10YR 3/4	
			SP	6		SAND, fine (88%), well-rounded, with clay (10%), low plasticity, trace gravel, medoium (2%), angular; dry to moist, 10YR 4/6	
			ML	8		SAND, fine (88%), well-rounded, with silt (10%), low plasticity, trace gravel, medoium (2%), angular; dry, 10YR 4/6	
				9		SILT, low plasticity, trace clay (5%); dry, 10YR 4/6	
			SW	12		SILT, low plasticity, with clay (15-20%); dry, 10YR 4/4	
			SW	12		SAND, fine to coarse (55% fine, 20% medium, 10% coarse), well-rounded, well graded, with gravel, fine (15%), sub-angular to sub-rounded; dry, 10YR 4/4, more gravel (20-30%) @ 12.5-13'	
			CL	14		CLAY, low plasticity, stiff, with gravel, medium to coarse (5% medium, 2% coarse), sub-angular to sub-rounded; dry to moist, 10YR 4/6	
			CL	15		CLAY, low plasticity, stiff, with gravel, medium to coarse (5% medium, 2% coarse), sub-angular to sub-rounded; dry to moist, 10YR 4/6	
			CL	16			
			CL	17			
			CL	18			
			CL	19			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW5A [847056]
LOGGED BY: AEL/AS/MGD/HT/CK	CHECKED BY: AEL/AS			SHEET 2 OF 12
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1345
BORING DEPTH: 220 ft bgs				FINISH TIME: 1800
GROUND SURFACE ELEVATION: 908.05 ft AMSL		WATER LEVEL		DATE: 12-02-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-04-19
COMMENTS: Northing: 4980840.19 Easting: 508682.95		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
			CL	21		CLAY, low plasticity, medium, trace gravel, coarse (2%), sub-angular to sub-rounded, trace cobbles (2%); moist, 10YR 4/3, 5" competent limestone cobble @ 20' bgs	 <p>Grout (neat cement) (0'-208' bgs)</p> <p>4" LC Steel Casing (0'-210' bgs)</p>
				22			
				23			
				24			
				25			
				26			
				27		SANDY CLAY, low plasticity, sand, fine to medium (25% fine, 10% medium), sub-angular to sub-rounded, trace cobbles (3%); 10YR 5/3	
				28			
				29			
				30			
				31			
			SP	32		SAND, medium to coarse (35% medium, 60% coarse), sub-angular, poorly graded, trace gravel, fine (5%), well-rounded; wet, 10YR 5/2	 <p>Grout (neat cement) (0'-208' bgs)</p>
				33			
				34			
				35			
				36			
				37			
				38			
				39		SAND, fine to coarse (5% fine, 60% medium, 30% coarse), sub-rounded to well-rounded, poorly	



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW5A [847056]
LOGGED BY: AEL/AS/MGD/HT/CK	CHECKED BY: AEL/AS			SHEET 3 OF 12
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1345
BORING DEPTH: 220 ft bgs				FINISH TIME: 1800
GROUND SURFACE ELEVATION: 908.05 ft AMSL		WATER LEVEL		DATE: 12-02-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-04-19
COMMENTS: Northing: 4980840.19 Easting: 508682.95		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				41		graded, trace gravel, medium (5%), sub-angular to sub-rounded; wet, 10YR 5/3	4" LC Steel Casing (0'-210' bgs)
			SW	42		SAND, fine to coarse (20% fine, 50% medium, 20% coarse), sub-angular to sub-rounded, well graded, trace gravel, medium (5%), sub-rounded, trace silt (5%); moist, 10YR 5/2, silt/clay lense @ 41.5' bgs	
				43			
			CL	44		SANDY CLAY, low plasticity, medium, sand, medium to coarse (15% medium, 15% coarse), sub-angular; moist, 10YR 6/2	
			SP	45		SAND, medium to coarse (30% medium, 40% coarse), sub-rounded, poorly graded, with gravel, fine to coarse (15% fine, 10% medium, 5% coarse), sub-rounded; moist, 10YR 4/2	
			CL	47		CLAY, medium plasticity, soft; dry to moist, 10YR 6/3	
				48			
			SW	49		SAND, fine to coarse (20% fine, 50% medium, 20% coarse), sub-angular to sub-rounded, well graded, trace gravel, medium (5%), sub-rounded, trace silt (5%); moist, 10YR 5/2	Grout (neat cement) (0'-208' bgs)
				50		SAND, fine to coarse (10% fine, 35% medium, 45% coarse), sub-rounded to well-rounded, well graded, with gravel, fine to coarse (7% fine, 3% coarse), angular to sub-angular; moist, 10YR 3/6	
				51			
			SP	52		SAND, medium to coarse (40% medium, 50% coarse), sub-angular to well-rounded, poorly graded, with gravel, fine to coars (8% fine, 2% coarse), sub-angular; moist, 10YR 3/6	
				53		SAND, fine to medium (40% fine, 60% medium), sub-rounded, poorly graded; moist, 10YR 4/6	
				54		SAND, medium to coarse (30% medium, 60% coarse), sub-rounded, poorly graded, with gravel, fine to medium (6% fine, 4% medium), sub-angular to well-rounded; moist, 10YR 4/6	4" LC Steel Casing (0'-210' bgs)
			SW	55		SAND, fine to coarse (20% fine, 60% medium, 15% coarse), sub-angular to sub-rounded, well graded, trace gravel, fine (5%), sub-rounded; moist, 10YR 4/3	
				56			
				57			
				58			
				59			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW5A [847056]
LOGGED BY: AEL/AS/MGD/HT/CK	CHECKED BY: AEL/AS			SHEET 4 OF 12
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1345
BORING DEPTH: 220 ft bgs				FINISH TIME: 1800
GROUND SURFACE ELEVATION: 908.05 ft AMSL		WATER LEVEL		DATE: 12-02-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-04-19
COMMENTS: Northing: 4980840.19 Easting: 508682.95		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				61		DOLOSTONE, not competent, weathered, medium plasticity, micritic, dendritic manganese staining (15%), dolomitic precipitate (5-10%), trace vugs (5%); 10YR 5/3, clay observed	
				62			
				63			
				64			
				65		DOLOSTONE, moderately competent, massive, vugs (5-15%), reworked clasts (5-15%), trace glauconite (1%); 10YR 5/6, clay observed	Grout (neat cement) (0'-208' bgs)
				66			
				67		SANDY DOLOSTONE, moderately competent, oolitic texture (20-30%), sand, fine to medium (25%), trace dolomitic precipitate (5%), trace glauconite (5%); gley 1 7/10Y to 2.5Y 6/6, clay observed	
				68			
				69		DOLOSTONE, moderately competent, micritic, iron staining (5-10%), trace dendritic manganese staining (5%); 2.5Y 7/3	
				70		SANDY DOLOSTONE, not competent, weathered, massive, sand, fine (20%), iron staining (15%), oolitic texture (10-15%); 10YR 7/2, clay observed, blocky texture @ 71' bgs	4" LC Steel Casing (0'-210' bgs)
				71			
				72			
				73		DOLOSTONE, not competent, weathered, massive, dark iron staining (30-50%), trace sand, fine (5%), trace vugs (5%); 10YR 6/2	
				74			
				75		SANDY DOLOSTONE, moderately competent, weathered, sand, fine to coarse (15% fine, 5% medium, 15% coarse), iron staining (15%), trace glauconite (5%); 10YR 6/3	
				76			
				77		DOLOSTONE, competent, banded iron staining/staining along fractures (25%), vugs (15%), trace sand, fine to coarse (2% fine, 3% coarse), trace glauconite (1%); 10YR 6/3, clay lense @ 79' bgs	
				78			
				79			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW5A [847056]
LOGGED BY: AEL/AS/MGD/HT/CK	CHECKED BY: AEL/AS			SHEET 5 OF 12
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1345
BORING DEPTH: 220 ft bgs				FINISH TIME: 1800
GROUND SURFACE ELEVATION: 908.05 ft AMSL		WATER LEVEL		DATE: 12-02-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-04-19
COMMENTS: Northing: 4980840.19 Easting: 508682.95		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				81		DOLOSTONE, competent, massive, oolitic texture (35%), with sand, fine (15%), trace vugs with manganese staining (3%); 10YR 6/2, clay observed	Grout (neat cement) (0'-208' bgs)
				82		DOLOSTONE, competent, cross bedding, iron staining (5-20%), trace sand, fine (3%); 10YR 6/2, clay observed	
				83			4" LC Steel Casing (0'-210' bgs)
				84		DOLOSTONE, competent, massive, trace medium grained dolomite precipitate (5%), trace oolitic texture (5%), trace sand, fine (3%); 10YR 6/3, clay observed	
				85		DOLOSTONE, competent, massive, iron staining throughout, oolitic texture (10%), trace vugs (5%), trace sand, fine (5%), trace dendritic manganese staining (5%); 10YR 6/3, clay observed	
				86		DOLOSTONE, competent, massive, iron staining throughout, trace fine grained dolomitic precipitate (5%), trace glauconite (3%), trace vugs (3%), trace manganese staining (2%); 10YR 6/4, clay observed	
				87			
				88		DOLOSTONE, competent, massive, iron staining throughout, trace fine grained dolomitic precipitate (5%), trace glauconite (3%), trace vugs (3%), trace manganese staining (2%); 10YR 6/4, clay observed	
				89			
				90		DOLOSTONE, competent, fine grained, iron staining along fractures (15-20%), trace sand (2%), trace vugs (1%); 5Y 7/2	
				91			
				92		DOLOSTONE, competent, fine grained, vugs (30-40%), trace iron staining (5%); 5Y 6/2	
				93			
				94		SANDY DOLOSTONE, competent, fine grained, bedding visible, sand (20%), banded iron staining (10%), trace manganese staining (2%); 5Y 6/2	
				95		DOLOSTONE, competent, dolomitic precipitate (15%), vugs (5-10%), banded iron staining (5-10%), trace oolitic texture (5%); 5Y 6/3	
				96		DOLOSTONE, moderately competent, massive, banded iron staining (30-40%), trace iron staining along fractures (2%); 5Y 6/3	
				97			
				98		DOLOSTONE, competent, vugs (15-20%), with sand (15%), iron staining (10%), trace manganese staining (5%), trace glauconite (1%); 5Y 7/2	
				99			Grout (neat cement) (0'-208' bgs)

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW5A [847056]
LOGGED BY: AEL/AS/MGD/HT/CK	CHECKED BY: AEL/AS			SHEET 6 OF 12
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1345
BORING DEPTH: 220 ft bgs				FINISH TIME: 1800
GROUND SURFACE ELEVATION: 908.05 ft AMSL		WATER LEVEL		DATE: 12-02-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-04-19
COMMENTS: Northing: 4980840.19 Easting: 508682.95		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				101		DOLOSTONE, competent, fine grained, vugs (30-40%), dolomitic precipitate (10%), trace iron staining (2%); 5Y 7/2	
				102		SANDY DOLOSTONE, competent, fine grained, sand, fine (30%), well-rounded, trace iron staining (5%), trace vugs (5%); 5Y 7/3	
				103		SANDY DOLOSTONE, competent, fine grained, massive, sand, fine (20-30%), well-rounded, banded iron staining (10%); 5Y 8/3	
				104		DOLOSTONE, moderately competent, manganese staining (10%), with sand, fine (5-10%), well-rounded, dolomitic precipitate (5-10%), iron staining (2%), trace glauconite (1%); 5Y 8/3	
				105		DOLOSTONE, not competent, blocky, iron staining throughout, dolomitic precipitate (10-15%), trace dark iron staining (5%), trace dendritic manganese staining (5%); 10YR 5/6	
				106		DOLOSTONE, moderately competent, massive, blocky, iron staining throughout, trace sand, fine (5%), trace dendritic manganese staining (3%), trace dark iron staining (3%); 10YR 5/4	
				107		DOLOSTONE, not competent, blocky, dolomitic precipitate (5-10%), trace dark iron staining (5%), trace manganese staining (1%); 2.5Y 6/4	
				108		DOLOSTONE, moderately competent, banded iron staining (10-15%), oolitic texture (10-15%), dolomitic precipitate (10%), trace vugs (5%); 2.5Y 6/4	
				109		DOLOSTONE, not competent, blocky, banded iron staining (15-20%), dolomitic precipitate (15%); 2.5Y 6/3	
				110		DOLOSTONE, moderately competent, massive, with sand, fine (10%), well-rounded, dolomitic precipitate (10%), iron banding (5-10%), oolitic texture (5-10%), trace dendritic manganese staining (5%); 10YR 6/4, no sand from 119-120' bgs	
				111			
				112			
				113			
				114			
				115			
				116			
				117			
				118			
				119			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW5A [847056]
LOGGED BY: AEL/AS/MGD/HT/CK	CHECKED BY: AEL/AS			SHEET 7 OF 12
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1345
BORING DEPTH: 220 ft bgs				FINISH TIME: 1800
GROUND SURFACE ELEVATION: 908.05 ft AMSL		WATER LEVEL		DATE: 12-02-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-04-19
COMMENTS: Northing: 4980840.19 Easting: 508682.95		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				121		DOLOSTONE, not competent, iron staining throughout, dark iron staining (15%), 10 mm white banding (10%); 10YR 7/2	<p>Grout (neat cement) (0'-208' bgs)</p> <p>4" LC Steel Casing (0'-210' bgs)</p>
				122		DOLOSTONE, competent, massive, coarse grained, oolitic texture (30-40%), vugs (20-25%), with sand, very fine to fine (10-15%), trace banded iron staining (1%); 10YR 7/2	
				123			
				124			
				125		DOLOSTONE, competent, wavy banded iron staining; 5YR 5/6	
				126		DOLOSTONE, not competent, oolitic texture (20-25%), banded iron staining, green/gray dolomitic precipitate; GLEY 1 7/5G-1 to 5YR 5/6, sand, fine (15-20%) and vugs (15-20%) from 129.9 to 130' bgs	
				127			
				128			
				129			
				130		DOLOSTONE, competent, oolitic texture (35-40%), vugs (15-20%), trace glauconite (1%); 10YR 6/2, green shale observed on borehole sidewalls in video log (12/4) @ 131.2' bgs, area of dolomitic precipitate and oolitic texture @ 130-131' bgs	
				131			
				132			
				133			
				134			
				135		SANDY DOLOSTONE, not competent, sand, fine (30-40%), dolomitic precipitate (10%), trace oolitic texture (2%); 2.5Y 6/4	
				136			
				137		SANDY DOLOSTONE, competent, oolitic texture (50%), sand, fine (20%), trace iron staining (5%), trace glauconite (2%); 2.5Y 7/2	
				138			
				139		SANDY DOLOSTONE, not competent, platy, staining along fractures, micritic on surface, sand, fine (15-20%), well-rounded, trace banded manganese staining (2%); 10YR 3/3 to 2.5Y 7/3	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW5A [847056]
LOGGED BY: AEL/AS/MGD/HT/CK	CHECKED BY: AEL/AS			SHEET 8 OF 12
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1345
BORING DEPTH: 220 ft bgs				FINISH TIME: 1800
GROUND SURFACE ELEVATION: 908.05 ft AMSL		WATER LEVEL		DATE: 12-02-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-04-19
COMMENTS: Northing: 4980840.19 Easting: 508682.95		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				141		DOLOSTONE, not competent, oolites (30%), trace banded iron staining (5%); 10YR 7/3	Grout (neat cement) (0'-208' bgs)
				142		DOLOSTONE, not competent, oolitic texture (10-15%), trace dolomitic precipitate (5%), trace iron staining (5%), trace vugs (5%); 2.5Y 7/4	
				143			4" LC Steel Casing (0'-210' bgs)
				144		DOLOSTONE, not competent, fine grained, trace iron staining (5%), trace oolitic texture (1%); 2.5Y 6/3	
				145			
				146			
				147			
				148			
				149			
				150		DOLOSTONE, not competent, weathered, vugs (50%), dolomitic precipitate (30%), iron staining (30%), trace quartz 4 mm nodules (5%); 2.5Y 6/1	Grout (neat cement) (0'-208' bgs)
				151		DOLOSTONE, not competent, very weathered; 2.5YR 7/2, clays and non-carbonate gravel observed	
				152		DOLOSTONE, not competent, reworked clasts (10-15%), red to dark iron staining (10%); 2.5YR 6/3, clay observed	4" LC Steel Casing (0'-210' bgs)
				153			
				154		DOLOSTONE, moderately competent, massive, vugs (10-15%), trace oolitic texture (5%), trace banded iron staining (5%); 2.5YR 7/2, clay observed	
				155			
				156			Grout (neat cement) (0'-208' bgs)
				157		DOLOSTONE, moderately competent, massive, trace vugs with quartz precipitate (5%), trace iron staining (2%), trace dendritic manganese staining (1%); 2.5YR 7/2, clay observed	
				158			
				159			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW5A [847056]
LOGGED BY: AEL/AS/MGD/HT/CK	CHECKED BY: AEL/AS			SHEET 9 OF 12
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1345
BORING DEPTH: 220 ft bgs				FINISH TIME: 1800
GROUND SURFACE ELEVATION: 908.05 ft AMSL		WATER LEVEL		DATE: 12-02-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-04-19
COMMENTS: Northing: 4980840.19 Easting: 508682.95		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				161		DOLOSTONE, not competent, vugs (25%), trace oolitic texture (5%), red banded iron staining (5%); 2.5YR 7/2, clay observed	<p>4" LC Steel Casing (0'-210' bgs)</p> <p>Grout (neat cement) (0'-208' bgs)</p> <p>4" LC Steel Casing (0'-210' bgs)</p>
				162			
				163		DOLOSTONE, very competent, vugs (10%), oolitic texture (5-10%), trace reworked micrite clasts (5%), trace micritic banding (5%); 2.5YR 6/3	
				164			
				165		DOLOSTONE, not competent, very weathered, vugs filled by precipitate (50%), iron staining (50%); 10YR 7/3	
				166		DOLOSTONE, moderately competent, dolomitic precipitate (50%), iron staining (10%); 2.5Y 7/2, vugs (5-10%) @ 169-170' bgs	
				167			
				168			
				169			
				170		DOLOSTONE, competent, massive, vugs (10%), trace manganese staining (1%); 2.5Y 7/2	
				171		DOLOSTONE, moderately competent, dolomitic precipitate (10%), trace vugs (5%); 2.5Y 6/2	
				172		DOLOSTONE, moderately competent, oolitic texture (20%); 2.5Y 6/2	
				173		DOLOSTONE, moderately competent, trace iron staining (1%), trace manganese staining (1%); 2.5Y 7/2	
				174			
				175			
				176		DOLOSTONE, moderately competent, fine grained dolomitic precipitate, dendritic manganese staining (20-30%), trace iron staining (1%); 2.5Y 7/2	
				177			
				178			
				179			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW5A [847056]
LOGGED BY: AEL/AS/MGD/HT/CK	CHECKED BY: AEL/AS			SHEET 10 OF 12
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1345
BORING DEPTH: 220 ft bgs				FINISH TIME: 1800
GROUND SURFACE ELEVATION: 908.05 ft AMSL		WATER LEVEL		DATE: 12-02-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-04-19
COMMENTS: Northing: 4980840.19 Easting: 508682.95		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				181		DOLOSTONE, competent, massive, vugs (10-15%), dolomitic precipitate (10%), iron staining (5-10%), trace fractures (5%), trace reworked micrite clasts (5%), trace oolitic texture (5%), trace dendritic manganese staining (2%); 2.5YR 7/3, clay observed		<p>Grout (neat cement) (0'-208' bgs)</p> <p>4" LC Steel Casing (0'-210' bgs)</p>
				182				
				183				
				184				
				185		DOLOSTONE, moderately competent, massive, medium grained dolomitic precipitate (50%), 5-10 mm vugs (5-10%), trace oolitic texture (5%), trace iron staining (3%); 2.5Y 6/4, clay observed		
				186				
				187				
				188		DOLOSTONE, competent, bedding visible, fine grained to micritic, dolomitic precipitate (50%), yellow iron staining (20-25%); 2.5YR 7/3		
				189				
				190		DOLOSTONE, not competent, weathered, red iron staining (50%), trace chert (5%); 10YR 4/6, clay observed		
				191		DOLOSTONE, competent, bedding visible, dolomitic precipitate (20%), oolitic texture (10%), trace vugs (5%), trace dendritic manganese staining (1%); 2.5Y 5/4, clay observed		
				192				
				193				
				194				
				195		DOLOSTONE, competent, vugs (10-15%), trace iron staining (4%), trace manganese staining (3%), trace quartz/chert nodules (2%); 2.5Y 6/3		
				196				
				197				
				198		DOLOSTONE, not competent, very weathered, iron staining throughout, calcite (30-40%), stromatolites (15-20%); 10YR 5/6, clay observed		
				199				



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW5A [847056]
LOGGED BY: AEL/AS/MGD/HT/CN	CHECKED BY: AEL/AS			SHEET 11 OF 12
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1345
BORING DEPTH: 220 ft bgs				FINISH TIME: 1800
GROUND SURFACE ELEVATION: 908.05 ft AMSL		WATER LEVEL		DATE: 12-02-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE: 12-04-19
COMMENTS: Northing: 4980840.19 Easting: 508682.95		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				201		SANDSTONE, cemented, dolostone lithic fragments (10-15%); 5Y 7/1		Grout (neat cement) (0'-208' bgs)
				202				
			Cj	203		QUARTZ ARENITE, fine to coarse, (40% fine, 40% medium, 20% coarse), well-rounded, iron staining throughout medium sized grains, trac cemented sandstone with banded iron staining (5%); 5Y 7/2		4" LC Steel Casing (0'-210' bgs)
				204		QUARTZ ARENITE, cemented, coarse, sub-rounded, banded iron staining along bedding (10%), less cemented and stained @ 204.75' bgs; 2.5Y 6/4 to 10YR 5/8		
				205		QUARTZ ARENITE, not cemented, clean, medium to coarse (15% medium, 85% coarse); 10YR 8/1 - bright white		
				206		QUARTZ ARENITE, not cemented, fine to medium (30% fine, 70% medium); 10YR 7/8		
				207		QUARTZ ARENITE, not cemented, medium to coarse (70% medium, 30% coarse); 10YR 5/8		
				208		QUARTZ ARENITE, not cemented, fine to medium (85% fine, 15% medium); 10YR 5/8		
				209		QUARTZ ARENITE, not cemented, fine to medium (15% fine, 85% medium); 10YR 5/8		
				210		QUARTZ ARENITE, not cemented, fine to coarse (40% fine, 40% medium, 20% coarse); 5Y 8/1		
				211		QUARTZ ARENITE, not cemented, medium to coarse (30% medium, 70% coarse); 2.5Y 6/2		
				212				
			Cj	213		QUARTZ ARENITE, not cemented, fine to coarse (45% fine, 45% medium, 10% coarse); 2.5Y 7/6		1.5' pellet seal on top of 0.5' pea rock (208'-210' bgs) Grout Basket (210' bgs)
				214		QUARTZ ARENITE, not cemented, fine to medium (50% fine, 50% medium); 5Y 8/1		
				215		QUARTZ ARENITE, not cemented, fine to medium (70% fine, 30% medium); 5Y 8/1		
				216				
				217				
				218				
				219				
							7" Open Hole (210'-220' bgs)	



# ENVIRONMENTAL BORING LOG

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW5A [847056]
LOGGED BY: AEL/AS/MGD/HT/CK	CHECKED BY: AEL/AS			SHEET 12 OF 12
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME 1345
BORING DEPTH: 220 ft bgs				FINISH TIME 1800
GROUND SURFACE ELEVATION: 908.05 ft AMSL		WATER LEVEL		DATE 12-02-19
DATUM: NAD 83 UTM 15 (meters)		TIME		DATE 12-04-19
COMMENTS: Northing: 4980840.19 Easting: 508682.95		DATE		
		CASING DEPTH		

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt	WELL DIAGRAM	
						LITHOLOGIC DESCRIPTION		
				221		E.O.B. @ 220' bgs, no refusal		
				222				
				223				
				224				
				225				
				226				
				227				
				228				
				229				
				230				
				231				
				232				
				233				
				234				
				235				
				236				
				237				
				238				
				239				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW5B [847057]
LOGGED BY: AS/JM/MGD	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags			SHEET 1 OF 6
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 120 ft bgs		31'	20.4'	20.2'	FINISH TIME
GROUND SURFACE ELEVATION: 907.86 ft AMSL		TIME	1530	1815	1400
DATUM: NAD 83 UTM 15 (meters)		DATE	12-09-19	12-09-19	12-10-19
COMMENTS: Northing: 4980837.84 Easting: 508681.37		CASING DEPTH	35'	55'	58'

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
MW5B-SOIL 8-9			SM	1		SILTY SAND, medium to coarse (30% medium, 20% coarse), sub-angular to sub-rounded, silt (30%), with organics (10%), with cobbles (10%); wet, 10YR 4/3		
			SC	2		CLAYEY SAND, medium to coarse (40% medium, 20% coarse), sub-rounded to well-rounded, clay (20%), with gravel, fine to medium (10% fine, 10% medium); moist, 10YR 5/4		
			SM	4		SILTY SAND, fine to coarse (50% fine, 23% medium, 10% coarse), sub-rounded to well-rounded, silt (15%), trace gravel, fine (2%); dry, 10YR 5/4		
				5				
				7		SILTY SAND, fine to medium (30% fine, 15% medium), sub-rounded, silt (25%), clay (25%), trace gravel, fine (3%), trace cobbles (2%); dry, 10YR 4/3		
				8				
			CL	10		SILTY SAND, fine to medium (50% fine, 20% medium), sub-angular to sub-rounded, silt (25%), trace gravel, fine (3%), trace cobbles (2%); dry, 10YR 5/4		
				11				
				13		CLAY, low plasticity, stiff, trace gravel, medium (3%), trace cobbles (2%); dry, 10YR 4/3		
				14				
15	CLAY, low plasticity, stiff, trace gravel, medium (3%), trace cobbles (2%); dry, 10YR 4/3							
MW5B-SOIL 16-18			CL	16				
MW5B-SOIL				17				
				18				
				19				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW5B [847057]	
LOGGED BY: AS/JM/MGD	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags			SHEET 2 OF 6	
DRILLING CONTR.: Traut					DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic				START TIME: 1400	
BORING DEPTH: 120 ft bgs		WATER LEVEL	31'	20.4'	20.2'	FINISH TIME: 1750
GROUND SURFACE ELEVATION: 907.86 ft AMSL		TIME	1530	1815	1020	DATE: 12-09-19
DATUM: NAD 83 UTM 15 (meters)		DATE	12-09-19	12-09-19	12-10-19	DATE: 12-10-19
COMMENTS: Northing: 4980837.84 Easting: 508681.37		CASING DEPTH	35'	55'	58'	

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
18-20			CL	21-24		CLAY, low plasticity, stiff, with gravel, coarse (7%), sub-rounded; dry to moist, 10YR 4/3		Grout (neat cement) (0'-108' bgs)
MW5B-SOIL 28-30			ML	25-28		SANDY CLAY, low plasticity, stiff, sand, fine to medium (20% fine, 5% medium), sub-rounded to well-rounded, trace gravel, coarse (5%), trace cobbles (5%); dry to moist, 10YR 4/3	← 4" LC Steel Casing (0'-110' bgs)	
MW5B-SOIL 31-32			ML	29-30		SANDY SILT, low plasticity, sand, fine to medium (25% fine, 10% medium), sub-rounded to well-rounded, trace gravel, fine to coarse (3% fine, 5% coarse); dry to moist, 10YR 4/4, 6" black mica lense @ 28.5'		
MW5B-GW 31-35			SP	31-32		SANDY SILT, low plasticity, sand, fine to coarse (15% fine, 10% medium, 5% coarse), sub-angular to sub-rounded, trace cobbles (5%); wet, 10YR 4/3		
MW5B-SOIL 34-35			SP	33-34		SAND, fine to coarse (5% fine, 35% medium, 50% coarse), sub-rounded, poorly graded, with gravel, fine to medium (8% fine, 2% medium), sub-rounded to sub-angular; moist, 10YR 3/2		
			SP	35-36		SAND, fine to coarse (5% fine, 35% medium, 55% coarse), sub-angular, poorly graded, with gravel, fine to coarse (8% fine, 2% coarse), sub-angular; moist, 10YR 4/4		Grout (neat cement) (0'-108' bgs)
				37-39		SAND, fine to coarse (3% fine, 25% medium, 55% coarse), sub-angular to well-rounded, poorly graded, with gravel, fine to coarse (10% fine, 5% medium, 2% coarse), angular to sub-angular; moist, 10YR 4/3, gravel @ 42' - 46'		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW5B [847057]	
LOGGED BY: AS/JM/MGD	CHECKED BY: AEL/AS				SHEET 3 OF 6	
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic				START TIME: 1400	
BORING DEPTH: 120 ft bgs		WATER LEVEL	31'	20.4'	20.2'	FINISH TIME: 1750
GROUND SURFACE ELEVATION: 907.86 ft AMSL		TIME	1530	1815	1020	DATE
DATUM: NAD 83 UTM 15 (meters)		DATE	12-09-19	12-09-19	12-10-19	DATE
COMMENTS: Northing: 4980837.84 Easting: 508681.37		CASING DEPTH	35'	55'	58'	12-09-19 12-10-19

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
MW5B-SOIL 48-49			SP	41-45				4" LC Steel Casing (0'-110' bgs)
			SP	45-46				
			SW	46-47		SAND, fine to coarse (3% fine, 25% medium, 55% coarse), sub-angular to well-rounded, poorly graded, with gravel, fine to coarse (10% fine, 5% medium, 2% coarse), angular to sub-angular; moist, 10YR 4/3, gravel @ 42' - 46'		
			CL	47-48		SAND, fine to coarse (20% fine, 60% medium, 20% coarse), sub-angular to well-rounded, well graded; moist, 10YR 4/4		
			CL	48-49		CLAY, low plasticity, soft; wet, 10YR 5/4		
			GP	49-50		GRAVEL, fine to medium (60% fine, 10% medium), angular to sub-angular, poorly graded, sand, medium to coarse (5% medium, 15% coarse), sub-angular, with silt (10%); moist, 10YR 4/3		
			ML	50-51		SANDY SILT, low plasticity, sand, fine to medium (15% fine, 5% medium), sub-angular to sub-rounded, trace gravel, coarse (5%), sub-rounded; moist, 10YR 5/3		
MW5B-SOIL 50-54				51-54		SAND, fine to coarse (40% fine, 50% medium, 5% coarse), sub-angular to sub-rounded, poorly graded, trace gravel, coarse (5%), well-rounded; dry to moist, 10YR 6/4		
MW5B-GW 51-55			SP	54-55				
MW5B-SOIL 55-58				55-58		SAND, medium to coarse (30% medium, 56% coarse), well-rounded, poorly graded, with gravel, coarse (10%), sub-angular to sub-rounded, trace silt (2%), trace clay (2%); dry, 10YR 5/4		
MW5B-GW 55-58				58-59		DOLOSTONE, not competent, very weathered, with gravel, fine (10%), with cobbles (10%); 10YR 6/6, clay observed		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN					
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW5B [847057]			
LOGGED BY: AS/JM/MGD	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags			SHEET 4 OF 6			
DRILLING CONTR.: Traut					DRILLING			
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL		31'	20.4'	20.2'	START TIME	FINISH TIME
BORING DEPTH: 120 ft bgs		DATE		1530	1815	1020	1400	1750
GROUND SURFACE ELEVATION: 907.86 ft AMSL		DATE		12-09-19	12-09-19	12-10-19	12-09-19	12-10-19
DATUM: NAD 83 UTM 15 (meters)		CASING DEPTH		35'	55'	58'		
COMMENTS: Northing: 4980837.84 Easting: 508681.37								

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				61		DOLOSTONE, not competent, very weathered, with gravel, fine (10%), with cobbles (10%); 10YR 6/6, clay observed	<p>Grout (neat cement) (0'-108' bgs)</p> <p>4" LC Steel Casing (0'-110' bgs)</p>
				62		DOLOSTONE, moderately competent, oolitic texture (15%), dendritic manganese staining (10%), with sand, fine (15%), trace glauconite (1%); 10YR 6/2	
				63		DOLOSTONE, moderately competent, trace banded iron staining (5%); 10YR 5/4	
				64		DOLOSTONE, competent, oolitic texture, with sand, fine (5-10%), trace glauconite (1%); 10YR 5/6, clay observed	
				65		SANDY DOLOSTONE, competent, oolitic texture, sand, fine to coarse (30% fine, 5% coarse), trace reworked clasts (5%), trace glauconite (1%); 10YR 6/4	
				66		DOLOSTONE, competent, massive, trace calcite (1%); 10YR 6/4	
				67		SANDY DOLOSTONE, not competent, massive, sand, fine (35%), oolitic texture (10-20%), trace calcite (1%), trace vugs (1%); 10YR 6/4, clay observed	
				68		SANDY DOLOSTONE, not competent, massive, sand, fine to medium (35%), trace vugs (1%); 10YR 6/2, clay observed	
				69		SANDY DOLOSTONE, not competent, massive, sand, fine to medium (20%), trace vugs (1%), trace oolitic texture (1%); 10YR 6/2, clay observed	
				70		DOLOSTONE, not competent, massive, with sand, fine to medium (10%), trace vugs (3%), trace glauconite (1%); 10YR 6/2, clay observed	
				71		DOLOSTONE, not competent, massive, with sand, fine to medium (10%); 10YR 6/4	
				72		DOLOSTONE, not competent, massive, trace vugs (3%), trace banded iron staining (2%); 10YR 6/4	
				73		DOLOSTONE, not competent, massive, very fine grained, dendritic manganese staining (10%); 10YR 6/4	
				74		DOLOSTONE, not competent, massive, oolitic texture (30%), with sand (5-10%), fine to medium (5-10%), trace dendritic manganese staining (5%);	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW5B [847057]	
LOGGED BY: AS/JM/MGD	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags			SHEET 5 OF 6	
DRILLING CONTR.: Traut					DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic				START TIME: 1400	
BORING DEPTH: 120 ft bgs		WATER LEVEL	31'	20.4'	20.2'	FINISH TIME: 1750
GROUND SURFACE ELEVATION: 907.86 ft AMSL		DATE	12-09-19	12-09-19	12-10-19	DATE
DATUM: NAD 83 UTM 15 (meters)		CASING DEPTH	35'	55'	58'	DATE
COMMENTS: Northing: 4980837.84 Easting: 508681.37					12-09-19	12-10-19

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				81		10YR 5/3 DOLOSTONE, not competent, massive, very fine grained; 10YR 5/1		Grout (neat cement) (0'-108' bgs)
				82		DOLOSTONE, competent, massive, trace sand, fine (5%), trace banded iron staining (1%); 10YR 7/2		
				83				4" LC Steel Casing (0'-110' bgs)
				84				
				85		DOLOSTONE, not competent, massive, oolitic texture (10%), trace sand, fine (5%), trace banded iron staining (5%), trace dendritic manganese staining (5%); 10YR 7/6		
				86		SANDY DOLOSTONE, competent, sand, fine to medium (20-30%), trace dendritic manganese staining (5%), trace dolomitic precipitate (5%); 10YR 6/3		
				87		DOLOSTONE, competent, trace vugs (5%), trace dolomitic precipitate (5%), trace sand, fine (3%); 10YR 7/2		
				88		DOLOSTONE, moderately competent, very fine grained, banded iron staining (10%), trace dendritic manganese staining (5%), trace sand, fine (5%); 10YR 6/3		
				89		DOLOSTONE, moderately competent, fine grained, oolitic texture (15%), trace vugs (2%); 10YR 6/2, vugs filled with dolomitic precipitate		
				90		DOLOSTONE, not competent, massive, very fine grained, dolomitic precipitate, vugs (50%); 10YR 6/3		
				91		DOLOSTONE, not competent, massive, very fine grained, trace dendritic manganese staining (5%), trace banded iron staining (2%); 10YR 7/3		
				92		DOLOSTONE, not competent, massive, very fine grained, trace dendritic manganese staining (5%), trace banded iron staining (2%); 10YR 7/3		
				93		SANDY DOLOSTONE, not competent, massive, sand, fine to medium (15-20%), trace banded iron staining (2%); 10YR 6/5		Grout (neat cement) (0'-108' bgs)
				94		DOLOSTONE, moderately competent, very fine grained, dolomitic precipitate, trace oolitic texture (5%), trace vugs (3%), trace glauconite (1%); 10YR 8/2		
				95		DOLOSTONE, moderately competent, very fine grained, banded iron staining (10-12%); 10YR 8/2		
				96		DOLOSTONE, moderately competent, very fine grained, trace dendritic manganese staining (5%), trace banded iron staining (2%); 10YR 7/3		
				97		DOLOSTONE, moderately competent, very fine grained, banded iron staining (10-12%); 10YR 8/2		
				98		DOLOSTONE, moderately competent, very fine grained, trace dendritic manganese staining (5%), trace banded iron staining (2%); 10YR 7/3		
				99		DOLOSTONE, moderately competent, very fine grained, trace dendritic manganese staining (5%), trace banded iron staining (2%); 10YR 7/3		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN				
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW5B [847057]		
LOGGED BY: AS/JM/MGD	CHECKED BY: AEL/AS				SHEET 6 OF 6		
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING		
DRILLER: Dan Pflipsen	EQUIP.: Sonic				START TIME		
BORING DEPTH: 120 ft bgs		WATER LEVEL	31'	20.4'	20.2'	FINISH TIME	
GROUND SURFACE ELEVATION: 907.86 ft AMSL		TIME	1530	1815	1020	1400	1750
DATUM: NAD 83 UTM 15 (meters)		DATE	12-09-19	12-09-19	12-10-19	DATE	DATE
COMMENTS: Northing: 4980837.84 Easting: 508681.37		CASING DEPTH	35'	55'	58'	12-09-19	12-10-19

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Asphalt		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				101		grained, dolomitic precipitate, trace sand, fine to medium (5%), trace vugs (2%), trace glauconite (2%); 10YR 7/3		<p>4" LC Steel Casing (0'-110' bgs)</p> <p>Grout (neat cement) (0'-108' bgs)</p> <p>4" LC Steel Casing (0'-110' bgs)</p> <p>1.5' pellet seal on top of 0.5' pea rock (108'-110' bgs)</p> <p>Grout Basket (110' bgs)</p> <p>7" Open Hole (110'-120' bgs)</p>
				102		DOLOSTONE, moderately competent, very fine grained, dolomitic precipitate, trace oolitic texture (5%), trace vugs (5%), trace glauconite (2%); 10YR 7/3		
				103		DOLOSTONE, competent, massive, vugs (15-20%), trace dendritic manganese staining (2%); 10YR 6/2		
				104		SANDY DOLOSTONE, moderately competent, trace vugs (5%), dendritic manganese staining @ 103' (5%); 10YR 7/3		
				105		DOLOSTONE, competent, massive, with sand, fine to medium (5-10%), trace vugs (5%); 10YR 6/3		
				106				
				107				
				108		DOLOSTONE, competent, massive, with sand, fine to medium (5-10%), trace vugs (5%), trace banded iron staining (5%); 10YR 6/3		
				109		DOLOSTONE, competent, massive, with sand, fine to medium (5-10%), trace vugs (5%), trace dolomitic precipitate (5%), trace iron staining (2%); 10YR 6/3		
				110		DOLOSTONE, not competent, trace medium grained dolomitic precipitate (5%); 10YR 7/2		
				111		DOLOSTONE, not competent, with sand, medium (5-10%), trace banded iron staining (2-5%); 10YR 6/3		
				112				
				113				
				114				
				115		DOLOSTONE, moderately competent, massive, oolitic texture (20-25%), trace banded iron staining (5%), trace sand (5%); 10YR 6/4		
				116				
				117				
				118		DOLOSTONE, moderately competent, massive, with sand, medium (5%), reworked clasts (10%), trace massive iron staining (5%), trace vugs (5%); 10YR 6/3		
				119		E.O.B. @ 120' bgs. no refusal		



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW6A [847058]
LOGGED BY: AEL/MGD	CHECKED BY: AEL/AS			SHEET 1 OF 11
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1520
BORING DEPTH: 210 ft bgs		WATER LEVEL: 9'		FINISH TIME: 1130
GROUND SURFACE ELEVATION: 890.46 ft AMSL		TIME: 0800		DATE: 11-13-19
DATUM: NAD 83 UTM 15 (meters)		DATE: 11-13-19		DATE: 11-14-19
COMMENTS: Northing: 4980133.29 Easting: 509410.80		CASING DEPTH:		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
						No Recovery		
			ML	1		SILT, low plasticity, trace non-native clay (5%); dry to moist, 2.5Y 4/4		
			CL	2		CLAY, low plasticity; dry to moist, 2.5Y 4/4		
			SW	3		SAND, fine to coarse (33% fine, 33% medium, 33% coarse), sub-rounded, well graded; moist, 5Y 3/2		
				4				
			SP	6		SAND, fine, well-rounded, poorly graded; dry to moist, 2.5Y 4/4		Grout (neat cement) (0'-183' bgs)
				7		SAND, medium, sub-rounded to well-rounded, poorly graded, with gravel (10%), coarse, subangular; dry to moist, 2.5Y 4/4		
			SW	9		SAND, fine to coarse (33% fine, 33% medium, 33% coarse), sub-rounded, well graded; dry to moist, 2.5Y 4/4		4" LC Steel Casing (0'-185' bgs)
				10			SAND, fine to coarse (27% fine, 27% medium, 27% coarse), sub-rounded, well graded, with gravel, fine to medium (10% fine, 5% medium), sub-angular to well-rounded; wet, 2.5Y 4/3	
				11				
				12				
				18		SAND, fine to coarse (32% fine, 32% medium, 32% coarse), sub-rounded, well graded, trace gravel, fine (4%), sub-angular to sub-rounded; wet, 2.5Y 5/3		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW6A [847058]
LOGGED BY: AEL/MGD	CHECKED BY: AEL/AS			SHEET 2 OF 11
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1520
BORING DEPTH: 210 ft bgs		WATER LEVEL: 9'		FINISH TIME: 1130
GROUND SURFACE ELEVATION: 890.46 ft AMSL		TIME: 0800		DATE: 11-13-19
DATUM: NAD 83 UTM 15 (meters)		DATE: 11-13-19		DATE: 11-14-19
COMMENTS: Northing: 4980133.29 Easting: 509410.80		CASING DEPTH:		

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				21		SAND, fine to coarse (32% fine, 32% medium, 32% coarse), sub-rounded, well graded, trace gravel, fine (4%), sub-rounded; wet, 2.5Y 4/3		<p>Grout (neat cement) (0'-183' bgs)</p> <p>4" LC Steel Casing (0'-185' bgs)</p>
				22		SAND, fine to coarse (25% fine, 25% medium, 25% coarse), sub-rounded, well graded, with gravel, fine (25%), sub-rounded; wet, 2.5Y 4/3, 15% of gravel in seams		
				23				
				24				
				25				
				26		SAND, fine to coarse (32% fine, 32% medium, 32% coarse), sub-rounded, well graded, trace gravel, fine (4%), sub-rounded; wet, 2.5Y 4/3		
				27				
			SW	28		SAND, fine to coarse (30% fine, 30% medium, 30% coarse), sub-rounded, well graded, with gravel, fine to medium (10% fine, 5% medium), sub-rounded; moist, 2.5Y 4/3		
				29				
				30				
				31				
				32		SAND, fine to coarse (27% fine, 27% medium, 27% coarse), sub-rounded, well graded, with gravel, fine to medium (10% fine, 9% medium), sub-angular to sub-rounded; moist, 2.5Y 4/3		
				33				
				34				
				35				
				36				
				37		SAND, fine, well-rounded, poorly graded; dry to moist, 10YR 5/3, iron staining @ 39.5' bgs		
			SP	38				
				39				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW6A [847058]
LOGGED BY: AEL/MGD	CHECKED BY: AEL/AS			SHEET 3 OF 11
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1520
BORING DEPTH: 210 ft bgs		WATER LEVEL: 9'		FINISH TIME: 1130
GROUND SURFACE ELEVATION: 890.46 ft AMSL		TIME: 0800		DATE: 11-13-19
DATUM: NAD 83 UTM 15 (meters)		DATE: 11-13-19		DATE: 11-14-19
COMMENTS: Northing: 4980133.29 Easting: 509410.80		CASING DEPTH:		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
			SW	41		SAND, fine to coarse (33% fine, 33% medium, 33% coarse), sub-rounded, well graded; moist, 10YR 5/3		<p>Grout (neat cement) (0'-183' bgs)</p> <p>4" LC Steel Casing (0'-185' bgs)</p>
			SP	45		SAND, fine to medium (50% fine, 50% medium), sub-rounded, poorly graded; moist, 10YR 5/3		
			SP	46		SAND, fine, well-rounded, poorly graded; dry, 10YR 5/4		
			SW	48		SAND, fine to coarse (33% fine, 33% medium, 33% coarse), sub-rounded, well graded; moist, 10YR 5/3		
				49		SAND, fine to coarse (45% fine, 45% medium, 10% coarse), sub-rounded, well graded; moist, 10YR 5/3		
			SW	50		SAND, fine to coarse (33% fine, 33% medium, 33% coarse), sub-rounded, well graded; moist to wet, 10YR 5/3		
				51		SAND, fine to coarse (32% fine, 32% medium, 32% coarse), sub-rounded, well graded, trace gravel, fine (4%), sub-rounded; moist to wet, 10YR 5/3		
			SW	52		SAND, fine to coarse (30% fine, 30% medium, 30% coarse), sub-rounded, well graded, with gravel, fine (10%), well-rounded; moist to wet, 10YR 4/3		
				53		SAND, fine, well-rounded, poorly graded; moist, 10YR 5/3		
			SP	55		SAND, fine to coarse (32% fine, 32% medium, 32% coarse), sub-rounded, well graded, trace gravel, fine (4%), well-rounded; moist to wet, 10YR 4/3		
			SW	56		SAND, fine, well-rounded, poorly graded; moist, 10YR 5/3		
				57		SAND, fine to coarse (32% fine, 32% medium, 32% coarse), sub-rounded, well graded, trace gravel, fine (4%), well-rounded; moist to wet, 10YR 4/3		
			SP	58		SAND, fine to medium (50% fine, 50% medium), sub-rounded, poorly graded; moist, 10YR 5/4		
			SW	59		SAND, fine to coarse (32% fine, 32% medium, 32% coarse), sub-rounded, well graded, trace gravel, fine		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW6A [847058]
LOGGED BY: AEL/MGD	CHECKED BY: AEL/AS			SHEET 4 OF 11
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1520
BORING DEPTH: 210 ft bgs		WATER LEVEL: 9'		FINISH TIME: 1130
GROUND SURFACE ELEVATION: 890.46 ft AMSL		TIME: 0800		DATE: 11-13-19
DATUM: NAD 83 UTM 15 (meters)		DATE: 11-13-19		DATE: 11-14-19
COMMENTS: Northing: 4980133.29 Easting: 509410.80		CASING DEPTH:		

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
			SW	61		(4%), well-rounded; moist to wet, 10YR 4/3		
			SW	62		SAND, fine to coarse (20% fine, 60% medium, 20% coarse), sub-rounded, well graded; wet, 10YR 5/4		
			SW	63				
			SW	64				
			SW	65		SAND, fine to coarse (5% fine, 60% medium, 30% coarse), sub-rounded, poorly graded, trace gravel, medium (5%), sub-angular; 10YR 5/2		Grout (neat cement) (0'-183' bgs)
			SW	66		SAND, fine, sub-rounded to well-rounded, poorly graded; wet, 10YR 5/2		
			SW	67				
			SW	68				
			SW	69				
			SW	70		SAND, fine to medium (70% fine, 30% medium), sub-angular to sub-rounded, poorly graded; wet, 10YR 4/3		4" LC Steel Casing (0'-185' bgs)
			SW	71				
			SW	72				
			SW	73		SAND, fine to coarse (40% fine, 50% medium, 5% coarse), sub-angular to sub-rounded, poorly graded, trace gravel, fine (5%), well-rounded; wet, 10YR 4/3		
			SW	74				
			SW	75				
			SW	76				
			SW	77				
			SW	78				
			SW	79		SAND, fine to coarse (20% fine, 40% medium, 30% coarse), sub-angular to sub-rounded, well graded,		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW6A [847058]
LOGGED BY: AEL/MGD	CHECKED BY: AEL/AS			SHEET 5 OF 11
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1520
BORING DEPTH: 210 ft bgs		WATER LEVEL: 9'		FINISH TIME: 1130
GROUND SURFACE ELEVATION: 890.46 ft AMSL		TIME: 0800		DATE: 11-13-19
DATUM: NAD 83 UTM 15 (meters)		DATE: 11-13-19		DATE: 11-14-19
COMMENTS: Northing: 4980133.29 Easting: 509410.80		CASING DEPTH:		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
			SW	81		with gravel, fine (10%), well-rounded; wet, 10YR 4/3	<p>Grout (neat cement) (0'-183' bgs)</p> <p>4" LC Steel Casing (0'-185' bgs)</p>
			SW	82		SAND, fine to coarse (30% fine, 60% medium, 10% coarse), sub-rounded, well graded; wet, 10YR 5/2	
			SW	83			
			SW	84			
			SW	85			
			SW	86			
			SP	87		SAND, fine to medium (95% fine, 5% medium), sub-rounded, poorly graded; wet, 10YR 5/2	
			SW	88		SAND, fine to coarse (30% fine, 60% medium, 10% coarse), sub-rounded, well graded; wet, 10YR 5/2	
			SW	89			
			SW	90		SAND, fine to coarse (20% fine, 40% medium, 30% coarse), sub-angular to sub-rounded, well graded, trace gravel, fine (5%), well-rounded; 10YR 4/2	
			SW	91			
			SW	92			
			SW	93			
			SW	94			
			SW	95			
			SW	96			
			SP	97		SAND, fine, sub-rounded to well-rounded, poorly graded; 10YR 4/2	
			SP	98		SAND, medium to coarse (50% medium, 50% coarse), sub-rounded, poorly graded; 10YR 4/2	
			SW	99		SAND, fine to coarse (20% fine, 50% medium, 15% coarse), sub-angular to sub-rounded, well graded,	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW6A [847058]
LOGGED BY: AEL/MGD	CHECKED BY: AEL/AS			SHEET 6 OF 11
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME
BORING DEPTH: 210 ft bgs		WATER LEVEL	9'	FINISH TIME
GROUND SURFACE ELEVATION: 890.46 ft AMSL		TIME	0800	1520
DATUM: NAD 83 UTM 15 (meters)		DATE	11-13-19	1130
COMMENTS: Northing: 4980133.29 Easting: 509410.80		CASING DEPTH		DATE DATE
				11-11-19 11-14-19

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
			SW	101		with gravel, medium to coarse (10% medium, 5% coarse), sub-angular to sub-rounded; 10YR 4/2		
			SP	102		SAND, fine to coarse (45% fine, 35% medium, 10% coarse), sub-angular to sub-rounded, well graded, trace gravel, medium (5%), sub-angular to sub-rounded, trace cobbles (5%); wet, 10YR 4/2		
			GP	103		SAND, fine to medium (50% fine, 50% medium), sub-angular to sub-rounded, poorly graded; wet, 10YR 4/2		
		104						
		105						
		106						
				107		GRAVEL, fine to medium (55% fine, 35% medium), angular to sub-angular, poorly graded, with sand, coarse (9%) sub-angular to sub-rounded, trace cobbles (1%); 10YR 3/1		Grout (neat cement) (0'-183' bgs)
				108				
				109				
				110		DOLOSTONE, competent, massive, fine grained dolomitic precipitate, oolitic texture (5-15%); 10YR 4/2		4" LC Steel Casing (0'-185' bgs)
				111		SANDY DOLOSTONE, competent, fine to medium sub-rounded sand (20%), chert (5-10%), angular, trace reworked clasts (5%), trace micrite bands (5%), trace glauconite (2%); 2.5Y 7/2		
				112				
				113				
				114				
				115				
				116				
				117				
				118				
				119				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW6A [847058]
LOGGED BY: AEL/MGD	CHECKED BY: AEL/AS			SHEET 7 OF 11
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1520
BORING DEPTH: 210 ft bgs		WATER LEVEL: 9'		FINISH TIME: 1130
GROUND SURFACE ELEVATION: 890.46 ft AMSL		TIME: 0800		DATE: 11-13-19
DATUM: NAD 83 UTM 15 (meters)		DATE: 11-13-19		DATE: 11-14-19
COMMENTS: Northing: 4980133.29 Easting: 509410.80		CASING DEPTH:		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				121		DOLOSTONE, competent, oolitic texture (20%), vugs (15%), with sand, fine (5-10%), well-rounded, trace glauconite (2%); 10YR 5/3	<p>Grout (neat cement) (0'-183' bgs)</p> <p>4" LC Steel Casing (0'-185' bgs)</p>
				122		DOLOSTONE, competent, oolitic texture (20%), vugs (10%), trace sand, fine (5%), well-rounded; 10YR 5/3	
				123			
				124			
				125			
				126			
				127		DOLOSTONE, moderately competent, iron oxidation (20-30%), vugs (20%), oolitic texture (15%), trace fine sand (5%); 10YR 5/4, quartz (20%) @ 130' bgs	
				128			
				129			
				130		DOLOSTONE, moderately competent, iron oxidation (20-30%), vugs (20%), oolitic texture (15%); 10YR 5/4	
				131		DOLOSTONE, competent, vugs (10%), oolitic texture (5-10%), trace iron oxidation (5%); 10YR6/3, trace micrite layers 133-136' bgs	
				132			
				133			
				134			
				135			
				136		DOLOSTONE, competent, bedding visible, vugs (10%), trace dendritic manganese staining (2%), trace glauconite (1%); 10YR 7/4	
				137			
				138			
				139			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW6A [847058]
LOGGED BY: AEL/MGD	CHECKED BY: AEL/AS			SHEET 8 OF 11
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1520
BORING DEPTH: 210 ft bgs		WATER LEVEL: 9'		FINISH TIME: 1130
GROUND SURFACE ELEVATION: 890.46 ft AMSL		TIME: 0800		DATE: 11-13-19
DATUM: NAD 83 UTM 15 (meters)		DATE: 11-13-19		DATE: 11-14-19
COMMENTS: Northing: 4980133.29 Easting: 509410.80		CASING DEPTH:		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				141		DOLOSTONE, competent, fine grained dolomitic precipitate (10-50%); 2.5Y 7/2		<p>Grout (neat cement) (0'-183' bgs)</p> <p>4" LC Steel Casing (0'-185' bgs)</p>
				142				
				143				
				144				
				145		DOLOSTONE, competent, fine grained dolomitic precipitate (10-50%), trace oolitic texture (5%); 2.5Y 7/3		
				146				
				147				
				148				
				149				
				150		DOLOSTONE, competent, fine grained dolomitic precipitate, oolitic texture (15-20%), vugs (10-15%), trace dendritic manganese staining (1%); 2.5Y 6/3		
				151				
				152				
				153				
				154				
				155		DOLOSTONE, competent, dendritic manganese staining (5-10%), trace oolitic texture (5%); 2.5Y 7/4		
				156				
				157				
				158				
				159				



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW6A [847058]
LOGGED BY: AEL/MGD	CHECKED BY: AEL/AS			SHEET 9 OF 11
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME: 1520
BORING DEPTH: 210 ft bgs		WATER LEVEL: 9'		FINISH TIME: 1130
GROUND SURFACE ELEVATION: 890.46 ft AMSL		TIME: 0800		DATE: 11-13-19
DATUM: NAD 83 UTM 15 (meters)		DATE: 11-13-19		DATE: 11-14-19
COMMENTS: Northing: 4980133.29 Easting: 509410.80		CASING DEPTH:		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				161		DOLOSTONE, competent, trace dendritic manganese staining (5%), trace small (1mm) vugs (5%); 2.5Y 7/2	<p>Grout (neat cement) (0'-183' bgs)</p> <p>4" LC Steel Casing (0'-185' bgs)</p>
				162			
				163		DOLOSTONE, moderately competent, dendritic manganese staining (10%), trace small (1mm) vugs (5%); 2.5Y 7/2	
				164			
				165		DOLOSTONE, moderately competent, trace dendritic manganese staining (5%), trace small (1mm) vugs (5%); 2.5Y 7/2	
				166			
				167		SANDY DOLOSTONE, moderately competent, platy, medium sand (10-30%), oolitic texture (15%); 2.5Y 7/2	
				168			
				169			
				170		DOLOSTONE, competent, trace oolitic texture (5%), trace vugs (5%); 2.5Y 6/3	
				171		DOLOSTONE, competent, bedded, dolomitic precipitate (15-20%), vugs (20%), oolitic texture (15-20%); 2.5Y 6/3	
				172			
				173			
				174			
				175		DOLOSTONE, competent, dendritic manganese staining (5-10%), trace oolitic texture (5%), trace iron banding (5%); 2.5Y 6/4	
				176			
				177			
				178			
				179		DOLOSTONE, not competent, clay and silt (40%), with sand (5-10%); 10YR 5/8	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW6A [847058]
LOGGED BY: AEL/MGD	CHECKED BY: AEL/AS			SHEET 10 OF 11
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME 1520
BORING DEPTH: 210 ft bgs		WATER LEVEL 9'		FINISH TIME 1130
GROUND SURFACE ELEVATION: 890.46 ft AMSL		TIME 0800		DATE 11-13-19
DATUM: NAD 83 UTM 15 (meters)		DATE 11-13-19		DATE 11-14-19
COMMENTS: Northing: 4980133.29 Easting: 509410.80		CASING DEPTH		

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
				181		SANDY DOLOSTONE, weathered, 10-30 mm angular to sub-angular fragments, fine sand (15%), iron banding (5-10%), trace silt/clay (5%); 2.5Y 6/6		<p>Grout (neat cement) (0'-183' bgs)</p> <p>4" LC Steel Casing (0'-185' bgs)</p> <p>1.5' pellet seal on top of 0.5' pea rock (183'-185' bgs)</p> <p>Telescoping Screen (185'-192' bgs)</p> <p>7" Open Hole (192'-210' bgs)</p>
				182		QUARTZ ARENITE, fine to coarse (5% fine, 75% medium, 20% coarse), well-rounded; 2.5Y 7/1		
				183				
				184		QUARTZ ARENITE, fine to coarse (10% fine, 65% medium, 5% coarse), well-rounded, with silt (15%), trace clay (5%); 2.5Y 7/1		
				185		QUARTZ ARENITE, fine to coarse (10% fine, 20% medium, 70% coarse), well-rounded; 2.5Y 7/1		
				186				
				187				
				188				
				189				
				190		QUARTZ ARENITE, fine to coarse (5% fine, 80% medium, 15% coarse), well-rounded; 10YR 7/1		
			Cj	191				
				192				
				193				
				194				
				195		QUARTZ ARENITE, fine to coarse (5% fine, 90% medium, 5% coarse), well-rounded; 10YR 7/1		
				196				
				197				
				198				
				199				



# ENVIRONMENTAL BORING LOG

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW6A [847058]
LOGGED BY: AEL/MGD	CHECKED BY: AEL/AS			SHEET 11 OF 11
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags		DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic			START TIME 1520
BORING DEPTH: 210 ft bgs		WATER LEVEL 9'		FINISH TIME 1130
GROUND SURFACE ELEVATION: 890.46 ft AMSL		TIME 0800		DATE 11-13-19
DATUM: NAD 83 UTM 15 (meters)		DATE 11-13-19		CASING DEPTH 11-11-19 11-14-19
COMMENTS: Northing: 4980133.29 Easting: 509410.80				

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				201	[Dotted Pattern]	QUARTZ ARENITE, medium to coarse (50% medium, 45% coarse), well-rounded, trace silt (5%); 5Y 8/1	<p>7" Open Hole (192'-210' bgs)</p>
				202	[Dotted Pattern]		
				203	[Dotted Pattern]	QUARTZ ARENITE, fine to medium (30% fine, 70% medium), well-rounded; 5Y 8/1	
			Cj	204	[Dotted Pattern]		
				205	[Dotted Pattern]		
				206	[Dotted Pattern]		
				207	[Dotted Pattern]	QUARTZ ARENITE, medium to coarse (40% medium, 60% coarse), well-rounded; 5Y 8/1	
				208	[Dotted Pattern]		
				209	[Dotted Pattern]	QUARTZ ARENITE, fine to medium (20% fine, 70% medium), well-rounded, silt (10%); 5Y 8/1	
				210	[Dotted Pattern]	E.O.B. @ 210' bgs, No Refusal	
				211	[Dotted Pattern]		
				212	[Dotted Pattern]		
				213	[Dotted Pattern]		
				214	[Dotted Pattern]		
				215	[Dotted Pattern]		
				216	[Dotted Pattern]		
				217	[Dotted Pattern]		
				218	[Dotted Pattern]		
				219	[Dotted Pattern]		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN					
PROJECT: Project 1007		DRILLING METHOD: Sonic				BORING NO. MW6B [847059]		
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags				SHEET 1 OF 8		
DRILLING CONTR.: Traut								
DRILLER: Dan Pflipsen	EQUIP.: Sonic	SURFACE CONDITIONS: Grass/Mud				DRILLING		
BORING DEPTH: 150 ft bgs		WATER LEVEL	10.1'	10.1'	13'	10.3'	START TIME	FINISH TIME
GROUND SURFACE ELEVATION: 890.53 ft AMSL		TIME	0840	1000	1345	0800	0830	1200
DATUM: NAD 83 UTM 15 (meters)		DATE	11-19-19	11-19-19	11-19-19	11-20-19	DATE	DATE
COMMENTS: Northing: 4980132.12 Easting: 509412.93		CASING DEPTH	13'	40'	85'	110'	11-19-19	11-21-19

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass/Mud		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
MW6B-SOIL 6-7			OL	1	[Hatched]	TOPSOIL, silt (85%), medium sand (15%); wet, 5YR 3/1		
			SW	2	[Dotted]	SAND, fine to coarse (10% fine, 30% medium, 45% coarse), sub-angular to sub-rounded, well graded, with gravel, fine (10%), sub-angular, trace clay (5%); dry, 10YR 4/3		
MW6B-SOIL 8.5-10			SM	4	[Dotted]	SILTY SAND, fine, subrounded, poorly graded, silt (20%), trace clay (5%); dry, 7.5YR 3/2		
			SW	5	[Dotted]	SAND, fine to coarse (15% fine, 65% medium, 10% coarse), sub-angular to sub-rounded, well graded, with clay (8%), trace gravel, coarse (2%), angular; dry to moist, 7.5YR 4/2		
MW6B-SOIL 10-13			GP	11	[Large Dotted]	GRAVEL, medium, sub-angular to sub-rounded, poorly graded, with sand, coarse (30%), angular to sub-angular, trace cobbles (5%), sub-angular to sub-rounded, trace clay 5%; wet, 7.5YR 3/2	Grout (neat cement) (0'-138' bgs)	4" LC Steel Casing (0'-140' bgs)
MW6B-GW 11-13			GW	13	[Large Dotted]	GRAVEL, fine to coarse (50% fine, 20% medium, 10% coarse), sub-angular, well graded, with sand, coarse (15%), sub-angular to sub-rounded, trace clay (5%); wet, 10YR 3/4		
			SW	16	[Large Dotted]	GRAVEL, fine to coarse (50% fine, 20% medium, 10% coarse), sub-angular, well graded, with sand, coarse (15%), sub-angular to sub-rounded, trace clay (5%); wet, 10YR 3/4		
			GW	18	[Large Dotted]	SAND, fine to coarse (19% fine, 40% medium, 40% coarse), sub-angular to sub-rounded, well graded, trace cobbles (1%), sub-angular; moist to wet, 10YR 3/4		
			SP	19	[Large Dotted]	GRAVEL, fine to coarse (60% fine, 20% medium, 10% coarse), angular to well-rounded, well graded, with sand, medium to coarse (5% medium, 5% coarse), sub-angular to sub-rounded; wet, 10YR 3/4		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic				BORING NO. MW6B [847059]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags				SHEET 2 OF 8
DRILLING CONTR.: Traut						
DRILLER: Dan Pflipsen	EQUIP.: Sonic	DRILLING				
BORING DEPTH: 150 ft bgs		WATER LEVEL	10.1'	10.1'	13'	10.3'
GROUND SURFACE ELEVATION: 890.53 ft AMSL		TIME	0840	1000	1345	0800
DATUM: NAD 83 UTM 15 (meters)		DATE	11-19-19	11-19-19	11-19-19	11-20-19
COMMENTS: Northing: 4980132.12 Easting: 509412.93		CASING DEPTH	13'	40'	85'	110'
						11-19-19 11-21-19

SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass/Mud		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
MW6B-GW 36-40 MW6B-SOIL 37-38  MW6B-SOIL 38-39			SP	21		SAND, coarse, sub-rounded, poorly graded sand, with gravel, fine to medium (30% fine, 5% medium), sub-angular; wet, 10YR 3/4		
				22		SAND, fine to coarse (5% fine, 10% medium, 80% coarse), sub-angular to sub-rounded, poorly graded, trace gravel, coarse (5%), sub-angular to sub-rounded; moist, 7.5Y 5/4		
				23				
			GP	25		GRAVEL, medium to coarse (60% medium, 5% coarse), sub-angular, poorly graded, with sand, fine to coarse (5% fine, 10% medium, 20% coarse), sub-angular; moist, 10YR 3/2		
				26				
			SP	27		SAND, fine to coarse (5% fine, 10% medium, 75% coarse), sub-rounded, poorly graded, with gravel, fine to coarse (5% fine, 2% medium, 3% coarse), sub-rounded; moist, 10YR 3/2, gravel lense @ 28-28.5' bgs		
				28				
				29		SAND, fine to coarse (10% fine, 5% medium, 60% coarse), sub-rounded, poorly graded, with clay (10%), with silt (10%), trace gravel, medium (5%), sub-rounded; moist, 10YR 4/2		
			SP	30		SAND, fine to coarse (5% fine, 30% medium, 60% coarse), sub-rounded to well-rounded, poorly graded, trace gravel, medium (5%), angular; moist, 10YR 4/2		
				31				
				32				
				33				
			GP	37		SAND, fine to medium (30% fine, 60% medium), sub-rounded to well-rounded, poorly graded, with silt (8%), trace gravel, fine (2%); moist, 10YR 5/2		
		38		GRAVEL, fine to medium (75% fine, 10% medium), angular to sub-angular, poorly graded, with sand, medium to coarse (5% medium, 10% coarse), sub-rounded to well-rounded; moist, 10YR 4/2				
		SP	39		SAND, fine to medium (30% fine, 60% medium), sub-rounded to well-rounded, poorly graded, with silt			
			39					

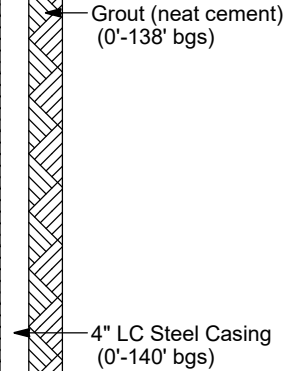
CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic				BORING NO. MW6B [847059]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags				SHEET 3 OF 8
DRILLING CONTR.: Traut						DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	START TIME: 0830		FINISH TIME: 1200		
BORING DEPTH: 150 ft bgs		WATER LEVEL	10.1'	10.1'	13'	10.3'
GROUND SURFACE ELEVATION: 890.53 ft AMSL		TIME	0840	1000	1345	0800
DATUM: NAD 83 UTM 15 (meters)		DATE	11-19-19	11-19-19	11-19-19	11-20-19
COMMENTS: Northing: 4980132.12 Easting: 509412.93		CASING DEPTH	13'	40'	85'	110'

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass/Mud		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
MW6B-SOIL 36-40			SP	41		(8%), trace gravel, fine (2%); moist, 10YR 5/2		
				42		GRAVEL, fine to medium (75% fine, 10% medium), angular to sub-angular, poorly graded, with sand, medium to coarse (5% medium, 10% coarse), sub-rounded to well-rounded; moist, 10YR 4/2		
			SW	43		SAND, fine to coarse, (50% fine, 40% medium, 5% coarse), sub-rounded to well-rounded, poorly graded, trace silt (5%); moist, 10YR 5/2		
				44		SAND, fine to medium (45% fine, 45% medium), sub-rounded to well-rounded, poorly graded, with silt (10%); moist, 10YR 5/2		
				45		SAND, fine to coarse (20% fine, 60% medium, 20% coarse), sub-angular to sub-rounded, well graded; moist, 10YR 5/3		
			SM	46		SAND, fine to coarse (10% fine, 60% medium, 30% coarse), sub-angular to sub-rounded, well graded; moist, 10YR 5/2		
MW6B-SOIL 46-47			SW	47		SAND, fine to coarse (10% fine, 60% medium, 30% coarse), sub-angular to sub-rounded, well graded; moist, 10YR 5/2		
				48		SAND, fine to coarse (10% fine, 60% medium, 30% coarse), sub-angular to sub-rounded, well graded; moist, 10YR 5/2		
			SM	49		SILTY SAND, fine, sub-rounded to rounded, poorly graded, silt (30%); dry to moist, 10YR 5/4		
				50		SAND, fine to coarse (10% fine, 30% medium, 45% coarse), sub-angular to sub-rounded, well graded, with gravel, fine (10%), sub-angular, trace clay (5%); dry, 10YR 4/3		
			SW	51		SILTY SAND, fine to medium (35% medium, 50% fine), well-rounded, poorly graded, silt (15%); dry to moist, 10YR 5/4		
				52		SAND, fine to coarse (10% fine, 45% medium, 45% coarse), sub-angular to well-rounded, well graded; moist, 10YR 5/2		
				53		SAND, fine to coarse (10% fine, 45% medium, 45% coarse), sub-angular to well-rounded, well graded; moist, 10YR 5/2		
			SP	54		SAND, fine to coarse (5% fine, 35% medium, 60% coarse), sub-angular to sub-rounded, poorly graded; moist, 10YR 4/3		
				55		SAND, fine to coarse (5% fine, 35% medium, 60% coarse), sub-angular to sub-rounded, poorly graded; moist, 10YR 4/3		
				56				
			CL	57				
				58		CLAY, low plasticity, soft, silt (40%); dry to moist, 10YR 5/3		
			SW	59		SAND, fine to coarse (10% fine, 30% medium, 60% coarse), angular to sub-rounded, well graded; moist, 10YR 5/4		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN				
PROJECT: Project 1007		DRILLING METHOD: Sonic				BORING NO. MW6B [847059]	
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags				SHEET 4 OF 8	
DRILLING CONTR.: Traut						DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic	START TIME		FINISH TIME			
BORING DEPTH: 150 ft bgs		10.1'	10.1'	13'	10.3'	0830	1200
GROUND SURFACE ELEVATION: 890.53 ft AMSL		DATE	11-19-19	11-19-19	11-19-19	11-20-19	
DATUM: NAD 83 UTM 15 (meters)		CASING DEPTH	13'	40'	85'	110'	11-21-19
COMMENTS: Northing: 4980132.12 Easting: 509412.93							

SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass/Mud		WELL DIAGRAM
						LITHOLOGIC DESCRIPTION		
			SW	61				
			SW	62				
			SW	63				
			SW	64				
			SW	65				
			SW	66				
			SW	67				
			SW	68				
			SW	69				
			SW	70				
			SW	71				
			SP	72				
			SP	73				
			SP	74				
			SP	75				
			SP	76				
			SP	77				
			SP	78				
			SP	79				

ENVIRONMENTAL 1007\_GINT\_LOGS.GPJ BORING LOGS.GPJ 6/19/20

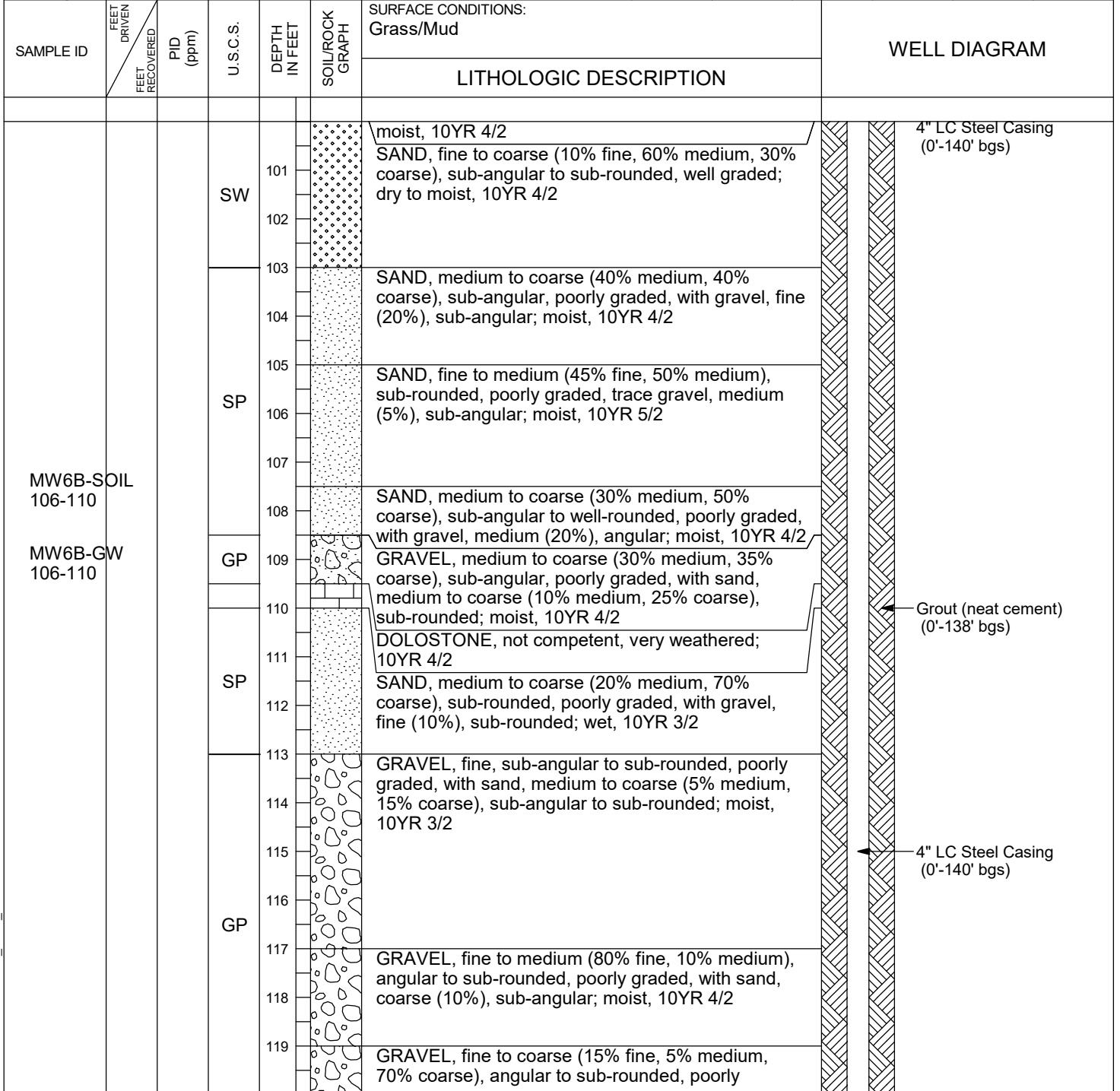


CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN				
PROJECT: Project 1007		DRILLING METHOD: Sonic				BORING NO. MW6B [847059]	
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags				SHEET 5 OF 8	
DRILLING CONTR.: Traut							
DRILLER: Dan Pflipsen	EQUIP.: Sonic	DRILLING				START TIME: 0830	
BORING DEPTH: 150 ft bgs		WATER LEVEL	10.1'	10.1'	13'	10.3'	FINISH TIME: 1200
GROUND SURFACE ELEVATION: 890.53 ft AMSL		TIME	0840	1000	1345	0800	DATE: 0830
DATUM: NAD 83 UTM 15 (meters)		DATE	11-19-19	11-19-19	11-19-19	11-20-19	DATE: 1200
COMMENTS: Northing: 4980132.12 Easting: 509412.93		CASING DEPTH	13'	40'	85'	110'	11-19-19 11-21-19

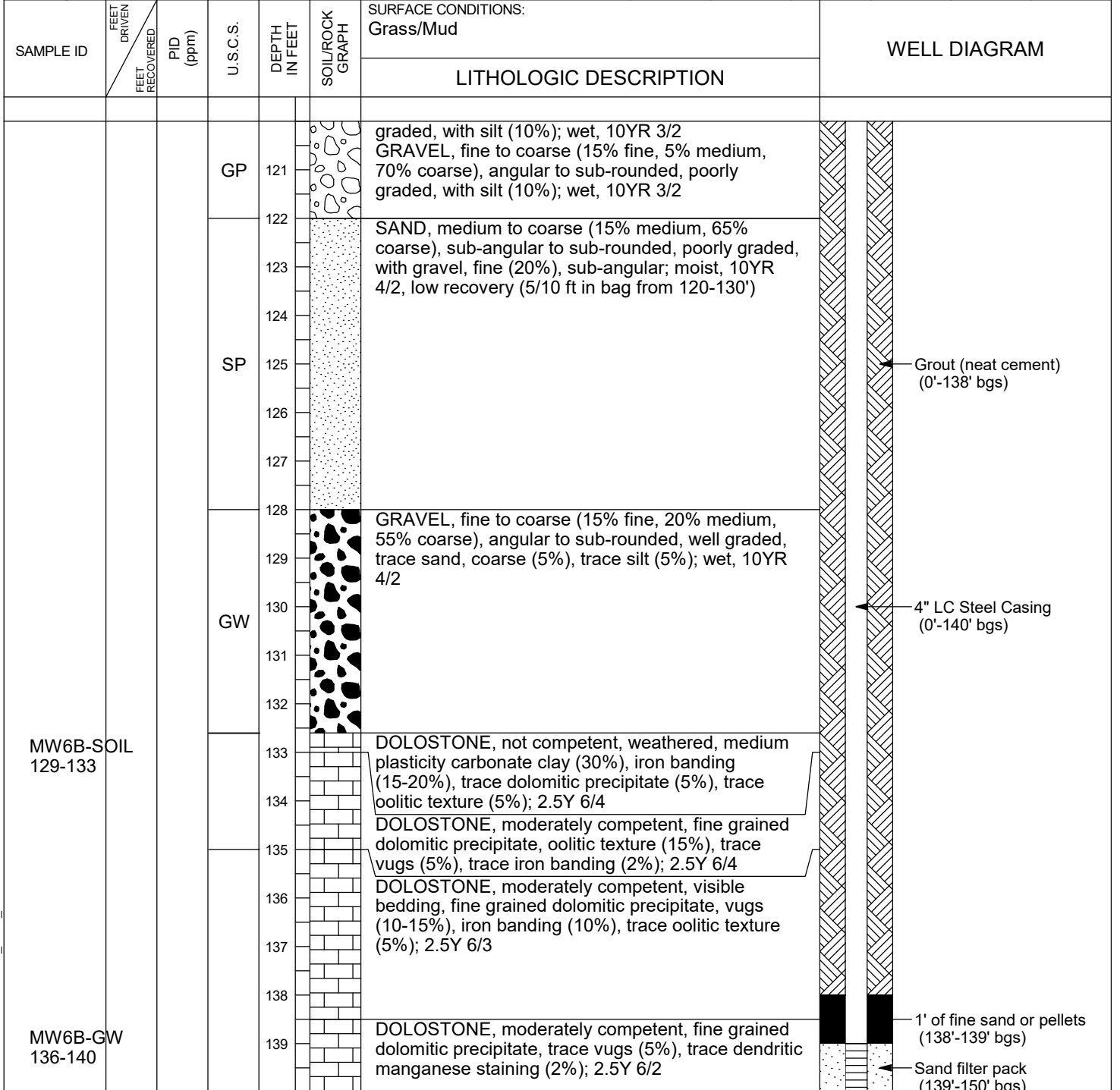
SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass/Mud				WELL DIAGRAM	
						LITHOLOGIC DESCRIPTION					
MW6B-SOIL 81-85			SP	81-85	[Dotted Pattern]	SAND, medium to coarse (35% medium, 60% coarse), sub-angular to sub-rounded, poorly graded, trace gravel, medium (5%), sub-angular to sub-rounded; moist, 10YR 5/2				Grout (neat cement) (0'-138' bgs)	
MW6B-GW 81-85			SP	85-88	[Dotted Pattern]	SAND, medium to coarse (45% medium, 55% coarse), sub-rounded, poorly graded; moist, 10YR 5/2				4" LC Steel Casing (0'-140' bgs)	
			CL	88-89	[Diagonal Pattern]	SAND, fine to coarse (5% fine, 55% medium, 40% coarse), sub-angular to sub-rounded, poorly graded; moist, 10YR 4/2					
			SW	89-90	[Dotted Pattern]	SAND, fine to coarse (5% fine, 70% medium, 25% coarse), sub-angular to well-rounded, poorly graded; moist, 10YR 5/2				Grout (neat cement) (0'-138' bgs)	
			SW	90-91	[Dotted Pattern]	CLAY, low plasticity, soft, silt (40%); dry to moist, 10YR 5/3					
			SP	91-94	[Dotted Pattern]	SAND, fine to coarse (10% fine, 60% medium, 30% coarse), sub-angular to well-rounded, well graded; moist, 10YR 4/2				Grout (neat cement) (0'-138' bgs)	
			SP	94-95	[Dotted Pattern]	SAND, fine to coarse (5% fine, 30% medium, 60% coarse), sub-angular to sub-rounded, poorly graded, trace gravel, medium (5%), sub-rounded; moist, 10YR 4/1					
			SP	95-97	[Dotted Pattern]	SAND, medium to coarse (25% medium, 60% coarse), sub-angular to sub-rounded, poorly graded, with gravel, medium (15%), sub-angular; moist, 10YR 4/1				Grout (neat cement) (0'-138' bgs)	
			SP	97-98	[Dotted Pattern]	SAND, fine to coarse (5% fine, 30% medium, 58% coarse), sub-angular to sub-rounded, poorly graded, with gravel, medium to coarse (5% medium, 2% coarse), angular to sub-angular; moist, 10YR 4/1					
			SP	98-99	[Dotted Pattern]	SAND, fine to medium (65% fine, 25% medium), sub-rounded, poorly graded, with silt (10%); dry to					



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN				
PROJECT: Project 1007		DRILLING METHOD: Sonic				BORING NO. MW6B [847059]	
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags				SHEET 6 OF 8	
DRILLING CONTR.: Traut							
DRILLER: Dan Pflipsen	EQUIP.: Sonic	DRILLING				START TIME: 0830	
BORING DEPTH: 150 ft bgs		WATER LEVEL	10.1'	10.1'	13'	10.3'	FINISH TIME: 1200
GROUND SURFACE ELEVATION: 890.53 ft AMSL		TIME	0840	1000	1345	0800	DATE: 0830
DATUM: NAD 83 UTM 15 (meters)		DATE	11-19-19	11-19-19	11-19-19	11-20-19	DATE: 1200
COMMENTS: Northing: 4980132.12 Easting: 509412.93		CASING DEPTH	13'	40'	85'	110'	DATE: 11-19-19 11-21-19



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic				BORING NO. MW6B [847059]
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags				SHEET 7 OF 8
DRILLING CONTR.: Traut						
DRILLER: Dan Pflipsen	EQUIP.: Sonic	DRILLING				
BORING DEPTH: 150 ft bgs		WATER LEVEL	10.1'	10.1'	13'	10.3'
GROUND SURFACE ELEVATION: 890.53 ft AMSL		TIME	0840	1000	1345	0800
DATUM: NAD 83 UTM 15 (meters)		DATE	11-19-19	11-19-19	11-19-19	11-20-19
COMMENTS: Northing: 4980132.12 Easting: 509412.93		CASING DEPTH	13'	40'	85'	110'
		START TIME	0830	FINISH TIME		1200
		DATE	11-19-19	DATE		11-21-19



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: Twin Cities East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW6B [847059]	
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	SAMPLING METHOD: 10' acetate bags			SHEET 8 OF 8	
DRILLING CONTR.: Traut					DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic	START TIME	FINISH TIME			
BORING DEPTH: 150 ft bgs		0830	1200			
GROUND SURFACE ELEVATION: 890.53 ft AMSL		DATE	11-19-19	11-19-19	11-19-19	11-20-19
DATUM: NAD 83 UTM 15 (meters)		CASING DEPTH	13'	40'	85'	110'
COMMENTS: Northing: 4980132.12 Easting: 509412.93		11-19-19	11-21-19			

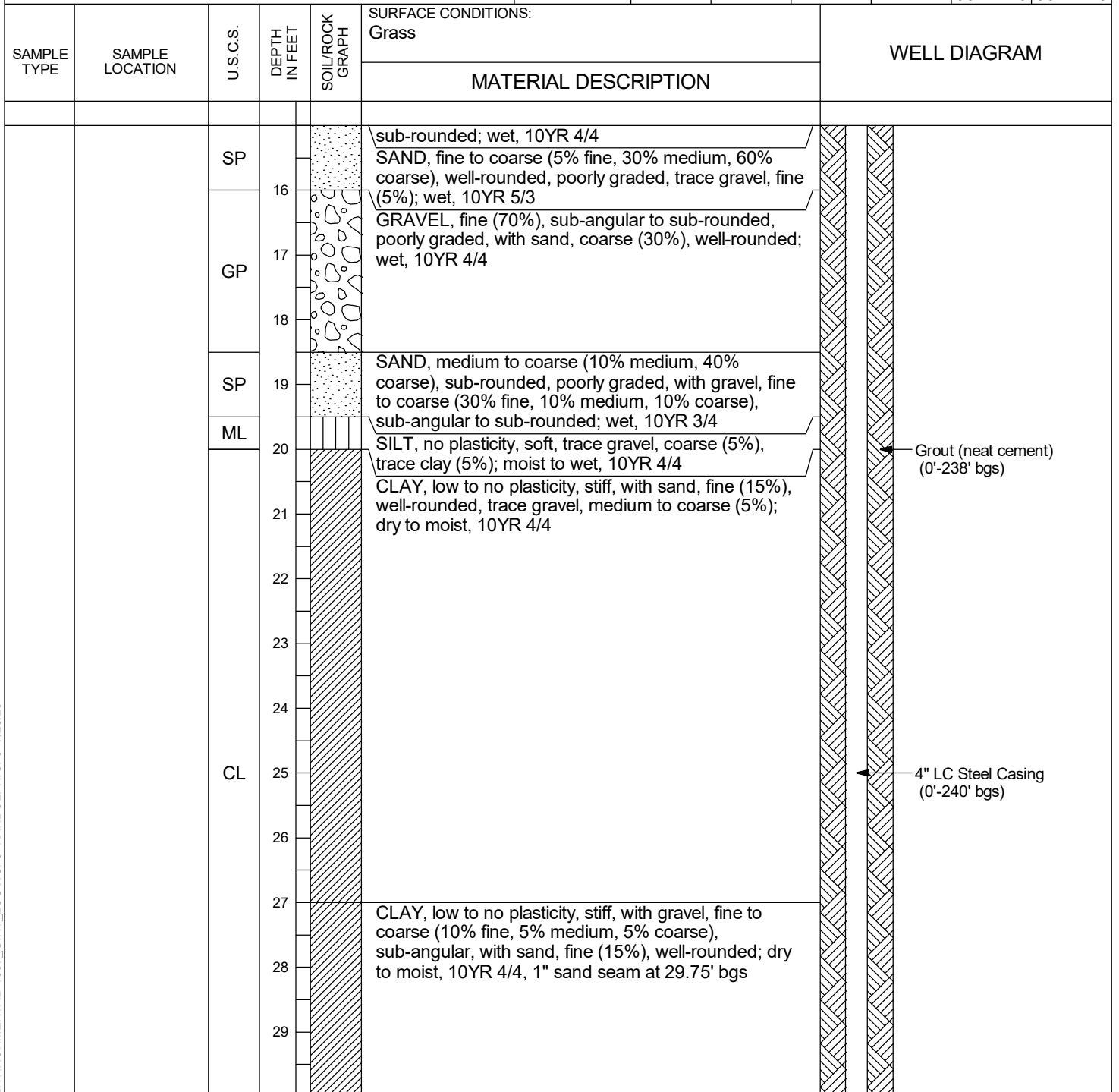
SAMPLE ID	FEET DRIVEN / FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass/Mud	WELL DIAGRAM
						LITHOLOGIC DESCRIPTION	
				141		DOLOSTONE, moderately competent, fine to medium grained dolomitic precipitate, sparry, trace iron staining (2%); 2.5Y 6/2	<p>Screened interval (0.010" slot) (140'-150' bgs)</p>
				142		DOLOSTONE, moderately competent, nonuniform oolitic texture (15%), trace vugs (5%); 2.5Y 6/2	
				143		DOLOSTONE, moderately competent, fine grained dolomitic precipitate, oolitic texture (5-10%), trace 0.25-0.50 mm iron bands (5%), trace vugs (2%); 2.5Y 6/3	
				144			
				145		DOLOSTONE, moderately competent, fine grained dolomitic precipitate, trace vugs (5%), trace non-uniform iron staining (5%), trace oolitic texture (5%); 2.5Y 6/2	
				146			
				147			
				148			
				149			
				150		E.O.B. @ 150' bgs, no refusal	
				151			
				152			
				153			
				154			
				155			
				156			
				157			
				158			
				159			

APPENDIX E  
BETA SITE DRILLING  
INVESTIGATION (BS 2,7,9,13)  
DRAFT BORING LOGS

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 1 OF 18
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 263 FT BGS		DATE			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1330
DATUM: UTM NAD83		DATE			1000 1330
COMMENTS:		CASING DEPTH			06-22-20 06-24-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
					Grass	MATERIAL DESCRIPTION	
DISCRETE	MW2A-SOIL 8-10	SP	1		SAND, medium to coarse (15% medium, 40% coarse), sub-rounded, poorly graded, with gravel, fine to coarse (10% fine, 20% medium, 15% coarse), sub-angular; dry, 5YR 5/6		
			2				
			3				
			4				
			5				
			6				
			7				
			8				
			9				
			DISCRETE				
11							
GRAB	MW2A-GW 11-12	CL	12		SAND, medium to coarse (15% medium, 70% coarse), sub-rounded to well-rounded, poorly graded, with gravel, fine to medium (10% fine, 5% medium); moist, 10YR 6/3 CLAY, low plasticity, medium stiff, with sand, coarse (25%), sub-rounded, trace gravel, medium (5%); wet, 10YR 4/6, sand seams at: 10.25', 10.5', 11', 11.5' bgs		4" LC Steel Casing (0'-240' bgs)
			13				
			14				
		SP			SAND, medium to coarse (15% medium, 60% coarse), sub-rounded, poorly graded, with gravel, fine to medium (15% fine, 10% medium), sub-angular to		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 2 OF 18
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 263 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1330
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-22-20 06-24-20



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS			SHEET 3 OF 18
DRILLING CONTR.: Traut				DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	SAMPLING METHOD: 10' acetate bags		START TIME 1000
BORING DEPTH: 263 FT BGS				FINISH TIME 1330
GROUND SURFACE ELEVATION:		WATER LEVEL		DATE 1000
DATUM: UTM NAD83		TIME		DATE 1330
COMMENTS:		DATE		DATE
		CASING DEPTH		06-22-20 06-24-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM		
					MATERIAL DESCRIPTION			
COMP	MW2A-SOIL 36-40	SW	31	[Dotted pattern]	SAND, fine to coarse (70% fine, 20% medium, 10% coarse), sub-rounded, well graded; wet, 10YR 4/3	[Well diagram showing casing and grout]		
			32					
		GP	33	[Gravel pattern]	GRAVEL, fine to medium (50% fine, 25% medium), angular to well-rounded, poorly graded, with sand, coarse (25%), well-rounded; wet, 10YR 4/4			
			34					
		GRAB	MW2A-GW 36-40	SW	35		[Dotted pattern]	SAND, fine to coarse (40% fine, 15% medium, 30% coarse), sub-rounded, well graded, with gravel, fine (15%), angular; wet, 10YR 4/4
					36			
GRAB	MW2A-GW 36-40 +DUP	SP	37	[Gravel pattern]	GRAVEL, fine (75%), angular to sub-angular, poorly graded, with sand, coarse (25%), well-rounded; moist, 10YR 4/3			
			38					
		ML	39	[Silt pattern]	SILT, no plasticity, soft, trace clay (5%); dry to moist, 10YR 3/4			
			40		No Recovery (drill pushed down rock, 4" rock fragment observed at 47' bgs)			
			41					
			42					
			43					
			44					

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS			SHEET 4 OF 18
DRILLING CONTR.: Traut				DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	SAMPLING METHOD: 10' acetate bags		START TIME 1000
BORING DEPTH: 263 FT BGS				FINISH TIME 1330
GROUND SURFACE ELEVATION:		WATER LEVEL		DATE 06-22-20
DATUM: UTM NAD83		TIME		DATE 06-24-20
COMMENTS:		DATE		
		CASING DEPTH		

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			46		No Recovery (drill pushed down rock, 4" rock fragment observed at 47' bgs)	
		SW	47-48		SAND, fine to coarse (20% fine, 20% medium, 40% coarse), sub-rounded, well graded, with gravel, fine (20%), sub-rounded; wet, 10YR 4/3	
		SP	49-50		SAND, fine to medium (80% fine, 20% medium), sub-rounded, poorly graded, trace gravel, fine (5%); wet, 10YR 4/4	Grout (neat cement) (0'-238' bgs)
		GP	51		GRAVEL, fine to medium (65% fine, 10% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded; wet, 10YR 4/4	
			52		GRAVEL, fine to medium (45% fine, 30% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded; wet, 10YR 4/4	
			53		GRAVEL, fine to medium (65% fine, 10% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded; wet, 10YR 4/4	
			54		GRAVEL, fine to medium (65% fine, 10% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded; wet, 10YR 4/4	
			55		GRAVEL, fine to medium (50% fine, 25% medium), sub-rounded to well-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded; wet, 10YR 4/4	4" LC Steel Casing (0'-240' bgs)
			56		GRAVEL, fine to medium (50% fine, 25% medium), sub-rounded to well-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded; wet, 10YR 4/4	
			57		GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (5% medium, 19% coarse), well-rounded, trace clay (1%); wet, 10YR 4/4	
			58			
		GW	59		GRAVEL, fine to coarse (20% fine, 65% medium, 15% coarse), angular to well-rounded, well graded; wet, 10YR 4/3	
		ML				



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 5 OF 18
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 263 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1330
DATUM: UTM NAD83		DATE			06-22-20 06-24-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
COMP	MW2A-SOIL 66-70	GW	61-67		<p>SILT, no plasticity, soft, with sand, fine to medium (10% fine, 5% medium), well-rounded; dry to moist, 10YR 4/3, sand @ 60' bgs, wet</p> <p>GRAVEL, fine to coarse (20% fine, 60% medium, 20% coarse), sub-angular to sub-rounded, well graded; moist, 10YR 4/3, low recovery from 60-70' bgs (2.5'/10')</p>	<p>Grout (neat cement) (0'-238' bgs)</p>
GRAB	MW2A-GW 66-70	Os	68-70		<p>SANDSTONE, poorly cemented, fine to medium (70% fine, 30% medium), well-rounded; 2.5Y 8/2, clay observed, beginning of St Peter</p>	<p>4" LC Steel Casing (0'-240' bgs)</p>
			70-74		<p>SANDSTONE, poorly cemented, fine to medium (85% fine, 15% medium), well-rounded; 2.5Y 7/2, clay observed, oxidation at 72' bgs</p>	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS		SHEET 6 OF 18		
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME	
BORING DEPTH: 263 FT BGS		WATER LEVEL			1000
GROUND SURFACE ELEVATION:		TIME			1330
DATUM: UTM NAD83		DATE			06-22-20
COMMENTS:		CASING DEPTH			06-24-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			76		SANDSTONE, poorly cemented, fine to medium (85% fine, 15% medium), well-rounded; 2.5Y 7/2, clay observed, oxidation at 72' bgs	<p>Grout (neat cement) (0'-238' bgs)</p> <p>4" LC Steel Casing (0'-240' bgs)</p>
			77		SANDSTONE, poorly cemented, fine to medium (80% fine, 20% medium), well-rounded; 8/N (white), oxidation at 79' and 80' bgs	
			78			
			79			
			80		SANDSTONE, well cemented, fine (100%), well-rounded, gray mottling; 10YR 6/6, silt observed, 1" silt seam at 85' bgs	
		Os	81			
			82			
			83			
			84			
			85			
			86		SANDSTONE, poorly cemented, fine (100%), well-rounded; 8/N (white)	
			87			
			88		SANDSTONE, well cemented, fine to medium (90% fine, 10% medium), well-rounded; 5Y 7/4	
			89			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS		SHEET 7 OF 18		
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME	
BORING DEPTH: 263 FT BGS		WATER LEVEL			1000
GROUND SURFACE ELEVATION:		TIME			1330
DATUM: UTM NAD83		DATE			06-22-20
COMMENTS:		CASING DEPTH			06-24-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			91		SANDSTONE, moderately cemented, fine to medium (30% fine, 70% medium), well-rounded, trace red mottling; 5Y 7/1 to 10YR 7/8, silt observed, well cemented at 93' bgs	
			92			
			93			
			94			
		Os	95		SANDSTONE, poorly cemented, fine to coarse (5% fine, 30% medium, 65% coarse), sub-rounded to well-rounded; 10YR 5/8	← Grout (neat cement) (0'-238' bgs)
			96			
			97		SANDSTONE, poorly cemented, fine to medium (30% fine, 70% medium), sub-rounded to well-rounded; 2.5Y 6/1	
			98		SANDSTONE, poorly cemented, medium to coarse (25% medium, 75% coarse), sub-rounded; 2.5Y 5/6, silt observed	
			99			
			100		SANDSTONE, moderately cemented, fine to medium (80% fine, 20% medium), well-rounded, mottling; 5Y 7/1 to 10YR 5/8	← 4" LC Steel Casing (0'-240' bgs)
		Ops	101		DOLOSTONE, not competent, oolitic texture (20%), dolomitic precipitate (10%), trace vugs (5%), trace chert (5%); 5YR 6/1, dendritic manganese and glauconitic staining at 105' bgs, beginning of Shakopee	
			102			
			103			
			104			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS		SHEET 8 OF 18		
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME: 1000	FINISH TIME: 1330	
BORING DEPTH: 263 FT BGS		WATER LEVEL			
GROUND SURFACE ELEVATION:		TIME			
DATUM: UTM NAD83		DATE			
COMMENTS:		CASING DEPTH			06-22-20 06-24-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:	WELL DIAGRAM
					Grass	
					MATERIAL DESCRIPTION	
GRAB	MW2A-GW 116-120	Ops	106		DOLOSTONE, moderately competent, massive iron staining, dolomitic precipitate (15%), small (<1mm) vugs (10%), trace dendritic manganese staining (5%); 5YR 6/2, silt observed at 106' bgs	<p>Grout (neat cement) (0'-238' bgs)</p> <p>4" LC Steel Casing (0'-240' bgs)</p>
			107			
			108			
			109			
			110		DOLOSTONE, not to moderately competent, weathered, oolitic texture (30%), dolomitic precipitate (20%), small (<1mm) vugs (10%); 10YR 7/6	
			111		DOLOSTONE, not competent, massive iron staining, dendritic manganese staining (10%), trace glauconitic staining (5%), trace small (<1mm) vugs (5%), trace sand, medium (1%), trace chert (1%); 10YR 7/4	
			112			
			113		DOLOSTONE, not to moderately competent, iron staining along fractures; 10YR 6/1, 2" sandy dolostone with dolomitic precipitate at 114' bgs	
			114			
			115		DOLOSTONE, moderately competent, massive, oxidized red staining/fine grained precipitate along fractures, trace vugs (5%); 10YR 6/1	
116		DOLOSTONE, not to moderately competent, trace oolitic texture (5%), trace sand, fine (5%), trace manganese staining (3%); 10YR 7/3, iron staining (10YR 6/4) at 117' bgs				
117						
118		DOLOSTONE, not competent, fine to medium dolomitic precipitate (15%), trace small (<1mm) vugs (5%), trace glauconitic staining (5%), trace sand, fine (2%), trace manganese staining (2%); 10YR 5/6				
119						

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS		SHEET 9 OF 18		
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME	
BORING DEPTH: 263 FT BGS		WATER LEVEL			1000
GROUND SURFACE ELEVATION:		TIME			1330
DATUM: UTM NAD83		DATE			06-22-20
COMMENTS:		DATE			06-24-20
		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			121		DOLOSTONE, not competent, massive iron staining, dolomitic precipitate (15%), small (<1mm) vugs (5-10%), oolitic texture (5-10%), trace sand, fine to medium (5%); 10YR 6/2	<p>Grout (neat cement) (0'-238' bgs)</p> <p>4" LC Steel Casing (0'-240' bgs)</p>
			122			
			123			
			124			
			125		DOLOSTONE, not competent, very weathered, blocky, oolitic texture (10%), trace chert (5%), trace dendritic manganese staining (2%); 2.5Y 6/1, silt/clay observed	
			126		DOLOSTONE, moderately competent, fine dolomitic precipitate (15%), sand, medium (5-10%), trace oolitic texture (5%); 10YR 6/2	
		Ops	127			
			128			
			129			
			130		DOLOSTONE, moderately competent, massive, iron staining along fractures, dendritic manganese staining (10%); 2.5Y 7/2	
			131		DOLOSTONE, not to moderately competent, sand, fine to medium (10-15%), dolomitic precipitate (10%), trace small (<1mm) vugs (2%); 10YR 6/1, 3" fine sand layer at 131.5' bgs	
			132			
			133			
			134			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 10 OF 18
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1000
BORING DEPTH: 263 FT BGS					FINISH TIME 1330
GROUND SURFACE ELEVATION:		DATE			DATE 06-22-20
DATUM: UTM NAD83		DATE			DATE 06-24-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			136		SHALE, very weathered (clay); GLEY 8/2 DOLOSTONE, not competent, blocky, massive, chert (10%), manganese staining (10%); 2.5Y 6/2	
			137		SANDSTONE, moderately cemented, fine (100%), sub-rounded; 2.5Y 6/6	
			138		DOLOSTONE, not to moderately competent, massive iron staining, dolomitic precipitate (15%), sand, fine to medium (10-15%), manganese staining (10%), trace glauconitic staining (5%); 10YR 5/6	
			139		DOLOSTONE, not competent, very weathered, massive fine dolomitic precipitate, sand (20%); 5Y 4/2, clay observed	
			140		DOLOSTONE, moderately competent, iron staining along fractures (10%), trace glauconitic staining (5%), trace manganese staining (5%), trace vugs (5%); 2.5Y 5/3, clay observed	Grout (neat cement) (0'-238' bgs)
			141		DOLOSTONE, not to moderately competent, dolomitic precipitate (15%), sand, fine (5-10%), oolitic texture (5-10%), trace vugs (5%); 2.5Y 6/1	
		Ops	142			
			143			
			144			
			145		DOLOSTONE, moderately competent, massive, blocky, trace manganese staining along fractures (5%); 10YR 7/2, silt, dolomitic precipitation, glauconitic staining observed at 144.5' bgs	4" LC Steel Casing (0'-240' bgs)
			146		DOLOSTONE, not to moderately competent, dolomitic precipitate (15-20%), iron staining (10%), trace small (<1mm) vugs (5%), trace sand, fine (5%); 10YR 7/3 No Recovery (karst feature likely)	
			147			
			148			
			149			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 11 OF 18
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1000
BORING DEPTH: 263 FT BGS					FINISH TIME 1330
GROUND SURFACE ELEVATION:		DATE			DATE 06-22-20
DATUM: UTM NAD83		DATE			DATE 06-24-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			151		DOLOSTONE, not competent, very weathered, lithic fragments (80%), sand, coarse (15-20%); 10YR 5/4	<p>Grout (neat cement) (0'-238' bgs)</p> <p>4" LC Steel Casing (0'-240' bgs)</p>
			152		DOLOSTONE, not to moderately competent, weathered, iron staining (15-20%), oxidized dolomitic precipitate (15%), sand, medium (10%), trace small (<1mm) vugs (5%); 10YR 6/1	
			153		DOLOSTONE, moderately competent, iron staining (10%), dolomitic precipitate (10%), trace calcite precipitate (5%), trace sand, fine (2%); 10YR 7/1	
			154		DOLOSTONE, moderately competent to competent, massive staining, oolitic texture (10%), sand, fine to medium (10%), trace vugs (5%), trace quartz precipitate (2%); 10YR 5/6	
		Ops	155		DOLOSTONE, moderately competent, massive, blocky, trace iron staining (2%); 2.5Y 7/2	
			156		DOLOSTONE, not competent, very weathered, massive dark iron staining, glauconitic staining (10%); 10YR 6/2 to 10YR 4/6	
			157		DOLOSTONE, moderately competent, weathered, oxidized dolomitic precipitate (15%), green/pink chert (15%), vugs (10%), trace oxidized calcite precipitation (2%), trace sand, fine (2%); 2.5Y 7/1	
			158		DOLOSTONE, moderately competent, fine dolomitic precipitate (15%), glauconitic staining (5-10%), trace small (<1mm) vugs (5%); 2.5Y 6/1, less competent,	
			159			
			160			
			161			
			162			
			163			
			164			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS			SHEET 12 OF 18
DRILLING CONTR.: Traut				DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	SAMPLING METHOD: 10' acetate bags		START TIME 1000
BORING DEPTH: 263 FT BGS				FINISH TIME 1330
GROUND SURFACE ELEVATION:		WATER LEVEL		DATE 1000
DATUM: UTM NAD83		TIME		DATE 1330
COMMENTS:		DATE		DATE
		CASING DEPTH		06-22-20 06-24-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			166		blocky, iron stained at 164' bgs DOLOSTONE, moderately competent, fine dolomitic precipitate (15%), glauconitic staining (5-10%), trace small (<1mm) vugs (5%); 2.5Y 6/1, less competent, blocky, iron stained at 164' bgs	<p>Grout (neat cement) (0'-238' bgs)</p> <p>4" LC Steel Casing (0'-240' bgs)</p>
			167		DOLOSTONE, moderately competent, weathered, oxidized dolomitic precipitate (15%), green/pink chert (15%), vugs (10%), trace oxidized calcite precipitation (2%), trace sand, fine (5%), trace glauconitic staining (2%); 2.5Y 7/1	
			168		SANDY DOLOSTONE, moderately competent, dolomitic precipitate (30%), sand, fine (30%), chert (5-10%), trace manganese staining (5%); 10YR 7/6, green (GLE Y1 7/5GY), platy shale from 169'-169.25' bgs	
			169			
			170		DOLOSTONE, very competent, massive iron staining, oolitic texture (30%), small to medium vugs (15%), trace dolomitic precipitate (5%); 10YR 6/6	
			171			
			172			
			173			
			174			
			175			
			176		DOLOSTONE, moderately competent, dolomitic precipitate (15%), small (<1) vugs (15%), dark red iron staining (10%), trace oolitic texture (5%); 10YR 6/6	
			177			
			178		SHALE, platy, manganese staining (5-10%); GLE Y1 6/10Y	
			179			



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A	
LOGGED BY: AEL	CHECKED BY: AS		SHEET 13 OF 18			
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME		
BORING DEPTH: 263 FT BGS		WATER LEVEL			1000	1330
GROUND SURFACE ELEVATION:		DATE			1000	1330
DATUM: UTM NAD83		DATE			06-22-20	06-24-20
COMMENTS:		CASING DEPTH				

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			181			
			182			
			183			
			184			
			185			Grout (neat cement) (0'-238' bgs)
			186			
			187			
			188			
			189			
			190			4" LC Steel Casing (0'-240' bgs)
			191			
			192			
			193			
			194			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 14 OF 18
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1000
BORING DEPTH: 263 FT BGS					FINISH TIME 1330
GROUND SURFACE ELEVATION:		DATE			DATE
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-22-20 06-24-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
GRAB	MW2A-GW 206-210	Ops	196		DOLOSTONE, not competent, massive, vugs (50%), yellow precipitation (10%); 2.5Y 7/1	<p>Grout (neat cement) (0'-238' bgs)</p> <p>4" LC Steel Casing (0'-240' bgs)</p>
			197		DOLOSTONE, moderately to very competent, massive, small (<1mm) vugs (15%), orange (oxidized) dolomitic precipitate (10%), dolomitic precipitate (10%), trace oolitic texture (5%); 5Y 7/1, beginning of Oneota	
		198		DOLOSTONE, moderately to very competent, massive, small to medium vugs (15-20%), dolomitic precipitate (15%), trace oolitic texture (5%); 10YR 7/1		
		199				
		200		DOLOSTONE, moderately to very competent, massive, small to medium vugs (15-20%), dolomitic precipitate (15%), trace oolitic texture (5%); 10YR 7/1		
		201				
		202		DOLOSTONE, moderately to very competent, massive, small to medium vugs (15-20%), dolomitic precipitate (15%), trace oolitic texture (5%); 10YR 7/1		
		203				
		204		DOLOSTONE, moderately to very competent, massive, small to medium vugs (15-20%), dolomitic precipitate (15%), trace oolitic texture (5%); 10YR 7/1		
		205				
206		DOLOSTONE, moderately to very competent, massive, small to medium vugs (15-20%), dolomitic precipitate (15%), trace oolitic texture (5%); 10YR 7/1				
207						
208		DOLOSTONE, very competent, massive, small (<1mm) vugs (10%), trace oolitic texture (5%), trace faint iron staining (2%), trace dendritic manganese staining (1%); 2.5Y 7/2				
209						

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 15 OF 18
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1000
BORING DEPTH: 263 FT BGS					FINISH TIME 1330
GROUND SURFACE ELEVATION:		DATE			DATE 06-22-20
DATUM: UTM NAD83		DATE			DATE 06-24-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			211		DOLOSTONE, moderately to very competent, massive, small (<1mm) vugs (15%), trace manganese staining (2%); 10YR 7/2	<p>Grout (neat cement) (0'-238' bgs)</p> <p>4" LC Steel Casing (0'-240' bgs)</p>
			212			
			213		DOLOSTONE, moderately competent, massive, dendritic manganese staining (10%), trace small (<1mm) vugs (2%); 10YR 7/3	
			214			
			215		DOLOSTONE, moderately competent, small to medium vugs (20%), oxidized dolomitic precipitate (20%); 10YR 6/1 to 10YR 7/6	
			216			
		Opo	217			
			218		DOLOSTONE, moderately to very competent, yellow dolomitic precipitate (20%), oolitic texture (10%), small (<1mm) vugs (10%), trace quartz precipitate (3%); 10YR 6/2	
			219			
			220		DOLOSTONE, moderately competent, massive, trace dolomitic precipitate (2%), trace manganese staining (2%); 10YR 6/1	
			221		DOLOSTONE, moderately competent, small to medium vugs (20%), oxidized dolomitic precipitate (20%); 10YR 5/1 to 10YR 6/6	
			222		DOLOSTONE, moderately competent, small to medium vugs (20%), oxidized dolomitic precipitate (20%), trace dendritic manganese staining (5%); 10YR 5/1 to 10YR 6/6	
			223			
			224		DOLOSTONE, very competent, oolitic texture (15%), small (<1mm) vugs (10%); 10YR 6/1	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 16 OF 18
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 263 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1330
DATUM: UTM NAD83		DATE			06-22-20 06-24-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			226		DOLOSTONE, very competent, oolitic texture (15%), small (<1mm) vugs (10%); 10YR 6/1	<p>Grout (neat cement) (0'-238' bgs)</p> <p>4" LC Steel Casing (0'-240' bgs)</p> <p>2' Fine Sand (238'-240' bgs)</p> <p>Grout Basket (240' bgs)</p>
			227			
			228		DOLOSTONE, competent, massive iron staining, trace medium vugs (5%); 10YR 6/3	
			229		DOLOSTONE, not competent, oxidized dolomitic precipitate (30%), small to medium vugs (20%); 10YR 6/1 to 10YR 7/6	
			230		DOLOSTONE, not competent, massive, iron staining (30%), small (<1mm) vugs (15%), oxidized dolomitic precipitate (5-10%), trace manganese staining (5%), trace chert (2%), trace glauconitic staining (2%); 10YR 5/6	
		Opo	231			
			232			
			233		DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (15%), trace dendritic manganese staining (2%); 2.5Y 6/1 to 10YR 7/6	
			234			
			235			
			236			
			237		DOLOSTONE, not competent, very weathered, massive iron staining, trace glauconite, possible stromatolites; 10YR 6/8, beginning of Coon Valley	
			238		SANDY DOLOSTONE, moderately competent, dolomitic precipitate (15%), sand (5-30%), fine to coarse; 5YR 5/4, grades coarser/more sand with depth, loose sand possibly at 238' bgs	
		Cj	239		SANDSTONE, loose sand; 2.5Y 6/6, beginning of	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 17 OF 18
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 263 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1330
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-22-20 06-24-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			241		Jordan SANDSTONE, poorly cemented, medium to coarse (80% medium, 20% coarse), well-rounded; 2.5Y 8/6	<p>7" Open Hole (240'-363' bgs)</p>
			242			
			243		SANDSTONE, poorly cemented, fine to coarse (5% fine, 90% medium, 5% coarse), well-rounded; 2.5Y 6/6	
			244		SANDSTONE, poorly cemented, fine to coarse (10% fine, 80% medium, 10% coarse), well-rounded; 2.5Y 8/6	
			245			
			246		SANDSTONE, poorly cemented, medium to coarse (30% medium, 70% coarse), well-rounded; 2.5Y 7/2	
		Cj	247		SANDSTONE, poorly cemented, fine to coarse (25% fine, 70% medium, 5% coarse), well-rounded; 2.5Y 8/4	
			248			
			249		SANDSTONE, poorly cemented, fine to medium (75% fine, 25% medium), well-rounded; 2.5Y 8/1	
			250		SANDSTONE*, poorly cemented, medium to coarse (30% medium, 70% coarse), dark yellow/orange oxidized layers, trace shale at 250.5' bgs, *logged from video - no recovery from 250'-260' bgs	
			251			
			252			
			253			
			254		SANDSTONE*, poorly cemented, fine to medium (90% fine, 10% medium), dark, *logged from video - no recovery from 250'-260' bgs	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW2A
LOGGED BY: AEL	CHECKED BY: AS		SHEET 18 OF 18		
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME	
BORING DEPTH: 263 FT BGS		WATER LEVEL			1000
GROUND SURFACE ELEVATION:		TIME			1330
DATUM: UTM NAD83		DATE			06-22-20
COMMENTS:		CASING DEPTH			06-24-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			256		<p>SANDSTONE*, poorly cemented, fine to medium (90% fine, 10% medium), dark, *logged from video - no recovery from 250'-260' bgs</p>	<p>7" Open Hole (240'-363' bgs)</p>
			257			
			258			
		Cj	259			
			260			
			261			
			262			
			263			
			264			
			265			
			266		E.O.B. at 263' bgs, no refusal	
			267			
			268			
			269			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW7A
LOGGED BY: AS/AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 1 OF 15
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1045
BORING DEPTH: 220 FT BGS					FINISH TIME 1830
GROUND SURFACE ELEVATION:		DATE			DATE 05-26-20
DATUM: UTM NAD83		DATE			DATE 05-28-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
					Grass	MATERIAL DESCRIPTION	
		SW	1		SAND, fine to coarse (25% fine, 25% medium, 25% coarse), sub-rounded, well graded, with organics (25%); moist, 10YR 4/3		<p>Grout (neat cement) (0'-198' bgs)</p> <p>4" LC Steel Casing (0'-200' bgs)</p>
		CL	2		GRAVELLY CLAY, medium plasticity, stiff, gravel, fine to medium (15% fine, 15% medium), sub-rounded, with sand, medium (15%), sub-angular, trace organics (5%); moist, 10YR 4/4		
			3		SAND, medium to coarse (62% medium, 13% coarse), sub-angular, poorly graded, with gravel, medium to coarse, sub-angular (25%); moist, 10YR 5/3		
		SP	4		SAND, medium to coarse (75% medium, 20% coarse), sub-angular to sub-rounded, poorly graded, trace gravel, fine to coarse (5%); moist, 10YR 5/3		
			5				
			6				
		SW	7		SAND, fine to coarse (20% fine, 20% medium, 40% coarse), sub-rounded, well graded, with gravel, fine to medium (20%); moist, 10YR 4/3		
			8				
			9		SAND, medium to coarse (70% medium, 25% coarse), sub-rounded, poorly graded, trace gravel, fine (5%); moist, 10YR 5/3		
			10		SAND, medium to coarse (40% medium, 45% coarse), sub-rounded, poorly graded, gravel, fine (10%), trace clay (5%); moist, 10YR 4/3		
DISCRETE	MW7A-SOIL 12-14	SP	11				
DISCRETE	MW7A-SOIL 12-14		12		SAND, coarse (80%), sub-angular to sub-rounded, poorly graded, with gravel, fine to medium (15% fine, 3% medium), trace cobbles (2%); moist, 10YR 5/3		
GRAB	MW7A-GW 12-16		13				
			14		SAND, coarse (89%), sub-angular to sub-rounded, poorly graded, gravel, fine (10%), trace silt (1%); moist, 10YR 5/2		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW7A
LOGGED BY: AS/AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 2 OF 15
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1045
BORING DEPTH: 220 FT BGS					FINISH TIME 1830
GROUND SURFACE ELEVATION:		DATE			DATE 1045 1830
DATUM: UTM NAD83		DATE			DATE 1045 1830
COMMENTS:		CASING DEPTH			05-26-20 05-28-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM	
					MATERIAL DESCRIPTION		
COMP GRAB	MW7A-SOIL 26-30  MW7A-GW 26-30	SP	16		SAND, coarse (89%), sub-angular to sub-rounded, poorly graded, gravel, fine (10%), trace silt (1%); moist, 10YR 5/2		
			17		SAND, medium to coarse (50% medium, 45% coarse), sub-angular, poorly graded, trace gravel, fine (5%); moist, 10YR 5/3		
			18				
			19				
			20				
		21	SW	20	SAND, medium to coarse (50% medium, 33% coarse), sub-angular, poorly graded, with gravel, fine (15%), trace silt (2%); moist to wet, 10YR 4/3		← Grout (neat cement) (0'-198' bgs)
		22		SAND, medium to coarse (25% medium, 45% coarse), sub-angular to sub-rounded, poorly graded, with gravel, fine to coarse (15% fine, 5% medium, 10% coarse), sub-angular to sub-rounded; moist, 10YR 4/2			
		23					
		24	24	SAND, fine to coarse (32% fine, 32% medium, 32% coarse), sub-angular, well graded, trace gravel, fine to medium (4%); moist, 10YR 4/2	← 4" LC Steel Casing (0'-200' bgs)		
25	SP	26	SAND, fine to medium (25% fine, 75% medium), sub-rounded, poorly graded; moist, 10YR 5/2				
27		SAND, medium to coarse (65% medium, 30% coarse), sub-angular to sub-rounded, poorly graded, trace gravel, fine (5%); moist, 10YR 4/3					
28	SP	28	SAND, coarse (85%), sub-angular, poorly graded, with gravel, fine (10-15%), sub-angular; moist, 10YR 5/2				
29		29					



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW7A
LOGGED BY: AS/AEL	CHECKED BY: AS			SHEET 3 OF 15
DRILLING CONTR.: Traut				DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	SAMPLING METHOD: 10' acetate bags		START TIME: 1045
BORING DEPTH: 220 FT BGS				FINISH TIME: 1830
GROUND SURFACE ELEVATION:		WATER LEVEL		DATE: 1045
DATUM: UTM NAD83		TIME		DATE: 1830
COMMENTS:		DATE		DATE: 1045
		CASING DEPTH		DATE: 1830
				05-26-20 05-28-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
					Grass		
					MATERIAL DESCRIPTION		
			31		SAND, medium to coarse (30% medium, 55% coarse), sub-angular, poorly graded, gravel, fine (10%), trace clay (5%); moist, 10YR 4/2, clay lense @ 31' bgs		
		SP	32				
			33		SAND, medium to coarse (75% medium, 20% coarse), sub-angular to sub-rounded, poorly graded, trace gravel, medium (5%); moist, 10YR 4/2		
			34				
			35				Grout (neat cement) (0'-198' bgs)
			36		SAND, medium to coarse (35% medium, 55% coarse), sub-angular, poorly graded, gravel, fine to medium (5% fine, 5% medium); moist, 10YR 4/2		
			37		SAND, fine (95%), sub-rounded to well-rounded, poorly graded, trace clay (5%); dry, 10YR 4/1		
		GW	38		GRAVEL, fine to coarse (20% fine, 20% medium, 40% coarse), angular to sub-rounded, well graded, with sand, coarse (20%); moist, 10YR 4/1		
			39		CLAYEY SAND, medium (75%), sub-rounded, clay (25%); wet, 10YR 4/3		
		SC	40				4" LC Steel Casing (0'-200' bgs)
			41		SAND, medium (100%), sub-rounded, poorly graded; moist, 10YR 4/2		
		SP	42		GRAVEL, fine to medium (90% fine, 10% medium), sub-angular to sub-rounded, poorly graded; moist, 10YR 3/2		
			43		SAND, fine to medium (20% fine, 65% medium), sub-rounded, poorly graded, with clay (10%), trace gravel, medium (5%); moist to wet, 10YR 4/1		
		SP	44		SAND, medium to coarse (45% medium, 45% coarse), sub-rounded, poorly graded, with clay (5-10%), trace gravel, fine (5%); moist, 10YR 4/2, two-1" clay rich layers @ 44' and 47' bgs		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW7A	
LOGGED BY: AS/AEL	CHECKED BY: AS		SHEET 4 OF 15			
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME		
BORING DEPTH: 220 FT BGS		WATER LEVEL			1045	1830
GROUND SURFACE ELEVATION:		DATE			1045	1830
DATUM: UTM NAD83		DATE			1045	1830
COMMENTS:		CASING DEPTH			05-26-20	05-28-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM	
					Grass			
					MATERIAL DESCRIPTION			
COMP GRAB	MW7A-SOIL 46-50 MW7A-GW 46-50 +DUP+MS/MSD	SP	46	[Dotted pattern]	SAND, medium to coarse (45% medium, 45% coarse), sub-rounded, poorly graded, with clay (5-10%), trace gravel, fine (5%); moist, 10YR 4/2, two-1" clay rich layers @ 44' and 47' bgs	[Hatched pattern]	[Hatched pattern]	
		CL	47-48					SANDY CLAY, low plasticity, soft to medium, sand, fine to medium (40%); moist, 10YR 4/1, 2" sand rich layer @ 48' bgs, wet @ 47' bgs
		SW	49-51	[Dotted pattern]	SAND, fine to coarse (30% fine, 30% medium, 30% coarse), sub-rounded, well graded, trace silt (5-10%); wet, 10YR 4/1, potentially sluff			← Grout (neat cement) (0'-198' bgs)
		SP	52-54	[Dotted pattern]	SAND, medium to coarse (44% medium, 44% coarse), sub-rounded, poorly graded, gravel, fine to coarse (5% fine, 5% medium, 2% coarse); moist, 10YR 4/1			
		CL	55	[Hatched pattern]	SANDY CLAY, low plasticity, soft, sand, medium to coarse (40%); moist, 10YR 4/1			← 4" LC Steel Casing (0'-200' bgs)
		SC	56-57	[Hatched pattern]	CLAYEY SAND, medium to coarse (40% medium, 40% coarse), sub-rounded, clay, medium plasticity, soft (20%); dry, 10YR 4/1, 2" clay layer observed			
		SP	58-59	[Dotted pattern]	SAND, medium (90%), sub-rounded, poorly graded, with clay, soft, low plasticity (5-10%); dry, 10YR 4/1			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW7A	
LOGGED BY: AS/AEL	CHECKED BY: AS		SHEET 5 OF 15			
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME		
BORING DEPTH: 220 FT BGS		WATER LEVEL			1045	1830
GROUND SURFACE ELEVATION:		DATE			05-26-20	05-28-20
DATUM: UTM NAD83		CASING DEPTH				
COMMENTS:						

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:	WELL DIAGRAM
					Grass	
					MATERIAL DESCRIPTION	
GRAB	MW7A-GW 73-77		61 62 63 64 65 66 67 68 69 70 71 72 73 74		No Recovery Drillers: All sand from 60-77' bgs	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW7A	
LOGGED BY: AS/AEL	CHECKED BY: AS		SHEET 6 OF 15			
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME		
BORING DEPTH: 220 FT BGS		WATER LEVEL			1045	1830
GROUND SURFACE ELEVATION:		DATE			1045	1830
DATUM: UTM NAD83		DATE			1045	1830
COMMENTS:		CASING DEPTH			05-26-20	05-28-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:	WELL DIAGRAM
					Grass	
					MATERIAL DESCRIPTION	
GRAB	MW7A-GW 86-90	Ops	76		No Recovery Drillers: All sand from 60-77' bgs	<p>Grout (neat cement) (0'-198' bgs)</p> <p>4" LC Steel Casing (0'-200' bgs)</p>
			77		DOLOSTONE, very competent, coarse dolomitic precipitate (60%), trace 2-4mm vugs (5%), trace glauconite (2%); 10YR 7/1, beginning of Shakopee	
			78		DOLOSTONE, not competent, sand, fine (10%), massive iron staining (5-10%), trace manganese staining (3%); 10YR 6/2	
			79		DOLOSTONE, not competent, massive faint iron staining (10%), trace dolomitic precipitate (5%); 10YR 6/2, clay observed	
			80		DOLOSTONE, not competent, sand, medium (10%), trace small (<1mm) vugs (5%), trace patchy iron staining (5%); 10YR 6/1	
			81		DOLOSTONE, competent, massive faint iron staining along fractures, trace 1-3mm vugs (5%), trace sand (2%); 10YR 7/2	
			82		DOLOSTONE, not competent, massive iron staining (75%), with sand, medium to coarse (15%), trace dolomitic precipitate (5%); 10YR 6/4	
			83			
			84			
85						
86						
87						
88						
89						

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW7A	
LOGGED BY: AS/AEL	CHECKED BY: AS		SHEET 7 OF 15			
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME		
BORING DEPTH: 220 FT BGS		WATER LEVEL			1045	1830
GROUND SURFACE ELEVATION:		TIME			1045	1830
DATUM: UTM NAD83		DATE			DATE	DATE
COMMENTS:		CASING DEPTH			05-26-20	05-28-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:	WELL DIAGRAM
					Grass	
MATERIAL DESCRIPTION						
			91		DOLOSTONE, not competent, trace sand, medium to coarse (5%), trace patchy iron staining (5%), trace dolomitic precipitate (5%); 10YR 6/3	<p>Grout (neat cement) (0'-198' bgs)</p> <p>4" LC Steel Casing (0'-200' bgs)</p>
			92			
			93			
			94		DOLOSTONE, not competent, massive faint iron staining (>50%), medium to coarse dolomitic precipitate (5%); 10YR 6/4	
			95			
			96		DOLOSTONE, not to moderately competent, trace fine to coarse dolomitic precipitate (5%), trace patchy dark red iron staining (3%), trace sand (4%); 10YR 5/4, clay observed	
		Ops	97			
			98		DOLOSTONE, not to moderately competent, sand, fine to medium (15%), small (1-2mm) vugs (5-10%), trace reworked clasts (5%), trace iron staining (2%); 10YR 6/3	
			99			
			100		DOLOSTONE, not competent, with sand, fine to medium (15%), dolomitic precipitate (10%), trace vugs (5%), trace reworked clasts (4%); 10YR 6/3, clay observed	
			101			
			102			
			103		DOLOSTONE, not to moderately competent, dark iron staining (20%), fine to coarse dolomitic precipitate (15%), trace chert (5%), trace vugs (2%); 10YR 6/4, clay observed	
			104			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW7A	
LOGGED BY: AS/AEL	CHECKED BY: AS		SHEET 8 OF 15			
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME		
BORING DEPTH: 220 FT BGS		WATER LEVEL			1045	1830
GROUND SURFACE ELEVATION:		TIME			DATE	DATE
DATUM: UTM NAD83		DATE			05-26-20	05-28-20
COMMENTS:		CASING DEPTH				

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM	
					MATERIAL DESCRIPTION		
			106		DOLOSTONE, not to moderately competent, dark iron staining (20%), fine to coarse dolomitic precipitate (15%), trace chert (5%), trace vugs (2%); 10YR 6/4, clay observed		
			107		DOLOSTONE, not to moderately competent, dark iron staining along fractures (30%), trace coarse dolomitic precipitate (5%), trace sand, medium (2%); 10YR 6/3		
			108		DOLOSTONE, moderately competent, massive dark iron staining (50%), trace sand, fine (5%), trace dolomitic precipitate and coarse calcite (2%); 10YR 5/3 to 7.5YR 3/3		
			109		DOLOSTONE, moderately competent, massive dark iron staining (50%), trace sand, fine (5%), trace dolomitic precipitate and coarse calcite (2%); 10YR 5/3 to 7.5YR 3/3		
		Ops	110		DOLOSTONE, moderately competent, massive dark iron staining (50%), trace sand, fine (5%), trace dolomitic precipitate and coarse calcite (2%); 10YR 5/3 to 7.5YR 3/3		
			111		DOLOSTONE, moderately competent, massive dark iron staining (50%), trace sand, fine (5%), trace dolomitic precipitate and coarse calcite (2%); 10YR 5/3 to 7.5YR 3/3		
			112		DOLOSTONE, moderately competent, massive dark iron staining (50%), trace sand, fine (5%), trace dolomitic precipitate and coarse calcite (2%); 10YR 5/3 to 7.5YR 3/3		
			113		DOLOSTONE, competent, banded orange iron staining (40%), trace sand, medium (5%); 10YR 7/3		
			114		DOLOSTONE, competent, banded orange iron staining (40%), trace sand, medium (5%); 10YR 7/3		
			115		DOLOSTONE, very competent, massive faint iron staining (>50%), oolites (25%), trace small (<1mm) vugs (2%), trace dark iron staining (2%); 10YR 6/3		
			116		DOLOSTONE, very competent, massive faint iron staining (>50%), oolites (25%), trace small (<1mm) vugs (2%), trace dark iron staining (2%); 10YR 6/3		
			117		DOLOSTONE, very competent, massive faint iron staining (>50%), oolites (25%), trace small (<1mm) vugs (2%), trace dark iron staining (2%); 10YR 6/3		
			118		DOLOSTONE, very competent, massive iron staining (>50%), small (<1mm) vugs (20%), dolomitic precipitate (10%), trace sand (5%), trace oolites (3%); 10YR 5/3 to 10YR 7/3		
			119		DOLOSTONE, very competent, massive iron staining (>50%), small (<1mm) vugs (20%), dolomitic precipitate (10%), trace sand (5%), trace oolites (3%); 10YR 5/3 to 10YR 7/3		

← Grout (neat cement)  
(0'-198' bgs)

← 4" LC Steel Casing  
(0'-200' bgs)

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW7A
LOGGED BY: AS/AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 9 OF 15
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 220 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1045 1830
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			05-26-20 05-28-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			121		DOLOSTONE, not to moderately competent, massive faint iron staining (>50%), trace oolites (3%); 10YR7/2, clay observed	<p>Grout (neat cement) (0'-198' bgs)</p> <p>4" LC Steel Casing (0'-200' bgs)</p>
			122			
			123			
			124		DOLOSTONE, not competent, massive iron staining (>50%), sand, medium to coarse (15%); 10YR 6/4, clay observed	
			125			
		Ops	126		DOLOSTONE, moderately competent, trace oolites (3%), trace sand, fine (3%), trace glauconite on core fracture (1%); 10YR 5/3	
			127			
			128			
			129		DOLOSTONE, competent, oolites (20%), trace sand, coarse (5%); 10YR 6/4	
			130		DOLOSTONE, not competent, dolomitic precipitate (10%), trace vugs (5%), trace sand (1%); 10YR 6/2, trace small (3-4") fragments with medium sand (30%)	
			131			
			132			
		Opo	133		DOLOSTONE, moderately competent, vugs (5-10%), trace dolomitic precipitate (5%); 10YR 6/2, beginning of Oneota	
			134			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW7A	
LOGGED BY: AS/AEL	CHECKED BY: AS		SHEET 10 OF 15			
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME		
BORING DEPTH: 220 FT BGS		WATER LEVEL			1045	1830
GROUND SURFACE ELEVATION:		TIME			DATE	DATE
DATUM: UTM NAD83		DATE			05-26-20	05-28-20
COMMENTS:		CASING DEPTH				

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			136		DOLOSTONE, very competent, oolitic texture (40%), small (<1mm) vugs (15%); 10YR 6/6 to 10YR 6/2, banding from drilling observed	<p>Grout (neat cement) (0'-198' bgs)</p> <p>4" LC Steel Casing (0'-200' bgs)</p>
			137			
			138			
			139			
			140		DOLOSTONE, moderately competent, dolomitic precipitate (20-30%), vugs (5-10%); 10YR 6/6	
			141		DOLOSTONE, not competent, blocky, fine to medium dolomitic precipitate (10%), trace iron staining along fractures (5%); 10YR 6/3	
			142			
			143			
			144		DOLOSTONE, competent, oolitic texture (40%), small (<1mm) vugs (10%), orange/gray banding; 10YR 6/4	
			145			
			146			
			147			
			148			
			149			



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW7A
LOGGED BY: AS/AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 11 OF 15
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1045
BORING DEPTH: 220 FT BGS					FINISH TIME 1830
GROUND SURFACE ELEVATION:		DATE			DATE 05-26-20
DATUM: UTM NAD83		DATE			DATE 05-28-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:	WELL DIAGRAM
					Grass	
					MATERIAL DESCRIPTION	
GRAB	MW7A-GW 156-160	Opo	151		DOLOSTONE, moderately competent, oolitic texture (30-40%), vugs (20%); 10YR 6/4, banding from drilling observed	
			152		DOLOSTONE, very competent, oolitic texture (30%), vugs (10%); 10YR 6/4	
			153			
			154			
			155			
			156			
			157			
			158			
			159		DOLOSTONE, very competent, oolitic texture (30%), vugs (10%); 10YR 6/6	
			160			
161						
162						
163						
164		DOLOSTONE, very competent, oolitic texture (30%), vugs (5%), trace manganese staining (1%); 10YR 7/2				

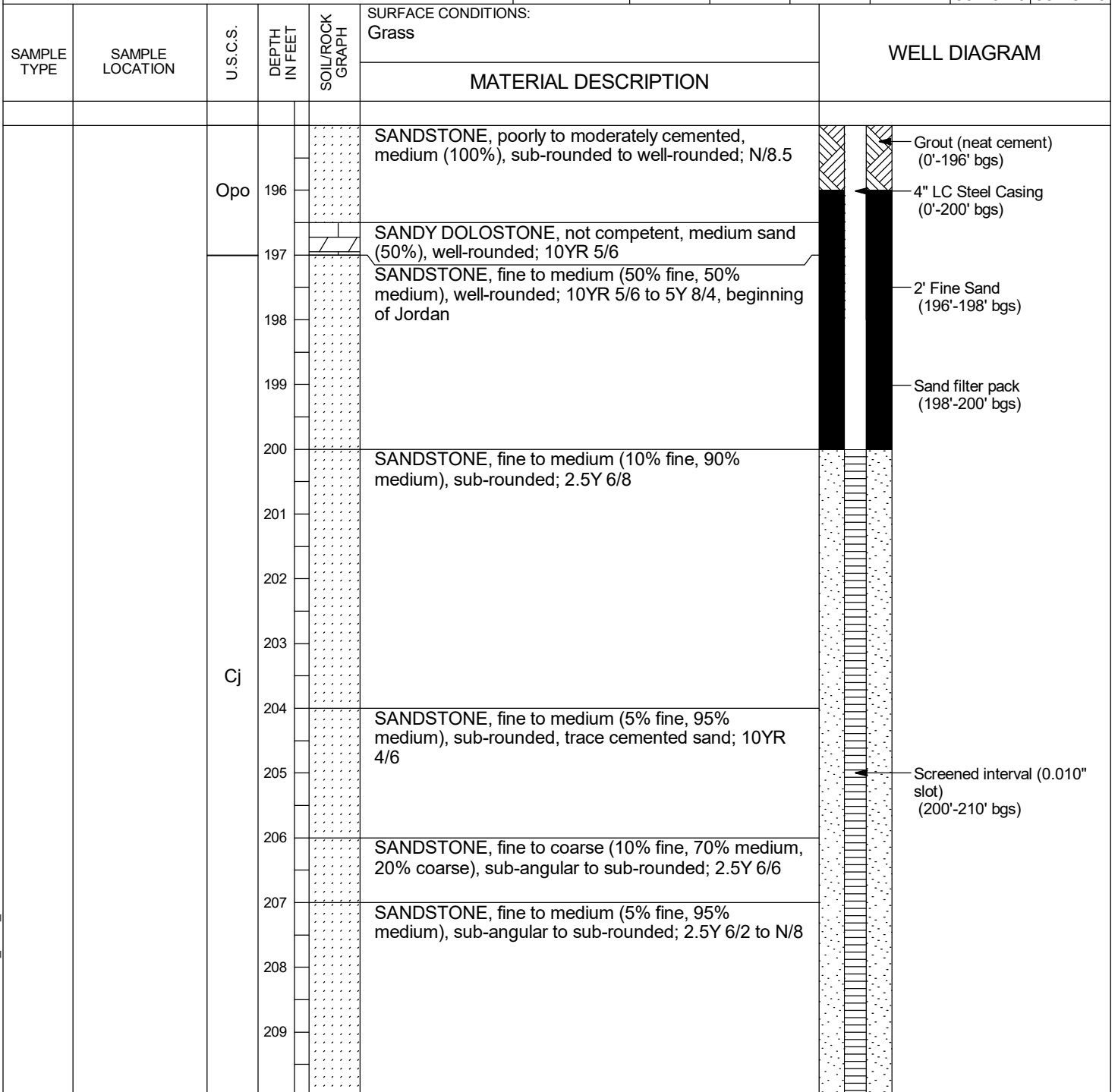
CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW7A	
LOGGED BY: AS/AEL	CHECKED BY: AS		SHEET 12 OF 15			
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME		
BORING DEPTH: 220 FT BGS		WATER LEVEL			1045	1830
GROUND SURFACE ELEVATION:		TIME			DATE	DATE
DATUM: UTM NAD83		DATE			05-26-20	05-28-20
COMMENTS:		CASING DEPTH				

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			166		DOLOSTONE, very competent, oolitic texture (30%), vugs (5%), trace manganese staining (1%); 10YR 7/2	<p>Grout (neat cement) (0'-198' bgs)</p> <p>4" LC Steel Casing (0'-200' bgs)</p>
			167			
			168			
			169		DOLOSTONE, competent, oolitic texture (20%), coarse dolomitic precipitate (10%), trace small (<1mm) vugs (3%), trace manganese staining (3%); 10YR 7/2	
			170		DOLOSTONE, competent, oolitic texture (40%), vugs (10%); 10YR 6/3	
			171			
			172		DOLOSTONE, moderately competent, oolitic texture (20%), dark iron staining (10%), trace glauconite (2%); 10YR 4/3	
		Opo	173		DOLOSTONE, not competent, fractures (10%), trace dark iron staining (5%); 10YR 7/2	
			174			
			175			
			176			
			177		DOLOSTONE, not competent, iron staining (50%), fractures (40%), stromatolites (20%); 10YR 5/4	
			178			
			179		DOLOSTONE, moderately competent, fractures (20%), iron staining (20%), trace vugs (5%); 10YR 6/4	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW7A
LOGGED BY: AS/AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 13 OF 15
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1045
BORING DEPTH: 220 FT BGS					FINISH TIME 1830
GROUND SURFACE ELEVATION:		DATE			DATE 05-26-20
DATUM: UTM NAD83		DATE			DATE 05-28-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			181		DOLOSTONE, moderately competent, trace fractures (5%), trace stromatolites (5%), trace manganese staining (3%); 10YR 6/2	<p>Grout (neat cement) (0'-198' bgs)</p> <p>4" LC Steel Casing (0'-200' bgs)</p>
			182		DOLOSTONE, not competent, very weathered, massive orange iron staining (100%), dark iron staining (15%); 10YR 6/8, clay observed	
			183		DOLOSTONE, not competent, trace dark iron staining (3%); 10YR 4/4 to 7.5YR 3/3, clay observed	
			184			
			185			
			186			
			187			
			188			
			189		DOLOSTONE, competent, trace vugs (5%), trace oolitic texture (1%); 10YR 6/3	
			190		SANDY DOLOSTONE, competent, medium sand (40%), well-rounded; 10YR 6/6	
			191			
			192		SANDSTONE, moderately cemented, fine to medium (50% fine, 50% medium), sub-rounded to well-rounded; 10YR 4/6	
			193		SANDSTONE, poorly to moderately cemented, medium (100%), sub-rounded to well-rounded; N/8.5	
			194			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW7A
LOGGED BY: AS/AEL	CHECKED BY: AS			SHEET 14 OF 15
DRILLING CONTR.: Traut				DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	SAMPLING METHOD: 10' acetate bags		START TIME 1045
BORING DEPTH: 220 FT BGS				FINISH TIME 1830
GROUND SURFACE ELEVATION:		WATER LEVEL		DATE 05-26-20
DATUM: UTM NAD83		TIME		DATE 05-28-20
COMMENTS:		DATE		
		CASING DEPTH		



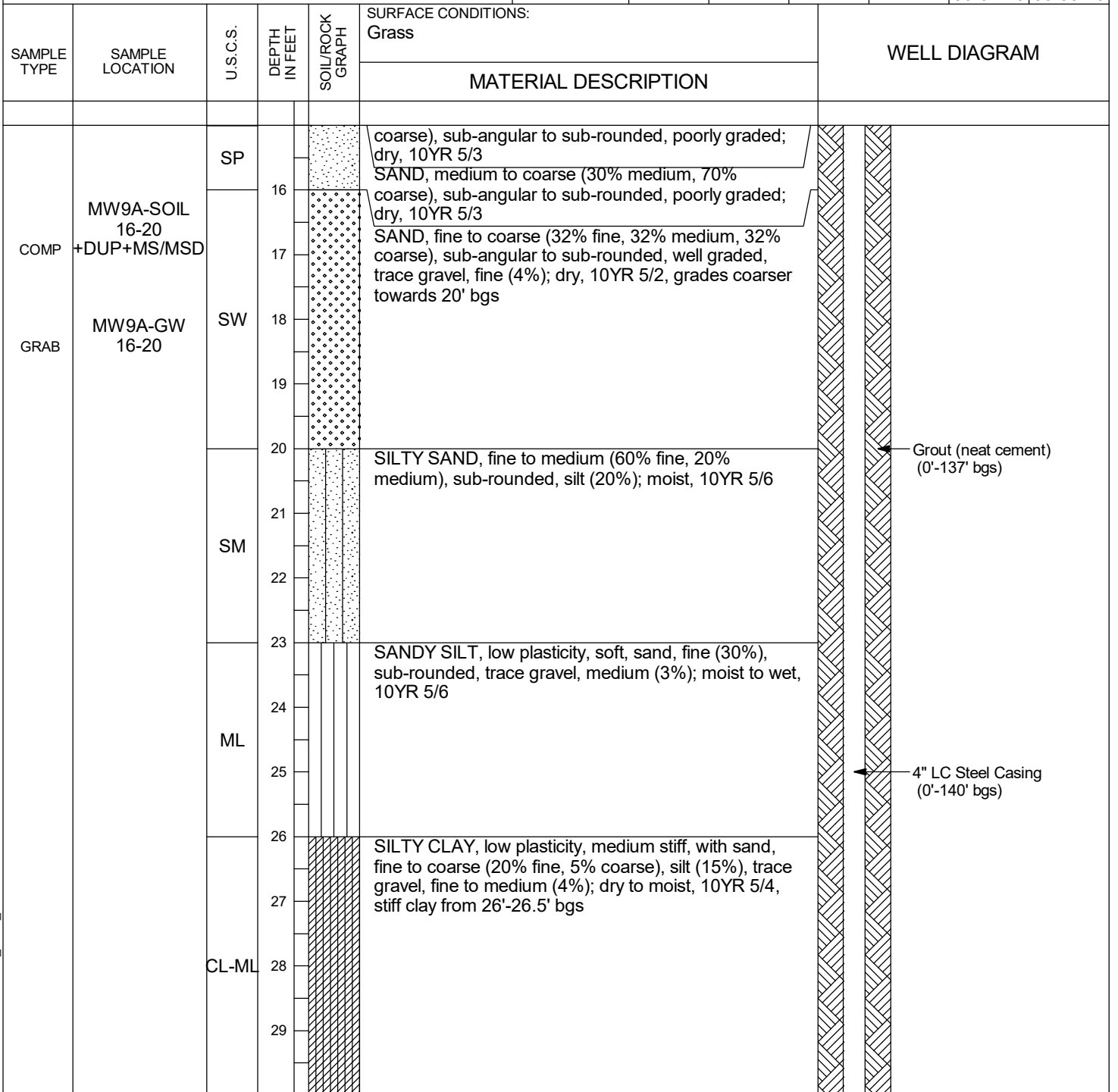
CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW7A	
LOGGED BY: AS/AEL	CHECKED BY: AS		SHEET 15 OF 15			
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME		
BORING DEPTH: 220 FT BGS		WATER LEVEL			1045	1830
GROUND SURFACE ELEVATION:		TIME			DATE	DATE
DATUM: UTM NAD83		DATE			05-26-20	05-28-20
COMMENTS:		CASING DEPTH				

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:	WELL DIAGRAM
					Grass	
					MATERIAL DESCRIPTION	
			211		SANDSTONE, fine to medium (25% fine, 75% medium), sub-rounded to well-rounded; 5Y 6/4	
			212		SANDSTONE, fine to coarse (10% fine, 85% medium, 5% coarse), well-rounded to sub-rounded; 5Y 7/3	
			213			
			214			
		Cj	215			
			216			
			217		SANDSTONE, fine to coarse (20% fine, 75% medium, 5% coarse), sub-rounded; 2.5Y 8/1	
			218			
			219			
			220		E.O.B. @ 220' bgs, no refusal	
			221			
			222			
			223			
			224			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW9A
LOGGED BY: AS/AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 1 OF 10
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 0830
BORING DEPTH: 150 FT BGS					FINISH TIME 0930
GROUND SURFACE ELEVATION:		DATE			DATE 06-02-20
DATUM: UTM NAD83		DATE			DATE 06-03-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
DISCRETE	MW9A-SOIL 3-5	CL	1		SANDY CLAY, low plasticity, soft, sand, fine to medium (40%), sub-rounded, with organics (10%); moist, 10YR 3/2	<p>Grout (neat cement) (0'-137' bgs)</p> <p>4" LC Steel Casing (0'-140' bgs)</p>
DISCRETE	MW9A-SOIL 5-7	SC	2		CLAY, medium plasticity, soft, with sand, medium to coarse (15%), sub-rounded, trace gravel, medium (5%); moist, 10YR 5/2	
			3		CLAYEY SAND, fine to coarse (25% fine, 20% medium, 20% coarse), sub-angular, clay (30%), trace gravel, medium (5%); dry to moist, 10YR 5/4	
GRAB	MW9A-GW 6-10	SP	4		SAND, medium to coarse (60% medium, 20% coarse), sub-rounded, poorly graded, with clay (10%), gravel, fine to medium (7% fine, 3% medium); moist, 10YR 5/4	
			5		SAND, medium to coarse (60% medium, 32% coarse), sub-angular, poorly graded, trace clay (5%), trace gravel, fine (3%); moist, 10YR 5/4	
			6		SANDY CLAY, low plasticity, soft, sand, fine (30%); dry to moist, 10YR 5/3	
		7		SAND, medium to coarse (50% medium, 48% coarse), sub-angular, poorly graded, trace gravel, fine (2%); dry, 10YR 5/4		
		8		SAND, medium to coarse (30% medium, 70%		
		9				
		10				
		11				
		12				
		13				
		14				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW9A
LOGGED BY: AS/AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 2 OF 10
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 150 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			0830 0930
DATUM: UTM NAD83		DATE			06-02-20 06-03-20
COMMENTS:		CASING DEPTH			

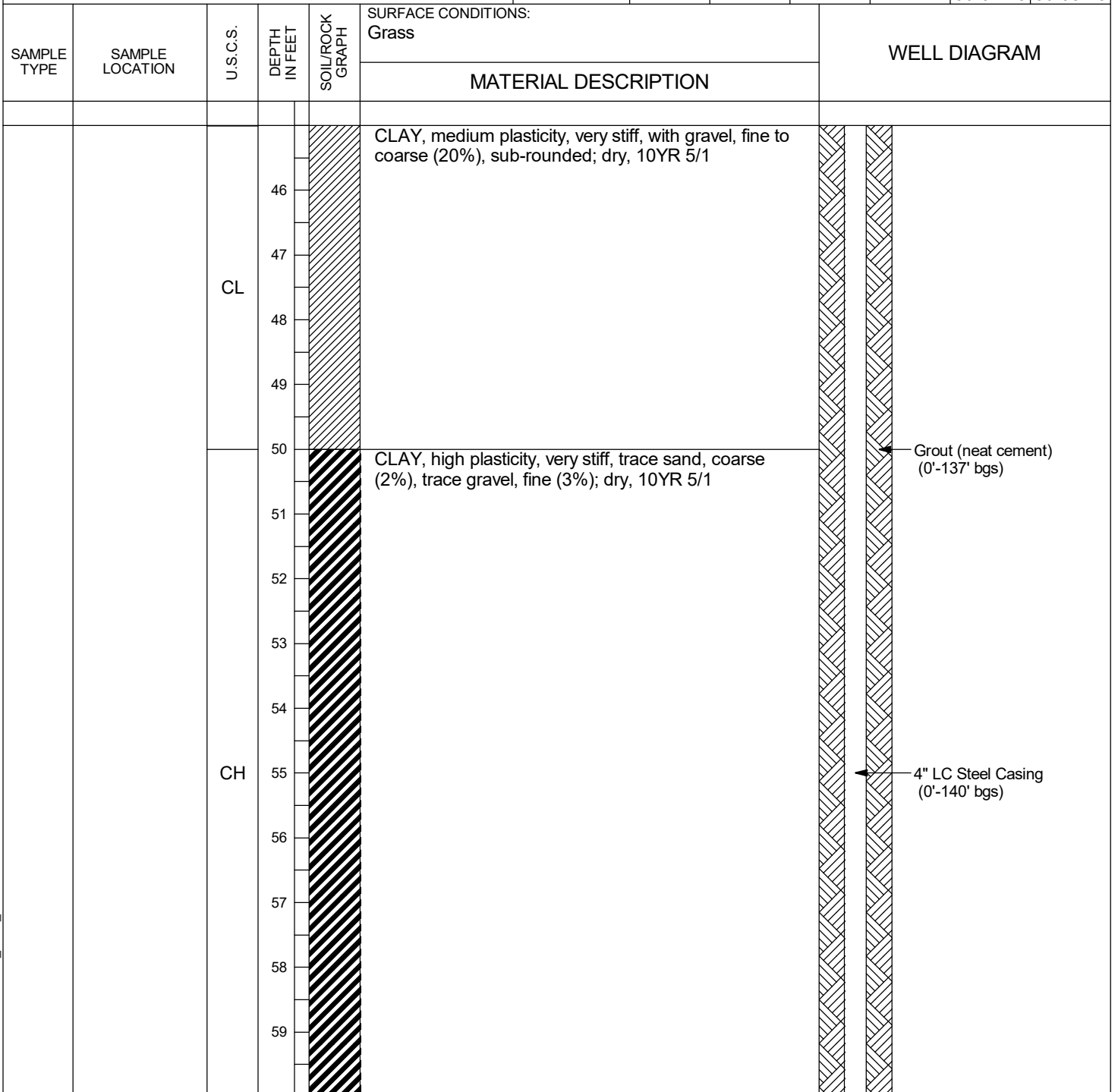


CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW9A
LOGGED BY: AS/AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 3 OF 10
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 150 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			0830 0930
DATUM: UTM NAD83		DATE			0830 0930
COMMENTS:		CASING DEPTH			06-02-20 06-03-20

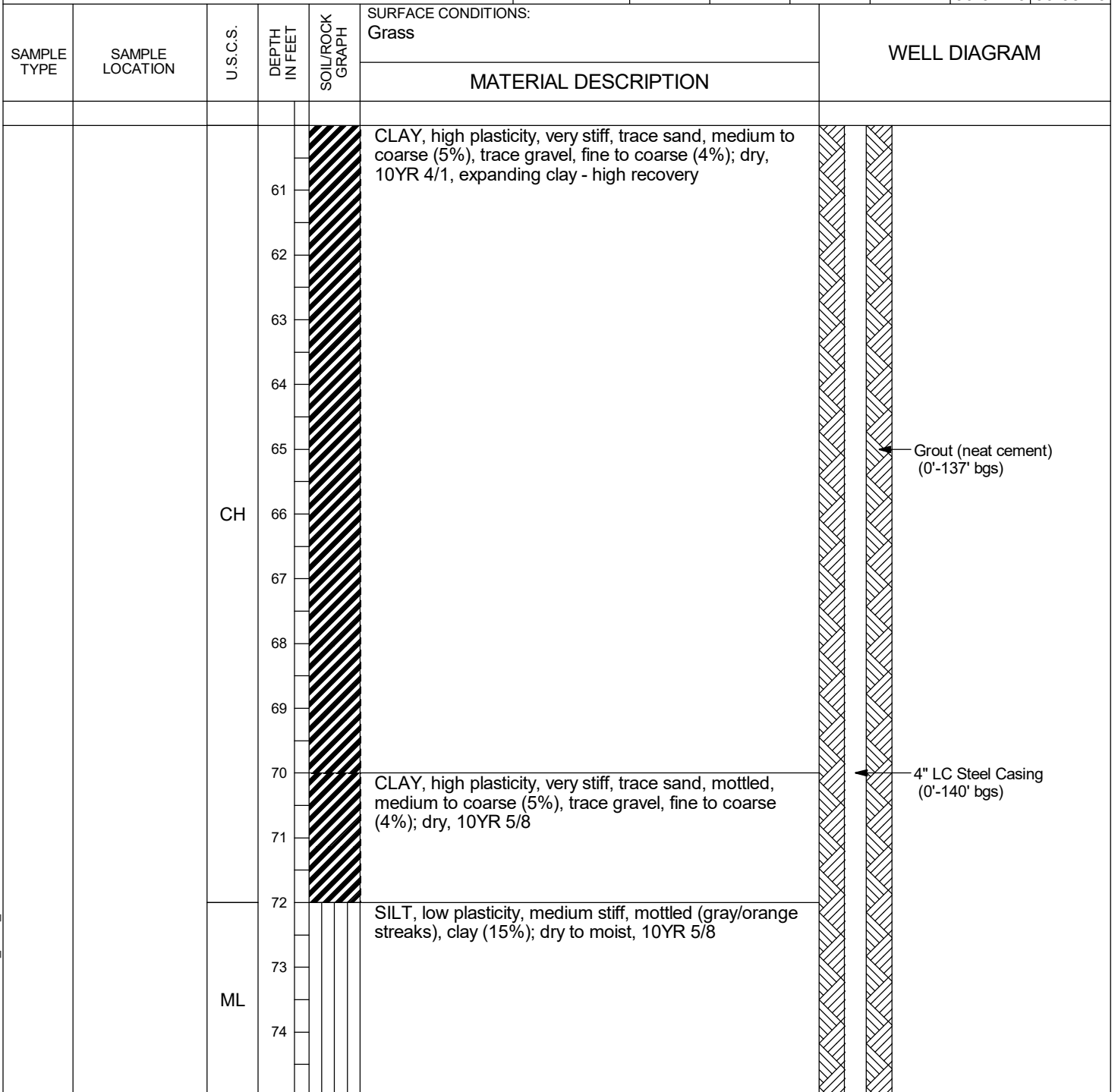
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:	WELL DIAGRAM
					Grass	
					MATERIAL DESCRIPTION	
		CL	31		CLAY, low plasticity, soft, with sand, fine (20%), well-rounded, trace gravel, coarse (5%); dry to moist, 2.5Y 5/6	
		SC	34		CLAYEY SAND, fine to medium (50% fine, 10% medium), well-rounded, clay (15%), with gravel, fine to medium (15%), sub-angular to sub-rounded; moist, 2.5Y 5/6	Grout (neat cement) (0'-137' bgs)
		SC	35		CLAYEY SAND, fine to medium (40% fine, 10% medium), well-rounded, clay (15%), with gravel, fine to medium (25%), sub-angular to sub-rounded; moist to wet, 2.5Y 5/6	
		CL	37		CLAY, low plasticity, stiff, with sand, fine (20%), well-rounded, gravel, fine to medium (20%), sub-angular, 2.5-4" cobbles (20%), sub-angular; moist, 2.5Y 5/6	
		CL	38		CLAY, low plasticity, stiff, with gravel, fine to medium (15%), sub-angular to sub-rounded; moist, 2.5Y 5/6	
		CL	40		CLAY, medium plasticity, very stiff, with gravel, fine to coarse (20%), sub-rounded; dry, 10YR 5/1	4" LC Steel Casing (0'-140' bgs)
			41			
			42			
			43			
			44			



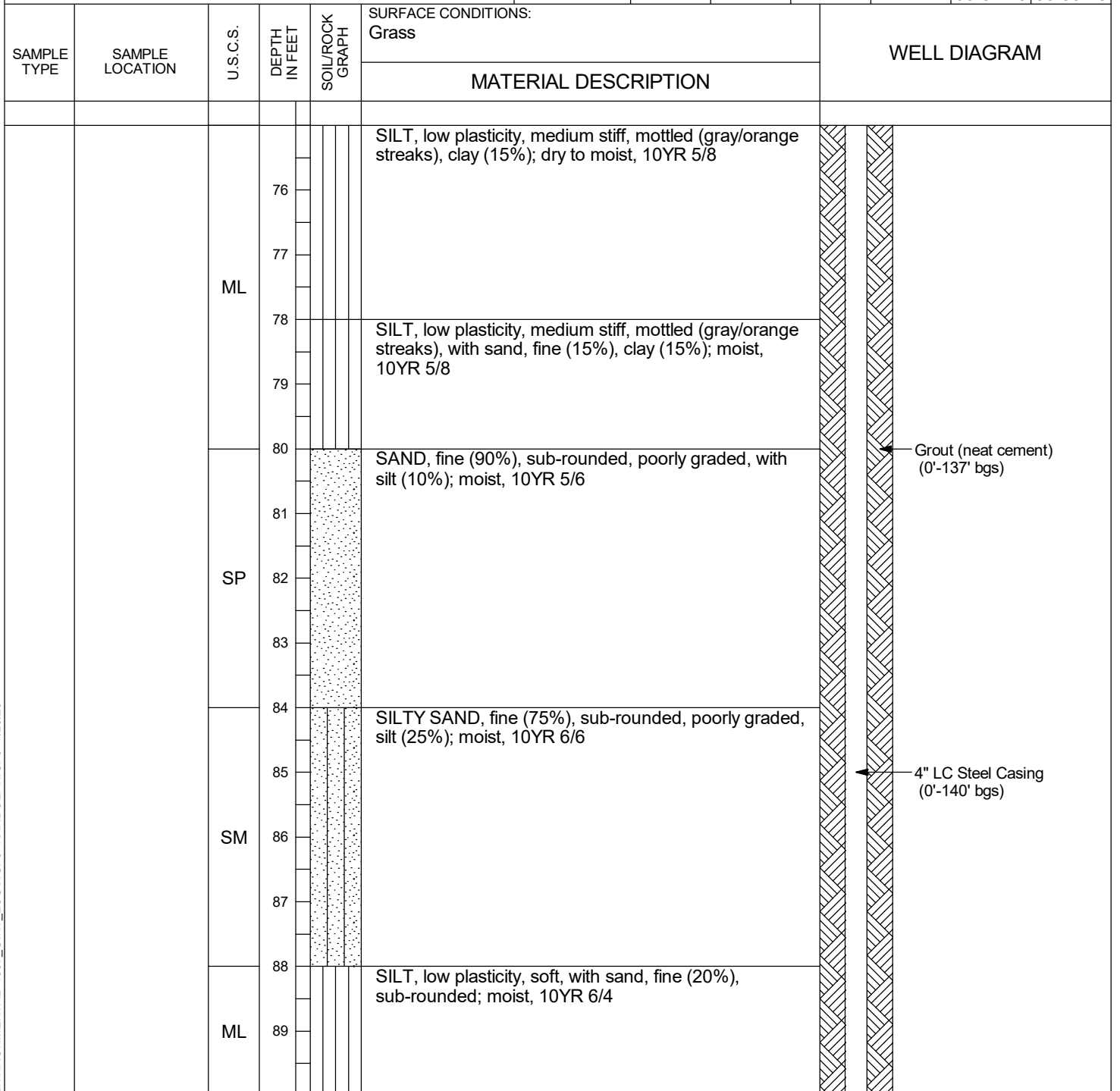
CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW9A	
LOGGED BY: AS/AEL	CHECKED BY: AS		SHEET 4 OF 10			
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME		
BORING DEPTH: 150 FT BGS		WATER LEVEL			0830	0930
GROUND SURFACE ELEVATION:		TIME			DATE	DATE
DATUM: UTM NAD83		DATE			06-02-20	06-03-20
COMMENTS:		CASING DEPTH				



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW9A
LOGGED BY: AS/AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 5 OF 10
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 150 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			0830 0930
DATUM: UTM NAD83		DATE			06-02-20 06-03-20
COMMENTS:		CASING DEPTH			



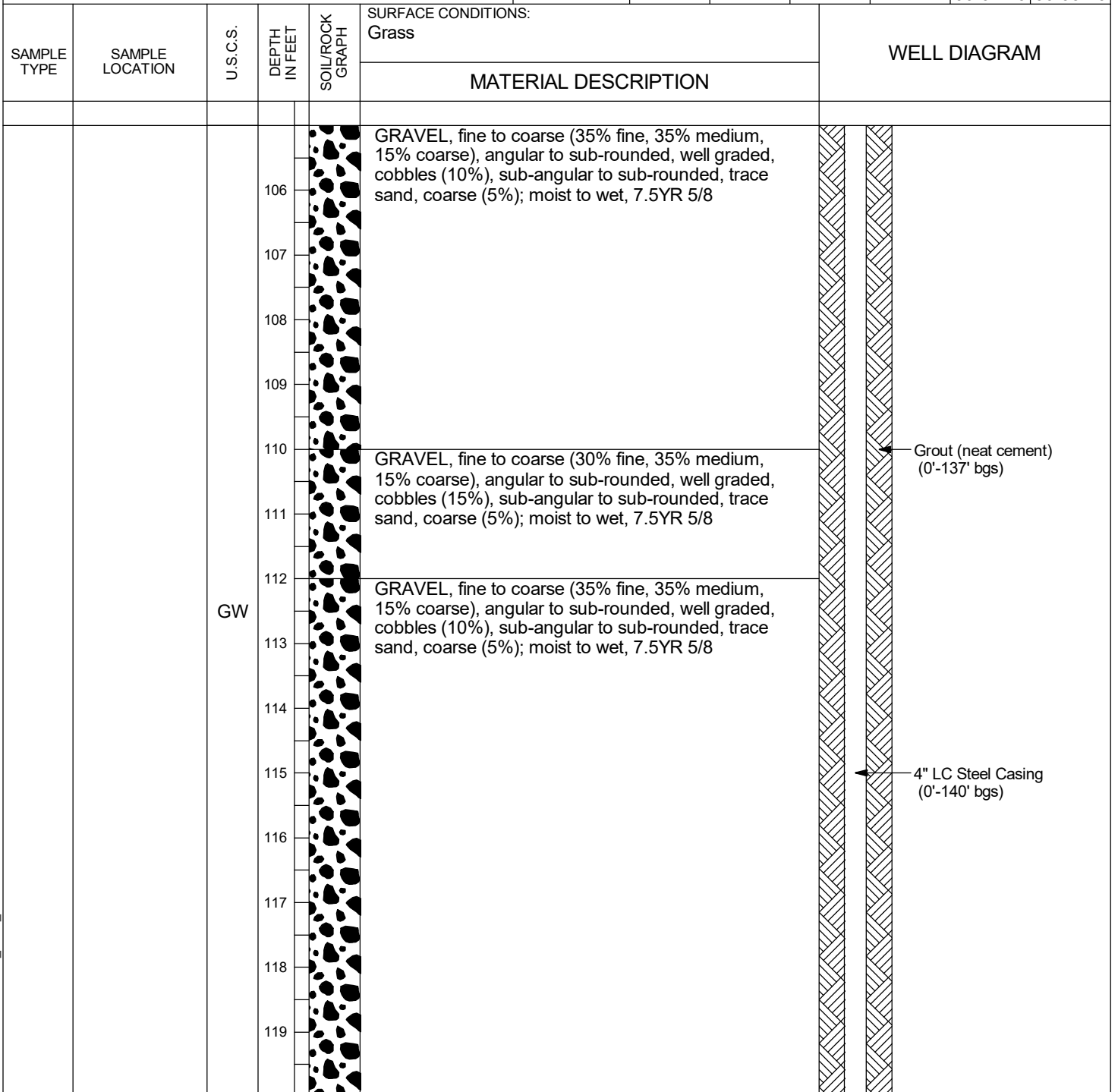
CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN			
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW9A	
LOGGED BY: AS/AEL	CHECKED BY: AS		SHEET 6 OF 10			
DRILLING CONTR.: Traut		SAMPLING METHOD: 10' acetate bags			DRILLING	
DRILLER: Dan Pflipsen	EQUIP.: Sonic		START TIME	FINISH TIME		
BORING DEPTH: 150 FT BGS		WATER LEVEL			0830	0930
GROUND SURFACE ELEVATION:		TIME			DATE	DATE
DATUM: UTM NAD83		DATE			06-02-20	06-03-20
COMMENTS:		CASING DEPTH				



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW9A
LOGGED BY: AS/AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 7 OF 10
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 0830
BORING DEPTH: 150 FT BGS					FINISH TIME 0930
GROUND SURFACE ELEVATION:		DATE			0830 0930
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-02-20 06-03-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
COMP	MW9A-SOIL 96-100	SP	91		SAND, fine to medium (80% fine, 15% medium), sub-angular to sub-rounded, poorly graded, trace silt (5%); moist, 10YR 5/6	<p>Grout (neat cement) (0'-137' bgs)</p> <p>4" LC Steel Casing (0'-140' bgs)</p>
			92		SAND, fine to medium (60% fine, 40% medium), sub-angular, poorly graded; dry, 7YR 4/4	
93	SAND, fine to medium (45% fine, 45% medium), sub-angular, poorly graded, with silt (10%); moist, 5YR 5/8					
94		GRAVEL, fine to coarse (40% fine, 9% medium, 1% coarse), sub-angular, poorly graded, with sand, fine to coarse (5% fine, 40% coarse), sub-rounded, trace silt (5%); moist, 5YR 5/8				
95	SAND, fine to coarse (5% fine, 5% medium, 60% coarse), sub-rounded, poorly graded, with gravel, fine (25%), sub-angular, trace silt (5%); moist, 5YR 5/8, 2" clay lense @ 103' bgs					
96		GRAVEL, fine to coarse (35% fine, 35% medium, 15% coarse), angular to sub-rounded, well graded, cobbles (10%), sub-angular to sub-rounded, trace sand, coarse (5%); moist to wet, 7.5YR 5/8				
97	GW					
98		GW				
99	GW					
100		GW				
101	GW					
102		GW				
103	GW					
104		GW				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW9A
LOGGED BY: AS/AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 8 OF 10
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 150 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			0830 0930
DATUM: UTM NAD83		DATE			06-02-20 06-03-20
COMMENTS:		CASING DEPTH			



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW9A
LOGGED BY: AS/AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 9 OF 10
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 0830
BORING DEPTH: 150 FT BGS					FINISH TIME 0930
GROUND SURFACE ELEVATION:		DATE			DATE 06-02-20
DATUM: UTM NAD83		DATE			DATE 06-03-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
COMP	MW9A-SOIL 127-131	SW	121	[Dotted pattern]	SAND, fine to coarse (10% fine, 40% medium, 10% coarse), sub-rounded, well graded, with gravel, fine to coarse (10% fine, 15% medium, 5% coarse), sub-angular, with clay (10%); moist, 10YR 4/3	<p>Grout (neat cement) (0'-137' bgs)</p> <p>4" LC Steel Casing (0'-140' bgs)</p>
			122	[Dotted pattern]		
			123	[Dotted pattern]	SAND, fine to coarse (10% fine, 40% medium, 10% coarse), sub-rounded, well graded, with gravel, fine to coarse (10% fine, 10% medium, 5% coarse), sub-angular, trace clay (5%), trace cobbles (5%); moist, 10YR 4/3	
			124	[Dotted pattern]		
			125	[Dotted pattern]		
		126	[Dotted pattern]	SAND, fine to medium (20% fine, 55% medium), sub-rounded, poorly graded, with gravel, fine to coarse (5% fine, 10% medium, 5% coarse), sub-rounded, trace clay (5%); dry to moist, 10YR 4/3		
		127	[Dotted pattern]	SAND, fine to coarse (20% fine, 70% medium, 5% coarse), sub-angular to sub-rounded, poorly graded, trace gravel, fine to medium (5%); dry to moist, 10YR 5/4		
		128	[Dotted pattern]	SAND, fine to medium (20% fine, 55% medium), sub-rounded, poorly graded, with gravel, fine to coarse (5% fine, 10% medium, 5% coarse), sub-rounded, trace clay (5%); dry to moist, 10YR 5/3		
		129	[Dotted pattern]			
		130	[Dotted pattern]	SAND, fine to medium (20% fine, 50% medium), sub-rounded, poorly graded, with gravel, fine to coarse (5% fine, 10% medium, 5% coarse), sub-rounded, with clay (10%); dry to moist, 10YR 5/3		
Opo			131	[Brick pattern]	DOLOSTONE, very weathered, fine to coarse lithic fragments, sand, coarse (10%); 10YR 6/4, clay observed, beginning of Oneota	
			132	[Brick pattern]	DOLOSTONE, very weathered, fine to medium lithic fragments, sand, medium to coarse (30%); 10YR 6/6, clay observed	
			133	[Brick pattern]		
			134	[Brick pattern]		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW9A
LOGGED BY: AS/AEL	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 10 OF 10
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 150 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			0830 0930
DATUM: UTM NAD83		DATE			06-02-20 06-03-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			136			<p>Grout (neat cement) (0'-137' bgs)</p> <p>4" LC Steel Casing (0'-140' bgs)</p> <p>2' Fine Sand (137'-139' bgs)</p> <p>Sand filter pack (139'-140' bgs)</p>
			137			
			138			
			139			
			140			
			141			
			142			
			143			
			144			
			145			
			146			
			147			
			148			
			149			
						<p>Screened interval (0.010" slot) (140'-150' bgs)</p>
E.O.B. @ 150' bgs, no refusal						

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 1 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1500 1500
DATUM: UTM NAD83		DATE			06-04-20 06-09-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			1		SAND, fine to medium (60% fine, 25% medium), sub-rounded, poorly graded, trace clay (5%), trace silt (5%), trace organics (5%); moist, 10YR 4/4	<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
		SP	2		SAND, fine to medium (62% fine, 35% medium), sub-angular to sub-rounded, poorly graded, trace silt (3%); moist, 10YR 4/4	
			3			
			4			
		SW	5		SAND, fine to coarse (40% fine, 40% medium, 10% coarse), sub-angular to sub-rounded, well graded, with clay (8%), trace gravel, medium (2%); moist, 10YR 4/4, 3" clay layer at 4' and 6' bgs	
			6			
		SP	7		SAND, fine to coarse (5% fine, 5% medium, 90% coarse), sub-angular to sub-rounded, poorly graded; moist, 10YR 4/3	
			8		SAND, fine to medium (50% fine, 50% medium), sub-angular, poorly graded; moist, 10YR 5/4	
		SW	9		SAND, fine to coarse (35% fine, 30% medium, 30% coarse), sub-rounded, well graded, trace silt (5%); moist, 10YR 5/3	
			10			
		SP	11		SAND, fine to coarse (70% fine, 25% medium, 3% coarse), sub-angular, poorly graded, trace gravel, fine (2%); moist, 10YR 4/3	
			12			
			13		SAND, medium to coarse (70% medium, 30% coarse), sub-rounded, poorly graded; moist, 10YR 4/3	
		SC	14		CLAYEY SAND, fine to coarse (30% fine, 25% medium, 25% coarse), sub-rounded, clay (20%); moist, 10YR 4/4	



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 2 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS					FINISH TIME
GROUND SURFACE ELEVATION:		TIME			1500
DATUM: UTM NAD83		DATE			1500
COMMENTS:		CASING DEPTH			06-04-20
					06-09-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
					Grass	MATERIAL DESCRIPTION	
		SC	16		CLAYEY SAND, fine to coarse (30% fine, 25% medium, 25% coarse), sub-rounded, clay (20%); moist, 10YR 4/4		
		CL	17		CLAY, medium plasticity, soft; moist, 10YR 5/3		
		SW	18		SAND, fine to coarse (40% fine, 40% medium, 20% coarse), sub-angular to sub-rounded, well graded; moist, 10YR 4/3		
		CL	19		SANDY SILT, low plasticity, soft, sand, fine to medium (30%), sub-rounded; moist, 10YR 4/3, 1" oxidized sand layer		
		SP	20		SAND, fine to medium (60% fine, 35% medium), sub-angular, poorly graded, trace silt (5%); dry, 10YR 5/4		Grout (neat cement) (0'-350' bgs)
		SP	21		SAND, fine to medium (60% fine, 35% medium), sub-angular, poorly graded, trace silt (5%); moist, 10YR 5/4		
		SW	22		SAND, fine to coarse (45% fine, 45% medium, 10% coarse), sub-angular to well-rounded, well graded; wet, 10YR 5/3		
		SW	23				
		SW	24				
		SP	25		SAND, fine to coarse (5% fine, 60% medium, 30% coarse), sub-angular, poorly graded, trace gravel, fine (4%), trace silt (1%); moist, 10YR 5/4		4" LC Steel Casing (0'-350' bgs)
		SP	26				
		SP	27				
		SP	28		SAND, medium to coarse (45% medium, 40% coarse), sub-angular to sub-rounded, poorly graded, gravel, fine to medium (10% fine, 2% medium), trace silt (3%); moist, 7.5YR 4/4, 2-4" fine sand at 30' bgs		
		SP	29				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 3 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1500
BORING DEPTH: 370 FT BGS					FINISH TIME 1500
GROUND SURFACE ELEVATION:		DATE			DATE 1500
DATUM: UTM NAD83		DATE			DATE 1500
COMMENTS:		CASING DEPTH			06-04-20 06-09-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
					Grass	MATERIAL DESCRIPTION	
		SP	31		SAND, medium to coarse (25% medium, 45% coarse), sub-rounded to well-rounded, poorly graded, with gravel, fine to medium (25% fine, 5% medium), sub-rounded; wet, 10YR 5/6		<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
		SW	32		SAND, fine to coarse (15% fine, 50% medium, 30% coarse), sub-rounded, well graded, trace gravel, fine (5%); moist to wet, 10YR 4/4		
		SP	33		SAND, medium to coarse (25% medium, 50% coarse), sub-rounded, poorly graded, with gravel, fine to medium (20% fine, 5% medium), sub-angular to sub-rounded; moist to wet, 10YR 4/4, 0.5" coarse gravel seam at 37.5' bgs		
			34				
		35					
		36					
		37					
		38			CLAY, low to medium plasticity, soft; dry to moist, 10YR 3/2		
		39					
		40					
		41					
		42					
		43					
		44					

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 4 OF 25
DRILLING CONTR.: Traut					DRILLER: Dan Pflipsen
BORING DEPTH: 370 FT BGS		WATER LEVEL			START TIME 1500
GROUND SURFACE ELEVATION:		TIME			FINISH TIME 1500
DATUM: UTM NAD83		DATE			DATE 1500
COMMENTS:		CASING DEPTH			06-04-20 06-09-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
					Grass	MATERIAL DESCRIPTION	
		SW	46		SAND, fine to coarse (50% fine, 25% medium, 20% coarse), well-rounded, well graded, trace gravel, fine (5%); moist, 10YR 5/2		<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
		GP	47		GRAVEL, fine to coarse (85% fine, 5% coarse); sub-rounded to well-rounded, poorly graded, sand, coarse (10%), sub-rounded; moist to wet, 10YR 4/2		
		SP	49		SAND, fine to medium (60% fine, 30% medium), sub-rounded, poorly graded, gravel, fine (10%), well-rounded; moist to wet, 10YR 4/2		
		GW	50		GRAVEL, fine to coarse (40% fine, 15% medium, 20% coarse), sub-angular to well-rounded, well graded, with sand, coarse (25%), sub-rounded; moist to wet, 10YR 4/2,		
		SP	52		SAND, medium to coarse (50% medium, 20% coarse), sub-rounded, poorly graded, with gravel, fine (30%), well-rounded; moist to wet, 10YR 4/2		
		GW	54		GRAVEL, fine to coarse (35% fine, 25% medium, 10% coarse), well-rounded, well graded, with sand, coarse (25%), sub-rounded, trace cobbles (5%); moist to wet, 10YR 4/3, 2" fine sand seam at 53' bgs		
		SW	58		SAND, fine to coarse (30% fine, 30% medium, 20% coarse), sub-rounded, well graded, with gravel, fine to coarse (15% fine, 3% medium, 2% coarse), sub-rounded; moist to wet, 10YR 5/3		
		SW	59		SAND, fine to coarse (30% fine, 30% medium, 20% coarse), sub-rounded, well graded, with gravel, fine to coarse (15% fine, 3% medium, 2% coarse), sub-rounded; moist to wet, 10YR 5/3		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 5 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1500
DATUM: UTM NAD83		DATE			1500
COMMENTS:		CASING DEPTH			06-04-20
					06-09-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
					Grass	MATERIAL DESCRIPTION	
		ML				Grass	
		SM	61		SILTY SAND, fine to coarse (45% fine, 15% medium, 20% coarse), sub-rounded, silt (15%), trace gravel, medium (5%); moist, 10YR 4/2		
		ML	62		SANDY SILT, low plasticity, soft, sand, fine to coarse (30%), sub-rounded, clay (15%); moist, 10YR 5/2		
		CL	65		CLAY, low plasticity, medium stiff, with sand, medium to coarse (20%), sub-rounded, trace gravel, medium (2%); moist, 10YR 5/3		Grout (neat cement) (0'-350' bgs)
		CL	67		CLAY, low plasticity, medium stiff, with sand, medium (20%), sub-rounded, trace gravel, fine to medium (4%); moist, 10YR 5/3		
		CH	70		CLAY, high plasticity, very stiff, sand, fine (10%), well-rounded, trace gravel, fine (2%); dry, 7.5YR 4/6		4" LC Steel Casing (0'-350' bgs)
		CH	71		CLAY, high plasticity, very soft, trace sand, fine (2%), orange mottling; dry, 10Y-5GY 4/2		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 6 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1500 1500
DATUM: UTM NAD83		DATE			06-04-20 06-09-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			76		CLAY, low plasticity, soft, with silt (10%), gray to orange mottling; dry, 10YR 3/2	
			77		CLAY, low plasticity, soft, with silt (10%); dry, 10YR 3/2	
			78		CLAY, low plasticity, soft, with silt (10%), gray mottling; dry, 10YR 3/2	
			79			
		CL	80		CLAY, low plasticity, stiff, with silt (10%), heavy mottling (green/gray/orange/black); dry, 10YR 6/2	← Grout (neat cement) (0'-350' bgs)
			81			
			82			
			83			
			84			
			85		CLAY, low plasticity, stiff, with silt (20%), with sand, fine (15%), sub-rounded; dry, 7.5YR 3/4 to 7.5YR 2.5/1	← 4" LC Steel Casing (0'-350' bgs)
		SW	86		SAND, fine to coarse (30% fine, 45% medium, 20% coarse), sub-rounded, well graded, trace silt (5%); moist, 10YR 5/2	
		CL				
		SW	87		CLAY, low plasticity, medium stiff, with silt (10%), trace sand, fine (5%), trace gravel, medium (2%); dry, 10Y-5GY 5/5 GY	
			88		SAND, fine to coarse (25% fine, 60% medium, 13% coarse), sub-rounded, well graded, trace gravel, fine (2%); moist, 10YR 4/2	
		SP	89		SAND, fine to medium (30% fine, 68% medium), sub-rounded, poorly graded, trace gravel, fine (2%); moist, 10YR 5/2, grades coarser towards 90' bgs	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 7 OF 25
DRILLING CONTR.: Traut					START TIME: 1500
DRILLER: Dan Pflipsen	EQUIP.: Sonic	DATE: 06-04-20			DATE: 06-09-20
BORING DEPTH: 370 FT BGS		WATER LEVEL			
GROUND SURFACE ELEVATION:		TIME			
DATUM: UTM NAD83		DATE			
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			91	[Dotted pattern]	SAND, fine to medium (70% fine, 30% medium), well-rounded, poorly graded; moist to wet, 5Y 4/1	[Hatched pattern]
		SP	92			
			93	[Dotted pattern]	SAND, fine to medium (50% fine, 50% medium), well-rounded, poorly graded; moist to wet, 5Y 4/2	[Hatched pattern]
			94			
			95	[Dotted pattern]	SAND, fine to medium (50% fine, 50% medium), well-rounded, poorly graded; moist to wet, 5Y 4/2	[Hatched pattern]
			96			
			97	[Vertical lines]	SILT, no plasticity, soft, trace clay (5%); dry, 5Y 4/2	[Hatched pattern]
		ML	98			
			99	[Diagonal lines]	CLAY, low to medium plasticity, soft, trace gravel, fine (5%), orange mottling in bands; dry, 10YR 6/6	[Hatched pattern]
		CL	100			
			101	[Dotted pattern]	SAND, fine to medium (50% fine, 50% medium), well-rounded, poorly graded; wet, 10YR 4/6	[Hatched pattern]
			102			
			103	[Dotted pattern]	SAND, fine to coarse (5% fine, 45% medium, 45% coarse), well-rounded, poorly graded, trace gravel, fine to coarse (5%); wet, 2.5Y 4/2	[Hatched pattern]
		SP	104			

← Grout (neat cement) (0'-350' bgs)

← 4" LC Steel Casing (0'-350' bgs)

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN	
PROJECT: Project 1007		DRILLING METHOD: Sonic		BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS			SHEET 8 OF 25
DRILLING CONTR.: Traut				DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	SAMPLING METHOD: 10' acetate bags		START TIME 1500
BORING DEPTH: 370 FT BGS				FINISH TIME 1500
GROUND SURFACE ELEVATION:		WATER LEVEL		DATE 1500
DATUM: UTM NAD83		TIME		DATE 1500
COMMENTS:		DATE		DATE 1500
		CASING DEPTH		06-04-20 06-09-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
		SP				
		SW	106		SAND, fine to medium (65% fine, 35% medium), sub-rounded to well-rounded, poorly graded; moist, 2.5Y 5/2	<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
			107		SAND, fine to coarse (10% fine, 70% medium, 20% coarse), sub-angular to sub-rounded, well graded; moist, 2.5Y 5/2	
		SP	108		SAND, fine to coarse (30% fine, 63% medium, 5% coarse), sub-rounded, poorly graded, trace gravel, fine (2%); moist, 2.5Y 5/2	
			109			
		SW	110		SAND, fine to coarse (25% fine, 60% medium, 25% coarse), sub-rounded, well graded; dry to moist, 2.5Y 5/2	
			111			
			112		SAND, fine to medium (40% fine, 60% medium), sub-rounded, poorly graded; dry, 2.5Y 5/2	
			113			
		SP	115			
			116			
			117			
			118			
			119		SAND, medium to coarse (50% medium, 50% coarse), sub-angular, poorly graded; dry, 2.5Y 5/2 SAND, fine to medium (80% fine, 20% medium), sub-angular, poorly graded; dry, 2.5Y 5/2	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 9 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS		DATE			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			DATE
DATUM: UTM NAD83		CASING DEPTH			06-04-20 06-09-20
COMMENTS:					

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
					Grass	MATERIAL DESCRIPTION	
		SP	121		SAND, fine to medium (70% fine, 30% medium), well-rounded, poorly graded; wet, 2.5Y 4/3		<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
		SW	122		SAND, fine to coarse (33% fine, 33% medium, 34% coarse), sub-rounded to well-rounded, well graded; wet, 2.5Y 4/3		
		SP	123		SAND, very fine to fine (70% v. fine, 30% fine), well-rounded, poorly graded; moist to wet, 10YR 5/3		
			124				
		ML	125		SILT, no plasticity, soft, trace clay (5%), trace orange oxidation/mottling; moist, 10YR 5/4		
			126				
			127				
			128		SILT, no plasticity, soft, clay (10%); moist, 10YR 5/6, 1" coarse sand seam at 129' bgs		
			129				
		SW	130		SAND, fine to coarse (25% fine, 30% medium, 30% coarse), sub-rounded to well-rounded, well graded, gravel, fine to medium (10% fine, 5% medium), sub-angular to sub-rounded; moist to wet, 10YR 4/4		
			131				
		SP	132		SAND, fine to medium (25% fine, 30% medium), sub-rounded, poorly graded, with gravel, fine to medium (30% fine, 15% medium), sub-angular to sub-rounded; moist to wet, 10YR 4/4		
			133		SAND, fine to coarse (50% fine, 45% medium, 5% coarse), well-rounded, poorly graded; moist, 10YR 5/4		
			134				



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 10 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS		DATE			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			DATE
DATUM: UTM NAD83		CASING DEPTH			06-04-20 06-09-20
COMMENTS:					

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			136		SAND, fine to coarse (20% fine, 75% medium, 5% coarse), sub-angular, poorly graded; moist, 7.5YR 5/4	<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
			137		SAND, fine to medium (50% fine, 50% medium), sub-angular to sub-rounded, poorly graded; dry, 10YR 5/4	
			138		SAND, fine to medium (50% fine, 50% medium), sub-angular to sub-rounded, poorly graded; dry, 10YR 5/3	
			139		SAND, fine to medium (75% fine, 20% medium), sub-angular to sub-rounded, poorly graded, trace silt (5%); dry, 10YR 6/3 to 7.5YR 5/3	
			140		SAND, fine to medium (20% fine, 80% medium), sub-angular to sub-rounded, poorly graded; dry, 10YR 5/3	
			141		SAND, very fine to fine (50% v. fine, 50% fine), sub-angular to sub-rounded, poorly graded; dry, 10YR 5/4	
		SP	142			
			143		SAND, very fine to fine (50% v. fine, 50% fine), sub-angular to sub-rounded, poorly graded; dry, 10YR 5/4	
			144			
			145			
			146		SAND, fine to medium (80% fine, 20% medium), sub-angular to sub-rounded, poorly graded; dry to moist, 10YR 5/4	
			147			
			148			
			149			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 11 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1500 1500
DATUM: UTM NAD83		DATE			06-04-20 06-09-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass		WELL DIAGRAM
					MATERIAL DESCRIPTION		
			151		SAND, fine (95%), well-rounded, poorly graded, trace silt (5%); wet, 10YR 5/6		
		SP	152		SAND, fine to medium (80% fine, 20% medium), well-rounded, poorly graded; moist to wet, 10YR 5/6		
			153		SAND, fine (95%), well-rounded, poorly graded, trace silt (5%); wet, 10YR 5/6		
			154		SAND, fine to medium (80% fine, 20% medium), well-rounded, poorly graded; moist, 10YR 5/6		
			155		SAND, fine (100%), well-rounded, poorly graded; moist to wet, 10YR 5/6		
			156		← Grout (neat cement) (0'-350' bgs)		
			157				
			158				
			159				
		ML	160		← 4" LC Steel Casing (0'-350' bgs)		
			161		SILT, no plasticity, soft, trace clay (5%); moist to wet, 10YR 5/6		
			162		SAND, fine to medium (50% fine, 50% medium), well-rounded, poorly graded; moist to wet, 10YR 5/6		
		SP	163		SAND, fine (100%), well-rounded, poorly graded; moist to wet, 10YR 5/6		
			164				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 12 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1500
BORING DEPTH: 370 FT BGS		DATE			FINISH TIME 1500
GROUND SURFACE ELEVATION:		DATE			DATE
DATUM: UTM NAD83		CASING DEPTH			06-04-20 06-09-20
COMMENTS:					

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
		SP	166		SAND, fine to medium (80% fine, 20% medium), well-rounded, poorly graded; moist to wet, 10YR 5/6	<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
		ML	167		SILT, no plasticity, soft, trace sand (5%); moist to wet, 10YR 5/6, 2" silty sand seam at 169' bgs	
		SP	170		SAND, fine (100%), well-rounded, poorly graded; moist, 10YR 4/3	
		ML	175		SILT, low to no plasticity, soft, trace clay (5%); dry to moist, 10YR 6/4	
		SP	179		SAND, fine to medium (70% fine, 30% medium), well-rounded, poorly graded; dry to moist, 2.5Y 5/6	
			168			
			169			
			171			
			172			
			173			
			174			
			176			
			177			
			178			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 13 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	START TIME	FINISH TIME		
BORING DEPTH: 370 FT BGS		1500	1500		
GROUND SURFACE ELEVATION:		DATE	DATE		
DATUM: UTM NAD83					
COMMENTS:		CASING DEPTH			
		06-04-20	06-09-20		

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
		SP	181		SAND, fine to medium (60% fine, 40% medium), sub-rounded to well-rounded, poorly graded; moist, 10YR 5/6	<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
		SW	182		SAND, fine to coarse (30% fine, 50% medium, 20% coarse), sub-rounded to well-rounded, well graded; moist, 10YR 4/6	
			183			
			184			
			185			
		186				
		187				
		188				
		189				
		190		SAND, fine to coarse (70% fine, 25% medium, 5% coarse), well-rounded, poorly graded; moist, 10YR 6/4		
		191				
		192				
		193				
		194				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 14 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS		DATE			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			DATE
DATUM: UTM NAD83		CASING DEPTH			06-04-20
COMMENTS:					06-09-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			196		SAND, fine to coarse (40% fine, 40% medium, 20% coarse), sub-rounded to well-rounded, well graded; moist, 10YR 6/4	<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
		SW	197			
		SW	198			
		SW	199			
		SW	200		SAND, fine to coarse (40% fine, 40% medium, 20% coarse), sub-rounded to well-rounded, well graded; moist, 10YR 5/4	
		SP	201			
		SP	202		SAND, fine to medium (60% fine, 40% medium), sub-rounded, poorly graded; moist, 10YR 5/4	
		SW	203			
		SW	204		SAND, fine to coarse (40% fine, 30% medium, 30% coarse), sub-rounded, well graded; moist, 10YR 5/4	
		SW	205		SAND, fine to coarse (20% fine, 20% medium, 30% coarse), sub-rounded, well graded, with gravel, fine (30%), angular; moist, 2.5Y 5/6	
		SW	206			
		SW	207			
		SW	208			
		SW	209			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 15 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS		DATE			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			DATE
DATUM: UTM NAD83		CASING DEPTH			06-04-20
COMMENTS:					06-09-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM	
					MATERIAL DESCRIPTION		
		SP	211		SAND, fine to coarse (60% fine, 35% medium, 5% coarse), sub-rounded to well-rounded, poorly graded; moist, 10YR 6/4		<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
			212		SAND, fine to coarse (30% fine, 50% medium, 20% coarse), sub-rounded to well-rounded, well graded; moist, 10YR 6/4		
			213		SAND, fine to coarse (30% fine, 30% medium, 35% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine to medium (5%); moist, 10YR 6/4		
			214		SAND, fine to coarse (30% fine, 30% medium, 35% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine to medium (5%); moist, 10YR 6/4		
		SW	215		SAND, fine to coarse (30% fine, 30% medium, 35% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine to medium (5%); moist, 10YR 6/4		
			216		SAND, fine to coarse (30% fine, 30% medium, 35% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine to medium (5%); moist, 10YR 6/4		
			217		SAND, fine to coarse (30% fine, 30% medium, 35% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine to medium (5%); moist, 10YR 6/4		
			218		SAND, fine to coarse (30% fine, 30% medium, 35% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine to medium (5%); moist, 10YR 6/4		
			219		SAND, fine to coarse (30% fine, 30% medium, 35% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine to medium (5%); moist, 10YR 6/4		
			220		SAND, fine to coarse (30% fine, 45% medium, 20% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine (5%); moist, 10YR 4/3		
			221		SAND, fine to coarse (30% fine, 45% medium, 20% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine (5%); moist, 10YR 4/3		
			222		SAND, fine to coarse (30% fine, 45% medium, 20% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine (5%); moist, 10YR 4/3		
			223		SAND, fine to coarse (30% fine, 45% medium, 20% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine (5%); moist, 10YR 4/3		
			224		SAND, fine to coarse (30% fine, 45% medium, 20% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine (5%); moist, 10YR 4/3		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 16 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1500 1500
DATUM: UTM NAD83		DATE			06-04-20 06-09-20
COMMENTS:		CASING DEPTH			

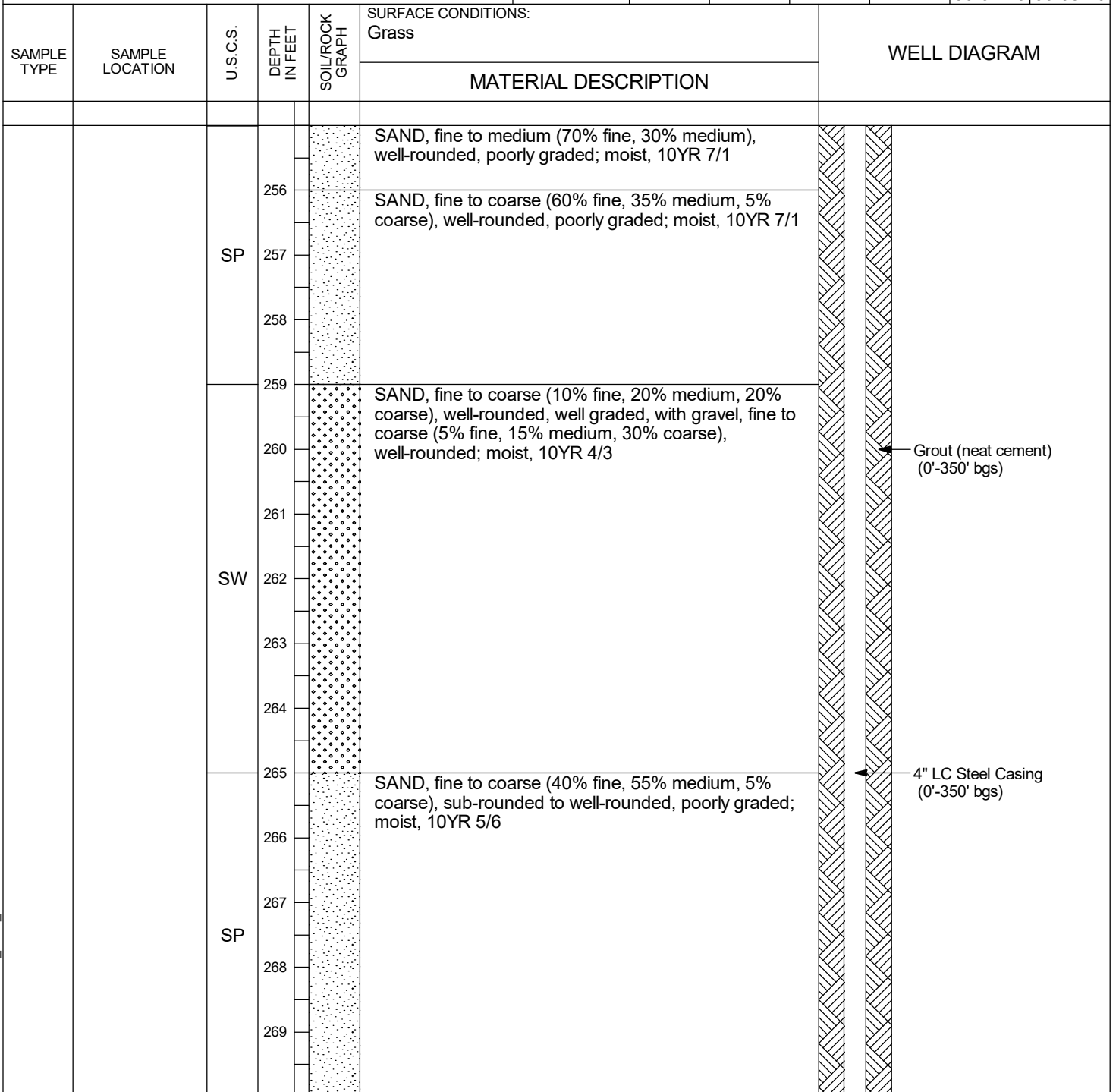
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			226		SAND, fine to coarse (20% fine, 45% medium, 30% coarse), sub-rounded, well graded, trace gravel, fine to medium (5%); moist to wet, 10YR 5/2	<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
		SW	227			
		228				
		229				
		230		SAND, fine to coarse (20% fine, 25% medium, 15% coarse), sub-rounded, well graded, with gravel, fine to medium (20% fine, 20% medium), sub-rounded to well-rounded; wet, 10YR 5/6		
		231				
		SP	232		SAND, fine to coarse (60% fine, 35% medium, 5% coarse), sub-rounded to well-rounded, poorly graded; moist, 10YR 5/3	
		233				
		234				
		235		SAND, fine to coarse (30% fine, 40% medium, 30% coarse), sub-rounded to well-rounded, well graded; moist, 10YR 5/6		
		SW	236			
		237				
		238				
		239				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 17 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1500
BORING DEPTH: 370 FT BGS		DATE			FINISH TIME 1500
GROUND SURFACE ELEVATION:		DATE			DATE
DATUM: UTM NAD83		CASING DEPTH			06-04-20 06-09-20
COMMENTS:					

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
		SW	241		SAND, fine to coarse (30% fine, 40% medium, 30% coarse), sub-rounded to well-rounded, well graded; moist, 10YR 5/6	<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
			242		SAND, fine to coarse (45% fine, 45% medium, 5% coarse), sub-rounded, poorly graded; moist, 10YR 6/2	
			243			
			244			
			245			
		SP	246		SAND, fine to medium (55% fine, 40% medium), sub-rounded, poorly graded, trace clay at 246.5' bgs (2%), trace gravel, fine (3%), trace iron staining; moist, 7.5YR 4/6	
			247		SAND, fine to coarse (65% fine, 25% medium, 5% coarse), sub-rounded, poorly graded, trace gravel, medium (5%); moist, 10YR 6/4	
			248			
			249			
			250			
		SW	252		SAND, fine to coarse (30% fine, 40% medium, 25% coarse), sub-rounded, well graded, trace gravel, fine (5%); moist, 10YR 6/2	
			253			
			254			



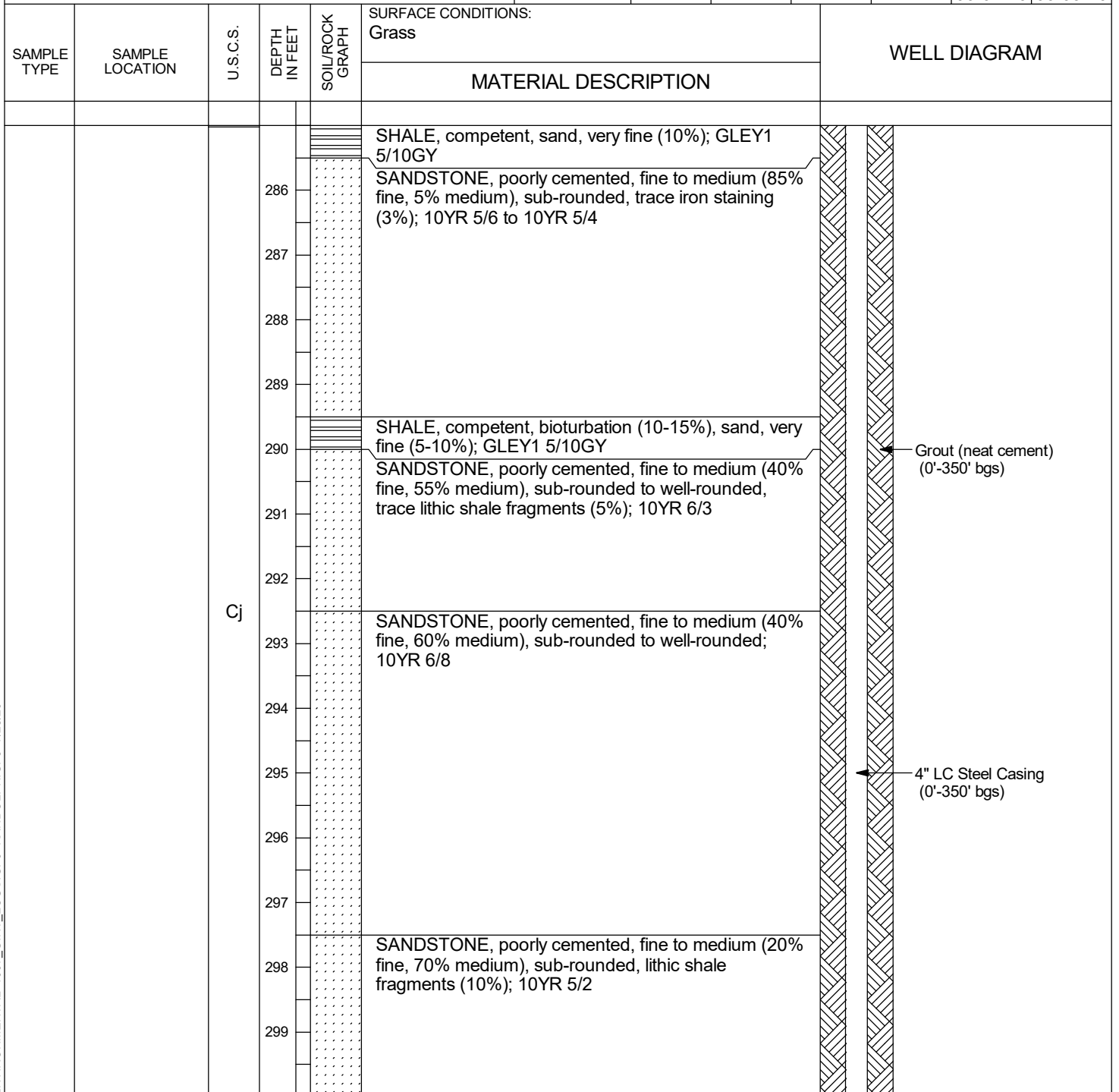
CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 18 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1500
BORING DEPTH: 370 FT BGS		DATE			FINISH TIME 1500
GROUND SURFACE ELEVATION:		DATE			DATE
DATUM: UTM NAD83		CASING DEPTH			06-04-20 06-09-20
COMMENTS:					



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 19 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1500
BORING DEPTH: 370 FT BGS					FINISH TIME 1500
GROUND SURFACE ELEVATION:		DATE			DATE 1500
DATUM: UTM NAD83		DATE			DATE 1500
COMMENTS:		CASING DEPTH			06-04-20 06-09-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
					Grass	MATERIAL DESCRIPTION	
		SP	271				
		SC	272				
		LF	275				Grout (neat cement) (0'-350' bgs)
		LF	276				
		LF	277				
			278				
			279				
		Cj	280				4" LC Steel Casing (0'-350' bgs)
		Cj	281				
		Cj	282				
		Cj	283				
			284				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 20 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS		DATE			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			DATE
DATUM: UTM NAD83		CASING DEPTH			06-04-20 06-09-20
COMMENTS:					



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 21 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1500 1500
DATUM: UTM NAD83		DATE			06-04-20 06-09-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			301		SANDSTONE, poorly cemented, fine to medium (20% fine, 80% medium), sub-rounded; 10YR 5/2	<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
			302			
			303			
			304			
		Cj	305		SANDSTONE, poorly cemented, fine to medium (30% fine, 70% medium), sub-rounded; 5Y 6/1	
			306			
			307			
			308			
			309			
			310		SHALE, not to moderately competent, very weathered, trace green staining (3%), trace bioturbation (2%), trace sand, very fine (1%); GLEY2 5/10BG, clay observed, beginning of St. Lawrence	
		Cs	311			
			312			
			313			
			314			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 22 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS		DATE			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			DATE
DATUM: UTM NAD83		CASING DEPTH			06-04-20
COMMENTS:					06-09-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:	WELL DIAGRAM
					Grass	
					MATERIAL DESCRIPTION	
			316		SHALE, not to moderately competent, very weathered, trace green staining (3%), trace bioturbation (2%), trace sand, very fine (1%); GLEY2 5/10BG, clay observed	<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p>
			317			
			318			
			319			
			320		SHALE, not competent, trace precipitate (2%); GLEY1 5/N	
			321			
		Cs	322			
			323		SHALE, not competent, very weathered (clay); GLEY1 4/N	
			324			
			325			
			326			
			327		SHALE, not competent, very weathered (clay), glauconite/chlorite (25%), bioturbation (10%); GLEY1 5/10GY	
			328			
			329		SHALE, moderately competent, weathered, sand, very fine (20%), trace thin fractures (2%); GLEY1 6/10Y, clay observed	

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 23 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 370 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1500 1500
DATUM: UTM NAD83		DATE			1500 1500
COMMENTS:		CASING DEPTH			06-04-20 06-09-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			331		SHALE, moderately competent, sand, fine (20%), precipitate (5-10%), trace manganese staining (5%); GLEY1 5/10Y	
			332			
			333			
			334			
			335		SHALE, moderately competent, glauconite/chlorite (40%); GLEY1 5/10GY	← Grout (neat cement) (0'-350' bgs)
			336			
		Cs	337		SHALE, moderately competent, glauconite/chlorite (40%), sand, fine to medium (25%), dark manganese staining on sand (10%); GLEY1 5/5GY	
			338		SHALE, not competent, very weathered (clay), lithic fragments (25%); GLEY1 5/10GY	
			339		SHALE, not to moderately competent, weathered, glauconite (50-60%), trace sand, fine (5%); GLEY1 7/10Y to GLEY1 5/10GY	
			340		SHALE, moderately competent to competent, glauconite (20-30%), sand, fine (5-10%), trace vugs (5%), trace interlayered silt (5%); GLEY1 6/10GY	← 4" LC Steel Casing (0'-350' bgs)
			341			
			342			
			343			
			344			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 24 OF 25
DRILLING CONTR.: Traut					DRILLER: Dan Pflipsen
BORING DEPTH: 370 FT BGS		WATER LEVEL			START TIME 1500
GROUND SURFACE ELEVATION:		TIME			FINISH TIME 1500
DATUM: UTM NAD83		DATE			DATE 06-04-20
COMMENTS:		CASING DEPTH			DATE 06-09-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			346		SANDSTONE, poorly to moderately cemented, fine to medium, sub-rounded, dolomitic precipitate (10%), trace glauconite (5%), trace dark manganese staining (5%); GLEY2 4/10G, beginning of Tunnel City	<p>Grout (neat cement) (0'-350' bgs)</p> <p>4" LC Steel Casing (0'-350' bgs)</p> <p>Grout Basket (350' bgs)</p>
			347			
			348		SANDSTONE, poorly to moderately cemented, fine to medium, well-rounded, dolomitic cement (10%); GLEY2 5/10BG to GLEY2 5/10G	<p>7" Open Hole (350'-370' bgs)</p>
			349			
			350			
			351			
		Ct	352			
			353			
			354			
			355			
			356			
			357			
			358			
			359			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13A
LOGGED BY: AS/AEL/JM	CHECKED BY: AS				SHEET 25 OF 25
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	SAMPLING METHOD: 10' acetate bags			START TIME
BORING DEPTH: 370 FT BGS					FINISH TIME
GROUND SURFACE ELEVATION:		WATER LEVEL			1500
DATUM: UTM NAD83		TIME			1500
COMMENTS:		DATE			DATE
		CASING DEPTH			06-04-20 06-09-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:	WELL DIAGRAM
					Grass	
					MATERIAL DESCRIPTION	
			361		SANDSTONE, poorly to moderately cemented, fine to medium, well-rounded, dolomitic cement (10%), vugs (10%); GLEY1 5/N, clay observed	<p>7" Open Hole (350'-370' bgs)</p>
			362			
			363			
			364			
		Ct	365			
			366			
			367			
			368			
			369			
			370			
			371		E.O.B. @ 370' bgs, no refusal	
			372			
			373			
			374			



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 1 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			06-15-20 06-17-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
DISCRETE	MW13B-SOIL 11-14	SP	1		SAND, fine to medium (50% fine, 45% medium), sub-rounded, poorly graded, trace clay (5%); wet, 10YR 6/6	
			2		SAND, fine to coarse (55% fine, 35% medium, 5% coarse), sub-rounded, poorly graded, trace clay (5%); moist, 10YR 6/6	
			3			
			4			
			5			
			6			
			7			
		8				
		9	SW		SAND, fine to coarse (45% fine, 40% medium, 10% coarse), sub-rounded, well graded, trace silt (5%); moist to wet, 10YR 4/6	
		10	SC		CLAYEY SAND, fine to coarse (20% fine, 50% medium, 10% coarse), sub-rounded, well graded, clay (20%); moist, 10YR 4/4	
		11	SP		SAND, fine to coarse (15% fine, 70% medium, 5% coarse), sub-rounded, poorly graded, with clay (10%); moist, 10YR 4/4	
		12				
		13				
		14	CL		CLAY, low to medium plasticity, soft, with sand, fine to medium (20%), sub-rounded; moist, 10YR 5/3	

ENVIRONMENTAL 1007\_GINT\_LOGS.GPJ RANDOLPH.GPJ 7/29/20

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 2 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM	
					MATERIAL DESCRIPTION		
DISCRETE	MW13B-SOIL 20-22	SP	16-18		SAND, fine to medium (60% fine, 40% medium), sub-rounded, poorly graded; dry, 10YR 5/6	<p>Grout (neat cement) (0'-291' bgs)</p> <p>4" LC Steel Casing (0'-295' bgs)</p>	
DISCRETE	MW13B-SOIL 22-24	SP	18-21		SAND, fine to coarse (10% fine, 80% medium, 5% coarse), sub-rounded, poorly graded, trace clay (5%); dry, 10YR 5/3		
DISCRETE	MW13B-SOIL 22-24	SP	20-22		SAND, fine to medium (30% fine, 70% medium), sub-rounded, poorly graded; dry, 10YR 5/6		
GRAB	MW13B-GW 22-24	SW	22-23		SAND, fine to coarse (20% fine, 50% medium, 20% coarse), sub-rounded, well graded, with clay (10%); moist, 10YR 4/3, clay lense @ 22.5' bgs		
		SW	23-27		SAND, fine to coarse (10% fine, 60% medium, 20% coarse), sub-angular to sub-rounded, well graded, with clay (10%); dry to moist, 10YR 5/6 to 10YR 5/4, clay lense @ 27' bgs		
		SP	27-29		SAND, medium to coarse (70% medium, 30% coarse), sub-rounded, poorly graded; moist, 10YR 4/2		

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 3 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
					Grass	MATERIAL DESCRIPTION	
		SW	31				
		GW	32				
		CL	34-36				Grout (neat cement) (0'-291' bgs)
		SC	38				
		CL	40				4\"/>
		CL	41				

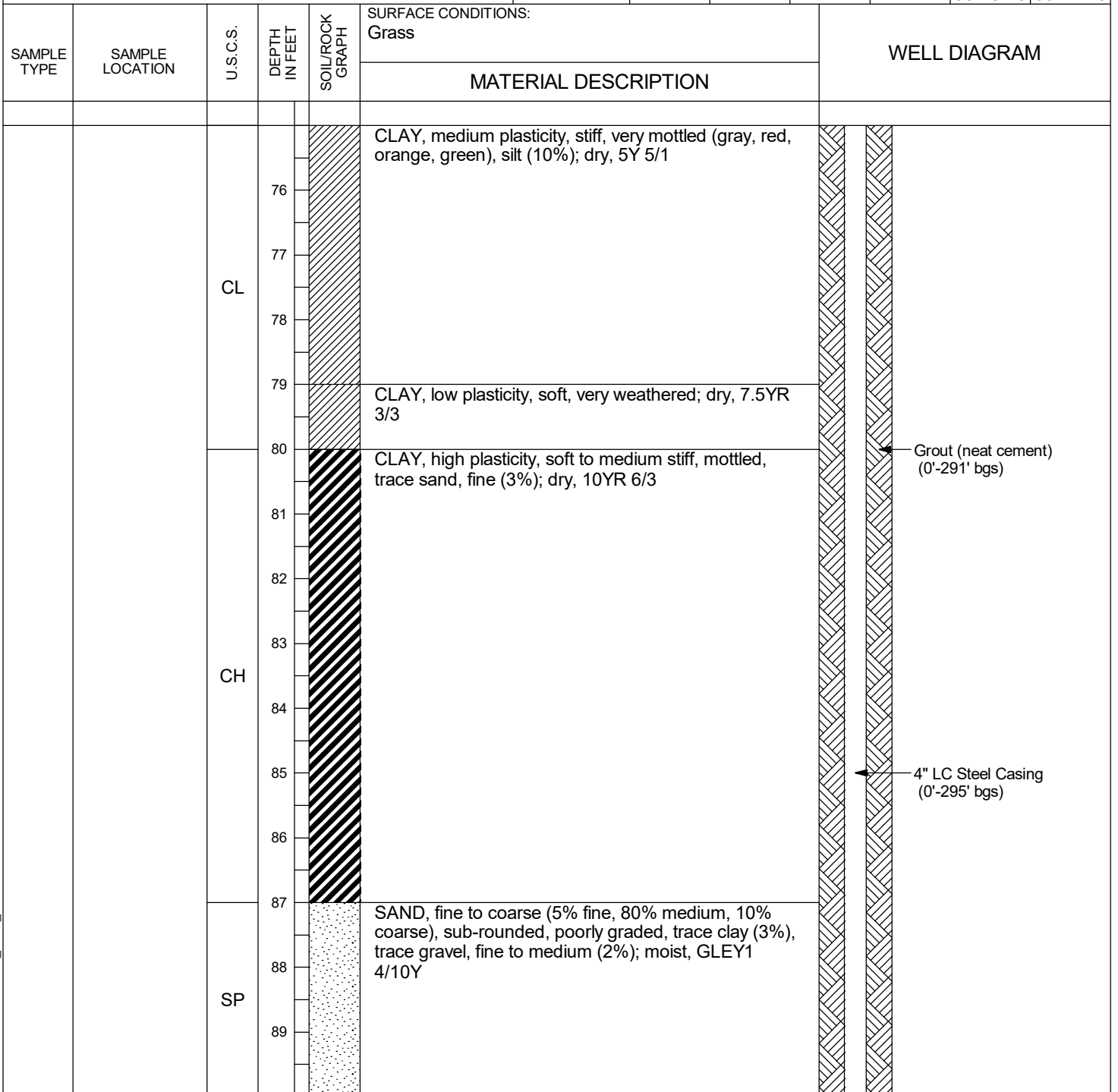
CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 4 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:	WELL DIAGRAM
					Grass	
MATERIAL DESCRIPTION						
COMP	MW13B-SOIL 46-50		46		SAND, medium to coarse (35% medium, 35% coarse), sub-rounded, poorly graded, with gravel, fine to coarse (20%), with clay (10%); moist, 5Y 4/1	<p>Grout (neat cement) (0'-291' bgs)</p> <p>4" LC Steel Casing (0'-295' bgs)</p>
GRAB	MW13B-GW 46-50	SP	47		SAND, medium to coarse (18% medium, 80% coarse), sub-rounded to well-rounded, poorly graded, trace gravel, medium (2%); dry to moist, 5Y 4/1	
			48			
			49			
			50		SAND, fine to coarse (10% fine, 30% medium, 40% coarse), sub-angular to sub-rounded, well graded, with gravel, fine to medium (15% fine, 5% medium), sub-angular to sub-rounded; moist to wet, 10YR 4/3, 3" fine gravel seam @ 54' bgs	
		SW	51			
			52			
			53			
			54			
			55		SAND, fine to coarse (20% fine, 60% medium, 20% coarse), sub-rounded to well-rounded, well graded; moist to wet, 10YR 4/2	
		GP	56		GRAVEL, fine to medium (60% fine, 25% medium), sub-angular to sub-rounded, poorly graded, with sand, coarse (15%), well-rounded; moist to wet, 10YR 4/2	
			57			
			58			
		SW	59		SAND, fine to coarse (20% fine, 55% medium, 20% coarse), sub-rounded to well-rounded, well graded, trace gravel, fine (5%); moist, 10YR 4/2	

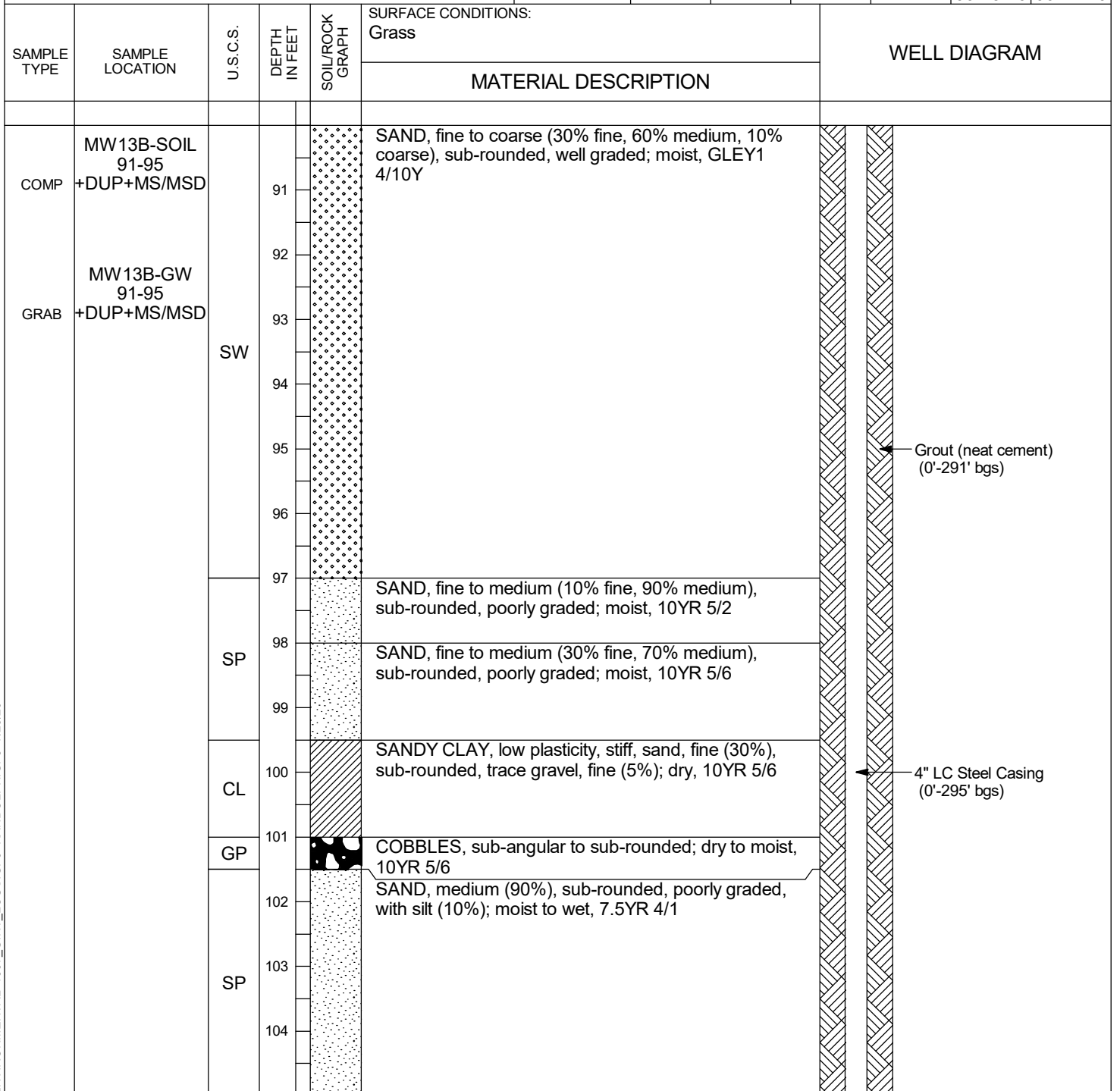
CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 5 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
					Grass	MATERIAL DESCRIPTION	
		CL	61		CLAY, low plasticity, soft, with sand, fine to medium (15%), sub-rounded, trace gravel, coarse (5%); moist, 10YR 4/2		
		SP	61		SAND, fine to medium (47% fine, 47% medium), sub-rounded, poorly graded, trace gravel, coarse (5%), trace cobbles (1%); moist, 10YR 4/2		
		CL	62				
		SP	63		CLAY, medium plasticity, stiff, trace sand, coarse (5%), trace gravel, medium (5%); dry to moist, 10YR 4/2		
		SP	64		SAND, medium to coarse (25% medium, 50% coarse), sub-rounded, poorly graded, with gravel, medium to coarse (10% medium, 15% coarse), sub-angular to sub-rounded; wet, 10YR 4/3		
			65		SAND, fine to medium (45% fine, 45% medium), sub-rounded, poorly graded, with clay (10%); moist, 10YR 4/3		
		CL	66		CLAY, low to medium plasticity, very stiff, trace gravel, fine (5%); dry, 10YR 5/4		Grout (neat cement) (0'-291' bgs)
		CH	69		CLAY, medium to high plasticity, stiff, trace sand, coarse (5%), trace gravel, fine (5%); moist, 10YR 5/4		
		CL	71		CLAY, medium plasticity, stiff, very mottled (gray, red, orange, green), silt (10%); dry, 5Y 5/1		4" LC Steel Casing (0'-295' bgs)
		CL	72				
			73				
			74				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 6 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		DATE			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			06-15-20 06-17-20
COMMENTS:		CASING DEPTH			



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 7 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			06-15-20 06-17-20
COMMENTS:		CASING DEPTH			



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 8 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			06-15-20 06-17-20
COMMENTS:		CASING DEPTH			

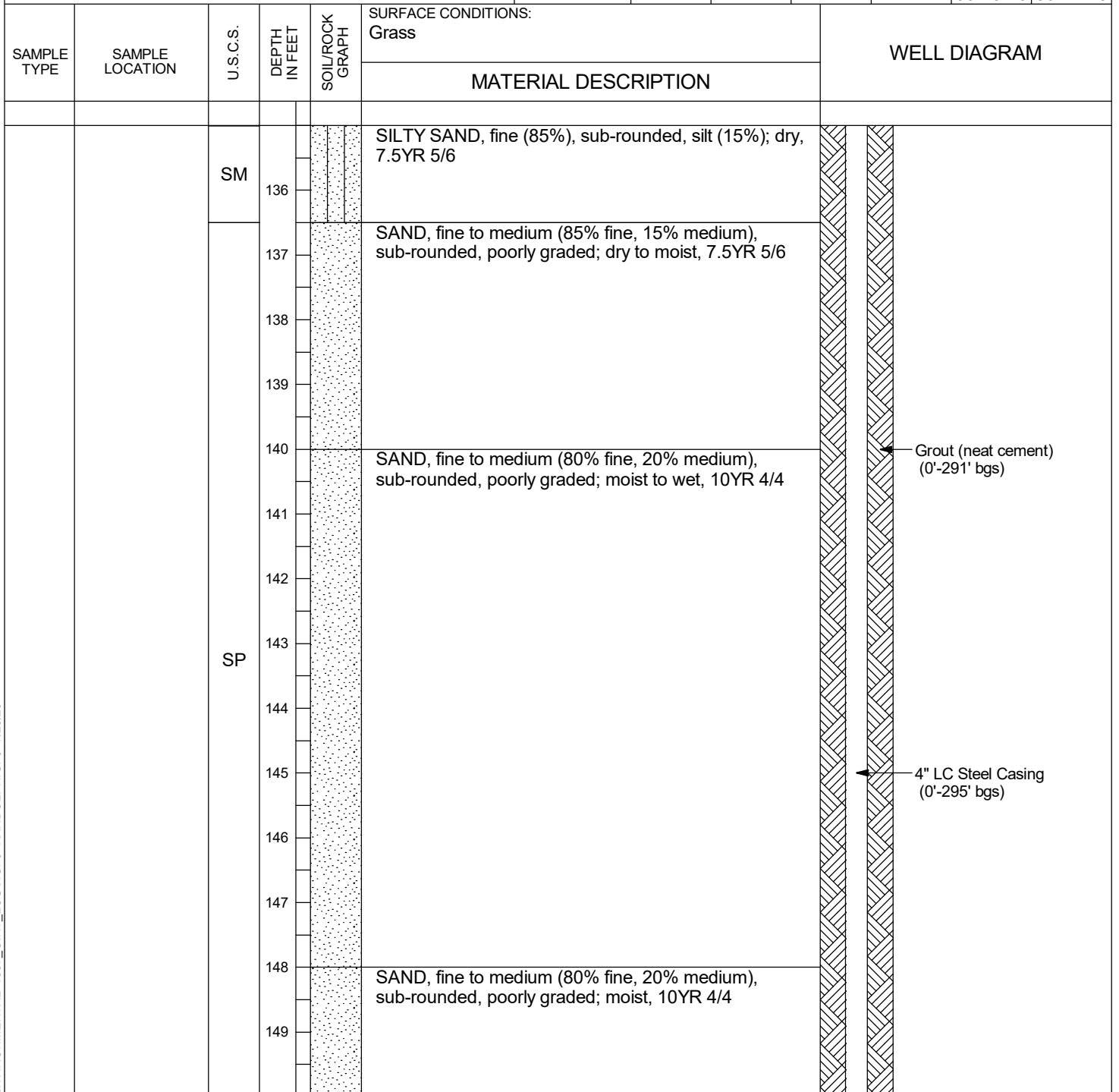
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			106		SAND, medium (90%), sub-rounded, poorly graded, with silt (10%); moist to wet, 7.5YR 4/1	
			107		SAND, medium to coarse (45% medium, 40% coarse), sub-angular to sub-rounded, poorly graded, gravel, fine to medium (10%), trace silt (5%); moist, 7.5YR 4/1	
			108		SAND, fine to coarse (20% fine, 70% medium, 5% coarse), sub-angular to sub-rounded, poorly graded, trace silt (5%); moist to wet, 7.5YR 4/1	
		SP	110		SAND, medium to coarse (60% medium, 40% coarse), sub-rounded to well-rounded, poorly graded; moist, 10YR 5/2	
			112		SAND, fine to medium (60% fine, 37% medium), sub-angular to sub-rounded, poorly graded, trace silt (3%); moist, 10YR 5/2	
			113			
			114			
			115			
			116			
		ML	117		SILT, low plasticity, soft, sand, fine to medium (10%), sub-rounded, trace clay (5%); dry to moist, 10YR 5/4	
			118			
			119			



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 9 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		DATE			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			06-15-20 06-17-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
COMP	MW13B-SOIL 121-125		121		SAND, medium to coarse (70% medium, 20% coarse), sub-angular to sub-rounded, poorly graded, with clay (9%), trace gravel, coarse (1%); moist, 7.5YR 4/4	<p>Grout (neat cement) (0'-291' bgs)</p> <p>4" LC Steel Casing (0'-295' bgs)</p>
GRAB	MW13B-GW 121-125		122		SAND, fine to coarse (25% fine, 70% medium, 5% coarse), sub-rounded, poorly graded; dry to moist, 7.5YR 5/3	
		SP	123		SAND, medium to coarse (50% medium, 35% coarse), sub-angular to sub-rounded, poorly graded, gravel, fine to coarse (10%), sub-angular, trace silt (5%); moist, 7.5YR 4/4	
			124		SAND, fine to medium (70% fine, 30% medium), sub-rounded, poorly graded; dry to moist, 7.5YR 5/6	
			125			
			126			
			127			
			128			
		SW	129		SAND, fine to coarse (10% fine, 60% medium, 30% coarse), sub-rounded, well graded; dry to moist, 7.5YR 6/6	
			130		SILTY SAND, fine (85%), sub-rounded, silt (15%); dry, 7.5YR 5/6	
		SM	131			
			132			
			133			
			134			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 10 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 11 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			151		SAND, fine to medium (80% fine, 15% medium), sub-rounded, poorly graded, trace silt (5%); dry to moist, 10YR 4/4	
			152			
		SP	153			
			154			
			155			
			156			← Grout (neat cement) (0'-291' bgs)
			157		SILT, low plasticity, soft, with sand, fine (15%), sub-rounded; dry, 10YR 5/4	
		ML	158			
			159			
			160		SAND, fine to medium (78% fine, 20% medium), sub-rounded, poorly graded, trace silt (2%); moist, 10YR 5/4	← 4" LC Steel Casing (0'-295' bgs)
		SP	161			
			162			
			163		SILT, low plasticity, soft, sand, fine (10%), sub-rounded; wet, 10YR 4/4	
		ML	164			
			164		SAND, fine to medium (85% fine, 5% medium), sub-rounded, poorly graded, with silt (10%); moist, 10YR 5/4	
		SP				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 12 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1000
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME 1300
GROUND SURFACE ELEVATION:		DATE			DATE
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
		SP	166		SAND, fine to medium (85% fine, 5% medium), sub-rounded, poorly graded, with silt (10%); moist, 10YR 5/4	<p>Grout (neat cement) (0'-291' bgs)</p> <p>4" LC Steel Casing (0'-295' bgs)</p>
		ML	167		SILT, low plasticity, soft to medium stiff, trace sand, fine (5%); dry, 10YR 5/4	
		SP	168		SAND, fine to medium (80% fine, 15% medium), sub-rounded, poorly graded, trace silt (5%); moist to wet, 10YR 4/4	
		ML	169		SANDY SILT, low plasticity, soft, sand, fine to medium (30%), sub-rounded; moist, 10YR 5/4	
		SP	170		SAND, fine to medium (49% fine, 49% medium), sub-rounded, poorly graded, trace silt (2%); dry to moist, 10YR 5/4	
		ML	171			
		SP	172			
		ML	173			
		SP	174			
		ML	175			
		SP	176			
		ML	177			
		SP	178			
		ML	179			
		SP	180			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 13 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME 1000
BORING DEPTH: 310 FT BGS		DATE			FINISH TIME 1300
GROUND SURFACE ELEVATION:		DATE			DATE
DATUM: UTM NAD83		CASING DEPTH			06-15-20 06-17-20
COMMENTS:					

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
COMP	MW13B-SOIL 181-185		181			<p>Grout (neat cement) (0'-291' bgs)</p> <p>4" LC Steel Casing (0'-295' bgs)</p>
GRAB	MW13B-GW 181-185		182		SAND, fine to coarse (25% fine, 70% medium, 5% coarse), sub-angular to sub-rounded, poorly graded; dry to moist, 10YR 5/4	
			183			
			184			
			185		SAND, fine to coarse (55% fine, 40% medium, 5% coarse), sub-rounded, poorly graded; dry to moist, 10YR 5/6	
			186			
		SP	187			
			188			
			189			
			190			
			191			
			192			
			193			
			194			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 14 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			196		SAND, medium to coarse (30% medium, 50% coarse), sub-rounded, poorly graded, with gravel, fine (20%), sub-rounded; moist to wet, 10YR 5/6	<p>Grout (neat cement) (0'-291' bgs)</p> <p>4" LC Steel Casing (0'-295' bgs)</p>
			197			
			198			
			199		SAND, fine to medium (70% fine, 30% medium), sub-rounded to well-rounded, poorly graded; moist to wet, 10YR 5/6	
			200			
			201		SAND, fine to medium (85% fine, 15% medium), well-rounded, poorly graded; moist, 10YR 5/6	
			202			
			203			
			204			
			205		SAND, fine to coarse (5% fine, 55% medium, 40% coarse), sub-angular to sub-rounded, poorly graded; dry, 10YR 4/3	
			206			
			207			
			208			
			209			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 15 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM							
					MATERIAL DESCRIPTION								
COMP	MW13B-SOIL 221-225 (+DUP)	SW	211		SAND, fine to coarse (40% fine, 50% medium, 10% coarse), sub-rounded, well graded; dry, 10YR 5/3								
			212										
			213										
			214										
			215						SAND, fine to coarse (10% fine, 40% medium, 50% coarse), sub-rounded, well graded; dry, 10YR 5/4				
			216										
			217										
			218										
			219										
			220										
221													
222													
223													
224													
GRAB					MW13B-GW 221-225 (+DUP)								

← Grout (neat cement)  
(0'-291' bgs)

← 4" LC Steel Casing  
(0'-295' bgs)

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 16 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			226		SAND, fine to coarse (10% fine, 70% medium, 20% coarse), sub-angular to sub-rounded, well graded; dry, 10YR 5/4	<p>Grout (neat cement) (0'-291' bgs)</p> <p>4" LC Steel Casing (0'-295' bgs)</p>
		SW	227		SAND, fine to coarse (25% fine, 63% medium, 10% coarse), sub-angular to sub-rounded, well graded, trace gravel, fine (2%); dry, 10YR 4/4	
			228			
			229			
			230		SAND, fine to coarse (5% fine, 65% medium, 30% coarse), sub-angular to sub-rounded, poorly graded; moist, 10YR 5/4	
			231			
			232			
			233			
		SP	234			
			235		SAND, fine to coarse (5% fine, 55% medium, 40% coarse), sub-angular to sub-rounded, poorly graded; moist, 10YR 5/4	
			236			
			237			
			238			
			239			



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 17 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			241		SAND, fine to coarse (30% fine, 65% medium, 5% coarse), sub-angular to sub-rounded, poorly graded; moist, 10YR 4/4	
			242			
			243			
			244			
		SP	245		SAND, fine to medium (45% fine, 50% medium), sub-rounded, poorly graded, trace silt (3%), trace gravel, fine (2%); moist, 10YR 5/4	← Grout (neat cement) (0'-291' bgs)
			246			
			247		SAND, fine to coarse (15% fine, 50% medium, 20% coarse), sub-rounded, poorly graded, with gravel, fine to coarse (12%), sub-angular, trace cobbles (3%); moist, 10YR 5/4	
			248			
			249			
			250		SAND, fine to coarse (40% fine, 30% medium, 25% coarse), sub-rounded, well graded, trace gravel, fine (3%), trace cobbles (2%); moist, 10YR 5/4	← 4" LC Steel Casing (0'-295' bgs)
		SW	251			
			252			
			253			
			254			

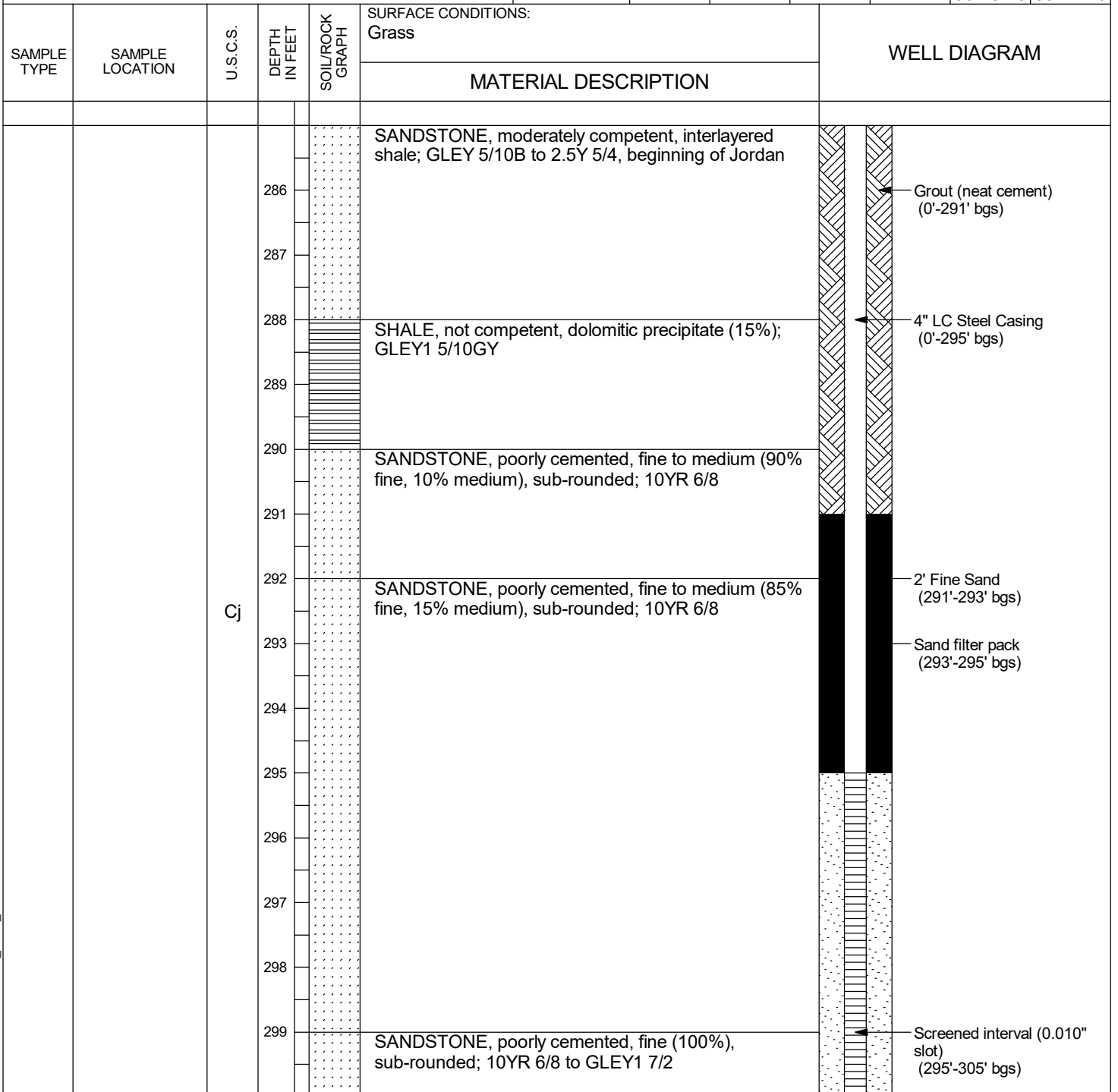
CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 18 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS:		WELL DIAGRAM
					Grass	MATERIAL DESCRIPTION	
		SW	256		SAND, fine to coarse (20% fine, 60% medium, 20% coarse), sub-rounded, well graded; moist, 2.5Y 6/4		<p>Grout (neat cement) (0'-291' bgs)</p> <p>4" LC Steel Casing (0'-295' bgs)</p>
		SP	257		SAND, fine (90%), well-rounded, poorly graded, with silt (10%); dry, 2.5Y 5/3		
			258				
		SW	259		SAND, fine to coarse (30% fine, 55% medium, 10% coarse), sub-rounded, well graded, trace lithic fragments (5%); moist to wet, 2.5Y 6/4		
		GP	260		GRAVEL, medium to coarse (60% medium, 25% coarse), sub-angular to well-rounded, poorly graded, sand, coarse (10%), well-rounded, trace silt (5%); wet, 10YR 3/3		
			261				
			262				
		SP	263		SAND, fine to medium (20% fine, 80% medium), sub-rounded, poorly graded; moist, 10YR 4/6		
			264				
			265				
			266				
		SP	267		SAND, fine to medium (65% fine, 30% medium), sub-rounded, poorly graded, trace silt (5%); dry to moist, 10YR 4/4		
			268				
			269				

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 19 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			271		LITHIC FRAGMENTS, not competent dolostone, very weathered, sand, fine (30%); 10YR 6/3, clay observed	<p>Grout (neat cement) (0'-291' bgs)</p> <p>4" LC Steel Casing (0'-295' bgs)</p>
			272		LITHIC FRAGMENTS, not competent dolostone, very weathered, sand, fine (30%); 10YR 6/3, clay observed, coarser fragments than 270'-275' bgs	
			273			
			274			
			275			
			276			
		LF	277			
			278			
			279			
			280		LITHIC FRAGMENTS, not to moderately competent dolostone, sand, medium to coarse (30%), dolomitic precipitate (30%), oxidized; 2.5Y 5/4	
			281	LITHIC FRAGMENTS, not to moderately competent dolostone, sand, medium to coarse (30%), dolomitic precipitate (30%), oolitic texture (15%), vugs (15%); 10YR 5/3		
			282			
			283			
			284			

CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 20 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			DATE
COMMENTS:		CASING DEPTH			06-15-20 06-17-20



CLIENT: MPCA		JOB NO.: 60618753	LOCATION: East Metro, MN		
PROJECT: Project 1007		DRILLING METHOD: Sonic			BORING NO. MW13B
LOGGED BY: AS/AEL/JM	CHECKED BY: AS	SAMPLING METHOD: 10' acetate bags			SHEET 21 OF 21
DRILLING CONTR.: Traut					DRILLING
DRILLER: Dan Pflipsen	EQUIP.: Sonic	WATER LEVEL			START TIME
BORING DEPTH: 310 FT BGS		TIME			FINISH TIME
GROUND SURFACE ELEVATION:		DATE			1000 1300
DATUM: UTM NAD83		DATE			06-15-20 06-17-20
COMMENTS:		CASING DEPTH			

SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass	WELL DIAGRAM
					MATERIAL DESCRIPTION	
			301		SANDSTONE, poorly cemented, fine to medium (80% fine, 20% medium), sub-rounded; GLEY1 7/2	<p>Screened interval (0.010" slot) (295'-305' bgs)</p> <p>Sluff Backfill (305'-310' bgs)</p>
			302		SANDSTONE, poorly cemented, fine to medium (80% fine, 20% medium), sub-rounded, trace shale (5%); GLEY1 7/1, 1" shale seam @ 304' bgs	
			303			
			304			
		Cj	305			
			306			
			307			
			308			
			309			
			310		E.O.B. @ 310' bgs, no refusal	
			311			
			312			
			313			
			314			