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



CLIENT:							JOB NO.:		LOCATION:				
PROJECT:	1PCA						60618753 DRILLING METHO		Twin Cit	ies Ea	st Metro,	MN BORING N	0
	roject ´	1007					Sonic	ט.					
LOGGED BY:	AS/A	EL		CHEC	KED BY:	AEL/AS						SHEET	[847052]
DRILLING CO	NTR.:	Traut										1 0	OF 13
DRILLER: [FOLIP	ı: Sor	nic	SAMPLING METH						LING
BORING DEP				Laon			10' acetate ba	gs				START	FINISH
GROUND SU			N: 9	10.51f	t AMSL		WATER LEVEL					TIME	TIME
DATUM: N	AD 83 L	JTM 1	5 (met	ers)			TIME					1530	1815
COMMENTS: Northing: 4	979696	6.86					DATE					DATE	DATE
Easting: 50	7372.8					SURFACE CONDITION	CASING DEPTH					01-06-20	01-08-20
SAMPLE ID	FEET DRIVEN FEET RECOVERED	DIA (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass	OLOGIC DESC	CRIE	PTION	_	WEL	L DIAGRA	M
	/ ##				0)	ZIIII			11011				
			SM	1 - 2 -		SILTY SAND, fir medium), well-ro material (5%); d	ounded, silt (20% ry, 10YR 4/2	6), tr	race organic				
			CL SC	3 -		CLAY, low plast			e (5%), _(5%); dry, 10YR_				
			30	 	////	1√4/2	· ·						
			SP	5 —		CLAYEY SAND medium), well-ro to medium (10% sub-rounded; dr SAND, medium coarse), sub-rou	ounded, clay (20 o fine, 5% mediu y to moist, 10YF to coarse (45%	%), m), 8 3/2 med	with gravel, fine sub-angular to 2 dium, 40%			out (neat cen '-228' bgs)	nent)
				7		fine to coarse (1 sub-rounded; dr SILTY CLAY, lo	2% fine, 3% coay to moist, 10YF w to no plasticity	arse) 8 4/3 ⁄, tra), sub-angular to ce gravel,				
			CL	8 — 9 — 10 —		medium to coars angular; dry, 10`	se (2% medium, YR 4/3	1%	coarse),		4"	LC Steel Cas	ina
				11 -		SILT, with clay (angular to sub-a	15%), with grave ingular; dry to m	el, m oist,	nedium (10%), , 10YR 4/4			'-230' bgs)	siriy
5S.GPJ 6/19/2				12 -	-								
BORING LOC			ML	14 -									
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20				16 —		SILT, with clay (sub-rounded; dr	25%), with grave y to moist, 10YF	el, fii R 5/4	ne (10%), !				
MENTAL 1007				18 —	-	SILT, with sand, (5%), trace grav moist, 2.5Y 4/4							
ENVIRON			SP	19 —		SAND, fine to m sub-angular to s							



CLIENT:	4DO 4						JOB NO.:	LC	OCATION:	···	-4 1 4 - 4	- NANI	
PROJECT:	IPCA						60618753 DRILLING METHOD): D:	Twin Ci	ities Ea	st ivietro	O, IVIN BORING N	O.
	roject 1						Sonic					MW3A	[847052]
LOGGED BY:	AS/AI	<u>EL</u>		CHECKE	ED BY:	AEL/AS	-					SHEET	
DRILLING CO	NTR.: 7	Γraut										2 (DF 13
DRILLER: D	an Pflip	sen		EQUIP.:	Son	ic	SAMPLING METHO 10' acetate bag					DRIL	LING
BORING DEP	гн: 25	0 ft bgs										START	FINISH
GROUND SUF				10.51ft	AMSL		WATER LEVEL					TIME	TIME
DATUM: NA	AD 83 L	JTM 15	5 (met	ers)			DATE					1530 DATE	1815 DATE
Northing: 4 Easting: 50	979696	68.86					CASING DEPTH					01-06-20	01-08-20
Easing. 50		0			¥	SURFACE CONDITION						01-00-20	01-00-20
SAMPLE ID	DRIVEN	PID (ppm)	S.C.S.	DEPTH IN FEET	ROC APH	Grass					WE	LL DIAGRA	М
SAMI LE ID	PEET DRIN	ਜ ਕੁ	U.S	필드	SOIL/ROCK GRAPH	LITHO	DLOGIC DESC	RIP	TION		***	LL DI/ (OI V)	
	/ ##				0,								
						(10%), trace grav	vel, fine (5%), su	ıb-an	igular to	7 🔯		Grout (neat cen (0'-228' bgs)	nent)
				21		SAND, medium f	,	nediı	um, 70%	¹ 🔯		(0 220 090)	
						coarse), sub-rou	nded, poorly gra	ded,	with gravel,				
				22		trace cobbles (5°	%); moist, 2.5Y 3	3/3					
			SP	23		SAND, coarse (7 \setminus with gravel, fine							
						dry to moist, 10Y	′R 4/4		•				
				24		SAND, fine to mo	edium (15% fine orly graded, trace	, 70% silt	% medium), (5%): drv.				
				25		10YR 4/4] 👹 .		4" LC Steel Cas	sing
						SAND, medium to coarse), sub-ang	gular, poorly grad	led, ۱	with gravel, fine			(0'-230' bgs)	
				26		∖to coarse (25% f ∖10YR 4/4	ine, 5% medium), sul	b-rounded; dry,				
				27		SILTY SAND, fin				¹			
						medium), sub-ro SILTY SAND, fin				~\\\\\			
				28		medium), sub-ro							
			SM	29									
				30		SILTY SAND, fin medium), sub-ro							
				31		wet, 10YR 5/4	unded to well-rol	unue	u, Siit (2070),				
/20													
6/19/20				32		SAND, medium to coarse), sub-ang							
BORING LOGS.GPJ				33		wet, 10YR 4/3	guiar to well-rouri	u c u,	poorly graded,				
FOG			SP	H									
NING 0				34		SAND, fine (90% clay (10%), low p							
				35		SAND, fine to co	•			-		Grout (neat cen	nent)
GINT_LOGS.GPJ			SW			coarse), sub-rou	nded to well-rou	nded	l, well graded,			(0'-228' bgs)	
기				36		trace silt (5%); m							
GIN			CL	37		CLAY, medium p	•			_X			
1007			SW			coarse), sub-rou	nded to well-rou						
ENTAL			GP	38		moist to wet, 10\ GRAVEL, fine (7		ed to	well-rounded	/			
ONME			<u> </u>	39		, poorly graded, w	ith sand, coarse	(25%					
ENVIRONMENTAL			SW			well-rounded; mo			medium, 33%	J 💹			



CLIENT:							JOB NO.:		LOCATION:						
	1PCA						60618753			vin Citie	s Eas	st Met	ro, MN		
PROJECT:	roject	1007					DRILLING METHO	OD:					В	ORING NO	Э.
LOGGED BY:				CHEC	KED BY:	AEL/AS								W3A [847052]
DRILLING CO	NTR.:	Traut												3 c	F 13
DRILLER: D	an Pfli	psen		EQUIF	o.: Soi	nic	SAMPLING METH								LING
BORING DEP							10' acetate ba	ags						START	FINISH
GROUND SUF	RFACE E	LEVATIO	N: 9	10.51	ft AMSL		WATER LEVEL							TIME	TIME
DATUM: NA	AD 83 U	JTM 1	5 (met	ters)			TIME							1530	1815
COMMENTS: Northing: 4	.97969	6 86					DATE							DATE	DATE
Easting: 50	7372.8					_	CASING DEPTH						01	1-06-20	01-08-20
SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (bbm)	.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	NS:					WI	ELL DI	AGRA	M
	RECO.				SOI	LITH	OLOGIC DES	CRI	PTION						
												N//4	411.00		
						coarse), sub-and	gular to well-rou 5Y 4/3	ınde	d, well grade	ed; /			4" LC S' (0'-230'	teel Cas ' bgs)	ing
				41		SAND, fine to m sub-rounded, po	nedium (50% me			rse),			•	- ,	
				42											
			SP			:									
				43											
				44		SAND, medium coarse), sub-an				aded					
						with gravel, fine									
				45		2.5Y 4/2 SAND, fine to co	oarso (5% fino	150/	modium 6	70/					
			SP	46		coarse), sub-rou	unded, poorly gr	ade	d, with grave	∍l,					
			35	40		fine (20%), sub- 4/2	angular to sub-	roun	ded; wet, 2.	5Y					
				47	601	GRAVEL, fine to	n coarse (55% f	ine	20% mediur	n					
					1° 0° <	5% coarse), sub	o-angular to well	l-rou	inded, poorly	/					
				48		graded, with sar 10% coarse), su				lium,					
			GP	49		1070 coarse), se	ib-rourided, wet	., ∠.	71 -1/2						
				"											
				50	000	SAND, medium	to coarse (15%	me	dium 70%					neat cem	ent)
				-		coarse), sub-roι	unded to well-ro	und	ed, poorly				(0'-228'	' bgs)	
				51		graded, with gra sub-rounded; dr									
				52		SAND, fine to m	nedium (80% fin	e, 1	5% medium						
5				-		sub-angular to s (5%); dry to moi		orly	graded, trad	e silt					
5				53		(370), dry to mor	31, 2.31 4/2								
			SP												
				54											
				55 -							X -	Ŋ.	-4" LC S	teel Cas	ina
5													(0'-230'	' bgs)	J
				56	+										
<u> </u>						-									
3				57	1000	GRAVEL, fine to									
-			GP	58 -	10°0-	angular to sub-a coarse (25%), s									
						moist, 2.5Y 4/1	·								
				59		SAND, fine to m	nedium (75% fin	e, 1	5% medium),					
	1		SP	1	1	sub-angular, po					$\rangle\rangle$	\rangle			



CL	IENT:							JOB NO.:		LOCATION:				
MPCA PROJECT:								60618753 Twin Cities East Metro, MN						
PF		roject ²	1007					DRILLING METHO Sonic	D:				BORING N	
LC	GGED BY:	AS/A	EL		CHEC	KED BY:	AEL/AS						MW3A SHEET	[847052]
DE	RILLING CO	NTR ·	Traut											40
					FOLUE	. Car	io	SAMPLING METH	OD:					DF 13 LING
	RILLER: D				EQUIF	o.: Sor	iic	10' acetate ba	gs				START	FINISH
	ROUND SUF			ννi- Ο	10 51	ft AMSL		WATER LEVEL					TIME	TIME
	TUM: NA					IT / WIOL		TIME					1530	1815
CC	DMMENTS:			- (<u> </u>			DATE					DATE	DATE
	orthing: 4 asting: 50							CASING DEPTH					01-06-20	01-08-20
	AMPLE ID	FEET DRIVEN FEET RECOVERED	OIA (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass LITHO	OLOGIC DESC	CRI	PTION		WEL	L DIAGRA	
-							\sub-angular, tra	co silt (5%): mai	ct '	2 5V 5/2	V/I	N/A		
				SP			SAND, fine to co	parse (5% fine, 2	20%	6 medium, 70%				
					61	*****	coarse), sub-rou $_{ eal}$ graded, trace gr	avel, fine (5%),	sub	-angular to				
				SW	62 -		\sub-rounded; dr SAND, fine to co coarse), sub-rou	parse (15% fine,	50	% medium, 35%				
					63		trace gravel, me moist, 2.5Y 5/2	edium (2%), sub-	anç	gular; dry to				
		SP 64 SAND, medium to coarse (coarse), sub-angular to sub-								dium, 20%				
					65			to medium (5%	fine	e, 25% medium),			rout (neat cen)'-228' bgs)	nent)
					66									
					67		SILTY SAND, fir medium), sub-ar							
				SM	68		dry, 2.5Y 4/2							
				SW	69		SAND, fine to co	. `		% medium, 45% d, well graded,				
				300	70		with gravel, med sub-rounded, tra	dium (10%), sub- ace silt (5%); dry	ano to	gular to moist, 2.5Y 4/2	/	4"	LC Steel Cas	sing
					71 -		GRAVEL, fine to 3% coarse), sub graded, with sar	o-angular to sub-	rou	inded, poorly		(0	0'-230' bgs)	
9/20				GP	72		well-rounded, tra							
GPJ 6/1					73									
. LOGS.														
RING					74		DOLOSTONE, r			weathered and trace glauconite				
3P.) BC					75		grains/smear (2-	-3%); 10YR 5/6						
LOGS.(76		precipitate), 10Y DOLOSTONE, r ∫broken, dolomiti	not competent, v		weathered and trace glauconite				
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20					77		grains/smear (2- precipitate), 10Y	-3%); 10YR 5/6						
AL 100					78			itate (10-15%), t	race	e sand, fine (3%),				
NMENT					79 -		well-rounded, tra 5/4	ace glauconite s	mea	ars (1%); 10YR				
NVIRO					"									
шЩ		1									K/4	K/4		



4004					JOB NO.:			T : 0::					
						D:		I win Cit	ies Ea	st Me		ORING NO).
roject 1007					Sonic						M	۱۸/۵۵ ۲	8470521
AS/AEL		CHECK	ED BY:	AEL/AS									0+1002
NTR.: Traut												5 0	F 13
an Pflipsen		EQUIP.:	: Son	iic									
•	3				- 10° acetate ba	gs					:	START	FINISH
RFACE ELEVATI	on: 9	10.51ft	AMSL		WATER LEVEL							TIME	TIME
AD 83 UTM 1	5 (met	ters)			TIME								1815
979696.86					DATE							DATE	DATE
7372.86				SUBEACE CONDITION	CASING DEPTH						01	1-06-20	01-08-20
PEE DRIVER VERED PID PPID	S.C.S.	EPTH FEET	L/ROCK RAPH	Grass	NO.					W	ELL DI	AGRAI	М
FEET RECOV) D	□≧	SOI	LITHO	DLOGIC DESC	RI	PTION						
		81 — 82 — 83 — 84 — 85 — 86 — 87 — 88 —		SANDY DOLOS bedding, sand (2 vugs (5-10%), trace quare DOLOSTONE, representation of the control	tate (10-15%), itz precipitation (170NE, not come 20-30%), dolomi ace chert (5%); noderately come, 2.5Y 6/3 TONE, compete cell-rounded, dolvugs (5%), trace quartz; 270NE, moderatic precipitate (270 ded, trace quart; 270 ded, trace quartic quarti	pete 2% petetic p 2.5 pete	e glaucom); 2.5Y 6/6 ent, appar precipitate Y 6/3 ent, massive, tic precipi ert (2.5%) Y 6/4	ent (20%), ve, sand, tate t, trace			(0'-228' -4" LC S	' bgs) teel Cas	,
	ML	91 — 92 — 93 — 94 — 95 — 96 — 97 —		DOLOSTONE, r precipitate (5-10 the staining on d (5%); 2.5Y 6/3 DOLOSTONE, r manganese stain SANDY DOLOS (20%), massive 1 mm lamellae b (3%); 2.5Y 6/3, o DOLOSTONE, r manganese/iron trace sand, med SILT, with weath sand, fine (15%) observed in the of drilling	not competent, r %), trace iron si lolomitic precipii not competent, i ning (10%); 2.5° TONE, moderar manganese sta lands (5%), trace clay observed moderately com staining along to ium (5%); 2.5° leered dolostone i; 10YR 4/4, silt video log - may very weathered,), with clay (30%	ron / 5/5 ely ining e recoete and hav	ng (5%) - trace gla staining (* 3, clay obsections (20%) competer g (5-10%) worked cl ent, patchy ures (20% clay obsections (25%) clay not e been th ostone roce nedium pla	half of uconite 0%), served it, sand trace asts 6), rived , with e result					ent)
) P	Dan Pflipsen PTH: 250 ft bgs RFACE ELEVATI AD 83 UTM 1 4979696.86 07372.86	Project 1007 AS/AEL ONTR:: Traut Dan Pflipsen OTH: 250 ft bgs RFACE ELEVATION: 9 AD 83 UTM 15 (met 4979696.86 07372.86 1334 1344 1356 1366 1376	Project 1007 AS/AEL CHECK ONTR:: Traut Dan Pflipsen EQUIP. OTH: 250 ft bgs RFACE ELEVATION: 910.51 ft AD 83 UTM 15 (meters) 4979696.86 07372.86 HABL 81 82 83 84 85 86 87 90 91 92 93 94 95 ML 97 98	Project 1007 AS/AEL ONTR: Traut Dan Pflipsen PTH: 250 ft bgs RFACE ELEVATION: 910.51 ft AMSL AD 83 UTM 15 (meters) 4979696.86 07372.86 Galage Galag	Project 1007 AS/AEL CHECKED BY: AEL/AS ONTR: Traut Dan Pflipsen EQUIP.: Sonic OTH: 250 ft bgs RFACE ELEVATION: 910.51ft AMSL AD 83 UTM 15 (meters) 4979696.86 07372.86 LITHO BOLOSTONE, r trace sand (2%), well-roun trace sand, (2%), massive, dolomi (20%), well-roun trace chert (5%), DOLOSTONE, r precipitate (5-10 the staining on (5%); 2.5Y 6/3 DOLOSTONE, r manganese stain (5%), polostone, r manganese stain (5%), polostone, r manganese stain (3%); 2.5Y 6/3 DOLOSTONE, r manganese stain (3%); 2.5Y 6/3 DOLOSTONE, r manganese stain (5%), polostone, r manganese stain (5%); 2.5Y 6/3 DOLOSTONE, r manganese stain (5%); 2.5Y 6/3 D	Project 1007 AS/AEL CHECKED BY: AEL/AS DATE: Traut Dan Pflipsen EQUIP: Sonic SAMPLING METHO SONTR:: Traut Dan Pflipsen EQUIP: Sonic SAMPLING METHO Thr.: 250 ft bgs RFACE ELEVATION: 910.51 ft AMSL AD 83 UTM 15 (meters) DATE CASING DEPTH SURFACE CONDITIONS: Grass LITHOLOGIC DESC BY DOLOSTONE, moderately comy dolomitic precipitate (10-15%), trace quart yrecipitate (2%), 2.5Y 6/3 DOLOSTONE, moderately comy trace sand (2%), 2.5Y 6/3 DOLOSTONE, moderately comy trace sand (2%), 2.5Y 6/3 SANDY DOLOSTONE, moderately comy trace sand (2%), 2.5Y 6/3 SANDY DOLOSTONE, moderately comy trace sand (2%), 2.5Y 6/3 SANDY DOLOSTONE, moderately comy trace sand (2%), 2.5Y 6/3 SANDY DOLOSTONE, moderately comy trace sand (2%), 2.5Y 6/3 DOLOSTONE, not competent, in manganese staining (10%); 2.5Y 6/3 DOLOSTONE, not competent, in manganese staining (10%); 2.5Y 6/3 DOLOSTONE, not competent, in manganese staining (10%); 2.5Y 6/3 DOLOSTONE, moderately comy trace staining (10%); 2.5Y 6/3 DOLOSTONE, not competent, in manganese staining (10%); 2.5Y 6/3 DOLOSTONE, moderately comy trace sand, medium (5%); 2.5Y 6/3 DOLOSTONE, moderately comy manganese staining (10%); 2.5Y 6/3 DOLOSTONE, moderately comy trace sand, medium (5%); 2.5Y 6/3 DOLOSTONE, moderately comy trace sand, medium (5%); 2.5Y 6/3 DOLOSTONE, moderately comy trace sand, medium (5%); 2.5Y 6/3 DOLOSTONE, moderately comy trace sand, medium (5%); 2.5Y 6/3 DOLOSTONE, moderately comy trace sand, medium (5%); 2.5Y 6/3 DOLOSTONE, moderately comy trace sand, medium (5%); 2.5Y 6/3 DOLOSTONE, moderately comy trace sand, medium (5%); 2.5Y 6/3 DOLOSTONE, were weathered, fragments (60%), with clay (30%) of drilling DOLOSTONE, very weathered, fragments (60%), with clay (30%) of drilling	AS/AEL CHECKED BY: AEL/AS AS/AEL CHECKED BY: AEL/AS DRILLING METHOD: Sonic AS/AEL CHECKED BY: AEL/AS DRILLING METHOD: Sonic SAMPLING METHOD: 10' acetate bags RFACE ELEVATION: 910.51 ft AMSL AD 83 UTM 15 (meters) DATE AS/BEL AD 83 UTM 15 (meters) DOLOSTONE, moderately competed dolomitic precipitate (10-15%), trace (5%), trace quartz precipitate (20-30%), dolomitic precipitate (20-30%), dolomitic precipitate (20-30%), used enter trace sand (2%), 2.57 6/3 BSANDY DOLOSTONE, moderately competed trace sand (2%), trace enter (5%); 2.57 6/3 BSANDY DOLOSTONE, moderately competed trace sand (2%), trace enter (5%); 2.57 6/3 BSANDY DOLOSTONE, moderately competed trace sand (2%), trace enter (5%); 2.57 6/3 BSANDY DOLOSTONE, moderately competed trace cand, moderately massive, dolomitic precipitate (20%), trace enter (5%); 2.57 6/3 DOLOSTONE, not competent, massive, dolomitic precipitate (20%), well-rounded, trace quartz precipitate (20%), trace enter (5%); 2.57 6/3 DOLOSTONE, not competent, massive colomitic precipitate (20%), massive, dolomitic precipitate (20%), massive manganese staining (10%); 2.57 6/3 DOLOSTONE, not competent, massive precipitate (20%), massive manganese staining (10%); 2.57 6/3 DOLOSTONE, not competent, massive precipitate (20%), massive manganese staining (10%); 2.57 6/3 DOLOSTONE, not competent, massive precipitate (20%), massive manganese staining (10%); 2.57 6/3 DOLOSTONE, not competent, massive precipitate (20%), massive manganese staining (10%); 2.57 6/3 DOLOSTONE, not competent, massive precipitate (20%), massive manganese staining along fractures and, medium (5%); 2.57 6/3 DOLOSTONE, moderately competer manganese staining along fractures and, medium (5%); 2.57 6/3 DOLOSTONE, moderately competer manganese filon staining along fractures and, medium (5%); 2.57 6/3 DOLOSTONE, very weathered, dolomitic precipitate, 20%, massive manganese staining along fractures and, medium (5%); 2.57 6/3 DOLOSTONE, very weathered, dolomitic precipitate, down down down down down down down d	AS/AEL CHECKED BY: AEL/AS DRILLING METHOD: Sonic AS/AEL CHECKED BY: AEL/AS DRILLING METHOD: Sonic Th: 250 ft bgs RFACE ELEVATION: 910.51 ft AMSL AD 83 UTM 15 (meters) DATE CASING DEPTH DATE CASING DEPTH DOLOSTONE, moderately competent, massive, dolomitic precipitate (10-15%), trace glaucom (5%), 2.57 6/3 DOLOSTONE, moderately competent, massive, fine (20-30%), uell-orunded, dolomitic precipitate (71-15-20%), trace chart (2-5%) iron staining (2%) trace quartz; 2.57 6/4 SANDY DOLOSTONE, competent, massive, fine (20-30%), brace chart (2-5%) iron staining (10%); 2.57 6/3 (aly observed) DOLOSTONE, not competent, massive, dolomitic precipitate (20%), massive, dolomitic precipitate (20%), sand, fine (15%); 2.57 6/3 (aly observed) DOLOSTONE, not competent, massive, rion is along fractures; 2.57 6/4 SANDY DOLOSTONE, competent, massive, rion is along fractures; 2.57 6/4 DOLOSTONE, not competent, massive, rion is along fractures; 2.57 6/4 DOLOSTONE, not competent, massive, rion is along fractures; 2.57 6/4 DOLOSTONE, not competent, massive, rion is along fractures; 2.57 6/4 DOLOSTONE, not competent, massive, rion is along fractures; 2.57 6/4 DOLOSTONE, not competent, massive, rion is along fractures; 2.57 6/4 DOLOSTONE, not competent, massive, dolomitic precipitate, trace gla (5%); 2.57 6/3, clay observed DOLOSTONE, moderately competent, patch, manganese staining (10%); 2.57 6/3, clay observed DOLOSTONE, moderately competent, patch, manganese staining (5%), clay 6/3, clay observed DOLOSTONE, moderately competent, patch, manganese staining (5%), store reworked of the water of the staining on dolomitic precipitate, trace gla (5%), 157 6/3, clay observed DOLOSTONE, moderately competent, patch, manganese staining (5%), 2.57 6/3, clay observed DOLOSTONE, not competent, patch, manganese staining (5%), store reworked of the water of the staining on dolomitic precipitate, trace gla (5%), store and medium (5%), 2.57 6/3, clay observed DOLOSTONE, not competent, patch, manganese staining (5%), store rewor	### ASIAPL CHECKED BY: AEL/AS Checked By: AEL/AS Checked By: AEL/AS	ASAREL CHECKED BY: AEL/AS Project 1007 ASI/AEL CHECKED BY: AEL/AS DAILING METHOD: SONIC SAMPLING METHOD: SONIC SAMPLING METHOD: O' acetate bags The 250 hbgs PRACE ELEVATION: 910.51 ft AMSL AD 83 UTM 15 (meters) DATE CASING DEPTH DOLOSTONE, moderately competent, massive, dolomitic precipitate (10-15%), trace ugartzy trace sand (2%), 2.57 6/3 SANDY DOLOSTONE, moderately competent, massive, trace sand (2%), 2.57 6/3 SANDY DOLOSTONE, moderately competent, massive, trace sand (2%), 2.57 6/3 SANDY DOLOSTONE, moderately competent, massive, trace sand (2%), 2.57 6/3 SANDY DOLOSTONE, moderately competent, massive, trace sand (2%), 2.57 6/3 SANDY DOLOSTONE, moderately competent, massive, trace sand (2%), 2.57 6/3 SANDY DOLOSTONE, moderately competent, massive, trace sand (2%), 2.57 6/3 SANDY DOLOSTONE, moderately competent, massive, trace sand (2%), 2.57 6/3 SANDY DOLOSTONE, moderately competent, massive, trace sand (2%), 2.57 6/3 DOLOSTONE, moderately competent, massive, trace sand (2%), 2.57 6/3 SANDY DOLOSTONE, moderately competent, massive, trace sand (2%), trace ugartzy competent, massive, dolomitic precipitate (15-20%), trace ugartzy competent, massive, trace sand (2%), 2.57 6/3 DOLOSTONE, moderately competent, massive, trace glauconite (2%), trace ugartzy competent, massive, trace sand (2%), 2.57 6/3 DOLOSTONE, not competent, massive, tron staining (5%), half of the staining on dolomitic precipitate, trace glauconite (2%), massive manganeses staining (5%), trace trace glauconite (2%), massive manganeses staining (5%), brace trace glauconite (2%), massive manganeses staining (5%), brace trace glauconite (2%), massive manganeses staining along fractures (20%), trace sand, medium (5%), 2.57 6/3, clay observed SANDY DOLOSTONE, moderately competent, patchy manganeses in staining along fractures (20%), trace sand, medium (5%), 2.57 6/3, clay observed SANDY DOLOSTONE, moderately competent, patchy manganeses in staining along fractures (20%), trace sand, medium (5%), 2.57 6/3, clay observed observed	### APPOIDS TONE, moderately competent, massive, sand, fine (20-30%), well-rounded, dolomitic precipitate (5%), 2.5 Y 6/3 ### SANDY DOLOSTONE, moderately competent, massive, sand, fine (20-30%), well-rounded, dolomitic precipitate (15%), 175 C 6/3 DOLOSTONE, moderately competent, massive, sand, fine (16%), 2.5 Y 6/3 DOLOSTONE, moderately competent, massive, in masking (3%), 125 Y 6/3, along being a staining (10%), and the staining on dolomitic precipitate, trace glauconite (15%), massive manganese staining (5%), had being a staining (10%), massive manganese staining (10%), mangalmese staining (10%), baserved DOLOSTONE, moderately competent, sand (20%), mangalmese staining (10%), baserved DOLOSTONE, moderately competent, sand (20%), mangalmese staining (10%), baserved DOLOSTONE, moderately competent, sand (20%), mangalmese staining (10%), 25 Y 5/3, dolostore pieces (25%), with sand, fine (15%), 10YK 4/4, slit and clay not observed in the video log - may have been the result of drilling pasticity, mangalmese/firon staining along fractures (20%), mangalmese/firon staining along	### OFFICIAL CHECKED BY: A ELUAS Project 1007 ASI/AEL CHECKED BY: A ELUAS ANTR: Traut DRILLING METHOD. Sonic SAMPLING METHOD. 10' acetate bags MATER LEVEL AD 83 UTM 15 (meters) DATE CASING DEPTH CASING DEPTH DOLOSTONE, moderately competent, massive, dolomitic precipitate (10-15%), trace ugal (20%), trace ugartz; 2.5Y 6/3 DOLOSTONE, moderately competent, massive, trace sand (2%), 2.5Y 6/3 DOLOSTONE, moderately competent, massive, trace sand (2%), 2.5Y 6/3 DOLOSTONE, moderately competent, massive, and, fine (20-30%), well-rounded, dolomitic precipitate (15-20%), trace ugartz; 2.5Y 6/3 DOLOSTONE, moderately competent, massive, and, fine (20-30%), well-rounded, dolomitic precipitate (15-20%), trace ugartz; 2.5Y 6/3 DOLOSTONE, moderately competent, massive, and, fine (20-30%), well-rounded, dolomitic precipitate (15-20%), trace ugartz; 2.5Y 6/3 DOLOSTONE, moderately competent, massive, irrace sand (2%), 2.5Y 6/3 DOLOSTONE, moderately competent, massive, fron staining (3%), 2.5Y 6/3 DOLOSTONE, moderately competent, massive, fron staining (3%), 2.5Y 6/3 DOLOSTONE, moderately competent, massive, fron staining (3%), 2.5Y 6/3 DOLOSTONE, moderately competent, massive, fron staining (3%), 2.5Y 6/3 DOLOSTONE, moderately competent, massive, fron staining (3%), 2.5Y 6/3 DOLOSTONE, moderately competent, massive, dolomitic precipitate (5%), irrace uses staining (10%), ball of the staining on dolomitic precipitate (20%), half of the staining on dolomitic precipitate, trace glauconite (5%), 2.5Y 6/3 DOLOSTONE, moderately competent, sand (5%), trace developed (5%), trace deve	### CA 6618753 Twin Cities East Metro, MN Project 1007 AS/AEL OHECKED BY: AEL/AS ONIC DIRLING METHOD. Sonic SAMPLING METHOD. DRIVEN AND PRIJECT STATE THAT SON THE TABLE STATE THE 250 https: 10 acetate bags START TIME 150 https://doi.org/10.1001/



CLIENT:			JOB NO.:	LOCATION:		MAN	
MPCA PROJECT:			60618753 DRILLING METHOD:	I win Citi	ies East Meti	BORING N	O.
Project 1007			Sonic			MW3A	[847052]
LOGGED BY: AS/AEL	CHECKED BY	: AEL/AS				SHEET	
DRILLING CONTR.: Traut						6 0	of 13
DRILLER: Dan Pflipsen	EQUIP.: So	nic	SAMPLING METHOD 10' acetate bags			DRIL	LING
BORING DEPTH: 250 ft bgs			To destate sage	,		START	FINISH
GROUND SURFACE ELEVATION			WATER LEVEL			TIME	TIME
DATUM: NAD 83 UTM 15 COMMENTS:	(meters)		TIME			1530 DATE	1815 DATE
Northing: 4979696.86			DATE CASING DEPTH				
Easting: 507372.86		SURFACE CONDITION				01-06-20	01-08-20
VVERED DISTRICT NVERED DESIGNATION PID PID PID PID PID PID PID PI	U.S.C.S. DEPTH IN FEET OIL/ROC	Grass			\\/[ELL DIAGRA	NΛ
SAMPLE ID BID (mdd) (mdd)	U.S.C.S. DEPTH IN FEET SOIL/ROCK GRAPH	LITHO	DLOGIC DESCR	RIPTION	_	ELL DIAGNA	IVI
/ ##	- 0,	Littie	DEGGIO BEGGI				
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20	101	(5-10%), trace vimanganese stair DOLOSTONE, r (10-15%), iron staire (10%), well- 2.5Y 4/3 SANDY DOLOS sand, fine (20%) (15%), vugs (10%) DOLOSTONE, of precipitate (15%), dendritic mangar DOLOSTONE, of precipitate (30%) on dolomitic precipitate (30%), fracture (10%), with sanction on fracture (10-20%), fracture dendritic manganese stair (10-20%), trace dendritic manganese (313' bg) DOLOSTONE, of trace dendritic manganese sand, medium (5-10%)	ugs (5%), trace dening (1%); 2.5Y 6/not competent, doltaining/banding (1 rounded, trace glatering), and trace glatering (5%), trace iron stail competent, massiv.), vugs (5-10%), trace sand, from the stail (15%), iron stail (15%), trace sand, from the stail (15%), iron stail (15%), vugs (10-15%), competent, massiv.), vugs (10-15%), trace stailing (10%), ures (5%); 2.5Y 6/noderately competent, iron stail (10%), banderately competent, iron stail (15%); 2.5 scompetent, iron stail (15%); 2.5Y 6/noderately competent, iron stail (15%); 2.5Y 7/nompetent,	omitic precipitate 0%), with sand, nuconite (2%); etent, massive, omitic precipitate ning (5%); 2.5Y 6/4 re, dolomitic race iron staining ine (5%), tent, bedded, aining along 5%), well-rouned, 0%); 2.5Y 8/3 re, dolomitic trace iron staining e sand, fine (2%), tent, vuggy texture trace manganese 3, clay observed tent, dendritic es/bedding d iron staining 5Y 7/4, 6" clay aining (5-10%), g (3%), trace dark g fractures (3%), d, clay observed		4" LC Steel Cas (0'-230' bgs) Grout (neat cem (0'-228' bgs)	nent)



CLIENT:			JOB NO.:	LOCATION:	: 	N A N I	
PROJECT:			60618753 DRILLING METHOD:	I win Cit	ies East Metro	BORING NO	O.
Project 1007			Sonic			MW3A I	[847052]
LOGGED BY: AS/AEL	CHECKED BY:	AEL/AS				SHEET	-
DRILLING CONTR.: Traut						7 c	of 13
DRILLER: Dan Pflipsen	EQUIP.: Soi	nic	SAMPLING METHOD 10' acetate bags			DRIL	LING
BORING DEPTH: 250 ft bgs						START	FINISH
GROUND SURFACE ELEVATION:	910.51ft AMSL		WATER LEVEL			TIME	TIME
DATUM: NAD 83 UTM 15 (r COMMENTS:	meters)		DATE			1530 DATE	1815 DATE
Northing: 4979696.86 Easting: 507372.86			CASING DEPTH			01.06.20	01-08-20
- KEEL	DEPTH IN FEET SOIL/ROCK GRAPH	SURFACE CONDITION Grass			WEL	L DIAGRA	
SAMPLE ID SAMPLE DIA DIA SAMPLE DIA DIA SAMPLE DIA DIA SAMPLE DIA DIA		LITHO	DLOGIC DESCR	RIPTION			
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20	121	DOLOSTONE, n (20-30%), vugs (2.5Y 5/3 DOLOSTONE, n dolomitic precipition staining on of fine grained dolomitic precipition staining glauconite (1%); DOLOSTONE, n dolomitic precipit sand, fine (1%), DOLOSTONE, n precipitate (15% (5%), trace sand DOLOSTONE, n precipitate (15% (5%), trace sand DOLOSTONE, n precipitate (5%), dolomitic precipitate (5%), dolomitic precipitation (15% dolomiti	moderately competate (10-15%), trace iron sometate (10-15%), vug dolomitic precipitate at a smitic precipitate (4%), trace sand at a smitic precipitate (5-10%), trace well-rounded; 2.5° moderately competate (5-10%), trace well-rounded (5-10%), trace well-rounded (5-10%), trace well-rounded (5-10%), trace well-rounded (5	tent, massive, gs (10%), trace te (5%); 2.5Y 5/3, tt 129-130' bgs tent, massive, gs (10%), trace te (5%); 2.5Y 5/3, tt 129-130' bgs tent, vugs precipitate (5%), d, fine (2%), trace tent, dolomitic ng along fractures bunded; 2.5Y 5/4 tent, dolomitic gon rock and 3 tent, dolomitic anding along i/3	4'	rout (neat cem 0'-228' bgs) ' LC Steel Cas 0'-230' bgs)	



CLIENT:		JOB NO	D.:	LOCATION:				
MPCA PROJECT:			618753 NG METHOD:	Twin Citie	es East I	Metro, M	IN BORING NO	<u> </u>
Project 1007		Sonic						
LOGGED BY: AS/AEL	CHECKED BY: A	EL/AS					MW3A [847052
DRILLING CONTR.: Traut							8 0	F 13
DRILLER: Dan Pflipsen	EQUIP.: Sonic		ING METHOD					LING
BORING DEPTH: 250 ft bgs	LQOII COIIIC	10' ad	etate bags				START	FINISH
	10.51ft AMSL	WATE	R LEVEL				TIME	TIME
DATUM: NAD 83 UTM 15 (met	ers)	Т	IME				1530	1815
COMMENTS: Northing: 4979696.86		D	ATE				DATE	DATE
Easting: 507372.86			G DEPTH				01-06-20	01-08-20
DEET PEET PROVERED PID (ppm)	-	RFACE CONDITIONS: ass LITHOLOGI	C DESCR	IPTION		WELL	DIAGRA	M
			d fine to m	a divers (200/)	K// K/	2 Grou	it (neat cem	ent)
	141	uartz precipitates, san vell-rounded; 2.5Y 4/4 OLOSTONE, moderataining along fractures anganese staining (5°,5Y 6/4, clay observed OLOSTONE, not commodolostone pieces, 6°,0LOSTONE, moderatolomitic precipitate (15°,15%), with sand, fine (10°,15%), with sand, fine (10°,15%), trace chert (10°,15%), t	petent, ver petent, ver "" silt lense tely compet %), iron sta 10-15%), w 2%); 10YR moderately taining (20- % medium) 0%), trace of (6); 10YR 6 not compe d, platy, sai ing (10%), ong fracture 2.5Y 7/4	tent, massive iron be dendritic and, fine (2%); y weathered, 5-15; 10YR 6/4 tent, massive, ining/banding ell-rounded, trace 5/4 y competent, 30%), sand, fine lendritic lendritic lendritic lendritic lendritic les (10%), dolomitic les (10%), dolomitic		(0'-2	C Steel Cas (30' bgs)	,
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20	151	nassive, fine grained, in colomitic precipitate (10 nanganese staining (50 OLOSTONE, moderate (10%), with sine, 5% medium), trace 0YR 6/6 ANDY DOLOSTONE, moderate (30%), colitic to 5Y 6/3 OLOSTONE, moderate (30%), chert (15-20%), on staining (2%); 2.5Y OLOSTONE, moderate (30%), trace iron staining (20%), trace iron staining (20%)	19%), trace of 2%); 2.5Y 6/3 tely competed and, fine to be glauconited to competent exture (20%) tely competed acceptance glauconited tely competed acceptance glauconited acceptance g	dendritic 3 tent, dolomitic 5 tent, grains (3%); tent, sand, fine to 6 tent, vugs (15%); tent, oolitic texture 5 tent, bedding 6 tic precipitate			it (neat cem !28' bgs)	nent)
ENVIRONIM		5%); 5Y 7/2 ANDY DOLOSTONE, eathered, platy, sand,						



С	LIENT:	IDO A						JOB NO.:	LOC	CATION:	·· -			45 1	
Р	ROJECT:	IPCA						60618753 DRILLING METHO	D:	Twin Ci	ties Ea	st Me	tro, N	BORING N	O .
	Р	roject ´	1007					Sonic						M/M/3A I	847052
L	OGGED BY:	AS/A	EL		CHEC	KED BY:	AEL/AS							SHEET	0+1002
D	RILLING CO	NTR.:	Traut											9 0	of 13
D	RILLER: D	an Pfli	osen		EQUII	P.: Sor	nic	SAMPLING METH							LING
	ORING DEPT							10' acetate ba	gs					START	FINISH
G	ROUND SUF	RFACE EI	EVATIC	n: 9	10.51	ft AMSL		WATER LEVEL						TIME	TIME
	ATUM: NA	ND 83 L	JTM 1	5 (met	ers)			TIME						1530	1815
	OMMENTS: lorthing: 4	979696	6.86					DATE						DATE	DATE
	asting: 50	7372.8				1	SURFACE CONDITION	CASING DEPTH						01-06-20	01-08-20
		FEET DRIVEN	_ e	οί	ᆂᇤ	옷	Grass	V 5:							
5	SAMPLE ID	PEET DRI	PID (mdd)	J.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH						W	ELL	DIAGRA	M
		\ FEG		j		OS O	LITHO	DLOGIC DESC	CRIPTI	ON					
								1 ***		(400()	1 874	N/A	<i>A</i> " 1 <i>(</i>	C Steel Cas	ina
							well-rounded, de trace chert (5%)	endritic mangan ; 2.5Y 6/4	ese stai	ining (10%),				230' bgs)	ilig
					161		CHERT, modera	ately competent			, 🎇				
					162		manganese stai _ (1%); 2.5Y 6/1	ning (10-15%), 1	race iro	on staining					
					102		DOLOSTONE, r								
					163		(10-15%), with s medium), trace of								
					404		glauconite (3%);			, , , , , , , , , , , , , , , , , , ,					
					164										
					165	$\overline{\Box}$	DOLOSTONE, r	moderately com	netent	dolomitic					
					-		precipitate (5-10	%), trace sand,	fine (29	%),					
					166		well-rounded, tra	ace glauconite (2%); 2.	5Ý 5/3					
					167										
					168	+	DOLOSTONE, d	competent, mas	sive, do	lomitic					
					169		precipitate (15%), trace vugs (5	%), trac	e dendritic					
					169		manganese stail @ 167.75-168' b	ning (2%); 2.5 r ogs	6/4, tra	ce sand (5%)					
					170		DOLOSTONE, r	not competent v	veather	ed iron				ıt (neat cem	nent)
							staining on dolor	mitic precipitate	(20%),	dolomitic			(0'-2	228' bgs)	
					171 -	77	precipitate (15-2 well-rounded; 2.		l, fine (3	3%),					
9/20					172		Woll Fouridou, 2.	0.07.							
/9 F						+/_/									
3S.GF					173		DOLOSTONE, r								
3,00					174	 	reworked, dolom manganese stai								
NINC NINC					''*		precipitate stain								
ا ا					175	+	DOLOSTONE, d	competent mas	sive vu	ıns (20%)				C Steel Cas	ing
GS.GI							dolomitic precipi						(0'-2	230' bgs)	
					176		2.5Y 6/3								
N O					177	47	DOLOGIONE	madaretely		maasiira					
1007							DOLOSTONE, r dolomitic precipi								
TAL					178		(5%); 2.5Y 6/2	. ,, 3	` '						
NME					179	 									
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20					"	77									
						7					_K//	K/A			



	CLIENT:							JOB NO.:		LOCATION:					
-	PROJECT:	IPCA						60618753 DRILLING METHO	Twin Cit	ies Ea	st Met		NORING NO).	
-		roject ´	1007					Sonic						/ ///2Λ Γ	847052]
	LOGGED BY:	AS/A	EL		CHEC	KED BY:	AEL/AS							SHEET	047032]
	DRILLING CON	NTR.:	Traut											10 o	F 13
	DRILLER: D	an Pfli	psen		EQUIF	c.: Sor	nic	SAMPLING METH						DRIL	
	BORING DEPT				•			10' acetate ba	igs					START	FINISH
	GROUND SUR	RFACE EI	LEVATIO	N: 9	10.51	ft AMSL		WATER LEVEL						TIME	TIME
	DATUM: NA	ND 83 L	JTM 1	5 (met	ers)			TIME						1530	1815 DATE
	Northing: 4							DATE						DATE	
-	Easting: 50		36 1				SURFACE CONDITION	CASING DEPTH S:					[0)1-06-20	01-08-20
		PEET DRIVEN	۵Ê	S.S.	ĔĦ	SOIL/ROCK GRAPH	Grass					10/			
	SAMPLE ID	PEET DRI	PID (mdd)	U.S.C.S.	DEPTH IN FEET	GRA GRA	LITUC	DLOGIC DESC	וםי	DTION		VV	ELL D	IAGRAI	VI
-		/ E#				S	LITTIC	DEGIC DEGI	-	FIION					
ł							DOLOSTONE, r				M	M			
					181		(15-20%), dolom oolitic texture (5°	nitic precipitate (%). trace iron st	10- aini	15%), trace ng (4%): 2.5Y					
							7/4, 40x10 mm c			,					
					182		DOLOSTONE, o								
					183		(5-10%), trace cl	hert (5%); 2.5Y	6/3						
					184										
					185		DOLOGIONE		4				-Grout ((neat cem	ent)
					_	- 7 - 7	staining, trace ba			ent, massive iron (5%); 10YR 6/8,				è' bgs)	,
					186		clay observed								
					187		DOLOSTONE, o dolomitic precipi								
					100		(5%); 2.5Ý 6/3	, ,,		· ·					
					188 –										
					189	+									
					100								4" 0 0	Ctool Coo	ina
					190 -		DOLOSTONE, of trace fractures (5				`			Steel Cas 0' bgs)	ing
					191		2.5Y 6/4	570), trace rewo	INC	a clasts (270),					
1/20					192	77									
J 6/19					192	77									
S.GP.					193		DOLOSTONE, o	competent, mas	sive	e, manganese					
3 LOG					194		staining along fra	actures/vugs (5	-109	%), trace					
ORING					194		fractures (3%), to	race vugs (170),	۷.ن	01 0/0					
PJ B(195		DOLOSTONE, o	competent, mas	sive	e. verv fine	- 💹				
GS.G					106		grained, vugs (1								
J-F					196 –	 	2.5Y 6/3								
17_GII					197		DOLOSTONE, r	noderately com	pete	ent, massive.					
L 100					198 -	1///	manganese stair	ning (5-10%), tr	ace	dolomitic					
ENTA					190		∼precipitate (5%), DOLOSTONE, n	noderately com	pete	ent, massive,					
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20					199	+	trace dolomitic p staining (3%), tra	recipitate (5%),	tra	ce manganese					
ENVIE						1//	Julian 19 (0 /0), 118	aco non bandin	<u>-</u>) او	,,, 2.01 0/Z					



CLIENT:	Α.				JOB NO.:	LOCATIO		F	4 1 1 - 4	NANI	
PROJECT:					60618753 DRILLING METHOD	 :	Twin Citi	es Eas	t ivietro	BORING NO	O.
•	ect 1007				Sonic					MW3A I	847052]
LOGGED BY: AS	S/AEL	CH	IECKED BY:	AEL/AS	_					SHEET	
DRILLING CONTR.	: Traut									11 c)F 13
DRILLER: Dan l		EQ	UIP.: Sor	ic	SAMPLING METHO 10' acetate bag						LING
BORING DEPTH:	250 ft bgs								l	START	FINISH
GROUND SURFAC			51 ft AMSL		WATER LEVEL TIME						
DATUM: NAD 8 COMMENTS:	33 UTM 18	5 (meters)		DATE					1530 DATE	1815 DATE
Northing: 4979 Easting: 50737					CASING DEPTH					01-06-20	01-08-20
SAMPLE ID		U.S.C.S.	IN FEET SOIL/ROCK GRAPH	SURFACE CONDITION Grass	IS:		l		WEL	L DIAGRA	
	RECOV	<u>2</u>	N SOIL	LITHO	LOGIC DESCI	RIPTION					
		20° 20° 20° 20° 20° 20° 20° 20° 20° 20°	3 - / / - / / 4 - / / 5 - / / 7 - / / 7 - / / 3 - / / 3 - / / 4 - / / 5 - / / 6 - / / 7 - / / 7 - / / 9 - /	DOLOSTONE, n staining (10-15% trace vugs (5%); DOLOSTONE, n precipitate (15% chert (3%); 2.5Y DOLOSTONE, n dolomitic precipit trace vugs (3%); DOLOSTONE, c precipitate (10%) (5%); 10YR 5/2,	noderately competent (20%), trace iron stain 7/3 noderately competent (20%), trace 10YR 6/3 competent, massi), trace fractures parallel	etent, dolong (3%), interest, massiron stainition ve, dolom (5%), tracto bedding	omitic trace ssive, ing (3%),		4"	rout (neat cerr 0'-228' bgs) ' LC Steel Cas 0'-230' bgs)	,
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20		212 213 214 215 216 217 218	2	DOLOSTONE, n banded iron stair 6/6 CHERT, dolomiti DOLOSTONE, n staining (15%), d fractures (5-10% DOLOSTONE, n glauconite (2%), observed DOLOSTONE, c (10%), trace fine 2.5Y 7/4 DOLOSTONE, c (10%), fine grain 10YR 6/4	ning (30%), trace ic precipitate (10th moderately competendritic manganes); 2.5Y 7/3 moderately competence vugs (1%); competent, bander grained dolomitic	sand (1% %); 2.5Y 6 etent, denese stainin etent, trace 2.5Y 7/2, d iron sta	e clay ining ate (5%);			rout (neat cem 0'-228' bgs)	nent)



MPCA PROJECT: Project 1007 LOGGED BY: AS/AEL CHECKED BY: AEL/AS DRILLING METHOD: Sonic SAMPLING METHOD: 10' acetate bags GROUND SURFACE ELEVATION: DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4979696.86 Easting: 507372.86 SAMPLE ID SAMPLE	BORING NO.
DRILLING CONTR.: Traut DRILLER: Dan Pflipsen BORING DEPTH: 250 ft bgs GROUND SURFACE ELEVATION: 910.51 ft AMSL DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4979696.86 Easting: 507372.86 SAMPLE ID SAMPLE ID SAMPLING METHOD: 10' acetate bags WATER LEVEL TIME CASING DEPTH CASING DEPTH SURFACE CONDITIONS: Grass LITHOLOGIC DESCRIPTION SANDY DOLOSTONE, not competent, weathered, sand, coarse (50%), well-rounded, iron staining (30%); 10YR 6/4	
DRILLER: Dan Pflipsen BORING DEPTH: 250 ft bgs GROUND SURFACE ELEVATION: 910.51 ft AMSL DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4979696.86 Easting: 507372.86 SAMPLE ID SURFACE CONDITIONS: Grass SURFACE CONDITIONS: Grass LITHOLOGIC DESCRIPTION SANDY DOLOSTONE, not competent, weathered, sand, coarse (50%), well-rounded, iron staining (30%); 10YR 6/4	MW3A [847052 SHEET
BORING DEPTH: 250 ft bgs GROUND SURFACE ELEVATION: 910.51 ft AMSL DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4979696.86 Easting: 507372.86 SAMPLE ID SAMPLE ID SAMPLE ID SANDY DOLOSTONE, not competent, weathered, sand, coarse (50%), well-rounded, iron staining (30%); 10YR 6/4	12 OF 13
BORING DEPTH: 250 ft bgs GROUND SURFACE ELEVATION: 910.51 ft AMSL DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4979696.86 Easting: 507372.86 SAMPLE ID SAMPLE ID SAMPLE ID SANDY DOLOSTONE, not competent, weathered, sand, coarse (50%), well-rounded, iron staining (30%); 10YR 6/4	DRILLING
DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4979696.86 Easting: 507372.86 SAMPLE ID SAMPLE ID SURFACE CONDITIONS: Grass LITHOLOGIC DESCRIPTION SANDY DOLOSTONE, not competent, weathered, sand, coarse (50%), well-rounded, iron staining (30%); 10YR 6/4	START FINISH
COMMENTS: Northing: 4979696.86 Easting: 507372.86 SAMPLE ID SAMP	TIME TIME
Northing: 4979696.86 Easting: 507372.86 SAMPLE ID SAM	1530 1815
SAMPLE ID	DATE DATE
SAMPLE ID The property of t	01-06-20 01-08-20
SANDY DOLOSTONE, not competent, weathered, sand, coarse (50%), well-rounded, iron staining (30%); 10YR 6/4	WELL DIAGRAM
sand, coarse (50%), well-rounded, iron staining 221 (30%); 10YR 6/4	
sand, coarse (50%), well-rounded, iron staining 221 (30%); 10YR 6/4	
	(0'-230' bgs) Grout Basket
medium, 20% coarse), well-rounded; 2.5Y 8/3	(221' bgs)
Cj 223	
QUARTZ ARENITE, fine to coarse (10% fine, 75% medium, 15% coarse), well-rounded; 2.5Y 8/2	Grout (neat cement)
226	(0'-228' bgs) 4" LC Steel Casing
227	(0'-230' bgs)
228	
229 — :::::	—1.5' pellet seal on top of
230	0.5' pea rock (228'-230' bgs)
231) 원
QUARTZ ARENITE, medium to coarse (70%	
QUARTZ ARENITE, medium to coarse (70% medium, 30% coarse), well-rounded, pieces of well	7" Open Hole
	(230'-250' bgs)
QUARTZ ARENITE, medium to coarse (55% medium, 45% coarse), well-rounded, massive iron staining; 10YR 5/6	94 73 84
QUARTZ ARENITE, medium to coarse (65%	역 최
medium, 45% coarse), well-rounded, 2.51 6/1	
238 —	(전) (점)



CLIENT:							JOB NO.:		LOCAT	ION:						
	1PCA						60618753			Twin	Cit	es Ea	st M	etro, I		
PROJECT:	roject 1	1007					DRILLING METHO	OD:							BORING N	O.
LOGGED BY:				CHEC	KED BY:	AEL/AS									MW3A SHEET	[847052
DRILLING CO	NTR.:	Traut													13 (OF 13
DRILLER: D	an Pflii	osen		EQUIP	.: Sor	nic	SAMPLING METH									LING
BORING DEP							10' acetate ba	ags							START	FINISH
GROUND SUF			N· 9	10.511	ft AMSL		WATER LEVEL								TIME	TIME
DATUM: NA							TIME								1530	1815
COMMENTS: Northing: 4	979696	3.86					DATE								DATE	DATE
Easting: 50		36			T .	SURFACE CONDITION	CASING DEPTH					1			01-06-20	01-08-20
SAMPLE ID	PEET DRIVEN	DID (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass	NO.						V	VELL	. DIAGRA	М
	FEET DR	<u> </u>),	äz	SOIL	LITHO	DLOGIC DES	CR	IPTIOI	N						
						QUARTZ AREN										
				241]::::::::	medium, 15% co	,				,					
						QUARTZ AREN medium, 10% co					′ 0					
				242		well-cemented b	edrock (5%); 2.	.5Y	7/4		/	1				
				243]:::::::	QUARTZ AREN medium, 10% co								— 7" <i>C</i>	Open Hole	
						well-cemented b	edrock (3%); 2.	.5Y	8/4					(23	80'-250' bgs)	
				244												
			Cj	245	- : : : : : : : : : : : : : : : : : : :											
				246		QUARTZ AREN			n (5% 1	fine, 95%	6	-				
				247		medium), well-ro	ounded; 2.5Y 8/	1								
				248												
				-		QUARTZ AREN medium, 20% co	oarse), well-roui	nde	d, iron	staining						
				249		(5-15%), trace w 6/4	ell-cemented b	edr	ock (5%	%); 7.5Ý						
				250		E.O.B. @250' bo	gs, no refusal									
				251												
				252												
				253	-											
				254	-											
				255												
				256												
				257												
				258	-											
				259	-											



CLIENT:							JOB NO.:	LOCAT		/I VIVILI	HALE		o Loc
	PCA						60618753	DD:	Twin	Cities Eas	st Metro, M		
PROJECT: Pi	roject 1	1007					DRILLING METHO Sonic	JD:				BORING N	
LOGGED BY:	AS/AI	EL		CHEC	KED BY:	AEL/AS						MW3B SHEET	[847053
DRILLING CON	ITR.:	Γraut										1 0	OF 7
DRILLER: Da	an Pflip	osen		EQUIP	: Sor	nic	SAMPLING METH					DRII	LING
BORING DEPT	н: 13	0 ft bgs					10' acetate ba	ags				START	FINISH
GROUND SUR	FACE EL	EVATIO	N: 9	10.40f	t AMSL		WATER LEVEL	16.5'	22'	39.6'	21.5'	TIME	TIME
DATUM: NA	D 83 L	JTM 15	(met	ers)			TIME	1130	1230	1545	1635	1100	1830
COMMENTS: Northing: 49	270603	2 2 2					DATE	01-13-20	01-13-20	01-13-20	01-13-20	DATE	DATE
Easting: 50							CASING DEPTH	19'	35'	45'	55'	01-13-20	01-14-2
SAMPLE ID	FEET DRIVEN	PID (ppm)	.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	IS:				\//ELI	DIAGRA	M
SAMPLE ID	DR FEET RECOVERED	д <u>д</u>	U.S.	DEF	SOIL/ GR	LITHO	DLOGIC DES	CRIPTIO	N		VV L L L	DIAGNA	ivi
			CL	1 -		CLAY, low plasti (5%); 10YR 4/3	city, medium st	iff, trace o	organics				
	CL 1 CLAY, low plasticity, medium stiff, trace organics (5%); 10YR 4/3 SILTY SAND, medium to coarse (60% medium, 15 coarse), sub-rounded, silt (20%), trace organics (5%); dry, 10YR 4/4 SM SILTY SAND, fine to medium (50% fine, 15% medium), sub-rounded, silt (30%), trace clay (5%); dry to moist, 10YR 4/3 SANDY CLAY, low plasticity, stiff, sand, fine to medium (10% fine, 5% medium), sub-angular to sub-rounded; dry to moist, 10YR 4/4											ut (neat cen 108' bgs)	nent)
			SC	-		medium (10% fin	ne, 5% medium), sub-ang					
			CL ML	10 - 11 - 12 - 13 - 14 - 14 - 10		SANDY SILTY C fine to coarse (20 sub-rounded to v SANDY SILTY C fine to medium (2 sub-rounded to v (3%), sub-angula		C Steel Cas 110' bgs)	sing				
MW3B-S 15-16.5		_		15 -		SANDY SILTY C fine to medium (2 sub-rounded to v (3%), sub-angula	20% fine, 5% m vell-rounded, tra ar; dry, 10YR 5/	nedium), ace grave /6	l, medium				
MW3B-S 16.5-19	OIL		SW	17		SAND, fine to co coarse), sub-ang with clay (10%),	jular to sub-rou low plasticity, tr	nded, wel	l graded, el, medium	ı 💹			
MW3B-G 16.5-19	W	-	SM	18		to coarse (3%), s \10YR 5/6 SILTY SAND, fin	sub-angular to s	sub-round	ed; moist,				
			GP	19	3000	with gravel, coars	se (10%), sub-i	rounded;	moist,				



CLIENT:							JOB NO.:	LOCA					
PROJECT:	PCA						60618753 DRILLING METH		Twin	Cities Eas	st Metro, N	IN BORING NO	<u></u> Э.
	oject 1	1007		1			Sonic					MW3B I	
LOGGED BY:	AS/A	EL		CHEC	KED BY:	AEL/AS	_					SHEET	<u>04100</u>
DRILLING CON	TR.:	Traut										2 0	of 7
DRILLER: Da	an Pflip	osen		EQUIF	e: Sor	nic	SAMPLING METH						LING
BORING DEPTI							10' acetate b	ags				START	FINISH
GROUND SURF	FACE EL	EVATIO	N: 9	10.40	ft AMSL		WATER LEVEL	16.5'	22'	39.6'	21.5'	TIME	TIME
DATUM: NAI	D 83 L	JTM 15	5 (met	ers)			TIME	1130	1230	1545	1635	1100	1830
COMMENTS: Northing: 49	79693	3.32					DATE		01-13-20			DATE	DATE
Easting: 507	7372.0					SURFACE CONDITION	CASING DEPTH	19'	35'	45'	55'	01-13-20	01-14-2
SAMPLE ID	PEET DRIVEN ERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass	NS.				WELL	DIAGRA	M
	PEET DRI'	и Ш). 	۵z	SOIL	LITH	OLOGIC DES	CRIPTIO	N				
						GRAVEL, fine to				,		ut (neat cem 108' bgs)	nent)
				21		sub-angular to s sand, coarse (20 10YR 4/4	sub-rounded, po 0%), sub-angula	oorly grade ar, moist t	ed, With o wet,		(0-	ioo bys)	
				22		SAND, fine to co				1 , / 🖟			
			SP	23		with gravel, fine wet, 10YR 5/4	(10%), sub-ano	gular, trac	e silt (5%);				
				24		SAND, medium coarse), sub-rou	ınded, poorly gi	raded, trad	ce gravel,				
				25 -		fine (5%), well-re 5/3		, ,		`		C Steel Cas	ing
				26		SAND, medium coarse), sub-rou coarse (5%), su	ınded, poorly gı	raded, trad	ce gravel,		(0'-	110' bgs)	
			SW	27		SAND, medium coarse), sub-rou	to coarse (25% unded, poorly g	medium, raded, trac	70%				
				28	******	fine (5%), sub-a	ngular; moist, 1 parse (15% fine	10YR 5/4 e, 50% me	dium, 25%				
				-		coarse), sub-and	e (5%), sub-rou); / 🔝			
			SP	29 –		moist, 10YR 5/3 SAND, medium coarse), sub-rou	to coarse (25%						
				30 -		fine (10%), sub-	angular; moist,	10YR 5/3	_	_/			
			SW	31 -	*******	sub-rounded to silt (5%); dry to	well-rounded, p	oorly grad	led, trace				
MW3B-S0 31-35	OIL			32	*****	SAND, fine to co coarse), sub-rou	oarse (20% fine unded to well-ro	e, 55% me unded, we	ell graded,				
				33		with gravel, fine sub-angular; dry			coarse),				
MW3B-G	W		SP	34		SAND, fine to co	parse (70% fine	e, 15% me		_ 🛭			
31-35				-		coarse), sub-rou coarse (5%), su 10YR 5/3						ıt (nc=t ==	\ant\
			SW	35		SAND, fine to co						ut (neat cem 108' bgs)	ient)
				36	*.*.*.* <u>*</u>	coarse), sub-rouvet, 10YR 5/4			_	_/			
				37		SAND, fine to co coarse), sub-rou	ınded, poorly gi	raded, trad	ce gravel,				
			SP	38		fine (5%), angul	ai io sub-angui	aı, wel, Il) IN 3/3				
				1 H	1:3:3:3								
				39	1. 1. 1. 1. 1.	SAND, medium					K//		



CLIENT:	D.C. '						JOB NO.:	LOCAT		O''' =			
PROJECT:	PCA						60618753 DRILLING METHO		Twin	Cities Eas	st Metro, N	IN BORING N	O.
	oject '	1007					Sonic						[847053]
LOGGED BY:	AS/A	EL		CHEC	KED BY:	AEL/AS						SHEET	[047000]
DRILLING CON	ITR.:	Traut										3 (OF 7
DRILLER: Da	an Pfli	psen		EQUIF	.: Sor	nic	SAMPLING METH					DRII	LING
BORING DEPT	н: 13	0 ft bgs					10' acetate ba	ays 				START	FINISH
GROUND SUR	FACE EI	LEVATIO	N: 9	10.40	ft AMSL		WATER LEVEL	16.5'	22'	39.6'	21.5'	TIME	TIME
DATUM: NA	D 83 l	JTM 1	5 (met	ters)			TIME	1130	1230	1545	1635	1100	1830
COMMENTS: Northing: 49							DATE				01-13-20	1	DATE
Easting: 50	7372.0)1 1			T.,	SURFACE CONDITION	CASING DEPTH	19'	35'	45'	55'	01-13-20	01-14-20
		o €	S.S.	투띠	PSC	Grass	140.						
SAMPLE ID	PEET PEET RECOVERED	PID (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	LITU	OLOGIC DES	CDIDTIO	.NI		WELL	DIAGRA	.M
	/ ##				, v	LIIM	OLUGIC DES	CRIPTIO	'IN				
						graded, with gra	avel, fine to coar	se (5% fir	ne, 5%			C Steel Cas	sing
				41		coarse), sub-an	gular, with cobb	les (10%)	; moist,		(0'-	110' bgs)	
MW3B-S 41-42	OIL					SAND, fine to co				- / ₩			
41-42				42		່ coarse), sub-roເ ∖graded, trace gr				t. /🗑			
MW3B-G	W			43		10YR 5/2	,						
41-45				"		SAND, medium coarse), sub-rou							
MW3B-S				44		graded, with gra	evel, fine (10%),	sub-roun	ded; mois	t, /			
44-45	OIL			45		SAND, fine to co	oarse (30% fine	, 60% me	dium, 5%				
			SP	45		coarse), sub-rou graded, trace gr	unded to well-ro	unded, po	orly				
				46		sub-rounded; dr	y to moist, 10Ŷl	R 5/2					
						SAND, fine to cocoarse), sub-an							
				47		dry to moist, 10	ŸR 6/2	•					
				48		SAND, fine to cocoarse), sub-rou							
				10		medium (5%), s							
				49		SAND, medium coarse), sub-rou							
				50		graded, with gra	avel, fine (25%),	sub-roun				ut (neat cen	nent)
				[cobbles (5%); d	ry to moist, 10Y	K 4/1			(0'-	108' bgs)	
MW3B-S	OIL			51		SAND, fine to co				6			
51-53				52		with gravel, fine				l/1 👹			
MW3B-S	OII		0.47	_	******	SAND, fine to co							
53-55	J.L		SW	53 –		coarse), sub-rou moist, 10YR 5/1		unded, we	ell graded;				
				54									
MW3B-G	\ \ /												
51-55	V V			55		SAND, medium						C Steel Cas I10' bgs)	sing
				56		coarse), sub-ang with gravel, fine						- ,	
				-		SAND, fine to co	oarse (40% fine	, 55% me	dium, 5%	_ ⋈			
			SP	57		coarse), sub-and moist to wet, 2.5		muea, poc	niy grade	u, 🕌			
			JF	58									
				-									
				59		SAND, medium							
					1	coarse), sub-an	gular to sub-rou	ınded, pod	orly grade	d, 🔀			



										INIVIL	NIAL C		
CLIENT:	PCA						JOB NO.: 60618753	LOCA		Cities Fa	st Metro, N	/N	
PROJECT:	oject 1	007					DRILLING METH		I AAIII	- 11100 La	S. 1410ti U, 11	BORING NO	O .
LOGGED BY:				CHEC	KED BY:	AEL/AS	Sonic					MW3B	[84705
DRILLING CON	TR.:	Γraut											DF 7
DRILLER: Da				EOUIP	: Sor	nic	SAMPLING METH						LING
BORING DEPT					. 331		10' acetate b	ags				START	FINISH
GROUND SURI	FACE EL	EVATIO	n: 9	10.401	t AMSL		WATER LEVEL	16.5'	22'	39.6'	21.5'	TIME	TIME
DATUM: NA	D 83 L	JTM 15	5 (met	ers)			TIME	1130	1230	1545	1635	1100	1830
COMMENTS: Northing: 49							DATE				01-13-20	-	DATE
Easting: 50	7372.0					SURFACE CONDITION	CASING DEPTH	19'	35'	45'	55'	01-13-20	01-14-2
SAMPLE ID	FEET DRIVEN FEET FEET RECOVERED	PID (bbm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					WELL	DIAGRA	M
	REC			_ =	S	LITHO	DLOGIC DES	CRIPTIC	N				
			SP	61 — 62 — 63 — 64 — 65 — 66 — 67 — 68 — 70 — 71 — 72 — 73 — 74 —		with gravel, fine sub-rounded; me SAND, fine to coarse), sub-and with gravel, fine to moist, 2.5Y 5/5 SAND, medium coarse), sub-rounded; with gravel, sub-rounded; with gramedium), angulate 5/3 SAND, medium coarse), well-rounded; medium (moist, 2.5Y 5/2 SAND, medium coarse), well-rounded; medium (moist, 2.5Y 5/2 SANDY SILT, sasub-rounded; medium (moist, 2.5Y 5/2)	oist, 2.5Y 5/3 parse (5% fine, gular to sub-rou (10%), angular /2 to coarse (15% inded to well-rovel, fine to medar to sub-round to coarse (10% inded, poorly ginded, trace coand, fine (35%)	15% med unded, poor to sub-ar medium, dium (10% ed; dry to medium, raded, with medium, 5 cobbles (5	ilium, 70% orly graded gular; dry fine, 5% moist, 2.5 75% h gravel, angular; 45% h gravel, % coarse) % coarse) %); moist,	Y	(0'-'	ut (neat cem 108' bgs) C Steel Cas 110' bgs)	,
MW3B-G 75-79 MW3B-S			SP	75 -		SAND, fine to m sub-rounded to silt (5%); moist,	well-rounded, p						
75-79				78 – 79 –		DOLOSTONE, r	not competent.	heavily we	eathered,				
						fine grained dolo	omitic precipitat	te (10%), v	with sand,				



											NIAL D		
CLIENT:	1PCA						JOB NO.: 60618753	LOCA		Cities Fac	st Metro, N	/N	
PROJECT:	roject	1007					DRILLING METH		I WILL	omos La	or ividuo, IV	BORING N	Э.
LOGGED BY:				CHEC	KED BY:	AEL/AS	Sonic					MW3B SHEET	[84705
DRILLING COI	NTR.:	Traut										5 0	OF 7
DRILLER: D	an Pfli	psen		EQUIP	.: Sor	nic	SAMPLING METH						LING
BORING DEPT	гн: 13	0 ft bgs					10' acetate b	ays				START	FINISH
GROUND SUF	RFACE E	LEVATIO	N: 9	10.401	ft AMSL		WATER LEVEL	16.5'	22'	39.6'	21.5'	TIME	TIME
DATUM: NA	AD 83 I	JTM 15	5 (met	ters)			TIME	1130	1230	1545	1635	1100 DATE	1830 DATE
Northing: 4							DATE CASING DEPTH	19'	01-13-20 35'	45'	01-13-20 55'	4	
Easting: 50	FEET DRIVEN CONFIDENCE NECT NECT NECT NECT NECT NECT NECT	1	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass						01-13-20 DIAGRA	
				81 — 82 — 83 — 84 — 85 — 86 — 87 — 88 — 90 — 91 — 92 — 93 —		\fine (10%); 10YF DOLOSTONE, r (10%), trace gre green silt observed SANDY DOLOS to coarse sand (coarse); 10YR 6 DOLOSTONE, c staining (5%), tra SANDY DOLOS (20%), mangane trace vugs (3%); DOLOSTONE, r (10%), trace sar silt observed SANDY DOLOS sand, medium to coarse); 10YR 4 DOLOSTONE, r (15%), with sand 10YR 5/3	moderately comen smears on red TONE, moderately competent, vugace sand, media TONE, competent, vugace staining alogators and, medium (5%) TONE, moderately comed, medium (5%)	npetent, irrock (5%); ately compredium, s (10%), t ium (5%); tent, sand ing fractur npetent, irro h); 10YR 7	netent, fine 10% race iron 10YR 5/3 medium es (5-10% on staining 7/3, green netent, 5%		(0'-'	ut (neat cen 108' bgs) C Steel Cas 110' bgs)	ŕ
				94 — 95 — 96 — 97 — 98 —		DOLOSTONE, r (15%), with sand staining (10%), t DOLOSTONE, r staining (10%), t trace dolomitic p clay observed	d, medium (10% trace glauconite for the competent, trace sand, fine	6), manga e (5%); 10 weathered	nese YR 5/4 d, iron m (5%),			ut (neat cen 108' bgs)	nent)



						VIKU	NINIEN	IIAL D		J LUG
CLIENT: MPCA				JOB NO.: 60618753	LOCAT		Cities Fas	t Metro, M	IN	
PROJECT: Project 1007				DRILLING METHO	DD:	I VVIII V	cinos Las	c iviou o, IV	BORING NO	D .
LOGGED BY: AS/AEL	OUE O	VED DV	AEL/AS	Sonic					MW3B	847053
	CHEC	VED RA:	AEL/AO						SHEET	
DRILLING CONTR.: Traut				SAMPLING METH	IOD.)F 7
DRILLER: Dan Pflipsen	EQUIF	o.: Son	iic	10' acetate ba					START	LING
BORING DEPTH: 130 ft bgs	on: 910.40	ft AMCI		WATER LEVEL	16.5'	22'	39.6'	21.5'	TIME	TIME
GROUND SURFACE ELEVATION DATUM: NAD 83 UTM 1		IL AIVISL		TIME	1130	1230	1545	1635	1100	1830
COMMENTS:	o (meters)				01-13-20				DATE	DATE
Northing: 4979693.32 Easting: 507372.01				CASING DEPTH	19'	35'	45'	55'	01-13-20	01-14-20
SAMPLE ID RECOVERED (PM)	U.S.C.S. DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	S:				WELL	DIAGRA	
FEET (F		SOII	LITHC	LOGIC DES	CRIPTIO	N				
	101 - 102 - 103 - 104 - 105 - 106 - 107 - 108 - 110 - 111 - 112 - 113 - 114 - 115 - 116 - 117 - 118 - 119 -		SANDY DOLOS sand, medium to clasts (5-10%); 1 DOLOSTONE, m precipitate (10%) trace sand, medi (5%); 10YR 5/6 SANDY DOLOS trace massive iros SANDY DOLOS medium (20%), trace massive iros sandy polos frace massive iros sandium (20%), trace sandium (25%), constaining in 1-3mm banding horizont polos from the polos frace sanding frace sanding horizont polos fr	coarse (15%), 0YR 4/6 moderately components, trace massive um (5%), trace FONE, competent staining (5%) FONE, competent stai	petent, doe iron stair mangane ent, sand,); 10YR 5, ent, sand,); 10YR 5, ent, sand, ng (5%), t	omitic ling (5%), se staining (5%), se staining (15%) fine (15%) fine to race vugs	g , , , , , , , , , , , , , , , , , , ,	Grou (0'-1 -4" LC (0'-1 -1.5' p 0.5' p (108	c Steel Cas 10' bgs) c Steel Cas 10' bgs) c Steel Cas 10' bgs) c ellet seal coea rock '-110' bgs)	nent) ing



									NVIRC	NIMEN	HALE	SORING	J LUC
CLIENT:	IDC A						JOB NO.:	LOCAT		Cition Fa-	et Motro	/N	
PROJECT:	IPCA						60618753 DRILLING METHO	DD:	ı wın	Cities Eas	si ivietro, N	BORING N	D.
P	roject 10	07					Sonic					MW3B	847053
LOGGED BY:	AS/AEL	_		CHEC	(ED BY:	AEL/AS	_					SHEET	<u>0+1000</u>
DRILLING CO	NTR.: Tra	aut		1								7 0)F 7
DRILLER: D	an Pflips	en		EQUIP	: Sor	nic	SAMPLING METH 10' acetate ba					DRIL	LING
BORING DEPT	гн: 130 f	ft bgs					To acciate be					START	FINISH
GROUND SUF	RFACE ELE	VATIO	N: 9	10.40f	AMSL		WATER LEVEL	16.5'	22'	39.6'	21.5'	TIME	TIME
DATUM: NA	ND 83 UT	M 15	(met	ers)			TIME	1130	1230	1545	1635	1100 DATE	1830 DATE
Northing: 4		32					DATE			01-13-20			
Easting: 50						SURFACE CONDITION	CASING DEPTH	19'	35'	45'	55'	01-13-20	01-14-20
	PEET DRIVEN	n E	S.	돌 H H	SOCK PH	Grass					\A/E11	DIAGRA	
SAMPLE ID	FEET DRIT	(mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	LITUO		CDIDTIC	NI	$\overline{}$	vv⊨LL	DIAGRA	IVI
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	_	•		Š	LITHC	DLOGIC DES	CKIPTIO	IN				
		+				DOLOSTONE, m	noderately com	petent, fir	ne to coars	se :			
				121		grained dolomition fine (5-10%), trace	precipitate (10)-15%), w	ith sand,				
				'-		IIIIC (0-1070), trac	oc vuga (0 /0),	101110/3					
				122	H								
				122									
				123		DOLOSTONE, n grained dolomitic	noderately com	petent, trace i	ace fine	20			
				124		(5%); 10YR 6/2	precipitate (5	70), trace i	ion stainii	' ⁹		pen Hole	
				<u> </u>							[:] (110 [:])'-130' bgs)	
				125		DOLOSTONE, n	noderately com	petent, ba	anded iron				
				126		staining (15%), n (5-10%); 10YR 6	nedium grained 5/4	dolomitic	precipita	te			
				-									
				127		DOLOSTONE, c	ompetent, fine	grained d	olomitic				
				128		precipitate (5-10 ^o 6/3	%), trace iron s	taining (5	%); 10YR				
				-									
				129	$\pm \pm$								
		-		130		E.O.B. @ 130' b	ne no refueal						
				131		c.b. @ 100 b(yo, no reiusal						
				132									
				133									
				134									
				135									
				136									
				_									
				137									
				138									
				139 —									



MPCA	[CLIENT:	IDO 4						JOB NO.:		LOCATION:	··· -			AN 1	
DRILLING CONTR: Traut TIME CONTR: TIME TIME DATUM: NAD 83 UTM 15 (meters) DATUM: NAD 83 UTM 15 (meters) DATE DATE DATE CASING DEPTH 16.10 DATE DATE CASING DEPTH 12-13-19 12-16-11 SAMPLE ID DATE CASING DEPTH 12-13-19 12-16-11 CASING DEPTH 12-13-19 12-16-11 CL 2 SAND, fine to coarse (10% fine, 60% medium, 20% coarse), angular to sub-rounded, well graded, with gravel, medium (15%), well-rounded; dry, 10YR 4/3 MW4A-SOIL MW4A-SOIL 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 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 SAND, fine to coarse (20% fine, 35%, 30% coarse), sub-angular to sub-rounded, well graded, with gravel, coarse (12%), well-rounded, well graded, with gravel, coarse (12%), sub-angular to sub-rounded, well graded, well orace (12%), sub-angular to sub-rounded, well graded, with gravel, coarse (12%), sub-angular to sub-rounded, well graded, well graded, with gravel, fine (10%), well-rounded, well graded, well orace (12%), sub-angular to sub-rounded, well graded, well graded, with gravel, fine (10%), well-rounded, well graded, well orace (12%), sub-angular to sub-rounded, well orace (12%), sub-angular to sub-rounded, well	-	PROJECT:							DRILLING METHO	D:	I WIN C	ities E	ast ivie	etro, iv	BORING NO	D .
DRILLER: Dan Pflipsen EQUIP: Sonic DRILLER: Dan Pflipsen EQUIP: Sonic SAMPLING METHOD: 10" acetate bags START FINISH GROUND SURFACE ELEVATION: 890.06ñ AMSL DATE: Northing: 4980608.11 Easting: 508614.01 OL CL SAMPLE ID OL CL SAMPLE ID OL CL SAMPLE ID OL SAMPLE ID OL CL SAMPLE ID OL SAMPLE ID SAMPLE ID OL SAMPLE ID SAMPLE ID OL SAMPLE ID SAMPLE I	-	Р	roject '	1007					Sonic						MW4A I	8470541
DRILLER: Dan Pflipsen EQUIP: Sonic BORING DEPTH: 160 ft bgs GROUND SUPFACE ELEVATION: 890.06 ft AMSL DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4980608.11 Easting: 508614.01 CL OL CL SAMPLING METHOD: 10' acetate bags START FINISH TIME O800 1700 DATE DATE OBSOIL 1700 DATE CASING DEPTH 12-13-19 12-16-1! SAMPLE ID OL CL CL SILT, organic matter, low plasticity; 10YR 2/2 CLAY, medium plasticity, firm; dry, 10YR 4/3 CASING DEPTH CLAY, medium plasticity, firm; dry, 10YR 4/3 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 MW4A-SDIL 8-8.5 MW4A-SDIL 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 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 SAND, fine to coarse (20% fine, 35% medium, 40% coarse), sub-angular to well-rounded, well graded, with gravel, coarse (12%), fine, 60% medium, 8% coarse), sub-angular to well-rounded, dry, 10YR 4/3 SAND, fine to coarse (20% fine, 30% medium), sub-angular to well-rounded, well graded, with gravel, coarse (12%), fine 10 coarse (20% fine, 30% medium), sub-angular to well-rounded, well graded, with gravel, gravel, fine (10%), well-rounded, well forgavel, coarse (12%), mell-rounded, well graded, with gravel, gravel, fine (10%), well-rounded, well graded, with gravel, fine (10%), well-rounded well graded, with gravel	ļ	OGGED BY:	JM/A	EL/AS		CHEC	KED BY:	AEL/AS	_							011001]
Dorigo Early Holds Dorigo Executive Dorigo Executive Dorigo Executive Dorigo Executive Dorigo Executive Dorigo Dorigo Executive	L	DRILLING CON	NTR.:	Traut											1 0)F 9
BRORNO DEPTH: 160ft bgs GROUND SURFACE ELEVATION: 890.06 ft AMSL DATUM: NAD 83 UTM 15 (meters) DATIME: NAD 83 UTM 15 (meters) DATE DATUM: NAD 83 UTM 15 (meters) DATE CASING DEPTH CASING DEPTH LITHOLOGIC DESCRIPTION SAMPLE ID OL CL SAND, fine to coarse (10% fine, 60% medium, 20% coarse), angular to sub-rounded, well graded, with gravel, medium (15%), well-rounded; dry, 10YR 4/3 MW4A-SOIL 8-8.5 MW4A-SOIL 8-8.5 BORNO STATI FINISH TIME DATE CASING DEPTH LITHOLOGIC DESCRIPTION WELL DIAGRAM WELL DIAGRAM WELL DIAGRAM WELL DIAGRAM WELL DIAGRAM Fine to coarse (10% fine, 60% medium, 20% coarse), angular to sub-rounded, well graded, with gravel, medium (15%), well-rounded; dry, 10YR 4/3 SAND, fine to coarse (20% fine, 35%, 30% coarse), sub-angular to well-rounded, with gravel, coarse) (12%), well-rounded; dry, 10YR 4/3 SANDY CLAY, medium plasticity, soft, sand, fine to coarse (16% fine, 8% medium, 8% coarse), sub-angular to well-rounded, well graded, with gravel, fine (10%), well-	L	ORILLER: D	an Pfli	psen		EQUIF	.: Sor	nic							DRIL	LING
DATUM: NAD 83 UTM 15 (meters) TIME DATE DATE DATE DATE DATE CASING DEPTH Lasting: 508614.01 CASING DEPTH DATE		BORING DEPT	тн: 16	0 ft bgs					TO acetate ba	ys 					START	FINISH
COMMENTS: Northing: 4980608.11 Easting: 508614.01 OL OL OL OL OL OL OL OL OL O	_ (GROUND SUR	FACE EI	LEVATIC	N: 8	90.06	ft AMSL		WATER LEVEL						TIME	TIME
Northing: 4980608.11 Easting: 508614.01 SAMPLE ID SILT, organic matter, low plasticity; 10YR 2/2 CLAY, medium plasticity, firm; dry, 10YR 4/3 SAND, fine to coarse (10% fine, 60% medium, 20% coarse), angular to sub-rounded, well graded, with gravel, medium (10%), well-rounded; dry, 10YR 4/3 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 SAND, fine to coarse (20% fine, 35%, 30% coarse), sub-angular to sub-rounded, with gravel, coarse (12%, well-rounded, with gravel, coarse (12%), well-rounded, with gravel, coarse (12%), well-rounded, well graded, with gravel, coarse (12%), well-rounded, well-graded, with gravel, coarse (12%), well-rounded, well-grad			D 83 L	JTM 1	5 (met	ers)			TIME							
Easting: 508614.01 SAMPLE ID SA			980608	8.11											DATE	DATE
SAMPLE ID SAMPLE ID SAMPL	L	Easting: 50)1 1		<u> </u>	Ι.,	SURFACE CONDITION							12-13-19	12-16-19
SAMPLE ID Sample ID Sampl			PRIVE ED) (F	ο.	를 다 다	 장표		10 .							
OL CLAY, medium plasticity, firm; dry, 10YR 2/2 SAND, fine to coarse (10% fine, 60% medium, 20% coarse), angular to sub-rounded, well graded, with gravel, medium (15%), well-rounded; dry, 10YR 4/3 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 SANDY CLAY, medium plasticity, soft, sand, fine to coarse (16% fine, 8% medium, 8% coarse), sub-angular to sub-rounded, with gravel, coarse (16% fine, 8% medium, 40% coarse), sub-angular to sub-rounded, with gravel, fine (10%), well-rounded, well graded, with gravel, fine (10%), well-rounded, well		SAMPLE ID	OT O	PIC (pp.	J.S.C	DEP.	OIL/R GRAI					_	W	/ELL	DIAGRA	M
CL 2 CLAY, medium plasticity, firm; dry, 10YR 4/3 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 SW 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 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 SAND, fine to coarse (20% fine, 36% medium, 8% coarse), sub-angular to sub-rounded, with gravel, coarse (12%), well-rounded, with gravel, coarse (12%), well-rounded; dry, 10YR 4/3 SAND, fine to coarse (20% fine, 30% medium, 40% (0'-140' bgs) 4" LC Steel Casing (0'-140' bgs) sub-angular to well-rounded, well graded, with gravel, fine (10%), well-rounded; wet, 10YR 4/3 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded well graded, with gravel, fine (10%), well-rounded; wet, 10YR 4/3 SAND, fine to medium (80%) fine, 10% medium), sub-angular to well-rounded well graded, with gravel, fine (10%), well-rounded; wet, 10YR 4/3 SAND, fine to medium (80%) fine, 10% medium), sub-angular to well-rounded well graded, with gravel, fine (10%), well-rounded well graded, with gravel, fine (10%), well-rounded well graded, with gravel, fine to coarse (20% fine, 30% medium, 40%)							S	LITHO	DLOGIC DESC	CRI	PTION					
CL 2 CLAY, medium plasticity, firm; dry, 10YR 4/3 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 SW 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 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 SAND fine to coarse (20% fine, 36% and, fine to coarse (16% fine, 8% medium, 8% coarse), sub-angular to sub-rounded, with gravel, coarse (12%), well-rounded; dry, 10YR 4/3 SAND, fine to coarse (20% fine, 30% medium, 40% (0'-140' bgs) 10 A"LC Steel Casing (0'-140' bgs) 11 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded, well graded, with gravel, fine (10%), well-rounded; wet, 10YR 4/3 SAND, fine to medium (80%) fine, 10% medium), sub-angular to well-rounded well graded, with gravel, fine (10%), well-rounded; wet, 10YR 4/3 SAND, fine to medium (80%) fine, 10% medium), sub-angular to well-rounded fine, 10% medium), sub-angu	-						<u> </u>	SILT organic m	atter low plastic	itv.	10YR 2/2					
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 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 ANDY 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 SAND, fine to coarse (20% fine, 35%, 30% coarse), angular to sub-rounded; dry, 10YR 4/3 SAND, fine to coarse (20% fine, 35%, 30% coarse), angular to sub-rounded; dry, 10YR 4/3 SAND, fine to coarse (20% fine, 35%, 30% coarse), angular to sub-rounded; dry, 10YR 4/3 SAND, fine to coarse (20% fine, 35%, 30% coarse), angular to sub-rounded, with gravel, coarse (16% fine, 8% medium, 40% coarse), sub-angular to well-rounded, well graded, with gravel, fine (10%), well-rounded; wet, 10YR 4/3 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded poorly graded trace silt sub-rounded to the coarse (20% fine, 10% medium), sub-angular to well-rounded poorly graded trace silt sub-rounded to the coarse (20% fine, 10% medium), sub-angular to well-rounded poorly graded trace silt sub-rounded to the coarse (20% fine, 10% medium), sub-angular to well-rounded poorly graded trace silt sub-rounded					OL	l .	 	oier, oigaine iii	attor, for plactic	,,,	101112/2					
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 SW 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 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 SAND, fine to coarse (20% fine, 35%, 30% coarse), sub-angular to sub-rounded, with gravel, coarse (10°-140° bgs) WHAA-SOIL 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 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 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded, well graded, with gravel, fine (10%), well-rounded; wet, 10YR 4/3 SAND, fine to medium (80% fine, 10% medium), fine, 10% medium, fine, 10% medium, fine, 10% medium, graded, trace silt, sub-angular to well-rounded, well graded, with gravel, fine (10%), well-rounded, well graded, with gravel, fine (10%), well-rounded, well graded, with gravel, fine (10%), well-rounded, well-graded, with gravel, fine (10%), well-rounded, well-graded, with gravel, fine (10%), well-rounded, well-graded, with gravel, fine (10%), well-graded, trace silt graded, with gravel, fine (10%), well-graded, fine, 10% medium, graded, fine, 10% medium, graded, fine, 10% medium, graded, fine,					CI	1 1		CLAY, medium	plasticity, firm; d	ry,	10YR 4/3					
SW SAND, fine to coarse (20% fine, 35%, 30% coarse), angular to sub-rounded; dry, 10YR 4/2 SW 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 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 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 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded; wet, 10YR 4/3 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded trace silt sub-angular to well-rounded poorly graded trace silt sub-angular to sub-angular to well-rounded poorly graded trace silt sub-angular to sub-angular to sub-angular to sub-angular to sub-an					OL	2		SAND fine to co	parso (10% fina	60	% modium 20%	-				
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 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 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 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded poorly graded trace silt						-		coarse), angular	to sub-rounded	, we	ell graded, with					
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 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 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 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded, poorly graded trace silt sub-angular to well-rounded trace silt sub-angular to well-						3		gravel, medium	(10%), well-rour	nde	d; dry, 10YR 4/2					
MW4A-SOIL 8-8.5 SANDY CLAY, medium plasticity, soft, sand, fine to coarse (16% fine, 8% medium, 8% coarse), sub-angular to sub-rounded, well graded, with gravel, coarse (12%), well-rounded; dry, 10YR 4/3 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 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 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded, moorly graded, trace silt.						4										
MW4A-SOIL 8-8.5 SANDY CLAY, medium plasticity, soft, sand, fine to coarse (16% fine, 8% medium, 8% coarse), sub-angular to sub-rounded, with gravel, coarse (12"/4" LC Steel Casing (0"-138" bgs) SANDY CLAY, medium plasticity, soft, sand, fine to coarse (16% fine, 8% medium, 8% coarse), sub-angular to sub-rounded, with gravel, coarse (12"/4" LC Steel Casing (0"-140" bgs) A" LC Steel Casing (0"-140" bgs) 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 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded, moorly graded, trace silt						-										
MW4A-SOIL 8-8.5 CL SANDY CLAY, medium plasticity, soft, sand, fine to coarse (16% fine, 8% medium, 8% coarse), sub-angular to sub-rounded; dry, 10YR 4/3 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 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded, poorly graded, trace silt					SW	5	*****					-		−Groι	ut (neat cem	ent)
MW4A-SOIL 8-8.5 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 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 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded, poorly graded, trace silt														(0 -	130 bys)	
MW4A-SOIL 8-8.5 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 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 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded, poorly graded, trace silt sub-angular to well-rounded, poorly graded, p								medium (1376),	well-lourided, di	у, і	01104/3					
MW4A-S OIL 8-8.5 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 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 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded, poorly graded, trace silt.						7 -										
MW4A-SOIL 8-8.5 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 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 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded, poorly graded, trace silt.																
8-8.5 SW SW SW SW 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 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded trace silt sub-angular to well-rounded tra		MW4A-S	OIL		CI											
SW (12%), well-rounded; dry, 10YR 4/3 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 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded trace silt		8-8.5			OL	9 -		$_{\!$	ub-rounded, wit	h gr	avel, coarse					
coarse), sub-angular to well-rounded, well graded, with gravel, fine (10%), well-rounded; wet, 10YR 4/3 SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded, poorly graded, trace silt					SW	-		∖(12%), well-roun	ided; dry, 10YR	4/3		J 💹				
with gravel, fine (10%), well-rounded; wet, 10YR 4/3 / SAND, fine to medium (80% fine, 10% medium), sub-angular to well-rounded, poorly graded, trace silt						10	*****	\ coarse), sub-ang	parse (20% fine, gular to well-rou	30' nde	% medium, 40% d, well graded,	/₩				sing
SAND, life to medium (00% life, 10% medium),						11		with gravel, fine	(10%), well-rou	nde	d; wet, 10YR 4/3			(0	. 10 bgo,	
SP 12 (5%), trace clay (5%); moist, 10YR 5/2 SAND, fine to coarse (20% fine, 30% medium, 30% coarse), sub-angular to well-rounded, poorly graded, with gravel, medium (15%); moist, 10YR 5/2 SAND, fine to medium (50% fine, 40% medium), sub-angular to well-rounded, trace silt (5%); moist, 10YR 4/1 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 SAND, fine to well-rounded, poorly graded, trace gravel, coarse (5%), well-rounded, trace silt (5%); moist, 10YR 4/1 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 SILTY SAND, fine, sub-rounded to well-rounded, silt						``						ıt 💹				
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 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 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 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 SILTY SAND, fine, sub-rounded to well-rounded, silt	19/2					12		–∖(5%), trace clay	(5%); moist, 10°	YR	5/2					
with gravel, medium (15%), sub-angular to well-rounded, trace silt (5%); moist, 10YR 5/2 SAND, fine to medium (50% fine, 40% medium), sub-angular to well-rounded, poorly graded, trace gravel, coarse (5%), well-rounded, poorly graded, trace sub-angular to well-rounded, poorly graded, trace gravel, coarse (5%), well-rounded, poorly graded, trace gravel, coarse (5%), well-rounded, trace silt (5%); moist, 10YR 4/1 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 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 SILTY SAND, fine, sub-rounded to well-rounded, silt	3PJ 6				SP	12										
SAND, fine to medium (50% fine, 40% medium), sub-angular to well-rounded, trace silt (5%); moist, 10YR 4/1 SAND, fine to medium (50% fine, 40% medium), sub-angular to well-rounded, trace silt (5%); moist, 10YR 4/1 SAND, fine to medium (50% fine, 40% medium), sub-angular to well-rounded, trace gravel, coarse (5%), well-rounded, trace silt (5%); moist, 10YR 4/1 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 SILTY SAND, fine, sub-rounded to well-rounded, silt	368.0					13		with gravel, med	lium (15%), sub	-ang	gular to					
Sub-angular to well-rounded, poorly graded, trace gravel, coarse (5%), well-rounded, trace silt (5%); moist, 10YR 4/1 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 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 SILTY SAND, fine, sub-rounded to well-rounded, silt	NG LC					14						J 💥				
gravel, coarse (5%), well-rounded, trace slit (5%); moist, 10YR 4/1 SAND, fine to medium (50% fine, 40% medium), sub-angular to well-rounded, poorly graded, trace gravel, coarse (5%), well-rounded, trace slit (5%); moist, 10YR 4/1 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 SILTY SAND, fine, sub-rounded to well-rounded, silt	BOR							sub-angular to w	vell-rounded, po	orly	graded, trace					
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 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 SILTY SAND, fine, sub-rounded to well-rounded, silt	GPJ					15			5%), well-rounde	ea, i	trace siit (5%);					
SP 17 Gravel, coarse (5%), well-rounded, trace silt (5%); moist, 10YR 4/1 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 SILTY SAND, fine, sub-rounded to well-rounded, silt	068.					16		SAND, fine to m				- ₩				
moist, 10YR 4/1 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 SILTY SAND, fine, sub-rounded to well-rounded, silt	N N				QD	-		gravel, coarse (
SAND, fille to coarse (30% fille, 30% filledium, 30% coarse), sub-angular to well-rounded, well graded, with gravel, coarse (10%), well-rounded; moist, 10YR 4/2 SILTY SAND, fine, sub-rounded to well-rounded, silt	07_G				٦٢	17			narce /200/ fine	30	% madium 200/	_/				
with gravel, coarse (10%), well-rounded; moist, 10 Vith gravel, coarse (10%), well-rounded; moist, 10 Vith gravel, coarse (10%), well-rounded; moist, 10 SILTY SAND, fine, sub-rounded to well-rounded, silt	100					12		coarse), sub-ang	gular to well-rou	nde	d, well graded,					
SILTY SAND, fine, sub-rounded to well-rounded, silt	ENTA					'°		with gravel, coar								
mi i i J oly i i i i Jiyi i i i i i i i i i i i i i i	ONM				SM	19			ne, sub-rounded	to	well-rounded, sil	_t ′ ₩				
(40%); moist, 10YR 4/4	INVIR				SIVI	-										



	CLIENT:	DO 4						JOB NO.:	LO	CATION:	_				
ł	PROJECT:	PCA_						60618753 DRILLING METHO	D:	Twin Citie	es Ea	st Me	tro, M	N BORING NO	D.
+		roject '						Sonic						MW4A I	847054]
+	LOGGED BY:	JM/A	EL/AS		CHEC	KED BY:	AEL/AS							SHEET	
-	DRILLING CON	NTR.:	Traut											2 c)F 9
	DRILLER: D	an Pfli	psen		EQUIF	c.: Sor	nic	SAMPLING METH 10' acetate ba						DRIL	LING
	BORING DEPT	H: 16	0 ft bgs											START	FINISH
-	GROUND SUR					ft AMSL		WATER LEVEL						TIME	TIME
	DATUM: NA	D 83 L	JTM 15	5 (met	ers)			TIME						0800 DATE	1700 DATE
	Northing: 4							DATE CASING DEPTH							
+	Easting: 50)1 				SURFACE CONDITION							12-13-19	12-16-19
	SAMPLE ID	DRIVEN	PID (ppm)	.S.C.S.	DEPTH IN FEET	ROC	Grass					۱۸/	<u></u>	DIAGRA	N /
	SAMPLE ID	FEET	P G	U.S.	N N N	SOIL/ROCK GRAPH	LITHO	DLOGIC DESC	RIPT	ION	-	VV		DIAGNA	IVI
+		/ 22				0)	LITTIC) (III I	1014					
t				CIM		*****	SAND, fine to co				M	M		t (neat cem	ent)
	MW4A-S	OIL		SW	21		coarse), sub-ang with gravel, fine						(0-1	38' bgs)	
	20-21			sc			moist, 10YR 5/3	, ,							
					22	1////	CLAYEY SAND, moist, 10YR 5/3	fine, well-round	led, cla	ay (50%);					
	MW4A-S	OIL		SP	23	7777	SAND, fine to co	parse (35% fine,	35% r	medium, 5%					
	20-23				-		coarse), sub-rou graded, with grav								
					24		(10%); moist, 10	YR 5/3	,						
					25		CLAYEY SAND, medium), sub-ro	unded to well-ro	oùnded	, poorly	M.		-4" I C	Steel Cas	ina
					23		graded, clay (30 ^o 10YR 5/3	%), trace gravel	, coars	se (5%); moist,				40' bgs)	iiig
					26		10110 3/3								
				SC											
					27										
					28		CLAYEY SAND,	fine to medium	(50%	fine 15%					
					 		medium), sub-ro	unded to well-ro	oùnded	, poorly					
					29		graded, clay (30' well-rounded; mo		, coars	se (5%),					
					30		CLAYEY SAND,		led no	orly graded					
							clay (30%), with	gravel, fine to c	oarse ((5% fine, 5%					
					31		coarse), well-rou	ınded; moist to v	wet, 10	YR 4/4					
19/20	MW4A-S	OIL			32										
PJ 6/	31-32														
GS.GI				SC	33										
G LO					34										
ORIN					-										
PJ B					35									t (neat cem 38' bgs)	ent)
)GS.0					36								(0-1	oo bgs)	
J_F				01	"		CLAY, medium p well-rounded, tra								
7_GII				CL	37	<i>\\\\\\</i>	moist, 10YR 4/2		(- , o j, v	. on roundou,					
L 100	MW4A-S	OIL				<u> </u>	SAND, fine to co								
ENTA	37-38				38 -		coarse), sub-rou trace gravel, fine								
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20				SW	39		j ,	. ,,	, -						
ENVIE	MW4A-S	OIL				***** *******************************									



[CLIENT:							JOB NO.:	LOCATION:					
		PCA						60618753	Twin Ci	ties Ea	st Met		00000000	
	PROJECT: P	roject 1	1007					DRILLING METHOD: Sonic					ORING NO	
	LOGGED BY:	JM/A	EL/AS		CHEC	KED BY:	AEL/AS						IW4A [847054]
	DRILLING CON	ITR.:	Traut										3 o	F 9
	DRILLER: D	an Pfli _l	osen		EQUIF	.: Sor	nic	SAMPLING METHOD					DRIL	LING
	BORING DEPT	н: 16	0 ft bgs					10' acetate bags					START	FINISH
	GROUND SUR	FACE EI	EVATIO	N: 8	90.06	ft AMSL		WATER LEVEL					TIME	TIME
	DATUM: NA	D 83 L	JTM 1	5 (met	ers)			TIME					0800	1700
	COMMENTS: Northing: 49	980608	3.11					DATE					DATE	DATE
-	Easting: 50)1		I	Ι	SURFACE CONDITION	CASING DEPTH				12	2-13-19	12-16-19
	SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass	.			WI	ELL DI	IAGRAI	М
		RECO				SOI	LITHO	DLOGIC DESCR	IPTION					
İ											N//4	411.00	N	
	38-40				41 -		coarse), sub-rou	parse (30% fine, 39 anded to well-round (5%), well-round	ded, well graded,			(0'-140	Steel Casi o' bgs)	ing
					10									
				sw	42 -									
					43									
					44									
					45		SAND, fine to co	parse (30% fine, 3	5% medium, 30%					
					46		trace gravel, fine	inded to well-round e (5%), well-rounde	ded, well graded, ed; wet, 10YR 5/2					
				CVA	47									
				SW	48									
					49									
					50	*****	SAND, fine to m	edium (60% fine, 3	30% medium),			-Grout (r	neat cem	ent)
				SP	51		sub-rounded to v (10%); moist, 10	well-rounded, poor	ly graded, with silt			(0'-138	s bys)	
6/19/20	MW4A-S 51-52	OIL			52		coarse), sub-rou	parse (30% fine, 50 unded to well-round	0% medium, 10% ded, well graded,					
SS.GPJ					53		with silt (10%); w	vet, 10YR 5/2						
ING LOG					54									
PJ BOR					55)			Steel Casi	ing
LOGS.G				sw	56							(0'-140	r bgs)	
7_GINT					57									
TAL 100					58									
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ					59 -									
ENVIR														



CLIENT:			JOB NO.:	LOCATION:				
MPCA PROJECT:			60618753 DRILLING METHOD		Cities Ea	st Metro, N	//N BORING NO	<u> </u>
Project 1007	1		Sonic	J.				
LOGGED BY: JM/AEL/AS	CHECKED BY:	AEL/AS					SHEET	[847054]
DRILLING CONTR.: Traut							4 0	of 9
DRILLER: Dan Pflipsen	EQUIP.: Sor	nic	SAMPLING METHO					LING
BORING DEPTH: 160 ft bgs	LQOII		่ 10' acetate bao	gs			START	FINISH
	90.06 ft AMSL		WATER LEVEL				TIME	TIME
DATUM: NAD 83 UTM 15 (met	ters)		TIME				0800	1700
COMMENTS: Northing: 4980608.11			DATE				DATE	DATE
Easting: 508614.01		SURFACE CONDITION	CASING DEPTH				12-13-19	12-16-19
DI STORY PRECION (PPID)	DEPTH IN FEET SOIL/ROCK GRAPH	Grass	DLOGIC DESC	RIPTION		WELL	DIAGRA	M
/ 22	0)	Little	DEGGIO DEGG	THE TION				
MW4A-SOIL 60-62	61 — 62 — 63 — 64 — 65 — 66 — 67 — 68 — 69 — 69 —	SAND, fine to co coarse), sub-ang with cobbles (10 SAND, fine to co coarse), sub-ang with cobbles (10 SAND, fine to co coarse), sub-ang	parse (20% fine, gular to well-roun)%); moist, 10YR parse (45% fine, gular to well-roun	30% medium, 40% nded, well graded; 30% medium, 40% nded, well graded, 4/3 45% medium, 5% nded, poorly graded; moist, 10YR 4/2			ut (neat cem 138' bgs)	nent)
MW4A-SOIL 68-70 SP SW SW SP GP	70 71 71 72 73 73 73 73 75 75 75 75 75 75 75 75 75 75 75 75 75	silt (5%); wet, 10 SAND, fine to co	well-rounded, por DYR 5/3 parse (33% fine, anded to well-rou	33% medium, 33% medium, 33% medium, 33% nded, well graded,			C Steel Cas 140' bgs)	ing
MW4A-SOIL 74-75	74 75		parse (40% fine,	25% medium, 25%				
SW SW	76	with gravel, fine (3%), well-round	(7%), well-round led; moist, 10YR					
SP SP	78	coarse), angular	to well-rounded	30% medium, 30%, well graded, with well-rounded; wet,				
GP GP	79	COBBLES, well- (10% fine, 15% to well-rounded;	medium, 15% co wet, 10YR 6/1	and, fine to coarse parse), sub-angular um plasticity, stiff,				



[CLIENT:	DO 4						JOB NO.:	LOCA	ATION:		-4 1 4 -	4 N	18.1	
F	PROJECT:	PCA	1007					60618753 DRILLING METHO	D:	Twin Citi	es Ea	St ivie	etro, iv	BORING NO	D .
+		roject					451/40	Sonic						MW4A [847054]
	OGGED BY:				CHEC	CKED BY:	AEL/AS							SHEET	
1	DRILLING CON	ITR.:	Traut		Ι									5 c)F 9
	DRILLER: D		•		EQUI	P.: Sor	nic	SAMPLING METH							LING
E	BORING DEPT	H: 16	0 ft bgs					\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\						START	FINISH
	GROUND SUR					ft AMSL		WATER LEVEL TIME						-	
	DATUM: NA	D 83 (JIM 1	o (met	ers)			DATE						0800 DATE	1700 DATE
	Northing: 49 Easting: 50							CASING DEPTH						12-13-19	 12-16-19
-	<u></u>	DRIVEN C		(Ó		¥_	SURFACE CONDITION	NS:				_		12 10 10	12 10 10
	SAMPLE ID	/ 🗒	PID (ppm)	S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Glass					W	/ELL	DIAGRA	М
		RECO.		J.	<u>o</u> <u>z</u>	SOI	LITHO	DLOGIC DESC	CRIPTION	NC					
						,01	\\	050/) -1	al . 4	0VD 0/0	874	R/A	Grou	it (neat cem	ent)
	NAVA 4 A . O					-{· O° <	∖iron banding (10- GRAVEL, mediu							38' bgs)	ierit)
	MW4A-S 80-81	OIL			81		coarse), sub-rou graded, with san	nded to well-rou	ınded, p	oorly					
					82]; O; <	10% medium, 10)% coarse), sub							
				GP	-	40°C	well-rounded; we	et, 10YR 5/3							
					83	7000									
					84										
				SP	85	<u> </u>	SAND, fine to me				·		4" LC-1 0'-1	C Steel Cas 40' bgs)	ing
	MW4A-S	OIL		- SP	86		sub-rounded to v	well-rounded, po (5%). well-round	orly gra led: moi	ded, trace st. 10YR 5/3 /			(
	85-86						SAND, fine to co	arse (15% fine,	15% m	edium, 20%					
					87		coarse), sub-ang with gravel, fine	(20%), sub-rour	nded to						
				SW	88		well-rounded, will weathered; mois	th dolostone, co t_10YR 5/3	bbles (3	30%),					
	MW4A-S					-		.,							
	88-89	OIL			89										
					90	*****	DOLOSTONE, n	not competent v	uas (10	%) trace					
					91		iron staining (3% (2%), clay obser), dendritic mar							
					91		(2%), clay observ	veu, 101K 5/5							
9/19/2					92										
.GPJ					93										
FOGS					-										
RING					94		DOLOSTONE, n	noderately com	petent, t	race sand,					
) B0					95		medium (5%), tra glauconite (2%);	ace oolitic textui 10YR 5/2	re (3-5%), trace			-Grou	it (neat cem	ent)
GS.GF													(0'-1	38' bgs)	
11_LO					96										
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20					97		DOLOSTONE, n	not competent i	ron stair	ning (5-10%)					
100					98		trace sand, fine t	to medium (5%)	, trace c	olitic texture					
ENTA					30		5/3	ooniile (170), cia	y observ	eu, iVir€					
SONM					99										
ENVI															



	OLIENT:							IOD NO	1.00	ATION					
	CLIENT:	PCA						JOB NO.: 60618753	LOC	ATION: Twin Citie	es Fa	st Met	ro MN		
	PROJECT:	roject 1	1007					DRILLING METHOD):	1 Will Old	<u> </u>	ot wice		RING NO).
	LOGGED BY:				CHEC	KED BY:	AEL/AS							N4A [847054
	DRILLING CON	NTR.:	Traut												- 0
						. 0		SAMPLING METHO	D:					6 o	
	DRILLER: D				EQUIF	o: Sor	1IC	10' acetate bag	JS					START	FINISH
	BORING DEPT		0 ft bgs					WATER LEVEL				1		TIME	TIME
	GROUND SUR					ft AMSL		TIME						0800	1700
	COMMENTS:			o (mete	513)			DATE						DATE	DATE
	Northing: 49 Easting: 50							CASING DEPTH					12	-13-19	12-16-19
	SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	DLOGIC DESC	RIPTI	ON		Wi	ELL DIA		
		/ ===													
6/19/20					101 - 102 - 103 - 104 - 105 - 106 - 107 - 108 - 110 - 111 - 111 - 112 -		DOLOSTONE, n (5-10%), reworked fine to medium (3 staining along 1r DOLOSTONE, n (15%), reworked sand, medium (3 DOLOSTONE, n (15%), reworked sand, medium (3 DOLOSTONE, c trace vugs (5%), 5/3 DOLOSTONE, c well-rounded, vu (10%); 10YR 6/2 DOLOSTONE, n fine (5-10%), we	ed ~4mm clasts of 3%), trace dendrately comports (10%), chasts (10%), dolometrace sand, medical comports (10%), dolometrace sand, denderately comports (10%), dolometrace sand, dolometrace	etent, in the et	iron staining 10%), trace			4" LC Str (0'-140'	bgs)	
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/1					113 - 114 - 115 - 116 - 117 - 118 -		DOLOSTONE, n (30%), dolomitic DOLOSTONE, n (30%), dolomitic DOLOSTONE, n iron staining (10% well-rounded; 2.5 DOLOSTONE, n (20-30%), with strace iron bandin staining (2%); 2. DOLOSTONE, n (20%), vugs (15% 10YR 6/3	moderately comp precipitate (10% moderately comp %), trace sand, fi 5 Y 6/3 not competent, or and, fine (10-15% and, fine (10-15% and, fine (20%), trace de 5Y 8/2 moderately comp %), dolomitic pre	etent, (); 10Y etent, () etent, () blitic te (%), wel ndritic etent, ()	oolitic texture R 6/2 ooids (20%), %), exture Il-rounded, manganese iron staining e (15%);			-4" LC Sto (0'-140'		ing
ENVIR							DOLOSTONE, n (20-30%), ooids								



	CLIENT:	DO 4						JOB NO.:		LOCAT					45.1	
	PROJECT:	PCA_						60618753 DRILLING METHO	DD:		Twin Ci	ties E	ast Me	etro, i	BORING NO	D.
	Pi	roject '	1007	T				Sonic							MW4A [847054
	LOGGED BY:	JM/A	EL/AS	;	CHEC	KED BY:	AEL/AS	-							SHEET	<u> </u>
	DRILLING CON	NTR.:	Traut												7 o	F 9
	DRILLER: D	an Pfli	psen		EQUIF	: Sor	nic	SAMPLING METH 10' acetate ba							DRIL	LING
	BORING DEPT	H: 16	0 ft bgs										-		START	FINISH
	GROUND SUR					ft AMSL		WATER LEVEL							TIME	TIME
	DATUM: NA	D 83 L	JTM 1	5 (mete	ers)			TIME							0800 DATE	1700 DATE
	Northing: 49							DATE CASING DEPTH							_	
	Easting: 50)1 				SURFACE CONDITION								12-13-19	12-16-19
	SAMPLE ID	DRIVEN	PID (mdd)	.S.C.S.	DEPTH IN FEET	ROC	Grass						۱۸	/ = 11	DIAGRAI	M
	SAIVIPLE ID	FEET	д <u>а</u>	U.S.	N N	SOIL/ROCK GRAPH	LITHC	LOGIC DES	CRII	PTIO	N		v	v L L L	DIAGINA	IVI
		/ ##					2	200.0 520			. •					
							(5-10%), with sai					7 🔯				
					121		trace dendritic m					<i>J</i>				
							well-rounded, de iron banding (5%	ndritic mangen	ese	(10-1)	5%), tráce					
					122		(2%); 5Y 7/2), trace still file	diui	II pias	slicity clay					
					123	\Box	DOLOSTONE, n	ot compotent	ooliti	c toyt	uro (20%)					
							dolomitic precipit	ate (10%), trac	e iro	n bar	ding (2%),					
					124		trace dendritic m	anganese stair	ning	(2%);	2.5Y 7/4					
					125	\vdash	DOLOSTONE, n	anderstely sem	noto	nt do	lomitio			—Gro	ut (neat cem	ient)
							precipitate (15%)), trace sand, fi	ne (5	5%),				(0'-	138' bgs)	
					126		well-rounded, tra					/\ <u>\</u>				
					127		_dolomitic precipit	ates (10%); 2.5	5Y 7	/3	,					
							SANDY DOLOS well-rounded, do									
					128		(10%), trace ooli	tic texture (5%)	, tra	ce iro	n banding					
					129	\vdash	(2%); 2.5Y 7/2 DOLOSTONE, c	ompotont dolo	mitic	nroo	initata					
						井井	(15%), vugs (10%	%), with sand (5	5-10°	%), tra	ace iron					
					130		banding (2%); 2. DOLOSTONE, n		nete	nt m	acciva	∕ ∭			C Steel Cas 140' bgs)	ing
					131		dolomitic precipit	ate (10%), vug	s (10	0%), v	vith sand			`	0 /	
20							@ 132-133 (5-10 7/1)%), trace iron s	stain	ing (2	%); 2.5Y					
6/19/					132											
.GPJ					133		DOLOSTONE -	anderstely som	noto	nt m	200110					
LOGS							DOLOSTONE, n dolomitic precipit	tate (10%), vug								
RING					134		− staining (2%); 2.5 DOLOSTONE, n		ovidi	zod fi	no grainad	/ ₩				
J BO					135		dolomitic precipit	ate (20-30%), v								
S.GP					-		silt (2%); 2.5Y 7/		oxidi	zed fi	ne grained	/ 🔯				
. Log					136		dolomitic precipit	tate (20-30%), v						Groر -(۵'-	ut (neat cem 138' bgs)	ient)
EN D					137	1/	silt (2%); 2.5Y 7/		m = 1	4	i C				C Steel Cas	ing
1007					-		DOLOSTONE, n grained dolomite								140' bgs)	5
VTAL					138		trace dark precip				- , ,,,	Y//	Y//	4		
NME					139									0.5'	pellet seal o	п юр от
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20					-									(13	8'-140' bgs)	
Ш						\perp										



									_					
	CLIENT:	DO 4						JOB NO.:	LOC	ATION:	o:::		N 4 N 1	
	PROJECT:	PCA roject 1	1007					60618753 DRILLING METHO	D:	I WIN (Cities Ea	st ivieti	ro, IMIN BORING N	1O.
	LOGGED BY:				CHEC	CKED BY:	AEL/AS	Sonic					MW4A SHEET	[847054]
	DRILLING CON	ITR.:	Traut	'				1						of 9
	DRILLER: Da				EQUI	P.: Sor	nic	SAMPLING METH						ILLING
	BORING DEPT		0 ft bgs					10' acetate ba	gs				START	FINISH
	GROUND SUR	FACE EL	EVATIO	N: 89	90.06	ft AMSL		WATER LEVEL					TIME	TIME
	DATUM: NA	D 83 L	JTM 1	5 (mete	ers)			TIME					0800	1700
	COMMENTS: Northing: 49	980608	3.11					DATE					DATE	DATE
	Easting: 50	8614.0					SURFACE CONDITION	CASING DEPTH					12-13-1	9 12-16-19
	SAMPLE ID	DRIVEN	DID (mdd)	.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass	vo.				WE	ELL DIAGRA	λM
	9, 22 .2	PEET DRI		U.S	N N	SOIL	LITHO	DLOGIC DESC	CRIPTI	ON				
							DOLOGTONE					◆	Grout Basket	
					-		DOLOSTONE, n staining with den	dritic mangane	se alon	g fractures	n		(140' bgs)	
					141		(15%), dendritic (10%); 10YR 7/3		ining or	surface				
					142		DOLOSTONE, n							
					143		dolomitic precipit staining (2%), 2.		gs (15-2	20%), iron	-		7" Open Hole	`
					144								(140'-160' bgs)
					445	+								
					145		DOLOSTONE, n precipitate (40-5				g			
					146		(2%); 2.5Y 6/3							
					147		DOLOSTONE, n							
					148		dolomitic precipit –(2-3%); 2.5Y 7/2	, ,,			_/			
					149		DOLOSTONE, c	competent, ~5 m tate (10-15%), t	nm vugs race iro	s (15-20%), on banding				
					150		(5%); 2.5Ý 7/2							
					-		DOLOSTONE, c precipitate (20%), vugs (10%), t	race de					
0					151		manganese stair	ning (2%); 2.5Y	7/2					
6/19/2					152									
GS.GPJ					153						•		7" Open Hole (140'-160' bgs)
NG LO					154								(1.0 100 290	,
J BORI					155	1//	DOLOGTONE							
GS.GP,					-	- 7 7	DOLOSTONE, n	tate (15-20%), i	petent, ron stai	massive, ning and				
INT_LC					156		banding (10%); 2	2.51 7/3						
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20					157		DOLOSTONE, n	not competent, p	olaty, do	olomitic				
NTAL					158		Freeignate (10-1)	20,0,, 2.01 170						
RONME					159	+								
ENVIF														



								-					5
CLIENT:	1PCA						JOB NO.: 60618753	LOC	ATION: Twin	Cities Eas	st Metro N	/N	
PROJECT:		1007					DRILLING METHO	DD:	I WII	Cilles La	st ivietio, i	BORING NO	D.
	roject					A E 1 / A C	Sonic					MW4A [847054]
LOGGED BY:			•	CHEC	KED BY:	AEL/AS						SHEET	
DRILLING CO							SAMPLING METH	OD.					F 9
DRILLER: D				EQUIF	o.: Sor	nic	10' acetate ba					START	LING FINISH
GROUND SUF				90 06	ft AMSL		WATER LEVEL					TIME	TIME
DATUM: NA					IC / UVIOL		TIME					0800	1700
COMMENTS: Northing: 4			`	,			DATE					DATE	DATE
Easting: 50	08614.0	01		1		SURFACE CONDITION	CASING DEPTH			1		12-13-19	12-16-19
	PEET DRIVEN	o ê	S.	 	PH PH	Grass	NO.						
SAMPLE ID	DRIN FEET RECOVERED	OIA (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	LITU	DLOGIC DESC	PDIDTI	ON		WELL	DIAGRA	М
					S	LIIN	DEOGIC DESC	JRIP I I	ON				
						EOB @ 160' bgs	s, no refusal						
				161	-								
				162	1								
				-	-								
				163	1								
				164									
				165									
				-	-								
				166									
				167									
				168									
				169									
				170									
				-	-								
				171 -	-								
				172									
				173	_								
				174									
				175									
5				176									
				-	-								
				177									
				178									
<u> </u>				179	-								
[╛	1							



ſ	CLIENT:							JOB NO.:	LOCATION:		_			
-	PROJECT:	IPCA						60618753 DRILLING METHOD:		Twin Cities	Eas	st Metro,	BORING NO	O .
-	P	roject [*]	1007					Sonic					MW5A I	847056]
-	LOGGED BY:	AEL/	AS/MG	SD/HT	CKEC	KED BY:	AEL/AS						SHEET	017000]
	DRILLING CON	NTR.:	Traut										1 1	of 12
	DRILLER: D	an Pfli _l	psen		EQUIF	.: Sor	nic	SAMPLING METHOD					DRIL	LING
	BORING DEPT	гн: 22	0 ft bgs		•			10' acetate bags	5				START	FINISH
	GROUND SUR	RFACE EI	LEVATIC	n: 9	08.05	ft AMSL		WATER LEVEL					TIME	TIME
	datum: N A	ND 83 L	JTM 1	5 (met	ers)			TIME					1345	1800
	COMMENTS: Northing: 4	980840	0.19					DATE					DATE	DATE
	Easting: 50	8682.9		1		1	SURFACE CONDITION	CASING DEPTH					12-02-19	12-04-19
	SAMPLE ID	FEET DRIVEN FEET RECOVERED	OIA (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Asphalt	OLOGIC DESCF	RIPTION			WEL	L DIAGRA	M
-						//////	SANDY CLAY r	medium plasticity,	sand fine to	,				
				CL			medium (5% fine	e, 15% medium), s	sub-rounded	, with				
					1 1		∖gravel, medium ∖sub-angular; we	to coarse (5% me t. 10YR 3/6	dium, 5% co	arse), /				
				sw	2 -		SAND, fine to co	parse (15% fine, 3	0% medium	, 30%				
							medium to coars	inded, well graded se (10% medium,	10% coarse)),				
					3		∖sub-angular, trad ∖10YR 4/6	ce clay (5%), low p	olasticity; we	:t, ∫				
				CL	4 -		CLAY, low plasti	icity, with sand, m						
					-			ace gravel, mediur ce cobbles (1%); r						
					5	(/////	∖3/4	, ,					out (neat cem '-208' bgs)	nent)
				SP	6 -			6), well-rounded, vace gravel, medoiu /R 4/6					· ,	
					8 -	-		6), well-rounded, v gravel, medoium (
					-		SILT, low plastic	city, trace clay (5%); dry, 10YR	4/6				
				ML	9 -]								
				IVIL	10		CILT low plantic	city, with clay (15-2	00%), dn. 10	VP		4"	LC Steel Cas	ing
					-		4/4	oity, with clay (15-2	20%), dry, 10			(0)'-210' bgs)	
					11			parse (55% fine, 2						
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20				sw	12		(15%), sub-angu	unded, well graded ular to sub-rounde -30%) @ 12.5-13'						
3S.GF					13		CLAY, low plasti	icity, stiff, with gra	vel, medium	to				
3100				CL	14		coarse (5% med	lium, 2% coarse), y to moist, 10YR 4	sub-angular					
ORIN				CL	'		sub-rounded, dr	y to moist, To the	F/ O					
PJ B					15		CLAV low plasti	icity, stiff, with gra	vel medium	to				
LOGS.G					16		coarse (5% med	lium, 2% coarse), y to moist, 10YR 4	sub-angular					
GINT					17									
1007				CL	"									
ITAL					18	<i>\\\\\\</i>				8				
NMEN					19									
IVIRO														
						<u> </u>				K		K/2		



	CLIENT:	IDO A						JOB NO.:	LOCA		: - -	-4 1 4 -	4 N	4N.I	
	PROJECT:	IPCA	4007					60618753 DRILLING METHOD	D:	Twin Cit	ies Ea	IST IVIE	etro, iv	BORING NO	D.
		roject '			I			Sonic						MW5A J	847056
	LOGGED BY:	AEL/	AS/MG	SD/HT	(C)K(EC	KED BY:	AEL/AS	-						SHEET	
	DRILLING CON	NTR.:	Traut											2 0	F 12
	DRILLER: D	an Pfli _l	osen		EQUIF	c.: Sor	nic	SAMPLING METHO 10' acetate bag							LING
	BORING DEPT	H: 22	0 ft bgs											START	FINISH TIME
	GROUND SUR					ft AMSL		WATER LEVEL							
	DATUM: NA	D 83 U	JIM 1	5 (met	ers)			DATE						1345 DATE	1800 DATE
	Northing: 49 Easting: 50							CASING DEPTH						12-02-19	12-04-19
	SAMPLE ID	VEN /		.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Asphalt						/ELL	DIAGRA	
	9, 22 .2	PEET DRI	a a	O.U.	N N	SOIL	LITHO	DLOGIC DESC	RIPTIO	N					
											V/4	NZA	Cnai		
					21 -		CLAY, low plasti (2%), sub-angula (2%); moist, 10Y cobble @ 20' bg	ar to sub-rounde ′R 4/3, 5" compe	d, trace	cobbles				it (neat cem 208' bgs)	ient)
					22		cobble @ 20 bg	5							
					23										
					24										
				CL	25						>			C Steel Cas 210' bgs)	ing
					26										
					27		SANDY CLAY, lo (25% fine, 10% r	medium), sub-an	gular to						
					28 -		sub-rounded, tra	ce cobbles (3%)	; 10YR 5	5/3					
					29										
					30 -		SAND, medium to coarse), sub-ang fine (5%), well-ro	gular, poorly grad	led, trac						
9/20					32										
S.GPJ 6/1					33		SAND, fine to co coarse), sub-and with gravel, fine	gular to sub-roun to coarse (10% f	ded, pod ine, 5%	orly graded, coarse),					
ING LOG					34		sub-angular to su SAND, fine to co								
3PJ BOR				SP	35		coarse), sub-rou medium to coars sub-angular to si	nded, poorly gra se (3% medium,	ded, trad 2% coar	ce gravel, se),				ut (neat cem 208' bgs)	nent)
T_LOGS.(36		Sub-angular to Si	ab-iodilaea, IIIOI	5t, 101P	. U/∠			(5 2	-20 ~90/	
.NIS 2001					37										
IENTAL 1					38 -										
ENVIRONMENTAL 1007 GINT LOGS.GPJ BORING LOGS.GPJ 6/19/20					39 -		SAND, fine to co coarse), sub-rou								



CLIENT:							JOB NO.:	LOCATION:				
	MPCA						60618753	Twin Ci	ities Ea	st Met		
PROJECT:	Project	1007					DRILLING METHOD: Sonic				BORING N	Ю.
LOGGED BY	: AEL/	AS/MG	D/HT	(CKEC	KED BY:	AEL/AS					MW5A SHEET	[847056]
DRILLING C	ONTR.:	Traut									3	OF 12
DRILLER:	Dan Pfli	psen		EQUIF	P.: Sor	nic	SAMPLING METHOD					LLING
BORING DE		•		1 2 4 5			10' acetate bags	;			START	FINISH
GROUND SI			9 9	08 05	ft AMSL		WATER LEVEL				TIME	TIME
DATUM: N							TIME				1345	1800
COMMENTS Northing:		0.40	,				DATE				DATE	DATE
Easting:							CASING DEPTH				12-02-19	12-04-19
SAMPLE ID	PEET DRIVEN FEET RECOVERED	DIA (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Surface condition Asphalt	NS: 	RIPTION		W	ELL DIAGRA	λM
			sw	41 - 42 - 43 -		SAND, fine to co coarse), sub-and trace gravel, me	avel, medium (5% et, 10YR 5/3 parse (20% fine, 5 gular to sub-round dium (5%), sub-ro /R 5/2, silt/clay len	0% medium, 20% ed, well graded, unded, trace silt			4" LC Steel Cas (0'-210' bgs)	sing
			CL	44			ow plasticity, medi					
			CL	45		medium to coars √sub-angular; mo	se (15% medium, bist, 10YR 6/2	15% coarse),				
			SP	46		SAND, medium coarse), sub-rou	to coarse (30% manded, poorly grad	ed, with gravel,				
				1	/////	sub-rounded; m	5% fine, 10% med oist, 10YR 4/2	num, 5% coarse),				
			CL	47 -		CLAY, medium 6/3	plasticity, soft; dry	to moist, 10YR				
				40		CAND Size to	(000/ £ F	00/ 000/				
				49		coarse), sub-ang	parse (20% fine, 5 gular to sub-round dium (5%), sub-ro	ed, well graded,				
			SW	50	******	(5%); moist, 10Y					Grout (neat cer (0'-208' bgs)	ment)
				51		coarse), sub-rou with gravel, fine	inded to well-round to coarse (7% fine	ded, well graded, e, 3% coarse),			(0 -200 bg3)	
6/19/20				52]	ingular; moist, 10Y					
S.GPJ 6/				53		coarse), sub-ano	to coars (8% fine,	ed, poorly graded,				
PIOG			SP			sub-angular; mo	oist, 10YR 3/6 nedium (40% fine, i	60% medium)	J 👹 -			
ORING				54 -		\sub-rounded, po	orly graded; moist	i, 10YR 4/6				
9. BC				55	*****		to coarse (30% manded, poorly grade		₩ .		-4" LC Steel Cas	sing
1007_GINT_LOGS.GPJ BORING LOGS.GPJ				56		fine to medium (to well-rounded;	6% fine, 4% medi moist, 10YR 4/6	um), sub-angular			(0'-210' bgs)	
GINT				57		coarse), sub-ang	parse (20% fine, 6) gular to sub-round	ed, well graded,				
1001			SW	_	- ::::::::::::::::::::::::::::::::::::	trace gravei, fine 4/3	e (5%), sub-rounde	eu, moist, TUYK				
INTAI				58								
ENVIRONMENTAL				59								
EN												



CLIENT:					JOB NO.:	LOCATION:	Turin Citia	- -	4 N/atua	MANI	
PROJECT:	4007				60618753 DRILLING METHOD:		Twin Citie	s Eas	t ivietro,	BORING NO	D.
Project					Sonic					MW5A [8470561
LOGGED BY: AEL	AS/MGD	D/HT/(C)*	KECKED BY:	AEL/AS	-					SHEET	-
DRILLING CONTR.:	Traut									4 c	F 12
DRILLER: Dan Pfl	ipsen	EC	QUIP.: Son	ic	SAMPLING METHOD 10' acetate bags					DRIL	LING
BORING DEPTH: 2	20 ft bgs									START	FINISH
GROUND SURFACE E			.05ft AMSL		WATER LEVEL					TIME	TIME
DATUM: NAD 83 COMMENTS:	UTM 15	(meters	s)		DATE					1345 DATE	1800 DATE
Northing: 498084					CASING DEPTH					_	
Easting: 508682.	1		-	SURFACE CONDITION						12-02-19	12-04-19
SAMPLE ID	PID (bbm)	S.C.S.	SOIL/ROCK GRAPH	Asphalt					WELL	DIAGRA	М
		. C	SOIDS	LITHO	LOGIC DESCF	IPTION					
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20		6.666666666677777777777777777777777777	64	DOLOSTONE, m vugs (5-15%); glauconite (1%); SANDY DOLOSTONE, m staining (5-10%), (5%); 2.5Y 7/3 SANDY DOLOSTONE, m dark iron staining trace vugs (5%); SANDY DOLOSTONE, m dark iron staining trace vugs (5%);	noderately compeworked clasts (5-10YR 5/6, clay of 10YR 5/6, clay of 10YR 5/6, clay of 10-30%), sand, fine recipitate (5%), trace interest (5%), incoderately competent (20%), iron state (20%), iron state (20%), iron state (30-15%); 10YR 7/2 (30-50%), trace 10YR 6/2 TONE, moderately (30-50%), trace 10YR 6/3 ompetent, bander (10YR 6/3) ompetent, bander (2%) ocoarse (2% fine	tent, massive tent, massive tent, massive tent, massive tent, massive to medium ace glaucory observed tent, micritical anganese statent, weath anining (15% clay observed tent, micritical anganese statent, weath sining (15% clay observed tent, massive tent, weath sining (15% clay observed tent, massive tent, weath sining (15%) clay observed tent, massive tent, weath sining (15%), tradition 5%, tradition 5%, vugs (15%), vu	ve, ve, tt, (25%), nite c, iron staining ered,), ved, assive, 5%), tt, 6 ace (15%), e),		(0'	out (neat cem -208' bgs) -C Steel Cas -210' bgs)	



CLIENT:	4DC A				JOB NO.:	LOCATION:	4: -	.t Matua	MANI	
PROJECT:	IPCA				60618753 DRILLING METHOD		ties Eas	t Metro,	BORING NO	D.
	roject 1007				Sonic				MW5A [8470561
LOGGED BY:	AEL/AS/M	GD/HT	(CK ECKED BY	: AEL/AS					SHEET	
DRILLING CO	NTR.: Traut		T						5 c	F 12
	an Pflipsen		EQUIP.: So	nic	SAMPLING METHOR 10' acetate bag					LING
BORING DEP	TH: 220 ft bgs								START	FINISH TIME
	RFACE ELEVATI		08.05ft AMSL		WATER LEVEL					
COMMENTS:	AD 83 UTM 1	5 (met	ers)		DATE				1345 DATE	1800 DATE
Northing: 4 Easting: 50					CASING DEPTH				12-02-19	12-04-19
SAMPLE ID	FEET DRIVEN PEET PEET PEET PEET PEET PEET PEET PE	S.C.S.	DEPTH IN FEET SOIL/ROCK GRAPH	SURFACE CONDITION Asphalt	NS:			WEL	L DIAGRA	
	RECOV) .u		LITHO	DLOGIC DESC	RIPTION				
			81 82 83 83	(35%), with sand manganese stair DOLOSTONE, c staining (5-20%) clay observed	competent, massing, fine (15%), trace sand, fine competent, massing competent, massing precipitate (5%).	e vugs with 6/2, clay observed bedding, iron (3%); 10YR 6/2,			out (neat cem '-208' bgs)	ent)
			85 86 87 88 89	texture (5%), traiobserved DOLOSTONE, control trace sand, fine in staining (5%); 10 DOLOSTONE, control throughout, trace (5%), trace glaude	ce sand, fine (3% competent, massi- ic texture (10%), (5%), trace dendr DYR 6/3, clay obs- competent, massi- e fine grained dol- conite (3%), trace	ye, iron staining race vugs (5%), itic manganese erved			LC Steel Cas '-210' bgs)	ing
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20			90	along fractures (vugs (1%); 5Y 7/20 Vugs (1%); 5Y 7/20 Vugs (10%), trace (30-40%), trace (10%), trace mail (15%), vugs (5-12 Vugs (15%), vugs (5-12 Vugs (15%), vu	competent, fine griron staining (5%) TONE, competers and (20%), banding anese staining competent, dolom (10%), banded iror (10%), banded iror (10%), banded iror (10%), sy 6/3 moderately compening (30-40%), tra (2%); 5Y 6/3	ained, vugs; 5Y 6/2 It, fine grained, led iron staining (2%); 5Y 6/2 Itic precipitate staining (5-10%), letent, massive, ace iron staining 15-20%), with sand manganese			out (neat cem '-208' bgs)	ent)



CLIENT:							JOB NO.:		LOCATION:				
PROJECT:	<u>МРСА</u>						60618753 DRILLING METHO	DD:	Twin Citie	es Eas	st Metro,	MN BORING N	O.
	Project	1007					Sonic					Μ/////////////////////////////////////	[847056]
LOGGED BY	AEL/	AS/MG	SD/HT/	CK EC	KED BY:	AEL/AS						SHEET	[047030]
DRILLING CO	NTR.:	Traut										6 0	of 12
DRILLER: [Dan Pfli	psen		EQUIF	.: Sor	ic	SAMPLING METH						LING
BORING DEF	тн: 22	0 ft bgs					10' acetate ba	iys ——				START	FINISH
GROUND SU	RFACE E	LEVATIC	on: 90	08.05	ft AMSL		WATER LEVEL					TIME	TIME
DATUM: N		JTM 1	5 (mete	ers)			TIME					1345 DATE	1800 DATE
Northing:	498084						DATE					_	
Easting: 5		95 1				SURFACE CONDITION	CASING DEPTH S:					12-02-19	12-04-19
SAMPLE ID	FEET	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Asphalt					WELL	_ DIAGRA	M
	DRI FEET RECOVERED	_ 🗷	U.S	<u>2</u>	SOIL	LITHO	DLOGIC DESC	CRI	PTION				
										V/4	N// AII -	0.041.0	ina
				-		DOLOSTONE, c (30-40%), dolom						₋C Steel Cas -210' bgs)	sing
				101		staining (2%); 5			,,				
				102		SANDY DOLOS	TONE, compete	ent.	fine grained.				
				103		sand, fine (30%) (5%), trace vugs	, well-rounded,						
						SANDY DOLOS	TONE, compete		fine grained, rounded, banded				
				104		\iron staining (10	%);						
				105		DOLOSTONE, n	with sand, fine (5-10)%), Γ				
				106		well-rounded, do staining (2%), tra							
				 		DOLOSTONE, r throughout, dolo	not competent, b	oloc	ky, iron staining				
				107		dark iron staining staining (5%); 10	g (5%), trace de						
				108		stairing (570), 10	7110 3/0						
				109		DOLOSTONE, r blocky, iron stair							
				110			Iritic manganes	e sta	aining (3%), trace		Gr	out (neat cem	nent)
						DOLOSTONE, ri precipitate (5-10	not competent, k	oloc	ky, dolomitic			-208' bgs)	ieiii)
				111		trace manganes							
19/20				112									
GPJ 6				113									
0.68.0				113		DOLOSTONE, n staining (10-15%			ent, banded iron 0-15%), dolomitic				
RING				114		precipitate (10% DOLOSTONE, r), trace vugs (5	%);	2.5Y 6/4				
00 FG				115		staining (15-20%)		_C Steel Cas	sing
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20				116		6/3					(O'	-210' bgs)	
L N N													
007_G				117					ent, massive, with				
TAL 1				118			ling (5-10%), oc	litic	texture (5-10%),				
N N N N N N N N N N N N N N N N N N N				110		trace dendritic m no sand from 11		ing	(5%); 10YR 6/4,				
VIRO				119			J -						
Z										K/A	K//		



CLIENT:	DCA				JOB NO.:	LOCATION:	F		ANI	
PROJECT:	PCA				60618753 DRILLING METHOD:		ies Eas	t Metro, N	BORING NO	D.
	roject 1007				Sonic				MW5A [8470561
LOGGED BY:	AEL/AS/MC	3D/HT∤	CK ECKED BY	: AEL/AS	_				SHEET	
DRILLING CON	ITR.: Traut								7 c	F 12
DRILLER: D	an Pflipsen		EQUIP.: So	nic	SAMPLING METHOD 10' acetate bags				DRIL	LING
BORING DEPT	H: 220 ft bgs							1	START	FINISH
	FACE ELEVATION		08.05ft AMSL		WATER LEVEL				TIME	TIME
DATUM: NA	D 83 UTM 1	5 (mete	ers)		DATE				1345 DATE	1800 DATE
Northing: 49					CASING DEPTH				4	
Easting: 50				SURFACE CONDITION					12-02-19	12-04-19
SAMPLE ID	DRIVEN DVERED PID (ppm)	S.C.S.	DEPTH IN FEET OIL/ROC GRAPH	Asphalt				\/\FII	DIAGRA	M
SAIVIFEE ID	FEET DRIT	U.S	DEPTH IN FEET SOIL/ROCK GRAPH	LITHO	DLOGIC DESCF	RIPTION		***	DIAGRA	ivi
	/ ##									
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20			121	throughout, dark banding (10%); DOLOSTONE, coolitic texture (30 very fine to fine (1%); 10YR 7/2 DOLOSTONE, costaining; 5YR 5/6 DOLOSTONE, rostaining; 5YR 5/6 DOLOSTONE, rostaining; 5YR 5/6 DOLOSTONE, rostaining; 5YR 5/6 DOLOSTONE, costaining; 5YR 5/6 DOLOSTONE, costaining; 5YR 5/6 Vugs (15-20%), and vusticate (15-20%), and vusticate (15-20%), in green shale obsolog (12/4) @ 131 and oolitic texture (2%); 2.5 SANDY DOLOS (30-40%), dolom texture (2%); 2.5 SANDY DOLOS (50%), sand, fine trace glauconite SANDY DOLOS staining along frafine (15-20%), with the same properties of the same	competent, massive part of the competent	texture (35-40%), 10 miles (35-40%), with sand, anded iron (35-40%), 129.9 to 130' bgs (42), 20 sidewalls in video olomitic precipitate (35-40%), 129.9 to 130' bgs (45), 20 sidewalls in video olomitic precipitate (35-40%), 130' bgs (45), 20 sidewalls in video olomitic precipitate (35), 20 sidewalls in video olomitic precipitate ((0'	ut (neat cem 208' bgs) C Steel Cas 210' bgs)	,



CLIENT:	MADOA						JOB NO.:	LOCAT			- 4 . N 4 - 4 -	NANI	
PROJECT:	MPCA						60618753 DRILLING METHOD	<u> </u> :	Twin Citi	es Eas	st Metr	BORING I	NO.
	Project 1						Sonic					MW5A	[847056]
LOGGED BY	: AEL/	AS/MC	3D/HT	CKE	CKED BY:	AEL/AS	-					SHEET	-
DRILLING C	ONTR.:	Traut										8	OF 12
DRILLER:	Dan Pfli	osen		EQUI	P.: Son	ic	SAMPLING METHOR 10' acetate bag						ILLING
BORING DE	PTH: 22	0 ft bgs										START	FINISH
GROUND SI					ft AMSL		WATER LEVEL						
DATUM: N	IAD 83 L	JIM 1	5 (met	ers)			DATE					1345 DATE	1800 DATE
Northing: Easting: 5							CASING DEPTH					12-02-1	9 12-04-19
SAMPLE ID	FEET DRIVEN FEET RECOVERED		U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Asphalt	NS:				WE	ELL DIAGRA	
	FEET RECOV	_ <u>ਢ</u>))	۵z	SOIL	LITHO	DLOGIC DESCI	RIPTIO	N				
						I DOL COTONIE	-4	1:4 /00	10() 4	X /A	R/A	Grout (neat ce	ment)
					-	banded iron stair	not competent, oo ning (5%); 10YR	lites (30 7/3	1%), trace			(0'-208' bgs)	illelit)
				141		DOLOSTONE, n	not competent, oo dolomitic precipita	litic text					
				142		staining (5%), tra	ace vugs (5%); 2.	5Y 7/4	, trace iron				
					+/-/								
				143									
				144		DOLOSTONE n	not competent, fin	e graine	ed trace				
				445		iron staining (5%), trace oolitic tex	ture (19	%); 2.5Y 6/3			4" C Ct C-	
				145								4" LC Steel Ca (0'-210' bgs)	ising
				146									
				147									
				147									
				148									
				149	1717								
				143	77	DOLOSTONE n	not competent, we	athered	Lyuge				
				150		√(50%), dolomitic	precipitate (30%)), iron st	aining /				
				151			irtz 4 mm nodules not competent, ve						
0							and non-carbona						
6/19/20				152		DOLOSTONE, n	not competent, rev	worked o	clasts				
				153		(10-15%), red to clay observed	dark iron staining	g (10%);	2.5YR 6/3,				
LOGS						,							
BORING LOGS.GPJ				154		DOLOSTONE, n	noderately compe	etent, ma	assive,				
				155		vugs (10-15%), t banded iron stair	race oolitic textur ning (5%); 2.5YR	e (5%), 7/2, cla	trace v observed			Grout (neat ce	ment)
GINT_LOGS.GPJ				-			3 (//	,	,			(0'-208' bgs)	,
Z 100				156									
B				157		DOLOSTONE ~	noderately compe	tent m	assivo				
1007						trace vugs with o	quartz precipitate	(5%), tra	ace iron				
ENTAL				158		staining (2%), tra (1%); 2.5YR 7/2,	ace dendritic man , clay observed	ganese	staining				
SONME				159	+	· ,,	•						
ENVIRONMENTAL													



CLIENT:							JOB NO.:	LOCA	TION:					
	1PCA						60618753		Twin Ci	ties Ea	ast Me	etro, N		
PROJECT:	roject 1	007					DRILLING METHOD: Sonic						BORING NO	Э.
LOGGED BY:			D/HT	/ CK EC	KED BY:	AEL/AS							MW5A J	[847056]
DRILLING CO	NTR.: 7	raut											9 0	· 10
					- 0	:_	SAMPLING METHOD):						DF 12 LING
DRILLER: D				EQUI	P.: Sor	IIC	10' acetate bags	3						
BORING DEP							\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\						START	FINISH
GROUND SUF					ft AMSL		WATER LEVEL						_	
DATUM: NA	AD 83 L	ITM 1	5 (met	ters)			TIME						1345	1800 DATE
Northing: 4 Easting: 50							DATE CASING DEPTH						DATE 12-02-19	12-04-19
Lasting. 50		<u> </u>			Y	SURFACE CONDITION							12-02-13	12-04-13
SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Asphalt					W	/ELL	DIAGRA	M
	RECO)	۵≥	SOS	LITHO	DLOGIC DESCR	RIPTIO	N					
						DOLOSTONE :	not compatant ····	ao (0E0	/) trace	V/A	N/A	<u> </u>	C Steel Cas	ina
					- 77		not competent, vu %), red banded ird						210' bgs)	iiig
				161	- _	2.5YR 7/2, clay								
					77									
				162	7/7									
				163	7/7									
				100		DOLOSTONE, V	very competent, vo trace reworked m	ugs (10	%), oolitic					
				164			nding (5%); 2.5YF		iasis (5 /0),					
						- , ,								
	165				DOLOSTONE, r	not competent, ve	ry weat	hered, vugs	-					
				400		filled by precipita	ate (50%), iron sta	ining (5	50%); 10YR					
				166			moderately compe	tent de	olomitic	/ X /				
				167	- 7 7), iron staining (10							
				168	77	(* *) 🔾 * * *	. J							
				169										
				170	- 7 7							– Grou	ut (neat cem	nent)
					- //	DOLOSTONE, of trace manganes	competent, massive staining (1%); 2	/e, vug: .5Y 7/2	s (10%),				208' bgs)	iciti)
20				171 -	- / /		noderately compe), trace vugs (5%)							
07 6/19/20				172	-//	DOLOSTONE, r (20%); 2.5Y 6/2	moderately compe	tent, o	olitic texture					
BORING LOGS.GPJ				173		DOLOSTONE, r	moderately compe							
RING L	174					ace manganese s	tairiirig	(170), 2.01						
3PJ BC												C Steel Cas 210' bgs)	ing	
GINT_LOGS.GPJ				176	7/7	DOLOSTONE, r	noderately compe	tent, fir	ne grained			(0 -	0 290)	
				177	- / _/ /	dolomitic precipi	itate, dendritic ma iron staining (1%)	nganes	e staining					
ENVIRONMENTAL 1007,				178										
ONMENT	179													
VIRC														
<u>ш</u>										_K//	_K//			



CLIENT:				JOB NO.:	LOCATION:	- Citi F-	at Matua	NANI	
PROJECT:				60618753 DRILLING METHOD:		n Cities Ea	ist ivietro,	BORING NO	O.
Project 1007				Sonic				MW5A I	847056]
LOGGED BY: AEL/AS/M	GD/HT/@	KECKED BY:	AEL/AS	_				SHEET	
DRILLING CONTR.: Traut								10 c	F 12
DRILLER: Dan Pflipsen		QUIP.: Sor	ic	SAMPLING METHOD 10' acetate bags					LING
BORING DEPTH: 220 ft bg								START	FINISH
GROUND SURFACE ELEVAT		3.05ft AMSL		WATER LEVEL TIME					
DATUM: NAD 83 UTM COMMENTS:	15 (meter	s)		DATE				1345 DATE	1800 DATE
Northing: 4980840.19 Easting: 508682.95				CASING DEPTH				12-02-19	12-04-19
SAMPLE ID SAMPLE ID GEGOVERNO (Mag)	U.S.C.S.	DEPTH IN FEET SOIL/ROCK GRAPH	SURFACE CONDITION Asphalt	NS:			WELL	DIAGRA	
RECO.	, 5, 1, g		LITHC	DLOGIC DESCF	RIPTION				
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20	1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1	81	DOLOSTONE, n staining (50%), trace oolitic manganese stair DOLOSTONE, n medium grained mm vugs (5-10% iron staining (3%) DOLOSTONE, c grained to micriti yellow iron staining (50%), trobserved DOLOSTONE, c precipitate (20%) (5%), trace dend 5/4, clay observed DOLOSTONE, c staining (4%), trace dend 5/4, clay observed DOLOSTONE, n staining (4%), trace dend 5/4, clay observed	competent, massive tate (10%), iron state (10%), iron state (10%), trace reworks of texture (5%), trace texture (5%), trace olitic precipite (10%), trace olitic texture (10%); 2.5Y 6/4, clay of the competent, we race chert (5%); 1 competent, bedding, olitic texture (10%), olitic texture (10%), olitic texture (10%); 2.5Y 6/4, clay observe the court, calcite (30-40%); 2.5Y 6/5/6, clay observe	ry weathered, ir wolf and in the control of the con	ved iron acce	4" 1	out (neat cem -208' bgs) C Steel Cas -210' bgs)	



BORING DEPTH: 220 ft bgs GROUND SURFACE ELEVATION: 908.05 DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4980840.19 Easting: 508682.95	CKED BY: AEL/AS IP.: Sonic Oft AMSL	60618753 DRILLING METHOD: Sonic SAMPLING METHOD: 10' acetate bags WATER LEVEL TIME	:	es East M	В <u>М</u> S	BORING NO. SHEET 11 OF	347056]
Project 1007 LOGGED BY: AEL/AS/MGD/HT/CME DRILLING CONTR.: Traut DRILLER: Dan Pflipsen EQU BORING DEPTH: 220 ft bgs GROUND SURFACE ELEVATION: 908.05 DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4980840.19 Easting: 508682.95	P.: Sonic	SAMPLING METHOD 10' acetate bags WATER LEVEL			M	1W5A [8 SHEET 11 OF	347056]
DRILLING CONTR.: Traut DRILLER: Dan Pflipsen EQU BORING DEPTH: 220 ft bgs GROUND SURFACE ELEVATION: 908.05 DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4980840.19 Easting: 508682.95	P.: Sonic	SAMPLING METHOD 10' acetate bags WATER LEVEL			S	SHEET 11 OF	
DRILLER: Dan Pflipsen EQU BORING DEPTH: 220 ft bgs GROUND SURFACE ELEVATION: 908.05 DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4980840.19 Easting: 508682.95		10' acetate bags					. 40
BORING DEPTH: 220 ft bgs GROUND SURFACE ELEVATION: 908.05 DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4980840.19 Easting: 508682.95		10' acetate bags					12
BORING DEPTH: 220 ft bgs GROUND SURFACE ELEVATION: 908.05 DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4980840.19 Easting: 508682.95		WATER LEVEL				DIVILL	
GROUND SURFACE ELEVATION: 908.09 DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4980840.19 Easting: 508682.95	5ft AMSL					START	FINISH
DATUM: NAD 83 UTM 15 (meters) COMMENTS: Northing: 4980840.19 Easting: 508682.95		TIME				TIME	TIME
Northing: 4980840.19 Easting: 508682.95						1345	1800
Easting: 508682.95		DATE				DATE	DATE
L S S S S S S S S S S S S S S S S S S S		CASING DEPTH			12	2-02-19	12-04-19
SAMPLE ID DRAWS (PPE) (PPD) (P	SURFACE CONDITION Asphalt LITH	OLOGIC DESCR	RIPTION	\	WELL DI	IAGRAM	1
/ ##							
201 202 203 204 205 206 Cj 207 208 209 210 211 212 213 214 Cj 215 216 217 218 219	QUARTZ AREN medium, 20% co throughout med sandstone with QUARTZ AREN sub-rounded, ba (10%), less cem 2.5Y 6/4 to 10Y QUARTZ AREN to coarse (15% bright white QUARTZ AREN (30% fine, 70% QUARTZ AREN (30% fine, 15% QUARTZ AREN (15% fine, 85% QUARTZ AREN (40% fine, 40% QUARTZ AREN (40% fine, 40% QUARTZ AREN (45% fine, 45% fine, 45% GUARTZ AREN (50% fine, 50% QUARTZ AREN (50%	NITE, fine to coarse oarse), well-rounde lium sized grains, t banded iron stainin NITE, cemented, co anded iron staining nented and stained	e, (40% fine, 40% ed, iron staining rac cemented ng (5%); 5Y 7/2 parse, along bedding @ 204.75' bgs; d, clean, medium rse); 10YR 8/1 - d, fine to medium 8 d, fine to medium 8 d, fine to medium 8 d, fine to coarse rse); 5Y 8/1 d, medium to e); 2.5Y 6/2 d, fine to coarse rse); 5Y 8/1 d, fine to medium to e); 2.5Y 6/2		— 4" LC S (0'-210 — 1.5' pel 0.5' pes (208'-2 — Grout E (210' b	Steel Casir of bgs) llet seal or a rock 210' bgs) Basket bgs)	ng



ſ	CLIENT:							JOB NO.:		LOCATIO					
ŀ	PROJECT:	IPCA						60618753 DRILLING METHO	D:		Twin	Cities Ea	st Metro,	BORING N	O.
-		roject [*]						Sonic						MW5A	[847056]
-	LOGGED BY:	AEL/	AS/MG	SD/HT	CHEC	KED BY:	AEL/AS							SHEET	[0000]
-	DRILLING CO	NTR.:	Traut		1									12 (DF 12
	DRILLER: D	an Pfli	psen		EQUIF	.: Sor	nic	SAMPLING METH 10' acetate ba							LING
	BORING DEPT													START	FINISH
г	GROUND SUF				08.05	ft AMSL		WATER LEVEL TIME							
	DATUM: NA COMMENTS:			5 (met	ers)			DATE						1345 DATE	1800 DATE
	Northing: 4 Easting: 50	980840	0.19 95					CASING DEPTH						12-02-19	12-04-19
	SAMPLE ID	FEET DRIVEN FEET POPULATION OF THE PRECOVERED POPULATION OF THE POPULATION OF TH	1	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Asphalt	NS:					WEL	L DIAGRA	
		RECO	<u> </u>	j	۵z	SOII	LITHO	DLOGIC DESC	CRI	IPTION	1				
							505 0 222								
						-	E.O.B. @ 220' b	gs, no refusal							
					221										
					222										
					223										
	224														
					225										
					226										
					227										
					228										
					229										
					230										
50					231	-									
3PJ 6/19/					232										
S LOGS.G					233 -										
BORING					235										
OGS.GP.					236										
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20					237										
TAL 1007					238	-									
ONMEN					239										
ENVIF						1									



							E	NVIRO	NINIE	HALE	SORING	J LOC
CLIENT:)CA					JOB NO.:	LOCA		Cition For		451	
PROJECT:	CA					60618753 DRILLING METHO	DD:	I WIN	Cities Eas	t Metro, N	BORING NO	D.
LOGGED BY:	oject 1007 AS/JM/MG	3D	CHECK	ED BY:	AEL/AS	Sonic					MW5B [84705
DRILLING CONT						1						
				0	.:_	SAMPLING METH	HOD:				1	DF 6 LING
DRILLER: Da			EQUIP.:	: Sor	1IC	10' acetate ba					START	FINISH
BORING DEPTH			07.004			WATER LEVEL	31'	20.4'	20.2'		TIME	TIME
GROUND SURF			07.86ft	AMSL		TIME	1530	1815			-	
DATUM: NAC COMMENTS:	9 83 OTM	15 (met	ers)						1020		DATE	1750 DATE
Northing: 49						DATE		12-09-19			-	
Easting: 508		U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Asphalt	CASING DEPTH	35'	55'	58'	WELL	12-09-19 DIAGRA	
JAMI LE ID	FEET DRI RECOVERED PID (ppm)	S.U	DE N	SOIL	LITHO	DLOGIC DES	CRIPTIO	N		***	<i>DII</i> (010 (IVI
					SILTY SAND, m					M		
		SM	1		coarse), sub-ang organics (10%),	with cobbles (1	0%); wet,	10YR 4/3	th N			
MW5B-SOIL 8-9		sc	2		CLAYEY SAND, 20% coarse), sul (20%), with grave medium); moist,	b-rounded to w el, fine to medi	ell-rounde	d, clay				
	DIL	SM	5		SILTY SAND, fin medium, 10% co silt (15%), trace of	parse), sub-roui gravel, fine (2% ne to medium (3 unded, silt (25%	nded to w 6); dry, 10 80% fine, 6), clay (2	ell-rounde YR 5/4 15% 25%), trace	e	(0'	ut (neat cem 108' bgs)	,
			11		SILTY SAND, fin medium), sub-an trace gravel, fine 10YR 5/4	ngular to sub-rò e (3%), trace co	unded, si bbles (2%	t (25%), b); dry,			C Steel Cas 110' bgs)	ing
		CL	13		CLAY, low plasti (3%), trace cobb	city, stiff, trace les (2%); dry, 1	gravei, m 0YR 4/3	eaium				
MW5B-SC 16-18	DIL	CL	15 — 16 — 17 — 18 —		CLAY, low plasti (3%), trace cobb	city, stiff, trace les (2%); dry, 1	gravel, m 0YR 4/3	edium				
MW5B-SC	DIL											



								_	INVIRC	I AIVIL		'		
CLIENT:	PCA						JOB NO.: 60618753	LOCAT		Cities E	oot Ma	otro N	/NI	
PROJECT:		1007					DRILLING METHO	DD:	I WIII	Cilles E	ast ivie	elio, iv	BORING N	D .
	oject 1					A.F.I. /A.O.	Sonic						MW5B	847057]
LOGGED BY:)	CHEC	KED BY:	AEL/AS							SHEET	
DRILLING CON	TR.:	Traut					OAAADI INO METI	100)F 6
DRILLER: Da	an Pflip	psen		EQUIF	o.: Sor	nic	SAMPLING METH 10' acetate ba							LING
BORING DEPTI	H: 12	0 ft bgs					14/ATED EVE	041	00.41	00.01			START	FINISH
GROUND SURF					ft AMSL		WATER LEVEL TIME	31'	20.4' 1815	20.2' 1020	-			
DATUM: NA	D 83 C	J I M 1	o (met	ers)			DATE	1530	12-09-19		_		1400 DATE	1750 DATE
Northing: 49 Easting: 508							CASING DEPTH	35'	55'	58'			12.00.10	12-10-19
	RIVEN		S.S.	至田	ROCK	SURFACE CONDITION Asphalt					10	<i>/</i> =		
SAMPLE ID	FEET RECOVERED	OIA (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	LITHC	DLOGIC DES	CRIPTIO	N		V	VELL	DIAGRA	IVI
18-20				21 -										nent)
				22 -										
23														
			CL	25 -		SANDY CLAY, Id	ow plasticity st	iff sand f	fine to			-4" L0	C Steel Cas	ing
				26		medium (20% fin well-rounded, tra cobbles (5%); dr	ne, 5% medium ice gravel, coar), sub-rourse (5%), f	inded to			(0'-1	110' bgs)	
				27		CODDICS (070), di	y to moist, for	11.4/5						
				28 -		SANDY SILT, Iov								
MW5B-S 28-30	OIL		ML	29 -	-	(25% fine, 10% r well-rounded, tra 5% coarse); dry	ice gravel, fine	to coarse	(3% fine,					
MW5B-S	OIL		ML	31 -	- - -		medium, 5% co	arse), sub	o-angular i	to				
31-32 MW5B-G 31-35	W		SP	32 -		(15% fine, 10% medium, 5% coarse), sub-angular to sub-rounded, trace cobbles (5%); wet, 10YR 4/3 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								
MW5B-S	OIL			34 -		SAND, fine to co coarse), sub-ang to coarse (8% fin	— Grou	ıt (neat cem	nent)					
34-35			SP	36		10YR 4/4 `	(0'-1	108' bgs)						
				37										
				38 -		SAND, fine to co coarse), sub-ang with gravel, fine	jular to well-rou to coarse (10%	inded, poo	orly grade medium,	d,				
						2% coarse), ang 4/3, gravel @ 42		ıular; mois	st, 10YR					



								_	INVIRC			.	
CLIENT:	٠,						JOB NO.:	LOCAT		Cition En	at Motro N	4N1	
PROJECT:		207					60618753 DRILLING METHO	OD:	I WIII	Cilles Eas	st Metro, N	BORING NO	O .
	ect 10					151/10	Sonic					MW5B	[847057]
LOGGED BY: A)	CHEC	KED BY:	AEL/AS	_					SHEET	
DRILLING CONTR	R.: T	raut					OAMBUNO MET	100)F 6
DRILLER: Dan	Pflips			EQUIF	c.: Son	ic	SAMPLING METH 10' acetate ba						LING
BORING DEPTH:) ft bgs					WATER LEVEL	31'	20.41	20.21		START	FINISH
DATUM: NAD					ft AMSL		TIME	1530	20.4' 1815	20.2' 1020		1400	1750
COMMENTS:			(met	ers)			DATE		12-09-19)	DATE	DATE
Northing: 4980 Easting: 50860							CASING DEPTH	35'	55'	58'		12-09-19	12-10-19
SAMPLE ID	L EN	PID (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Asphalt	S:				WELL	DIAGRA	
January	FEET RECOVERED	<u> </u>	N.S	N N	SOIL	LITHC	LOGIC DES	CRIPTIO	N				
MW5B-SOII 48-49 MW5B-SOII 50-54 MW5B-GW 51-55 MW5B-GW 55-58	L		SP SW CL GP ML	41 - 42 - 43 - 44 - 45 - 46 - 47 - 48 - 50 - 51 - 52 - 53 - 54 - 55 - 56 - 57 - 58 - 59 - 59 - 59 - 59 - 59 - 59 - 59		SAND, fine to co coarse), sub-ang with gravel, fine to 2% coarse), angular, gravel @ 42 SAND, fine to co coarse), sub-ang moist, 10YR 4/4 CLAY, low plastic GRAVEL, fine to angular to sub-angular to sub-angular to sub-angular, with SANDY SILT, low (15% fine, 5% m sub-rounded, trausub-rounded; mc SAND, fine to co coarse), sub-angular to coarse), sub-angular to coarse, sub-angular to coarse), sub-angular to coarse, sub-angular to coars	jular to well-route coarse (10% ular to sub-ang ' - 46' arse (20% fine jular to well-route (5% medium (60% mgular, poorly ge (5% medium), sub-angedium), sub-angedium), sub-angedium), sub-ange (70% fine jular to sub-route (5%), well-angular to sub-angular to sub	inded, poor fine, 5% jular; mois inded, well and fine, 10% graded, sar, 15% coapist, 10YR and, fine to gular to se (5%), and fine to se	orly graded medium, st, 10YR dium, 20% ll graded; medium) and, arse), 4/3 medium dium, 5% orly graded dry to 56% h gravel, d, trace si hered, with	it	(0'- Groi (0'-	C Steel Cas 110' bgs) C Steel Cas 110' bgs)	nent)



					. 4141-1		OKIIN	
CLIENT: MPCA		JOB NO.: 60618753	LOCAT		Cities Fac	t Metro, N	/N	
PROJECT:		DRILLING METHO	DD:	i Will C	JIUGS EAS	ı ıvı c ıı O, N	BORING N	0.
Project 1007 LOGGED BY: AS/JM/MGD	CHECKED BY: AEL/AS	Sonic					MW5B	[84705
DRILLING CONTR.: Traut								^
DRILLER: Dan Pflipsen	EQUIP.: Sonic	SAMPLING METH						DF 6 LING
BORING DEPTH: 120 ft bgs	EQUI COITIO	10' acetate ba	ıgs				START	FINISH
GROUND SURFACE ELEVATION: 9	907.86 ft AMSL	WATER LEVEL	31'	20.4'	20.2'		TIME	TIME
DATUM: NAD 83 UTM 15 (me	ters)	TIME	1530	1815	1020		1400	1750
COMMENTS: Northing: 4980837.84		DATE		12-09-19			DATE	DATE
Easting: 508681.37	SURFACE C	CASING DEPTH CONDITIONS:	35'	55'	58'		12-09-19	12-10-
SAMPLE ID FEET PID (Ppm) PID PI	SORFACE C Asphalt	LITHOLOGIC DESC	CRIPTIO	N		WELL	DIAGRA	М
	gravel, ficlay obs 62 DOLOS (15%), d sand, fin 64 DOLOS iron stain 65 DOLOS fine (5-1 observer SANDY sand, fin reworker 6/4 BOLOS (1%); 10 69 SANDY sand, fin calcite (' observer SANDY sand, fin calcite (' observer SANDY sand, fin object (2, clay SANDY sand, fin object (3%), tra 70 DOLOS fine to m glauconi 75 DOLOS fine to m glauconi 76 DOLOS fine to m glauconi 77 DOLOS fine to m glauconi 78 DOLOS fine to m glauconi 79 texture (fine to m grained, fine to m glauconi 79 texture (fine to m grained, fine to m gr	TONE, moderately complendritic manganese state (15%), trace glauconic TONE, moderately comping (5%); 10YR 5/4 TONE, competent, colit 0%), trace glauconite (10%), trace glauconite (10%), trace glauconite (10%), trace glauconic (10%), trace glauconic (10%), competent, massive (10%), competent, massive (10%), colitic texture (10%), trace vugs (10%); 1	petent, ocining (10%); 10 petent, ocining (10%); 10 petent, trace ic texture, 1%); 10YF ent, oolitic 5% coarse uconite (1' sive, trace upetent, m (10-20%) 0YR 6/4, occupate (1' upetent, m ce vugs (' lay obser' massive, v us (3%), tr observed massive, v us (10%); 10 massive, v taining (10 massive, v taining (10%); 10 massive, v taining (10%)	politic texture, with sand some calcite cassive, trace clay cassiv	e d ·	(0'-'	ut (neat cen 108' bgs) C Steel Cas 110' bgs)	,



								TIVILIY		OKIIN	J LO
CLIENT: MPCA					JOB NO.: 60618753	LOCAT		Cities Eas	t Metro	<u>—</u> —	
PROJECT:	17				DRILLING METH		I WIII	Oluco Eds	or ivicuo, l	BORING NO	O .
Project 100 LOGGED BY: AS/JM/N		CHEC	KED BY	AEL/AS	Sonic					MW5B J	[84705
DRILLING CONTR.: Tra		LOUI		, .	1						
				:_	SAMPLING METH	HOD:					DF 6
DRILLER: Dan Pflipse		EQUIP	: Son	IC	10' acetate ba					START	FINISI
BORING DEPTH: 120 ft GROUND SURFACE ELEV		07.86f	1 AMSI		WATER LEVEL	31'	20.4'	20.2'		TIME	TIME
DATUM: NAD 83 UTN			LUIVIOL		TIME	1530	1815	1020		1400	1750
COMMENTS:	,	.5.5)			DATE		12-09-19			DATE	DATE
Northing: 4980837.8 Easting: 508681.37	4				CASING DEPTH	35'	55'	58'		12-09-19	12-10-
Z EE T	(ppm) U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Asphalt					WELL	DIAGRA	M
RECC			So	LITHO	DLOGIC DES	CRIPTIO	N				
		81 - 82 - 83 - 84 - 85 - 90 - 91 - 92 - 93 - 94 - 95 - 96 - 97 - 97 - 97 - 97 - 97 - 97 - 97		DOLOSTONE, r grained; 10YR 5/3 DOLOSTONE, r grained; 10YR 5 DOLOSTONE, c (5%), trace band DOLOSTONE, r texture (10%), tr iron staining (5%); 10 SANDY DOLOS medium (20-30% staining (5%), trace banded imanganese stain 10YR 7/2 DOLOSTONE, r grained, banded manganese stain 10YR 6/3 DOLOSTONE, r grained, dolomit DOLOSTONE, r grained, trace de trace banded iro SANDY DOLOS sand, fine to me staining (2%); 10 DOLOSTONE, r grained, dolomit (5%), trace vugs 8/2 DOLOSTONE, r grained, banded	competent, masted iron staining ace sand, fine to the same staining ace sand, fine to the same staining ace dendrito ace moderately competent, in precipitate, vot competent, ic precipitate, vot competent, and staining (2%) action accompetent, action accompet	massive, (5%), trace tent, sand, fin the example of the sand, fin the massive, ugs (50% massive, the sand); 10YR 7/10 mpetent, was taken to the sand the	e sand, fire to nese (5%); 10Y (5%); 10Y (5%); 10Y (5%); 10Y (6/2, wery fine ing (5%), 3 (10) (10) (10) (10) (10) (10) (10) (10)	R	-4" L (0'-	ut (neat cem 108' bgs) C Steel Cas 110' bgs)	ing



					NVIRU	IAIMIEI	HALL	OKIIN	3 LUG
CLIENT: MPCA			JOB NO.: 60618753	LOCAT		Cities Fas	st Metro, N	/N	
PROJECT:			DRILLING METHO	DD:	i Will C	Jiudo Eds	or ivicuo, IV	BORING NO	D .
Project 1007	T	A E 1 / A C	Sonic					MW5B [847057
LOGGED BY: AS/JM/MGD	CHECKED BY	AEL/AS	-					SHEET	
DRILLING CONTR.: Traut			OAMBI INC. :==	100					OF 6
DRILLER: Dan Pflipsen	EQUIP.: So	nic	SAMPLING METH 10' acetate ba						LING
BORING DEPTH: 120 ft bgs			MATER LEVEL	241	20.41	20.21		START	FINISH
	07.86ft AMSL		WATER LEVEL TIME	31' 1530	20.4' 1815	20.2' 1020		-	
DATUM: NAD 83 UTM 15 (met COMMENTS:	ers)		DATE		12-09-19			1400 DATE	1750 DATE
Northing: 4980837.84 Easting: 508681.37			CASING DEPTH	35'	55'	58'		12-09-19	12-10-1
SAMPLE ID DAILER PEET PEET PEET PEET PEET PEET PEET PE	DEPTH IN FEET SOIL/ROCK GRAPH	SURFACE CONDITION Asphalt	IS:				WELL	DIAGRA	
L RECO	OZ IOS	LITHO	DLOGIC DES	CRIPTIO	N				
		grained, dolomiti	c precipitate, tr	ace sand,	fine to			C Steel Cas	ing
	101	medium (5%), tra (2%); 10YR 7/3	ace vugs (2%),	trace glau	uconite		(0'-	110' bgs)	
	102	DOLOSTONE, n							
	102	(5%), trace vugs							
	103 DOLOSTONE, competent, massive, vugs (15- trace dendritic manganese staining (2%); 10YF								
	104	trace dendritic m							
		vugs (5%), dend							
	105	(5%); 10YR 7/3 DOLOSTONE, c							
	106	to medium (5-10						ut (neat cem 108' bgs)	nent)
	107					→		C Steel Cas 110' bgs)	ing
	108	DOLOSTONE, c	%), trace vugs			• *	<i>Y/</i> .	mallet 1	un ten -f
	109	iron staining (5% DOLOSTONE, c to medium (5-10	ompetent, mas %), trace vugs	(5%), trac	e dolomiti	c ,	0.5' (108	pellet seal o pea rock 8'-110' bgs) ut Basket	·
	111	\precipitate (5%), DOLOSTONE, n \grained dolomitic	trace iron stair ot competent, t	ning (2%); race med	10YR 6/3 ium			ot Basket 0' bgs)	
	112	DOLOSTONE, n (5-10%), trace ba	ot competent, v	with sand,	medium	7			
	113	6/3							
	114								
	115	DOLOSTONE, noolitic texture (20				-		pen Hole 0'-120' bgs)	
	116	(5%), trace sand							
	117								
	118	DOLOSTONE, n sand, medium (5 massive iron sta	5%), reworked o	lasts (109	%), trace	th			
		6/3 E.O.B. @ 120' b		. 250 (0	.,,				



	CLIENT:	IDO A						JOB NO.:	LOCA	TION:	0:4:	4 . N . 4 - 4	- NANI	
ł	PROJECT:	IPCA						60618753 DRILLING METHO	OD:	I WIN	Cities Ea	ast Metro	BORING N	O.
ŀ	P	roject 1	1007					Sonic					MW6A	[847058]
-	LOGGED BY:	AEL/I	MGD		CHEC	KED BY:	AEL/AS						SHEET	[0 17 000]
L	DRILLING CO	NTR.:	Traut										1 0	OF 11
	DRILLER: D	an Pfli	osen		EQUIP	.: Sor	nic	SAMPLING METH					DRIL	LING
	BORING DEPT	гн: 21	0 ft bgs					10' acetate ba	ags				START	FINISH
	GROUND SUF	RFACE EI	EVATIO	N: 8	90.46f	t AMSL		WATER LEVEL	9'				TIME	TIME
	DATUM: NA	AD 83 L	JTM 1	5 (met	ers)			TIME	0800				1520	1130
	COMMENTS: Northing: 4	980133	3.29					DATE	11-13-19	9			DATE	DATE
	Easting: 50	9410.8		I			SURFACE CONDITION	CASING DEPTH			1		11-11-19	11-14-19
		FEET DRIVEN	o ê	s;	를 다	SOIL/ROCK GRAPH	Grass	NO.						
	SAMPLE ID	PEET DRI'	PID (ppm)	U.S.C.S.	DEPTH IN FEET	OIL/R GRA		21 0010 050	001071			WE	LL DIAGRA	M
		\ FF			_	SS	LITHO	DLOGIC DES	CRIPTIC)N				
ŀ							No Recovery					N/A		
						-	, , , , , , , , , , , , , , , , , , , ,							
				ML	1 1		SILT, low plastic to moist, 2.5Y 4/	ity, trace non-n	ative clay	/ (5%); dry	' \			
					2 -		CLAY, low plasti		st 2.5Y.4	/4	-			
				CL			OL/ (1, 10W place	oity, dry to mon	51, 2.01	, ,				
					3		SAND, fine to co				%			
					4 -		coarse), sub-rou	nded, well grad	ieu, mois	1, 51 3/2				
				SW	-									
					5								Grout (neat cen (0'-183' bgs)	nent)
					6	*****	SAND, fine, well	rounded neer	ly gradad	· dry to	>		, ,	
					-		moist, 2.5Y 4/4	-rounded, poor	iy graded	, dry to				
				SP	7		SAND, medium,							
				35	8 -		poorly graded, w subangular; dry			,				
					-									
					9		SAND, fine to co				%			
					10	*****	coarse), sub-rou ∖ 2.5Y 4/4	inded, well grad	led; dry to	o moist,		4	" LC Steel Cas	sing
					-		SAND, fine to co						(0'-185' bgs)	· ·
					11		coarse), sub-rou to medium (10%	inded, well grad fine, 5% medit	iea, with : um), sub-	gravei, tine angular to	• 💥			
9/20					12		well-rounded; we	et, 2.5Y 4/3						
J 6/1					-	******								
3S.GF					13									
G LO					14									
ORIN				sw	``									
E E					15									
JGS.(16									
NT_L					"									
17_GII					17									
L 100					10	*****								
ENTA					18		SAND, fine to co coarse), sub-rou							
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20					19		(4%), sub-angula							
ENVIF											💹			



	CLIENT.							IOR NO :	1,004	TION.				
	CLIENT:	PCA						JOB NO.: 60618753	LOCAT		Cities Ea	st Metro	. MN	
	PROJECT:	roject 1	1007					DRILLING METHO		1 WIII C	Jilios La	or word	BORING N	O.
	LOGGED BY:				CHEC	KED BY:	AEL/AS	_ 001110					MW6A SHEET	[847058]
	DRILLING CON	JTR· -	Traut											- 44
								SAMPLING METH	HOD:					DF 11 LING
	DRILLER: Da				EQUIF	o.: Soi	nic	10' acetate ba					START	FINISH
	BORING DEPT				00.40			WATER LEVEL	9'				TIME	TIME
	GROUND SUR					ft AMSL		TIME	0800				1520	1130
	COMMENTS:			J (IIICI	.013)			DATE	11-13-19				DATE	DATE
	Northing: 49 Easting: 50	980133 9410 8	3.29 RO					CASING DEPTH					11-11-19	11-14-19
	SAMPLE ID	FEET DRIVEN :	OIA (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	DLOGIC DES	CRIPTIO	N		WE	LL DIAGRA	•
		/ ##					211110	220.0 220		••				
ENVIRONMENTAL 1007 GINT LOGS.GPJ BORING LOGS.GPJ 6/19/20				SW	21 - 22 - 23 - 24 - 25 - 26 - 27 - 28 - 29 - 23 - 33 - 34 - 35 - 36 - 37 - 38 - 39 - 39 - 39 - 39 - 39 - 39 - 39		SAND, fine to co coarse), sub-round (4%), sub-round (25%), sub-round (25%), sub-round (25%), sub-round (4%), sub-round (4%), sub-round (4%), sub-round (10% moist, 2.5Y 4/3 SAND, fine to co coarse), sub-round (10% moist, 2.5Y 4/3 SAND, fine to co coarse), sub-round (10% moist, 2.5Y 4/3	parse (25% fine inded, well graded; wet, 2.5Y 4 parse (32% fine inded, well graded; wet, 2.5Y 4 parse (30% fine inded, well graded) fine, 5% media fine, 9% media fine, 9% media parse, 2.5Y 4/3	ded, trace /3 25% me ded, with ge /3 32% me ded, trace /3 30% me ded, with ge /3 30% me ded, with ge /3 27% me ded, with ge /3 27% me /3 27% m	dium, 25% gravel, fine of gravel, fine ounded; dium, 27% gravel, fine ounded;		4	Grout (neat cen (0'-183' bgs)	,
ENVIRONMENTAL 1007 GINT				SP	38 -		SAND, fine, well moist, 10YR 5/3,	-rounded, poor , iron staining (ly graded; ② 39.5' bg	dry to s				



Г	CLIENT:							JOB NO.:	LOCA	ΓΙΟΝ:				
H	PROJECT:	IPCA						60618753 DRILLING METHO	DD:	Twin C	ties Ea	st Metro	D, MN BORING N	O.
		roject ´	1007					Sonic						[847058]
	LOGGED BY:	AEL/I	MGD		CHEC	KED BY:	AEL/AS						SHEET	[047030]
	DRILLING CON	NTR.:	Traut										3 0	OF 11
	DRILLER: D	an Pfli _l	psen		EQUIF	.: Sor	nic	SAMPLING METH						LING
	BORING DEPT	гн: 21	0 ft bgs		•			10' acetate ba	ags 				START	FINISH
L	GROUND SUR	RFACE EL	LEVATIO	N: 8	90.46	ft AMSL		WATER LEVEL	9'				TIME	TIME
	DATUM: NA	ND 83 L	JTM 1	5 (met	ers)			TIME	0800				1520 DATE	1130 DATE
	Northing: 4							DATE	11-13-19					
+	Easting: 50		30 1				SURFACE CONDITION	CASING DEPTH NS:					11-11-19	11-14-19
	SAMPLE ID	DRIVEN	PID (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					\ \ /⊏	LL DIAGRA	M
	SAMPLE ID	DR FEET RECOVERED	Д <u>ф</u>	U.S.	N N	SOIL	LITHO	DLOGIC DES	CRIPTIC	N		V V L	LL DIAGINA	iivi
H		/ ##				"								
Ī						*****	SAND, fine to co coarse), sub-rou							
					41		coarse), sub-rou	ilided, well grad	ieu, moisi	, 10111 3/3				
					42									
				sw	42									
					43									
					44									
					45	• • • •	SAND, fine to m						Grout (neat cen (0'-183' bgs)	nent)
				0.0	46		sub-rounded, po	, ,	•		_\		(c .cc 2gc)	
				SP	-		SAND, fine, well 5/4	-rounaea, poor	iy graded:	ary, TUYK				
					47									
					48		SAND, fine to co coarse), sub-rou							
					49		SAND, fine to co coarse), sub-rou							
					50		SAND, fine to co	parse (33% fine	. 33% me	dium. 33%			I" LC Steel Cas	sing
				SW	51		coarse), sub-rou 10YR 5/3						(0'-185' bgs)	
19/20				300	52		CAND fine to a	(200/ f :	200/	-l: 200/				
.GPJ 6/					53		SAND, fine to co coarse), sub-rou ∖(4%), sub-round	nded, well grad	led, trace	gravel, fine				
SOOTS					-		SAND, fine to co coarse), sub-rou	parse (30% fine	, 30% me	dium, 30%				
SORING					54 –		(10%), well-roun							
GPJ [SP	55	• • • •	SAND, fine, well	-rounded, poor	ly graded:	moist,				
LOGS					56		\\\10YR 5/3 SAND, fine to co				¹ 📓			
GINT				SW	57		coarse), sub-rou (4%), well-round							
1007					-									
MENTAL				SP	58		SAND, fine to me sub-rounded, po							
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20				SW	59		SAND, fine to co	parse (32% fine	, 32% me	dium 32%				



CLIENT:	MDOA						JOB NO.:	I .	CATION:	0:::	4	- MNI	
PROJECT:	MPCA						60618753 DRILLING METHO		I WIN	Cities Ea	ist ivietr	BORING N	O.
	Project	1007					Sonic					MW6A	[847058]
LOGGED B	: AEL/	MGD		CHEC	KED BY:	AEL/AS	_					SHEET	[0 17 000]
DRILLING C	ONTR.:	Traut										4 (OF 11
DRILLER:	Dan Pfli	ipsen		EQUIF	: Sor	nic	SAMPLING METH						LING
BORING DE				•			10' acetate ba	ags				START	FINISH
GROUND S	URFACE E	LEVATIO	N: 8	90.46	ft AMSL		WATER LEVEL	9'				TIME	TIME
DATUM: 1		UTM 1	5 (met	ers)			TIME	0800				1520	1130
COMMENTS Northing:		3.29					DATE	11-13-	19			DATE	DATE
Easting:	509410.8	80				0.1054.05.001.017.01	CASING DEPTH			<u> </u>		11-11-19	11-14-19
	PEET DRIVEN		ωį	ᆂᇤ	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	NS:						
SAMPLE ID	PEET DRI	PID (ppm)	U.S.C.S.	DEPTH IN FEET	IL/RC						WE	ELL DIAGRA	M
	THE			0 2	SO	LITHO	DLOGIC DES	CRIPT	ON				
						\((10())			4.0	1871	N/A		
						\((4%), well-round				~/ ※			
				61		coarse), sub-rou							
			SW	62									
			SVV	02									
				63									
				_									
				64									
				65		SAND, fine to co	paras (E0/ fina	600/ m	adium 200/			Grout (neat cen	nent)
				-		coarse), sub-rou	inded, poorly gr	aded, tr	ace gravel,			(0'-183' bgs)	,
				66		medium (5%), su SAND, fine, sub			ad naarly	_/\ \			
				67		graded; wet, 10		II-rouria	ea, poorty				
				•									
				68									
				69									
				09									
				70		SAND, fine to m	edium (70% fin	e 30%	medium)	 ₩	-	4" LC Steel Cas	sing
				71 -		sub-angular to s 10YR 4/3						(0'-185' bgs)	
6/19/20			SP	72									
S.GPJ				73		SAND, fine to co	parse (40% fine	. 50% n	nedium 5%				
NG LOG				74		coarse), sub-and trace gravel, fine	gular to sub-rou	ınded, p	oorly graded				
J BORII				75									
06S.GP				76									
GINT				77									
ור 1007_				_									
ZMENTA				78 -									
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20			sw	79 –		SAND, fine to co coarse), sub-ang				6			



	CLIENT:	4DO 4						JOB NO.:		OCATION				N 4N 1	
	PROJECT:	1PCA						60618753 DRILLING METHO			Twin Citi	es Ea	st Metro	BORING N	O.
	P	roject 1	1007		Ι			Sonic						MW6A	[847058]
	LOGGED BY:	AEL/I	MGD		CHEC	KED BY:	AEL/AS							SHEET	[0 11 000]
	DRILLING CO	NTR.:	Traut											5 (OF 11
	DRILLER: D	an Pflij	osen		EQUIF	.: Sor	nic	SAMPLING METH 10' acetate ba						DRII	LLING
	BORING DEP	гн: 21	0 ft bgs					TO acetate ba	ays 					START	FINISH
	GROUND SUF	RFACE EI	EVATIO	N: 8	90.46	ft AMSL		WATER LEVEL	9'					TIME	TIME
	DATUM: NA COMMENTS:	AD 83 L	JTM 1	5 (met	ers)			TIME	080					1520 DATE	1130 DATE
	Northing: 4							DATE	11-13	3-19					
ŀ	Easting: 50		80				SURFACE CONDITION	CASING DEPTH						11-11-19	11-14-19
		PEET DRIVEN	o ê	S.S.	F [ii	SOIL/ROCK GRAPH	Grass	10.							
	SAMPLE ID	PEET DRI	PID (ppm)	U.S.C.S.	DEPTH IN FEET	OIL/R GRA		01 0010 DE0	0010	TION			WE	LL DIAGRA	M
L		\ FF		_	_	Š	LITHO	DLOGIC DES	CRIP	HON					
ŀ						*****	\with gravel, fine	(10%), well-rou	ınded:	wet. 1	0YR 4/3 /	M	K/A		
							SAND, fine to co	parse (30% fine	, 60%	mediu	ım, 10%				
					81		coarse), sub-rou	ınded, well grad	ded; we	et, 10Y	/R 5/2				
				sw	82										
					-										
					83										
					84										
					-										
					85	******								Grout (neat cen (0'-183' bgs)	nent)
					86									(
					-										
				SP	87	*****	SAND, fine to m								
					88		\sub-rounded, po SAND, fine to co								
					"		coarse), sub-rou	inded, well grad	ded; we	et, 10Y	/R 5/2				
					89										
					90									" LC Steel Cas	sing
					30		SAND, fine to co							(0'-185' bgs)	sirig
				sw	91		trace gravel, fine								
/20															
6/19					92										
S.GPJ					93										
LOGS					-										
RING					94										
) B0					95 -										
SS.GP					-										
- Log					96										
GIN					97	******	CANE "								
1007					•		SAND, fine, sub- graded; 10YR 4/		II-roun	ded, p	oorly				
ITAL				SP	98		SAND, medium		medi	um, 50)%				
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20					99		coarse), sub-rou	ınded, poorly gr	aded;	10YR	4/2				
VIRO				SW	99	******	SAND, fine to co								
Ш Ц						• \$ • \$ • \$ • \$ •	- Joursey, Jub-and	yalar 10 300-100	ucu,	wen g	radou,	K/A_	K//		



1	CLIENT:							IOP NO :	1,000	TION:					
	CLIENT:	PCA						JOB NO.: 60618753	LOCA		Cities E	=ast M	Metro I	MNI	
	PROJECT:	roject 1	1007					DRILLING METHO	OD:	TWIII	Onios L	_431 10	ictio, i	BORING NO	O.
	LOGGED BY:				CHEC	KED BY:	AEL/AS							MW6A J	[847058]
	DRILLING CON	NTR.:	Traut												of 11
					FOLIII	P.: Sor	nio.	SAMPLING METH	HOD:						LING
	DRILLER: D				EQUI	P.: 301	IIC	10' acetate ba	ags					START	FINISH
	BORING DEPT			0	00.46	ft AMSL		WATER LEVEL	9'					TIME	TIME
	GROUND SUR					IL AIVIOL		TIME	0800					1520	1130
	COMMENTS:			o (mot	013)			DATE	11-13-19					DATE	DATE
	Northing: 49 Easting: 50	980133 9410.8	3.29 30					CASING DEPTH						11-11-19	11-14-19
	SAMPLE ID	FEET DRIVEN FEET RECOVERED		U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	DLOGIC DES	CRIPTIO	N		,	WELL	. DIAGRA	•
				SW	101 -		with gravel, med coarse), sub-ang SAND, fine to co coarse), sub-ang trace gravel, med sub-rounded, tra	gular to sub-rou parse (45% fine gular to sub-rou dium (5%), sub	inded; 10` , 35% me inded, we i-angular t	/R 4/2 dium, 10% I graded, o	5				
				SP	103		SAND, fine to me sub-angular to su 10YR 4/2 GRAVEL, fine to	ub-rounded, po	orly grade	ed; wet,					
				GP	105 - 106 - 107 - 108 - 109 -		angular to sub-a coarse (9%) sub cobbles (1%); 10	ngular, poorly (-angular to sub)YR 3/1	graded, wi -rounded,	th sand, trace				out (neat cem 183' bgs)	nent)
					110 -		DOLOSTONE, condition dolomitic precipited 4/2 SANDY DOLOS	tate, oolitic text	ure (5-15°	%); 10YR				.C Steel Cas ·185' bgs)	sing
6/19/20					112		sub-rounded san trace reworked o (5%), trace glaud	lasts (5%), trad	ce micrite	angular, bands					
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20					113										
ORING LO					114										
S.GPJ B					115										
INT_LOG					116										
1007_G					117										
MENTAL					118 -										
ENVIRON					119										



ſ	CLIENT:							JOB NO.:	LO	CATION:					
-	PROJECT:	IPCA						60618753 DRILLING METHO		Twin	Cities	Eas	t Metro,	MN BORING N	0
		roject 1	1007					Sonic	OD:						
	LOGGED BY:	AEL/I	MGD		CHEC	KED BY:	AEL/AS							MVV6A SHEET	[847058]
	DRILLING CO	NTR.:	Traut											7 (OF 11
	DRILLER: D				FOUIP	ı: Sor	nic	SAMPLING METH							LING
Ì	BORING DEPT				LGO			10' acetate ba	ags					START	FINISH
Ī	GROUND SUF			N: 8	90.461	t AMSL		WATER LEVEL	9'					TIME	TIME
	DATUM: NA	ND 83 L	JTM 1	5 (met	ers)			TIME	0800)				1520	1130
	COMMENTS: Northing: 4	980133	3.29					DATE	11-13-	19				DATE	DATE
-	Easting: 50	9410.8	30				SURFACE CONDITION	CASING DEPTH						11-11-19	11-14-19
		PRIVEN	o €	S.	를 다 다	SOIL/ROCK GRAPH	Grass	vo.							
	SAMPLE ID	PEET DR RECOVERED	PID (mdd)	U.S.C.S.	DEPTH IN FEET	OIL/R GRA	LITUO			TON			WEL	L DIAGRA	.M
-						Ö	LITHC	DLOGIC DES	CRIPI	ION					
ł							DOLOSTONE, c	competent, ooli	tic textu	ıre (20%),	X	1	W		
					121		vugs (15%), with trace glauconite			ell-rounded/	,				
					'-'		trace gladeornic	(270), 1011(3/	5						
					122		DOLOSTONE, c	competent, ooli	tic textu	ıre (20%),					
					123		vugs (10%), trac 10YR 5/3	e sand, fine (5	%), wel	l-rounded;					
					120		10110 0/0								
		124													
													Gr	rout (neat cen	nent)
					120)'-183' bgs)	icitij
					126										
					127								\gg		
					'2'		DOLOSTONE, r (20-30%), vugs (
					128		fine sand (5%);	10YR 5/4, quar	tz (20%) @ 130' bg	js 🎇				
					129										
													\gg		
					130		DOLOSTONE, r	noderately com	petent	iron oxidati	ion /	1 ₹		LC Steel Cas 0'-185' bgs)	sing
					131		∖(20-30%), vugs (√5/4	(20%), oolitic te	exture (15%); 10YR				, 100 bgs)	
0							DOLOSTONE, c								
6/19/2					132	7	texture (5-10%), trace micrite laye	trace iron oxiders 133-136' bo	ation (5 _I s	%); 10YR6/	3,		\gg		
GPJ					133		.,,	3	•						
OGS.															
SINGL					134										
BOR					135										
S.GP.											K				
F00					136		DOLOSTONE, o				— <u>></u>				
GINT					137		(10%), trace den trace glauconite			ning (2%),					
1007							ado giduooiiite	(170), 1011(17							
ŢĀL					138						X				
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20					139										
WIRC					-										
甸						\vdash					K/	4	//		



CLIENT:				JOB NO.:	LOCAT	ION:				
MPCA				60618753	LOCAI		Cities Ea	st Metro	. MN	
PROJECT: Project 1007				DRILLING METHO	OD:		<u> </u>	<u> </u>	BORING NO	Э.
LOGGED BY: AEL/MGD	CHECK	KED BY:	AEL/AS						MW6A [847058
DRILLING CONTR.: Traut										- 11
	FOLUD	. Con	io	SAMPLING METH	HOD:					DF 11 LING
DRILLER: Dan Pflipsen BORING DEPTH: 210 ft bgs	EQUIP	.: Son	IC .	10' acetate ba	ags				START	FINISH
GROUND SURFACE ELEVATION	ı: 890.46f	+ AMQI		WATER LEVEL	9'				TIME	TIME
DATUM: NAD 83 UTM 15		LAWISE		TIME	0800				1520	1130
COMMENTS:	(meters)			DATE	11-13-19				DATE	DATE
Northing: 4980133.29 Easting: 509410.80				CASING DEPTH					11-11-19	11-14-19
SAMPLE ID SAMPLE ID (mdd)	U.S.C.S. DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass LITHO	DLOGIC DES	CRIPTIO	N		WEI	LL DIAGRA	
/ ፲፫፫										
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20	141 — 142 — 143 — 144 — 145 — 146 — 147 — 148 — 150 — 151 — 152 — 153 — 154 — 155 — 156 — 157 — 158 — 159 —		DOLOSTONE, coprecipitate (10-5) DOLOSTONE, coprecipitate (10-5) 7/3 DOLOSTONE, coprecipitate, oolitic trace dendritic modern dendritic modern dendritic modern dendritic modern dendritic modern dendrities de	competent, fine 0%), trace oolit competent (15-20) anganese stair	grained dic texture grained down, vugs hing (1%);	olomitic (5%); 2.5\ olomitic (10-15%) 2.5Y 6/3		4	Grout (neat cem 0'-183' bgs) " LC Steel Cas 0'-185' bgs)	



LOGGED BY: AEL/MGD CHECKED BY: AEL/AS DRILLING CONTR.: Traut 9	OF 11 DRILLING T FINISH T TIME D 1130
LOGGED BY: AEL/MGD CHECKED BY: AEL/AS DRILLING CONTR: Traut DRILLER: Dan Pflipsen EQUIP.: Sonic SAMPLING METHOD: 10' acetate bags	OF 11 DRILLING T FINISH TIME D 1130
DRILLER: Dan Pflipsen EQUIP.: Sonic SAMPLING METHOD: 10' acetate bags	OF 11 DRILLING T FINISH TIME D 1130
DRILLER: Dan Pflipsen EQUIP.: Sonic SAMPLING METHOD: 10' acetate bags	PRILLING T FINISH TIME D 1130
DRILLER: Dan Pilipsen EQUIP.: Sonic 10' acetate bags	PRILLING T FINISH TIME D 1130
	TIME 1130
561.111.0 521.1111. 2.10 3	1130
GROUND SURFACE ELEVATION: 890.46 ft AMSL WATER LEVEL 9'	
DATUM: NAD 83 UTM 15 (meters) TIME 0800 152 COMMENTS: DATE 11 13 10 DATE	DATE
Northing: 4980133.29	
L = A CURTAGE CONDITIONS	19 11-14-19
SAMPLE ID	ο Λ Ν <i>Ι</i>
SAMPLE ID	XAIVI
WEED OF LITTICEOGIC BESCHILL HOLD	
DOLOSTONE, competent, trace dendritic	
manganese staining (5%), trace small (1mm) vugs (5%); 2.5Y 7/2	
162	
163 POLOSTONE maderately competent dendritie	
DOLOSTONE, moderately competent, dendritic manganese staining (10%), trace small (1mm) vugs	
164 (5%); 2.5Y 7/2	
Grout (neat	cement)
dendritic manganese staining (5%), trace small (0'-183' bgs	
166 (1mm) vugs (5%); 2.5Y 7/2	
167 CANDY DOLOGTONE was doubt to several to the sev	
SANDY DOLOSTONE, moderately competent, platy, medium sand (10-30%), oolitic texture (15%);	
168 7 7 2.5Y 7/2	
169	
DOLOSTONE, comepetent, trace oolitic texture 4" LC Steel (0'-185' bgs	Casing)
(5%), trace vugs (5%); 2.5Y 6/3	
DOLOSTONE, competent, bedded, dolomitic precipitate (15-20%), vugs (20%), oolitic texture	
(15-20%); 2.5Y 6/3	
g 173 17	
175 POLOSTONE	
DOLOSTONE, competent, dendritic manganese staining (5-10%), trace oolitic texture (5%), trace iron	
9 banding (5%); 2.5Y 6/4	
Image: Control of the control of t	
172	
DOLOSTONE, not competent, clay and silt (40%), with sand (5-10%); 10YR 5/8	



								NVIRU	IAIAITI			S LOC
CLIENT:	IDO 4					JOB NO.:	LOCAT		O:4: - =			
PROJECT:	IPCA					60618753 DRILLING METHO	 DD:	Twin (Jities Eas	st Metro, N	MN BORING N	O.
Р	roject 1007					Sonic					M/M/6A	[Q/70EQ
LOGGED BY:	AEL/MGD		CHEC	KED BY:	AEL/AS						MW6A SHEET	<u> </u>
DRILLING CO	NTR.: Traut										10 0	OF 11
DRILLER: D	an Pflipsen		FOLIR	.: Sor	nic	SAMPLING METH						LING
	H: 210 ft bg:	s	LQOII	001	110	10' acetate ba	ags				START	FINISH
	RFACE ELEVATI			t AMSL		WATER LEVEL	9'				TIME	TIME
	D 83 UTM					TIME	0800				1520	1130
COMMENTS: Northing: 4			,			DATE	11-13-19				DATE	DATE
Easting: 50	9410.80					CASING DEPTH					11-11-19	11-14-1
OAMBI E IB	DRIVEN DVERED PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	NS:				\ \ /=!!	. DIAGRA	N.A
SAMPLE ID	FEET DRIV	S.U	N N N	SOIL/I GR/	LITHO	DLOGIC DES	CRIPTIO	N		VVELL	. DIAGRA	IVI
										N/ / 4		
					SANDY DOLOS angular to sub-a							
			181	7 7	iron banding (5-						ut (neat cen 183' bgs)	nent)
			182	:::::	QUARTZ AREN	IITE, fine to coa	rse (5% fi	ne, 75%			.C Steel Cas 185' bgs)	sing
			183		medium, 20% co	oarse), well-rou	nded; 2.5\	7/1		(0-	103 bgs)	
			-							— 1.5'	pellet seal o	on top of
			184	:::::	QUARTZ AREN	IITE, fine to coa	rse (10%	fine, 65%		(18	pea rock 3'-185' bgs)	
			185	:::::	medium, 5% coa trace clay (5%);	arse), well-roun 2.5Y 7/1	ded, with s	silt (15%),	/	I: · · .		
					QUARTZ AREN	ITE, fine to coa						
			186		medium, 70% co	parse), well-rou	naea; 2.51	7 7/1				
			187									
			188							Tele (18	escoping Sc 5'-192' bgs)	reen
			189									
			190		QUARTZ AREN medium, 15% co	IITE, fine to coa parse), well-rou	rse (5% fi nded; 10Y	ne, 80% R 7/1				
		Cj	191									
			192									
			193									
			194							7" (Open Hole	
											2'-210' bgs)	
			195 —		QUARTZ AREN medium, 5% coa	IITE, fine to coa	rse (5% fi	ne, 90% R 7/1				
			196		, , , , , , , , , , , , ,	,,	,,					
			197									
			198									
			199									
				:::::	1							



C	CLIENT:	IDOA						JOB NO.:		OCATION:		:4: _ _	-4 N 4 - 4	NANI		
F	ROJECT:	IPCA						60618753 DRILLING METHO			Twin C	ities Ea	st ivietr	O, IVIN BORIN	IG NO	
		roject 1						Sonic						MW6	3A [8	347058]
L	OGGED BY:	AEL/I	MGD		CHEC	KED BY:	AEL/AS							SHEE		
С	RILLING CO	NTR.:	Traut		I									11	OI	= 11
_	RILLER: D	an Pfli _l	osen		EQUIF	e: Sor	nic	SAMPLING METH 10' acetate ba							DRILL	ING
В	ORING DEPT	TH: 21	0 ft bgs										1	STAI		FINISH
	ROUND SUF				90.46	ft AMSL		WATER LEVEL	9'					TIM		TIME
	DATUM: NA COMMENTS:	ND 83 L	JTM 1	5 (met	ters)			TIME	080 11-13					152 DAT	_	1130 DATE
N	Northing: 4	980133	3.29					DATE CASING DEPTH	11-13	5-19	+					
	Easting: 50		1			×	SURFACE CONDITIO							[11-11	-19	11-14-19
	SAMPLE ID	FEET DRIVEN RED	PID (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass						\٨/⊏	ELL DIAG	DΛN	1
`	SAIVIPLE ID	PEET DRI'	ਕ ਕੁ	U.S.	N N	SOLV	LITH	OLOGIC DES	CRIP.	TION			V V L	LL DIAG	ı VAI	/1
		/ ##				0)	LITTI			11011						
						::::::	QUARTZ AREN	NTE, medium to	coars	se (50%)					
					201		medium, 45% c 5Y 8/1	oarse), well-rou	nded,	trace sil	It (5%);					
					 											
					202											
					203		QUARTZ AREN	UTC fine to me	dium /	200/ fin	700/	_				
					 	-	medium), well-re	ounded; 5Y 8/1	alulli (30% 1111	ie, 70%					
					204											
				Cj	205							-		7" Open Ho	le	
				,	-									(192'-210' l	ogs)	
					206	- ::::::::										
					207		QUARTZ AREN	HTC manadismanta		(400/						
					 		medium, 60% c	oarse), well-rou	nded;	5Y 8/1)					
					208											
					209	::::::	OLIADTZ ADEA	UTC fine to me	dium /	200/ fin	700/	_				
					-	-	QUARTZ AREN medium), well-ro				ie, 70%					
					210		E.O.B. @ 210' k	ogs, No Refusal					1			
					211											
19/20					212											
GPJ 6					213											
S LOGS					214											
BORIN					-											
SS.GPJ					215											
NT_LO					216											
007_GII					217											
NTAL					218											
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20					219											
ENZ L																



										NVIKU	NIVIE	NIALE	OKING	J LUG
(CLIENT:	PCA						JOB NO.: 60618753	LOCAT		Cities Fa	st Metro, M	1N	
F	ROJECT:	oject ′	1007					DRILLING METHO	DD:	1 44111	Ollios La	St Wictio, IV	BORING NO	O.
L	OGGED BY:	-			CHEC	KED BY:	AEL/AS	Sonic					MW6B [847059]
_	RILLING CON	ITR.:	Traut										1 0)F 8
	RILLER: Da	an Pfli _l	psen		EQUIF	c.: Sor	nic	SAMPLING METH					 	LING
E	ORING DEPT		0 ft bgs					10' acetate ba	ags				START	FINISH
	ROUND SUR	FACE EI	LEVATIO	N: 8	90.53	ft AMSL		WATER LEVEL	10.1'	10.1'	13'	10.3'	TIME	TIME
	ATUM: NA	D 83 L	JTM 1	5 (met	ers)			TIME	0840	1000	1345	0800	0830	1200
1	OMMENTS: Northing: 49							DATE				11-20-19	-	DATE
E	asting: 50	9412.9 lz. /	93 1				SURFACE CONDITION	CASING DEPTH	13'	40'	85'	110'	11-19-19	11-21-19
	SAMPLE ID	PEE DRIVE FEET RECOVERED	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass/Mud					WELL	DIAGRA	M
						S	LITHO	DLOGIC DES	CRIPTIO	N				
\vdash						 	TOPSOIL, silt (8	5%), medium s	and (15%); wet, 5Y	R 🔀	\bowtie		
				OL	1		3/1	/400/ 5	0001	p 4=*				
							SAND, fine to co coarse), sub-ang	gular tò sub-rou	nded, wel	I graded,				
				SW	2		with gravel, fine dry, 10YR 4/3	(10%), sub-ang	jular, trace	e clay (5%	o);			
				300	3		ary, rorre no							
					-									
				SM	4		SILTY SAND, fin			aded, silt				
				OW	5		(20%), trace clay	, ,		dium 10%			ıt (neat cem	ent)
					-		coarse), sub-ang	gular tò sub-rou	nded, wel	I graded,	° 🙀	(0'-	138' bgs)	
					6		with clay (8%), tr dry to moist, 7.5	ace gravel, coa YR 4/2	arse (2%),	angular;				
	MW6B-S	OIL			7									
	0-7			SW										
					8 -									
	MW6B-S				9									
	8.5-10	OIL			10							4"10	C Steel Cas	ina
					"	600	GRAVEL, mediu	ım eub angulai	to sub ro	undad			140' bgs)	iiig
	MW6B-S 10-13	OIL			11		poorly graded, w	ith sand, coars	e (30%), a	angular to				
3				GP	12		sub-angular, trac sub-rounded, tra							
5	MW6B-G 11-13	W				7000	,	•	•					
5	11-13				13	100	GRAVEL, fine to							
					14		10% coarse), su coarse (15%), su							
				GW	-		clay (5%); wet, 1		ab rourido	u, ii uoo				
5					15	30	GRAVEL, fine to							
					16		10% coarse), sul ∖ coarse (15%), su							
				SW			∖clay (5%); wet, 1	0YR 3/4			_/ ፟፟፟፟∭			
				300	17		SAND, fine to co coarse), sub-and							
1				GW	18	: 7.5	trace cobbles (19				R 📈			
ENVIRONMENTAL 1007_GINT_LOGS.GPJ BORING LOGS.GPJ 6/19/20							∏3/4 GRAVEL, fine to	coarse (60% f	ine, 20% ı	medium,	-1			
5				SP	19	-	10% coarse), an with sand, mediu	gular to well-ro	unded, we	ell graded,				
2							coarse), sub-ang				4			



								E	NVIKO	NINIEN	HALE	ORING	J LU(
CLIENT:	IDC 4						JOB NO.:	LOCA		Cition Fa-	t Motro	INI	
PROJECT:	IPCA						60618753 DRILLING METHO	DD:	ı win	Cilles Eas	t Metro, M	IN BORING NO	Э.
P	roject ´	1007					Sonic					MW6B [84705
LOGGED BY:	AS/A	EL		CHEC	KED BY:	AEL/AS						SHEET	UT1 UU
DRILLING CON	NTR.:	Traut										2 0)F 8
DRILLER: D	an Pflii	psen		EQUIF	.: Sor	nic	SAMPLING METH						LING
BORING DEPT		0 ft bgs					10' acetate ba	ags				START	FINISH
GROUND SUR	RFACE EI	LEVATIO	N: 8	90.53	ft AMSL		WATER LEVEL	10.1'	10.1'	13'	10.3'	TIME	TIME
DATUM: NA	ND 83 L	JTM 15	5 (met	ers)			TIME	0840	1000	1345	0800	0830	1200
COMMENTS: Northing: 49	980133	2 12					DATE	11-19-19	11-19-19	11-19-19	11-20-19	DATE	DATE
Easting: 50	9412.9						CASING DEPTH	13'	40'	85'	110'	11-19-19	11-21-
SAMPLE ID S. C. S						SURFACE CONDITION Grass/Mud	NS:				WELL	DIAGRAI	M
SAMELE ID SO LI							DLOGIC DES	CRIPTIO	N				
						SAND, coarse, s						it (neat cem 38' bgs)	nent)
				21		with gravel, fine sub-angular; we		% tine, 5%	o medium)), 💹	(0-1	oo bys)	
						SAND, fine to co	parse (5% fine,						
			SP	22		coarse), sub-ang trace gravel, coa	arse (5%), sub-a			ı, 🕍			
			SF	23		sub-rounded; me	oist, 7.5Y 5/4						
				24									
				25		GRAVEL, medium to coarse (60% medium, 5%					4"10	C Steel Cas	ina
			GP			∫ GRAVEL, mediu coarse), sub-ang						40' bgs)	
			GP	26	00C	to coarse (5% fii sub-angular; mo	ne, 10% mediur oist, 10YR 3/2						
				27		SAND, fine to co coarse), sub-rou	inded, poorly gr	aded, with	n gravel,				
				28		fine to coarse (5 sub-rounded; mo							
			SP	-		√28-28.5' bgs							
				29		SAND, fine to co coarse), sub-rou							
				30		(10%), with silt (10%), trace gra	vel, medi	um (5%),				
						sub-rounded; mo	parse (5% fine,			-/ 💹 │			
				31		coarse), sub-rou graded, trace gr	inded to well-ro	unded, po	orly				
				32		10YR 4/2	avoi, moulum (t	, , o j, angu	nai, moist,				
			SP	33									
				34									
				54									
				35								it (neat cem	nent)
											(U'-1	38' bgs)	
MW6B-G	W			36		SAND, fine to m sub-rounded to				ilt 👹			
36-40 MM6R-S	ייטי			37	600	∖(8%), trace grav	el, fine (2%); m	oist, 10YF	R 5/2	_/\/			
MW6B-S	OIL		GP	 	5000	GRAVEL, fine to	medium (75%	fine, 10%	medium)	, 💥			
37-38													
37-38			60	38		medium to coars		, 10% coa	arse),				
37-38 MW6B-S 38-39	OIL		SP GP	38 -			se (5% medium well-rounded; m	, 10% coa noist, 10Y	arse), R 4/2				



									NVIRU	'IN IVI⊏IN	IIAL D		G LUC
CLIENT:	DCA						JOB NO.:	LOCAT		Cition For	t Motro N	INI	
PROJECT:	PCA						60618753 DRILLING METHO	DD:	1 WIN	Uitles Eas	t Metro, M	BORING N	0.
Pr	oject 10	007					Sonic					MW6B	847059
LOGGED BY:	AS/AE	L		CHEC	KED BY:	AEL/AS	_					SHEET	[0 17 000
DRILLING CON	TR.: T	raut										3 0	OF 8
DRILLER: Da	an Pflips	sen		EQUIP	: Sor	nic	SAMPLING METH						LING
BORING DEPTI	н: 150	ft bgs					10' acetate ba	ags				START	FINISH
GROUND SURF	FACE ELE	OITAVE	v: 8	90.531	t AMSL		WATER LEVEL	10.1'	10.1'	13'	10.3'	TIME	TIME
datum: NAI	D 83 U	TM 15	(met	ers)			TIME	0840	1000	1345	0800	0830	1200
COMMENTS: Northing: 49	980132	12					DATE	11-19-19	11-19-19	11-19-19	11-20-19	DATE	DATE
Easting: 509	9412.93						CASING DEPTH	13'	40'	85'	110'	11-19-19	11-21-1
SAMPLE ID	FEET DRIVEN FEET RECOVERED	PID (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass/Mud	IS:				WELL	DIAGRA	М
	RECO		Ď	□ ≤	SO	LITHO	DLOGIC DES	CRIPTIO	N				
											X / 4 4 11 1 6	0.011.0	
MW6B-S0 36-40	OIL		SP			(8%), trace grave						C Steel Cas 40' bgs)	sing
30-40			5P	41		angular to sub-a	ngular, poorly o	ıradéd, wi	th sand, [′]	' M			
				40	******	medium to coars							
				42		SAND, fine to co	arse, (50% fine	e, 40% me	edium, 5%				
				43	******	coarse), sub-rou graded, trace silt			orly				
			SW	_		SAND, fine to me	edium (45% fin	e, 45% m	edium),				
				44		sub-rounded to v (10%); moist, 10		oorly grad	ed, with s	ilt 📗			
				45		SAND, fine to co		, 60% me	dium, 20%	∄ 📓 🛭			
				"		coarse), sub-ang	jular to sub-rou	nded, wel	l graded;				
		-		46	moist, 10YR 5/3 SAND, fine to coarse (10% fine, 60% medium, 30% coarse), sub-angular to sub-rounded, well graded;								
MW6B-S	OII		SM	47		coarse), sub-ang moist, 10YR 5/2	jular tò sub-rou	nded, wel	l graded;				
46-47			SW	47		SAND, fine to co							
		-		48		coarse), sub-ang moist, 10YR 5/2	jular to sub-rou	nded, wel	l graded;				
						SILTY SAND, fin							
			SM	49		graded, silt (30% SAND, fine to co							
		-		50		coarse), sub-ang	jular tò sub-rou	nded, wel	I graded,		Grou	it (neat cen	nent)
				-		with gravel, fine dry, 10YR 4/3	(10%), sub-ang	ular, trace	e clay (5%);		38' bgs)	,
				51		SILTY SAND, fin							
			SW	52		fine), well-rounde moist, 10YR 5/4							
			U V V			SAND, fine to co							
				53		coarse), sub-ang moist, 10YR 5/2	jular to well-rou	nded, we	ll graded;				
		-		54	*****	SAND fine to se	oroo (E0/ fino	25% mad	ium 60%				
				-		SAND, fine to co coarse), sub-ang				ı; 🔯			
				55		moist, 10YR 4/3		•	- -			C Steel Cas 40' bgs)	sing
			SP	56)	.o byo,	
				"									
				57									
		 	CL	_		CLAY, low plasti	city, soft, silt (4	0%); dry t	o moist,				
		f		58		∖10YR 5/3				_/			
			SW	59		SAND, fine to co coarse), angular							
			300	1 29 -	`	10YR 5/4	to out roundo	, g. a	aoa, moio	" [XX] "	XXI		



									NVIRU	אואואויבר	HALE		3 LUC
CLIENT:	PCA						JOB NO.: 60618753	LOCAT		Cities Fas	st Metro, M	IN	
PROJECT:		007					DRILLING METHO	DD:	I AAIII	J.1.00 Ld3	.: IVIOU 0, IV	BORING NO	D .
	oject 1					A.E.I. / A.C.	Sonic					MW6B	84705
LOGGED BY:				CHEC	KED BY:	AEL/AS	-					SHEET	
DRILLING CON	itr.: 7	Γraut					OAMBI III C	100)F 8
DRILLER: Da				EQUIF	o.: Sor	nic	SAMPLING METH 10' acetate ba						LING
BORING DEPTI	н: 15	0 ft bgs							40.41	401	40.01	START	FINISH
GROUND SURF					ft AMSL		WATER LEVEL	10.1'	10.1'	13'	10.3'	-	
DATUM: NA	D 83 C	JIM 15	o (met	ters)			TIME DATE	0840	1000	1345	0800 11-20-19	0830 DATE	1200 DATE
Northing: 49	980132	2.12					CASING DEPTH	13'	40'	85'	110'	11-19-19	11_21_
Easting: 509	EET	Old (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass/Mud		10	10				
SAMPLE ID Control Con							WELL DIAGRAM THOLOGIC DESCRIPTION						
			SP	61		SAND, fine to co coarse), sub-ang trace gravel (5% 10YR 4/4 SAND, fine to co coarse), angular moist, 10YR 4/3 SAND, medium t coarse), sub-roungraded, with grav sub-rounded; dry SAND, fine to me sub-rounded, por 10YR 5/3 SAND, fine to me sub-rounded, por 10YR 5/3	arse (10% fine to sub-rounded to sub-rounded to well-rounded to moist, 10YF edium (35% finorly graded, transport graded	medium, unded, po o o o o o o o o o o o o o o o o o o	dium, 40% ded; dry to 70% orly angular to edium), 6); dry, edium),	60	(0'-1	t (neat cem 38' bgs)	ŕ



						1.22			. 41VILI	HALE		
CLIENT: MPCA						JOB NO.: 60618753	LOCAT		Cities Fas	st Metro, M	1N	
PROJECT:	1007					DRILLING METHO	DD:	I VVIII	Ciuco Las	, ivicii U, IV	BORING N	0.
Project			I			Sonic					MW6B	[84705
LOGGED BY: AS/A	EL		CHEC	KED BY	AEL/AS	-					SHEET	
DRILLING CONTR.:	Traut										5 0	OF 8
DRILLER: Dan Pfl	ipsen		EQUIF	.: So	nic	SAMPLING METH 10' acetate ba					DRIL	LING
BORING DEPTH: 15	50 ft bgs					10 acciaic be					START	FINISH
GROUND SURFACE E	LEVATIO)N: 8	90.531	ft AMSL		WATER LEVEL	10.1'	10.1'	13'	10.3'	TIME	TIME
DATUM: NAD 83 COMMENTS:	UTM 1	5 (met	ers)			TIME	0840	1000	1345	0800	0830 DATE	1200 DATE
Northing: 498013						DATE				11-20-19	-	
Easting: 509412.	93 ⁄/		Т		SURFACE CONDITION	CASING DEPTH	13'	40'	85'	110'	11-19-19	11-21-1
FEET		S.	투뉴	ŠĘ	Grass/Mud	Mud						
SAMPLE ID	PID (ppm)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	LITIV	OLOGIC DES	CDIDTIC	ıNı		vv⊨LL	DIAGRA	IVI
	ž		-	S	LITH							
			++		SAND, medium	to coarse (35%	medium.	60%			it (neat cen	nent)
			81		coarse), sub-and trace gravel, me	gular to sub-rou	nded, poo	orly grade	d, 🔛	(0'-1	38' bgs)	
			" [sub-rounded; m	oist, 10YR 5/2	-angulai l	J				
			82 -									
MW6B-SOIL			83									
81-85			83									
		SP	84	SAND, medium to coarse (45% medium, 55%								
MW6B-GW					coarse), sub-rou					 .	204 10	
81-85			85		5/2 SAND, fine to co	parse (5% fine	55% med	ium. 40%	_/		C Steel Cas 40' bgs)	sing
			86		🛴 coarse), sub-an	gular to sub-rou	nded, poo	orly grade	d; /		- •	
			-		\moist, 10YR 4/2 SAND, fine to co		70% med	ium. 25%	-/ 👹 │			
			87		coarse), sub-an	gular to well-rou	inded, poo	orly grade	d; 👹			
			88	111111	moist, 10YR 5/2		00/ \ 4	a maist				
		CL	 	/////	CLAY, low plast \10YR 5/3	ıcıty, soπ, siit (4	∪‰); dry t	o moist,				
		sw	89		SAND, fine to co				√ 👹			
			90	**** ***	moist, 10YR 4/2		•					
			-		SAND, fine to co	parse (5% fine,						
			91		trace gravel, me	gaiai 10 sub-100 edium (5%), sub	-rounded;	moist,	1 , 📓			
			92		10YR 4/1							
					:]							
			93									
			94		:							
			34		SAND, medium coarse), sub-an							
		SP	95		with gravel, med				-,)		it (neat cen	nent)
					10YR 4/1					(U-1	38' bgs)	
			96									
			97		SAND, fine to co	parse (5% fine	30% med	ium. 58%				
					coarse), sub-an	gular to sub-rou	nded, poo	orly graded	d, 📓			
			98		with gravel, med coarse), angular							
			99		SAND, fine to m							
	1						a)hu_m	adii im i				



										NIVIEN	IIALE	ORING	J LUC	
CLIENT:	PCA						JOB NO.: 60618753	LOCA		Cities Fas	st Metro, M	1N		
PROJECT:		1007					DRILLING METHO	DD:	1 ******	Onics Las	it ivicuo, iv	BORING NO	Э.	
	roject '						Sonic					MW6B [847059	
LOGGED BY:	AS/A	EL		CHEC	KED BY:	AEL/AS	-					SHEET		
DRILLING CON	NTR.:	Traut		T								6 c)F 8	
DRILLER: D	an Pfli	psen		EQUIP	: Sor	nic	SAMPLING METH 10' acetate ba					DRIL	LING	
BORING DEPT	H: 15	0 ft bgs					To doctate be		I		1	START	FINISH	
GROUND SUR	FACE EI	LEVATIO	N: 8	90.53	ft AMSL		WATER LEVEL	10.1'	10.1'	13'	10.3'	TIME	TIME	
DATUM: NA	D 83 L	JTM 1	(met	ters)			TIME	0840	1000	1345	0800	0830 DATE	1200 DATE	
Northing: 4							DATE				11-20-19	-		
Easting: 50		93			Ι	SURFACE CONDITION	CASING DEPTH	13'	40'	85'	110'	11-19-19	11-21-1	
SAMPLE ID	PEET DRIVEN FEET RECOVERED	PID (mdd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass/Mud	NO.				WELL	DIAGRA	M	
S O O O O O						LITHO	LITHOLOGIC DESCRIPTION							
					*****	\moist, 10YR 4/2				7 🔯 1		C Steel Cas	ing	
				101		SAND, fine to co coarse), sub-ang				6 💹	(U'-1	40' bgs)		
			SW	-		dry to moist, 10Y		nucu, WE	ı grau c u,					
				102										
				103										
				103		SAND, medium to coarse), sub-ang								
				104		(20%), sub-angu			graver, in					
		QP.	105		SAND, fine to me									
			SP	106		sub-rounded, po (5%), sub-angula								
MW6B-S	OII			107										
106-110				108		SAND, medium to coarse), sub-ang	ular to weÌl-rou	nded, poo	orly grade	d,				
MW6B-G	W		GP	109	000	∽with gravel, med GRAVEL, mediu	m to coarse (3	0% mediu	m, 35%	/2/				
106-110				110		coarse), sub-ang	se (10% mediur	nded, with n, 25% co	sand, arse),		Grou	ıt (neat cem	nent)	
						sub-rounded; mo		very weat	hered;			38' bgs)	,	
			SP	111		10YR 4/2 SAND, medium t	to coarse (20%	medium	70%	J 🕅				
			OI	112		coarse), sub-rou	nded, poorly gr	aded, witl						
				-		fine (10%), sub-r	rounded; wet, 1	UYR 3/2						
				113	670	GRAVEL, fine, s	ub-angular to s	ub-round	ed, poorly					
				114		graded, with san 15% coarse), sul 10YR 3/2								
				115		.5						C Steel Cas 40' bgs)	ing	
				116) (J-1)	-o bys)		
			GP		Pool									
				117		GRAVEL, fine to	medium (80%	fine. 10%	medium)					
				118		angular to sub-ro coarse (10%), su	ounded, poorly	graded, w	ith sand, [´]					
				119	[· 0°									
				119		GRAVEL, fine to 70% coarse), an								
					Py	7070 00a136), all	gaiai 10 300-101	αου, ρυ	Orry		K//			



									IVVIIVO	NINIEN			
CLIENT:	IDC A						JOB NO.:	LOCA		O:ti	4 NA=4== N	451	
PROJECT:	IPCA						60618753 DRILLING METHO		ı win	Cities Eas	ı ıvıetro, N	BORING N	0.
	roject	1007					Sonic						
LOGGED BY:	AS/A	.EL		CHEC	KED BY:	AEL/AS						MW6B SHEET	[0 4 7U38
DRILLING CON	NTR.:	Traut										7 .	o 0
DRILLER: D				FOLUE	o.: Soi	nic	SAMPLING METH	HOD:					DF 8 LING
BORING DEPT		•		EQUI	² .: 301	IIC	10' acetate ba	ags				START	FINISH
			Ω	00 53	ft AMSL		WATER LEVEL	10.1'	10.1'	13'	10.3'	TIME	TIME
GROUND SUR					IL AIVIOL		TIME	0840	1000	1345	0800	0830	1200
DATUM: NA	ND 63 (J I IVI 13	o (mei	iers)			DATE			11-19-19			DATE
Northing: 4							CASING DEPTH	13'	40'	85'	110'	 11-19-19	11 21 1
Easting: 50		1				SURFACE CONDITION		10	40		110	11-19-19	-
	PEET DRIVEN	PID (mdd)	S.S.	투파	SOCI PH	Grass/Mud					\A/ELI		N 4
SAMPLE ID	PEET DRI'	I dd)	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	LITUO		CDIDTIC	ıNı		vv⊨LL	DIAGRA	IVI
		!		-	ŭ	LITHC	DLOGIC DES	CKIPTIO	'IN				
				-	000	graded, with silt	(10%): wet 10	YR 3/2			X		
						GRAVEL, fine to	coarse (15% f	ine, 5% m					
			GP	121		70% coarse), an graded, with silt			orly				
				122	; O°								
				122		SAND, medium coarse), sub-and				, 🕅 [
				123		with gravel, fine	(20%), sub-ang	gular; mois	st, 10YR	¹' 🔘			
						4/2, low recovery	ý (5/10 ft in bag	from 120	-130')				
				124									
			SP	105							S Crau	ıt (neat cen	- ont)
			38	125								it (neat cen 138' bgs)	ient)
				126									
				-									
				127									
				400									
				128		GRAVEL, fine to							
				129		55% coarse), an trace sand, coar	guiar to sub-ro se (5%), trace :	unaea, we silt (5%); \	n graded, vet, 10YR				
						4/2	(- //	(- //	, -				
			GW	130								C Steel Cas	sing
			GVV								(0-	140' bgs)	
				131							\bowtie		
				132	.7.9								
	L			↓ ├		DOLOGIONE			d				
MW6B-S 129-133	OIL			133		DOLOSTONE, r					\bowtie		
123-133						(15-20%), trace	dolomitic precip						
				134		oolitic texture (5° DOLOSTONE, r		netent fir	ne arained	→ 🕅 [
				135	H	dolomitic precipi	tate, oolitic text	ure (15%)	, trace		X		
				-	++++	√vugs (5%), trace	iron banding (2%); 2.5Y	6/4	⊿ ⋈			
				136		DOLOSTONE, no bedding, fine gra							
						(10-15%), iron b					\mathbb{X}		
				137		(5%); 2.5Y 6/3							
				138									
				136	++	DOLOGICO:					— 1' of	fine sand o	r pellets
MW6B-G	W			139		DOLOSTONE, r						3'-139' bgs)	
136-140							ecipitate, trace vugs (5%), trace dendrition staining (2%); 2.5Y 6/2					d filter pack	
	1										(139	9'-150' bgs)	



			_		/		OKIN	<i>-</i>	
CLIENT: MPCA		JOB NO.: LOCATION: 60618753 Twin Cities East Metro, MN							
PROJECT: Project 1007		DRILLING METHO	DD:	1 77111	Olico Las	t Wictio, N	BORING NO).	
LOGGED BY: AS/AEL	CHECKED BY: AEL/AS	Sonic					MW6B [847059]	
DRILLING CONTR.: Traut							8 0	of 8	
DRILLER: Dan Pflipsen	EQUIP.: Sonic	SAMPLING METH 10' acetate ba					DRIL	LING	
BORING DEPTH: 150 ft bgs		TO acciate be		I		1	START	FINISH	
	890.53 ft AMSL	WATER LEVEL	10.1'	10.1'	13'	10.3'	TIME	TIME	
DATUM: NAD 83 UTM 15 (me COMMENTS:	eters)	DATE	0840	1000	1345 11-19-19	0800	0830 DATE	1200 DATE	
Northing: 4980132.12		CASING DEPTH	13'	40'	85'	110'	<u>'</u> 11-19-19		
Easting: 509412.93 SAMPLE ID SOURCE ID SO	SURFACE CONDITION Grass/Mud LITHO						DIAGRA		
	DOLOSTONE, m medium grained iron staining (2% ir	dolomitic precipol; 2.5Y 6/2 moderately commoderately com	petent, no (5%); 2.5 (5%); 2.5 (5-10%); race vug	onuniform SY 6/2 ne grained %), trace s (2%);		slot)	eened interv	al (0.010"	

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



ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20

CLIENT:						JOB NO.: LOCATION:						
PROJECT	MPCA:					60618753 DRILLING METHOI		East Metro	, MN		BORING N	O.
	Project 1007					Sonic					N 41 A	V 2 A
LOGGED	BY: AEL		CHEC	KED BY:	AS						SHEET	V2A
DRILLING	CONTR.: Traut										1 .	SE 10
			FOLUE	S C or	vio.	SAMPLING METHO	DD:					DF 18 LING
	Dan Pflipsen DEPTH: 263 FT B	868	EQUI	⊃.: Sor	IIC	10' acetate bag	S				START	FINISH
	SURFACE ELEVAT					WATER LEVEL					TIME	TIME
	UTM NAD83	IOIN.				TIME					1000	1330
COMMEN						DATE					DATE	DATE
						CASING DEPTH					06-22-20	06-24-20
				¥-	SURFACE CONDITIO	NS:	I				100 == =0	100 2 : 20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Glass					WEL	L DIAGRAI	М
TYPE	LOCATION) j		SOI	MAT	ΓERIAL DESCR	IPTION					
									/ / N/	7.4		
					SAND, medium t	to coarse (15% m nded, poorly grad	edium, 40%	vel fine				
					to coarse (10% fi	ine, 20% medium						
			1		sub-angular; dry,	, 5YR 5/6						
										\mathbb{X}		
			2									
			3 -		SAND, medium t	to coarse (15% m	edium, 40%			\mathbb{X}		
					coarse), sub-rou	nded, poorly grad ine, 20% medium	ed, with grav	vel, fine				
			4 -		∖sub-angular; dry,	, 5YR 3/6						
		0.0			SAND, fine to co	parse (60% fine, 3	0% medium	5%		×		
		SP	5 -		⊤∖medium to coars	nded, poorly grad e (5%); dry, 10YF	eu, trace gra R 5/6	avei,			out (neat cem	ent)
						arse (5% fine, 55				(0	'-238' bgs)	
			6		coarse (15% fine	ned, poorly grade e, 13% medium, 2	% coarse),	ei, fine to				
					sub-angular to su	ub-rounded; dry, s	5YR 4/6					
			7					K				
			· L									
DISCRETE	MW2A-SOIL 8-10		8 –							\mathbb{X}		
			9		SAND, fine to co	arse (5% fine, 20	% medium, 4	40%		X		
		SW	i t	*****	medium to coars	nded, poorly grad e (20% medium,	ed, with grav 10% coarse	/ei,).				
	MW2A-SOIL		10	7/////	Sub-rounded, tra	ce clay (5%); moi	st, 10YR 4/4				LC Steel Casid '-240' bgs)	ng
DISCRETE	11-12			<i>\\\\\\</i>		to coarse (15% m nded to well-roun					240 bg0)	
			11 -	<i>\\\\\\</i>	with gravel, fine to	o medium (10% f						
	MW2A-GW				moist, 10YR 6/3	city, medium stiff,	with sand o	narse				
GRAB	11-12	CL	12		(25%), sub-round	ded, trace gravel,	medium (5%	6); wet, 🗦				
				<i>\\\\\\</i>	10YR 4/6, sand s	seams at: 10.25',	10.5', 11', 1 ⁻	1.5' bgs		\mathbb{X}		
			13	<i>\\\\\\</i>				K				
			<u> </u>	<i>\\\\\\</i>								
			14							\mathbb{X}		
		SP				to coarse (15% m nded, poorly grad						
		٥٢			to medium (15%				7	\mathcal{I}		



ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20

CLIENT:	MDCA					JOB NO.:	LOCA		- 141			
PROJECT						60618753 DRILLING METHO	DD:	East Metr	O, IVIIN		BORING N	O.
	Project 1007					Sonic					MV	V2A
LOGGED	BY: AEL		CHEC	KED BY:	AS	_					SHEET	
DRILLING	CONTR.: Traut										2 0	of 18
DRILLER:	Dan Pflipsen		EQUIF	e: Son	ic	SAMPLING METH 10' acetate ba						LING
BORING D	EPTH: 263 FT	BGS									START	FINISH
	SURFACE ELEVAT	ION:				WATER LEVEL					-	
DATUM: COMMEN	UTM NAD83 rs:					DATE					1000 DATE	1330 DATE
						CASING DEPTH					06 22 20	06-24-20
SAMPLE	SAMDI E	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass					\//ELI	. DIAGRA	
TYPE	SAMPLE LOCATION	U.S.	N N N	SOIL/I GR/	MAT	TERIAL DESCI	RIPTION	I		VVELL	. DIAGRA	VI
		SP			\sub-rounded; we SAND, fine to co	arse (5% fine, 3						
		GP	16 -		coarse), well-rour \(5%); wet, 10YR GRAVEL, fine (7 poorly graded, w wet, 10YR 4/4	5/3 0%), sub-angula	ar to sub-i	rounded,				
			18		SAND, medium t	to coarse (10%)	medium /	10%				
		SP	19		coarse), sub-rour to coarse (30% fi \sub-angular to su	nded, poorly gra ine, 10% mediur						
		ML	20		SILT, no plasticity, soft, trace gravel, coarse (5%),						ut (neat cem	ent)
			21 -	-	\trace clay (5%); r CLAY, low to no well-rounded, tra- dry to moist, 10Y	plasticity, stiff, w	ith sand,	fine (15%), rse (5%);		(0'-	238' bgs)	,
			23 -									
		CL	25 –						-		C Steel Casi 240' bgs)	ng
			26 -					_				
			28 –		CLAY, low to no coarse (10% fine sub-angular, with to moist, 10YR 4,	e, 5% medium, 5 n sand, fine (15%	% coarse 6), well-ro	e), unded; dry				
			29 –									



CLIENT:						JOB NO.:	LOCAT	TION!				
CLIENT.	MPCA					60618753	LUCA		etro, MN	ı		
PROJEC						DRILLING METHO	OD:	Lastin	ou o, 1111	-	BORING N	10.
LOGGED	BY: AEL		CHEC	KED BY:	AS	Johns					MV SHEET	V2A
DRILLING	CONTR.: Traut										3	OF 18
DRILLER	Dan Pflipsen		EQUII	⊃.: Sor	nic	SAMPLING METH						LLING
	DEPTH: 263 FT	BGS				10' acetate ba	gs				START	FINISH
GROUNE	SURFACE ELEVAT	ION:				WATER LEVEL					TIME	TIME
	UTM NAD83					TIME					1000	1330
COMMEN	ITS:					DATE					DATE	DATE
	Ι	1		1	SURFACE CONDITIO	CASING DEPTH					06-22-20	06-24-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass	JNS:				WE	ELL DIAGRA	M
TYPE	LOCATION) N	۵z	SOIL	MAT	TERIAL DESCI	RIPTION					
COMP	MW2A-SOIL 36-40	SW	31 - 32 - 33 - 34 -		GRAVEL, fine to angular to well-rocoarse (25%), we	nded, well grade medium (50% founded, poorly g	ine, 25% i					
COMP	MW2A-GW 36-40	GP	35 -		SAND, fine to co	parse (40% fine	15% med	ium 30%			Grout (neat cen (0'-238' bgs)	ient)
GRAB	MW2A-GW 36-40 +DUP	SW	37 -		coarse), sub-rou (15%), angular; v	nded, well grade wet, 10YR 4/4	ed, with gr	aveľ, fine				
		SP	39		GRAVEL, fine (7 graded, with san 10YR 4/3							
		ML	40		SILT, no plasticit 10YR 3/4	y, soft, trace clay	/ (5%); dr <u>y</u>	y to moist,			4" LC Steel Cas	ina
		41 - 42 - 43 - 44 -	-	No Recovery (dri fragment observe	ill pushed down ed at 47' bgs)	rock, 4" ro	ock			(0'-240' bgs)	ъ	

ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20



ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20

MPCA	CLIENT:						JOB NO.: LOCATION:							
Project 1007 Pr		MPCA					60618753		East	Metr	o, MN	l		
DOGETIO BY AEL DIECNED BY AS SHEET SHEET A OF 18 DRILLING CONTR. Traut A OF 18 DRILLING CONTR. Traut BORING DEPTH 283 FT BGS TOUR START PRISS TIME	PROJEC1						1	D:						
DRILLER Dan Pflipsen EQUP: Sonic 10" acetale bags 10" START Finish Incornage Depth 263 FT EGS DATE	LOGGED	BY: AEL		CHEC	KED BY	AS								/2A
DRILLER Dan Pflipsen EQUIP: Sonic SAMPLINE METHOD. 10'a cetate bags START Finish	DRILLING	CONTR.: Traut											4 0	F 18
SORING DEPTH 263 FT BGS GROWD SURPACE ELEVATION DATUM UTRINADBS COMMENTS. SAMPLE SAMPLE LOCATION SAMPLE LOCATION SAMPLE LOCATION SAMPLE LOCATION SAMPLE LOCATION SAMPLE SAMPLE OF SAMPLE	DRILLER:	Dan Pflipsen		EQUIF	c.: Sor	nic								
DATE DATE COMMENTS: DATE DATE DATE DATE DATE DATE DATE DAT			3GS				10 acetate bag	JS 					START	FINISH
DATE CASING DEPTH 06-22-20 06-24-20 SAMPLE TYPE SAMPLE LOCATION 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	GROUND	SURFACE ELEVATI	ON:				WATER LEVEL						TIME	TIME
SAMPLE TYPE SAMPLE LOCATION STATE LOCATION No Recovery (drill pushed down rock, 4" rock fragment observed at 47" bgs) SAND, fine to coarse (20% fine, 20% medium, 40% coarse), sub-rounded, well graded, with gravel, fine (20%), sib-rounded, well graded, with gravel, fine (20%), sib-rounded, poorly graded, with gravel, fine (5%); well-towned, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded, well-rounded, well graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded, well														
SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE AT AT SAND, fine to coarse (20% fine, 20% medium, 40% coarse), sub-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded; wet, 10YR 4/4 SP GRAVEL, fine to medium (65% fine, 20% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded; wet, 10YR 4/4 GRAVEL, fine to medium (65% fine, 20% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded; well-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded; well-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded; well-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded; well-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded, well-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded, well-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded, poorly graded, with sand, medium to coarse (15% medium, 15% coarse), well-rounded, poorly graded, with sand, medium to coarse (15% medium, 15% coarse), well-rounded, poorly graded, with sand, medium to coarse (15% medium, 15% coarse), well-rounded, poorly graded, with sand, medium to coarse (15% mediu	COMMEN	10.												
No Recovery (drill pushed down rock, 4* rock fragment observed at 47* bgs) 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 SAND, fine to medium (80% fine, 20% medium), sub-rounded, poorly graded, trace gravel, fine (5%); wett, 10YR 4/4 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 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 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 GRAVEL, fine to medium (50% fine, 25% medium), sub-rounded to well-rounded, poorly graded, with sand, medium to coarse (15% medium, 15% coarse), well-rounded; wet, 10YR 4/4 GRAVEL, fine to medium (50% fine, 25% medium), sub-rounded to well-rounded, poorly graded, with sand, medium to coarse (15% medium, 15% coarse), well-rounded; wet, 10YR 4/4 GRAVEL, fine to medium (50% fine, 25% medium), sub-rounded, wet, 10YR 4/4 GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium, 15% coarse), well-rounded, wet, 10YR 4/4 GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium, 15% coarse), well-rounded, wet, 10YR 4/4 GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium, 15% coarse), well-rounded, wet, 10YR 4/4	SAMDLE	SAMDI E	C.S.	TH EET	ROCK	_						\\/=		
fragment observed at 47' bgs) fragment observed at 47' bgs) SAND, fine to coarse (20% fine, 20% medium, 40% coarse), sub-rounded, well graded, with gravel, fine (20%), sub-rounded; wet, 10YR 4/3 SAND, fine to medium (80% fine, 20% medium), sub-rounded, poorly graded, trace gravel, fine (5%); wet, 10YR 4/4 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 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 GRAVEL, fine to medium (50% fine, 25% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (10% medium, 10% coarse), well-rounded; wet, 10YR 4/4 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 GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, wet, 10YR 4/4 GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, wet, 10YR 4/4 GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, wet, 10YR 4/4 GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, well-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, well-rounded, well graded;			U.S.	N N N	SOIL/ GR/	MAT	ERIAL DESCR	RIP	ION			VVL	LL DIAGNAI	VI
fragment observed at 47' bgs) fragment observed at 47' bgs) SAND, fine to coarse (20% fine, 20% medium, 40% coarse), sub-rounded, well graded, with gravel, fine (20%), sub-rounded; wet, 10YR 4/3 SAND, fine to medium (80% fine, 20% medium), sub-rounded, poorly graded, trace gravel, fine (5%); wet, 10YR 4/4 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 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 GRAVEL, fine to medium (50% fine, 25% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (10% medium, 10% coarse), well-rounded; wet, 10YR 4/4 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 GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, wet, 10YR 4/4 GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, wet, 10YR 4/4 GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, wet, 10YR 4/4 GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, well-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded, well-rounded, well graded;											~	NZZZ		
SAND, fine to coarse (20% mine, 20% medium, 40% coarse), sub-rounded; wet, 10YR 4/3 SP SAND, fine to medium (80% fine, 20% medium), sub-rounded, poorly graded, trace gravel, fine (5%); wet, 10YR 4/4 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 GRAVEL, fine to medium (65% fine, 30% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded; wet, 10YR 4/4 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 GRAVEL, fine to medium (65% fine, 25% medium), sub-rounded well-rounded, poorly graded, with sand, medium to coarse (10% medium, 10% coarse), well-rounded; wet, 10YR 4/4 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 GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (55% medium, 10% coarse), well-rounded, trace clay (1%); wet, 10YR 4/4 GRAVEL, fine to medium (40% fine, 35% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (55% medium, 10% coarse), well-rounded, well-rou					-			ock	4" rock					
SAND, fine to medium (80% fine, 20% medium), sub-rounded, poorly graded, trace gravel, fine (5%); wet, 10YR 4/4 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 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 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 GRAVEL, fine to medium (50% fine, 25% medium), sub-rounded to well-rounded, poorly graded, with sand, medium to coarse (10% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (10% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (5% medium, 19% coarse), well-rounded, wet, 10YR 4/4 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				47 -	******	coarse), sub-rour	nded, well graded	d, w						
SAND, fine to medium (80% fine, 20% medium), sub-rounded, poorly graded, trace gravel, fine (5%); wet, 10YR 4/4 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 GRAVEL, fine to medium (65% fine, 30% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded; wet, 10YR 4/4 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 GRAVEL, fine to medium (65% fine, 25% medium), angular to sub-rounded poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded; wet, 10YR 4/4 GRAVEL, fine to medium (65% fine, 25% medium), angular to sub-rounded, poorly graded, with sand, medium to coarse (15% medium, 10% coarse), well-rounded; wet, 10YR 4/4 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 GRAVEL, fine to medium (50% fine, 65% medium), 10% coarse), well-rounded, trace clay (1%); wet, 10YR 4/4 GRAVEL, fine to medium (50% fine, 65% medium), 10% coarse), well-rounded, trace clay (1%); wet, 10YR 4/4			SW			(20%), sub-round	dea; wet, 10YR 4	1/3						
sub-rounded, poorly graded, trace gravel, fine (5%); wet, 10YR 4/4 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 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 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 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 GRAVEL, fine to medium (40% fine, 35% medium), and graded, with sand, medium to coarse (5% medium, 19% coarse), well-rounded, poorly graded, with sand, medium to coarse (5% medium, 19% coarse), well-rounded, poorly graded, with sand, medium to coarse (5% medium, 19% coarse), well-rounded, poorly graded, with sand, medium to coarse (5% medium, 19% coarse), well-rounded, well-rounded, poorly graded, with sand, medium to coarse (5% medium, 19% coarse), well-rounded, well-rou				49 –		SAND fine to me	odium (80% fino	200	(modium)					
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 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 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 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 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 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 GRAVEL, fine to coarse (20% fine, 65% medium, 15% coarse), angular to well-rounded, well graded;			SP	50	6 C C	sub-rounded, poo							ent)	
angular to sub-rounded, poorly graded, with sand, medium to coarse (10% medium, 15% coarse), well-rounded; wet, 10YR 4/4 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 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 GRAVEL, fine to medium (40% fine, 35% medium), and gular to sub-rounded, poorly graded, with sand, medium to coarse (5% medium, 19% coarse), well-rounded, trace clay (1%); wet, 10YR 4/4 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 GRAVEL, fine to coarse (20% fine, 65% medium, 15% coarse), angular to well-rounded, well graded;						angular to sub-ro medium to coarse well-rounded; we	unded, poorly gr e (10% medium, t, 10YR 4/4	ade 159	d, with sand, 6 coarse),				, 3,	
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 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 GRAVEL, fine to coarse (20% fine, 65% medium, 15% coarse), angular to well-rounded, well graded;			GP			angular to sub-ro medium to coarse well-rounded; we GRAVEL, fine to angular to sub-ro medium to coarse	unded, poorly gree (10% medium, t, 10YR 4/4 medium (65% fir unded, poorly gree (10% medium,	15° ne,	d, with sand, 6 coarse), 0% medium) d, with sand,					
angular to sub-rounded, poorly graded, with sand, medium to coarse (5% medium, 19% coarse), well-rounded, trace clay (1%); wet, 10YR 4/4 GRAVEL, fine to coarse (20% fine, 65% medium, 15% coarse), angular to well-rounded, well graded;				_		sub-rounded to w sand, medium to well-rounded; we	vell-rounded, poo coarse (15% me t, 10YR 4/4	orly g ediu	graded, with ´n, 10% coars			ng		
GRAVEL, fine to coarse (20% fine, 65% medium, 15% coarse), angular to well-rounded, well graded;			-		angular to sub-ro medium to coarse	unded, poorly gr e (5% medium, 1								
			GW ML											



DOB NO.: LOCATION:	BORING NO MW: SHEET 5 OF DRILL START TIME	2A = 18
PROJECT: Project 1007 LOGGED BY: AEL CHECKED BY: AS	SHEET 5 OF DRILL START	2A = 18
LOGGED BY: AEL CHECKED BY: AS	SHEET 5 OF DRILL START	= 18
	5 OF DRILL START	
DRILLING CONTR.: Traut	DRILL	
	START	ING
DRILLER: Dan Pflipsen EQUIP.: Sonic SAMPLING METHOD: 10' acetate bags		
BORING DEPTH: 263 FT BGS	I IIVIE	FINISH
GROUND SURFACE ELEVATION: WATER LEVEL		
DATUM: UTM NAD83 COMMENTS: DATE	1000 DATE	1330 DATE
COMMENTS: DATE CASING DEPTH	_	
	06-22-20	06-24-20
SAMPLE TYPE SAMPLE LOCATION SO SO SO SURFACE CONDITIONS: Grass WEL	L DIAGRAM	4
SAMPLE SAMPLE LOCATION SO	L DIAGRAIN	1
0 WATERIAL DESCRIPTION		
SILT, no plasticity, soft, with sand, fine to medium		
│ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │		
61 10YR 4/3, sand @ 60' bgs, wet 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')		
GW 64 64 64 64 64 64 64 64 64 64 64 64 64		
65 Gr	out (neat cemer	nt)
	'-238' bgs)	
COMP 66-70 67 67 67		
SANDSTONE, poorly cemented, fine to medium (70%		
MW2A-GW fine, 30% medium), well-rounded; 2.5Y 8/2, clay observed, beginning of St Peter		
GRAB 66-70 69 69 ODSEIVEU, DEGITTING OF ST FETER		
SANDSTONE, poorly cemented, fine to medium (85%	LC Steel Casino	g
fine, 15% medium), well-rounded; 2.5Y 7/2, clay	'-240' bgs)	
observed, oxidation at 72' bgs		
Os Os		



CLIENT:	MPCA					JOB NO.:	LOCATION:	ast Metro,	MANI			
PROJEC1	Γ:					60618753 DRILLING METHOR		asi ivieiro,	IVIIN		BORING N	0.
	Project 1007					Sonic					MV	/2A
LOGGED	BY: AEL		CHEC	KED BY:	AS						SHEET	
DRILLING	CONTR.: Traut										6 c	F 18
DRILLER:	Dan Pflipsen		EQUIF	o.: Sor	ic	SAMPLING METHO 10' acetate bag					DRIL	LING
BORING I	DEPTH: 263 FT	3GS									START	FINISH
	SURFACE ELEVAT	ON:				WATER LEVEL					TIME	TIME
DATUM: COMMEN	UTM NAD83					TIME					1000 DATE	1330 DATE
OOMINE						DATE CASING DEPTH					1	
				Y	SURFACE CONDITIO						06-22-20	06-24-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass				,	WELL	DIAGRAI	М
TYPE	LOCATION	S.U	A S	SOIL	MAT	ERIAL DESCR	IPTION				<i>511</i> (0. 0 ti	
				<u> </u>								
					SANDSTONE, p fine, 15% mediur	n), well-rounded;	ine to medium 2.5Y 7/2, clay	(85%				
			76		observed, oxidati	on at 72' bgs	-	K	1 🖔			
				<u> </u> ::::::	SANDSTONE, p fine, 20% mediur	oorly cemented, t n). well-rounded:	ine to medium 8/N (white).	(80%				
			77		oxidation at 79' a	nd 80' bgs	(//					
			78									
				<u></u>								
			79 –									
			"									
			80 -	::::::						Crow	t (neat cem	ant)
					SANDSTONE, w well-rounded, gra	ell cemented, find	(100%), 6/6 silt observ	ved 🗦		(0'-2	138' bgs)	311L)
			81 -		1"silt seam at 85'	bgs	oro, one oboor	vou,				
]::::::								
			82]:::::::								
		00	02									
		Os	83]::::::								
]::::::					1 🖔			
]:::::::								
			84									
]:::::::								
			85							4" L0 (0'-2	C Steel Casi 240' bgs)	ng
			86 –		SANDSTONE, p		ine (100%),					
					well-rounded; 8/1	v (write)						
			87]:::::::				K				
				 								
			88	: : : : : : : : : : : : : : : : : : :	SANDSTONE, w	vell cemented, fine	to medium (9	90%				
				 	fine, 10% mediur	11), well-rounded;	7/14 YC	K				
			89 –	 								
				 ::::::								



CLIENT:	MDCA					JOB NO.:	LOCA		141			
PROJEC1						60618753 DRILLING METHO	DD:	East Met	O, IVII	1	BORING N	IO.
	Project 1007					Sonic					MV	V2A
LOGGED	BY: AEL		CHEC	KED BY:	AS	_					SHEET	
DRILLING	CONTR.: Traut										7 (OF 18
DRILLER:	Dan Pflipsen		EQUIF	c.: Sor	nic	SAMPLING METH 10' acetate bag					DRII	LLING
BORING I	DEPTH: 263 FT	BGS						1			START	FINISH
GROUND	SURFACE ELEVAT	ION:				WATER LEVEL					TIME	TIME
DATUM: COMMEN	UTM NAD83					TIME					1000 DATE	1330 DATE
COMMEN	10.					DATE CASING DEPTH						
				\ \	SURFACE CONDITIO						06-22-20	06-24-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	ROC	Grass					\ / /F	ELL DIAGRA	М
TYPE	LOCATION	U.S.	N IN	SOIL/ROCK GRAPH	MAT	TERIAL DESC	RIPTION	<u> </u>		***	LLL DIMORVA	IVI
					SANDSTONE, m (30% fine, 70% n	noderately cemer	nted, fine	to medium				
			91 -		mottling; 5Y 7/1 t	to 10YR 7/8, silt o	bserved	, well				
			91]::::::	cemented at 93'	bgs						
			92 -									
			93									
			94 -	-								
		Os	95		SANDSTONE, p						Grout (neat cem (0'-238' bgs)	ent)
					fine, 30% mediur well-rounded; 10	m, 65% coarse), YR 5/8	sub-rour	ided to			(0 200 290)	
			96		,							
				1	SANDSTONE, p	oorly cemented,	fine to m	edium (30%				
			97		$_{\sim}$ fine, 70% mediur $_{\sim}$ 2.5Y 6/1	m), sub-rounded	to well-ro	ounded;				
				-	SANDSTONE, p	oorly cemented,	medium	to coarse				
			98		(25% medium, 75 silt observed	5% coarse), sub	-rounded	; 2.5Y 5/6,				
			 									
			99		SANDSTONE, m	noderately ceme	nted, fine	to medium				
				-	(80% fine, 20% n 7/1 to 10YR 5/8	nedium), ໌well-roເ	ınded, m	ottling; 5Y				
			100		DOLOSTONE, n	ot competent. o	olitic textu	ıre (20%).	₩ -		4" LC Steel Casi	ing
			-	+///	dolomitic precipita	ate (10%), trace	vugs (5%	6), trace			(0'-240' bgs)	
			101	+	chert (5%); 5YR (glauconitic stainir	ng at 105' bgs, b	nganese eginning	of				
				 	Shakopee	•						
			102	 								
		Ops		 								
			103									
			104									
				17 7					Y //	Y //		



OLIENT						LODNO		1011					
CLIENT:	MPCA					JOB NO.: 60618753	LOCAT		1etro, Mi	J			
PROJECT						DRILLING METHO	OD:	Lastiv	ieuo, ivii	<u> </u>		BORING N	O.
LOGGED	BY: AEL		CHEC	KED BY:	AS	Corne						SHEET	/2A
DRILLING	CONTR.: Traut											8 0	F 18
	Dan Pflipsen		FOLUE	o.: Sor	uic.	SAMPLING METH						DRIL	
	DEPTH: 263 FT E	BGS	LGO			10' acetate ba	gs					START	FINISH
	SURFACE ELEVATI					WATER LEVEL						TIME	TIME
	UTM NAD83					TIME						1000	1330
COMMEN	TS:					DATE						DATE	DATE
		1			SURFACE CONDITION	CASING DEPTH						06-22-20	06-24-20
SAMPLE	SAMPLE	S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass	vo .				١	WELL	DIAGRAI	И
TYPE	LOCATION	U.S.	□⊒	SOI	MAT	ERIAL DESC	RIPTION						
					DOLOSTONE, m	noderately comp	etent. ma	ssive iron		K			
					staining, dolomitic vugs (10%), trace	c precipitate (15	%), small	(<1mm)	. 🕅				
			106		5YR 6/2, silt obse	erved at 106' bg	ganese sta s	iiriirig (5%)	, 💥				
			_	 									
			107	 									
			_	 									
			108										
			109										
			_										
			110	 	DOLOSTONE, no	ot to moderately	/ compete	nt.	-			t (neat ceme	ent)
					weathered, oolitic	texture (30%),	dolomitic _l	orecipitate			(0'-2	(38' bgs)	
			111	 	(20%), small (<1n	, - ,	•		$- \varnothing$				
			_		dendritic mangan	ese staining (10)%), trace	glauconitic	; 🚫				
			112		staining (5%), trac sand, medium (19								
		Ops		7									
			113		DOLOSTONE, no	ot to moderately	/ compete	nt, iron					
				 	staining along fractivity with dolomitic pre	ctures; 10YR 6/ cipitate at 114' l	1, 2" sand bgs	y doloston	e 🔀				
			114		·	ı	3						
			_										
			115		DOLOSTONE, m	noderately comp	etent. ma	ssive.				Steel Casi	ng
	MW2A-GW				oxidized red stain	ing/fine grained	precipitate				(0'-2	!40' bgs)	
GRAB	116-120		116	 	fractures, trace vu	- , ,		nt traco					
			_	77	oolitic texture (5%	b), trace sand, fi	ne (5%), tı	race					
			117	77	manganese staini (10YR 6/4) at 117		7/3, iron s	staining					
				F	(10111 0/4) at 11/	. bys							
			118 –										
			110		DOLOSTONE, no dolomitic precipita								
			140		(5%), trace glauce	onitic staining (5	5%), tráce	sand, fine					
			119 –		(2%), trace mang	anese staining	(2%); 10Y	R 5/6					



CLIENT:				JOB NO.:		LOCATION:					
MPCA				60618753			East Metr	o, MN	l		
PROJECT: Project 1007				DRILLING METHO Sonic	D:					BORING N	
LOGGED BY: AEL	CHEC	KED BY:	AS							SHEET	/2A
DRILLING CONTR.: Traut										9 0	F 18
	FOLUE	. Con	io	SAMPLING METH	OD:					9 c	
DRILLER: Dan Pflipsen	EQUIF	e.: Son	IIC .	10' acetate bag	gs					START	FINISH
BORING DEPTH: 263 FT BGS				WATER LEVEL						TIME	TIME
GROUND SURFACE ELEVATION:				TIME						1000	4220
DATUM: UTM NAD83 COMMENTS:				DATE						1000 DATE	1330 DATE
				CASING DEPTH						06 22 20	06 24 20
SAMPLE SAMPLE GO TYPE LOCATION	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass						WEL	L DIAGRAI	06-24-20 И
TYPE LOCATION	۵z	SOIL	MAT	ERIAL DESC	RIP	TION					
Ops	121		DOLOSTONE, n dolomitic precipits (5-10%), oolitic te medium (5%); 10 DOLOSTONE, n blocky, oolitic tex dendritic mangar observed DOLOSTONE, n precipitate (15%) texture (5%); 10Y	ate (15%), small exture (5-10%), to competent, verture (10%), trace ture (10%), trace nese staining (2%), sand, medium (7R 6/2) moderately competent, verture (10%), trace nese staining (2%), sand, medium (7R 6/2) moderately competent (10%), dolomitic of to moderately (10%), dolomit (10%), vugs (2%); 10%	eter ma	weathered lert (5%), to 2.5Y 6/1, so to 10%), trace mit, massive inganese so the method of the method in the metho	race ilt/clay omitic e oolitic		4"	out (neat ceme '-238' bgs) LC Steel Casir '-240' bgs)	



CLIENT:	MDOA					JOB NO.:	LOCA					
PROJECT						60618753 DRILLING METHO	DD:	East Met	O, MIN		BORING NO	O.
	Project 1007					Sonic					MW	/2A
LOGGED	BY: AEL		CHEC	KED BY:	AS						SHEET	
DRILLING	CONTR.: Traut										10 0	F 18
DRILLER:	Dan Pflipsen		EQUIF	.: Sor	nic	SAMPLING METH 10' acetate bag					DRIL	LING
BORING	DEPTH: 263 FT E	BGS				To acctate bay					START	FINISH
GROUND	SURFACE ELEVATI	ON:				WATER LEVEL					TIME	TIME
	UTM NAD83					TIME					1000	1330
COMMEN	115:					DATE					DATE	DATE
					SURFACE CONDITIO	CASING DEPTH NS:					06-22-20	06-24-20
SAMPLE	SAMPLE	S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					WEL	L DIAGRAN	м
TYPE	LOCATION	U.S.	BZ	SOIL	MAT	TERIAL DESC	RIPTION					
					_ SHALE, very wea	athorod (clay): C	I EV 9/2		V/A	N/A		
					DOLOSTONE, n			ssive, chert				
			136 –		(10%), mangane	se staining (10%	b); 2.5Y 6/	/2				
					CANDOTONE			(4000/)				
			137 —	77	SANDSTONE, m $_{\sim}$ sub-rounded; 2.5	noderately ceme 5Y 6/6	ntea, fine	(100%),				
				77	DOLOSTONE, n							
			138 —	77	medium (10-15%	b), manganese s	tàining (1					
					glauconitic stainii DOLOSTONE, n			orod				
			139 —	77	_ massive fine dolo	mitic precipitate	sand (20	ereu,)%); 5Y 4/2, __				
					clay observed DOLOSTONE, n	noderately comp	etent iron	n etaining				
			140 —	77	along fractures (10%), trace glau	conitic sta	aining (5%),			rout (neat ceme	ont)
					trace manganese 5/3, clay observe		race vugs	s (5%); 2.5Y			0'-238' bgs)	5111.)
			141 –		DOLOSTONE, n	ot to moderately	compete	nt, dolomitic				
			141	7/7	precipitate (15%) (5-10%), trace vu), sand, fine (5-1) Jas (5%): 2.5Y 6	0%), ooliti /1	ic texture				
			142	77	,,,	3 (),						
		0==	142	77								
		Ops	440									
			143									
			144		DOLOSTNE, mo	derately compet	ent, mass	sive, blocky,				
					trace manganese 7/2, silt, dolomitic	precipitation, gl	ractures (auconitic	staining				
			145		observed at 144.		, aamn ata	nt delemitie	*		' LC Steel Casir 0'-240' bgs)	ng
					precipitate (15-20	ງ%), iron stainin໌ເ	յ (10%), t	race small			3 ,	
			146		√(<1mm) vugs (5% No Recovery (ka			10YR 7/3				
				1	No necovery (Ka	ı ət icature likely)						
			147	1								
				1								
			148	1								
				1								
			149	1								
			 	1								



CLIENT:						JOB NO.:		LOCATION:						
	MPCA					60618753		East	Metr	o, MN	I			
PROJEC1	: Project 1007					DRILLING METHO Sonic	D:						BORING NO	
LOGGED	BY: AEL		CHEC	KED BY:	AS								SHEET	/2A
DRILLING	CONTR.: Traut												11 0	f 18
	Dan Pflipsen		FOUIF	o: Sor	nic.	SAMPLING METH							DRIL	
	DEPTH: 263 FT E	BGS	LQOII	001		10' acetate bag	gs						START	FINISH
	SURFACE ELEVATI					WATER LEVEL							TIME	TIME
DATUM:	UTM NAD83					TIME							1000	1330
COMMEN	TS:					DATE							DATE	DATE
				1	OUDEAGE CONDITION	CASING DEPTH							06-22-20	06-24-20
		ο.	ΞШ	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	NS:								
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	OIL/R				T.O.			W	/ELL	DIAGRAI	/
				S	MAT	ERIAL DESCF	RIP	TION						
					DOLOSTONE, n	ot competent ve	erv v	veathered lithi	C	<u> </u>	M			
					fragments (80%)	, sand, coarse (1	5-2	0%); 10YR 5/4	Ĭ	\gg				
			151											
			152 —		201002015									
					DOLOSTONE, n weathered, iron s	ot to moderately staining (15-20%)	COI	npetent, xidized dolomit	ic	\mathbb{X}				
			153 —		precipitate (15%)	, sand, medium ((10	%), trace small						
			133	77	(<1mm) vugs (5%	%); 10YR 6/1								
			l [\aleph				
			154 -		DOLOSTONE, m									
				 	(10%), dolomitic precipitate (5%),	precipitate (10%) trace sand, fine (), tr (2%	ace calcite): 10YR 7/1						
			155	 	F,		(,,		\aleph			t (neat ceme 38' bgs)	ent)
												(0 -2	30 bgs)	
			156											
			157		DOLOSTONE, m	noderately comp	otor	nt to competen	t					
		Ops	_		massive staining,	oolitic texture (1	0%), sand, fine to						
			158 —	77	medium (10%), ti ∖precipitate (2%);		trac	e quartz		\gg				
				77	DOLOSTONE, m	noderately compe			/					
			159 —	77	blocky, trace iron	- , ,								
					DOLOSTONE, n massive dark iror				6).					
			400		10YR 6/2 to 10YI		,,,,,,,,	o otaninig (107	·),			411.1.0	041-0	
			160	77	DOLOSTONE, m				4				Steel Casir 40' bgs)	19
					oxidized dolomition (15%), vugs (10%)	krace oxidized	d ca	lcite precipitati	on					
			161		(2%), trace sand,	fine (2%); 2.5Y	7/1			\aleph				
			162	1//										
			-							\gg				
			163							$\langle \langle \rangle$				
			-											
			164		DOLOSTONE, m	noderately comp	eter	nt fine dolomiti	C	\gg				
				 	precipitate (15%)	, glauconitic stair	ning	(5-10%), trac	e	M				
					small (<1mm) vu	gs (5%); 2.5Y 6/ <i>′</i>	1, le	ss competent,		//	X //			



CLIENT:						JOB NO.:		LOCATION:				
	MPCA					60618753		East Met	o, MN			
PROJEC1	: Project 1007					DRILLING METHO Sonic	OD:				BORING N	
LOGGED	BY: AEL		CHEC	KED BY:	AS						SHEET	/2A
DRILLING	CONTR.: Traut										12 0	F 18
DRILLER:	Dan Pflipsen		EQUIP	.: Sor	iic	SAMPLING METH		:			DRIL	
	DEPTH: 263 FT B	BGS				10' acetate ba	gs 			_	START	FINISH
GROUND	SURFACE ELEVATI	ON:				WATER LEVEL					TIME	TIME
DATUM:	UTM NAD83					TIME					1000 DATE	1330 DATE
COMMEN	15:					DATE CASING DEPTH						
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass					\//ELI	06-22-20 DIAGRA	
TYPE	LOCATION	U.S.	DEF	SOIL	MAT	ERIAL DESCI	RIP	TION		VVLLL	DIAGNAI	VI
					∖blocky, iron staine	ed at 164' bgs		/	M			
			166 — 167 — 168 — 169 —		DOLOSTONE, m precipitate (15%) small (<1mm) vug blocky, iron staine DOLOSTONE, m oxidized dolomitic (15%), vugs (10% (2%), trace sand, (2%); 2.5Y 7/1 SANDY DOLOS dolomitic precipita (5-10%), trace m green (GLEY1 7/ bgs	noderately comp, glauconitic staigs (5%); 2.5Y 6/ed at 164' bgs noderately compc precipitate (15%), trace oxidized fine (5%), trace TONE, moderate (30%), sand anganese stainii 5GY), platy shalery competent, response	ining (1, king) bete (%), d can ely (ely (fin (le from	g (5-10%), trace ess competent, nt, weathered, green/pink chert alcite precipitation auconitic staining competent, e (30%), chert (5%); 10YR 7/6, om 169'-169.25'		Gro. (0'-2	ıt (neat ceme 238' bgs)	ent)
		Ops	171 — 172 — 173 — 174 —		oolitic texture (30 trace dolomitic pr	%), small to med	diur	n vugs (15%),		(0-2	oo bys)	
			175 — 176 — 177 — 178 —		DOLOSTONE, m precipitate (15%) staining (10%), tr SHALE, platy, ma 6/10Y	, small (<1) vugs ace oolitic textur	s (1 re (ŧ	5%), dark red iron 5%); 10YR 6/6			C Steel Casir 240' bgs)	ng



CLIENT:						JOB NO.:		LOCATIO	N:				
	MPCA					60618753			East Met	ro, MN			
PROJECT	Project 1007					DRILLING METHO Sonic	D:					BORING N	
LOGGED	BY: AEL		CHEC	KED BY:	AS							SHEET	/2A
DRILLING	CONTR.: Traut											12 0	- 10
			FOLUE	. Con	vio.	SAMPLING METH	OD:					13 c	
	Dan Pflipsen DEPTH: 263 FT B	000	EQUIF	o: Sor	IIC	10' acetate bag	gs					START	FINISH
	SURFACE ELEVATI					WATER LEVEL						TIME	TIME
	UTM NAD83	OIN.				TIME						1000	1330
COMMEN						DATE						DATE	DATE
						CASING DEPTH						06 22 20	06-24-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass						WE	ELL DIAGRA	
TYPE	LOCATION). S.D	ä≥	SOIL	MAT	TERIAL DESC	RIP	TION					
		Ops	181 — 182 — 183 — 184 — 185 — 186 — 187 — 188 — 190 — 191 — 191 —		DOLOSTONE, n iron staining, dold (<1mm) vugs (15 staining (5%), tra 180.25' bgs DOLOSTONE, n precipitate (30%) sand, fine to med (2%), trace dend Y/2 DOLOSTONE, n staining (40%), v medium vugs (25 7/1 DOLOSTONE, n yellow precipitation	moderately compugs (30%); trace oblitic manganese	cooluga glaasta etek	mpetent is (20%), uconitic ning (19 at 10 10).	all ese at all ese all all ese all ese all ese all est at all to all to be all the all t			Grout (neat ceme (0'-238' bgs) I" LC Steel Casin (0'-240' bgs)	
			194										



CLIENT.						IOD NO :	LOCAT	IONI				
CLIENT:	MPCA					JOB NO.: 60618753	LOCAT		letro, MN	I		
PROJECT						DRILLING METHO	OD:	Lustiv	icao, ivii	•	BORING N	O.
LOGGED	BY: AEL		CHEC	KED BY:	AS						SHEET	V2A
DRILLING	CONTR.: Traut											of 18
DRILLER:	Dan Pflipsen		EQUIF	e.: Sor	nic	SAMPLING METH						LING
	DEPTH: 263 FT E	BGS				10' acetate ba	gs				START	FINISH
GROUND	SURFACE ELEVATI	ON:				WATER LEVEL					TIME	TIME
	UTM NAD83					TIME					1000	1330
COMMEN	TS:					DATE					DATE	DATE
					SURFACE CONDITION	CASING DEPTH					06-22-20	06-24-20
SAMPLE	SAMPLE	C.S.	DEPTH IN FEET	ROCK	Grass					\ ∧/ ⊏I I	. DIAGRAI	M
TYPE	LOCATION	U.S.	DEF	SOIL/ROCK GRAPH	MAT	ERIAL DESC	RIPTION			V V L L L	. DIAGINAI	VI
		Ops			DOLOSTONE, no yellow precipitatio	ot competent, m on (10%): 2.5Y 7	nassive, vu 7/1	ıgs (50%),				
		Орз	196	77		, ,,						
					DOLOSTONE, m massive, small (<	noderately to ver 1mm) vugs (15º	ry compete %). orange	ent, e (oxidized`				
			197		dolomitic precipita (10%), trace ooliti	ate (10%), dolor	mitic precip	oitate				
					Oneota	ic texture (5 70),	31 7/1, be	giriring or				
			198 –									
			199 –									
			200		DOLOSTONE, m	adoratoly to you	a compet	nt .		Gro	ut (neat cem	ent)
			_		massive, small to precipitate (15%)	medium vugs (15-20%), (dolomitic		(0'-	238' bgs)	,
			201		precipitate (15%)	, trace oolitic tex	(5%)	; 10YR //1				
			202	7								
		_		77								
		Оро	203									
			204									
			205		DOLOSTONE, m dendritic mangan	noderately comp	etent, ma	ssive, trace		M	0.041.01	
			205		precipitate (5%);	10YR 7/1	/6), ⊪ace u	Olomilic		(0'-	.C Steel Casi 240' bgs)	ng
GRAB	MW2A-GW 206-210		206	7								
OI VID	200 210		206	77								
			207	77								
			207	H								
			208									
			200		DOLOSTONE, ve (<1mm) vugs (10	ery competent, i	massive, s	mall %), trace				
			209		faint iron staining	(2%), trace den	ndritic man	ganese				
					staining (1%); 2.5	01 //2						
				\Box					$\rangle\rangle\rangle$	$\rangle\rangle$		



CLIENT:	MDOA					JOB NO.:	LOCA						
PROJEC	MPCA r:					60618753 DRILLING METHO	D:	East Met	ro, MN	l	E	BORING NO	O.
	Project 1007					Sonic						MANA	/2A
LOGGED	BY: AEL		CHEC	KED BY:	AS						5	SHEET	121
DRILLING	CONTR.: Traut											15 o	F 18
DRILLER	Dan Pflipsen		EQUIP	.: Sor	nic	SAMPLING METH						DRIL	
	DEPTH: 263 FT E	3GS				− 10' acetate baç	gs					START	FINISH
	SURFACE ELEVATI					WATER LEVEL						TIME	TIME
	UTM NAD83					TIME						1000	1330
COMMEN	ITS:					DATE						DATE	DATE
	Γ		1		OUDEAGE CONDITIO	CASING DEPTH			1		C	06-22-20	06-24-20
		.C.S.	ᆂᇤ	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass	NS:							
SAMPLE TYPE	SAMPLE LOCATION	U.S.C	DEPTH IN FEET	IL/RG					-	W	ELL D	IAGRA	И
	200/11011			S	MAT	TERIAL DESCR	RIPTION						
					DOLOCTONE -				K/A	R/A			
				77	DOLOSTONE, n massive, small (<	noderately to ver (1mm) vugs (15%	y compet ७), trace ।	ent, manganese					
			211	77	staining (2%); 10	YR 7/2	•	-					
				77									
			242	77									
			212	77									
				77									
			213		DOLOSTONE, n	noderately comp	etent, ma	ssive,					
					dendtritic manga (<1mm) vugs (2%	nese staining (10 %): 10YR 7/3)%), trace	e small					
			214		(,9- (-,,							
			-		DOLOSTONE, n	noderately comp	etent, sm	all to					
			215		medium vugs (20 (20%); 10YR 6/1)%), oxidized dol	omitic pre	ecipitate				neat ceme	ent)
			<u> </u>		(20%), 1018 6/1	10 10 1K 7/6					(0'-238	8. pgs)	
			216										
			217										
		Оро											
			218 —										
					DOLOSTONE, n dolomitic precipit								
			040	7	(<1mm) vugs (10)%), trace quartz	precipita	te (3%);					
			219	77	√10YR 6/2 DOLOSTONE, n	noderately comp	atent ma	esive trace					
					dolomitic precipit	ate (2%), trace n	nanganes	se staining					
			220		√(2%); 10ÝR 6/1 DOLOSTONE, n	noderately comp	atant em	all to			4" LC 8- 0'-240)	Steel Casir 0' bgs)	ng
					medium vugs (20)%), oxidized dol	omitic pre	ecipitate			`	0 ,	
			221		(20%); 10YR 5/1 DOLOSTONE, n		otont om	all to					
					medium vugs (20)%), oxidized dol	omitic pre	ecipitate					
			222		(20%), trace den 5/1 to 10YR 6/6	dritic manganese	e staining	(5%); 10YR					
			-		0/110 10111 0/0								
			223	-	DOLOSTONE, v	ery competent	nlitic tevt	ure (15%)					
				 	small (<1mm) vu	gs (10%); 10YR	6/1	a.o (1070),					
			224	[7]									
				$\angle 7$					\mathcal{V}	\rangle			



MPCA
Project 1007 LOGGED BY: AEL CHECKED BY: AS DRILLING CONTR: Traut CHECKED BY: AS SAMPLING METHOD: 10' acetate bags START FINISH TIME 1000 1330 COMMENTS: DATIM: UTM NADB3 COMMENTS: DATE DA
DRILLING CONTR: Traut Table
DRILLER Dan Pflipsen EQUIP: Sonic 10' acetate bags START FINSH TIME 1000 1330 COMMENTS: DATE DATE DATE DATE DATE DATE DATE DATE
DRILLER: Dan Pflipsen BORING DEPTH: 263 FT BGS GROUND SURFACE ELEVATION: WATER LEVEL TIME DATE CASING DEPTH CASING DEPTH CASING DEPTH CASING DEPTH DATE CASING DEPTH CASING DEPTH DATE CASING DEPTH DOLOSTONE, very competent, oolitic texture (15%), small (<1mm) vugs (10%): 10YR 6/1 DOLOSTONE, not competent, massive iron staining, trace medium vugs (30%), 10YR 6/1 DOLOSTONE, not competent, massive, iron staining (5%), small (<1mm) vugs (15%), oxidized dolomitic precipitate (30%), small (<1mm) vugs (15%), oxidized dolomitic precipitate (5-10%), trace menaganese staining (5%), trace chert (2%), trace glauconitic staining (2%): 10YR 5/6 DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (5-10%), trace glauconitic staining (2%): 10YR 5/6 DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (5-10%), trace glauconitic staining (2%): 10YR 5/6 DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (5-10%), trace glauconitic staining (2%): 10YR 5/6 DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (5-10%), trace dendritic
BORING DEPTH: 263 FT BGS GROUND SURFACE ELEVATION: DATUM: UTM NADB3 COMMENTS: DATE CASING DEPTH CASING DEPTH DATE CASING DEPTH DATE CASING DEPTH DOCATION SAMPLE LOCATION SAMPLE LOCATION DOLOSTONE, very competent, oolitic texture (15%), small (<1mm) vugs (10%); 10YR 6/1 DOLOSTONE, not competent, massive iron staining, trace medium vugs (20%), 10YR 6/3 DOLOSTONE, not competent, massive, iron staining (30%), small (<1mm) vugs (15%), oxidized dolomitic precipitate (5-10%), trace entert (2%), trace entert (2%), trace entert (2%), trace elauconitic staining (2%); 10YR DOLOSTONE, not competent, massive, iron staining (30%), small (<1mm) vugs (15%), oxidized dolomitic precipitate (5-10%), trace entert (2%), trace elauconitic staining (2%); 10YR DOLOSTONE, not competent, massive, iron staining (30%), small (<1mm) vugs (15%), oxidized dolomitic precipitate (5-10%), trace elauconitic staining (2%); 10YR DOLOSTONE, not competent, massive, iron staining (30%), small (<1mm) vugs (15%), oxidized dolomitic precipitate (5-10%), trace elauconitic staining (2%); 10YR DOLOSTONE, not competent, massive, iron staining (3%), small (<1mm) vugs (15%), oxidized dolomitic precipitate (5-10%), trace glauconitic staining (2%); 10YR DOLOSTONE, not competent, massive, iron staining (5%), oxidized dolomitic precipitate (5-10%), trace elauconitic staining (5%), trace dendritic
DOLOSTONE, not competent, massive, iron staining, trace medium vugs (5%); 10YR 6/1 DOLOSTONE, not competent, massive, iron staining (30%), small (~1mm) vugs (15%), oxidized dolomitic precipitate (5-10%), trace analyses estaining (2%); 10YR 5/6 Opo DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (5-10%), trace analyses estaining (2%); 10YR 5/6 DOLOSTONE, not competent, massive, iron staining (30%), small (~1mm) vugs (15%), oxidized dolomitic precipitate (5-10%), trace analyses estaining (2%); 10YR 5/6 DOLOSTONE, not competent, massive, iron staining (30%), small (~1mm) vugs (15%), oxidized dolomitic precipitate (5-10%), trace analyses estaining (2%); 10YR 5/6 DOLOSTONE, not competent, massive, iron staining (30%), small (~1mm) vugs (15%), oxidized dolomitic precipitate (5-10%), trace analyses estaining (2%); 10YR 5/6 DOLOSTONE, not competent, massive, iron staining (30%), small (~1mm) vugs (15%), oxidized dolomitic precipitate (5-10%), trace analyses estaining (2%); 10YR 5/6 DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (15%), trace dendritic
COMMENTS: DATE CASING DEPTH CASING DEPTH DOLOSTONE, very competent, oolitic texture (15%), small (<1mm) vugs (10%); 10YR 6/3 DOLOSTONE, not competent, massive, iron staining, for tice precipitate (30%), small to medium vugs (20%); 10YR 6/1 DOLOSTONE, not competent, massive, iron staining (30%), small (or 10YR 7/6) DOLOSTONE, very competent, massive, iron staining (30%), small (or 10YR 7/6) DOLOSTONE, very competent, massive, iron staining (30%), small or medium vugs (20%); 10YR 6/1 DOLOSTONE, not competent, massive, iron staining (30%), small (or 10YR 7/6) DOLOSTONE, not competent, massive, iron staining (30%), small (or 10YR 7/6) DOLOSTONE, not competent, massive, iron staining (5%), trace dendritic precipitate (5-10%), trace manganese staining (2%); 10YR DOLOSTONE, not competent, massive, iron staining (5%), trace chert (2%), trace glauconitic staining (2%); 10YR DOLOSTONE, not to moderately competent, massive, or oxidized dolomitic precipitate (5-10%), trace glauconitic staining (2%); 10YR DOLOSTONE, not to moderately competent, massive, or oxidized dolomitic precipitate (15%), trace dendritic
SAMPLE TYPE SAMPL
SAMPLE TYPE SAMPLE LOCATION SAMPLE LOCATION SAMPLE LOCATION SAMPLE LOCATION SAMPLE LOCATION DOLOSTONE, very competent, oolitic texture (15%), small (<1mm) vugs (10%); 10YR 6/1 226 DOLOSTONE, competent, massive iron staining, trace medium vugs (5%); 10YR 6/3 DOLOSTONE, not competent, oxidized dolomitic precipitate (30%), small to medium vugs (20%); 10YR 6/1 to 10YR 7/6 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 6/1 DOLOSTONE, not competent, massive, iron staining (0'-238' bgs) DOLOSTONE, not competent, massive, iron staining (30%), small (<1mm) vugs (15%), oxidized dolomitic precipitate (5-10%), trace glauconitic staining (2%); 10YR 5/6 DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (15%), trace dendritic
SAMPLE TYPE LOCATION SAMPLE LOCATION SAMPLE LOCATION MATERIAL DESCRIPTION DOLOSTONE, very competent, oolitic texture (15%), small (<1mm) vugs (10%); 10YR 6/1 DOLOSTONE, competent, massive iron staining, trace medium vugs (5%); 10YR 6/3 DOLOSTONE, not competent, oxidized dolomitic precipitate (30%), small to medium vugs (20%); 10YR 6/1 to 10YR 7/6 DOLOSTONE, not competent, oxidized dolomitic precipitate (30%), small to medium vugs (20%); 10YR 6/1 to 10YR 7/6 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 DOLOSTONE, not competent, massive, oxidized dolomitic precipitate (5-10%), trace glauconitic staining (2%); 10YR 5/6 DOLOSTONE, not competent, massive, oxidized dolomitic precipitate (5-10%), trace glauconitic staining (2%); 10YR 5/6 DOLOSTONE, not competent, massive, oxidized dolomitic precipitate (5-10%), trace dendritic
DOLOSTONE, very competent, colitic texture (15%), small (<1mm) vugs (10%); 10YR 6/1 228 DOLOSTONE, competent, massive iron staining, trace medium vugs (5%); 10YR 6/3 DOLOSTONE, not competent, oxidized dolomitic precipitate (30%), small to medium vugs (20%); 10YR 6/1 to 10YR 7/6 DOLOSTONE, not competent, oxidized dolomitic precipitate (510%), small to medium vugs (20%); 10YR 6/1 to 10YR 7/6 DOLOSTONE, not competent, oxidized dolomitic precipitate (5-10%), trace manganese staining (5%), oxidized dolomitic precipitate (5-10%), trace glauconitic staining (2%); 10YR 5/6 Opo DOLOSTONE, to moderately competent, oxidized dolomitic precipitate (15%), trace dendritic oxidized dolomitic precipitate (15%), trace dendritic
DOLOSTONE, very competent, colitic texture (15%), small (<1mm) vugs (10%); 10YR 6/1 228 DOLOSTONE, competent, massive iron staining, trace medium vugs (5%); 10YR 6/3 DOLOSTONE, not competent, oxidized dolomitic precipitate (30%), small to medium vugs (20%); 10YR 6/1 to 10YR 7/6 DOLOSTONE, not competent, oxidized dolomitic precipitate (510%), small to medium vugs (20%); 10YR 6/1 to 10YR 7/6 DOLOSTONE, not competent, oxidized dolomitic precipitate (5-10%), trace manganese staining (5%), oxidized dolomitic precipitate (5-10%), trace glauconitic staining (2%); 10YR 5/6 Opo DOLOSTONE, to moderately competent, oxidized dolomitic precipitate (15%), trace dendritic oxidized dolomitic precipitate (15%), trace dendritic
small (<1mm) vugs (10%); 10YR 6/1 228 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 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 DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (15%), trace dendritic
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Opo 6/1 to 10YR 7/6 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 DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (15%), trace dendritic
Opo 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 DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (15%), trace dendritic
Opo Opo Opo Opo Opo Opo Opo Opo
Opo 231 trace chert (2%), trace glauconitic staining (2%); 10YR 5/6 232
Opo 232 DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (15%), trace dendritic
Opo 233 DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (15%), trace dendritic
DOLOSTONE, not to moderately competent, massive, oxidized dolomitic precipitate (15%), trace dendritic
oxidized dolomitic precipitate (15%), trace dendritic
oxidized dolomitic precipitate (15%), trace dendritic
mongonogo ataining (20/): 2 EV C/A to 40VD 7/G
manganese staining (2%); 2.5Y 6/1 to 10YR 7/6
235 4" LC Steel Casing (0'-240' bgs)
DOLOSTONE, not competent, very weathered,
massive iron staining, trace glauconite, possible stromatolites; 10YR 6/8, beginning of Coon Valley
3 Submatchites, 10 TK 6/6, beginning of Cooff Valley
238 SANDY DOLOSTONE, moderately competent,
dolomitic precipitate (15%), sand (5-30%), fine to
coarse); 5YR 5/4, grades coarser/more sand with (238'-240' bgs) depth, loose sand possibly at 238' bgs
Cj SANDSTONE, loose sand; 2.5Y 6/6, beginning of (240' bgs)



CLIENT:	MDGA					JOB NO.:	LOCAT					
PROJEC1						60618753 DRILLING METHO	DD:	East Met	o, MN	l	BORING N	O.
	Project 1007					Sonic					N // /	V2A
LOGGED	BY: AEL		CHEC	KED BY:	AS						SHEET	VZA
DRILLING	CONTR.: Traut										17 (of 18
	Dan Pflipsen		EOUII	c.: Sor	uic.	SAMPLING METH	OD:					LING
	DEPTH: 263 FT	BGS	EQUI	·. 301	iic	10' acetate baç	gs				START	FINISH
	SURFACE ELEVAT					WATER LEVEL					TIME	TIME
	UTM NAD83	1014.				TIME					1000	1330
COMMEN						DATE					DATE	DATE
						CASING DEPTH					06-22-20	06-24-20
				X_	SURFACE CONDITIO	NS:		l			177 == =7	100 - 1 - 0
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					WE	ELL DIAGRA	М
TYPE	LOCATION	U.S	H H H	SOL	МАТ	TERIAL DESC	RIPTION					
				+								
				::::::	Jordan							
				 	SANDSTONE, p (80% medium, 2	oorly cemented,	medium t	o coarse				
			241	-	(00 % mediam, 2	0 70 00di 30 j, Well	Tourided,	2.01 0/0				
			242	-								
			243	1	CANDSTONE 5	a articomentad	fine to se	oroo /E0/				
					SANDSTONE, p $_{\neg}$ fine, 90% mediur	m, 5% coarse), w	ell-round	ed; 2.5Y				
			244	<u> </u>	\6/6	,	. .	(400/				
					SANDSTONE, p fine, 80% mediur	noorly cemented, m. 10% coarse).	tine to co well-roun	arse (10% ded: 2.5Y				
			245	::::::	8/6	, - ,,		, -				
			245									
				-								
			246		SANDSTONE, p	oorly cemented,	medium t	o coarse	•		7" Open Hole (240'-363' bgs)	
					(30% medium, 7	0% coarse), well	-rounded;	2.5Y 7/2			(
			247		SANDSTONE, p	oorly cemented,	fine to co	arse (25%				
		Cj			fine, 70% mediur 8/4	m, 5% coarse), w	ell-round/	ed; 2.5Y				
			248	-	0/4							
			249	::::::	CANDSTONE 5	a articomentad	fine to me	adium /7E0/				
					SANDSTONE, p fine, 25% mediur	m), well-rounded	; 2.5Y 8/1	alum (75%				
			250									
				<u>_</u> ::::::	SANDSTONE*, (30% medium, 7)	poorly cemented 0% coarse), dark	, medium ; vellow/oi	to coarse range				
			254		oxidized layers, tr	race shale at 250).5' bgs, *l	logged from				
			251 -]:::::::	video - no recove	ery from 250'-260)' bgs					
				1								
			252	 								
				†:::::::								
			253	 ::::::								
			-	1::::::								
			254	:::::::	SANDSTONE*,	poorly cemented	fine to m	nedium				
				∤ ∷∷∷∷	(90% fine, 10% r	nedium), dark, *l						
	l	1	1 1	1	no recovery from	1 ∠5U -∠6U bgs			12.4	17: - I		



						T						
CLIENT:	MPCA					JOB NO.: 60618753	LOCA		/letro, MN			
PROJEC1						DRILLING METHO	OD:	Lastin	/ieuo, iviiv		BORING N	O.
LOGGED	BY: AEL		CHEC	KED BY:	AS	Corno					SHEET	V2A
DRILLING	CONTR.: Traut											of 18
	Dan Pflipsen		FOUIF	e: Sor	nic	SAMPLING METH						LING
	DEPTH: 263 FT B	3GS				10' acetate ba	igs				START	FINISH
GROUND	SURFACE ELEVATI	ON:				WATER LEVEL					TIME	TIME
	UTM NAD83					TIME					1000	1330
COMMEN	IS:					DATE					DATE	DATE
					SURFACE CONDITION	CASING DEPTH					06-22-20	06-24-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					WELL	DIAGRA	м
TYPE	LOCATION	S.U	HR	SOIL	MAT	ERIAL DESC	RIPTION			***		
					CANDOTONE					1		
				: : : : : : : : : : : : : : : : : : :	SANDSTONE*, p (90% fine, 10% m	ooorly cemented nedium), dark, *	d, fine to n logged fro	nedium om video -				
			256		no recovery from	250'-260' bgs						
			257	<u> </u>								
]:::::::								
			258							7" (pen Hole	
									\	(240)'-363' bgs)	
		Cj	259									
			260									
			261									
			262									
			-	-								
			263		E.O.B. at 263' bg	ıs, no refusal			[
			264									
				-								
			265	-								
			266	_								
			267									
			268	-								
			269	-								
			-	1								

ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20



CLIENT:	14004					JOB NO.:	LOCATION:				
PROJECT						60618753 DRILLING METHOD		Metro, MN	l	BORING N	O.
	Project 1007					Sonic				N/1\/	V7A
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS					SHEET	VIA
DRILLING	CONTR.: Traut									1 1	of 15
DRILLER.	Dan Pflipsen		FOUIF	c.: Sor	nic	SAMPLING METHO					LING
	DEPTH: 220 FT	BGS	1 = 40			10' acetate bag	}			START	FINISH
	SURFACE ELEVAT					WATER LEVEL				TIME	TIME
DATUM:	UTM NAD83					TIME				1045	1830
COMMEN	TS:					DATE				DATE	DATE
						CASING DEPTH				05-26-20	05-28-20
		S.S.	1年間	SOCK	SURFACE CONDITIO Grass	NS:			\A/=! !	DIAGRAI	
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	MAT	 ΓERIAL DESCR	IPTION		WELL	. DIAGRAI	VI
		sw			SAND, fine to co coarse), sub-roul (25%); moist, 10	parse (25% fine, 29 nded, well graded YR 4/3	5% medium, 25% , with organics				
		CL	1 -		to medium (15%	AY, medium plastion fine, 15% mediur fine (15%), sub-ang	n), sub-rounded,				
	1				coarse), sub-ang medium to coars 5/3 SAND, medium t coarse), sub-ang trace gravel, fine	to coarse (62% m gular, poorly grade se, sub-angular (29 to coarse (75% m gular to sub-round to coarse (5%); n	ed, with gravel, 5%); moist, 10YR edium, 20% ed, poorly graded noist, 10YR 5/3	i,		ut (neat cem 198' bgs)	ent)
		SW	8 -		coarse), sub-rour medium (20%); r	parse (20% fine, 20 nded, well graded moist, 10YR 4/3 to coarse (70% m nded, poorly grad	, with gravel, fine	to			
DISCRETE	MW7A-SOIL 12-14		10 -		(5%); moist, 10Y SAND, medium t coarse), sub-rou		edium, 45% ed, gravel, fine			.C Steel Casi 200' bgs)	ng
DISCRETE	MW7A-SOIL	SP	13 -		poorly graded, w	80%), sub-angular ith gravel, fine to r ce cobbles (2%);	nedium (15% fine	э,			
GNAD	12-10		14 -		SAND, coarse (8 poorly graded, gr moist, 10YR 5/2	39%), sub-angular ravel, fine (10%), t	to sub-rounded, race silt (1%);				



CLIENT:						JOB NO.:	LOCATION:				
PROJEC1	MPCA T:					60618753 DRILLING METHOD		Metro, MN		BORING N	O.
	Project 1007					Sonic				1/1/	V7A
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS					SHEET	<u> </u>
DRILLING	CONTR.: Traut									2 0	of 15
DRILLER:	Dan Pflipsen		EQUIF	.: Sor	nic	SAMPLING METHO					LING
	DEPTH: 220 FT B	GS				10' acetate bags	;			START	FINISH
	SURFACE ELEVATI					WATER LEVEL				TIME	TIME
	UTM NAD83					TIME				1045	1830
COMMEN	TS:					DATE				DATE	DATE
			1	1	OUDEAGE CONDITION	CASING DEPTH				05-26-20	05-28-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	NS:			WEL	L DIAGRAI	М
TYPE	LOCATION	N.S.	a z	SOIL	MAT	ERIAL DESCR	PTION				
					SAND coarse (8	9%), sub-angular	to sub rounded	- KA	N/I		
			16 -		poorly graded, gr moist, 10YR 5/2	9%), sub-angular ravel, fine (10%), t	race silt (1%);				
			18		SAND, medium t	o coarse (50% mo ular, poorly grade	edium, 45% d. trace gravel. fir	e			
s		SP	19 -		(5%); moist, 10Ÿl	R 5/3	, 3 ,				
			21 -		coarse), sub-ang	o coarse (50% moular, poorly grade 2%); moist to wet	d, with gravel, fine	ė		out (neat cem '-198' bgs)	ent)
			22 -		coarse), sub-ang with gravel, fine to	o coarse (25% mo ular to sub-roundo o coarse (15% fino o-angular to sub-r	ed, poorly graded e, 5% medium,	,			
		SW	24 -			arse (32% fine, 32 ular, well graded, oist, 10YR 4/2				LC Steel Casi '-200' bgs)	ng
COMP	MW7A-SOIL 26-30		26 -		sub-rounded, poo	edium (25% fine, 7 orly graded; moist	, 10YR 5/2				
GRAB	MW7A-GW 26-30	SP	28 -		coarse), sub-ang	o coarse (65% moular to sub-round (5%); moist, 10YF	ed, poorly graded	,			
			29 –			5%), sub-angular 10-15%), sub-ang					



CLIENT:	MDCA					JOB NO.:	LOCATION:	\			
PROJECT						60618753 DRILLING METHOD		Metro, MN	ı	BORING N	O.
	Project 1007					Sonic				MV	V7A
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS	_				SHEET	****
DRILLING	CONTR.: Traut									3 0	F 15
DRILLER:	Dan Pflipsen		EQUIF	.: Sor	nic	SAMPLING METHO					LING
	DEPTH: 220 FT	BGS				10' acetate bag	5			START	FINISH
GROUND	SURFACE ELEVAT	ION:				WATER LEVEL				TIME	TIME
DATUM:	UTM NAD83					TIME				1045	1830
COMMEN	TS:					DATE				DATE	DATE
						CASING DEPTH				05-26-20	05-28-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	NS:			WELL	_ DIAGRAI	М
TYPE	LOCATION	U.S	BZ	SOIL	MAT	ERIAL DESCR	IPTION				
				0.000	SAND, medium t	200/ ***	- divers - 550/	- KA	R/A		
			31 - 32 - 33 -		coarse), sub-ang (10%), trace clay 31' bgs	ular, poorly grade (5%); moist, 10Y	d, gravel, fine R 4/2, clay lense (
SP 31 31' bgs 32 31' bgs SAND, med coarse), sub trace gravel, 35 SAND, med coarse), sub medium (5%)				coarse), sub-ang trace gravel, med	ular to sub-round lium (5%); moist,	ed, poorly graded 10YR 4/2			out (neat cem 198' bgs)	ent)	
			37		coarse), sub-ang medium (5% fine	ular, poorly grade	d, gravel, fine to oist, 10YR 4/2				
		GW	38 —		poorly graded, tra	ace clay (5%); dry coarse (20% fine gular to sub-round	, 10YR 4/1 , 20% medium, ded, well graded,				
		sc	39		CLAYEY SAND, (25%); wet, 10YF		ub-rounded, clay				
		SP	41 —		SAND, medium (moist, 10YR 4/2	100%), sub-roun	ded, poorly graded	d;		.C Steel Casi ·200' bgs)	ng
		GP	42	000	GRAVEL, fine to sub-angular to su 10YR 3/2						
		SP	43		SAND, fine to me sub-rounded, poogravel, medium (SAND, medium toarse), sub-rour	orly graded, with of 5%); moist to wet of coarse (45% minded, poorly grad avel, fine (5%); m	clay (10%), trace , 10YR 4/1 edium, 45% ed, with clay oist, 10YR 4/2,				



CLIENT:						JOB NO.:		OCATION:				
OLILITI.	MPCA					60618753	-		etro, MN	l		
PROJEC						DRILLING METHO	OD:		,		BORING N	
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS						SHEET	V7A
DRILLING	CONTR.: Traut										1	. 1E
			FOLUE	Cor	vio.	SAMPLING METH	HOD:					DF 15 LING
	Dan Pflipsen		EQUIF	o.: Sor	IIC	10' acetate ba	gs				START	FINISH
	DEPTH: 220 FT B					WATER LEVEL					TIME	TIME
	SURFACE ELEVATION UTM NAD83	JN:				TIME					1045	1830
COMMEN						DATE					DATE	DATE
						CASING DEPTH					05-26-20	05-28-20
		s.	ĒĦ.	S C K	SURFACE CONDITION Grass	NS:				\^/E11		
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.	DEPTH IN FEET	SOIL/ROCK GRAPH	MAT	TERIAL DESCI	RIPT	ION		WELL	DIAGRA	VI
COMP	MW7A-SOIL 46-50 MW7A-GW 46-50 +DUP+MS/MSD	SP CL SW	46 — 47 — 48 — 50 — 51 — 52 — 53 —		SAND, medium to coarse), sub-rour (5-10%), trace gr two-1" clay rich lass SANDY CLAY, lofine to medium (4 layer @ 48' bgs, sub-rour wet, 10YR 4/1, possible SAND, medium to coarse), sub-rour coarse (5% fine, 10YR 4/1	nded, poorly gracevel, fine (5%); layers @ 44' and ow plasticity, soft 10%); moist, 10% wet @ 47' bgs arse (30% fine, anded, well grade otentially sluff to coarse (44% inded, poorly graded)	ded, moist 47' t to m /R 4/	with clay , 10YR 4/2, gs edium, sand, 1, 2" sand rich medium, 30% ice silt (5-10%);			ut (neat cem 198' bgs)	ent)
		CL	55		SANDY CLAY, lo coarse (40%); mo		i, san	d, medium to			C Steel Casi 200' bgs)	ng
		SC	56 —		CLAYEY SAND, 40% coarse), sub soft (20%); dry, 1	b-rounded, clay,	med	ium plasticity,				
		SP	58 —		SAND, medium (with clay, soft, lov	(90%), sub-roun ν plasticty (5-10	ded, %); d	poorly graded, ry, 10YR 4/1				



CLIENT:	MDCA					JOB NO.:	LOCAT		4 - 4 NANI			
PROJECT	MPCA : Project 1007					60618753 DRILLING METHOD):	East N	1etro, MN		BORING N	O.
						Sonic					MV	V7A
	BY: AS/AEL		CHEC	KED BY	AS						SHEET	
DRILLING	CONTR.: Traut		1									DF 15
DRILLER:	Dan Pflipsen		EQUIF	c.: Sor	nic	SAMPLING METHO 10' acetate bags						LING
BORING [DEPTH: 220 FT E	3GS									START	FINISH
GROUND	SURFACE ELEVATI	ON:				WATER LEVEL					TIME	TIME
DATUM: COMMEN	UTM NAD83					TIME					1045 DATE	1830 DATE
COMMEN	13.					DATE					_	
		I			SURFACE CONDITIO	CASING DEPTH					05-26-20	05-28-20
		S.	투뉴	SOIL/ROCK GRAPH	Grass					\A/ = 1	LDIAODA	
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	OIL/F GRA	N 4 A 7	TEDIAL DESCRI	IDTION			WEL	L DIAGRA	M
			<u>↓ </u>	Š	IVIA	TERIAL DESCRI	PHON					
					No Recovery					N/A		
			-	-	No Recovery Drillers: All sand	from 60-77' bgs						
			61									
			62									
			63									
			64									
				1								
			65	1						Gr (0	out (neat cem '-198' bgs)	ent)
				1							3,	
			66	1								
				1								
			67	1								
			-	1								
			68	1								
			-	-								
			69									
			70							4"	I C Steel Casi	na
										(0	LC Steel Casi '-200' bgs)	9
			71 –									
			''									
			72	1								
OD A D	MW7A-GW 73-77			1								
GRAB	13-11		73	1								
			-	1								
			74	1								
			-	1								



CLIENT:						JOB NO.:	LO	OCATION:				
	MPCA					60618753			letro, MN			
PROJECT	: Project 1007					DRILLING METHO Sonic	DD:				BORING N	
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS						SHEET	V7A
DRILLING	CONTR.: Traut										6 0	of 15
DRILLER:	Dan Pflipsen		EQUIF	p.: Sor	nic	SAMPLING METH						LING
	DEPTH: 220 FT E	BGS	1 = 40			10' acetate ba	gs				START	FINISH
	SURFACE ELEVATI					WATER LEVEL					TIME	TIME
	UTM NAD83					TIME					1045	1830
COMMEN	TS:					DATE					DATE	DATE
			I		SURFACE CONDITION	CASING DEPTH					05-26-20	05-28-20
SAMPLE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					WELL	. DIAGRA	М
TYPE	LOCATION		ΔZ	SOI	MAT	ERIAL DESCI	RIPTI	ON				
			76 -	-	No Recovery Drillers: All sand f	·						
			''		DOLOSTONE, vo	, trace 2-4mm v	ugs (5	5%), trace				
78 78 glauconite (2						TUYR 7/1, begin	ining (от Ѕпакорее				
DOLOSTONE						ot competent, so ning (5-10%), tra YR 6/2						
			80 –	7 7	DOLOSTONE, n staining (10%), tr	ot competent, m	nassive	e faint iron		Gro (0'-	ut (neat cem 198' bgs)	ent)
			81		6/2, clay observe	d	Сорис	ate (070), 1011				
			82	777								
			83	7 7								
		Ops	84	-/-/								
			04		DOLOSTONE, n trace small (<1mi	m) vugs (5%), tr	and, n ace pa	nedium (10%), atchy iron				
			85		staining (5%); 10	YR 6/1			>		.C Steel Casi 200' bgs)	ng
	MW7A-GW		_							(0-	200 bgs)	
GRAB	86-90		86 –									
			-									
			87		DOLOSTONE, c	ompetent, mass	ive fai	nt iron staining				
				 	along fractures, to (2%); 10YR 7/2	race 1-3mm vug	ıs (5%), trace sand				
			88		, ,,							
			89	7 7	DOLOSTONE, n (75%), with sand dolomitic precipita	, medium to coa	rse (1	e iron staining 5%), trace				
									$\rangle\rangle\rangle$	[XX]		



CLIENT:					JOB NO.:	LOCATION		141			
PROJECT:					60618753 DRILLING METHO	D:	East Met	O, IVIIN		BORING I	NO.
Project 1007					Sonic					M\	N7A
LOGGED BY: AS/AEL		CHEC	KED BY:	AS	1					SHEET	
DRILLING CONTR.: Traut										7	OF 15
DRILLER: Dan Pflipsen		EQUIP	: Sor	ic	SAMPLING METH					DR	ILLING
BORING DEPTH: 220 FT BG	S					,- 				START	FINISH
GROUND SURFACE ELEVATION	N:				WATER LEVEL					TIME	TIME
DATUM: UTM NAD83 COMMENTS:					TIME DATE					1045 DATE	1830 DATE
					CASING DEPTH						
			×	SURFACE CONDITION						05-26-20	0 05-28-20
SAMPLE SAMPLE	U.S.C.S.	DEPTH IN FEET	ROC	Grass					۱۸/۱	ELL DIAGRA	
TYPE LOCATION	U.S.	IN IN	SOIL/ROCK GRAPH	MAT	ERIAL DESC	RIPTION			V V I		uvi
	Ops	91 — 92 — 93 — 94 — 95 — 96 — 97 — 98 — 99 — 100 — 101 — 102 — 103 — 104		DOLOSTONE, n staining (>50%), trace dolomitic precipitate (5%); DOLOSTONE, n fine to coarse dol dark red iron stain 5/4, clay observed DOLOSTONE, n fine to medium (1 trace reworked cl 10YR 6/3 DOLOSTONE, n medium (15%), d (5%), trace reworked cl 10YR 6/3	ot competent, m medium to coars 10YR 6/4 ot to moderately lomitic precipitate ning (3%), trace d ot to moderately 15%), small (1-2r lasts (5%), trace ot competent, will lolomitic precipitate ning (3%), trace ot competent	assive faint in se dolomitic competent, the (5%), trace sand (4%); 1 competent, sonm) vugs (5-iron staining tith sand, fine ate (10%), trace to (10%), trace	trace patchy 0YR sand, 10%), (2%); to ace vugs lay			Grout (neat cen (0'-198' bgs) 4" LC Steel Cas (0'-200' bgs)	



CLIENT:						JOB NO.:		LOCATION:						
	MPCA					60618753		Eas	st Metro	o, MN	1			
PROJEC1	: Project 1007					DRILLING METHO Sonic	DD:						BORING NO	
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS								SHEET	/7A
DRILLING	CONTR.: Traut												8 0	F 15
DRILLER:	Dan Pflipsen		FOUIF	.: Sor	nic	SAMPLING METH							DRIL	
	DEPTH: 220 FT E	BGS				10' acetate ba	gs						START	FINISH
	SURFACE ELEVATI					WATER LEVEL							TIME	TIME
DATUM:	UTM NAD83					TIME							1045	1830
COMMEN	TS:					DATE							DATE	DATE
						CASING DEPTH							05-26-20	05-28-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	NS:					۱۸	/FII	DIAGRAN	,
TYPE	LOCATION	N.S	씸	SOIL/ GR	MAT	ERIAL DESC	RIP	TION			•	,		v i
					DOLCOTO::E	-44 1					R/A			
			106	7 7	DOLOSTONE, n staining (20%), fir (15%), trace cher clay observed	ne to coarse dol	omi	tic precipitate	-					
			107	7 7										
			108	7 7	DOLOSTONE, n staining along fra precipitate (5%),	ctures (30%), tra	nitic							
			109	77										
			110		DOLOSTONE, m				ark				t (neat ceme 98' bgs)	ent)
			111	7 7	iron staining (50% dolomitic precipita 5/3 to 7.5YR 3/3	%), trace sand, ा ate and coarse o	ne (calc	5%), trace ite (2%); 10Yi	₹					
		Ops	112	/ /										
		op:	113	7 7	DOLOSTONE, co				//3					
			114	777		,		<i>"</i>						
			115	/ /	DOLOSTONE, w)		-4" LC (0'-2	Steel Casir 00' bgs)	ng
			116	777	vugs (Ž%), trace	dark iron stainin	g (2	!%); 10`YR 6/3	3					
			117	7 7	DOLOSTONE, vo (>50%), small (<	ery competent, r	mas ໒) ເ	sive iron stain	ning					
			118		precipitate (10%) 10YR 5/3 to 10YI	, trace sand (5%	5), t	race oolites (3	3%);					
119														
			1 1	1 1							K//			



CLIENT:	MDOA					JOB NO.:	LOCA	ATION:					
PROJECT						60618753 DRILLING METHO	DD:	East Met	ro, IVIN	1		BORING NO	O .
	Project 1007					Sonic						MW	/7A
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS	1						SHEET	
DRILLING	CONTR.: Traut											9 0	F 15
DRILLER:	Dan Pflipsen		EQUIP	.: Sor	nic	SAMPLING METH 10' acetate bag						DRIL	LING
BORING	DEPTH: 220 FT E	BGS				To acciaic bag						START	FINISH
GROUND	SURFACE ELEVATI	ON:				WATER LEVEL						TIME	TIME
DATUM: COMMEN	UTM NAD83					TIME						1045	1830
COMMEN	115:					DATE						DATE	DATE
					SURFACE CONDITIO	CASING DEPTH NS:						05-26-20	05-28-20
		S.S.	토뉴	S F	Grass					١.	<i>,</i> –		
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	MAT	ERIAL DESC	RIPTIO	N.		V	VELL	DIAGRAI	VI
				07	170 (1		1101	•					
					DOLOSONE, no	t to moderately o	ompete	nt, massive	M	M			
				 	faint iron staining clay observed	(>50%), trace o	olites (3°	%); 10YR7/2,					
			121		,								
			122										
				77									
			123	77									
			<u> </u>	77									
			124		DOLOSTONE, n	ot competent, m	assive ir	on staining					
			 	 	(>50%), sand, mo	edium to coarse	(15%);	10YR 6/4,					
			125		ciay observed							t (neat ceme	ent)
			-	 							(0'-1	98' bgs)	
			126		DOLOSTONE, m	noderately comp	etent, tra	ace oolites					
		Ops			(3%), trace sand,	fine (3%), trace	glaucon	ite on core					
			127		fracture (1%); 10	1K 5/3							
			128	 									
			129		DOLOSTONE, c	omnetent colite	c (20%)	trace sand					
			<u> </u>	77	coarse (5%); 10Y	'R 6/4	3 (20 70),	trace sarie,					
			130		DOLOSTONE, n	ot compotent de	olomitic I	aracinitata	- 💹 -		−4" LC	Steel Casir	ng
				77	(10%), trace vugs trace small (3-4")	s (5%), trace sar	nd (1%);	10YR 6/2,			(0'-2	00' bgs)	
			131 –	77	trace small (3-4")	fragments with	medium	sand (30%)					
			132 —										
			133		DOLOGIONE	d - m - t - l	_44	(F. 400/.)					
					DOLOSTONE, m trace dolomitic pr	roderately comp recipitate (5%); 1	etent, vu 0YR 6/2	gs (5-10%), , beginning					
		Оро	134 —	 	of Oneota .	. ,		-					
				$\perp \perp Z$					$\mathcal{Y}_{\mathcal{A}}$	\mathbb{Z}			



CLIENT:	MPCA					JOB NO.: 60618753	LOCA	TION: East Met	tro M	NI .		
PROJECT:						DRILLING METHO	D:	East Me	iiO, ivi	IN	BORING N	NO.
LOCCEDI	BY: AS/AEL		CLIEC	KED BY:	. 49	Sonic						N7A
			CHEC	KED BY:	. A3	_					SHEET	
	CONTR.: Traut					SAMPLING METHO	DD:					OF 15 LLING
	Dan Pflipsen EPTH: 220 FT	RGS	EQUIF	⊃.: Sor	NC	10' acetate bag					START	FINISH
	SURFACE ELEVAT					WATER LEVEL					TIME	TIME
	UTM NAD83					TIME					1045	1830
COMMENT	S:					DATE					DATE	DATE
					SUPEACE CONDITIO	CASING DEPTH			_		05-26-20	05-28-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	JNS:				W	ELL DIAGRA	M
TYPE	LOCATION) 8.		SOIL	MA	ΓERIAL DESCF	RIPTION					
			136 -		banding from dri	lling observed						
			139 -		precipitate (20-3	oderately compet 0%), vugs (5-10%	6); 10YR	6/6			-Grout (neat cem (0'-198' bgs)	nent)
0		Оро	142 -		dolomitic precipit fractures (5%); 1		iron stain	ing along				
ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20			144 — 145 — 146 — 147 — 148 — 149 —		DOLOSTONE, c (<1mm) vugs (10	competent, oolitic 0%), orange/gray	texture (banding	40%), small ; 10YR 6/4			-4" LC Steel Cas (0'-200' bgs)	ing



CLIENT:						JOB NO.:		LOCATION:				
	MPCA					60618753		East Met	ro, MN			
PROJECT	: Project 1007					DRILLING METHO Sonic	OD:				BORING N	
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS						SHEET	V7A
DRILLING	CONTR.: Traut										11 0	F 15
DRILLER:	Dan Pflipsen		EQUIF	e: Sor	nic	SAMPLING METH					+	LING
	DEPTH: 220 FT E	BGS				10' acetate ba	gs				START	FINISH
GROUND	SURFACE ELEVATI	ON:				WATER LEVEL					TIME	TIME
	UTM NAD83					TIME					1045	1830
COMMEN	TS:					DATE					DATE	DATE
			I	1	SURFACE CONDITIO	CASING DEPTH					05-26-20	05-28-20
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					WELL	DIAGRA	М
ITFE	LOCATION	⊃	۵۷	So	MAT	TERIAL DESCI	RIP	TION				
GRAB	MW7A-GW 156-160	Оро	151 — 152 — 153 — 154 — 155 — 156 — 157 — 158 — 160 — 161 — 162 — 163 —		DOLOSTONE, v vugs (10%); 10Y	ery competent, on R 6/6	oolit	ic texture (30%),		(0'-1	ot (neat ceme 198' bgs)	

ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20



CLIENT:						JOB NO.:		LOCATIO	ON:					
	MPCA					60618753			East Met	ro, MN	1			
PROJECT	: Project 1007					DRILLING METHO Sonic	OD:						BORING NO	
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS								SHEET	/7A
DRILLING	CONTR.: Traut												12 0	F 15
	Dan Pflipsen		EQUIP	.: Sor	nic	SAMPLING METH							DRIL	
	DEPTH: 220 FT E	BGS			· ·	10' acetate ba	gs						START	FINISH
	SURFACE ELEVATI					WATER LEVEL							TIME	TIME
DATUM:	UTM NAD83					TIME							1045	1830
COMMEN	TS:					DATE							DATE	DATE
					OUDEAGE GOLDITIO	CASING DEPTH							05-26-20	05-28-20
		ω.	돌늅	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	NS:								
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	OIL/R				TION			V	VELL	DIAGRA	M
			_	S	MAI	ERIAL DESCI	RIP	HON						
					DOLOSTONE, v	ery competent, o	oolit	ic textur	e (30%),	Ka	M			
			-		vugs (5%), trace	manganese stai	ining	g (1%);	10YR 7/2					
			166											
			-											
			167	 										
				 										
			168 —	 										
			169 —											
			103		DOLOSTONE, c coarse dolomitic	ompetent, oolitic	tex	ture (20)%), all (<1mm)					
			470	77	vugs (3%), trace	manganese stai	ning	g (3%); ⁻	10ÝR 7/2			_		
			170 –		DOLOSTONE, c		tex	ture (40)%), vugs				t (neat ceme 98' bgs)	ent)
			l. <u>.</u> . [(10%); 10YR 6/3									
			171											
				77										
			172		DOLOSTONE, m	noderately comp	ete	nt, oolitid	c texture	\mathbb{N}				
		Оро			(20%), dark iron : 10YR 4/3	staining (10%), t	trac	e glauco	onite (2%);					
			173		DOLOSTONE, n	ot competent, fr	acti	ıres (10	%), trace					
			 		dark iron staining	(5%); 10YR 7/2	2							
			174	 										
			<u> </u>	 										
			175	 						>		-4" LC	C Steel Casir	ng
												(0'-2	200' bgs)	
			176											
			177 –						(=00()					
					DOLOSTONE, n fractures (40%),	ot competent, iro stromatolites (20	on s)%):	staining 10YR 5	(50%), 5/4					
			178 –		, , ,	,	,							
			👢	 										
			179 —											
			"		DOLOSTONE, m (20%), iron staini									
					(20 /0), IION SIAM	ng (zu%), trace	vug	s (370),	10117 0/4					

ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20



CLIENT:	MDOA					JOB NO.:	LC	OCATION:					
PROJECT						60618753 DRILLING METHO	DD:	East Me	iro, ivin	1	В	ORING NO	D.
	Project 1007					Sonic						MW	/7A
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS						Si	HEET	.,.
DRILLING	CONTR.: Traut											13 o	F 15
DRILLER:	Dan Pflipsen		EQUIF	.: Sor	iic	SAMPLING METH 10' acetate bag						DRIL	LING
BORING	DEPTH: 220 FT E	3GS										START	FINISH
GROUND	SURFACE ELEVATI	ON:				WATER LEVEL						TIME	TIME
DATUM: COMMEN	UTM NAD83					TIME						1045 DATE	1830 DATE
OOMINIER						DATE CASING DEPTH							
					SURFACE CONDITIO				Τ		0	5-26-20	05-28-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					W	ELL DI	AGRAN	Л
TYPE	LOCATION	U.8	<u>Z</u>	SOIL	MAT	TERIAL DESC	RIPTI	ON					
					DOLOGTONE				874	RZZ			
					DOLOSTONE, n (5%), trace strom	natolites (5%), tra	etent, ace ma	trace tractures anganese					
			181 –	77	staining (3%); 10	YR 6/2							
				77	DOLOGTONE								
			182 —		DOLOSTONE, n massive orange i	iron staining (100)%), d	ark iron					
				77	staining (15%); 1	0YR 6/8, clay ob	serve	d					
			183 —	77	201002015								
					DOLOSTONE, n (3%); 10YR 4/4 t	iot competent, tra to 7.5YR 3/3, cla	ace da y obse	ark iron staining erved					
			184 —	77	,		-						
				77									
			185 —								-Grout (n	neat ceme	ent)
											(0'-198'		,
			186 –										
			187 —										
		Оро		77									
		Opo	188 —										
			L										
			189 —	77									
					DOLOSTONE, coolitic texture (1%)	competent, trace 6): 10YR 6/3	vugs	(5%), trace					
			190 —	77	,	•			∭.		-4" I C S	teel Casir	na
					SANDY DOLOS (40%), well-round	TONE, compete ded: 10YR 6/6	nt, me	edium sand			(0'-200'		'9
			191 -	77	(),	,							
				77									
			192 —	77									
			132]:::::: <u>:</u>	SANDSTONE, m (50% fine, 50% r	noderately cemen	nted, i	fine to medium					
			193		well-rounded; 10	YR 4/6							
			133		SANDSTONE, p medium (100%),	oorly to moderat	ely ce well-r	mented, ounded: N/8 5					
			194]::::::		Jan Touridou (O	011-1	- mid					
			134]:::::::									
				::::::									



CLIENT:	MDCA					JOB NO.:	LOCATION:		401		
PROJEC1						60618753 DRILLING METHO		East Metro, I	VIIN	BORING N	O.
	Project 1007					Sonic				MW	V7A
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS	_				SHEET	,,,,
DRILLING	CONTR.: Traut									14 0	F 15
DRILLER:	Dan Pflipsen		EQUI	o.: Sor	iic	SAMPLING METHO				DRIL	LING
	DEPTH: 220 FT	BGS				10' acetate bag	S			START	FINISH
GROUND	SURFACE ELEVAT	ION:				WATER LEVEL				TIME	TIME
	UTM NAD83					TIME				1045	1830
COMMEN	TS:					DATE				DATE	DATE
						CASING DEPTH				05-26-20	05-28-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass	NS:			\٨/	'ELL DIAGRAI	M
TYPE	LOCATION	U.S.	NE	SOIL/ GR	MAT	TERIAL DESCR	IPTION		VV	LLL DIAGINA	VI
								V//	1 17/1		
					medium (100%),	oorly to moderate sub-rounded to	ely cemented, vell-rounded;	N/8.5		Grout (neat ceme (0'-196' bgs)	ent)
		Оро	196 –		,					-4" LC Steel Casi	na
		Оро								(0'-200' bgs)	19
			197 –		SANDY DOLOS $_{\sim}$ (50%), well-roun	TONE, not comp	etent, mediun	n sand			
			1197		SANDSTONE, fi	ne to medium (50				0.5.	
					medium), well-ro of Jordan	unded; 10YR 5/6	to 5Y 8/4, be	ginning		-2' Fine Sand (196'-198' bgs)	
			198		or Jordan						
				- : : : : : :							
			199							Sand filter pack (198'-200' bgs)	
			-							(130-200 bgs)	
			200		SANDSTONE. fi	ne to medium (10	% fine. 90%	<u> </u>			
					medium), sub-ro		,				
			201								
				<u> </u>							
			202	<u> </u>							
			203	<u> </u> ::::::							
		Cj									
		0,	204	::::::							
			204		SANDSTONE, fi	ne to medium (5º unded, trace cem	6 fine, 95%	10VP			
					4/6	unded, trace cem	enteu sanu,				
			205							Screened interva slot)	I (0.010"
										(200'-210' bgs)	
			206			ne to coarse (109					
				 ::::::	20% coarse), su	b-angular to sub-	ounded; 2.5	Y 6/6			
			207		SANDSTONE, fi	ne to medium (5%	6 fine, 95%				
			-	∤ ∷∷∷	medium), sub-an	igular to sub-rour	ded; 2.5Y 6/2	2 to N/8			
			208	 :::::::							
				∤ ∷∷∷∷							
			209	<u> </u> :::::::							
		1		1::::::							



CLIENT:	MDCA					JOB NO.:	LOCA	ATION:				
PROJECT	MPCA : Project 1007					60618753 DRILLING METHO	D:	East Met	ro, ivir	N .	BORING N	O.
						Sonic					MV	V7A
	BY: AS/AEL		CHEC	CKED BY:	AS						SHEET	
DRILLING	CONTR.: Traut										15 c	of 15
DRILLER:	Dan Pflipsen		EQUI	P.: Sor	ic	SAMPLING METHO 10' acetate bag						LING
BORING D	DEPTH: 220 FT E	BGS .									START	FINISH
GROUND	SURFACE ELEVATI	ON:				WATER LEVEL					TIME	TIME
DATUM: COMMEN	UTM NAD83					TIME					1045 DATE	1830 DATE
COMMEN	10.					DATE CASING DEPTH						
CAMPLE	CAMPLE	C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	CASING DEPTH NS:				\	05-26-20 L DIAGRA	05-28-20
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	IN PER	SOIL/I GR4	MAT	TERIAL DESCR	RIPTIOI	N		VVEL	L DIAGRAI	VI
					SANDSTONE, fir medium), sub-rou	ne to medium (28	5% fine,	75% SV 6/4				
			211		SANDSTONE, fir 5% coarse), well-	ne to coarse (10º	% fine, 8	35% medium,				
			212		576 Coarse), Well-	-rounded to sub-	ounded	1, 31 773				
		213										
		214										
		Cj	215 -								uff Backfill 210'-220' bgs)	
			216									
			217		SANDSTONE, fir 5% coarse), sub-	ne to coarse (20° -rounded; 2.5Y 8	% fine, 7/1	75% medium,				
			218									
			219									
			220		E.O.B. @ 220' bo	gs, no refusal			100			
			221 -									
			222 -									
223 —												
			224 -	-								



CLIENT:	MDOA					JOB NO.:	LOCATION:				
PROJECT						60618753 DRILLING METHOD		letro, MN		BORING N	O.
	Project 1007					Sonic				MVV	V9A
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS	1				SHEET	7071
DRILLING	CONTR.: Traut									1 0	of 10
DRILLER:	Dan Pflipsen		EQUIF	c.: Sor	nic	SAMPLING METHO					LING
	DEPTH: 150 FT B	GS				10' acetate bag	5			START	FINISH
	SURFACE ELEVATI					WATER LEVEL				TIME	TIME
	UTM NAD83					TIME				0830	0930
COMMEN	TS:					DATE				DATE	DATE
						CASING DEPTH				06-02-20	06-03-20
		ο.	 	PH FI	SURFACE CONDITIO Grass	NS:					
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	ΜΔΤ	ERIAL DESCR	IPTION		WEL	L DIAGRAI	VI
				o o	IVIZ	LIVIAL DESCIT	11014				
DISCRETE	MW9A-SOIL 3-5	CL	1 - 2 - 3 - 4 -		SANDY CLAY, lo medium (40%), s moist, 10YR 3/2 CLAY, medium p coarse (15%), su (5%); moist, 10YR	sub-rounded, with	organics (10%);				
DISCRETE	MW9A-SOIL 5-7										
DISCRETE	MW9A-GW 6-10	SC	6 -		CLAYEY SAND, medium, 20% co gravel, medium (arse), sub-angula	r, clay (30%), trace	;		rout (neat ceme '-137' bgs)	ent)
GRAB	0-10	SP	8 -		coarse), sub-roui	o coarse (60% m nded, poorly grad dium (7% fine, 3%	edium, 20% ed, with clay (10%) 6 medium); moist,	,			
			11 -			o coarse (60% m ular, poorly grade (3%); moist, 10YI	d, trace clay (5%),		4" (0	LC Steel Casin '-140' bgs)	ng
		CL	12		SANDY CLAY, lo	ow plasticity, soft, R 5/3	sand, fine (30%);				
		SP	13 -		SAND, medium t	o coarse (50% m ular, poorly grade	edium, 48% d, trace gravel, fine	·			
					SAND, medium t	o coarse (30% m	edium, 70%				



CLIENT:	MDCA						JOB NO.:	LC	OCATIO		- 1/11			
PROJECT							60618753 DRILLING METHO	DD:		East Metr	O, IVIIN		BORING N	0.
	Project 1007						Sonic						MW	/9A
LOGGED	BY: AS/AEL		CHEC	CKED E	3Y:	AS	1						SHEET	
DRILLING	CONTR.: Traut												2 c	F 10
DRILLER:	Dan Pflipsen		EQUI	P.: S	oni	<u> </u>	SAMPLING METH 10' acetate ba							LING
BORING	DEPTH: 150 FT B	GS											START	FINISH
GROUND	SURFACE ELEVATION	ON:					WATER LEVEL						TIME	TIME
DATUM: COMMEN	UTM NAD83						TIME						0830 DATE	0930 DATE
COMMEN	113.						DATE CASING DEPTH							
						SURFACE CONDITIO	CASING DEPTH NS:						06-02-20	06-03-20
		S.	ĒΪ	SOIL/ROCK	ב נ	Grass						١٨/١	LL DIAODAI	
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	JIL/F	5 -		EDIAL DECC	DIDTI	ON.			WE	LL DIAGRAI	VI
		_		ŭ	4	IVIAT	ERIAL DESCI	KIPTI	ON					
						coarse), sub-ang	ular to sub-roun	ded. r	oorly	graded:	Ka T			
		SP	-	-		dry, 10YR 5/3		•	•					
			16	• • • •	•••	SAND, medium to coarse), sub-ang								
	MW9A-SOIL 16-20					dry, 10YR 5/3								
COMP	+DUP+MS/MSD		17			SAND, fine to coaccoarse), sub-ang	arse (32% fine, 3 ular to sub-roun	32% r ded. v	nediun vell ara	n, 32% aded.				
						trace gravel, fine	(4%); dry, 10YR	5/2 [°] , ç	grades	coarser				
		sw	18 -			towards 20' bgs								
GRAB	MW9A-GW 16-20													
			40											
			19											
			20			SILTY SAND, fine							Grout (neat ceme (0'-137' bgs)	ent)
			-	-		medium), sub-rou	unded, silt (20%); moi	st, 10Y	/R 5/6			(0 .0. 290)	
			21	-										
		SM	-	-										
			22	-										
				-										
			23			SANDY SILT, lov	v planticity poft	cond	fino (2	200/.)				
				411		sub-rounded, trac								
			24			10YR 5/6		`	,					
		ML												
		IVIL	25 -										UI I O Ot - I O i	
			25									4	l" LC Steel Casii (0'-140' bgs)	ng
			26		匆	SILTY CLAY, low	plasticity, medi	um sti	ff, with	sand,				
						fine to coarse (20 gravel, fine to me)% fine, 5% coa edium (4%): drv t	rse), s to moi	ilt (15% st. 10\	%), trace ⁄R 5/4.				
			27			stiff clay from 26'-	-26.5' bgs		,	1				
			-											
		СС-МЦ	28											
			-											
			29											
			-											
			- 1	τ_{XXXY}	xxx						K7 / 3	N7/1		



CLIENT:	MDOA					JOB NO.:	LOCA	ATION:		.		
PROJECT						60618753 DRILLING METHO)D:	East Me	tro, ivi	<u>N</u>	BORING N	0.
	Project 1007					Sonic					MV	V9A
LOGGED I	BY: AS/AEL		CHEC	KED BY	: AS	\perp					SHEET	
DRILLING	CONTR.: Traut		ı								3 0	of 10
DRILLER:	Dan Pflipsen		EQUI	o.: Sor	nic	SAMPLING METH 10' acetate bag					DRIL	LING
BORING D	EPTH: 150 FT	BGS									START	FINISH
	SURFACE ELEVAT	ION:				WATER LEVEL					TIME	TIME
DATUM: COMMENT	UTM NAD83					TIME DATE					0830 DATE	0930 DATE
						CASING DEPTH						
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass					WI	ELL DIAGRA	06-03-20 M
TYPE	LOCATION) S.	äΖ	SOIL	MA	TERIAL DESC	RIPTIOI	N				
									+			
			31 -		CLAY, low plasti well-rounded, tra 2.5Y 5/6	city, soft, with sar ace gravel, coarse	nd, fine (e (5%); c	(20%), dry to moist,				
		CL	32 -									
			33									
			34 -		medium), well-ro	, fine to medium (ounded, clay (15% sub-angular to su	6), with o	gravel, fine to				
		sc	35 -		2.5Y 5/6	fine to medium (Grout (neat ceme (0'-137' bgs)	ent)
			36		medium), well-ro	bunded, clay (15% sub-angular to su	6), with o	gravel, fine to				
			37		CLAY, low plasti well-rounded, gra	city, stiff, with sar avel, fine to medi -4" cobbles (20%	um (209	6),				
			38 -		moist, 2.5Y 5/6 CLAY, low plasti	city, stiff, with gra	vel, fine	to medium				
			39		(15%), sub-angu	ılar to sub-rounde	ea; mois	it, 2.5 Y 5/6				
			40			olasticity, very stiff					-4" LC Steel Casi (0'-140' bgs)	ng
		CL	41		coarse (20%), su	ub-rounded; dry,	10YR 5/	/1			, ,	
			42									
			43									
			44									



							ENVIR	CONME	:NT	AL I	BORING	G LOG
CLIENT:	MDCA					JOB NO.: 60618753	LOCATION:	at Matra M	MNI.			
PROJECT						DRILLING METHOD:	Eas	st Metro, M	IIN		BORING N	O.
	Project 1007		T			Sonic					MV	V9A
LOGGED	BY: AS/AEL		CHEC	CKED BY	AS						SHEET	
DRILLING	CONTR.: Traut										4 0	of 10
DRILLER:	Dan Pflipsen		EQUI	P.: Sor	nic	SAMPLING METHOD 10' acetate bags	:				DRIL	LING
BORING	DEPTH: 150 FT	BGS				To acciaic bags					START	FINISH
GROUND	SURFACE ELEVAT	TION:				WATER LEVEL					TIME	TIME
DATUM: COMMEN	UTM NAD83					TIME					0830 DATE	0930 DATE
CONNICIO						DATE CASING DEPTH					4	
					SURFACE CONDITI						06-02-20	06-03-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	ROC	Grass				V	//⊏	. DIAGRA	М
TYPE	LOCATION	U.S.	N PER	SOIL/ROCK GRAPH	MA	TERIAL DESCRIF	PTION		V	VLLL	. DIAGINA	IVI
				//////	CLAV medium	plasticity, very stiff, v	ith gravel fine	to	N/A			
				¥////	coarse (20%), s	sub-rounded; dry, 10	YR 5/1					
			46	<i>\\\\\\</i>								
				- //////								
			47	<i>\\\\\\</i>								
		CL		-\////								
			48	<i>\\\\\\</i>								
				- //////								
			49	- /////								
				- /////								
			50		CLAY high plas	sticity, very stiff, trace	sand coarse	-		— Gro	ut (neat cem	ent)
					(2%), trace grav	vel, fine (3%); dry, 10	YR 5/1			(0	137' bgs)	
			51									
			52									
			53									
			54									
		СН	55							-4" L	C Steel Casi 140' bgs)	ng
										(0 -	140 bgs)	
			56									
			57									
			58									
			59									
			-									

ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20



CLIENT:	MDOA					JOB NO.:	LOC	CATION:				
PROJECT:	MPCA					60618753 DRILLING METHO	DD:	East Met	.ro, ivii	N	BORING N	0.
	Project 1007					Sonic					MV	V9A
LOGGED E	BY: AS/AEL		CHEC	KED BY	r: AS						SHEET	
DRILLING	CONTR.: Traut		ı								5 0	DF 10
DRILLER:	Dan Pflipsen		EQUI	P.: S o	nic	SAMPLING METH 10' acetate ba						LING
BORING D	EPTH: 150 FT	BGS									START	FINISH
	SURFACE ELEVAT	TION:				WATER LEVEL					TIME	TIME
DATUM: COMMENT	UTM NAD83 's:					TIME DATE				-	0830 DATE	0930 DATE
						CASING DEPTH						
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CON Grass					WEI		06-03-20 м
TYPE	LOCATION	U.S.		SOLV		MATERIAL DESCI	RIPTIC	ON .		V V L L		ivi
				0)		TWO CE EL CO						
			61 -		coarse (5%	plasticity, very stiff, tra), trace gravel, fine to expanding clay - high	coarse	(4%); dry,				
ı			62									
			63									
			64 -									
			65							G ₍	rout (neat ceme 0'-137' bgs)	ent)
		CH	66 -									
			68 -									
			69 -									
			70		CLAY, high	plasticity, very stiff, tra	ace san	nd. mottled.		4"	LC Steel Casi	ng
			71 -		medium to (4%); dry, 1	coarse (5%), trace gra	vel, fin	e to coarse			0'-140' bgs)	
			72		SILT, low p	lasticity, medium stiff,	mottled	d (gray/orange				
			73	† 	streaks), cla	ay (15%); dry to moist	10YR	5/8				
		ML	74									



CLIENT:	MDOA					JOB NO.:	LOCATION		- 141			
PROJECT						60618753 DRILLING METHOR	D:	East Metr	O, IVIIN		BORING N	0.
	Project 1007					Sonic					MW	/9A
LOGGED	BY: AS/AEL		CHEC	KED BY	: AS	_					SHEET	
DRILLING	CONTR.: Traut										6 c	F 10
DRILLER:	Dan Pflipsen		EQUIF	c.: So	nic	SAMPLING METHO 10' acetate bag					DRIL	LING
BORING	DEPTH: 150 FT	BGS									START	FINISH
	SURFACE ELEVAT	ION:				WATER LEVEL					TIME	TIME
DATUM: COMMEN	UTM NAD83					DATE					0830 DATE	0930 DATE
0011						CASING DEPTH						
					SURFACE CONDITIO						06-02-20	06-03-20
SAMPLE	SAMDLE	U.S.C.S.	DEPTH IN FEET	ROC	Grass					\//⊏I	LL DIAGRAI	М
TYPE	SAMPLE LOCATION	U.S.	H H	SOIL/ROCK GRAPH	MAT	TERIAL DESCR	IPTION			V V L	LL DIAGINAI	VI
				"								
					SILT, low plastici streaks), clay (15	ity, medium stiff, n	nottled (gray	y/orange				
			l _	1111	Sileaks), Clay (15	on, ary to moist,	1011 3/6					
			76	1111								
				1					M			
			77	1								
		ML		1								
			78 –		SILT, low plastici	ity, medium stiff, n	nottled (gray	//orange				
				1	streaks), with sar 10YR 5/8	nd, fine (15%), cla	y (15%); m	oist,				
			79	1								
				1								
			80		SAND, fine (90%), sub-rounded, p	oorly grade	ed, with		G	Grout (neat ceme 0'-137' bgs)	ent)
					silt (10%); moist,	10YR 5/6				(0 101 bgs)	
			81		- -							
		SP	82	-					X	\aleph		
					-							
			83 -		-							
			-		-							
			84		SILTY SAND, fin	e (75%), sub-rou	nded, poorl	y graded,				
			-		silt (25%); moist,	10YR 6/6	, i	, ,				
			85						₩ -	4	" LC Steel Casii	ng
			-		-						0'-140' bgs)	
		SM	86		-							
			-									
			87		- - -							
			-						X	\gg		
			88		SILT, low plastici	ity soft with sand	fine (20%)	1	$\langle \langle $			
					sub-rounded; mo	oist, 10YR 6/4	, (20 /0)	,				
		ML	89									
			-									
	İ	1	1 1	+1.11	1				<i>///</i> /	7//		

ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20



CLIENT:	MDCA					JOB NO.:	LOCA			ı		
PROJECT						60618753 DRILLING METHO	DD:	East Met	ro, iviin		BORING N	0.
	Project 1007				••	Sonic					MV	V9A
LOGGED	BY: AS/AEL		CHE	CKED BY:	AS						SHEET	
DRILLING	CONTR.: Traut		I								7 0	of 10
DRILLER:	Dan Pflipsen		EQU	IP.: Sor	ic	SAMPLING METH 10' acetate ba					DRIL	LING
BORING [DEPTH: 150 FT E	BGS								1	START	FINISH
GROUND	SURFACE ELEVATI	ON:				WATER LEVEL					TIME	TIME
DATUM: COMMEN	UTM NAD83					TIME					0830 DATE	0930 DATE
00						DATE CASING DEPTH						
					SURFACE CONDITIO						06-02-20	06-03-20
SAMPLE	CAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					\ \ /⊏I	L DIAGRAI	N //
TYPE	SAMPLE LOCATION	U.S.			ΜΔΤ	ERIAL DESCI	RIPTION	 I	1	VVEL	LL DIAGNAI	IVI
				0	IVIAI	LINAL DEGGI	I TION					
					SAND, fine to me	edium (80% fine	, 15% me	dium),	M	M		
					sub-angular to su (5%); moist, 10Yl	ub-rounded, pod P 5/6	orly grade	d, trace silt				
			91		(370), 1110131, 1011	1 3/0						
				-								
			92									
		SP	93									
			94									
			54		SAND, fine to me sub-angular, poo			dium),				
			95								rout (neat cem	4\
			35		SAND, fine to me sub-angular, poo						rout (neat cem 0'-137' bgs)	ent)
COMP	MW9A-SOIL 96-100		00		5/8	my graded, with	Siit (1070)	, moist, o m				
00	00 100		96	000	GRAVEL, fine to coarse), sub-ang	coarse (40% fin	e, 9% me	edium, 1%				
			!	700	coarse (5% fine,	40% coarse), su						
		GP	97		(5%); moist, 5YR	2 5/8						
0040	MW9A-GW			700								
GRAB	96-100		98									
					SAND, fine to co							
			99		coarse), sub-rour (25%), sub-angu	nded, poorly gra lar. trace silt (5%	ided, with 6): moist.	gravel, fine 5YR 5/8. 2"				
					clay lense @ 103		-,,,					
			100						 -		' LC Steel Casi 0'-140' bgs)	ng
		SP		-						\\\	0-140 bgs)	
		35	101	_								
				_								
			102	_								
			103		CDAVEL for a	000rg = /0F0/ F	0.050/	o di ure				
					GRAVEL, fine to 15% coarse), and	gular to sub-rou	nded, wel	l graded,				
		GW	104		cobbles (10%), s sand, coarse (5%	็นb-angular to รเ	ıb-rounde	ed, trace				
				A.	Sanu, Coarse (5%	oj, moisi io wei,	7.5113/0	,				
									\mathbb{N}	\mathbb{N}		



											. BURING	3 LOG
CLIENT:	MDCA					JOB NO.:	LOCA		Motro NA	VI.		
PROJEC1	MPCA r: Project 1007					60618753 DRILLING METHO Sonic	DD:	⊨ast	Metro, Mi	N	BORING N	O
100055	BY: AS/AEL		CLIE	NED DV	Λς.							/9A
			CHE	CKED BY:	. AO	-					SHEET	
	CONTR.: Traut					SAMPLING METH	IOD:					of 10
	Dan Pflipsen		EQUI	P.: Sor	nic	10' acetate ba						LING
	DEPTH: 150 FT E					WATER LEVEL					START	FINISH TIME
	SURFACE ELEVAT	ION:				TIME						
COMMEN	UTM NAD83 TS:					DATE					0830 DATE	0930 DATE
						CASING DEPTH					06.02.20	06-03-20
		S.S.	두 H H	30CK PH	SURFACE CONDITIO					__\		
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	MAT	TERIAL DESC	RIPTION			VVE	LL DIAGRAI	VI
		GW	106 - 107 - 108 - 109 - 110 - 111 - 112 - 113 - 114 - 115 - 116 - 117 - 118 -		GRAVEL, fine to 15% coarse), an cobbles (10%), s sand, coarse (5% GRAVEL, fine to 15% coarse), an cobbles (15%), s sand, coarse (5% GRAVEL, fine to 15% coarse), an cobbles (10%), s sand, coarse (5% sand, coarse (5% sand, coarse (5% sand, coarse (5% sand)).	gular to sub-rour sub-angular to su %); moist to wet, coarse (30% fin gular to sub-rour sub-angular to su %); moist to wet, coarse (35% fin gular to sub-rour sub-angular to su	e, 35% maded, well ib-rounded, well ib-rounded, 7.5YR 5/8 maded, well ib-rounded, well ib-rounded, well ib-rounded, well ib-rounded.	redium, I graded, d, trace 3 redium, I graded, d, trace 3 redium, I graded, d, trace d, trace d, trace d, trace d, trace		4	"LC Steel Casi 0'-140' bgs)	



CLIENT:						JOB NO.:	LO	OCATION:					
	MPCA					60618753		East	Metro, M	N			
PROJECT	: Project 1007					DRILLING METHO Sonic	OD:					BORING N	
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS							SHEET	/9A
DRILLING	CONTR.: Traut											9 0	F 10
	Dan Pflipsen		EOLUI	c.: Sor	uic.	SAMPLING METH	HOD:					DRIL	
	DEPTH: 150 FT E	BGS	EQUIP	<u>301</u>	iic	10' acetate ba	gs					START	FINISH
	SURFACE ELEVATI					WATER LEVEL						TIME	TIME
	UTM NAD83					TIME						0830	0930
COMMEN						DATE						DATE	DATE
						CASING DEPTH						06-02-20	06-03-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	NS:				٧	/ELL	DIAGRAI	М
TYPE	LOCATION	U.S		SOIL	MAT	ERIAL DESC	RIPTI	ON		·			
										N			
					SAND, fine to co- coarse), sub-rour	arse (10% fine, nded. well grade	40% r ed. wit	nedium, 10% n gravel. fine	to 💹				
			121 –		coarse (10% fine	, 15% medium,	5% cc	arse),					
			121		sub-angular, with	i clay (10%); mo	oist, Tu	YR 4/3					
			400										
			122 -										
		SW											
			123		SAND, fine to co	arse (10% fine,	40% r	nedium, 10%					
			H		coarse), sub-rour coarse (10% fine	nded, well grade	ed, wit	n gravel, fine	to 🙀				
			124		sub-angular, trac								
			-		moist, 10YR 4/3								
			125									t (neat ceme	ent)
			-	*****	SAND, fine to me	edium (20% fine	55%	medium)			(0'-1	37' bgs)	
			126		sub-rounded, poo	orly gràded, with	grave	el, fine to coa	rse				
					(5% fine, 10% me trace clay (5%); c			ıb-rounded,					
			127		. , ,	-							
					SAND, fine to coance), sub-ang								
COMP	MW9A-SOIL 127-131		128 –		trace gravel, fine	to medium (5%)); dry t	o moist, 10YI	₹ / 💹				
		SP	120		SAND, fine to me	edium (20% fine	. 55%	medium).	→ 👹				
			400		sub-rounded, poo	orly gràded, with	grave	el, fine to coa	rse				
			129 -		(5% fine, 10% me trace clay (5%); c			ıb-rounded,					
					3 (= 7,	, ,							
			130		SAND, fine to me							C Steel Casii 40' bgs)	ng
					sub-rounded, pool (5% fine, 10% mo	orly graded, with	n grave	el, fine to coa	rse		(0 .	10 290)	
			131		∖with clay (10%); o	dry to moist, 10\	/R 5/3		/\				
			-	+//	DOLOSTONE, ve fragments, sand,								
			132	++	nagments, sand,		1011	or∓, ciay					
				77	DOLOSTONE, v								
		Оро	133		fragments, sand, clay observed	meulum to coal	15 C (30	1/0), IUTK 6/	u, 🙀				
		'			-								
			134 –										
				$\perp \sqrt{7}$									
				/_/					\otimes				



CLIENT:	MDOA					JOB NO.:	LOCAT						
PROJEC						60618753 DRILLING METHO	D:	East Met	ro, IVII	N	1	BORING NO	D.
	Project 1007					Sonic						ΜV	/9Δ
LOGGED	BY: AS/AEL		CHEC	KED BY:	AS	_					:	SHEET	7071
DRILLING	CONTR.: Traut											10 o	F 10
DRILLER	Dan Pflipsen		EQUIF	.: Sor	nic	SAMPLING METH						DRIL	
BORING	DEPTH: 150 FT	3GS				10' acetate bag	js 					START	FINISH
GROUND	SURFACE ELEVAT	ION:				WATER LEVEL						TIME	TIME
	UTM NAD83					TIME						0830	0930
COMMEN	115:					DATE						DATE	DATE
					SURFACE CONDITIO	CASING DEPTH					(06-02-20	06-03-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					V	/ELL D	IAGRAN	И
TYPE	LOCATION	U.8	äz	SOII	MAT	TERIAL DESC	RIPTION						
					DOLOSTONE, v fragments, sand,	ery weathered, fi	ne to med	lium lithic 10YR 6/6			Grout (0'-13'	(neat ceme 7' bgs)	ent)
			136		clay observed	, mediam to cour	30 (00 70),	10111 0/0,			,	Steel Casir	
			130	7/7								o' bgs)	ig
			127	7.7	DOLOSTONE, n dolomitic precipit	not competent, fi	ne to med	ium					
			137 –		10YR 6/3	.atc (50 70), tracc	iion staiiii	119 (3 /0),					
											o. =:		
			138	77							−2' Fine -(137'-	Sand 139' bgs)	
					DOLOSTONE, c								
			139		(15%), trace thin 6/4	iy banded iron si	aining (3%	o); IUYK					
												ilter pack 140' bgs)	
			140 -								,		
					(10-15%), 1-15m along fractures (2	nm vugs (10%), ti 2%); 10YR 6/4	race iron s	staining					
			141		,	•							
			142	77						- 1			
		Opo		77									
			143		DOLOSTONE, n	not to moderately	competer	nt, dolomitic	┧┋				
				 	precipitate (15-20 fractures (1%): 1	0%), trace calcite 0YR 6/3	nodules ((5%), trace					
			144		,, .								
			145							-	Screer	ned interval	(0.010"
			_	7							(140'-	150' bgs)	
			146	77									
			147		DOLOSTONE. n	noderately comp	etent, dolo	mitic	 				
			-	 	precipitate (5-10°	%), iron staining	along frac	tures					
			148		(3-10%), 1018 0)/ 1							
				 									
			149	 									
	DOLOSTONE, competent, dolomitic precipitate (10-15%), 1-15mm vugs (10%), trace iron along fractures (2%); 10YR 6/4 DOLOSTONE, not to moderately competer precipitate (15-20%), trace calcite nodules fractures (1%); 10YR 6/3 DOLOSTONE, moderately competent, dolomitic precipitate (15-20%), trace iron along fractures (1%); 10YR 6/3									⊣ - " .1			



CLIENT:						JOB NO.:		LOCATION:						
	MPCA					60618753		Ea	ast Metr	o, MN	l			
PROJECT	: Project 1007					DRILLING METHO Sonic	OD:						BORING NO	
LOGGED	BY: AS/AEL/JM		CHEC	KED BY	AS							;	MW SHEET	13A
DRILLING	CONTR.: Traut												1 0	F 25
					.:_	SAMPLING METH	HOD:						1 o DRIL	
	Dan Pflipsen	200	EQUIF	P.: Sor	1IC	10' acetate ba	gs						START	FINISH
	DEPTH: 370 FT					WATER LEVEL							TIME	TIME
	SURFACE ELEVAT	ION:				TIME							4500	4500
COMMEN	UTM NAD83 TS:					DATE							1500 DATE	1500 DATE
						CASING DEPTH						—		
					SURFACE CONDITION							()6-04-20	06-09-20
		o.	본교	SOIL/ROCK GRAPH	Grass									
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	JE/R							W	ELL D	DIAGRAN	Л
		ر		S	MAT	ERIAL DESC	RIP	TION						
											N/ / /			
					SAND, fine to me sub-rounded, poor				eilt م					
					(5%), trace organ	nics (5%); moist,	, 10	YR 4/4	C SIII					
			1 -							\gg				
			H							\otimes				
		SP	2 -		SAND, fine to me	edium (62% fine	35	% medium)						
					sub-angular to su	ub-rounded, pod			silt	\gg				
			3 -		(3%); moist, 10YI	R 4/4								
									\aleph					
		4		SAND, fine to coa	arse (40% fine,	40%	medium, 10)%						
			<u> </u>		coarse), sub-ang				l,	\gg				
		SW	5 –		with clay (8%), tra 10YR 4/4, 3" clay	/ layer at 4' and	6' b	(270), MOISI, 38		\mathbb{M}		-Grout ((neat ceme	ent)
						•						(0'-35	Ò' bgs)	
			6							\gg				
					SAND, fine to coacco	arse (5% fine, 5	% n	nedium, 90%	ed.					
		SP			moist, 10YR 4/3	ulai to sub-rour	iuec	, poorly grad	eu,					
			7		SAND, fine to me					\gg	\bowtie			
			1	*****	sub-angular, poo SAND, fine to co				70/					
			8 -		coarse), sub-rour									
					moist, 10YR 5/3	, 0		,		\aleph				
		SW	9 -	<u> </u>										
										\gg				
			10		SAND, fine to coa					% ~			Steel Casir 0' bgs)	ng
					coarse), sub-ang (2%); moist, 10Yl	ular, poorly grad	ded,	trace gravel,	fine	\gg		(0 00	0 290)	
			11		(270), 1110131, 1011	11 4/5				$\langle \langle \rangle$				
		SP	12							\gg				
		"								$\langle \langle \rangle$	\bowtie			
										\gg				
			13		SAND, medium t	o coarse (70% i	med	ium, 30%		$\langle \rangle \rangle$				
			-		coarse), sub-rour	nded, poorly gra	dec	; moist, 10YI	₹ 4/3					
			14	/////	CLAYEY SAND,	fine to coarse (?	30%	fine. 25%		\gg				
		sc			medium, 25% co					\otimes				
				moist, 10YR 4/4					Y/}	Y //				



CLIENT:	MDOA					JOB NO.:	LOCATION:					
PROJECT	MPCA T:					60618753 DRILLING METHO		East Metro	, MN	_	BORING N	O.
	Project 1007					Sonic					NAVA.	′13A
LOGGED	BY: AS/AEL/JM		CHEC	KED BY:	AS						SHEET	10/1
DRILLING	CONTR.: Traut										2 0	of 25
DRILLER:	Dan Pflipsen		EQUIF	.: Sor	nic	SAMPLING METH						LING
	DEPTH: 370 FT E	3GS	1 = 40			10' acetate baç	gs				START	FINISH
	SURFACE ELEVAT					WATER LEVEL					TIME	TIME
DATUM:	UTM NAD83					TIME					1500	1500
COMMEN	TS:					DATE					DATE	DATE
						CASING DEPTH					06-04-20	06-09-20
SAMPLE	SAMPLE	S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass	NS:				WE	ELL DIAGRAI	М
TYPE	LOCATION	U.S.		SOIL	MAT	ERIAL DESCR	RIPTION					
				11111	CLAYEY SAND,	fine to coarse (3	0% fine. 25%			M		
		00			medium, 25% co	arse), sub-round	led, clay (20%	o);				
		SC	16		moist, 10YR 4/4							
			_		CLAY, medium p	lasticity soft: mo	iot 10VD 5/2					
		CL	17 –		CLAT, medium p	nasticity, sort, mo	ist, 101K 3/3					
					CAND	(400/ 5	100/	200/	\mathbb{X}			
		sw	18 –		SAND, fine to co coarse), sub-ang							
				*****	moist, 10YR 4/3							
		CL	19 –		SANDY SILT, low (30%), sub-round sand layer							
			20 -		SAND, fine to me sub-angular, poo	edium (60% fine, orly graded, trace	35% medium silt (5%); dry,	1), 10YR			Grout (neat cem	ent)
		SP			\5/4	1: (000/ 5	050/	/ }			(0'-350' bgs)	5111)
		J.	24		SAND, fine to me sub-angular, poo	edium (60% fine, orly graded, trace	silt (5%); moi	ı), st,	\mathbb{X}			
			21		10YR 5/4		, ,,					
			22						\gg			
					wet, 10YR 5/3	ular to well-round	ueu, weli grau	eu,				
			23 -									
		SW										
			24						\mathbb{X}			
			25	*****	SAND, fine to co	arse (5% fine, 60)% medium, 3	0%	/// -		4" LC Steel Casi (0'-350' bgs)	ng
			_		coarse), sub-ang	ular, poorly grad	ed, trace grav		\aleph		(U-350 bgs)	
			26		(4 70), trace siit (1	70), IIIOISI, 1011X	3/4					
			_									
			27						\mathbb{X}			
		SP			SAND modium 4	to cooree /4E0/ =	andium 400/		\mathbb{X}			
			28 –		coarse), sub-ang	ular to sub-roun	ded, poorly gr					
					gravel, fine to me	dium (10% fine,	2% medium),	trace				
			29		Siit (3 /0), 11101St, /	.JIN 4/4, Z-4 III	ne sanu at 30	ngs	\mathbb{X}	N/A		
			_ [<u> </u>				
SAND, fine to coarse (45% fine, 45% medium coarse), sub-angular to well-rounded, well grad wet, 10YR 5/3 SAND, fine to coarse (5% fine, 60% medium, coarse), sub-angular, poorly graded, trace grad (4%), trace silt (1%); moist, 10YR 5/4 SP SAND, medium to coarse (45% medium, 40%)												



OL IENT						LIGHTIG	1.004				. DOMIN	
CLIENT:	MPCA					JOB NO.: 60618753	LOCA	East Me	atro MN	J		
PROJECT						DRILLING METHO	DD:	East ivit	euo, ivii	N .	BORING N	O.
LOGGED	BY: AS/AEL/JM		CHEC	CKED BY:	AS						MW	/13A
	CONTR.: Traut											_
						SAMPLING METH	IOD.					DF 25 LING
	Dan Pflipsen		EQUI	P.: Sor	nic	10' acetate ba					START	FINISH
	DEPTH: 370 FT E					WATER LEVEL					TIME	TIME
	SURFACE ELEVATI	ION:				TIME						
COMMEN	UTM NAD83 TS:					DATE					1500 DATE	1500 DATE
						CASING DEPTH					06.04.20	06-09-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass					\\/E	LL DIAGRA	
TYPE	LOCATION	U.S.	DEF	SOIL/ GR	MAT	TERIAL DESC	RIPTION			V V L	LL DIAGIVA	IVI
										N///		
		SP	31 -		SAND, medium t coarse), sub-rou with gravel, fine t sub-rounded; we	nded to well-rou o medium (25%	nded, pod	orly graded,				
		sw	32	******	SAND, fine to co coarse), sub-rou (5%); moist to we	nded, well grade						
		SP	33 -		SAND, medium to coarse), sub-rounto medium (20% sub-rounded; mogravel seam at 3	nded, poorly gra fine, 5% mediur pist to wet, 10YR	ded, with n), sub-a	gravel, fine ngular to			Grout (neat cem 0'-350' bgs)	ent)
		SF	36 -									
			39 -		CLAY, low to me 10YR 3/2					4	" LC Steel Casi	ng
		CL	41 - 42 - 43 -		CLAY, low plastic well-rounded, wit medium, 5% coa 10YR 5/2	th gravel, mediur	n to coar	se (10%			LC Steel Casi 0'-350' bgs)	ng
			44 -									



								INVIRC	I A I A I C	1417			G LOG
CLIENT:	MDCA					JOB NO.:	LOCAT		Anto- N	N.I.			
PROJECT						60618753 DRILLING METHO	DD:	East N	/letro, M	N		BORING N	O.
	Project 1007					Sonic						MW	/13A
LOGGED	BY: AS/AEL/JM	l	CHEC	CKED BY:	AS	_						SHEET	10/1
DRILLING	CONTR.: Traut											4 0	of 25
DRILLER:	Dan Pflipsen		FOUL	P.: Sor	nic	SAMPLING METH							LING
	DEPTH: 370 FT 6	BGS	1 = 40.			10' acetate ba	gs					START	FINISH
GROUND	SURFACE ELEVAT	ION:				WATER LEVEL						TIME	TIME
DATUM:	UTM NAD83					TIME						1500	1500
COMMEN	ITS:					DATE						DATE	DATE
						CASING DEPTH						06-04-20	06-09-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass	NS:				٧	VELL	. DIAGRA	М
TYPE	LOCATION) 0.		SOIL	MAT	ERIAL DESC	RIPTION						
		SW	_	********	SAND, fine to co coarse), well-rou (5%); moist, 10Y	nded, well grade	25% med d, trace g	ium, 20% ravel, fine					
		GP	46 - 46 - 47 - 48 - 49 -		GRAVEL, fine to sub-rounded to v coarse (10%), su	coarse (85% fin well-rounded, po b-rounded; mois edium (60% fine	orly gradest to wet,	ed, sand, 10YR 4/2					
		SP	50		well-rounded; mo GRAVEL, fine to 20% coarse), sub graded, with sand	oist to wet, 10YR coarse (40% fin b-angular to well	e, 15% m -rounded	iedium, well	t			ut (neat cem 350' bgs)	ent)
		SP	52 -		to wet, 10YR 4/2 SAND, medium t coarse), sub-roun (30%), well-round	o coarse (50% r nded, poorly gra ded; moist to we coarse (35% fin	medium, 2 ded, with t, 10YR 4 e, 25% m	20% gravel, fine /2 ledium,	-/				
		GW	54 - 55 - 56 - 57 - 58 -		SAND, fine to co coarse), sub-rounded; mc	arse (30% fine, and selections, 2" fine sand selections are selections.	e cobbles am at 53' 30% med d, with gr % coarse	ium, 20% avel, fine to			—4" L (0'∹	C Steel Casi 350' bgs)	ng



OUENT						IODNO	1.004					
CLIENT:	MPCA					JOB NO.: 60618753	LOCA		etro, MN	J		
PROJECT						DRILLING METHO Sonic	DD:	Last IVI	euo, ivii	N .	BORING N	0.
LOGGED	BY: AS/AEL/JM	1	CHEC	KED BY:	AS	Gorne					MW	/13A
		-	1020									
	CONTR.: Traut					SAMPLING METH	OD.					OF 25
	Dan Pflipsen		EQUIF	o.: Son	iic	10' acetate bag					START	LING
	DEPTH: 370 FT I					WATER LEVEL				Τ	TIME	TIME
	SURFACE ELEVAT	ION:				TIME						
COMMEN	UTM NAD83 TS:					DATE					1500 DATE	1500 DATE
						CASING DEPTH					06.04.20	06-09-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDIT Grass			1		WF	ELL DIAGRA	
TYPE	LOCATION	U.S.	N N	SOIL/ GR	M	ATERIAL DESCF	RIPTION	l		V V L		IVI
										N///		
		ML] [ticity, soft; dry, 10YF]
			61 -			fine to coarse (45% sub-rounded, silt (1						
		SM	"		medium (5%);	moist, 10YR 4/2	0 70), 11 40	oc gravei,				
			62			low plasticity, soft,						
				1	(30%), SUD-rou	unded, clay (15%);	moist, TC	1YK 5/2				
			63	1								
		ML		1								
			64	1								
			65		CLAY, low plas	sticity, medium stiff,	with san	d. medium			Grout (neat cem	ent)
			-		to coarse (20%	6), sub-rounded, tra					(0'-350' bgs)	
			66		(2%); moist, 10	JYR 5/3						
			-									
			67		CLAV law play	atiaity madium atiff	with con	d madium				
		CL			(20%), sub-rou	sticity, medium stiff, unded, trace gravel,	, with san , fine to n	nedium				
			68		(4%); moist, 10	OYR 5/3						
						sticity, very stiff; dry						
			69 -		SANDY CLAY medium (30%)	, low plasticity, stiff,), sub-rounded; dry	sand, fin	e to /2				
						,, 200 . Carrada, dry	, .5110					
											411.1.O. Otrock O	
			70		CLAY, high pla	asticity, very stiff, sa	nd, fine (10%),		*	4" LC Steel Casi (0'-350' bgs)	ng
					well-rounded, 1	trace gravel, fine (2	70), ary, 1	0/4 AIC.				
			71		CLAY, high pla	asticity, very soft, tra	ace sand	fine (2%),				
					orangle mottlin	ng; dry, 10Y-5GY 4/	2					
			72									
		СН										
			73									
			-									
			74									



						1.05.00							
CLIENT:	MPCA					JOB NO.: 60618753	LOCA		1etro, M	NI			
PROJEC1						DRILLING METHO Sonic	DD:	East IV	ieuo, ivi	IN		BORING N	0.
LOGGED	BY: AS/AEL/JM		CHEC	CKED BY:	AS	John						MW	′13A
			OTILO	INCO DT.	7.0								_
	CONTR.: Traut			- 0	:-	SAMPLING METH	OD:						DF 25 LING
	Dan Pflipsen DEPTH: 370 FT E	8GS	EQUI	P.: Sor	NIC	10' acetate baç						START	FINISH
	SURFACE ELEVATI					WATER LEVEL						TIME	TIME
	UTM NAD83					TIME						1500	1500
COMMEN						DATE						DATE	DATE
						CASING DEPTH						06-04-20	06-09-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass	NS:				٧	VELL	DIAGRA	м
TYPE	LOCATION	05.	۵Z	SOIL	MAT	TERIAL DESCR	RIPTION						
		CL SW CL SP	76 - 77 - 78 - 78 - 80 - 81 - 82 - 83 - 84 - 85 - 86 - 87 - 88 -		CLAY, low plastic orange mottling; CLAY, low plastic 3/2 CLAY, low plastic dry, 10YR 3/2 CLAY, low plastic mottling (green/g CLAY, low plastic mottling (green/g CLAY, low plastic fine (15%), sub-roundist, 10YR 5/2 CLAY, low plastic sand, fine (5%), 1 10Y-5GY 5/5 GY SAND, fine to co coarse), sub-roundist, 10YR 5/2, SAND, fine to me sub-rounded, po moist, 10YR 5/2,	city, soft, with silt city, soft, with silt city, stiff, with silt c	(10%); d (10%), g (10%), he (20%), w (20%), w YR 3/4 to d, trace s with silt of tium (2%) 60% med d, trace g 68% med e gravel, t	ry, 10YR ray mottling eavy YR 6/2 ith sand, 7.5YR ium, 20% it (5%); (10%), trace it (5%); (10%), trace it (5%); ium, 13% ium, 1			(0'-₹	ot (neat cem 350' bgs) C Steel Casi 350' bgs)	



CLIENT:	MDCA					JOB NO.:	LOCATION:	atua NAN			
PROJECT						60618753 DRILLING METHOD		etro, MN		BORING N	0.
	Project 1007					Sonic				MW	13A
LOGGED	BY: AS/AEL/JM	1	CHEC	KED BY:	AS					SHEET	
DRILLING	CONTR.: Traut									7 c	F 25
DRILLER:	Dan Pflipsen		EQUIF	c.: Sor	nic	SAMPLING METHO 10' acetate bags				DRIL	LING
BORING I	DEPTH: 370 FT	BGS								START	FINISH
GROUND	SURFACE ELEVAT	ION:				WATER LEVEL				TIME	TIME
DATUM: COMMEN	UTM NAD83					TIME				1500 DATE	1500 DATE
OOMINE	10.					DATE CASING DEPTH					
					SURFACE CONDITIO					06-04-20	06-09-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	ROCI	Grass				\∧/⊏I	L DIAGRAI	М
TYPE	LOCATION	U.S.	N N N	SOIL/ROCK GRAPH	MAT	ERIAL DESCR	IPTION		V V L	L DIAGINAI	VI
					SAND, fine to me well-rounded, po	edium (70% fine, 3	30% medium),				
					well-rourided, po	ony graded, mos	1 to Wet, 31 4/1				
			91								
			92								
	SP 93										
			94		SAND, fine to me	edium (50% fine,	50% medium),				
					well-rounded, po	orly graded; mois	t to wet, 5Y 4/2				
			95						G	rout (neat ceme 0'-350' bgs)	ent)
									M '	3 ,	
			96		SILT, no plasticity	y, soft, trace clay	(5%); dry, 5Y 4/2				
				1111							
		ML	97	1111							
				1111							
			98		CLAY, low to me	dium plasticity, so	ft, trace gravel, fine				
				\	(5%), orange mo	ittling in bands; dr	y, 10YR 6/6				
		CL	99								
			-								
			100	//////	SAND, fine to me	edium (50% fine,	50% medium),		4'	LC Steel Casi	ng
			-		well-rounded, po	orly graded; wet,	10YR 4/6) (0'-350' bgs)	
			101								
			-								
			102								
		SP									
			103		SAND fine to co	arse (5% fine, 45°	% medium 45%				
					coarse), well-roui	nded, poorly grad	ed, trace gravel, fine	;			
			104		to coarse (5%); v	vet, 2.5Y 4/2					
		1		pyridd.	1			V //	V//		



								INVIRC	/ 	131/	▔┖▐		3 LOG
CLIENT:	MPCA					JOB NO.: 60618753	LOCAT		Netro M	NI			
PROJECT	Γ:					60618753 DRILLING METHO	DD:	⊏ast i	∕letro, M	IN		BORING N	O
	Project 1007					Sonic						MW	′13A
LOGGED	BY: AS/AEL/JN	1	CHEC	KED BY:	AS	-						SHEET	
DRILLING	CONTR.: Traut											8 0	F 25
DRILLER:	Dan Pflipsen		EQUI	P.: Sor	nic	SAMPLING METH							LING
	DEPTH: 370 FT	BGS				10' acetate ba	ys 					START	FINISH
	SURFACE ELEVAT					WATER LEVEL						TIME	TIME
	UTM NAD83					TIME						1500	1500
COMMEN	ITS:					DATE						DATE	DATE
	ı				OUDEA OF COMPITIO	CASING DEPTH						06-04-20	06-09-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass	NS:				٧	VELL	DIAGRAI	М
TYPE	LOCATION	U.S.	<u> </u>	SOIL	MAT	TERIAL DESC	RIPTION						
		SP			SAND, fine to me	edium (65% fine	, 35% me	dium),		M			
		-	1	*****	sub-rounded to v	well-rounded, po	orly grade	ed; moist,					
		SW	106		SAND, fine to co				→ 💥				
		344			coarse), sub-ang moist, 2.5Y 5/2	jular to sub-roun	ded, well	graded;					
			107	* * * * * * * * * * * * * * * * * * * *	SAND, fine to co	arse (30% fine.	63% med	ium. 5%					
					coarse), sub-rou	nded, poorly gra	ne 💹						
			108		(2%); moist, 2.5\	7 5/2							
		SP											
			109										
			110									ut (neat cem	ont)
] ''0 [*****	SAND, fine to co coarse), sub-rou	parse (25% fine,	60% med	ium, 25%	, 💹			350' bgs)	ent)
		SW	 [5/2	rided, Well grade	a, dry to i	110151, 2.01					
			111										
			1		SAND, fine to me			dium),					
			112	1	sub-rounded, po	orly graded; dry,	2.5Y 5/2						
			113										
				+									
			114										
5			115								−4" L	C Steel Casi	ng
- 											(0'-	350' bgs)	-
		SP	116										
5													
			117										
í 			' '										
5													
3			118	1									
					SAND, medium t								
			119		coarse), sub-ang				_/				
2					sub-angular, poo			uiuiii),					
i				FREE	J .,				K/A_	<u>K//</u>			



CLIENT:	MDCA					JOB NO.:	LOCATION:	4 - 4 NAN			
PROJECT						60618753 DRILLING METHOR		letro, MN	l	BORING N	O.
	Project 1007					Sonic				MW	′13A
LOGGED	BY: AS/AEL/JM	1	CHEC	KED BY	AS					SHEET	10/1
DRILLING	CONTR.: Traut									9 0	of 25
DRILLER:	Dan Pflipsen		EQUIF	⊃.: Sor	nic	SAMPLING METHO					LING
	DEPTH: 370 FT	BGS				10' acetate bag	5			START	FINISH
GROUND	SURFACE ELEVAT	ION:				WATER LEVEL				TIME	TIME
	UTM NAD83					TIME				1500	1500
COMMEN	TS:					DATE				DATE	DATE
						CASING DEPTH				06-04-20	06-09-20
		S. S.	 	PSCK	SURFACE CONDITION Grass	NS:					
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	MAT	TERIAL DESCR	IPTION		WELL	_ DIAGRAI	VI
				+							
					SAND, fine to me	edium (70% fine,	30% medium),				
					well-rounded, po	orly graded; wet,	2.51 4/3				
		SP	121								
		SW	122	*****	SAND, fine to co	parse (33% fine, 3	3% medium, 34%				
			1		coarse), sub-rou wet, 2.5Y 4/3	nded to well-roun	ded, well graded;				
			123		SAND, very fine	to fine (70% v. fin	e, 30% fine),	-/ 💹			
SAND, ve						orly graded; mois	t to wet, 10YR 5/3				
			124								
			 		SILT, no plasticit	y, soft, trace clay	(5%), trace orange				
			125	$+ \ \ \ $	oxidation/mottling	g; moist, 10YR 5/4	i "			out (neat ceme	ent)
									(0)	-350' bgs)	
			126								
				4111							
			127	4							
		ML		_							
			128								
					SILT, no plasticit 1" coarse sand s	y, soft, clay (10%) seam at 129' bos	; moist, 10YR 5/6,				
			129 -								
			129								
			l [1111					S		
			130				0% medium, 30%			C Steel Casi -350' bgs)	ng
						nded to well-rounedium (10% fine, 5					
		SW	131		sub-angular to s	ub-rounded; mois	t to wet, 10YR 4/4				
			132	*****		edium (25% fine,					
			 	-	sub-rounded, po	orly graded, with ne, 15% medium),	gravel, fine to				
			133		\sub-rounded; mo	oist to wet, 10YR	1/4				
		SP				parse (50% fine, 4	5% medium, 5% ed; moist, 10YR 5/				
			134		Coarse), Well-10u	naea, poony grad	cu, 111015t, 1011X 5/-	'			
		1		100000	1			V//	V//		



CLIENT:	MDCA					JOB NO.:	LOCATIO		- 141			
PROJEC1						60618753 DRILLING METHO	 D:	East Metr	O, IVIIN		BORING N	O.
	Project 1007					Sonic					MW	13A
LOGGED	BY: AS/AEL/JM		CHEC	KED BY:	AS	_					SHEET	10/1
DRILLING	CONTR.: Traut										10 0	F 25
DRILLER:	Dan Pflipsen		EQUIF	c.: Sor	iic	SAMPLING METHO					DRIL	LING
BORING I	DEPTH: 370 FT I	BGS	•			10' acetate bag	S 				START	FINISH
GROUND	SURFACE ELEVAT	ION:				WATER LEVEL					TIME	TIME
	UTM NAD83					TIME					1500	1500
COMMEN	TS:					DATE					DATE	DATE
					SURFACE CONDITIO	CASING DEPTH					06-04-20	06-09-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass	JNS.				WEL	L DIAGRAI	М
TYPE	LOCATION) U		SOIL	MAT	TERIAL DESCR	IPTION					
					SAND, fine to co	parse (20% fine, 7 gular, poorly grade	5% mediun	n, 5%				
			l		SAND, fine to me	edium (50% fine,	50% mediu	ım),				
\sub-angular \5/4						ub-rounded, poor	ly graded; o	dry, 10YR ∫				
SAND, fine						edium (50% fine,	50% mediı					
			137		sub-angular to si 5/3	ub-rounded, poor	ly graded; o	dry, 10YR				
				3/3								
			138									
			-		SAND, fine to me	edium (75% fine,	20% mediı	ım).				
			139		sub-angular to si	ub-rounded, poor 6/3 to 7.5YR 5/3						
			140									4)
			140			edium (20% fine, ub-rounded, poor				((rout (neat ceme 0'-350' bgs)	ent)
					5/3	ub-rounded, poor	ly graded, d	ary, fork				
			141									
			142							\gg		
		SP										
			143		SAND, very fine	to fine (50% v. fin	e. 50% fine	2).				
					sub-angular to si	ub-rounded, poor						
			144		5/4							
			145							<u>4"</u>	LC Steel Casi	na
										(i	0'-350' bgs)	.9
			146		SAND, fine to me sub-angular to se moist, 10YR 5/4	edium (80% fine, ub-rounded, poor	20% mediu ly graded; o	ım), dry to				
			 									
			147									
										\aleph		
			148									
			149							\gg		
										Y //		



CLIENT:	MDOA					JOB NO.:	LOCATIO					
PROJEC1						60618753 DRILLING METHO	 D:	East Met	ro, MN		BORING NO	D .
	Project 1007					Sonic					MW	134
LOGGED	BY: AS/AEL/JM		CHEC	KED BY:	AS						SHEET	15/4
DRILLING	CONTR.: Traut										11 0	F 25
DRILLER:	Dan Pflipsen		EQUIP	.: Sor	nic	SAMPLING METHO					DRIL	
	DEPTH: 370 FT E	BGS				10' acetate bag	S				START	FINISH
	SURFACE ELEVATI					WATER LEVEL					TIME	TIME
	UTM NAD83					TIME					1500	1500
COMMEN	ITS:					DATE					DATE	DATE
	I				OUDEA OF OOLIDITION	CASING DEPTH					06-04-20	06-09-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	NS:				WFI	LL DIAGRAN	л
TYPE	SAMPLE LOCATION	U.S	ᆱᇎ	SOIL	MAT	ERIAL DESCR	IPTION			***		
				0 9.F.	CAND fine (0E0/	\ wall rounded .	a orby grad	ad traca	N/A	У Л		
		SP	151 — 152 — 153 — 154 — 155 — 156 — 157 —		SAND, fine to me well-rounded, poor silt (5%); wet, 10\ SAND, fine (95% silt (5%); wet, 10\) SAND, fine to me	edium (80% fine, orly graded; moise), well-rounded, pyR 5/6	20% mediu t to wet, 10 poorly grad	um),)YR 5/6 ed, trace			rout (neat ceme 0'-350' bgs)	ent)
			159 —		well-rounded, poo	orly graded; mois	t, 10YR 5/6	5			' LC Steel Casir	
		ML	-		SILT, no plasticity 10YR 5/6	y, soft, trace clay	(5%); mois	t to wet,		(1	0'-350' bgs)	ig
		1	162 —		SAND, fine to me well-rounded, poo	edium (50% fine, orly graded; mois	50% mediu t to wet, 10	ım), IYR 5/6				
		SP	164 —		SAND, fine (1009 moist to wet, 10Y	%), well-rounded, ′R 5/6	poorly gra	ded;				



CLIENT:	MDOA					JOB NO.:	LOCATION:	-4 NANI			
PROJECT						60618753 DRILLING METHOD		etro, MN		BORING N	O.
	Project 1007					Sonic				MW	/13A
LOGGED	BY: AS/AEL/JN	1	CHEC	KED BY	AS					SHEET	10/1
DRILLING	CONTR.: Traut									12 0	of 25
DRILLER:	Dan Pflipsen		EQUIF	c.: Sor	nic	SAMPLING METHO					LING
	DEPTH: 370 FT	BGS				10' acetate bags	•			START	FINISH
GROUND	SURFACE ELEVAT	ION:				WATER LEVEL				TIME	TIME
	UTM NAD83					TIME				1500	1500
COMMEN	TS:					DATE				DATE	DATE
					OUDEAGE CONDITION	CASING DEPTH				06-04-20	06-09-20
		S. S.	두 H	S A A	SURFACE CONDITION Grass	NS:			\A/ = 1		
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	MAT	ERIAL DESCRI	PTION		VVEL	L DIAGRAI	VI
		SP	166 — 167 — - - 168 —		well-rounded, po	edium (80% fine, 2 orly graded; moist y, soft, trace sand y sand seam at 16	to wet, 10YR 5/6				
	ML 169 — SILI, no 10YR 5/6					%), well-rounded,	poorly graded;		Gro	out (neat ceme -350' bgs)	ent)
SAND, Tine (10 moist, 10YR 4, 177) 172 SP 173 174 175 SILT, low to no moist, 10YR 6, 176 ML 176 ML 177											
					SILT, low to no p moist, 10YR 6/4	olasticity, soft, trace	e clay (5%); dry to		4" (0'	LC Steel Casii -350' bgs)	ng
							5%); dry, 10YR 6/4				
		SP	179		SAND, fine to me well-rounded, poo	edium (70% fine, 3 orly graded; dry to	80% medium), moist, 2.5Y 5/6				



CLIENT:	MDOA					JOB NO.:	LOCA					
PROJECT	MPCA					60618753 DRILLING METHO	D:	East Met	ro, IVII	N .	BORING N	0.
	Project 1007					Sonic					MW	/13A
	BY: AS/AEL/JN		CHEC	KED BY	: AS						SHEET	
DRILLING	CONTR.: Traut											of 25
	Dan Pflipsen		EQUIF	e.: Soi	nic	SAMPLING METHO 10' acetate bag						LING
	DEPTH: 370 FT					_					START	FINISH
	SURFACE ELEVAT	ΓΙΟΝ:				WATER LEVEL TIME						
DATUM: COMMEN	UTM NAD83 TS:					DATE					1500 DATE	1500 DATE
						CASING DEPTH					06-04-20	06-09-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass					WEL	L DIAGRA	
TYPE	LOCATION	U.S.		SOIL	MA	TERIAL DESCR	RIPTION	I				
		+										
		SP	181 -		SAND, fine to m sub-rounded to 10YR 5/6	nedium (60% fine, well-rounded, poo	40% me orly grade	edium), ed; moist,				
		182 -	•••••	SAND, fine to co coarse), sub-rou moist, 10YR 4/6	parse (30% fine, 5 unded to well-roun	0% med ded, we	lium, 20% Il graded;					
	183 moist, 10YR											
			185 –							- Gr	out (neat cem '-350' bgs)	ent)
		sw	186								σ,	
			187									
			188									
ויין וויין			189 –									
ANDOLPH.G			190		SAND, fine to co coarse), well-rou	oarse (70% fine, 2 unded, poorly grad	5% med led; moi	lium, 5% st, 10YR 6/4		4" (0	LC Steel Casi '-350' bgs)	ng
068.6PJ R			191 -									
007_GINT_L(SP	192									
ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/28/20			194									
ENVIRC												



OLIENT						LODNO	1.004			••••	L DOI		
CLIENT:	MPCA					JOB NO.: 60618753	LOCA	TION: Fast M	etro, MN	J			
PROJEC						DRILLING METHO Sonic	DD:	East IVI	euo, ivii	N .	BORI	NG N	O.
LOGGED	BY: AS/AEL/JM	ı	CHEC	CKED BY:	ΔS	Johns							′13A
		•	CITEC	NLD DT.	AU						SHEE		
	CONTR.: Traut					SAMPLING METH	OD:				14		DF 25 LING
	Dan Pflipsen	PCS	EQUI	P.: Sor	NIC	10' acetate bag					STA		FINISH
	DEPTH: 370 FT E					WATER LEVEL					TIN		TIME
	UTM NAD83	1014.				TIME					15	00	1500
COMMEN						DATE					DA		DATE
						CASING DEPTH					06-0	4-20	06-09-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass	NS:				WI	ELL DIAG	RA	м
TYPE	LOCATION	D. O.	N N	SOIL	MAT	TERIAL DESCR	RIPTION	١					
		SP	196 - 197 - 198 - 199 - 200 - 201 - 202 - 203 - 204 - 205 - 206 - 207 - 208 - 209 -		SAND, fine to co coarse), sub-roun moist, 10YR 6/4 SAND, fine to co coarse), sub-roun moist, 10YR 5/4 SAND, fine to mosub-rounded, po SAND, fine to co coarse), sub-roun (30%), angular; r	parse (40% fine, 4 nded to well-rour edium (60% fine, orly graded; mois nded, well graded arse (20% fine, 2 nded, well graded nded, well graded)	40% meded, we added, we added, we added, we added, we added, we added and ad	dium, 20% edium), 5/4 dium, 30% 10YR 5/4			Grout (neat (0'-350' bg	Casi	



								/ 		DUKIN	
CLIENT:					JOB NO.:	LOCA		Motro NA	v1		
MPCA PROJECT: Project 1007					60618753 DRILLING METHO Sonic	DD:	East N	Metro, Mi	N .	BORING N	O.
_		01.75	OVED DV	۸e	_ 501110						′13A
LOGGED BY: AS/AEL/JM		CHEC	CKED BY:	AS	_					SHEET	
DRILLING CONTR.: Traut										15 c	of 25
DRILLER: Dan Pflipsen		EQUI	P.: Sor	nic	SAMPLING METH 10' acetate ba					DRIL	LING
BORING DEPTH: 370 FT B	BGS						ı	1		START	FINISH
GROUND SURFACE ELEVATI	ON:				WATER LEVEL					TIME	TIME
DATUM: UTM NAD83 COMMENTS:					TIME					1500 DATE	1500 DATE
COMMENTS:					DATE						
SAMPLE SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass	CASING DEPTH NS:				WEL	06-04-20 L DIAGRA	06-09-20 M
TYPE LOCATION	O.S.	ΗŽ	SOIL	MAT	ERIAL DESCI	RIPTION					
	SP	211 - 212 - 213 - 214 - 215 - 216 - 217 - 218 - 219 - 220 - 221 - 222 - 223 -		SAND, fine to co coarse), sub-rour moist, 10YR 6/4 SAND, fine to co coarse), sub-rour moist, 10YR 6/4 SAND, fine to co coarse), sub-rour trace gravel, fine SAND, fine to co coarse), sub-rour trace gravel, fine	arse (30% fine, arse (30% fine, arse (30% fine, arse (50%)) arse (30% fine, arse (50%))	50% med nded, web	ium, 20% I graded; ium, 35% I graded, 0YR 6/4		4"	rout (neat cem)'-350' bgs) LC Steel Casi)'-350' bgs)	



CLIENT:						JOB NO.:	LOCA	ATION:					
	MPCA					60618753		East M	etro, M	N			
PROJECT	Project 1007					DRILLING METH	OD:					BORING N	
LOGGED	BY: AS/AEL/JM	1	CHEC	KED BY	: AS							SHEET	/13A
DRILLING	CONTR.: Traut											16 0	of 25
DRILLER:	Dan Pflipsen		EQUIF	c.: Sor	nic	SAMPLING METH							LING
	DEPTH: 370 FT	BGS				10' acetate ba	ıgs					START	FINISH
	SURFACE ELEVAT					WATER LEVEL						TIME	TIME
	UTM NAD83					TIME						1500	1500
COMMEN	TS:					DATE						DATE	DATE
					,	CASING DEPTH						06-04-20	06-09-2
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	ONS:				V	VELL I	DIAGRA	M
TYPE	LOCATION	0.0	äz	SOIL	MA	TERIAL DESC	RIPTIOI	V					
					CAND fine to a	(200/ fine	450/	di 200/	- KZA	R/A			
					coarse), sub-roι	oarse (20% fine, unded, well grade	ed, trace	gravel, fine to	, 🕅				
			226		medium (5%); n	noist to wet, 10Yl	₹ 5/2						
			227		<u>†</u>								
			200										
		sw	228										
			229										
			230			oarse (20% fine,					Grout	(neat cem 50' bgs)	ent)
					coarse), sub-rou	uned, well graded ne, 20% medium	d, with gr	avel, fine to			(0-50	oo bgs)	
			231		well-rounded; w	et, 10YR 5/6	i), 3ub-10	unded to					
				..*.	SAND, fine to co	oarse (60% fine,	35% me	dium, 5%					
			232		coarse), sub-rou	unded to well-rou							
					moist, 10YR 5/3	3							
			233										
		SP											
			234										
1071													
			235								_ 4" l C	Steel Casi	na
			233	*****		oarse (30% fine, unded to well-rou					(0'-3	50' bgs)	i ig
					moist, 10YR 5/6))	nu c u, We	ıı yı au c u,					
			236										
					1								
			237		Ī								
		SW		- - - - -	•								
<u> </u>			238										
			-										
			239	ļ									
ENVIKONMENTAL 1007_GINT_LOGS.GFJ KANDOLPH.GFJ 7/28/20				ļ									
<u>2</u>					‡								



CLIENT:	MDOA					JOB NO.:	LOCAT					
PROJECT						60618753 DRILLING METHO): D:	East Met	ro, ivin		BORING N	O.
	Project 1007					Sonic					MW	13A
LOGGED	BY: AS/AEL/JM	1	CHEC	KED BY:	AS	_					SHEET	10/ (
DRILLING	CONTR.: Traut										17 c	F 25
DRILLER:	Dan Pflipsen		EQUIF	o.: Son	ic	SAMPLING METHO					DRIL	LING
	DEPTH: 370 FT	BGS				10' acetate bag	5				START	FINISH
GROUND	SURFACE ELEVAT	ION:				WATER LEVEL					TIME	TIME
	UTM NAD83					TIME					1500	1500
COMMEN	TS:					DATE					DATE	DATE
		1			SURFACE CONDITIO	CASING DEPTH					06-04-20	06-09-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass	N3.				WEI	LL DIAGRAI	М
TYPE	LOCATION	D.	äz	SOIL	MAT	ERIAL DESCR	IPTION					
				..*.	SAND fine to co	arse (30% fine 1	0% mediı	um 30%		×//		
SW 241 moist, 10YR 242 SAND, fine to coarse), sub-						arse (30% lifte, 4 nded to well-roun	ded, well	graded;				
						arse (45% fine, 4						
					·							
			245 –							G (Frout (neat ceme 0'-350' bgs)	ent)
			246		SAND, fine to me	edium (55% fine,	40% med	dium),				
		SP	247		sub-rounded, poo (2%), trace grave 7.5YR 4/6	el, fine (3%), trace	iron stair	ning; moist, /				
			248		SAND, fine to co- coarse), sub-rour medium (5%); mo	nded, poorly grad						
			249	-								
			250						-	4'	" LC Steel Casiı 0'-350' bgs)	ng
			251 –									
			252	***************************************	SAND, fine to co- coarse), sub-rour (5%); moist, 10Yl	nded, well graded	0% medii l, trace gr	um, 25% ravel, fine				
SW 253 Coal (5%)					(= :=),=.55, 1011							
		254 –										



CLIENT:						JOB NO.:	LOCAT					
PROJECT						60618753 DRILLING METHO	 D:	East Me	etro, M	N	BORING N	0.
	Project 1007					Sonic					MW	′13A
LOGGED	BY: AS/AEL/JN	Л	CHEC	KED BY	: AS						SHEET	10/1
DRILLING	CONTR.: Traut										18 c	F 25
DRILLER:	Dan Pflipsen		EQUIF	c.: Soi	nic	SAMPLING METHO 10' acetate bag					DRIL	LING
BORING D	DEPTH: 370 FT	BGS				10 acetate bag	<u>.</u>				START	FINISH
GROUND	SURFACE ELEVAT	ΓΙΟΝ:				WATER LEVEL					TIME	TIME
DATUM:	UTM NAD83					TIME					1500 DATE	1500 DATE
COMMEN	10.					DATE						
		1			SURFACE CONDITION	CASING DEPTH DNS:					06-04-20	06-09-20
0.1151.5	044515	C.S.	투끈	PH PH	Grass					\ ^ /⊏		
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	MA	TERIAL DESCR	IDTION	 	\dashv	VVE	LL DIAGRAI	VI
				S	IVIA	TERIAL DESCR	AIP HON					
					SAND, fine to m	edium (70% fine,	30% me	dium),	Ka	M		
			-		well-rounded, po	oorly graded; mois	t, 10YR	7/1				
			256		SAND, fine to co	parse (60% fine, 3	5% med	ium, 5%				
			-	1	coarse), well-rou	unded, poorly grac	led; mois	st, 10YR 7/1				
		SP	257	-	-							
			-									
			258		-							
			259	••••	SAND fine to co	parse (10% fine, 2	0% medi	ium 20%				
					coarse), well-rou	unded, well graded	d, with gr	avel, fine to				
			260		coarse (5% fine, well-rounded; m	, 15% medium, 30 oist, 10YR 4/3	% coars	e),			Grout (neat ceme	ent)
					,	,					(0'-350' bgs)	
			261		Ī							
					<u>‡</u>							
		SW	262		1							
			263		!							
					<u> </u>							
			264		‡							
					1							
			265	******		(400) 5	-0/				I" LC Steel Casi	na
					SAND, fine to co	parse (40% fine, 5 unded to well-roun	5% medi ded. noo	ium, 5% orly graded:			(0'-350' bgs)	·· · 9
			266		moist, 10YR 5/6		, poc	, தாவமை,				
			200		-							
			207		-							
		0.5	267	7	-							
		SP			-							
			268									
					- - -							
			269									
				-								
				1:10					_K//	K//		



CLIENT:	MBOA					JOB NO.:	LOCA	TION:				
PROJECT						60618753 DRILLING METHO	DD:	East Me	etro, ivin	l	BORING N	O.
	Project 1007					Sonic					MW	/13A
LOGGED I	BY: AS/AEL/JM		CHEC	KED BY:	AS	_					SHEET	
DRILLING	CONTR.: Traut		1								19 0	OF 25
DRILLER:	Dan Pflipsen		EQUI	c.: Sor	nic	SAMPLING METH 10' acetate ba					DRIL	LING
BORING D	EPTH: 370 FT	BGS				To acciate ba					START	FINISH
GROUND	SURFACE ELEVAT	ION:				WATER LEVEL					TIME	TIME
	UTM NAD83					TIME					1500	1500
COMMENT	TS:					DATE					DATE	DATE
1		1			SUBSACS CONDITIO	CASING DEPTH					06-04-20	06-09-20
CAMPLE	CAMPLE	C.S.	DEPTH IN FEET	ROCK	SURFACE CONDITIO Grass	NS:				\ \ /⊏I	L DIAGRAI	N /
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	IN DEF	SOIL/ROCK GRAPH	MAT	ERIAL DESCI	RIPTION	1		VV⊏L	L DIAGRAI	.VI
		SP			SAND, fine to co coarse), sub-rout trace lithic fragme	nded to well-rou	nded, po	orly graded,				
			271		CLAYEY SAND, medium), sub-rou	fine to medium	(35% fine	, 35%				
			272									
		sc										
			273									
			074									
			274	H	LITHIC FRAGME weathered, sand	ENTS, not comp	etent dol	ostone, very				
				M	sub-rounded, lith	ic fragments of	shale/san	dy shale				
			275	N	(25%), oxidized;		-44-1-1				rout (neat cem 0'-350' bgs)	ent)
				25	LITHIC FRAGME reworked clasts (M '		
		LF	276		$_{ m 1}$ oolitic texture (10	%), trace dolom	itic precip	oitate (5%);				
				X	\10YR 6/3 LITHIC FRAGME	ENTS. not comp	etent dol	ostone, fine	/ 💹			
			277	3.5	∖dolomitic precipita ∖staining (10%); 1	ate (30%), sand			/ >			
				**	LITHIC FRAGME	ENTS, not comp	etent dol	ostone,	′ 🕍 −			
			278		orange to dark re	ed iron staining (15%); 10	YR 7/3				
			1		SHALE, moderat sand (3%), trace							
			279		beginning of Jord		12 4/ 10	oG,				
			280	::::::	SANDSTONE, m	noderately ceme	nted, fine	to medium	-₩	4"	LC Steel Casi 0'-350' bgs)	ng
				 ::::::	(85% fine, 5% me staining (3%); 10			ce iron				
			281	 :::::::								
		Cj		- ::::::::::::::::::::::::::::::::::::								
		0	282	- ::::::								
			-	- :::::::								
			283	::::::::								
				<u> </u>								
			284		CHAIT	ont ocad ···· C	no /400/ \	. CLEVA				
					SHALE, compete 5/10GY	ent, sand, very fl	ne (10%)	, GLEYI				
- 1		1	1 1						$\mathcal{Y}A$	IX/		



								INVIRU	71 4181		\L L		
CLIENT:	MDCA					JOB NO.:	LOCA		Actro M	NI			
PROJECT	MPCA T: Project 1007					60618753 DRILLING METHO Sonic	DD:	±ast N	Лetro, М	IN		BORING N	0.
100055			C: :-	OVED DV	ΛC	_ 501116							13A
	BY: AS/AEL/JM		CHE	CKED BY:	CA	+						SHEET	
DRILLING	CONTR.: Traut					CAMPUNCATE	IOD:						F 25
	Dan Pflipsen		EQU	IP.: Son	ic	SAMPLING METH 10' acetate bag							LING
	DEPTH: 370 FT E						-					START	FINISH TIME
	SURFACE ELEVATI	ON:				TIME						1	
DATUM: COMMEN	UTM NAD83 TS:					DATE						1500 DATE	1500 DATE
						CASING DEPTH						06 04 20	06-09-20
SAMPLE	SAMDI E	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass					\//	/ELI	DIAGRAI	
TYPE	SAMPLE LOCATION	U.S.	N N N	SOIL/I	MAT	ERIAL DESC	RIPTION	l		VV		DIAGRAI	VI
					SHALE, compete	ent, sand, very fi	ne (10%);	; GLEY1					
		SANDSTONE, p fine, 5% medium (3%); 10YR 5/6 to	fine to m trace iron	edium (85º staining	%								
			287		(3%), 1018 5/6 (0 10 FR 5/4							
			288										
			289		SHALE, compete	ant hioturbation	(10_15%)	sand ver	7/				
			290		fine (5-10%); GL SANDSTONE, p	EY1 5/10GY oorly cemented,	fine to m	edium (40°				it (neat ceme 350' bgs)	ent)
			291		fine, 55% mediur trace lithic shale f	n), sub-rounded fragments (5%);	to well-ro 10YR 6/3	ounded, 3					
			292										
		Cj	293		SANDSTONE, p fine, 60% mediur	oorly cemented, n), sub-rounded	fine to m	edium (40° ounded;	%				
					10YR 6/8								
			294										
			295								-4" LC (0'-3	C Steel Casir 850' bgs)	ng
			296										
			297										
			298		SANDSTONE, p	n), sub-rounded			%				
			299		fragments (10%)	; 10YK 5/2							
			200										
										K//			



CLIENT:	MDCA					JOB NO.:	LOCATION		- MA	ı		
PROJECT						60618753 DRILLING METHOR	D:	East Metr	O, IVIIN	ı	BORING N	0.
	Project 1007					Sonic					MW	13A
LOGGED	BY: AS/AEL/JM		CHEC	KED BY:	AS						SHEET	
DRILLING	CONTR.: Traut										21 c	F 25
DRILLER:	Dan Pflipsen		EQUIF	c.: Sor	nic	SAMPLING METHO 10' acetate bag					DRIL	LING
BORING I	DEPTH: 370 FT E	BGS									START	FINISH
	SURFACE ELEVAT	ION:				WATER LEVEL					TIME	TIME
DATUM: COMMEN	UTM NAD83					DATE					1500 DATE	1500 DATE
0011111211						CASING DEPTH						
				×	SURFACE CONDITIO						06-04-20	06-09-20
SAMPLE	SAMDI E	U.S.C.S.	DEPTH IN FEET	ROC	Grass					\//E	LL DIAGRAI	M
TYPE	SAMPLE LOCATION	U.S.	N N	SOIL/ROCK GRAPH	MAT	ERIAL DESCR	IPTION		-	**		VI
					SANDSTONE, p fine, 80% mediur	oorly cemented, to sub-rounded:	ine to mediu 10YR 5/2	um (20%				
			301 -			,,,						
		302										
			002									
			303									
			303									
			304									
			304									
		Ci	305								O	4\
		Cj	303		SANDSTONE, p fine, 70% mediur			um (30%			Grout (neat cemo (0'-350' bgs)	ent)
			206		ilite, 70 % ilicular	ii), sub-rourided,	31 0/1					
			306]:::::::								
			007									
			307									
				Ī								
			308									
			309	<u> </u>								
				<u> </u>								
			310		SHALE, not to m	oderately compe	ent, very we	eathered,			4" LC Steel Casi (0'-350' bgs)	ng
			l		trace green stain trace sand, very f	fine (1%); GLEY2	5/10BG, cla	2%), ay				
			311 -		observed, beginn	ning of St. Lawrer	ce					
			312									
		Cs										
			313									
			314									



								INVIRC	' AIAI C	.1 1 1 1	<u> </u>		3 LOG
CLIENT:	MDCA					JOB NO.:	LOCAT		Antro M	NI			
PROJEC1	MPCA T: Project 1007					60618753 DRILLING METHO Sonic	DD:	±ast ľ	Metro, M	IN		BORING N	O.
LOCCED	BY: AS/AEL/JM		CUE	CKED BY:	Δς								′13A
		I	UHE(VED RA:	ΛU	_						SHEET	
	CONTR.: Traut					SAMPLING METH	IOD:					+	of 25
	Dan Pflipsen		EQUI	P.: Sor	nic	SAMPLING METH 10' acetate ba							LING
	DEPTH: 370 FT E						-	T				START	FINISH TIME
	SURFACE ELEVATI	ION:				WATER LEVEL				+			
DATUM: COMMEN	UTM NAD83 TS:					TIME DATE						1500 DATE	1500 DATE
						CASING DEPTH						_	
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass					\	VFI I		06-09-20 M
TYPE	LOCATION	U.S	N Z	SOIL	MAT	ERIAL DESCI	RIPTION				VLLL		
					CHALE not to m	adaratalı aama	atont von	, wooth oro	- V/	N/A			
					SHALE, not to m trace green stain	ing (3%), trace b	ioturbatio	n (2%).	u,				
			316		trace sand, very f	fine (1%); GLEY	2 5/10BG	, clay					
					ODSCI VEU								
			317										
			"										
			318										
			319										
			320		SHALE, not com	petent, trace pre	ecipitate (2	2%); GLE\	<u>/1</u>	No.	— Grou	ut (neat cem	ent)
					5/N	. , 1		,,			(0	350' bgs)	
			321										
			322										
		Cs											
			323										
			525		SHALE, not com 4/N	petent, very wea	thered (c	lay); GLE\	′1 🙀				
			224		1/14								
			324										
			325								—4" L∈ (ດ'-:	C Steel Casi 350' bgs)	ng
											,0 -		
			326										
			327		SHALE, not com	netent vervives	thered (c	lav)	─ ※				
					glauconite/chlorit	e (25%), bioturb	ation (10	%); GLEY	ı				
1			328		5/10GY								
			329										
			023		SHALE, moderate fine (20%), trace	tely competent, v thin fractures (2	weathered %); GLEY	d, sand, ve /1 6/10Y,	ry 📓				
					clay observed								



CLIENT:						JOB NO.:	LOCA						
PROJECT	MPCA T:					60618753 DRILLING METHOD):):	East Met	ro, M	N	BORIN	G NC).
	Project 1007		1			Sonic						/\ <i>\\</i>	13A
LOGGED	BY: AS/AEL/JM	1	CHEC	KED BY	: AS						SHEET		10/1
DRILLING	CONTR.: Traut										23	OF	= 25
DRILLER:	Dan Pflipsen		EQUIF	.: Sor	nic	SAMPLING METHO 10' acetate bags						DRILL	ING
BORING I	DEPTH: 370 FT	BGS				To doctate bage					STAR		FINISH
GROUND	SURFACE ELEVAT	ION:				WATER LEVEL					TIME		TIME
	UTM NAD83					TIME					150	_	1500
COMMEN	TS:					DATE					DATI	=	DATE
			1	1	SURFACE CONDITION	CASING DEPTH			_		06-04	-20	06-09-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass	ONG.				W	/ELL DIAGF	RAN	1
TYPE	LOCATION) U.S	Z	SOIL	MA	TERIAL DESCR	IPTION	I					
					SHALE, modera	ately competent, sa)%), trace mangan	nd, fine	(20%),					
					GLEY1 5/10Y	770), trace mangani	csc stail	illig (3 /0),					
			331										
			332										
			333										
			-										
			334										
			-										
			335		CLIALE mades			/ - - - - -			-Grout (neat c	eme	nt)
					(40%); GLEY1	ately competent, gla 5/10GY	auconiie	e/cnionte			(0'-350' bgs)		,
			336		, ,								
			337										
			337			ately competent, gla e to medium (25%							
		Cs			staining on sand	d (10%); GLEY1 5/	5GY	nanganese /					
			338		∖fragments (25%	npetent, very weath); GLEY1 5/10GY	·	/					
8/20			339		glauconite (50-6	moderately compet 60%), trace sand, fi							
7/2					7/10Y to GLEY1	1 5/10GY							
표 명			340		SHALE modera	ately competent to	compet	ent.			-4" LC Steel C		g
JOLE					glauconite (20-3	30%), sand, fine (5-	·10%), t	race vugs			(0'-350' bgs)		
RAN			341		(5%), trace inter	layered silt (5%); G	iLEY16	7/10GY					
GPJ													
068.			342										
니													
19_7G			242										
100			343										
ATME													
ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/28/20			344										
N N N													
шΙ	İ		1						\mathbb{N}^{2}	\mathbb{K}/\mathbb{A}			



CLIENT:						JOB NO.:	L	OCATION:				
	MPCA					60618753		East Me	tro, MI	N		
PROJECT	: Project 1007					DRILLING METHOD Sonic	D:				BORING N	
LOGGED	BY: AS/AEL/JM		CHEC	CKED BY	AS						SHEET	13A
DRILLING	CONTR.: Traut										24	v= 25
			F01.11	D C01	nio.	SAMPLING METHO	D:					DF 25 LING
	Dan Pflipsen	000	EQUI	P.: Sor	IIC	10' acetate bags	S				START	FINISH
	DEPTH: 370 FT E					WATER LEVEL					TIME	TIME
	SURFACE ELEVATI	ON:				TIME					4500	4500
COMMEN	UTM NAD83 TS:					DATE					1500 DATE	1500 DATE
						CASING DEPTH					06.04.20	06 00 20
										WEI	06-04-20 _L DIAGRAI	06-09-20 M
	LOCATION	S. O		SOIL	MAT	TERIAL DESCR	IPT	ION				
			346		medium, sub-rou trace glauconite	poorly to moderate unded, dolomitic p (5%), trace dark n 10G, beginning of	recip nanç	oitate (10%), ganese staining		G	rout (neat ceme 0'-350' bgs)	ent)
			347								0 000 bgs,	
			348							4' (1	' LC Steel Casi 0'-350' bgs)	ng
			349									
			350			poorly to moderate unded, dolomitic of					rout Basket 350' bgs)	
			351		GLE 12 3/ TOBG	10 GLL 12 3/10G						
		Ct	352									
			353									
			354									
355 —									•	7'	' Open Hole 350'-370' bgs)	
356 —												
			359 -									



							_		••••			
CLIENT:	MPCA					JOB NO.: 60618753	LOCAT	ΓΙΟΝ: East Me	tro MN	ı		
PROJECT	:					DRILLING METHO	DD:	East Me	uo, wiiv		BORING	NO.
	Project 1007		Ī		•	Sonic						V13A
	BY: AS/AEL/JM		CHEC	CKED BY:	AS	_					SHEET	
	CONTR.: Traut					SAMPLING METH	IOD:					OF 25
	Dan Pflipsen		EQUI	P.: Sor	nic	10' acetate ba					START	ILLING FINISH
	DEPTH: 370 FT E					WATER LEVEL					TIME	TIME
	UTM NAD83	OIN.				TIME					1500	1500
COMMEN						DATE					DATE	DATE
		ı		1		CASING DEPTH					06-04-2	06-09-20
		κį	 포뇨	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	NS:						
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	JIL/R(WE	ELL DIAGRA	M
			_=) S	MAT	ERIAL DESCI	RIPTION					
				::::::	SANDSTONE, po	oorly to moderat	telv cemer	nted, fine to				
					SANDSTONE, po medium, well-rou (10%); GLEY1 5/	nded, dolomitic	cement (1	10%), vugs				
			361		(10%), GLETT 3/	in, clay observe	u					
				-								
			362									
			363									
				-								
			364	-								
		Ct	365						-		7" Open Hole	
											(350'-370' bgs)
			366									
			367									
			368									
				-								
			369									
			370		E.O.B. @ 370' bg	gs, no refusal			1.:1	<u> </u>		
			371	-								
			372	-								
				-								
			373									
			374									
				1								



CLIENT:	MDCA					JOB NO.:	LOCATION:	4 NA - 4 NAN			
PROJECT						60618753 DRILLING METHOD		t Metro, MN		BORING N	0.
	Project 1007					Sonic				MW	′13B
LOGGED	BY: AS/AEL/JM		CHEC	CKED BY:	AS	_				SHEET	100
DRILLING	CONTR.: Traut									1 0	F 21
DRILLER:	Dan Pflipsen		EQUI	P.: Sor	nic	SAMPLING METHO				DRIL	LING
	DEPTH: 310 FT B	GS				10' acetate bag	;			START	FINISH
GROUND	SURFACE ELEVATI	ON:				WATER LEVEL				TIME	TIME
	UTM NAD83					TIME				1000	1300
COMMEN	TS:					DATE				DATE	DATE
				_		CASING DEPTH				06-15-20	06-17-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass	NS:			WEL	L DIAGRAI	M
TYPE	LOCATION	U.S	۵z	SOIL	MAT	TERIAL DESCR	IPTION				
					SAND fine to me	edium (50% fine,	15% medium)	- KA	K/J		-
			1 -		sand, fine to me sub-rounded, por 10YR 6/6	edium (50% fine, 4 orly graded, trace	i5% medium), clay (5%); wet,				
			2 -			arse (55% fine, 39 nded, poorly grad					
			3 -								
		SP	4 -								
			5 -						(0'	out (neat cem '-291' bgs)	ent)
			6 -								
			8 -			to coarse (60% fir orly graded; dry, 1),			
		sw	9 -		SAND, fine to co coarse), sub-rou moist to wet, 10Y	arse (45% fine, 40 nded, well graded /R 4/6)% medium, 10% , trace silt (5%);	%			
DISCRETE	MW13B-SOIL 11-14	sc	10 -			fine to coarse (20 parse), sub-rounde YR 4/4		clay		LC Steel Casi '-295' bgs)	ng
JISOKETE	11-14	SP	11 -			arse (15% fine, 70 nded, poorly grad					
			13 -	- -	CLAY. low to me	dium plasticity, so	ft, with sand. fine	e to			
		CL				sub-rounded; mois					



CLIENT:	MPCA					JOB NO.: 60618753	LOCAT		etro, MN				
PROJECT						DRILLING METHO	DD:	East IV	elio, iviin		BORING N	O.	
LOGGED	BY: AS/AEL/JM		CHEC	KED BY:	AS	Johno					MW	′13B	
DRILLING	CONTR.: Traut										2 0	of 21	
	Dan Pflipsen		EQUIP	: Sor	nic	SAMPLING METH					+	LING	
	DEPTH: 310 FT B	BGS				10' acetate ba	gs				START	FINISH	
GROUND	SURFACE ELEVATI	ON:				WATER LEVEL					TIME	TIME	
	UTM NAD83					TIME					1000	1300	
COMMEN	15:					DATE					DATE	DATE	
		ω	z.t.	ğτ	SURFACE CONDITION	CASING DEPTH					06-15-20	06-17-20	
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH		ERIAL DESCI	RIPTION			WELL	DIAGRA	М	
				0,									
			16		SAND, fine to me sub-rounded, poo								
DISCRETE	MW13B-SOIL 20-22	SP	19 —		coarse), sub-rour dry, 10YR 5/3	O fine to modium (20% fine 70% modium)							
DISCRETE	MW13B-SOIL 22-24		21 —		sub-rounded, poo	orly gråded; dry,	10YR 5/6)		(0'-2	291' bgs)		
GRAB	MW13B-GW 22-24		23 —		SAND, fine to coa coarse), sub-rour moist, 10YR 4/3,	nded, well grade							
		SW	25 — 26 — 27 —		SAND, fine to coa coarse), sub-ang with clay (10%); o clay lense @ 27'	ular to sub-roun lry to moist, 10\	ded, well	graded,			C Steel Casi 295' bgs)	ng	
		SP	28 -		SAND, medium to coarse), sub-rour								



											L DOMIN	
CLIENT:	14504					JOB NO.:	LOC	ATION:				
PROJECT	MPCA : Project 1007					60618753 DRILLING METHOD Sonic):	East M	etro, MN	N	BORING N	Ю.
	•				•	Johne					MW	/13B
LOGGED	BY: AS/AEL/JN	VI	CHEC	CKED BY	: AS	-					SHEET	
DRILLING	CONTR.: Traut					_					3 (OF 21
DRILLER:	Dan Pflipsen		EQUI	p.: Soi	nic	SAMPLING METHO 10' acetate bags					DRIL	LING
BORING D	EPTH: 310 FT	BGS				To doolate bage					START	FINISH
GROUND	SURFACE ELEVA	TION:				WATER LEVEL					TIME	TIME
	UTM NAD83					TIME					1000	1300
COMMENT	15:					DATE					DATE	DATE
				1	SURFACE CONDITIO	CASING DEPTH					06-15-20	06-17-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass	ing.				WE	ELL DIAGRA	M
TYPE	LOCATION	U.S		SOIL	MA ⁻	TERIAL DESCRI	PTIO	N				
		sw			coarse), sub-rou	parse (30% fine, 30 nded to well-round b), sub-angular; mo	led, w	ell graded,				
			31		4/3	/500/ S	000/		/ >>			
					20% coarse), su	coarse (50% fine, b-angular to sub-re	ounde	d, well				
			32		graded, sand, co wet, 10YR 4/2	parse (10%), sub-re	ounde	d; moist to				
		GW			wet, 1011X 4/2							
			33									
			34		CLAY low plasti	city, medium stiff, ç	rravel	coarse				
				- //////	(5-10%), sub-rou	unded, trace cobbl	es (5%	6); dry to				
			35 -	¥/////	moist, 10YR 5/2, 36' bas	, 1" wet sand seam	ıs @ 3	35', 35.5', and			Grout (neat cem	ent)
				¥////	20 292						(0'-291' bgs)	,
		CL	36									
			37									
			38									
		sc				fine to medium (5 unded, clay (25%)						
		30			coarse (5%); we	t, 10YR 4/1	,auc	giavoi,				
1/29/2			39		CLAY, low plasti	city, medium stiff, o unded, trace cobbl	gravel,	coarse				
. J. J.				\ ////	moist, 10YR 5/2	anded, liace coppi	GS (37	υ _j , uiy ιΟ				
ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20			40	V////		ow plasticity, soft to					4" LC Steel Casi (0'-295' bgs)	ng
NDON				<i>\\\\\</i>	sand, fine to med (5-10%); dry, 10	dium (40%), grave YR 3/1	ı, tine t	o medium			. ,	
2			41	\ ////	, , , ,							
S.G				\ ////								
PLOG		CL	42	\ /////								
D N				\ ////								
1007			43	<i>\\\\\\</i>								
TAL				¥////								
Z E E			44	¥////								
IRON				<i>\\\\\\</i>								
Σ E				<i>\\\\\\</i>	1							



CLIENT:						JOB NO.:		LOCATION:				
	MPCA					60618753		East Me	tro, MN	١		
PROJEC1	: Project 1007					DRILLING METHO Sonic	DD:				BORING NO	
LOGGED	BY: AS/AEL/JM		CHEC	KED BY:	AS						SHEET	13B
DRILLING	CONTR.: Traut										4	- 04
			FOLUE	. Cor	io	SAMPLING METH	OD:				4 o	
	Dan Pflipsen		EQUIF	o.: Sor	IIC	10' acetate ba	gs				START	FINISH
	DEPTH: 310 FT B					WATER LEVEL					TIME	TIME
	SURFACE ELEVATION	ON:				TIME					1000	1200
COMMEN	UTM NAD83 TS:					DATE					1000 DATE	1300 DATE
						CASING DEPTH					06-15-20	06 17 20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass					WEI	LL DIAGRAN	
TYPE	LOCATION	U.S	ᆲ	SOIL	MAT	ERIAL DESC	RIP	TION	1			
				"								
COMP	MW13B-SOIL 46-50		46 —		SAND, medium t coarse), sub-rour to coarse (20%), SAND, medium t	nded, poorly grawith clay (10%); o coarse (18% r	dec mo	I, with gravel, fine bist, 5Y 4/1 lium, 80%				
	MW13B-GW	SP	47		coarse), sub-rour trace gravel, med	nded to well-roui lium (2%); dry to	nde mo	d, poorly graded, oist, 5Y 4/1				
GRAB	46-50		48 –									
										Grout (neat ceme	ont)	
	50 SAND, fin coarse), s with grave sub-angul					arse (10% fine, 3 ular to sub-roun o medium (15% ub-rounded; moi im @ 54' bgs	dec fine	l, well graded,			0'-291' bgs)	ant)
	3" fine gra											
coarse), su					SAND, fine to co- coarse), sub-rour moist to wet, 10Y	nded to well-rour					" LC Steel Casir 0'-295' bgs)	ng
56 GRAVEL, fir sub-angular						medium (60% fi ub-rounded, poo ell-rounded; mois	rly (graded, with sand,				
			58 -									
		SW			SAND, fine to co coarse), sub-rour trace gravel, fine	nded to well-rour	nde	d, well graded,				



								=NVIKC		IN I A	√ L [OKIN	G LUG
CLIENT:	MPCA					JOB NO.: 60618753	LOCA	ATION: Fast I	Metro, M	N			
PROJECT						DRILLING METHO	DD:	Last i	171	. •		BORING N	0.
	•				4.0	Sonic							/13B
LOGGED I	BY: AS/AEL/JN	/1	CHEC	CKED BY	: AS	+						SHEET	
DRILLING	CONTR.: Traut		1			_						5 (OF 21
DRILLER:	Dan Pflipsen		EQUI	P.: Soi	nic	SAMPLING METH 10' acetate bag						DRII	LING
BORING D	EPTH: 310 FT	BGS				To decide bu			1			START	FINISH
GROUND	SURFACE ELEVAT	ΓΙΟΝ:				WATER LEVEL						TIME	TIME
DATUM: COMMENT	UTM NAD83					TIME						1000	1300
COMMENT	13.					DATE						DATE	DATE
				1	SURFACE CONDITIO	CASING DEPTH						06-15-20	06-17-20
.		S.	上点	SOIL/ROCK GRAPH	Grass	7110.							
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	OIL/R GRA						V	VELL	DIAGRA	M
				8	MA	TERIAL DESCI	RIPTIOI	N					
		+		/////	CLAY, low plasti	city soft with sa	nd fine t	n medium	- KA	[X]			
		CL		-\////	(15%), sub-roun	ded, trace grave	, coarse	(5%); mois	t,				
			61	<i>\\\\\\</i>	10YR 4/2 SAND, fine to m	odium /470/ 5	170/ ·	odium/	─ 綴				
		SP		1/////	sub-rounded, pc	orly gràded, trac	e gravel,	, coarse					
		CL	62			oles (1%); moist,							
					CLAY, medium p	olasticity, stiff, tra el, medium (5%);							
			63 -		4/2	, ,	•						
		0.0	03		SAND, medium coarse), sub-rou	to coarse (25% r Inded, poorly gra	nedium, ded, with	50% n gravel,					
		SP			medium to coars	se (10% medium	, 15% cc	oarse),					
			64		sub-angular to s				$\neg \bowtie$				
					sub-rounded, po	orly graded, with	clay (10)%); moist,					
			65		10YR 4/3 CLAY, low to me	edium plasticity v	erv stiff	trace grave	<u>-</u>		−Groυ	ut (neat cem 291' bgs)	ent)
				- /////	fine (5%); dry, 10	OYR 5/4	ory our,	uace grave	" 👹		(0 -2	201 bg3)	
			66	- /////									
		CL		-{/////									
			67	-\////									
				-\////									
			68		CLAV modium	to high placticity	otiff too	0 0024	<u> </u>				
					CLAY, medium t coarse (5%), tra	.o nigri piasticity, ce gravel, fine (5º	ຣແກ, ເrac %); mois	e sand, it, 10YR 5/4	. 👹				
		СН	69 -		, , ,	J , (¹	,.						
			70								4" 1 4	C Stool C==	na
			70		CLAY, medium porange, green),	olasticity, stiff, ver	y mottle	d (gray, red	,		— 4" L((0'-2	C Steel Casi 295' bgs)	ng
				\////	orange, green),	ын (1070 <i>)</i> , ary, 5°) I						
			71	\ /////									
				<i>\\\\\\</i>									
			72	\ ////									
		CL		<i>\\\\\\</i>									
			73	-\////									
				- {/////									
			74	¥/////									
				¥/////									
				<u> </u>									



					T	1	.14 0 11 ()				<u> </u>	
CLIENT: MPCA					JOB NO.: 60618753	LOCA	TION: East M	atro Mi	NI.			
PROJECT: Project 1007					DRILLING METHO Sonic	DD:	Last IVI	euo, ivii	<u> </u>		BORING N	0.
LOGGED BY: AS/AEL/JM		CHEC	KED BY:	AS	John							′13B
DRILLING CONTR.: Traut		OTILC	NED	710							SHEET	
DRILLER: Dan Pflipsen		FOL!!!	⊃.: Sor	NO.	SAMPLING METH	OD:						DF 21 LING
BORING DEPTH: 310 FT BO	GS	EQUII	<u>301</u>	iic	10' acetate bag	js –					START	FINISH
GROUND SURFACE ELEVATION					WATER LEVEL						TIME	TIME
DATUM: UTM NAD83					TIME						1000	1300
COMMENTS:					DATE						DATE	DATE
			T ~	SURFACE CONDITIO	CASING DEPTH						06-15-20	06-17-20
SAMPLE SAMPLE TYPE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					W	ÆLL I	DIAGRAI	М
TYPE LOCATION	<u> </u>		SOI	MAT	TERIAL DESCF	RIPTION	1					
	CH	76 - 77 - 78 - 78 - 79 - 78 - 79 - 78 - 79 - 78 - 79 - 79		CLAY, medium porange, green), so CLAY, low plastic 3/3 CLAY, high plast trace sand, fine (so coarse), sub-rout trace gravel, fine 4/10Y	city, soft, very weaticity, soft to media 3%); dry, 10YR 6	athered; um stiff, 6/3	dry, 7.5YR mottled,			(0'-29	Steel Casi 95' bgs)	



OLUENIT.						LODNO		IN VIII (OI			`		
CLIENT: MPC	-Δ					JOB NO.: 60618753	LOCAT	ION: East Me	atro M	N			
PROJECT:	ect 1007					DRILLING METHOD):	East Me	euo, ivi	IN		BORING N	0.
LOGGED BY: A			CHEC	CKED BY:	AS	Johno						MW	′13B
DRILLING CONTE				-									SE 24
DRILLER: Dan			FOUL	P.: Sor	nic	SAMPLING METHO							DF 21 LING
BORING DEPTH:		GS	LGO			10' acetate bag	6					START	FINISH
GROUND SURFA	CE ELEVATI	ON:				WATER LEVEL						TIME	TIME
DATUM: UTM	NAD83					TIME						1000	1300
COMMENTS:						DATE						DATE	DATE
					SURFACE CONDITIO	CASING DEPTH NS:						06-15-20	06-17-20
	AMPLE CATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					V	VELL	DIAGRAI	М
TYPE LO	CATION	'n	ΔZ	So	MAT	ERIAL DESCR	IPTION						
COMP +DUP	13B-SOIL 11-95 +MS/MSD 13B-GW 11-95 +MS/MSD	SP CL GP	91 - 92 - 93 - 94 - 95 - 96 - 97 - 100 - 101 - 102 - 103 - 104 -		SAND, fine to me sub-rounded, por SANDY CLAY, lo sub-rounded, trace COBBLES, sub-10YR 5/6 SAND, medium (edium (10% fine, 60 nded, well graded orly graded; moist edium (30% fine, 50 orly graded; moist ow plasticity, stiff, sice gravel, fine (5% angular to sub-rough), sub-roundioist to wet, 7.5YR	90% me;, 10YR st., 10YR st	dium), 5/2 dium), 5/6 e (30%), 0YR 5/6			(0'-2́	ut (neat cem 291' bgs) C Steel Casi 295' bgs)	



Cl	LIENT:						JOB NO.:	LOCATI						
PF	ROJECT						60618753 DRILLING METHOD):	East Met	o, M	N	BOI	RING N	O.
		Project 1007					Sonic						MW	13B
LC	OGGED	BY: AS/AEL/JN	1	CHEC	KED BY	: AS						SHE		100
DF	RILLING	CONTR.: Traut											8 o	F 21
DF	RILLER:	Dan Pflipsen		EQUIF	c.: So	nic	SAMPLING METHO 10' acetate bags						DRIL	LING
ВС	ORING E	DEPTH: 310 FT	BGS										TART	FINISH
GI	ROUND	SURFACE ELEVAT	TON:				WATER LEVEL						ΓIME	TIME
	ATUM: OMMEN	UTM NAD83					TIME						000 ATE	1300 DATE
	OIVIIVILIN	10.					DATE CASING DEPTH							
						SURFACE CONDITI						06-	15-20	06-17-20
	AMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					W	/ELL DIA	.GRAI	М
	TYPE	LOCATION	j		SOI	MA	ATERIAL DESCR	PTION						
										V//	N/A			
						SAND, medium with silt (10%):	n (90%), sub-rounde moist to wet, 7.5YR	ed, poorly : 4/1	graded,					
				106										
							n to coarse (45% mongular to sub-round							
				107		∷∖gravel, fine to m	nedium (10%), trace	silt (5%)	; moist,					
				107		7.5YR 4/1	coarse (20% fine, 70)% mediu	m. 5%					
				108		coarse), sub-an	ngular to sub-round	ed, poorly	graded,					
				108		trace slit (5%); r	moist to wet, 7.5YR	4/1						
				100										
				109										
				110		SAND, medium	to coarse (60% m	edium, 40)%			Grout (ne: (0'-291' b		ent)
			SP			coarse), sub-ro moist, 10YR 5/2	unded to well-round 2	ded, poor	ly graded;			`	0 /	
				111										
				112			nedium (60% fine, 3							
						sub-angular to (3%); moist, 10	sub-rounded, poorl YR 5/2	y graded,	trace silt					
				113		(6 70), 1110.00, 10	111 0/2							
9/20				114										
J 7/2				-										
H.GP				115								-4" LC Ste		ng
DOLP												(0'-295' b	igs)	
RAN				116		SII T low plasti	city, soft, sand, fine	to mediu	m (10%)					
.GPJ					4111		ace clay (5%); dry t							
-0GS				117	4111									
Į.					4111									
07_G			ML	118	1111									
ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20]									
AENT,				119]									
RONA]									
ENVE					$\coprod $									



01.15.15						LOBALG	1,55.	T1011				
CLIENT:	MPCA					JOB NO.: 60618753	LOCA	TION: East Me	tro M	N		
PROJEC1						DRILLING METHO Sonic	D:	Last IVIE	u U, IVI	IN	BORING N	O.
LOGGED	BY: AS/AEL/JM		CHEC	CKED BY	· AS	JOHIC						13B
		ı	LOHEC	PULLU DY	. 10						SHEET	
	CONTR.: Traut					SAMPLING METH	DD:					DF 21 LING
	Dan Pflipsen DEPTH: 310 FT F	RC8	EQUIF	P.: So	nic	10' acetate bag					START	FINISH
	SURFACE ELEVAT					WATER LEVEL					TIME	TIME
	UTM NAD83	1014.				TIME					1000	1300
COMMEN						DATE					DATE	DATE
						CASING DEPTH					06-15-20	06-17-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	DNS:				WE	ELL DIAGRAI	M
TYPE	LOCATION) S.O	Z	SOIL	MA	TERIAL DESCF	RIPTION	l				
										N		
COMP	MW13B-SOIL 121-125		121 -		coarse), sub-and	to coarse (70% m gular to sub-round ace gravel, coars	ded, pooi	rly graded,				
			122									
GRAB	MW13B-GW 121-125		123 -		SAND, fine to co coarse), sub-rou 7.5YR 5/3	parse (25% fine, 7 Inded, poorly grad	0% med led; dry t	ium, 5% o moist,				
		SP	124		coarse), sub-and	to coarse (50% m gular to sub-round	ded, poor	rly graded,				
			125		(5%); moist, 7.5	arse (10%), sub-a YR 4/4 edium (70% fine,					Grout (neat ceme (0'-291' bgs)	ent)
			126		sub-rounded, po	oorly graded; dry t	o moist,	7.5YR 5/6				
			127		•							
			128									
			129		CAND fine to a	(400/ fine 6	·00/ d	i 200/				
		SW			coarse), sub-rou	parse (10% fine, 6 inded, well graded	d; dry to i	moist,				
			130		7.5YR 6/6	ne (85%), sub-rou	nded sil	t (15%): da.			4" LC Steel Casi	ng
			124		7.5YR 5/6	ie (00%), Sub-fou	nueu, Sil	i (15%); ary,			(0'-295' bgs)	-
			131 -		•							
		SM	132									
		JIVI	133									
			134									



CLIENT:						JOB NO.:	LOC	ATION:				
	MPCA					60618753		East Met	ro, MN			
PROJECT						DRILLING METHOD	D:		•		BORING N	
LOGGED	BY: AS/AEL/JM		CHEC	KED BY:	AS						SHEET	13B
DRILLING	CONTR.: Traut										10 0	F 21
	Dan Pflipsen		EOUI	c.: Sor	nic	SAMPLING METHO						LING
	DAN FINDSEN DEPTH: 310 FT E	RGS	EQUIF	·. 301	IIC .	10' acetate bag	3				START	FINISH
	SURFACE ELEVATI					WATER LEVEL					TIME	TIME
	UTM NAD83	O14.				TIME					1000	1300
COMMEN						DATE					DATE	DATE
						CASING DEPTH					06-15-20	06-17-20
SAMPLE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass	NS:				WELL	. DIAGRAI	
TYPE	LOCATION	ت ا	□Z	SOII	MAT	TERIAL DESCR	IPTIO	N				
		SM	136		SILTY SAND, fin 7.5YR 5/6	e (85%), sub-roui	nded, s	silt (15%); dry,				
			137		SAND, fine to me sub-rounded, po	edium (85% fine, orly graded; dry to	15% m moist	nedium), r, 7.5YR 5/6				
			138									
			139	_								
			140		SAND, fine to me sub-rounded, po	edium (80% fine, 2 orly graded; moist	20% m to we	nedium), t, 10YR 4/4		Gro (0'-	ut (neat cemo 291' bgs)	ent)
			141 –									
			142									
		SP	143 -									
			144							4" 1	C Steel Casii	na
			146	-						(0'-	295' bgs)	19
			147 —	- -								
			148 -		SAND fine to me	edium (80% fine, 2	20% m	nedium)				
			149 –		sub-rounded, po	orly graded; moist	1, 10YF	R 4/4				



CLIENT:						JOB NO.:		LOCATION:						
	MPCA					60618753		Ea	st Metro	, MN				
PROJECT	г: Project 1007					DRILLING METHO Sonic	OD:						BORING NO	
LOGGED	BY: AS/AEL/JM		CHEC	KED BY:	AS								MW SHEET	13B
DRILLING	CONTR.: Traut												11 o	F 21
	Dan Pflipsen		EQUIF	.: Sor	nic	SAMPLING METH							DRIL	
	DEPTH: 310 FT E	BGS				10' acetate ba	gs						START	FINISH
	SURFACE ELEVATI					WATER LEVEL							TIME	TIME
DATUM:	UTM NAD83					TIME							1000	1300
COMMEN	ITS:					DATE							DATE	DATE
						CASING DEPTH							06-15-20	06-17-20
		ο.	E 타	SOIL/ROCK GRAPH	SURFACE CONDITION Grass	NS:								
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	OIL/R	MAT	ERIAL DESCI	DID	TION			W	ELL [DIAGRAI	Л
				S	IVIAT	ENIAL DESCI	NIF	TION						
					SAND, fine to me	edium (80% fine	, 15	% medium),	K	<u>a</u>	M			
					sub-rounded, poo moist, 10YR 4/4	orly graded, trac	e si	lt (5%); dry to)					
			151		1110131, 10111 4/4					8				
			152											
			153											
		SP	_											
			154 —											
			155 —									-Grout	(neat ceme	ent)
												(0'-29	(fical cerric 91' bgs)	111)
			156 –											
			157											
			157 —		SILT, low plasticit sub-rounded; dry	ty, soft, with san	d, fi	ne (15%),						
			450	1111	sub-rounded, dry	7, 1011(3/4								
			158 –	1										
		ML		1										
			159	1						X				
				1										
			160		SAND, fine to me	edium (78% fine	, 20	% medium),				4" LC (0'-29	Steel Casir 95' bgs)	ng
					sub-rounded, poo 10YR 5/4	orly graded, trac	e si	lt (2%); moist	.,			(-3-,	
			161							$\langle \rangle$				
		SP							K					
			162											
			 							X				
			163		SILT, low plasticit	ty, soft, sand. fin	ne (1	0%),						
		ML	-		sub-rounded; we	t, 10YR 4/4	`	,,						
			164		SAND, fine to me	edium (85% fine	. 5%	medium)	—— <u> </u>	X				
		SP			sub-rounded, poor				t,					

ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20



CLI	ENT:						JOB NO.:	LOCAT						
PRO	OJECT	MPCA :					60618753 DRILLING METHOD): :	East Met	ro, M	N	BORI	ING NO	D.
		Project 1007		1			Sonic							13B
LOC	GGED	BY: AS/AEL/JN	1	CHEC	KED BY	: AS						SHEE		100
DRI	ILLING	CONTR.: Traut										12	2 0	F 21
DRI	ILLER:	Dan Pflipsen		EQUIF	c.: So	nic	SAMPLING METHO 10' acetate bags						DRIL	LING
вог	RING D	EPTH: 310 FT	BGS					, 				STA		FINISH
GR	OUND	SURFACE ELEVAT	ION:				WATER LEVEL					TIM	ME	TIME
	TUM: MMEN	UTM NAD83					TIME					10 DA		1300 DATE
	IVIIVILIA	10.					DATE CASING DEPTH							
					\ \	SURFACE CONDITI						06-1	5-20	06-17-20
	MPLE YPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					W	ELL DIAG	SRAN	Л
	YPE	LOCATION))		SOI	MA	ATERIAL DESCR	PTION						
											N/A			
						sub-rounded, p	nedium (85% fine, 5 oorly graded, with s	o% medi silt (10%	um),); moist,					
				166		10YR 5/4								
			SP			:								
				167										
				168		CII T lour placti	oitre ooft to modium	atiff tra	aa aand					
					4	fine (5%); dry, 1	city, soft to medium IOYR 5/4	Sun, ua	ce sanu,					
			ML	169	1111									
					1111									
				170	<u> </u>	CAND for the second		150/	di			−Grout (neat	ceme	ent)
						sub-rounded, p	nedium (80% fine, 1 oorly graded, trace	silt (5%)	; moist to			(0'-291' bg	s)	,
				171		wet, 10YR 4/4								
				172										
			SP	173										
20				174		:]								
7/29/						: -								
LGPJ				175								-4" LC Steel	Casir	ng
OLP!												(0'-295' bg	s)	
RAND				176		CANDVOLLE		l 6:	An and alterna					
GP.					1111		ow plasticity, soft, sanded; moist, 10YR		to mealum					
.0GS.				177	1111									
빌			ML]									
07_G				178]									
AL 10]									
AENT,				179				100'						
ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20			SP				nedium (49% fine, ² loorly graded, trace							
ENX						moist, 10YR 5/4			, , ,					



CLIENT:	MDCA					JOB NO.:	L	OCATIO		latua NAN			
PROJEC	MPCA T: Project 1007					60618753 DRILLING METHO	OD:		East IV	letro, MN	N	BORING N	0.
	<u>-</u>		0.150		4.0	Sonic							13B
	BY: AS/AEL/JM		CHEC	CKED BY:	AS	_						SHEET	
	CONTR.: Traut					SAMPLING METH	HOD:						F 21
	Dan Pflipsen		EQUI	P.: Sor	nic	10' acetate ba						START	LING
	DEPTH: 310 FT E					WATER LEVEL						TIME	FINISH
	SURFACE ELEVATI UTM NAD83	ON:				TIME						1000	1300
COMMEN						DATE						DATE	DATE
						CASING DEPTH						06-15-20	06-17-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass	NS:		I			\//E	ELL DIAGRAI	
TYPE	LOCATION	U.S.	DE	SOIL	MAT	TERIAL DESC	RIPT	ION			VVL		VI
COMP	MW13B-SOIL 181-185		181 -		SAND, fine to co coarse), sub-ang dry to moist, 10Y	gular to sub-roun	70% i ided,	mediu poorly	m, 5% graded;				
GRAB	MW13B-GW 181-185		_										
GIVAD	101-100		183 -										
			184										
			185		SAND, fine to co coarse), sub-rou							Grout (neat cem (0'-291' bgs)	ent)
			186		10YR 5/6	71 70	ŕ	j	,				
		SP	187										
		36	188 -										
			189										
			190							-	-	4" LC Steel Casi (0'-295' bgs)	ng
			191										
			192										
			193										
			194	- -									

ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20



CLIENT:	MDOA					JOB NO.:	LOCA		4 NAN	ı		
PROJECT:	MPCA : Project 1007					60618753 DRILLING METHO	DD:	East Me	tro, Min		BORING N	0.
					10	Sonic					MW	′13B
	BY: AS/AEL/JM		CHEC	KED BY:	AS	1					SHEET	
DRILLING	CONTR.: Traut										14 (of 21
DRILLER:	Dan Pflipsen		EQUIF	c.: Sor	nic	SAMPLING METH 10' acetate bag						LING
BORING D	EPTH: 310 FT E	3GS								1	START	FINISH
	SURFACE ELEVATI	ION:				WATER LEVEL					-	
DATUM: COMMENT	UTM NAD83					DATE					1000 DATE	1300 DATE
						CASING DEPTH						
		(o)		ğτ	SURFACE CONDITIO Grass						06-15-20	06-17-20
SAMPLE TYPE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH		ERIAL DESCR	RIPTION	<u> </u>		WELI	L DIAGRA	М
		SP	196 - 197 - 198 - 199 - 200 - 201 - 202 - 203 - 204 - 205 - 206 -		SAND, fine to me sub-rounded to v wet, 10YR 5/6 SAND, fine to me well-rounded, por sub-rounded, por sub-rounded, por sub-rounded, por sub-rounded, sub-ang dry, 10YR 4/3	edium (70% fine, vell-rounded; moist to we edium (85% fine, orly graded; moist arse (5% fine, 55% ded, with t, 10YR 5	gravel, fine 5/6 edium), ed; moist to edium), 5/6		4" 1	out (neat cem -291' bgs) _C Steel Casi -295' bgs)		
			207 -	-								



	CLIENT:	MPCA					JOB NO.:	LOCA		otro NAI	NI.		
	PROJECT						60618753 DRILLING METHO Sonic	D:	East Me	euo, ivii	N .	BORING N	IO.
	LOGGED	BY: AS/AEL/JM		CHEC	KED BY	: AS	Corne					MW	/13B
	DRILLING	CONTR.: Traut										15 (OF 21
	DRII I FR	Dan Pflipsen		FOUI	P.: Soi	nic	SAMPLING METHO						LLING
		DEPTH: 310 FT E	BGS	1 = 40			10' acetate bag	JS				START	FINISH
	GROUND	SURFACE ELEVAT	ION:				WATER LEVEL					TIME	TIME
		UTM NAD83					TIME					1000	1300
	COMMEN	TS:					DATE					DATE	DATE
				1	1		CASING DEPTH					06-15-20	06-17-20
	SAMPLE	SAMPLE	.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass	NS:				W	ELL DIAGRA	M
	TYPE	LOCATION	U.S.	N N	SOIL	MAT	ERIAL DESCR	RIPTION			VV	LLL DIAGRA	111
						CAND for the co	(400/ £ E	.00/	: 400/	\ \ \ \ \	R/A		
						SAND, fine to co coarse), sub-rour	arse (40% fine, 5 nded, well graded	ou‰ mea d; dry, 10	ium, 10% YR 5/3				
				211									
						!							
				212		•							
				213		Ī							
						•							
				214 -									
				214		SAND, fine to co coarse), sub-rour	arse (10% fine, 4	0% med	ium, 50%				
				045		COarse), Sub-rour	naca, well graded	a, dry, ro	111 3/4			0 1/ 1	
				215		SAND, fine to co coarse), sub-ang	arse (10% fine, 3	0% med	ium, 60%			Grout (neat cem (0'-291' bgs)	ent)
						to moist, 10YR 5	/4	ieu, weii	graueu, ury				
				216		!							
						•							
				217									
			SW			!							
				218		•							
9/20				219									
J 7/2						•							
PH.GF		MW13B-SOIL		220								-4" LC Steel Casi (0'-295' bgs)	ing
DOLF		221-225		-								(0-295 bgs)	
RAN	COMP	(+DUP)		221		<u> </u>							
.GPJ													
_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20				222	- - ! ! ! ! !	!							
INT		MW13B-GW 221-225											
	GRAB	(+DUP)		223	-								
ENVIRONMENTAL 1007						Ţ							
MENT				224		‡							
RON						<u> </u>							
ENV					Ĭ. Š. Š. Š. Š. Š.								



CLIENT:	MDOA					JOB NO.:	LOCAT						
PROJECT						60618753 DRILLING METHOD):	East Met	ro, IVI	N	ВС	ORING NO) .
	Project 1007					Sonic						MW	13B
LOGGED	BY: AS/AEL/JN	1	CHEC	KED BY	: AS	_					SH	HEET	
DRILLING	CONTR.: Traut											16 o	F 21
DRILLER:	Dan Pflipsen		EQUIF	c.: Sor	nic	SAMPLING METHO 10' acetate bags						DRIL	LING
BORING I	DEPTH: 310 FT	BGS										TART	FINISH
	SURFACE ELEVAT	ION:				WATER LEVEL						TIME	TIME
DATUM: COMMEN	UTM NAD83 TS:					DATE						1000 DATE	1300 DATE
						CASING DEPTH							
				×	SURFACE CONDITI						00	-15-20	06-17-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					W	/ELL DIA	AGRAN	Л
TYPE	LOCATION	U.S	밀밀	SOIL	MA	TERIAL DESCR	IPTION			•		(OI to til	v i
					SAND, fine to c	coarse (10% fine, 70)% medi	um, 20%	M				
					10YR 5/4	igular to sub-round	ea, well (graded, dry,					
			226	*****	•								
					•								
			227	*****		oarse (25% fine, 63							
		SW			trace gravel, find	ngular to sub-rounde e (2%); dry, 10YR 4	ea, well (1/4	graded,					
			228		_	, , ,							
					<u> </u>								
			229										
					!								
			230	0.0.0		oarse (5% fine, 659					Grout (ne (0'-291'	eat ceme	ent)
					coarse), sub-an moist, 10YR 5/	igular to sub-round 1	ed, poor	ly graded;			(-	3 /	
			231										
			232										
			233										
29/20			234										
// rc													
PH.G		SP	235			coarse (5% fine, 559					-4" LC Ste (0'-295'		ng
NDOL					coarse), sub-an moist, 10YR 5/	igular to sub-round 1	ed, poor	ly graded;			(0 200	~9~)	
L RAI			236										
S.GP													
901 			237										
TI GINI													
1007			238										
JA			-										
ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20			239		-								
NIRO 			-										
甸									K/λ	K/λ			



MPCA SOLITOR Project 1007 ROSING NO. SONIC SONI	CLIENT:						JOB NO.:	LOCA	TION:				
Project 1007								200/		tro, M	N		
DRILLING CONTR: Traut DRILLING Traut DRILLING DEPTH: 310 FT BGS GROUND SURFACE ELEVATION: DATE LOCATION SAMPLE TYPE SAMPLE SA	PROJECT:							D:				BORING N	О.
DRILLING CONTR:: Traut DRILLER: Dan Pflipsen EQUIP: Sonic SAMPLING METHOD: 10" acetate bags START FINISH TIME DATUM: UTM NAD83 COMMENTS: DATE LOCATION SAMPLE SAMP	LOGGED	•	1	CHEC	KEU BA	. Δς							′13B
DRILLER: Dan Pflipsen EQUIP: Sonic SAMPLING METHOD: 10' acetate bags START FINISH FINISH START FINISH TIME TIME TIME DATUR. UTM NAD83 TIME DATE DATE DATE DATE DATE DATE DATE DAT			'1	CHLC	KLD D1	. 10						SHEET	
BORING DEPTH: 310 FT BGS GROUND SURFACE ELEVATION: DATUM: UTM NAD83 COMMENTS: SAMPLE SAMPLE LOCATION Grass WELL DIAGRAM Grout (neat cement) (0'-291' bgs) Grout (neat cement) (0'-291' bgs) Grout (neat cement) (0'-291' bgs) SAND, fine to medium (45% fine, 50% medium), sub-rounded, poorly graded, with gravel, fine to coarse (12%), sub-angular, trace cobbles (3%); moist, 10YR 5/4							SAMPLING METH						
GROUND SURFACE ELEVATION: DATE DATE DATE CASING DEPTH SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE SAMPLE TYPE SAMPLE TIME 1000 1300 1300 1300 1300 1300 1300 13		•		EQUIF	p.: Sor	nic							
DATURE LTM NAD83							WATER LEVEL						
COMMENTS: DATE CASING DEPTH DATE DATE DATE DATE DATE DATE DATE DAT			ION:									1000	1200
SAMPLE TYPE SAMPL													
SAMPLE TYPE SAMPLE LOCATION SAMPLE LOCATION SAND, fine to coarse (30% fine, 65% medium, 5% coarse), sub-angular to sub-rounded, poorly graded; moist, 10YR 4/4 SP 241 SAND, fine to medium (45% fine, 50% medium), sub-rounded, poorly graded, trace silt (3%), trace gravel, fine (2%); moist, 10YR 5/4 SAND, fine to coarse (15% fine, 50% medium, 20% coarse), sub-rounded, poorly graded, with gravel, fine to coarse (15% fine, 50% medium, 20% coarse), sub-rounded, poorly graded, with gravel, fine to coarse (15% fine, 50% medium, 20% coarse), sub-rounded, poorly graded, with gravel, fine to coarse (15% fine, 50% medium, 20% coarse), sub-rounded, poorly graded, with gravel, fine to coarse (15%), sub-angular, trace cobbles (3%); moist, 10YR 5/4							CASING DEPTH					06-15-20	06-17-20
SAND, fine to coarse (30% fine, 65% medium, 5% coarse), sub-angular to sub-rounded, poorly graded; moist, 10YR 4/4 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 SAND, fine to coarse (15% fine, 50% medium), sub-rounded, poorly graded, trace silt (3%), trace gravel, fine (2%); moist, 10YR 5/4 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	SAMPLE	SAMPLE	. C.S.	PTH	/ROCK		DNS:				WE		
SAND, fine to coarse (30% fine, 65% medium, 5% coarse), sub-angular to sub-rounded, poorly graded; moist, 10YR 4/4 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 SAND, fine to coarse (15% fine, 50% medium), sub-rounded, poorly graded, trace silt (3%), trace gravel, fine (2%); moist, 10YR 5/4 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		LOCATION	U.S		SOIL	MA	TERIAL DESCF	RIPTION	1				
coarse), sub-angular to sub-rounded, poorly graded; moist, 10YR 4/4 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 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													
SAND, fine to medium (45% fine, 50% medium), sub-rounded, poorly graded, trace silt (3%), trace gravel, fine (2%); moist, 10YR 5/4 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				241 —		coarse), sub-and	gular tò sub-round	5% med led, poo	lium, 5% rly graded;				
SAND, fine to medium (45% fine, 50% medium), sub-rounded, poorly graded, trace silt (3%), trace gravel, fine (2%); moist, 10YR 5/4 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				242									
SAND, fine to medium (45% fine, 50% medium), sub-rounded, poorly graded, trace silt (3%), trace gravel, fine (2%); moist, 10YR 5/4 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													
SAND, fine to medium (45% fine, 50% medium), sub-rounded, poorly graded, trace silt (3%), trace gravel, fine (2%); moist, 10YR 5/4 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													
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			SP			sub-rounded, po	orly graded, trace	silt (3%				Grout (neat ceme (0'-291' bgs)	ent)
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													
						coarse), sub-rou to coarse (12%),	ınded, poorly grad , sub-angular, trad	ded, with	gravel, fine				
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 SW 251 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						moist, 10YR 5/4							
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 SW 251 SW 253 254													
SW 251 - 252 - 253 - 254				250		coarse), sub-rou	inded, well graded	d, trace g	gravel, fine				ng
SW 252 - 253 - 254				251			, ,, ,,						
			sw	252									
				253									
				254 -									



						1	<u> </u>					
CLIENT:	MDCA					JOB NO.:	'	LOCATION:	ro MA	ı		
PROJECT	MPCA : Project 1007					60618753 DRILLING METHO	D:	East Me	Iro, iviiv	1	BORING NO	D .
LOGGED	BY: AS/AEL/JM	1	CHEC	KED BY:	AS	Sonic					MW	13B
		•	OFFICE	NED D1.	710	1					SHEET	
DRILLING	CONTR.: Traut					CAMPLING METHO	3D.				18 o	
DRILLER:	Dan Pflipsen		EQUIF	o.: Sor	ic	SAMPLING METHO 10' acetate bag					DRIL	
BORING D	EPTH: 310 FT	BGS									START	FINISH
GROUND	SURFACE ELEVAT	ION:				WATER LEVEL					TIME	TIME
	UTM NAD83					TIME					1000	1300
COMMEN.	18:					DATE					DATE	DATE
		1	ı		OUDEAGE CONDITIO	CASING DEPTH			1		06-15-20	06-17-20
		o,	ᆂ	SOIL/ROCK GRAPH	SURFACE CONDITIO Grass	INS:						
SAMPLE	SAMPLE LOCATION	U.S.C.S.	DEPTH IN FEET	L/RC						WE	LL DIAGRAM	Л
TYPE	LOCATION) –		SOI	MAT	ΓERIAL DESCR	RIPT	TION				
		SW		*****	SAND, fine to co	arse (20% fine, 6	0%	medium, 20%				
			1			nded, well graded b), well-rounded, p						
			256		silt (10%); dry, 2.	.5Y 5/3	poo	rry graded, with				
			 									
			257									
		SP										
			258									
			230									
			259		SAND, fine to co	arse (30% fine, 5	5%	medium, 10%				
		SW	-		coarse), sub-rou	nded, well graded	d, tra	ace lithic				
			260	6000		moist to wet, 2.5\ m to coarse (60%)				-	Grout (neat ceme	ent)
				[0°C	coarse), sub-and	gular to well-round	ded,	poorly graded,			(0'-291' bgs)	
			261		sand, coarse (10 10YR 3/3)%), well-rounded	l, tra	ice silt (5%); wet,				
			201	600	10 YR 3/3							
			262									
				100								
		GP	263									
			-	00								
			264									
				00								
			265								111 L C Ct C	
			205	Pool							l" LC Steel Casir (0'-295' bgs)	ıg
			266		SAND, fine to me	edium (20% fine,	80%	6 medium),				
						orly graded; mois						
			267									
		SP	268									
		J.	200									
			269			edium (65% fine,						
					sub-rounded, po moist, 10YR 4/4	orly graded, trace	e silt	(5%); dry to				



CLIENT:	MDCA					JOB NO.:	LOCAT		1.11				
PROJECT						60618753 DRILLING METHO	DD:	East Met	ro, ivii	1		BORING NO	D.
	Project 1007					Sonic						MW	13B
LOGGED	BY: AS/AEL/JM		CHEC	KED BY:	AS	_						SHEET	-
DRILLING	CONTR.: Traut											19 o	F 21
DRILLER:	Dan Pflipsen		EQUIF	.: Sor	ic	SAMPLING METH 10' acetate bag						DRIL	LING
BORING	DEPTH: 310 FT E	BGS										START	FINISH
	SURFACE ELEVATI	ON:				WATER LEVEL						TIME	TIME
DATUM: COMMEN	UTM NAD83					TIME DATE						1000 DATE	1300 DATE
						CASING DEPTH							
				Y	SURFACE CONDITION							06-15-20	06-17-20
SAMPLE	SAMPLE	U.S.C.S.	DEPTH IN FEET	ROC	Grass					۱۸	/EII I	DIAGRAN	.,
TYPE	LOCATION	U.S.	A R	SOIL/ROCK GRAPH	MAT	ERIAL DESC	RIPTION			• • •			v'
				N	LITHIC FRAGME weathered, sand,	NTS, not comp	etent dolo	stone, very					
			271	A	weathered, sand,	, 11110 (00 70), 101	1 (0/0, 010	ay observed					
			272	3									
			2/2										
			273	X									
			074	R									
			274	72									
			275	K									
			2/5	K	LITHIC FRAGME weathered, sand,	NTS, not comp	etent dolo	stone, very			- Grout 0'-2!	t (neat ceme 91' bgs)	ent)
			070	A	coarser fragment	s than 270'-275'	bgs	ay observed,					
			276										
			077	3									
		LF	277	1									
		LF	278										
			210	X									
			279										
				X									
			280						M.	Ň.	- 4" I C	Steel Casir	ng.
					LITHIC FRAGME dolostone, sand,	ENTS, not to mo medium to coar	derately c se (30%).	competent dolomitic			(0'-2	95' bgs)	9
			281 –	P	precipitate (30%)	, oxidized; 2.5Y	5/4	dolorina					
			282	3									
				X									
			283	, CC									
					LITHIC FRAGME dolostone, sand,	ENTS, not to mo medium to coar	derately ones	ompetent dolomitic					
			284 –	3	precipitate (30%) 10YR 5/3	, oolitic texture (15%), vug	js (15%);					
					10113/3								
									$\rangle\rangle$				



									• • • •			
CLIENT:					JOB NO.:	LOCA	ATION:	otro NAN				
MPCA PROJECT: Project 1007					60618753 DRILLING METHO Sonic	DD:	East Mo	etro, ivir	N .		BORING N	О.
LOGGED BY: AS/AEL/JM		CHEC	CKED BY:	ΔS	_ Soriic							13B
DRILLING CONTR.: Traut		TOTILO	NED DT.	710						;	SHEET	
		- CO. III	n Con	.i.o	SAMPLING METH	OD:						F 21 LING
DRILLER: Dan Pflipsen BORING DEPTH: 310 FT BO	GS	EQUII	P.: Sor	IIC	10' acetate baç	gs					START	FINISH
GROUND SURFACE ELEVATION					WATER LEVEL						TIME	TIME
DATUM: UTM NAD83					TIME						1000	1300
COMMENTS:					DATE						DATE	DATE
				SURFACE CONDITIO	CASING DEPTH					0	06-15-20	06-17-20
SAMPLE SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	Grass					W	/ELL D	IAGRAI	М
TYPE LOCATION			SO	MAT	ERIAL DESCR	RIPTION	N					
				SANDSTONE, m	noderately comp	etent, int	erlayered		M			
				shale; GLEY 5/10	UB 10 2.5 ¥ 5/4, D	eginning	j oi Jordan				, ,	.
		286								Grout (0'-29	(neat ceme 1' bgs)	ent)
		287										
		288		CHALE			-1- (450/)			-4" LC \$	Steel Casir	ng
				SHALE, not com GLEY1 5/10GY	ресепт, аоютнис	precipil	ate (15%);			(0'-29	5' bgs)	
		289										
		290		SANDSTONE, p								
		291		fine, 10% mediur	n), sub-rounded	; 10YR 6	5/8					
		291										
		292		CANDSTONE =	oorly competed	fine to n	andium (QE)/			-2' Fine	Sand	
	Cj			SANDSTONE, p fine, 15% mediur	n), sub-rounded	; 10YR 6	6/8			(291'-	293' bgs)	
		293								-Sand fi	ilter pack 295' bgs)	
										(200)	Loo bgo,	
		294	†									
		295										
		233										
		296 -	: : : : : : : : : : : : : : : : : : :									
			-									
		297	-									
		298	- ::::::									
			 ::::::									
		299		SANDSTONE, p			0%),	 		slot)	ned interva	I (0.010"
				sub-rounded; 10	YR 6/8 to GLEY	1 //2					305' bgs)	



CLIENT:						JOB NO.:	Т	LOCATION:						
MPCA						60618753	o, M	, MN						
PROJECT: Project 1007						DRILLING METHOR Sonic	BORING NO.							
LOGGED BY: AS/AEL/JM CHECKED BY: AS							MW13B SHEET							
DRILLING CONTR.: Traut						24 05 24								
						SAMPLING METHO	21 OF 21 DRILLING							
DRILLER: Dan Pflipsen EQUIP.: Sonic BORING DEPTH: 310 FT BGS						10' acetate bags						START FINISH		
GROUND SURFACE ELEVATION:						WATER LEVEL						TIME	TIME	
DATUM: UTM NAD83						TIME						1000	1300	
COMMENTS:						DATE						DATE	DATE	
						CASING DEPTH						06-15-20	06-17-20	
SAMPLE TYPE	SAMPLE	U.S.C.S.	DEPTH IN FEET	SOIL/ROCK GRAPH	SURFACE CONDITIONS: Grass			WELL DIAGRAM						
	SAMPLE LOCATION				MAT	ERIAL DESCR	RIP	TION			**	2,, (0, 0, 0	••	
					SANDSTONE, p fine, 20% mediur	, poorly cemented, fine to medium (80% lium), sub-rounded; GLEY1 7/2								
			301		SANDSTONE, poorly cemented, fine to medium (80% fine, 20% medium), sub-rounded, trace shale (5%);					Screened interval (0.010" slot)				
			200		GLEY1 7/1, 1" sh	7/1, 1" shale seam @ 304' bgs		gs		∄ :	(29	(295'-305' bgs)		
			302											
			303 -							∄				
		Cj												
			304							=				
				- : : : : : : :										
			305											
				-										
			306	-:::::										
			307							₩	— Sluff	Backfill 5'-310' bgs)		
			_								(30	5'-310' bgs)		
			308											
			309											
			310		E.O.B. @ 310' b	ıs, no refusal								
			311											
				-										
			312											
			313											
			314											
				+										

ENVIRONMENTAL 1007_GINT_LOGS.GPJ RANDOLPH.GPJ 7/29/20