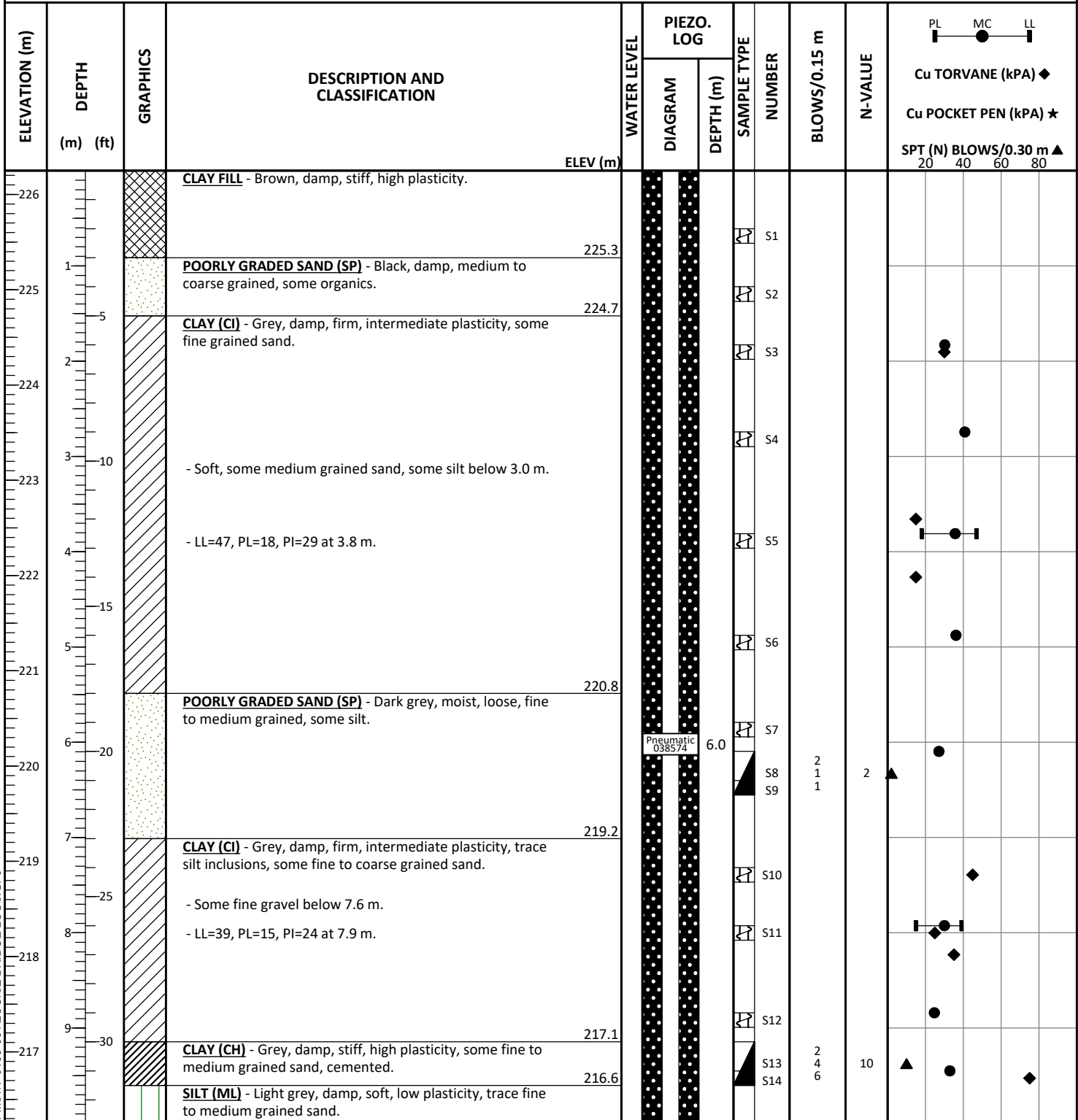


APPENDIX D: ADDITIONAL TEST HOLE LOGS

CLIENT	WSP CANADA GROUP LIMITED	PROJECT NO.	17-0183-001
PROJECT	Eastern Corridor Study - Louise Bridge	SURFACE ELEV.	226.25 m
LOCATION	Winnipeg, Manitoba	TOC STICK-UP / ELEV.	0.91 m / 227.16 m (Inclinometer)
DESCRIPTION	South abutment, mid bank, 4 m west of the bridge	DATE DRILLED	7/27/2020
DRILL RIG / HAMMER	Acker MP5 Track Mounted Drill Rig with Auto-Hammer	UTM (m)	N 5,529,747
METHOD(S)	0.0 m to 12.8 m: 125 mm ø SSA		E 635,391



WATER LEVELS ▼ Upon Completion of Drilling on 7/27/2020 None Encountered	CONTRACTOR Maple Leaf Drilling Ltd.	INSPECTOR N. BRAY
	APPROVED T. ERNST	DATE 9/24/2020

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	WATER LEVEL	PIEZO. LOG		SAMPLE TYPE	NUMBER	BLOWS/0.15 m	N-VALUE	PL MC LL Cu TORVANE (kPa) ◆ Cu POCKET PEN (kPa) ★ SPT (N) BLOWS/0.30 m ▲			
					DIAGRAM	DEPTH (m)								
216			ELEV (m) 215.9					S15						
	35		CLAY (CH) - Grey, moist, stiff, high plasticity, trace silt inclusions (1 to 5 mm dia.), cemented.		Pneumatic 038336	10.6								
	11		- Soft below 11.0 m.											
215			- LL=75, PL=20, PI=55 at 11.3 m.					S16						
	12		ELEV (m) 214.4					S17						
214	40		SILT TILL - Light brown, dry, very dense, non-plastic, some fine to medium grained, some fine gravel.											
			ELEV (m) 213.4		Pneumatic 038335	12.6		S18	9 16 45	61				
			Notes: 1. End of test hole at 12.8 m. 2. Power auger refusal encountered in till at a depth of 12.8 m. 3. Slope inclinometer installed to a depth of 12.7 m. 4. Locking protective cover installed at surface. 5. Test hole backfilled with grout.			12.7								
213														
	45													
212														
	15													
211	50													
	16													
210														
	55													
209	17													
	18													
208	60													
	19													
207	65													
	20													
206														
	21													
205	70													

WATER LEVELS ▼ Upon Completion of Drilling on 7/27/2020 None Encountered

CONTRACTOR
Maple Leaf Drilling Ltd.

INSPECTOR
N. BRAY

APPROVED
T. ERNST

DATE
9/24/2020

CLIENT	WSP CANADA GROUP LIMITED	PROJECT NO.	17-0183-001
PROJECT	Eastern Corridor Study - Louise Bridge	SURFACE ELEV.	227.01 m
LOCATION	Winnipeg, Manitoba	TOC STICK-UP / ELEV.	0.99 m / 228.00 m (Inclinometer)
DESCRIPTION	North abutment, mid bank, 17 m west of the bridge	DATE DRILLED	7/28/2020
DRILL RIG / HAMMER	Acker MP5 Track Mounted Drill Rig with Auto-Hammer	UTM (m)	N 5,529,926
METHOD(S)	0.0 m to 16.8 m: 125 mm ø SSA 0.0 m to 16.8 m: 200 mm ø HSA - switched due to sloughing		E 635,466

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	WATER LEVEL	PIEZO. LOG		SAMPLE TYPE	NUMBER	RECOVERY %	BLOWS/0.15 m	N-VALUE	PL MC LL				
					DIAGRAM	DEPTH (m)						Cu TORVANE (kPa) ◆	Cu POCKET PEN (kPa) ★	SPT (N) BLOWS/0.30 m ▲		
													20	40	60	80
			SANDY SILT (ML) - Light brown, dry, loose, non-plastic, some fine to medium grained sand, trace coarse grained sand, friable.					S1								
226	1		SILT (ML) - Light brown, dry, soft, low plasticity, trace fine to coarse grained sand.					S2								
	5		CLAY (CH) - Mottled grey/brown, damp, firm, high plasticity, trace silt inclusions (1 to 5 mm dia.).													
225	2							S3								
224	3															
223	4							S4								
	15		- Stiff below 4.3 m.													
222	5							S5								
221	6															
	20															
220	7		- Grey below 6.7 m.					S6								
	25															
219	8															
	30							S7								
218	9		- Firm below 8.8 m.													

WATER LEVELS	▼ Upon Completion of Drilling 4.88 m on 7/28/2020	CONTRACTOR Maple Leaf Drilling Ltd.	INSPECTOR N. BRAY
		APPROVED T. ERNST	DATE 9/24/2020

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	WATER LEVEL	PIEZO. LOG		SAMPLE TYPE	NUMBER	RECOVERY %	BLOWS/0.15 m	N-VALUE	PL MC LL Cu TORVANE (kPa) ◆ Cu POCKET PEN (kPa) ★ SPT (N) BLOWS/0.30 m ▲			
					DIAGRAM	DEPTH (m)						20	40	60	80
				ELEV (m)											
			- Increased moisture, soft below 10.4 m.					S8							
216	11														
			- LL=81, PL=24, PI=57 at 11.4 m.					S9							
215	12					12.1									
			- No silt inclusions below 12.2 m.												
214	13							S10							
213	14			213.0				S11							
			CLAY TILL - Grey, moist, soft, low to intermediate plasticity, trace to some fine to coarse grained sand, trace fine gravel.												
212	15			212.1				S12							
			SILT TILL - Light brown, dry to damp, dense, low plasticity, some fine to coarse grained sand, some fine gravel.					S13	89	17 15 20	35				
211	16							S14							
210	17			210.1		16.6		S15	100	50/ 130mm	+100				>>
			Notes: 1. End of test hole at 16.9 m. 2. Power auger refusal encountered in till at a depth of 16.9 m. 3. Slope inclinometer installed to a depth of 16.7 m. 4. Locking protective cover installed at surface. 5. Test hole backfilled with grout.			16.7									
209	18														
208	19														
207	20														
206	21														

WATER LEVELS ▼ Upon Completion of Drilling 4.88 m on 7/28/2020

CONTRACTOR
Maple Leaf Drilling Ltd.

INSPECTOR
N. BRAY

APPROVED
T. ERNST

DATE
9/24/2020

KEY TO SYMBOLS

LITHOLOGIC SYMBOLS

	Clay (CH, high plasticity)
	Clay (CI, intermediate plasticity)
	Clay Till
	Fill (made ground)
	Silt (ML)
	Silt Till
	Sandy Silt (ML)
	Poorly Graded Sand (SP)

SAMPLER SYMBOLS

	Auger Grab
	SPT Split Spoon

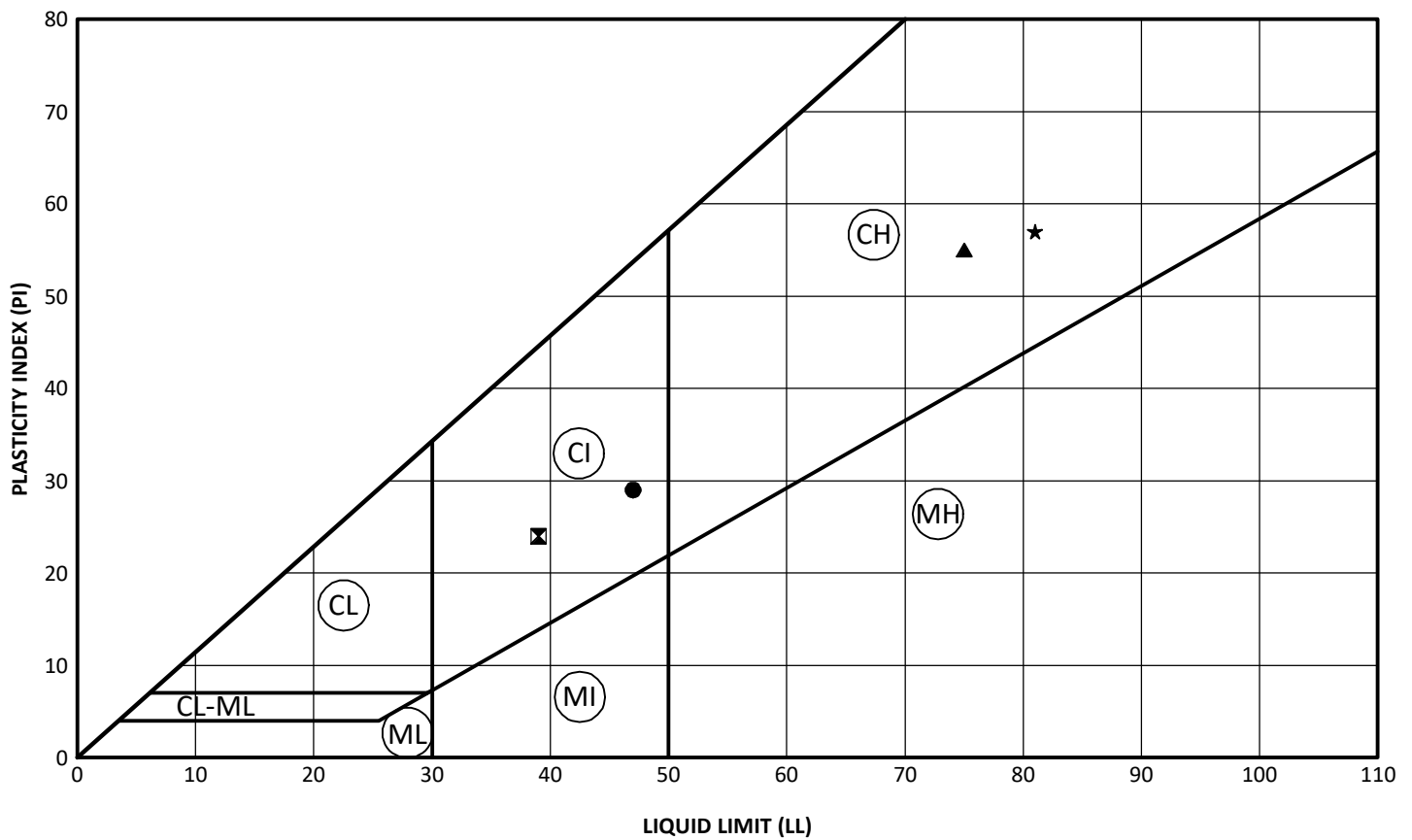
WELL CONSTRUCTION SYMBOLS

	Slope Inclinator (grout)
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ABBREVIATIONS

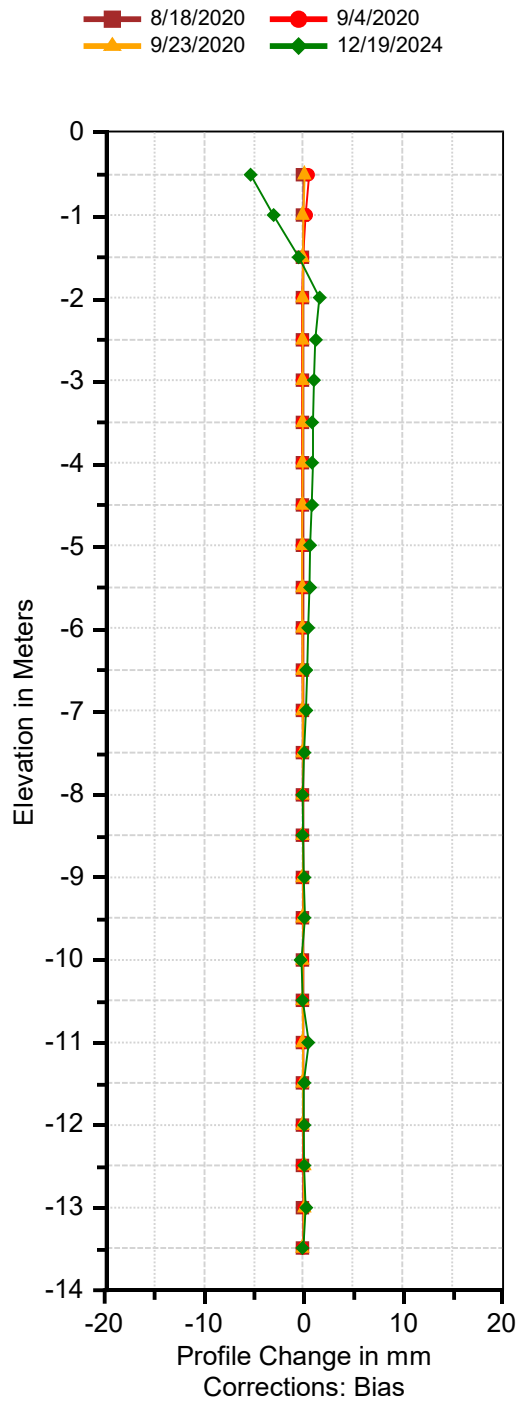
LL - Liquid Limit	PN - Pneumatic Piezometer
PL - Plastic Limit	VW - Vibrating Wire Piezometer
PI - Plastic Index	PID - Photoionization Detector
MC - Moisture Content	ppm - Parts Per Million
DD - Dry Density	▽ Water Level During Drilling
NP - Non-Plastic	▼ Water Level Upon Completion of Drilling
-200 - Percent Passing No. 200 Sieve	▽ Water Level Remeasured/Static
TV - Torvane (kPa)	
PP - Pocket Penetrometer (kPa)	
PSA - Particle Size Analysis	
TOC - Top Of Casing	

ATTERBERG LIMITS

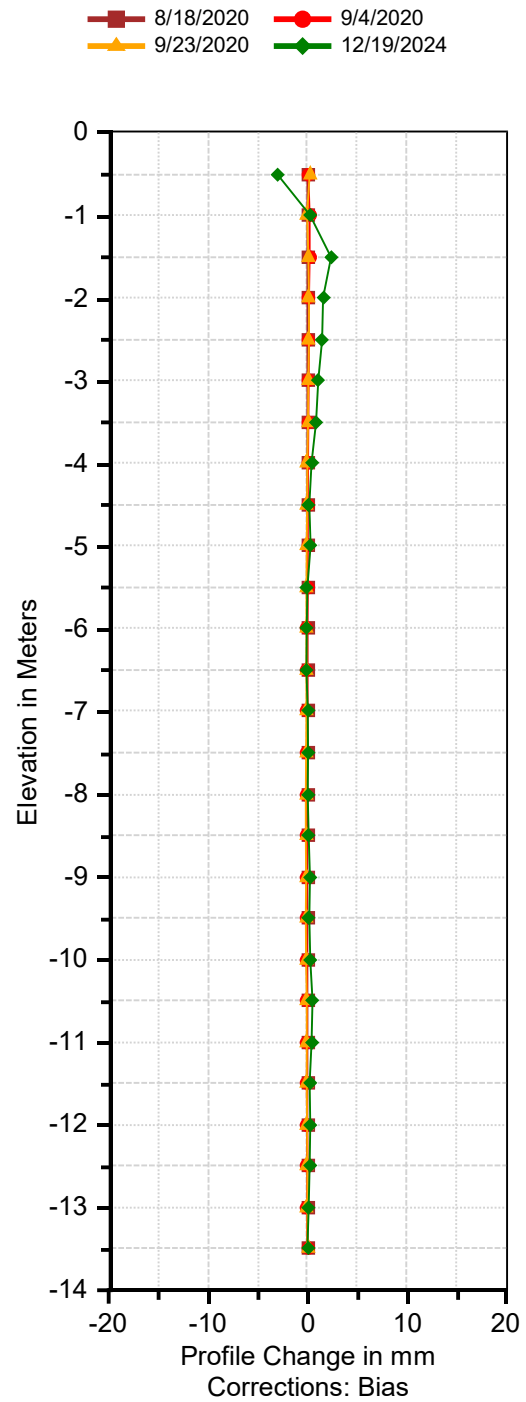


	HOLE	DEPTH (m)	SAMPLE #	LL	PL	PI	SAND (%)	SILT (%)	CLAY (%)	SILT & CLAY (%)	MC (%)	CLASSIFICATION
●	TH20-01	3.8	S5	47	18	29					36	CI
⊠	TH20-01	7.9	S11	39	15	24					30	CI
▲	TH20-01	11.3	S16	75	20	55					56	CH
★	TH20-02	11.4	S8	81	24	57					62	CH

TH20-01 A-Axis

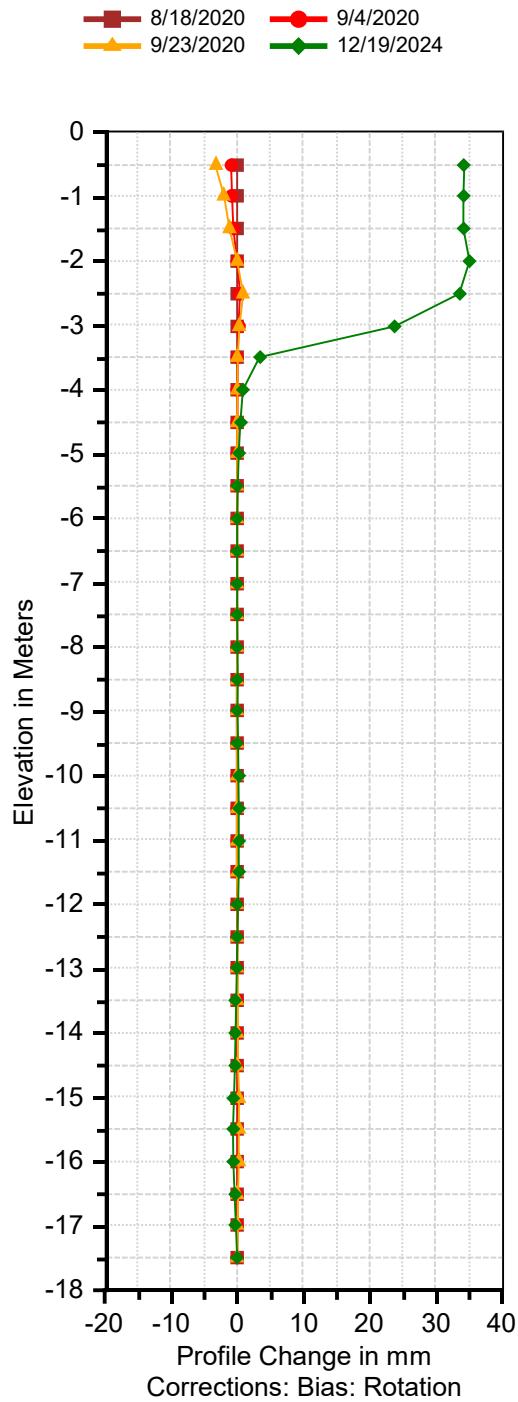


TH20-01 B-Axis

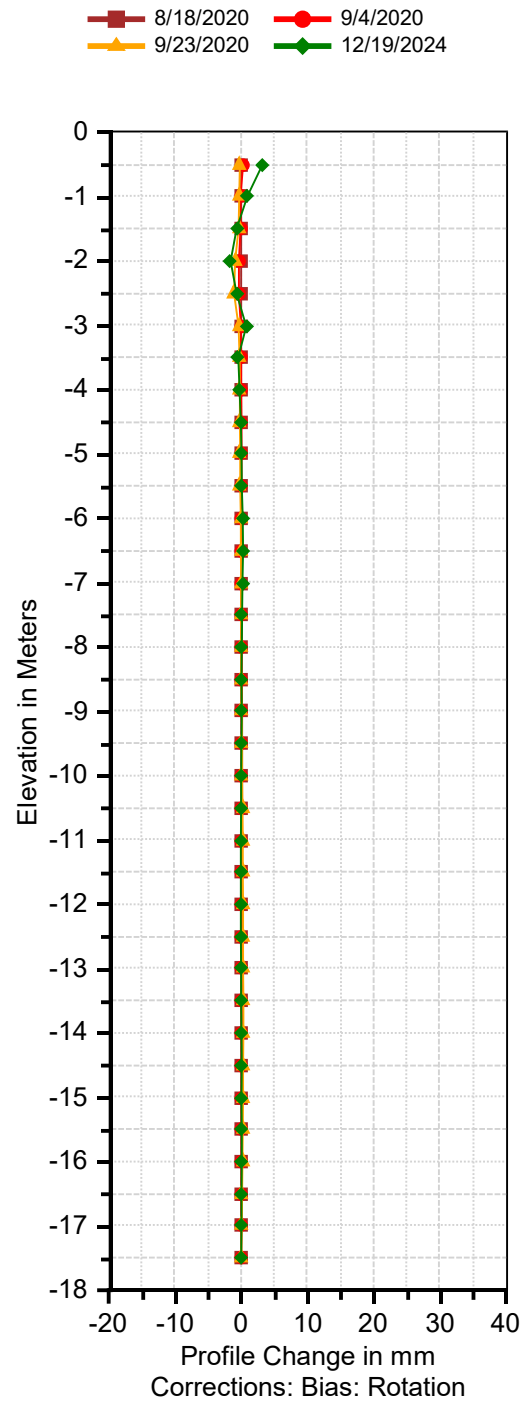


Project Name: Eastern Corridor Study
 Project Number: 17-0183-001
 Baseline Date: August 18, 2020

TH20-02 A-Axis



TH20-02 B-Axis



Project Name: Eastern Corridor Study
 Project Number: 17-0183-001
 Baseline Date: August 18, 2020

TABLE 1
PIEZOMETRIC MONITORING RESULTS
17-0183-001
Eastern Corridor Study

Test Hole:		TH20-01			TH20-02		
Ground Elevation (m):		226.25			227.01		
Piezometer No.:		PN038574	PN038336	PN038335	PN038575	PN038334	PN038332
Tip Elevation (m):		220.25	215.65	213.55	218.81	214.91	210.31
Monitoring Zone:		Upper Clay	Lower Clay	Silt Till	Upper Clay	Lower Clay	Silt Till
Date	River Level (m) ⁽¹⁾	Piezometric Elevation (m)					
18-Aug-20	223.53	224.71	215.61	213.54	223.09	223.62	223.38
04-Sep-20	223.7	224.79	225.00	213.65	223.44	223.91	223.66
23-Sep-20	223.7	225.01	225.15	213.65	224.22	223.91	224.37
19-Dec-24	222.02	Note 2	Note 2	223.57	223.66	224.84	223.02

Note:

1. River level from monitoring station along Red River at James Avenue Pumping Station (05OJ015)
2. Instrument damaged

Applied Pressure (PSI)						
0	10	20	30	40	50	60

Lead Length (m)	S/N	Measured Pressure (PSI)						
15	PN038574	0.52	10.1	19.95	29.81	39.69	49.62	60.36
25	PN038336	0.4	10.25	20.1	30.02	39.94	49.86	60.25
25	PN038335	0.36	10.29	20.31	30.28	40.2	50.1	60.85
15	PN038575	0.24	10.29	20.37	30.45	40.49	50.51	60.53
25	PN038334	0.56	10.38	20.25	30.16	40.11	50.1	60.22
25	PN038332	0.68	10.71	20.51	30.35	40.25	50.32	60.88

$$\text{Corrected Reading [psi]} = \frac{(\text{Applied Pressure}_2 - \text{Applied Pressure}_1)}{(\text{PN Measured Pressure}_2 - \text{PN Measured Pressure}_1)} \times (\text{Original Reading} - \text{PN Measured Pressure}_1)$$

$$\text{Head [m]} = \text{Corrected Reading [psi]} \times 2.3072 \left[\frac{\text{foot head}}{\text{psi}} \right] \times 0.3048 \left[\frac{\text{metres}}{\text{foot}} \right]$$