FOUNDATION INVESTIGATION AND DESIGN REPORT
HIGH FILL EMBANKMENTS, DEEP CUTS AND SWAMP CROSSINGS
HIGHWAY 11, HIGHWAY 518 WEST TO HIGHWAY 520
G.W.P. 480-93-00
VOLUME 2

Geocres Number: 31E-233

Report to

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Appendix I

Highway 11, Station 12+280 to 12+480

including E/W-N Ramp, Three Mile Lake Road

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 400-1 1 OF 3 METRIC

G.W.P. 480-93-00 LOCATION Magnetawan River E/W-N Ramp, ST. 12+268.5 CL ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Core COMPILED BY WM

DATUM Geodetic DATE 26.11.03 - 27.11.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
294.8											
294.6	**TOPSOIL**										
0.1	Silty **SAND** to Sandy **SILT**, trace organics Very Loose Brown Wet										
			1	SS	1		294				0 53 44 3
	Grey		2	SS	2		293				
			3	SS	2		292				0 45 55 (SI+CL)
291.8											
3.0	**SAND**, fine grained, some silt to silty, trace organics to 5.6m Very Loose to Compact Grey Wet		4	SS	3		291				
			5	SS	2		290				0 74 23 3
			6	SS	1		289				
	Brown		7	SS	8		288				
			8	SS	6		287				0 79 21 (SI+CL)
							286				
							285				

Continued Next Page

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 400-1 2 OF 3 METRIC

G.W.P. 480-93-00 LOCATION Magnetawan River E/W-N Ramp, ST. 12+268.5 CL ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Core COMPILED BY WM

DATUM Geodetic DATE 26.11.03 - 27.11.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
			9	SS	13		284				
			10	SS	14		283				
			11	SS	17		282				0 58 40 2
			12	SS	11		281				
			13	SS	39		280				
	Dense with cobbles						279				
							278				
							277				
							276				
							275				

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

15-20-10-5 (%) STRAIN AT FAILURE

ONTM4T4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 400-1 3 OF 3 METRIC

G.W.P. 480-93-00 LOCATION Magnetawan River E/W-N Ramp, ST. 12+268.5 CL ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Core COMPILED BY WM

DATUM Geodetic DATE 26.11.03 - 27.11.03 CHECKED BY MA

SOIL PROFILE ELEV/DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
272.3			14	SS	50/.025		274				
							273				
22.6	**GRANITIC GNEISS (BEDROCK)** Slightly weathered, laminated to thinly banded, pale pink with subvertical dark banding		1	GS			272				
			1	RUN			271				RUN 1# TCR=99%, SCR=95%, RQD=82%, UCS=143MPa
			2	RUN			270				RUN 2# TCR=100%, SCR=100%, RQD=100%, UCS=141MPa
268.9							269				
25.9	END OF BOREHOLE AT 25.93m. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen.										

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

20
15 ⊕ 5
10
(%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 396N-1 1 OF 3 METRIC

G.W.P. 480-93-00 LOCATION Magnetawan River NBL, ST. 12+283, O/S 1R ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Core COMPILED BY WM

DATUM Geodetic DATE 21.11.03 - 25.11.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
294.8												
294.6 / 0.0	**TOPSOIL**											
0.1	**SAND**, fine grained, trace to some silt Very Loose to Loose Brown Wet											
			1	SS	6		294					
	heavily stained by organics, trace rootlets, grey		2	SS	5		293					
			3	SS	4		292					
			4	SS	3		291					
	Brown		5	SS	3		290					
			6	SS	6		289					0 92 8 (SI+CL)
			7	SS	9		288					
	becoming Compact		8	SS	19		287					
							286					
							285					

Continued Next Page

$+^3$, $\times^3$ Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 396N-1 2 OF 3 METRIC

G.W.P. 480-93-00 LOCATION Magnetawan River NBL, ST. 12+283, O/S 1R ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Core COMPILED BY WM

DATUM Geodetic DATE 21.11.03 - 25.11.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SAND, fine grained, trace to some silt Compact Brown Wet						284				
			9	SS	15				○		0 86 14 (SI+CL)
							283				
			10	SS	21				○		
							282				
			11	SS	19		281		○		
							280				
			12	SS	10				○		0 94 6 (SI+CL)
							279				
			13	SS	22		278		○		
277.3											
17.5	**SILT**, some sand Dense Brown Wet						277				
			14	SS	31				○		1 10 76 13
276.0							276				
18.8	Gravelly **SAND** boulder from 18.75m to 19.05m.		1	GS							
	boulder from 19.66m to 20.12m.						275				

Continued Next Page

+ ^{3}, × ^{3} : Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 396N-1 3 OF 3 METRIC

G.W.P. 480-93-00 LOCATION Magnetawan River NBL, ST. 12+283, O/S 1R ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Core COMPILED BY WM

DATUM Geodetic DATE 21.11.03 - 25.11.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	boulder from 20.19m to 20.39m.		2	GS							
	boulder from 20.73m to 21.03m.						274				
			15	SS	50/ .127						
	boulder from 21.18m to 21.64m.								o		
	boulder from 21.69m to 21.99m.						273				
272.7											
22.1	**GRANITIC GNEISS (BEDROCK)** Weathered to slightly weathered, laminated to thinly banded, pale pink with subvertical dark banding Rough sub-planar joints						272				
			1	RUN							RUN 1# TCR=95%, SCR=77%, RQD=77%, UCS=133MPa
							271				RUN 2# TCR=98%, SCR=88%, RQD=71%, UCS=137MPa
			2	RUN							
							270				
			3	RUN							RUN 3# TCR=99%, SCR=99%, RQD=92%, UCS=149MPa
269.0							269				
25.8	END OF BOREHOLE AT 25.8m. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen.										

+ ³, × ³: Numbers refer to Sensitivity

15 (20 / 10) 5 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+292.5 R35 1 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 12+292.5, O/S R35 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY WM

DATUM Geodetic DATE 28.11.03 - 28.11.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L WATER CONTENT (%)	γ kN/m^3	GR SA SI CL
0.0	DCPT from surface.							20 40 60 80 100 20 40 60 80 100	20 40 60		

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 15 5 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+292.5 R35 2 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 12+292.5, O/S R35 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY WM

DATUM Geodetic DATE 28.11.03 - 28.11.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	w_P w w_L WATER CONTENT (%) 20 40 60	γ kN/m^3	GR SA SI CL
13.4	END OF DCPT AT 13.36 m. CONE REFUSAL AT 13.36 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

15-$\oplus^{20}_{10}$-5 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 396S-1 1 OF 3 METRIC

G.W.P. 480-93-00 LOCATION Magnetawan River SBL, ST. 12+309.5, CL ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Core COMPILED BY WM

DATUM Geodetic DATE 18.11.03 - 20.11.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
294.3											
294.2	Silty, sandy **TOPSOIL**										
0.1	Sandy **SILT** Very Loose Grey Wet						294				0 16 73 11
			1	SS	1		293		○		
			2	SS	3				○		
			3	SS	2		292		○		6 33 54 7
	with organics to 5.6m Black Soft		4	SS	3		291		○		
	Very Loose Dark Grey		5	SS	2		290		○		0 30 64 6
288.6							289				
5.7	**SAND**, very fine grained, some silt Very Loose Grey Wet		6	SS	4		288		○		
			7	SS	3		287		○		0 64 36 (SI+CL)
	Compact Brown		8	SS	19		286				
							285		○		0 90 10 (SI+CL)

Continued Next Page

+ ³, × ³ : Numbers refer to Sensitivity

{%} STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 396S-1 2 OF 3 METRIC

G.W.P. 480-93-00 LOCATION Magnetawan River SBL, ST. 12+309.5, CL ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Core COMPILED BY WM

DATUM Geodetic DATE 18.11.03 - 20.11.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
							284				
			9	SS	20		283		○		
	Loose		10	SS	8				○		
							282				
			11	SS	25		281		○		
	becoming dense		12	SS	30		280		○		
							279				
			13	SS	39		278		○		
							277				
			14	SS	32		276		○		
			15	SS	32		275		○		3 76 21 (SI+CL)

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

15 ⊕ 5 (20, 10) (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 396S-1 3 OF 3 METRIC

G.W.P. 480-93-00 LOCATION Magnetawan River SBL, ST. 12+309.5, CL ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Core COMPILED BY WM

DATUM Geodetic DATE 18.11.03 - 20.11.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Boulder encountered at 20.88m to 21.34m.		1	GS			274		○		
							273				
	Cobble encountered at 22.25m to 22.4m. Cobble encountered at 22.56m to 22.71m.		16	SS	50		272				
	Boulder encountered at 22.91m to 23.16m. Boulders encountered at 23.24m to 23.93m, 24m to 24.54m.		2	GS	50/.00		271		DS		
269.7							270				
24.5	**BEDROCK**						269				
	start of coring		1	RUN			268				RUN 1# TCR=100%, SCR=100%, RQD=100%, UCS=156.4MPa RUN 2# TCR=99%, SCR=99%, RQD=99%, UCS=145.2MPa
			2	RUN			267				RUN 3# TCR=100%, SCR=100%, RQD=100%, UCS=158.7MPa
265.4			3	RUN			266				
28.9	END OF BOREHOLE AT 28.93m. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen.										

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 400-2 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Magnetawan River, E/W-N Ramp, ST. 12+314, O/S 37R ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 04.12.03 - 04.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
294.8											
294.6	TOPSOIL										
0.1	Silty **SAND** to Sandy **SILT**, fine grained Very Loose Brown Wet (SM)		1	SS	1		294				
293.4											
1.5	**SAND**, fine grained, trace silt to silty, trace organics, occasional wood fibers Very Loose Grey Wet (SP)		2	SS	1		293				
			3	SS	2						
							292				
			4	SS	2						
							291				
			5	SS	1		290				0 64 32 4
	Brown										
							289				
			6	SS	3						
288.1											
6.7	END OF BOREHOLE AT 6.71m. BOREHOLE OPEN TO 1.52m. WATER LEVEL IN OPEN BOREHOLE AT 0.91m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 10/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 396N-2 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Magnetawan River NBL, ST. 12+305, O/S 18.75R ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 04.12.03 - 04.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
294.5											
294.6	**TOPSOIL**										
0.1	Silty **SAND**, fine grained Brown										
293.9							294				
0.6	**SAND**, fine grained, trace to some silt Loose to Very Loose Brown Wet		1	SS	7				○		
			2	SS	2		293		○ ○		
	grey		3	SS	2		292		○		
	occasional decayed wood fibers, occasional black staining from 3.0m to 4.1m		4	SS	1				○		0 86 11 3
							291				
			5	SS	3		290		○		
							289				
			6	SS	4		288		○		
287.8											
6.7	END OF BOREHOLE AT 6.7m. BOREHOLE OPEN TO 1.7m. WATER LEVEL IN OPEN BOREHOLE AT 0.9m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus \frac{20}{10} 5$ (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+312 L19.5 1 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+312, O/S L19.5 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY WM

DATUM Geodetic DATE 01.12.03 - 01.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE	WATER CONTENT (%)	γ kN/m³	GR SA SI CL
0.0	DCPT from surface.							20 40 60 80 100	20 40 60		

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+ ³, × ³: Numbers refer to Sensitivity

20 15 5 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+312 L19.5 2 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+312, O/S L19.5 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY WM

DATUM Geodetic DATE 01.12.03 - 01.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
10.6	END OF DCPT AT 10.62 m. CONE REFUSAL AT 10.62 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+317.5 CL 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+317.5 CL ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 01.12.03 - 01.12.03 CHECKED BY MA

SOIL PROFILE ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.1	Silty **SAND** to Sandy **SILT**, fine grained, occasional wood fibers, occasional organics Loose to Very Loose Brown Wet		1	SS	1				○		
			2	SS	5				○		
			3	SS	2				○		
			4	SS	1				○		
			5	SS	4				○		0 52 44 4
			6	SS	2				○		
6.7	END OF BOREHOLE AT 6.71m. BOREHOLE OPEN TO 2.9 m AND WATER LEVEL AT 0.91 ON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS AND BENTONITE TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \diamond 5}$ (%) STRAIN AT FAILURE
10

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+317.5 L42.6 1 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+317.5, O/S L42.6 ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 08.12.03 - 08.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	DCPT from surface.										

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+317.5 L42.6 2 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+317.5, O/S L42.6 ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 08.12.03 - 08.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT w_P w w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
15.2	END OF DCPT AT 15.24 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\Phi\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 396S-2 1 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Magnetawan River SBL, ST. 12+330, O/S 17.75L ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 08.12.03 - 08.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
294.5											
0.0 / 294.3	**TOPSOIL**										
0.2	Sandy **SILT**, some organics Very Loose Brown Wet		1	SS	1		294		○		
			2	SS	1		293		○		
292.2											
2.3	with organics from 2.2m to 3.0m Dark Brown										
	SAND Very Loose Grey Mottled Brown Wet		3	SS	1		292		○		0 72 25 3
			4	SS	1		291		○		
	Grey		5	SS	0				○		
			6	SS	1		290		○		1 80 19 (SI+CL)
							289				
			7	SS	1		288		○		
287.7											
6.7	END OF SAMPLE AT 6.71m. Dynamic cone penetration testing from 6.71 to 12.19m.						287				
							286				
							285				

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTM4T4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 396S-2 2 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Magnetawan River SBL, ST. 12+330, O/S 17.75L ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 08.12.03 - 08.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
							284				
							283				
282.3											
12.2	END OF DYNAMIC CONE AT 12.19m. WATER LEVEL IN OPEN BOREHOLE AT 2.7m DEPTH UPON COMPLETION. BOREHOLE OPEN TO 4.88m. BOREHOLE BACKFILLED WITH DRILL CUTTINGS TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+328 R24 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+328, O/S R24 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 04.12.03 - 04.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.1	Silty **SAND**, fine grained Brown										
0.6	**SAND**, fine grained, trace silt to some silt Very Loose to Loose Brown Wet		1	SS	4				○		
	grey from 1.5 m to 2.2 m trace organics from 1.5 m to 4.1 m		2	SS	1				○		
			3	SS	1				○		0 82 18 (SI+CL)
			4	SS	2				○		
			5	SS	2				○		0 88 12 (SI+CL)
			6	SS	5				○		
6.7	END OF BOREHOLE AT 6.71m. BOREHOLE OPEN TO 1.83m. WATER LEVEL IN OPEN BOREHOLE AT 0.61m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+340.5 CL 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+340.5 CL ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 02.12.03 - 02.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.1	**SAND**, some silt to **SAND and SILT**, fine grained, trace to some organics Very Loose to Loose Brown Wet		1	SS	3			○	○		
	becoming grey		2	SS	5			○	○		
			3	SS	1			○	○		0 54 43 3
	heavily stained by organics from 2.2 m to 4.1 m		4	SS	2			○	○		
			5	SS	1			○	○		
			6	SS	2			○	○		
6.7	END OF BOREHOLE AT 6.71m. BOREHOLE OPEN TO 2.74m. WATER LEVEL IN OPEN BOREHOLE AT 0.91m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS AND BENTONITE TO SURFACE.										

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+342.5 L42.5 1 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+342.5, O/S L42.5 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 09.12.03 - 09.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**										
0.3	Clayey **SILT**, with organics Very Soft Brown		1	SS	1				134		
1.4	Sandy **SILT**, with organics Very Loose Grey Wet		2	SS	1						
			3	SS	1						
2.9	**SAND**, fine grained, trace to some silt, with organics Very Loose Grey Wet		4	SS	1						
4.1	Silty **CLAY**, trace sand Very Soft Grey		5	SS	1						0 9 54 37
5.6	**SAND**, fine grained, trace silt Very Loose Grey Wet		6	SS	0						
6.7	END OF SAMPLING AT 6.71 m. DCPT started at 6.71 m.										

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+ ³, × ³: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTM4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+342.5 L42.5 2 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+342.5, O/S L42.5 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 09.12.03 - 09.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
12.2	END OF DCPT AT 12.19 m. BOREHOLE OPEN TO 3.76 m AND WATER LEVEL AT 0.76 m UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+355 L18.75 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+355, O/S L18.75 ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 09.12.03 - 09.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**										
0.7	Clayey **SILT**, trace sand, trace organics, some black staining Soft to Very Soft Grey Wet		1	SS	4						
			2	SS	3						
			3	SS	1						
3.0	**SAND and SILT**, fine grained, trace clay Loose Grey Wet		4	SS	4						0 46 50 5
	trace gravel		5	SS	6						
			6	SS	6						
6.7	END OF BOREHOLE AT 6.71 m. BOREHOLE OPEN TO 4.34 m AND WATER LEVEL AT 0.76 m UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+355 R18.75 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 12+355, O/S R18.75 ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 08.12.03 - 08.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**										
0.4	Silty **SAND** Loose to Very Loose Grey Wet		1	SS	7				○		
			2	SS	2				○		
			3	SS	1				○		1 79 21 (SI+CL)
	trace gravel		4	SS	2				○		
			5	SS	3				○		
5.1	**SAND**, fine grained, trace silt Very Loose Grey Wet		6	SS	3				○		0 90 10 (SI+CL)
6.7	END OF BOREHOLE AT 6.71 m. Piezometer installation consist of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 19.01.05 0.31 28.02.05 0.36										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTM T4 MAGENTAWAN RIVER.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+364 CL 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+364 CL ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 02.12.03 - 02.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**										
0.1	Silty **SAND**, fine grained, trace organics Brown										
0.6	Sandy **SILT**, fine grained, trace clay, trace organics Very Loose to Loose Grey Wet		1	SS	3				○		
			2	SS	3				○		
			3	SS	1				○		0 22 74 4
			4	SS	5				○		
4.6	**SAND and SILT**, fine grained, trace clay Very Loose Grey Wet		5	SS	0				○		0 55 45 (SI+CL)
			6	SS	0				○		
6.7	END OF BOREHOLE AT 6.71m. BOREHOLE OPEN TO 4.27m. WATER LEVEL IN OPEN BOREHOLE AT 1.22m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS AND BENTONITE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+367.5 L44 1 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+367.5, O/S L44 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 09.12.03 - 09.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
0.0	DCPT from surface.										

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$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+367.5 L44 2 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+367.5, O/S L44 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 09.12.03 - 09.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
13.7	END OF DCPT AT 13.72 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+367.5 R52 1 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+367.5, O/S R52 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 05.12.03 - 05.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100; ○ UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	w_P w w_L; 20 40 60	γ kN/m^3	GR SA SI CL
0.0	DCPT from surface.										

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$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+367.5 R52 2 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+367.5, O/S R52 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 05.12.03 - 05.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
10.7	END OF DCPT AT 10.67 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+380 L18.75 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+380, O/S L18.75 ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 08.12.03 - 08.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**										
0.4	**SAND**, trace silt, trace rootlets, some wood fibers Very Loose Brown Wet		1	SS	2						
1.5	Sandy **SILT**, trace rootlets, trace organics Loose to Very Loose Brown Wet		2	SS	5				○		
			3	SS	1				○		
3.0	**SAND**, fine grained, some gravel, trace silt Loose to Compact Grey Wet		4	SS	4				○		13 80 7 (SI+CL)
			5	SS	10				○		
			6	SS	10				○		
6.7	END OF BOREHOLE AT 6.71 m. BOREHOLE OPEN TO 3.66 m AND WATER LEVEL AT 1.52 m ON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

$\div^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+380 R18.75 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+380, O/S R18.75 ORIGINATED BY SL
HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM
DATUM Geodetic DATE 08.12.03 - 08.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**										
0.3	**SILT**, some sand, trace clay, trace organics Loose to Very Loose Brown to Grey Wet		1	SS	5				○		
			2	SS	5				○		
			3	SS	2				○		0 19 76 4
			4	SS	5				○		
3.5	Silty **SAND**, fine grained Loose Grey Wet		5	SS	8				○		0 73 27 (SI+CL)
			6	SS	4				○		
6.7	END OF BOREHOLE AT 6.71 m. BOREHOLE OPEN TO 4.27 m AND WATER LEVEL AT 1.83 m ON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+392.5 CL 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+392.5 CL ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 02.12.03 - 02.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	γ kN/m^3	GR SA SI CL
0.0	DCPT from surface.										
6.1	END OF DCPT AT 6.1m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+392.5 L42.5 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 12+392.5, O/S L42.5 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Solid Stem Augers COMPILED BY WM

DATUM Geodetic DATE 05.12.03 - 05.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT** Very Loose		1	SS	2				○		
1.4	Sandy **SILT**, some organics Very Loose Brown Wet		2	SS	1				○		
			3	SS	0				10⊕		
3.1	**SAND and SILT**, fine grained Very Loose to Loose Brown Wet		4	SS	1				○		
			5	SS	6				○		0 40 57 3
			6	SS	3				○		
6.7	END OF BOREHOLE AT 6.71 m. BOREHOLE OPEN TO 2.74 m AND WATER LEVEL AT 1.22 m ON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS TO SURFACE.										

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+392.5 R59 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+392.5, O/S R59 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 05.12.03 - 05.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.1	Silty **SAND**, fine grained, trace organics Brown										
0.6	Sandy **SILT**, fine grained, trace organics Very Loose Brown to Grey Wet		1	SS	1				○		
			2	SS	2				○		0 20 74 7
			3	SS	1				○		
			4	SS	1				○		
4.6	**SAND**, fine grained, some silt Very Loose to Loose Grey Wet		5	SS	3				○		0 83 17 (SI+CL)
			6	SS	7				○		
6.7	END OF BOREHOLE AT 6.71 m. BOREHOLE OPEN TO 0.91 m. WATER LEVEL IN OPEN BOREHOLE AT 0.76 m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS TO SURFACE.										

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+405 L18.75 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+405, O/S L18.75 ORIGINATED BY NIC

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 09.12.03 - 09.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**										
0.4	**SILT**, some sand, with organics, occasional wood fragments Very Loose Brown Wet		1	SS	2				○		
			2	SS	1				○		
			3	SS	1				○ 155		
3.0	Clayey **SILT** Stiff Grey Wet		4	SS	9				○		
4.1	**SAND and SILT**, fine grained Loose Grey Wet		5	SS	9				○		0 50 47 3
			6	SS	8				○ ○		
6.7	END OF BOREHOLE AT 6.71 m. BOREHOLE OPEN TO 2.74 m. WATER LEVEL IN OPEN BOREHOLE AT 1.14 m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS TO SURFACE.										

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 10/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+405 R18.75 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+405, O/S R18.75 ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 09.12.03 - 09.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**										
0.4	Clayey **SILT**, trace rootlets Soft Brown		1	SS	2						
1.5	Sandy **SILT** Very Loose Brown Wet		2	SS	3						
			3	SS	1						
3.0	**SAND**, fine grained, some silt Very Loose Brown Wet		4	SS	1						
			5	SS	3						0 86 14 (SI+CL)
	becoming compact, grey		6	SS	20						
6.7	END OF BOREHOLE AT 6.71 m. BOREHOLE OPEN TO 4.88 m AND WATER LEVEL AT SURFACE ON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTM4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+416 CL 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+416, CL ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 02.12.03 - 02.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.2	Sandy **SILT**, fine grained, with organics Very Loose Brown to Grey		1	SS	1				○		
			2	SS	1				○		
			3	SS	0				○		
2.7	**SAND**, fine to medium grained, trace silt, occasional gravelly zones Very Loose to Loose Grey Wet		4	SS	1				○		0 92 8 (St+CL)
	becoming brown		5	SS	4				○		
	Compact		6	SS	16				○		
6.7	END OF BOREHOLE AT 6.71 m. BOREHOLE OPEN TO 3.66 m. WATER LEVEL IN OPEN BOREHOLE AT 1.22 m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS AND BENTONITE.										

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity

(%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+417.5 L39.8 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+417.5, O/S L39.8 ORIGINATED BY NIC

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 05.12.03 - 05.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	DCPT from surface.										
6.1	END OF DCPT AT 6.1m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+417.5 R46.6 1 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+417.5, O/S R46.6 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 05.12.03 - 05.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	w_P w w_L WATER CONTENT (%) 20 40 60	γ kN/m^3	GR SA SI CL
0.0	DCPT from surface.										

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+417.5 R46.6 2 OF 2 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+417.5, O/S R46.6 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 05.12.03 - 05.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L WATER CONTENT (%)	γ kN/m^3	GR SA SI CL
								20 40 60 80 100	20 40 60		
17.6	END OF DCPT AT 17.6 m. CONE REFUSAL AT 17.6 m.										

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTM4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+430 L18.75 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Townshp, ST. 12+430, O/S L18.75 ORIGINATED BY NIC

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 05.12.03 - 05.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT** Very Loose Wet										
			1	SS	1				28		
			2	SS	1				26		
2.2	**SAND**, fine grained, trace silt Very Loose Brown Wet		3	SS	3						0 98 2 (SI+CL)
			4	SS	4						
3.4	Clayey **SILT**, some sand Soft Brown Wet		5	SS	3						0 18 49 34
5.6	**SAND**, trace silt Very Loose Brown Wet		6	SS	2						
6.7	END OF BOREHOLE AT 6.71 m. BOREHOLE OPEN TO 2.29 m. WATER LEVEL IN OPEN BOREHOLE AT 0.91 m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS TO SURFACE.										

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+441 CL 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+441, CL ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 02.12.03 - 02.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
0.0	DCPT from surface.										
6.1	END OF CONE TEST AT 6.1m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+442.5 L38.8 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 12+442.5, O/S L38.8 ORIGINATED BY NIC

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 05.12.03 - 05.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.1	Silty **SAND** to Sandy **SILT**, fine grained, with organics Loose to Very Loose Brown Wet		1	SS	5						
			2	SS	0						
2.2	**SAND**, fine to medium grained, trace gravel, trace silt Compact to Loose Grey Wet		3	SS	12						5 87 9 (SI+CL)
			4	SS	4						1 95 3 (SI+CL)
			5	SS	4						
			6	SS	4						
6.7	END OF BOREHOLE AT 6.71m. BOREHOLE OPEN TO 3.05m. WATER LEVEL IN OPEN BOREHOLE AT 1.22m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

(%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+455 L18.75 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+455, O/S L18.75 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 02.12.03 - 02.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.1	Silty **SAND**, fine grained, some organics Brown										
0.6	**SAND**, fine grained, trace gravel, trace silt Very Loose to Compact Brown to Grey Wet		1	SS	2				○		
			2	SS	2				○		
	trace organics from 2.6 m to 3.0 m		3	SS	6				○		2 89 8 (SI+CL)
			4	SS	13				○		
			5	SS	8				○		
			6	SS	7				○		
6.7	END OF BOREHOLE AT 6.71 m. BOREHOLE OPEN TO 2.13 m. WATER LEVEL IN OPEN BOREHOLE AT 0.91 m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS AND BENTONITE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+467.5 CL 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+467.5 CL ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 02.12.03 - 02.12.03 CHECKED BY MA

SOIL PROFILE ELEV/DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**										
0.2	Silty **SAND**, fine grained, some organics Brown		1	SS	1				○		
1.5	Clayey **SILT**, trace sand Firm Brown to Grey Wet		2	SS	6				○		0 1 78 20
2.2	**SAND**, fine to medium grained, trace silt, trace gravel Loose to Compact Brown Wet		3	SS	9				○		
			4	SS	10				○		
4.6	END OF SOIL SAMPLING AT 4.57 m. DCPT from 4.57 m.										
7.6	END OF DCPT AT 7.62 m. BOREHOLE OPEN TO 2.59 m. WATER LEVEL IN OPEN BOREHOLE AT 0.61 m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS AND BENTONITE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+467.5 L35 1 OF 1 METRIC

G.W.P. 480-93-00 LOCATION Armour Township, ST. 12+467.5, O/S L35 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 02.12.03 - 02.12.03 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
0.0	DCPT from surface.										
6.1	END OF DCPT AT 6.1 m.										

÷ ^{3}, × ^{3}: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 MAGENTAWAN RIVER.GPJ 15/11/04

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+478 L20.5 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 12+478, O/S L20.5 ORIGINATED BY DP

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 02.12.03 - 02.12.03 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.2	Silty **SAND**, fine grained, trace organics Brown										
0.6	**SAND**, fine grained, trace gravel, trace silt, occasional organics Loose to Very Loose Brown to Grey Wet		1	SS	4				○		
			2	SS	1					13	
			3	SS	9				○		
			4	SS	8				○		6 87 7 (SI+CL)
			5	SS	8				○		
			6	SS	0				○		
6.7	END OF BOREHOLE AT 6.71m. BOREHOLE OPEN TO1.83m. WATER LEVEL IN OPEN BOREHOLE AT 0.91m DEPTH UPON COMPLETION. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 19.01.05 0.42 28.02.05 0.44										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

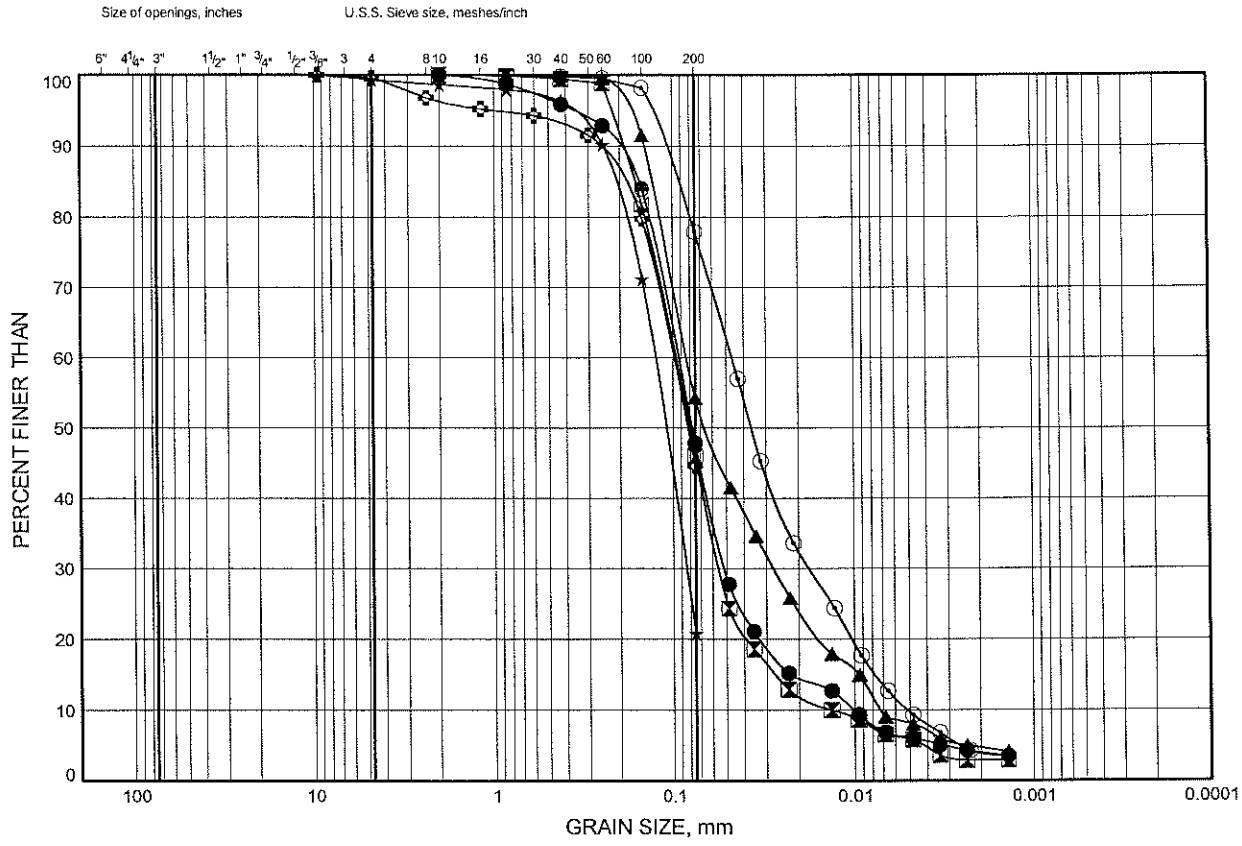
ONTM14 MAGENTAWAN RIVER.GPJ 09/03/05

Hwy 11 Four Laning

GRAIN SIZE DISTRIBUTION

FIGURE I1

Sandy SILT to Silty SAND



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	12+317.5 CL	4.88	
⊠	12+340.5 CL	2.59	
▲	12+355 L18.75	3.35	
★	12+355 R18.75	2.59	
⊙	12+364 CL	2.59	
✿	12+364 CL	4.88	

Date March 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

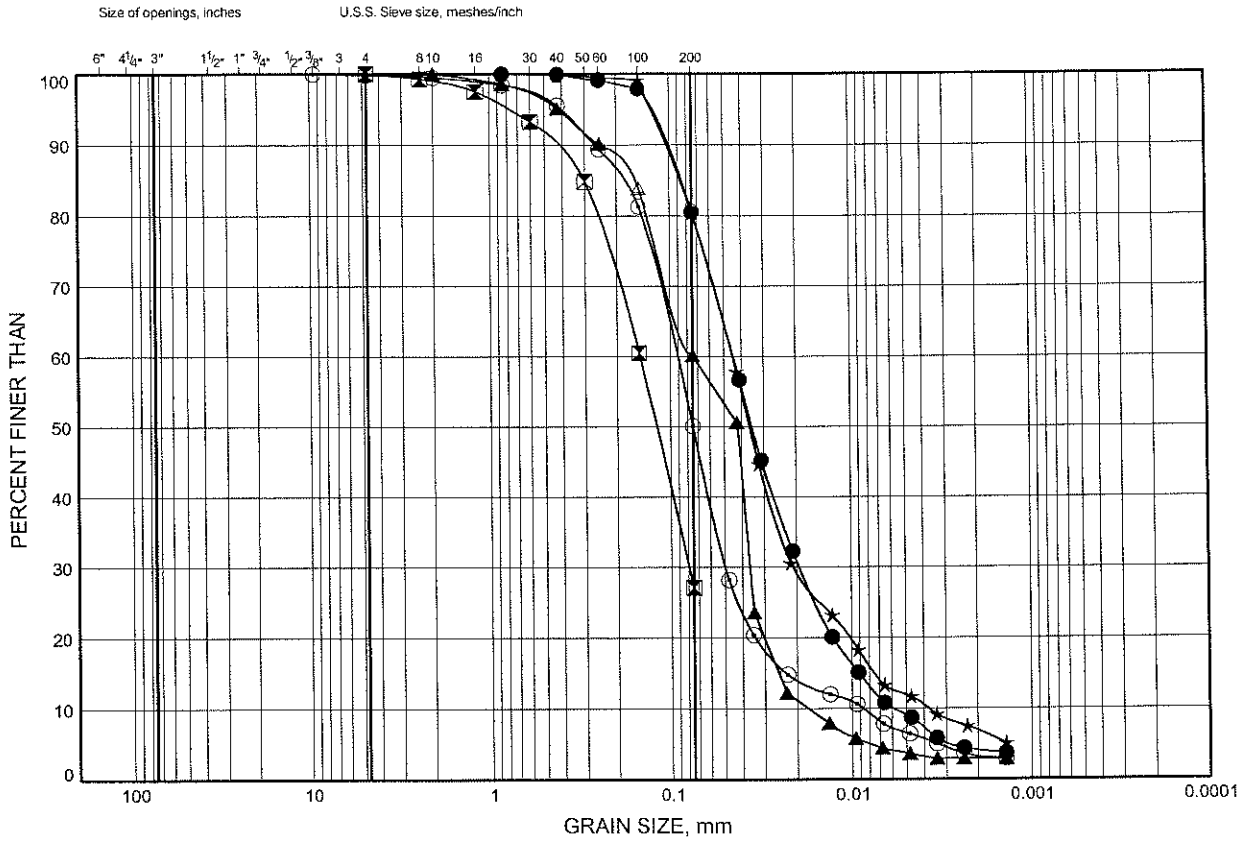
THURBGSD MAGENTAWAN RIVER.GPJ 09/03/05

Hwy 11 Four Laning

GRAIN SIZE DISTRIBUTION

FIGURE I2

Sandy SILT to Silty SAND



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	12+380 R18.75	2.59	
⊠	12+380 R18.75	4.88	
▲	12+392.5 L42.5	5.03	
★	12+392.5 R59	1.83	
⊙	12+405 L18.75	4.88	

Date March 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

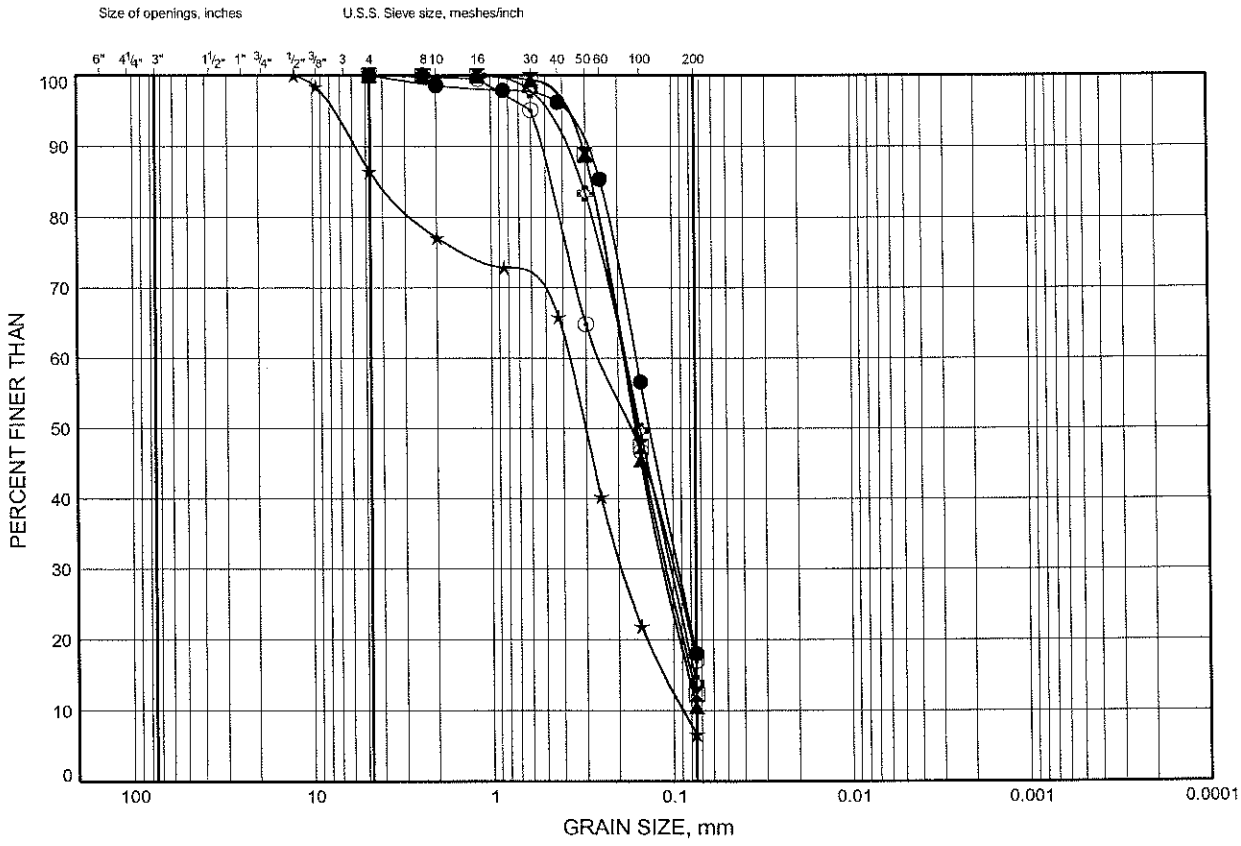
THURBGSD MAGENTAWAN RIVER.GPJ 09/03/05

Hwy 11 Four Laning

GRAIN SIZE DISTRIBUTION

FIGURE I3

SAND



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	12+328 R24	2.59	
⊠	12+328 R24	4.88	
▲	12+355 R18.75	5.14	
★	12+380 L18.75	3.35	
⊙	12+392.5 R59	4.88	
✪	12+405 R18.75	4.88	

Date March 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

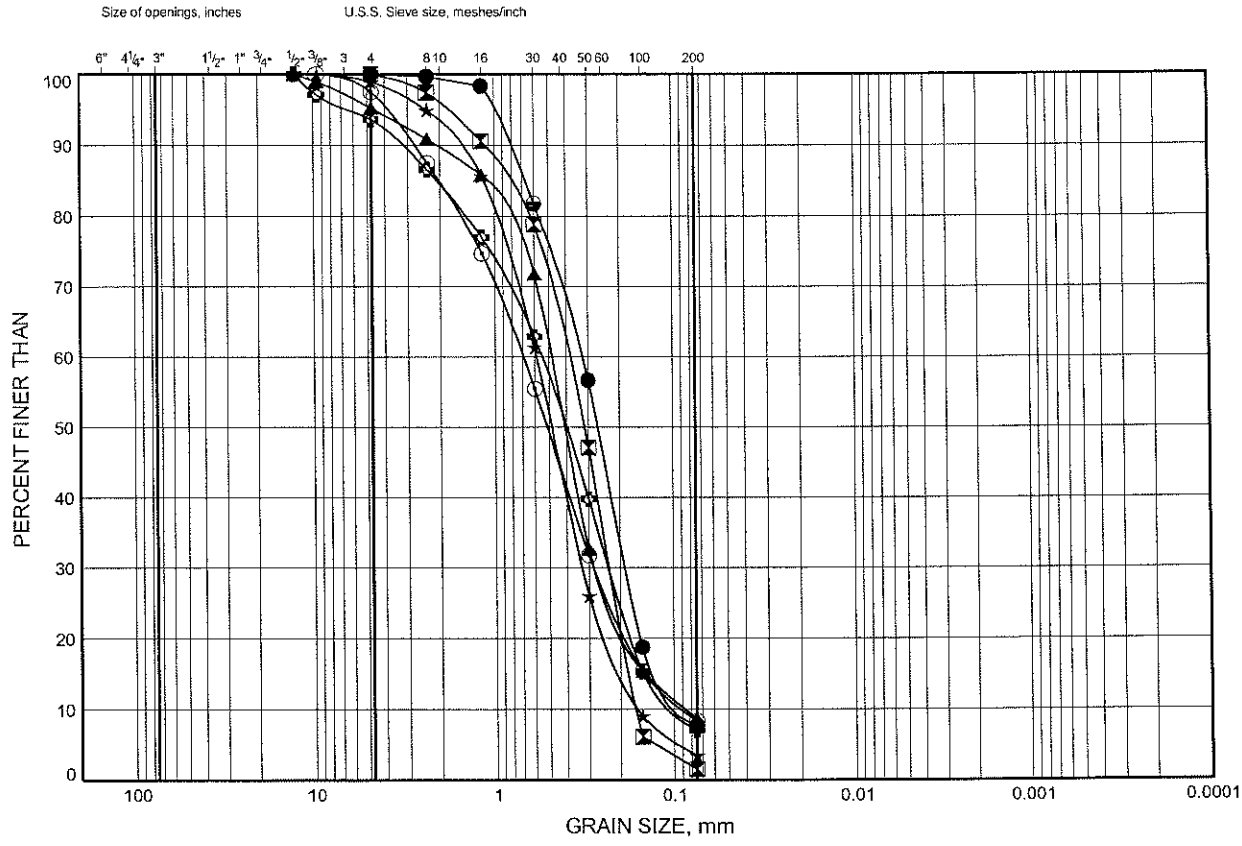
THURBGSD MAGENTAWAN RIVER.GPJ 09/03/05

Hwy 11 Four Laning

GRAIN SIZE DISTRIBUTION

FIGURE I4

SAND



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	12+416 CL	3.35	
⊠	12+430 L18.75	2.59	
▲	12+442.5 L38.8	2.74	
★	12+442.5 L38.8	3.35	
⊙	12+455 L18.75	2.59	
✿	12+478 L20.5	3.35	

Date March 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

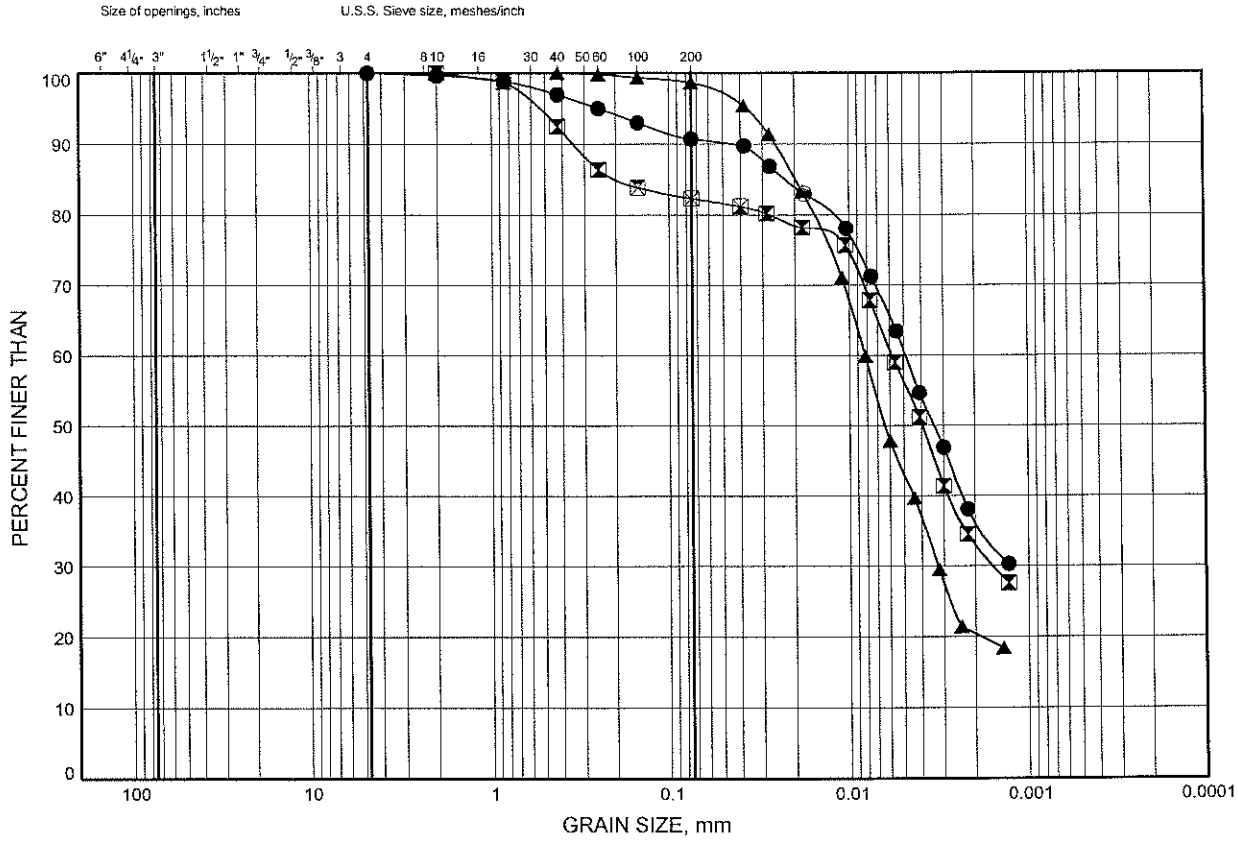
THURBGSD MAGENTAWAN RIVER.GPJ 09/03/05

Hwy 11 Four Laning

GRAIN SIZE DISTRIBUTION

FIGURE I5

Silty CLAY to Clayey SILT



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	12+342.5 L42.5	4.88	
⊠	12+430 L18.75	3.51	
▲	12+467.5 CL	1.83	

Date March 2005

Project 480-93-00

THURBER

Prep'd WM

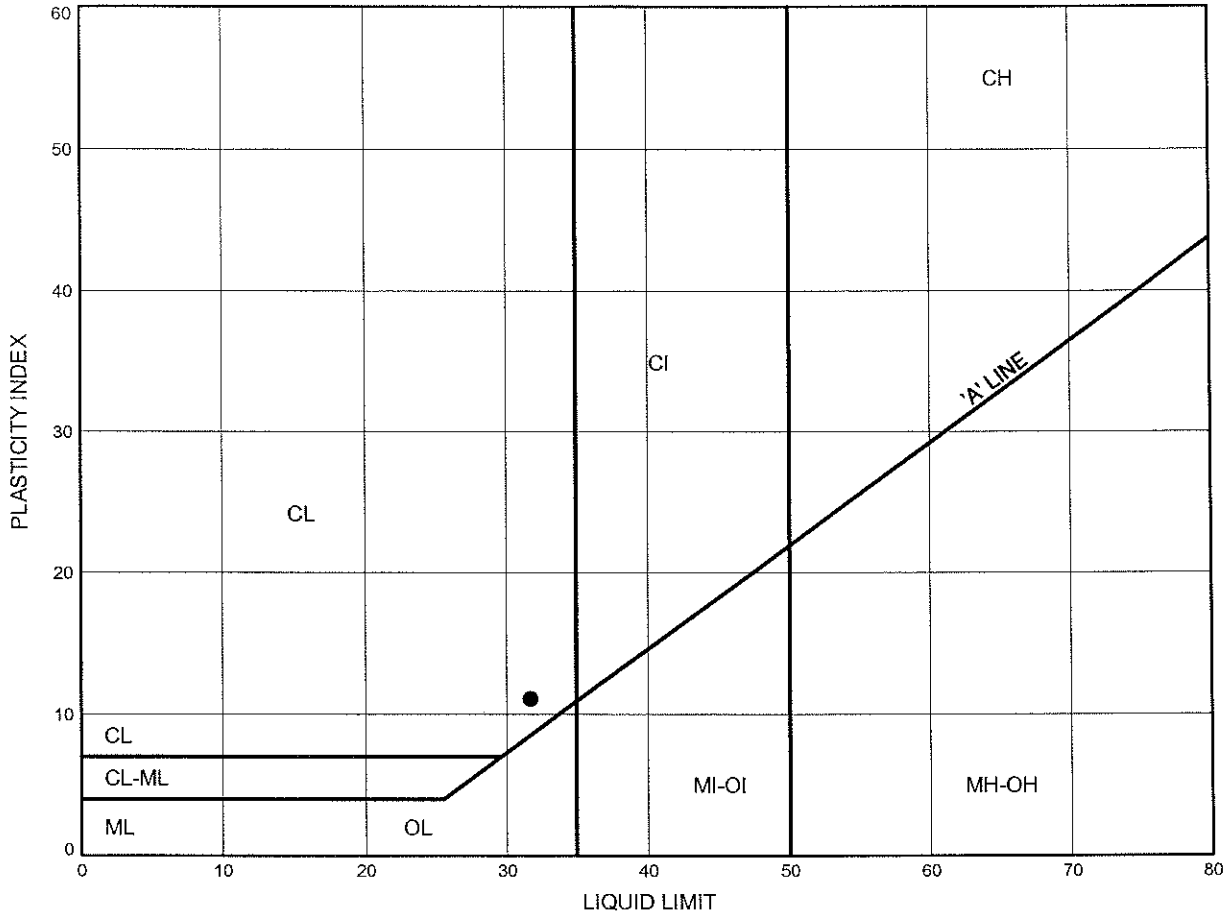
Chkd. MA

THURBGSD MAGENTAWAN RIVER.GPJ 09/03/05

Hwy 11 Four Laning

ATTERBERG LIMITS TEST RESULTS

FIGURE I6



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	12+342.5 L42.5	4.88	

Date March 2005

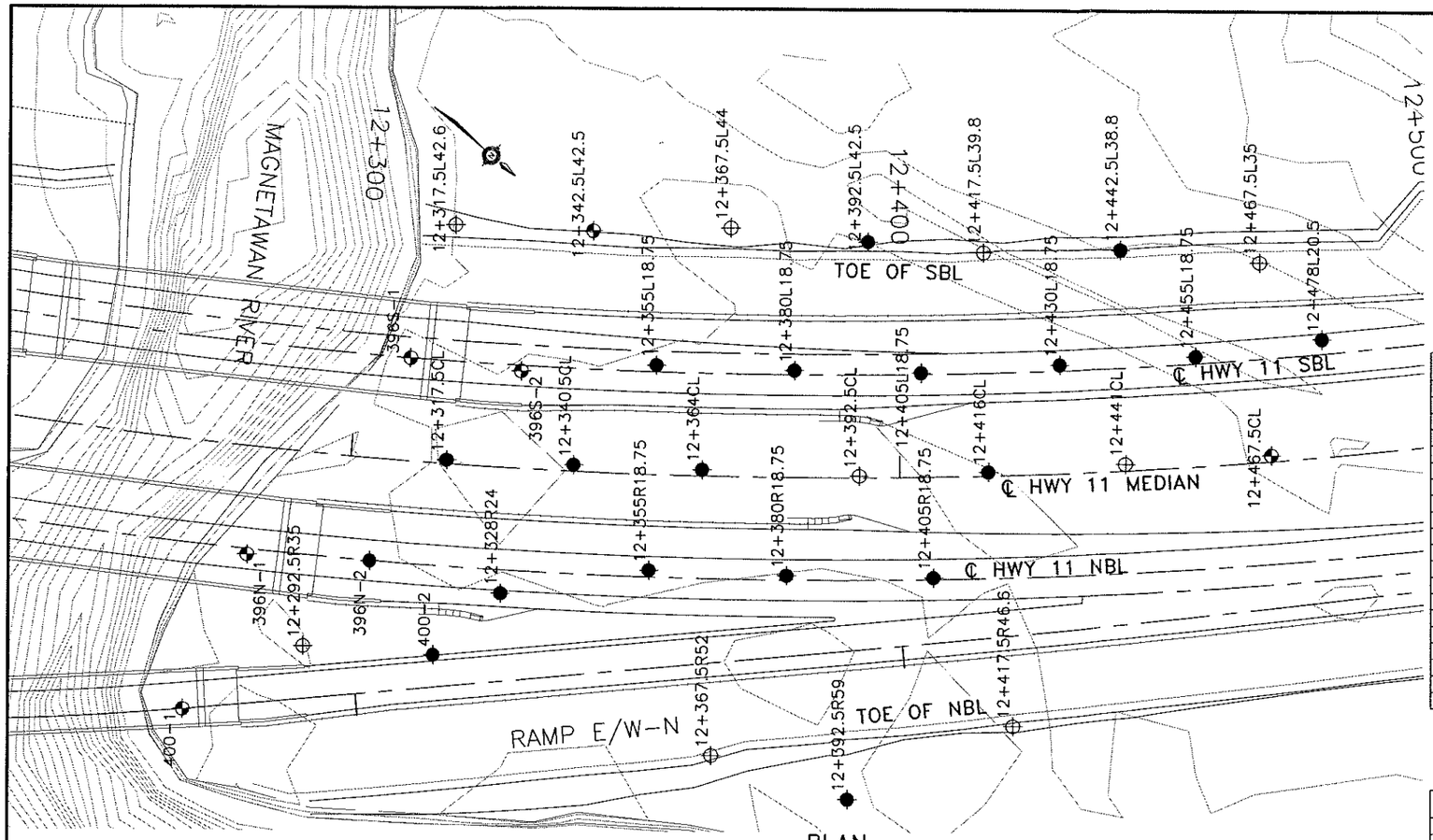
Project 480-93-00

THURBER

Prep'd WM

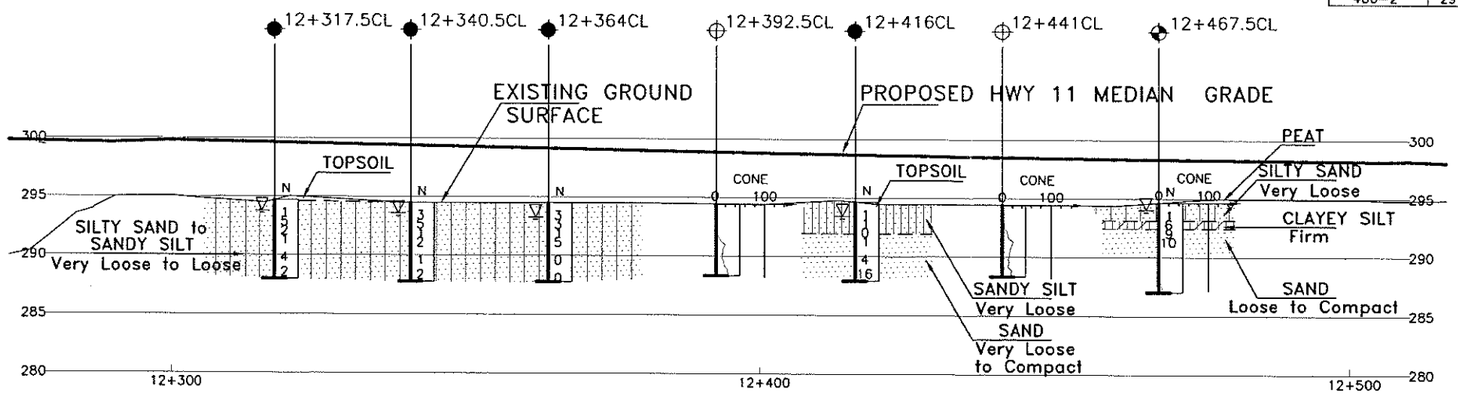
Chkd. MA

THURBALT MAGENTAWAN RIVER.GPJ 09/03/05



PLAN

5 0 10 20m



PROFILE ℄ HWY 11 MEDIAN

5 0 10 20m HOR
2.5 0 5 10m VERT

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HWY 11
CONT No
WP No 480-93-00

SHEET

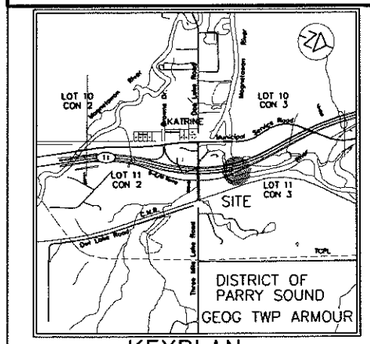
HIGHWAY 11 MAINLINE
ARMOUR TOWNSHIP
STATION 12+280 TO 12+480
MEDIAN CENTRELINE
BOREHOLE LOCATIONS AND SOIL STRATA

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

THURBER ENGINEERING LTD.

NO	STATION	OFFSET FROM MEDIAN CL
12+367.5 R52	12+367.5	R52
12+380 L18.75	12+380	L18.75
12+380 R18.75	12+380	R18.75
12+392.5 CL	12+392.5	CL
12+392.5 L42.5	12+392.5	L42.5
12+392.5 R59	12+392.5	R59
12+405 L18.75	12+405	L18.75
12+405 R18.75	12+405	R18.75
12+416 CL	12+416	CL
12+417.5 L39.8	12+417.5	L39.8
12+417.5 R46.6	12+417.5	R46.6
12+430 L18.75	12+430	L18.75
12+441 CL	12+441	CL
12+442.5 L38.8	12+442.5	L38.8
12+455 L18.75	12+455	L18.75
12+467.5 CL	12+467.5	CL
12+467.5 L35	12+467.5	L35
12+478 L20.5	12+478	L20.5

NO	ELEVATION	NORTH	EAST
396N-1	294.8	5048586.1	316363.9
396N-2	294.5	5048604.0	316350.3
396S-1	294.3	5048585.9	316317.2
396S-2	294.5	5048602.7	316306.1
400-1	294.8	5048595.4	316392.9
400-2	294.8	5048623.9	316356.0



KEYPLAN

0 500m 1km

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
⊕	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

NO	STATION	OFFSET FROM MEDIAN CL
12+292.5 R35	12+292.5	R35
12+317.5 CL	12+317.5	CL
12+317.5 L42.6	12+317.5	L42.6
12+328 R24	12+328	R24
12+340.5 CL	12+340.5	CL
12+342.5 L42.5	12+342.5	L42.5
12+355 L18.75	12+355	L18.75
12+355 R18.75	12+355	R18.75
12+364 CL	12+364	CL
12+367.5 L44	12+367.5	L44

— NOTE —

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

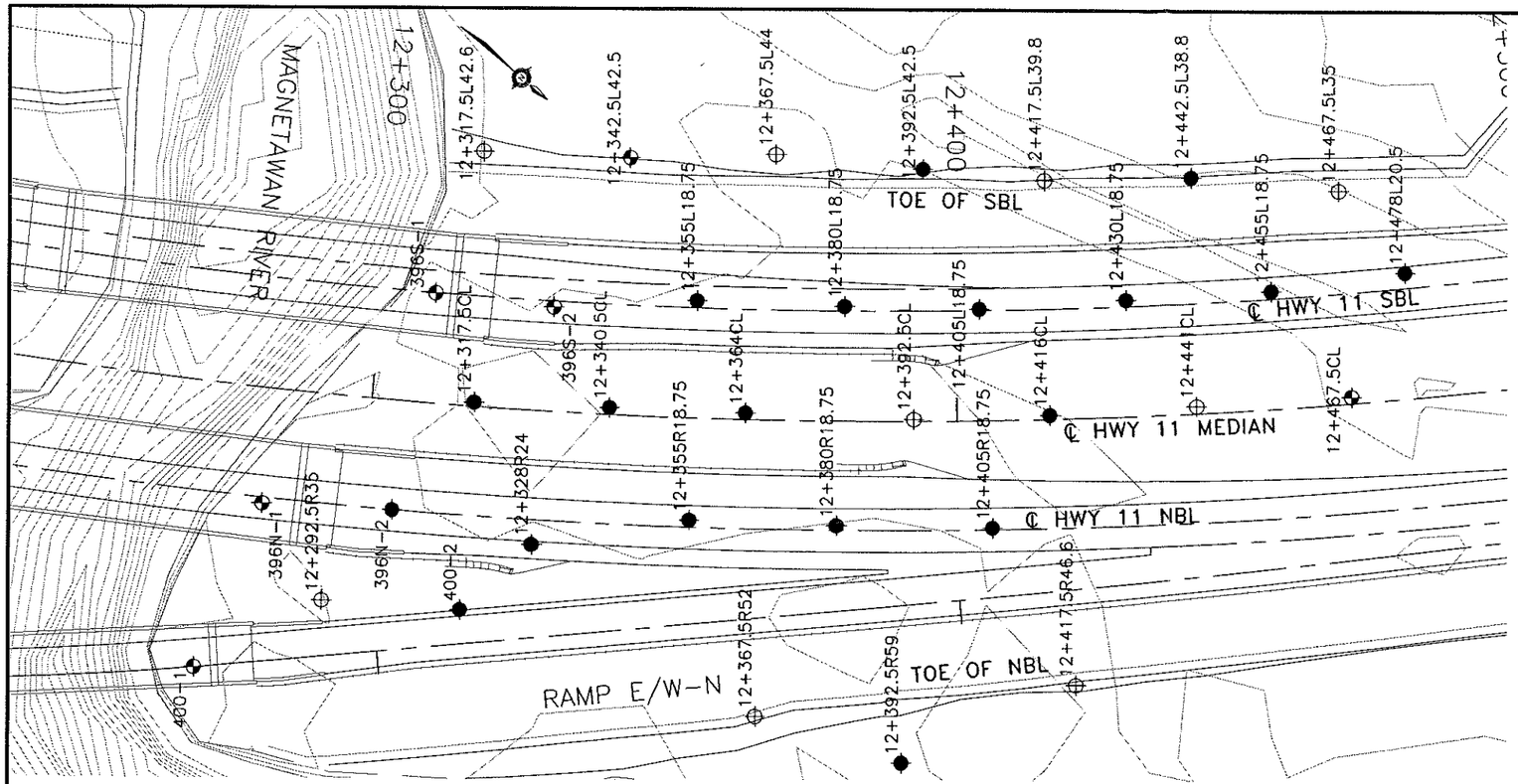
LICENSED PROFESSIONAL ENGINEER
M. R. ANDERSON
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. J. BRANCO
PROVINCE OF ONTARIO

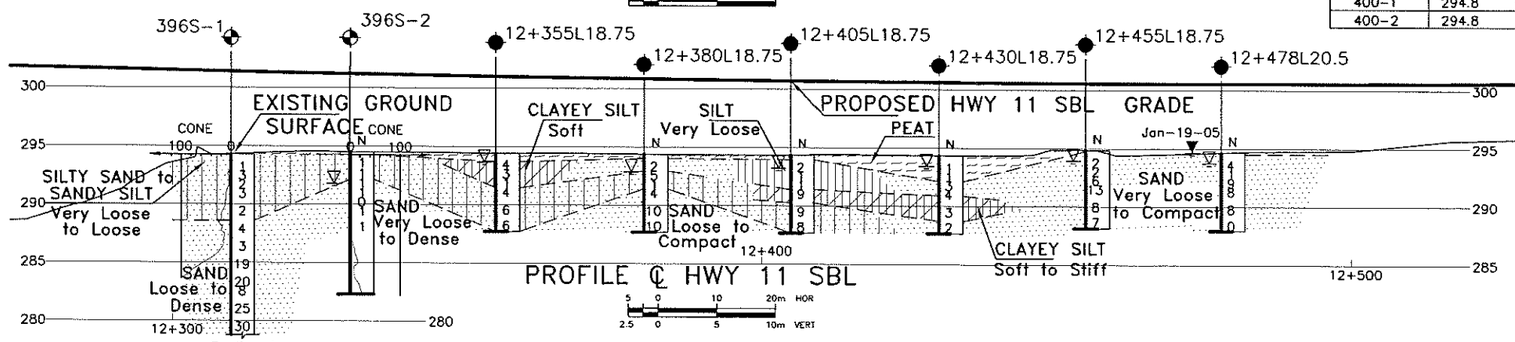
DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

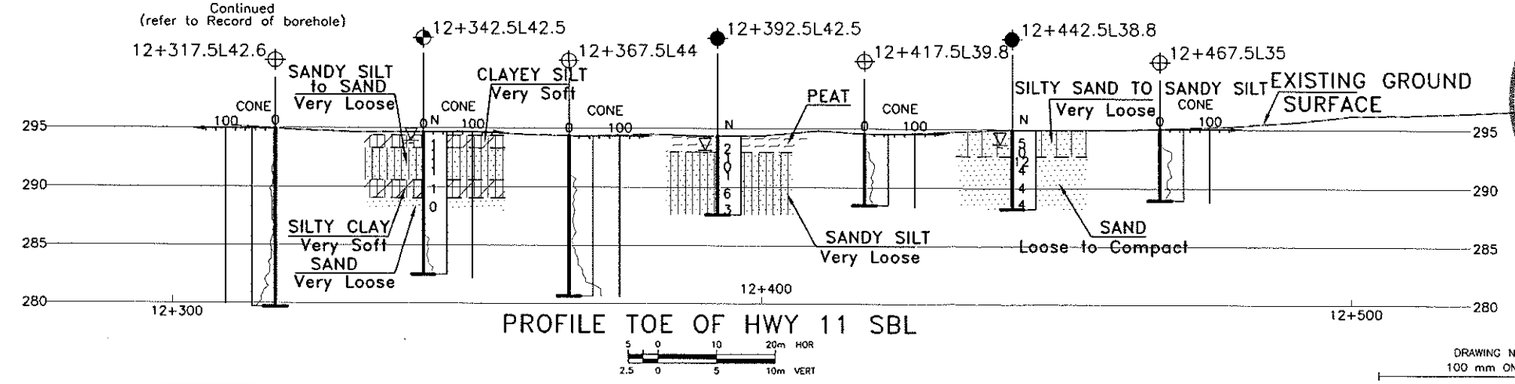
REVISIONS		
DATE	BY	DESCRIPTION
JAN, 05	MA	ISSUED AS DRAFT FOR REVIEW

DESIGN MA	CHK AEG	CODE CHBDC	LOAD	DATE JAN, 2005	
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG 1 1



PLAN





DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HWY 11
CONT No
WP No 480-93-00

SHEET

HIGHWAY 11 MAINLINE
ARMOUR TOWNSHIP
STATION 12+280 TO 12+480
SBL CENTRELINE AND TOE
BOREHOLE LOCATIONS AND SOIL STRATA

Marshall Macklin Monaghan
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THURBER ENGINEERING LTD.

NO	STATION	OFFSET FROM MEDIAN CL
12+367.5 R52	12+367.5	R52
12+380 L18.75	12+380	L18.75
12+380 R18.75	12+380	R18.75
12+392.5 CL	12+392.5	CL
12+392.5 L42.5	12+392.5	L42.5
12+392.5 R59	12+392.5	R59
12+405 L18.75	12+405	L18.75
12+405 R18.75	12+405	R18.75
12+416 CL	12+416	CL
12+417.5 L39.8	12+417.5	L39.8
12+417.5 R46.6	12+417.5	R46.6
12+430 L18.75	12+430	L18.75
12+441 CL	12+441	CL
12+442.5 L38.8	12+442.5	L38.8
12+455 L18.75	12+455	L18.75
12+467.5 CL	12+467.5	CL
12+467.5 L35	12+467.5	L35
12+478 L20.5	12+478	L20.5

	ELEVATION	NORTH	EAST
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400-1	294.8	5048595.4	316392.9
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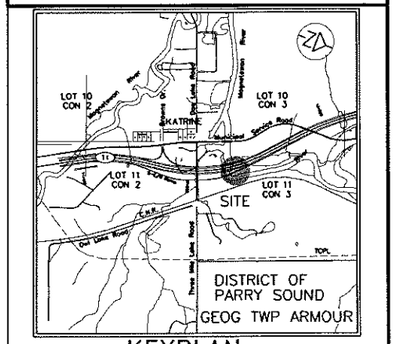

KEYPLAN
0 500m 1km

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
⊕●	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

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P. J. BRANCO
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12+292.5 R35	12+292.5	R35
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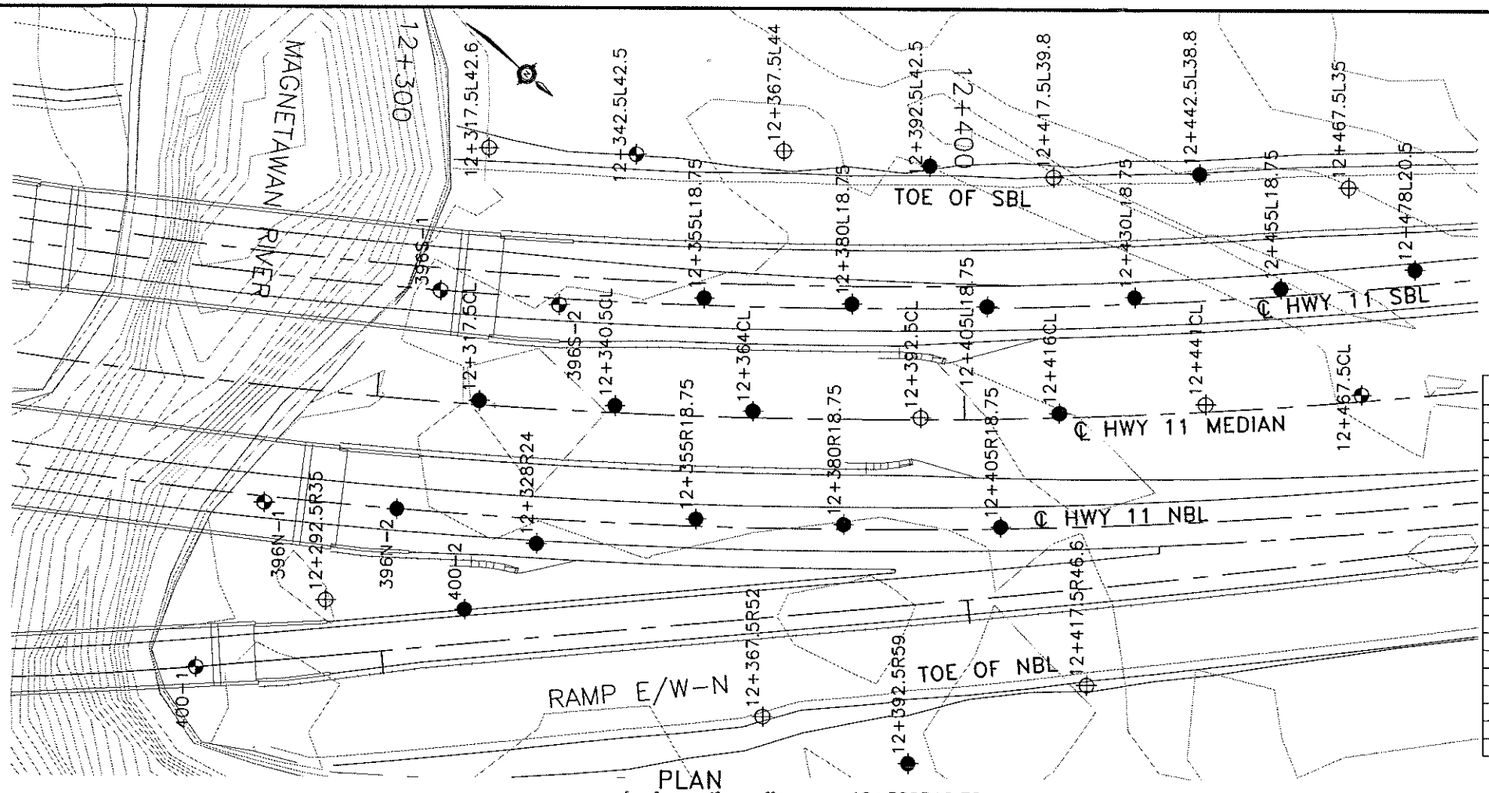
12+317.5 L42.6	12+317.5	L42.6
12+328 R24	12+328	R24
12+340.5 CL	12+340.5	CL
12+342.5 L42.5	12+342.5	L42.5
12+355 L18.75	12+355	L18.75
12+355 R18.75	12+355	R18.75
12+364 CL	12+364	CL
12+367.5 L44	12+367.5	L44

— NOTE —

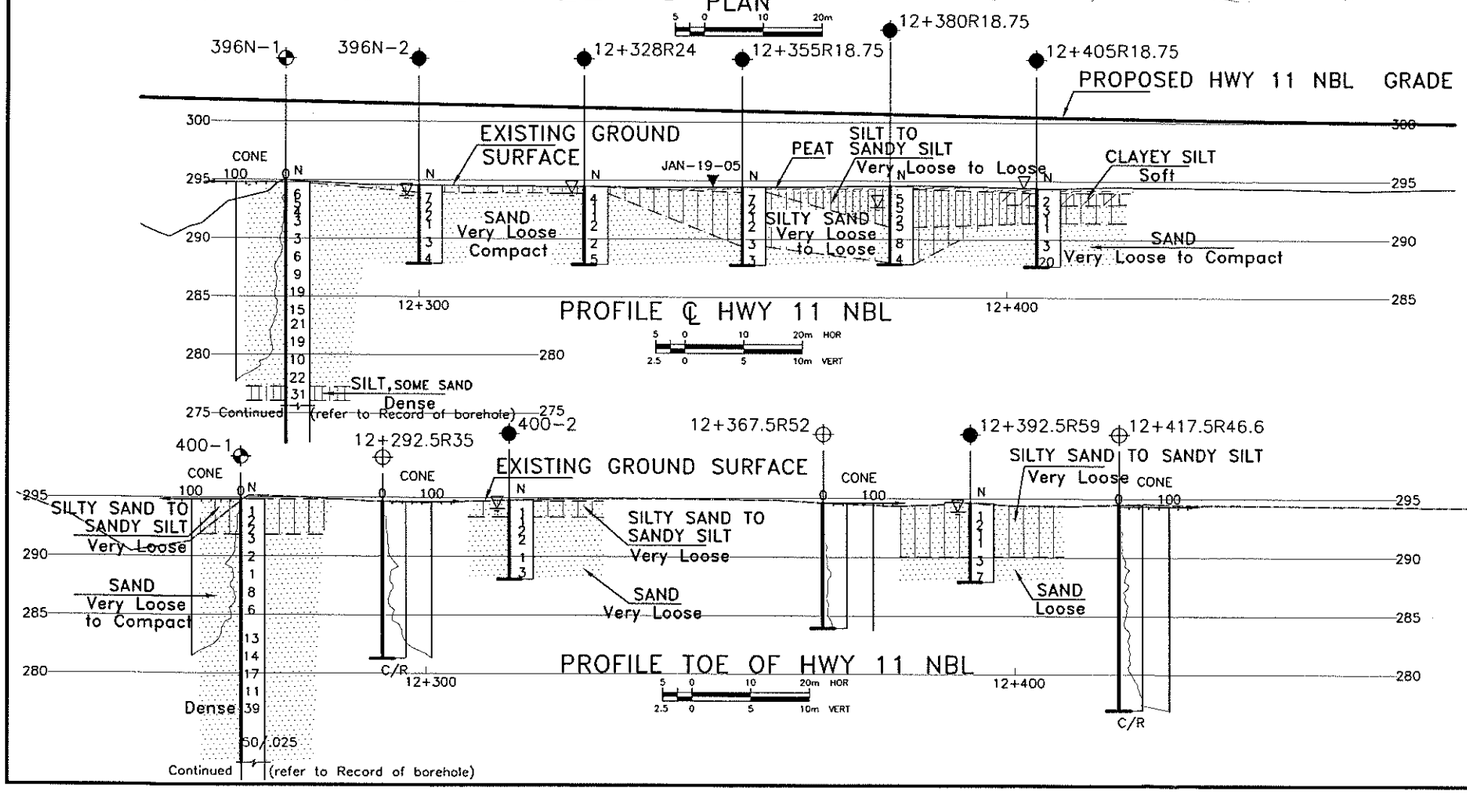
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

REVISIONS		
DATE	BY	DESCRIPTION
JAN, 05	MA	ISSUED AS DRAFT FOR REVIEW

DESIGN MA	CHK AEG	CODE CHBDC	LOAD	DATE JAN, 2005	
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG 1 2



PLAN



METRIC

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HWY 11
CONT No
WP No 480-93-00

SHEET

HIGHWAY 11 MAINLINE
ARMOUR TOWNSHIP
STATION 12+280 TO 12+480
NBL CENTRELINE AND TOE
BOREHOLE LOCATIONS AND SOIL STRATA

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12+380 R18.75	12+380	R18.75
12+392.5 CL	12+392.5	CL
12+392.5 L42.5	12+392.5	L42.5
12+392.5 R59	12+392.5	R59
12+405 L18.75	12+405	L18.75
12+405 R18.75	12+405	R18.75
12+416 CL	12+416	CL
12+417.5 L39.8	12+417.5	L39.8
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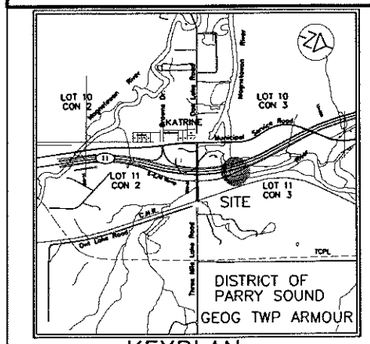
12+442.5 L38.8	12+442.5	L38.8
12+455 L18.75	12+455	L18.75
12+467.5 CL	12+467.5	CL
12+467.5 L35	12+467.5	L35
12+478 L20.5	12+478	L20.5



KEYPLAN

0 500m 1km

	ELEVATION	NORTH	EAST
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LEGEND

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⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
⊕	Bore Hole & Cone
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CONE	Blows/0.3m (60° Cone, 475J/blow)
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▼	Head Artesian Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
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12+317.5 L42.6	12+317.5	L42.6
12+328 R24	12+328	R24
12+340.5 CL	12+340.5	CL
12+342.5 L42.5	12+342.5	L42.5
12+355 L18.75	12+355	L18.75
12+355 R18.75	12+355	R18.75
12+364 CL	12+364	CL
12+367.5 L44	12+367.5	L44

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DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS			
JAN. 05	MA	ISSUED AS DRAFT FOR REVIEW	
DATE	BY	DESCRIPTION	
DESIGN MA	CHK AEG	CODE CHBDC	LOAD	DATE JAN. 2005
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG 1 3

Appendix J

Platts Access Road, Station 10+300 to 10+400

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+300 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+300, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 23.11.04 - 23.11.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.2	Silty **CLAY**, trace sand Hard Brown		1	SS	53				○		
			2	SS	30				⊖		0 3 51 46
2.2	**SILT**, some clay, trace sand Stiff Brown		3	SS	11				○		
3.0	**SILT**, some sand, trace clay, trace gravel Loose Brown Wet		4	SS	9				○		1 13 82 4
4.1	**SAND**, some silt, some gravel, with cobbles Dense Brown Wet		5	SS	36				○		
5.2	END OF BOREHOLE AT 5.18 m. BOREHOLE BACKFILLED WITH BENTONITE GROUT UPON COMPLETION.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 18/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+312.5 L18 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+312.5, O/S 18L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 23.11.04 - 23.11.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100; ○ UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	w_P w w_L; 20 40 60	γ kN/m³	GR SA SI CL
0.0	DCPT from surface.										
3.2	END OF DCPT AT 3.23 m. CONE REFUSAL AT 3.2 m. BOREHOLE BACKFILLED WITH BENTONITE HOLE PLUG.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15\frac{20}{10}5$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 18/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+312.5 R18 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+312.5, O/S 18R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 23.11.04 - 23.11.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** (150 mm)										
0.2	**SILT**, some clay to clayey, occasional thin silt layers Very Stiff to Stiff Brown		1	SS	15				o		
			2	SS	9				o		
			3	SS	14				o		0 0 83 17
2.9	**SILT**, trace clay, trace sand Compact Grey Moist to Wet		4	SS	19				o		
			5	SS	14				o		0 3 89 8
			6	SS	16				o		
6.7	END OF BOREHOLE AT 6.71 m. BOREHOLE BACKFILLED WITH BENTONITE GROUT UPON COMPLETION.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15\text{-}\overset{20}{\underset{10}{\Phi}}\text{-}5$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 18/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+325 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+325, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 23.11.04 - 23.11.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT** Black										
0.8	Clayey **SILT** Stiff Brown		1	SS	8				○		
1.4	**SAND**, fine grained, trace to some silt, trace gravel Compact to Dense Brown Wet		2	SS	30				○		
			3	SS	26				○		
	Becoming Grey		4	SS	18				○		5 78 18 (SI+CL)
			5	SS	47				○		
5.9	END OF BOREHOLE AT 5.92 m. AUGER REFUSAL AT 5.92 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE BACKFILLED WITH BENTONITE GROUT.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 18/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+337.5 L26 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+337.5, O/S 26L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 24.11.04 - 24.11.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT** Black										
0.6	**SAND,** some gravel to gravelly, some silt Very Dense to Compact Brown Wet		1	SS	57				○		
			2	SS	36				○		20 63 17 (SI+CL)
			3	SS	26				○		
	Becoming Grey		4	SS	27				○		25 62 14 (SI+CL)
	with cobbles		5	SS	50/.100				○		
			6	SS	50/.050						
6.2	END OF BOREHOLE AT 6.20 m. AUGER REFUSAL AT 6.20 m ON PROBABLE BEDROCK OR BOULDER. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 24.11.04 0.00										

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

15 20 10 5 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+337.5 R26 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+337.5, O/S 26R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 24.11.04 - 24.11.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	w_P w w_L	γ kN/m^3	GR SA SI CL
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	20 40 60		
0.0	Cone sank 0.61 m										
0.6	DCPT started at 0.61 m										
4.2	END OF DCPT AT 4.24 m. CONE REFUSAL AT 4.24 m. BOREHOLE BACKFILLED WITH BENTONITE HOLE PLUG.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20
15 5
10
(%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 18/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+350 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+350, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 24.11.04 - 24.11.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT** Black										
0.6	**SAND**, fine grained, some silt, trace gravel Loose to Compact Brown Wet		1	SS	3				○		
			2	SS	30				○		
			3	SS	12				○		9 70 20 (SI+CL)
			4	SS	20				○		
	Becoming Very Dense, with cobbles		5	SS	50/ .125				○		
5.9	END OF BOREHOLE AT 5.94 m. AUGER REFUSAL AT 5.94 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE BACKFILLED WITH BENTONITE GROUT UPON COMPLETION.										

+ ³, × ³: Numbers refer to Sensitivity

20
15 ⊕ 5
10
(%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 18/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+362.5 L23 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+362.5, O/S 23L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 10.01.05 - 10.01.05 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**SILT**, trace sand, trace clay, occasional organics Brown		1	SS	51				○		
0.8	**SILT and SAND**, some clay, trace gravel Very Dense Brown Wet		2	SS	81/.225				○		9 38 40 14
1.5	END OF BOREHOLE AT 1.52 m. AUGER REFUSAL AT 1.52 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 1.52 m. WATER LEVEL AT 1.52 m. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

+ ³, × ³: Numbers refer to Sensitivity

15 20 10 5 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 21/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+362.5 R26 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+362.5, O/S 26R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 24.11.04 - 24.11.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	DCPT from surface										
5.2	END OF DCPT AT 5.16 m. CONE REFUSAL AT 5.2 m. BOREHOLE GROUTED WITH BENTONITE HOLE PLUG.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTMT4 2316.GPJ 18/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+375 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+375, CL ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 10.01.05 - 10.01.05 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	Silty **SAND**, some gravel to gravelly, trace rootlets, trace iron oxide staining Compact to Dense Brown Wet		1	SS	15				○		
			2	SS	46				○		21 41 30 7
1.5	END OF BOREHOLE AT 1.52 m. AUGER REFUSAL AT 1.52 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 1.52 m AND WATER LEVEL AT 0.61 m UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus^{20}_{10} 5$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 21/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+387.5 L20 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+387.5, O/S 20L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 10.01.05 - 10.01.05 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	**SAND**, trace silt to silty, trace gravel Compact to Dense Brown Wet		1	SS	12				○		
			2	SS	35				○		
			3	SS	40				○		4 65 28 3
2.3	END OF BOREHOLE AT 2.29 m. AUGER REFUSAL AT 2.29 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 2.29 m AND WATER LEVEL AT 0.61 m UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 18/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+387.5 R20 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+387.5, O/S 20R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 10.01.05 - 10.01.05 CHECKED BY MA

SOIL PROFILE ELEV/DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**SAND**, trace silt, occasional rootlets Compact Brown Moist		1	SS	13				○		
0.7	Sandy **SILT**, some clay, occasional iron oxide staining Compact Brown Moist		2	SS	21				○		0 31 54 15
1.5	**SAND**, trace to some gravel, trace silt Dense Brown Wet		3	SS	30				○		
2.1	END OF BOREHOLE AT 2.13 m. AUGER REFUSAL AT 2.13 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 2.13 m AND WATER LEVEL AT 1.83 m UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 21/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+387.5 R21 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+387.5, O/S 21R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 10.01.05 - 10.01.05 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
0.0	DCPT from surface.										
1.9	END OF DCPT AT 1.93 m. CONE REFUSAL AT 1.93 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\oplus} 5$ 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 18/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No PLT 10+400 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Platts Access, ST. 10+400, CL ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 10.01.05 - 10.01.05 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Silty **CLAY**, trace organics and rootlets, occasional iron oxide staining Stiff to Very Stiff Brown		1	SS	11				○		
			2	SS	30				⊖		0 2 59 39
1.5	**SILT**, trace sand, trace clay Dense to Compact Grey Wet		3	SS	32				○		
			4	SS	20				○		0 2 88 9
2.9	END OF BOREHOLE AT 2.90 m. AUGER REFUSAL AT 2.90 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 2.90 m AND WATER LEVEL AT 2.44 m UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

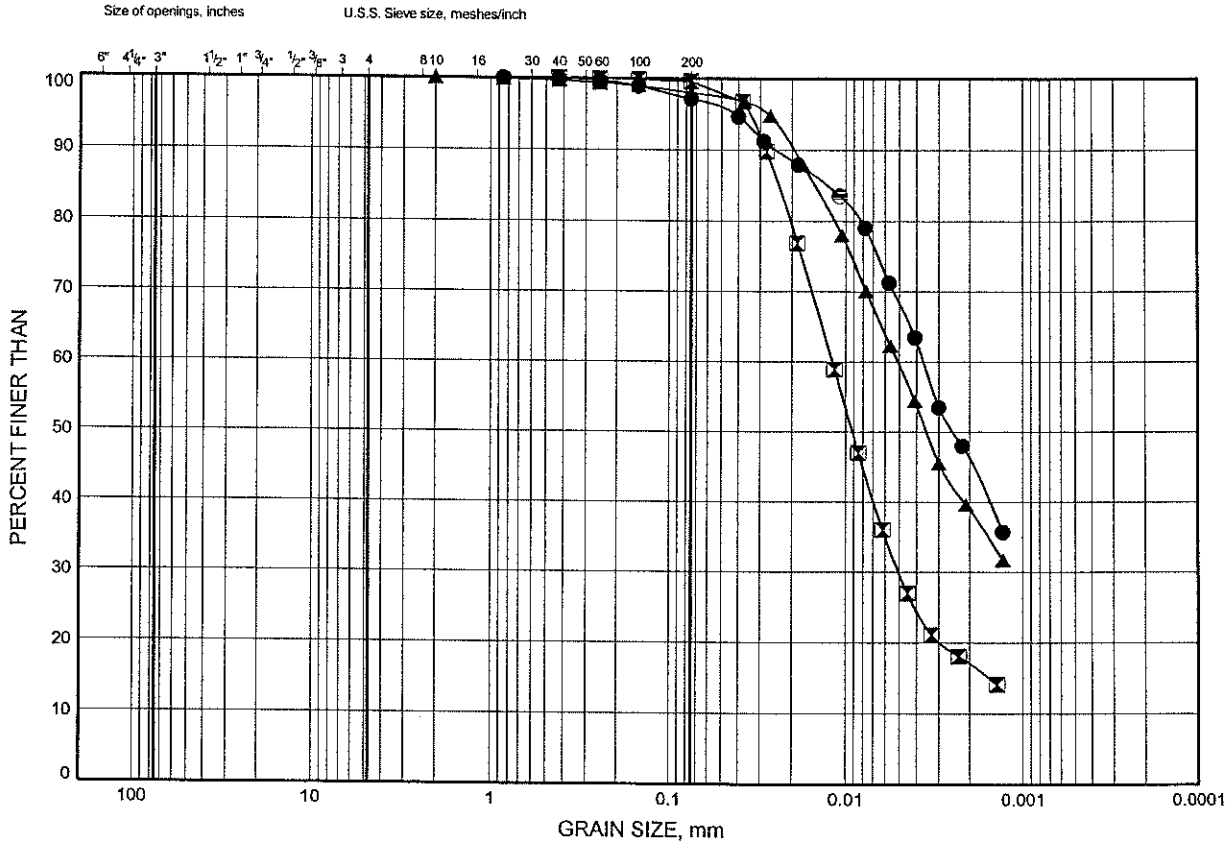
ONTMT4 2316.GPJ 21/02/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE J1

Silty CLAY to Clayey SILT



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	PLT 10+300 CL	1.83	
⊠	PLT 10+312.5 R18	2.59	
▲	PLT 10+400 CL	1.07	

Date February 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

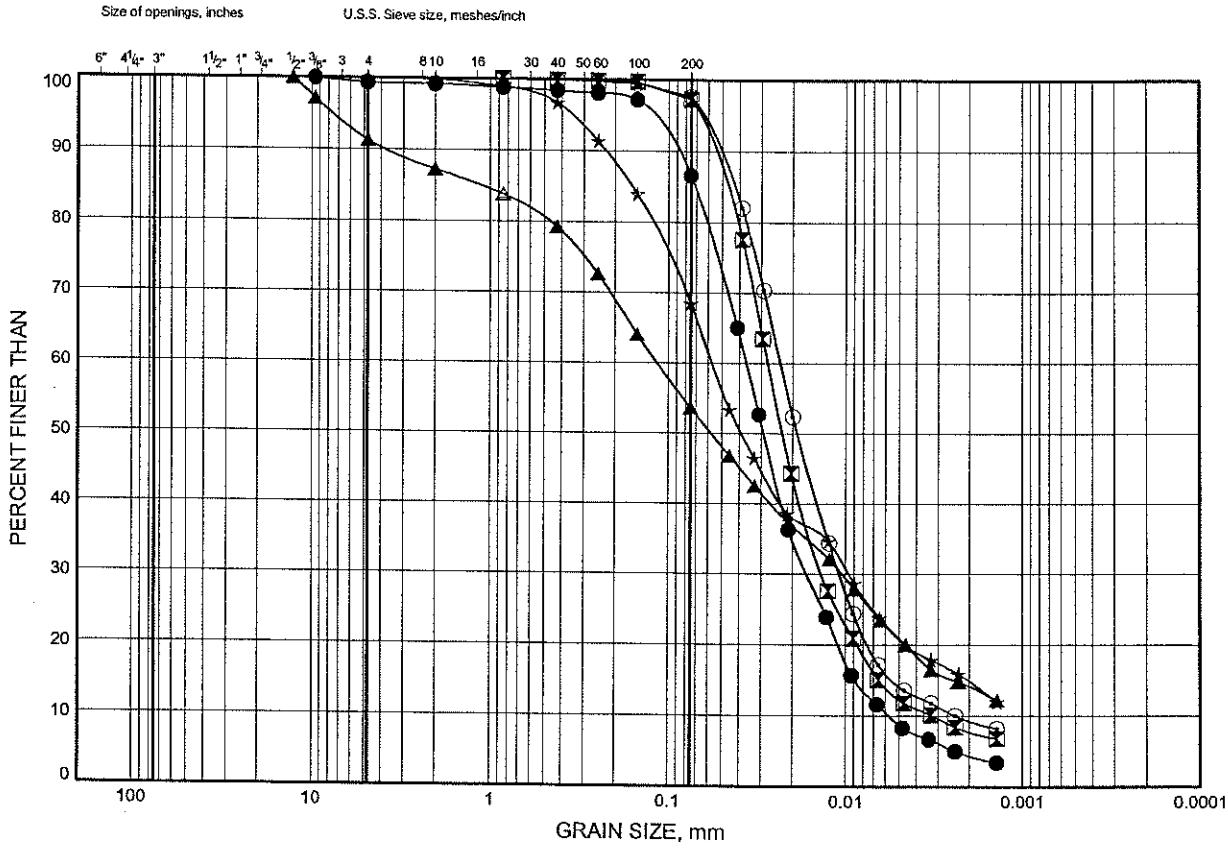
THURBGSD 2316.GPJ 21/02/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE J2

SILT to SILT and SAND



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	PLT 10+300 CL	3.35	
⊠	PLT 10+312.5 R18	4.88	
▲	PLT 10+362.5 L23	1.07	
★	PLT 10+387.5 R20	1.07	
⊙	PLT 10+400 CL	2.59	

Date February 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

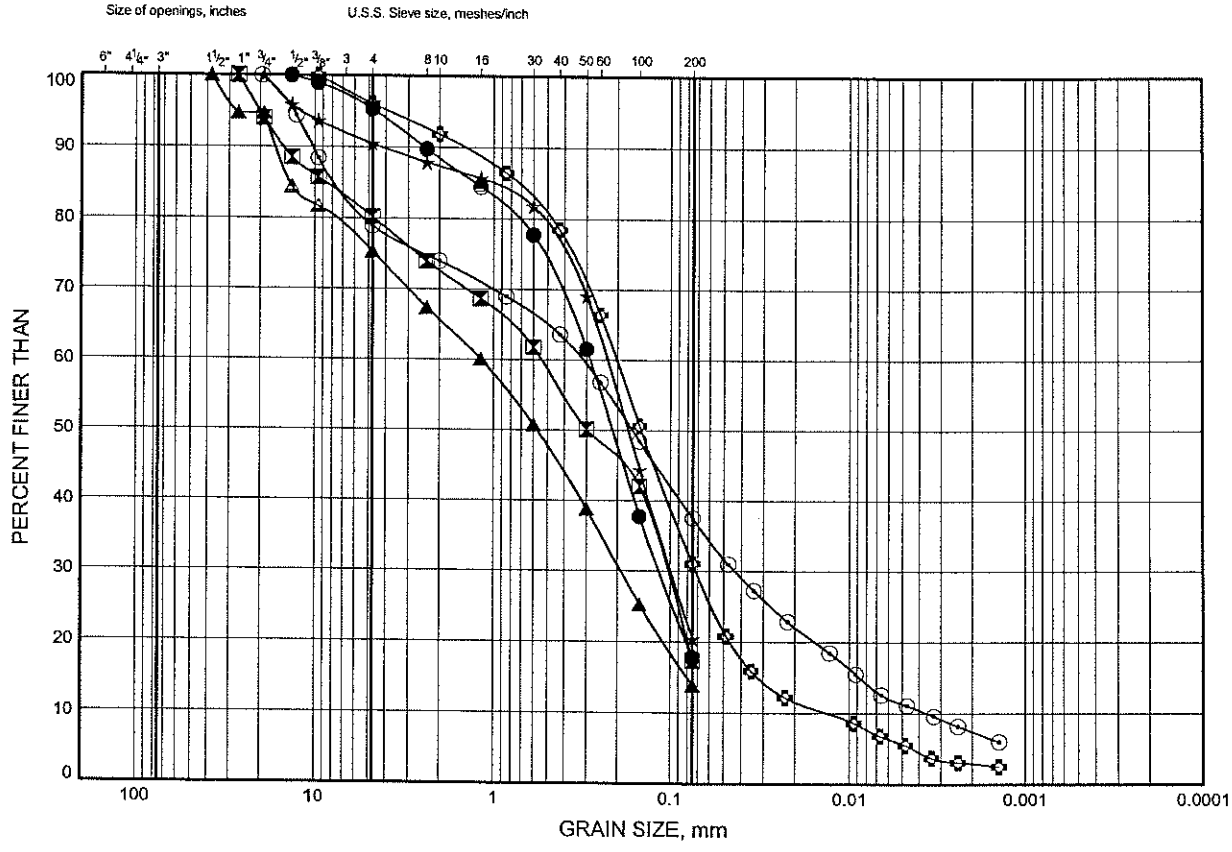
THURBGSD 2316.GPJ 21/02/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE J3

SAND to Silty SAND



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	PLT 10+325 CL	3.35	
⊠	PLT 10+337.5 L26	1.83	
▲	PLT 10+337.5 L26	3.35	
★	PLT 10+350 CL	2.59	
⊙	PLT 10+375 CL	1.07	
✿	PLT 10+387.5 L20	1.83	

Date February 2005

Project 480-93-00

THURBER

Prep'd WM

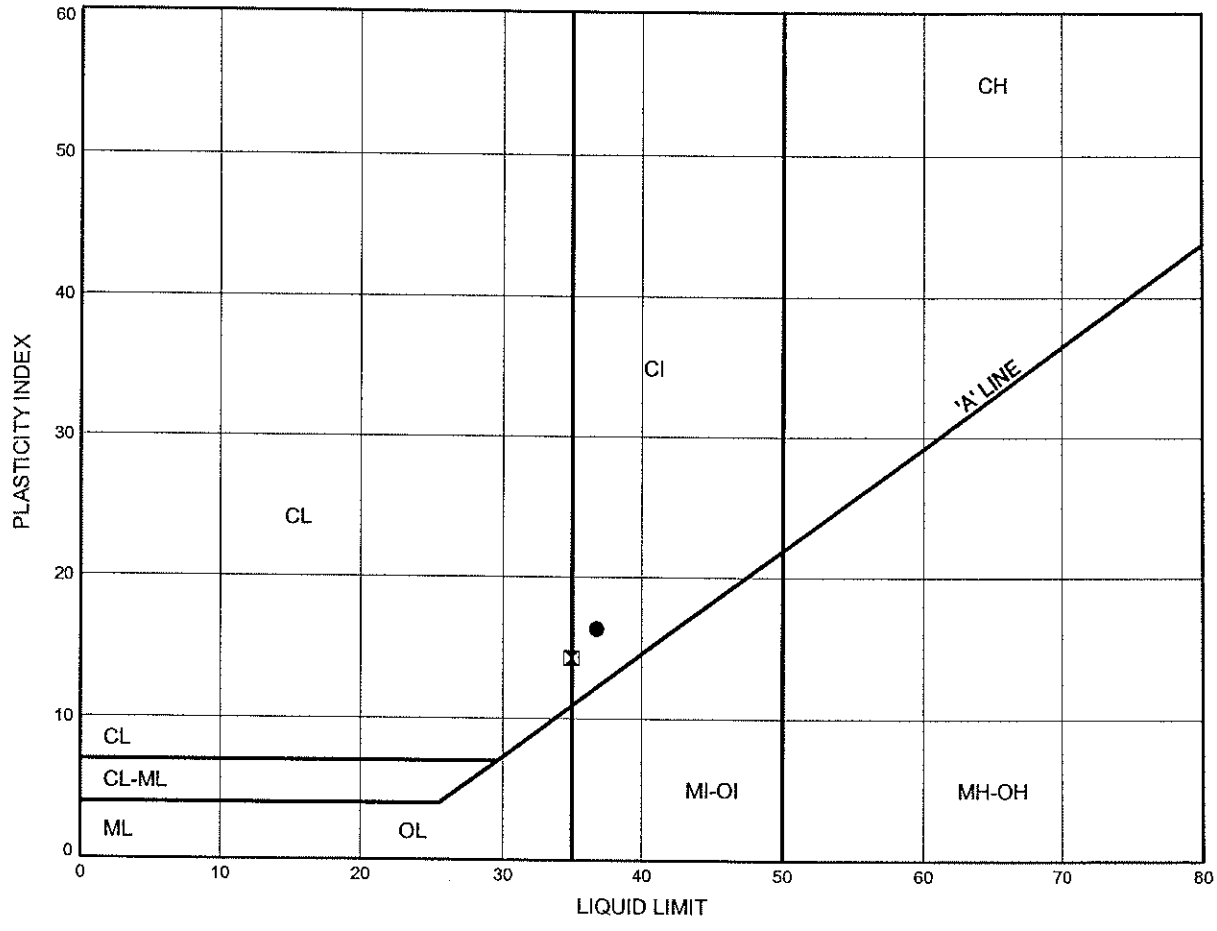
Chkd. MA

THURBGSD 2316.GPJ 21/02/05

Hwy 11 Katrine

ATTERBERG LIMITS TEST RESULTS

FIGURE J4



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	PLT 10+300 CL	1.83	
⊠	PLT 10+400 CL	1.07	

Date February 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

THURBALT 2316.GPJ 21/02/05

TRIC

ARE IN METRES
MILLIMETRES
ERWISE SHOWN

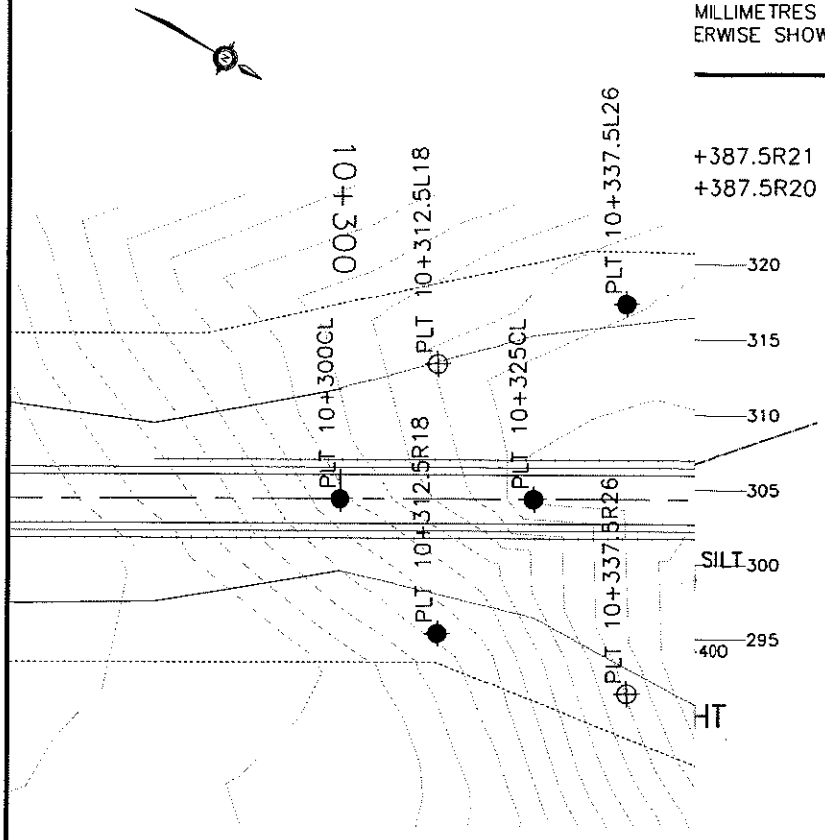
HWY 11
CONT No
WP No 480-93-00

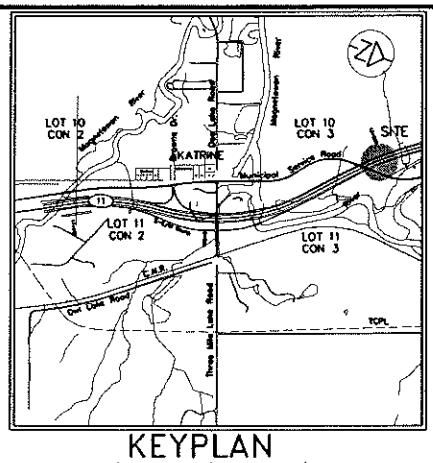
SHEET

PLATTS ACCESS
ARMOUR TOWNSHIP
STATION 10+300 TO 10+400
CL, RIGHT TOE , LEFT TOE
BOREHOLE LOCATIONS AND SOIL STRATA

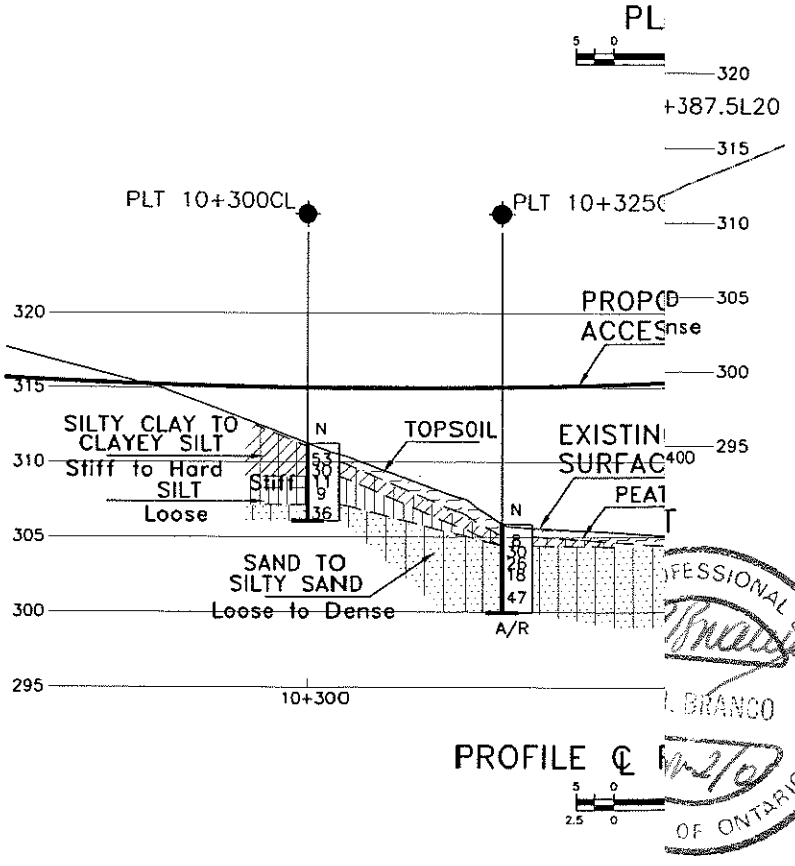
Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

THURBER ENGINEERING LTD.





KEYPLAN



L E G E N D

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
◈	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

NO	STATION	OFFSET FROM CL
PLT 10+300 CL	10+300	CL
PLT 10+312.5 L18	10+312.5	L18
PLT 10+312.5 R18	10+312.5	R18
PLT 10+325 CL	10+325	CL
PLT 10+337.5 L26	10+337.5	L26
PLT 10+337.5 R26	10+337.5	R26
PLT 10+350 CL	10+350	CL
PLT 10+362.5 L23	10+362.5	L23
PLT 10+362.5 R26	10+362.5	R26
PLT 10+375 CL	10+375	CL
PLT 10+387.5 L20	10+387.5	L20

— NOTE —

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

REVISIONS			
	JAN, 05	MA	ISSUED AS DRAFT FOR REVIEW
	DATE	BY	DESCRIPTION

DESIGN MA	CHK AEG	CODE CHBDC	LOAD	DATE JAN, 2005	
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG J1

Appendix K

Municipal Service Road, Station 9+600 to 9+815

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 9+592.5 L13 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 9+592.5, O/S L13 ORIGINATED BY SL

HWY 11 BOREHOLE TYPE NW Casing COMPILED BY WM

DATUM Geodetic DATE 16.06.04 - 16.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** Dark Brown										
0.3	**SAND**, trace silt, trace gravel, with cobbles and boulders Very Dense Brown Moist		1	SS	50/.050						
			2	SS	50/.075						RUN #1 Boulder
			1	RUN							RUN #2 Boulder
			2	RUN							RUN #3 Boulder
			3	RUN							
			3	SS	50/.125				○		RUN #4 Cobbles
			4	RUN							
			4	SS	50/.150				○		RUN 5# TCR=93%, SCR=86%, RQD=79%, UCS=154.8MPa
5.1	Fresh, massive dark grey, strong to very strong **GNEISS**, occasional mechanical breaks		5	RUN						FI	RUN 6# TCR=100%, SCR=100%, RQD=100%, UCS=165.7MPa
			6	RUN						0	RUN 7# TCR=100%, SCR=100%, RQD=100%, UCS=175.1MPa
			7	RUN						0	RUN 8# TCR=100%, SCR=100%, RQD=100%, UCS=169.6MPa
			8	RUN						0	
8.5	END OF BOREHOLE AT 8.46 m. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 18.06.04 3.30 24.06.04 3.41									1	
										0	
										0	

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\Leftrightarrow} 5$ $\overset{}{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 9+612.5 L28 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 9+612.5, O/S L28 ORIGINATED BY SL

HWY 11 BOREHOLE TYPE NW Casing COMPILED BY WM

DATUM Geodetic DATE 14.06.04 - 14.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**, some wood fragments Black		1	SS	50/ .050				○		
0.4	**SAND**, trace to some silt, with cobbles Very Dense Brown Wet		1	RUN							RUN #1 Cobbles
			2	SS	50/ .075				○		
			2	RUN							RUN #2 Cobbles
			3	RUN							RUN #3 Cobbles
			3	SS	50/ .150				○		
3.5	Fresh, massive dark grey, strong **GNEISS**, occasional mechanical breaks		4	RUN						FI 3 1 1	RUN 4# TCR=100%, SCR=100%, RQD=83%, UCS=144.8MPa
			5	RUN						0 0 0 0 0	RUN 5# TCR=100%, SCR=100%, RQD=100%, UCS=177.0MPa
			6	RUN						0 0	RUN 6# TCR=100%, SCR=100%, RQD=100%,
6.6	END OF BOREHOLE AT 6.58 m. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen.										UCS=147.1MPa

WATER LEVEL READINGS:

DATE	DEPTH (m)
18.06.04	5.03
24.06.04	5.01

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus^{20}_{10} 5$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 04/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 9+637.5 L15 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 9+637.5, O/S L15 ORIGINATED BY SL

HWY 11 BOREHOLE TYPE NW Casing COMPILED BY WM

DATUM Geodetic DATE 15.06.04 - 15.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** (moss)										
0.2	**SAND**, trace silt, trace gravel, with cobbles Very Dense Brown Wet		1	SS	10				○		
			2	SS	50/.125				○		
			3	SS	50/.075						
1.7	Fresh, massive, dark grey, strong **GNEISS**, occasional mechanical breaks		1	RUN						FI >5 >5 >5	RUN 1# TCR=97%, SCR=67%, RQD=42%, UCS=138.7MPa
			2	RUN						>5 0	RUN 2# TCR=100%, SCR=58%, RQD=58%, UCS=155.9MPa
			3	RUN						0 0 0 0	RUN 3# TCR=100%, SCR=100%, RQD=100%, UCS=153.8MPa
4.7	END OF BOREHOLE AT 4.67 m. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen.										

WATER LEVEL READINGS:

DATE	DEPTH (m)
18.06.04	1.89
24.06.04	2.28

+ ³, × ³: Numbers refer to Sensitivity

15 (20, 10, 5) (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 04/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 9+662.5 L36 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 9+662.5, O/S L36 ORIGINATED BY SL

HWY 11 BOREHOLE TYPE NW Casing COMPILED BY WM

DATUM Geodetic DATE 16.06.04 - 16.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**, with wood fragments and rootlets										
0.2	Dark Brown Moist		1	SS	6				○		
	SAND, trace to some silt, with cobbles		2	SS	50/.100						
0.9	Very Dense Brown Wet									FI	
	Fresh, massive dark grey, strong to medium strong **GNEISS**, occasional mechanical breaks		1	RUN						4	RUN 1# TCR=100%,
										2	SCR=100%,
										0	RQD=80%,
			2	RUN						0	UCS=144.8MPa RUN 2# TCR=100%,
										2	SCR=100%,
										0	RQD=97%,
			3	RUN						1	UCS=145.4MPa RUN 3# TCR=63%,
										0	SCR=63%,
4.2	END OF BOREHOLE AT 4.22 m.										RQD=63%,
	Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen.										UCS=191.2MPa
	WATER LEVEL READINGS: DATE DEPTH (m) 18.06.04 2.18 24.06.04 2.92										

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

$\frac{20}{15}\phi\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 04/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 9+687.5 L16 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 9+687.5, O/S L16 ORIGINATED BY SL

HWY 11 BOREHOLE TYPE NW Casing COMPILED BY WM

DATUM Geodetic DATE 17.06.04 - 17.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.1	**SAND and SILT** Loose Brown Moist		1	SS	5				○		
0.8	Gravelly **SAND**, some silt, occasional cobbles Very Dense Brown Moist		2	SS	64				○		35 52 13 (SI+CL)
			3	SS	50/					FI	
1.5	Fresh, massive, dark grey, strong to medium strong **GNEISS**, occasional mechanical breaks		1	RUN	.125					1	RUN 1# TCR=100%, SCR=100%, RQD=100%, UCS=79MPa
			2	RUN						0 2	RUN 2# TCR=100%, SCR=100%, RQD=92%, UCS=101.3MPa
			3	RUN						2 1 0 0 0 1 3 0	RUN 3# TCR=90%, SCR=90%, RQD=87%, UCS=133.8MPa
4.8	END OF BOREHOLE AT 4.78 m. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen.										

WATER LEVEL READINGS:

DATE	DEPTH (m)
18.06.04	1.97
24.06.04	2.29
28.02.05	1.64

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 9+712.5 L32 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 9+712.5, O/S L32 ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE NW Casing COMPILED BY WM

DATUM Geodetic DATE 17.06.04 - 17.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.2	**SAND**, fine grained, trace silt, trace organics Very Loose Brown		1	SS	2				o		
0.6	**SAND**, trace silt, trace gravel, with cobbles Very Dense Brown Moist		2	SS	30/.050	▽					
			3	SS	50/.125						
1.8	Fresh, massive, dark grey, strong **GNEISS**, occasional mechanical breaks		1	RUN						Fl 2 2 0	RUN 1# TCR=93%, SCR=89%, RQD=84%, UCS=135.4MPa
			2	RUN						1 0 1 0 0	RUN 2# TCR=100%, SCR=100%, RQD=97%, UCS=123.9MPa
			3	RUN						0 1	RUN 3# TCR=100%, SCR=100%, RQD=100%, UCS=135.5MPa
5.2	END OF BOREHOLE AT 5.16 m. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen.										

WATER LEVEL READINGS:

DATE	DEPTH (m)
18.06.04	1.29
24.06.04	1.47

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\Phi\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 04/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 9+737.5 L14 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 9+737.5, O/S L14 ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE NW Casing COMPILED BY WM

DATUM Geodetic DATE 18.06.04 - 18.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	TOPSOIL										
0.1	Sandy **SILT**, trace gravel, trace clay, trace rootlets Very Loose to Very Dense Brown		1	SS	3				○		
			2	SS	50/ .125				○		7 34 56 3
			1	RUN							RUN #1 Cobble
			2	RUN							RUN #2 Cobbles
	cobbles and boulders throughout		3	RUN							RUN #3 Cobbles
2.7	Fresh, massive, dark grey, strong **GNEISS**, occasional mechanical breaks		4	RUN							RUN 4# TCR=74%, SCR=56%, RQD=22%, UCS=122.2MPa
			5	RUN						FI 0 1	RUN 5# TCR=93%, SCR=93%, RQD=93%, UCS=135.2MPa
			6	RUN						0 1 0 1 3	RUN 6# TCR=100%, SCR=100%, RQD=92%, UCS=133.4MPa
6.3	END OF BOREHOLE AT 6.32 m. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 24.06.04 4.86 28.02.05 Dry										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\Phi\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 9+762.5 L26 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 9+762.5, O/S L26 ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE NW Casing COMPILED BY WM

DATUM Geodetic DATE 21.06.04 - 21.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**, trace rootlets, wood fragments Very Loose Dark Brown		1	SS	3				○		
0.6	**SAND**, trace to some silt, trace rootlets, trace gravel, cobbles Very Dense Brown Moist		2	SS	25/ ~~050~~						
1.4	Fresh to slightly weathered, massive, dark grey, strong **GNEISS**, occasional mechanical breaks		1	RUN						Fl 2 1	RUN 1# TCR=100%, SCR=100%, RQD=94%, UCS=122.6MPa
			2	RUN						1 4 2 1 2	RUN 2# TCR=93%, SCR=93%, RQD=83%, UCS=141.8MPa
			3	RUN						1 1 1	RUN 3# TCR=100%, SCR=100%, RQD=93%, UCS=130.9MPa
5.1	END OF BOREHOLE AT 5.11 m. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 24.06.04 1.62										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTMT4 2316.GPJ 04/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 9+787.5 L14 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 9+787.5, O/S L14 ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE NW Casing COMPILED BY WM

DATUM Geodetic DATE 18.06.04 - 18.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.1	**SILT**, some sand, trace gravel, with cobbles and boulders Loose to Very Dense Brown Moist to Wet		1	SS	4				○		
			2	SS	50/.125				○		
			1	RUN							RUN #1 Cobble
			3	SS	50/.100				○		3 17 73 7
			2	RUN							RUN #2 Cobbles
			3	RUN							RUN #3 Cobbles
4.0	Fresh, massive, dark grey, strong **GNEISS**, occasional mechanical breaks		4	RUN						FI	RUN 4#
			5	RUN						4 1 0	TCR=100%, SCR=89%, RQD=0%, UCS=103.2MPa
			6	RUN						2 2 2	RUN 5# TCR=100%, SCR=91%, RQD=91%, UCS=174.2MPa
			7	RUN						2 6 2 >5 >5 >5	RUN 6# TCR=100%, SCR=84%, RQD=75%, UCS=169.2MPa RUN 7# TCR=83%, SCR=52%, RQD=33%, UCS=173.3MPa
7.3	END OF BOREHOLE AT 7.29 m. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 24.06.04 Dry										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20
15 ⊕ 5 (%) STRAIN AT FAILURE
10

ONTMT4 2316.GPJ 04/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 9+812.5 L24 1 OF 2 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 9+812.5, O/S L24 ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE NW Casing COMPILED BY WM

DATUM Geodetic DATE 22.06.04 - 22.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.1	Sandy **SILT**, trace gravel, trace clay, with cobbles Loose to Very Dense Brown Moist to Wet		1	SS	3				○		
			2	SS	43				⊖		0 26 70 3
			3	SS	50/.125				○		
2.1	Silty **SAND**, some gravel Very Dense Brown Wet		4	SS	50/.100				○		13 60 27 (SI+CL)
2.7	**SAND and GRAVEL**, with cobbles and boulders Very Dense Brown Wet		5	SS	25/.075						
			6	SS	25/.050						
6.9	Fresh, massive, dark grey, strong to medium strong **GNEISS**, occasional mechanical breaks		1	RUN						FI	RUN 1# TCR=85%, SCR=30%, RQD=22%, UCS=90.6MPa
			2	RUN						>5 5	RUN 2# TCR=71%, SCR=47%, RQD=15%, UCS=134.8MPa
			3	RUN						2 >5	RUN 3# TCR=63%, SCR=63%, RQD=45%, UCS=124.7MPa
			4	RUN						0 1 0	RUN 4# TCR=100%, SCR=100%, RQD=100%, UCS=154.2MPa

Continued Next Page

+³, ×³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 9+812.5 L24 2 OF 2 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 9+812.5, O/S L24 ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE NW Casing COMPILED BY WM

DATUM Geodetic DATE 22.06.04 - 22.06.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
										1 / 0	
10.6	END OF BOREHOLE AT 10.59 m. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 24.06.04 8.76 28.02.05 Damaged										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\underset{10}{\Phi}} 5$ (%) STRAIN AT FAILURE

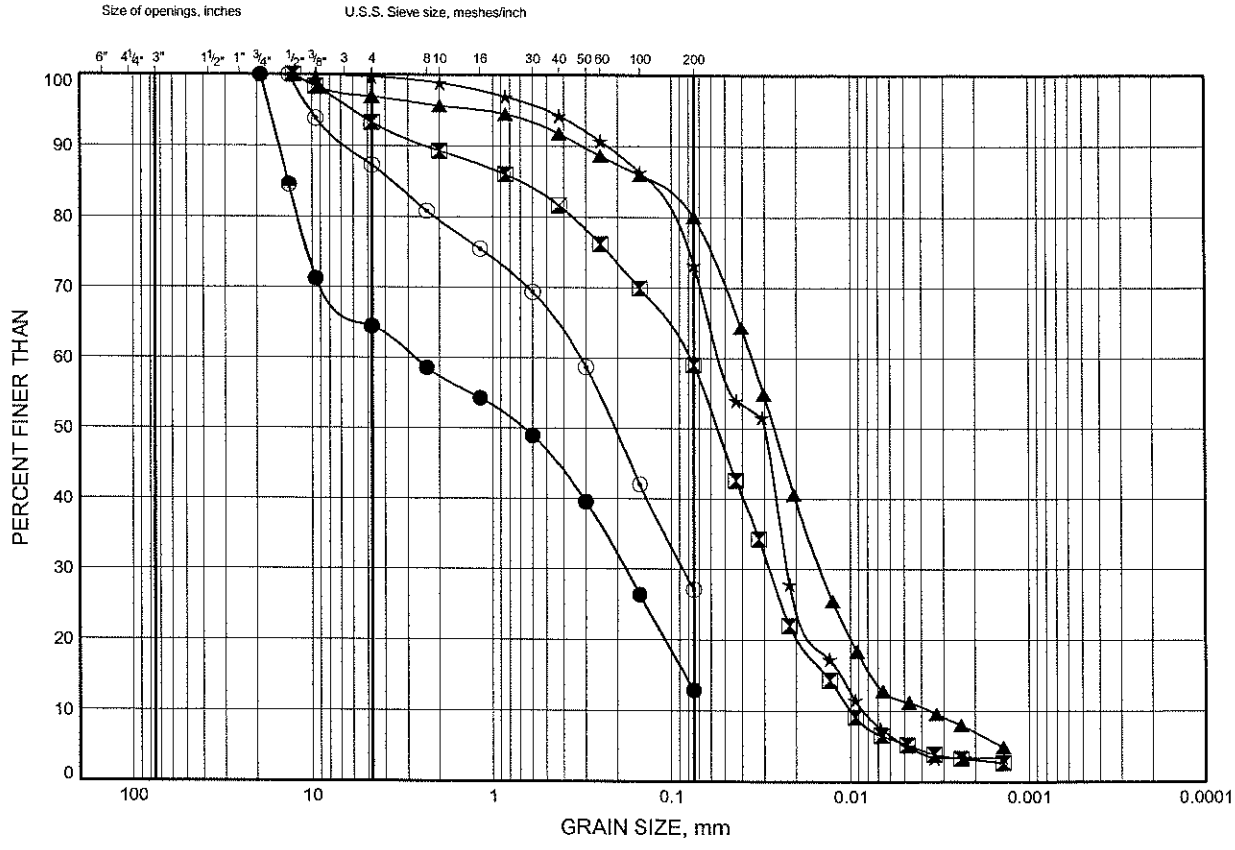
ONTMT4 2316.GPJ 09/03/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE K1

SILT to Silty SAND, Gravelly SAND



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	MSR 9+687.5 L16	0.99	
⊠	MSR 9+737.5 L14	0.74	
▲	MSR 9+787.5 L14	1.75	
★	MSR 9+812.5 L24	0.90	
⊙	MSR 9+812.5 L24	2.34	

Date February 2005

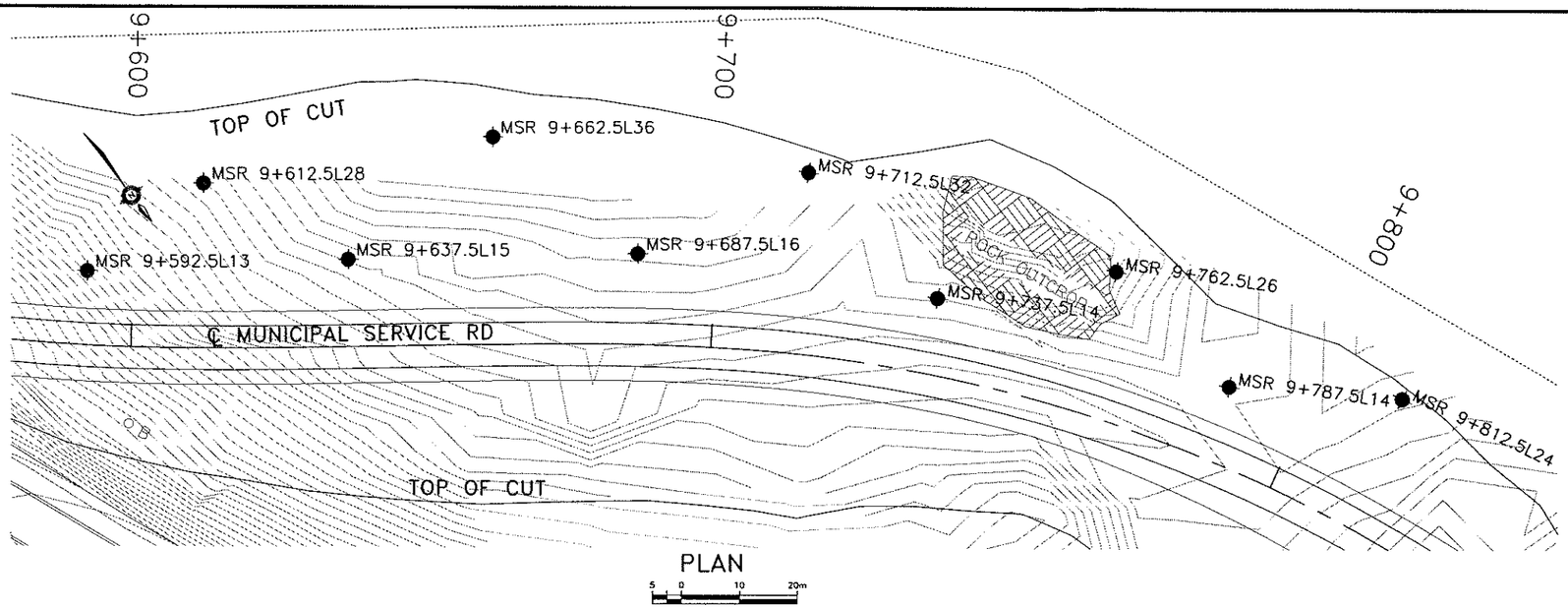
Project 480-93-00

THURBER

Prep'd WM

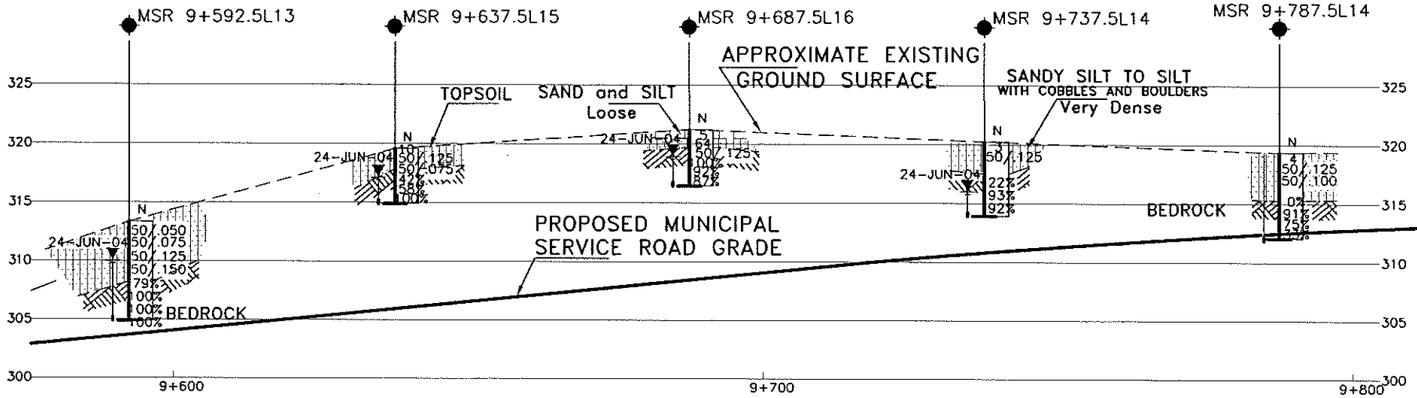
Chkd. MA

THURBGSD 2316.GPJ 04/02/05



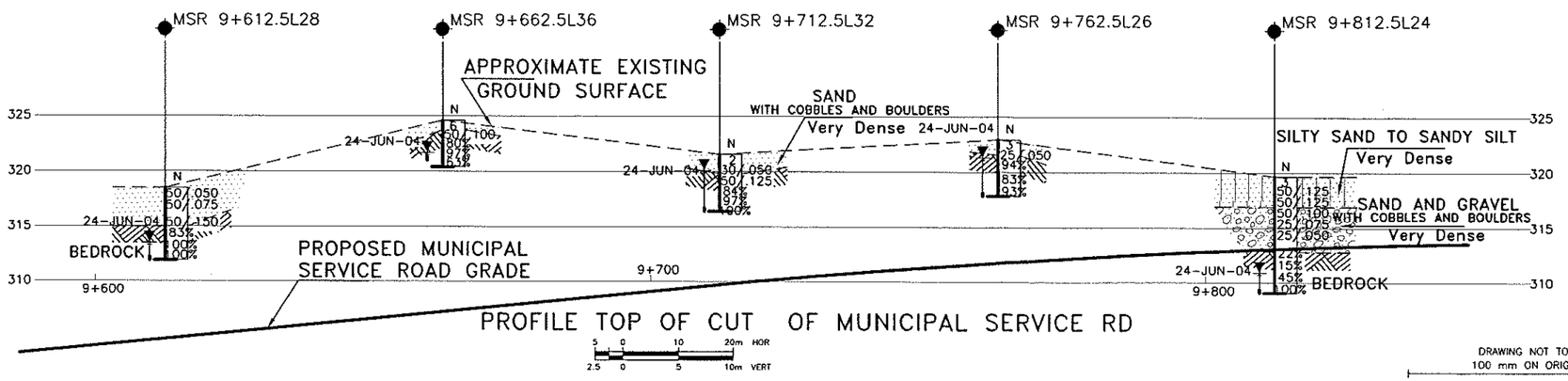
PLAN

5 0 10 20m



PROFILE MIDHEIGHT OF CUT OF MUNICIPAL SERVICE RD

5 0 10 20m HOR
2.5 0 5 10m VERT



PROFILE TOP OF CUT OF MUNICIPAL SERVICE RD

5 0 10 20m HOR
2.5 0 5 10m VERT

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

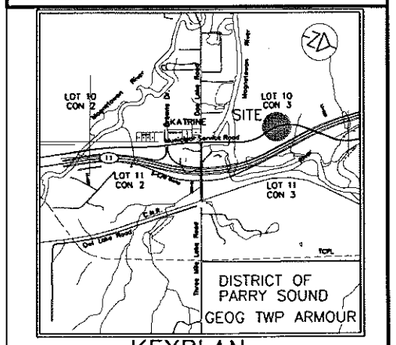
HWY 11
CONT No
WP No 480-93-00

SHEET

MUNICIPAL SERVICE ROAD
STATION 9+600 TO 9+815
LEFT MID-HEIGHT AND TOP OF CUT
BOREHOLE LOCATIONS AND SOIL STRATA

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

THURBER ENGINEERING LTD.



KEYPLAN

0 500m 1km

LICENSED PROFESSIONAL ENGINEER
M. R. ANDERSON
Nov 2/05
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. J. BRANCO
Nov 2/05
PROVINCE OF ONTARIO

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
◆	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water
	Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

NO	STATION	OFFSET FROM CL
MSR 9+592.5 L13	9+592.5	L13
MSR 9+612.5 L28	9+612.5	L28
MSR 9+637.5 L15	9+637.5	L15
MSR 9+662.5 L36	9+662.5	L36
MSR 9+687.5 L16	9+687.5	L16
MSR 9+712.5 L32	9+712.5	L32
MSR 9+737.5 L14	9+737.5	L14
MSR 9+762.5 L26	9+762.5	L26
MSR 9+787.5 L14	9+787.5	L14
MSR 9+812.5 L24	9+812.5	L24

NOTE

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

REVISIONS		
DATE	BY	DESCRIPTION
JAN, 05	MA	ISSUED AS DRAFT FOR REVIEW

DESIGN MA	CHK AEG	CODE CHBDC	LOAD		DATE JAN, 2005
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG K1

Appendix L

Highway 11, Station 12+930 to 12+940

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+935 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 12+935, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 11.06.04 - 11.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT W_P / NATURAL MOISTURE CONTENT W / LIQUID LIMIT W_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	DCPT from surface.										
3.9	END OF DCPT AT 3.94 m. CONE REFUSAL AT 3.94 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

15 (20 / 10) 5 (%) STRAIN AT FAILURE

ONTM14 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+935 R18.75 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 12+935, O/S 18.75R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 09.06.04 - 09.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (20 40 60 80 100)	WATER CONTENT (%) PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.1	Sandy **SILT** Compact Brown Wet		1	SS	18						
0.8	Clayey **SILT**, trace sand Hard Brown		2	SS	54						
1.5	Silty **CLAY** Very Stiff to Stiff Brown		3	SS	19						
			4	SS	12						
			5	SS	11						
			6	SS	11						
6.1	**SILT**, occasional clay layers, occasional sand seams Loose to Compact Brown Moist		7	SS	8						
			8	SS	28						
8.2	END OF BOREHOLE AT 8.23 m. BOREHOLE OPEN TO 7.01 m AND DRY UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE

$+^3$, $\times^3$: Numbers refer to Sensitivity

15 ⊕ 5 (20 / 10) (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 12+935 R47 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 12+935, O/S 47R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

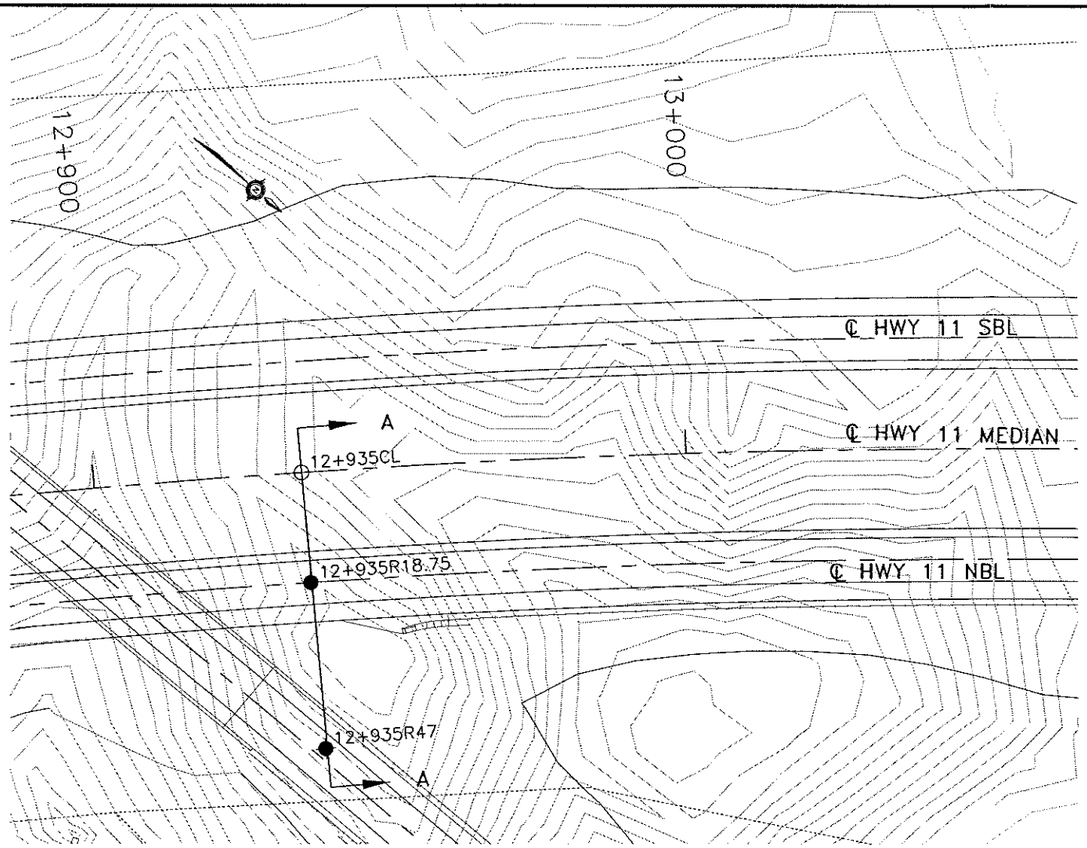
DATUM Geodetic DATE 09.06.04 - 09.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.3	Clayey **SILT**, trace sand seams Very Stiff to Firm Brown		1	SS	8				○		
			2	SS	20				○		
			3	SS	17				○		
			4	SS	9				○		
			5	SS	7				○		
4.3	**SILT**, trace sand, trace clay Loose to Compact Brown Moist to Wet		6	SS	5				○		
			7	SS	16				○		
			8	SS	24				○		
8.2	END OF BOREHOLE AT 8.23 m. BOREHOLE OPEN TO 5.94 m AND WATER LEVEL AT 2.44 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

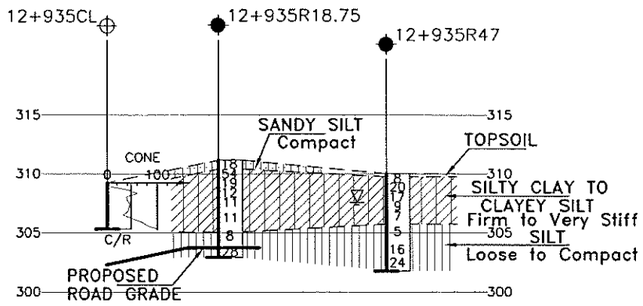
20
15 ⊕ 5
10
(%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05



PLAN

5 0 10 20m



SECTION A–A

5 0 10 20m HOR

2.5 0 5 10m VERT

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

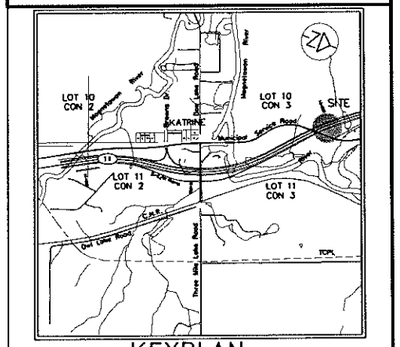
HWY 11
CONT No
WP No 480-93-00

SHEET

HIGHWAY 11 MAINLINE
ARMOUR TOWNSHIP
STATION 12+930 TO 12+940
SECTION AT 12+935 NBL
BOREHOLE LOCATIONS AND SOIL STRATA

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

THURBER ENGINEERING LTD.



KEYPLAN

LICENSED PROFESSIONAL ENGINEER
M. R. ANDERSON
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. J. BRANCO
PROVINCE OF ONTARIO

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
⊕	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

NO	STATION	OFFSET FROM MEDIAN CL
12+935 CL	12+935	CL
12+935 R18.75	12+935	R18.75
12+935 R47	12+935	R47

— NOTE —

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS		
DATE	BY	DESCRIPTION
JAN. 05	MA	ISSUED AS DRAFT FOR REVIEW

DESIGN MA	CHK AEG	CODE CHBDC	LOAD	DATE JAN. 2005	
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG L1

Appendix M

Highway 11, Station 13+100 to 13+150

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+100 L14 1 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+100, O/S 14L ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 24.06.04 - 24.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**SILT**, some sand, trace rootlets, trace wood fibers Very Loose Brown		1	SS	3				○		Topsoil stripped during access preparation
0.8	**SILT**, some clay, trace sand Compact Brown Wet		2	SS	19				○		
			3	SS	19				○		0 3 85 12
			4	SS	19				○		
			5	SS	11				○		
3.5	Sandy **SILT**, trace clay Very Loose to Compact Brown Wet		6	SS	3				○		0 22 75 3
			7	SS	14				○		
			8	SS	14				○		
	DCPT from 8.23 m										
8.7	END OF BOREHOLE AT 8.69 m. CONE REFUSAL ON PROBABLE BEDROCK OR BOULDER.										

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+100 L14 2 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+100, O/S 14L ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 24.06.04 - 24.06.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
	Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m)										

$+^3$, $\times^3$ Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+100 R18.75 1 OF 1 METRIC

W.P. 460-93-00 LOCATION Armour Township, ST. 13+100, O/S 18.75R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 11.06.04 - 11.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.2	Clayey **SILT**, trace sand, trace gravel, occasional topsoil staining Soft to Stiff Brown		1	SS	3				○		
			2	SS	12				○		
			3	SS	10				○		
2.2	**SILT**, some sand seams Compact Brown Wet		4	SS	10				○		
3.0	Silty **SAND**, trace gravel, occasional cobbles Dense Brown Wet		5	SS	36				○		
4.0	END OF BOREHOLE AT 4.01 m. AUGER REFUSAL AT 4.01 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 1.91 m AND WATER LEVEL AT 1.91 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 30/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+112.5 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+112.5, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 11.06.04 - 11.06.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
0.0	**TOPSOIL**										
0.2	Clayey **SILT**, trace gravel, trace sand Soft to Very Stiff Brown		1	SS	3				o		
			2	SS	12				o		
			3	SS	28				o		
2.1	END OF BOREHOLE AT 2.08 m. AUGER REFUSAL AT 2.08 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 2.08 m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+112.5 L47 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+112.5, O/S 47L ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 23.06.04 - 23.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	DCPT from surface.										
3.1	END OF DCPT AT 3.10 m. CONE REFUSAL AT 3.10 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\Phi\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 30/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+112.5 R43 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+112.5, O/S 43R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 11.06.04 - 11.06.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100; ○ UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	w_P w w_L; 20 40 60	γ kN/m³	GR SA SI CL
0.0	DCPT from surface.										
9.1	END OF DCPT AT 9.14 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \Phi 5}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 30/01/05

SITE 3 | **RECORD OF BOREHOLE No 13+119** | **1 OF 1** | **METRIC**

W.P. 314-99-00 | LOCATION Highway 11, Katrine, ON - Coords N 5 049 171.0; E 315 764.5 | ORIGINATED BY R.A

DIST 52 | HWY 11 | BOREHOLE TYPE Continuous Penetration with Split Spoon & modified D.C.P.T. | COMPILED BY G.T

DATUM Geodetic | DATE 13.07.01 | CHECKED BY Z.O

ELEV DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES * "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	MODIFIED DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
301.7	Ground Surface							20 40 60 80 100	20 40 60		
0.0	200 mm **Topsoil**										
	SILT										
	some clay, somewhat organic, brown		1	SS **	1	▼			○		** No recovery bulk sample collected
	some root fibres to 0.9 m, -----		2	SS	3		301		○		
	very soft to soft to 1.2 m, grey										
	hard below, wet		3	SS	40				○		0 13 77 10
299.9							300				
1.8	**SILTY SAND**, some gravel, trace		4	SS	25/21				○		22 43 30 5
299.6	clay, very dense, grey, wet										
2.1											
299.3	End of borehole										
2.4	End of modified DCPT										25/21 denotes 25 blows for 21 cm penetration
	Water level at 0.3 m on 14.07.01										
	*Modified Dynamic Cone Penetration Test performed from 2.1 m to 2.4 m.										
	*Modified N-values and Dynamic Cone Penetration Test (31.8 kg hammer dropping 0.76 m; recorded value divided by 2)										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\underset{10}{\oplus}} 5$ (%) STRAIN AT FAILURE

SITE 3 — RECORD OF BOREHOLE No 13+122 SBL — 1 OF 1 — METRIC

W.P. 314-99-00 LOCATION Highway 11, Katrine, ON - Coords N 5 049 162.3; E 315 748.4 ORIGINATED BY R.A

DIST 52 HWY 11 BOREHOLE TYPE Continuous Penetration with Split Spoon & modified D.C.P.T. COMPILED BY G.T

DATUM Geodetic DATE 18.07.01 CHECKED BY Z.O

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	MODIFIED DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
301.7	Ground Surface										
0.0	200 mm **Topsoil**										
301.0	**SILT**: Sandy, some clay, somewhat organic, some root fibres, very loose, brown		1	SS **	1	▼			○		**No recovery bulk sample collected
0.7	**SAND**: with organics and decomposed wood, some silt and clayey silt seams/lenses, very loose to 1.2 m, compact below, grey, wet		2	SS	4		301		○		
300.2			3	SS	26				○		
1.5	**SILTY SAND**: some gravel, compact to very dense, wet		4	SS	38		300		○		19 63 17 1
299.0	End of borehole		5	SS	25/8				○		
298.9							299				
2.8	End of modified Dynamic Cone Penetration Test Water level at 0.4 m two hours after completion *Modified Dynamic Cone Penetration Test performed from 2.7 m to 2.8 m. * Modified N-Values and Dynamic Cone Penetration Test (31.8 kg hammer dropping 0.76 m; recorded value divided by 2)										'N' = 25/8 denotes 25 blows for 8 cm penetration

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+125 L17 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+125, O/S 17L ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 23.06.04 - 23.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**, some rootlets Dark Brown										
0.3	Silty **SAND**, trace organics, trace rootlets, trace clay, occasional wood fibers Very Loose Dark Brown Moist		1	SS	2				○		
			2	SS	2				○		
1.7	**SAND**, some silt to silty, some gravel to gravelly Compact to Very Dense Brown Moist		3	SS	8				○		
			4	SS	72				○		23 56 22 (SI±CL)
2.8	END OF BOREHOLE AT 2.82 m. AUGER REFUSAL AT 2.82 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

15 ⊕ 5 (20, 10) {%} STRAIN AT FAILURE

ONTMT4 2316.GPJ 30/01/05

SITE 3 | **RECORD OF BOREHOLE No 13+125** | **1 OF 1** | **METRIC**

W.P. 314-99-00 | LOCATION Highway 11, Katrine, ON - Coords N 5 049 175.7; E 315 760.8 | ORIGINATED BY R.A

DIST 52 | HWY 11 | BOREHOLE TYPE Continuous Penetration with Split Spoon | COMPILED BY G.T

DATUM Geodetic | DATE 17.07.01 | CHECKED BY Z.O

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	MODIFIED DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
301.7	Ground Surface										
0.0	200 mm **Topsoil**					***					
	SILT with some clay, somewhat organic, some root fibres, very soft, brown, wet		1	SS	1		301		○		** No recovery bulk sample collected
			2	SS	3				○		
300.4	with sand										
300.2	**SILTY SAND**: trace of organics, very loose, grey, wet		3A 3B	SS	3				○		0 66 31 3
1.5	End of borehole										

End of borehole
Split Spoon refusal at 1.5 m probably on tree-stump.
Borehole moved 2.0 m west and extended to 1.8 m without sampling (see Borehole 13 + 125A)
*Modified N-values (31.8 kg hammer dropping 0.76 m; recorded value divided by 2).
*** Water level not measured due to obstruction

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

SITE 3 **RECORD OF BOREHOLE No 13+125A** 1 OF 1 **METRIC**

W.P. 314-99-00 LOCATION Highway 11, Katrine, ON - Coords N 5 049 174.5; E 315 759.2 ORIGINATED BY R.A

DIST 52 HWY 11 BOREHOLE TYPE Continuous Penetration with Split Spoon & modified D.C.P.T. COMPILED BY G.T

DATUM Geodetic DATE 17.07.01 CHECKED BY Z.O

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	MODIFIED DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	* "N" VALUES						
301.7 0.0	Ground Surface					▼					
	Borehole extended to 1.8 m without sampling (see BH13+125 for Soil Stratigraphy)						301				
299.9							300				
1.8 299.4	**SILTY SAND**: some gravel and clay, trace of organics, dense, grey, wet		1	SS	50/28				○		
2.3 299.1	End of borehole										
2.6	End of modified DCPT Water level at 0.3 m on 18.07.01 *Modified Dynamic Cone Penetration Test performed from 2.3 m to 2.6 m. *Modified N-value and Dynamic Cone Penetration Test (31.8 kg hammer dropping 0.76 m; recorded value divided by 2)										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+125 R16 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+125, O/S 16R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 11.06.04 - 11.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**, some sand Very Loose Brown Wet		1	SS	1				○		
0.7	**SAND**, coarse grained, trace silt Very Loose to Loose Grey Wet		2	SS	2						
			3	SS	5				○		
2.3	**SILT**, trace sand Compact Grey Wet		4	SS	15				○		
3.0	END OF BOREHOLE AT 2.97 m. AUGER REFUSAL AT 2.97 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 0.94 m AND WATER LEVEL AT 0.74 m UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

+ ³, × ³: Numbers refer to Sensitivity

15 (20/10) 5 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 30/01/05

SITE 3 — RECORD OF BOREHOLE No 13+130 — 1 OF 1 — METRIC

W.P. 314-99-00 LOCATION Highway 11, Katrine, ON - Coords N 5 049 179.7; E 315 757.7 ORIGINATED BY R.A

DIST 52 HWY 11 BOREHOLE TYPE Continuous Penetration with Split Spoon COMPILED BY G.T

DATUM Geodetic DATE 17.07.01 CHECKED BY Z.O

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	MODIFIED DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
301.7	Ground Surface										
0.0	300 mm **Peat and Topsoil**		1	SS	1	***	301		○		** No recovery bulk sample collected
	SILT some clay, frequent rootlets and organics, very soft to 1.0 m, firm below, grey, wet		2	SS	5				○		
300.1			3	SS	5				○		
1.6	End of borehole										

Split Spoon refusal at 1.6 m, probably on tree-stump.
Borehole moved hole 2 m west and extended to 1.2 m without sampling (see Borehole 13 + 130A).
* Modified N-value (31.8 kg hammer dropping 0.76 m; recorded value divided by 2).
*** Water level not measured due to obstruction.

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

SITE 3 **RECORD OF BOREHOLE No 13+130A** 1 OF 1 **METRIC**

W.P. 314-99-00 LOCATION Highway 11, Katrine, ON - Coords N 5 049 178.5; E 315 756.1 ORIGINATED BY R.A

DIST 52 HWY 11 BOREHOLE TYPE Continuous Penetration with Split Spoon & modified D.C.P.T. COMPILED BY G.T

DATUM Geodetic DATE 17.07.01 CHECKED BY Z.O

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	MODIFIED DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	* "N" VALUES						GR SA SI CL
301.7	Ground Surface										
0.0 / 300.5	Borehole extended to 1.2 m without sampling (see BH 13+130 for Soil Stratigraphy)					▼	301				
1.2 / 299.9	**SILT**: some clay, traces of rootlets and organics, firm, grey, wet		1	SS	5				o	18.3	
1.8	**SILTY SAND**: traces of gravel and clay, traces of organics, some sandy silt zones/layers, compact to 2.5 m,		2	SS	19		300		o		3 51 41 5
298.7	dense below, grey, wet		3	SS	50		299		o	22.3	
3.0 / 298.4	End of borehole										
3.3	End of modified DCPT Water level at 0.2 m and hole open to 1.5 m two hours after completion *Modified Dynamic Cone Penetration Test performed from 3.0 m to 3.3 m. *Modified N-vlaue and Dynamic Cone Penetration Test (31.8 kg hammer dropping 0.76 m; recorded value divided by 2).										

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

15 (20 / 10) 5 (%) STRAIN AT FAILURE

SITE 3 — RECORD OF BOREHOLE No 13+132 NBL — 1 OF 1 — METRIC

W.P. 314-99-00 LOCATION Highway 11, Katrine, ON - Coords N 5 049 193.5; E 315 772.3 ORIGINATED BY R.A

DIST 52 HWY 11 BOREHOLE TYPE Continuous Penetration with Split Spoon & modified D.C.P.T. COMPILED BY G.T

DATUM Geodetic DATE 18.07.01 CHECKED BY Z.O

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	MODIFIED DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
301.2	Ground Surface										
0.0	200 mm **Topsoil**		1	SS	1	▼**	301		○		
	sandy		2	SS	2				○	19.9	
	SILT some clay, traces of organics to 1.8 m, very soft to 1.2 m, stiff below, grey, wet		3	SS	10		300		○	19.9	
	sandy compact		4	SS	16		299		○	20.0	0 32 62 6
298.5			5A	SS	6						
2.7	**SILTY FINE SAND** with sandy silt zones, very loose to compact, grey, wet		5B						○		0 56 36 8
			6	SS	***		298				*** spoon sinking under own weight
297.3									○		
3.9	**SILTY SAND** : traces to some gravel, trace clay, compact, grey, wet		7	SS	18		297				
	(Soil Stratigraphy inferred below 4.3 m)		8	SS ****	12						**** no recovery
296.3											
4.9	End of borehole						296				
295.4											
5.8	End of modified DCPT **Water level at 0.7 m (not stabilized) and hole open to 3.7 m on completion *Modified Dynamic Cone Penetration Test performed from 4.9 m to 5.8 m. *Modified N-value and Dynamic Cone Penetration Test (31.8 kg hammer dropping 0.76 m; recorded value divided by 2).										

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+137.5 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+137.5, CL ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 23.06.04 - 23.06.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60		GR SA SI CL
0.0	DCPT from surface.										
2.6	END OF DCPT AT 2.57 m. CONE REFUSAL AT 2.57 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20
15 ⊕ 5
10
(%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 30/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+137.5 R42 1 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+137.5, O/S 42R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 10.06.04 - 10.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.2	Silty **CLAY**, trace sand Firm to Stiff Brown		1	SS	5						
			2	SS	10						
1.5	**SILT**, some sand seams, trace to some clay Loose to Compact Moist		3	SS	8						
			4	SS	20						
			5	SS	8						
4.1	**SAND**, some silt Loose to Very Loose Brown Wet		6	SS	5						
			7	SS	5						
			8	SS	0						
			9	SS	2						

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

15 20 10 5 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 30/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+137.5 R42 2 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+137.5, O/S 42R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 10.06.04 - 10.06.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Becoming Compact		10	SS	12				○		
			11	SS	50/				○		
12.3	END OF BOREHOLE AT 12.34 m. AUGER REFUSAL AT 12.34 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 9.70 m AND WATER LEVEL AT 1.0 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.				.150						

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTMT4 2316.GPJ 30/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+140 L48 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+140, O/S 48L ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 23.06.04 - 23.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.1	Clayey **SILT**, some sand, occasional topsoil lenses, trace rootlets Firm Grey		1	SS	4				○		
1.0	Sandy **SILT** to Silty **SAND**, some clay, occasional iron oxide staining Compact to Loose Grey Moist to Wet		2	SS	14				○		
			3	SS	5	▽			○		5 28 51 16
			4	SS	8				○		
			5	SS	4				○		
3.8	**SAND**, trace to some silt, trace gravel, occasional cobbles and boulders Compact to Very Dense Brown Wet		6	SS	25				○		4 83 13 (SI+CL)
			7	SS	50/.125				○		
6.9	END OF BOREHOLE AT 6.86 m. AUGER REFUSAL AT 6.86 m ON PROBABLE BEDROCK OR BOULDER. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 28.02.05 1.65										

+ ³, × ³: Numbers refer to Sensitivity

15 ⊕ 5 (20, 10) (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+146 L18.75 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+146, O/S 18.75L ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 23.06.04 - 23.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Clayey **SILT**, trace sand, occasional oxide staining Very Stiff to Hard Grey		1	SS	16				○		Topsoil stripped during access preparation
			2	SS	34				○		0 8 70 22
1.5	**SILT**, trace sand, trace clay Compact Grey		3	SS	18				○		
2.0	END OF BOREHOLE AT 2.01 m. AUGER REFUSAL AT 2.01 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

+ ³, × ³: Numbers refer to Sensitivity

20
15 5
10
(%) STRAIN AT FAILURE

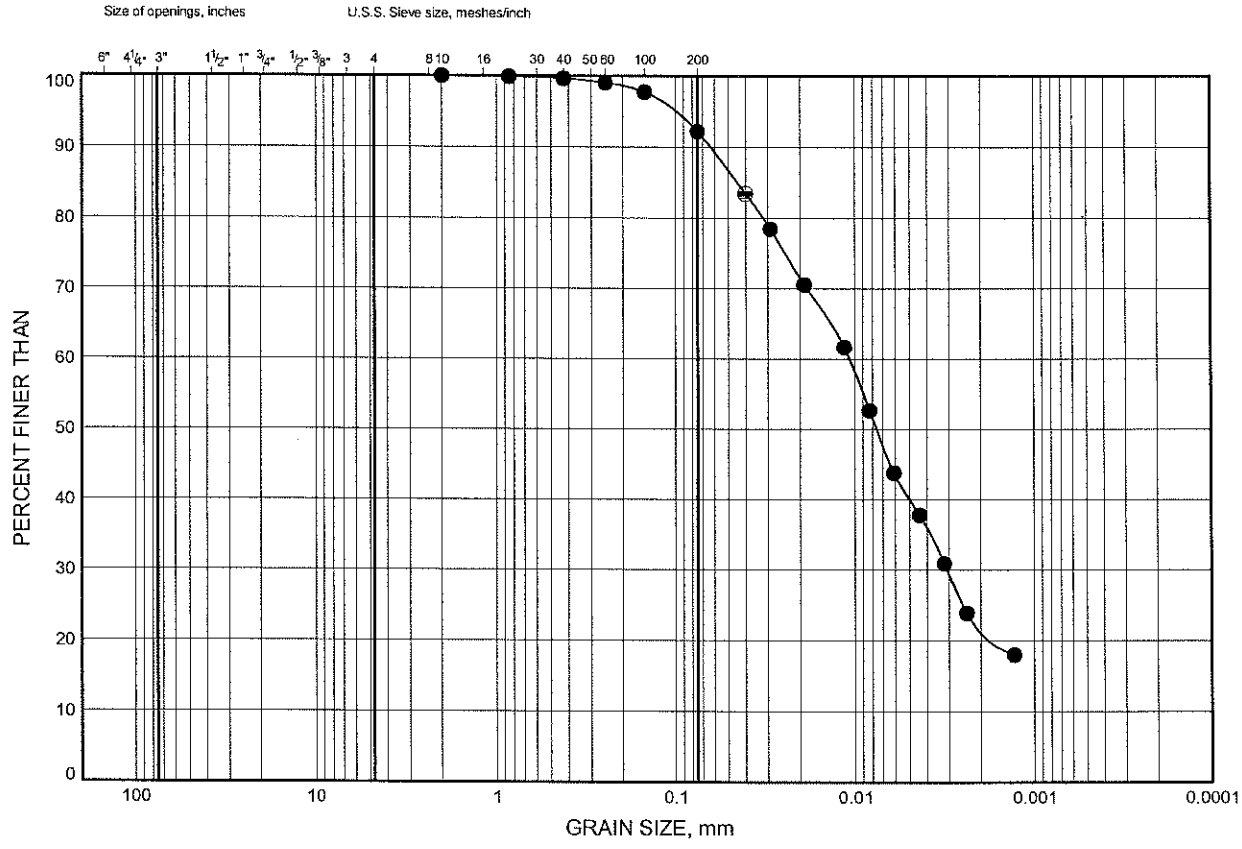
ONTMT4 2316.GPJ 30/01/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE M1

Clayey SILT



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	13+146 L18.75	1.07	

Date January 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

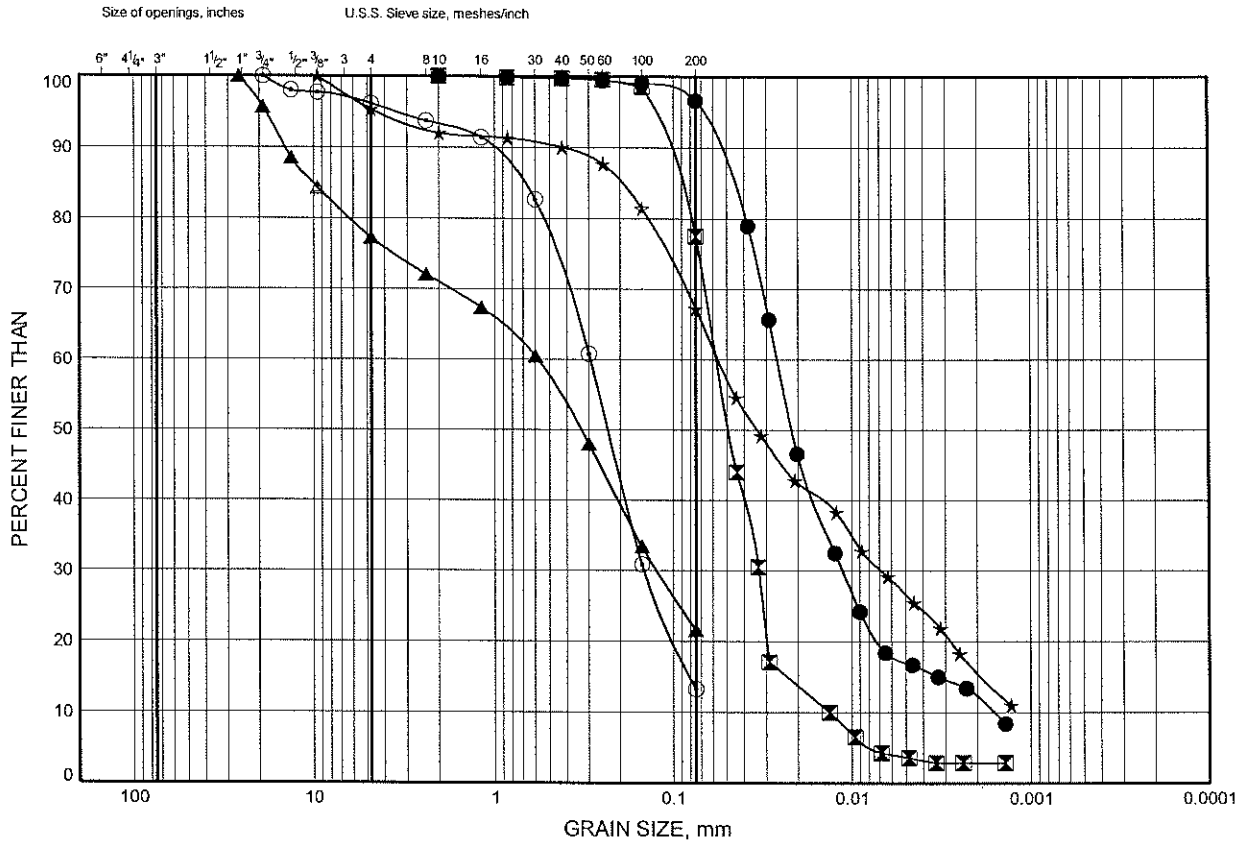
THURBGSD 2316.GPJ 30/01/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE M2

SILT to SAND



COBBLE SIZE	GRAVEL		SAND			FINE GRAINED
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	13+100 L14	1.83	
⊠	13+100 L14	4.88	
▲	13+125 L17	2.59	
★	13+140 L48	1.83	
⊙	13+140 L48	4.88	

Date January 2005

Project 480-93-00

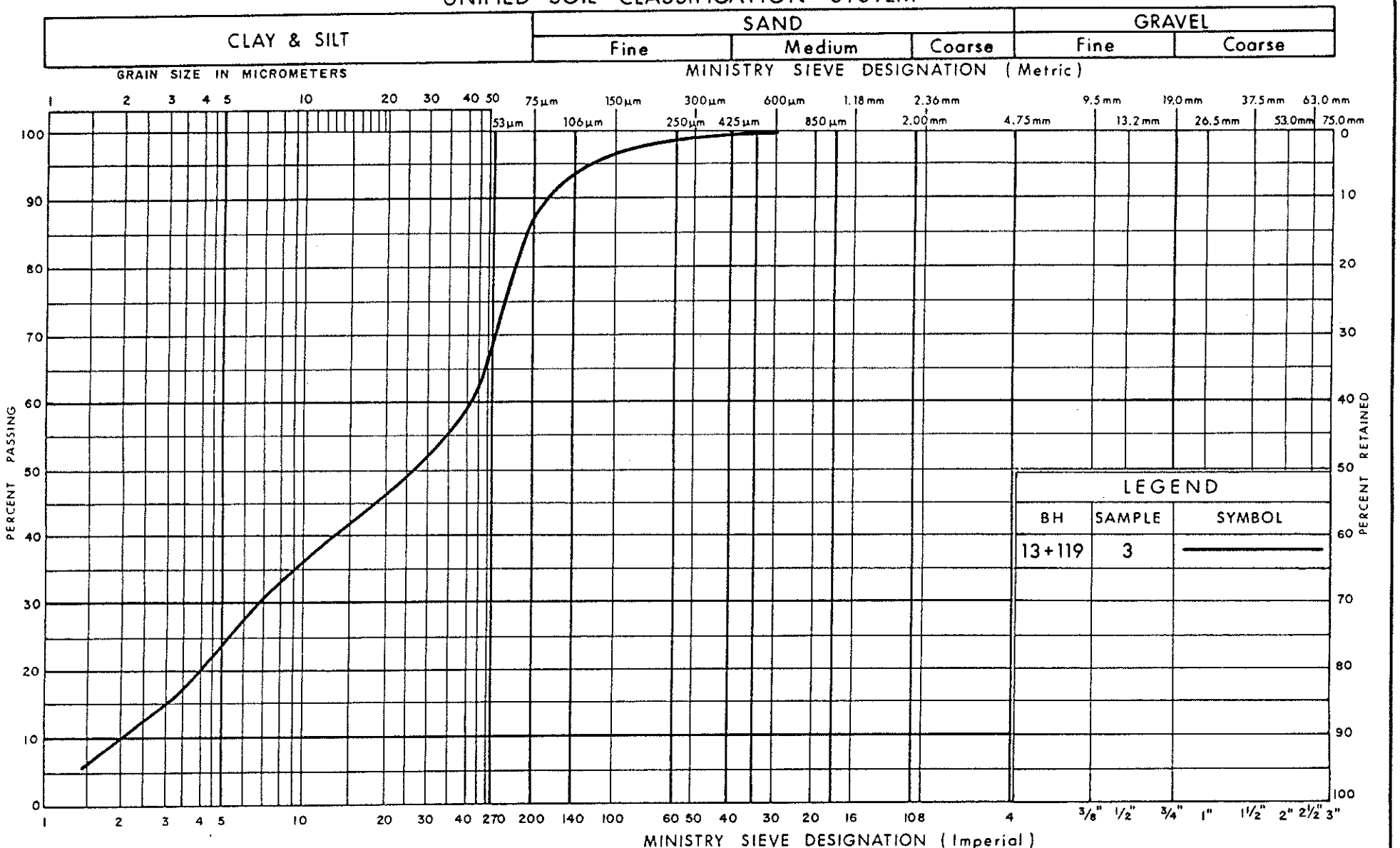
THURBER

Prep'd WM

Chkd. MA

THURBGSD 2316.GPJ 30/01/05

UNIFIED SOIL CLASSIFICATION SYSTEM



Ministry of Transportation
Ontario

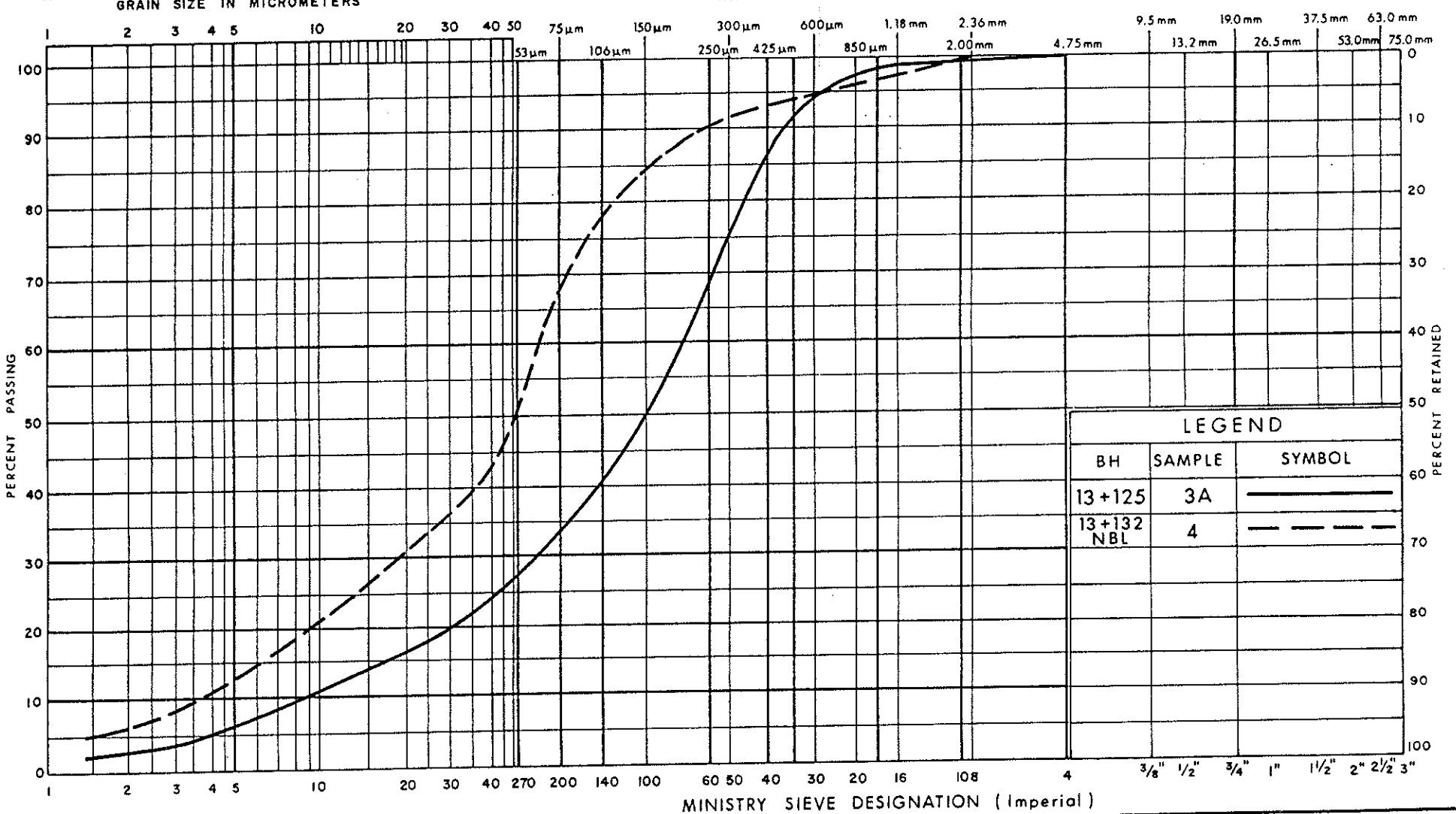
GRAIN SIZE DISTRIBUTION
SILT

FIG No B3-1
W P 314-99-00
SPT 1010F

78 12 M

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse

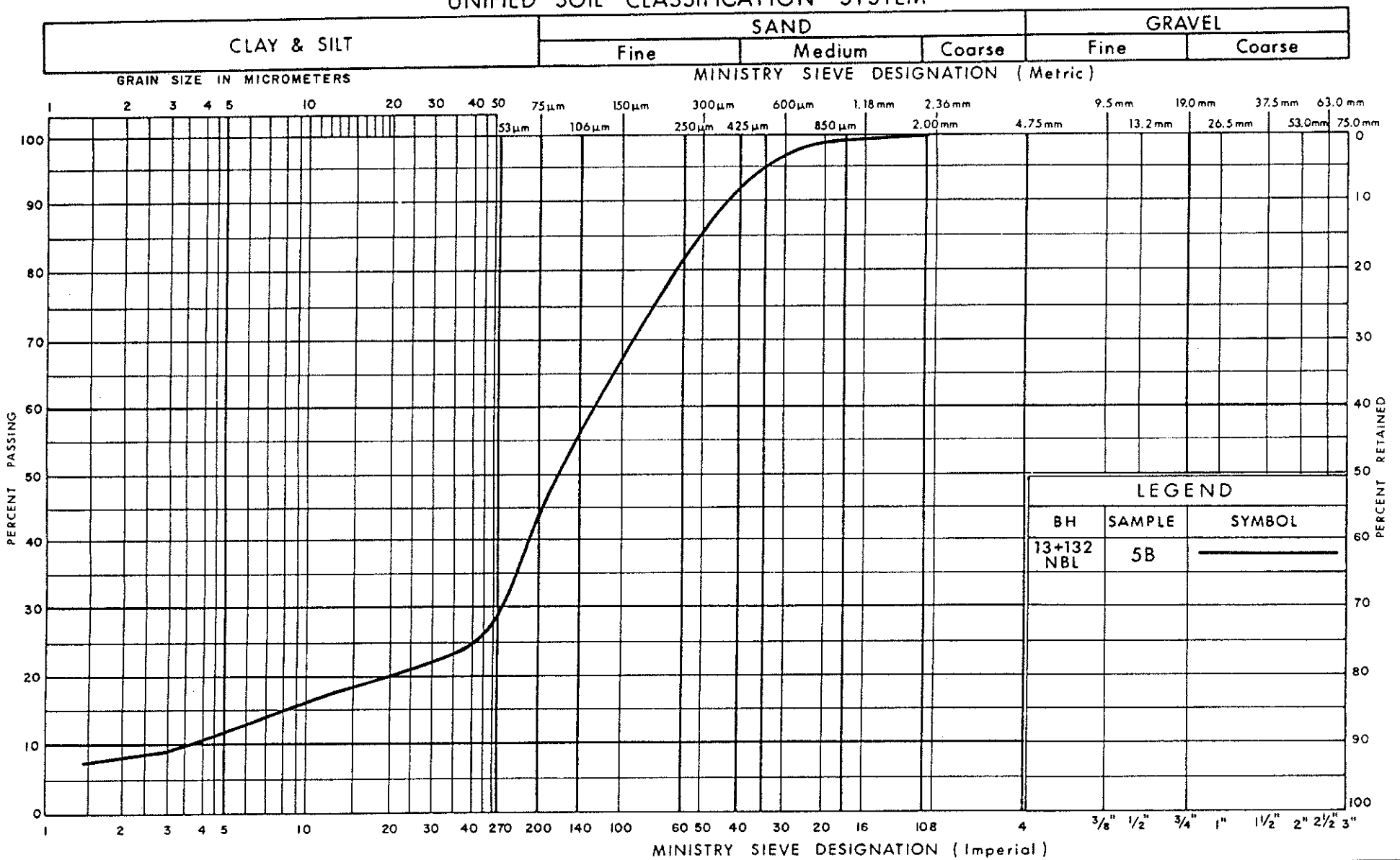


Ministry of Transportation
Ontario

GRAIN SIZE DISTRIBUTION
SANDY SILT

FIG No B3-2
W P 314-99-00
SPT 1010F

UNIFIED SOIL CLASSIFICATION SYSTEM

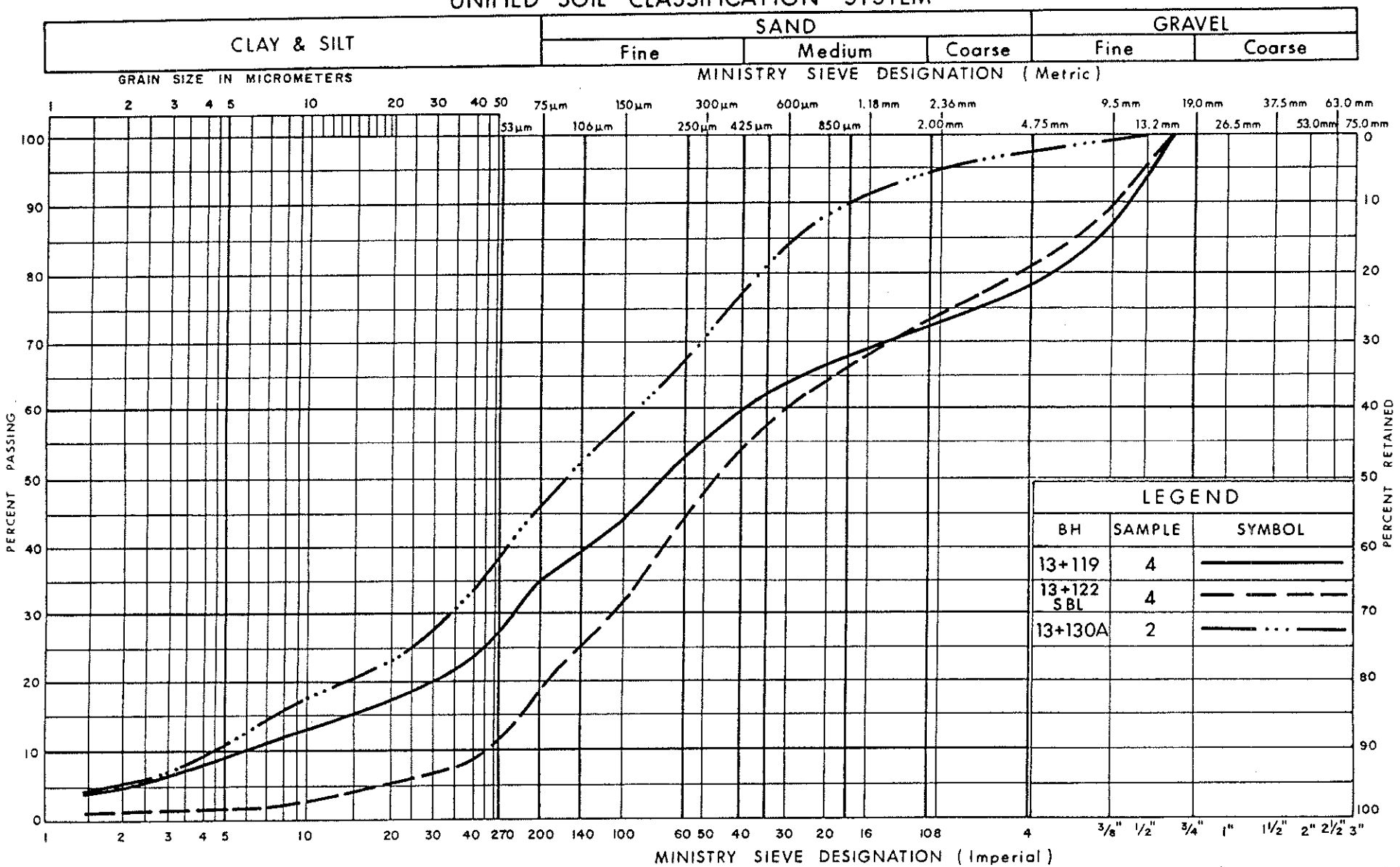


Ministry of Transportation
Ontario

GRAIN SIZE DISTRIBUTION
SILTY FINE SAND

FIG No B3-4
W P 314-99-00
SPT 1010F

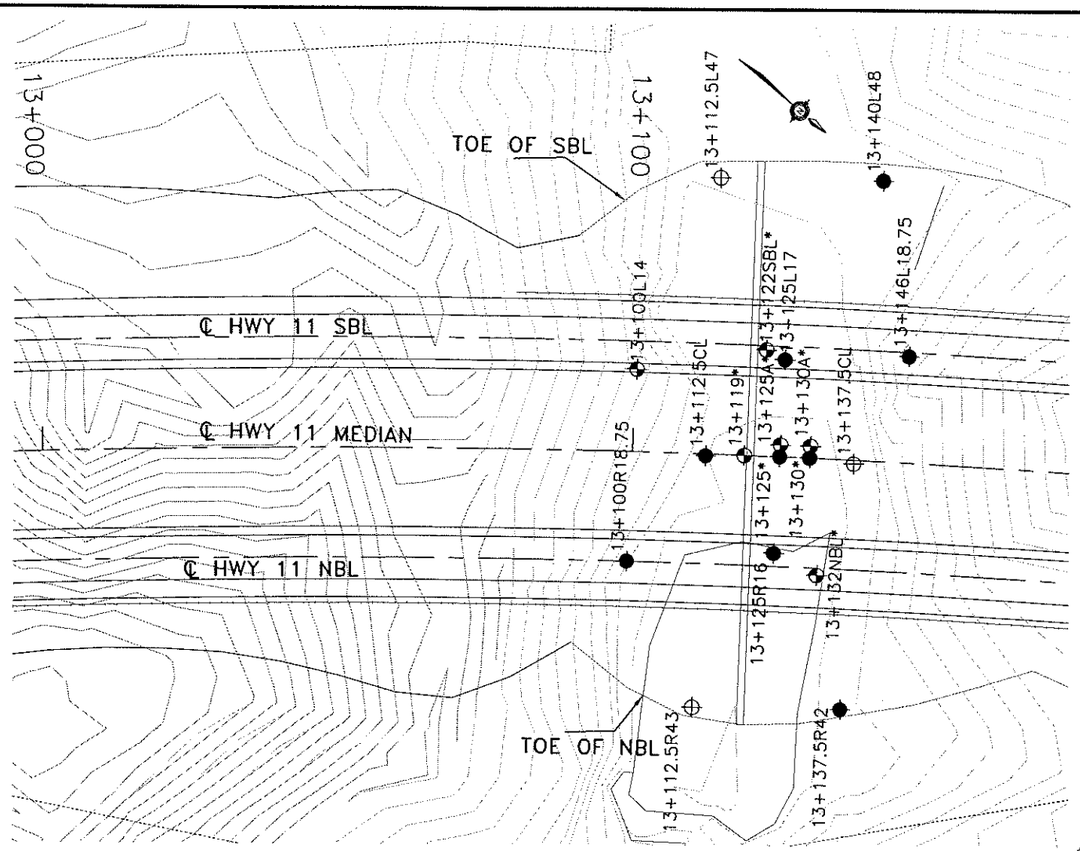
UNIFIED SOIL CLASSIFICATION SYSTEM



Ministry of Transportation
Ontario

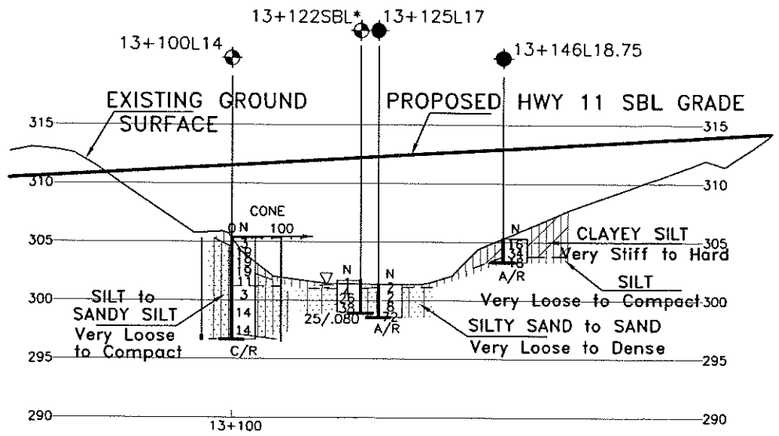
GRAIN SIZE DISTRIBUTION
SILTY SAND
TRACES TO SOME GRAVEL, TRACES OF CLAY

FIG No B3-5
W P 314-99-00
SPT 1010F



PLAN

5 0 10 20m



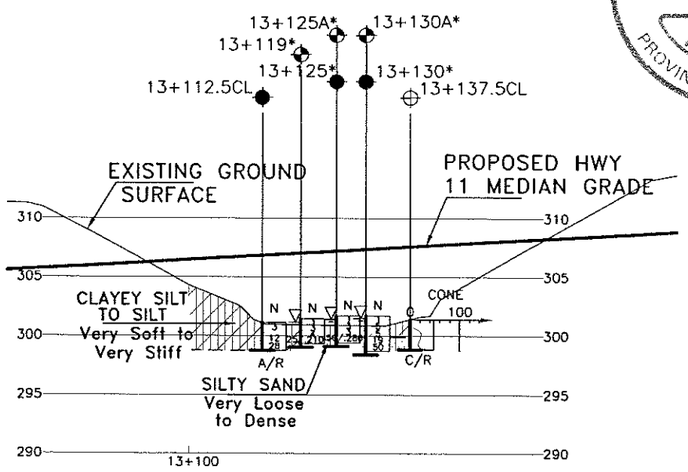
PROFILE ℄ HWY 11 SBL

5 0 10 20m HOR

2.5 0 5 10m VERT

NO	ELEVATION	NORTH	EAST
13+119*	301.7	5049171.0	315764.5
13+122SBL*	301.7	5049162.3	315748.4
13+125*	301.7	5049175.7	315760.8
13+125A*	301.7	5049174.5	315759.2
13+130*	301.7	5049179.7	315757.7
13+130A*	301.7	5049178.5	315756.1
13+132NBL*	301.2	5049193.5	315772.3

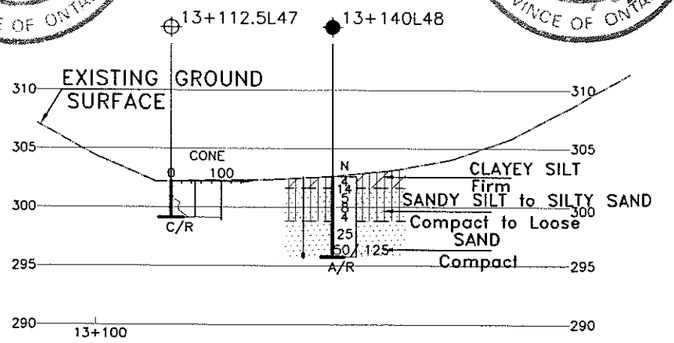
* Borehole drilled by Shaheen & Peaker.



PROFILE ℄ HWY 11 MEDIAN

5 0 10 20m HOR

2.5 0 5 10m VERT



PROFILE TOE OF HWY 11 SBL

5 0 10 20m HOR

2.5 0 5 10m VERT

LICENSED PROFESSIONAL ENGINEER
M. R. ANDERSON
PROVINCE OF ONTARIO
Nov 2/05

LICENSED PROFESSIONAL ENGINEER
P. J. BRANCO
PROVINCE OF ONTARIO
Nov 2/05

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

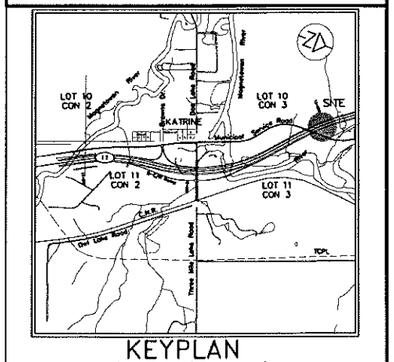
HWY 11
CONT No
WP No 480-93-00

SHEET

HIGHWAY 11 MAINLINE
ARMOUR TOWNSHIP
STATION 13+100 TO 13+150
MEDIAN CL, SBL CL, LEFT TOE
BOREHOLE LOCATIONS AND SOIL STRATA

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
◈	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

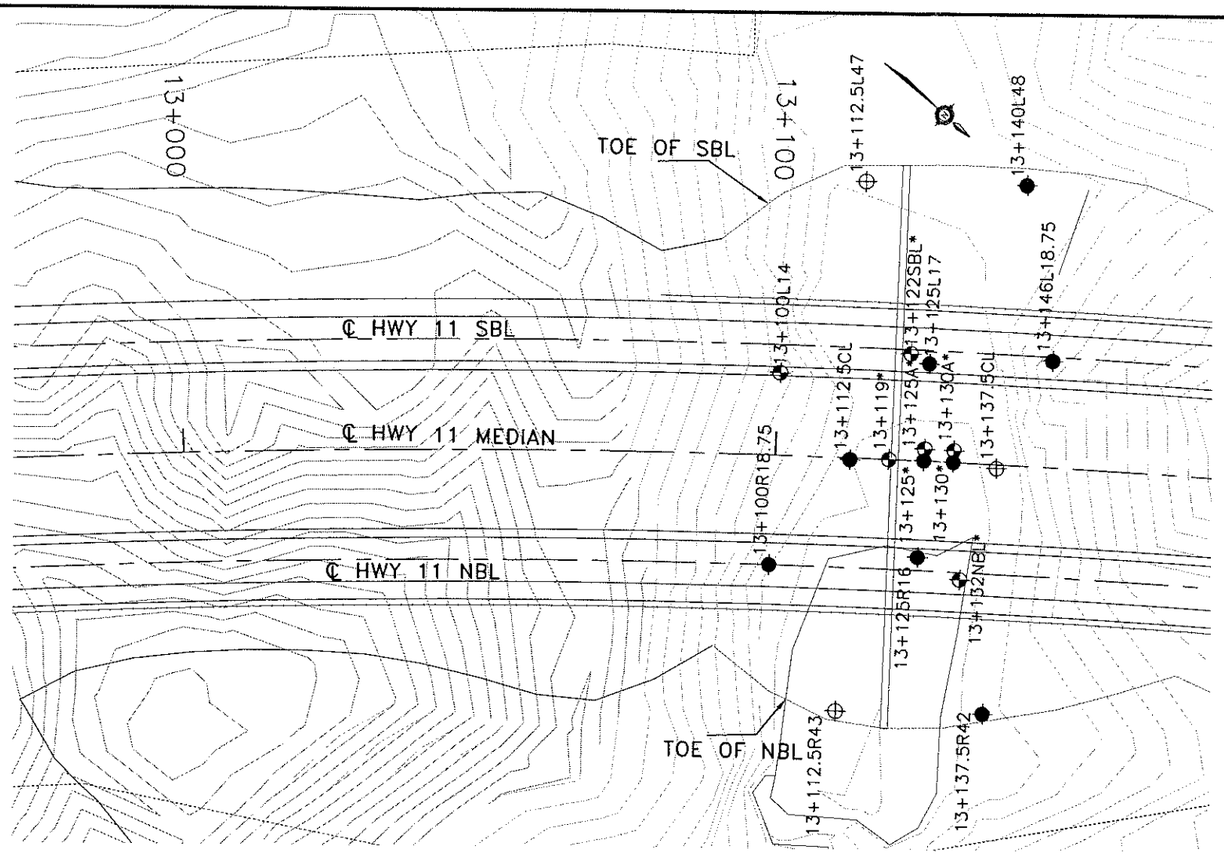
NO	STATION	OFFSET FROM MEDIAN CL
13+100 L14	13+100	L14
13+100 R18.75	13+100	R18.75
13+112.5 CL	13+112.5	CL
13+112.5 L47	13+112.5	L47
13+112.5 R43	13+112.5	R43
13+125 L17	13+125	L17
13+125 R16	13+125	R16
13+137.5 CL	13+137.5	CL
13+137.5 R42	13+137.5	R42
13+140 L48	13+140	L48
13+146 L18.75	13+146	L18.75

— NOTE —

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

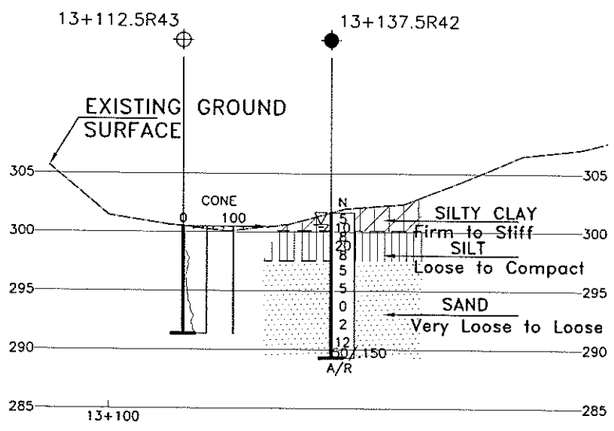
REVISIONS		
DATE	BY	DESCRIPTION
JAN, 05	MA	ISSUED AS DRAFT FOR REVIEW

DESIGN MA	CHK AEG	CODE CHBDC	LOAD		DATE JAN, 2005
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG M1



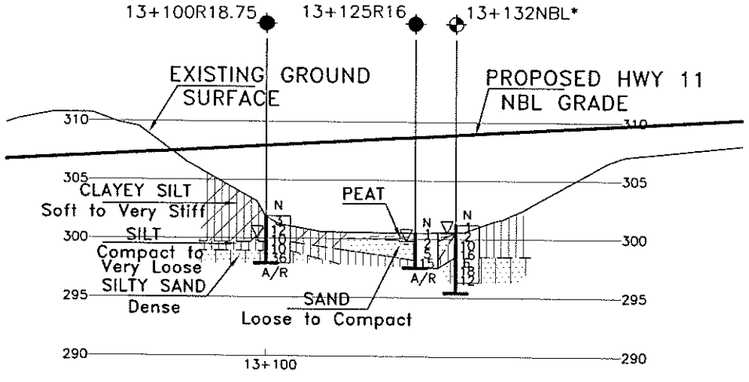
PLAN

5 0 10 20m



PROFILE TOE OF HWY 11 NBL

5 0 10 20m HOR
2.5 0 5 10m VERT



PROFILE ℄ HWY 11 NBL

5 0 10 20m HOR
2.5 0 5 10m VERT

NO	ELEVATION	NORTH	EAST
13+119*	301.7	5049171.0	315764.5
13+122SBL*	301.7	5049162.3	315748.4
13+125*	301.7	5049175.7	315760.8
13+125A*	301.7	5049174.5	315759.2
13+130*	301.7	5049179.7	315757.7
13+130A*	301.7	5049178.5	315756.1
13+132NBL*	301.2	5049193.5	315772.3

* Borehole drilled by Shoheen & Peaker.

LICENSED PROFESSIONAL ENGINEER
M. R. ANDERSON
Nov 2/05
PROVINCE OF ONTARIO

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Nov 2
PROVINCE OF ONTARIO

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

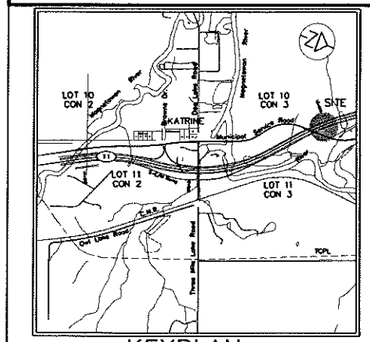
HWY 11
CONT No
WP No 480-93-00

SHEET

HIGHWAY 11 MAINLINE
ARMOUR TOWNSHIP
STATION 13+100 TO 13+150
NBL CENTRELINE AND RIGHT TOE
BOREHOLE LOCATIONS AND SOIL STRATA

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
⊕	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

NO	STATION	OFFSET FROM MEDIAN CL
13+100 L14	13+100	L14
13+100 R18.75	13+100	R18.75
13+112.5 CL	13+112.5	CL
13+112.5 L47	13+112.5	L47
13+112.5 R43	13+112.5	R43
13+125 L17	13+125	L17
13+125 R16	13+125	R16
13+137.5 CL	13+137.5	CL
13+137.5 R42	13+137.5	R42
13+140 L48	13+140	L48
13+146 L18.75	13+146	L18.75

— NOTE —

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

REVISIONS		
DATE	BY	DESCRIPTION
JAN. 05	MA	ISSUED AS DRAFT FOR REVIEW

DESIGN MA	CHK AEG	CODE CHBDC	LOAD	DATE JAN, 2005	
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG M2

Appendix N

Highway 11, Station 13+520 to 14+100

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+600 L14 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+600, O/S 14L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 14.07.04 - 14.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** Dark Brown										
0.2	**SAND**, trace silt, trace gravel, occasional boulders and cobbles Compact Brown Moist		1	SS	16				○		
0.9	Fresh, massive dark grey, very strong to strong **GNEISS**		1	RUN						FI 1 0 0 2 0	RUN 1# TCR=100%, SCR=100%, RQD=100%, UCS=84.8MPa
			2	RUN						0 0 0	RUN 2# TCR=100%, SCR=100%, RQD=100%, UCS=129.6MPa
3.2	END OF BOREHOLE AT 3.20 m. Piezometer installation consist of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen.										

WATER LEVEL READINGS:
DATE DEPTH (m)

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+650 L28 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+650, O/S 28L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 14.07.04 - 14.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.2	Dark Brown **SAND**, trace silt, trace gravel, occasional cobbles and boulders Compact to Dense Brown Moist		1	SS	20				○		
			2	SS	48				○		
1.3	Fresh, massive, dark grey, very strong **GNEISS**		1	RUN						Fl 0 3 4 2 1	RUN 1# TCR=100%, SCR=95%, RQD=93%, UCS=109.5MPa
2.8	Fresh, massive, light pink **GRANITE**									4 2	RUN 2# TCR=100%, SCR=100%, RQD=100%, UCS=101.6MPa
3.4	Fresh, massive, dark grey, very strong **GNEISS**		2	RUN						0 1 0	
4.3	END OF BOREHOLE 4.34 m. Piezometer installation consist of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 19.01.05 1.49										

+ ³, × ³: Numbers refer to Sensitivity

15 (20, 10, 5) (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+700 L15 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+700, O/S 15L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 13.07.04 - 13.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** (75 mm)										
0.1	Silty **SAND**, fine grained, trace gravel, occasional cobbles and boulders Compact to Dense Brown Moist		1	SS	26				○		
			2	SS	45	▽			○		
			3	SS	48				○		
			4	SS	44				○		3 59 35 3
			5	SS	53				○		
3.8	Fresh, massive, grey, very strong **GNEISS**, occasional mechanical breaks		1	RUN						FI 0 0 1 0 3	RUN 1# TCR=100%, SCR=100%, RQD=100%, UCS=175.0MPa
			2	RUN						1 2 0	RUN 2# TCR=100%, SCR=100%, RQD=100%, UCS=165.4MPa
6.3	END OF BOREHOLE AT 6.35 m. Piezometer installation consist of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 19.01.05 1.42										

+ ³, × ³: Numbers refer to Sensitivity

15 (20 / 10) 5 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+750 L28 1 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+750, O/S 28L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 12.07.04 - 13.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.2	Silty **SAND**, fine grained, trace silt, trace to some gravel, with boulders and cobbles Dense to Very Dense Brown Dry to Moist		1	SS	37				○		
			2	SS	47				○		4 62 30 3
			3	SS	50/.125				○		
			4	SS	50/.100						
			5	SS	50/.050						
			6	SS	50/.100						
5.2	**SAND and GRAVEL**, trace silt, numerous cobbles and boulders Very Dense Grey (advanced below 5.2 m by NQ coring)		7	SS	50/.075						
			8	SS	50/.100				○		FI RUN 1#
7.7	Fresh, massive dark grey, strong to very strong **GNEISS**, occasional mechanical breaks		1	RUN							>5 5 3 >5 0 TCR=100%, SCR=80%, RQD=60%, UCS=201.6MPa
			2	RUN							1 3 RUN 2# TCR=100%, SCR=100%, RQD=100%, UCS=136.4MPa

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+750 L28 2 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+750, O/S 28L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 12.07.04 - 13.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
10.5	END OF BOREHOLE AT 10.54 m. Piezometer installation consist of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m)										

$+^3$, $\times^3$: Numbers refer to Sensitivity

15 (20/10) 5 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+800 L15 1 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+800, O/S 15L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 08.07.04 - 09.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** Dark Brown										
0.3	**SAND**, some silt, trace gravel, occasional cobbles and boulders Very Dense Brown Moist		1	SS	51				○		
1.4	Silty **SAND**, trace gravel, with cobbles Dense to Very Dense Brown Moist		2	SS	37				○		
			3	SS	29				○		
			4	SS	50/.125				○		4 62 34 (SI+CL)
			5	SS	50/.150						
5.9	Fresh to slightly weathered, massive, dark grey, very strong **GNEISS**, occasional mechanical breaks, iron oxide staining on joints		1	RUN						FI 4 2	RUN 1# TCR=100%, SCR=100%, RQD=35%, UCS=122.7MPa
			2	RUN						1 1 1 2	RUN 2# TCR=98%, SCR=98%, RQD=92%, UCS=136.4MPa
			3	RUN						1 0 1 1	RUN 3# TCR=100%, SCR=100%, RQD=89%, UCS=152.8MPa
8.9	END OF BOREHOLE AT 8.92 m. Piezometer installation consist of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen.										

Continued Next Page

+ ³, × ³. Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+800 L15 2 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+800, O/S 15L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 08.07.04 - 09.07.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	WATER LEVEL READINGS: DATE DEPTH (m) 19.01.05 Destroyed										

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+855 L29 1 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+855, O/S 29L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 08.07.04 - 08.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** Black										
0.3	**SAND**, trace to some silt, trace gravel, occasional cobbles Dense Brown Moist		1	SS	48				○		
1.4	Silty **SAND**, trace gravel, with cobbles Very Dense to Compact Brown Moist to Wet		2	SS	60				○		
			3	SS	26				○		5 59 33 4
			4	SS	74				○		
	(advanced below 4.65 m using NQ coring)		5	SS	50/.075						
			6	SS	50/.075						
			1	AS					○		1 59 35 5
			7	SS	50/.050						
8.5	Moderately weathered to fresh, massive, grey, strong **GNEISS**, occasional mechanical breaks		1	RUN						FI 4 1 1	RUN 1# TCR=100%, SCR=100%, RQD=76%, UCS=142.0MPa
	highly fractured from 9.62 to 9.75 m									>5 0	RUN 2# TCR=100%, SCR=100%

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

15 (20/10) 5 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+855 L29 2 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+855, O/S 29L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 08.07.04 - 08.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	iron oxide staining on joint surfaces		2	RUN						1 0 0	RQD=91%, UCS=155.7MPa
			3	RUN						1 0 0	RUN 3# TCR=100%, SCR=100%, RQD=100%, UCS=129.9MPa
12.0	END OF BOREHOLE AT 11.99 m. Piezometer installation consist of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen.										
	WATER LEVEL READINGS: DATE DEPTH (m)										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+900 L14 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+900, O/S 14L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 07.07.04 - 08.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** Black										
0.4	Silty **SAND**, trace gravel, occasional cobbles Dense to Very Dense Brown Moist		1	SS	50/125				○		
			2	SS	62				○		9 60 32 (SI+CL)
			3	SS	30				○		
			4	SS	66				○		
3.9	Fresh, massive, grey, very strong **GNEISS**, occasional mechanical breaks		1	RUN						Fl 3 1 0	RUN 1# TCR=100%, SCR=100%, RQD=94%, UCS=130.3MPa
			2	RUN						0 0 0	RUN 2# TCR=100%, SCR=100%, RQD=100%, UCS=162.4MPa
			3	RUN						1 0	RUN 3# TCR=100%, SCR=100%, RQD=100%, UCS=148.6MPa
7.2	END OF BOREHOLE AT 7.19 m. Piezometer installation consist of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 19.01.05 6.24										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+950 L26 1 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+950, O/S 26L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 06.07.04 - 07.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** Black										
0.4	**SAND**, trace to some silt, trace gravel Compact to Very Dense Brown Moist		1	AS					○		
			1	SS	50/ 100				○		
2.1	Silty **SAND**, trace gravel, occasional cobbles Compact to Very Dense Brown Wet		2	SS	28				○		
			3	SS	32				○		6 63 31 (SI+CL)
			4	SS	63				○		
			5	SS	50/ 125	▽			○		3 53 38 6
6.6	Fresh, massive, dark grey, very strong **GNEISS**, occasional mechanical breaks		1	RUN						FI 0 0 0 1	RUN 1# TCR=95%, SCR=90%, RQD=90%, UCS=153.4MPa
			2	RUN						>5 0 1 0 1 0	RUN 2# TCR=98%, SCR=85%, RQD=85%, UCS=170.2MPa
9.6	END OF BOREHOLE AT 9.60 m. Piezometer installation consist of 19										

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

15 (20, 10, 5) (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 13+950 L26 2 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 13+950, O/S 26L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 06.07.04 - 07.07.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 19.01.05 6.10										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+000 L14 1 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+000, O/S 14L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 05.07.04 - 05.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** Black										
0.4	Silty **SAND**, trace gravel, occasional cobbles Compact to Dense Brown Moist		1	SS	32				○		
			2	SS	39				○		4 65 27 4
	becoming Grey		3	SS	29				○		
			4	SS	43				○		
			5	SS	76				○		8 61 31 (SI+CL)
			6	SS	50/.125				○		
			7	SS	50/.125				○		
8.8	Fresh, massive, grey, very strong **GNEISS**, occasional mechanical breaks		1	RUN						FI 4	RUN 1# TCR=94%, SCR=94%, RQD=94%, UCS=176.9MPa RUN 2# TCR=100%,

ONTMT4 2316.GPJ 03/02/05

Continued Next Page

+ ³ . × ³ : Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+000 L14 2 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+000, O/S 14L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 05.07.04 - 05.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (20 40 60 80 100): ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
			2	RUN						0	SCR=100%, RQD=100%, UCS=182.5MPa
										1	
										1	
										0	
			3	RUN						0	RUN 3# TCR=100%, SCR=100%, RQD=100%, UCS=170.0MPa
										0	
										0	
11.9	END OF BOREHOLE AT 11.91 m. Piezometer installation consist of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen.										

WATER LEVEL READINGS:

DATE	DEPTH (m)
07.07.04	1.43

ONTMT4 2316.GPJ 03/02/05

+ ³, × ³: Numbers refer to Sensitivity

15 20 10 5 (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+050 L22 1 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+050, O/S 22L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 29.06.04 - 30.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** Black										
0.4	Silty **SAND**, trace gravel, with cobbles and boulders Dense to Very Dense Brown Moist		1	SS	33				○		
	Becoming Grey		2	SS	62/.200				○		
			3	SS	54				○		3 59 32 5
			4	SS	50/.125				○		
			5	SS	50/.125						
			6	SS	50/.140				○		
			7	SS	50/.075				○		8 79 13 (SI+CL)
			8	SS	50/.150				○		
9.4	END OF BOREHOLE AT 9.45 m. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe										

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

(%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+050 L22 2 OF 2 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+050, O/S 22L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 29.06.04 - 30.06.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
	with a 1.52 m slotted screen.										
	WATER LEVEL READINGS: DATE DEPTH (m) 07.07.04 1.14										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+100 L13 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+100, O/S 13L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 30.06.04 - 30.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** Black										
0.5	Silty **SAND**, trace gravel, occasional cobbles and boulders Dense to Very Dense Brown Moist		1	SS	41	▽			○		
	Becoming Grey		2	SS	47				○		
			3	SS	50				○		
			4	SS	50/.100				○		
			5	SS	75				○		2 53 39 5
6.7	END OF BOREHOLE AT 6.71 m. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen.										

WATER LEVEL READINGS:

DATE	DEPTH (m)
30.06.04	3.97
07.07.04	2.26

$+^3$, $\times^3$: Numbers refer to Sensitivity

(%) STRAIN AT FAILURE

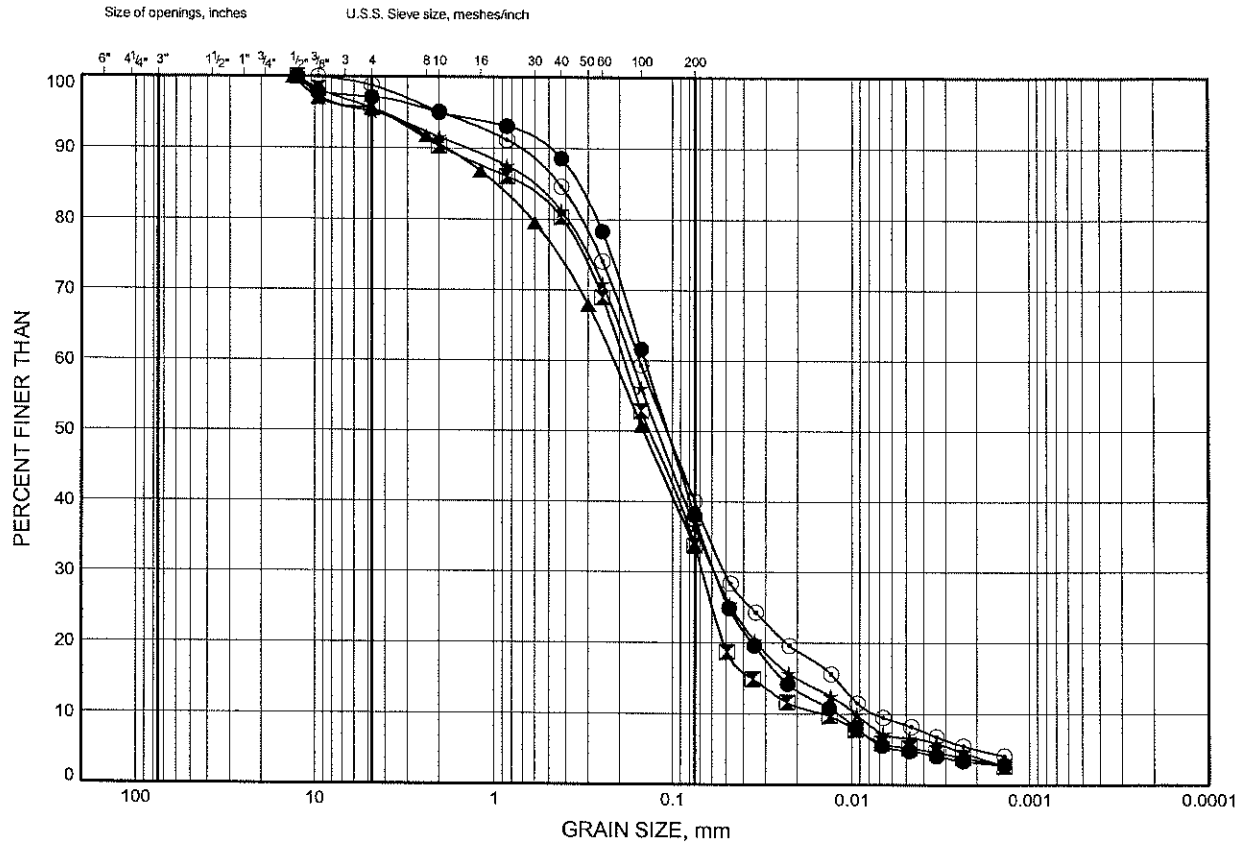
ONTMT4 2316.GPJ 03/02/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE N1

Silty SAND



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	13+700 L15	2.59	
⊠	13+750 L28	1.07	
▲	13+800 L15	3.28	
★	13+855 L29	2.59	
⊙	13+855 L29	6.86	

Date February 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

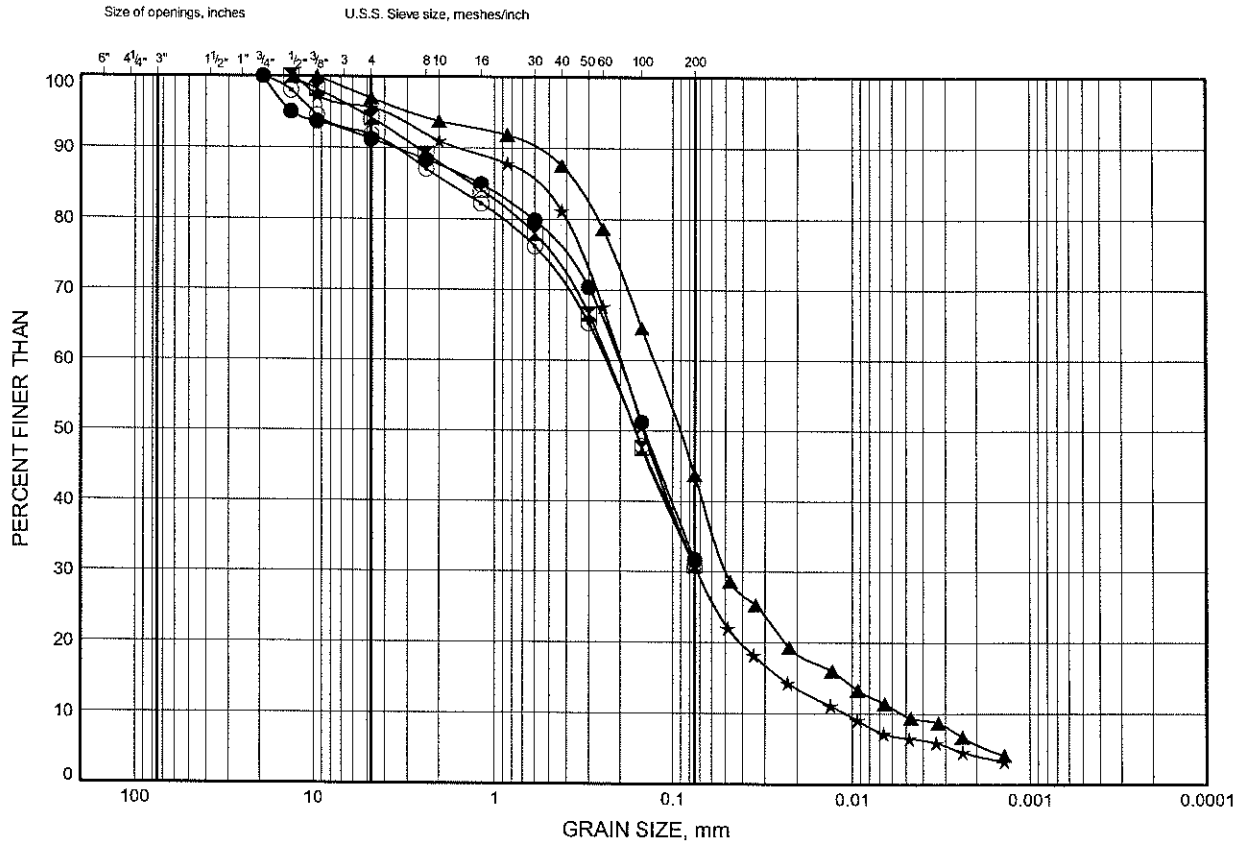
THURBGSD 2316.GPJ 03/02/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE N2

Silty SAND



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	13+900 L14	1.83	
⊠	13+950 L26	3.35	
▲	13+950 L26	6.31	
★	14+000 L14	1.83	
⊙	14+000 L14	4.88	

Date February 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

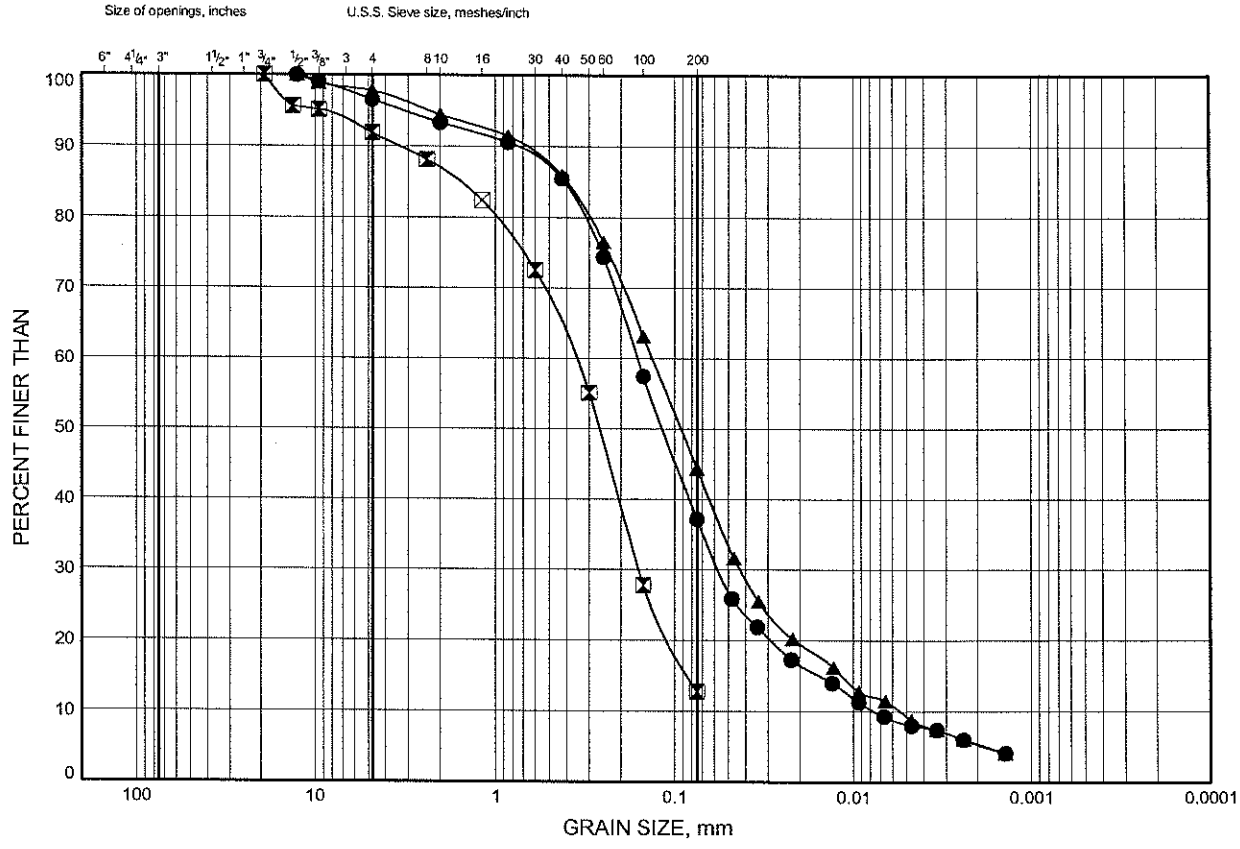
THURBGSD 2316.GPJ 03/02/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE N3

Silty SAND



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	14+050 L22	2.74	
⧓	14+050 L22	8.64	
▲	14+100 L13	6.40	

Date February 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

THURBGSD 2316.GPJ 03/02/05

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

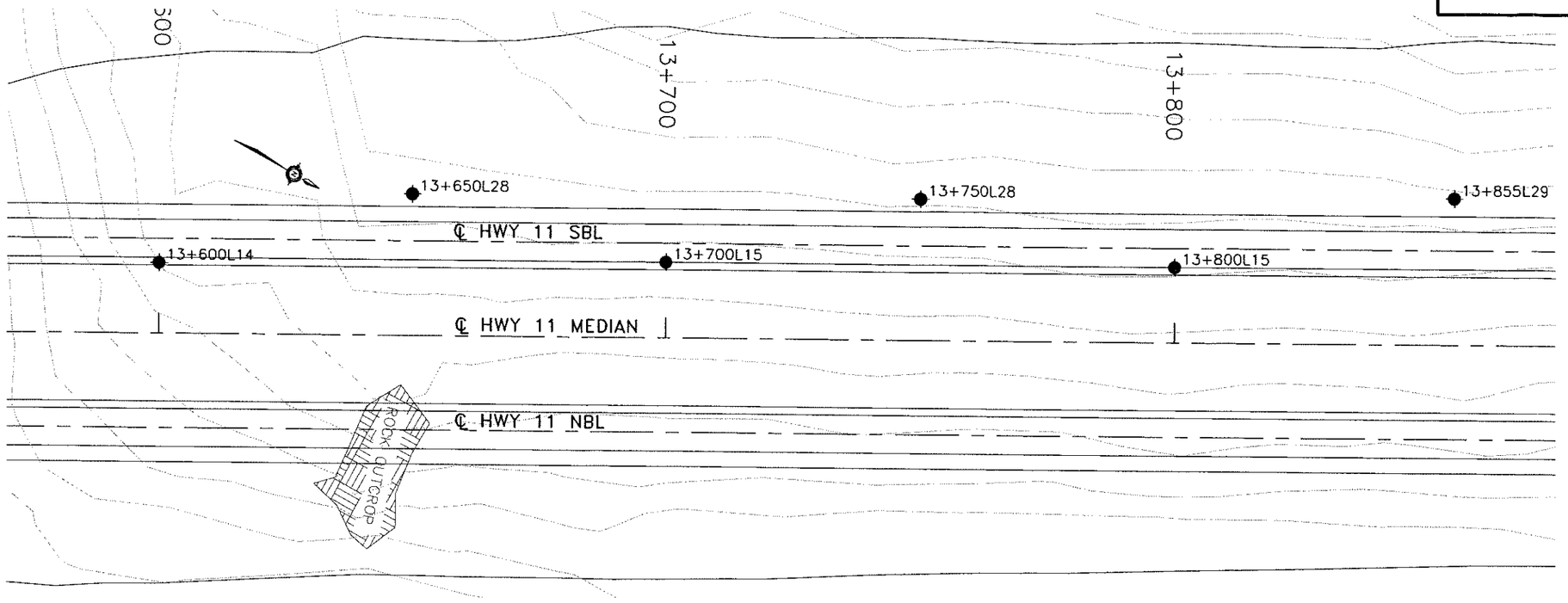
HWY 11
CONT No
WP No 480-93-00

SHEET

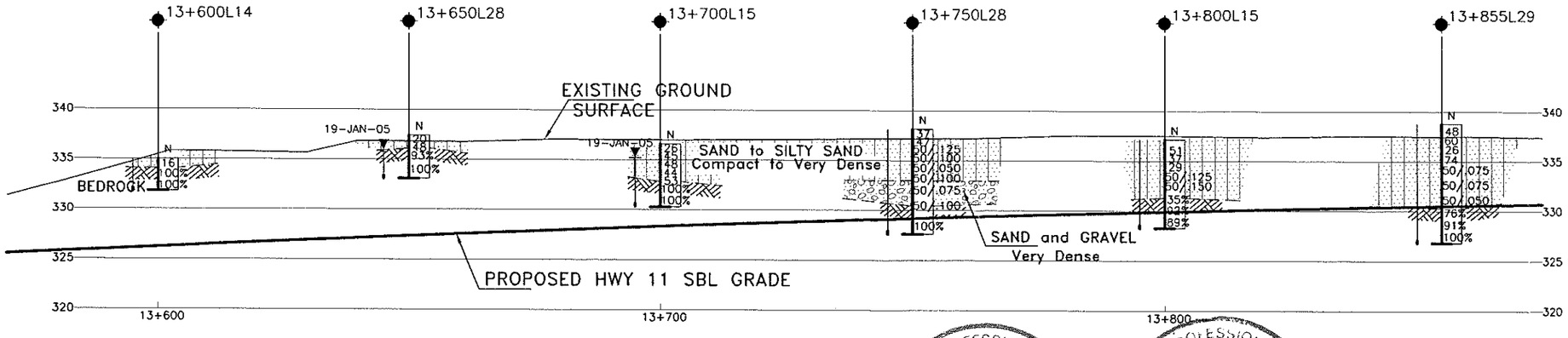
HIGHWAY 11 MAINLINE
ARMOUR TOWNSHIP
STATION 13+520 TO 14+100
SOUTHBOUND CENTRELINE
BOREHOLE LOCATIONS AND SOIL STRATA

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

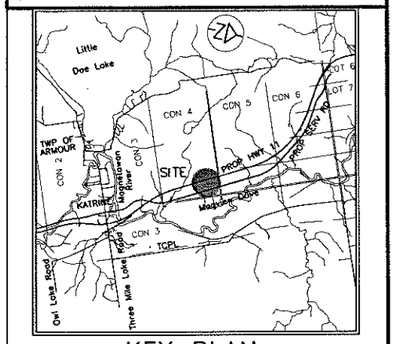
THURBER ENGINEERING LTD.



PLAN
5 0 10 20m



PROFILE ℄ HWY 11 SBL
5 0 10 20m HOR
2.5 0 5 10m VERT



KEY PLAN
0.5km 0 1.0km

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
⊕	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesion Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

NO	ELEVATION	STATION	OFFSET FROM MEDIAN CL
13+600 L14	335.0	13+600	L14
13+650 L28	337.4	13+650	L28
13+700 L15	336.6	13+700	L15
13+750 L28	338.2	13+750	L28
13+800 L15	337.2	13+800	L15
13+855 L29	338.8	13+855	L29
13+900 L14	336.9	13+900	L14
13+950 L26	339.0	13+950	L26
14+000 L14	336.8	14+000	L14
14+050 L22	337.0	14+050	L22
14+100 L13	333.5	14+100	L13

— NOTE —
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

LICENSED PROFESSIONAL ENGINEER
M. R. ANDERSON
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. J. BRANCO
PROVINCE OF ONTARIO

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS		
JAN. 05	MA	ISSUED AS DRAFT FOR REVIEW
DATE	BY	DESCRIPTION

DESIGN MA	CHK AEG	CODE CHBDC	LOAD	DATE JAN. 2005	
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG N1

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HWY 11
CONT No
WP No 480-93-00

SHEET

HIGHWAY 11 MAINLINE
ARMOUR TOWNSHIP
STATION 13+520 TO 14+100
SOUTHBOUND CENTRELINE
BOREHOLE LOCATIONS AND SOIL STRATA

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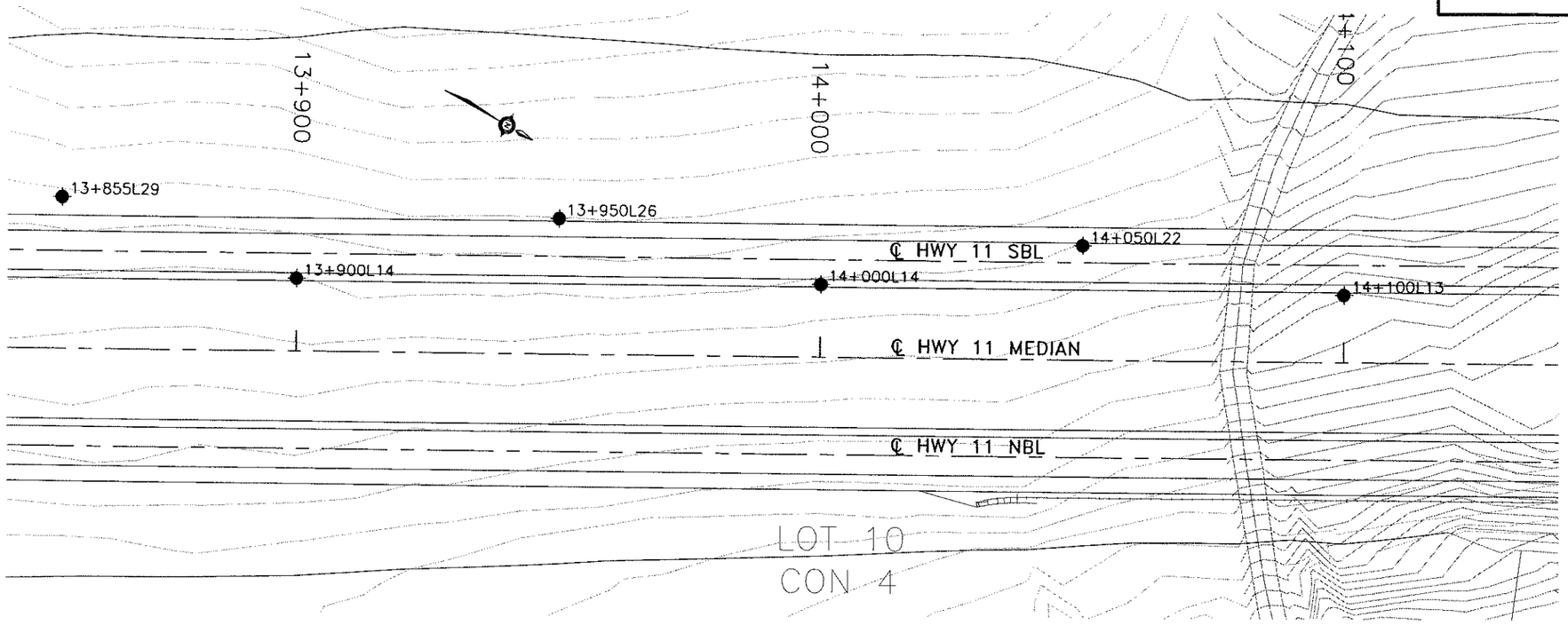
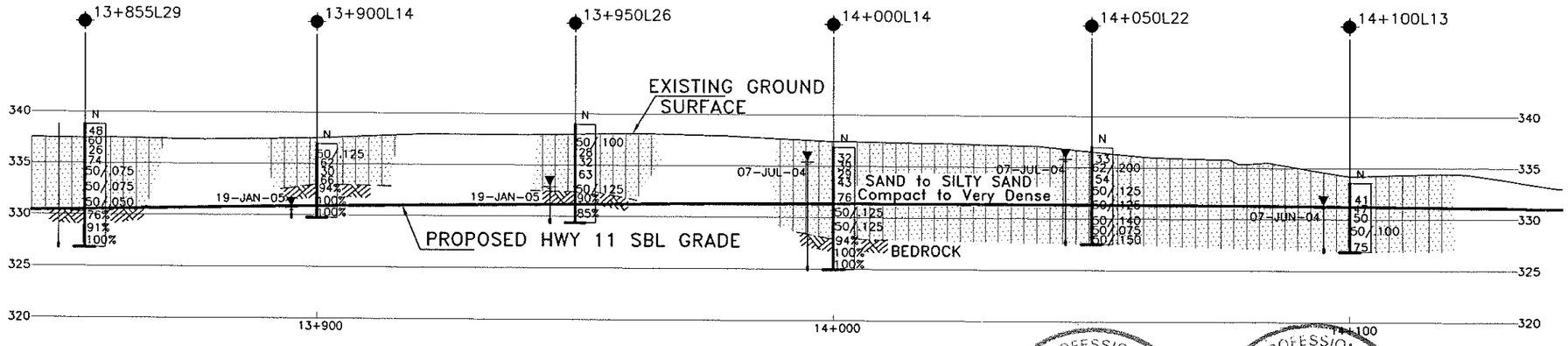
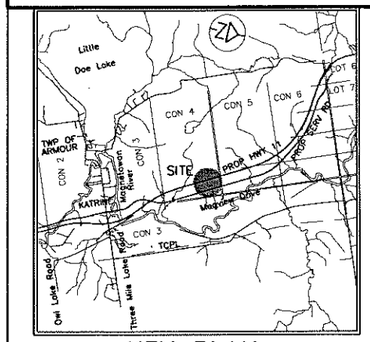


PLAN
5 0 10 20m



PROFILE ℄ HWY 11 SBL
5 0 10 20m HOR
2.5 0 5 10m VERT



KEY PLAN
0.5km 0 1.0km

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
◈	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

NO	ELEVATION	STATION	OFFSET FROM MEDIAN CL
13+600 L14	335.0	13+600	L14
13+650 L28	337.4	13+650	L28
13+700 L15	336.6	13+700	L15
13+750 L28	338.2	13+750	L28
13+800 L15	337.2	13+800	L15
13+855 L29	338.8	13+855	L29
13+900 L14	336.9	13+900	L14
13+950 L26	339.0	13+950	L26
14+000 L14	336.8	14+000	L14
14+050 L22	337.0	14+050	L22
14+100 L13	333.5	14+100	L13

— NOTE —
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

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PROVINCE OF ONTARIO

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS		
JAN, 05	MA	ISSUED AS DRAFT FOR REVIEW
DATE	BY	DESCRIPTION

DESIGN MA	CHK AEG	CODE CHBDC	LOAD		DATE JAN, 2005
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG N2

Appendix O

Highway 11, Station 14+290 to 14+390

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+300 L18.75 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+300, O/S 18.75L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 25.06.04 - 25.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (20 40 60 80 100): ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**, some rootlets Black										
0.5	Silty **SAND**, trace gravel, with cobbles Very Dense Brown Wet		1	SS	50/.150						
			2	SS	50/.125				○		10 62 29 (SI+CL)
1.9	END OF BOREHOLE AT 1.93 m. AUGER REFUSAL AT 1.93 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 0.81 m AND WATER LEVEL AT 0.76 m UPON COMPLETION. BOREHOLE BACKFILLED WITH AUGER CUTTINGS.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus^{5}_{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+300 R18.75 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+300, O/S 18.75R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 25.06.04 - 25.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**, some rootlets Black										
0.4	Silty **SAND**, trace to some gravel, with cobbles Dense to Very Dense Brown to Grey Moist to Wet		1	SS	49				○		
			2	SS	45				○		17 54 29 (SI+CL)
			3	SS	50/.075						
			4	SS	50/.100				○		
			5	SS	50/.100				○		10 54 31 5
			6	SS	58				○		
6.7	END OF BOREHOLE AT 6.71 m. BOREHOLE OPEN TO 2.44 m AND WATER LEVEL AT 2.29 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

+ ³, × ³: Numbers refer to Sensitivity

15 (20 / 10) 5 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+312.5 L34 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+312.5, O/S 34L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 29.06.04 - 29.06.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
0.0	DCPT from surface.										
1.4	END OF DCPT AT 1.37 m. CONE REFUSAL AT 1.37 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+312.5 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+312.5, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 25.06.04 - 25.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**, some rootlets Black										
0.4	Silty **SAND**, trace gravel, with cobbles Very Dense Brown to Grey Moist		1	AS					○		
			1	SS	50/.050				○		
			2	AS					○		7 53 36 5
2.6	END OF BOREHOLE AT 2.62 m. AUGER REFUSAL AT 2.62 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 2.21 m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

(%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+312.5 R 58 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+312.5, O/S 58R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 25.06.04 - 25.06.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100		UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L; WATER CONTENT (%) 20 40 60	γ kN/m^3	GR SA SI CL
0.0	DCPT from surface.										
3.6	END OF DCPT AT 3.58 m. CONE REFUSAL AT 3.58 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+325 R18.75 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+325, O/S 18.75R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 25.06.04 - 25.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**, some rootlets Black										
0.5	Silty **SAND**, trace gravel, occasional cobbles Dense to Very Dense Brown to Grey Moist		1	S	35				○		
			2	SS	40				○		8 55 34 4
			3	SS	58				○		
2.9	END OF BOREHOLE AT 2.95 m. AUGER REFUSAL AT AT 2.95 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 2.95 m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

+ ³, × ³: Numbers refer to Sensitivity

15-⊕-5 (20, 10) (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+337.5 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+337.5, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 25.06.04 - 25.06.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60		GR SA SI CL
0.0	DCPT from surface.										
4.2	END OF DCPT AT 4.19 m. CONE REFUSAL AT 4.19 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+337.5 R46 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+337.5, O/S 46R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 29.06.04 - 29.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**, some rootlets Black										
0.3	Silty **SAND** to Sandy **SILT**, trace gravel, occasional cobbles Very Dense Brown Moist		1	SS	66				o		
	Becoming Grey		2	SS	50				o		0 39 57 3
			3	SS	58				o		
			4	SS	61				o		3 54 31 12
4.0	END OF BOREHOLE AT 3.99 m. AUGER REFUSAL AT 3.99 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 3.66 m AND DRY UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+350 R18.75 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+350, O/S 18.75R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 28.06.04 - 28.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**, some rootlets Black										
0.4	Silty **SAND**, trace gravel, occasional cobbles Dense to Very Dense Brown to Grey Moist		1	SS	36				○		
			2	SS	50/.050						
			3	SS	70				○		11 62 27 (SI+CL)
			4	SS	62				○		
3.7	END OF BOREHOLE AT 3.71 m. AUGER REFUSAL AT 3.71 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 3.43 m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE GROUT TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+362.5 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+362.5, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 28.06.04 - 28.06.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60	γ kN/m^3	GR SA SI CL
0.0	**TOPSOIL**, some rootlets										
0.4	**SAND**, some silt to silty, trace gravel, occasional cobbles Dense to Very Dense Brown Wet		1	SS	51				○		
	Grey		2	SS	46				○		
2.2	Silty **SAND**, trace gravel, occasional cobbles Dense to Very Dense Grey Moist		3	SS	44				○		5 66 29 (SI+CL)
			4	SS	52				○		
3.8	END OF BOREHOLE AT 3.76 m. AUGER REFUSAL AT 3.76 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 3.51 m AND DRY UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\underset{10}{\oplus}} 5$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+362.5 R48 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+362.5, O/S 48R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 29.06.04 - 29.06.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100; ○ UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	w_P w w_L; 20 40 60	γ kN/m^3	GR SA SI CL
0.0	DCPT from surface.										
1.8	END OF DCPT AT 1.80 m. CONE REFUSAL AT 1.80 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 15 10 5 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+375 R18.75 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+375, O/S 18.75R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 29.06.04 - 29.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**, some rootlets Black										
0.4	Silty **SAND**, trace gravel, occasional cobbles Compact Brown Moist		1	SS	24				○		
1.5	END OF BOREHOLE AT 1.50 m. AUGER REFUSAL AT 1.50 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 1.50 m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20
15 5
10
(%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+387.5 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+387.5, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 28.06.04 - 28.06.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L WATER CONTENT (%)	γ kN/m^3	GR SA SI CL
0.0	DCPT from surface.							20 40 60 80 100 20 40 60 80 100	20 40 60		
2.4	END OF DCPT AT 2.41 m. CONE REFUSAL AT 2.41 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 27/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 14+387.5 R51 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Armour Township, ST. 14+387.5, O/S 51R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 28.06.04 - 28.06.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**ORGANICS**, some rootlets Black										
0.7	Silty **SAND**, trace gravel, with cobbles Compact to Very Dense Brown Moist		1	SS	11				○		
			2	SS	50/.125						
			3	SS	50/.125				○		
			4	SS	55				○		3 60 31 5
3.7	END OF BOREHOLE AT 3.73 m. AUGER REFUSAL AT 3.73 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 3.20 m AND WATER LEVEL AT 3.1 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

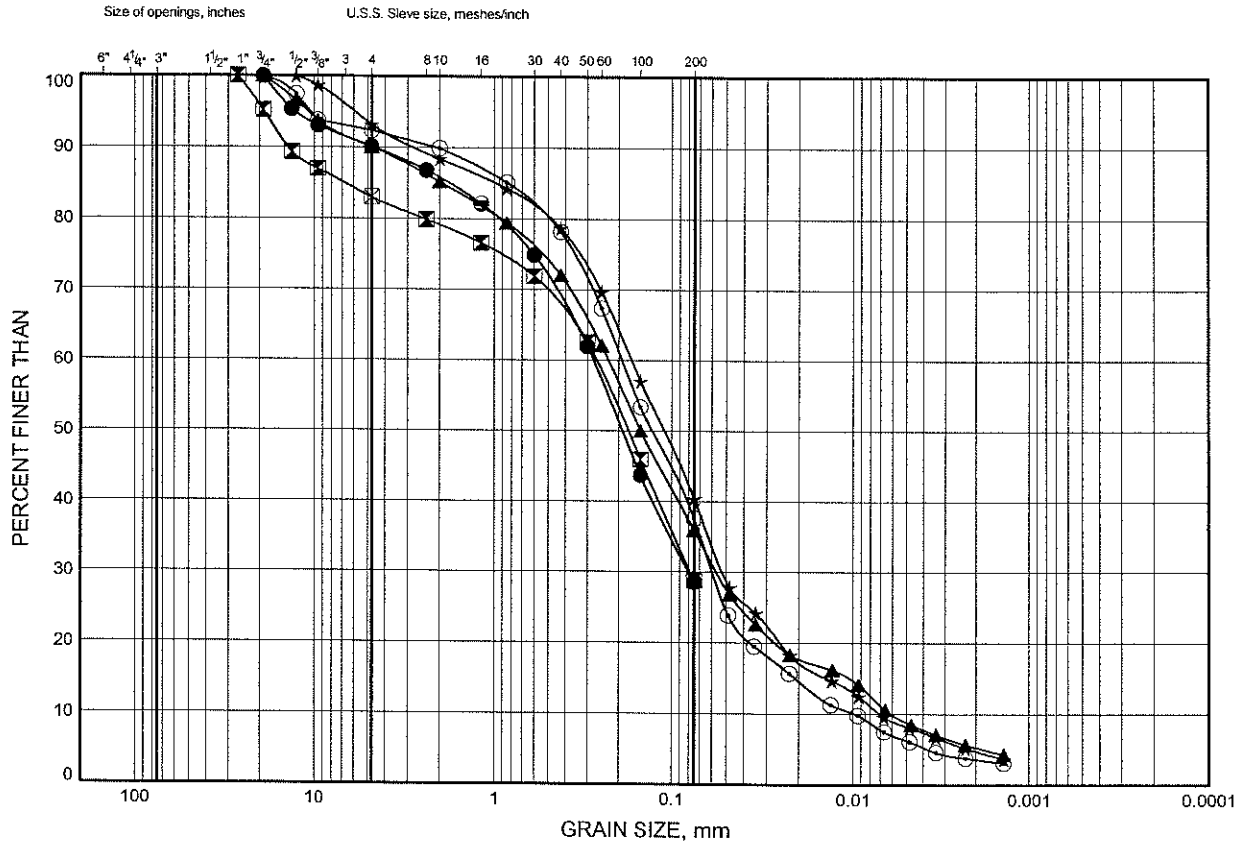
ONTMT4 2316.GPJ 27/01/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE O1

Silty SAND



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	14+300 L18.75	1.66	
⊠	14+300 R18.75	1.83	
▲	14+300 R18.75	4.78	
★	14+312.5 CL	2.36	
⊙	14+325 R18.75	1.83	

Date January 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

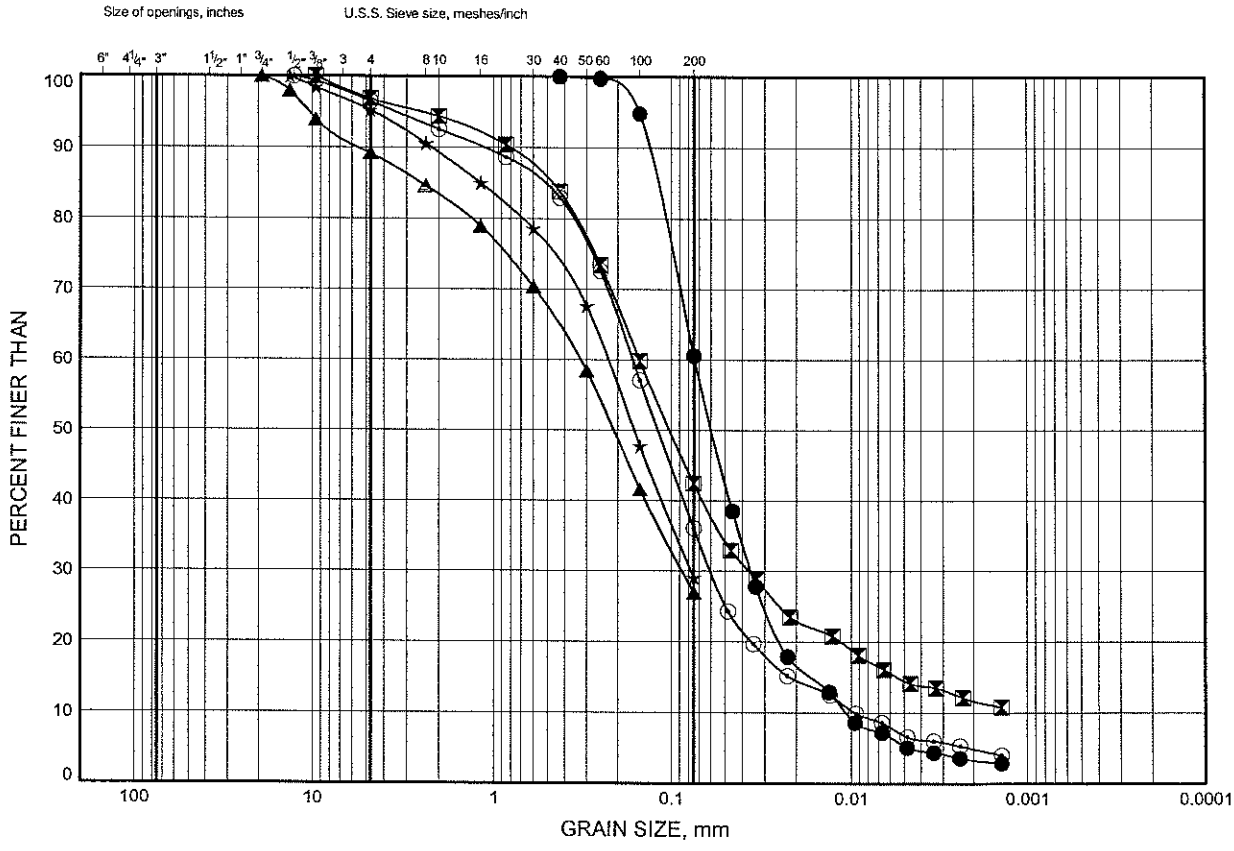
THURBGSD 2316.GPJ 27/01/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE O2

Silty SAND, Sandy SILT



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	14+337.5 R46	1.83	
⊠	14+337.5 R46	3.28	
▲	14+350 R18.75	2.59	
★	14+362.5 CL	2.59	
⊙	14+387.5 R51	3.28	

Date January 2005

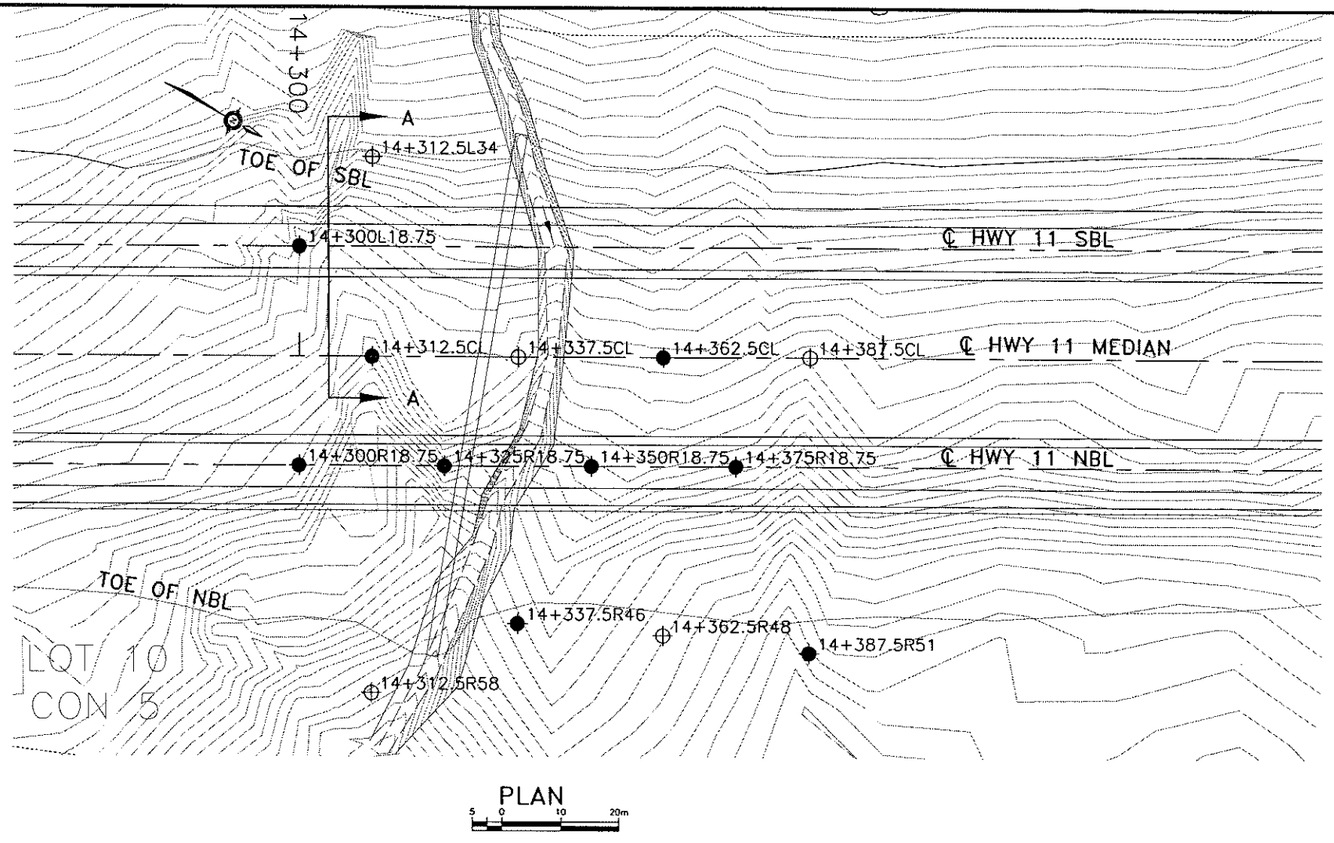
Project 480-93-00

THURBER

Prep'd WM

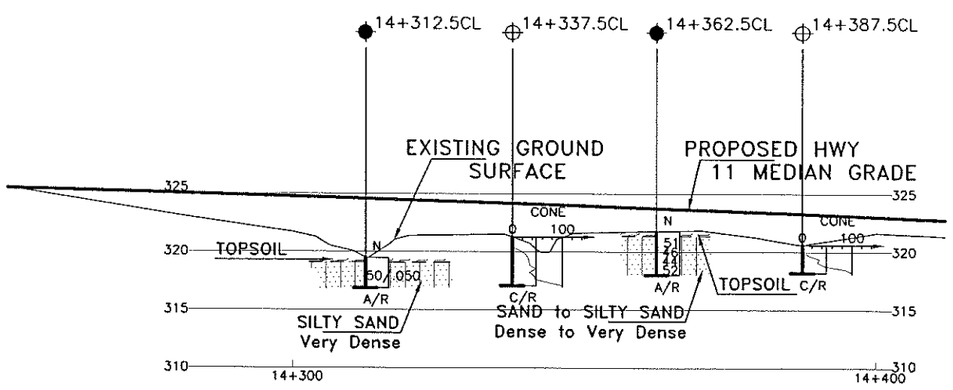
Chkd. MA

THURBGSD 2316.GPJ 27/01/05



PLAN

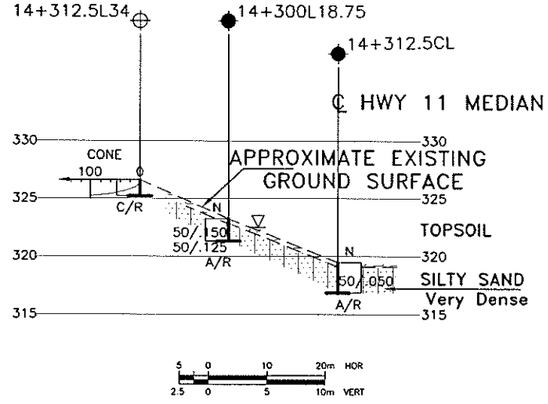
5 0 10 20m



PROFILE ℄ HWY 11 MEDIAN

5 0 10 20m HOR

2.5 0 5 10m VERT



SECTION A–A

5 0 10 20m HOR

2.5 0 5 10m VERT

NO	STATION	OFFSET FROM MEDIAN CL
14+362.5 R48	14+362.5	R48
14+375 R18.75	14+375	R18.75
14+387.5 CL	14+387.5	CL
14+387.5 R51	14+387.5	R51

LICENSED PROFESSIONAL ENGINEER
M. R. ANDERSON
Nov 2/05
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. J. BRANCO
Jan 2/06
PROVINCE OF ONTARIO

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

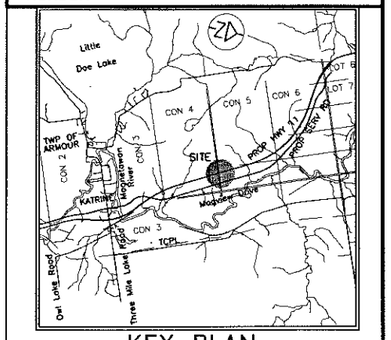
HWY 11
CONT No
WP No 480-93-00

SHEET

HIGHWAY 11 MAIN LINE
ARMOUR TOWNSHIP
STATION 14+290 TO 14+390
MEDIAN CL & SECTION AT 14+305 SBL
BOREHOLE LOCATIONS AND SOIL STRATA

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

THURBER ENGINEERING LTD.



KEY PLAN

0.5km 0 1.0km

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
⊕	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

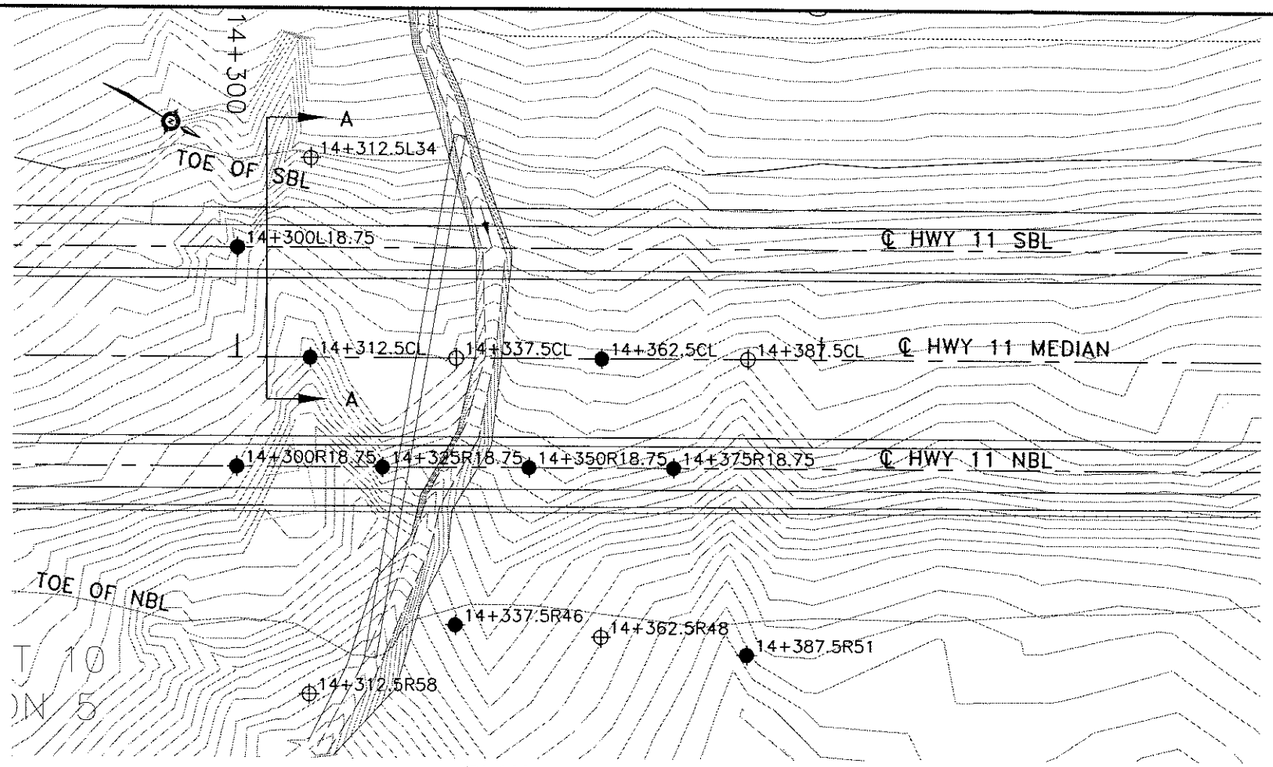
NO	STATION	OFFSET FROM MEDIAN CL
14+300 L18.75	14+300	L18.75
14+300 R18.75	14+300	R18.75
14+312.5 CL	14+312.5	CL
14+312.5 L34	14+312.5	L34
14+312.5 R 58	14+312.5	R 58
14+325 R18.75	14+325	R18.75
14+337.5 CL	14+337.5	CL
14+337.5 R46	14+337.5	R46
14+350 R18.75	14+350	R18.75
14+362.5 CL	14+362.5	CL

— NOTE —

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

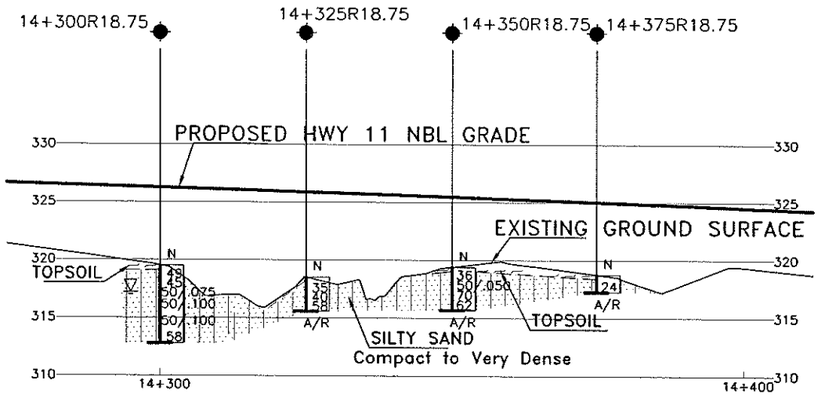
REVISIONS		
DATE	BY	DESCRIPTION
JAN. 05	MA	ISSUED AS DRAFT FOR REVIEW

DESIGN MA	CHK AEG	CODE CHBDC	LOAD	DATE JAN. 2005	
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG 01



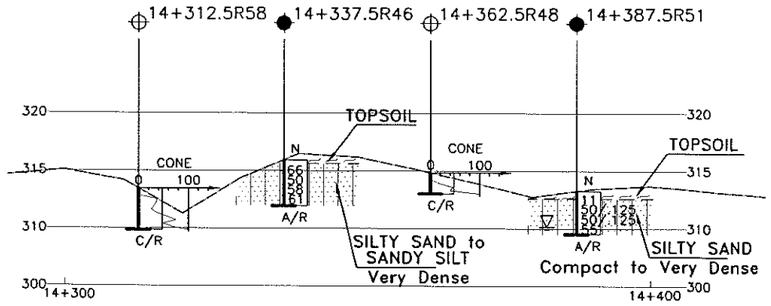
PLAN

5 0 10 20m



PROFILE ℄ HWY 11 NBL

5 0 10 20m HOR
2.5 0 5 10m VERT



PROFILE TOE OF HWY 11 NBL

5 0 10 20m HOR
2.5 0 5 10m VERT

NO	STATION	OFFSET FROM MEDIAN CL
14+362.5 R48	14+362.5	R48
14+375 R18.75	14+375	R18.75
14+387.5 CL	14+387.5	CL
14+387.5 R51	14+387.5	R51

LICENSED PROFESSIONAL ENGINEER
M. R. ANDERSON
NOV 2/05
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. J. BRANCO
Nov 2/05
PROVINCE OF ONTARIO

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HWY 11
CONT No
WP No 480-93-00

SHEET

HIGHWAY 11 MAIN LINE
ARMOUR TOWNSHIP
STATION 14+290 TO 14+390
NBL CENTRELINE AND RIGHT TOE
BOREHOLE LOCATIONS AND SOIL STRATA

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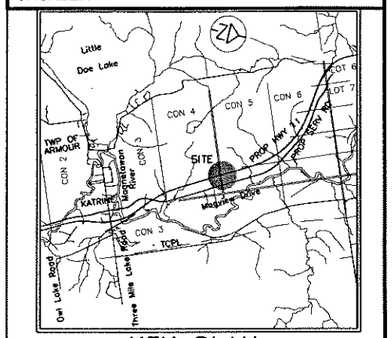
THURBER ENGINEERING LTD.



KEY PLAN
0.5km 0 1.0km

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
⊕	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▽	WL in Piezometer at Time of Investigation (Date)
▽	Head Artesian Water Piezometer
▽	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

NO	STATION	OFFSET FROM MEDIAN CL
14+300 L18.75	14+300	L18.75
14+300 R18.75	14+300	R18.75
14+312.5 CL	14+312.5	CL
14+312.5 L34	14+312.5	L34
14+312.5 R 58	14+312.5	R 58
14+325 R18.75	14+325	R18.75
14+337.5 CL	14+337.5	CL
14+337.5 R46	14+337.5	R46
14+350 R18.75	14+350	R18.75
14+362.5 CL	14+362.5	CL

— NOTE —

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS		
DATE	BY	DESCRIPTION
JAN. 05	MA	ISSUED AS DRAFT FOR REVIEW

DESIGN MA	CHK AEG	CODE CHBDC	LOAD	DATE JAN. 2005	
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG 02

Appendix P

Highway 11, Station 15+220 to 15+290

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+227 R18.75 1 OF 1 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+227, O/S 18.75R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY HS

DATUM Geodetic DATE 25.08.05 - 25.08.05 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT** Dark Brown		1	SS	2				105		
0.6	Sandy **SILT**, trace gravel, occasional cobbles Compact Grey Wet		2	SS	10						
			3	SS	12						3 26 67 4
2.1	Silty **SAND**, occasional cobbles Grey		4	SS	50/						
2.4	END OF BOREHOLE AT 2.44m. AUGER REFUSAL AT 2.44m ON PROBABLE BOULDERS. BOREHOLE OPEN TO BOTTOM AND WATER LEVEL AT 0.76m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS AND BENTONITE TO SURFACE.				.150						

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity

$15\frac{20}{10}5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+231.7 R39.9 1 OF 1 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+231.7, O/S 39.9R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 19.08.04 - 19.08.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**SAND**, trace silt, trace rootlets										
0.2	Brown										
	SAND and SILT, trace clay, trace gravel Loose to Very Dense Brown Wet		1	SS	8				○		
			2	SS	28				○		
	occasional cobbles or boulders		3	SS	74				○		4 48 45 4
			4	SS	17				○		
			5	SS	50/.075				○		
3.7	END OF BOREHOLE AT 3.66 m. AUGER REFUSAL AT 3.66 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 3.66 m AND WATER LEVEL AT 2.74 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+237 CL 1 OF 1 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+237, CL ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY HS

DATUM Geodetic DATE 25.08.05 - 25.08.05 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** (150mm)										
0.2	**SAND**, trace silt, trace gravel Compact to Dense Grey Moist		1	SS	16				○		
			2	SS	30				○		
1.5	Sandy **SILT**, trace gravel, occasional cobbles Compact Grey Wet		3	SS	19				○		
	Becoming Very Dense		4	SS	100				○		5 29 58 7
2.7	END OF BOREHOLE AT 2.74m. AUGER REFUSAL AT 2.74m ON PROBABLE BOULDERS. WATER LEVEL IN OPEN BOREHOLE AT 1.52m DEPTH UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS AND BENTONITE TO SURFACE.										

+ ³, × ³ Numbers refer to Sensitivity

15 (20 / 10) 5 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+242.9 R76.5 1 OF 1 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+242.9, O/S 76.5R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 19.08.04 - 19.08.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	w_P w w_L	γ kN/m^3	GR SA SI CL
0.0	DCPT from surface.							SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60		
6.1	END OF DCPT AT 6.10 m.										

ONTMT4S 2316.GPJ 24/10/05

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\underset{10}{\diamond}} 5$ (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+244.5 R21.5 1 OF 1 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+244.5, O/S 21.5R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 19.08.04 - 19.08.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**, sandy										
0.2	Dark Brown **SAND**, some silt, trace gravel, occasional cobbles Loose to Very Dense Brown Wet		1	SS	9				○		
			2	SS	37				○		13 74 13 (SI+CL)
			3	SS	28				○		
			4	SS	50/.100				○		
			5	SS	50/.050				○		
3.4	END OF BOREHOLE AT 3.35 m. AUGER REFUSAL AT 3.35 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 3.35 m AND WATER LEVEL AT 2.44 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20
15 ⊕ 5
10
(%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+256.1 R40.7 1 OF 1 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+256.1, O/S 40.7R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 19.08.04 - 19.08.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES 'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**, fibrous Black										
0.3	Silty **SAND**, trace clay, trace gravel, occasional cobbles Loose to Compact Brown Wet		1	SS	4				15 ○		
			2	SS	21				○		
			3	SS	11				○		4 57 37 3
			4	SS	50/.125				○		
3.0	Gravelly **SAND**, some silt Very Dense Brown Moist		5	SS	86/250				○		27 61 12 (SI+CL)
4.1	END OF BOREHOLE AT 4.11 m. AUGER REFUSAL AT 4.11 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus^{20}_{10} 5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+257.5 CL 1 OF 1 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+257.5, CL ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY HS

DATUM Geodetic DATE 25.08.05 - 25.08.05 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L	γ kN/m^3	GR SA SI CL
0.0	DCPT started at surface.							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	20 40 60		
3.4	END OF DCPT AT 3.35m. HOLE GROUTED TO SURFACE.										

ONTMT4S 2316.GPJ 24/10/05

$+^3$, $\times^3$: Numbers refer to Sensitivity

(%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+266.7 R79.4 1 OF 1 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+266.7, O/S 79.4R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 19.08.04 - 19.08.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT** Black										
0.2	Silty **CLAY**, trace sand Soft Brown		1	SS	2				182		
			2	SS	7						
			3	SS	2						
			4	SS	2						
			5	SS	2						0 1 52 47
			6	SS	2						
5.0	**SAND and SILT**, trace clay, trace gravel Compact Brown Wet		7	SS	27						2 41 54 3
6.7	END OF BOREHOLE AT 6.71 m. BOREHOLE OPEN TO 6.71 m AND WATER LEVEL AT 5.49 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity

$15 \oplus^{20}_{10} 5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+269.1 R22.5 1 OF 1 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+269.1, O/S 22.5R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 19.08.04 - 19.08.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100; ○ UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	w_P w w_L; 20 40 60	γ kN/m³	GR SA SI CL
0.0	DCPT from surface.										
4.3	END OF DCPT AT 4.27 m. CONE REFUSAL AT 4.27 m.										

+ ³, × ³ : Numbers refer to Sensitivity

15 (20 / 10) 5 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+270 R15 1 OF 1 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+270, O/S R15 ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY HS

DATUM Geodetic DATE 25.08.05 - 25.08.05 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	**PEAT** (200mm)										
0.2	Sandy **SILT**, trace gravel, occasional cobbles or boulders Loose to Compact Grey Dry to Moist		1	SS	6				○		
			2	SS	12				○		2 25 69 4
			3	SS	10				○		
2.1	END OF BOREHOLE AT 2.13m. AUGER REFUSAL AT 2.13m ON PROBABLE BOULDERS. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH DRILL CUTTINGS AND BENTONITE TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

15 (20, 10, 5) (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+280.5 R41.8 1 OF 1 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+280.5, O/S 41.8R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 19.08.04 - 19.08.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.2	Dark Brown **SAND and SILT**, trace clay, trace gravel, occasional cobbles Loose to Compact Brown Wet		1	SS	8				○		
			2	SS	23				○		2 50 45 3
			3	SS	25				○		
			4	SS	8				○		
			5	SS	11				○		1 49 47 3
4.3	END OF BOREHOLE AT 4.27 m. AUGER REFUSAL AT 4.27 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE OPEN TO 4.27 m AND WATER LEVEL AT 0.30 m UPON COMPLETION. Piezometer installation consist of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 19.01.05 0.50 28.02.05 0.48										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

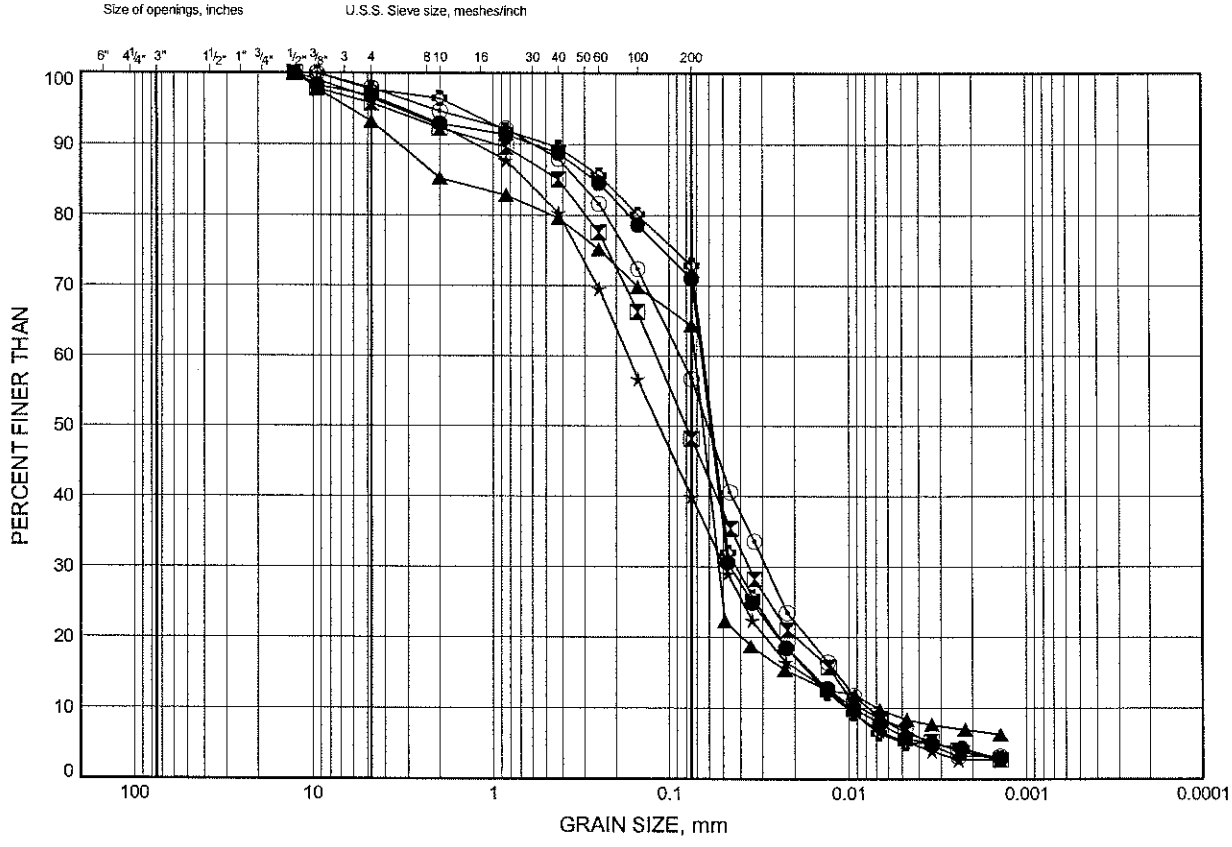
ONTMT4S 2316.GPJ 24/10/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE P1

Silty SAND to Sandy SILT



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+227 R18.75	1.83	
⊠	15+231.7 R39.9	1.83	
▲	15+237 CL	2.59	
★	15+256.1 R40.7	1.83	
⊙	15+266.7 R79.4	6.40	
✿	15+270 R15	1.07	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

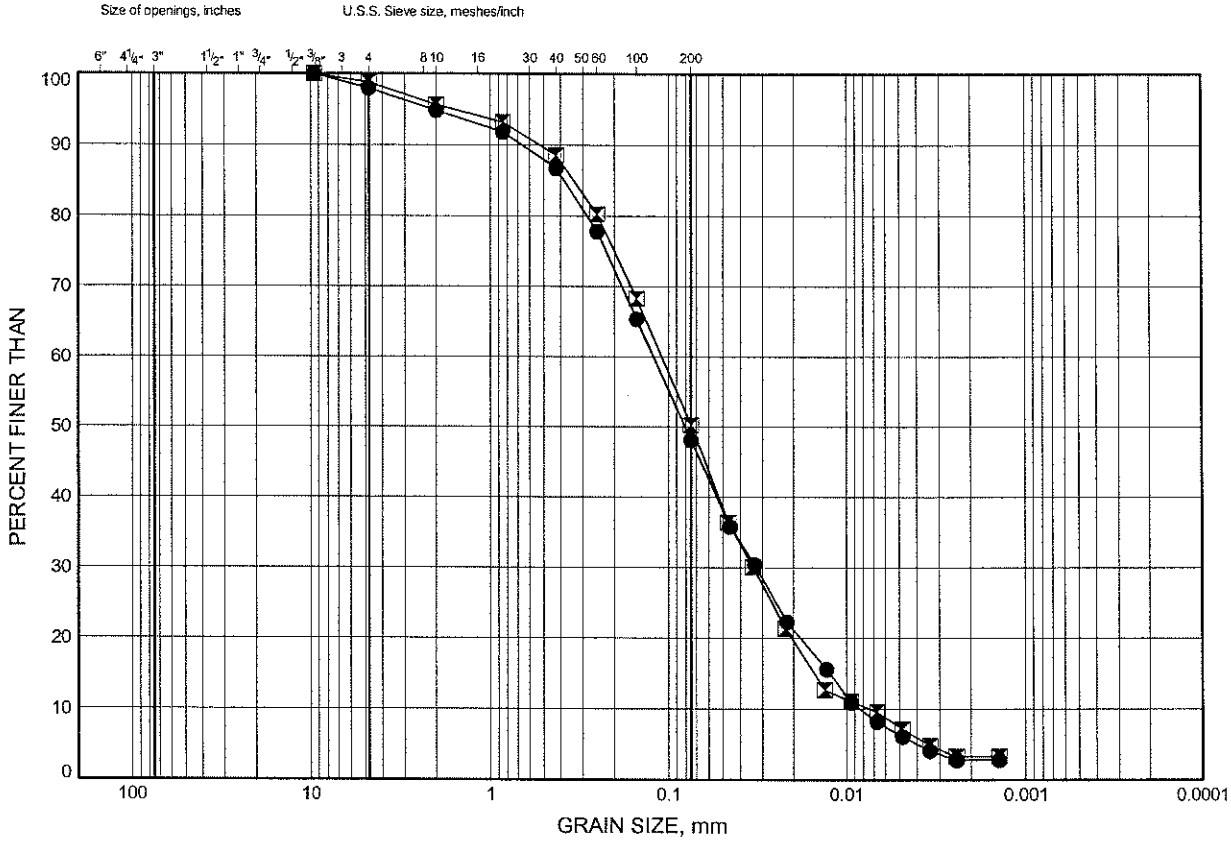
THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE P2

Silty SAND to Sandy SILT



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+280.5 R41.8	1.07	
⧓	15+280.5 R41.8	3.35	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

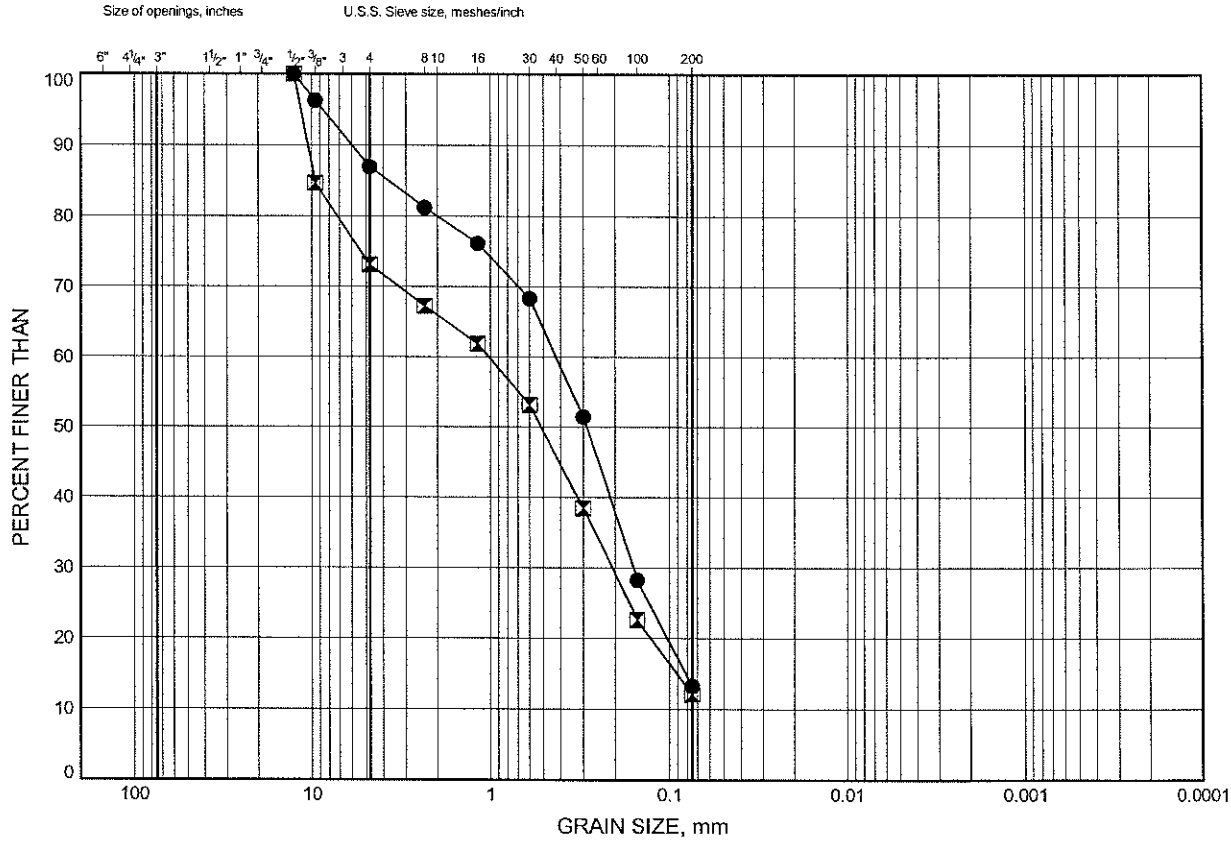
THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE P3

SAND to Gravelly SAND



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+244.5 R21.5	1.07	
⊠	15+256.1 R40.7	3.35	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

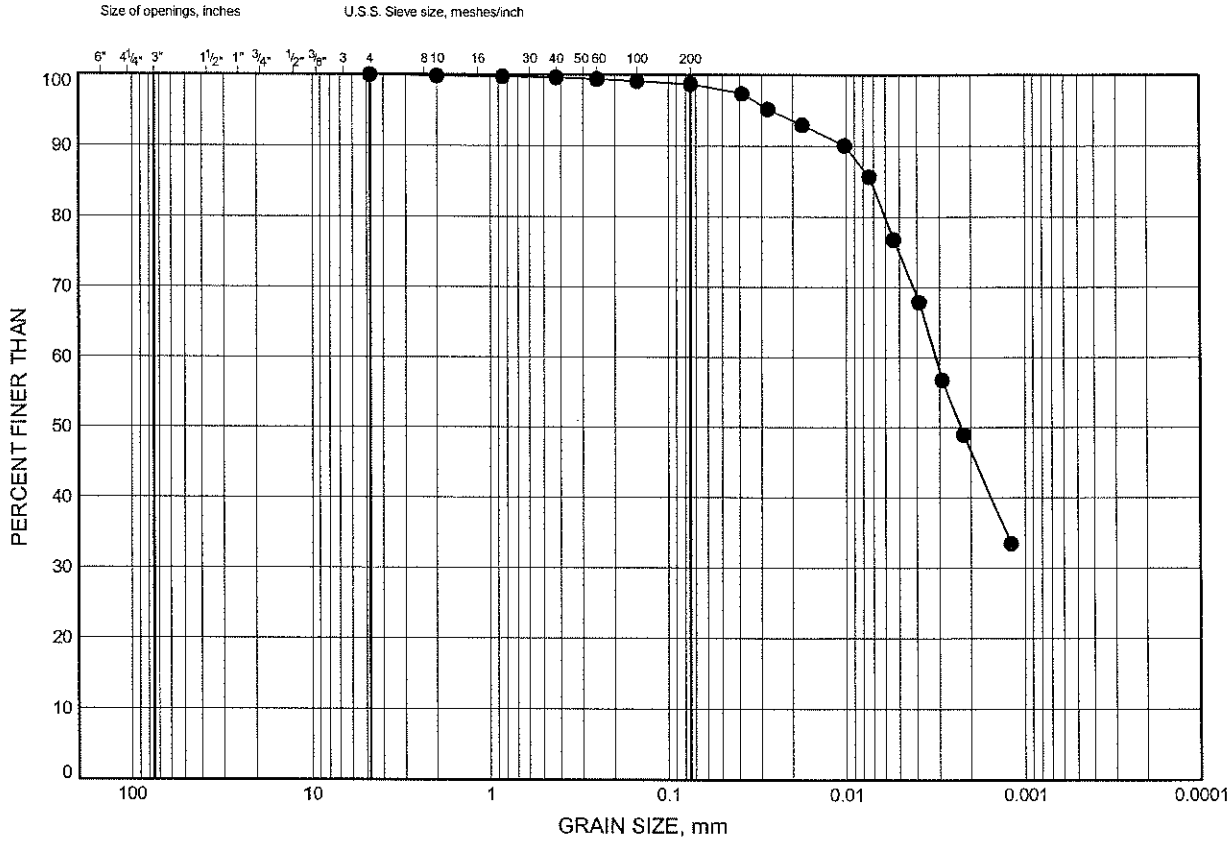
THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE P4

Silty CLAY



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+266.7 R79.4	3.35	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

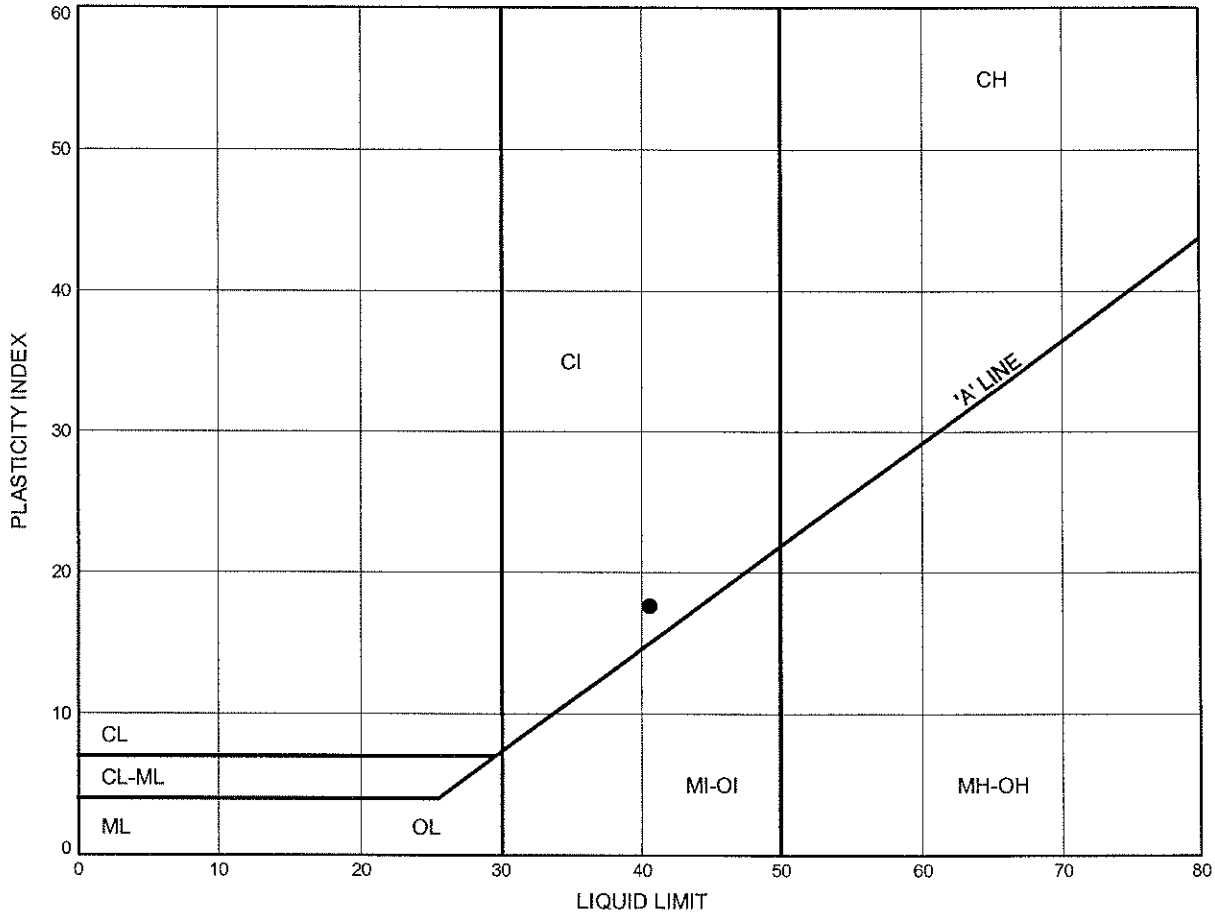
Chkd. MA

THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

ATTERBERG LIMITS TEST RESULTS

FIGURE P5



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+266.7 R79.4	3.35	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

TTCALTR 2316.GPJ 27/09/05

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

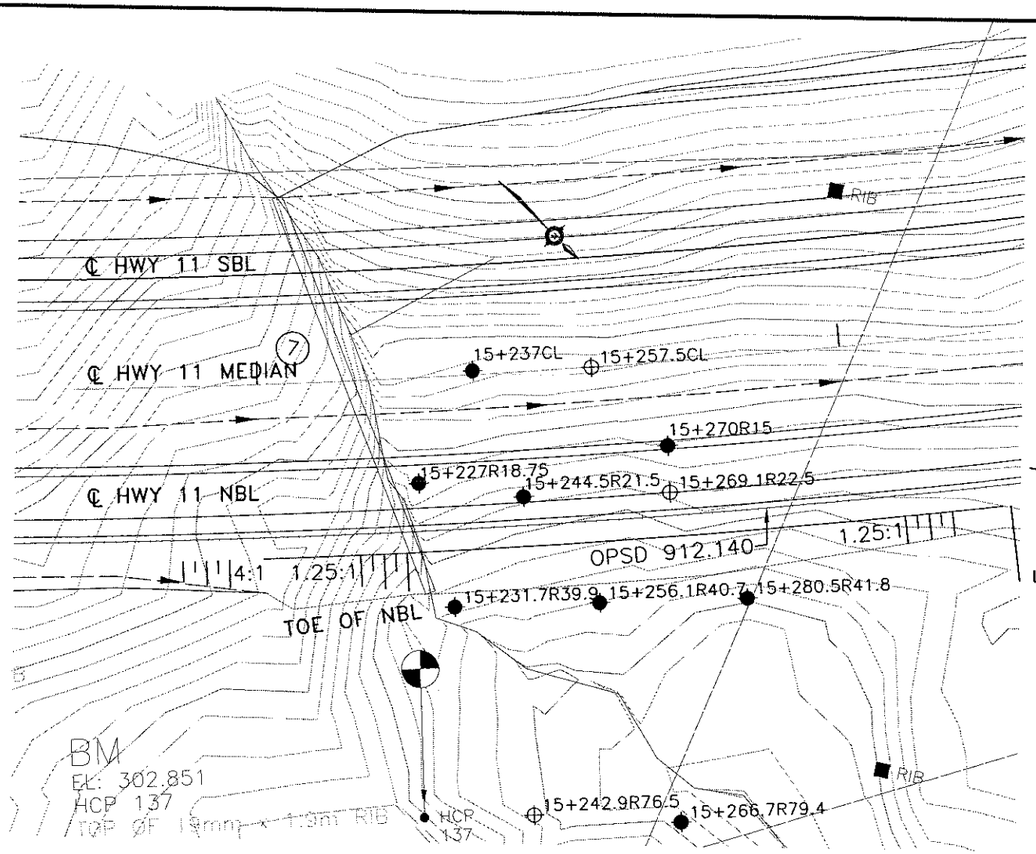
HWY 11
CONT No
WP No 480-93-00

SHEET

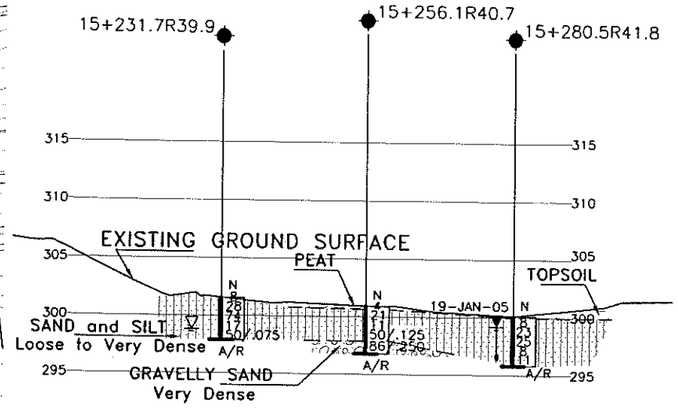
HIGHWAY 11 MAIN LINE
ARMOUR TOWNSHIP
STATION 15+220 TO 15+290
MEDIAN CL, NBL CL, RIGHT TOE
BOREHOLE LOCATIONS AND SOIL STRATA

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

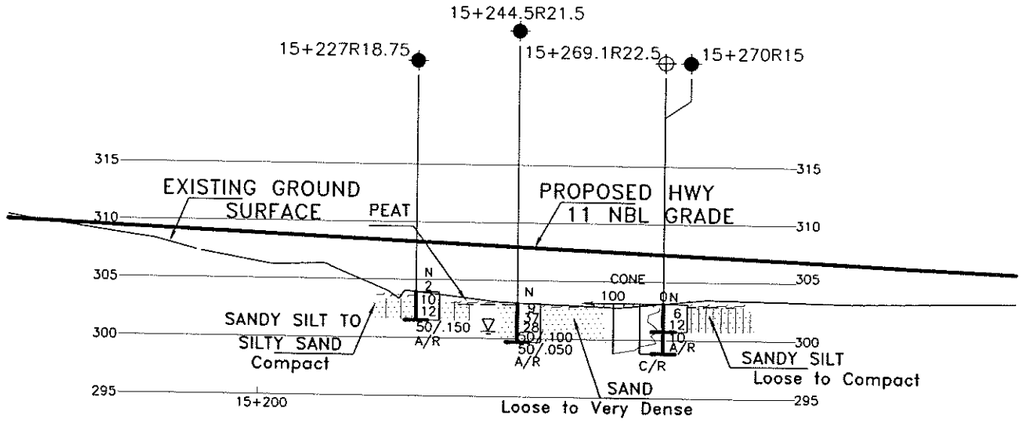
THURBER ENGINEERING LTD.



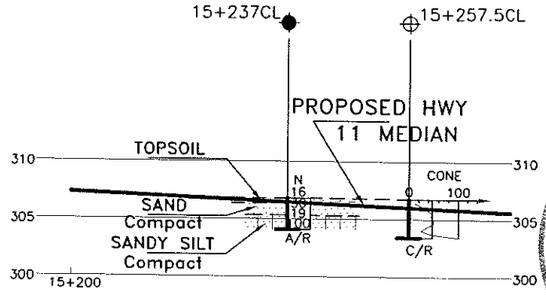
PLAN
5 0 10 20m



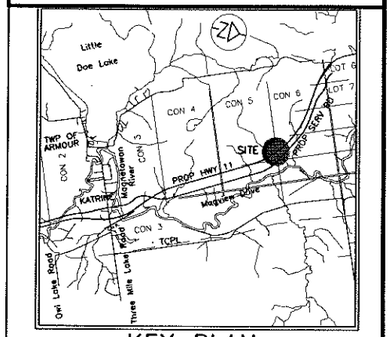
PROFILE TOE OF HWY 11 NBL
5 0 10 20m HOR
2.5 0 5 10m VERT



PROFILE ℄ HWY 11 NBL
5 0 10 20m HOR
2.5 0 5 10m VERT



PROFILE ℄ HWY 11 MEDIAN
5 0 10 20m HOR
2.5 0 5 10m VERT



KEY PLAN
0.5km 0 1.0km

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
⊕	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

NO	STATION	OFFSET FROM MEDIAN CL
15+231.7R39.9	15+231.7	R39.9
15+242.9R76.5	15+242.9	R76.5
15+244.5R21.5	15+244.5	R21.5
15+256.1R40.7	15+256.1	R40.7
15+266.7R79.4	15+266.7	R79.4
15+269.1R22.5	15+269.1	R22.5
15+280.5R41.8	15+280.5	R41.8
15+237CL	15+237	CL
15+257.5CL	15+257.5	CL
15+227R18.75	15+227	R18.75
15+270R15	15+270	R15

— NOTE —

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

LICENSED PROFESSIONAL ENGINEER
M. R. ANDERSON
Nov 2/05
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. I. BRANCO
Nov 2/05
PROVINCE OF ONTARIO

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS		
JAN, 05	MA	ISSUED AS DRAFT FOR REVIEW
DATE	BY	DESCRIPTION

DESIGN MA	CHK AEG	CODE CHBDC	LOAD	DATE OCT, 2005	
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG P1

Appendix Q

Highway 11, Station 15+715 to 15+815

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+712.5 L37 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+712.5, O/S 37L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY HS

DATUM Geodetic DATE 24.08.05 - 24.08.05 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** (100mm)										
0.1	Clayey **SILT**, trace sand, occasional rootlets Firm Grey to Brown Moist to Wet occasional iron oxide staining		1	SS	7						
			2	SS	6						0 11 70 19
1.5	Silty **CLAY**, trace to some sand Firm to Soft Brown Wet		3	SS	5						
			4	SS	2						
			5	SS	2			2.1			
			6	SS	1			1.8			0 14 44 42
	becoming grey		7	SS	0			2			
			8	SS	0			1.7			
9.1	Clayey **SILT**, trace sand Soft to Firm Grey Wet		9	SS	2						0 1 81 18

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 25/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+712.5 L37 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+712.5, O/S 37L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY HS

DATUM Geodetic DATE 24.08.05 - 24.08.05 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
			10	SS	7				○		
			11	SS	6				○		
12.8	END OF BOREHOLE AT 12.80m. BOREHOLE OPEN TO BOTTOM AND WATER LEVEL AT 1.52m DEPTH UPON COMPLETION.. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \frac{20}{10} 5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 25/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+714.7 R3.6 1 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+714.7, O/S 3.6R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 08.09.04 - 08.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Silty **CLAY**, trace sand, occasional iron oxide staining Stiff to Very Stiff Brown		1	SS	10						
			2	SS	16						
1.5	Silty **CLAY**, occasional sand seams Soft to Firm Brown to Grey		3	SS	3						0 14 63 23
			4	SS	4						
			5	SS	4						
			6	SS	2			2.7			
			7	SS	0						0 4 40 56
	varved		8	SS	0			2.0			
			9	SS	2						
9.4	**SILT**, trace to some sand Very Loose to Loose Grey										

Continued Next Page

+ ³, × ³ : Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+714.7 R3.6 2 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+714.7, O/S 3.6R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 08.09.04 - 08.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Wet										
			10	SS	5						0 3 90 7
			11	SS	3						
			12	SS	9						
	Becoming Compact		13	SS	11						
15.8	END OF SOIL SAMPLING AT 15.85 m. DCPT started at 15.24 m.										
19.8	END OF DCPT AT 19.81 m.										

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTMT4S 2316.GPJ 25/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+714.7 R3.6 3 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+714.7, O/S 3.6R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 08.09.04 - 08.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60		GR SA SI CL
	WATER LEVEL AT 1.83 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\underset{10}{\oplus}} 5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 25/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+715.6 R41.1 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+715.6, O/S 41.1R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 08.09.04 - 08.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Silty **CLAY**, trace sand Stiff to Firm Brown		1	SS	9						
			2	SS	7						
			3	SS	5						
2.3	Silty **CLAY**, occasional sand seams Soft to Very Soft Grey		4	SS	2						0 9 37 54
			5	SS	2						
			1	TW	PH			2.5			
	varved		6	SS	0						
	occasional silt layers		7	SS	0			2.4			
9.1	**SILT**, trace sand Loose Grey Wet		8	SS	4						0 2 89 9
9.8	END OF SOIL SAMPLING AT 9.75 m.										

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15-5}$ (%) STRAIN AT FAILURE

ONTM4S 2316.GPJ 25/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+715.6 R41.1 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+715.6, O/S 41.1R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 08.09.04 - 08.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	DCPT started at 9.14 m.										
18.3	END OF DCPT AT 18.29 m. BOREHOLE OPEN TO 18.29 m AND WATER LEVEL AT 2.44 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE. SLOW ARTESIAN FLOW ON 09.09.04. AUGERED TO 4.6 m AND PLUGGED FLOW WITH HOLE PLUG BENTONITE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus \frac{20}{10} 5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 25/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+726.8 L15.9 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+726.8, O/S 15.9L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 08.09.04 - 08.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	DCPT started from surface.										

Continued Next Page

+ ^{3}, × ^{3} : Numbers refer to Sensitivity

15 $\frac{20}{10}$ 5 (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+726.8 L15.9 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+726.8, O/S 15.9L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 08.09.04 - 08.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100; ○ UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	20 40 60	γ kN/m^3	GR SA SI CL
16.8	END OF DCPT AT 16.76 m. HOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 25/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+728.1 R57.1 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+728.1, O/S 57.1R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 08.09.04 - 08.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	DCPT started from surface.										

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus^{20}_{10} 5$ (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+728.1 R57.1 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+728.1, O/S 57.1R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 08.09.04 - 08.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100; ○ UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	w_P w w_L; 20 40 60	γ kN/m^3	GR SA SI CL
15.2	END OF DCPT AT 15.24 m. HOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus^{20}_{10} 5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 25/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+729 R22.9 1 OF 4 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+729, O/S 22.9R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 09.09.04 - 09.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Silty **CLAY**, trace sand Firm Brown		1	SS	7						
			2	SS	5						
			3	SS	4						0 7 42 51
2.3	Silty **CLAY**, occasional sand seams Soft to Very Soft Grey		4	SS	0						
			5	SS	0						
			6	SS	0						
			7	SS	0						0 1 51 48
			8	SS	2						
9.1	**SILT**, trace sand Loose Grey Wet		9	SS	6						

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE

ONTM4TAS 2316.GPJ 25/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+729 R22.9 2 OF 4 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+729, O/S 22.9R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 09.09.04 - 09.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	WATER CONTENT (%)	γ kN/m³	GR SA SI CL
								20 40 60 80 100	20 40 60		
			10	SS	7				○		0 8 88 3
			11	SS	6				○		
12.8	END OF SOIL SAMPLING AT 12.80 m. DCPT STARTED AT 12.80 m.										

Continued Next Page

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity

15 10 20 5 (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+729 R22.9 3 OF 4 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+729, O/S 22.9R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 09.09.04 - 09.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
28.8	END OF DCPT AT 28.80 m. CONE REFUSAL AT 28.80 m. BOREHOLE OPEN TO 18.29 m AND WATER LEVEL AT SURFACE UPON COMPLETION. BOREHOLE GROUTED TO SURFACE. LOW ARTESIAN FLOW ON 10.09.04.										

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+729 R22.9 4 OF 4 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+729, O/S 22.9R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 09.09.04 - 09.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	AUGERED TO 4.6 m AND PLUGGED FLOW WITH HOLE PLUG BENTONITE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\underset{10}{\oplus}} 5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 25/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+737.5 L37 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+737.5, O/S 37L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY HS

DATUM Geodetic DATE 24.08.05 - 24.08.05 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	DCPT started at surface.										

Continued Next Page

+ 3 , × 3 : Numbers refer to Sensitivity

15 (20 / 10) 5 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+737.5 L37 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+737.5, O/S 37L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY HS

DATUM Geodetic DATE 24.08.05 - 24.08.05 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60		GR SA SI CL
15.2	END OF DCPT AT 15.24m. HOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTM4TAS 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+739.6 R3.2 1 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+739.6, O/S 3.2R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 14.09.04 - 14.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**, some rootlets Black										
0.4	Clayey **SILT**, some sand Firm Brown		1	SS	4				○		
			2	SS	4				○		
2.2	Silty **CLAY**, occasional sand seams Soft to Very Soft Grey		3	SS	1				○		
			4	SS	0			1.5 +	○		0 12 40 48
			5	SS	0			1.6 +	○		
			6	SS	0			1.8 +	○		
7.3	**SILT**, some sand, trace clay Loose to Very Loose Grey Wet		7	SS	4				○		
			8	SS	4				○		

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

15 (20 / 10) 5 (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+739.6 R3.2 2 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+739.6, O/S 3.2R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 14.09.04 - 14.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
			9	SS	0				○		0 13 83 4
			10	SS	7				○		
12.8	END OF SAMPLING AT 12.80 m. DCPT started from 12.80 m.										
19.8	END OF DCPT AT 19.81 m.										

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\underset{10}{\diamond}} 5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+739.6 R3.2 3 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+739.6, O/S 3.2R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 14.09.04 - 14.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+740.0 R40.7 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+740.0, O/S 40.7R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 13.09.04 - 13.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	**PEAT**, fibrous Black										
0.4	Clayey **SILT**, trace sand Stiff to Soft Brown Moist		1	SS	8						
			2	SS	3						
2.3	Silty **CLAY**, occasional sand seams Soft to Very Soft Grey		3	SS	0						
			4	SS	0						
			1	TW	PH			3 2.8 2.6			
			5	SS	0						0 1 58 42
7.0	**SILT**, trace to some sand, some to trace clay Loose to Very Loose Grey Wet		6	SS	5						
			7	SS	1						

Continued Next Page

+ 3, × 3 : Numbers refer to Sensitivity

15-20-10-5 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+740.0 R40.7 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+740.0, O/S 40.7R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 13.09.04 - 13.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
			8	SS	3				○		0 2 91 7
			9	SS	8				○		
12.8	END OF BOREHOLE AT 12.80 m. WATER LEVEL AT 1.98 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\oplus} 5$ $\overset{}{10}$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+752 L18.2 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+752, O/S 18.2L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 14.09.04 - 14.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**, fibrous Black										
0.4	Sandy **SILT**, some clay, trace rootlets Very Loose Brown Moist		1	SS	3						
			2	SS	3						0 32 56 12
2.2	Silty **CLAY**, occasional sand seams Soft to Very Soft Grey		3	SS	0						
			4	SS	0			1.6			
			5	SS	0			3.2			0 6 42 52
			6	SS	2			3			
7.2	**SILT**, trace to some sand, some to trace clay Very Loose to Loose Grey Wet		7	SS	3						
			8	SS	2						0 2 92 6

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+752 L18.2 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+752, O/S 18.2L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 14.09.04 - 14.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
			9	SS	0				○		
			10	SS	8				○		
12.8	END OF BOREHOLE AT 12.80 m. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+752.3 R59.8 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+752.3, O/S 59.8R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 09.09.04 - 09.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Silty **CLAY**, trace sand, occasional rootlets Soft Brown 75 mm layer of peat layer at 0.3 m		1	SS	4				○		
			2	SS	5				○		
1.5	Silty **CLAY**, occasional sand seams Soft to Very Soft Grey		3	SS	2				○		
			4	SS	1				○		
			5	SS	2				⊕		0 6 32 63
			6	SS	0				○		
	varved		1	TW	PH						
7.0	**SILT**, trace sand, trace clay Loose Grey Wet		7	SS	6				○		0 3 88 9
			8	SS	5				○		

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+ ³, × ³ : Numbers refer to Sensitivity

15 ⊕ 5 (20 / 10) (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+752.3 R59.8 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+752.3, O/S 59.8R ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 09.09.04 - 09.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60		GR SA SI CL
			9	SS	4			○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	○		
11.3	END OF BOREHOLE AT 11.28 m. BOREHOLE OPEN TO 10.67 m. PIEZOMETER INSTALLED AND BOREHOLE GROUTED TO SURFACE. LOW ARTESIAN FLOW PUSHED GROUT OUT TO 8.2 m DEPTH. RESEALED WITH HOLE PLUG BENTONITE ON 10.09.04. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen.										

WATER LEVEL READINGS

DATE	DEPTH (m)
09/09/04	0.35 above surface
10/09/04	0.60 above surface
28/02/05 (frozen)	0.40 above surface

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus^{20}_{10} 5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+764.4 R40.6 1 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+764.4, O/S 40.6R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers / Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 20.09.04 - 20.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** Brown										
0.5	Sandy **SILT**, trace clay, trace rootlets Loose Brown Wet		1	SS	7				○		
1.4	Silty **CLAY**, some sand seams Firm to Soft Brown		2	SS	6				○		
			3	SS	2				○		
3.0	Silty **CLAY**, occasional sand seams Soft to Very Soft Grey		4	SS	0				○		
								+ 2.4			
			5	SS	1				⊢⊣	85	0 2 38 60
			1	TW	PH						
								+ 3.6			
6.9	**SILT**, some to trace clay, trace sand Soft to Very Soft Grey Wet		6	SS	2				○		
			7	SS	0				○		0 3 91 6

Continued Next Page

+ 3, × 3 : Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+764.4 R40.6 2 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+764.4, O/S 40.6R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers / Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 20.09.04 - 20.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
			8	SS	0				○		
			9	SS	3				○		
12.8	END OF SOIL SAMPLING AT 12.80 m. DCPT started at 12.80 m.										
19.8	END OF DCPT AT 19.81 m.										

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$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+764.4 R40.6 3 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+764.4, O/S 40.6R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers / Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 20.09.04 - 20.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	LOW ARTESIAN PRESSURE NOTED UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus^{20}_{10} 5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+764.6 R3.1 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+764.6, O/S 3.1R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollw Stem Augers COMPILED BY WM

DATUM Geodetic DATE 21.09.04 - 21.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
0.0	**PEAT** Black										
0.9	Silty **CLAY**, some sand seams Soft to Very Soft Grey		1	SS	2						
			2	SS	2						
			3	SS	1						0 7 42 51
			4	SS	1						
			5	SS	1			1.8			
			6	SS	0			1.7			
			7	SS	5			2.2			0 2 73 25
8.5	**SILT**, some sand, trace clay Very Loose Grey Wet		8	SS	3						

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+ ^{3}, × ^{3} : Numbers refer to Sensitivity

15 20 10 5 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+764.6 R3.1 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+764.6, O/S 3.1R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollw Stem Augers COMPILED BY WM

DATUM Geodetic DATE 21.09.04 - 21.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
			9	SS	0				○		0 19 78 3
	Becoming Compact		10	SS	10				○		
12.8	END OF BOREHOLE AT 12.80 m. LOW ARTESIAN PRESSURE NOTED DURING DRILLING AND UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\oplus} 5$ $_{10}$ (%) STRAIN AT FAILURE

ONTM4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+768 L35 1 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+768, O/S 35L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY HS

DATUM Geodetic DATE 24.08.05 - 24.08.05 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** (150mm)										
0.2	**SILT**, trace sand, some clay, occasional rootlets Firm Brown Wet		1	SS	4				○		
			2	SS	5				○		
1.5	Silty **CLAY**, trace sand Firm to Soft Grey Wet		3	SS	5				○		
			4	SS	2				○		
			5	SS	2			+ 1.8	○		0 6 39 55
			6	SS	1			+ 2	○		
			7	SS	0				○		0 0 57 43
7.6	**SILT**, some clay, trace sand Loose Grey Wet		8	SS	8				○		
			9	SS	7				○		0 2 85 13

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus^{20}_{10} 5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+768 L35 2 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+768, O/S 35L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY HS

DATUM Geodetic DATE 24.08.05 - 24.08.05 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	w_P w w_L	γ kN/m^3	GR SA SI CL
			10	SS	2			○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	20 40 60		
			11	SS	9						
12.8	END OF SOIL SAMPLING AT 12.80m. DCPT started at 12.80m.										

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$+^3$, $\times^3$: Numbers refer to Sensitivity

$15\frac{20}{10}5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+768 L35 3 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+768, O/S 35L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY HS

DATUM Geodetic DATE 24.08.05 - 24.08.05 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	w_P w w_L WATER CONTENT (%) 20 40 60	γ kN/m^3	GR SA SI CL
24.4	END OF DCPT AT 24.38m. BOREHOLE OPEN TO BOTTOM AND WATER LEVEL AT 0.91m DEPTH UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+774.6 L18.2 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+774.6, O/S 18.2L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 23.09.04 - 23.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	Augered to 3.05 m prior ro start of DCPT due to potential artesian pressure.										
3.0	DCPT started at 3.05 m.										

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$+^3$, $\times^3$: Numbers refer to Sensitivity

15 (20) 10 5 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+774.6 L18.2 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+774.6, O/S 18.2L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 23.09.04 - 23.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
18.3	END OF DCPT AT 18.29 m. HOLE GROUTED TO SURFACE.										

+ ³, × ³: Numbers refer to Sensitivity

15 (20 / 10) 5 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+776.4 R21.9 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+776.4, O/S 21.9R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 21.09.04 - 21.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT** Black										
0.5	Silty **CLAY**, some sand seams Stiff to Soft Brown Moist		1	SS	14				○		
			2	SS	8				○		
			3	SS	2						
3.0	Silty **CLAY**, occasional sand seams Soft to Very Soft Grey		4	SS	1				○		0 4 36 60
								+ 1.8			
			5	SS	1				○		
								+ 1.9			
			6	SS	1				○		
7.0	**SILT**, some to trace clay, trace sand, some silt and clay lamination Very Loose Grey Wet		7	SS	3				○		
			8	SS	3				○		0 3 89 8

Continued Next Page

+ ³, × ³ : Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+776.4 R21.9 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+776.4, O/S 21.9R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 21.09.04 - 21.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60		GR SA SI CL
			9	SS	1				○		
			10	SS	9				○		0 2 92 6
12.8	END OF BOREHOLE AT 12.80 m. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus \frac{20}{10} 5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+778.8 R58.7 1 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+778.8, O/S 58.7R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 17.09.04 - 17.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
0.0	DCPT started from surface.										

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$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\oplus} 5$ (10) (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+778.8 R58.7 2 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+778.8, O/S 58.7R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 17.09.04 - 17.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	w_P w w_L; WATER CONTENT (%) 20 40 60	γ kN/m^3	GR SA SI CL
19.8	END OF DCPT AT 19.81 m.										

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$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+778.8 R58.7 3 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+778.8, O/S 58.7R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 17.09.04 - 17.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60	γ kN/m^3	GR SA SI CL
	HOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

15 ⊕ 20 5 10 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+787.5 L35 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+787.5, O/S 35L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY HS

DATUM Geodetic DATE 23.08.05 - 23.08.05 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	**TOPSOIL** (150mm)										
0.2	Clayey **SILT**, trace sand Firm Grey to Brown Moist to Wet		1	SS	4						
			2	SS	8						
1.5	Silty **CLAY**, occasional sand seams Soft Grey Wet		3	SS	2						
			4	SS	2						
			5	SS	1			1.7			0 8 44 47
			6	SS	0			2			
			7	SS	0			1.7			0 0 53 46
			8	SS	3						
7.9	**SILT**, some clay, trace sand Soft to Firm Grey Wet		9	SS	5						0 2 86 12

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$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+787.5 L35 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+787.5, O/S 35L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY HS

DATUM Geodetic DATE 23.08.05 - 23.08.05 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
10.7	**SILT**, trace sand Loose Grey Wet		10	SS	4				○		0 8 89 2
			11	SS	8				○		
12.8	END OF BOREHOLE AT 12.80m. BOREHOLE OPEN TO 7.62m. WATER LEVEL AT SURFACE UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

+ ³, × ³: Numbers refer to Sensitivity

20
15 5
10
(%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+788.2 R2.4 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+788.2, O/S 2.4R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 16.09.04 - 17.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PEAT**, fibrous Black										
0.6	Clayey **SILT**, some sand Very Stiff Brown Moist		1	SS	18						
1.5	Silty **CLAY**, some sand seams Soft Grey		2	SS	4						
			3	SS	2						0 4 33 63
								1.8 +			
			4	SS	2						
								2.1 +			
			1	TW	PH						
								2.3 +			
7.3	**SILT**, trace sand, some to trace clay Loose to Very Loose Grey Wet		5	SS	6						
			6	SS	0						0 2 89 9

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$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus^{20}_{10} 5$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+788.2 R2.4 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+788.2, O/S 2.4R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 16.09.04 - 17.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
			7	SS	0				○		
	Becoming Loose		8	SS	6				○		
12.8	END OF BOREHOLE AT 12.80 m. LOW ARTESIAN PRESSURE NOTED UPON COMPLETION. BOREHOLE GROUTED WITH CEMENT TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+790 R39.8 1 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+790, O/S 39.8R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 16.09.04 - 16.09.04 CHECKED BY MA

SOIL PROFILE ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.3	Silty **CLAY**, some sand seams Very Stiff to Firm Brown		1	SS	18				○		
			2	SS	7				○		
2.3	Silty **CLAY**, occasional sand seams Soft to Very Soft Grey		3	SS	3				○		
			4	SS	0						
								2.3 +			
			5	SS	0				○		0 4 29 67
								2.5 +			
			6	SS	5				○		
7.3	**SILT**, some sand, some to trace clay Loose to Very Loose Grey Wet		7	SS	5				○		
			8	SS	0				○		

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$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+790 R39.8 2 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+790, O/S 39.8R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 16.09.04 - 16.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: 'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
			9	SS	1				○		0 11 86 3
			10	SS	0				○		
12.8	END OF SOIL SAMPLING AT 12.80 m. DCPT started at 12.80 m.										
19.8	END OF DCPT AT 19.81 m.										

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$+^{3}$. $\times^{3}$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+790 R39.8 3 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+790, O/S 39.8R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 16.09.04 - 16.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60		GR SA SI CL
	BOREHOLE GROUTED TO SURFACE. LOW ARTESIAN FLOW NOTED 30 MINUTES AFTER GROUTING. RE-AUGERED TO 4.6 m AND PLUGGED FLOW WITH HOLE PLUG BENTONITE.										

$+^3, \times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+799.9 L17.5 1 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+799.9, O/S 17.5L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 15.09.04 - 15.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.2	Clayey **SILT**, trace sand, trace rootlets Stiff Brown		1	SS	9				○		
			2	SS	8				○		
2.2	Silty **CLAY**, occasional sand seams Soft to Very Soft Grey		3	SS	2				○		
			4	SS	0				○		0 17 39 44
								2.7 +			
			5	SS	0				○		
								2.5 +			
			1	TW	PH						
								2.5 +			
			6	SS	0				○		
8.5	**SILT**, trace sand, some to trace clay Very Loose to Loose Grey Wet		7	SS	3				○		

Continued Next Page

+ ³, × ³ : Numbers refer to Sensitivity

15 (20/10) 5 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+799.9 L17.5 2 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+799.9, O/S 17.5L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 15.09.04 - 15.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
			8	SS	0				○		0 5 88 7
			9	SS	0				○		
			10	SS	9				○		
14.3	END OF SOIL SAMPLING AT 14.33 m. DCPT started at 14.33 m.										
19.8	END OF BOREHOLE AT 19.81 m.										

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

15 (20 / 10) 5 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+799.9 L17.5 3 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+799.9, O/S 17.5L ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 15.09.04 - 15.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	WATER LEVEL AT 2.21 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus^{20}_{10}$ 5 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+801.5 R20.5 1 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+801.5, O/S 20.5R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 16.09.04 - 16.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L WATER CONTENT (%)	γ kN/m^3	GR SA SI CL
0.0	DCPT started from surface.							20 40 60 80 100 20 40 60 80 100	20 40 60		

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+801.5 R20.5 2 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+801.5, O/S 20.5R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 16.09.04 - 16.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	w_P w w_L	γ kN/m^3	GR SA SI CL
								SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60		
19.8	END OF DCPT AT 19.81 m.										

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+801.5 R20.5 3 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+801.5, O/S 20.5R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 16.09.04 - 16.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60		GR SA SI CL
	HOLE GROUTED TO SURFACE.										

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+803 R58.5 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+803, O/S 58.5R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 16.09.04 - 16.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.3	Clayey **SILT**, some sand Hard to Very Stiff Brown		1	SS	30				○		
			2	SS	19				○		
2.2	Silty **CLAY**, trace sand Firm to Very Soft Grey		3	SS	5				○		0 3 51 46
			4	SS	5			2.1 +			
			5	SS	2					○	
			6	SS	2			3.1 +		○	
			7	SS	0			2.8 +		○	
			8	SS	0			2.8 +		○	
8.8	**SILT**, some sand, some to trace clay Very Loose to Loose Grey Wet										

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\oplus}_{10} 5$ (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+803 R58.5 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+803, O/S 58.5R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 16.09.04 - 16.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
			9	SS	0				○		
			10	SS	0				○		0 11 87 3
			11	SS	5						
14.3	END OF BOREHOLE AT 14.33 m. WATER LEVEL AT 3.51 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

+ ³, × ³: Numbers refer to Sensitivity

15 (20 / 10) 5 (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+812.5 L37 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+812.5, O/S 37L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY HS

DATUM Geodetic DATE 24.08.05 - 24.08.05 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	DCPT started at surface.										

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+812.5 L37 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+812.5, O/S 37L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY HS

DATUM Geodetic DATE 24.08.05 - 24.08.05 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100; ○ UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	w_P w w_L; 20 40 60	γ kN/m^3	GR SA SI CL
15.2	END OF DCPT AT 15.24m. HOLE GROUTED TO SURFACE.										

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

20
15 5
10
(%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+813.2 R1.3 1 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+813.2, O/S R1.3 ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 23.09.04 - 23.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** Dark Brown										
0.3	**SAND**, trace silt Compact Brown Moist										
0.9	Silty **CLAY**, some sand Very Stiff to Stiff Brown		1	SS	23				○		
			2	SS	20				○		
			3	SS	15				○		
			4	SS	8						
3.8	Silty **CLAY**, occasional sand seams Soft Grey										
			5	SS	2			1.9 +			
			6	SS	1				○		0 2 39 59
								1.9 +			
			7	SS	1				○		
	varved							1.9 +			
			8	SS	2				○		

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+813.2 R1.3 2 OF 2 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+813.2, O/S R1.3 ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 23.09.04 - 23.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60		GR SA SI CL
								17 +			
10.2	**SILT**, some clay, trace sand Soft to Very Soft Grey Wet		9	SS	3				○		0 1 86 13
			10	SS	0				○		
12.8	END OF BOREHOLE AT 12.80 m. WATER LEVEL AT 3.81 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

ONTMT4S 2316.GPJ 24/10/05

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

15 $\oplus^{20}_{10}$ 5 (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+814.5 R38.8 1 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+814.5, O/S 38.8R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test COMPILED BY WM

DATUM Geodetic DATE 15.09.04 - 15.09.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.2	Clayey **SILT**, some sand seams Hard to Very Stiff Brown Moist		1	SS	35						
1.5	Silty **CLAY**, some sand seams Very Stiff to Soft Brown		2	SS	21						0 7 59 34
			3	SS	3						
3.0	Silty **CLAY**, occasional sand seams Soft to Very Soft Grey		4	SS	4			+2			
			5	SS	2						
			6	SS	0			+2.6			0 18 34 48
			7	SS	0			+2.7			
			8	SS	0			+2.7			0 1 67 32

Continued Next Page

+ ^{3}, × ^{3} : Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+814.5 R38.8 2 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+814.5, O/S 38.8R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test COMPILED BY WM

DATUM Geodetic DATE 15.09.04 - 15.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
10.1	SILT, trace sand, trace clay Loose to Very Loose Grey Wet										
			9	SS	5				○		
			10	SS	0				○		0 2 94 4
			11	SS	0				○		
14.3	END OF SOIL SAMPLING AT 14.33 m. DCPT started at 14.33 m.										
19.8	END OF DCPT AT 19.81 m.										

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTMT4S 2316.GPJ 24/10/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 15+814.5 R38.8 3 OF 3 METRIC

W.P. 480-93-01 LOCATION Armour Township, ST. 15+814.5, O/S 38.8R ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test COMPILED BY WM

DATUM Geodetic DATE 15.09.04 - 15.09.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
	WATER LEVEL AT 2.51 m UPON COMPLETION. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

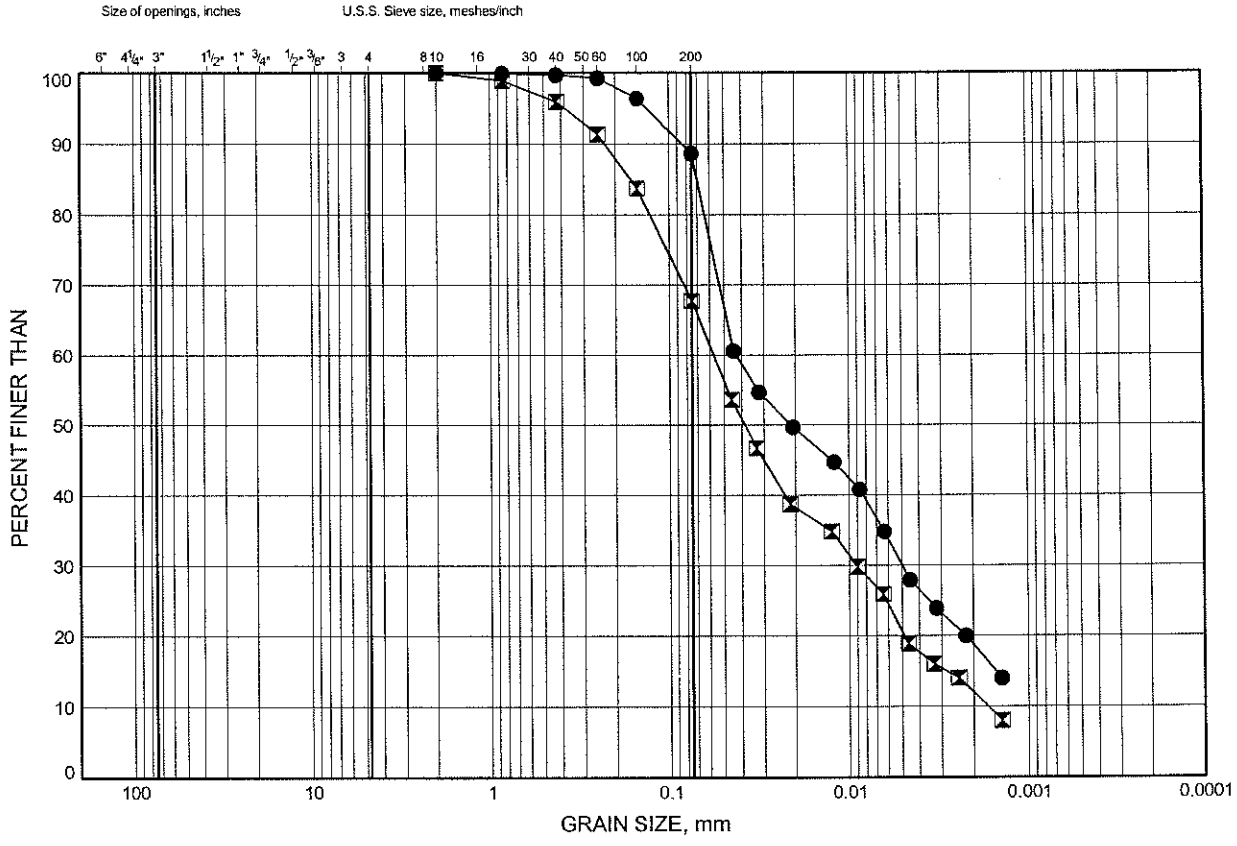
ONTMT4S 2316.GPJ 24/10/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE Q1

Sandy to Clayey SILT



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+712.5 L37	1.07	
⊠	15+752 L18.2	1.83	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

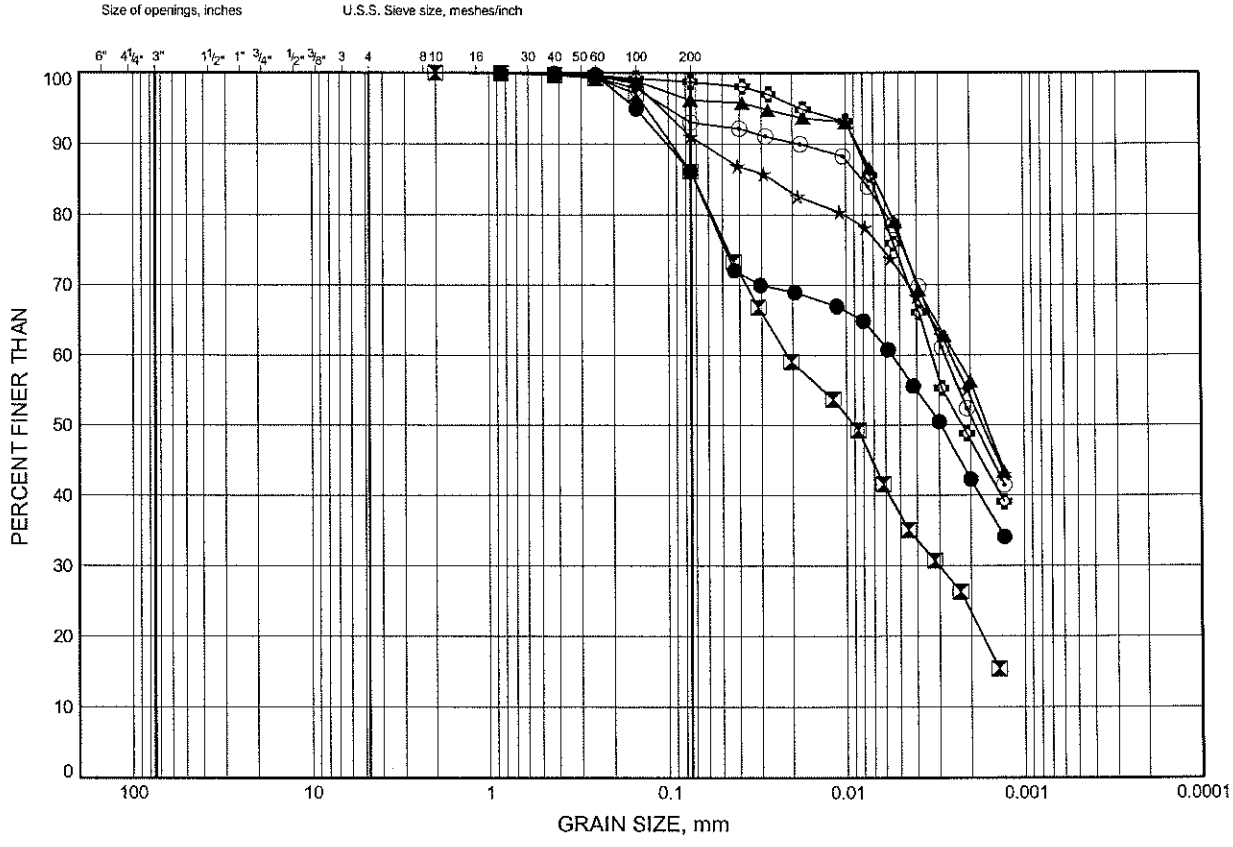
THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE Q2

Silty CLAY



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+712.5 L37	4.88	
⧓	15+714.7 R3.6	1.83	
▲	15+714.7 R3.6	6.40	
★	15+715.6 R41.1	2.59	
⊙	15+729 R22.9	1.83	
✿	15+729 R22.9	6.40	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

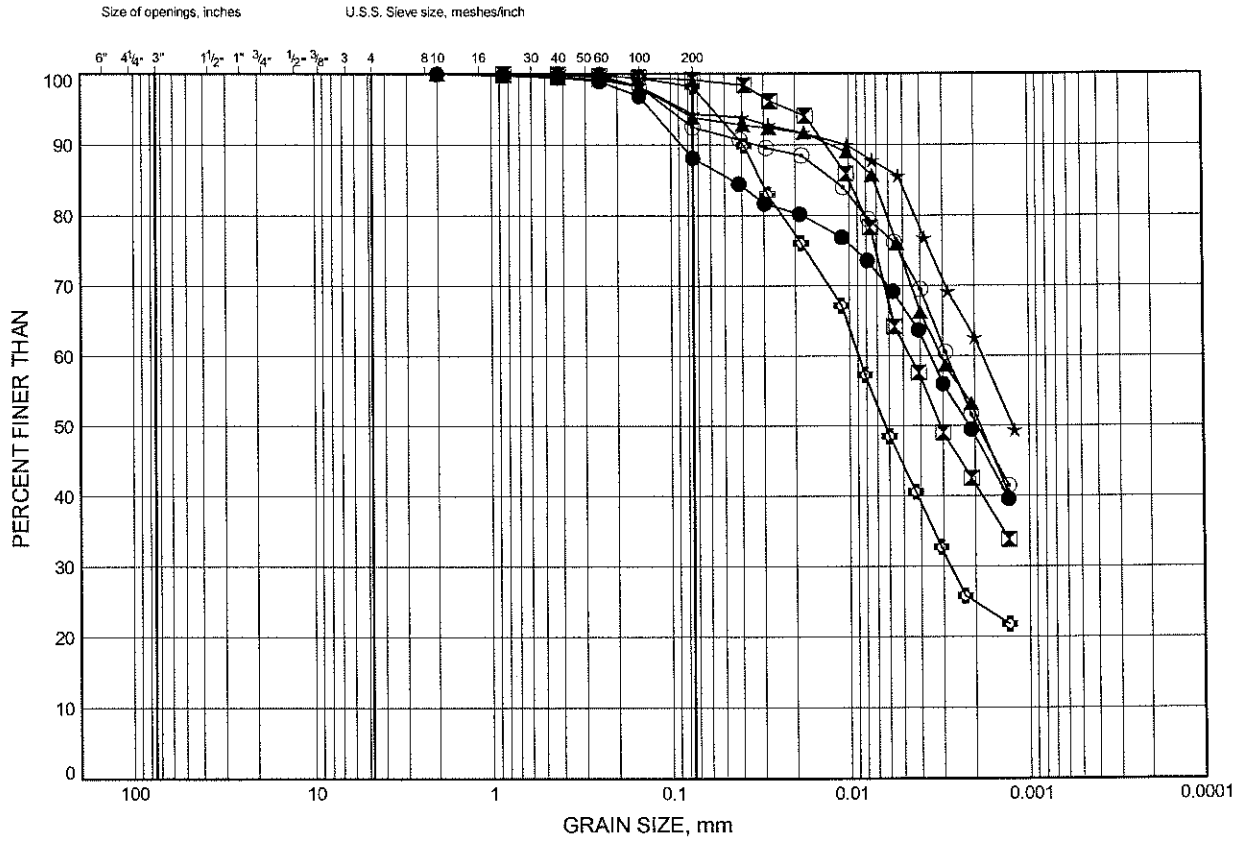
THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE Q3

Silty CLAY



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+739.6 R3.2	3.35	
⧓	15+740.0 R40.7	6.40	
▲	15+752 L18.2	4.88	
★	15+752.3 R59.8	3.35	
⊙	15+764.6 R3.1	2.59	
☼	15+764.6 R3.1	7.92	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

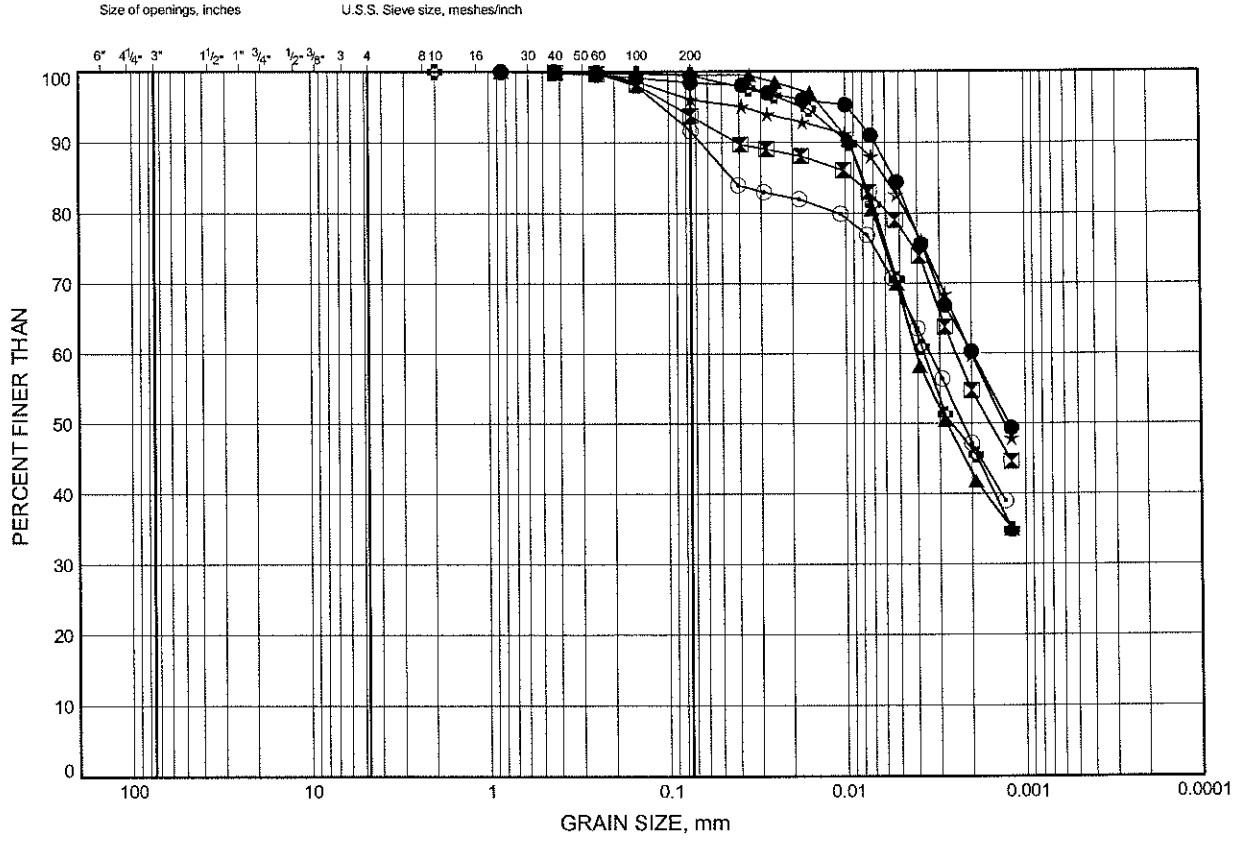
THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE Q4

Silty CLAY



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+764.4 R40.6	4.88	
⊠	15+768 L35	3.35	
▲	15+768 L35	6.40	
★	15+776.4 R21.9	3.35	
⊙	15+787.5 L35	3.35	
✪	15+787.5 L35	6.40	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

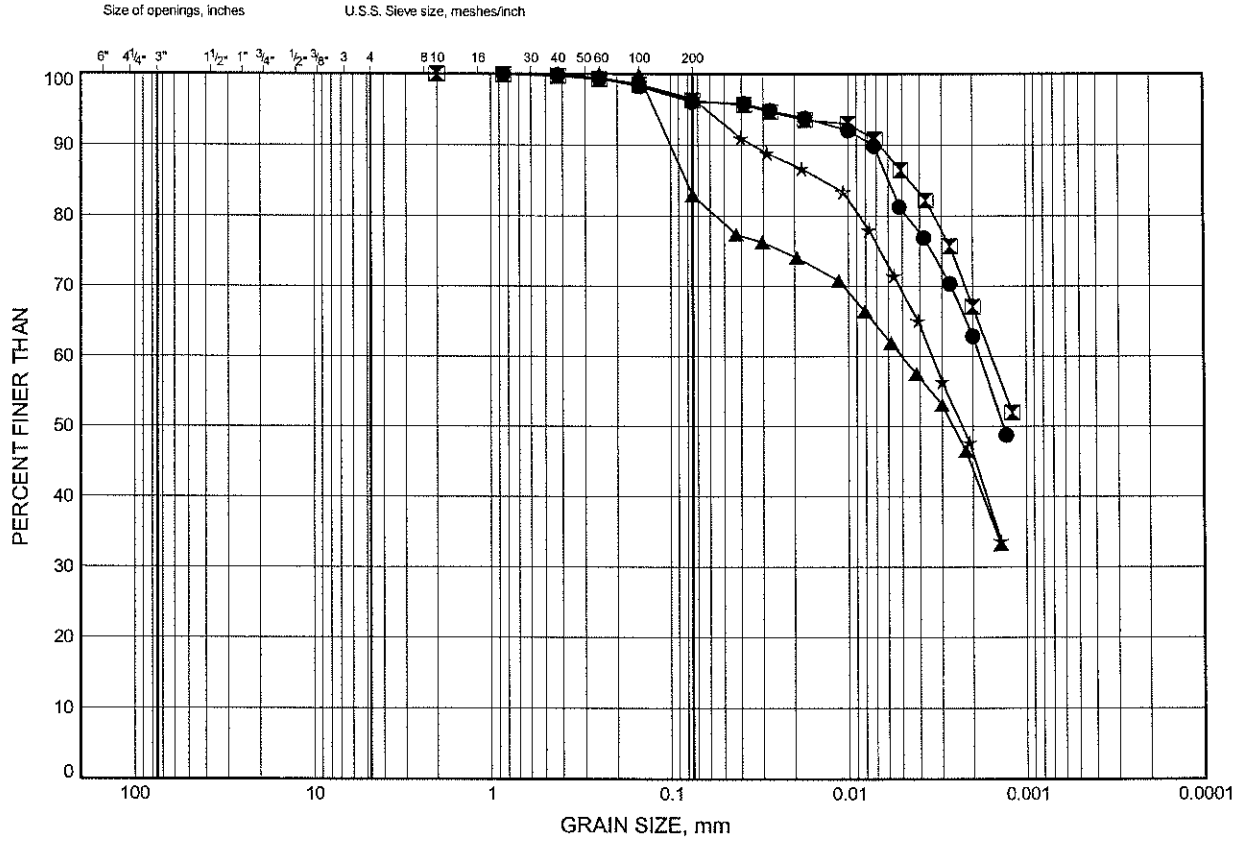
THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE Q5

Silty CLAY



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+788.2 R2.4	3.35	
⧓	15+790 R39.8	4.88	
▲	15+799.9 L17.5	3.35	
★	15+803 R58.5	2.59	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

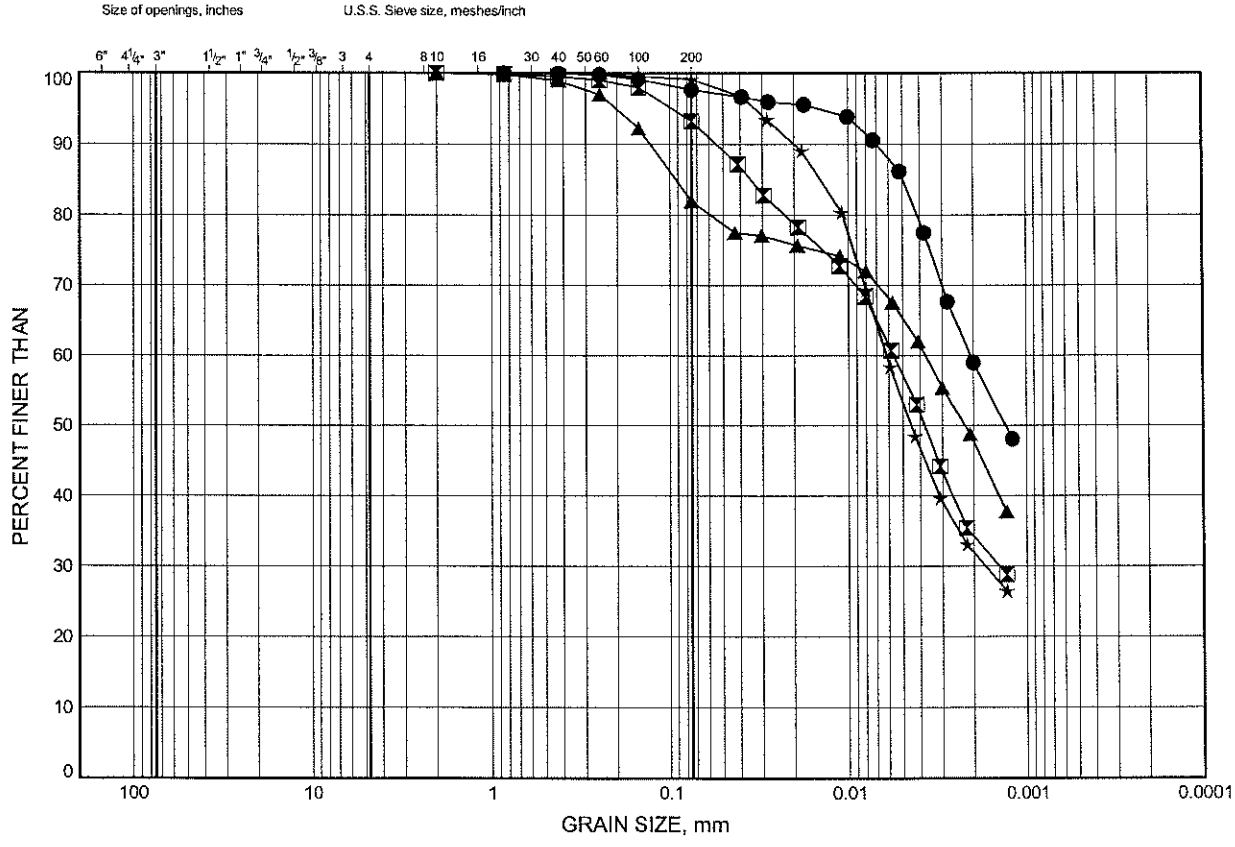
THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE Q6

Silty CLAY



COBBLE SIZE	GRAVEL		SAND			FINE GRAINED
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+813.2 R1.3	6.40	
⊠	15+814.5 R38.8	1.83	
▲	15+814.5 R38.8	6.40	
★	15+814.5 R38.8	9.45	

Date September 2005

Project 480-93-00

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Chkd. MA

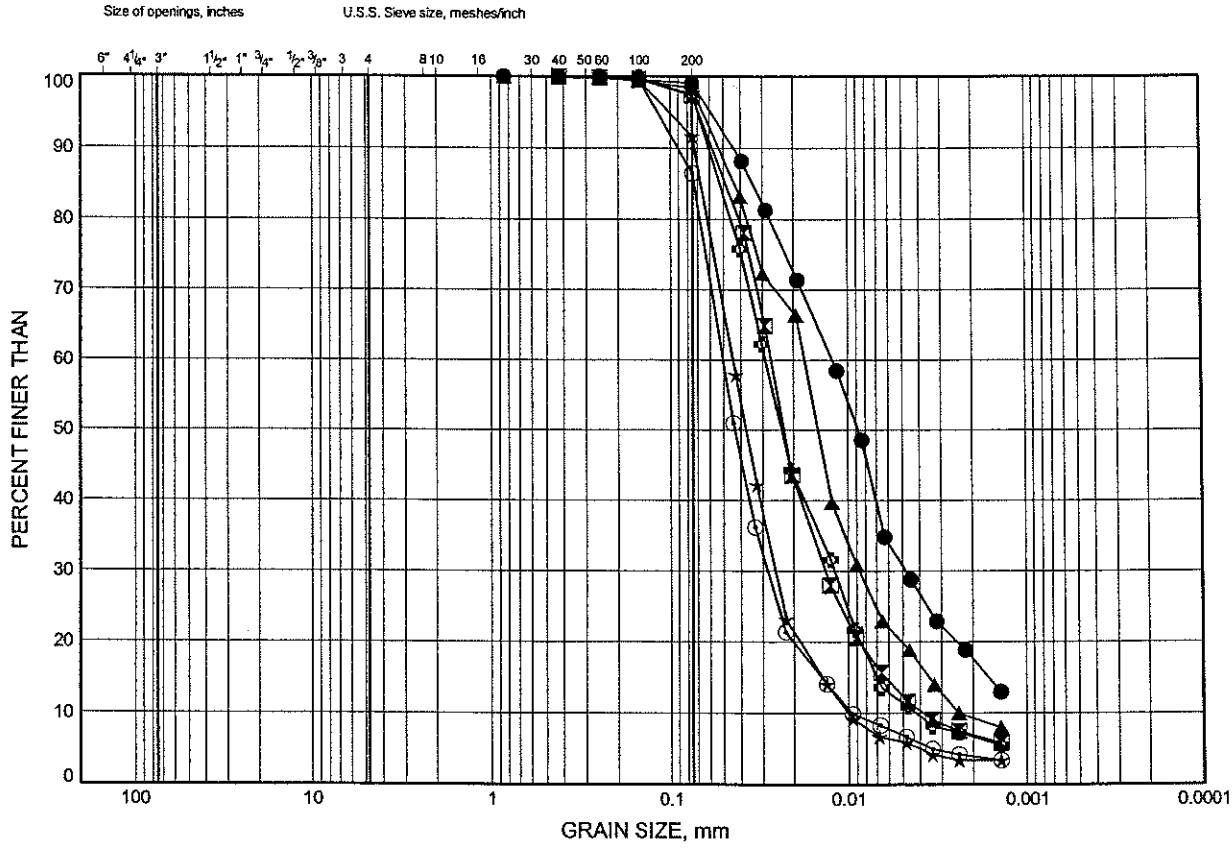
THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE Q7

SILT



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+712.5 L37	9.45	
⊠	15+714.7 R3.6	10.97	
▲	15+715.6 R41.1	9.45	
★	15+729 R22.9	10.97	
⊙	15+739.6 R3.2	10.97	
✿	15+740.0 R40.7	10.97	

Date September 2005

Project 480-93-00

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Chkd. MA

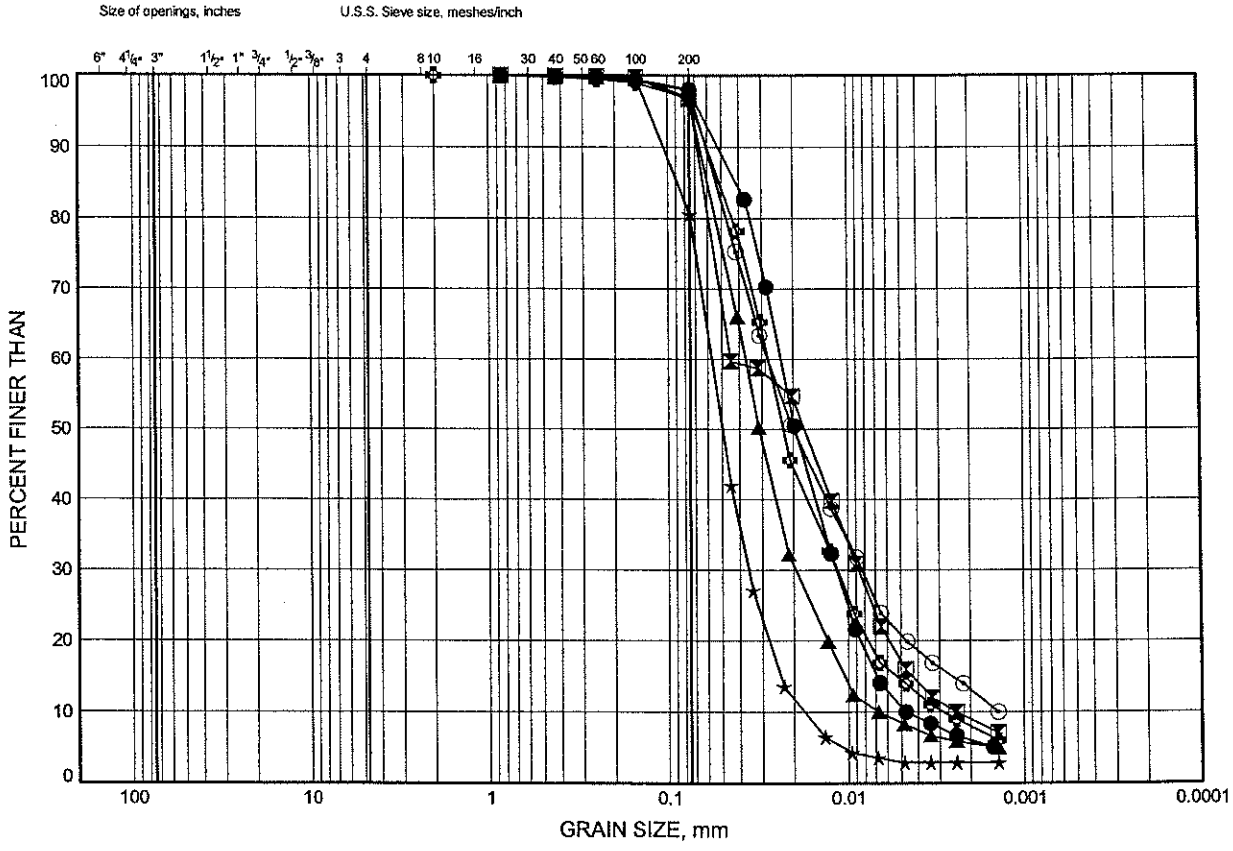
THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE Q8

SILT



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+752 L18.2	9.45	
⊠	15+752.3 R59.8	7.92	
▲	15+764.4 R40.6	9.45	
★	15+764.6 R3.1	10.97	
⊙	15+768 L35	9.45	
✿	15+776.4 R21.9	9.45	

Date September 2005

Project 480-93-00

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Chkd. MA

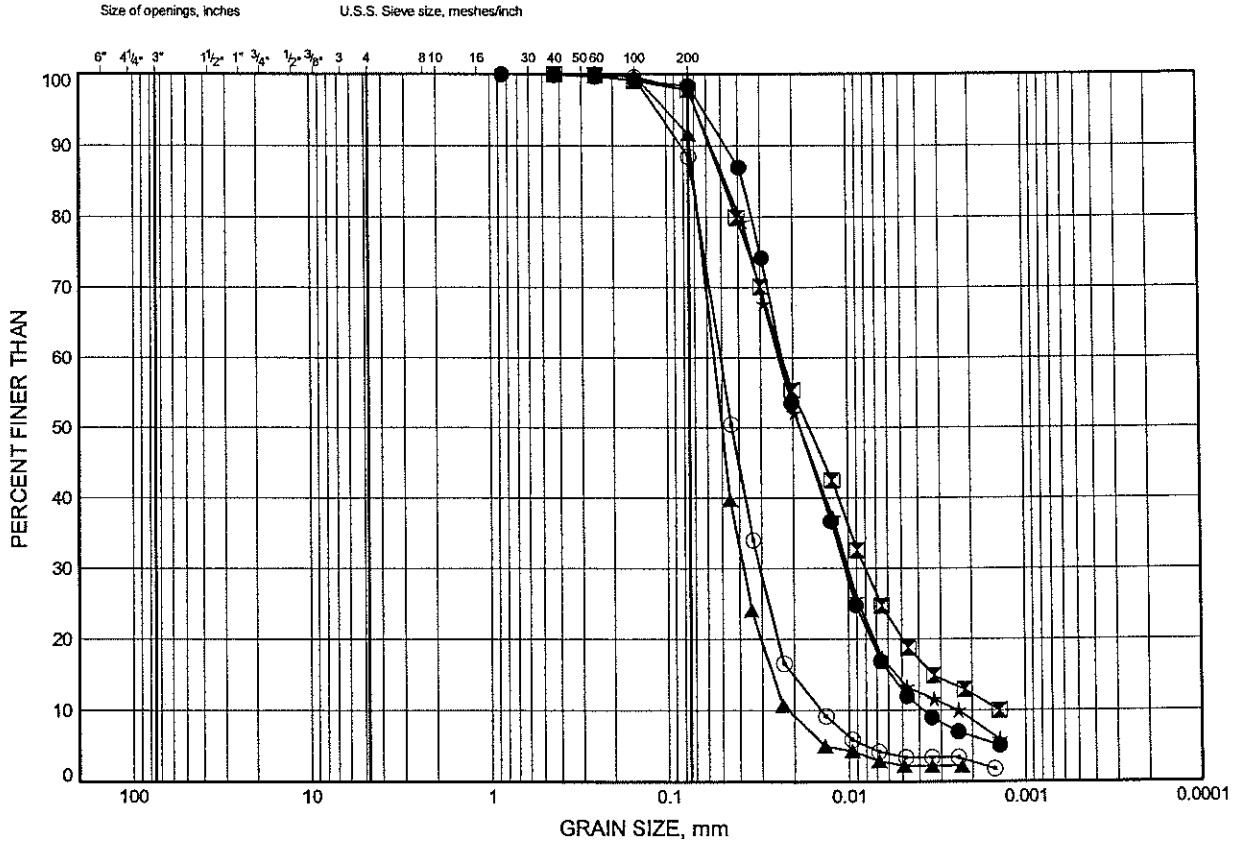
THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE Q9

SILT



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+776.4 R21.9	12.50	
⊠	15+787.5 L35	9.45	
▲	15+787.5 L35	10.97	
★	15+788.2 R2.4	9.45	
⊙	15+790 R39.8	10.97	

Date September 2005

Project 480-93-00

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Prep'd WM

Chkd. MA

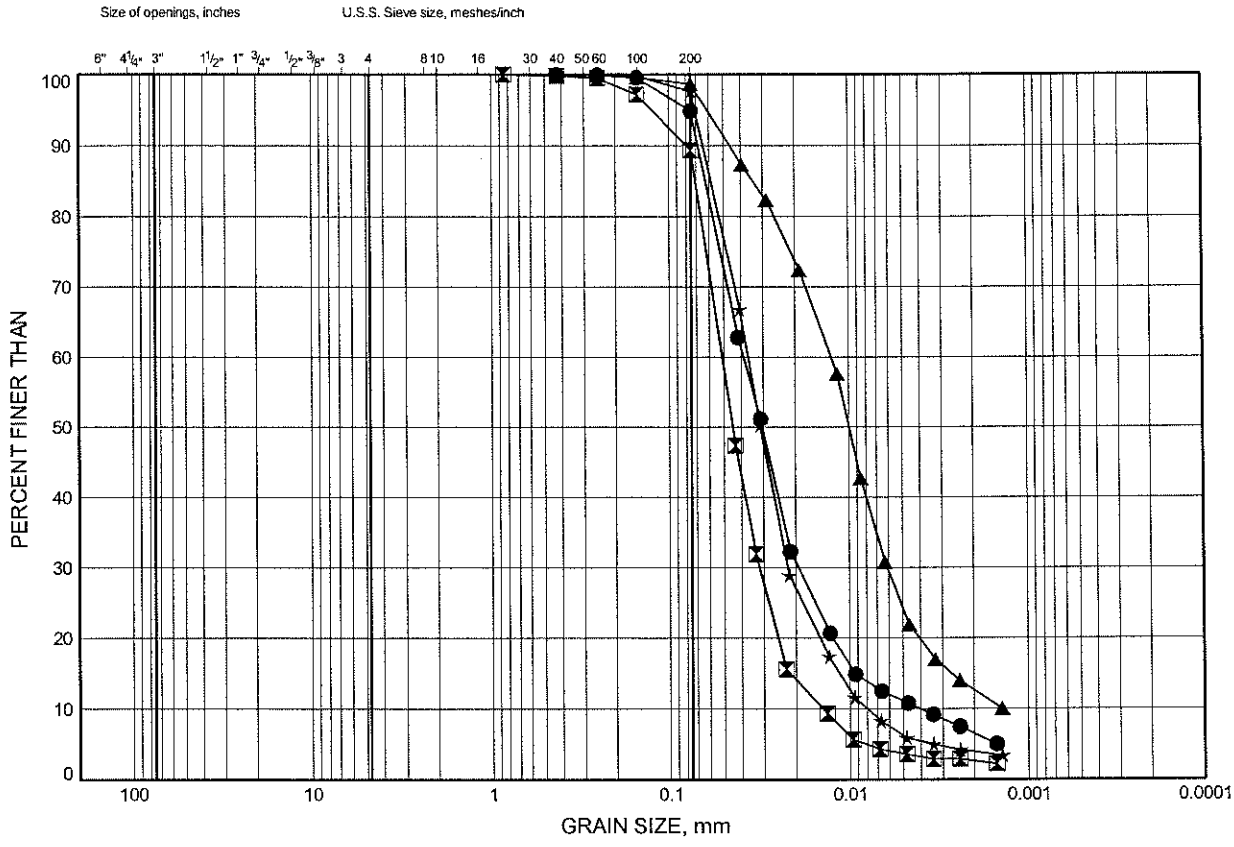
THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE Q10

SILT



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+799.9 L17.5	10.97	
⊠	15+803 R58.5	12.50	
▲	15+813.2 R1.3	10.97	
★	15+814.5 R38.8	12.50	

Date September 2005

Project 480-93-00

THURBER

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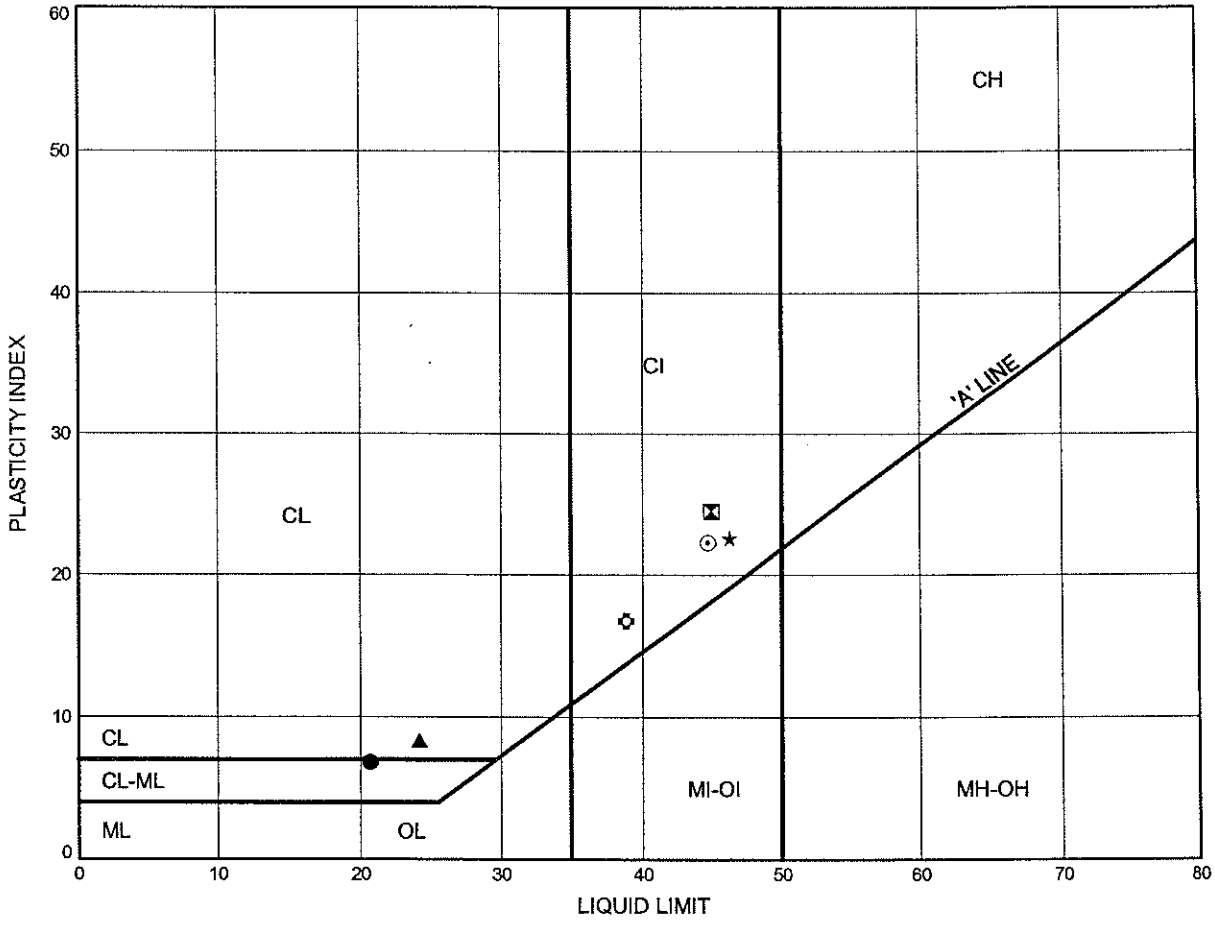
THURBGSD 2316.GPJ 27/09/05

Hwy 11 Katrine

ATTERBERG LIMITS TEST RESULTS

FIGURE Q11

SILTY CLAY



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+712.5 L37	1.07	
⊠	15+712.5 L37	4.88	
▲	15+714.7 R3.6	1.83	
★	15+714.7 R3.6	6.40	
⊙	15+729 R22.9	1.83	
✿	15+729 R22.9	6.40	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

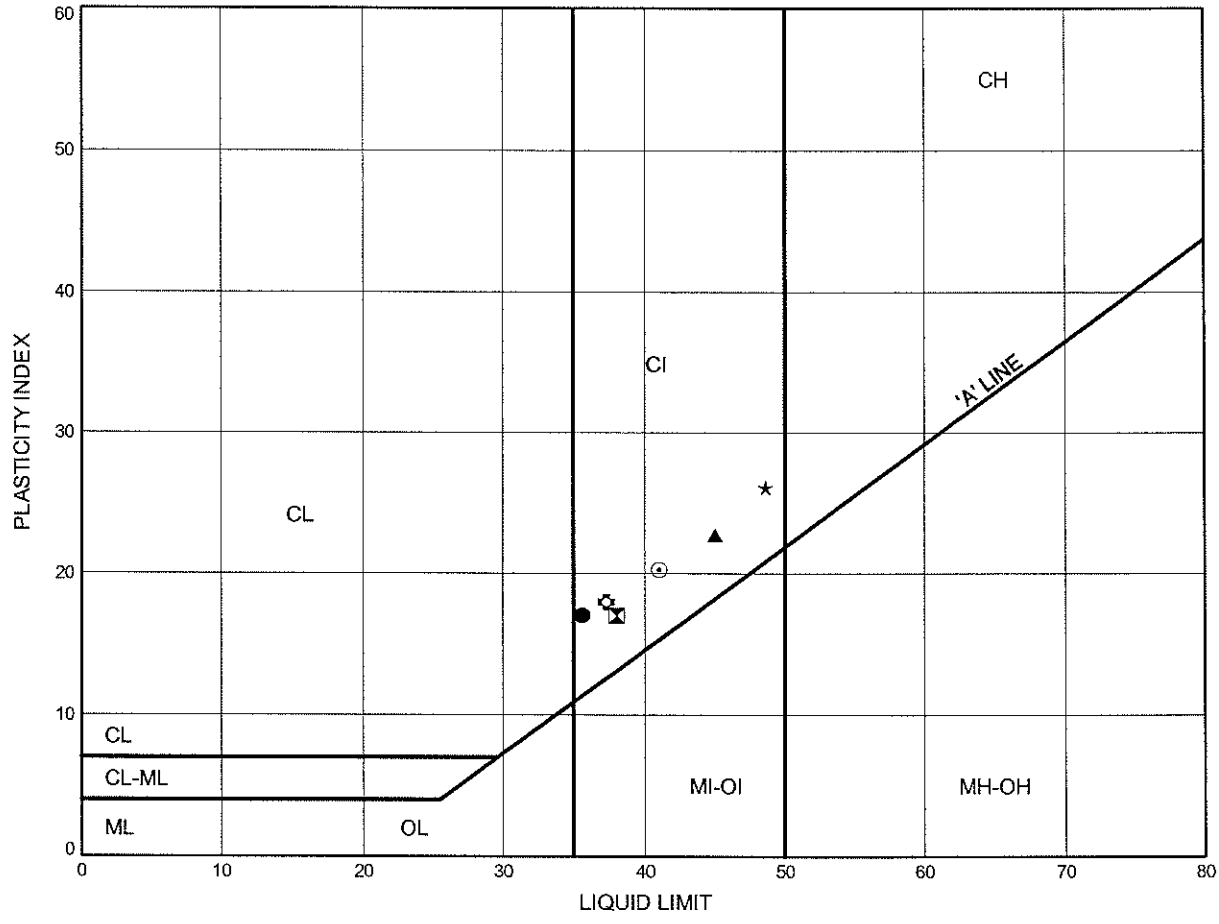
THURBALT 2316.GPJ 27/09/05

Hwy 11 Katrine

ATTERBERG LIMITS TEST RESULTS

FIGURE Q12

Silty CLAY



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+739.6 R3.2	3.35	
⊠	15+740.0 R40.7	6.40	
▲	15+752 L18.2	4.88	
★	15+752.3 R59.8	3.35	
⊙	15+764.6 R3.1	2.59	
✿	15+764.6 R3.1	7.92	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

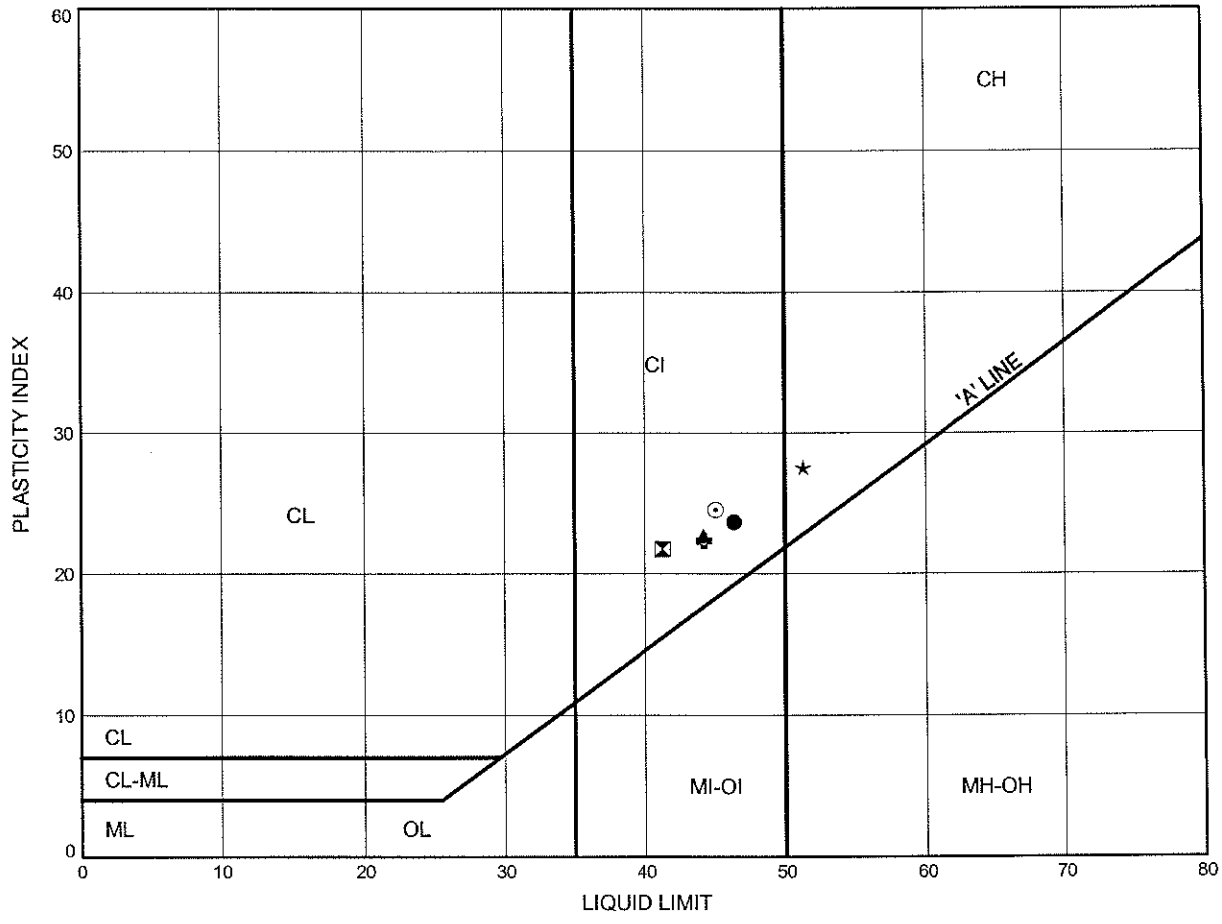
THURBALT 2316.GPJ 27/09/05

Hwy 11 Katrine

ATTERBERG LIMITS TEST RESULTS

FIGURE Q13

Silty CLAY



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+764.4 R40.6	4.88	
⊠	15+768 L35	3.35	
▲	15+768 L35	6.40	
★	15+776.4 R21.9	3.35	
⊙	15+787.5 L35	3.35	
✿	15+787.5 L35	6.40	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

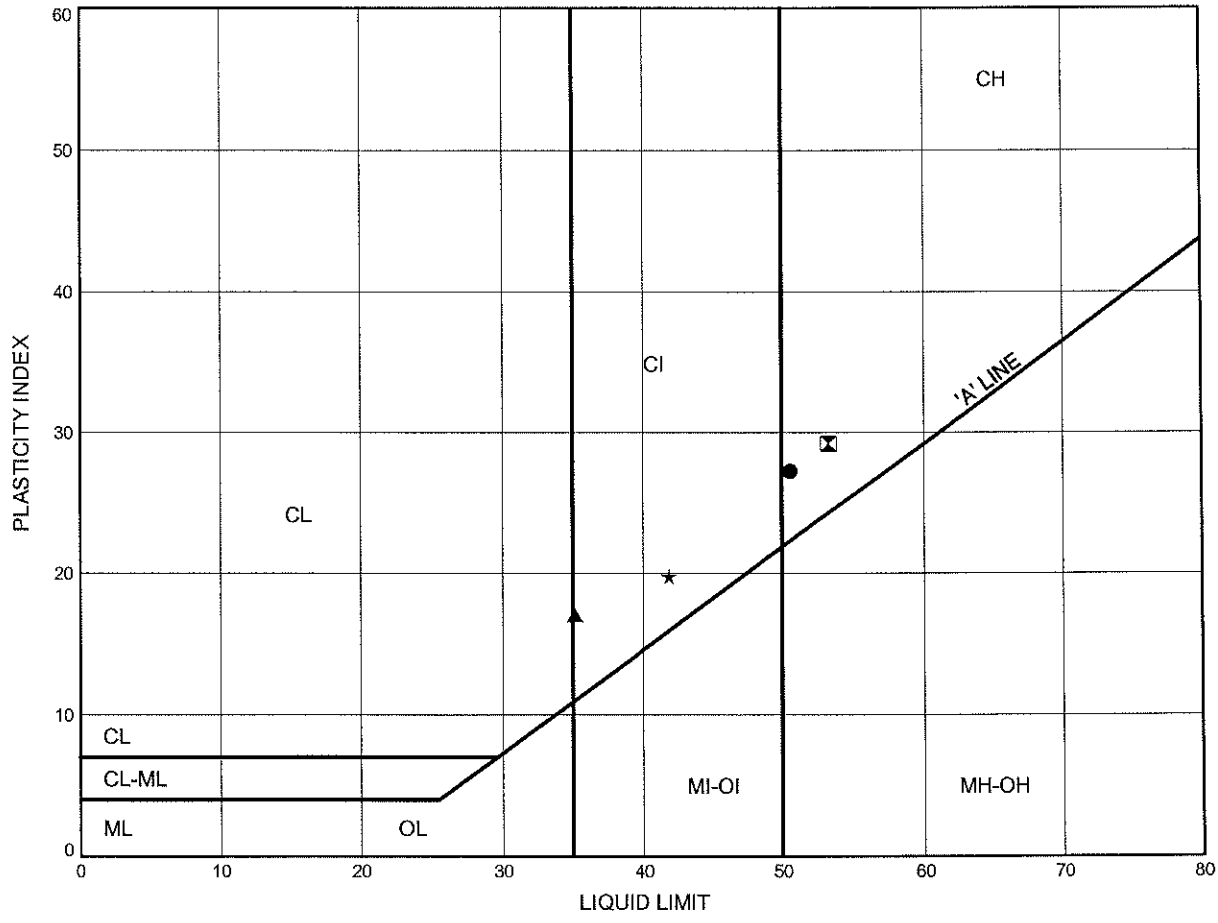
THURBALT 2316.GPJ 27/09/05

Hwy 11 Katrine

ATTERBERG LIMITS TEST RESULTS

FIGURE Q14

Silty CLAY



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+788.2 R2.4	3.35	
⊠	15+790 R39.8	4.88	
▲	15+799.9 L17.5	3.35	
★	15+803 R58.5	2.59	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

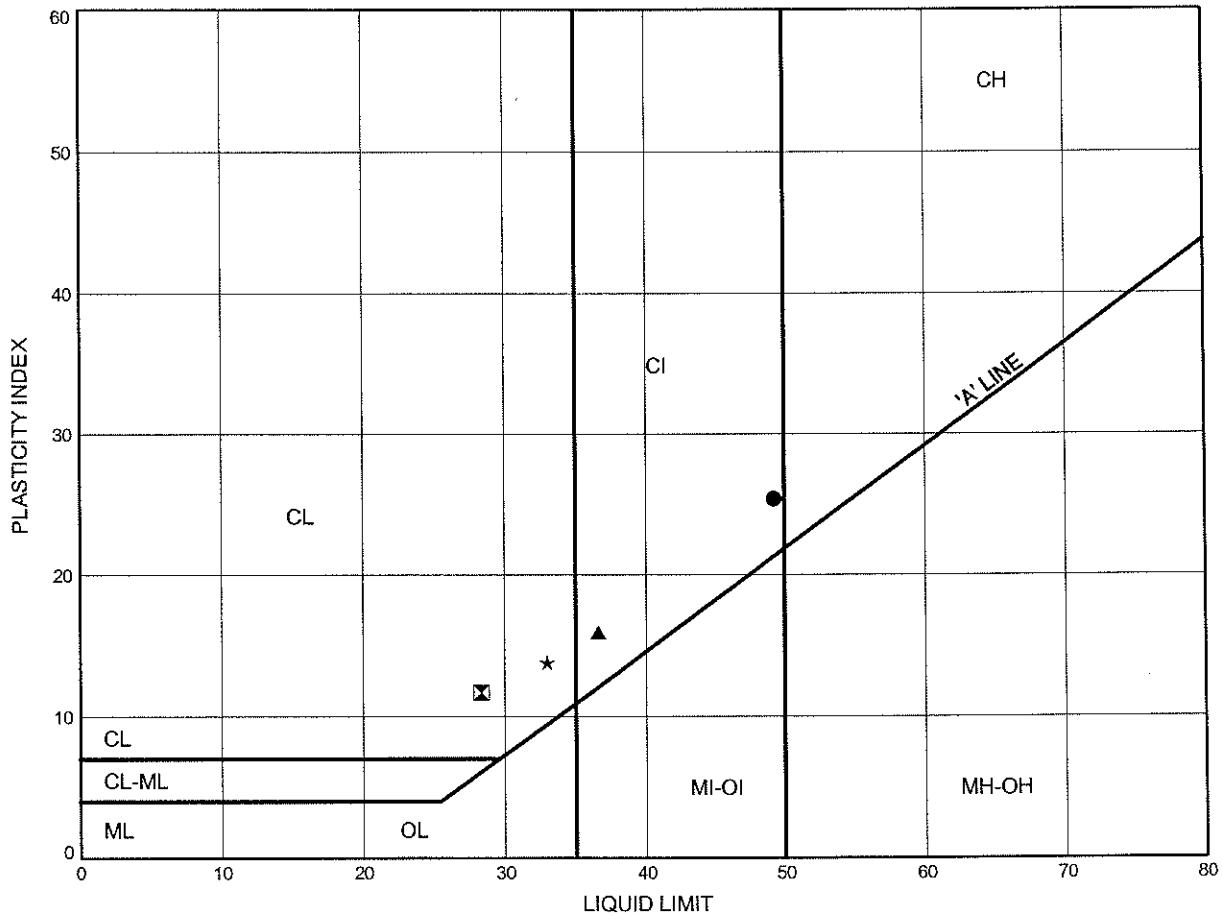
THURBALT 2316.GPJ 27/09/05

Hwy 11 Katrine

ATTERBERG LIMITS TEST RESULTS

FIGURE Q15

Silty CLAY



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+813.2 R1.3	6.40	
⊠	15+814.5 R38.8	1.83	
▲	15+814.5 R38.8	6.40	
★	15+814.5 R38.8	9.45	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

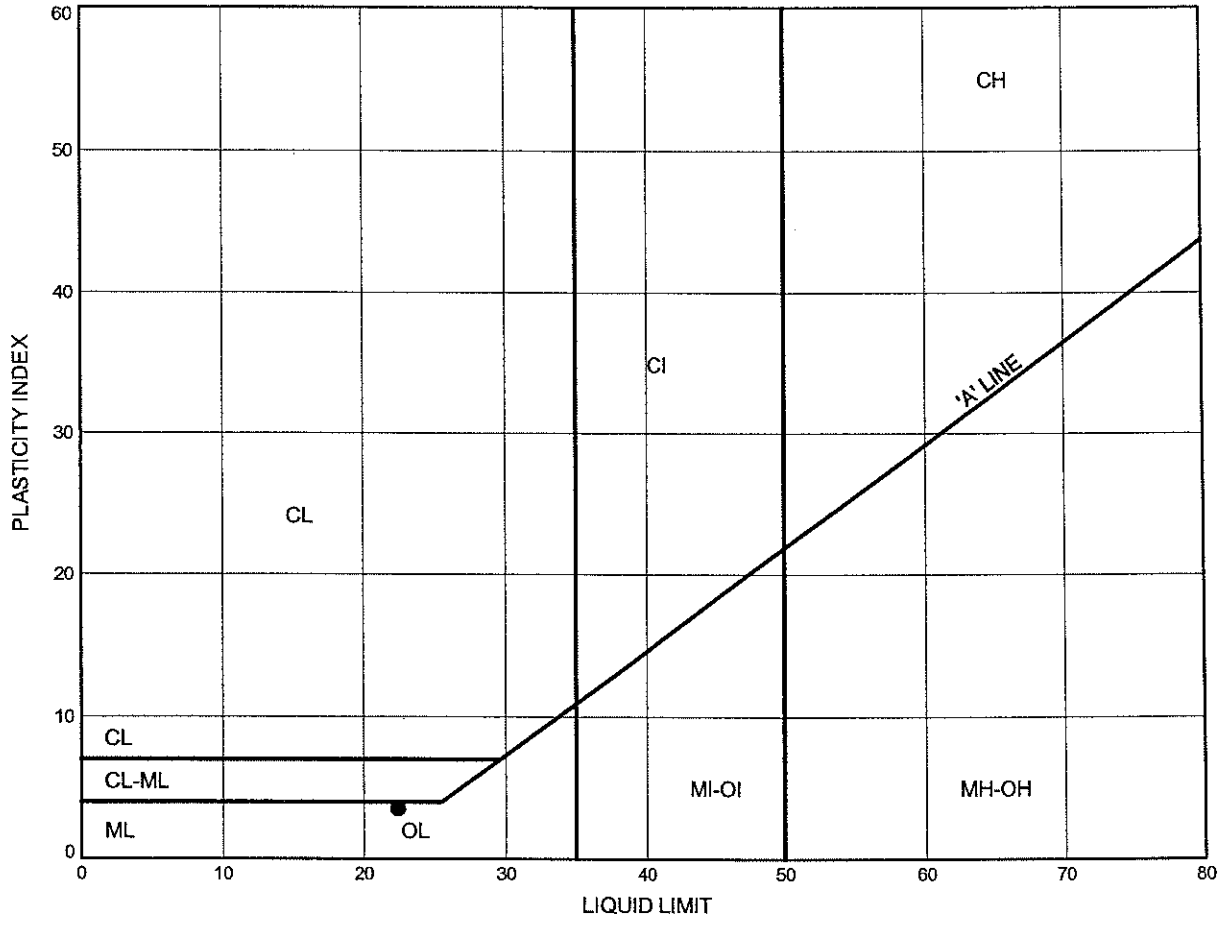
THURBALT 2316.GPJ 27/09/05

Hwy 11 Katrine

ATTERBERG LIMITS TEST RESULTS

FIGURE Q16

CLAYEY SILT



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	15+712.5 L37	9.45	

Date September 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

OEDOMETER CONSOLIDATION SUMMARY

SAMPLE IDENTIFICATION

Project Number	04-1116-112	Sample Number	-
Borehole Number	Q 15+665 R18.75	Sample Depth, m	4.6-5.2

TEST CONDITIONS

Test Type	Standard	Load Duration, hr	24
Oedometer Number	6		
Date Started	11/17/2004		
Date Completed	11/28/2004		

SAMPLE DIMENSIONS AND PROPERTIES - INITIAL

Sample Height, cm	1.90	Unit Weight, kN/m^3	15.55
Sample Diameter, cm	6.35	Dry Unit Weight, kN/m^3	9.06
Area, cm^2	31.67	Specific Gravity, measured	2.75
Volume, cm^3	60.17	Solids Height, cm	0.638
Water Content, %	71.69	Volume of Solids, cm^3	20.21
Wet Mass, g	95.44	Volume of Voids, cm^3	39.96
Dry Mass, g	55.59	Degree of Saturation, %	99.7

TEST COMPUTATIONS

Pressure kPa	Corr. Height cm	Void Ratio	Average Height cm	t_{90} sec	cv. cm^2/s	mv m^2/kN	k cm/s
0.00	1.900	1.977	1.900				
4.75	1.860	1.914	1.880	540	1.39E-03	4.43E-03	6.03E-07
9.54	1.841	1.884	1.851	211	3.44E-03	2.09E-03	7.04E-07
19.25	1.808	1.833	1.825	271	2.60E-03	1.79E-03	4.56E-07
38.68	1.749	1.740	1.779	404	1.66E-03	1.60E-03	2.60E-07
77.38	1.644	1.576	1.697	394	1.55E-03	1.43E-03	2.17E-07
154.68	1.508	1.363	1.576	563	9.35E-04	9.26E-04	8.49E-08
309.29	1.397	1.189	1.453	287	1.56E-03	3.78E-04	5.77E-08
618.45	1.302	1.040	1.350	135	2.86E-03	1.62E-04	4.53E-08
1236.52	1.219	0.910	1.261	94	3.58E-03	7.07E-05	2.48E-08
2472.79	1.139	0.784	1.179	85	3.47E-03	3.41E-05	1.16E-08
1236.52	1.152	0.805	1.146				
309.29	1.175	0.841	1.164				
77.38	1.208	0.893	1.192				
19.25	1.250	0.958	1.229				
4.75	1.294	1.027	1.272				

Notes:
k calculated using cv based on t_{90} values.

SAMPLE DIMENSIONS AND PROPERTIES - FINAL

Sample Height, cm	1.29	Unit Weight, kN/m^3	18.44
Sample Diameter, cm	6.35	Dry Unit Weight, kN/m^3	13.30
Area, cm^2	31.67	Specific Gravity, measured	2.75
Volume, cm^3	40.98	Solids Height, cm	0.638
Water Content, %	38.59	Volume of Solids, cm^3	20.21
Wet Mass, g	77.04	Volume of Voids, cm^3	20.77
Dry Mass, g	55.59		

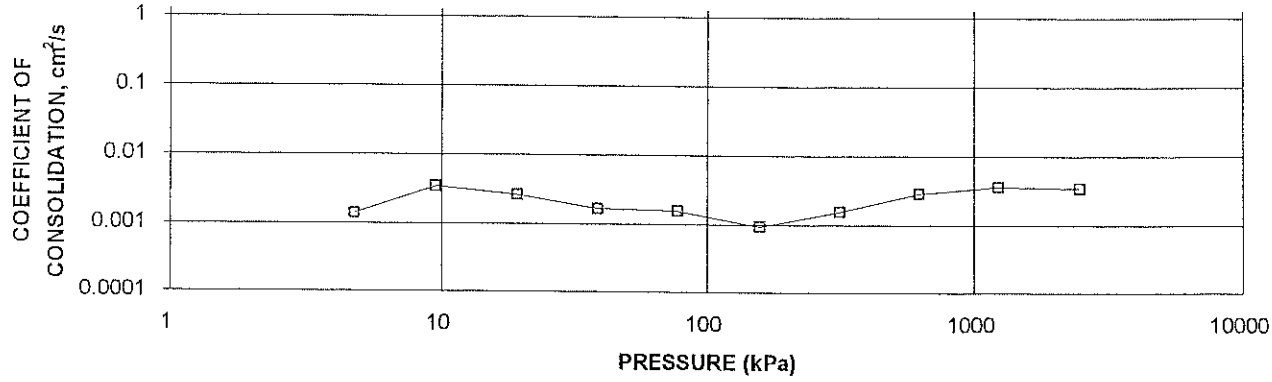
Prepared By: LFG

Golder Associates

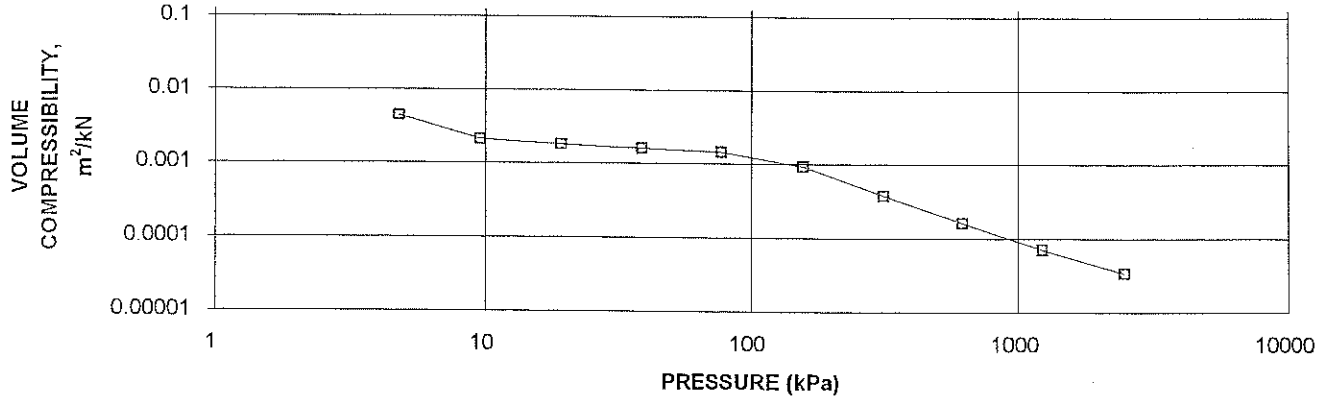
Checked By: MM

OEDOMETER CONSOLIDATION SUMMARY

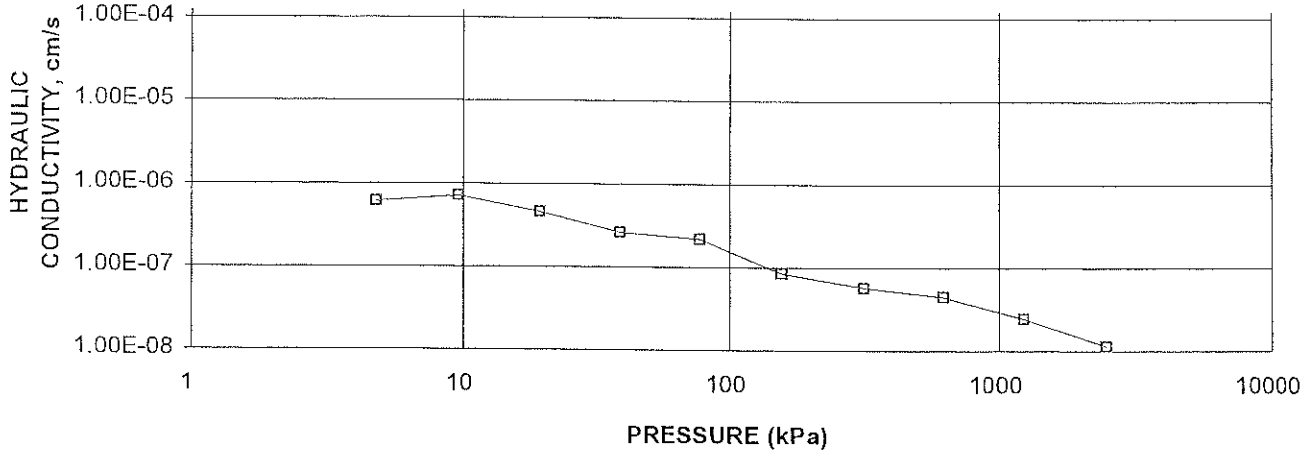
CONSOLIDATION TEST
CV cm^2/s VS PRESSURE (kPa)
BH Q 15+665 R18.75



CONSOLIDATION TEST
MV m^2/kN vs PRESSURE (kPa)
BH Q 15+665 R18.75



CONSOLIDATION TEST
HYDRAULIC CONDUCTIVITY vs PRESSURE
BH Q 15+665 R18.75

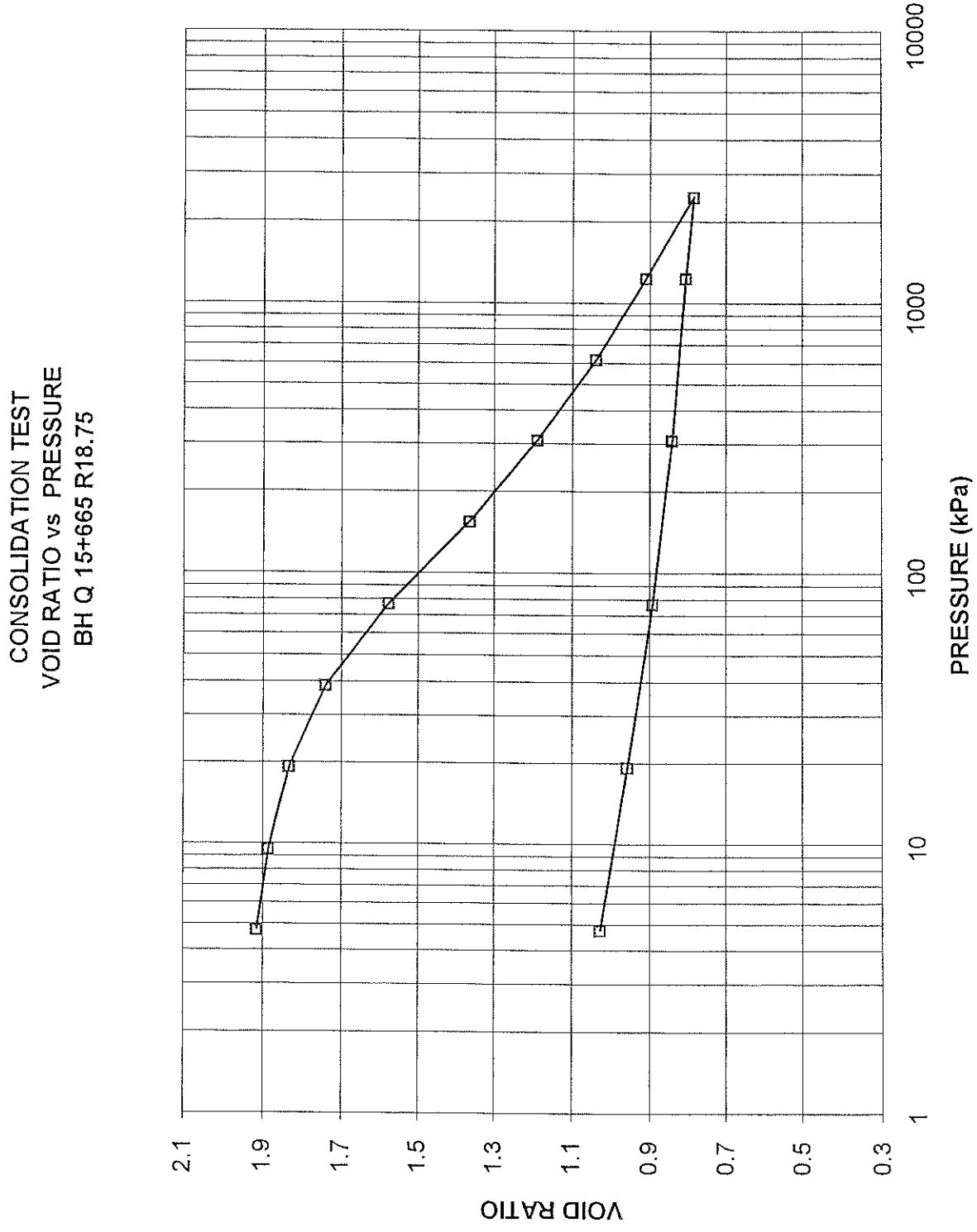


Project No. 04-1116-112
Prepared By: LFG

Golder Associates

Checkey By: MM

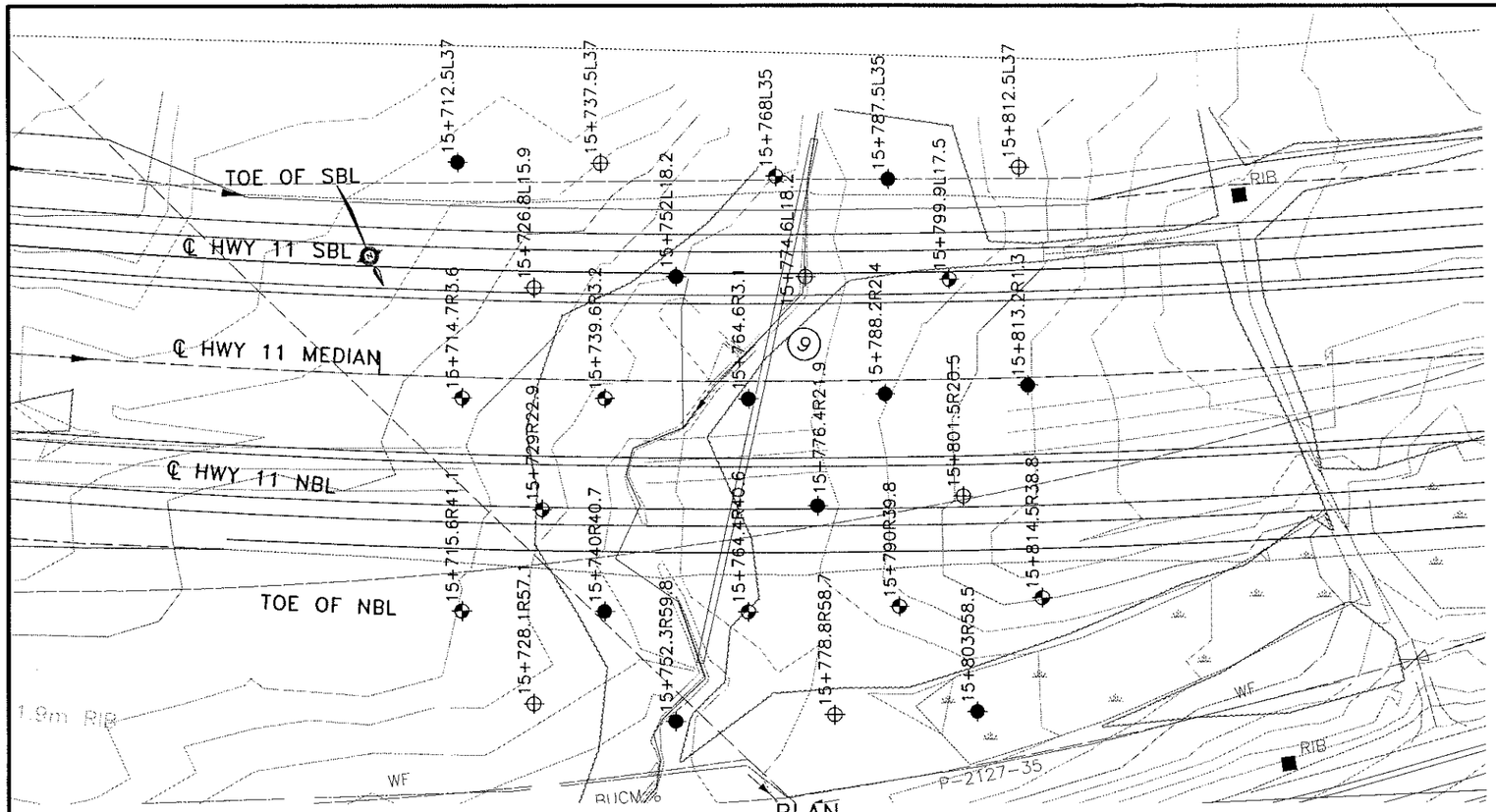
CONSOLIDATION TEST VOID RATIO VS. LOG PRESSURE	FIGURE

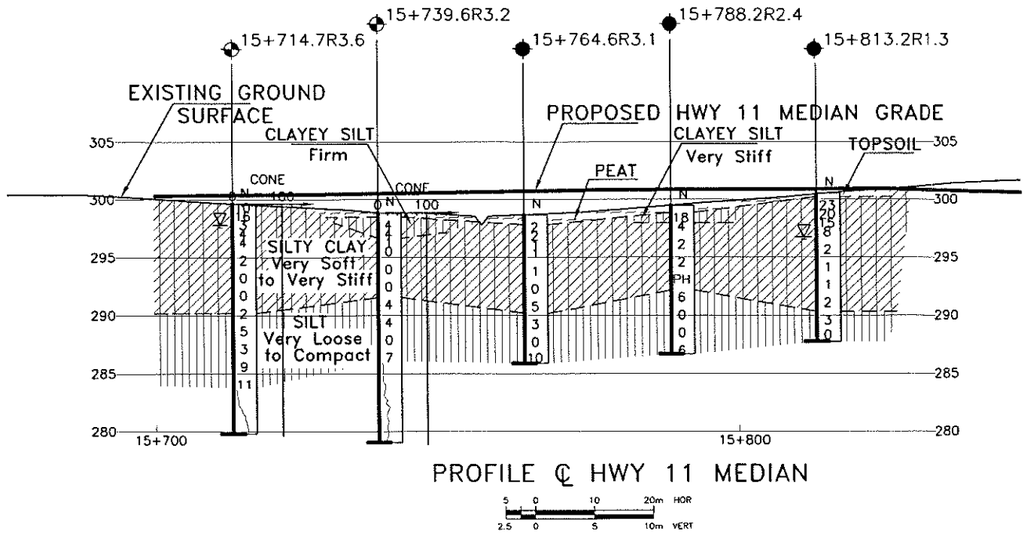


Project No. 04-1116-112
Prepared By: LFG

Golder Associates

Checked By: M





NO	STATION	OFFSET FROM MEDIAN CL
15+764.4R40.6	15+764.4	R40.6
15+764.6R3.1	15+764.6	R3.1
15+768L35	15+768	L35
15+774.6L18.2	15+774.6	L18.2
15+776.4R21.9	15+776.4	R21.9
15+778.8R58.7	15+778.8	R58.7
15+787.5L35	15+787.5	L35
15+788.2R2.4	15+788.2	R2.4
15+790R39.8	15+790	R39.8
15+799.9L17.5	15+799.9	L17.5
15+801.5R20.5	15+801.5	R20.5
15+803R58.5	15+803	R58.5
15+812.5L37	15+812.5	L37
15+813.2R1.3	15+813.2	R1.3
15+814.5R38.8	15+814.5	R38.8

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HWY 11
CONT No
WP No 480-93-00

SHEET

HIGHWAY 11 MAINLINE
ARMOUR TOWNSHIP
STATION 15+715 TO 15+815
MEDIAN CENTRELINE
BOREHOLE LOCATIONS AND SOIL STRATA

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

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Nov 2/05
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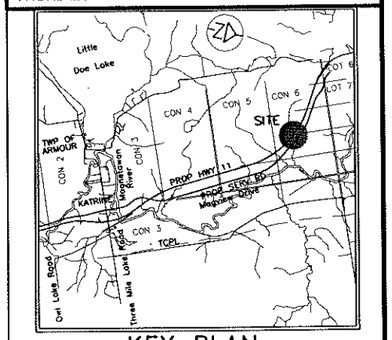


KEY PLAN
0.5km 0 1.0km

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
⊕	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

NO	STATION	OFFSET FROM MEDIAN CL
15+712.5L37	15+712.5	L37
15+714.7R3.6	15+714.7	R3.6
15+715.6R41.1	15+715.6	R41.1
15+726.8L15.9	15+726.8	L15.9
15+728.1R57.1	15+728.1	R57.1
15+729R22.9	15+729	R22.9
15+737.5L37	15+737.5	L37
15+739.6R3.2	15+739.6	R3.6
15+740R40.7	15+740.7	R40.7
15+752L18.2	15+752	L18.2
15+752.3R59.8	15+752.3	R59.8

— NOTE —
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS		
		ISSUED AS DRAFT FOR REVIEW
DATE	BY	DESCRIPTION

DESIGN MA	CHK AEG	CODE CHBDC	LOAD	DATE OCT. 2005	
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG Q1

Appendix R

Municipal Service Road, Station 13+525 to 13+575

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 13+525 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 13+525, CL ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 22.07.04 - 22.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**, sand, some organics and rootlets, some wood fibers Loose Brown		1	SS	5				○		
0.7	Silty **CLAY**, some sand Very Stiff to Very Soft Grey		2	SS	22				○		
			3	SS	11				⊖		0 27 33 40
			4	SS	3			4	○		
			5	SS	0				○		
			6	SS	2			2	⊖		1 15 51 33
			7	SS	4			+	○		
	occasional cobbles and boulders		8	SS	50/.050						
7.7	END OF BOREHOLE AT 7.67 m. SAMPLER BOUNCING ON PROBABLE BOULDER OR BEDROCK. BOREHOLE GROUTED TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 30/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 13+537.5 L23 1 OF 2 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 13+537.5, O/S 23L ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 23.07.04 - 23.07.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	TYPE	'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Sandy **SILT**, trace clay Very Loose to Compact Brown Moist		1	SS	3				○		
			2	SS	19				○		
1.5	Silty **CLAY**, trace to some sand Stiff Brown		3	SS	14				⊢○⊣		0 14 48 38
	Becoming Grey, Soft to Firm		4	SS	0				○		
			5	SS	0			+3	○		
			6	SS	0				○		
			7	SS	0				⊢○		0 1 55 43
			8	SS	7				○		
9.1	**SILT**, some clay, trace sand Stiff Grey		9	SS	9				○		0 1 87 12
9.8	END OF SOIL SAMPLING AT 9.75 m.										

Continued Next Page

+3, ×3: Numbers refer to Sensitivity

15 20 10 5 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 10/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 13+537.5 L23 2 OF 2 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 13+537.5, O/S 23L ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Hollow Stem Augers/Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 23.07.04 - 23.07.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	DCPT from 9.75 m.										
12.2	END OF BOREHOLE AT 12.19 m. Piezometer installation consist of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) 23.07.04 1.07										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\diamond\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 10/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 13+537.5 R18 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 13+537.5, O/S 18R ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Shovel COMPILED BY WM

DATUM Geodetic DATE 22.07.04 - 22.07.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	Bedrock exposed on surface.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \overset{20}{\oplus} 5$ $_{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 30/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 13+550 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 13+550, CL ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 22.07.04 - 22.07.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60	kN/m^3	GR SA SI CL
0.0	**TOPSOIL**, some sand, some rootlets and wood fibers Loose Brown		1	SS	8				○		
0.7	**SAND and SILT**, fine grained, trace clay, occasional cobbles and boulders Very Dense Brown Dry		2	SS	50/.150				○		0 41 51 7
			3	SS	50/.100						
1.9	END OF BOREHOLE AT 1.85 m. AUGER REFUSAL AT 1.85 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus^{20}_{10} 5$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 30/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 13+562.5 L30 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 13+562.5, O/S 30L ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Dynamic Cone Penetration Test (DCPT) COMPILED BY WM

DATUM Geodetic DATE 22.07.04 - 22.07.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60	kN/m^3	GR SA SI CL
0.0	DCPT from surface.										
6.1	END OF DCPT AT 6.10 m.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$15 \oplus \frac{20}{10} 5$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 30/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 13+562.5 R13 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 13+562.5, O/S 13R ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Shovel COMPILED BY WM

DATUM Geodetic DATE 22.07.04 - 22.07.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100; SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L; WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	Bedrock exposed on surface.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 30/01/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 13+565 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 13+565, CL ORIGINATED BY WRW

HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY WM

DATUM Geodetic DATE 22.07.04 - 22.07.04 CHECKED BY MA

SOIL PROFILE ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**, some rootlets										
0.2	Wet **SAND and SILT**, fine grained, occasional boulders and cobbles Compact to Very Dense Brown Moist		1	SS	15				○		
			2	SS	53				○		
1.3	END OF BOREHOLE AT 1.35 m. AUGER REFUSAL AT 1.35 m ON PROBABLE BEDROCK OR BOULDER. BOREHOLE BACKFILLED WITH DRILL CUTTINGS.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

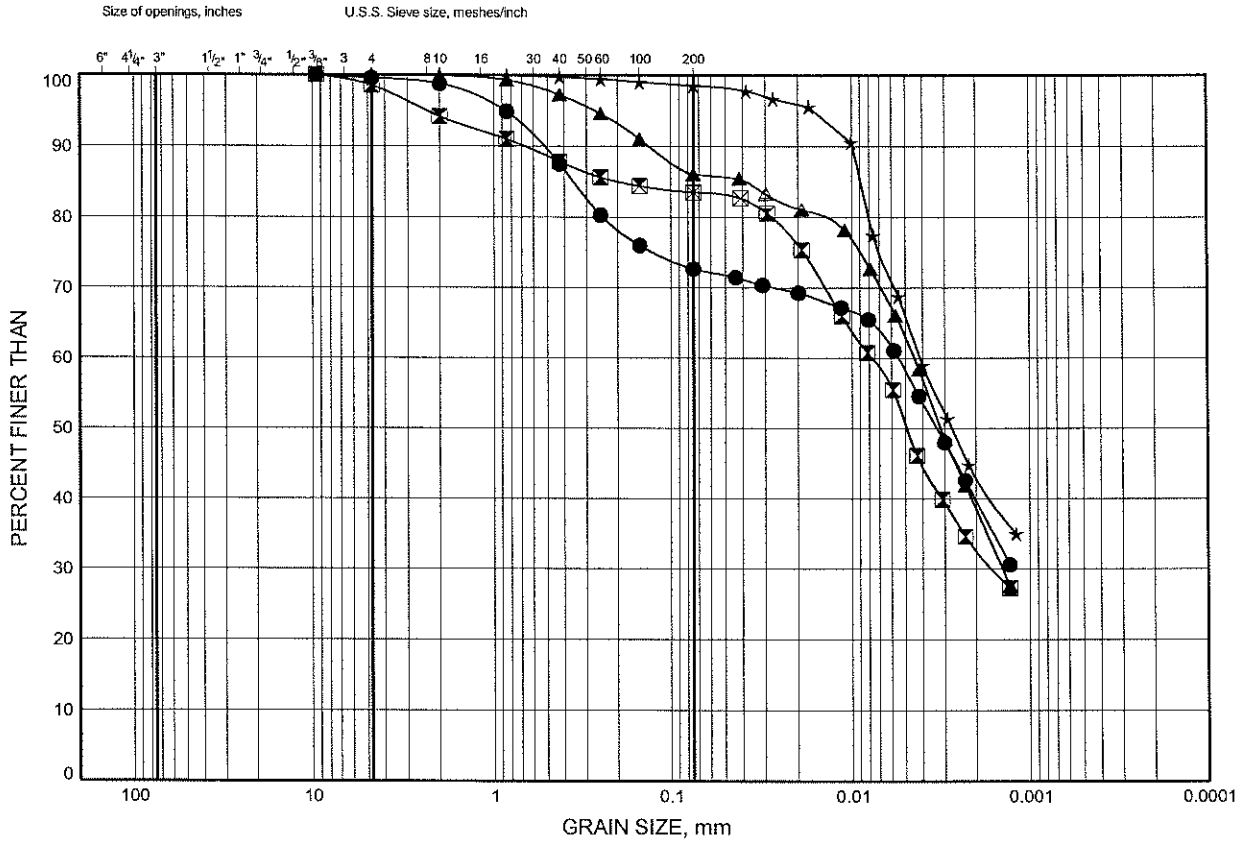
ONTMT4 2316.GPJ 30/01/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE R1

Silty CLAY



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	MSR 13+525 CL	1.83	
⊠	MSR 13+525 CL	4.88	
▲	MSR 13+537.5 L23	1.83	
★	MSR 13+537.5 L23	6.40	

Date January 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

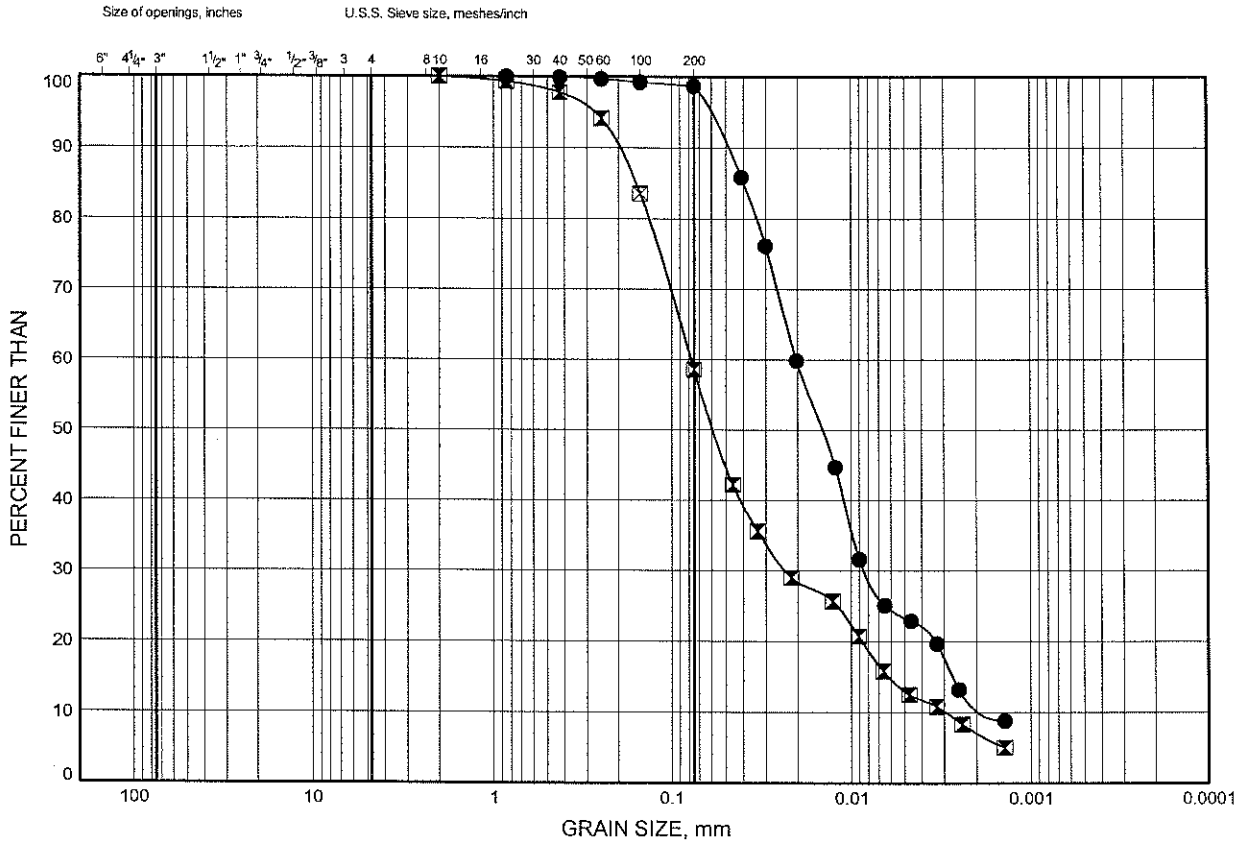
THURBGSD 2316.GPJ 30/01/05

Hwy 11 Katrine

GRAIN SIZE DISTRIBUTION

FIGURE R2

SILT to SAND and SILT



COBBLE SIZE	GRAVEL		SAND			SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	MSR 13+537.5 L23	9.45	
⊠	MSR 13+550 CL	0.84	

Date January 2005

Project 480-93-00

THURBER

Prep'd WM

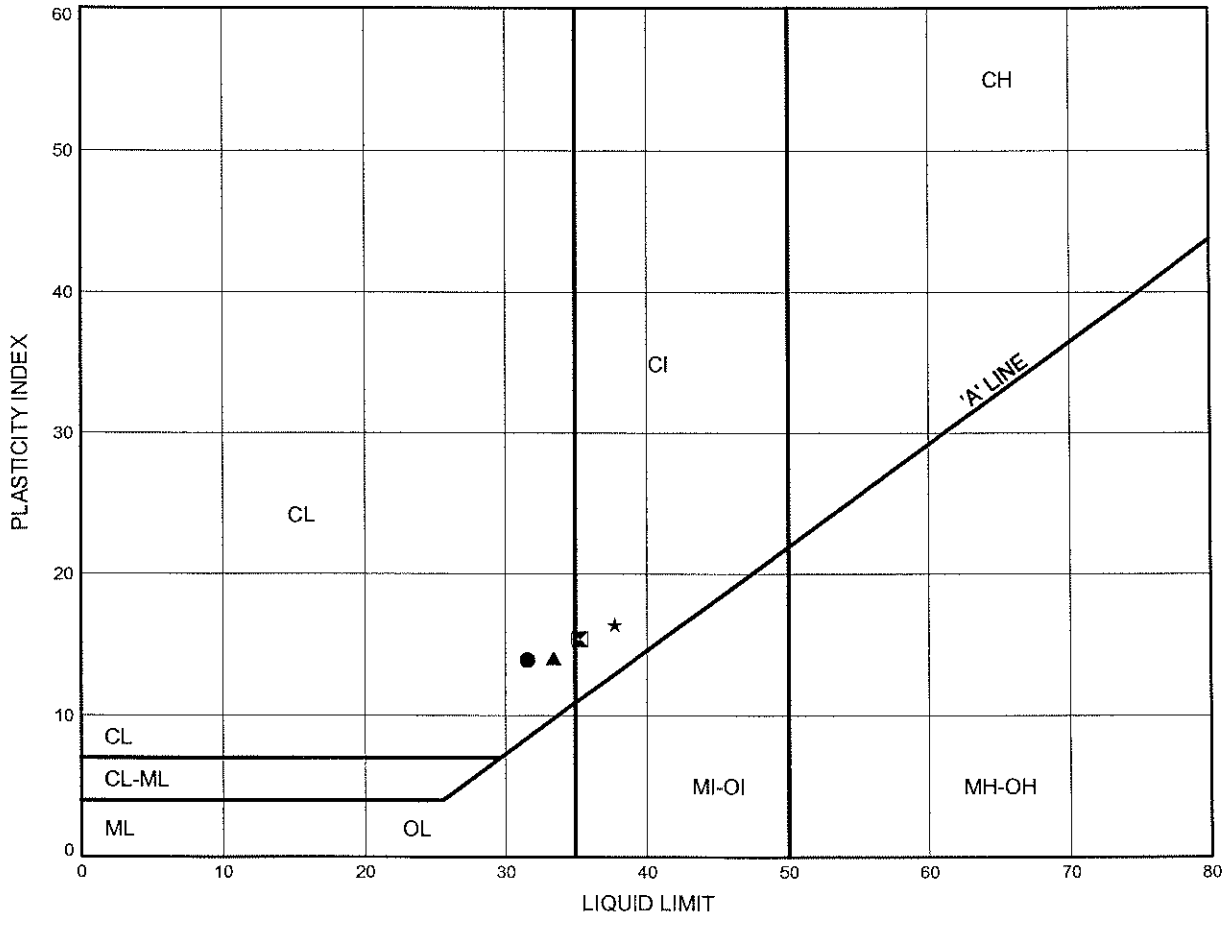
Chkd. MA

THURBGSD 2316.GPJ 30/01/05

Hwy 11 Katrine

ATTERBERG LIMITS TEST RESULTS

FIGURE R3



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	MSR 13+525 CL	1.83	
⧓	MSR 13+525 CL	4.88	
▲	MSR 13+537.5 L23	1.83	
★	MSR 13+537.5 L23	6.40	

Date January 2005

Project 480-93-00

THURBER

Prep'd WM

Chkd. MA

THURBALT 2316.GPJ 30/01/05

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

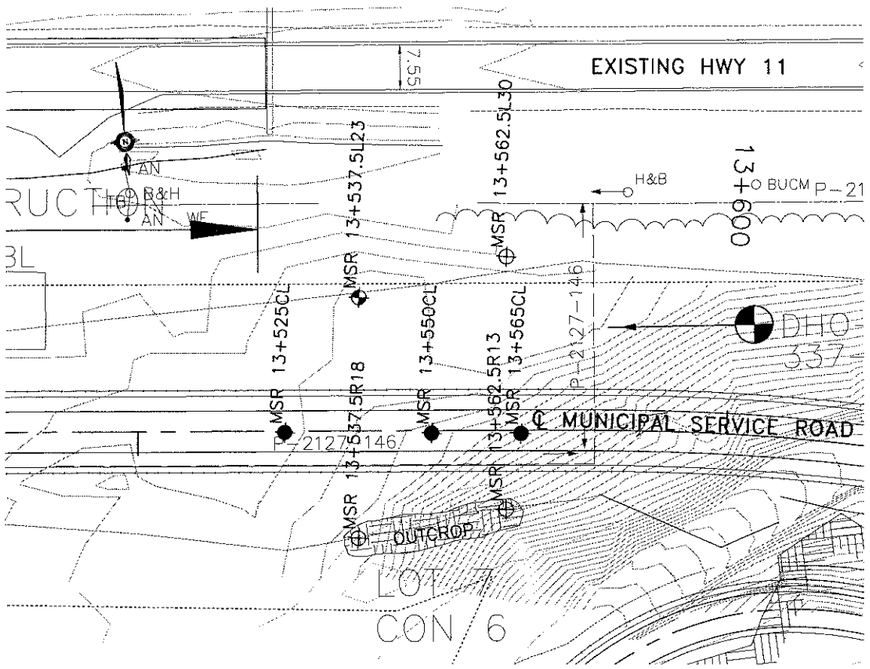
HWY 11
CONT No
WP No 480-93-00

SHEET

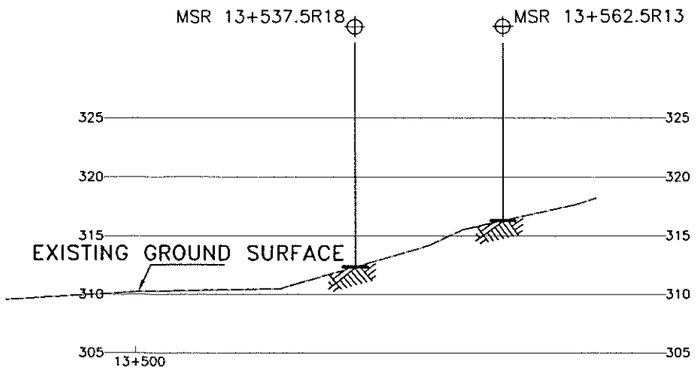
MUNICIPAL SERVICE ROAD
STATION 13+525 TO 13+575
CENTRELINE, RIGHT TOE, LEFT TOE
BOREHOLE LOCATIONS AND SOIL STRATA

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

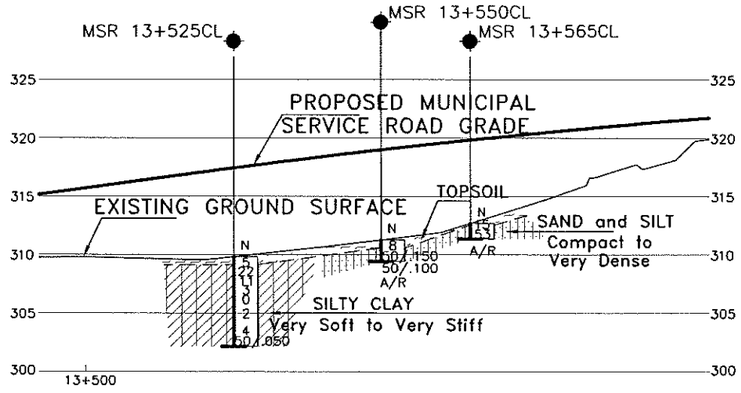
THURBER ENGINEERING LTD.



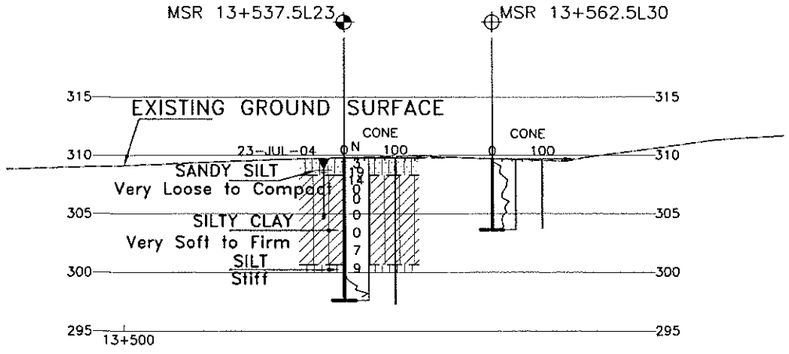
PLAN
5 0 10 20m



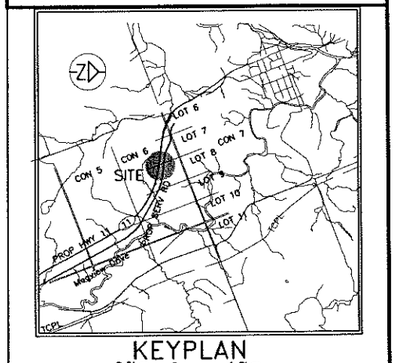
PROFILE TOE OF MUNICIPAL SERVICE RD RIGHT
5 0 10 20m HOR
2.5 0 5 10m VERT



PROFILE ℄ MUNICIPAL SERVICE RD
5 0 10 20m HOR
2.5 0 5 10m VERT



PROFILE TOE OF MUNICIPAL SERVICE RD LEFT
5 0 10 20m HOR
2.5 0 5 10m VERT



LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
◈	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water
▼	Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

NO	STATION	OFFSET FROM CL
13+525 CL	13+525	CL
13+537.5 L23	13+537.5	L23
13+537.5 R18	13+537.5	R18
13+550 CL	13+550	CL
13+562.5 L30	13+562.5	L30
13+562.5 R13	13+562.5	R13
13+565 CL	13+565	CL

— NOTE —
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

LICENSED PROFESSIONAL ENGINEER
M. R. ANDERSON
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. J. BRANCO
PROVINCE OF ONTARIO

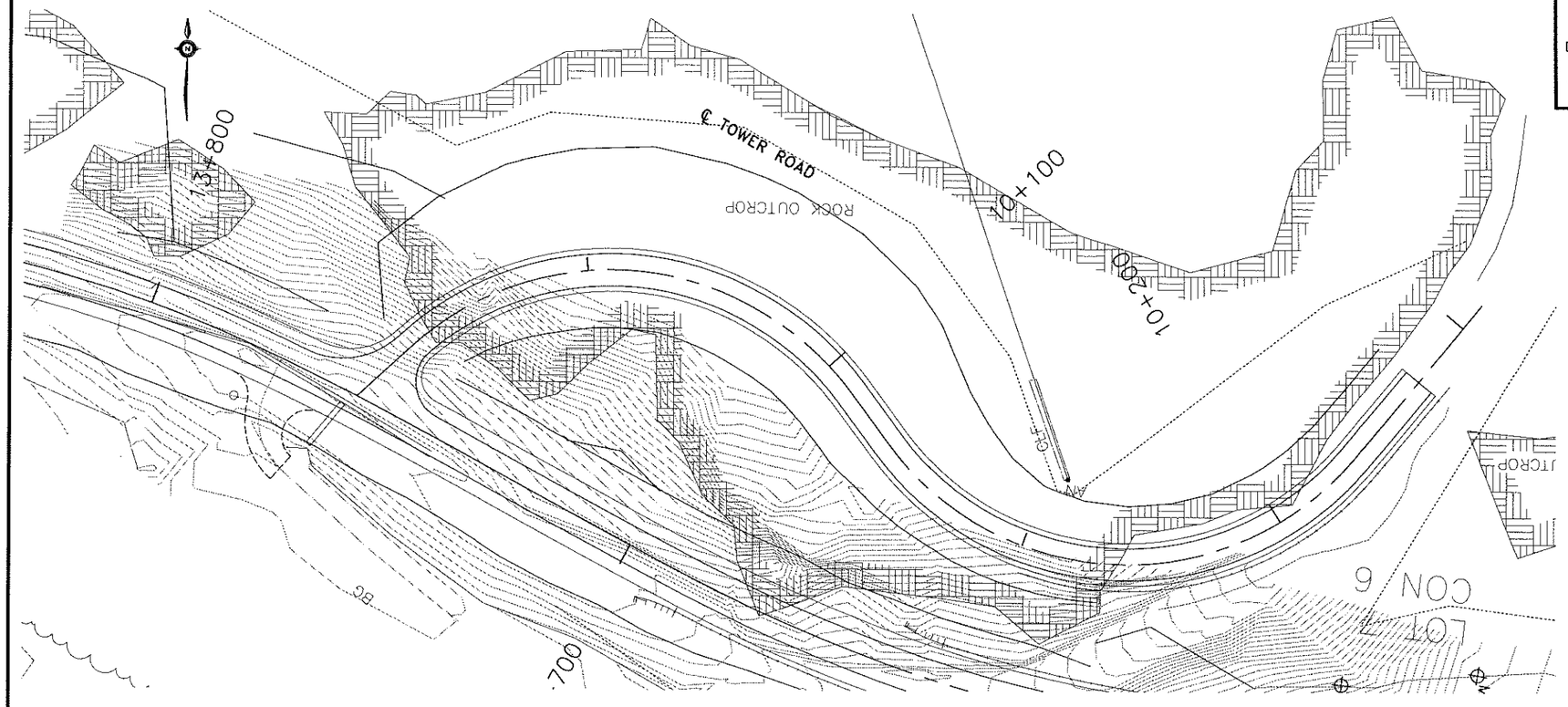
DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS		
DATE	BY	DESCRIPTION
JAN, 05	MA	ISSUED AS DRAFT FOR REVIEW

DESIGN MA	CHK AEG	CODE CH8DC	LOAD	DATE JAN, 2005	
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG R1

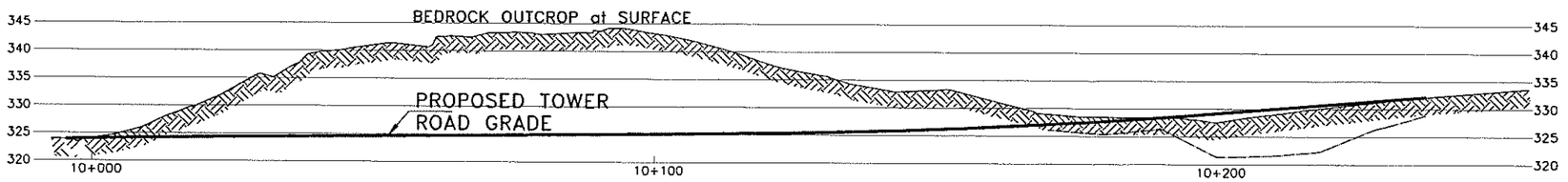
Appendix S

Tower Road, Station 10+020 to 10+155



PLAN

5 0 10 20m



PROFILE ℄ TOWER ROAD

5 0 10 20m

LICENSED PROFESSIONAL ENGINEER
M. R. ANDERSON
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. J. BRANCO
PROVINCE OF ONTARIO

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

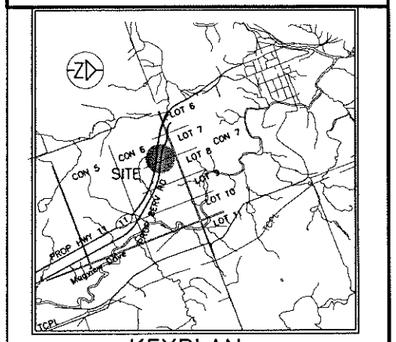
HWY 11
CONT No
WP No 480-93-00

SHEET

TOWER ROAD
ARMOUR TOWNSHIP
STATION 10+020 TO 10+155
CENTRELINE
BOREHOLE LOCATIONS AND SOIL STRATA

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

THURBER ENGINEERING LTD.



KEYPLAN

0.5km 0 1.0km

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
◈	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

NO	STATION	OFFSET FROM CL

— NOTE —

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

REVISIONS		
DATE	BY	DESCRIPTION
JAN. 05	MA	ISSUED AS DRAFT FOR REVIEW

DESIGN MA	CHK AEG	CODE CHBDC	LOAD	DATE JAN. 2005	
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG S1

Appendix T

Municipal Service Road, Station 14+200 to 14+510

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 14+200 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 14+200, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 30.11.04 - 30.11.04 CHECKED BY MA

SOIL PROFILE ELEV/DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** (100 mm)										
0.1	Silty **SAND**, fine grained, some gravel, trace clay, occasional cobbles and boulders Very Dense Brown Wet		1	AS					○		12 65 21 2
			1	SS	50/.050						
			2	SS	50/.075						
3.0	Fresh to slightly weathered, dark grey, strong to very strong **GNEISS**		1	RUN						FI 2 2 2	RUN 1# TCR=100%, SCR=100%, RQD=78%, UCS=82.2MPa
			2	RUN						5 4 4	RUN 2# TCR=100%, SCR=100%, RQD=52%, UCS=99.0MPa
			3	RUN						2 2 4	RUN 3# TCR=100%, SCR=100%, RQD=45%, UCS=69.2MPa
			4	RUN						3	RUN 4# TCR=100%, SCR=100%, RQD=70%, UCS=59.5MPa
			5	RUN							RUN 5# TCR=100%, SCR=88%, RQD=75%, UCS=118MPa
6.2	END OF BOREHOLE AT 6.25 m. BOREHOLE BACKFILLED WITH BENTONITE GROUT UPON COMPLETION.										

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 14+250 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 14+250, CL ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers / NQ Coring COMPILED BY WM

DATUM Geodetic DATE 07.12.04 - 07.12.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** (100 mm)										
0.1	**SAND**, trace silt, trace rootlets, occasional boulders Compact Brown Moist to Wet		1	SS	10				○		
			2	SS	28				○		
1.4	Fresh to slightly weathered, dark grey, strong to very strong **GNEISS**		1	RUN						FI	RUN 1# TCR=100%, SCR=94%, RQD=44%, UCS=105.3MPa
			2	RUN						5 2 0 0	RUN 2# TCR=52%, SCR=37%, RQD=37%, UCS=116.9MPa
			3	RUN						0 4 2 0 1 2 2	RUN 3# TCR=100%, SCR=97%, RQD=75%, UCS=101.4MPa
4.7	END OF BOREHOLE AT 4.72 m. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m)										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 14+300 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 14+300, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 03.12.04 - 03.12.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** Dark Brown										
0.3	Silty **SAND**, fine grained, some gravel Very Dense Brown Moist		1	AS							
			1	SS	58				○		13 64 23 (SI+CL)
2.4	Slightly weathered, grey, strong **GNEISS** iron oxide staining on joint surfaces		1	RUN						FI >5 3 4	RUN 1# TCR=100%, SCR=95%, RQD=56%, UCS=66.9MPa
3.4	Fresh, light pink, strong **GRANITE**		2	RUN						2 0 1	RUN 2# TCR=100%, SCR=73%, RQD=55%, UCS=139.0MPa
			3	RUN						2 2	RUN 3# TCR=100%, SCR=100%, RQD=88%, UCS=94.1MPa
5.0	END OF BOREHOLE AT 5.03 m. BOREHOLE BACKFILLED WITH BENTONITE GROUT UPON COMPLETION.										

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTM4T4 2316.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 14+355 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 14+355, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 02.12.04 - 02.12.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL** Dark Brown										
0.2	Silty **SAND**, fine grained, some gravel, occasional cobbles Very Dense Brown Moist		1	AS					○		
			2	SS	50/.100				○		12 63 25 (SI+CL)
2.4	Moderately weathered, massive, grey, strong **GNEISS** iron oxide staining on joint surfaces		1	RUN						FI 1 4 4	RUN 1# TCR=100%, SCR=100%, RQD=67%, UCS=108.5MPa
			2	RUN						1 1 3 4 2	RUN 2# TCR=100%, SCR=91%, RQD=75%, UCS=124MPa
			3	RUN						2 2 1	RUN 3# TCR=100%, SCR=100%, RQD=88%, UCS=110.6MPa
5.6	END OF BOREHOLE AT 5.61 m. BOREHOLE BACKFILLED WITH BENTONITE GROUT UPON COMPLETION.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 14+400 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 14+400, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY WM

DATUM Geodetic DATE 02.12.04 - 02.12.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.2	Dark Brown **SAND**, trace silt, trace gravel, occasional cobbles and boulders Very Dense Brown Moist		1	AS					○		
			1	SS	50/.150				○		
2.3	Slightly to moderately weathered, strong **GNEISS** iron oxide staining on joint surfaces light pink, strong **GRANITE** layer from 3.05 to 3.51 m		1	RUN							FI >5 5 4 >5 >5 3 2 2 >5	RUN 1# TCR=100%, SCR=100%, RQD=24%, UCS=83.2MPa RUN 2# TCR=100%, SCR=81%, RQD=30%, UCS=65MPa RUN 3# TCR=97%, SCR=97%, RQD=53%, UCS=92.7MPa
			2	RUN								
			3	RUN								
5.1	END OF BOREHOLE AT 5.13 m. BOREHOLE BACKFILLED WITH BENTONITE GROUT UPON COMPLETION.											

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 09/03/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 14+450 L10 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 14+450, O/S 10L ORIGINATED BY GA

HWY 11 BOREHOLE TYPE Hollow Stem Augers / NQ Coring COMPILED BY WM

DATUM Geodetic DATE 07.12.04 - 07.12.04 CHECKED BY MA

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL**										
0.2	Dark Brown **SAND**, fine grained, trace silt, trace gravel, occasional rootlets Compact		1	SS	11					FI	
0.7	Brown Wet Fresh, coarse grained, pink, strong to very strong **GRANITE**		1	RUN						5 0 1	RUN 1# TCR=100%, SCR=87%, RQD=78%, UCS=105.6MPa
			2	RUN						5 0 5 5 1	RUN 2# TCR=100%, SCR=89%, RQD=77%, UCS=144.0MPa
3.3	END OF BOREHOLE AT 3.30 m. BOREHOLE OPEN TO 3.30 m. Piezometer installation consist of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m)										

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE

ONTMT4 2315.GPJ 03/02/05

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No MSR 14+500 CL 1 OF 1 METRIC

W.P. 480-93-00 LOCATION Municipal Service Road, ST. 14+500, CL ORIGINATED BY SL

HWY 11 BOREHOLE TYPE COMPILED BY WM

DATUM Geodetic DATE 02.12.04 - 02.12.04 CHECKED BY MA

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
0.0	Bedrock on surface.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4 2316.GPJ 03/02/05

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

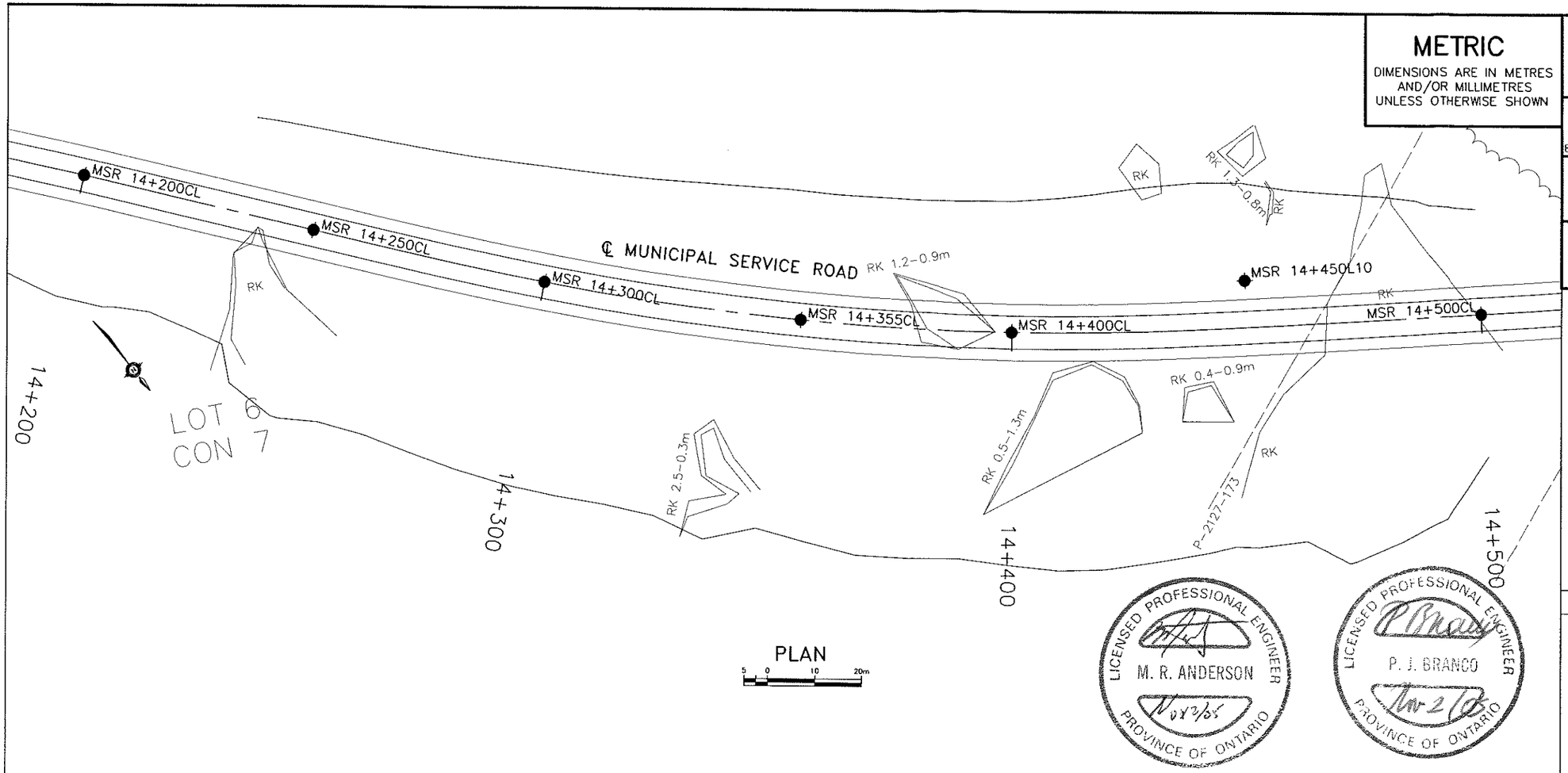
HWY 11
CONT No
WP No 480-93-00

SHEET

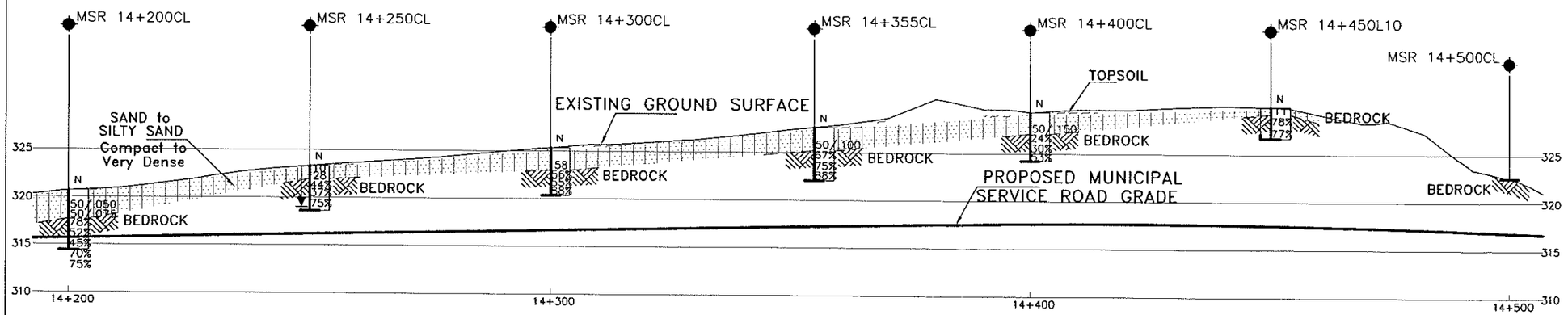
MUNICIPAL SERVICE ROAD
STATION 14+200 TO 14+510
CENTRELINE
BOREHOLE LOCATIONS AND SOIL STRATA

Marshall Macklin Monaghan
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

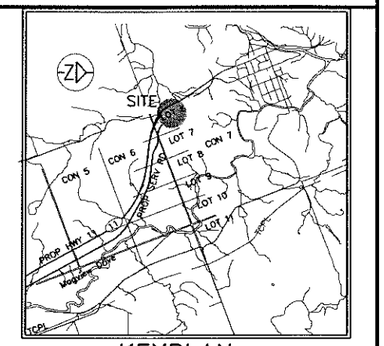
THURBER ENGINEERING LTD.



PLAN
5 0 10 20m



PROFILE ℄ MUNICIPAL SERVICE RD
5 0 10 20m HOR
2.5 0 5 10m VERT



KEYPLAN
0.5km 0 1.0km

LEGEND

●	Bore Hole
⊕	Dynamic Cone Penetration Test (cone) or Probe Hole
⊕	Bore Hole & Cone
N	Blows/0.3m (Std pen Test, 475J/blow)
CONE	Blows/0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▼	WL in Piezometer at Time of Investigation (Date)
▼	Head Artesian Water Piezometer
▼	WL in Open Borehole Upon Completion of Drilling
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal
C/R	Cone Refusal

NO	STATION	OFFSET FROM CL
MSR 14+200 CL	14+200	CL
MSR 14+250 CL	14+250	CL
MSR 14+300 CL	14+300	CL
MSR 14+355 CL	14+355	CL
MSR 14+400 CL	14+400	CL
MSR 14+450 L10	14+450	L10
MSR 14+500 CL	14+500	CL

NOTE

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

LICENSED PROFESSIONAL ENGINEER
M. R. ANDERSON
PROVINCE OF ONTARIO

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P. J. BRANCO
PROVINCE OF ONTARIO

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS		
DATE	BY	DESCRIPTION
JAN. 05	MA	ISSUED AS DRAFT FOR REVIEW

DESIGN MA	CHK AEG	CODE CHBDC	LOAD	DATE JAN. 2005	
DRAWN HS	CHK MA	SITE	STRUCT	SCHEME	DWG T1