

# **APPENDIX 'A'**

# **GEOTECHNICAL REPORT**

## **APPENDIX 'A' - GEOTECHNICAL REPORT**

The geotechnical report is provided to aid in the Contractor's evaluation of the existing pavement structure and/or soil conditions. The information presented is considered accurate at the locations shown on the Drawings and at the time of drilling. However, variations in pavement structure and/or soil conditions may exist between test holes and fluctuations in groundwater levels can be expected seasonally and may occur as a result of construction activities. The nature and extent of variations may not become evident until construction commences.

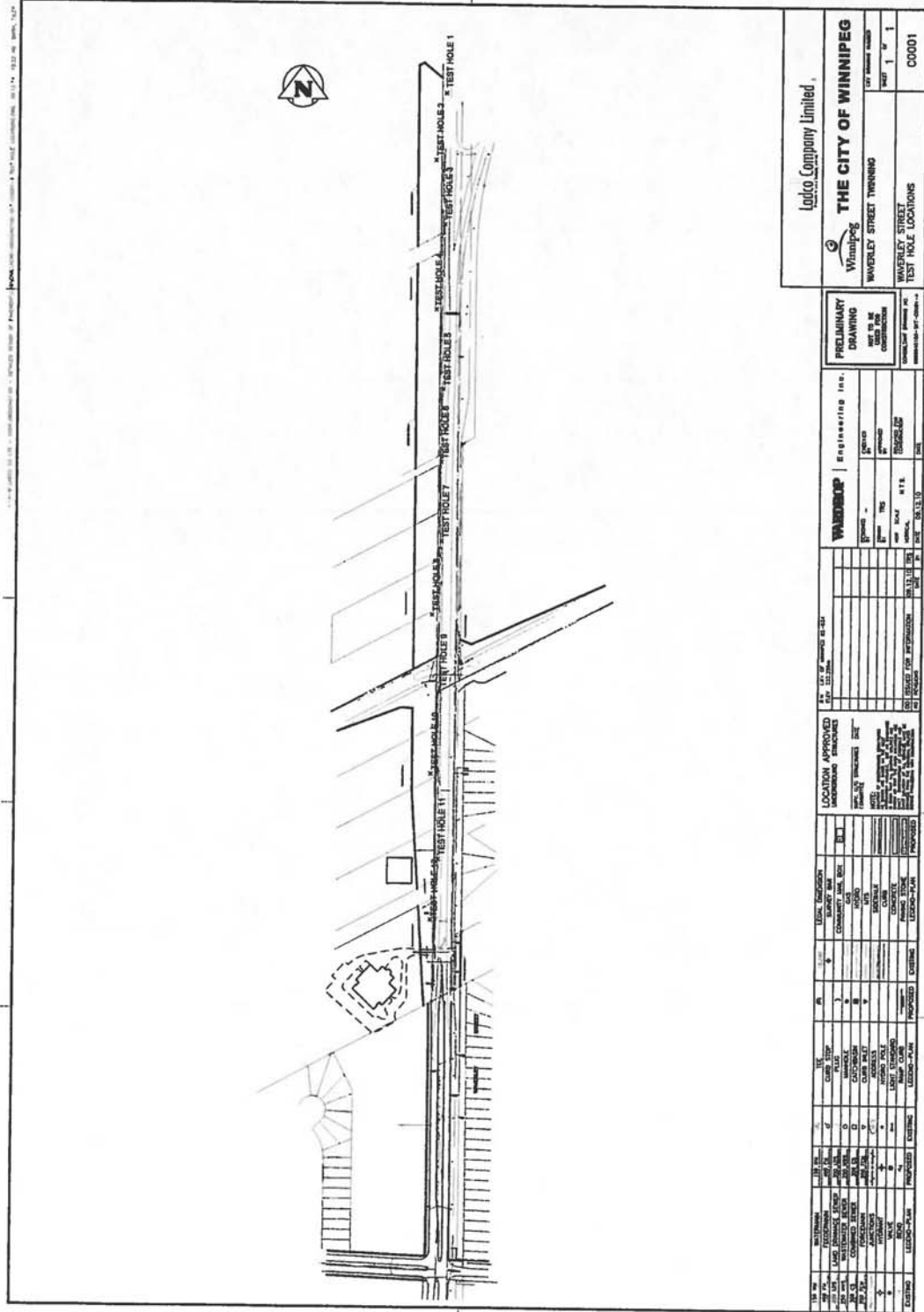


**GEOTECHNICAL INVESTIGATION FOR  
WAVERLEY STREET TWINNING  
BISON DRIVE TO WARWICK AVENUE**

Prepared for  
**WARDROP ENGINEERING INC.**  
400-386 BROADWAY  
WINNIPEG MANITOBA  
R3C 4M8

Prepared by  
**THE NATIONAL TESTING LABORATORIES LIMITED**  
199 HENLOW BAY  
WINNIPEG, MANITOBA  
R3Y 1G4

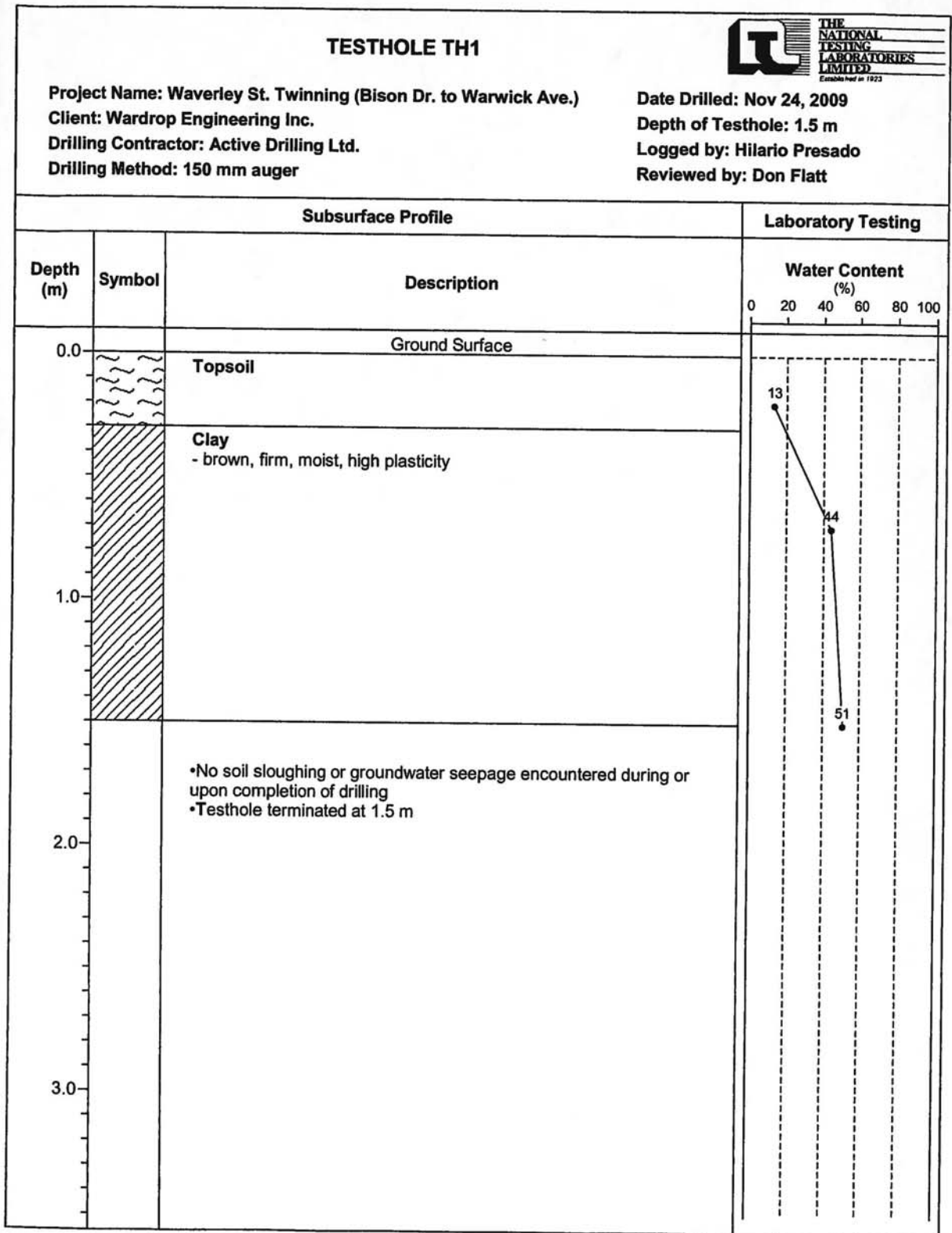
**December 14, 2009**



<b>Ludco Company Limited</b> <b>THE CITY OF WINNIPEG</b> Waverley Street Turning Waverley Street TEST HOLE LOCATIONS		<b>PRELIMINARY DRAWING</b> NOT TO BE USED FOR CONSTRUCTION SHEET 1 OF 1 C0001	
<b>Wardrop Engineering Inc.</b> 1000 St. James St. W. Winnipeg, MB R4R 1X5 Tel: 204-944-1111 Fax: 204-944-1112 www.wardrop.ca		PROJECT NO.: DRAWING NO.: DATE:	
LOCATION APPROVED (Municipal, Provincial, or Federal) PROJECT TRACKING:		LOCATION APPROVED (Municipal, Provincial, or Federal) PROJECT TRACKING:	
LEGAL DESCRIPTION BLOCK: 10 LOT: 10 DISTRICT:		LEGAL DESCRIPTION BLOCK: 10 LOT: 10 DISTRICT:	
COMMENTS:		COMMENTS:	
DATE:		DATE:	
DRAWN BY:		DRAWN BY:	
CHECKED BY:		CHECKED BY:	
APPROVED BY:		APPROVED BY:	

**Waverley Street Twinning  
 Bison Drive to Warwick Avenue**

Testhole ID	Soil Type	Soil Description	Sample Depth (m)	Moisture Content (%)	Particle Size Analysis				Atterberg Limits		
					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH4	Clay	black, firm, moist, high plasticity	0.75	35	0	1.8	19.9	78.3	91	26	65
TH6	Silty Clay	brown, firm, moist, medium plasticity	0.30	26	0	4.0	49.8	46.2	46	17	29
TH10	Clayey Silt	tan, soft, moist, low plasticity	0.75	23	0	8.6	65.1	26.3	30	17	13



### TESTHOLE TH2



**Project Name:** Waverley St. Twinning (Bison Dr. to Warwick Ave.)  
**Client:** Wardrop Engineering Inc.  
**Drilling Contractor:** Active Drilling Ltd.  
**Drilling Method:** 150 mm auger

**Date Drilled:** Nov 24, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Hilario Presado  
**Reviewed by:** Don Flatt

Subsurface Profile			Laboratory Testing
Depth (m)	Symbol	Description	Water Content (%)
			0 20 40 60 80 100
0.0		Ground Surface	
		<b>Topsoil</b>	
		<b>Clay</b> - brown, firm, moist, high plasticity - trace silt below 1.8 m	
1.0			
2.0			
3.0		<ul style="list-style-type: none"> <li>•No soil sloughing or groundwater seepage encountered during or upon completion of drilling</li> <li>•Testhole terminated at 3.0 m</li> </ul>	

Depth (m)	Water Content (%)
0.0	38
0.5	28
1.5	31
2.5	33
3.0	45

### TESTHOLE TH3



**Project Name:** Waverley St. Twinning (Bison Dr. to Warwick Ave.)  
**Client:** Wardrop Engineering Inc.  
**Drilling Contractor:** Active Drilling Ltd.  
**Drilling Method:** 150 mm auger

**Date Drilled:** Nov 24, 2009  
**Depth of Testhole:** 1.5 m  
**Logged by:** Hilario Presado  
**Reviewed by:** Don Flatt

Subsurface Profile			Laboratory Testing
Depth (m)	Symbol	Description	Water Content (%)
0.0		Ground Surface	
		Topsoil	
1.0		Clay - brown, firm, moist, high plasticity	
2.0		<ul style="list-style-type: none"> <li>•No soil sloughing or groundwater seepage encountered during or upon completion of drilling</li> <li>•Testhole terminated at 1.5 m</li> </ul>	
3.0			



### TESTHOLE TH4



**Project Name:** Waverley St. Twinning (Bison Dr. to Warwick Ave.)  
**Client:** Wardrop Engineering Inc.  
**Drilling Contractor:** Active Drilling Ltd.  
**Drilling Method:** 150 mm auger

**Date Drilled:** Nov 24, 2009  
**Depth of Testhole:** 3.0 m  
**Logged By:** Hilario Presado  
**Reviewed By:** Don Flatt

Subsurface Profile			Laboratory Testing					
Depth (m)	Symbol	Description	Water Content (%)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)
			PL	LL				
0.0		Ground Surface						
0.0 - 0.45		<b>Topsoil</b>						
0.45 - 3.0		<b>Clay</b> - black, firm, moist, high plasticity - trace organic material - brown below 0.45 m - trace silt below 1.8 m	39	35	0	1.8	19.9	78.3
3.0		<ul style="list-style-type: none"> <li>•No soil sloughing or groundwater seepage encountered during or upon completion of drilling</li> <li>•Testhole terminated at 3.0 m</li> </ul>	39	46				
3.0 - 3.5			52					

### TESTHOLE TH5



**Project Name:** Waverley St. Twinning (Bison Dr. to Warwick Ave.)  
**Client:** Wardrop Engineering Inc.  
**Drilling Contractor:** Active Drilling Ltd.  
**Drilling Method:** 150 mm auger

**Date Drilled:** Nov 24, 2009  
**Depth of Testhole:** 1.5 m  
**Logged by:** Hilario Presado  
**Reviewed by:** Don Flatt

Subsurface Profile			Laboratory Testing								
Depth (m)	Symbol	Description	Water Content (%)								
			0 20 40 60 80 100								
0.0		Ground Surface <b>Topsoil</b>									
0.0 - 1.5		<b>Clay</b> - brown, firm, moist, high plasticity - trace silt below 1.3 m	<table border="1"> <caption>Water Content Data Points</caption> <thead> <tr> <th>Depth (m)</th> <th>Water Content (%)</th> </tr> </thead> <tbody> <tr> <td>~0.1</td> <td>37</td> </tr> <tr> <td>~0.8</td> <td>32</td> </tr> <tr> <td>~1.4</td> <td>44</td> </tr> </tbody> </table>	Depth (m)	Water Content (%)	~0.1	37	~0.8	32	~1.4	44
Depth (m)	Water Content (%)										
~0.1	37										
~0.8	32										
~1.4	44										
2.0		•No soil sloughing or groundwater seepage encountered during or upon completion of drilling •Testhole terminated at 1.5 m									
3.0											

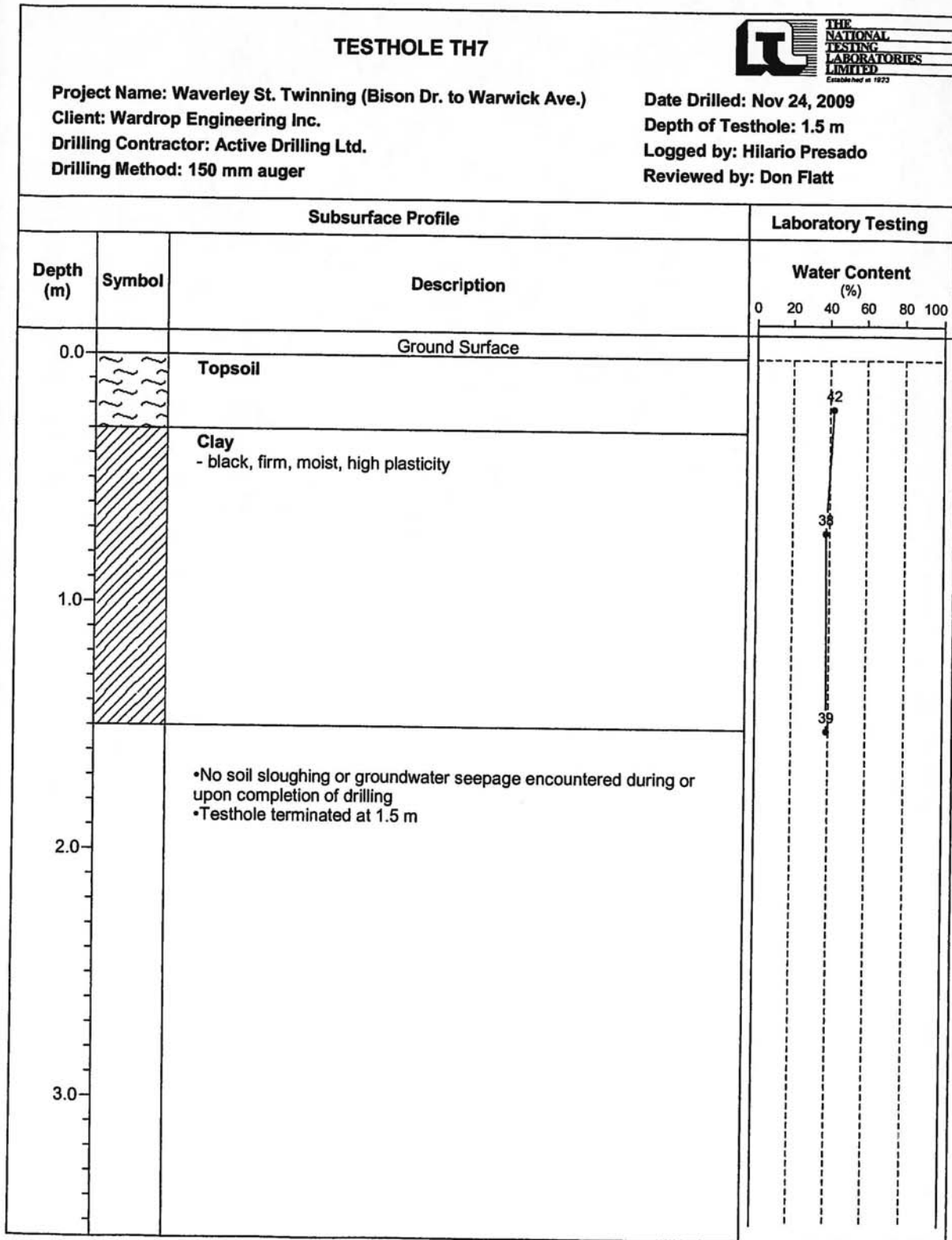
### TESTHOLE TH6



**Project Name:** Waverley St. Twinning (Bison Dr. to Warwick Ave.)  
**Client:** Wardrop Engineering Inc.  
**Drilling Contractor:** Active Drilling Ltd.  
**Drilling Method:** 150 mm auger

**Date Drilled:** Nov 24, 2009  
**Depth of Testhole:** 3.0 m  
**Logged By:** Hilario Presado  
**Reviewed By:** Don Flatt

Subsurface Profile			Laboratory Testing					
Depth (m)	Symbol	Description	Water Content (%)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)
			PL	LL				
0.0		Ground Surface						
0.0 - 0.4		Topsoil						
0.4 - 1.0		Silty Clay - brown, firm, moist, medium plasticity	26		0	4.0	49.8	46.2
1.0 - 3.0		Clay - brown, firm, moist, high plasticity - trace silt below 1.5 m	30					
			39					
			47					
			52					
3.0 - 3.5		<ul style="list-style-type: none"> <li>•No soil sloughing or groundwater seepage encountered during or upon completion of drilling</li> <li>•Testhole terminated at 3.0 m</li> </ul>						



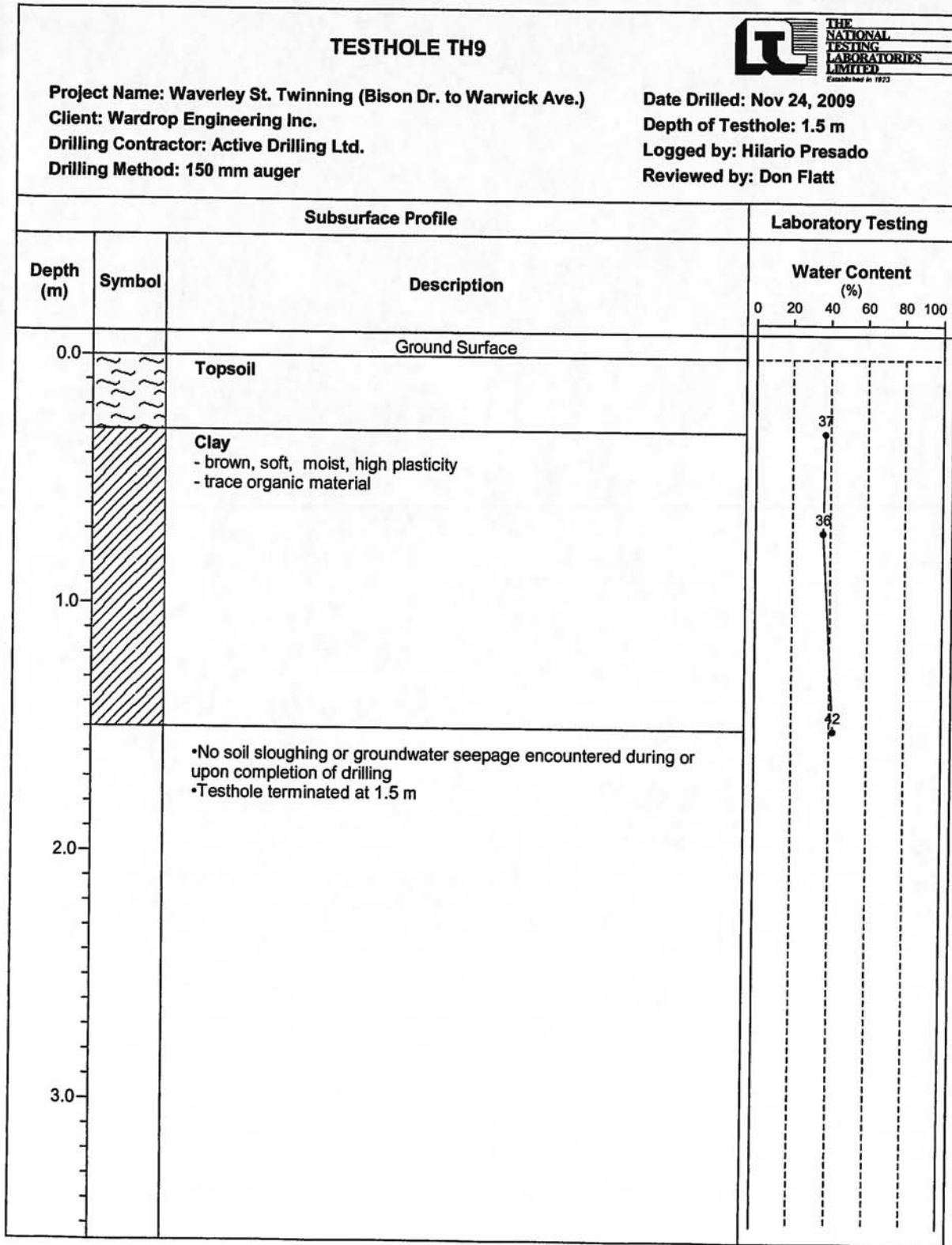
### TESTHOLE TH8



**Project Name:** Waverley St. Twinning (Bison Dr. to Warwick Ave.)  
**Client:** Wardrop Engineering Inc.  
**Drilling Contractor:** Active Drilling Ltd.  
**Drilling Method:** 150 mm auger

**Date Drilled:** Nov 24, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Hilario Presado  
**Reviewed by:** Don Flatt

Subsurface Profile			Laboratory Testing
Depth (m)	Symbol	Description	Water Content (%)
0.0		Ground Surface	
		<b>Topsoil</b>	
		<b>Clay</b> - black, firm, moist, high plasticity - brown below 0.3 m - trace silt below 1.5 m	
3.0		<ul style="list-style-type: none"> <li>•No soil sloughing or groundwater seepage encountered during or upon completion of drilling</li> <li>•Testhole terminated at 3.0 m</li> </ul>	



### TESTHOLE TH10



**Project Name:** Waverley St. Twinning (Bison Dr. to Warwick Ave.)  
**Client:** Wardrop Engineering Inc.  
**Drilling Contractor:** Active Drilling Ltd.  
**Drilling Method:** 150 mm auger

**Date Drilled:** Nov 24, 2009  
**Depth of Testhole:** 3.0 m  
**Logged By:** Hilario Presado  
**Reviewed By:** Don Flatt

Subsurface Profile			Laboratory Testing					
Depth (m)	Symbol	Description	Water Content (%)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)
			PL	LL				
0.0		Ground Surface						
0.0 - 0.5		<b>Topsoil</b>						
0.5 - 1.0		<b>Clayey Silt</b> - tan, soft, moist, low plasticity	23		0	8.6	65.1	26.3
1.0 - 2.2		<b>Clay</b> - brown, stiff, moist, high plasticity - trace silt below 2.1 m						
2.2 - 2.5		<b>Silty Clay</b> - brown, soft, moist, medium plasticity						
2.5 - 3.0		<b>Clay</b> - brown, stiff, moist, high plasticity						
3.0 - 3.5		•No soil sloughing or groundwater seepage encountered during or upon completion of drilling •Testhole terminated at 3.0 m						

