

# **APPENDIX 'A'**

# **GEOTECHNICAL REPORT**

## APPENDIX 'A' - GEOTECHNICAL REPORT



**GEOTECHNICAL INVESTIGATION  
FOR  
GUNN ROAD RECONSTRUCTION AND  
DAY STREET AND GUNN ROAD BOX CULVERT**

Prepared for  
**STANTEC CONSULTING  
905 WAVERLEY STREET  
WINNIPEG, MANITOBA  
R3T 5P4**

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

November 27, 2009



## Table of Contents

1.0 Summary .....	1
2.0 Terms of Reference .....	1
3.0 Geotechnical Investigation .....	1
3.1 Testhole Drilling and Soil Sampling .....	1
3.2 Laboratory Testing .....	2
4.0 Subsurface Conditions .....	2
4.1 Soil Profile .....	2
4.2 Groundwater .....	3
5.0 Design Recommendations and Comments .....	4
5.1 Subgrade Preparation .....	4
5.2 Drainage .....	5
5.3 Box Culvert .....	5
5.4 Pile Foundation .....	7
6.0 Closure .....	7

Figures 1 and 2 - Testhole Location Plans  
Testhole Logs - TH1 to TH26

The City of Winnipeg  
Bid Opportunity No. 248-2010

Template Version: C420100203 - RW



## **1.0 SUMMARY**

The National Testing Laboratories Limited was retained to undertake a geotechnical investigation to establish the soil conditions and provide recommendations for the proposed reconstruction of Gunn Road between Plessis Road and Redonda Road in Winnipeg, Manitoba. The total length of the reconstruction is 3.6 km. Gunn Road will be realigned at Day Street to a direct and true eastbound-westbound connection. The project includes the construction of a concrete box culvert at the intersection of Day Street and Gunn Road. Twenty-one testholes were drilled on the project site on August 19 and 20, 2009. The geotechnical investigation revealed a general soil profile of mixed clay and granular fill, or granular fill only at the surface. Clay fill was encountered below the mixed clay and granular fill material in some testholes. Silt layers were typically encountered at a depth of 1.0 to 1.5 m below existing grade. High plasticity clay overlying silt till was encountered in the testholes drilled to auger refusal. Based upon the soil and groundwater conditions encountered at the site, the box culvert may be supported on a raft slab. Alternatively, the proposed box culvert may be supported on driven precast concrete piles. Cast-in-place concrete friction piles are not recommended for this site due to the limited frictional support provided by the soft to firm clay encountered in the testholes.

## **2.0 TERMS OF REFERENCE**

The National Testing Laboratories Limited was retained to undertake a geotechnical investigation to establish the soil conditions and provide recommendations for the proposed reconstruction of Gunn Road between Plessis Road and Redonda Road in Winnipeg, Manitoba. Authorization to proceed with the geotechnical investigation was provided by Wayne Byczek on July 16, 2009.

## **3.0 GEOTECHNICAL INVESTIGATION**

### **3.1 Testhole Drilling and Soil Sampling**

The subsurface drilling and sampling program was conducted on August 19 and 20, 2009 with drilling services provided by Paddock Drilling Ltd. under the supervision of our geotechnical field personnel. Nineteen testholes were drilled along Gunn Road between Plessis Road and Redonda Road to depths of 3 m. Two additional testholes were drilled to auger refusal near the proposed box culvert. The testholes were drilled using a track-mounted drill rig equipped with 125 mm diameter solid stem augers. The testhole locations are shown on the attached Testhole Location Plan.

Representative soil samples were obtained directly off the augers. Upon completion of drilling, the testholes were examined for evidence of sloughing and groundwater seepage. The



testholes were backfilled with auger cuttings. The samples were visually classified in the field and returned to our soils laboratory for additional examination and testing.

### 3.2 Laboratory Testing

Laboratory testing included moisture content determinations, Atterberg limits, particle size analyses and unconfined compressive strength testing. The results of the Atterberg limits, particle size analysis, and unconfined compressive strength are summarized in the tables below.

Testhole No.	Depth (m)	Soil Type	Particle Size			Atterberg Limits		
			Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH5	0.9	Clay	0.7	7.6	91.7	80	23	57
TH8	0.9	Silt	0	63.5	36.5	31	17	14
TH15	1.8	Silt	1.1	62.7	36.2	33	16	17
TH17	1.5	Clay	0.7	5.5	93.8	96	29	67

Testhole No.	Depth (m)	Soil Type	Unconfined Compressive Strength (kPa)
TH20	3.1	Clay	64
TH20	6.1	Clay	52
TH21	4.6	Clay	54

## 4.0 SUBSURFACE CONDITIONS

### 4.1 Soil Profile

The general soil stratigraphy at the site, as interpreted from the testhole logs, typically consists of fill materials at the ground surface overlying clay and silt till. Silt layers were typically encountered at a depth of 1.0 to 1.5 m below existing grade. A hydrocarbon odour was detected in Testholes TH2, TH3, and TH4. The hydrocarbon odour was detected below a depth of 1.8 m in Testhole TH2 and below a depth of 0.9 m in Testholes TH3 and TH4. Additional information on the soils encountered in the testholes is provided below.

#### Mixed Clay/Granular Fill

Mixed clay and granular fill was encountered at the surface of Testholes TH1 to TH11, TH15, TH16, and TH20. The mixed clay and granular fill was composed of medium sand to coarse gravel with high plasticity clay. The mixed clay and granular fill extended to depths ranging from 0.2 to 0.3 m.



### **Granular Fill**

Granular fill was encountered at the surface of Testholes TH12, TH13 TH14, TH17, TH18 and TH19. The granular fill consisted of medium to coarse sand with a trace of fine to coarse gravel and clay. The granular fill extended to depths ranging from 0.3 to 1.4 m. Water contents of the granular fill ranged from 4 to 16%.

### **Clay Fill**

Clay fill was encountered beneath the mixed clay and granular fill or granular fill in all testholes with the exception of Testholes TH3, TH4, TH7, and TH12. In TH21, clay fill was encountered at the surface of the testhole. The clay fill was grey to black, stiff, moist, and of high plasticity. The clay fill extended to depths ranging from 0.3 to 0.9 m. Water contents of the clay fill ranged from 16 to 43%.

### **Clay**

Clay was encountered in all testholes. The clay was brown to grey, soft to stiff, moist, and of high plasticity. The clay extended to a depth of 13.7 m in Testholes TH20 and TH21 and to the depths explored in the remaining testholes. Water contents of the clay ranged from 22 to 59%.

### **Silt**

Silt was encountered in Testholes TH4, TH6, TH7, TH8, TH10, TH15, TH16, and TH17. Silt was encountered at depths between 0.8 and 2.1 m below grade. Thickness of the silt layer was typically in the range of 0.1 to 0.3 m. The silt was tan, soft, moist, and of low plasticity. Water contents of the silt ranged from 22 to 33%.

### **Silt Till**

Silt till was encountered below the clay layer at a depth of 13.7 m in Testholes TH20 and TH21. The silt till was tan, dense, moist, and of low plasticity. Water contents of the silt till ranged from 9 to 16%.

## **4.2 Groundwater**

Groundwater conditions were observed during and upon the completion of drilling the testholes. Moderate groundwater seepage was observed in Testholes TH13 and TH20, and minor groundwater seepage was observed in Testhole TH21. In Testhole TH13, groundwater seepage was observed from the granular fill at a depth of 1.2 m. In testholes TH20 and TH21, groundwater seepage from the silt till was observed. The groundwater level upon completion of drilling was 1.2 m in Testhole TH13, 10.4 m in Testhole TH20, and 12.2 m in Testhole TH21. No groundwater seepage was observed in the remaining testholes.

Soil sloughing was observed in Testholes TH20 and TH21 to depths of 12.8 and 12.2 m respectively. No soil sloughing was observed in the remaining testholes. It should be noted



that only short-term seepage and sloughing conditions were observed and groundwater levels will normally fluctuate during the year and will be dependent upon precipitation and surface drainage.

## **5.0 DESIGN RECOMMENDATIONS AND COMMENTS**

### **5.1 Subgrade Preparation**

The pavement structure must be constructed on a stable subgrade. The fill materials and clay encountered at a shallow depth in the testholes should provide a suitable subgrade for the proposed road reconstruction. Proof rolling should be conducted to identify any unsuitable materials at the subgrade level. Where subcutting is required to remove unsuitable subgrade materials, the underlying material should be scarified and compacted to at least 95% Standard Proctor dry density. Sub-base materials, complying with the requirements of CW3110, should be used to backfill areas with unsuitable subgrade materials. Subcutting of unsuitable subgrade materials should typically not extend more than 1 m below the final elevation of the road surface. Preparation of the subgrade should comply with the City of Winnipeg Standard Construction Specification CW3110.

Where stable subgrade is exposed at the base of the pavement structure, a geotextile fabric should be placed between the stable subgrade and the sub-base material to provide separation. If an unstable subgrade is exposed beneath the proposed pavement structure, a geotextile fabric together with geogrid should be placed over the unstable subgrade. Supply and installation of geotextile fabric and geogrid should comply with the requirements of City of Winnipeg Standard Construction Specification CW3130.

Silt layers were encountered at a shallow depth in Testholes TH4, TH6, TH7, TH8, TH10, TH15, TH16 and TH17. The depth to silt ranged from 0.8 m in Testhole TH8 to 2.1 m in Testhole TH7. The thickness of the silt layer was typically in the range of 0.1 to 0.3 m. Silt is considered to be a frost-susceptible soil. If silt is found within the annual depth of frost penetration, the service life of the pavement may be reduced due to frost heave and thaw weakening of the subgrade. The annual depth of frost penetration is dependent upon several factors but is typically in the order of 2 m in the Winnipeg area. To eliminate frost-related distress in the pavement would require removal of frost-susceptible soils within the depth of annual frost penetration. To minimize frost-related distress, it is recommended that silt, if encountered at the subgrade level, be subcut to a maximum depth of 1 m below the final elevation of the road surface. It is recommended that the final grades for the pavement be set as high as possible to avoid the potential requirement for subexcavation and reduce the risk of frost-related distress in the pavement.





## 5.2 Drainage

Drainage of water from the subgrade is an important consideration because excess water will lead to reduced subgrade strength and consequently, increase the potential for subgrade failure and frost heave. During construction, the surface of the subgrade should be graded to prevent water from ponding on the exposed subgrade. Where ditches are provided adjacent to the roadway, they should be deep enough to ensure that the surface of the free water will be maintained below the pavement structure. Where ditches are not provided, underdrains should be installed along the full length of the roadway to provide drainage of the sub-base and base course layers. Risers should be installed for the inspection and cleaning of the underdrains.

## 5.3 Box Culvert

It is our understanding that a box culvert will be constructed at the proposed realigned intersection of Gunn Road and Day Street. Based upon the soil and groundwater conditions encountered at the testhole locations, the box culvert may be supported on a raft slab. A raft slab bearing on stiff clay may be designed based upon an allowable bearing pressure of 100 kPa. The excavation sidewalls and base must be maintained in a frost-free condition for the duration of construction to prevent potential frost heave and thaw settlement of the structure. Measures should be taken to prevent moisture content changes in the high plasticity clay during construction. Protecting the bearing surface from wetting or drying during construction will minimize moisture changes in the clay subsoil. The bottom of the excavation must be kept free from excessive moisture and free-flowing water.

A 300 mm thick layer of free draining granular material should be provided beneath the raft slab. The granular material should be compacted to a minimum of 95% maximum standard proctor density. The free draining granular backfill should consist of hard crushed stone, free from organic material meeting the following gradation requirements:

Canadian Metric Sieve Size	Percent Passing
40,000	95 to 100
20,000	35 to 70
10,000	10 to 30
5,000	0 to 5

To prevent channel flow from seeping through the base course and prevent the potential for underslab piping, a concrete cutoff wall extending through the base course into the foundation clay should be installed along the upstream and downstream lip of the raft slab.



Backfill for the culvert should be unfrozen granular material that complies with the following gradation requirements:

Canadian Metric Sieve Size	Percent Passing
50,000	100
20,000	75 to 100
5,000	45 to 85
2,500	35 to 55
315	15 to 35
160	5 to 20
80	0 to 7

The granular backfill should be placed in layers not exceeding 150 mm in thickness and compacted to at least 95% maximum standard proctor density.

The culvert walls should be designed based on the following expression which assumes a triangular pressure distribution:

$$P_o = K_o (\gamma D + q)$$

where  $P_o$  = lateral earth pressure (at-rest condition) at depth  $D$ , kPa

$K_o$  = at-rest coefficient of lateral earth pressure (0.5 for granular backfill)

$\gamma$  = soil unit weight (21 kN/m<sup>3</sup> for granular backfill)

$q$  = live load surcharge within distance  $D$ , kPa

Excavation for the culvert will occur in the fill materials and native clay soils. The stability of temporary excavations is a function of several factors, including the total time the excavation is exposed, soil moisture conditions, soil type and consistency, and the contractor's operations. It is the responsibility of the contractor to maintain safe and stable slopes or design and provide shoring during construction. As a guideline, temporary excavations may be sloped 1 horizontal to 1 vertical within the clay. If temporary shoring is used, it should be designed by a registered professional engineer who has experience with excavation shoring. The design of the shoring system should take into consideration lateral surcharge pressures from construction equipment close to the excavation. Groundwater seepage may occur and pumps should be available to remove water that collects in the excavation. Excavated materials must be stockpiled a safe distance from the edge of the excavation. All excavations must comply with Manitoba Workplace Safety and Health regulations.



#### **5.4 Pile Foundation**

An alternative foundation system suitable to support the box culvert structure is a system of driven, prestressed, precast concrete piles. These units, when driven to practical refusal with a hammer capable of delivering a minimum rated energy of 40 KJ per blow, may be assigned the following allowable loads.

Nominal Pile Size	Allowable Load	Refusal Criteria
300 mm	450 kN	5 blows/25 mm
350 mm	625 kN	8 blows/25 mm
400 mm	800 kN	12 blows/25 mm

Pile spacing should not be less than 2.5 pile diameters, measured center to center. Pile heave for piles within 5 pile diameters should be monitored and re-driving done where pile heave is found to be significant. Pre-boring to at least 3 m should be considered for all driven piles to enhance pile alignment and minimize vibration levels in adjacent structures during installation. The prebored hole diameter should be slightly larger than the nominal pile diameter. All piles should be driven continuously to their required depth once driving is initiated. Precast concrete piles driven to practical refusal will develop the majority of their capacity from toe resistance, and therefore, no reduction in pile capacity is necessary for group action. The design capacity of a pile group is equal to the number of piles in the group times the allowable capacity per pile.

Auger refusal was encountered within the silt till at depths of 15.2 and 18.3 m in the deep testholes near the proposed location of the culvert. Driven piles are expected to reach refusal at similar depth ranges. Some variation in pile refusal depths should be anticipated on the site. Negligible settlement beyond the elastic compression of the pile can be expected with an end-bearing pile system. A minimum void space of 200 mm should be provided beneath all structural elements to accommodate potential heave of the high plasticity clay. To ensure that the piles achieve their design capacities, full time inspection by qualified geotechnical personnel is recommended during pile installation.

#### **6.0 CLOSURE**

Professional judgments and recommendations are presented in this report. They are based on an evaluation of the technical information gathered during our site investigation. We do not guarantee the performance of the project in any respect other than that our engineering work and judgment rendered meet the standards and care of our profession. It should be noted that the testholes may not represent potentially unfavourable subsurface conditions between testholes. If during construction soil conditions are encountered that vary from those

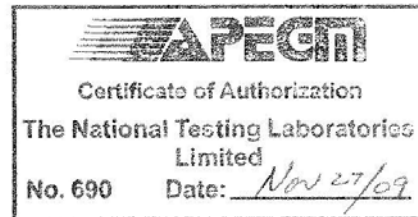


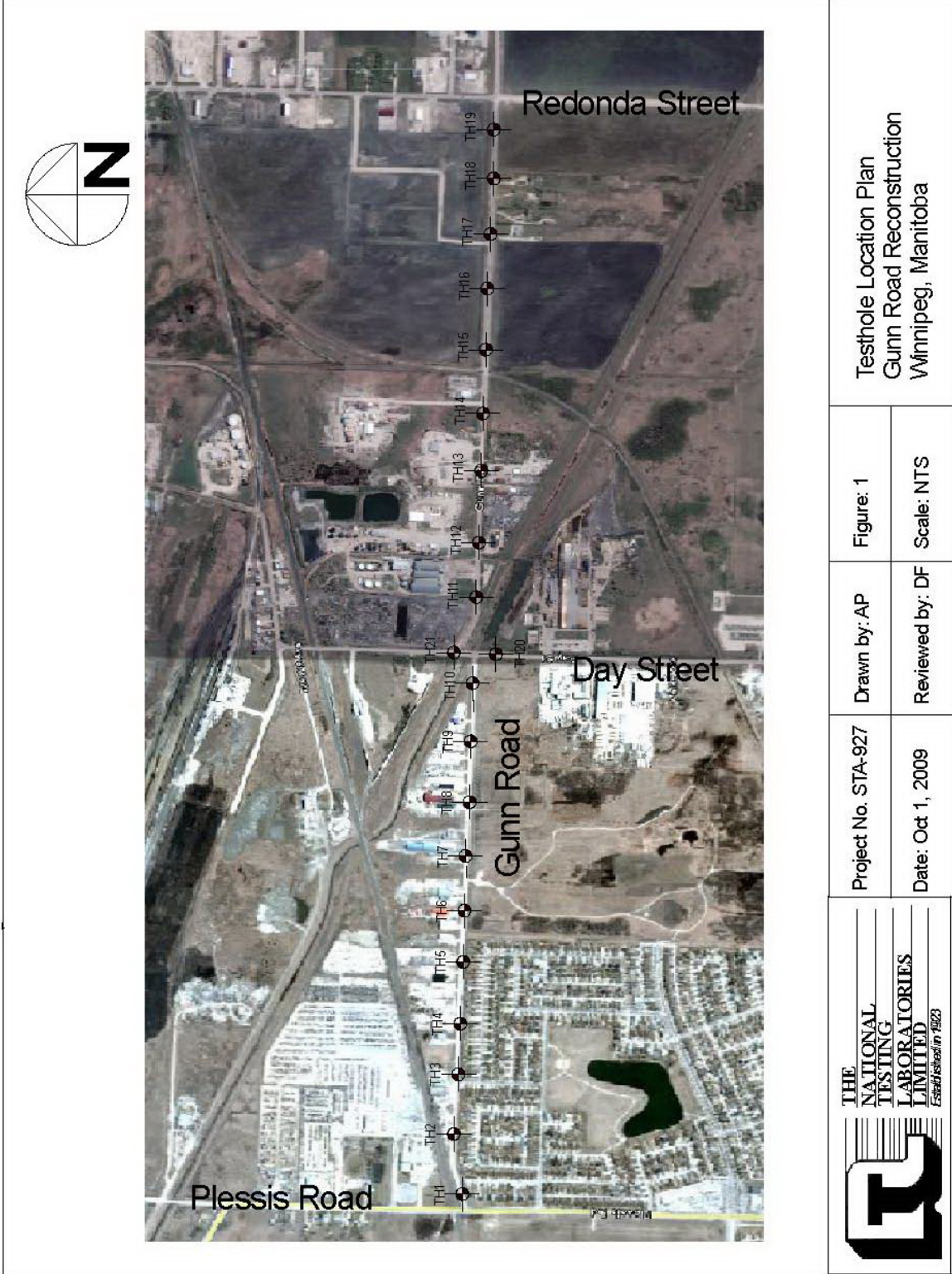
discussed in this report, we should be notified immediately in order that we may evaluate effects, if any, on the recommendations provided in this report. The recommendations presented in this report are applicable only to this specific site. These data should not be used for other purposes.


We appreciate the opportunity to assist you in this project. Please call me if you have any questions regarding this report.

A handwritten signature in cursive script that reads 'Don Flatt'.

Don Flatt, M. Eng., P.Eng.  
Senior Geotechnical Engineer





 <p><b>THE NATIONAL TESTING LABORATORIES LIMITED</b>  <small>Established in 1923</small></p>	<p>Project No. STA-927</p>	<p>Drawn by: AP</p>	<p>Testhole Location Plan          Gunn Road Reconstruction          Winnipeg, Manitoba</p>	
	<p>Date: Oct 1, 2009</p>	<p>Reviewed by: DF</p>	<p>Figure: 1</p>	<p>Scale: NTS</p>

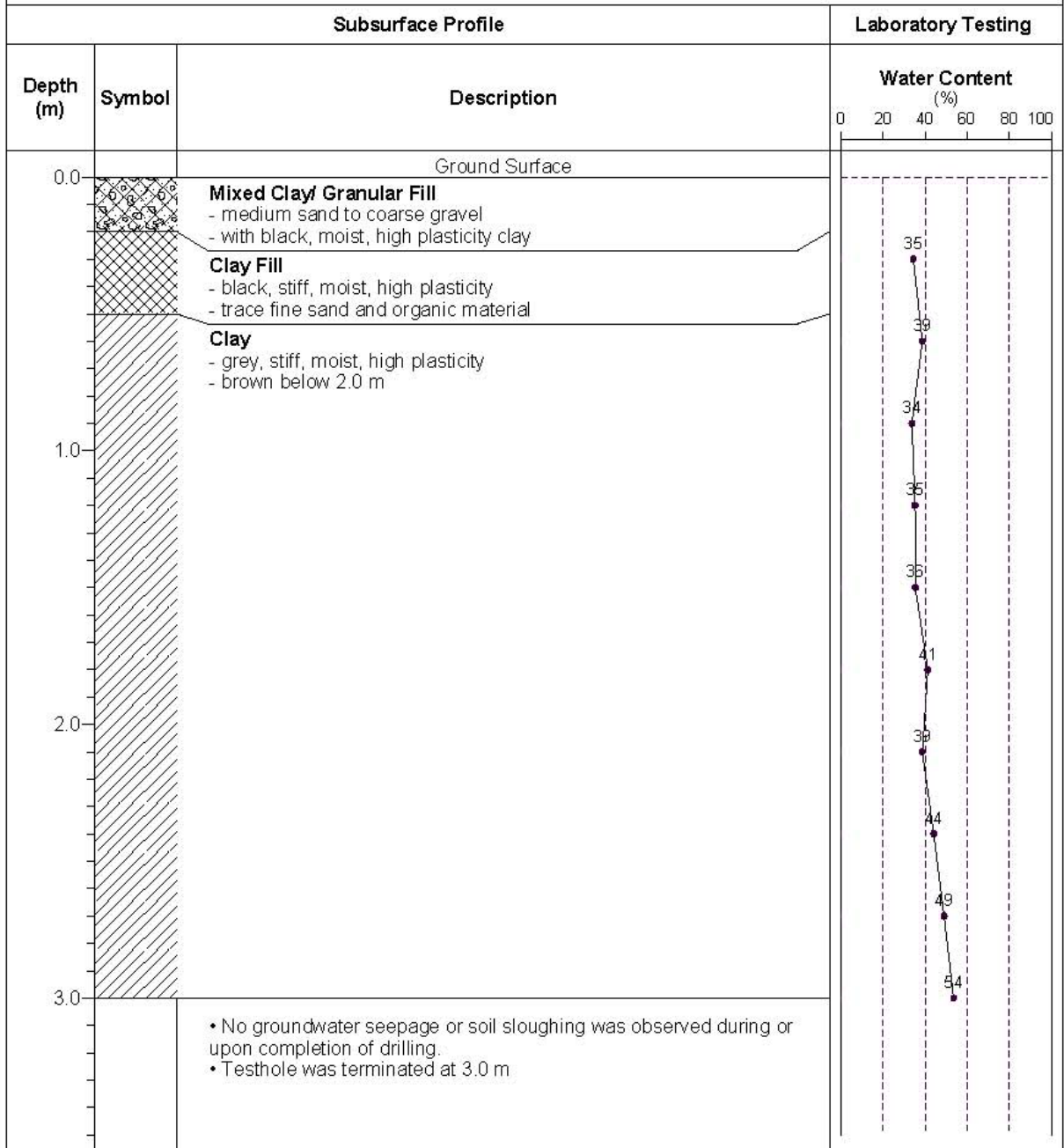


### TESTHOLE TH1



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt



### TESTHOLE TH2



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

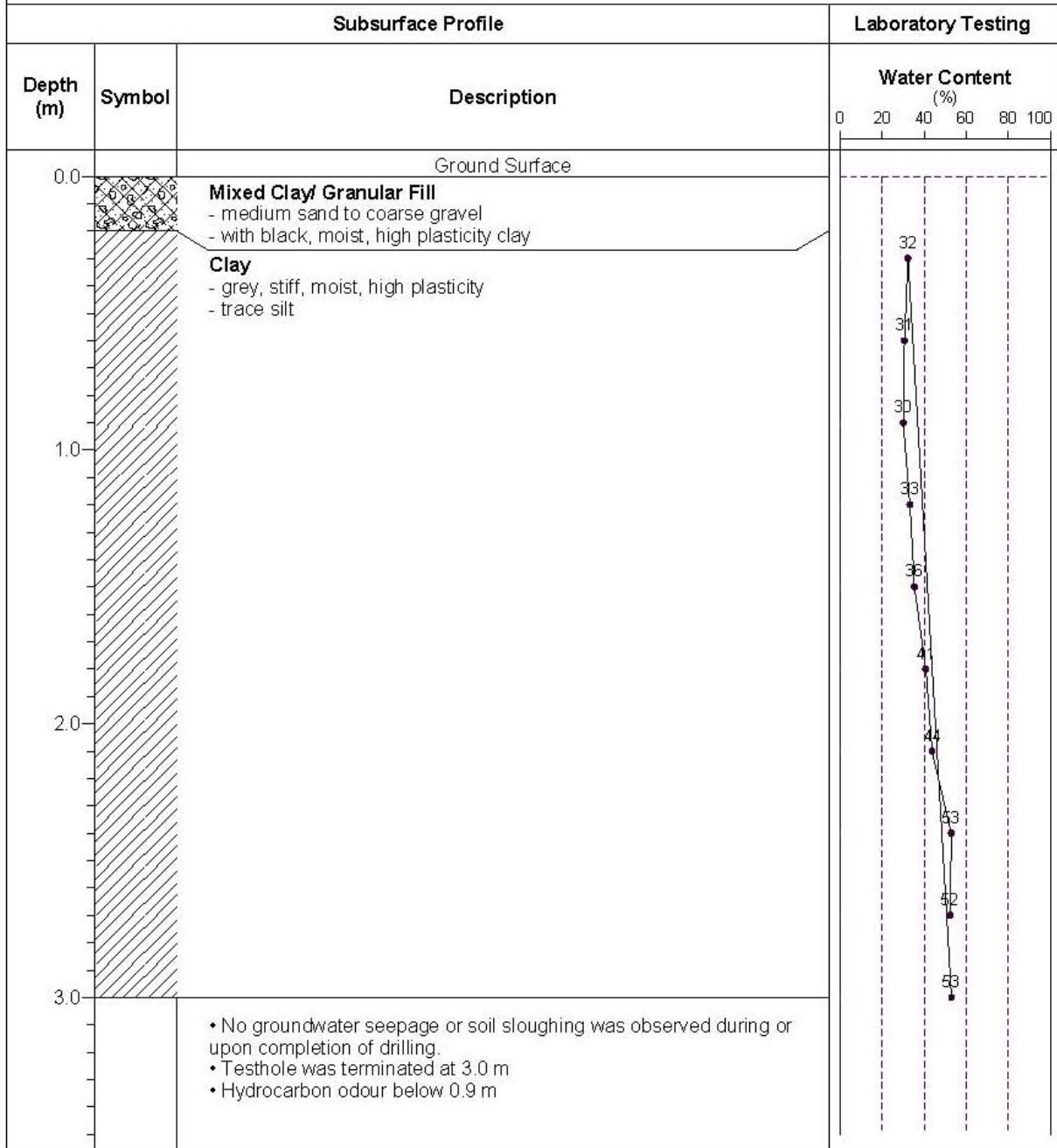
Subsurface Profile			Laboratory Testing
Depth (m)	Symbol	Description	Water Content (%)
Ground Surface			
0.0		<b>Mixed Clay/ Granular Fill</b> - medium sand to coarse gravel - with black, moist, high plasticity clay	
		<b>Clay Fill</b> - grey, stiff, moist, high plasticity - trace silt and fine sand	
1.0		<b>Clay</b> - grey to brown, stiff, moist, high plasticity - brown, trace silt below 1.8 m	
2.0			
3.0		<ul style="list-style-type: none"> <li>• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>• Testhole was terminated at 3.0 m</li> <li>• Hydrocarbon odour below 1.8 m</li> </ul>	

### TESTHOLE TH3



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt





### TESTHOLE TH4



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

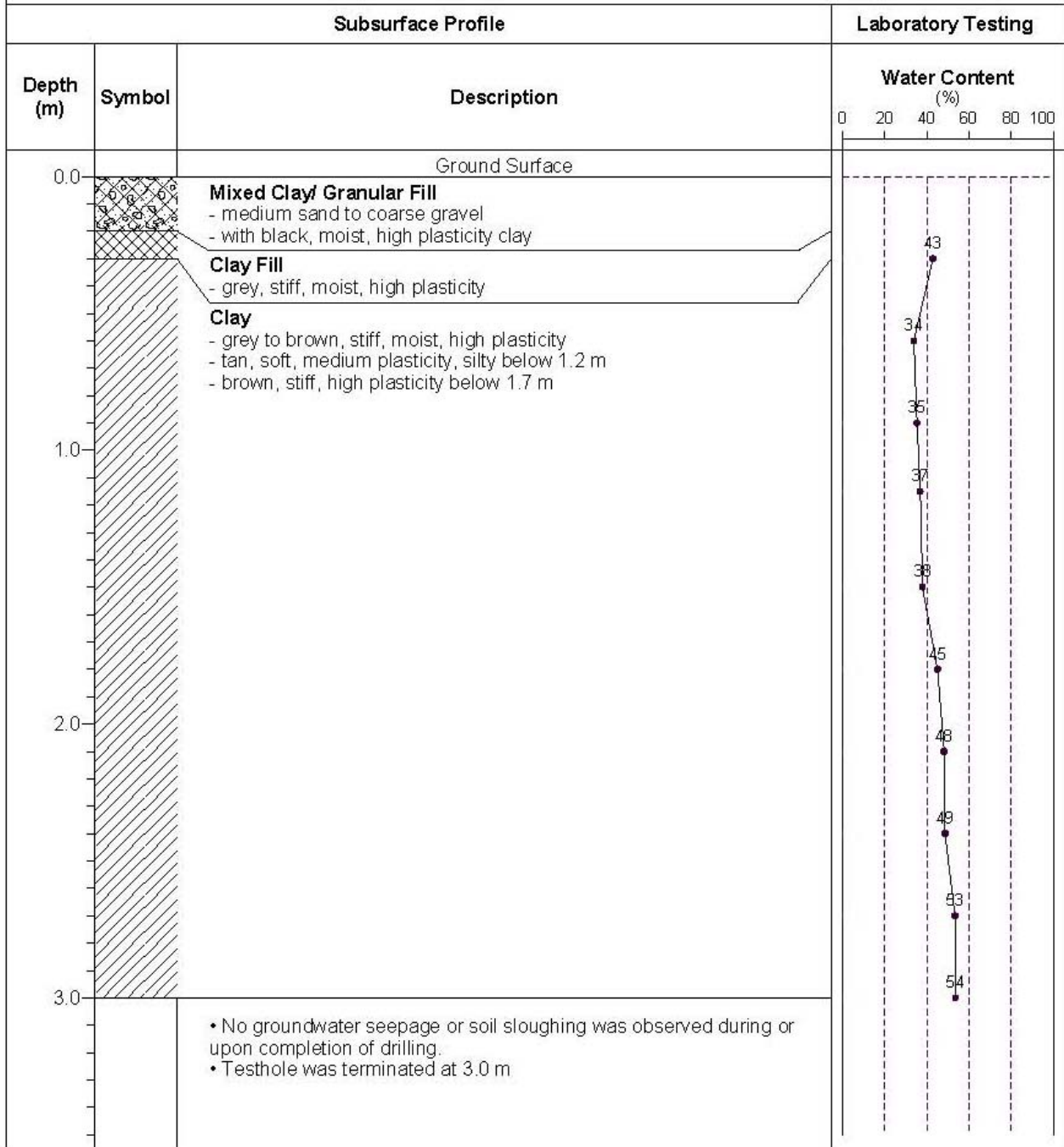
Subsurface Profile			Laboratory Testing
Depth (m)	Symbol	Description	Water Content (%)
Ground Surface			
0.0		<b>Mixed Clay/ Granular Fill</b> - medium sand to coarse gravel - with black, moist, high plasticity clay	11
		<b>Clay</b> - grey to brown, stiff, moist, high plasticity	38
1.0		<b>Silt</b> - brown, soft, moist, low plasticity - some sand and clay	39
		<b>Clay</b> - brown, stiff, moist, high plasticity	29
2.0			31
			41
			45
			51
			52
3.0			53
<ul style="list-style-type: none"> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole was terminated at 3.0 m</li> <li>Hydrocarbon odour below 0.9 m</li> </ul>			

### TESTHOLE TH5



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

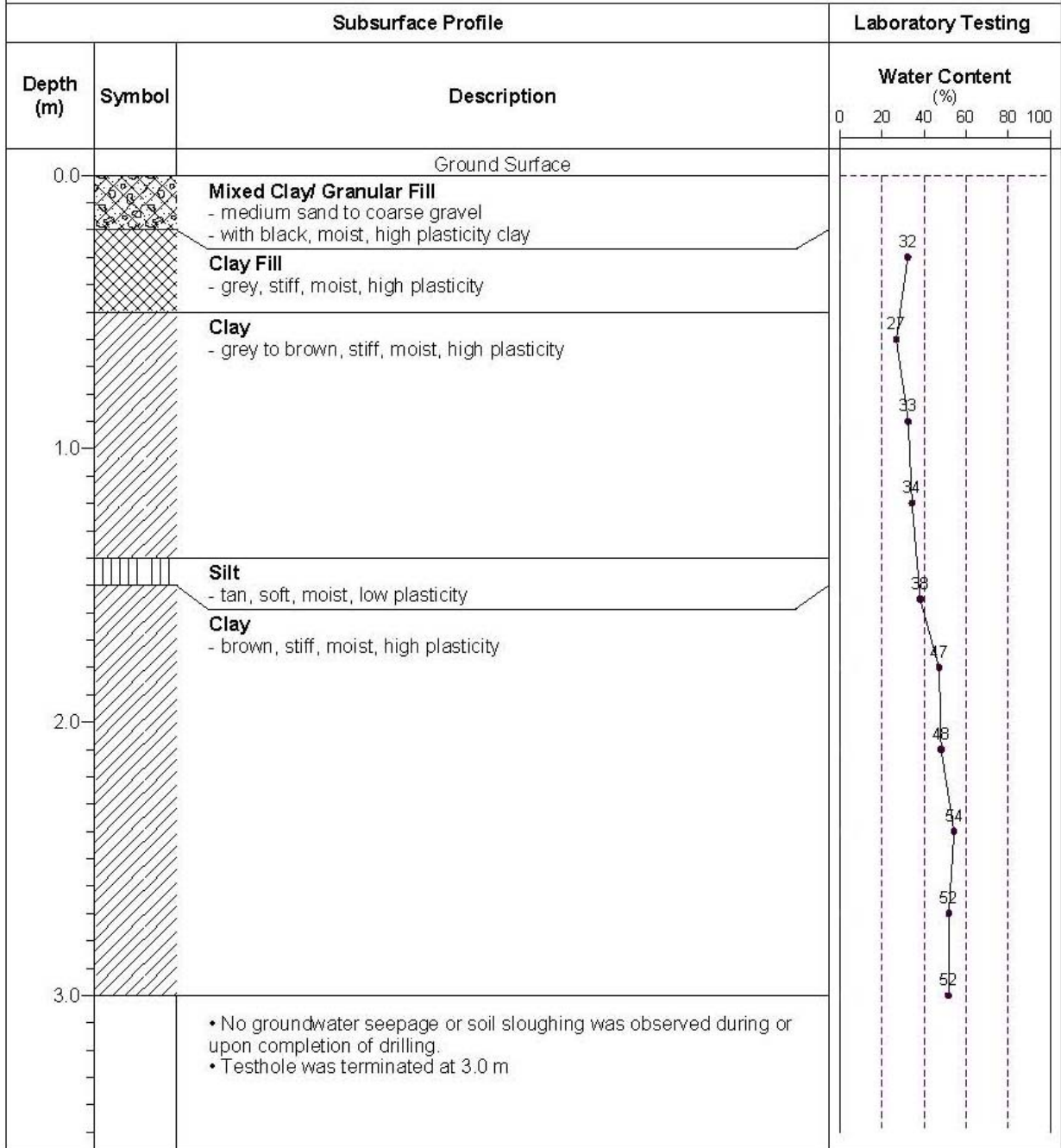


### TESTHOLE TH6



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

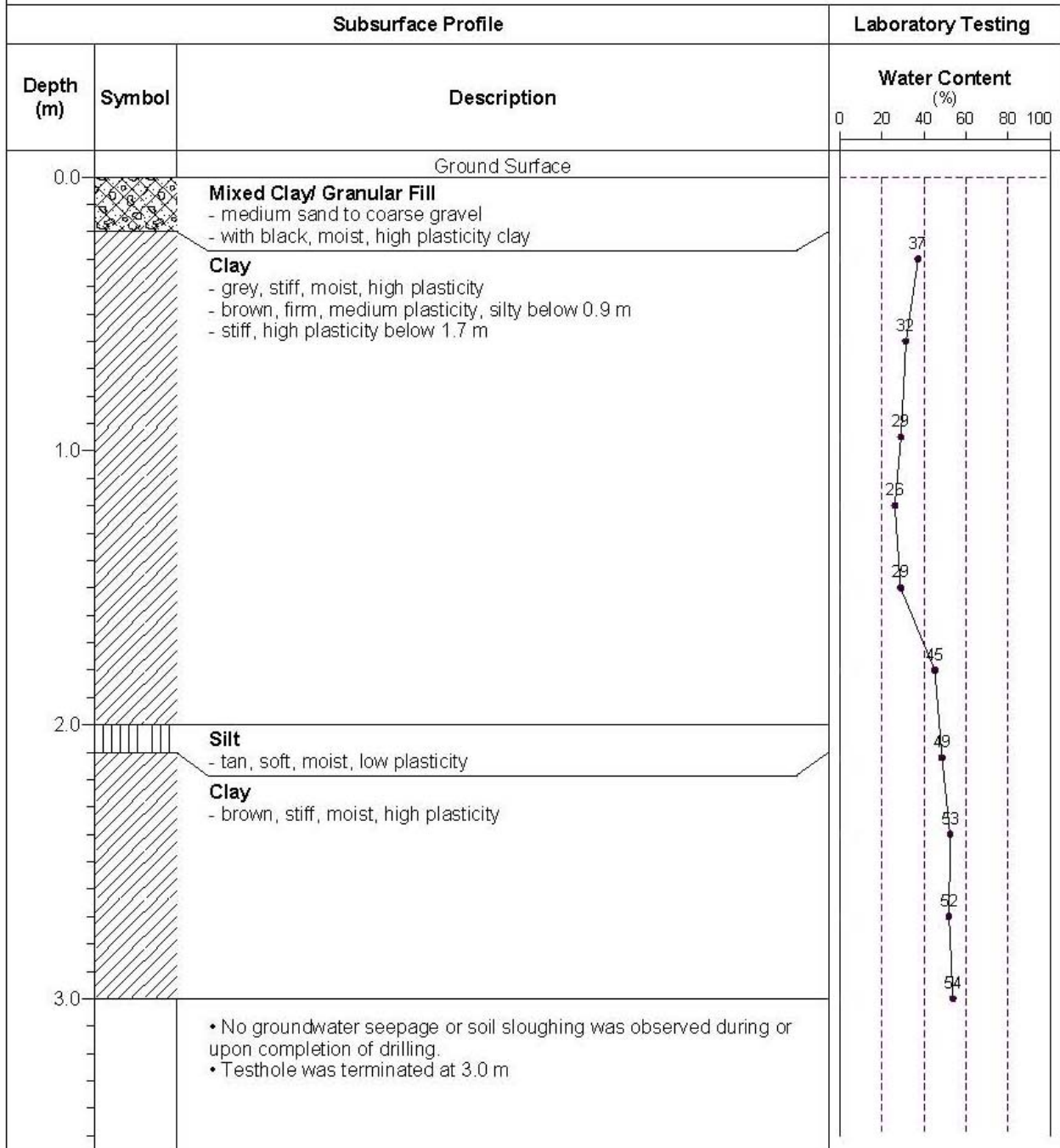


### TESTHOLE TH7



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt



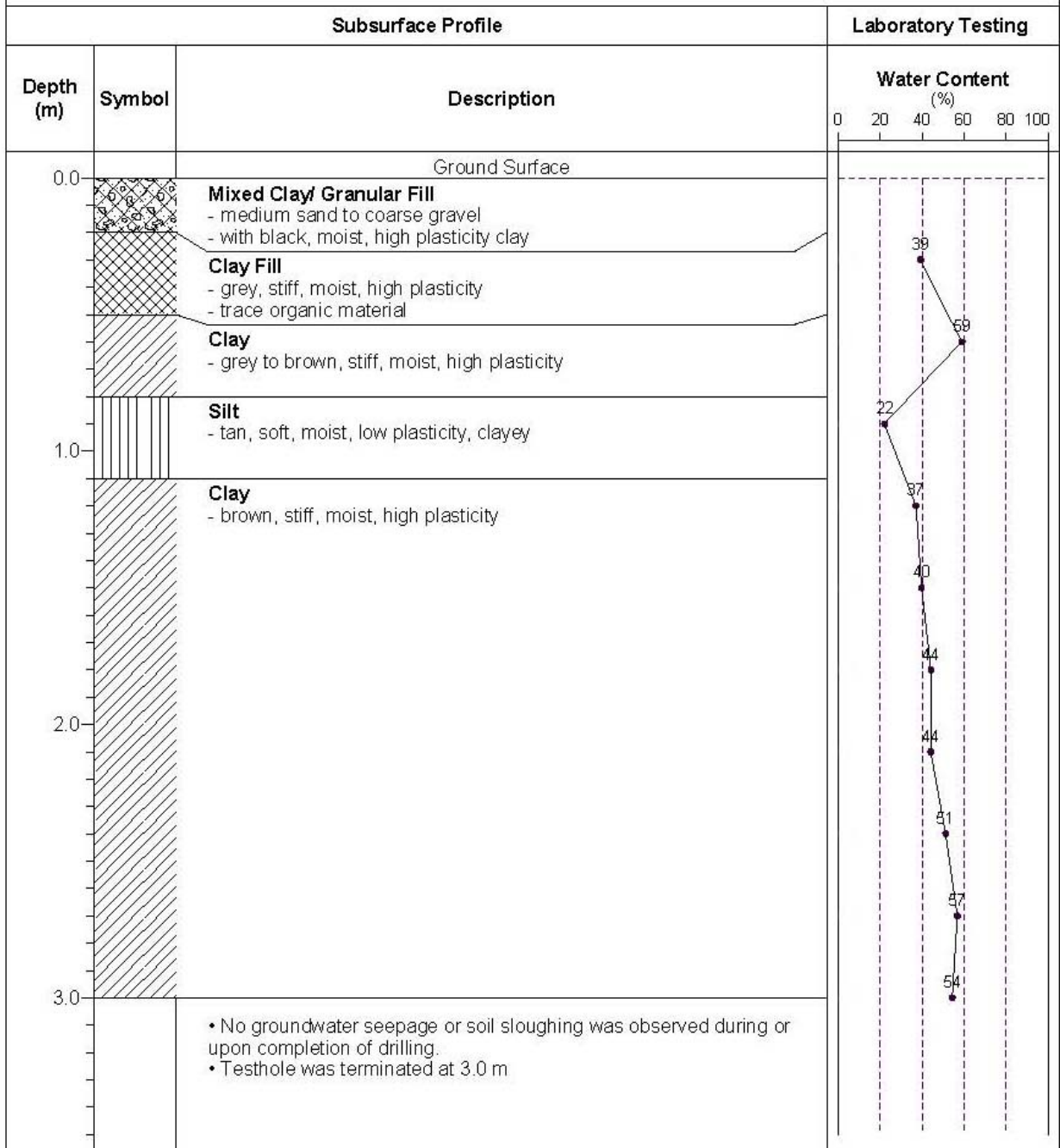


### TESTHOLE TH8



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

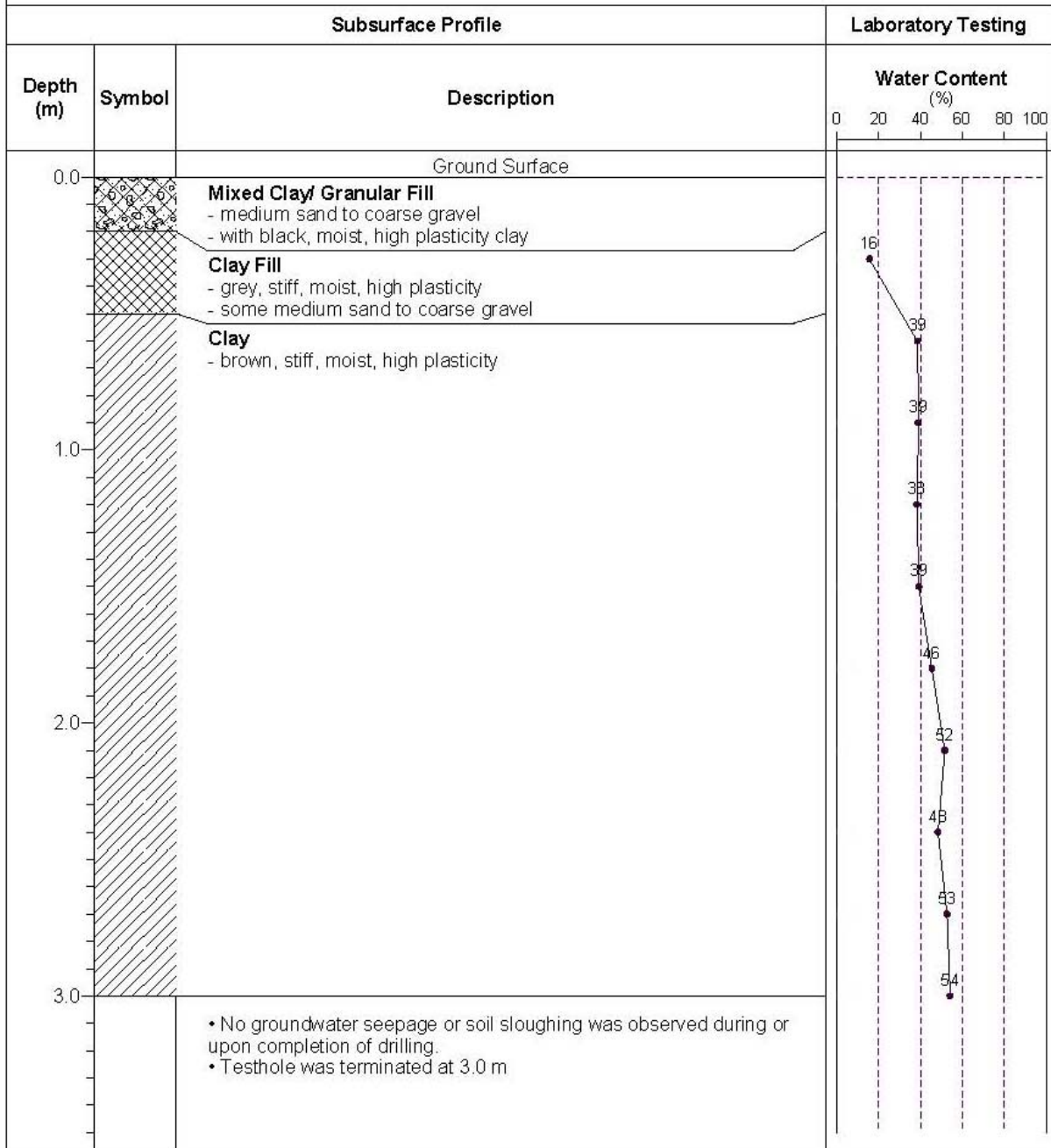


### TESTHOLE TH9



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

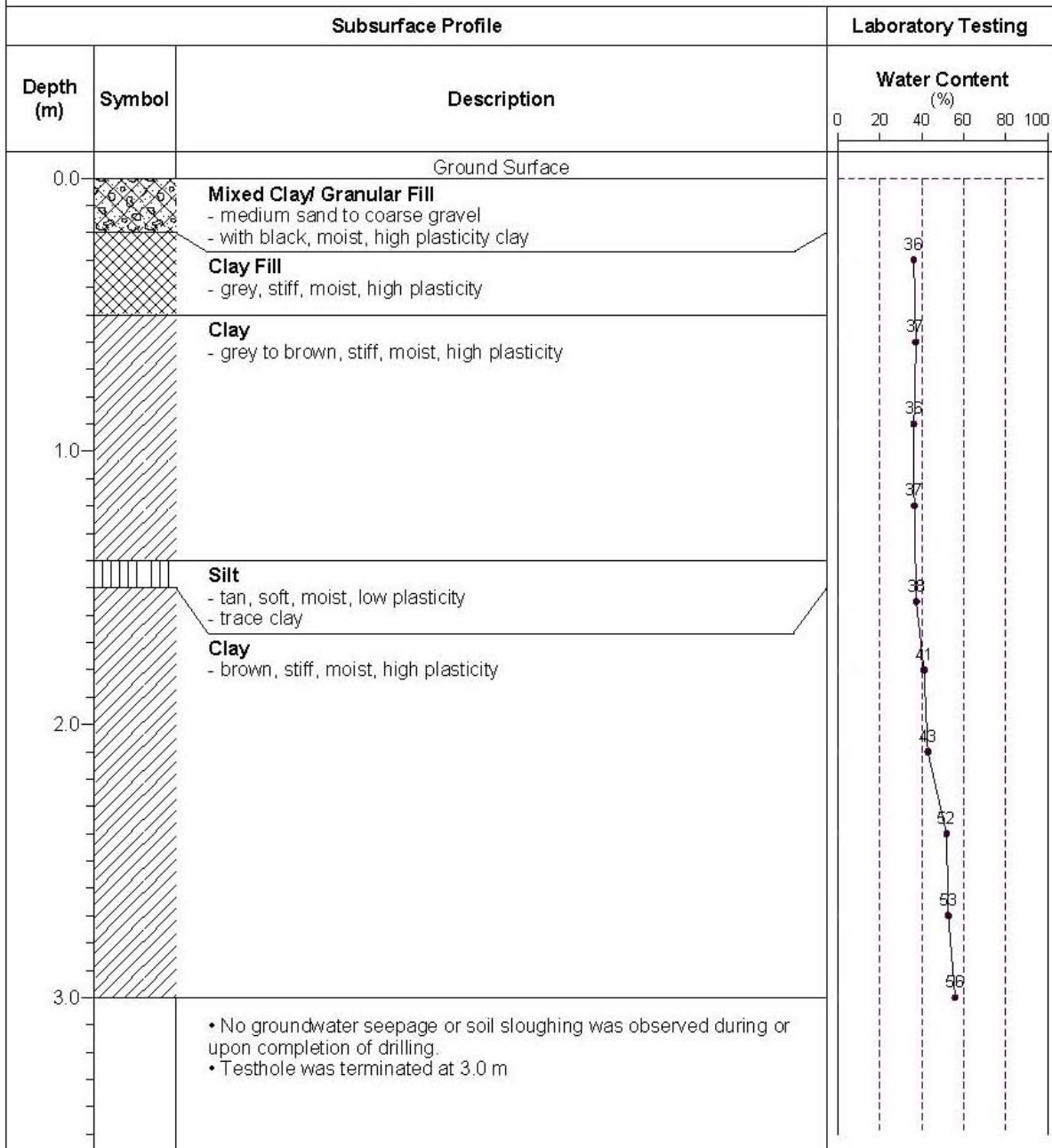


### TESTHOLE TH10



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

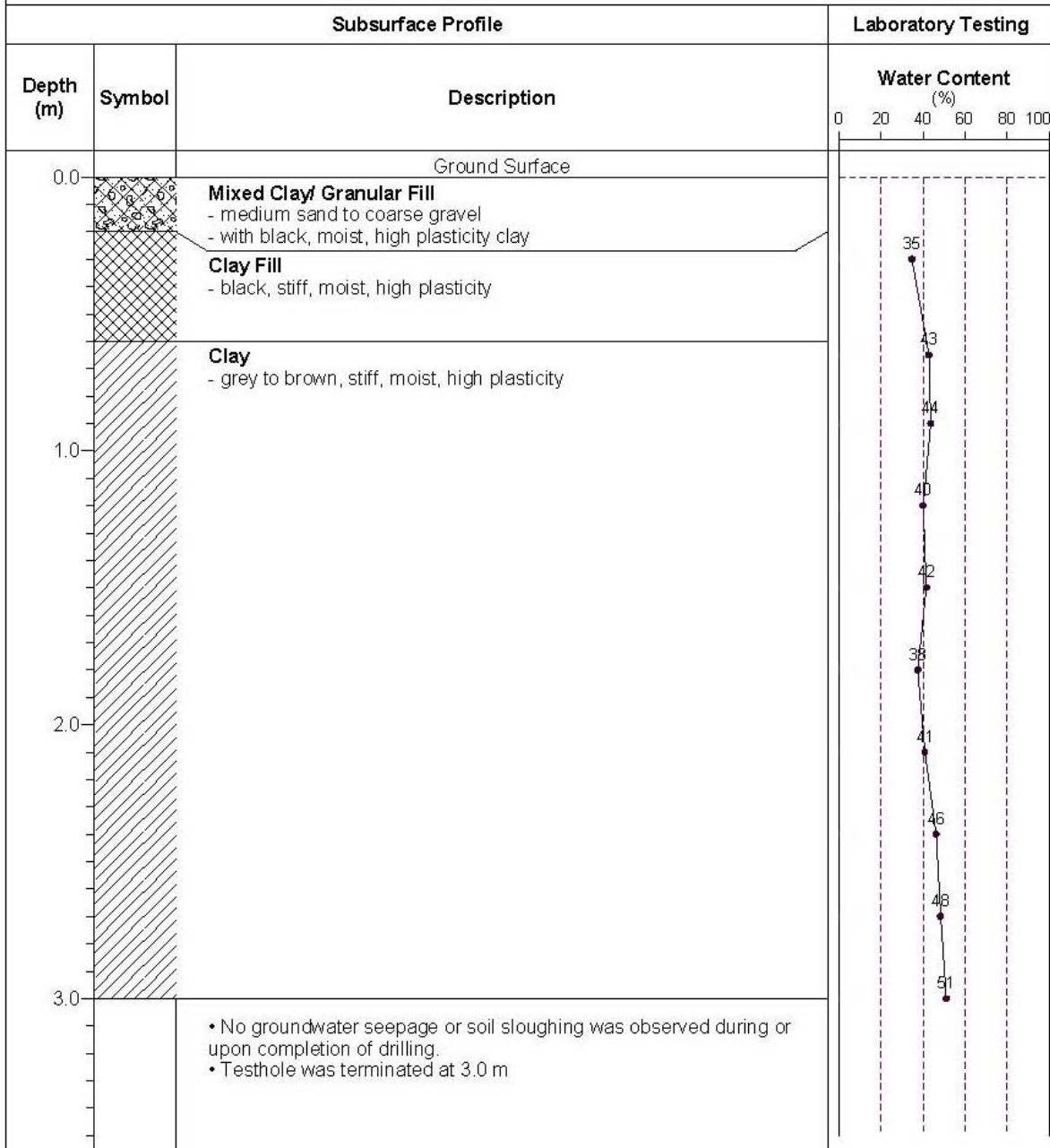


### TESTHOLE TH11



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt



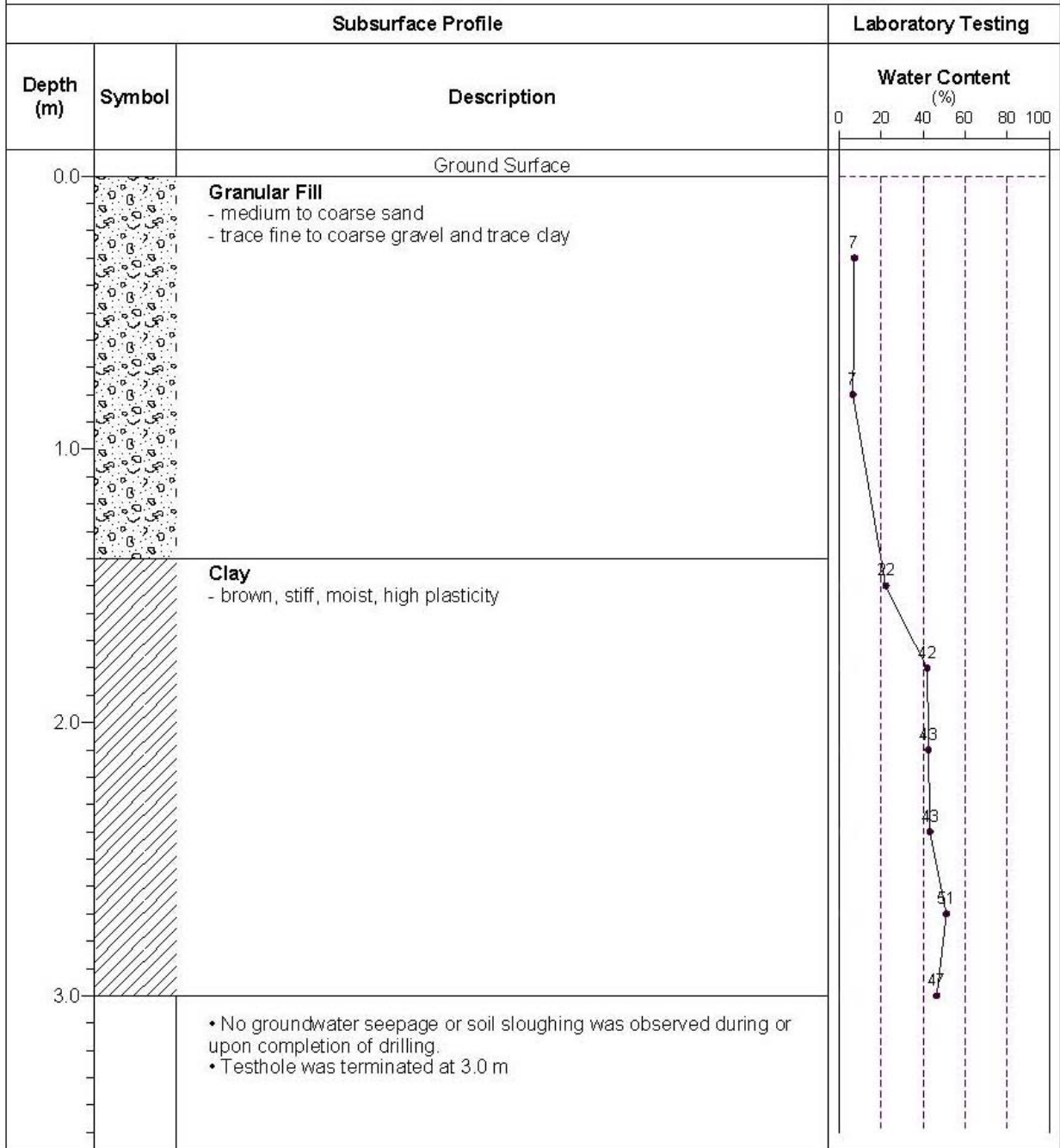


### TESTHOLE TH12



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt



### TESTHOLE TH13



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

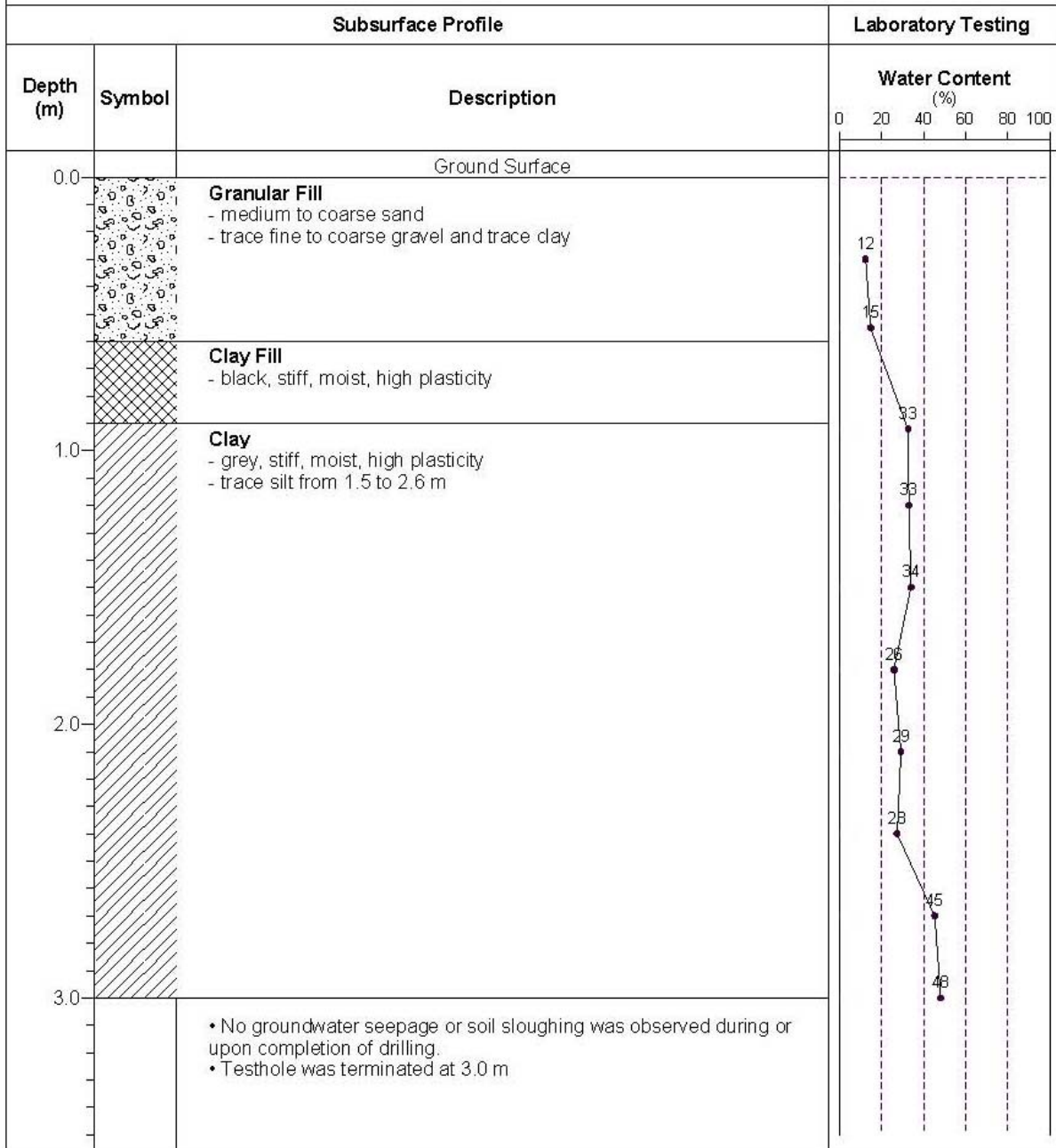
Subsurface Profile			Laboratory Testing
Depth (m)	Symbol	Description	Water Content (%)
Ground Surface			
0.0		<b>Granular Fill</b> - medium to coarse sand - trace fine to coarse gravel and trace clay	8
1.0			11
1.5			15
2.0		<b>Clay Fill</b> - grey, stiff, moist, high plasticity - some concrete debris observed at bottom of clay fill layer	45
2.5			52
3.0		<b>Clay</b> - brown, stiff, moist, high plasticity	50
3.0			56
<ul style="list-style-type: none"> <li>Moderate groundwater seepage was observed below a depth of 1.2 m from the granular fill.</li> <li>Groundwater level at a depth of 1.2 m upon completion of drilling.</li> <li>No soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole was terminated at 3.0 m.</li> </ul>			

### TESTHOLE TH14



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt



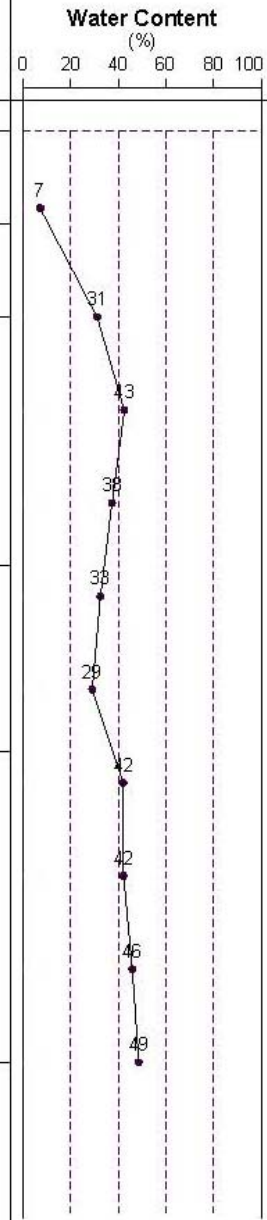
### TESTHOLE TH15



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

Subsurface Profile			Laboratory Testing
Depth (m)	Symbol	Description	Water Content (%)
0.0		Ground Surface	
		<b>Mixed Clay/ Granular Fill</b> - medium sand to coarse gravel - with black, moist, high plasticity clay	
		<b>Clay Fill</b> - black, stiff, moist, high plasticity	
		<b>Clay</b> - brown, stiff, moist, high plasticity	
1.0			
		<b>Silt</b> - tan, soft, moist, low plasticity, clayey	
2.0			
		<b>Clay</b> - brown, stiff, moist, high plasticity	
3.0			
		<ul style="list-style-type: none"> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole was terminated at 3.0 m</li> </ul>	



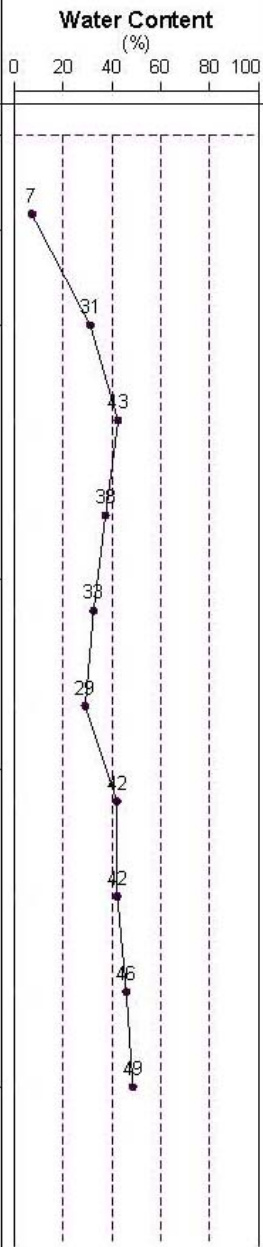
### TESTHOLE TH15



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 19, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

Subsurface Profile			Laboratory Testing
Depth (m)	Symbol	Description	Water Content (%)
0.0		Ground Surface	
		<b>Mixed Clay/ Granular Fill</b> - medium sand to coarse gravel - with black, moist, high plasticity clay	
		<b>Clay Fill</b> - black, stiff, moist, high plasticity	
		<b>Clay</b> - brown, stiff, moist, high plasticity	
1.0			
		<b>Silt</b> - tan, soft, moist, low plasticity, clayey	
2.0			
		<b>Clay</b> - brown, stiff, moist, high plasticity	
3.0			
		<ul style="list-style-type: none"> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole was terminated at 3.0 m</li> </ul>	





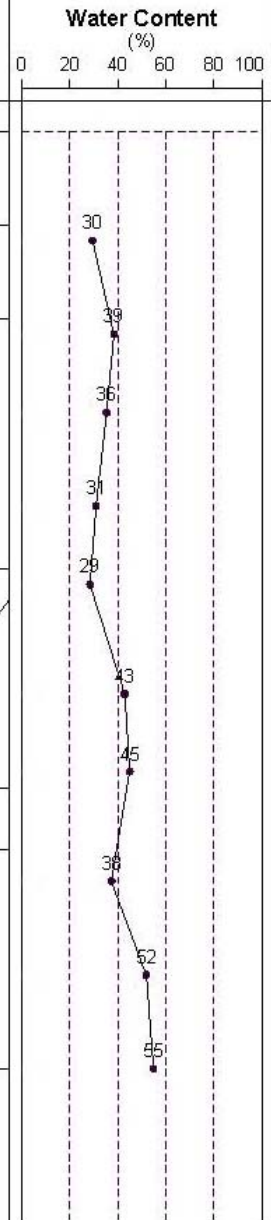
### TESTHOLE TH16



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 20, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

Subsurface Profile			Laboratory Testing
Depth (m)	Symbol	Description	Water Content (%)
Ground Surface			
0.0		<b>Mixed Clay/ Granular Fill</b> - medium sand to coarse gravel - with black, moist, high plasticity clay	
		<b>Clay Fill</b> - black, stiff, moist, high plasticity - trace fine to coarse gravel	
		<b>Clay</b> - brown to grey, stiff, moist, high plasticity	
1.0			
		<b>Silt</b> - tan, soft, moist, low plasticity - trace clay	
		<b>Clay</b> - brown, stiff, moist, high plasticity	
2.0			
		<b>Silt</b> - tan, soft, moist, low plasticity	
		<b>Clay</b> - brown, stiff, moist, high plasticity	
3.0			
		<ul style="list-style-type: none"> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole was terminated at 3.0 m</li> </ul>	

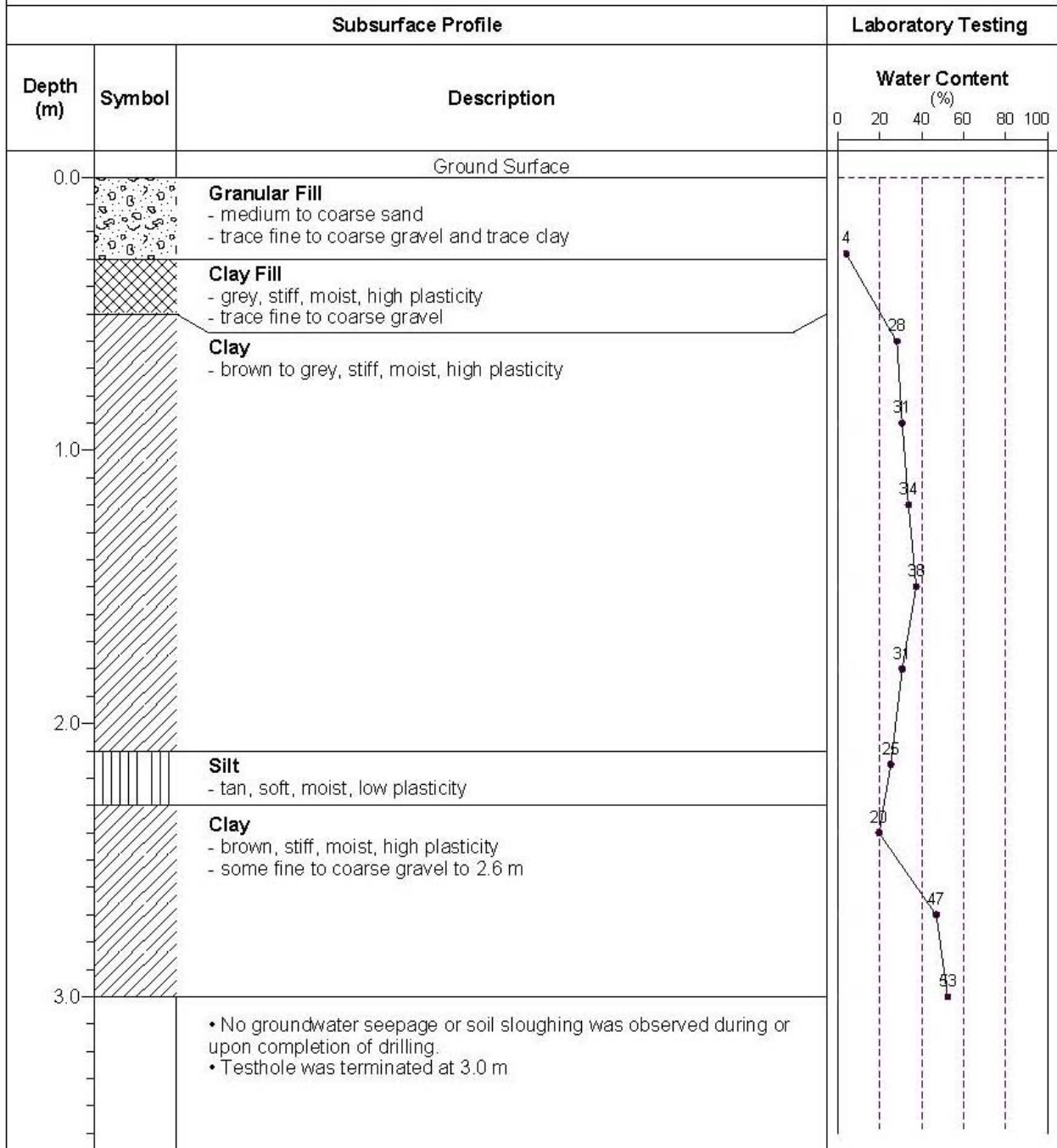


### TESTHOLE TH17



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 20, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt



### TESTHOLE TH18



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 20, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

Subsurface Profile			Laboratory Testing
Depth (m)	Symbol	Description	Water Content (%)
0.0		Ground Surface	
		<b>Granular Fill</b> - medium to coarse sand - trace fine to coarse gravel and trace clay	
		<b>Clay Fill</b> - black, stiff, moist, high plasticity - trace fine to coarse gravel	
		<b>Clay</b> - grey to brown, stiff, moist, high plasticity - 0.2 m silt layer at 1.8 m	
3.0		<ul style="list-style-type: none"> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole was terminated at 3.0 m</li> </ul>	

Water Content (%)
20
30
35
36
38
43
45
46
50
53



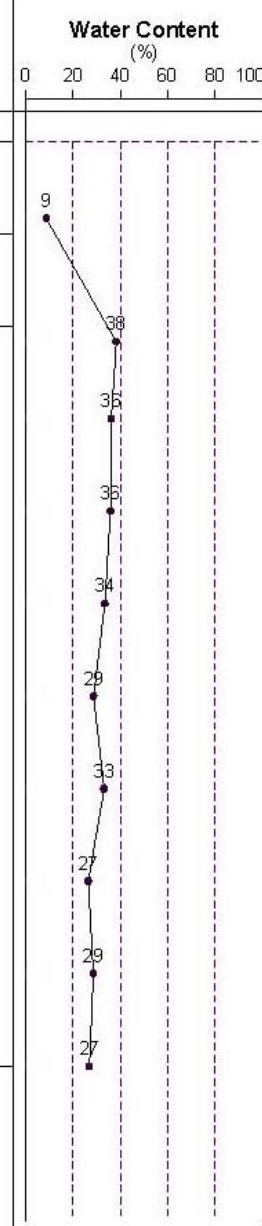
### TESTHOLE TH19



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 20, 2009  
**Depth of Testhole:** 3.0 m  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

Subsurface Profile			Laboratory Testing
Depth (m)	Symbol	Description	Water Content (%)
0.0		Ground Surface	
		<b>Granular Fill</b> - medium to coarse sand - trace fine to coarse gravel and trace clay	
		<b>Clay Fill</b> - black, stiff, moist, high plasticity - trace fine to coarse gravel	
		<b>Clay</b> - grey to brown, stiff, moist, high plasticity - silty below 2.9 m	
3.0		<ul style="list-style-type: none"> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole was terminated at 3.0 m</li> </ul>	

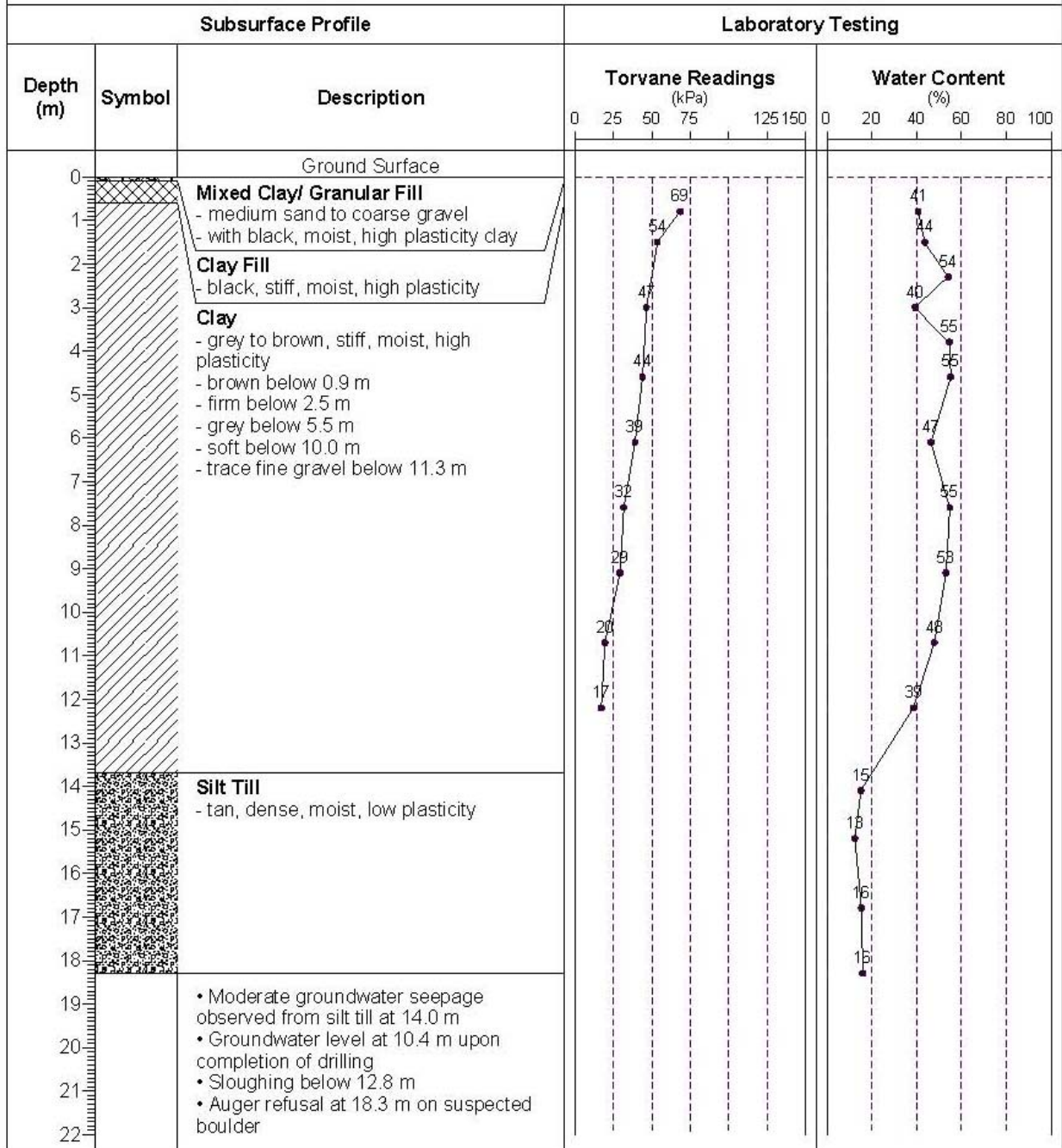


### TESTHOLE TH20



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 20, 2009  
**Depth of Testhole:** 18.3  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt

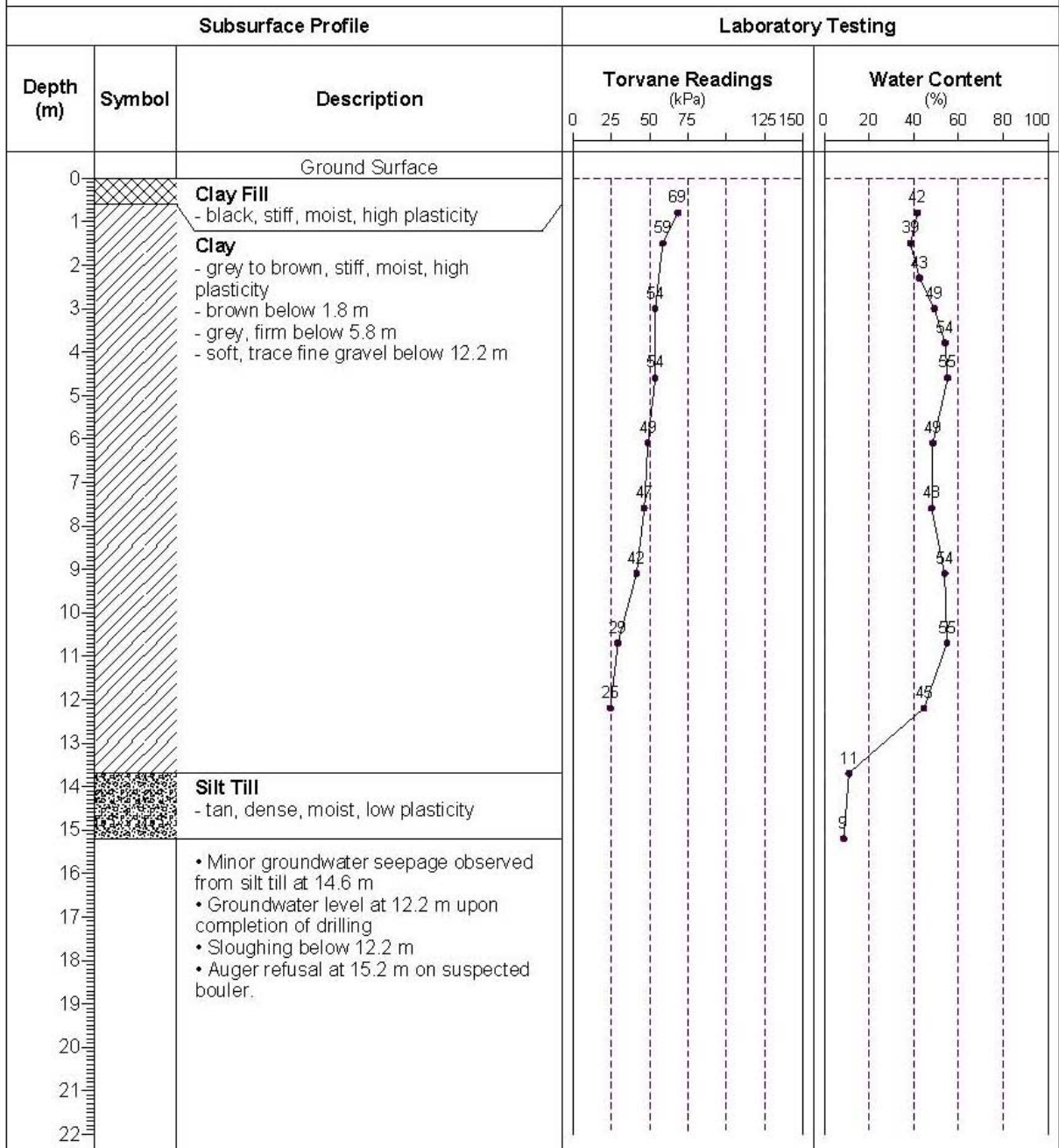


### TESTHOLE TH21



**Project Name:** Gunn Road Reconstruction  
**Client:** Stantec Consulting Ltd.  
**Drilling Contractor:** Paddock Drilling Ltd.  
**Drilling Method:** 125 mm Auger

**Date Drilled:** August 20, 2009  
**Depth of Testhole:** 18.3  
**Logged by:** Farouk Fourar  
**Reviewed by:** Don Flatt



# **APPENDIX 'B'**

## **CPR GUIDELINES**

## APPENDIX 'B' – CPR GUIDELINES

# **CANADIAN PACIFIC RAILWAY** Ingenuity. Procurement: Safety Requirements

[Salvage And Procurement Home](#)

### MINIMUM SAFETY REQUIREMENTS FOR CONTRACTORS WORKING ON RAILWAY PROPERTY

#### **TABLE OF CONTENTS**

SR1 INTRODUCTION
SR2 GENERAL
SR3 PERSONAL ATTIRE
SR4 PERSONAL PROTECTIVE EQUIPMENT
SR5 PERSONAL CONDUCT
SR6 PROTECTION OF RAILWAY TRAFFIC AND PROPERTY
SR7 TRAIN MOVEMENTS AND WORKING NEAR TRACKS
SR8 TOOLS, EQUIPMENT AND MACHINERY
SR9 CRANES
SR10 CLEANUP, ENVIRONMENT AND FIRE PREVENTION
SR11 HAZARDOUS MATERIALS and RESPONSIBLE CARE
SR12 FIRST AID, INCIDENT AND ACCIDENT REPORTING
SR13 JOB BRIEFINGS
SR14 CONTRACTOR SAFETY POLICY
SR15 CONSTRUCTION SAFETY PLAN
SR16 COMPLIANCE WITH SAFETY REQUIREMENTS
TABLE A - EMERGENCY INFORMATION SHEET

#### **SR1 INTRODUCTION**

- 1.1 At Canadian Pacific Railway (“**CPR**”), safety is an integral part of the way we do business. We expect everyone working on Canadian Pacific Railway’s property (“**Railway property**”) to be unconditionally committed to safety. Safety must be given top priority and will take precedence over deadlines, production schedules, and all other considerations.

#### **SR2 GENERAL**

- 2.1 The Contractor shall be solely responsible for the safety of it’s agents, employees and subcontractors (“**Contractor Personnel**”).

- 2.2 The Contractor shall comply with all health and safety legislation, regulations and codes applicable to the work.
- 2.3 Contractor shall ensure that all Contractor's Personnel comply with the following safety requirements when working on Railway property. The Contractor shall have a copy of the following documents on site at all times:
- 2.3.1 Canadian Pacific Railway's Minimum Safety Requirements for Contractors Working on Railway Property.
  - 2.3.2 Contractor's construction safety plan pursuant to section SR15 (if applicable).
  - 2.3.3 Contractor's Emergency Information Sheet pursuant to section SR15.
  - 2.3.4 Contractor's safety policies, rules and work procedures pursuant to SR14.
- 2.4 Access to Railway property for any Contractor Personnel is at CPR's sole discretion. Such access is only for the purpose of Contractor Personnel performing services for CPR, and only for the duration of Contractor's contract with CPR. Contractor shall ensure that Contractor Personnel wear appropriate Contractor photo identification and/or visitor tags while on Railway property, and have appropriate documentation to verify the services being performed for CPR. Contractor shall ensure that Contractor Personnel comply with CPR's instructions regarding security restrictions or other restrictions resulting from emergent conditions.

### **SR3 PERSONAL ATTIRE**

- 3.1 Contractor shall ensure that Contractor Personnel wear clothing required by applicable legislation, regulation and codes and suitable to perform job functions safely, protect against hazards to the skin and adequate for existing weather conditions.

### **SR4 PERSONAL PROTECTIVE EQUIPMENT**

- 4.1 Contractor shall ensure that Contractor Personnel wear personal protective equipment required by applicable legislation, regulations and codes and as necessary to protect against personal injuries while on Railway property, and in accordance with this Article SR4. All personal protective equipment shall be approved by the Canadian Standards Associations (CSA) or by the American National Standards Institute (ANSI), and shall be in good condition and be properly fitted.
- 4.2 The following mandatory protective equipment shall be supplied by the Contractor at its own expense, and Contractor shall ensure that it is worn by Contractor Personnel on Railway property:
- 4.2.1 Safety hard hat shall be worn at all times, except inside enclosed vehicles or equipment.
  - 4.2.2 Safety boots shall be worn at all times. They must have puncture resistant soles and meet CSA Z195 Grade One, Green Triangle, or US ANSI Z41-1999, Section 5 standards.
  - 4.2.3 Eye and face protective equipment should be worn as determined necessary by the Contractor, based upon the contractor's risk assessment. Examples of eye and face protective equipment include safety glasses with side shields, goggles, face shields

and welding helmets.

4.2.4 Hearing protectors shall be worn in all designated locations and as required by any applicable governing legislation, regulations or codes.

4.2.5 Appropriate respirators shall be worn whenever work processes create airborne particulates (i.e. dust, mist, vapour or fumes).

High visibility fluorescent orange work wear with reflective striping shall be worn whenever work is being done on Railway property.

High visibility work wear must not be covered by other clothing or equipment, except where necessary for safety reasons such as where fall protection or pole climbing equipment is being used.

## **SR5 PERSONAL CONDUCT**

5.1 Entry upon Railway property when in possession of, or under the influence of intoxicants, narcotics, controlled substances or medication which may in any way adversely affect alertness, concentration, reaction response time or safety is prohibited. Contractors must have appropriate programs and processes in place to ensure that Contractor Personnel are in compliance with this requirement.

5.2 CPR is committed to providing and maintaining a work environment that supports the dignity of all individuals and will not tolerate any discrimination, harassment or violence in the workplace. Contractor shall ensure that Contractor Personnel conduct themselves in a manner consistent with these principles.

5.3 Possessing or using any alcoholic beverage or drug is prohibited when working on Railway property:

5.4 Smoking is prohibited in all buildings and on all Railway property, except where CPR management has designated an outdoor smoking area.

## **SR6 PROTECTION OF RAILWAY TRAFFIC AND PROPERTY**

6.1 The work shall be organized and executed in such a manner as to ensure no interference with the regularity and safety of railway operations. No step in any sequence of operations which might either directly or indirectly affect the regularity or safety of railway traffic shall be started until approval of the project manager has been obtained. No temporary structure, materials, or equipment shall be permitted closer than 12 feet (3.66 meters) to the nearest rail of any track without prior approval in writing of the project manager.

6.2 No work shall be done on, or use made of, any trackage without approval by the project manager and then only under the direct supervision of a qualified CPR flagperson.

6.3 The Contractor shall, at all times, conduct its operations in a wholly responsible manner to avoid damage to the CPR's trackage or property.

6.4 Signs, signals and flags necessary for the safe operation of the railway shall not be obstructed, removed, relocated, or altered in any way without proper authorization.

6.5 Blue flag protection on tracks signifies CPR employees are on, under or between rolling



- stock equipment. Blue flags are important safety devices and must not be touched or obstructed.
- 6.6 Only qualified CPR personnel are permitted to operate switch, derail, electric locking mechanisms or other appliances. The Contractor shall keep equipment, material and Contractor Personnel clear of these facilities at all times. Neither Contractor nor Contractor Personnel shall operate or tamper with any signal or communication systems or any other railway safety devices.
- 6.7 While railway traffic is passing through the work area, the mechanisms for securing rotating equipment must be used to prevent rotational movement. Buckets on shovels must be lowered to the ground to rest. Operators shall get out of their equipment and position themselves in a safe area.
- 6.8 Construction equipment parked on Railway property on nights or weekends shall be secured in a safe position well clear of all tracks. As much as possible, materials shall be stored in locations where they are not subject to public viewing in order to prevent vandals from using them to cause derailments or damage to Railway property. Scrap materials shall be disposed of as soon as possible.
- 6.9 Before starting excavation operations, the Contractor shall ascertain that there are no underground wires, fibre optic cables, pipelines or other facilities which could be damaged or that such installations are properly protected. Excavations shall not be left unattended unless they are properly protected; and the CPR supervisor shall be notified.
- 6.10 Fibre optic cables are present on most segments of the right-of-way. Prior to commencing any excavation, the Contractor shall contact the proper authority to locate and protect such cables.
- 6.11 Railway pole lines carry electric power and should be treated as any other power wires.
- 6.12 Any Contractor Personnel discovering a hazardous or potentially unsafe condition which may affect the safe passage of railway traffic must advise CPR immediately.

## **SR7 TRAIN MOVEMENTS AND WORKING NEAR TRACKS**

- 7.1 The Contractor shall ensure that all Contractor Personnel are aware of and comply with the following safety rules which apply to working near railway tracks:
- 7.1.1 Personnel shall be alert to train movement shall expect the movement of trains, engines, cars, or other moveable equipment at any time, on any track, and in either direction, even cars on sidings that appear to be stationary or in storage. Stay at least 50 feet (15 meters) away from the ends of stationary cars when crossing the track, and never climb on, under or between cars. To cross tracks, personnel shall look both ways, and if the tracks are clear, walk at a right angle to them.
- 7.1.2 Personnel shall not rely on others to protect them from train movement. The responsibility is theirs for safety on the railway.
- 7.1.3 Personnel shall not stand on the track in front of an approaching engine, car or other equipment.
- 7.1.4 Personnel shall be aware of the location of structures or obstructions where



clearances are close.

- 7.1.5 Personnel shall not stand or walk on railroad tracks, either between the rails or on the ends of ties unless absolutely necessary. Personnel shall stay clear of tracks whenever possible.
- 7.1.6 Within the United States, "ON TRACK SAFETY" rules apply. This is a set of rules, developed and promulgated by the Federal Railroad Administration (FRA), that must be complied with to work on or near Railroad property. Specific training and obedience of their rules are a requirement of the FRA. Significant fines can result from the violation of these rules.
- 7.1.7 No work activities or processes are allowed within 50 feet (15 meters) of the track centerline while trains are passing through the work site. Personnel shall always stand as far back as possible to prevent injury from flying debris or loose rigging. Also, personnel shall observe the train as it passes and be prepared to take evasive action in the event of an emergency.
- 7.1.8 Personnel shall not remain in a vehicle that is within 50 feet (15 meters) of a passing train, and shall not drive near moving trains. Personnel shall move vehicles away from the tracks at least 50 feet (15.24 meters), or park the vehicle away from the tracks and walk to a safe distance whenever trains pass.
- 7.1.9 Personnel shall not stand on or between adjacent tracks in multiple track territory when a train is passing. Personnel shall be especially alert in yards and terminal areas as engines may be pushing cars, or cars may be moving without any engine attached.
- 7.1.10 Personnel shall not walk, stand or sit on the rails. As the rail surface can be extremely slippery, personnel must step over the rails when crossing tracks. Personnel shall stay away from track switches as remotely operated switch points can move unexpectedly with enough force to crush ballast rock Personnel shall stay away from any other railway devices they are unsure of. Personnel shall not disturb or foul the ballast at any time.
- 7.1.11 Personnel shall not foul the track with any piece of equipment without a CPR flagperson and proper protection.
- 7.1.12 Certain projects will require the assistance of a qualified flagperson. The decision as to where flagpersons are required rests with CPR. One week advance notice is required before entering the Railway property so that flagging protection requirements may be determined and arranged for.
- 7.1.13 Good communication between Contractor Personnel and CPR's flagperson is imperative. Everyone must have a knowledge of the flagging limits, time limits and location to clear for any train movements. CPR's flagperson will be responsible for clearing any movement of workers and equipment near the tracks, no matter how minor.
- 7.1.14 Personnel shall not interfere with a CPR's flagperson who is communicating by radio with the dispatcher or other CPR employees. Personnel shall wait until the flagperson is finished and able to give them full attention. Personnel shall not assume a move is cleared by something overheard on a radio conversation.

- 7.1.15 Personnel shall not move equipment across the tracks except at established road crossings, or unless under the protection of a CPR flagperson and only if the job site has been properly prepared for such a move. Tracked equipment will require a CPR flagperson any time railroad tracks are crossed.
- 7.1.16 Personnel shall not move equipment across railroad bridges or through tunnels, except as expressly agreed by CPR, and under such conditions as stipulated by CPR, including without limitation, a CPR flagperson.
- 7.1.17 Contractor shall keep all Contractor personnel informed of current weather conditions. Personnel shall stay alert for possible high water conditions or flash floods. During severe weather conditions:
- Personnel shall be prepared to take cover in the event of a tornado.
  - Personnel shall not work while lightning is occurring;
  - If storm conditions arise unexpectedly, Contractor Personnel shall ensure that equipment is in the clear of the tracks and secured before seeking cover. Contractor Personnel shall stay away from railroad tracks when visibility is poor, such as during fog or blizzard conditions.

## **SR8 TOOLS, EQUIPMENT AND MACHINERY**

- 8.1 All Contractor equipment, machinery and highway vehicles must:
- Be in good working order (including lights and safety devices such as back-up alarms) and properly serviced and maintained;
  - Be safe for their proposed use;
  - Be equipped with appropriate emergency equipment (examples include fire extinguisher, first aid kit;) based upon Contractor's risk assessment;
  - Comply with all applicable legislation, regulations and codes.
- 8.2 Drivers of highway vehicles must be in possession of a valid driver's license of the proper class of the vehicle being operated. The use of seat belts is mandatory for all drivers and passengers. Operators of vehicles and construction equipment must keep their headlights on at all times and observe all facility/area's speed limits and traffic rules. Unless otherwise posted, the speed limit on the CPR's roads is 15 mph (24 km/h) or less as conditions warrant. No Contractor Personnel shall be carried in CPR vehicles except in case of an emergency or unless specifically authorized.
- 8.3 Tools must be used only for the purpose for which they are designed. Defective tools must be repaired or replaced.
- 8.4 Machinery and equipment must be operated and maintained only by persons properly trained and qualified for that duty.
- 8.5 All equipment shall be in compliance with applicable legislation, regulations and codes and be equipped with appropriate safety apparatus. In particular, all mobile equipment, including excavators, shall be equipped with beacons and backup alarms.

- 8.6 The Contractor shall provide adequate lighting when performing work between sunset and sunrise.

## **SR9 CRANES**

- 9.1 Contractor shall ensure that its cranes and their operation by Contractor Personnel are in compliance with applicable legislation, regulations and codes and be equipped with appropriate safety apparatus. A copy of the latest annual crane inspection shall be provided to CPR prior to the work's debut.
- 9.2 All cranes shall be equipped with anti-two-blocking devices and safety latches on every hook.
- 9.3 All lifting apparatus such as steel cables, nylon slings, chains, shackles, etc., must be safety certified.
- 9.4 All power lines that can be reached by cranes shall be de-energized or relocated.
- 9.5 While railway traffic is passing through the work area, loads on cranes must be lowered to the ground to rest. Cranes without bucket or load must have their load line tightened or retracted to prevent movement.
- 9.6 Cranes parked on Railway property on nights or weekends shall be secured in a safe position well clear of all tracks. Crane booms shall be lowered onto ground supports so that it will be impossible for them to rotate and cause a track to be fouled.

## **SR10 CLEANUP, ENVIRONMENT AND FIRE PREVENTION**

- 10.1 The Contractor shall take care to avoid any hazardous, unsafe, unhealthy or environmentally unsound condition, activity or spill on Railway property. The Contractor shall maintain Railway property in a tidy condition and free from the accumulation of waste products and debris. The Contractor shall not permit any debris, products used in the work, or water used to rinse out equipment, to be discharged or spilled on Railway property or into any adjacent lands, ditches, streams, ponds, sewers, etc.
- 10.2 Contractor shall ensure that Contractor Personnel take all necessary precautions to prevent fires. All flammable material such as paper, rubbish, sawdust, oily or greasy rags, etc. must be kept away from buildings, structures and other facilities subject to fire damage. All flammable material must be disposed of daily by Contractor.
- 10.3 Storing or transporting fuel or gasoline in unapproved containers is prohibited.
- 10.4 If possible, the use of cutting or welding torches must be avoided during the last one-half hour of shifts.
- 10.5 Suitable, charged fire extinguishers and/or full water pump cans must be readily available at all times on the work site. Where Contractor is working on the right-of-way or other property where a fire risk exists, Contractor shall have an appropriate fire prevention and suppression plan (including emergency numbers for local firefighters and fire control districts) as well as such additional fire fighting equipment and trained Contractor Personnel on site, as required by provincial regulations, codes and guidelines.
- 10.6 CPR's representative must be advised promptly of any fire. Such fire must be fully

extinguished or protection provided prior to leaving the work site.

- 10.7 Upon completion of the work, the Contractor shall remove his surplus materials and equipment from the Railway property. Contractor shall also remove all waste products and debris, including rinse out water, and leave the Railway property clean and suitable for occupancy.

## **SR11 HAZARDOUS MATERIALS and RESPONSIBLE CARE**

- 11.1 If chemicals are required by the Contractor to carry out its contractual obligations, Contractor must ensure that the transport, label, use and storage of any chemicals are in accordance with all applicable laws, regulations and codes.
- 11.2 For all chemicals to be used, the Contractor must have available on site the latest Material Safety Data Sheet (MSDS) and provide CPR with a list of employees' names who have been trained in Workplace Hazardous Materials Information System (WHMIS), or in OSHA's Hazard Communication Standard.
- 11.3 A current emergency response plan must be maintained by the Contractor and made available upon request, to CPR. Emergency response plans must include at a minimum:
- Contractor reporting procedures in the event of an incident or spill;
  - Emergency response contacts and phone numbers;
  - Incident reporting phone numbers including phone numbers for CPR incident reporting and local CPR personnel.
- 11.4 In the event of an incident or spill, Contractor must take all reasonable actions to contain the spill and respond in accordance with its emergency response plan.
- 11.5 The Contractor shall dispose of all chemicals and surplus waste materials in accordance with all relevant legislation, regulations and codes.
- 11.6 In addition to compliance with all applicable legislation, regulations and codes and as part of CPR's commitment to Responsible Care (an initiative by the chemical industry to which CPR is a Responsible Care partner), contractors must have appropriate systems and controls in place to mitigate potential environmental, health and safety risks while using chemicals on Railway property. CPR will provide Contractor with information regarding Responsible Care upon request from Contractor.

## **SR12 FIRST AID, INCIDENT AND ACCIDENT REPORTING**

- 12.1 Contractor must have a first aid kit available in the immediate vicinity of the work site. It must be examined by Contractor prior to the commencement of work, after each use and regularly each month to ensure that it is properly equipped. Any missing or altered articles must be promptly replaced by Contractor.
- 12.2 Where required, other first aid equipment such as stretchers, emergency showers, eye wash stations, etc. must be made available by Contractor at the work site.
- 12.3 All accidents, personal injury, occupational illness, damage to Railway property or customer property, and incidents, such as environmental spills, must be reported promptly by Contractor to CPR. Contractor shall provide CPR with as much detailed information as

possible, including:

- Time of incident;
- Location of incident;
- Description of incident including the cause of incident, if known; and
- Contractor's name and telephone number.

In the event of an environmental spill or any spill that could have a negative impact on the environment, Contractor shall also provide CPR with the following information:

- Description of location and surrounding area, including any sensitive environmental areas nearby (eg. rivers, parks, sewers);
- Type and quantity of substance released;
- Cause of spill or deposit, if known; and
- Details of any immediate action taken or action proposed to be taken to contain spill and recover substance.

12.4 Security concerns and security incidents (i.e. theft, vandalism, bribery, stalking, assault or other incidents that may cause injury or property damage, or involve criminal activity) must be reported by Contractor to the Canadian Pacific Railway Police Service.

### **SR13 JOB BRIEFINGS**

13.1 When required by CPR or by the Contractor, a job briefing must be conducted.

13.2 The Contractor Personnel performing services on Railway property must participate in the job briefing and any such individuals who are not able to be present at the main briefing, must attend a separate briefing. Contractor must ensure that all Contractor Personnel on the work site understand the content of the job briefing. CPR representative(s) or designates may attend at CPR's sole discretion.

13.3 The following topics should be covered in the job briefing:

- Tasks to be accomplished;
- Work location;
- Contractor Personnel responsibilities;
- Equipment to be used;
- Specific safety reminder due to a hazardous condition;
- Identification of all potential hazards;
- Special instructions due to an unusual situation or practice;

- Type of track protection along with it's time and physical limits;
- Identification of CPR's employee responsible for the protection.

#### **SR14 CONTRACTOR SAFETY POLICY**

14.1 Prior to the commencement of any work, the Contractor shall provide CPR with its applicable safety policies, rules and procedures.

#### **SR15 CONSTRUCTION SAFETY PLAN**

15.1 Prior to commencement of any construction work, the Contractor shall provide CPR with a Construction Safety Plan.

15.2 The Construction Safety Plan shall:

15.2.1 List and define the construction methods that will be used for each major phase of the work and describe the process and safety procedures to be incorporated.

15.2.2 Integrate the necessary safeguards implementation in the work's planning schedules.

15.2.3 List all safety activities and their frequency including:

- Contractor Personnel's Review of:
  - Canadian Pacific Railway's Minimum Safety Requirements for Contractors Working on Railway Property;
  - Contractor's Safety Plan;
  - Contractor's Emergency Information Sheet, and Emergency Response Plan;
- Contractor Personnel Orientation Meetings;
- Site Hazard Assessments;
- Site Inspections and Monitoring;
- Safety Meetings.

15.2.4 Provide for each piece of heavy equipment to be used, such as loaders, excavators and cranes, a summary of the Contractor Personnel's experience, past performance and safety tests, and list of previous accidents resulting from the equipment's operation.

15.2.5 Provide the layout of temporary construction buildings and facilities, including how the Contractor will ensure safe use.

15.2.6 Provide details of emergency procedures for work near or over water. Emergency equipment such as ring buoys, floating vests and, if physically possible, a powered boat must be readily available in the downstream vicinity of the work site.



15.2.7 Provide details of safety procedures for blasting work. Explosive materials must be handled, stored and used in accordance with all applicable legislation, regulations and codes.

15.2.8 Provide details of safety procedures for work in confined spaces including:

- Atmosphere test results;
- Evaluation of hazard within the confined space;
- Procedures for entering/exiting the confined space;
- Required protection equipment;
- Emergency procedures and equipment.

Prior to entry of any Contractor Personnel into a confined space, Contractor shall conduct such testing, and obtain such permits as required under applicable legislation, regulations and codes. Contractor shall ensure Contractor Personnel wear such additional protective equipment as determined necessary by the Contractor, based upon the Contractor's risk assessment of the space (examples include full body harness, approved respirators).

15.2.9 Provide the layout of cranes, proposed lifting procedures and other pertinent information such as cranes' capacity charts, working radius, loads, possible obstacles or site restrictions, etc.

15.2.10 Provide an Emergency Information Sheet for notifying medical assistance, emergency transportation and direction of rescue operations, including the information identified in appended Table A. Copies of this document shall be present on site at all times and be in a location readily accessible to all Contractor Personnel on the site. It's content shall be reviewed at the beginning of each week and when job location changes. The Contractor must ensure that all Contractor Personnel on the work site are familiar with it's contents.

15.3 The Safety Plan shall also include drawings and specifications prepared, sealed and signed by a qualified professional engineer, for each of the following items, whenever applicable to the work:

15.3.1 Details of the design, erection, use and inspection of fall prevention structures such as scaffolding, work platforms and other staging. These are mandatory wherever Contractor Personnel are working at heights in excess of 8 feet (2.44 meters), in Canada or 12 feet (3.66 meters), in the USA, above the nearest permanent safe level or where a drowning hazard exists. This requirement does not apply where pre-engineered scaffolding is used as a fall prevention device; provided it is used in accordance with the manufacturer specifications and is designed to meet all applicable legislation, regulations and codes.

15.3.2 Details of fall protection systems when it is physically impossible to provide safe fall prevention structures or when working on a temporary structure more than 20 feet (6.10 meters) above the nearest permanent safe level. Personal fall protection equipment shall include a CSA or ANSI approved full body harness, lanyard and shock-absorbing device, attached to a CSA or ANSI approved or engineered anchored lifeline or fixed anchor. The system shall also provide a

retrieval device or equipment readily available on the work site. Safety nets are acceptable in lieu of personal fall protection equipment, if it is impracticable to use a fall protection system.

- 15.3.3 Details of shoring systems for excavations, which may endanger nearby Contractor Personnel or structures. Shoring systems shall be designed to comply with applicable legislation, regulations and codes. Excavations must be properly covered or barricaded with appropriate reflective equipment. Lights or flares must be used where practicable.

## **SR16 COMPLIANCE WITH SAFETY REQUIREMENTS**

- 16.1 If ever the Contractor's Personnel does not comply with the safety requirements, the Contractor's site supervisor will be reminded of the requirements by the CPR's representative. If Contractor Personnel refuses to comply with the safety requirements, Contractor will be required to ensure that such Contractor Personnel immediately leaves the property, failing which CPR maintains the right to require the Contractor Personnel immediately leave the property.
- 16.2 Any working procedures not conforming to the safety requirements will result in the closing down of the work site.
- 16.3 CPR will not accept any claims for delays or lost time due to safety compliance or procedures issues.

**The above provisions and requirements may be amended from time to time by Canadian Pacific Railway.**

### **TABLE A - EMERGENCY INFORMATION SHEET** **WORK SITE INFORMATION**

Work Site Location:	(Mileage, Subdivision)	(Address, Number and Street)
Contractor' Supervisor:	(Name)	(Title)
Site Telephone:		
Emergency Site Access Route:	(Provide sketch)	
Nearest Town:		
Certified First Aid Attendant:		
Location of First Aid Supplies at Site:		
Location of Fire Extinguishing Equipment:		

### **EMERGENCY CONTACT INFORMATION**

<b>EMERGENCY CONTACTS</b>	<b>PHONE</b>	<b>LOCATION</b>
Railway Traffic Controller:	( )	
Firefighter:	( )	
Police:	( )	
Ambulance:	( )	
Hospital:	( )	
Physician:	( )	
Aircraft Service, (if applicable):	( )	

Watercraft Service, (if applicable): ( )  
Stretcher location at site: ( )  
Location of WHIMS data sheets: ( )  
Type and location of retrieval systems at bridges, (if applicable): ( )  
Type and location of emergency equipment for work near or over water, (if applicable): ( )  
Employee(s) responsible for rescue operations, (if applicable): ( )  
Designated Evacuation Vehicle: ( )  
Emergency Evacuation Route, (Provide sketch): ( )

**UTILITIES INFORMATION**

<b>UTILITIES CONTACT</b>	<b>PHONE</b>	<b>LOCATION</b>
Natural Gas:	( )	
Electrical:	( )	
Water & Sewer:	( )	
Telephone:	( )	
Cable System:	( )	
Qualified employee(s) in:	( )	
Confined Space Entry, (if applicable):	( )	
Equipment requirements for Confined Space Entry, (if applicable):	( )	

**All job sites will be open to audits by CPR Safety and Health representatives.**

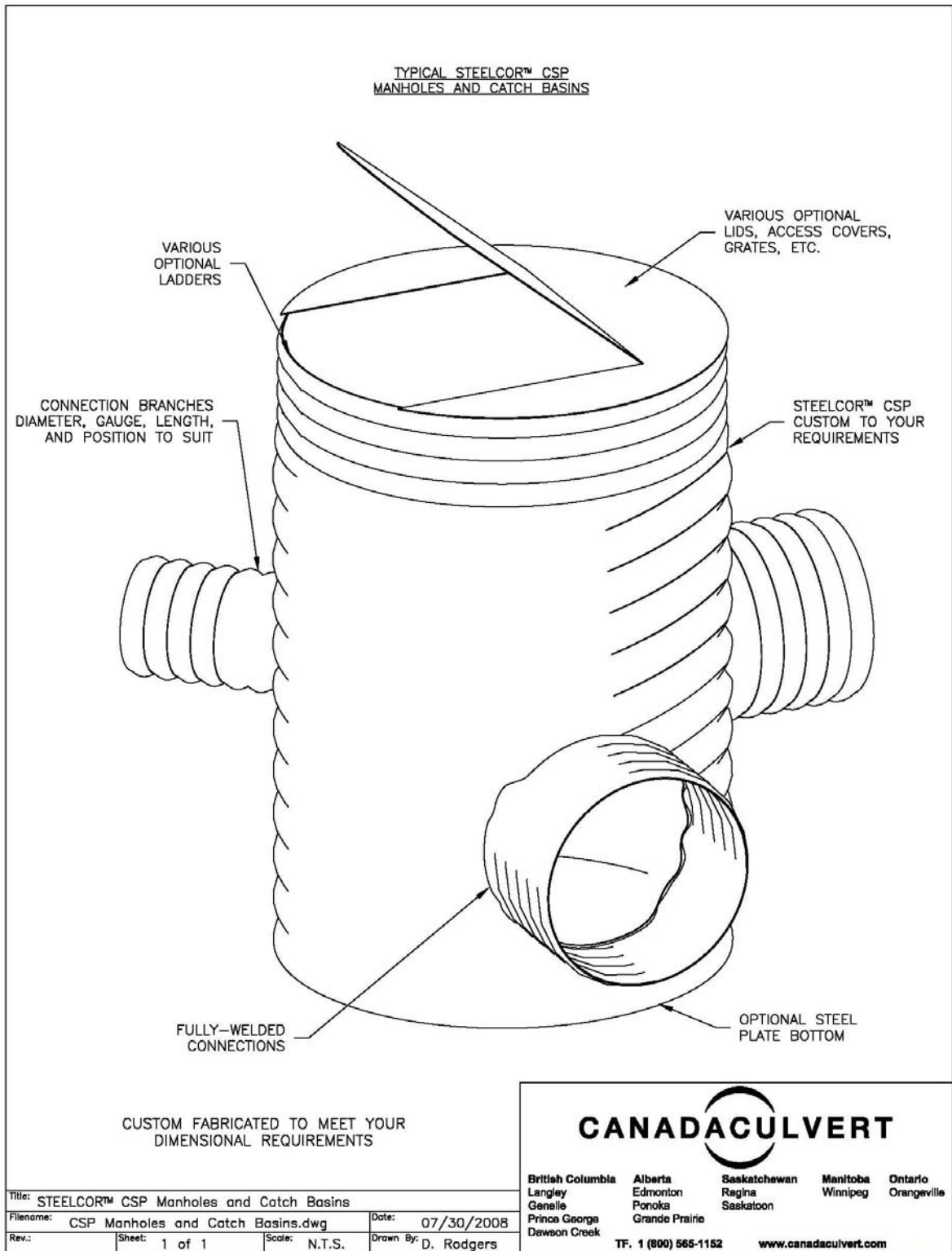
Date: \_\_\_\_\_

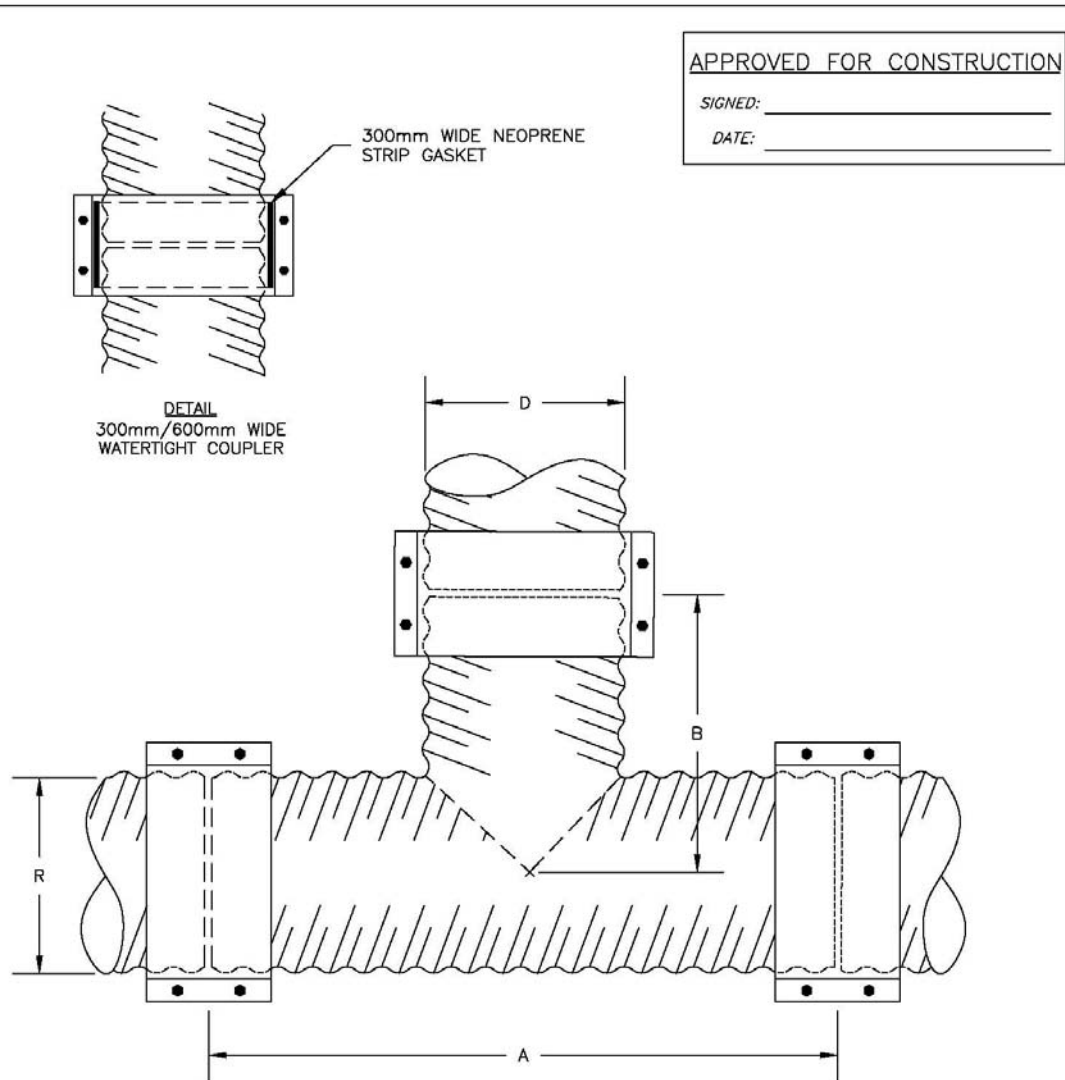
Signed: \_\_\_\_\_  
Contractor's Supervisor

# **APPENDIX 'C'**

## **CULVERT PRODUCTS**

## APPENDIX 'C' – CULVERT PRODUCTS





**APPROVED FOR CONSTRUCTION**

SIGNED: \_\_\_\_\_

DATE: \_\_\_\_\_

CSP FITTING PARAMETERS	
'R' RUN DIAMETER:	
'D' BRANCH DIAMETER:	
MATERIAL THICKNESS:	
COATING:	
'A' LENGTH:	
'B' LENGTH:	
COUPLER TYPE:	
COUPLER WIDTH:	
GASKET REQUIRED:	

- NOTE:
1. WELD FITTINGS OF ANY KIND CAN FOSTER PIN HOLE LEAKS. FORCES DUE TO DIFFERENTIAL SETTLEMENT CAN RESULT IN FAILURE OF WELDS. CANADA CULVERT CANNOT AND DOES NOT WARRANTY WELDED FITTINGS.
  2. FITTING CONNECTIONS MAY REQUIRE 300mm WIDE DIMPLED COUPLERS

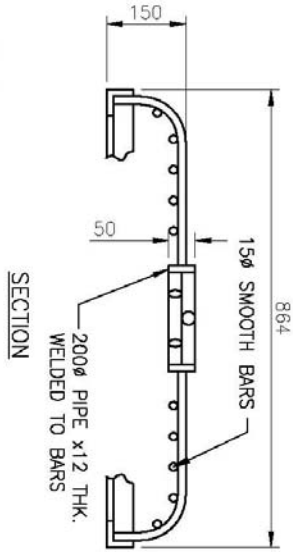
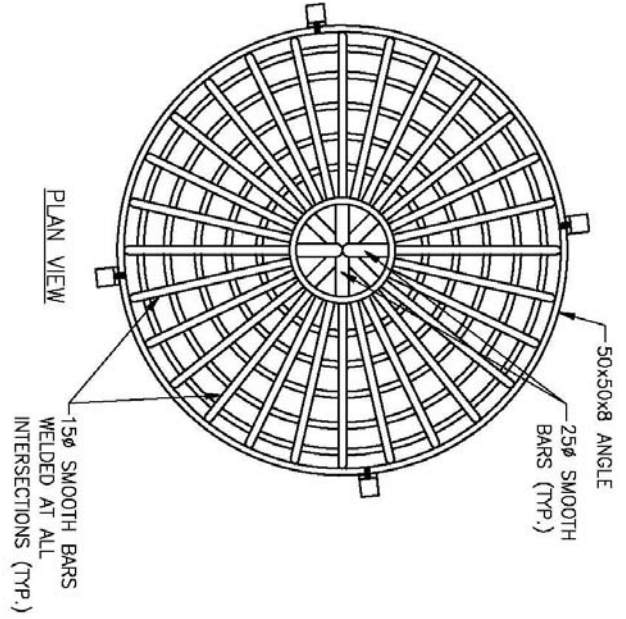
**CANADACULVERT**

British Columbia    Alberta    Saskatchewan    Manitoba    Ontario  
 Langley    Edmonton    Regina    Winnipeg    Orangeville  
 Genelle    Ponoka    Saskatoon  
 Prince George    Grande Prairie  
 Dawson Creek

TF. 1 (800) 565-1152    www.canadaculvert.com

Title: STEELCOR™ CSP Tee Fitting  
 Filename: CSP Tee Fitting.dwg    Date: 04/30/2008  
 Rev.:    Sheet: 1 of 1    Scale: N.T.S.    Drawn By: D. Rodgers





NOTES:  
 DITCH INLET GRATE TO BE SHOPPOST IRONWORKS MK. A1 OR APPROVED EQUAL. GALVANIZE ENTIRE ASSEMBLY AFTER FABRICATION.

CATCHBASIN GRATE DETAIL

