



# GEMTEC

CONSULTING ENGINEERS  
AND SCIENTISTS

GEMTEC Limited tel: 506.858.7180  
77 Rooney Crescent fax: 506.858.0742  
Moncton, NB gemtec@gemtec.ca  
E1E 4M4 www.gemtec.ca

9 August 2012

File: 6489.07-L01

via e-mail Garth.Holder@pwgsc-tpsgc.gc.ca

Public Works and Government Services Canada  
1045 Main Street, Unit 100  
Moncton, NB  
E1C 1H1

**DRAFT**

Attention: Garth Holder, Project Manager

**Re: Marine Test Pit Investigation – McEachern's Point, NB, Harbour Channel  
And Gully Entrance (Call Up EC015-110732/001/PWB)**

---

GEMTEC Limited was retained by Public Works and Government Services Canada to undertake a marine test pit investigation in the McEachern's Point Wharf channel and the Gully entrances. We understand that the test pit data will be used to determine dredging methods. The purpose of this investigation was to assess the soils in the channel. This report contains a summary of the fieldwork carried out.

Fifteen test pits (TP) were excavated on 24 and 25 July 2012 in the McEachern's Point channel. The work was carried out in the presence of one of our geotechnical technologists using a self propelled floating dredge plan, Amphibex, equipped with an excavator using a 1 cubic meter hydraulic bucket subcontracted to ECO Technologies. Fourteen of the fifteen test pits were excavated to minimum elevation of -2.5 metres chart datum (CD). Test pit 11 was excavated to elevation -2.2 metres CD where a compact grey sand and gravel was encountered. Based on observations in the field the excavator (Amphibex) was suitable to excavate all soils encountered with the exception of the grey sand and gravel encountered at TP 11 at an approximate elevation of -2.0 metres CD.

Test pit locations were provided by PWGSC. GEMTEC Limited guided the excavator and surveyed the test pit locations in the field using a Topcon HiPer L1 GPS. All elevations on appended test pit logs are based on chart datum and are referenced to benchmark 88B9004 with a published elevation of +3.120 metres at the McEachern's Point wharf.

Descriptive terms and detailed test pit logs, site photos, and test pit coordinates are attached (Attachments A, B and C, respectively).



If you have any questions regarding our proposal contact the undersigned.



---

Harold McQuade, P.Eng  
GEMTEC Limited

Attachments

(tds)

## **Attachment A**

### **Descriptive Terms and Detailed Test Pit Logs**

## DESCRIPTIVE TERMS- BOREHOLE/TEST PIT LOG

SOILS

GRAIN SIZE

0.01

0.1

1.0

10

100

1000mm

SILT CLAY

SAND

GRAVEL

Cobble

BOULDER

0.08

0.4

2

5

80

200

DESCRIPTIVE TERMINOLOGY

0

10

20

35

weight. % of material

TRACE	SOME	ADJECTIVE	and > 35% noun > 35% and main fraction		
trace clay, etc.	some gravel, etc.	silty, etc.	sand and gravel, etc.		

COMPACTNESS

gravels, sands, tills

N, RANGE	0 - 4	4 - 10	10 - 30	30 - 50	> 50
DENSITY	V. LOOSE	LOOSE	MEDIUM	DENSE	V. DENSE

CONSISTENCY

silt, clay

S, KPa	< 12.5	12.5 - 25	25 - 50	50 - 100	100 - 200
CONSISTENCY	V. SOFT	SOFT	MEDIUM	STIFF	V. STIFF

ROCK

RQD

0 - 25

25 - 50

50 - 75

75 - 90

90 - 100

OVERALL QUALITY

VERY POOR

POOR

FAIR

GOOD

EXCELLENT

FRACTURE SPACING

VERY CLOSE 20 - 60 mm

CLOSE 60 - 200 mm

MODERATE 200 - 600 mm

WIDE 600 - 2000 mm









VERY WIDE 2 - 6 m

COMP. STR. MPa	1 - 5	5 - 25	25 - 50	50 - 100	100 - 250
DESCRIPTION	V. WEAK	WEAK	MODERATE	STRONG	V. STRONG





### SAMPLE TYPES (location to scale on log)

S SPLIT TUBE	G SHOVEL
T SHELBY TUBE	H CARVED BLOCK
P PISTON	K SLOTTED
F AUGER	V IN SITU VANE
W WASH	NR NO RECOVERY

### LOG SYMBOLS

			
GRAVEL	SAND	SILT	CLAY
			
ORGANIC	BOULDER	ROCK	TILL

### ROCK CORES A(30mm); B(41mm); N(54mm)

			
SCREEN WITH SAND	PIPE WITH SAND	PIPE WITH BENTONITE	PIPE WITH BACKFILL

### WELL SYMBOLS

- N - standard penetration test; blows by 475 J drop hammer to advance Std. 50mm O.D. split tube sampler 0.3m
- RQD - percent of core consisting of hard, sound pieces in excess of 100mm long (excluding machine breaks)
- RECOVERY - sample recovery expressed as percent or length
- S - shear strength, kPa; vane  $\oplus$ ; penetrometer  $\blacksquare$ ; unconfined  $\circ$ ; U<sub>c</sub> unconfined compressive strength
- S<sub>r</sub> - shear strength, remoulded; vane  $\otimes$ ; penetrometer  $\square$
- D<sub>d</sub> - dry density; t/m<sup>3</sup>
- W - natural moisture content, percent \*
- PL - plastic limit, percent —
- LL - liquid limit, percent —
- ND - non detect, total petroleum hydrocarbons (TPH) not detected in soil
- Groundwater Level  $\nabla$  ; Seepage  $\nabla$

# TEST PIT LOG

Client		Public Works and Government Services Canada				Proj No.		6489.07		Test pit	
Project		Marine Test Pit Investigation				Date End		24.July.2012		TP 1 (MP) Page 1 of 1	
Location		McEachern's Point, NB				<div> <div>0</div> <div>25</div> <div>50</div> <div>75</div> <div>100</div> </div> <div>Undrained Shear Strength - kPa<sub>s</sub></div> <div> <input type="checkbox"/> Pocket Penetrometer &lt;225         <input checked="" type="checkbox"/> Pocket Penetrometer         <input type="checkbox"/> Field Vane Test         <input checked="" type="checkbox"/> Remoulded       </div> <div> <div> <div>W<sub>p</sub></div> <div>W</div> <div>W<sub>L</sub></div> </div> <div> <div>★</div> <div>●</div> </div> </div> <div>Water Content &amp; Atterberg Limits</div> <div>Dynamic Penetration Test, blows/0.3m</div> <div>Standard Penetration Test, blows/0.3m</div>					
Ground Level, m		-1.60		Datum: Chart		Logged By		TDS			
DEPTH m	SAMPLE				LOG	DESCRIPTION					
	No	TYPE	N (RQD)	REC mm							
0						Black SILT some organics.					
1						Brown SILT, some sand and organics.					
2						End of Test Pit at elevation -3.60 metres chart datum as referenced to benchmark 88B9004 with a published elevation of +3.12 chart datum.					

**GEMTEC** LIMITEDGROUND ENGINEERING  
& MATERIALS TECHNOLOGY  
Fredericton, Moncton, Bathurst N.B. Canada

## TEST PIT LOG

Client		Public Works and Gouvernement Services Canada			Proj No.		6489.07		Test pit			
Project		Marine Test Pit Investigation			Date End		24.July.2012		TP 2 (MP) Page 1 of 1			
Location		McEachern's Point, NB			<div>0 25 50 75 100</div> <div>Undrained Shear Strength - kPa</div> <div><input type="checkbox"/> Pocket Penetrometer &lt;225    <input checked="" type="checkbox"/> Pocket Penetrometer</div> <div><input checked="" type="checkbox"/> Field Vane Test    <input checked="" type="checkbox"/> Remoulded</div> <div>Water Content &amp; Atterberg Limits</div> <div>Dynamic Penetration Test, blows/0.3m</div> <div>Standard Penetration Test, blows/0.3m</div> <div>0 10 20 30 40 50 60 70 80 90 100</div>							
Ground Level, m		-1.34			Datum:		Chart		Logged By		TDS	
DEPTH		SAMPLE			LOG		DESCRIPTION					
m		No	TYPE	N (RQD)	REC mm							
0						Dark grey SILT some organics.						
1						Dark grey SILT some sand and organic layers (compressed sea weed).						
2						Dark grey SAND and GRAVEL, some cobbles.						
						End of Test Pit at elevation -3.84 metres chart datum as referenced to benchmark 88B9004 with a published elevation of +3.12 chart datum.						

# TEST PIT LOG

[illegible]

# TEST PIT LOG

Client		Public Works and Government Services Canada				Proj No.		6489.07		Test pit	
Project		Marine Test Pit Investigation				Date End		24.July.2012		TP 4 (MP) Page 1 of 1	
Location		McEachern's Point, NB									
Ground Level, m		-1.21		Datum: Chart		Logged By		TDS			
DEPTH m	SAMPLE				LOG	DESCRIPTION					
	No	TYPE	(RQD)	REC mm							
0						Dark grey SILT, some sand and organics.					
1						Brown SAND with some gravel and cobbles and intermittent organic layers (compressed sea weed).					
						SAND and GRAVEL, some cobbles.					
2						End of Test Pit at elevation -3.31 metres chart datum as referenced to benchmark 88B9004 with a published elevation of +3.12 chart datum.					



**GEMTEC** LIMITEDGROUND ENGINEERING  
& MATERIALS TECHNOLOGY  
Fredericton, Moncton, Bathurst N.B. Canada

## TEST PIT LOG

Client Public Works and Gouvernement Services Canada

Proj  
No. 6489.07

Test pit

Project Marine Test Pit Investigation

Date  
End 24.July.2012TP 5 (MP)  
Page 1 of 1

Location McEachern's Point, NB

Ground Level, m  
-1.29Datum:  
ChartLogged  
By TDS

0 25 50 75 100 Undrained Shear Strength - kPa

☐ Pocket Penetrometer <225  
☒ Field Vane Test☒ Pocket Penetrometer  
☒ RemouldedWater Content & Atterberg Limits  
Dynamic Penetration Test, blows/0.3m  
Standard Penetration Test, blows/0.3mW<sub>p</sub> W W<sub>L</sub>

DEPTH m SAMPLE No TYPE (RQD) REC mm LOG DESCRIPTION

0 10 20 30 40 50 60 70 80 90 100

0 Dark grey SILT, some organics.

1

1.20 -2.49 Grey SAND, some gravel and cobbles.

- Sand medium to dense compact at 1.6 metres.

1.90 -3.19

End of Test Pit at elevation -3.19 metres chart datum as referenced to benchmark 88B9004 with a published elevation of +3.12 chart datum.

# TEST PIT LOG

Client		Public Works and Government Services Canada				Proj No.		6489.07		Test pit	
Project		Marine Test Pit Investigation				Date End		24.July.2012		TP 6 (MP) Page 1 of 1	
Location		McEachern's Point, NB									
Ground Level, m		-1.16		Datum: Chart		Logged By		TDS		<input type="checkbox"/> Pocket Penetrometer <225 <input checked="" type="checkbox"/> Field Vane Test <input checked="" type="checkbox"/> Pocket Penetrometer <input checked="" type="checkbox"/> Remoulded	
DEPTH m		SAMPLE			LOG		DESCRIPTION				
		No	TYPE	N (RQD)	REC (mm)						
0											
1											
2											

# TEST PIT LOG

Client		Public Works and Government Services Canada						Proj No.		6489.07		Test pit	
Project		Marine Test Pit Investigation						Date End		24.July.2012		TP 7 (MP) Page 1 of 1	
Location		McEachern's Point, NB						<div>02550Undrained Shear Strength - kPa100</div> <div><input type="checkbox"/> Pocket Penetrometer &lt;225 <input checked="" type="checkbox"/> Field Vane Test</div> <div><input checked="" type="checkbox"/> Pocket Penetrometer <input checked="" type="checkbox"/> Remoulded</div> <div>Water Content &amp; Atterberg Limits Dynamic Penetration Test, blows/0.3m Standard Penetration Test, blows/0.3m</div> <div>0102030405060708090100</div> <div><div>w<sub>p</sub>w<sub>L</sub></div><div>*</div><div>★●</div></div>					
Ground Level, m		-0.85		Datum:		Chart		Logged By		TDS			
DEPTH m		SAMPLE				LOG		DESCRIPTION					
		No	TYPE	N (RQD)	REC mm								
0								Dark SILT, some organics (Wood and sea shells)0.15-1.00					
								Brown sity SAND, trace gravel and wood debris.					
1								Brown SAND, some gravel and cobbles with trace to some boulders (300 - 400 mm)1.00-1.85					
2								End of Test Pit at elevation -2.85 metres chart datum as referenced to benchmark 88B9004 with a published elevation of +3.12 chart datum.2.00-2.85					

# TEST PIT LOG

Client		Public Works and Government Services Canada				Proj No.		6489.07		Test pit	
Project		Marine Test Pit Investigation				Date End		24.July.2012		TP 8 (MP) Page 1 of 1	
Location		McEachern's Point, NB									
Ground Level, m		-0.75		Datum: Chart		Logged By		TDS			
DEPTH m	SAMPLE				LOG	DESCRIPTION					
	No	TYPE	N (RQD)	REC mm							
0						Grey SAND and GRAVEL trace organics.					
						Brown SAND with organic layering (compressed sea weed)					
						Orange brown SAND with some gravel.					
1						Grey SAND and GRAVEL with some cobbles and trace to some boulder (300 to 540 mm)					
2						End of Test Pit at elevation -2.75 metres chart datum as referenced to benchmark 88B9004 with a published elevation of +3.12 chart datum.					

## TEST PIT LOG

Client		Public Works and Government Services Canada				Proj No.		6489.07		Test pit	
Project		Marine Test Pit Investigation				Date End		24.July.2012		TP 9 (MP)	
Location		McEachern's Point, NB								Page 1 of 1	
Ground Level, m		-1.28		Datum:		Chart		Logged By		TDS	
DEPTH m		SAMPLE			LOG		DESCRIPTION				
		No	TYPE	N (RQD)	REC mm						
0						Grey SAND some gravel with trace organics.					
						0.30 -1.58					
						Peat					
						0.45 -1.73					
						Brown silty SAND, some organics, trace gravel and trace to some cobbles.					
1						1.20 -2.48					
						Grey SAND and GRAVEL with trace to some cobbles.					
						1.90 -3.18					
2						End of Test Pit at elevation -3.10 metres chart datum as referenced to benchmark 88B9004 with a published elevation of +3.12 chart datum.					

# TEST PIT LOG

[illegible]

**GEMTEC** LIMITEDGROUND ENGINEERING  
& MATERIALS TECHNOLOGY  
Fredericton, Moncton, Bathurst N.B. Canada**TEST PIT LOG**

Client      Public Works and Gouvernement Services Canada					Proj No.      6489.07		Test pit TP 11 (MP)												
Project      Marine Test Pit Investigation					Date End      24.July.2012		Page 1 of 1												
Location      McEachern's Point, NB					<div style="display: flex; justify-content: space-between;"> <div>             0      25      50      75      100              Undrained Shear Strength - kPa           </div> <div> <input type="checkbox"/> Pocket Penetrometer &lt;225  <input checked="" type="checkbox"/> Field Vane Test           </div> <div> <input checked="" type="checkbox"/> Pocket Penetrometer  <input checked="" type="checkbox"/> Remoulded           </div> </div> <div style="text-align: center; margin-top: 10px;">             Water Content &amp; Atterberg Limits              Dynamic Penetration Test, blows/0.3m              Standard Penetration Test, blows/0.3m  </div>														
Ground Level, m -0.15		Datum: Chart		Logged By TDS															
DEPTH m	SAMPLE				LOG	DESCRIPTION													
	No	TYPE	N (RQD)	REC mm															
0						Brown silty SAND, trace to some gravel.													
						0.15      -0.30 Brown SAND and GRAVEL, some cobbles and boulders.													
						0.45      -0.60 Peat													
1						1.00      -1.15 Grey to brown silty sand some gravel and cobbles, trace organics.													
						- Sand compact at 1.8 metres.													
2						2.00      -2.15 End of Test Pit at elevation --2.15 metres chart datum as referenced to benchmark 88B9004 with a published elevation of +3.12 chart datum.													

# TEST PIT LOG

[illegible]



# TEST PIT LOG

Client		Public Works and Government Services Canada				Proj No.		6489.07		Test pit	
Project		Marine Test Pit Investigation				Date End		24.July.2012		TP 13 (MP) Page 1 of 1	
Location		McEachern's Point, NB				<div>0255075100</div> <div>Undrained Shear Strength - kPa</div> <div><input type="checkbox"/> Pocket Penetrometer &lt;225</div> <div><input checked="" type="checkbox"/> Pocket Penetrometer</div> <div><input checked="" type="checkbox"/> Field Vane Test</div> <div><input checked="" type="checkbox"/> Remoulded</div> <div><div><div>W<sub>p</sub></div><div>W</div><div>W<sub>L</sub></div></div><div>★</div><div>●</div></div> <div>Water Content &amp; Atterberg Limits</div> <div>Dynamic Penetration Test, blows/0.3m</div> <div>Standard Penetration Test, blows/0.3m</div> <div>0102030405060708090100</div>					
Ground Level, m		-1.22		Datum: Chart		Logged By		TDS			
DEPTH	m	SAMPLE				LOG	DESCRIPTION				
		No	TYPE	N (RQD)	REC mm						
0							Brown SAND and GRAVEL some cobbles.				
							Peat				
							Grey SAND and GRAVEL, some cobbles and trace organics.				
1							Grey SAND, trace to some gravel. Sand compact at 1.2 metres.				
							End of Test Pit at elevation -2.82 metres chart datum as referenced to benchmark 88B9004 with a published elevation of +3.12 chart datum.				

**GEMTEC** LIMITEDGROUND ENGINEERING  
& MATERIALS TECHNOLOGY  
Fredericton, Moncton, Bathurst N.B. Canada

## TEST PIT LOG

Client					Public Works and Gouvernement Services Canada					Proj No.		6489.07		Test pit	
Project					Marine Test Pit Investigation					Date End		24.July.2012		TP 14 (MP) Page 1 of 1	
Location					McEachern's Point, NB					<div>0 25 50 75 100</div> <div>Undrained Shear Strength - kPa</div> <div><input type="checkbox"/> Pocket Penetrometer &lt;225 <input checked="" type="checkbox"/> Pocket Penetrometer</div> <div><input checked="" type="checkbox"/> Field Vane Test <input checked="" type="checkbox"/> Remoulded</div> <div>Water Content &amp; Atterberg Limits</div> <div>Dynamic Penetration Test, blows/0.3m</div> <div>Standard Penetration Test, blows/0.3m</div> <div>0 10 20 30 40 50 60 70 80 90 100</div> <div><div>W<sub>p</sub> W W<sub>L</sub></div><div><div></div><div></div><div></div></div></div>					
Ground Level, m		Datum:		Chart		Logged By		TDS							
-0.90															
DEPTH m															
SAMPLE															
No TYPE (RQD) REC mm LOG															
DESCRIPTION															
0															
Brown SAND and GRAVEL with some cobbles and boulders.															
1															
- flat boulders in excess of 300 mm observed.															
- Sand content increases with depth.															
1.70 -2.60															
End of Test Pit at elevation -2.60 metres chart datum as referenced to benchmark 88B9004 with a published elevation of +3.12 chart datum.															

# TEST PIT LOG

Client		Public Works and Government Services Canada						Proj No.		6489.07		Test pit	
Project		Marine Test Pit Investigation						Date End		24.July.2012		TP 15 (MP) Page 1 of 1	
Location		McEachern's Point, NB						<div style="text-align: right;">Undrained Shear Strength - kPa</div> <div style="font-size: small;"> <input type="checkbox"/> Pocket Penetrometer &lt;225      <input checked="" type="checkbox"/> Pocket Penetrometer  <input checked="" type="checkbox"/> Field Vane Test                  <input checked="" type="checkbox"/> Remoulded  Water Content &amp; Atterberg Limits  Dynamic Penetration Test, blows/0.3m  Standard Penetration Test, blows/0.3m </div>					
Ground Level, m		-1.40		Datum:		Chart		Logged By		TDS			
DEPTH m	SAMPLE				LOG	DESCRIPTION							
	No	TYPE	N (RQD)	REC mm									
0						Brown SAND and GRAVEL with COBBLES and BOULDERS ( 300 to 600 mm)							
1						Grey to orange brown silty SAND, trace organics with trace to some cobbles.							
						End of Test Pit at elevation -3.10 metres chart datum as referenced to benchmark 88B9004 with a published elevation of +3.12 chart datum.							

**Attachment B**

**Select Site Photos**



**Photo 1 - ECO Technologies Amphibian Excavator at McEachern's Point Wharf.**



**Photo 2 - Amphibian excavator in McEachern's point channel.**



**Photo 3 - Manual sounding undertaken at test pit locations.**



**Photo 4 - Depth during excavation tracked by sounding measurements on inside of excavator arm.**





**Photo 5 - Dark silt with organics encountered at TP 1 - McEachern's Point (Elev.  $-1.60$  to  $-2.60$  CD).**



**Photo 6 - Dark grey silt encountered at TP 2 - MaEachern's Point (Elevation  $-1.34$  to  $-2.34$  CD).**



**Photo 7 - Dark silt with some organics some gravel encountered at TP 3 - McEachern's Point (Elevation -1.00 to -1.80 CD).**



**Photo 8 - Organics present in silt layer at TP 4 - McEachern's Point (Elevation -1.21 to -2.21 CD).**





**Photo 9 - Dark grey silt with some organics at TP 5 - McEachern's Point (Elevation – 1.29 to –2.49 CD).**



**Photo 10 - Grey silty sand with some cobbles encountered at TP 6 - McEachern's Point (Elevation –1.86 to –2.36 CD).**



**Photo 11 - Brown silty sand with trace gravel and wood debris encountered at TP 7 - McEachern's Point (Elevation  $-1.00$  to  $-1.85$  CD).**



**Photo 12 - Orange brown sand with some gravel encountered at TP 8 – McEachern's Point (Elevation  $-1.35$  to  $-1.85$  CD).**





**Photo 13 - Peat encountered at TP 9 - McEachern's Point (Elevation –1.58 to –1.73 CD).**



**Photo 14 - Thick peat layer encountered at TP 10 - MaEachern's Point (Elevation – 0.47 to –1.12 CD).**



**Photo 15 - Thick layer of peat encountered at TP 11 - McEachern's Point (Elevation  $-0.60$  to  $-1.15$  CD).**



**Photo 16 - Brown sand with some cobbles and organics encountered at TP 12 - McEachern's Point (Elevation  $-1.03$  to  $-1.53$  CD).**





**Photo 17 - Brown sand and gravel with cobbles and organics encountered at TP 13 - McEacherns Point (Elevation -1.22 to -1.72 CD).**



**Photo 18 - Brown sand and gravel with some cobbles and flat boulders encountered at TP 14 - McEachern's Point (Elevation -0.90 to -2.60 CD).**



**Photo 19 - Brown sand and gravel with cobbles and boulders encountered at TP 15 - McEachern's Point (Elevation -1.40 to -2.90 CD).**

**Attachment C**

Test Pit Coordinates

### McEachern's Point Test Pit Coordinates

BH	TP Elevation	TP Depth	Easting*	Northing*
	(m)	(m)		
TP 1	-1.60	2.0	353875.951	5243795.767
TP 2	-1.34	2.5	354070.820	5243840.621
TP 3	-1.00	2.0	354269.138	5243865.852
TP 4	-1.21	2.1	354467.249	5243841.906
TP 5	-1.29	1.9	354622.036	5243725.570
TP 6	-1.16	2.1	354571.356	5243534.053
TP 7	-0.85	2.0	354496.453	5243348.880
TP 8	-0.75	2.0	354486.602	5243150.972
TP 9	-1.28	1.9	354526.640	5243059.337
TP 10	-0.02	3.6	354554.303	5243017.686
TP 11	-0.15	2.0	354581.965	5242976.036
TP 12	-1.03	1.5	354600.528	5242928.798
TP 13	-1.22	1.6	354618.952	5242881.915
TP 14	-0.90	1.7	354637.320	5242835.172
TP 15	-1.40	1.7	354655.442	5242789.058



