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## Iqaluit Wastewater Treatment Plant – Conversion & Expansion – Phase 1

### Project History

<b>The City of Iqaluit:</b>	<p><b>City of Iqaluit Public Works &amp; Engineering</b>  <b>P.O. Box 460</b>  <b>Iqaluit, NU X0A 0H0</b></p> <p><b>Mr. Geoff Baker</b>  <b>Phone: (867) 975-8502</b>  <b>Fax: (867) 975-8505</b></p>
<b>Project Engineer:</b>	<p><b>Earth Tech Canada Inc.</b>  <b>17203-103 Ave</b>  <b>Edmonton, Alberta T5S 1J4</b></p> <p><b>Mr. Glenn Prosko, P.Eng.</b>  <b>Phone: (780) 488-6800</b>  <b>Fax: (780) 488-2121</b></p>
<b>General Contractor:</b>	<p><b>Kudlik Construction Ltd.</b>  <b>P.O. Box 727 1519 Federal Road</b>  <b>Iqaluit, NU X0A 0H0</b></p> <p><b>Mr. Martin Simard</b>  <b>Phone: (867) 979-1166</b>  <b>Fax: (867) 979-1169</b></p>
<b>Mechanical Subcontractor:</b>	<p><b>Sifec North Inc.</b>  <b>P.O. Box 727 1519 Federal Road</b>  <b>Iqaluit, NU X0A 0H0</b></p> <p><b>Mr. Guy Fauteux, Pres. P.Eng.</b>  <b>Phone: (866) 437-4001</b>  <b>Fax: (450) 430-7106</b></p>
<b>Electrical Subcontractor:</b>	<p><b>Sifec North Inc.</b>  <b>P.O. Box 727 1519 Federal Road</b>  <b>Iqaluit, NU X0A 0H0</b></p> <p><b>Mr. Guy Fauteux, Pres. P.Eng.</b>  <b>Phone: (866) 437-4001</b>  <b>Fax: (450) 430-7106</b></p>
<b>Instrumentation Subcontractor:</b>	<p><b>Sifec North Inc.</b>  <b>P.O. Box 727 1519 Federal Road</b>  <b>Iqaluit, NU X0A 0H0</b></p> <p><b>Mr. Guy Fauteux, Pres. P.Eng.</b>  <b>Phone: (866) 437-4001</b>  <b>Fax: (450) 430-7106</b></p>

**Architectural/Structural Operation & Maintenance Manual**  
**for the**  
**Iqaluit Wastewater Treatment Plant – Conversion & Expansion – Phase 1**  
**Iqaluit, Nunavut**  
**Chapter 2**  
**INDEX**

Chapter 1	INTRODUCTION .....	1-1
	Project History .....	1-2
Chapter 2	INDEX.....	2-1
Chapter 3	BACKGROUND AND DESIGN DATA .....	<b>Error! Bookmark not defined.</b>
	3.1 General .....	<b>Error! Bookmark not defined.</b>
	3.2 Background.....	<b>Error! Bookmark not defined.</b>
	3.3 New Process Description .....	<b>Error! Bookmark not defined.</b>
	3.4 New Building (General).....	<b>Error! Bookmark not defined.</b>
	3.4.1 New Building Lower Floor .....	<b>Error! Bookmark not defined.</b>
	3.4.2 New Building Upper Floor .....	<b>Error! Bookmark not defined.</b>
	3.4.3 Lower Wall Construction.....	<b>Error! Bookmark not defined.</b>
	3.4.4 Upper Wall Construction .....	<b>Error! Bookmark not defined.</b>
	3.4.5 New Building Interior Wall Construction. ....	<b>Error! Bookmark not defined.</b>
	3.4.6 New Building Roof Construction.....	<b>Error! Bookmark not defined.</b>
	3.4.7 New Electrical Room Construction.....	<b>Error! Bookmark not defined.</b>
	3.4.8 New Lab Room Construction .....	<b>Error! Bookmark not defined.</b>
	3.4.9 Doors and Stairs.....	<b>Error! Bookmark not defined.</b>
Chapter 4	SCHEMATICS AND FUNCTIONAL DATA .....	<b>Error! Bookmark not defined.</b>
	4.1 General .....	<b>Error! Bookmark not defined.</b>
Chapter 5	COMPONENT DETAILS .....	<b>Error! Bookmark not defined.</b>
	5.1 General Overview .....	<b>Error! Bookmark not defined.</b>
Chapter 6	OPERATING PROCEDURES .....	<b>Error! Bookmark not defined.</b>
	6.1 General .....	<b>Error! Bookmark not defined.</b>
Chapter 7	MAINTENANCE .....	<b>Error! Bookmark not defined.</b>
	7.1 General Maintenance .....	<b>Error! Bookmark not defined.</b>
	7.2 Keep it Clean .....	<b>Error! Bookmark not defined.</b>
	7.3 Keep it Tight.....	<b>Error! Bookmark not defined.</b>
	7.4 Renewal Parts .....	<b>Error! Bookmark not defined.</b>
	7.5 Parts and Equipment Ordering Procedure .....	<b>Error! Bookmark not defined.</b>

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7.6	Scheduled Preventative Maintenance .....	<b>Error! Bookmark not defined.</b>
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Chapter 8	TESTING AND CERTIFICATION DATA .....	<b>Error! Bookmark not defined.</b>
	8.1 General .....	<b>Error! Bookmark not defined.</b>
Chapter 9	MANUFACTURER DATA AND SERVICE INFORMATION ..	<b>Error! Bookmark not defined.</b>
	9.1 General .....	<b>Error! Bookmark not defined.</b>
Chapter 10	APPENDIX .....	<b>Error! Bookmark not defined.</b>
	10.1 General .....	<b>Error! Bookmark not defined.</b>
	10.2 Photographs .....	<b>Error! Bookmark not defined.</b>
	10.3 Drawings .....	<b>Error! Bookmark not defined.</b>

## **Chapter 3**

### **BACKGROUND AND DESIGN DATA**

#### **3.1 General**

The discussion in this document includes the background and design data for the Architectural and structural systems included in the Iqaluit Wastewater Treatment Plant only. Refer to the Electrical & Instrumentation, Mechanical and Process Operation and Maintenance Manuals for information on those systems.

#### **3.2 Background**

Earth Tech (Canada) Inc. (ET) was retained by the City of Iqaluit to undertake the design of improvements/upgrades to the Iqaluit WWTP, and provide inspection services during the construction stage of the project.

Further information is provided in the following reports:

- “Structural Review of the Process Tanks at the Iqaluit Reclamation Facility” prepared by CH<sub>2</sub>M Gore & Storrie.
- “Sewage Treatment Plant Investigation” prepared by Earth Tech (Canada) Inc.
- “Completion Study for the Iqaluit Wastewater” prepared by CH<sub>2</sub>M Hill.

As part of this project, it is the City’s intention to address the deficiencies and issues identified in these previous reports. Furthermore, it is the City’s desire to convert the existing facility to a conventional activated sludge secondary treatment plant to meet the projected flows and loadings for a 20-year design horizon.

The objectives of the design team are to:

- Provide a complete operation system to meet the needs of the community and also to address the specific characteristics of its location;

- Provide a simple operational design with features suited to the community and avoid processes or equipment that require highly specialized technical skills or sophisticated maintenance procedures;
- Maximize the re-use and integration of salvageable components within the existing facility; and
- Minimize life cycle costs of the facility.

### **3.3 New Process Description**

Phase 1 incorporates only the headworks (“preliminary treatment”) of the new WWTP. The new headworks building houses the following components for Preliminary Treatment:

- New influent pumping;
- Relocate the existing screw screens;
- New fine screening equipment;
- New valves; and
- New PLC-based control.

### **3.4 New Building (General)**

The new building has been constructed to the current building code, and to good northern engineering practices. The new building foundation is set on rock socket piles with lengths varying up to 7m long. The new building consists of an upper and lower level. There are also two new rooms in the existing building one is the electrical room and the new lab.

#### **3.4.1 New Building Lower Floor**

The lower floor consists of a concrete slab covering a bituminous damp proofing, 100mm Rigid insulation. The concrete slab is 150mm thick on top of a compacted fill.

### **3.4.2 New Building Upper Floor**

The upper floor consists of 150mm thick concrete slab, with grating covering the channels and the hole to the sludge hopper.

### **3.4.3 Lower Wall Construction**

The lower wall assembly consists of a concrete wall that supports the upper floor. On the exterior of the concrete wall is attached bituminous damp proofing, 100mm rigid insulation and finally cement board.

### **3.4.4 Upper Wall Construction**

The upper wall assembly consists of a prefinished metal liner; notched Z bar sub grit, the cavity is filled with a semi rigid insulation, weather barrier and a prefinished metal siding.

### **3.4.5 New Building Interior Wall Construction**

The interior wall has a 1 hour fire rating and is constructed of 15.9mm 'Densarmour' Densguard Fireguard, 91mm steel studs 400mm on center and 15.9mm 'Densarmour' Densguard Fireguard.

### **3.4.6 New Building Roof Construction**

The new building roof assembly consists of a prefinished metal liner, 12.7mm exterior grade GWB, a thermal barrier, an air/vapour barrier, 2 layers of 100mm rigid insulation with Zgrit and finally prefinished sheet metal roofing.

### **3.4.7 New Electrical Room Construction**

The three new electrical room wall assemblies are constructed of two types one with a 1 hour fire rating and is constructed of 15.9mm 'Densarmour' Densguard Fireguard, 38x89mm wood studs 400mm on center, 9.5mm plywood backing on the electrical room side and 15.9mm 'Densarmour' Densguard Fireguard, the other two new walls are fire rated for 1 hour and is constructed of 15.9mm 'Densarmour' Densguard Fireguard, 91mm steel studs 400mm on center and 15.9mm 'Densarmour' Densguard Fireguard.



### **3.4.8 New Lab Room Construction**

The new Lab walls are constructed of three different types of assemblies. The one wall is common with the new electrical room which is fire rated for 1 hour and is constructed of 15.9mm 'Densarmour' Densguard Fireguard, 91mm steel studs 400mm on center and 15.9mm 'Densarmour' Densguard Fireguard, one of the other walls is common with the existing washroom and constructed of 12.7mm 'Densarmour' Densguard, 152mm steel studs 400mm on center and 12.7mm 'Densarmour' Densguard. The last wall is constructed of 12.7mm 'Densarmour' Densguard, 91mm steel studs 400mm on center and 12.7mm 'Densarmour' Densguard. The new lab also has new cabinets for the storage of the laboratory equipment.

### **3.4.9 Doors and Stairs**

The doors are fire rated in fire rated walls and regular doors in non fire rated walls, there are two new overhead doors are installed for access to the lower floor in the new headworks building and the second floor for installation of equipment onto the second floor in phase 2. The new stairs are galvanized for access from the lower headworks floor to the upper headworks floor and another from the upper headworks floor to the second floor in the existing building as well as the exterior access to the second floor of the existing building.

**END OF CHAPTER 3**

## **Chapter 4**

### **SCHEMATICS AND FUNCTIONAL DATA**

#### **4.1 General**

This Section is Not Applicable.

**END OF CHAPTER 4**

## **Chapter 5**

### **COMPONENT DETAILS**

#### **5.1 General Overview**

This Section is Not Applicable.

**END OF CHAPTER 5**

**Chapter 6**  
**OPERATING PROCEDURES**

**6.1    General**

This Section is Not Applicable.

**END OF CHAPTER 6**

## **Chapter 7**

### **MAINTENANCE**

#### **7.1 General Maintenance**

To ensure uninterrupted use, equipment should be regularly inspected, tested, and proper repairs made and recorded. The objective is to minimize equipment operating problems and prevent failures by making minor or necessary repairs before major difficulties occur. The importance of record keeping cannot be over-emphasized. Good maintenance protects the owner's interest with manufacturer warranties, continuity, or maintenance despite staff turnovers and equipment reliability track record.

Environmental and operating conditions are key elements affecting proper and reliable operation of equipment. Costly repairs can be minimized if the following items are attended to:

#### **KEEP IT CLEAN**

#### **KEEP IT TIGHT**

#### **7.2 Keep it Clean**

Day-to day accumulation of normal atmospheric particles, lint, metallic particles form mechanical equipment cause problems with equipment over a long period of time. An accumulation affects equipment reliability and operating life. ALL equipment should be regularly cleaned.

#### **7.3 Keep it Tight**

All contactors and control devices operate with high speed movement. This motion creates vibration that can loosen hardware and other parts. External vibration from equipment may cause the loosening of hardware and connections in any equipment. All hardware and connections should be tightened regularly. This simple procedure takes only a small amount of time and can save hours of searching for intermittent problems.

All rotating equipment such as motors are affected by vibrations. This can cause alignment problems, which can result in bearing failures.

#### **7.4 Renewal Parts**

Availability of parts can be a major problem these days as distributors are keeping very low inventories in a move to economize. This may make any part a long delivery item. For this reason local distributors should be contacted and parts availability assessed.

Any critical part affecting the reliability of the system should be ordered, recorded and stored by the maintenance department.

#### **7.5 Parts and Equipment Ordering Procedure**

During the first year of operation, the Contractor should be contacted for any replacement parts required. This will ensure that parts covered by warranty will be replaced under warranty. Failure to contact the Contractor may result in difficulties in obtaining warranty replacement.

Following the first year of operation, it is recommended that the Contractor also be contacted as many of the suppliers have a wholesale only policy. If it is necessary to purchase parts directly from the original supplier, the following information is required.

- **Make**
- **Model No.**
- **Year of Installation**
- **Installing Contractor**
- **Description of Part Required (i.e. Fan Bearing)**
- **Part No. if Available.**

When quoting a part number contained in manufacturer's catalogue, always provide the date of the catalogue you are referring to, as these numbers are often subject to change. The equipment supplier will have the latest edition of the manufacturer's catalogue.

If the original supplier is no longer in business, contact the contractor who will be able to suggest an alternate source of supply.

## **7.6 Scheduled Preventative Maintenance**

See the manufacturer's data in Chapter 9 to see what items require regular maintenance.

**END OF CHAPTER 7**



## **Chapter 8**

# **TESTING AND CERTIFICATION DATA**

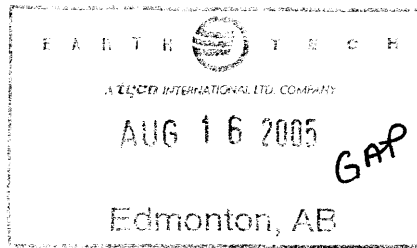
### **8.1 General**



File 75360 - 08

## Trow Associates Inc.

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Reference: OTGE00017181B

August 12, 2005

Mr. Glen Prosko, P.Eng.  
Earth Tech (Canada) Inc.  
17203 - 103 Avenue  
Edmonton, AB T5S 1J4

*File removed 05/06/16*

Via Facsimile:  
(780) 488-2121

### **Piling Supervision Waste Water Treatment Plant, Phase I City of Iqaluit, Nunavut**

Dear Mr. Prosko:

We have now completed the installation of the piles on the above site. This work was authorized by you on July 11, 2005.

Installation of the piles on the site was undertaken between July 16, 2005 and July 26, 2005. A total of 32 piles were installed on the site. Each pile consisted of HSS 168 x 6.4 open ended steel pipe. The piles were installed in a 230 mm diameter pre drilled hole which extended a minimum of 2000 mm into the bedrock. The base of the hole was then cleaned and the hole filled with fast setting concrete grout. The open ended steel pipe was then vibrated into the grout to ensure that it is seated on bedrock. Reinforcing steel was then placed in the pipe. The portion of the pile that projected above the ground surface was wrapped with two layers of 6 mil poly prior to backfilling.

The annular space between the pipe and the drilled hole was filled with sand slurry after the grout had set. The top of the pile was filled with dry cuttings.

Attached summary sheets give the relevant data for each pile including pile number, length of the pile from cut off to tip, ground surface elevation, top of bedrock elevation and pile tip elevation. A review of this summary indicates that a total of 191.486 linear metres of piling was installed on the project. The pile numbering system is shown on the attached Drawing I. Individual pile installation records and daily field reports have also been attached for your records.

We trust that this information is satisfactory for your purposes. Should you have any questions, please contact this office.

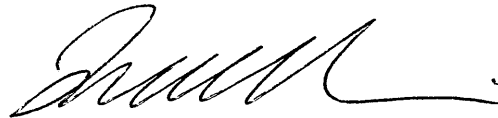
Yours truly,

**Trow Associates Inc.**

A handwritten signature in black ink, appearing to read "S. Aggarwal", with a stylized flourish at the end.

Surinder K. Aggarwal, M.Sc., P.Eng.  
Principal Geotechnical Engineer  
Assistant Branch Manager

Enclosures

A handwritten signature in black ink, appearing to read "I. Taki", with a long, sweeping horizontal line extending to the right.

Ismail M. Taki, M.Eng., P.Eng.  
Manager  
Geotechnical & Materials Testing Services



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## Piling Summary Report

Project No: OTGE00017181B

Date

July 24, 2005

Project Name Waste Water Treatment Plant, Phase I, Iqaluit

Pile No.	Pile Length C/o to Tip	Elevation at Ground Level	Top of Bedrock	Tip of Pile Elevation	Final Location	% Plumb	Comments
1	7.297	7.6	3.902	1.703	on centre	within tolerance	
2	5.985	7.6	5.162	3.015	on centre	within tolerance	
3	4.851	7.63	6.43	4.149	on centre	within tolerance	
4	4.912	7.6	6.4	4.088	55mm S of centre	within tolerance	gusset
5	5.421	7.6	5.771	3.579	on centre	within tolerance	
6	5.696	7.825	5.691	3.304	60mm N of centre	within tolerance	gusset
7	5.377	8.05	5.916	3.623	50mm N of centre	within tolerance	gusset
8	6.662	8.03	4.677	2.338	90mm E of centre	within tolerance	gusset
9	7.200	8	4.038	1.8	60mm E of centre	within tolerance	gusset
10	5.650	7.9	5.462	3.35	25mm E of centre	within tolerance	
11	5.712	7.9	5.462	3.288	on centre	within tolerance	
12	5.361	7.9	5.766	3.639	on centre	within tolerance	
13	6.340	7.95	4.902	2.66	on centre	within tolerance	
14	5.670	8.05	5.612	3.33	190mm N of centre	within tolerance	18" x 12" x 1/2 plate gusset
15	4.625	7.76	6.76	4.375	70mm N of centre	within tolerance	gusset
16	3.856	7.73	7.58	5.144	on centre	within tolerance	
17	5.850	7.8	5.362	3.15	on centre	within tolerance	
18	7.758	7.75	3.483	1.242	25mm W of centre	within tolerance	gusset
19	8.749	7.7	2.518	0.251	on centre	within tolerance	
20	8.553	7.7	2.823	0.447	on centre	within tolerance	
21	5.998	7.62	5.212	3.002	on centre	within tolerance	
22	5.280	7.625	6.101	3.72	on centre	within tolerance	
23	6.997	7.9	4.242	2.003	70mm E of centre	within tolerance	gusset
24	8.720	7.7	2.518	0.28	on centre	within tolerance	
25	7.250	7.7	4.042	1.75	65mm W of centre	within tolerance	
26	5.230	7.65	6.126	3.77	on centre	within tolerance	
27	5.675	8.25	8.25	3.825	220mm N of centre	within tolerance	gusset 18" x 12" x 1/2 plate
28	5.044	7.72	7.12	4.456	150mm N of centre	within tolerance	gusset 12" plate
29	4.180	7.53	7.53	5.32	100mm N 11.5cm splice	within tolerance	gusset 14" plate
30	5.288	7.495	6.595	4.212	40mm E of centre	within tolerance	Resurvey, relocated July 26/05 & reweldcap plate - gusset
31	5.111	7.54	5.406	3.189	50mm S of centre	within tolerance	gusset
32	5.188	7.51	5.376	3.112	140mm S of centre	within tolerance	gusset 15" plate
Total	191.486						

### Notes

\* Refer to pile records for additional information

## **Chapter 9**

### **MANUFACTURER DATA AND SERVICE INFORMATION**

#### **9.1 General**