

Operation & Maintenance Plan for  
Coral Harbour Municipal Water  
Licence:  
Water Supply Facilities  
2021

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# 1.0 Site Description

Date this plan was prepared: June 30, 2021

## 1.1 Location of the water supply and water treatment plant (WTP)

Municipality: Coral Harbour  
Latitude: 64° 08' 18" N  
Longitude: 83° 09' 56" W

## 1.2 WTP History

Year of commissioning the WTP: 2016  
Design life of the WTP: 2035



Figure 1 Coral Harbour Water Supply and WTP Infrastructure

## 2.0 Staff and Training

### 2.1 Staff

**Role:** Senior Administrative Officer      **Name:** Leonie Pameolik  
**Phone:** (867) 925-8870      **Email:** munch@qiniq.com

**Responsibilities:** The SAO manages the municipal staff to ensure that:

- proper operation of the water supply system is carried out
- sampling and inspections are completed
- annual reporting to the Nunavut Water Board (NWB) is prepared by the Government of Nunavut Department of Community and Government Services (GN-CGS)

**Role:** Foreman      **Name:** Darryl Nakoolak  
**Phone:** (867) 925 8323      **Email:** foremanch@qiniq.com

**Responsibilities:** The foreman is responsible for:

- operation and maintenance of the intake and overland pipeline from Post River to the reservoir
- annual resupply of the reservoir

**Role:** WTP Operator      **Name:** Various  
**Phone:** N/A      **Email:** N/A

**Responsibilities:** The WTP operators oversee that daily operation and maintenance of the treatment facility including:

- chlorine solution preparation
- sampling of treated water
- monthly and annual inspections

**Role:** Water Truck Drivers      **Name:** Various  
**Phone:** N/A      **Email:** N/A

**Responsibilities:** The water truck drivers fill truck for distribution of drinking water to the municipality. They also record and report the quantities of delivered water.

## 2.2 Training

Training records were last updated: 2020

Table 1 List of trainings obtained by staff

Staff member	GN Small Systems Course	GN Class I Systems Course	Other:
Luke Eetuk	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Darryl Nakoolak	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bernie Uluadluak	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Daniel Kadlak	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Logan Nakoolak	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Darcy Nakoolak	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 3.0 Security and Control

Access Control of to the facility:

- Perimeter fencing around the water reservoir
- Locks on gates and doors
- Signage

## 4.0 Facility Design

As built drawings for the WTP can be found in Appendix A.

## 5.0 Raw Water Sources

### 5.1 Raw Water Source

**Raw water source fill system type:** Reservoir Fill

**Alterations to the natural water source have occurred due to the WTP:**

None, water is drawn from a blasted rock 2-cell reservoir adjacent to the WTP.

#### 5.1.1 Primary Source

<b>Name of primary raw water source:</b>	Post River
<b>Type of raw water source:</b>	River
<b>Average annual quantity of water drawn:</b>	40,000 m <sup>3</sup> /year
<b>Maximum allowable withdrawal:</b>	45,000 m <sup>3</sup> /year
<b>Ice formation on the water source (Month):</b>	September
<b>Ice breakup on the water source (Month):</b>	June or July

#### **Equipment:**

- Intake pipe with fish screen installed annually approximately 20 m offshore
- Skid mounted portable intake pump and diesel fuel tank
- 6-inch diameter overland ABS pipeline, approximately 1500 m in length

#### 5.1.2 Reservoir

<b>Total volume of the reservoir:</b>	49,500 m <sup>3</sup>
<b>Number of reservoir cells:</b>	2
<b>Volume Cell 1:</b>	33,200 m <sup>3</sup>
<b>Year Constructed:</b>	1980
<b>Volume Cell 2:</b>	16,300 m <sup>3</sup>
<b>Year Constructed:</b>	1998

<b>Number of times per year the reservoir is filled:</b>	1
<b>Number of days it takes to fill the reservoir:</b>	Approximately 25
<b>Months the reservoir is filled:</b>	August - September

## 5.2 Operations

### **Overview of the operations process:**

Water is obtained from Post River once annually through an intake pump that runs for 24-hours until the reservoir cells are full. The following procedure is followed:

1. Ensure that the end of the overland pipeline at the reservoir is free and clear of debris or ice.
2. A diesel intake pump is located in the pump house at Post River, ensure that the fuel tank is full prior to starting the pump
3. Start the pump by pushing the Start button
4. To begin pumping water, turn the switch to the opposite side
5. Once running, the pump should be monitored periodically throughout the day to ensure it is operating properly
6. Once the reservoirs are filled, leaving 1 m freeboard, turn off the pump switch and turn off the pump
7. The total pumping volume should be recorded and reported in the annual report submitted to the NWB

## 5.3 Maintenance

### **Overview of the maintenance process:**

Maintenance of the intake pipe, intake pump and overland pipeline are the responsibility of the municipal staff. Inspection of the intake pipe, intake screen, intake pump, fuel tank, and overland pipeline is required each time water is pumped from the Post River. Regular oil changes and other mechanical repairs to the pump should be performed as needed. If any repairs to the overland pipe are required, they must be completed promptly.

Inspection and repair records should be brought to the Hamlet Office for filing annually. If any issues or problems are noted with the intake pipe, intake pump, fuel tank or overland pipeline, these should be communicated to the Foreman and/or SAO as soon as possible.

## 6.0 Water Treatment Process

### A brief overview of the water treatment process:

Water is drawn in from the raw water reservoir adjacent to the WTP where it undergoes:

- Pre-chlorination: Chlorine is injected prior to the filtration process.
- Cartridge Filtration: The sequence of filters is 20-micron, followed by 5-micron, followed by 1-micron cartridges.
- Chlorine Disinfection: This is accomplished using the CT concept through a 12,000 L chlorine contact pipe.

<b>Total annual water usage:</b>	37,000 m <sup>3</sup>
<b>Water distribution method:</b>	Trucked
<b>Treated water storage:</b>	12,000 L chlorine contact pipe within the WTP
<b>Rate of truck-fill:</b>	1000 L/min

### Operations and Maintenance:

The following documents are on site at the WTP and available from the GN-CGS upon request:

- Water Pump House O&M Manual Mechanical Process 1313 pages
- Water Pump House O&M Manual Architecture 427 pages
- Water Pump House O&M Manual Electrical, Ventilation & Plumbing 636 pages

## 7.0 Monitoring

**Regulatory Inspection:** The annual Crown Indigenous Relations and Affairs Canada (CIRNAC) inspection will take place accompanied by the licensee and/or with a licensee representative from GN-CGS. The inspection will be reviewed by a GN-CGS municipal engineer and submitted with the annual report.

*Table 2 Licence requirements related to O&M of the water supply facilities*

<b>Requirements</b>	<b>Reported</b>
Monthly and annual quantities of fresh water obtained from all sources	Annual report submitted to NWB
A summary of modifications and/or major maintenance work carried out on the WTP	Annual report submitted to NWB
A list of spills and unauthorized discharges.	Annual report submitted to NWB
A summary of any studies requested for the WTP and future planned studies planned	Annual report submitted to NWB
Volume of Potable Water Supply at Post River Monitoring Program Station COR-1	Annual report submitted to NWB

## 8.0 Modifications and Upgrades

### **Modifications or upgrades needed for the water supply facility:**

Modifications are required to the chlorination room, chlorine analyzers, heating system, and a treated water storage tank is planned to be added in the future to provide adequate supply of treated water. These modifications are planned to take place in the next 5 years and updated documentation will be provided to NWB during the design stage of these upgrades.

### **Planned modifications or upgrades:**

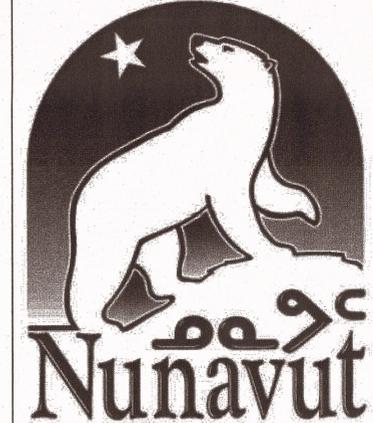
The municipality plans to move the pumping location upstream to a deeper more easily accessible point on Post River as indicated on Figure 1. NWB will notified prior to making this change. If this modification becomes permanent, an updated Water Supply OM plan will be submitted to NWB.

**Additional Comments or Notes**

None

## Appendix A: As-built WTP Drawings





**AS BUILT**  
By: [Signature] Date: 2016-11-27

NOTES: GENERAL CONTRACTOR TO VERIFY ALL DIMENSIONS WITH FINAL ARCHITECTURAL AND MECHANICAL DRAWINGS. NOTIFY THE ENGINEERS OF ANY ERRORS AND/OR OMISSIONS PRIOR TO CONSTRUCTION FOR DIRECTION. DO NOT SCALE THIS DRAWING.

No.	DESCRIPTION	DATE	BY	APPD
3	ISSUED FOR CONSTRUCTION	17/05/2016	M.N.	K.A.B.
2	REISSUED FOR TENDER	18/11/2015	M.N.	K.A.B.
1	ISSUED FOR TENDER	11/12/2014	M.N.	K.A.B.

PERMIT OF PRACTICE  
EXP SERVICES INC.  
Signature: *Karen A. Baker*  
Date: 2016/05/17  
PERMIT NUMBER: P483  
NTNU Association of Professional Engineers and Geoscientists

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CLIENT  
**GOVERNMENT OF NUNAVUT**  
DEPARTMENT OF COMMUNITY AND GOVERNMENT SERVICES

PROJECT  
**CORAL HARBOUR, NUNAVUT**  
WATER TRUCK FILL STATION  
PROJECT: 11-3018

TITLE  
**GROUND FLOOR PLAN, SECTIONS AND GENERAL NOTES**

design by	K.A. BAKER	project no.	OTT-200203694-A0
drawn by	M. NUGENT	drawing no.	
checked by	K.A. BAKER		
date	NOV, 2013		
scale	AS NOTED		

**WALL TYPES**

**W1**  
PRE-FINISHED METAL CLADDING  
19x64 HORIZONTAL WOOD STRAPPING @ 610 O.C.  
VAPOUR PERMEABLE WEATHER BARRIER  
75 mm RIGID INSULATION - RSI 2.64 (R15) ON VERTICAL Z-GIRTS @ 610 mm O.C.  
38 x 38 HORIZ. WOOD STRAPPING @ 610 O.C.  
38 mm RIGID INSULATION - RSI 1.32 (R7.5)  
AIR / VAPOUR BARRIER MEMBRANE  
12.5 mm OSB SHEATHING  
2 - 38 x 140 STUDS @ 400 O.C.  
9.5 mm OSB SHEATHING  
PRE-FINISHED METAL LINER

**W2** (125mm OSB SHEATHING)  
2 HOUR FIRE RATED WALL (NBC - DESIGN W2d NON-LOADBEARING)  
PRE-FINISHED METAL LINER  
2 - 15.9 mm TYPE X GYPSUM BOARD\*\*\*  
9.5 mm OSB SHEATHING  
2 - 38 x 140 STUDS @ 400 O.C.  
9.5 mm OSB SHEATHING  
2 - 15.9 mm TYPE X GYPSUM BOARD\*\*\*  
PRE-FINISHED METAL LINER

**W3**  
PRE-FINISHED METAL CLADDING  
19x64 HORIZONTAL WOOD STRAPPING @ 610 O.C.  
VAPOUR PERMEABLE WEATHER BARRIER  
75 mm RIGID INSULATION - RSI 2.64 (R15) ON VERTICAL Z-GIRTS @ 610 mm O.C.  
38 x 38 HORIZ. WOOD STRAPPING @ 610 O.C.  
38 mm RIGID INSULATION - RSI 1.32 (R7.5)  
AIR / VAPOUR BARRIER MEMBRANE  
12.5 mm OSB SHEATHING  
2 - 38 x 140 STUDS @ 400 O.C.  
9.5 mm OSB SHEATHING  
12 mm CEMENT-FIBRE BOARD

**W4** (125mm OSB SHEATHING)  
PRE-FINISHED METAL LINER  
9.5 mm OSB SHEATHING  
2 - 38 x 140 STUDS @ 400 O.C.  
9.5 mm OSB SHEATHING  
12 mm CEMENT-FIBRE BOARD

\*\*\* THE JOINTS OF THE OUTER LAYER OF FINISH ON BOTH SIDES OF THE WALL SHALL BE TAPED AND FINISHED. FASTENER TYPES AND SPACING SHALL CONFORM TO CSA-A23.31-M, "GYPSUM BOARD APPLICATION"

**DOOR TYPES**

**D01**  
TWO INSULATED METAL DOORS  
PAINTED, 800 x 2150 x45  
DOOR CLOSER  
1-1/2 PR. HEAVY DUTY HINGES  
ASTRAGAL  
WEATHER STRIPPING  
DOOR SWEEP  
ALUMINUM THRESHOLD  
FLUSH BOLTS  
PANIC HARDWARE  
THERMALLY BROKEN PRESSED STEEL FRAME PAINTED

**D02**  
1-1/2 HR. FIRE RATED HOLLOW METAL DOOR  
PAINTED, 800 x 2150 x45  
DOOR CLOSER  
1-1/2 PR. HEAVY DUTY HINGES  
WEATHER STRIPPING  
DOOR SWEEP  
ALUMINUM THRESHOLD  
LEVERED PASSAGE SET  
1-1/2 HR. FIRE RATED PRESSED STEEL FRAME PAINTED

**D03**  
INSULATED METAL DOOR  
PAINTED, 800 x 2150 x45  
DOOR CLOSER  
1-1/2 PR. HEAVY DUTY HINGES  
WEATHER STRIPPING  
DOOR SWEEP  
ALUMINUM THRESHOLD  
LEVERED LOCKSET  
THERMALLY BROKEN PRESSED STEEL FRAME PAINTED

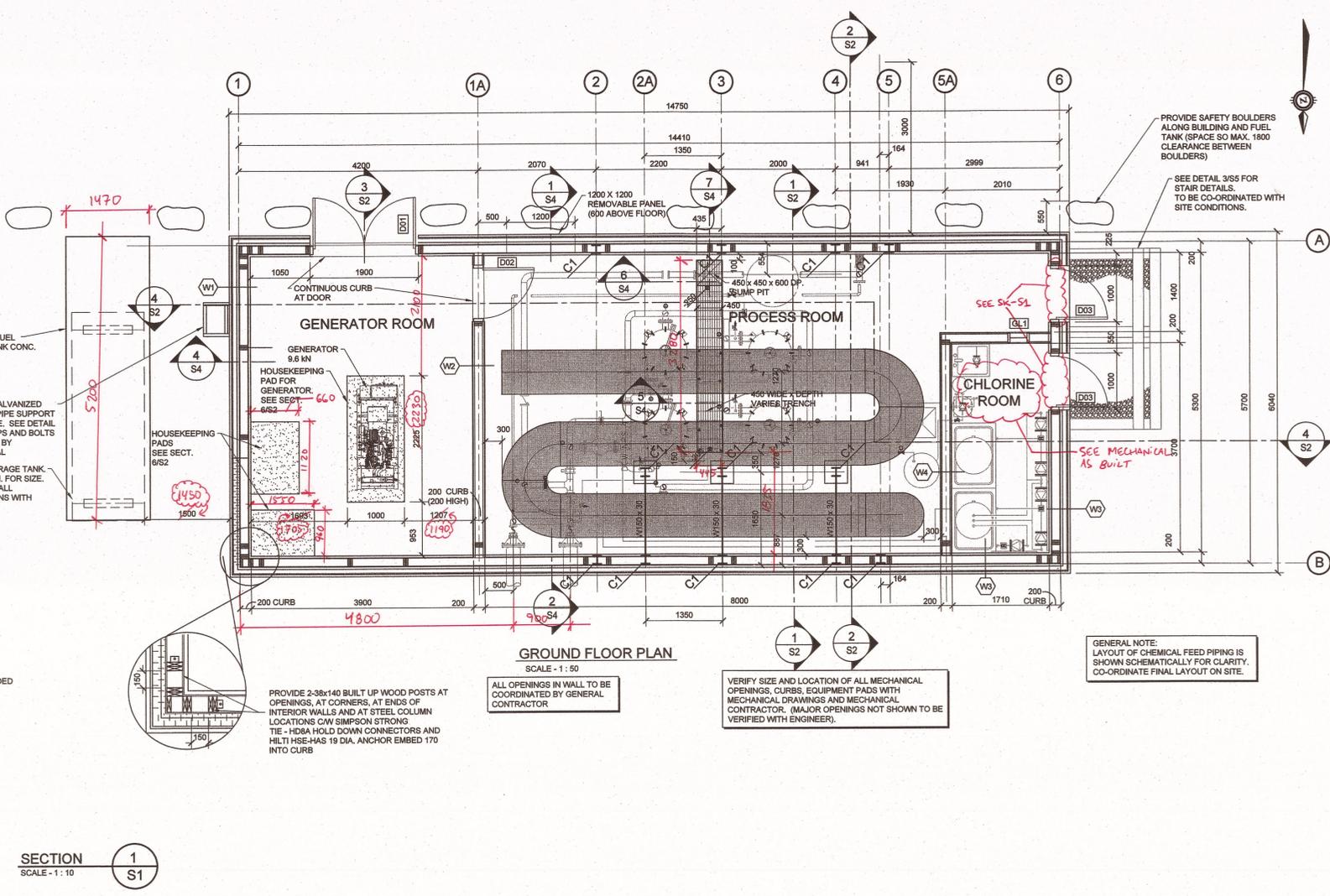
**WINDOW TYPES**

**GL1**  
300 mm WIDE X 600 mm HIGH WINDOW  
CW GEORGIAN WIRE GLASS  
METAL FRAME  
BOTTOM OF WINDOW AT 1200 mm ABOVE FINISHED FLOOR

**SECTION 1 S1**  
SCALE - 1:10

BASE PLATE 175 x 20 x 300 LONG  
CW 2 A325 - 20mm @ THREADED A. BOLTS  
C/W NUTS AND WASHERS

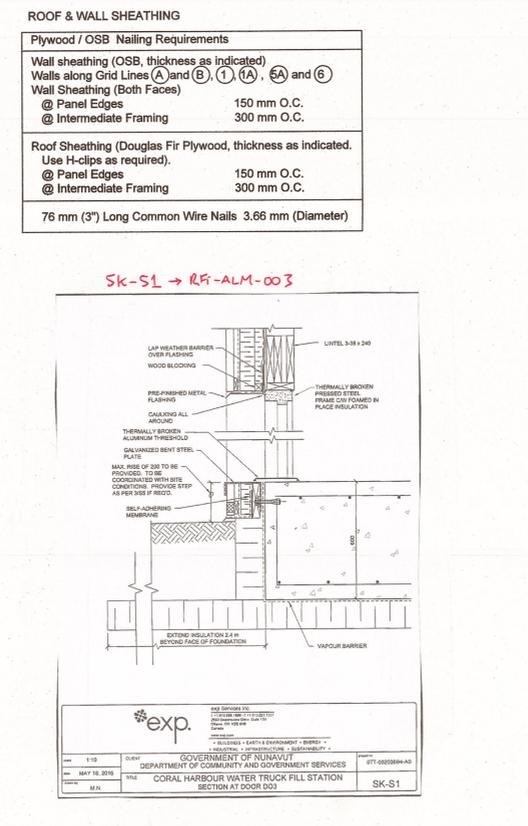
200 WIDE CONCRETE BEAM



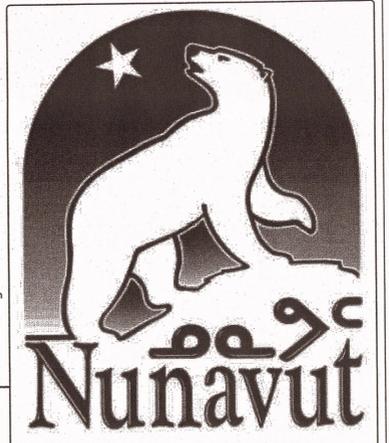
- GENERAL NOTES**
- Check all dimensions on structural drawings with other drawings. Report any inconsistencies before proceeding with the work. DO NOT SCALE THESE DRAWINGS.
  - All work shall comply with current provisions of the National Building Code, the Workplace Safety and Insurance Board and best trade practices. Work shall comply with all local and provincial regulations and with applicable C.S.A. standards. In all cases, the latest editions of codes and standards shall apply.
  - Structural design complies with the minimum standards of Part 9 of the National Building Code 2010.
  - Before submitting tenders contractors shall carefully examine existing conditions to establish the extent of the work.
  - Locate all buried services prior to excavation. The contractor shall be responsible for all temporary bracing, shoring and dewatering necessary to undertake the work.
  - The contractor is responsible for removing excess materials and cleaning up on completion of the work.
  - The contractor shall verify dimensions before construction and report discrepancies before proceeding with the work.
- MATERIALS SPECIFICATIONS**
- Concrete - materials to CSA-A23.1-14. Compressive strength minimum 35 MPa. 6% +/- 1% entrained air for concrete. Slump 70 +/- 20mm. Maximum water/cement ratio: 0.43. Maximum aggregate size 20 mm. Type GU cement. Exposure Class : C1
  - Formwork - to CSA-A23.1-14. Use only new forming materials for architecturally exposed surfaces. Form release agent shall be nonstaining, compatible with finishes where applicable.
  - Rebar - deformed billet steel bars to CSA G30.18M-09, Grade 400. Type W for welded rebar.
  - Mesh - welded wire fabric to ASTM A1064/A1064M-14.
  - Rolled structural steel shapes - General requirements to CSA S16-14, rolled shapes to CSA G40.21, 350W minimum. Channels, angles and plates 300W.
  - Hollow structural sections - to CSA-G40.20-13/G40.21-13, 350W, Class H.

- Bolts, nuts and washers - General requirements to CSA-S16-14, ASTM A325M-09. Hot dipped galvanized as required.
  - Welding - to CSA W59-13, E480XXCH or LH basic electrodes conforming to CSA W48-14. Welding shall be performed only by companies certified by Canadian Welding Bureau as follows: Fusion Welding - certified to CSA W47.1-09(2014); Resistance Welding - certified to CSA W55.3-08 (2013). Workmanship to best trade practices for cold weather installations.
  - Prime paint to Structural Steel - to CISC/CPMA STANDARD 2-75, one shop coat, one touch up field coat.
  - Wood Framing Material - SPF Grade No. 1 or 2. All lumber in direct contact with concrete, soil or moisture to be pressure treated.
  - Rough Carpentry - Timber Construction shall conform to Part 9 of NBC 2010 and CSA 086-14.
  - Nails and Staples - materials to ASTM F1667-13 Common and spiral anchor nails to be galvanized.
  - Prefinished Metal Roofing - Sheet steel to ASTM A653/A653M-13, commercial quality, galvanized, Z275 coating, designation, factory precoated with paint finish.  
Colour: White White QC8317 BRIGHT SILVER QC2624  
Profile: Ideal Roofing Pocket Rib AGWAY 7-150NF  
Class: FIS  
Thickness: 0.53 mm base metal thickness
  - Preformed Cladding/Siding - Sheet steel to ASTM A653/A653M-13, grade A, galvanized, Z275 coating designation, factory precoated with paint finish. 2 coat system dry paint film thickness of 0.025 mm +/- 0.005 mm both faces conforming to film test procedures described in C-SSB1 Bulletin No. 5 and ASTM D1005-95 (2013), Stelco 10000 Series or equal.  
Colour: White White QC16076 BRIGHT SILVER QC2629  
Profile: 36 mm deep x 190 mm flute spaces, preformed AGWAY 7-150NF  
Vic West CL622R with rib profile or equal  
Thickness: 0.61 mm base metal thickness  
Fascia and Trims: same colour and thickness as cladding
  - Wall and Roof Insulation: Rigid Closed Cell polystyrene: to CAN/ULC-S701-11, type 4, compressive strength at 5% deformation 275 kPa, thermal resistance of 0.87 RSI/25 mm, thicknesses as specified, square shipped edges. Acceptable material Styrofoam SM or approved equal.
- REINFORCEMENT PLACEMENT**
- Minimum clear cover  
- For concrete placed against earth.....75 mm  
- For concrete placed in forms but in contact with earth and weather.....50 mm  
- Interior slabs and walls.....40 mm  
- Curb .....40 mm
  - Laps  
- lap all bars 36 bar diameters or 450 mm minimum, whichever is greater, unless otherwise indicated.
- Chairs for support of slab reinforcing spaced at maximum of 1.0 m in either direction. Supply support bars, chairs and carriers.
- DESIGN SERVICE LOADS**
- DEAD LOADS**
- FLOOR 4.8 kPa  
ROOF (Self weight) 1.35 kPa  
Superimposed Loads (Mech. Allowance) 0.5 kPa

- LIVE LOADS**  
FLOOR 7.2 kPa
- ROOF SNOW LOAD**  
Se = 3.8 kPa  
Sr = 0.2 kPa  
Is = 1.25 ULS  
Is = 0.9 SLS
- $S = Is [Ss (Cb Cw Cs Ca) + Sr]$   
= 1.25 [ 3.8 (0.8)(1.0)(1.0)(1.0) + 0.2 ]  
= 4.05 kPa
- LATERAL LOADING**  
WIND LOAD (Governs)  
q(1.50) = 0.69 kPa  
Cp Cg = 1.95 for walls  
Cp Cg = 2.00 for roof  
Ce = 0.9  
Iw = 1.25 ULS Iw = 0.75 SLS
- WIND EAST - WEST**  
= 24 kN
- WIND NORTH - SOUTH**  
= 58 kN
- EARTHQUAKE LOAD**  
Site Classification C  
Sa (0.2) = 0.240  
Sa (0.5) = 0.110  
Sa (1.0) = 0.051  
Sa (2.0) = 0.013  
Fa = 1.0  
Fv = 1.0  
S (T = 0.2) = 0.24  
S (T = 0.5) = 0.11  
S (T = 1.0) = 0.051  
S (T = 2.0) = 0.013  
S (T > 4.0) = 0.0065  
Rb = 1.7  
Rc = 3.0  
Ie = 1.5 No Irregularities  
 $V = \frac{1}{3} S(0.2) \leq W/Rd Ro$   
= 2/3 (0.24)(1.5) W(3.0)(1.7)  
= 0.0471W
- NORTH - SOUTH or EAST - WEST**  
V = 14.75 kN







**AS BUILT**  
By: *[Signature]* Date: 2016-11-28

NOTES: GENERAL CONTRACTOR TO VERIFY ALL DIMENSIONS WITH FINAL ARCHITECTURAL AND MECHANICAL DRAWINGS. NOTIFY THE ENGINEERS OF ANY ERRORS AND/OR OMISSIONS PRIOR TO CONSTRUCTION FOR OR CORRECTIONS. DO NOT SCALE THIS DRAWING.

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1	ISSUED FOR TENDER	11/12/2014	M.N.	K.A.B.

REVISIONS

PERMIT OF PRACTICE  
EXP SERVICES INC.  
Signature: *K.A. Baker*  
Date: 2016/05/17  
PERMIT NUMBER: P483  
NTNU Association of Professional Engineers and Geoscientists

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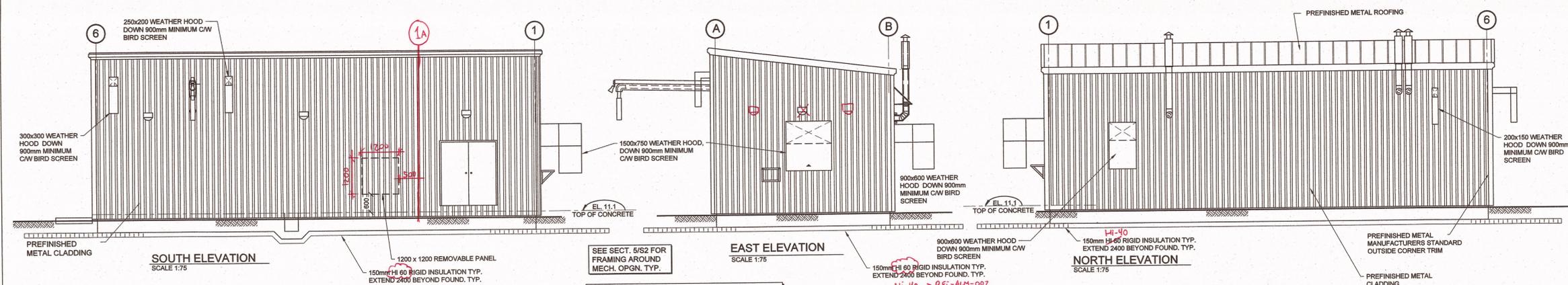
CLIENT  
**GOVERNMENT OF NUNAVUT**  
DEPARTMENT OF COMMUNITY AND GOVERNMENT SERVICES

PROJECT  
**CORAL HARBOUR, NUNAVUT**  
WATER TRUCK FILL STATION  
PROJECT: 11-3018

TITLE  
**BUILDING ELEVATIONS AND FILL PIPE DETAILS**

designed by	K.A. BAKER	project no.	OTT-0203694-A0
drawn by	M. NUGENT	drawing no.	
checked by	K.A. BAKER		
date	NOV. 2013		
scale	AS NOTED		

**S3**



LOCATION, ELEVATION AND SIZE OF WALL OPENINGS, WEATHER HOODS AND CHIMNEYS TO BE COORDINATED WITH MECHANICAL DWGS.

