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ᐅᖃᓕᑕᐅᔪᖅ (867) 979-5600
ᐊᖏᕐᓂᑦ (867) 979-0866

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3 July 2018

Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Attention: Manager of Licensing

Re: Iqaluit Wastewater Treatment Plant Upgrade
Type "A" Water Licence No. 3AM-IQA1626
Lagoon Diversion for Upgrade Purposes

Dear Sir or Madam,

The City of Iqaluit has awarded a contract and work is commencing for the upgrade and expansion of the existing Wastewater Treatment Plant (WWTP). The current plant provides primary treatment only and the upgrade will not only replace the existing Headworks (Primary Treatment), but also provide complete Secondary Treatment. It is planned that the work will be undertaken in 2 stages, with the Primary Treatment being completed and commissioned early 2019, and the Secondary Treatment being completed and commissioned at the end of 2019. To allow the replacement of the existing Headworks, it is necessary to divert flow from the current Primary Treatment at the WWTP to the existing sewage lagoon.

In accordance with the City's Type "A" Water Licence, we consider this diversion to be subject to Part G, "Conditions Applying to Modifications", based on the assessment that:

- The proposed modifications will not change land use and are therefore consistent with the NPC Land Use Planning Conformity Determination and NIRB Screening Decision.

- The diversion will provide a similar or higher level of treatment as compared to the current performance of the existing plant.

On this basis, the City is proceeding with the diversion and is hereby providing the Nunavut Water Board with 60 days advanced notification. The final schedule is being confirmed with the General Contractor (Kudlik Construction) but it is anticipated that the diversion will commence in October 2018 and be in place for approximately 4 months.

Furthermore, the City intends on undertaking a trial run of the diversion to better evaluate the lagoon's ability to receive the flow. This will entail diverting the wastewater stream to the existing lagoon for a period of 2 weeks in the month of July. Test data will be collected from the discharge and the results provided to the Nunavut Water Board.

Iqaluit

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The overall plan for the temporary use, and long-term integration of the lagoon into the operation of the wastewater treatment system, has been previously presented in the "Existing Lagoon Action Plan" dated June 7, 2018. It is attached for your information. A link to the Issued for Construction drawings has also been provided.

Should you have any questions, do not hesitate to contact the undersigned.

Sincerely,

Matthew Hamp
A/Chief Administrative Officer
Director of Public Works and Engineering
City of Iqaluit
Box 460, Iqaluit, NU
X0A 0H0

Attached: Issued for Construction Drawings (May 30, 2018) – via FTP site
Existing Lagoon Action Plan (June 7, 2018)

Nunami Stantec
P.O. Box 188
RANKIN INLET, Nunavut
X0C 0G0

June 7, 2018

City of Iqaluit
Building 901 (City Hall) Nunavut Drive
Iqaluit, NU X0A 0H0

Attention: **Matthew Hamp, Department of Engineering and Sustainability**

Dear Matthew,

Reference: **Iqaluit Wastewater Treatment System**
Existing Lagoon Action Plan

BACKGROUND

The City of Iqaluit has requested Nunami Stantec review the potential timeline and develop an action plan to temporarily divert flow to the existing lagoon to allow the improvements to be implemented to the existing Wastewater Treatment Plant (WWTP). The diversion is necessary as the current Headworks within the WWTP will require a complete shutdown for up to 4 months to replace the existing components with new and improved equipment in order to provide additional capacity to meet the growing needs of the City.

The City's lagoon has been in operation since the mid-1970's, with some upgrades and desludging being completed in 1991. In the late 1990's, the City endeavored to build a mechanical treatment facility capable of secondary treatment but following a series of problems, the design-builder abandoned the project. Following a facility evaluation in 2002, a remedial plan was developed, and a new design for a primary and secondary facility was produced. However, lack of funding allowed only the primary treatment portion (Phase 1) to be completed and the secondary treatment was put on hold.

Following completion of Phase 1, future use of the lagoon was identified as a provisional treatment process in the event that the wastewater treatment facility needed to be bypassed. This objective remains with a specific requirement for the current project to provide a treatment process for a four-month flow diversion that is required to build the new plant. The intent is also to incorporate the lagoon, as previously intended as a provisional treatment process in the overall treatment system.

LAGOON COMPONENTS

Lagoon Characteristics

The available piping systems to the lagoon incorporate a combination septage dump station and diversion chamber which allows both the septage and gravity flow from the City's system to be directed to the lagoon on a provisional basis.

Based on the limited information available, the lagoon volume is reported to be 56,000 m^3.

The outlet from the lagoon, based on 1991 as-builts, consists of piped discharge controlled by a valve chamber; the elevation of the discharge is 5.6 metres, which is approximately 2 metres above the bottom of the lagoon. The lagoon is not lined and several features such as a French drain, and an overflow spillway, were incorporated into the design of the lagoon to maintain the geotechnical stability of the system. The discharge point of the outlet directs the flow to the same channel that the current WWTP outfall discharges to and which ultimately releases to Koojesse Inlet.

The lagoon provided successful treatment of sewage for decades, and although it may be undersized for the current quantity of flow, it is anticipated that it will continue to function as a treatment facility and for the four-month shutdown, provide a reasonable level of treatment.

See attached overall figure and the 1991 as-built drawings.

Current Sludge Volume

It is understood that the most recent desludging of the sewage lagoon occurred in 1991. The lagoon remained in full operation until 2006 at which time the mechanical primary treatment system was commissioned at the current WWTP. Since 2006, the lagoon has been utilized for short periods during process upsets at the WWTP.

No information is available on the current quantity of sludge accumulated, and as discussed later, a sludge survey will be performed to establish the volume.

LAGOON ACTION PLAN

In order to ascertain the expected performance of the lagoon while diverting all the City's flow, the following action is recommended:

1. Performance Test

Flow will be diverted to the lagoon for a period of two weeks in early July, at which time samples will be taken from the piped discharge outlet. This should provide a reasonable expectation of the results that can be achieved during the anticipated four-month diversion, while the new WWTP primary treatment system is constructed and commissioned.

Meanwhile, the City has increased their testing frequency of effluent from the existing mechanical primary treatment system, and the results can be compared.

2. Desludging

With the quantity of sludge unknown, it is recommended that a sludge survey be performed this year, which would establish the elevation of the sludge "blanket" in the lagoon and the density of the sludge blanket. The benefit will be:

- The sludge accumulation quantity can be better established for future desludging requirements.
- The available volume for accumulation of solids while diverting the sewage flow to the lagoon can be more reasonably established. Based on the current quantity of solids collected at the WWTP, a retention time can be established and an approximation of the reduction of TSS and COD estimated based upon hydraulic retention time.

Following confirmation that the lagoon is acceptable for the four-month diversion, construction of the new WWTP can proceed with desludging of the lagoon taking place in 2019 (see the following timeline). Various methods exist for the desludging of the lagoon. Some common methods include:

- *Mechanical Removal of Sludges* - This involves decanting the lagoon, continued dewatering of accumulated liquids and removing the sludge by mechanical means. The in place dewatered sludge is typically hauled to a landfill site for disposal.
- *Pumping and Dewatering of Sludge* – In this method, a barge mounted solids handling pump is utilized to pump the solids to a dewatering system, while the liquid remains in the lagoon. Dewatering methods can typically be by centrifuge, or more suitable to this operation, the use of Geotubes. Geotubes are essentially a large filter sock whereby, the solids are encapsulated within the fabric, while allowing the liquids to drain out. Once the tube is full, and the water has drained, the solids can be excavated and hauled to the landfill. Iqaluit also has the advantage that the tube can be put through a freeze/thaw season, providing further dewatering and more importantly, a reduction in pathogens.

- *Disposal of Sludge* – The City is currently developing a solids management plan which will determine the ultimate disposal option, and which may include utilizing the sludge as organic cover/mix material for the landfill.

Should indication be that the lagoon will not be able to accommodate the four-month diversion, efforts may be necessary to expedite the desludging efforts, and desludge prior to the needed diversion.

3. Decanting of Existing Lagoon

It has been suggested that the City may want to consider decanting the existing lagoon prior to the temporary four-month diversion. This is not considered prudent at this time as:

- Recent test results of the effluent discharge from the existing mechanical primary treatment provides indication that the performance is lacking and would not provide the same level of treatment as the lagoon itself, should the decanted liquid be sent there.
- It may be more beneficial overall to decant and desludge the lagoon upon completion of the new mechanical primary treatment as more reliable and increased treatment of the decanted liquid can be provided as compared to the current system.

Therefore, it is recommended to decant the existing lagoon following the desludging efforts in 2019 (see the following timeline).

4. Public Awareness

Although the lagoon has been in intermittent operation for the past decade, the additional flow may cause increased odours. To combat the production of additional odours, the lagoon should be monitored for any surface exposure of the solids themselves. Maintaining a liquid cover will assist in reducing the odours.

In addition, the diversion is planned for fall 2018 and with freezing occurring, the ice cover will also provide a reduction in odours.

However, should exposed solids be witnessed, it is suggested that the available liquid be circulated by pump to dissipate exposed sludges.

In addition, the City may want to consider providing signage at known access points to deter public access. Currently no such measures are in place.

5. Stakeholder Notification

The relevant regulatory organizations will be kept informed of:

- Schedule of events
- Planned procedures being undertaken
- Temporary diversion test results
- Sludge survey results
- Treatment levels achieved during the four-month diversion

In addition, the City may want to inform the residents, through the City's website, of the anticipated use of the lagoon while the new WWTP is being constructed. If presented in a positive light, i.e. that is necessary for the completion of a state of the art, complete mechanical treatment plant, it should be viewed as favourable.

LAGOON TIMELINE OF ACTIVITIES

There are several steps in reaching the completion of integrating the lagoon into the temporary and permanent overall treatment system. The anticipated timeline is:

Date	Event
Prepare and Approve Lagoon Action Plan	June 2018
Performance Test (two weeks)	July 2018
Perform Sludge Survey	August 2018
Quantify Anticipated Treatment Results	August 2018
Inform Stakeholders	September 2018
Install Public Access Deterrents	September 2018
Divert Flow to Lagoon	October 2018
Monitor Lagoon	October 2018 to January 2019
Return Flow to New Primary WWTP	January 2019
Prepare Desludge Documents for Pricing	February 2019
Obtain Pricing & Award	March 2019
Shipping of Geotubes	July 2019
Commence Dewatering of Sludge	August 2019
Complete Dewatering of Sludge	September 2019
Decant Lagoon & Evaluate Condition	September 2019

Date	Event
Prepare Lagoon Operations Manual	October 2019
Lagoon in Operation for Plant Upset Conditions	October 2019
WWTP Commissioned	November 2019
Geotube Freeze Thaw Dewatering	Winter 2019/2020
Excavate and Transport Dewatered Solids to Landfill for use as an organic cover material (options being evaluated)	August 2020

We trust this meets your current requirements and should you have any questions, please contact the undersigned.

Sincerely,

Nunami Stantec

Glenn Prosko, P.Eng.
Senior Project Manager
Phone: (780) 969-3258
Glenn.Prosko@stantec.com

Attachment: Figure and As-builts

cc. Eslam Maher, Colliers


Iqaluit Sewage Lagoon
Legend
Feature 1
Septage Dump and WWTP Diversion
WWTP
Potential Area for GeoTube Dewatering
WWTP Outfall
Piped Dicharge
Overflow Spillway
Google earth
© 2018 Google
Image © 2018 DigitalGlobe
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500 ft

TOWN OF IQALUIT

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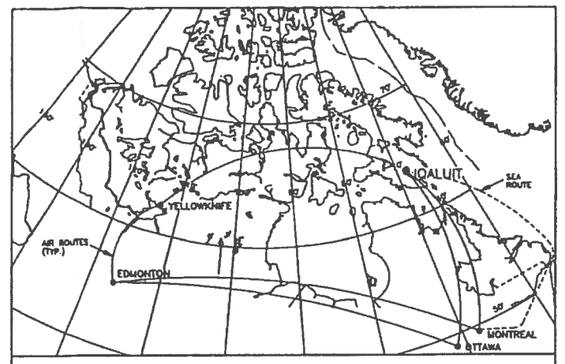

LOCATION PLAN
N.T.S.

IQALUIT - N.W.T. - CANADA

LAGOON RECONSTRUCTION AND DRAINAGE IMPROVEMENTS

RECORD DRAWINGS

CONTRACT No.

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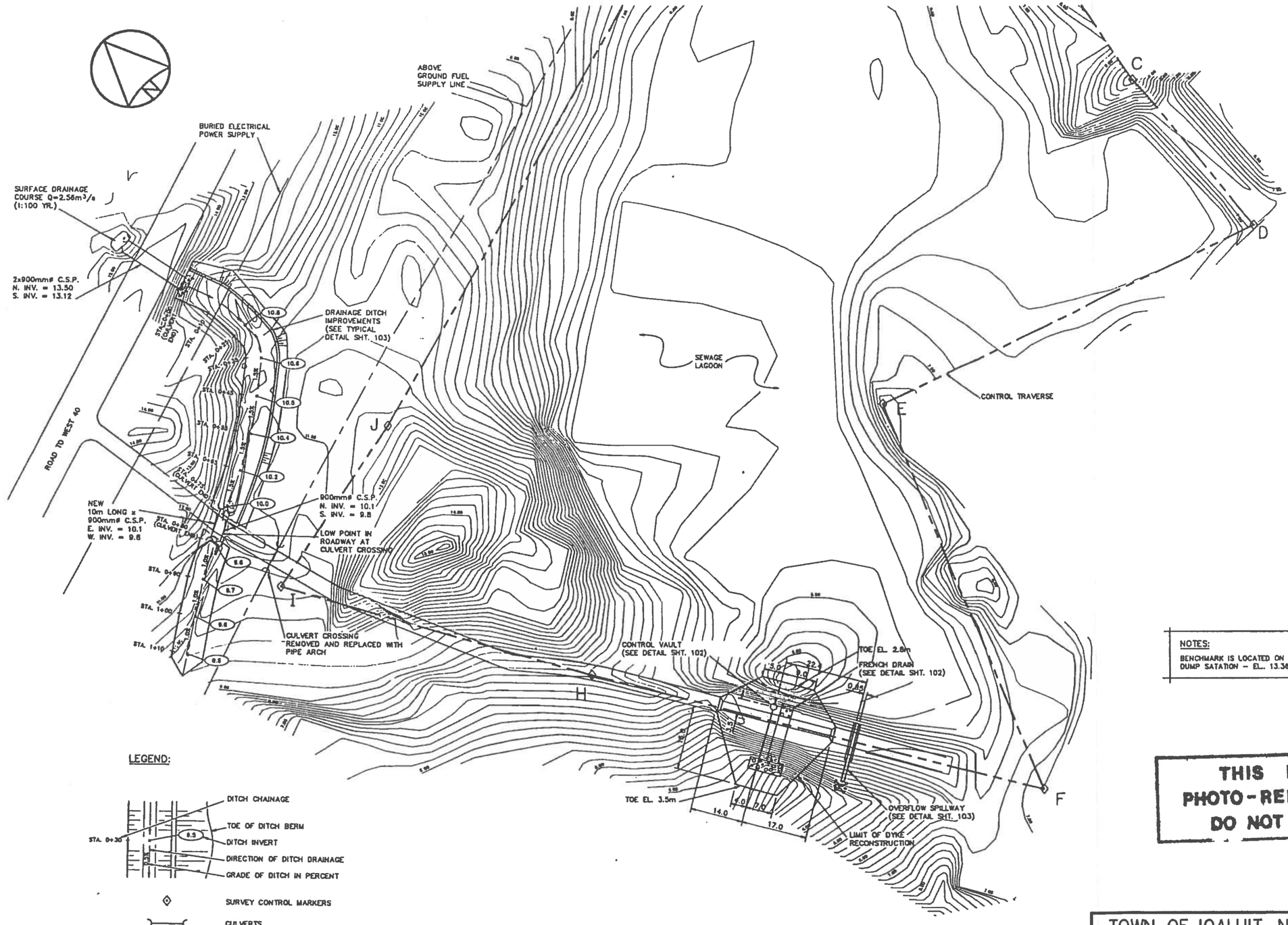
Kenneth R. Johnson
M.A.Sc., MCIP, P.Eng.
Planner & Engineer
www.cryofront.com

UMA Engineering Ltd.
Engineers, Planners & Surveyors



LEGEND:

- DITCH CHAINAGE
- TOE OF DITCH BERM
- DITCH INVERT
- DIRECTION OF DITCH DRAINAGE
- GRADE OF DITCH IN PERCENT
- SURVEY CONTROL MARKERS
- CULVERTS

NOTES:

BENCHMARK IS LOCATED ON CONCRETE SLAB OF SEWAGE DUMP SATATION – EL. 13.366m.

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PLAN SCALE 0 10 20 30m (10 5 1 : 000)

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THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 007
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TOWN OF IQALUIT, N.W.T.

LAGOON RECONSTRUCTION AND DRAINAGE IMPROVEMENTS

OVERALL SITE PLAN AND GRADING

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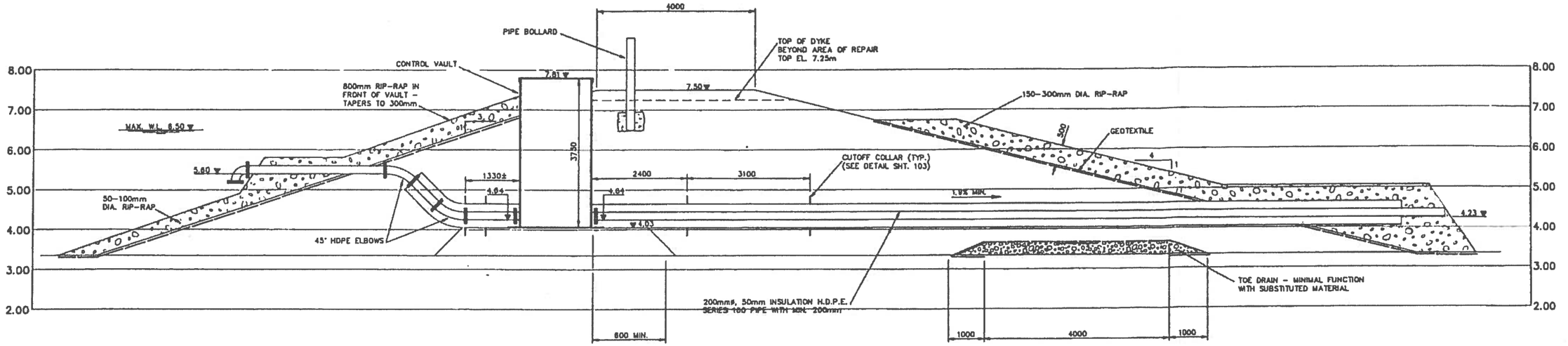

DYKE RECONSTRUCTION

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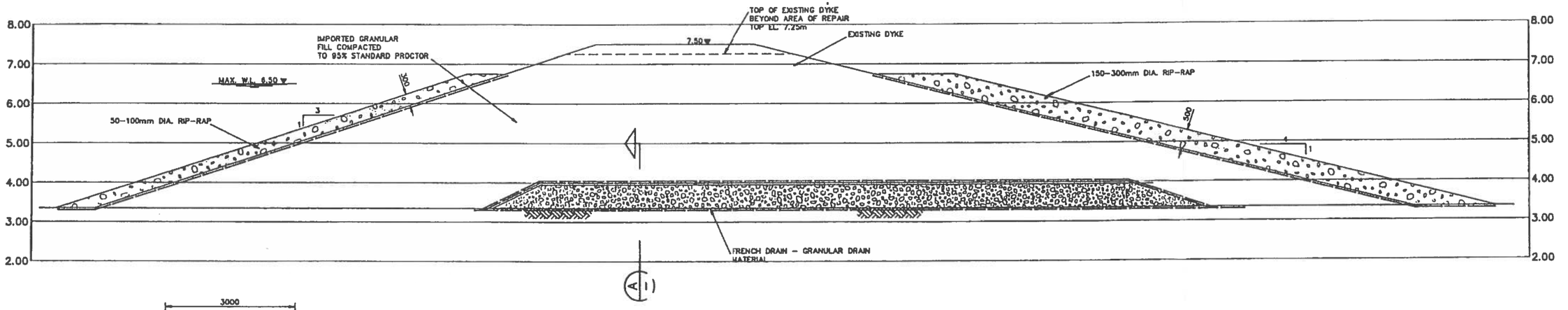

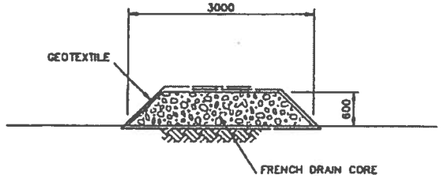

SECTION A

SCALE 1:50

FRENCH DRAIN (MINIMAL FUNCTION WITH SUBSTITUTED MATERIAL)

SCALE 1:50

NOTE: IMPORTED GRANULAR FILL CLASS D2 NOT UTILIZED ABOVE ELEVATION OF FRENCH DRAIN. MATERIAL WITH LARGER FINES COMPONENT SUBSTITUTED BY TOWN OF IQALUIT. DESIGN SLOPES OF 4:1 (EXTERIOR) AND 3:1 (INTERIOR) ACCOMMODATE THIS MATERIAL.

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LAGOON RECONSTRUCTION
AND DRAINAGE IMPROVEMENTS

SECTIONS & DETAILS

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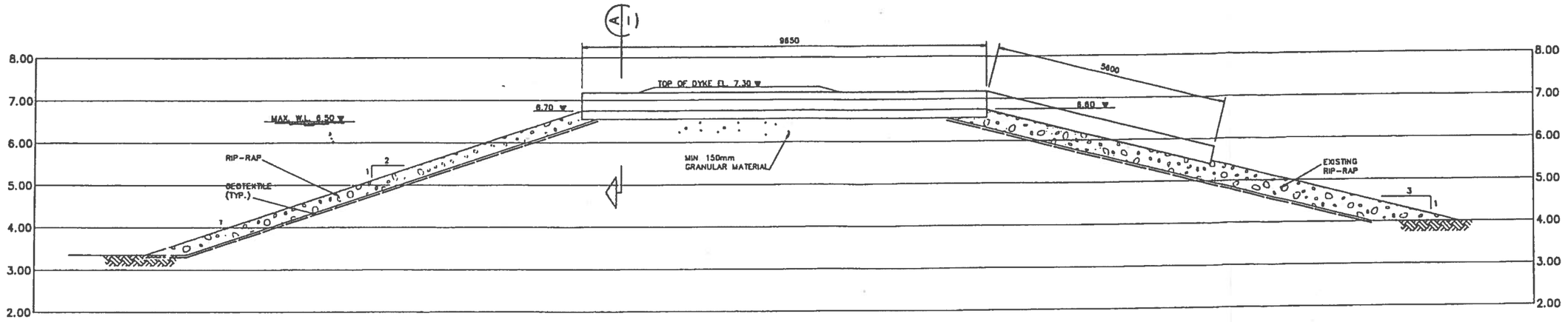

SECTION THROUGH OVERFLOW SPILLWAY

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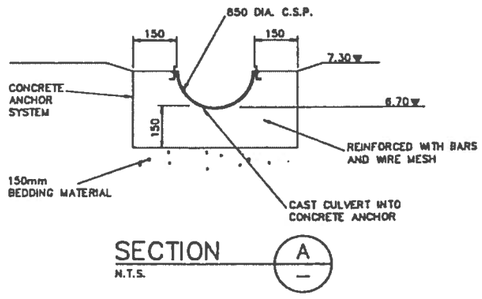
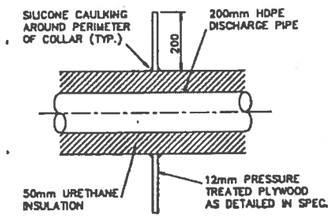
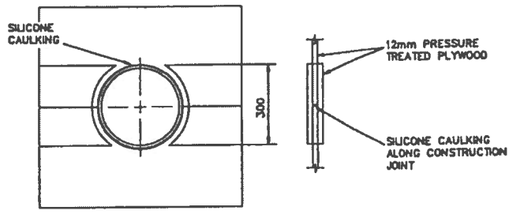


SECTION A — A
N.T.S.





CUTOFF COLLAR DETAIL

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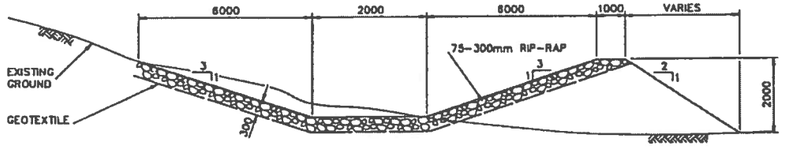

DITCH X-SECTION DETAIL

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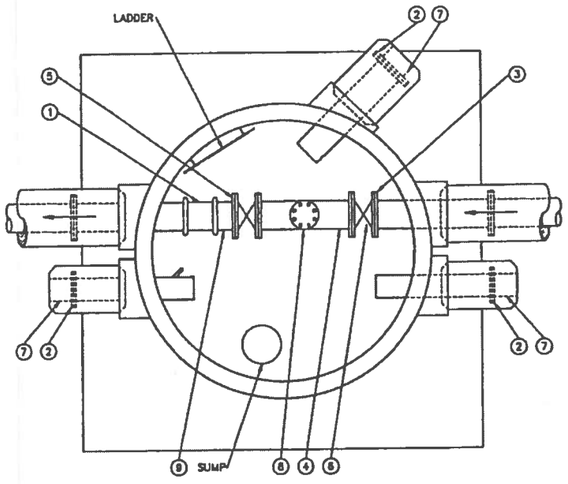

REFERANCE

1. VICTAULIC SPOOL PIECE
2. BLIND FLANGE – GALVANIZED
3. VICTAULIC STYLE #741 FLANGE – GALVANIZED
4. FLANGE SPOOL PIECE – GALVANIZED
5. PINCH VALVE
6. 200 KNIFE GATE VALVE (200 CWP CRANE)
7. MASTIC COATED P.U. INSUL. PLUG
8. TEE WITH BLIND FLANGE
9. FLANGE BY VICTAULIC SPOOL PIECE

CONTROL VAULT

N.T.S.

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TOWN OF IQALUIT, N.W.T.

LAGOON RECONSTRUCTION AND DRAINAGE IMPROVEMENTS

SECTIONS AND DETAILS

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