	PROJECT # 15255-00331-07 **MARINE INFRASTRUCTURE** **POND INLET, NUNAVUT**	

GENERAL DOCUMENT TRANSMITAL FORM FOR REVIEW OR INFORMATION

Document # :	**Document type**			
15255-00331-07-TA-GN-CWP-0002-1	**Shop Drawing & Data Sheet (SUB)**	☐	**Request for Information (RFI)**	☐
	Construction Work Plans (CWP)	✔	**Change Order Request (COR)**	☐
Date : 10/07/2018	**Non Conformance Report (NCR)**	☐		☐
Description :				

For review ✔		**For information** ☐	
Sent to ADVISIAN on : (Date)		**Sent to GN on : (Date)**	10/07/2018
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Remarks : In accordance to the section 01 41 00 of Construction Specifications

Prepared by : Simon-Pier Laberge Date: 10/07/2018

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Quarry Management Plan

WORK PLAN

Tower Arctic LTD.

Contract Number:	15255-00331-07
Project Number:	15255-00331
Tower Arctic Number:	21807
Document Number:	15255-00331-07-TA-GN-CWP-0002-1
Submitted From:	Tower Arctic LTD.
Submitted To:	Government of Nunavut
Date Submitted:	July 10th, 2018

Contents

1. INTRODUCTION

1.1 Purpose and Scope

The infrastructure construction project of Pond Inlet village includes a quarry. This quarry will permit the production of aggregates of different sizes for the construction of a bypass hauling route as well as for the different harbour development works. The aim of this plan is to manage different measures necessary for its exploitation. A periodic revision of this document is foreseen for reality activity checks.

1.2 Regulatory Context

The Ministry of Indigenous and Northern Affairs Canada manages the permit requests in related to quarries on Canadian soil, especially in the Nunavut province. According to the existing regulations, an operating plan needs to be presented in conjunction with this present plan in view of the volume superior to 1000 m^3.

1.3 Site Description

Requirement	Description
NTS Map Sheet (1:50,000)	NTS 038B10
Corresponding Plan of Property Drawing	Refer to Appendix A for quarry location
Total Area of Quarry (ha)	Approximately 21 ha
Current Volume Removed	Approximately 200 000 m3
Topsoil / Overburden Storage Area	None is required as the site is primarily exposed rock
Access Roads/Trails	A specific hauling road will be made linking the proposed quarry site and the construction site. (approx.. 6km)
Camp Locations	No camp will be built specifically for the quarry operation.

At the proposed quarry, the encountered subsurface conditions included 1 to 1.5 m of colluvium / frost shattered bedrock, overlying bedrock. Colluvium is a mix of sand, gravel, cobbles and boulders of various lithologies and/or of the underlying bedrock. It ranged in thickness from approximately 1 m to 1.5 m.

2. Site Security and Safety

A health and safety prevention plan will be available for consultation at all times on the operating site. This general prevention plan contains all the specific construction site safety measures. Moreover, safety prevention breaks are foreseen during the whole construction completion time. In order to respect the security measures in place, each supervisor will be briefed to ensure their application.

Various traffic signs will be installed in the operating site and also in it periphery. Moreover the installed signs will be in accordance to the regulations in place for the use of explosives. The drilling and blast procedures will rigorously be applied in order to assure adequate security.

An adequate barricade/fence will be installed in the career periphery, in order to limit the access to no authorized persons. This disposal, aims to prevent any risks of falls from heights.

Finally, the stabilization of the walls by consolidation will be a security priority on the operational site.

3. Quarry Operations

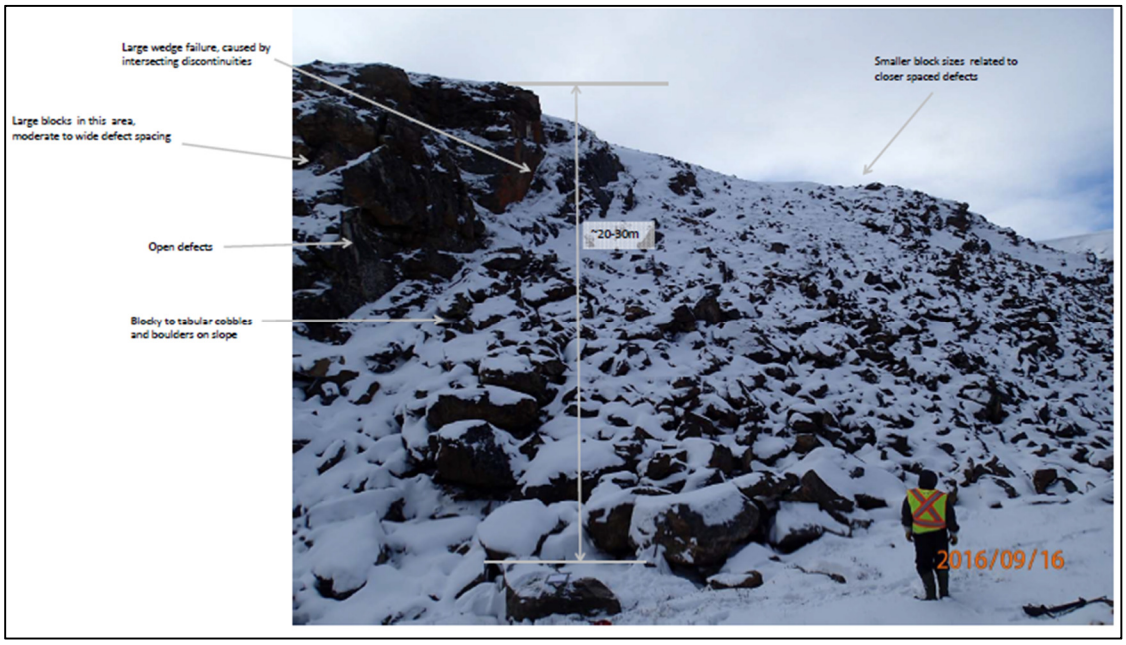
3.1 Equipment

The following list presents all the equipment that will be used for quarrying.

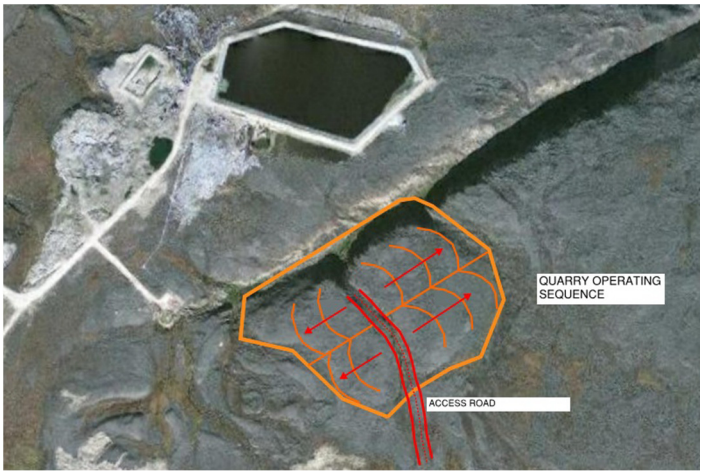
- Drilling equipment
- Blasting equipment
- Rock hauling trucks
- Excavators
- Portable crusher/screener units

3.2 Current Quarry Development and Proposes Design

According to the reconnaissance works carried out previously, the site has been exploited in the past. Indeed, a face of the land to be exploited has large blocks blasting residues. It is obvious that these residues will have to be removed before exploitation.



Depending on the orientation of the existing face, the work could continue along this same direction or be reoriented, to ensure a South-West direction towards North-East. This direction is suggested, in order to benefit from the existing relief which presents a rock wall. This wall would act as a protective wall. It should be noted that the suggested method is arbitrary and may differ slightly depending on conditions and restrictions on field.



3.3 Quarry Development

The following steps provide a summary of the stages in the operation of the quarry.

1. Access Road: Construct an access road with culvert water crossings, sediment and erosion controls from the crusher pad to the quarry face using fill material from a previously developed borrow/quarry site. This access road is used to transport the blasted quarry rock to a designated crusher pad.

2. Pioneer Bench and Loading Pad: Using a pioneer track drill, the first bench is drilled and blasted at some higher elevation so the bench bottom elevation is similar to the desired loading pad elevation. A portion of the initial blasted quarry rock will be utilized at the quarry face to create a level pad for loading quarry rock into haul trucks. After the loading pad is finished, blasted quarry rock is hauled to the crushing pad as crusher feed material to produce rock products.

3. Bench Drilling: As each drill round is blasted out, the drill either stays at this elevation to expand the bench in a longitudinal direction along the face, or the drill climbs up the quarry site to a higher elevation to drill and blast subsequent higher elevation benches. These benches are expanded in length as required for subsequent blasting of rock at that bench elevation. Benches are created for safety and for efficient drill/blast operations.

4. Subsequent Bench Development: Additional benches are created at higher elevations, starting at the open face of the site. Each bench proceeds toward the main body of rock at that elevation. Lower benches follow behind upper benches and drilled and blasted to move toward the main body of rock. Ramps may be constructed to the upper benches for truck loading near the blasted rock. Material is excavated from benches and loaded onto trucks for delivery to the crusher.

5. Drilling Quarry Rock: Drilling of the quarry rock is normally completed with the use of one drill rig. The boreholes are laid out by a surveyor to the engineered spacing and burden for each particular rock type, geology, and desired product size. The drill is removed from the area for loading explosives and blasting. The drill can proceed along the bench to continue drilling or proceed to a new bench.

6. Blasting Operations: Blasting rock is completed by installing high explosive detonating boosters with initiation wires, followed by dropping pre-packaged sticks of explosives, or pouring from pre-packaged bags, or by pumping bulk explosives (i.e. emulsion) from an explosives truck into the boreholes. Detonation and initiation is carried out with the use of delays to time the detonators in a very fast millisecond sequence of smaller blasts for efficient rock breakage. Blasting lags behind the drill as more drilling is completed.
   As each new drill round is completed, the drill moves on and the drilled round is loaded with explosives and blasted.

7. Hauling Quarry Rock: The blasted rock is loaded onto trucks for delivery to the crusher.

8. Crushing Operations: Quarry rock is fed to the crusher and screening equipment to size and produce the desired rock product, stored in stockpiles and loaded into trucks for delivery to construction sites.

3.4 Quarry Activities

3.4.1 Stripping and stockpiling of vegetation and topsoil

The proposed site for the present quarry operation does not have any surface vegetation. There is mainly a flush rock or coarse sediment on a thickness not exceeding 1.5m. No precise stripping method will be used.

3.4.2 Quarry Monitoring and Maintenance

Operation of the Quarry must be monitored to ensure compliance to meet the terms and conditions of the regulations and land-use permits granted for the Project. Monitoring will focus on:

- Regular inspection of site-preparation measures
- Regular inspection of drainage from the quarry site
- Volume and quality estimates of the granular resource material produced
- Monitoring for permafrost and ground-ice presence
- Monitoring for presence of avian, terrestrial and marine mammals in the area
- Any additional reporting requirements as outlined in any permits

3.4.3 Explosives Management

A Blasting and Drilling Management Method has been developed for this project. The framework focuses on the control and mitigation of key potential risks arising from the management and use of Ammonium Nitrate/Fuel Oil (ANFO).

The blasting operations will be carried out by Operations and/or an experienced contractor(s). Quarry operations will be using of Ammonium Nitrate/Fuel Oil. Transportation of ANFO to and from the quarry site will occur from the magazine storage area(s) via Project hauling road.

Blast hole drilling will take place on an appropriate grid pattern, determined by field testing, in an effort to optimize blast rock size and blasting efficiency. Blasting will normally take place once or twice a day.

3.4.4 Traffic Control

A Traffic Management Plan has been developed for this project. This plan presents in detail all the signs that will be used on the site and on the periphery of the site. It should be noted that the road traffic will be very minimal because of a hauling road specially built for the project

3.4.6 Spill Response Plan

A Spill Response Plan has been developed for this project. This plan presents in detail all the measures that will be taken to prevent spills of harmful substances to the environment.

3.4.7 Dust Management

The primary sources of dust associated with activities at the Q1 Quarry are blasting, loading and crushing and screening of aggregates. Very little topsoil exists at the quarry site, and is not considered a primary source of dust. The management of dust will be accomplished by minimizing the creation of dust at source. Crushing activity will take place as far from surface water or dust sensitive areas as is practical at the site. If possible, protection from prevailing winds will be accomplished by situating the crushing operation to take advantage of the local topography for shelter. Transport of material will be subject to speed limit restrictions to help reduce dust.

Dust management activities will include dustfall monitoring. Dustfall monitoring for the quarry will consist of monitoring the snow near the quarry (when available) for deposits of quarry dust by means of visual observations.

3.4.8 Noise Management

Quarry activities will generate noise from equipment operation, blasting and crushing and screening operations. Noise receptors within the area are restricted to wildlife, which is minimal.

During quarry operations, wildlife monitors will inform management if significant wildlife activity, such as caribou movements, is occurring. Depending on the concentrations and likely effect of the noise generating activity, management may temporarily suspend operation of the quarry.

3.4.9 Erosion Control

Because of the field's topography that suggest a natural slope that leads to small watercourses, erosion mitigation measures will be taken during quarry activities (See Appendix B). Tower Arctic Ltd. will use settling ponds and sediment fences around quarry location. The specific locations are to be determined on site during construction works.

4. Supporting Management Plans

This plan should be viewed in concert with the following additional plans:

- Spill Response Plan
- Blasting and Drilling Management Method
- Traffic Management Plan

5. Closure and Reclamation Activities

As previously mentioned, consolidation methods will be used to make the career as the safest as possible. Specific activities required for closure and reclamation of the quarry are described in the subsections below. Closure of the active quarry face will involve removing all materials, equipment and infrastructure.

5.1 Closure of Active Quarry Face

The active quarry face will be terraced during operation to closely manage issues related to drainage and will not be altered for closure. The quarry development will minimize the creation of pits and depressions to the degree practicable to reduce the potential for standing water. The quarry pit floor will be left as free draining.

5.2 Waste Disposal

All site waste will be collected and placed in appropriate containers for removal. Pre and post waste removal inspections will be made to ensure the thoroughness of the program. Waste will include metallic waste, construction material waste and domestic waste.

At the current time, no washroom facilities for personnel are expected at the quarry site. Any requirement for such facilities will be met by easily removable portable toilets.

5.3 Stockpile Removal

Removal of the stockpiles will not be necessary since part of the contract requires that our last material production be for the needs of the community.

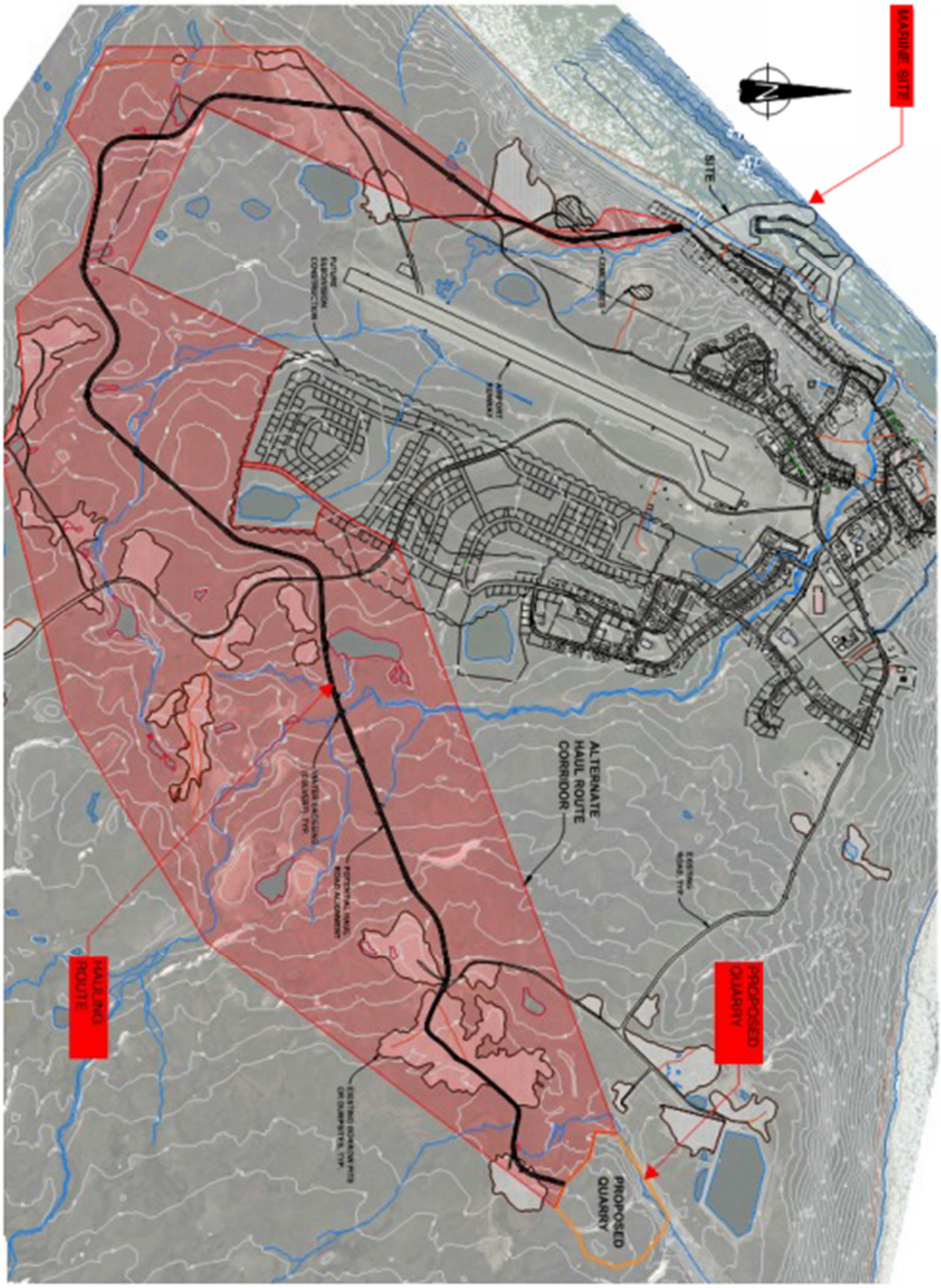
5.4 Hauling Road

At the end of the quarry exploitation, the hauling route will be rehabilitated and locals will be able to use it.

APPENDIX A

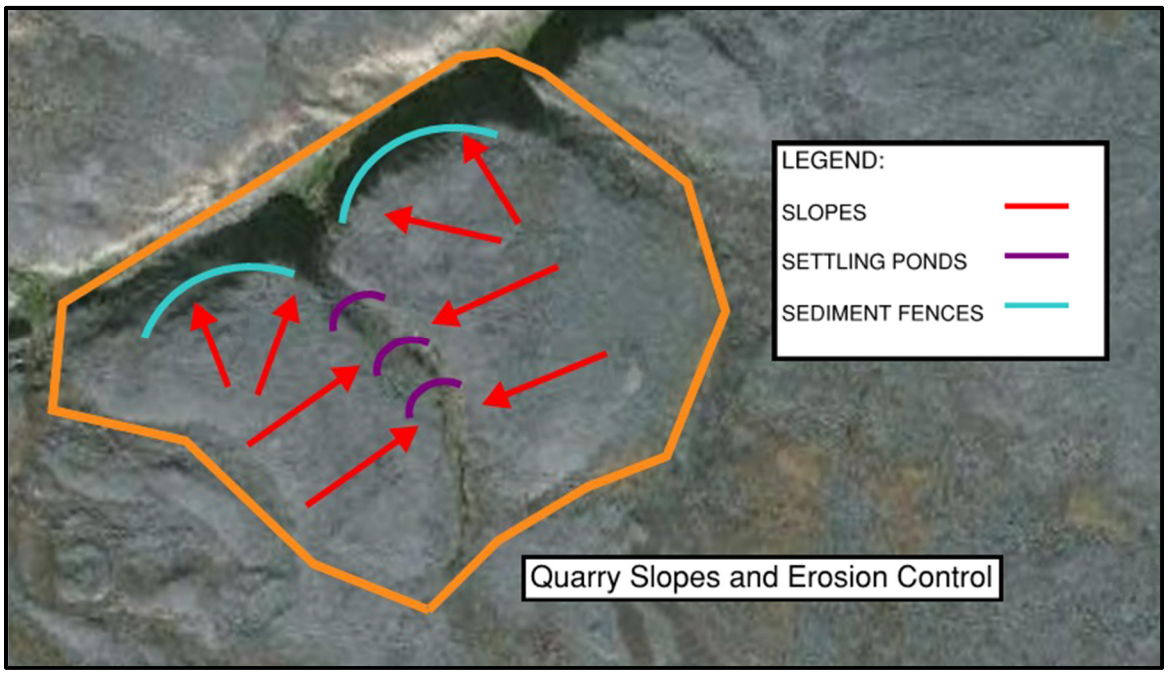
Quarry Location Plan

SIMPLIFIED MAP OF THE PROJECT



APPENDIX B

Quarry Topography


LEGEND:
SLOPES
SETTLING PONDS
SEDIMENT FENCES
Quarry Slopes and Erosion Control

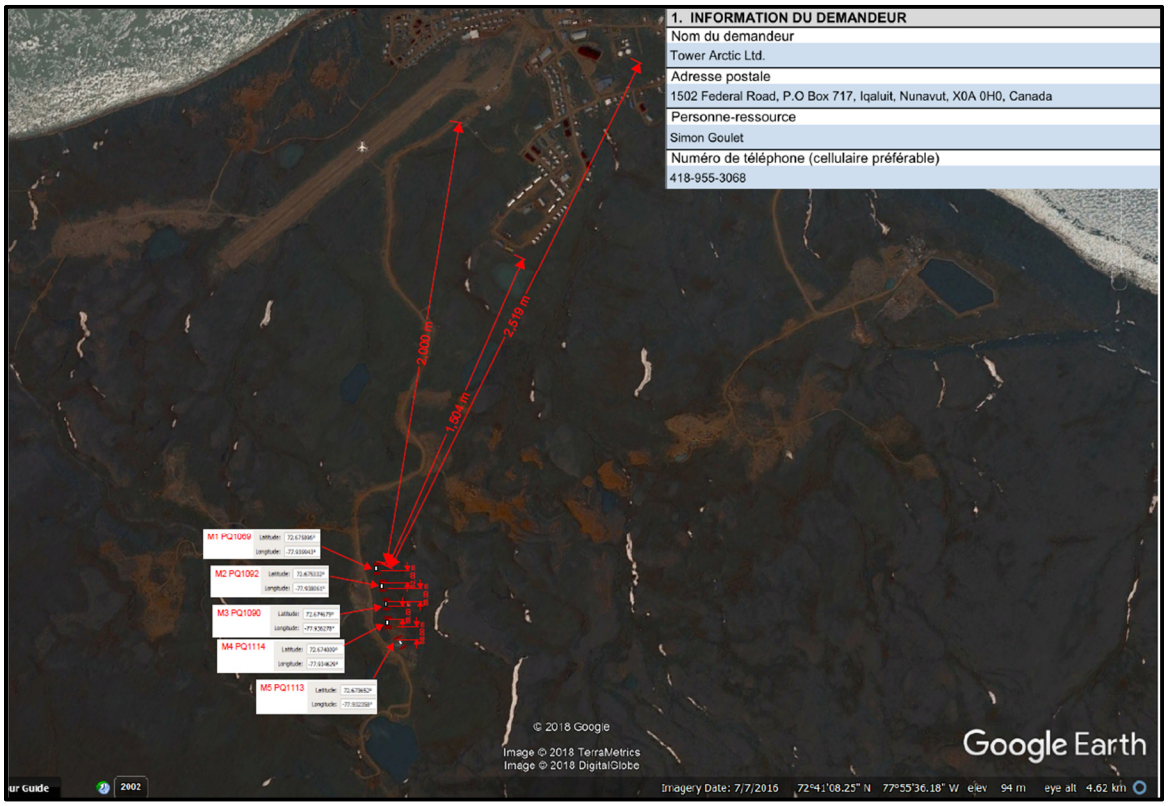
APPENDIX C

Stockpiles Zone


Pond Inlet
Pond Inlet Airport
QUARRY
STOCKPILES

APPENDIX D

Explosives magazines location


1. INFORMATION DU DEMANDEUR
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Personne-ressource
Simon Goulet
Numéro de téléphone (cellulaire préférable)
418-955-3068
2,000 m
2,519 m
1,804 m
M1 PQ1109
M2 PQ1092
M3 PQ1090
M4 PQ1114
M5 PQ1113
© 2018 Google
Image © 2018 TerraMetrics
Image © 2018 DigitalGlobe
Google Earth
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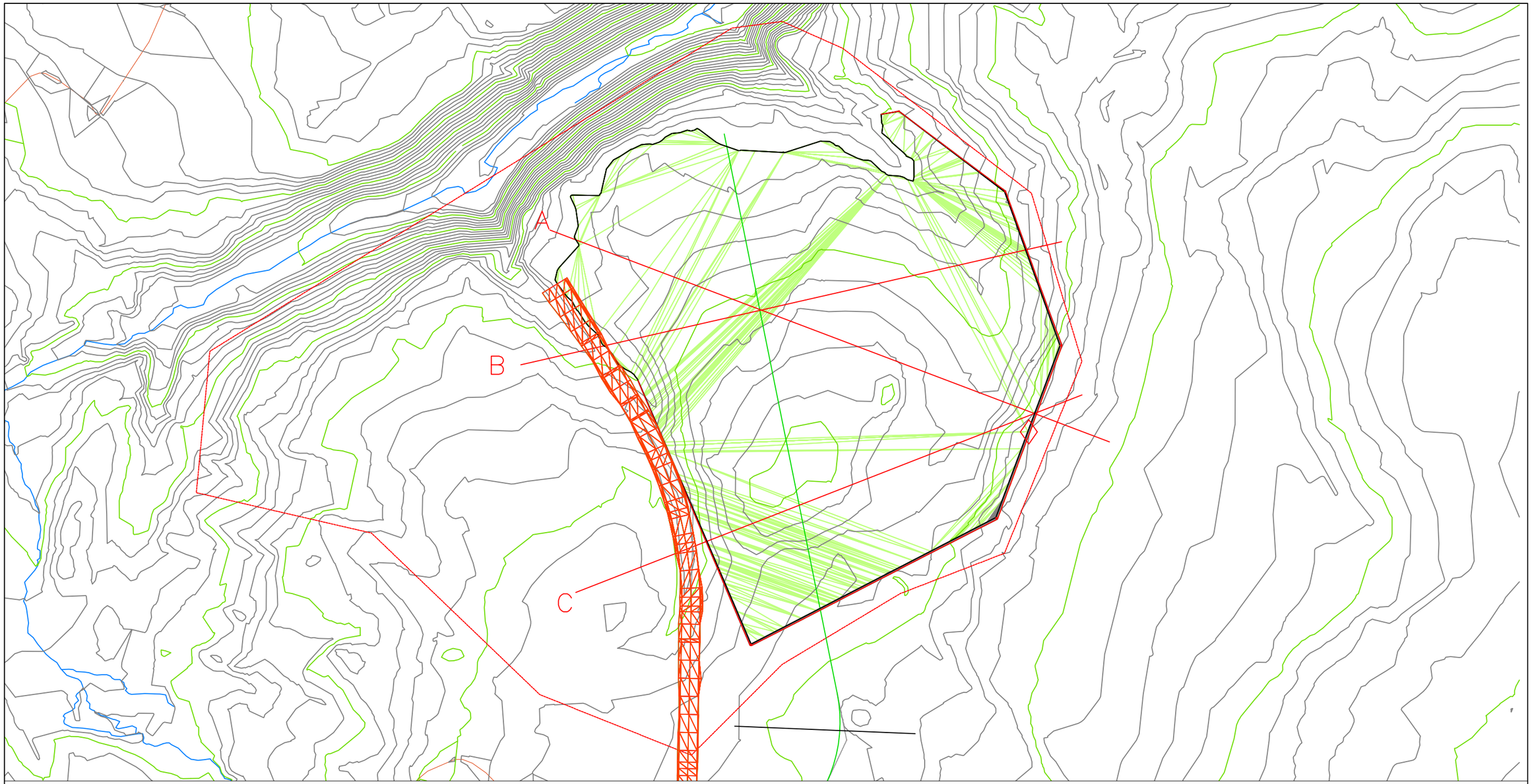
APPENDIX E

Quarry road and profiles



No	NOTE
1	Proposal is estimated to 292300 cu. m. capacity
2	For the Ramp Estimated Qtt. is Fill = 2200 cu.m excav. = 222 cu.m.
3	Material for backfill of the ramp should be Gravel and crushed rock

Company/Provider	INTERN REF. N°.	CONTRACT N°.	DATE

No	REFERENCE	DRAWING NUMBER

Date	Conceived_by	Approoved_by
2018-07-05	Mark Lafond	Simon Brochu ing,
Fichier :	Draughted_by Mark Lafond	

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POND INLET MARINE INFRASTRUCTURE

CARREER EXPLOITATION

SCALE 0 SCALE RATIO N/A DIMENSION UNIT m

PROJECT N°	DRAWING NUMBER	SHEET N°. OF	REV.	PAPER
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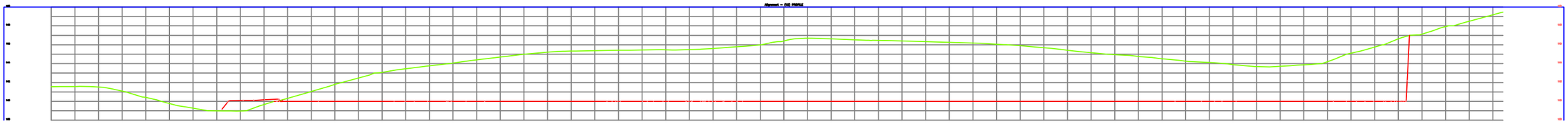

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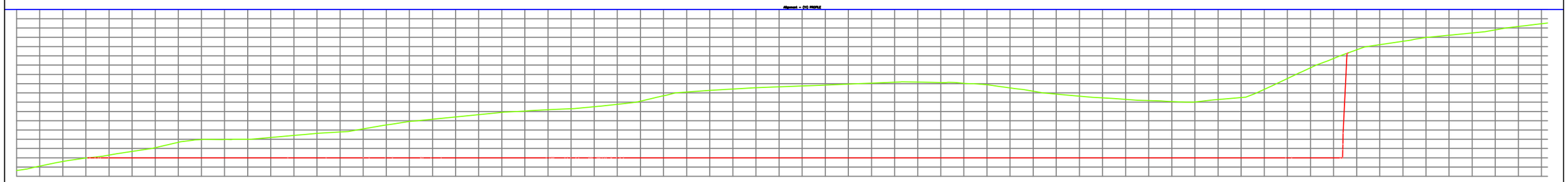

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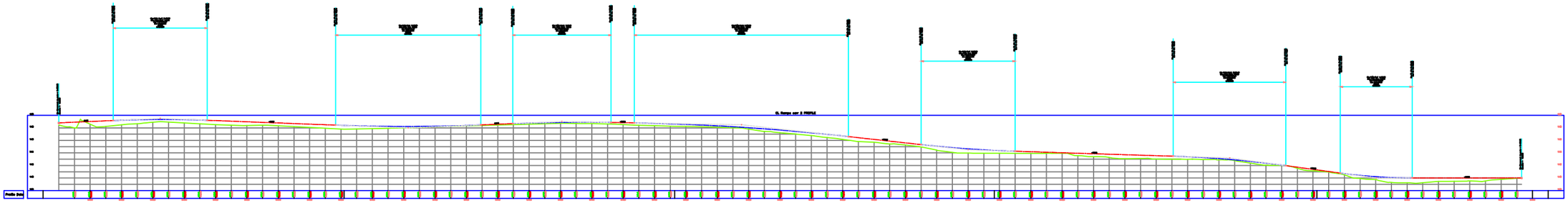
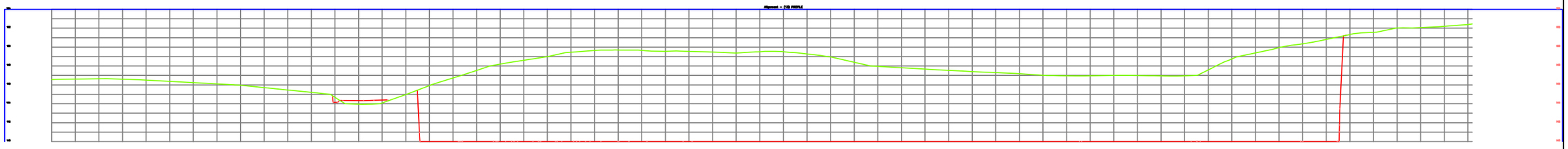
POND INLET MARINE INFRASTRUCTURE

CARREER EXPLOITATION

SCALE 0 SCALE RATIO N/A DIMENSION UNIT m

PROJECT #.	DRAWING NUMBER	SHEET #. OF	REV.	FINAL
21807	21807-SK-0001	2 of 3	0	B





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POND INLET MARINE INFRASTRUCTURE

CARREER EXPLOITATION

SCALE 0 SCALE RATIO N/A DIMENSION UNIT m

PROJECT N°	DRAWING NUMBER	SHEET N°. OF	REV.	DATE
21807	21807-SK-0001	3 of 3	0	B