WHALE TAIL WATER MANAGEMENT PROJECT

ROAD 22 CULVERT #22-2

CONSTRUCTION SUMMARY REPORT

WHALE TAIL PROJECT

Submitted by:
Agnico Eagle Mines Limited
Meadowbank Division
P.O. Box 540
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December 16, 2021

Approved by:

Frederick L.Bolduc
NAPEG Member # L3733

EXECUTIVE SUMMARY

The construction of Road 22 culvert #22-2 at Whale Tail was carried out from October 14th to October 15th, 2021. The purpose of the culvert is to direct non-contact water from the natural watershed through the Road 22 infrastructure. The controls applied during the construction were used to confirm that the work was completed in compliance with the Construction Drawings. This includes earthwork such as excavation, fill placement, and culvert installation.

During the work, no field adjustments or design changes were applied.

Document Control

Document Version	Date	Revised Section	Revision
V1	12/10/2021	-	For Submission

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TABLES

Section 1.0 – Introduction

The objective of the culvert, as dictated by the design report from SNC-Lavalin, is to direct non-contact water from the natural watershed through the Road 22 infrastructure. The construction of culvert #22-2 at Whale Tail was carried out from October 14th to October 15th, 2021. The location of culvert #22-2 is shown on Drawing 1 in Appendix B. This as-built report presents a summary of the construction activities, the QA/QC activities, as well as the overall information used to produce the as-built drawings as requested by the 2AM-WTP1830 Water License.

1.1 Roles and Responsibilities

The Engineering Design and Construction Drawings for the culvert was developed by SNC Lavalin Inc. with input from AEM. The Kivaliq Contractor Group (KCG) was contracted by AEM to execute and supervise the work. The Owner's Representative from AEM was the main point of contact between the stakeholders of the project (designer, contractor, AEM project manager). The Owner's Representative was also responsible for the Quality Assurance (QA) to ensure the culvert was built as per the construction Drawings. All filling material was taken from stockpiles of controlled quality that were already sampled in the past; therefore, no QC was present or required for the culvert installation, visual assessment was done by QA during field visits.

The Table 1 presents a summary of the general roles and responsibilities for each of the parties involved during the culvert construction. This table also includes the key companies and the key personnel that contributed to the various construction activities.

Table 1: Roles, Responsibilities and Key Personnel for the culvert 22-2 of Road 22 at Amaruq

Company	Role	Responsibility	Key Personnel	Position
Agnico Eagle Mines Limited	Owner	Project Management Act as Owner's Representative QA during construction and technical review of construction work.	Patrice Gagnon	Geotechnical Specialist
			Camille Pelletier	QA Representative
			Guillaume Baril	Surveyor
Kivaliq Contractor Group (KCG)	Contractor	Carry out culvert construction activity. Supervise work.	Claude Tremblay	Field Supervisor
			Michael Gagnon	Superintendent
SNC Lavalin Inc.	Designer	Provide Engineering Design & Construction Drawings for the culvert.	Gilles Marcotte	Engineer

1.2 Definitions of Terms Used in this Document

The following table presents the definitions of the terms used in this report.

Table 2 : Definitions of Terms

Term	Definition
AEM	Agnico Eagle Mines Limited, Owner.
As-built drawing	Document showing no new concept. It is the graphical representation of a built structure showing the real measurements, installed instruments and objects. It is an inventory of what was built for reference.
Approval	A written engineering or geotechnical opinion, related to the progress and completion of the Work.
Contractor	Kivaliq Contractor Group (KCG). On-site representative of the construction company contracted by the Owner to successfully carry out the scope of work as defined by the drawings.
Designer	SNC Lavalin Inc.
Fine Filter	Material produced from the processing of NAG and meeting the Specifications. Used as sub granular material.
NAG	A material that has been geochemically classified as not being acid generating.
Owner	Agnico Eagle Mines Limited, Meadowbank Division (AEM).
Owner's Representative	Person(s) employed by the Owner to oversee the project works and the Owner's interests. The primary point of contact for the Designer and the Contractor.
Quality Assurance (QA)	A planned system of inspection and testing that document, to the satisfaction of the Owner, other stakeholders, and regulator that the Work complies with the design and Drawings. Quality Assurance forms a subset of the Quality Control program. Quality Assurance comprises inspections carried out during Quality Control and includes verifications, evaluations of materials and workmanship necessary to determine and document the quality of the constructed facility. Quality Assurance refers to the measures taken to assess whether the Contractor follows the design intent and Drawings
Quality Control (QC)	A planned system of inspection, testing and documentation carried out by the Contractor during construction to ensure that the Work is being performed and completed in a manner that complies with the Drawings and Specifications. The Contractor is responsible for the Quality Control of all Work performed by him and all Work performed by any Subcontractor under contract with him.
Work	All activities associated with the construction of the culvert 22-2.

1.3 Description of the Structure built

The objective of the culvert is to direct the non-contact water from the natural watershed runoff through the Road 22 infrastructure. The culvert #22-2 is 18 m long and was built to have a minimum longitudinal slope of 0.3% along the invert. It consists of a helically corrugated steep pipe with a 900 mm diameter. The culvert was built at Sta. 0+550.

The culvert was installed on a compacted fine filter bedding and the excavation was then backfilled with compacted fine filter layers up to the elevation required by the Design.

1.4 Construction Documents

The Construction Drawings of the culvert was completed by SNC Lavalin Inc. in 2018. Table 3 presents the available construction documents for the Road 22 culverts to be installed.

Table 3: List of Construction Drawings for the Road 22 culverts

Drawing Number	Date	Rev	Title
61-417-230-252	2018/06/04	0	417 - Roads, yards, fences and other 230 – General Earth Works Plan & Profile, Rd 22 Explosive road, 0+600 – 1+200
61-417-230-251	2018/06/04	0	417 - Roads, yards, fences and other 230 – General Earth Works Plan & Profile, Rd 22 Explosive road, 0+000 – 0+600

1.5 As-built Drawings

Table 4 presents the as-built drawings for the Road 22 culvert #22-2. The surveying was done by the Owner's Representatives and the as-built drawings were done and verified by AEM. The as-built drawings are included in Appendix A.

Table 4: List of As-Built Drawings for the culvert at Road 22

Drawing Title	Date	Rev	Description
General Plan Culvert #22-2	2021-11-04	00	Aerial view of the 2021 work.
As-Built Culvert #22-2	2021-11-04	00	Culvert #22-2 cross-section 2021 work

Section 2.0 Summary of Construction Activities and Schedule

This section presents the construction steps of the culvert 22-2 of Road 22 and the schedule of the work done.

2.1 Schedule and Construction Steps

The construction of the Road 22 culvert 22-2 at Whale Tail was carried out from October 14th to October 15th, 2021. All work was performed on dayshift only:

- Site preparation (removal of material, temporary access construction).
- Excavation of Road 22 and slope profiling.
- Placement and compaction of subgrade material (fine filter) along the excavation profile.
- Culvert installation.
- Placement and compaction of culvert protection layer (compacted fine filter).
- Profiling slope to inlet to promote water channeling.
- Re-establishment of the road surface on top of the new culvert installed.
- Removal of the Road 22 temporary access built for the construction period.
- Re-opening the road to full traffic.

All the different steps were realized subsequently over the course of the 2 days of construction. The culvert was installed at St. 0+550.

The work procedures followed during the construction of this culvert are discussed in the following subsections. Selected photographs of the work progress taken throughout the construction are shown in Appendix B.

2.1.1 Site Preparation

The first step in the culvert construction was to stake the area of the required earthwork and build a temporary access road around the construction site during the works, as the Road 22 is the only access to Whale Tail explosive products storage areas.

2.1.2 Excavation

The Road 22 excavation was completed at St. 0+550 using an excavator. No drilling and blasting were required. The excavation was done with a minimum 0.3% longitudinal profile. The depth of excavation varied from 1.2 m to 1.5 m and ensured a minimum height of 0.5 m after culvert placement. The material excavated was mainly till with some rockfill, and it was disposed of by stacking it on the side of the road and reused to extend a nearby safety-bay. Water management and erosion control during excavation was not necessary. Daily visual inspections were performed, and no mitigation measures were required for water management or erosion control.

The volume of material excavated for the construction of the culverts represents about 100 m^3. All material was reused to extend the nearby safety-bay.

2.1.3 Subgrade Installation

A minimum of 0.1 m thick lift of NAG (Non-Acid Generating Rock) and Non-Metal Leaching fine filter material was placed over the bottom of the excavation to act as bedding for the culvert placement. The material was placed and sloped with a minimal 0.3% grade and compacted with the bucket of the excavator and P10,000 Wacker-Packer vibro-compactor. About 15m^3 of fine filter was placed during subgrade installation.

2.1.4 Culvert Installation

The culvert was lowered unto the bottom of the excavation using slings and an excavator bucket. When required, a union joining two sections was installed according to the standards. Final placement in the excavation was made by a laborer before backfilling occurred to fill all gaps in the bottom of the culvert.

2.1.5 Backfilling of the Culvert

Following the culvert installation, a protective cover was installed over it consisting of compacted NAG fine filter. The layer was about 0.5 m, and was compacted with the bucket of the excavator, when practical, and with a vibro-compactor in tighter areas.

A total of 75 m^3 of fine filter was placed on culvert 22-2.

Section 3.0 QA/QC Program and Results

3.1 General

During the construction of the culvert, the Quality Assurance (QA) and Quality Control (QC) of the culvert installation was carried out by the Owner's Representative. The program included periodic inspection of all construction activity such as excavation, fill placement, culvert installation and backfilling. Review of the work methodology used was also done and corrections were made if necessary. There was an Owner's Representative present full time on site during the construction period. Photographs of the work progress and activities were taken frequently as presented in the photographic record in Appendix B.

3.2 Excavation

The foundation was inspected before placing any material over natural soil. The objective of the inspection process was to ensure that the foundation was suitable. The inspection was done by the Owner's Representative and the Contractor. It was verified that the inspected foundation was competent, free of contamination or ice, and that:

- The clearing and stripping were adequate.
- The foundation excavation and the removal of unsuitable foundation materials was adequate.
- The slope was respected.

3.3 Material Placement

During material placement, the quality of the material and the placement technique were routinely reviewed. It was ensured that the placement technique limited segregation, that the material quality was visually acceptable and that the lift thickness was respected. Material was compacted with a P10.000 Wacker-Packer vibro-compactor, but no formal compaction control was done during the placement of material.

Section 4.0 – Design Changes and Field Adjustments

No design changes or field adjustments were implemented during the construction of the culvert 22-2.

Section 5.0 – Operation, Maintenance and Surveillance

A monitoring program is essential to ensure the integrity of this structure, especially at freshet. The monitoring program for this structure will be included within the Whale Tail freshet action plan. This program includes regular inspections, monitoring, maintenance. If anomalous conditions are observed, a more detailed assessment should be done, and remedial action should be taken.

APPENDIX A – Construction Drawings

NO. DESSIN
DRAWING NO. 61-417-230-251

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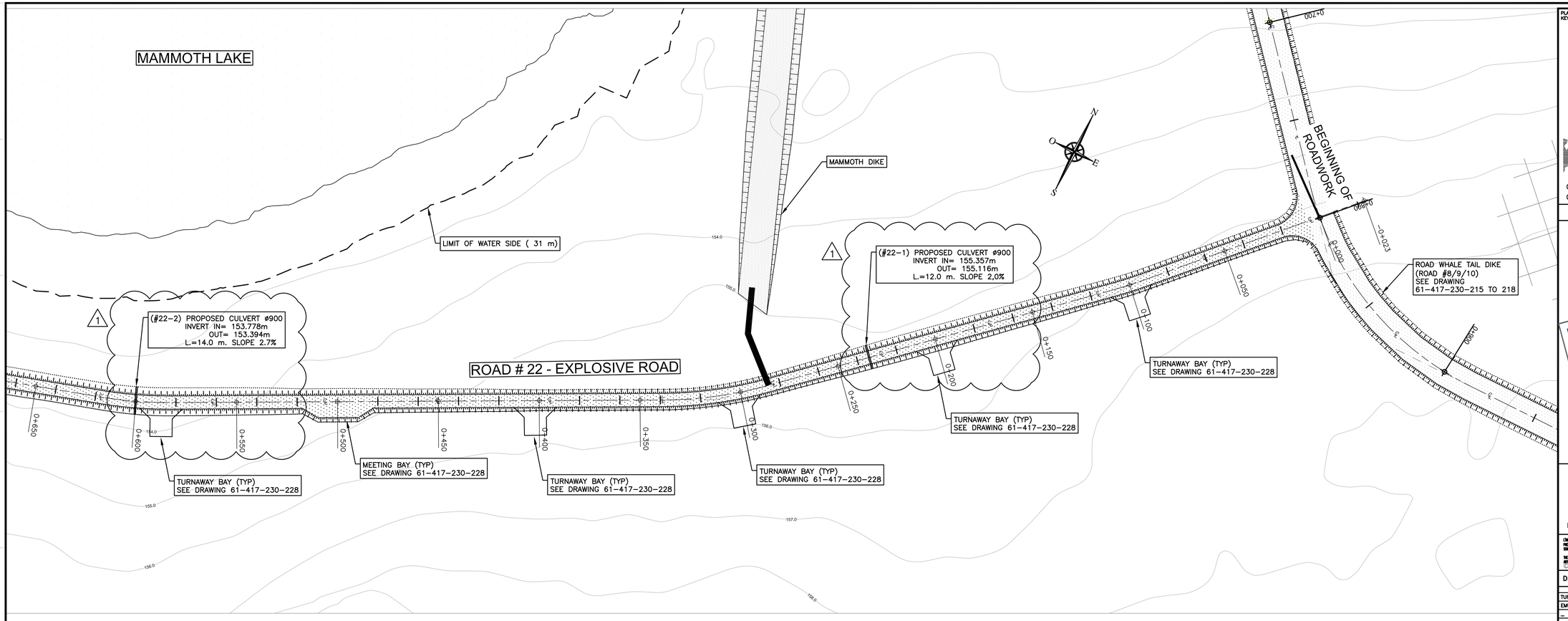

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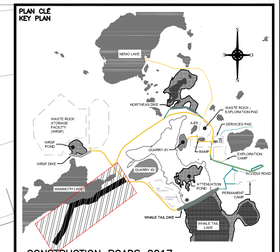
KEY PLAN



CONSTRUCTION ROADS 2017:
CONSTRUCTION ROADS 2018:

NOTES GÉNÉRALES / GENERAL NOTES

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-08-13

SNC-Lavalin Stavibel Inc.
150, rue Gamble Ouest
Rouyn-Noranda (Québec) J9X 2R7
Tél. : 819 764-5181 Fax : 819 797-0158
www.sncstavibel.com

Project # : 644819-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
TURN AWAY / MEETING BAY	61-417-230-228
EMULSION STORAGE PAD	61-417-230-262
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–	–
–	–

ROAD #22 – EXPLOSIVE ROAD

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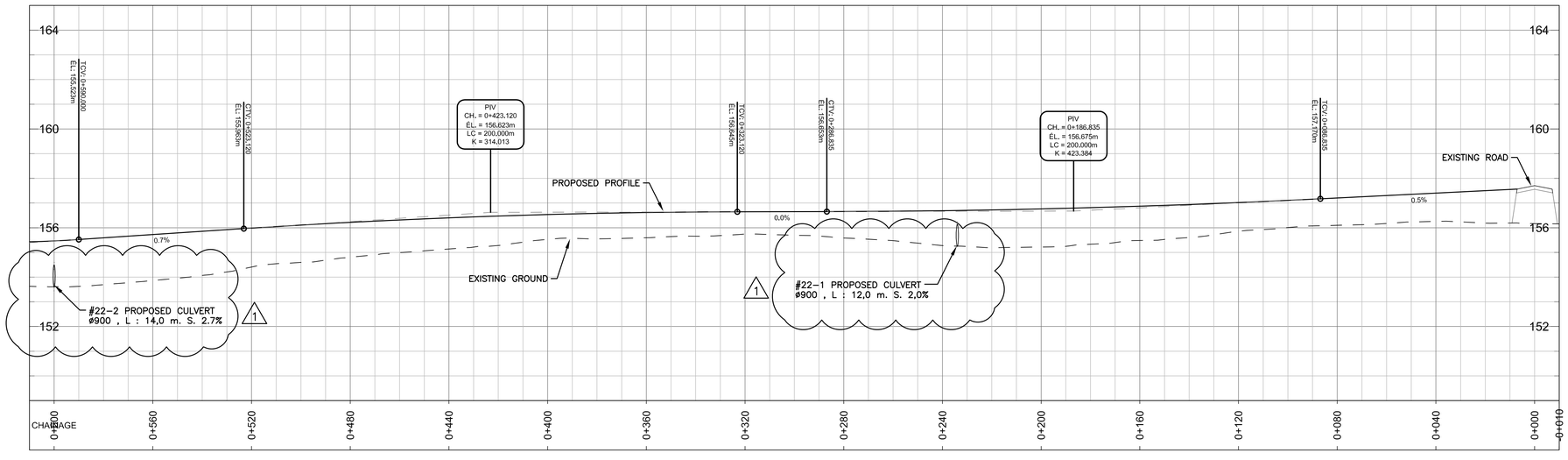

PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature
Date 2018-08-15
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
1	2018-08-13	REVISED FOR CONSTRUCTION	Y.B.	G.M.	E.T.
0	2018-06-04	ISSUED FOR CONSTRUCTION	D.D.	G.M.	E.T.

REVISIONS

DIGITALLY SIGNED DOCUMENT
PROFESSIONAL ENGINEER
G. MARCOTTE
LICENSEE
NT/NU
2018-08-15

TITRE / TITLE
AGNICO EAGLE – WHALE TAIL (AMARUQ)
417 – ROADS, YARDS, FENCES AND OTHER
230 – GENERAL EARTH WORKS
PLAN & PROFILE
ROAD #22 – EXPLOSIVE ROAD
0+000 @ 0+600

DESSINÉ PAR / DRAWN BY	DANIELLE DESCÔTEAUX, T.P	DATE 2018-06-04
VERIFIÉ PAR / CHECKED BY	GILLES MARCOTTE, ING.	2018-06-04
APPROUVÉ PAR / APPROVED BY	GILLES MARCOTTE, ING.	2018-06-04
ÉCHELLE / SCALE	1:1000/1:100	DATE 2018-06-04
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NO. PROJET / PROJECT NO.	6115	REVISION 1 / FEUILLE / SHT 1 / 1

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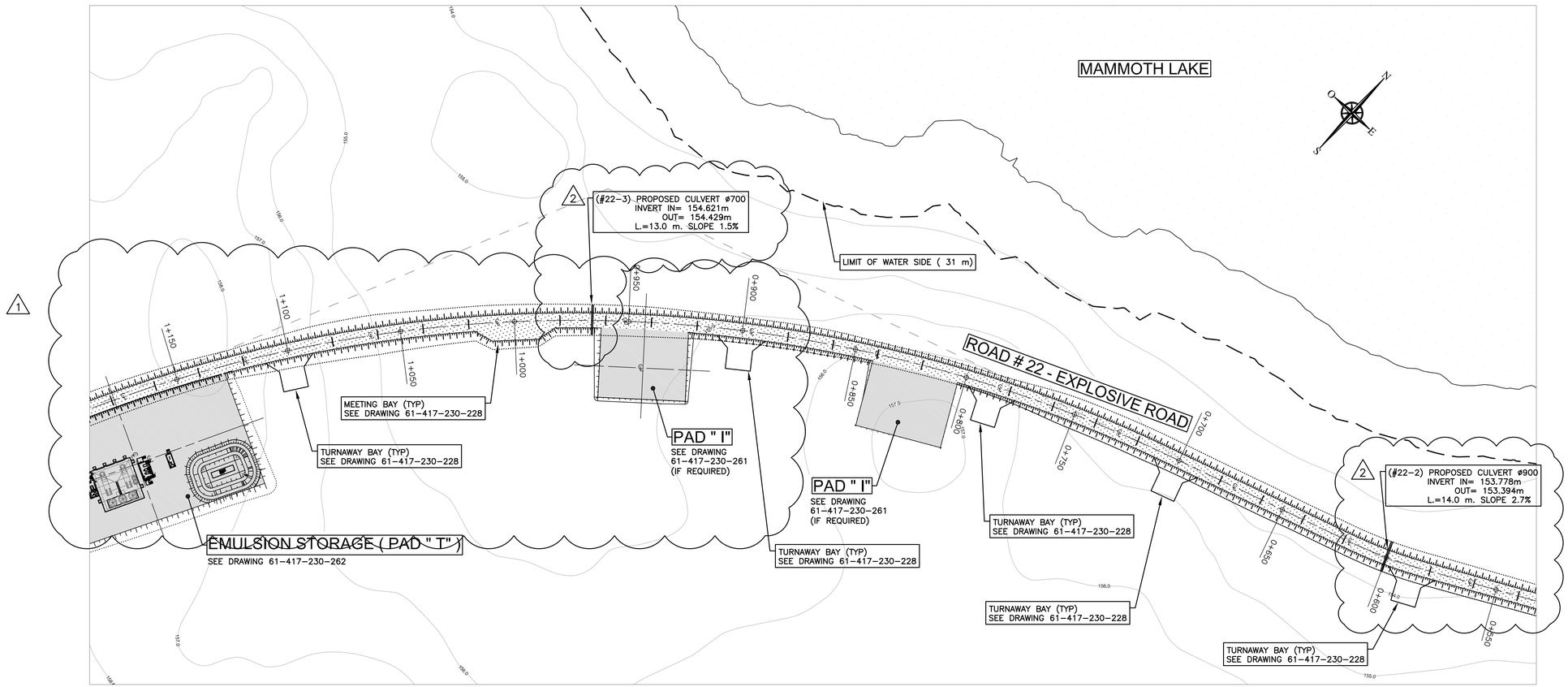

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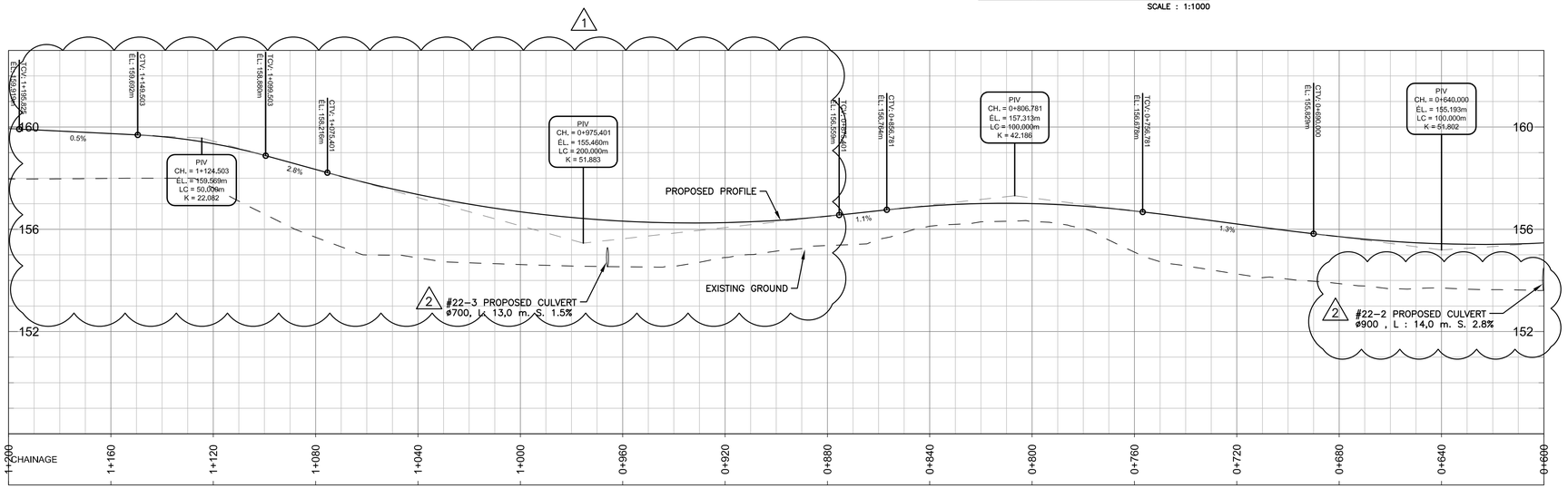
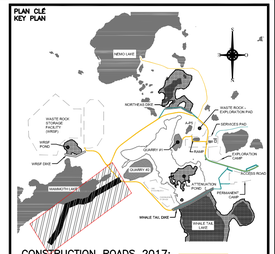


PERMIT TO PRACTICE
SNC - LAVALIN STAVIBEL INC.
Signature
Date 2018-08-15
PERMIT NUMBER: P 718
NT/NU Association of Professional Engineers and Geoscientists

PLAN CLÉ
KEY PLAN



CONSTRUCTION ROADS 2017:
CONSTRUCTION ROADS 2018:

NOTES GÉNÉRALES / GENERAL NOTES

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-08-13

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Project # : 644819-0000

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

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EMULSION STORAGE PAD	61-417-230-262
–	–
–	–
–	–
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
2	2018-08-13	REVISED FOR CONSTRUCTION	Y.B.	G.M.	E.T.
1	2018-07-19	ISSUED FOR CONSTRUCTION	D.D.	G.M.	E.T.
0	2018-06-04	ISSUED FOR CONSTRUCTION	D.D.	G.M.	E.T.

REVISIONS

DIGITALLY SIGNED DOCUMENT
REGISTERED PROFESSIONAL ENGINEER
G. MARCOTTE
LICENSEE
NT/NU
2018-08-15

TITRE / TITLE
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417 – ROADS, YARDS, FENCES AND OTHER
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PLAN & PROFILE
ROAD #22 – EXPLOSIVE ROAD
0+600 @ 1+200

DESSINÉ PAR / DRAWN BY	DANIELLE DESCÔTEAUX, T.P	DATE 2018-07-19
VÉRIFIÉ PAR / CHECKED BY	GILLES MARCOTTE, ING.	2018-07-19
APPROUVÉ PAR / APPROVED BY	GILLES MARCOTTE, ING.	2018-07-19
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NO. PROJET / PROJECT NO.	6115	REVISION 2 / FEUILLE / SHT 1 / 1

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APPENDIX B – As-Built Drawings

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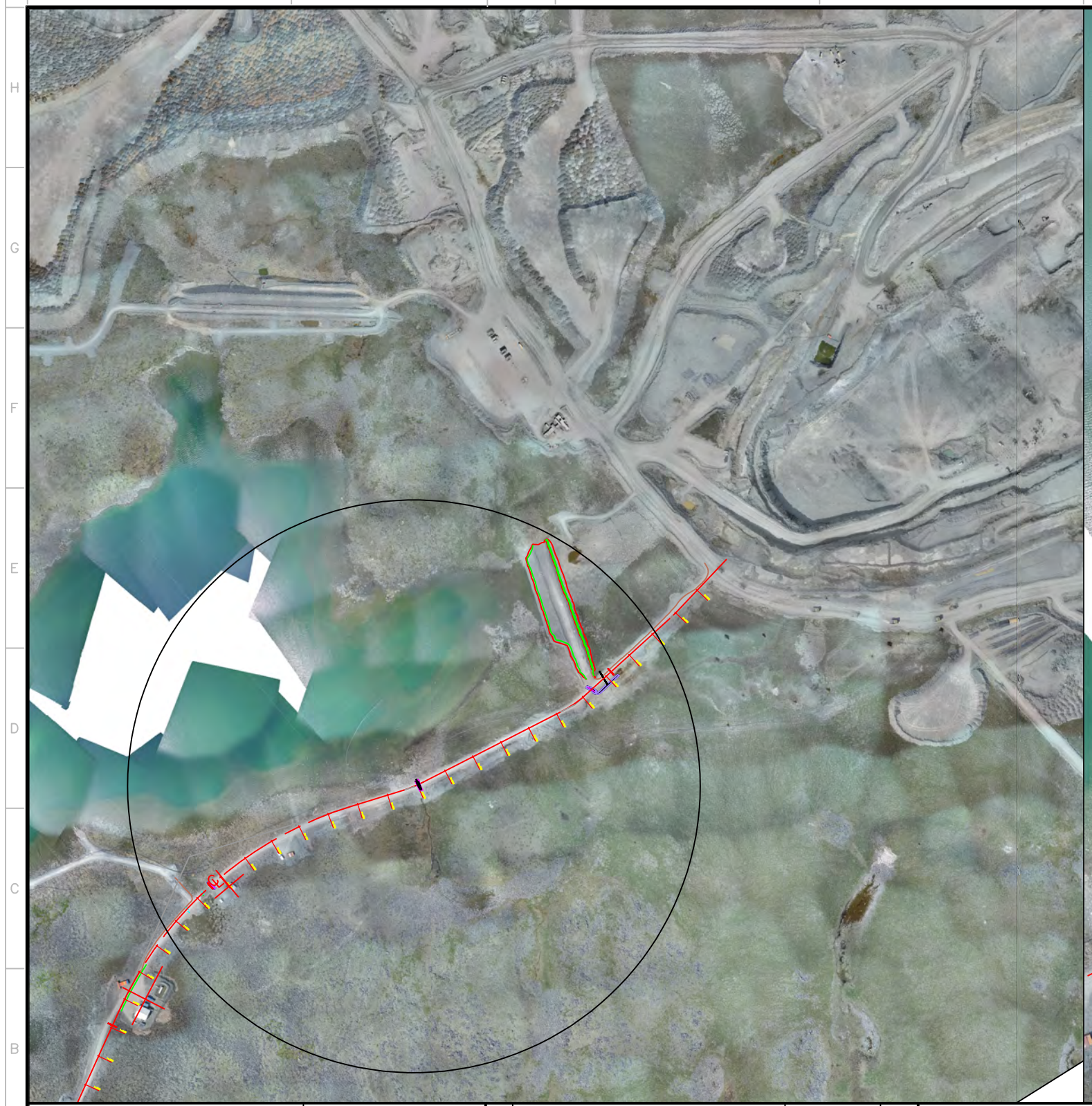

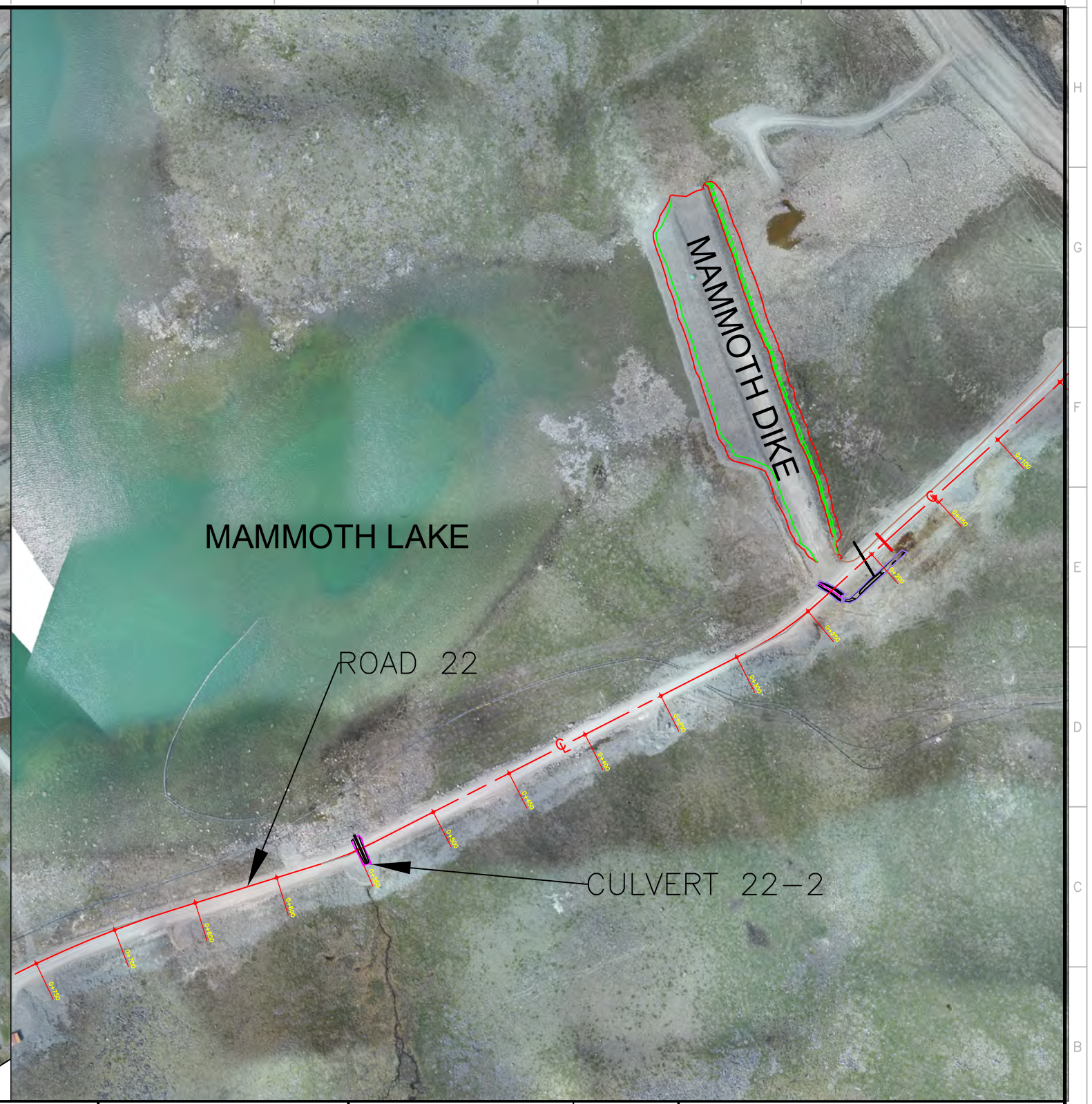

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REFERENCE DRAWINGS

REVISIONS

AGNICO EAGLE
MEADOWBANK

DRAWN BY	T. DAHM	DATE	2021–11–04
CHECKED BY			
APPROVED BY			
PROJECT NO.			
DATE			

TITLE
AGNICO–EAGLE – MEADOWBANK DIVISION
GENERAL PLAN
CULVERT 22–2

SCALE	FILE		
N.T.S.	.DWG		
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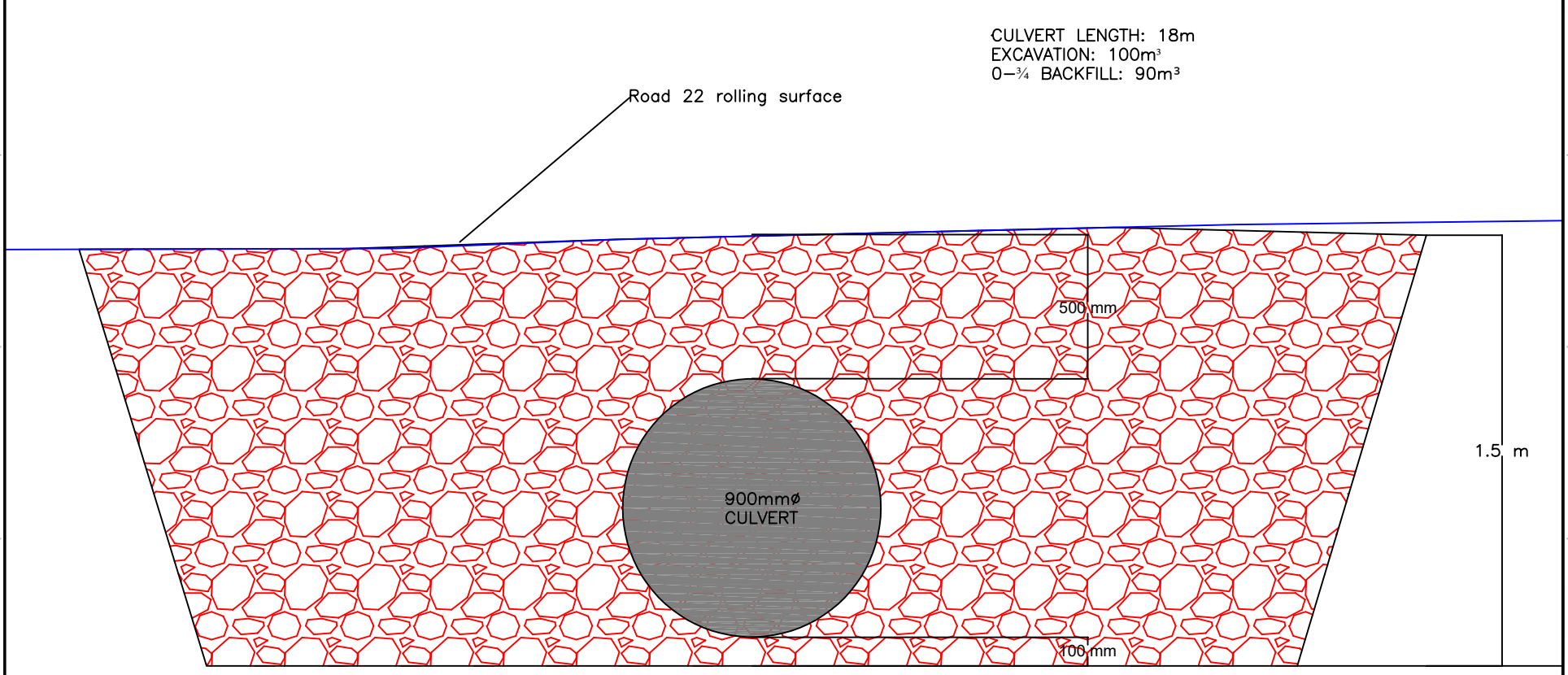

REV	DESCRIPTION	DATE	BY

REVISIONS

AGNICO EAGLE
MEADOWBANK

DRAWN BY	T. DAHM	DATE	2021–11–04
CHECKED BY			
APPROVED BY			
PROJECT NO.			
DATE			

TITLE
AGNICO–EAGLE – MEADOWBANK DIVISION
AS BUILT CULVERT 22–2

SCALE	FILE
N.T.S.	.DWG

DRAWING NO.	REVISION	SHEET
2		2 / 2

APPENDIX C – Construction Photographs

Photo 1. Initial site view along Road 22 of culvert 22-2 location, looking West.

Photo 2: Excavation of the road material to install the culvert 22-2, looking North.

Photo 3. Excavation of the road material to install the culvert 22-2, looking South.

Photo 4. Placement of fine filter layer (0-3/4”), culvert 22-2, looking South.

Photo 5. Installed culvert 22-2 with overlaying protective layer with excavated inlet, looking North.

Photo 6. Installed culvert 22-2 with overlaying protective layer, looking South.