TECHNICAL MEMORANDUM

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TO Kyle Conway
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MELIADINE MINE – IFC DESIGN OF THREE WATERCOURSE CROSSINGS (KM 1.1 ON THE EXPLORATION CAMP ACCESS ROAD AND KM 15.4 AND KM 8.8 ON THE ALL-WEATHER ACCESS ROAD)

1.0 INTRODUCTION

Agnico Eagle Mines Limited (Agnico Eagle) is operating the Meliadine Gold Mine located approximately 25 km north of Rankin Inlet, and 80 km southwest of Chesterfield Inlet in the Kivalliq Region of Nunavut. Two access roads are used to connect the Meliadine Gold Mine and Itivia: the All-Weather Access Road (AWAR) and the Rankin Inlet Bypass Road (RIBR). The Exploration Camp Access Road (EXPLO) is used to connect the main operational camp with the original Meliadine exploration camp. Three watercourse crossings on the access roads were recently assessed for culvert replacement, remediation, or installation:

- Replacement of the southern culvert crossing along the EXPLO at KM 1.1 (EXPLO 1.1B)
- Installation of culvert crossing on the AWAR at KM 8.8 (AWAR 8.8)
- Installation of culvert crossing on the AWAR at KM 15.4 (AWAR 15.4)

WSP on behalf of Nuqsana Golder Engineering and Environmental Inc., was retained by Agnico Eagle to prepare Issued for Construction (IFC) drawings for upgrades to these three locations with fish habitat functions (e.g., connectivity) considered as required (locations shown in Figure 1 and Figure 2).

To support the development of the culvert designs and related approval from DFO, Agnico Eagle retained WSP to collect additional data at the crossings. A site visit was subsequently conducted from 4 to 7 July 2024 by a WSP Fisheries Technician and an Agnico Eagle Site Technician.

This technical memorandum provides background details, design basis, methodology, and concepts for culvert crossing designs, with consideration of fish passage.

2.0 AVAILABLE DATA AND MODELS

The data and models used in this study include:

- The topographic survey data of the area provided by Agnico Eagle during the conceptual design phase.
- High Resolution Digital Elevation Model (HRDEM) CanElevation Series project 20-19 (ArcticDEM 2017).
- Location of culvert crossing provided by Agnico Eagle in February 2024.
- Survey elevations and locations of the culverts conducted by WSP and Agnico Eagle during site visit in July 2024.
- Survey elevations and locations of the EXPLO 1.1A and EXPLO 1.1B culverts by Agnico Eagle in August 2024.
- Survey elevations and location of the culvert EXPLO 1.1B provided by Agnico Eagle email dated August 5, 2023.
- Google Maps World Imagery dated 2024.
- The Water Balance Model (WBM) for the Meliadine area recently updated by WSP (2024c), originally developed and calibrated as part of the Final Environmental Impact Statement (FEIS) for the Meliadine Gold Project (Golder 2014).
- Conceptual designs for Culverts EXPLO 1.1B, AWAR 15.4 and AWAR 8.8 provided to Agnico Eagle in August 1, 2024 (WSP 2024b).
- Technical fish and fish habitat assessment memo dated August 15, 2024, titled “Agnico Eagle Meliadine – Spring Site Visit – Summary Report” (WSP 2024a).

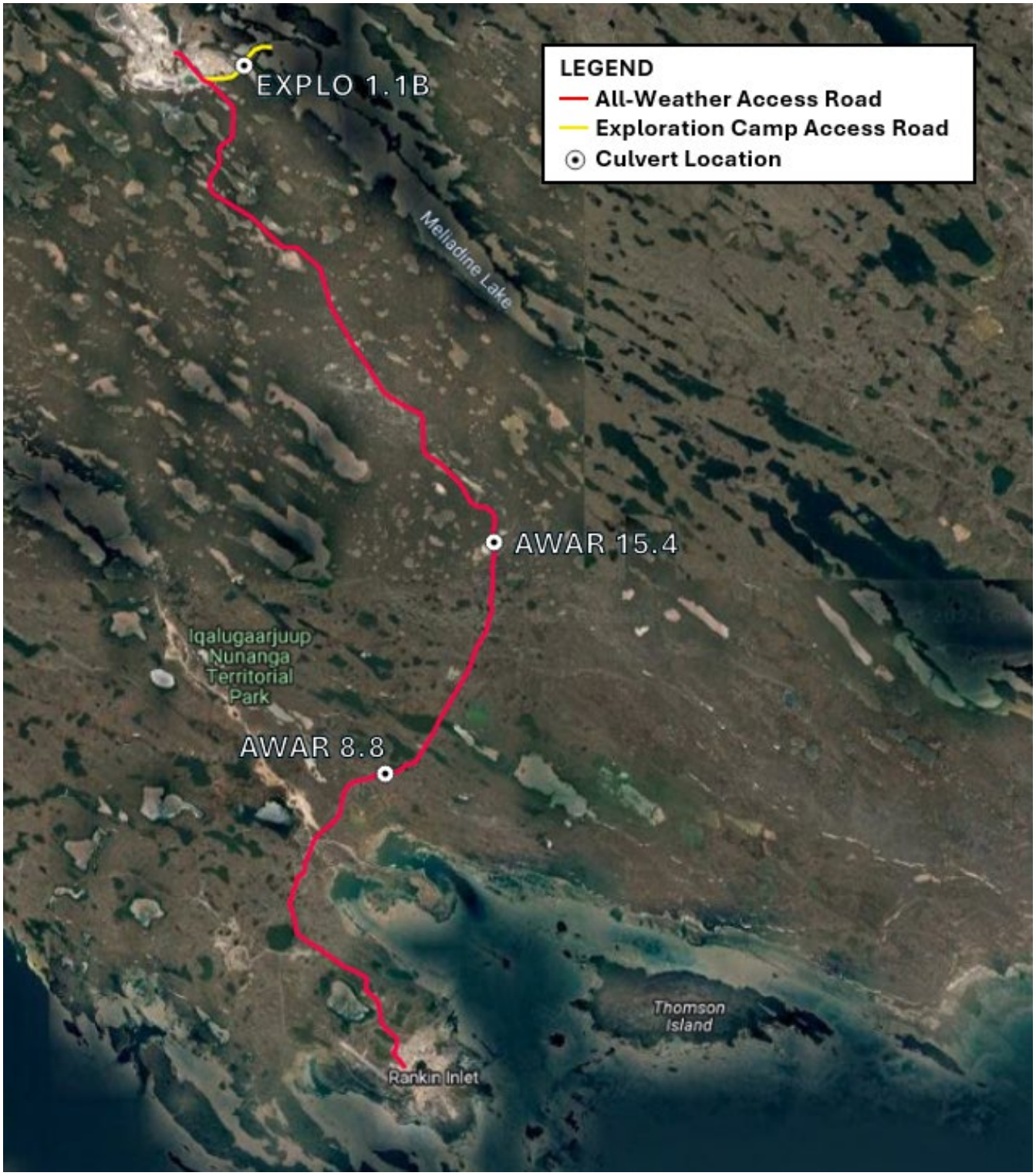

Figure 1: Site Overview with Culvert Crossing Locations

Figure 2: Exploration Road Crossing Locations at KM 1.1

3.0 DESIGN BASIS

The design basis for the IFC level culvert crossing designs is presented in Table 1.

Table 1: Design Basis Summary

Item No.	Item Description	Design Basis	Reference/Rationale
Background			
1	Fish habitat requirements / design event	Only small-bodied fish species and fish habitat with potential for small-bodied fish species were observed at the relevant crossing locations during the July 2024 fish survey by WSP. Small-bodied fish species do not move upstream during the freshet or high-volume flows; therefore, fish passage assessment and design are not required during high flows. Best practices for fish passage during typical summer flows are observed in designs, including matching culvert grade to existing grade, incorporating culvert embedment to avoid perching with substrate placement inside the culvert to minimize footprint and to facilitate fish passage, and sizing culverts to avoid flow constriction during typical summer flows. Q50 for culvert capacity design as per Agnico Eagle -WSP discussion in call dated August 1, 2024.	(WSP 2024a) (WSP 2024b)
2	Reporting watersheds	The watersheds contributing inflow to the culvert crossings delineated using the topographical survey and aerial photo. The adopted watershed areas are summarized in Table 2.	Site-specific DEM (Agnico Eagle supplied) Satellite imagery
Climate and Hydrology			
3	Daily to instantaneous flow peaking factor	1.5	Adopted
4	Historical climate data	Available historical data from 1981 to 2023 downloaded for Rankin Inlet Gauge combined with the Meliadine Mine site data for 2023 period.	(ClimateData 2024) (WSP 2024c)
5	Runoff coefficient	Natural catchment 0.7 Disturbed catchment 0.9 Lake 1.0	(Golder 2014) (WSP 2024c)
Hydraulics			
6	Tailwater channel geometry for hydraulic analysis	Tailwater channel width = culvert diameters + 0.6 m spacing between culverts and on either side. Channel side slope = 3H:1V Measured average slope from the high-level survey data. Culvert existing stream patterns/tailwater channel width measured from DEM and satellite imagery of existing culverts.	Adopted tailwater channel width and side slopes Existing culvert survey conducted by WSP during site visit in July 2024. Site-specific DEM (Agnico Eagle supplied) Google Maps Satellite Imagery
7	Freeboard	Q50 peak water level at the culvert inlet is below the culvert crown level.	Adopted
8	Road cover above culvert	Loading based on the maximum gross weight of CAT 740 GVW = 71,900 kg Total 70% of loading to central and rear axles when loaded	Adopted (CHBDC 2014)

Table 1: Design Basis Summary

Item No.	Item Description	Design Basis	Reference/Rationale
9	Road	Top width = 8.5 m. Road height to be designed by others based on minimum cover height and culvert diameter.	(Tetra Tech 2023) Existing culvert and road survey conducted by WSP and Agnico Eagle during site visit in July 2024.
10	Culvert longitudinal slope	Channel slope to match existing grade based on minimum survey elevations of existing inlet and outlet stream inverts, Existing culvert length measured from satellite imagery.	Existing culvert survey conducted by WSP during site visit in July 2024. Google Maps Satellite Imagery
11	Culvert embedment depth	The recommended minimum embedment is 20% to 40% of the culvert diameter. For these three crossings, a 40% embedment depth was adopted to increase the base width of flows within the culvert, better reflecting hydraulic conditions in the natural channels, and to reduce potential road raises needed to meet the required minimum culvert cover and hydraulic capacity. Embedded with culvert bed substrate (e.g., to match natural streambed; unless natural streambed is fines, then fine substrates should be mixed with gravel and cobble).	(USFWS 2024) (WSP 2024b)
12	Culvert alignment	EXPLO 1.1B & AWAR 15.4: Culvert alignments are perpendicular to the roads. AWAR 8.8: Skewed to match topographic lows.	(WSP 2024b) Google Maps Satellite Imagery
13	Manning's roughness coefficients (n)	CSP (top and sides): n = 0.024 Culvert streambed substrate: n = 0.035	(FHWA 2022) (GAT 2011)
Quantity Estimation			
14	Material Takeoff (MTO)	Geometries are approximated based on design drawings in Attachment 1. It is recommended to include a contingency factor due to the absence of a site-specific field survey. Length (m): Culvert Area (m^2): Geotextile Volume (m^3): Granular bedding, culvert backfill, culvert embedment material, riprap and boulders	Adopted
Existing Culverts			
15	EXPLO 1.1	EXPLO 1.1A: Existing 1x 508 mm corrugated HDPE (currently the main drainage path). Note: This culvert is not considered in the design scope and may be left in place as an overflow culvert at the discretion of Agnico Eagle. EXPLO 1.1B: Existing 1x 508 mm corrugated HDPE (historically the main natural drainage path). Note: Existing culvert EXPLO 1.1B to be removed and replaced to restore the historical main flow path at this location.	Existing culvert survey conducted by WSP and Agnico Eagle during site visit in July 2024. Adopted
16	AWAR 8.8	Existing 1x 406 mm HDPE pipe (temporary pipe to minimize erosion). Note: Existing HDPE pipe was installed in October 2024. The pipe is not considered in the design scope and may be left in place as an overflow culvert at the discretion of Agnico Eagle.	Existing culvert survey conducted by WSP during site visit in July 2024. Adopted

Table 1: Design Basis Summary

Item No.	Item Description	Design Basis	Reference/Rationale
17	AWAR 15.4	No existing culverts.	Existing culvert survey conducted by WSP during site visit in July 2024. Adopted

4.0 WATERCOURSE CROSSING LOCATIONS AND WATERSHEDS

Location data for a total of three watercourse crossings were proposed to Agnico Eagle and agreed upon with WSP to be represented in IFC drawings (WSP 2024b). The locations of the watercourse crossings are depicted in Figure 1. The culvert locations, catchment areas, and land use types outlined in Table 2 were estimated based on the provided topographical survey data, waterbody GIS layers, and satellite imagery.

Table 2: Watercourse Crossing Watershed Details

Crossing Name	Easting (m) UTM Z 15N	Northing (m) UTM Z 15N	Total Watershed Area (ha)	Land Area (ha)	Disturbed Area (ha)	Lake Area (ha)	Long. Channel Slope (%)
EXPLO 1.1B	541,766	6,988,739	113	91	0	22	1.6
AWAR 8.8	545,351	6,971,850	91	61	0	30	1.1
AWAR 15.4	547,910	6,977,423	32	28	0	4	4.0

5.0 FLOW ESTIMATION

A WBM was developed in 2009 to conduct various water-related assessments for the Meliadine project (Golder 2009). The model underwent updates and calibration in 2014 based on hydrometric data collected up to 2011, aiming to include additional lakes potentially affected by the mine development (Golder 2014). More recently, the model was further updated with data recorded from 2011 to 2023 for the proposed design and construction of a fishway at Pistol Bay Falls as part of the Meliadine Project Phase 2 Offsetting Plan (WSP 2024c).

The WBM was configured using GoldSim™ software with a daily time step, covering the period from 1981 to 2023. This timeframe was chosen to align with the climate data derived for the site, using long-term data from the Environment Canada Rankin Inlet A climate station (Station 2303401).

In the WBM, each lake was represented as a reservoir. Inflows to the reservoirs comprised local watershed rainfall and snowfall, segregated into land and lake components to accommodate runoff losses, in addition to inflows from upstream watersheds. Outflows consisted of evaporation and lake outlet discharges. The model also considered lake storage, with evapotranspiration implicitly factored into land runoff losses.

Stage-discharge rating curves for lake outlets are included in the model when the lake is large enough to attenuate the flow. The development of stage-discharge rating curves was detailed in Meliadine FEIS Appendix 7.3-B Baseline Model Calibration (Golder 2014) and were used for this assessment.

The recently updated WBM (WSP 2024c) for the Meliadine area was updated with estimated watershed areas and land use types to estimate flows for the culvert crossings. All three crossings' watersheds were evaluated for flow analysis. The model simulates mean daily flows for each watershed from 1981 to 2023. From the daily time

series, a Flood Frequency Analysis (FFA) was conducted for each watershed to estimate the mean daily Q50 (1-in-50 year) flow. Since the model estimated the mean daily flow, a peaking factor of 1.5 was used to estimate the peak instantaneous value for the Q50 design event, which was used to assess the capacity of proposed culverts during a large flood. The estimated flows for each crossing are listed in Table 3. It is noted that the estimated peak flow at Crossing AWAR 8.8 was attenuated due to presence of upstream lake storage.

Table 3: Watercourse Crossing Estimated Flows

Crossing Name	Total Watershed Area (ha)	Peak Instantaneous Flow (m^3/s)
		Q50
EXPLO 1.1B	113	0.34
AWAR 8.8	91	0.23
AWAR 15.4	32	0.24

6.0 FISH PASSAGE CONSIDERATIONS

A site assessment was conducted by WSP in July 2024 at the Meliadine Mine and was intended to support regulatory requirements and proposed culvert designs. The results of the July 2024 site surveys suggest that large-bodied fish species are unlikely to inhabit the watercourses associated with the road crossings at EXPLO 1.1B, AWAR 8.8, and AWAR 15.4. All three road crossings intersect with small, ephemeral watercourses, and because of the small size of the watercourses and positions of the watercourses within the respective drainage basins, the only species that may be present include small-bodied fish such as Ninespine Stickleback at EXPLO 1.1B and AWAR 8.8, and both Ninespine Stickleback and Slimy Sculpin at AWAR 15.4.

It is expected that small-bodied fish species use these small, ephemeral watercourses when water temperatures warm during early to mid-summer and when surface waters are present (e.g., during a rain event or years when there is above average precipitation). As such, the design of the culverts do not require a specific fish passage assessment for spring freshet flow or high-flow velocity mitigation measures; instead, the designs include design best practices to maintain sufficient water depths and substrate for small-bodied fish species when these species are expected to use these watercourses. A fish passage assessment for upstream movements of fish during spring freshet flows is not required.

Best practice design considerations for culverts with habitat requirements for small-bodied fish species include:

- 0.15 m deep V-notch in the embedment material to concentrate water to the centre of the culvert to create suitable flow conditions during low summer flows
- culvert embedment design (20% to 40% for culvert crossings) with suitable stream substrate
- culvert installation with a slope similar to, or less than, the natural slope of the channel
- culvert design that represents hydraulic characteristics of the watercourse through a range of spring and fall flows

It is anticipated that the installation of the culverts at AWAR 8.8 with new designs and the installation of culverts at AWAR 15.4 that consider the life-history requirements of small-bodied fish will directly improve habitat connectivity for the small-bodies species that use habitat at those watercourses. The replacement of the crossing at EXPLO 1.1B is expected to improve connectivity within the respective watercourse by restoring the historical main flow path and connecting any fish trapped above the crossing (i.e., fish that enter the low-lying area during wet conditions) to downstream sections of the watercourse. The historical flow path is evident in Google Earth historical imagery. EXPLO 1.1B is one of two crossings on a braided watercourse (Figure 2). The adjacent crossing (EXPLO 1.1A) is the primary corridor for fish passage movement in the system, however, after replacement of EXPLO 1.1B, EXPLO 1.1B and the downstream historical channel are expected to be the primary corridor for any fish movements in the system.

7.0 HYDRAULIC ANALYSIS

The HY-8 culvert hydraulic analysis program was used to estimate the culvert sizes for the Q50 design flood event. The following three culverts are considered in the analysis:

- Culvert EXPLO 1.1B: 1x 1,200 mm diameter CSP of length 20 m with 40% embedment
- Culvert AWAR 8.8: 1x 1,000 mm diameter CSP of length 19 m with 40% embedment
- Culvert AWAR 15.4: 1x 1,200 mm diameter CSP of length 20 m with 40% embedment

EXPLO 1.1B shows evidence of serving as the historical primary drainage path prior to EXPLO road construction (historical Google Earth imagery). Currently, EXPLO 1.1A, located 75 m north of EXPLO 1.1B, has a lower culvert inlet (survey data provided by Agnico Eagle dated 5 August 2024) and is serving as the primary flow path, which creates ponding and intermittent flow conditions at EXPLO 1.1B during low-flow season. The design proposes lowering the inlet of the EXPLO 1.1B culvert to restore the historical flow path. The existing culvert at EXPLO 1.1A was not included in the hydraulic analysis or considered in the capacity assessment for EXPLO 1.1B, but it may remain in place to provide contingency flow capacity for the designed replacement culvert at EXPLO 1.1B at the review and direction of Agnico Eagle. Similarly, the existing 1x 406 mm HDPE pipe at AWAR 8.8 can be left in place at the discretion of Agnico Eagle.

7.1 Culvert Hydraulics

A 40% embedment with channel substrate is included for all culverts; while a 20% embedment is the minimum requirement, the embedment is increased to 40% to increase the base width of flows within the culvert to closer reflect hydraulic conditions in the natural channels and better suit the existing road elevation. The adopted hydraulic roughness (Manning's n) of channel substrate in the culvert and tailwater channel is 0.035, and the CSP sidewalls are 0.024. The results of the hydraulic analysis for the Q50 design event in the culverts are summarized in Table 4.

Table 4: Hydraulic Analysis Results for Culverts

Crossing Name	Culvert Design	Culvert Slope	Embedment Depth (m)	Q50 Available Freeboard to Culvert Inlet Crown (m)	Q50 Culvert Outlet Velocity (m/s)	Estimated Potential Road Raise (m) [(d)]
EXPLO 1.1B	1x CSP 1,200 mm[(a)]	0.5%[(b)]	0.48	0.31	1.4	None
AWAR 8.8	1x CSP 1,000 mm[(c)]	2.1%	0.40	0.26	1.3	None to 0.2
AWAR 15.4	1x CSP 1,200 mm	2.0%	0.48	0.41	1.3	None

(a) Not including flows through existing culvert EXPLO 1.1A.

(b) Culvert function is acceptable for all slopes between 0.5% and 2.0% as required to field fit culvert after lowering inlet invert elevations to restore historical flow path to culvert EXPLO 1.1B.

(c) Not including flows through existing 1 x 406 mm HDPE pipe at AWAR 8.8.

(d) Potential road raises were estimated using the available survey data and are subject to change during construction (field-fitting). The road design will be carried out by others.

7.2 Riprap Erosion Protection

Riprap is designed to be placed at the inlets and outlets of all culverts (both as a riprap apron on the channel bed and banks, and also on the roadside slope embankment) to reduce erosion of the natural landscape without mobilization of sediment by high flows. Riprap design size was rounded up to the nearest riprap class. Angular, class 10 kg riprap shall be used at all culverts. Table 5 provides gradation for the specified riprap class.

Table 5: Riprap Gradation for Culvert Outlets

Class of Riprap	Intermediate Dimension (mm)			
	Percentage Smaller Than Intermediate Dimension			Max. Size
	15%	50%	85%	
10 kg	90	200	285	350

8.0 ADDITIONAL CONSIDERATIONS

Road cover requirements were calculated using a loaded CAT 740 for the design load and grading considerations for gravel roads in compliance with CSPI 2007. Table 6 provides additional typical construction information.

Table 6: Typical Culvert Construction Details

Item	Value
Minimum Road Cover	0.9 m for 1200 mm CSP 0.7 m for 1000 mm CSP
Embedment Depth	480 mm embedment (i.e., 40%) for 1,200 mm CSP 400 mm embedment (i.e., 40%) for 1,000 mm CSP
Tailwater Channel Width	2.2 m for 1x 1,200 mm CSP 2.0 m for 1x 1,000 mm CSP

The detailed design drawings and specifications are provided with this memo in Attachment 1. These detailed drawings and specifications supersede any previous drawings supplied by WSP for this Project, and they should be referenced for design requirements prior to construction.

The work areas shall be monitored for erosion and sediment transport as required during construction. Any required mitigation measures will be put in place as per the Sediment and Erosion Management Plan.

9.0 MATERIAL TAKE-OFF

Material take-off estimates for the three culvert crossings are provided in Table 7, below, for select materials. These represent estimates based on available topography, assumptions, and estimated culvert placement, which may be subject to field fitting. A contingency of 35% (not applied in Table 7) is recommended for planning purposes. It should be noted that due to anticipated negligible road raises required, uncertainties and field-fitting layouts, the quantities for road raises are not included as a specific line item in the MTO estimates.

Table 7: Material Take-off Estimates for Culvert Crossings

Material	EXPLO 1.1B	AWAR 8.8	AWAR 15.4	Total
Non-woven geotextile (m^2)	187	179	187	**553**
Granular bedding (m^3)	21	19	21	**61**
Engineered culvert backfill (m^3)	153	131	153	**437**
Culvert substrate material (m^3)	11	7	11	**29**
Class 10 kg riprap (m^3)	20	19	20	**59**
1,000 mm culvert (m)	0	19	0	**19**
1,200 mm culvert (m)	20	0	20	**40**

10.0 TECHNICAL SPECIFICATIONS

This section provides technical specifications which shall be read in conjunction with the issued for construction (IFC) design drawings, provided in Attachment 1.

1. PRIOR TO CONSTRUCTION

1.1 PRIOR TO ANY CULVERT CONSTRUCTION ACTIVITIES TAKING PLACE THE FOLLOWING SPECIFICATIONS SHALL BE FOLLOWED.

2. SCHEDULE

2.1 PROPOSED WORK IS PLANNED TO TAKE PLACE IN 2025.

3. ENVIRONMENTAL PROTECTION

3.1. THE WORK AREAS SHALL BE MONITORED FOR EROSION AND SEDIMENT TRANSPORT AS REQUIRED DURING CONSTRUCTION. ANY REQUIRED MITIGATION MEASURES WILL BE PUT IN PLACE AS PER THE SEDIMENT AND EROSION MANAGEMENT PLAN.

3.2. EXECUTION OF THE WORK IS RECOMMENDED TO FOLLOW FISHERIES AND OCEANS CANADA (DFO) STANDARDS AND CODE OF PRACTICES, WHICH MAY INCLUDE THE FOLLOWING: ICE BRIDGES AND SNOW FILLS, CULVERT MAINTENANCE, TEMPORARY FORDS, AND IN-WATER ISOLATION (DFO 2024), AND ADDITIONAL MEASURES OR RECOMMENDATIONS PROVIDED BY DFO DURING THE PERMITTING PROCESS.

4. QUALITY ASSURANCE INSPECTIONS

4.1. WORK THROUGHOUT THE ENTIRE PROJECT SHALL BE COMPLETED IN ACCORDANCE WITH THE INSPECTIONS AND TESTING GUIDELINES LAID OUT BY THE CANADIAN STANDARDS ASSOCIATION (CSA) IN CODE CSA-G401-14, WITH ADDITIONAL QUALITY ASSURANCE INSPECTIONS SUMMARIZED BELOW.
4.2. MONITORING OF THE QUALITY ASSURANCE (QA)/QUALITY CONTROL (QC) WILL BE CONDUCTED BY A QUALIFIED AGNICO EAGLE PERSONNEL TO ENSURE WORK IS COMPLETED IN ACCORDANCE WITH THE DESIGN DRAWINGS AND TECHNICAL SPECIFICATIONS.
4.3. PRODUCTS SHALL BE MADE AVAILABLE FOR INSPECTION AND ACCEPTANCE BY THE ENGINEER AT THE POINT AND TIME OF INCORPORATION INTO THE WORK.
4.4. MINIMUM QUALITY CONTROL (QC) TESTS AND INSPECTIONS, TO BE PERFORMED BY THE CONTRACTOR, SHALL BE PER TABLE 1.

TABLE 1: QUALITY ASSURANCE REQUIREMENTS

ELEMENT	DESCRIPTION	REQUIREMENT
MANUFACTURERS QC	CONFIRM CULVERT MATCHES MATERIAL SPECIFICATIONS IN THIS DOCUMENT AND ANY FIELD FIT CHANGES ALIGN WITH MANUFACTURER'S SPECIFICATIONS, FOR EXAMPLE DEPTH OF COVER.	DOCUMENT THICKNESS OF CULVERT, CIRCUMFERENCE, CORRUGATIONS, CULVERT MATERIAL AND DEPTH OF COVER
VISUAL INSPECTIONS	INSPECT CULVERT AND COUPLERS FOR RUST, STAINING, DENTS/DEFORMITIES. REPAIR ANY MINOR DAMAGE SUCH AS RUST OR REPLACE IF DAMAGE IS MAJOR.	DOCUMENT CULVERT AND COUPLER CONDITION BEFORE COVERING, DO NOT INSTALL IF DAMAGED
VISUAL INSPECTIONS	INSPECT RIPRAP, CULVERT SUBSTRATE MATERIAL, ROAD SUB-BASE COARSE FILLS FOR ADHERENCE TO THE DESCRIPTIONS PROVIDED IN THESE SPECIFICATIONS.	INSPECT AND DOCUMENT MATERIAL CONDITION BEFORE INSTALLATION.
SURVEY	COMPLETE SURVEYS FOR APPROVAL FOR ITEMS LISTED BELOW: 1. LAYOUT OF WORK 2. EXCAVATED SURFACE 3. FINAL SURFACE 4. CULVERT ALIGNMENT AND ELEVATIONS	COMPLETE, DOCUMENT, AND PROVIDE SURVEYS FOLLOWING COMPLETION OF EVERY ITEM FOR APPROVAL BY THE ENGINEER.

5. MATERIALS

5.1. ALL MATERIALS USED SHALL BE NON-POTENTIAL ACID GENERATING (NPAG) AND NON-METAL LEACHING. ANY NEWLY SOURCED MATERIALS SHALL BE COLLECTED AND ANALYZED TO CONFIRM THEY ARE NPAG AND NON-METAL LEACHING.

5.2. NON-WOVEN GEOTEXTILE

5.2.1. NON-WOVEN GEOTEXTILE SHALL HAVE MINIMUM PARAMETERS CONFORMING TO THE FOLLOWING VALUES.

TABLE 2: GEOTEXTILE REQUIREMENTS	
PARAMETER	**VALUE**
GRAB STRENGTH	650 N
PUNCTURE STRENGTH	275 N
TRAPEZOIDAL TEAR	250 N
BURST STRENGTH	2.1 MPa

5.3. CULVERTS

5.3.1. THE SUPPLY AND FABRICATION OF CORRUGATED STEEL PIPE (CSP) INCLUDING COUPLERS AND APPURTENANCES SHALL BE IN ACCORDANCE WITH CSA STANDARD G401-07

5.3.2. THE CSP SHALL BE GALVANIZED WITH MINIMUM WALL THICKNESS OF 2.8 mm AND A CORRUGATION PROFILE OF 68 mm X 13 mm.

5.4. RIPRAP

5.4.1. RIPRAP MATERIAL SHALL MEET THE FOLLOWING STANDARDS:

5.4.1.1. RIPRAP SHALL CONSIST OF WELL GRADED, HARD, DURABLE AND ANGULAR ROCK WHICH MEETS THE PHYSICAL AND GRADATION REQUIREMENTS SET OUT BELOW.

5.4.1.2. RIPRAP SHALL BE NON-POTENTIAL ACID GENERATING (NPAG). ANY NEW SOURCED MATERIAL SHALL BE COLLECTED AND ANALYZED BY APPROPRIATE GEOCHEMICAL ANALYSES TO ENSURE IT IS NPAG AND NON-METAL LEACHING.

TABLE 3: RIPRAP GRADATION				
CLASS	**INTERMEDIATE AVERAGE DIMENSION (mm)**			
	D15	**D50**	**D85**	**D100**
10 kg	90	200	285	350

5.5. CULVERT SUBSTRATE MATERIAL

5.5.1. CULVERT SUBSTRATE MATERIAL SHALL BE WELL GRADED SANDY/GRAVEL/COBBLE MIXTURE. COBBLES SHALL NOT EXCEED 150 mm IN DIAMETER. SUBSTRATE MATERIAL SHALL MATCH THE NATURAL STREAMBED MATERIAL, UNLESS NATURAL STREAMBED MATERIAL IS COMPOSED PRIMARILY OF FINES, IN WHICH CASE GRAVEL AND COBBLES SHALL BE ADDED TO THE CULVERT SUBSTRATE MATERIAL. MATERIAL SHALL BE APPROVED BY THE ENGINEER.

5.5.2. EXCAVATED CULVERT SUBSTRATE MATERIAL MAY BE USED FOR CULVERT SUBSTRATE IF APPROVED BY THE ENGINEER. SUBSTRATE MATERIAL SHALL BE STOCKPILED FOR LATER REUSE AS CULVERT SUBSTRATE MATERIAL (AS PER SPECIFICATION 6.1.1.4) AND SHALL BE KEPT FREE OF DEBRIS, OIL OR OTHER CONTAMINANTS, SNOW, AND OTHER SOURCES OF MOISTURE.

5.6. ENGINEERED BACKFILL, BASE AND BEDDING

5.6.1. ENGINEERED BACKFILL

5.6.1.1. ENGINEERED BACKFILL SHALL BE CLEAN, GRANULAR, AND POSSESS TIME-INDEPENDENT PROPERTIES.

5.6.1.2. BACKFILL MATERIAL SHALL BE FREE OF ORGANIC, FROZEN AND OTHERWISE DELETERIOUS MATERIAL AND CONSIST OF A WELL GRADED GRANULAR MATERIAL WITH ANGULAR GRAINS AND MEET THE FOLLOWING REQUIREMENTS.
5.6.1.3. MAXIMUM PARTICLE SIZE SHALL NOT EXCEED 75 mm OR AS APPROVED BY THE EOR (OR APPROVED DESIGNATE).
5.6.1.4. MINIMUM GRAVEL CONTENT (PARTICLE SIZE > 4.75 mm): 30%
5.6.1.5. MAXIMUM FINES CONTENT (PASSING THROUGH #200 SIEVE): 10%.

5.6.2. COMPACTED PIPE BEDDING

5.6.2.1. BASE AND PIPE BEDDING MATERIALS SHALL BE A 50 mm MINUS GRANULAR MATERIAL WHICH MEETS THE GRADATION SPECIFICATIONS PRESENTED IN TABLE 4.
5.6.2.2. BASE MATERIAL MAY NOT BE REQUIRED IF THE SUBSURFACE CONDITIONS ARE APPROVED BY THE ENGINEER.

TABLE 4: GRANULAR FILL (0-50 mm) – PARTICLE SIZE DISTRIBUTION LIMITS

PARTICLE SIZE (mm)	% PASSING
50	100
38	87-100
19	60-95
12.5	46-80
5	35-60
2	25-45
0.315	10-25
0.08	4-10

5.6.3 COMPACTION

5.6.3.1 MAXIMUM UNCOMPACTED LIFT HEIGHT SHALL BE 200 mm.
5.6.3.2 EACH LAYER SHALL BE COMPACTED TO A MINIMUM 95% STANDARD PROCTOR DENSITY (ASTM D698).
5.6.3.3 OPTIMUM MOISTURE CONTENT SHALL BE MAINTAINED DURING COMPACTION (ASTM D698).

6. EXECUTION

6.1. PREPARATION OF CULVERT SITE

6.1.1. PRIOR TO THE CULVERT BEING INSTALLED THE FOLLOWING SHALL BE FOLLOWED:
6.1.1.1. REMOVE LARGE STONES OR OTHER HARD MATERIALS IN THE CULVERT FOUNDATION, TRENCH WALLS, AND BACKFILL THAT MAY DAMAGE OR WEAKEN THE PIPING OR IMPEDE CONSISTENT BACKFILLING FOR COMPACTION. THIS SHALL INCLUDE THE REMOVAL OF ANY EXISTING, CULVERTS(S) AND ASSOCIATED MATERIALS.
6.1.1.2. EXISTING CULVERTS MAY REMAIN IN PLACE IF THEY COMPLY WITH THE EXCAVATION AND MINIMUM SPACING DIMENSIONS PROVIDED IN THE DESIGN DRAWINGS. CULVERTS SHALL BE REMOVED IF DAMAGED OR BACKFILL AND COVER REQUIREMENTS CAN NOT BE MET.
6.1.1.3. IT IS THE RESPONSIBILITY OF AGNICO EAGLE TO ENSURE THAT THE EXISTING CULVERTS MEET THE REQUIREMENTS TO REMAIN IN PLACE DURING AND AFTER CONSTRUCTION.

6.1.1.4. IF CHANNEL SUBSTRATES ARE TO BE REMOVED, SEPARATE AND STOCKPILE GRANULAR SUBSTRATE MATERIAL (IF PRESENT) FOR USE AS CULVERT SUBSTRATE AND IF REMAINING MATERIAL IS AVAILABLE AT COMPLETION, REPLACE ALONG ANY DISTURBED STREAM AREAS, UPON COMPLETION OF PROJECT WORKS. SEPARATE SUBSTRATE MATERIAL INTO TWO STOCKPILES:
6.1.1.4.1. MATERIAL FROM THE TOP 0.3 m OF THE CHANNEL AND
6.1.1.4.2. MATERIAL BELOW THE TOP 0.3 m
6.1.1.5. MATERIAL STOCKPILES PLACED ADJACENT TO ANY EXCAVATION OR EMBANKMENT SHALL BE LIMITED TO MAXIMUM 1.2 m IN HEIGHT.
6.1.1.6. MATERIAL STOCKPILES SHALL BE PLACED A HORIZONTAL DISTANCE AWAY FROM AN EXCAVATION EQUIVALENT TO (OR GREATER THAN) THE EXCAVATION DEPTH.
6.1.1.7. MATERIAL STOCKPILES SHALL BE KEPT FREE OF DEBRIS, OIL OR OTHER CONTAMINANTS, SNOW, AND OTHER SOURCES OF MOISTURE.
6.1.1.8. STOCKPILES SHALL BE SIZED TO MINIMIZE SEGREGATION AND TO FACILITATE FUTURE USE.
6.1.1.9. CULVERT ELEVATIONS NOTED ON THE DESIGN DRAWINGS ARE ESTIMATED FROM SURVEY DATA FOR STREAM INVERTS. CULVERT PLACEMENT AND INSTALLATION SHALL BE FIELD FIT, TO REFLECT ACTUAL CONDITIONS ENCOUNTERED ON-SITE, INCLUDING BUT NOT LIMITED TO CHANGES IN ELEVATION, GRADE, SKEW, AND/OR DEPTH BASED ON THE DIRECTION OF THE ENGINEER.
6.1.1.10. CULVERT SLOPES DEVIATING FROM THE DESIGN DRAWINGS SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.
6.1.1.11. ALL FIELD FIT REVISIONS TO THE DESIGN SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.

6.2. EXCAVATION AND TRENCHING

6.2.1. EXCAVATION SAFETY AND SUITABILITY OF FOUNDATION MATERIALS SHALL BE CARRIED OUT ACCORDING TO THE CONTRACTOR'S / OWNER'S GEOTECHNICAL ENGINEER.
6.2.2. DURING EXCAVATION OF THE CULVERT PLACEMENT AREA, THE EXCAVATED CLEAN CHANNEL SUBSTRATE SHALL BE STOCKPILED FOR REUSE AS PER 6.1.1.4.
6.2.3. EXCAVATED SUBGRADE CONDITIONS SHALL BE INSPECTED FOR THE SUITABILITY OF MATERIAL AND CULVERT PLACEMENT. SATURATED FINE-GRAINED SOILS, OR ICE-RICH FINE-GRAINED SOILS IN THE THAWED ACTIVE LAYER SHALL BE STRIPPED UNTIL COMPETENT SUBGRADE MATERIAL IS FOUND, SUBJECT TO APPROVAL BY THE ENGINEER.

6.3. CULVERT INSTALLATION

6.3.1. BASE

6.3.1.1. BASE MATERIAL SHALL BE PLACED ACCORDING TO THE DESIGN DRAWINGS OR AS APPROVED BY THE ENGINEER.

6.3.2. COMPACTED BEDDING

6.3.2.1. CULVERT BEDDING SHALL BE CONSTRUCTED ACCORDING TO THE DESIGN DRAWINGS, OR AS APPROVED BY THE ENGINEER.
6.3.2.2. BEDDING TO BE INSTALLED TO PROVIDE FULL CONTACT WITH CULVERT INVERT TO SUPPORT CULVERT AND LIMIT MOVEMENT

6.3.3. RIPRAP PLACEMENT

6.3.3.1. NON-WOVEN GEOTEXTILE FILTER CLOTH PLACEMENT, AS REQUIRED BY THE ENGINEER BASED ON SITE CONDITIONS, AND RIPRAP PLACEMENT SHALL FOLLOW THE FOLLOWING PRACTICES:
6.3.3.1.1. NON-WOVEN GEOTEXTILE SHALL BE PLACED BENEATH BOTH THE INLET AND OUTLET RIPRAP SHOWN IN THE DESIGN DRAWINGS AND SHALL BE KEYED INTO THE SLOPE AT THE TOP OF THE BANKS AT A MINIMUM DISTANCE OF 0.3 m. THE GEOTEXTILE SHALL BE KEYED INTO THE CULVERT BEDDING MATERIALS WHERE THE RIPRAP MEETS THE CULVERT BASE AND KEYED INTO THE THALWEG WHERE RIPRAP COVERAGE BLENDS IN WITH THE NATURAL CHANNEL.
6.3.3.1.2. THE CONTRACTOR SHALL EXERCISE CARE DURING RIPRAP PLACEMENT TO AVOID DAMAGE OR DISPLACEMENT OF THE NON-WOVEN GEOTEXTILE. CONSTRUCTION EQUIPMENT IS NOT PERMITTED ON THE SURFACE OF THE NON-WOVEN GEOTEXTILE.
6.3.3.1.3. NON-WOVEN GEOTEXTILE SHALL BE PLACED TO ENSURE THERE IS A MINIMUM OVERLAP OF 0.3 m AT EACH JOINT, OR AS RECOMMENDED BY THE MANUFACTURER.
6.3.3.1.4. RIPRAP PLACEMENT WILL BE FIELD FIT BY THE CONTRACTOR, WHO SHALL FOLLOW THE DETAILS SHOWN IN THE DESIGN DRAWINGS. RIPRAP SHALL FOLLOW THE NATURAL STREAM CHANNEL, CENTERED AT THE THALWEG AND CULVERT.
6.3.3.1.5. RIPRAP SHALL BE PLACED 0.3 m ABOVE THE CULVERT CROWNS AGAINST THE ROAD EMBANKMENT AT THE INLET AND OUTLET.
6.3.3.1.6. ENGINEERED BACKFILL MATERIAL (SECTION 5.6.1) SHALL BE LAID WITHIN THE VOIDS ON THE SURFACE OF THE RIPRAP AS DIRECTED BY THE ENGINEER.

6.3.4. CULVERT PLACEMENT

6.3.4.1. INSTALL AND CONSTRUCT CULVERT IN GENERAL ACCORDANCE WITH THE LINES, GRADES, AND LOCATIONS SPECIFIED IN THE DESIGN DRAWINGS.
6.3.4.2. LIFT OR ROLL PIPE INTO POSITION. DO NOT DROP OR DRAG THE CULVERT OVER PREPARED BEDDING.
6.3.4.3. ENSURE BOTTOM OF CULVERT MAKES CONTACT WITH THE SHAPED BED FOR THE ENTIRE LENGTH OF THE CULVERT.
6.3.4.4. INSERT AND TIGHTEN BOLTS TO PRODUCT SPECIFICATIONS SET OUT BY CULVERT MANUFACTURER.

6.3.5. CULVERT SUBSTRATE MATERIAL PLACEMENT

6.3.5.1. PLACE APPROVED CULVERT SUBSTRATE MATERIAL (AS PER SPECIFICATION 5.5) INSIDE THE CULVERT TO EMBEDMENT DEPTH AS PER DRAWINGS.
6.3.5.2. SUBSTRATE MATERIAL SHALL BE KEPT CLEAN AND DRY AND SOURCES OF MOISTURE SHALL NOT BE ALLOWED TO ACCUMULATE ON OR WITHIN THE MATERIAL.
6.3.5.3. THE SURFACE OF THE BACKFILLED CULVERT SUBSTRATE MATERIAL WITHIN THE CULVERTS SHALL CONFORM TO THE DIMENSIONS SHOWN IN THE DESIGN DRAWINGS.
6.3.5.4. FILL IN VOIDS IN CULVERT SUBSTRATE BY WASHING IN SAND/FINES.

6.3.6. BACKFILL AND PLACEMENT

6.3.6.1. FILL SHALL BE PLACED TO THE LINES AND GRADES AS SHOWN IN THE DRAWINGS, AND AS DIRECTED BY THE OWNER’S GEOTECHNICAL ENGINEER.
6.3.6.2. BACKFILL SHALL BE PLACED IN VERTICAL LIFTS NOT EXCEEDING 0.2 m. FILLS MAY BE PLACED DURING LIGHT SNOWFALL PROVIDED THAT THE SNOW ACCUMULATION IS LESS THAN 5 mm BETWEEN

EACH LIFT. ANY HEAVIER SNOW ACCUMULATION ON THE LIFT SHALL BE REMOVED BEFORE CONTINUING PLACEMENT OF FILLS.
6.3.6.3. CAUTION SHALL BE EXERCISED WHILE PLACING AND COMPACTING BACKFILL NEAR THE CORNERS/HAUNCHES.
6.3.6.4. COMPACT ENGINEERED BACKFILL TO A MINIMUM 95% STANDARD PROCTOR.
6.3.6.5. MAINTAIN MOISTURE CONTENT OUTLINED IN SECTION 4.5.3 DURING COMPACTION
6.3.6.6. COMPACTION TESTING USING A NUCLEAR DENSOMETER SHALL BE CONDUCTED BY THE CONTRACTOR ON EVERY LIFT OF FILL. COMPACTION TESTING RESULTS SHALL BE PROVIDED TO THE ENGINEER FOR REVIEW.

6.3.7. ROADWAY SURFACE
6.3.7.1. FINAL ROADWAY SURFACE GEOMETRY AND MATERIAL IS TO BE DETERMINED BY THE OWNER.

6.4. COMPLETION OF WORK
6.4.1. ONCE THE CULVERTS HAVE BEEN INSTALLED AND ALL BACKFILLING AND RIPRAP PLACEMENT IS COMPLETE, THE FOLLOWING SHALL BE COMPLETED:
6.4.1.1. ENVIRONMENTAL AND EROSION AND SEDIMENT CONTROL MEASURES SHALL BE COMPLETED AS DIRECTED BY THE OWNER.

6.4.1.2. INSPECTIONS SHALL BE COMPLETED AND AS-BUILT MEASUREMENTS AND OBSERVATIONS FOR THE CULVERT AND FINAL ROADWAY SURFACE SHALL BE CONDUCTED AND SUBMITTED TO THE ENGINEER FOR APPROVAL.

11.0 SUMMARY AND CONCLUSIONS

This technical memorandum presents the background details, design basis, methodology and design details for culvert crossings at Culverts EXPLO 1.1B, AWAR 8.8 AND AWAR 15.4 with fish passage considerations. The assessment includes the analysis of watershed areas and hydrology to estimate Q50 design flood event flows for culvert capacity assessments. The analysis is recommended as suitable for preparation of culvert crossing designs. The IFC drawings and specifications are provided in Attachment 1.

The following culvert crossing designs are proposed:

- Culvert EXPLO 1.1B: 1x 1,200 mm diameter CSP of 20 m length with 40% embedment (480 mm); Angular, class 10 kg riprap for inlet and outlet channel armouring.
- Culvert AWAR 8.8: 1x 1,000 mm diameter CSP of 19 m length with 40% embedment (400 mm); Angular, class 10 kg riprap for inlet and outlet channel armouring.
- Culvert AWAR 15.4: 1x 1,200 mm diameter CSP of 20 m length with 40% embedment (480 mm); Angular, class 10 kg riprap for inlet and outlet channel armouring.

The existing culvert EXPLO 1.1A, located 75 m north of crossing EXPLO 1.1B., may remain in place at the review and direction of Agnico Eagle. Assessment of existing culvert EXPLO 1.1A's conveyance capacity or structural integrity is outside of this design scope. This assessment assumes that the entire design flow can be routed through EXPLO 1.1B leaving the existing EXPLO 1.1A as contingency conveyance capacity located at a higher

elevation than the designed EXPLO 1.1B in the case of ice damming. Similarly, the existing 1x 406 mm HDPE pipe located near AWAR 8.8 can also be left in place at the discretion of Agnico Eagle.

A 0.15 m deep V-notch in the culvert substrate is included in the design drawings to maintain flow depths for passage of fish where small-bodied fish may be moving during low-flow conditions.

Execution of the work is recommended to follow Fisheries and Oceans Canada (DFO) standards and code of practices, which may include the following: ice bridges and snow fills, culvert maintenance, temporary fords, and in-water isolation (DFO 2024), and additional measures or recommendations provided by DFO during the permitting process.

12.0 CLOSURE

This memorandum is to be read with the Study Limitations appended to this report, which follows the text and forms an integral part of the memorandum.

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2024-12-17

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STUDY LIMITATIONS

WSP Canada Inc.(“WSP”) prepared this report solely for the use of the intended recipient, Agnico Eagle Mines Limited, in accordance with the professional services agreement between the parties. In the event a contract has not been executed, the parties agree that the WSP General Terms for Consultant shall govern their business relationship which was provided to you prior to the preparation of this report.

The report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment.

The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the present report are based on the observations and/or information available to WSP at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by WSP and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

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Design recommendations given in this report are applicable only to the project and areas as described in the text and then only if constructed in accordance with the details stated in this report. The comments made in this report on potential construction issues and possible methods are intended only for the guidance of the designer. The number of testing and/or sampling locations may not be sufficient to determine all the factors that may affect construction methods and costs. We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

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This limitations statement is considered an integral part of this report.

ATTACHMENT 1

IFC Culvert Drawings

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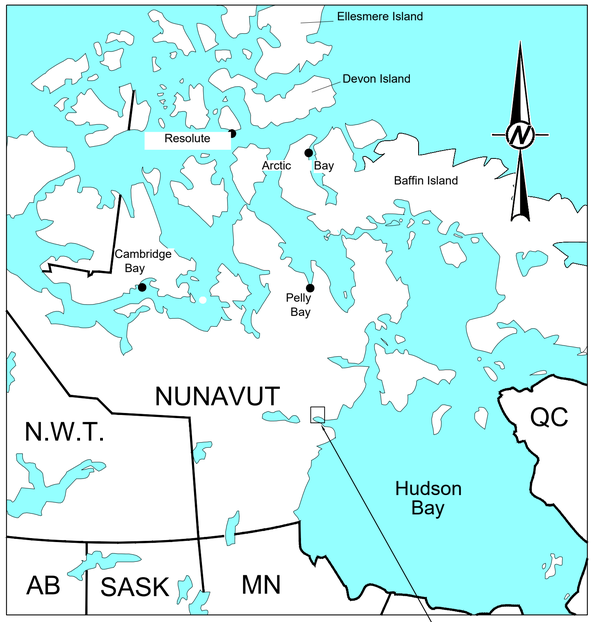
MELIADINE GOLD PROJECT
CULVERT CROSSING INSTALLATIONS - DETAILED DESIGN
NUNAVUT



PROJECT LOCATION MAP
NOT TO SCALE

PROJECT LOCATION

CROSSING LOCATION MAP
NOT TO SCALE

SHEET LIST TABLE			
DRAWING No.	DRAWING TITLE	REVISION	DATE
01	LOCATION PLAN AND DRAWING INDEX	0	2024-12-17
02	CROSSING EXPLORATION CAMP ACCESS ROAD KM 1.1B PLAN	0	2024-12-17
03	CROSSING AWAR KM 15.4 PLAN	0	2024-12-17
04	CROSSING AWAR KM 8.8 PLAN	0	2024-12-17
05	TYPICAL CULVERT PROFILE	0	2024-12-17
06	TYPICAL CULVERT CROSS-SECTION AND DETAILS	0	2024-12-17
07	TECHNICAL SPECIFICATIONS	0	2024-12-17

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PROJECT
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CULVERT CROSSING INSTALLATIONS - DETAILED DESIGN
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TITLE
LOCATION PLAN AND DRAWING INDEX

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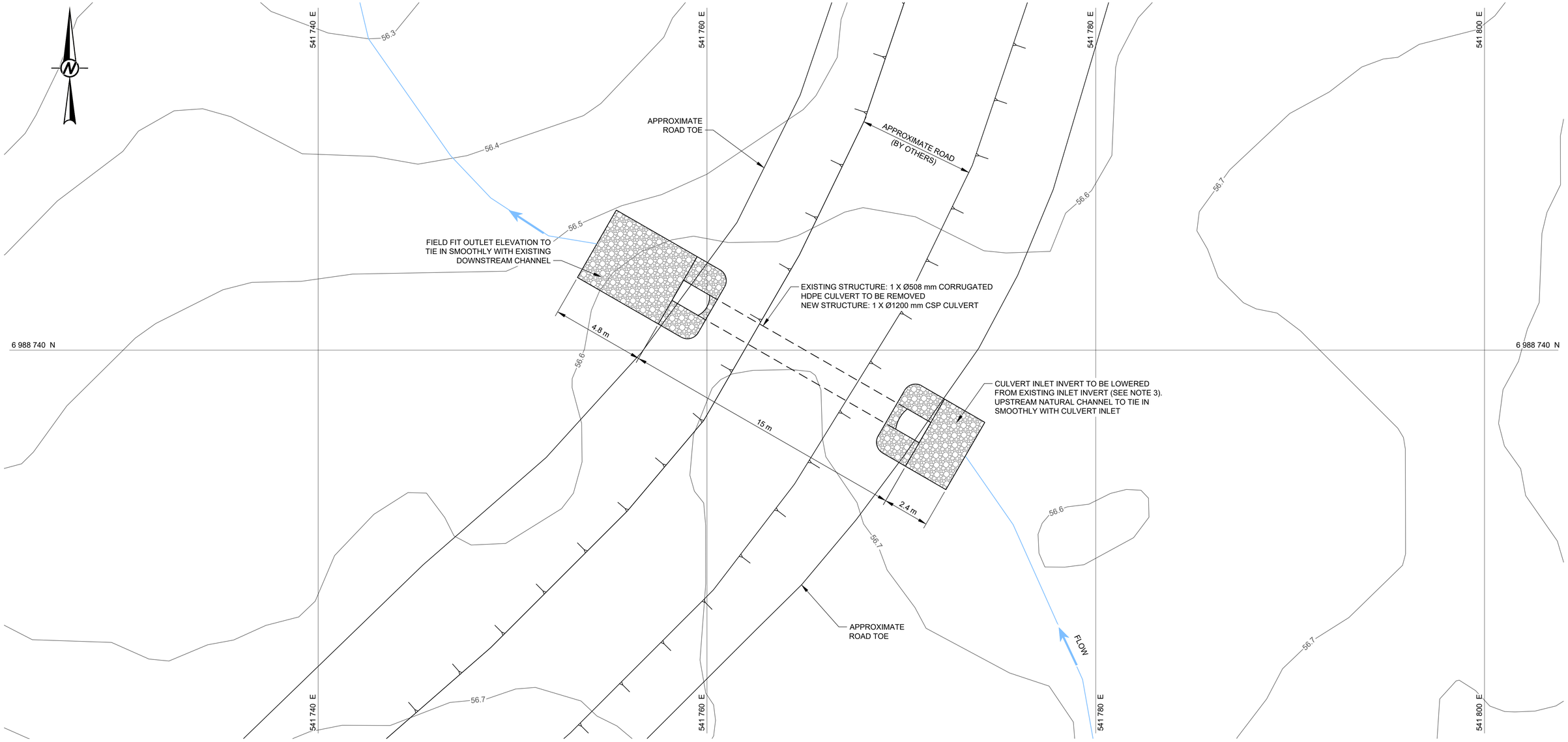

CROSSING EXPLORATION CAMP ACCESS ROAD KM 1.1B PLAN

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LEGEND

- EXISTING STREAM
- TOPOGRAPHIC CONTOUR (MAJOR INTERVAL = 0.1 m); (SEE REFERENCE 1)
- RIPRAP

NOTES

1. ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED.
2. COORDINATE SYSTEM: NAD83 UTM ZONE 15.
3. EXPLO 1.1B CULVERT INLET INVERT TO BE 0.2 m BELOW THE CULVERT INLET INVERT OF EXPLO 1.1A.

REFERENCES

1. TOPOGRAPHIC INFORMATION GENERATED BY PHOTOSAT FEBRUARY, 2011; FILE NAME: dsm_2m_polarstereo_20_19_1_2.tif.

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CROSSING EXPLORATION CAMP ACCESS ROAD KM 1.1B PLAN

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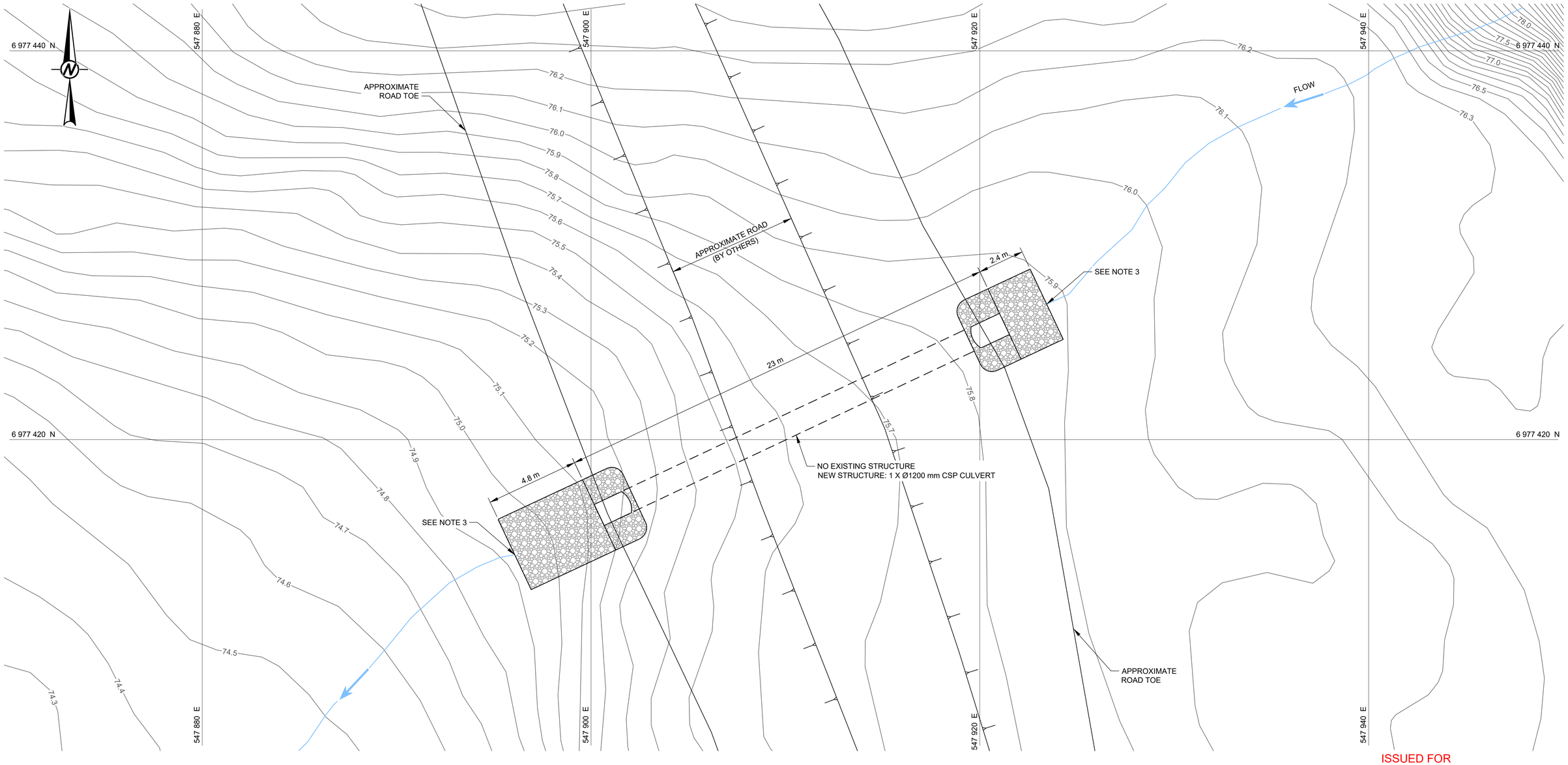

CROSSING AWAR KM 15.4 PLAN
SCALE 1:100

LEGEND

- EXISTING STREAM
- TOPOGRAPHIC CONTOUR (MAJOR INTERVAL = 0.1 m); (SEE REFERENCE 1).
- RIPRAP

NOTES

1. ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED.
2. COORDINATE SYSTEM: NAD83 UTM ZONE 15.
3. FIELD FIT CULVERT INLET AND OUTLET LOCATIONS TO ALIGN WITH TOPOGRAPHIC LOWS AND TIE IN SMOOTHLY TO THE EXISTING GRADE.

REFERENCES

1. TOPOGRAPHIC INFORMATION GENERATED BY PHOTOSAT FEBRUARY, 2011; FILE NAME: hope_bay_1m_dem_tile_02.tif.

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TITLE
CROSSING AWAR KM 15.4 PLAN

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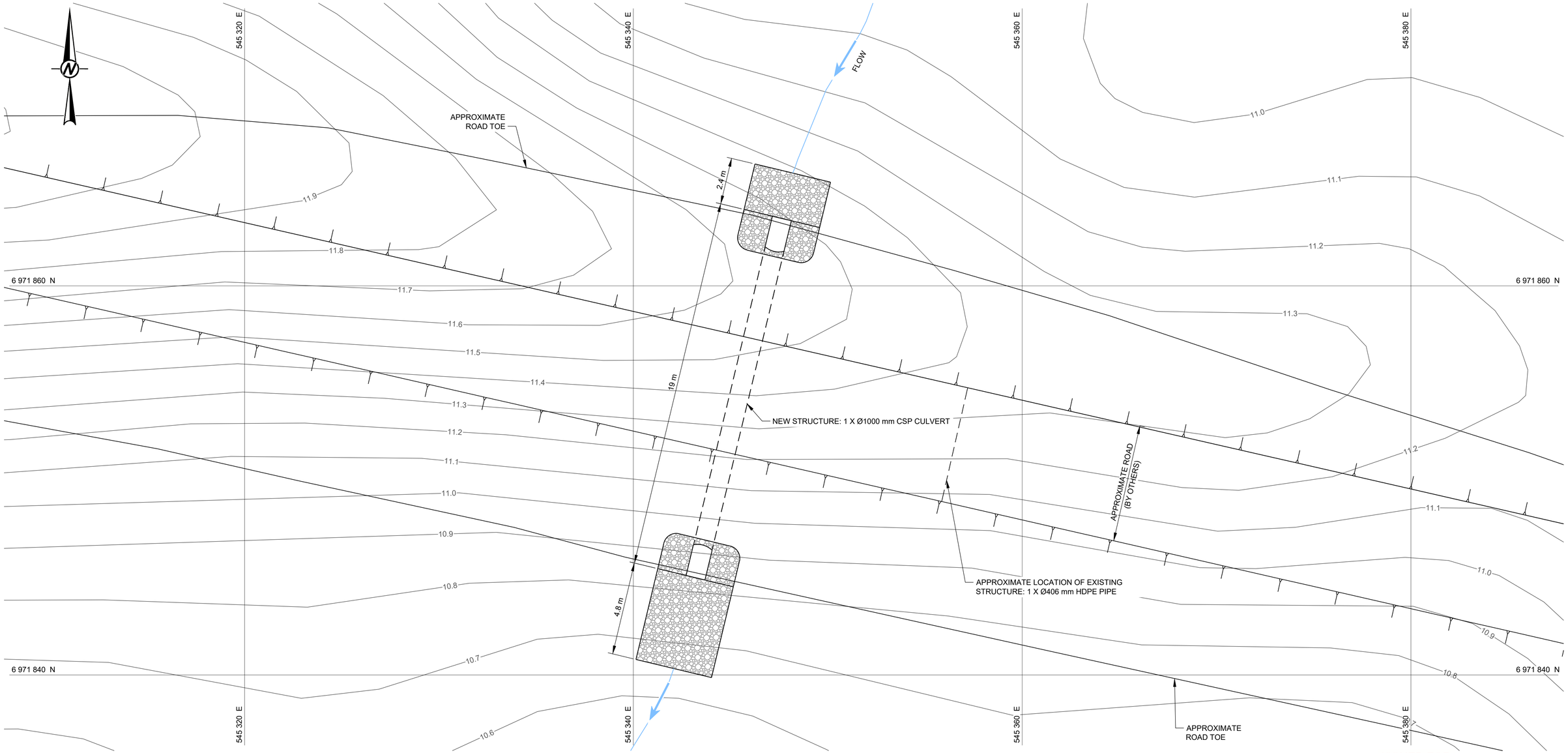

CROSSING AWAR KM 8.8 PLAN

SCALE 1:100

LEGEND

- EXISTING STREAM
- TOPOGRAPHIC CONTOUR (MAJOR INTERVAL = 0.1 m); (SEE REFERENCE 1).
- RIPRAP

NOTES

1. ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED.
2. COORDINATE SYSTEM: NAD83 UTM ZONE 15.

REFERENCES

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PROJECT
MELIADINE GOLD PROJECT
CULVERT CROSSING INSTALLATIONS - DETAILED DESIGN
NUNAVUT

TITLE
CROSSING AWAR KM 8.8 PLAN

PROJECT NO.	PHASE/TASK	REV.		DRAWING
CA0021981.5443	2000/2009	0	4 of 7	04

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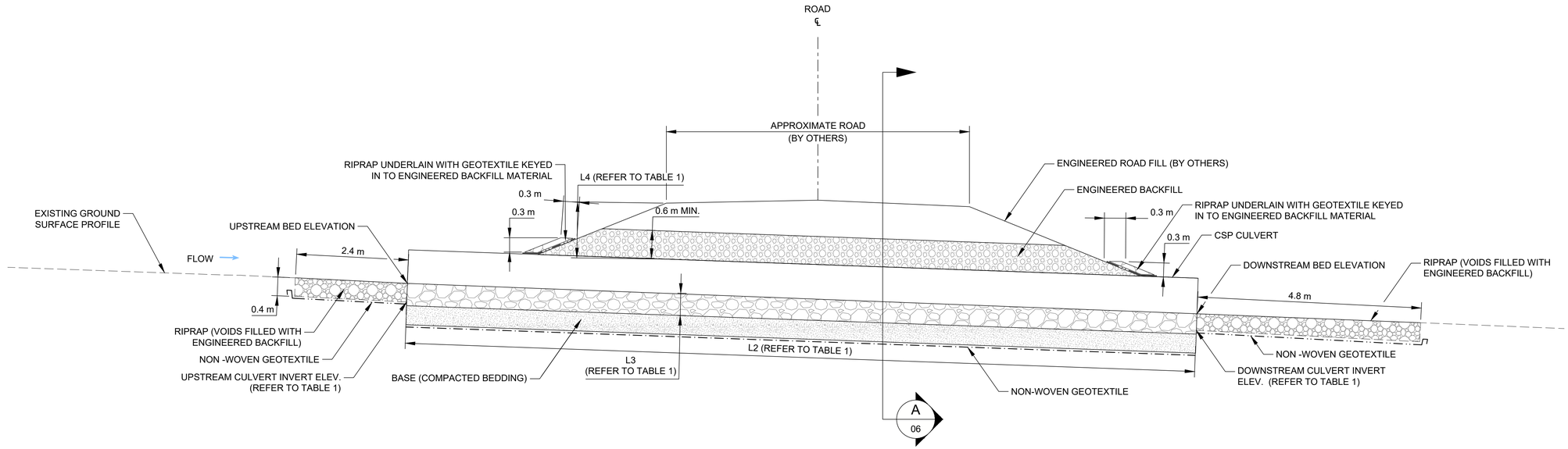

TYPICAL CULVERT CROSSING PROFILE

SCALE 1:50

TABLE 1

CROSSING NAME	CULVERT	L1 CSP CULVERT DIAMETER (m)	L2 CULVERT LENGTH (m)	L3 EMBEDMENT DEPTH (m)	CULVERT SLOPE (SEE NOTE 3)	APPROXIMATE UPSTREAM CULVERT INVERT ELEVATION (m) (SEE NOTE 2 AND 3)	APPROXIMATE DOWNSTREAM CULVERT INVERT ELEVATION (m) (SEE NOTE 2 AND 3)	L4 MINIMUM CULVERT COVER (m)
EXPLO 1.1B	1x CSP 1200 mm	1.2	20	0.48	0.5%	55.03	54.93	0.9
AWAR 15.4	1x CSP 1200 mm	1.2	20	0.48	2.1%	75.15	74.74	0.9
AWAR 8.8	1x CSP 1000 mm	1.0	19	0.40	2.0%	15.11	14.70	0.7

LEGEND

- EXISTING GROUND SURFACE PROFILE
- ENGINEERED BACKFILL
- CULVERT SUBSTRATE MATERIAL
- RIPRAP
- COMPACTED BEDDING

NOTES

1. ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED.
2. CULVERT ELEVATIONS NOTED ON THE DESIGN DRAWINGS ARE ESTIMATED FROM HIGH-LEVEL SURVEY DATA FOR STREAM INVERTS. CULVERT PLACEMENT AND INSTALLATION SHALL BE FIELD FIT, TO REFLECT ACTUAL CONDITIONS ENCOUNTERED ON-SITE, INCLUDING BUT NOT LIMITED TO CHANGES IN ELEVATION, GRADE, SKEW, AND/OR DEPTH BASED ON THE DIRECTION OF THE ENGINEER.
3. CULVERT INLET INVERT ELEVATION OF EXPLO 1.1B TO BE SET AS MINIMUM OF 0.2 m LOWER THAN THE CULVERT INLET INVERT ELEVATION OF THE EXISTING EXPLO 1.1A CROSSING. CULVERT SLOPE AND INVERT ELEVATIONS MAY CHANGE ACCORDING TO FIELD FIT REQUIREMENTS BETWEEN 0.5%-2.0%.

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1:50 METRES

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0	2024-12-17	ISSUED FOR CONSTRUCTION	AJ	AS	AJ	CV

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WSP Canada Inc.
Signature
Date 2024-12-17
PERMIT NUMBER: P407
NT/NU Association of Professional Engineers and Geoscientists

SEAL

REGISTERED PROFESSIONAL ENGINEER
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TYPICAL CULVERT PROFILE

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CA0021981.5443	2000/2009	0	5 of 7	05

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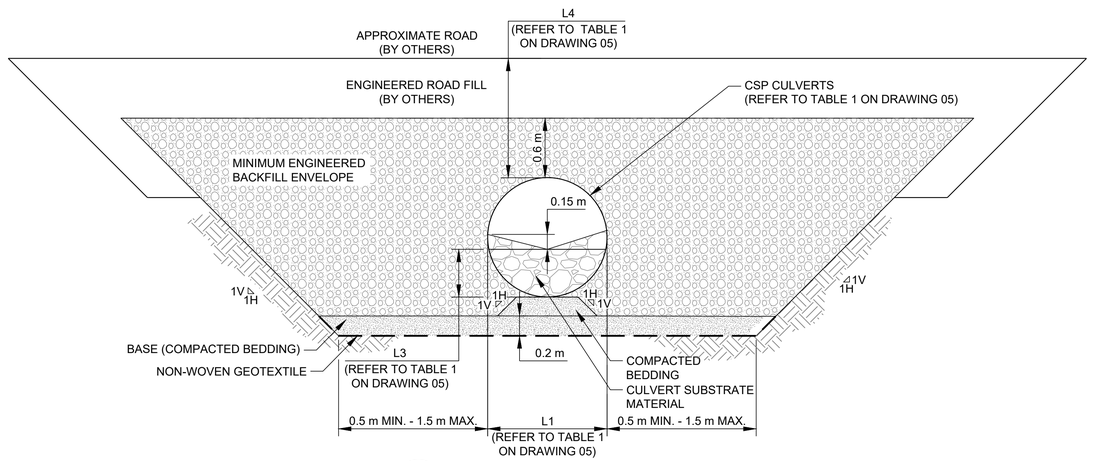
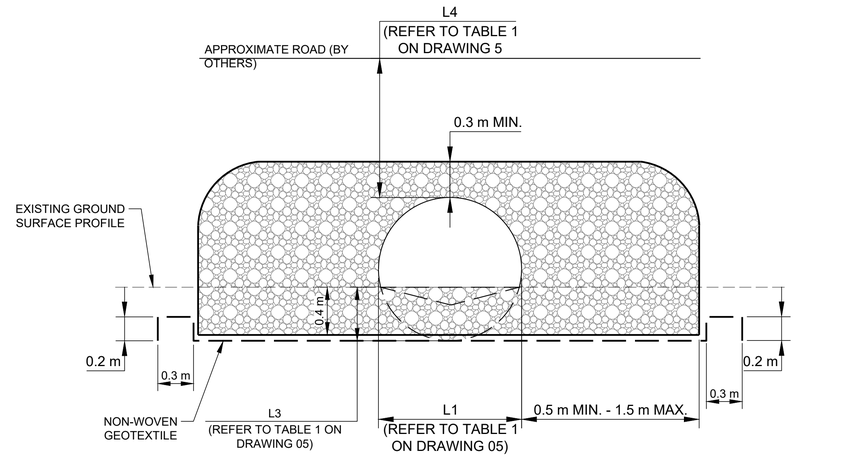
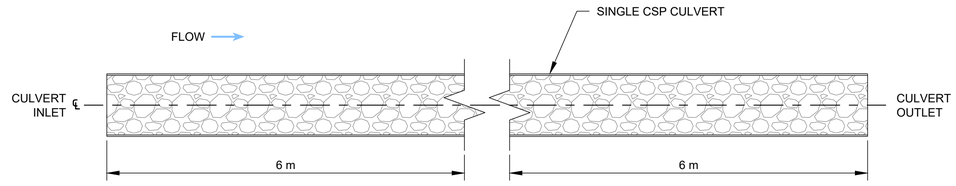


SCALE 1:30 A 02 TYPICAL CULVERT CROSS-SECTION



SCALE 1:30 1 TYPICAL CULVERT INLET AND OUTLET FACE RIPRAP DETAIL



SCALE 1:50 2 PLAN DETAIL - SUBSTRATE MATERIAL WITHIN CULVERT

LEGEND

- NON-WOVEN GEOTEXTILE
- EXISTING GROUND SURFACE PROFILE
- ENGINEERED BACKFILL
- CULVERT SUBSTRATE MATERIAL
- COMPACTED BEDDING
- RIPRAP

NOTES

1. ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED.
2. ALL CULVERTS EMBEDDED AS PER L3 (EMBEDMENT DEPTH) IN TABLE 1 ON DRAWING 05.
3. EMBEDMENT DEPTH DOES NOT INCLUDE 150 mm V-NORTH ABOVE THALWEG.
4. UPSTREAM AND DOWNSTREAM SLOPES SHALL BE MATCHED TO CHANNEL SLOPES DESCRIBED IN TABLE 1 ON DRAWING 05.

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1. PRIOR TO CONSTRUCTION

1.1 PRIOR TO ANY CULVERT CONSTRUCTION ACTIVITIES TAKING PLACE THE FOLLOWING SPECIFICATIONS SHALL BE FOLLOWED.

2. SCHEDULE

2.1 PROPOSED WORK IS PLANNED TO TAKE PLACE IN 2025.

3. ENVIRONMENTAL PROTECTION

3.1. THE WORK AREAS SHALL BE MONITORED FOR EROSION AND SEDIMENT TRANSPORT AS REQUIRED DURING CONSTRUCTION. ANY REQUIRED MITIGATION MEASURES WILL BE PUT IN PLACE AS PER THE SEDIMENT AND EROSION MANAGEMENT PLAN.

3.2. EXECUTION OF THE WORK IS RECOMMENDED TO FOLLOW FISHERIES AND OCEANS CANADA (DFO) STANDARDS AND CODE OF PRACTICES, WHICH MAY INCLUDE THE FOLLOWING: ICE BRIDGES AND SNOW FILLS, CULVERT MAINTENANCE, TEMPORARY FORDS, AND IN-WATER ISOLATION (DFO 2024), AND ADDITIONAL MEASURES OR RECOMMENDATIONS PROVIDED BY DFO DURING THE PERMITTING PROCESS.

4. QUALITY ASSURANCE INSPECTIONS

4.1. WORK THROUGHOUT THE ENTIRE PROJECT SHALL BE COMPLETED IN ACCORDANCE WITH THE INSPECTIONS AND TESTING GUIDELINES LAID OUT BY THE CANADIAN STANDARDS ASSOCIATION (CSA) IN CODE CSA-G401-14, WITH ADDITIONAL QUALITY ASSURANCE INSPECTIONS SUMMARIZED BELOW.

4.2. MONITORING OF THE QUALITY ASSURANCE (QA)/QUALITY CONTROL (QC) WILL BE CONDUCTED BY A QUALIFIED AGNICO EAGLE PERSONNEL TO ENSURE WORK IS COMPLETED IN ACCORDANCE WITH THE DESIGN DRAWINGS AND TECHNICAL SPECIFICATIONS.

4.3. PRODUCTS SHALL BE MADE AVAILABLE FOR INSPECTION AND ACCEPTANCE BY THE ENGINEER AT THE POINT AND TIME OF INCORPORATION INTO THE WORK.

4.4. MINIMUM QUALITY CONTROL (QC) TESTS AND INSPECTIONS, TO BE PERFORMED BY THE CONTRACTOR, SHALL BE PER TABLE 1.

TABLE 1: QUALITY ASSURANCE REQUIREMENTS

ELEMENT	DESCRIPTION	REQUIREMENT
MANUFACTURERS QC	CONFIRM CULVERT MATCHES MATERIAL SPECIFICATIONS IN THIS DOCUMENT AND ANY FIELD FIT CHANGES ALIGN WITH MANUFACTURER'S SPECIFICATIONS, FOR EXAMPLE DEPTH OF COVER.	DOCUMENT THICKNESS OF CULVERT, CIRCUMFERENCE, CORRUGATIONS, CULVERT MATERIAL AND DEPTH OF COVER
VISUAL INSPECTIONS	INSPECT CULVERT AND COUPLERS FOR RUST, STAINING, DENTS/DEFORMITIES. REPAIR ANY MINOR DAMAGE SUCH AS RUST, OR REPLACE IF DAMAGE IS MAJOR.	DOCUMENT CULVERT AND COUPLER CONDITION BEFORE COVERING, DO NOT INSTALL IF DAMAGED
VISUAL INSPECTIONS	INSPECT RIPRAP, CULVERT SUBSTRATE MATERIAL, ROAD SUB-BASE COARSE FILLS FOR ADHERENCE TO THE DESCRIPTIONS PROVIDED IN THESE SPECIFICATIONS.	INSPECT AND DOCUMENT MATERIAL CONDITION BEFORE INSTALLATION.
SURVEY	COMPLETE SURVEYS FOR APPROVAL FOR ITEMS LISTED BELOW: 1. LAYOUT OF WORK 2. EXCAVATED SURFACE 3. FINAL SURFACE 4. CULVERT ALIGNMENT AND ELEVATIONS	COMPLETE, DOCUMENT, AND PROVIDE SURVEYS FOLLOWING COMPLETION OF EVERY ITEM FOR APPROVAL BY THE ENGINEER.

5. MATERIALS

5.1. ALL MATERIALS USED SHALL BE NON-POTENTIAL ACID GENERATING (NPAG) AND NON-METAL LEACHING. ANY NEWLY SOURCED MATERIALS SHALL BE COLLECTED AND ANALYZED TO CONFIRM THEY ARE NPAG AND NON-METAL LEACHING.

5.2. NON-WOVEN GEOTEXTILE

5.2.1. NON-WOVEN GEOTEXTILE SHALL BE PROVIDED IF REQUIRED BY THE ENGINEER AND THE FOLLOWING VALUES.

TABLE 2: GEOTEXTILE REQUIREMENTS

PARAMETER	VALUE
GRAB STRENGTH	650 N
PUNCTURE STRENGTH	275 N
BURST STRENGTH	2.1 Mpa
TRAPEZOIDAL TEAR	250 N

5.3. CULVERTS

5.3.1. THE SUPPLY AND FABRICATION OF CORRUGATED STEEL PIPE (CSP) INCLUDING COUPLERS AND APPURTENANCES SHALL BE IN ACCORDANCE WITH CSA STANDARD G401-07

5.3.2. THE CSP SHALL BE GALVANIZED WITH MINIMUM WALL THICKNESS OF 2.8 mm AND A CORRUGATION PROFILE OF 68 mm X 13 mm.

5.4. RIPRAP

5.4.1. RIPRAP MATERIAL SHALL MEET THE FOLLOWING STANDARDS:

5.4.1.1. RIPRAP SHALL CONSIST OF WELL GRADED, HARD, DURABLE AND ANGULAR ROCK WHICH MEETS THE PHYSICAL AND GRADATION REQUIREMENTS SET OUT BELOW.

5.4.1.2. RIPRAP SHALL BE NON-POTENTIAL ACID GENERATING (NPAG). ANY NEW SOURCED MATERIAL SHALL BE COLLECTED AND ANALYZED BY APPROPRIATE GEOCHEMICAL ANALYSES TO ENSURE IT IS NPAG AND NON-METAL LEACHING.

TABLE 3: RIPRAP GRADATION

CLASS	INTERMEDIATE AVERAGE DIMENSION (mm)			
	D15	D50	D85	D100
10 kg	90	200	285	350

5.5. CULVERT SUBSTRATE MATERIAL

5.5.1. CULVERT SUBSTRATE MATERIAL SHALL BE WELL GRADED SANDY/GRAVEL/COBBLE MIXTURE. COBBLES SHALL NOT EXCEED 150 mm IN DIAMETER. SUBSTRATE MATERIAL SHALL MATCH THE NATURAL STREAMBED MATERIAL, UNLESS NATURAL STREAMBED MATERIAL IS COMPOSED PRIMARILY OF FINES, IN WHICH CASE GRAVEL AND COBBLES SHALL BE ADDED TO THE CULVERT SUBSTRATE MATERIAL. MATERIAL SHALL BE APPROVED BY THE ENGINEER.

5.5.2. EXCAVATED CULVERT SUBSTRATE MATERIAL MAY BE USED FOR CULVERT SUBSTRATE IF APPROVED BY THE ENGINEER. SUBSTRATE MATERIAL SHALL BE STOCKPILED FOR LATER REUSE AS CULVERT SUBSTRATE MATERIAL (AS PER SPECIFICATION 6.1.1.4) AND SHALL BE KEPT FREE OF DEBRIS, OIL OR OTHER CONTAMINANTS, SNOW, AND OTHER SOURCES OF MOISTURE.

5.6. ENGINEERED BACKFILL, BASE AND BEDDING

5.6.1. ENGINEERED BACKFILL

5.6.1.1. ENGINEERED BACKFILL SHALL BE CLEAN, GRANULAR, AND POSSESS TIME-INDEPENDENT PROPERTIES.

5.6.1.2. BACKFILL MATERIAL SHALL BE FREE OF ORGANIC, FROZEN AND OTHERWISE DELETERIOUS MATERIAL AND CONSIST OF A WELL GRADED GRANULAR MATERIAL WITH ANGULAR GRAINS AND MEET THE FOLLOWING REQUIREMENTS.

5.6.1.3. MAXIMUM PARTICLE SIZE SHALL NOT EXCEED 75 mm OR AS APPROVED BY THE EOR (OR APPROVED DESIGNATE).

5.6.1.4. MINIMUM GRAVEL CONTENT (PARTICLE SIZE > 4.75 mm): 30%

5.6.1.5. MAXIMUM FINES CONTENT (PASSING THROUGH #200 SIEVE): 10%.

5.6.2. COMPACTED PIPE BEDDING

5.6.2.1. BASE AND PIPE BEDDING MATERIALS SHALL BE A 50 mm MINUS GRANULAR MATERIAL WHICH MEETS THE GRADATION SPECIFICATIONS PRESENTED IN TABLE 4.

5.6.2.2. BASE MATERIAL MAY NOT BE REQUIRED IF THE SUBSURFACE CONDITIONS ARE APPROVED BY THE ENGINEER.

TABLE 4: GRANULAR FILL (0-50 mm) - PARTICLE SIZE DISTRIBUTION LIMITS

PARTICLE SIZE (mm)	% PASSING
50	100
38	87-100
19	60-95
12.5	46-80
5	35-60
2	25-45
0.315	10-25
0.08	4-10

5.6.3 COMPACTION

5.6.3.1 MAXIMUM UNCOMPACTED LIFT HEIGHT SHALL BE 200 mm.

5.6.3.2 EACH LAYER SHALL BE COMPACTED TO A MINIMUM 95% STANDARD PROCTOR DENSITY (ASTM D698).

5.6.3.3 OPTIMUM MOISTURE CONTENT SHALL BE MAINTAINED DURING COMPACTION (ASTM D698).

6. EXECUTION

6.1. PREPARATION OF CULVERT SITE

6.1.1. PRIOR TO THE CULVERT BEING INSTALLED THE FOLLOWING SHALL BE FOLLOWED:

6.1.1.1. REMOVE LARGE STONES OR OTHER HARD MATERIALS IN THE CULVERT FOUNDATION, TRENCH WALLS, AND BACKFILL THAT MAY DAMAGE OR WEAKEN THE PIPING OR IMPEDE CONSISTENT BACKFILLING FOR COMPACTION. THIS SHALL INCLUDE THE REMOVAL OF ANY EXISTING, CULVERTS(S) AND ASSOCIATED MATERIALS.

6.1.1.2. EXISTING CULVERTS MAY REMAIN IN PLACE IF THEY COMPLY WITH THE EXCAVATION AND MINIMUM SPACING DIMENSIONS PROVIDED IN THE DESIGN DRAWINGS. CULVERTS SHALL BE REMOVED IF DAMAGED OR BACKFILL AND COVER REQUIREMENTS CAN NOT BE MET.

6.1.1.3. IT IS THE RESPONSIBILITY OF AGNICO EAGLE TO ENSURE THAT THE EXISTING CULVERTS MEET THE REQUIREMENTS TO REMAIN IN PLACE DURING AND AFTER CONSTRUCTION.

6.1.1.4. IF CHANNEL SUBSTRATES ARE TO BE REMOVED, SEPARATE AND STOCKPILE GRANULAR SUBSTRATE MATERIAL (IF PRESENT) FOR USE AS CULVERT SUBSTRATE AND IF REMAINING MATERIAL IS AVAILABLE AT COMPLETION, REPLACE ALONG ANY DISTURBED STREAM AREAS, UPON COMPLETION OF PROJECT WORKS. SEPARATE SUBSTRATE MATERIAL INTO TWO STOCKPILES:

6.1.1.4.1. MATERIAL FROM THE TOP 0.3 m OF THE CHANNEL AND

6.1.1.4.2. MATERIAL BELOW THE TOP 0.3 m

6.1.1.5. MATERIAL STOCKPILES PLACED ADJACENT TO ANY EXCAVATION OR EMBANKMENT SHALL BE LIMITED TO MAXIMUM 1.2 m IN HEIGHT.

6.1.1.6. MATERIAL STOCKPILES SHALL BE PLACED A HORIZONTAL DISTANCE AWAY FROM AN EXCAVATION EQUIVALENT TO (OR GREATER THAN) THE EXCAVATION DEPTH.

6.1.1.7. MATERIAL STOCKPILES SHALL BE KEPT FREE OF DEBRIS, OIL OR OTHER CONTAMINANTS, SNOW, AND OTHER SOURCES OF MOISTURE.

6.1.1.8. STOCKPILES SHALL BE SIZED TO MINIMIZE SEGREGATION AND TO FACILITATE FUTURE USE.

6.1.1.9. CULVERT ELEVATIONS NOTED ON THE DESIGN DRAWINGS ARE ESTIMATED FROM SURVEY DATA FOR STREAM INVERTS. CULVERT PLACEMENT AND INSTALLATION SHALL BE FIELD FIT, TO REFLECT ACTUAL CONDITIONS ENCOUNTERED ON-SITE, INCLUDING BUT NOT LIMITED TO CHANGES IN ELEVATION, GRADE, SKEW, AND/OR DEPTH BASED ON THE DIRECTION OF THE ENGINEER.

6.1.1.10. CULVERT SLOPES DEVIATING FROM THE DESIGN DRAWINGS SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.

6.1.1.11. ALL FIELD FIT REVISIONS TO THE DESIGN SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.

6.2. EXCAVATION AND TRENCHING

6.2.1. EXCAVATION SAFETY AND SUITABILITY OF FOUNDATION MATERIALS SHALL BE CARRIED OUT ACCORDING TO THE CONTRACTOR'S / OWNER'S GEOTECHNICAL ENGINEER.

6.2.2. DURING EXCAVATION OF THE CULVERT PLACEMENT AREA, THE EXCAVATED CLEAN CHANNEL SUBSTRATE SHALL BE STOCKPILED FOR REUSE AS PER 6.1.1.4.

6.2.3. EXCAVATED SUBGRADE CONDITIONS SHALL BE INSPECTED FOR THE SUITABILITY OF MATERIAL AND CULVERT PLACEMENT. SATURATED FINE-GRAINED SOILS, OR ICE-RICH FINE-GRAINED SOILS IN THE THAWED ACTIVE LAYER SHALL BE STRIPPED UNTIL COMPETENT SUBGRADE MATERIAL IS FOUND, SUBJECT TO APPROVAL BY THE ENGINEER.

6.3. CULVERT INSTALLATION

6.3.1. BASE

6.3.1.1. BASE MATERIAL SHALL BE PLACED ACCORDING TO THE DESIGN DRAWINGS OR AS APPROVED BY THE ENGINEER.

6.3.2. COMPACTED BEDDING

6.3.2.1. CULVERT BEDDING SHALL BE CONSTRUCTED ACCORDING TO THE DESIGN DRAWINGS, OR AS APPROVED BY THE ENGINEER.

6.3.2.2. BEDDING TO BE INSTALLED TO PROVIDE FULL CONTACT WITH CULVERT INVERT TO SUPPORT CULVERT AND LIMIT MOVEMENT

6.3.3. RIPRAP PLACEMENT

6.3.3.1. NON-WOVEN GEOTEXTILE FILTER CLOTH PLACEMENT, AS REQUIRED BY THE ENGINEER BASED ON SITE CONDITIONS, AND RIPRAP PLACEMENT SHALL ADHERE TO THE FOLLOWING PRACTICES:

6.3.3.1.1. NON-WOVEN GEOTEXTILE SHALL BE PLACED BENEATH BOTH THE INLET AND OUTLET RIPRAP SHOWN IN THE DESIGN DRAWINGS AND SHALL BE KEYED INTO THE SLOPE AT THE TOP OF THE BANKS AT A MINIMUM DISTANCE OF 0.3 m. THE GEOTEXTILE SHALL BE KEYED INTO THE CULVERT BEDDING MATERIALS WHERE THE RIPRAP MEETS THE CULVERT BASE AND KEYED INTO THE THALWEG WHERE RIPRAP COVERAGE BLENDS IN WITH THE NATURAL CHANNEL.

6.3.3.1.2. THE CONTRACTOR SHALL EXERCISE CARE DURING RIPRAP PLACEMENT TO AVOID DAMAGE OR DISPLACEMENT OF THE NON-WOVEN GEOTEXTILE. CONSTRUCTION EQUIPMENT IS NOT PERMITTED ON THE SURFACE OF THE NON-WOVEN GEOTEXTILE.

6.3.3.1.3. NON-WOVEN GEOTEXTILE SHALL BE PLACED TO ENSURE THERE IS A MINIMUM OVERLAP OF 0.3 m AT EACH JOINT, OR AS RECOMMENDED BY THE MANUFACTURER.

6.3.3.1.4. RIPRAP PLACEMENT WILL BE FIELD FIT BY THE CONTRACTOR, WHO SHALL FOLLOW THE DETAILS SHOWN IN THE DESIGN DRAWINGS. RIPRAP SHALL FOLLOW THE NATURAL STREAM CHANNEL, CENTERED AT THE THALWEG AND CULVERT.

6.3.3.1.5. RIPRAP SHALL BE PLACED 0.3 m ABOVE THE CULVERT CROWNS AGAINST THE ROAD EMBANKMENT AT THE INLET AND OUTLET.

6.3.3.1.6. ENGINEERED BACKFILL MATERIAL (SECTION 5.6.1) SHALL BE LAID WITHIN THE VOIDS ON THE SURFACE OF THE RIPRAP AS DIRECTED BY THE ENGINEER.

6.3.4. CULVERT PLACEMENT

6.3.4.1. INSTALL AND CONSTRUCT CULVERT IN GENERAL ACCORDANCE WITH THE LINES, GRADES, AND LOCATIONS SPECIFIED IN THE DESIGN DRAWINGS.

6.3.4.2. LIFT OR ROLL PIPE INTO POSITION. DO NOT DROP OR DRAG THE CULVERT OVER PREPARED BEDDING.

6.3.4.3. ENSURE BOTTOM OF CULVERT MAKES CONTACT WITH THE SHAPED BED FOR THE ENTIRE LENGTH OF THE CULVERT.

6.3.4.4. INSERT AND TIGHTEN BOLTS TO PRODUCT SPECIFICATIONS SET OUT BY CULVERT MANUFACTURER.

6.3.5. CULVERT SUBSTRATE MATERIAL PLACEMENT

6.3.5.1. PLACE APPROVED CULVERT SUBSTRATE MATERIAL (AS PER SPECIFICATION 5.5) INSIDE THE CULVERT TO EMBEDMENT DEPTH AS PER DRAWINGS.

6.3.5.2. SUBSTRATE MATERIAL SHALL BE KEPT CLEAN AND DRY AND SOURCES OF MOISTURE SHALL NOT BE ALLOWED TO ACCUMULATE ON OR WITHIN THE MATERIAL.

6.3.5.3. THE SURFACE OF THE BACKFILLED CULVERT SUBSTRATE MATERIAL WITHIN THE CULVERTS SHALL CONFORM TO THE DIMENSIONS SHOWN IN THE DESIGN DRAWINGS.

6.3.5.4. FILL IN VOIDS IN CULVERT SUBSTRATE BY WASHING IN SAND/FINES.

6.3.6. BACKFILL AND PLACEMENT

6.3.6.1. FILL SHALL BE PLACED TO THE LINES AND GRADES AS SHOWN IN THE DRAWINGS, AND AS DIRECTED BY THE OWNER'S GEOTECHNICAL ENGINEER.

6.3.6.2. BACKFILL SHALL BE PLACED IN VERTICAL LIFTS NOT EXCEEDING 0.2 m. FILLS MAY BE PLACED DURING LIGHT SNOWFALL PROVIDED THAT THE SNOW ACCUMULATION IS LESS THAN 5 mm BETWEEN EACH LIFT. ANY HEAVIER SNOW ACCUMULATION ON THE LIFT SHALL BE REMOVED BEFORE CONTINUING PLACEMENT OF FILLS.

6.3.6.3. CAUTION SHALL BE EXERCISED WHILE PLACING AND COMPACTING BACKFILL NEAR THE CORNERS/HAUNCHES.

6.3.6.4. COMPACT ENGINEERED BACKFILL TO A MINIMUM 95% STANDARD PROCTOR.

6.3.6.5. MAINTAIN MOISTURE CONTENT OUTLINED IN SECTION 4.5.3 DURING COMPACTION

6.3.6.6. COMPACTION TESTING USING A NUCLEAR DENSOMETER SHALL BE CONDUCTED BY THE CONTRACTOR ON EVERY LIFT OF FILL. COMPACTION TESTING RESULTS SHALL BE PROVIDED TO THE ENGINEER FOR REVIEW.

6.3.7. ROADWAY SURFACE

6.3.7.1. FINAL ROADWAY SURFACE GEOMETRY AND MATERIAL IS TO BE DETERMINED BY THE OWNER.

6.4. COMPLETION OF WORK

6.4.1. ONCE THE CULVERTS HAVE BEEN INSTALLED AND ALL BACKFILLING AND RIPRAP PLACEMENT IS COMPLETE, THE FOLLOWING SHALL BE COMPLETED:

6.4.1.1. ENVIRONMENTAL AND EROSION AND SEDIMENT CONTROL MEASURES SHALL BE COMPLETED AS DIRECTED BY THE OWNER.

6.4.1.2. INSPECTIONS SHALL BE COMPLETED AND AS-BUILT MEASUREMENTS AND OBSERVATIONS FOR THE CULVERT AND FINAL ROADWAY SURFACE SHALL BE CONDUCTED AND SUBMITTED TO THE ENGINEER FOR APPROVAL.

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