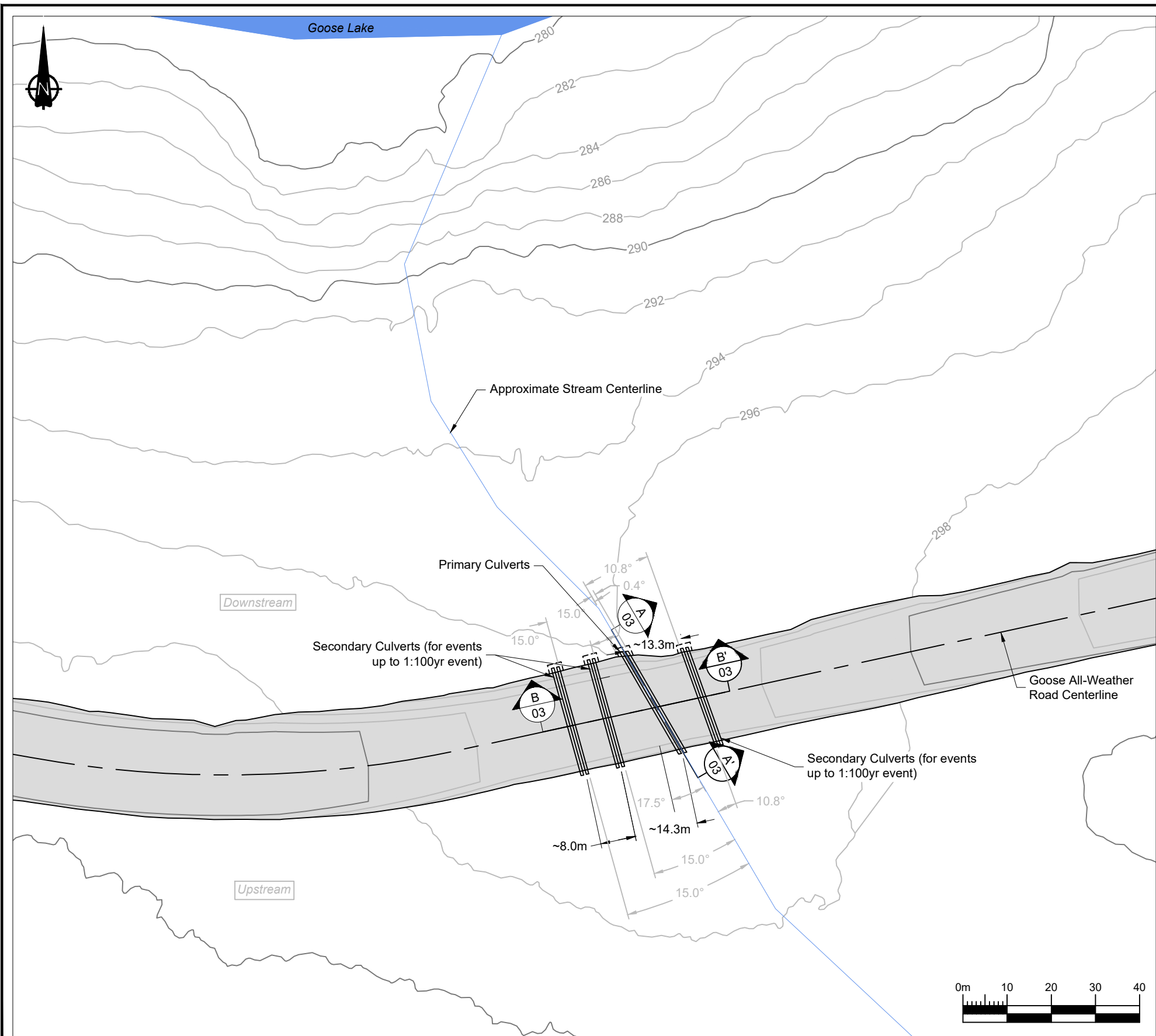


Engineering Drawings for the Goose All-Weather Road (Type B License) - Echo Crossing Back River Project, Nunavut, Canada

ACTIVE DRAWING STATUS

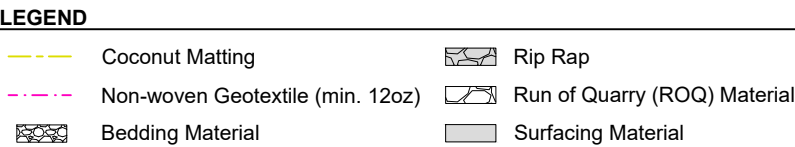
SABINA DWG NUMBER	SRK DWG NUMBER	DRAWING TITLE	REVISION	DATE	STATUS
SBR6SRK-23-C-PLN-005	ECHO-01	Echo Crossing Location Plan	2	March 12, 2020	Issued for Permit
SBR6SRK-23-C-PLN-006	ECHO-02	Echo Crossing Culvert Plan	3	June 15, 2020	Issued for Permit
SBR6SRK-23-C-DET-002	ECHO-03	Echo Crossing Profile and Sections	3	June 15, 2020	Issued for Permit



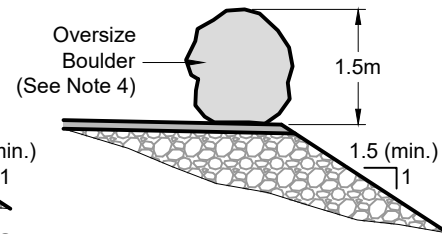
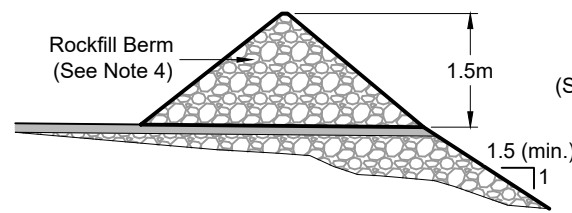
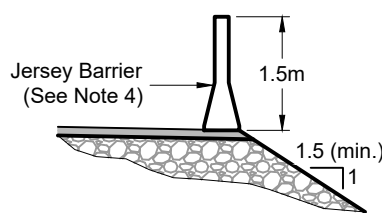
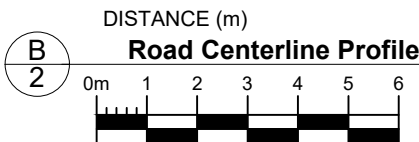
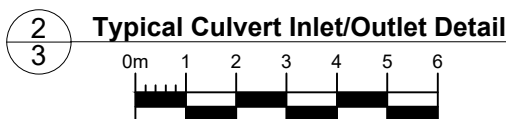
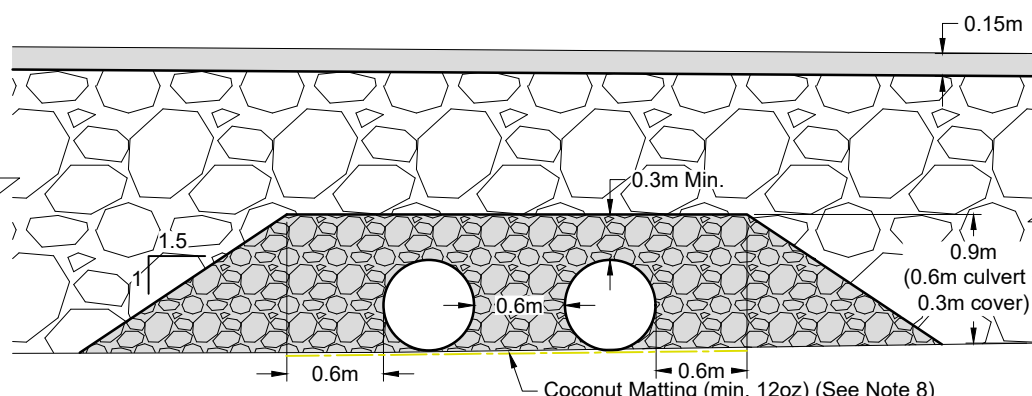


14. If the client wishes to have Engineering sign-off on the Echo Crossing Area then the details outlined in the project Technical Specifications document must be followed. See the Technical Specifications - 'Earthworks and Geotechnical Engineering - Back River Gold Project, Nunavut, Canada - Issued for Construction' document for additional details. As a minimum the following will be required.:
- a. QC and QA documentation confirming that the material specification have been followed and met. This would include manufacturer certificates for all the non-woven geotextile material, QC documentation and photos of all geotextile seams, manufacturer certificate for each culvert, QC documentation for any joins or welds in the culverts, QC material testing for all crush (bedding) materials; as per the site Technical Specifications.
 - b. As-Built survey information for all layers and components of the design (i.e. survey data for original ground, stream centerline and banks, bedding and ROQ above the culvert, riprap on the face of the culvert, and top surfacing layer.
 - c. Survey information for the as-built placed volumes as well as daily truck load counts.
 - d. Engineer site supervision during construction. This would consist of at least one site visit during construction and photos from the Client and Contractor throughout construction of the Echo crossing.

Goose All-Weather Road		
DRAWING TITLE: Echo Crossing Culvert Plan		
DRAWING NO. ECHO-02	SHEET 2 OF 3	REVISION NO. 3



- ## NOTES
1. All dimensions in meters unless otherwise stated.
 2. Installation of culverts to follow the manufacturers assembly and installation guide.
 3. Total depth of cover above culvert, including bedding material, surfacing material, and ROQ material, will be 1.5m minimum. Road to be built up to a minimum height of 1.5m above the top of the installed culverts (typical road thickness 2.1m above the original ground).
 4. For safety barrier sizing, height to be a minimum $\frac{2}{3}$ the diameter of the largest vehicle tire.
 5. If natural ground is less than 1% grade, fill material (surfacing material) to be placed below culvert to establish minimum 1% grade.
 6. All fill material compaction effort to be done in accordance with the site Technical Specifications document (see referenced on dwg. ECHO-02). Bedding material to be compacted in thin lifts (max. 0.2m) to 95% of standard proctor testing densities.
 7. Non-woven geotextile is suggested to be placed below all culvert pipes to help slow rates of permafrost degradation from surface water flow, and to help reduce differential settlement.
 8. Erosion protection measures will be required around the outlet of the culverts. These erosion control measures are expected to non consist of placed rip rap but instead consist of a small patch of non-woven geotextile at the immediate outlet of the culvert (approximately 1.0m in length by 0.7m in width) that is covered by a larger layer (larger extents) of coconut matting. The coconut matting material would be placed approximately 2.0m beyond the culvert outlet and at least one culvert diameter in width beyond each side of the culvert. Coconut matting will help to limit erosion by still allowing the top vegetative tundra mat to live. Not that a thin layer of rip rap fill material is not planned to be placed on the downstream. Placement of thin lifts of fill material (less than 1.5m) should be avoided as this may lead to deepening of the active layer and increased rates of permafrost degradation at the culvert outlet. Conditions at the inlet and outlet of the culvert should be monitored to ensure permafrost conditions are stable immediately after construction. Monitoring observations at each culvert should be documented annually to allow for better tracking of performance, resulting change near the outlet, and scheduling of required maintenance if / as required.
 9. Maintenance and grading to be done at the upstream inlet of the culvert if / as required to limit the potential for ponding water; which could help to accelerate permafrost degradation / deepen the active layer.



3 Typical Safety Barrier Details
3 Not to Scale

[illegible]