



Basic Environmental Impact Analysis (BEIA)

Rogers Pass Snowshed Lighting High and Low Voltage Distribution Systems

Glacier National Park

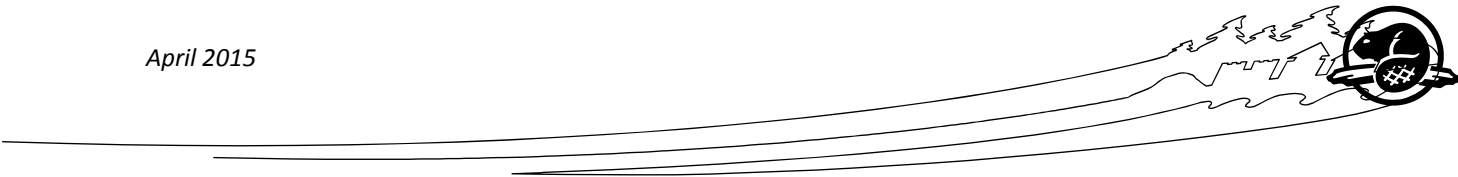
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**1. PROJECT TITLE**

Rogers Pass Snowshed Lighting – High and Low Voltage Distribution Systems

2. PROJECT LOCATION

Glacier National Park

3. PROJECT SITE(S)

The Project will occur within Glacier National Park (GNP) beginning at Rogers Pass and then eastward along the Trans-Canada Highway (TCH) eastbound shoulder for approximately 5.2 km. All work associated with the snowshed lighting upgrades is to occur immediately adjacent to the TCH east bound lane and at all five snowsheds east of Rogers Pass including Single Bench, Len's, Tupper #1, Tupper #2, and Tupper Timber.

Approximate start coordinates: 11U, 463744.63 m E; 5683479.58 m N

Approximate end coordinates: 11U, 468338.83 m E; 5686392.52 m N

4. PROPONENT

Parks Canada: Ryan Syme, P.Eng. Engineer II – Highway Service Centre

BEIA Author: Tetra Tech EBA Inc.

5. PROPONENT CONTACT INFORMATION

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6. PROJECT DATES

The Project is expected to occur over four years, beginning in 2014 as described in Section 8.

Planned commencement: 2014-06-20

Planned completion: 2017-10-31

7. INTERNAL PROJECT FILE # MRG2014-05**8. PROJECT DESCRIPTION**

Snowshed Lighting and a High and Low Voltage Distribution System will be installed from approximately the Rogers Pass Maintenance Yard intersection at the TCH to the eastern end of the Tupper Timber snowshed. The Project is being considered as safety maintenance and upgrades of the current lighting within the Rogers Pass snowsheds which currently does not exist for three of the five snowsheds. The snowsheds will be upgraded with high efficiency LED lighting thereby requiring less power than conventional lighting. No alternative improvements to TCH safety have been considered for this project.

In early 2015, an additional component to the work scope was proposed. This included the replacement of the feeder cables which are currently buried along the eastbound shoulder of the TCH from the Roger's Pass Maintenance Yard to the east end of the Single Bench snowshed. This will require the excavation and replacement of feeder cable for approximately 2.9 km along the TCH east bound shoulder (Drawings are attached).

April 2015

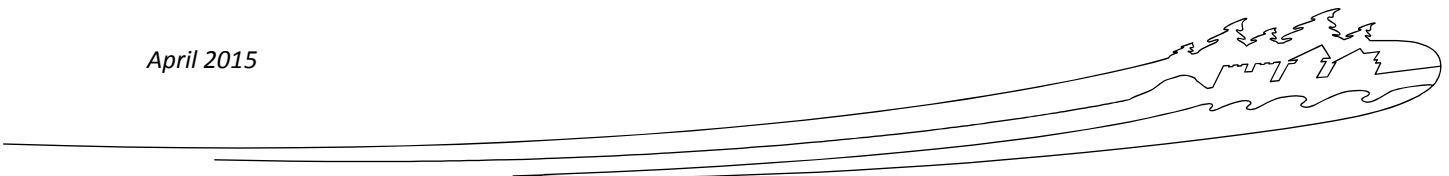




Photo 1. Approach to Single Bench snowshed.

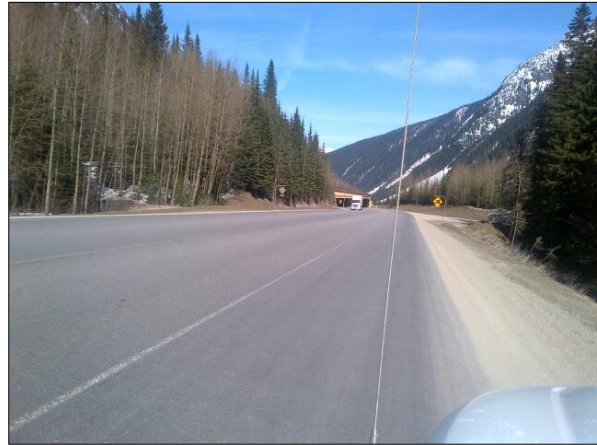


Photo 2. Approach to Len's snowshed.

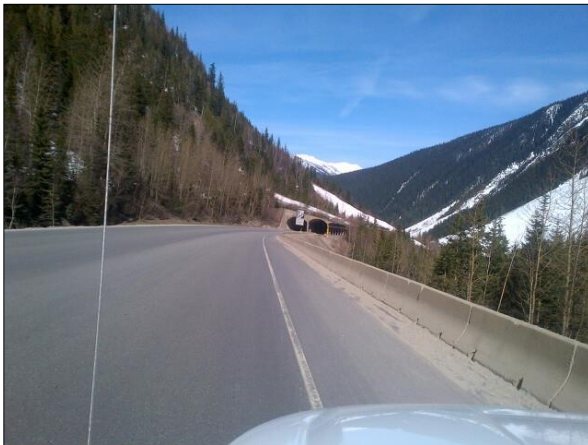


Photo 3. Approach to Tupper 1 snowshed.

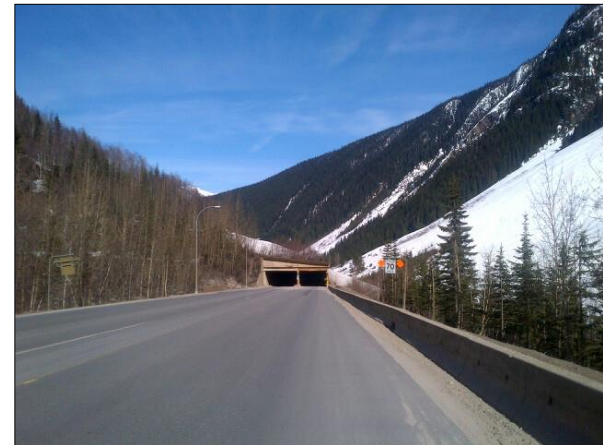


Photo 4. Approach to Tupper 2 snowshed.

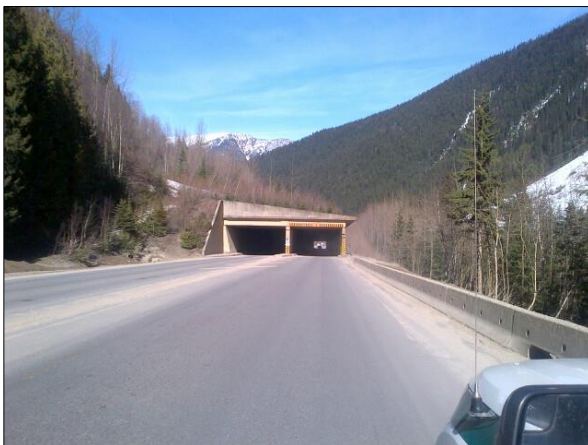
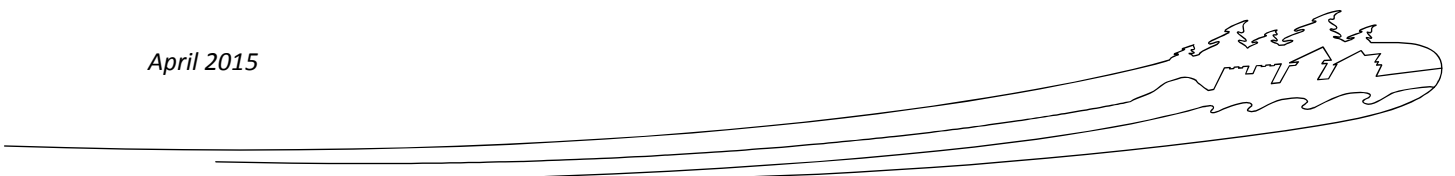


Photo 5. Approach to Tupper Timber snowshed.

All works are located within the TCH right-of-way and are therefore considered to be located within previously cleared and/or disturbed lands. Additional Photos are included in Appendix 3.

April 2015





Works are to occur over four successive years beginning in 2014. Annual work descriptions will be updated, as necessary, and will be provided to the MRG Parks EA officer prior to each field season. Any changes to the work scope and schedule as outlined below will also be amended as necessary.

Year 1, July to October 2014:

A.) Trenching

This task involves all works related to installation of high voltage distribution system. Open trenching will be required from the west portal of the Tupper No. 2 snowshed (from the new bunker building) to the east portal of the Timber Timber snowshed. Continuous open trenching will not be required from the Maintenance Yard to Tupper No. 2 snowshed because infrastructure already exists. Between the Maintenance Yard and Tupper No. 2 snowshed's west portal the electrical upgrades can tied in to existing electrical infrastructure (inserted and pulled through existing ducting) and will not require additional open excavation.

Excavation and trenching between Tupper No. 2 and Tupper Timber is to occur only within the existing right of way of the TCH, predominantly along the shoulder of the east bound TCH lane, immediately adjacent to the asphalt or behind existing concrete guardrails or snowshed columns. Please refer to attached Drawings 10 through 13 for locations of different trench types, and Drawing 15 for the four proposed trench cross-sections types (A to D). Trench types have been included on the Issued For Tender (IFT) Drawings (attached) as a visual representation of the existing ducting system and is not meant to depict total open excavation. Open excavation will only occur between Tupper No. 2 and Tupper Timber as described above.

Trench excavations will be approximately 50 cm wide by 1.2 m depth and excavated using an excavator backhoe. Total width of disturbance will vary, but will remain entirely within the TCH gravel shoulder. Trenches will then have high voltage cables systems installed and buried within sand bedding (types A, B and C) or encased within concrete over sand bedding (Type D) and backfilled with native material to surface grade with approximately 150 mm of shoulder gravel (Types A, B and C) or 150 mm of hot-mix asphalt.

Trenching was completed during 2014.

B.) Substation Bunker Building Construction

Construction of an electrical substation bunker buildings will occur at Single Bench (one building) and Tupper No. 2 (two buildings). For location and details of each substation bunker building, please refer to the set of Bunker Building Drawings attached. The Maintenance Yard substation will be a pre-fabricated bunker enclosed within security fencing. All other bunker buildings will be a concrete enclosure on a concrete foundation/floor, constructed 500 mm above a switchgear grounding layout built into a 200 mm layer of crushed rock. Concrete will be cast in place into formwork built on site during the construction of each substation. Initial construction will include drilling boreholes at each substation location (except at Maintenance Yard).

C.) Surface Mounted LED Installation

LED luminaire installation will occur at Single Bench snowshed. This work requires only surface mounting of LED's and associated wiring. No physical earthworks are to occur. Mobile elevated platforms (boom-lifts) will be required for surface mounting of luminaires inside the snowsheds.

D.) Approach Lighting

Outer approach lighting at the Single Bench snowshed will involve the installation of two LED luminaire poles at the east and west snowshed portal. Poles will be installed immediately adjacent to the westbound lane. The poles will be installed approximately 28 m from the edge of the snowshed portal, and another installed 55 m further down the TCH. All poles will be installed onto a pre-cast concrete base which will be buried approximately 1,500 mm. Associated wiring will be within a shallow trench from the snowshed wingwall. Please refer to Drawings attached to this document where lighting for each snowshed is identified by a separate drawing package.

Works will require excavation immediately adjacent to the TCH, but will remain within the TCH right of way. No clearing will occur.



**Year 2, 2015 May to October:****A.) Surface Mounted LED Installation**

LED luminaire installation will occur at Tupper 1 snowshed. This work requires only surface mounting of LED's and associated wiring. No physical earthworks are to occur. Mobile elevated platforms (boom-lifts) will be required for surface mounting of luminaires inside the snowsheds.

B.) Approach Lighting

Outer approach lighting at the Tupper 1 snowshed will involve the installation of two LED luminaire poles at the east and west snowshed portal. Poles will be installed immediately adjacent to the westbound lane. The poles will be installed approximately 28 m from the edge of the snowshed portal, and another installed 55 m further down the TCH. All poles will be installed onto a pre-cast concrete base which will be buried approximately 1,500 mm. Associated wiring will be within a shallow trench from the snowshed wingwall. Please refer to Drawings attached to this document where lighting for each snowshed is identified by a separate drawing package.

Works will require excavation immediately adjacent to the TCH, but will remain within the TCH right of way. No clearing will occur.

C.) Replacement of Feeder Cable

The existing feeder cable exists within the TCH right of way, buried along the eastbound shoulder. Work will include excavation of the eastbound shoulder outside of the paved surface. This will be required from the Roger's Pass Maintenance Yard to the Single Bench snowshed. Open trenching will be required from the Maintenance Yard to the east portal of the Single Bench snowshed. The cable follows the shoulder immediately behind (towards slope) the snowshed, terminating at the East end. All excavated soils in excess of that to be reinstated following cable installation will be disposed of outside of National Parks at a location to be determined by the Contractor.

The replacement cable will be installed within the identical alignment excavation, and will be followed by backfilling with imported material composed of road crush and sand. Please refer to Drawings attached to this document.

D.) Installation of Maintenance Yard Substation and associated works

A substation at the Maintenance Yard will be installed during 2015. The substation will be placed on top of a 400 mm bed of compacted 25 mm sub-base (Drawings attached).

Year 3, 2016:**A.) Surface Mounted LED Installation**

LED luminaire installation will occur at the Tupper Timber and Tupper 2 snowsheds during the 2016 season. This work requires only surface mounting of LED's and associated wiring. No physical earthworks are to occur. Mobile elevated platforms (boom-lifts) will be required for surface mounting of luminaires inside the snowsheds.

B.) Approach Lighting

Outer approach lighting at the Tupper Timber and Tupper 2 snowsheds will involve the installation of two LED luminaire poles at the east and west snowshed portals. Poles will be installed immediately adjacent to the westbound lane. The poles will be installed approximately 28 m from the edge of the snowshed portal, and another installed 55 m further down the TCH. All poles will be installed onto a pre-cast concrete base which will be buried approximately 1,500 mm. Associated wiring will be within a shallow trench from the snowshed wingwall. Please refer to Drawings attached to this document where lighting for each snowshed is identified by a separate drawing package.

Works will require excavation immediately adjacent to the TCH, but will remain within the TCH right of way. No clearing will occur.

Year 4, 2017:**A.) Surface Mounted LED Installation**

LED luminaire installation will occur at the Len's snowshed during the 2017 season. This work requires only surface mounting of LED's and associated wiring. No physical earthworks are to occur. Mobile





elevated platforms (boom-lifts) will be required for surface mounting of luminaires inside the snowsheds.

B.) Approach Lighting

Outer approach lighting at the Len's snowshed will involve the installation of two LED luminaire poles at the east and west snowshed portals. Poles will be installed immediately adjacent to the westbound lane. The poles will be installed approximately 28 m from the edge of the snowshed portal, and another installed 55 m further down the TCH. All poles will be installed onto a pre-cast concrete base which will be buried approximately 1,500 mm. Associated wiring will be within a shallow trench from the snowshed wingwall. Please refer to Drawings attached to this document where lighting for each snowshed is identified by a separate drawing package.

Works will require excavation immediately adjacent to the TCH, but will remain within the TCH right of way. No clearing will occur.

Most earth works will be completed during Year 1 (2014) except excavations necessary for installation of the feeder cable and the luminaire pole's concrete base. Aside from concrete and concrete wastewater, only diesel and machinery lubricants, oils and greases are expected on site.

Mobilization

Equipment will be transported to the respective sites using the most direct route (along TCH) and will be stored either at the Maintenance Yard and/or on existing hard surfaces (TCH shoulder). All containment structures, which consist of temporary sediment fencing/containment around the work areas, should specifically be installed along a contour according to manufacturer's instructions, just downslope of the eastbound lane of the TCH. This would potentially require the use of a small truck mounted crane and general labour.

All trenching works will take the TCH shoulders out of use for all traffic on the highway. East and westbound lanes will have only one lane remain open (1 + 1 each direction) through the construction periods.

Portable washrooms will be brought to site and stationed on hard surfaces at least 30 m away from any watercourse.

All equipment (large vehicles, concrete trucks, excavators, boom lifts etc.) will be operated in accordance with Best Work Practices and all will be adequately stocked with necessary spill kits. Crews on site may vary from 6 to 12 people depending on the project schedules.

To ensure the safety of the public and the crew, the following safety precautions will be employed: safety assessments, pre-work safety meetings and temporary road signs. Pre-work meetings will be held to cover all necessary safety and environmental protocol. This practice will continue throughout construction. As per the General Construction Notes, all works will comply with the Parks Canada construction contract, master municipal construction documents (MMCD) standards, BC Hydro Standards and BC Ministry of Transportation Electrical Specifications and Standards. All work will also comply with Canadian Electrical Code, local bylaws and all Parks Canada requirements for working within a National Park.

Demobilization

All waste generated by project activities will be collected and disposed of off-site. All equipment will be moved off site and the temporary signage will be taken down. Any environmental concerns that may arise from the proposed project works will be mitigated prior to the construction crew leaving site.

9. VALUED COMPONENTS LIKELY TO BE AFFECTED

Following the background review of environmental information, potential Valued Components (VCs) were identified for the Project, including biological resources (vegetation, aquatic and wildlife), visitor experiences and visual and aesthetic values. The potential VCs were assessed to determine if they are present near the TCH or snowshed locations and if they are subject to stakeholder or regulatory concern. Based on these criteria and the professional judgment of the study team, Tetra Tech EBA professionals used this information to determine the final VC selection for the purposes of the environmental impact analysis for these projects.

April 2015





Project activities that may interact with VCs are identified by investigating the various components of the projects that have potential effect pathways to the receiving environment. The potential effects pathway for these projects involves trenching via excavation and concrete construction. The project pathway was compared to the list of identified VCs and the interactions were documented for further consideration in the EIA process. The documented interactions between the projects pathways and the VCs were used to identify potential impacts. Knowledge of both the projects and VCs were used to identify potential adverse effects of the projects on the environment.

Background Information:

The Project will occur within the Selkirk Mountain Range which is part of the larger Columbia Mountain Range. The Project falls within the Engelmann Spruce – Subalpine Fir (ESSF), very wet cold subzone (ESSFvc) biogeoclimatic zone at Rogers Pass and drops down into the Interior Cedar Hemlock (ICH) wet cool (ICHwk) biogeoclimatic zone. Most of the Project occurs within the ICH zone (Figure 1). The ESSF is the uppermost forested zone in the southern 75% of BC, predominantly in steep and rugged mountainous terrain (Meidinger and Pojar 1991). This zone exists immediately above the ICH, among others. In general, this zone is cold, moist and snowy due to its continental climate, with mean annual temperatures ranging from -2°C to $+2^{\circ}\text{C}$ and can be below freezing temperatures for 5 to 7 months (Meidinger and Pojar 1991).

In southeastern BC the ICH zone occupies the lower elevations of the Columbia Mountains. The climate within the ICH is typically interior, continental, influenced by easterly moving air masses which result in cool wet winters and warm dry summers. The mean annual temperature ranges from $2 - 8.7^{\circ}\text{C}$. The wide range is the result of wide latitudinal span of the ICH (Meidinger and Pojar 1991).

The Project exists around the area of Rogers Pass, a location with extensive historic human use. The presence of contaminated soils related to rail and highway construction is therefore likely and can pose a risk to humans and the environment.

Vegetation:

Vegetation within the ESSF and ICH landscape is typically dominated by upland coniferous forests. Comparatively, the ICH has the largest diversity of tree species than any other biogeoclimatic zone in BC. Dominant climax species within the ICHwk include western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*) while hybrid white spruce (*Picea engelmannii* x *glauca*) and subalpine fir (*Abies lasiocarpa*) are also common seral species. Typical understory species include black huckleberry (*Vaccinium membranaceum*), oval-leaved blueberry (*Vaccinium ovalifolium*), devils club (*Oplopanax horridus*) and falsebox (*Paxistima myrsinites*) (Braumandl and Curran 2002). Climax tree species within the ESSFvc include: Engelmann spruce (*Picea engelmannii*), subalpine fir and mountain hemlock (*Tsuga mertensiana*) while western hemlock and western red cedar can be found at lower elevations of the variant. White flowered rhododendron (*Rhododendron albiflorum*) is a characteristic shrub of the ESSF and along with black huckleberry (*Vaccinium membranaceum*), oval-leaved blueberry and false azalea (*Menziesia ferruginea*) are common understory shrubs (Braumandl and Curran 2002). Whitebark Pine (*Pinus albicaulis*), a tree of management concern, is infrequent but not uncommon to GNP and may be found at the treeline on west-south rocky outcrops.

The BC Conservation Data Centre (CDC) iMap BC Tool and BC Species and Ecosystems Explorer and Parks Canada's Biotics Web Explorer databases were used to determine potential occurrences of vegetation species of concern at or near the Project location.

According to the CDC, numerous (57) provincially blue and red listed species are found in the regional context of the Project. Of the species identified two are listed under the *Species at Risk Act* (SARA), including; Cryptic Paw (*Nephroma occultum*) is listed as Special Concern and the Endangered Whitebark Pine (*Pinus albicaulis*). However, given the habitat preferences of these species, the probability of occurrence within habitats present within the Project Area would be considered low. Of the 57 vascular plant species of management concern with potential to occur in the regional vicinity of the Project Area, none have been historically observed in direct proximity to the Project Area (Figure 1). Given the habitat preferences for these species, it is unlikely that any would occur such that direct Project effects would be expected.

April 2015





Whitebark Pine (*Pinus albicaulis*) is an infrequent, but not uncommon tree in GNP, although predominantly at higher elevations. Whitebark Pine is a blue-listed S2S3 species in BC, which is ranked as Endangered, and designated as a Schedule 1 species under SARA, and Endangered (E) by COSEWIC. It is unlikely this species occurs at or near the bridge location. Nahanni Oak Fern (*Gymnocarpium jessoense ssp. parvulum*) is provincially blue listed S3 has been observed within alpine areas of GNP (BC CDC 2013b).

It is noted that a rare plant survey may be required at the discretion of the Mount Revelstoke-Glacier (MRG) Field Unit prior to Project works.

Wildlife:

It is reported that over 1200 species of wildlife (predominantly birds) are known or have potential to occur within GNP. The Parks Canada Biotics Web Explorer was used to determine the species present in GNP listed under SARA and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and identified a total of 13 are on Schedule 1 of the *Species At Risk Act* (SARA) (PCA 2011).

Table 1: Species in Glacier National Park listed under SARA and COSEWIC

Common Name	Scientific Name	SARA Schedule	SARA Legal Status	COSEWIC Status
Western Toad	<i>Anaxyrus boreas</i>	Schedule 1	Special Concern	-
Coeur d'Alene salamander	<i>Plethodon idahoensis</i>	Schedule 1	Special Concern	Special Concern (SC)
Common Nighthawk	<i>Chordeiles minor</i>	Schedule 1	Threatened	Threatened (T)
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Schedule 1	Threatened	Threatened (T)
Rusty Blackbird	<i>Euphagus carolinus</i>	Schedule 1	Special Concern	Special Concern (SC)
Peregrine Falcon	<i>Falco peregrinus pop. 1</i>	Schedule 1	Special Concern	Special Concern (SC)
Band-tailed Pigeon	<i>Patagioenas fasciata</i>	Schedule 1	Special Concern	Special Concern (SC)
Flammulated Owl	<i>Psiloscops flammeolus</i>	Schedule 1	Special Concern	Special Concern (SC)
Sage Thrasher	<i>Oreoscoptes montanus</i>	Schedule 1	Endangered	Endangered (E)
Yellow-breasted Chat	<i>Icteria virens pop. 1</i>	Schedule 1	Endangered	Endangered (E)
Lewis's Woodpecker	<i>Melanerpes lewis</i>	Schedule 1	Threatened	Threatened (T)
Barn Swallow	<i>Hirundo rustica</i>	-	-	Threatened (T)
Westslope Cutthroat Trout	<i>Oncorhynchus clarkii pop. 8</i>	Schedule 1	Special Concern	Special Concern (SC)
Woodland Caribou Southern Mountain Population	<i>Rangifer tarandus pop. 1</i>	Schedule 1	Threatened	Threatened (T)
Little Brown Myotis	<i>Myotis lucifungus</i>	Schedule 1	Endangered	Endangered (E)
Northern Myotis	<i>Myotis septentrionalis</i>	Schedule 1	Endangered	Endangered (E)

Of the 16 potentially occurring listed species, only three are reported to be regularly occurring within GNP. The population of caribou (*Rangifer tarandus pop. 1*), a BC red-listed species, specific to the area within which the Project occurs, is the Southern Mountain Population (SMP) part of which is the Columbia South herd (BC Conservation Data Centre, 2014). This caribou population is ranked provincially as S1 and as Threatened under Schedule 1 of the *Species at Risk Act* (SARA). The Columbia South herd ranges through both Mount Revelstoke and Glacier National Parks. According to Thomas and Gray (2002), the SMP caribou use low slopes and valley bottoms in early winter, moving to higher elevations where their diet is predominantly arboreal lichens when then snow pack deepens in mid to late winter. In spring, the caribou descend to lower elevations to access other vegetation. Pregnant caribou will migrate upwards in elevation to older forests in May through June to birth their calves. They tend to prefer isolated areas with low predator densities, such as islands in lakes, lakeshores, forests and tundra (Thomas and Gray 2002). Rutting typically takes place during the fall season (Parks Canada 2014).

The Western Toad (*Anaxyrus boreas*) is known to occur at lower elevations within GNP. The Western Toad is a blue-listed S3S4 species in BC and ranked as a species of Special Concern under SARA. This species spends a large majority of their time in terrestrial habitats including forested areas, moist shrublands, meadows and avalanche slopes. A wide variety of habitats are used by this species for breeding ranging from natural





lakes to roadside ditches (Environment Canada 2013). There is potential for this amphibian species to occur within or adjacent to the Project Area during its migration to and from breeding ponds.

The Olive-sided Flycatcher (*Contopus cooperi*) is a blue-listed S3S4B species in BC and is ranked as Threatened under SARA. Habitat for this species generally constitutes open areas with tall trees or snags for perching including forest clearings, openings near water bodies or cut-blocks. Foraging occurs from high vantage points targeting flying insects (Environment Canada 2013).

Other notable species which may exist at or near the Project location includes:

- Northern Myotis (*Myotis septentrionalis*) is blue-listed in BC. Northern Myotis hunt nocturnally and typically emerge after sunset. Habitat used to hunt includes small ponds, forest clearings and forest edges at a height of 1 to 3 meters. Winter hibernacula are generally solitary or can occur in small groups. Narrow crevices are preferred where temperatures can be as low as 1.6 °C. During the summer months the Northern Myotis typically roost in crevices behind peeling bark or cavities of decaying trees.
- Little Brown Myotis (*Myotis lucifungus*) is yellow-listed in BC. This bat species ranking is due to recent high mortalities as a result of extensive spread of the White-nose Syndrome (WNS) (Forbes, 2012). The Little Brown Myotis uses caves and hollow trees but has also adapted to human-made structure for resting and maternity sites and generally forage in forested areas near water (BC CDC 2012).
- Grizzly Bear (*Ursus arctos*) is blue-listed in BC and is known to occur within GNP. Grizzly Bear is listed as a species of Special Concern by COSEWIC. Two viable populations were identified by the CDC, the North Selkirk population and the Spillamcheen population, and may occur at or near the Project area.
- The Coeur d'Alene Salamander (*Plethodon idahoensis*) is a blue-listed species in BC and ranked as a species of Special Concern under the *Species at Risk Act* (SARA). This species lacks lungs and breathes through their skin and requires moist, shady habitat which could include: rock walls with flowing seepages or streams, waterfall splash zones, caves, streams with exposed bedrock, avalanche paths and moist talus. They are very unlikely to occur if rocky areas are devoid of moisture (Parks Canada 2014). They may inhabit streamside gravel/cobble habitat adjacent to TCH stream crossings. Based on these required habitats for the Coeur d'Alene Salamander there is low potential for them to exist adjacent to the TCH where the influence of the Project may potentially affect this species.
- The Lewis's Woodpecker (*Melanerpes lewis*) is a red-listed species in BC and is ranked as Threatened under SARA. Habitat for this species generally constitutes open areas for feeding with large snags for nesting (Environment Canada 2013).
- The Band-tailed Pigeon (*Patagioenas fasciata*) is a blue-listed species in BC and is ranked as Special Concern under SARA. Habitat for this species generally constitutes high-elevation forests near openings and edges with areas of flowering and berry-producing trees and shrubs (Environment Canada, 2013).

Numerous other wildlife species are known to inhabit GNP and are likely to occur near the Project Site. These include Moose (*Alces alces*), Canada Lynx (*Lynx canadensis*), Black Bear (*Ursus americanus*), Wolverine (*Gulo gulo*), Coyote (*Canis latrans*), deer, Elk (*Cervus elaphus*) among others. According to the Biotics WebExplorer, 31 species of mammal, two reptiles and five species of amphibians are known to occur within GNP.

Aquatics:

The Project occurs adjacent to Connaught Creek (Freshwater Atlas 20K watershed code: 300-879410-388988), which is culverted below the TCH from west to east near Rogers Pass and continues to flow eastward towards the Beaver River. Connaught Creek flows mostly eastward approximately parallel to the TCH downslope of the Project Area before passing below the TCH again approximately 425 m from the east portal of the Tupper Timber snowshed (Figure 1). Connaught Creek is separated from the TCH first by the gravel shoulder (approximately 1 to 5 m; greater at areas where highway pull-outs exist) and a narrow (generally less than 5 m) and sloping cleared area comprised only of grasses and other low vegetation within the highway right of way, then by existing native forest (See photos 1 through 5 above and in Appendix 3). In general, based on aerial photography, Connaught Creek is within 20 m from the proposed work.

Numerous tributaries to Connaught Creek are culverted from the north side to the south side of the TCH. None of these tributaries have been named according to Provincial database information. Watershed codes of the tributaries from west to east include:

April 2015





- | | | |
|----------------------------|----------------------------|----------------------------|
| ■ 300-879410-388988-652023 | ■ 300-879410-388988-428686 | ■ 300-879410-388988-355672 |
| ■ 300-879410-388988-587171 | ■ 300-879410-388988-327520 | ■ 300-879410-388988-314444 |
| ■ 300-879410-388988-571331 | ■ 300-879410-388988-488482 | ■ 300-879410-388988-298647 |
| ■ 300-879410-388988-530389 | ■ 300-879410-388988-377007 | |
| ■ 300-879410-388988-468174 | ■ 300-879410-388988-363381 | |

No fisheries information was available for Connaught Creek or any of its tributaries from provincial databases (FISS, iMap, Habitat Wizard). The Mount Revelstoke/Glacier (MRG) Field Unit provided fish inventory information (based on recent electrofishing effort), which identified fish within Connaught Creek. The MRG Field Unit's fish inventory identified numerous Bull Trout (*Salvelinus confluentus*), a Provincially blue-listed and designated Special Concern fish, near Rogers Pass approximately 200 m east of the Glacier compound (Figure 1). The reach that was inventoried via backpack electrofisher was described as having excellent habitat and had numerous important fish habitat attributes such as deep pools, coarse woody debris, undercut banks, meanders and riffles. The MRG also reported a natural waterfall barrier downstream at Bear Creek Falls, approximately 9 km downstream of the project site indicating that this was likely a local resident population of Bull Trout.

Connaught Creek is a tributary to the Beaver River, the confluence of which is approximately 3.45 km to the north-east of the end of the Project. The Beaver River is known to support Bull Trout, Rainbow Trout (*Oncorhynchus mykiss*), Mountain Whitefish (*Prosopium williamsoni*) and various sculpin species (*Cottus* spp.). While the status of these fish species is unknown within Connaught Creek (with exception of Bull Trout), their downstream presence indicates that the creeks and rivers adjacent to the TCH in and around the Project are sensitive fish habitat and subject to appropriate mitigation to ensure no harm to fish occurs per the federal *Fisheries Act*. This Project does not require review by Fisheries and Oceans Canada (DFO) as per the self-assessment criteria for Projects Near Water.

The Parks Canada Biotics WebExplorer identified one fish species of management concern present within Glacier National Park, the Westslope Cutthroat Trout (*Oncorhynchus clarkii* pop. 8). The Westslope Cutthroat Trout is listed under Schedule 1 of SARA as Special Concern and blue-listed in BC. This species is known to occur within the Illecillewaet River; however, none have been recorded within the Beaver River or Connaught Creek. Project effects are unlikely to affect this sensitive fish species subject to application of appropriate mitigation measures.

Cultural Resources:

Glacier National Park is home to Rogers Pass, a National Historic Site of Canada since 1971 to commemorate the Canadian Pacific Railway's main line construction and operation. Parks Canada constructed the Rogers Pass Discovery Centre, which opened in 1984 near the summit, and is located at the start of this Project. The proposed Project however, is not expected to affect the Rogers Pass National Historic Site, with exception of the potential for temporary disruption or restricted access to visitors while working at the summit. Only work at the Maintenance Yard (Year 1 works) which is located adjacent to the National Historic Site entrance off the TCH will affect park visitors and travellers.

Human Use:

Each of the five snowsheds are located on the Trans-Canada Highway, the main transportation route through the Park and therefore important for human use. Each snowshed will remain open to traffic during construction; however, lanes will be reduced to one in each direction.



**Valued Components:**

Valued components for which there is potential for Project related effects include:

- SARA-listed wildlife species (identified above in Section) as well as other wildlife species expected near the Project site;
- Vegetation adjacent to the TCH;
- Aquatic components – Connaught Creek and associated tributaries water quality;
- Aquatic fish species identified or potentially existing within Connaught Creek, and;
- Human Use – park visitors and travellers along the TCH will have temporary restricted access through the snowsheds and to the National Historic Site over the short-term duration during construction.

10. EFFECTS ANALYSIS

Please see the Effects Identification Matrix in Appendix 1 for further identification of Direct Project effects. No indirect effects from the Project are anticipated given that the works are of a routine nature. All proposed works will take place in or immediately adjacent to an existing transportation corridor. The environment in the transportation right-of-ways (ROW) is well understood and is considered to be previously disturbed.

Vegetation/Soils:

1. Vegetation clearing is not part of the work scope and is therefore not anticipated for the proposed Project work. All equipment laydown areas will be placed within the road alignment on existing hard surfaces and or at the Maintenance Yard. It is possible that construction activities may result in the trampling of roadside vegetation.
2. Vegetation in the immediate vicinity of the proposed project may be affected by dust accumulation resulting from dry excavated stockpiles.
3. Vegetation could be affected by an accidental spill of a harmful substance (oil, concrete, machinery lubricants, fuels, asphalt additives etc.) on site.
4. Slope stability may be negatively affected as a result of trench excavation where the TCH shoulder narrows (i.e. approaches to Tupper 1, Tupper 2 and Tupper Timber snowsheds) resulting in slope instability.
5. Soil compaction and rutting may result from machine use and material storage alongside the TCH during construction works.
6. Contaminated soils may be present or be discovered during trench excavation work and can pose a risk to humans and the environment. MRG guidelines for handling contaminated soils shall be incorporated into the Project Environmental Protection Plan (EPP).

Wildlife:

1. Local wildlife may exhibit avoidance behaviors as a result of increased noise, vibration and human presence from project activities.
2. Local wildlife may be affected by an accidental spill of a harmful substance occur on site, particularly if it occurs at one of the Connaught Creek culvert crossings.
3. Local wildlife may be attracted to garbage and wastes generated by construction activities leading to human-wildlife interactions.
4. Local wildlife may be affected by airborne dust accumulation resulting from excavation works or by windborne sediment from dry excavated stockpiles.
5. Local wildlife mortality may occur as a result of Project activities or operating vehicles and machinery.

Aquatics/Water Quality:

1. No in-stream work will occur during the Project. All works will remain immediately adjacent to the TCH.
2. Aquatic life and water quality may be negatively affected by excavation and storage of soil stockpiles, particularly if located near Connaught Creek and tributary culverts, which may result in sedimentation to fish bearing waters during rainfall events.
3. Water quality may be negatively affected if equipment or materials are accidentally dropped into a

April 2015





Connaught Creek tributary during excavation, backfilling or asphalt application or other works along the TCH.

4. Aquatic life may be negatively affected within Connaught Creek or one of its tributaries should an accidental spill of harmful material (fuel, hydraulic fluids, oils etc.) occur into a tributary crossing the TCH, or in volumes sufficient to enter Connaught Creek directly.
5. Aquatic habitat and water quality may be negatively affected by wet concrete, concrete dust or concrete leachate from uncured concrete if spilled into a creek in the Project area due to high alkaline inputs.

Cultural Resources:

1. Effects to cultural resources are not anticipated as a result of the proposed Project.

Human Use:

1. Increased traffic and delays along the TCH are likely to result from the Project, which is expected to commence in July of 2014 and occurring in subsequent years as previously described. Works are expected to occur over four to six months each year. Each snowshed will remain open during construction; however, the lanes will be reduced to one in each direction to accommodate the light installation.
2. Visitor safety may be negatively affected due to presence of construction equipment and activities along the TCH.
3. Park visitors may experience may be affected by increased noise generated by construction activities, particularly at the Rogers Pass National Historic Site.

11. MITIGATION MEASURES

Mitigation measures can be applied by adhering to operational protocol or through project design alterations adopted by the Project to reduce potential adverse effects.

11.1 Project Specific Mitigations

1. The Contractor is required to prepare an Environmental Protection Plan (EPP) in accordance with Parks Canada Environmental Procedures. The EPP shall include, but is not be limited to:
 - a. An access plan including access routes, type of equipment used for various construction phases, and lay down areas in order to prevent/minimize disturbance to vegetation and soils. Any new laydown areas will require approval from the ESO and Departmental Representative. Management of contaminated soils shall be based on the MRG National Park – Contaminated Soils Guide June 2012.
 - b. Details on how the work limits will be marked and what procedures will be employed to ensure trespass outside these limits does not occur and to ensure that the environment is not impacted or damaged by workers or construction equipment beyond the work limits.
 - c. An erosion and sediment control plan to prevent/minimize sedimentation and erosion into watercourses within or adjacent to the Project area and will outline appropriate dewatering and erosion and sediment control measures for the project, if required.
 - d. A Spill Response Plan will be prepared by the Contractor and shall detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products, to the satisfaction of the Departmental Representative and the Environmental Surveillance Officer (ESO) and in accordance with all applicable federal and provincial legislation. The Plan shall include a list of products and materials to be used or brought to the work site that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement and sand blasting agents.
 - e. An emergency response plan that outlines procedures to follow in the case of an emergency (wildlife encounter, equipment malfunction/failure, fire).
 - f. A fire prevention plan which describes the fire prevention equipment (fire extinguishers etc.) and procedures on site in the event of a fire. Should a fire occur, Jasper dispatch and the Fire Duty Officer must be notified immediately.





2. It is expected that all staff and contactors will understand and comply with all National Park regulations within the Park. All staff employed at the construction site will be required to attend an environmental briefing regarding their individual and collective responsibilities to ensure avoidable adverse environmental impact does not arise from their activities and personal choices. This information will be available on site and provided to any new workers and/or subcontractors such that subsequent environmental briefings can be presented by arrangement with the Environmental Surveillance Officer (ESO) through the Departmental Representative.
3. It is the responsibility of the Project Manager to ensure that all Project works are conducted in accordance with all applicable regulations and approvals including *Fisheries Act*, *Species at Risk Act* and *Canada National Parks Act*.
4. It is the responsibility of the proponent to obtain all necessary permits prior to the commencement of Project activities.
5. MRG will provide periodic and unscheduled visits to ensure that Project operations are conducted in accordance with all identified environmental protection measures including those described by this BEIA, the Contractor's EPP, applicable legislation and construction Best Management Practices. MRG maintains the right to halt any work that does not comply with all Project Approvals, Permits or Authorizations. Provision of an on-site environmental monitor is the responsibility of the Contractor.
6. It is the responsibility of the Project Manager to provide Parks Canada staff with advance notifications of Project activities and ensure that this information be included in local media.
7. All site staff are required to wear appropriate Personal Protective Equipment (PPE) and be trained to standards that comply with Worksafe BC.
8. Generally, personal vehicles shall be parked at least 10 m from any watercourse.
9. Firearms and pets are prohibited on site.
10. Fishing on site by Project crew is prohibited.
11. Park campgrounds will not be used for staff accommodation.
12. The Contractor assumes any risk to public safety as a result of Project activities.

11.2 Vegetation/Soils

1. At the discretion of the MRG Field Unit, a rare plant survey prior to works would confirm or deny the presence of any rare plants in the Project area.
2. All Contractor's equipment will be stored either on the road or on previously disturbed areas along the Trans-Canada Highway alignment or within the Maintenance Yard in order to avoid trampling roadside vegetation and compaction of soils.
3. Should effects to vegetation occur as a result of the proposed project activities, efforts will be made to re-vegetate the disturbed area with vegetation native to the area according to MRG planting criteria.
4. Prior to accessing the site, all construction equipment will be pressure washed or steam cleaned to prevent the transport of invasive plant parts including seeds to the work site where there is disturbed soil that may be easily invaded, particularly tire treads, wheel wells and bumper areas clear of dirt and plant debris from former work sites many of the invasive plants such as knapweeds and Sulphur Cinqufoil (*Potentilla recta*) have plant skeletons that tend to cling to the bottom of vehicles.
5. Contaminated soils have been well documented in the Rogers Pass area. When undertaking construction works near the Rogers Pass Maintenance Yard the MRG National Park – Contaminated Soils Guide shall be followed (PCA 2012). Where contaminated soils are identified, the area must be managed for human and ecological health risks. This may include collection of soil samples for laboratory analysis and delineation of the contaminated soil through consultation with contaminated sites risk management specialists. Contractors shall maintain a contingency plan to excavate and remove contaminated soils off-site to an appropriate treatment facility. Recommended actions in the event of encountered contamination include:
 - a. evaluate the type or suspected type of contamination;
 - b. attempt to determine the source of contamination;
 - c. record the location, depth and horizontal extent of the contamination;
 - d. report the contamination to Resource Conservation.





11.3 Wildlife

1. The Contractor shall be aware of sensitive wildlife windows (e.g. bird breeding) within Glacier National Park. The Nesting Bird Window is April 1 to August 31 and no vegetation removal shall occur within this period unless authorized by PCA and following a nesting bird survey. Works shall be scheduled outside sensitive wildlife periods as much as possible. Where works are required to occur within sensitive wildlife periods, care will be taken to prevent the disturbance or harm during construction activities.
2. Observations of wildlife and species at risk must be immediately reported to Parks Canada Wildlife personnel. Species groups of particular interest include: bears, amphibians, birds (especially attempting to build nests), and fish. Observations of road kills should also be reported.
3. All efforts to prevent wildlife from obtaining food, garbage or other domestic wastes shall be made by the Contractor and contract staff while undertaking work in National Parks. Such wildlife attractants shall not be stored at the work site overnight. Lunches, coolers and food products, including waste food products, shall be securely stored away from access by animals. Daily removal from the National Park and off-site disposal of food scraps, food wrappers, pop cans, domestic waste, and other potential wildlife attractants is mandatory. Existing Parks Canada waste receptacles shall not be used for disposal of such wastes without prior arrangement with Parks Canada.
4. Feeding, harassment or destruction of any wildlife is strictly prohibited. Wildlife encountered at or near project locations will be allowed to passively disperse without undue harassment. Nuisance wildlife will be immediately reported to the Parks Canada personnel and any incidents involving wildlife getting into garbage or attractants should be immediately reported.

11.4 Aquatics/Water Quality

1. No in-stream works are to occur as per the scope of this Project. Nonetheless, the Contractor shall be aware that the Kootenay Region least-risk (instream work) window for Bull Trout is June 1 to August 31; Cutthroat Trout is August 20 to October 15; Mountain Whitefish is May 1 to September 30. All terms and conditions related to the protection of fish and fish habitat must be employed even if works are conducted within the appropriate instream window per the Terms and Conditions for Changes In and About a Stream Specified by Ministry of Environment (MoE) Habitat Officers, Kootenay Region (June 2009).
2. The Contractor is responsible for ensuring that the Project avoids causing 'serious harm to fish' as per the *Fisheries Act*. While the Project does not require input from DFO, 'measures to avoid causing harm to fish and fish habitat' are to be employed as appropriate. Advice within these Measures replaces former Operational Statements produced by DFO:
 - a. Project Planning
 - i. Timing - avoid instream works as per above and schedule work to avoid wet, windy, rainy periods that may increase erosion and sedimentation;
 - ii. Containment and Spill Management - Excavation and concrete works shall occur such that sediment, concrete materials, fuels, hydraulic fluids etc. do not enter any watercourse. A response plan shall be developed by the Contractor and shall be implemented immediately in the event of a sediment release or spill of deleterious substance. Appropriately sized spill kits will be kept on site containing materials specific to the types of products and chemicals being used.
 - b. Erosion and Sediment Control - The Contractor shall develop and implement an Erosion and Sediment Control (ESC) Plan for the Project that minimizes the risk of sedimentation of a watercourse during all phases of the work. ESC measures shall be maintained until all disturbed ground has been permanently stabilized. The ESC plan should include:
 - i. The installation of effective ESC measures before starting trench, substation foundation, or light standard excavations to prevent sediment from entering a nearby waterbody.
 - ii. Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. For example construction of a settling basin or other filtration system.
 - iii. Measures for containing and stabilizing waste material (e.g., excavation spoils,





- construction waste and materials, accumulated debris) at the shoulder of the TCH to prevent entry into nearby waterbodies.
- iv. Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction.
 - v. Repairs to erosion and sediment control measures and structures if damage occurs.
 - vi. Removal of non-biodegradable erosion and sediment control materials once site is stabilized.
- c. Revegetation and stabilization – clearing of riparian vegetation will not be required as part of this Project.
3. If the work schedule requires working during high precipitation periods or high runoff periods, the area of work must be isolated and appropriate sediment and erosion controls must be installed to prevent the release of sediment laden water or any other deleterious substance. As works for the Project will involve the disturbance of soils, prevent the transport of sediment through application of appropriate erosion and sediment control mitigation guidelines as per DFO Measures.
 4. Dust generated by Project activities will be controlled as necessary by covering and/or dust control for onsite work by methods approved by the Departmental Representative.
 5. No water is to be extracted from a local stream, river or other water body within a National Park.
 6. Wet and uncured concrete is an acutely toxic substance for an aquatic environment. Extra care not to introduce these materials into the environment is required. The Contractor is to prepare a Plan which addresses concrete plant location, operation, and reclamation where required, to the satisfaction of the Departmental Representative and the ESO. This plan shall include the following concrete management elements:
 - a. Concrete mixer truck washout must be contained in an approved facility with wash products moved back to the concrete batching yard for disposal.
 - b. Rolling concrete mixers with surplus concrete in amounts less than one cubic metre of wet concrete may waste this concrete in the grade right-of-way as directed by the Departmental Representative and well away from and in areas that drain well away from watercourses. Surplus amounts in excess of one cubic metre are to be returned to the batching yard.
 - c. Water contaminated in the placing of cement and curing of concrete shall be contained and removed from the site to an approved disposal facility.
 - d. The concrete batching plant must be operated pursuant to applicable dust, air emission, and water quality control regulations.
 - e. Waste, solidified concrete from rolling concrete mixers in amounts less than 1 cubic meter and waste solidified concrete from construction pour, shall be buried in the grade within 48 hours of the pour, subject to approval and direction from the Departmental Representative.
 7. Prior to use on site, equipment will be inspected and found to be free of fluid leaks of any kind. Any detected leaks from equipment on site will be addressed immediately and absorbent pads will be used under equipment with chronic leaks. Equipment stored overnight should be stored on tarps with appropriate containment if required.
 8. The Contractor shall have a spill response and cleanup plan prepared as part of the EPP. Appropriately sized and stocked spill kits shall be on site capable of dealing with 110% of the largest potential spill. All staff must be aware of its location on site and must be trained on spill response procedures.
 9. In the event of any fluid spills or leaks exceeding 5 litres or any spill quantity to water, Parks Canada Dispatch and the ESO should be notified immediately. Any absorbent materials used in the clean-up or soils contaminated by the spill should be disposed of in the appropriate facilities.
 10. All refueling should take place on hardened, impermeable surfaces at least 30 m from any waterbody.
 11. Excavated materials shall be placed at storage sites or on the grade without spillage outside the working limits. Any material inadvertently falling outside the work limits is to be removed promptly in a manner that does not damage trees or vegetation at that location.
 12. All re-paving and asphalt work shall comply with the following:
 - a. Trucks for hauling asphalt mixture shall have tight, clean, smooth metal beds that have been sprayed with a minimum amount of fuel oil to prevent the mixture from adhering and causing waste asphalt. The vehicle covers shall be securely fastened. Excess truck box lubricants such as light oil, detergent or lime solutions shall not be allowed to contaminate





- the mix, and shall be disposed of in an environmentally acceptable manner. Truck box lubricant application shall be carried out within adequate containment (i.e. bermed).
- Asphalt plant operation must comply with all environmental pollution control regulations applicable in the plant area.
 - The Contractor shall be responsible for the purchase and the safe delivery/storage/handling of asphalt cement and emulsions to the asphalt plant site. Excess hot mix or reject asphalt shall be temporarily stored as directed by the Departmental Representative, and removed from the Park, prior to completion of the contract a later date. All costs for removal and disposal shall be the responsibility of the Contractor and no separate payment shall be made.
 - Ground asphalt material shall be removed, recycled, or properly stored at a location approved by the Departmental Representative or the ESO.
 - The Contractor shall ensure that there is enough room between the stockpiles and the asphalt plant for a loader in the event of a spill at the asphalt plant. A containment berm with an associated liner made of occlusive material (e.g. plastic of a thickness approved by the Departmental Representative) and covered with absorbent sand or clay shall be installed under the asphalt storage tank to ensure containment of 110% of the tank's capacity.
 - The Contractor may wish to protect containment/catchment areas and drip trays at the asphalt plant from rainfall since if contaminated, all of the collected water will have to be disposed of at the expense of the Contractor at an approved disposal facility.
 - Sites from which materials have been removed shall be restored to a neat and presentable condition upon the completion of the work.

11.5 Human Use/Visitor Experience

- A Traffic Management Plan will be developed and implemented by the Contractor. Informative signs will be placed strategically in locations around the project site, Information Centers and kiosks around the Park, providing information regarding the construction activities and timelines.
- To reduce noise and air pollution, construction equipment will be turned off when not in use.
- Impacts to cultural or historical resources are not anticipated. However, in the unlikely event that a cultural or historical artifact is observed during works, it will be left undisturbed and reported to Parks Canada personnel immediately.

12. CONSIDERATION OF THE NEED FOR PUBLIC PARTICIPATION & ABORIGINAL CONSULTATION

12 a) Indicate whether opportunity for public participation should be offered:

☒ No ☐ Yes

If yes, provide a simple rationale, describe the process used to involve participants and summarize comments received. Refer to results of other relevant consultations that addressed the same project (for example, in the context of management planning).

12 b) Indicate whether there is a requirement for Aboriginal Consultation:

☒ No ☐ Yes

If yes, provide a rationale including references to legal or other advice, describe the process used and summarize the outcomes.

13. EFFECT SIGNIFICANCE

Temporary Effects

Temporary effects resulting from the proposed project activities include:

- Park visitors being inconvenienced by construction activities and reduced lane capacity through the snowsheds.
- Possible avoidance behavior in local wildlife due to increased noise and human presence at the project site.
- Conversely, attraction of wildlife to site due to garbage and waste generated by the construction activities and crew.

April 2015





- Potential spills and leaks resulting from the proposed project activities and equipment.

Residual Effects

It is anticipated that, there will be no adverse residual environmental effects as a result of the proposed project activities provided all mitigation measures discussed in this report are followed. Furthermore, no significant adverse effects are anticipated for identified valued components.

14. SITE INSPECTION

Document whether a site inspection program will be required while the project is underway.

- ☒ Site inspection required
☐ Site inspection not required

If inspection is required:

- PCA will provide periodic and unscheduled site visits. Environmental monitoring and follow up reporting to be provided by the Contractor to the satisfaction of the MRG Field Unit.

15. SPECIES AT RISK MONITORING

There are not expected to be any adverse effects to species at risk prior to, during or following upgrades to the GNP snowsheds lighting, provided mitigation measures outlined are adhered to.

16. SARA NOTIFICATION

SARA listed species are not expected to be affected outside of Parks Canada Lands as a result of this Project. No notification has been made.


17. EXPERTS CONSULTED

Include Parks Canada experts. Add as many entries as necessary for the project.

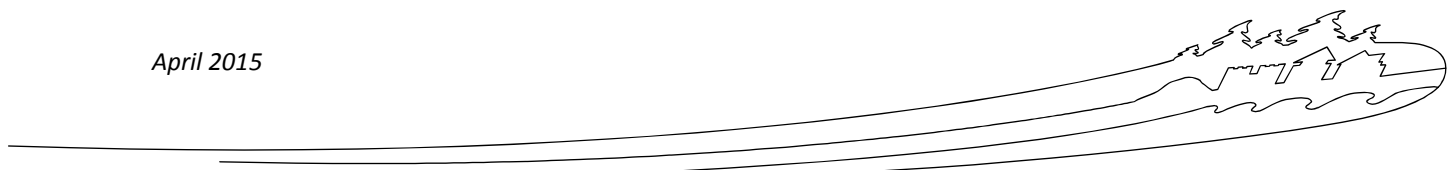
Department/Agency/Institution: Parks Canada Agency	Date of Request: 2015-04-01
Expert's Name: Danielle Backman, R.P.Bio	Title: A/Ecosystem Team Lead
Contact Information: 250-837-7511; danielle.backman@pc.gc.ca	
Expertise Requested: Requested review of BEIA for completeness and accuracy of information, based on additional scope added.	
Response: Incorporated into document where applicable.	

19. SIGNATURES


EA Author

Name: Cameron Kulak, B.Sc., Dipl.T., R.P.Bio Tetra Tech EBA Inc.	Date: 2015-04-20
Position: Aquatic Biologist	
Signature: 	

April 2015



**EA Review**

Name: David Morantz, M.Sc., R.P.Bio Tetra Tech EBA Inc.	Date: 2014-04-20
Position: Senior Aquatic Biologist	
Signature: 	

20. REFERENCE LIST

- BC Conservation Data Centre (BC CDC). 2013a. Conservation Data Centre Internet Mapping Service (iMAPBC). Victoria, British Columbia, Canada. Available: <http://webmaps.gov.bc.ca/imfx/imf.jsp?site=imapbc> (Accessed April 30, 2014).
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- Parks Canada. 2014. Glacier National Park, Species at Risk. Available: <http://www.pc.gc.ca/eng/pn-np/bc/glacier/natcul/EEP-SAR.aspx>. (Accessed April 29, 2014).
- Thomas, D.C. and D.R. Gray. 2002. COSEWIC Assessment and Update Status Report on the Woodland Caribou, *Rangifer tarandus caribou*, in Canada. Pages 1-98 in COSEWIC Committee on the Status of Endangered Wildlife in Canada. Environment Canada, Ottawa, Ontario, Canada.

21. ATTACHMENTS LIST

Figure 1 – Site Location; Tetra Tech EBA Inc.
Relevant Project Drawings for 2015; PBX Engineering
Updated copy of PCA Comments Table

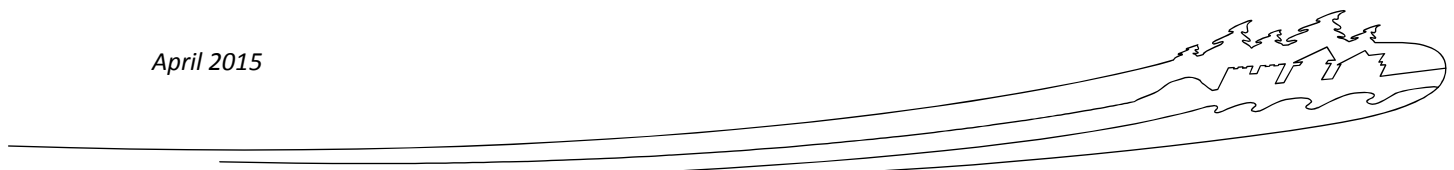
22. ADDITIONAL CONSIDERATIONS / COMMENTS

Use this space to record additional content as needed.

23. TRACKING SYSTEM

The project must be registered in the [Parks Canada Interim Tracking System](#) within the fiscal year the project took place. If the project is on hold, was cancelled, or was determined to be likely to cause significant adverse effects and did not go ahead, please indicate this information in the tracking system (see selections in the *Assessment Status/Decision* field).

April 2015

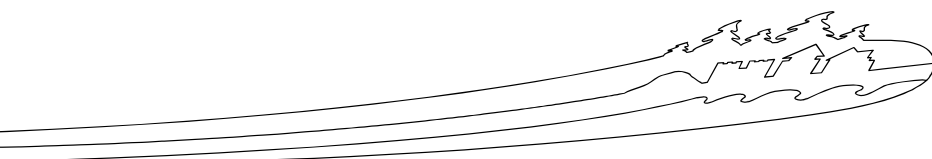




Appendix 1 Environmental Impact Analysis Tools: Effects Identification Matrix

A. Direct Effects (during preparation/construction phases)												
			Components potentially directly affected by the proposed project									
			Natural Resources					Cultural Resources	Visitor Experience			
			Air	Soil & landforms	Water (surface, ground, crossings, etc.)	Fauna (specify, including SAR)	Flora (specify, including SAR)	Rogers Pass National Historic Site	Visitor access & services	Recreational/Accomm. opportunities	Viewscapes and soundscapes	Visitor Safety
Phase	Examples of Associated Activities											
Project Components	Preparation / construction	Supply and storage of materials	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Concrete works	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Disposal of waste	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Drilling boreholes	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Trench Excavation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Backfilling trenches	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Use of machinery (excavator, transport trucks, boom-lifts, concrete trucks, asphalt trucks etc.)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Use of Chemicals (fuels, lubricants, hydraulic oils, concrete/cement, asphalt etc.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Temporary facilities (washrooms)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SAR- species at risk

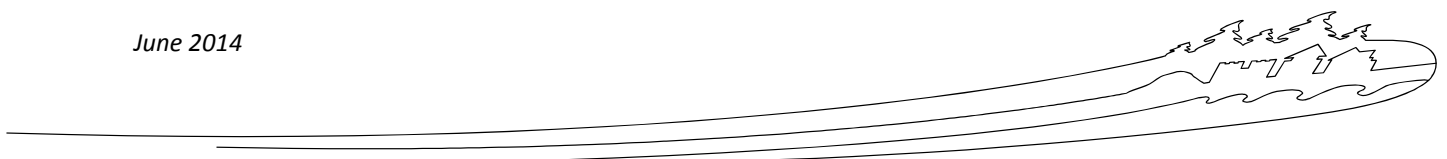




A. Direct effects continued (during operation/implementation/decommissioning phases)													
			Components potentially affected by the proposed project										
			Natural Resources					Cultural Resources	Visitor Experience				
			Air	Soil & landforms	Water (surface, ground, crossings, etc.)	Flora (specify, including SAR)	Flora (specify, including SAR)	Rogers Pass National Historic Site	Visitor access & services	Recreational & Accom. opportunities	Views/capes and soundscapes	Visitor Safety	Essence of place
	Phase	Examples of Associated Activities											
Project Components	Operation/Implementatio n/Decommissioning	Waste disposal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Maintenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Use/Removal of temporary facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Use of Chemicals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Vehicle Traffic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Other...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Operation of the snowshed lighting is not expected to cause and direct effects to the VECs identified. There will be a positive effect to visitor safety through the snowsheds with improved lighting.

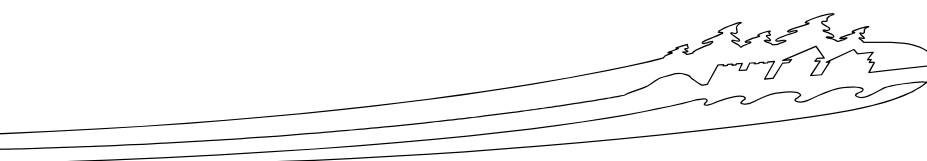
Section B- next page





- **Section B** of the matrix was reviewed to identify potential indirect effects that may result from impacts on components of the environment identified on the preceding pages. It was determined that no indirect effects are expected as a result of the Project subject to applicable mitigation measures being implemented throughout.

B. Indirect Effects (all phases)				
<p>You may wish to change the components listed under the headings to specify the natural or resources that are priority considerations for your PCA site or for the specific project being reviewed.</p>		Impacts as a result of changes to the environment		
		With respect to non-Aboriginal peoples:	With respect to Aboriginal peoples:	
		Health and socio-economic conditions	Health & socio-economic conditions	Current use of lands and resources for traditional purposes
Phase	Natural resource components affected by the project			
All phases: Preparation /construction operation/implementation/decommissioning	Could impacts to <u>air</u> lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>soils and landforms</u> lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>water</u> (e.g. surface, ground water and water crossings) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>flora</u> (including SAR) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>fauna</u> (including SAR) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Other...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>





Appendix 2: SARA-Compliant Authorization Decision Tool

(Note: Please consult a representative of the [Species Conservation and Management team](#) when completing this form)

Date:	Topic/Issue:	Species :	Where: (PCA site)	Who: (your name)

Part A – Is a SARA authorization required?

1. Will the activity directly or indirectly affect a listed endangered, threatened or extirpated species at risk, its residence or critical habitat?

Affect = kill, harm, harass, capture, or take individuals; possess, collect, buy, sell or trade individuals or parts of individuals; damage or destroy residence; destroy any part of critical habitat

☒ **No** **SARA authorization is NOT required. Provide explanation and STOP HERE.**

- No SARA listed species are anticipated to be adversely affected by this Project. The mitigation measures described above have been recommended to prevent potential effects on species at risk. Furthermore, no works are to occur outside of the TCH right of way and therefore, no SAR habitat will be affected.

☐ **Yes** **SARA authorization IS required. Describe the activity and its effects on the species and continue to Question 2.**

Note: If you are contemplating an activity that may destroy critical habitat, it must be discussed with VPs and the CEO due to a recent federal court decision. If possible, find alternatives and mitigation measures to prevent destruction of critical habitat (i.e., to avoid an effect on the critical habitat and the requirement for an authorization).

2. Is the activity already authorized in a final recovery document or required for public safety?

☐ **Yes** **SARA authorization is NOT required. Explain why the activity is exempt and STOP HERE**

☐ **No** **SARA authorization is required. Continue to Part B.**

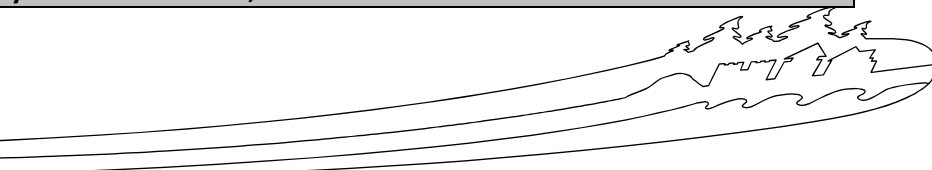
Part B – Can a SARA authorization be issued?

******Complete ONLY if you have answered Yes to Questions 1 or 2, above******

3. Does the activity fall into one of the following three categories? Check the appropriate box and continue to Question 4. If the proposed activity DOES NOT fit in any of the three categories below, the activity CANNOT be authorized and you should continue to Part C to summarize your decision.

- ☐ The activity is scientific research related to the conservation of the species and conducted by qualified persons; OR
- ☐ The activity benefits the species or is required to enhance its chance of survival in the wild ; OR
- ☐ Affecting the species is incidental to the activity (i.e., the purpose of the activity is not a prohibited activity, for example, fishing for a listed species cannot be permitted, but accidental by-catch *may* be, and repairs to a bridge that incidentally disturbs a nearby plant *may* be).

4. If you concluded that the activity can be authorized, have alternatives that would reduce the





impact(s) on the species been considered?	
<input type="checkbox"/> No	The activity CANNOT be authorized as alternatives have not been/cannot be considered. Continue to Part C to summarize your decision.
<input type="checkbox"/> Yes	<p>The activity MAY be authorized. Provide explanation and continue to Question 5.</p> <ul style="list-style-type: none"> Identify all reasonable alternatives that were considered to reduce the impact on the species (including alternatives to the project and alternative means of carrying out the project, including a “no action” alternative). The explanation must demonstrate that the best solution has been adopted.
5. Will all feasible measures be taken to minimize the impact of the activity?	
<input type="checkbox"/> No	The activity CANNOT be authorized. If it is <u>not possible</u> to implement all feasible measures, continue to Part C to summarize your decision.
<input type="checkbox"/> Yes	<p>The activity MAY be authorized.</p> <ul style="list-style-type: none"> Identify all feasible measures to avoid or lessen potential impacts of the project on the species and continue to Question 6. Measures and conclusions must be consistent with existing recovery documents, COSEWIC assessments etc. Note: If this authorization is considered as part of an EA process, the information provided should be consistent with the mitigation section of the EA.
6. Will the activity jeopardize the survival or recovery of the species?	
<input type="checkbox"/> Yes	The activity CANNOT be authorized. If the survival or recovery of the species <u>will</u> be jeopardized, continue to Part C to summarize your decision.
<input type="checkbox"/> No	<p>The activity MAY be authorized. Provide explanation and continue to Part C.</p> <ul style="list-style-type: none"> A strong justification is required to demonstrate that the activity will not jeopardize survival or recovery. The justification must demonstrate that the activity will not jeopardize the achievement of the recovery goal and objectives identified in the recovery strategy (if available). Provide a justification that the activity will not contribute to increasing an existing threat, or that it is not an activity that might destroy critical habitat for the species (if identified). Indicate whether the project will increase mortality, decrease fertility/recruitment, affect a key life stage/cycle. Make reference to known effects of similar activities based on existing literature.
Part C – Summary - Will the SARA authorization be issued?	
7. Will the SARA Authorization be issued?	
<input type="checkbox"/> No (indicate selection)	<p>The activity WILL NOT be authorized because:</p> <ol style="list-style-type: none"> The activity does not fit into one of the three required categories (see response to Question 3). Alternatives have not been considered (see response to Question 4). All feasible measures cannot be taken to minimize impacts (see response to Question 5). The activity will jeopardize the survival or recovery of the species (see response to question 6).
<input type="checkbox"/> Yes	The activity WILL be authorized, as the requirements in Part B have been met.



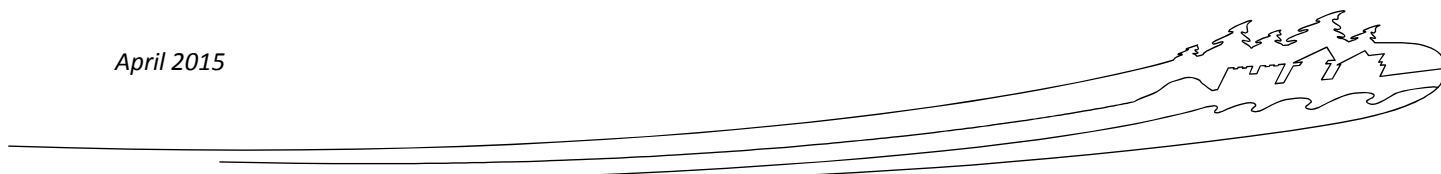


Part D - How will the SARA authorization be issued?

8. Which process will be used?

Existing PCA processes such as the EA process and the Research and Collection Permit System can be used to issue a SARA-compliant permit, as long as the SARA requirements are met.

<input type="checkbox"/> SARA permit (s.73)	<ul style="list-style-type: none">• The SARA-compliant authorization must be issued (see template on intranet).• An explanation must be posted on the SARA public registry (using the information provided above) – see template on intranet.
<input type="checkbox"/> An existing PCA process (and SARA s.74)	<ul style="list-style-type: none">• Explain which permitting process will be used (i.e. EA, research permit, etc.).• The SARA authorization cover letter must be attached to the EA or permit (see template on intranet).• An explanation must be posted on the SARA public registry (using the information provided above) – see template on intranet.





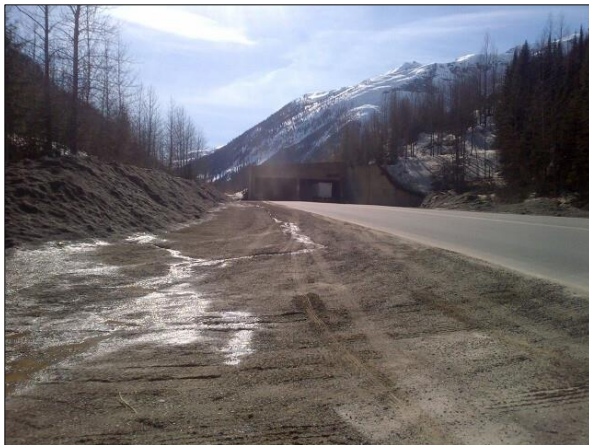
Appendix 3: Site Photos – Courtesy of McElhanney Single Bench



1. View alongside snowshed.

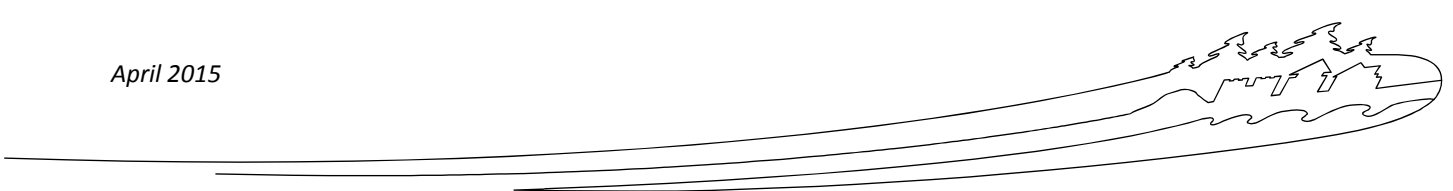


2. Wide gravelled area adjacent to snowshed entrance.



3. View of snowshed exit from wide gravel shoulder.

April 2015





Len's



1. Entrance to snowshed from TCH shoulder.

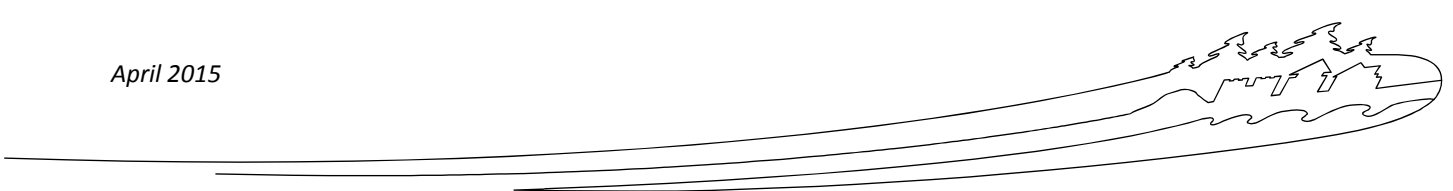


2. View alongside the snowshed.



2. View of snowshed exit.

April 2015





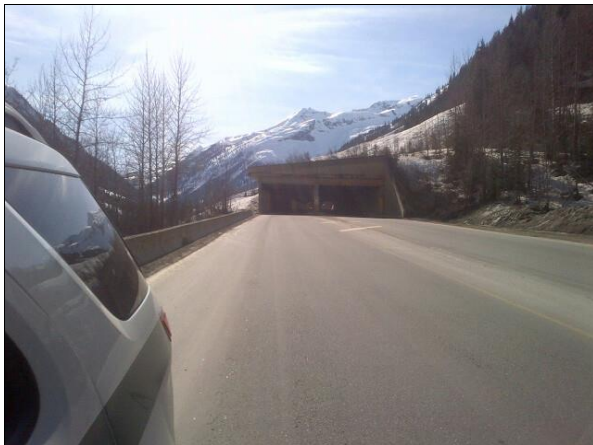
Timber 1



1. Entrance portal to snowshed.

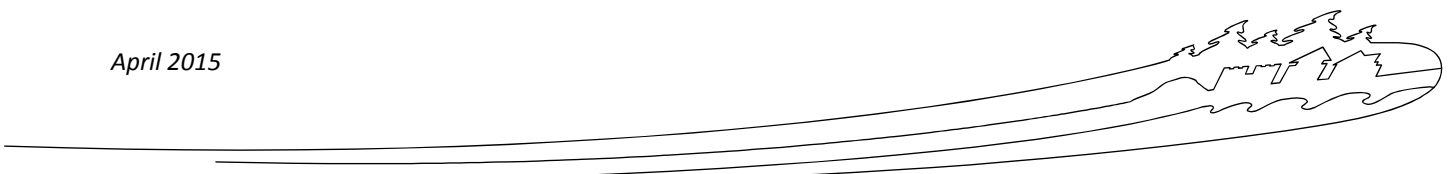


2. Entrance and view alongside snowshed.



3. View of exit from snowshed.

April 2015





Tupper 2



1. Entrance to snowshed.

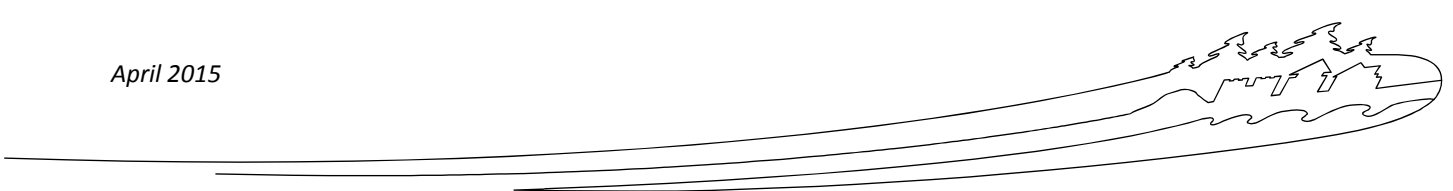


2. View alongside snowshed.



3. View back to snowshed exit.

April 2015





Tupper Timber



1. Entrance to snowshed.

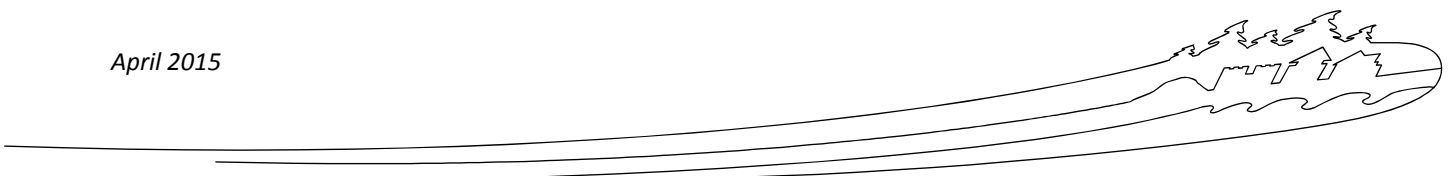


2. View alongside snowshed.



3. View back to snowshed exit.

April 2015





FEDERAL SNOWSHEDS
(SITE LOCATION)

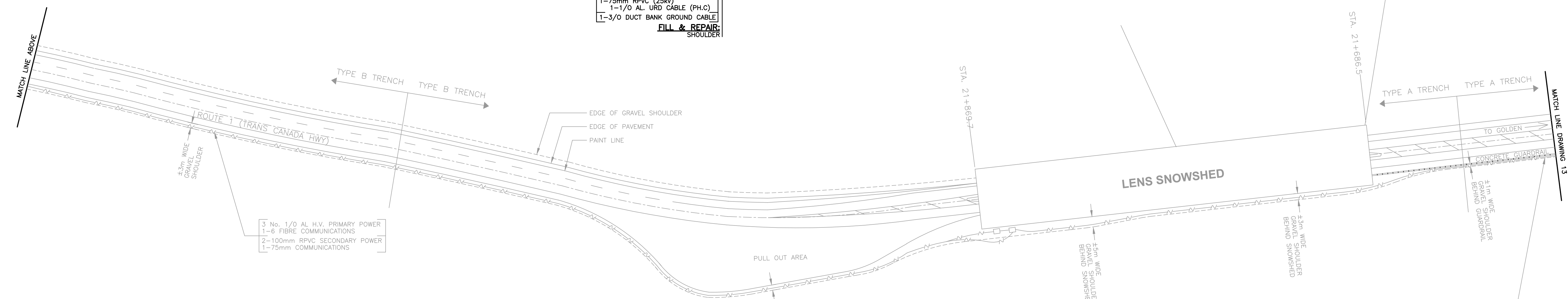


DRAWING INDEX		
DRAWING No.	REV.	DESCRIPTION
1	—	COVER SHEET, INDEX & SITE PLAN
2	—	SYMBOLS, LEGEND & ABBREVIATIONS
3	—	GENERAL NOTES
4	—	DETAILS — EXISTING POWER DISTRIBUTION SYSTEM
10	—	PLAN — STA. 26+025 TO STA. 24+611
11	—	PLAN — STA. 24+611 TO STA. 23+024
12	—	PLAN — STA. 23+024 TO STA. 21+600
13	—	PLAN — STA. 21+600 TO STA. 20+094
14	—	PLAN — STA. 20+094 TO STA. 19+406
15	—	SECTIONS — TYPICAL TRENCH
16	—	SINGLE LINE DIAGRAM — EXISTING SYSTEM — HIGH VOLTAGE
17	—	SINGLE LINE DIAGRAM — PROPOSED SYSTEM — HIGH VOLTAGE
18	—	BLOCK DIAGRAM — LIGHTING CONTROL SYSTEM
19	—	25KV SERVICE LAYOUT — MAINTENANCE YARD
20	—	SWITCHGEAR LAYOUT — MAINTENANCE YARD
21	—	SWITCHGEAR GROUNDING — MAINTENANCE YARD
30	—	SWITCHGEAR LAYOUT — SINGLE BENCH
31	—	SWITCHGEAR GROUNDING — SINGLE BENCH
32	P1	UNDERGROUND LAYOUT — SINGLE BENCH
33	—	ABOVE GROUND LAYOUT — SINGLE BENCH
36	—	SINGLE LINE DIAGRAM — LOW VOLTAGE — SINGLE BENCH
40	—	SWITCHGEAR LAYOUT — LEN'S
41	—	SWITCHGEAR GROUNDING — LEN'S
42	—	UNDERGROUND LAYOUT — LEN'S
43	—	ABOVE GROUND LAYOUT — LEN'S
46	—	SINGLE LINE DIAGRAM — LOW VOLTAGE — LEN'S
50	—	SWITCHGEAR LAYOUT — TUPPER 2 WEST
51	—	SWITCHGEAR GROUNDING — TUPPER 2 WEST
52	—	UNDERGROUND LAYOUT — TUPPER 2 WEST
53	—	ABOVE GROUND LAYOUT — TUPPER 2 WEST
56	—	SINGLE LINE DIAGRAM — LOW VOLTAGE — TUPPER 2 WEST
60	—	SWITCHGEAR LAYOUT — TUPPER 2 EAST
61	—	SWITCHGEAR GROUNDING — TUPPER 2 EAST
62	—	UNDERGROUND LAYOUT — TUPPER 2 EAST
63	—	ABOVE GROUND LAYOUT — TUPPER 2 EAST
66	—	SINGLE LINE DIAGRAM — LOW VOLTAGE — TUPPER 2 EAST



ALL EQUIPMENT IS EXISTING
UNLESS NOTED OTHERWISE

-	MAR. 20 2015	ISSUED FOR TENDER	PBX	AC	
No.	Date	Description	Drawn by Dessiné par	Approved Approuvé	
Revision / Revision					
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Linear dimensions en millimètres			Dimensions linéaires en millimètres		
Consultant's Stamp Sceau de l'expert-conseil			Eng. Stamp Sceau de l'ingénieur		
Client/client					
		Parks Canada Agence Western and Northern Region	L'Agence Parcs Canada Ouest et Nord Région		
Consultant's Name Nom de l'expert-conseil					
		PBX ENGINEERING Ltd. Suite 200 - 2615 Bridge St. Victoria BC, V8T 4S9 Tel 250.388.7222 Suite 300 - 131 Water St. Vancouver BC, V6B 4M3 Tel 604.408.7222 www.pbxing.com			
Project title/Titre du projet					
ROGERS PASS SNOWSHED LIGHTING					
TRANS CANADA HIGHWAY THROUGH ROGERS PASS					
GLACIER NATIONAL PARK					
Drawing Title/Titre du dessin					
HIGH AND LOW VOLTAGE DISTRIBUTION SYSTEMS					
COVER SHEET, INDEX & SITE PLAN					
Surveyed by/Arpenté par		Drawn by/Dessiné par		Date	
		PBX		2014-01-17	
Designed by/Concept par		Reviewed by/Revisé par		Scale/Echelle	
AC		PB		AS NOTED	
Client Acceptance/Acceptation du client			Approved by/Approuvé par		
PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE Date			A & E SERVICES/GÉNIE ET ARCHITECTURE Date		
Project No./No du projet		Asset No./N° du bien		Sheet No./ N°de la feuille	
201422				1	
Drawing Reference No./No de référence du dessin					
G2002R1					



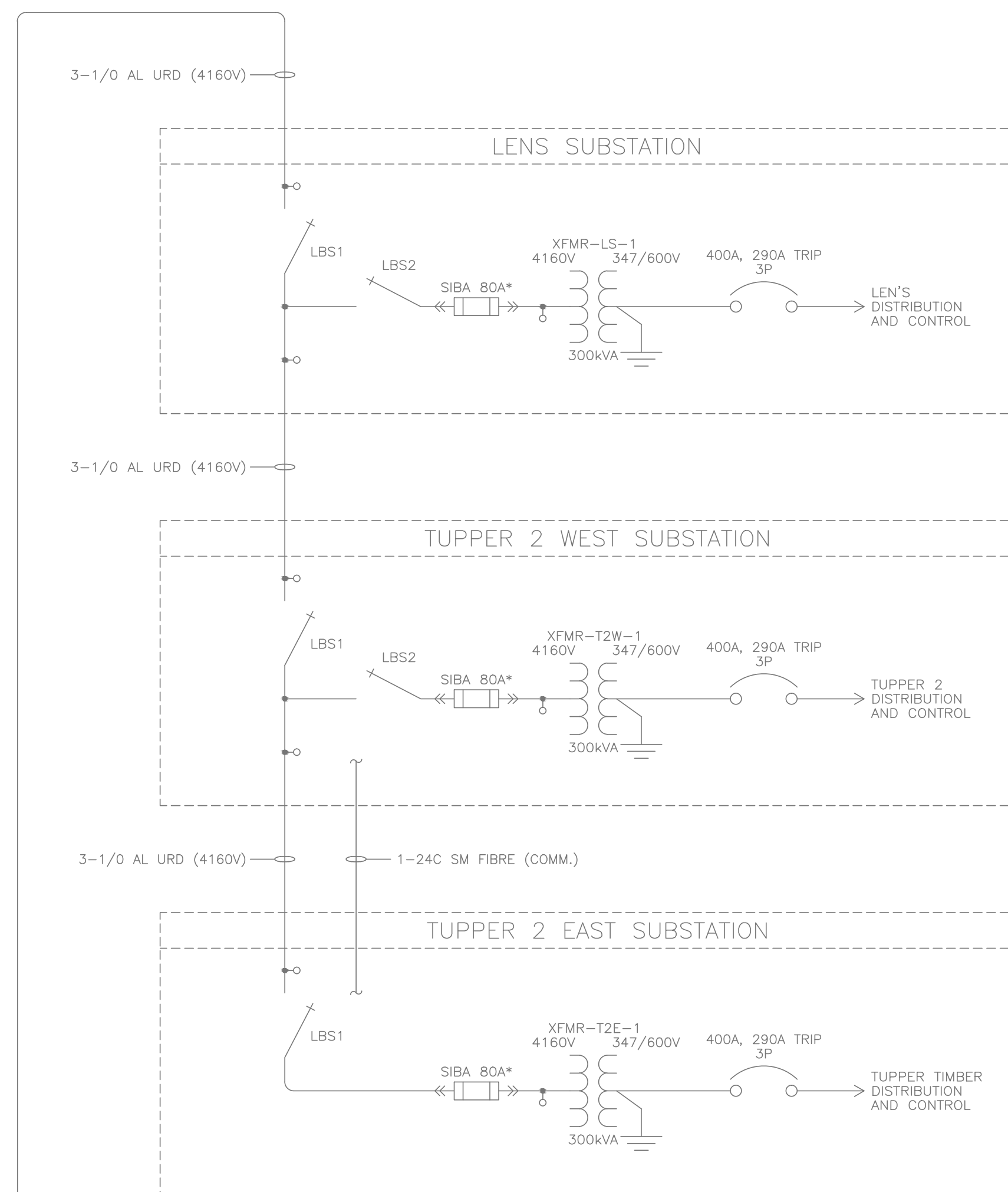
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1-6	FIBRE COMMUNICATIONS
2-100mm	RPVC SECONDARY POWER
1-75mm	COMMUNICATIONS

EXCAVATE & REMOVE:
CABLES AND EXCESS MATERIAL
INSTALL & GROUND:
JB11-TYPE 832
COIL:
ADDITIONAL 10m OF F.O.
AND 25kv 1/O AL. URD
CABLE INSIDE JB
FILL & REPAIR:
SHOULDER

PLAN
1:1000

PLAN
1:1000

ALL EQUIPMENT IS EXISTING
UNLESS NOTED OTHERWISE



ALL EQUIPMENT IS EXISTING
UNLESS NOTED OTHERWISE



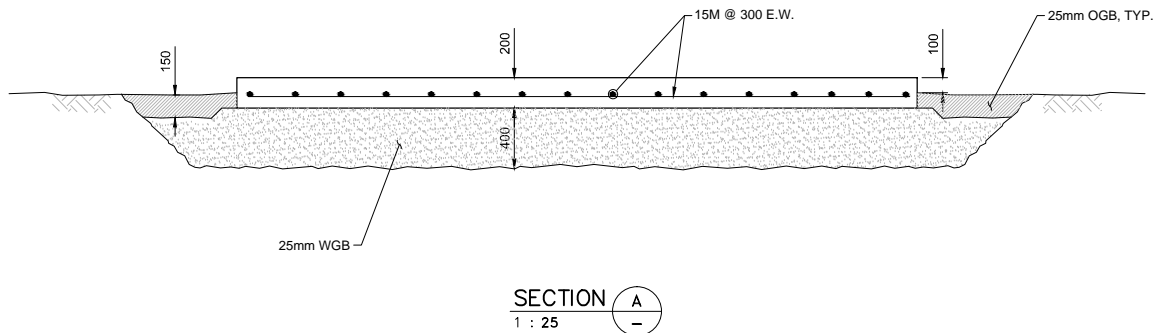
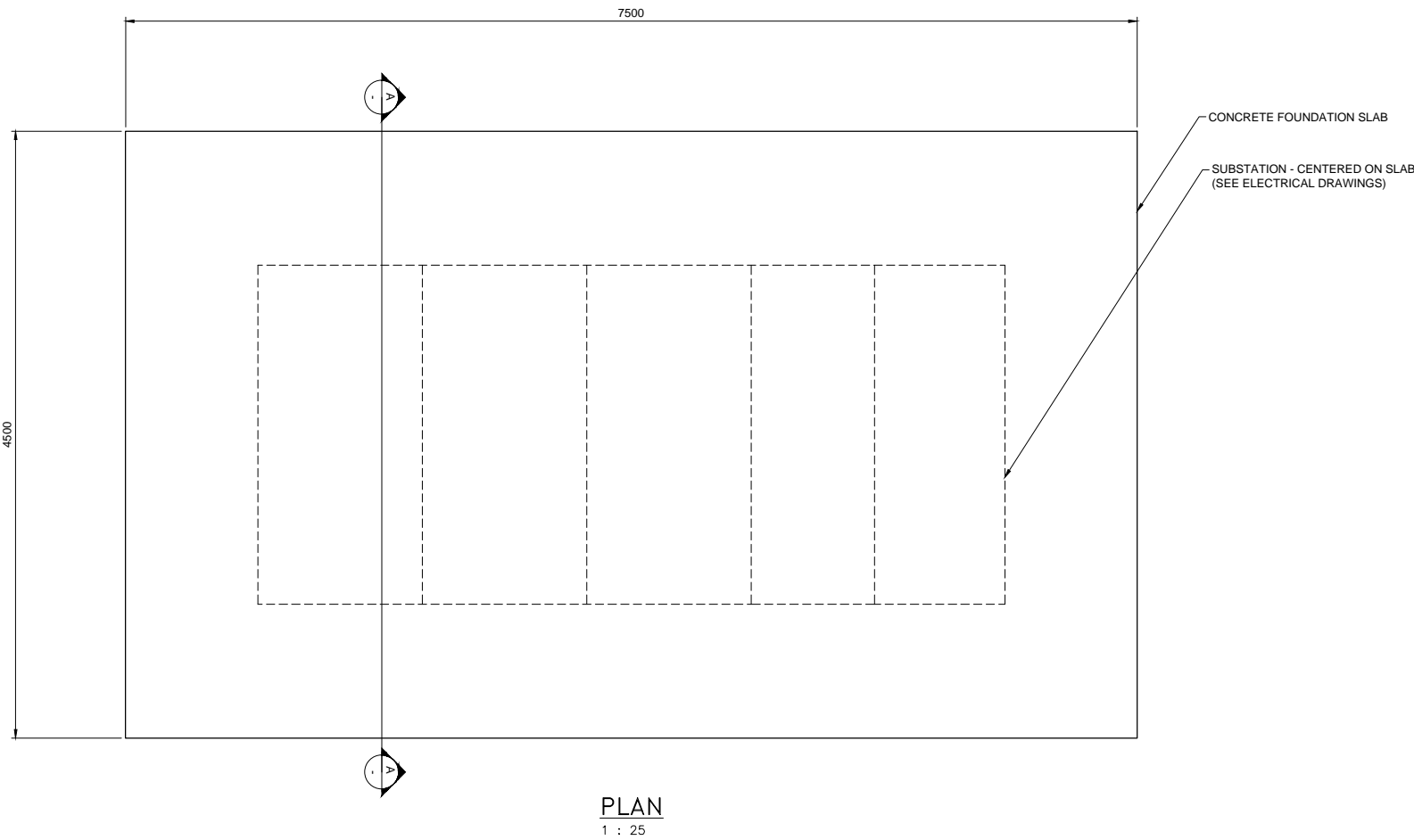
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P:\13230_Snowshed Lighting - Glacier National Park\01 - Design\Drawings\ACAD\Primary Powerline Construction\25KV FEEDER UPGRADES\32; 20/03/2015 1:02 PM: MICHAEL.TALADJAR

Plotted: March 09, 2015, 10:57:49
Filename: N:\Proj\2511-00485-00 Snowshed Burken\10.0 DRAWINGS\10.5 Structural\10.5.2 Sheet\00485-STRC-004.dwg\$04



NOTES:

1. CONCRETE SHALL BE IN ACCORDANCE WITH CSA A23.1/2, CLASS C2 AND 32 MPa AT 28 DAYS.
2. REINFORCING STEEL COVER SHALL BE 50mm AND 75mm FOR CONCRETE CAST AGAINST GROUND.
3. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 20mm.
4. REINFORCING STEEL SHALL BE REGULAR UNCOATED STEEL, GRADE 400R AND IN ACCORDANCE WITH CSA G30.18.
5. THE SUB-BASE SHALL BE UNDISTURBED AND COMPETENT MATERIAL APPROVED BY THE MINISTRY REPRESENTATIVE.
6. GRANULAR BASE SHALL BE COMPACTED TO MINIMUM 95% SPD IN ACCORDANCE WITH ASTM D698.
7. ALL DIMENSIONS ARE IN mm UNLESS NOTED OTHERWISE.

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B	03-09-15	ISSUED FOR TENDER	MC	MF
A	02-24-15	ISSUED FOR REVIEW	KDW	MF

No.	Date/Date	Description/Description	Drawn by Dessiné par	Approved Approuvé
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Revision / Revision				
A		detail number numéro de détail		
B		source drawing no. de dessin no.		
C		detail on drawing no. détail sur dessin no.		

Consultant's Stamp Sceau de l'expert-conseil	Eng. Stamp Sceau de l'ingénieur
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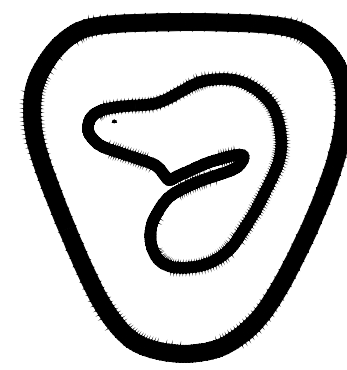
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Parks Canada Agency Western and Northern Region	L'Agence Parcs Canada Ouest et Nord Région

Consultant's Name Nom de l'expert-conseil
McElhanney

Project Title/Titre du projet
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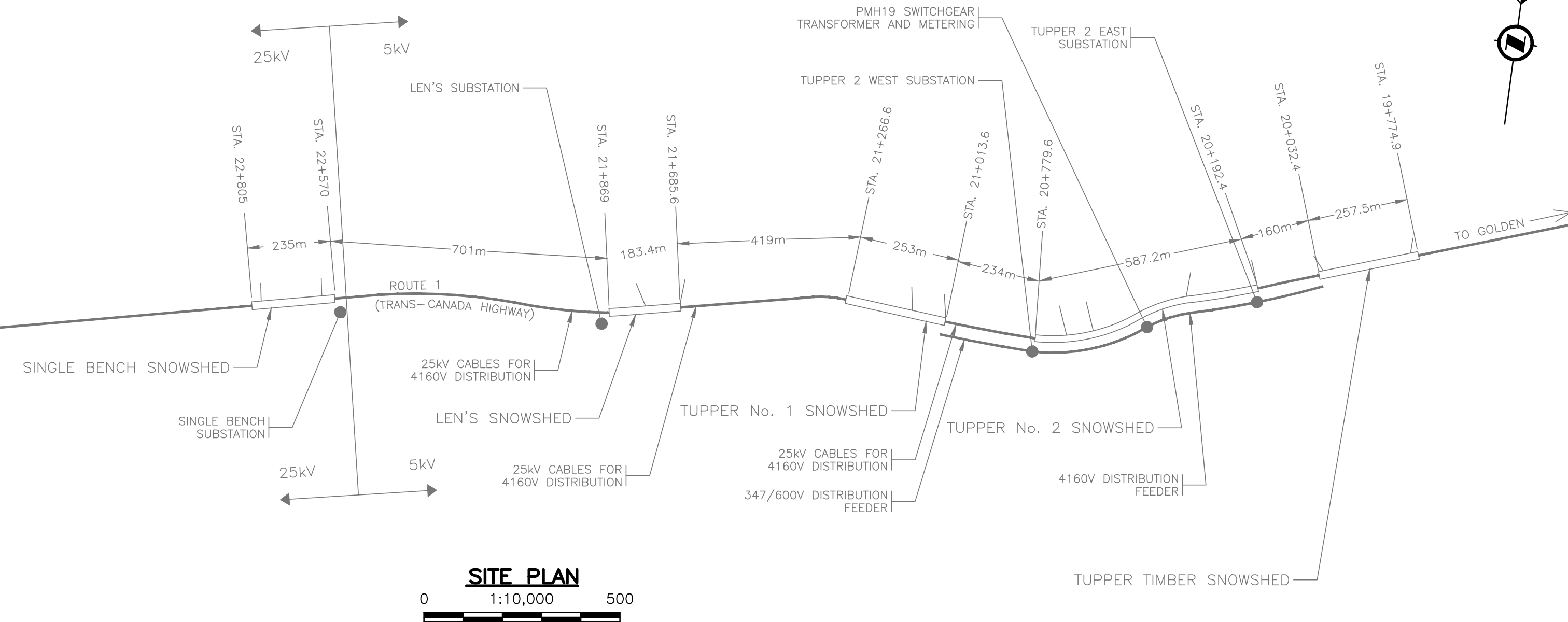
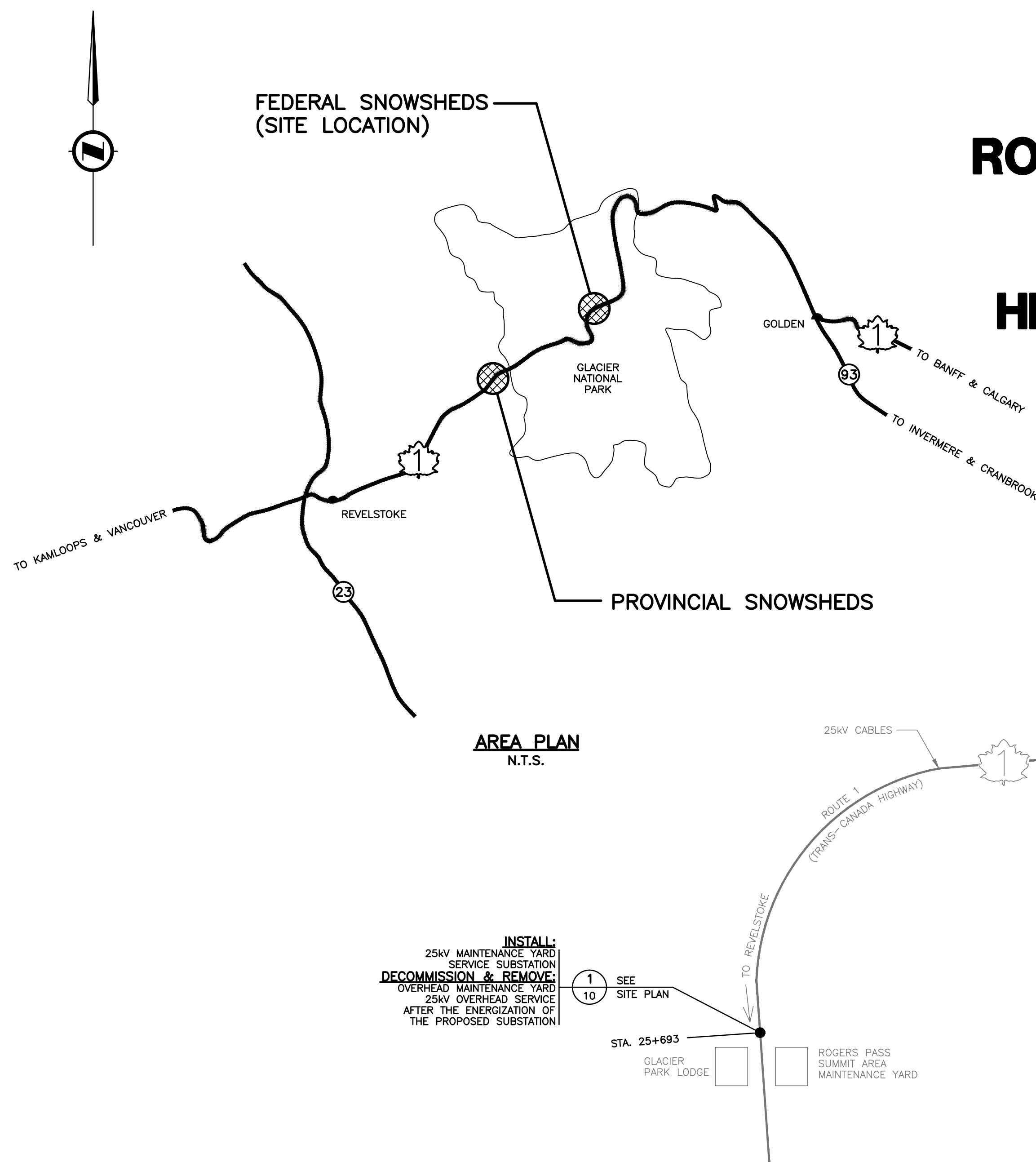
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SUBSTATION FOUNDATION SLAB

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Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle
MF	NJ	AS NOTED
Parks Canada Project Manager/Administrateur de Projets Parcs Canada		
Client Acceptance/Acceptation du client		Approved by/Approuvé par
Parks Canada Responsible Officer/Agent Responsable Parcs Canada		Parks Canada Project Manager/Administrateur de Projets Parcs Canada
Project No./No. du projet	Asset No./No. du bien	Sheet No./ No. de la feuille
201422		S01
Drawing Reference No./No. de référence du dessin		
G2002R1		



PARKS CANADA
GLACIER NATIONAL PARK

ROUTE 1 (TRANS-CANADA HIGHWAY) THROUGH ROGERS PASS
ROGERS PASS SNOWSHED LIGHTING
HIGH AND LOW VOLTAGE DISTRIBUTION SYSTEMS - YEAR 2
MAINTENANCE YARD SERVICE SUBSTATION
PROJECT No. 201422



DRAWING INDEX

DRAWING No.	REV.	DESCRIPTION
1	-	COVER SHEET, INDEX & SITE PLAN
2	-	SYMBOL, LEGEND & ABBREVIATIONS
3	-	GENERAL NOTES
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11	-	PLAN - STA. 24+611 TO STA. 23+024
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63	-	ABOVE GROUND LAYOUT - TUPPER 2 EAST
66	-	SINGLE LINE DIAGRAM - LOW VOLTAGE - TUPPER 2 EAST

REFERENCE DRAWINGS

DRAWING No.
G2001R6-1 TO G2001R6-7
G2002R1-1 TO G2002R1-21
A.C. DANDY AS BUILTS ESK#9 TO ESK#22

DRAWINGS NOT INCLUDED IN
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No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
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Linear dimensions In millimetres		Dimensions linéaires en millimètres		
Consultant's Stamp Sceau de l'expert-conseil		Eng. Stamp Sceau de l'ingénieur		
Client/client				
Parks Canada Agence Western and Northern Region				
L'Agence Parcs Canada Ouest et Nord Région				
Consultant's Name Nom de l'expert-conseil				
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Project title/Titre du projet				
ROGERS PASS SNOWSHED LIGHTING				
TRANS CANADA HIGHWAY THROUGH ROGERS PASS				
GLACIER NATIONAL PARK				
Drawing title/Titre du dessin				
HIGH AND LOW VOLTAGE DISTRIBUTION SYSTEMS				
COVER SHEET, INDEX & SITE PLAN				
Surveyed by/Arpenté par	Drawn by/Dessiné par	Date		
	PBX	2014-01-17		
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Project No./No du projet		Asset No./N° du bien	Sheet No./N° de la feuille	
201422			1	
Drawing Reference No./No de référence du dessin		G2002R1		

CONSTRUCTION NOTES:

GENERAL REQUIREMENTS:

1. PARKS CANADA CONSTRUCTION CONTRACT, MASTER MUNICIPAL CONSTRUCTION DOCUMENTS (MMCD) STANDARDS, BC HYDRO STANDARDS AND BC MINISTRY OF TRANSPORTATION ELECTRICAL SPECIFICATIONS AND STANDARDS APPLY TO THIS PROJECT UNLESS NOTED OTHERWISE.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE. ALL CONCRETE BASES AND JB SYMBOLS ARE NOT TO SCALE.
3. ALL WORK SHALL COMPLY WITH CANADIAN ELECTRICAL CODE, LOCAL BYLAWS AND THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LOCATE EXISTING UNDERGROUND UTILITIES PRIOR TO EXCAVATING.
5. ALL INSTALLATIONS SHALL CONFORM TO CSA C22.1-02 INCLUDING BC ELECTRICAL SAFETY BRANCH AMENDMENTS, ALL UNDERGROUND CONDUITS SHALL BE RIGID PVC CONDUIT, COMPLYING CSA C22.2 No. 211.2 (NOTED AS "RPVC" ON THE DRAWINGS).
6. ALL MANUFACTURER AND CSA LABELS SHALL BE VISIBLE AND LEGIBLE AFTER THE EQUIPMENT IS INSTALLED.
7. ALL EQUIPMENT AND MATERIAL SHALL BE CSA CERTIFIED FOR INSTALLATION IN BC.
8. NO WORK SHALL INTERFERE WITH OTHER CONSTRUCTION ACTIVITIES IN THE AREA.
9. ALL WORK INCLUDING SHUTDOWNS/POWER OUTAGES SHALL BE COORDINATED AND SCHEDULED WITH PARKS CANADA.
10. LOCK-OUT PROCEDURES SHALL APPLY FOR ALL HOT EQUIPMENT/WIRING THAT REQUIRE DISCONNECTION. CONTRACTOR SHALL COORDINATE ALL LOCK-OUTS WITH PARKS CANADA.
11. OBTAIN AN ELECTRICAL PERMIT FROM THE PROVINCIAL ELECTRICAL SAFETY BRANCH PRIOR TO COMMENCEMENT OF ANY WORK. PAY ASSOCIATED FEES.
12. NOTIFY CONSULTANT OF CHANGES REQUIRED BY ELECTRICAL INSPECTION DEPARTMENT PRIOR TO MAKING CHANGES.
13. SUPPLY COPIES OF ALL INSPECTION REPORTS TO THE ENGINEER WITHIN 24 HOURS OF INSPECTION.
14. FURNISH CERTIFICATES OF ACCEPTANCE FROM ELECTRICAL INSPECTION DEPARTMENT ON COMPLETION OF WORK TO ENGINEER.
15. INTERPRET THE USE OF THE WORDS "REMOVE AND ABANDON" SHOWN ON THE DRAWINGS AS "REMOVE THE CONDUCTORS AND ABANDON THE EXISTING DUCT" OR "ABANDON EXISTING CABLE".
16. UNUSED EXCAVATED MATERIAL AND ABANDONED EQUIPMENT SHALL BE DISPOSED OF AT THE CONTRACTORS EXPENSE.
17. INSTALLATION FOR ALL EQUIPMENT SHALL INCLUDE ALL NECESSARY CONNECTORS, TERMINATIONS, FASTENERS AND BONDING REQUIRED TO CREATE A FULLY FUNCTIONAL SYSTEM.
18. ALL CONDUCTORS SHALL BE STRANDED COPPER, RW90 XLPE INSULATED UNLESS NOTED OTHERWISE.
19. ALL GROUNDING AND BONDING SHALL COMPLY WITH THE CANADIAN ELECTRICAL CODE.
20. ALL CONDUCTORS SHALL BE IDENTIFIED IN ALL JUNCTION BOXES, CABINETS OR OTHER ACCESS POINTS. IDENTIFY WIRING WITH PERMANENT INDELEIBLE IDENTIFYING MARKINGS, EITHER NUMBERED AND/OR COLOURED PLASTIC TAPES ON BOTH ENDS OF THE PHASE CONDUCTORS OR FEEDERS AND BRANCH CIRCUIT WIRING, PRINTED USING A THERMAL HEAT TRANSFER SYSTEM.
21. IDENTIFY GROUPS OF CONDUCTORS OR CABLES IN ENCLOSURES AND PANELS USING BRADY #B-109 (TY-WRAP STYLE MULTIPURPOSE IDENTIFICATION TAG) OR APPROVED EQUAL.
22. MAINTAIN PHASE SEQUENCE AND COLOUR CODING THROUGHOUT.
23. ALL EMPTY CONDUITS SHALL BE CAPPED.
24. ALL CONDUITS SHALL DRAIN TO JUNCTION BOX.
25. INDIVIDUAL CONDUITS SHALL ENTER AND EXIT CONCRETE VAULTS AND JUNCTION BOXES IN THE SAME POSITION AT EACH LOCATION FOR EASE OF IDENTIFICATION AND CONTINUITY.
26. SPACING BETWEEN POWER AND OTHER CONDUITS FOR LONGITUDINAL RUNS SHALL BE 300mm (UNLESS CONCRETE ENCASED), THE SPACING MAY BE REDUCED TO 50mm AT CROSSEOVER POINTS WHERE THE CONDUITS ENTER AND EXIT JUNCTION BOXES AND PULL PITS.
27. CONCRETE JUNCTION BOXES SHALL REST ON 300mm DEEP LAYER OF 19mm CLEAR DRAIN ROCK.
28. THE CONTRACTOR SHALL NOT USE ANY FACTORY BENDS IN CONDUIT RUNS, EXCEPT WHERE SHOWN ON THE DRAWINGS OR APPROVED BY THE PROJECT ENGINEER IN THE FIELD. WHERE FACTORY 90 DEGREE BENDS ARE APPROVED THE RADIUS SHALL BE GREATER THAN 900mm.
29. ALL CONDUITS SHALL BE VERIFIED AND CLEANED USING THE FOLLOWING PROCEDURES:
 - TO VERIFY INTEGRITY OF CONDUIT, PULL THROUGH EACH CONDUIT DUCT A HARD RUBBER MANDREL, NOT LESS THAN 300mm LONG AND OF A DIAMETER 6mm LESS THAN THE INTERNAL DIAMETER OF THE DUCT, PRECEDED BY A SWAB OF SUITABLE DAMETER TO REMOVE SAND, EARTH AND OTHER FOREIGN MATERIALS.
 - NOTIFY PROJECT ENGINEER IN THE EVENT OF CONDUIT FAILURE.
 - CLEAN DUCTS BEFORE LAYING. CAP BOTH ENDS DURING CONSTRUCTION AND AFTER INSTALLATION TO PREVENT ENTRANCE OF FOREIGN MATERIALS.
 - INSTALL PULL LINE.
 - TERMINATE CONDUIT ENDS IN THE JUNCTION BOX.
 - CLEAN AND VACUUM JUNCTION BOXES.
30. ALL PLUGS, TERMINATOR KITS, RPVC CONDUITS AND PULL LINES MUST BE PRE-APPROVED PRODUCTS. REFER TO Mgt APPROVED SUPPLIER AND PRODUCT LISTS.
31. ALL EQUIPMENT LOCATIONS SHALL BE LAID OUT BY CONTRACTOR AND REVIEWED BY THE ENGINEER PRIOR TO INSTALLATION.
32. THE CONTRACTOR SHALL SUPPLY AND INSTALL ALL NECESSARY RIGID PVC BENDS, COUPLINGS, REDUCERS, BELL END FITTINGS, PLUGS, CAPS AND ADAPTORS OF THE SAME PRODUCT MATERIAL AS THE CONDUIT TO ENSURE A COMPLETE INSTALLATION.
33. FOR CABLE INSTALLATION IN DUCTS, THE CONTRACTOR SHALL USE THE FOLLOWING PROCEDURES:
 - INSTALL CABLES AS INDICATED IN DUCTS.
 - DO NOT PULL SPLICED CABLES IN DUCTS.
 - INSTALL MULTIPLE CABLES IN DUCT SIMULTANEOUSLY.
 - USE CSA APPROVED LUBRICANTS OF TYPE COMPATIBLE WITH CABLE JACKET TO REDUCE PULLING TENSION.
 - AFTER INSTALLATION OF CABLES, SEAL DUCT ENDS WITH DUCT SEALING COMPOUND.
34. FOR LOW VOLTAGE CABLE SPLICING:
 - REMOVE INSULATION CAREFULLY FROM ENDS OF CONDUCTORS.
 - CONNECTOR SPLICES SHALL BE SECURED WITH SOLDERLESS TWIST-ON (MARRETTE) TYPE CONNECTORS.
 - WHERE THE NUMBER AND/OR SIZE OF CONDUCTORS EXCEED THE CAPACITY OF THE TWIST-ON CONNECTOR, SPLIT-BOLT TYPE CONNECTORS SHALL BE USED.
 - ALL WIRING SHALL BE NEATLY BUNDLED AND LABELED IN ALL JUNCTION BOXES, VAULTS, HAND HOLES, CONTROL BOXES, DEVICE BOXES AND PANELS.
35. SEALING OF LOW VOLTAGE CONNECTIONS SHALL BE PERFORMED USING DOUBLE DIPPING METHOD, SUCH AS "3M SCOTCHKOTE" OR APPROVED EQUAL.
36. TESTING:
 - PERFORM TESTS USING QUALIFIED PERSONNEL, PROVIDE NECESSARY INSTRUMENTS AND EQUIPMENT.
 - FOR FEEDERS SUPPLYING MOTORS, CHECK PHASE ROTATION AND IDENTIFY EACH PHASE CONDUCTOR OF EACH FEEDER.
 - AFTER INSTALLING CABLE BUT BEFORE SPLICING AND TERMINATING PERFORM INSULATION RESISTANCE TEST WITH 1000V MEGGER ON EACH PHASE CONDUCTOR.
37. HIPOT ALL THE HIGH VOLTAGE CABLES AFTER INSULATION/SPLICING. PROVIDE TEST REPORTS TO THE ENGINEER.
38. ALL THE EQUIPMENT SHALL BE SUPPLIED AND INSTALLED UNLESS NOTED OTHERWISE.
39. THE CONTRACTOR SHALL NOT DISTURB OR DESTROY EXISTING PLANTS, BUSHES, TREES AND ROOTS WHEN INSTALLING THE EQUIPMENT UNLESS APPROVED BY THE PARKS CANADA.
40. ALL OVERHEAD WORK SHALL COMPLY WITH THE BC HYDRO OVERHEAD ELECTRICAL DISTRIBUTION STANDARDS ES43 UNLESS NOTED OTHERWISE.
41. ALL UNDERGROUND WORK SHALL COMPLY WITH THE BC HYDRO UNDERGROUND ELECTRICAL DISTRIBUTION STANDARDS ES53 UNLESS NOTED OTHERWISE.
42. ALL SURFACES SHALL BE REPAIRED AND RETURNED TO THE ORIGINAL CONDITION OR BETTER AFTER THE INSTALLATION OF THE UNDERGROUND EQUIPMENT AND CABLES.
43. HIGH VOLTAGE CABLES SHALL BE STRANDED COPPER 25kV WITH 100% XLP INSULATION AND CONCENTRIC NEUTRAL. CABLES SHALL BE SINGLE CONDUCTOR TYPE RATED FOR DUCT AND DIRECT BURIED INSTALLATION.
44. HIGH VOLTAGE EQUIPMENT STANDARDS SHALL BE TO BC HYDRO DISTRIBUTION STANDARDS AND REQUIREMENTS FOR CUSTOMER OWNED PRIMARY SERVICES SUPPLIED AT 4kV TO 35kV, PRIMARY GUIDE, LATEST EDITION. MINIMUM RATING SHALL BE AS FOLLOWS:
 - 25kV
 - 125kV BIL
 - 500MVA SYMMETRICAL
 - 11,500A SYMMETRICAL RMS, AND 20,000A ASYMMETRICAL RMS

LAWS, RULES, ORDINANCES AND INSPECTION:

1. THE ENTIRE ELECTRICAL INSTALLATION SHALL COMPLY WITH THE LATEST ADOPTED REVISION OF PART 1 OF THE CANADIAN ELECTRICAL CODE, CURRENT EDITION "SAFETY STANDARD FOR ELECTRICAL INSTALLATION" AND THE B.C. PROVINCIAL AMENDMENTS TO THIS CODE AND WITH NATIONAL BUILDING CODE, ALL LOCAL BYLAWS, RULES, AND ORDINANCES APPLICABLE TO THIS INSTALLATION.
2. OBTAIN ALL NECESSARY PERMITS AND PAY ALL PERMIT FEES.
3. UPON COMPLETION, PRESENT TO THE ENGINEER A CERTIFICATE OF APPROVAL FOR ALL ELECTRICAL WORK FROM THE ELECTRICAL INSPECTION DEPARTMENT HAVING JURISDICTION.

SITE INSPECTION:

1. EXAMINE THE SITE AND THE LOCAL CONDITIONS AFFECTING THE WORK UNDER THIS CONTRACT. NO CLAIM SHALL BE CONSIDERED LATER DUE TO UNSATISFACTORY REVIEW OF EXISTING SITE CONDITIONS. CO-ORDINATE ALL SERVICES.

RESPONSIBILITY:

1. SUPPLY AND INSTALLATION OF THE EQUIPMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONNECTION OF ALL EQUIPMENT MENTIONED IN THE DRAWINGS. COORDINATE WITH AND OBTAIN APPROVAL, FOR THE SCHEDULING OF THE ABOVE WORK.
2. CUTTING, PATCHING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
3. ON COMPLETION OF THE WORK, THE ELECTRICAL CONTRACTOR SHALL CLEAN ALL EXPOSED SURFACES OF LIGHTING FIXTURES, LAMPS, PANEL BOARDS AND OTHER ELECTRICAL EQUIPMENT, OF DUST, PLASTER, PAINT (ETC).

TYPE AND QUALITY OF MATERIAL:

1. EQUIPMENT AND MATERIALS SHALL BE NEW AND BEAR THE APPROVAL OF C.S.A. OR EQUIVALENT ULC TAGS.

OPERATION AND MAINTENANCE MANUALS:

1. WHERE WORK PERFORMED INCLUDES THE SUPPLY AND INSTALLATION OF ELECTRICAL EQUIPMENT OR CONTROLS, TWO IN-SERVICE DEMONSTRATIONS FOR EACH SYSTEM SHALL BE CONDUCTED FOR THE OWNER'S MAINTENANCE PERSONNEL; FIVE (5) COPIES OF THE COMPLETE MANUALS DETAILING THE PROPER MAINTENANCE AND OPERATION OF THE EQUIPMENT AND SYSTEMS SHALL BE PROVIDED PRIOR TO THE START OF THE IN-SERVICE DEMONSTRATION.
2. INCLUDE ALL THE INFORMATION NEEDED TO OPERATE AND MAINTAIN ALL SYSTEMS AND EQUIPMENT PROVIDED IN THE PROJECT. IT SHALL BE PRESENTED AND ARRANGED IN A LOGICAL MANNER FOR EFFICIENT USE BY THE OWNER'S OPERATING PERSONNEL. THE INFORMATION PROVIDED SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING:
 1. EQUIPMENT MANUFACTURER, MAKE, MODEL NUMBER, SIZE, NAMEPLATE DATA, ETC.
 2. COMPLETE PARTS LIST INCLUDING REORDERING INFORMATION, RECOMMENDED SPARES AND ANTICIPATED USEFUL LIFE (IF APPROPRIATE).
 3. APPROVED SHOP DRAWINGS.
 4. AS-BUILT DRAWINGS.
 5. NAMES AND ADDRESSES OF LOCAL SUPPLIERS FOR ITEMS INCLUDED IN MAINTENANCE MANUAL.
 6. GUARANTEES AND WARRANTIES.
 7. ALL APPLICABLE TEST REPORTS AND MANUFACTURERS' LETTERS VERIFYING TEST COMPLETION.
 8. A COPY OF FINAL CERTIFICATES FROM ELECTRICAL INSPECTION DEPARTMENT, FIRE DEPARTMENT, AND OTHER AUTHORITIES HAVING JURISDICTION OVER THE WORK.
 9. ALL SCHEDULES INCLUDED IN THE ELECTRICAL SPECIFICATION SHALL BE UPDATED TO REFLECT ALL CHANGES MADE DURING TENDER AND CONSTRUCTION PERIODS.

GUARANTEE:

1. THE ELECTRICAL CONTRACTOR SHALL GUARANTEE THE SATISFACTORY INSTALLATION OF ALL WORK AND APPARATUS AND REPLACE, AT NO ADDITIONAL COST TO THE OWNER, ANY PART WHICH MAY FAIL OR PROVE DEFECTIVE WITHIN A PERIOD OF TWELVE CALENDAR MONTHS AFTER THE FINAL ACCEPTANCE OF THE COMPLETE PROJECT.

EQUIPMENT GROUNDING:

1. CONDUCTOR SHALL BE XLPE INSULATED GREEN ANNEALED COPPER WIRE RW90 (MIN. SIZE #12 AWG).
2. EACH BRANCH CIRCUIT SHALL BE PROVIDED WITH A DEDICATED NEUTRAL AND EQUIPOTENTIAL GROUND CONDUCTOR.

SEISMIC RESTRAINTS:

1. PROVIDE CERTIFIED PROFESSIONALLY SEALED SHOP AND PLACEMENT DRAWINGS FOR ALL ELECTRICAL EQUIPMENT, INCLUDING RUNS OF CONDUIT/CABLE RACKS SHOWING THE METHODS OF ATTACHMENT TO THE PARTICULAR STRUCTURE FOR EACH PIECE OF EQUIPMENT AND ASSEMBLY AND PROVIDE ANCHORAGE/ATTACHMENT DETAILS APPROVED AND SEALED BY A B.C. REGISTERED PROFESSIONAL ENGINEER FOR REVIEW BY THE CONSULTANT. SUBMIT SAMPLES OF MATERIALS REQUIRED TO COMPLETE THE SEISMIC RESTRAINT WORK FOR REVIEW IF AND WHEN REQUIRED. THE PROFESSIONAL ENGINEER SHALL DESIGN, INSPECT AND PROVIDE TYPED WRITTEN INSPECTION REPORTS TO THE CONSULTANT THROUGHOUT CONSTRUCTION AND TO PROVIDE ALL REQUIRED "LETTERS OF ASSURANCE AND CONFORMANCE" WITH THE SPECIFIED CODES, STANDARDS AND BYLAWS. SEISMICALLY RESTRAIN THE FOLLOWING:
 1. LIGHT FIXTURES.
 2. CONDUIT BANKS WITHIN CEILING SPACE.
 3. ELECTRICAL DISTRIBUTION EQUIPMENT.
 4. MISC. ELECTRICAL DEVICES.

LABELING:

1. LABEL ALL EQUIPMENT, CABLES, CONDUCTORS, PORTS, AND TERMINALS INCLUDING DEVICE NAME, DEVICE LOCATION, SOURCE, AND DESTINATION AS APPLICABLE.
2. CABLES AND CONDUCTORS SHALL BE LABELED AS FOLLOWS:
 - SECURELY FASTEN LABEL TAG TO THE CABLE USING THE WRAPS OR EQUIVALENT FASTENING METHOD.
 - ALL ENDS OF WIRE SEGMENTS AND ALL ACCESS POINTS BETWEEN SOURCE AND DESTINATION SHALL BE LABELED.
 - BUNDLE TOGETHER AND LABEL CABLES AT TERMINATION POINTS.
3. EQUIPMENT AND ENCLOSURES SHALL BE LABELED AS FOLLOWS:
 - LABEL EQUIPMENT ENCLOSURES USING LAMICOID STYLE LABEL IN THE FRONT FACE OF EACH ENCLOSURE USE 10mm HIGH BLACK CHARACTERS ON WHITE BACKGROUND.
 - LABEL ALL OTHER EQUIPMENT AND TERMINALS USING SELF LAMINATING VINYL STYLE LABELS. USE 8mm HIGH BLACK CHARACTERS ON WHITE BACKGROUND.
4. WIRING IDENTIFICATION:
 - USE COLOUR CODED WIRES IN COMMUNICATION CABLES, MATCHED THROUGHOUT SYSTEM.
5. WIRING TERMINATIONS:
 - TERMINATE ALL CABLES AND WIRING AS PER MANUFACTURER SPECIFICATIONS.

COORDINATION:

1. CONTRACTOR SHALL COORDINATE ALL WORK AS REQUIRED WITH BC HYDRO FOR BC HYDRO SERVICE.
2. CONTRACTOR SHALL COORDINATE AND OBTAIN ALL PERMITS AS REQUIRED FOR THE WORK AT THE SUBSTATION.

TESTING:

PRE-TESTING DOCUMENTATION:

1. THE CONTRACTOR SHALL SUBMIT AN OUTLINE OF PROPOSED TEST PROCEDURES TO THE ENGINEER FOR REVIEW AT LEAST 14 DAYS PRIOR TO THE START OF TESTS. PRINTED FORMS AND TAGGING SHALL BE IDENTIFIED AND SUBMITTED WITH THE PROPOSED TEST PROCEDURES OUTLINE FOR REVIEW.
2. THE ENGINEER SHALL BE ADVISED IN WRITING ONE WEEK IN ADVANCE OF ALL TESTS.
3. ALL TESTS SHALL BE PERFORMED IN THE PRESENCE OF THE ENGINEER AT THE ENGINEERS DISCRETION, AND A RECORD OF ALL TESTS SHALL BE MADE BY THE CONTRACTOR. ALL TESTING DOCUMENTATION SHALL BE SIGNED BY THE CONTRACTOR.
4. WHERE APPLICABLE, THE MANUFACTURER'S INSTALLATION AND TESTING MANUALS (OR EQUIVALENT DOCUMENTATION) SHALL BE CONSULTED BY THE CONTRACTOR FOR RECOMMENDED FIELD TESTS. THESE FIELD TESTS SHALL, WHERE APPLICABLE, BE INCORPORATED IN THE CONTRACTOR'S PROPOSED TEST PROCEDURES SUBMITTAL TO THE ENGINEER.

POST-TESTING DOCUMENTATION:

1. SUBMIT TO THE ENGINEER THE RESULTS OF ALL EQUIPMENT TESTING.
2. PROVIDE EVIDENCE (AS A MINIMUM) OF TESTING OF THE OPERATION AND CORRECT INSTALLATION OF THE FOLLOWING EQUIPMENT AND WIRING TO BE INSTALLED IN THE FIELD CHECKLISTS:
 - 2.1 SECURITY SYSTEM
 - 2.2 DISTRIBUTION SYSTEM INCLUDING (BUT NOT LIMITED TO):
 - 2.2.1 DISTRIBUTION PANELS
 - 2.2.2 TRANSFORMERS
 - 2.2.3 SWITCHGEAR
 - 2.2.4 GENERATOR
 - 2.2.5 LOAD BANK
 - 2.3 FIRE PROTECTION SYSTEM
 - 2.4 GENERAL ELECTRICAL AND LIGHTING SYSTEMS
 - 2.5 SUBMIT A SIGNED LETTER INDICATING THAT ALL CABLES WERE TESTED AND PASSED THE TESTS.

TEST PROCEDURES:

- 2.3. THE CONTRACTOR SHALL VISUALLY INSPECT ALL EQUIPMENT FOR DEFECTS IMMEDIATELY UPON RECEIPT AT THE WORK SITE, INCLUDING ITEMS PROVIDED BY OTHERS.
24. ALL EQUIPMENT CABLING/WIRING SHALL BE TESTED FOR CORRECT FUNCTIONING WITH REGARDS TO SAFETY, INSULATION RESISTANCE, GROUNDING CONTINUITY AND GENERAL OPERATION.
25. ALL EQUIPMENT SHALL BE TESTED FOR PROPER AND SECURE CONNECTIONS, AND CONFORMANCE TO EQUIPMENT NAMEPLATE DETAILS AND THE DRAWINGS AND SPECIFICATIONS.
26. BEFORE ENERGIZING ANY PORTION OF THE ELECTRICAL SYSTEMS, MEGGER TESTS SHALL BE PERFORMED ON ALL FEEDERS AND BRANCH CIRCUITS AND HI-POT TEST SHALL BE PERFORMED ON ALL HIGH VOLTAGE FEEDERS. EXERCISE CARE NOT MEGGERING LOW VOLTAGE CABLES (SIGNALS, VIDEO, ETC.) TEST REPORTS SHALL BE PROVIDED TO ENGINEER FOR REVIEW. HI-POT OLDER HIGH VOLTAGE CABLES IN COMPLIANCE WITH NETA TESTING STANDARDS.

27. VOLTAGE CHECKS SHALL BE PERFORMED THROUGHOUT THE WORK WITH ALL LOADS ENERGIZED AND IF REQUIRED TRANSFORMER TAP SETTINGS (INCLUDING EXISTING TRANSFORMER) SHALL BE ADJUSTED. READINGS TAKEN AT THIS TIME SHALL BE LOGGED AND TABULATED AND ANY TRANSFORMER TAP ADJUSTMENTS SHALL BE LOGGED.

28. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ARRANGING ALL INSPECTIONS AND TESTS REQUIRED BY MUNICIPAL OR OTHER AUTHORITIES HAVING JURISDICTION OVER THE WORK AND FOR OBTAINING ALL NECESSARY PERMITS. COPIES OF ALL INSPECTION AND TEST RESULTS UNDERTAKEN BY THE REPRESENTATIVES OF SUCH AUTHORITIES SHALL BE PASSED TO THE ENGINEER.

CORRECTIONS:

1. ALL FAULTS AND DEFECTS IN ANY ELECTRICAL EQUIPMENT AND SYSTEMS COMPLETED UNDER THE CONTRACT, SHALL BE CORRECTED WITHOUT ADDED EXPENSE TO THE OWNER AND PRIOR TO SUBSTANTIAL PERFORMANCE.

EXISTING FIBRE OPTIC CABLE:

1. THE EXISTING FIBRE OPTIC CABLE IS FOR FUTURE USE. CONTRACTOR SHALL EXPOSE, PROTECT AND MARK THE LOCATION OF THE EXISTING FIBRE OPTIC CABLE IN THE CONSTRUCTION ZONES.

—	MAR. 17 2015	ISSUED FOR TENDER	PBX	AC
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No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
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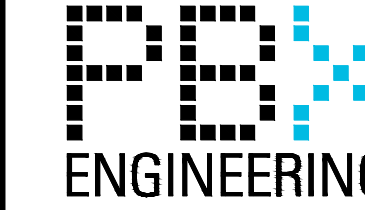
Revision / Révision

<div><div>A</div><div>B</div></div>	Detail number Sheet number	A Numéro de détail B Numéro de la feuille
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Linear dimensions In millimètres	Dimensions linéaires en millimètres
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Consultant's Stamp Sceau de l'expert-conseil	Eng. Stamp Sceau de l'ingénieur
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Client/client	<div><div> Parks Canada Agency Western and Northern Region</div><div>L'Agence Parcs Canada Ouest et Nord Région</div></div>
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Consultant's Name Nom de l'expert-conseil	<div><div> PBX ENGINEERING</div><div>PBX ENGINEERING Ltd. Suite 200 - 2612 Bridge St. Victoria BC, V8T 4S9 Tel 250.388.7222 Suite 300 - 131 Water St. Vancouver BC, V6B 4M3 Tel 604.408.7222 www.pbxeng.com</div></div>
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Project title/Titre du projet	ROGERS PASS SNOWSHED LIGHTING
	TRANS CANADA HIGHWAY THROUGH ROGERS PASS
	GLACIER NATIONAL PARK

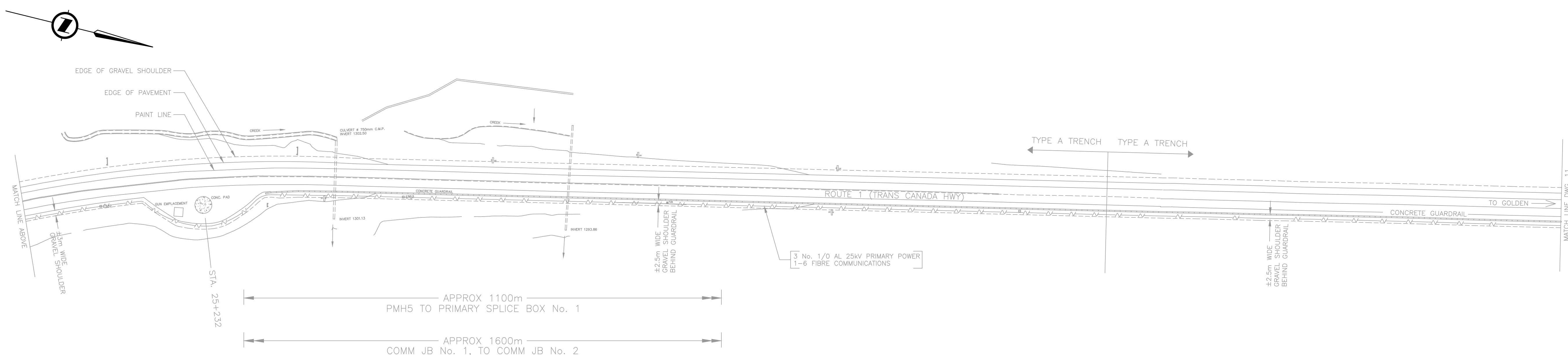
Drawing title/Titre du dessin

HIGH AND LOW VOLTAGE DISTRIBUTION SYSTEMS	
GENERAL NOTES	

Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
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201422			
Drawing Reference No./No de référence du dessin			3
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ISSUED FOR TENDER
NOT FOR CONSTRUCTION

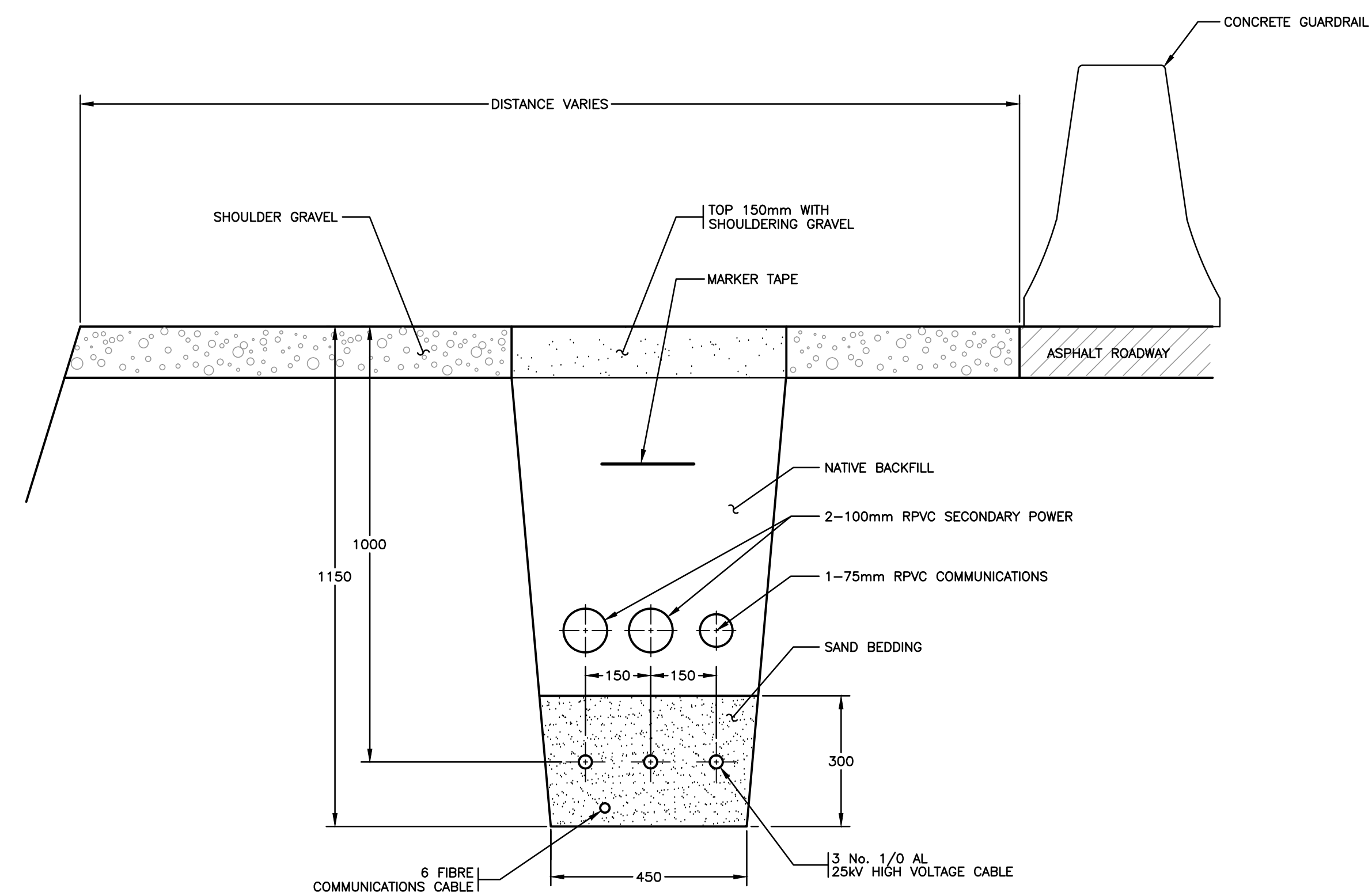


PLAN
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1. REFER TO DWG. 16 AND 17 FOR THE EXISTING AND PROPOSED 25KV SERVICE SINGLE LINE DIAGRAMS.

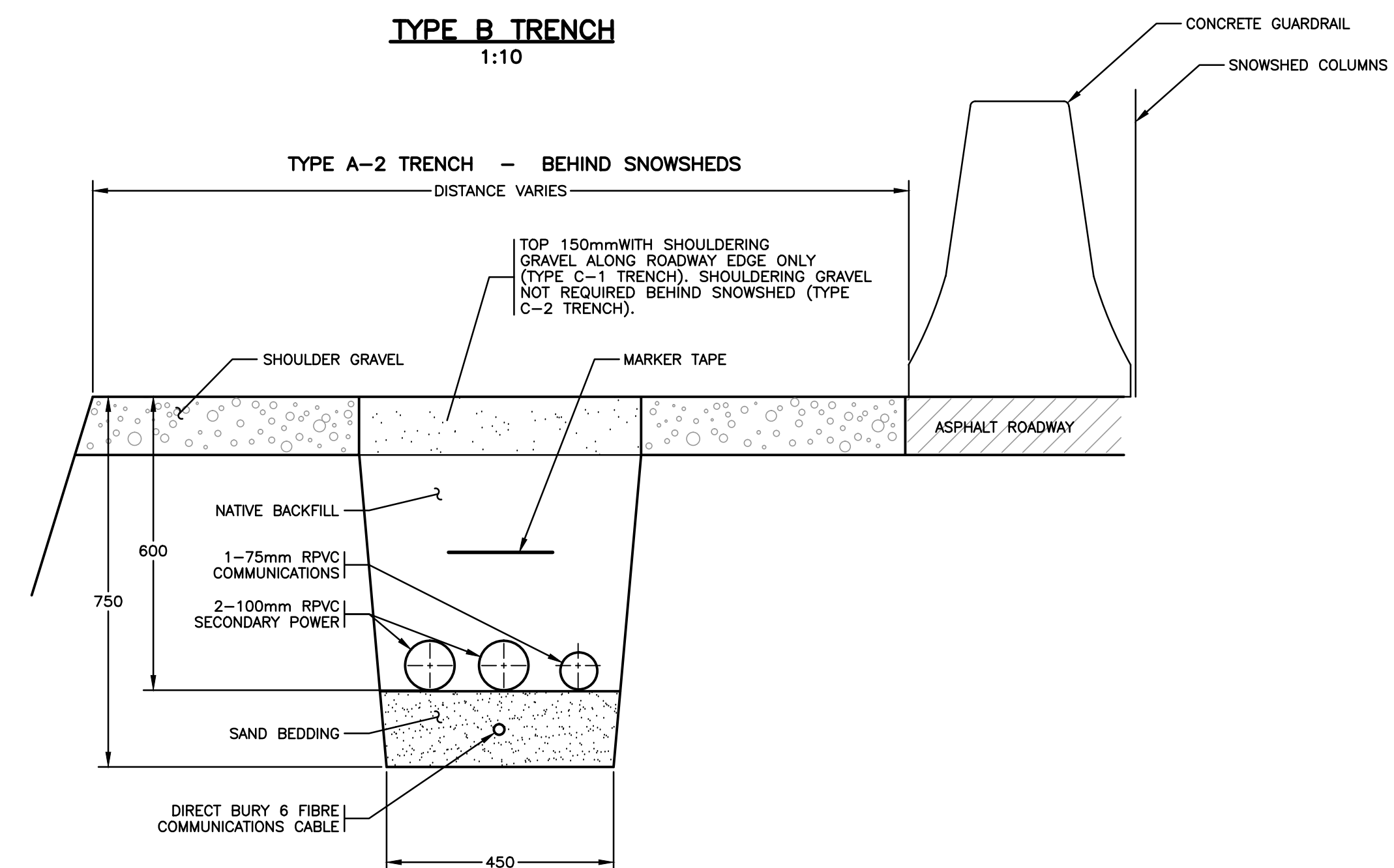
ALL EQUIPMENT IS EXISTING
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-	MAR. 17 2015	ISSUED FOR TENDER	PBX	AC	
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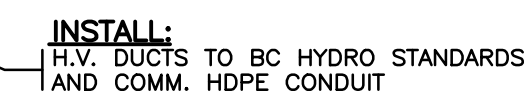
TYPE B TRENCH
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TYPE A-2 TRENCH - BEHIND SNOWSHEDS

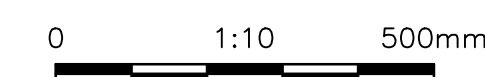


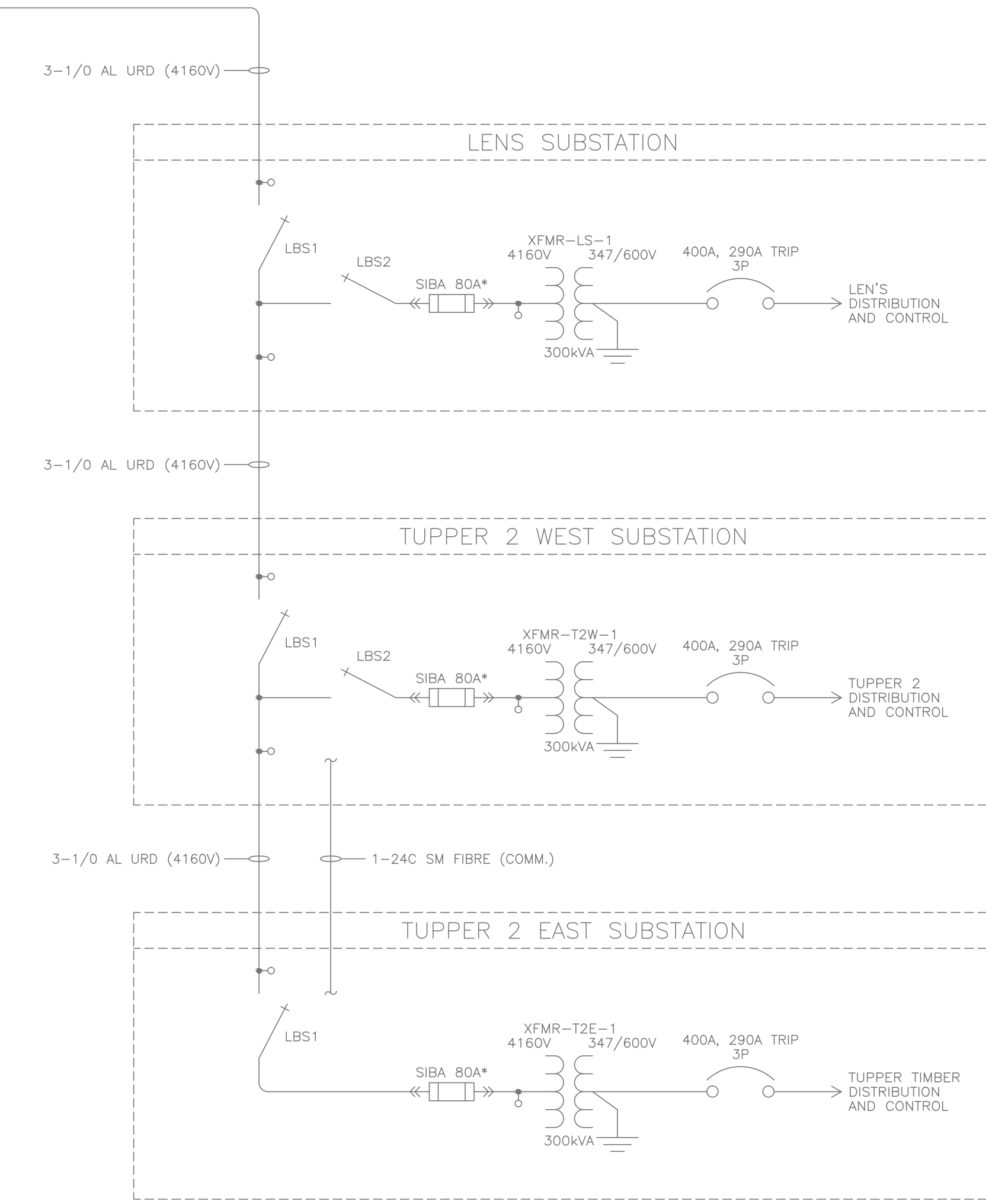
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SECTION 1:10 **E 10** **E 19** **TYPE E TRENCH**



ALL EQUIPMENT IS EXISTING
UNLESS NOTED OTHERWISE



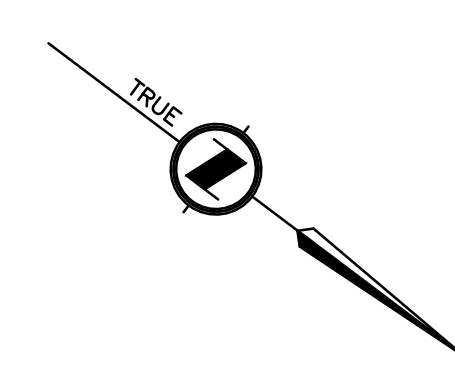
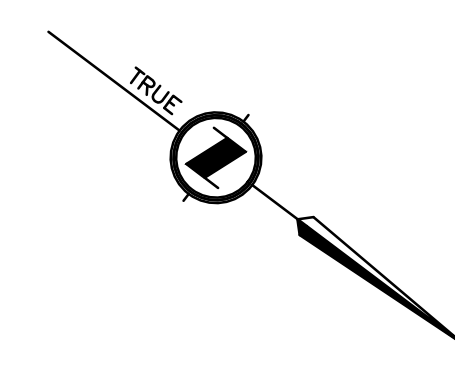


- WORK INCLUDED AS
PART OF THIS CONTRACT

**ISSUED FOR TENDER
NOT FOR CONSTRUCTION**

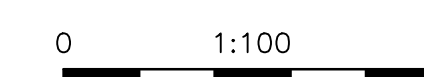
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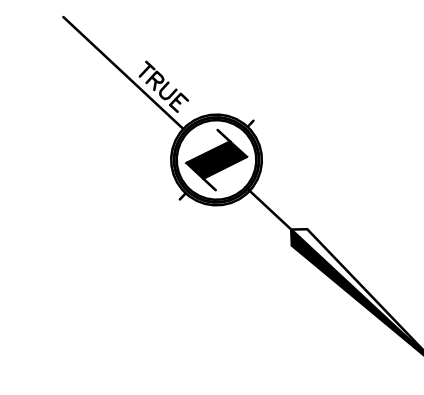
P:\13230_Snowshed Lighting - Glacier National Park\01 - Design\Drawings\ACAD\Primary Powerline Construction\17: 17/03/2015 2:12 PM: CARLOS.MATIAS


$$\frac{1}{10}$$


NT 2
10

- 
- BC**
OneCall
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Technical drawing of a 'DANGER HIGH VOLTAGE' warning sign. The sign is rectangular with a white background and a black border. It features a circular warning symbol in the upper half, consisting of a black circle with a diagonal slash and a stylized figure of a person being struck by lightning. Below the symbol, the words 'DANGER' and 'HIGH VOLTAGE' are printed in large, bold, black capital letters. The drawing includes detailed dimensions and color specifications:

- Overall Dimensions:** The sign is 400mm wide and 705mm high.
- Symbol Dimensions:** The circular symbol has an outer diameter of 270mm and an inner diameter of 320mm.
- Text Dimensions:** The text 'DANGER' and 'HIGH VOLTAGE' is 360mm high. The letters are 30mm wide.
- Color Specifications:** The symbol and text are black. The background of the symbol is yellow. The background of the text is red.
- Material:** The sign is made of vinyl film (Note 5 to 8).
- Mounting:** The sign is mounted on a 5mm hole (typical of 4).
- Other Dimensions:** The sign has a 30mm top margin, a 15mm bottom margin, and a 20mm side margin. The text is 50mm from the bottom and 20mm from the sides. The symbol is 30mm from the top and 20mm from the sides.
- Radius:** The corners of the sign are rounded with a radius of R 12.



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Surveyed by/Arpenté par	Drawn by/Dessiné par	Date
	PBX	2014-01-17
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle
AC	PB	AS NOTED
Client Acceptance/Acceptation du client		Approved by/Approuvé par
FIRM RESPONSIBLE OFFICER/AGENT RESPONSIBLE Date		A & E SERVICES/GÉNIE ET ARCHITECTURE Date
Project No./No du projet	Asset No./No du bien	Sheet No./ N°de la feuille
201422		20
Drawing Reference No./No de référence du dessin		
G2002R1		



SPLIT-BOLT (TYP.)

3/0 COPPER

TO STATION GROUND (ELECTRON)

DETAIL 5 FENCE GROUNDING
N.T.S. -



MAINTENANCE YARD SWITCHGEAR GROUNDING
1:25

1. GROUND GRID CONDUCTORS SHALL BE BURIED 500mm BELOW ROUGH GRADE, OR BELOW THE CONCRETE PAD.
2. GROUNDING SYSTEM TO BE INSTALLED PER THE CANADIAN ELECTRICAL CODE.
3. ALL MATERIALS TO BE SUPPLIED AND INSTALLED BY CONTRACTOR.
4. GROUND THE SUBSTATION IN AT LEAST 10 LOCATIONS AS SHOWN.
5. GROUNDING GRID RESISTANCE SHALL BE MAXIMUM 0.50 (OHM).
6. ALL THE GROUNDING GRID/LOOP/ROD CONNECTIONS SHALL BE COMPRESSION TYPE.
7. PAINT ALL THE VISIBLE BARE GROUND CABLES AND THE FENCE CONNECTION POINTS WITH GALVACON.

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