



Little Burgess Dam Rehabilitation Existing Conditions and Environmental Impact Assessment

Township of Muskoka Lakes, Bala, ON.
Project # 23-1236

16 May 2025

Version 1.0



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APPENDICES

Appendix A – Project Plans

Appendix B – Natural Heritage Review and Communication with Regulators

16 May 2025

The Township of Muskoka Lakes
1 Bailey Street
P.O. Box 129
Port Carling, ON
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Re: Existing Conditions and Environmental Impact Assessment (EC/EIA) for the Little Burgess Generating Station Rehabilitation, Township of Muskoka Lakes, Ontario; Tulloch Project # 230236

1. BACKGROUND

1.1 General

Tulloch Environmental, a division of Tulloch Engineering Inc. (Tulloch), was retained by the Township of Muskoka Lakes to complete an Existing Conditions and Environmental Impact Assessment (ECEIA) in support of the Little Burgess Generating Station Rehabilitation in Bala, ON (henceforth the Site). This report outlines the results of a Natural Heritage Desktop Review and field studies performed at the Site. It also provides assessment of impacts anticipated by the Project outlined in the Municipal Class EA. Avoidance and mitigations strategies to alleviate the anticipated impacts for each solution are provided.

1.2 Study Area and Project Description

The existing structure (henceforth referred to as Burgess Dam) is an approximately 59 m long and 3 m high concrete dam (Figure 1). The powerhouse is approximately 9m x 14m including the turbine, generator and associated equipment. A retaining wall 16m in length connects the north wall of the powerhouse and supports River St. immediately North of the powerhouse. The Burgess Dam runs across the north channel of the outlet from Lake Muskoka to the Moon River in Bala, Ontario; UTM (NAD83) coordinates are 17T 609163 4985226.

The Township has identified the need to complete the rehabilitation / replacement of Burgess Dam. A Municipal Class EA was initiated and assesses the impacts of alternative solutions for the rehabilitation / replacement. The below sections are taken from the justification section of the Class EA document.

“The powerhouse section of the dam is in poor overall condition from both a structural and dam safety perspective and will require remediation due to the presence of failed or failing structural members and a large transverse crack through the floor slab of the dam. Furthermore, significant washout of the downstream fill from another future flooding event has the potential to cause the structure to fail.”

“The facility has no spill capacity as upstream water level control is provided by the Bala North and Bala South dams. It can be determined that the Burgess Dam does not have sufficient freeboard nor was the existing facility designed to handle inflow design flood in its current state”

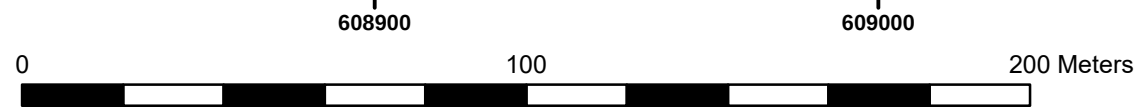
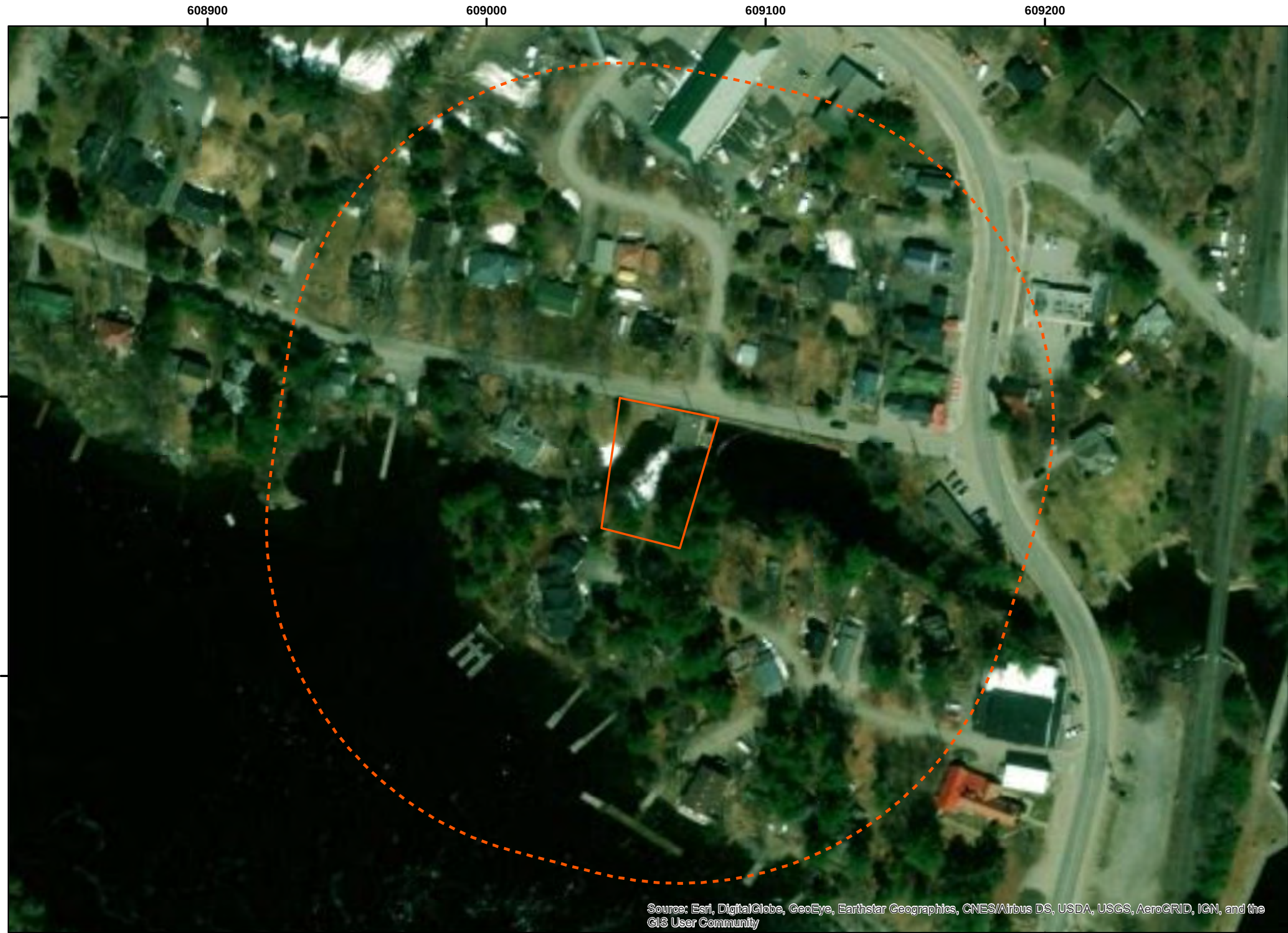
“Repair or mitigation measures must be developed for both the non-overflow dam section and powerhouse dam section to improve the FOS to meet the minimum acceptable criteria.”

“The Embankment along River Street downstream of the Site is very steep and appears to be eroding at the toe where there are newer gabion baskets placed on a historic boulder/stone wall. There is a concern for slope failure of the embankment due to the erosion / scour caused by water flows during power generation activity.”

The results of the Class EA identified repair of the dam and construction of a spillway as the preferred solution.

1.3 Scope

The Ministry of Natural Resources (MNR) has identified a need to complete an ECEIA to support the permitting and approvals process for the proposed Burgess Dam repair project. To assess the existing conditions and potential impacts of the proposed alternative solutions (Appendix A), TULLOCH performed a Natural Heritage Desktop Review of the site and surrounding area as well as an on-site field assessment. The Natural Heritage Desktop Review included areas within 1000 m of the proposed solution footprint. The Study Area for on-site assessments was defined as areas within 120 m of the proposed solution footprints. The information presented in this submission have been taken from the 2020 Class EA document and updated to reflect the current plans and consultation to date.



Coordinate System: NAD 1983 UTM Zone 17N

Document Path: J:\2020 Projects\Environmental\191493 Burgess Dam Safety Assessment\5_Maps\Figure 1 - 191493 - Burgess Dam Rehab - 23June2020.mxd

User Name: Kelly.Major

Burgess Dam Rehabilitation/Replacement Environmental Impact Assessment	
Site Investigations	
Legend Site (Approx.) Study Area (120m)	
Figure 1 PROJECT: 191493	
DATE: 23/06/2020 SCALE: 1:1,500	

2. NATURAL HERITAGE DESKTOP REVIEW

2.1 Sources Reviewed

The Natural Heritage Desktop Review was conducted to determine which natural heritage features exist, or have the potential to exist, within 1000 m of the Site. Records and resources searched as part of the background review are listed in Table 1. Communications with regulatory authorities are provided in Appendix B. Project staff qualifications are provided in Appendix C.

2.2 Land Use

The existing structure is currently located on private land and is surrounded by privately owned land.

2.3 Ecodistrict and Ecoregion

This Site is located in Ecodistrict 5E-7 of Ecoregion 5E (the Georgian Bay Ecoregion). The Georgian Bay Ecoregion is characterized by a cool-temperate and humid climate with a mean annual temperature range of 2.8 to 6.2°C (MNR 2009). This Ecoregion is situated on the southern edge of the Precambrian shield. It is typically underlain with gneissic bedrock as well as deposits of ground moraine till and glaciofluvial materials. This Ecoregion is part of the Great Lakes Watershed. Land cover is predominantly mixed forest, deciduous forest, and coniferous forest of the Great Lakes – St. Lawrence Forest Region (MNR 2009).

2.4 Protected Areas

Protected areas included federal, provincial, and municipal parks as well as Conservation Reserves, Enhanced Management Areas (EMAs), Provincially Significant Wetlands (PSWs) and Areas of Natural and Scientific Interest (ANSI). A review of data provided by Land Information Ontario (LIO) in conjunction with communications with the Ministry of Natural Resources and Forestry (MNRF) have identified no protected areas within 1000 m of the project site.

Table 1 - Records and resources searched during the Natural Heritage Desktop Review.

Record Source		Records Requested and/or Reviewed
Ministry of Natural Resources and Forestry (MNRF) Parry Sound District	Date of Request: 03 February 2020 Date of Data Receipt: 12 February 2020	Jeremy Rouse Management Biologist Existing environmental values information, including any sensitivities and environmental constraints.
Natural Heritage Information Centre (NHIC)	Accessed: 28 January 2020	Natural Heritage Mapping Tool queried for records of provincially tracked species (e.g. SAR and rare species), ANSI and other protected areas in vicinity to the Site.
MNRF Species at Risk in Ontario (SARO) List	Accessed: 28 January 2020	Determine SAR within range and their status.
MNRF Fish ON-line	Accessed: 28 January 2020	Reviewed known fish species present in Lake Muskoka and Moon River.
Atlas of the Breeding Birds of Ontario (Ontario Nature; ABBO)	Accessed: 28 January 2020	Determine migratory birds, including SAR within block #s: 17PK08
Bat Conservation International	Accessed: 28 January 2020	Reviewed SAR bat ranges associate with the Site and surrounding area.
eBird.org Cornell Lab of Ornithology	Accessed: 28 January 2020	Query for records of selected SAR bird species in vicinity to the Site.
iNaturalist – Herps of Ontario Project	Accessed: 28 January 2020	Reviewed recorded reptile and amphibian sightings in the area.
Ontario Butterfly Atlas Online (Toronto Entomologists' Association; OBAO)	Accessed: 28 January 2020	Query for records of SAR butterflies in vicinity to the Site.
Land Information Ontario (LIO)	Accessed: 30 January 2020	Accessed GIS spatial data regarding known significant habitats including: • Significant Wildlife Habitats • Wildlife Nesting Areas • Provincially Significant Wetlands • Areas protected federally, provincially or municipally.

2.5 Species at Risk

Species at Risk (SAR) include species identified federally under the *Committee on the Status of Endangered Wildlife in Canada* (COSEWIC) and provincially under the *Committee on the Status of Species at Risk in Ontario* (COSSARO). Species and their habitat listed as Endangered or Threatened are regulated federally under the *Canadian Species at Risk Act* (SARA S.C. 2002 c.29) and provincially under the *Ontario Endangered Species Act* (ESA S.O. 2007 c.6). In some instances, species listed as Special Concern may also receive habitat protection under the 2014 *Provincial Policy Statement* (PPS; MMAH 2014); see Section 2.6 *Significant Wildlife Habitat*.

The NHIC identified records of Massasauga Rattlesnake (*Sistrurus catenatus*; Threatened), the Rusty-Patched Bumblebee (*Bombus affinis*; Endangered), Blanding's Turtle (*Emydoidea blandingii*; Threatened) and Eastern Wood-pewee (*Contopus virens*; Special Concern) within 1000m of the Site. A restricted species was also identified. The MNRF has requested that the name of this species is not released, however, the impact assessment and respective mitigations have accounted for the possible presence of this species on the Site.

ABBO Records indicated that ten (10) species have been observed within the 10 x 10km atlas block associated with the site:

- Barn Swallow (*Hirundo rustica*; Threatened)
- Bobolink (*Dolichonyx oryzivorus*; Threatened)
- Canada Warbler (*Cardellina Canadensis*; Special Concern)
- Chimney Swift (*Chaetura pelagica*; Threatened)
- Common Nighthawk (*Chordeiles minor*; Special Concern)
- Eastern Meadowlark (*Sturnella magna*; Threatened)
- Eastern Wood-pewee (Special Concern)
- Golden-winged Warbler (*Vermivora chrysoptera*; Special Concern)
- Olive-sided Flycatcher (*Contopus cooperi*; Special Concern)
- Wood Thrush (*Hylocichla mustelina*; Special Concern).

Queries of Cornell Lab's eBird atlas identified records of the following 13 SAR birds:

- Bald Eagle (*Haliaeetus leucocephalus*; Special Concern; records within 7km)
- Bank Swallow (*Ripari riparia*; Threatened; records within 4km)
- Barn Swallow (records at the Site)
- Canada Warbler (records within 1km)
- Chimney Swift (records at the Site)
- Eastern Whip-poor-will (*Antrostomus vociferous*; Threatened; records within 1km)
- Eastern Wood-pewee (records within 1km)
- Evening Grosbeak (*Coccothraustes vespertinus*; Special Concern; records within 1km)
- Golden-winged Warbler (records within 100m)
- Olive-sided Flycatcher (records within 8km)
- Red-headed Woodpecker (*Melanerpes erythrocephalus*; Special Concern; records within 11km)
- Rusty Blackbird (*Euphagus carolinus*; Special Concern; records within 5km)
- Wood Thrush (records within 4.5km)

The ORAA indicated that Blanding's Turtle, Massasauga Rattlesnake, Snapping Turtle (*Chelydra serpentina*; Special Concern), Five-lined Skink (*Plestiodon fasciatus*; Endangered) and the restricted species identified in the NHIC records is associated with the Site (Block 17PK08).

BCI indicated that three (3) Endangered bat species have ranges which include the Site:

- Little Brown Bat (*Myotis lucifugus*)
- Northern Long-eared Bat (*Myotis septentrionalis*)
- Eastern Small-footed Bat (*Myotis leibii*)

The Butterfly Atlas of Ontario identified that Monarch Butterfly (*Danaus plexippus*; Special Concern) is associated with the Site.

A review of iNaturalist for citizen science records, the Royal Ontario Museum Collections, the Canadian National Collection of Insects, Arachnids and Nematodes and University Collections from McMaster University returned no records of SAR species at the Site, or in areas within 1000m of the Site

Table 2 – Species at Risk with Potential to Occur in the Study Area.

Source	Species	Scientific Name	SARA	ESA
eBird.org	Bald Eagle	<i>Haliaeetus leucocephalus</i>	-	SPC
eBird.org	Bank Swallow	<i>Ripari riparia</i>	THR	THR
ABBO (Record) / eBird.org	Barn Swallow	<i>Hirundo rustica</i>	-	THR
MNRF / ORAA	Blanding's Turtle	<i>Emydoidea blandingii</i>	THR	THR
ABBO (Record)	Bobolink	<i>Dolichonyx oryzivorus</i>	-	THR
ABBO (Record) / eBird.org	Canada Warbler	<i>Cardellina canadensis</i>	THR	SPC
ABBO (Range) / eBird.org	Chimney Swift	<i>Chaetura pelagica</i>	THR	THR
ABBO (Record)	Common Nighthawk	<i>Chordeiles minor</i>	THR	SPC
ABBO (Record)	Eastern Meadowlark	<i>Sturnella magna</i>	-	THR
BCI (Range)	Eastern Small-footed Bat	<i>Myotis leibii</i>	END	END
eBird.org	Eastern Whip-poor-will	<i>Antrostomus vociferous</i>	THR	THR
ABBO (Record) / MNRF / eBird.org	Eastern Wood-pewee	<i>Contopus virens</i>	SPC	SPC
eBird.org	Evening Grosbeak	<i>Coccothraustes vespertinus</i>	SPC	SPC
ORAA	Five-lined Skink	<i>Plestiodon fasciatus</i>	END	END
ABBO (Range) / eBird.org	Golden-winged Warbler	<i>Vermivora chrysoptera</i>	THR	SPC
BCI (Range)	Little Brown Bat	<i>Myotis lucifugus</i>	END	END
MNRF / ORAA	Massasauga Rattlesnake	<i>Sistrurus catenatus</i>	THR	THR

Source	Species	Scientific Name	SARA	ESA
OBAO	Monarch Butterfly	<i>Danaus plexippus</i>	SPC	SPC
BCI (Range)	Northern Long-eared Bat	<i>Myotis septentrionalis</i>	END	END
ABBO (Record) / eBird.org	Olive-sided Flycatcher	<i>Contopus cooperi</i>	THR	SPC
eBirg.org	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	THR	SPC
eBird.org	Rusty Blackbird	<i>Euphagus carolinus</i>	SPC	SPC
MNRF	Rusty-patched Bumblebee	<i>Bombus affinis</i>	END	END
ORAA (Record)	Snapping Turtle	<i>Chelydra serpentina</i>	SPC	SPC
ABBO (Record) / ebird.org	Wood Thrush	<i>Hylocichla mustelina</i>	-	SPC

*ABBO = Atlas of the Breeding Bird of Ontario; BCI = Bat Conservation International; MNRF = MNRF Species at Risk by Area Web Application; OBAO = Ontario Butterfly Atlas Online; ORAA = Ontario Reptile and Amphibian Atlas.

**END = Endangered; THR = Threatened; SC = Special Concern

***SARA = Species at Risk Act (Federal); ESA = Endangered Species Act (Provincial)

2.6 Significant Wildlife Habitat (SWH)

Significant Wildlife Habitat (SWH) is defined in the *Significant Wildlife Habitat Technical Guide* (OMNR 2000) as natural heritage areas that are “ecologically important in terms of features, functions, representation and amount and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System”. Development within and adjacent SHW is only permissible provided no negative impacts to the feature or its ecological functions. Habitat may be considered SWH according to four broad categories:

- Seasonal concentration areas (i.e., winter deer yards, colonial bird nesting sites, reptile hibernacula);
- Rare vegetation communities or specialized habitat for wildlife (i.e., alvars, rare forest types, moose aquatic feeding areas, amphibian woodland breeding ponds, turtle nesting habitat);
- Habitat of species of conservation concern (i.e., species identified as special concern federally or provincially, and species listed as rare or historical in Ontario based on records kept by the NHIC (i.e. S1- Critically Imperiled, S2- Imperiled, S3- Vulnerable and SH - Historic ranks); These ranks are not legal designations but are assigned in a manner to set protection priorities); and,
- Animal movement corridors (i.e., naturally vegetated corridors or man-made features such as power transmission and pipeline corridors that provide animal movement from one habitat to another).

No records of SWH or candidate SWH were found within 1000 m of the existing structure. Records of five locally rare species were identified by the NHIC:

- Redtop Panicgrass (*Panicum rigidulum*)
- Cyrano Darner (*Nasiaeschna pentacantha*)
- Giant Lacewing (*Polystoechotes punctatus*)
- Ridged Yellow Flax (*Linum striatum*)
- Sand Panicgrass (*Dichanthelium spretum*)

2.7 Migratory Birds

The *Migratory Birds Convention Act* (MBCA S.C. 1994, C.22) and the Ontario Fish and Wildlife Conservation Act (FWCA S.O. 1997, C.41) prohibits the disturbance and destruction of most birds, their nests and eggs. Environment and Climate Change Canada has developed a number of tools, including the general nesting calendars (<http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=4F39A78F-1>) and avoidance guidelines (<http://ec.gc.ca/paom-itmb/default.asp?lang=En&n=AB36A082-1>) to support compliance with the Act.

The General Nesting Period for this site (Nesting Zone C3) is considered by Environment Canada to be from 08 April to 28 August in forested habitats, 12 April to 28 August in open areas, and 08 April to 16 August in wetlands.

2.8 Fisheries and Fish Management Objectives

The Burgess Dam runs across the north channel of the outlet from Lake Muskoka to the Moon River. Lake Muskoka has a surface area of 12,1000 ha, and a maximum depth of 73 m. There is intense urban shoreline development with residential and commercial properties. The water level in Lake Muskoka is controlled by MNR-owned and operated dams in Bala. The flows and levels are governed by the Muskoka River Water Management Plan. The lake supports a large diversity of sport fish including Brook Trout (*Salvelinus fontinalis*), Lake Trout (*Salvelinus namaycush*), Lake Whitefish (*Coregonus clupeaformis*), Cisco (*Coregonus artedii*), Northern Pike (*Esox lucius*), Burbot (*Lota lota*), Smallmouth Bass (*Micropterus dolomieu*), Largemouth Bass (*Micropterus salmoides*), Walleye (*Sander vitreus*), Pumpkinseed (*Lepomis gibbosus*), Black Crappie (*Pomoxis nigromaculatus*) and Yellow Perch (*Perca flavescens*). Current stocking initiatives include yearly Lake Trout stocking to supplement populations. A disjunct population of Margined Madtoms (*Noturus insignis*) are present in Lake Muskoka. Margined Madtoms are considered rare in Ontario.

The MNR refers to the section of the Moon River between the outlet of Lake Muskoka to the Swift Rapids downstream as the Bala Reach. This section of the Moon River is “lake-like” and has a surface area of 307 ha. The water levels are regulated by the Ontario Power Generation owned and operated dams at Swift Rapids Generating Station and Moon River Control Dam. This section of the Moon River supports Northern Pike, Smallmouth Bass, Largemouth Bass, Black Crappie, Walleye, Brown Bullhead (*Ameiurus nebulosus*), Emerald Shiner (*Notropis atherinoides*), Hornyhead Chub (*Nocomis biguttatus*), Logperch (*Percina caprodes*), Longnose Dace (*Rhinichthys cataractae*), Pumpkinseed, Rock Bass (*Ambloplites rupestris*), White Sucker (*Catostomus commersonii*), Yellow Perch and Rainbow Smelt (*Osmerus mordax*). Efforts to

successfully re-establish the Walleye population in the Bala Reach began in the early 2000s and included stocking and habitat enhancement. Night Lighting and egg collection was completed in May 2008 by Hatch Energy, where they identified adult Walleye and Walleye eggs downstream of the Burgess Generating Station (Hatch 2009).

The MNRF has identified that there is a known Walleye spawning area from the Burgess Falls downstream towards the main Bala Falls. Smelt and suckers may also be expected to spawn in the area. A map of the identified Walleye spawning area is shown in Appendix B. The **MNRF stated that work which may require plant shutdown should be scheduled to avoid the spring spawning period (01 April to 01 June).**

Lake Muskoka is a cold-water system, and the Moon River is warmwater. This prohibits work below the natural high-water mark from **October 1 through July 15** (of the following year). Any work that requires shutting off flow through the dam should be scheduled to avoid the spring Walleye spawning period (01 April to 01 June).

Any work below the high-water mark must be assessed for whether it needs to be submitted to DFO for review. If the development has a potential to result in the death of fish or the harmful alteration, disruption, or destruction of fish habitat the project may require an Authorization under the Fisheries Act. To determine whether the proposed development is required to be submitted to DFO and assistance in submitting a project request for review to DFO see: <https://www.dfo-mpo.gc.ca/pnw-ppe/reviews-revues/request-review-demande-d-examen-001-eng.html>.

Assistance by a qualified Fisheries Scientist is recommended for DFO permitting support.

3. FIELD INVESTIGATION METHODS

The Study Area (Figure 1) was investigated using general reconnaissance methods performed on foot. Aerial imagery of the Study Area was evaluated prior to field assessments to identify priority areas. Survey effort varied across the Study Area depending on the potential for an area to possess Natural Heritage features, as well as the topography and homogeneity of the site.

3.1 Terrestrial Habitat Assessment

The Study Area was walked by Kelly Major, Terrestrial Ecologist and Certified Environmental Professional on 06 May 2020. Mr. Major's qualifications are provided in Appendix C.

Existing terrestrial conditions were established throughout the Study Area through the description of the plant community structure, composition, and condition. Terrestrial habitat was assessed for suitability to support Natural Heritage features, including Species at Risk, Significant Wildlife Habitat and Significant Wetlands. Emphasis was placed on assessing site suitability for species identified within the Natural Heritage Desktop Review, but the site assessment was not limited to these species.

Any habitat found to be suitable for nesting by Barn Swallow (which includes porous vertical surfaces secluded from the rain) was searched with a flashlight for evidence of current or historical nesting. Evidence of Barn Swallow nesting includes the presence of intact nests, remnant nesting scars, whitewash and adults foraging in vicinity. This habitat was also search for evidence of nesting by migratory bird species with similar nesting habitats as Barn Swallow (e.g. Eastern Phoebe; *Sayornis phoebe*). Tall trees on (and overhanging) the Site were searched for evidence of raptor stick nests.

Several restrictions applied to the terrestrial habitat assessment, specifically (1) unless otherwise stated, all observations were visual assessments of the site exterior (2) areas were not assessed that could not be seen from the exterior, (3) only the subject facility and public lands within 120m were assessed; no assessments were performed on adjacent private lands

3.2 Aquatic Habitat Assessment

Moon River and Lake Muskoka were investigated to determine the potential to provide fish habitat. Emphasis was placed on habitat potential to support important or critical habitat to the known (or likely) fish community upstream and downstream of the crossing. The area of investigation focused on the existing crossing and the Study Area upstream and downstream. Areas downstream were searched for evidence of recent nesting or spawning activity. A MNRF License to Collect Fish for Scientific Purposes (License No.1095458) was received, however, no fish sampling occurred during the on-site field assessment.

4. FIELD INVESTIGATION RESULTS

Field Assessments were performed on 06 May 2020 by Bill Tibble (Senior Aquatic Ecologist) and Kelly Major (Terrestrial Ecologist). The qualifications of site investigators can be found in Appendix C. Field photographs are provided below.

4.1 Terrestrial Habitat

Both the north and south sides of the Site are cleared and dominated by manicured domestic grasses (lawn) and disturbance tolerant forbs such as Common Plantain (*Plantago major*), Common Dandelion (*Taraxacum officinale*), Wild Strawberry (*Fragaria vesca*), Common Mullein (*Verbascum thapsus*) and Common Burdock (*Arctium minus*); see Photos A to D. This area is also fringed by scattered shrubs, including Honeysuckle (*Lonicera* sp.), Common Blackberry (*Rubus allegheniensis*), Pin Cherry (*Prunus pensylvanica*), Showy Mountain Ash (*Sorbus decora*) and Red Elderberry (*Sambucus racemosa*). Several large White Pines (*Pinus strobus*) are located in the southeast corner of the site and low Red Maple (*Acer rubrum*) saplings were observed along the south shore.

The Site is bordered on all sides by residential properties. These properties support a mix of native and ornamental tree and shrub species. Residential lands south of the site include semi-

naturalised woodlot fragments dominated by White Pine, Eastern Hemlock (*Tsuga canadensis*), Red Maple, White Birch (*Betula papyrifera*) and Eastern White Cedar (*Thuja occidentalis*).

Habitat suitable for nesting by Barn Swallow and certain migratory bird species exists at the dam outlets (Photo E) and under decking at the powerhouse man-door entrance (Photo F). This habitat was searched and no evidence of active or past nesting was found. There was no Barn Swallow or migratory bird nesting on the outside of powerhouse and dam structure in at the time of the field investigation.

Woody vegetation (trees and shrubs) scattered around the dam site and surrounding Study Area all have the potential to support nesting by migratory bird species. No active bird nests were observed on the Site but thorough searches were not performed and several migratory bird species were observed in within the Study Area, including: Black-capped Chickadee (*Poecile atricapillus*), Palm Warbler (*Setophaga palmarum*) and American Robin (*Turdus migratorius*). No evidence of raptor nesting was found in trees on / overhanging the Site.

The powerhouse could support day roosting by bats, including up to three Endangered bat species: Little Brown Bat, Eastern Small-footed Bat and Northern Long-eared Bat (taxa). Males, and non-gravid females, of many bat species, including the endangered *Myotis* species, will make use of vertical surfaces sheltered from the sun and rain, crevices on built structures (e.g. cracks in masonry, eaves, gaps in fascia) as well as uninhabited building interiors for transient daytime roosting. No evidence of bat occupation (e.g. adult bats, holes / cracks discoloured by grease and urine, feces) was observed from the outside of the facility but the facility interior was not searched.

No other candidate terrestrial SAR or SWH habitat was observed within the Study Area.



Photo A – Dam structure and south bank including access road and staging area as seen from the north bank.



Photo B – South side of the Study Area including dam access road and staging area.



Photo C – Dam structure and north bank including River Street (left of frame).



Photo D – Open habitat south of River Street and west of the dam structure.



Photo E – Dam outlets were searched for nesting by bird species, including Barn Swallow.



Photo F – The undersides of decking on site was searched for nesting by bird species.

4.2 Aquatic Habitat

Directly downstream of the dam outlet there is a plunge pool (Photo G). Old gabion baskets line the right downstream bank immediately downstream of the dam (Photo H) which were slightly unstable. Further downstream the right downstream bank is stabilized with an installed boulder wall, transitioning to a boulder bank which was likely historically placed for bank protection. The left downstream bank immediately downstream of the dam is stabilized with a boulder wall. Gravel extends from the wall into the channel. Undermining was identified on the left downstream bank, and the bank eventually becomes exposed boulders with debris scattered throughout the gradually sloping banks. The habitat downstream transitions from cobble riffles (Photo I) and runs (Photo J), to shallow bedrock cascades. The watercourse widens into the Bala Reach and flows downstream to the Moon River. Spawning habitat for Walleye and Sucker species was identified from the base of the dam downstream until the substrate transitions from cobble to bedrock. While completing the site assessment, staff observed White Sucker spawning in the gravel and cobble habitat 5-10m downstream of the dam.

The watercourse upstream of the dam is dominated by deep pool habitat (Photo K), with the highest flow evident along the right downstream bank. Directly upstream of the powerhouse the right upstream bank is undercut and slightly unstable. A floating barrier is in the watercourse upstream of the powerhouse. A culvert enters the watercourse from under River Road on the right downstream bank upstream of the powerhouse. The right downstream bank upstream of the dam is composed of cobbles and boulders. Substrate upstream of the dam is predominately sand, silt, gravel and detritus (Photo L). The MNRF has indicated that upstream of the dam provides spawning habitat for Marginated Madtom. Madtoms prefer structure for spawning, including large boulders and sunken logs. The water level was deep, and in-water structure was difficult to identify.



Photo G – Directly downstream of the dam



Photo H – Gabion baskets and placed boulders on the right downstream bank downstream of the dam



Photo I – Boulder cascade downstream of the dam



Photo J – Run habitat and cobble / gravel bed directly downstream of the dam



Photo K – Deep pool habitat upstream of the dam



Photo L – Water levels and substrate abutting the concrete dam face upstream

5. PROPOSED WORK

The Proposed Work and construction sequence is outlined below.

ESC and Isolation:

- Place turbidity curtain as per OPSD 219.260 upstream of the power generation building, encompassing the north shoreline and north abutment of the dam which will have work completed below the high-water mark.
- Place turbidity curtain as per OPSD 219.260 upstream of the dam along the southern dam abutment for the approximately 7m southern extension of the dam. A cofferdam will also be placed if required, connecting the turbidity curtain to the edge of the new dam extension on the south side of the project upstream of the current dam face.
- A proposed cofferdam will be placed downstream of the generation building, and downstream of all proposed in-stream work to isolate the downstream area.
- All isolated areas will be salvaged for fish prior to work commencing.
- Heavy duty silt fence as per OPSD 219.130 along all shorelines, including along the downstream banks, at the downstream edge of the spillway, and surrounding the top of the slope of the upstream work areas.
- Remove all ESC measures once Site is stabilized at the conclusion of the project.

Dam Face:

- Raise existing dam crest (225.93m) (non-overflow section) to El. 226.50m
- Remove trees within approximately 2m of the dam on south shore. Strip topsoil and place granular fill at maximum 2:1 slope, and cover with 150mm of topsoil and native seed.
- Extend dam on upstream south shore
 - Existing dock to be removed
 - Extend by 6.6m with a crest elevation of El. 226.50m
 - Backfill new extension with granular A.
- Replace chain link fence on top of concrete dam

Emergency Spillway:

- Remove vegetation within the spillway channel. The spillway invert will be set at the current dam crest at approx. elevation El. 226.0 m. Topsoil will be removed within the spillway channel down to existing granular fill, grounding grid to be left in place.
- Install spillway channel via Cast-in place walls pinned to bedrock. Spillway channel to be infilled with 750 mm spillway rip rap over non-woven geotextile.
- Remove existing laneway atop of the spillway and reinstall 4.5m wide access road connecting the existing gate to the power generation station.
- Install two 150mm perforated subdrain with filter socks at the bottom of the spillway under the proposed laneway.
- The emergency spillway will activate under the Inflow Design Flood (1/100 years) event. The proposed rehabilitation of the dam will not change the operational parameters and function but will improve the protection of environmental features during extreme floods.

Embankment Wall:

- Place a 10m long x 0.60m wide embankment wall placed into bedrock along the north shoreline east of the generation building.
 - Remove wood posts and steel sections of guard rail
 - Backfill with Granular A. Install 150mm perforated subdrain with filter sock to a minimum slope of 0.5%.
 - Fill around east end of retaining wall to elevation 226.2m (approx. 3.0m).
 - Place riprap in front of retaining wall to ensure stabilization along the bottom
- Place concrete retaining wall along left and right bank downstream of the generation building.

Bank Protection:

- Place bank protection on right downstream bank, downstream of dam southwest of new retaining wall.
 - Place non-woven geotextile on the bank.
 - Bank protection will include 750mm thick rip rap (same size as spillway rip rap)
 - Existing boulders on the bank will remain

6. IMPACT ASSESSMENT AND MITIGATIONS

The below mitigation measures will be adopted for the duration of the Project and are referenced on the E1 design drawings.

6.1 Mitigations

- Soil works will be scheduled to avoid wet, windy and rainy periods to the maximum extent possible. In the event of forecasted heavy rain events (≥ 7.5 mm rain / hour) exposed soils will be stabilized with temporary ESC measures (geotextile, tarps, etc.)
- The site supervisor will hold a meeting of all equipment operators working at the site to make them aware of the environmental concerns and measures set out in this plan to control sediment.
- Equipment shall be cleaned of all contaminants prior to being brought on site.
- Work below the high-water mark will only be conducted during approved MNR timing windows to protect fish.
- The contractor is required to develop and implement an Erosion and Sediment Control Plan that includes effective erosion and sediment control measures, measures for managing water flowing into the site, site isolation measures, and regular inspection and maintenance of erosion and sediment control measures
- To the maximum extent possible, no sediments shall enter the water during any aspect of the work. Short-term introduction of sediment shall be kept to the lowest practical level and there should be no long-term sources of sediment from this completed project.

- Erosion and sediment control measures will be removed once the site is stabilized.
- The in-water work area will be isolated using turbidity curtains / temporary cofferdams, and all fish will be salvaged and relocated outside of the works.
- If required, de-watering of the isolated in-water work area will occur prior to work below the high-water mark and after the fish salvage.
- Proper fish screens according to DFO Interim Guidelines will be used at the intake and outlet of the de-watering pumps. All de-watering flow will be pumped into a settling basin or de-watering trap to ensure any disturbed particles do not re-enter the watercourse.
- The Contractor will ensure machinery arrives on site in a clean condition and maintained free of leaks, invasive species and noxious weeds.
- Washing and servicing of machinery will be completed >30m away from the watercourse and shall be done in such a way as to prevent any deleterious substances from entering the water. Fueling of machinery will be completed in the designated fueling area using fuel containment measures to contain spillage.
- At all times store, handle and dispose of all materials used or generated (e.g. organics, soils, woody debris, temporary stockpiles, construction debris, etc.) in a manner that prevents entry to any water body. Temporary storage and stockpiling of materials must take place a safe distance from any water body; these materials must be stabilized or otherwise contained. Any lay down or soil piles subject to water erosion and the subsequent transmission of disturbed soil particles into the adjacent surface waters shall be surrounded by a silt fence to prevent any migration of soil into the adjacent surface waters. Silt fences shall be constructed prior to any material being placed.
- Avoid riparian vegetation removals unless indicated on the design drawings. Use existing trails whenever feasible. If removal is necessary, minimize clearing, protect adjacent vegetation and use proper clearing techniques. Where possible use techniques that allow the root system to stay intact; this helps bind the soil and encourages rapid colonization of low-growing plant species.
- Re-stabilize unstable or banks disturbed during construction to pre-construction conditions or better. This may include vegetation or rock protection. Temporary measures (i.e. biodegradable materials) may be incorporated to provide interim stabilization until vegetation is fully established.

6.2 Impact Assessment and Mitigation

Table 3 – Impact Assessment and Mitigations for Construction Options

Consists Of	Potential Impacts (in the absence of Mitigation)	Mitigations
Dam Crest Raise and Spillway Construction - Downstream veg removal - Strip top organic soil - Partially raise dam crest on north and south dam sections (Non-overflow section) - Install emergency spillway (Rip Rap channel and cast in place spillway training walls) - Replace DS fill materials - Regrade middle dam section DS and add rock/riprap for erosion protection - Repair large transverse cracks in existing dam - Concrete slab at powerhouse repaired and anchored	Harm to migratory birds. Removal of woody vegetation, if performed while migratory birds are nesting, could result in harm to active migratory bird nests, eggs and young. Change in sensitive fish habitat. Diverting overflow downstream may result in alteration to sensitive fish habitat required for critical life functions. Change in fish habitat. Placement of rip-rap below the high-water mark will alter fish habitat. Harm to fish. Development may result in increase of erosion or sediment transport, or the introduction of deleterious substances to the River. Construction may result in direct mortality to fish or their eggs or offspring.	Avoid active migratory bird nests. Avoid clearing vegetation during the General Nesting Period: avoid clearing from 12 April to 28 August. Alternatively, inspect woody vegetation immediately prior to removal and retain any tree or shrub that is supporting an active migratory bird nest. Minimize the clearing of vegetation. Clear only what is necessary to accomplish the undertaking. Incorporate existing vegetation into the final plan where possible. Regreen de-vegetated areas where feasible. Direct spillway to non-sensitive habitat. Direct the outlet of the spillway downstream of the cobble / gravel spawning bed. The outlet should be located at the bedrock cascade as to prevent scour and resuspension of soft sediment. Avoid changes to fish habitat. Retain in-water and riparian vegetation as much as possible. Avoid placing material below the high-water mark if possible. All work below the high-water mark must be submitted to DFO for review. Erosion and Sediment Control. ESC measures should be implemented prior to construction to prevent entry of sediment into the waterbody. All banks should be stabilized following construction. Control deleterious substances. Waste materials should be stabilized. Construction materials and equipment should arrive on site clean. Storage of fluids should be >30m from the watercourse or within defined area with redundant containment measures. Minimize in-water work. MNRF in-water timing windows must be followed. All in-water work must be isolated from the watercourse and a fish salvage must be completed. In water work areas, or areas downstream of the dam which may be affected by the temporary loss of flow, must be salvaged and fish relocated to the area downstream of the work area.
Powerhouse Refurbishment and Reinforcement - Fill scour areas in foundation with non-shrink grout - Grout and anchor the cracks developed in powerhouse base - Reinforce the powerhouse structure with 9 DYWIDAG anchors - Repair / Replace the roof - Replace structural bracing in the powerhouse building	Harm to Barn Swallow or migratory birds. No evidence of Barn Swallow or migratory bird nesting was found on the powerhouse, but habitat is suitable. Should nesting occur in the future, maintenance and upgrades to the powerhouse could result in harm to active nests, eggs and young. Harm to bats. Bats could day-roost within the existing powerhouse. If present, renovations within the structure could harm endangered species. Change in fish habitat. Excavation and placement of fill below the high-water mark will alter fish habitat. Harm to fish. Development may result in increase of erosion or sediment transport, or the introduction of deleterious substances to the River. Construction may result in direct mortality to fish or their eggs or offspring. In-water work. The replacement of the dam and powerhouse will result in work below the high-water mark. <i>This impact cannot be eliminated; however, refurbishment will result in less time working in-water than a full replacement.</i>	Avoid Barn Swallow and nests. No evidence of Barn Swallow nesting was found on the existing powerhouse, but habitat is suitable. Inspect the structure again immediately prior to undertaking the work. Endangered Species Act registration is required if Barn Swallow nests are found on the powerhouse and if any activity is to be undertaken that will harm the nests or harm / harass Barn Swallows. A Barn Swallow Mitigation Plan would need to be prepared by a qualified person in support of registration under this Act. Avoid active migratory bird nests. No evidence of migratory bird nesting was found on the existing powerhouse, but habitat is suitable. Avoid maintenance and upgrades during the General Nesting Period: from April 12 to August 28. Alternatively, inspect the exterior and interior of the existing powerhouse prior to maintenance and upgrades and only proceed if active migratory bird nests are not present. The proponent may choose to inspect the interior of the powerhouse prior to April 12 for evidence of past nesting. If nesting has occurred in the past, the proponent can exclude migratory birds from re-entering the structure. Avoid roosting bats. Avoid renovations while bats are active: from April 15 to September 30. Alternatively, inspect the powerhouse interior prior to renovations and proceed only if bats are absent. The proponent may choose to inspect the interior of

Consists Of	Potential Impacts (in the absence of Mitigation)	Mitigations
	• Changes in flow. Complete isolation of the dam and powerhouse for removal may result in changes to flow downstream.	the powerhouse prior to April 15 for evidence of past bat roosting. If roosting has occurred in the past, the proponent can exclude bats from re-entering the structure. • Avoid changes to fish habitat. Retain in-water and riparian vegetation as much as possible. Reinstall in-water cover after construction is complete. All work below the high-water mark must be submitted to DFO for review. • Erosion and Sediment Control. ESC measures should be implemented prior to construction to prevent entry of sediment into the waterbody. Cofferdams used should result in complete isolation of the in-water work area. All banks should be stabilized following construction. • Control flow. Use by-pass pumps to control water discharge from upstream around the isolated area. Use DFO approved fish screens at inlet and outlet of pipes. Ensure areas of discharge are stable, and that discharging will not result in scouring. • Control deleterious substances. Waste materials should be stabilized. Construction materials and equipment should arrive on site clean. Storage of fluids should be >30m from the watercourse or within defined area with redundant containment measures. • Minimize in-water work. MNRF in-water timing windows must be followed. All in-water work must be isolated from the watercourse and a fish salvage must be completed. In water work areas, or areas downstream of the dam which may be affected by the temporary loss of flow, must be salvaged and fish relocated to the area downstream of the work area.
Concrete Retaining Walls • Install a drainage ditch upstream of the retaining wall to divert the surficial run-off water from River Street • Drill drainage holes and install drainage pipes along the base of the existing concrete retaining wall.	• Harm to migratory birds. Removal of woody vegetation, if performed while migratory birds are nesting, could result in harm to active migratory bird nests, eggs and young. • Harm to fish. Development may result in increase of erosion or sediment transport, or the introduction of deleterious substances to the River. Construction may result in direct mortality to fish or their eggs or offspring	• Avoid active migratory bird nests. Avoid clearing vegetation during the General Nesting Period: avoid clearing from 12 April to 28 August. Alternatively, inspect woody vegetation immediately prior to removal and retain any tree or shrub that is supporting an active migratory bird nest. • Minimize the clearing of vegetation. Clear only what is necessary to accomplish the undertaking. Incorporate existing vegetation into the final plan where possible. Regreen de-vegetated areas where feasible. • Control deleterious substances. Waste materials should be stabilized. Construction materials and equipment should arrive on site clean. Storage of fluids should be >30m from the watercourse or within defined area with redundant containment measures. • Erosion and Sediment Control. ESC measures should be implemented prior to construction to prevent entry of sediment into the waterbody. All banks should be stabilized following construction.

7. SUMMARY

The potential impacts of the proposed works and mitigation strategies which should be adopted to control these impacts are presented in Table 3.

Construction of the non-overflow dam section require the removal of woody vegetation, which could result in harm to migratory birds. To minimize these impacts, it is advised that clearing of vegetation be kept to a minimum, and that vegetation should only be cleared outside of the General Nesting Period. Constructing a spillway, may result in changes to fish habitat. Impacts should be controlled through minimizing in-water work, implementing proper isolation techniques and ESC measures, controlling deleterious substances, and abiding by all DFO and MNRF guidelines and permitting requirements. The spillway construction should be designed as to not discharge to sensitive fish habitat and minimize potential high-velocity flows directly into the downstream fish habitat. Any discharge should be directed downstream towards the bedrock cascade, preventing scouring, suspension of soft substrate and changes to spawning habitat in the cobble / gravel beds directly downstream of the dam.

Refurbishing the dam and powerhouse could result in impacts to nesting birds, specifically Barn Swallow, and roosting bats. Although there was no evidence of roosting bats, or migratory bird nests on the structure during the field assessment, all active bird nests and roosting bats should be avoided. Work should be avoided during the General Nesting Period or while bats are active (April 15 to September 30). In-water work is required for both powerhouse / dam section options. The proposed works must be submitted to DFO for approval, and in-water work areas must be isolated, fish must be salvaged, and MNRF in-water timing guidelines should be followed.

The construction proposed on the River St. retaining wall is not likely to result in impacts to fish and fish habitat. If work is being completed within 30m of the watercourse, erosion and sediment control measures should be used to control any sediment from entering the watercourse. If any clearing is required, it should occur within the General Nesting Period.

Based on TULLOCH's understanding of the Site conditions, the proposed works, and through implementation of the proposed mitigations, it is our opinion that the Project can be completed safely and with minimal to no negative impacts on the natural environment.

8. CLOSING

TULLOCH Environmental, a division of TULLOCH Engineering Inc. (TULLOCH), was retained by The Township of Muskoka Lakes to complete an Existing Conditions and Environmental Impact Assessment (EC/EIA) in support of the Burgess Dam and Generating Station rehabilitation / replacement in Bala, ON. This report outlines the results of a Natural Heritage Desktop Review, field investigations on the Site and an assessment of anticipated environmental impacts. It also provides mitigation strategies to avoid or minimize project impacts.

The undersigned is pleased to provide this report as a record of our services and findings. If you have any questions or if we can be of further assistance in this matter, please do not hesitate to contact us.

Sincerely,

Tulloch ENVIRONMENTAL, a division of TULLOCH Engineering Inc.

Report Prepared By:

A handwritten signature in black ink, appearing to read 'Bill Tibble', with a stylized flourish at the end.

Bill Tibble, M.Sc., E.P.
Sr. Aquatic Ecologist

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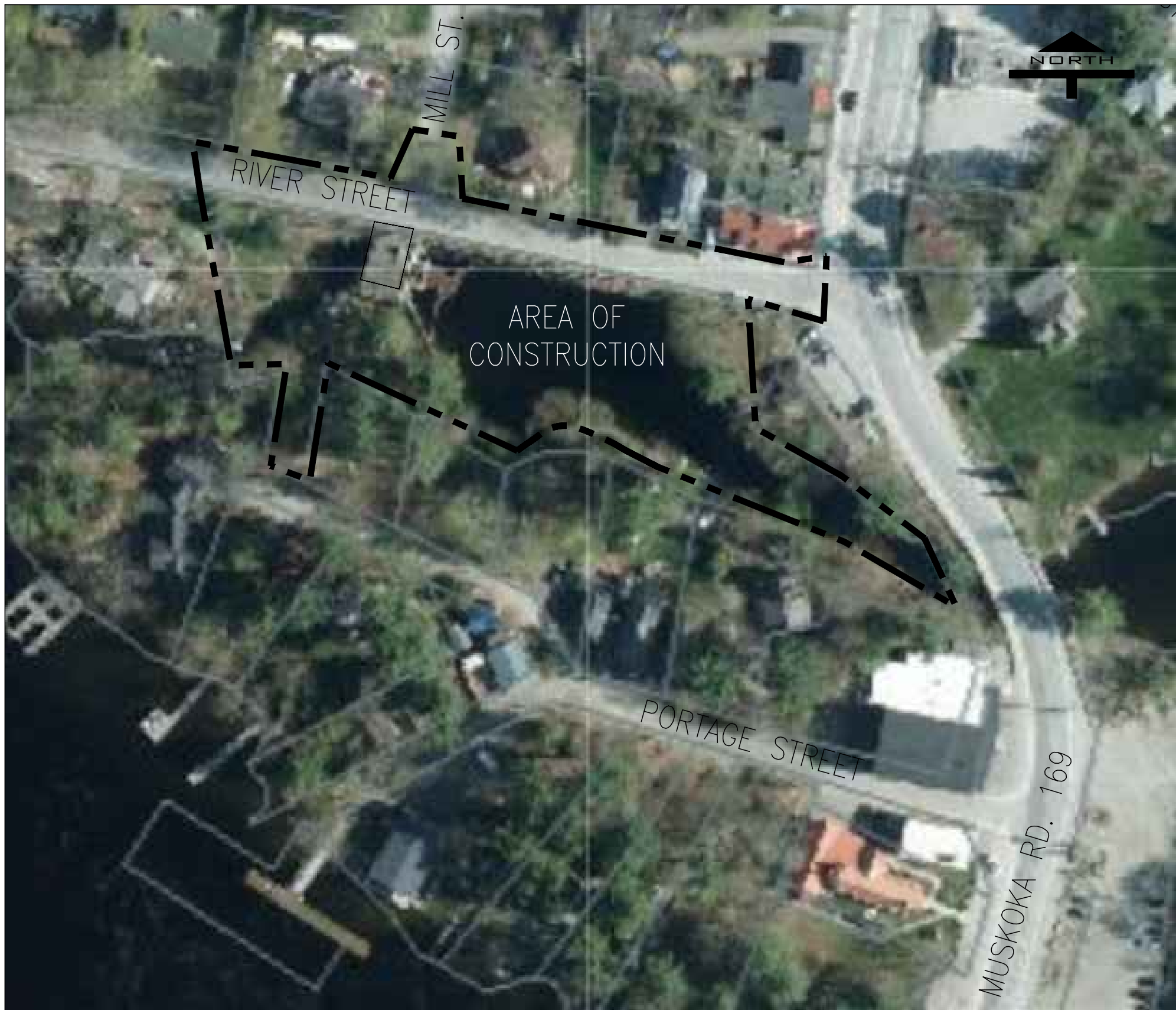
APPENDIX A

PROJECT PLANS

TOWNSHIP OF MUSKOKA LAKES

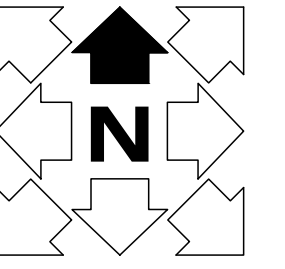
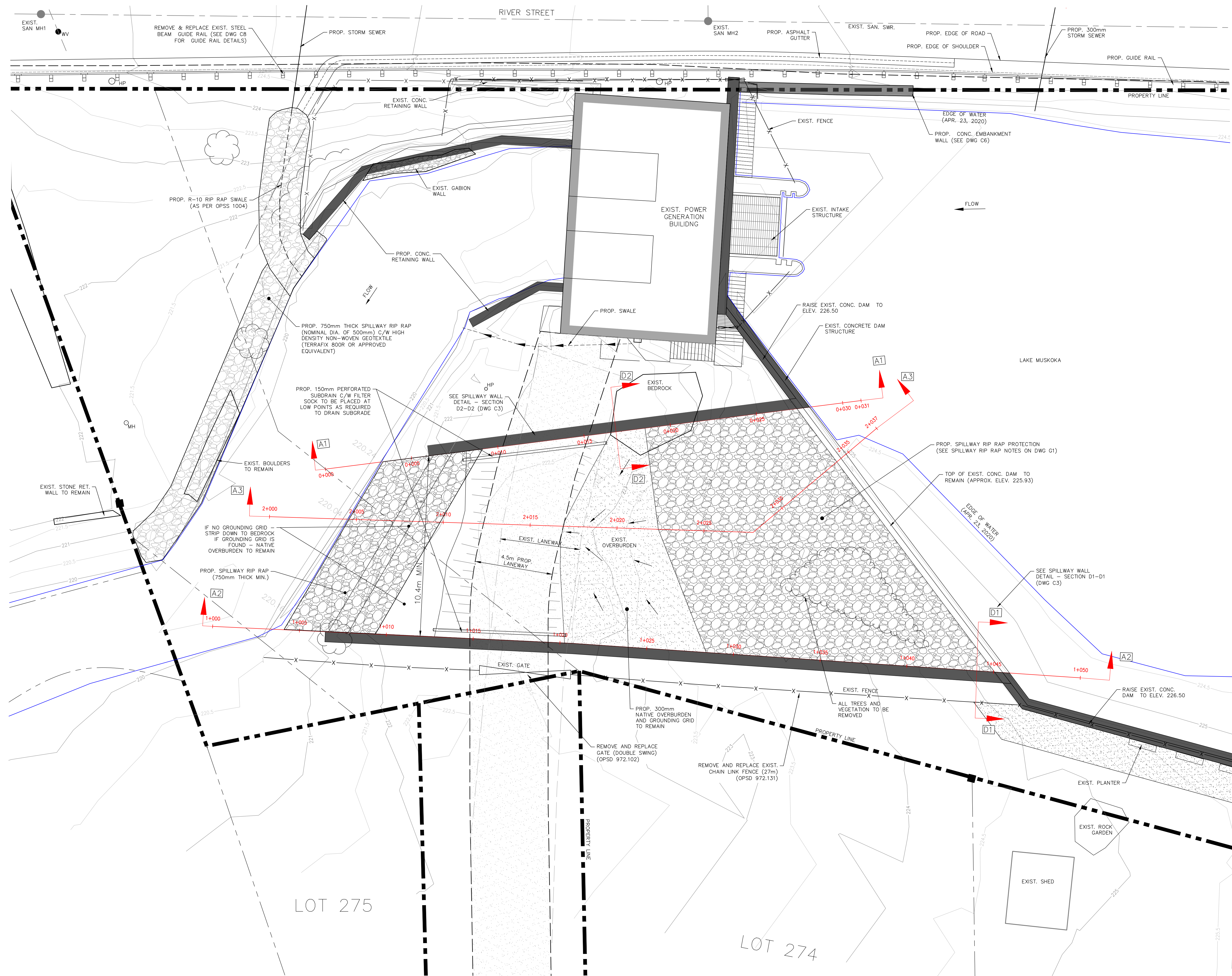
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1 BAILEY STREET
PORT CARLING, ONTARIO



KEY PLAN
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LIST OF DRAWINGS		
No.	Rev.	DRAWING DESCRIPTION
C1	1	Existing Conditions & Removals
C2	6	Spillway Plan
C3	6	Spillway Sections & Details
C4	6	Spillway, Dam Raise & Dam Extension Plan
C5	6	Spillway, Dam Raise & Dam Extension Section & Details
C6	6	Concrete Embankment Wall
C7	6	Laneway Grading & Details
C8	6	River Street Road Reconstruction Plan & Profile Sta. 0+940 to 1+091
E1	6	Sediment & Erosion Control Plan
S1	1	General Arrangement, Elevations & Retaining Wall Detail
S2	1	Retaining Wall Sections
S3	1	Foundation Upgrades & Roof Framing Plans
S4	1	Foundation Upgrades & Roof Framing Details
S5	1	Removal Photos
G1	6	General Notes



08/05/2025	6	ISSUED FOR TENDER	DR	EG
18/07/2024	5	ISSUED FOR APPROVALS	DR	EG
05/06/2024	4	ISSUED FOR FINAL REVIEW	DR	EG
08/05/2024	3	ISSUED FOR CLIENT REVIEW	DR	EG
05/04/2024	2	ISSUED FOR CLIENT REVIEW	DR	EG
28/03/2024	1	ISSUED FOR CLIENT REVIEW	DR	EG/FP
30/09/2022	0	ISSUED FOR CLIENT REVIEW	BJW	FP
DATE	REV.	REVISION	BY	APP'D

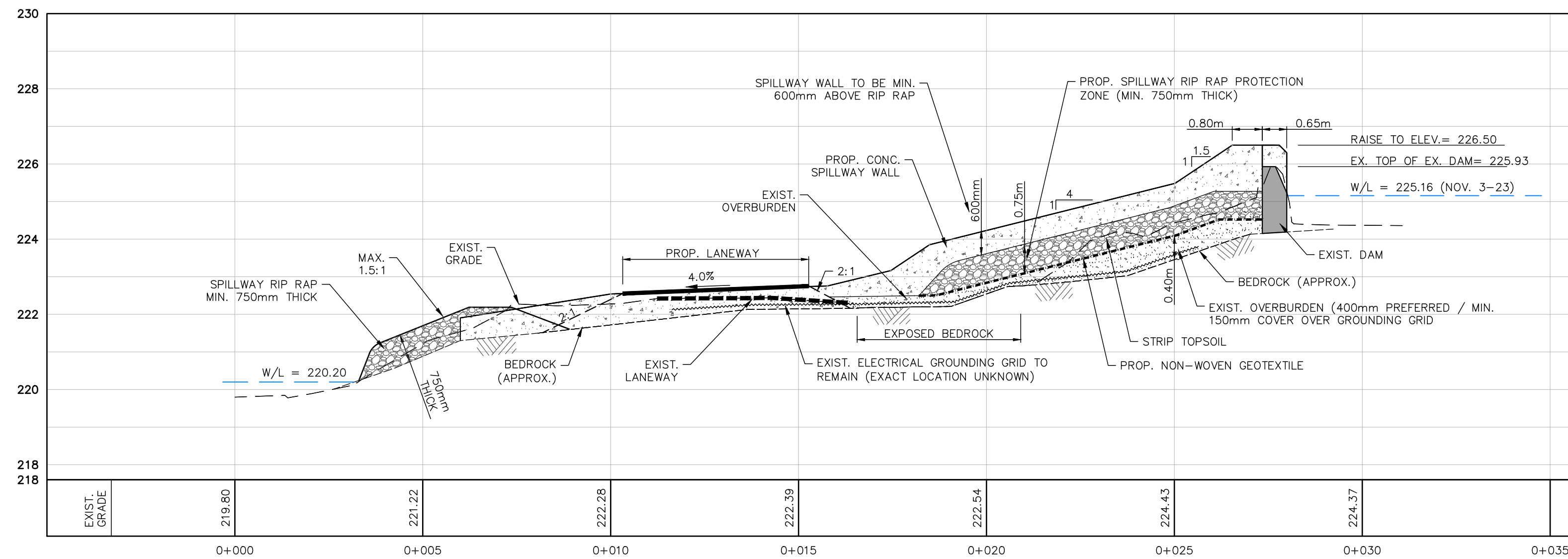
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1 Bailey Street, P.O. Box 129
Port Carling, Ontario



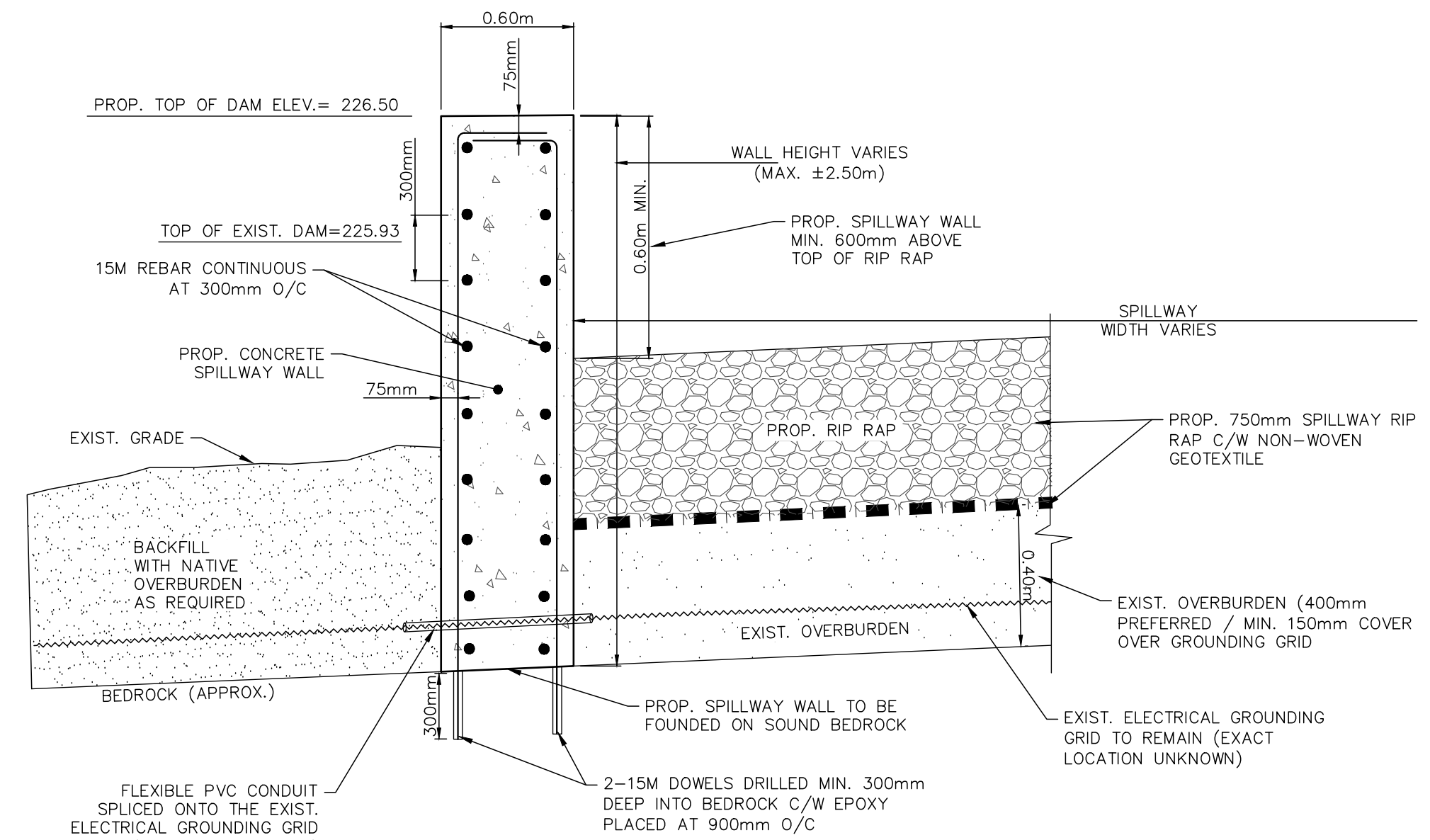
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SPILLWAY PLAN

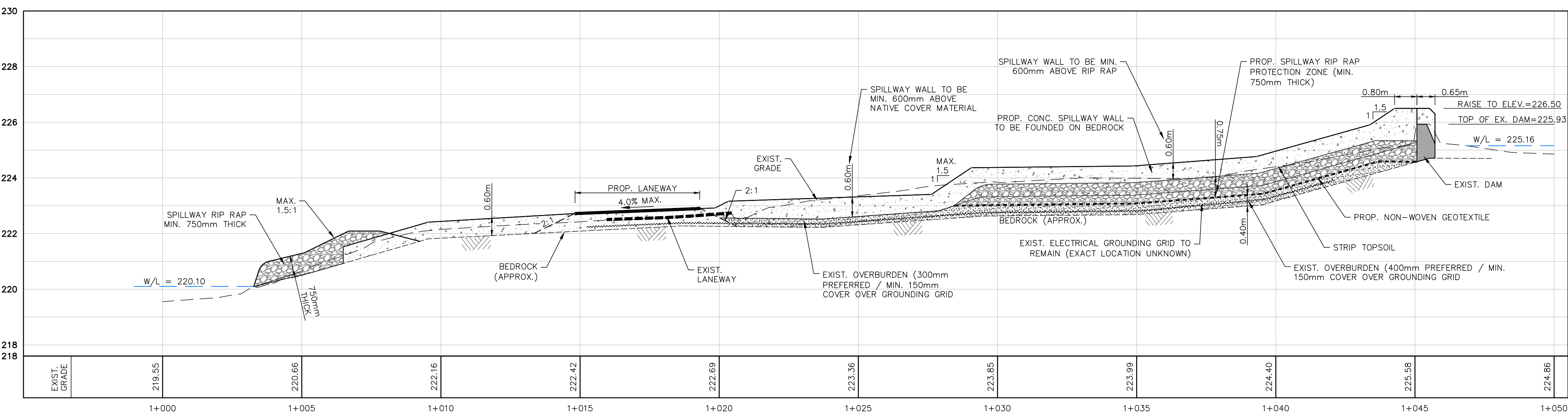
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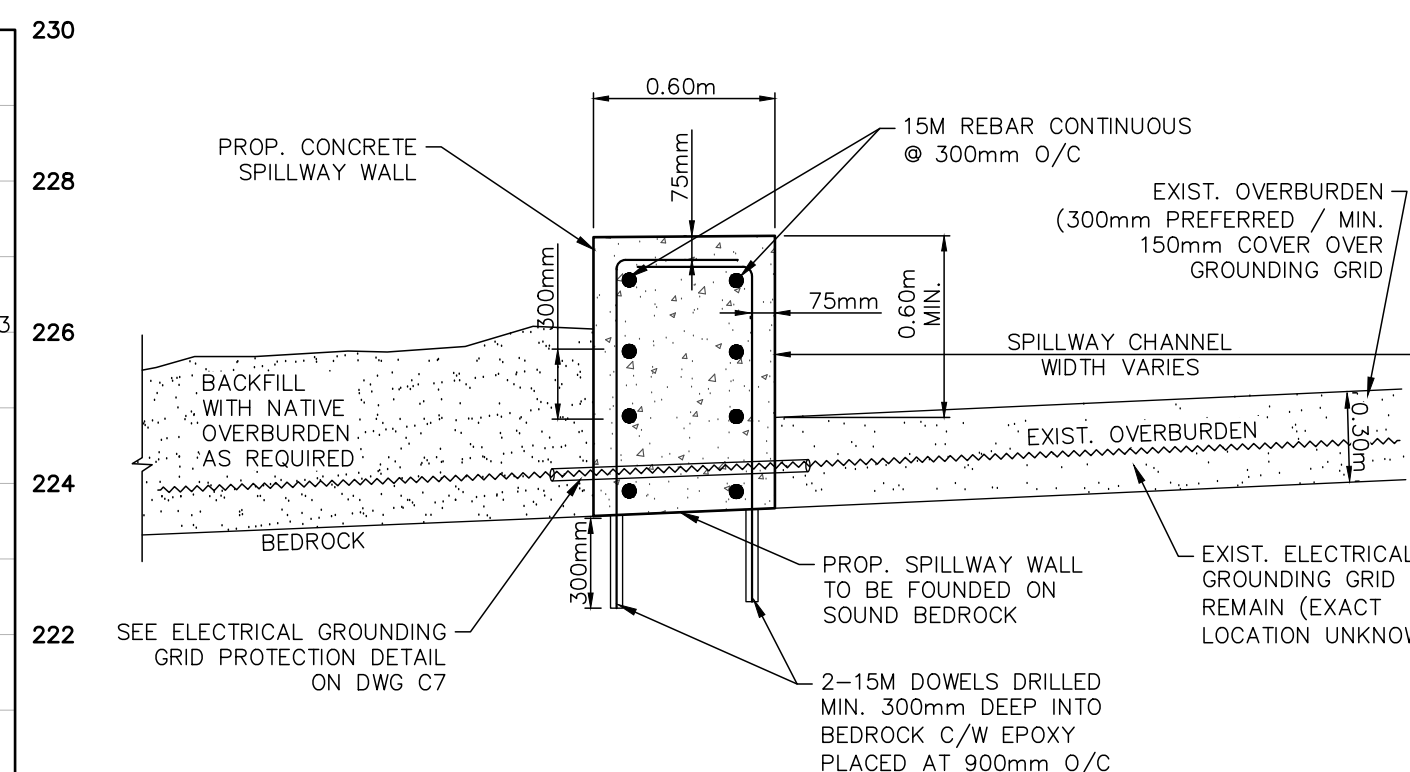
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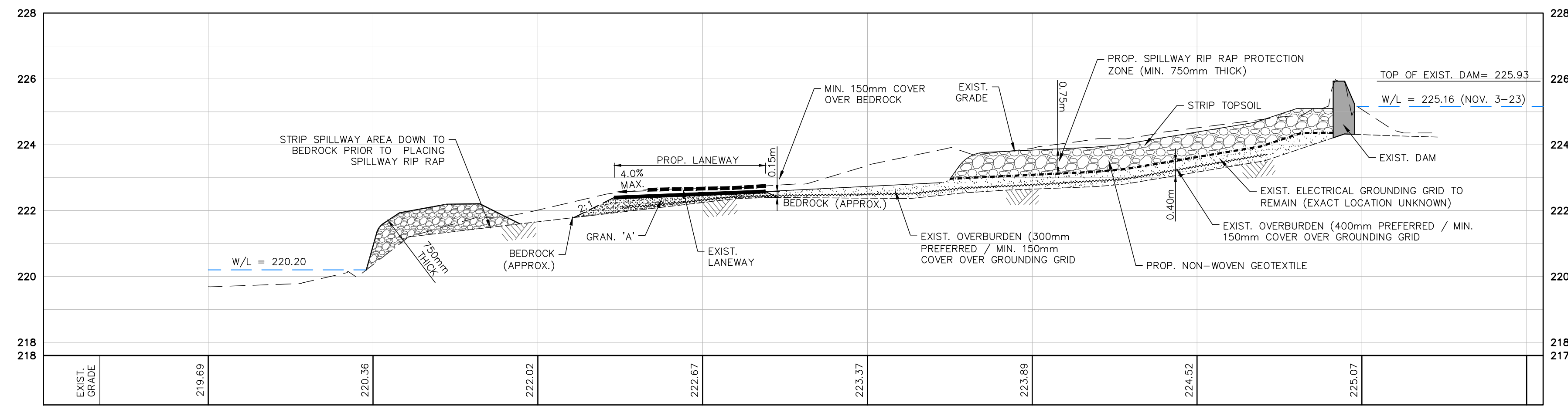
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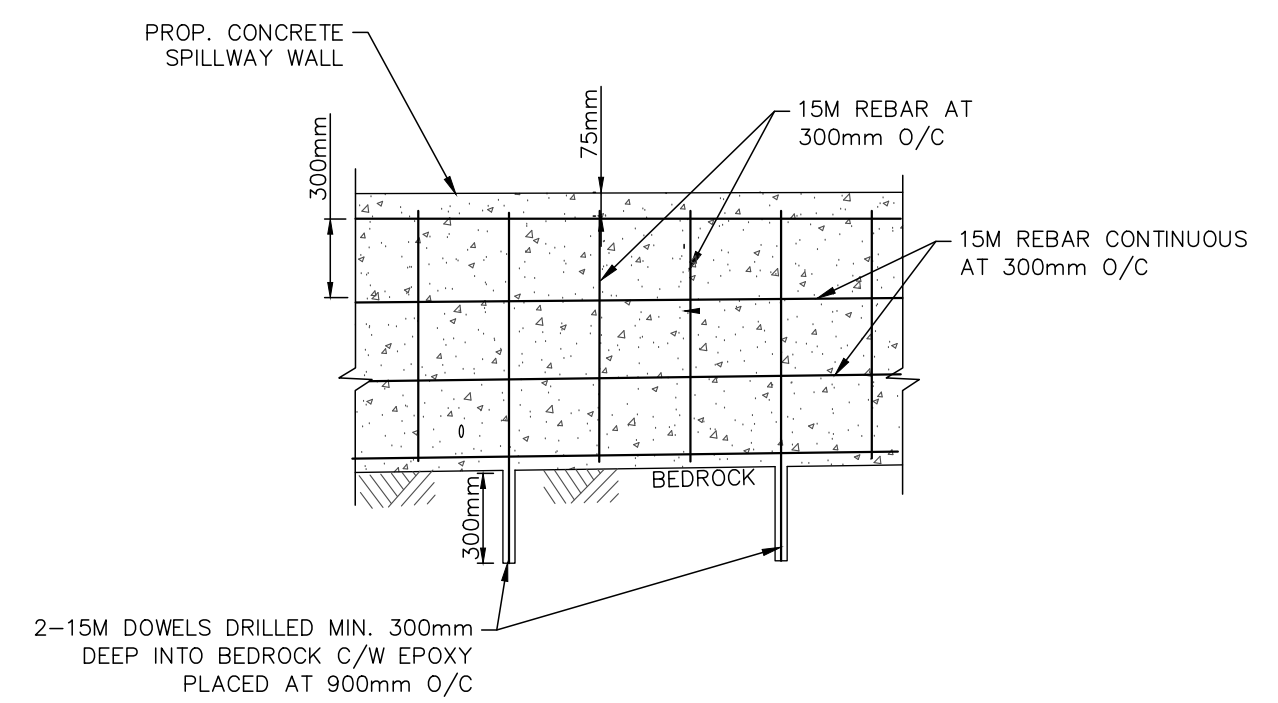
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SECTION D2 - D2
SPILLWAY WALL DETAIL
SCALE 1:25



SECTION A3 - A3
SCALE 1:100



SPILLWAY WALL LONGITUDINAL VIEW
SCALE 1:25

KEY PLAN



ENGINEER'S SEAL:

DATE	REV.	DESCRIPTION	BY	APP'D
08/05/2025	6	ISSUED FOR TENDER	DR	EG
18/07/2024	5	ISSUED FOR APPROVALS	DR	EG
05/06/2024	4	ISSUED FOR FINAL REVIEW	DR	EG
08/05/2024	3	ISSUED FOR CLIENT REVIEW	DR	EG
05/04/2024	2	ISSUED FOR CLIENT REVIEW	DR	EG
28/03/2024	1	ISSUED FOR CLIENT REVIEW	DR	EG/FP
30/09/2022	0	ISSUED FOR CLIENT REVIEW	BNJ	FP

CLIENT:

Township of Muskoka Lakes
1 Bailey Street, P.O. Box 129
Port Carling, Ontario

CONSULTANT:



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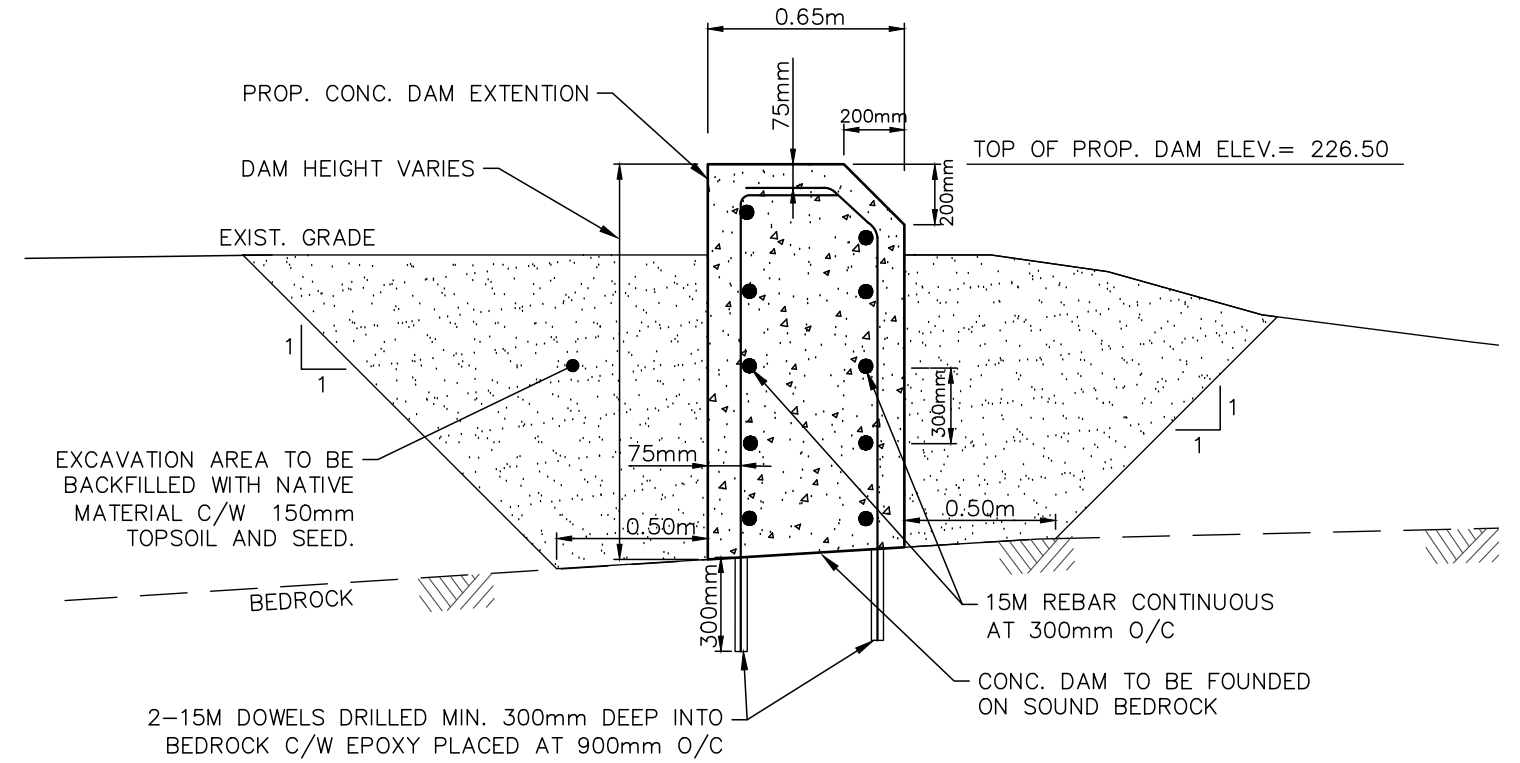
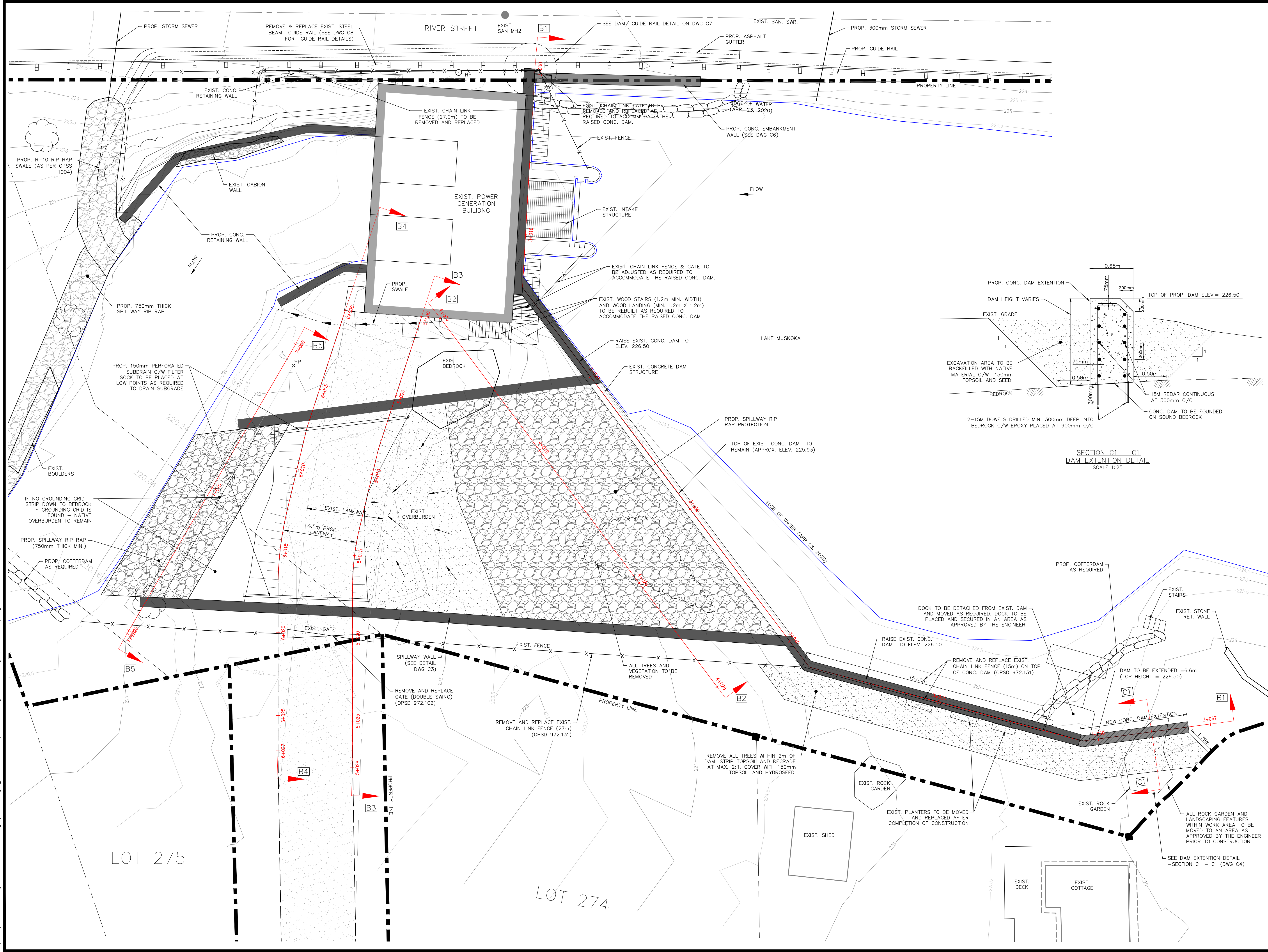
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GENERATING STATION
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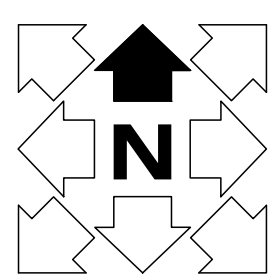
**SPILLWAY SECTIONS
AND DETAILS**

DR	EG	EG	EG
DRAWN	DESIGNED	CHECKED	APPROVED
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SCALE		DATE	
23-1236	6	C3	
PROJECT No.	REVISION	DRAWING	

P:\2023\231236 - Burgess Dam Detailed Design\03 Drawings\Civil Drawings\23-1236-Burgess Dam Design (April 16-25).dwg



SECTION C1 - C1
DAM EXTENSION DETAIL
SCALE 1:25



KEY PLAN



ENGINEER'S SEAL:

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18/07/2024	5	ISSUED FOR APPROVALS	DR	EG
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28/03/2024	1	ISSUED FOR CLIENT REVIEW	DR	EG/FP
30/09/2022	0	ISSUED FOR CLIENT REVIEW	BJW	FP

CLIENT:

Township of Muskoka Lakes
1 Bailey Street, P.O. Box 129
Port Carling, Ontario

CONSULTANT:



PROJECT TITLE:

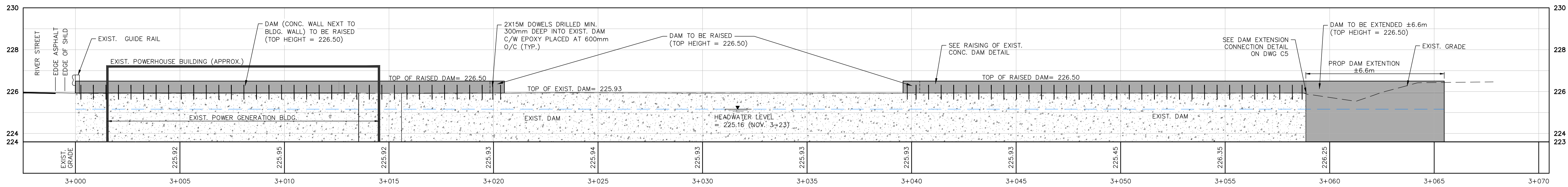
**LITTLE BURGESS
GENERATING STATION
REHAB**

DRAWING TITLE:

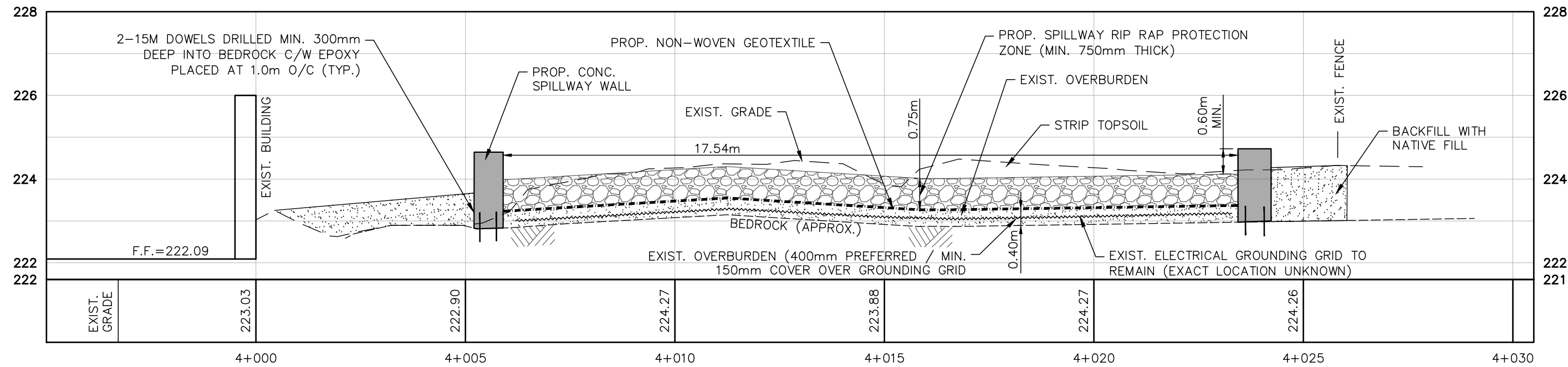
**SPILLWAY, DAM RAISE
AND DAM EXTENSION
PLAN**

DR	EG	EG	EG
DRAWN	DESIGNED	CHECKED	APPROVED
1 : 100		MAR. 27, 2024	
SCALE		DATE	
23-1236	6	C4	
PROJECT No.	REVISION	DRAWING	

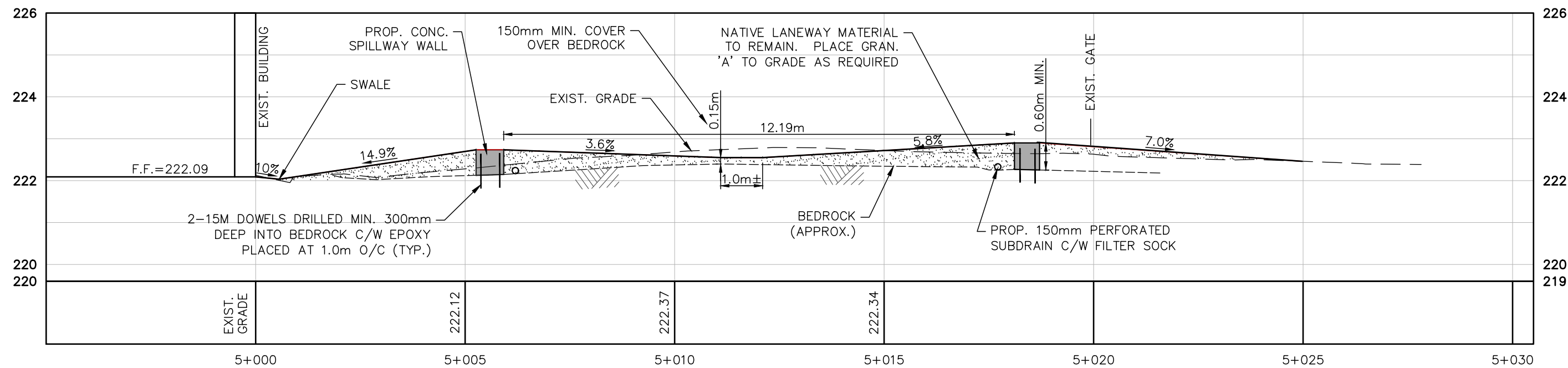
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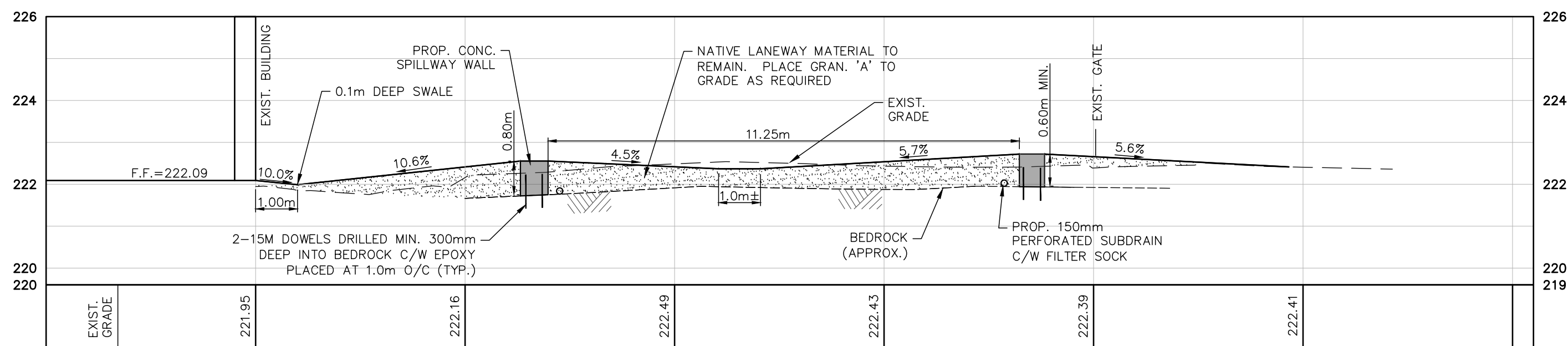
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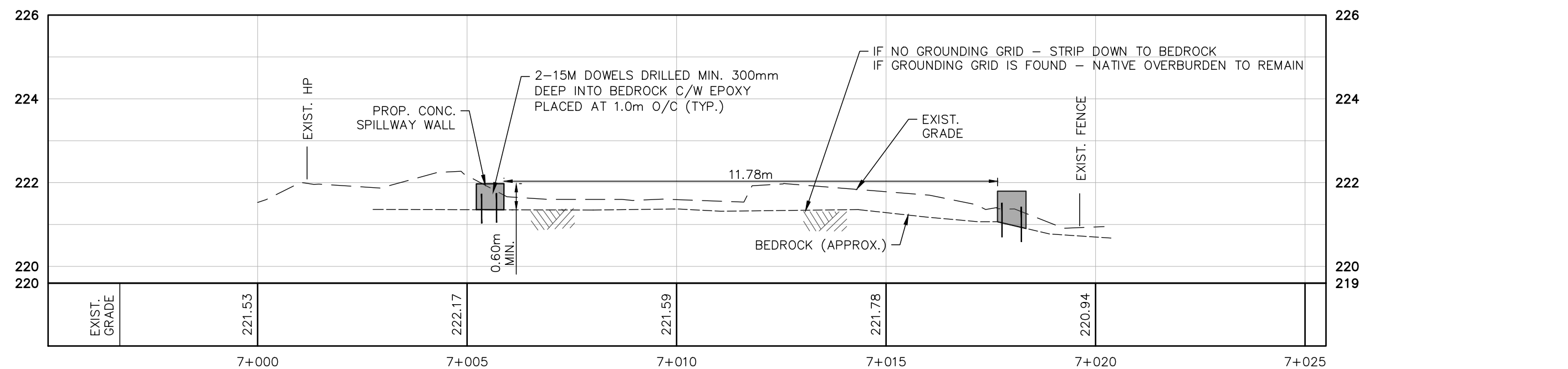
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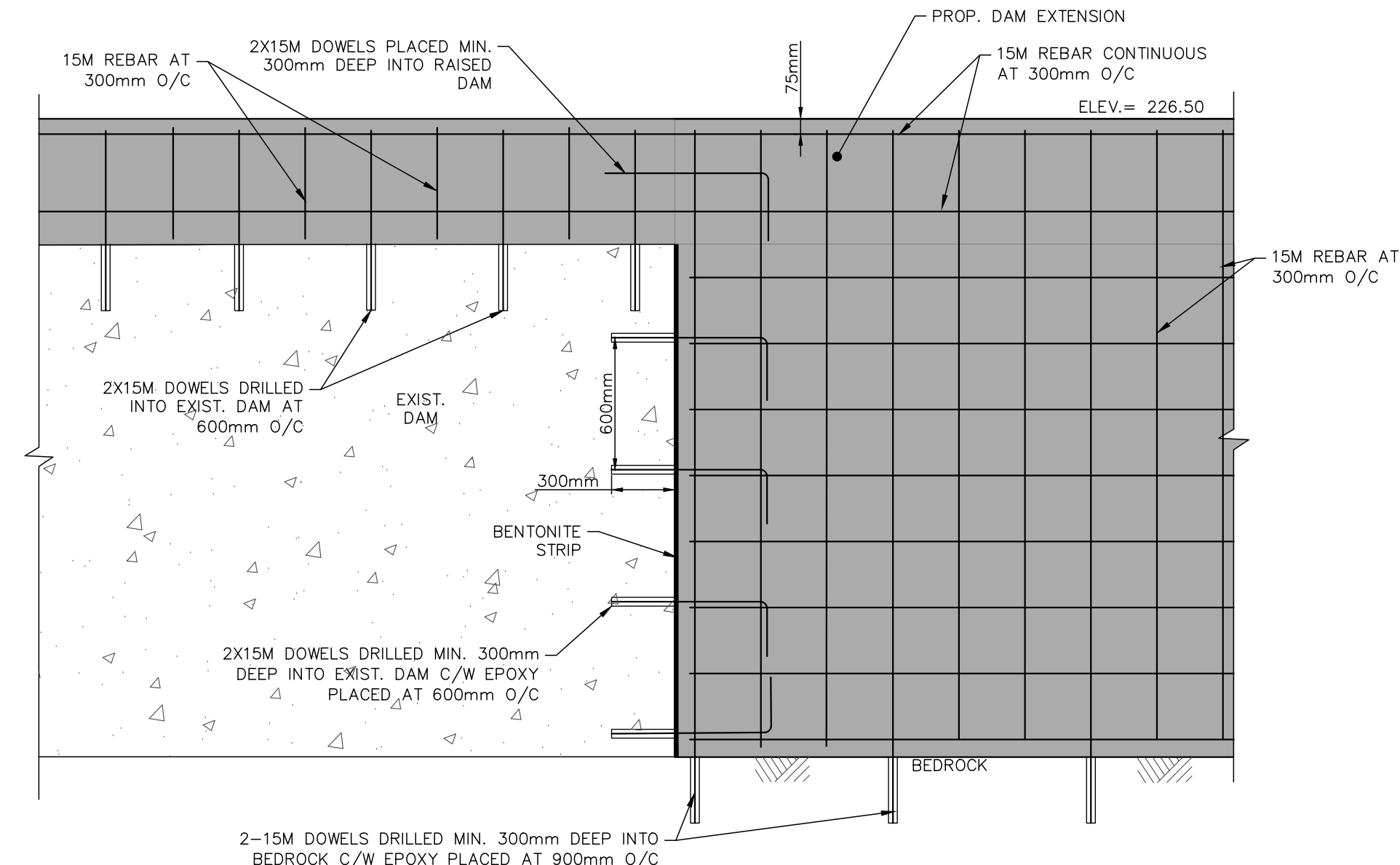
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SCALE 1:100



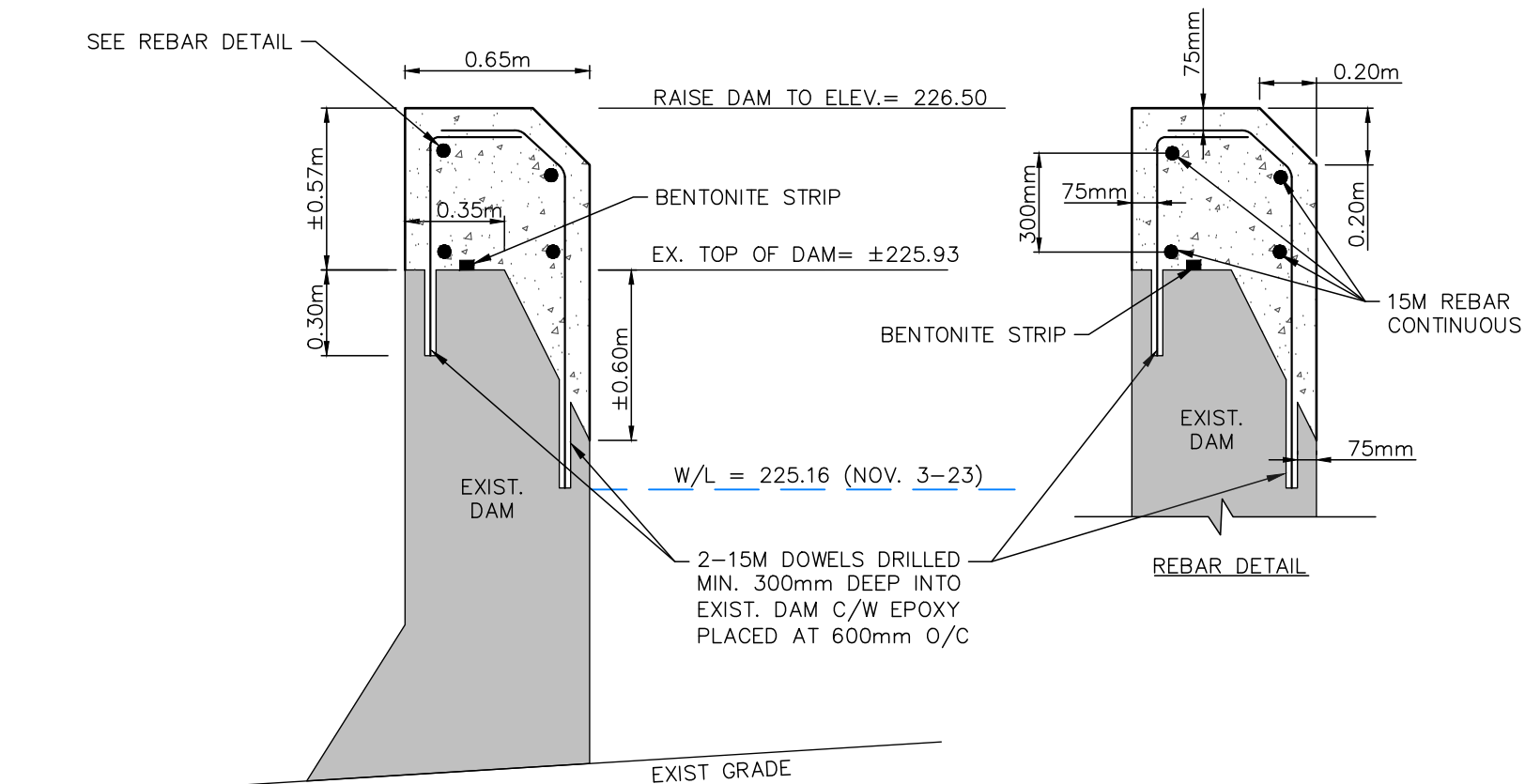
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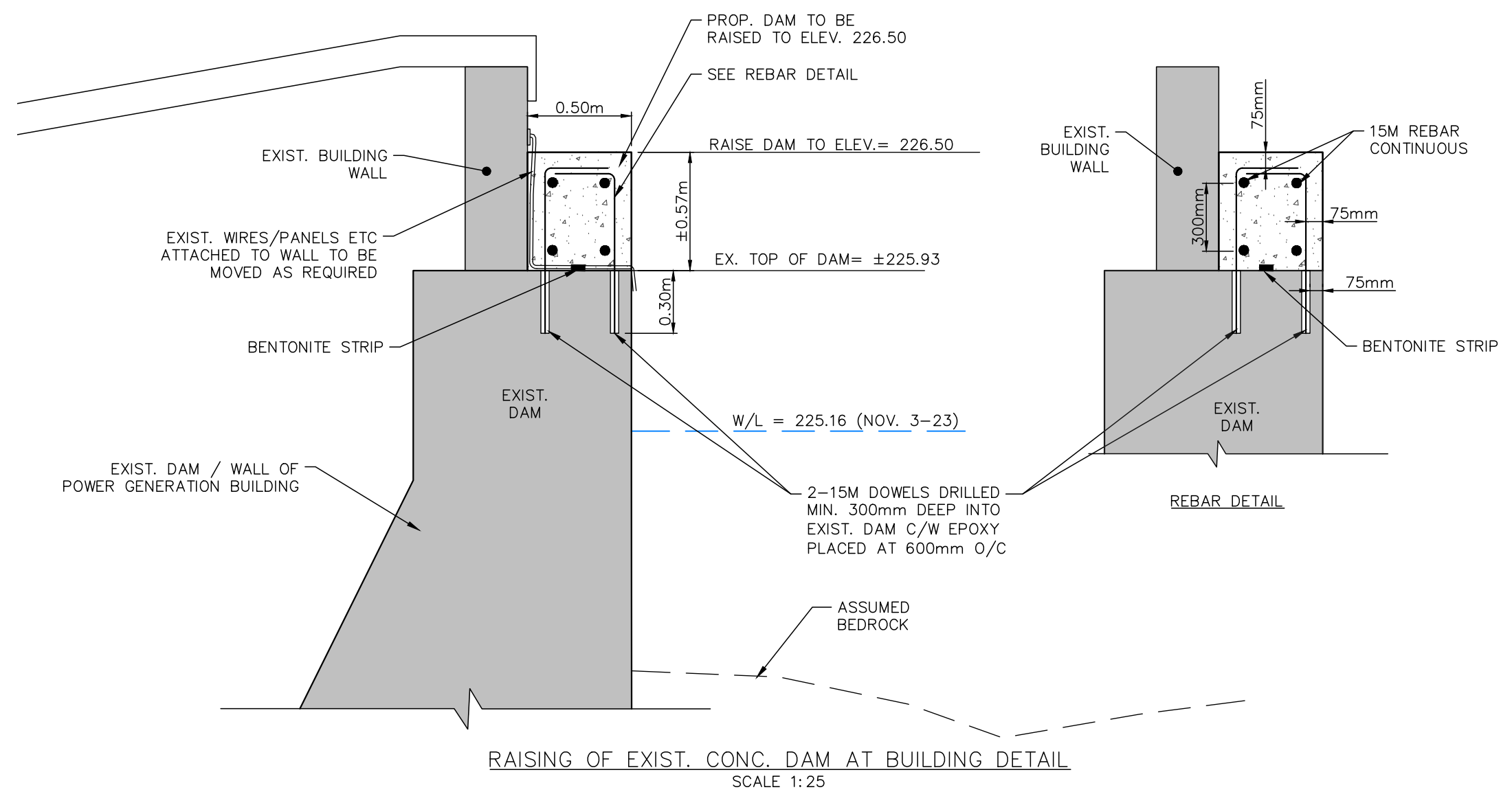
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DAM EXTENSION CONNECTION TO EXIST. DAM DETAIL
SCALE 1:25



RAISING OF EXIST. CONC. DAM DETAIL
SCALE 1:25



RAISING OF EXIST. CONC. DAM AT BUILDING DETAIL
SCALE 1:25

KEY PLAN



ENGINEER'S SEAL:

08/05/2025	6	ISSUED FOR TENDER	DR	EG
18/07/2024	5	ISSUED FOR APPROVALS	DR	EG
05/06/2024	4	ISSUED FOR FINAL REVIEW	DR	EG
08/05/2024	3	ISSUED FOR CLIENT REVIEW	DR	EG
05/04/2024	2	ISSUED FOR CLIENT REVIEW	DR	EG
28/03/2024	1	ISSUED FOR CLIENT REVIEW	DR	EG/FP
30/09/2022	0	ISSUED FOR CLIENT REVIEW	BMJ	FP
DATE	REV.	REVISION	BY	APP'D

CLIENT:

Township of Muskoka Lakes
1 Bailey Street, P.O. Box 129
Port Carling, Ontario

CONSULTANT:



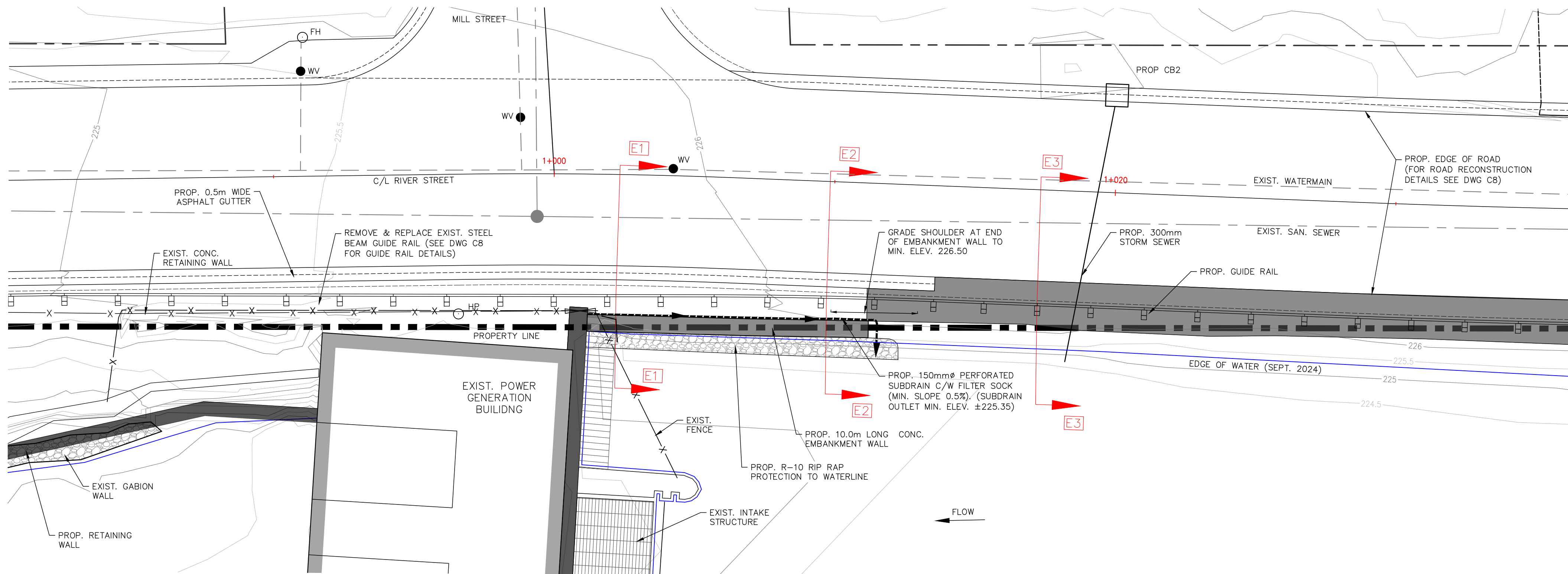
PROJECT TITLE:

**LITTLE BURGESS
GENERATING STATION
REHAB**

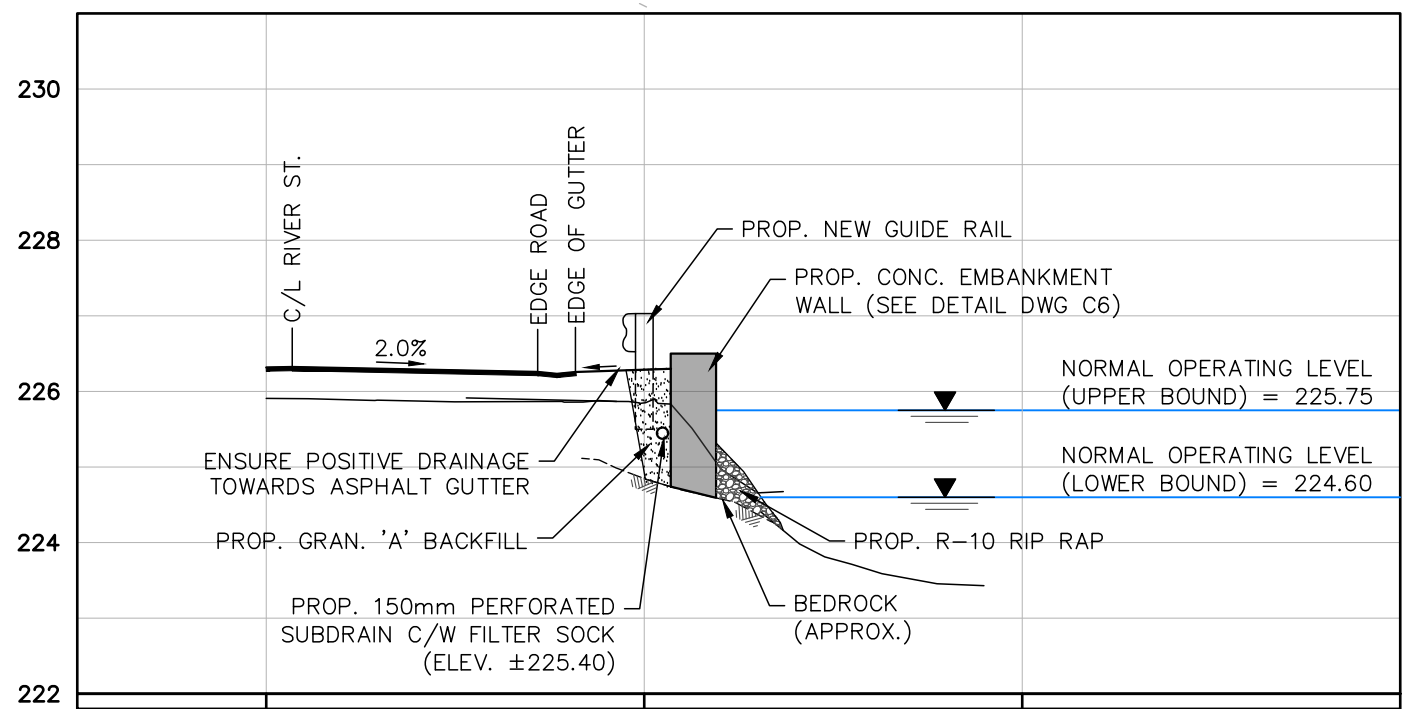
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**SPILLWAY, DAM RAISE
AND DAM EXTENSION
SECTIONS AND DETAILS**

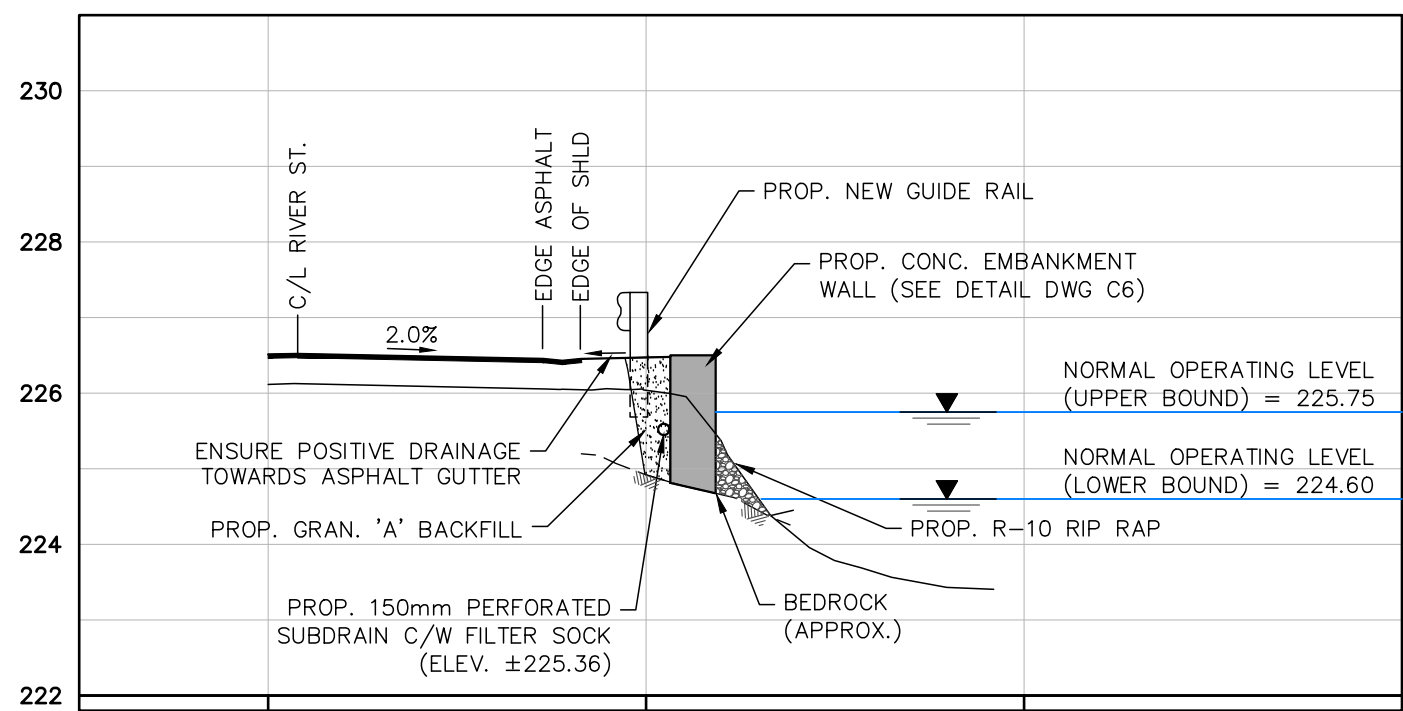
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DRAWN	DESIGNED	CHECKED	APPROVED
1 : 100		MAR. 27, 2024	
SCALE		DATE	
23-1236	6	C5	
PROJECT No.	REVISION	DRAWING	



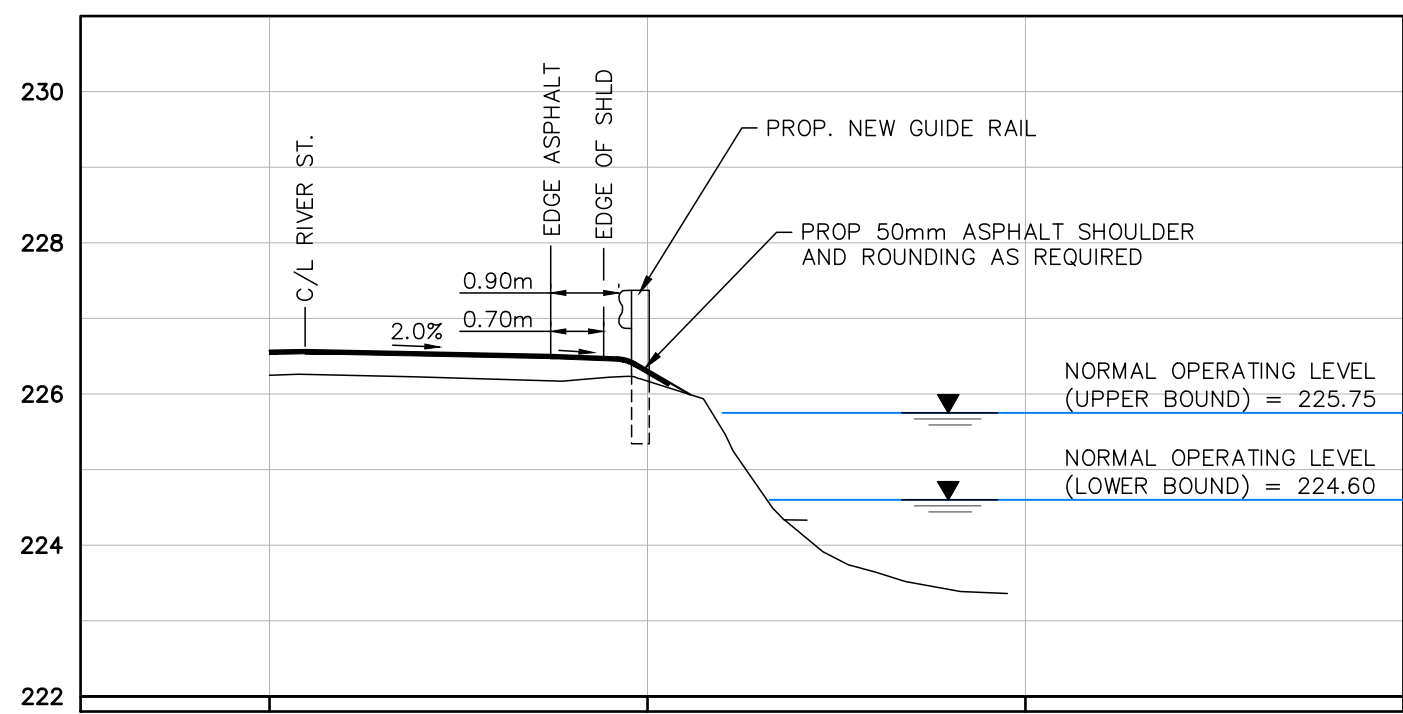
PLAN VIEW
SCALE 1:100



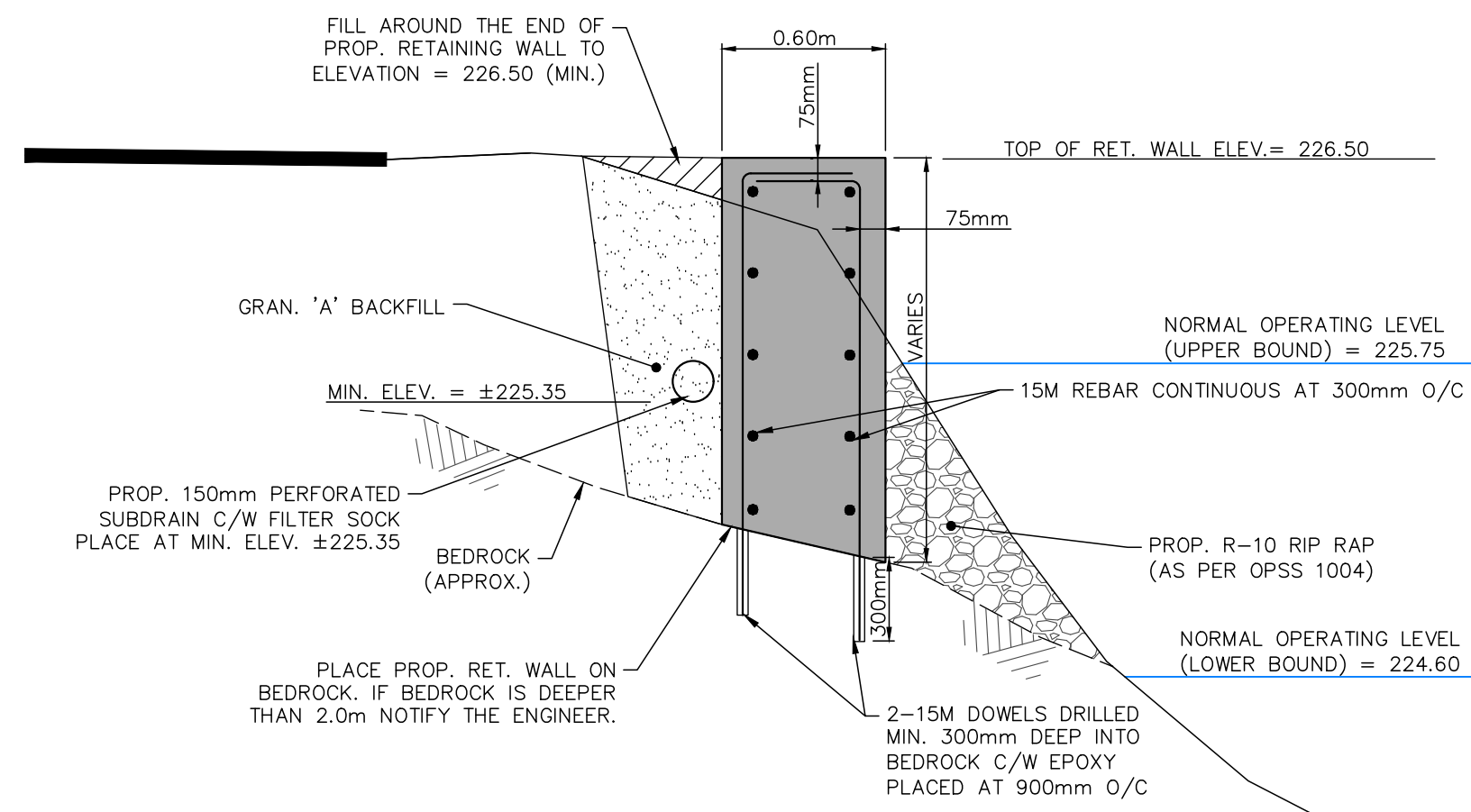
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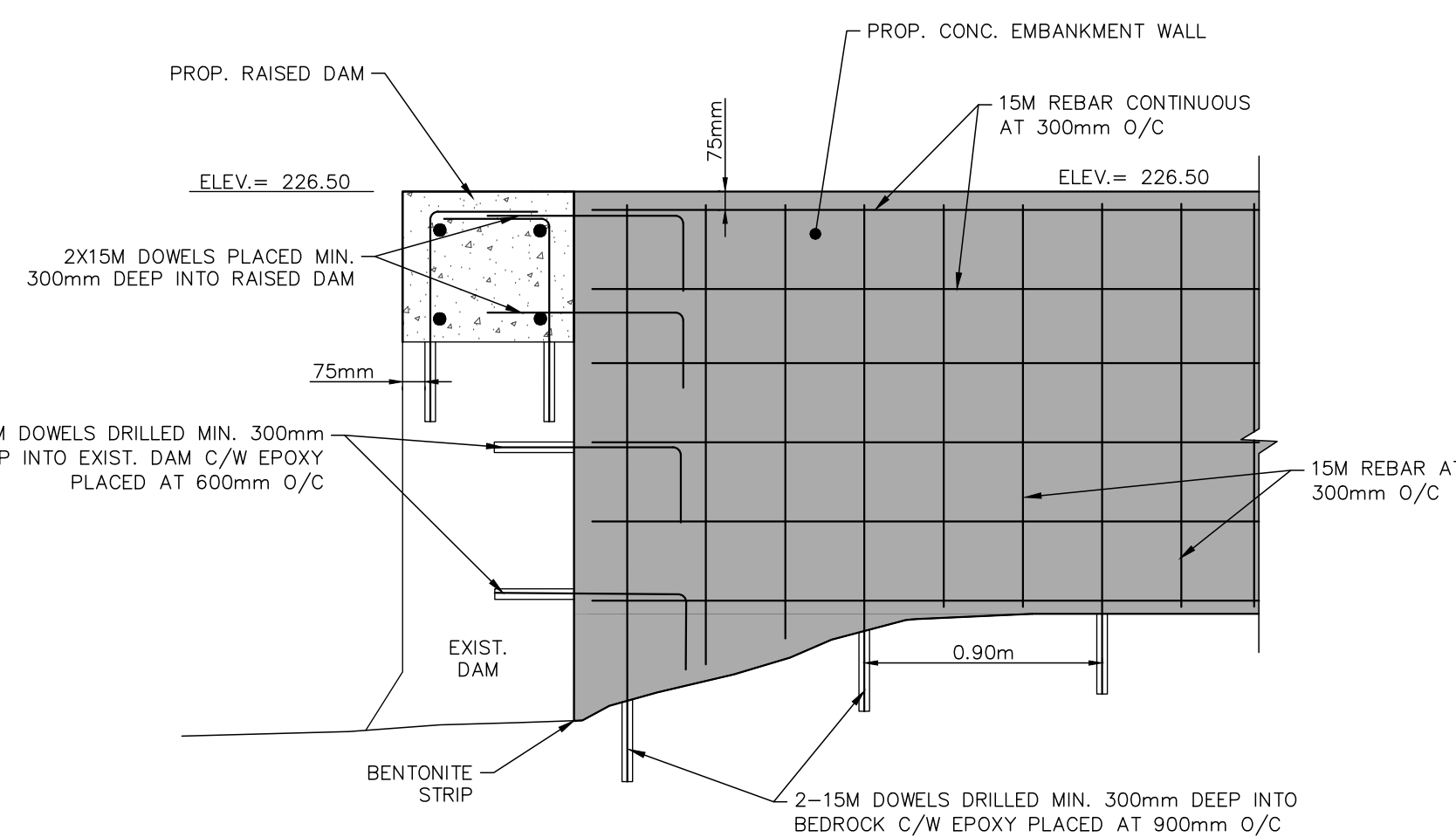
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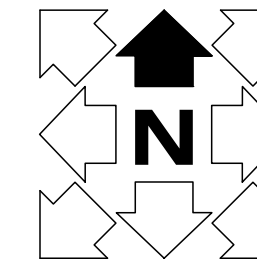
SECTION E3 - E3
SCALE 1:100



PROP. CONCRETE EMBANKMENT
WALL ON NATIVE GROUND
SCALE 1:25



PROP. CONCRETE EMBANKMENT WALL
CONNECTION TO EXIST. DAM
SCALE 1:25



KEY PLAN



ENGINEER'S SEAL:

DATE	REV.	REVISION	BY	APP'D
08/05/2025	6	ISSUED FOR TENDER	DR	EG
18/07/2024	5	ISSUED FOR APPROVALS	DR	EG
05/08/2024	4	ISSUED FOR FINAL REVIEW	DR	EG
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05/04/2024	2	ISSUED FOR CLIENT REVIEW	DR	EG
28/03/2024	1	ISSUED FOR CLIENT REVIEW	DR	EG/FP
30/09/2022	0	ISSUED FOR CLIENT REVIEW	BNJ	FP

CLIENT:

Township of Muskoka Lakes
1 Bailey Street, P.O. Box 129
Port Carling, Ontario

CONSULTANT:



PROJECT TITLE:

**LITTLE BURGESS
GENERATING STATION
REHAB**

DRAWING TITLE:

**CONCRETE
EMBANKMENT WALL**

DR	EG	EG	EG
DRAWN	DESIGNED	CHECKED	APPROVED
1 : 100		MAR. 27, 2024	
SCALE		DATE	
23-1236	6	C6	
PROJECT No.	REVISION	DRAWING	



ENGINEER'S SEAL:

08/05/2025	6	ISSUED FOR TENDER	DR	EG
18/07/2024	5	ISSUED FOR APPROVALS	DR	EG
05/08/2024	4	ISSUED FOR FINAL REVIEW	DR	EG
08/05/2024	3	ISSUED FOR CLIENT REVIEW	DR	EG
05/04/2024	2	ISSUED FOR CLIENT REVIEW	DR	EG
28/03/2024	1	ISSUED FOR CLIENT REVIEW	DR	EG/FP
30/09/2022	0	ISSUED FOR CLIENT REVIEW	BNJ	FP
DATE	REV.	REVISION	BY	APP'D

CLIENT:

Township of Muskoka Lakes
1 Bailey Street, P.O. Box 129
Port Carling, Ontario

CONSULTANT:



PROJECT TITLE:

LITTLE BURGESS GENERATING STATION REHAB

DRAWING TITLE:

LANEWAY GRADING AND DETAILS

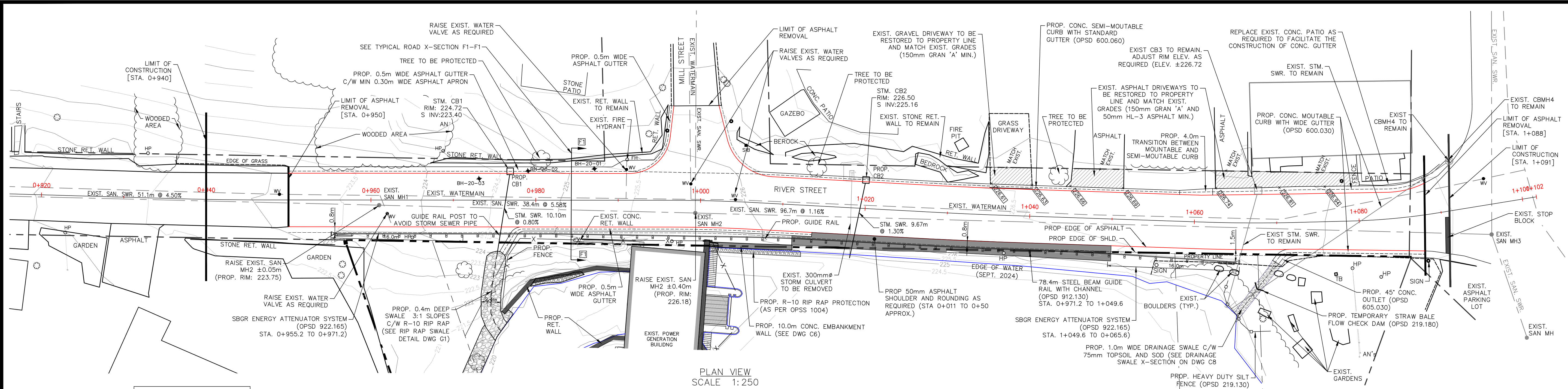
SCALE	DATE
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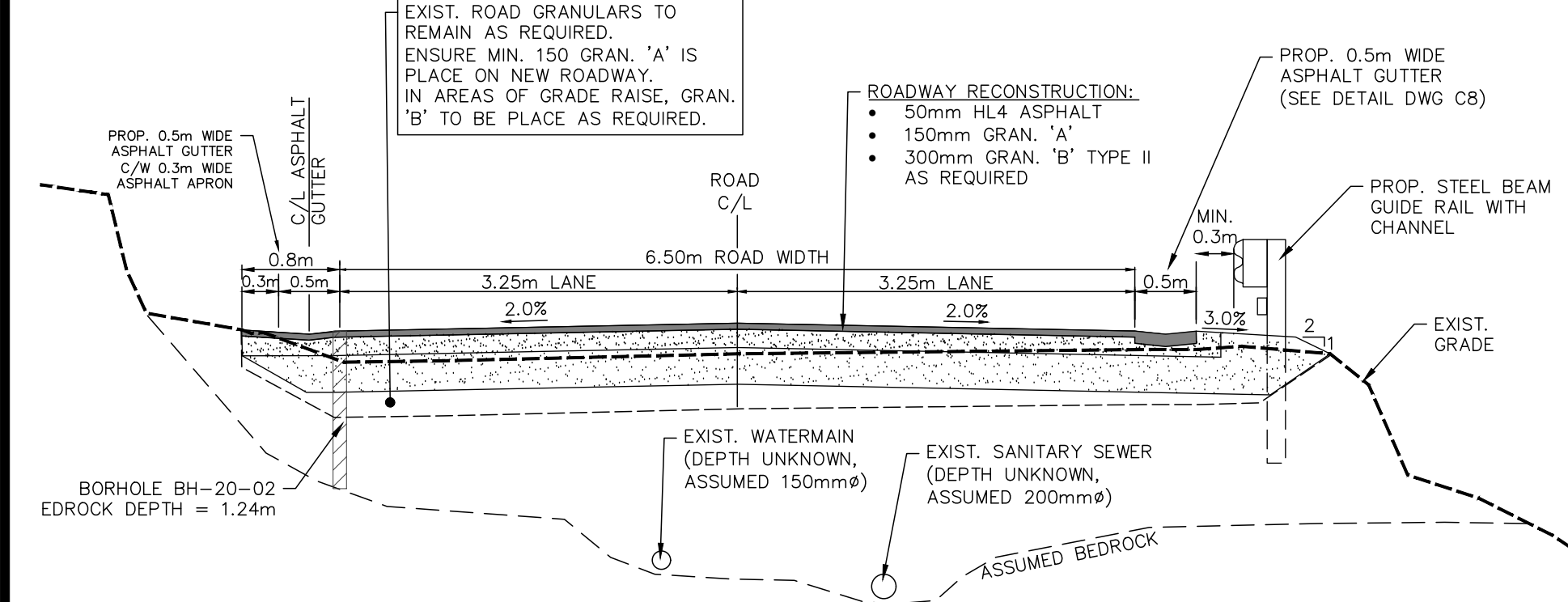
23-1236 | 6 | C7

PROJECT No.	REVISION	DRAWING
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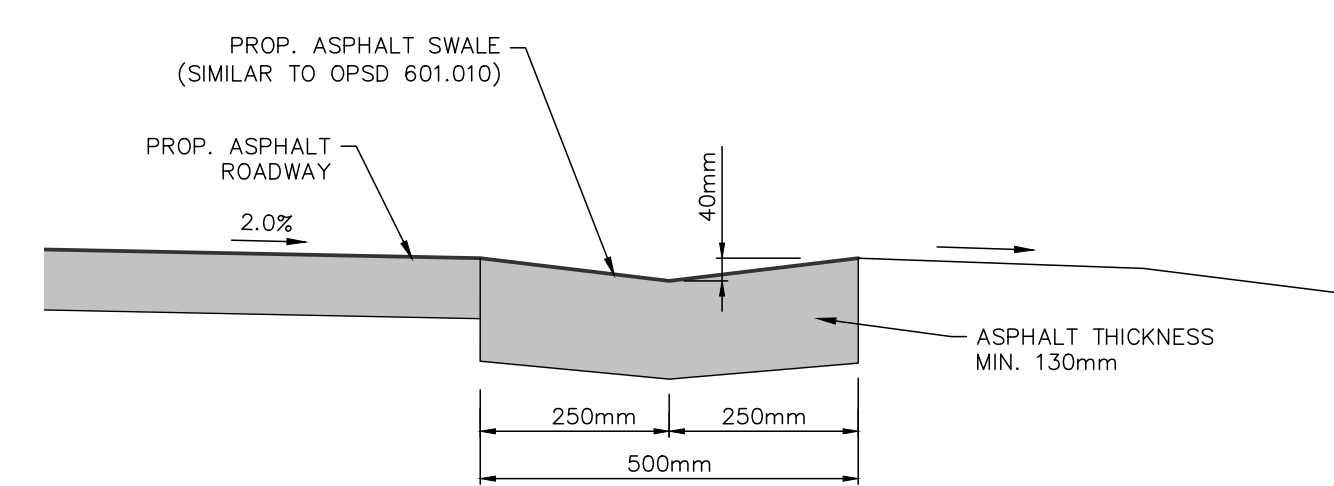
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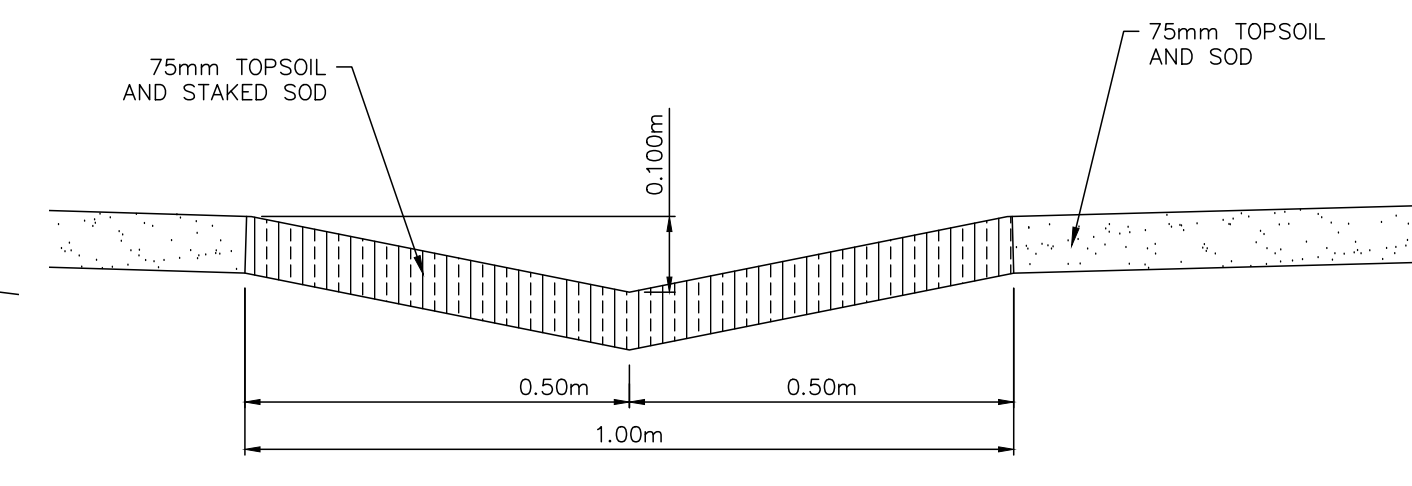
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SCALE 1:250



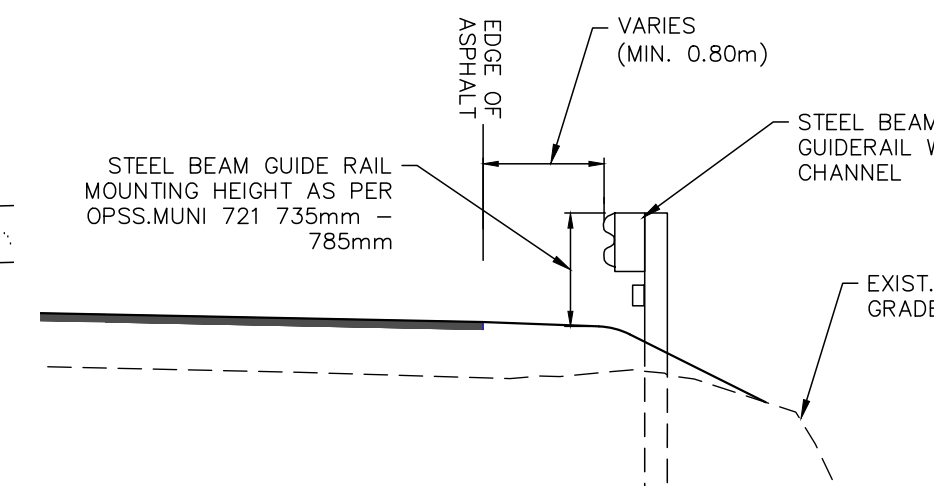
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SCALE 1:50



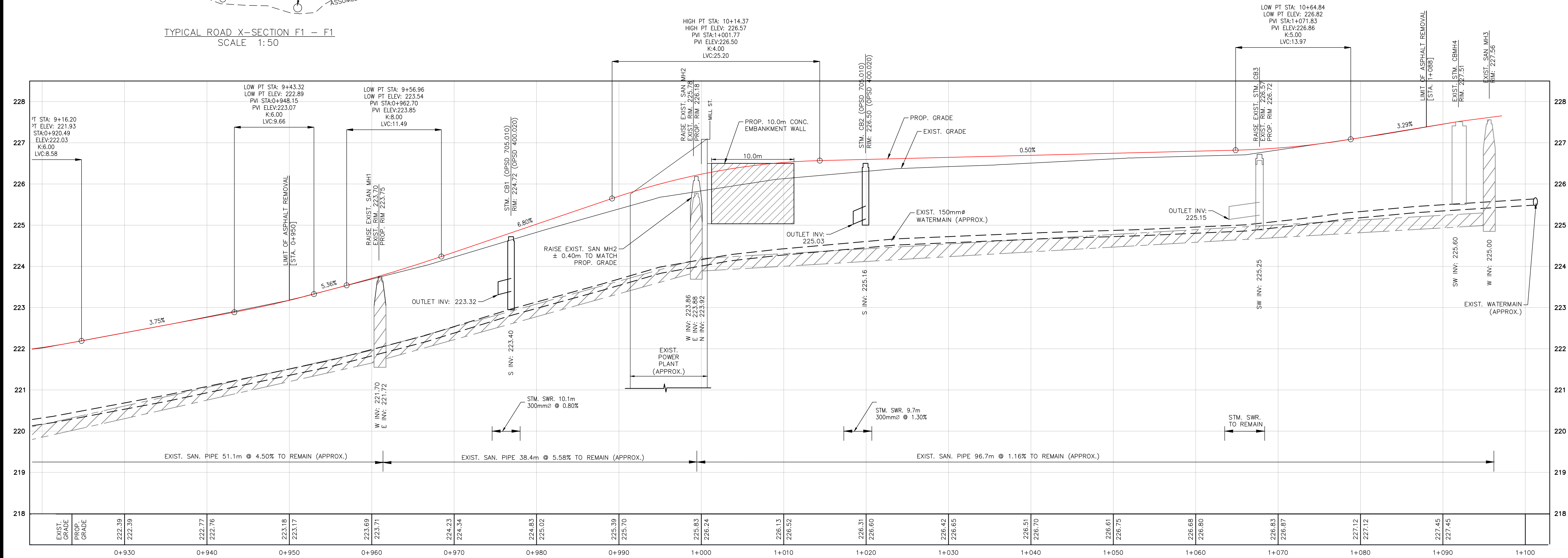
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SCALE 1:10



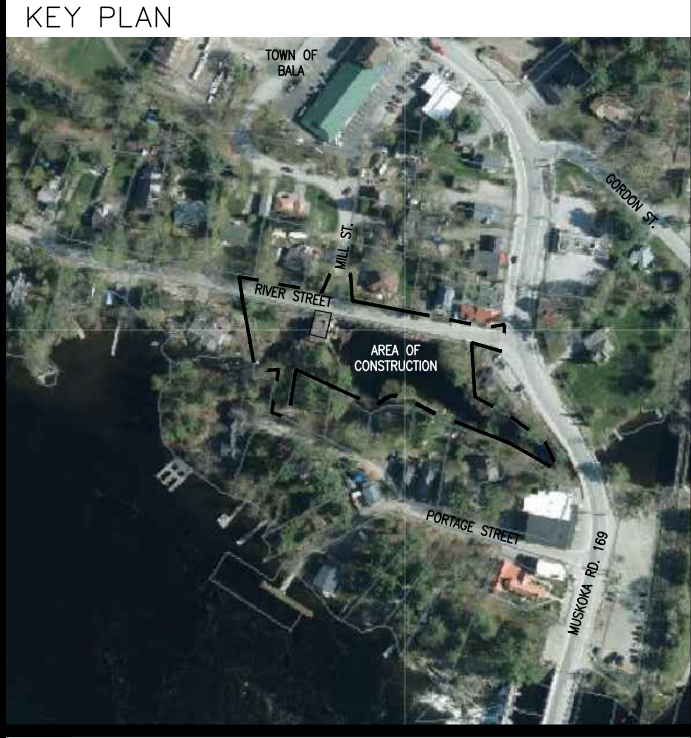
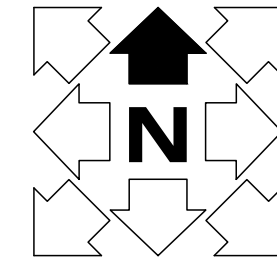
DRAINAGE SWALE X-SECTION
SCALE 1:10



GUARD RAIL DETAIL
SCALE 1:50



PROFILE - RIVER STREET
SCALE HORZ. 1:250
VERT. 1:50



ENGINEER'S SEAL:

DATE	REV.	REVISION	BY	APP'D
08/05/2025	6	ISSUED FOR TENDER	DR	EG
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CLIENT:

Township of Muskoka Lakes
1 Bailey Street, P.O. Box 129
Port Carling, Ontario



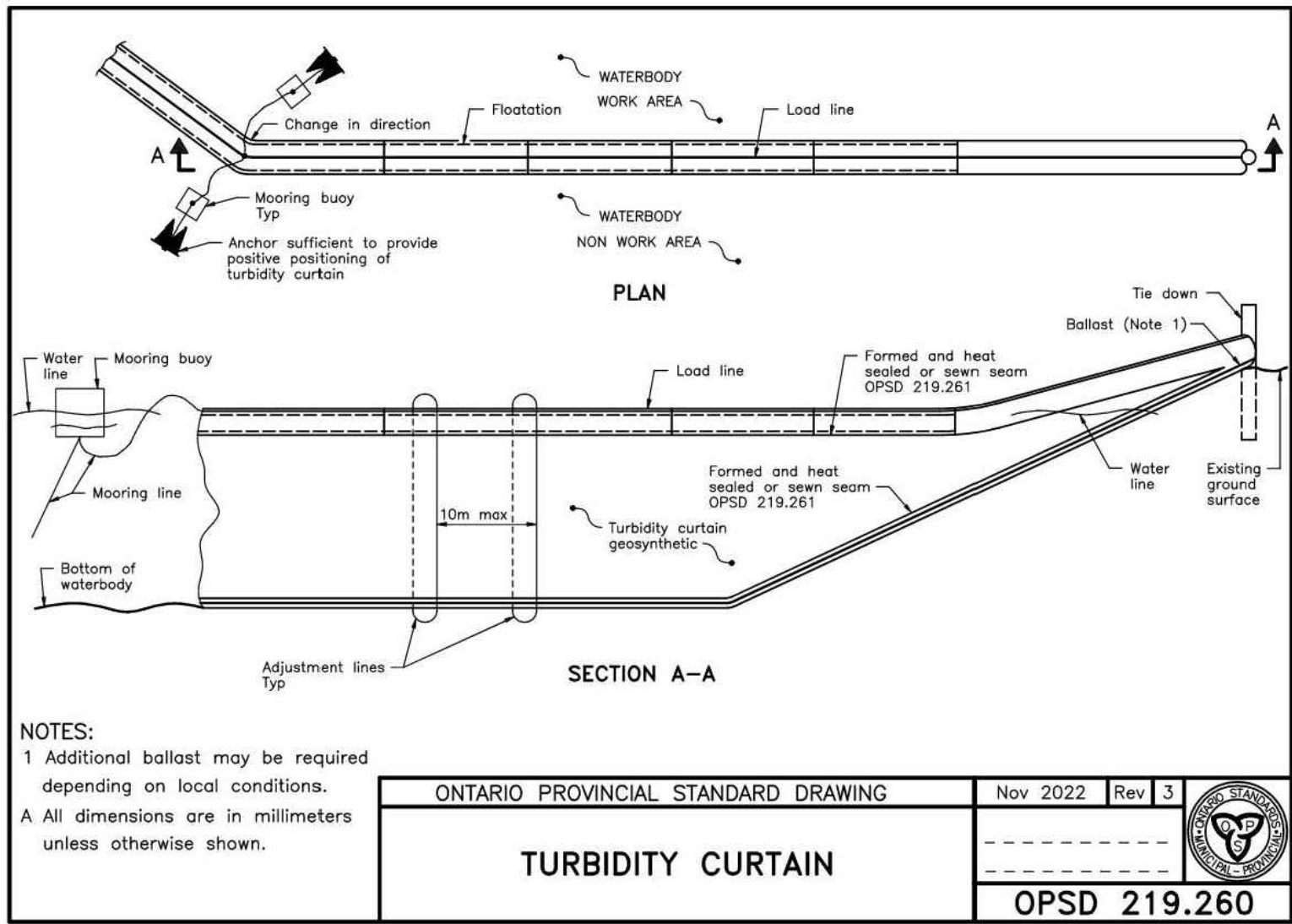
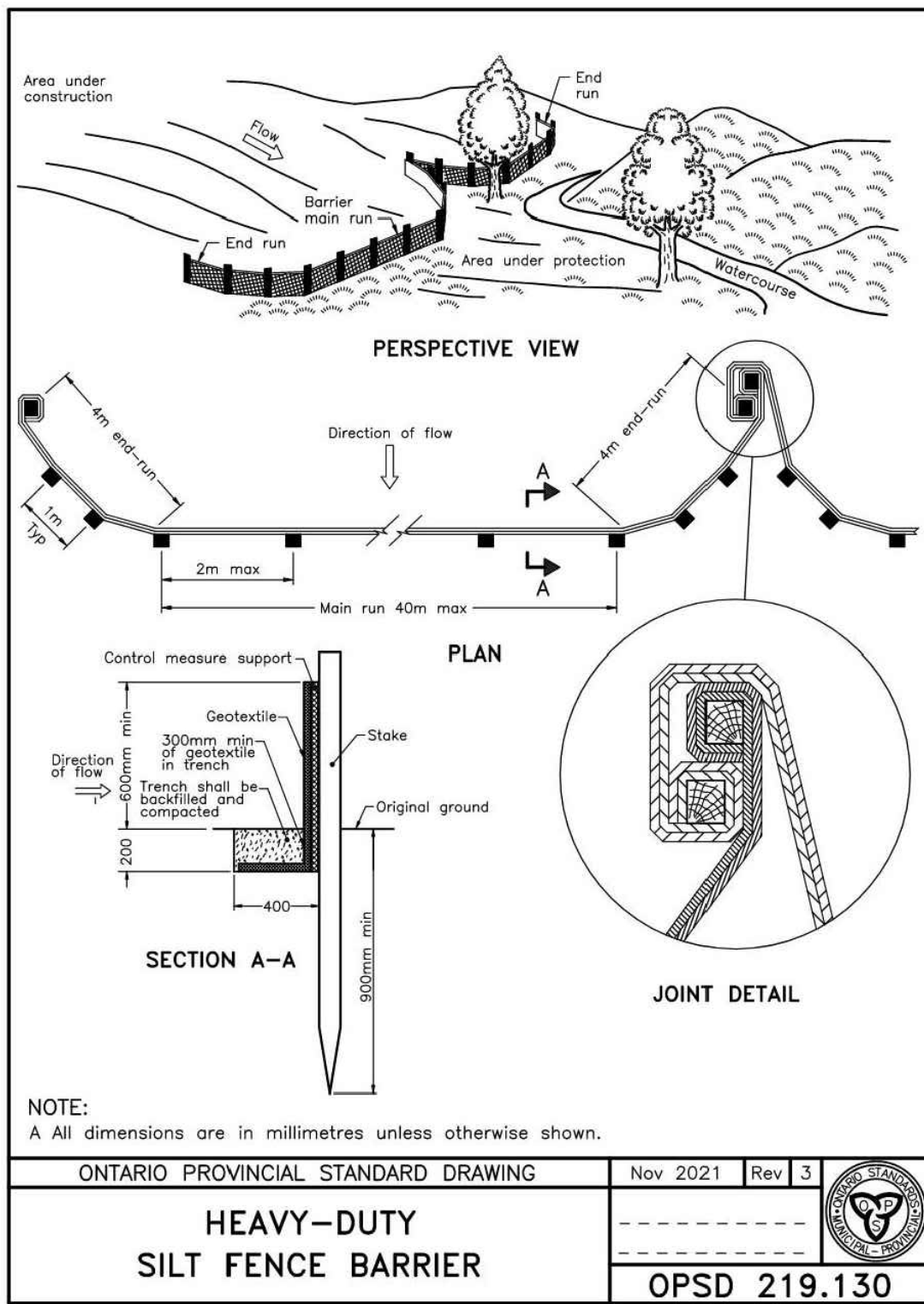
PROJECT TITLE:

**LITTLE BURGESS
GENERATING STATION
REHAB**

DRAWING TITLE:

**RIVER STREET
ROAD RECONSTRUCTION
PLAN & PROFILE
STA. 0+940 TO 1+091**

DR	DR	CS	EG
DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN		MAR. 27, 2024	
SCALE		DATE	
23-1236	6	C8	
PROJECT No.	REVISION	DRAWING	



CONSTRUCTION MITIGATION:

1. EROSION CONTROL STRUCTURES ARE TO BE MONITORED REGULARLY AND ANY DAMAGE REPAIRED IMMEDIATELY. SEDIMENT IS TO BE REMOVED WHEN ACCUMULATIONS BUILD UP INSIDE THE CONTROL FENCE.
2. ALL EROSION CONTROL STRUCTURES ARE TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND HAS BEEN RESTABILIZED EITHER BY GRAVEL OR RESTORATION OF VEGETATIVE GROUND COVER.
3. NO ALTERNATE METHODS OF EROSION PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY THE ENGINEER AND THE TOWNSHIP OF MUSKOKA LAKES.
4. THE CONTRACTOR IS RESPONSIBLE FOR MUNICIPAL ROADWAY TO BE CLEARED OF ALL SEDIMENT TRACKED BY VEHICLES AT THE END OF EACH DAY.
5. THE CONTRACTOR IS RESPONSIBLE TO REMOVE ANY SEDIMENT THAT HAS TRACKED OFF SITE ONTO ADJACENT PROPERTY OWNED BY OTHERS. RESTORATION AND/OR MAINTENANCE TO ADJACENT PROPERTY MUST BE COMPLETED TO EQUAL OR BETTER CONDITION.
10. THE CONTRACTOR SHALL ISOLATE THE WORK AREA FROM THE WATER AND COMPLETE ALL WORK IN THE DRY.
11. ALL SEDIMENT CONTROL AND EROSION PROTECTION DEVICES ARE TO BE IN PLACE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND SHALL BE MAINTAINED BY THE CONTRACTOR UNTIL CONSTRUCTION IS COMPLETE, SUBJECT TO APPROVAL BY THE CONTRACT ADMINISTRATOR.

SEDIMENT CONTROL AND ENVIRONMENTAL MANAGEMENT:

GENERAL:

1. IT IS THE CONTRACTOR'S RESPONSIBILITY FOR THE SEDIMENT CONTROL PLAN DURING CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE FOR APPROVAL A CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP) FOR THE MANAGEMENT AND MITIGATION OF CONSTRUCTION IMPACTS, COMPLYING WITH THE REGULATORY REQUIREMENTS OUTLINED IN ALL PERMITS AND LICENSES PERTINENT TO THIS CONTRACT.
2. THE CONTRACTOR SHALL USE MATERIALS, CONSTRUCTION PRACTICES, MITIGATION TECHNIQUES AND MONITORING OF OPERATION AT MUSKOKA LAKE AND ADJACENT WATER CROSSING AT THE DAM SITE IN ORDER TO PREVENT HARMFUL ALTERATION, DISRUPTION OR DISTRACTION OF FISH HABITAT OR THE IMPAIRMENT OF WATER QUALITY.

SEDIMENT CONTROL:

1. THE CONTRACTOR SHALL PHASE THE CONSTRUCTION ACTIVITIES TO MINIMIZE THE SIZE OF THE DISTURBED AREA AND THE DURATION OF SOIL EXPOSURE. SEDIMENTATION CONTROL PLAN (SCP) BY CONTRACTOR MUST BE SUBMITTED FOR APPROVAL PRIOR TO CONSTRUCTION. THE SCP SHALL COVER THE ENTIRE CONSTRUCTION ACTIVITIES.
2. ALL EXCAVATIONS SHALL HAVE STABLE SIDE SLOPES TO PREVENT SLOPE FAILURE AND MINIMIZE EROSION. RUNOFF THROUGH THE WORKS AREA SHALL BE MINIMIZED BY PROVIDING BERMS, DITCHES AND OTHER DIVERSION MEASURES.
3. RUNOFF FROM THE WORK AREA INCLUDING ACCESS ROAD, LAYDOWN AREA, TEMPORARY EXCAVATION WASTE DISPOSAL AREA AT THE SITE SHALL BE CHANNELIZED AND CONTROLLED BY A VARIETY OF TECHNIQUES INCLUDING SILT TRAP, STRAW BALES, SILT FENCE, SEDIMENTATION POND, AND EARTH-FILL BERMS WITH GEOSYNTHETIC FILTER BEFORE DISCHARGING TO THE RECEIVING WATER COURSE.
4. IF DETERMINING IS REQUIRED, CONTRACTOR TO UTILIZE SEDIMENT CONTROL BAGS TO PREVENT SEDIMENT FROM ENTERING THE WATERWAY.

FUEL AND OIL SPILLS:

1. THE CONTRACTOR SHALL WORK IN ACCORDANCE WITH ALL ENVIRONMENT REGULATIONS AND THE TOWNSHIP POLICIES REGARDING SPILLS OF FUELS AND OILS DURING CONSTRUCTION.
2. CORROSIVE, TOXIC, FLAMMABLE OR OTHERWISE POLLUTING FLUIDS SHALL NOT BE DISCHARGED. SPILLS OF SUCH FLUIDS SHALL BE CONTAINED AND CLEANED UP IN ACCORDANCE WITH THE SPILL RESPONSE AND REPORTING PROCEDURES.
3. THE AREA AROUND FUEL STORAGE LOCATIONS THAT ARE SET UP ON-SITE SHALL BE CONTAINED IN SUCH A WAY THAT THE CONTAINMENT WALLS (BERMS OR OTHERWISE) AND THE AREA CONTAINED WITHIN THE WALLS ARE IMPERMEABLE TO FUEL. THE STORAGE AREA WITHIN THE CONTAINMENT ZONE SHALL PROVIDE ADEQUATE STORAGE FOR THE MAXIMUM VOLUME OF FUEL TO BE STORED AT THAT LOCATION.
4. PORTABLE FUEL TANKS AND FUEL CANS SHALL NOT BE LEFT AT LOCATIONS NEAR A WATERCOURSE OF ANY KIND. ALL FUEL TANKS MUST BE DOUBLE WALLED, EQUIPPED WITH 360° VEHICLE PROTECTION, A SPILL KIT AND AN EMPTY 45-GAL DRUM FOR SPILL CONTAINMENT. A LIST OF EMERGENCY CONTACT NUMBERS FOR KEY PERSONNEL MUST BE PROVIDED TO THE SITE.

SEDIMENT & EROSION CONTROL STRATEGIES:

PRECONSTRUCTION SITE ACTIVITIES:

1. ALL MATERIALS AND EQUIPMENT USED FOR THE PURPOSE OF SITE PREPARATION AND PROJECT COMPLETION SHOULD BE OPERATED AND STORED IN A MANNER THAT PREVENTS ANY DELETERIOUS SUBSTANCE (e.g. PETROLEUM PRODUCTS, SILT, etc.) FROM ENTERING THE WATER. THE EQUIPMENT SHALL BE CLEANED OF ALL CONTAMINANTS PRIOR TO BEING BROUGHT ON SITE.
- ADMINISTRATIVE MEASURES
1. THE CONTRACTOR WILL BE IN CHARGE OF ON-SITE WORK AND IS RESPONSIBLE FOR THE IMPLEMENTATION OF THE ENVIRONMENT PROTECTION PLAN. MITIGATION MEASURES ARE TO BE INSTALLED IN ACCORDANCE WITH THE PROJECT DRAWINGS.
2. THE SITE SUPERVISOR WILL HOLD A MEETING OF ALL EQUIPMENT OPERATORS WORKING AT THE SITE TO MAKE THEM AWARE OF THE ENVIRONMENTAL CONCERNS AND MEASURES SET OUT IN THIS PLAN TO CONTROL SEDIMENT. EXISTING VEGETATION IS TO BE PROTECTED TO THE MAXIMUM EXTENT POSSIBLE.
3. TO THE MAXIMUM EXTENT POSSIBLE, NO SEDIMENTS SHALL ENTER THE WATER DURING ANY ASPECT OF THE WORK. SHORT TERM INTRODUCTION OF SEDIMENTS SHALL BE KEPT TO THE LOWEST PRACTICAL LEVEL AND THERE SHOULD BE NO LONG TERM SOURCES OF SEDIMENT FROM THE COMPLETED PROJECT.

SEDIMENT CONTROL MEASURES:

1. THE CONTRACTOR SHALL INSTALL SEDIMENT AND EROSION MEASURES PRIOR TO CONSTRUCTION AND MAINTAIN UNTIL THE WORK SITE IS STABILIZED TO PREVENT ENTRY OF SEDIMENT INTO THE WATER.

INSPECTION & MAINTENANCE:

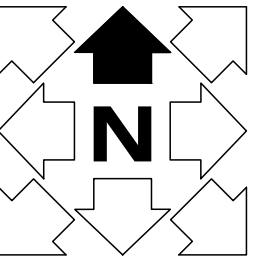
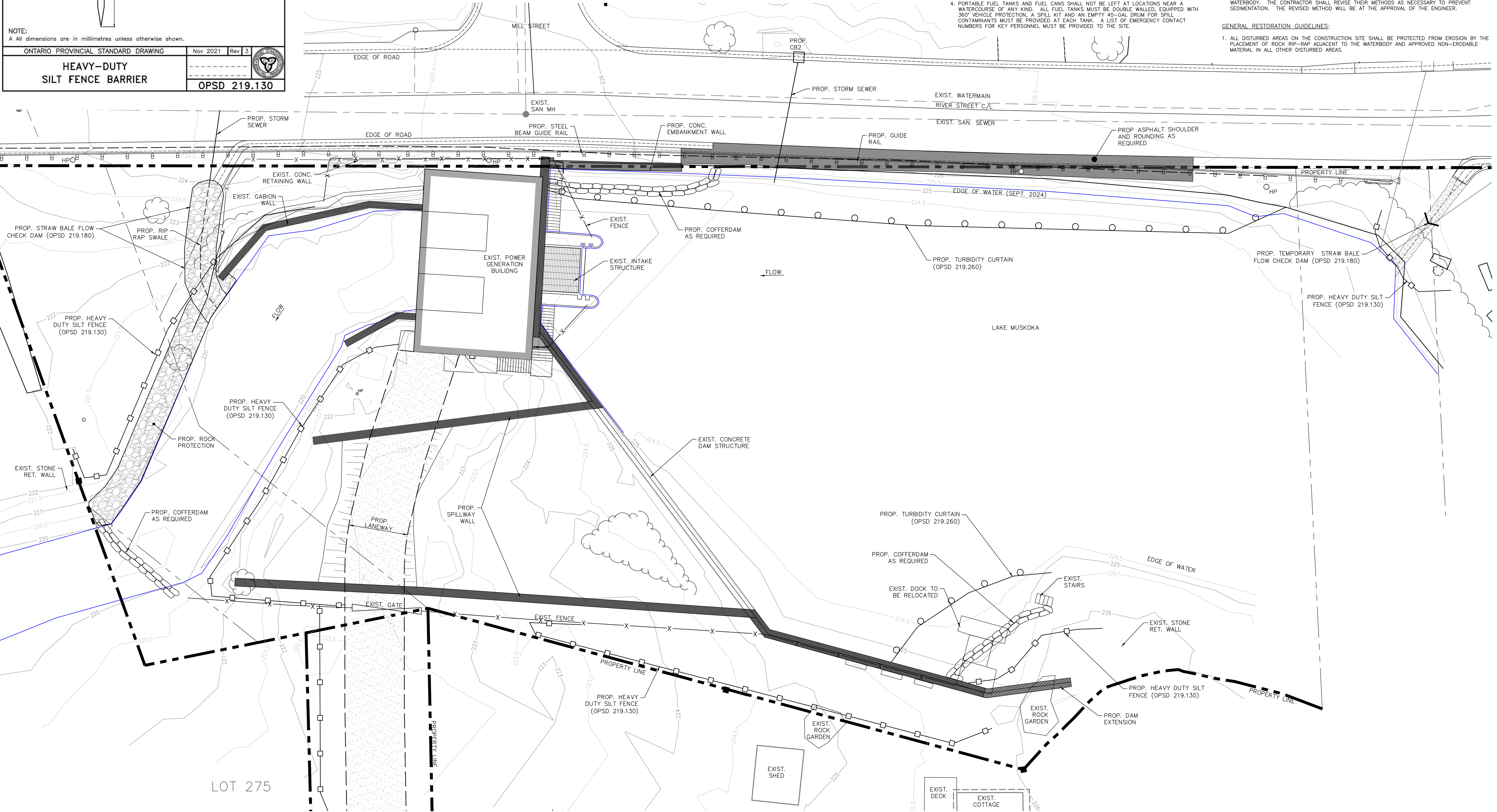
2. CONSTRUCTION OPERATIONS WILL BE UNDER THE DIRECTION OF THE SITE SUPERVISOR FOR THE CONTRACTOR AND INSPECTED BY THE SITE INSPECTOR FOR THE OWNER. ANY PROBLEMS OR CONCERNS WILL BE RESOLVED ON SITE WITH THE ENGINEER.
3. DOWNSTREAM AREA SHALL BE REGULARLY INSPECTED. IF SUSPENDED SEDIMENTS ARE NOTED WORK IS TO STOP IMMEDIATELY, ESC MEASURES AND CONDITIONS TO BE INSPECTED BY A QUALIFIED PROFESSIONAL. ADDITIONAL MEASURES AND ISOLATION SHALL BE INSTALLED PER INSPECTION RECOMMENDATIONS. IF A SEDIMENT RELEASE IS IDENTIFIED THE CONTRACTOR WILL TAKE IMMEDIATE ACTION TO CONTAIN AND/OR CLEAN THE SPILL. THE MECSP SPILLS ACTION CENTRE SHALL BE CONTACTED IMMEDIATELY AT 1-800-268-6060.

CONTINGENCY PLANS:

1. THE CONTINGENCY PLANS WILL BE INITIATED AS CONDITIONS IN THE FIELD DICTATE.
2. RAIN STORMS MAY REQUIRE THE SUSPENSION OF WORK TO PREVENT SEDIMENTATION OF THE WATERBODY. THE CONTRACTOR SHALL REVISE THEIR METHODS AS NECESSARY TO PREVENT SEDIMENTATION. THE REVISED METHOD WILL BE AT THE APPROVAL OF THE ENGINEER.

GENERAL RESTORATION GUIDELINES:

1. ALL DISTURBED AREAS ON THE CONSTRUCTION SITE SHALL BE PROTECTED FROM EROSION BY THE PLACEMENT OF ROCK RIP-RAP ADJACENT TO THE WATERBODY AND APPROVED NON-ERODABLE MATERIAL IN ALL OTHER DISTURBED AREAS.



KEY PLAN



ENGINEER'S SEAL:

DATE	REV.	REVISION	BY	APP'D
08/05/2025	6	ISSUED FOR TENDER	DR	EG
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05/06/2024	4	ISSUED FOR FINAL REVIEW	DR	EG
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05/04/2024	2	ISSUED FOR CLIENT REVIEW	DR	EG
28/03/2024	1	ISSUED FOR CLIENT REVIEW	DR	EG/FP
30/09/2022	0	ISSUED FOR CLIENT REVIEW	BWJ	FP

CLIENT:

Township of Muskoka Lakes
1 Bailey Street, P.O. Box 129
Port Carling, Ontario

CONSULTANT:



PROJECT TITLE:

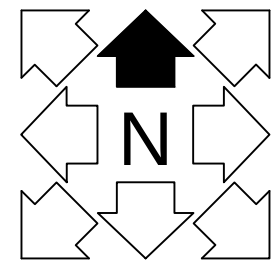
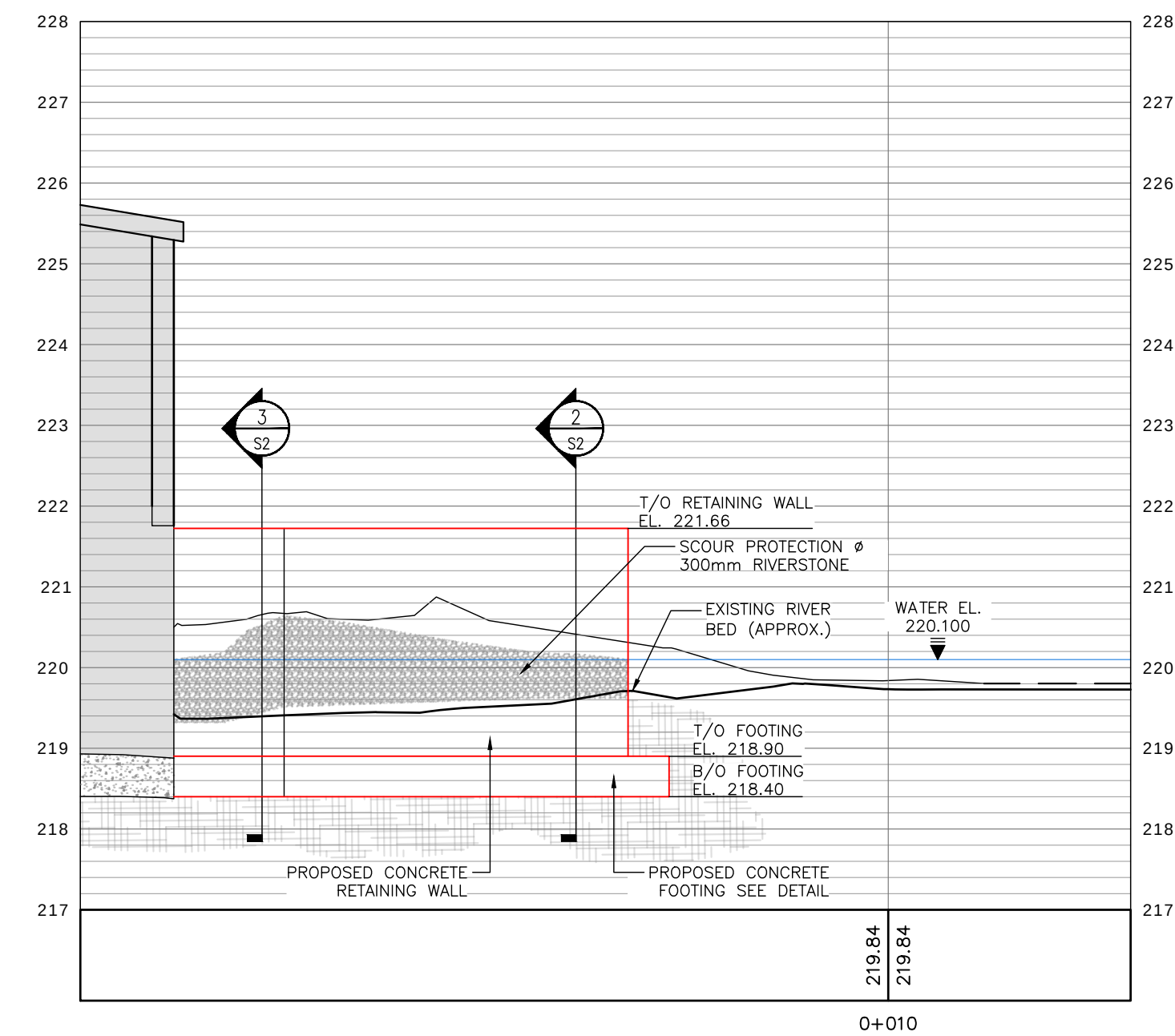
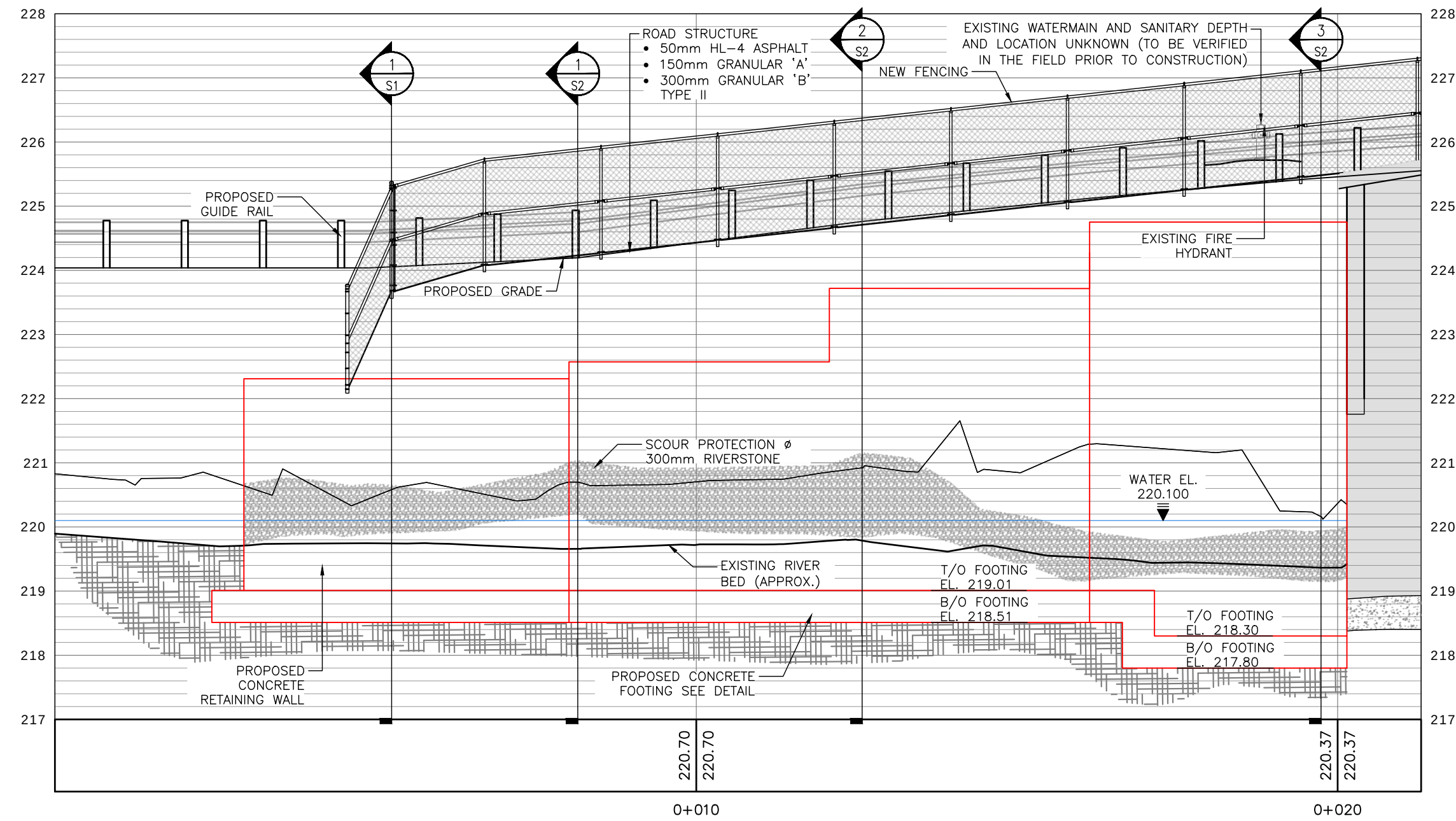
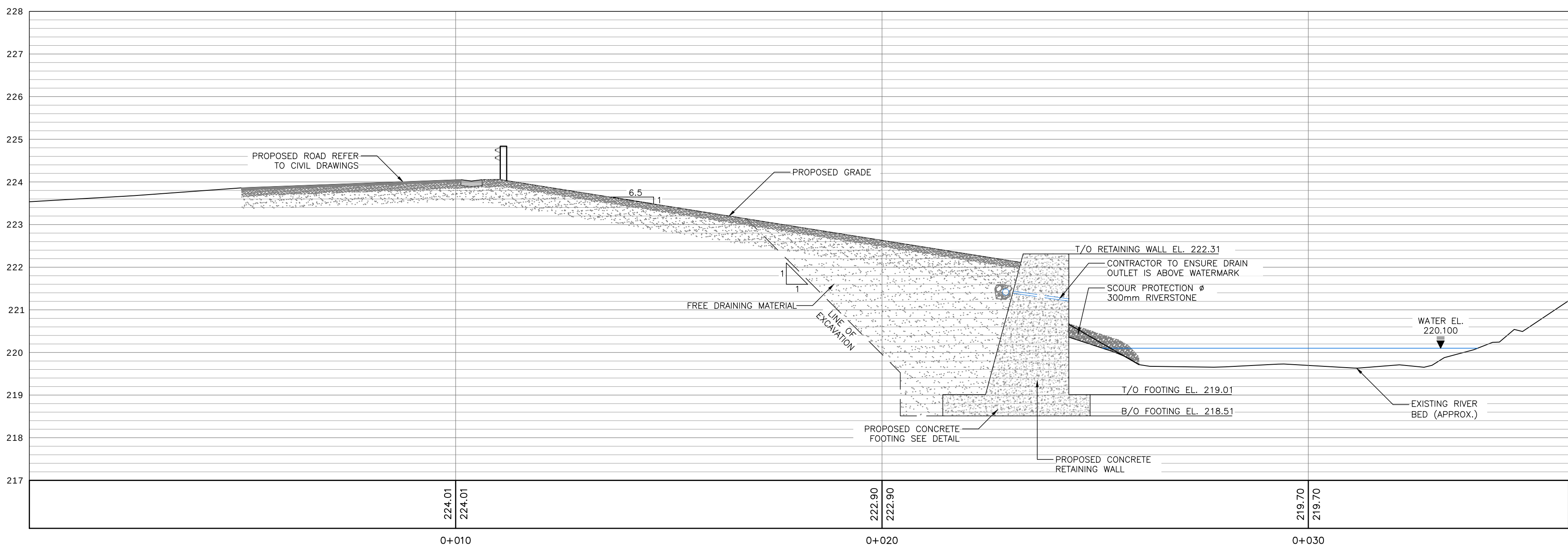
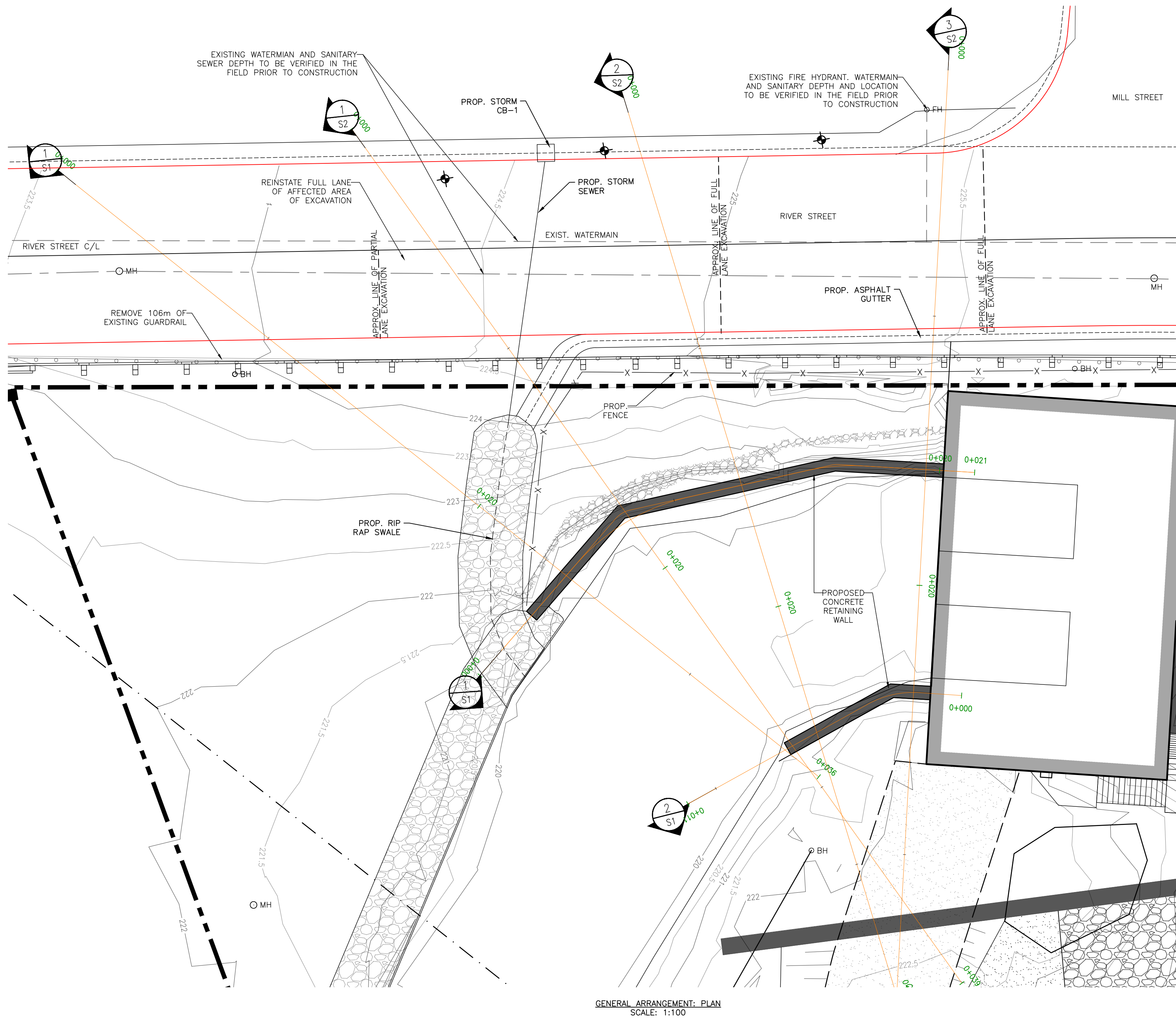
**LITTLE BURGESS
GENERATING STATION
REHAB**

DRAWING TITLE:

**SEDIMENT & EROSION
CONTROL PLAN**

DR	EG	EG	EG
DRAWN	DESIGNED	CHECKED	APPROVED
1 : 150		MAR. 27, 2024	
SCALE		DATE	
23-1236	6	E1	
PROJECT No.	REVISION	DRAWING	

P:\2023\231236 - Burgess Dam Detailed Design\03 Drawings\03.02 Current\231236 - Burgess Dam - Retaining Wall - 2025-05-13.dwg



KEY PLAN



ENGINEER'S SEAL:



DATE	REV.	REVISION	BY	APP'D
13/05/2025	2	ISSUED FOR TENDER	HD	FP
26/06/2024	1	ISSUED FOR FINAL REVIEW	HD	FP
09/05/2024	0	ISSUED FOR REVIEW	HD	FP

CLIENT:

Township of Muskoka Lakes
1 Bailey Street, P.O. Box 129
Port Carling, Ontario

CONSULTANT:



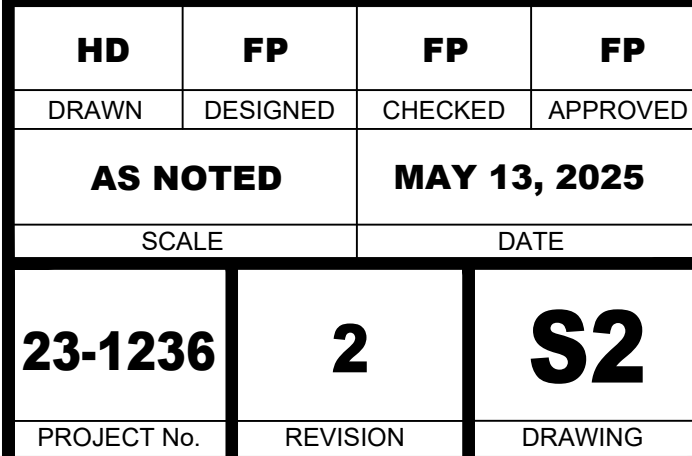
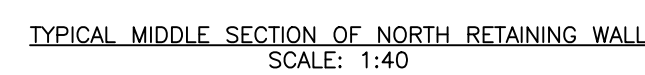
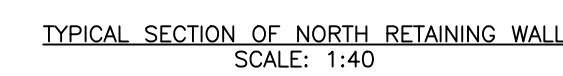
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**LITTLE BURGESS
GENERATING STATION
REHAB**

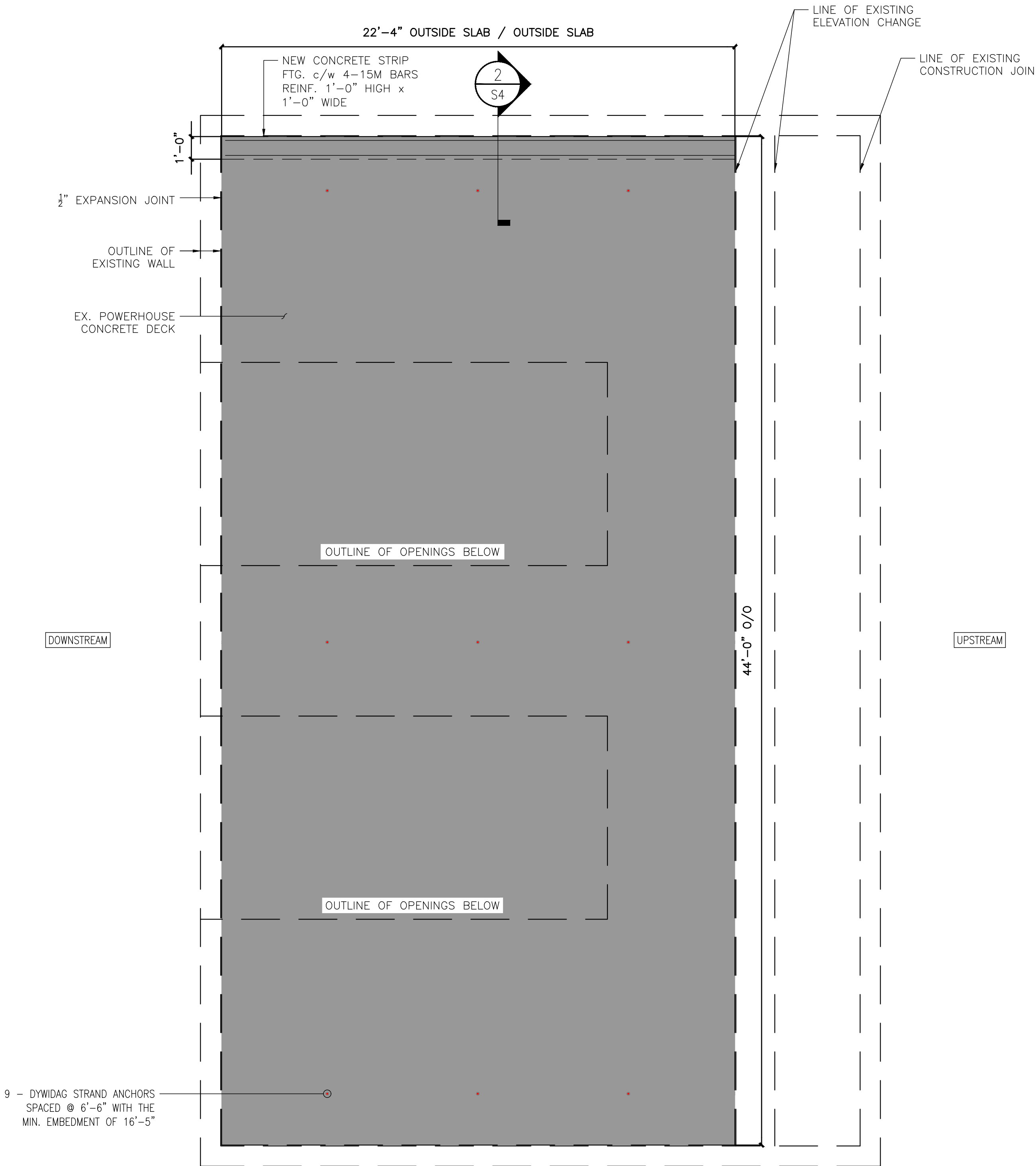
DRAWING TITLE:

**GENERAL ARRANGEMENT,
ELEVATIONS & RETAINING
WALL DETAIL**

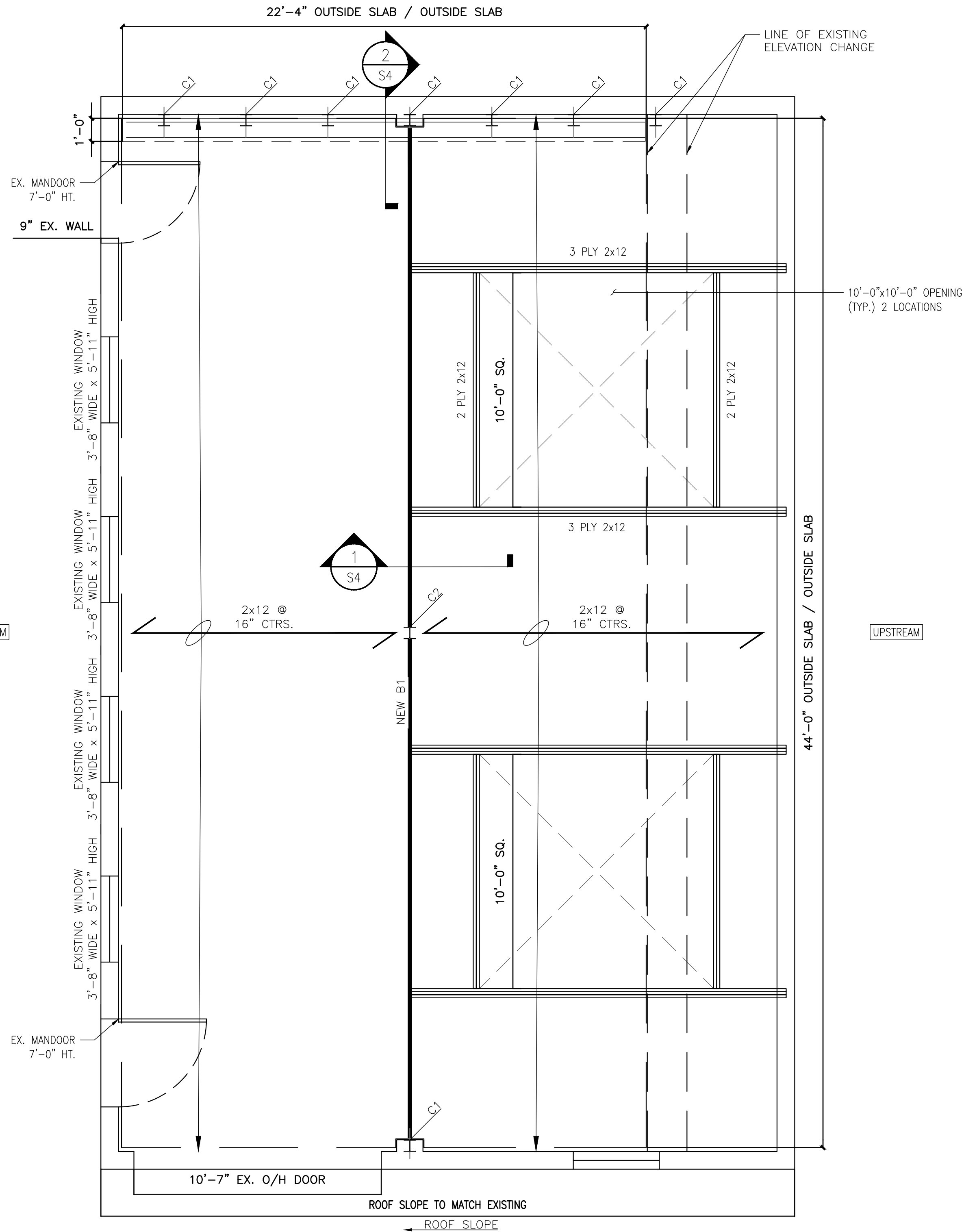
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AS NOTED		MAY 13, 2025	
SCALE		DATE	
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PROJECT No.	REVISION	DRAWING	



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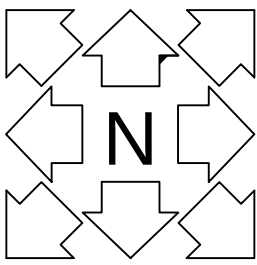


FOUNDATION PLAN: PROPOSED POWER HOUSE CONCRETE DECK UPGRADES
SCALE: 1:50



PROPOSED ROOF FRAMING PLAN
SCALE: 1:50

BEAM SCHEDULE	
	B1 = NEW W8x40 WITH CONTINUOUS NAILER PLATE
COLUMN SCHEDULE	
	C1 = NEW W6x15 WITH 10"x10"x $\frac{3}{8}$ " BASE PLATE TO BE ANCHORED TO EXISTING WALL.
	C2 = NEW W6x15 WITH 10"x10"x $\frac{3}{8}$ " BASE PLATE.



KEY PLAN



ENGINEER'S SEAL:



DATE	REV.	REVISION	BY	APP'D
13/05/2025	1	ISSUED FOR TENDER	HD	FP
20/06/2024	1	ISSUED FOR REVIEW	HD	FP
09/05/2024	0	ISSUED FOR REVIEW	HD	FP

CLIENT:

Township of Muskoka Lakes
1 Bailey Street, P.O. Box 129
Port Carling, Ontario

CONSULTANT:



PROJECT TITLE:

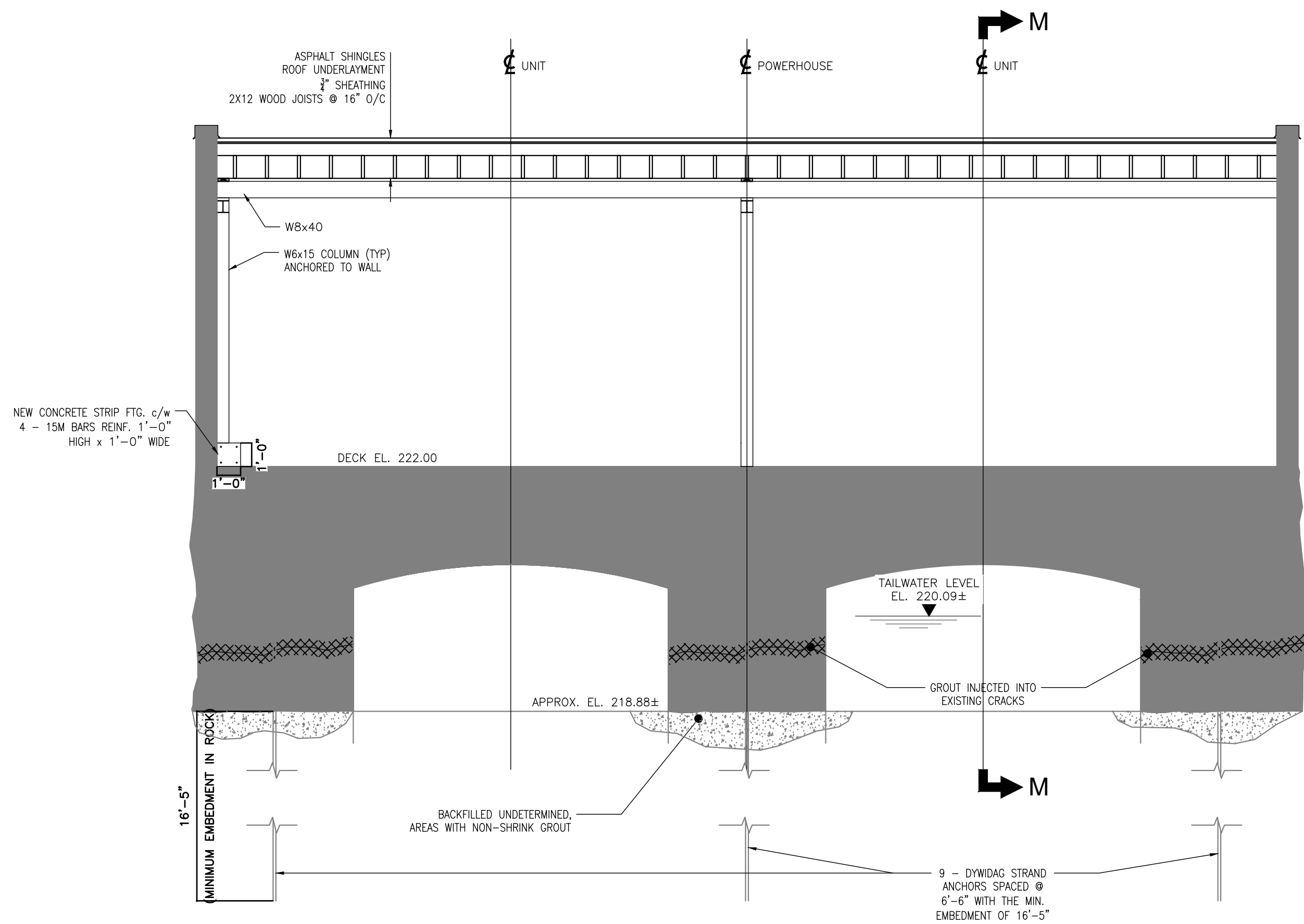
**LITTLE BURGESS
GENERATING STATION
REHAB**

DRAWING TITLE:

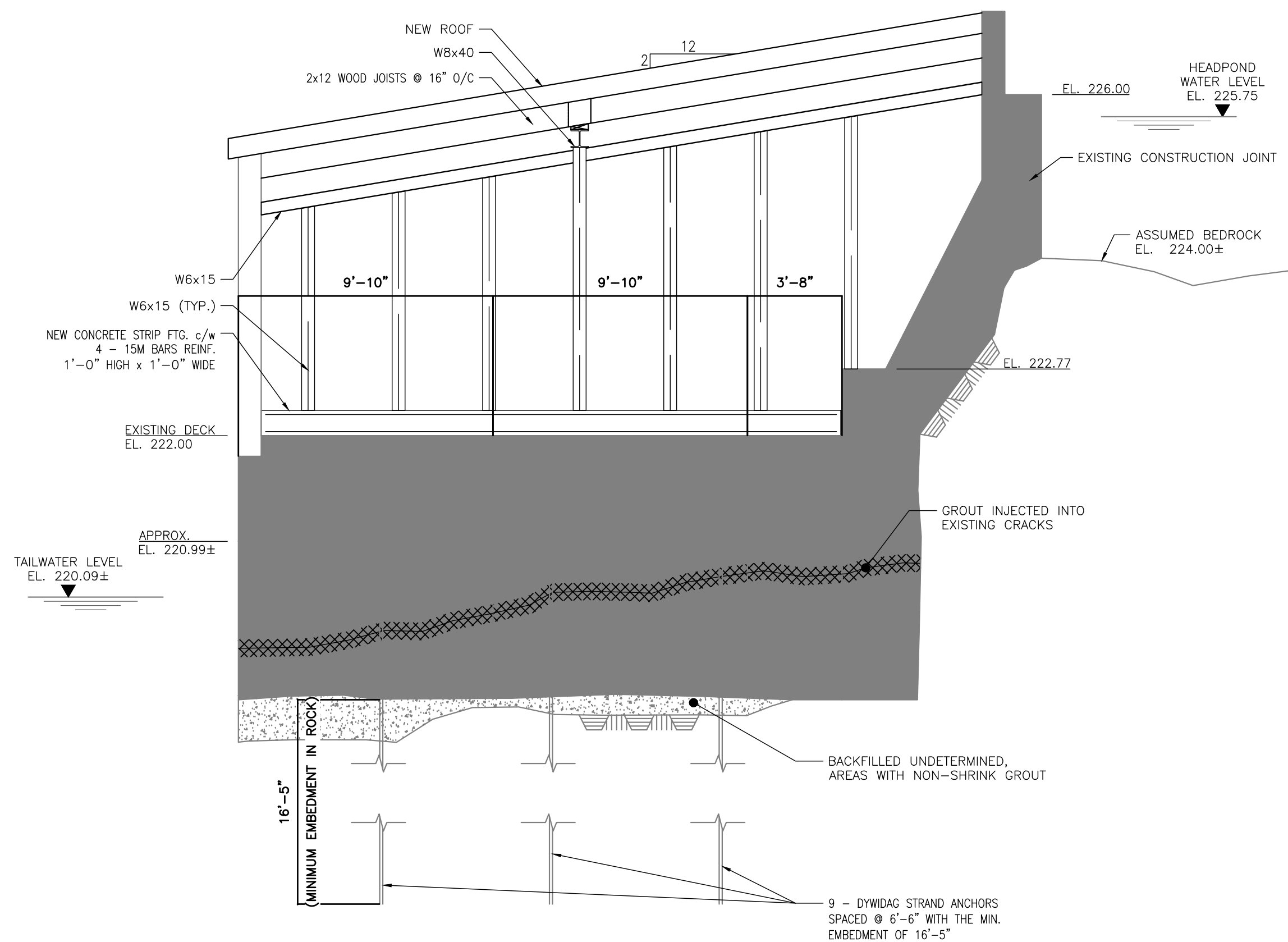
**FOUNDATION
UPGRADES & ROOF
FRAMING PLANS**

HD	FP	FP	FP
DRAWN	DESIGNED	CHECKED	APPROVED
AS NOTED		MAY 13, 2025	
SCALE		DATE	
23-1236	2	S3	
PROJECT No.	REVISION	DRAWING	

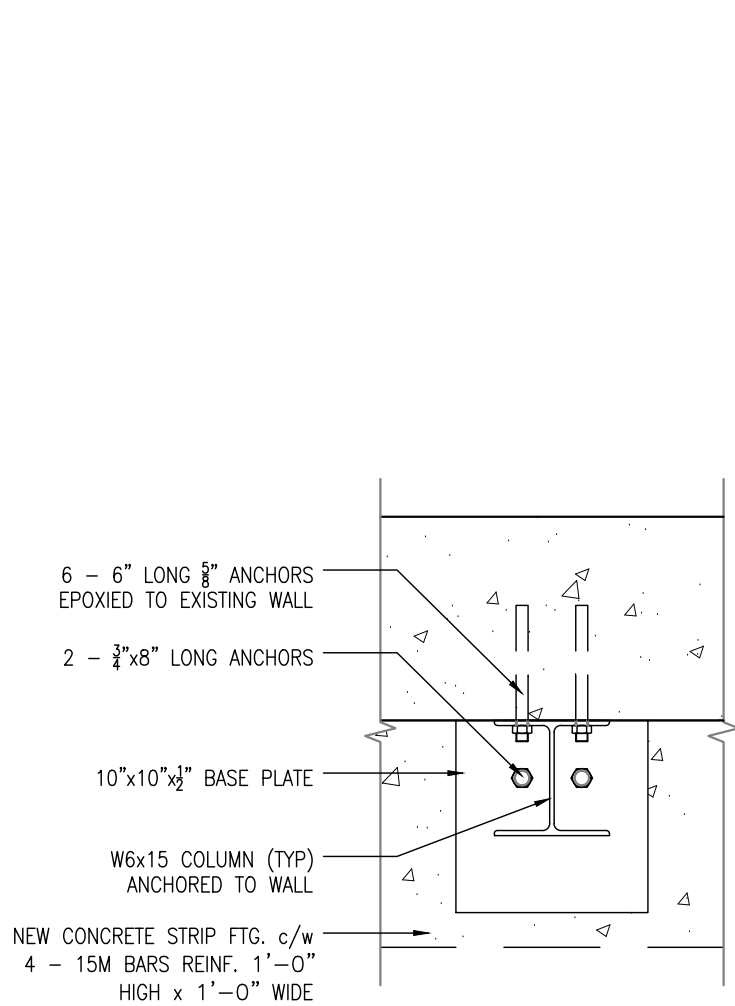
P:\2023\231236 - Burgess Dam Detailed Design\03 Drawings\03.02 Current\231236 - Burgess Dam - 2025-05-13.dwg



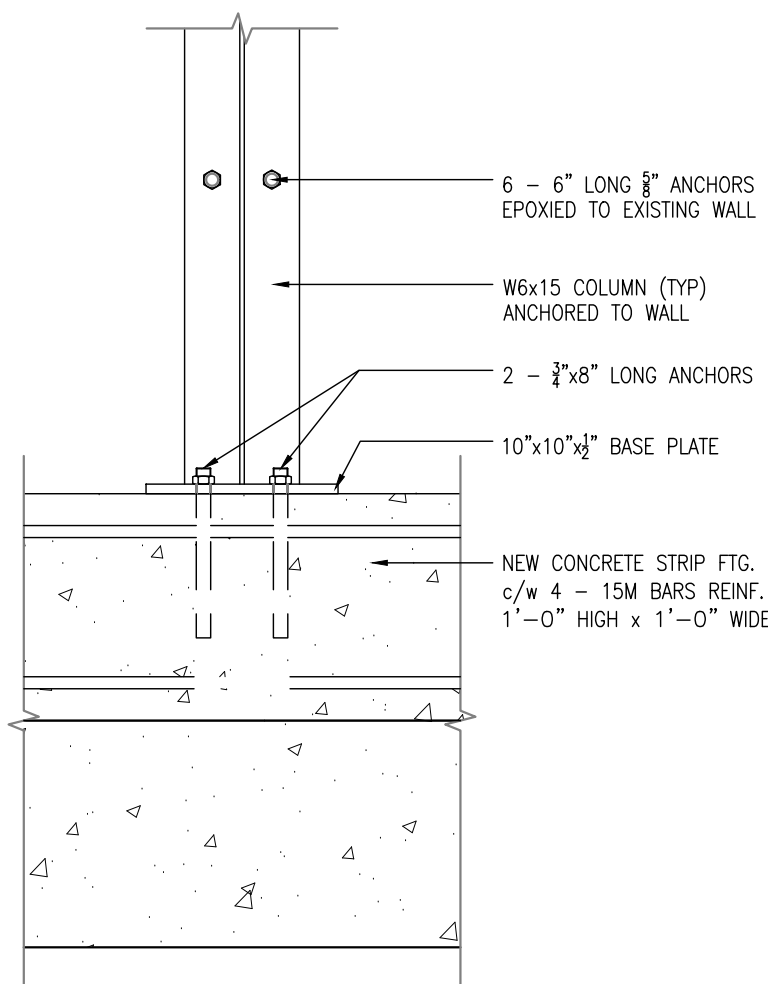
DOWNSTREAM FACE SECTION OF PROPOSED POWER HOUSE STRUCTURE ASSEMBLY
SCALE: 1:50



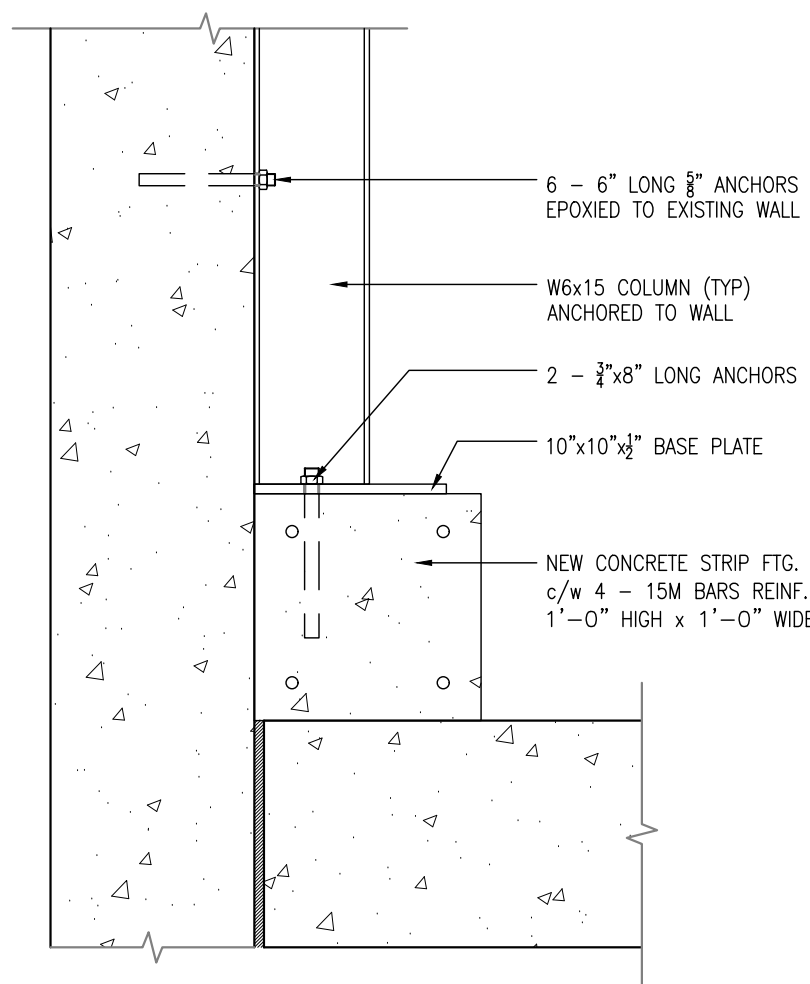
SECTION M-M, SIDE SECTION OF PROPOSED ROOF ASSEMBLY AND NEW WALL ASSEMBLY
SCALE: 1:50



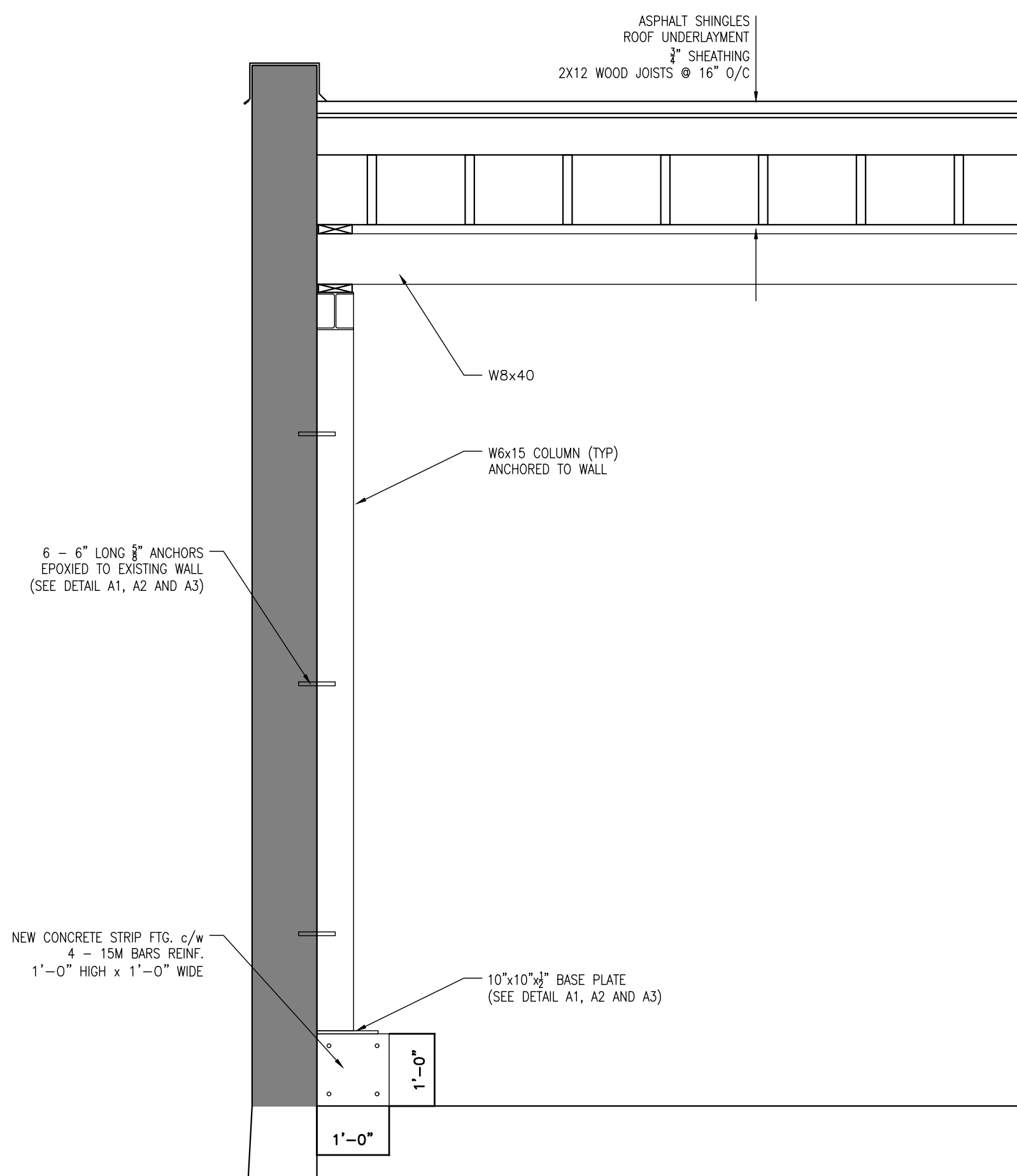
BASE PLATE AND ANCHOR DETAILS : DETAIL A1
SCALE: 1:10



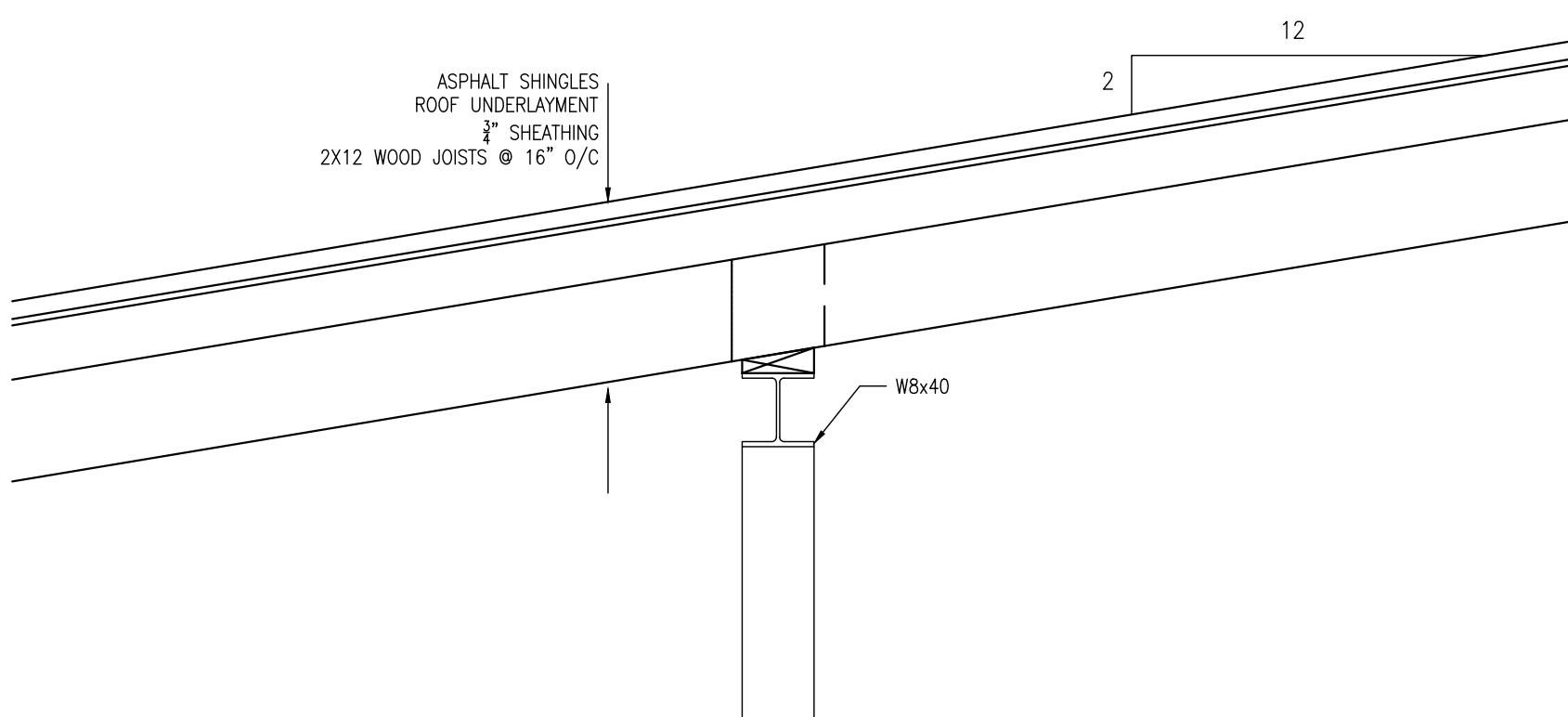
BASE PLATE AND ANCHOR DETAILS : DETAIL A2
SCALE: 1:10



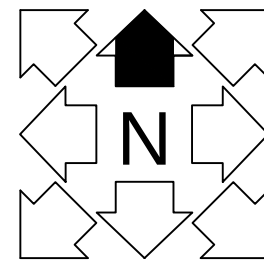
BASE PLATE AND ANCHOR DETAILS : DETAIL A3
SCALE: 1:10



2 ROOF ASSEMBLY AND NEW CONCRETE STRIP FOOTING: DETAIL
SCALE 1:20



1 ROOF ASSEMBLY: DETAILS
SCALE 1:20



KEY PLAN



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**LITTLE BURGESS
GENERATING STATION
REHAB**

DRAWING TITLE:

**FOUNDATION
UPGRADES AND ROOF
FRAMING DETAILS**

HD	FP	FP	FP
DRAWN	DESIGNED	CHECKED	APPROVED
AS NOTED		MAY 13, 2025	
SCALE		DATE	
23-1236	2	S4	
PROJECT No.	REVISION	DRAWING	



PHOTO 1
DOWNSTREAM SIDE
WEST ELEVATION LOOKING EAST



PHOTO 2
EXISTING BEAM AND ROOF STRUCTURE



PHOTO 3
EXISTING BEAM AND ROOF STRUCTURE

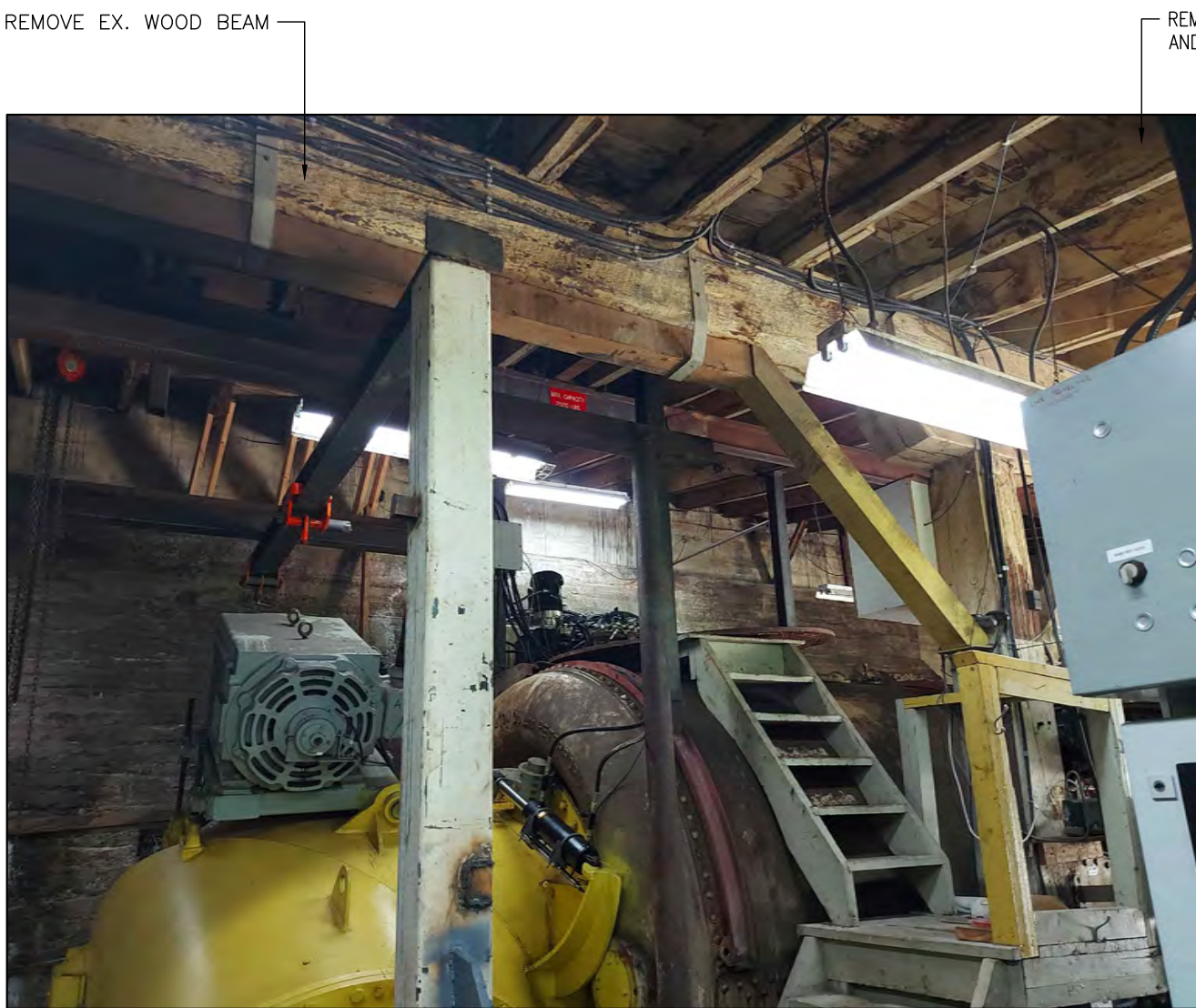


PHOTO 4
EXISTING BEAM AND ROOF STRUCTURE

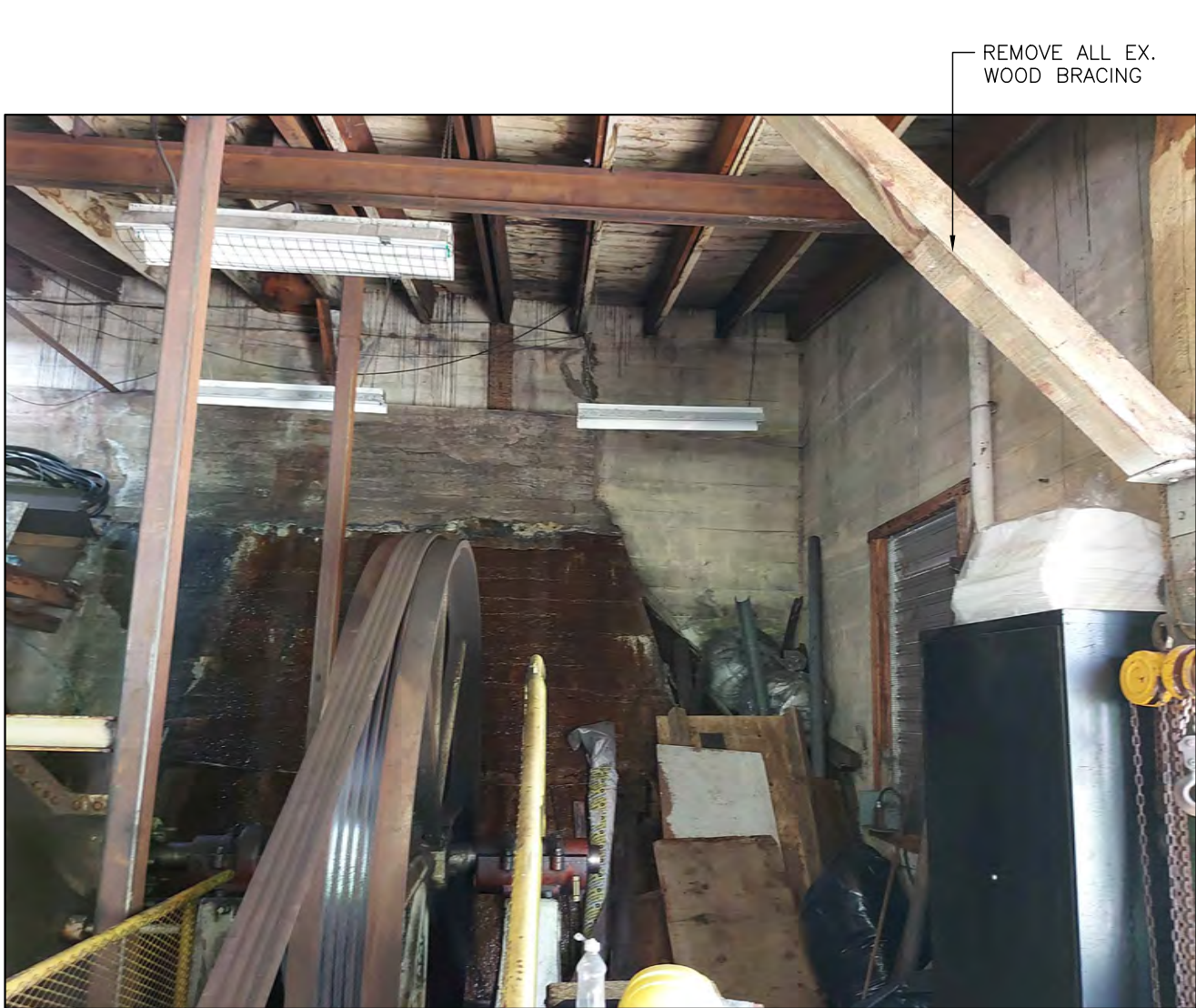


PHOTO 5
EXISTING BEAM AND ROOF STRUCTURE



PHOTO 6
EXISTING STEEL COLUMN BASE -- NORTH WALL

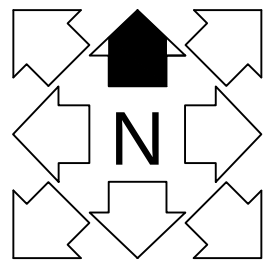


PHOTO 7
EXISTING STEELWORK -- NORTH WALL



PHOTO 8
EXISTING STEELWORK -- NORTH WALL

- REMOVAL NOTES**
1. REMOVE EXISTING WOOD FRAMED ROOF STRUCTURE AND REPLACE WITH NEW.
 2. REMOVE EXISTING WOOD TIMBER CENTRE BEAM AND EX. WOOD COLUMNS AND REPLACE WITH NEW STEEL.
 3. REMOVE ALL EXISTING STEEL COLUMNS ON NORTH WALL AND REPLACE WITH NEW.



KEY PLAN



ENGINEER'S SEAL:



13/05/2025	2	ISSUED FOR TENDER	HD	FP	
20/06/2024	1	ISSUED FOR REVIEW	HD	FP	
09/05/2024	0	ISSUED FOR REVIEW	HD	FP	
DATE (DAY/MON/YR.)	REV.	REVISION	BY	APP'D	

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PROJECT TITLE:

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GENERATING STATION
REHAB**

DRAWING TITLE:

REMOVAL PHOTOS

HD	FP	FP	FP
DRAWN	DESIGNED	CHECKED	APPROVED
AS NOTED		MAY 13, 2025	
SCALE		DATE	
23-1236	2	S5	
PROJECT No.	REVISION	DRAWING	

P:\2023\231236 - Burgess Dam Detailed Design\03 Drawings\Civil Drawings\23-1236-Burgess Dam Design (April 16-25) dwg

GENERAL NOTES (CIVIL):

- DO NOT SCALE DRAWINGS.
- ALL STANDARDS ARE TO BE IN ACCORDANCE WITH CURRENT ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD), ONTARIO PROVINCIAL STANDARD SPECIFICATIONS (OPSS) AND ONTARIO BUILDING CODE (LATEST EDITION), UNLESS OTHERWISE NOTED.
- NOTIFY ALL UTILITIES AND MUNICIPAL AUTHORITIES 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION. UTILITY PERSONNEL TO BE ON SITE WHEN EXCAVATING ADJACENT TO UNDERGROUND UTILITIES. SUPPORT UTILITIES IN ACCORDANCE WITH THE DIRECTIONS AND GUIDELINES OF THE IMPACTED UTILITY.
- THE LOCATION OF UTILITIES AND SERVICES SHOWN ON DRAWINGS IS APPROXIMATE AND MAY BE INCOMPLETE. CONFIRM EXACT LOCATION OF UTILITIES WITH MINISTRY, MUNICIPALITY OR UTILITIES. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION AND WILL BE RESPONSIBLE FOR PROTECTING AGAINST DAMAGE. THE CONTRACTOR ASSUMES ALL LIABILITY FOR DAMAGE TO UTILITY AND ROAD WORKS.
- COMPLY WITH THE REQUIREMENTS OF THE DISTRICT MUNICIPALITY OF MUSKOKA IN REGARD TO TRAFFIC FLOW ON MUNICIPAL STREETS. ALL NECESSARY TRAFFIC CONTROL AND SIGNAGE IS TO BE IN ACCORDANCE WITH MTO BOOK 7 REQUIREMENTS.
- DESIGN DRAWINGS ARE TO BE READ IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS. ARE RELEVANT TO THE WORK SHOWN ON THE DRAWING PRIOR TO THE COMMENCEMENT OF THE WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE CONTRACT ADMINISTRATOR AND THE PROPOSED ADJUSTMENT OF THE WORK REQUIRED TO MATCH THE EXISTING STRUCTURE SHALL BE SUBMITTED FOR APPROVAL.
- THE CONTRACTOR IS RESPONSIBLE FOR ALL DETAILED LAYOUT WORK.
- ALL SILTATION AND EROSION CONTROL MEASURES ARE TO BE IN PLACE PRIOR TO CONSTRUCTION AND SHALL REMAIN IN PLACE UNTIL THE DISTURBED AREAS ARE REINSTATEL TO THE EXISTING CONDITION IS BETTER.
- THE CONTRACTOR IS RESPONSIBLE FOR ALL DE-WATERING AND WATER MANAGEMENT DURING CONSTRUCTION.
- LATEST APPROVED DRAWINGS TO BE USED FOR CONSTRUCTION AND ALL DISCREPANCIES REPORTED TO THE ENGINEER.
- TYPICAL DESIGN DETAILS SHOWN ON THE DRAWINGS SHALL GOVERN THE WORK. IF DETAILS ON OTHER DRAWINGS CONFLICT THE MOST STRINGENT SHALL GOVERN.
- ALL INSTALLATIONS AND CONSTRUCTION TO BE COMPLETED TO THE SATISFACTION OF THE ENGINEER AND THE TOWNSHIP OF MUSKOKA LAKES IN ACCORDANCE WITH THE CONTRACT DOCUMENTS
- COMPLETE ALL EXCAVATIONS AND FOUNDATION WORK IN ACCORDANCE WITH THE OCCUPATIONAL HEALTH & SAFETY ACT (LATEST EDITION).
- RESTORATION OF ALL DISTURBED AREAS SHALL BE 75mm TOPSOIL AND SEED MIX UNLESS NOTED OTHERWISE.
- THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, DETAILS, AND ELEVATIONS OF THE EXISTING STRUCTURE THAT ARE RELEVANT TO THE WORK SHOWN ON THE DRAWING PRIOR TO THE COMMENCEMENT OF THE WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE CONTRACT ADMINISTRATOR AND THE PROPOSED ADJUSTMENT OF THE WORK REQUIRED TO MATCH THE EXISTING STRUCTURE SHALL BE SUBMITTED FOR APPROVAL.
- CONTRACTOR ASSUMES ALL RESPONSIBILITY OF DESIGN, ERECTION AND REMOVAL OF TEMPORARY WORKS.
- FORMWORK SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF CSA A23.1.
- DESIGN OF FORMWORK IS THE CONTRACTOR'S RESPONSIBILITY.
- CONTRACTOR TO PROVIDE TEMPORARY BRACING, SUPPORTS AND/OR OTHER INSTALLATIONS NECESSARY TO MAINTAIN PLUMBNESS, TRUE, ALIGNMENT AND STABILITY OF THE STRUCTURE AND ALL OF ITS PARTS THROUGHOUT ALL ERECTION STAGES.
- IT IS THE ULTIMATE RESPONSIBILITY OF THE CONTRACTOR/OWNER TO ENSURE THAT ALL REQUIRED PERMITS AND APPROVALS ARE OBTAINED & POSTED PRIOR TO PROCEEDING WITH CONSTRUCTION. THESE PERMITS/APPROVALS MAY INCLUDE (BUT ARE NOT NECESSARILY LIMITED TO):
 - MUNICIPAL BUILDING DEPARTMENT PERMIT TO CONSTRUCT (MULTIPLE PERMITS MAY BE REQUIRED)
 - GOVERNMENTAL REGULATORS (CDA/MNRF)
 - ELECTRICAL SAFETY AUTHORITY (ESA) PERMIT

FOUNDATION PREPARATION:

- GENERAL:
- THIS SPECIFICATION COVERS WORK ITEMS REQUIRED FOR CLEARING/ GRUBBING, STRIPPING, EXCAVATION AND FOUNDATION PREPARATION PRIOR TO PLACEMENT OF EMBANKMENT FILL MATERIALS AND CONSTRUCTION OF THE RELATED APPURTENANT STRUCTURES INCLUDING SPILLWAY, ACCESS ROADS, LAYDOWN AREA AND TEMPORARY DISPOSAL AREA ETC.
 - WATER MANAGEMENT:
 - THE EXISTING DAM CAN BE THE UPSTREAM COFFERDAM DURING REHABILITATION CONSTRUCTION. THE FOUNDATION PREPARATION FOR THE DOWNSTREAM WORK AREA WILL RESULT IN SOME SEEPAGE FROM UPSTREAM (THE EXISTING DAM FOUNDATION). THE SEEPAGE RATE IS CONSIDERED TO BE MANAGEABLE BY SUMPS AND PUMPS DURING CONSTRUCTION. IT IS THE CONTRACTOR'S RESPONSIBILITY FOR WATER MANAGEMENT DURING CONSTRUCTION.
 - SOME SEEPAGE AND /OR RUN-OFF WATER MAYBE ENCOUNTERED FROM SURROUND AREAS AT THE SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROL OF RUN-OFF STORM EVENT DURING CONSTRUCTION.
 - THE CONTRACTOR'S PROPOSED WATER MANAGEMENT PLAN SHALL BE SUBMITTED TO THE CLIENT'S APPROVAL.
- FOUNDATION PREPARATION:
- CLEARING AND GRUBBING:
- THE WORK TO BE DONE UNDER THIS ITEM COMPRISES THE SUPPLY OF ALL LABOUR, PLANT AND MATERIAL, AND THE PERFORMANCE OF ALL WORK NECESSARY FOR CLEARING AND GRUBBING THE CONSTRUCTION AREA, AS SHOWN ON THE DESIGN DRAWINGS.
 - CLEARING AND GRUBBING SHALL CONSIST OF CUTTING AND DISPOSING OF ALL TREES, HEDGES, SHRUBS ALIVE OR DEAD, DEBRIS AND ALL OTHER PERISHABLE MATERIALS, INCLUDING FALLEN TREES AND LOGS WHICH MAY BE VISIBLE ON THE SURFACE OF THE GROUND WITHIN THE CONSTRUCTION AREA. ALL TREES, HEDGES, AND SHRUBS SHALL BE CUT OFF AT THE NATURAL GROUND SURFACE IN ALL AREAS OF THE CONSTRUCTION AS SHOWN ON THE DESIGN DRAWINGS.
 - THE CONTRACTOR SHALL GIVE THE CLIENT OR ITS REPRESENTATIVE AT LEAST THREE (3) DAYS NOTICE OF INTENT TO CLEAR AREAS. THE LIMITS OF CLEARING AS APPROVED BY THE CLIENT OR ITS REPRESENTATIVE AND AS SPECIFIED HEREIN SHALL BE STRICTLY ADHERED TO.
 - REMOVE ALL CLEARED MATERIAL FROM THE SITE AND DISPOSED OF IN A MANNER ACCEPTABLE TO THE CLIENT OR ITS REPRESENTATIVE.
 - THE WORK SHALL BE CARRIED OUT STRICTLY IN ACCORDANCE WITH THE ENVIRONMENTAL ASSESSMENT PERMIT ISSUED FOR THE PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND COMPLYING WITH ANY AND ALL PERMITS ASSOCIATE WITH CLEARING, GRUBBING AND PERMANENT DISPOSAL OF MATERIALS.
 - CLEARING, GRUBBING AND STRIPPING SHALL BE COMPLETED PRIOR TO THE START OF EARTHWORKS AND SHALL BE AT A MINIMUM DISTANCE OF FIVE (5) METERS FROM FILL PLACEMENT. CONTRACTOR CAN ONLY PROCEED WITH FILL PLACEMENT AFTER RECEIVING WRITTEN APPROVAL FROM THE CLIENT OR ITS REPRESENTATIVE.
- STRIPPING, EXCAVATION AND STOCKPILING:
- THE WORK SHALL COMPRISE THE SUPPLY OF ALL LABOUR AND PLANT, AND THE PERFORMANCE OF ALL WORK NECESSARY FOR THE STRIPPING, EXCAVATION AND STOCKPILING FOR SUBSEQUENT REUSE OR DISPOSING OF STRIPPED AND EXCAVATED MATERIALS FROM THE CONSTRUCTION AREA OF THE DAM, ACCESS ROAD AND LAYDOWN AREA ETC.
 - IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH THE CLIENT FOR CLEARANCE OF ANY BURIED UTILITIES, EXISTING GROUND GRID AND INSTRUMENTATION AT THE DAM SITE. BURIED UTILITIES, GROUNDING GRID AND INSTRUMENTATION SHALL BE PROTECTED OR REMOVED WITHOUT DAMAGE BEFORE STRIPPING AND EXCAVATION ACTIVITY. NO STRIPPING OF ANY AREA SHALL START WITHOUT PRIOR WRITTEN APPROVAL FROM THE CLIENT OR ITS REPRESENTATIVE.
 - THE STRIPPING AND EXCAVATED MATERIALS AT THE EXISTING DAM SITE SHALL NOT BE REUSED FOR ENGINEERED DAM FILL MATERIALS. THE MATERIAL MAY NEED TO BE DISCARDED AT THE CLIENT OR ITS REPRESENTATIVE'S DISCRETION. THE STRIPPED MATERIAL NOT SUITABLE FOR RE-USE SHALL BE DISPOSED OF BY THE CONTRACTOR OFF SITE AND DISPOSED OF IN A MANNER ACCEPTABLE TO THE CLIENT OR ITS REPRESENTATIVE.
 - THE EXCAVATED MATERIALS FROM THE EXISTING DAM SITE AS PER DESIGN SHALL BE TEMPORARILY STOCKPILED AT THE DAM SITE. THE STOCKPILED MATERIAL SHALL BE PROTECTED WITHOUT CONTAMINATION AND EROSION FOR STABILITY. STOCKPILED MATERIALS SHALL BE PROTECTED WITHOUT CONTAMINATION AND EROSION.

GRANULAR FILL PLACEMENT AND COMPACTION:

- GENERAL:
- THIS SPECIFICATION DESCRIBES THE REQUIREMENTS FOR PLACEMENT AND COMPACTION OF GRANULAR FILL MATERIALS INCLUDING ROCKFILL/RIP RAP FOR EMBANKMENT DAM BUTTRISS, SPILLWAY, AND CREEK BANK EROSION PROTECTION CONSTRUCTION AS PER DESIGN DRAWINGS.
- MATERIAL CODES AND TEST STANDARDS:
- THE GRANULAR FILL MATERIALS SHALL FOLLOW THE ASTM STANDARDS INCLUDING:

ASTM	DESCRIPTION
ASTM D75	METHODS FOR SAMPLING AGGREGATES
ASTM D422	METHOD FOR PARTICLE SIZE ANALYSIS
ASTM D698	TEST METHOD FOR MOISTURE-DENSITY RELATIONS OF SOILS AND SOIL AGGREGATE MIXTURES USING 4.4LB. (2.5 KG) RAMMER AND 305mm (12") DROP
ASTM D854	TEST METHOD FOR SPECIFIC GRAVITY OF SOILS
ASTM D1140	TEST METHOD FOR AMOUNT OF MATERIALS IN SOILS FINER THAN THE NO. 200 SIEVE
ASTM D2216	METHOD FOR LABORATORY DETERMINATION OF WATER (MOISTURE) OF SOIL, ROCK AND SOIL-AGGREGATE MIXTURES
ASTM D2922	TEST METHODS FOR DENSITY OF SOIL AND SOIL-AGGREGATE IN PLACE BY NUCLEAR METHODS (SHALLOW DEPTH)
ASTM D3017	TEST METHODS FOR MOISTURE CONTENT OF SOIL AND SOIL-AGGREGATE IN PLACE BY NUCLEAR METHODS (SHALLOW DEPTH)
ASTM D5519	STANDARD TEST METHOD FOR PARTICLE SIZE ANALYSIS OF NATURAL AND MAN-MADE RIP RAP MATERIALS
ASTM D7263	STANDARD TEST METHODS FOR LABORATORY DETERMINATION OF DENSITY (UNIT WEIGHT) OF SOIL SPECIMENS
 - DIMENSIONAL TOLERANCES:
 - DIMENSIONS SHALL NOT BE LESS THAN THOSE SPECIFIED AND FINAL SLOPES SHALL NOT BE STEEPER THAN THOSE INDICATED ON THE DESIGN DRAWINGS. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, THE ACCEPTABLE DIMENSIONAL TOLERANCES FOR THE FILL PLACEMENT SHALL BE THE FOLLOWING:
 - LEVEL TOLERANCE: +/- 0.1m
 - HORIZONTAL TOLERANCE +/- 0.3m
 - SHOULD ANY ERRORS IN SETTING OUT THE WORKS OCCUR, SUCH ERRORS SHALL BE CORRECTED AND ANY NECESSARY ADJUSTMENT TO PREVIOUSLY PLACED FILL MATERIALS RESULTING FROM SUCH ERRORS SHALL BE MADE GOOD TO THE SATISFACTION OF THE ENGINEER AT THE SITE PRIOR TO FURTHER PLACEMENT OF FILL MATERIALS AT NO COST TO THE CLIENT.

GRANULAR FILL MATERIALS:

- THE GRANULAR FILL MATERIALS FOR THE WORK AS PER DESIGN DRAWING SHALL BE:
 - ROCKFILL
 - RIP RAP
 - FREE DRAINING GRANULAR FILL AS NOTED ON DESIGN DRAWINGS
- THE GRANULAR FILL MATERIALS SHALL CONSIST OF NATURALLY OCCURRING (AS SPECIFIED HERE), OR CRUSHED, CLEAN, SOUND, MINERAL PARTICLES, NON-PLASTIC, FREE FROM ROOTS AND TOPSOIL OR OTHER DEBRIS. MATERIALS CONTAINING QUANTITIES OF ORGANIC MATTER, FLAT OR ELONGATED PARTICLES, DELETERIOUS MATERIAL SHALL NOT BE USED FOR GRANULAR FILL MATERIALS.
- A MATERIAL PLACED WHICH DOES NOT MEET THE SPECIFIED GRADATION REQUIREMENTS SHALL BE REMOVED, BLENDED OR OTHERWISE REWORKED TO PRODUCE A MATERIAL WHICH DOES.
- OVERSIZED PARTICLES SHALL BE REMOVED, EITHER AT THE SOURCE OR DURING PLACEMENT OR BOTH. WHERE REDUCED LIFT THICKNESSES ARE REQUIRED, PARTICLES LARGER THAN 2/3 OF THE REDUCED LIFT THICKNESS SHALL BE REMOVED PRIOR TO COMPACTION.
- THE GRANULAR FILL MATERIALS SHOULD BE NON-METAL LEACHING AND ARD POTENTIAL MATERIALS.
 - ROCKFILL
 - ROCKFILL MATERIAL FOR EMBANKMENT FILL SHALL BE FROM CRUSHED ROCK SPALLS IN ACCORDANCE WITH THE FOLLOWING GRADATIONS:

SIEVE SIZES (U.S. STANDARD SIZE)	GRAIN SIZE (mm)	% PASSING
12"	300	100
6"	240	85
3"	150	50
1-1/2"	80	15
 - SPILLWAY RIP RAP
 - RIP RAP MATERIAL FOR EMBANKMENT AND SPILLWAY EROSION PROTECTION SHALL BE WELL GRADED SIZES OF HARD STRONG DURABLE, DENSE, AND HIGH-QUALITY ROCK FRAGMENTS. THE FRAGMENTS SHALL BE GENERALLY CUBIC IN SHAPE WITH THE LARGEST DIMENSION NOT MORE THAN TWICE THE SMALLEST. THE RIP RAP SHALL MEET THE FOLLOWING CRITERIA:
 - MAXIMUM SIZE (D_{max}): 750 mm (±50mm)
 - MEDIAN SIZE (D₅₀): 370 mm
 - MINIMUM SIZE (D_{min}): 180 mm (±50mm)

GRANULAR FILL PLACEMENT AND COMPACTION:

- GENERAL
- THE WORK TO BE DONE SHALL COMPRISE THE SUPPLY OF ALL LABOUR, PLANT AND MATERIAL, AND THE PERFORMANCE OF ALL WORK NECESSARY FOR PLACING, PLACING AND COMPACTION GRANULAR FILL MATERIALS, AS SHOWN ON THE DESIGN DRAWINGS.
 - GRANULAR FILL MATERIALS SHALL BE PLACED TO THE LINES AND GRADES SHOWN ON THE DRAWINGS AND AS REQUIRED BY THE ENGINEER BASED ON SPECIFIC SITE CONDITIONS.
 - PLACING AND SPREADING OF GRANULAR FILL MATERIAL IN ACCORDANCE WITH THESE SPECIFICATIONS SHALL BE PERFORMED IN SUCH A MANNER AS TO AVOID SEGREGATION OF SIZES AND TO OBTAIN A HOMOGENEOUS MASS.
 - THE SELECTION OF COMPACTION EQUIPMENT SHALL BE SUBJECT TO THE APPROVAL OF ENGINEER AND TO CONTINUING SATISFACTORY PERFORMANCE.
 - NATIVE MATERIAL, SUITABLE FOR BACKFILL, SHALL BE COMPACTED TO 98% STANDARD PROCTOR MAXIMUM DRY DENSITY.
 - GRANULAR MATERIAL USED FOR BACKFILL, AND EMBEDMENT SHALL BE PLACED IN LAYERS 200mm IN DEPTH MAXIMUM AND COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY UNLESS OTHERWISE NOTED.
 - WHERE NECESSARY TO ACHIEVE THE SPECIFIED COMPACTION, WATER SHALL BE APPLIED BY CONTROLLED SPRINKLING TO THE GRANULAR FILL MATERIALS IN AMOUNTS AS APPROVED BY THE ENGINEER.
 - THE STOCKPIILING OF GRANULAR FILL MATERIAL WILL BE INSPECTED AND APPROVED BY ENGINEER, AT APPROVED LOCATIONS, PROVIDED THAT CONTRACTOR EXERCISES EVERY PRECAUTION NECESSARY AND BEST PRACTICES TO PREVENT SEGREGATION OF PARTICLE SIZES. THE STOCKPILED MATERIAL SHALL MEET THE GRADATION REQUIREMENTS SPECIFIED ABOVE.
 - GRANULAR FILL MATERIAL SHALL NOT BE CONTAMINATED BY MIXING WITH OTHER MATERIALS. FILL MATERIALS WHICH HAVE BECOME CONTAMINATED SHALL BE REMOVED AND REPLACED AT NO ADDITIONAL COST TO THE CLIENT.
 - GRANULAR FILL MATERIALS SHALL BE PLACED, SPREAD AND COMPACTED IN A DIRECTION PARALLEL TO THE AXIS OF THE DAM EXCEPT AS OTHERWISE PERMITTED BY ENGINEER BASED ON THE SPECIFIC SITE CONDITION.
 - THE CONTRACTOR MAY USE AN ALTERNATIVE TYPE OF ROLLER OR EQUIPMENT FOR COMPACTION PROVIDED THAT THE PERFORMANCE OF SUCH EQUIPMENT IS DEMONSTRATED TO PRODUCE THE COMPACTION SPECIFIED TO MEET THE REQUIREMENT OF THE SPECIFICATION.
 - THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE QUALITY OF WORK IN ACCORDANCE WITH THESE SPECIFICATIONS. ENGINEER WILL CARRY OUT QUALITY CONTROL TESTING OF CONTRACTOR'S OPERATIONS, AND CONTRACTOR SHALL COOPERATE IN EVERY WAY TO ENSURE THAT TESTS CAN BE PERFORMED AT ALL LOCATIONS AND TIMES AS REQUIRED BY THE ENGINEER. THE CONTRACTOR SHALL VARY THE METHOD OF PLACING AND COMPACTION IN ORDER TO MEET THE REQUIREMENTS OF THESE SPECIFICATIONS AS DETERMINED BY TESTING AND AS ACCEPTED BY THE ENGINEER.
 - THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER THE SOURCE OF ALL THE REQUIRED GRANULAR FILL MATERIALS SPECIFIED IN THE DESIGN DRAWING AND ASSOCIATE TESTING DATA RESULTS WITHIN 7 DAYS OF AWARD OF CONTRACT. ADDITIONAL TESTING OF THE MATERIAL MAY BE REQUIRED BY THE ENGINEER DURING THE WORK TO DEMONSTRATE CONFORMANCE TO THE SPECIFIED GRADATIONS.
 - ROCKFILL
 - EACH LAYER OF ROCKFILL MATERIAL SHALL BE COMPACTED BY NOT LESS THAN FOUR COMPLETE PASSES OF THE VIBRATORY ROLLER EQUIPMENT. VIBRATORY ROLLER SHALL HAVE A SMOOTH STEEL DRUM, EQUIPPED WITH CLEANING DEVICES, EITHER PULLED OR SELF-PROPELLED. CONTRACTOR SHALL HAVE A STATIC WEIGHT OF 10 TONNES ON THE AXIS OF THE DRUM. THE VIBRATION FREQUENCY OF THE VIBRATORY ROLLER DURING OPERATION SHALL BE BETWEEN 30HZ AND 35HZ AND THE COMPACTION FORCE CENTRIFUGAL. THE ROLLER AT 30 HZ SHALL NOT BE LESS THAN 1 T. THE POWER OF THE ENGINE DRIVING THE VIBRATORY ROLLER SHALL BE SUFFICIENT TO MAINTAIN THE SPECIFIED FREQUENCY AND CENTRIFUGAL FORCE UNDER THE MOST ADVERSE CONDITIONS WHICH MAY BE ENCOUNTERED DURING COMPACTION OF THE FILL.
 - THE VIBRATORY ROLLER SHALL MAINTAIN A MINIMUM DISTANCE OF 1.5m FROM THE EXISTING CONCRETE DAM FOR COMPACTION. ROCKFILL MATERIAL AROUND THE EXISTING CONCRETE DAM SHALL BE LAID IN 300mm LAYERS AND SHALL BE COMPACTED WITH HAND COMPACTORS TO 98% SPMDO.
 - ROCKFILL MATERIAL UNDER WATER SHALL BE PLACED WITH MECHANICAL EQUIPMENT AND COMPACTED UNDER WATER WITH THE BACK OF EXCAVATOR BUCKET SO THAT NO DISTORTION CAN BE OBSERVED. EACH LAYER OF ROCKFILL MATERIAL UNDER WATER SHALL NOT BE MORE THAN 250mm THICK BEFORE COMPACTION.
 - IF REQUIRED BY THE ENGINEER, CONTRACTOR SHALL VARY THE NUMBER OF PASSES OF COMPACTION EQUIPMENT FROM THE MINIMUM FOUR COMPLETE PASSES SPECIFIED, IN ORDER TO ACHIEVE THE SPECIFIED DENSITY.
 - RIP RAP
 - RIP RAP SHALL BE PLACED BY SUITABLE MECHANICAL EQUIPMENT SO THAT INTERMIXING OF ADJOINING ROCKFILL AND RIP RAP DOES NOT OCCUR DURING PLACING AND SO THAT MINIMUM BREAKAGE OF ROCK FRAGMENTS OCCURS.
 - RIP RAP NEED NOT BE COMPACTED BUT PLACED CAREFULLY IN SUCH A MANNER THAT LARGER ROCK FRAGMENTS ARE UNIFORMLY DISTRIBUTED AND SMALLER ROCK FRAGMENTS FILL VOIDS BETWEEN LARGER PIECES. HAND PLACING SHALL BE REQUIRED TO THE EXTENT NECESSARY TO SECURE RESULTS SPECIFIED ABOVE. THE SPECIFIED ROCK SIZES AND GRADING APPLY TO RIP RAP IN-PLACE.

CONCRETE CAST-IN-PLACE AND REPAIR:

- GENERAL:
- THE CONCRETE CAST-IN-PLACE AND REPAIR WORK FOR THIS PROJECT MAINLY CONSISTS OF:
 - REMOVING THE CONCRETE STRUCTURE AS SHOWN AND DESCRIBED ON THE DRAWINGS AND IN THIS SPECIFICATION.
 - PREPARING THE SURFACE FOR THE CONCRETE CAST-IN-PLACE AS SHOWN ON THE DRAWINGS, INCLUDING ABRASIVE CLEANING, CLEANING OF EXISTING REINFORCEMENT, AND APPLYING BONDING AGENT TO THE SURFACE.
 - SUPPLYING MATERIALS AND THE MIXING AND PLACING OF CONCRETE AS SHOWN AND DESCRIBED ON THE DRAWINGS AND INCLUDING SPECIFICATION INCLUDING VIBRATING, FINISHING, AND CURING.
 - SUPPLYING, FABRICATING, CONSTRUCTING, MAINTAINING AND REMOVING TEMPORARY WORKS, INCLUDING FALSEWORK AND FORMWORK.
 - THE QUALITY CONTROL (QC) TESTING OF ALL CONCRETE MIX MATERIALS.
- REFERENCES AND STANDARDS:
- CSA A23.1/A23.2, CONCRETE MATERIALS AND METHODS OF CONCRETE CONSTRUCTION/METHODS OF TEST AND STANDARD PRACTICES FOR CONCRETE.
 - CAN/CSA A3001, CEMENTITIOUS MATERIALS FOR USE IN CONCRETE.
 - INTERNATIONAL CONCRETE REPAIR INSTITUTE (ICRI) TECHNICAL GUIDELINE NO. 310.1R, GUIDE FOR SURFACE.
 - PREPARATION FOR THE REPAIR OF DETERIORATED CONCRETE RESULTING FROM REINFORCING STEEL CORROSION.
 - CAN/CSA G30.18, BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT.
 - ACI 117, STANDARD TOLERANCES FOR CONCRETE CONSTRUCTION AND MATERIALS.
 - REINFORCING STEEL INSTITUTE OF CANADA, (RSIC), MANUAL OF STANDARD PRACTICE.
 - GUIDE TO CONCRETE REPAIR (2ND EDITION), U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION, AUGUST 2015.

CONCRETE REMOVAL:

- ALL AREAS OF THE EXISTING CONCRETE TO BE REMOVED WILL BE MARKED BY THE CONTRACTOR AS SHOWN ON DRAWINGS. THE CONCRETE REMOVAL AREAS SHALL BE CONFIRMED AND APPROVED BY THE ENGINEER BEFORE PROCEEDING.
- THE CONTRACTOR SHALL REMOVE THE EXISTING CONCRETE AS THE DIMENSIONS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER. ANY DAMAGE CAUSED BY THE CONTRACTOR TO ANY PORTION OF THE STRUCTURE NOT INTENDED FOR THE REMOVAL SHALL BE REPAIRED/RECOVERED BY THE CONTRACTOR, AT THE CONTRACTOR'S EXPENSE, TO THE SATISFACTION OF THE ENGINEER.
- THE CONTRACTOR SHALL EXERCISE CAUTION AND TAKE CARE NOT TO DAMAGE ANY EXISTING DAM, POWERHOUSE, ROAD, AND EARTH RETAINING STRUCTURE, INTENDED TO REMAIN IN PLACE.

CONCRETE CAST-IN-PLACE:

- CONCRETE MIX DESIGN SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:
 - MINIMUM 28-DAY COMPRESSIVE STRENGTH – 30 MPa, CLASS F1.
 - CEMENTITIOUS MATERIAL: TYPE GU WITH UP TO 30% FLY ASH.
 - MAXIMUM WATER/CEMENT RATIO BY WEIGHT: 0.45
 - SUMP: 75mm +/- 25mm (BEFORE ADDITION OF SUPERPLASTICIZER).
 - AGGREGATE: 20mm MAX. NOMINAL SIZE.
 - AIR CONTENT AS PER CSA A23.1
 - EXECUTION ACCORDING TO CSA A23.1, LATEST EDITION.
 - CURING ACCORDING TO CSA A23.1, LATEST EDITION.
- ALL CONCRETE SHALL MEET THE REQUIREMENTS OF CSA A23.1 AND A23.2 STANDARDS, LATEST EDITION.
- AGGREGATES SHALL BE TESTED FOR ALKALI REACTIVITY AS PER CSA A23.1 AND A23.2 AND APPROVED BY THE ENGINEER.
- BACK-FILLING AGAINST CAST-IN-PLACE CONCRETE WALLS SHALL NOT COMMENCE UNTIL CONCRETE IN THE WALL HAS ACHIEVED DESIGN STRENGTH.

GEOTEXTILE:

- GENERAL:
- GEOTEXTILE WILL BE USED TO:
- PROVIDE EROSION CONTROL FOR OVERFLOW ROCKFILL/RIP RAP FILL OF DOWNSTREAM SPILLWAY CHANNEL AND/OR THE AREA SUBJECT TO FLOWING OFF FROM EROSION AND OR SCOUR DURING DAM OPERATION.
 - INTERFACE BETWEEN THE ROCKFILL/RIP RAP AND EXCAVATED NATIVE SOIL FOR THE CREEK BANK EROSION PROTECTION.
 - SEPARATE AND PREVENT MIXING OF MATERIALS OF DIFFERENT GRADING AS REQUIRED IN THE DESIGN DRAWING
- APPLICABLE CODES AND STANDARDS:
- THE FOLLOWING CODES AND STANDARDS APPLY FOR THE USE OF GEOTEXTILES:
- ASTM D 4354 PRACTICE FOR SAMPLING OF GEOSYNTHETICS FOR TESTING.
 - ASTM D 4355 TEST METHOD FOR DETERIORATION OF GEOTEXTILES FROM EXPOSURE TO ULTRAVIOLET LIGHT AND WATER (XENON-ARC TYPE APPARATUS).
 - ASTM D 4491-99A, STANDARD TEST METHODS FOR WATER PERMEABILITY FOR GEOTEXTILES BY PERMITTIVITY.
 - ASTM D 4595-86 (2001), STANDARD TEST METHOD FOR TENSILE PROPERTIES OF GEOTEXTILES BY THE WIDE-WIDTH STRIP METHOD.
 - ASTM D 4632 TEST METHOD FOR GRAB BREAKING LOAD AND ELONGATION OF GEOTEXTILES.
 - ASTM 4716-01, TEST METHOD FOR DETERMINING THE (N-PLANE) FLOW RATE PER UNIT WIDTH AND HYDRAULIC TRANSMISSIVITY OF A GEOSYNTHETIC USING A CONSTANT HEAD.
 - ASTM D 4751-99A, STANDARD TEST METHOD FOR DETERMINING APPARENT OPENING SIZE OF A GEOTEXTILE.
 - ASTM D4759, PRACTICE FOR DETERMINING THE SPECIFICATION CONFORMANCE OF GEOSYNTHETICS.
 - ASTM D4833, TEST METHOD FOR INDEX PUNCTURE RESISTANCE OF GEOTEXTILES, GEOMEMBRANES AND RELATED PRODUCTS.
 - ASTM D4873, GUIDE FOR IDENTIFICATION, STORAGE, AND HANDLING OF GEOTEXTILES.
 - ASTM D4884, STANDARD TEST METHOD FOR STRENGTH OF SEWN OR THERMALLY BONDED SEAMS OF GEOTEXTILES.
 - ASTM D5261, TEST METHOD FOR MEASURING MASS PER UNIT AREA OF GEOTEXTILES.
 - ASTM D5321, STANDARD TEST METHOD FOR DETERMINING THE COEFFICIENT OF SOIL AND GEOSYNTHETIC OR GEOSYNTHETIC AND GEOSYNTHETIC FRICTION BY THE DIRECT SHEAR METHOD.
 - GRI STANDARD GT12(A) (EDITORIAL CHANGES), GEOSYNTHETIC RESEARCH INSTITUTE, DECEMBER 19, 2012.

SHIPPING, STORAGE, AND HANDLING:

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SHIPPING, STORAGE, AND HANDLING OF GEOTEXTILE, AS PER THE ASTM, AND AS WELL AS ANY RELATED COSTS, INCIDENTAL OR OTHERWISE, INCLUDED IN THE INSTALLATION PRICE.
- THE GEOTEXTILE SHALL ADHERE TO THE LABELLING REQUIREMENTS OF ASTM D 4873 AND SHIPPING, HANDLING AND STORAGE SHALL ADHERE TO ASTM D 4873.

MATERIAL TYPE:

- THE GEOTEXTILE SHALL BE OF NON-WOVEN SYNTHETIC FIBER, SUPPLIED IN ROLLS:
 - MINIMUM WIDTH OF 4.6m;
 - MINIMUM LENGTH OF 91m; AND
 - COMPOSED OF MINIMUM 85% BY MASS OF POLYPROPYLENE WITH INHIBITORS ADDED TO BASE PLASTIC TO RESIST DETERIORATION BY ULTRA-VIOLET AND HEAT EXPOSURE FOR 60 DAYS.
- PHYSICAL PROPERTIES OF THE GEOTEXTILE SHALL INCLUDE:

PHYSICAL PROPERTY	VALUE	UNIT	ASTM
NOMINAL THICKNESS	4.1	mm	ASTM D 5199
MASS PER UNIT AREA	540	G/m ²	ASTM D 5261
TENSILE STRENGTH	1.64	kN	ASTM D 4632
ELONGATION AT BREAK	50%	—	ASTM D 4632
TRAPEZOIDAL TEAR STRENGTH	0.64	kN	ASTM D 4533
PUNCTURE STRENGTH	1.0	kN	ASTM D 4833
MINIMUM MULLEN BURST	5170	KPA	—
UV RESISTANCE	MINIMUM 70%	—	ASTM D4355
APPARENT OPENING SIZE	0.2	mm	ASTM D 4751
MINIMUM WATER FLOW RATE	2,000	L/MIN/m ²	ASTM D 4491
PERMITTIVITY	0.7	S ⁻¹	ASTM D 4491

- MATERIAL ACCEPTANCE SHALL ADHERE TO ASTM D 4759.

GEOTEXTILE PLACEMENT:

- PLACE GEOTEXTILE ON APPROVED SUBGRADE, FOLLOWING THE REQUIRED EXCAVATION AND STRIPPING, SITE PREPARATION FOR GEOTEXTILE INSTALLATION AND SMOOTH-ROLLING THE PREPARED SUBGRADE SURFACE.
- PLACE GEOTEXTILE SMOOTH AND FREE OF TENSION STRESS, FOLDS, WRINKLES AND CREASES.
- GEOTEXTILE PLACED ON SLOPES SHALL BE STARTED FROM THE TOE TO THE UPPER EXTENT OF THE SLOPE.
- THE GEOTEXTILE SHALL BE JOINED BY OVERLAPS, THE MINIMUM OVERLAP BEING 500mm.
- ANY DAMAGED GEOTEXTILE SHALL BE PROMPTLY REPAIRED OR REPLACED TO THE APPROVAL OF THE ENGINEER AT THE SITE.
- PROTECT PLACED GEOTEXTILE FROM DISPLACEMENT, DAMAGE OR DETERIORATION BEFORE, DURING AND AFTER PLACEMENT OF MATERIAL LAYERS.

STRUCTURAL STEEL:

- STRUCTURAL STEEL SHALL CONFORM TO CAN/CSA-519.
- STRUCTURAL STEEL SHALL BE NEW G40.21 350W MATERIAL UNLESS NOTED OTHERWISE.
- HOLLOW STRUCTURAL SECTIONS SHALL BE ASTM A500 GRADE C OR G40.21 350W MATERIAL UNLESS NOTED OTHERWISE.
- ANGLES CHANNELS AND PLATES TO BE G40-21-300W MATERIAL UNLESS NOTED OTHERWISE.
- WELDING TO CSA W59 WELDED STEEL CONSTRUCTION, LATEST EDITION.
- FABRICATOR SHALL BE CERTIFIED ACCORDING TO CSA STANDARD W47.1 DIVISION 1 OR 2, LATEST EDITION.
- ALL BOLTED CONNECTIONS TO BE BEARING TYPE. THE BOLTS SHALL BE BROUGHT TO TO A SNUG TIGHT CONDITION AS DEFINED BY CAN/CSA S16.1.
- MEMBERS SHALL BE CONNECTED FOR THE FORCES INDICATED. WHERE THESE FORCES ARE NOT KNOWN, COMPRESSION AND TENSION SHOULD BE CONNECTED FOR 50% OF THE EFFECTIVE STRENGTH OF THAT MEMBER AND BEAMS CONNECTED FOR THE FULL UNIFORM CAPACITY FOR THAT SPAN.
- SPICES SHALL BE DESIGNED TO DEVELOP THE FULL CAPACITY OF THAT MEMBER AT THE POINT OF SPICE. MEMBERS SHALL NOT BE SPICED AT THE MAXIMUM STRESS POINTS. NO SPICE IS TO BE MADE UNLESS SHOWN ON THE DRAWINGS OR REVIEWED AND APPROVED BY THE CONSULTANT.
- PROVIDE WELDED STIFFENERS PLATING ON BOTH SIDES OF BEAMS AT POINTS OF CONCENTRATED LOADS INCLUDING BEAMS SUPPORTING COLUMNS OR RUNNING OVER THE TOP OF COLUMNS.
- ANCHOR BOLTS TO ASTM A307, UNLESS NOTED OTHERWISE.
- GROUND (NON-SHRINK) UNDER BEARING PLATES SHALL BE M-BED BY STERNSON LTD. OR APPROVED EQUAL.
- NO DRILLING OR CUTTING AFTER FABRICATION OF STRUCTURAL STEEL UNLESS APPROVED BY THE ENGINEER.
- ALL FIELD WELDED CONNECTIONS TO BE INSPECTED BY FABRICATION CONTRACTOR.
- PROVIDE WEEP HOLES IN ALL HSS STRUCTURAL.

MATERIAL TESTING AND INSPECTIONS:

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENGAGING THE SERVICES OF A CERTIFIED TESTING AND INSPECTION COMPANY TO COMPLETE:
 - COMPACTION TESTING ON ALL INSTALLED GRANULAR MATERIAL.
 - TESTING OF ALL PLACED CONCRETE/CEMENTITIOUS GROUT
 - IN ACCORDANCE WITH CAN/CSA-A23.2-14.
 - ROCK ANCHOR PULL TEST.
 - ALL OTHER QUALITY CONTROL REQUIREMENTS AS OUTLINED IN OPS SPECIFICATIONS.

POSTED TENSIONED ANCHOR DOWEL:

- GENERAL:
- THE WORK TO BE DONE SHALL COMPRISE THE SUPPLY OF ALL LABOUR, PLANT AND MATERIAL, AND THE PERFORMANCE OF ALL WORK NECESSARY FOR SUPPLYING, DRILLING, INSTALLATION, AND GROUTING, POST-TENSIONING TO THE DESIGN LOAD FOR THE ANCHOR DOWELS, AS SHOWN ON THE DESIGN DRAWINGS.

ROCK DOWEL INSTALLATION:

- ALL ROCK DOWEL LOCATIONS AND ORIENTATIONS SHALL BE COORDINATED WITH THE ENGINEER PRIOR TO DRILLING. BORE HOLES DRILLED WITHOUT PRIOR APPROVAL FROM THE ENGINEER MAY BE REJECTED AT THE DISCRETION OF THE ENGINEER. REJECTED BORE HOLES SHALL BE FILLED WITH GROUT AND NEW HOLES SHALL BE DRILLED AT THE CONTRACTOR'S EXPENSE.
- THE LOCATES FOR DRILLING SHALL BE CLEAR OF BURIED UTILITIES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO THE CLEARANCE OF THE DRILLING AREA.
- UNLESS OTHERWISE SPECIFIED AND APPROVED IN WRITING BY THE ENGINEER, ALL BORE HOLES SHALL BE DRILLED USING A LOW IMPACT ROTARY DRILL TO PREVENT DAMAGE TO THE EXISTING DAM CONCRETE STRUCTURE. AIR POWERED DRILLS ARE NOT ALLOWED TO PREVENT DAMAGE TO THE EXISTING CONCRETE STRUCTURE. ANY DAMAGE SHALL BE REPORTED TO THE ENGINEER FOR CORRECTIVE. CORRECTIVE ACTION AS SPECIFIED BY THE ENGINEER WILL BE COMPLETED AT THE CONTRACTOR'S EXPENSE.
- ALL BORE HOLES SHALL BE CLEANED OUT USING COMPRESSED AIR PRIOR TO INSERTING THE REINFORCING DOWEL. THE ENGINEER RESERVES THE RIGHT TO WITNESS THE CLEANING PROCESS AND INSERTION OF DOWELS. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN ADVANCE OF CLEANING AND INSERTION OF DOWELS SO THAT DEPTH AND CLEANLINESS OF THE DRILLED HOLES CAN BE CONFIRMED. DOWELS GROUTED WITHOUT INSPECTION SHALL BE REJECTED AND REPLACED AT NO ADDITIONAL COST TO THE CLIENT.
- ALL ROCK DOWELS SHALL BE GROUTED IN THE PRESENCE OF THE ENGINEER. GROUTING PERFORMED WITHOUT THE ENGINEER PRESENT SHALL BE REJECTED AND THE ROCK DOWELS REPLACED AT THE CONTRACTOR'S EXPENSE.
- ALL ROCK DOWELS SHALL BE CENTERED IN THE DRILLED HOLE USING CENTRALIZERS. CONTRACTOR SHALL ADJUST CENTRALIZER SIZE ACCORDING TO DRILLED HOLE DIAMETER IF NECESSARY. ANY ROCK DOWEL NOT CENTERED SHALL BE REJECTED AND REPLACED AT THE CONTRACTOR'S EXPENSE. ANCHORS OR DOWELS SHALL NOT DEVIATE MORE THAN 8% OF THE DRILLED DIAMETER FROM THE CENTER OF THE HOLE. ALL DOWELS SHALL BE APPROVED PRIOR TO INSERTION OF CEMENT GROUT PLUG.
- THE CONTRACTOR SHALL KEEP THE AREA CLEAN DURING GROUTING. ANY SPILLED GROUT SHALL BE CLEANED IMMEDIATELY AT NO ADDITIONAL COST TO THE CLIENT.
- SURFACE GROUT SHALL BE SCULPTED AND STAINED TO MATCH EXISTING SURROUNDING COLOR, TEXTURE, AND SHAPE CONDITIONS.
- ROCK DOWEL MATERIAL, DIAMETER AND EMBEDMENT SHALL BE AS SPECIFIED ON THE DESIGN DRAWING. EMBEDMENT LENGTH SHALL BE THE ACTUAL LENGTH BAR SET BENEATH THE EXISTING CONCRETE SURFACE AND ENCASED INTO GROUT. THE CONTRACTOR SHALL ADJUST THE DRILL DEPTH TO MEET THE REQUIRED MINIMUM EMBEDMENT LENGTHS AND ACCOUNT FOR TOP/BOTTOM CLEARANCE AND/OR GROUT PLUG.

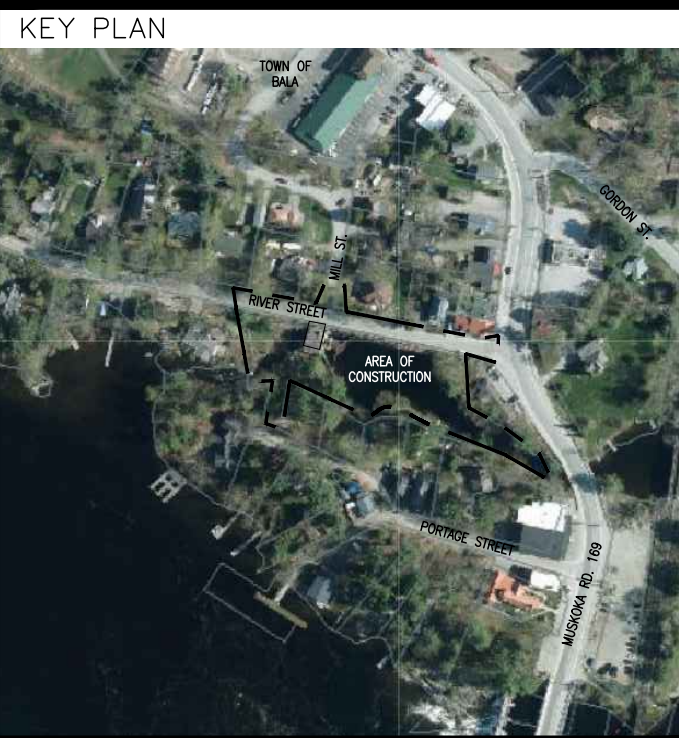
CONCRETE NOTES:

- CONCRETE IS SPECIFIED USING ALTERNATIVE NUMBER OF CSA A23.1 TABLE 2 AS FOLLOWS:

PARAMETER	EXTERIOR SLAB
EXPOSED CLASS (TABLE 1)	C-2
AIR CONTENT CATEGORY (TABLE 4)	1
MAX. W/C RATION (TABLE 2)	0.5
CURING TYPE (TABLE 2)	2
MIN. COMPRESSIVE STRENGTH	32MPa
- AT LEAST TWO (2) WEEKS PRIOR TO THE PLACEMENT OF CONCRETE THE CONTRACTOR SHALL SUBMIT THE FOLLOWING TO THE ENGINEER FOR REVIEW:
 - A VALID 'CERTIFICATE OF READY MIXED CONCRETE PRODUCTION FACILITIES' OR A VALID 'CERTIFICATE OF MOBILE MIX CONCRETE PRODUCTION FACILITIES' AS ISSUED BY THE 'READY MIXED CONCRETE ASSOCIATION OF ONTARIO' TO THE PLANT BEING USED.
 - A COMPLETED 'CONCRETE MIXED DESIGN SUBMISSION FORM'
 - A QUALITY PLAN THAT DESIGNATES A SPECIFIED SLUMP OR SOME OTHER MEASURE OF WORKMANSHIP.
 - TEST RESULTS TO SHOW COMPLIANCE WITH CSA A23.1.
 - AIR VOID SYSTEM OF HARDENED CONCRETE.
 - STATISTICAL STRENGTH TEST ANALYSIS TO CONFIRM THE STRENGTH LEVEL FOR EACH CLASS OF CONCRETE INCLUDING THE EXPECTED 7/28 DAY STRENGTH RATIO
- FABRICATION AND PLACEMENT OF REINFORCING STEEL TO BE IN ACCORDANCE WITH CSA A23.1 AND THE REINFORCING STEEL INSTITUTE OF CANADA'S 'REINFORCING STEEL MANUAL OF STANDARD PRACTICE'.
- REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO CSA G30.18 M92, F_y=400 MPa (GRADE 400).
- CONCRETE SHALL NOT BE POURED UNTIL REBAR HAS BEEN INSPECTED BY THE ENGINEER.
- WHERE REBARS JOIN AT CORNERS PROVIDE CORNER BARS FOR LAPS.
- CONCRETE COVER FOR REINFORCING STEEL AS PER TABLE 17 OF CSA A23.1
 - ALL CONCRETE CAST AGAINST EARTH 75mm (3")
 - ALL CONCRETE CAST IN FORMS BUT EXPOSED TO EARTH OR WEATHER 50mm (2")
 - BARS 20M AND SMALLER IN WALLS AND SLABS 32mm (1 1/4")
 - CONCRETE NOT EXPOSED TO EARTH AND WEATHER 25mm (1") OR 1.5 NOMINAL BAR DIAMETER
- ALL REINFORCING BARS SHALL BE ACCURATELY PLACED AND ADEQUATELY SUPPORTED BY PRECAST CONCRETE, ADDITIONAL BARS, STIRRUPS, TIES OR APPROVED CHAIRS AGAINST DISPLACEMENT.
- CONTINUOUS AND TEMPERATURE REINFORCING BARS SPLICES TO BE LAPPED 40 BAR DIAMETERS OR A MINIMUM OF 300mm (12") AT SPLICES AND CORNERS UNLESS OTHERWISE SHOWN ON SECTION OR TYPICAL DETAILS. LAP CONTINUOUS TOP BARS AT CENTRE BETWEEN SUPPORTS AND CONTINUOUS BOTTOM BARS AT SUPPORTS. AS REQUIRED, TERMINATE CONTINUOUS BARS AT NON CONTINUOUS ENDS WITH STANDARD HOOKS.
- CONSTRUCTION JOINTS: SLAB CONSTRUCTION JOINTS MAY BE MADE ONLY AT APPROVED LOCATIONS SHOWN OR AS DIRECTED BY THE ENGINEER.

CONCRETE ANCHORS:

- ALL CONCRETE ANCHORS TO BE HILTI HAS ROD HOT DIPPED GALVANIZED (DIAMETER AS NOTED ON DRAWINGS).
 - ALL CONCRETE ANCHORS TO BE COMPLETE WITH HOT DIPPED GALVANIZED FLAT WASHERS, NUTS, LOCK NUTS, ETC. AS SPECIFIED ON THE DRAWINGS.
 - ALL EPOXY ADHESIVE SHALL BE HILTI HIT-HY 200/HIT ICE.
 - INSTALL AS PER MANUFACTURER'S SPECIFICATIONS.
- CEMENTITIOUS GROUT:
- CEMENTITIOUS GROUT FOR ROCK DOWELS TO BE SIKAGROUT 212.
 - CEMENTITIOUS GROUT UNDER BASE PLATES TO BE SIKAGROUT 212.
- ROCK DOWELS:
- ROCK DOWELS TO BE:
 - 25M – POWER HOUSE STABILIZATION
 - 20M – RETAINING WALL
 - 15M – SPILLWAY WALL, DAM RAISING, DAN EXTENSION AND RETAINING WALL #2
 - ALL DOWELS TO CONFORM TO CSA G30.18 M92, F_y=400 MPa (GRADE 400)
 - ALL DRILLED HOLES FOR ROCK DOWELS SHALL BE 25mm GREATER THAN THE DOWEL DIAMETER.



ENGINEER'S SEAL:

08/05/2025	6	ISSUED FOR TENDER	DR	EG
18/07/2024	5	ISSUED FOR APPROVALS	DR	EG
05/06/2024	4	ISSUED FOR FINAL REVIEW	DR	EG
08/05/2024	3	ISSUED FOR CLIENT REVIEW	DR	EG
05/04/2024	2	ISSUED FOR CLIENT REVIEW	DR	EG
28/03/2024	1	ISSUED FOR CLIENT REVIEW	DR	EG/FP
30/09/2022	0	ISSUED FOR CLIENT REVIEW	BJW	FP
DATE	REV.	REVISION	BY	APP'D

APPENDIX B

Natural Heritage Review and Communications with Regulators

03 February 2020

Karine Beriault | Management Biologist
7 Bay St, Parry Sound,
ON, P2A 1S4
Tel: 705-773-4240

Dear Karine Beriault,

Re: Natural Heritage Background Information Request: A Class Environmental Assessment on Burgess Dam for the Township of Muskoka Lakes, Bala, Ontario, Canada.

Tulloch Environmental, a division of Tulloch Engineering Inc. (Tulloch), has been retained by the Corporation of the Township of Muskoka Lakes to conduct a review of Natural Heritage Background Information available for an existing Dam across the north channel of the outlet from Lake Muskoka into the Moon River in Bala, Ontario. This review is in support of the proposed rehabilitation and/or replacement of the Burgess 1 Dam and Generating Station.

The focus of this review is located at an existing Dam, which can be accessed from River Street and Portage Street in the Village of Bala, ON. The facility consists of a 59m long concrete dam approximately 3m in height. A 16m long retaining wall connects to the north wall of the powerhouse and runs along River St. UTM Coordinates (NAD83) for the site are: 17T 609163 4985226. A map of the project location is provided in the attachments. The scope of this review includes the site and areas within 1000m.

Tulloch has reviewed information obtained from Land Information Ontario (LIO) regarding land uses and natural heritage features known (or believed) to occur within 1000m of the site. These data included sites of domestic, recreational, commercial and industrial land uses as well as known environmental sensitivities (e.g. Significant Wildlife Habitat, nesting sites, fish spawning sites) and areas of enhanced protection (e.g. parks, conservation reserves, ANSI). A series of maps indicating LIO findings are provided in the attachments.

Tulloch has also reviewed natural heritage information provided by the Ministry of Natural Resources and Forestry via the Natural Heritage Information Centre (NHIC) Make-a-map, Crown Land Use Atlas and Fish ON-Line web applications. This information was supplemented with records obtained from authoritative atlases, including; the Atlas of the Breeding Birds of Ontario, Bat Conservation International and the Ontario Reptiles and Amphibians Atlas. A summary of notable information is provided below:

- **Four (4)** NHIC records of Species at risk were returned within 1000m of the study area.
 - Massasauga – Great Lakes / St. Lawrence population (Threatened)
 - Rusty-patched Bumble Bee (Endangered)
 - Blanding's Turtle (Threatened)
 - Eastern Wood-pewee (Special Concern)

- **Five (5)** NHIC records of locally rare species were returned within 1000m of the study area
 - Redtop Panicgrass
 - Cyrano Darner
 - Giant Lacewing
 - Ridged Yellow Flax
 - Sand Panicgrass
- Records of restricted species were returned within 1000m of the study area.
- **Ten (10)** ABBO records of species at Risk were returned within 1000m of the study area.
 - Barn Swallow (OBBA 1985 & 2005)
 - Bobolink (OBBA 1985)
 - Canada Warbler (OBBA 1985 & 2005)
 - Chimney Swift (OBBA 1985 & 2005)
 - Common Nighthawk (OBBA 1985 & 2005)
 - Eastern Meadowlark (OBBA 1985)
 - Eastern Wood-pewee (OBBA 1985 & 2005)
 - Golden-winged Warbler (OBBA 1985)
 - Olive-sided Flycatcher (OBBA 1985 & 2005)
 - Wood Thrush (OBBA 1985 & 2005)
- One Natural Area, BALA was identified from NHIC records
- Environment and Climate Change Canada considers the General Nesting Periods for this area (Nesting Zone C3) to be 8 April to 28 August for Forests, 12 April to 28 August for open habitats and 8 April to 16 August for Wetlands.
- Lake Muskoka outlets to the Moon River through the Burgess Dam. The Moon River outlets to Georgian Bay approximately 40km downstream.
 - Lake Muskoka is 120.4 ha with a mean depth of 15m and a max depth of 66m. The thermal regime is unknown but is assumed to be cool-cold. Lake Trout stocking has occurred every year since 2013, and once in 2010. Known fish species in the lake include:
 - Black Crappie
 - Brown Bullhead
 - Burbot
 - Cisco
 - Lake Trout
 - Lake Whitefish
 - Largemouth Bass
 - Northern Pike
 - Pumpkinseed
 - Rainbow Smelt
 - Rock Bass

- Smallmouth Bass
 - Walleye
 - White Sucker
 - Yellow Perch
- Moon River thermal regime is cool-water. Fishing is restricted at Freeman Twp. Lots 33, 34, 35, 36 in Concessions VIII, IX, and X. No fishing from Apr 1 - Fri before the 3rd sat in May. Fish species are unknown; however, online fishing atlases suggest Muskie, Pike, Walleye and Bass are all present in the River.

Tulloch is requesting the following information and guidance from the OMNRF:

- A SAR list for the district.
- The identification of the Restricted Species (proof of medium sensitivity data training can be provided).
- Terrestrial data pertaining to the site and areas within 1000m, such as:
 - Records of provincially tracked species associate with the planning areas.
 - Known Significant Wildlife Habitat and other areas of critical habitat associate with the planning areas.
 - The General Nesting Periods for the area (if different from that recommended by Environment and Climate Change Canada, above)
 - Other terrestrial timing windows and restrictions
- Fishery data for water bodies adjacent to the project area including:
 - Known fish community species
 - Thermal regimes (if different than above)
 - Areas of known critical habitat (spawning, etc.)
 - Aquatic species at risk (records, local knowledge)
 - Barriers to passage
- OMNRF fishery management information:
 - In-water work timing window
 - Areas of concern (e.g. known sources of sediment and erosion, sources of pollution)
 - Fishery management objectives (e.g. rehabilitation or protection goals, etc.)
 - Known commercial fishing licenses (i.e. commercial baitfish licenses) in the area
- Adjacent areas of protection not listed above (ANSI, Parks, Conservation Reserves, etc.)

If you have any questions or require additional information, please do not hesitate to contact the undersigned at (705) 522-6303.

Thank you for your time and assistance.

Sincerely,



Emelia Myles-Gonzalez

Aquatic Ecologist

Tulloch Environmental, a division of Tulloch Engineering

emelia.myles-gonzalez@tulloch.ca

(705) 522-6303 x 624

Attachments

Burgess Dam - 19001305

Tulloch Engineering - Natural Heritage Information Request

Legend

- Active Turtle
- Bala
- Bala
- Bala United Church
- Bala's Museum with Memories of Lucy Maud Montgomery
- Beaver Run Golf Course
- Burgess Dam
- Feature 1
- Feature 2
- Forest Hill Real Estate Inc. (Gidley Division)
- Kee to Bala
- Park
- Sun And Ski

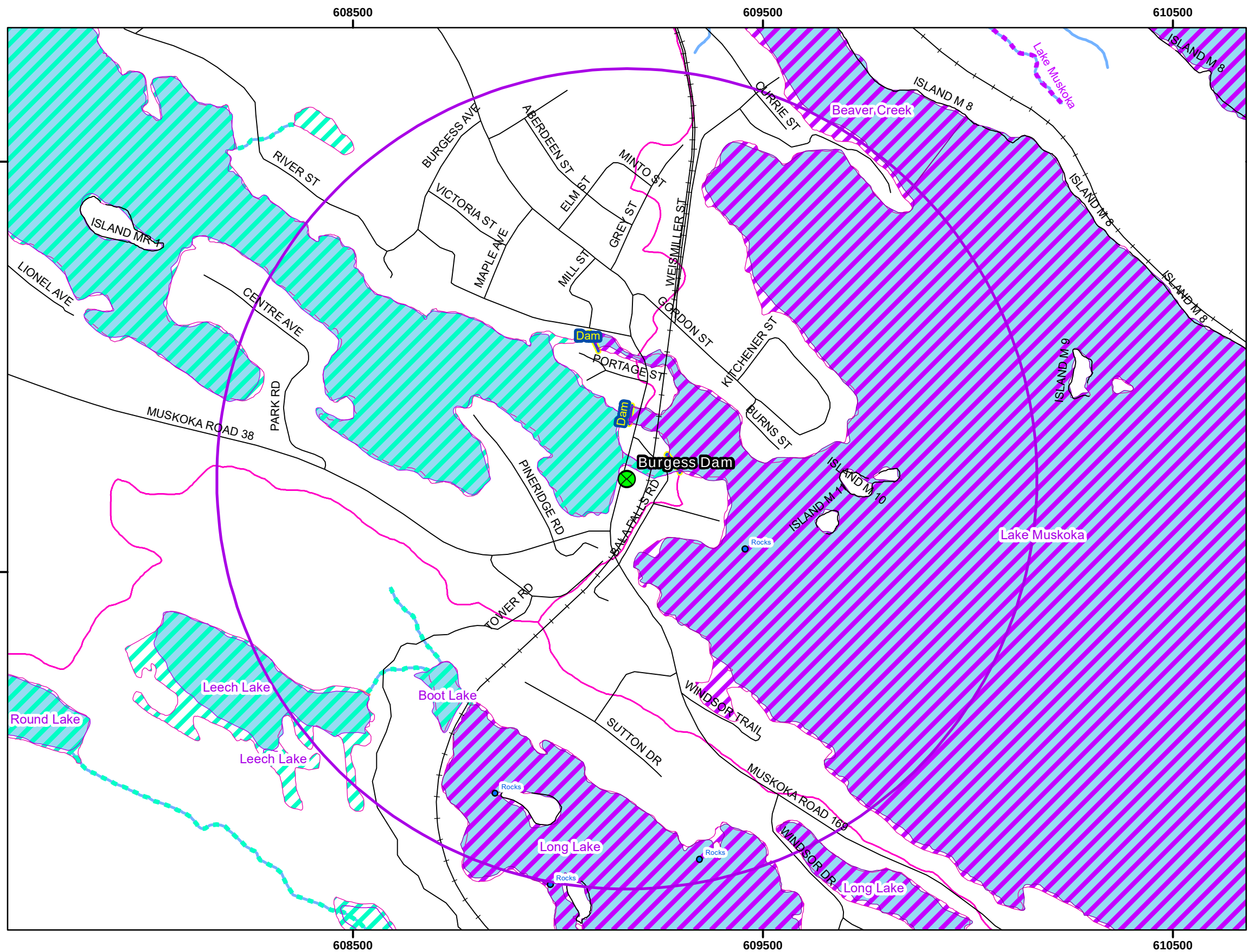
Google Earth

© 2019 Google

Leech Lake

Image © 2020 CNES / Airbus

1 km



Burgess Dam Project # 191493

Natural Heritage
Background Review
- Aquatic Habitat -

Legend

- Local Road
- Rail Line
- OHN Hydrographic Points
- OHN Hydrographic Line
- Beaver Dam
- OHN Hydrographic Poly
- OHN Waterbody
- OHN Watercourse
- Primary Watershed
- Secondary Watershed
- Tertiary Watershed
- Quaternary Watershed
- ARA Waterbody Regime**
 - Unknown Regime
 - Cold Water
 - Cool Water
 - Warm Water
- ARA Watercourse Regime**
 - Cold Water
 - Cool Water

Coordinate System: NAD 1983 UTM Zone 17N Transverse Mercator

0 0.2 0.4 0.8 1.2 1.6 Kilometers

User Name: Kelly.Major

SCALE: 1:10,000

DATE: 30/01/2020

Data Provided by Land Information Ontario:
Data updated as of February 2018.

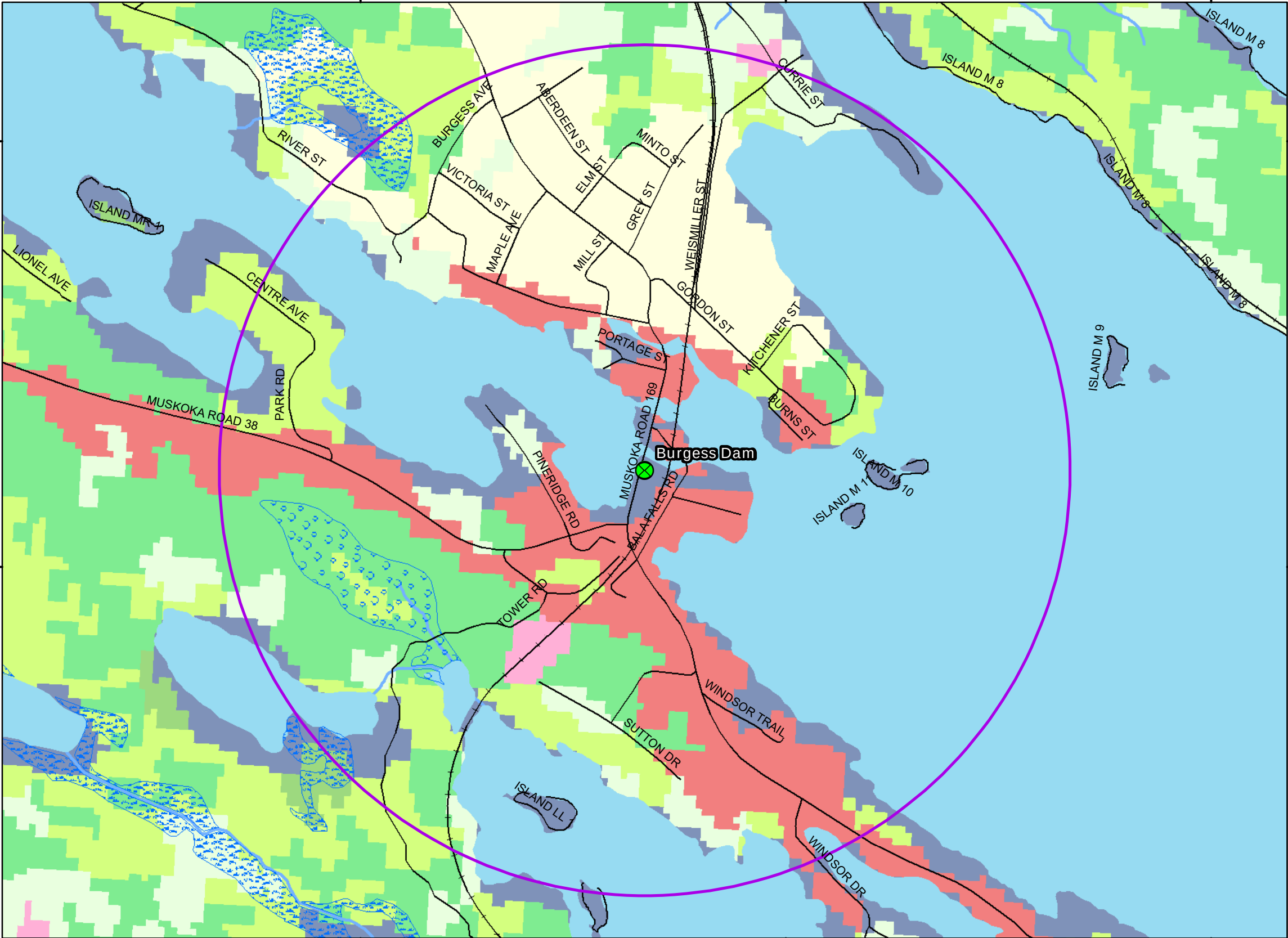


Burgess Dam Project # 191493

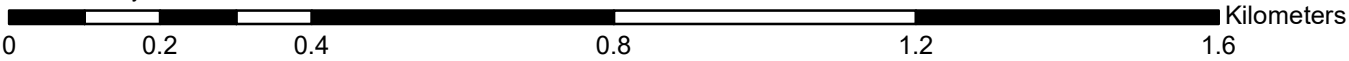
Natural Heritage
Background Review
- Terrestrial Habitat -

Legend

- Local Road
 - Rail Line
 - FRI Wetland (Open)
 - FRI Wetland (Treed)
 - OHN Waterbody
 - OHN Watercourse
- Ontario Land Cover Compilation Version 2**
- 1 - Clear Open Water
 - 11 - Sparse Treed
 - 13 - Deciduous Treed
 - 14 - Mixed Treed
 - 15 - Coniferous Treed
 - 26 - Bedrock
 - 27 - Community/Infrastructure
 - 28 - Agriculture and Undifferentiated Rural Land Use



Coordinate System: NAD 1983 UTM Zone 17N Transverse Mercator



User Name: Kelly.Major

SCALE: 1:10,000

DATE: 30/01/2020

Data Provided by Land Information Ontario:
Data updated as of February 2018.



Burgess Dam
Project # 191493

Natural Heritage
Background Review
- Land Uses -

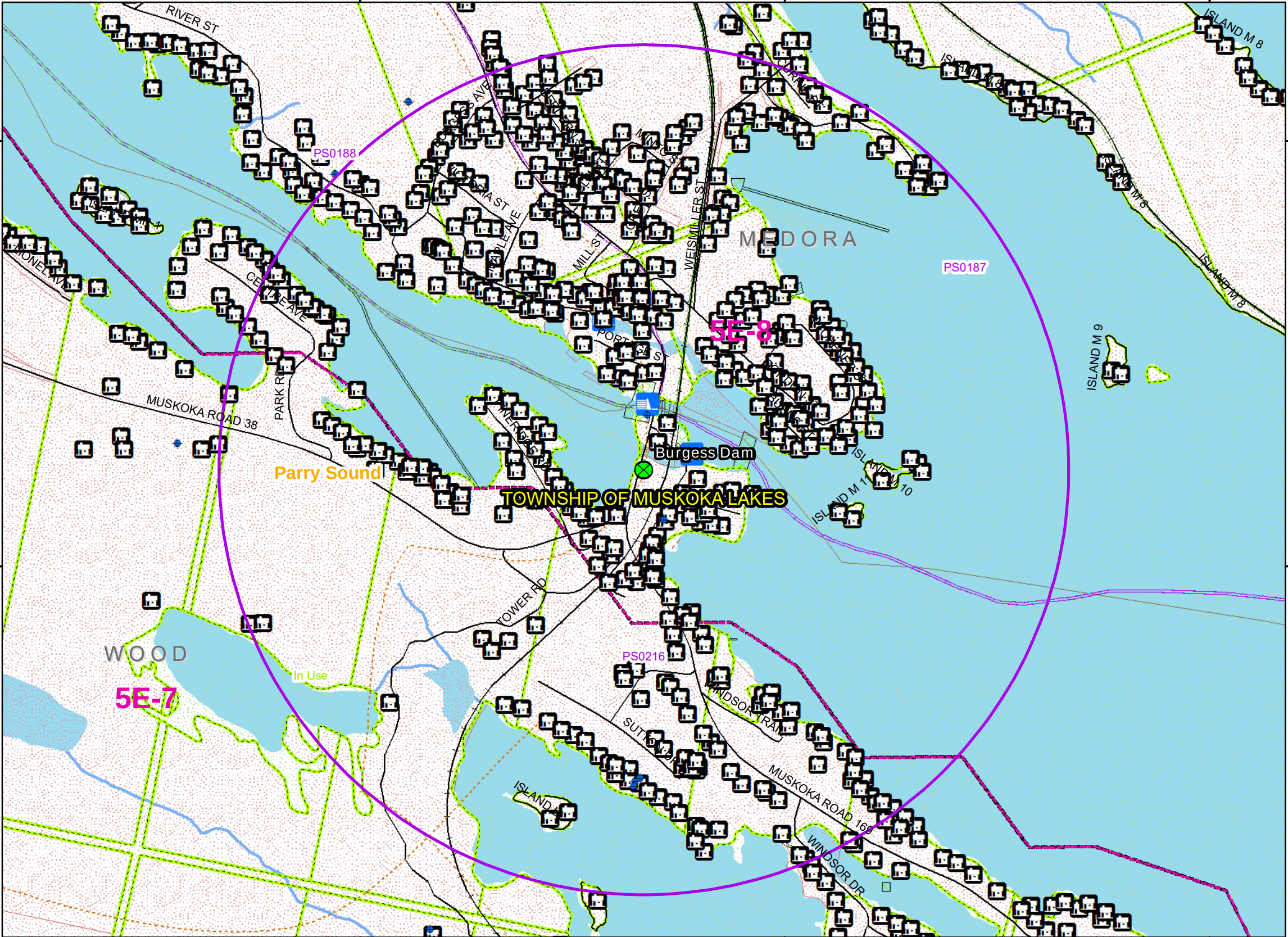
Legend

- Groundwater Well
- Building
- Dam
- Trail Segment
- Local Road
- Rail Line
- Township
- Ecodistrict
- Municipalities
- Geographic Lot Fabric
- Trapline License Area
- Bait Harvest Area
- MNRF District
- Crown Land Non-freehold Disposition
- Patent Land
- Crown Land
- OHN Waterbody
- OHN Watercourse

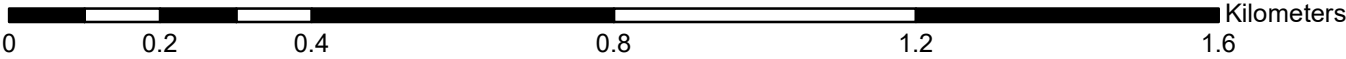
SCALE: 1:10,000

DATE: 30/01/2020

Data Provided by Land Information Ontario:
Data updated as of February 2018.



Coordinate System: NAD 1983 UTM Zone 17N Transverse Mercator



User Name: Kelly.Major

Burgess Dam
Project # 191493

Natural Heritage
Background Review
- Protected Areas -

Legend

- Local Road
- Rail Line
- OHN Waterbody
- OHN Watercourse
- CLUPA Designation
 - General Use Area



Coordinate System: NAD 1983 UTM Zone 17N Transverse Mercator

0 0.2 0.4 0.8 1.2 1.6 Kilometers

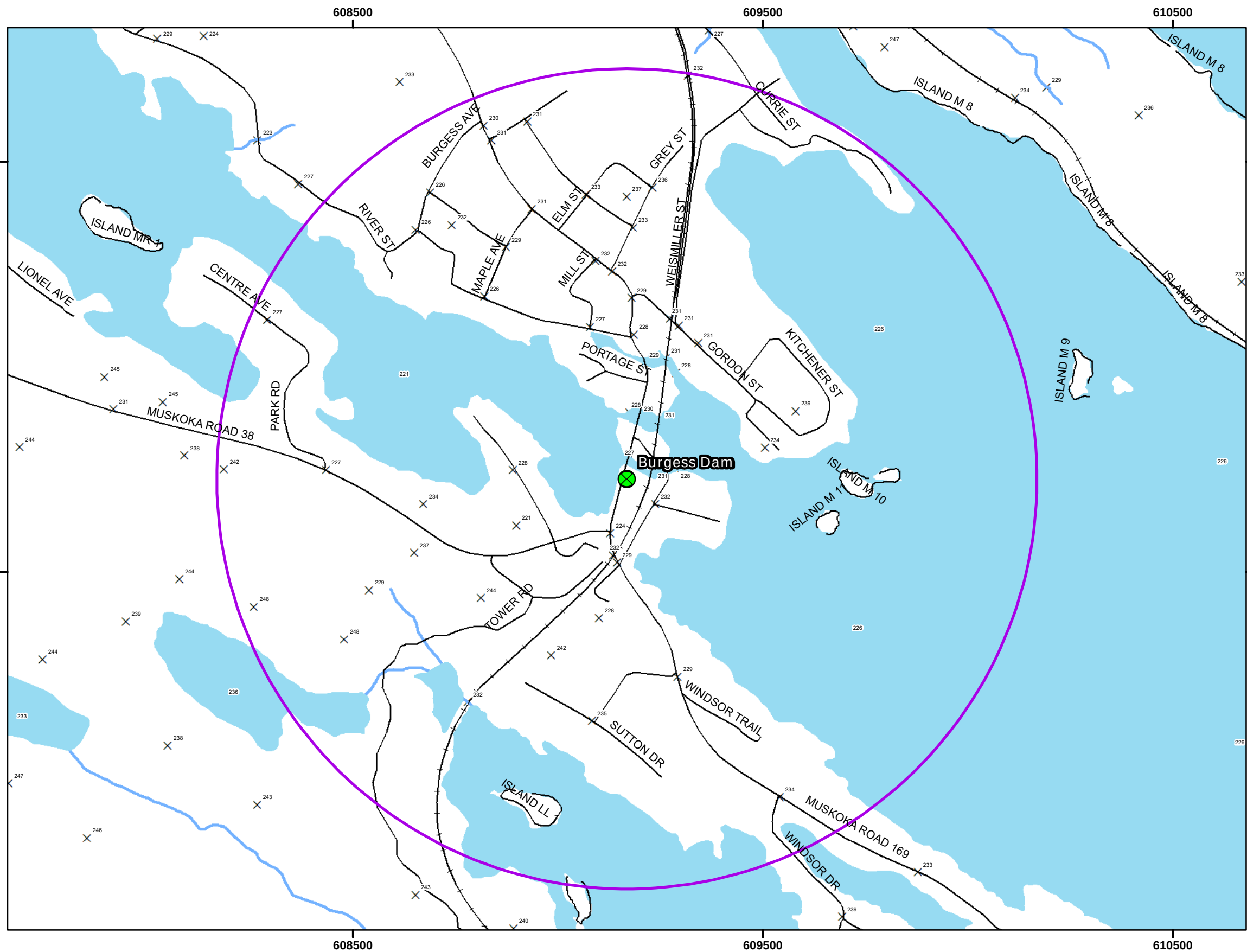
User Name: Kelly.Major

SCALE: 1:10,000

DATE: 30/01/2020

Data Provided by Land Information Ontario:
Data updated as of February 2018.





Burgess Dam Project # 191493

Natural Heritage
Background Review
- Surficial Geology -

Legend

- Local Road
- Rail Line
- OHN Waterbody
- OHN Watercourse
- Spot Height

Coordinate System: NAD 1983 UTM Zone 17N Transverse Mercator

0 0.2 0.4 0.8 1.2 1.6 Kilometers

User Name: Kelly.Major

SCALE: 1:10,000

DATE: 30/01/2020

Data Provided by Land Information Ontario:
Data updated as of February 2018.



Emelia Myles-Gonzalez

From: Emelia Myles-Gonzalez
Sent: February 12, 2020 9:50 AM
To: NHI ParrySound (MNRF)
Subject: RE: Natural Heritage Information Request - Tulloch - Burgess Dam in Bala, ON

Thank you Jake.

I will review your information and let you know if I have any questions.

Regards,

Emelia Myles-Gonzalez

Aquatic Biologist



Tel: 705 522 6303
Cell: 613 985 6961

TULLOCH Engineering Inc
1942 Regent St, Sudbury, ON P3E 5V5

emelia.myles-gonzalez@TULLOCH.ca | TULLOCH.ca

From: NHI ParrySound (MNRF) <NHI.ParrySound@ontario.ca>
Sent: February 12, 2020 9:48 AM
To: Emelia Myles-Gonzalez <emelia.myles-gonzalez@tulloch.ca>
Subject: RE: Natural Heritage Information Request - Tulloch - Burgess Dam in Bala, ON

Hi Emelia,

Please see information below:

All SAR information is to be request from MOE.

The location of the Burgess dam is incorrectly marked on the maps.

You seem to be relying on fish online rather than direct LIO data which is more complete.

Lake Muskoka is ~12040 ha not 120.4 and is considered coldwater.

Lake Muskoka fact sheet is attached – is somewhat out of date but may have some useful info.

Bala Reach. Fact sheet attached and data is in LIO (ARA summary), not fish online.

There is a walleye spawning area - mapped as an area that includes the Burgess tailrace all the way over to the main Bala Falls. Other typical species that spawn in that type of habitat can be expected as well, such as smelt and suckers. The Burgess plant has normally run as a run-of river plant and there has not been any flow requirements in the water management plan. Work that requires plant

shutdown (shutting off of flow through the dam/plant) should be scheduled to avoid the spring spawning period (April 1 – June 1). Same recommendation applies for work in water.

There is also a potential spawning area mapped on the upstream, Lake Muskoka, side between Burgess and North Bala dam. It must have been mapped based on habitat as it does not seem to be a great location.

Margined madtom may be present as they do occur in Lake Muskoka and they like that rocky kind of habitat that is in the tailrace.

The EA documents for the Bala Falls project which may have some material of interest are on the Swift River web site (balafalls.ca).

If there are any other questions please give me a call.

Jake Rouse

Jeremy Rouse
Management Biologist
Parry Sound District
Ministry of Natural Resources and Forestry

Office: 705-773-4205



From: Emelia Myles-Gonzalez <emelia.myles-gonzalez@tulloch.ca>

Sent: Monday, February 3, 2020 2:33 PM

To: NHI ParrySound (MNRF) <NHI.ParrySound@ontario.ca>

Subject: Natural Heritage Information Request - Tulloch - Burgess Dam in Bala, ON

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello,

On behalf of Tulloch Environmental, a branch of Tulloch Engineering, I am seeking any Natural Heritage Information you may have for the proposed rehabilitation of the Burgess Dam and Generating Station in Bala, Ontario. All information gathered from online resources is summarized in the attachment, as well as a site map and maps showing Aquatic Features, Terrestrial Features, Protected Areas and Land-use Features.

A list of the requested information is outlined in the letter attached above. We understand that MNRF does not provide information on SAR, but would appreciate any additional information on tracked or locally rare species. A restricted

species was retrieved in our background review. If you require proof of Sensitivity training for this information please let me know.

Thank you for any information you can provide. I look forward to hearing back from you,

Emelia Myles-Gonzalez

Aquatic Biologist



Tel: 705 522 6303
Cell: 613 985 6961

TULLOCH Engineering Inc
1942 Regent St, Sudbury, ON P3E 5V5

emelia.myles-gonzalez@TULLOCH.ca | TULLOCH.ca

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Lake Fact Sheet – Parry Sound District

Lake Muskoka

Location

<i>Official Name:</i>	Lake Muskoka	<i>Local Names:</i>	
<i>County/District:</i>	Muskoka	<i>Geographic Twp:</i>	Muskoka
<i>Municipality:</i>	Township of Muskoka Lakes	<i>MNR Admin. Area:</i>	Bracebridge
<i>Lat./Long:</i>	45.054 N -79.475 W	<i>UTM (NAD83):</i>	17 620081 4990037
<i>Topographic Map (1:50,000):</i>	31E03	<i>Drainage Basin:</i>	Muskoka River

Physical Features

<i>Surface Area (ha):</i>	12,100	<i>Maximum Depth (m):</i>	73	<i>Mean Depth (m):</i>	18
<i>Elevation (m asl):</i>	225	<i>Perimeter (km):</i>	269	<i>Island Shoreline (km):</i>	209
<i>Volume (10⁴ m³):</i>	183,000	<i>Watershed (km²):</i>	4,600 (excludes area of lake)	<i>Water Clarity:</i>	3.5 (varies across the lake)

Land Use and Development

<i>Crown Land (%):</i>	0	<i>Provincial Parks:</i>	Hardy Lake Provincial Park
<i>Shoreline Development:</i>	Intense; urban, shoreline residential, commercial,		
<i>Access:</i>	Public launches: Bracebridge - George Road, Beaumont Drive; Gravenhurst – Muskoka Wharf; Bala; Milford Bay and others; private access through several marinas.		
<i>Water Level Management:</i>	Regulated; water level is controlled by MNR-owned and operated dams at Bala. Flows and levels are governed by the Muskoka River Water Management Plan.		

Fish Species

<i>Major Fish Species:</i>	brook trout (E), lake trout (S), lake whitefish (R), Cisco (R), rainbow smelt (I), northern pike, burbot, smallmouth bass (I?), largemouth bass (I?), walleye (I?),
<i>Other Fish Species:</i>	longnose sucker, white sucker, lake chub, golden shiner, common shiner, blacknose shiner, spottail shiner, spotfin shiner (I), bluntnose minnow, black bullhead (?), brown bullhead, margined madtom (I?), trout-perch, rock bass (I), pumpkinseed, black crappie (I 1989), yellow perch, iowa darter, logperch, cisco, Slimy Sculpin, Spoonhead Sculpin

Lake Fact Sheet – Parry Sound District

Lake Muskoka

Other Species: spiny water flea (I 1989), freshwater jellyfish (I 2002)

Notes: E: extirpated, I: introduced – intentional or accidental, O: occasional, R: remnant, S: currently stocked, ?: status uncertain, 2009: year of first record or introduction if known, blank: presumed native

Fisheries Management

Fisheries Management Zone:.....15

*Designation for Lake Trout Management:*designated; natural reproduction; not at development capacity

Fishing Regulation Exceptions: No lake-specific exceptions (2009);

Muskoka River; Bracebridge Falls and South Falls to Lake Muskoka: Fish sanctuary - no fishing from Apr. 1 - June 15 (2009)

Current Stocking: Lake trout – supplemental, some natural reproduction occurs, stocked every year with yearlings.

Historic Stocking (last year stocked): brown trout (1933), smallmouth bass (1949), walleye (1989), rainbow trout (1983), brook trout (1961), splake (1961)

Contaminants: Species tested: lake trout, northern pike, walleye, smallmouth bass, yellow perch, rock bass, brown bullhead, rainbow smelt

Assessment: Completed Projects:

1988	contaminant sampling
1989	benthic invertebrate sampling
1989-94	zooplankton sampling
1990	critical habitat mapping
1990-91	vegetation mapping
1992-93	winter creel survey
1993	summer creel survey
1993-94	substrate mapping
1993-94	contaminant sampling
1993-95	small fish survey
1995	development mapping
1995	cisco study
1995-96	spring littoral index netting
1998	summer creel survey
1998	lake trout spawning observations
1998	contaminant sampling
1998-99	spring littoral index netting
2001	near shore community index netting
2003	Summer Profundal Index Netting (targets lake trout) (SPIN)
2005	SPIN
2002-06	Fall Walleye Index Netting
2007	Broad-scale Monitoring (BsM)– large mesh (generalized fish community assessment
2008	BsM – small mesh
2010	BsM – large mesh
2014	Broad-scale Monitoring (large and small mesh netting)
Annual	ice hut count

Lake Muskoka

Lake Fact Sheet – Parry Sound District

Lake Muskoka

Synopsis

Lake Muskoka is the largest inland lake in the District of Muskoka and MNR's Parry Sound District. It supports a large diverse sport fishery. The lake is highly developed and has been greatly perturbed by water management, contaminants, shoreline development and species introductions.

Lake trout were the primary native sport fish species. The population went into serious decline in the 1970's at least partly due to reproductive failure from DDT contamination. The population has not fully recovered; supplemental stocking still occurs. Lake whitefish and lake herring (cisco) populations have been severely depressed as well and are currently present in low numbers, but believed to be increasing. The walleye population crashed as well. Rehabilitation efforts including water level control, habitat improvement, harvest regulation and stocking have largely restored the population.

A disjunct population of margined madtom, a small, secretive member of the catfish family, occurs in Lake Muskoka. It is not known if the population is native or introduced. Margined madtoms are rare in Ontario and are listed as Data Deficient by the Committee on the Status of Species Endangered Wildlife in Canada (COSEWIC 2002).

Fish habitat features along the shoreline of Lake Muskoka have been mapped and provided to municipalities for use in municipal planning. Inquiries regarding the application of this information should be directed to the relevant municipality.

Lake Muskoka is a 'fixed' lake for the provincial Broad-scale Monitoring Program. Repeated sampling on a five year cycle is planned to monitor long-term trends in water quality, fish community and sport fish abundance in randomly selected lakes across the province.

2014 Broad-scale Monitoring

Lake Muskoka was sampled in 2014 as a "trend" lake for the Cycle 2 of the provincial Broad-scale monitoring program. Results will be reported through that program. Two species not previously documented were captured; Slimy Sculpin and Spoonhead Sculpin. Both species are thought to be native to the lake.

Updated: 2018

Refer to Lake Fact Sheet Interpretation document for explanation of content.

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Lake Fact Sheet – Parry Sound District

Bala Reach

Location

Official Name: Moon River Local Names: Bala Reach
 County/District: Muskoka Geographic Twp: Medora, Wood
 Municipality: Township of Muskoka Lakes MNR Admin. Area: Bracebridge
 Lat./Long: 45.025 N 79.642 W UTM (NAD83): 17 607002 4986580
 Topographic Map (1:50,000): 31E04 Drainage Basin: Moon River, Musquash River

Physical Features

Surface Area (ha): 307 Maximum Depth (m): Mean Depth (m):
 Elevation (m asl): 225 Perimeter (km): Island Shoreline (km):
 Volume (10^4 m^3): Watershed (km^2): 4700 Water Clarity (m):
 (excludes area of lake)

Land Use and Development

Crown Land (%): 10 Provincial Parks: None
 Shoreline Development: High
 Access: Public; boat launch and public docks in Bala
 Water Level Management: . Regulated; Ontario Power Generation owned and operated dams at Swift Rapids Generating Station and Moon River control dam
 Water level is managed in accordance with the Muskoka River Water Management Plan

Fish Species

Major Fish Species: Northern Pike, Smallmouth Bass, Largemouth Bass, Black Crappie (I 2004), Walleye
 Other Fish Species: Brown Bullhead, Emerald Shiner, Hornyhead Chub (I), Logperch, Longnose Dace
 Pumpkinseed, Rock Bass, White Sucker, Yellow Perch, Rainbow Smelt (I 1980)
 Other Species: Spiny Water Flea

Notes: E: extirpated, I: introduced – intentional or accidental, O: occasional, R: remnant, S: currently stocked, ?: status uncertain,
 2009: year of first record or introduction if known, blank: presumed native

Lake Fact Sheet – Parry Sound District

Bala Reach

Fisheries Management

<i>Fisheries Management Zone:</i>	15
<i>Designation for Lake Trout Management:</i>	not designated
<i>Fishing Regulation Exceptions</i>	no lake-specific exceptions
<i>Current Stocking:</i>	none
<i>Historic Stocking (last year stocked):</i>	Walleye (1943-1954, 1997-2000)
<i>Contaminants (species tested):</i>	Walleye, Smallmouth Bass, White Sucker
<i>Assessment:</i>	<i>Completed Projects:</i>
	1980 Fish Community Survey (trap net and gill net)
	2004 ESTN Trap Net Survey
	2017 MOE Contaminant Sampling

Synopsis

Bala Reach is a lake-like section of the Moon River located between Bala and Swift Rapids. It has not had a complete inventory conducted but several fish community surveys have been done.

In the early 2000s, efforts were made by the local community, supported by MNRF, to rehabilitate the Walleye population. Like Lake Muskoka, upstream, the Walleye population had collapsed decades previously, probably due to a combination of water level fluctuations, introduced Rainbow Smelt and pesticide use. Habitat enhancement, stocking and possibly downstream movement of fish from the previously rehabilitated Lake Muskoka population resulted in successful re-establishment of a population and fishery.

Updated: 2018

Refer to Lake Fact Background Information document for explanation of content.

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