

Gough Creek and Clack Creek at Day Road
Robert's Creek, BC

Environmental Overview Assessment



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solve and simplify

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List of Acronyms

BEC	-	Biogeoclimatic Ecosystem Classification
CDC	-	Conservation Data Centre
CEMP	-	Construction Environmental Management Plan
COSEWIC	-	Committee on the Status of Endangered Wildlife in Canada
CSP	-	Corrugated Steel Pipe
DFO	-	Fisheries and Oceans Canada
ENV	-	BC Ministry of Environment & Climate Change Strategy
ESA	-	Environmentally Sensitive Area
HWM	-	High water mark
MFLNRORD	-	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
MOTI	-	Ministry of Transportation and Infrastructure
PGL	-	PGL Environmental Consultants
QEP	-	Qualified Environmental Professional
SAR	-	Species at Risk
SEI	-	Sensitive Ecosystem Inventory
WSA	-	<i>Water Sustainability Act</i>
WQG	-	Water Quality Guidelines

1.0 INTRODUCTION

Pottinger Gaherty Environmental Consultants (PGL) was retained by the Ministry of Transportation and Infrastructure (MOTI) to complete an Environmental Overview Assessment (EOA) of proposed flood damage remediation works along Day Road at Gough Creek and Clack Creek on the Sunshine Coast (the Sites; Figure 1). The Sites are located within the territories of the Shishálh Nation. Widespread flooding from an atmospheric rain event in November 2021 resulted in the washout of the Gough Creek and Clack Creek culverts. After the flooding, emergency operations, which included temporary culvert replacements, were conducted.

A Change Approval (File 2009876) under the *Water Sustainability Act* (WSA.) was received for proposed interim works to be completed in 2022. Planned instream interim works, including culvert replacements, were not conducted, as the works could not be completed during the approved least-risk instream work window due to contractor availability. Bank stabilization activities adjacent to the existing culverts was subsequently carried out on January 12, 2023, with environmental monitoring provided by Barsanti Environmental Services Ltd.

Permanent design scopes of work will address outstanding concerns at the Sites including culvert sizing concerns and removal of washed-out culverts/debris. The new culverts will provide improved fish passage over the previously existing Corrugated Steel Pipe (CSP) culverts and the temporary culverts.

It is understood the Project will be completed as part of the provincial Disaster Financial Assistance Arrangements work underway across southern BC in response to the fall 2021 floods. Based on the 90% completed engineer design drawings, the scope of the permanent work for Day Road (Gough and Clack Creeks) includes:

- Removing anthropogenic debris; specifically, the damaged, rusted, washed-out CSP culverts from downstream habitat at both creeks;
- Removing downstream debris jam (“log jam,” large woody debris/tree limbs) accumulated from the atmospheric river flooding event;
- Removing accumulated debris and gravel upstream of the culvert on Gough Creek to direct stream flow to culvert, to a maximum depth of 150mm;
- Clearing and grubbing Day Road shoulders for temporary equipment access (to be revegetated);
- Removing the emergency works temporary culverts (1.8m-diameter CSP at Gough Creek and 1.5m-diameter CSP at Clack Creek);
- Installing a single, 20m-long, concrete box culvert (2.7m width x 2.7m height), complete with a concrete headwall and fish baffles (spacing of fish baffles is to be determined) at Gough Creek;
- Installing two-barrel (twin-barrels), 15m-long, concrete box culverts, each barrel measuring 2.4m width x 2.4m height, complete with concrete headwall and fish baffles (spacing of fish baffles is to be determined) at Clack Creek;
- Stripping surface materials and installing non-woven geotextile fabric—to be covered with 1.5m thickness of 50kg class riprap at the inlet and outlet of Gough Creek (approximately 9m-long riprap apron at inlet, and 14m-long riprap apron at outlet);
- Stripping surface materials and installing non-woven geotextile fabric—to be covered with 1.5m thickness of 50kg class riprap at the inlet and outlet of Clack Creek (approximately 6m-long riprap apron at inlet, and 10m-long riprap apron at outlet);
- Dressing channel bottom riprap placed at the inlet and outlet of both Gough and Clack Creeks with fisheries gravels;

- Installing pre-cast headwalls with concrete footings at inlet and outlet of the Clack Creek twin-box culverts;
- Constructing cast-in-place headwalls with concrete footings at inlet and outlet of the Gough Creek box culvert;
- Installing a pedestrian walkway and walkway fencing along the upstream (northern) edge at both creek crossings; and
- Excavating, stripping, rebuilding, grading, and paving 70m of Day Road surrounding Gough Creek crossing, and 50m of Day Road surrounding Clack Creek crossing.

Construction of the Project is scheduled to begin in 2023 following receipt of regulatory approvals. The estimated permitting and construction schedule is provided in Table A. Details outlining permitting requirements and timing of construction within reduced-risk timing windows for fish and wildlife are described in Section 5.0.

Table A: Estimated Project Timeline

Development Task	Proposed Start	Anticipated Finish
Permitting¹		
<i>Water Sustainability Act</i> Change Approval Application	January 2023	May 2023
<i>Fisheries Act</i> Request for Project Review	January 2023	May 2023
Fish and Wildlife Salvage Applications (Ministry of Forests)	February 2023	May 2023
Construction		
Preparation	July 26, 2023	October 31, 2023
Instream/riparian work ²	August 1, 2023	October 31, 2023
Other work conducted away from streams including road repair work provided Erosion and Sediment Control measures are in place and are maintained.	August 1, 2023	No end date

1.1 Objectives

The objective of this EOA was to complete a biological inventory of the Site, including an assessment of the terrestrial, aquatic, and riparian environment. It is noted that an EOA was previously submitted in advance of the proposed temporary interim works and that this report is an updated version of the assessment for the permanent repair works proposed for 2023.

¹ For the permitting section in this table, the proposed start and anticipated finish refers to when the application will be submitted to the regulatory agencies and when PGL expects to receive the approved permit.

² Instream works can be conducted prior to the start date if streams are dry upon the confirmation of a Qualified Environmental Professional.

This EOA provides:

- A description of the terrestrial and aquatic conditions near the Project footprint, including a review of vegetation, wildlife, fish and fish habitat, and species at risk that may interact with the proposed works;
- Guidance to avoid and mitigate impacts to environmental resources, including recommendations for the Project design; and
- The outcomes of this report are intended to serve the dual purpose of supporting detailed design processes as well as environmental regulatory submissions. Our approach consisted of a desktop review of pertinent resources and a reconnaissance-level field assessment.

This report is organized into ten sections:

- Section 1 provides an introduction to the proposed project and objective of this report;
- Section 2 outlines the scope of work and describes the methods with which data was collected to prepare this report;
- Section 3 describes the regulatory framework for the proposed Project;
- Section 4 provides a brief overview of the Site's conditions;
- Section 5 describes the environmental conditions at each Site and observations from field visits;
- Section 6 outlines the potential permit, approvals, and timelines for the works occurring, and associated least risk work windows;
- Section 7 gives a brief summary of the findings and recommendations for optimal avoidance and mitigation measures; and
- Sections 8, 9 and 10 provide standard limitations as well as closing remarks and referenced material used to compile this report.

1.2 Site Overview

Gough Creek (Watershed Code 900-118200-08700-39000) and Clack Creek (Watershed Code 900-118200-08700) are located between Roberts Creek Provincial Park and Mt. Elphinstone Provincial Park along the Sunshine Coast of British Columbia. The two streams cross Day Road at approximately 1.6 km north of Highway 101 and 170 m elevation. The Sites are located at the intersections of Day Road at Gough Creek (UTM Zone 10U 0453805, 5476772) and Clack Creek (UTM Zone 10U 0451567, 5475649). Both Sites had pre-existing 1500mm culverts that were washed out during high rain and flood events during the fall of 2021. Approximately five days after the washouts on Day Road, MOTI's Maintenance Contractor was able to re-establish Day Road by installing a single 1800mm CSP culvert at Gough Creek and a 1500mm CSP culvert at Clack Creek to provide access to residential properties on Day Road beyond the Sites.

Current land use observed on and near the Sites included: roadways (Day Road), and large lot, rural residential properties within a heavily forested area. The town of Roberts Creek is approximately 2km south of the Site. Day Road is situated above the creeks at each Site by approximately 2m (slightly higher at the Gough Creek crossing). At each Site, the watercourse was flowing through a temporary corrugated steel culvert covered by rip rap and structural road fill.

2.0 SCOPE OF WORK

To complete the EOA, PGL:

- Reviewed orthophotographic/aerial imagery and available base maps of the Sites, paying particular attention to watercourses, potential habitat areas, and general land uses and disturbance;
- Identified fish-bearing watercourses near the Sites, as indicated by internet-based federal and provincial databases (Habitat Wizard, Fisheries and Oceans Canada - Aquatic Species at Risk map [DFO, 2020]);
- Reviewed distribution and habitat suitability characteristics for Species At Risk (SAR) provided by the BC Conservation Data Centre (CDC) (see Appendix 2 for SAR status definitions), BC Species and Ecosystems Explorer and iMapBC;
- Reviewed Environment Canada's Sensitive Ecosystems Inventory (SEI) of the Sunshine Coast and Adjacent Islands Mapping Index and associated report catalogue (Ministry of Environment Canada, 2005); and
- Visited the Sites and conducted habitat assessments.

Site visits were conducted by Qualified Environmental Professional (QEP) Katharine Scotton, B.Sc., R.P.Bio and field technician, Hayley Howes, B.Sc., on May 25 and 26, 2022. The weather conditions during the Site visits were 12°C and overcast with occasional light drizzle on May 25 and 13°C with sun and cloud on May 26.

The information obtained from the identified resources, in combination with our Site visits, was sufficient to complete our EOA.

3.0 REGULATORY CONTEXT

Day Road is managed by the MOTI and thus falls primarily under the purview of provincial government; however, federal and regional legislation also applies in select circumstances. The proposed Project is subject to an extensive set of integrated and multi-scalar laws, regulations, guidelines, best practices, and standards. It is noted that a previous EOA had been submitted in advance of the proposed temporary interim works under Change Approval 2009876 and that this report is an updated version of the assessment for the permanent repair works proposed for 2023. The permanent works will require an amendment application to the existing Change Approval.

The following environmental legislation is most relevant to this report:

- Provincial WSA: The purpose of the WSA is to safeguard ground and surface water in BC through licensing its diversion or extraction, and prohibiting changes in and about a stream (inclusive of wetlands and some ditches) without prior approval (Government of BC 2014). Works in and near Gough Creek and Clack Creek (e.g., bank armoring, road re-surfacing) and other aquatic features affiliated with the Site typically require a notification or Change Approval under the WSA, based on the nature of the works;
- Federal *Fisheries Act*: prohibits the harmful alteration of fish and fish habitat (HADD) or the release of deleterious substances into fish habitat unless authorized by Fisheries and Oceans Canada (DFO; Government of Canada, 1985). The Fisheries Act applies to any proposed activities in or around fish habitat, inclusive of aquatic features that discharge to fish habitat. Proposed works that align with a DFO code of practice can typically proceed without regulatory barriers. Where works extend beyond the intent of a code of practice and the AQP identifies the potential for works to result in a HADD or death of fish, a Request for Review should be submitted to DFO; and

- Federal *Species at Risk Act (SARA)*: There are two primary mechanisms by which the SARA may interact with the proposed works: (i) protecting land identified as critical habitat for species at risk, and (ii) protecting SAR and their residence (e.g., a nest or den) from harm (Government of Canada 2022). The SARA typically only applies on federally-administered land³. As such, the SARA has limited preview on Site. However, we have assumed MOTI wishes to satisfy the management intent of the SARA where practical.

Table B provides a high-level overview of other laws, regulations, guidelines, best practices, and standards that may also apply in select circumstances. It is the responsibility of MOTI and contractors to understand how these guidelines apply to the proposed works and achieve compliance with immovable regulatory requirements.

Table B: Applicable Legislation, Regulations, and Guidelines for the Site

Federal Legislation	Provincial Legislation	Guidelines
Fish and Fish Habitat		
<ul style="list-style-type: none"> • <i>Fisheries Act</i> (Canada), 1985 (Government of Canada, 1985a) 	<ul style="list-style-type: none"> • <i>Riparian Areas Protection Act</i>, 1997 (Government of BC) • <i>Riparian Areas Protection Regulation</i>, 2019 (Government of BC) • <i>BC Water Sustainability Act</i>, 2014 (Government of BC 2014) 	<ul style="list-style-type: none"> • Land Development Guidelines for the Protection of Aquatic Habitat, 1993 (DFO and MELP 1992) • A Users' Guide for Changes in and About a Stream in BC (Gov. of BC, 2022a) • Requirements and Best Management Practices for Making Changes In and About a Stream in BC (Gov. of BC, 2022b) • Guidelines for Reduced Risk Instream Work Window (MOE, 2006)
Wildlife		
<ul style="list-style-type: none"> • <i>Migratory Birds Convention Act</i> (Canada), 1994 (Government of Canada 1994a) • <i>Species at Risk Act</i> (Canada), 2002 (Government of Canada 2002) • <i>Wildlife Act (Canada)</i>, 1985, (Government of Canada 1985b) 	<ul style="list-style-type: none"> • <i>BC Wildlife Act</i>, 1996 (Government of BC 1996) 	<ul style="list-style-type: none"> • Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia (BC MOE 2014a) • Guidelines for Amphibians and Reptile Conservation during Urban and Rural Land Development in BC (BC MOE 2014b) • Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia 2013 (BC MOE 2013) • Guidelines to Reduce Risk to Migratory Birds (Government of Canada, 2021) • Best Management Practices Guidelines for Pacific Water Shrew in Urban and Rural Areas (DRAFT) (Craig, Vennesland and Welstead, 2010)

³ Except for aquatic SAR and migratory bird SAR, for which protection is extended to non-federal land.

Federal Legislation	Provincial Legislation	Guidelines
Water Quality		
<ul style="list-style-type: none"> • <i>Canadian Environmental Protection Act, 1999</i> (Government of Canada, 1999) 	<ul style="list-style-type: none"> • <i>BC Environmental Management Act, 2003</i> (Government of BC 2003) • <i>BC Water Sustainability Act, 2014</i> (Government of BC 2014) 	<ul style="list-style-type: none"> • Approved Water Quality Guidelines (BC), 2021 (BC ENV 2021) • Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME 2022) • A Users' Guide for Changes in and About a Stream in BC (Gov. of BC, 2022a) • Requirements and Best Management Practices for Making Changes In and About a Stream in BC (Gov. of BC, 2022b)
Soil		
<ul style="list-style-type: none"> • <i>Canadian Environmental Protection Act, 1999</i> (Government of Canada, 1999) 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME 2022)
Vegetation		
<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • <i>BC Weed Control Act, 1985</i> (Government of BC 1996) 	<ul style="list-style-type: none"> • Best Management Practices for Managing Invasives on Roadsides (MOTI, 2019)
Other		
<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • <i>BC Forest and Range Practices Act, 1996</i> (Government of BC 2002) • <i>BC Heritage Conservation Act, 1996</i> (Government of BC 1996) 	<ul style="list-style-type: none"> • Archaeological Impact Assessment Guidelines, Rev. 1998 (Gov. of BC 1989)

4.0 ENVIRONMENTAL CONDITIONS

PGL completed a desktop review of available resources prior to the Site visits. A summary of both desktop and field observations is provided in the following sections.

4.1 Vegetation and Ecological Conditions

The Sites lie within the Dry Maritime subzone of the Coastal Western Hemlock (CWHdm) Biogeoclimatic Ecosystem Classification (BEC) zone.

All descriptions of BEC subzone characteristics provided below are derived from *A Field Guide to Site Identification and Interpretation for the Vancouver Forest Region* (Green and Klinka, 1994).

4.1.1 CWHdm (Dry Maritime; Coastal Western Hemlock Subzone)

The CWHdm occurs at low elevations on the mainland and immediately adjacent islands. It extends from Hardwicke Island in the north to the Chilliwack River in the southeast. The climate is warm and dry in the summer, with moist, mild winters and little snowfall. Zonal sites may experience minor water deficiency accompanied by longer growing seasons.

Forests are dominated by western redcedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*). With lesser amounts of red alder (*Alnus rubra*). The shrub layer is dominated by salal (*Gaultheria shallon*), red huckleberry (*Vaccinium parvifolium*), and sword fern (*Polystichum munitum*). Less common species include dull Oregon grape (*Mahonia nervosa*), vine maple (*Acer circinatum*), and bracken fern (*Pteridium aquilinum*). Mosses include step moss (*Hylocomium splendens*), and Oregon beaked moss (*Kindbergia oregana*).

4.1.2 Invasive Alien Plant Program Observations

PGL searched for recorded invasive species within and around the Sites using the Invasive Alien Plant Program webmap. Invasive species were recorded 175m east of the crossing at Clack Creek at the end of Day Road including oxeye daisy (*Leucanthemum vulgare*) and hairy cat's ear (*Hypochaeris radicata*). Approximately 340m west of the Gough Creek crossing, invasive species including Canada thistle (*Cirsium arvense*), curled dock (*Rumex crispus*), and hairy cat's ear were recorded along Clover Road. Additionally, Japanese knotweed (*Reynoutria japonica*), a noxious weed listed under the BC *Weed Control Act*, was recorded 400m west of the Gough Creek crossing. No invasive species were recorded by the Invasive Alien Plant Program within or immediately adjacent the Sites; however, invasive and non-native plants were observed during the Site visit, as described in Section 4.1.3.3

4.1.3 Onsite Vegetation Observations

The following subsections describe the vegetation conditions observed at each Site.

4.1.3.1 Gough Creek

Generally, Gough Creek was contained with a narrow flood plain. The dominant canopy species consisted of mature western redcedar and western hemlock, and subdominant red alder. The understory was fairly open, consisting mostly of ferns including sword fern, lady fern (*Athyrium filix-femina*), deer fern (*Blechnum spicant*), and spiny wood fern (*Dryopteris expansa*), with small tree saplings emerging. Other understory vegetation included salal, June plum (*Oemleria cerasiformis*), red huckleberry, stink currant (*Ribes bracteosum*), vine maple, and salmonberry (*Rubus spectabilis*). Riparian cover was about 40% and the creek margins featured red elderberry (*Sambucus racemosa*) and western skunk cabbage (*Lysichiton americanus*).

Vegetation downstream of the temporary culvert was similar in composition to upstream. All species which were present upstream, were also present downstream of the temporary culvert. Furthermore, several additional species were also observed.

4.1.3.2 Clack Creek

Clack Creek on the upstream side of Day Road featured a large floodplain on river right (facing downstream) with grasses and forbs. Cobbles, sand, and woody debris were deposited through the low bank riparian between a small tributary to the northeast, and the main channel. Debris and substrate deposition is assumed to have been due to the heavy rain events and flooding of fall 2021. The riparian area was vegetated with sweet coltsfoot (*Petasites frigidus*), step moss, western skunk cabbage, three-leaved foamflower (*Tiarella trifoliata*), bedstraw (*Galium* sp.) and invasive ivy (*Hedera* sp.).

The riparian habitat of Clack Creek was very similar to that of Gough Creek. In addition to the species found at the Gough Creek Site, thimbleberry (*Rubus parviflorus*), large-leaved avens (*Geum macrophyllum*), and common horsetail (*Equisetum arvense*) were also observed.

4.1.3.3 Invasive Plants

Invasive plant species were observed at both sites. Non-native ivy (*Hedera* sp.) was present sporadically along the forest floor. Ivy is an aggressive invader in large quantities and can envelop native species if left unchecked. Himalayan blackberry (*Rubus armeniacus*) was also found occasionally on both sites. Additionally, non-native Robert's geranium (*Geranium robertianum*), fox glove (*Digitalis* spp.), wall lettuce (*Lactuca muralis*), creeping buttercup (*Ranunculus repens*) were noted within close proximity to the road.

4.1.3.4 Sensitive Ecosystem Inventory

The SEI of the Sunshine Coast and Adjacent Islands Map Index was used to determine the sensitive ecosystem within which the Sites are located. Sensitive ecosystems are fragile and/or rare and are ecologically important because of the diversity of species they support. Both the Gough Creek and Clack Creek Sites at Day Road are comprised of Riparian Habitat sensitive ecosystems with the 'Fringe' subclass. This sensitive ecosystem runs adjacent to Gough and Clack Creek, beginning at their headwaters and continuing through the confluence of Roberts Creek until its outlet into the Strait of Georgia.

Riparian habitats are areas directly adjacent to waterbodies and are easily influenced by erosion, sedimentation, flooding and/or subterranean irrigation due to proximity to the waterbody (Meidinger *et al.*, 2014). Riparian 'Fringe' encompass the plant community adjacent to a freshwater feature where there is no floodplain.

Field surveys confirmed that the description in the SEI of the Sunshine Coast and Adjacent Islands is generally accurate for the Sites.

4.2 Wildlife and Wildlife Habitat

The Sites are in the Georgian Depression Ecoprovince. Ecoprovince descriptions can be used to provide general wildlife characteristics and identify expected wildlife species for a particular area. The following fauna descriptions are derived from The British Columbia Ecoregion Classification (Demarchi, 2011).

Mule deer (*Odocoileus hemionus*) are very abundant in the Georgian Depression Ecoprovince, both in urban and rural settings. Cougars (*Puma concolor*), American black bears (*Ursus americanus*), and coyotes (*Canis latrans*) are also common throughout, as well as several small mammals, including Virginia opossum (*Didelphis virginiana*) (introduced), Trowbridge's shrew (*Sorex trowbridgii*), shrew-mole (*Neurotrichus gibbsii*), Townsend's mole (*Scapanus townsendii*), coast mole (*Scapanus orarius*), Douglas' squirrel (*Tamiasciurus hudsonicus*), and creeping vole (*Microtus oregoni*). It is possible for most of these species to occur on/near the Site with the exception of Virginia opossum.

The Georgian Depression Ecoprovince supports the highest diversity of bird species in BC, as roughly 90% of all species known to occur in the province occur here. Approximately 60% of all species known to breed in BC also occur here. Given its location within the Fraser River corridor, it is likely that many of these species could occur on/near the Site, either as transient visitors or residents.

Barn Owl (*Tyto alba*) and Anna's Hummingbird (*Calypte anna*) are only found within the Georgian Depression Ecoprovince within BC. In addition, Purple Martin (*Progne subis*), Bushtit (*Psaltriparus minimus*), and Hutton's Vireo (*Vireo huttoni*) breed only within this ecoprovince in BC. It is expected that these species would occur on/near the Site, except for Purple Martin. Pileated woodpeckers (*Dryocopus pileatus*) commonly breed in this Ecoprovince (Easton, 2015) and are listed under the Migratory Birds Regulation, 2022. Nest cavities of pileated woodpeckers are used by other birds and mammals (secondary cavity nesters) in the years following the creation of the cavities. The nest cavities are therefore important components of the nest web, have year-round protection, and require proof of inactivity for 36 months before removal.

The ecoprovince is home to a variety of reptiles and amphibians, both native and introduced. Some species that may occur on the Site include northwestern gartersnake (*Thamnophis ordinoides*), northwestern salamander (*Ambystoma gracile*), ensatina (*Ensatina eschscholtzii*), American bullfrog (*Lithobates catesbeiana*) (introduced), and green frog (*Lithobates clamitans*) (introduced).

4.2.1 Onsite Wildlife Observations

Wildlife species were confirmed present during the field surveys through visual and or auditory identification. Several bird species were identified including the Bald Eagle (*Haliaeetus leucocephalus*), Anna's Hummingbird, Spotted Towhee (*Pipilo maculatus*), Townsend's Warbler (*Setophaga townsendi*), American Robin (*Turdus migratorius*), and Yellow-rumped Warbler (*Setophaga coronata*). The mature forest and understory habitat provide suitable nesting and feeding opportunities for a large variety of avian species including raptors, songbirds, and woodpeckers. There was evidence of amphibian presence at the Gough Creek Site within a stagnant pool on river right upstream of Day Road. Remnants of egg masses were identified, potentially from northwestern salamander (*Ambystoma gracile*). Western toad (*Anaxyrus boreas*) and pacific treefrog (*Pseudacris regilla*) have been observed by a resident upstream of the Sites on Clack Creek (personal communication). Abundant coarse woody debris (CWD) present in the riparian area of the Sites also offered potential cover habitat for terrestrial species of amphibians and small mammals. Other significant wildlife habitat features were not observed at the Sites.

4.3 Aquatic Features and Fish Habitat

Gough Creek and Clack Creek originate from headwaters to the north and are part of the Roberts Creek watershed. The creeks run parallel to each other through the Project footprint before Gough Creek merges into Clack Creek approximately 400m to the south. The confluence of Clack and Roberts Creeks is located just south of Highway 101 before Roberts Creek discharges to the Strait of Georgia in the Salish Sea.

The existing gradients above and below the culverts are:

- Gough Creek: upstream gradient of 5.670% with a downstream gradient of 8.727%; and
- Clack Creek: upstream gradient of 5.541% with a downstream gradient of 3.970%.

4.3.1 Gough Creek

Gough Creek enters a temporary culvert (1.8m diameter) from the east-northeast and flows beneath Day Road at an approximate 3% gradient in a riffle/pool sequence. A second, smaller drainage from the northwest runs parallel to Day Road, and joins the Gough Creek before it passes through the culvert. Banks on the creek upstream of the temporary culvert were not undercut or disturbed. The main channel of Gough Creek features moderate accumulations of large woody

debris (LWD) and ideal substrates for salmonid habitat, as well as stagnant water pools on river right suitable for amphibian breeding locations. The substrates consisted of primarily round cobbles slightly embedded with gravels and minor sand in slower flow areas, and occasional small boulders.

Downstream of the culvert, the right banks were significantly more disturbed, with exposed roots and undercutting along the margins of the watercourse. The watercourse cascades down 1.5m over riprap and bedrock, and narrows before featuring a cobble bar about 40m downstream before being confined by exposed bedrock. This section of the stream featured deep plunge pools at least 1m deep followed by riffle. The wetted width within the downstream reach was about 8m wide at the time of the Site visit. The original culverts was present in fragments deposited through the channel and riparian areas. Water quality sampling results for Gough Creek can be seen below in Table C.

4.3.2 Clack Creek

Clack Creek meanders from the north, with several bends, in a riffle-pool sequence before entering the temporary culvert underneath Day Road. A small drainage from the west enters just upstream of the culvert, as well as a tributary meandering in from the northeast. The main channel featured sparse LWD. The banks of the creek have abundant CWD, particularly on river left, which is less disturbed. The creek featured cobble bars and sparse large woody debris. The bench on the river right just upstream of the floodplain featured a steeper slope and higher banks. There was a large pile of riprap on the shoulder of Day Road and a residential driveway to the west of the upstream entrance of the culvert. The temporary culvert outlets on the downstream side of Day Road and was perched about 0.2m above a plunge pool. The remaining sections of the original culvert were strewn through the creek and riparian areas. There was some slight erosion and rilling from the fill on the road above the temporary culvert. Gravel and sand deposits were observed in the riparian areas throughout the Site. Downstream of the road, Clack Creek meandered, with a steeper gradient than upstream, but maintained a riffle-pool morphology.

Water conditions within Gough and Clack Creek were extremely clear, with very low turbidity, fast flowing and highly oxygenated. Water quality sampling results for both creeks can be seen below in Table C. It is worth noting that both pH's were below BC's minimum water quality guidelines (WQGs), which could provide potentially sub-optimal conditions for salmonids.

Table C: Water Quality for Gough and Clack Creek

Sample Location	Temperature (°C)	DO (mg/L)	Conductivity (µs/cm)	Turbidity (NTU)	pH
Water Quality Station 1 – Gough Creek	7.3	15.56	7.9	0.5	5.02
Water Quality Station 2 – Clack Creek	7.5	15.31	7.6	0.49	5.20

4.3.3 Fish and Fish Habitat

Gough Creek is a tributary to Clack Creek, which in turn is a tributary to Roberts Creek, before discharging to the Salish Sea. Both Clack Creek and Gough Creek originate high up in the mountain range to the north of the Sites. The provincial database (Habitat Wizard) identifies a fish barrier waterfall of 3.3 to 3.4m high at the confluence of Clack Creek and Roberts Creek (Ministry of Environment, 2022). The waterfall is a complete barrier to fish movement; therefore, no

anadromous species of fish would be present upstream of the waterfalls. The provincial database identifies both Cutthroat Trout (*Oncorhynchus clarkii*) and Dolly Varden as being present upstream of Day Road; however, this observation is from 1997. Additional undated observations of both species have been recorded downstream of Day Road in Cliff Gilker Park. The provincial database only includes data that has been submitted, and lack of data does not represent absence of fish.

Sampling by Strategic Natural Resource Consultants Inc. in February 2017 at locations both upstream and downstream of the Site on Clack Creek was completed using an electrofisher and resulted in no fish captures. However, only one season of sampling was conducted (Strategic, 2017).

There have been no recorded fish occurrences at either site. However, a local resident informed the QEPs during the Site assessment that there has been presence of Dolly Varden (*Salvelinus malma*) and another trout species (suspected to be cutthroat trout) upstream of the Site within Clack Creek on her property. Fish habitat at the Sites is considered year-round provided water quantity and water quality remains suitable through the summer season.

Given the above information, there is a possibility fish are present in Clack Creek, and potentially Gough Creek. However, recent changes to habitat, including logging, may have limited the distribution of the fish populations.

4.4 Species at Risk

PGL searched the provincial CDC Species and Ecosystems Explorer database for SAR that could potentially occur on the Site. Additionally, the CDC was consulted to identify provincially listed Ecosystems at Risk within the CWHdm subzone with the potential of occurring onsite.

Detailed surveys for focal wildlife, plant, and ecosystems of conservation concern (i.e., listed by the CDC and/or protected under the Species at Risk Act) were not included in the scope of this overview assessment. Therefore, it is assumed that the listed species and ecosystems that use habitat types provided in or around the Site may potentially occur in this area.

All animals and plants and ecosystems of conservation concern potentially associated with the Site, are listed in Tables 3, 4 and 5, respectively, and a description of SAR status definitions is provided in Appendix 2. The provided lists are comprehensive; however, species that utilize habitat conditions not likely present at the Site are acknowledged wherever possible. A detailed habitat suitability assessment would likely result in a smaller, more Site-specific list of potential species.

PGL also reviewed CDC iMap to confirm the presence/absence of known masked sensitive occurrences (occurrences are identified, but species information is not publicly available) and non-sensitive occurrences (species information is publicly available) of SAR and Ecosystems at Risk, and federally designated Critical Habitat for SAR on or within 2km of the Site. Occurrences within 2km of the Site include the following:

- Marbled Murrelet (*Brachyramphus marmoratus*) Proposed Critical Habitat;
- Sitka Spruce (*Picea sitchensis*)/Salmonberry (*Rubus spectabilis*) Very Dry Maritime – Provincially Red-listed Ecological Community; and
- Coastal Cutthroat Trout (*Oncorhynchus clarkii clarkii*).

4.4.1 Marbled Murrelet (*Brachyramphus marmoratus*)

Marbled Murrelets are listed as Threatened by the Committee on Status of Endangered Wildlife in Canada (COSEWIC) and are provincially Red Listed, which means they are legally designated or being considered for legal designation as Endangered or Threatened within the Province of British Columbia (Burger, 2004).

Marbled Murrelet Proposed Critical Habitat has been applied across the south coast mainland of BC as a precautionary measure by the province. Marbled Murrelet are small seabirds that require old growth forest habitat for nesting. They will fly up to 65km inland from their foraging areas of saltwater to find suitable nesting habitat; but most nests are located within 30km of the sea (Environment Canada, 2014). Suitable nesting habitat for Marbled Murrelet was not identified at the Sites as the mature trees were not old enough to provide nesting platforms in the upper canopy.

4.4.2 Sitka Spruce/Salmonberry Very Dry Maritime (CWHvm1-09)

The Site lies within 2km of the BC red-listed sitka spruce/salmonberry very dry maritime ecological community. This community occurs within high bench floodplains that experience flooding at greater than five-year intervals. Soils are typically sorted silts, sandy loams, or sands. This is due to a high percentage of fluvial materials and a surface cap of fine sediments, with a medium to rich nutrient regime (BC Conservation Data Centre, 2022).

Sitka Spruce is the expected climax species with a canopy dominated by red alder, and less dominant western red cedar and bigleaf maple. The understory layer consists of dominating salmonberry and lesser devil's club (*Oplonanax horridus*), stink currant (*Ribes bracteosum*), trailing blackberry (*Rubus ursinus*), vanilla leaf (*Achlys triphylla*), sword fern (*Polystichum munitum*), enchanter's nightshade (*Circaea alpina*), piggy black plant (*Tomiea menziesii*), foamflower (*tiarella trifoliata*), cooley's hedge-nettle (*Stachys cooleyae*), sweet-scented bedstraw (*Galium triflorum*), lady fern (*Athyrium filix-femina*), coastal leafy moss (*Plagiomnium insigne*), and palm tree moss (*Leucolepis menziesii*).

The Sites are not located within a mapped polygon of this ecological community. However, given the plant communities observed by the QEP, there is a possibility that this ecosystem could exist onsite.

4.4.3 Coastal Cutthroat Trout

Coastal cutthroat trout (*Oncorhynchus clarkii clarkii*) is Provincially Blue Listed. Early sampling efforts have not described the subspecies of cutthroat present; however, coastal cutthroat trout is considered the likely subspecies of cutthroat trout present within and near the Sites.

Coastal cutthroat trout occur in coastal streams usually within 150km from the mouth of the river. This coastal subspecies of cutthroat can occur as both resident or sea-run, and resides in low-gradient, shady streams and estuaries. Adults require small gravels for spawning. Coastal cutthroat trout are iteroparous and may spawn once a year after reaching maturity, with spawning usually occurring in late-winter or early-spring. Sea-run cutthroat older than one year will migrate to estuaries or coastal waters in late-spring or early-summer, spending two to five months in the cooler ocean or estuarine environments before returning to freshwater streams to overwinter (BC CDC, 1995).

It is expected that resident coastal cutthroat trout persist within the proposed Project area and vicinity. However, suitable water quantity and water quality are required for year-round presence at the Sites, which has not been confirmed.

5.0 PERMITS, APPROVALS, AND TIMELINES

Anticipated environmental permits and approvals required for this Project are listed below.

- **WSA Change Approval:** it is understood that bank stabilization works will require a WSA change approval for repairs and upgrades needed following the 2021 floods. Proposed interim works received a Change Approval, and permanent works will require an amendment to the existing approval.
- **Fisheries Act Request for Review:** works are expected to occur proximal to, and within, the wetted perimeter of Gough Creek and Clack Creek, known fish-bearing features. To confirm compliance with provisions of the *Fisheries Act* and *Species at Risk Act*, a Request for Review should be submitted to DFO. The interim works received a Letter of Advice, and it's expected that the proposed permanent works will not require an authorization under the *Fisheries Act*. The DFO Request for Review is expected to require 30 to 90 days for a response from DFO.
- **Fish and Wildlife Salvage Permits:** As works are expected to conflict with fish and wildlife habitat; relevant salvage permits should be secured prior to the commencement of activities. Fish and wildlife salvage permits (provincial and federal) should be submitted a minimum of 60 days prior to the start of works. These include:
 - *Fisheries Act* salvage permit;
 - *Wildlife Act* general wildlife permit (salvage); and
 - *Wildlife Act* fish salvage permit.

The following permits and approvals are not anticipated:

- *Land Act* Crown Land Use Permit;
- WSA Short Term Use Approval (groundwater extraction); and
- *Fisheries Act* Authorization.

5.1 Timing Windows

Least-risk timing windows for fish and wildlife anticipated to be present at the Site during the proposed work are summarized in Table D.

Table D: Least-Risk Timing Windows for Fish and Wildlife

Species	Least-Risk Window	Reference
Cutthroat Trout	August 1–October 31	MOE, 2006
Dolly Varden	June 15–August 31	MOE, 2006
Bald Eagle	September 1–December 31	BC MOE, 2014a
Hérons	September 15–January 15	BC MOE, 2014a
Raptors	October 1–February 28	BC MOE, 2014a
Songbirds	September 1–February 28	BC MOE, 2014a
Amphibians	August 1–October 31	FLNRORD, 2016

For Dolly Varden and cutthroat trout, it is assumed that spawning generally occurs in reaches with abundant pebbles and gravels with cool flowing water.

For avian species, the breeding season begins to wind down in late summer. Breeding activity is dependent on the weather and resource conditions from year to year, so caution should be used when planning activities that fall outside the least risk windows. If work cannot be avoided outside the least risk window, a QEP should be consulted to conduct pre-clearing nest surveys to determine the risk of breeding activity, establishment of buffers and ongoing monitoring.

Given the above least risk windows and the known and assumed uses of the Site by the species anticipated to be present, a general timing window of August 1–August 31 is appropriate for the Sites if water is present.

5.1.1 Working Outside of Reduced-Risk Timing Window

It is anticipated that instream and riparian works may extend past the reduced-risk timing window, based on the MOTI's requirement to conduct extensive instream works on multiple sites on the Sunshine Coast under the Disaster Financial Assistance Arrangements funding (not described in this EOA) that are a priority for bank stability and public safety. The works will not extend past October 31 to protect amphibian and trout species potentially present within the Site.

Conducting instream works past August 31 extends beyond the Dolly Varden reduced-risk window, which is recommended to prevent interference during the spawning season. The works are not expected to impact Pacific salmon as the waterfall at the confluence of Clack and Gough Creeks is a barrier to upstream fish passage. Additional mitigation measures to reduce potential impacts to spawning Dolly Varden should be implemented during works occurring outside of the fish window, including completing the initial diversion of the streams and increasing environmental monitoring frequency to the minimum of a daily inspection. All instream works (regardless of timing) must be isolated, with flow bypassed around the Site, maintaining water quantity and water quality.

As suitable spawning habitat is present both upstream and downstream of the Sites, and Dolly Varden are resident species. Adult Dolly Varden relocation is not anticipated; however, if the QEP Environmental Monitor observes congregations of Dolly Varden trying to migrate upstream of the isolated work zone, a salvage and relocation may occur.

It is also noted that if the watercourse is dry, work may take place in the dry stream channel outside of the reduced-risk instream work window, provided other species (birds and amphibians) have also been considered and risks have been mitigated. Works away from streams and riparian habitat, including the proposed road works, can occur outside of the reduced-risk timing window.

6.0 CONCLUSIONS AND RECOMMENDATIONS

PGL conducted an EOA to identify environmental conditions at two temporary culverts carrying Clack Creek and Gough Creek under Day Road in Roberts Creek, BC. Temporary culvert replacement works occurred during emergency operations after the flooding of fall 2021, and interim works were conducted January 2023. Permanent replacement of the temporary culverts and associated roadway has been flagged as a priority for the MOTI. Improvements to fish passage and prevention of potential future failures has been considered.

The most prominent environmental features at the Sites include ideal substrates for fish spawning (i.e., gravel and fines of varying sizes) and physical features for fish habitat (i.e., LWD, plunge pools, shady overhanging banks). These provide habitat for potential SAR such as coastal cutthroat trout and any other salmonids that may be present.

Instream and riparian work proposed for the Project will require several regulatory permits and approvals, as outlined in Section 6. Restoration of the work areas will be required to maintain a no-net-loss of habitat for both the provincial and federal permitting processes.

The most suitable period for conducting instream and riparian works for the proposed Project is August 1–August 31, taking into consideration the potential fish and wildlife species present at the Site, and their life histories. However, works may be conducted outside of the least-risk instream work window if the watercourse is dry, or until October 31 if additional mitigation measures are applied including completing the initial diversion of the stream prior to August 31 and increasing monitoring frequency.

Based on PGL's assessment, four key categories for environmental due diligence measures to reduce the risk to fish and wildlife species and their habitats have been identified; Planning and Design, Pre-Construction, Construction Mitigation and Post-Construction. The categories and recommended measures are as follows:

Planning and Design

- Culvert design specifications should include:
 - Consideration of best management practices as outlined in *Appendix A7: Best Management Practices for Culvert Installation, Maintenance and Removal* provided in the *Requirements and Best Management Practices for Making Changes In and About a Stream in British Columbia* guidance;
 - Provision for fish passage under Day Road, such as the use of an open-bottomed pipe arch culvert or box culvert;
 - Alignment similar to that of the natural stream channel, including matching natural channel width with channel width where possible, while also aiming for the shortest culvert length (do not skew alignment greater than 30° to the stream);
 - Adequate water depth and velocity to allow adult and juvenile fish passage, including creation of a thalweg within natural bottomed culvert;
 - Attempt to match the new culvert width to the natural width of the channel, if possible;
 - Access for maintenance equipment to remove accumulated debris or conduct repairs and restoration; and
 - Ensure culvert positioning does not block westerly side drainages (both Sites) or the east tributary on Clack Creek.

Pre-Construction

- Preparation of a Construction Environment Management Plan (CEMP) to identify Best Management Practices, construction specific mitigation and erosion and sediment control plan, environmental monitoring requirements and emergency plans as per Standard Specifications for Highway Construction, Section 165 – Protection of the Environment (MOTI, 2020).
- Preparation of regulatory permits and approvals (Section 6).

Construction Mitigation

- Conduct instream and riparian work during the most suitable least risk window of August 1–August 31.
- Follow CEMP and Standard Specifications for Highway Construction, Section 165 – Protection of the Environment (MOTI, 2020).
- Delineate Environmentally Sensitive Areas.
- Ensure water quality and quantity is maintained upstream and downstream of the work area, including the use of temporary bypasses.
- Retain a QEP experienced in identifying, handling and salvaging fish and wildlife, to conduct fish salvage and wildlife salvages (if needed).
- Retain a QEP to conduct raptor and pileated woodpecker nest surveys prior to Site preparation.
- Retain a QEP to conduct pre-clearing nest surveys prior to Site preparation (clearing and grubbing) if occurring outside the breeding bird least-risk window (September 1–February 28 for songbirds), or as directed by the QEP.
- Full-time monitoring of instream works by a QEP.
- Removal of invasive plant species and seed contaminated soils and disposal at a certified facility.

Post-Construction

- Conduct a one-year post-construction monitoring assessment that includes:
 - Structural stability;
 - Fish passage and water flow;
 - Planting and/or seed growth success; and
 - Fish habitat use.

7.0 STATEMENT OF LIMITATIONS AND CONDITIONS FOR REPORT

7.1 Complete Report

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to PGL by the Client, communications between PGL and the Client, and any other reports, proposals or documents prepared by PGL for the Client relative to the specific site described herein, all of which together constitute the Report.

In order to properly understand the suggestions, recommendations and opinions expressed herein, reference must be made to the whole of the Report. **PGL is not responsible for use by any part of portions of the Report without reference to the whole report.**

7.2 Basis of Report

The Report has been prepared for the specific site and purposes that are set out in the contract between PGL and the Client. The findings, recommendations, suggestions, or opinions expressed in the Report are only applicable to the site and purposes in relation to which the Report is expressly provided, and then only to the extent that there has been no material alteration to or variation from the information provided or available to PGL.

7.3 Use of the Report

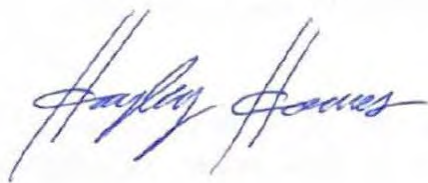
The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. No other party may use or rely upon the Report or any portion thereof without PGL's written consent, and such use shall be on terms and conditions as PGL may expressly approve. Ownership in and copyright for the contents of the Report belong to PGL. Any use which a third party makes of the Report, is the sole responsibility of such third party. **PGL accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report.**

8.0 CLOSING

We trust our report meets your needs. If you have any questions, please contact Stewart Brown at 604-895-7612.

PGL ENVIRONMENTAL CONSULTANTS

Per:



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Environmental Consultant



Stewart Brown, M. Sc., P. Ag., R.P.Bio.
Lead Consultant

HAH/CSB/ncb/neg

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Figures

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Parcel boundary and site features are approximate and are presented for discussion purposes only.

2021 orthoimage and street map from ESRI Road and watercourse data from BC Open Data NAD 1983 UTM Zone 10N

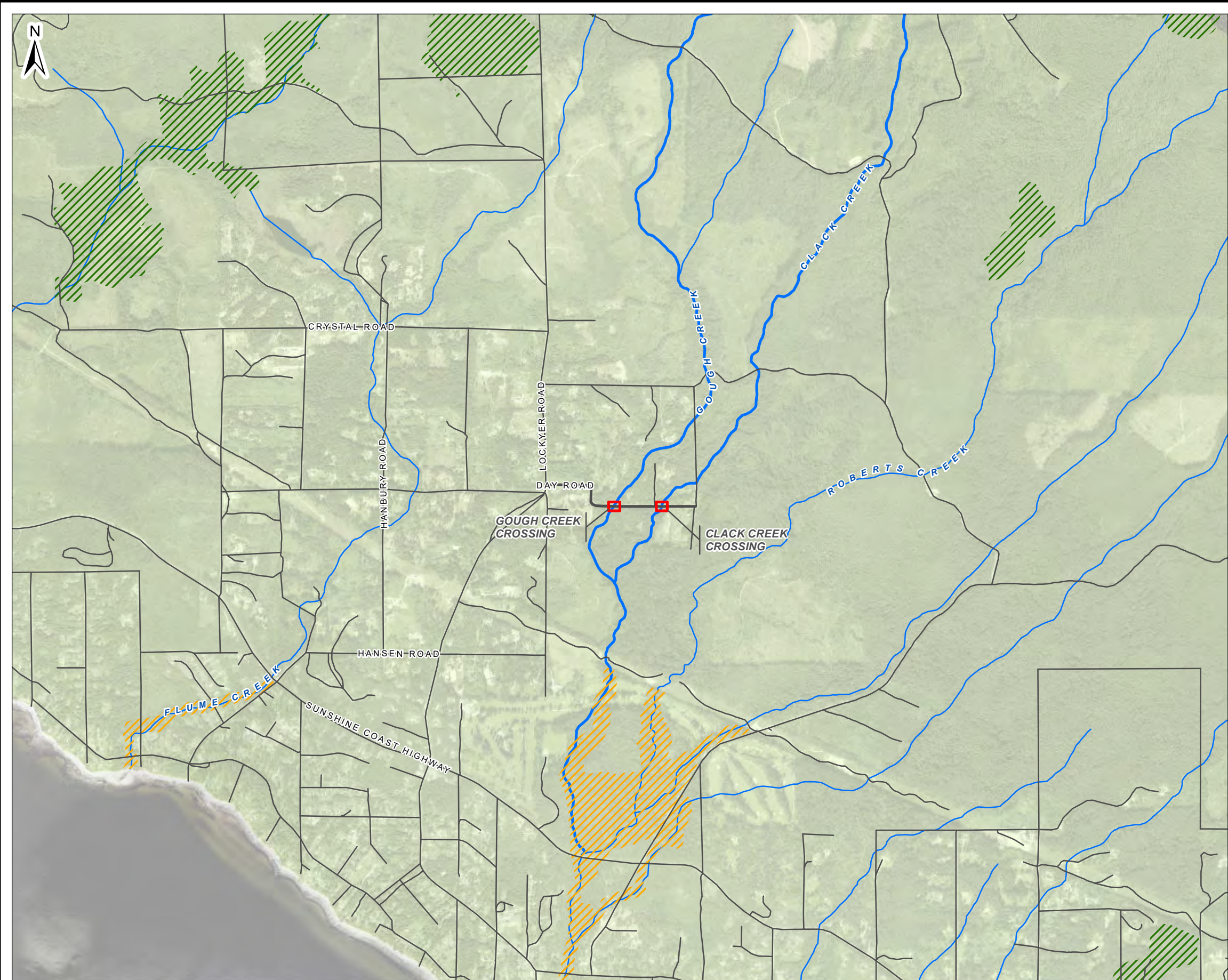


0 5 Km

- Subject Site
- Road Centreline
- Watercourse

SITE LOCATION			
Gough Creek Crossing & Clack Creek Crossing at Day Road, Roberts Creek, BC			
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE			
	File No.: 0346-65.01	Dwg No.: EOA_0010	FIGURE 1
	Date: JUL 2022	Drawn by: RSS	

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Parcel boundary and site features are approximate and are presented for discussion purposes only.

0 1:20,000 1,100 m

2021 orthoimage from ESRI
Road and environmental feature data from BC Open Data
NAD 1983 UTM Zone 10N

- Subject Site
- Sensitive Ecological Community – Sitka Spruce/Salmonberry
- Proposed Critical Habitat - Marbled Murrelet (Fine-Filtered)
- Proposed Critical Habitat - Marbled Murrelet (Blanket)
- Road Centreline
- Watercourse

SPECIES AT RISK CRITICAL HABITAT			
Gough Creek Crossing & Clack Creek Crossing at Day Road, Roberts Creek, BC			
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE			
	File No.:	Dwg No.:	FIGURE
	0346-65.01	EOA_0020	2
Date:	AUG 2022	Drawn by:	RSS

Tables

Table 1
SAR Animals
Gough Creek and Clack Creek at Day Road
Roberts Creek, BC, Ministry of Transportation and Infrastructure,
PGL File: 346-65.01

Scientific Name	English Name	BC list	COSEWIC	SARA
Bivalves				
<i>Musculium partumeium</i>	Swamp Fingernailclam	Blue		
<i>Musculium transversum</i>	Long Fingernailclam	Blue		
<i>Ostrea lurida</i>	Olympia Oyster	Blue	SC (May-11)	SC (Jun-03)
<i>Sphaerium occidentale</i>	Herrington Fingernailclam	Blue		
<i>Sphaerium patella</i>	Rocky Mountain Fingernailclam	Red		
<i>Sphaerium striatinum</i>	Striated Fingernailclam	Blue		
Gastropods				
<i>Allogona townsendiana</i>	Oregon Forestsnail	Red	E (Apr-13)	E (Jan-05)
<i>Carychium occidentale</i>	Western Thorn	Blue		
<i>Deroceras hesperium</i>	Evening Fieldslug	Red	Data Deficient (Nov-03)	
<i>Galba bulimoides</i>	Prairie Fossaria	Blue		
<i>Galba dalli</i>	Dusky Fossaria	Blue		
<i>Galba parva</i>	Pygmy Fossaria	Blue		
<i>Galba vancouverensis</i>	Vancouver Fossaria	Red		
<i>Gyraulus crista</i>	Star Gyro	Blue		
<i>Haliotis kamtschatkana</i>	Northern Abalone	Red	E (Apr-09)	E (Jan-00)
<i>Hemphillia dromedarius</i>	Dromedary Jumping-slug	Red	T (May-14)	T (Jan-05)
<i>Hemphillia glandulosa</i>	Warty Jumping-slug	Red	SC (Apr-13)	SC (Jan-05)
<i>Nearctula sp. 1</i>	Threaded Vertigo	Blue	SC (Apr-10)	SC (Jul-12)
<i>Physella propinqua</i>	Rocky Mountain Physa	Blue		
<i>Physella virginea</i>	Sunset Physa	Blue		
<i>Planorbula campestris</i>	Meadow Rams-horn	Blue		
<i>Pristiloma johnsoni</i>	Broadwhorl Tightcoil	Blue		
<i>Promenetus umbilicatellus</i>	Umbilicate Sprite	Blue		
<i>Prophysaon coeruleum</i>	Blue-grey Taildropper	Blue	T (Apr-16)	T (Feb-19)
<i>Stagnicola caperata</i>	Wrinkled Marshsnail	Blue		
<i>Stagnicola traski</i>	Widelip Pondsnaail	Blue		
Insects				
<i>Anarta edwardsii</i>	Edwards' Beach Moth	Red	E (May-21)	E (Feb-11)
<i>Argia emma</i>	Emma's Dancer	Blue		
<i>Argia vivida</i>	Vivid Dancer	Blue	SC (May-15)	SC (Feb-19)
<i>Bombus occidentalis</i>	Western Bumble Bee	Blue	T (May-14)	
<i>Callophrys eryphon sheltonensis</i>	Western Pine Elfin, <i>sheltonensis</i> subspecies	Blue		
<i>Callophrys johnsoni</i>	Johnson's Hairstreak	Red		
<i>Callophrys mossii mossii</i>	Moss' Elfin, <i>mossii</i> subspecies	Red		
<i>Cercyonis pegala incana</i>	Common Wood-nymph, <i>incana</i> subspecies	Red		
<i>Chlosyne hoffmanni</i>	Hoffman's Checkerspot	Red		
<i>Cicindela hirticollis</i>	Hairy-necked Tiger Beetle	Blue		
<i>Coenonympha tullia insulana</i>	Common Ringlet, <i>insulana</i> subspecies	Red		
<i>Copablepharon fuscum</i>	Sand-verbena Moth	Red	E (Nov-13)	E (Jul-05)
<i>Danaus plexippus</i>	Monarch	Red	E (Nov-16)	SC (Jun-03)
<i>Enallagma clausum</i>	Alkali Bluet	Blue		
<i>Epargyreus clarus</i>	Silver-spotted Skipper	Blue		
<i>Epargyreus clarus californicus</i>	Silver-spotted Skipper, <i>californicus</i> subspecies	Red		
<i>Erynnis propertius</i>	Propertius Duskywing	Red		
<i>Erythemis collocata</i>	Western Pondhawk	Blue		
<i>Euphydryas editha taylori</i>	Edith's Checkerspot, <i>taylori</i> subspecies	Red	E (May-11)	E (Jun-03)
<i>Euphyes vestris</i>	Dun Skipper	Blue	T (Apr-13)	T (Jun-03)
<i>Hesperia colorado oregonia</i>	Western Branded Skipper, <i>oregonia</i> subspecies	Red	E (Nov-13)	

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Scientific Name	English Name	BC list	COSEWIC	SARA
<i>Icaricia icarioides blackmorei</i>	Boisduval's Blue, <i>blackmorei</i> subspecies	Blue		
<i>Icaricia saepiolus insulanus</i>	Greenish Blue, <i>insulanus</i> subspecies	Red	E (May-12)	E (Jun-03)
<i>Octogomphus specularis</i>	Grappletail	Red	SC (May-21)	
<i>Omus audouini</i>	Audouin's Night-stalking Tiger Beetle	Red	T (Nov-13)	T (Jun-18)
<i>Ophiogomphus occidentis</i>	Sinuuous Snaketail	Blue		
<i>Pachydiplax longipennis</i>	Blue Dasher	Blue		
<i>Papilio indra</i>	Indra Swallowtail	Red		
<i>Parnassius clodius claudianus</i>	Clodius Parnassian, <i>claudianus</i> subspecies	Blue		
<i>Parnassius clodius pseudogallatinus</i>	Clodius Parnassian, <i>pseudogallatinus</i> subspecies	Blue		
<i>Parnassius smintheus olympiannus</i>	Rocky Mountain Parnassian, <i>olympiannus</i> subspecies	Blue		
<i>Speyeria zereene bremnerii</i>	Zerene Fritillary, <i>bremnerii</i> subspecies	Red		
<i>Sympetrum vicinum</i>	Autumn Meadowhawk	Blue		
<i>Tanypteryx hageni</i>	Black Petaltail	Blue		
<i>Tramea lacerata</i>	Black Saddlebags	Red		
Amphibians				
<i>Anaxyrus boreas</i>	Western Toad	Yellow	SC (Nov-12)	SC (Jun-18)
<i>Aneides vagrans</i>	Wandering Salamander	Blue	SC (May-14)	SC (Feb-18)
<i>Ascaphus truei</i>	Coastal Tailed Frog	Yellow	SC (Nov-11)	SC (Jun-03)
<i>Dicamptodon tenebrosus</i>	Coastal Giant Salamander	Blue	T (May-14)	T (Jun-03)
<i>Lithobates pipiens</i>	Northern Leopard Frog	Red	E (Dec-21)	E (Jun-03)
<i>Rana aurora</i>	Northern Red-legged Frog	Blue	SC (May-15)	SC (Jan-05)
<i>Rana pretiosa</i>	Oregon Spotted Frog	Red	E (May-11)	E (Jun-03)
Mammals				
<i>Aplodontia rufa</i>	Mountain Beaver	Yellow	SC (May-12)	SC (Jun-03)
<i>Cervus elaphus roosevelti</i>	Roosevelt Elk	Blue		
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	Blue		
<i>Eptesicus fuscus</i>	Big Brown Bat	Yellow		
<i>Eschrichtius robustus</i>	Grey Whale	Blue	SC / E / Not at Risk (May-04)	SC (Jul-05)
<i>Eumetopias jubatus</i>	Steller Sea Lion	Blue	SC (Nov-13)	SC (Jul-05)
<i>Gulo gulo</i>	Wolverine		SC (May-14)	SC (Jun-18)
<i>Gulo gulo luscus</i>	Wolverine, <i>luscus</i> subspecies	Blue	SC (May-14)	SC (Jun-18)
<i>Gulo gulo vancouverensis</i>	Wolverine, <i>vancouverensis</i> subspecies	Red	SC (May-14)	SC (Jun-18)
<i>Lasionycteris noctivagans</i>	Silver-haired Bat	Yellow		
<i>Lasiurus cinereus</i>	Hoary Bat	Yellow		
<i>Lepus americanus washingtonii</i>	Snowshoe Hare, <i>washingtonii</i> subspecies	Red		
<i>Mirounga angustirostris</i>	Northern Elephant Seal	Red	Not at Risk (May-86)	
<i>Mustela frenata altifrontalis</i>	Long-tailed weasel, <i>altifrontalis</i> subspecies	Red		
<i>Mustela richardsonii anguinae</i>	Ermine, <i>anguinae</i> subspecies	Blue		
<i>Myodes gapperi occidentalis</i>	Southern Red-backed Vole, <i>occidentalis</i> subspecies	Red		
<i>Myotis californicus</i>	Californian Myotis	Yellow		
<i>Myotis evotis</i>	Long-eared Myotis	Yellow		
<i>Myotis lucifugus</i>	Little Brown Myotis	Yellow	E (Nov-13)	E (Dec-14)
<i>Myotis volans</i>	Long-legged Myotis	Yellow		
<i>Myotis yumanensis</i>	Yuma Myotis	Yellow		
<i>Oreamnos americanus</i>	Mountain Goat	Blue		
<i>Pekania pennanti</i>	Fisher			
<i>Scapanus townsendii</i>	Townsend's Mole	Red	E (Nov-14)	E (Jan-05)
<i>Sorex bendirii</i>	Pacific Water Shrew	Red	E (Apr-16)	E (Jun-03)
<i>Sorex navigator brooksi</i>	Western Water Shrew, <i>brooksi</i> subspecies	Blue		
<i>Sorex rohweri</i>	Olympic Shrew	Red		
<i>Sorex trowbridgii</i>	Trowbridge's Shrew	Blue		
<i>Ursus arctos</i>	Grizzly Bear	Blue	SC (May-12)	SC (Jun-18)

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Scientific Name	English Name	BC list	COSEWIC	SARA
Birds				
<i>Accipiter gentilis laingi</i>	Northern Goshawk, <i>laingi</i> subspecies	Red	T (Apr-13)	T (Jun-03)
<i>Aechmophorus occidentalis</i>	Western Grebe	Red	SC (May-14)	SC (Nov-17)
<i>Aeronautes saxatalis</i>	White-throated Swift	Blue		
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Red		
<i>Ammospiza nelsoni</i>	Nelson's Sparrow	Red	Not at Risk (May-98)	
<i>Ardea herodias fannini</i>	Great Blue Heron, <i>fannini</i> subspecies	Blue	SC (Mar-08)	SC (Feb-10)
<i>Asio flammeus</i>	Short-eared Owl	Blue	T (May-21)	SC (Jul-12)
<i>Athene cunicularia</i>	Burrowing Owl	Red	E (Apr-17)	E (Jun-03)
<i>Bartramia longicauda</i>	Upland Sandpiper	Red		
<i>Botaurus lentiginosus</i>	American Bittern	Blue		
<i>Brachyramphus marmoratus</i>	Marbled Murrelet	Blue	T (May-12)	T (Jun-03)
<i>Branta bernicla</i>	Brant	Blue		
<i>Branta canadensis occidentalis</i>	Canada Goose, <i>occidentalis</i> subspecies	Red		
<i>Buteo lagopus</i>	Rough-legged Hawk	Blue	Not at Risk (May-95)	
<i>Buteo swainsoni</i>	Swainson's Hawk	Red		
<i>Butorides virescens</i>	Green Heron	Blue		
<i>Calcarius pictus</i>	Smith's Longspur	Blue		
<i>Calidris canutus</i>	Red Knot	Red	E / T (Nov-20)	T / E (Feb-10)
<i>Cardellina canadensis</i>	Canada Warbler	Blue	SC (Nov-20)	T (Feb-10)
<i>Chondestes grammacus</i>	Lark Sparrow	Blue		
<i>Chordeiles minor</i>	Common Nighthawk	Yellow	SC (May-18)	T (Feb-10)
<i>Coccythraustes vespertinus</i>	Evening Grosbeak	Yellow	SC (Nov-16)	SC (May-19)
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Red		
<i>Contopus cooperi</i>	Olive-sided Flycatcher	Blue	SC (May-18)	T (Feb-10)
<i>Cygnus columbianus</i>	Tundra Swan	Blue		
<i>Cypseloides niger</i>	Black Swift	Blue	E (May-15)	E (May-19)
<i>Dolichonyx oryzivorus</i>	Bobolink	Blue	T (Apr-10)	T (Nov-17)
<i>Eremophila alpestris strigata</i>	Horned Lark, <i>strigata</i> subspecies	Red	E (May-18)	E (Jul-05)
<i>Euphagus carolinus</i>	Rusty Blackbird	Blue	SC (Apr-17)	SC (Mar-09)
<i>Falco mexicanus</i>	Prairie Falcon	Red	Not at Risk (May-96)	
<i>Falco peregrinus</i>	Peregrine Falcon		SC (Apr-07)	SC (Jan-00)
<i>Falco peregrinus anatum</i>	Peregrine Falcon, <i>anatum</i> subspecies	Red	Not at Risk (Dec-17)	SC (Jun-12)
<i>Falco peregrinus pealei</i>	Peregrine Falcon, <i>pealei</i> subspecies	Blue	SC (Dec-17)	SC (Jun-03)
<i>Falco rusticolus</i>	Gyrfalcon	Blue	Not at Risk (May-87)	
<i>Fratercula cirrhata</i>	Tufted Puffin	Blue		
<i>Fratercula corniculata</i>	Horned Puffin	Red		
<i>Fulmarus glacialis</i>	Northern Fulmar	Red		
<i>Glaucidium gnoma swarthi</i>	Northern Pygmy-owl, <i>swarthi</i> subspecies	Blue		
<i>Hirundo rustica</i>	Barn Swallow	Blue	SC (May-21)	T (Nov-17)
<i>Hydroprogne caspia</i>	Caspian Tern	Blue	Not at Risk (May-99)	
<i>Icteria virens</i>	Yellow-breasted Chat	Red	E (Nov-11)	E (Jun-03)
<i>Larus californicus</i>	California Gull	Blue		
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Blue		
<i>Limosa haemastica</i>	Hudsonian Godwit	Red	T (May-19)	
<i>Megascops kennicottii</i>	Western Screech-Owl	No Status	T (May-12)	T (Jan-00)
<i>Megascops kennicottii kennicottii</i>	Western Screech-Owl, <i>kennicottii</i> subspecies	Blue	T (May-12)	T (Jan-05)
<i>Melanerpes lewis</i>	Lewis's Woodpecker	Blue	T (Apr-10)	T (Jul-12)
<i>Melanitta americana</i>	Black Scoter	Blue		
<i>Melanitta perspicillata</i>	Surf Scoter	Blue		
<i>Nannopterum auritum</i>	Double-crested Cormorant	Blue	Not at Risk (May-78)	

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Scientific Name	English Name	BC list	COSEWIC	SARA
<i>Numenius americanus</i>	Long-billed Curlew	Blue	SC (May-11)	SC (Jan-05)
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Red		
<i>Oporornis agilis</i>	Connecticut Warbler	Blue		
<i>Oreoscoptes montanus</i>	Sage Thrasher	Red	E (Dec-21)	E (Jun-03)
<i>Patagioenas fasciata</i>	Band-tailed Pigeon	Blue	SC (May-21)	SC (Feb-11)
<i>Pelecanus erythrorhynchos</i>	American White Pelican	Red	Not at Risk (May-87)	
<i>Phalaropus lobatus</i>	Red-necked Phalarope	Blue	SC (Nov-14)	SC (May-19)
<i>Pinicola enucleator carlottae</i>	Pine Grosbeak, <i>carlottae</i> subspecies	Blue		
<i>Pluvialis dominica</i>	American Golden-Plover	Blue		
<i>Poocetes gramineus affinis</i>	Vesper Sparrow, <i>affinis</i> subspecies	Red	E (May-18)	E (Dec-07)
<i>Progne subis</i>	Purple Martin	Blue		
<i>Ptychoramphus aleuticus</i>	Cassin's Auklet	Red	SC (Nov-14)	SC (May-19)
<i>Recurvirostra americana</i>	American Avocet	Blue		
<i>Setophaga castanea</i>	Bay-breasted Warbler	Red		
<i>Setophaga virens</i>	Black-throated Green Warbler	Blue		
<i>Sterna forsteri</i>	Forster's Tern	Red	Data Deficient (May-96)	
<i>Strix occidentalis</i>	Spotted Owl	Red	E (Mar-08)	E (Jun-03)
<i>Synthliboramphus antiquus</i>	Ancient Murrelet	Blue	SC (Nov-14)	SC (Aug-06)
<i>Tringa incana</i>	Wandering Tattler	Blue		
<i>Tyto alba</i>	Barn Owl	Red	T (Nov-10)	T (Jun-18)
<i>Uria aalge</i>	Common Murre	Red		
<i>Uria lomvia</i>	Thick-billed Murre	Red		
<i>Urile penicillatus</i>	Brandt's Cormorant	Red		
Fish				
<i>Acipenser medirostris</i>	Green Sturgeon	Blue	SC (Nov-13)	SC (Aug-06)
<i>Acipenser transmontanus</i>	White Sturgeon		E / T (Nov-12)	E (Jan-00)
<i>Acipenser transmontanus</i> pop. 4	White Sturgeon (Lower Fraser River Population)	Red	T (Nov-12)	
<i>Catostomus</i> sp. 4	Salish Sucker	Red	T (Nov-12)	T (Jan-05)
<i>Cottus aleuticus</i> pop. 1	Coastrange Sculpin, Cultus Population	Red	E (Nov-19)	T (Jun-03)
<i>Gasterosteus aculeatus</i> pop. 2	Little Quarry Lake Benthic Threespine Stickleback	Red	T (Nov-15)	
<i>Gasterosteus aculeatus</i> pop. 3	Little Quarry Limnetic Threespine Stickleback	Red	T (Nov-15)	
<i>Gasterosteus</i> sp. 16	Vananda Creek Limnetic Stickleback	Red	E (Apr-10)	E (Jun-03)
<i>Gasterosteus</i> sp. 17	Vananda Creek Benthic Stickleback	Red	E (Apr-10)	E (Jun-03)
<i>Gasterosteus</i> sp. 2	Enos Lake Limnetic Stickleback	Red	E (May-12)	E (Jan-05)
<i>Gasterosteus</i> sp. 3	Enos Lake Benthic Stickleback	Red	E (May-12)	E (Jan-05)
<i>Gasterosteus</i> sp. 4	Paxton Lake Limnetic Stickleback	Red	E (Apr-10)	E (Jun-03)
<i>Gasterosteus</i> sp. 5	Paxton Lake Benthic Stickleback	Red	E (Apr-10)	E (Jun-03)
<i>Hybognathus hankinsoni</i> - Pacific group	Brassy Minnow - Pacific Group	Blue		
<i>Oncorhynchus clarkii clarkii</i>	Cutthroat Trout, <i>clarkii</i> subspecies	Blue		
<i>Rhinichthys cataractae</i> - Chehalis lineage	Nooksack Dace	Red	E (Dec-18)	E (Jun-03)
<i>Salvelinus confluentus</i>	Bull Trout	Blue	SC (Nov-12)	
<i>Salvelinus confluentus</i> pop. 28	Bull Trout - South Coast Population	Blue	SC (Nov-12)	SC (Aug-19)
<i>Spirinchus</i> sp. 1	Pygmy Longfin Smelt	Red	Data Deficient (Nov-04)	
<i>Thaleichthys pacificus</i>	Eulachon	Blue	E / T (May-11)	
Reptiles				
<i>Charina bottae</i>	Northern Rubber Boa	Yellow	SC (Apr-16)	SC (Jan-05)
<i>Chrysemys picta</i>	Northern Painted Turtle		E / SC (Apr-06)	E / SC (Dec-07)
<i>Chrysemys picta</i> pop. 1	Northern Painted Turtle - Pacific Coast Population	Red	T (Sep-21)	E (Dec-07)
<i>Contia tenuis</i>	Common Sharp-Tailed Snake	Red	T (Dec-21)	E (Jun-03)
<i>Dermochelys coriacea</i>	Leatherback Sea Turtle	Red	E (May-12)	E (May-17)

Citation: B.C. Conservation Data Centre. 2022. BC Species and Ecosystems Explorer. B.C. Minist. of Environ. Victoria, B.C. Available: <http://a100.gov.bc.ca/pub/eswp/> (accessed May 19, 2022).

Search Criteria: Municipality: District of Sechelt; Biogeoclimatic unit: Coastal Western Hemlock Very Dry Maritime (CWHxm)

Note: Marine mammals (e.g., whales) were excluded from this list due to the Sites being terrestrial based with no offshore marine component.

¹ See Appendix 2 for definitions and status descriptions.

Species not likely to occur based on available habitat.

Table 2
SAR Plants
Gough Creek and Clack Creek at Day Road
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Scientific Name	English Name	BC List	COSEWIC	SARA
Nonvascular Plants				
<i>Bartramia aprica</i>	rigid apple moss	Red	E (Nov-09)	E
<i>Callophrys mossii mossii</i>	Moss' Elfin, <i>mossii</i> subspecies	Red		
<i>Entosthodon fascicularis</i>	banded cord-moss	Blue	SC (May-15)	SC
<i>Fabronia pusilla</i>	silver hair moss	Red	E (May-12)	E
<i>Fissidens pauperculus</i>	poor pocket moss	Red	E (May-11)	E
<i>Pinus contorta</i> / <i>Sphagnum</i> spp. Very Dry Maritime	lodgepole pine / peat-mosses Very Dry Maritime	Blue		
<i>Rhododendron groenlandicum</i> / <i>Kalmia microphylla</i> / <i>Sphagnum</i> spp.	Labrador-tea / western bog-laurel / peat-mosses	Blue		
<i>Seligeria acutifolia</i>	acuteleaf small limestone moss	Red	E (May-18)	E
<i>Syntrichia laevipila</i>	twisted oak moss	Blue	SC (Nov-14)	SC
<i>Tsuga heterophylla</i> / <i>Buckiella undulata</i>	western hemlock / flat-moss	Blue		
<i>Tsuga heterophylla</i> - <i>Pseudotsuga menziesii</i> / <i>Eurhynchium oregonum</i>	western hemlock - Douglas-fir / Oregon beaked-moss	Red		
Dicots				
<i>Abronia latifolia</i>	yellow sand-verbena	Blue		
<i>Callitriche heterophylla</i> var. <i>heterophylla</i>	two-edged water-starwort	Unknown		
<i>Calystegia soldanella</i>	beach bindweed	Blue		
<i>Camissonia contorta</i>	contorted-pod evening-primrose	Red	E (Apr-06)	E (Dec-07)
<i>Castilleja levisecta</i>	golden paintbrush	Red	E (Nov-07)	E (Jun-03)
<i>Castilleja victoriae</i>	Victoria's owl-clover	Red	E (Apr-10)	E (Jul-12)
<i>Claytonia washingtoniana</i>	Washington springbeauty	Red		
<i>Corispermum hookeri</i> var. <i>pseudodeclinatum</i>	British Columbia bugseed	Unknown		
<i>Crassula connata</i>	Erect Pigmyweed	Blue		
<i>Hosackia gracilis</i>	seaside bird's foot lotus	Red	E (Nov-10)	E (Jun-03)
<i>Lathyrus littoralis</i>	silky beach pea	Red	T (Apr-13)	
<i>Limnanthes macounii</i>	Macoun's meadow-foam	Red	T (Nov-04)	T (Aug-06)
<i>Lomatium dissectum</i>	fern-leaved desert-parsley	Red		
<i>Lupinus microcarpus</i> var. <i>microcarpus</i>	dense-flowered lupine	Red	E (May-05)	E (Aug-06)
<i>Meconella oregana</i>	white meconella	Red	E (May-05)	E (Feb-11)
<i>Microseris bigelovii</i>	coast microseris	Red	E (Apr-06)	E (Aug-06)
<i>Nuttallanthus texanus</i>	Texas toadflax	Blue		(Dec-07)

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Scientific Name	English Name	BC List	COSEWIC	SARA
<i>Orthocarpus bracteosus</i>	rosy owl-clover	Red	E (May-04)	E
<i>Plagiobothrys figuratus</i> ssp. <i>figuratus</i>	fragrant popcornflower	Red	E (Mar-08)	E (Jul-05)
<i>Polygonum paronychia</i>	black knotweed	Blue		(Feb-10)
<i>Psilocarphus elatior</i>	tall woolly-heads	Red	E (May-18)	E
<i>Pyrola aphylla</i>	leafless wintergreen	Blue		(Jun-03)
<i>Ranunculus alismifolius</i> var. <i>alismifolius</i>	water-plantain buttercup	Red	E (Apr-09)	E
<i>Ranunculus californicus</i>	California buttercup	Red	E (Nov-08)	E (Jun-03)
<i>Sabulina pusilla</i>	dwarf sandwort	Red	E (May-04)	E (Feb-11)
<i>Sanicula arctopoides</i>	bear's-foot sanicle	Red	T (Nov-15)	T (Jul-05)
<i>Sanicula bipinnatifida</i>	purple sanicle	Red	T (May-01)	T (Jun-03)
<i>Sericocarpus rigidus</i>	white-top aster	Blue	SC (Apr-09)	SC (Jun-03)
<i>Silene scouleri</i> ssp. <i>scouleri</i>	coastal Scouler's catchfly	Red	E (May-03)	E (Jun-03)
<i>Trifolium depauperatum</i> var. <i>depauperatum</i>	poverty clover	Blue		(Jan-05)
<i>Trifolium dichotomum</i>	Macrae's clover	Red		
<i>Triphysaria versicolor</i> ssp. <i>versicolor</i>	bearded owl-clover	Red	E (Nov-11)	E
<i>Utricularia ochroleuca</i>	ochroleucous bladderwort	Blue		(Jun-03)
Monocots				
<i>Allium amplexans</i>	slimleaf onion	Blue		
<i>Carex tumulicola</i>	foothill sedge	Yellow	E (Mar-08)	E
<i>Festuca rubra</i> ssp. <i>mediana</i>	dwarf red fescue	Yellow		(Feb-10)
<i>Sisyrinchium idahoense</i> var. <i>segetum</i>	Idaho blue-eyed-grass	Red		
Ferns				
<i>Dryopteris arguta</i>	coastal wood fern	Blue	SC (May-21)	SC
<i>Polystichum californicum</i>	California Sword-fern	Red		(Jun-03)
<i>Woodwardia fimbriata</i>	giant chain fern	Blue		

Citation: B.C. Conservation Data Centre. 2022. BC Species and Ecosystems Explorer. B.C. Minist. of Environ. Victoria, B.C. Available: <http://a100.gov.bc.ca/pub/eswp/> (accessed May 19, 2022).

Search Criteria: Municipality: District of Sechelt; Biogeoclimatic unit: Coastal Western Hemlock Very Dry Maritime (CWHxm)

¹ See Appendix 2 for definitions and status descriptions.

Species not likely to occur based on available habitat.

Table 3
Ecological Community
Gough Creek and Clack Creek at Day Road
Roberts Creek, BC, Ministry of Transportation and Infrastructure,
PGL File: 346-65.01

Scientific Name	English Name	BC List
Ecological Community		
<i>Arbutus menziesii</i> / <i>Arctostaphylos columbiana</i>	arbutus / hairy manzanita	Red
<i>Carex lasiocarpa</i> - <i>Rhynchospora alba</i>	slender sedge - white beak-rush	Red
<i>Carex lyngbyei</i> Herbaceous Vegetation	Lyngbye's sedge herbaceous vegetation	Red
<i>Carex macrocephala</i> Herbaceous Vegetation	large-headed sedge Herbaceous Vegetation	Red
<i>Carex sitchensis</i> - <i>Oenanthe sarmentosa</i>	Sitka sedge - Pacific water-parsley	Blue
<i>Deschampsia cespitosa</i> - <i>Sidalcea hendersonii</i>	tufted hairgrass - Henderson's checker-mallow	Red
<i>Deschampsia cespitosa</i> ssp. <i>beringensis</i> - <i>Hordeum brachyantherum</i>	tufted hairgrass - meadow barley	Red
<i>Distichlis spicata</i> - <i>Sarcocornia pacifica</i>	seashore saltgrass - Pacific swampfire	Red
<i>Eleocharis palustris</i> Herbaceous Vegetation	common spike-rush Herbaceous Vegetation	Blue
<i>Festuca roemeri</i> - <i>Koeleria macrantha</i>	Roemer's fescue - junegrass	Red
<i>Juncus arcticus</i> - <i>Plantago macrocarpa</i>	arctic rush - Alaska plantain	Red
<i>Leymus mollis</i> ssp. <i>mollis</i> - <i>Lathyrus japonicus</i>	dune wildrye - beach pea	Red
<i>Myrica gale</i> / <i>Carex sitchensis</i>	sweet gale / Sitka sedge	Red
<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Dry	Sitka spruce / salmonberry Dry	Red
<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Very Dry Maritime	Sitka spruce / salmonberry Very Dry Maritime	Red
<i>Pinus contorta</i> / <i>Sphagnum</i> spp. Very Dry Maritime	lodgepole pine / peat-mosses Very Dry Maritime	Blue
<i>Populus tremuloides</i> / <i>Malus fusca</i> / <i>Carex obnupta</i>	trembling aspen / Pacific crab apple / slough sedge	Red
<i>Populus trichocarpa</i> - <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	black cottonwood - red alder / salmonberry	Blue
<i>Populus trichocarpa</i> / <i>Salix sitchensis</i>	black cottonwood / Sitka willow	Blue
<i>Pseudotsuga menziesii</i> / <i>Polystichum munitum</i>	Douglas-fir / sword fern	Red
<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Gaultheria shallon</i> Dry Maritime	Douglas-fir - western hemlock / salal Dry Maritime	Red
<i>Rhododendron groenlandicum</i> / <i>Kalmia microphylla</i> / <i>Sphagnum</i> spp.	Labrador-tea / western bog-laurel / peat-mosses	Blue
<i>Ruppia maritima</i> Herbaceous Vegetation	beaked ditch-grass Herbaceous Vegetation	Red
<i>Salix sitchensis</i> - <i>Salix lasiandra</i> var. <i>lasiandra</i> / <i>Lysichiton americanus</i>	Sitka willow - Pacific willow / skunk cabbage	Red
<i>Sarcocornia pacifica</i> - <i>Lysimachia maritima</i>	American glasswort - sea-milkwort	Red
<i>Schoenoplectus acutus</i> Deep Marsh	hard-stemmed bulrush Deep Marsh	Blue
<i>Selaginella wallacei</i> / <i>Cladina</i> spp.	Wallace's selaginella / reindeer lichens	Blue
<i>Sidalcea hendersonii</i> Tidal Marsh	Henderson's checker-mallow Tidal Marsh	Red
<i>Thuja plicata</i> / <i>Carex obnupta</i>	western redcedar / slough sedge	Red
<i>Thuja plicata</i> / <i>Lonicera involucrata</i>	western redcedar / black twinberry	Red
<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Lysichiton americanus</i>	western redcedar - Sitka spruce / skunk cabbage	Blue
<i>Thuja plicata</i> / <i>Polystichum munitum</i> - <i>Lysichiton americanus</i>	western redcedar / sword fern - skunk cabbage	Blue
<i>Thuja plicata</i> / <i>Polystichum munitum</i> Dry Maritime	western redcedar / sword fern Dry Maritime	Red
<i>Thuja plicata</i> / <i>Polystichum munitum</i> Very Dry Maritime	western redcedar / sword fern Very Dry Maritime	Red
<i>Thuja plicata</i> / <i>Rubus spectabilis</i>	western redcedar / salmonberry	Red
<i>Thuja plicata</i> / <i>Tiarella trifoliata</i> Dry Maritime	western redcedar / three-leaved foamflower Dry Maritime	Blue
<i>Thuja plicata</i> / <i>Tiarella trifoliata</i> Very Dry Maritime	western redcedar / three-leaved foamflower Very Dry Maritime	Blue
<i>Tsuga heterophylla</i> / <i>Buckiella undulata</i>	western hemlock / flat-moss	Blue
<i>Tsuga heterophylla</i> - <i>Pseudotsuga menziesii</i> / <i>Eurhynchium oreganum</i>	western hemlock - Douglas-fir / Oregon beaked-moss	Red
<i>Tsuga heterophylla</i> - <i>Thuja plicata</i> / <i>Struthiopteris spicant</i>	western hemlock - western redcedar / deer fern	Red
<i>Typha latifolia</i> Marsh	common cattail Marsh	Blue

Appendix 1
Site Photographs



Photograph 1:

Gough Creek – View facing upstream from Day Road above Gough Creek (May 25, 2022)



Photograph 2:

Gough Creek – Temporary culvert from upstream side, facing downstream (May 25, 2022)



Photograph 3:

Gough Creek – View facing downstream from Day Road, above Glack Creek (May 25, 2022)



Photograph 4:

Gough Creek – Temporary culvert from downstream side, facing upstream (May 25, 2022)



Photograph 5:

Clack Creek – View facing upstream from Day Road, above Clack Creek (May 26, 2022)



Photograph 6:

Clack Creek – Temporary culvert from upstream side, facing downstream (May 26, 2022)



Photograph 7:

**Clack Creek – View facing
downstream from Day Road,
above Clack Creek
(May 26, 2022)**



Photograph 8:

**Clack Creek – Temporary
culvert from downstream side,
facing upstream
(May 26, 2022)**

Appendix 2

Status Definitions for Provincial and Federal SAR

Appendix 2

Status Definitions For Provincial and Federal Species at Risk

Status Definitions as per provincial Conservation Data Centre (CDC)

RED: Species that are candidates for Extirpated, Endangered, or Threatened status in BC. Placing taxa on these lists flags them as being at risk and requiring investigation.

BLUE: Species considered of Special Concern in BC. Taxa of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events.

Status Definitions as per federal Species at Risk Act (SARA)

ENDANGERED: A wildlife species that is facing imminent extirpation or extinction.

THREATENED: A wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.

SPECIAL CONCERN: A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

SCHEDULE 1: Official list of federally protected species.

SCHEDULE 2 and 3: Species under assessment for inclusion to Schedule 1.

Appendix 3
Detailed Design Drawings



Ministry of
Transportation
and Infrastructure

PROJECT NO. 14007

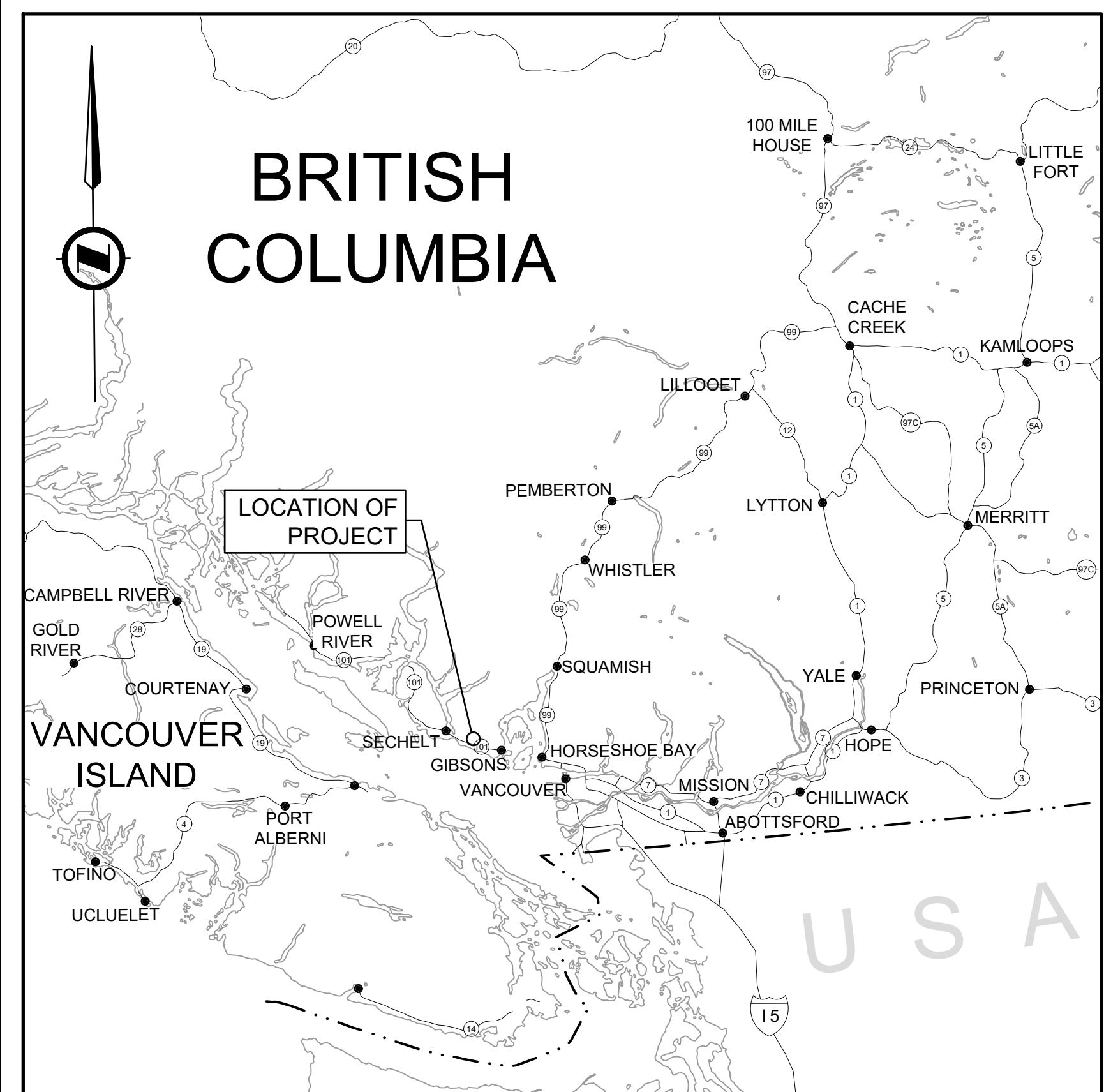
DAY ROAD DFAA FLOOD DAMAGE

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2022-11-04
urbansystems.ca

Refer to Tender Drawing Package Approval Form DIRECTOR, ENGINEERING DATE	Refer to Tender Drawing Package Approval Form REGIONAL DIRECTOR DATE
--	--

DRAWING NUMBER	REV
R1-1026-000	

PLOT DATE: 2022/11/03 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\000_CoverKeyPlan\Legend\R1-1026-000.dwg



LOCATION MAP
N.T.S



Ministry of
Transportation
and Infrastructure

PROJECT NO. 14007

DAY ROAD DFAA FLOOD DAMAGE

STA. 100+08.000- STA. 103+30.000

0.322 km

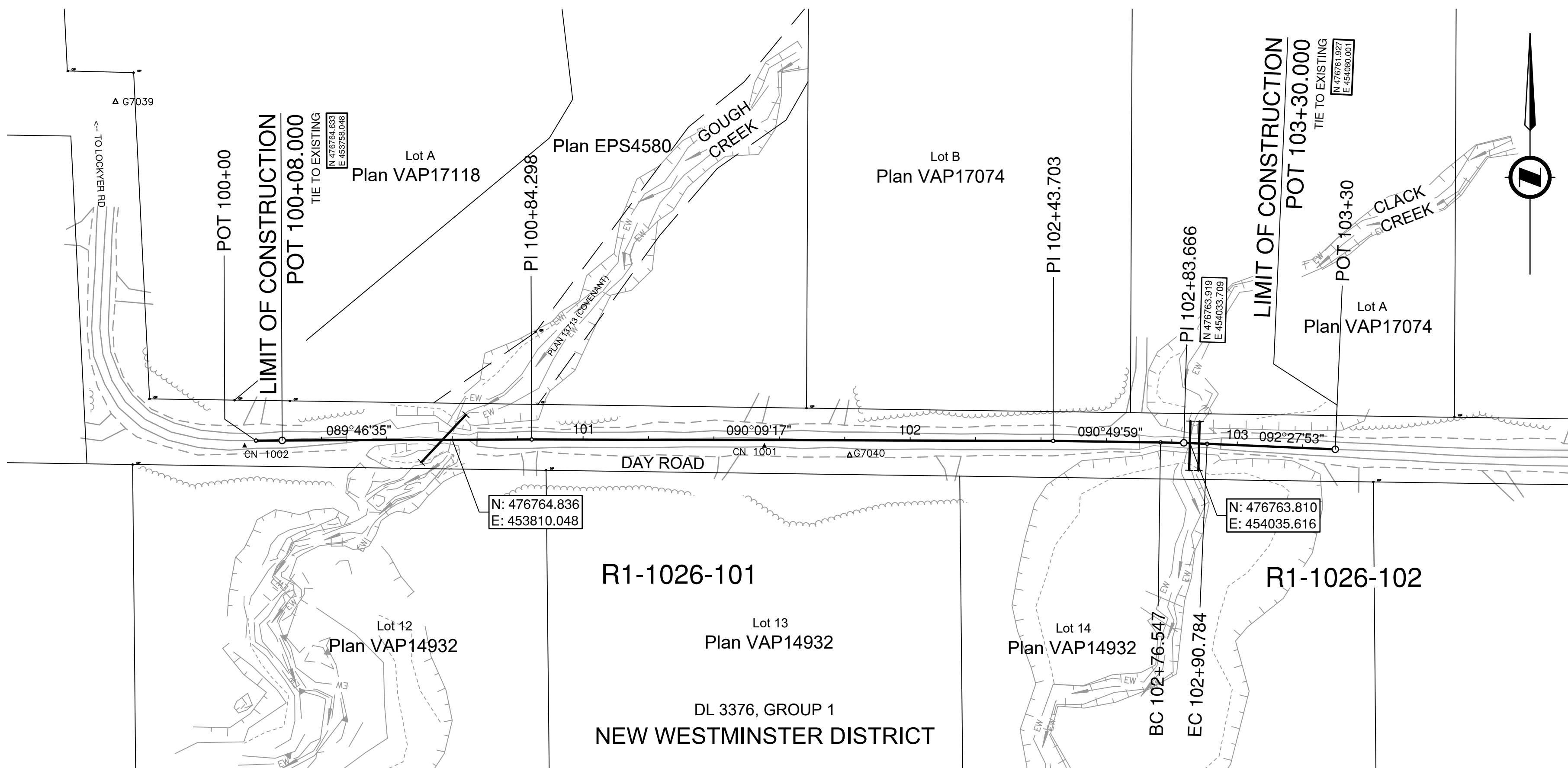
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CLACK CREEK: N: 476763.810, E: 454035.616

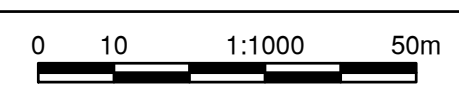
GRADING AND DRAINAGE CONTRACT

DRAWING INDEX

R1-1026-000	COVER PAGE
R1-1026-001	KEY PLAN
R1-1026-002	LEGEND
R1-1026-101 & 102	PLAN
R1-1026-201	PROFILE
R1-1026-301	TYPICAL SECTIONS
R1-1026-401 & 402	GEOMETRICS, LANING AND SIGNAGE
R1-1026-701 & 702	DRAINAGE AND DETAILS



KEY PLAN

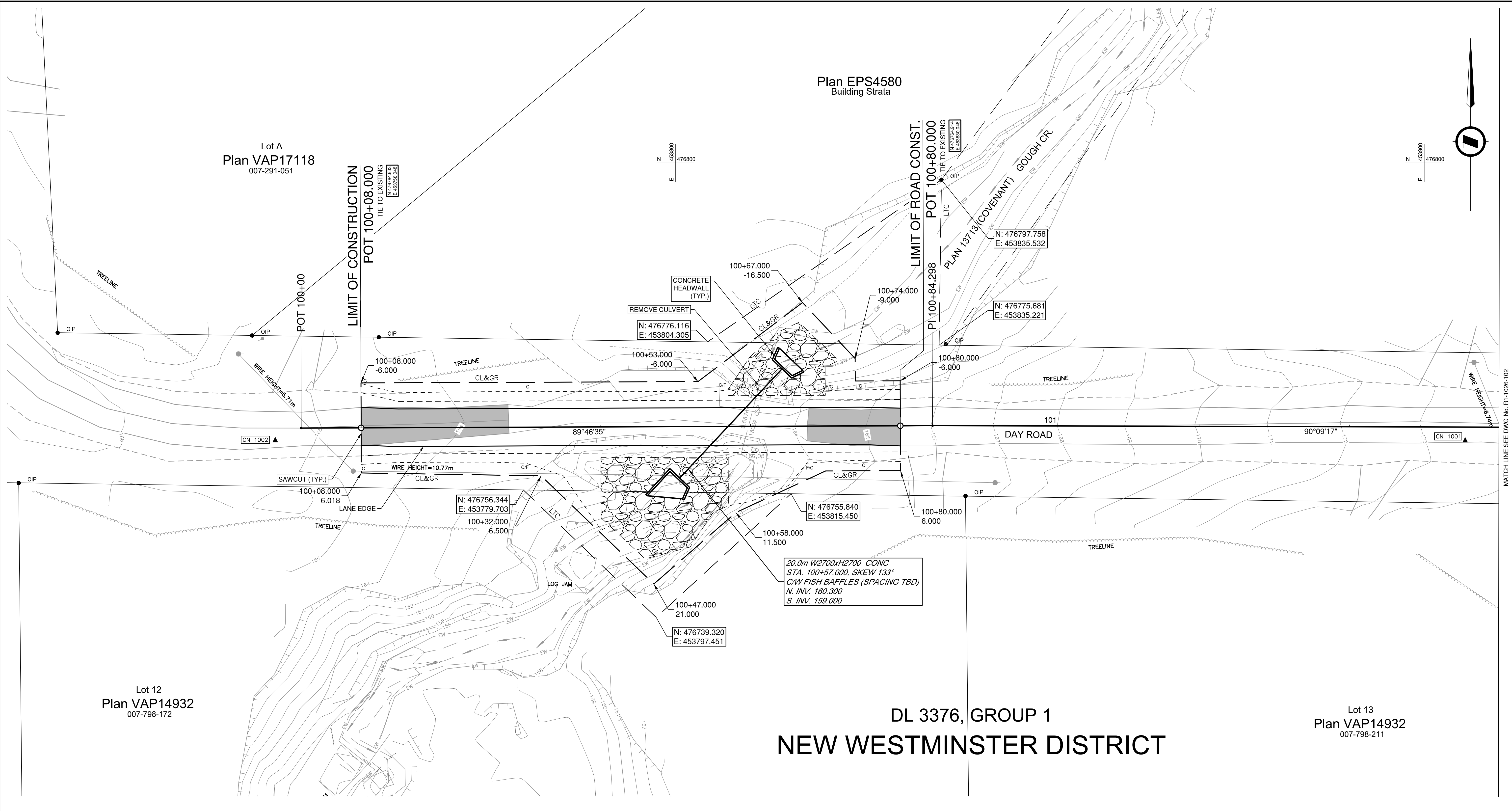


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DRAWING NUMBER	REV
R1-1026-001	

PLOT DATE: 2022/11/03 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\100_Plans\R1-1026-100.dwg



Lot A
Plan VAP17118
007-291-051

Lot 12
Plan VAP14932
007-798-172

Lot 13
Plan VAP14932
007-798-211

Plan EPS4580
Building Strata

DL 3376, GROUP 1
NEW WESTMINSTER DISTRICT

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SURVEY NOTE:
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-TACK POINT: GCM 314369
-ADJUSTED COORDINATES WERE DIVIDED BY GIVEN SCALE FACTOR OF : 0.9996343
-ROTATION: NOT APPLIED
-TRANSLATION: SHIFT NORTH (-5000000.000), SHIFT EAST (0.000)

CL & GR TOTAL
THIS DWG 0.1253 ha.

FOR PROFILES SEE DWG
R1-1026-201

FOR DRAINAGE AND UTILITIES
SEE DWG R1-1026-701 to R1-1026-702

THE LOCATION OF EXISTING UNDERGROUND UTILITIES SHOWN HEREON IS APPROXIMATE ONLY AND PREDOMINANTLY BASED ON AS-BUILT INFORMATION. THE CONTRACTOR WILL CONFIRM THE FIELD LOCATIONS OF THESE UTILITIES WITH THE UTILITY STAKEHOLDERS.

101 102

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		PLOT DATE 2022-11-03	
REV	DATE	REVISIONS	NAME

BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

DESIGNED S.FUJICO DATE 2022-11-04
QUALITY CONTROL C.BAGG DATE 2022-11-04
QUALITY ASSURANCE J.BORCH DATE 2022-11-04
DRAWN S.FUJICO DATE 2022-11-04

CODY BAGG, P.ENG.
SENIOR DESIGNER

PLAN DAY ROAD DFAA FLOOD DAMAGE STA. 100+08.000 TO 101+60.000		FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
		872CS1714	14007	1	R1-1026-101	



DL 3376, GROUP 1 NEW WESTMINSTER DISTRICT

Lot B
Plan VAP17074
007-325-177

Lot A
Plan VAP17074
007-325-126

Lot 13
Plan VAP14932
007-798-211

Lot 14
Plan VAP14932
007-798-237

Lot 15
Plan VAP14932
007-798-261

MATCH LINE SEE DWG No. R1-1026-101

PLOT DATE: 2022/11/03 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\100_Plans\R1-1026-100.dwg

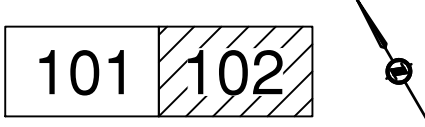
CL & GR TOTAL
THIS DWG 0.1024 ha.

FOR PROFILES SEE DWG
R1-1026-201

FOR DRAINAGE AND UTILITIES
SEE DWG R1-1026-701 to R1-1026-702

SURVEY NOTE:
COORDINATES ARE AT GROUND LEVEL AND BASED ON THE FOLLOWING
CONVERSION FACTORS FROM UTM Z10 NAD 83 (CSRS), CGVD28 (HT2.0):
-TACK POINT: GCM 314369
-ADJUSTED COORDINATES WERE DIVIDED BY GIVEN SCALE
FACTOR OF : 0.9996343
-ROTATION: NOT APPLIED
-TRANSLATION: SHIFT NORTH (-5000000.000), SHIFT EAST (0.000)

THE LOCATION OF EXISTING UNDERGROUND UTILITIES SHOWN
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AS-BUILT INFORMATION. THE CONTRACTOR WILL CONFIRM THE FIELD
LOCATIONS OF THESE UTILITIES WITH THE UTILITY STAKEHOLDERS.



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				PLOT DATE	2022-11-03
REV	DATE	REVISIONS	NAME		

BRITISH COLUMBIA
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SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

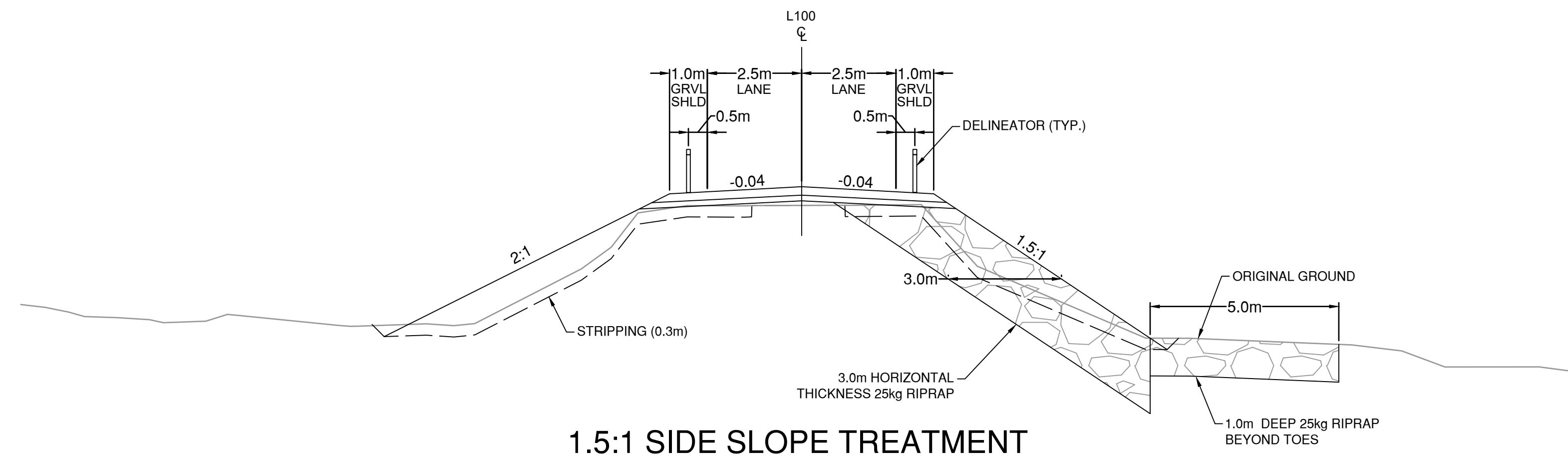
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QUALITY CONTROL: C.BAGG DATE: 2022-11-04
QUALITY ASSURANCE: J.BORCH DATE: 2022-11-04
DRAWN: S.FUQCO DATE: 2022-11-04

CODY BAGG, P.ENG.
SENIOR DESIGNER

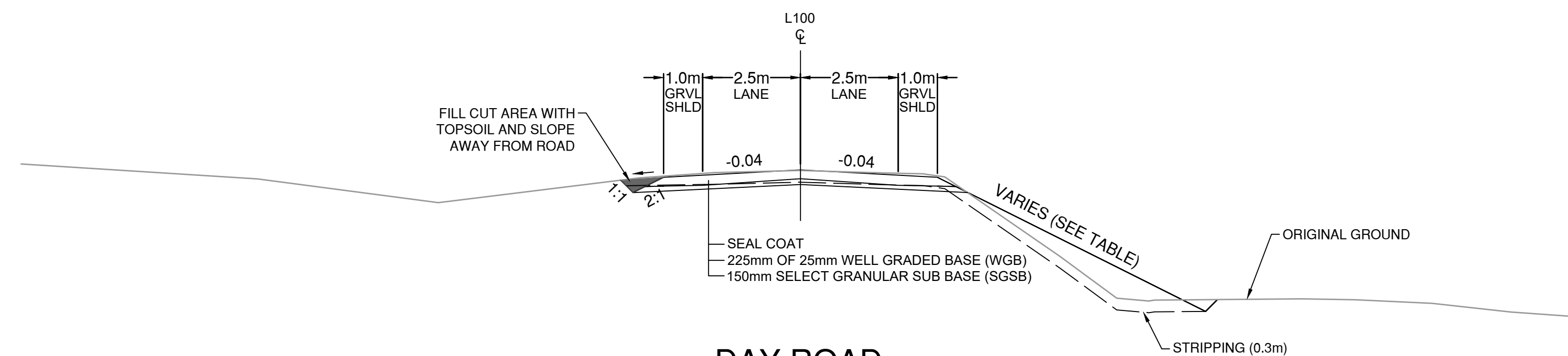
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FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-102	



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1.5:1 SIDE SLOPE TREATMENT



DAY ROAD

STA. 100+08.000 TO STA. 100+80.000
 STA. 102+60.000 TO STA. 103+10.000

VARIABLE SIDESLOPES		
Station	Sideslope Left	Sideslope Right
100+08	2:1	2:1
100+40	2:1	2:1
100+45	2:1	1.5:1
100+52	2:1	1.5:1
100+57	2:1	2:1
100+62	1.5:1	2:1
100+68	1.5:1	2:1
100+73	2:1	2:1
102+77	2:1	2:1
102+82	1.5:1	1.5:1
102+92	1.5:1	1.5:1
103+07	2:1	2:1
103+10	2:1	2:1

PLOT DATE: 20221103 U:\Projects_SUR\1961048013\3-D-Design\CAD\Drawing\Production\300_TypicalSections\R1-1026-300.dwg

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REV	DATE	REVISIONS	NAME

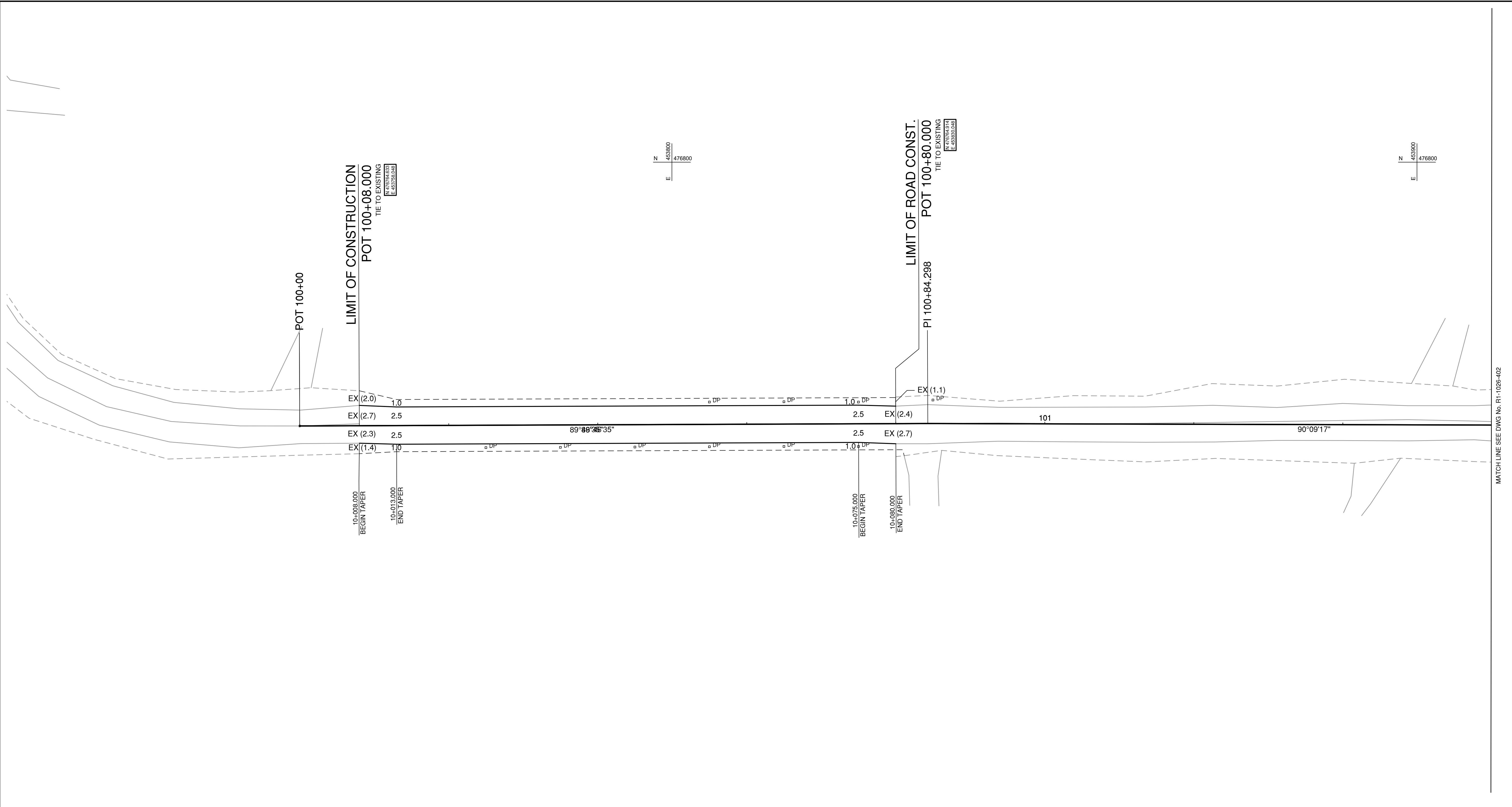
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 SOUTH COAST REGION
 HIGHWAY ENGINEERING AND GEOMATICS

DESIGNED S.FUGCO DATE 2022-11-04
 QUALITY CONTROL C.BAGG DATE 2022-11-04
 QUALITY ASSURANCE J.BORCH DATE 2022-11-04
 DRAWN S.FUGCO DATE 2022-11-04

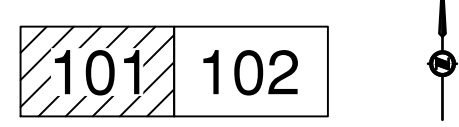
CODY BAGG, P.ENG.
 SENIOR DESIGNER
 DATE

TYPICAL SECTIONS				
DAY ROAD				
DFAA FLOOD DAMAGE				
STA. 100+08.000 TO 103+10.000				
FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-301	

PLOT DATE: 2022/11/03 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\400_Geometrics\laning\R1-1026-400.dwg



DESIGN SPEED: 80 km/h
 FOR DRAINAGE AND UTILITIES
 SEE DWG R1-1026-701 to R1-1026-702



URBAN
 SYSTEMS

SCALE 0 2 1:250 12m

CAD FILENAME: R1-1026-400
 PLOT DATE: 2022-11-03

REV	DATE	REVISIONS	NAME

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DESIGNED: S.FUJICO DATE: 2022-11-04
 QUALITY CONTROL: C.BAGG DATE: 2022-11-04
 QUALITY ASSURANCE: J.BORCHE DATE: 2022-11-04
 DRAWN: S.FUJICO DATE: 2022-11-04

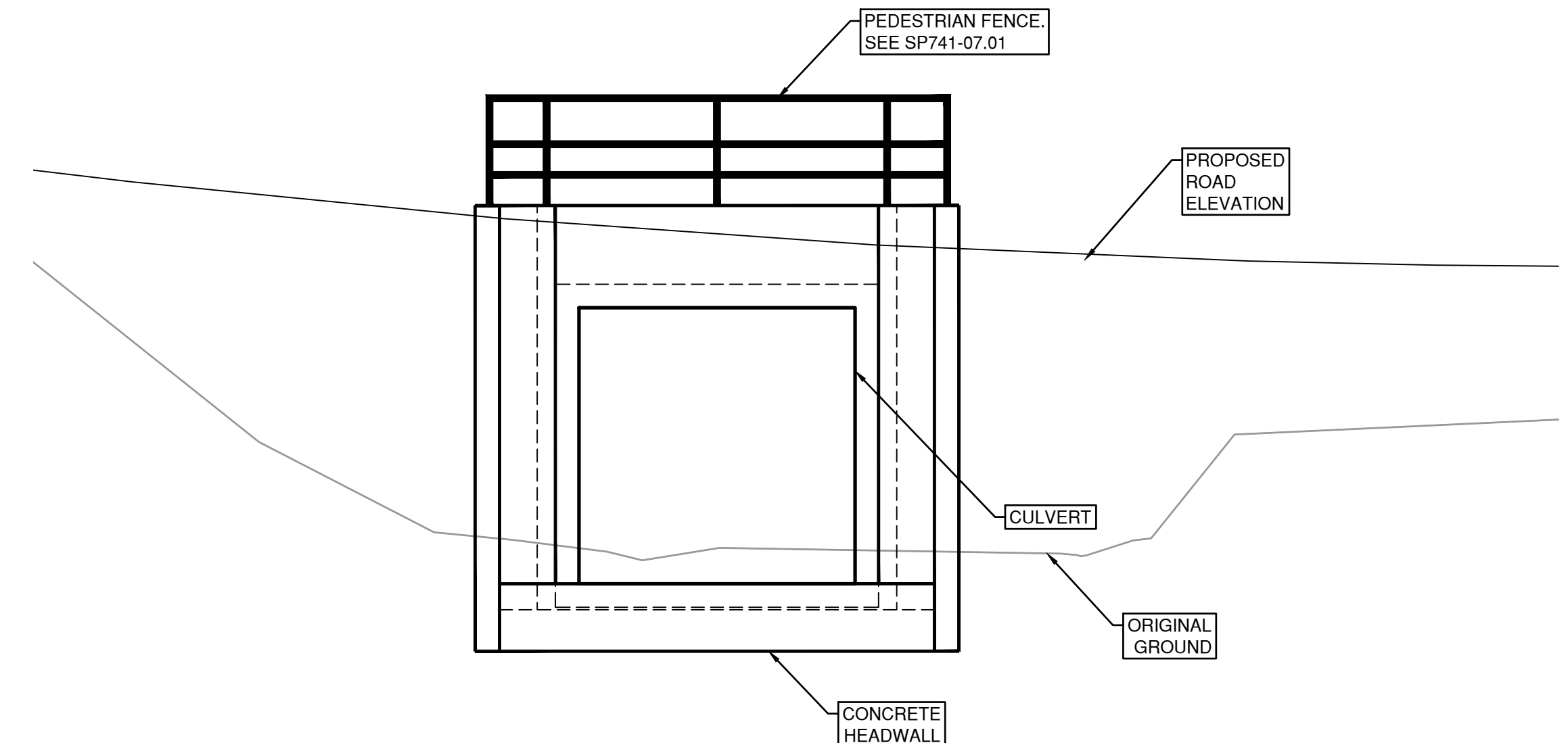
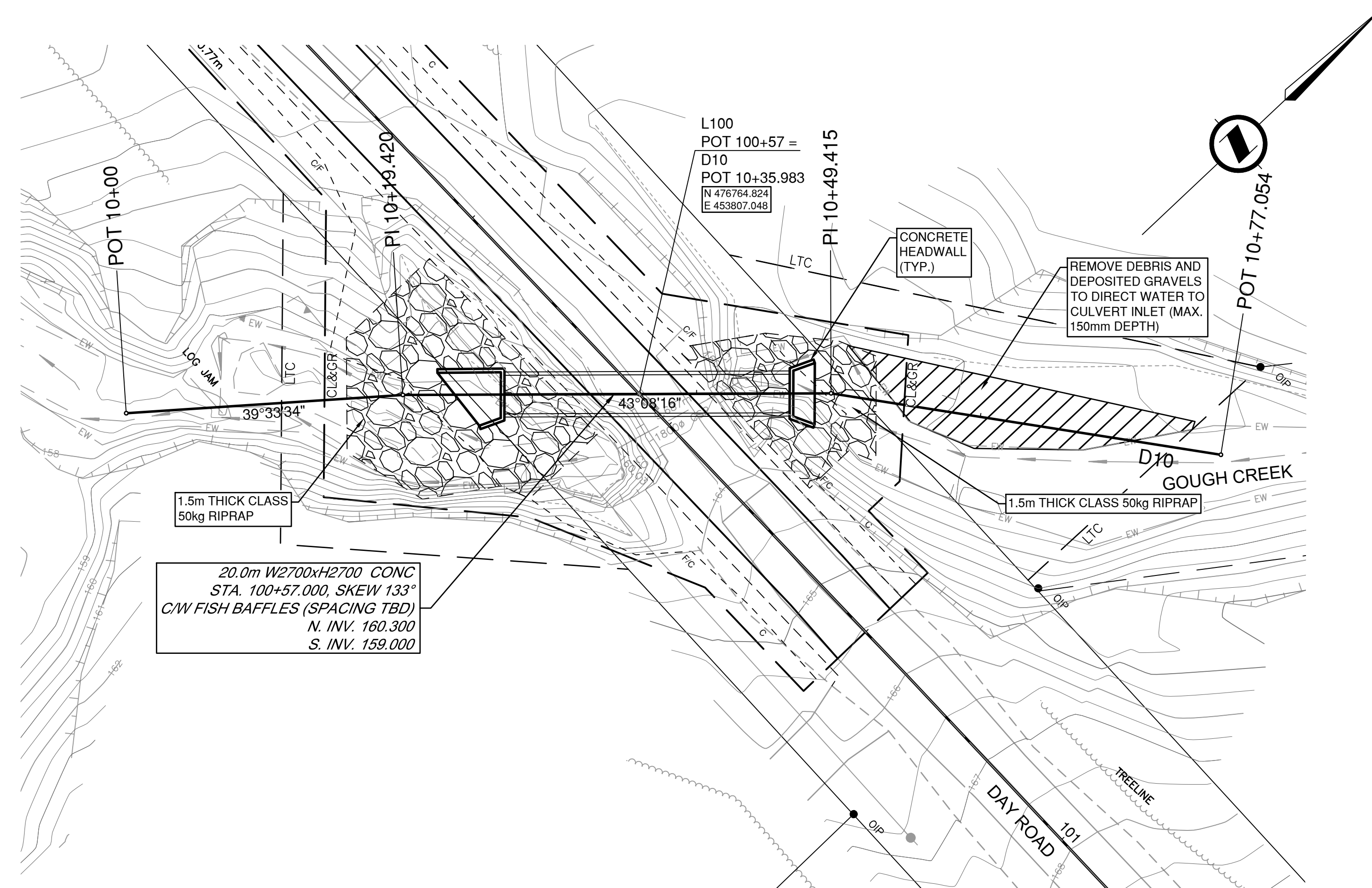
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 SENIOR DESIGNER

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GEOMETRICS, LANING AND SIGNAGE
 DAY ROAD
 DFAA FLOOD DAMAGE
 STA. 100+08.000 TO 101+60.000

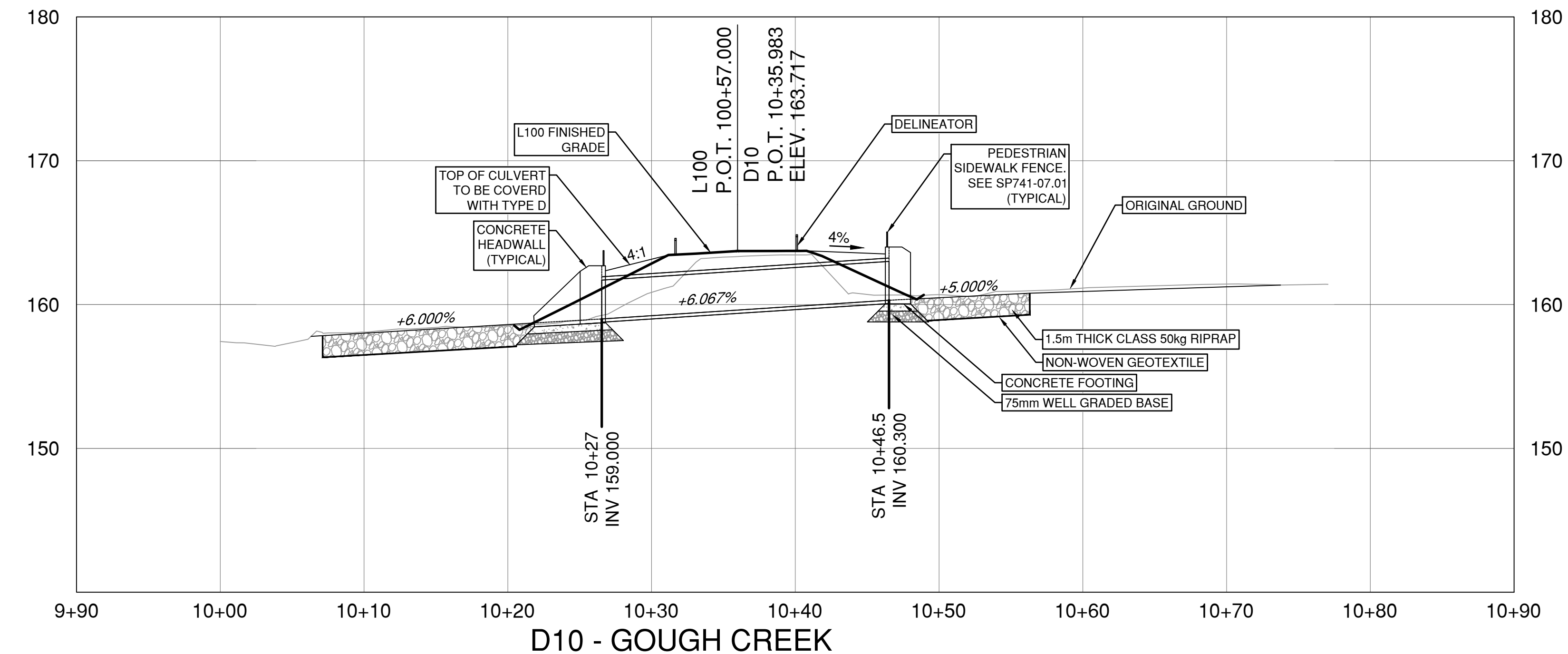
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MATCH LINE SEE DWG No. R1-1026-402



INLET SECTION

0 0.5 1.50 2.5m



SURVEY NOTE:
 COORDINATES ARE AT GROUND LEVEL AND BASED ON THE FOLLOWING CONVERSION FACTORS FROM UTM Z10 NAD 83 (CSRS), CGVD28 (HT2.0):
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 -ROTATION: NOT APPLIED
 -TRANSLATION: SHIFT NORTH (-5000000.000), SHIFT EAST (0.000)

THE LOCATION OF EXISTING UNDERGROUND UTILITIES SHOWN HEREON IS APPROXIMATE ONLY AND PREDOMINANTLY BASED ON AS-BUILT INFORMATION. THE CONTRACTOR WILL CONFIRM THE FIELD LOCATIONS OF THESE UTILITIES WITH THE UTILITY STAKEHOLDERS.

PLOT DATE: 2022/11/03 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\700_DrainageUtilities\R1-1026-700.dwg

FOR PLANS SEE DWG R1-1026-101 to -102

FOR PROFILES SEE DWG R1-1026-201



SCALE 0 2 1:250 12m

CAD FILENAME R1-1026-702

PLOT DATE 2022-11-03

REV	DATE	REVISIONS	NAME

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

SOUTH COAST REGION

HIGHWAY ENGINEERING AND GEOMATICS

DESIGNED S.FUOCO DATE 2022-11-04

QUALITY CONTROL C.BAGG DATE 2022-11-04

QUALITY ASSURANCE J.BORCH DATE 2022-11-04

DRAWN S.FUOCO DATE 2022-11-04

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2022-11-04

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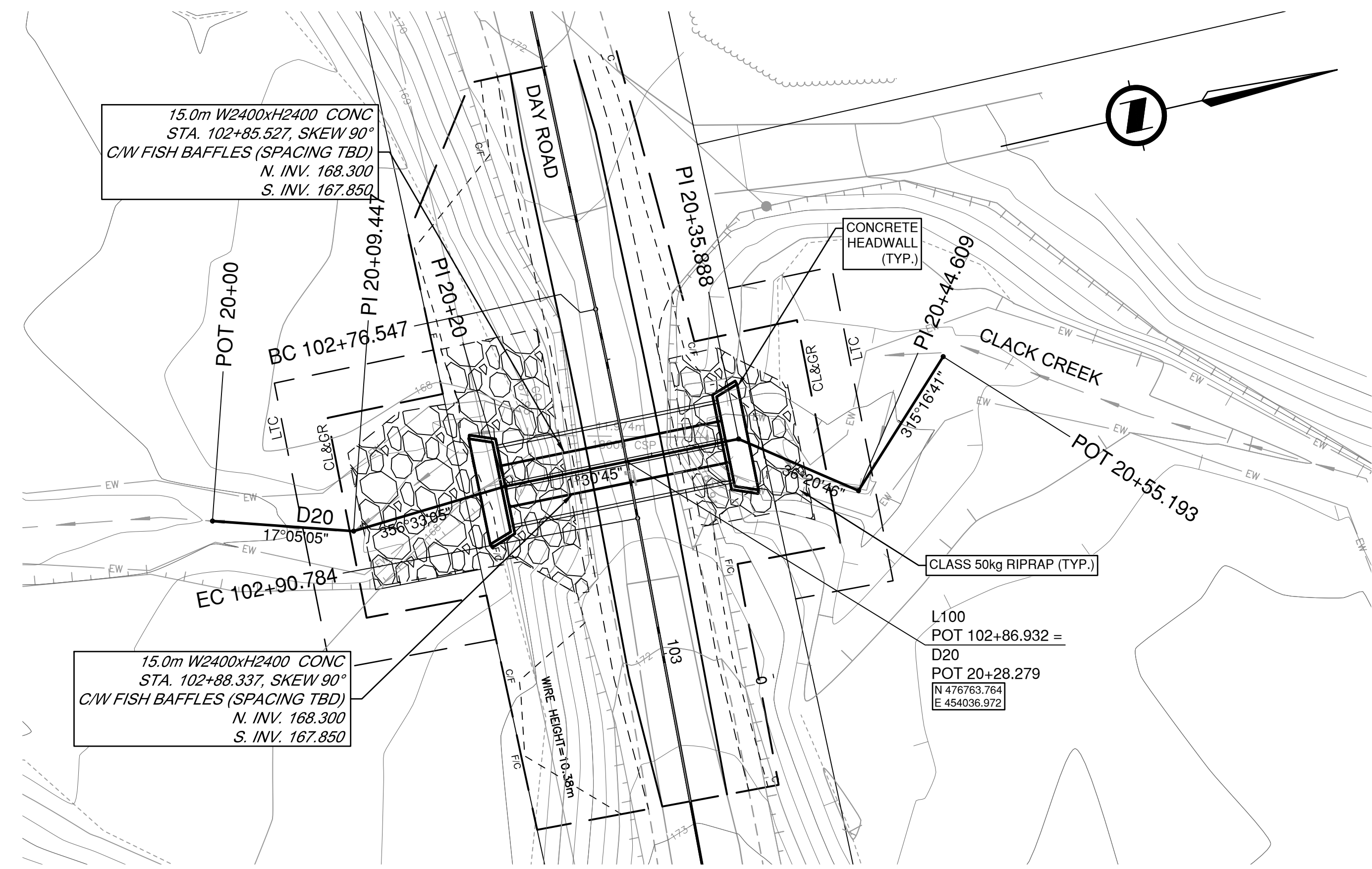
DRAINAGE AND DETAILS

DAY ROAD

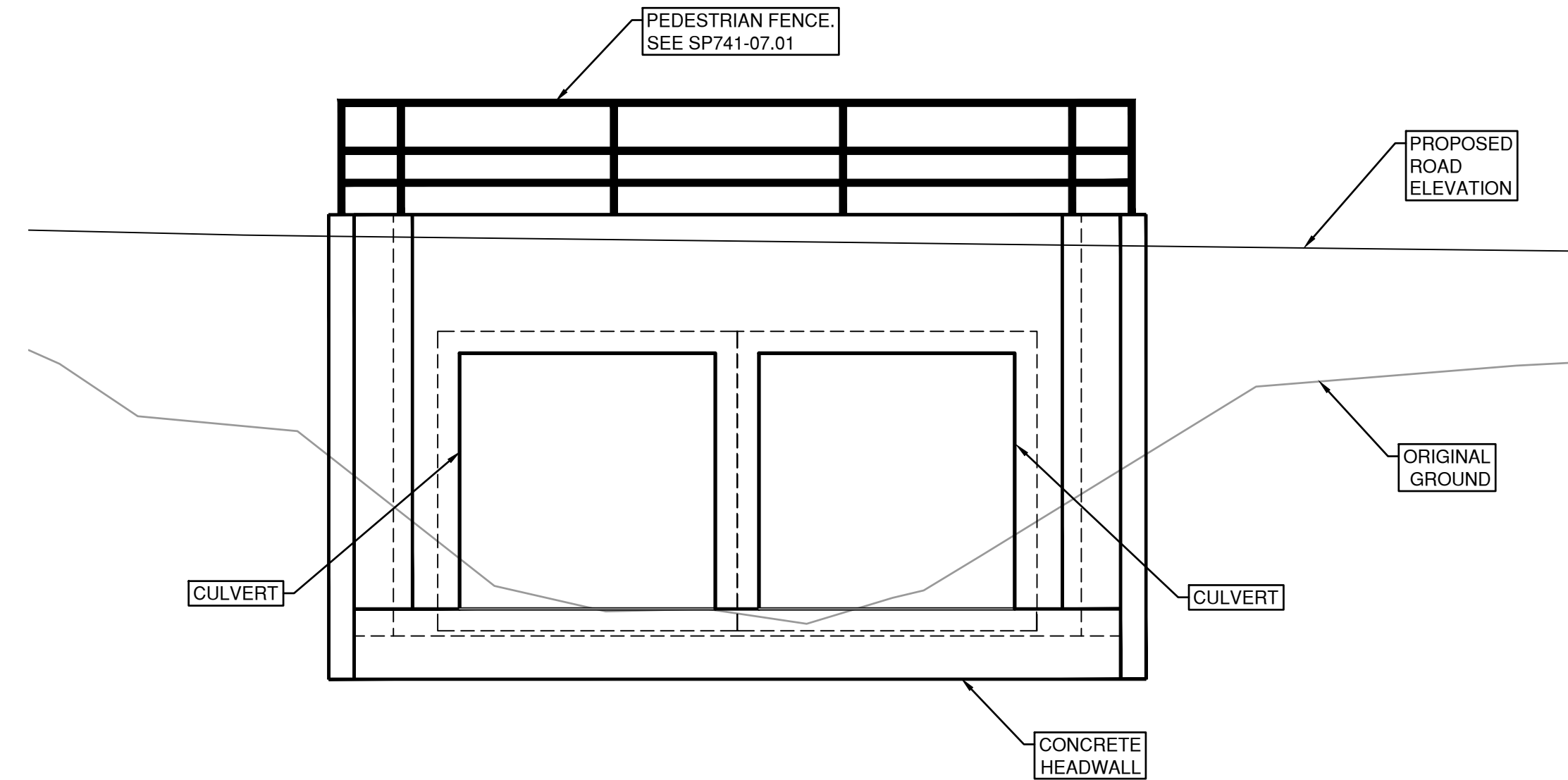
DFAA FLOOD DAMAGE

D10

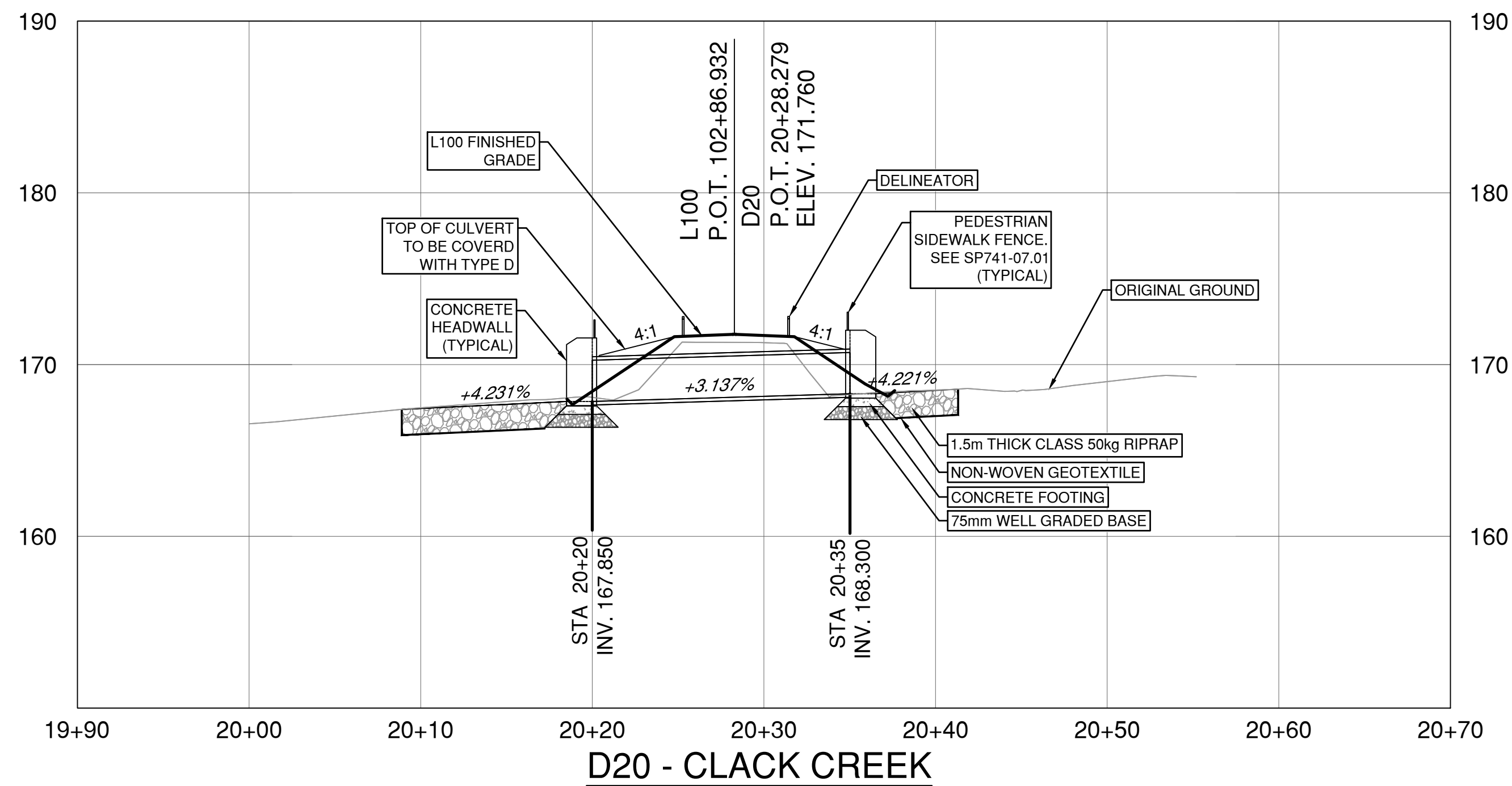
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872CS1714	14007	1	R1-1026-701	



D20 - CLACK CREEK



INLET SECTION



D20 - CLACK CREEK

SURVEY NOTE:
 COORDINATES ARE AT GROUND LEVEL AND BASED ON THE FOLLOWING CONVERSION FACTORS FROM UTM Z10 NAD 83 (CSRS), CGVD28 (HT2.0):
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 FACTOR OF : 0.9996343
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FOR PLANS SEE DWG R1-1026-101 to -102

FOR PROFILES SEE DWG R1-1026-201



SCALE 0 2 1:250 12m		CAD FILENAME R1-1026-702	
		PLOT DATE 2022-11-03	
REV	DATE	REVISIONS	NAME



MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
 SOUTH COAST REGION
 HIGHWAY ENGINEERING AND GEOMATICS

CODY BAGG, P.ENG.
 SENIOR DESIGNER

DESIGNED S.FUGCO DATE 2022-11-04
 QUALITY CONTROL G.BAGG DATE 2022-11-04
 QUALITY ASSURANCE J.BORCH DATE 2022-11-04
 DRAWN S.FUGCO DATE 2022-11-04

DRAINAGE AND DETAILS
 DAY ROAD
 DFAA FLOOD DAMAGE
 D20

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-702	

ISSUED FOR 90% DESIGN
 2022-11-04
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PLOT DATE: 2022/11/03 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\700_DrainageUtilities\R1-1026-700.dwg



Ministry of
Transportation
and Infrastructure

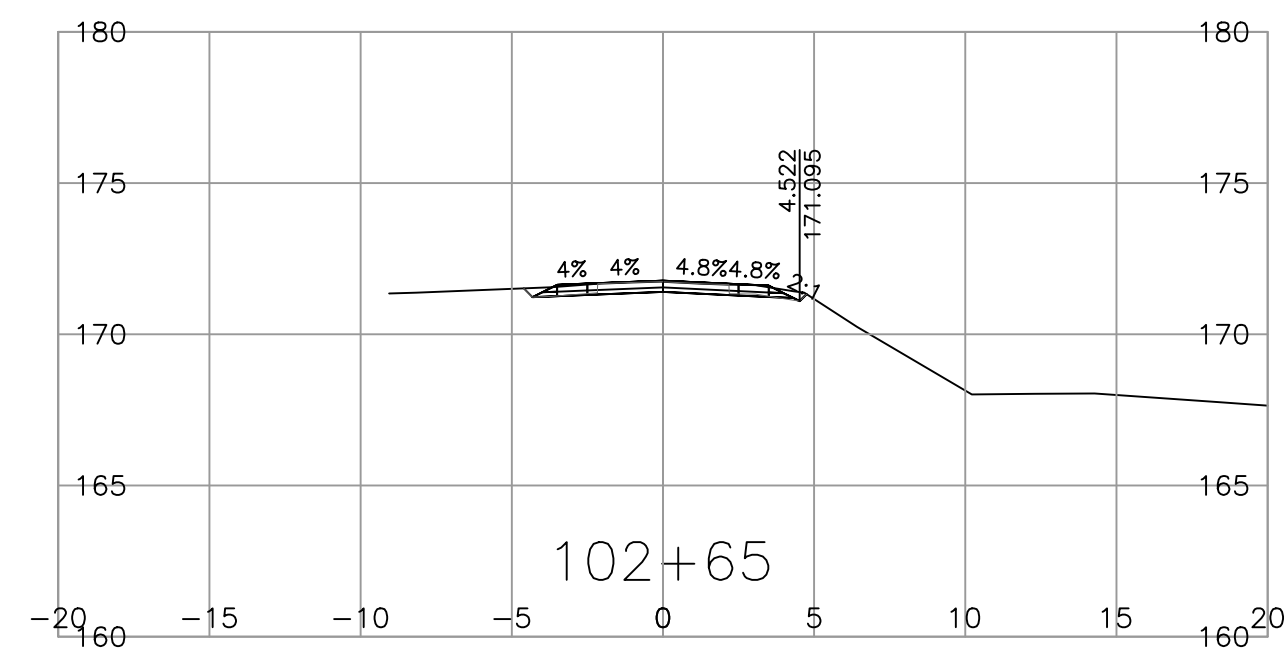
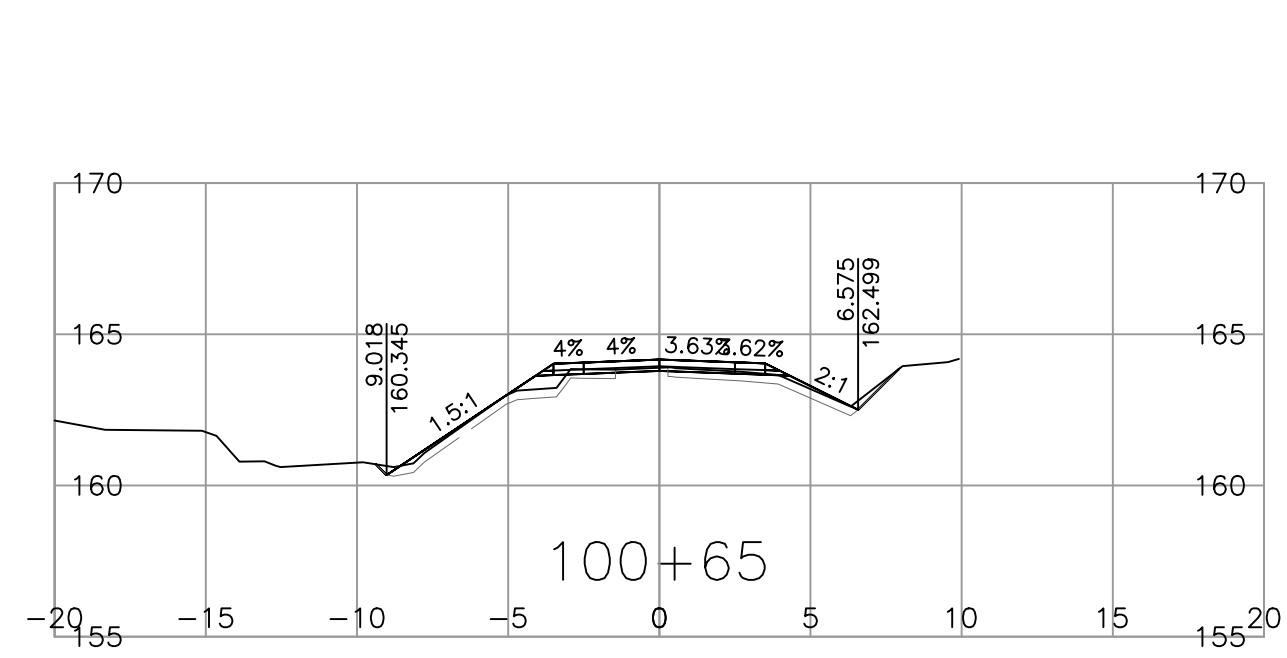
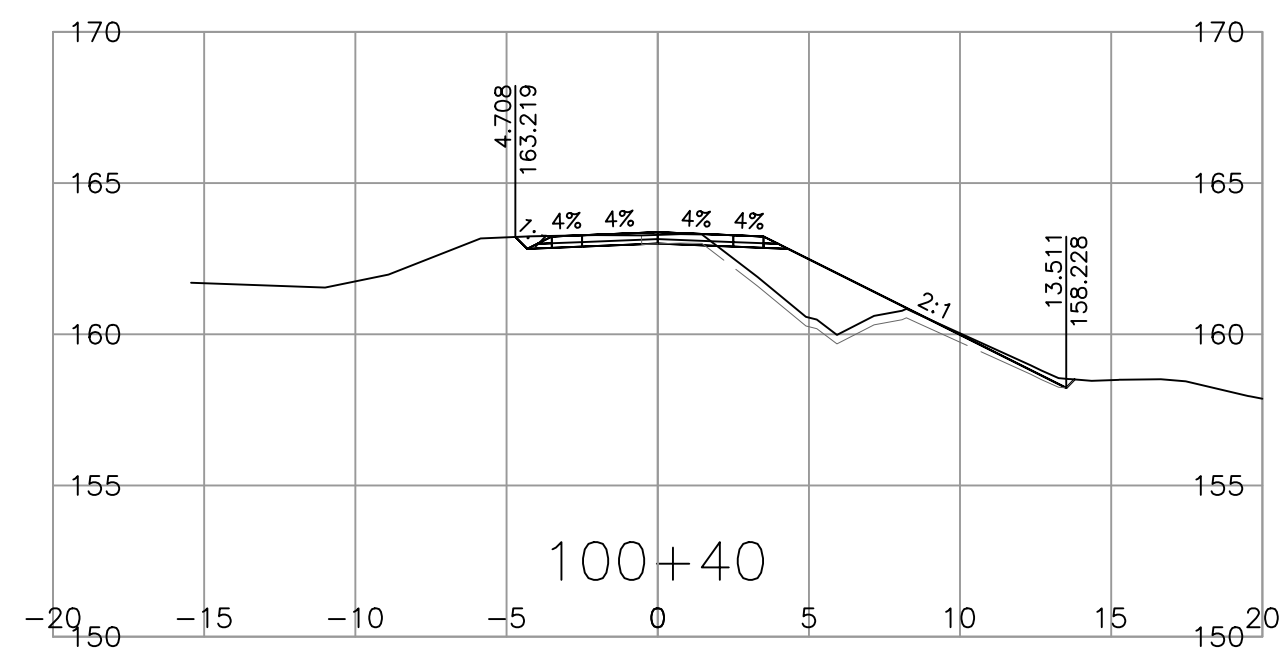
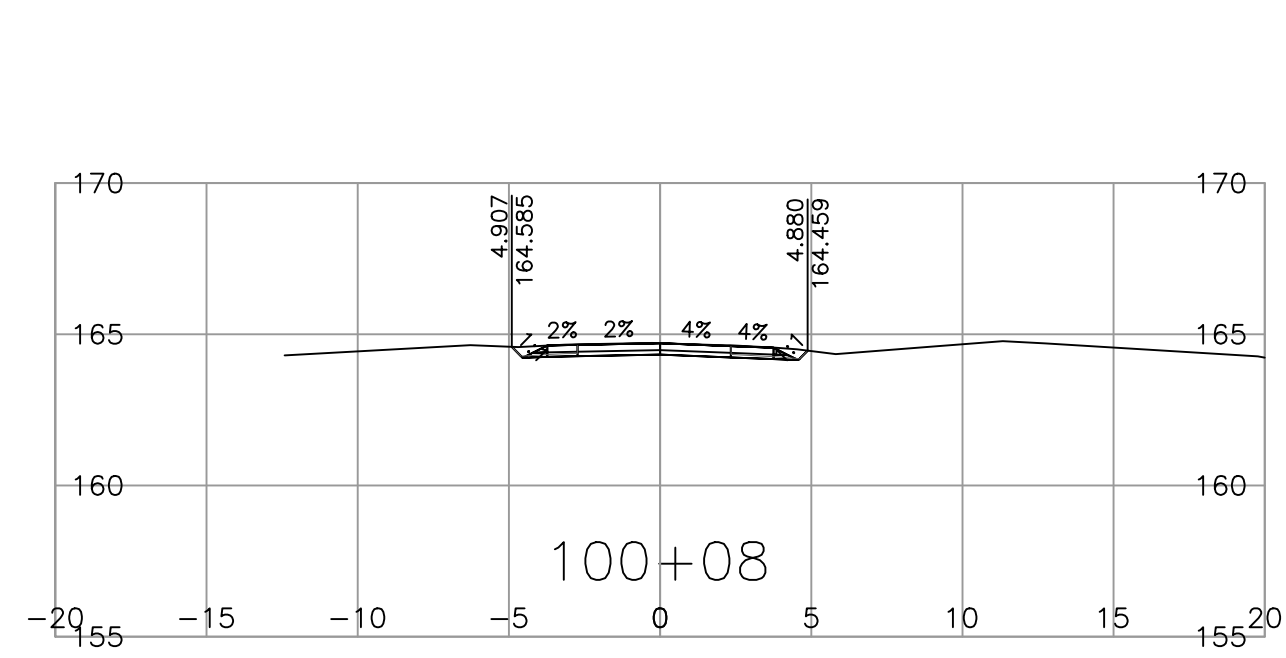
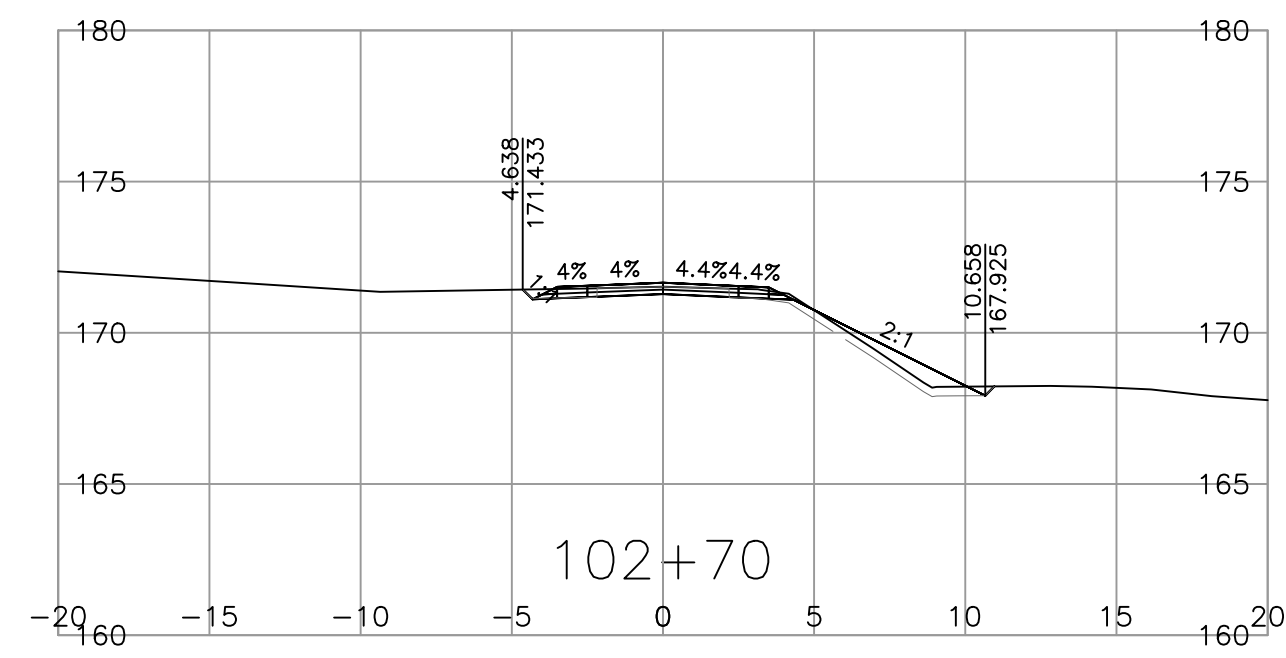
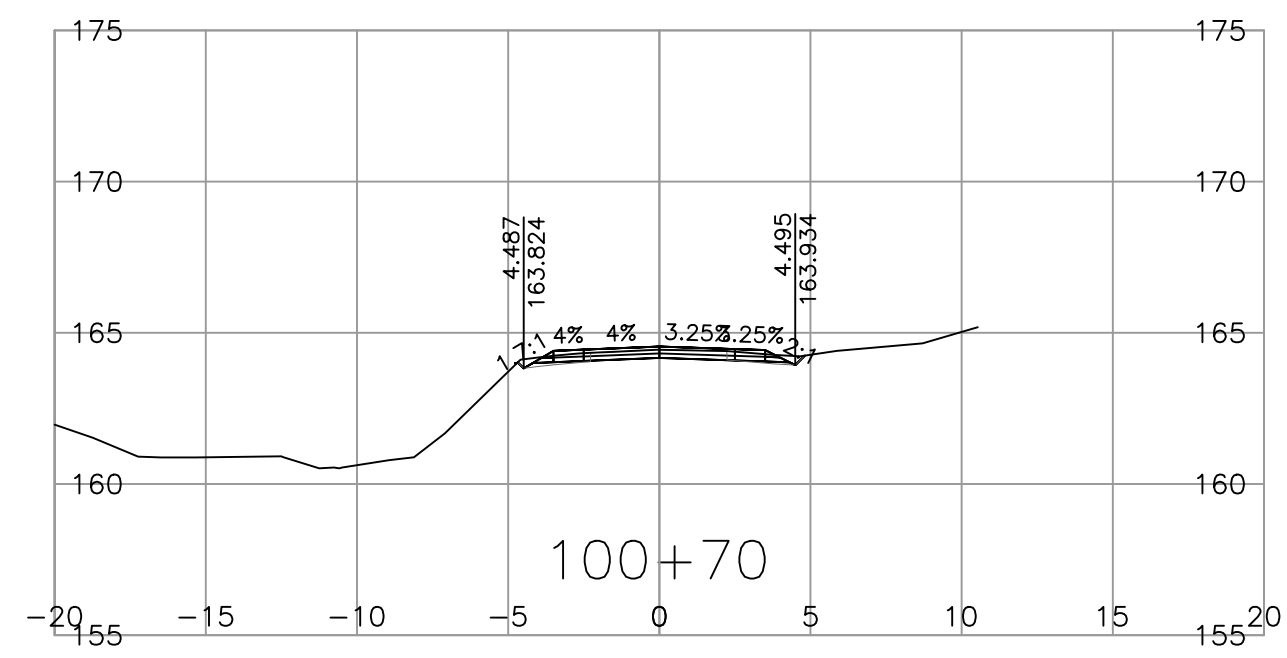
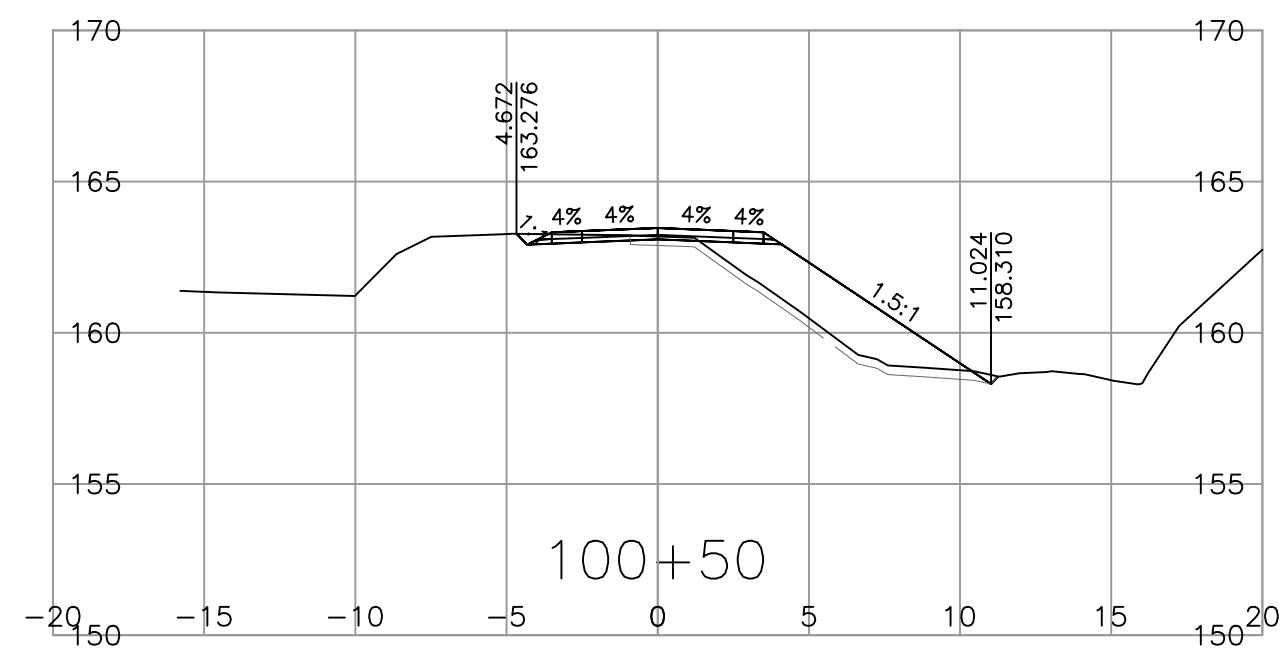
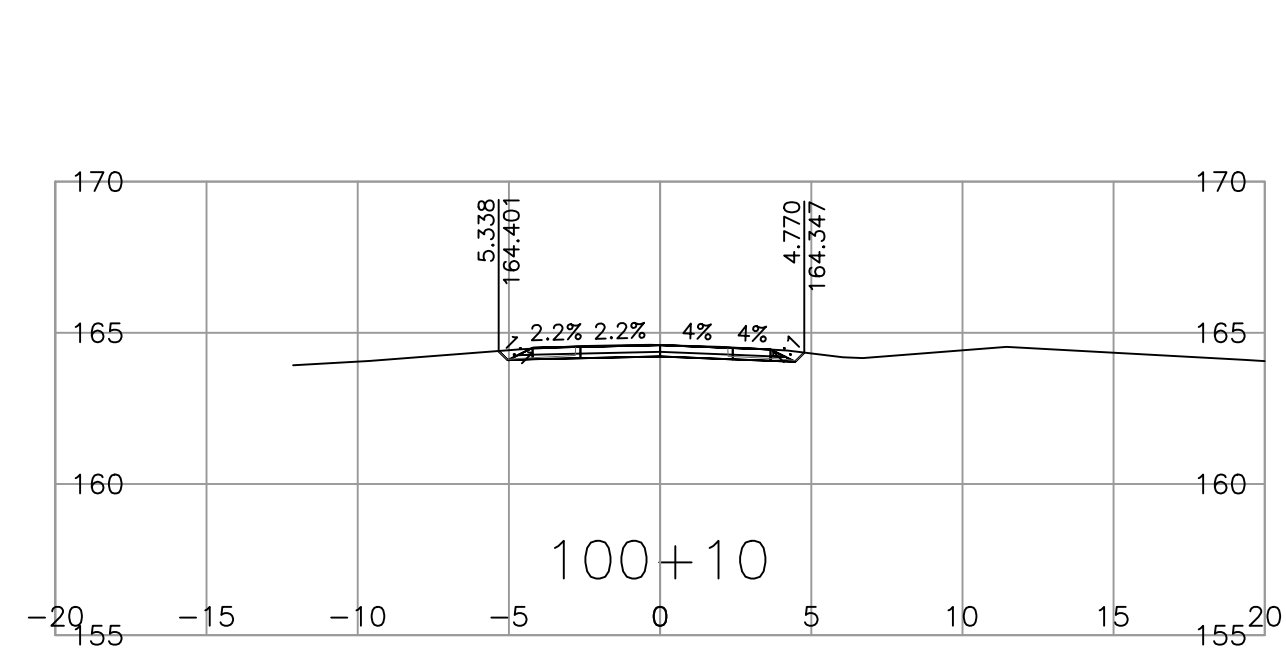
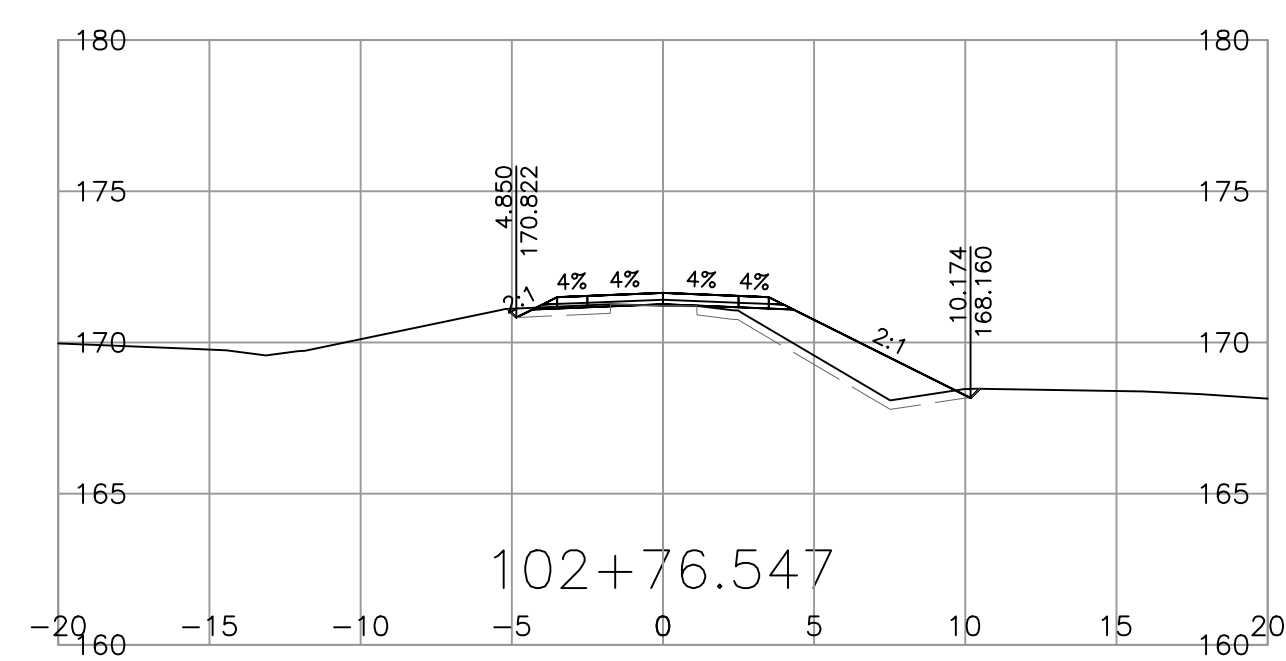
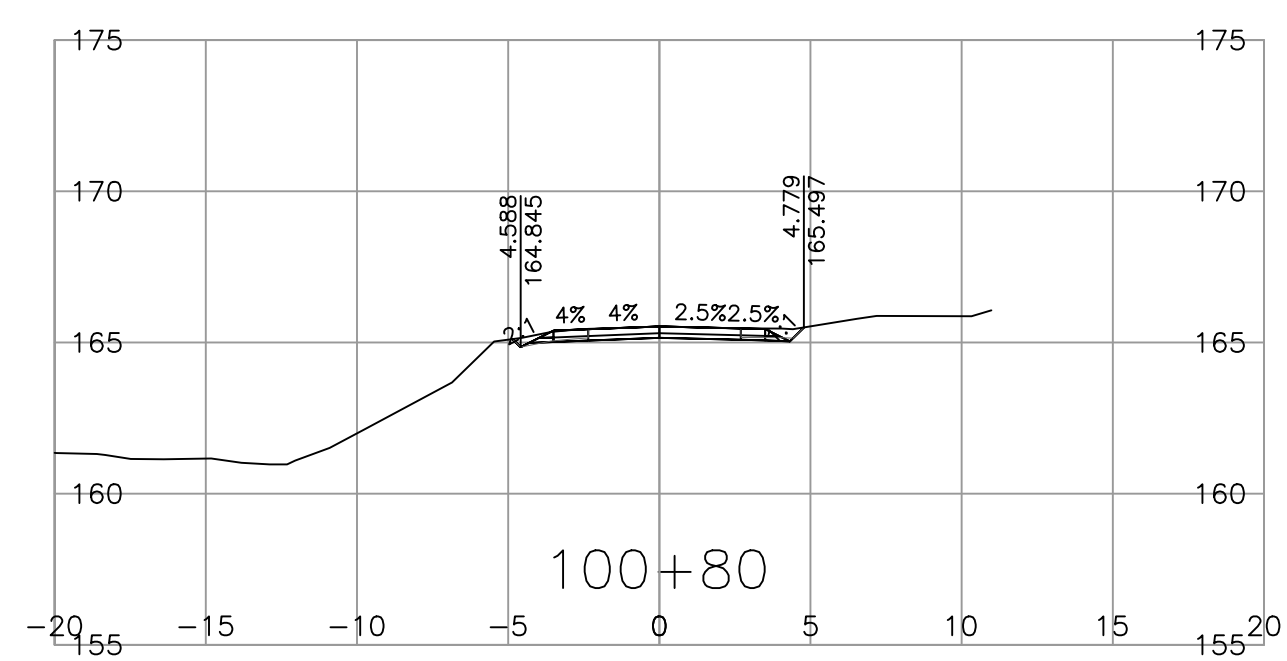
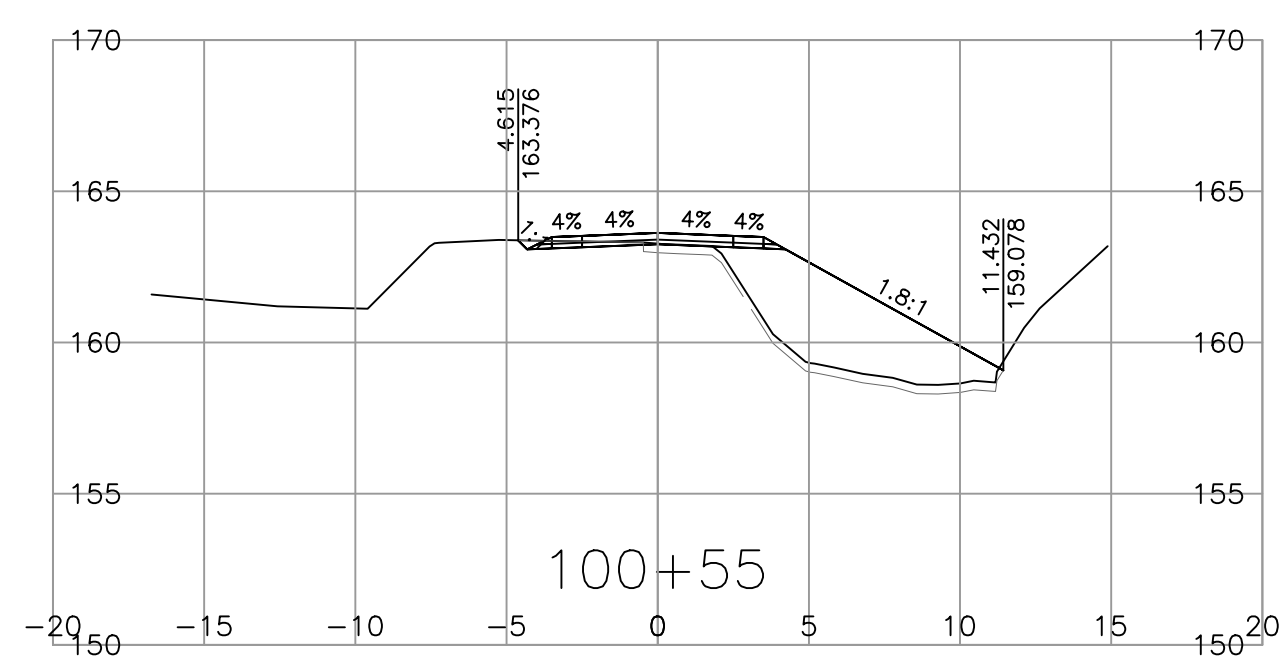
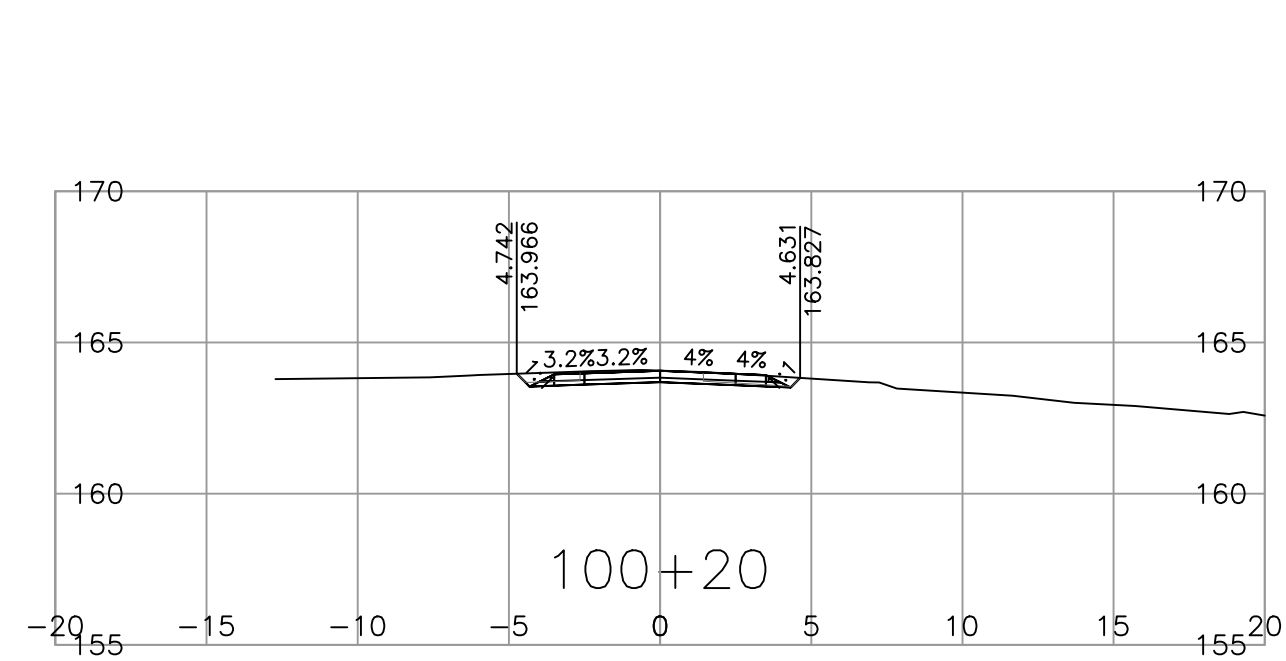
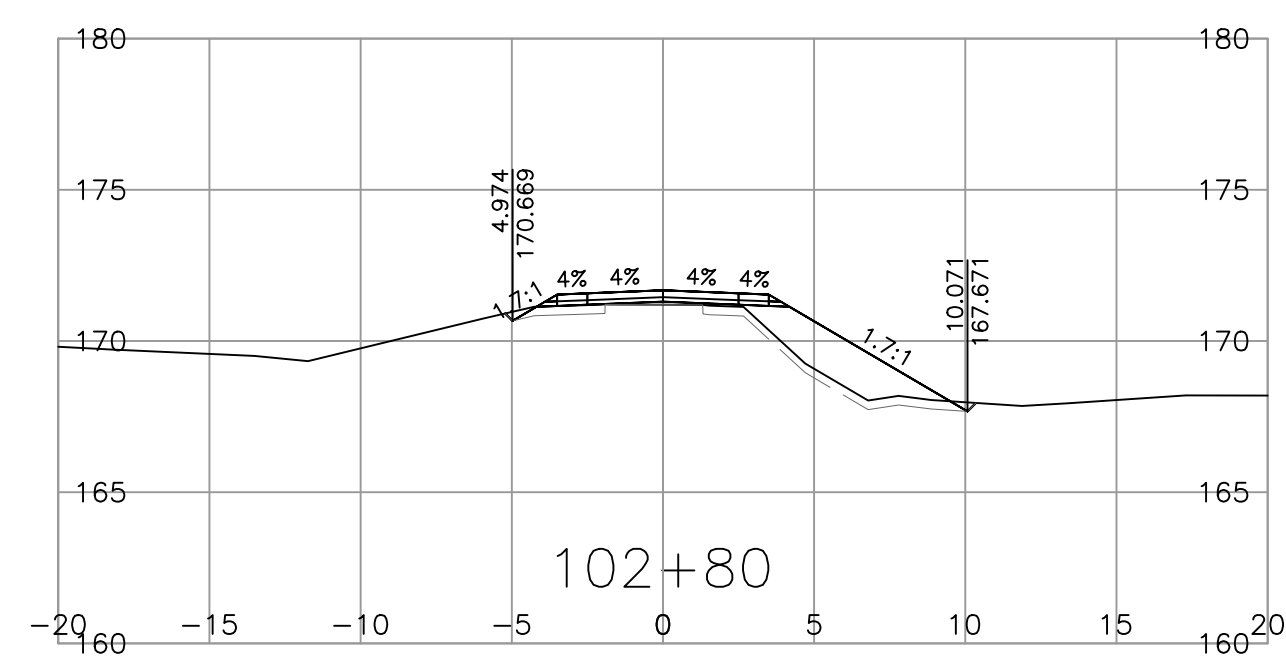
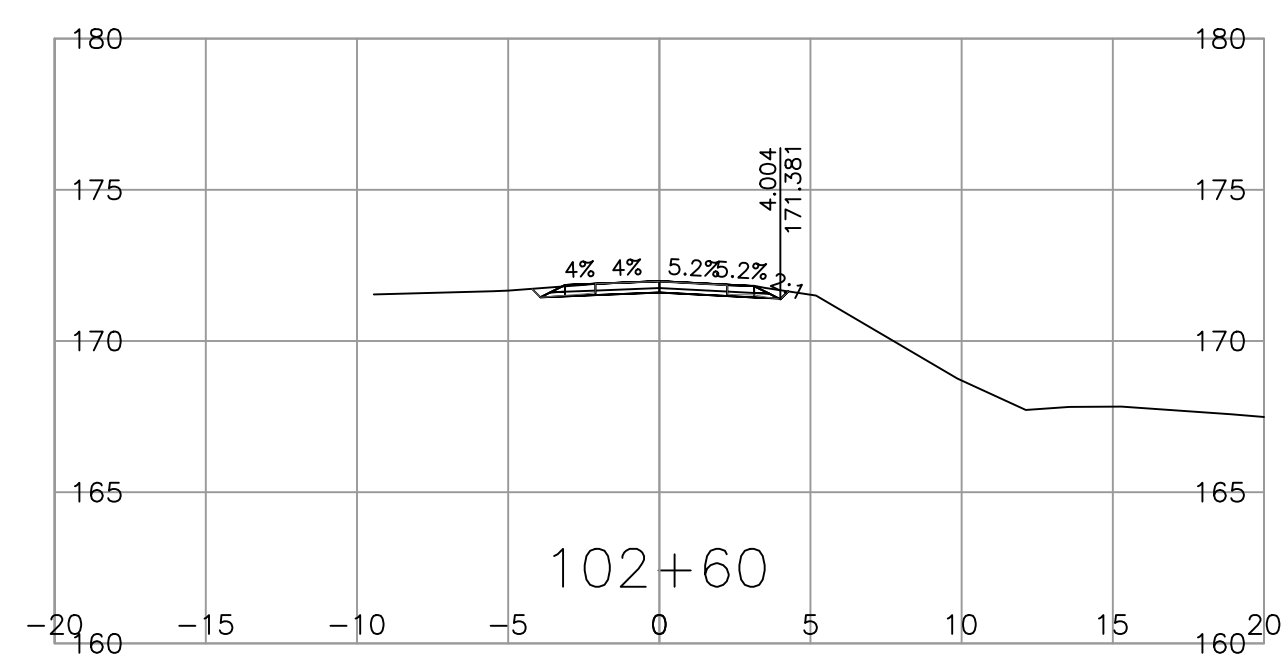
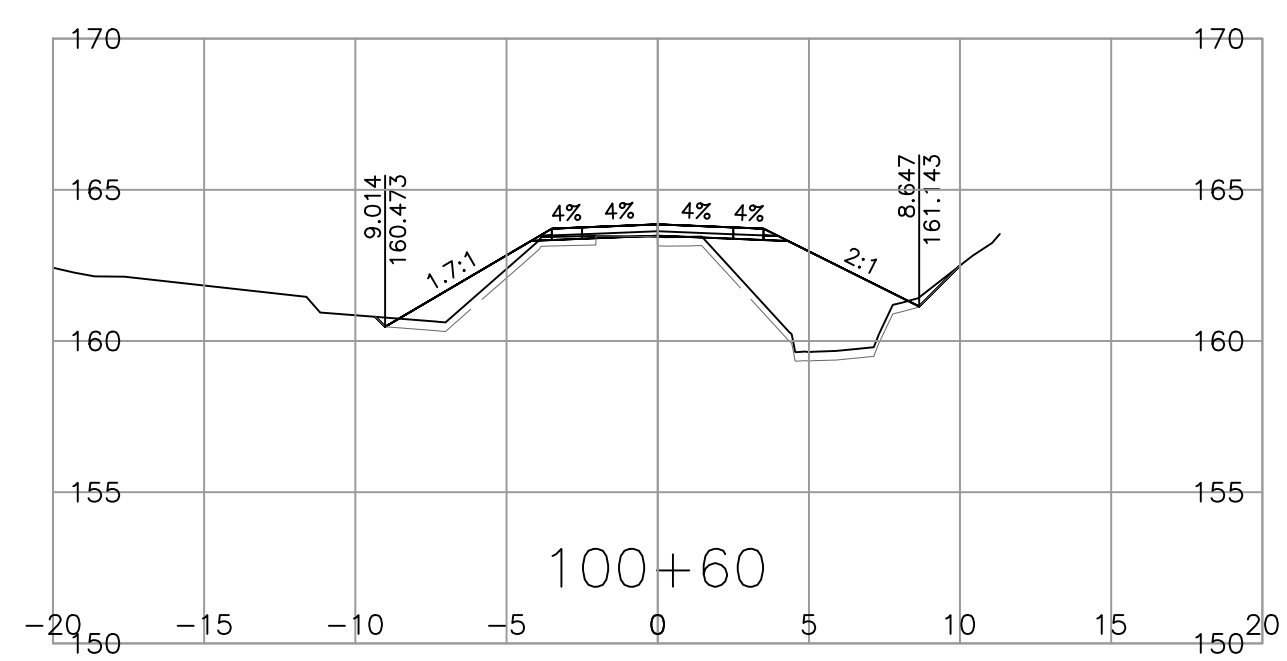
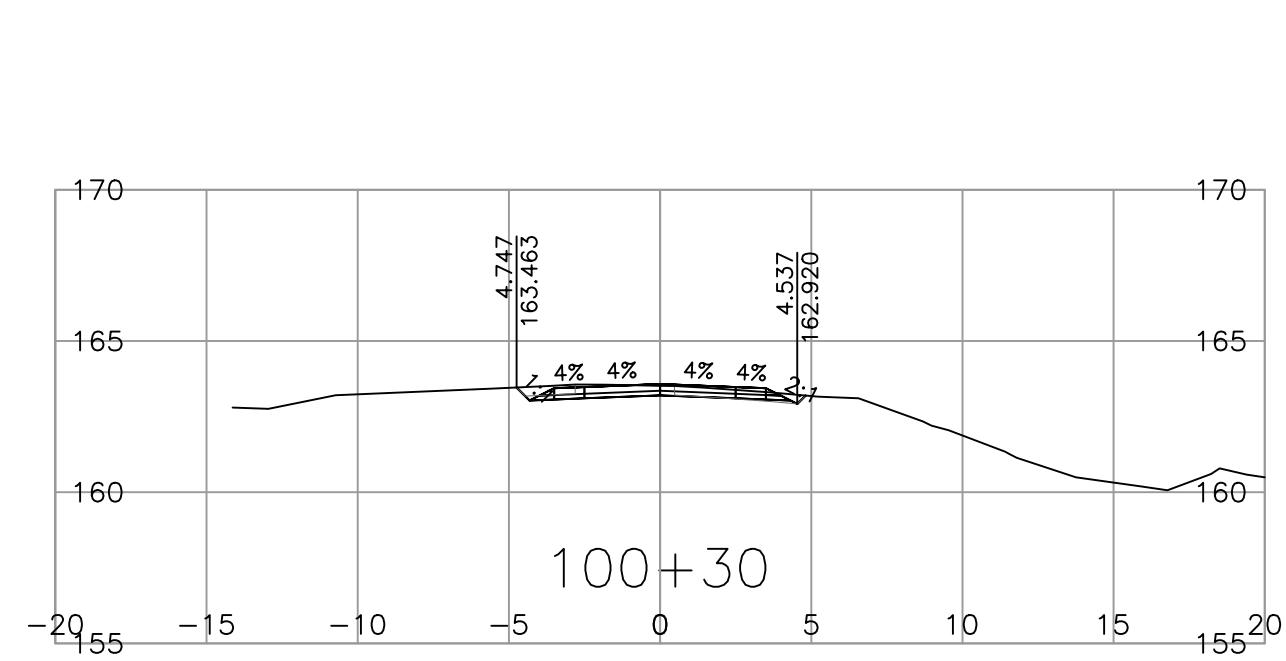
PROJECT NO. 14007

DAY ROAD
DFAA FLOOD DAMAGE

DESIGN SECTIONS

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PLOT DATE: 2022/11/03 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\1000_DesignSections\R1-1026-1000.dwg



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2022-11-04
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SCALE 0 2 1:250 12m

CAD FILENAME R1-1026-1000
PLOT DATE 2022-11-03

REV	DATE	REVISIONS	NAME

BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

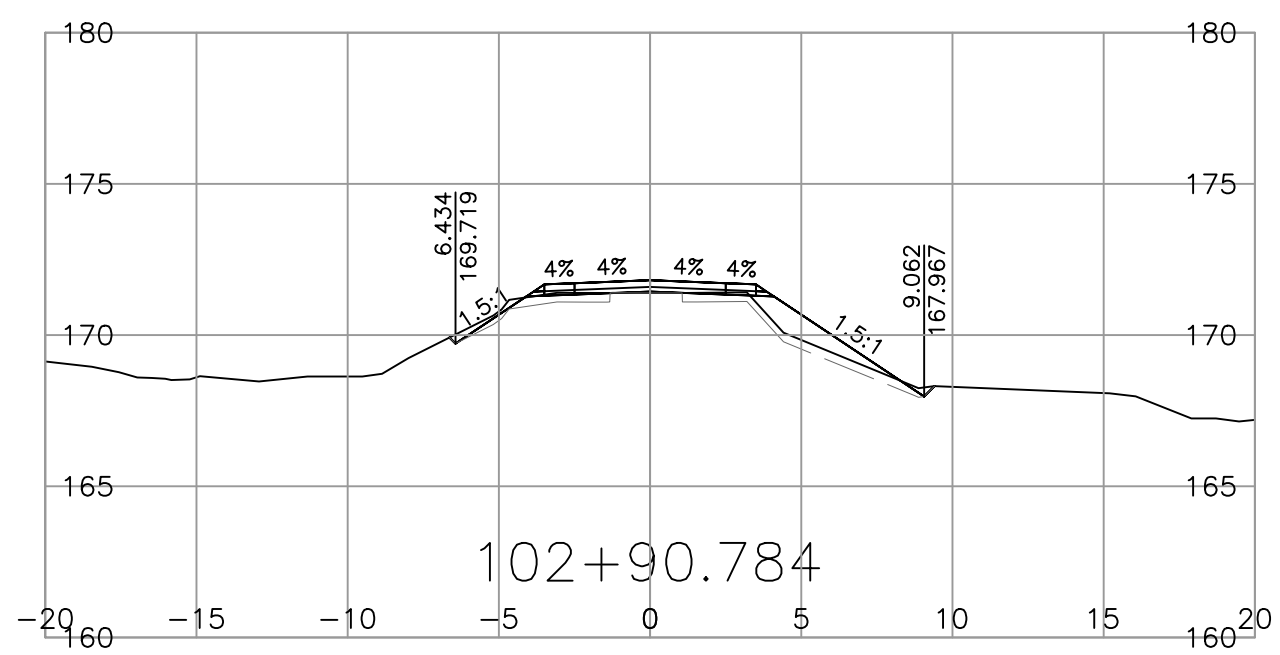
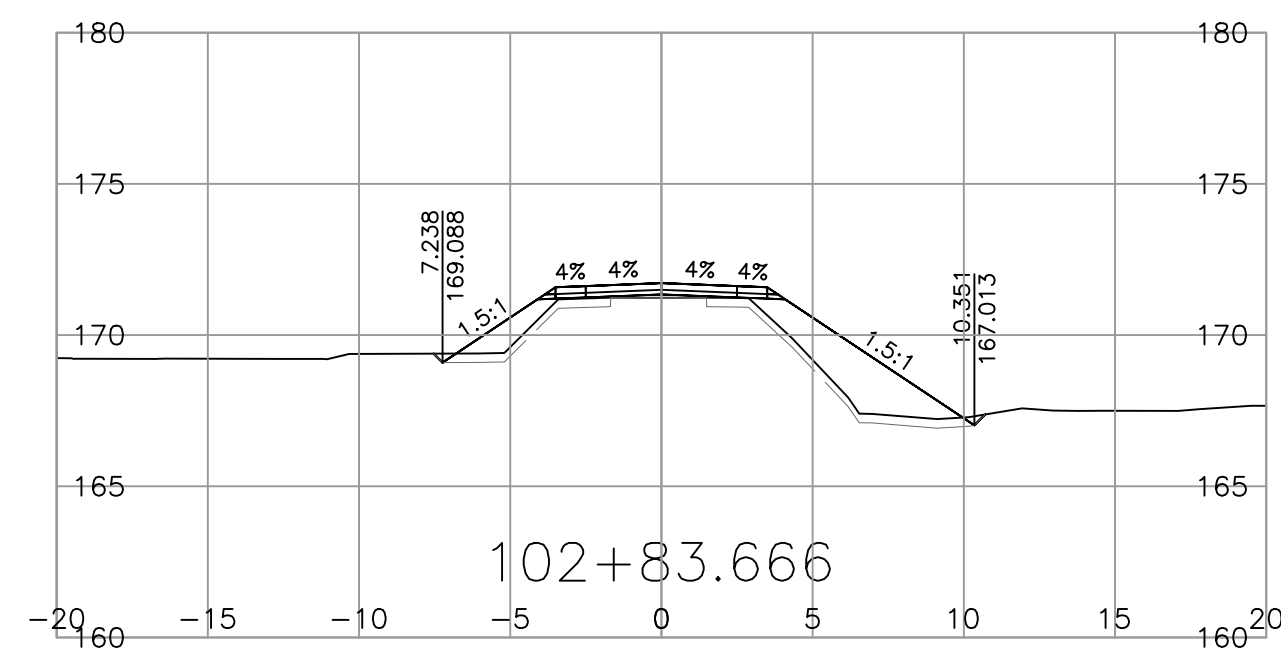
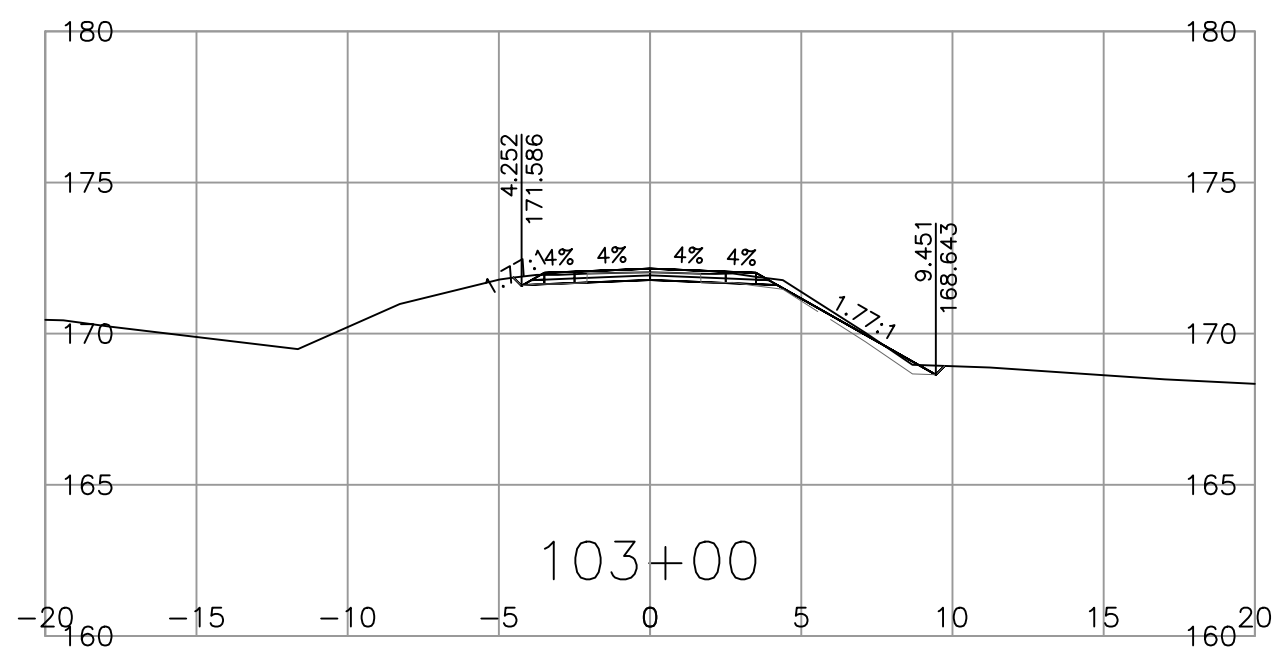
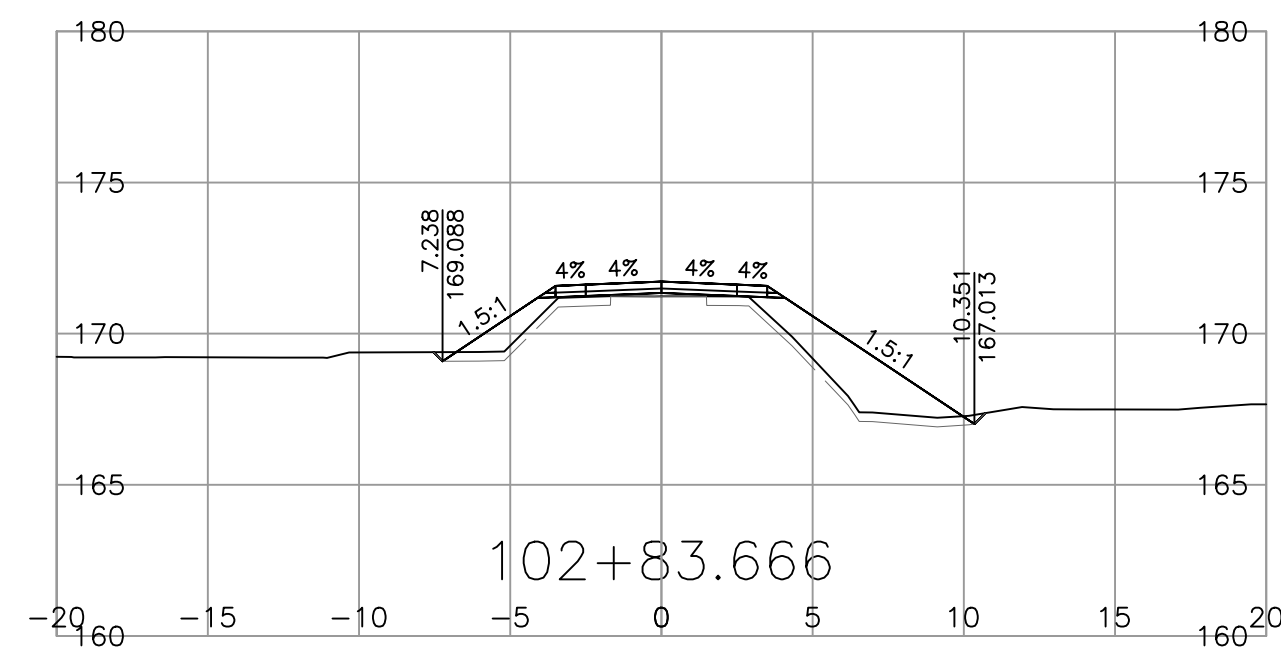
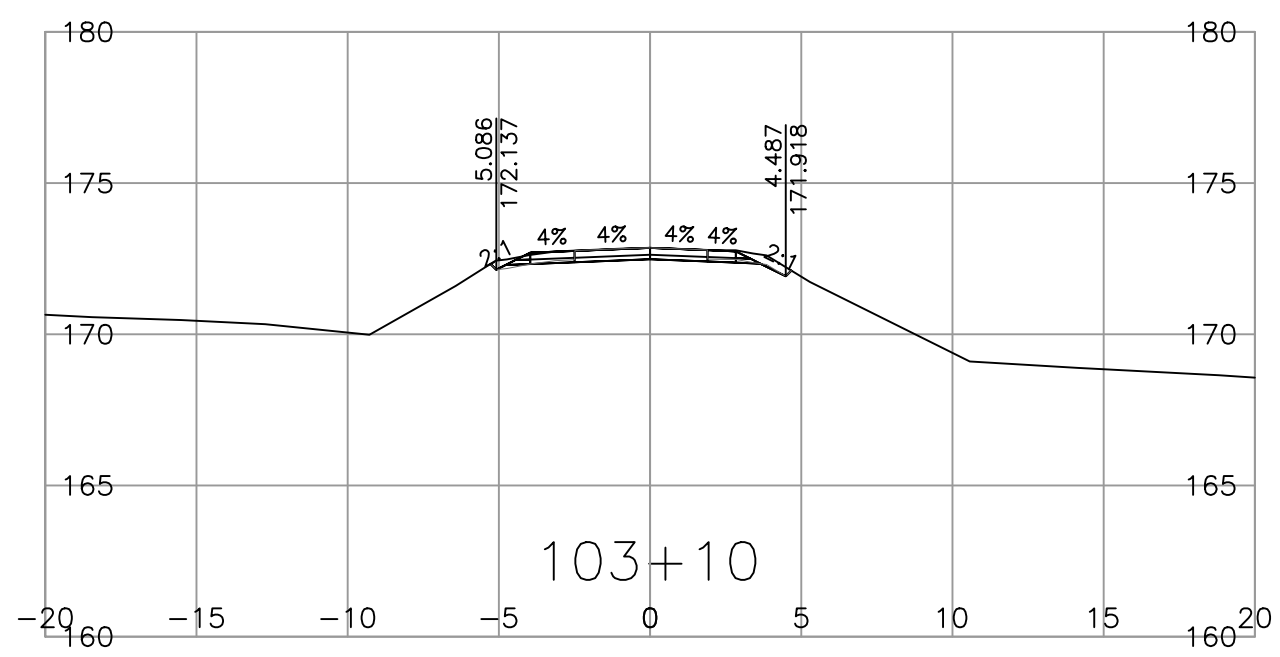
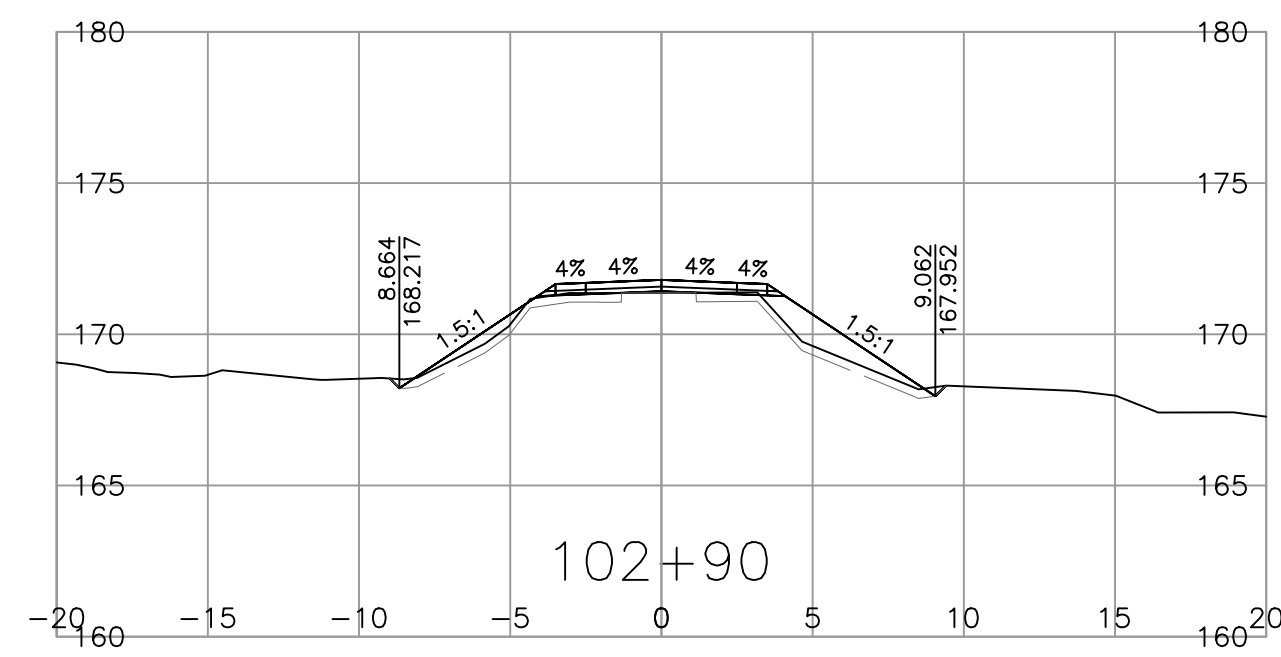
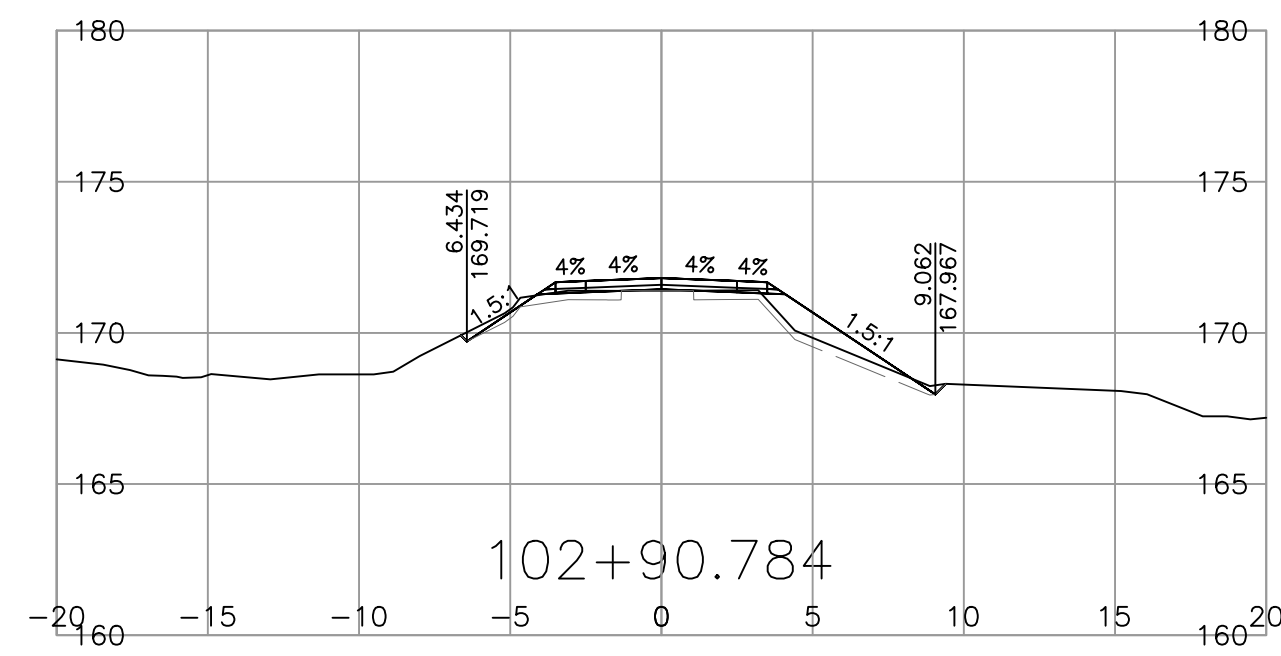
CODY BAGG, P.ENG.
SENIOR DESIGNER

DESIGNED S.FUGCO DATE 2022-11-04
QUALITY CONTROL G.BAGG DATE 2022-11-04
QUALITY ASSURANCE J.BORCH DATE 2022-11-04
DRAWN S.FUGCO DATE 2022-11-04

DESIGN SECTIONS
DAY ROAD
DFAA FLOOD DAMAGE
L100

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-1001	

PLOT DATE: 2022/11/03 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\1000_DesignSections\R1-1026-1000.dwg



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SCALE 0 2 1:250 12m		CAD FILENAME R1-1026-1000	
		PLOT DATE 2022-11-03	
REV	DATE	REVISIONS	NAME

BRITISH COLUMBIA
 MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
 SOUTH COAST REGION
 HIGHWAY ENGINEERING AND GEOMATICS

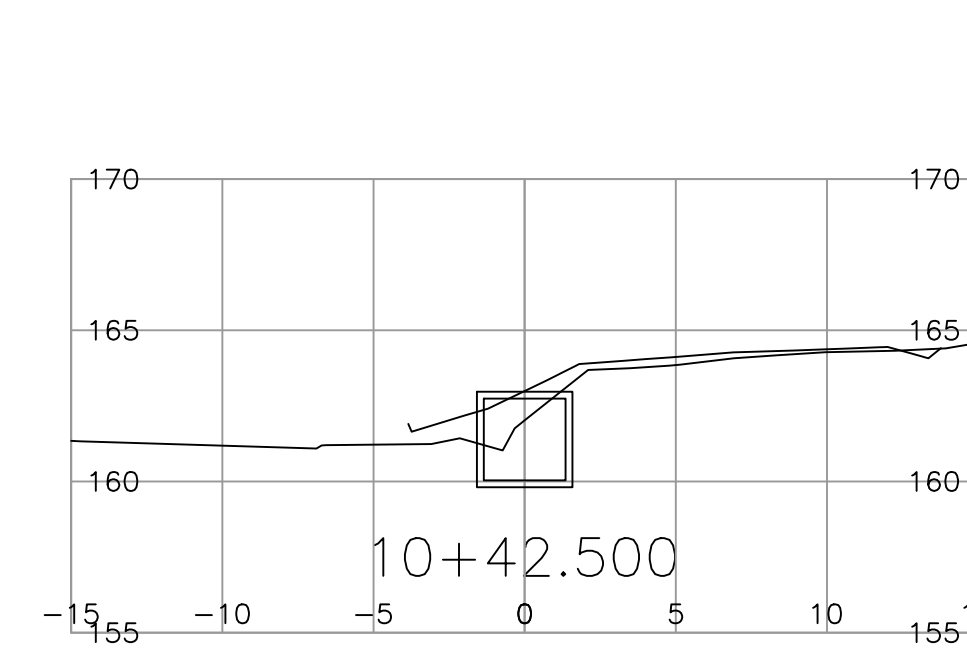
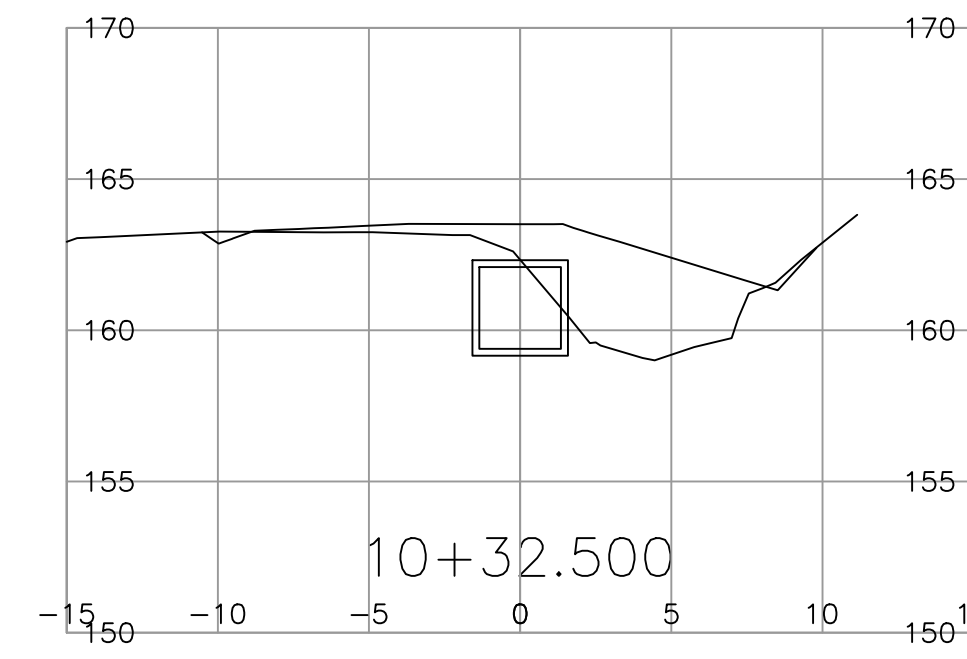
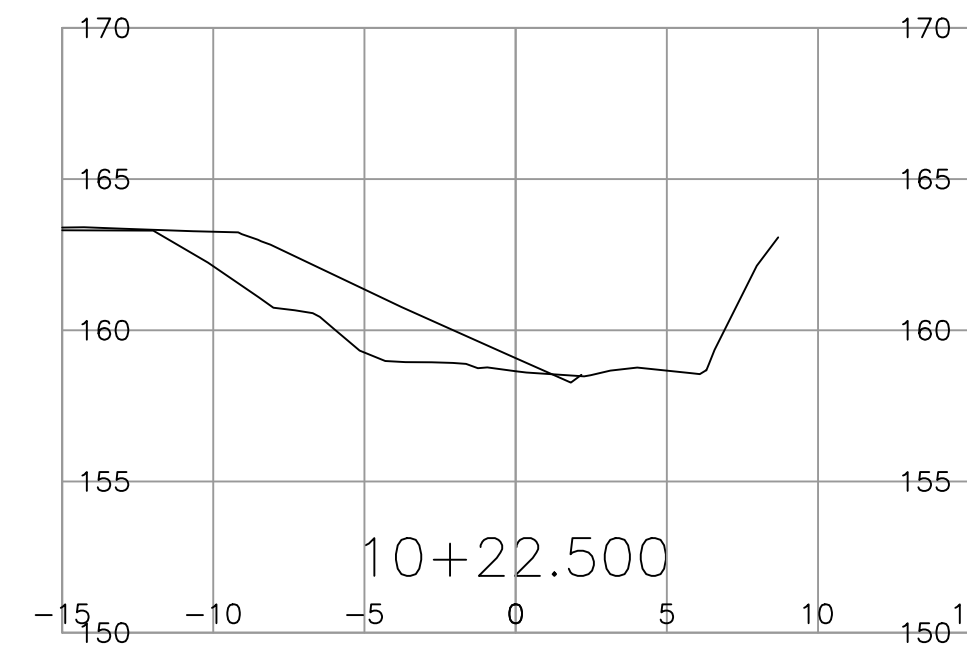
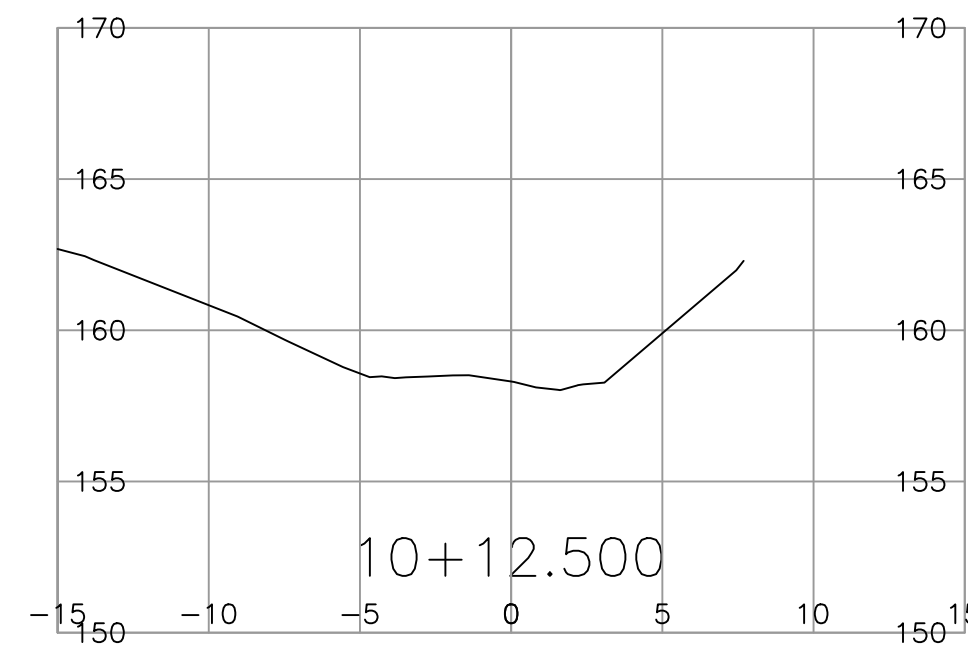
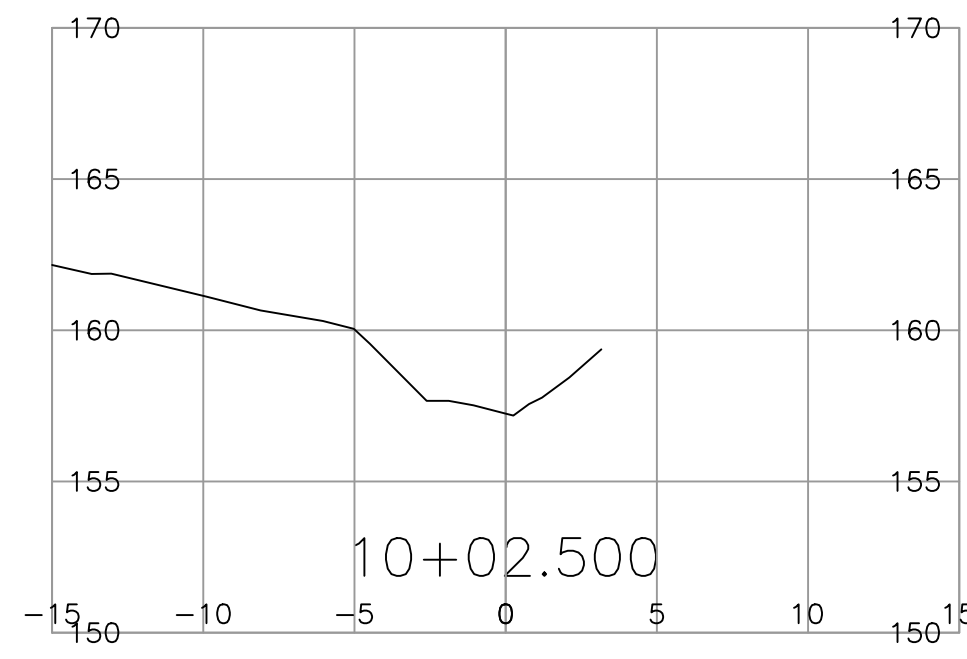
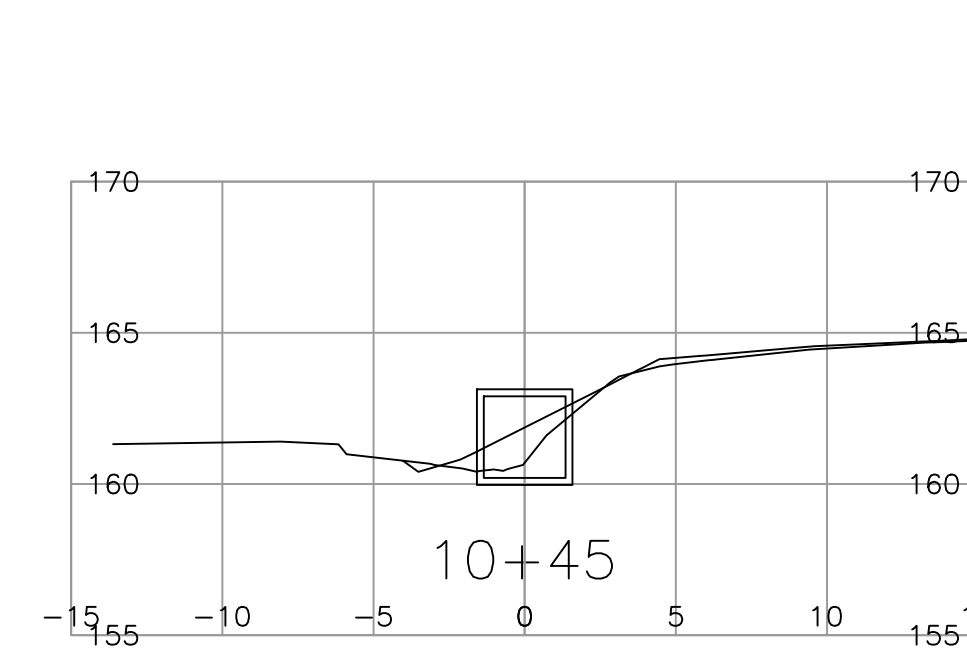
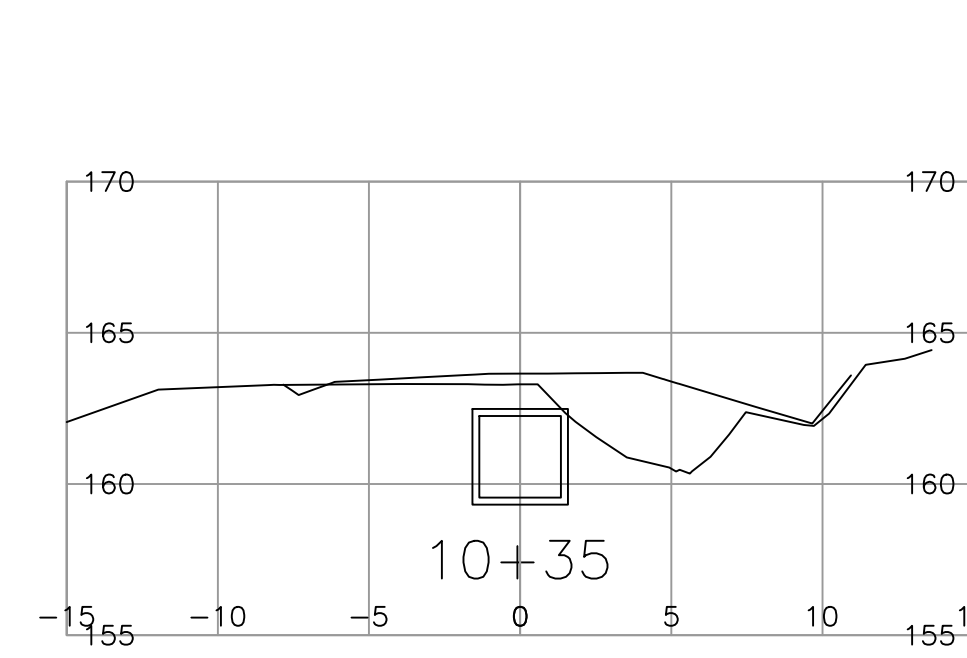
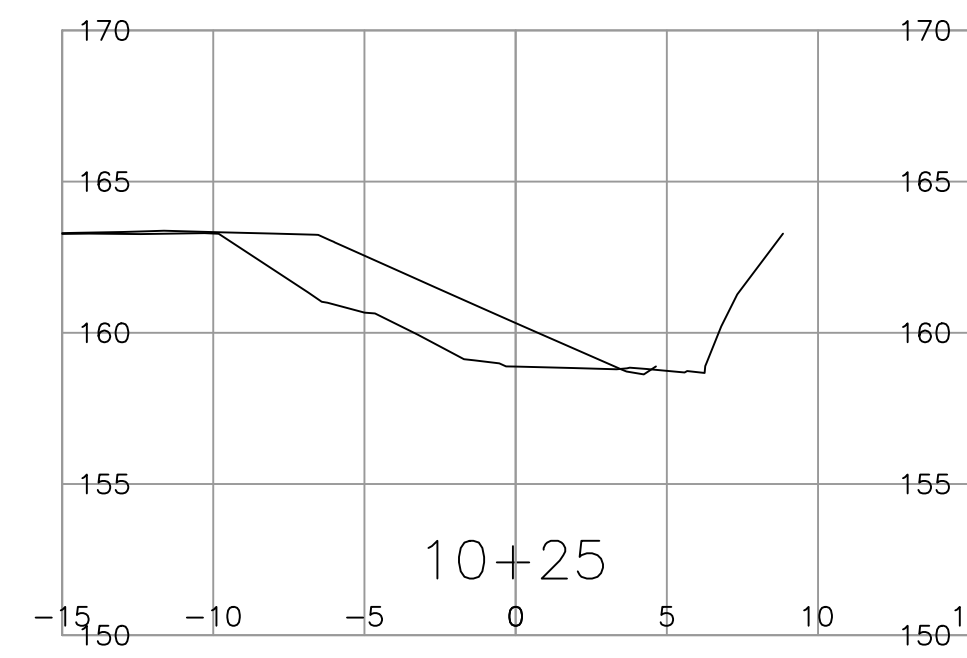
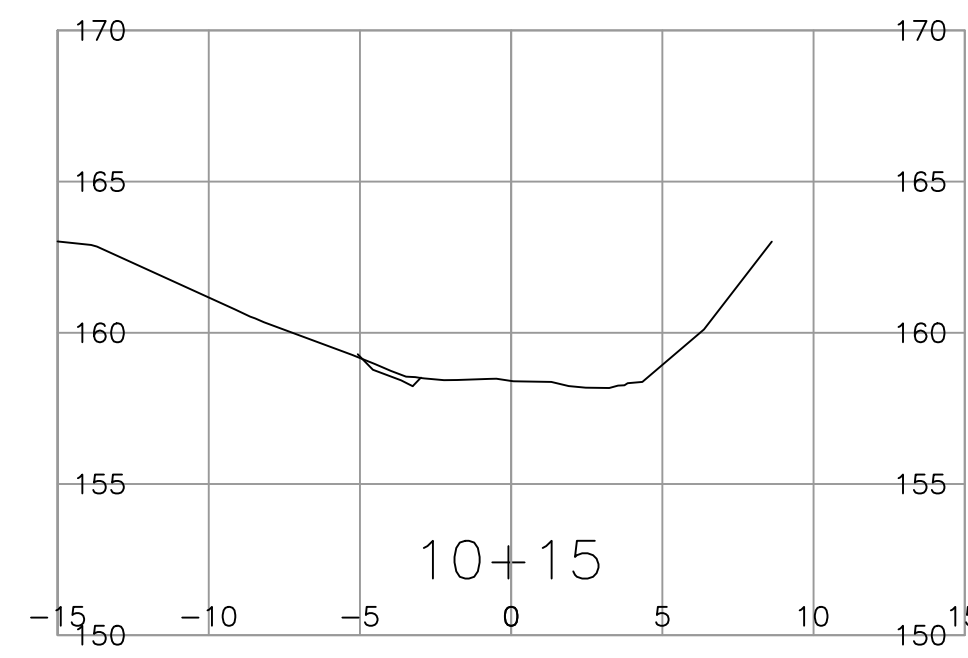
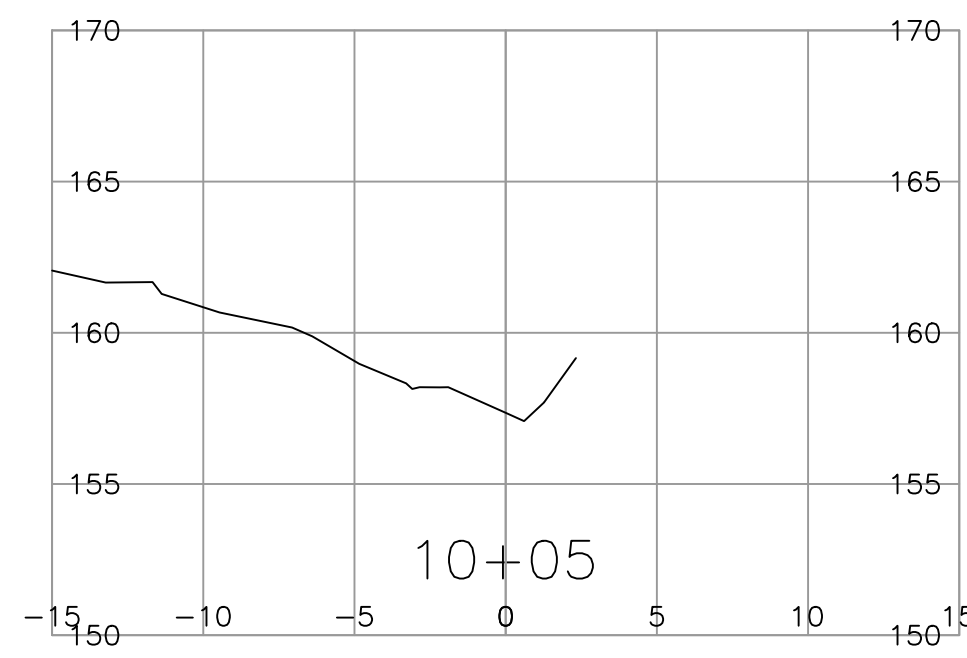
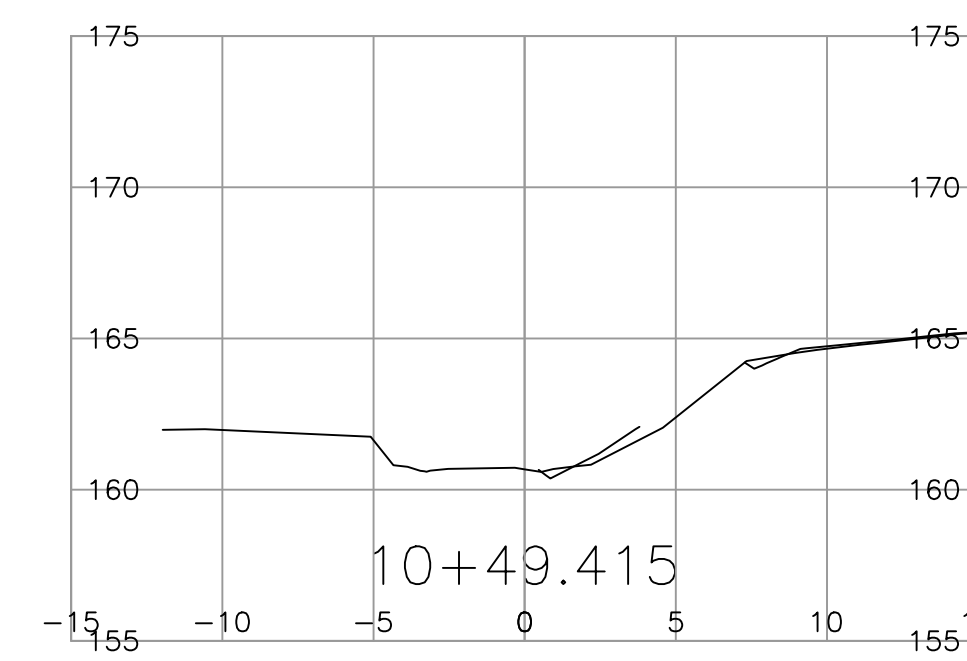
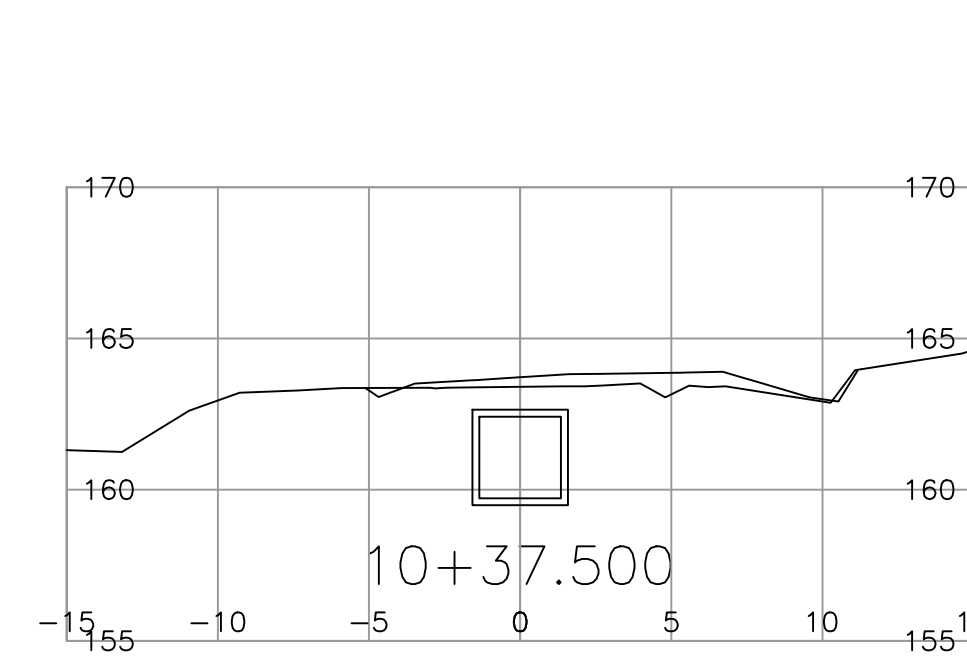
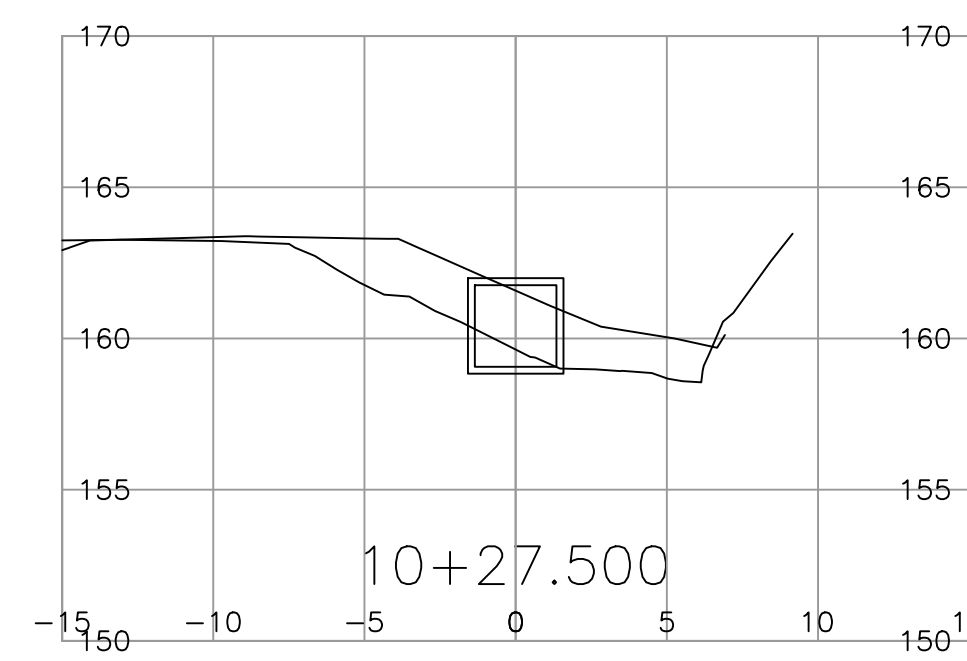
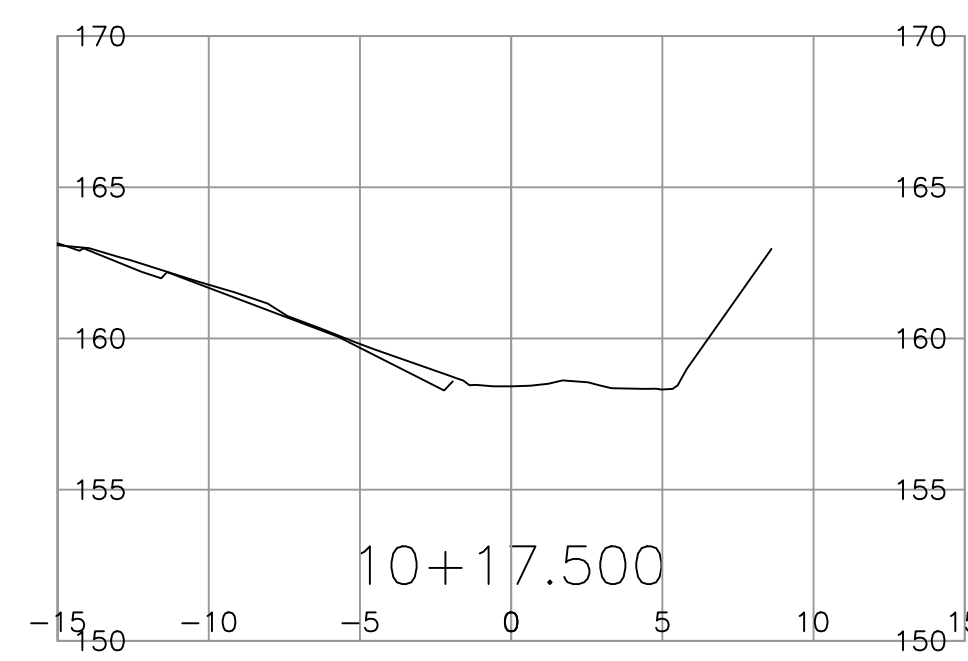
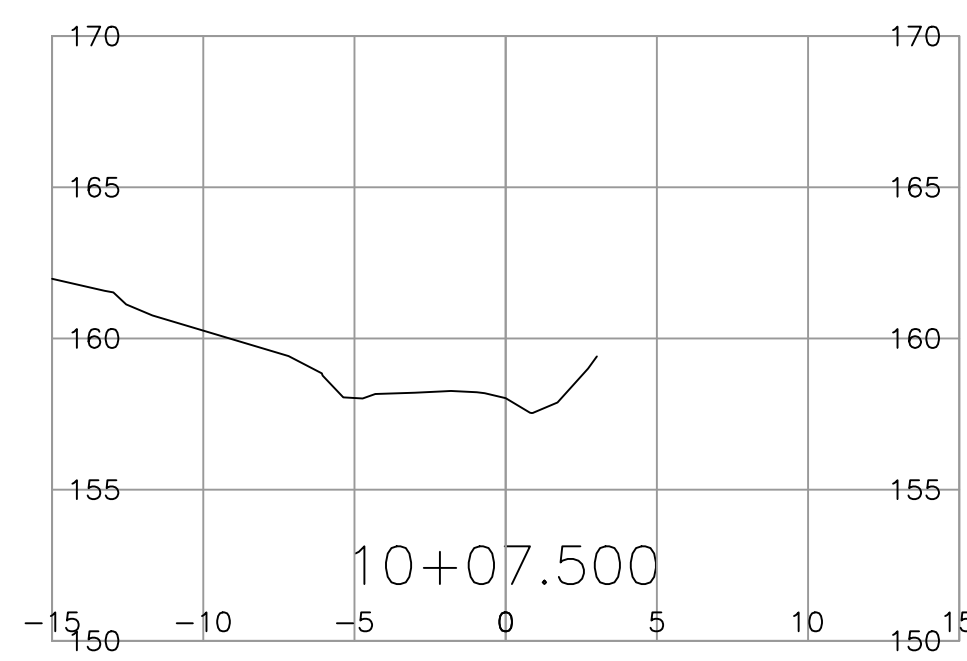
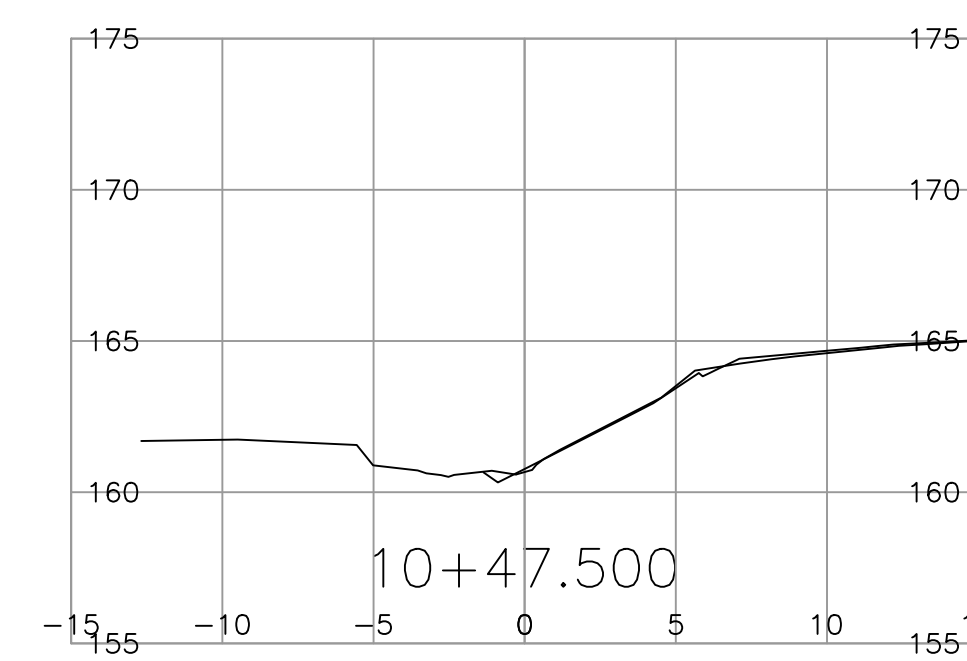
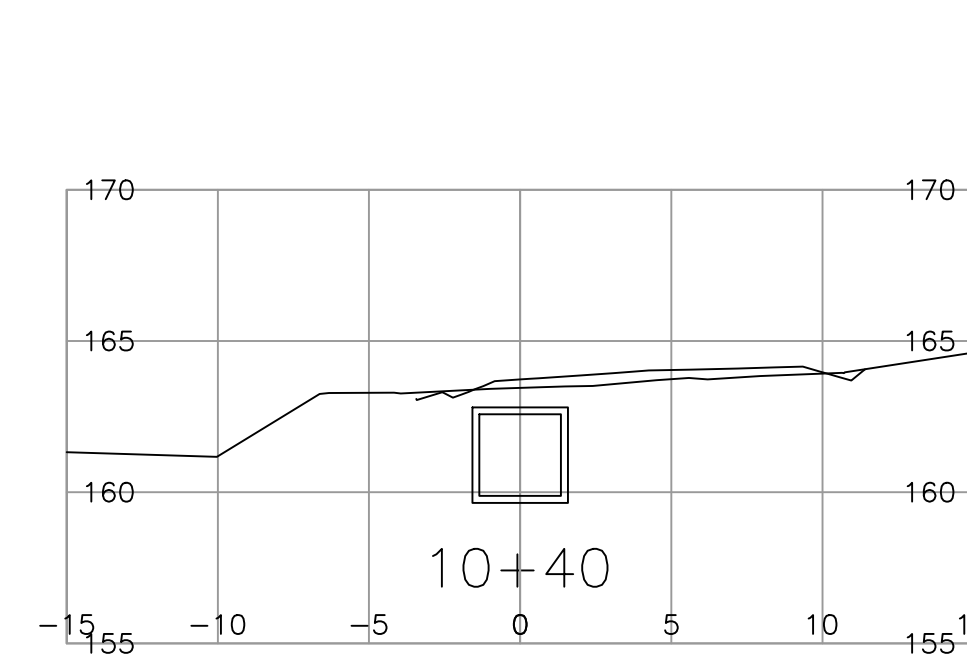
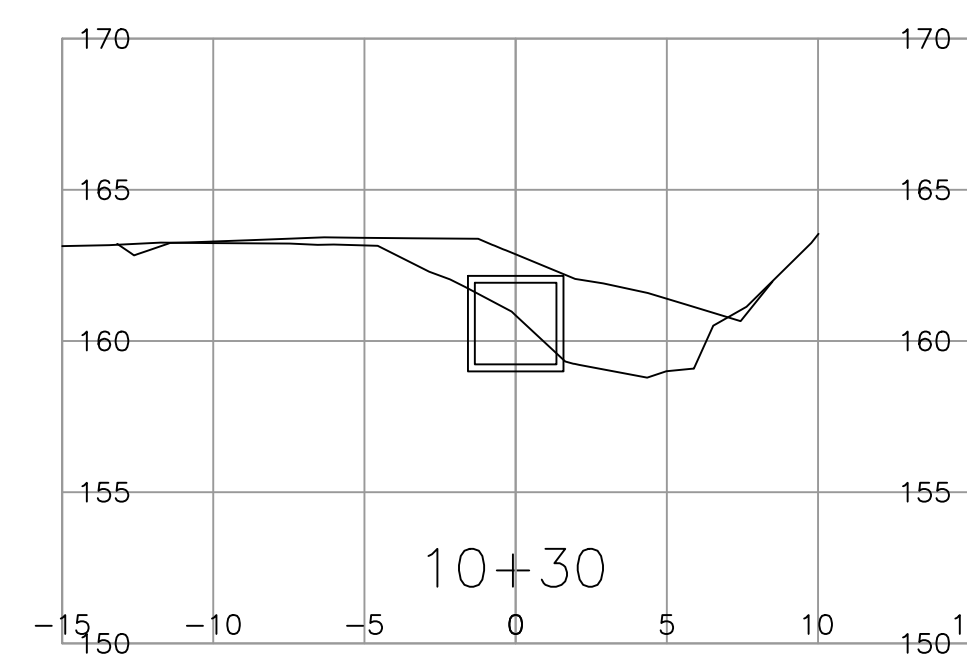
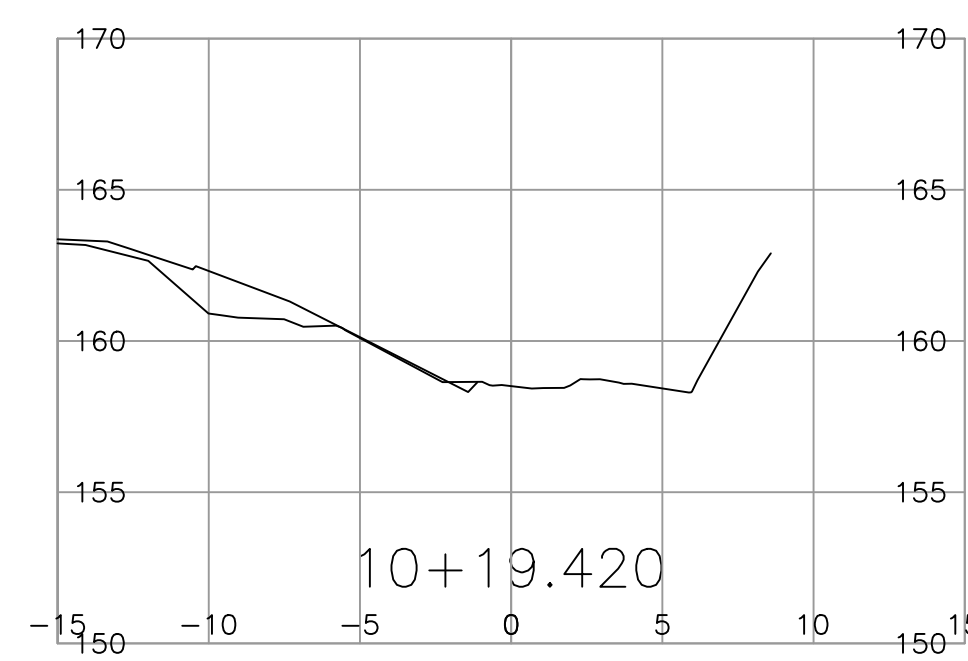
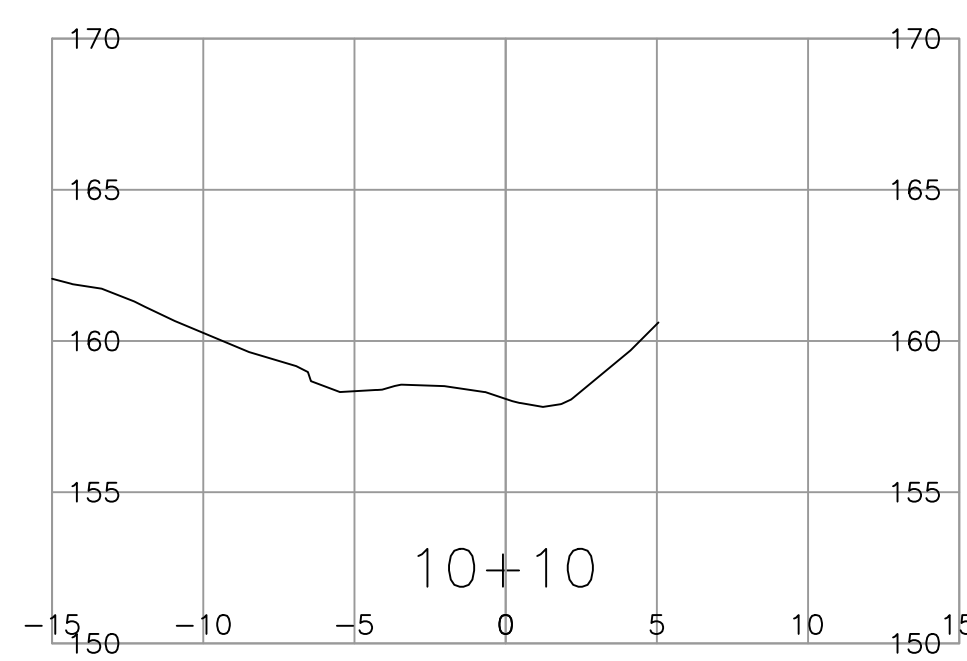
CODY BAGG, P.ENG.
 SENIOR DESIGNER
 DATE _____

DESIGNED S.FUJICO DATE 2022-11-04
 QUALITY CONTROL C.BAGG DATE 2022-11-04
 QUALITY ASSURANCE J.BORCH DATE 2022-11-04
 DRAWN S.FUJICO DATE 2022-11-04

DESIGN SECTIONS
DAY ROAD
DFAA FLOOD DAMAGE
L100

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-1002	

PLOT DATE: 2022/11/03 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\1000_DesignSections\R1-1026-1010-Drainage.dwg



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REV	DATE	REVISIONS	NAME

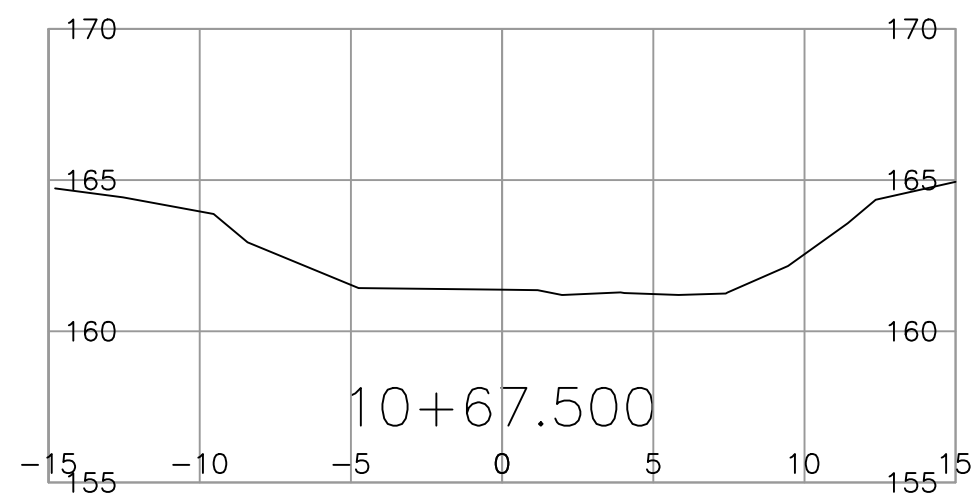
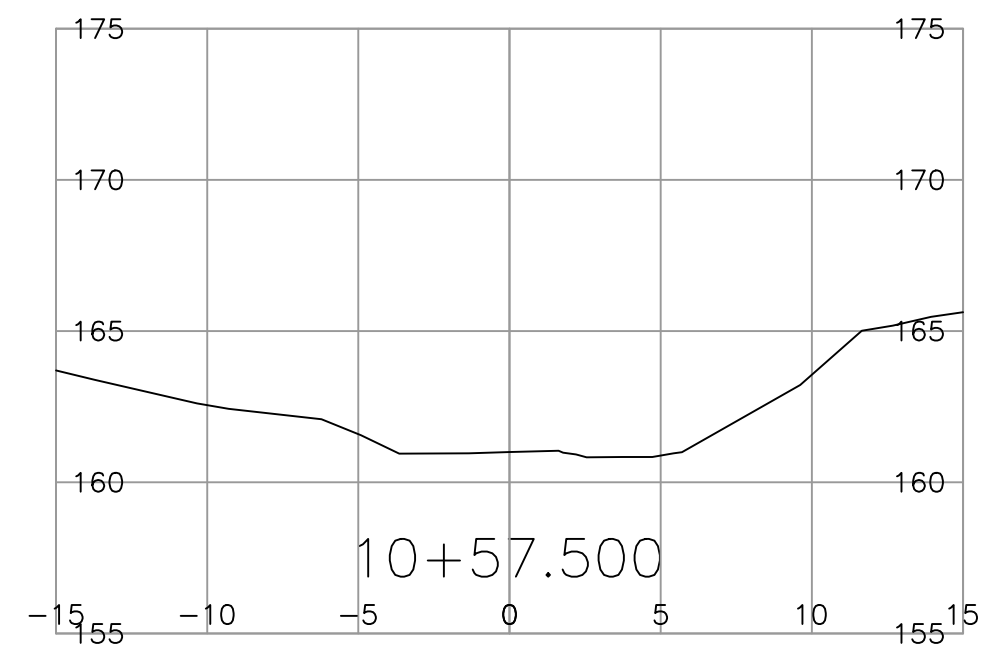
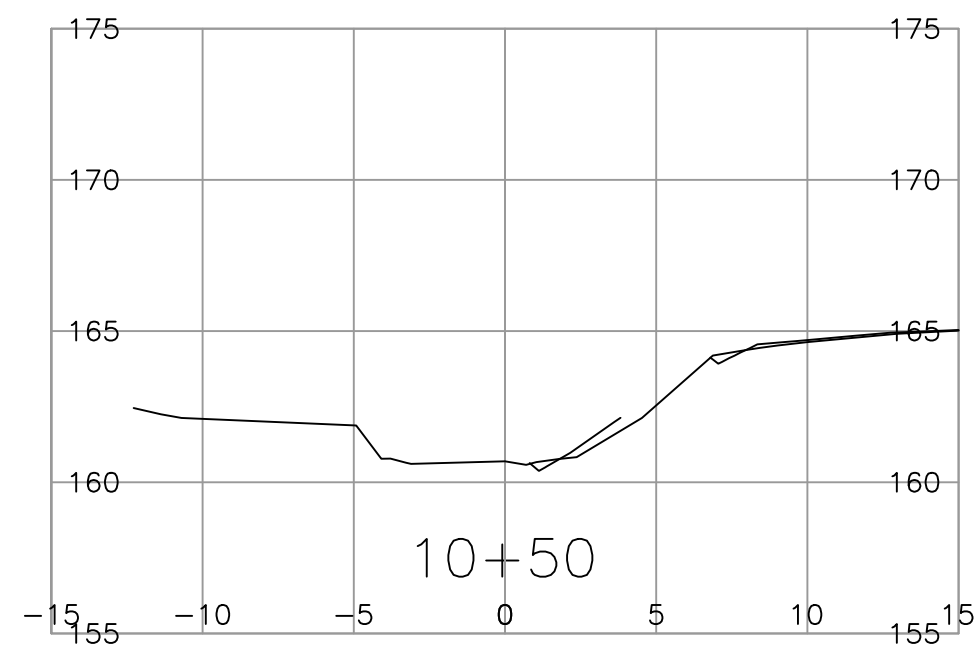
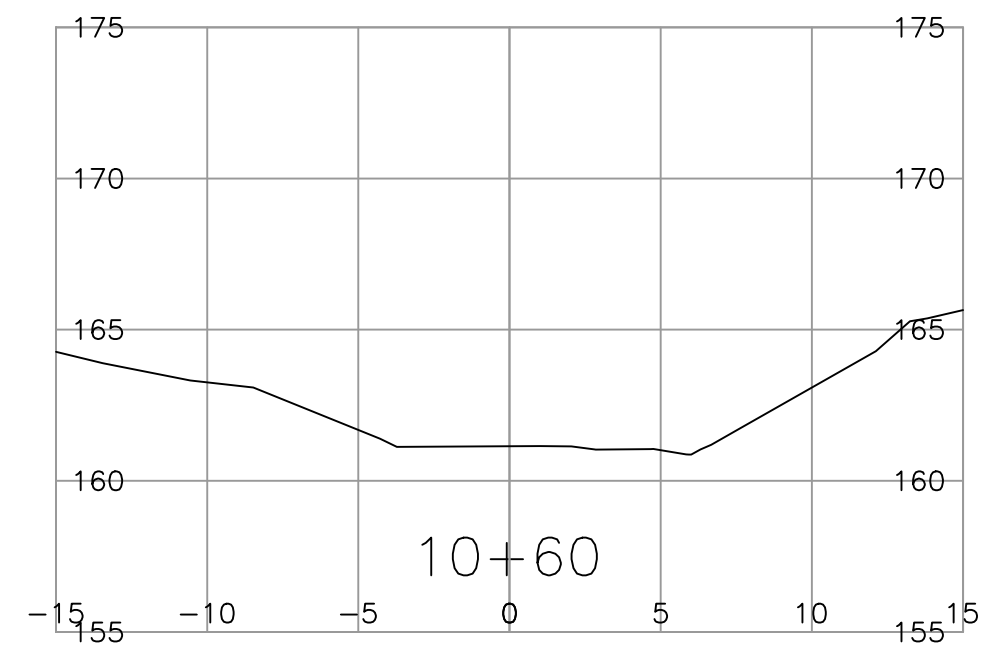
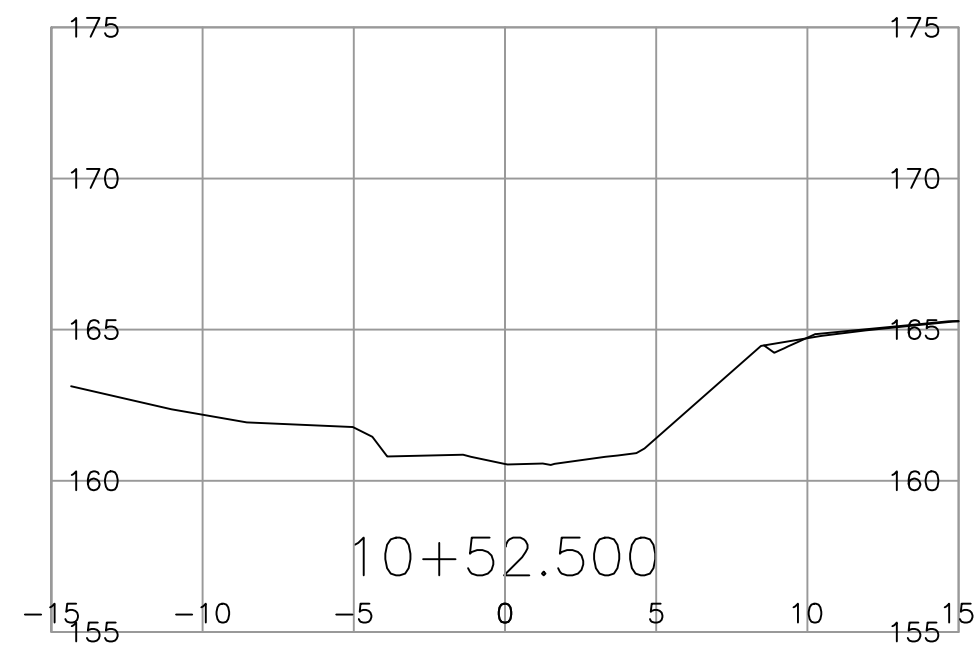
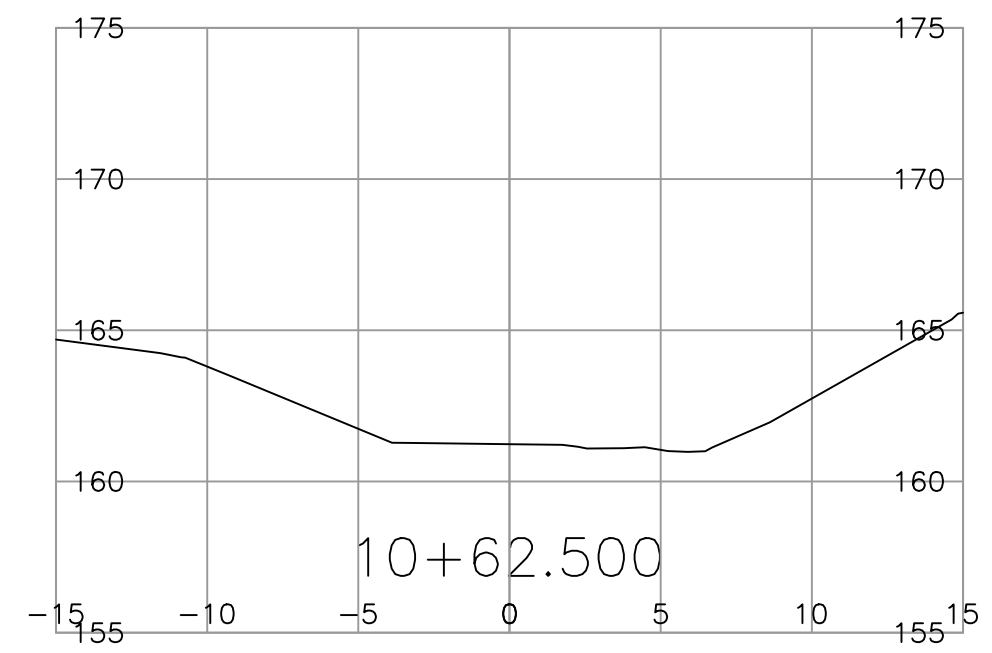
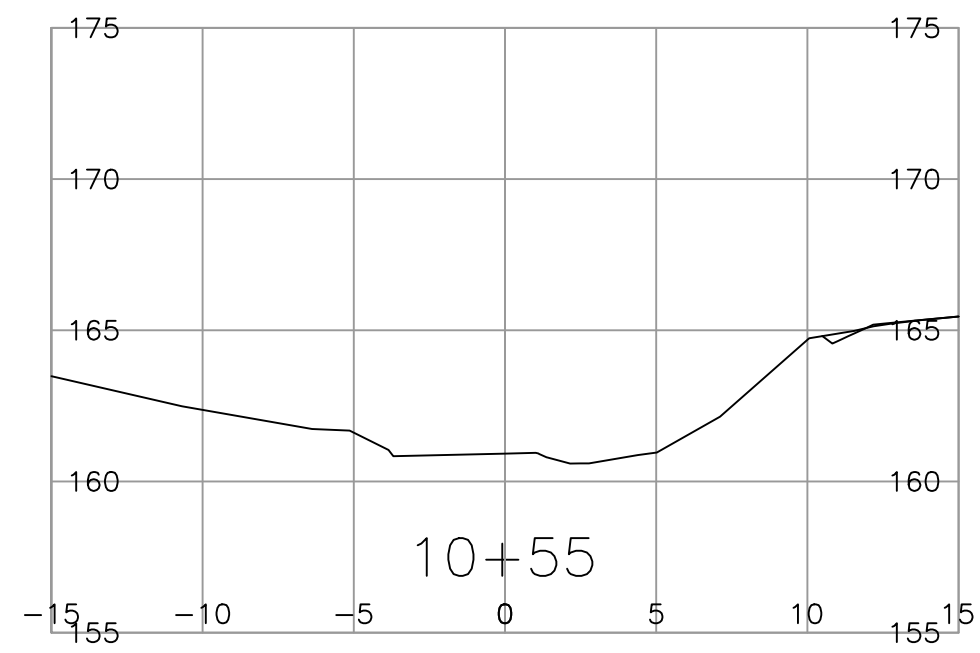
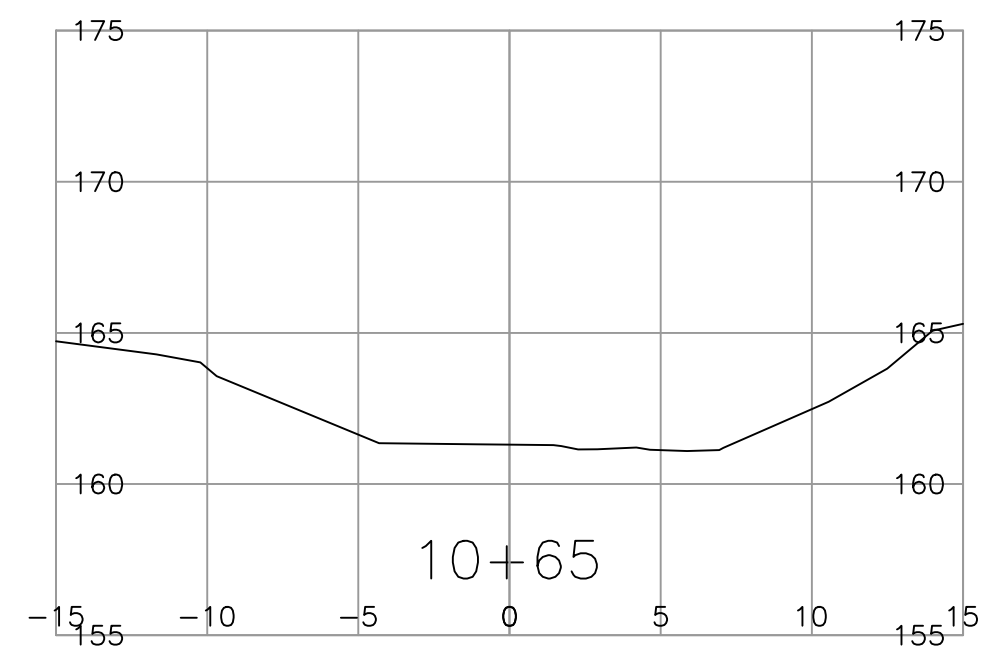
BRITISH COLUMBIA
 MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
 SOUTH COAST REGION
 HIGHWAY ENGINEERING AND GEOMATICS

DESIGNED: S.FUGCO DATE: 2022-11-04
 QUALITY CONTROL: C.BAGG DATE: 2022-11-04
 QUALITY ASSURANCE: J.BORCHE DATE: 2022-11-04
 DRAWN: S.FUGCO DATE: 2022-11-04

CODY BAGG, P.ENG.
 SENIOR DESIGNER
 DATE:

DESIGN SECTIONS				
DAY ROAD DFAA FLOOD DAMAGE				
D10				
FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-1010	

PLOT DATE: 2022/11/03 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\1000_DesignSections\R1-1026-1010-Drainage.dwg



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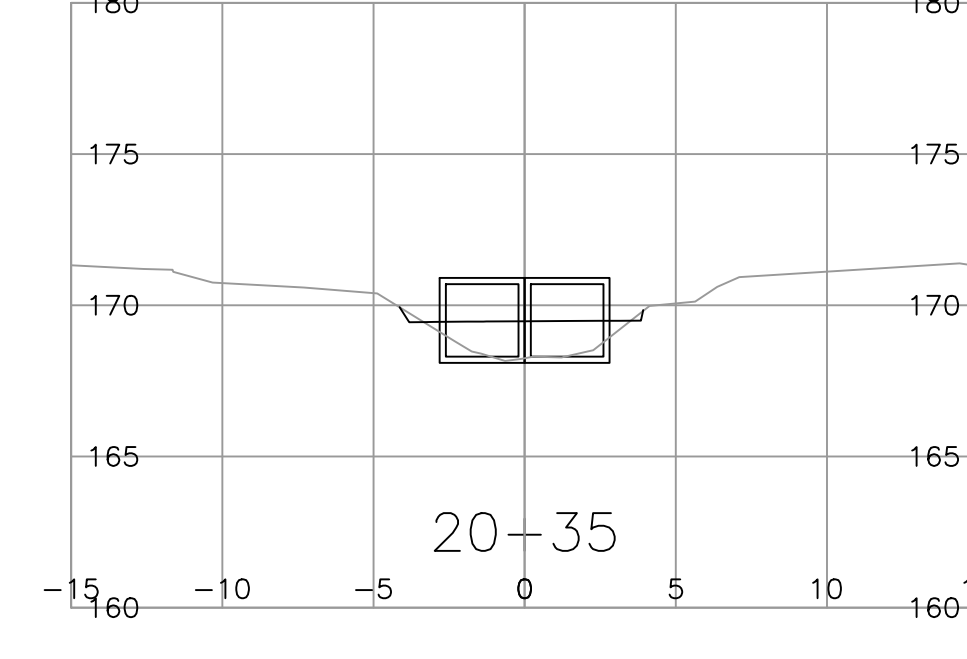
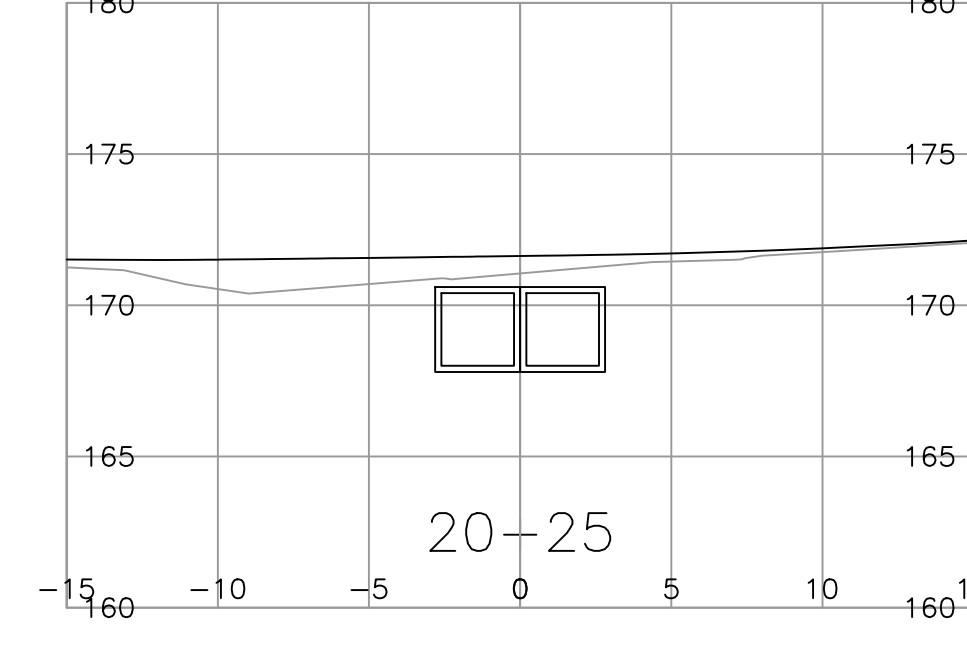
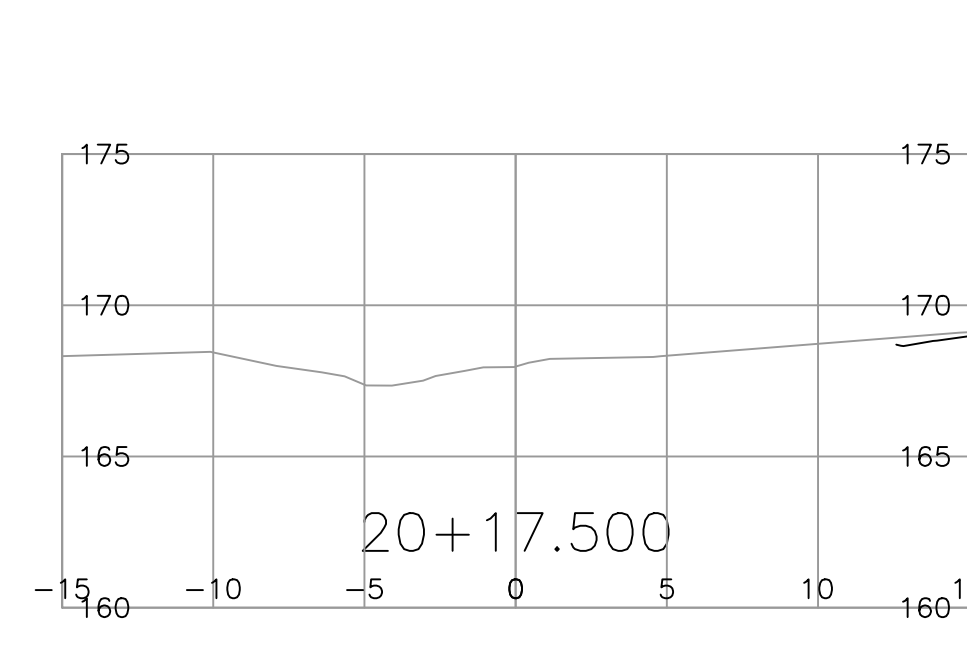
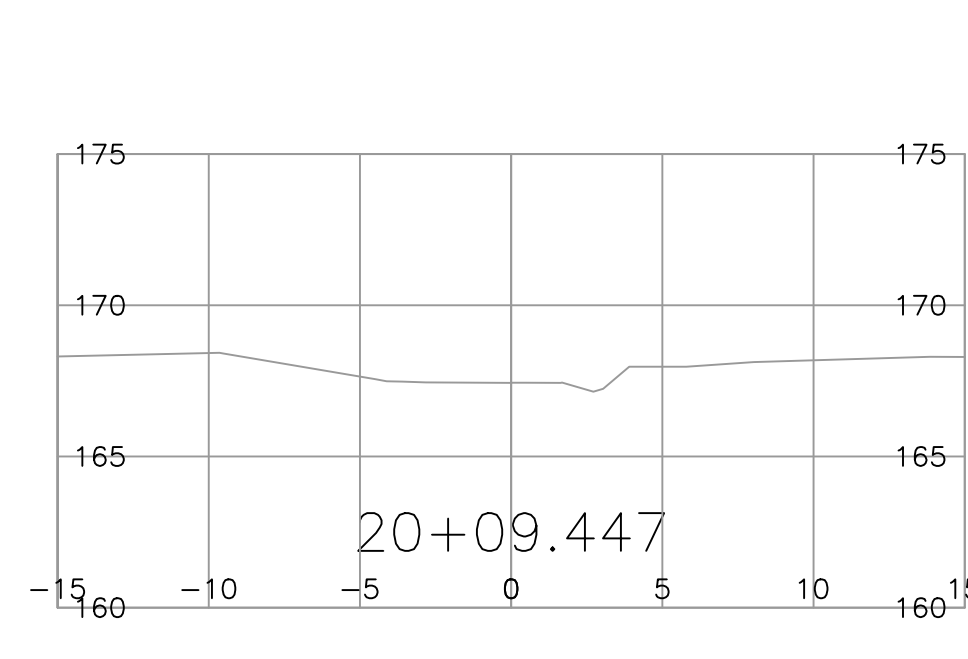
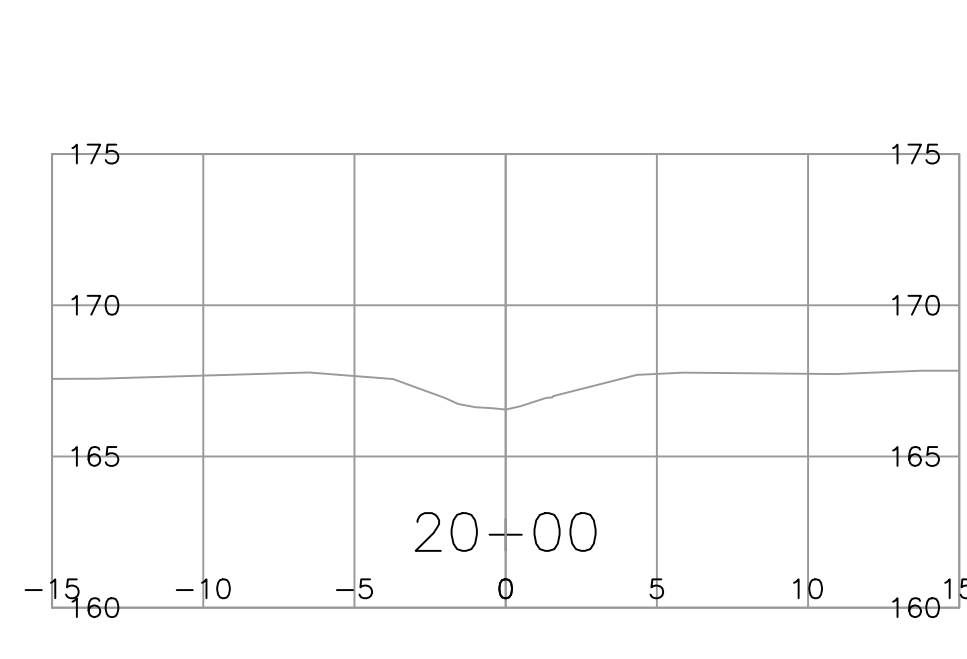
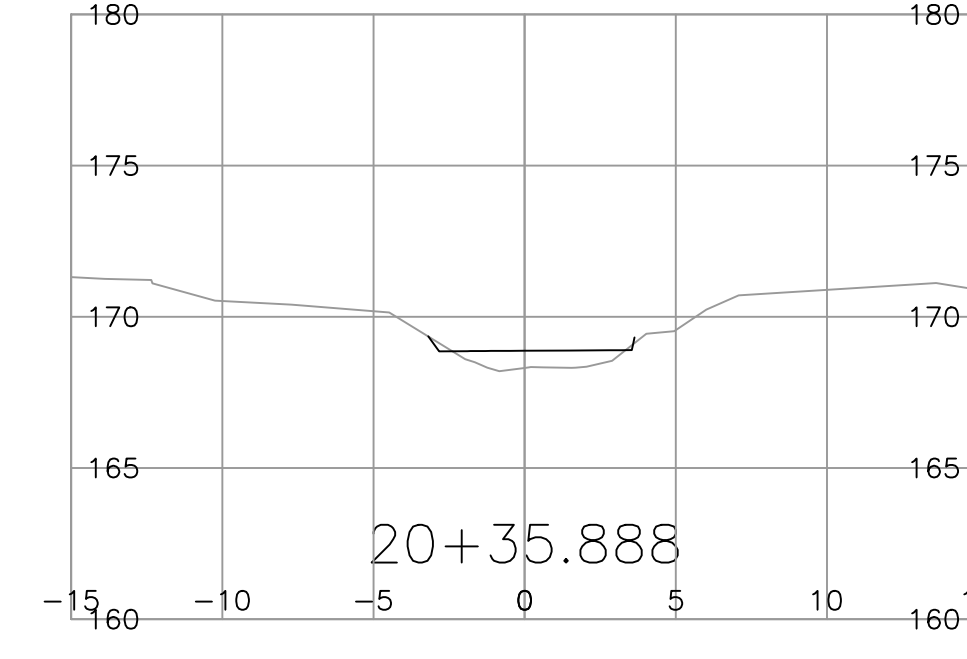
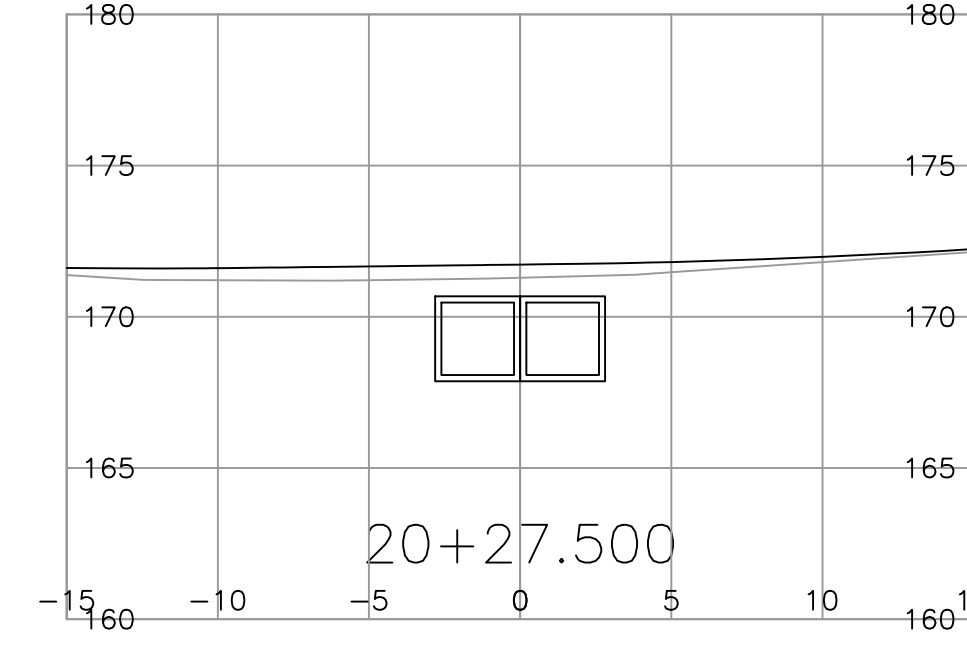
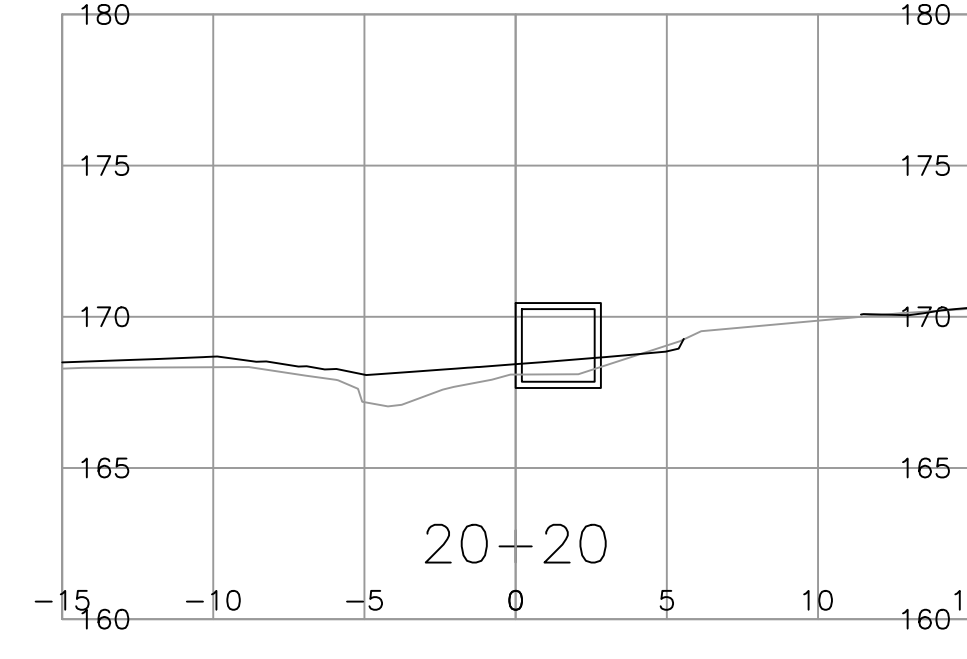
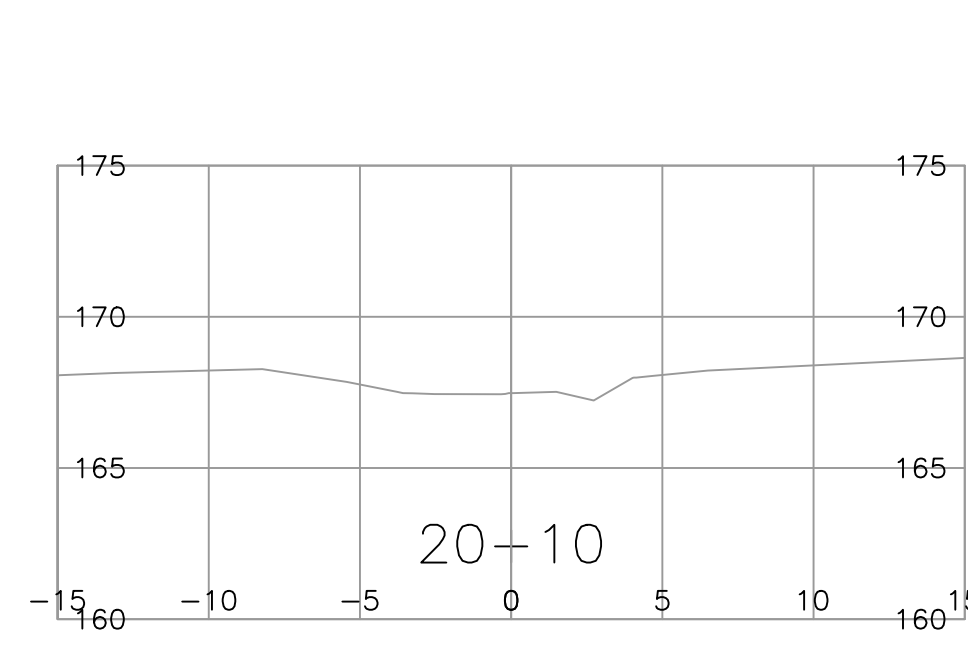
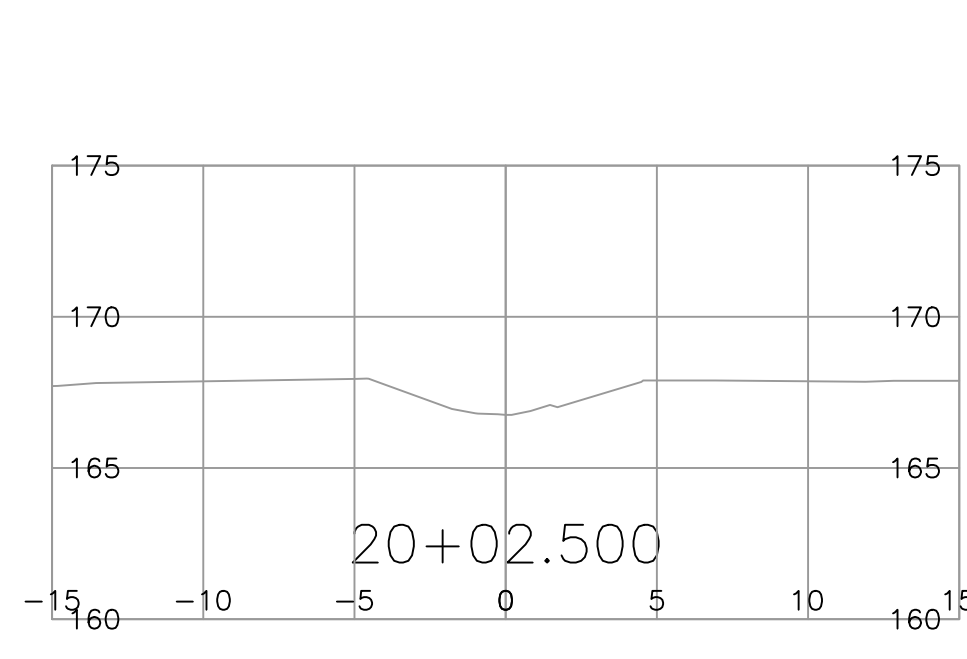
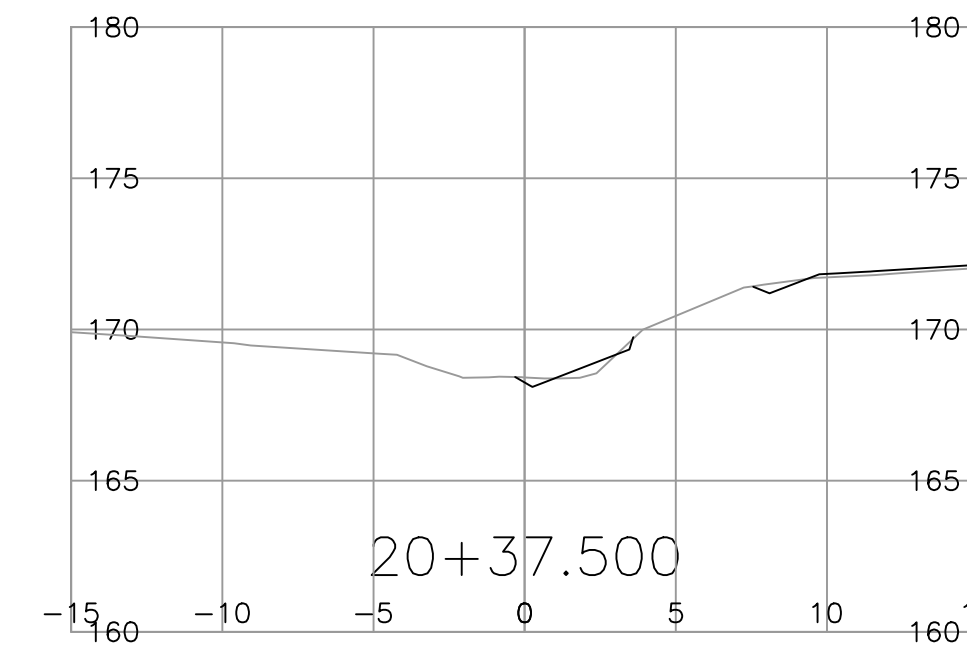
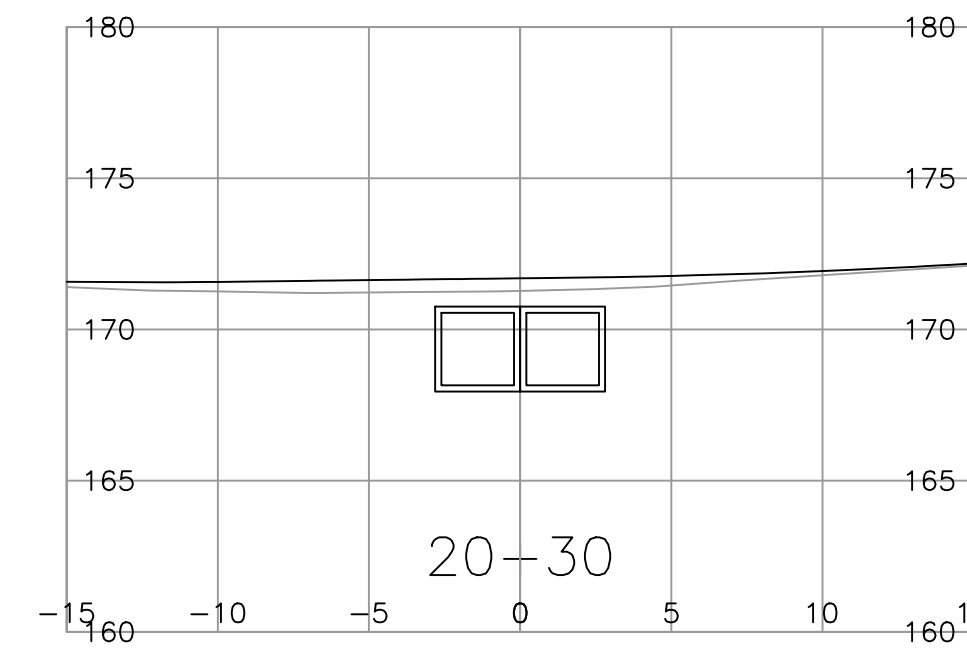
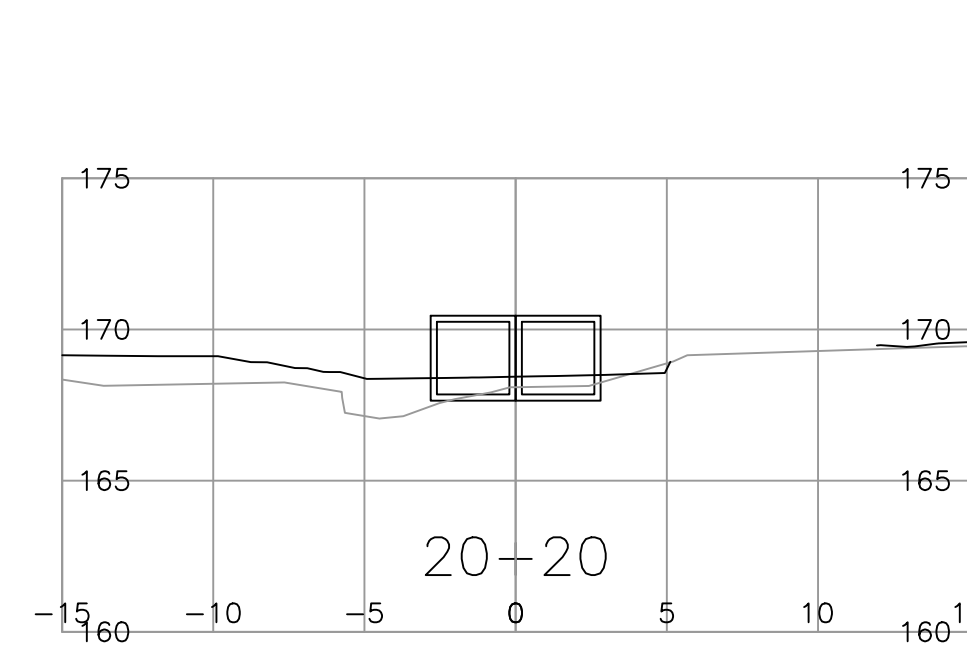
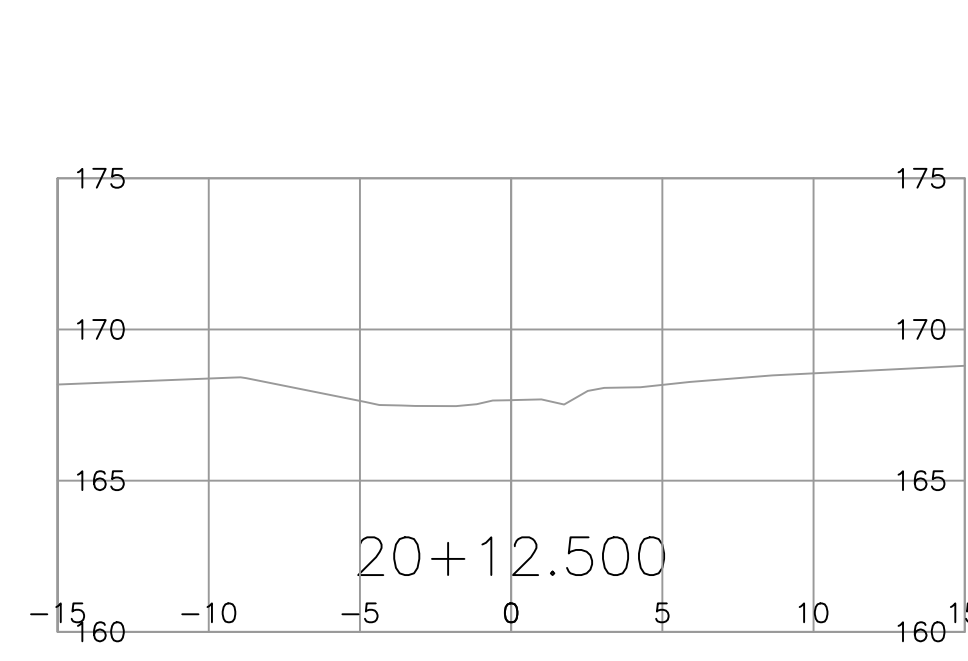
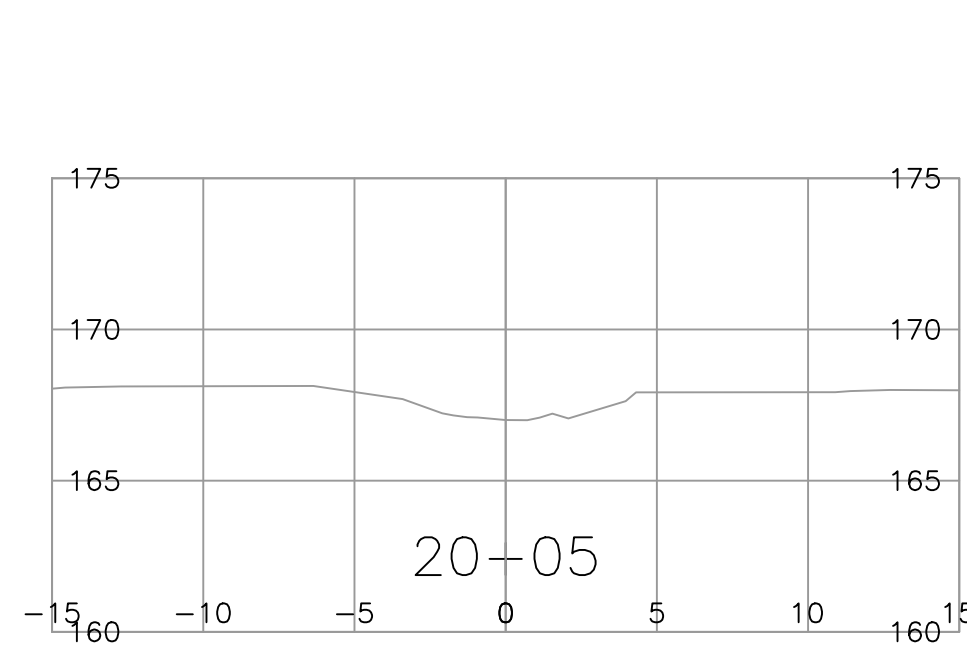
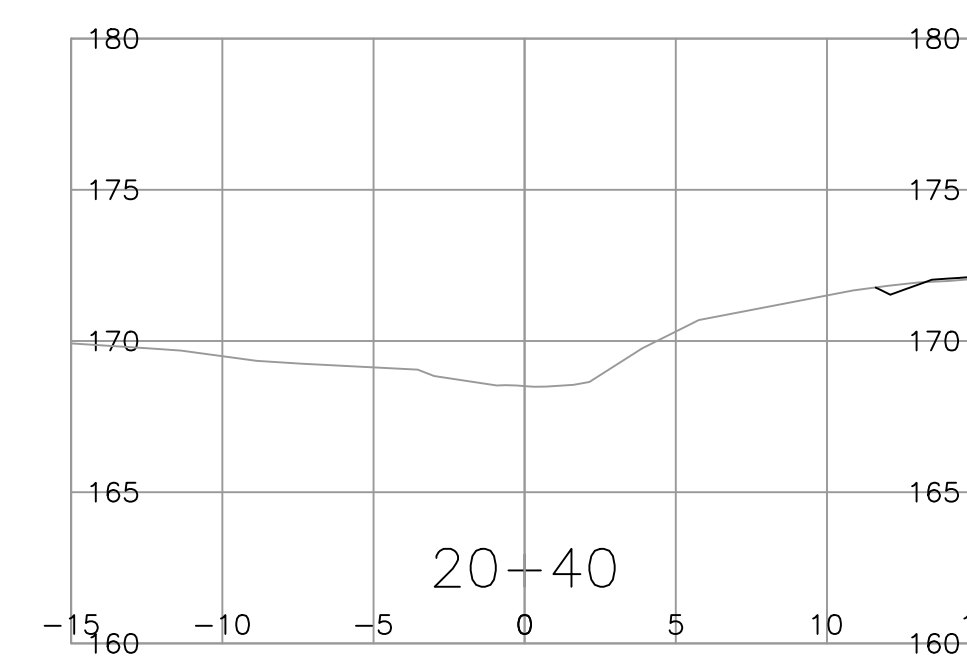
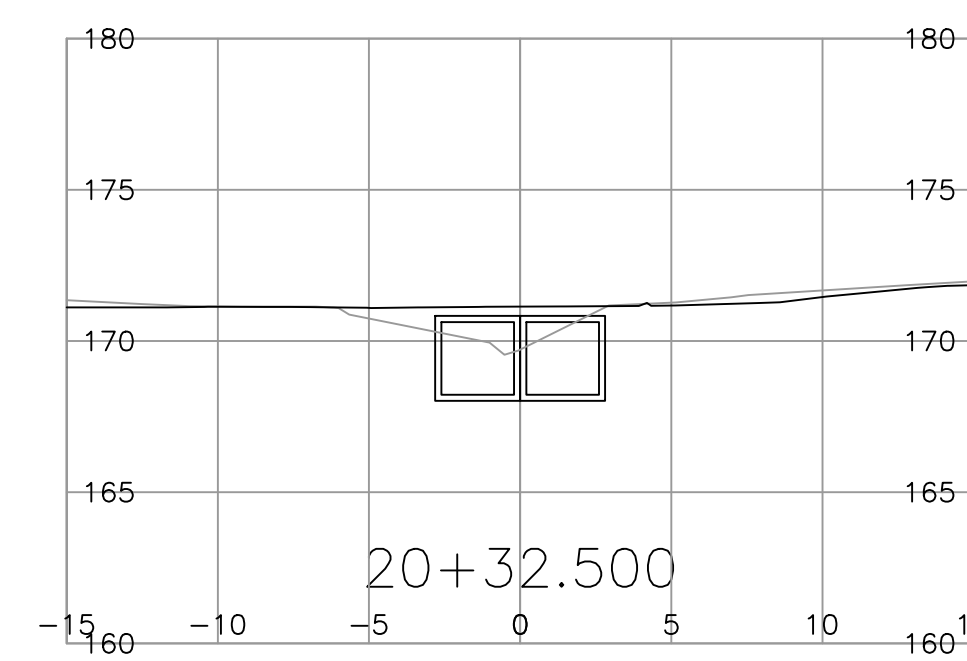
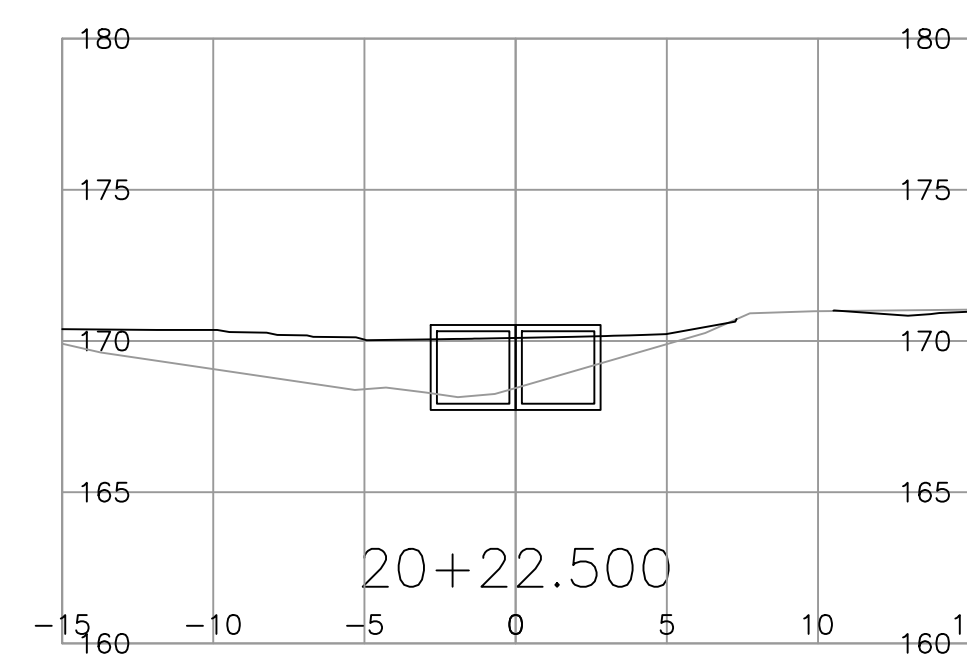
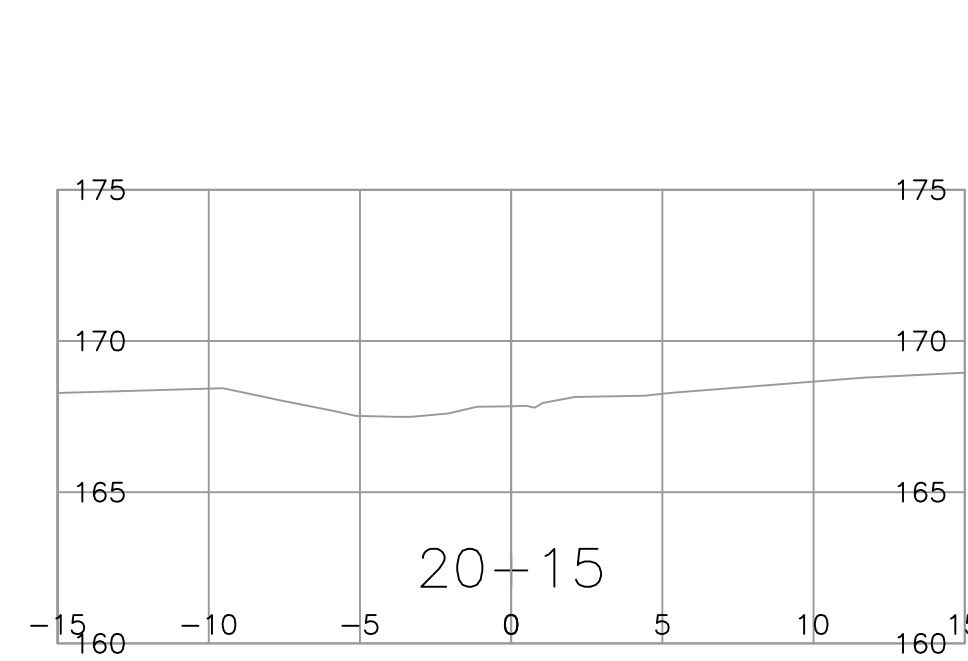
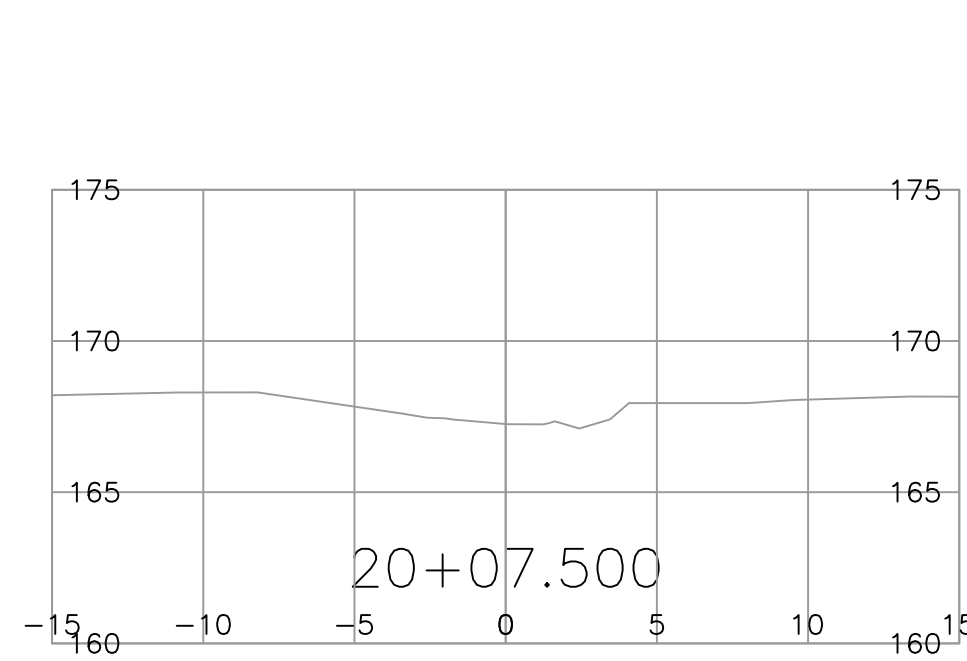
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		PLOT DATE: 2022-11-03	
REV	DATE	REVISIONS	NAME

 BRITISH COLUMBIA	MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE SOUTH COAST REGION HIGHWAY ENGINEERING AND GEOMATICS	DESIGNED: S.FUGCO DATE: 2022-11-04
		QUALITY CONTROL: C.BAGG DATE: 2022-11-04
CODY BAGG, P.ENG. SENIOR DESIGNER		QUALITY ASSURANCE: J.BORCHE DATE: 2022-11-04
DATE: _____		DRAWN: S.FUGCO DATE: 2022-11-04

DESIGN SECTIONS
DAY ROAD
DFAA FLOOD DAMAGE
D10

FILE NUMBER 872CS1714	PROJECT NUMBER 14007	REG 1	DRAWING NUMBER R1-1026-1011	REV
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PLOT DATE: 2022/11/03 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\1000_DesignSections\R1-1026-1010-Drainage.dwg



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SCALE 0 2 1:250 12m		CAD FILENAME: R1-1026-1010-DRAINAGE	
		PLOT DATE: 2022-11-03	
REV	DATE	REVISIONS	NAME

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

SOUTH COAST REGION

HIGHWAY ENGINEERING AND GEOMATICS

DESIGNED: S.FUGCO DATE: 2022-11-04

QUALITY CONTROL: C.BAGG DATE: 2022-11-04

QUALITY ASSURANCE: J.BORCHE DATE: 2022-11-04

DRAWN: S.FUGCO DATE: 2022-11-04

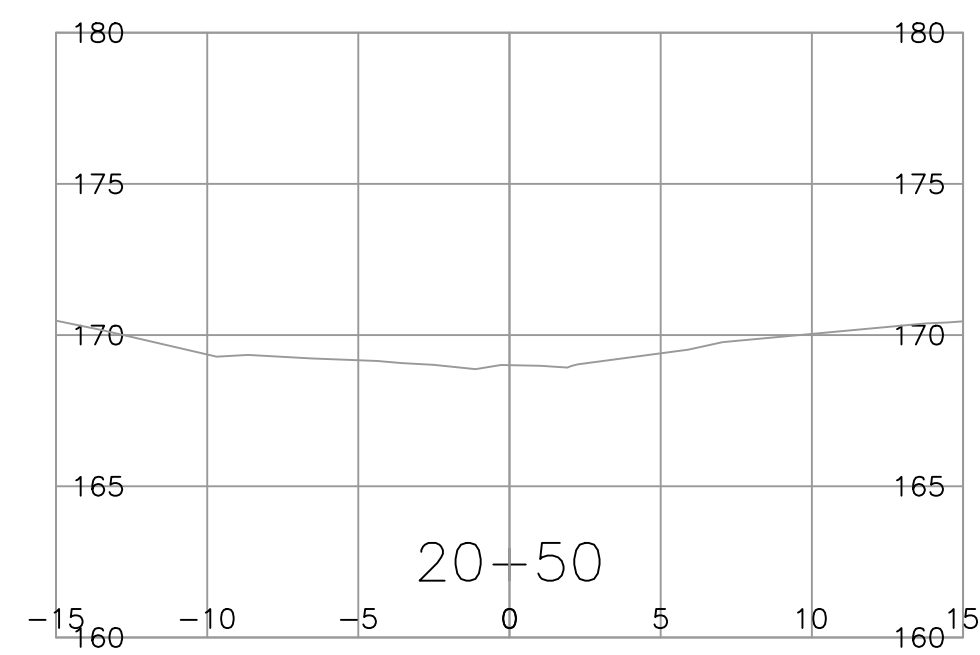
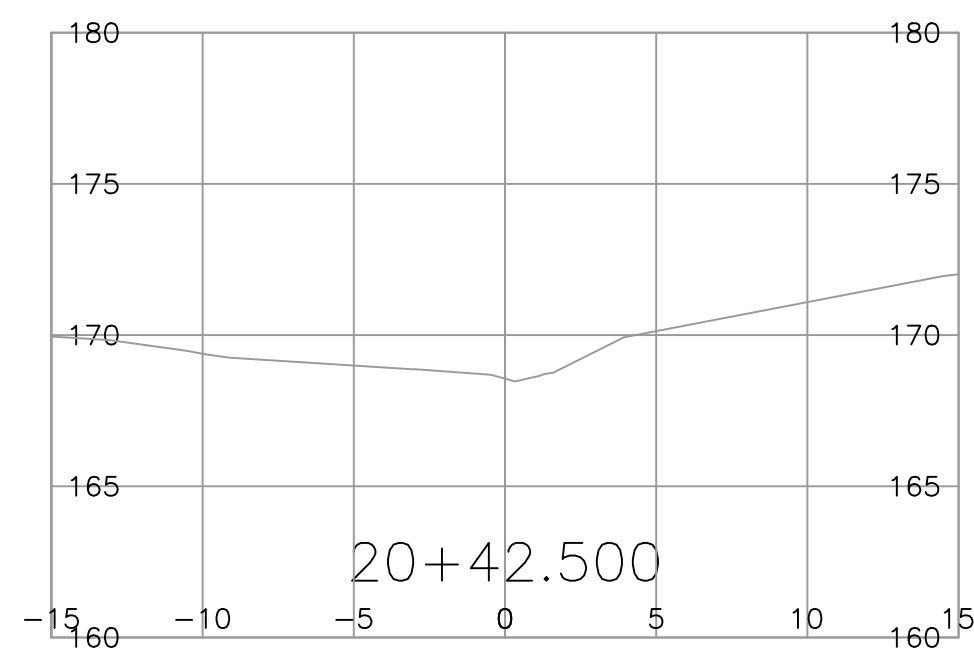
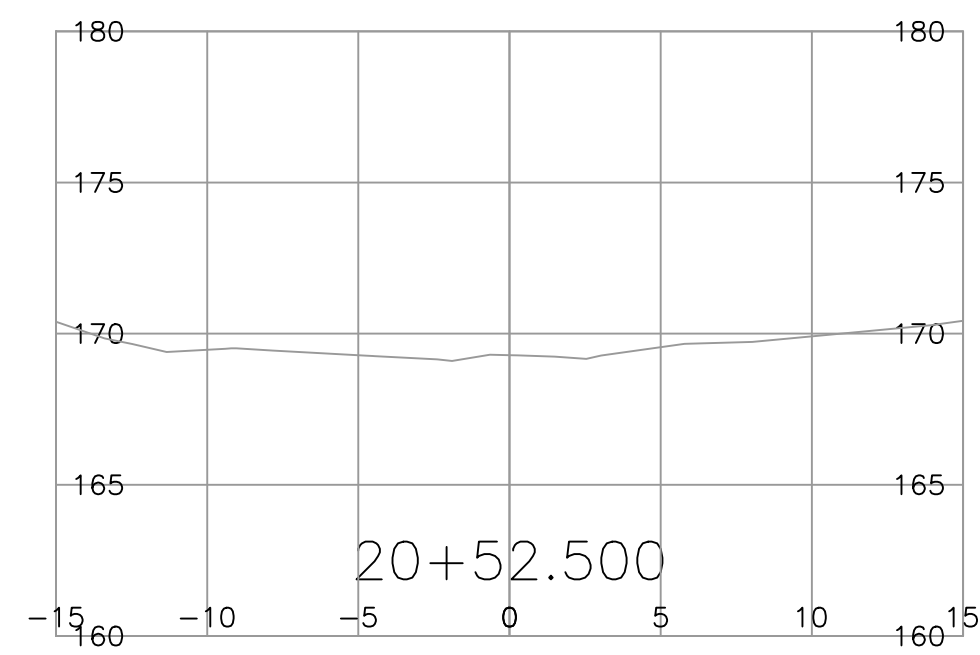
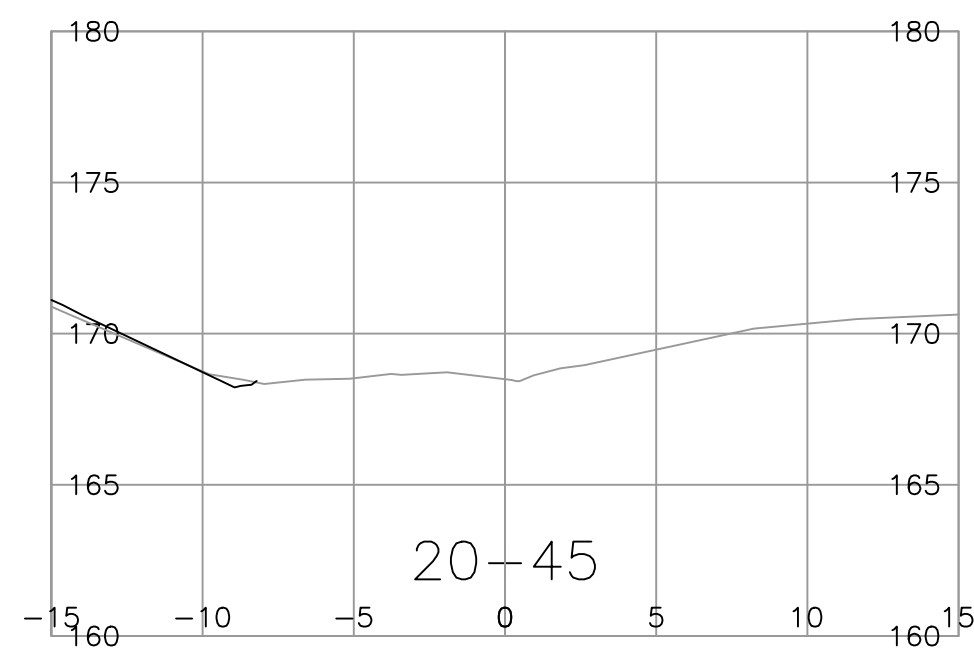
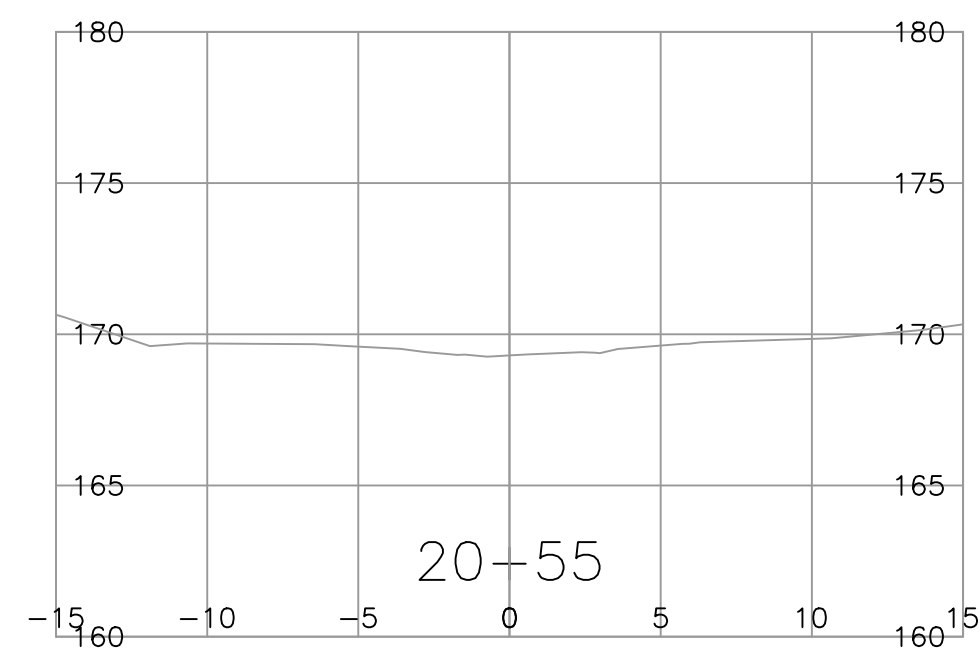
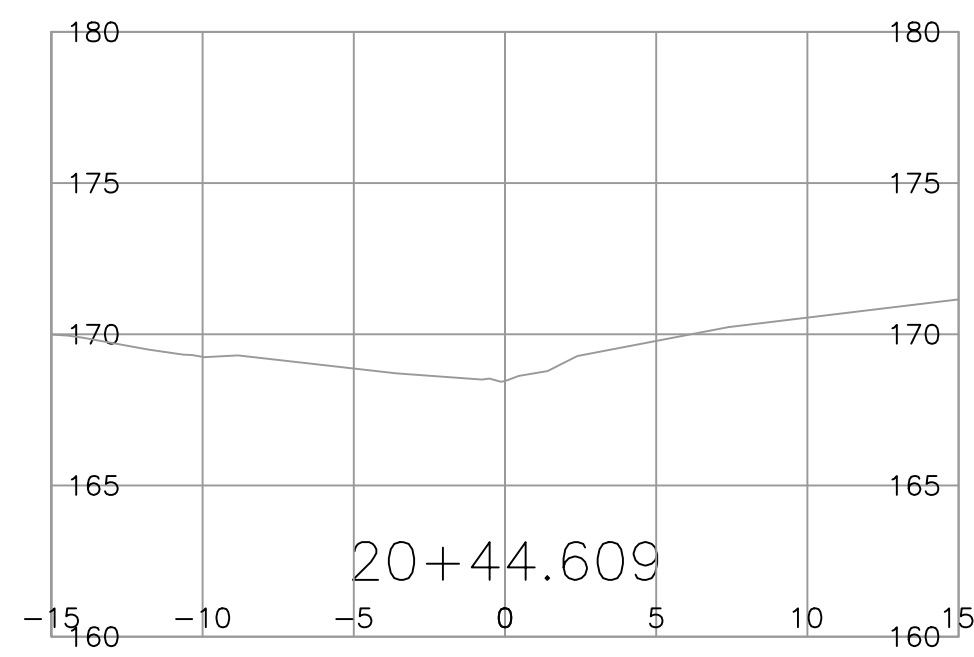
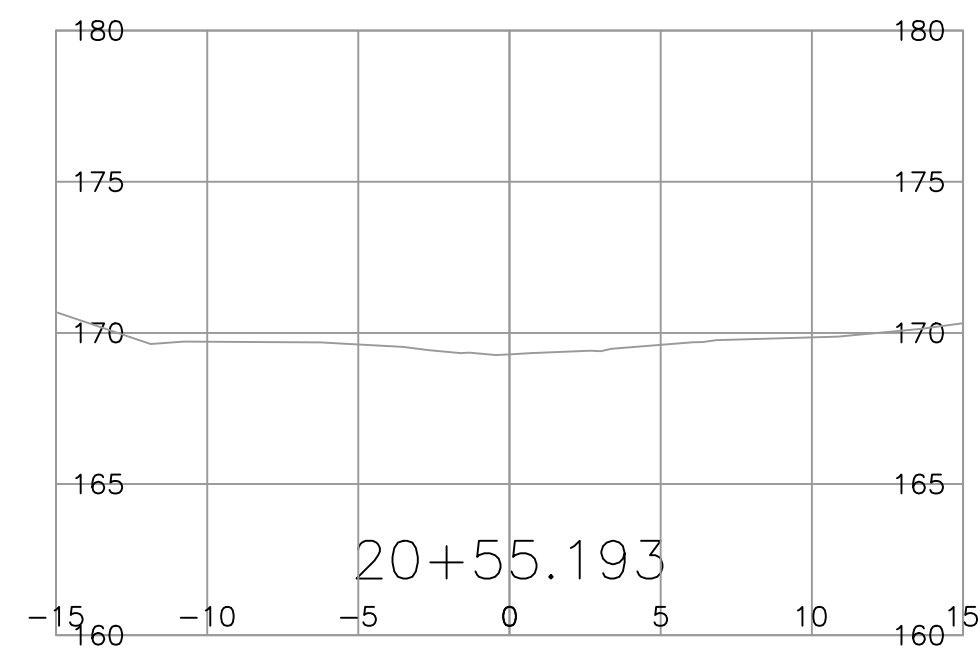
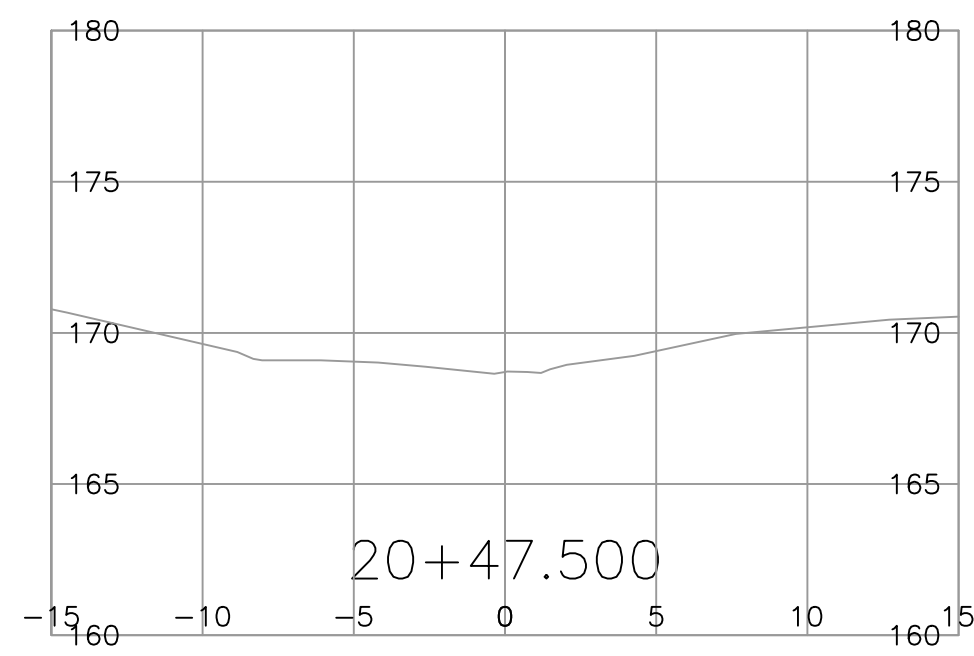
CODY BAGG, P.ENG.

SENIOR DESIGNER

DATE: _____

DESIGN SECTIONS				
DAY ROAD				
DFAA FLOOD DAMAGE				
D20				
FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-1020	

PLOT DATE: 2022/11/03 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\1000_DesignSections\R1-1026-1010-Drainage.dwg



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90% DESIGN
2022-11-04
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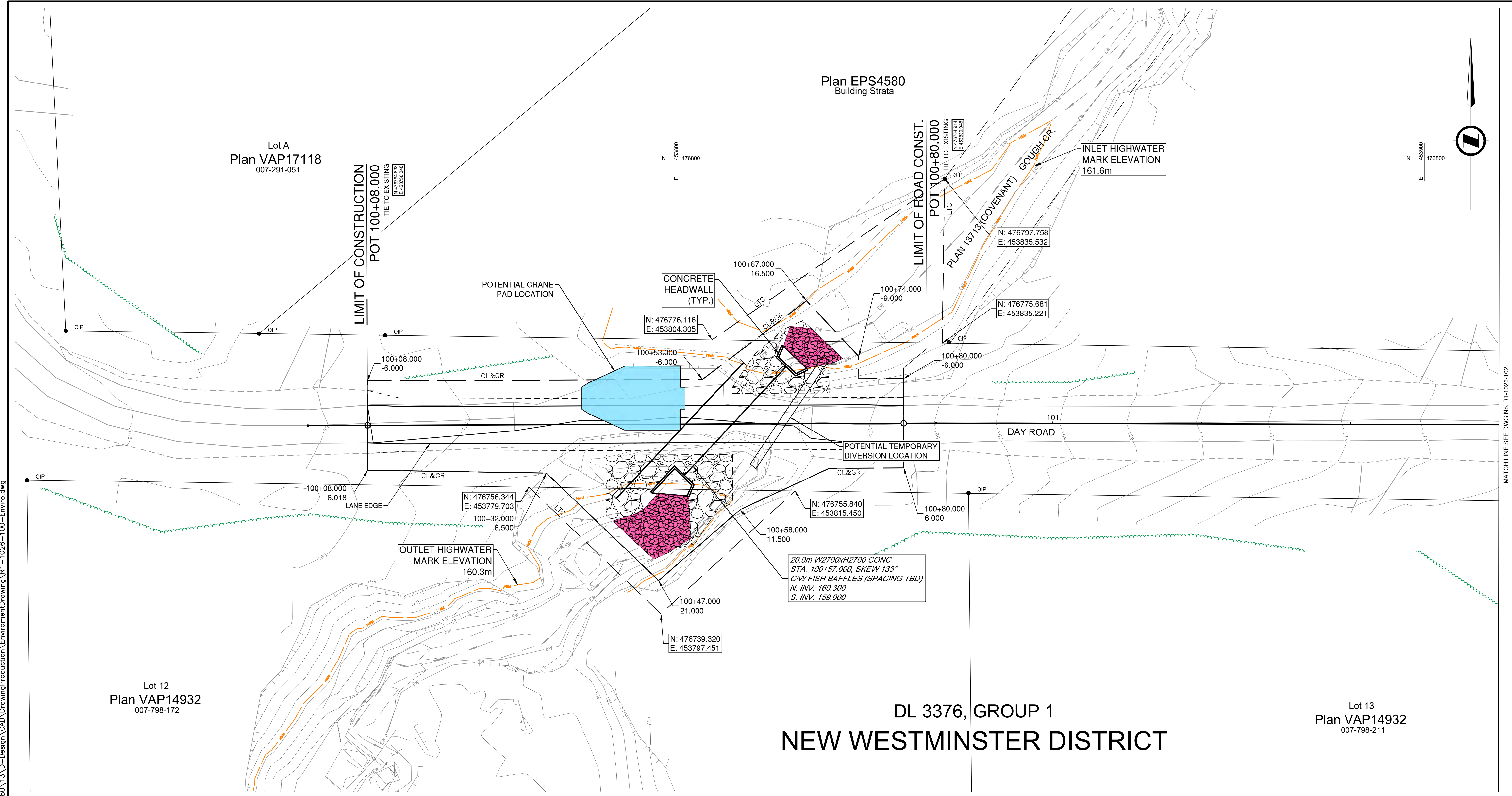


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		PLOT DATE: 2022-11-03	
REV	DATE	REVISIONS	NAME

 BRITISH COLUMBIA	MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE SOUTH COAST REGION HIGHWAY ENGINEERING AND GEOMATICS	DESIGNED: S.FUGCO DATE: 2022-11-04
		QUALITY CONTROL: C.BAGG DATE: 2022-11-04
CODY BAGG, P.ENG. SENIOR DESIGNER		QUALITY ASSURANCE: J.BORCHE DATE: 2022-11-04
DATE: _____		DRAWN: S.FUGCO DATE: 2022-11-04

DESIGN SECTIONS				
DAY ROAD DFAA FLOOD DAMAGE D20				
FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-1021	

PLOT DATE: 2023/01/20 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\Environment\Drawing\R1-1026-100-Enviro.dwg



WORK WITHIN RIPARIAN ZONE = 870 m²

TOTAL PROJECT AREA = 1718 m²

CL & GR TOTAL THIS DWG = 974 m²

WORK BELOW HWM = 300 m²

FOR DRAINAGE AND UTILITIES SEE DWG R1-1026-701 to R1-1026-702

LEGEND

RIPRAP

CHANNEL BOTTOM - RIPRAP TOP DRESSED WITH FISHERIES GRAVELS

101 102

FOR ENVIRONMENTAL PERMITTING



SCALE 0 2 1:250 12m

CAD FILENAME R1-1026-100-ENVIRQ
PLOT DATE 2023-01-20

REV	DATE	REVISIONS	NAME

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

SOUTH COAST REGION

HIGHWAY ENGINEERING AND GEOMATICS

CODY BAGG, P.ENG.
SENIOR DESIGNER

DESIGNED S.FUGCO DATE 2022-11-04
QUALITY CONTROL C.BAGG DATE 2022-11-04
QUALITY ASSURANCE J.BORCH DATE 2022-11-04
DRAWN E.PROULX DATE 2023-01-17

PLAN DAY ROAD DFAA FLOOD DAMAGE

STA. 100+08.000 TO 103+10.000

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-101-ENVIRQ	

DL 3376, GROUP 1 NEW WESTMINSTER DISTRICT

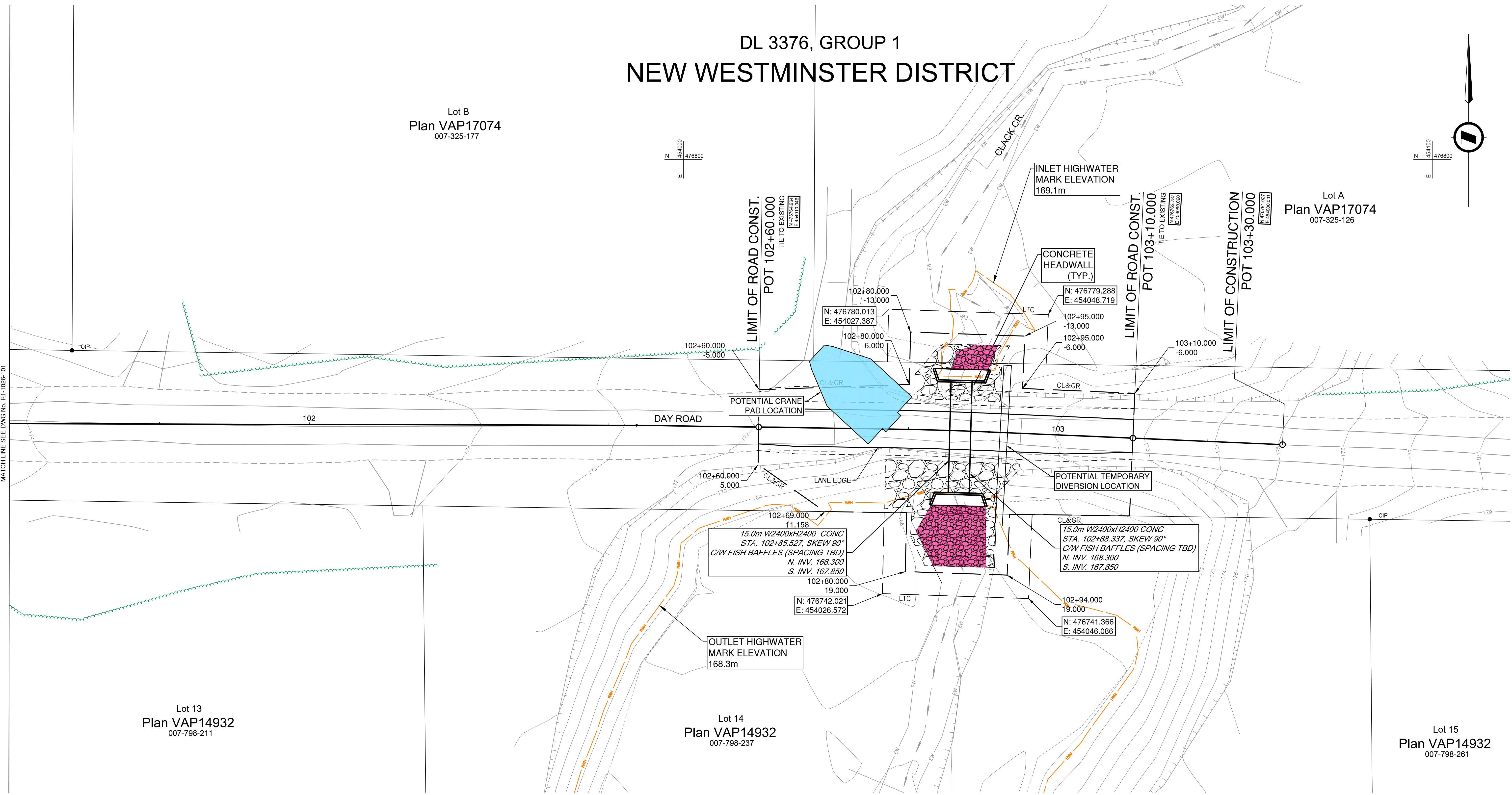
Lot B
Plan VAP17074
007-325-177

Lot A
Plan VAP17074
007-325-126

Lot 13
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Lot 14
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Lot 15
Plan VAP14932
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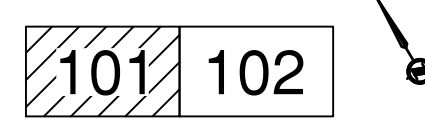


WORK WITHIN RIPARIAN ZONE = 740 m²
 TOTAL PROJECT AREA = 1237 m²
 CL & GR TOTAL THIS DWG = 845 m²
 WORK BELOW HWM = 300 m²
 FOR DRAINAGE AND UTILITIES SEE DWG R1-1026-701 to R1-1026-702

LEGEND

RIPRAP

CHANNEL BOTTOM - RIPRAP TOP DRESSED WITH FISHERIES GRAVELS



FOR ENVIRONMENTAL PERMITTING



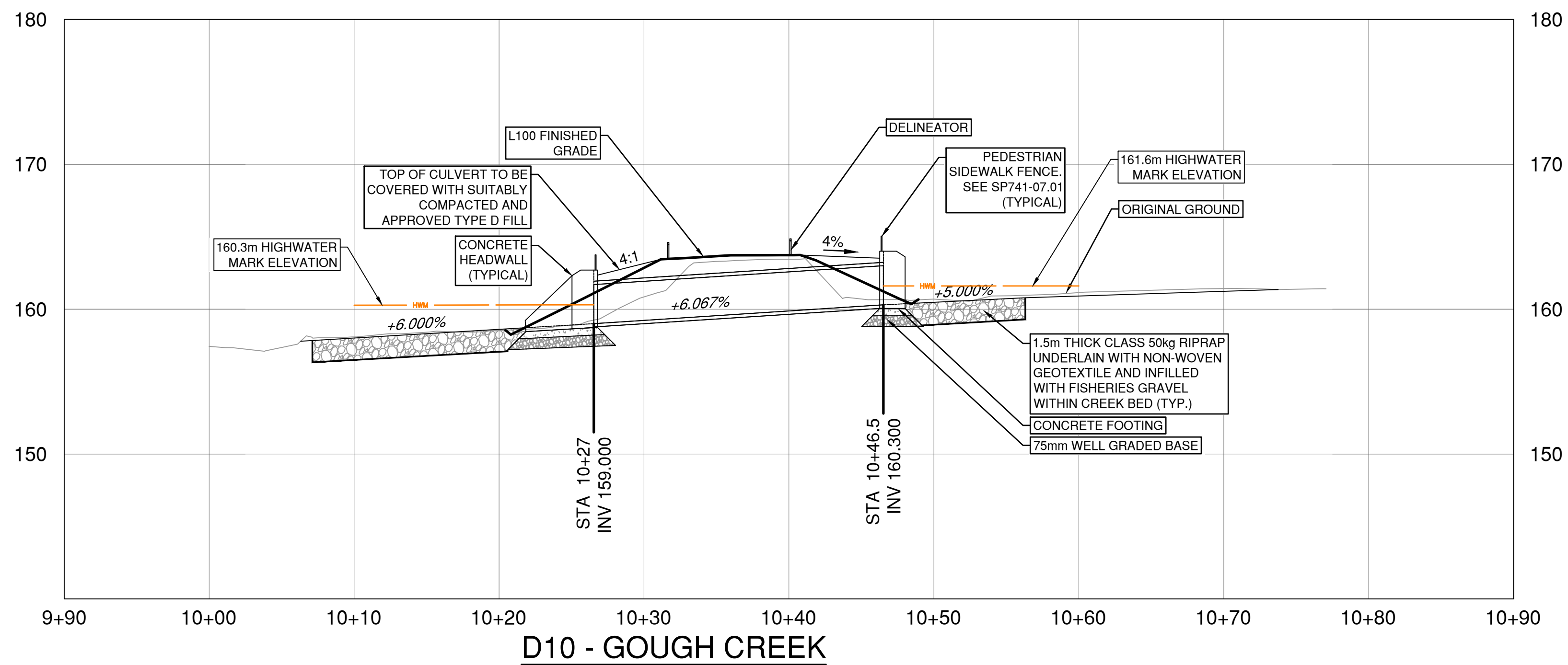
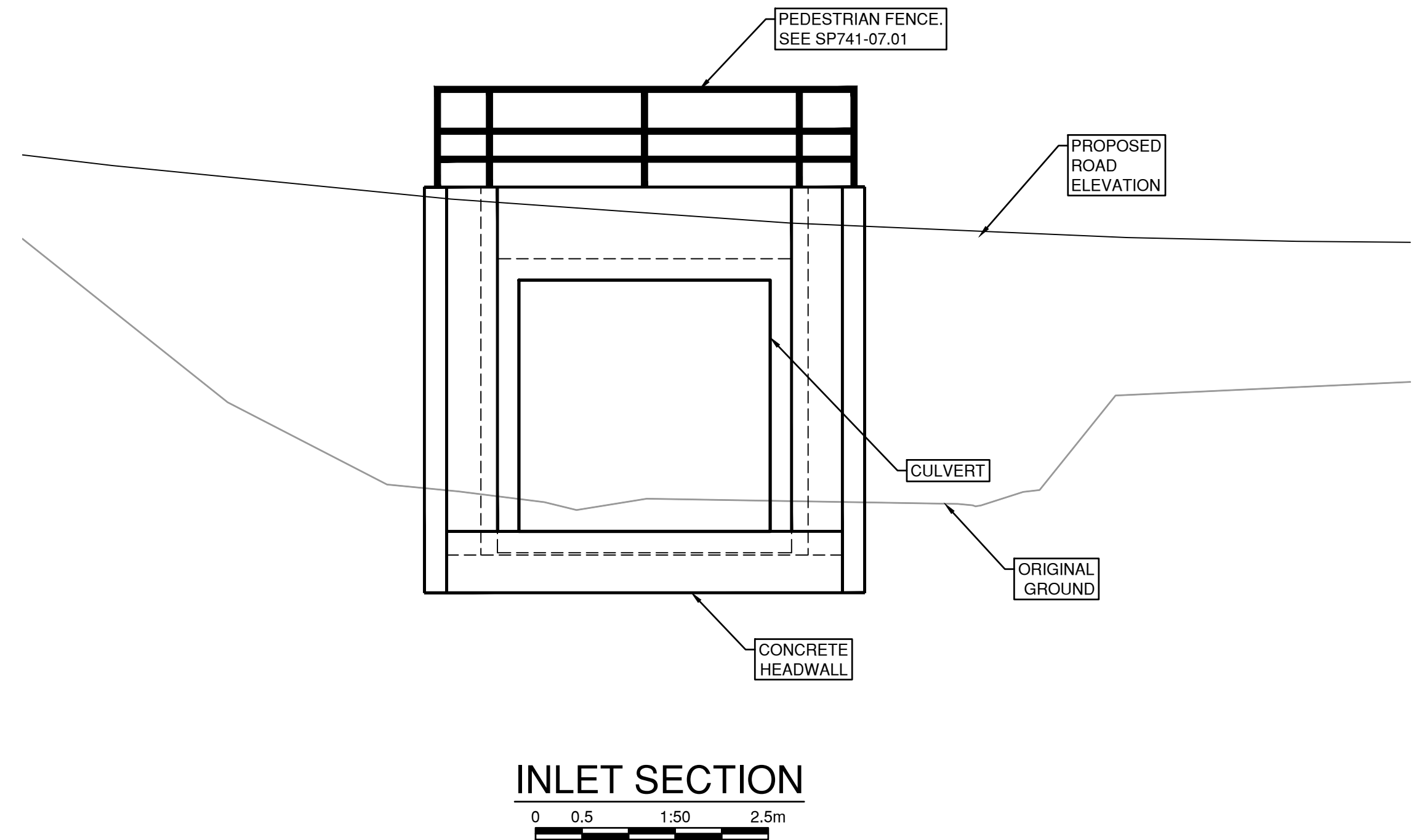
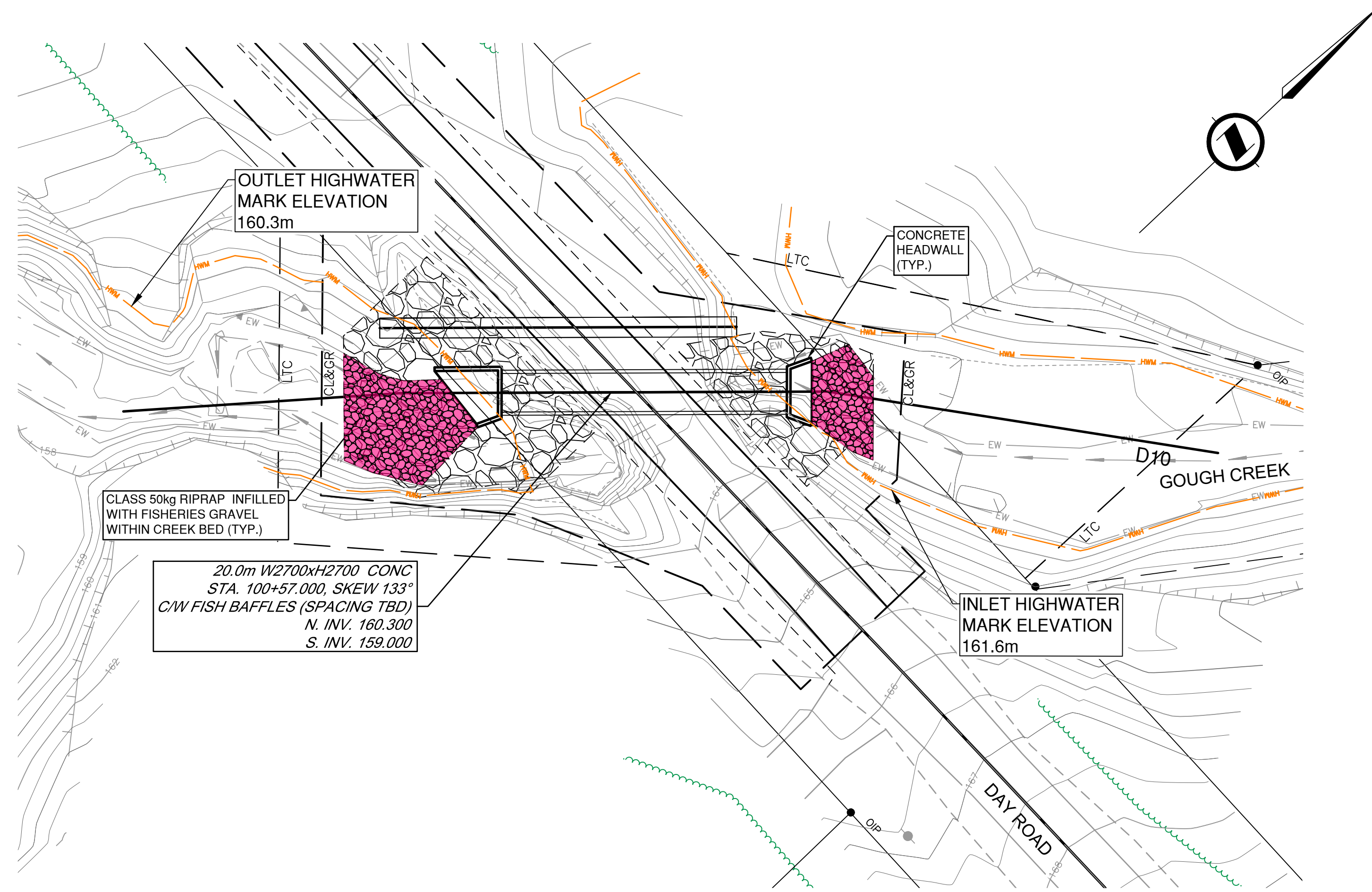
REV	DATE	REVISIONS	NAME

BRITISH COLUMBIA
 MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
 SOUTH COAST REGION
 HIGHWAY ENGINEERING AND GEOMATICS

DESIGNED: S.FUGCO DATE: 2022-11-04
 QUALITY CONTROL: C.BAGG DATE: 2022-11-04
 QUALITY ASSURANCE: J.BORCH DATE: 2022-11-04
 DRAWN: E.PROULX DATE: 2023-01-17

CODY BAGG, P.ENG.
 SENIOR DESIGNER

PLAN		DAY ROAD		DFAA FLOOD DAMAGE	
STA. 100+08.000 TO 103+10.000					
FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV	
872CS1714	14007	1	R1-1026-102-ENVIRQ		



FOR ENVIRONMENTAL PERMITTING

LEGEND

RIPRAP 

CHANNEL BOTTOM - RIPRAP TOP DRESSED WITH FISHERIES GRAVELS 



SCALE 0 2 1:250 12m

CAD FILENAME R1-1026-700-ENVIRQ

PLOT DATE 2023-01-20

REV	DATE	REVISIONS	NAME

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

SOUTH COAST REGION

HIGHWAY ENGINEERING AND GEOMATICS

DESIGNED S.FUGCO DATE 2022-11-04

QUALITY CONTROL G.BAGG DATE 2022-11-04

QUALITY ASSURANCE J.BORCH DATE 2022-11-04

DRAWN E.PROULX DATE 2023-01-17

CODY BAGG, P.ENG. SENIOR DESIGNER

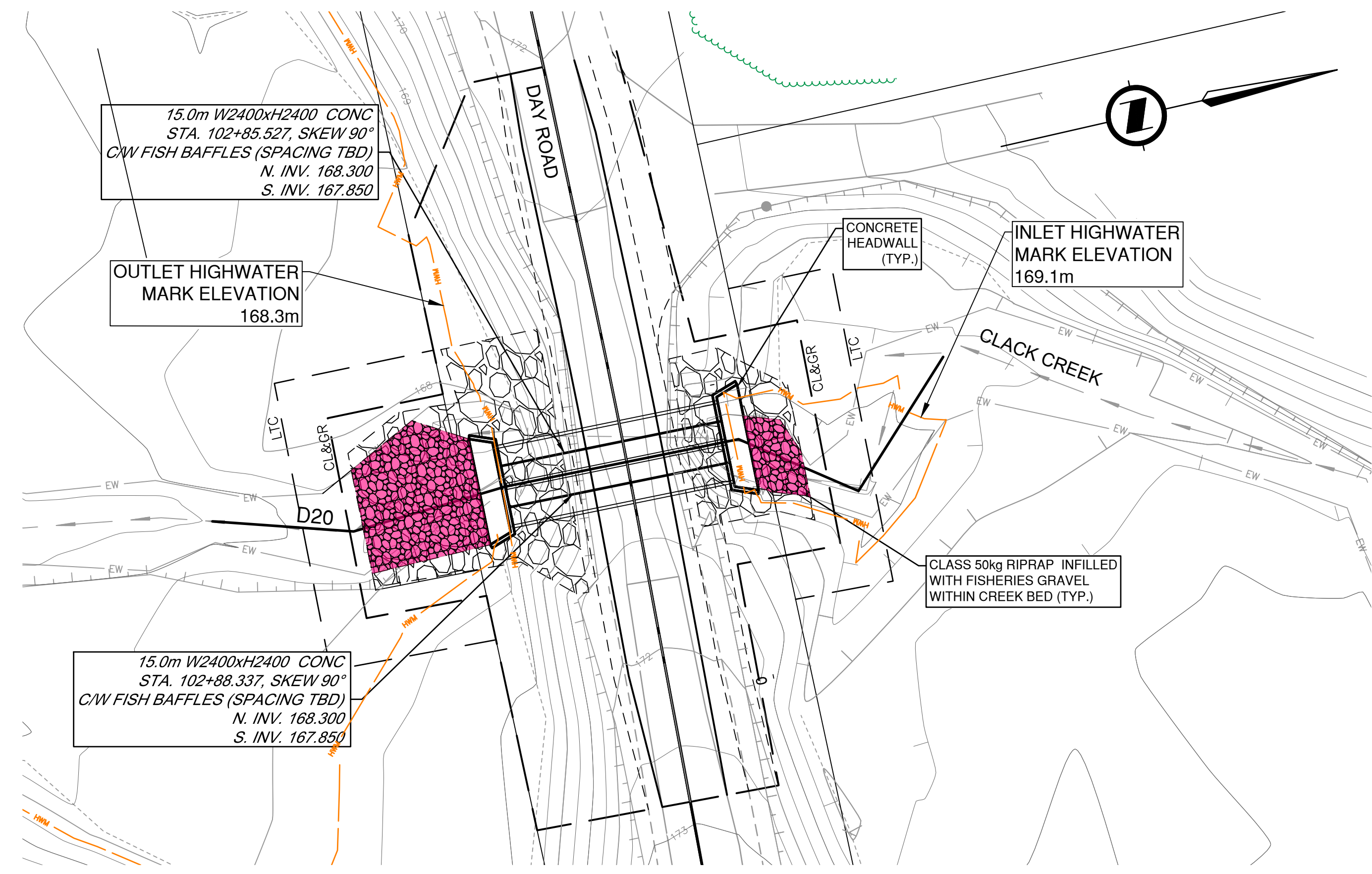
DRAINAGE DETAILS

DAY ROAD

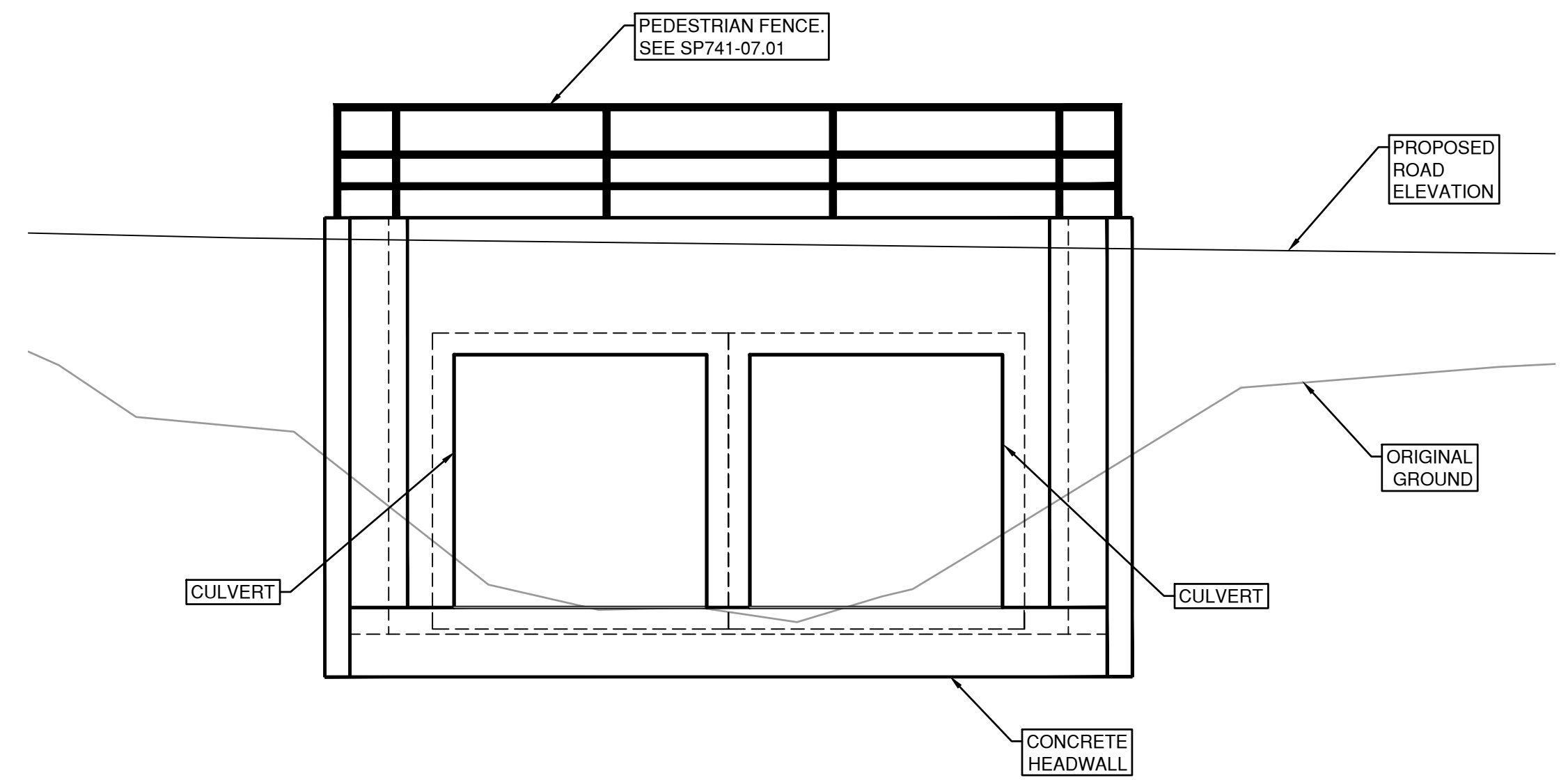
DFAA FLOOD DAMAGE

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
872CS1714	14007	1	R1-1026-701-ENVIRQ	

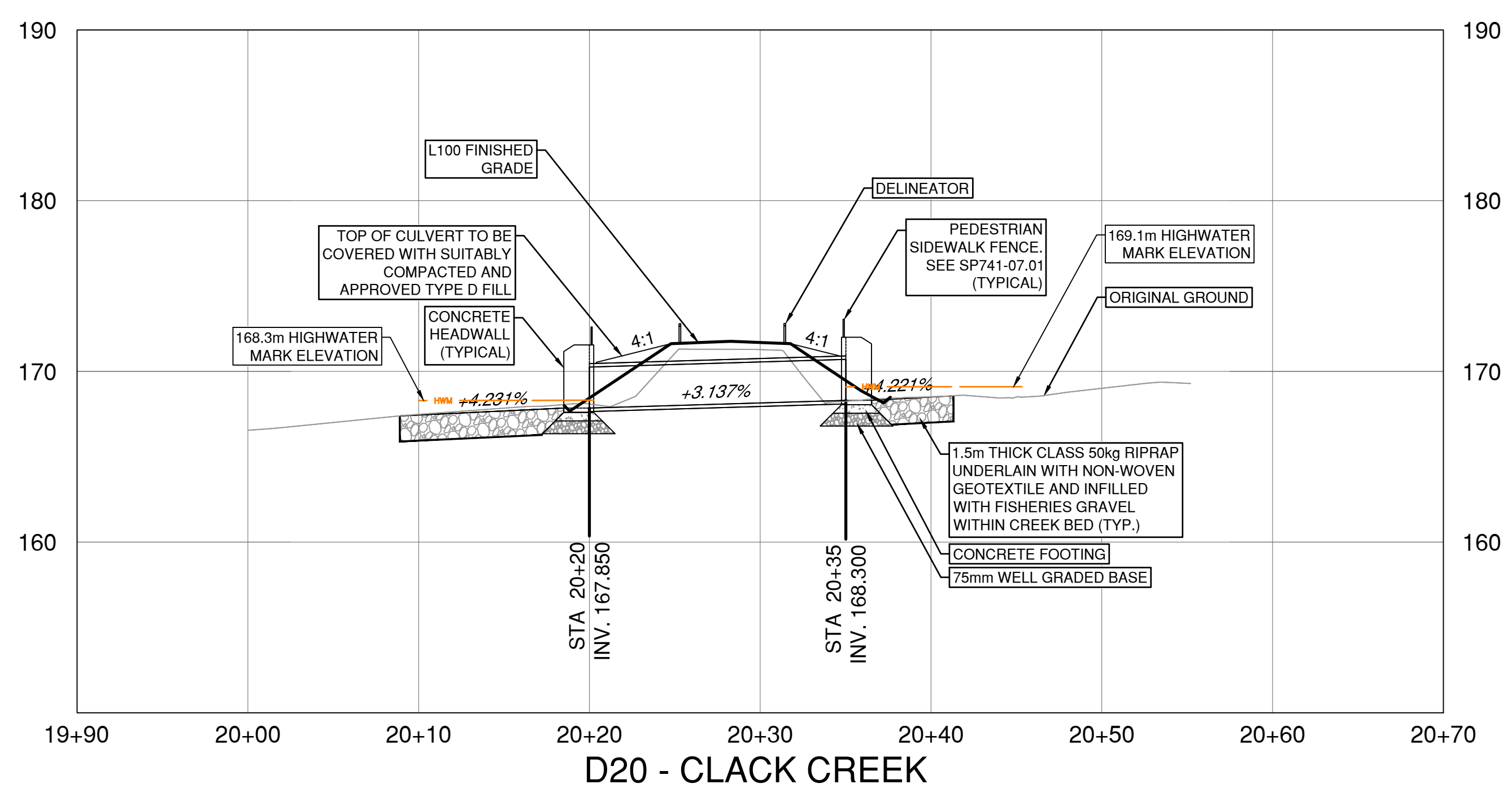
PLOT DATE: 2023/01/20 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\Environment\Drawing_R1-1026-700-Enviro.dwg



D20 - CLACK CREEK



INLET SECTION
0 0.5 1.50 2.5m



D20 - CLACK CREEK

LEGEND

RIPRAP

CHANNEL BOTTOM - RIPRAP TOP DRESSED WITH FISHERIES GRAVELS



SCALE 0 2 1:250 12m

CAD FILENAME R1-1026-702-ENVIRQ
PLOT DATE 2023-01-20

REV	DATE	REVISIONS	NAME

BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

DESIGNED S.FUGCO DATE 2022-11-04
QUALITY CONTROL G.BAGG DATE 2022-11-04
QUALITY ASSURANCE J.BORCH DATE 2022-11-04
DRAWN E.PROULX DATE 2023-01-17

CODY BAGG, P.ENG.
SENIOR DESIGNER

FOR ENVIRONMENTAL PERMITTING

DRAINAGE DETAILS
DAY ROAD
DFAA FLOOD DAMAGE

FILE NUMBER 872CS1714	PROJECT NUMBER 14007	REG 1	DRAWING NUMBER R1-1026-702-ENVIRQ
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PLOT DATE: 2023/01/20 U:\Projects_SUR\1961\0480\13\0-Design\CAD\DrawingProduction\Environment\Drawing\R1-1026-700-Enviro.dwg