

April 08, 2020

File Ref: C20-5714/A

Spuzzum First Nation
36500 Main Road
Spuzzum, BC V0K 2S1

Attention: Chief James Hobart
Crystal Hatzidimitriou, Band Administrator

**Reference: Pedestrian Underpass on Highway 1
Conceptual Design & Feasibility Assessment**

INTRODUCTION

Spuzzum First Nation is contemplating a safe pedestrian crossing of Highway 1 for their members and particularly the children. The current bus stop is located on the west side of the highway with the main housing and band administration on the east side. The posted highway speed through this area is 100 km/hr with speeds often observed much higher, which has significant concerns for Spuzzum with members having to cross at grade in this situation.

The writer met with members of the Spuzzum council and administration including Chief James Hobart and Crystal Hatzidimitriou to discuss and review the crossing onsite. Spuzzum has requested a concept design and feasibility assessment of a pedestrian underpass accordingly. This pedestrian connection would also compliment future planned pathway access routes through the community and bus stop and shelter improvements.

SITE DESCRIPTION

The main center of the community is between the CPR Railway to the east and Highway 1 to the west. New member housing is near completion at the north end in the same general area as the proposed pedestrian underpass.

Both the CPR Railway and Highway 1 effectively separate the community. There is a grade level CPR crossing but trains have staged through the area in the past, blocking the crossing. The CPR Railway further separates the main community from the Fraser River. Wedler drawing SK-1, area site plan can be found in [Appendix A](#), also shown on page 2.

Highway 1 is effectively four lanes wide with a left turn lane west to Johnson Road, a right turn lane east to access Main Street and two through lanes north and south. The width of asphalt at this intersection is 15m. The highway, adjacent land and cross roads are essentially at grade at this intersection with the highway transitioning to a fill over the adjacent grade just to the north of the intersection.

See google photograph included in [Appendix A](#). The general community area is flat to gentle sloping with steeper sections to the north/east down towards the Fraser River.



PROPOSED WORKS

Based on the site topography the preferred grade separated crossing option is a pedestrian underpass. A level grade pedestrian controlled crossing is likely not an option with the posted speed of 100 km/hr and could increase the crossing danger. Pedestrian overpass would be very costly and be of little benefit to small children, elders and members with physical disabilities given the number of steps which would be required.

The fill area of the highway just north of the intersection allows for a reduced level of grading connecting the underpass to the existing local roads on either side. The proposed crossing consists of a multi plate vertical elliptical culvert for the feasibility assessment; see [Appendix B](#) for an example Armtex product. The installation would be a cut and cover process with traffic control to MOTI standards and acceptance. Two travel lanes should be able to remain open given the road width at the proposed crossing. See [Appendix C](#) for Wedler's concept design plans. Further detailed design may consider alternate materials but only if there are feasible advantages.

The crossing would need to be approximately 25m long with pathways from existing roads on either side connecting to it. The proposed location will be across from the recently completed member housing project for added security with exposure to the housing. This area also optimizes fill depth available along Highway 1 with the bottom of the multi-plate being approximately 1.0m to 1.7m below the surrounding end grades.

Drainage catch basins complete with rock pits are proposed and will require infiltration testing to confirm. General local knowledge and site conditions indicate the natural ground is mainly free draining in the area.

Lighting should be considered with future detailed designs. Given the rural nature of the area with limited area lighting, pole mounted area lighting at either end of the under pass may be suitable with consideration for further internal lighting through the crossing.

CONSTRUCTION BUDGET ESTIMATE

The estimate is in [Appendix E](#) and should be considered as a high level Class D estimate. The costs are based on a four week construction period. Please note there will be changes to the scope of work through the application, detailed design and approvals process.

The budget is based on the excavated material being placed on Spuzzum First Nation's lands within 10 minutes travel time.

DESIGN CRITERIA

Detailed design drawings would need to be prepared to MOTI specifications for construction. The application process is identified in MOTI's "Highway Permits and Approvals" under "Other Approvals". The multi plate size selected for the proposed under pass exceeds the horizontal and vertical operating envelopes as identified in TAC, Chapter 6, Figures 6.2.1 and 6.2.2. Copies of both reference documents are in [Appendix D](#). The Pedestrian Crossing Control Manual for BC (second edition, April 1994) was also reviewed for reference.

All detailed designs for MOTI must be completed by a professional engineer and all construction must be to MOTI standards and specifications with review and certification by a professional engineer. MOTI guideline diagram for open cutting paved roads is also included in [Appendix D](#) for reference.

NEXT STEPS

We would understand there to be a funding request by Spuzzum to move to the detailed design stage with the project budget estimates provided in [Appendix E](#). Meetings and coordination with MOTI for application and approval requirements would be required. A site investigation and report by a geotechnical engineer would need to be completed to confirm / support the civil detailed design, construction methodology and MOTI acceptance.

CONCLUSION

This report was prepared for Spuzzum First Nation in support of its further funding application process and approvals to construct an underpass of Highway 1 to provide safe pedestrian movement for their community. We trust that the information contained herein is suitable and sufficient to support further process.

Yours truly,
Wedler Engineering LLP

Reviewed by:

Per:



Glen Darychuk,
Project Manager
gdarychuk@wedler.com



Kelly Kerr, P.Eng.
Partner

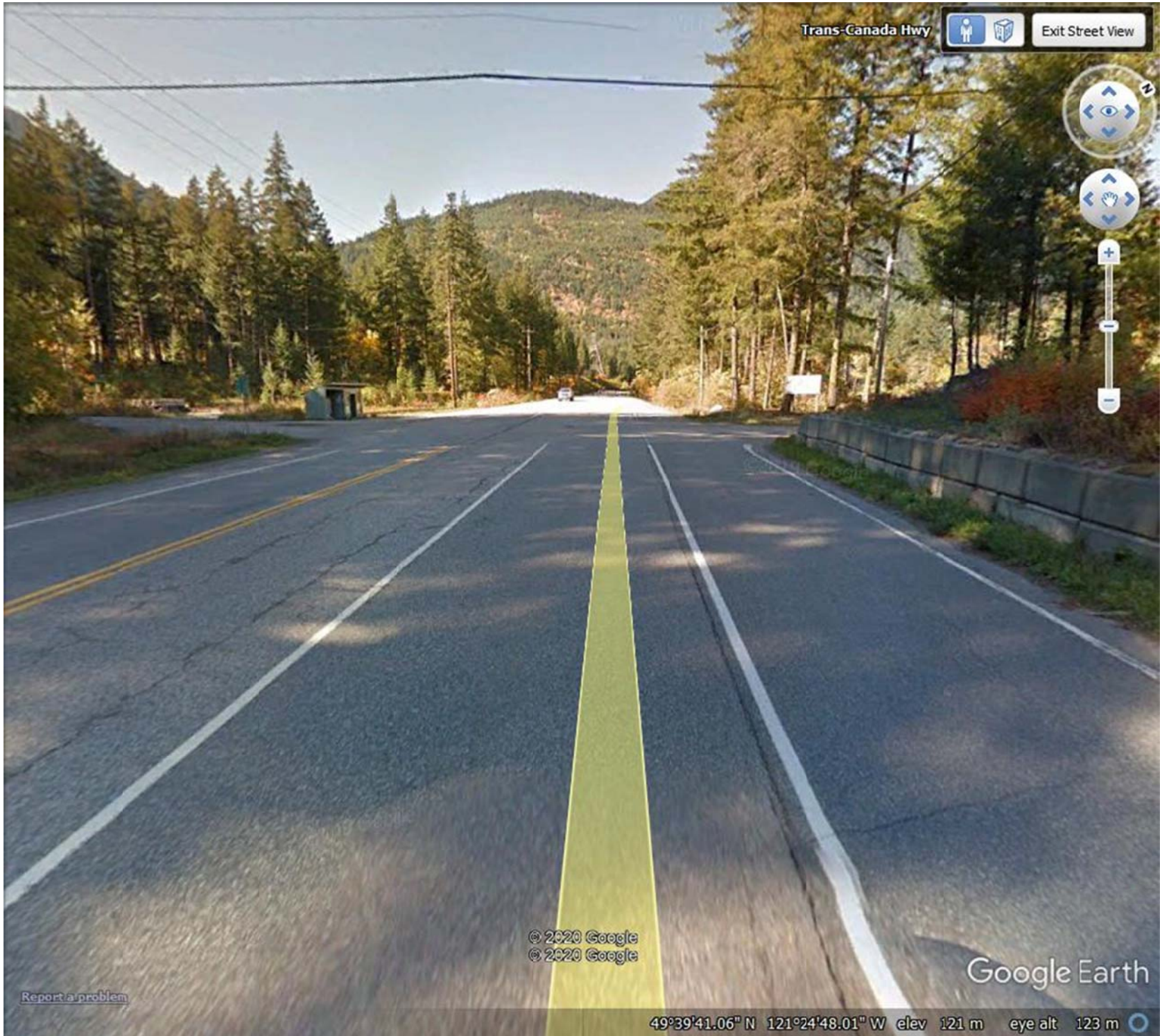
cc: Mel Wooley, Land Strategies

Enclosures

APPENDIX A
Site Plan SK-1







Trans-Canada Hwy



Exit Street View



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Google Earth

[Report a problem](#)

49°39'41.06" N 121°24'48.01" W elev 121 m eye alt 123 m

APPENDIX B

Armtec Multi Plate Detail



32N Multi-Plate Vertical Ellipse

2310 Span x 2570 Rise

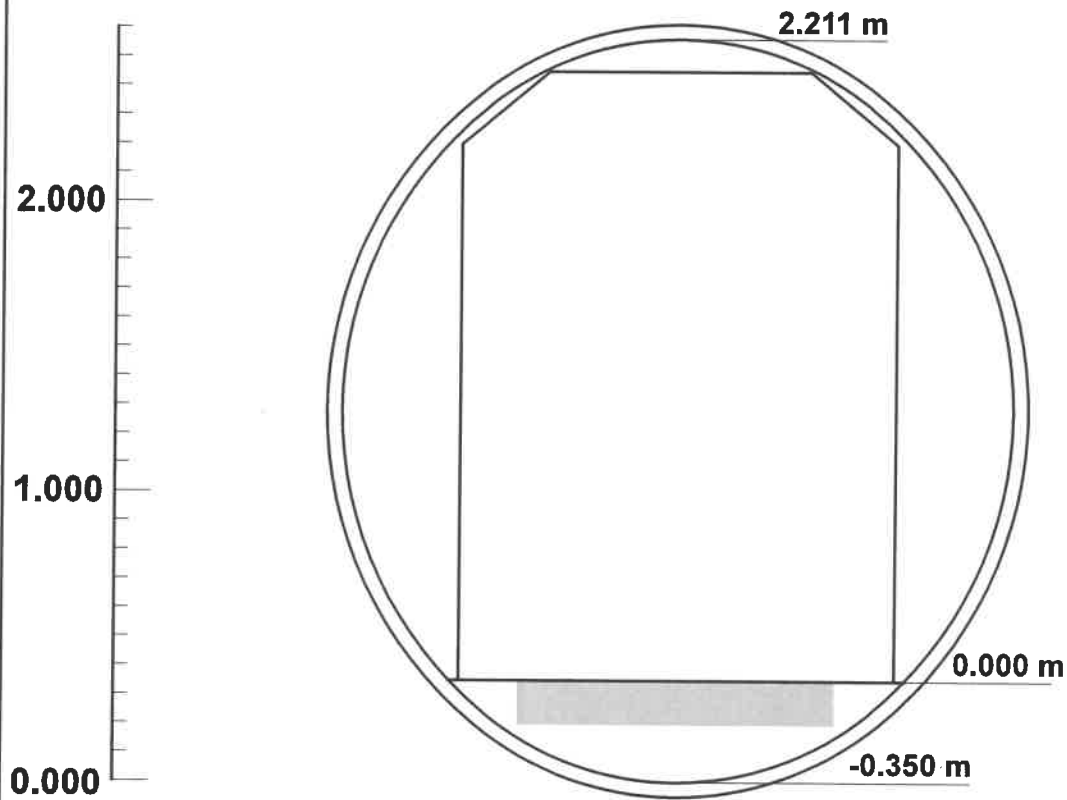
End Area = 4.634 m²

Open Area = 4.255 m²

'B' = 1280 mm

1500 mm x 2100 mm clearance box

300 mm x 250 mm chamfer on upper edges



Arc	N	Radius	Angle
Top	6	1045	78.31°
Side	10	1350	101.58°
Bottom	6	1045	78.31°



Scale 1:25

Not for final design or construction purposes

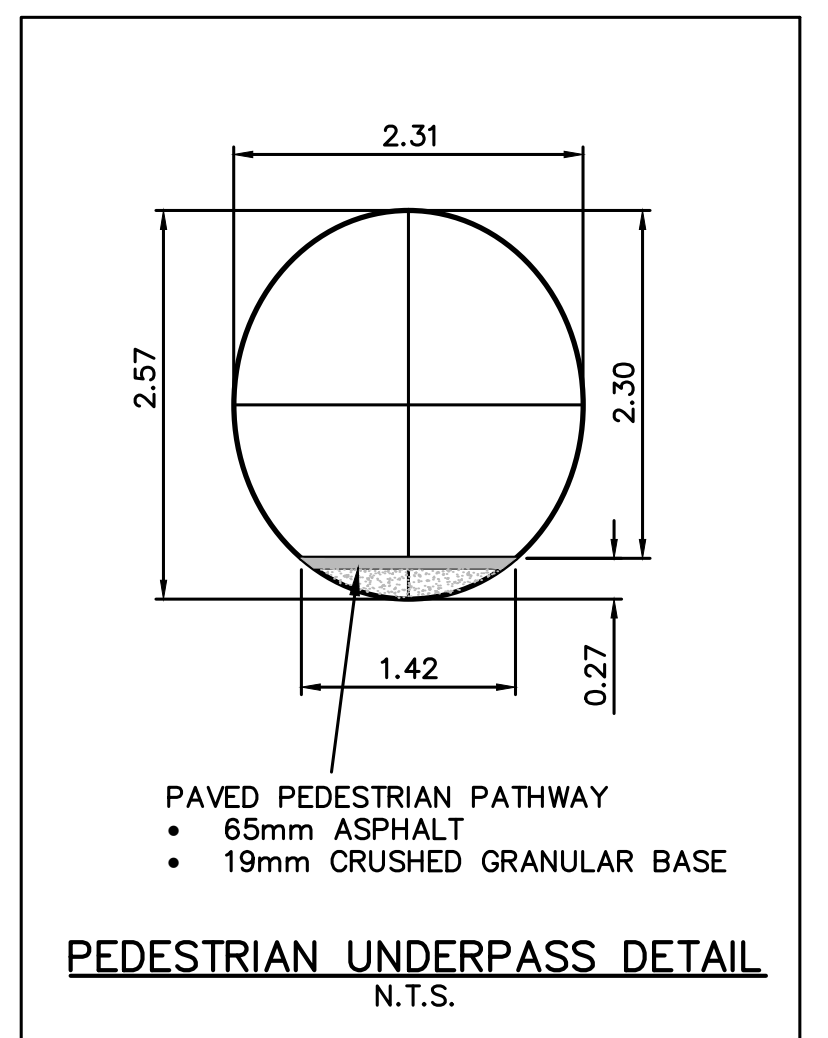
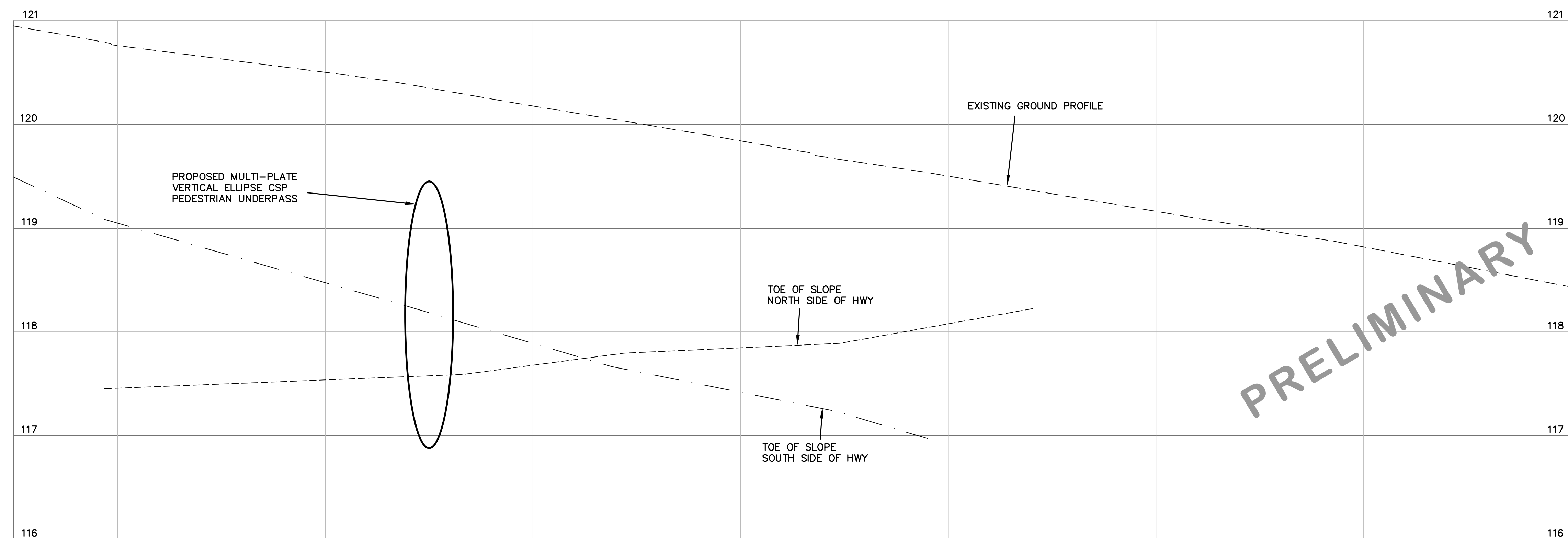
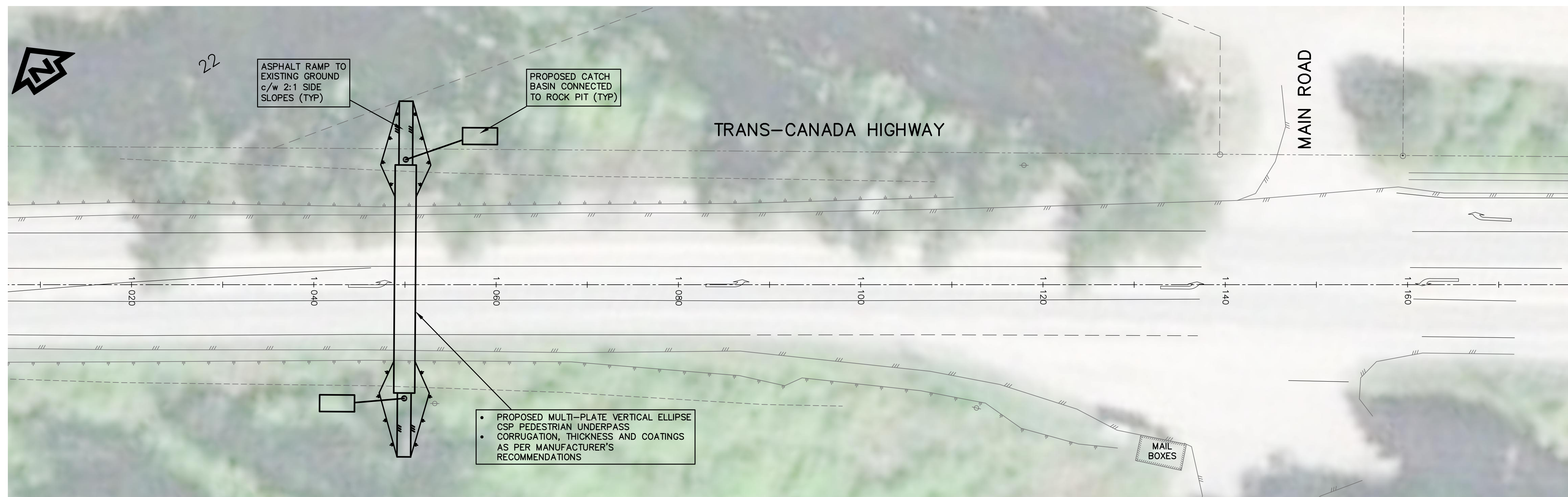
APPENDIX C

Wedler Drawings

C20-5714/A-P01 (2)

C20-5714/A-X01

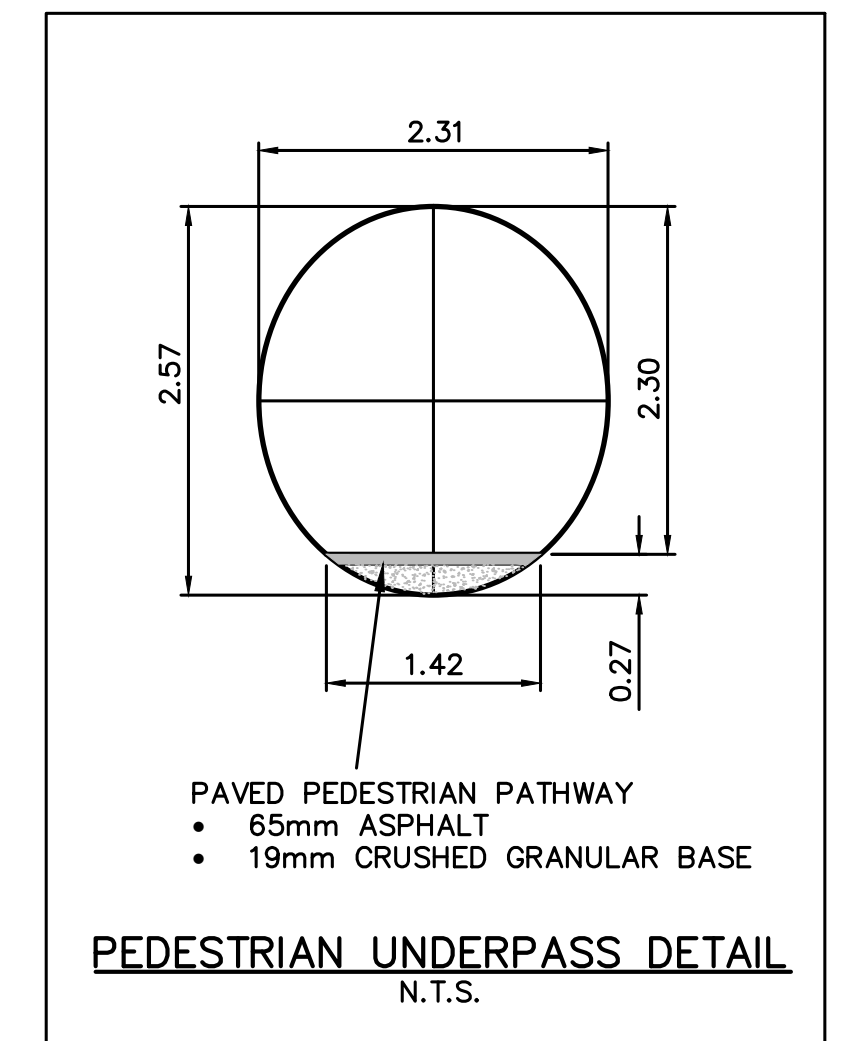
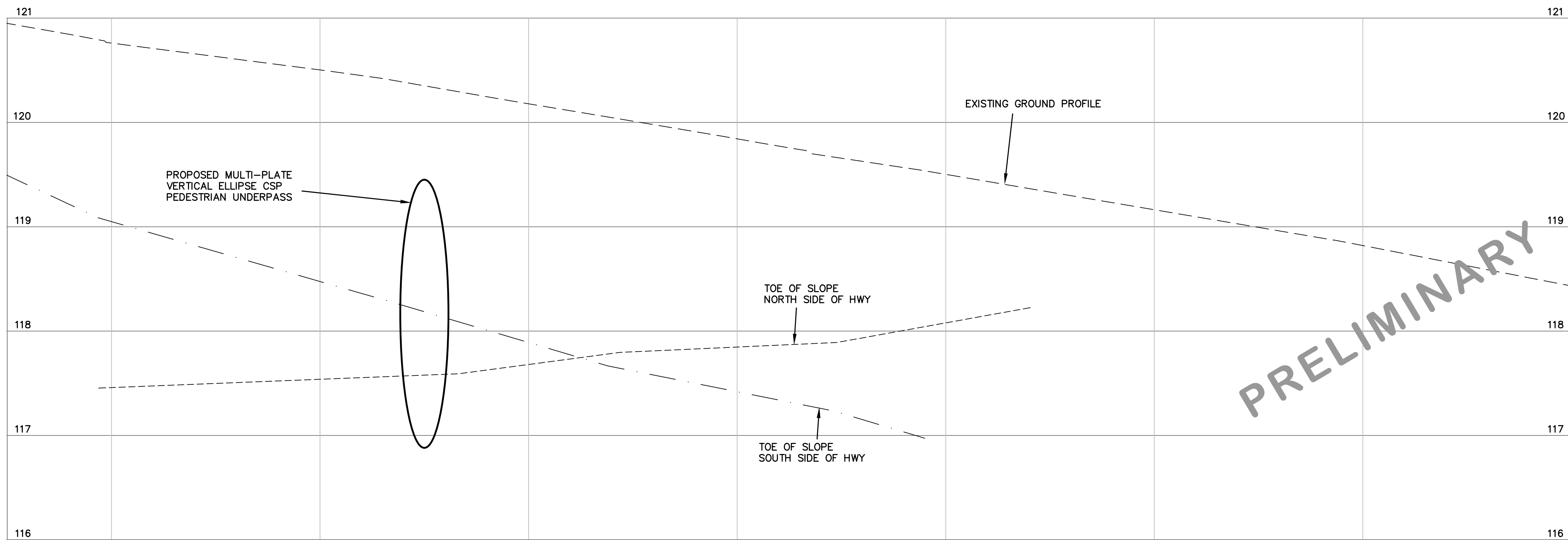
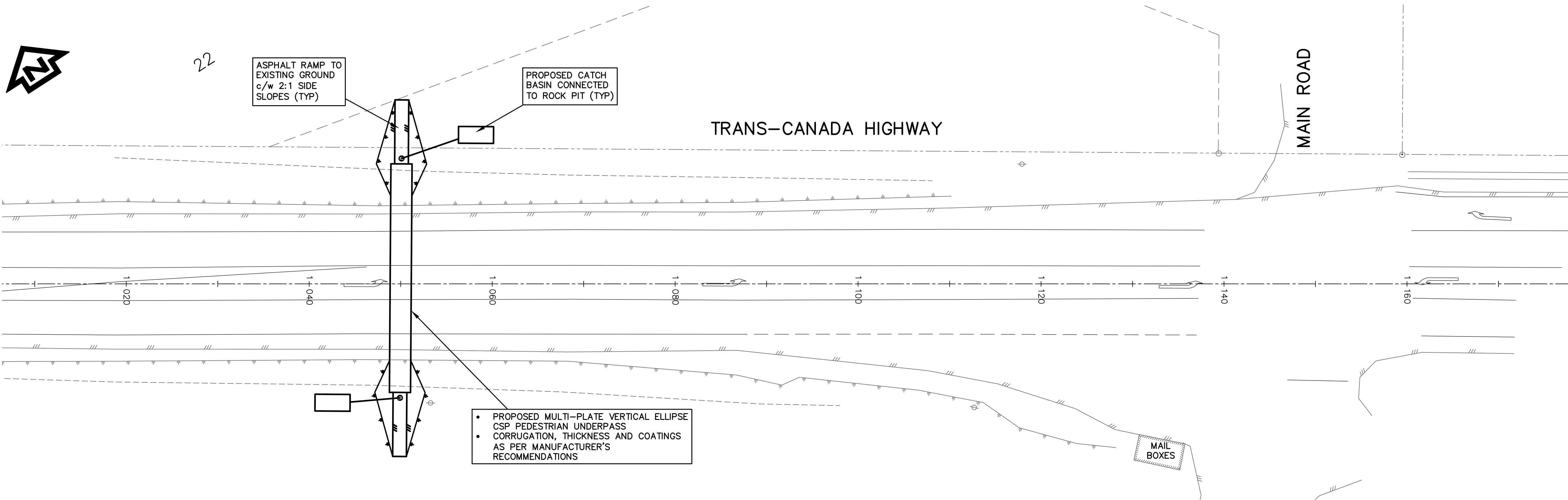




120.76	120.50	120.18	119.84	119.50	119.16	118.82	118	ELEVATION STATION
1+020	1+040	1+060	1+080	1+100	1+120	1+140	1+160	

[illegible]

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120.76 1+020	120.50 1+040	120.18 1+060	119.84 1+080	119.50 1+100	119.16 1+120	118.82 1+140	118 1+160	ELEVATION STATION
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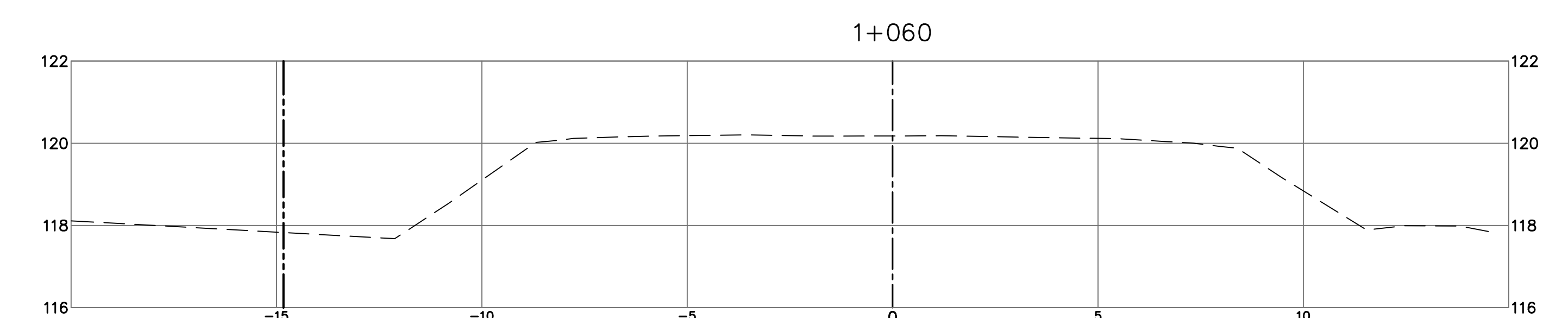
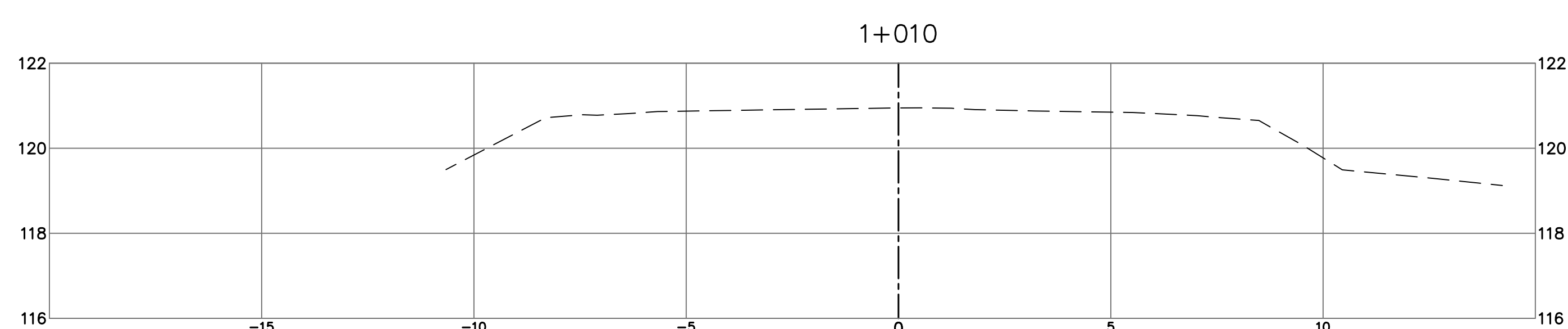
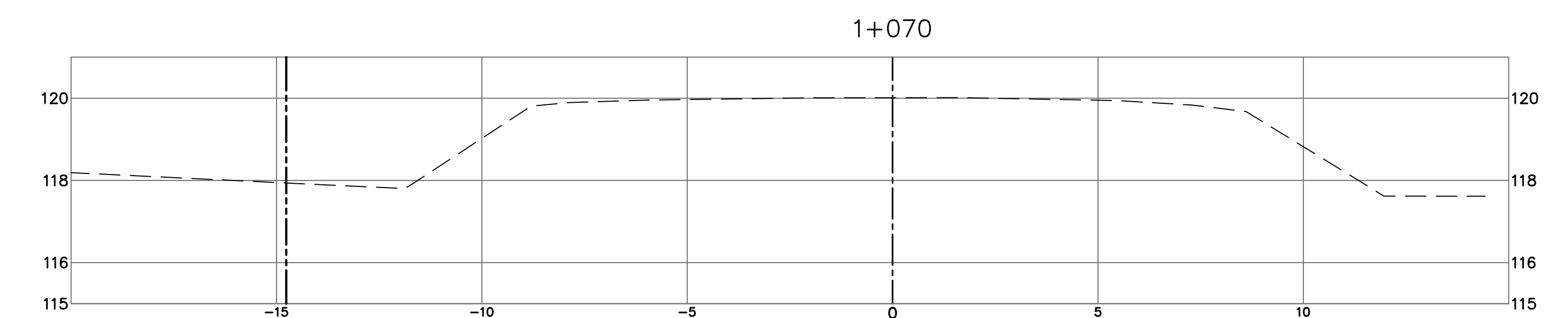
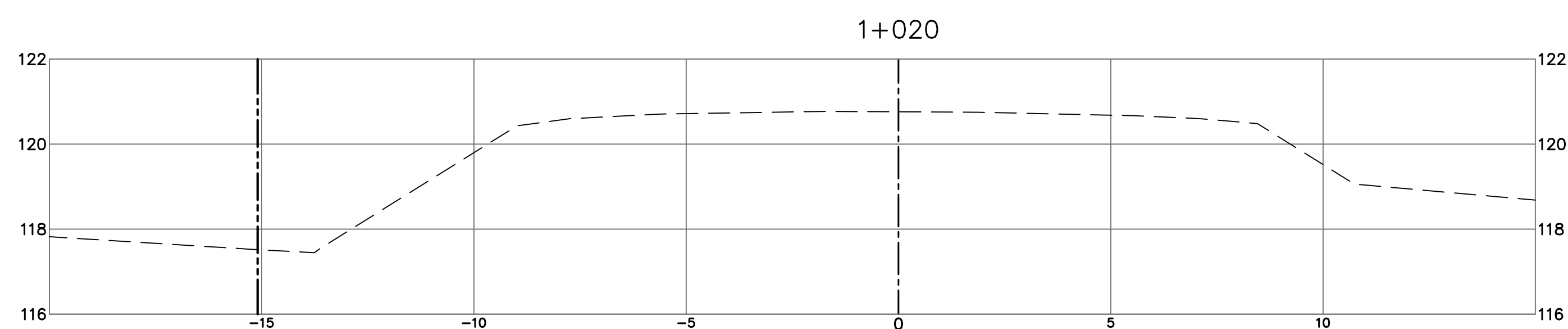
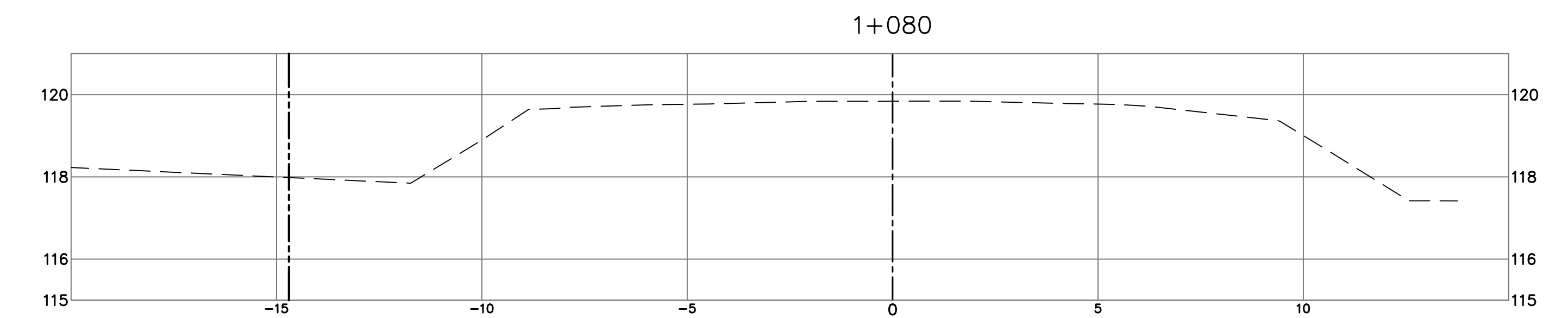
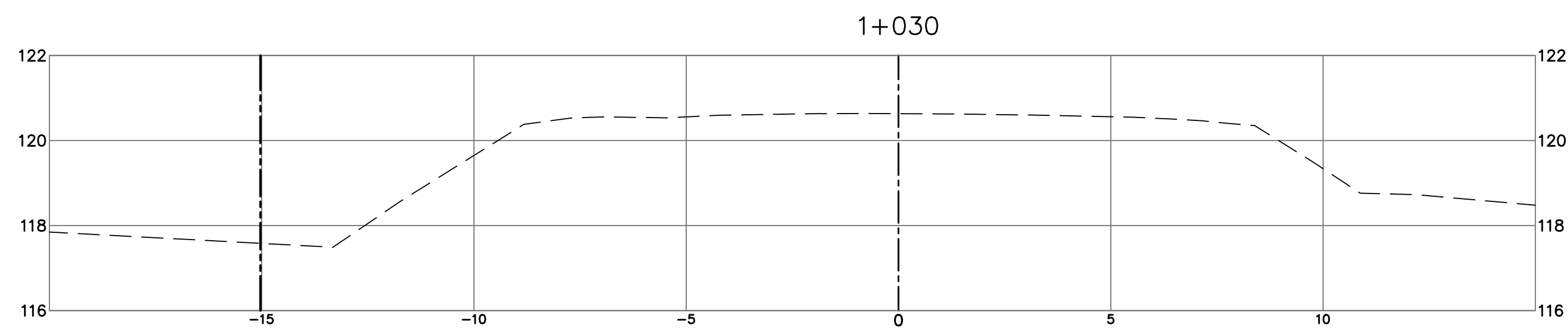
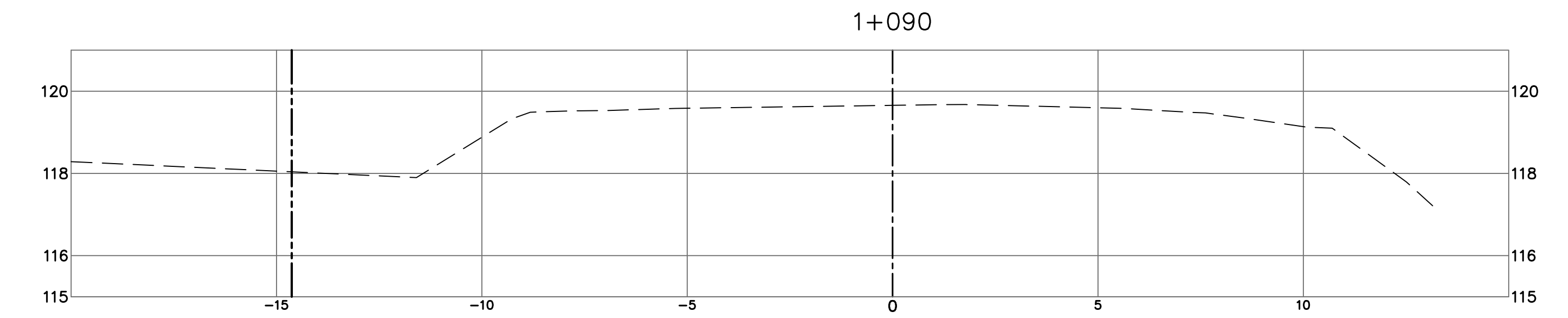
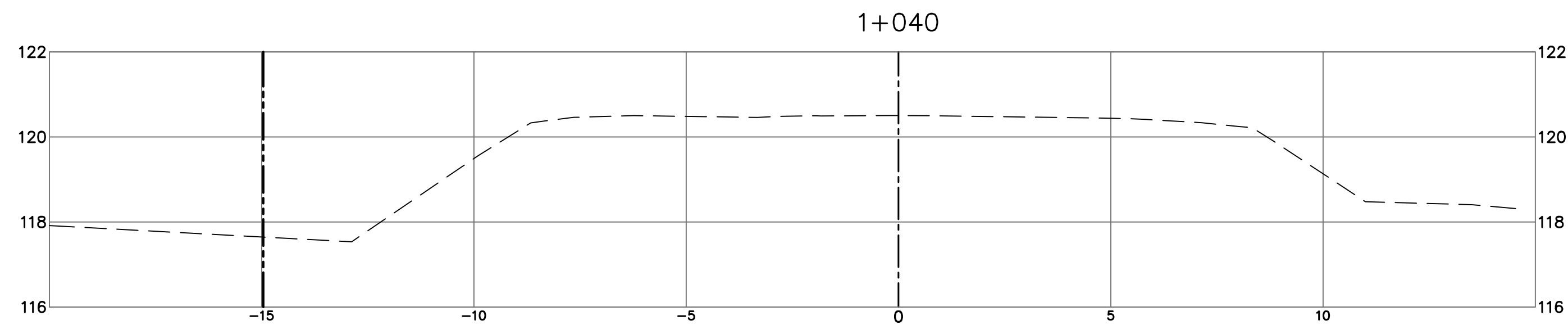
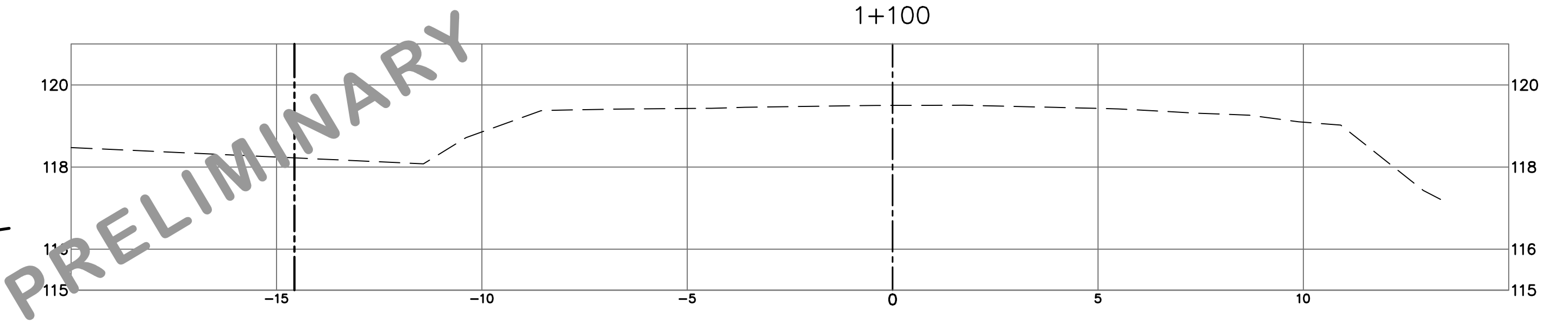
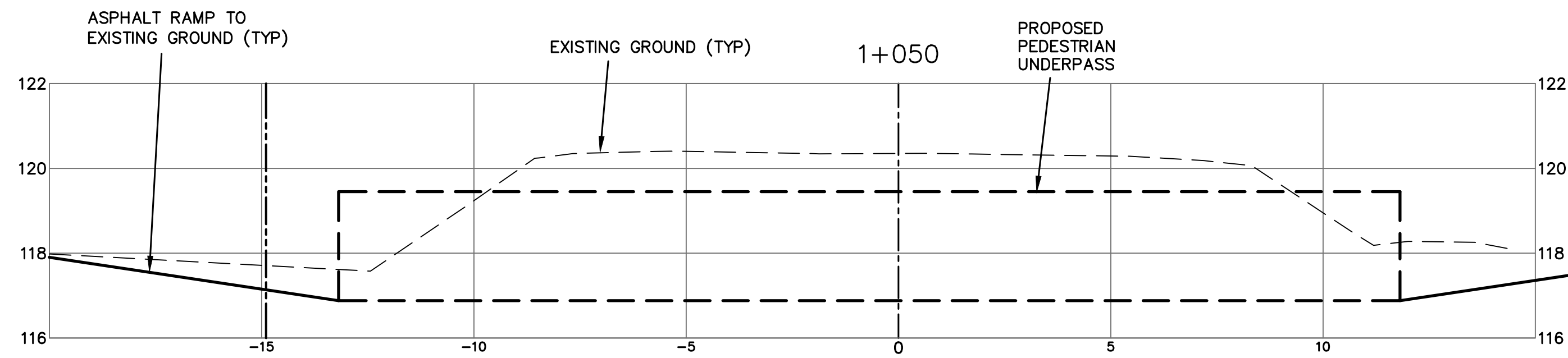
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DESIGN/DRAWN	CHWK
PEER REVIEWED	(ABC)
HORIZ. SCALE	1:250
VERT. SCALE	1:25



THE WEDLER GROUP	
■ Abbotsford	1,604,746.0300
■ Chilliwack	1,604,792.0651
■ Courtenay	1,250,334.3263
■ Surrey	1,604,588.1919

SPUZZUM FIRST NATIONS	
TRANSPORTATION & PEDESTRIAN ACCESS REVIEW	
SPUZZUM, BC	
PLAN/PROFILE	
TRANS-CANADA HIGHWAY	

DRAWING NO.	OF -2-
C20-5714/A-P01	
LOCAL GOVERNMENT FILE	
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APPENDIX D
Reference Documents





Other Approvals

Underpasses (tunnels) under public highways are often required to address highway safety concerns, such as the movement of animals and/or machinery from one side of an agricultural operation to another. Usually they are built at the same time as the highway is constructed or upgraded but on occasion, especially where the land use has changed or traffic volumes have increased dramatically since highway construction, an applicant will request a permit to place a private structure under the road. They may also be constructed in connection with recreational or industrial developments.

Examples of such structures could include:

- pedestrian underpasses
- cattle underpasses
- wildlife underpasses
- skier underpasses
- golf cart underpasses
- industrial conveyor belts

While the Ministry will not pay for private accesses of this type, if the developer is willing to pay the cost of construction and maintenance, a permit of this sort can be considered. Properly engineered drawings will be required and, should the installation be approved, the works must be designed, constructed and supervised by a professional engineer. Liability insurance will also be required. Please see **Approval Process** in this guide for general information on the application requirements. You should also contact the **District Transportation Office** during the initial planning stages.

This guide is a living document; it is subject to change without notice. Please check the Rural Subdivisions Website (http://www.th.gov.bc.ca/permits/Subdibision_Home.asp) to make sure you version is sufficiently current.

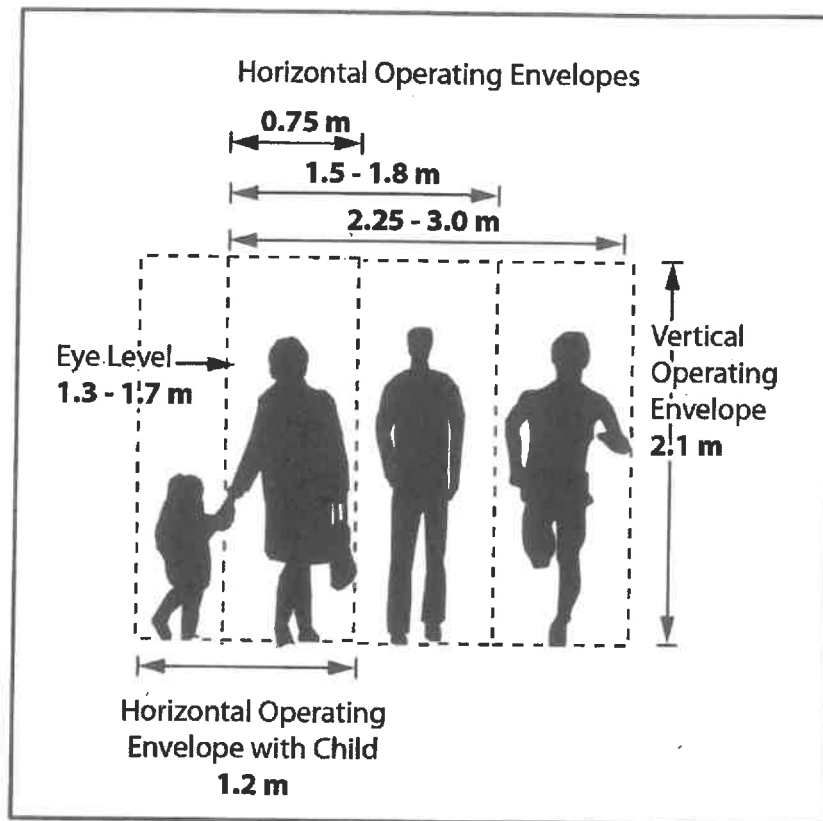


Figure 6.2.1: Typical Pedestrian Dimensions

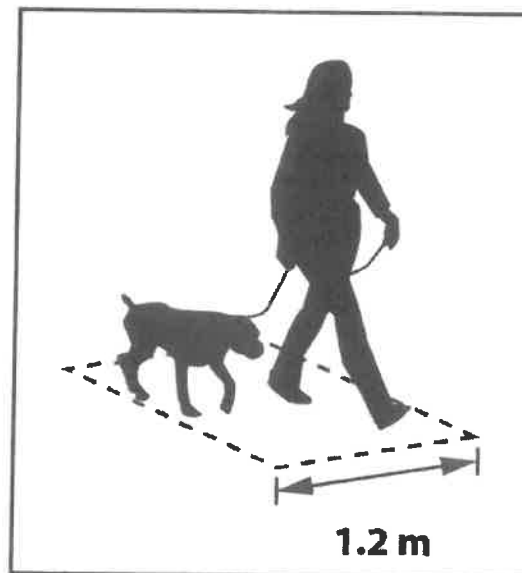
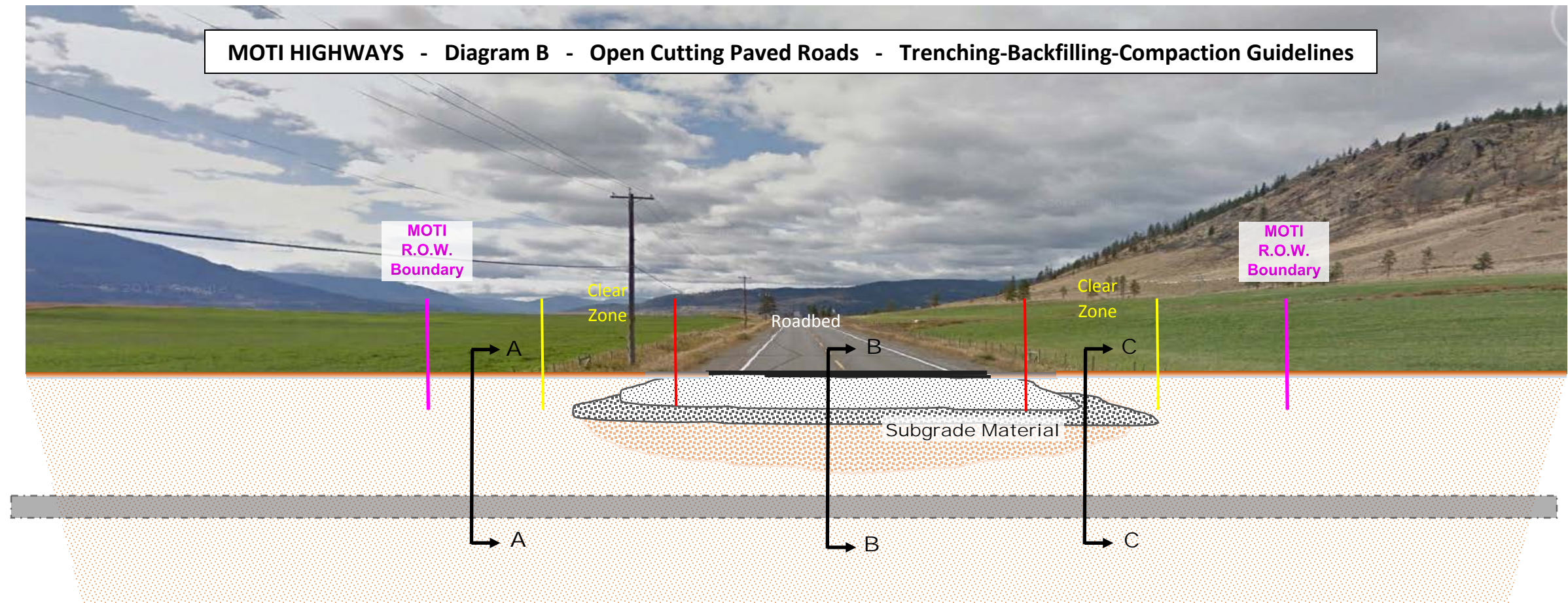


Figure 6.2.2: Horizontal Operating Envelope for a Person with a Service Animal

MOTI HIGHWAYS - Diagram B - Open Cutting Paved Roads - Trenching-Backfilling-Compaction Guidelines



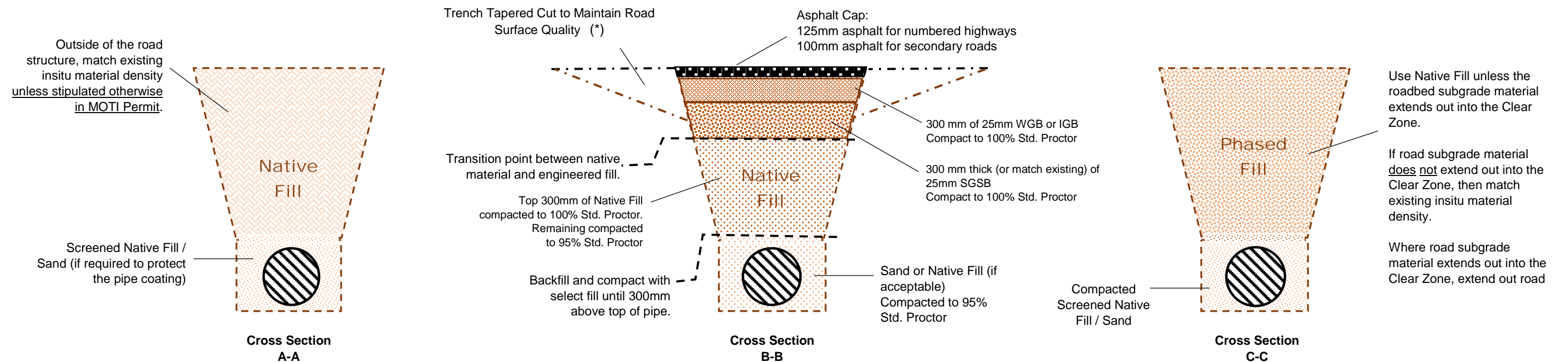
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NAME/NUMBER/REVISION/
DATE

(*) Trench Tapered Cut to Maintain Road Surface Quality

- PERMIT APPLICATION TO IDENTIFY IF TRENCH TAPERED CUT IS TO BE INCORPORATED AND ACCEPTABLE TO MOTI.**
- Start trench tapered cut at 900mm depth or depth of existing SGSB material if deeper.
- Trench tapered cut to be at 3H:1V or 5H:1V unless specified otherwise in MOTI Permit (i.e. Tapered Trench Not Required by MOTI).
- Where proximity to an adjacent pipeline does not allow for a 3H:1V or 5H:1V trench taper, adjust slope of taper (on that side) based on excavation offset requirements set by adjacent pipeline.

NOTES:

- All trench works within MOTI ROW shall comply with trench slope stability as required by WorksafeBC.
- For Cross-Section C-C: Roads indicated in the MOTI Permit as likely to be widened, backfill and compaction requirements shall be extended into the Clear Zone matching Cross-Section B-B. Extend far enough out to accommodate future widening and document in QA records.
- Alternative borrow shall be used if insitu fill material becomes saturated and cannot be suitably compacted.



APPENDIX E
Construction Budget Estimate



Construction Budget Estimate



Date: **3-Apr-20**
 File Number: **C20-5714/A**
 Project: **Spuzzum First Nations Transportation and Pedestrian Access Review**

ITEM DESCRIPTION

A. Multi Plate Elliptical Culvert
Construction duration estimate 4 weeks - 160 work hours

1	Labour and Equipment	Total Hours	Rate per Hour	COST
a.	400 track excavator	160	260 \$	41,600.00
b.	Dump truck	160	100 \$	16,000.00
c.	Packer	160	100 \$	16,000.00
d.	Small tools	160	50 \$	8,000.00
e.	Pick up	160	50 \$	8,000.00
f.	Foreman	160	75 \$	12,000.00
g.	Grademan	160	65 \$	10,400.00
h.	Two Labourers @ \$50/hr	160	100 \$	16,000.00
Total Labour & Equipment				\$ 128,000.00

2	Traffic Control	Total Days	Rate per Day	Cost
		20	\$ 3,000.00	\$ 60,000.00

3	Multi Plate Assembly	Unit	Per Unit	Cost
		m 25	\$ 800.00	\$ 20,000.00

4	Materials				
a.	25m Multi Plate delivered to site	ea	1	\$ 80,000.00	\$ 80,000.00
b.	25mm minus crush bedding backfill and road structure (26m ² /m@20LM = 520m ³)	m ³	520	\$ 50.00	\$ 26,000.00
c.	Asphalt 15m wide	m ²	225	\$ 50.00	\$ 11,250.00
Total Materials				\$	117,250.00

B.	Line Painting	LS	1	\$ 10,000.00	\$ 10,000.00
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C. Trail Connections

1	Gravel & Asphalt through crossing	m ²	35	\$ 100.00	\$ 3,500.00
2	Connecting trails (2m wide @150/m)	m	100	\$ 150.00	\$ 15,000.00
3	Pole complete with overhead light at both ends	ea	2	\$ 5,000.00	\$ 10,000.00
Total Trail Connections				\$	28,500.00

Construction Budget Estimate \$ 363,750.00

Engineering

1	Civil Engineering 7.5%			\$	27,281.25
2	Geotechnical Engineering 2.5%			\$	9,093.75
3	Traffic Management Plan	LS	1	\$ 5,000.00	\$ 5,000.00
Total Engineering				\$	41,375.00

Sub Total Construction & Engineering \$ 405,125.00
 Contingency 20% \$ 81,025.00
Total Budget Estimate (not including taxes) \$ 486,150.00