



Fernie Valley Pathway 2020 Preliminary Design Report

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Submitted to: The Corporation of The City of Fernie
Prepared by McElhanney Ltd.

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Executive Summary

The City of Fernie and Fernie Trails Alliance are pursuing the design of a 6.1km paved active transportation pathway from West Fernie to Fernie Alpine Resort. Called the *Fernie Valley Pathway* it is intended to be a direct commuter link to the neighborhoods along the Highway 3 corridor, recreation sites, and Fernie Alpine Resort.

For the pathway alignment, predominately the highway corridor has been chosen, along the west side of Highway 3. This eliminates the need for additional trail crossings of the highway and provides for the most direct route. Typically, the pathway stays within the highway right-of-way adjacent to private property boundaries, occasionally crossing private property or utilizing frontage roads where possible. At Mt Fernie Park Road and Highway 3, Ministry of Transportation is potentially discussing intersection upgrades at this intersection, which is identified as a key location for the pathway to service the neighborhood of Riverside. In the vicinity of Lizard Creek, Ministry of Transportation is currently upgrading the highway bridge including adding a multi-use pathway to the bridge, as well as the pathway tie-ins at either end.

From Lizard Creek to Fernie Alpine Resort, pathway alignment options are still undecided between the Ski Hill Road Alignment and following Boardman Creek. This area needs additional geotechnical investigation to decide the feasibility of each route. Both options will require retaining wall structures to stabilize the pathway and fencing for user safety regarding steep slopes.

This report and the preliminary design drawings are intended to narrow down the optional pathway concepts and structure (cross section) prior to detailed design. A design criteria matrix was developed to design the pathway cross sections for items like the grades (< 8%), width (2.7-3m wide), and setback from vehicle traffic. A preliminary geotechnical, transportation safety, environmental and stormwater drainage review was also conducted. From the cross sections and preliminary design drawings of the alignment, the total quantities of each material required for construction were estimated. Cost estimates for the design, construction, and operations and maintenance were developed.

For detailed design and construction, a phased approach is planned with the more urban segment from West Fernie to Mt Fernie Park Rd to be constructed first, as this is expected to have the most users and fewest property and permitting challenges.

Contents

1. Introduction	1
1.1. Project Background	1
1.2. Vision.....	2
2. Pathway Design Process	3
2.1. Review and Research	4
2.2. Client Provided Background Information	4
3. Alignment Validation	4
3.1. Field Review	4
3.2. Trail Alignment Survey Limitations.....	5
3.3. Initial Conceptual Pathway Alignments	5
3.4. Segment Division	6
3.5. Segment 1	7
3.6. Segment 2.....	12
3.7. Lizard Creek Bridge	13
3.8. Segment 3	14
4. Design Criteria and Technical Review.....	17
4.1. Design Criteria.....	17
4.2. Design Criteria Items Applied to Pathway Cross Sections	19
4.3. West Fernie Cross Sections.....	22
4.4. Winter Pathway Design Considerations.....	25
4.5. Geotechnical Review	26
4.6. Environmental Review	28
4.7. Transportation Safety Review	30
5. Detailed Design & Construction Sequence.....	32
6. Discussion	34
6.1. Constraint Analysis & Risk Discussion	34
6.2. Cost Estimate	37
6.3. Operation and Maintenance Costs	37
7. Next Steps for Implementation	41
7.1. Implementation Funding Strategy	41
7.2. Phase A Detailed Design	41
7.3. Agricultural Land Reserve.....	41
7.4. Cost Sharing & Partnership Agreement(S)	41
7.5. Detailed Survey	41
7.6. Landowner and Stakeholder Engagement.....	41

7.7.	Environmental Review	42
7.8.	Detailed Design Drawings for Phase A	42
7.9.	Construct Phase A	42
7.10.	Geotechnical Investigation Part One	42
7.11.	Update Fernie Ski Hill Road Concept Drawings	43
7.12.	Geotechnical Study Part 2	43
7.13.	Implementation of Phase B & C	43
8.	Closure.....	44

Appendices

Appendix A – Drawing List

Appendix B – Cost Estimate

Appendix C – Client Provided Background Information List

Appendix D – Fernie Trails Alliance Project Charter

Appendix E – Original Conceptual Design Options Drawing from Fernie Trails Alliance

1. Introduction

1.1. PROJECT BACKGROUND

McElhanney was retained by the Fernie Trails Alliance (FTA), which is contracted with the City of Fernie (CoF), to confirm an alignment and provide recommendations for the Fernie Valley Pathway, a paved multi-use pathway that will connect the communities within the valley corridor between the City of Fernie and Fernie Alpine Resort (FAR).

Many people commute and recreate using non-motorized transportation modes along this corridor, including on the shoulder of Highway 3. Pedestrian and cyclist use of Highway 3 is increasing, furthering the need for this pathway. Public safety is a primary driver for developing this pathway.

Key stakeholders in this project are:

- City of Fernie (CoF);
- Regional District of East Kootenay (RDEK);
- Ministry of Transportation and Infrastructure (MOTI);
- Resorts of the Canadian Rockies (RCR – the owners of FAR);
- Agricultural Land Commission (ALC); and
- Fernie Trails Alliance (FTA),

Other stakeholders include:

- Fernie Snow Valley Community Association (FSVCA);
- Various private landowners; and
- A range of community interest groups, businesses and organizations.

This project requires significant stakeholder engagement and support to be successful, which is currently being led by the FTA and CoF to obtain approval and build support for the project. In addition, stakeholder engagement will play an important role during detailed design and construction in future stages of the project.



1.2. VISION

The completed project will provide a non-motorized, paved multi-use pathway that connects the communities within the corridor between the City of Fernie and Fernie Alpine Resort (FAR). The project also aims to connect the neighbourhoods and communities of downtown Fernie, West Fernie, Riverside, Anderson Road, The Cedars, and FAR with businesses, hotels, restaurants and places of employment as a strategic link in a larger active transportation strategy for the Fernie area. The opportunity to connect these areas through a continuous paved pathway that separates active transportation users from vehicle traffic, as much as practically possible, will mitigate existing safety concerns and facilitate greater participation in active transportation modes within the community.

When completed, the Fernie Valley Pathway will address the significant public concern regarding the safety of pedestrians, cyclist and other active forms of transportation travelling between the City of Fernie and Fernie Alpine Resort using the highway. In addition, the pathway should improve the connectivity between the urban and semi-rural areas by connecting with pre-existing trail networks and cycle routes.

Anticipated users will vary along the length of the pathway depending on population density and proximity to businesses. Commuters on road, hybrid, or mountain bikes are anticipated to be the most abundant users between Mt Fernie Park Road and downtown Fernie due to the distance between these locations. Within West Fernie, extensive pedestrian and small wheeled use (such as skateboards and kick scooters), is also anticipated as residents and tourists travel short distances between businesses and residences. Along the entire pathway, extensive use is expected by resident and tourist mountain bikers pedalling to recreate on Fernie's renowned singletrack trails at Mt. Fernie Provincial Park and FAR. Recreational walking and running is anticipated along the length of the pathway, with a higher percentage of these users concentrated south of Mt Fernie Park Road.

The objective of McElhanney's current scope is to complete a preliminary design that will confirm the preferred alignment of the pathway to be carried forward into detailed design. The cost estimate will aid stakeholders to budget and source funding for pathway implementation.

2. Pathway Design Process

The following section outlines the process undertaken to validate the conceptual alignments for the purposes of developing the preliminary design and cost estimates. A simplified diagram of how each process led into the next is shown in Figure 1.

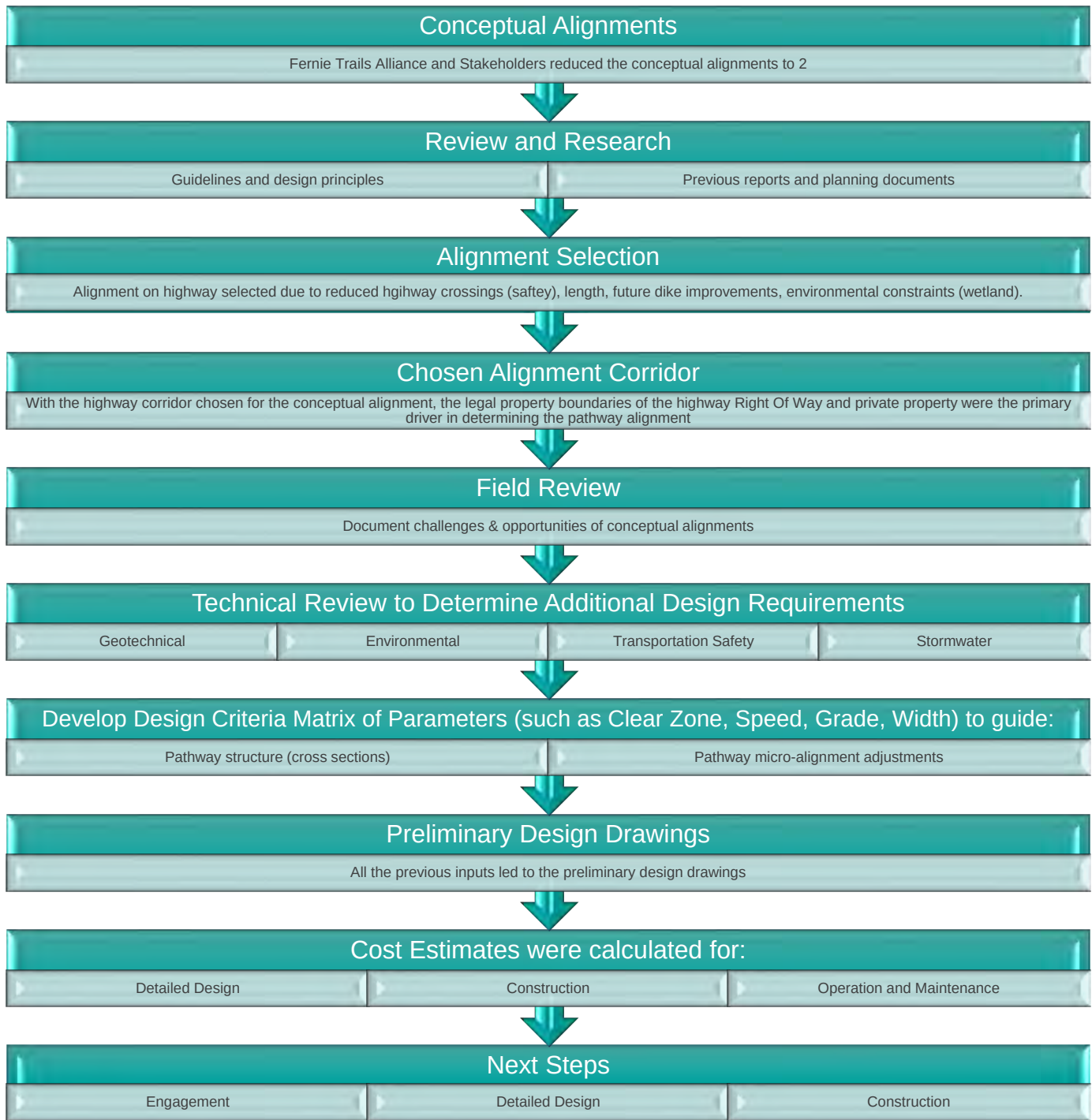


Figure 1. Flow Chart of Factors Guiding the Preliminary Design Drawings.

2.1. REVIEW AND RESEARCH

McElhanney completed a literature review of applicable design guidelines to provide the basis for determining the design criteria. Documents reviewed included:

- *British Columbia Active Transportation Design Guideline* – (BC MoTI, 2019)
- *British Columbia Ministry of Transportation and Infrastructure (various sources)* – given that the majority of the proposed Fernie Valley Pathway from West Fernie out to FAR is along the MoTI right-of-way (ROW), the standards and guidelines provided by MoTI govern the majority of the pathway design.
- National Association of City Transportation Officials (NACTO) the *Urban Bikeway Design Guide* and *Separated Bike Lane Planning and Design Guide*.
- *Alberta Trails in Highway Right of Ways*, This document outlines many design principles and best practices that apply to pathways within the highway right-of-way. There is no equivalent guide for BC.
- *Planning and Design for Pedestrians and Cyclists – A Technical Guide (Velo Quebec, 2010)* – developed through the construction of the Route Verte, a system of 5,300 kilometers of pathway in Quebec with much of it separated paved pathway. This technical guide collates many best practices all into one useful resource.

2.2. CLIENT PROVIDED BACKGROUND INFORMATION

Please see Appendix C with regards to a complete list of the documents that were provided to and reviewed by McElhanney. The FTA also provided a Project Charter to guide the pathway design process. The complete Charter is available in Appendix D.

3. Alignment Validation

3.1. FIELD REVIEW

McElhanney staff Darin Langhorst, P.Eng. and Matt Hadley, B.Sc. travelled to the site for a Design Kick-off Meeting with stakeholders from the FTA, City of Fernie, and MoTI to review the project scope and key considerations. Following this meeting on August 27, 2019, a comprehensive review of the alignment was conducted by vehicle and, where necessary, by foot. The outcomes of this field reconnaissance form the basis of the trail alignment description in the following sections.

3.2. TRAIL ALIGNMENT SURVEY LIMITATIONS

When reading this report and reviewing the drawings be aware that the survey data and base mapping was compiled from numerous different sources. We were unable to verify the accuracy of the information and we do note that there are contradictions. To develop a surface that covered the entire alignment all of these sources were required.

We recommend that a detailed topographic survey be conducted of the alignment and a legal land surveyor engaged to review the source and placement of all the data sources. This will solve any misalignment issues and ensure that sufficient level of detail is gathered for items such as edge of pavement, manhole covers, power poles and anchors, utility pedestals, signage, culvert sizes and inverts gutters, etc. A detailed survey is outlined in the next steps in section 7.

3.3. INITIAL CONCEPTUAL PATHWAY ALIGNMENTS

When the project was awarded, the FTA had already narrowed down the pathway alignment options to two possibilities at the north end, Segment 1, that are described in **Error! Reference source not found.** and Table 1. Previously, approximately a dozen options were considered, some of which went from Mt. Fernie Provincial Park through the forest, and others which climbed through private land on the north side of Boardman Creek. Essentially all of these other possibilities were ruled out due to land ownership challenges, or the fact the Fernie Alpine Resort prefers the pathway to *come up the front entrance* as in Figure 2. A complete drawing of the original conceptual options is in Appendix E. These were presented to Council July 23, 2018 by the FTA.

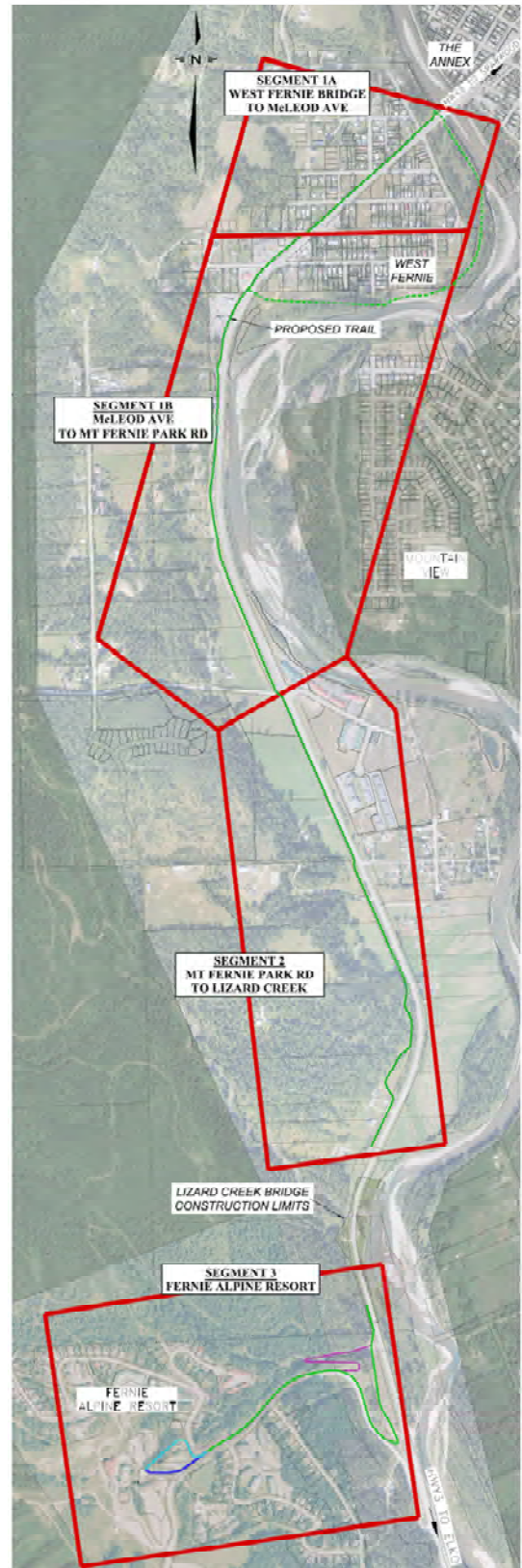


Figure 2. Welcome to Fernie Alpine Resort Sign, the Pathway would run between the Sign and the Road, or on a Widened Road Edge.

3.4. SEGMENT DIVISION

The overall route was divided into three segments as delineated in **Error! Reference source not found.** by the red polygons, and in more detail in the drawings in Appendix A.

- Segment 1 is from the West Fernie Bridge to Mt Fernie Park Rd.
 - Construction began in this segment since this report was originally published. We have therefore divided Segment 1 into Segment 1A and 1B. Segment 1A is currently under construction, funded by the Ministry of Transportation.
 - o Segment 1A (is under construction) from the West Fernie Bridge to McLeod Ave in West Fernie.
 - o Segment 1B extends from McLeod Ave to the Mt. Fernie Park Road.
- Segment 2 extends south to the Lizard Creek Bridge Construction.
- Segment 3 is from the south side of Lizard Creek Bridge Construction to Fernie Alpine Resort. The individual segments are described further in the following report sections including justification of why they were chosen.



3.5. SEGMENT 1

3.5.1. West Fernie Bridge Pathway Upgrades (Segment 1A)

The four upgrades listed below are beyond the scope of the current preliminary design project, however, they are outlined due to their importance for seamless connectivity and the safety of pathway users crossing the West Fernie Bridge. See Figure 3 for context.

- 1) Improvements to the non-motorized sidewalk crossing on the West Fernie Bridge over the Elk River. This may include sidewalk widening and railing improvements to upgrade the pedestrian sidewalk to a multi-use pathway across the bridge;
- 2) Improvements to the existing trails which cross beneath the bridge;
- 3) Improvements to existing sidewalk and pathway connections at the West Fernie Bridge. This may include sidewalk widening to upgrade the pedestrian sidewalk to a multi-use pathway on the connections to the bridge;
- 4) Improvements to the connection from the bridge to the pathways which curve and loop underneath the bridge itself.

Functionally, these elements become an interchange for non-motorized users to connect from the existing West Fernie Dike trail onto the paved pathway and sidewalk network. Currently, parts of these sidewalks and pathways would need improvements to meet current guidelines for multi-use pathways.

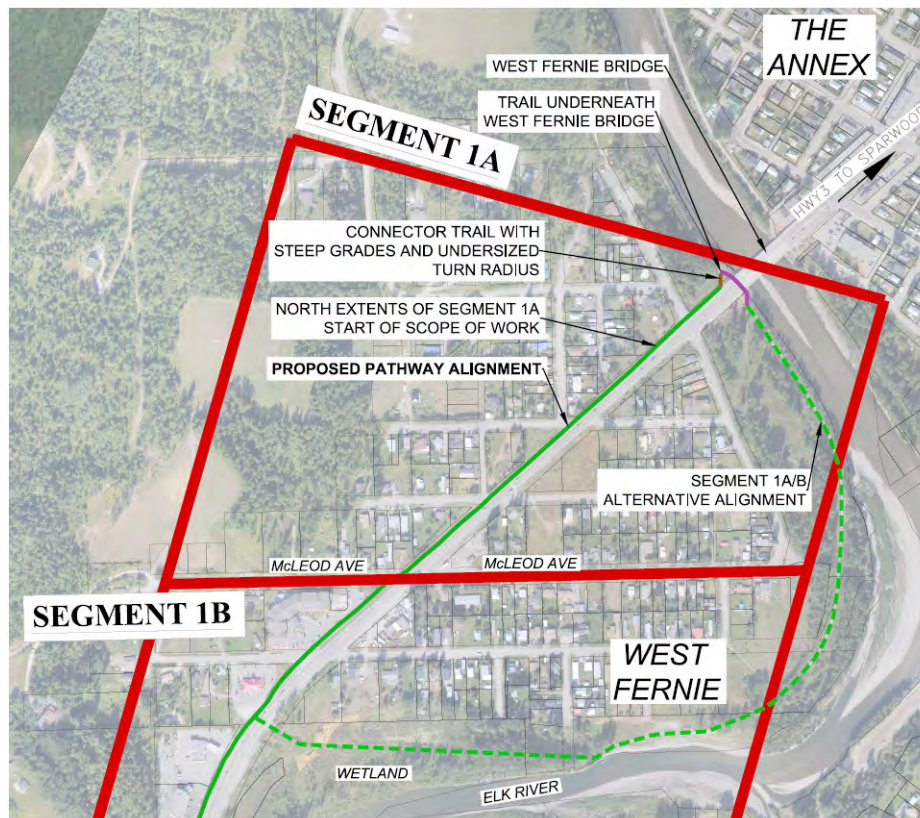


Figure 3. Conceptual Pathway Alignments in West Fernie showing Preferred Alignment Following Highway 3 and Alternative Alignment along West Fernie Dike.

3.5.2. Segment 1 (A & B) Alignment Concept Options

In Segment 1, two conceptual pathway alignments were considered and evaluated using input from the FTA, the MoTI, and the City of Fernie. Both conceptual alignments began at the West Fernie Bridge (see Figure 3, where an existing multi-use underpass crosses under Highway 3 to the West Fernie Dike Trail. The option along the West Fernie Dike (Figure 4) was eliminated due to the elevation of the existing dike being below the Flood Construction Level identified in the 2019 Flood Mitigation Plan. Paving a pathway along the dike prior to raising the dike was not considered a reasonable investment. Environmental feasibility was also viewed as challenging as there is a wetland (Figure 3 & Figure 5) to cross at the south end before reconnecting with the highway corridor. The alignment also is less direct, less visible, and adds to the pathway's overall length.



Figure 4. Existing West Fernie Dike Trail Downstream of the West Fernie Bridge.



Figure 5. The Wetland a Pathway would need to cross if the Alternative Alignment in West Fernie were used.

3.5.3. Segment 1B Highway Crossing Options

The Fernie Valley Pathway requires a highway crossing of the Crowsnest Highway (Highway 3) south of the Anderson Rd intersection with Highway 3 in order to improve the connectivity between urban and semi-rural areas, which was identified as a priority in the City of Fernie Official Community Plan (OCP). The highway crossing will connect the neighborhoods and commercial developments at Riverside and Vanlerberg Rd on the east side of Highway 3 with the proposed Fernie Valley Pathway, as well as The Cedars and Anderson Rd neighborhoods, Mt Fernie Provincial Park, the Elk Valley Nordic Center, and Island Lake Lodge, see Figure 6.

The most feasible location for the highway crossing is at the Riverside Way and Mt Fernie Park Road intersection. This location is ideal because it provides the neighborhoods of Riverside and Vanlerberg Rd with direct access to the Fernie Valley Pathway and also services the high volume of traffic coming from Fernie Provincial Park and downtown Fernie to access the existing and future commercial businesses in the Riverside neighbourhood. The alternative location considered was a highway crossing under the Lizard Creek Bridge, however, this location is not suitable due to physical constraints, the use of the Lizard Creek underpass as a wildlife corridor, and the preference to have trail crossings within a 60 km/h zone, as stated by MoTI.

At the Mt Fernie Park Rd and Riverside Way intersection with Highway 3 intersection signage with cross walk markings and signs, with interim lighting improvements such as push-button signals could be considered for a highway crossing. Any interim solutions will need close coordination with MoTI. Potential

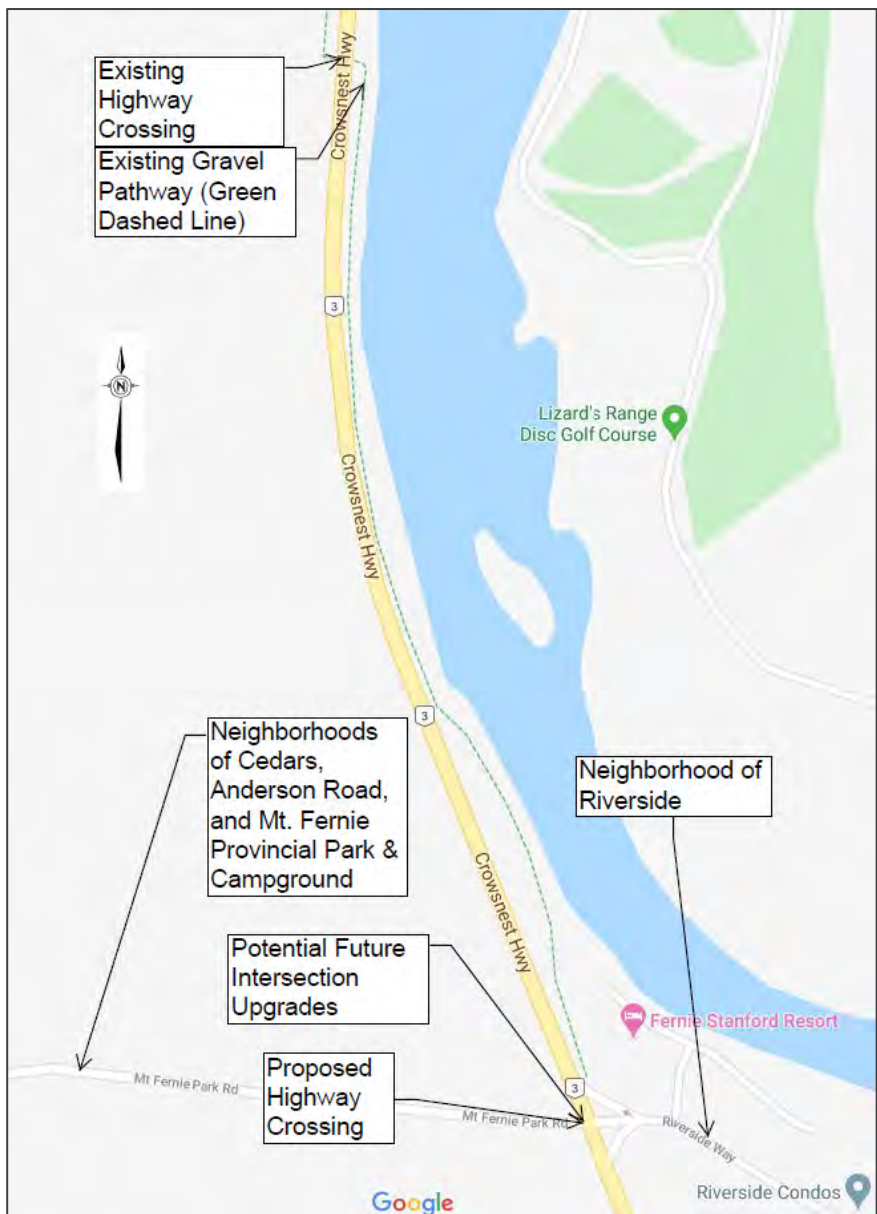


Figure 6. Existing Pathway, Unmarked Crossing, and Potential Future Intersection Upgrades, map from Google Maps.

future improvements to the intersection to address vehicle traffic are outside of the scope of this preliminary pathway design report.

The current unmarked and unsigned crossing (location shown in Figure 6, image shown in Figure 7) is not considered a safe option to be retained once Segment 1 of the Fernie Valley Pathway is constructed on the west side of Highway 3. For the highway driver there is no indication that a speed change should occur at this segment of highway, such as a corner, prominent roadway intersection or flashing lights etc. Once the Fernie Valley Pathway is constructed this informal crossing should be completely decommissioned. The future of the gravel trail on the east side of the highway will need to be determined by the CoF.



Figure 7. Existing Centennial Trail unmarked, unsigned crossing of Highway 3. Image from Google Street View.

Table 1. Description of the Trail Alignments Options in Segment 1 (A & B) and Justification for the Preferred Alignment

Segment 1 (A & B)	
Description	Justification for Preferred Alignment
Preferred Alignment: Follows Highway 3 along the west side, with six (6) road crossings, two (2) commercial driveway crossings and eight (8) private driveway crossings, until reaching a road crossing at Mt Fernie Park Rd. Length: 2300m	A commuter route has the purpose of moving users from start to finish in a timely and intuitively direct way. Routing the pathway along the highway corridor provides the most direct route and provides good connectivity to neighborhoods on both sides of the highway, as well as commercial businesses within the corridor. The preferred alignment includes several commercial driveway crossings, therefore allowing users, including tourists, to access these commercial developments, such as restaurants and hotels, more easily. Aligning the pathway on the west side of Highway 3 is farther from the river. This location is less likely to be damaged by flood events as outlined in the Elk River Flood Plain Mapping.
Alternative Alignment: Strays away from the Highway 3 corridor and follows the existing primitive recreation trail adjacent to the river, eventually meeting back with and following the highway on the east side until the intersection of Riverside Way and Mt Fernie Park Rd, which will require a highway crossing. Length: 2860m	Routing the pathway along the river adds on several hundred extra meters, therefore making it less direct, intuitive, and desirable for commuters. Routing the pathway along the river is also not currently feasible due to the existing West Fernie Dike being too low to satisfy the updated flood constructions levels provided in the 2019 City of Fernie Flood Mitigation Plan. Due to the high cost to raise the dike and its lower priority within the CoF's long-term planning, the rebuilding of the dike is not expected in the near future and building the pathway along the dike prior to raising the dike would require pathway reconstruction once the dike is raised. The trail along the existing dike is already highly utilized even with a gravel surface. If the pathway were alongside the river, then the neighborhoods closer to the highway would be tempted to continue using the shoulder of the highway, as it is closer and more direct, regardless of the direction of travel.

3.6. SEGMENT 2

Segment 2 connects from Mt Fernie Park Road to the Lizard Creek Bridge construction at the south end of Lizard Creek Road. See Appendix A for a complete drawing set. For an overview see Figure 3.

Table 2. Segment 2 Pathway Alignment Justification.

Segment 2	
Description	Justification
Continues to follow Highway 3 along the west side, starting at the Mt Fernie Park Rd potentially crossing three (3) private parcels and a private driveway in the MoTI ROW until reaching the Lizard Creek multi-use bridge. Length: 1706m 	Routing the pathway on the west side of Highway 3 removes the need for an additional pathway crossing of the highway to ultimately connect with Fernie Ski Hill Rd.

3.7. LIZARD CREEK BRIDGE

Lizard Creek Multi-Use Bridge and pathway, this 520m of trail is out of scope of the Fernie Valley Pathway project as it is already under construction by MoTI as shown in Figure 8.

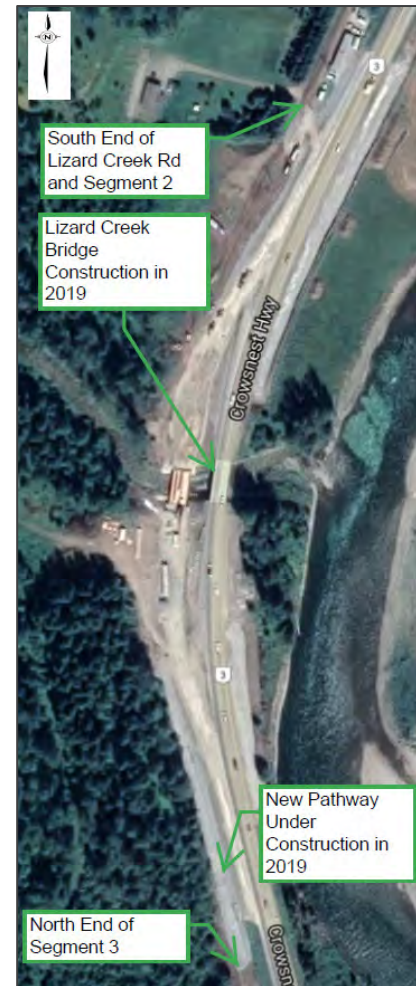


Figure 8. Lizard Creek Bridge and Pathway Construction.

3.8. SEGMENT 3

During the design process two additional alignment options for Segment 3, (Option A and D in Figure 9), were brought forward that were beyond the initial project scope. They are in the vicinity of FAR and the reasoning for these options is to reduce the expense and complexity of running the pathway alignment along the edge of Fernie Ski Hill Rd. They would also improve the user experience by decreasing the grades and separating the pathway from the road where possible. The conceptual analysis of these options is discussed below in Table 3. These options were presented to MoTI and Resorts of the Canadian Rockies (RCR), however at this point each organization expressed preferences for different alignments from

Highway 3 up to FAR based on the conceptual level evaluation.

Currently there is not enough geotechnical information to make a truly informed decision regarding the construction cost and lifecycle costs of each option, however Options A and D are estimated to be approximately half the cost of the alternates (B and C, respectively). A higher-level cost estimate with 50% contingency is used due to the unknowns present in segment 3. A two-stage geotechnical investigation is recommended as one of the next steps outlined in section 7 to support the alignment decisions required for Segment 3.

The following Table 3 describes the options outlined in Figure 9 and highlights the pros and cons of each option.

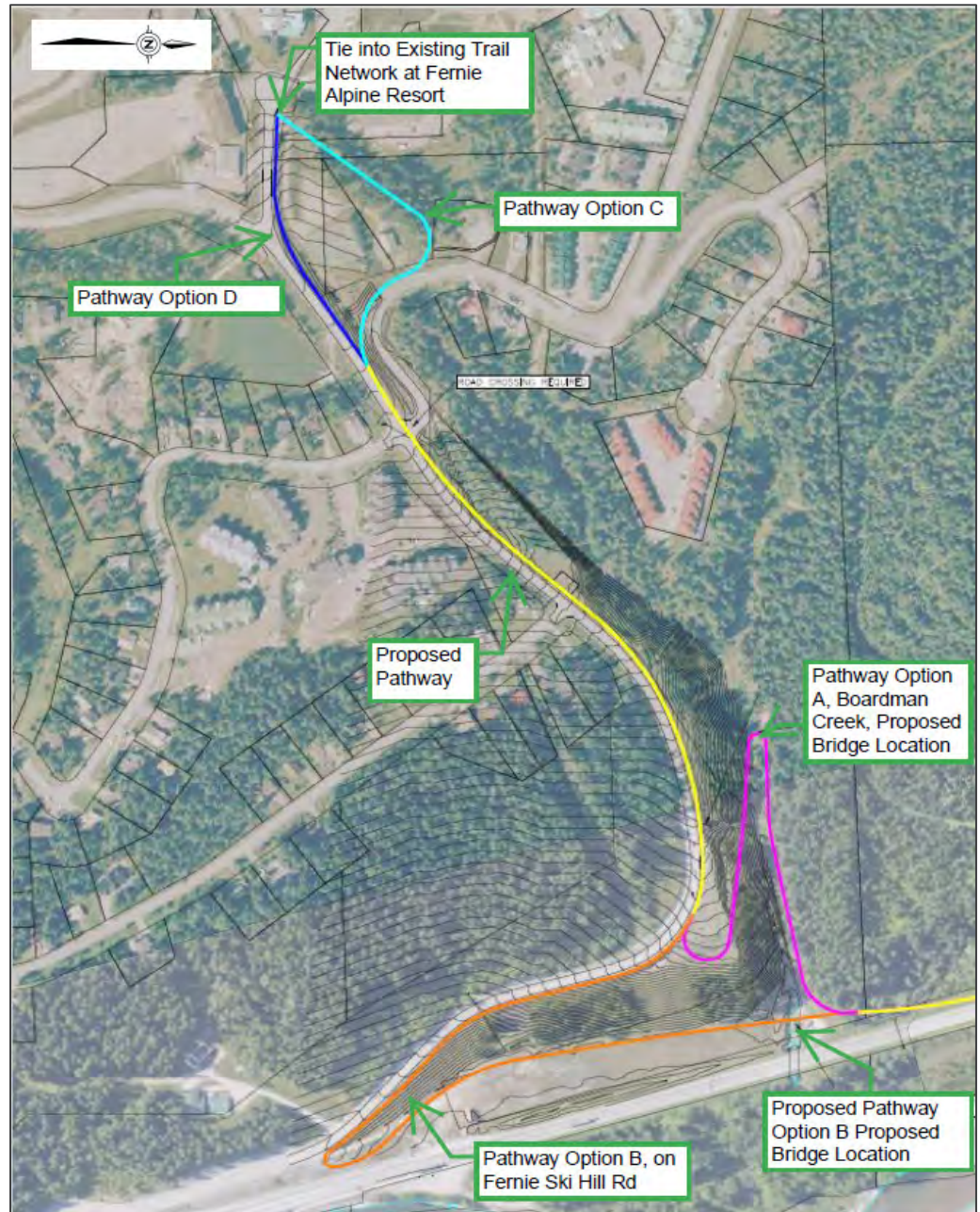


Figure 9. Segment 3, Showing Pathway Options at Fernie Alpine Resort

Table 3. Pathway Alignment Options in Segment 3 from Highway 3 to the Fernie Alpine Resort

Segment 3 Alignment Option & Description	Pros	Cons
Option A: Length 690m Route climbs up an abandoned service road along the north side of Boardman Creek, would cross the creek with a new bridge, and then climbs a steep slope on the south side to join Fernie Ski Hill Rd. From there it would continue adjacent to the road shoulder on a common alignment with Option B to the Highline Dr. intersection. 	• more scenic and interesting route along a creek and within a forested area • more flexibility to site a bridge over Boardman Creek • more flexibility to add mix of slopes to the climbing path and construct at lower grades, meaning a wider variety of skill/fitness level of cyclists could safely climb/descend this segment of the pathway • separated from vehicles and winter maintenance (snow clearing) operations • lower cost than Option B	• terrain steeper in the ravine and unknown soils conditions • more exposure of pathway to flood or debris flow damage • more environmental impact by routing by watercourse and through forest, • higher potential for wildlife conflict • less intuitive route for entry/exit from FAR
Option B: Length 840m Route would cross Boardman Creek with a new bridge adjacent to Highway 3 and follow along the flat until it intersects with the embankment of Fernie Ski Hill Rd. From there it would switchback and climb up to the road and continue adjacent to the road shoulder, eventually becoming a common alignment with Option A to Highline Dr. intersection. 	• intuitive and direct route for entry/exit from FAR • potential to use some of the existing developed roadway plateau as the base for the pathway • lower potential for wildlife encounters	• construction costs/complexity if road needs to be widened adjacent to steep slope • more steep side slope requiring fencing than in Option A • continuous steep grade and steeper than Option A • depending on how the pathway is separated from the road there could be winter maintenance (snow clearing) challenges • road engineered fill slopes have settled in the past and been repaired by MoTI (potential quality/condition issues are unknown) • higher cost than Option A

Option C: Length 280m

Route diverges from Fernie Ski Hill Rd. above the Highline Dr. intersection, contouring below the existing tennis courts and horse stables until it reaches Boardman Creek. From there it would gently climb on the south side of the creek within the forested setback to a common tie-in location with the existing FAR trail network in the cul-de-sac below the Day Lodge.



- more scenic and interesting route along a creek and within a forested area
- more flexibility to add mix of slopes to climbing path and construct at lower grades
- separated from vehicles and winter maintenance (snow clearing) operations
- less potential for conflicts with future development plans for the tennis court lands as the pathway could be within the environmental setback from Boardman Creek
- could double as a community trail connector for Highline Dr.
- less intuitive route for entry/exit from FAR
- more environmental impact by routing by watercourse and through forest,
- higher potential for wildlife conflict
- higher cost than Option D

Option D: Length 235m

Route generally follows Fernie Ski Hill Rd adjacent to the road shoulder to a common tie-in location with the existing FAR trail network in the cul-de-sac below the Day Lodge.



- intuitive and direct route for entry/exit from FAR
- lower potential for wildlife encounters
- could also serve as a community trail connector for future development of the tennis court lands
- lower cost than Option C
- depending on how the pathway is separated from road there could be winter maintenance (snow clearing) challenges

4. Design Criteria and Technical Review

4.1. DESIGN CRITERIA

The majority of the pathway will be located inside the right of way for Highway 3 and, potentially, the Fernie Alpine Resort access road. As both are under the jurisdiction of the BC MoTI, the design standards and guidelines of the ministry will play a major role in the design of the pathway. There are portions of the pathway which will be in City of Fernie, RDEK, and other lands, however it will be important to maintain a consistent pathway design throughout the overall trail.

The design criteria summarized in Table 4 use the idea of “design domain” to establish practical and recommended minimum/maximum for various aspects of the design. This is to provide understanding of how the sizing of elements in the typical sections and pathway design parameter values were selected. To develop the design criteria matrix the BC Active Transportation Design Guide (MoTI) [BC ATDG] and the BC Supplement to TAC Geometric Design Guide [BC MoTI TAC] were referenced wherever possible. Additional sources are referenced at the bottom of the table.

When using the design criteria matrix, in Table 4, each item is assigned a practical minimum and maximum based on the literature review. Then the constraints at the specific location along the pathway alignment are considered to refine this to the recommended minimum or maximum. This is reflected in the “Choice” column, with the rationale of why it was chosen described in the adjacent “Rationale” column. Along the pathway, different widths, clear zone, clear space etc. were chosen based on the design constraints such as highway speed, proximity to property lines or objects. The culmination of the design criteria matrix and the local constraints are reflected in the cross sections for the pathway which are explained further in the following section and drawn with specific location-based information in Appendix A.

While some guidelines use the term “recommended” instead of preferred when discussing design domain, this can create confusion during design. For example, assume a certain type of pathway has a practical minimum width of 2.5m and a preferred maximum of 3.0m. This means that going any narrower than 2.5m will result in safety, user conflict, and other operational issues. It also means that going wider than 3.0m is not necessary because the additional width, and costs, do not provide significant benefits regarding safety, user conflict, and operational issues. Then, based on site specific geometry, the designer finds that the widest trail which fits into the existing road ROW is 2.8m. For the purpose of this example, 2.8m becomes the “choice” for the width, which is within the recommended design domain. In highly constrained designs, the practical minimum criteria and recommended criteria are the same. When unconstrained, the preferred maximum and recommended criteria are the same. Physical, financial, and possibly other types of constraints can shift the chosen design criteria within the design domains.

It must be recognized that some elements relating to geotechnical slopes, retaining walls, etc. are assumptions that will require site specific geotechnical investigation prior to moving into detailed design. Criteria that are not a function of local conditions, like a 2% typical pathway crossfall, are very unlikely to change during detailed design.

Table 4. DESIGN CRITERIA MATRIX

#	Item	Description (If Required)	Practical Minimum	Practical Maximum	Recommended Minimum	Recommended Maximum	Source	Choice	Rationale
1	Posted Road Speed		n/a	n/a	n/a	n/a	n/a	60km/h, 80km/h	Existing Condition
2	Trail Design Speed		15km/h	50km/h	30km/h	50km/h	BC ATDG	30km/h	Keep design speed relatively low to accommodate all skill levels.
3	Trail Width		2.7m	4.0m	3.0m	4.0m	BC ATDG	2.7m, 3.0m	3.0m in Town section, 2.7m in Highway and Ski Hill Road section to save space.
4	Clear Zone	Fog line to inside pathway edge	4.5m, 6.0m	5.0m, 6.5m	4.5m, 6.0m	5.0m, 6.5m	BC MoTI TAC	4.5m, 6.0m	Minimum chosen due to limited space between road and power poles in many cases. Different values are based on 60km/h and 80km/h road speed.
5	Clear Zone (Outside Curves)	Safety factor applied for outside curves	5.4m, 6.0m	6.0m, 6.5m	5.4m, 6.0m	6.0m, 6.5m	BC MoTI TAC	5.4m, 6.0m	Based on 60km/h with 450m road centerline radius, or 80km/h and >1000m road centerline radius.
6	Clear Space	Edge of pathway to object or fill slope	0.6m	n/a	1.5m	n/a	BC ATDG	0.6m, 1.5m	0.6m areas with minimal drop off or a guardrail. 1.5m for more significant drop offs but no guardrail.
7	Street Buffer	Edge of shoulder to edge of pathway	0.6m	n/a	1.5m	2.0m	BC ATDG	Varies	Make as wide as space allows without going below minimum.
8	Barrier Height	MoTI Precast Concrete Median Barrier 810mm - CMB-E	0.6m	n/a	0.81m	n/a	BC ATDG, BC MoTI SSHC	0.810m	Suitable for use on MoTI Freeways.
9	Barrier Width	MoTI Precast Concrete Median Barrier 810mm - CMB-E	n/a	n/a	n/a	n/a	BC MoTI SSHC	0.612m	Suitable for use on MoTI Freeways.
10	Fence Height		1.4m	n/a	n/a	n/a	BC ATDG	1.4m	Treated wood post and rail fence will be used instead of chain link as it is safer for cyclists, and provides wildlife permeability.
11	Longitudinal Slopes		0.60%	5%-8%	n/a (crossfall can provide drainage if path is level)	4%	BC ATDG	Varies	Try to keep within preferred range for drainage and inclusion of all skill levels. Rest areas required for steeper gradients. Rest area spacing dependent on gradient. May not be able to keep below 8% grade on ski hill road, however, this route is only desirable for intermediate to advanced riders anyway.
12	Cross Slope		0.70%	4.00%	2.00%	3.00%	CC, TAC, BC ATDG	2.00% Typical	Practical minimum based on City of Calgary sidewalk standards. Practical maximum based on TAC. Preferred values based on BC ATDG & TAC.
13	Fill Side Slopes		Vertical (if retained)	Vertical (if retained)	3:1	2:1		Varies	Sideslopes to be confirmed by geotechnical engineer.
14	Cut Side Slopes		Vertical (if retained)	Vertical (if retained)	3:1	2:1		Varies	Sideslopes to be confirmed by geotechnical engineer.
15	Vertical Clearance		2.7m	3.6m	3.0m	3.6m	BC ATDG	3.0m	Vegetation to be cleared to 3.0m height.
16	Horizontal Clearance (curb)		0.2m				BC ATDG	0.2m	Suitable for section along Boardman Road.
17	Horizontal Clearance (object)	Objects greater than 750mm high	0.5m				BC ATDG	0.5m, 0.6m	0.5m clearance minimum from utility poles, 0.6m typical. 0.6m vegetation clearance.
18	Vehicle Shy Distance from Barrier	Fog line to barrier	1.4m	2.0m	1.4m	2.0m	TAC	1.4m, 2.0m	Minimum based on 60km/h road speed, maximum based on 80km/h.
19	Barrier to Outside Edge of Path		3.5m				BC MoTI TAC	3.5m	
20	Pathway Centerline Radius		9.0m, 21.0m		10.0m, 24.0m		TAC	9.0m, 24.0m	Based on 30km/h design speed and between 2% & 5% superelevation. Lower values are for tight switchback corner at the base of Ski Hill Road and is based on 20km/h design speed and between 2% & 5% superelevation.
21	Pathway Crest		K=2				TAC	Varies	Based on 30km/h design speed.
22	Pathway Sag		K=2.5				TAC	Varies	Based on 30km/h design speed.
23	Stopping Sight Distance		34m	44m			BC ATDG	Varies	Based on 2% uphill and 10% downhill at 30km/h design speed. Case by case basis of each crest curve to be determined at detailed design stage.
24	Horizontal Sightline Offset		9.2m				TAC	9.2m	Based on 25m horizontal radius and 44m stopping sight distance.
25	Minimum Vertical Curve Length		48.3m		48.3m		BC ATDG	48.3m	Based on 30km/h design speed.

Guideline Sources and abbreviations: BC Active Transportation Design Guide (MoTI) [BC ATDG]; BC Supplement to TAC Geometric Design Guide [BC MoTI TAC]; BC Standard Specifications for Highway Construction [BC MoTI SSHC]; Transportation Association of Canada Geometric Design Guidelines for Canadian Roads [TAC]; City of Calgary Roads Construction Standards [CC]

4.2. DESIGN CRITERIA ITEMS APPLIED TO PATHWAY CROSS SECTIONS

The following three figures are meant to illustrate how the design criteria matrix were applied to create the pathway cross sections.

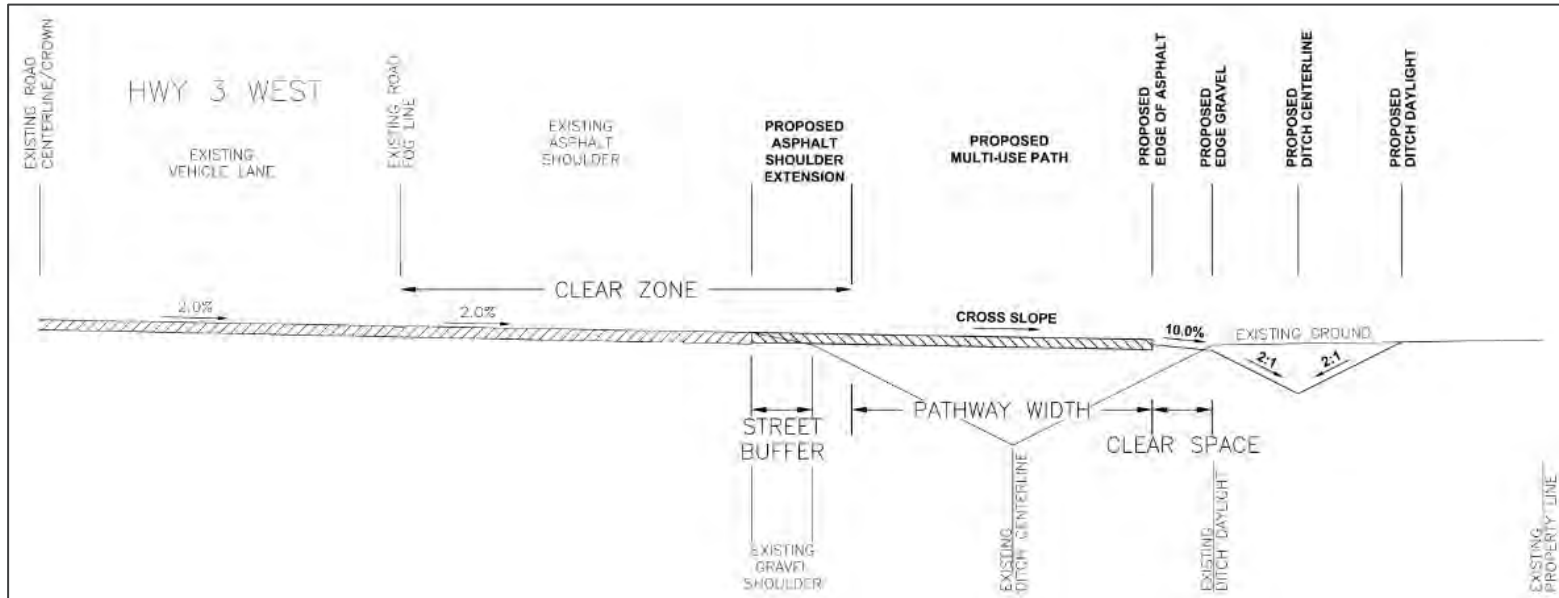


Figure 10. Pathway Cross Section Describing Design Criteria Matrix Terminology and Location. Location Specific and Dimensioned Cross Sections are in Appendix A.

In Figure 10 the design criteria matrix items were identified and chosen to create the desired cross section. The Highway 3 travel speed of requires a wide clear zone for vehicle and pathway user safety. Pathway width is chosen based on anticipated level of use, the available space between the vehicle traffic and the existing property line. The Clear Space is maximized to provide a physical and perceived recovery space for users that lose control.

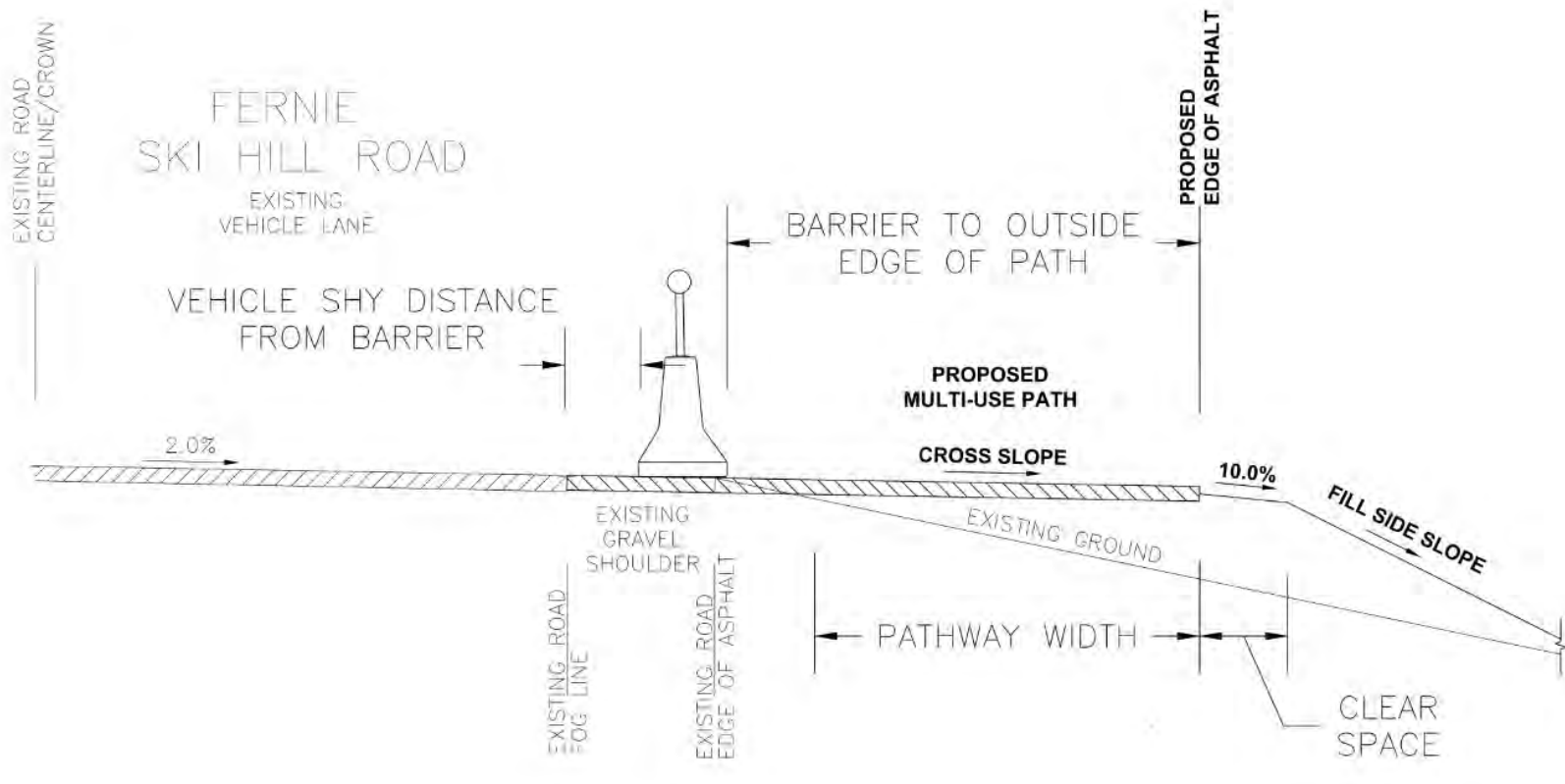


Figure 11. Pathway Cross Section Illustrating Barrier Placement and Design Criteria Terminology.

Figure 11 illustrates the design use of a barrier on a road with a slower speed limit. MoTI guidelines as shown in the design criteria matrix identify the preferred height for the barrier. The vehicle shy distance from the barrier is identified. The pathway width leaves a clear space from the fill side slope and the barrier to allow for space for pedals and handlebars, as well as a recovery space for cyclists that lose control. In this example no fence is required due to the gradual nature of the fill side slope. The pathway width is minimized to reduce the requirement for widening the road and extending the fill slope, which if widened further would possibly then require a retaining wall and a fence. When it is a steeper side slope with an identified fall hazard a fence can be used as in the next figure.

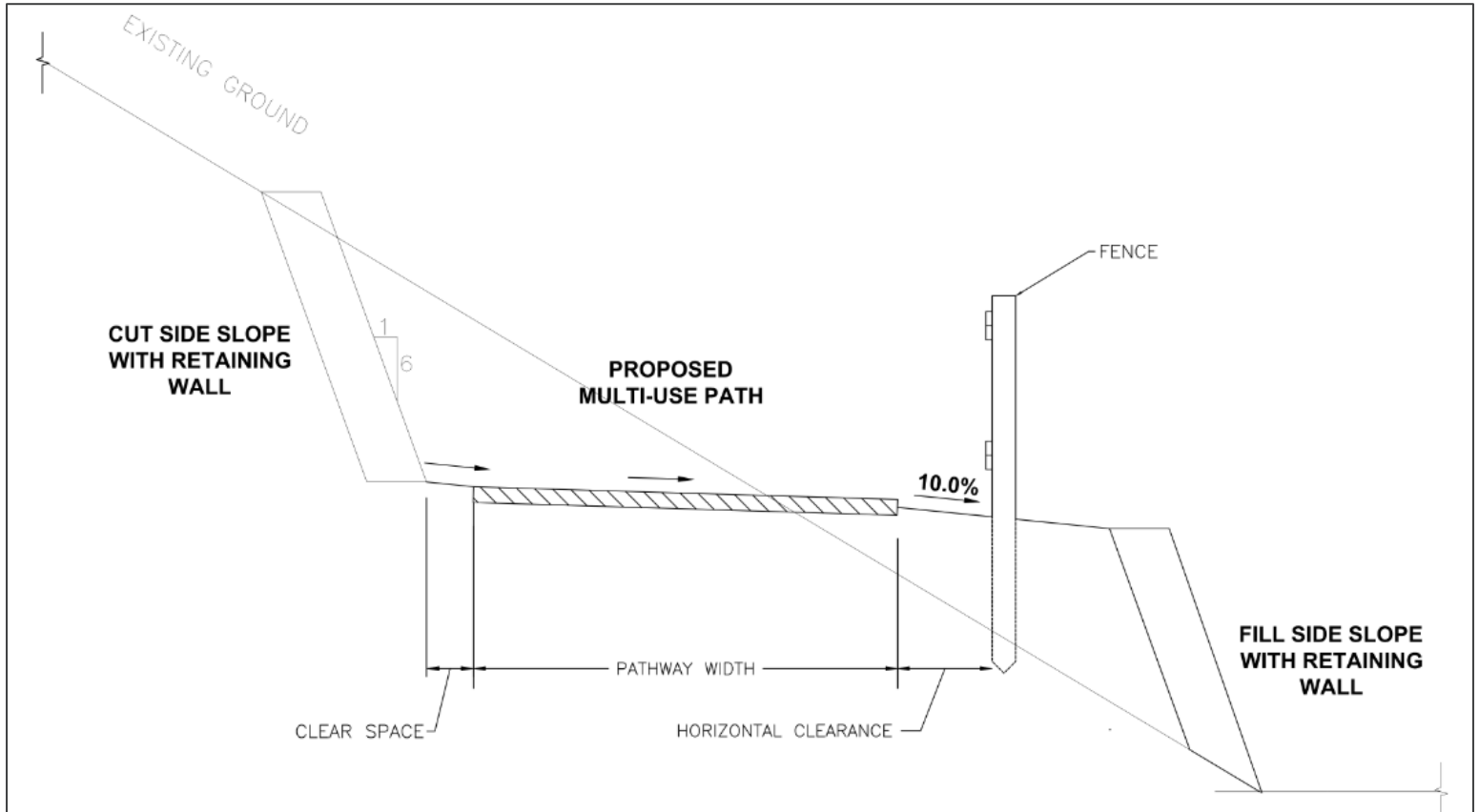


Figure 12. Proposed Pathway Cross Section on a Steep Side Slope.

Figure 12 illustrates the proposed construction of the pathway on a steep side slope. Retaining walls are used to provide stability for the cut and fill material from slumping. Additional information on retaining walls is provided in section 4.5. Due to the fall hazard off the steep fill side slope with the retaining wall, a fence is required. The pathway width and clear space are reduced to the minimums for cost efficiency. For location specific and dimensioned cross sections see the complete drawing set in Appendix A.

4.3. WEST FERNIE CROSS SECTIONS

During the January 27, 2020 design progress meeting with the CoF and FTA, the CoF noted that there had been discussions with BC MoTI about the length of path between the West Fernie Bridge and McLeod Avenue. The CoF explained there was some urgency to this request as there may be an opportunity to coordinate with BC MoTI in the spring/summer of 2020 to install roadside barriers here. The CoF requested that the design team provide typical section option(s) for an on-shoulder pathway with barriers between the travelled lane of the highway. As this may be an interim option, the design team also looked at whether a separate pathway, without highway modifications, would fit in the highway right of way or not.

The key constraints and design criteria in this length of the path (shown as typical sections O and P in the preliminary design drawings) are as follows:

- The existing Highway speed limit is 60km/hr and has a minimum 4.5m clear zone from white fog line to edge of pathway;
- Pathway design width is 3.0m based on higher user numbers in West Fernie;
- Existing highway ditch slopes appear to exceed 3:1 and 2:1;
- Vehicle shy distance to a roadside barrier is 1.4m for 60km/hr highway speed;
- Minimum 0.6m clear space between edge of path and a path side barrier/fence;
- It is important to preserve existing overland drainage system of ditches and culverts to avoid the need for a piped system; and
- There are existing power poles and utilities on the west side of the Highway.

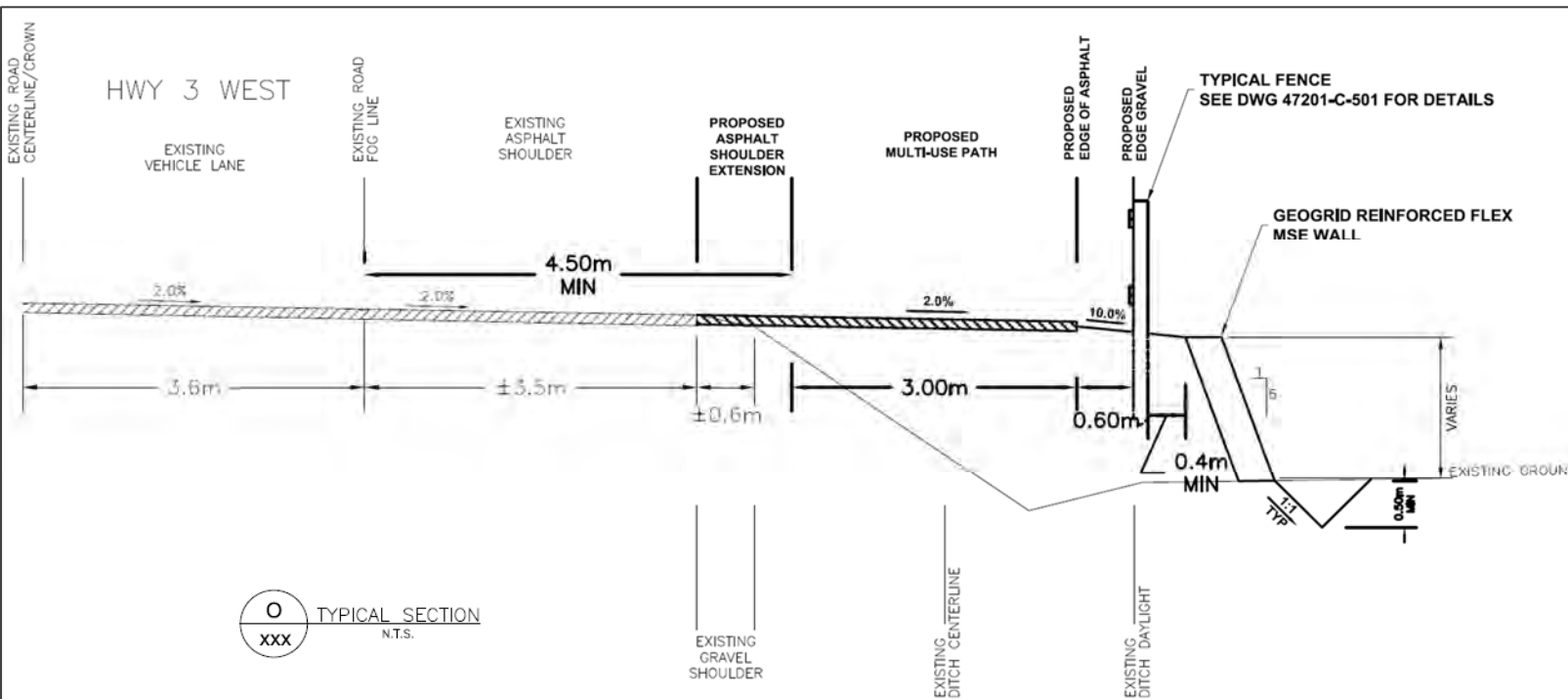


Figure 13. Typical Section O, Typical Section P is Similar, for Specifics see Appendix A.

Based on the key design criteria and existing, two conceptual design questions emerged:

- 1) Would it be possible to install some form of roadside barrier on the existing shoulder and still have enough room for a functional pathway in the summer of 2020? This option would look similar to Section D, but with asphalt being continuous under the barrier and with a 3.0m path width.
- 2) What is the ideal ultimate typical section for this length of pathway and what could be done for an interim pathway in 2020 to avoid cost or rework in the future?

As the design team evaluated the existing section and worked through various constraints, design criteria, several options took shape. The list below summarizes the main factors that influenced the sections developed along this part of the preliminary design.

- a. The paved width needed for an on-shoulder pathway would be 1.4m (vehicle shy distance) + 0.6m (pre-cast concrete barrier width) + 0.6m (path clear space) + 3.0m path = 5.6m. This is 2.1m wider than the existing asphalt shoulder. This means that the widest pathway that could be accommodated on the existing shoulder is 0.9m wide which does not meet any relevant guidelines for a multi-use, bi-directional pathway.
- b. Standard MoTI concrete barriers require extensions on top of them to meet the 1.4m recommended height when adjacent to a path used by cyclists.
- c. Widening the shoulder by 2.1m would push the fill slope well into the existing ditch. Having a ditch directly beside the pathway would trigger the need for a fence between the path and steep ditch. This would result in pathway users being channelized between both a 1.4m tall barrier and fence. Besides being a negative user experience, vertical elements also create challenges for winter maintenance, and winter path usage is a goal that was identified by the CoF on this portion of the path.
- d. While it is possible to eliminate both the fence and retaining wall by filling in the ditch, similar to the right side of Section D which lacks a defined ditch, the by-product of this decision would require the roadside ditches and culverts would need to be converted into a piped storm system. The preliminary design team believes it will be lower cost to preserve the ditch and install low retaining wall and a wooden fence as shown in Sections O and P. This assumption should be confirmed during detailed design.

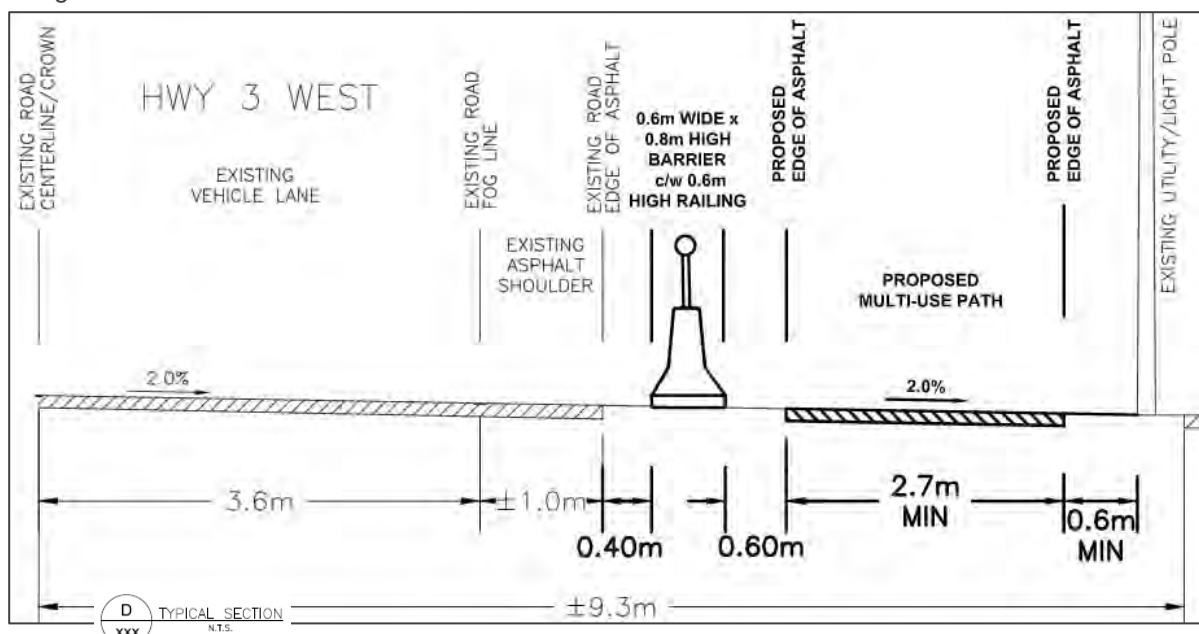


Figure 14. Typical Section D.

- e. By extending the pavement slightly further, Sections O and P have eliminated the need for the roadside barriers.
- f. In short, the answer to Question #1 above is that there is no practical way to accommodate a functional path simply by adding barriers to the edge of the existing highway. This results in Question #2 being moot. Detailed design and construction will be required to create the ultimate section for the length of path between the West Fernie Bridge and McLeod Avenue.

MoTI has indicated that additional physical separation between the pathway and highway may be preferred to reduce the potential of vehicle traffic confusing the pathway of Section O as additional vehicle lanes during the winter when paint lines are covered with snow. A physical barrier as in Section D would eliminate this issue, however, snow removal and storage becomes a greater challenge for both the highway and pathway. Physically separating the pathway from the highway by a ditch then requires a ditch on either side of the pathway which may exceed the available width between the highway clear zone and the private property boundaries. These design options will be evaluated during detailed design.

It is acknowledged that there are multiple types of roadside barriers, path side fences, retaining walls, storm systems, etc. that could be combined in numerous ways while meeting relevant design criteria. It is our expectation that specific possibilities will be evaluated during the detailed design process. The purpose of the preliminary design is to present a functional option to guide future design work. The Sections shown in Sections O and P have not undergone rigorous analysis as that goes beyond the scope of the preliminary design. The ultimate design will need to consider many factors such as user needs and safety, capital and operational costs, MoTI approvals, ease of maintenance, overland drainage, existing utilities, and possibly others.

Cost is also recognized to be a driving factor in the selection of a pathway cross section. We have compared the anticipated costs for constructing Sections O and P compared to Section D in West Fernie. The key differences that drive cost between Sections O and P and Section D can be simply put that Section D requires a roadside barrier and railing due to the narrow width of the paved shoulder and Highway ROW constraints. On the other hand, Sections O and P have more paved shoulder and ROW available, but must consider the relatively narrow, deep ditch adjacent to the future path. Sections O and P can eliminate the higher cost for roadside barriers with railing extensions but would require additional engineered fill to get the path out of the Highway clear zone. Please see the below table for a cost break down per linear meter:

Table 5. West Fernie Trail Cross Section Cost Comparison.

Section	Element	Cost per meter of Pathway Section
Section O and P	2.1 meter extra width requires additional engineered fill.	\$275
Section D	Roadside barrier, c/w railing	\$505

Please note that the existing ground contours in the base CAD may not be accurately showing the existing ground of the existing ditch. Field reconnaissance found this ditch to be relatively narrow and deep, however, in the modeled sections, the ditch is almost non-existent. This may be due to interpolation across the narrow feature which smooths out the ditch and makes it appear shallower and less steep than it actually is. With more survey information before detailed design, it can be confirmed whether or not Sections O and P would require storm system improvements as well.

We trust this describes the evolution of Sections O and P with a sufficient level of detail to help readers understand the rationale behind the size and combination of elements in the typical section and which factors were considered in the decision-making process to widen the pavement and eliminate roadside barriers where possible.

4.4. WINTER PATHWAY DESIGN CONSIDERATIONS

Four season use has been identified as a priority for Segment 1 between West Fernie and Mt Fernie Park Road. For this section with high population density, winter plowing would serve the active transportation needs of the West Fernie, Riverside, and Cedars residents. For Segments 2 & 3 additional discussions with stakeholders such as RDEK, MoTI and FAR are required to clarify winter use and maintenance expectations, signage, etc. Specific considerations with regards to winter pathway use include:

1. Where the pathway is close to the highway pathway users will be in close proximity to the highway during plowing activities. It is expected that plowing would only take place at lower speeds, like when plowing a bridge deck where sidewalk users adjacent to the travelled lane have no means of escape.
2. Snow will be stored primarily in the ditch adjacent to private property, as is typical of much of Fernie.
3. Trucking may be required to haul away snow in constrained locations where snow storage is not practical.
4. Bridges may need higher railings in case plowing does not keep up with snow load.
5. In Segment 3, option A, avalanche risk will need to be evaluated, not for trail users as it is not intended for use in the winter months, but for the trail itself. Snow creep, and/or small avalanches may break fencing beside the trail and result in seasonal repairs in the springtime.

4.5. GEOTECHNICAL REVIEW

McElhanney's geotechnical engineer Ryan Gibbard, P.Eng reviewed existing geotechnical reports provided by the FTA that were available for the area. These reports were only intended for the original client and project, but were useful in confirming assumptions and providing some insight into the soils that will be found. MoTI mentioned past settling issues and repairs on the Fernie Ski Hill Rd, however no geotechnical report was available for this area.

Generalizations based on the available previous geotechnical work and geologic and soils mapping are discussed below at a high level:

A. Alongside Highway 3 (Segments 1 and 2) the typical characteristics are expected to be:

- Fluvial/fluvioglacial (granular riverbed) deposits (suitable for pathway subgrade) overlying Glaciolacustrine clays at depth (non-suitable for pathway subgrade), however have not been viewed near the surface down at this elevation and considered to be a low risk.
- Highway embankment fill soils also likely present that are typically granular and known to be granular at Lizard creek. Typically, these are suitable for pathway subgrade.
- Based on field review and topography, a few low-lying locations contain marshy areas which will require consideration.

B. Alongside the Fernie Ski Hill Road (Segment 3, Option B and Option D):

- This hillside is known to be primarily comprised of morainal soils (a silty clay loam).
- It typically varies in consistency and strength characteristics but is a primarily fine-grained soil which can be more challenging to build on (moisture sensitive, not useful as fill – prone to softening/settlement).
- Till soils are firmer in situ, and when undisturbed and unsaturated are typically a suitable subgrade for trail construction.
- Consideration for geosynthetics should be made, with a material separator (geotextile over base), and in some softer locations placement of geogrid for strengthening/bridging over soft areas.
- If road embankment buildout is needed to accommodate the trail width, the soils are likely of variable quality and strength. These scenarios can get costly, with retaining structure or mechanically stabilized earthwork buildouts likely needed (Figure 15).



Figure 15. Mechanically Stabilized Earth, Three Months After Planting. Credit www.flexmse.com

- Further study is necessary for determining the subsurface constraints.

C. Alternate Alignment up or near Boardman Creek (Segment 3, Option A and Option C):

- This hillside is known to be primarily comprised of morainal soils (a silty clay loam). See above for similar comments.
- The creek draw is likely an eroded morainal till soil, with fluvial deposits and debris (soil, rock and organic) deposit along the creek sidewalls. Oversteepening of the eroded sidewalls may have resulted in soil movement/slide activity historically, with some colluvium possibly present.
- Possible flood / debris torrent hazard identification. While possible, no recent/anecdotal occurrences are known at this time.
- A creek crossing (bridge) will be necessary.
- Given the variable and likely loose nature of soil and subgrade conditions in the creek draw, there would be the need for additional design considerations for soft/loose soil, organic pockets of material, and possibly exposed rock.
- Further study is necessary for determining the subsurface constraints.

For the section of trail alongside Highway 3 a full geotechnical investigation along this alignment would be quite costly with minimal benefit to the project (other than possibly greater cost certainty). It is likely to be a much more cost-effective methodology to provide a desktop study style report with a few different design cross sections depending on encountered subgrade strength. This approach will then necessitate subgrade evaluation at the time of stripping and subgrade preparation.

While these the previous geotechnical reports provide some generalizations of the soils to be expected in the area, they are insufficient with regards to the proposed pathway location and the level of detail required for the detailed design stage of this project. In the vicinity of FAR, we recommend that the geotechnical study be completed in stages, as detailed slope study above the creek will be problematic and possibly not necessary. The first stage would include a study of the existing ground conditions along the Fernie Ski Hill Rd edge and top of slope with a two-day drill programme planned. This investigation, along with initial recommendations, would be in the range of \$25,000. This level of investigation will allow an informed decision to be completed regarding the two conceptual options to climb to the FAR base area. If the Boardman Creek Option A is then chosen, additional geotechnical investigation could be completed along the corridor.

Mechanically stabilized earth retaining walls are one method of retaining steep slopes. They were chosen as one option for the preliminary design. Figure 16 shows a very similar application to the West Fernie trail cross sections O described previously in Figure 13 where the ditch is partially narrowed and the bank steepened with a retaining wall. Additional cost/benefit analysis of conventional retaining structures and final recommendations will need to be completed during the detailed design process.

4.6. ENVIRONMENTAL REVIEW

The Fernie Valley Pathway will be passing through/near environmentally sensitive areas, including the general valley bottom around the Elk River and watercourses such as Lizard Creek. It is important that certain environmental guidelines are followed and appropriate mitigation measures are carried out in order to protect the natural environment.

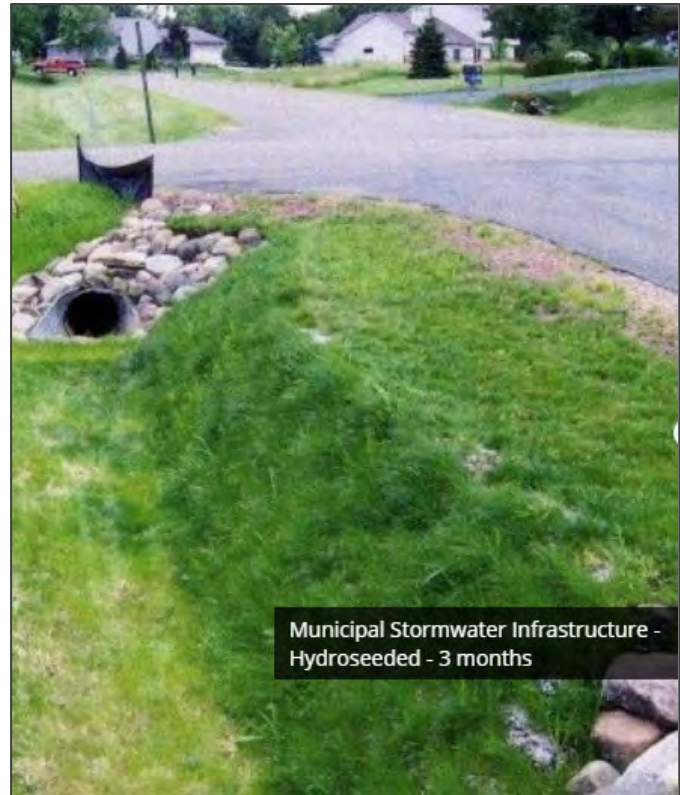


Figure 16. Mechanically Stabilized Earth Three Months After Hydroseeding. Credit www.flexmse.com

Section B.3 Environmental Considerations in the Fernie Trails Master Plan outlines the best management practices for new trails in and around the City of Fernie to reduce potential negative impacts. These best management practices are summarized as follows:

- Use strategic and careful planning to identify and avoid environmentally sensitive areas. According to The City of Fernie Official Community Plan (OCP), these environmentally sensitive areas include sensitive watersheds, riparian areas, aquatic habitats, mature and old growth forests, wildlife corridors, and habitats supporting red and blue listed species.
- Avoid watercourses and their surrounding riparian areas not only to protect water quality and fish habitat, but also because they are often used as wildlife corridors.
- Refer to Wildlife Habitat Areas (Cordillera Technical Services, 2013) for recommendations for protecting sensitive wildlife species.
- Minimize the amount of tree removal and, where possible, leave stumps in place as they contribute to overall soil stability.
- Reclaim any disturbed areas as soon as possible to prevent erosion and establishment of invasive plants.

- Equipment, including bikes, and clothing should be inspected before travelling in these areas to avoid the spread of invasive seeds or plant parts.

Susan O'Bryan RPBio, PBIOL, a Registered Professional Biologist from McElhanney reviewed the conceptual alignment and provided the following feedback:

- Any new creek crossings (or crossing upgrades) will require permitting by Fisheries and Oceans Canada (DFO) and the Ministry of Forests, Lands, Natural Resource Operations and Rural Development, unless the crossing can be installed completely above the high water mark (HWM). If no work occurs, and construction activities do not affect, within/below HWM, no permits should be required. Permits and/or the review process (depending on crossing type) could be 45-120 days to process and/or approve.
- Local streams contain blue-listed (of special concern) fish species; any instream works will have a limited work-window based on relevant regulations in effect at the time of construction.
- To conform to the migratory bird act, tree clearing and vegetation removal should be completed outside the breeding bird nesting window (roughly mid-April through end of July).
- General sediment and erosion control concerns during construction need to be addressed, however, much of the alignment is lower risk, given proximities to surface water bodies.
- No critical wildlife habitat areas noted on online open-data sources. Also, most of the pathway alignment is adjacent to existing roadways.
- Several invasive plant species have been noted along the alignment, so revegetation should be completed as soon as possible after pathway construction. Maintenance programs must recognize the importance of identifying and controlling invasive species as an ongoing operational practice.



Figure 17. Existing Brydon Creek Bridge that will need to be Upgraded.

Overall, environmental concerns are low; with potential impacts to the streams (via crossing installation or erosion/sedimentation) is the main challenge noted at this point. Following the highway corridor and using or upgrading existing trails where practical reduces potential environmental impacts.

4.7. TRANSPORTATION SAFETY REVIEW

Safety and hazards were reviewed for the conceptual pathway alignment by Cory Wilson, P.Eng. RSP1 a McElhanney Road Safety Engineer. A summary of the recommendations is as follows:

- Trees and other foliage should be cleared at intersections (where required) to provide adequate sight lines between pathway users and motorists.
- For the side street crossings in West Fernie where two streets meet Highway 3 at an angle (Figure 18), it forms a longer crosswalk for the pathway users. These crossings should be redesigned to improve safety. As there are numerous ways to redesign the crossings, this is considered to be a detailed design issue. However, the general principles of shortening the crossing distance, improving sightlines, large vehicle turning movements, signage and pavement markings, etc. will all be part of this redesign work. The existing crosswalk is a long zig-zag and exposes users to lots of time crossing the road. The goal is to shorten the crossing and improve safety. While each intersection is unique, the design intent will be to develop set of visual cues, signage and pavement markings to create a consistent style of for all pathway road crossings. The most important factor, from the perspective of cyclists, will be to create safe crossings that do not require cyclists to dismount when crossing.



Figure 18. Proposed Pathway Crossing Location of the Side Streets at Colclough Ave and Beaver St

- For each road crossing, the right-of-way (trail users or motorists) needs to be established. Where trail users have the right-of-way, elephant's feet markings should be used, in addition to conventional crosswalk markings. Depending on the level of visibility desired by the City, the crosswalks could be marked with 100mm white lines on the outside of the crossing, or use bolder zebra stripe panels on the crossing. For example, commercial driveway crossings could use white lines while road crossings could use zebra stripes to create a visual difference for users to understand what type of crossing it is.

- Due to the angle of the existing intersections with Highway 3, consideration for vehicle stop lines, crosswalk location, possible refuge medians, and other design elements will need to be reviewed to confirm whether the crosswalks should be located in front of the stop line close to Highway 3, or pulled further away from the Highway to function more like a mid-block crossing.
- Segment 1 is likely to have users in all seasons as it is a commuter connection through West Fernie to access downtown Fernie. Cycle yield signage (Figure 19) could be considered adjacent to the pathway for winter if the path is snow-covered and will be kept open in all seasons. What this means is that for pedestrians, the crosswalk will function just as it normally does, with pedestrians having the right of way once yielded to them by a vehicle. This does not mean a pedestrian can simply walk or run out into traffic without consideration for the stopping distance of a vehicle. With a shared use crosswalk with elephant's feet markings, cyclists are not required to dismount before crossing. The cyclist yield signage is in place to let cyclists know that they are required to slow down and yield the crossing to motorized vehicles first, before crossing. If a driver does stop for the cyclist, or if there are no vehicles, the cyclist can ride safely across the crosswalk. In studies where this is common practice, the shorter crossing time for cyclists has been found to have lower collision rates than for cyclists who walk their bikes. It also is more efficient for cyclists in terms of shorter overall travel times from point A to point B.
- At the Mt Fernie Park Rd and Highway 3 intersection, a crosswalk will be required to connect with Riverside Way on the east side of the highway as this will be a connector link to the pathway for those neighbourhoods on the east side of the highway. For the pathway crossing of Mt Fernie Park Rd, an at grade crossing should be planned which can be integrated into future intersection upgrades. The exact type of crosswalk in the interim, and long-term, may be different, depending on the speed limit on the Highway, which may be reduced from 80km/hr to 60 km/hr.
- The outside curve on the Fernie Ski Hill Rd will have exposure risk for pathway users from vehicle traffic, if that alignment is chosen. There are various ways to address this exposure risk ranging from different kinds of temporary or permanent physical barriers to locating the path outside of the clear zone.



Figure 19. Cycle Yield Signage

4.7.1. Stormwater and Overland Drainage Review

The overland drainage review was based on the existing ground contours provided from various sources through the FTA in CAD base drawings. The design philosophy was to maintain existing drainage directions without having the pathway redirect water. For the preliminary design all culverts have been nominally sized at 300mm to provide continuity to any existing drainage directions at natural low points along the trail. As pathways are not considered to be critical infrastructure, low return periods (1:5year) can be considered for culvert sizing, just enough to provide an outlet for water to continue on its way. For example, as shown in Figure 20, even a small culvert could provide improved drainage for water trapped on the upstream side of an existing driveway to allow it to drain to the highway ditch. This would prevent ponded water from overtopping the pathway and maintain continuity of the natural drainage pattern to the Highway 3 ditch system.

Bridge spans have been estimated based on spanning from top of bank to top of bank and will require site specific hydrological, geotechnical, and structural design in detailed design of the Fernie Valley Pathway. Consideration should also be given for flood resiliency and how these structures may have to be designed to withstand debris floods or debris flows. Bridges, due to their higher replacement cost, should be designed to a higher return period event with suitable freeboard for stream flows and potential debris flood/flow risks.



Figure 20. Spring Stormwater Collecting in a Field on the Proposed Trail Alignment, between Mt Fernie Park Rd and Lizard Creek.

5. Detailed Design & Construction Sequence

With the known project constraints being more challenging at the south end, and anticipated budget coming from a range of grant sources, it is recommended that the construction of the project be phased over multiple years, starting at the north end with Segment 1. Such an approach will provide more time to engage with stakeholders on Segment 2 and resolve the preferred alignment and design constraints of Segment 3 at FAR. This will also prioritize the construction of the more urbanized segment of the pathway first, where higher initial user numbers are expected. Please note that the multi-use bridge and associated pathway connections currently under construction at Lizard Creek are being completed by the BC MoTI under the Lizard Creek Bridge Replacement Project and are due to be completed in 2020.

Phase A – completing Segment 1 between the West Fernie Bridge and Mt Fernie Park Rd first will provide a well-connected and functional pathway in an area that currently sees high volumes of commuter and recreation users travelling the highway corridor. Detailed design of this phase could be completed in

2020 and to apply for the BC Active Transportation Infrastructure Grant. Pending successful grant funding through this grant and other funding sources, construction could proceed for Segment 1 in 2021.

Phase B – completing Segment 2 from Mt Fernie Park Rd to the Lizard Creek Bridge will provide functional pathway connectivity through the highway corridor to the Lizard Creek multi-use pathway and bridge that is currently under construction. Prior to completion of Segment 3, Segment 2 could be tied into the highway shoulder north of Boardman Creek to provide connectivity through to Fernie Ski Hill Rd. This segment will be more challenging as it involves private landowners and coordination with the ongoing construction of the Lizard Creek Bridge multi-use pathway and bridge. The RDEK will also need to be consulted for approval of this segment of pathway. Detailed design could be completed in either 2020 or 2021, with construction the following year.

Phase C – completing Segment 3 from Lizard Creek to Fernie Alpine Resort will provide the full benefits and functionality of the project as a commuter and recreation pathway. Detailed design for this segment will be very reliant on the geotechnical investigation and stakeholder discussions. MoTI approvals are expected to be the most challenging in this segment. While there may be benefits if Phase B and Phase C were constructed at the same time, the ability to synchronize both phases into a single construction season and budget year are dependent on a wide range of factors such as land ownership, design constraints, funding, and approvals.

6. Discussion

6.1. CONSTRAINT ANALYSIS & RISK DISCUSSION

The following table discusses the constraints or risks anticipated with this project and outlines possible mitigations to those risks.

Table 6. Constraint Analysis and Risk Mitigation Strategy.

Constraint	Risk Mitigation Strategy
Agriculture Land Reserve Application	Apply as early as possible prior to anticipated construction, this could take a year. The amount of pathway that is located within the ALR is unknown as the ALR is very encompassing. Even the highway itself is included in high level mapping information, so until a more detailed review is done for the overall pathway by the ALC, the potential impact of ALR lands on pathway design and construction phasing is unknown.
Landowner Right of Way Approvals	Develop an engagement strategy through the respective local governments showing the well thought out pathway alignment and benefits to locals and tourists alike, as well as methods to minimize impacts to landowners close to the pathway. Consider alternative options such as running the pathway on the highway shoulder as a temporary solution, if negotiations do not progress in a reasonable time frame.
Landowner Property Boundary Disputes	The digitally available files for legal property boundaries are either shifted or a number of residents have constructed structures within the highway ROW. Prior to this becoming a dispute, it is recommended that a physical survey of all legal boundaries within the pathway vicinity be completed. Best practice might be to complete the survey prior to publicly displaying the Preliminary Design Drawings, that may show potentially incorrect legal linework. This predominately affects the landowners between Anderson Rd and the Lizard Creek Bridge.
Encroachments on Private Property	For land owners like the Dairy Queen and Silver Rock Strata (NES 3053) that have the existing and future pathway running across what appears to be private property, research needs to be conducted to determine if there is an encroachment agreement or utility right of way in place or if one needs to be agreed upon.

Public Opposition to the Project	Come out with a strong engagement strategy to set a positive tone for the project at the community level and clarity on the project facts and frequently asked questions. Be ready to respond to social media quickly
Utility re-alignments	Any utility relocations or adjustment should be identified early in detailed design to schedule utility relocations sufficiently in advance of pathway construction.
Funding and Phasing	The successful implementation of the Fernie Valley Pathway depends on a robust funding strategy that will involve government grants, as well as private contributions. This is a risk that could drive the implementation schedule of the project depending on funding availability. Applying to a sufficient variety of grant funding sources and sponsorship commitments will be key to ensuring that each stage is fully funded and for the overall successful completion of the pathway. Through the implementation planning for the project, allow for adequate contingency in both the delivery schedule and budget to be flexible with respect to the scope, timing and sequencing of the construction.
BC Water Sustainability Act	Apply well in advance of the anticipated construction for any notifications, permitting could take four months or longer for approvals, if permits will be needed for the crossing design.
Crossing of Mt Fernie Park Rd	Continue to work with MoTI and other stakeholders so that a simple and effective crossing can be agreed upon.
Geotechnical uncertainty on Fernie Ski Hill Rd & Boardman Creek alignment options	Conduct a phased geotechnical investigation of the alignment options as outlined in section 7.
Boardman Creek crossing on Segment 3	Complete a hydrological study and debris flow/flood review to site and size the crossing for the preferred alignment option.
Archeological findings during Construction	Review and follow relevant legislation.

Existing highway stormwater drainage south of the West Fernie Bridge	A number of solutions exist with regards to location and design of the pathway through this section of pathway from Riverside Rd to McLeod Ave. The Preliminary Design Drawings show an at grade widening of the road. Alternative solutions should be explored during detailed design for their feasibility, including a raised pathway similar to a sidewalk design, or a curb with a buffer and then a raised pathway. Design solutions will attempt to allow the ditch to remain, however, it may be necessary to replace some (or all) of the ditch with a piped storm system to accommodate a pathway and MoTI's design requirements adjacent to Highway 3.
Existing highway frontage roads	The existing frontage roads of Boardman Rd and Lizard Creek Rd are considered to be a positive constraint. These frontage roads provide a location for the pathway to be located further away from the highway and off of private land. While not without risk, it is a considerably safer option than beside Highway 3. The pathway is currently designed on the east side of these roads to avoid the need for pathway users to cross multiple driveways and to provide better sightlines for pathway users and motorists. In a more constrained location like Boardman Rd, the pathway could be separated from the road with a curb.
Lizard Creek Bridge tie-ins	This is a positive constraint – however the pathway is constrained to tie-in to the proposed multi-use pathway sections that MoTI is constructing in 2020 within the Lizard Creek Bridge Replacement Project. Close communication between the two project teams is warranted to ensure the designs and tie-in points are coordinated.
New Subdivision access road from north end of Lizard Creek Rd	A positive constraint as an adequate shoulder is being constructed for the pathway location, however the pathway does need to align with the road that is being constructed to descend this hill as it has a steep side slope. Close communication between the two projects is warranted to ensure the designs are coordinated.
Multi-jurisdictional development and construction approvals	Where the pathway crosses from the CoF to RDEK's jurisdiction and is within the MoTI ROW, a number of stakeholders are involved and approvals will need to be acquired from each organization. This will take time and coordination.

6.2. COST ESTIMATE

- Implementation cost estimate breakdowns are provided in Appendix B. The following table summarizes the implementation costs by pathway segment, this includes all design services and construction. Segments 1 & 2 are estimated to a Class B level of accuracy, and Segment 3 with the current uncertainty in site conditions and design is estimated to a Class D level, as defined by the Engineers & Geoscientists British Columbia (EGBC) Cost Estimate Classification Definitions:
- Class B** estimate ($\pm 15\text{-}25\%$): An estimate prepared after site investigations and studies have been completed and the major systems defined. It is based on a project brief and preliminary design. It is used for obtaining effective project approval and for budgetary control.
- Class D** estimate ($\pm 50\%$): A preliminary estimate which, due to little or no site information, indicates the approximate magnitude of cost of the proposed project, based on the client's broad requirements. This overall cost estimate may be derived from lump sum or unit costs for a similar project. It may be used in developing long term capital plans and for preliminary discussion of proposed capital projects.

Table 7. Summary of Implementation Cost Estimates.

Summary of Implementation Cost Estimates			
Segment	Class of Cost Estimate		Cost Estimate*
Segment 1	Class B		\$ 2,544,551.
Segment 1A	Class B		\$ 963,069
Segment 1B	Class B		\$ 1,581,482
Segment 2	Class B		\$ 1,082,666
Segment 3**	Class D	Option A	\$ 1,156,815
		Option B	\$ 1,905,750
		Shared road section	\$ 1,336,252
		Option D	\$ 411,840
		Option C	\$ 193,875

*Taxes are excluded from the cost estimates

**In Segment 3, only two of the options (A or B plus the Shared road section and then C or D) will need to be chosen, do not add up all the optional segments into a total project cost.

6.3. OPERATION AND MAINTENANCE COSTS

Consistent and responsible maintenance may be the most important aspect to keeping pathway users safe from injury and protecting pathway operators from liabilities. It is important to note that poor property management is the most common lawsuit due to the pathway user's claims of improper design, construction, or maintenance. Therefore, it is essential to develop specific policies and procedures that fit into local situations since infrastructure maintenance requirements depend on many unpredictable

factors. These policies and procedures should include thorough documentation of the inspection and maintenance of the pathway infrastructure. Included in the maintenance policies and procedures are achievable goals set with reasonable deadlines and complexity that should be flexible to account for the potential growth in user numbers or changing conditions over time.

To support stakeholder discussions on the operational and maintenance (O&M) requirements for the completed pathway, a preliminary maintenance frequency and annual budgetary operating estimate was developed as shown in Table 8 & 9. These costs are based on information collected from the following sources:

1. A 2014 **Rails-to-Trails Conservancy study** which was the third such study since 1996 and had the following findings:
 - 200 trail managers responded with 63% urban;
 - 52% were paved trails;
 - 50% provided a total maintenance cost;
 - 58% have volunteer help with trail maintenance;
 - 60% reported that mowing was a labor-intensive maintenance activity and a significant component of the annual maintenance budget;
 - Tree roots were by far the leading cause of damage to asphalt pathways with the frost/freeze cycle second;
 - The summarized findings for paved pathway operation and maintenance was **\$1.78/m** when adjusted for inflation and Canadian currency;
 - Winter snow removal was not included in this unit rate.
2. The **25km Westside Legacy Trail** in Invermere BC. predicted the following:
 - An O&M budget of \$33,500 including mowing, garbage can collection, washroom maintenance, and bridge inspection which calculates to **\$1.35/m**;
 - An additional \$13,500 of labour and overhead, which for the estimate below we are assuming can not be scaled proportionately with trail length due to the time it takes to initiate a task, so this entire amount is used;
 - An annual depreciation of amenities and structures (washrooms, garbage receptacles, bridges, kiosks, benches) with \$21,000 set aside annually for replacement;
 - Annual budget allocation for repaving for a 35-year lifespan of approximately \$45,000.
3. The **25km NorthStar Trail** in Cranbrook BC. Reported the following actual spending
 - In 2012 and 2014 \$20,000 - \$23,000 was spent on O&M for grass cutting, weed management, graffiti removal, washroom maintenance, garbage can collection, which when adjusted for inflation results in **\$1.01/m**.
4. The **West Fernie Bridge to the Visitor Center Pathway** in the **City of Fernie** cost \$3200/winter for plowing of the approximately 700m long pathway, which works out to \$4.57/m for winter maintenance.

From this data the following operation and maintenance cost estimate tables were created for the Fernie Valley Pathway. Following detailed design these estimates can be refined when specific materials used in

construction are known. An extra contingency of 20% is applied for fence, retaining wall, barrier repair, unknown challenges. This contingency also accounts for the pathways the O&M budgets are derived from are much longer than the 6.1km Fernie Valley Pathway, and simply scaling down the numbers by linear meter may not account for economy of scale on these longer projects. Additionally, the following are assumed in table 8:

- Equipment capital and ownership costs are not included (e.g. equipment is already owned or an external contractor is utilized);
- For the purposes of operations and maintenance, the Lizard Creek MoTI segment of pathway is included in Segment 2 length;
- Segment 3 is calculated with the longer options (B&D); and,
- Segment 1 of the pathway within West Fernie is to be operated in the winter months, and winter maintenance has been included for this segment of the pathway in the estimate below. For the purpose of the preliminary design operating and maintenance estimates, Segments 2 and 3 of the pathway are expected to be a 3-season facility only (mid-April to end of October).

Table 8. Estimated Maintenance Costs for the Fernie Valley Pathway for Entire 6120m Long Pathway between West Fernie and Fernie Alpine Resort.

Description	Estimated Frequency	Unit Price / Frequency	Annual Amount
Annual Maintenance for 6120m Fernie Valley Pathway			
Sweeping	Twice per year	\$1.78 / m ^a	\$10,900
Mowing/Vegetation	Twice per year		
Asphalt Repair	Every 5 years		
Paint Markings	Every 5 years		
Drainage Maintenance	Once per year		
Signage Maintenance	Once per year		
Winter Maintenance (Snow Clearing) on Segment 1 only	As required	\$4.57/m	\$10,510
Condition Review, Management, and Administration Tasks	As required		\$13,500 ^b
Contingency (20%)			\$6,980
Annual Operation and Maintenance Total			\$41,990
Annualized Capital Reserve Contribution			
Pavement repair costs reserve allocation per year based on a 35-year lifespan before repaving		\$35/m ²	\$18,360
Contingency (10%)			\$1,840
Annual Capital Reserve Contribution			\$20,200
Annual Total			\$62,100

^a Based on average paved pathway maintenance costs from Rails-to-Trails Conservancy 2014 study results adjusted for inflation (Rails-to-Trails Conservancy, 2015).

^b Based off West Side Legacy Trail predicted labor and overhead, not scaled for length these tasks may not be proportional to trail length, many require a constant effort to initiate and administer.

The following table 9 breaks the operation and maintenance costs down based on segment. The first row is if Segment 1 only is constructed. This requires a higher operations and maintenance budget than when the same tasks can be scaled over a longer fully constructed pathway.

Table 9. Operation and Maintenance by Segments.

Segment	Annual Total of Operation and Maintenance and Capital Reserve Contribution
Segment 1 only constructed (Includes <u>all</u> of the Condition Review, Management, and Administration Tasks as this does not scale proportional to length)	\$41,300
Following Completion of the Entire Pathway	
Segment 1A	\$11,550
Segment 1B	\$18,970
Segment 2	\$17,500
Segment 3	\$14,100

Following detailed design, the operations and maintenance budget can be updated as the quantity of all items will be known.

7. Next Steps for Implementation

Given the many tasks required to complete this project in its entirety, the following list of tasks has been outlined to help guide and prioritize the next steps in the project. The following is a suggested order, however, many steps can occur concurrently providing they do not rely on completion of a prior task.

7.1. IMPLEMENTATION FUNDING STRATEGY

Using this Preliminary Design Report apply for funding to complete detailed design, construction management and construction of phase A.

7.2. PHASE A DETAILED DESIGN

Commence detailed design to guide the following steps until enough information is available to complete detailed design drawings in step 7.8.

7.3. AGRICULTURAL LAND RESERVE

Complete the application to the Agricultural Land Commission for the sections of pathway which cross Agricultural Land Reserve.

7.4. COST SHARING & PARTNERSHIP AGREEMENT(S)

Develop funding agreements for capital and operations and maintenance costs between the CoF and other stakeholders to determine who will pay for the construction of the pathway and how maintenance activities will be shared along the overall pathway.

7.5. DETAILED SURVEY

Complete a detailed survey of the entire alignment corridor to differentiate the inconsistencies in surfaces and property lines noted in the background CAD files provided for the preliminary design. This must include the confirmation of legal boundaries, completion of a topographical survey of the entire pathway corridor, along with location of existing utilities and relevant surface features. A varying level of detail could be gathered during the survey, with coarser information coming in the form of LiDAR for the simpler areas of pathway corridor, and more precise information for the road and driveway intersection tie-ins and the property lines. Field crews could also pick up manhole covers, edge of pavement, gutters, culverts, utility poles, signposts, fencelines, and other utilities and road furniture that could not be picked up accurately enough with LiDAR to complete detailed design. The collection and review of the detailed survey data is a prerequisite to commencing the detailed design process.

7.6. LANDOWNER AND STAKEHOLDER ENGAGEMENT

For Phase A of the trail as soon as the detailed survey is completed landowner and stakeholder discussions could commence with accurate information to discuss pathway location relative to property lines and where Right-of-Way easements are required. The timing of establishing required right-of-way agreements is also tied to the schedule of a number of approvals and funding processes, such as the

Agricultural Land Commission resolution, MoTI permitting, and the BC Active Transportation Infrastructure Grants Program.

For Segment 2 conduct landowner discussions with the property owners and the Regional District of East Kootenay.

7.7. ENVIRONMENTAL REVIEW

Conduct an Environmental Review to update the 2004 Centennial Trail Environment Report by Morrow Environmental to help guide the detailed design stage and identify which permits or approvals may be required.

7.8. DETAILED DESIGN DRAWINGS FOR PHASE A

Complete detailed design drawings for Phase A (Segment 1) from West Fernie to Mt Fernie Park Rd. Environmental permitting may need to be included, particularly for the bridge design near Anderson Rd. over Brydon Creek.

This should be done alongside functional planning for improvements associated with the non-motorized crossing of the West Fernie Bridge and associated tie-ins to the Fernie and West Fernie Dike Trails, which pass below this bridge. This functional planning effort will help determine the most appropriate alignment and connection points where the Fernie Valley Pathway will tie-in to those future trail network improvement projects.

Another activity that should be conducted during Phase A is to complete a network connectivity review for where users are expected to join the Fernie Valley Pathway. This will help inform the design team where to anticipate future crosswalk connections or path/sidewalk and connector trail tie-in locations. This could be done as a standalone review or coordinated with other work as part of the upcoming Active Transportation Network Plan that the City will be completing.

7.9. CONSTRUCT PHASE A

With the detailed design complete and funding secured, complete construction of Phase A.

7.10. GEOTECHNICAL INVESTIGATION PART ONE

Complete part one of a geotechnical investigation for the Fernie Ski Hill Road options analysis. This study would be preliminary in nature to address the feasibility of widening the Fernie Ski Hill Rd, or alternatively developing the Boardman Creek route. Ideally, test pits would be excavated three meters deep on the Boardman Creek route (Option A), however due to the steep hillside and proximity to the creek, this is not environmentally feasible as mobilizing equipment to site would essentially involve constructing the trail bench cut. The alternative is to drill alongside Fernie Ski Hill Road with a few test pits as close as possible on the steep embankment that the Boardman Creek route would climb. A two-day drilling programme along with initial recommendations would be in the range of \$25,000. From this preliminary investigation the scope of retaining structures required for both options can be better assessed and inform the alignment decisions for Segment 3.

7.11. UPDATE FERNIE SKI HILL ROAD CONCEPT DRAWINGS

Following the detailed survey and geotechnical study the conceptual design of the FAR options should be updated to a preliminary design level with the new information to better capture the benefits and considerations of each alignment option. The capital costs, operations and maintenance, expected social use patterns, and environmental impacts should all be considered to make an informed decision on the preferred alignment and pathway design objectives in this segment. With the updated information facilitate a discussion with MoTI and RCR to decide on a preferred option.

7.12. GEOTECHNICAL STUDY PART 2

Depending on which option is chosen to ascend to FAR, additional geotechnical study may be required to better assess bridge abutments and bank stability for retaining features.

7.13. IMPLEMENTATION OF PHASE B & C

Repeat the steps of funding application, Landowner and stakeholder discussion, detailed design, and construction for Phases B and C (Segments 2 and 3).

8. Closure

McElhanney is pleased to submit this report to the Fernie Trails Alliance. While there are many hurdles to complete this project, the vision of a safe pathway between the City of Fernie and the Fernie Alpine Resort and connecting communities along the way will be of huge benefit to locals and tourists alike. McElhanney appreciates the opportunity to work with the Fernie Trails Alliance, the City of Fernie, and the stakeholders on this project and we look forward to working on the next steps identified in this report. If you have any questions regarding the information within, please do not hesitate to contact the undersigned.

Respectfully submitted,



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January 25, 2021

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Disclaimer:

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APPENDIX A – DRAWING LIST

APPENDIX B – COST ESTIMATE

SUMMARY - Fernie Valley Pathway 2020 - Opinion of Probable Cost

	Segment 1 (1A+1B)	Segment 1A	Segment 1B	Segment 2	Segment 3A	Segment 3B	Segment 3 (Shared)	Segment 3C	Segment 3D
SCHEDULE A-1 - General	\$ 250,000.00	\$ 68,500.00	\$ 181,500.00						
SCHEDULE A-2 - Earthworks & Demolition	\$ 130,490.00	\$ 42,473.50	\$ 88,016.50	\$ 297,565.00					
SCHEDULE A-3 - Surfaceworks	\$ 1,376,418.25	\$ 567,383.10	\$ 809,035.15	\$ 486,390.00	\$ 566,100.00	\$ 930,000.00	\$ 809,850.00	\$ 249,600.00	\$ 117,500.00
SCHEDULE A-4 - Line Painting, Signage & Site Furniture	\$ 32,945.00	\$ 9,273.00	\$ 23,672.00	\$ 5,000.00					
SCHEDULE A-5 - Miscellaneous	\$ 45,000.00	\$ 30,755.00	\$ 14,245.00	\$ 13,020.00					
SCHEDULE A-6 - Bridges	\$ 50,000.00	\$ (5,000.00)	\$ 55,000.00		\$ 135,000.00	\$ 225,000.00			
SUB-TOTAL	\$ 1,884,853.25	\$ 713,384.60	\$ 1,171,468.65	\$ 801,975.00	\$ 701,100.00	\$ 1,155,000.00	\$ 809,850.00	\$ 249,600.00	\$ 117,500.00
Contingency (20% for Class B)	\$ 376,970.65	\$ 142,676.92	\$ 234,293.73	\$ 160,395.00					
Contingency (50% for Class D)					\$ 350,550.00	\$ 577,500.00	\$ 404,925.00	\$ 124,800.00	\$ 58,750.00
Construction Totals (see note 1)	\$ 2,261,823.90	\$ 856,061.52	\$ 1,405,762.38	\$ 962,370.00	\$ 1,051,650.00	\$ 1,732,500.00	\$ 1,214,775.00	\$ 374,400.00	\$ 176,250.00

	Segment 3 Options			
	Segment 3 A+C	Segment 3 A+D	Segment 3 B+C	Segment 3 B+D
Const. Totals	\$ 2,640,825.00	\$ 2,442,675.00	\$ 3,321,675.00	\$ 3,123,525.00

Engineering, Project Management and Contract Administration (13%)	\$ 245,030.92	\$ 92,740.00	\$ 152,290.92	\$ 104,256.75	\$ 91,143.00	\$ 150,150.00	\$ 105,280.50	\$ 32,448.00	\$ 15,275.00
Permitting and approvals (2%)	\$ 37,697.07	\$ 14,267.69	\$ 23,429.37	\$ 16,039.50	\$ 14,022.00	\$ 23,100.00	\$ 16,197.00	\$ 4,992.00	\$ 2,350.00
Pre-design survey, engineering design, permitting and approvals SUB-TOTAL	\$ 282,727.99	\$ 107,007.69	\$ 175,720.30	\$ 120,296.25	\$ 105,165.00	\$ 173,250.00	\$ 121,477.50	\$ 37,440.00	\$ 17,625.00
GRAND TOTAL	\$ 2,544,551.89	\$ 963,069.21	\$ 1,581,482.68	\$ 1,082,666.25	\$ 1,156,815.00	\$ 1,905,750.00	\$ 1,336,252.50	\$ 411,840.00	\$ 193,875.00

NOTES:

1 Total project construction costs based on adding Segment 1 + Segment 2 + (either Segment 3A or 3B) + Segment 3 Shared + (either Segment 3C or 3D). Do not add all optional segments into a total project cost.

2 This Cost Estimate does not include the following costs:

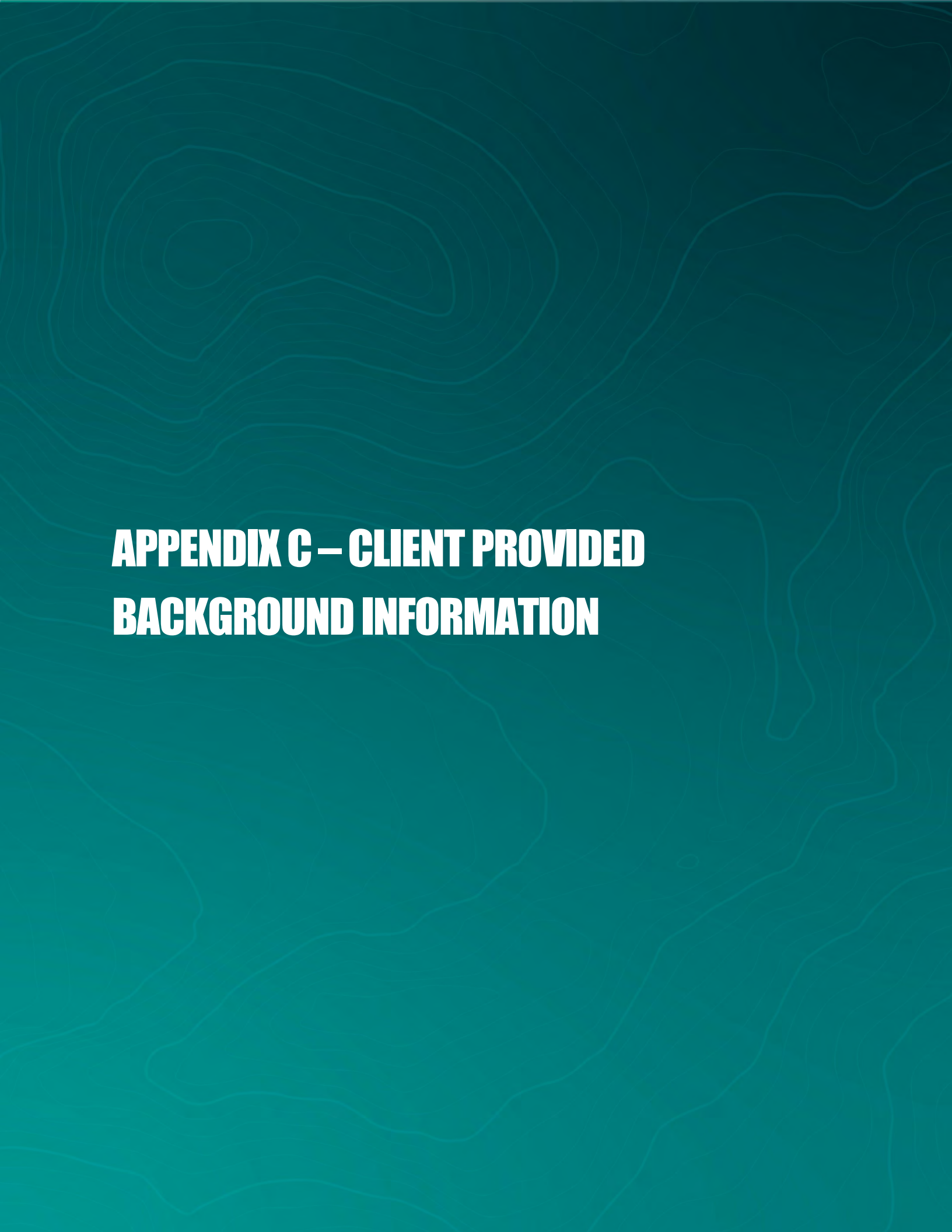
- A) Costs for permit(s) and approval(s) application fees.
- B) Costs associated with potential First Nations consultations, archeological and related work.
- C) Environmental study updates and fieldwork.
- D) Transportation Impact Assessment report(s).
- E) Potential legal survey work (easement, URW, etc.) or land acquisition costs.
- F) Relocation of buried utilities, shallow utility pedestals, overhead utilities, or streetlights.
- G) Lighting improvements (pathways in rural areas are not typically lit, the urban portion is in an existing road ROW)

3 This Cost Estimate is based on the following assumptions:

- A) Refer to the preliminary design report discussions of assumptions and constraints related to the overall project.

4 This construction cost estimate has been prepared using the design and technical information currently available, and without any benefit from Survey, Geotechnical or Environmental information. Furthermore, McElhanney cannot predict the competitive environment, weather or other unforeseen conditions that will prevail at the time that contractors will prepare their bids. The cost estimate is therefore subject to factors over which McElhanney has no control, and McElhanney does not guarantee its accuracy.

4 This construction cost estimate has been prepared using the design and technical information currently available, and without any benefit from Survey, Geotechnical or Environmental information. Furthermore, McElhanney cannot predict the competitive environment, weather or other unforeseen conditions that will prevail at the time that contractors will prepare their bids. The cost estimate is therefore subject to factors over which McElhanney has no control, and McElhanney does not guarantee its accuracy.



APPENDIX C – CLIENT PROVIDED BACKGROUND INFORMATION

BACKGROUND DOCUMENT LIST

Project Number	2531-47201
Project Name	Fernie Valley Pathway 2020
Client	Fernie Trails Alliance
Table Number	Table 10

#	Document	File Type	Description
1	2016-06-02 LIZARD CREEK TOPO	dwg, dxf, csv	Topography of Lizard Creek
2	2017 NHC Elk River and Fairy Creek Flood Mapping Final Report	PDF	Elk River and Fair Creek FloodPlain Mapping City of Fernie Final Report
3	20171222 DRAFT Geotechnical Report (All)	PDF	Draft Lizard Creek bridge replacement Geotechnical Investigation Report from Kohn Crippen Gerger
4	2018 Fernie Floodplain Area Lidar	Folder with various file types	Lidar information of Fernie floodplain
5	2018-09-10 Image for Fernie Trail's Alliance	PDF	Image of major highway access location and possible frontage road
6	2018-11-02 SKI HILL ROAD TOPO	dwg, dxf, csv	Topography along Ski Hill Road. Limited width, especially at top of road.
7	2019-09-11 18-005 2383 HWY 3 LES FRANK TOPO	dwg, dxf, csv	Utility and pathway linework near pump house. No topography.
8	2532_EV_OCP_Consolidation_December_1_2017	PDF	Elk Valley Official Community Plan Bylaw No. 2532, 2014
9	54521d1 (Westside Legacy Trail)	PDF	ALC letter for application to construct a recreational trail in the ALR
10	bl2363_fernie_alpine_resor_ocr_plan_bnry_ownership_b_jul12	PDF	This is Schedule B of Bylaw No. 2363 cited as "Regional District of East Kootenay - Fernie Alpine Resort Official Community Plan Bylaw No. 2363, 2012".
11	bl2363_fernie_alpine_resort_ocr_development_permit_areas_i_jul12	PDF	This is Schedule I of Bylaw No. 2363 cited as "Regional District of East Kootenay - Fernie Alpine Resort Official Community Plan Bylaw No. 2363, 2012".
12	bl2363_fernie_alpine_resort_ocr_development_phasing_areas_d_jul12	PDF	This is Schedule D of Bylaw No. 2363 cited as "Regional District of East Kootenay - Fernie Alpine Resort Official Community Plan Bylaw No. 2363, 2012".
13	bl2363_Fernie_Alpine_Resort_OCP_Landuse_Dev_Area_C2_jul12	PDF	This is Schedule C2 of Bylaw No. 2363 cited as "Regional District of East Kootenay - Fernie Alpine Resort Official Community Plan Bylaw No. 2363, 2012".
14	bl2363_fernie_alpine_resort_ocr_storm_water_system_g_jul12	PDF	This is Schedule G of Bylaw No. 2363 cited as "Regional District of East Kootenay - Fernie Alpine Resort Official Community Plan Bylaw No. 2363, 2012".
15	bl2363_fernie_alpine_resort_ocr_transportation_trails_h_jul12	PDF	This is Schedule H of Bylaw No. 2363 cited as "Regional District of East Kootenay - Fernie Alpine Resort Official Community Plan Bylaw No. 2363, 2012".
16	bl2363_fernie_alpine_resort_ocr_water_system_e_jul12	PDF	This is Schedule E of Bylaw No. 2363 cited as "Regional District of East Kootenay - Fernie Alpine Resort Official Community Plan Bylaw No. 2363, 2012".
17	BL2363_Fernie_Alpine_Resort_OCPConsolidation_November_2015	PDF	Fernie Alpine Resort Official Community Plan Bylaw No. 2363, 2012
18	BL2363_Fernie_Alpine_Resort_OCPConsolidation_November_2015_Page 30	PDF	11.3 Policies for Fernie Alpine Resort Official Community Plan
19	bl2363_fernie_alpine_resort-ocr-sanitary_sewer_system_f_jul12	PDF	This is Schedule F of Bylaw No. 2363 cited as "Regional District of East Kootenay - Fernie Alpine Resort Official Community Plan Bylaw No. 2363, 2012".
20	bl2532_elk_valley_cop_alr_c_oct14	PDF	This is Schedule C of Bylaw No. 2532 cited as "Regional District of East Kootenay - Elk Valley Official Community Plan Bylaw No. 2532, 2014".
21	bl2532_elk_valley_ocr_esa_uwr_south_e1_oct14	PDF	This is Schedule E1 of Bylaw No. 2532 cited as "Regional District of East Kootenay - Elk Valley Official Community Plan Bylaw No. 2532, 2014".
22	bl2532_elk_valley_ocr_flood_hazard_f1_oct14	PDF	This is Schedule F1 of Bylaw No. 2532 cited as "Regional District of East Kootenay - Elk Valley Official Community Plan Bylaw No. 2532, 2014".
23	bl2532_elk_valley_ocr_land_use_west_fernie_d2_dec17	PDF	This is Schedule D2 of Bylaw No. 2532 cited as "Regional District of East Kootenay - Elk Valley Official Community Plan Bylaw No. 2532, 2014".
24	bl2532_elk_valley_ocr_slope_analysis_south_h1_oct14	PDF	This is Schedule H1 of Bylaw No. 2532 cited as "Regional District of East Kootenay - Elk Valley Official Community Plan Bylaw No. 2532, 2014".
25	Bylaw 2348 Schedules A1 A2 A3	PDF	Elk River FloodPlain Map Sheet 1-3

26	Circle K TIA	PDF	Memo Fernie Trails Alliance Verbal FOI request for Traffic Impact Assessment 98 Riverside Way
27	Comments_FVP Proposed Alignment Sub Nov 1_ Combined	docx	City of Fernie Planning & Engineering Department comments on Fernie Valley Pathway Proposed Alignment Submission Nov 1, 2019
28	DV03S - Site East Fernie Bridge 36-011EW - NY on 10-18-2018	PDF	Daily volume from 10/18-2018 through 10/22/2018
29	DV03S - Site West Fernie Bridge 36-004EW - NY on 10-18-2018	PDF	Daily volume from 10/18-2018 through 10/22/2018
30	Elk River Flood Plain Mapping_Flood Construction Level Map 9	PDF	Elk Rver FloodPlain Mapping - Flood Construction Level Map Sheet 9 of 12
31	Elk River Flood Plain Mapping_Flood Depth Map 7	PDF	Elk River Flood Plain Mapping Flood Depth Map Sheet 7 of 10
32	Elk River Flood Plain Mapping_Geomorphic Hazard Map 7	PDF	Elk River Flood Plain Mapping Geomorphic Hazard Map Sheet 7 of 10
33	Elk River Flood Plain Mapping_Geomorphic Hazard Map 7 - Copy	PDF	Elk River Flood Plain Mapping Geomorphic Hazard Map Sheet 7 of 10 - Copy
34	ElkValleyFloodMapping_LiDAR and Ortho Data_August 9 2018_Part 1 & 2	Folder with various file types	Lidar information of Elk Valley Flood Mapping
35	Environmental Assessment Proposed Construction Multi Use Trail_Fernie Rec Trail Steer Comm_Morrow_Reduced	PDF	Environmental Assessment Proposed Construction of Multi Use Trail, Fernie, BC
36	Fernie OCP Schedule D-Parks Trails Open Space	PDF	Schedule D Parks, Trails, Facilities and Open Space Network May 6, 2014
37	FernieTrailsMasterPlanFinalDraftREV01	PDF	Fernie Trails Master Plan - Final Draft - January 2015
38	FernieWest_MoTILiDARandOrtho_2011	Folder with various file types	Duplicate information to above.
39	FernieWest-2011	Folder with various file types	Contains various Lidar data sources compiled into Survey Base. Dwg file contains orthophoto, contours, legal, utilities, road and building linework. Legal linework based on ICIS_Cadastre file which appears to have some inconsintisies in some property lines.
40	Floodplain Management Bylaw No. 2348 (Consolidated Version)	PDF	Corporation of the City of Fernie Consolidated Floodplain Management Bylaw No. 2348
41	HWY3_638_5480_UTM11_15cm_SP000-2100_AP000-2702_v1	ecw	Orthophoto
42	HWY3_638_5481_UTM11_15cm_SP000-2100_AP000-2702_v1	ecw	Orthophoto
43	HWY3_639_5479_UTM11_15cm_SP000-2100_AP000-2702_v1	ecw	Orthophoto
44	HWY3_639_5480_UTM11_15cm_SP000-2100_AP000-2702_v1	ecw	Orthophoto
45	HWY3_639_5481_UTM11_15cm_SP000-2100_AP000-2702_v1	ecw	Orthophoto
46	Lizard CAD Pathway	Folder with dwg files	Contains design linework for Lizard Creek Bridge Highway 3 and Pathway upgrades project.
47	Lizard Creek Bridge Survey Plans April 2017	PDF	Survey plan Lizard Creek Bridge Replacement
48	Lizard Creek Bridge_Issued for Tender_2019-02-14	PDF	Drawing of Lizard Creek Bridge No. 1181 and approaches, grading & paving
49	Lizard Creek site survey 2017a	PDF	Site survey Highway 3 at Lizard Creek
50	Lizard Creek site survey update 2017	dwg	Topo survey and orthophoto of Lizard Creek area
51	Lizard Creek Storyboard	PDF	Storyboard for Lizard Creek Bridge Replacement Highway #3
52	Lizard_EA_20171129	PDF	Environmental Assessment for Lizard Creek Bridge Replacement Project - Masse Environmental Consultants Ltd.
53	lizardUAV2017ortho	ecw	Orthophoto
54	Ministry of Agriculture Trails Guide	PDF	A guide to using and developing trails in farm and ranch areas
55	MoTI Letter_Fernie Valley Pathway October 2019	PDF	Letter from Ministry of Transportation & Infrastructure in support of Fernie Valley Pathway
56	Multi-Use Pathway_Route Options Concepts_MASTER_REV02_11x17 Print	PDF	Early conceptual route options.
57	MultiUsePathway_PreferredAlignmentConcepts_20181017_REV05	PDF	Highway 3 Corridor overview map - Fernie Alpine Resort to West Fernie Bridge
58	OCP Bylaw No. 2231, Amendment_8 (Bylaw No. 2343)	PDF	Consolidated Official Community Plan Bylaw No. 2231, 2014
59	ortho-lizard	dwg	Orthophoto
60	PlotCfgs	Folder with AutoCAD Plot Styles	Contains MoT Plot Styles
61	Property Acquisition & TLCA	PDF	Temporary License to Construct/Property Acquisition
62	Schedule A - Neighbourhoods and Planning Areas	PDF	Map - Schedule A: Neighbourhoods and Planning Areas - Bylaw No. 2231
63	Schedule B - Land Use Designations	PDF	Map - Schedule B: Land Use Designations
64	Schedule D - Parks, Trails, Facilities and Open Space Network	PDF	Map - Schedule D: Pakrs, Trails, Facilities and Open Space Network
65	Schedule E - Transportation Network	PDF	Map - Schedule E: Transporation Network
66	Schedule F - Sewer System Master Plan	PDF	Map - Schedule F: Sewer System Master Plan
67	Schedule G - Water System Master Plan	PDF	Map - Schedule G: Water System Master Plan
68	Schedule H - Boundary Expansion Study Areas	PDF	Map - Schedule H: Boundary Expansion Study Areas
69	Schedule I - Watercourses	PDF	Map - Schedule I: Watercourses
70	Schedule J - Slope Hazards	PDF	Map - Schedule J: Slope Hazards
71	Schedule L - Flood Hazard Areas	PDF	Map - Schedule L: Flood Hazard Areas
72	Schedule N - Highway Corridor	PDF	Map - Schedule N: Highway Corridor
73	Schedule Q - Multi Family	PDF	Map - Schedule Q: Multi-Family
74	Schedule T - Housing Capacity	PDF	Map - Schedule T: Housing Capacity
75	Survey Data COF	Folder with various dwg files	Contains various drawings containing legal linework, Maiden Lake orthophoto, topo, and utility linework..
76	Westside Legacy Trail Staff Report to RDEK July 6 2017	PDF	Request for Decision - Westside Legacy Trail - Additional Proposed Amenities



APPENDIX D – FERNIE TRAILS ALLIANCE PROJECT CHARTER



Fernie Centennial Trail Project Charter & Plan

Fernie Centennial Trail	Safe and Active Communities	2018-Feb-06
Project Name	Initiative or Program	Document Date
Terry Nelson	FTA President/Committee Liaison	
Project Sponsor	Project Sponsor's Title/Role	
Jason Sinclair	jason@sinclairkaiser.com	
Committee Chair	Committee Chair Contact Information	

<u>Document modified by</u>	<u>Changes made</u>	<u>Date modified</u>
Jason Sinclair	Initial Project Charter development	2018-Jan-04
Jason Sinclair	Committee review and sign-on to Project Charter	2017-Jan-28
Jason Sinclair	Clarifications from Route Evaluation & Selection process	2018-Feb-06

1. EXECUTIVE SUMMARY

The Fernie Centennial Trail, when completed, will provide a continuous, safe transportation corridor between the City of Fernie and the Fernie Alpine Resort that is separate from the highway. This will resolve a major safety issue by providing a much safer option for pedestrians and cyclists off of the shoulder of the highway. (Fernie Trails Master Plan, 2015)

2. ALIGNMENT WITH PRIORITIES

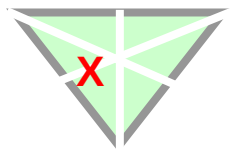
Community Priorities	Public survey responses and stakeholder engagement have identified completion of the Fernie Centennial Trail as a priority project for the communities, to connect existing trail networks and to provide a safe valley route for all users.
Municipal Policy and Official Community Plans (OCP)	Improved connectivity between urban and semi-rural areas is also identified as a priority in the City of Fernie OCP. Both Fernie Alpine Resort OCP and Elk Valley OCP identify a trail connection between FAR and Fernie within their policies, as a shared responsibility of the RDEK, City of Fernie and Fernie Alpine Resort.
FTA Priorities	Identified in the Fernie Trails Master Plan (2015) as a priority safety improvement project relating to the use of the Highway 3 corridor by cyclists and pedestrians.

3. PROJECT COMPLETION OUTCOMES AND SUCCESS MEASUREMENT

#	Project Completion Outcomes	Success Measures	Accountable
1	A viable and protected trail alignment that can be delivered in-whole, or phased if required.	Key stakeholder endorsement of the trail alignment, and design approvals by the responsible Approving Officer(s).	FCT Committee
2	Secured implementation funding for the design and construction of the Fernie Centennial Trail.	Provides for the development of <u>all</u> strategic trail segments and related infrastructure, with provision for potential paving, lighting and trail amenities.	FCT Committee
3	A safe and sustainable multi-use commuter pathway connecting communities between City of Fernie and Fernie Alpine Resort.	Trail is well used and valued by user groups, tourism organizations and the communities it serves, and is being sustained by government and private custodian partners.	Project Manager

4. STAKEHOLDER ANALYSIS AND REQUIREMENTS

Stakeholder	Stakeholder Requirements	Applicable Success Measures
City of Fernie (COF)	A safe design that minimizes maintenance burden and provides improved amenity to the community and visitors.	1, 2 & 3
Regional District of East Kootenay (RDEK)	A safe design that minimizes maintenance burden, and connects semi-rural communities.	1, 2 & 3
Fernie Alpine Resort (FAR) and RCR	A safe trail that will be used by staff and guests of the resort, and integrates with the resort's development plans.	1, 2 & 3
Kootenay East MLA	A safe trail that promotes community activity and economic prosperity.	1, 2 & 3
BC Ministry of Transportation and Infrastructure	A safe design that integrates with highway corridor and transportation infrastructure plans, and encourages healthy living and helps address climate change objectives.	1, 2 & 3
BC Ministry of Tourism, Arts and Culture (Resort Municipality Initiative)	Trail infrastructure that increases resort activities and amenities, and increases visitation and visitor activity.	1, 2 & 3
Columbia Basin Trust (CBT) – Funding and Support Programs	Strategically placed connector pathway that improves safety for active transportation modes (cycle and pedestrian), promotes healthy lifestyles, and provides connectivity between community amenities, attractions and businesses.	1, 2 & 3
Fernie Trails Alliance (FTA) Board	A safe pathway for all ages and abilities that connects communities and the trail networks.	1, 2 & 3
Land Owners providing access right-of-way (R/W) for the trail development	Limited impact on existing or future land use or amenity, and potentially increases land value through functional improvements (e.g. drainage or access).	1 & 3
Ministry of Environment & Climate Change Strategy	A sustainable trail design that minimizes impact on the environment and contributes to reduction of GHG emissions.	1 & 3
FSVCA (Ski Hill Home Owners)	Safe trail connectivity from the City of Fernie to FAR that integrates with existing and planned resort community trail networks.	1 & 3
Nearby Land Owners and Land Developers	Improved access and connectivity to trail network, and no loss of amenity from trail development or trail users.	1 & 3
BC Parks (Mt. Fernie Park)	Improved safety of non-motorized trail user access to Mt. Fernie Park from the communities.	1 & 3
Fernie area community residents	Safe pathway that connects existing centres of recreation, attractions, and businesses in the Fernie area.	1 & 3
Fernie Alpine Resort staff	Safe and efficient commuter pathway route between City of Fernie and Fernie Alpine Resort.	1 & 3
Tourism Fernie and Fernie Chamber of Commerce	Connected attraction centres and a feature trail for both valley residents and visitors.	3

Priority Management (Priority triangle for making project scope change or financial decisions)	Schedule Quality  Cost (\$)
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5. DELIVERABLES

List of Deliverables Relating to the Success Measures:			
Success Measure	Key Deliverables Required by each Success Measure		
1	Route selection and validation, including a safety review of preferred alignment	Land access agreements for all segments of the trail (statutory right-of-way where required)	Approved Preliminary Design, Implementation Plan and Class 3 (Class C) Cost Estimate
2	Funding Strategy for Project Implementation	Approved Funding Agreements to complete all trail segments	
3	Detailed Design and Construction Contract Documentation	Total Completion of Trail Construction Contracts	Trail Sustainment and Maintenance Plan for Asset Handover
Excluded Deliverables (Out of Scope)		1. Development of branch trail connectors to existing trail networks or developments adjacent to the primary Fernie Centennial Trail commuter route. 2. Lizard Creek multi-use bridge infrastructure (by MOTI). 3. Vehicle parking provisions at trailheads. 4. Land purchase or expropriation actions (excluding statutory right-of ways). 5. Ongoing maintenance operations of the completed trail infrastructure.	

6. PROJECT SCHEDULE

Milestones	Milestone Completion Date	Deliverables by Milestone (Target Completion Dates)				
Project Charter and Work Plan	March 31, 2018	Committee Endorsed Project Charter & Plan (January 31, 2018)	Key Stakeholder consultation on the Project's Work Plan			
Design Budget and Funding Strategy	March 31, 2018	Application submitted to FAR for Community Summit Fund. (Dec 6, 2017)	Application submitted to RDEK for Community Initiatives Program Funding. (Jan 22, 2018)	Application submitted to CBT for Community Development Program (CDP) funding. (Mar 2018)	Planning Phase Budget Approval by FTA Board	
Screening of alternative Trail Route Options	April 30, 2018	Evaluation and ranking of the route options by the Committee. (March 31, 2018)	Engagement of Key Stakeholders to validate the preferred route option.	Conceptual plan of the preferred route option for engineering feasibility and costing. (April 30, 2018)	Letters of Support from Key Stakeholders.	
Engagement of Engineering Consultant	May 31, 2018	Terms of Reference and Scope of Work for Alignment Feasibility and Preliminary Design.	Request for Proposals (RFP) for Engineering Services.	Evaluation of Proposals and Award of Engineering Assignment for Design Phase.		
Validation of Alignment Option(s) and Preliminary Design	December 31, 2018	Develop and approve the Design Basis and applicable Design Standards for the project	Technical validation of the preferred route alignment option and review of public safety risk mitigation measures	Agreements with Land Owners/Stewards that would be required to provide access for the preferred route alignment	Preliminary Design and Class 3 (Class C) Cost Estimate	Ministerial and Local Gov't approvals of the proposed trail pre-design.
Implementation Budget and Funding Strategy	April 30, 2019	Design and Construction Budget Finalization (December 2018)	Signed Private Funding Agreements. (December 2018)	RMI funding application (November 2018)	CBT funding application (February 2019)	BikeBC funding application (February 2019)
Detailed Design and Construction	October 31, 2020	Implementation deliverables and schedule to be developed with future Project Manager and Design Consultant				

7. FINANCIAL SUMMARY

Approved Funds	2018 FTA Budget:	\$5,000
	Fernie Alpine Resort Summit Fund Commitment:	\$1,500
	Total:	\$6,500
Current Total Project Budget Estimate	Route Selection and Pre-Design:	\$65,550 (3% of Project Total)
	Design and Contract Documentation:	\$152,950 (7% of Project Total)
	<u>Construction and Contract Supervision:</u>	<u>\$1,966,500</u>
	Project Total:	\$2,185,000 (Fernie Trails Master Plan, 2015)
Class of Cost Estimation	<u>CLASS 4 - CONCEPTUAL DESIGN (Expected variance -30% to +50%)</u>	

8. PROJECT GOVERNANCE

Project Sponsor	Name: Terry Nelson	Assigned Authority: TBD
Project Manager	Name: TBD	Assigned Authority: TBD
Proposed Committee Structures	A Project Committee of the Fernie Trails Alliance (FTA) has been established with representatives from trail user and community stakeholders groups. The Committee will provide leadership of the project during the planning and preliminary design phase and make recommendations to the FTA Board via the Committee's Board Liaison. During the implementation phase (detailed design and construction) the Committee will play a liaison and communications role between the Project Manager and key stakeholders, including community and user groups.	

9. PROJECT TEAM

Name	Project Role(s)
Terry Nelson	FTA Board liaison, route evaluation, ministries liaison
Jason Sinclair	Committee Chair, route evaluation, professional services procurement
Jim Miller	Committee Past Chair
Reg Holmes	Route evaluation, professional services procurement
Robert Champagne	Funding and fundraising, stakeholder engagement and communications
Sam Sedlowsky	Funding and fundraising, stakeholder engagement and communications
Ron Carrothers	Route evaluation, stakeholder engagement and communications
Chris Pedersen	Funding and fundraising, stakeholder engagement and communications

10. COMMUNICATIONS

Communications Plan	See communications information (below)
	A Stakeholder Engagement Strategy and Communications Plan will be developed by the Committee during the project planning phase.

11. RISK MANAGEMENT

Risk	Likelihood	Impact	Management Response
Required design funds are not obtained to meet the project's schedule	M	M	Phase the engineering design assignment and budget commitments to meet critical path design activities.
Access agreements cannot be obtained for preferred (highest ranked) route alignment	H	H	Multiple (two or more) feasible route alignments should be identified for potential detailed planning and design, subject to formalized access agreements.
Implementation funding for the trail construction cannot be secured within the project timelines	M	M	Implementation will allow for phased construction to strategic milestone locations as funding permits.
MOTI projects require design decision input ahead of completed trail alignment finalization and design	M	L	Prioritize the Design Consultant's work plan to meet MOTI design requirements.

12. CONSTRAINTS, ASSUMPTIONS, DEPENDENCIES

Constraints	- Trail must cross Lizard Creek at the new Lizard Creek Bridge when completed, which will provide a protected multi-use pathway in its design. - Project budget estimates do not provide for any land acquisition costs, beyond legal access agreements (statutory right-of-ways). - Trail must be designed for safe multi-use activities such as pedestrians and cyclists, and limited motorized uses that are not classified as motor vehicles under BC's <i>Motor Vehicle Act</i> (e.g. motorized wheelchairs) or relevant municipal bylaws.
Assumptions	- An at-grade trail crossing of the Crowsnest Highway, between City of Fernie and Fernie Alpine Resort, is only permissible at Riverside Way/Mt. Fernie Park Road. - Trail alignment and design will make provisions for ultimate pathway development standards, including but not limited to paving and lighting. - Existing pathway segments may be retained, however do not preclude new alignment options that improve public safety or reduce the project costs.
Dependencies	- Lizard Creek Bridge Replacement design and construction schedule (MOTI) - Fernie to Fernie Alpine Resort Corridor Access Study schedule (MOTI). - West Fernie OCP Amendment and Rezoning Project (COF) - Funding allocation cycles and deadlines set by potential funding partners.

13. APPENDICES

Fernie Trails Master Plan (2015)	<u>See link (below)</u> https://fernief.civicweb.net/FileStorage/62952946F36D4DD4BB30BCB59C878AB1-FernieTrails%20Master%20Plan%20-%20Final%20Draft%20(REV01).pdf
City of Fernie OCP Bylaw No. 2231	<u>See link (below)</u> https://fernief.civicweb.net/filepro/documents/19401
Elk Valley OCP Bylaw No.2532	<u>See link (below)</u> http://www.rdek.bc.ca/bylaws/ocp_zoning_landuse/ocp/elk_valley_official_com
Fernie Alpine Resort OCP Bylaw No.2363	<u>See link (below)</u> http://www.rdek.bc.ca/bylaws/ocp_zoning_landuse/ocp/fernialpineresortocp/

**APPENDIX E – ORIGINAL CONCEPTUAL
DESIGN OPTIONS DRAWING FROM FERNIE
TRAILS ALLIANCE**

Highway 3 Corridor Overview Map Fernie Alpine Resort to West Fernie Bridge

0 125 250 500 Meters 1:5,000

High resolution Imagery flown on September 2, 2014

Legend

- Parcel Boundary
- City Administrative Boundary

Route Alignment Options Legend

North Alignment Segments

South Alignment Segments

Galloway Alignment Segments

West Fernie Dyke Alignment Segments

Riverside Park Alignment Segments

Potential Connector Trails or Cycle Routes

The map illustrates the proposed Highway 3 corridor from the Fernie Alpine Resort to the West Fernie Bridge. It shows several alignment options: North Alignment Segments (blue dashed line), South Alignment Segments (red dashed line), Galloway Alignment Segments (cyan dashed line), West Fernie Dyke Alignment Segments (yellow dashed line), and Riverside Park Alignment Segments (magenta dashed line). Potential Connector Trails or Cycle Routes are shown as orange dashed lines. Key features and labels include:

- Node D: Fair Guest Services
- Timberline Tunnel
- Existing snow-making supply line & planned pathway/skiway easement
- Existing gravel trail to Mountain Pantry Intersection
- Intersection with EVNC Galloway Loop with 10-20 m treed buffer
- Intersection with EVNC Galloway Loop
- Existing Logging Skid Road
- Node C: Proposed Lizard Creek Multi-Use Bridge
- Old Growth Management Area (west of driveway)
- Drainage from Bryant and Back Creeks (Seasonal flooding on north side of highway)

Contact

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