# Bow River Pathway Conceptual Design

Town of Canmore

Final Report

November 2021

## Corporate Authorization

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Transportation Design

**Permit to Practice**
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RM APEGA ID: 56415
Date: 1 Dec. 2021
**Permit Number P4741**
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# 1.0 Introduction

The Bow River Pathway between the Rundle Drive Bow River bridge and the Homesteads Van Horne connection is an existing shared use gravel pathway which serves a critical purpose in the active modes network south of the Bow River. The project area is outlined in Figure 1.1 below. The upgrade of this facility to an all ages all abilities cycling and walking facility has been identified as an important step towards the Town of Canmore's vision of becoming "Alberta's premiere walking and cycling community" outlined in the Integrated Transportation Plan Update (2018, Stantec and Mobycon). This concept planning exercise aims to establish a facility design which enables year-round maintenance, ensures adequate width and eventual separated facilities.

This report includes a review of planning and policy documents, an overview of the pathway network in the area to determine what upgrades to surrounding infrastructure are necessary to ensure activation and utilization of the Bow River pathway. In addition, a conceptual design of the connection between Three Sisters Drive and West Canmore Park has been included. A plan for implementation is included with a Class D cost estimate for the ultimate pathway and initial stage.


Figure 1.1 Project Area

# 2.0 Study Background

Before establishing a conceptual design for the pathway, a review of anticipated pathway users, planning and policy documents, and previous reports has been completed to ensure a fulsome understanding of the pathway's place and role within the network.

## 2.1 Pathway Users

The Bow River pathway runs parallel to the Bow River and serves both local and tourist users. A variety of existing and future Bow River pathway user categories have been identified:

- Existing commuters from communities such as Prospect Heights, the Homesteads, Peaks of Grassi, Three Sisters and Stewart Creek who use the pathway to access the Town Centre and a variety of destinations north of the Bow River.
- Future commuters that will result from the significant development planned in the Three Sisters Mountain Village.
- Both locals and tourists using the pathway directly for recreation and to access other recreational destinations.

Based on the variety uses anticipated on the pathway, users will represent a wide variety of cycling abilities and level of comfort. Concept design should ensure provision is made to encourage use by cyclists of all abilities by ensuring a high level of comfort and safety.

## 2.2 Bow River Pathway Preliminary Assessment (WSP, August 2021)

WSP completed an assessment of the Bow River pathway which included a review and documentation of existing conditions and provided recommendations upgrades to the pathway. These recommendations have been included verbatim below:

- Pathway upgrades can be staged starting with a 3.0m multi-use paved pathway and upgrading to a separated 3.0m bike path and 2.5m sidewalk when volumes dictate the need.
- The current granular pathway surface should be upgraded to asphalt in order to provide a smooth continuous surface that is accessible to a wide variety of user groups.
- Lighting should be added to the pathway to ensure that hazards are visible to users and users are visible to each other.
- The minimum width of the multi-use pathway should be 3.0m, with potential to reduce to 2.7m in particularly laterally constrained sections or alternate alignments may need to be considered.
- At locations with steep grades (i.e., 8% or greater), the pathway should be re-graded or alternate alignments should be investigated.
- The volumes on the pathway should be monitored to determine when separation needs to be considered. Based on the 2020 volumes at the Bow River Bridge, the northern portion of the pathway (i.e., between Bow River Bridge and West Canmore Park) may require separation in the near term. Existing volumes at Prospect Bridge indicate that separation of the southern portion of the pathway can be deferred until the pathway volumes at least double from their current levels.

## 2.3 ITP Active Modes Map

The relevant area of the Integrated Transportation Plan Update's (Stantec and Mobycon, 2018) Existing and 2030 Bicycle Facilities Active Modes map is shown in Figure 2.1 below. The Bow River Pathway is classified as a Future Dedicated Bicycle Facility between the Rundle Drive Bow River Bridge and West Canmore Park. The pathway between West Canmore Park and the Homestead's Van Horne connection is shown as Future Shared Use Path / Street, likely highlighting that upgrades are needed to the gravel path before it forms part of an all ages all abilities network. Three Sisters Drive and Three Sisters Parkway, running parallel to the project area are shown as a Future Dedicated Bicycle Facility.

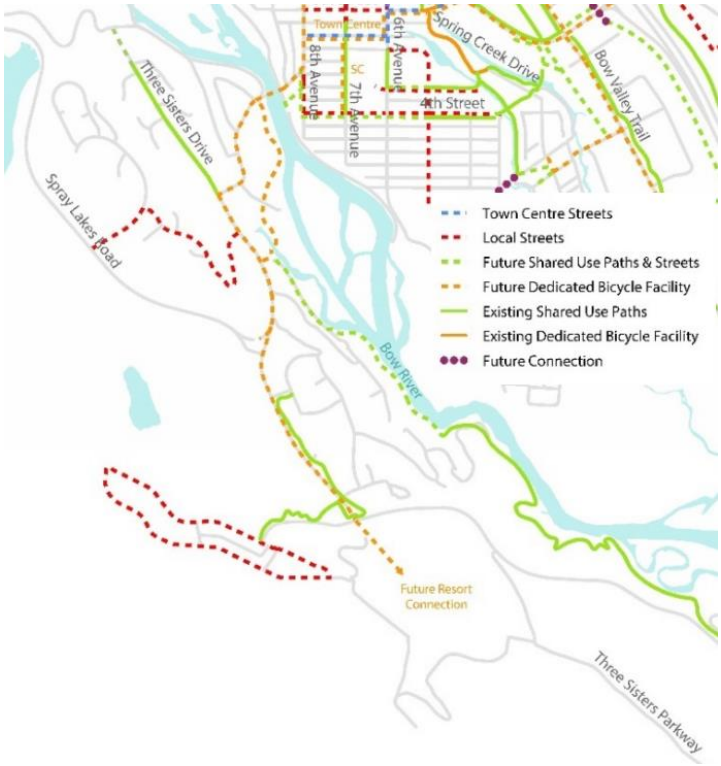


Figure 2.1 Existing & 2030 Bicycle Facilities (ITP Figure 5-3)

## 2.4 Open Space and Trails Plan

The Open Space and Trails Plan (Town of Canmore, June 2015) includes a section on the Rundleview / Quarry Lake area which also encompasses the Bow River pathway project area, as shown in Figure 2.2 below. Three key improvements within the study area are highlighted:

3. Improve pedestrian experience through west side of Bow River Bridge (improve path along fence on north side of bridge, align trail with pedestrian crossing, consider creating gravel path connection along Rundle Drive.
6. Extend paved surface of Bow River/Three Sisters Trail from near Van Horne out to the boat launch / pedestrian bridge.
9. Work with BCEAG & ESRD to consider bridge connecting South Canmore to Mineside / Three Sisters. The additional bridge should be constructed with greater freeboard than the Bow River Bridge and have adequate load bearing capacity for emergency vehicles in the event that the Bow River bridge is impacted by a flood.


Figure 2.2 Path / Trail Recommendations: Rundleview / Quarry (OSTP Figure 4.2.4)

Item 3 is generally outside of the scope of this project, although it is noted that improvements to this pathway and connection should be investigated as part of future planning for improvements including the implementation of dedicated cycle infrastructure on Rundle Drive. Item 6 largely comprises the

purpose of the Bow River pathway concept design. Planning for an additional Bow River Bridge as noted in Item 9 has not been reviewed as part of this concept design.

## 2.5 Roam Transit

Roam Transit provides bus services to the Bow Valley are under the Bow Valley Regional Transit Services Commission. Route 5, which provides local Canmore service, runs parallel to the project area along Rundle Drive, Three Sisters Drive and Three Sisters Parkway as shown in Figure 2.3.

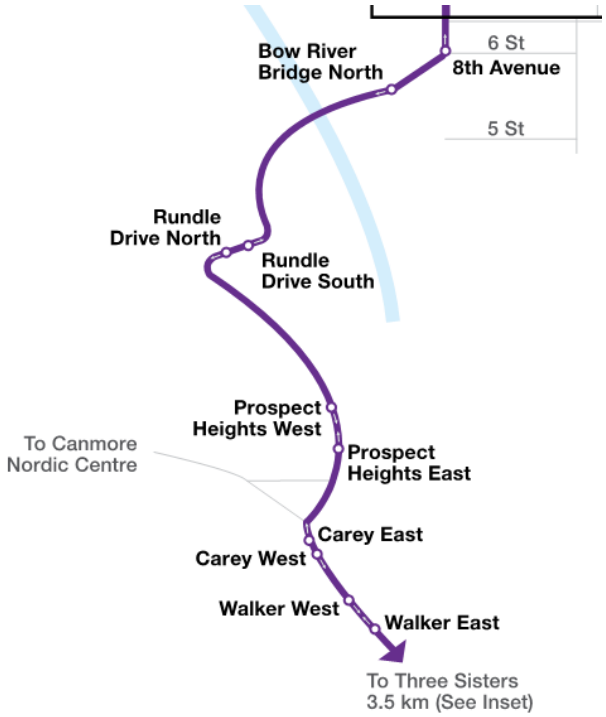


Figure 2.3 Roam Transit Route 5 (Accessed October 8, 2021)

Bus stops which provide logical transition points for multi-modal transit and bicycle or transit and walking trips are of particular relevance to pathway concept design. In particular, the Prospect Heights set of stops could provide a logical transition point, especially if connections to the pathway are improved. However, it is noted that the existing Route 5 and the Bow River pathway generally access similar destinations, reducing the likelihood of multi-modal commutes.

## 2.6 Flood Data

With the pathway running parallel to the Bow River and within the river valley, a review of available flood data and modelling is required to determine the effects of high water and flood events on the proposed infrastructure. Background reports including the Canmore Flood Risk Mapping Study (W-E-R Agra Ltd., March 1993), the Bow River Flood Modelling Report (McElhanney Consulting Services Ltd., January 2016) and the Bow River Dyke Capacity Analysis (BGC Engineering Inc., June 2014) were reviewed for relevance.

The section of the Bow River pathway between the Bow River bridge and West Canmore park is constructed on top of the Mine dyke which is owned and maintained by Alberta Environment Parks (AEP). The Bow River Dyke Capacity Analysis provides dyke elevation profiles in conjunction with a variety of modelled water levels, which is of particular interest. The report recommends assuming a peak event discharge of 685 $m^3/s$ for this section of the river, however, analysis has completed at higher discharge events including 800 $m^3/s$ and 1,000 $m^3/s$ events which are referenced later in this report.

Flooding extents data has been accessed from the Alberta Floods Portal referencing the Canmore Flood Risk Mapping Study (W-E-R Agra Ltd., March 1993) as shown in Figure 2.4. Notably, the 1:10 year and 1:100 flooding data from this source shows the entire area between the Rundle Drive Bow River road bridge and West Canmore as flooded during the 1:10 year event. This is anticipated to be due to overtopping of the Rundle Canal Dyke upstream of this location as the existing flood berm / pathway elevation is above peak events.

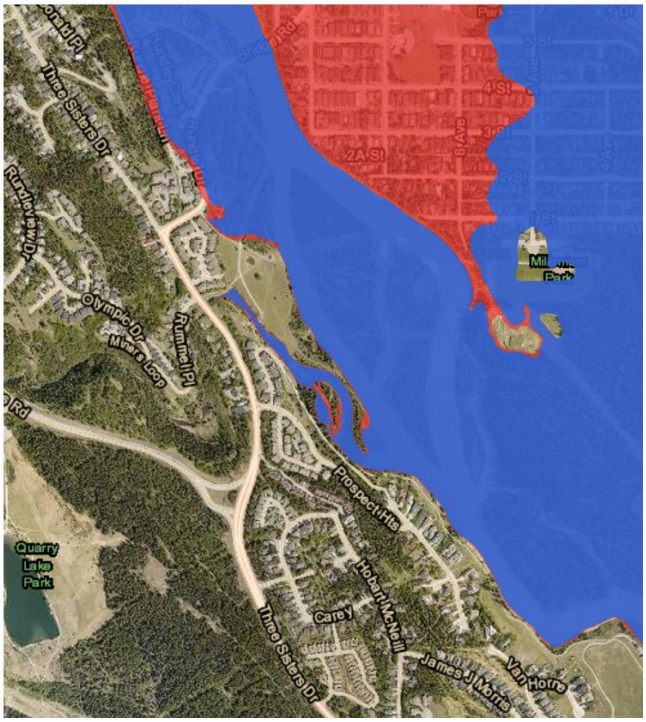


Figure 2.4 1:10 Year and 1:100 Year Flood Events

# 3.0 Pathway Network

A thorough analysis of the pedestrian and bicycle networks in the area has been completed to ensure that the proposed infrastructure fits within the context of the overall network. An emphasis on ensuring the Bow River pathway is well connected with the surrounding network is important to maximize utilization.

## 3.1 Existing Pathway Connections

As a starting point for determining existing active modes usage and understanding how the existing network functions, the existing trail network was reviewed and can be viewed on Exhibit 3.1. All network components have been included in this map, regardless of their current accessibility, safety or comfort. This includes all paved and gravel paths and trails, connections and stairways within the project area. Catchment boundaries have been established to delineate which areas are using connectors to access the primary pathways, assuming trips are heading towards the Bow River bridge. This exercise highlights that a robust trail network exists within the primary catchments, with the quality of these connections varying widely.

Table 3.1 Pathway Connections provides an overview of the community connections interfacing directly with the Bow River pathway, reference the 0 to 9 numbering sequence on Exhibit 3.1. The existing geometry of each pathway has been evaluated, along with constraints, existing usage and contributing areas. The existing usage column makes reference to Strava Heatmaps which pull cyclist and pedestrian usage data from Strava Metro. The Strava Heatmaps are available in Appendix A. Improvements to connections such as paving existing gravel pathways, replacing access gates with bollards and installing curb ramps are recommended in Table 3.1.

## 3.2 All Ages All Abilities Active Modes Network

A goal of the concept plan is to establish an all ages, all abilities active modes network which is maintained year-round. This includes determining which community connections meet or can be improved to meet all ages all abilities standards. Based on the evaluation of connections summarized in Table 3.1, several key connections require upgrades to form part of this network as shown in Exhibit 3.2. Connections 1, 6 and 9 have been identified as forming part of the all ages, all abilities network and should receive upgrades as noted along with winter maintenance. In discussion with the Town and review of existing and future usage patterns, Connection 1 between Three Sisters Drive and West Canmore Park was highlighted as in need of upgrades. Work to redesign Connection 1 is included in Section 5.6.

This exercise of identifying contributing areas and connections also highlighted the critical nature an active modes facility on Three Sisters Drive which connects the western portion of the Homestead's to the active modes network. Implementation of a facility on Three Sisters Drive which joins the Bow River Pathway at Connection 1 (West Canmore Park) would prevent back-tracking and the use of poor-quality connections which may not be a viable option in winter. Three Sisters Drive is identified as a dedicated bicycle facility in the ITP Active Modes map. Implementation of an interim facility, particularly connecting between Connection 1 and the existing pathway at Charles Carey, would also bring significant benefit. This could be accomplished through a combination of on- and off-street segments along Three Sisters Drive as shown in Exhibit 3.2.

| No. | Description | Existing Pathway Geometry | Constraints | Existing Usage / Contributing Areas | Potential Improvements | Disposition |
|---|---|---|---|---|---|---|
| 0 | **Rundle Drive to North West Canmore Park Lift Station Road**<br>Paved access road from Rundle Drive which crosses the path with access to the lift station and washroom. | Grade = 0-6%<br>Width = 3.5m<br>Length = 120m<br>Surface = gravel | • Access gate blocks use of this connection, desire line path is evident around the gate.<br>• Limited cycling infrastructure on Rundle Drive means this access has limited usefulness. | Strava Heatmap Usage = Med<br>Contributing Trails and Areas = Users accessing from Rundle Dr., Old Hospital Hill, Roam Route 5 Rundle Drive Stop | • Replace access gate with a bollard.<br>• This connection may serve a more important role once a dedicated bicycle facility is installed on Three Sisters Drive and Rundle Drive.<br>• Implement year-round maintenance. | All Ages All Abilities Connection<br>Minor Improvements Required |
| 1 | **Three Sisters Drive to Central West Canmore Park Connection**<br>Gravel pathway connection between the Mountain Shadows development and the West Canmore Park stream. | Grade = 0-7%<br>Width = ~1.0m<br>Length = 110m<br>Surface = gravel | • Narrow pathway width and poor sightlines constrained between the top of bank/guardrail and Mountain Shadows wood fence.<br>• Existing metal guardrails adjacent to Three Sisters Drive and the top of outfall bank. The top of bank guardrail artificially narrows the corner approach.<br>• Condo development has a chain link fence (east side) and a wood fence (south side). Sight lines are prohibited by the wood fence.<br>• Poor connecting and crossing infrastructure at Three Sisters Dr. crosswalk. No curb ramps are provided and there is a CB in travel path. | Strava Heatmap Usage = Med-High<br>Contributing Trails and Areas = Quarry Lake access trails, Rummel Place, Three Sisters Drive | • Consider approaching condo board and offer to change out wood fence for chain link to improve sight lines.<br>• Remove/adjust guardrails and regrade the south approach to improve alignment and sightlines around corner. Increase pathway width around the corner with a retaining wall.<br>• Improve the Three Sisters Drive crossing infrastructure including installing curb ramps.<br>• Provide an asphalt pathway surface with a width of 3.0m and implement year-round maintenance. | All Ages All Abilities Connection<br>Major Improvements Required |
| 2 | **Three Sisters Drive to South West Canmore Park Connection**<br>Existing gravel connection from Three Sisters Drive to the existing bridge at West Canmore Park. | Grade = 3-32%<br>Width = 0.5m<br>Length = 75m<br>Surface = gravel | • Steep section near Three Sisters Drive.<br>• Gravel lip/gutter provides poor access to trail at Three Sisters Drive. | Strava Heatmap Usage = Low<br>Contributing Trails and Areas = Three Sisters Drive | • None | Low Quality Trail Connection<br>No Improvements |
| 3 | **Prospect Heights Cul-de-sac**<br>Private access road through the Creekside at Prospect development with an emergency access road joining path. | N/A | • Private roadway which has a fire access onto the Bow River Pathway (connection noted here, but not considered further as it is part of a private development). | Strava Heatmap Usage = Low-Med<br>Contributing Trails and Areas = Creekside at Prospect development, potentially additional areas | • None | Private Road - Not Considered as a Connection |
| 4 | **Prospect Heights North Connection**<br>Existing gravel connection from Prospect Heights Trail. | Grade = 5-20%<br>Width = ~1.0m<br>Length = 115m<br>Surface = gravel | • Steep grades.<br>• Straight face curb at the interface with Prospect Heights.<br>• Tree limiting sightlines near Prospect Heights. | Strava Heatmap Usage = Med-High<br>Contributing Trails and Areas = portions of Prospect Heights, portions of Charles Carey / MacNeill | • Install a curb ramp at the entrance from Prospect Heights. | High Quality Trail Connection<br>Minor Improvements Required |
| 5 | **Prospect Heights South Connection**<br>Existing stairway and gravel connection to Prospect Heights. | Grade = 5-40%<br>Width = ~1.0m<br>Length = 55m<br>Surface = gravel | • Stairs directly adjacent to pathway.<br>• Straight face curb at Prospect Heights.<br>• Connects to trail on SW side of Prospect Heights (also has a straight face, and no crossing signage or pavement markings). | Strava Heatmap Usage = Low<br>Contributing Trails and Areas = MacNeill trail | • Install curb ramps on both sides of Prospect Heights and considered crossing pavement marking and signage. | Low Quality Trail Connection<br>Minor Improvements Required |
| 6 | **Prospect Court Access**<br>Existing emergency access road leading to Prospect Court. | Grade = 0-4%<br>Width = 3.5m<br>Length = 110m<br>Surface = gravel | • Gate blocks access at cul-de-sac.<br>• Rolled curb at cul-de-sac. | Strava Heatmap Usage = Low-Med<br>Contributing Trails and Areas = portions of Prospect Heights | • Replace access gate with a bollard and consider a curb ramp/driveway letdown.<br>• Consider providing an asphalt pathway surface with a width of 3.5m (existing gravel path width) and implement year-round maintenance. | All Ages All Abilities Connection<br>Minor Improvements Required |
| 7 | **Van Horne North Connection**<br>Existing gravel connection between Van Horne and Prospect Heights houses, includes a stairway accessing Van Horne cul-de-sac. | Grade = 1-18% (+stairway)<br>Width = 0.5-1.0m<br>Length = 155m<br>Surface = gravel | • Low quality trail with turf between the two back yards through here.<br>• Connection slopes up, then down several sets of stairs around corner of residential lot to connect to Van Horne. | Strava Heatmap Usage = Low<br>Contributing Trails and Areas = portions of Van Horne and Morris | • Consider formalizing a gravel trail between the backyards. | Low Quality Trail Connection<br>Minor Improvements Required |
| 8 | **Van Horne South Connection**<br>Existing gravel connection to Van Horne. | Grade = 0-14%<br>Width = 0.5m<br>Length = 55m<br>Surface = gravel | • Narrow gravel connection constrained by vegetation and post and rail fence.<br>• Rolled curb at intersection with Van Horne. | Strava Heatmap Usage = Med<br>Contributing Trails and Areas = portions of Morris and Van Horne | • Install a curb ramp at the entrance from Prospect Heights. | High Quality Trail Connection<br>Minor Improvements Required |
| 9 | **Van Horne Lift Station Access**<br>Existing gravel access road from Van Horne to a lift station. | Grade = 0-6%<br>Width = 3.0m<br>Length = 390m<br>Surface = gravel | • Lengthy connector with rolling (low intensity) grades which crosses the Bow River pathway (connection directs users south). | Strava Heatmap Usage = Med<br>Contributing Trails and Areas = portions of Morris and Van Horne | • Replace access gate with a bollard.<br>• Add connection to NB Bow River pathway.<br>• Provide an asphalt pathway surface with a width of 3.0m and implement year-round maintenance. | All Ages All Abilities Connection<br>Minor Improvements Required |

LEGEND

- EXISING ASPHALT TRAIL
- EXISING GRAVEL TRAIL
- EXISTING SECONDARY GRAVEL TRAIL
- INFORMAL GRAVEL TRAIL
- EXISTING SIDEWALK
- FUTURE ASPHALT TRAIL
- ROUTE ON ROADS
- ROUTE ON TRAILS

Bridge Road
West Canmore Park
Rundle Drive
Three Sisters Drive
Prospect Heights
Van Horne
Morris
McNeill
Three Sisters Drive
HWY 742
0
1
2
3
4
5
6
7
8
9

1:5000 0 100 200 m

Town of CANMORE

PROJECT
TOWN OF CANMORE
BOW RIVER PATHWAY

FIGURE TITLE
CATCHMENT AREAS FOR
EXISTING TRAIL NETWORK

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LEGEND

- EXISING ASPHALT TRAIL
- EXISING GRAVEL TRAIL
- EXISTING SECONDARY GRAVEL TRAIL
- INFORMAL GRAVEL TRAIL
- EXISTING SIDEWALK
- FUTURE ASPHALT TRAIL
- ROUTE ON LOCAL ROAD

Connection 9 improved to be AAAA

Connection 6 improved to be AAAA

Implement AAAA facility on Three Sisters Drive from Charles Carey to Connection 1

Connection 1 improved to be AAAA

Large portion of neighbourhood uses Three Sisters Drive path

Three Sisters Parkway

Van Horne

Morris

Prospect Heights

McNeill

Three Sisters Drive

West Canmore Park

Bridge Road

Rundle Drive

HWY 742

On-Street

Off-Street

On-Street

Off-Street

0 100 200 m

1:5000

Town of CANMORE

PROJECT

TOWN OF CANMORE
BOW RIVER PATHWAY

FIGURE TITLE

CATCHMENT AREAS FOR PROPOSED ALL AGES ALL ABILITIES PATHWAY NETWORK

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## 4.0 Design Criteria

Design criteria for the project is summarized in Table 4.1 below. Guidelines and sources for the criteria are supplied.

Table 4.1 Design Criteria

| Design Criteria | Bow River Pathway | Guideline / Source |
|---|---|---|
| Design Speed, V | 10 km/h (junctions)<br>30 km/h (mainline) | Design Manual for Bicycle Traffic, fietsberaad CROW, Chapter 3.2<br>TAC Geometric Design Guide, Section 5.5.1 |
| Horizontal Geometry | | |
| Curve at Junction, R | 3.0m Radius (minimum)<br>4.0m Radius (desirable) | EDCG Section 7.6 |
| Curve on Mainline, R | 25.0m Radius (minimum)<br>50.0m Radius (desirable) | TAC Geometric Design Guide, Table 5.5.2 |
| Vertical Geometry | | |
| Grade *(Maximum)* | <4.0% (desirable)<br>4% (less than 100m)<br>4-8% (less than 50m)<br>Landing length = 25m | TAC Geometric Design Guide, Section 5.5.4.1<br><br>DMBT, fietsberaad CROW, Chapter 3.2 |
| Grade *(Minimum)* | 0.6%, longitudinal drainage<br>0%, lateral drainage | TAC Geometric Design Guide, Section 5.5.4.1 |
| Crest Curve, L *(Minimum)* | 15m, provided change of grade A<5% | TAC Geometric Design Guide, Table 5.5.4 |
| Sag Curve, K *(Minimum)* | 2.5 | TAC Geometric Design Guide, Table 5.5.5 |
| Cross Section | | |
| Width, Ultimate Facility | 3.0m uni-directional cycle path with centreline; 2.5m sidewalk | Bow River Pathway Preliminary Assessment (August 27, 2021, WSP) |
| Outside buffer (gravel) | 0.5m, at a 10% slope | N/A |
| Clear Zone | 1.0m | EDCG Section 7.6 |
| Cross Slope | 2% crown between facilities;<br>2% reverse crown as needed | TAC Geometric Design Guide, Section 5.5.7 |
| Max Slope (Cut) | 3:1 | N/A |
| Max Slope (Fill) | 3:1 | N/A |
| Bridge Structures | | |
| Structure Type | Prefabricated weathering steel truss | N/A |
| Longitudinal Grade | 1.5% | N/A |
| Width | Facility plus 0.5m buffers | TAC Geometric Design Guide, Section 5.5.5 |

# 5.0 Ultimate Facility Design

## 5.1 Pathway Section and Surface Material

An investigation of pathway material has been completed based on the ultimate facility widths that were recommended in the Bow River Pathway Preliminary Assessment (WSP, August 2021). Three surface material options are presented in Table 5.1 below using a several material combinations including standard and red concrete, and asphalt.

Table 5.1 Ultimate Facility Surface Material Evaluation

| Evaluation Criteria | | Option A – Concrete Facilities | Option B – Concrete Walkway and Asphalt Bike Path | Option C – Asphalt Facilities |
|---|---|---|---|---|
| Material Distinction Between Modes | | Red concrete distinguishes bicycle infrastructure from sidewalks and is consistent with the rest of Canmore. | Distinct material type is provided for each mode, which is not fully consistent with precedent in Canmore. | Paint line and paint markings indicate separation; however, issues with compliance are likely. |
| Ability to Stage | | No intuitive way to stage a multi-mode facility without constructing the entire facility. | Asphalt facility could initially be a 3.5m shared-use path as Stage 1, then cut back to 3.0m when concrete side-walk is completed in the future. | Asphalt facility could initially be a 3.5m shared-use path as Stage 1, then widened to 5.5m in the future. |
| Lifecycle | | Concrete has a longer lifespan than asphalt. | Asphalt portion has shorter lifespan and requires increased maintenance. | Entire facility is asphalt, with a shorter lifespan and requiring increased maintenance. |
| Relative Cost | Material Unit Rates (/m²) | Red Concrete = $150. Standard Concrete = $130. | Standard Concrete = $130. Asphalt Path = $70.00 | Asphalt Path = $70. |
| | Ultimate Facility Cost | $1.4 Million | $1.0 Million | $0.7 Million |
| | % vs. Lowest | 200% | 143% | 100% |

Notes:

1. Unit rates pulled from TIP20 Project, Area 100 tendered prices, scaled by 1.1 and rounded up to nearest 10.
2. Ultimate facility cost includes a pedestrian facility width of 2.5m and bicycle facility width of 3.0m in accordance with the WSP report. This relative cost includes only the surface structure (gravels and surface treatment for the length of the study area. Pathway length of 1780m from Bridge Road to the existing asphalt transition at the Van Horne connection. This is intended as a cost comparison between three options and is not representative of a total project cost.
3. The inclusion of buffers between modes or concrete edging has not been considered, and costs reflect that. The addition of buffers and edging would increase costs.

Option B provides a suitable option which offers the ability to distinguish between modes and staging opportunities, while maintaining lower capital costs. In the future there may be opportunity to overlay the existing asphalt with red asphalt as products become more available, offering further consistency with the color differentiation in other areas of Canmore. The decision of material type may be delayed until future stages of design.

## 5.2 West Canmore Park Bridge

The existing West Canmore Park Bridge crosses the creek near the southern edge of the park as shown in Figure 5.1. The existing bridge is glulam beam structure with a width of 3.0m (effective width estimated at 2.0m) that has been identified as pinch point along the corridor in previous reports. The existing alignment approaching the bridge from the north approach has a radius of approximately 10m and is accompanied by a narrowing of the pathway to a minimum width of 1.4m. The south approach is comprised of a 11% slope for approximately 30m, and a 5.0m radius turn directly onto the bridge. These combined factors result in significant concerns with cyclist and pedestrian safety and comfort.

Figure 5.1 Existing West Canmore Park Bridge

While modest improvements to the existing conditions could be achieved through other alterations including widening and reducing the radius on the pathway at both bridge approaches, an all ages all abilities facility which meets accessibility standards is desired. Prior to a detailed evaluation of potential alignments, some general constraints of the area have been explored.

### 5.2.1 New Bridge Crossing Constraints

#### Environmental Considerations

A high-level environmental desktop review indicates that the Project area interacts with an area that is considered 'likely' to contain Bull Trout, a listed Species at Risk. Therefore, any work that has in-channel or in-water implications, could potentially trigger the *Species at Risk Act* and potentially require a formal Authorization from the Department of Fisheries and Oceans. To minimize impacts to the natural habitat and avoid onerous approval requirements, all bridge crossings have been designed with a clear span over the existing channel. In future stages of design, further investigation is required including environmental investigation to confirm extents of the channel and riparian areas and hydraulic modeling. Based on this further investigation, span lengths could potentially be reduced in length.

All bridge crossings are expected to require, at a minimum, a Water Act Code of Practice Notification which is typically accomplished with a 15-day notice period, and is required regardless of bridge type (e.g., clear span, etc.). By completing the bridge as a true clear span with no instream work, no additional aquatic information would be required to proceed to construction, nor would following onerous Restricted Activity Period (no in-water work permitted without a Qualified Aquatic Environmental Specialist [QAES] recommendations and presence from September 1 to April 30.).

*While the Bow River in this region is not considered to be a Scheduled waterbody on the Canada Navigable Waters Act* (CNWA), the use of the Bow River and the proximity to the channel to the Bow could trigger a CNWA approval. It is anticipated that a relatively simple CNWA approval is likely required, however it is recommended that the bridge is discussed with a Navigation Protection officer to confirm this, based on the bridge occurring on a tributary to the Bow.

### Escarpment Retaining Walls

Large retaining walls extends along the escarpment between the creek and the pathway south of the bridge (see Figure 5.2) and between the Creekside at Prospect development and the Bow River pathway (see Figure 5.3). The Town of Canmore, Parks has noted partial failure of a section of each boulder walls. The Town's investigation of the failure and potential solutions is on-going.

Figure 5.2 Creek Escarpment Retaining Wall

Figure 5.3 Upper Pathway Retaining Wall

### Stormwater Pond

The Creekside at Prospect development is located on the top of the escarpment overlooking the creek. Stormwater from the private access and development site is captured and routed through a 375 mm storm line at 0.6% grade under the existing pathway alignment, into a small stormwater management pond before release into the creek through an outfall just upstream of the existing pedestrian bridge. The stormwater pond should be considered in the development of alignment options.

### Emergency Access

The Creekside at Prospect development has an emergency access which enters the Bow River pathway at the north end of the development as seen in Figure 5.4. The emergency access route then runs along the Bow River pathway for approximately 465m before connecting with the main road network at the Prospect Court cul-de-sac. Maintaining this emergency access route has been considered a

requirement for all options. During the design process, a substantial lowering of this access was briefly considered to minimize the required elevation gain; however, extensive reconstruction of the access on the private property was required to provide profile benefit. This was not pursued further, and all options which interact with the access have assumed minor re-grading of several meters of the access to tie-in with the reconstructed pathway facility.

Figure 5.4 Creekside at Prospect Emergency Access

### 5.2.2 Alignment and Bridge Options

A suite of alignment and bridge options has been explored for the creek crossing to provide an all ages all abilities facility replacing the existing crossing as shown on Figure 5.5 and with more details on Exhibit 5.10. All options have assumed that the existing pathway alignment through West Canmore Park is maintained.

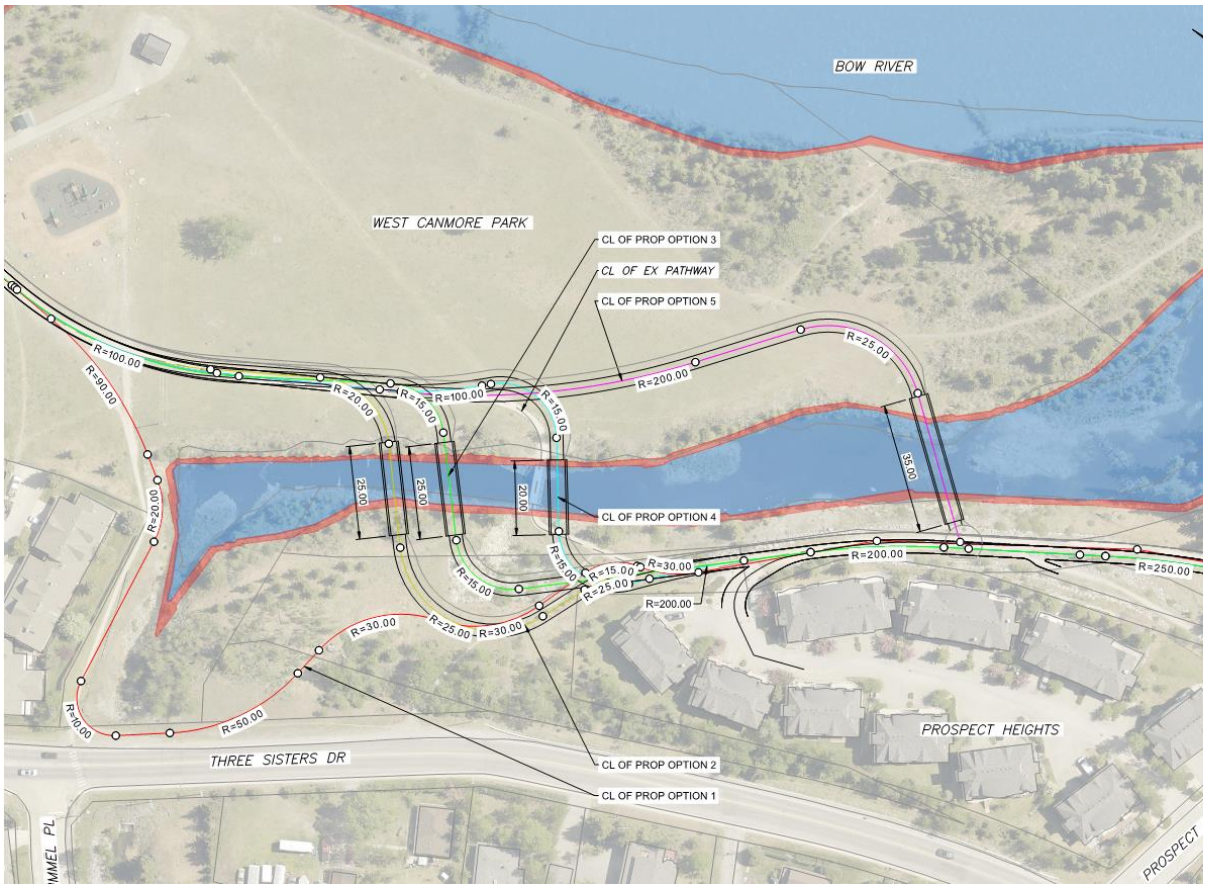



Figure 5.5 West Canmore Park Bridge Alignment Options

### Option 1 (Red)

The Option 1 alignment avoids the requirement for a new bridge over the creek by utilizing the existing connection between West Canmore Park and Three Sisters Drive. The connection has been identified as an area requiring upgrades, and an opportunity exists to maximize usefulness of improvements in the area. The alignment has several significant drawbacks including tight radius corners and an extremely indirect route, with a high detour factor. For this reason, Option 1 was dropped out of the evaluation and not considered further.

### Option 2 (Yellow)

The Option 2 alignment crosses the creek north of the existing bridge location, then heads west around the existing stormwater pond before joining the existing pathway alignment just before the Creekside at Prospect emergency access. A corner cut is required from Creekside at Prospect Heights to provide lower radii curves and minimize retaining wall extents. The bridge span length was estimated at 25.0m and the crossing occurs at a low height before an significant elevation gains occur. A 25.0m bridge is expected to be required, occurring before any significant elevation gain occurs. Shifting the crossing north of the existing bridge, allows for a more gradual climb along the west side of the creek to the Prospect Heights emergency access with grades at or below 4%.

### Option 3 (Green)

The Option 3 alignment is similar in configuration to Option 2 in many ways. The alignment crosses the creek north of the existing bridge but south of the Option 2. The alignment then cuts through the existing stormwater pond, providing a more direct route than Option 2. Reconstruction of the stormwater infrastructure in the area would be required, likely through replacement of the pond with an oil-grit separator and underground storage facility to provide rate control before entering the creek. Either a grading easement or a retaining wall is required along the south edge of lot 60 at Creekside by Prospect Heights. These costs, along with the additional grading to fill in the pond, are reflected in cost comparisons further in this memo. The Option 3 profile is similar to Option 2.

### Option 4 (Blue)

The Option 4 alignment crosses the creek at a similar location to the existing bridge crossing, generally following the existing alignment while providing more generous corner radii. The alignment avoids impacts to the existing stormwater pond but does require either a grading easement or a retaining wall along the south edge of lot 60 at Creekside by Prospect Heights. By raising the profile at the crossing by approximately 2m, grades between West Canmore Park and the Prospect Heights emergency access can be kept at or below 4%.

### Option 5 (Magenta)

The Option 5 alignment crosses the creek approximately 100m south of the existing bridge location. This alignment has the major advantage of re-joining the existing pathway alignment south of the Creekside at Prospect emergency access location, which avoids the highest elevation point along the existing alignment, eliminating just over 2m of elevation gain for pathway users. The creek at this crossing location is wider than locations further north, with a 35m bridge span required to clear the channel. The profile climbs approximately two meters above existing ground east of the creek, before crossing and cresting almost immediately. The conditions on the west side of the bridge create a more abrupt junction when compared to the larger radii curves shown for Options 2-4, however, this junction creates an opportunity for a mixing circle and other seating/viewpoint amenities at the edge of the escarpment.

## 5.2.3 Evaluation

An evaluation of the West Canmore Park alignment and bridge options has been completed based on a variety of parameters which are outlined below.

- **Horizontal Geometry –** Measures whether the alignment allows users to maintain a high speed around curves; the primary indicator investigated is the minimum radius along the alignment.
- **Effort / User Experience –** Measures the effort required by cyclists to navigate the facility; a suite of indicators is used including grades, elevation gain, alignment length and difficulty / slope severity (see Appendix B for slope severity calculations).
- **Private Property Impacts –** Indicates whether the alignment impacts Creekside at Prospect property; indicators include whether a grading easement is required, retaining walls or the facility encroaches on private property, or impacts to the Creekside at Prospect emergency access are required.
- **Bridge Span –** Indicates the estimated required bridge span for a clear span of the channel (based on 2013 LiDAR data). It is expected that these spans will be refined and potentially reduced in future design stages with completion of additional hydrologic modelling.

- **Relative Cost 3.5m Facility –** Presents a comparative cost value (not intended to indicate the total cost) for construction of a 3.5m facility which is intended as the initial stage of construction. Costs evaluated include the bridge (assuming a 4.2m clear width), retaining walls, stormwater, grading and 3.5m pathway.
- **Relative Cost 5.5m Facility –** Presents a comparative cost value for the construction of a 5.5m facility comprising the ultimate pathway. Costs evaluated include the bridge (4.2m clear width), retaining walls, stormwater, grading and 5.5m pathway.
- **Constructability & Staging Considerations –** Considers both constructability implications and the impact of completing the facility in two stages. Primary indicators include costs for future up-grades to an ultimate facility (Relative Cost 5.5m Facility) and pathway detours and closures during construction.

The results of this evaluation are summarized in Table 5.2.

TABLE 5.2: WEST CANMORE PARK BRIDGE OPTIONS EVALUATION

| Evaluation Criteria | | | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 |
|---|---|---|---|---|---|---|---|
| Horizontal Geometry | | | Not Evaluated | $R_{min}$ = 20m | $R_{min}$ = 15m | $R_{min}$ = 15m | Tight corner at pathway junction with mixing circle ($R_{min}$ = 7.5m) |
| Effort / User Experience | Grades | | | Max Grade 4% | Max Grade 4% | Max Grade 4% | All grades < 3.5% |
| | Elevation Gain | | | 4.2 m | 4.2 m | 4.2 m | 1.9 m |
| | Length | | | 340 m | 330 m | 330 m | 330 m |
| | Difficulty / Slope Severity (S) | EB | | 0.120 m | 0.117 m | 0.127 m | 0.052 m |
| | | WB | | 0.132 m | 0.135 m | 0.133 m | 0.037 m |
| Private Property Impacts | | | | • Pathway and grading encroachment onto Creekside at Prospect (Lot 60)<br>• Regrading of Prospect Point emergency access required | • Grading encroachment onto Creekside at Prospect (Lot 60)<br>• Regrading of Prospect Point emergency access required | • Grading encroachment onto Creekside at Prospect (Lot 60)<br>• Regrading of Prospect Point emergency access required | • No private property impacts |
| Bridge Span | | | | 25 m | 25 m | 20 m | 35 m |
| Relative Cost 3.5m Facility | Class 5 Cost Comparison | | | $750,000 | $1,180,000 | $710,000 | $850,000 |
| | % vs. lowest | | | 106% | 166% | 100% | 120% |
| Relative Cost 5.5m Facility | Class 5 Cost Comparison | | | $1,210,000 | $1,650,000 | $1,180,000 | $930,000 |
| | % vs. lowest | | | 130% | 177% | 127% | 100% |
| Constructability & Staging Considerations | | | | • More significant costs to upgrade to a 5.5m facility<br>• Longer pathway closure required to construct retaining walls (for both 3.5m and 5.5m options) | • More significant costs to upgrade to a 5.5m facility<br>• Longer pathway closure required to construct retaining walls (for both 3.5m and 5.5m options) | • More significant costs to upgrade to a 5.5m facility.<br>• Longer pathway closure required to construct retaining walls (for both 3.5m and 5.5m options) | • Lower cost to upgrade to a 5.5m facility<br>• Shorter pathway closure to install bridge and retaining walls |

Notes:

1. 3.5m Facility assumes a 3.5m asphalt pathway, 5.5m Facility assumes 3.0m asphalt pathway and 2.5m concrete sidewalk.
2. Bridge spans set to enable clear span of the channel, in-stream work will require approval from DFO due to presence of Bull Trout habitat.
3. Bridge spans to be reviewed once HWL is known.
4. Bridge width is assumed to be 5.2m out-to-out for all options, resulting in a pathway width of 4.2m.
5. Effort / User Experience criteria calculated from pathway STA. 0+528.6 at 1310.38m elevation to STA. 0+858.7 at 1310.80m.
6. Elevation gain listed is the profile high point elevation near the Creekside at Prospect emergency access minus the starting elevation of 1310.38.
7. Difficulty / Slope Severity has been calculated using the methods established in the Design Manual for Bicycle Traffic (fietsberaad CROW) Section 3.5. It is noted that a Slope Severity Value S < 0.075 is desirable.

## 5.3 Recommended Bridge and Alignment

Based on the evaluation summarized in Table 5.2, it is recommended that Option 5 (Magenta) moves forward. Option 5 has numerous advantages, including:

- Significant benefits in effort and user experience are achieved by tying into the existing pathway south of the Creekside at Prospect emergency access, eliminating 2.0m of overall elevation gain.
- Easements and encroachments on the Creekside at Prospect property are avoided.
- Significant cost savings in potential future upgrades to a 5.5m ultimate facility are achieved for a minor (approximately $140K) increase in the cost of a Stage 1 3.5m facility.
- Minimal construction disruptions and pathway detour requirements compared with other options.
- The existing pathway and bridge can be maintained after construction of the new route as an alternate crossing point.

As part of detailed design, refinements to the proposed bridge should occur including optimizing the span length and abutment locations through hydraulic analysis and navigating potential conflicts with the Prospect Heights sanitary line. Further bridge planning should also occur including determining the cost implications of different options including a single 6.5m clear width bridge, a single 4.2m clear width bridge, or two-4.0m clear width bridges with the second bridge constructed when volumes warrant.

## 5.4 West Canmore Park Alignment Options

The existing gravel pathway alignment arcs across through West Canmore Park before turning to cross the creek perpendicular to the direction of the creek. This project provides the opportunity to revisit the alignment and examine any opportunities associated with changing it. Four options have been developed and are shown on Exhibit 5.15. All options connect with the preferred West Canmore Park bridge Option 5.

Evaluation of the four options considered a variety of criteria outlined below. Table 3.5 provides evaluation of the alignment options based on the established criteria.

- **Existing Gravel Pathway and Bridge** – assesses whether the existing gravel pathway and bridge be used as an alternate parallel route to provide improved capacity.
- **Impacts to Open Space** – indicates whether the alignment impacts the valuable open space in West Canmore Park by bisecting and dividing these areas.
- **Directness** – considers how direct of a route the alignment provides, tracked as the difference between a shared start and end point (detour length based on the shortest alignment).
- **Meanders Providing Visual Interest** – determines whether the attractiveness of the route is enhanced through an additional gentle curve which add visual interest.
- **Cost Implications** – indicates if there are significant cost implications compared against other options (notably, option IV requires additional grading of 110m of pathway / flood embankment).

Table 5.3 West Canmore Park Alignment Evaluation

| Evaluation Criteria | Option I | Option II | Option III | Option IV |
|---|---|---|---|---|
| Existing Gravel Pathway/Bridge Maintained | No | Yes | Yes | Yes |
| Impacts to Open Space | None | Minimal | Significant | Significant |
| Directness (Detour Length) | 24m | -6m | -24m | -9m |
| Meanders / Visual Interest | No | No | Yes | Yes |
| Cost Implications | None | None | Significant | None |

It is recommended that alignment Option II through West Canmore Park is adopted as it offers the advantages of using the existing gravel path as an alternate route and minimizes impacts to open space.

## 5.5 Alignment and Profile

This section summarizes the recommended Bow River pathway alignment and profile along the study area as shown in Exhibits 5.2 – 5.7.

### 5.5.1 Bridge Road to West Canmore Park

The pathway between the Rundle Drive Bow River bridge and West Canmore Park runs along the top of a flood prevention dyke referenced as the Mine Dyke in the background reports. The embankment dimensions vary along the length of the dyke, but the top width is generally 4.5 – 6.0m based on Town of Canmore's 2013 LiDAR. With the ultimate 6.5m wide facility (including buffers), the existing dyke embankment is not sufficiently wide and requires expansion.

Widening the embankment while maintaining the top profile would require clearing of the forested area and challenging grading on the side of the embankment. An alternate strategy of lowering the dyke profile by approximately 300mm has been proposed as shown in Figure 5.6 and has been included in the recommended plan. To confirm the flood preventing capacity of the dyke is not substantially affected by lowering the profile, the proposed top of dyke (and top of pathway) profile has been compared again the modeled flood events in the Bow River Dyke Capacity Analysis (BGC Engineering Inc., June 2014). The profile is maintained above the 1,000 $m^3/s$ flood event outlined in the report.

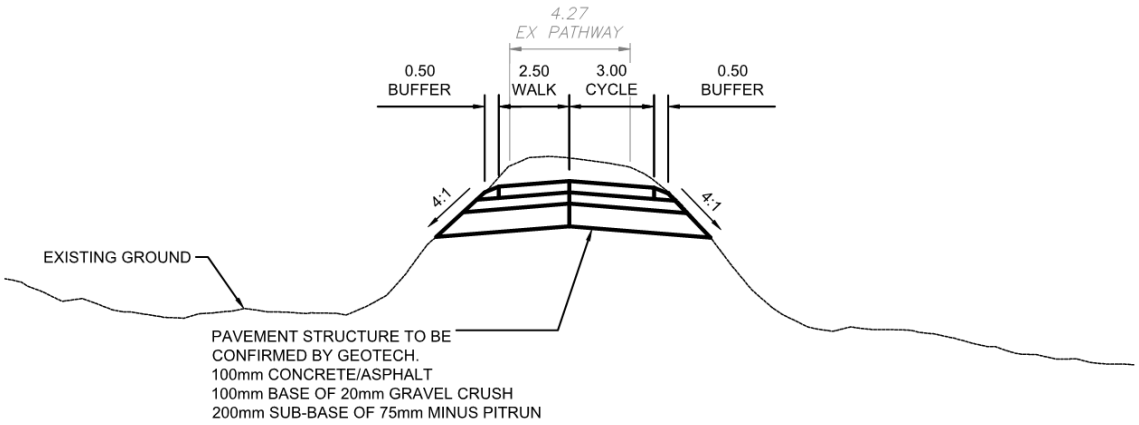



Figure 5.6 Flood Dyke / Pathway Proposed Section

Proceeding with the strategy of reducing the embankment height is contingent on the approval of Alberta Environment and Parks, who own the flood dyke. Approvals should be confirmed under both the *Public Lands Act* and *Water Act*, which would be triggered due to a potential change in the flood elevations of the Bow River. Exact approval requirements should be determined through conversations with AEP. The impacts of proceeding with this strategy should be considered further in detailed design to fully understand the environmental, flood risk and capital cost implications.

### 5.5.2 West Canmore Park

The preferred West Canmore Park alignment Option IV and the creek bridge alignment Option 5 have been carried forward as the recommended alignment through this area. The topography through West Canmore Park is extremely flat and existing drainage challenges are managed through several drywells located near the lift station road. The profile through this section has been set approximately 300mm above existing ground to prevent ponding on the pathway and facilitate snow clearing.

The existing gravel trail and bridge crossing should be maintained to increase capacity. It is expected that a desire line will develop between where the existing gravel trail connects with the existing bridge and the proposed bridge crossing location. It recommended that a 1.5m gravel trail connection is implemented as shown in Figure 5.7 below.

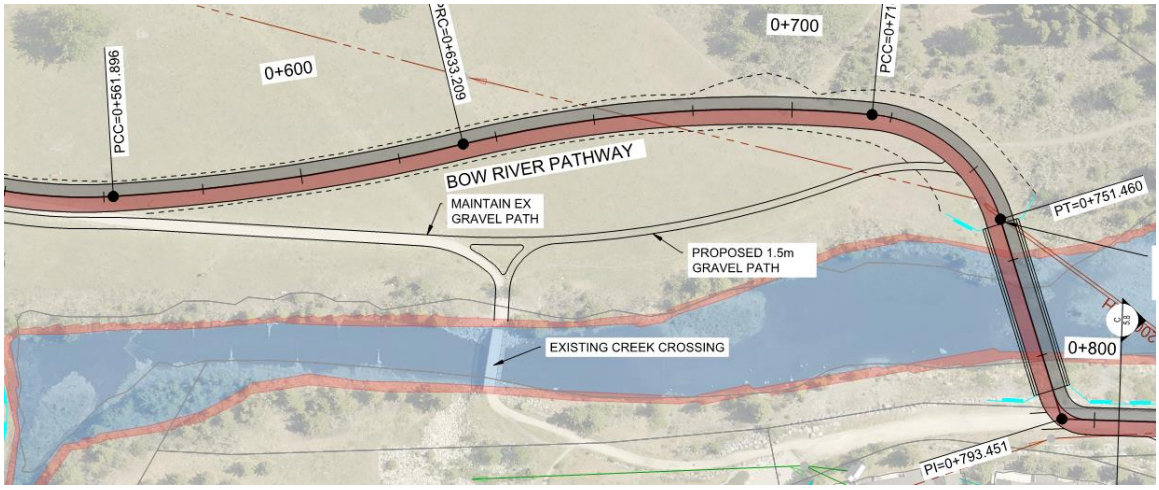



Figure 5.7 Parallel Gravel Pathway Connection

### 5.5.3 West Canmore Park Bridge to Van Horne Connection

The alignment between West Canmore Park and the Van Horne Connection is benched between natural forested area or residential homes on the southwest side and an escarpment above the Bow River on the northeast. This results in constraints on the facility width, steeper grades and occasional sections requiring retaining walls. Further design context is provided related to several key considerations in the sections below.

#### Prospect Heights Sanitary Sewer, Water and Power Lines

The Prospect Heights Sanitary Sewer Line runs under the existing pathway alignment from the Prospect Court emergency access (STA. 1+100) to West Canmore Park (STA. 0+660). A water line and power line are also present on the pathway intersection with the emergency access. Based on the available Issued for Construction drawings, the sanitary sewer pipe maintains a typical two meters of cover and conflicts can likely be avoided during detailed design. Further investigation in the power line and water line should occur in the next stage of design, including hydrovac of the utilities prior to construction and strategic placement of retaining walls to avoid conflicts.


Figure 5.8 Prospect Court Emergency Access Utilities

### Prospect Court Emergency Access

The existing Prospect Court emergency access at STA. 1+100 appears to be a southbound continuation of the Bow River pathway, which likely promotes confusion for users desiring to stay on the main pathway. To address this concern, the proposed design reconfigures the emergency access intersection to act as a junction connection to the main pathway. Profile adjustments to the Bow River pathway are required to ensure a smooth transition through this area. A modest re-grading and elevation drop to the existing emergency access is required to tie in.

### Homesteads Stormwater Outfall Bridge

Stormwater from the Homesteads and Prospect Heights outfalls to the Bow River through a dedicated right-of-way between 37 and 41 Prospect Heights, crossing the pathway around STA 1+390. The outfalls for the 750mm PVC and 750mm Concrete pipes are located upstream of the existing pathway bridge crossing. The water crosses under the existing Bow River pathway bridge in a steep channel with a grade 15% as shown in Figure 5.9. The existing bridge is 1.5m wide with steep downgrades on both approaches. A new crossing is required at this location as part of the ultimate design.

Figure 5.9 Homesteads Stormwater Outfall Channel

A culvert solution was briefly explored; however, the narrow steep channel would require significant excavation and additional erosion protection and retaining walls which are expected to result in higher costs than a bridge. Given the depth and width of the channel, a culvert would also be susceptible to snow drifts and gaining access for regular condition inspections would be challenging, and potentially hazardous. Proposed crossing improvements include raising the profile and flattening the approach grades and providing a 4.2m wide, 15.0m span bridge, as shown on Exhibit 5.6. Structural options for the bridge include a prefabricated weathering steel structure or a girder bridge. Approval for changes to the stormwater outfall are not expected to be required under *the Environment Protection and Enhancement Act*, as no changes are proposed to the channel or outfall.

### Van Horne Section

Several areas of slope stability concern due to bank erosion are apparent through the portion of the pathway bordering Van Horne (STA. 1+500 to STA. 1+740). To mitigate impacts to the ultimate facility, the alignment has been set several meters back from the escarpment, which requires excavation into the existing hillside between STA. 1+560 and STA 1+770 as can be seen in Section E on Exhibit 5.9.

## 5.6 Three Sisters Drive to West Canmore Park Connection

Connection 1 between Three Sisters Drive and West Canmore Park was identified in Section 3.0 as a critical high-usage connection with existing concerns including a narrow pathway with poor sightlines that is not maintained in winter. Existing conditions can be seen in Figure 5.10. Several design concepts are shown in Exhibits 5.16 – 5.19. The concepts vary in scope from an ultimate 5.5m mode separated facility, a 3.0m shared-use pathway and minor improvements to the alignment to improvement sightlines.

The existing pathway cuts through a corner of the Mountain Shadows development, through what is anticipated to be an established easement. All options maintain the same amount of encroachment and assume the existing fence remains in place.

Figure 5.10 Existing Three Sisters Drive to West Canmore Park Connection

### Ultimate 5.5m Facility

A potential 5.5m separated mode connection is shown on Exhibit 5.16 with Section F included on Exhibit 5.19. A total buffer of 1.0m has been included on the facility adjacent to the creek for a 0.5m buffer and 0.5m designated for a handrail. Through the constrained section adjacent to the creek, a large retaining wall with a maximum height of 2.5m above existing ground is required. The retaining wall extends essentially to the bottom of the creed bed. Geotechnical investigation is required before selecting a retaining wall system. Structural systems considered should include sheet pile walls and Mechanically Stabilized Earth walls.

The wall extends into the bank of the tributary, which could trigger extensive approvals requirements. A Request-for-Review should be submitted to the Department of Fisheries and Ocean's to determine if an Authorization is required for the works. Current design appears to have a limited instream footprint that would trigger an Authorization, however DFO could require an Authorization due to potential impacts to bull trout. Pending design, an Authorization requires extensive engagement with the regulatory agency which can take up to 3-12 months. Impacts to habitat are quantified and a compensation program would have to be developed, implemented and monitored by the Town, in the case that an Authorization is required. Approval from AEP would also be required under the Water Act and Public Lands Act, with current approvals timelines taking approximately 6 months.

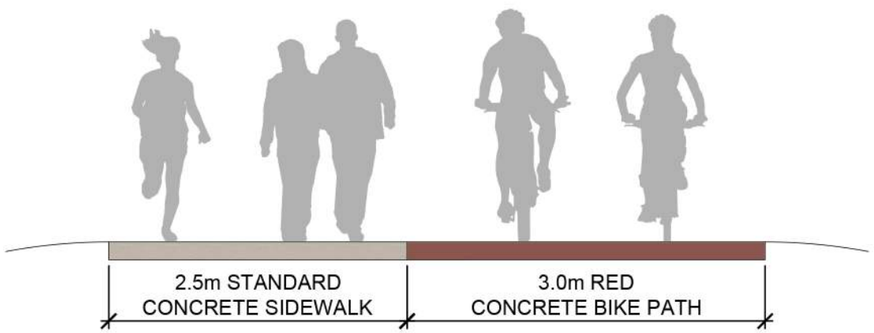
### 3.0m Shared-Use Pathway

A 3.0m shared-use pathway connection is shown on Exhibit 5.17 with Section G included on Exhibit 5.19. Similar buffers to the ultimate facility have been included. The retaining wall for this option has a maximum height of 1.5m significantly limits encroachment into the stream footprint.

The 3.0m shared-use pathway retaining wall extends part of the way down the creek bed slope but is not expected to directly impact the creek bed. Water Act approval could potentially be required pending review of impacts to flood conditions, and consultation with AEP is recommended.

### Minor Improvements to Existing Pathway

Improvements to the existing gravel pathway can be accomplished with only minor regrading to improve sight lines around the constrained corner. Removal of the existing guardrail which offers limited safety advantages allows for re-routing the pathway around the corner. By bringing the pathway further south in advance of the corner, sight lines are significantly improved. Reconstruction of the existing handrail may result in modest improvements to the width of the facility however it is expected that the facility width around the corner will remain at ~1.0m.

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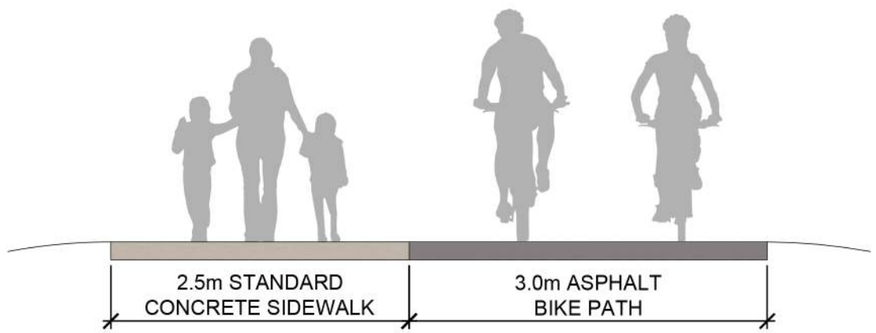
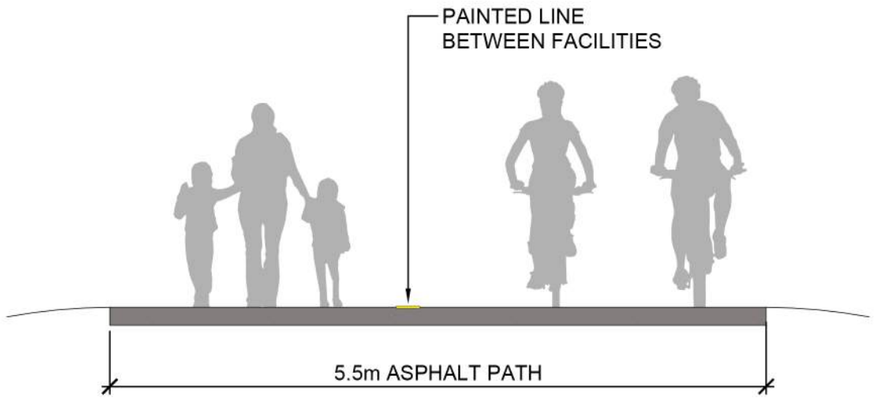



OPTION B - CONCRETE PEDESTRIAN
FACILITY AND ASPHALT BICYCLE FACILITY




OPTION C - ASPHALT PEDESTRIAN
AND BICYCLE FACILITIES

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Town of CANMORE

ISL

PROJECT
**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

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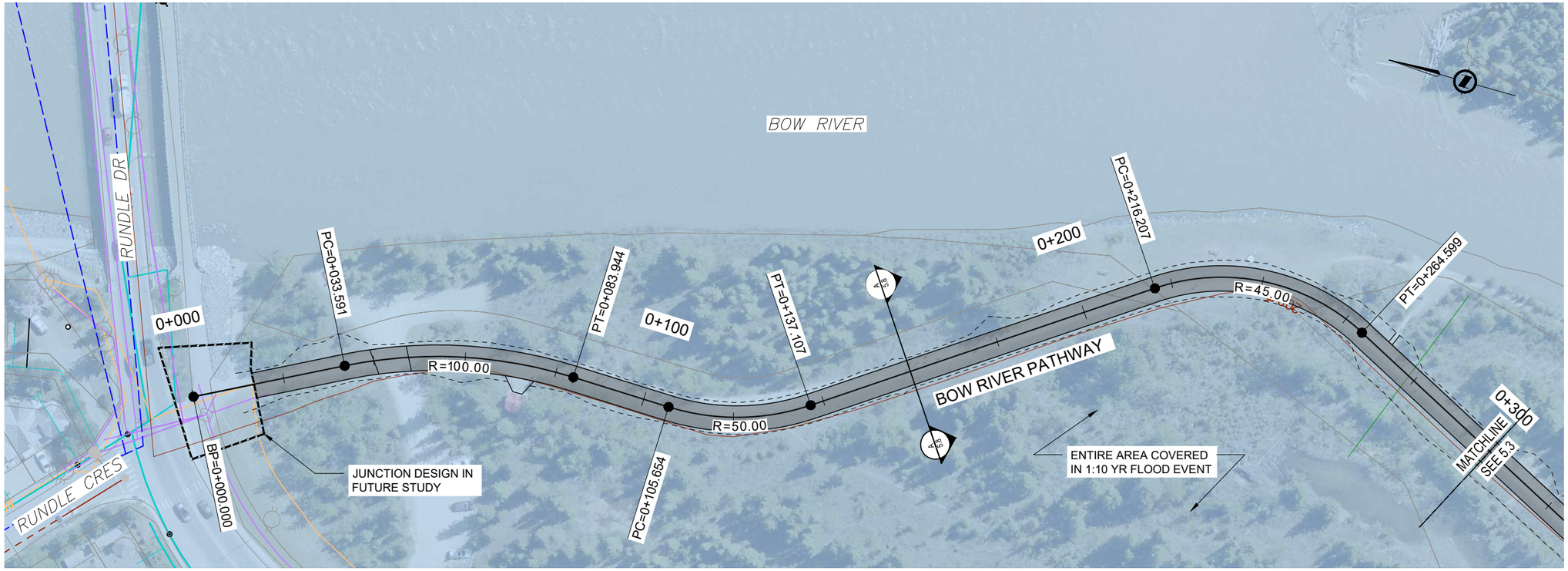


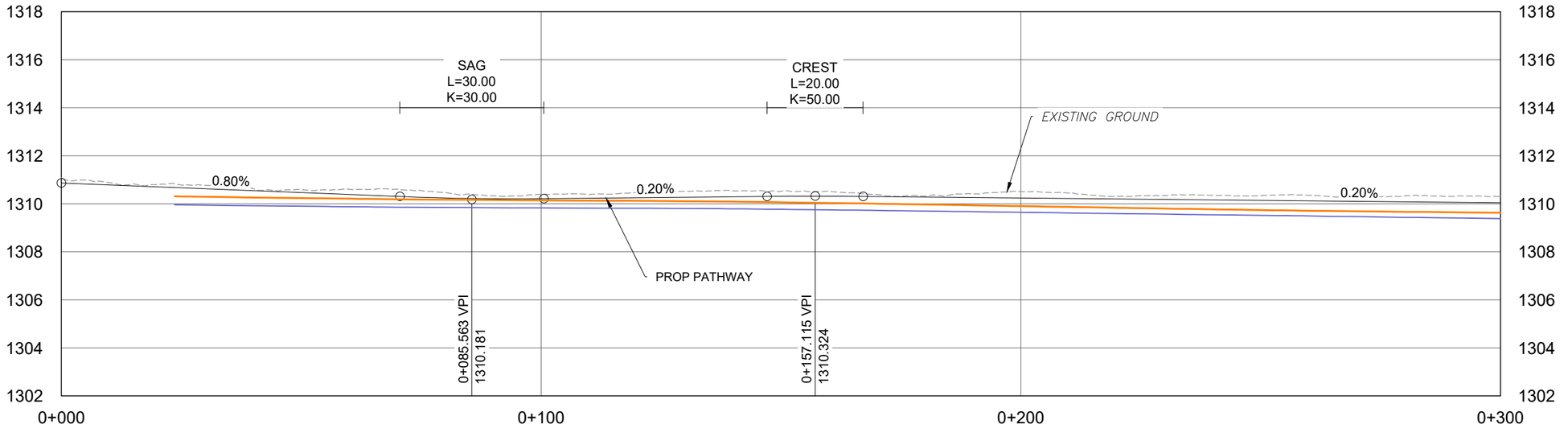


NOTES

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- EX STORM MAIN
- EX GAS MAIN
- EX HIGH PRESSURE GAS
- EX COMMUNICATIONS
- EX POWER
- 1:10 YR FLOOD EVENT
- 1:100 YR FLOOD EVENT
- PR CULVERT
- PR WALL <2.0m
- PR WALL >2.0m
- GRADING LIMIT
- PATHWAY FACILITY

PROFILE VIEW LEGEND

- 1000 $m^3/s$ SURFACE
- 800 $m^3/s$ SURFACE

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Town of CANMORE

ISL

PROJECT
**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

FIGURE TITLE
**ULTIMATE PATHWAY**
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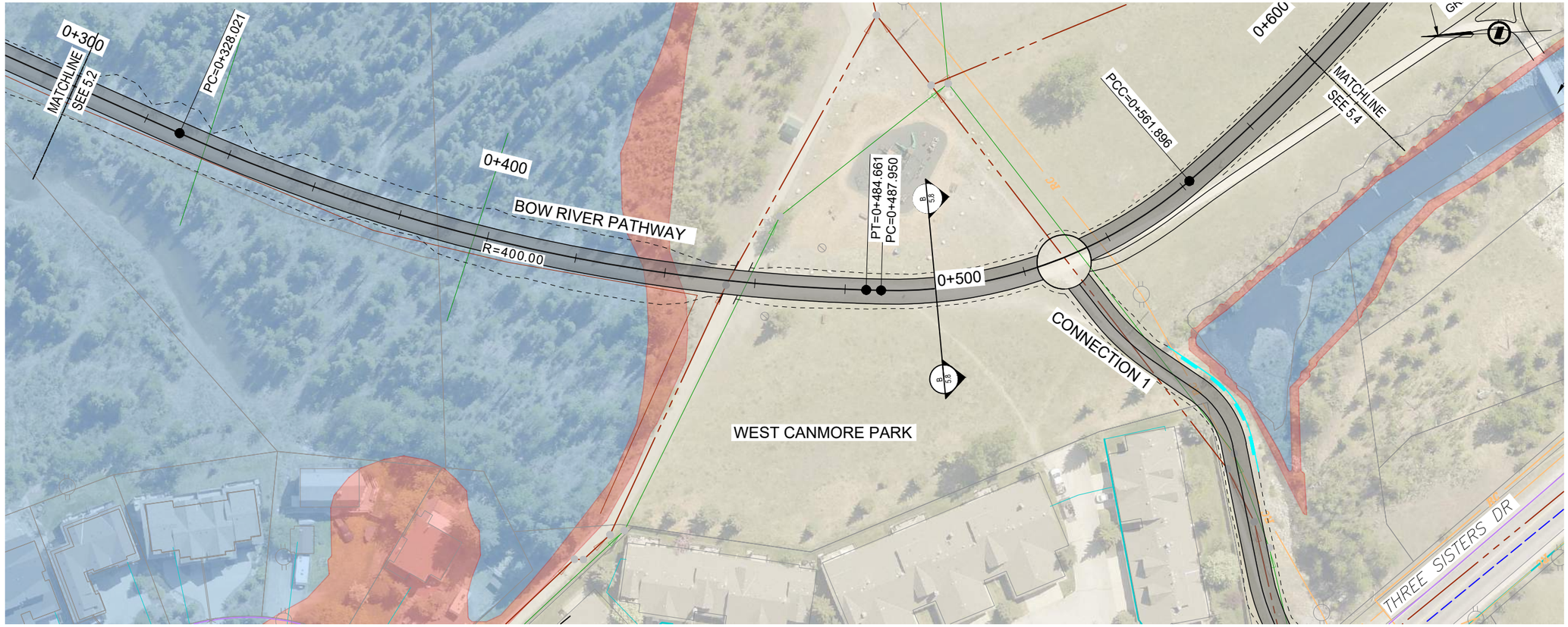


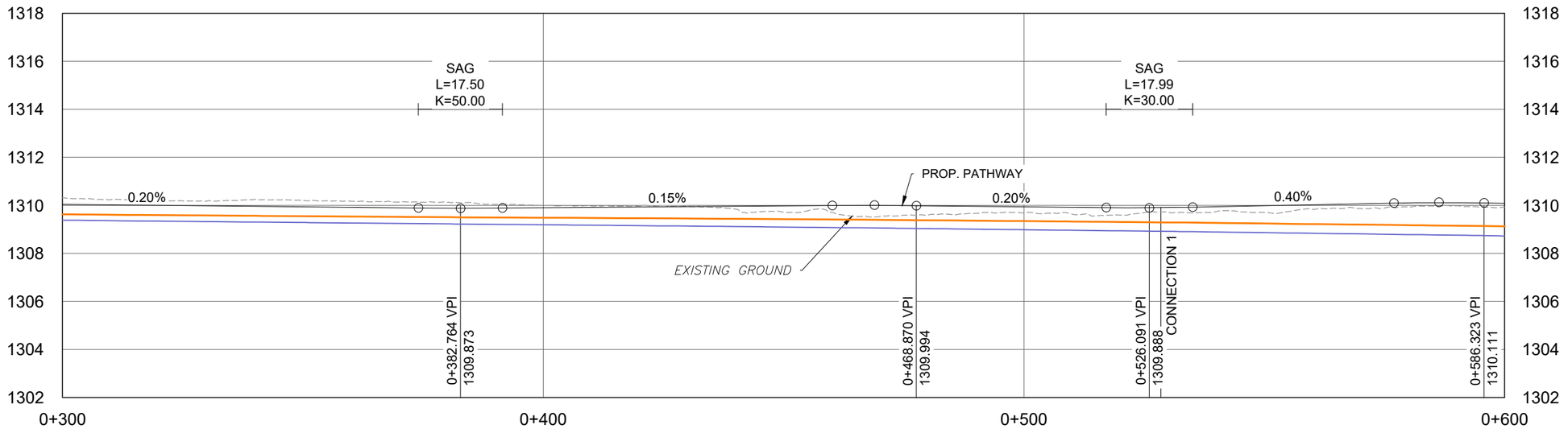


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PROFILE VIEW FLOOD DATA FROM BOW RIVER DYKE CAPACITY ANALYSIS (BGC ENGINEERING INC., JUNE 2014) DRAWING 01B.

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- EX GAS MAIN
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- EX COMMUNICATIONS
- EX POWER
- 1:10 YR FLOOD EVENT
- 1:100 YR FLOOD EVENT
- PR CULVERT
- PR WALL <2.0m
- PR WALL >2.0m
- GRADING LIMIT
- PATHWAY FACILITY

PROFILE VIEW LEGEND

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- 800 $m^3/s$ SURFACE

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Town of CANMORE

ISL

PROJECT

**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

FIGURE TITLE

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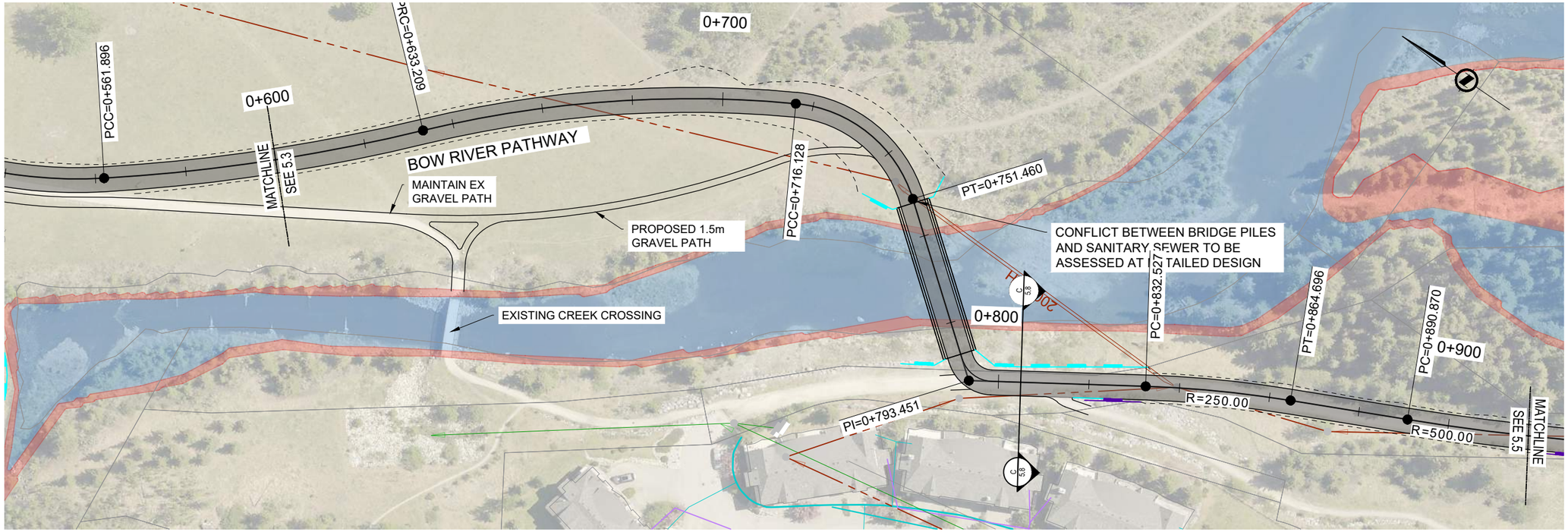


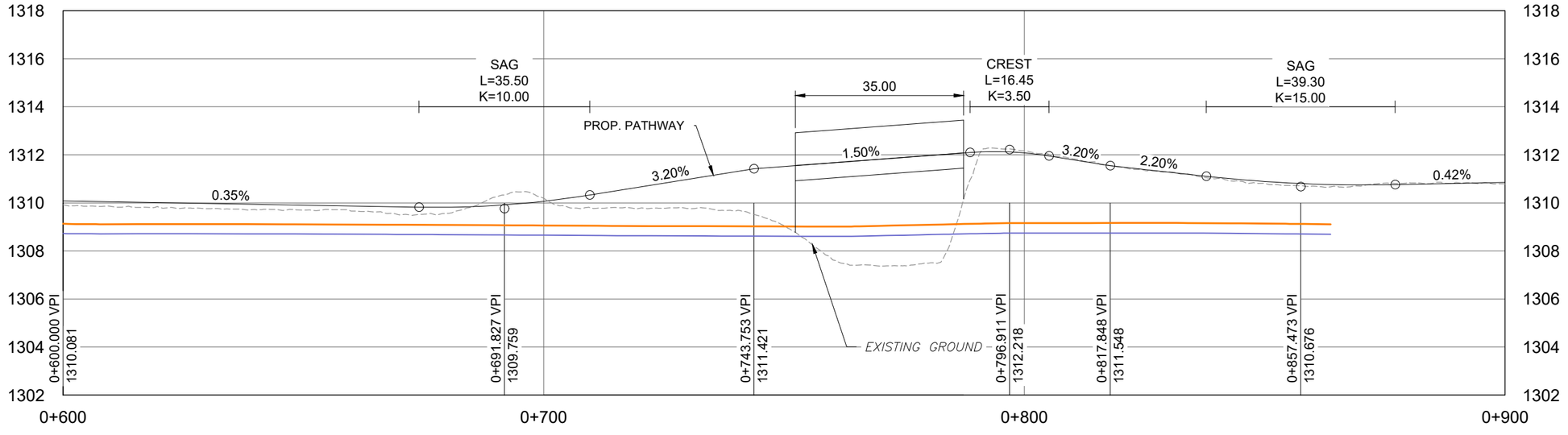


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- EX HIGH PRESSURE GAS
- EX COMMUNICATIONS
- EX POWER
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- 1:100 YR FLOOD EVENT
- PR CULVERT
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- PR WALL >2.0m
- GRADING LIMIT
- PATHWAY FACILITY

PROFILE VIEW LEGEND

- 1000 $m^3/s$ SURFACE
- 800 $m^3/s$ SURFACE

1:1000 (HORZ) 0 20 40 m

1:100 (VERT) 0 2 4 m

Town of CANMORE

ISL

PROJECT

**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

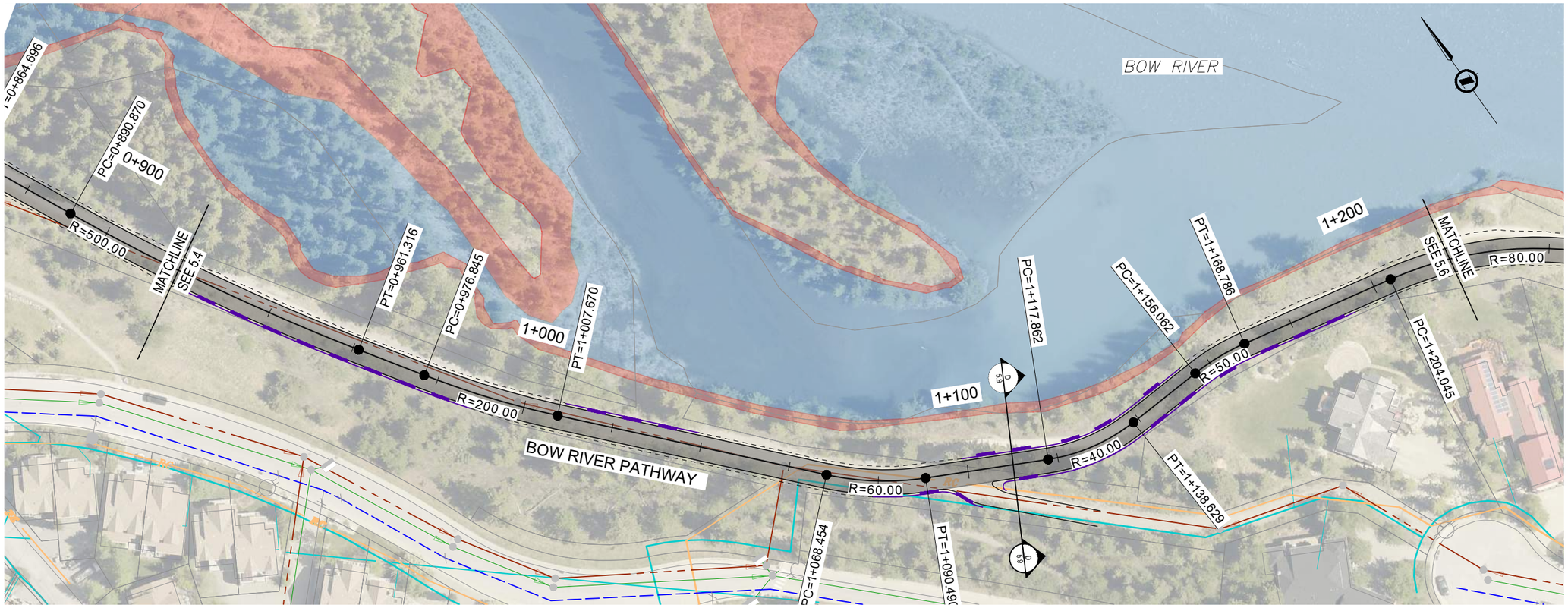
FIGURE TITLE

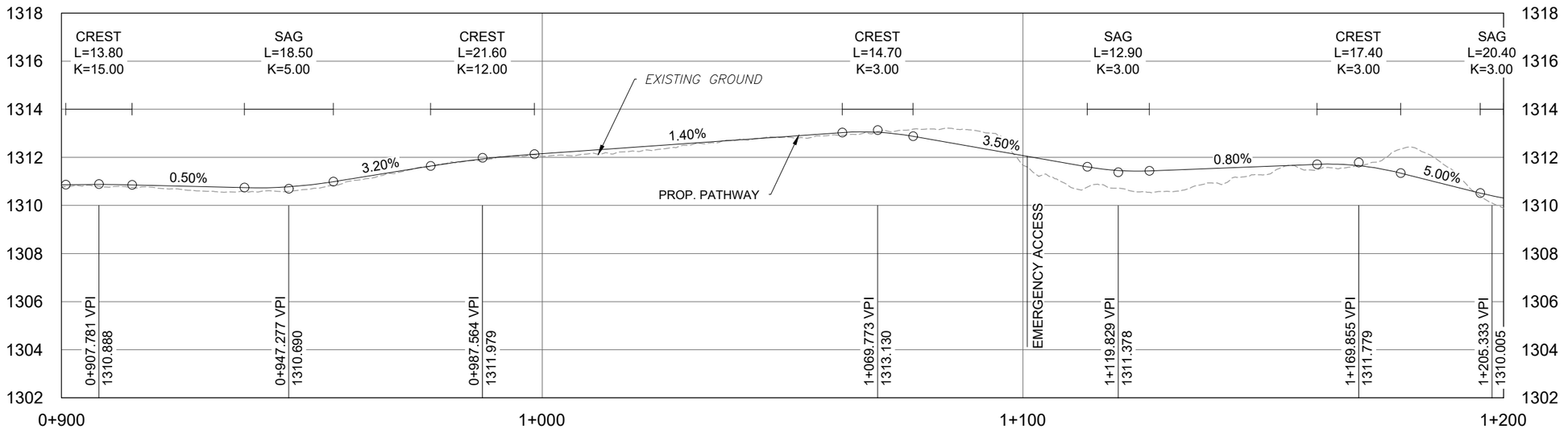
**ULTIMATE PATHWAY**
**PLAN PROFILE**
**STA 0+600 TO STA 0+900**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
| 61954_Ultimate-PP.dwg | 1:1000 | **5.4** |

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\61000\61900\61954_BOW_RIVER_TRAL_TO_THREE_SISTERS\02_CADD\2D_DRAFTING\01_EXHIBITS\61954_ULTIMATE-PP.DWG | DATE: November 30, 2021 5:02:23 PM




NOTES

PLAN VIEW FLOOD DATA FROM CANMORE FLOOD HAZARD STUDY (W-E-R AGRA LTD., MARCH 1993), ACCESSED ON ALBERTA FLOODS PORTAL NOVEMBER 2021.
PROFILE VIEW FLOOD DATA FROM BOW RIVER DYKE CAPACITY ANALYSIS (BGC ENGINEERING INC., JUNE 2014) DRAWING 01B.

PLAN VIEW LEGEND

- EX SANITARY MAIN
- EX WATER MAIN
- EX STORM MAIN
- EX GAS MAIN
- EX HIGH PRESSURE GAS
- EX COMMUNICATIONS
- EX POWER
- 1:10 YR FLOOD EVENT
- 1:100 YR FLOOD EVENT
- PR CULVERT
- PR WALL <2.0m
- PR WALL >2.0m
- GRADING LIMIT
- PATHWAY FACILITY

PROFILE VIEW LEGEND

- 1000 $m^3/s$ SURFACE
- 800 $m^3/s$ SURFACE

1:1000 (HORZ) 0 20 40 m

1:100 (VERT) 0 2 4 m

Town of CANMORE

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PROJECT

**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

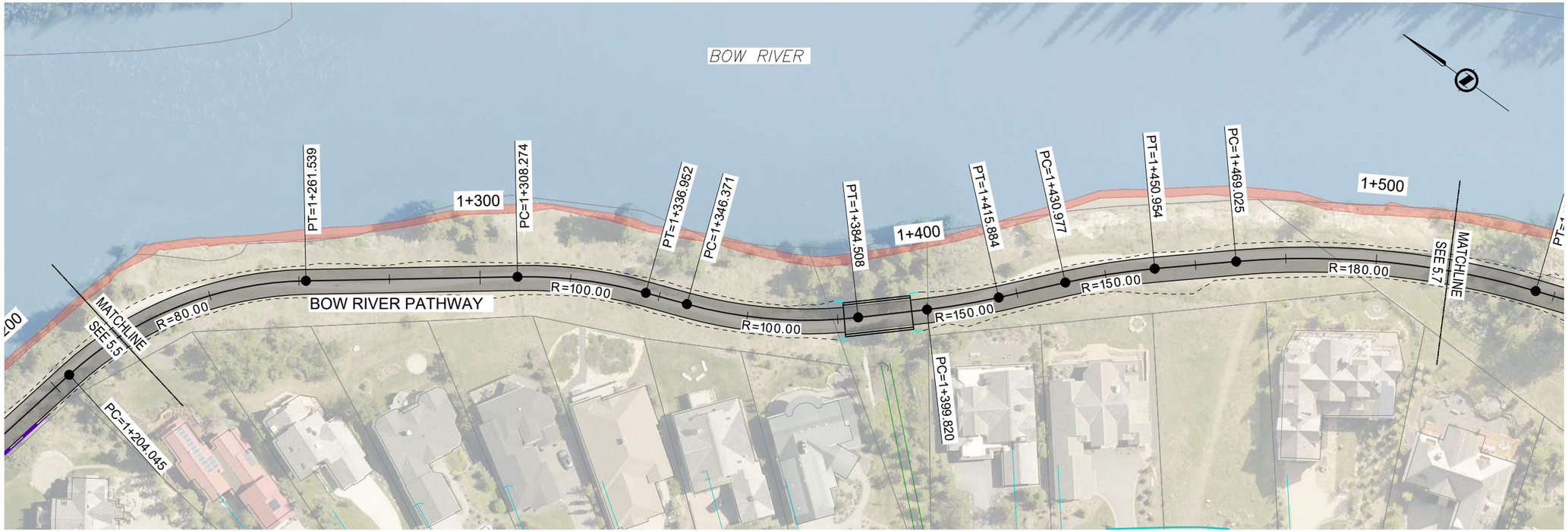
FIGURE TITLE

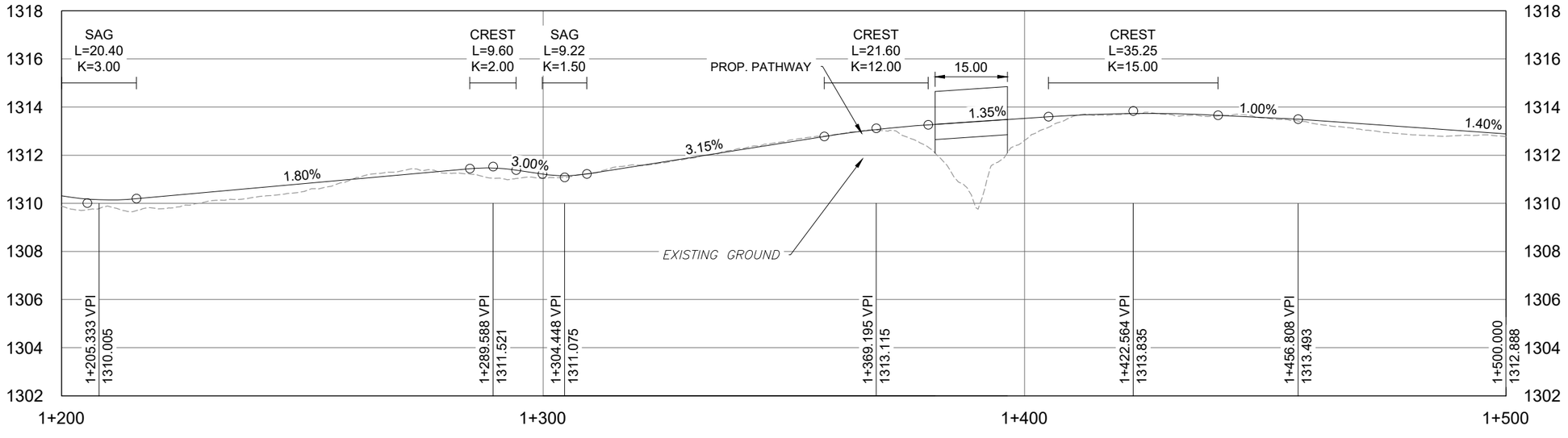
**ULTIMATE PATHWAY**
**PLAN PROFILE**
**STA 0+900 TO STA 1+200**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
| 61954_Ultimate-PP.dwg | 1:1000 | **5.5** |

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\61000\61000\61954_BOW_RIVER_TRAIL_TO_THREE_SISTERS\02_CADD\20_DRAFTING\01_EXHIBITS\61954_ULTIMATE-PP.DWG | DATE: November 30, 2021 5:05:41 PM




NOTES

PLAN VIEW FLOOD DATA FROM CANMORE FLOOD HAZARD STUDY (W-E-R AGRA LTD., MARCH 1993), ACCESSED ON ALBERTA FLOODS PORTAL NOVEMBER 2021.
PROFILE VIEW FLOOD DATA FROM BOW RIVER DYKE CAPACITY ANALYSIS (BGC ENGINEERING INC., JUNE 2014) DRAWING 01B.

PLAN VIEW LEGEND

- EX SANITARY MAIN
- EX WATER MAIN
- EX STORM MAIN
- EX GAS MAIN
- EX HIGH PRESSURE GAS
- EX COMMUNICATIONS
- EX POWER
- 1:10 YR FLOOD EVENT
- 1:100 YR FLOOD EVENT
- PR CULVERT
- PR WALL <2.0m
- PR WALL >2.0m
- GRADING LIMIT
- PATHWAY FACILITY

PROFILE VIEW LEGEND

- 1000 $m^3/s$ SURFACE
- 800 $m^3/s$ SURFACE

1:1000 (HORZ) 0 20 40 m

1:100 (VERT) 0 2 4 m

Town of CANMORE

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PROJECT

**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

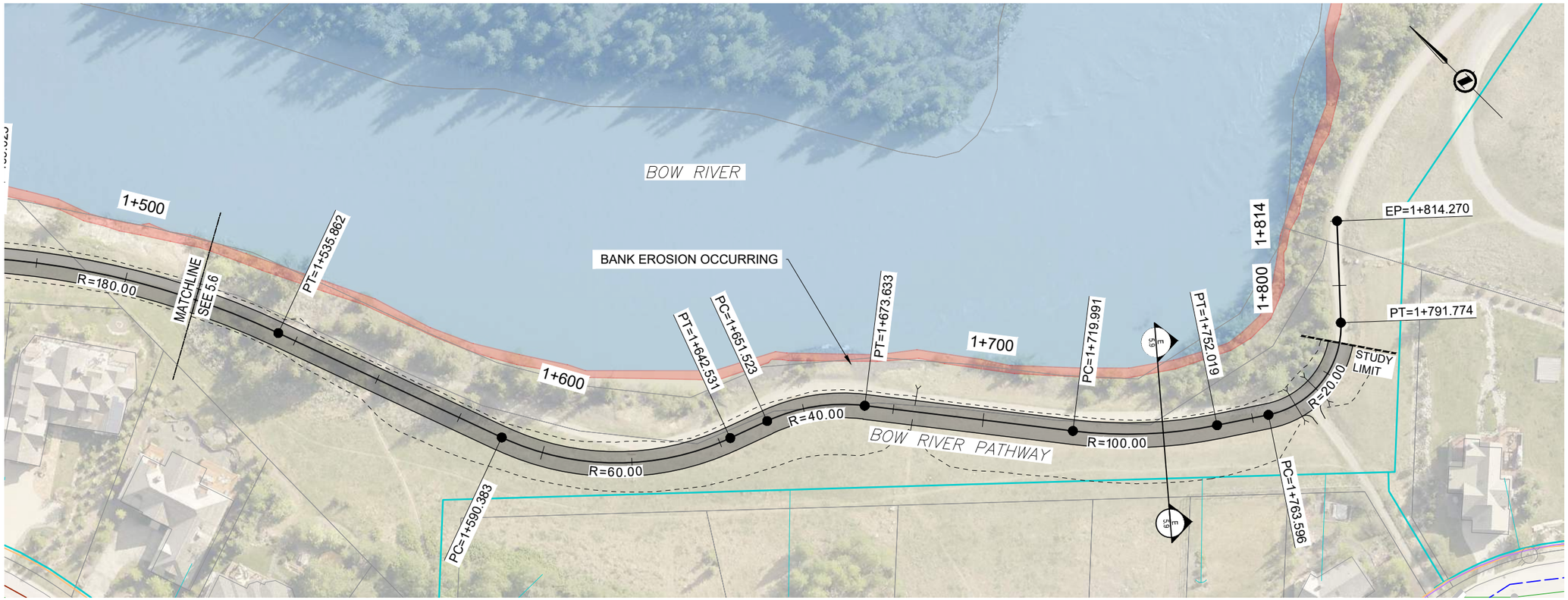
FIGURE TITLE

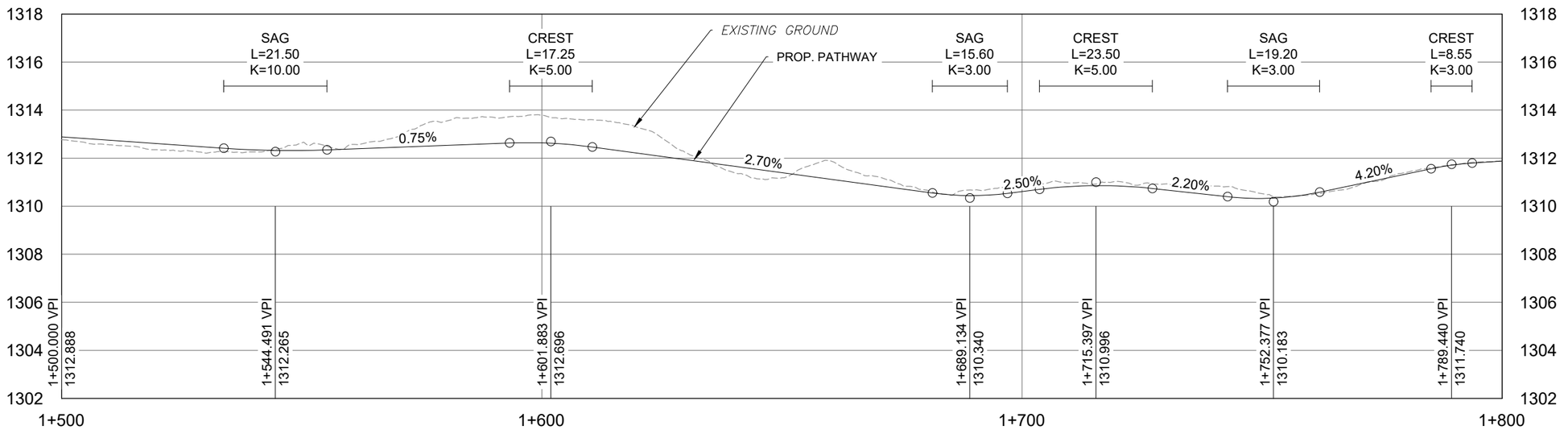
**ULTIMATE PATHWAY**
**PLAN PROFILE**
**STA 1+200 TO STA 1+500**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
| 61954_Ultimate-PP.dwg | 1:1000 | **5.6** |

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\61000\61900\61954_BOW_RIVER_TRAL_TO_THREE_SISTERS\02_CADD\20_DRAFTING\01_EXHIBITS\61954_ULTIMATE-PP.DWG | DATE: November 30, 2021 5:04:31 PM




NOTES

PLAN VIEW FLOOD DATA FROM CANMORE FLOOD HAZARD STUDY (W-E-R AGRA LTD., MARCH 1993), ACCESSED ON ALBERTA FLOODS PORTAL NOVEMBER 2021.
PROFILE VIEW FLOOD DATA FROM BOW RIVER DYKE CAPACITY ANALYSIS (BGC ENGINEERING INC., JUNE 2014) DRAWING 01B.

PLAN VIEW LEGEND

- EX SANITARY MAIN
- EX WATER MAIN
- EX STORM MAIN
- EX GAS MAIN
- EX HIGH PRESSURE GAS
- EX COMMUNICATIONS
- EX POWER
- 1:10 YR FLOOD EVENT
- 1:100 YR FLOOD EVENT
- PR CULVERT
- PR WALL <2.0m
- PR WALL >2.0m
- GRADING LIMIT
- PATHWAY FACILITY

PROFILE VIEW LEGEND

- 1000 $m^3/s$ SURFACE
- 800 $m^3/s$ SURFACE

1:1000 (HORZ) 0 20 40 m
1:100 (VERT) 0 2 4 m

Town of CANMORE

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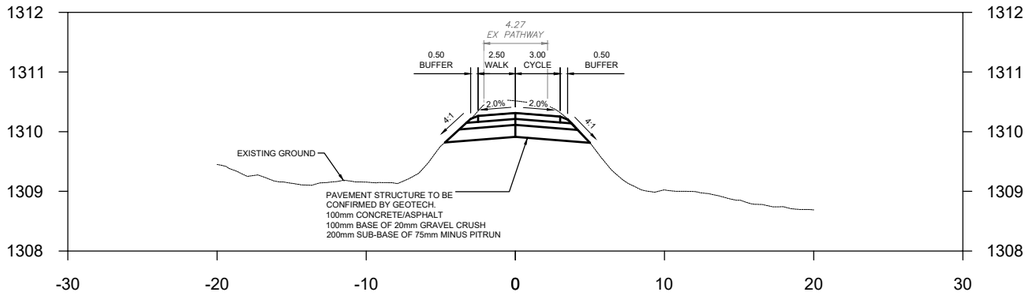
PROJECT
**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

FIGURE TITLE
**ULTIMATE PATHWAY**
**PLAN PROFILE**
**STA 1+500 TO STA 1+800**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
| 61954_Ultimate-PP.dwg | 1:1000 | **5.7** |

ISC: #### SHEET SIZE ANSI B 20 mm 0

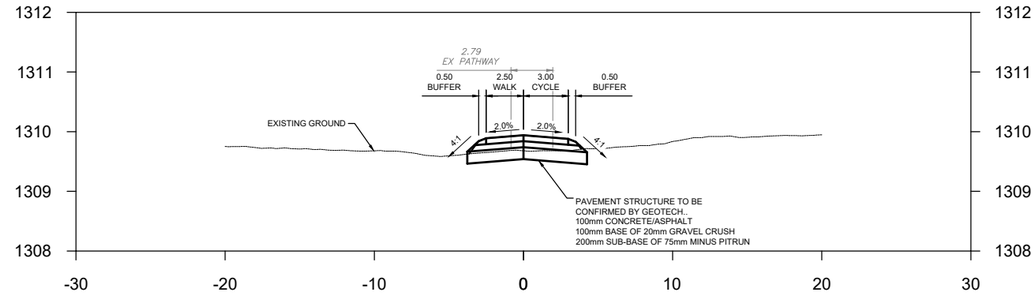
FILE: G:\PROJECTS\61000\61900\61954_BOW_RIVER_TRAIL_TO_THREE_SISTERS\02_CADD\20_DRAFTING\01_EXHIBITS\61954_ULTIMATE-PP.DWG | DATE: November 30, 2021 5:06:50 PM




A
5.8

# SECTION - STA 0+160

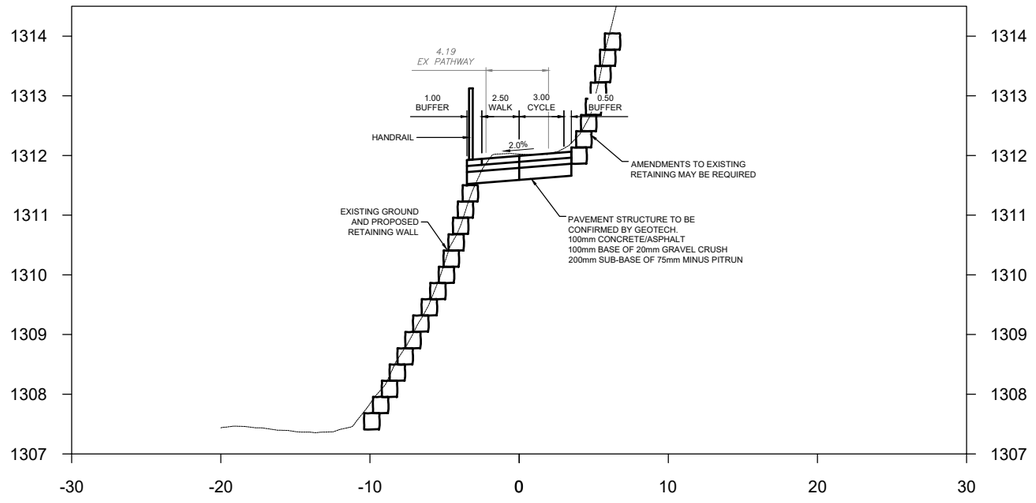
SCALE 1:400 (HORZ) 1:100 (VERT)




B
5.8

# SECTION - STA 0+500

SCALE 1:400 (HORZ) 1:100 (VERT)




C
5.8

# SECTION - STA 0+805

SCALE 1:400 (HORZ) 1:100 (VERT)

HORZ 1:400 0 8 16 m

VERT 1:100 0 2 4 m

Town of CANMORE

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PROJECT

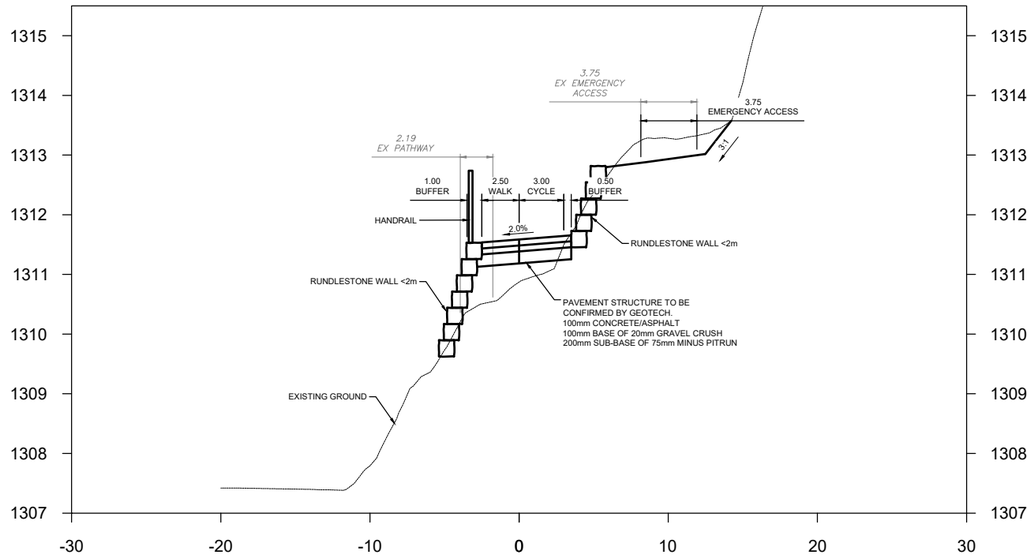
**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

FIGURE TITLE

**TYPICAL SECTIONS**
**SHEET 1**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
| 61954_XS.dwg | | 5.8 |

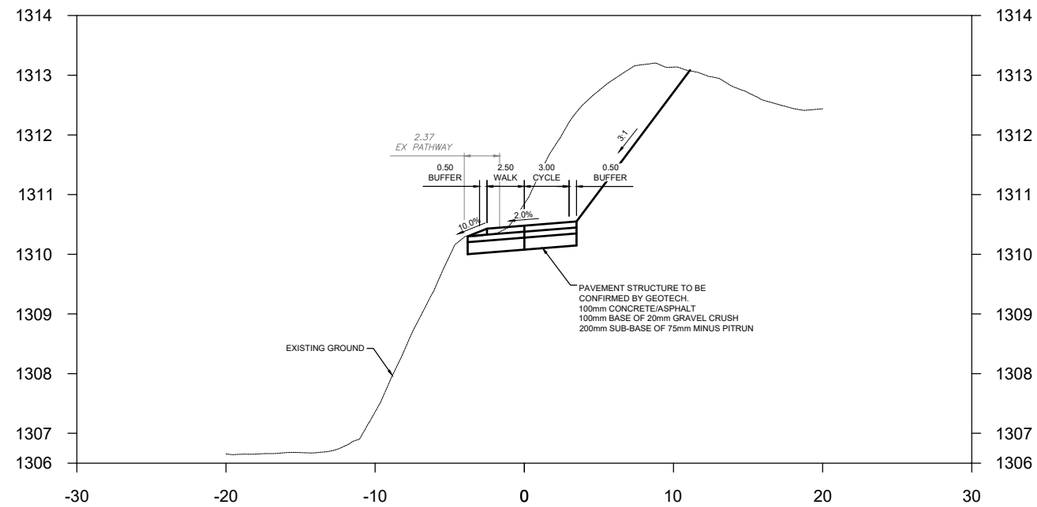
ISC: #### SHEET SIZE ANSI B 20 mm 0




D
5.9

## SECTION - STA 1+110

SCALE 1:400 (HORZ) 1:100 (VERT)




E
5.9

## SECTION - STA 1+740

SCALE 1:400 (HORZ) 1:100 (VERT)

HORZ 1:400 0 8 16 m

VERT 1:100 0 2 4 m

Town of CANMORE

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**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

FIGURE TITLE

**TYPICAL SECTIONS**
**SHEET 2**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
| 61954_XS.dwg | | **5.9** |

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\61000\61900\61954_BOW_RIVER_TRAIL_TO_THREE_SISTERS\02_CADD\20_DRAFTING\01_EXHIBITS\61954_XS.DWG | DATE: November 30, 2021 5:15:49 PM

BOW RIVER

WEST CANMORE PARK

CL OF PROP OPTION 3

CL OF EX PATHWAY

CL OF PROP OPTION 5

R=100.00

R=90.00

R=20.00

R=15.00

R=100.00

R=15.00

R=200.00

R=25.00

35.00

25.00

25.00

20.00

CL OF PROP OPTION 4

R=20.00

R=15.00

R=15.00

R=30.00

R=25.00

R=200.00

R=200.00

R=250.00

R=30.00

R=25.00

R=30.00

R=10.00

R=50.00

THREE SISTERS DR

CL OF PROP OPTION 2

CL OF PROP OPTION 1

RUMMEL PL

PROSPECT HEIGHTS

PROSPECT HEIGHTS

LEGEND

- 3.5m FACILITY
- 5.5m FACILITY
- 1:10 YR FLOOD EVENT
- 1:100 YR FLOOD EVENT

NOTES

PLAN VIEW FLOOD DATA FROM CANMORE FLOOD HAZARD STUDY (W-E-R AGRA LTD., MARCH 1993), ACCESSED ON ALBERTA FLOODS PORTAL NOVEMBER 2021.
PROFILE VIEW FLOOD DATA FROM BOW RIVER DYKE CAPACITY ANALYSIS (BGC ENGINEERING INC., JUNE 2014) DRAWING 01B.

0 20 40 m

1:1000

Town of CANMORE

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PROJECT

**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

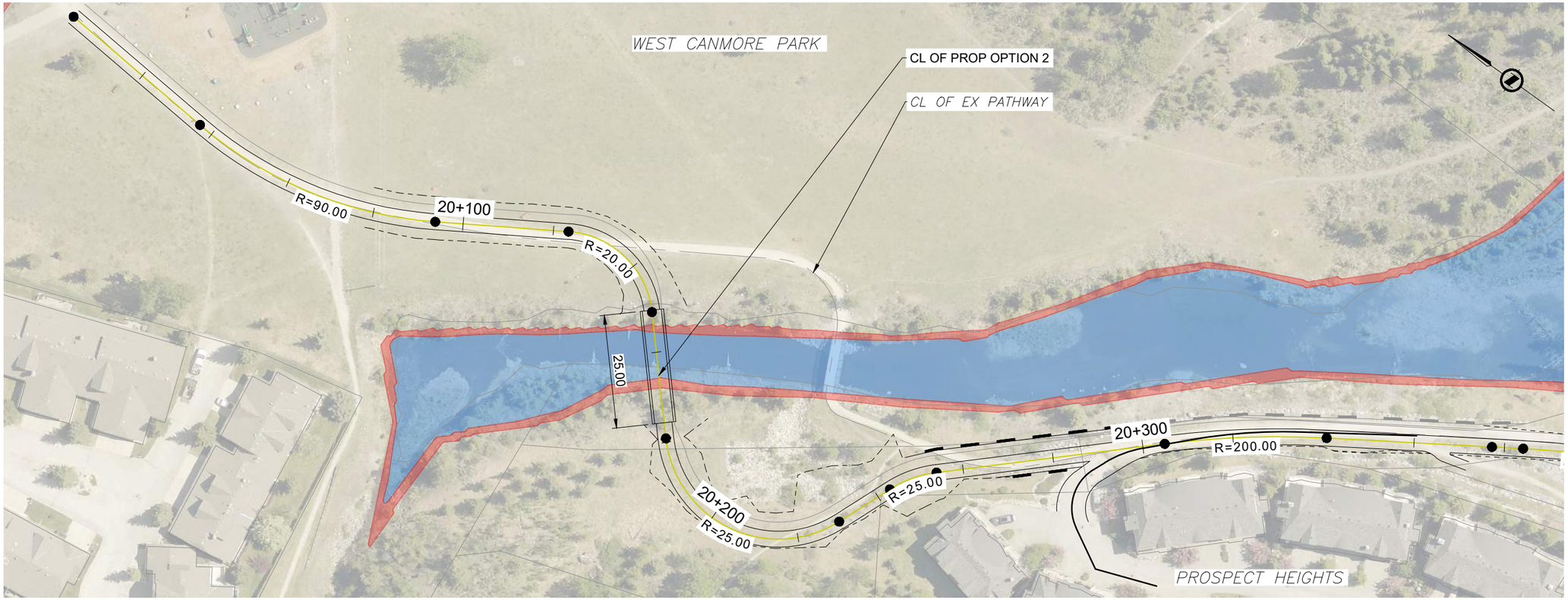
FIGURE TITLE

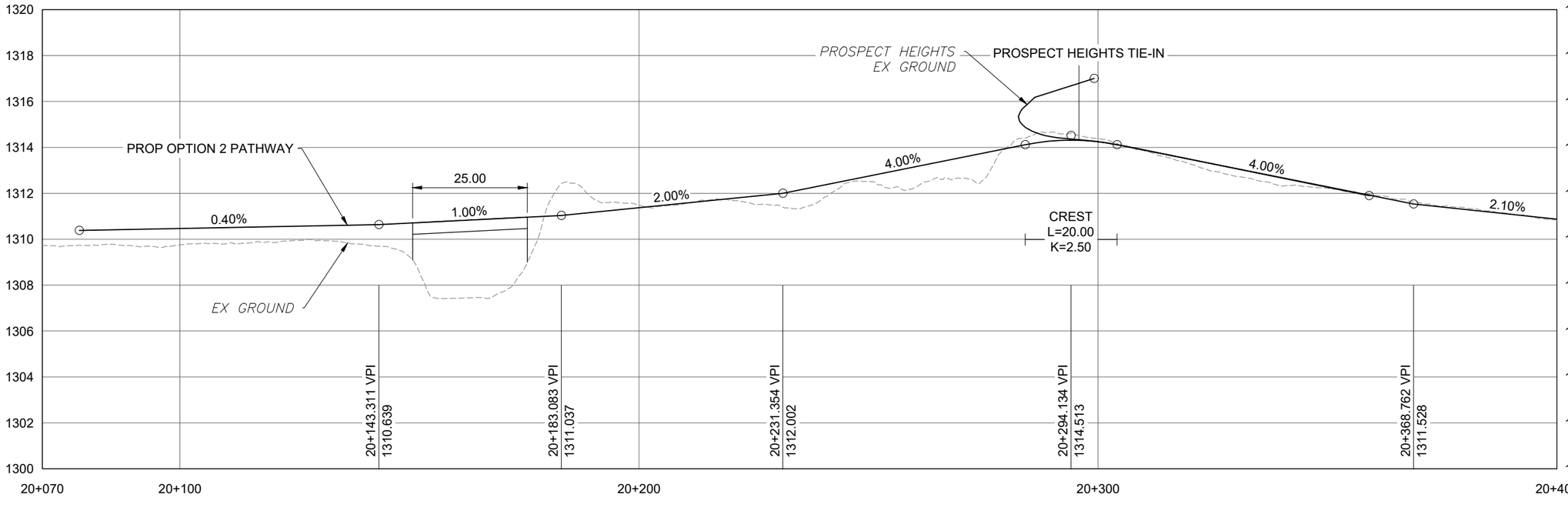
**WEST CANMORE PARK BRIDGE PATHWAY OPTIONS**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
| 61954_WCP-BridgeOptionPPs.dwg | 1:1000 | **5.10** |

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\61000\61900\61954_BOW_RIVER_TRAIL_TO_THREE_SISTERS\02_CADD\20_DRAFTING\01_EXHIBITS\61954_WCP-BRIDGEOPTIONPPS.DWG | DATE: November 20, 2021 4:46:58 PM




LEGEND

- 3.5m FACILITY
- 5.5m FACILITY
- 1:10 YR FLOOD EVENT
- 1:100 YR FLOOD EVENT

NOTES

PLAN VIEW FLOOD DATA FROM CANMORE FLOOD HAZARD STUDY (W-E-R AGRA LTD., MARCH 1993), ACCESSED ON ALBERTA FLOODS PORTAL NOVEMBER 2021.
PROFILE VIEW FLOOD DATA FROM BOW RIVER DYKE CAPACITY ANALYSIS (BGC ENGINEERING INC., JUNE 2014) DRAWING 01B.

1:1000 (HORZ) 0 20 40 m

1:100 (VERT) 0 2 4 m

Town of CANMORE

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**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

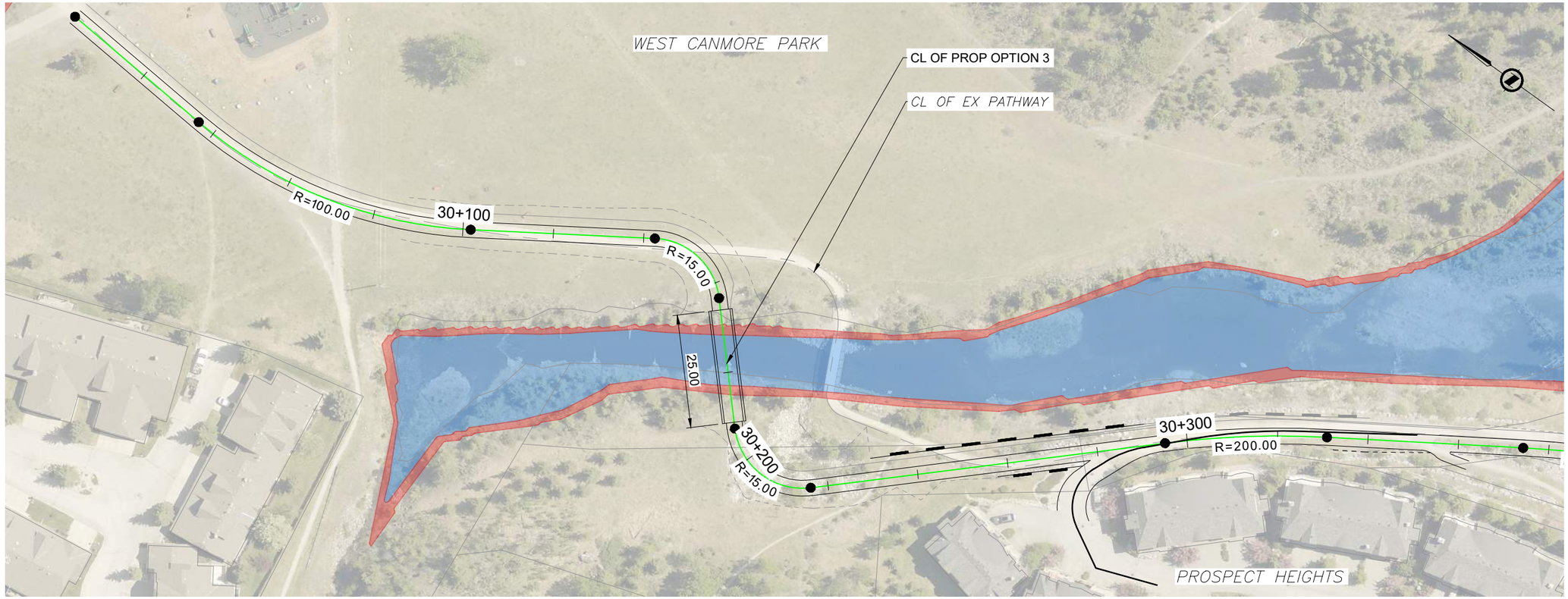
FIGURE TITLE

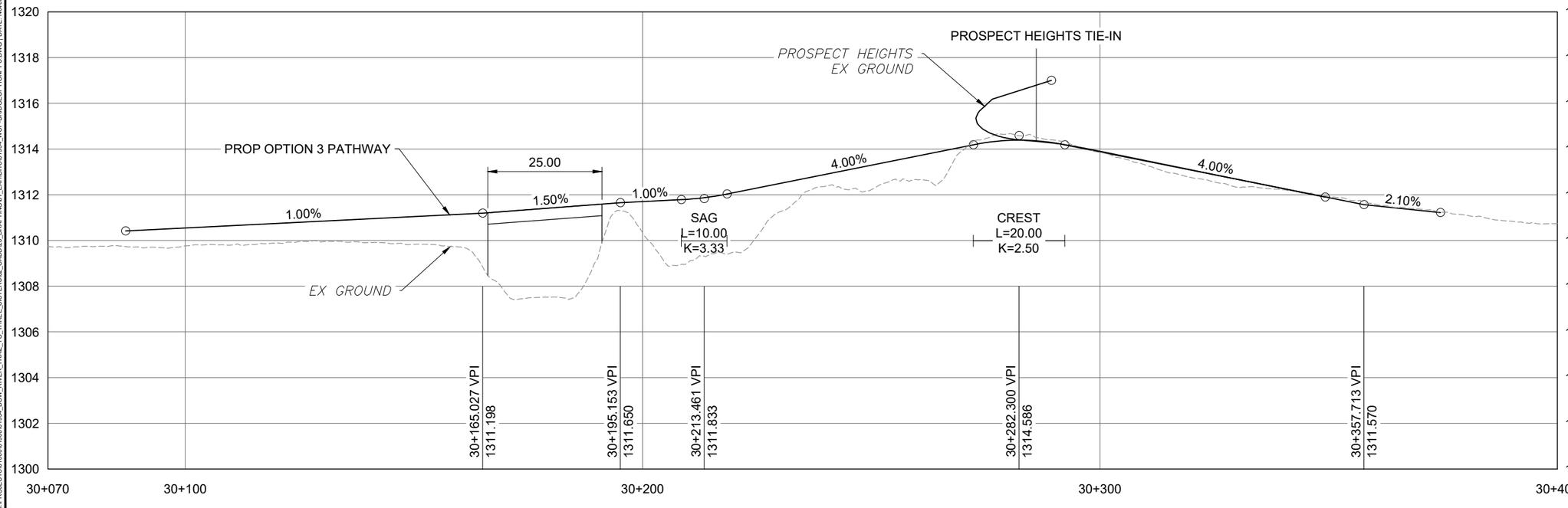
**WEST CANMORE PARK BRIDGE**
**PLAN PROFILE**
**OPTION 2**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
| 61954_WCP-BridgeOptionPPs.dwg | 1:1000 | 5.11 |

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\61000\61900\61954_BOW_RIVER_TRAIL_TO_THREE_SISTERS\02_CADD\20_DRAFTING\01_EXHIBITS\61954_WCP-BRIDGEOPTIONPPS.DWG | DATE: November 22, 2021 12:28:47 PM




LEGEND

- 3.5m FACILITY
- 5.5m FACILITY
- 1:10 YR FLOOD EVENT
- 1:100 YR FLOOD EVENT

NOTES

PLAN VIEW FLOOD DATA FROM CANMORE FLOOD HAZARD STUDY (W-E-R AGRA LTD., MARCH 1993), ACCESSED ON ALBERTA FLOODS PORTAL NOVEMBER 2021.
PROFILE VIEW FLOOD DATA FROM BOW RIVER DYKE CAPACITY ANALYSIS (BGC ENGINEERING INC., JUNE 2014) DRAWING 01B.

1:1000 (HORZ) 0 20 40 m

1:100 (VERT) 0 2 4 m

Town of CANMORE

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**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

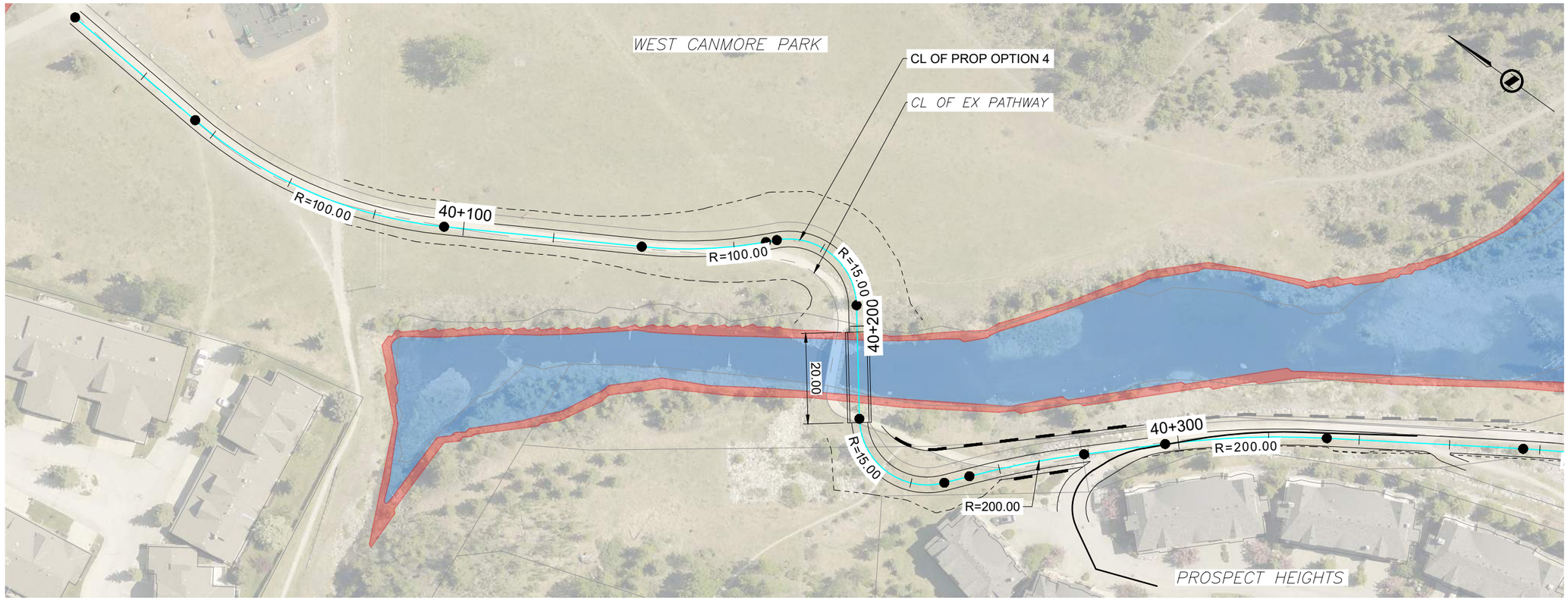
FIGURE TITLE

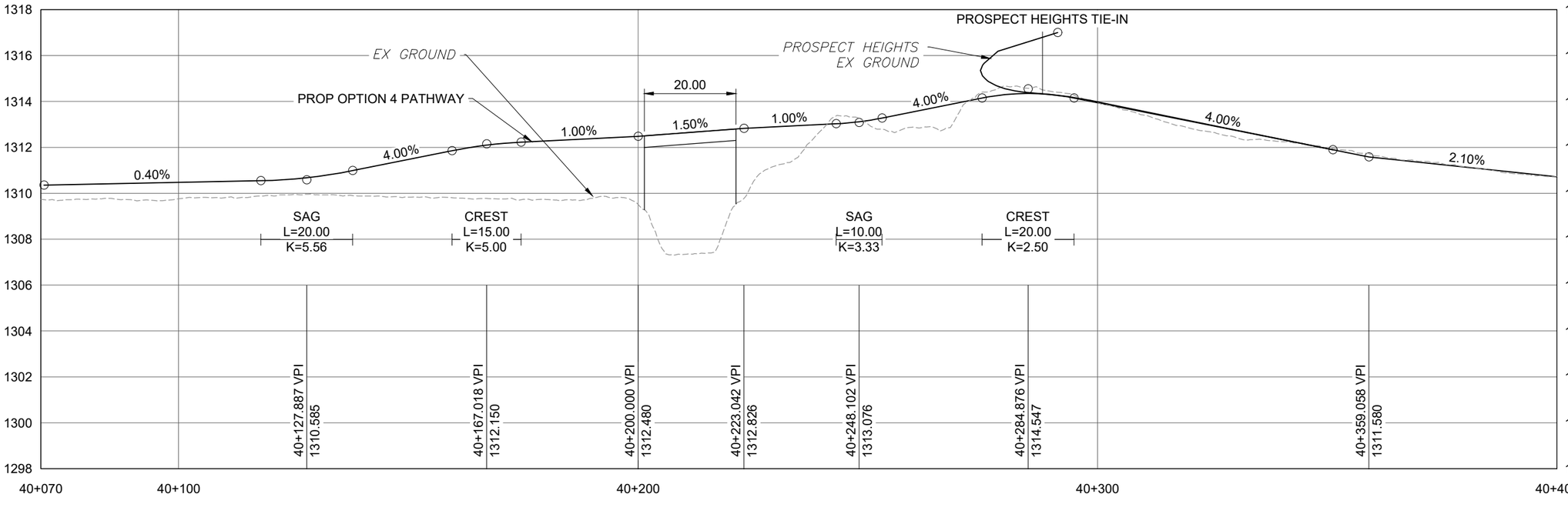
**WEST CANMORE PARK BRIDGE**
**PLAN PROFILE**
**OPTION 3**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
| 61954_WCP-BridgeOptionPPs.dwg | 1:1000 | 5.12 |

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\61000\61900\61954_BOW_RIVER_TRAIL_TO_THREE_SISTERS\02_CADD\20_DRAFTING\01_EXHIBITS\61954_WCP-BRIDGEOPTIONPPS.DWG | DATE: November 22, 2021 12:30:46 PM




LEGEND

- 3.5m FACILITY
- 5.5m FACILITY
- 1:10 YR FLOOD EVENT
- 1:100 YR FLOOD EVENT

NOTES

PLAN VIEW FLOOD DATA FROM CANMORE FLOOD HAZARD STUDY (W-E-R AGRA LTD., MARCH 1993), ACCESSED ON ALBERTA FLOODS PORTAL NOVEMBER 2021.
PROFILE VIEW FLOOD DATA FROM BOW RIVER DYKE CAPACITY ANALYSIS (BGC ENGINEERING INC., JUNE 2014) DRAWING 01B.

1:1000 (HORZ) 0 20 40 m

1:100 (VERT) 0 2 4 m

Town of CANMORE

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PROJECT

**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

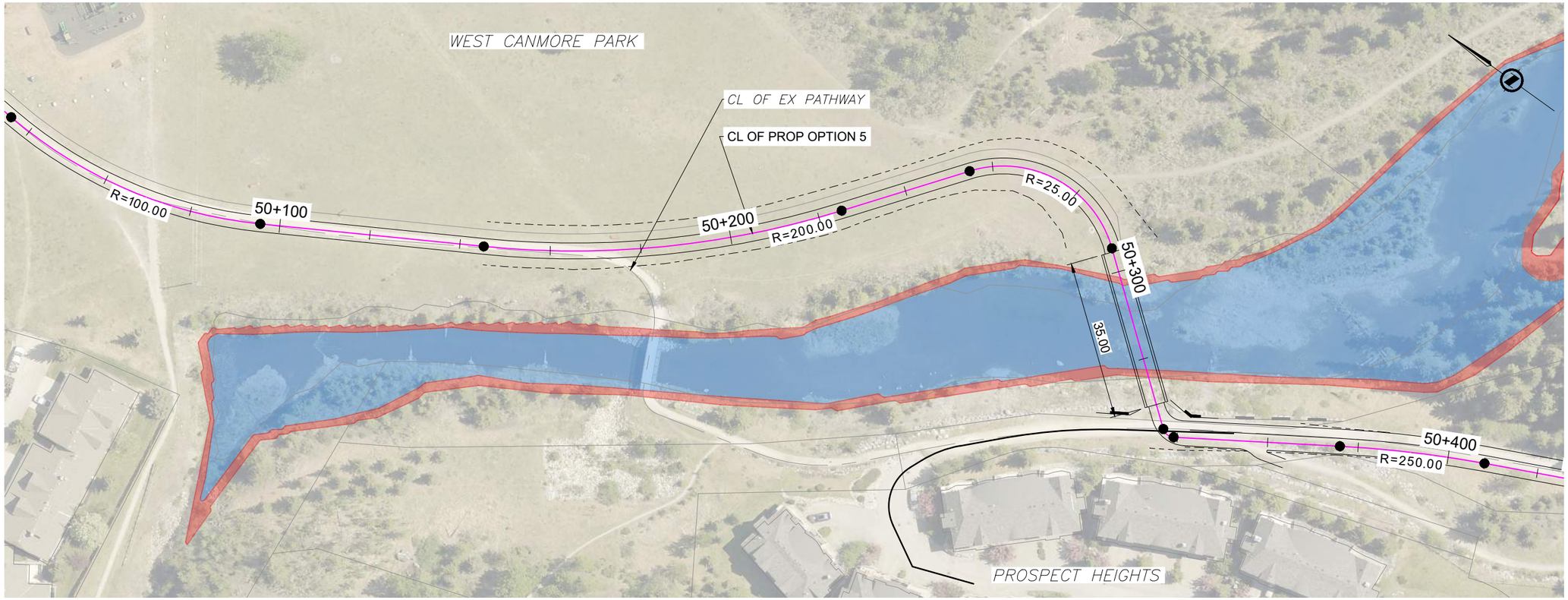
FIGURE TITLE

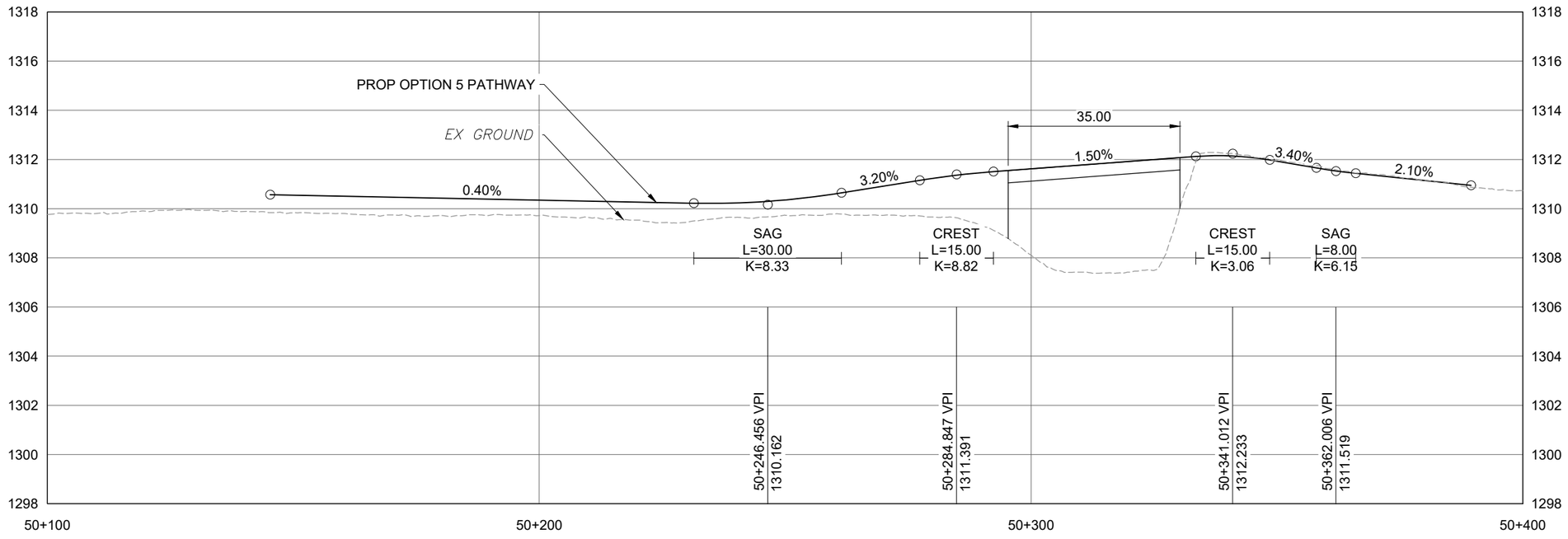
**WEST CANMORE PARK BRIDGE**
**PLAN PROFILE**
**OPTION 4**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
| 61954_WCP-BridgeOptionPPs.dwg | 1:1000 | 5.13 |

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\61000\61900\61954_BOW_RIVER_TRAIL_TO_THREE_SISTERS\02_CADD\20_DRAFTING\01_EXHIBITS\61954_WCP-BRIDGEOPTIONPPS.DWG | DATE: November 22, 2021 12:33:16 PM




LEGEND

- 3.5m FACILITY
- 5.5m FACILITY
- 1:10 YR FLOOD EVENT
- 1:100 YR FLOOD EVENT

NOTES

PLAN VIEW FLOOD DATA FROM CANMORE FLOOD HAZARD STUDY (W-E-R AGRA LTD., MARCH 1993), ACCESSED ON ALBERTA FLOODS PORTAL NOVEMBER 2021.
PROFILE VIEW FLOOD DATA FROM BOW RIVER DYKE CAPACITY ANALYSIS (BGC ENGINEERING INC., JUNE 2014) DRAWING 01B.

1:1000 (HORZ) 0 20 40 m

1:100 (VERT) 0 2 4 m

Town of CANMORE

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PROJECT

**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

FIGURE TITLE

**WEST CANMORE PARK BRIDGE**
**PLAN PROFILE**
**OPTION 5**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
| 61954_WCP-BridgeOptionPPs.dwg | 1:1000 | 5.14 |

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\61000\61900\61954_BOW_RIVER_TRAIL_TO_THREE_SISTERS\02_CADD\20_DRAFTING\01_EXHIBITS\61954_WCP-BRIDGEOPTIONPPS.DWG | DATE: November 22, 2021 12:42:19 PM

BOW RIVER

WEST CANMORE PARK

PROSPECT HEIGHTS

THREE SISTERS DR

R=80.00
R=120.00
R=200.00
R=100.00
R=120.00
R=100.00
R=400.00
R=200.00
R=270.00
R=250.00
R=30.00
R=25.00
R=25.00
R=25.00

CL OF PROP OPTION IV
CL OF PROP OPTION III
CL OF PROP OPTION II
CL OF PROP OPTION I

RC

NOTES

PLAN VIEW FLOOD DATA FROM CANMORE FLOOD HAZARD STUDY (W-E-R AGRA LTD., MARCH 1993), ACCESSED ON ALBERTA FLOODS PORTAL NOVEMBER 2021.
PROFILE VIEW FLOOD DATA FROM BOW RIVER DYKE CAPACITY ANALYSIS (BGC ENGINEERING INC., JUNE 2014) DRAWING 01B.

1:10 YR FLOOD EVENT

1:100 YR FLOOD EVENT

0 25 50 m
1:1250

Town of CANMORE

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**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

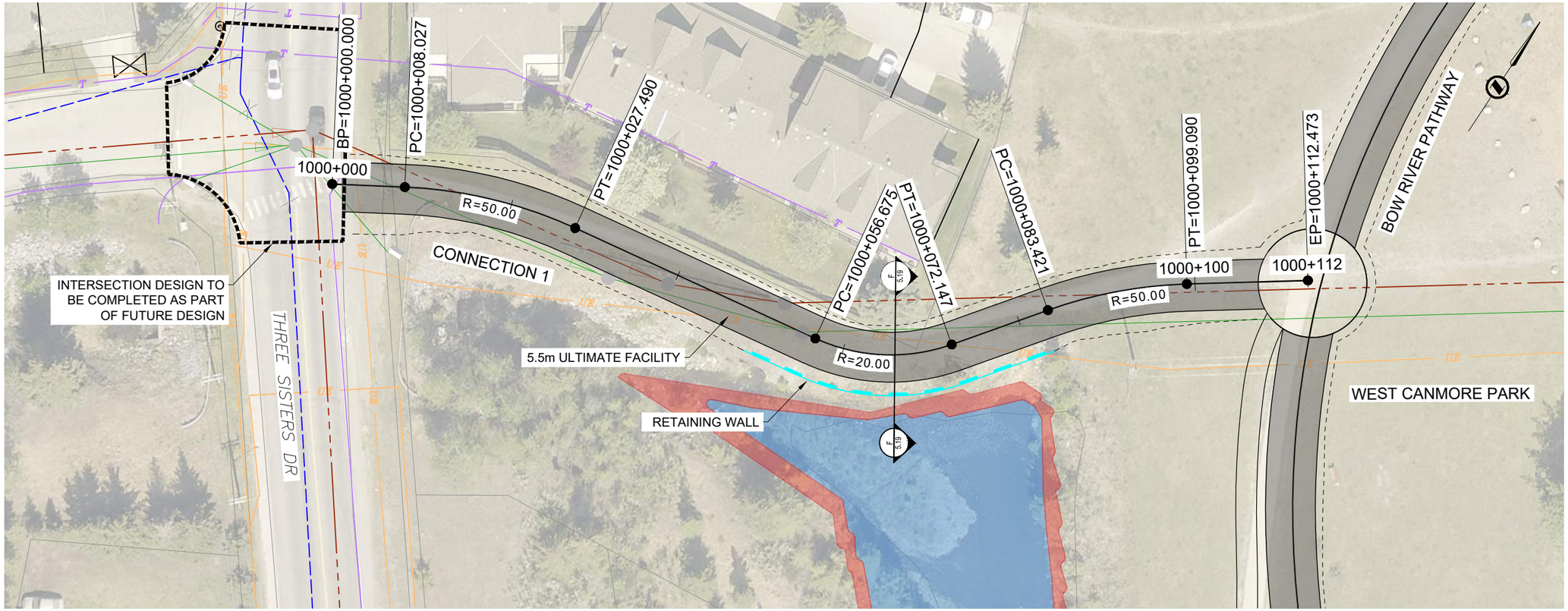
FIGURE TITLE

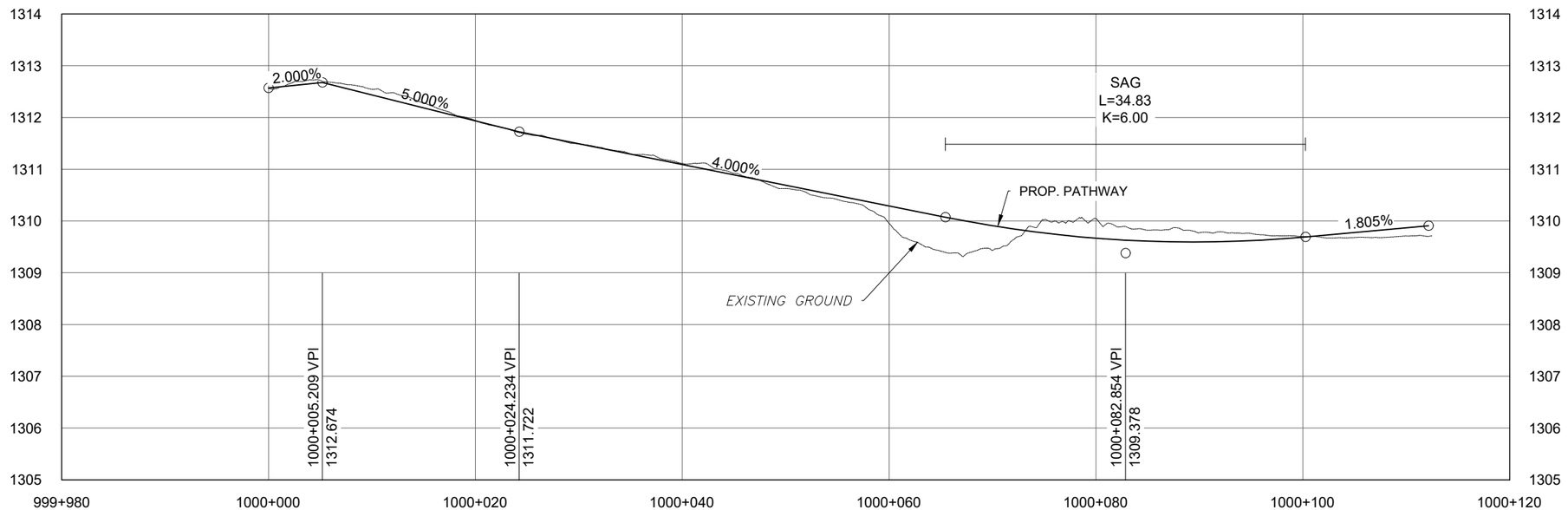
**WEST CANMORE PARK**
**ALIGNMENT OPTIONS**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
| 61954_WCP-AlignmentOptions.dwg | 1:1250 | 5.15 |

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\61000\61900\61954_BOW_RIVER_TRAIL_TO_THREE_SISTERS\02_CADD\03_DRAFTING\01_EXHIBITS\61954_WCP-AUGMENTOPTIONS.DWG | DATE: November 20, 2021 4:53:02 PM




NOTES

PLAN VIEW FLOOD DATA FROM CANMORE FLOOD HAZARD STUDY (W-E-R AGRA LTD., MARCH 1993), ACCESSED ON ALBERTA FLOODS PORTAL NOVEMBER 2021.
PROFILE VIEW FLOOD DATA FROM BOW RIVER DYKE CAPACITY ANALYSIS (BGC ENGINEERING INC., JUNE 2014) DRAWING 01B.

PLAN VIEW LEGEND

- EX SANITARY MAIN
- EX WATER MAIN
- EX STORM MAIN
- EX GAS MAIN
- EX HIGH PRESSURE GAS
- EX COMMUNICATIONS
- EX POWER
- 1:10 YR FLOOD EVENT
- 1:100 YR FLOOD EVENT
- PR CULVERT
- PR WALL <2.0m
- PR WALL >2.0m
- GRADING LIMIT
- PATHWAY FACILITY

PROFILE VIEW LEGEND

- 1000 $m^3/s$ SURFACE
- 800 $m^3/s$ SURFACE

1:500 (HORZ) 0 10 20 m

1:50 (VERT) 0 1 2 m

Town of CANMORE

ISL

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**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

FIGURE TITLE

**THREE SISTERS DRIVE TO WEST CANMORE PARK**
**ULTIMATE FACILITY**
**PLAN PROFILE**

| FILE No. | SCALE | FIGURE No. |
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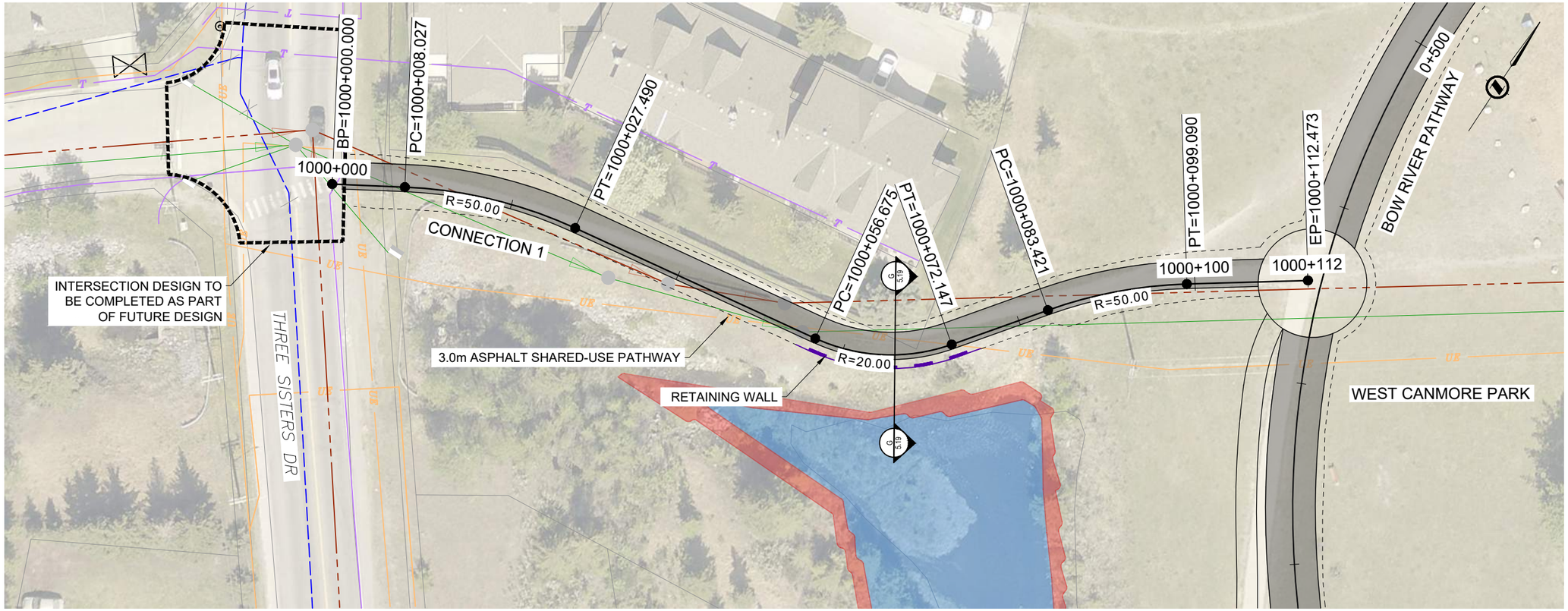


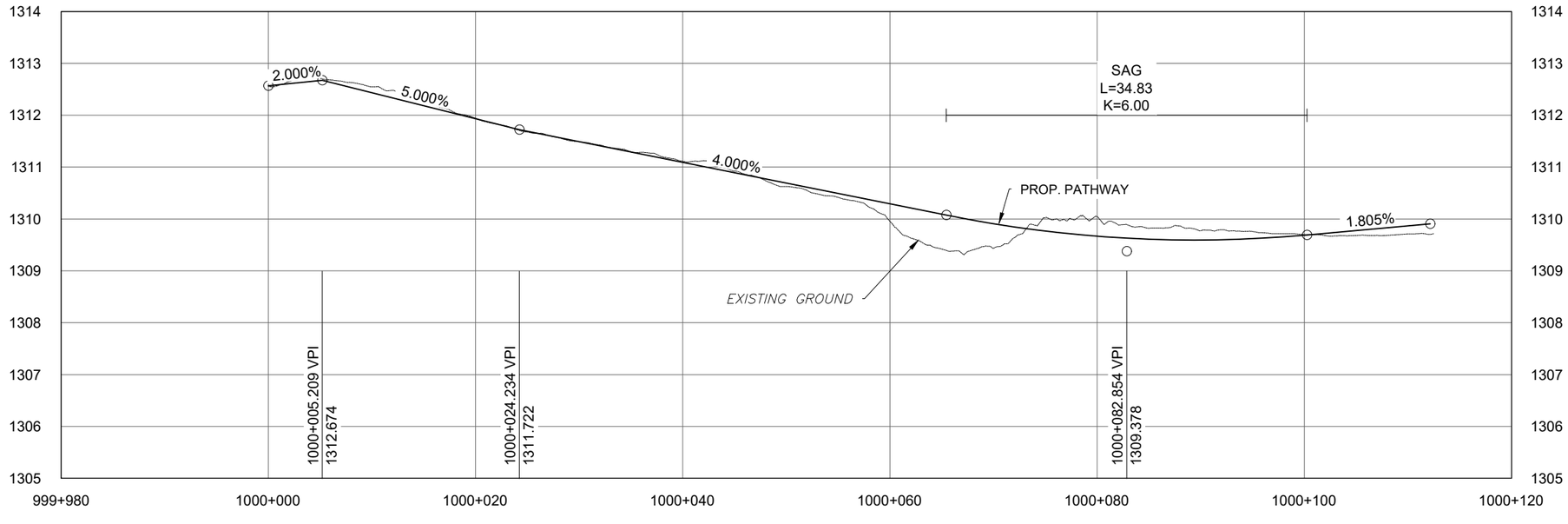


NOTES

PLAN VIEW FLOOD DATA FROM CANMORE FLOOD HAZARD STUDY (W-E-R AGRA LTD., MARCH 1993), ACCESSED ON ALBERTA FLOODS PORTAL NOVEMBER 2021.
PROFILE VIEW FLOOD DATA FROM BOW RIVER DYKE CAPACITY ANALYSIS (BGC ENGINEERING INC., JUNE 2014) DRAWING 01B.

PLAN VIEW LEGEND

- EX SANITARY MAIN
- EX WATER MAIN
- EX STORM MAIN
- EX GAS MAIN
- EX HIGH PRESSURE GAS
- EX COMMUNICATIONS
- EX POWER
- 1:10 YR FLOOD EVENT
- 1:100 YR FLOOD EVENT
- PR CULVERT
- PR WALL <2.0m
- PR WALL >2.0m
- GRADING LIMIT
- PATHWAY FACILITY

PROFILE VIEW LEGEND

- 1000 $m^3/s$ SURFACE
- 800 $m^3/s$ SURFACE

1:500 (HORZ) 0 10 20 m
1:50 (VERT) 0 1 2 m

Town of CANMORE

ISL

PROJECT
**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

FIGURE TITLE
**THREE SISTERS DRIVE TO WEST CANMORE PARK SHARED PATHWAY PLAN PROFILE**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
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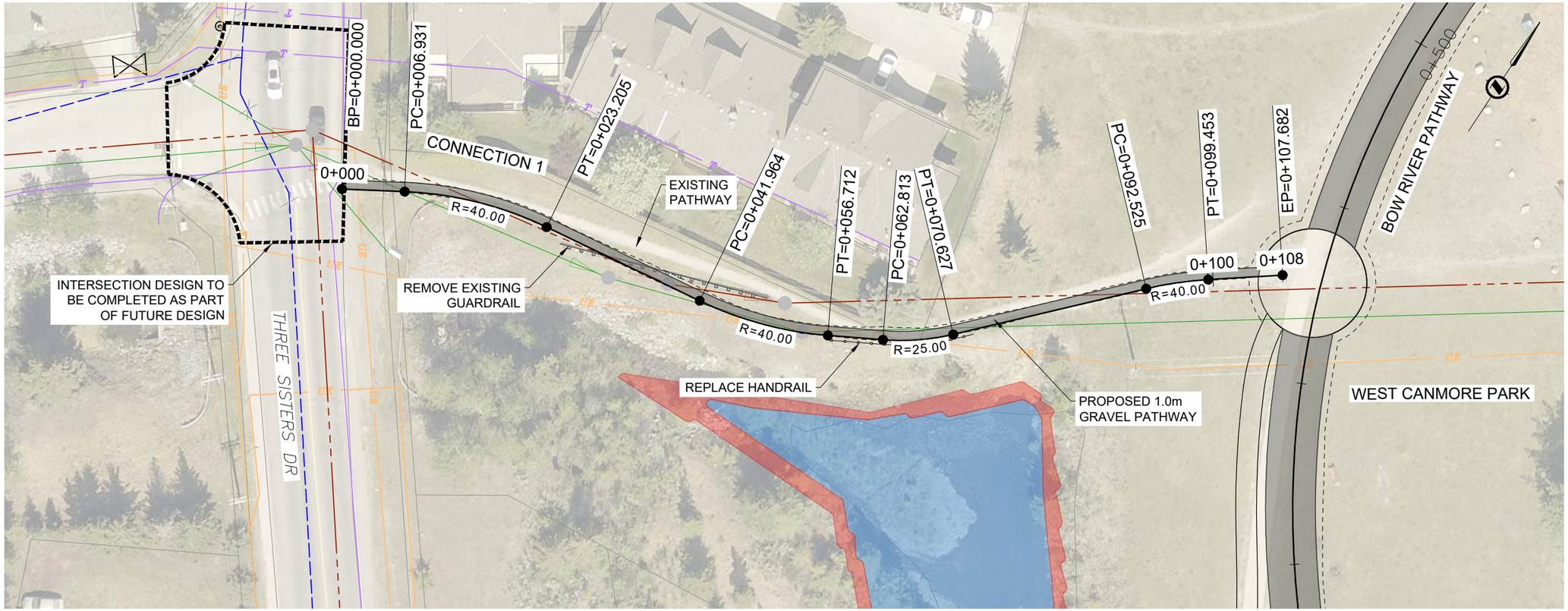


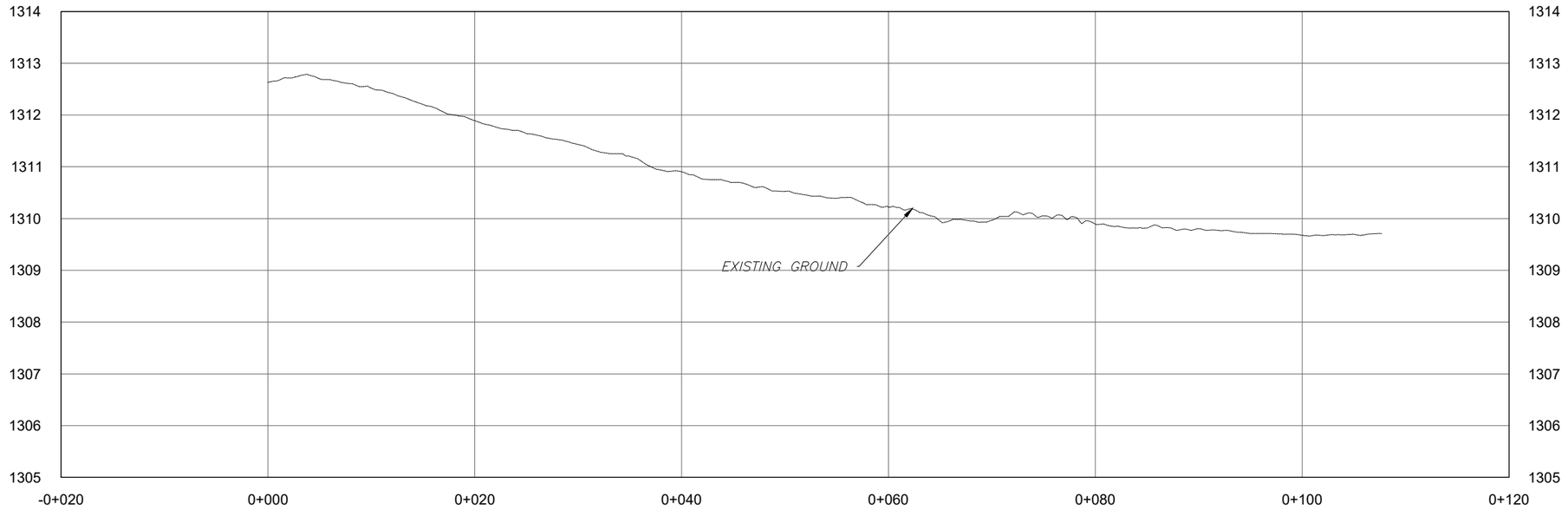


NOTES

PLAN VIEW FLOOD DATA FROM CANMORE FLOOD HAZARD STUDY (W-E-R AGRA LTD., MARCH 1993), ACCESSED ON ALBERTA FLOODS PORTAL NOVEMBER 2021.
PROFILE VIEW FLOOD DATA FROM BOW RIVER DYKE CAPACITY ANALYSIS (BGC ENGINEERING INC., JUNE 2014) DRAWING 01B.

PLAN VIEW LEGEND

- EX SANITARY MAIN
- EX WATER MAIN
- EX STORM MAIN
- EX GAS MAIN
- EX HIGH PRESSURE GAS
- EX COMMUNICATIONS
- EX POWER
- 1:10 YR FLOOD EVENT
- 1:100 YR FLOOD EVENT
- PR CULVERT
- PR WALL <2.0m
- PR WALL >2.0m
- GRADING LIMIT
- PATHWAY FACILITY

PROFILE VIEW LEGEND

- 1000 $m^3/s$ SURFACE
- 800 $m^3/s$ SURFACE

1:500 (HORZ) 0 10 20 m
1:50 (VERT) 0 1 2 m

Town of CANMORE

ISL

PROJECT
**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

FIGURE TITLE
**THREE SISTERS DRIVE TO WEST CANMORE PARK**
**MINOR IMPROVEMENTS**
**PLAN PROFILE**

| FILE No. | SCALE | FIGURE No. |
|---|---|---|
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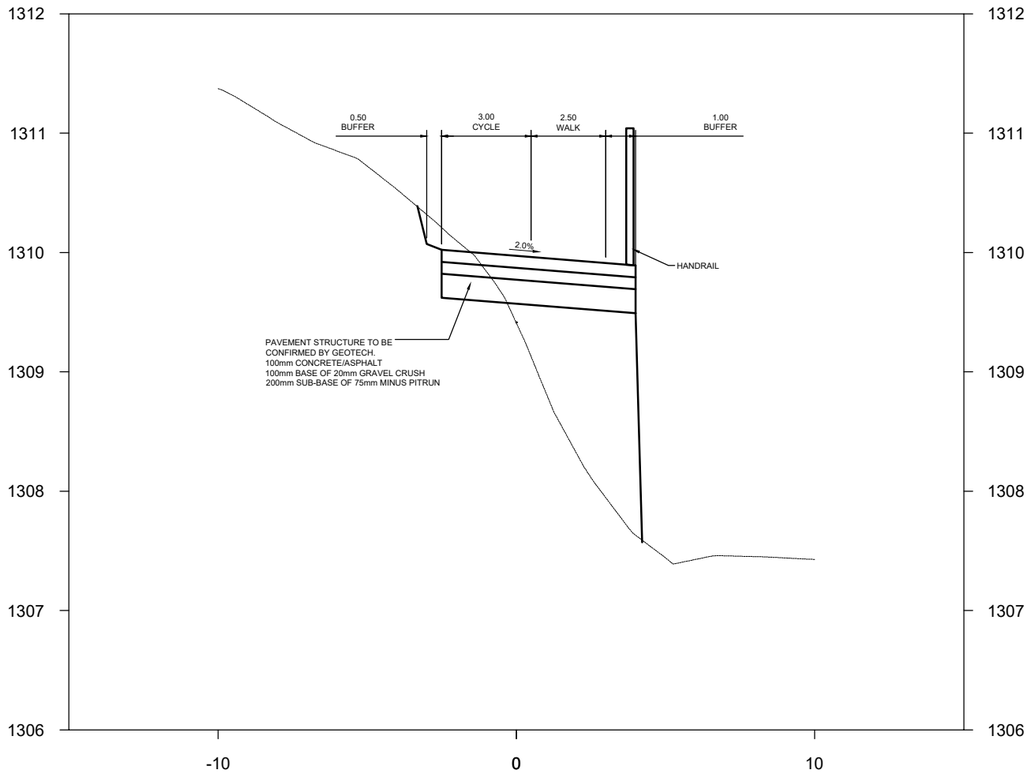


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5.16

## SECTION - ULTIMATE FACILITY

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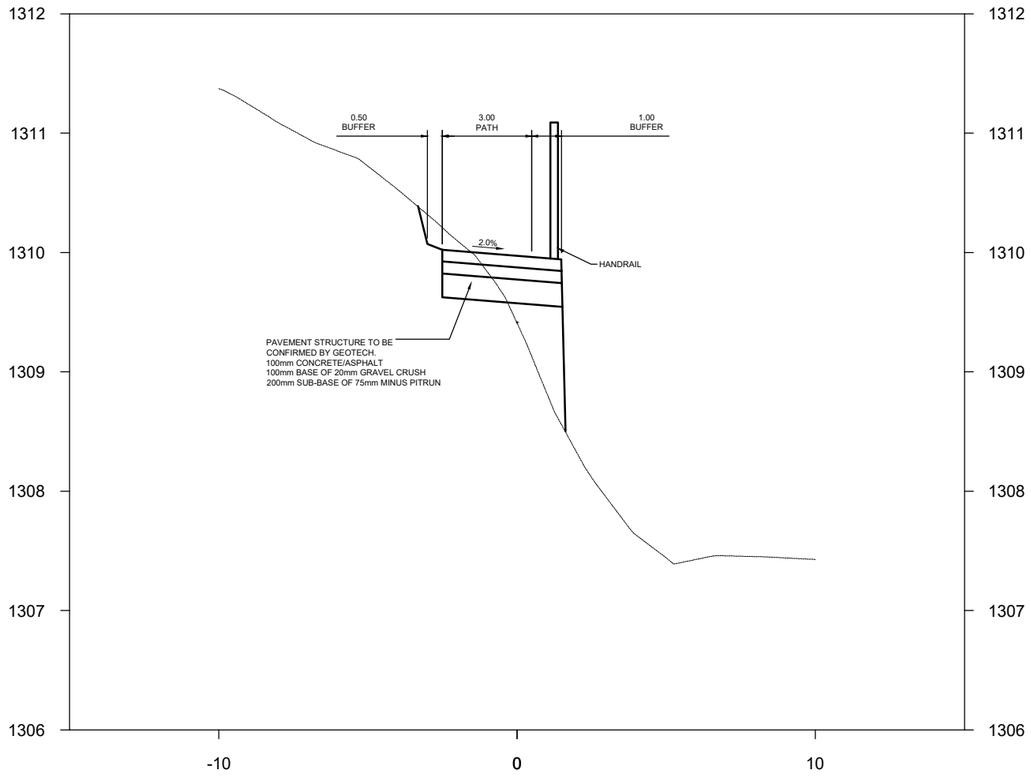


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5.17

## SECTION - SHARED-USE PATHWAY

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1:200 (HORZ) 0 4 8 m

1:50 (VERT) 0 1 2 m

Town of CANMORE

ISL

PROJECT

**TOWN OF CANMORE**
**BOW RIVER PATHWAY**

FIGURE TITLE

**THREE SISTERS DRIVE TO WEST CANMORE PARK SECTIONS**

| FILE No. | SCALE | FIGURE No. |
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# 6.0 Implementation

## 6.1 Cost Estimates

### 6.1.1 Ultimate Facility Cost Estimate

A Class D estimate has been completed for the ultimate facility from the Rundle Drive Bow River bridge to the Homestead's Van Horne connection. The full estimate and a list of assumptions are available in Appendix C with the summary shown in Table 6.1. Unit rates used in the estimate have been based on a variety sources, specifically referencing pricing from recent Canmore projects including the Transportation Improvements Program 2020. Several unit rates have been scaled to reflect site specific challenges including the transport of common excavation within the project area.

Table 6.1 Ultimate Class D Cost Estimate

| Item | Description | Cost |
|---|---|---|
| 1 | Removals | $18,000 |
| 2 | Earthworks | $199,700 |
| 3 | Surface Works | $1,023,050 |
| 4 | Structures | $1,791,500 |
| 5 | Stormwater and Utilities | $39,500 |
| 6 | Landscaping, Lighting and Misc. | $586,000 |
| | **Construction Sub-Total** | **$3,657,750** |
| | **Contingency (30%)** | $1,097,325 |
| | **Subtotal (Including Contingency)** | **$4,755,075** |
| | **Engineering and Testing (15%)** | $713,261 |
| | **Subtotal (Including Contingency and Engineering and Testing)** | **$5,468,336** |
| | **Order of Magnitude Estimate (Rounded)** | **$5,470,000** |

Key assumptions inherent in the cost estimate are highlighted here:

- The West Canmore Park creek bridge is comprised of a single 6.5m clear width prefabricated weathering steel truss structure.
- The Homesteads stormwater outfall bridge is assumed to be a single 6.5m clear width prefabricated weathering steel truss structure. Should an alternate bridge system be used including the re-use of girders from another location, cost savings may be available.

### 6.1.2 Three Sisters Drive to West Canmore Park Connection Cost Estimate

A Class D estimate has been completed for the three options developed for the Three Sisters Drive to Central West Canmore Park connection that were outlined in Section 5.6. The full estimate and assumptions can be found in Appendix C.

Table 6.2 Three Sisters Drive to West Canmore Park Connection Class D Cost Estimate

| Item | Description | Ultimate 5.5m Facility | 3.0m Shared-Use Path | Minor Improvements to Existing |
|---|---|---|---|---|
| 1 | Removals | $2,500 | $2,500 | $2,500 |
| 2 | Earthworks | $5,400 | $3,600 | $1,100 |
| 3 | Surface Works | $61,050 | $31,150 | $3,900 |
| 4 | Structures | $108,000 | $44,500 | $1,500 |
| 5 | Stormwater and Utilities | $104,000 | $3,000 | $2,000 |
| 6 | Landscaping, Lighting and Misc. | $62,500 | $2,000 | $2,000 |
| **Construction Sub-Total** | | **$343,450** | **$86,750** | **$13,000** |
| **Contingency (30%)** | | $103,035 | $26,025 | $3,900 |
| **Subtotal (Including Contingency)** | | **$446,485** | **$112,775** | **$16,900** |
| **Engineering and Testing (15%)** | | $66,973 | $16,916 | $2,535 |
| **Subtotal (Including Contingency and Engineering and Testing)** | | **$513,458** | **$129,691** | **$19,435** |
| **Order of Magnitude Estimate (Rounded)** | | **$520,000** | **$130,000** | **$20,000** |

Note that estimates have not carried costs which may be required to complete the environmental regulatory agency approval process, including potential Department of Fisheries and Oceans habitat offsetting.

## 6.2 Staging

The construction of an initial stage of pathway upgrades has been included in the 2022 capital budget submitted for Council review in December 2021. This initial stage of the project should construct critical infrastructure that provides the maximum benefit based on existing usage patterns. To determine areas that experience high usage, previous planning work for the pathway as well as existing and future pathway volumes are reviewed in this section.

The Bow River Pathway Preliminary Assessment (Draft, WSP, August 27, 2021) recommended that an asphalt pathway be implemented as the initial stage of construction. The report references the high volumes present between the Bow River bridge and West Canmore Park and lower existing volumes between the West Canmore Park bridge and Van Horne. Existing and future pathway volumes are shown in Table 6.3 including data from a 2020 count provided by the Town of Canmore and existing, 2040 background and 2040 background + development volumes from the Three Sisters Mountain Village Traffic Impact Assessment (WSP, 2021).

Table 6.3 Existing and Future Pathway Volumes

| Location (by mode) | 2020 Count [1] | 2040 Background [2] | 2040 Background + Development [2] |
|---|---|---|---|
| Bow River Bridge | 115 | 460 | 1318 |
| Pedestrians | 49 | 230 | 659 |
| Cyclists | 66 | 230 | 659 |
| West Canmore Park Bridge | 54 | 323 | 1069 |
| Pedestrians | 23 | 161 | 534 |
| Cyclists | 31 | 162 | 535 |

Notes:

1. Summer Weekday Peak Hour Two-way Volumes (WSP TSMV TIA Section 2.1.2).
2. Summer Saturday Peak Hour Two-way Volumes (WSP TSMV Figure 2-3).

Based on these volumes, the Stage 1 pathway improvement project should focus on the heavily utilized pathway segment between the Bow River bridge and the West Canmore Park bridge. Stage 1 pathway improvements should consider the following:

- Provide a 5.5m asphalt pathway on the Mine Dyke embankment between the Bow River bridge and West Canmore Park.
- Provide a 3.5m asphalt pathway and 1.5m parallel gravel trail within West Canmore Park.
- Construct a new West Canmore Park bridge to the ultimate width of 6.5m clear width.
- Improvements to the pathway between West Canmore Park and Van Horne should occur in the future once sufficient budget is available to complete upgrades.

To confirm that the proposed upgrades provide an adequate level of service for existing volumes, the Federal Highway Administration's Shared-Use Path Level of Service Calculator has been used. A Level of Service (LOS) of C is generally considered acceptable. The 5.5m pathway using Bow River bridge volumes from the 2020 count achieves a LOS of C. It is assumed that sufficient capacity is provided through West Canmore Park due to the parallel gravel trail and general dispersal of cyclists and pedestrians to various destinations and connectors at the park. The existing pathway between West Canmore Park and Van Horne generally maintains a width in the range of 2.0-3.0m. Based on 2020 volumes, the existing pathway achieves a LOS between B and D. Upgrades to this portion of the pathway should be considered in the near-term once budget is available.

The proposed Stage 1 project is shown below in Figure 6.1.

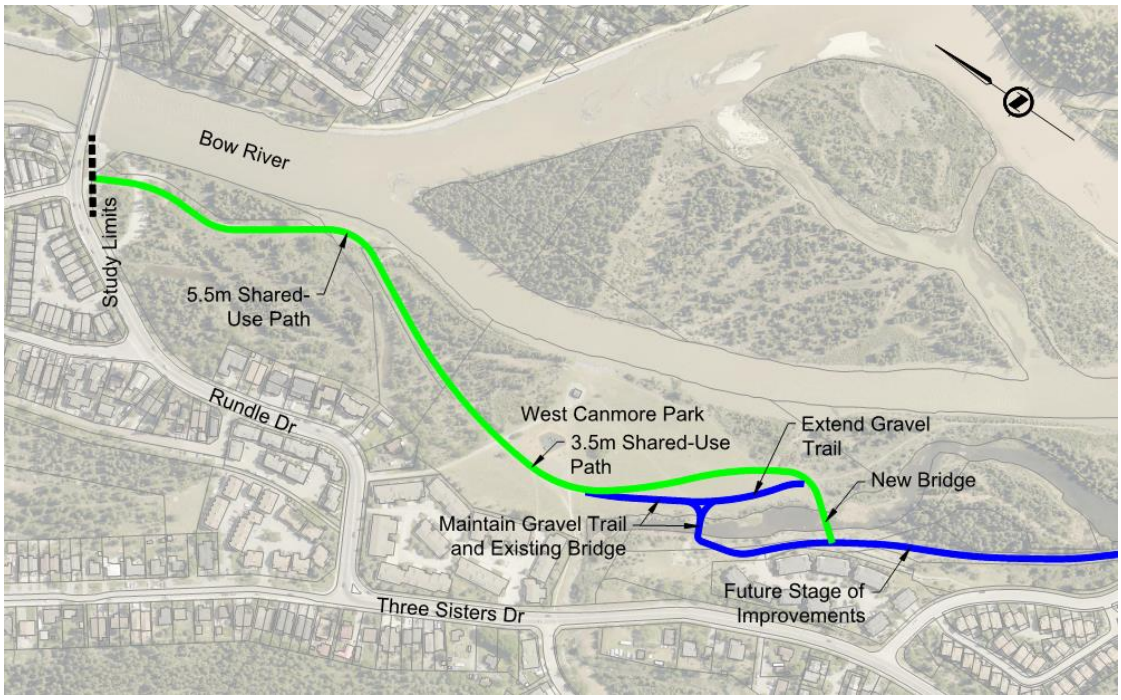


Figure 6.1 Stage 1 Project

### 6.2.1 Stage 1 Cost Estimate

A Class D cost estimate for the Stage 1 Pathway Improvements project has been completed and is summarized in Table 6.4, with the full estimate and assumptions available in Appendix C.

Table 6.4 Stage 1 Class D Cost Estimate

| Item | Description | Cost |
|---|---|---|
| 1 | Removals | $8,500 |
| 2 | Earthworks | $64,500 |
| 3 | Surface Works | $286,800 |
| 4 | Structures | $716,500 |
| 5 | Stormwater and Utilities | $22,500 |
| 6 | Landscaping, Lighting and Misc. | $61,000 |
| **Construction Sub-Total** | | **$1,159,800** |
| **Contingency (30%*)** | | $241,290 |
| **Subtotal (Including Contingency)** | | **$1,401,090** |
| **Engineering and Testing (15%)** | | $210,164 |
| **Subtotal (Including Contingency and Engineering and Testing)** | | **$1,611,254** |
| **Order of Magnitude Estimate (Rounded)** | | **$1,620,000** |

## 6.3 Recommendations and Next Steps

The Bow River Pathway is an important link in Canmore's all ages all abilities cycling and walking facility. A concept plan is summarized in this report to serve as a foundation for future detailed design of the project, anticipated to be completed in several stages as budget becomes available and pedestrian and cyclist volumes warrant. The following recommendations have resulted from the design process:

- Upgrades to three connections (Three Sisters Drive to Central West Canmore Park, Prospect Heights South and Van Horne Lift Station Acces) along the study area should receive minor upgrades to form part of the all ages all abilities network and should be maintained in the winter.
- An all ages all abilities facility should be implemented on Three Sisters Drive between Charles Carey and the Three Sisters Drive to Central West Canmore Park connection.
- The West Canmore Park bridge should be replaced with a new 6.5m clear width facility at a new crossing location south of the existing bridge (Option 5).
- The pathway alignment through West Canmore Park should cross the park east of the existing gravel trail. The existing gravel trail should be maintained as a parallel trail, with an additional gravel trail extension included to the connect with the new bridge crossing.
- The Three Sisters Drive to Central West Canmore Park connection should be improved using one of the three scenarios as budget allows.

Next steps to advance design of Stage 1 pathway improvements for 2022 construction include:

- Determine the extent of tree removals that are required, and complete tree removals in early 2022 in accordance with the Migratory Bird Convention Act.
- Complete conceptual design of the Rundle Drive and Rundle Crescent intersection, including junctions with the Bow River Pathway to facilitate connection with the Stage 1 design.
- Complete further assessment of pathway grading along the Mine Dyke to determine the preferred strategy from an environmental risk and cost perspective.
- Complete hydraulic analysis and modeling of the West Canmore Park creek to facilitate bridge design.
- Complete detailed design and tender of the Stage 1 pathway improvements.

# APPENDIX A
Strava Heatmaps

Strava Heat Map – Bicycle Map (Accessed October 2021)

Strava Heat Map – Pedestrian Map  (Accessed October 2021)

# APPENDIX B
West Canmore Park Bridge
Slope Severity Calculations

| Crossing Difficulty | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PVI | Station (m) | Elevation (m) | Grade Out (%) | Distance (m) | Height Change (m) | Difficulty / Slope Severity, S (m) | |
| | | | | | | | EB | WB |
| **West Canmore Park - Option 2 (Yellow)** | | | | | | | | |
| North Approach | START | 20070.897 | 1310.357 | 0.4% | 72.4 | 0.28 | - | - |
| | 2 | 20143.311 | 1310.639 | 1.0% | 39.8 | 0.40 | - | - |
| | 3 | 20183.083 | 1311.037 | 2.0% | 48.3 | 0.96 | 0.019 | - |
| | 4 | 20231.354 | 1312.002 | 4.0% | 62.8 | 2.51 | 0.100 | - |
| | 5 | 20294.134 | 1314.513 | -4.0% | 74.6 | -2.98 | - | 0.119 |
| | 7 | 20368.762 | 1311.528 | -2.1% | 40.6 | -0.73 | - | 0.013 |
| South Approach | END | 20409.351 | 1310.800 | | | | | |
| **West Canmore Park - Option 1 (Yellow) Total** | | | | | **338.5** | | **0.120** | **0.132** |
| **West Canmore Park - Option 3 (Green)** | | | | | | | | |
| North Approach | START | 30070.968 | 1310.357 | 1.0% | 94.1 | 0.84 | - | - |
| | 2 | 30165.027 | 1311.198 | 1.5% | 30.1 | 0.45 | 0.007 | - |
| | 3 | 30195.153 | 1311.650 | 1.0% | 18.3 | 0.18 | - | - |
| | 4 | 30213.461 | 1311.833 | 4.0% | 68.8 | 2.75 | 0.110 | - |
| | 5 | 30282.300 | 1314.586 | -4.0% | 75.4 | -3.02 | - | 0.121 |
| | 6 | 30357.713 | 1311.570 | -2.1% | 41.8 | -0.77 | - | 0.014 |
| South Approach | END | 30399.563 | 1310.800 | | | | | |
| **West Canmore Park - Option 3 (Green) Total** | | | | | **328.6** | | **0.117** | **0.135** |
| **West Canmore Park - Option 4 (Blue)** | | | | | | | | |
| North Approach | START | 40070.866 | 1310.357 | 0.4% | 57.0 | 0.23 | - | - |
| | 2 | 40127.867 | 1310.585 | 4.0% | 39.2 | 1.57 | 0.063 | - |
| | 3 | 40167.018 | 1312.150 | 1.0% | 33.0 | 0.33 | - | - |
| | 4 | 40200.000 | 1312.480 | 1.5% | 23.0 | 0.35 | 0.005 | - |
| | 5 | 40223.042 | 1312.826 | 1.0% | 25.1 | 0.25 | - | - |
| | 6 | 40248.102 | 1313.076 | 4.0% | 36.8 | 1.47 | 0.059 | - |
| | 7 | 40284.876 | 1314.547 | -4.0% | 74.2 | -2.97 | - | 0.119 |
| | 8 | 40359.058 | 1311.580 | -2.1% | 42.5 | -0.78 | - | 0.014 |
| South Approach | END | 40401.523 | 1310.800 | | | | | |
| **West Canmore Park - Option 4 (Blue) Total** | | | | | **330.7** | | **0.127** | **0.133** |
| **West Canmore Park - Option 5 (Magenta)** | | | | | | | | |
| North Approach | START | 50070.868 | 1310.357 | 0.4% | 74.4 | 0.21 | - | - |
| | 2 | 50145.272 | 1310.567 | -0.4% | 101.2 | -0.40 | - | - |
| | 3 | 50246.456 | 1310.162 | 3.2% | 38.0 | 1.23 | 0.040 | - |
| | 4 | 50284.487 | 1311.391 | 1.5% | 56.5 | 0.84 | 0.013 | - |
| | 5 | 50341.012 | 1312.233 | -3.4% | 21.0 | -0.71 | - | 0.024 |
| | 6 | 50362.006 | 1311.519 | -2.1% | 39.2 | -0.72 | - | 0.013 |
| South Approach | END | 50401.201 | 1310.800 | | | | | |
| **West Canmore Park - Option 5 (Magenta) Total** | | | | | **330.3** | | **0.052** | **0.037** |

Difficulty Target (Individual — S ≤ 0.075 m (Fietsberaad CROW, Design Manual for Bicycle Traffic, 2014)

**Assumptions:**

- grades under 1.25% are considered false flats and have been excluded.
- momentum loss/gain through transitions from up to downgrades not accounted for.

# APPENDIX C
Class D Cost Estimate

| | | | | Class D Cost Estimate - Ultimate Facility | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Segment 1 Bridge Rd to West Canmore Park (STA. 0+000 - 0+450) | | Segment 2 West Canmore Park (STA 0+450 - 0+830) | | Segment 3 West Canmore Park to Van Horne (STA 0+830 - 1+790) | | Total | |
| ITEM | DESCRIPTION | UNIT | UNIT RATE | QUANTITY | COST | QUANTITY | COST | QUANTITY | COST | TOTAL | COST |
| **1** | **REMOVALS** | | | | | | | | | | **$ 18,000** |
| 1.01 | Tree Removals | $m^2$ | $ 40 | 100 | $ 4,000 | 50 | $ 2,000 | 300 | $ 12,000 | 450 | $ 18,000 |
| **2** | **EARTHWORKS (GRADING)** | | | | **$ 39,500** | | **$ 26,900** | | **$ 133,300** | | **$ 199,700** |
| 2.01 | Stripping (Assume depth is 0.15m) | $m^3$ | $ 10 | 350 | $ 3,500 | 290 | $ 2,900 | 630 | $ 6,300 | 1,270 | $ 12,700 |
| 2.02 | Waste Excavation Off-Site | $m^3$ | $ 40 | 540 | $ 21,600 | 360 | $ 14,400 | 1300 | $ 52,000 | 2,200 | $ 88,000 |
| 2.03 | Common Excavation | $m^3$ | $ 30 | 480 | $ 14,400 | 320 | $ 9,600 | 2500 | $ 75,000 | 3,300 | $ 99,000 |
| **3** | **SURFACE WORKS** | | | | **$ 288,700** | | **$ 194,750** | | **$ 539,600** | | **$ 1,023,050** |
| 3.01 | Sidewalk (Standard Concrete) | $m^2$ | $ 130 | 1095 | $ 142,350 | 830 | $ 107,900 | 2350 | $ 305,500 | 4,275 | $ 555,750 |
| 3.02 | Cycle Path (Black Asphalt Pavement) | $m^2$ | $ 70 | 1305 | $ 91,350 | 1005 | $ 70,350 | 2830 | $ 198,100 | 5,140 | $ 359,800 |
| 3.03 | Gravel Shoulder / Trail / Access / Tie-in | $m^2$ | $ 30 | 500 | $ 15,000 | 550 | $ 16,500 | 1200 | $ 36,000 | 2,250 | $ 67,500 |
| 3.04 | Concrete Mixing Circle (WCP - Three Sisters Dr Junction) | LS | $ 15,000 | 1 | $ 15,000 | 0 | $ - | 0 | $ - | 1 | $ 15,000 |
| 3.05 | Rundle Drive Roadway Intersection and Pathway Junction Allowance | LS | $ 25,000 | 1 | $ 25,000 | 0 | $ - | 0 | $ - | 1 | $ 25,000 |
| **4** | **STRUCTURES** | | | | **$ -** | | **$ 919,000** | | **$ 872,500** | | **$ 1,791,500** |
| 4.01 | Retaining Wall <2.0m | m | $ 1,600 | 0 | $ - | 15 | $ 24,000 | 275 | $ 440,000 | 290 | $ 464,000 |
| 4.02 | Retaining Wall >2.0m (excl. bridge abutments) | $m^2$ | $ 1,500 | 0 | $ - | 120 | $ 180,000 | 0 | $ - | 120 | $ 180,000 |
| 4.03 | West Canmore Park Creek Bridge (steel truss, 6.5m clear width) | LS | $ 715,000 | 0 | $ - | 1 | $ 715,000 | 0 | $ - | 1 | $ 715,000 |
| 4.04 | Homesteads Stormwater Outfall Bridge (steel truss, 6.5m clear width) | LS | $ 417,500 | 0 | $ - | 0 | $ - | 1 | $ 417,500 | 1 | $ 417,500 |
| 4.05 | Hand Rail Allowance | LS | $ 1,500 | 0 | $ - | 0 | $ - | 10 | $ 15,000 | 10 | $ 15,000 |
| **5** | **STORMWATER AND UTILITIES** | | | | **$ 6,500** | | **$ 16,000** | | **$ 17,000** | | **$ 39,500** |
| 5.01 | Stormwater | LS | | 1 | $ 1,500 | 0 | $ - | 1 | $ 9,000 | 1 | $ 10,500 |
| 5.02 | Sanitary Sewer | LS | | 0 | $ - | 1 | $ 16,000 | 1 | $ 3,000 | 1 | $ 19,000 |
| 5.03 | Power Relocation | LS | | 1 | $ 5,000 | 0 | $ - | 1 | $ 5,000 | 1 | $ 10,000 |
| **6** | **LANDSCAPING, LIGHTING AND MISC** | | | | **$ 127,000** | | **$ 212,000** | | **$ 247,000** | | **$ 586,000** |
| 6.01 | Topsoil and Seeding | $m^2$ | $ 10 | 1,700 | $ 17,000 | 1,200 | $ 12,000 | 2,700 | $ 27,000 | 5,600 | $ 56,000.00 |
| 6.02 | Landscaping Planting Allowance | LS | $ 10,000 | 1 | $ 10,000 | 5 | $ 50,000 | 2 | $ 20,000 | 8 | $ 80,000.00 |
| 6.03 | Pathway Lighting (Allowance) | LS | $ 50,000 | 2 | $ 100,000 | 3 | $ 150,000 | 4 | $ 200,000 | 9 | $ 450,000.00 |
| | **Construction Subtotal (Approximate)** | | | | **$ 461,700** | | **$ 1,368,650** | | **$ 1,809,400** | | **$ 3,657,750** |
| | **Contingency** | **30%** | | | $ 138,510 | | $ 410,595 | | $ 542,820 | | $ 1,097,325 |
| | **Subtotal (Incl. Contingency)** | | | | **$ 600,210** | | **$ 1,779,245** | | **$ 2,352,220** | | **$ 4,755,075** |
| | **Engineering & Testing** | **15%** | | | $ 90,032 | | $ 266,887 | | $ 352,833 | | $ 713,261 |
| | **Subtotal (Incl. Contingency & Engineering and Testing)** | | | | **$ 690,242** | | **$ 2,046,132** | | **$ 2,705,053** | | **$ 5,468,336** |
| | **ORDER OF MAGNITUDE CLASS 4 COST ESTIMATE** | | | | **$ 700,000** | | **$ 2,050,000** | | **$ 2,710,000** | | **$ 5,470,000** |

| | | | | Class D Cost Estimate - Three Sisters Drive to West Canmore Park Connection | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Ultimate 5.5m Facility | | 3.0m Shared-Use Pathway | | Minor Improvements to Existing | |
| ITEM | DESCRIPTION | UNIT | UNIT RATE | QUANTITY | COST | QUANTITY | COST | QUANTITY | COST |
| 1 | REMOVALS | | | | $ 2,500 | | $ 2,500 | | $ 2,500 |
| 1.01 | Remove and Dispose of Guardrail | LS | $ 2,500 | 1 | $ 2,500 | 1 | $ 2,500 | 1 | $ 2,500 |
| 2 | EARTHWORKS (GRADING) | | | | $ 5,400 | | $ 3,600 | | $ 1,100 |
| 2.01 | Stripping (Assume depth is 0.15m) | $m^3$ | $ 10 | 90 | $ 900 | 60 | $ 600 | 20 | $ 200 |
| 2.02 | Common Excavation | $m^3$ | $ 30 | 150 | $ 4,500 | 100 | $ 3,000 | 30 | $ 900 |
| 3 | SURFACE WORKS | | | | $ 61,050 | | $ 31,150 | | $ 3,900 |
| 3.01 | Sidewalk (Standard Concrete) | $m^2$ | $ 130 | 265 | $ 34,450 | 0 | $ - | 0 | $ - |
| 3.02 | Cycle Path (Black Asphalt Pavement) | $m^2$ | $ 70 | 320 | $ 22,400 | 385 | $ 26,950 | 0 | $ - |
| 3.03 | Gravel Shoulder / Trail / Access / Tie-in | $m^2$ | $ 30 | 140 | $ 4,200 | 140 | $ 4,200 | 130 | $ 3,900 |
| 4 | STRUCTURES | | | | $ 108,000 | | $ 44,500 | | $ 1,500 |
| 4.01 | Retaining Wall <2.0m | m | $ 1,600 | 0 | $ - | 25 | $ 40,000 | 0 | $ - |
| 4.02 | Retaining Wall >2.0m | $m^2$ | $ 1,500 | 70 | $ 105,000 | 1 | $ 1,500 | 0 | $ - |
| 4.03 | Hand Rail Allowance | LS | $ 1,500 | 2 | $ 3,000 | 2 | $ 3,000 | 1 | $ 1,500 |
| 5 | STORMWATER AND UTILITIES | | | | $ 104,000 | | $ 3,000 | | $ 2,000 |
| 5.01 | Stormwater | LS | $ 1,000 | 2 | $ 2,000 | 1 | $ 1,000 | 1 | $ 1,000 |
| 5.02 | Sanitary Sewer | LS | $ 1,000 | 2 | $ 2,000 | 2 | $ 2,000 | 1 | $ 1,000 |
| 5.03 | Power Relocation (1 Pole) | LS | $ 100,000 | 1 | $ 100,000 | 0 | $ - | 0 | $ - |
| 6 | LANDSCAPING, LIGHTING AND MISC | | | | $ 62,500 | | $ 2,000 | | $ 2,000 |
| 6.01 | Topsoil and Seeding | $m^2$ | $ 10 | 250 | $ 2,500 | 200 | $ 2,000 | 200 | $ 2,000 |
| 6.02 | Landscaping Planting Allowance | LS | $ 10,000 | 1 | $ 10,000 | 0 | $ - | 0 | $ - |
| 6.03 | Pathway Lighting (Allowance) | LS | $ 50,000 | 1 | $ 50,000 | 0 | $ - | 0 | $ - |
| | Construction Subtotal (Approximate) | | | | $ 343,450 | | $ 86,750 | | $ 13,000 |
| | Contingency 30% | | | | $ 103,035 | | $ 26,025 | | $ 3,900 |
| | Subtotal (Incl. Contingency) | | | | $ 446,485 | | $ 112,775 | | $ 16,900 |
| | Engineering & Testing 15% | | | | $ 66,973 | | $ 16,916 | | $ 2,535 |
| | Subtotal (Incl. Contingency & Engineering and Testing) | | | | $ 513,458 | | $ 129,691 | | $ 19,435 |
| | ORDER OF MAGNITUDE CLASS 4 COST ESTIMATE | | | | $ 520,000 | | $ 130,000 | | $ 20,000 |

| | | | | Class D Cost Estimate - Stage 1 Facility | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Segment 1 Bridge Rd to West Canmore Park (STA. 0+000 - 0+450) | | Segment 2 West Canmore Park (STA 0+450 - 0+830) | | Three Sisters Drive to West Canmore Park Connection (Minor Improvements) | | Total | |
| ITEM | DESCRIPTION | UNIT | UNIT RATE | QUANTITY | COST | QUANTITY | COST | QUANTITY | COST | TOTAL | COST |
| **1** | **REMOVALS** | | | | **$ 4,000** | | **$ 2,000** | | **$ 2,500** | | **$ 8,500** |
| 1.01 | Tree Removals | $m^2$ | $ 40 | 100 | $ 4,000 | 50 | $ 2,000 | | $ - | 150 | $ 6,000 |
| 1.02 | Remove and Dispose of Guardrail | LS | $ 2,500 | 0 | $ - | 0 | $ - | 1 | $ 2,500 | 1 | $ 2,500 |
| **2** | **EARTHWORKS (GRADING)** | | | | **$ 37,700** | | **$ 25,700** | | **$ 1,100** | | **$ 64,500** |
| 2.01 | Stripping (Assume depth is 0.15m) | $m^3$ | $ 10 | 350 | $ 3,500 | 290 | $ 2,900 | 20 | $ 200 | 660 | $ 6,600 |
| 2.02 | Waste Excavation Off-Site | $m^3$ | $ 40 | 360 | $ 14,400 | 240 | $ 9,600 | | $ - | 600 | $ 24,000 |
| 2.03 | Common Excavation | $m^3$ | $ 30 | 660 | $ 19,800 | 440 | $ 13,200 | 30 | $ 900 | 1,130 | $ 33,900 |
| **3** | **SURFACE WORKS** | | | | **$ 194,400** | | **$ 88,500** | | **$ 3,900** | | **$ 286,800** |
| 3.01 | Sidewalk (Standard Concrete) | $m^2$ | $ 130 | | $ - | | $ - | 0 | $ - | 0 | $ - |
| 3.02 | Cycle Path (Black Asphalt Pavement) | $m^2$ | $ 70 | 2420 | $ 169,400 | 1050 | $ 73,500 | 0 | $ - | 3,470 | $ 242,900 |
| 3.03 | Gravel Shoulder / Trail / Access / Tie-in | $m^2$ | $ 30 | 500 | $ 15,000 | 500 | $ 15,000 | 130 | $ 3,900 | 1,130 | $ 33,900 |
| 3.03 | Concrete Mixing Circle (WCP - Three Sisters Dr Junction) | LS | $ 15,000 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| 3.04 | Rundle Drive Roadway Intersection and Pathway Junction Allowance | LS | $ 10,000 | 1 | $ 10,000 | 0 | $ - | 0 | $ - | 1 | $ 10,000 |
| **4** | **STRUCTURES** | | | | **$ -** | | **$ 715,000** | | **$ 1,500** | | **$ 716,500** |
| 4.01 | Retaining Wall <2.0m | m | $ 1,600 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| 4.02 | Retaining Wall >2.0m (excl. bridge abutments) | $m^2$ | $ 1,500 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| 4.03 | West Canmore Park Creek Bridge (steel truss, 4.0m clear width) | LS | $ 715,000 | 0 | $ - | 1 | $ 715,000 | 0 | $ - | 1 | $ 715,000 |
| 4.04 | Homesteads Stormwater Outfall Bridge (steel truss, 6.5m clear width) | LS | $ 417,500 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| 4.05 | Hand Rail Allowance | LS | $ 1,500 | 0 | $ - | 0 | $ - | 1 | $ 1,500 | 1 | $ 1,500 |
| **5** | **STORMWATER AND UTILITIES** | | | | **$ 6,500** | | **$ 16,000** | | **$ 2,000** | | **$ 22,500** |
| 5.01 | Stormwater | LS | | 1 | $ 1,500 | 0 | $ - | 1 | $ 1,000 | 2 | $ 1,500 |
| 5.02 | Sanitary Sewer | LS | | 0 | $ - | 1 | $ 16,000 | 1 | $ 1,000 | 2 | $ 16,000 |
| 5.03 | Power Relocation | LS | | 1 | $ 5,000 | 0 | $ - | 0 | $ - | 1 | $ 5,000 |
| **6** | **LANDSCAPING, LIGHTING AND MISC** | | | | **$ 22,000** | | **$ 37,000** | | **$ 2,000** | | **$ 61,000** |
| 6.01 | Topsoil and Seeding | $m^2$ | $ 10 | 1,700 | $ 17,000 | 1,200 | $ 12,000 | 200 | $ 2,000 | 3,100 | $ 31,000.00 |
| 6.02 | Landscaping Planting Allowance | LS | $ 5,000 | 1 | $ 5,000 | 5 | $ 25,000 | 0 | $ - | 6 | $ 30,000.00 |
| 6.03 | Pathway Lighting (Allowance) | LS | $ 50,000 | 0 | $ - | 0 | $ - | 0 | $ - | 0 | $ - |
| | **Construction Subtotal (Approximate)** | | | | **$ 264,600** | | **$ 884,200** | | **$ 13,000** | | **$ 1,159,800** |
| | **Contingency*** | **30%** | | | $ 79,380 | | $ 158,010 | | $ 3,900 | | $ 241,290 |
| | **Subtotal (Incl. Contingency)** | | | | **$ 343,980** | | **$ 1,042,210** | | **$ 16,900** | | **$ 1,401,090** |
| | **Engineering & Testing** | **15%** | | | $ 51,597 | | $ 156,332 | | $ 2,535 | | $ 210,164 |
| | **Subtotal (Incl. Contingency & Engineering and Testing)** | | | | **$ 395,577** | | **$ 1,198,542** | | **$ 19,435** | | **$ 1,611,254** |
| | **ORDER OF MAGNITUDE CLASS 4 COST ESTIMATE** | | | | **$ 400,000** | | **$ 1,200,000** | | **$ 20,000** | | **$ 1,620,000** |

# Cost Estimate Assumptions

## Ultimate Facility Cost Estimate

### Earthworks

- Common and Waste Excavation for Segment 1 and 2 assume hauling between the two segments. Division of the quantities between the two sections has been split 60% for Segment 1 and 40% for Segment 2 in accordance with the total cut and fill amounts in each segment.
- Future design should examine opportunities to reduce waste material through profile refinements.

### Structures

- The West Canmore Park Creek Bridge is assumed to be a 6.5m clear width with 35.0m span length. Structure type is to be prefabricated weathering steel delivered to site in two sections. Supplier costs have been used for the prefabricated bridge ($465,000) with a 10% contractor markup included ($46,500). An abutment cost including wingwalls of $200,000 has been used.
- Repairs to the West Canmore Park escarpment walls has not been included. A 30m long by 4m high section of wall located south of the bridge adjacent to the creek has been included in the project costs as this is required to widen the facility.
- Removal of the existing West Canmore Park bridge has not been included in the estimate.
- The Homesteads Stormwater Outfall Bridge is assumed to be a 6.5m clear width with 15.0m span. A cost per unit of area of $3,000/m2 has been used (inclusive of contractor markup), along with an abutment cost of $100,000. Removal of the existing bridge is assumed to cost $25,000.

### Stormwater and Utilities

- Stormwater allowance includes adjustment of riprap at the inlets and outlets of the 3 equalization culvert outlets between Rundle Drive and West Canmore Park at STA. 0+280, STA. 0+335 and STA. 0+ 395 ($1,500). Replacement of 3 existing small diameter culvert crossings is required in Segment 3 at STA. 1+685, STA. 1+768 and STA. 1+774 ($9,000).
- Sanitary sewer allowance includes minor manhole rim adjustments in four locations at STA. 0+455, STA. 0+840, STA. 1+000 and STA. 1+060 ($4,000). One major manhole rim adjustment (~2.0m) occurs at STA. 0+748 ($15,000). It is assumed that conflicts between the sanitary line and bridge abutment/piles are avoided in detailed design.
- No water relocation allowances have been included.
- Cash allowances for power relocation have been included at Rundle Dr. ($5,000) and the Prospect Court emergency access ($5,000).

## Stage 1 Facility Cost Estimate

### Earthworks

- Common and Waste Excavation for Segment 1 and 2 assume hauling between the two segments. Division of the quantities between the two sections has been split 60% for Segment 1 and 40% for Segment 2 in accordance with the total cut and fill amounts in each segment.
- Future design should examine opportunities to reduce waste material through profile refinements.

### Structures

- The West Canmore Park Creek Bridge is assumed to be a 6.5m clear width with 35.0m span length. Structure type is to be prefabricated weathering steel delivered to site in two sections. Supplier costs have been used for the prefabricated bridge ($465,000) with a 10% contractor markup included ($46,500). An abutment cost including wingwalls of $200,000 has been used.
- Repairs to the West Canmore Park escarpment walls has not been included. A 30m long by 4m high section of wall located south of the bridge adjacent to the creek has been included in the project costs as this is required to widen the facility.
- Removal of the existing West Canmore Park bridge has not been included in the estimate.
- Retaining wall improvements at the West Canmore Park bridge west abutment to widen to the future facility have not been included.
- The Homesteads Stormwater Outfall Bridge has not been included.

### Stormwater and Utilities

- All stormwater, sanitary and power line relocations within Segment 1 and 2, and the Three Sisters Drive to West Canmore Park Connection Minor Improvements option have been included in the estimate.

### Landscaping and Lighting

- Landscaping allowances have been decreased to half the value of ultimate estimate for Segment 1 and 2.
- No pathway lighting has been included.

## Three Sisters Drive to West Canmore Park Connection Cost Estimate

- Estimates for all options do not include reconfiguration of the roadway intersection with Three Sisters Drive (including crossing improvements etc.)
- Costs related to the environmental regulatory approval process (consulting, offsetting) have not been included in either the Ultimate 5.5m Facility or the 3.0m Shared-Use Pathway.

### Ultimate 5.5m Facility

- Power relocation includes moving a single pole (distribution line) out of conflict.
- Sanitary Sewer costs include minor manhole rim adjustments for two manholes.
- Stormwater costs include minor manhole rim adjustments for two manholes.

### 3.0m Shared-Use Pathway

- Sanitary Sewer costs include minor manhole rim adjustments for two manholes.
- Stormwater costs include a minor manhole rim adjustment for one manhole.

### Minor Improvements to Existing Gravel Pathway

- Stormwater costs include a minor manhole rim adjustment for one manhole.
- Sanitary sewer costs include a minor manhole rim adjustment for one manhole.