Issued for Use – 09 May 2017

Cycle 16
Trail Society

Proposed Telkwa-Smithers Multi-Use Pathway

Concept Design Report

McElhanney

McElhanney Consulting Services Ltd.
3907 4th Avenue
Smithers, BC
V0J 2N0

Contact: Tyler Wilkes, EIT
Phone [250.631.4068]
Email: twilkes@mcelhanney.com

2331-00795-00

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1. Introduction

1.1. Project Location

The proposed Telkwa-Smithers Pathway project is located along a 12 kilometer stretch of the Highway 16 Right-of-Way corridor connection between the Village of Telkwa and the Town of Smithers. Figure 1 shows the approximate study area with key landmarks at the start and end of the proposed alignment.

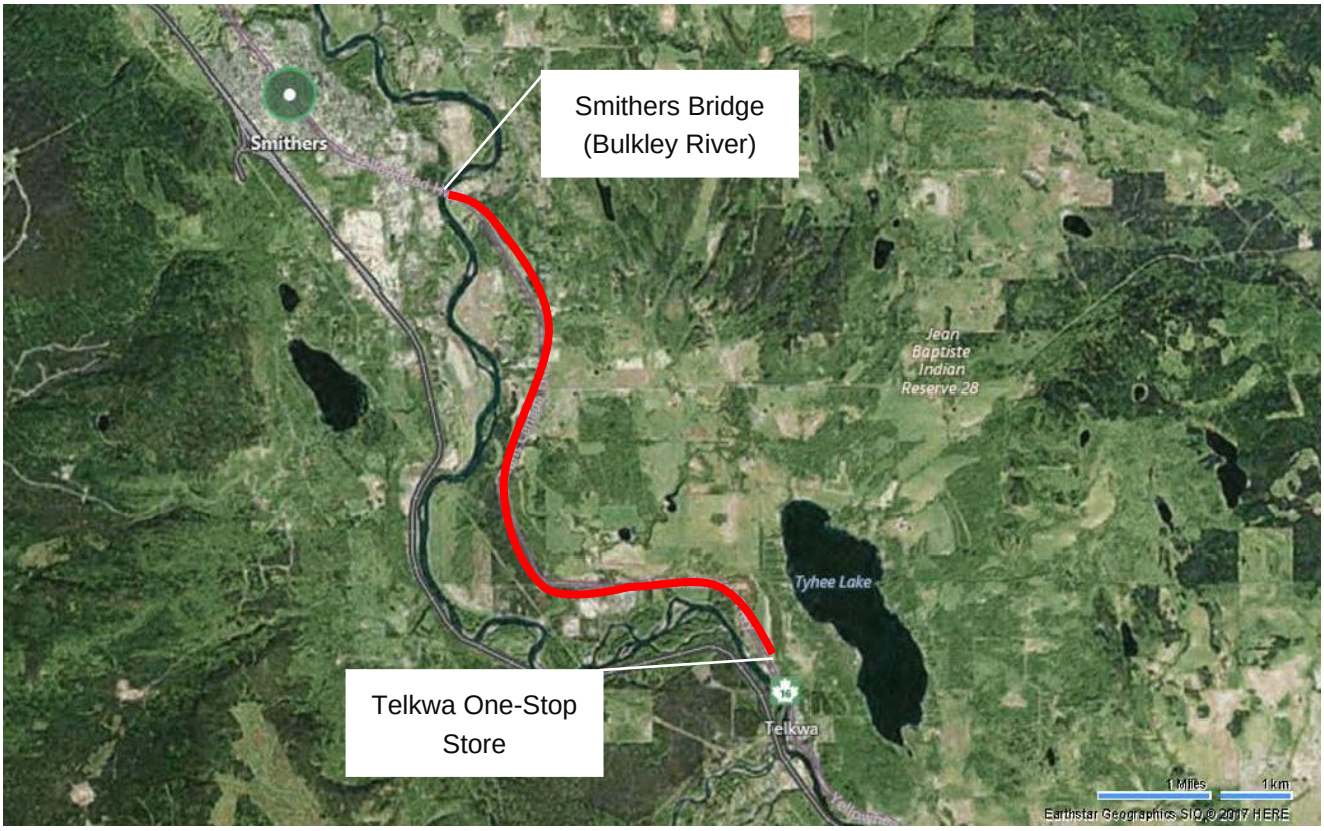


Figure 1. Site location map (source: bing.com/maps) with study area highlighted in red

1.2. Scope of Study

McElhanney Consulting Services Ltd. (McElhanney) was retained by the Cycle 16 Trail Society (Cycle 16 or the Client) for pre-design services at the conceptual level for the proposed project. The scope of work for this conceptual design report, as described in our proposal dated January 12, 2017, was to conduct a background review of relevant information provided by the Client and other stakeholders, define the project features and goals, identify the major constraints and opportunities for improvement for the alignment proposed by Cycle 16 through field and desktop review, prepare concept alignment drawings, and prepare a high-level construction cost estimate.

The main objectives and outcomes from the proposed scope of work were as follows:

- Review the proposed alignment provided by Cycle 16 and further develop technically feasible conceptual alignment options based on the physical and regulatory constraints provided by Cycle 16 and the BC Ministry of Transportation and Infrastructure (MoTI);
- Qualitatively compare various options considered;
- Prepare preliminary cost estimates for various options;
- Provide guidance to Cycle 16 for the next steps in project development; and,
- Prepare a report compiling the information above that can be used to facilitate the next steps of the project.

1.3. Vision

The proponent for the project, Cycle 16 Trail Society (Cycle 16), has put in significant preliminary effort to assess the feasibility of the proposed pathway link and begun stakeholder engagement along the corridor. The purpose of Cycle 16 Trail Society is to plan, develop, construct, maintain, and manage trails in the Bulkley Valley area of British Columbia for non-motorized use by the public to[1]:

- Promote health and fitness;
- Promote safe modes of transportation that are less harmful to the environment;
- Link the various communities in the Bulkley Valley for people who are unable to use highways or do not wish to use them for lack of a suitable vehicle or for safety, environmental, or other concerns; and,
- Promote non-motorized tourism within the Bulkley Valley.

The vision of the proposed project is to provide a non-motorized pathway connection, separate from highway traffic, between the communities of Telkwa and Smithers.

1.4. Stakeholders

McElhanney attended a project kickoff meeting, liaised with Cycle 16, conducted a legal land review, and attended the Cycle 16 Annual General Meeting and Open House to compile a preliminary list of stakeholders who may be directly or indirectly affected by the proposed project. The following list on Table 1 should be considered preliminary based on the information collected to date, and should be maintained by Cycle 16 as the project progresses.

[1] Constitution of Cycle 16 Trail Society (July 29, 2016).

Table 1. Preliminary List of Project Stakeholders

Stakeholder	Contacts
Cycle 16 Trail Society	Tony Harris (President) Jeremy Shriber (Technical Director)
BC Ministry of Trasportation	Carl Lutz (District Manager) Cailey Brown (Acting Programs Manager)
Town of Smithers	Mark Allen (Director of Development Services) Ariane Herzog (Engineering Tech) Greg Brown (City Councillor)
Village of Telkwa	Darcy Repen (Mayor)
Regional District of Bulkley-Nechako	Mark Fisher (Representative for Area A, Smithers Rural) Jason Llewellyn (Director of Planning)
Wet'suet'en First Nation	David deWit (Natural Resource Manager)
Private Property Owners	All owners along alignment where private land, road access, or driveway access is crossed

2. Methodology

2.1. Background Review

McElhanney was provided with the following materials by Cycle 16:

- PDF and CAD drawings of the initial proposed alignment from Cycle 16;
- Ground survey data from 2007 (conducted by McElhanney) of the study area with permission from MoTI;
- Architectural drawings.

Additional information, such as geotechnical reports, as-built highway drawings, and environmental studies were requested from MoTI; however, were not available or did not exist.

The 2007 survey data and the initially proposed alignment by Cycle 16 was utilized as the basis for the development of the conceptual alignments described in this report. Since the 2007 ground survey, it is understood that MoTI completed widening of the shoulder of Highway 16 by approximately 1 m; however, this was not considered a significant issue for the current scope of work as the pathway alignment is generally greater than 1 m away from the highway shoulder. Additionally, new driveways, subdivisions, utilities, etc. may have been added or moved near the highway corridor which were not shown in the background data; however, for it was assumed that the data was adequately representative of existing conditions for conceptual planning purposes.

Legal boundaries shown on the drawings in Appendix A were updated in April 2017 based on the most recently available land title and cadastre files from the Land Title and Survey Authority of British Columbia.

2.2. Field Reconnaissance

Tyler Wilkes of McElhanney conducted field reconnaissance of the highway corridor with Mr. Jeremy Shriber of Cycle 16 on February 1, 2017 and March 8, 2017. During the field reconnaissance, an effort was made to visually check the 2007 survey data for representativeness of existing conditions and minor updates or additions to significant deviations were added based on approximate measurements (without survey).

2.3. Design Criteria, Standards, and Guidelines

Geometric Layout

Geometric design criteria for the conceptual design were selected based upon review of the Transportation Association of Canada's Bikeway Traffic Control Guidelines for Canada (TAC), BC Ministry of Transportation Supplement to TAC Geometric Design Guide (BC MoTI TAC Supplement), various bikeway design guidelines, and McElhanney's experience on similar projects. Based on review of these sources, the following criteria were chosen for the conceptual design:

- Design Speed 30 km/h (minimum) to 50 km/h (maximum)
- Trail Width 3.0 m paved
- Minimum Horizontal Clearance 1.0 m
- Minimum Horizontal Curve 25 m centerline radius

- K-Value 2.5
- Vertical Crest Curve Minimum 30 m
- Vertical Clearance 2.5 m
- Fill Slopes 3H:1V
- Cut Slopes 2H:1V
- Maximum Grade 10%

Highway Clear Zone

Further to the design criteria above, the pathway was specified to be aligned outside of the existing highway 16 Clear Zone by MoTI. The Clear Zone concept is described in Section 3.1.3 of TAC, and is generally intended to serve as recovery zone free of obstacles to allow a motor vehicle to recover if it runs off the road. As per Table 620.08 of the BC MoTI TAC Supplement, the Clear Zone distance varies with traffic volume, curve radius, design speed, and fill/cut slope angle at a specific location; however, a consistent Clear Zone size of 9 m may also be used for practicality. The following fixed Clear Zone limits were used for the conceptual design based on Table 620.08 of the BC MoTI TAC Supplement:

- 9.0 m wherever possible in 90 km/hr posted speed limit areas (as per direction by MoTI);
- 7.5 m wherever 9.0 m was not possible due to land or physical feature conflict and the highway was in a minimum 6H:1V cut slope; and,
- 5.5 m wherever possible in the 60 km/hr posted speed limit areas.

Intersections

Detailed intersection design was not considered at this stage of the project; however, consideration was given to overall alignment of the pathway at roadways and driveways. Given that at all roadway and driveway intersections along the highway corridor have lower traffic volume than the highway itself and that the highway RoW is extremely narrow, it is recommended that the pathway be aligned near the existing side-road stop bars (eg. possibly inside the clear zone) near intersections and near the end of driveways. This alignment would allow for sight lines for both motorists and trail users and would force vehicles on the side-roads to stop prior to reaching the pathway crossing. For this reason, pathway alignment within the clear zone at these locations were not highlighted as problem areas (see Section 3.5). Signage, site-specific sight line clearance, and other aspects of detailed intersection design were not considered at this time, but will need to be considered for further steps of design.

Surfacing

Both paved and gravel surfaces were considered in the cost estimating exercise described below in Section 4.1. The pathway structure, considered suitable for most subgrade conditions, was as follows:

- 50 mm asphalt (for paved only);
- 150 mm Crushed Base Course; and,
- 300 mm Select Granular Sub-Base.

Other Guidelines and References

Other sources and guidelines reviewed relating to pathway design and construction include:

- Trails in Alberta Highway Rights-of-Way, Policies, Guidelines, and Standards (Alberta Transportation, 2015).
- Development Guidelines and Standard Specifications: Landscape Construction (The City of Calgary, Parks, 2013).
- Planning and Design for Pedestrians and Cyclists: A Technical Guide (Velo-Quebec, 2010)

2.4. Constraints

The physical constraints considered in the development of the conceptual alignments were as follows:

- Terminus points at the Smithers Bridge existing sidewalk (eastbound side of bridge) and the Telkwa One-Stop store (eastbound or westbound side of road) near existing crosswalk.
- Follow Highway 16 right-of-way, minimize alignment on private land.
- Pathway alignment outside highway clear zone wherever possible.
- Minimize conflicts with existing infrastructure and utilities.
- Level crossing of Highway 16 not permitted as per MoTI direction.
- User and vehicle safety at driveway and road crossings.

The physical constraints considered arose from discussions with Cycle 16 and MoTI during scope development for the project, as well as logistical factors based on past experience to reduce permitting requirements and construction costs.

2.5. Other Factors Considered

In addition to the physical and regulatory constraints described above, the following factors were at least preliminarily considered in development of the conceptual alignments:

- Minimize side road crossings, particularly busy crossings;
- Preliminary stakeholder feedback regarding use of private property (provided by Cycle 16);
- Constructability, drainage, and maintenance; and,
- Permitting and engineering requirements.

3. Conceptual Alignment Summary

Three conceptual alignments (designed Options 1 through 3) were developed for the proposed project based on the field observations, design criteria, constraints, and other factors considered as described in Section 2 and are attached in Appendix A. Given the conceptual scope of the project at this point, the alignments should be considered corridors suitable for the proposed pathway based on the constraints previously described as opposed to detailed pathway geometry layouts.

3.1. Common Alignment

All proposed alignment options begin at the eastbound side of the Smithers Bridge over the Bulkley River, route around the perimeter of the Par 3 golf course (Remainder of Lot A, Plan PRP 12858), and then follow along the eastbound side of the Highway 16 corridor to approximately station 4+050. Key challenges, opportunities, and features common to all proposed options (between 0+000 and 4+100) include:

- Fill slope required to provide design grades down highway embankment at 0+050.
- Route around Par 3 golf course, as opposed to following toe of highway embankment, to avoid steep and dangerous driveway crossing of the golf course entrance at 1+100.
- Existing underground cattle crossing under Highway 16 at 1+900 must be extended.
- Two (2) residential road crossings and one (1) side road crossing with common truck traffic (gravel truck access at Laidlaw Frontage Road).
- Aside from above areas, relatively simple alignment along highway RoW with opportunity to provide higher level of user experience with views of Bulkley River and subtle flow improvements to the final alignment (gentle curves and dips).

3.2. Option 1

Initial work by Cycle 16 in previous years suggested that the most favourable alignment, based on road crossing, stakeholder feedback, and constructability, would be Option 1 (similar original alignment provided by Cycle 16 as described in Section 2.1). This alignment proposes a bridge crossing of Highway 16 at station 4+050 near Babine Lake Road to avoid a private property conflict at 20+080 with a nearby owner not currently in support of the proposed pathway crossing the property. Additionally, the conceptually proposed bridge crossing location is at a geometrically-favourable area where the highway exists in an approximately 2 to 3 m deep cut which helps to provide clearance of the highway for a bridge. Beyond the proposed bridge crossing, Option 1 then follows along the westbound side of the Highway 16 RoW to the Telkwa One-Stop store utilizing several existing gravel and/or paved segments of decommissioned highway.

The key challenges, opportunities, and features of Option 1 include:

- Bridge crossing of Highway 16 at 4+050. A bridge crossing of Highway 16 would result in Option 1 having the highest construction costs, most challenging approval/permit process, and most intensive engineering requirements of the proposed Options.
- Utilizes three (3) segments of alignment with existing improved (gravel and/or paved) surfaces from 4+200 to 4+550 (300 m length), 5+500 to 6+100 (600 m length), and 9+600 to 10+050 (450 m length) resulting in lower construction costs in these areas.

- Steep side slope area for approximately 150 m at approximately 5+350 to 5+500 may require engineering during detailed design.
- From 5+100 to 10+100, the alignment on the eastbound side of the highway is generally located on the high-side of the highway cut providing improved sight lines, better drainage, and more enjoyable user experience as opposed to the other options on the westbound side.
- Four (4) road crossings, all small residential access roads with low traffic volume expected.

3.3. Option 2

Option 2 was developed to provide a lower-cost highway crossing method of an underpass at 21+400. This location was conceptually proposed for an underpass given the convenient geometry of the existing highway, which is a fill embankment approximately 3 to 5 m high in the area. Additional justification for proposing an underpass crossing, as opposed to an overhead crossing, is that precedence for this type of infrastructure is set in the area with several underpass structures for both pedestrian and cattle use. Beyond the conceptually proposed underpass location towards Telkwa, Option 2 follows the Option 1 alignment starting at approximately 5+500.

The key challenges, opportunities, and features of Option 2 include:

- Underpass crossing of Highway 16 at 21+400. An underpass crossing of the highway is a lower-cost alternative to a bridge crossing with less-intensive engineering, permitting, and approval requirements.
- From 20+000 where Option 2 begins from the common alignment, the alignment must cross two (2) private properties and constrained by many physical boundaries, such as power poles, fences, and embankments.
- Based on preliminary stakeholder feedback provided by Cycle 16, some of the property owners in this area are not currently in support of allowing the proposed pathway to cross the properties; therefore, challenging stakeholder negotiations and/or concessions may be required for Option 2.

3.4. Option 3

Option 3 was developed to follow the eastbound side of the Highway 16 corridor for the entire alignment. The terrain and the number/type of road crossings on the eastbound side of the highway corridor are less favourable than the westbound side; however, a highway crossing is not required making Option 3 the option with the least engineering, permitting, approval and cost challenges.

The key challenges, opportunities, and features of Option 3 include:

- No crossing of Highway 16 required – alignment on eastbound side of RoW for entire length.
- Same alignment and challenges as Options 2 from 30+000 to 31+400.
- No existing improved gravel or paved surfaces available for use.
- Steep slope at 34+500 will require significant fill to achieve appropriate grades for pathway.
- Several higher-volume road and/or driveway crossings, including Raymond Road, gravel pit access at 32+600, and Donaldson Road.
- Low-lying wet area on private property from 35+500 to 36+550 will require additional earthworks and drainage work for pathway construction.

3.5. Problem Areas and Notes

On the conceptual alignment drawings in Appendix A, “problem areas” for clear zone conflicts, fence relocation, and private property are identified by coloured boxes. These areas and the annotated notes on the drawings highlight some of the challenges described above.

4. Preliminary Options Analysis

Preliminary options analysis was completed based on the concept alignments developed. Given the current scope of work for this project, the analysis was performed at a high-level with focus only on financial and technical comparison of the construction and engineering features of the conceptual alignments – many of the "soft" factors, such as stakeholder and public support and land acquisition costs have not been considered at this time. This information is intended as preliminary information to facilitate discussions and decision-making processes by Cycle 16 and engaged stakeholders to determine which alignment(s) may be selected for further consideration.

4.1. Construction Cost Estimate

Class C construction cost estimates were prepared for each alignment based on the preliminary estimated quantities from the conceptual alignment drawings. The detailed Class C construction cost estimate spreadsheets are provided in Appendix B and a summary is provided below on Table 2. The values provided on Table 2 include estimated construction costs, design/construction engineering costs (estimated 15%), and construction contingency (20%) and the highway crossing and pathway costs were separated to show the impact of crossing costs on the overall project. Property costs are not included.

Table 2. Class C Cost Estimate Summary

Item	Option 1	Option 2	Option 3
Highway Crossing Costs	$2.0 million	$1.0 Million	n/a
Pathway Costs	$3.3 million (paved) $2.6 million (gravel)	$3.4 million (paved) $2.7 million (gravel)	$4.1 million (paved) $3.4 million (gravel)
Estimated Total	**$5.3 million (paved)** **$4.6 million (gravel)**	**$4.4 million (paved)** **$3.7 million (gravel)**	**$4.1 million (paved)** **$3.4 million (gravel)**

Note: property costs not included.

4.2. Alignment Comparison

A qualitative comparison table was developed to give an overview of the technical characteristics of each option relative to one another. The alignment comparison focused on features of the conceptual alignments that were comparable and easily quantifiable at the high-level of the conceptual design. The conceptual alignment comparison table is provided below on Table 3.

Table 3. Conceptual Alignment Comparison Table

Item	Option 1	Option 2	Option 3
Highway Crossing	- Bridge. - High cost relative to other options. - Specialized contractors required - Logistics, permitting and engineering challenges.	- Underground (culvert). - Intermediate cost relative to other options. - Construction impacts on highway. - logistics, permitting and engineering challenges.	- No Crossing required. - Least cost and less engineering/permitting required compared to other options.
Private Property Length	2.2 km	2.1 km	3.7 km
Number of Private Properties	10	11	17
Pathway Constructability	- Most favourable terrain for pathway construction. - Lowest pathway construction costs due to alignment on existing improved surfaces (0.6 km paved and 0.8 km gravel). - Steep slope area at 5+400 may require engineering design.	- Challenging terrain between 20+100 and 21+200. - Utilizes same existing improved surfaces as Option 1 (0.6 km paved and 0.8 km gravel).	- Least favourable terrain for pathway construction relative to other options. - Steep slope at 34+500 requires large fill slope. - Challenging terrain between 30+100 and 31+300. - Wet low area requiring extra earthworks and drainage (compared to other options) from 35+500 to 36+500.
Other Crossings	- 2 medium, high, or industrial volume road crossings. - 4 low volume road crossings. - 12 driveway crossings. - 1 existing cattle underpass	- 2 medium, high, or industrial volume road crossings. - 4 low volume road crossings. - 15 driveway crossings. - 1 existing cattle underpass	- 5 medium, high, or industrial volume road crossings. - 4 low volume road crossings. - 17 driveway crossings. - 1 existing cattle underpass
Clear Zone	- 3 x <20 m length sections within clear zone.	- 3 x <20 m length within clear zone.	- 1 x <20 m length within clear zone.

5. Discussion

McElhanney has provided three (3) conceptual alignments for the proposed Smithers-Telkwa Multi-Use Pathway that are considered technically feasible to design and construct based on the current understanding of the project. The conceptual alignments face many constraints and challenges, such as the narrow Highway 16 RoW considered for use, existing infrastructure conflicts, private property crossings, and sections of unfavourable terrain. The conceptual alignment drawings represent corridors suitable for the proposed pathway based on the constraints considered in this report, but do not wholly consider public, stakeholder, nor affected private property owner sentiment. Furthermore, the alignments will require significant effort to further determine appropriate design for the challenging areas described above and may require adjustment based on new information acquired during further stages of the project.

The preliminary options analysis described in Section 4 was limited to the construction and engineering "hard" costs and technical features associated with the conceptual alignments and does not include what may be significant costs of land acquisition. The analysis presented allows for informed discussion between project stakeholders, but does not adequately cover all considerations required to recommend the most feasible alignment. The technical and economic factors presented comprise only a portion of overall project feasibility – stakeholder, public, and affected property owner factors are more likely the driving factors but have not yet been determined.

The following sections provide guidance to Cycle 16 for the next steps and key issues for the project.

5.1. Next Steps

This report should be considered the first step in the project lifecycle – significant effort will be required by Cycle 16 and other to see the proposed project to construction. The following items are provided as general guidance for the next steps for the project:

- *Preliminary Stakeholder Engagement* – important stakeholders to the project should be engaged to provide feedback regarding the information provided in this report. A formalized process should be utilized and all feedback should be collected and maintained in a format suitable for incorporation into further design stages.
- *Functional Design* – this stage will incorporate feedback collected during preliminary stakeholder engagement and may involve more detailed options analysis, stakeholder and regulatory body engagement, refinement and more detailed design for alignment and pathway features where required, regulatory approval applications, and third-party agreement applications.
- *Stakeholder and Public Consultation* – formalized stakeholder and public consultation.
- *Detailed design* – refinement of alignment and details based on public and stakeholder consultation, detailed site assessments (surveying, geotechnical, hydrotechnical, etc.), engineering design, preparation of construction and tender documents.

5.2. Ownership Structure and Private Land

A key factor for the project requiring attention is the ownership structure. The proposed project connects two municipal areas (Telkwa and Smithers), occurs on public highway RoW administrated by MoTI, and impacts many private property owners with the Regional District of Bulkley-Nechako; therefore, there is not an obvious

choice of entity or organization to ultimately take ownership responsibility of the proposed infrastructure. Currently, Cycle 16 is the prime proponent of the project lobbying the affected parties for support; however, not-for-profit societies typically do not have the legal ability or capacity to own, operate, and maintain public infrastructure such as this without some form of partnership agreement with a government body.

Ultimately, the stakeholders and proponents for the project must collaborate to develop an ownership structure appropriate for the financial, political, and legal nature of the project and practical for the specific regional situation. It is also possible for portions of the proposed infrastructure may be owned, operated, or managed by different parties.

Private land considerations are directly linked to the ownership structure of the pathway infrastructure. Typically, pathway infrastructure on private land is created as an easement on the land title like other public infrastructure or utilities. To do this, the ownership structure must involve a ubiquitous legal entity to assume this role.

5.3. Further Design

Based on McElhanney's work to date, we recommend focusing on the following items during the stakeholder engagement and functional design phases:

- Private landowner engagement;
- User and roadway safety analysis to determine if clear zone constraints can be relaxed in certain areas to avoid private land conflicts;
- Stakeholder engagement to discuss ownership structure;
- Refine concept and cost estimates for underpass and bridge highway crossing options (if required); and,
- Refinement of alignment based on preliminary stakeholder engagement feedback.

6. Closure

This report has been prepared by McElhanney Consulting Services Ltd. for the benefit of Cycle 16 Trail Society. The information and data contained herein represent MCSL's best professional judgment considering the knowledge and information available to MCSL at the time of preparation. Except as required by law, this report and the information and data contained herein are to be treated as confidential and may be used and relied upon only by the client, its officers, and employees.

McElhanney Consulting Services Ltd. denies any liability whatsoever to other parties who may obtain access to this report for any injury, loss or damage suffered by such parties arising from their use of, or reliance upon, this document or any of its contents without the express written consent of McElhanney and Cycle 16.

We trust this report submission meets your requirements for the project. Should you have any queries, please do not hesitate to contact the undersigned at 250.631.4068 or twilkes@mcelhanney.com.

Respectfully submitted,

McElhanney Consulting Services Ltd.

Prepared by:

Tyler Wilkes, EIT
Project Manager and Trail Designer
twilkes@mcelhanney.com

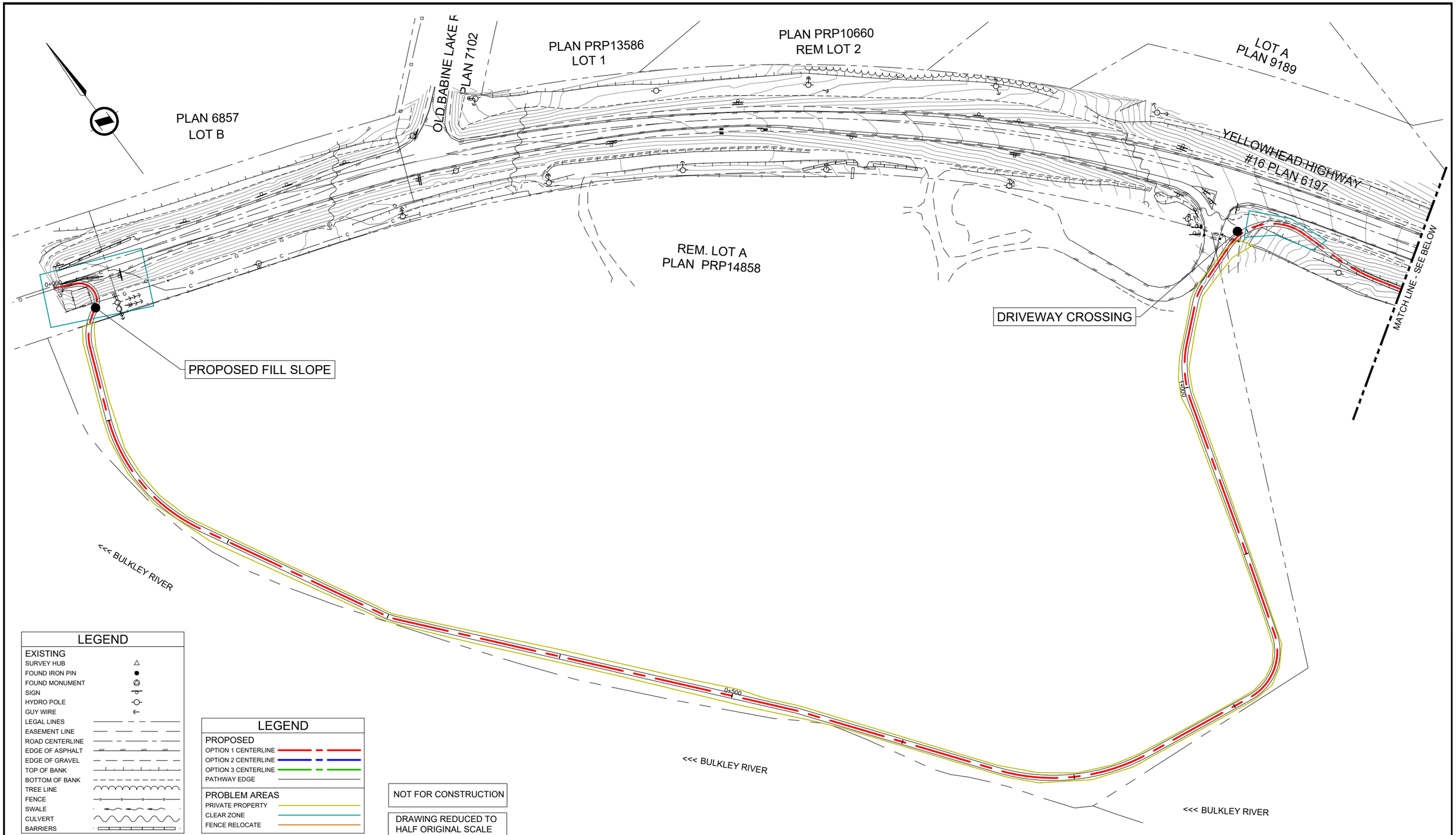
Reviewed by:

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. P. LANGHORST
34207

May 9 2017

Darin Langhorst, P. Eng
Division Manager, Municipal Engineering
dlanghorst@mcelhanney.com

Appendix A – Concept Alignment Drawings



LEGEND

EXISTING

- SURVEY HUB
- FOUND IRON PIN
- FOUND MONUMENT
- SIGN
- HYDRO POLE
- GUY WIRE
- LEGAL LINES
- EASEMENT LINE
- ROAD CENTERLINE
- EDGE OF ASPHALT
- EDGE OF GRAVEL
- TOP OF BANK
- BOTTOM OF BANK
- TREE LINE
- FENCE
- SWALE
- CULVERT
- BARRIERS

LEGEND

PROPOSED

- OPTION 1 CENTERLINE
- OPTION 2 CENTERLINE
- OPTION 3 CENTERLINE
- PATHWAY EDGE

PROBLEM AREAS

- PRIVATE PROPERTY
- CLEAR ZONE
- FENCE RELOCATE

NOT FOR CONSTRUCTION

DRAWING REDUCED TO HALF ORIGINAL SCALE

Rev	Date	Description	Drawn	Design	App'd
PB	2017-04-21	ISSUED FOR REVIEW	JMD	-	TW
PA	2017-02-23	ISSUED FOR REVIEW	JMD	-	TW

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ORIGINAL DWG SIZE: ANSI D (22" x 34")

McElhanney
McElhanney Consulting Services Ltd.
PO Box 787
3907 Fourth Avenue
Smithers BC
Canada V0J 2N0
Tel 250 847 4040

Approved Sealed

CYCLE 16 TRAIL SOCIETY

TELKWA TO SMITHERS PATHWAY CONCEPT ALIGNMENT

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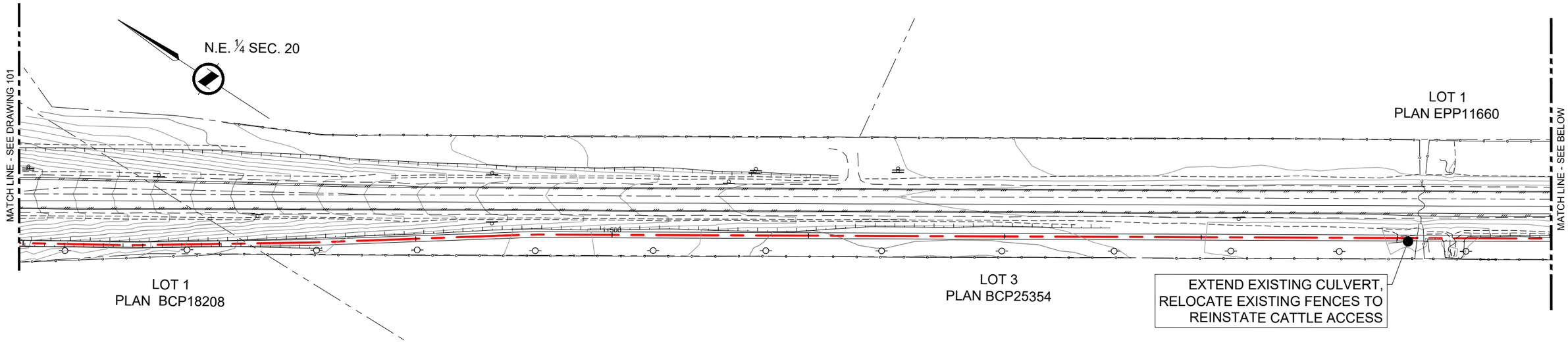
Drawing No. 101

Project Number	Rev.
2331-00795-00	PB



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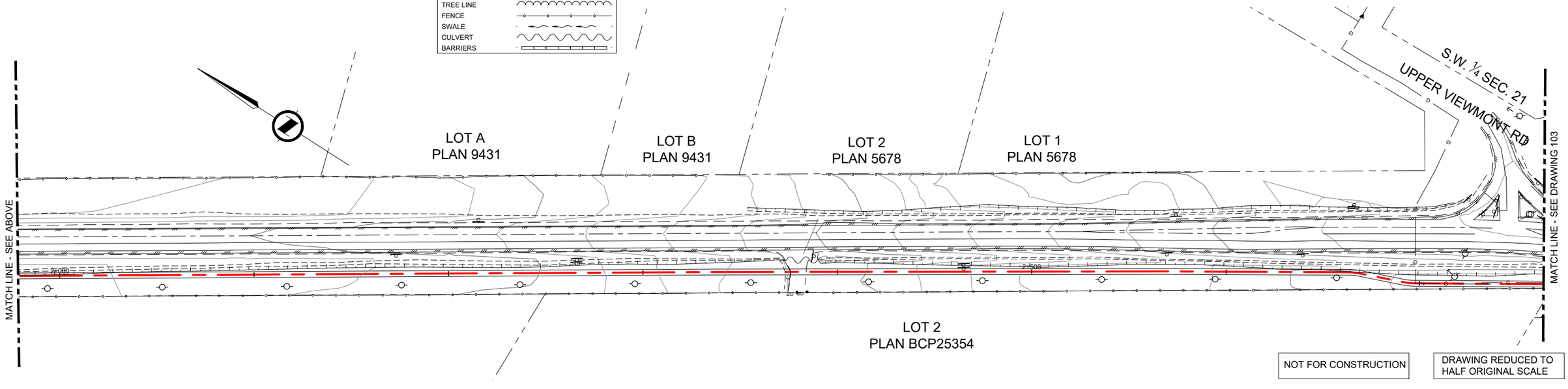

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ORIGINAL DWG SIZE: ANSI D (22" x 34")

McElhanney
McElhanney Consulting Services Ltd.
PO Box 787
3907 Fourth Avenue
Smithers BC
Canada V0J 2N0
Tel 250 847 4040

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CYCLE 16 TRAIL SOCIETY

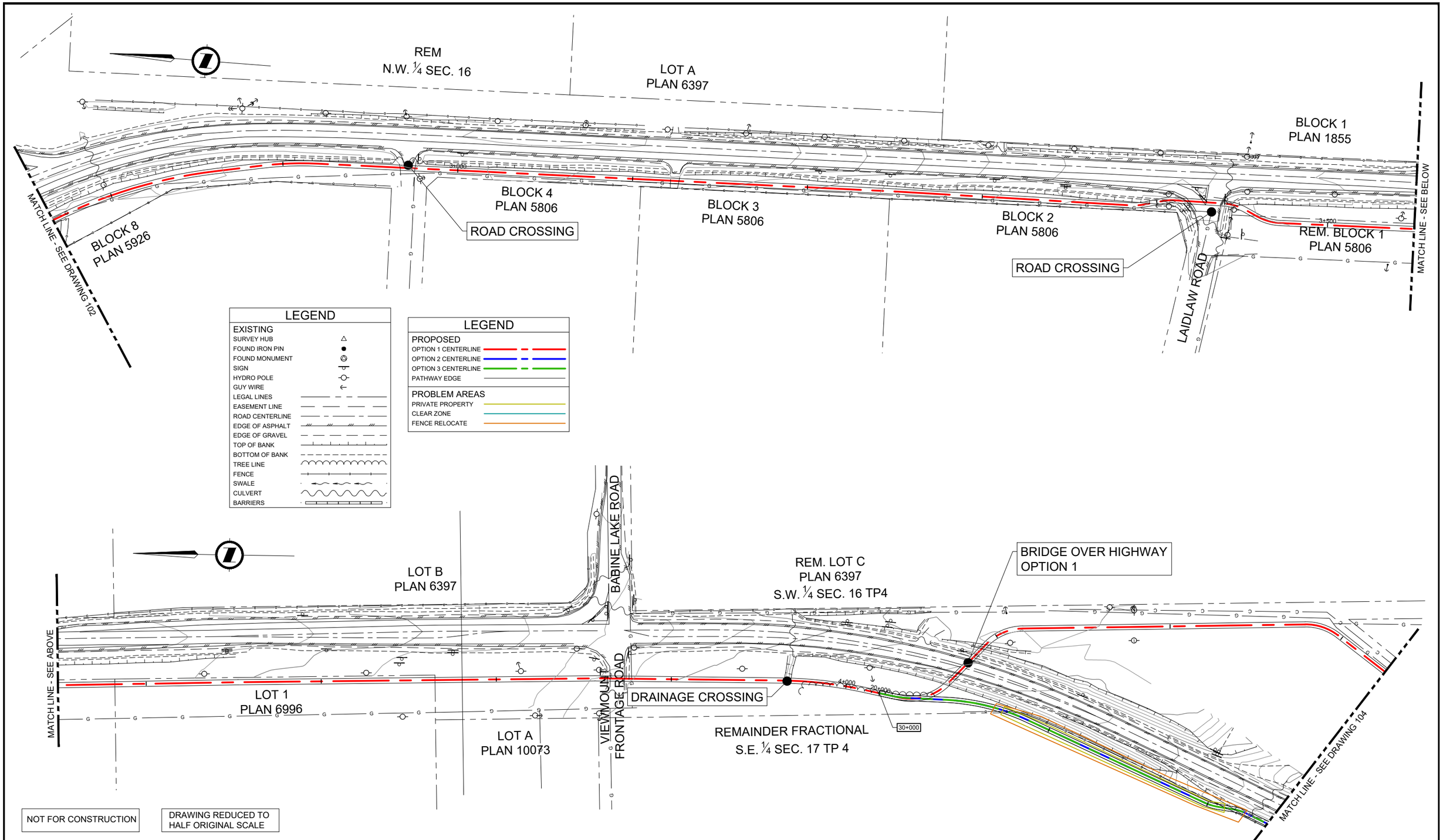
TELKWA TO SMITHERS PATHWAY CONCEPT ALIGNMENT

-

Drawing No. 102

Project Number 2331-00795-00

Rev. PB



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LEGEND

PROPOSED

- OPTION 1 CENTERLINE
- OPTION 2 CENTERLINE
- OPTION 3 CENTERLINE
- PATHWAY EDGE

PROBLEM AREAS

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Canada V0J 2N0
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CYCLE 16 TRAIL SOCIETY

TELKWA TO SMITHERS PATHWAY CONCEPT ALIGNMENT

-

Drawing No. 103

Project Number 2331-00795-00

Rev. PB

LOT A
PLAN 1299

MATCH LINE - SEE DRAWING 103

DRIVEWAY CROSSING

LOT 2
PLAN 4027

LOT 1
PLAN 12791

LOT 3
PLAN EPP60316

MATCH LINE - SEE BELOW

4+500

5+000

21+000

31+000

ROAD

LOT A
PLAN 7016

LOT 1
PLAN 3855

20+500

30+500

DRIVEWAY CROSSING

LOT 4
PLAN 6040

DRIVEWAY CROSSING

BLOCK 1
PLAN 1624

DRIVEWAY CROSSING

DRIVEWAY CROSSING

MATCH LINE - SEE ABOVE

DRIVEWAY CROSSING

STEEP SIDE SLOPE

ROUTE ALONG EXISTING
PAVED SURFACE

UNDERGROUND HIGHWAY
CROSSING OPTION 2

LOT 1
PLAN EPP60316

9+500

21+500 21+514.84

31+500

LOT 3
PLAN EPP60316

MATCH LINE - SEE DRAWING 105

LOT 2
PLAN EPP60316

LEGEND

EXISTING

- SURVEY HUB
- FOUND IRON PIN
- FOUND MONUMENT
- SIGN
- HYDRO POLE
- GUY WIRE
- LEGAL LINES
- EASEMENT LINE
- ROAD CENTERLINE
- EDGE OF ASPHALT
- EDGE OF GRAVEL
- TOP OF BANK
- BOTTOM OF BANK
- TREE LINE
- FENCE
- SWALE
- CULVERT
- BARRIERS

LEGEND

PROPOSED

- OPTION 1 CENTERLINE
- OPTION 2 CENTERLINE
- OPTION 3 CENTERLINE
- PATHWAY EDGE

PROBLEM AREAS

- PRIVATE PROPERTY
- CLEAR ZONE
- FENCE RELOCATE

NOT FOR CONSTRUCTION

DRAWING REDUCED TO HALF ORIGINAL SCALE

Rev	Date	Description	Drawn	Design	App'd
PB	2017-04-21	ISSUED FOR REVIEW	JMD	-	TW
PA	2017-02-23	ISSUED FOR REVIEW	JMD	-	TW

0 1:1,000 50

ORIGINAL DWG SIZE: ANSI D (22" x 34")

McElhanney
McElhanney Consulting Services Ltd.
PO Box 787
3907 Fourth Avenue
Smithers BC
Canada V0J 2N0
Tel 250 847 4040

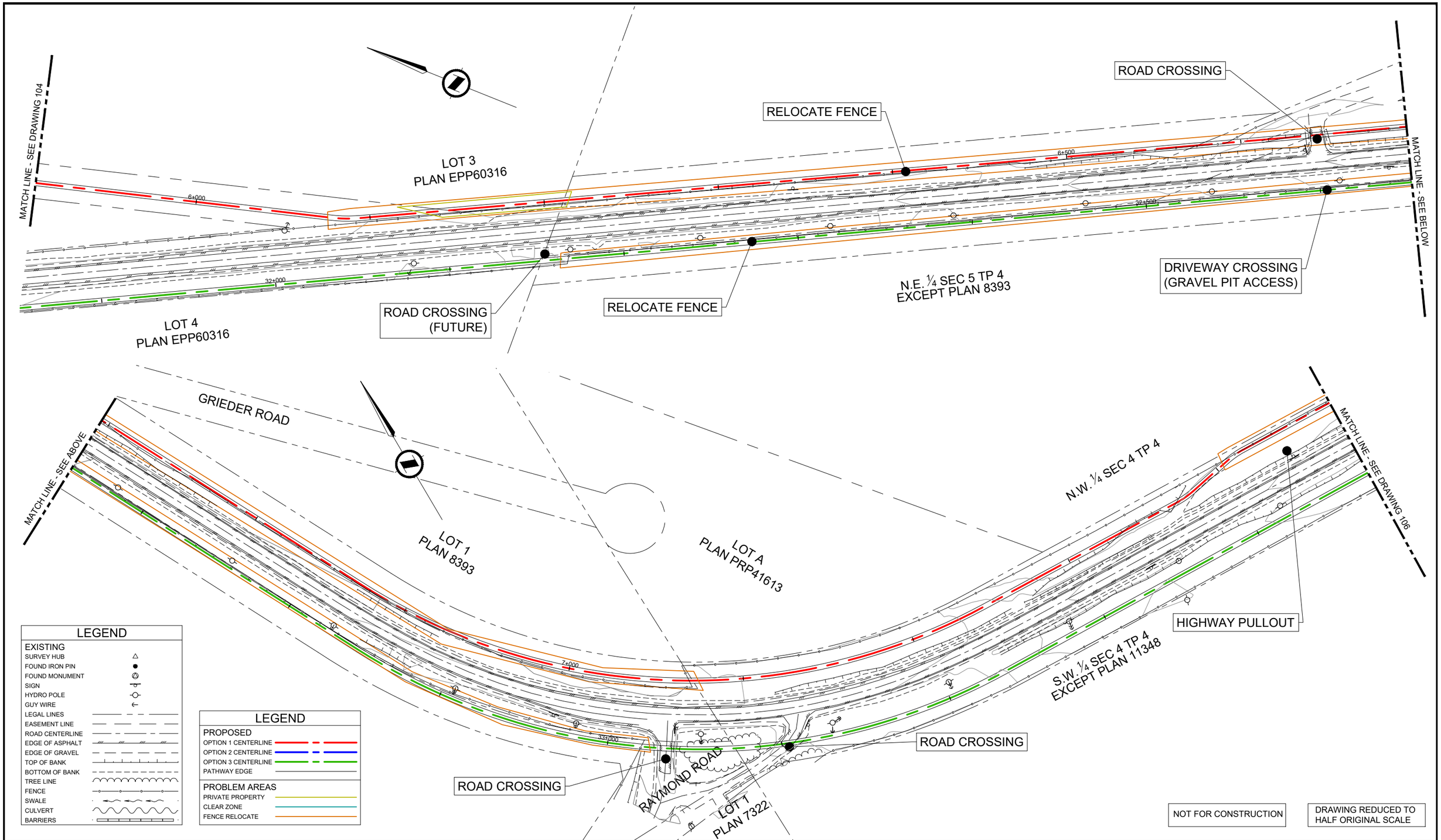
Approved Sealed

CYCLE 16 TRAIL SOCIETY

TELKWA TO SMITHERS PATHWAY
CONCEPT ALIGNMENT
-

Drawing No. 104

Project Number	Rev.
2331-00795-00	PB



LEGEND

EXISTING

- SURVEY HUB
- FOUND IRON PIN
- FOUND MONUMENT
- SIGN
- HYDRO POLE
- GUY WIRE
- LEGAL LINES
- EASEMENT LINE
- ROAD CENTERLINE
- EDGE OF ASPHALT
- EDGE OF GRAVEL
- TOP OF BANK
- BOTTOM OF BANK
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- CULVERT
- BARRIERS

LEGEND

PROPOSED

- OPTION 1 CENTERLINE
- OPTION 2 CENTERLINE
- OPTION 3 CENTERLINE
- PATHWAY EDGE

PROBLEM AREAS

- PRIVATE PROPERTY
- CLEAR ZONE
- FENCE RELOCATE

NOT FOR CONSTRUCTION

DRAWING REDUCED TO HALF ORIGINAL SCALE

Rev	Date	Description	Drawn	Design	App'd
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PA	2017-02-23	ISSUED FOR REVIEW	JMD	-	TW

ORIGINAL DWG SIZE: ANSI D (22" x 34")

0 1:1,000 50

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CYCLE 16 TRAIL SOCIETY

TELKWA TO SMITHERS PATHWAY
CONCEPT ALIGNMENT
-

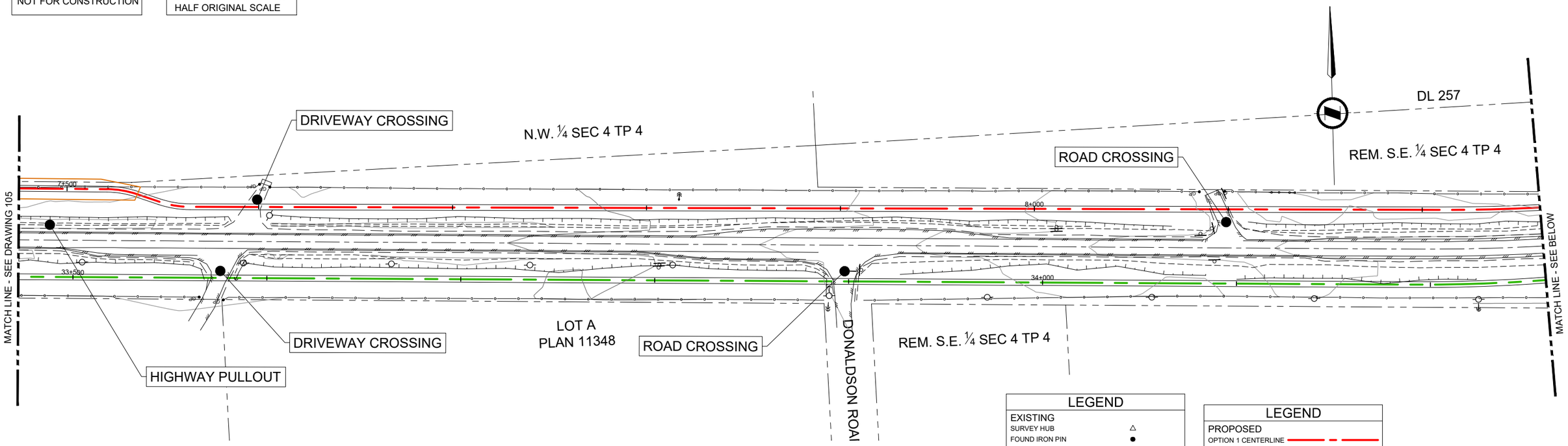
Drawing No. 105

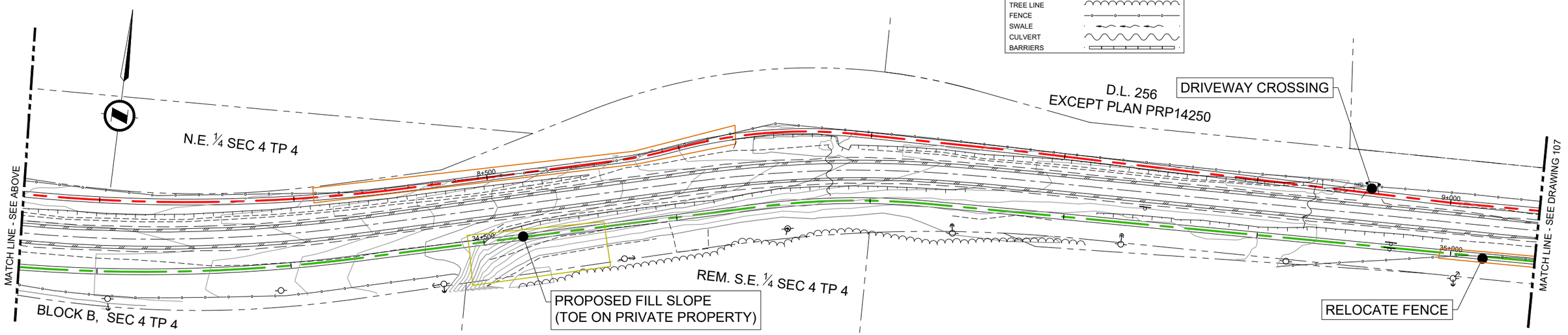
Project Number 2331-00795-00

Rev. PB

NOT FOR CONSTRUCTION

DRAWING REDUCED TO HALF ORIGINAL SCALE





LEGEND

EXISTING

- SURVEY HUB
- FOUND IRON PIN
- FOUND MONUMENT
- SIGN
- HYDRO POLE
- GUY WIRE
- LEGAL LINES
- EASEMENT LINE
- ROAD CENTERLINE
- EDGE OF ASPHALT
- EDGE OF GRAVEL
- TOP OF BANK
- BOTTOM OF BANK
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- SWALE
- CULVERT
- BARRIERS

LEGEND

PROPOSED

- OPTION 1 CENTERLINE
- OPTION 2 CENTERLINE
- OPTION 3 CENTERLINE
- PATHWAY EDGE

PROBLEM AREAS

- PRIVATE PROPERTY
- CLEAR ZONE
- FENCE RELOCATE

Rev	Date	Description	Drawn	Design	App'd
PB	2017-04-21	ISSUED FOR REVIEW	JMD	-	TW
PA	2017-02-23	ISSUED FOR REVIEW	JMD	-	TW

0 1:1,000 50

ORIGINAL DWG SIZE: ANSI D (22" x 34")

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CYCLE 16 TRAIL SOCIETY

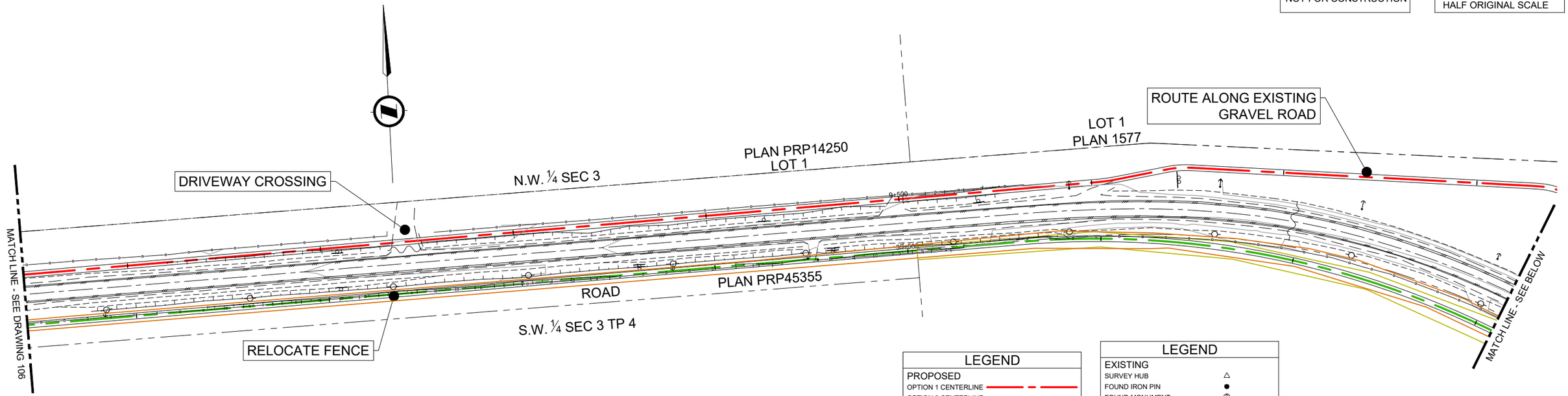
TELKWA TO SMITHERS PATHWAY
CONCEPT ALIGNMENT
-

Drawing No.
106

Project Number	Rev.
2331-00795-00	PB

NOT FOR CONSTRUCTION

DRAWING REDUCED TO HALF ORIGINAL SCALE



LEGEND

PROPOSED

- OPTION 1 CENTERLINE
- OPTION 2 CENTERLINE
- OPTION 3 CENTERLINE
- PATHWAY EDGE

PROBLEM AREAS

- PRIVATE PROPERTY
- CLEAR ZONE
- FENCE RELOCATE

LEGEND

EXISTING

- SURVEY HUB
- FOUND IRON PIN
- FOUND MONUMENT
- SIGN
- HYDRO POLE
- GUY WIRE
- LEGAL LINES
- EASEMENT LINE
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- EDGE OF GRAVEL
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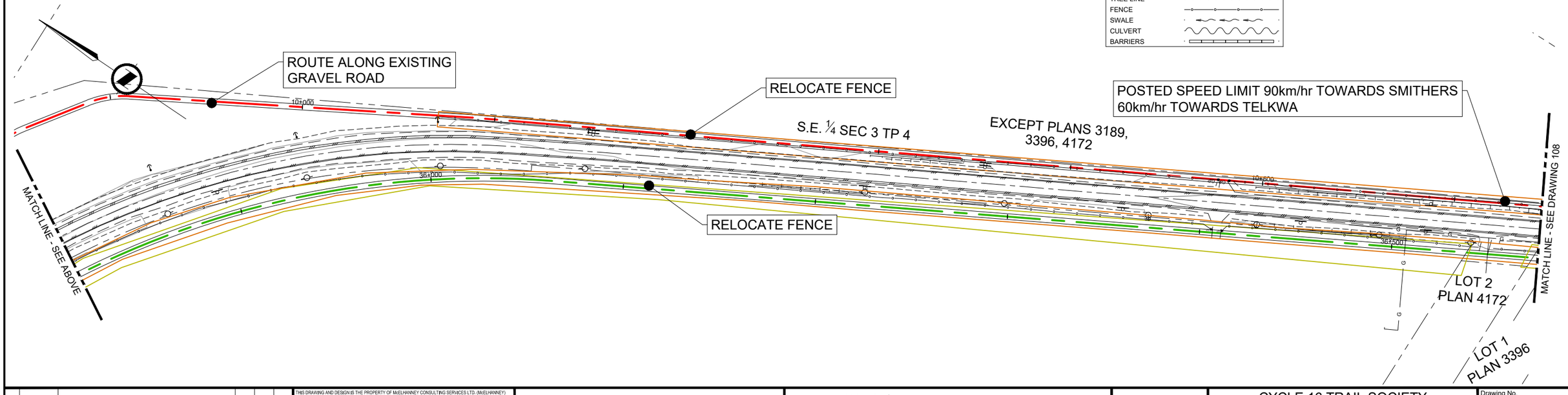
- FENCE
- SWALE
- CULVERT
- BARRIERS



Rev	Date	Description	Drawn	Design	App'd
PB	2017-04-21	ISSUED FOR REVIEW	JMD	-	TW
PA	2017-02-23	ISSUED FOR REVIEW	JMD	-	TW

0 1:1,000 50

ORIGINAL DWG SIZE: ANSI D (22" x 34")

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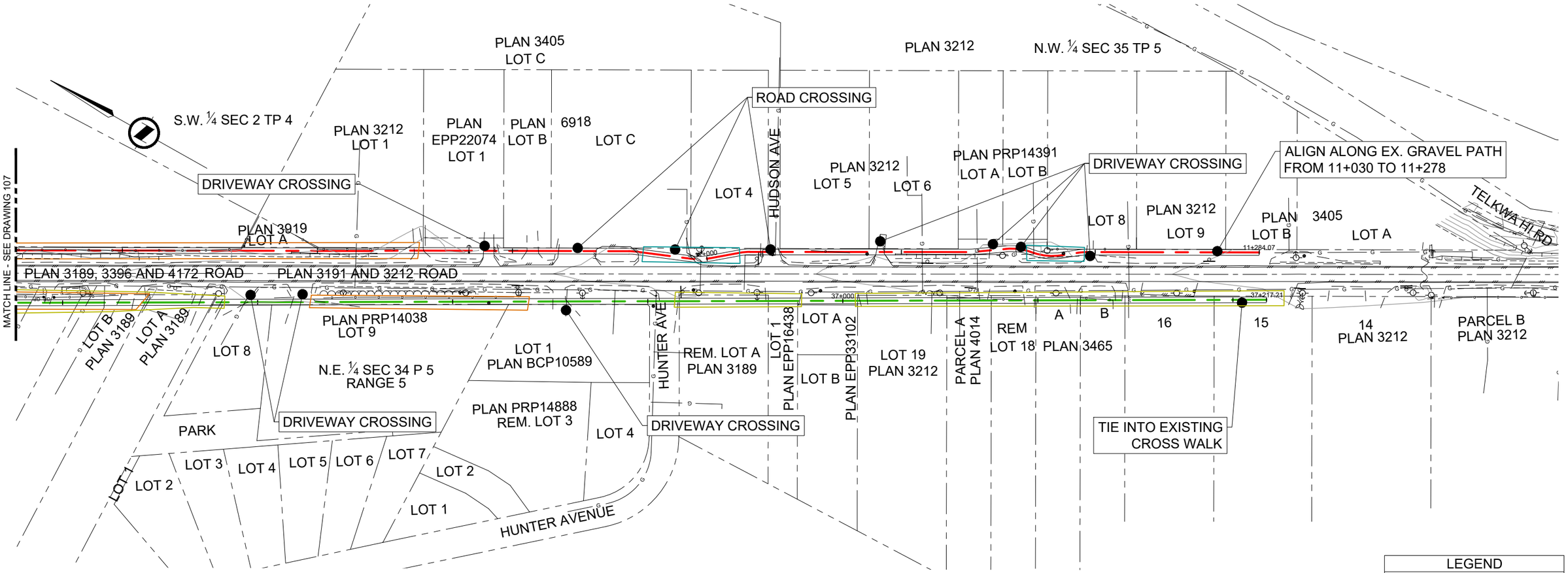
CYCLE 16 TRAIL SOCIETY

TELKWA TO SMITHERS PATHWAY
CONCEPT ALIGNMENT
-

Drawing No.
107

Project Number	Rev.
2331-00795-00	PB



LEGEND

EXISTING

- SURVEY HUB
- FOUND IRON PIN
- FOUND MONUMENT
- SIGN
- HYDRO POLE
- GUY WIRE
- LEGAL LINES
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- PATHWAY EDGE

PROBLEM AREAS

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NOT FOR CONSTRUCTION

DRAWING REDUCED TO HALF ORIGINAL SCALE

Rev	Date	Description	Drawn	Design	App'd
PB	2017-04-21	ISSUED FOR REVIEW	JMD	-	TW
PA	2017-02-23	ISSUED FOR REVIEW	JMD	-	TW

0 1:1,000 50

ORIGINAL DWG SIZE: ANSI D (22" x 34")

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CYCLE 16 TRAIL SOCIETY

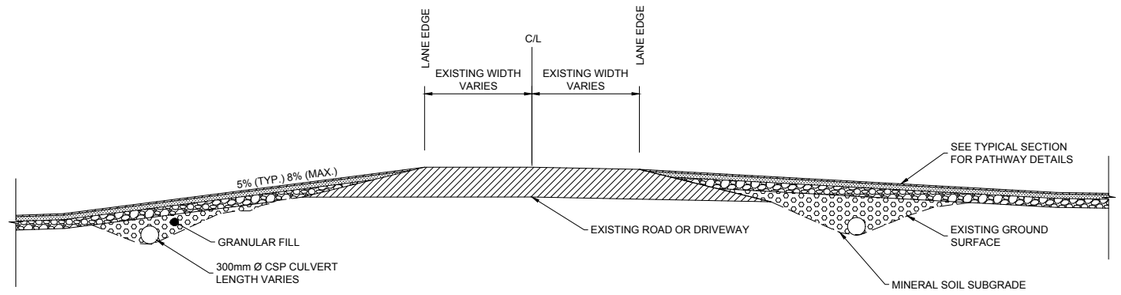
TELKWA TO SMITHERS PATHWAY CONCEPT ALIGNMENT

-

Drawing No. 108

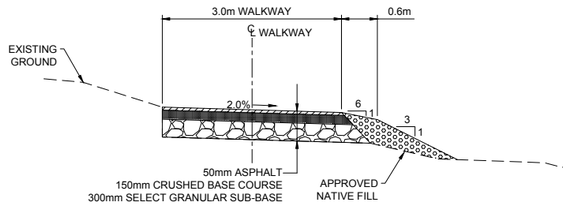
Project Number 2331-00795-00

Rev. PB



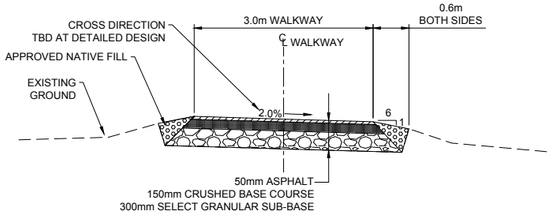
TYPICAL ROAD AND RODRIVEWAY CROSSINGS

N.T.S.



TYPICAL PATHWAY SECTION - SIDE SLOPE

SCALE 1:50



TYPICAL PATHWAY SECTION - LEVEL GROUND

SCALE 1:50

NOT FOR CONSTRUCTION

DRAWING REDUCED TO HALF ORIGINAL SCALE

Rev	Date	Description	Drawn	Design	App'd
PB	2017-04-27	UPDATED CROSSFALL	TBM	TW	-
PA	2017-04-19	ISSUED FOR REVIEW	TBM	TW	-

ORIGINAL DWG SIZE: ANSI D (22" x 34")

McElhanney
McElhanney Consulting Services Ltd.
PO Box 787
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Canada V0J 2N0
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CYCLE 16 TRAIL SOCIETY

TELKWA TO SMITHERS PATHWAY DETAILS

Drawing No. 001

Project Number 2331-00795-00

Rev. PB

DESTROY ALL PRINTS BEARING PREVIOUS REVISION

Appendix B – Class C Cost Estimate Sheets

McElhanney

Schedule of Quantities

Reference: MSCL 2331-00795-00 IFR report drawings 2017.04.27

	Task	Units	Quantity	Unit Price	Line Total	Sub-Totals	Comment
Telkwa-Smithers Pathway - Option 1							
1.00	**Construction Estimate**						
1.01	General Contractor Mobilization & Demobilization	l.s.	1	$ 80,000.00	$ 80,000.00		
1.02	Traffic Control	l.s.	1	$ 200,000.00	$ 200,000.00		
1.03	Strip Topsoil	sq.m.	14,907	$ 8.00	$ 119,256.00		
1.04	Crushed Base Course - 150 mm	cu. m.	5,291	$ 40.00	$ 211,622.40		
1.05	Select Granular Sub-base - 300 mm	cu. m.	10,733	$ 45.00	$ 482,986.80		
1.06	Significant Fill Areas	cu. m.	2,736	$ 45.00	$ 123,120.00		
1.07	Asphalt - 50 mm	tonnes	3,976	$ 130.00	$ 516,871.68		Remove asphalt line item and recalculate contingency and engineering percentages for gravel pathway cost.
1.08	Root Barrier Geotextile	sq.m.	39,752	$ 7.00	$ 278,264.00		
1.09	Subgrade Preparation	sq.m.	39,752	$ 3.00	$ 119,256.00		
1.10	Topsoil/Seed/Mulch	sq. m.	11,288	$ 5.00	$ 56,440.00		
1.11	Signage - less than 1 sq.m.	ea.	124	$ 500.00	$ 62,000.00		
1.12	Highway Crossing - Bridge	l.s.	1	$ 1,500,000.00	$ 1,500,000.00		
1.13	Culvert - 300 mm diameter	l.m.	192	$ 600.00	$ 115,200.00		
1.14	Relocate Fence	l.m.	2,860	$ 20.00	$ 57,200.00		
1.15	Line Painting - Road Crossings	ea.	6	$ 4,500.00	$ 27,000.00		
						$ 3,949,216.88	
2.00	**Other Items**						
2.01	Design/Construction Engineering (15% Construction)	l.s.	1	$ 592,382.53	$ 592,382.53		
2.03	Contingency (20%)	l.s.	1	$789,843.38	$ 789,843.38		
3.00	**Property Quantities**						
3.01	Private Land	l.m.	2,245	-			No costs included
3.02	Number of Properties	ea.	10				No costs included
	Option #1 Total					$ 5,331,442.79	

	Task	Units	Quantity	Unit Price	Line Total	Sub-Totals	Comment
Telkwa-Smithers Pathway - Option 2							
1.00	**General Requirements**						
1.01	General Contractor Mobilization & Demobilizatior	l.s.	1	$ 80,000.00	$ 80,000.00		
1.02	Traffic Control	l.s.	1	$ 200,000.00	$ 200,000.00		
1.03	Strip Topsoil	sq.m.	15,281	$ 8.00	$ 122,244.00		
1.04	Crushed Base Course - 150 mm	cu. m.	5,265	$ 40.00	$ 210,612.60		
1.05	Select Granular Sub-base - 300 mm	cu. m.	11,002	$ 45.00	$ 495,088.20		
1.06	Significant Fill Areas	cu. m.	2,836	$ 45.00	$ 127,620.00		
1.07	Asphalt - 50 mm	tonnes	3,957	$ 130.00	$ 514,405.32		Remove asphalt line item and recalculate contingency and
1.08	Root Barrier Geotextile	sq.m.	40,748	$ 7.00	$ 285,236.00		engineering percentages for gravel pathway cost
1.09	Subgrade Preparation	sq.m.	44,948	$ 3.00	$ 134,844.00		
1.10	Topsoil/Seed/Mulch	sq. m.	11,237	$ 5.00	$ 56,185.00		
1.11	Signage - less than 1m2	ea.	136	$ 500.00	$ 68,000.00		
1.12	Highway Crossing - Underpass	l.s.	1	$ 750,000.00	$ 750,000.00		
1.13	Culvert - 300 mm diameter	l.m.	222	$ 600.00	$ 133,200.00		
1.14	Relocate Fence	l.m.	2,795	$ 20.00	$ 55,900.00		
1.15	Line Painting - Road Crossings	ea.	6	$ 4,500.00	$ 27,000.00		
						$ 3,260,335.12	
2.00	**Other Items**						
2.01	Design/Construction Engineering (15% Construction	l.s.	1	$ 489,050.27	$ 489,050.27		
2.03	Contingency (20%)	l.s.	1	$652,067.02	$ 652,067.02		
3.00	**Property Quantities**						
3.01	Private Land	l.m.	2,055				No costs included
3.02	Number of Properties	ea.	11				No costs included
	Option #2 Total					$ 4,401,452.41	

	Task	Units	Quantity	Unit Price	Line Total	Sub-Totals	Comment
Telkwa-Smithers Pathway - Option 3							
1.00	**General Requirements**						
1.01	General Contractor Mobilization & Demobilizatior	l.s.	1	$ 80,000.00	$ 80,000.00		
1.02	Traffic Control	l.s.	1	$ 150,000.00	$ 150,000.00		
1.03	Strip Topsoil	sq.m.	21,111	$ 8.00	$ 168,885.00		
1.04	Crushed Base Course - 150 mm	cu. m.	5,573	$ 40.00	$ 222,928.20		
1.05	Select Granular Sub-base - 300 mm	cu. m.	15,200	$ 45.00	$ 683,984.25		
1.06	Significant Fill Areas	cu. m.	7,216	$ 45.00	$ 324,711.56		
1.07	Asphalt - 50 mm	tonnes	4,188	$ 130.00	$ 544,485.24		Remove asphalt line item and recalculate contingency and
1.08	Root Barrier Geotextile	sq.m.	45,036	$ 7.00	$ 315,252.00		engineering percentages for gravel pathway cost
1.09	Subgrade Preparation	sq.m.	45,036	$ 3.00	$ 135,108.00		
1.10	Topsoil/Seed/Mulch	sq. m.	11,259	$ 5.00	$ 56,295.00		
1.11	Signage - less than 1m2	ea.	166	$ 500.00	$ 83,000.00		
1.12	Culvert - 300 mm diameter	l.m.	276	$ 600.00	$ 165,600.00		
1.13	Relocate Fence	l.m.	3,345	$ 20.00	$ 66,900.00		
1.14	Line Painting	ea.	8	$ 4,500.00	$ 36,000.00		
						$3,033,149.25	
2.00	**Other Items**						
2.01	Design/Construction Engineering (15% Construction	l.s.	1	$ 454,972.39	$ 454,972.39		
2.03	Contingency (20%)	l.s.	1	$606,629.85	$ 606,629.85		
3.00	**Property Quantities**						
3.01	Private Land	l.m.	3,650	-			No costs included
3.02	Number of Properties	ea.	17	-			No costs included
	Option #3 Total					$ 4,094,751.49	