DISTRICT OF WELLS

WELLS-BARKERVILLE BIKE ROUTE FEASIBILITY STUDY

December 2009

Dayton & Knight Ltd.
CONSULTING ENGINEERS

THIRD PARTY DISCLAIMER

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1 INTRODUCTION

This Bike Route Feasibility Study has been completed by Dayton & Knight Ltd. for the District of Wells to evaluate the potential and cost of constructing a bicycle path between Wells and Barkerville. Three options will be considered. Option 1 includes two one-way shoulder lanes constructed immediately adjacent to Highway 26. Option 2 and 3 are two lane bike paths constructed separately from the highway, as shown on Figure 1-1, below.

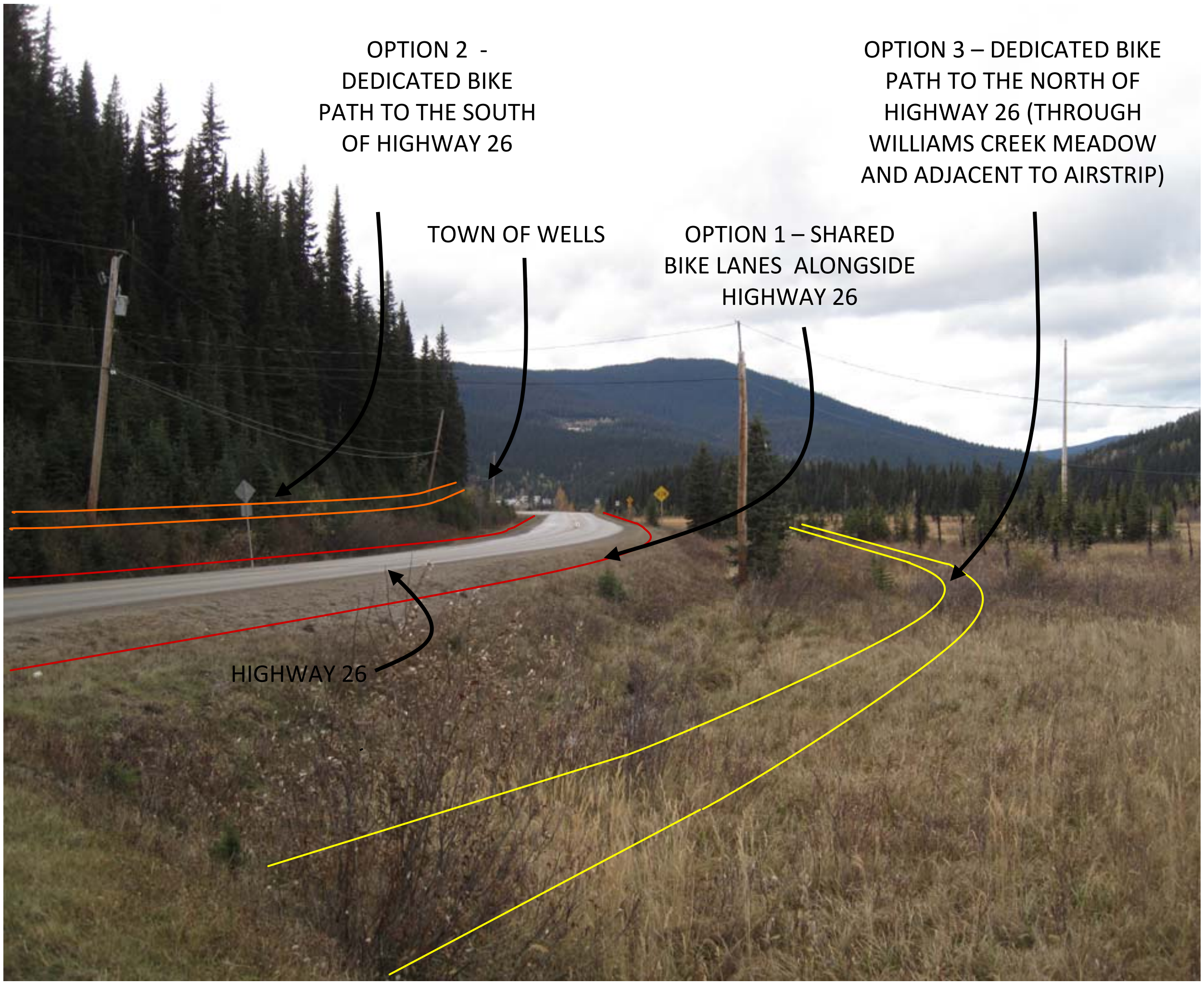

Figure 1-1 Highway 26 Illustrating Three Bike Path Options

1.1 Background

The Wells-Barkerville area is one of the largest tourist attractions in Northern B.C., with approximately 100,000 visitors to the area annually. The area was originally settled in 1862, with an abundance of gold being having been found near Barkerville causing an increase in mining activity. The government of British Columbia restored the townsite of Barkerville in 1958 and developed it as a historical town. With limited residences and hotels in the town of Barkerville itself, the majority of visitors and employees stay in the town of Wells, situated 7km to the West. Barkerville employs 150 seasonal workers between the middle of May and the end of September, with many commuting from Wells by bike.

The existing highway is narrow with paved lanes for vehicles and narrow gravel shoulders. The existing narrow gravel shoulders do not accommodate the needs of cyclists. Under the existing conditions, cyclists (tourists and local commuters) are required to share the paved traffic lanes of Highway 26. Sharing the narrow traffic lane requires that a relatively high volume of tourist traffic, including large R.V. units, and heavy equipment (mining and logging equipment) must either change into opposing lanes or travel dangerously close in order to pass cyclists on the roadway.

According to the Transportation Association of Canada:

“Transportation officials in Canada are sensitive to the importance of the bicycle as a viable form of transportation and as a means of recreation and exercise, and a way of protecting the environment … Throughout Canada, people are recognising the economic and health benefits and other advantages of cycling … Municipalities are responding to the increased use of bicycles by implementing a variety of bicycle facilities. Cyclists need sufficient space to allow them to operate with safety and convenience rather than simply being assigned to whatever residual space is available after the needs of vehicular traffic are accommodated”.

The bike path proposed by the District of Wells is intended to reduce the safety risks associated with commuting on the narrow highway, provide an aesthetically pleasing commuting route between the two towns, further increase the tourism potential of the area, and provide the added environmental benefit of commuting by bicycle rather than driving.

1.2 Objective

In the summer of 2009, the District of Wells put out a Request for Proposals (RFP) which outlined the project objectives and deliverables to be submitted. In July, the District of Wells retained Dayton & Knight Ltd. to complete a feasibility study and provide preliminary plan/profile drawings and recommendations of the best option. This report will assist the District by:

- Proposing a recommended route
- Suggesting design criteria
- Identifying project constraints and limitations
- Producing conceptual design drawings
- Estimating project costs
- Supporting applications for project funding and external financing.

1.3 Scope

The tasks required to complete the Bike Route Feasibility Study include:

- Performing site visits to gain an understanding of the site constraints
- Determining basic design constraints for a dedicated bike path
- Determining topographical limitations and benefits for each option
- Determining land ownership issues for all three options
- Determining permits and regulatory requirements

- Providing “class D” cost estimates to aid in comparing options
- Identifying and refining the preferred option based on cost and feasibility
- Determining outstanding unknowns, if any, needing to be resolved prior to detailed design or construction.

1.4 Study Methodology

The main objective of this study is to determine the preferred commuter bike path option based on an evaluation of cost, construction feasibility, safety, aesthetics and land use conflicts. For the preliminary designs, the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (1999 edition) was used.

The base plans were created using legal survey plans of the Wells and Barkerville townsites, as wells as legal maps and orthographic maps from the BC Provincial website. GPS points and field measurements were also added to verify locations and the accuracy of the base plan.

The cost estimate for each option was determined based on the different alignments and topographical constraints using our estimated cost of materials, labour and equipment. The cost estimates are based on previous projects of similar scope and size and on interviews with local gravel suppliers and contractors from the Quesnel and Prince George areas. The options were further evaluated based on aesthetic and safety benefits of the proposed alignments and land ownership issues as well as anticipated level of difficulty of construction.

1.5 Project Meetings

Meetings were held with the District of Wells staff, including a meeting prior to commencing the study in July of 2009 to outline the scope of the project as well as deliverables and timeline. Another follow up meeting was held in Wells in October, 2009 to review progress made and present preliminary alignments and drawings.

2 EXAMINATION OF EXISTING CONDITIONS

2.1 Field Investigation

Two site visits were undertaken by both Mr. Scott Bilbrough, P.Eng. and Mr. Liam Baker, EIT to evaluate the three proposed options. The second visit by Mr. Liam Baker in October 2009 was performed in order to re-evaluate the options after preliminary design and alignments had been identified and to refine the options according to site constraints. During this visit, the existing highway pavement and shoulder width was measured at several locations. Distances from the road to site characteristics were also measured, including from the road to the adjacent airstrip, sewage lagoon enclosure, campground, and access road, among others. GPS points of characteristics of interest such as road turnoffs and proposed alignment stationing were taken to ensure base plan and design accuracy.

Figure 2-1 on the following page illustrates the various unique site features along the highway corridor between Wells and Barkerville.

2.2 Land Use, Ownership and Rights-of-Way

Land use along the highway corridor between Wells and Barkerville varies and includes residential properties, vacant crown land, public utilities, and industrial (mining) land uses.

There are several privately owned properties adjacent the highway to the East of the Wells townsite. An example is shown in Figure 2-2. The properties all have single family dwellings and range from 0.33ha to 0.58ha in size.

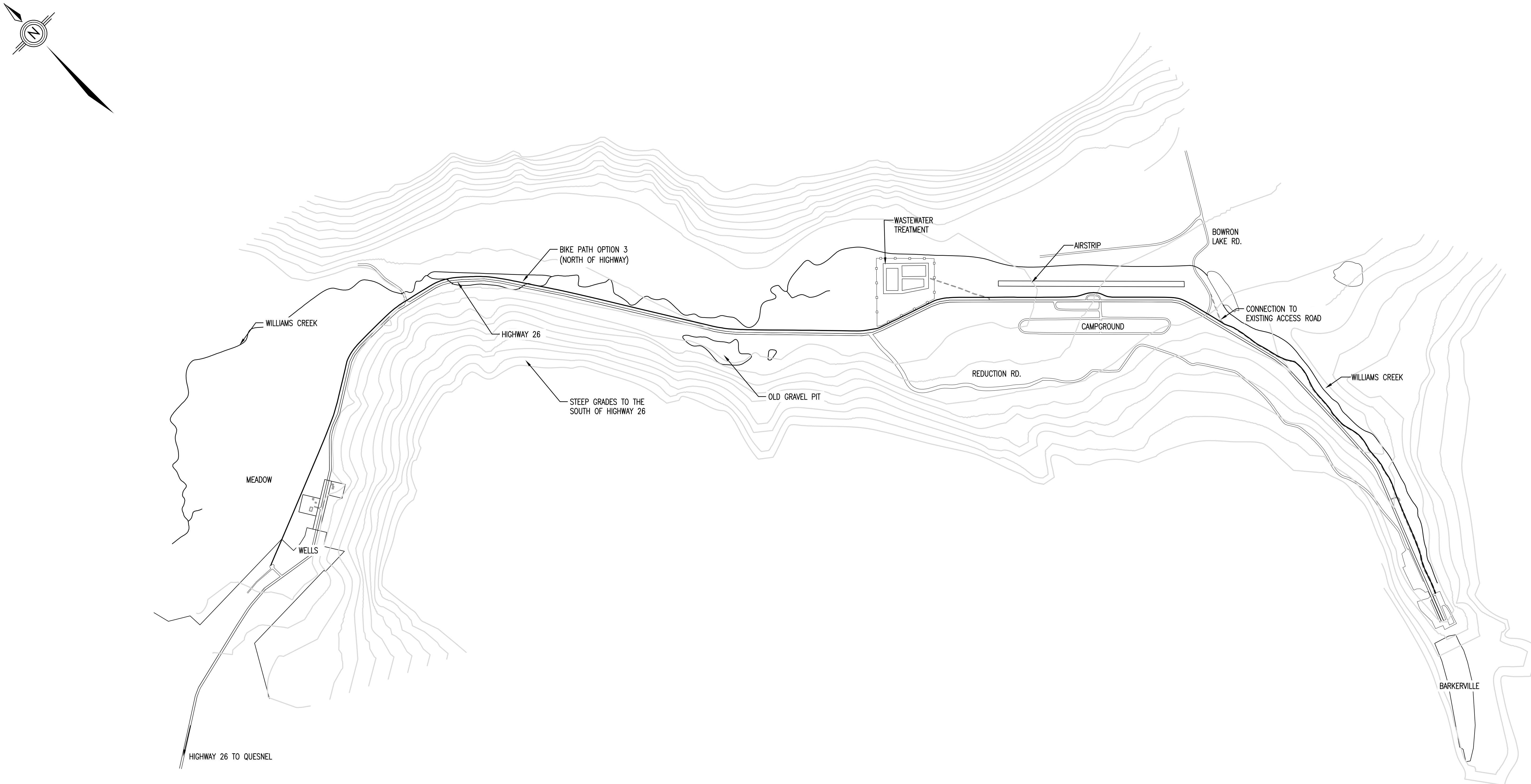

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FIGURE 2-1 - PROPOSED BIKE PATH - SITE PLAN

DISTRICT OF WELLS - WELLS-BARKERVILLE BIKE ROUTE STUDY

The meadow lands on the North side of the highway are predominantly reclaimed mining land from mining activity in the 1890s. There is an airstrip adjacent to the North side of the highway at station 4+300. There is also a community sewage treatment lagoon located on the North side of the highway, just to the West of the airstrip.

Figure 2-2. A private residence adjacent the highway to the South at 0+300m

On the South side of Highway 26, there is a gravel pit at station 2+400 and a campground at 4+000, both adjacent the highway. The power line between Wells and Barkerville runs parallel to the highway and is offset between 3 and 15 meters along the entire length of the South side of the highway.

2.3 Topography

The topography varies substantially between the North and South sides of the highway. On the South of the highway, the ground tends to slope steeply up away from the highway ditch. Lands on the North side of the highway are relatively flat for almost the entire length of the proposed trail (although low lying across the meadow) and may be more conducive to path construction.

On the South side of the highway, from station 0+000 to 3+100, the ground slopes steeply up away from the highway ditching at approximately 20-25%. Between station 3+100 and 4+700 the slopes are less significant. The South slopes are an issue again from station 4+700 to station 6+000 at the parking lot at Barkerville.

Where the proposed bike path would cross the Willow Creek Meadow, from station 0+000 to 3+400, land on the North side of the highway is between 2 and 5 metres lower than the highway, and is flat over the entire length. From station 3+400 to 4+900, on the North Side of the highway, the proposed bike path would lie between the highway and lagoon enclosure and the airstrip until it crosses Bowron Lake Road. From Bowron Lake Road to Barkerville, a bike path on the North side of the highway would follow an existing rough gravel path / access road that exists between the highway and Williams Creek. An example photo of the existing gravel path on the North side of Highway 26 is shown below.

Figure 2-3 Example of existing gravel path / access road from the Airport at Bowron Road to Barkerville.

2.4 Existing Highway Dimensions

Highway 26 is located within a 30m wide right-of-way, and consists of two 4.0 meter wide lanes, each with a 0.5 meter gravel shoulder. The ditches on both sides average 1.5m in depth, generally with 2:1 slopes. The ditch on the north side of the highway becomes steeper and extends to a depth of 5.0m near the wastewater lagoon to reflect the slight rise in elevation of the road.

2.5 Geotechnical Considerations

A detailed geotechnical investigation, including field investigations such as excavated soils test pits or drill holes was beyond the scope of this investigation. However, based upon visual observations and discussions with District staff, we have developed a sense of the soil conditions that might be expected along the corridor between Wells and Barkerville. There are likely to be geotechnical challenges on either side of the highway.

On the South side of the highway, steep slopes may significantly increase excavation volumes and require further investigation regarding slope stability or the presence of rock beneath the surface. Steep slopes, instability, clay soils or bedrock will increase the cost of construction on the South side of the highway.

The North side of the highway is much flatter with visible signs of native gravel soils in several locations along the route. From sta 3+300 to 6+450 the existing soils may be very well suited to bike path construction on the North side of the highway. From sta 0+000 to 3+300, along Williams Creek meadow, the land is low lying and might require that additional fill be imported to facilitate construction of the proposed bike path.

3.0 DESIGN CRITERIA

3.1 Transportation Association of Canada

Chapter 3.4 – Bikeways, of the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads provides guidelines for the design and analysis of bikeways. According to TAC, cyclists have four basic requirements whenever they ride including:

- Adequate space to ride
- A smooth riding surface
- The ability to maintain riding speed
- Connectivity along the bike route

These requirements apply equally, whether the route shares the roadway with vehicles or is located alone, as a separate path.

3.1.1 Space to Ride

Figure , on the following page, demonstrates a basic 1.0 meter wide bike lane envelope plus the added clearances recommended to be allowed from fixed objects, embankments, passing vehicles, etc.

3.1.2 Smooth Surface

In contrast to today's modern "off-road" mountain bikes, bicycles used for commuting or tourist recreation tend to have narrow tires inflated to relatively high pressures and have limited or no suspension. The surface of a bikeway should ideally be paved.

3.1.3 Speed Maintenance

For bicycles to be effective as a means of transportation, cyclists must be able to maintain speed without having to slow or stop unnecessarily. The design of a bicycle route should offer continuous riding, minimize steep grades, rough surfaces, sharp corners or the need to give way to other users.

3.1.4 Connectivity

Connectivity requires that a bike route be connected between links or end points. A partially complete or dead end route will not allow for a meaningful journey for a bicycle.

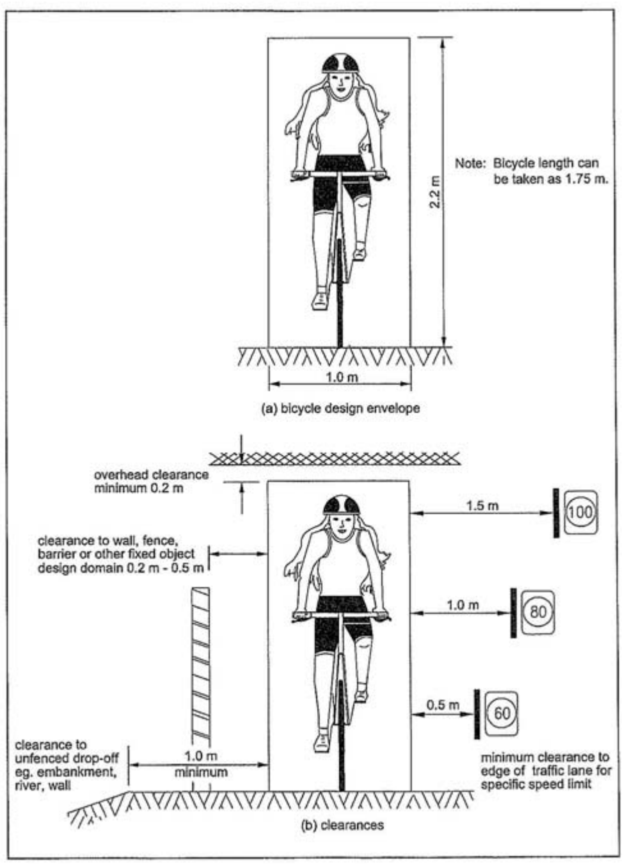


Figure 3-1 Recommended space constraints for bicycle commuters

3.1.5 Types of Bikeways

There are three basic types of bikeways that might apply to this project:

- A shared roadway requires the cyclist use the same lane as motor vehicle traffic. This matches the existing condition of Highway 26 between Wells and Barkerville.
- A shoulder bikeway is an improvement to a shared roadway, where wider than normal paved shoulders provide a suitable space for cycling with fewer conflicts with motor vehicles. Option 1 of this study would provide for shoulder bikeways on each side of Highway 26.
- Bike paths are physically separated from the roadway, and exclude vehicular traffic. Due to the inherent aesthetic and safety values, bike paths are frequently shared with walkers, joggers, etc. Option 2 and 3 of this study are each bike paths that would be constructed with significant portions of the respective routes constructed outside of the highway "clear zone". Figure 3-2 below shows an example of a commuter bike path.

Figure 3-2 Example of Commuter Path in Saanich, B.C.

3.6 Pavement Structure Design

The proposed bike path is not intended to support truck and heavy vehicle traffic. Accordingly, the minimum structure would be less than would otherwise be used for road construction. Conceptually the minimum bike path gravel and pavement structure might include:

- 50mm asphalt surface
- 100mm thickness 19mm minus crush gravel base
- Granular subbase, thickness varies depending on subgrade, native soil conditions

The exact pavement structure would vary along the route, depending on site specific conditions. For example, along low lying areas of the meadow, the subbase thickness might be increased to 600mm. Similarly, for bike lanes constructed along Highway 26, the Ministry of Transportation will likely require a pavement structure meeting MoT specifications for highway construction. This would allow vehicles, including heavy trucks and RV's to pull over to the side of the highway without damaging the proposed bike lanes.

The general structure of the proposed bike path is shown in 3-3, below.

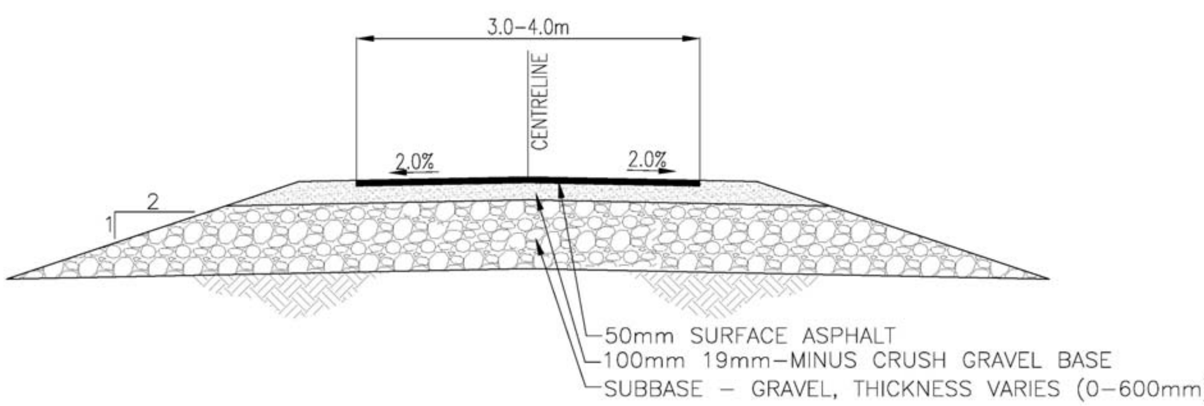


Figure 3-3 Typical Bike Path Pavement Structure

3.7 Permits and Regulatory Requirements

3.7.1 Ministry of Transportation

Under section 62 of the Transportation Act “all developers must apply for and receive a permit from the Ministry of Transportation before constructing or maintaining a work or structure or pipe on roads or land controlled by the Minister of Transportation”, including highway rights-of-way, which would likely apply to all three options. Additional permission may be required if option 1 were implemented due to construction involving the existing highway.

3.7.1 Ministry of Environment and Department of Fisheries and Oceans

Work undertaken in the meadow area to the North of the highway may require a review of the Ministry of Environment’s guidelines for working in and around water. When completing work in and about a stream the *Water Act* regulation applies, and a notification of work must be submitted to the Ministry of Environment prior to commencing work. The *Water Act* regulation permits stream crossings by way of installation, maintenance or removal of stream culverts for the purpose of a road, trail or footpath, as well as construction, maintenance or removal of clear-span bridges. Depending on the fish bearing potential of Williams Creek, other regulations might also apply, including the *Fisheries Act*, the *Fish Protection Act* and Riparian Area Regulation. The meadow area to the North of the highway (as shown in Figure 3-4) may also be considered an environmentally sensitive area, and as such extra care during construction would be required.

Figure 3-4 Williams Creek and the meadow area to the North of Highway 26

4 DESCRIPTION OF OPTIONS

4.1 Option 1 – Highway Shoulder Bike Lanes

Option 1 includes the widening of both sides of Highway 26 in order to construct new shoulder bike lanes. Each shoulder bike lane would be 2.0 meters wide, with a 1.0m gravel shoulder; effectively increasing the overall width of the roadway by 6.0m. A typical cross section of shoulder bike lanes are shown below in Figure 4-1.

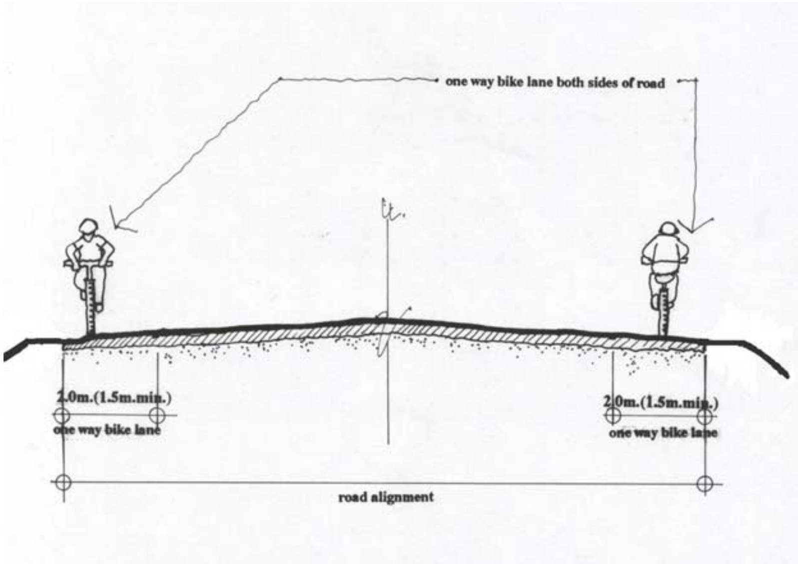


Figure 4-1 Option 1 cross section showing bicycle commuter space constraints

4.2 Option 2 – Dedicated Bike Path (South of Highway 26)

Option 2 is a dedicated two lane bike path, including 4.0 meter wide asphalt plus 1.0 meter wider gravel shoulders. Option 2 would be located on the South side of Highway 26, generally on the uphill side, above constraints such as ditches, power poles, private property, etc.

4.3 Option 3 – Dedicated Bike Path (North of Highway 26)

Option 3 is a dedicated 4.0 meter wide bike path, similar to Option 2, but located to the North of Highway 26. Figure 4-3, below, shows the conceptual location of the Option 3 bike path.

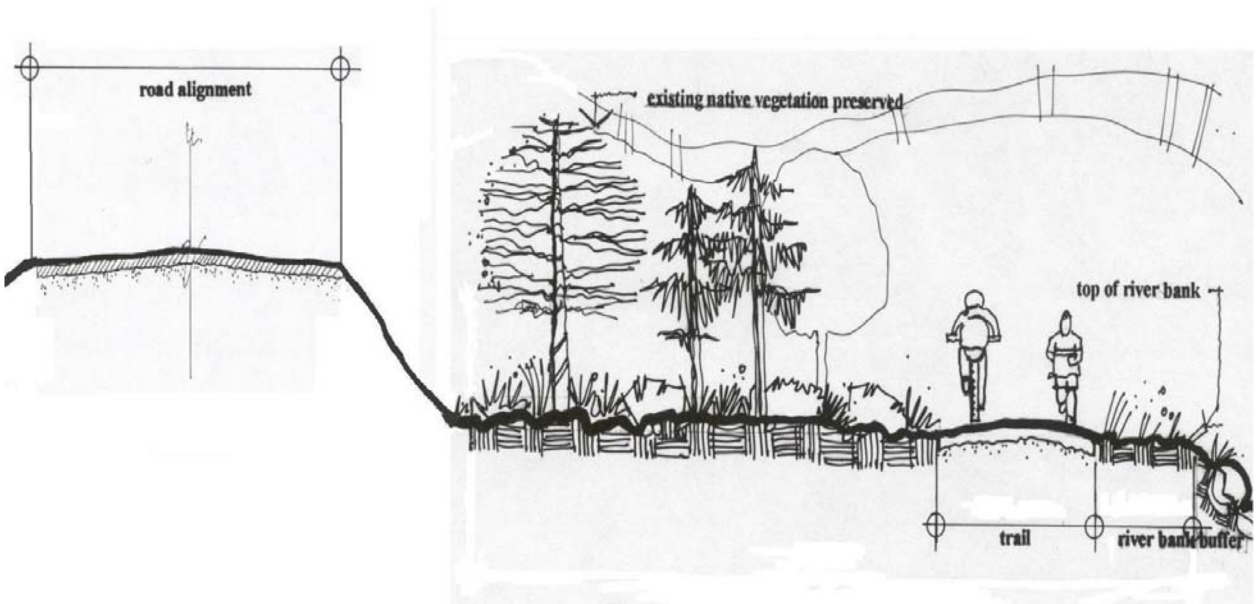


Figure 4-3
Cross section of Option 3 showing highway and meadow area adjacent Williams Creek

5 DISCUSSION OF OPTIONS

The main objective of this study is to determine the feasibility and cost of three commuter bike routes from Wells to Barkerville and to identify the preferred option.

5.1 Safety

The addition of shoulder bike lanes along Highway 26 would increase bicycle commuter safety slightly by increasing the overall width of the highway, allowing more room for commuters to travel, but not removing them from the highway altogether.

Option 2 and 3 would both generally be constructed outside of the highway “clear zone”. In the BC Ministry of Transportation Supplement to TAC Geometric Design Guide, a clear zone of 2.5 – 6.0 meters adjacent the highway is suggested for highways with a design speed of 80km/hour. By constructing a new bike path outside of the highway clear zone, the commuter safety risks associated with traffic along the highway would be essentially negligible.

5.2 Aesthetic Benefits

As Option 1 consists of highway shoulder bike lanes, there are very few additional aesthetic benefits to the option. Option 2 and 3 would greatly increase the aesthetic incentive to commute by bicycle, as the path would be separated from the highway, reducing vehicle noise and exhaust, and improving the view across the meadow. Arguably, Option 3 provides the greatest aesthetic benefit, especially where the path either crosses the meadow or parallels William’s creek. Option 3, to the North of the Highway, rather than South, in addition to it’s environmental aesthetics, would also provide less shade and greater exposure to Sun.

5.3 Land Use Conflicts

Option 1 would avoid the majority of land use conflicts as the design consists of shoulder bike lanes, and consequently the additional 5m of roadway width would not extend beyond the 30m right-of-way. There is a slight possibility of a conflict with the residences to the South of the highway at 0+300m and 0+450m as it is positioned relatively close to the edge of pavement of the highway. There is also a possibility that the ditching could extend beyond the right-of-way limit, particularly on the South side of the highway where grades away from the highway are steeper, however these instances are expected to be limited, and would most likely not produce any conflicts.

To the South of the highway there exists several land use conflicts including two private properties at approximately 0+200m and 0+450m, respectively, as well as a gravel pit at 2+500m and a campground from 3+800m. to 4+400m. As both residences are in close proximity to the highway, the proposed bike path would most likely be re-routed to the south of the properties, thereby increasing the option 2 alignment length, excavation volumes and construction costs. The gravel pit and campground are also adjacent the highway, and cannot be bypassed as easily as the private properties due to their size and the grades existing to the South of the highway. As the powerline that supplies power to Barkerville parallels the highway on the south side, difficulties would be encountered during construction, and potentially the power poles would be moved, further increasing the associated cost.

On the North side of the highway there are few land use conflicts, with only one private property between Wells and Barkerville. Conveniently, Option 3 does not conflict with this property, but instead crosses the meadow behind the property to a convenient path junction location at or near the Wells campground. There is a wastewater treatment lagoon at 3+500m and a 800m long airstrip beginning at 3+920m. As shown in the preliminary design drawings, there is likely sufficient distance between the airstrip and the backside of the highway ditch for the proposed bike path.

5.4 Cost Estimates

A key objective of this study is the review of options and costs for the proposed bike path along Highway 26. This section presents a summary of the preliminary cost estimates.

The costs for each option are summarized in Table 5-1, below. The estimated costs should be considered preliminary, Class D estimates and include a 35% allowance for engineering and contingencies.

Table 5-1. SUMMARY OF COST ESTIMATES

Option	Total Estimated Cost
Option 1 – Shared Shoulder Bike Lanes	$3,056,130.00
Option 2 – Dedicated Bike Path (South of Highway 26)	$4,243,360.50
Option 3 – Dedicated Bike Path (North of Highway 26)	$2,417,202.00

The cost estimates are based on estimated quantities from preliminary design drawings, with unit prices estimated using previous construction costs for similar projects and known local prices for materials as supplied by Wright Contracting of Wells, BC.
As might be expected, the cost for Option 2 South of Highway 26 would be the most expensive, due to the need for clearing and grubbing, the increased excavation volumes and the need for gravel sub base over the entire length of the path. Option 3 is expected to be the least expensive, as the topographical constraints allow for simpler and easier construction, while less excavation volume also reduces costs. Additionally, the presence of suitable sub base materials for the length of the existing access road eliminates the need for imported gravel sub base over a distance of 1,550 meters. Option 1 is moderately expensive comparatively, due to the required imported sub base along the entire length, however less expensive than Option 2, as little clearing and grubbing and lesser excavation would be required.

5.6 Preferred Option

The alignment, cross section, topographical constraints, safety and aesthetic benefits, land use issues and cost estimates for each have been discussed above. To determine the preferred option, the environmental and geotechnical issues must be considered and all the benefits and drawbacks must be evaluated simultaneously.

TABLE 5-2. COMPARISON OF OPTIONS

	Cost	Difficulty	Land Use Conflicts	Safety Benefits	Aesthetic Benefits	Environmental Issues	Geotechnical Issues
Option 1	Moderate	Low	None	Few	Few	Few	None
Option 2	High	High	Many	Many	Many	Few	Many
Option 3	Low	Moderate	None	Many	Many	Possible	Few

To adequately compare the three options and determine the preferred option, many project aspects have been considered, including estimated cost, feasibility of construction, land use issues, safety and aesthetic benefits and environmental and geotechnical considerations, all discussed in previous sections. It has become apparent through the comparison process, as well as through discussions with the District of Wells staff, that Option 3 to the North of the highway is the most desirable option.
Despite the obvious benefit of the lesser cost associated with Option 3, other benefits also incliude:

- Increased safety due to the path being removed completely from the highway
- Aesthetic value of the path being located through the meadow and parallel to the creek
- Fewer land use conflicts originating from private land ownership issues
- Ease of construction stemming from the lack of steep grades and clearing and grubbing requirements and,

- Use of the existing access road near Barkerville.

There are also slight drawbacks to Option 3, including the environmental sensitivity of the meadow area and Williams Creek, as well as the potential geotechnical consideration of path structural support in the meadow area, however these drawbacks are expected to be outweighed by the cost, safety, aesthetic and feasibility benefits associated with the option.

Options 1 and 2, while technically feasible, are likely to be more expensive and more difficult to construct due to land use conflicts and topographical constraints. These two options are also less desirable as they provide fewer safety and aesthetic benefits than Option 3.

5.7 Option 3 Refinement

Based on the anticipated cost of Option 3, there may be a need to refine the design and minimize costs to an amount that will facilitate construction. As the three options were compared using a preliminary design of maximum path pavement and shoulder width, there exists a possibility to reduce the width and lower paving, base and sub base costs.

The TAC manual indicated that an ideal paved width of 4 meters with two 1 meter wide shoulders would provide maximum safety and aesthetic benefits, however a path consisting of two 1.5 meter wide lanes with 0.5 meter shoulders would adequately serve the purpose of allowing commuters to safely travel between Wells and Barkerville. Based on the District's reliance on grants and limited funding opportunities, an additional cost estimate and attached figure showing the refined design is shown below.

Table 5-3. ESTIMATED COST –OPTION 3
(Assumes path width narrowed from 4.0 to 3.0 meters)

Description	Unit	Unit Price ($)	Quantity	Amount
From 0+000 to 4+900				
600mm Gravel Sub Base	m^3	30.00	16856	$505,680.00
100mm crushed gravel base	m^2	10.00	19600	$196,000.00
Paving (50mm)	m^2	25.00	14700	$367,500.00
From 4+900 to 6+450				
100mm crushed gravel base	m^2	10.00	6200	$62,000.00
Paving (50mm)	m^2	25.00	4650	$116,250.00

Total Cost	$1,247,430.00
Engineering (10%)	$124,743.00
Contingency (25%)	$311,857.50
Grand Total	**$1,684,030.50**

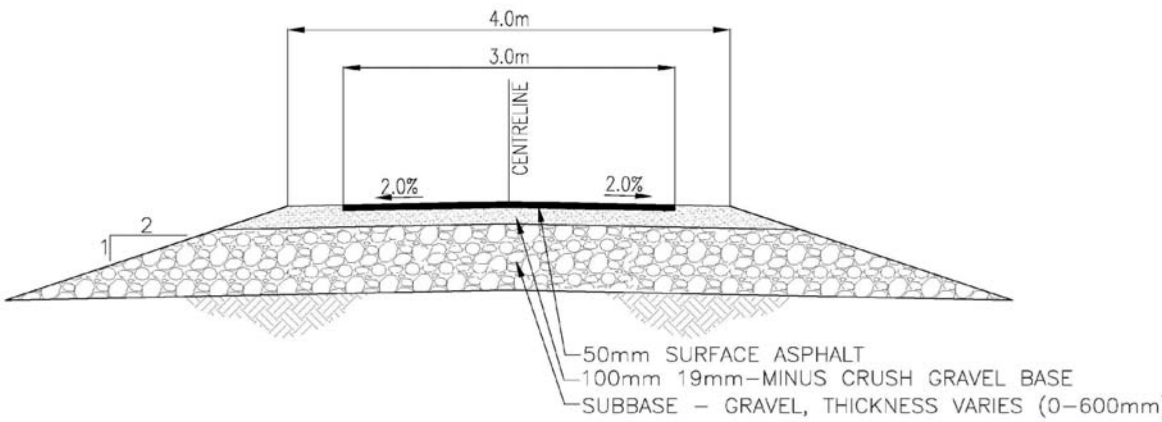


Figure 5-2 Refined Option 3 Bike Path

It can be seen from the above cost estimate that reducing the path to a total width of 4 meters from the original preliminary design of 6 meters reduces the estimated cost by approximately 30%, to a total of $1,684,030.50. This reduced estimated cost allows the project to become more feasible, while still serving essentially the same function.

6 FUTURE WORK

This report compared three bike path options including estimated costs, and issues such as bike path safety, environmental and aesthetic benefits. Prior to commencing detailed design or construction, however, several issues would need to be resolved. Future activities to be completed include:

- Environmental impact assessments of Williams Creek and the meadow area
- Geotechnical investigation of the meadow area
- Topographic survey to allow for more detailed and precise design

7 CONCLUSION AND RECOMMENDATIONS

This study presents options and costs for the three different bike path alignments and identifies the most desirable option. The proposed bike path project presents an opportunity for the construction of a dedicated commuter bike path that would reduce the safety risks associated with commuting on the narrow highway, provide an aesthetically pleasing commuting route between the two towns, further increase the tourism potential of the area, and provide the added environmental benefit of commuting by bicycle rather than driving.

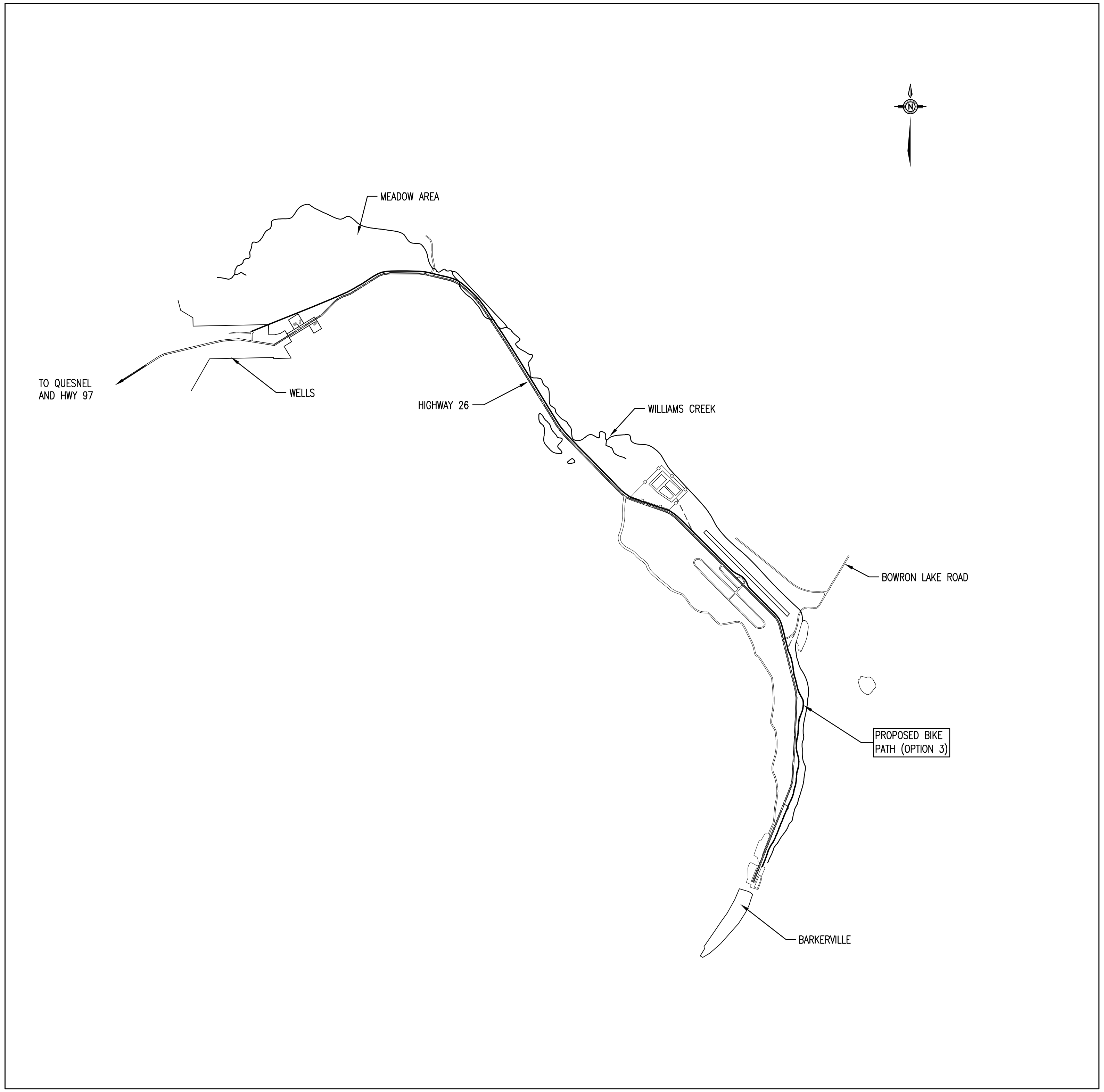
After reviewing the options and their associated costs, benefits and drawbacks, we recommend that Option 3, to the North of Highway 26, be pursued as the preferred option.

We look forward to presenting this study to the District in person and to assisting the District with further discussions as this project moves forward.

Prepared by:	Reviewed by:
Liam Baker, E.I.T. Assistant Project Engineer	Scott Bilbrough, P.Eng Senior Project Manager.

Appendix A

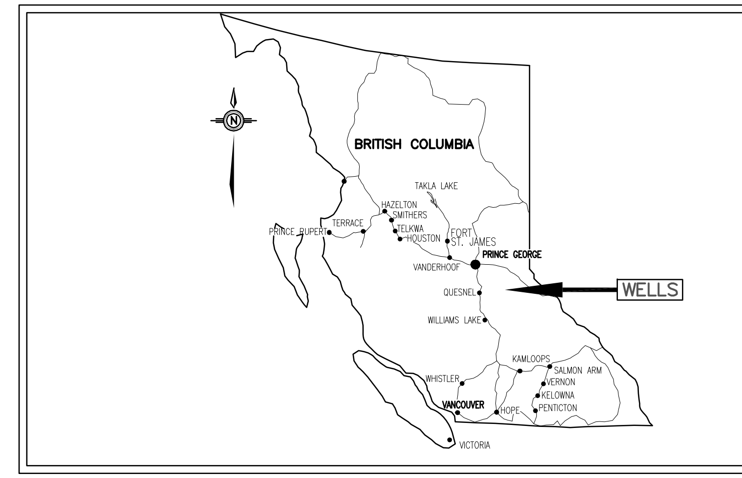
Preliminary Design Drawings



AREA PLAN

NOTES :

1. ALL DIMENSIONS & ELEVATIONS IN METERS OR MILLIMETERS
2. DRAWINGS BASED UPON EXISTING APPROXIMATE CONTOURS.
3. ALL WORK TO CONFORM TO MMCD – MASTER MUNICIPAL CONSTRUCTION DOCUMENT SPECIFICATIONS UNLESS OTHERWIST NOTED IN THE DRAWINGS OR CONTRACT DOCUMENTS.



KEY PLAN

INDEX TO DRAWINGS

No.	TITLE
	GENERAL
G0	KEY PLAN – AREA PLAN – INDEX TO DRAWINGS
G1	SITE PLAN
G2	STATION 0+000 TO 1+600
G3	STATION 1+600 TO 3+200
G4	STATION 3+200 TO 4+900
G5	STATION 4+800 TO 6+400
G6	OPTION 3 CROSS SECTION (STA. 2+500)
G7	OPTION 3 CROSS SECTION (STA. 6+500)

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WELLS-BARKERVILLE BIKE ROUTE STUDY
CONTRACT No. - 638.001

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AutoCAD DRAWING

REVISIONS

ISSUE	DATE	DRAWN	CHK'D	APP'D	DESCRIPTION	ISSUE	DATE	DRAWN	CHK'D	APP'D	DESCRIPTION
A	25.11.09	LDHB	SRB	SRB	ISSUED FOR REVIEW						
B	04.12.09	LDHB	SRB	SRB	ISSUED FOR SUBMITTAL						

DESIGNED SRB
DRAWN LDHB
CHECKED SRB

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WELLS–BARKERVILLE BIKE ROUTE STUDY
KEY PLAN–AREA PLAN–INDEX TO DRAWINGS

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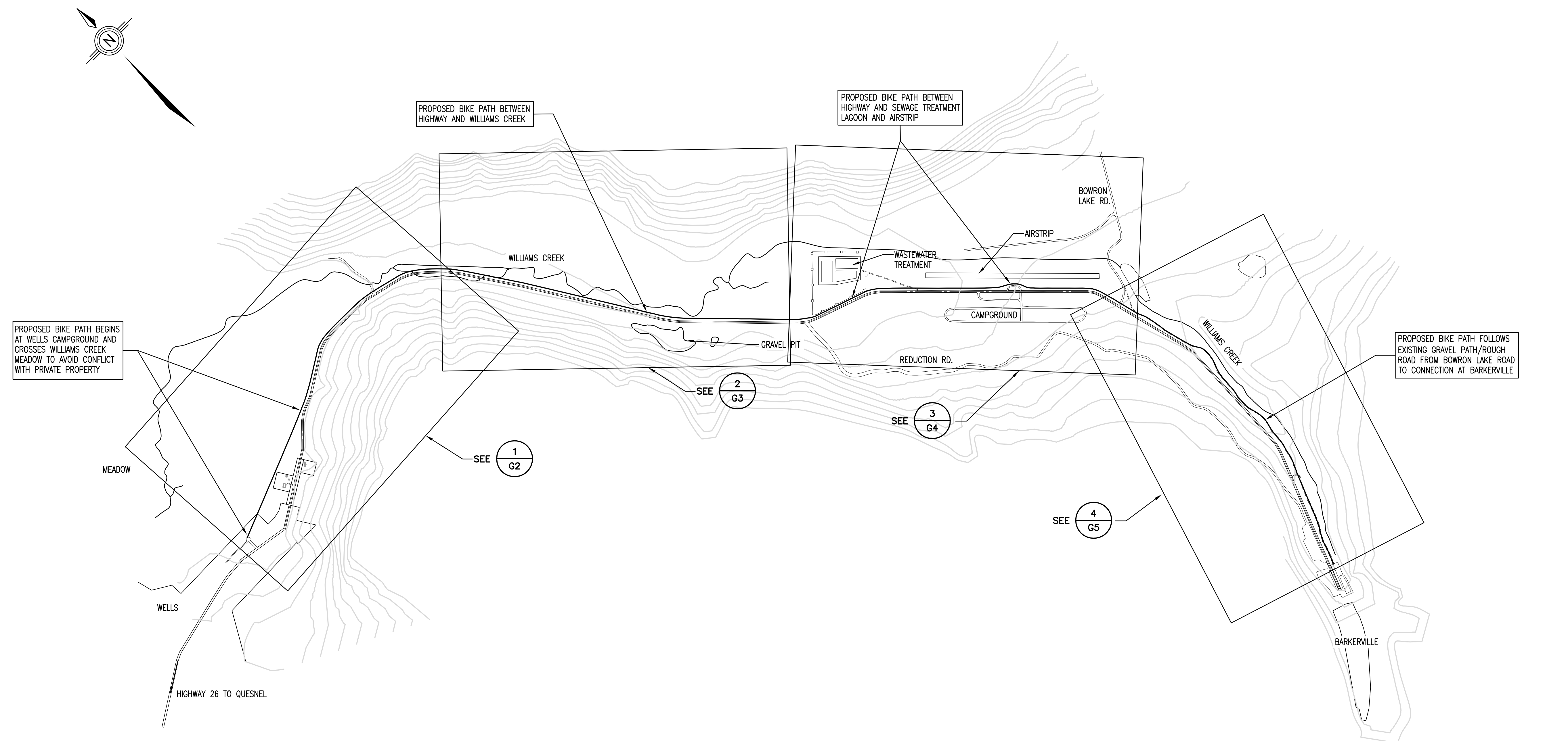

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REVISIONS

ISSUE	DATE	DRAWN	CHK'D	APP'D	DESCRIPTION	ISSUE	DATE	DRAWN	CHK'D	APP'D	DESCRIPTION
A	25.11.09	LDHB	SRB	SRB	ISSUED FOR REVIEW						
B	04.12.09	LDHB	SRB	SRB	ISSUED FOR SUBMITTAL						

DESIGNED LDHB
DRAWN LDHB
CHECKED SRB

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DISTRICT OF WELLS
WELLS–BARKERVILLE BIKE ROUTE STUDY
SITE PLAN

SCALE: 1:10000
DRAWING No. 638.001
SHEET No. G1 ISSUE B
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PLOT: FULL HALF 1:2

AutoCAD DRAWING

REVISIONS					
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DISTRICT OF WELLS
WELLS–BARKERVILLE BIKE ROUTE STUDY
PROPOSED BIKE PATH
STATION 0+000 TO 1+600

SCALE: 1:2000
DRAWING No. 638.001
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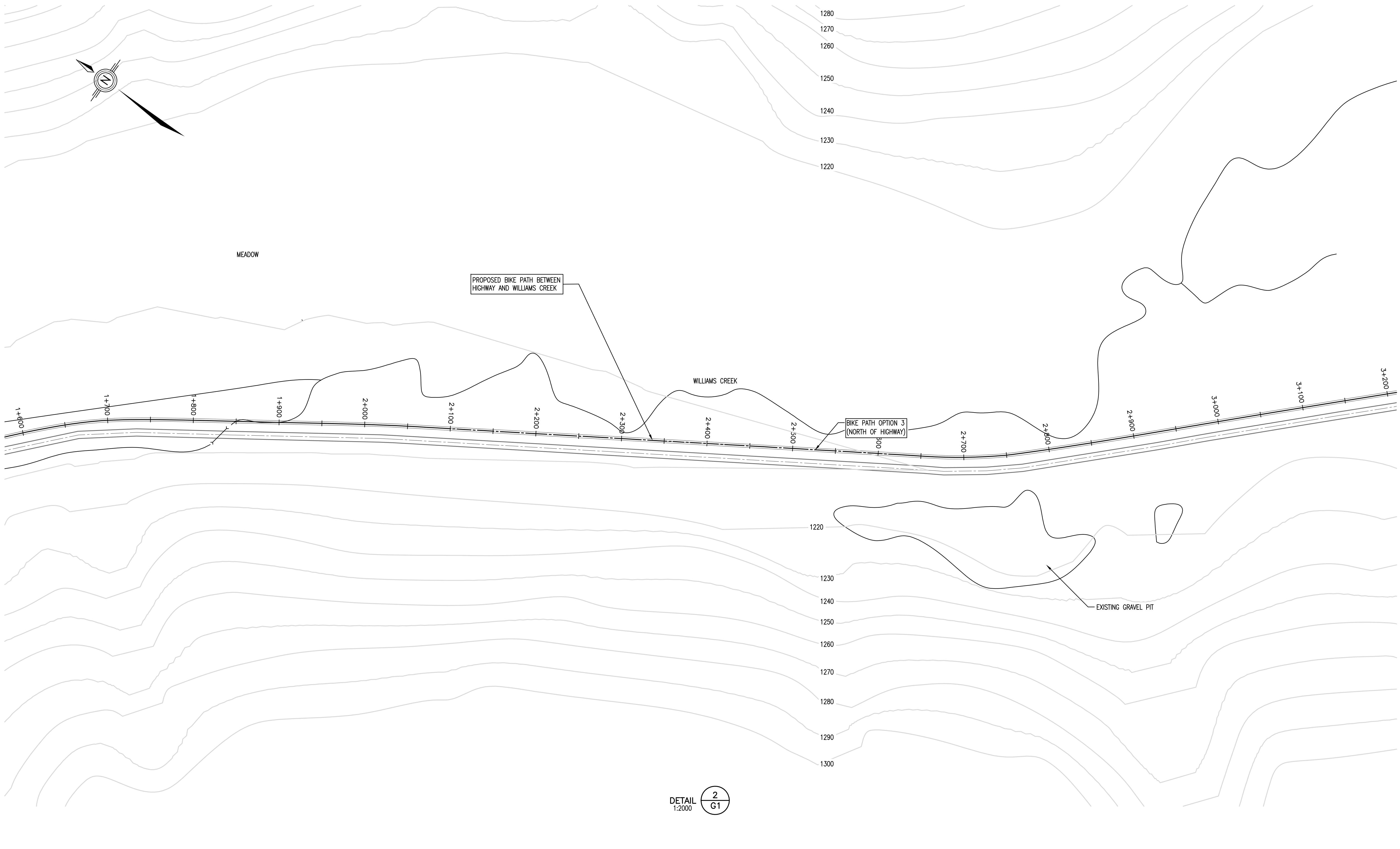

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PLOT: FULL HALF 1:2

AutoCAD DRAWING

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DISTRICT OF WELLS
WELLS–BARKERVILLE BIKE ROUTE STUDY
PROPOSED BIKE PATH
STATION 1+600 TO 3+200

SCALE: 1:2000
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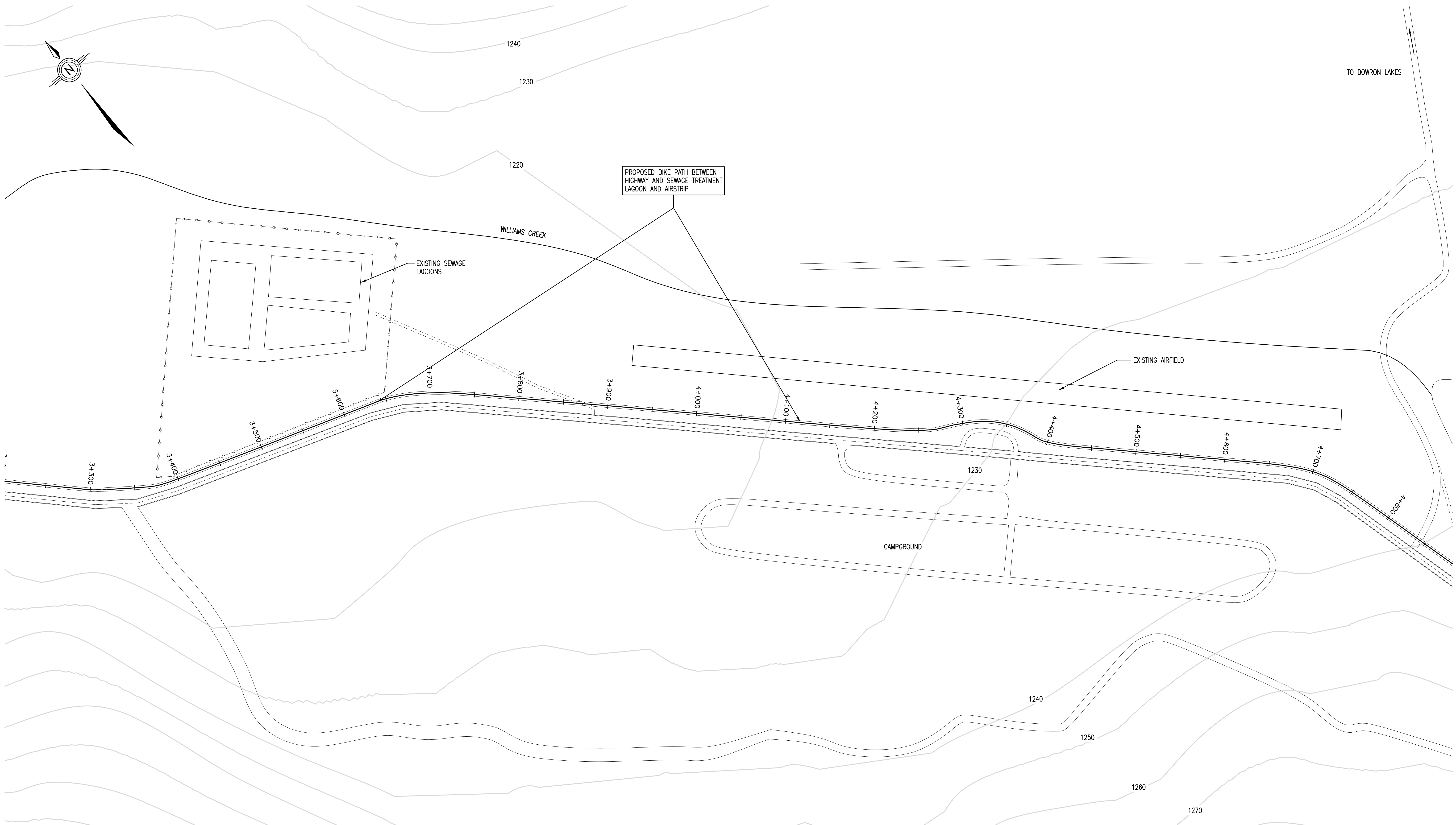

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AutoCAD DRAWING

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DISTRICT OF WELLS
WELLS–BARKERVILLE BIKE ROUTE STUDY
PROPOSED BIKE PATH
STATION 3+200 TO 4+900

SCALE: 1:2000
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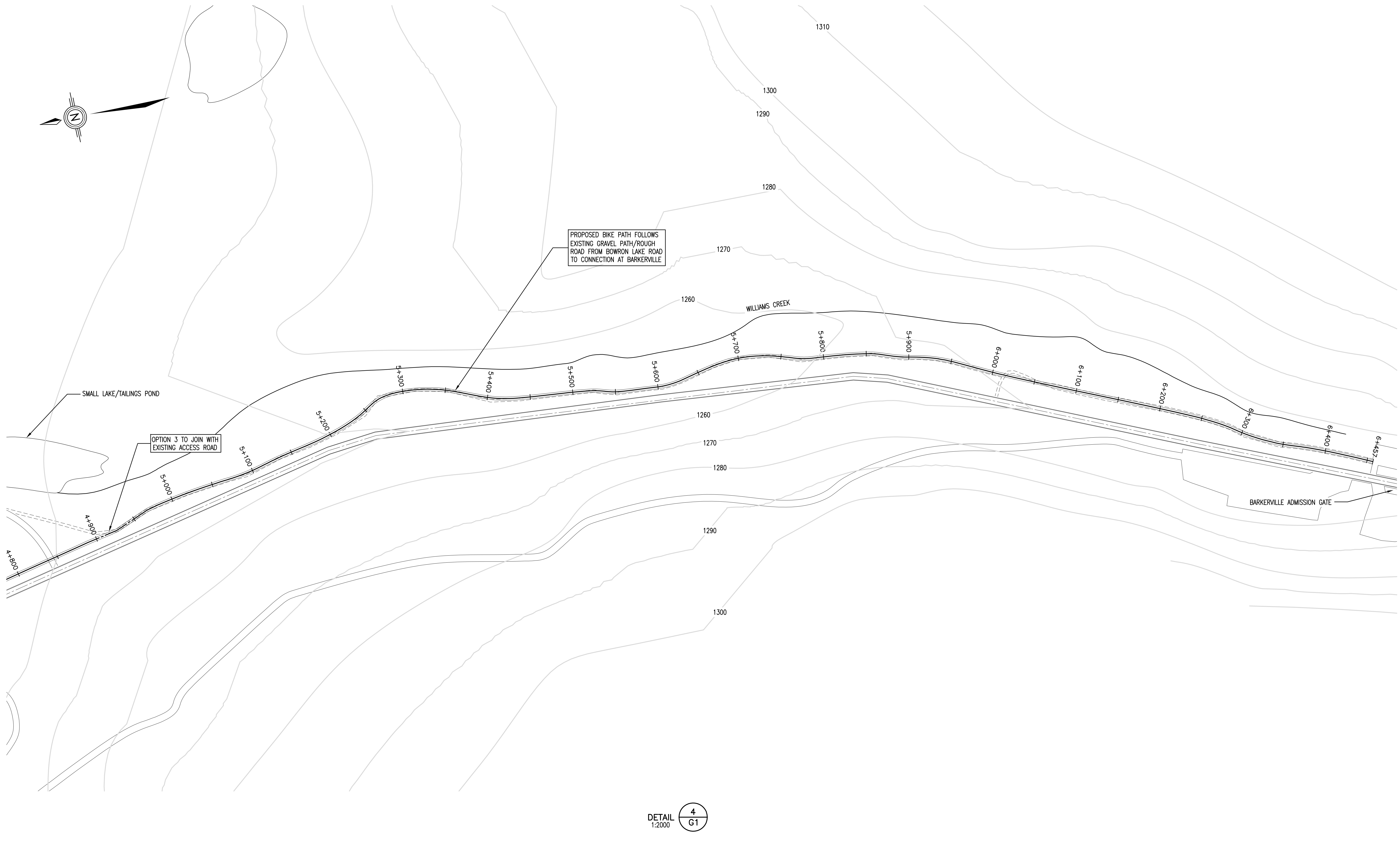

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AutoCAD DRAWING

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DISTRICT OF WELLS
WELLS–BARKERVILLE BIKE ROUTE STUDY
PROPOSED BIKE PATH
STATION 4+800 TO 6+457

SCALE: 1:2000
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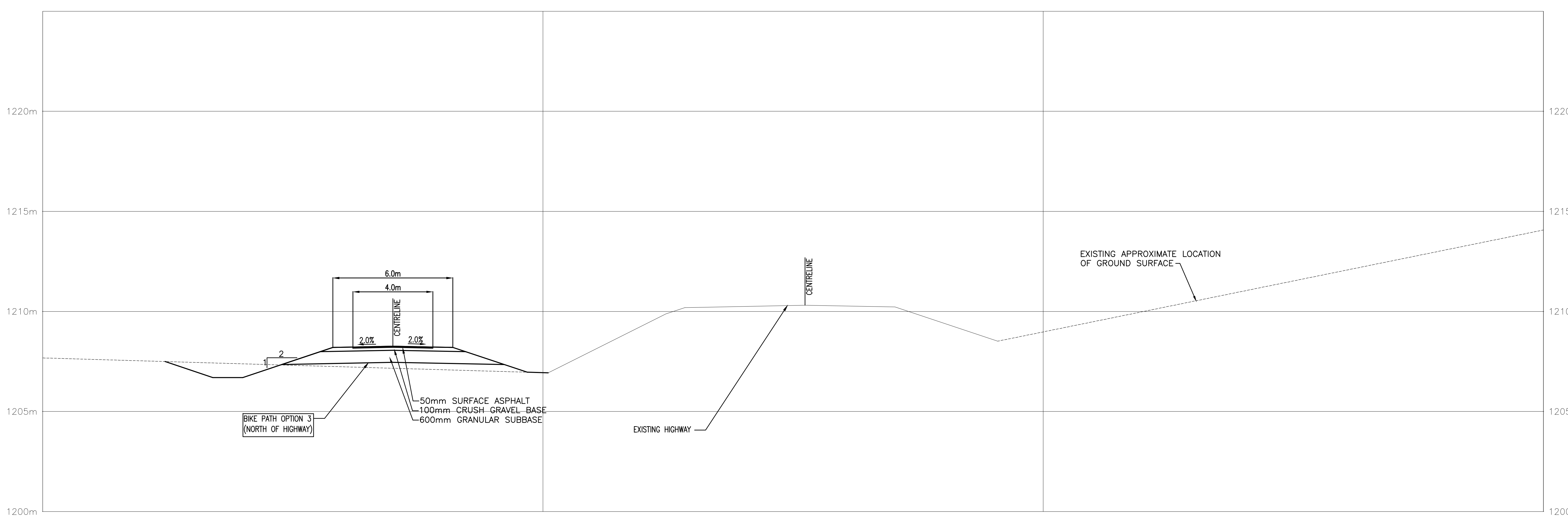

OPTION 3 CROSS SECTION (STA. 2+500)

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DISTRICT OF WELLS
WELLS–BARKERVILLE BIKE ROUTE STUDY
OPTION 3 CROSS SECTION (STA. 2+500)

SCALE: AS SHOWN
DRAWING No. 638.001
SHEET No. G6 ISSUE B
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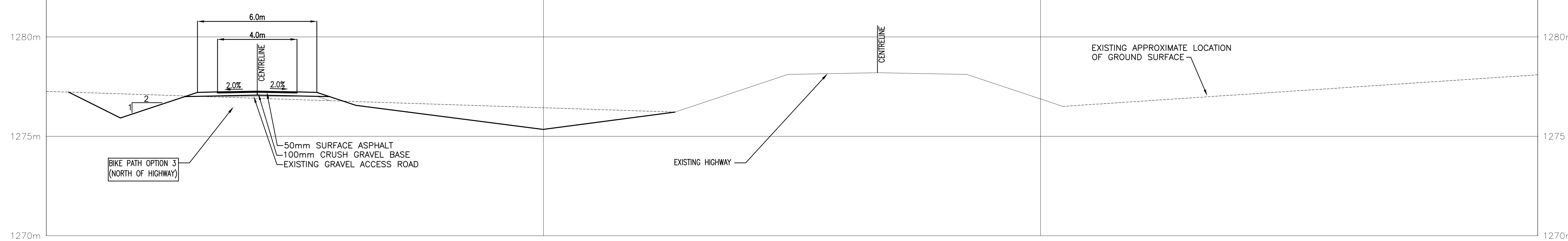

OPTION 3 CROSS SECTION (STA. 6+500)
1:100

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PLOT: FULL HALF 1:2

AutoCAD DRAWING

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DISTRICT OF WELLS
WELLS–BARKERVILLE BIKE ROUTE STUDY
OPTION 3 CROSS SECTION (STA. 6+500)

SCALE: AS SHOWN
DRAWING No. 638.001
SHEET No. G7 ISSUE B
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Appendix B

“Class D” Cost Estimates

Date: October 2009

PROJECT COST ESTIMATE

Client: District of Wells

Dayton & Knight Contract No.: 638.001
Description: Bike Path Feasibility Study Option 1

Option 1 (Attached to Highway)

Description	Unit	Unit Price ($)	Quantity	Amount
From 0+000 to 6+250				
Excavation to waste	m^3	15.00	25000	$375,000.00
600mm Gravel Sub Base	m^3	30.00	30960	$928,800.00
100mm crushed gravel base	m^2	10.00	36000	$360,000.00
Paving (50mm)	m^2	25.00	24000	$600,000.00
Total Cost				$2,263,800.00
Engineering (10%)				$226,380.00
Contingency (25%)				$565,950.00
Grand Total				**$3,056,130.00**

Date: October 2009

Dayton & Knight Ltd.
CONSULTING ENGINEERS

PROJECT COST ESTIMATE

Client: District of Wells

Dayton & Knight Contract No.: 638.001
Description: Bike Path Feasibility Study Option 2

Option 2 (South of Highway)

Description	Unit	Unit Price ($)	Quantity	Amount
From 0+000 to 3+100 and 4+550 to 5+923				
Excavation to Waste	m^3	15.00	85250	$1,278,750.00
600mm Gravel Sub Base	m^3	30.00	23080	$692,400.00
150mm crushed gravel base	m^2	10.00	26838	$268,380.00
Paving (50mm)	m^2	25.00	17892	$447,300.00
From 3+100 to 4+550				
600mm Gravel Sub Base	m^3	30.00	7480	$224,400.00
150mm crushed gravel base	m^2	10.00	8700	$87,000.00
Paving (50mm)	m^2	25.00	5800	$145,000.00
Total Cost				$3,143,230.00
Engineering (10%)				$314,323.00
Contingency (25%)				$785,807.50
Grand Total				**$4,243,360.50**

Date: October 2009

PROJECT COST ESTIMATE

Client: District of Wells

Dayton & Knight Contract No.: 638.001
Description: Bike Path Feasibility Study Option 3

Option 3 (North of Highway) - 4m wide

Description	Unit	Unit Price ($)	Quantity	Amount
From 0+000 to 4+900				
600mm Gravel Sub Base	m^3	30.00	25284	$758,520.00
100mm crushed gravel base	m^2	10.00	29400	$294,000.00
Paving (50mm)	m^2	25.00	19600	$490,000.00
From 4+900 to 6+450				
100mm crushed gravel base	m^2	10.00	9300	$93,000.00
Paving (50mm)	m^2	25.00	6200	$155,000.00
Total Cost				$1,790,520.00
Engineering (10%)				$179,052.00
Contingency (25%)				$447,630.00
Grand Total				**$2,417,202.00**