The E&N Rail Trail – Building on the Capital Regional District's Trail Network

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Abstract

The Capital Regional District (CRD) manages 85 kilometres of pedestrian and bike paths consisting of the Galloping Goose and Lochside Trails. These facilities are the backbone of a 475 kilometre CRD cycling network which includes bike lanes on roads, trails and shoulders on selected roads. The Galloping Goose Trail provides a direct link for cyclists between the urban core and the fast growing suburbs in the western parts of the CRD and was constructed on an abandoned railroad alignment (a Rail to Trail). A new trail being constructed by the CRD in 2009, the E&N Rail Trail, will be constructed within a railway corridor and alongside a functioning railway (a Rail with Trail). The E&N Rail Trail will traverse two First Nations lands and five municipalities and will link all of these with Downtown Victoria.

The Galloping Goose and Lochside Trails have been very popular and a high proportion of the region's estimated 40,500 daily bike trips travel on these paths. They are also partly responsible for Victoria's high bike mode share for work trips which at 4.8% is almost triple the Canadian average for metropolitan areas of 1.7% and almost double that of the next highest metropolitan area, being Saskatoon at 2.5% (1).

This paper outlines some of the design constraints, such as the narrow railway corridor and safety concerns for trail activities immediately adjacent to an operating railway line, and how the implementation of the E&N Rail Trail will add another valuable link to the CRD's pedestrian and bike path system.

1.0 Introduction

1.1 GENERAL

Every day, thousands of Greater Victoria residents safely use and enjoy the Capital Regional District (CRD) park trails. A pedestrian and bike trail on the Esquimalt and Nanaimo (E&N) Rail railway corridor has been one of the recommended actions for meeting the goals and objectives of the CRD's Regional Growth Strategy (RGS) which is the strategic plan for the region, and their transportation strategy called "Travel Choices". The RGS transportation vision is a balanced and sustainable transportation system providing residents with reasonable and affordable transportation choices that enhance overall regional quality of life. The mission of Travel Choices is to increase the proportion of walking, cycling, transit and ridesharing and the use of other alternatives to driving alone.

The E&N Rail Trail, which will ultimately form part of the Trans Canada Trail, was identified as a priority project in the CRD Travel Choices Investment and Implementation Plan (TIIP). The TIIP ranked projects for eligibility for Federal funding under the New Deal For Towns and Cities program implemented in 2005. The funding source for this program is rebates from the Federal Gas Tax and eligibility is determined on meeting sustainability goals such as Greenhouse Gas reduction.

The proposed 17 kilometre pedestrian and bicycle path along the E&N Rail corridor provides an opportunity for the CRD to continue with the very successful trail program in the lower Vancouver Island region. This proposed new trail is to be called the E&N Rail Trail. The purposes of the E&N Rail Trail are to provide quality recreational trail and tour opportunities, enhance the local economy, protect the health and beauty of the natural environment, promote healthy lifestyles and foster community pride and participation (or "participaction"). It represents all trail interests including trail user groups, managers and owners and community organizations. CRD engaged Stantec Consulting Ltd. (Stantec) to undertake the Detailed Design, prepare Tender Documents and provide Construction Management services during the construction phase.

For design purposes this trail is termed a "Bike Path" in the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR); the term "Rail Trail" is used as it has been commonly adopted terminology to describe this kind of public facility throughout North America when the trail is constructed adjacent to an existing operating railway line. As a distinction, it is noted that Rails to Trails also exist, wherein existing abandoned railway lines have been converted to trails, such as part of the Galloping Goose trail in Victoria.

Key components of this design that meet the RGS goals and objectives are:

- A continuous route that ties into other Municipalities' cycle and transportation networks
- Access provided from the Trail to surrounding amenities such as schools, public open spaces and footpaths on surrounding roads
- New paved surfaces for the entire length of the trail
- Longitudinal grades kept as flat as possible (preferred maximum 5%)
- Provision of safe crossings at all roads and railway lines
- Provision of new overpass structures across existing major roads
- Adoption of consistent design practices to those used on other CRD bike paths

The GDGCR suggests a lane width design domain of 3.0 m to 4.0 m for two-way, shared with pedestrian bike paths. The objective of this project was to provide a trail width of 4.0 m, with a preferred minimum of 3.5 m where required due to design constraints. CRD's experience has been that there is a dramatic decrease in the number of complaints from trail users when the path width is increased from 3.0 m to 3.5 m, with 4.0 m being considered an ideal balance between functionality and cost.

1.2 SCOPE OF THE PROJECT

This project includes design, tender, construction administration and resident inspection services for 17 kilometres of new rail trail along the E&N Rail corridor. The first 8.5 kilometres of the route from the Johnson Street Bridge in Victoria was surveyed and a feasibility study undertaken as part of a commission to CRD in July, 2002. A further analysis of this section was undertaken during the Preliminary Design stage of the E&N Rail Trail project to confirm the various options for routing. The remaining 8.5 kilometres of trail out to Humpback Road in Langford was surveyed by Stantec in the Predesign stage and a preferred alignment determined in consultation with CRD.

Stantec prepared a design criteria and parameters document that was reviewed and approved by CRD, and which formed the basis of progressing to Detailed Design. The designs are considered to be efficient and economical with a strong awareness safety, construction implications of local conditions and contractor's abilities. The basic parameter of the design provided CRD with a cost-effective and low maintenance asset.

Photo 1 – E&N Railway Corridor, Esquimalt, BC

1.3 STAKEHOLDER CONSULTATION

Government and service authorities consulted during the design stage included:

- Southern Railway of Vancouver Island (the railway operator)
- Island Corridor Foundation (the rail corridor owner)
- BC Hydro
- BC Ministry of Transportation and Infrastructure
- BC Safety Authority
- Canadian National Institute for the Blind
- Capital Bike and Walk Society
- City of Colwood
- City of Langford
- City of Victoria
- Esquimalt Nation (through CRD)
- Greater Victoria Regional District Mayors Group
- Greater Victoria School Board
- Public Works and Government Services Canada
- RCMP
- Recreation Integration Victoria
- Songhees First Nation (through CRD)
- Telus

- Terasen Gas
- Town of View Royal
- Township of Esquimalt
- Vancouver Island Cycle Tourism Alliance
- Victoria Police Department

1.4 PROJECT CENTRELINE

The centerline of the proposed trail was determined independently of the existing E&N Railway in order to have flexibility in achieving the desired grades and to minimize excavation of railway and other embankment materials.

2.0 DESIGN ISSUES

The following design issues were addressed during the Detailed Design phases of the project.

2.1 SAFETY

Safety of the trail user was a primary design requirement, with various safety issues being identified in the early stages of the project. Proximity to the existing tracks was to be considered, even though the rail was only being used for a tourist rail service between Victoria and northern destinations (Nanaimo/Courtney/etc) wherein the Via Rail Dayliner made one trip northward from Victoria in the morning returning back to Victoria in the evening. There is currently a study being undertaken by the BC Ministry of Transportation regarding the business case for developing the E&N Railway line to provide a commuter rail service, which could see an increase in the daily number of trips being increased to up to 24 trips per day or higher, depending on the number of hours service, number of trains and number of sidings that may be constructed. The design needed to assume the rail would be used and safety issues of a trail by a rail needed to be included. Grade separation would be the easiest solution but as vertical and/or horizontal separation was not available along the entire 17 kilometres of the trail other safety alternatives had to be investigated.

Crossing of the rail track needed to be considered and was identified as a potential conflict point; the resulting design objective was to keep the crossings to a minimum. The final design resulted in only five railway crossings, with two of them being through existing roadway signalized intersections.

In order to meet the requirements of the American Disabilities Act (and as supported by the BC Building Code) it was proposed to keep the trail at maximum 5 percent grade and with side slopes or retaining walls in excess of 0.6 m high being protected by a 1.4 m high plastic coated chain link fences.

The US Department of Transport Federal Highway Administration (FHWA) studies have shown that the presence of a painted path center-line influences the traveling behavior of bicyclists and encourages bicyclists to move in a single file if necessary, reducing the potential of a head-on collision (2). Although this trail will be 2 m wide in each direction, and wide enough for bicyclists to

ride tandem (side by side) in each direction and pass safely in opposites direction, it was recommended that a 100 mm wide solid yellow center-line be used to provide additional safety and promote proper lane recognition.

Additional items that were considered but were not deemed necessary as part of the final design included:

- Closed Circuit Cameras (because the trail itself would help reduce criminal events)
- Trail Lighting (as trail users could avoid the trail at night and other users would assume to have own lighting as necessary)
- Phones (due to the prevalence of cellular phones)
- Detector loops in pavements for signalized intersection activation (to avoid cyclists riding through intersections and becoming accustomed to this in the event the mechanism fails).

In order to ensure service and emergency vehicles can access trail, while restricting unwanted vehicles, it was suggested that removable bollards be placed at road junctions with the trail. CRD was consulted on the appropriate bollard design as there were minor but important details to be considered by the maintenance crews, such as the locks being located high enough to avoid dirt being splashed onto the locks when it rains and to be protected from animals fouling the locks.

2.2 FENCING

It was identified early on in the project that there were numerous pathways existing between surrounding streets and the railway corridor, as evidenced by worn/trampled vegetation on site. It was anticipated that the access points from surrounding road networks and other public open spaces were sufficient to provide unfettered access to the Rail Trail by local residents, but that these access points should be regulated and minimized to help avoid people crossing at inappropriate and unsafe locations. However, it was not guaranteed that the public would adhere strictly to the access points only that they were provided, and that they may forge individual and unapproved trails to the Rail Trail. It had been discussed with all relevant Municipalities that fencing would be installed at the most significant access points in order to discourage people from gaining access to the rail corridor at an uncontrolled location, and that this would be monitored after opening of the trail to find out what undesignated paths are forged. The ultimate effectiveness of the fencing would be determined by the level of cooperation adopted by the public. While all reasonable efforts would be taken to provide reasonable access, the more robust the fencing the more expensive the construction cost which had to be considered for a value-for money perspective. Fencing to restrict access to adjacent lands was proposed as 1.8 m high chain link.

The US Department of Transport Federal Highway Administration's Rails-with-Trails: Lessons Learned *Literature Review, Current Practices, Conclusions* (5) provides many examples of different types of fencing at different offsets from the railway centerlines ("setbacks"). The report states:

> *"The range of trail setback on the existing RWTs varies from less than 2.1 m (7 ft) to as high as 30 m (100 ft) (see Figure 5.7), with an average of almost 10 m (33 ft) of setback from the centerline of the nearest track. A comparison of RWT setback distance to both train speed and frequency reveal little correlation; over half (33 of 61) of the existing RWTs have 7.6 m (25 ft) or less setback, even alongside high speed trains"*

Given that there did not appear to be any specific design criteria to choose any particular fence type, height or setback for any given set of site conditions, it was left to the engineer's discretion in consultation with stakeholders to determine the most appropriate design details. With a 3.0 m wide trail as the minimum width, allowing for shoulders, retaining walls on both the inside and outside of the trail and the necessary train operating envelope, a setback of 3.24 m was adopted for the 15 m wide railway corridor (refer Figure 7.1 at end of report which shows the original design of 3.5 m trail and 2.74 m setback – since amended to 3.0 m and 3.24 m respectively). This provides a 0.8 m clearance between the outside of the train operating envelope and the fence line.

SVI noted that they require 3.65 m clearance from the railway centerline for railway tie replacement and for their brushcutter to undertake weed control activities. As the fence will only be on one side of the track at any location, it is anticipated that SVI will be able to replace ties despite the fence installation being located closer than 3.65 m on one side. CRD has undertaken a commitment to provide weed maintenance along areas where SVI can not operate their brushcutter as part of their ongoing maintenance program of works.

The fence type selected was a 1.2 m high plastic coated chain link fence with a 150 mm gap at the bottom to allow for small native animals to cross the railway corridor unhindered. Concern was raised that this could allow pets using the trail to access the railway line (and potentially have a pet owner chase after it if a train is approaching), but considering the trail would be signed for use by dogs on leashes only this hazard was assessed as being a low risk and that a 150 mm gap would only allow very small animals to breach the fence line. In addition, the lower fence height (versus 1.8 m high noted above) was to provide a less difficult height for scaling should anyone be caught inside the fence line with an approaching train.

2.3 TRAIL USERS WITH VISION LOSS

In consultation with Recreation Integration Victoria (RIV) and the Canadian National Institute for the Blind (CNIB) a 100 mm wide solid white painted edge line was also proposed to assist visually impaired people identify the edge of the trail.

Several options were investigated for providing audio tactile devices at road crossings. The choice was between score lines placed in concrete with the lines running parallel to the direction of travel (as adopted by the City of Vancouver (3)), or tactile walking surface indicators (TWSIs) in the form of truncated domes (as supported by CNIB). Truncated domes were considered as they are mandated by the FHWA in the US for road crossings as per the requirements of the Americans with Disabilities Act and ADA Accessibility Guidelines (4). In-line rollerblade user groups were consulted regarding the possible affect of either of these options affecting their activities and the responses ranged from no or little affect, to truncated domes being a problem to score lines being a problem. No consensus was reached on which option was better from their perspective. The BC Ministry of Transportation had also conducted some research on what options were available for road crossings on their projects and are currently considering adopting score lines over truncated domes as their standard design requirement. Without a detailed study of which option should be pursued for this or any other project in general, it was decided to proceed with the City of Vancouver preference of score lines in concrete.

2.4 DRAINAGE

Treatment of runoff using grass swales, control of inflow into receiving waters and siltation control during and post construction were developed in the Detailed Design stage. The trail was sloped at 2% toward the railway corridor centerline to avoid runoff towards and into adjacent properties. Runoff from the trail surface was captured via gravel-filled trenches with perforated drainage pipes leading to established piped/positive drainage networks. Consideration is being given to sloping the trail away from the railway centerline and catching the runoff via catch basins and piped storm sewer system, pending final approval and agreement with SVI.

2.5 PROJECTED TRAIL TRAFFIC VOLUMES

The CRD has estimated on previous counts that the current ridership on the Galloping Goose is approximately 600,000 trips per year, which was used as a basis to determine Equivalent Adult Units (EAUs) as per the guidelines set out in the BC Ministry of Transportation Pedestrian Crossing Control Manual for British Columbia (9). The calculations resulted in an anticipated volume of 540 EAUs.

Traffic volume counts were undertaken on the Galloping Goose trail to determine current trail figures as a basis for undertaking road crossing warrant analyses for selected roads crossings along the proposed E&N Rail Trail. The survey was undertaken on a Thursday in July with good weather, and resulted in a peak hour between 4:30 p.m. and 5:30 p.m. of 551 total trail users.

To confirm the validity of the calculated EAU of 540, Stantec Consulting Ltd. performed pedestrian counts at the Selkirk Trestle on the existing Galloping Goose Trail. The following Table 1 represents the raw data counted at the times and dates noted:

Date	Week Day	Time	Pedestrian Count	Bicycle Count	Other Count	Total Count
July 23, 2008	Wednesday	7:45 a.m. to 8:45 a.m.	99	357	5	461
July 17, 2008	Thursday	12:15 p.m. to 1:15 p.m.	285	111	13	409
July 17, 2008	Thursday	4:30 p.m. to 5:30 p.m.	102	434	16	552
Peak Hour Average						474

Table 1 – Galloping Goose Traffic Counts

To further confirm the validity of the calculated EAUs of 540, we averaged the count data noted in Table 2 for the am, lunch and pm counts (474) and entered it into the Peak Hour Distributions and

Peak Hour Equivalent Adult Units (EAUs) calculations to produce the following result shown in Table 2.

Peak Hour Distributions (Average of Table 1 = 474)

		#Count/hr
Adult	65%	308
Child (≤12)	20%	95
Senior (≥65)	10%	47
Physically Challenged	5%	24
Total	100%	

Peak Hour Equivalent Adult Units (EAUs)

	Factor	# Count(EAU)/hr
Adult	1.0	308
Child (≤12)	2.0	190
Senior (≥65)	1.5	71
Physically Challenged	2.0	48
Total		**617**

Table 2 – Validation of EAU Calculation

2.6 TRAILS CROSSING ROADS AND INTERSECTIONS

There were 24 road crossings on this project: one crossing was designed as a fully signalized traffic control intersection, two were Special Pedestrian Crosswalks (flashing amber overhead lights, internally illuminated pedestrian crossing signs and downlights to light up the crosswalk and pedestrians), and the remainder were dealt with by means of signs, pavement markings, additional lighting and/or speed platforms. The variety in crossing conditions included low traffic volumes at low speed local roads, while others were more difficult with higher traffic volumes and higher speed traffic on collector roads. Each road crossing was reviewed and a design prepared which considered the proximity of other signals, railway lines (for pre-emption and intertie), appropriate sight lines, approach speed, traffic calming possibilities, landscaping, lighting and signing to meet local regulations and standards. There were four higher-volume intersections that were considered to need a Warrant Analyses to determine the appropriate crossing type, resulting in:

A full traffic signal at Esquimalt Road and Robert Street in Victoria (see Photo 2):

- peak hour p.m. = 1,455 vph
- posted speed limit = 50 kph
- pre-emption and intertie with railway signals

A Signed and Marked Crosswalk at Wilson Street in Victoria

- peak hour p.m. = 597 vph
- posted speed limit = 30 kph

A Signed and Marked Crosswalk at Devonshire Road in Esquimalt

- peak hour p.m. = 534 vph
- posted speed limit = 50 kph

A Special Pedestrian Crosswalk at Lampson Street in Esquimalt

- peak hour p.m. = 912 vph
- posted speed limit = 50 kph

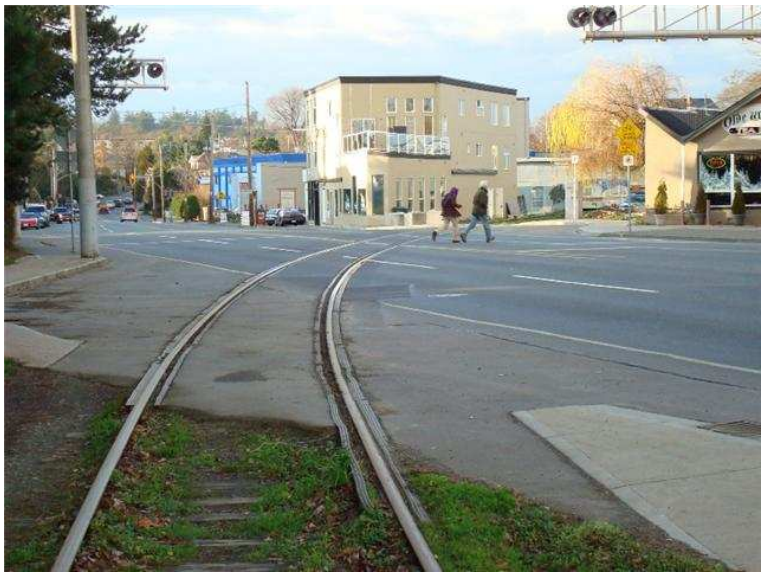

Photo 2 – E&N Railway Corridor Crossing of Esquimalt Road, Victoria, BC

2.7 SIGNS

The identity and quality of the user experience is directly related to the quality of the design. Signage is a key aspect of the design and provides users with much needed information about where they are on the trail, what is nearby, and what uses are permitted to do (trail etiquette). All signs should be visible and easily recognizable

Regulatory, Warning and Guide and Information Signs were provided in accordance with the Transportation Association of Canada (TAC) Bikeway Traffic Control Guidelines for Canada. All signs were recognizable and had consistent use of design elements and materials. The main types of signs were:

- Regulatory Signs indicating traffic regulations that apply at a specific time or place on a bike path or roadway. This included signs such as No Littering, Prohibited Access and Stop or Yield signs.
- Warning Signs indicating in advance conditions on or adjacent to a road or bikeway that would normally require caution and may require a reduction in vehicle speed (by CRD).
- Guide and Information Signs indicating information for route selection, for locating off-road facilities, or for identifying geographical features or points of interest (by CRD).

- Interpretive Signing educating and informing the trail users of native plant species, other flora and fauna or geographical features, or natural, cultural, heritage and other resources along the trail (by CRD).
- Identity Signs providing recognition of the E&N Rail Trail's name (by CRD).
- Cross-road Signs were included as part of the overall signing strategy, in coordination with the local Municipalities. It was suggested that these signs be included at all at-grade crossings and overpasses (by CRD).
- Etiquette Signs such as Ring Bell when Passing, Walkers Keep Right, Keep Dogs on Leashes, etc. These signs will remind the public of their responsibilities with the intention of making the Rail Trail a more pleasant facility for public use, minimize litter and amount of maintenance required, and improve safety (by CRD).
- Informational signs providing information on items that may be found in or visible from the trail area (by CRD).

The CRD are currently assessing the appropriate location to install some information signs on the E & N Railway as well as the Public Works and Government Services Canada Graving Docks site, which was the largest solid-bottom commercial dry-dock on the West Coast of the Americas and has been in operation since 1927. It was at this site that the S.S. Queen Elizabeth QE was secretly refitted in 1942 from a passenger liner to a troopship capable of carrying a full army division of 15,000 men.

Since the BC Motor Vehicle Act does not allow cyclists to ride through pedestrian crosswalks, Dismount and Walk signs (6) were detailed at all road crossings to identify proper cyclist behavior. In addition, proper signing of this requirement was considered to limit Municipalities' liability in the event someone was to ride across a crosswalk and get hit by a motor vehicle.

2.8 PAVEMENT MARKINGS

Providing suitable pavement markings along bikeways is a significant consideration in maintaining safety. Pavement markings will generally be provided in accordance with the Transportation Association of Canada Bikeway Traffic Control Guidelines for Canada, and will include:

- Longitudinal Contra-Flow Lane markings (along trail centreline)
- Zebra crossings at crosswalks
- Stop lines on side roads

Pavement markings would be split around bollards at road crossings to identify the obstacle to trail users.

2.9 LIGHTING

Lighting is an important feature of the Rail Trail, in particular at all intersections with public roads and at railway crossings. It was considered that the level of night-usage along the path would not be sufficient to warrant the additional cost of lighting the full length of the trail.

Full intersection lighting at all controlled and uncontrolled intersections along the trail was detailed.

2.10 BOLLARDS

In order to restrict motor vehicle accessing the Rail Trail, yet allow access for maintenance and emergency vehicles on an as-needs basis, it is proposed that removable bollards be installed at all at-grade road crossings. The type of bollard to be installed should meet the following criteria:

- Lockable (to prevent unauthorized removal)
- Light weight/hinged (to allow removal/lay down by hand)
- Durable (to withstand the effects of weather)
- Strong (to prevent damage due to vandalism)
- Visible (bright colour to ensure daytime visibility and reflectorized for nighttime visibility)

AASHTO specifies that when more than one post is necessary that an odd number of posts be used with a 1.5 m spacing being desirable. Narrower spacing could restrict access by tricycles, wheelchair users and bicycles with trailers.

2.11 LANDSCAPING

The proposed designs attempted to retain existing landscape wherever possible. However, due to the various design constraints, there were many locations where only limited options/one option for the location of the Rail Trail existed which resulted in landscape or vegetation having to be removed. Some species were avoided in particular, such as Garry Oaks and Arbutus trees, which are on the local municipalities' lists of protected species.

The only areas where specific landscape designs were carried out was on "green walls" at bridge abutments. It was considered that these walls would provide visual appeal while offering a surface that would not be suitable for graffiti. Slow growth native plant species were selected so that there would be less reliance on watering and trimming maintenance.

2.12 GREEN BUILDING PRACTICES

In order to reduce BC's carbon footprint, the Provincial Government has made a commitment to reduce its Greenhouse Gas (GHG) emissions to 33% below its 2007 level by 2020. To assist in achieving this goal, the Ministry of Transportation has established a Climate Action Program which is undertaking studies of historical design and construction practices for roadworks project and ways that they may be amended to reduce overall GHG emissions of a project's life cycle. Stantec consulted with the Project Director of the Climate Action Program to understand areas within the scope of this project that could be considered to minimize GHG emissions, including warm mix asphalt.

2.13 LANGUAGE

It is proposed that only English text is used for signs and any other Rail Trail related documents. Internationally recognized symbols would be used wherever possible and appropriate to ensure the desired message is easily and readily understood by all users.

2.14 EMERGENCY AND MAINTENANCE VEHICLE ACCESS

Access for emergency and maintenance vehicles to get to the trail has been provided via removable/foldable bollards at each side of the road crossings.

The overall paved path width of 4.0m is considered acceptable for use by maintenance vehicles, although these vehicles may have to straddle the shoulders if they are parked or causing any other hindrance to path users. It is anticipated that most maintenance issues could be managed by using smaller maintenance vehicles (i.e. 4WD pickup trucks, vans or utility vehicles) which would minimize clashes with other path users and minimize potential for damage to the track surfacing and/or unsealed shoulders. In selected areas where the trail width was reduced to 3.5 m it was considered that there remained sufficient width for vehicles to either park on the asphalt surface or straddling the gravel shoulders such that trail users could continue to safely use the trail.

2.15 TRAIL AMENITIES

After completion of the trail construction the CRD was to review the preferred locations for the following trail amenities:

- benches
- landscaping areas
- rest areas
- lookouts
- trash receptacles
- bicycle parking
- washrooms
- water fountains
- public telephones

2.16 CONSTRUCTION CONTRACT PHASING

It was proposed that there would be three tender packages consisting of one structural package and two trail packages. It was considered that this would allow more of the local contractors to have the ability to bid on the individual packages (e.g. they would have adequate resource and finance abilities) which would generate a more competitive bidding environment. In addition it was considered that this would produce economy of scale for the structural components.

Trail Packages

The two trail packages would include trail construction and retaining walls, and would be:

- Catherine Street to Old Island Highway/Burnside Road (9.0 Km length), and
- Old Island Highway/Burnside Road to Humpback Road (8.3 Km length).

Structural Package

The structural package would be for bridge works at the following locations:

- Hereward Road (see Photo 3)
- Old Island Highway – Trail Bridge
- Old Island Highway – E&N Railway Bridge (4 Mile Bridge)
- Helmcken Road

Photo 3 – Hereward Road Bridge, Victoria, BC

2.17 COMMUTER RAIL

There has been considerable discussion in the local media regarding the possibility of a commuter rail line being established along the E & N Railway line between Victoria and Langford. Politicians from all Municipalities through which this Rail Trail would traverse are in support of the commuter rail line, although little formal documentation was currently available about the overall strategy or possible timeline for implementation. At the time of writing this report a study was being undertaken by MoT on the feasibility of this commuter rail line. On the information available to date, it was understood and assumed that the commuter rail line would utilize the existing rail lines only, and that additional sidings and spur lines would not be required or constructed.

The posted speed for the commuter rail line was:

- Victoria over blue bridge: 8 km/h (5 mph)
- Increases to between 50 km/h to 65 km/h (30 mph to 40 mph)
- 15 km/h (10 mph) at most road crossings

3.0 Public Open Houses

The CRD sponsored a series of Open Houses to get input from the public on how they would like to see the trail designed and managed. Stantec participated in all the Open Houses so that the public's comments could be considered. The items that were revealed as the main issues raised from the Open Houses included the following.

3.1 PROPERTY VALUATIONS AND CRIME

The assessment of property valuations was outside the scope of this report. However, it is noted that there is considerable amount of literature available that provides comment on property valuations with respect to construction of pedestrian and trail facilities, such as the Transportation Research Board Burke-Gilman Trail report (10) and Rails-to-Trails Conservancy (7) which states that the report was conducted to document the extent of crime on rail trails and review such crime in a broader perspective. The report concluded that "converting an abandoned rail corridor to a trail tends to reduce crime by cleaning up the landscape and attracting people who use the trail for recreation and transportation", and it was viewed that adopting an active rail corridor for the same purpose would produce a similar result. This viewpoint was shared by both the Royal Canadian Mounted Police (RCMP) and Victoria Police Department (VPD).

3.2 GRAFFITI

Most of the facilities provided on this Rail Trail would not be susceptible to graffiti. It was considered that the increased public use of the rail corridor would reduce the likelihood of irresponsible social behavior.

Signs may be subject to both vandalism and graffiti, but the majority of signs are to be installed at or near to road intersections which would make them more visible to passing traffic on the roadway in addition to the trail users.

The majority of retaining walls would be on the low side of the trail and hence either inaccessible or not visible to trail users. Due to the limited exposure it was anticipated that these surfaces would not be targeted by vandals. If they are targeted then the CRD can apply anti-graffiti paint to surfaces to minimize maintenance costs and visual impact to local residents.

Green walls were designed at bridge abutments to improve aesthetics and avoid the potential surfaces attracting graffiti artists.

3.3 SECURITY

The local Municipalities were requested at the start of the project to provide any historical information regarding areas along the Rail Trail that are currently known to be areas of concern for public safety and security (i.e. "trouble spots"). Stantec then consulted with the Victoria Police Department (who are responsible for the City of Victoria and the Township of Esquimalt) and the RCMP (who are responsible for First Nations lands, the City of Colwood and the City of Langford) regarding these and any other areas that have historically required attendance by the police. It was

considered by both the VPD and RCMP that the construction of this trail would likely reduce the amount of crime and other antisocial behavior along the railway corridor. It was considered that when the Rail Trail was constructed that the railway corridor would not only open up due to the removal of hidden areas that are currently surrounded by scrub or other plants/trees, but that it would also become much more heavily used by the public. Both factors were anticipated to improve the overall security of the railway corridor.

3.4 LIGHTING

Lighting was provided at all road crossings in accordance with the required IESMA and MoT lighting design standards to ensure adequate illuminance was provided for pedestrians crossing the roadways at signalized intersections, special pedestrian crossings and marked crossings. Lighting was not designed for the length of the trail due to the capital costs associated with this work. The CRD has approved the installation of ducting to allow for the future installation of electrical cabling, and this has been provided in the design for the length of the trail. The need and location for lighting would be reassessed upon opening of the trail to users.

3.5 SURFACING

An issue/concern was raised regarding maintaining the natural surface (i.e. not paving) the proposed that the Rail Trail's surface; in order to ensure a safe riding surface was provided throughout the length of the trail it was proposed that the Rail Trail surface be paved. Maintaining a natural surface could be considered for areas where there was only pedestrian or other slow-moving traffic, but due to the higher speed of cyclist, the anticipated user volumes, and potential for cyclists to lose traction on a loose surface and cause injury to either themselves and/or other users, it was considered sufficient to warrant a paved surface.

3.6 ROCK EXCAVATION

Due to the presence of rock in many areas it was considered inevitable that rock excavations would take place as part of the construction process (see Photo 4). It was anticipated that this would be undertaken by either a hydraulic rock breaker (attached to an excavator or similar) or by drilling and blasting. Wherever rock was identified the cutting volumes have been kept to a minimum, subject to other design constraints such as trying to maintain a maximum vertical grade of 5% to meet ADA requirements.

Potential Acid Generating (PAG) rock was identified in several locations along the length of the trail, which were identified for removal off site due to potential environmental impacts and proximity of the works to water bodies and fish-bearing streams. The exposed cut PAG rock surfaces were not considered of sufficient risk to the environment to warrant any treatment after earthworks operations were carried out.

Photo 4 – Rock Excavation Area, View Royal, BC

4.0 Conclusion

The E&N Rail Trail will provide a significant improvement to the CRD's active transportation network, accommodating cyclists, pedestrians and other recreational trail users. It supports the regions initiatives of encouraging people to get out of their cars, to reduce greenhouse gas emissions and to lead a more active lifestyle. The trail enjoys the support of all municipalities, and is expected to be seen as a long-term asset to local residences in the vicinity of the trail. Despite the narrow railway corridors, this project demonstrates that given the necessary community support and interest for success from all stakeholders, such a facility can be provided even within a narrow design corridor.

It is anticipated that this trail will help Victoria remain as a national leader in bike mode share for work trips, as reported by Statistics Canada.

5.0 References

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6.0 Tables

Table 11c
Proportion of workers walking, cycling or using another mode of transportation to get to work, census metropolitan areas, 1996, 2001 and 2006

Census metropolitan areas	Walking			Cycling			Other mode of transportation[1]		
	1996	2001	2006	1996	2001	2006	1996	2001	2006
	percentage								
Note: Corresponds to the remaining modes of transportation, such as motorcycle, taxi or 'other modes', such as inline skating, snowmobile, etc. **Sources:** Statistics Canada, censuses of population, 1996 to 2006.									
Total	5.8	5.7	5.7	1.2	1.3	1.4	0.8	0.9	1.0
St. John's (Newfoundland and Labrador)	6.7	5.9	6.6	0.3	0.1	0.3	1.4	1.6	2.1
Halifax (Nova Scotia)	9.8	10.3	10.1	1.0	0.9	1.0	1.2	1.2	1.3
Moncton (New Brunswick)	7.5	7.5	7.6	0.7	0.6	1.0	1.1	1.4	1.4
Saint John (New Brunswick)	6.8	6.9	7.3	0.2	0.4	0.3	1.7	1.4	1.7
Québec (Quebec)	7.2	7.0	7.3	0.9	1.3	1.4	0.6	0.7	0.7
Trois-Rivières (Quebec)	7.0	6.0	6.1	1.2	1.5	1.4	0.7	0.6	0.8
Montréal (Quebec)	5.9	5.9	5.7	1.0	1.3	1.6	0.6	0.7	0.8
Ottawa - Gatineau (Ontario / Quebec)	6.9	6.8	6.8	2.1	1.9	2.1	0.8	0.7	0.9
Ottawa - Gatineau (Quebec part)	4.1	4.6	4.6	1.4	1.6	1.7	0.7	0.6	0.8
Ottawa - Gatineau (Ontario part)	7.9	7.5	7.6	2.3	2.0	2.2	0.8	0.8	0.9
Kingston (Ontario)	10.7	10.4	9.6	2.1	2.2	2.4	1.3	1.6	1.5
Toronto (Ontario)	4.6	4.6	4.8	0.8	0.8	1.0	0.7	0.8	0.9
Hamilton (Ontario)	5.2	5.1	5.0	0.7	0.9	0.9	0.7	0.7	0.8
St. Catharines - Niagara (Ontario)	5.4	5.0	5.0	0.9	0.9	1.5	0.8	1.0	1.1
Kitchener (Ontario)	5.7	4.9	5.1	1.1	1.1	1.6	0.7	0.7	0.8
Guelph (Ontario)	7.1	6.9	6.1	2.1	1.8	2.3	0.8	0.7	1.0
London (Ontario)	6.5	5.9	6.1	1.5	1.4	1.6	0.7	0.9	0.9
Greater Sudbury / Grand Sudbury (Ontario)	6.4	6.5	6.2	0.5	0.4	0.7	1.0	1.1	1.1
Thunder Bay (Ontario)	5.8	5.4	5.9	1.0	1.0	1.6	0.9	1.1	0.9
Winnipeg (Manitoba)	6.2	6.1	5.8	1.4	1.4	1.6	0.9	0.8	0.9
Regina (Saskatchewan)	5.8	5.2	5.8	1.1	1.4	1.4	0.9	0.8	0.9
Saskatoon (Saskatchewan)	6.4	5.8	6.2	2.0	2.5	2.4	1.4	1.4	1.6
Calgary (Alberta)	5.4	5.9	5.4	1.1	1.5	1.3	0.9	0.9	1.0
Edmonton (Alberta)	5.0	4.7	5.1	1.1	1.2	1.1	1.0	1.2	1.2
Kelowna (British Columbia)	4.6	4.5	4.6	2.0	2.1	2.1	1.2	1.4	1.5
Abbotsford (British Columbia)	3.6	3.6	3.2	0.9	0.9	0.7	1.0	0.8	1.2
Vancouver (British Columbia)	5.8	6.5	6.3	1.7	1.9	1.7	1.0	1.0	1.1
Victoria (British Columbia)	9.8	10.4	10.4	4.9	4.8	5.6	1.5	1.6	2.0

The following table was an estimate of the annual trips to determine the number of crossings during peak hour.

Total Annual Trips				Minimum projection	Maximum projection
				# Crossings/year	
Trips per Year				200,000	600,000
Seasonal Weekly Volume					per week
Spring			= 20%	Of annual	1.54%
Summer			= 50%	trips per year	3.85%
Fall			= 20%	over 13 week	1.54%
Winter			= 10%	period	0.77%
		Total	100%		
Average Weekly at Seasonal Peak					
				# Crossings/week	
Pedestrians per Week			3.85%	7692	23077
Average Week Distribution					
				# Crossings/day	
% Per Weekday	5 *	18%	= 90%	1385	4154
% Per Weekend Day	2 *	5%	= 10%	385	1154
		Total	100%		
Average Peak Hour Volume					
				# Crossings/hr	
Volume at Peak Hour			10%	138	415
Peak Hour Distributions					
				# Crossings/hr	
Adult			65%	90	270
Child (≤12)			20%	28	83
Senior (≥65)			10%	14	42
Physically Challenged			5%	7	21
		Total	100%		
Peak Hour Equivalent Adult Units (EAUs)					
				Factor	# Crossings(EAU)/hr
Adult				1.0	90 270
Child (≤12)				2.0	55 166
Senior (≥65)				1.5	21 62
Physically Challenged				2.0	14 42
		Total			**180** **540**

7.0 Figures

Figure 7.1 – 15 m (50 foot) Rail Corridor Typical Cross Section