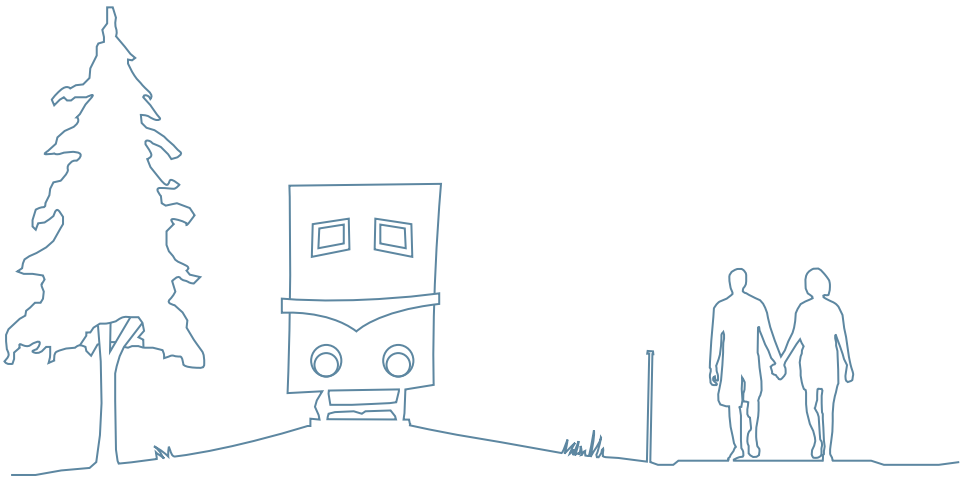

Vancouver Island Rail Corridor

Rail-with-Trail Design Guidelines

June 2009

Prepared for:
Island Corridor Foundation

with funding and/or support provided by:
Alberni Clayoquot Regional District
Capital Regional District
Comox Valley Regional District
Cowichan Valley Regional District
Regional District of Nanaimo
Southern Rail of Vancouver Island

Acknowledgements

These design guidelines were prepared by Leigh Sifton, HB Lanarc Consultants Ltd and Scott Lewis, Newcastle Engineering Ltd.

A number of individuals from the Island Corridor Foundation, Southern Rail of Vancouver Island and several Vancouver Island regional districts provided thoughtful input into the guidelines, including:

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B. Farquhar - Parks Manager, Cowichan Valley Regional District
B. Rees - Manager of Parks, Comox Valley Regional District
D. Backhouse - Executive Director, Island Corridor Foundation
D. Brown - Parks & Trails Planning Technician, Cowichan Valley Regional District
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D. Watmough - Parks Planner, Capital Regional District
G. Smith - Manager of Engineering, Southern Rail of British Columbia
J. Michel - Parks and Trails Coordinator, Regional District of Nanaimo
J. Ward - Manager, Planning, Resource Management and Development, Capital Regional District
K. Albert - Parks Planner, Comox Valley Regional District

Our thanks to everyone for your insight, time and resources.

We would also like to thank the City of Nanaimo for sharing their experience with rail-with-trail development. A number of the design guidelines are drawn from their previous hard work.

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1. Introduction to the Corridor

The Esquimalt and Nanaimo (E&N) Railway was incorporated on September 27, 1883 by Victoria coal baron Sir Robert Dunsmuir, to support the coal and lumber industry and the Royal Navy base at Esquimalt. Construction began on April 30, 1884 and on August 13, 1886, Prime Minister Sir John A. MacDonald drove the last railway spike into the ground. The initial rail operation ran for 115 kilometres from Esquimalt to Nanaimo, hence the original name of the company. In 1888, the line was extended to the City of Victoria.

In 1905, Robert Dunsmuir's son James sold the E&N Railway to the Canadian Pacific Railway (CPR), who extended the E&N to Lake Cowichan, Port Alberni, Parksville, Qualicum Beach, and Courtenay. At its peak, the E&N Railway network had over 89 stations. Today only about 25 stations remain, with the majority unused and in a state of disrepair.

The Island Corridor Foundation (ICF) was incorporated in early 2004, signaling a partnership of unprecedented magnitude between the Regional Districts and First Nations. In December 2004, the Foundation was granted registered charitable status, the initial step in allowing the transfer of property to local ownership.

The foundation negotiated agreements with Canadian Pacific Railway and RailAmerica in which they agreed to donate their assets in the corridor, including track, gravel, rails, trestles, ties, culverts, the land comprising the right-of-way and 6 heritage railway stations.

ICF is now the title-holder to all the land within the existing corridor, giving First Nations and local governments jurisdiction over this historic property for the first time since the land was granted to the Dunsmuirs in 1883.

A 12-person Board of Directors governs the Foundation. Five Directors represent the Regional Districts and five Directors represent First Nations. Membership in the Foundation is limited to local governments and First Nation governments whose territories are wholly or partly within the geographic area of the Corridor.

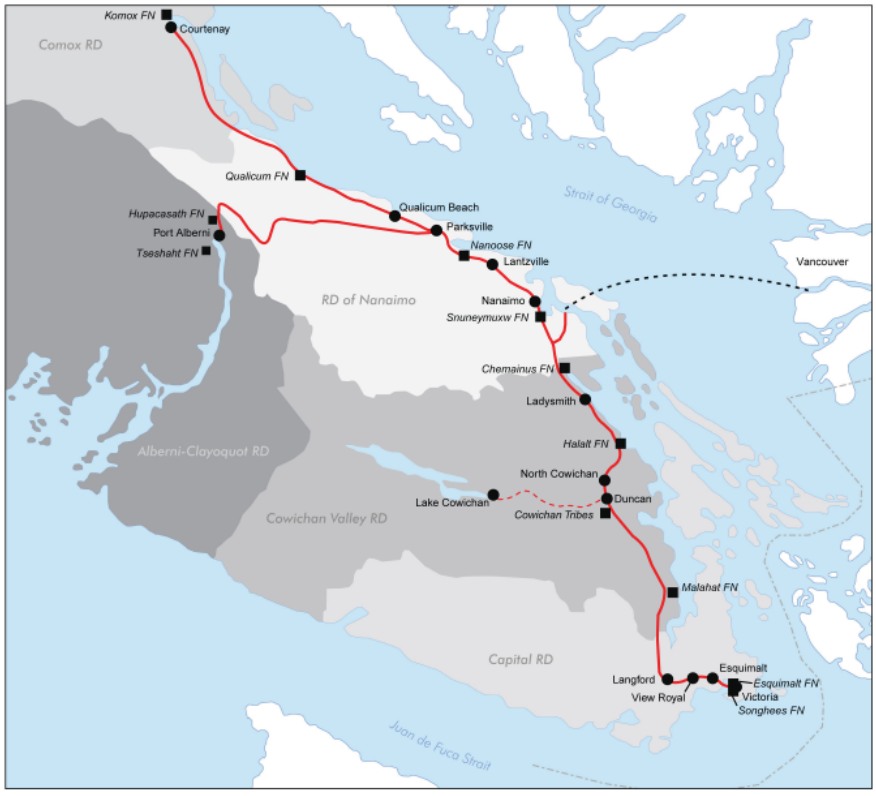


Figure 1. Vancouver Island Corridor Overview

The rail corridor is a unique railway

property (Figure 1). It consists of two tracks: a 225 km section between Victoria and Courtenay (Victoria Subdivision/VIC) and a 64 km link between Parksville and Port Alberni (Alberni Subdivision/ALB). A third subdivision owned by the Island Corridor Foundation runs 26 kms between Duncan and Lake Cowichan. This subdivision was abandoned in 1984 and the rail infrastructure has been removed.

The total area of the right-of-way is 651 hectares or 1610 acres. These three sections of Corridor pass through five Regional Districts, 14 municipalities and 13 First Nations territories. (See sidebar and Figure 1). Eighty percent of the Island's population lives within five kilometres of these tracks, creating an outstanding potential as a green transportation backbone for the island.

Regional Districts
Alberni-Clayoquot
Capital
Comox Valley
Cowichan Valley
Nanaimo

Municipalities
Courtenay
Duncan
Esquimalt
Ladysmith
Lake Cowichan
Langford
Lantzville
Nanaimo (City)
North Cowichan
Parksville
Port Alberni
Qualicum Beach
Victoria
View Royal

First Nations Territories
Chemainus FN
Comox FN
Cowichan Tribes
Esquimalt Nation
Halalt FN
Hupacasath FN
Lake Cowichan FN
Malahat FN
Qualicum FN
Snaw-Naw-As FN
Snuneymuxw FN
Songhees Nation
Tseshaht FN

Communities adjacent to the Corridor

ICF's vision

To preserve and use the E&N Corridor in perpetuity, as one continuous corridor to connect and benefit all Island communities and First Nations along the corridor.

ICF's Charitable Objectives

Through the sustained efforts of elected leaders of both First Nations and local municipal governments who have accepted a mandate to work towards the preservation of the corridor, the charitable objectives of the Foundation are to:

- Acquire, preserve and develop for purposes of the Corporation and its objects, but for no other purposes, the Island Corridor which lies North-South from Victoria to Courtenay and East-West from Nanaimo to Port Alberni on Vancouver Island, together with ancillary lands, structures and all other property rights attached thereto (the "Island Corridor") and the infrastructure and other assets that constitute the E&N Railroad and are located on the Island Corridor (the "Railroad");
- Maintain the continuity of the Island Corridor as a contiguous special use connection for all communities, while respecting and supporting First Nations interests and traditional lands and uses;
- Contribute to safe and environmentally sound passenger and freight rail services along the Railroad;
- Encourage a flexible infrastructure along the Island Corridor which will encourage a wide range of economic and trade activity for the benefit of all communities lying adjacent to the Island Corridor;
- Preserve archaeological resources, historic landmarks, structures, artifacts, and historic routes along the Island Corridor for historical purposes and for ongoing and future use by the community;
- Create trails, parks, gardens, greenways and other public areas for use of members of the public along the length of the Island Corridor; and,
- Conserve the environmental and spiritual features and functions of the Island Corridor in respect of the land, water and natural resources for the general benefit of the public.

2. Introduction to the Project

Since February 2006, community ownership of the E&N rail corridor by the Island Corridor Foundation (ICF) has generated an opportunity to create a larger system of rails-with-trails, linking communities and rural areas along the 290-kilometre corridor.

Local and regional governments along the corridor support the development of rail-with-trails, particularly as it will increase options for active, non-motorized transportation routes within and between Vancouver Island communities and regional districts. While providing a unique outdoor recreational potential, the trail is expected to connect with transit, park and ride systems to enhance commuter use and help to mitigate greenhouse gas emissions.

Rails-with-trails can make efficient use of rail rights-of-way, transforming often under-utilized spaces into active, non-motorized, multi-use transportation corridors. Benefits of rails-with-trails include:

- *Reduced pedestrian trespass coupled with reduced injury and fatalities:* Rail rights-of-way have long been used as informal, illegal pathways for pedestrians as they typically offer the most direct route through communities. These trails are typically located either on or directly beside the active railway trackage. Well-designed trails with adequate separation can help to keep trespassers off the operating portions of the rail corridor thus ensuring safety for both pedestrians and railway operations. The number of illegal track crossings can also be reduced through the design of channelized at-grade or grade separated crossings.
- *Beautification and maintenance including reduced petty crime (vandalism, dumping, etc):* Having municipal partners in the care of rail rights-of-way can mean cost-sharing for maintenance (i.e. mowing; weed removal and control) under railway protection. Communities will often feel a sense of ownership and pride in the corridor thus reducing the amount of dumping. Trails within the right-of-way can also provide improved access for specialized maintenance and law-enforcement vehicles.
- *Increased public awareness of rail service and the benefits of environmentally friendly transportation:* Rails-with-trails can help the public become more informed about the rail industry as well as the economic and environmental benefits of rail service. The rail operator, following trail development, is seen as a collaborator, not an opponent and this can translate to better cooperation between all parties to increase rail business.

If well designed; with appropriate setbacks, separations and crossings; rails-with-trails can provide many benefits to both operators and the communities through which the rights-of-way run. Along with this opportunity comes the task of ensuring consistent and clear design guidelines, covering all aspects of trail development with the additional challenge of ensuring safety for both rail and trail users.

Project Purpose and Scope

The project goal is to prepare a set of physical design guidelines to be used for rails-with-trails within the E&N right of way as a component of trail implementation plans.

This document is not intended to provide site-specific design solutions for the entire Corridor nor is it intended to replace trail feasibility studies. These guidelines may require modification on a case-by-case basis as detailed design and construction progresses.

These guidelines are not intended to replace applicable bylaws and/or other existing regulations.

These guidelines will apply within active portions of lands owned by the Island Corridor Foundation including the Victoria and Alberni Subdivisions.

What is a Rail-with-Trail?

A rail-with-trail (RWT) is a marked or established shared use pathway located directly adjacent to an active rail corridor for use by bicylists, pedestrians, wheelchair users, joggers and other non-motorized users, including motor assisted cycles, as defined in the Motor Vehicle Act.

About the Project Partners

This project was funded by the Capital Regional District, Cowichan Valley Regional District, the Regional District of Nanaimo and Comox Valley Regional District. Other project partners include Alberni-Clayoquot Regional District and Southern Railway of Vancouver Island.

This project was supported by a Vancouver Island Rail Trail Advisory Committee comprised of representatives from the Regional District governments as well as by Southern Railway of Vancouver Island, the rail operator.

Document Organization

This document is organized in the following sections:

3. Trail Rationale: Provides an overview of local, regional, provincial and federal initiatives or planning documents that relate to the development of a multi-use trail within the rail right-of-way.

4. Background Review: Outlines various references or precedents relevant to rail-with-trail design including bikeway facilities and railway regulations.

5. Trail Planning and Design: Outlines design guidelines relevant to trail planning including tenure, feasibility studies, trail users and location within the corridor.

6. Trail Design: Outlines design guidelines for all aspects of trail development including surfacing; grading and drainage; setback and separation, among others.

7. Design Guidelines: Provides an overview of three trail types – urban, suburban and rural.

3. Trail Rationale

A variety of planning documents, transportation strategies and community initiatives reflect the interest and support by Vancouver Island local and regional governments for the development of the Vancouver Island Rail Trail. Below is a review of relevant documents at the Regional, Provincial and Federal scales.

Regional Initiatives

Capital Regional District

The Capital Regional District (CRD) includes 13 municipalities and three electoral areas. The corridor runs through four municipalities in the region including the City of Victoria, Township of Esquimalt, Town of View Royal and City of Langford (Figure 2).

2006 Census figures for the CRD in total and communities adjacent to the Corridor:

CRD Total:	345,164
Esquimalt:	16,840
Langford:	22,459
Victoria:	78,057
View Royal:	8,768

Figure 2. Capital Regional District Overview

Regional scale planning documents that are relevant to trail development include:

1) CRD Parks Master Plan, 2000
A trail along the E&N Corridor is proposed as part of the regional trail system. The purpose of regional trails is "to establish where feasible trails for non-motorized use that provide a range of trail-use opportunities in a natural setting. These trails will be designed to connect the region's communities and major parks, and connect the CRD to other parts of Vancouver Island".

2) Regional Growth Strategy, 2003
The CRD Regional Growth Strategy (RGS) was developed and approved by the member municipalities and the regional district in partnership and provides direction on social, economic, and environmental goals and priority actions.

2) TravelChoices - Bicycle Strategy, Aug 2003
TravelChoices Transportation Strategy is a sub-strategy of the RGS. The proposed Rail Trail is identified as a key route of the recommended regional bicycle route network.

Other documents relevant to the trail within the CRD include municipal OCPs; City of Victoria's Sustainability Framework, Greenways Plan and Bicycle Master Plan; Township of Esquimalt's Bicycle Network Plan, Parks and Recreation Strategic Plan, Pedestrian Charter and Sustainability Strategic Plan; Town of View Royal's Parks and Trails Master Plan; City of Langford's Trail Plan; Green Transportation Plan (in preparation) and Bicycle Network Strategy.

Cowichan Valley Regional District

The Cowichan Valley Regional District consists of a total of four municipalities, nine Electoral Areas and several unincorporated communities (Figure 3). Of these, municipalities adjacent to the E&N corridor include the City of Duncan, District of North Cowichan and the Town of Ladysmith. The corridor also travels through Electoral Areas 'B' (Shawnigan Lake), 'C' (Cobble Hill), 'E' (Cowichan Station, Sahtlam, Glenora) and 'H' (North Oyster, Diamond).

2006 Census figures for adjacent municipalities and Electoral Areas:

CVRD Total:	76,929
Duncan:	4,986
Ladysmith:	7,538
North Cowichan:	27,557
Electoral Area 'B'	7,562
Electoral Area 'C'	4,530
Electoral Area 'D':	2,823
Electoral Area 'H':	2,274

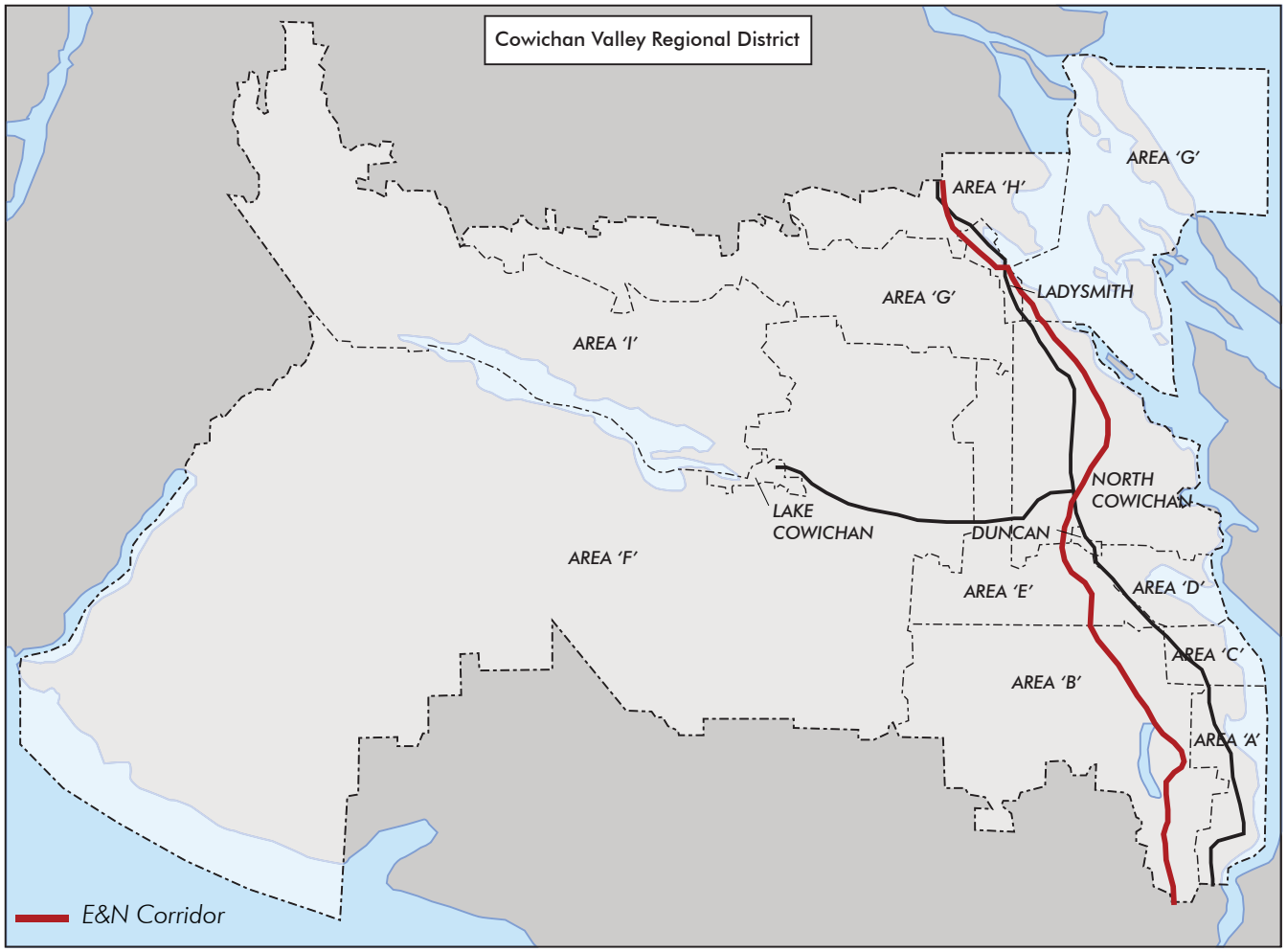


Figure 3. Cowichan Valley Regional District Overview

Regional scale planning documents that are relevant to trail development include:

1) Parks and Trails Master Plan, 2007
Portions of the Vancouver Island Rail Trail are included in the proposed Cowichan Valley Trail Route. The trail system provides recreation and tourism opportunities and will function as the Cowichan Region's contribution to the Trans Canada Trail. This trail is also identified as one of four Spirit of 2010 trails.

2) Draft Environmental Strategy, Cowichan Valley Economic Commission
Vision Statement: "The Cowichan Region is admired as the greenest, most sustainable community in Canada". Steps to get there include the development of a multi-modal, non-motorized transportation plan.

3) Trail Network and Cycling Plan,
A joint project with the District of North Cowichan and the City of Duncan to identify opportunities for an integrated walking and cycling trail network. Portions of the proposed trail network are within the E&N Corridor.

Other documents relevant to the trail within the Cowichan Valley RD include municipal OCPs and District of North Cowichan's Parks and Open Space Strategy.

Regional District of Nanaimo

The Regional District of Nanaimo includes four municipalities and eight electoral areas (Figure 4). The Corridor runs through all four municipalities (District of Lantzville, City of Nanaimo, the City of Parksville, and the Town of Qualicum Beach) as well as Electoral Areas 'A' (Cedar, South Wellington and Cassidy), 'E' (Nanoose Bay), 'F' (Coombs, Hilliers, Errington), 'G' (French Creek, San Pareil) and 'H' (Bowser, Qualicum Bay).

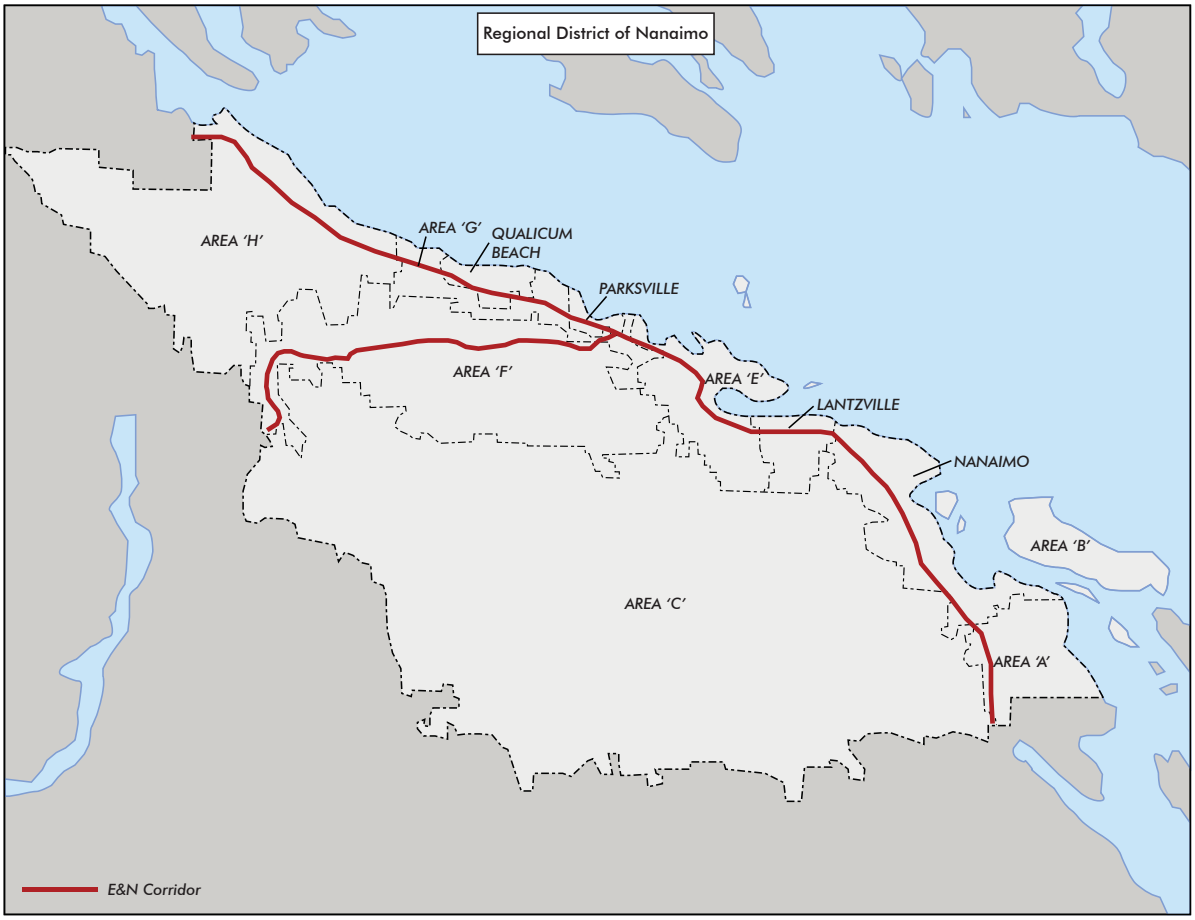


Figure 4. Regional District of Nanaimo Overview

2006 Census figures for adjacent municipalities and Electoral Areas:

RDN Total:	138,631
Lantzville:	3,661
Nanaimo (City):	78,692
Parksville:	10,993
Qualicum Beach:	8,502
Electoral Area 'A':	6,751
Electoral Area 'E':	5,462
Electoral Area 'F':	6,680
Electoral Area 'G':	7,023
Electoral Area 'H':	3,474

Regional scale planning documents that are relevant to trail development include:

1) Regional Growth Strategy, 2003
One of the goals of the RGS is to improve and diversify mobility options within the region - increasing transportation efficiency and reducing dependency on the automobile.

2) Transportation and Mobility Study, 2001
This study was intended to be the first step in looking at transportation issues and mobility for the RGS. It identified regional transportation issues that should be addressed within the RGS including the need to enhance opportunities for cycling as an alternative transportation mode.

3) State of Sustainability Recommendations Report, 2007
This final report of the State of Sustainability project presents recommendations and ideas for actions to address the issues and challenges highlighted by a review of sustainability indicators. Recommendations relevant to the Vancouver Island Rail Trail include implementing programs aimed at improving fitness levels for residents by promoting parks and trails and to encourage design features that promote walking and cycling.

4) Regional Parks and Trails Plan, 2005-2015
Criteria for establishing future regional trails include linking parks and open spaces; linking communities; presence of existing corridors; land availability; and, level of interest and support. The E&N corridor is identified as a priority for a future regional trail.

Other documents relevant to the trail within the RD of Nanaimo include Electoral Area and Municipal OCP's; Electoral Area 'A' Community Trails Study; Electoral Area 'A' Active Transportation report; Lighthouse Country Trail Development Report; City of Parksville's Parks and Open Space Master Plan; City of Nanaimo's Parks, Recreation and Culture Master Plan; Trail Implementation Plan; Bicycle Strategy and Bicycle Facility Design Guidelines.

Alberni-Clayoquot Regional District
Alberni-Clayoquot Regional District (ACRD) is comprised of three municipal governments and six electoral areas. The E&N Corridor travels through the City of Port Alberni and Electoral Areas 'B' (Beaufort), 'E' (Beaver Creek) and 'F' (Cherry Creek) (Figure 5).

2006 Census figures for adjacent municipalities and Electoral Areas:

ACRD Total:	30,664
Port Alberni:	17,548
Electoral Area 'B':	476
Electoral Area 'E':	2,822
Electoral Area 'F':	1,882

Regional scale planning documents that are relevant to trail development include:

1) Regional Parks and Trails Policy Report
This study was a preliminary look at the status of regional parks and trails in the ACRD. Findings of the report indicate that there is a strong

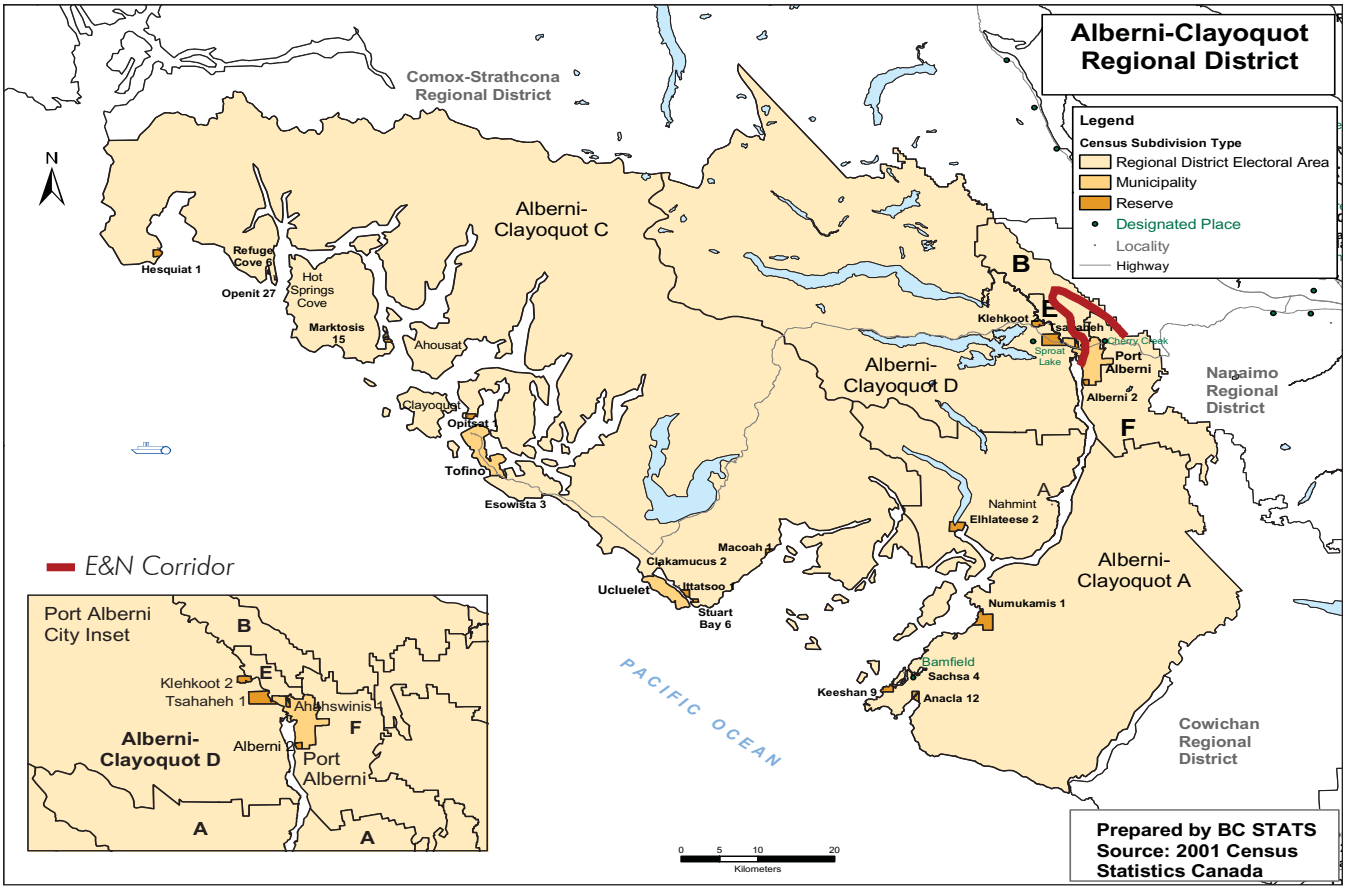


Figure 5. Alberni-Clayoquot Regional District Overview

desire in the region for an improved, non-motorized trail system for recreation as well as commuting.

2) Alberni Valley Trails Planning Study
Study proposes the development of a regional trail system that includes sections of the E&N Corridor identified as a potential trail corridor.

Other documents relevant to the trail within Alberni-Clayoquot RD include Municipal and Electoral Area OCPs and the City of Port Alberni's Climate Change Committee Final Report.

Comox Valley Regional District

Comox Valley Regional District is comprised of three municipal governments and four electoral areas. As shown in Figure 6, the E&N Corridor travels through the City of Courtenay and Electoral Area 'A' (Baynes Sound).

2006 Census figures for adjacent municipalities and Electoral Areas:

CVRD Total:	58,824
Courtenay:	21,940
Electoral Area 'A':	4,885

Regional scale planning documents that are relevant to trail development include:

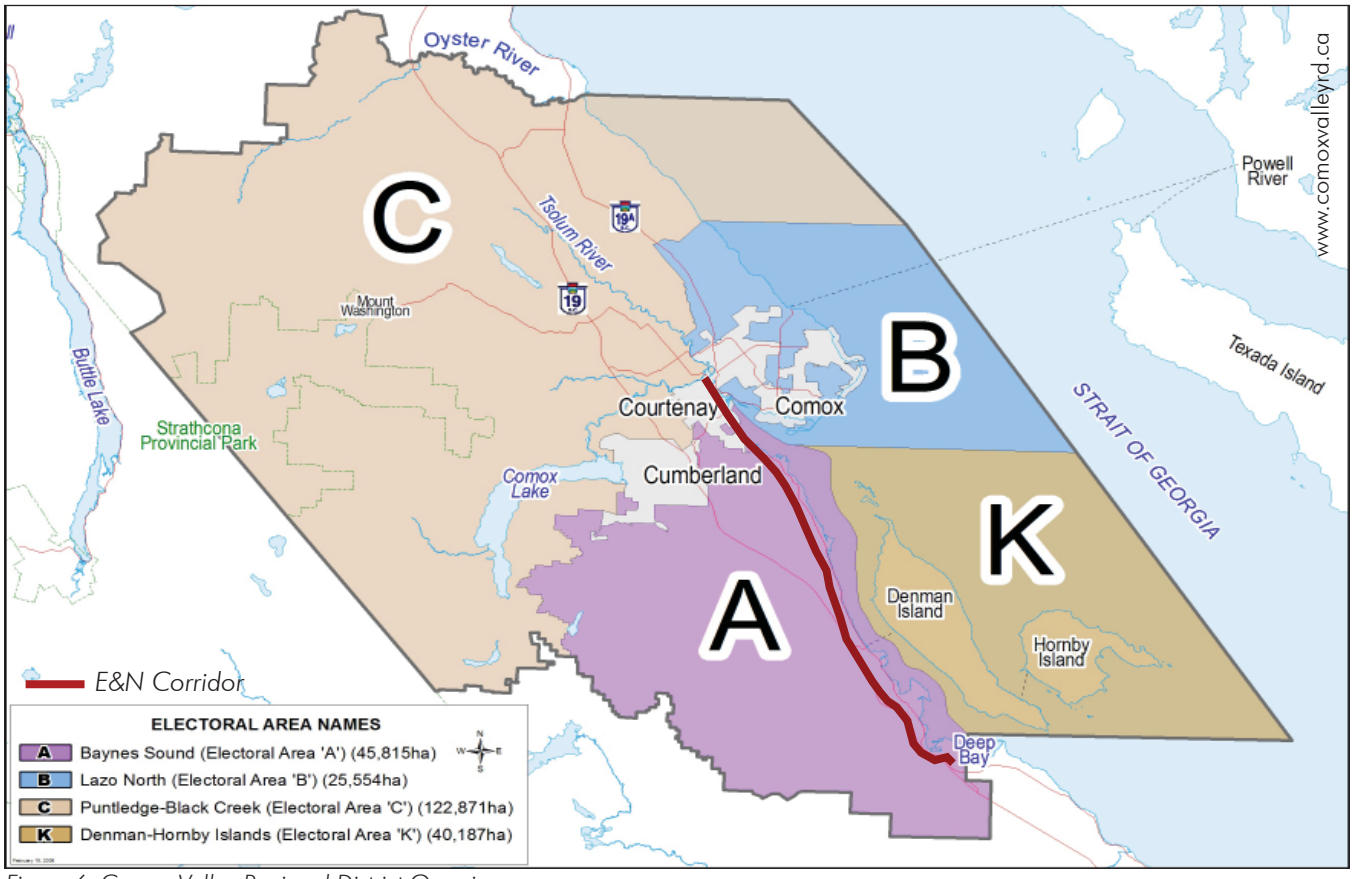


Figure 6. Comox Valley Regional District Overview

1) Regional Growth Strategy

The RGS is being created over a two-year period (2008-2010) with an approved RGS policy document to be adopted by December 31, 2010. All four Comox Valley local governments entered into a Memorandum of Understanding (MOU) in July 2008 which will provide interim management of planning and development initiatives until the RGS has been adopted in 2010.

2) Sustainability Strategy

Throughout 2007, elected official forums were held in the Comox Valley to share existing sustainability policies and initiatives by local government jurisdictions. These forums discussed the development of long-term strategies that would establish the Comox Valley communities as leading the way through an integrated and collaborative approach to planning based on sustainability principles. The long-term vision of the forums was the creation of a sustainable development plan complete with specific action and implementation plans that could be incorporated into local government regional growth strategy and official community plans. Expected completion in July 2009.

3) Comox Valley Greenways Plan Report, 1997

This Greenways Project predates the Regional District's Rural and Electoral Area OCPs and Greenways Plans. The Greenways Plan Report was used for the basis of the Greenways Roads and Greenways Trails components of these later documents. One of the goals was to create a network of non-motorized recreation and/or commuting trails linking

communities, linking public lands and parks and linking estuaries along the shoreline".

4) Parks and Greenways Strategic Plan, Expected Completion 2009
Comox Valley Regional District is currently engaged in a planning process to develop a 10-year parks and greenways strategic plan for the Valley. The purpose of this strategic plan is to identify opportunities for expanding networks of parks and greenways; provide guidelines for land acquisition and park dedication; identify priorities for acquisition for the next five to ten years; identify funding mechanisms and possible partnerships; and outline an implementation plan.

5) Comox Valley Cycling Plan, 2007
The purpose of this document is to compile and synthesize existing information, policies and guidelines from the provincial level to the local area (neighbourhood) level that pertain to safe cycling and bicycle ways within the Comox Valley. The document identifies and maps existing and desired bikeways throughout the Comox Valley and locates gaps and safety issues to be addressed in order to make the bikeway connections continuous and safe from community to community.

Other documents relevant to the trail within Comox Valley RD include Rural Comox Valley OCP; Area 'A' Electoral Area Plan and Greenway Plan; Royston Local Area Plan; Union Bay Local Area Plan; City of Courtenay's OCP and Bicycle Planning Strategy.

Provincial Initiatives

Two provincial programs related to trail development include Active Communities and the Climate Action Charter. Other provincial funding programs may emerge that might be suitable for trail building.

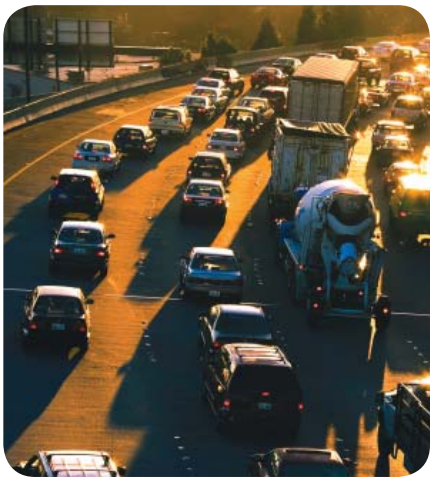
Active Communities

The Active Communities Initiative (ACI) is part of a much larger wellness initiative, called ActNow BC, which is aimed at promoting healthy lifestyle choices and environments. The BC Recreation and Parks Association is the implementation partner with support from the Ministry of Health and in partnership with ActNow BC and 2010 Legacies Now. Active Communities works with local governments, partner organizations and communities throughout BC to help increase by 20% the physical activity levels of British Columbians by the year 2010.

For this initiative, a "community" is a network of individuals with shared interests. The following are registered Vancouver Island communities:

- Wellness Committee, Camosun College, Victoria
- Active Comox Valley (includes Comox Valley RD and Courtenay)
- Cowichan Valley Regional District
- Esquimalt Parks and Recreation
- Greater Victoria - fitinfitness.ca, Recreation Centres of Greater Victoria
- Ladysmith Parks, Recreation and Culture

- Vancouver Island University, Nanaimo
- City of Nanaimo
- Port Alberni Parks and Recreation Department
- Regional District of Nanaimo Recreation and Parks Department
- City of Victoria – Municipal Parks, Recreation and Community Development Department
- University of Victoria – Active U
- West Shore Communities of Greater Victoria – West Shores Parks and Recreation Society (includes Langford and View Royal)



Provincial Climate Action Charter

Local governments from across B.C. have joined with the Province and the Union of BC Municipalities, to find ways to tackle the challenges posed by climate change, pledging to significantly cut greenhouse gas emissions by 2012.

Local governments who have signed the charter agree to develop strategies and take actions to achieve the following goals:

- Be carbon neutral in respect of their operations by 2012
- Measure and report on their community's GHG emissions profile; and,
- Create complete, compact, more energy efficient rural and urban communities (e.g. foster a built environment that supports a reduction in car dependency and energy use, establish policies and processes that support fast tracking of green development projects, adopt zoning practices that encourage land use patterns that increase density and reduce sprawl.)

133 local governments throughout the province have signed the charter including the following Vancouver Island local governments located adjacent to the corridor: Capital Regional District; Comox Valley Regional District; Courtenay; Cowichan Valley Regional District; Duncan; Ladysmith; Lake Cowichan; Langford; Lantzville; Nanaimo (City); Nanaimo (Regional District); North Cowichan; Parksville; Port Alberni; Qualicum Beach; Victoria; and, View Royal.

Federal Initiatives

Partners for Climate Protection

The Partners for Climate Protection (PCP) program is a network of Canadian municipal governments who have committed to reducing greenhouse gases and acting on climate change. PCP is the Canadian component of the International Council for Local Environmental Initiatives (ICLEI) Cities for Climate Protection (CCP) network that comprises more then 800 communities worldwide making the same efforts. Adjacent communities that are members of the PCP program include: Comox Valley Regional District; Cowichan Valley Regional District; Duncan; Lantzville; Nanaimo (City); Nanaimo (Regional District); Port Alberni; Qualicum Beach; and Victoria.

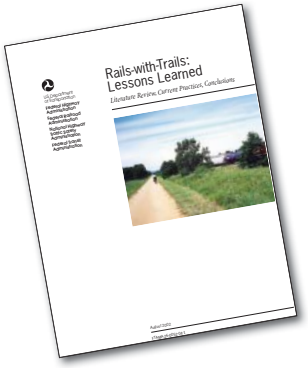
4. Background Review

In comparison to rail-trail conversions, rails-with-trails (RWTs) are less well known. Railway companies were at one time reticent to share their rights-of-way with multi-use trails. However time has shown that these trails may actually help to alleviate incidences of trespass, vandalism and other illegal uses such as dumping.

The key to a successful RWT is ensuring that the safety and liability concerns of the rail operator are balanced with appropriate, considerate design for trail users.

As there are no existing national or provincial guidelines for RWT design, guidelines in this report have been compiled from numerous background documents in regards to the design of RWTs, multi-use and/or bicycle trails. These documents were reviewed to summarize current best practices applicable to the implementation of multi-use trails within active rail corridors.

Rails-with-Trails Precedents and Case Studies



Rails-with-Trails: Lessons Learned, US Department of Transportation, 2002
This document reviews numerous RWTs in the US and reviews lessons learned in the development, construction and operation of rails-with-trails. The authors conducted an extensive literature review as well as reviewed 21 case studies. Design elements included in the review include setback distance, trail separation, crossings, drainage, lighting, signage and equestrian considerations. The study also reported that in many cases the addition of a trail benefitted the railroad.

Rails-with-Trails: Design, Management and Operating Characteristics of 61 Trails along Active Rail Lines, Rails to Trails Conservancy, 2000
This report analyzes 61 RWTs throughout the US and provides an overview of the growth and popularity of rails-with-trails as well as safety, design and liability issues.

Rails-with-Trails: A Preliminary Assessment of Safety and Grade Crossings, Rails to Trails Conservancy, 2005
This report provides a review of 40 unique at-grade railroad crossings throughout the US including warning lights, automatic gates, non-signalized crossings and surfacing.

Rails-with-Trails in Canada, Leisure Trends Monitor, 2004
Provides a review of the benefits of RWTs, design issues and review of six Canadian examples including trails in Montreal and Laval, PQ; Waterloo, St. Thomas, Peterborough and Toronto, ON.

Bikeway and Bike Facility Design

Bikeway Traffic Control Guidelines for Canada, Transportation Association of Canada, 1998
Provides Canadian guidelines for signage and pavement marking including sign design standards, symbols and placement for regulatory, warning and informational signage.

Bicycle Facility Design Guidelines, Richard Drdul Community Transportation Planning, 2004
Provides an overview of bicycle facility design including pathway design guidelines (pathway surfacing, width, alignment, grade, horizontal and vertical clearance, etc); crossing design and signage requirements

Railway Safety and Crossings

The following documents outline the safety requirements for rail operators for railway engineering, sitelines, crossing design, among others.

- *Manual for Railway Engineering, American Railway Engineering and Maintenance of Way Association, published annually.*
- *Railway Crossings & Utility Chapter, Transportation Association of Canada Geometric Design Guide, 2007.*
- *RTD 10, Road/Railway Grade Crossings - Technical Standards and Inspection, Testing and Maintenance Requirements*
- *Railway Safety Act*
- *Canada Transportation Act*
- *TC 0-093, Canadian Railway Operating Rules*
- *TC E-05, Standard Respecting Railway Clearances*

Regulations, Bylaws and Engineering Standards

The Corridor travels through numerous Regional Districts and municipal government jurisdictions. Final trail design will need to comply with any local engineering standards or bylaws.

5. Trail Planning

Tenure

The operating agreement between ICF and Southern Rail of Vancouver Island (SVI) acknowledges that the rail corridor property is to be managed for both rail and trail access. Trails should be safe and compatible with rail usage and not compromise the ability of the rail operators to service present and future customers.

A license agreement between ICF and the trail proponent is one of the first steps in a rail-with-trail project for the Vancouver Island rail corridor. In general, this document will outline the following key terms:

- Purpose: to use and occupy a portion of the lands for the purposes of constructing, operating and maintaining a multi-purpose trail for public use.
- Trail Corridor: Design drawings to be attached to license but the license/lease area will generally include 1/3rd of the rail corridor (approximately 10 metres in 100 foot corridor; 5 metres in 50 foot corridor).
- Right to Use: Consists of a non-exclusive right to enter for construction, maintenance and repair purposes, so long as does not interfere with and provides adequate notice and approval by rail operator; and the right of passage for public, non-motorized users.
- Third Party Interest: Maintains right for ICF and its licensees including the rail operator to have full access to the trail as required so long as it does not unreasonably disrupt or interfere with the trail.
- Plans and Drawings: Copies of any as-built drawings, plans or surveys are to be shared with the ICF and will form a part of the agreement. Costs of plan review by the ICF and the rail operator are to be covered by the trail proponent.
- Consideration: Includes an annual administration fee and the provision for property taxes to be paid or exempt by the trail proponent in the case of a lease. Where property tax exemptions are not possible, the ICF will pay property taxes but will collect a license fee from the trail proponent to offset.
- Grantee Covenants: Includes provisions for trail corridor maintenance (including vegetation management), drainage and signage requirements.

Liability

The trail proponent will be responsible for claims for any injury, loss or damage related to trail use caused by the failure to maintain adequate fencing, railings, guard rails and warning signs on the lands; or to follow

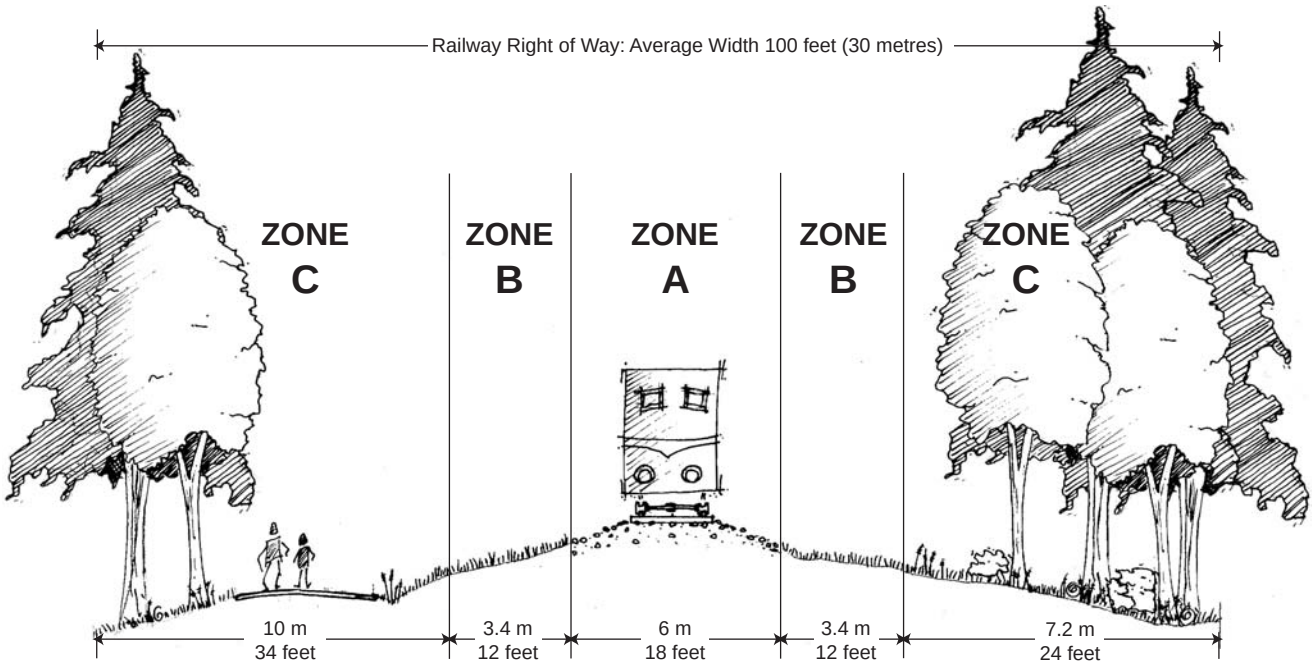
maintenance and inspection policies in connection with the trail corridor. They will not be responsible for issues that arise out of negligence by the land owner or the rail operator. The trail proponent will be required to carry sufficient general liability coverage and to name the Island Corridor Foundation and the rail operator as additional insured.

Vegetation Management

Vegetation management is an integral part of operating a rail system and is ultimately related to safety issues. Vegetation in the outer portions of the corridor where a trail is likely to be situated can:

- Block sightlines and restrict visibility at crossings and curves;
- Hide hazards such as fallen trees, wildlife or people;
- Shade the track, thus preventing adequate snow and ice melt and reducing the drying of track structure; and/or
- Harbor trees that may fall on the tracks or that deposit large quantities of leaf litter (i.e. big leaf maples) on the track creating slipping problems and hiding the tracks.

In 2007, the Island Corridor Foundation board approved an ecological approach to vegetation management. This approach seeks to use the natural ecological attributes of the vegetation to achieve management objectives.



Trail	Grass Verge	Ballast	Grass Verge	Naturalized Edge
Successionally advanced, stable ecosystem	Stable, weed free, non-woody vegetation	Vegetation free	Stable, weed free, non-woody vegetation	Successionally advanced, stable ecosystem

Figure 7. Ecological approach to vegetation management in the rail corridor.

As shown in Figure 7 on the previous page, the ecological approach identifies three management zones. Zone A, the ballast section, and Zone B, grass verges, will be maintained such that Zone A will be vegetation free (+/- 2%) and Zone B will consist of non-woody vegetation to be mowed biannually. Zone C will consist of a successionally advanced, stable ecosystem with pruning and silviculture as required in order to maintain adequate sight lines.

Vegetation management within the Trail Corridor will be the responsibility of the trail proponent. In general, the trail will be located in Zone C but in constrained conditions may be located in Zone B. No vegetation taller than 30 inches (0.76 metres) is permitted within 30 feet (9.1 metres) of the rail centreline. Outside of that zone, trees and shrubs may require limbing up to ensure adequate sightlines for rail operations.

Rail Sidings

A siding is a low-speed, track section distinct from the mainline. Rail sidings are vital to the operation of a rail line providing not only opportunities for equipment storage; loading and unloading of goods; and for passing, allowing trains travelling in opposite directions to pass or for faster/high priority trains to pass slower/lower priority trains going the same direction. They are important for efficiency on single track lines, such as that found in the E&N Corridor.

In some cases, the presence of rail sidings may impact the placement of trails within the corridor. In cases where necessary, there is the possibility to relocate and/or remove sidings so long as it does not impact current and/or future growth in the rail service as identified by the rail operator. Costs for removal and/or relocation will be borne by the trail proponent.

Trail Naming

Historically, the Corridor has been known as the E&N Corridor based on the past history of the Esquimalt & Nanaimo Railway as described on Page 1 of this document. Developed portions of the trail in the City of Nanaimo, are currently known as the E&N Trail.

The Island Corridor Foundation, in its efforts to liaise effectively with First Nations, recognizes that the name E&N may signify something different and perhaps less meaningful to Vancouver Island First Nations communities. Various alternate names have been suggested, and the Island Corridor Foundation is interested in continuing to liaise with local governments and First Nations to identify a name for the Corridor.

In regards to rails-with-trails in the Corridor, trails will be named the Vancouver Island Rail Trail.

User Groups

The Vancouver Island Rail Trail will be designed as a multi-use pathway

for pedestrians, cyclists and non-motorized recreational uses, as defined by the Motor Vehicle Act.

Equestrian use may be considered in rural areas but will be at the discretion of the local jurisdiction. Appropriate trail design and safety requirements will be required. Several of the guidelines outlined in this document provide "equestrian upgrade" options for items such as bridging, surfacing, etc.

Trail Types

The Corridor travels through a variety of ecosystem types as well as developed areas. Trail types will respond to their local environment, for instance, using soft surfaces in rural areas. As such, three trail types are identified for the Vancouver Island Rail Trail including:

- Urban
- Suburban
- Rural

Each trail type will vary in terms of character, surfacing, construction, level and type of use.

Trail Accessibility

Although the rail bed itself maintains a grade of less than 2.1% (the steepest grade found on the Alberni Subdivision) the remainder of the corridor is subject to steep banks, retaining walls, rock cuts, trestles as well as other natural and man-made features that could impact the overall grade of the trail.

An accessible design approach, eliminating barriers while providing access and usability for the broadest range of people, should be applied wherever possible, recognizing that certain areas within the corridor may make this impossible.

In general, the following guidelines will be taken into consideration:

- Maximum grade of 5% with a steeper grade of 8% allowable over distances of less than 10m. If the slopes exceed these grades, then landings should be provided.
- Where required, stairways may be used. Design should incorporate a ramp for bikes.
- Trail surfacing should be uniform with no obstructions or depressions.
- Install structures such as signs and other structures with consideration on their visual and physical impacts
- Additional considerations include trail grades, ramps, staircases, rest areas, seating, bollard placement, surfacing materials and trailhead facilities.

Feasibility Studies

Units of Measure

Standards respecting distances relative to rail corridor are in imperial units, because imperial measures continue to be used by the railway industry within their safety manuals. Metric conversions have been provided for reference.

Currently, feasibility studies have been completed within four of the five regional districts through which the corridor runs. Below is a summary of the findings of each of these reports.

Capital Regional District

A conceptual design report on the West Side Rail Trail Project was completed in 2002. This study reviewed the first 5.25 miles (8.5 kms) of the E&N Corridor from the Johnson Street Bridge in Victoria to the Galloping Goose Trail near Atkins Road in View Royal.

This section of the corridor presents challenges for rail-with-trail design due to the width of corridor (typically 50 feet) and the urban setting (i.e. adjacent residents, existing legal encroachments, road crossings and overpasses, etc.).

The principal conclusions of the report identified that a trail is possible in approximately 85-90% of the Study Area The study identifies four locations where it is recommended that the trail alignment leaves the right-of-way:

- Between Songhees Road and Catherine Street, Victoria West - recommended to use on-road bike lanes on Kitma Road.
- Portage Park, View Royal - Location of siding limits use.
- Kislingbury Lane, View Royal - Recommended to straddle road and rail rights-of-way
- Burnside Road to Colwood Interchange - Inadequate room at the base of fill. Recommended to straddle the rail and road rights-of-way.

This study did not incorporate Miles 5.28-11.50 (View Royal to Langford). Current trail design planning by the CRD uses the Galloping Goose Trail from Mile 5.25 to approximately Mile 7.5, where Atkins Road, Galloping Goose Trail and the E&N Corridor converge. Ultimately, the Millstream Ravine, at Atkins Road, will be crossed and the trail will remain in the corridor. In the meantime, bicycle lanes on Wale Road and Goldstream Avenue will connect the trail.

Cowichan Valley Regional District

In 2006, a feasibility study was conducted between Miller Road, south of Duncan (Mile 38.0) to First Avenue, Ladysmith (Mile 58.9), a total distance of 20.9 miles. Approximately 80% (16.6 miles) is considered to be 'difficult' or 'not practical'. Sections deemed not practical include:

- Beverley Street to Green Road: difficult terrain and major drainage conflicts
- Somenos Road to Westholme Road: Hwy 1 overpass creates impassable barrier for trail construction
- River Road to Old Victoria Road, Chemainus: rail grade constrained on both sides due to slope issues.
- Southin Road to Roberts Road: difficult grades, creek crossings and Holland Creek Bridge

This study did not incorporate lands south of Miller Road (Miles 17.4-38.0 nor lands north of the Town of Ladysmith (Miles 58.9 - 62.6).

Regional District of Nanaimo

In Fall 2008, HB Lanarc and Newcastle Engineering Ltd. conducted a feasibility study of approximately 90 kms of Corridor within the Region including both the Victoria and Alberni Subdivisions. This assessment addressed the portions of the corridor that passes through the electoral areas and the municipalities of Lantzville, Parksville and Qualicum Beach and included Miles 62.66-68.1 and 80.16-119.2 of the Victoria Subdivision.

Lands within the City of Nanaimo were not included in this study as they have already developed 3.41 km of multi-use trail within the corridor and are currently assessing the completion of the southern portion of that trail.

In total approximately 72% of the corridor was rated easy to moderate , 8% rated difficult or very difficult with 18% rated not practical.

In total, about 70% of the assessed corridor was rated Easy to Moderate with the remainder rated Difficult to Not Practical due to large river crossings, steep banks, several highway underpasses as well as several difficult road crossings.

Over a third of the portion of corridor south of the City of Nanaimo was rated difficult to not practical due to steep slopes, rock cuts and bridge crossings at Nanaimo River and Spruston Road. The corridor through Lantzville is relatively straightforward; the major cost items are road crossings and Knarston Creek. The corridor beyond Nanoose First Nation (Mile 82.76) to the northern boundary of Lantzville is rated Very Difficult to Not Practical due to steep slopes. The corridor remains relatively difficult until after Mile 93.17 (end of Englishman River Bridge). From Mile 93.17 to 107.85, the corridor is generally rated easy to moderate, with some Very Difficult or Not Practical sections at some of the major rivers including French Creek, Grandon Creek and Little Qualicum River. North of Mile 107.85 to the northern boundary of the RDN (Mile 119.2) there are several short sections rated easy to moderate. However, they are interspersed with areas rated difficult to not practical due to numerous creek or river crossings and/or steep banks.

The Alberni Subdivision to Mile 10.2 is generally rated Easy to Moderate with the exception of the French Creek Crossing. This subdivision was assessed only as far the Little Qualicum Falls Park Road at Mile 10.2, due to rock slides and poor track conditions beyond this junction.

Comox Valley Regional District

HB Lanarc and Newcastle Engineering Ltd. conducted a feasibility study of approximately 33 kms of Corridor within the Region. This assessment addressed the portions of the corridor that passes through the electoral areas and the City of Courtenay and included Miles 119.6-140.0.

In total approximately 86% of the corridor was rated Easy to Moderate, 6% rated Difficult or Very Difficult with 8% rated Not Practical.

Although the corridor through the Regional District (Mile 119.6-137.8) generally has flatter grades, drainage conditions and the watercourse system present difficulties for trail development. In general, the west side of the corridor holds the most water with numerous culverts required to divert water to the lower slopes on the east side. Numerous small creeks that are potentially spanable with separate footbridges include Cook Creek South and North forks, Waterloo Creek, Coal Creek and Hindoo Creek. Larger rivers or creeks found in steeper, wider ravines that are likely not spanable include Rosewall Creek, Mill Creek, Tsable River, Washer Creek and Trent River. Bypass routes around these sections are typically to nearby Highway 19A using various existing roads.

The corridor within the City of Courtenay (Mile 137.8-140.0) tends to be relatively flat with few topographical limitations to trail development with the exception of a large culvert at Millard Creek. Costs associated with trail development through the city tend to be related to road crossing conditions as opposed to difficult corridor conditions.

Alberni Clayoquot Regional District
To date, no study has been completed.

Community Links

Part of the mandate of the Island Corridor Foundation is "Connecting Communities". In order to be successful, the trail must be integrated with neighbourhoods on both sides of the corridor. The RWT will serve as a link within and between communities. The trail will link to existing community and regional trails and bicycle routes as well as to existing and future Park & Ride or other transit facilities.

Illegal crossing of right-of-way to access residential area.

Where possible, the trail should be sited on the side of the corridor that best benefits both the user and rail operator by limiting the amount of pedestrian cross-traffic. The involvement of the community - residents, merchants, institutions, employees and elected officials - should be viewed as an opportunity to design a better facility. Public meetings will be held to identify community links. Considerations should be given to proximity and location of adjacent residential developments, as well as connections to services including transit hubs, shopping areas, parks, schools and other community amenities.

If needed, additional pedestrian crossings may be considered, but final location will be site-specific and dependent on sightlines, stopping distances and any other safety considerations by the rail operator.

Cultural Protection

One of the key objectives of the ICF is to "preserve archaeological resources, historic landmarks, structures, artifacts, and historic routes along the Island Corridor for historical purposes and for ongoing and future use by the community". Trail planning and design will strive to protect known archaeological sites and other sites of historical and/or cultural importance.

6. Trail Design

Trail Setback and Separation

Numerous challenges existing for siting a trail within the E&N Corridor including physical constraints (topography and drainage issues, etc.); adjacent development patterns; and potentially difficult trail/roadway crossings among others.

The placement of the trail within the corridor will depend on a number of factors including site conditions and features, environmental conditions, utilities within the RoW, number of crossings required, and community connections.

"Setback" refers to the distance between the centreline of the railway track and the edge of trail (Figure 8). The setback distance is dependent on numerous safety factors including type (i.e. locomotive, passenger Budd car, etc.), speed and frequency of trains in the corridor; topography; separation technique; and sight distances. In a study of 21 RWTs, trail setback: ranges from 2.1 m (7 ft) to 30 m (100 ft) with an average of 10 m (33 ft) from the centreline (U.S. DoT, 2002).

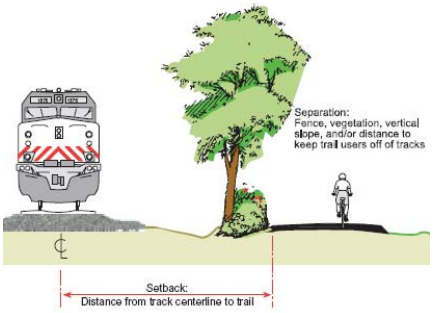


Figure 8. Setback and separation (From: Lessons Learned)

"Separation" refers to the space between the rail and trail. Separation may be provided by a constructed barrier (fences, retaining walls, etc), a 'natural' barrier (vegetation, drainage swales or berms, etc) or by other methods of grade separation (trail above or below rail grade). Horizontal as well as vertical separation can help to prevent conflicts between trail users and rail activity.

In most places, the E&N Corridor is 15.25 metres (50 feet) wide either side of the rail centreline, 30 metres (100 feet) total width (Figure 9). This diagram also shows the minimum and preferred clearances for a future double track, a zone that will be maintained for future use, as well as platform and building requirements for any potential future station building.

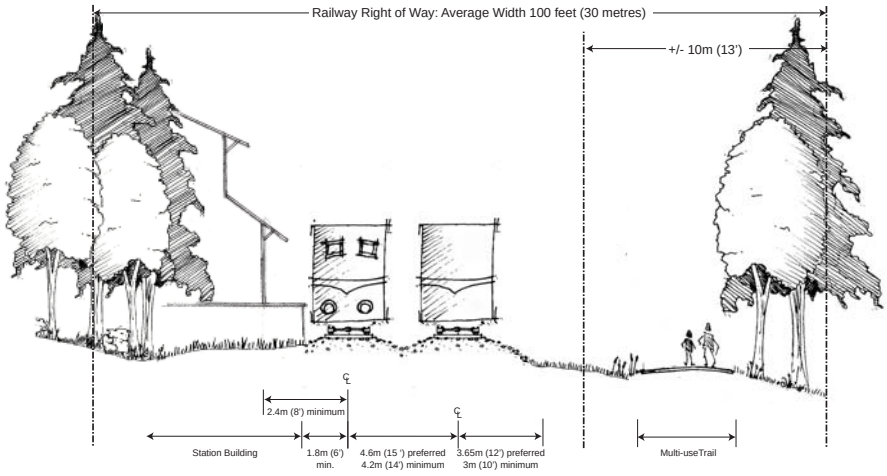


Figure 9. 30 metre (100 foot) corridor showing minimum and preferred clearances for future double track and/or station development.

In some instances, particularly in the Southern portions of the Island, the E&N Corridor narrows to 7.5 metres (25 feet) either side of centreline, 15 metres (50 feet) total width (Figure 10).

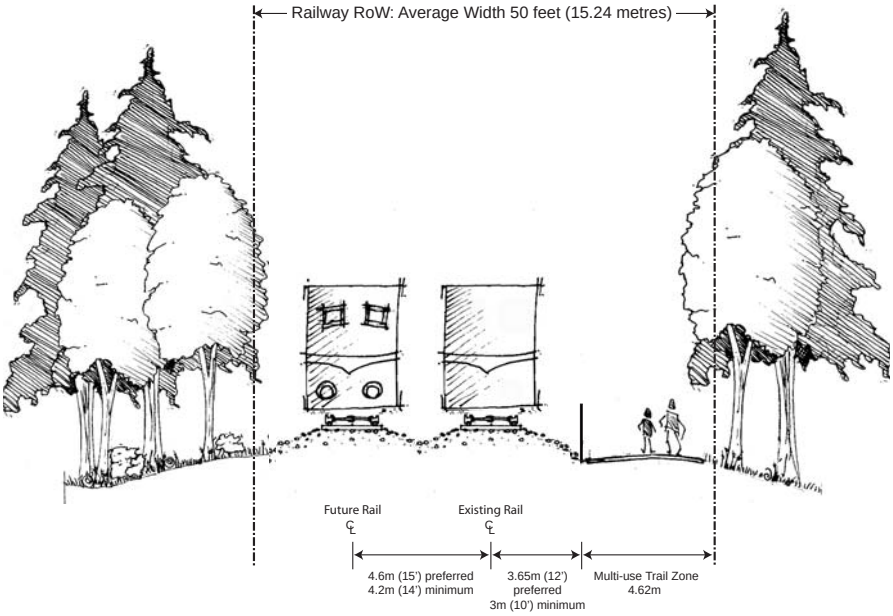


Figure 10. 15 metre (50 foot) corridor showing minimum and preferred separation of rail and trail uses.

Trail design should attempt to maximize the setback distance where possible. In many cases adequate setback distances of 7.5 metres (25 feet) or more can be achieved throughout the corridor, particularly where the total corridor width is 30 metres (100 feet).

A distance of at least 3.65 metres (12 feet) is the preferred allowable distance from the centre line of the railroad track to the edge of trail, provided that a physical barrier is constructed. In the course of trail planning, there may be unique circumstances that require a shortened separation between trail and rail. These areas will require review by the rail operator on a case-by-case basis but may be allowable to a minimum distance of 3.24 metres (10.6 feet).

Please note that these are ideal cross-sections and do not typify the variety in topography found within the corridor. In reality steep banks, rock cuts and other natural features may limit the amount of room within the corridor available for trail development. The completion of rail-trail feasibility studies will indicate where trails within the corridor are possible.

Typical cross-sections can be found in Figures 11 and 12. In general, the following guidelines will be considered:

- Grade separation between rail and trail is the preferred condition. This may be accomplished by the installation of vegetated drainage swales or berms between the two uses.
- In areas with significant vertical separation, barriers should be installed for trail user safety.

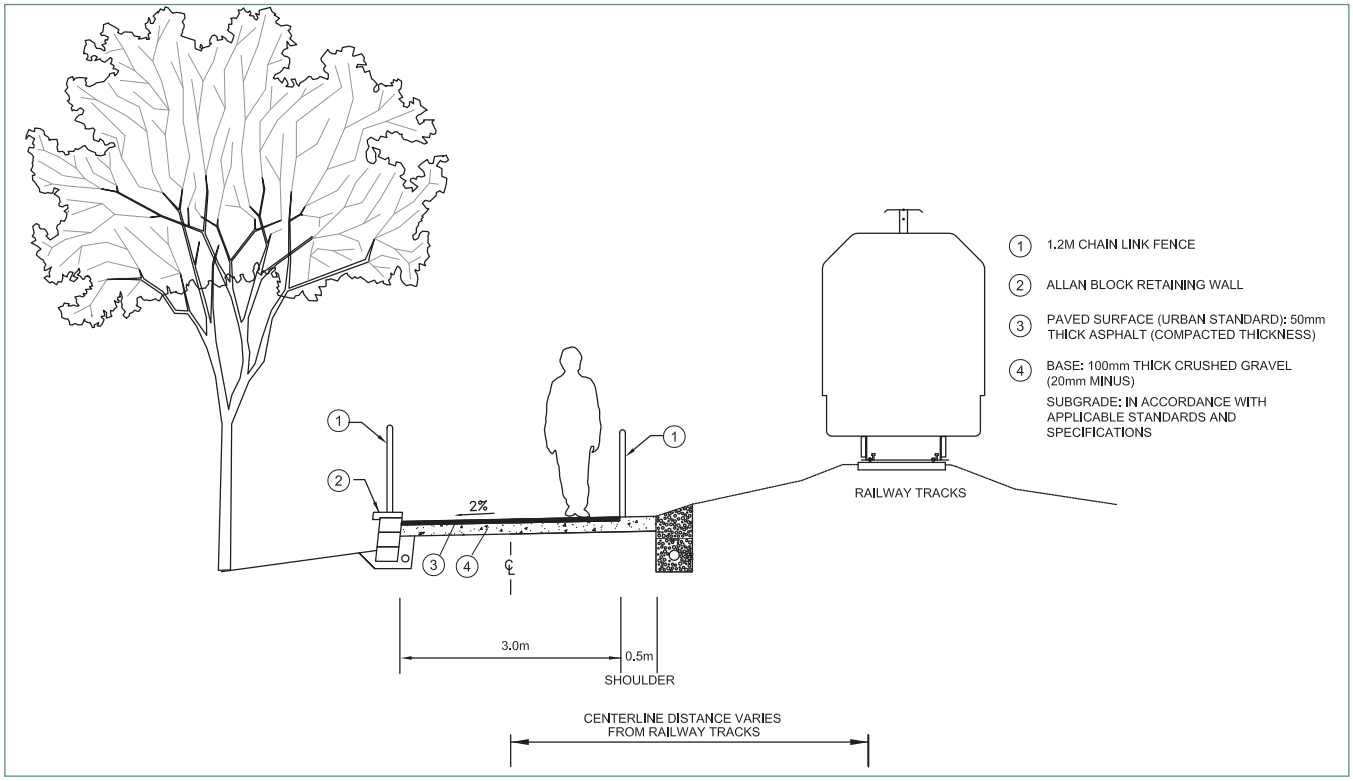


Figure 11. Typical Cross Section A: 15 metre (50 foot) or constrained corridor.

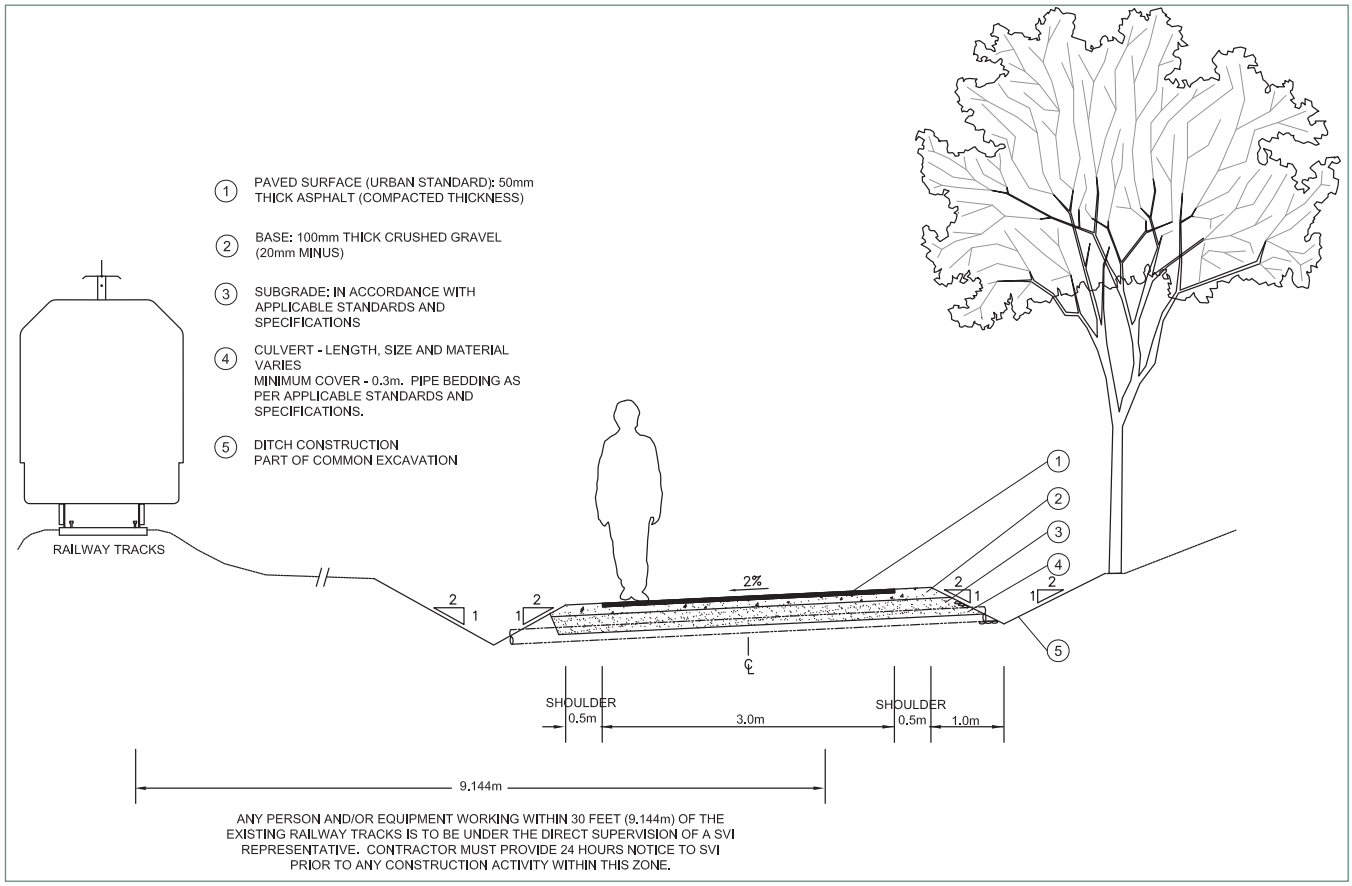


Figure 12. Typical Cross Section B: 30 metre (100 foot) corridor.

- In wider sections of the corridor, there may be room to use vegetation as a physical and visual barrier between uses depending on the types and density of planting. The use of vegetation must not impede sightlines for rail operations: low-shrubs, grasses and forbs are potentially allowable but must have a maximum height of 0.3 metres (1 foot). Large shrubs and/or trees may be considered on a case-by-case basis and will depend on distance from rail bed, rail speeds, track curvature and sightlines among other safety considerations for rail operations.

Grading and Drainage

In order to maintain the integrity of the railbed, railroad corridors are constructed with both lateral ditches and cross-culverts to keep water off the tracks and ballast. Maintaining the integrity of this drainage system is integral to RWT design, particularly as the trail may be constructed where there is an existing lateral ditch or swale.

In addition substantial topographic variations exist within the rail right-of-way and the lower elevations may act to collect stormwater runoff from higher elevations. Trail design will need to consider stormwater runoff patterns particularly where the trails are to be sited in these areas.

In general, the following guidelines will be applied and/or considered in final trail design:

- 2% cross slope on trail. Trails should be designed to slope away from the railbed whenever possible.
- A 2:1 drainage ditch should be constructed between the rail and trail beds where adequate room within the corridor exists (see 30 metre corridor typical cross-section). Where inadequate room exists, a perforated drain should be installed (see Figure 13).

Depending on the topographic conditions on the far side of the corridor, a secondary drainage swale or perforated drain may be required.

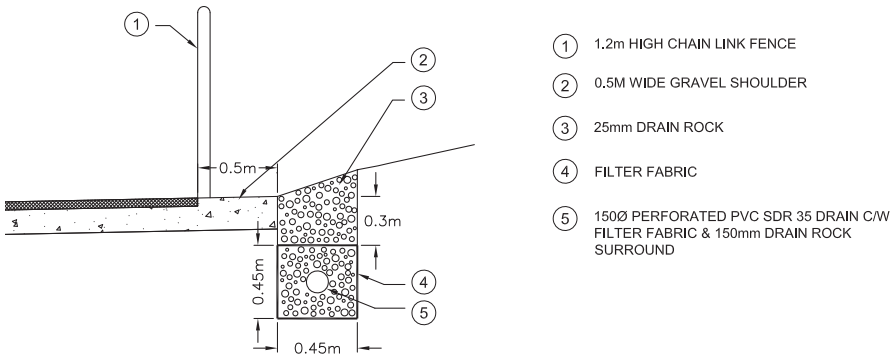


Figure 13. Perforated drain detail.

Environment

Final trail location, design and construction will use good environmental and best management practices to ensure limited impacts on the environment. The Ministry of Environment's *Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia* oulines province-wide guidelines for maintaining environmental values. It is the responsibility of the local government jurisdiction entity responsible for trail design and construction to ensure that all relevant regulations are adhered to.

Crossings and Intersections

Crossings and intersections can be one of the most challenging components in a successful rail-with-trail project.

There are two types of crossings related to trail development. *Road crossings* are either those that are located parallel to the rail line or those that use existing roadways as crossings (Figure 14). *Trail crossings* are when the trail alignment within the corridor changes requiring the trail to cross the tracks (Figure 15).

Trail crossings should be made at an angle as close to 90 degrees as possible, and no less than 70 degrees, to minimize the risk of bicycle tires slipping on the rail surface or becoming trapped in the flangeway (area between the rail and the concrete panel).

The primary objective in trail planning is to minimize the number trail crossings. Where possible, these crossings should be at locations where they are protected by existing crossing signals. If not, adequate sight distances must be provided along the track and approaching the crossing.

There are many ways that crossings can be accomplished. Each final crossing design will be site-specific requiring consultation with and sign-off by the rail operator and/or the Ministry of Transportation if related to a road crossing. Figure 16 is intended to highlight the variety of responses that are required for crossings. In this example from the City of Nanaimo, inadequate sightlines for southbound vehicles turning right off the Island Highway required a unique crossing design.

Any new crossings, outside of existing road rights-of-way, will be required to be built using prefabricated concrete panels (see Figure 17 on the following page) and will require a Crossing Agreement between the trail proponent and the rail operator. Design consideration will be based on the technical specifications outlined in Transport Canada RTD 10 standards (Road/Railway Grade Crossings) and/or other

Figure 14. Road crossing

Figure 15. Trail crossing.

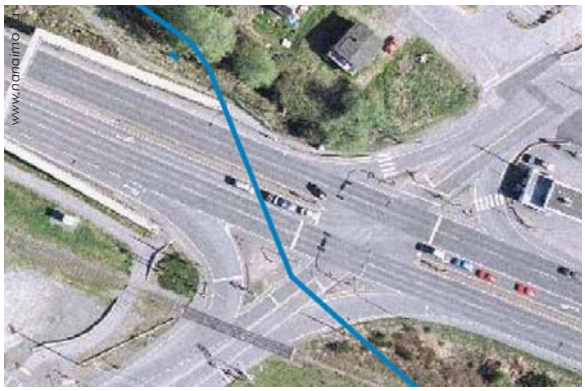


Figure 16. Site-specific crossing

standards identified by the rail operator and Ministry of Transportation, including rail and vehicular site lines, travel speeds, existing crossing protection among others.

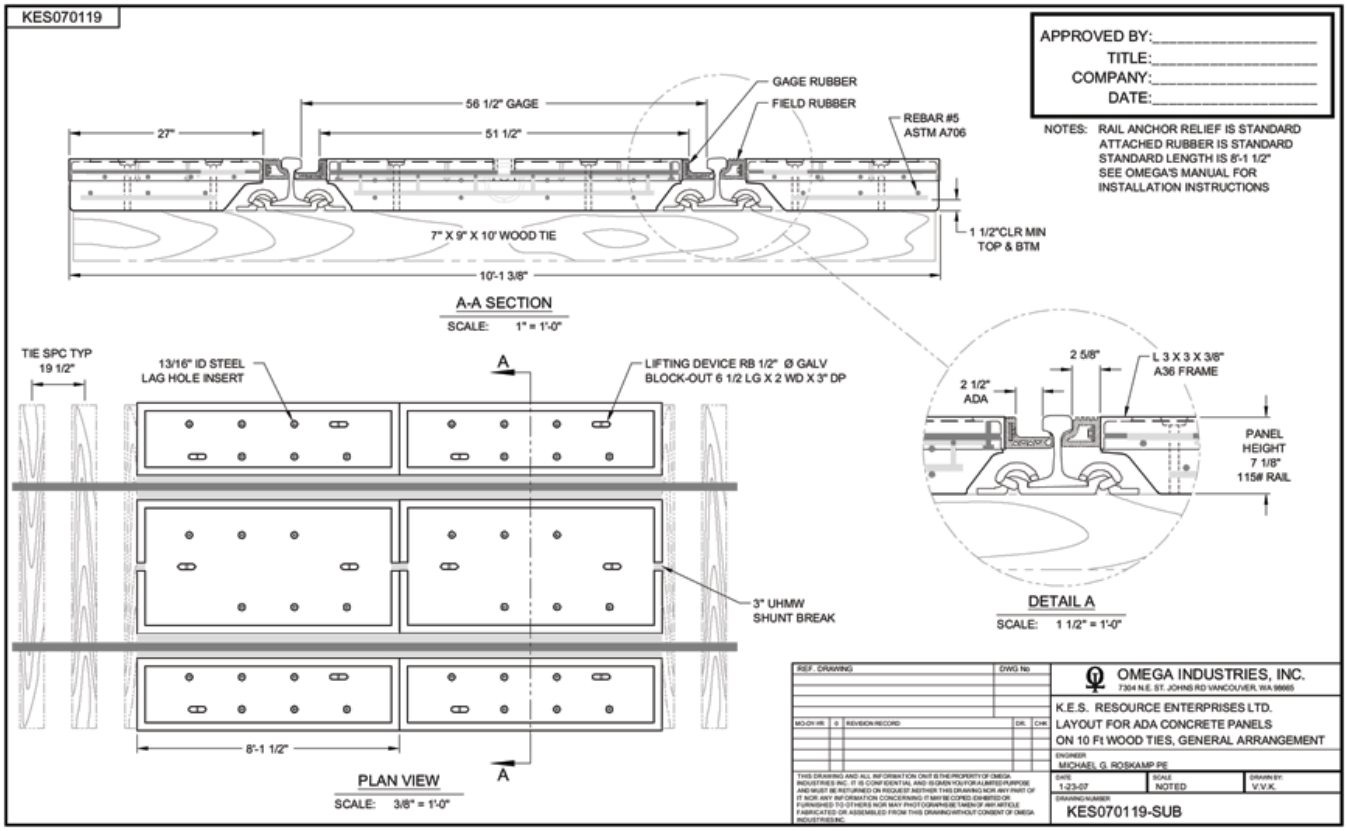


Figure 17. Prefabricated concrete panels for crossings.

Surfacing

Cost of construction, trail usage levels and activities as well as maintenance requirements are fundamental criteria in the selection of trail surfacing.

Hard surfacing such as asphalt, although more expensive to construct, allows for bicycles, rollerblades, strollers and wheelchairs; is suitable for commuters as it facilitates faster speeds and has lower maintenace costs than gravel. Paved pathways are suited to urban areas or areas with higher trail use.

Gravel trail surfaces tend to slow traffic and are generally more fitting to rural and suburban areas or areas with low to moderate trail use. Depending on how they are designed, gravel trails can still be used by bicycles, strollers and wheelchairs.

Figure 18 depicts the urban design guideline (see Section 7). This is based on a trail constructed to a width of 3 meters with 0.5 meter shoulders on either side. The subgrade is to be constructed in accordance with applicable standards and specifications. The base is 100mm thick crushed gravel (20mm minus). Surfacing in the urban design standard is 50 mm thick asphalt over 3m trail width.

In comparison, the suburban and rural design standard omit the asphalt surfacing and the rural standard is based on a trail width of 2 metres with 0.5 meter shoulders on either side.

Bridges and Creek Crossings

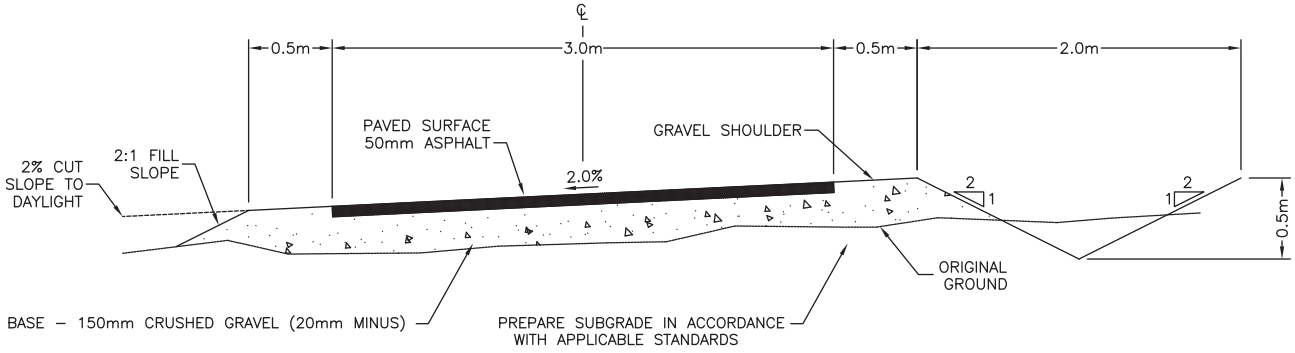


Figure 18. Surfacing detail

Existing rail trestles and bridges are large constraints in the overall feasibility and construction of rail-with-trails. In most cases, the railroad structures have not been designed for pedestrians and/or bicycles and, as a result, pose a safety hazard for corridor trespassers.

While it is possible for an engineer to design a solution to any bridge, modifications to trestles can be expensive. In order to consider modifications to the structure, the trail developer will be responsible for structural integrity improvements required along with the required Federal approvals and will be required to assume maintenance and liability protection for the improved structure. As such, stand-alone footbridges are the ideal bridging solution for the Vancouver Island Rail Trail.

The tables on the following page identify the bridges found on the Victoria and Alberni Subdivisions. Span and height values are provided offering some idea of the complexity required in completing any bridging. Smaller streams, culverts and other waterways, and roadways can potentially be crossed with either prefabricated or constructed bridges. Trail feasibility studies will indicate where bypasses may be required due to large spans.

In the future, as existing bridges within the right-of-way reach the end of their life span, it may be possible to explore dual purpose bridges. Tables also include expected lifespan (from Bridges and Culverts Valuation Report, completed by AMEC Earth and Environmental in 2006 for RailAmerica portion of corridor and by McLeman Bridge and Structures in 2004 for CPR portion of corridor).

Mileage	Stream/Roadway	Span (ft)	Height (ft)	Life (years)	Mileage	Stream/Roadway	Span (ft)	Height (ft)	Life (years)
0.20	Johnston Street	66	22	50	1.30	Hereward Street	55	15	35
4.0	Island Highway	43.5	17	35	4.50	Helmken Road	45	18	60
5.2	Burnside Road	65.3	21	90	5.34	Island Highway	337	26	90
5.45	Thetis Lake Road	65.3	21	90	5.8	Six Mile Road	108	27	90
14.0	Niagara Canyon	529	246	5	14.9	Arbutus Canyon	462.5	183	45
15.6	Tunnel	147	21.5	100	18.2	Unnamed Creek	16.5	6.5	20
26.8	Shawnigan Lake Road	33.67	14	25	28.2	Unnamed Creek	43.5	20	30
28.4	Unnamed Creek	43.5	18	10	28.6	Unnamed Creek	43.5	17	45
29.8	Northgate Road	47.5	18	15	35.6	Koksilah Road	27.83	14.5	50
37.6	Koksilah Overflow	75	20	15	37.8	Koksilah River	157.5	22	40
39.3	Cowichan River	224.17	32	10	40.6	River	38	11	40
46.60	Overflow	45	11	25	46.80	Whitehorse Creek	30.5	13	45
47.9	Chemainus River	157	23	35	60.70	Creek	106.92	38	15
64.40	Lochner Road	102.42	37	35	65.10	Nanaimo River	199.42	112	30
79.10	Doumont Road	117	20	30	79.90	Green Lake	210	26	20
86.90	Bonell Creek	66	20	50	87.20	Hamilton Creek	45	22	40
93.0	Englishman River	334	80	40	98.6	French Creek	1062.67	92	25
103.7	Little Qualicum River	450.5	132	50	110.7	Big Qualicum River	315.67	97	50
113.2	Nile Creek	166.5	55	35	119.2	Cook Creek South	30.67	14	35
119.5	Cook Creek North	29.67	13	15	120.2	Rosewall Creek	71.25	25	15
122.0	Waterloo Creek	66	16	35	123.0	Coal Creek	117.83	35	35
124.1	Mill Creek	172.83	40	35	125.5	Tsable River	603.25	75	30
126.15	Buckley Bay Road	65.3	22	90	127.6	Hindoo Creek	20.5	13	60
131.1	Washer Creek	111	39	45	135.1	Trent River	289	80	60

Table 1: Rail bridges on Victoria Subdivision

Mileage	Stream/Roadway	Span (ft)	Height (ft)	Life (years)	Mileage	Stream/Roadway	Span (ft)	Height (ft)	Life (years)
4.7	French Creek	75	45	40	12.3	McBey Creek	29	18	40
12.4	Little Qualicum River	75	30	50	13.7	Dry	210	37	25
13.8	Dry	110	20	25	14.0	Dry	241	30	25
14.6	Dry	441	100	25	17.5	Creek	195	63	25
18.1	Creek	165	42	25	18.8	Dry	197	28	25
20.2	Dry	143	42	25	21.4	Summit Lake	210	20	25
21.8	Loon Lake	480	22	25	22.1	Loon Lake	120	10	25
25.0	Creek	346	47	25	28.9	Dry	75	12.5	25
29.9	Creek	300	30	20	36.5	Kitsuksis Creek	227.75	62	40
37.1	Roger Creek	151.5	39	50					

Table 2: Rail bridges on Alberni Subdivision

Although the overall construction and design of any footbridges will vary case-by-case, the following design guidelines will be considered *(City of Nanaimo, 2008)*:

- Minimum clear width of the pathway both onto and on the bridge should be the same width as the approach path with an additional 0.6 metres (2 feet) on either side.
- Minimum railing height of 1.4 metres (4.6 feet) with a 200 mm (7.8 inch) rub rail installed between the heights of 0.9 metres (2.95 feet) and 1.1 metres (3.6 feet). Although the rub rail serves to prevent bicycle handle bars from catching vertical supports, it will also be designed to function as a handrail for pedestrians
- In order to support use by bicycles and horses, decking will be comprised of 4-inch, pressure treated planks laid perpendicular to the beams of the superstructure with gaps of 1/8" to 1/4" to allow for drainage.
- Where possible, bridge design will accomodate handicapped users and include appropriate design elements for both the bridge and the approach.

Stairways

While the rail-with-trail will strive to maintain accessible design, stairways may be required in areas of steep grades or to access the trail from neighbouring trail links. Stairways should be built to local design specifications and standards.

In order for cyclists to use stairs on the pathway, a ramp will be provided on at least one side of the stairs (Figure 19). This ramp should not exceed a 25% slope. Handrails will be provided as specified in local building specifications and codes.

Figure 19. Examples of bike ramps along staircases.

Fencing

As discussed above, fencing will be required where the setback distance between the trail and rail trackage becomes constrained and where adequate grade separation does not exist. Fencing may also be required in areas to control and/or divert pedestrian traffic flow (i.e. to reduce pedestrian cross-traffic or to direct to an existing crossing).

Fences will be 1.2m high constructed either with black, vinyl-coated chain-link or wood as shown in Figure 20 on the following page.

Chain-link fence will be constructed with a 150mm gap at the bottom for ease of maintenance as well as to allow the movement of small wildlife.

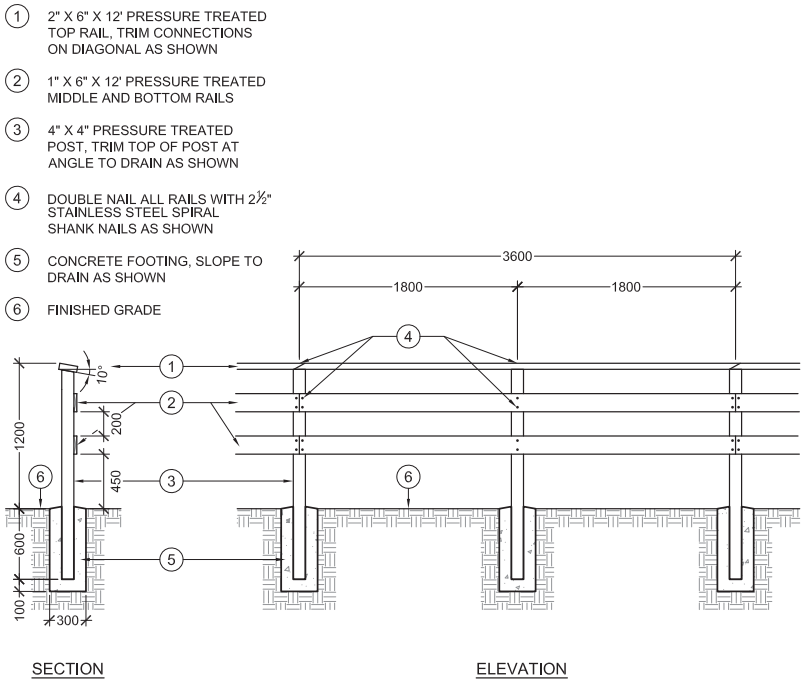


Figure 20. Wood fence construction detail.

Bollards

Bollards, gates and barriers are to be used to control access to the trail and should not be used as speed control devices. Bollards are to be installed at trail access points and railway crossings. At railway crossings, they will be oriented as depicted in Figure 21 with 1.5 m between bollards with a removable centre bollard to allow access for maintenance vehicles. Bollards should be set back 6 metres (19 feet) from roadway edge to allow maintenance vehicles to park in a safe location to access trail.

Bollards will be 1.3m tall and constructed of 100mm diameter steel as per Figure 22 and 23 on the following page.

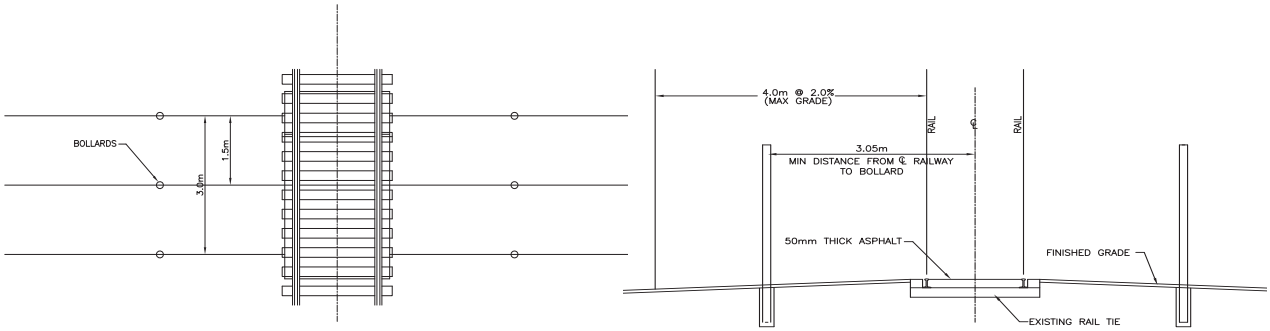


Figure 21. Typical bollard placement at rail crossing.

Figure 22. Typical Bollard

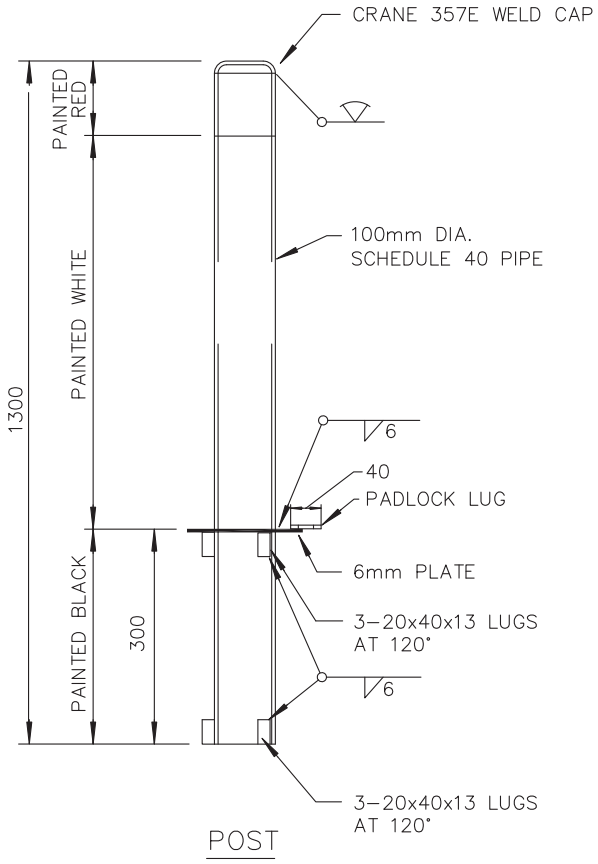


Figure 23. Bollard Construction Detail

Removable and permanent bollard details are depicted in Figures 24 and 25 on the following page.

Trailheads

Trailhead facilities will be located on the same side of the tracks as the trail and may include parking areas, restrooms and other facilities deemed necessary by the jurisdiction responsible for trail design, construction and maintenance.

Facilities will require a minimum setback of 3.24 m (10.5 feet) with a distance of greater than 3.65 m (12 feet) preferred. Trail kiosks and other signage may be allowable within 3.24 m (10.5 feet) so long as they do not impeded rail sightlines.

Rest Areas and Seating

Rest areas and seating can help to provide a more enjoyable trail experience by providing places for sitting and socializing.

In rural areas, rest areas may be fewer in number and consist of only a simple wooden bench on a concrete pad. In more urban areas, rest areas may be more frequent and could have additional amenities such as garbage cans, signage or bike racks.

The design of rest areas is dependent on site-specific conditions such

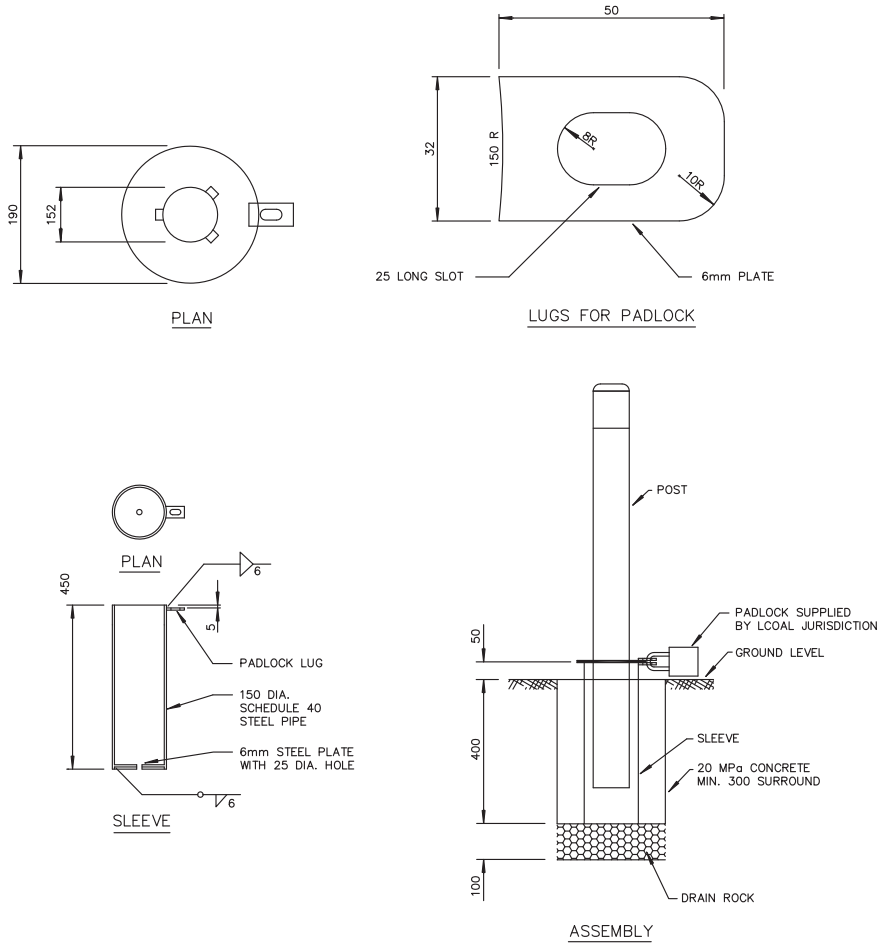


Figure 24. Removable Bollard Details.

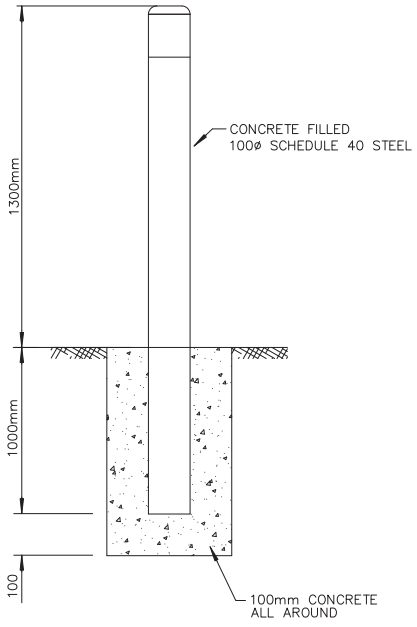


Figure 25. Permanent Bollard Detail.

as slope, soil, views, existing vegetation, interpretive opportunities and adjacent land uses.

Specific standards for benches and other amenities depends on the site character, trail budget as well as applicable local specifications and standards.

Signage

It is recommended that a separate trail signage study be prepared that includes public information and way-finding signage, interpretive signage and provisions for special events.

Regulatory and safety signage should be installed according to Transportation Assocation of Canada's Bikeway Traffic Control Guidelines for Canada (Dec 1998). Signs and pavement markings intended to be displayed to road users must conform to the principles outlined in the Manual of Uniform Traffic Control Devices for Canada (MUTCDC).

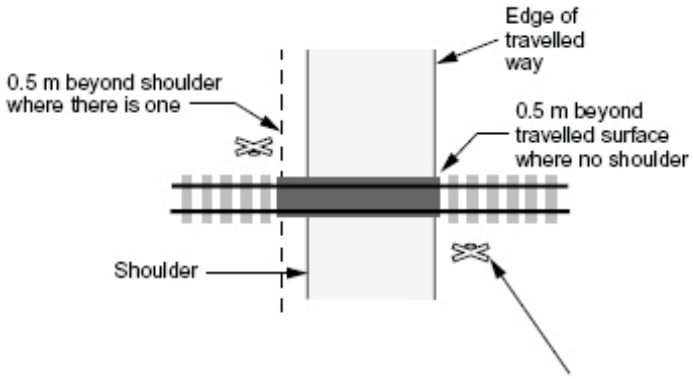


Figure 26. Railway crossing signage location (FROM RTD-10)

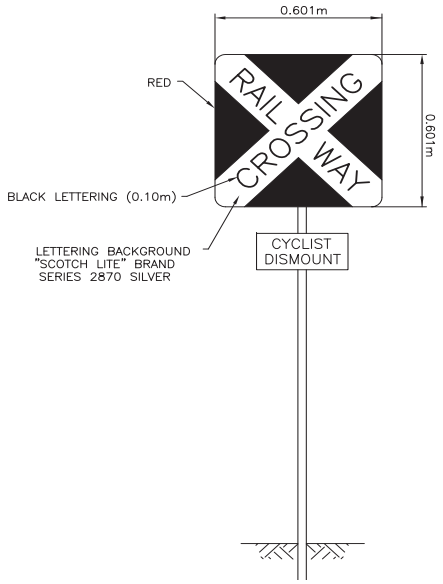


Figure 27. Railway crossing signage detail

Rail crossings will be signed as per Figures 26 and 27 above. When the trail crossing centreline is further than 3.6 metres (12 feet) from the edge of an existing road crossing, separate warning signs are required.

Lighting

The installation of lighting is dependent on the trail use (i.e. urban commuting facility vs. recreational trail), the potential impact on neighbours and the overall cost for installation, operation and maintenance.

For the most part, the trail will likely not be illuminated except at crossings and underpasses where safety and visibility are important factors. Any lighting installations will need to take into account the impacts on train operation and visibility.

There is the potential to install motion-detected, solar lighting so that the portion of trail requiring lighting is only lit as people approach and pass.

Retaining Walls

Retaining walls may be required in areas where the corridor narrows and/or there is significant grade difference between the tracks and trail.

Retaining wall requirements and design will be on a case-by-case basis by a geotechnical and/or structural engineering

7. Design Guidelines

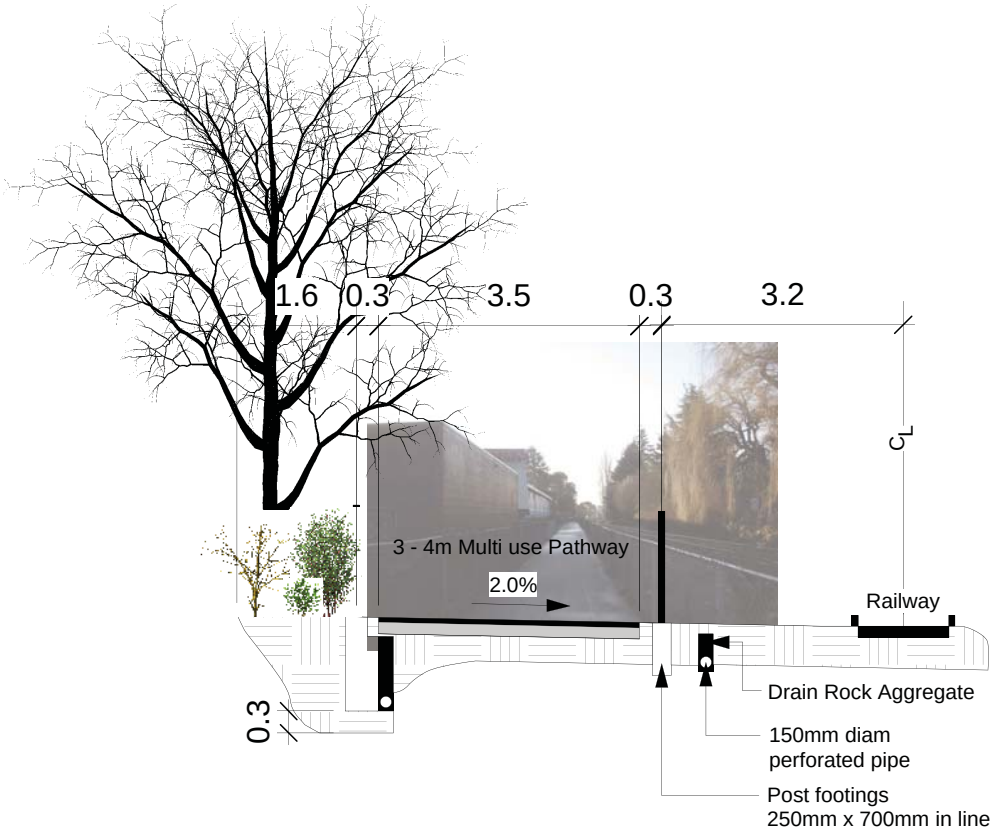
In order to ensure long-term sustainability of the trail with reduced need for on-going maintenance, trails must be designed and constructed to certain standards.

Design guidelines for the following trail types are provided:

- Urban
- Suburban
- Rural

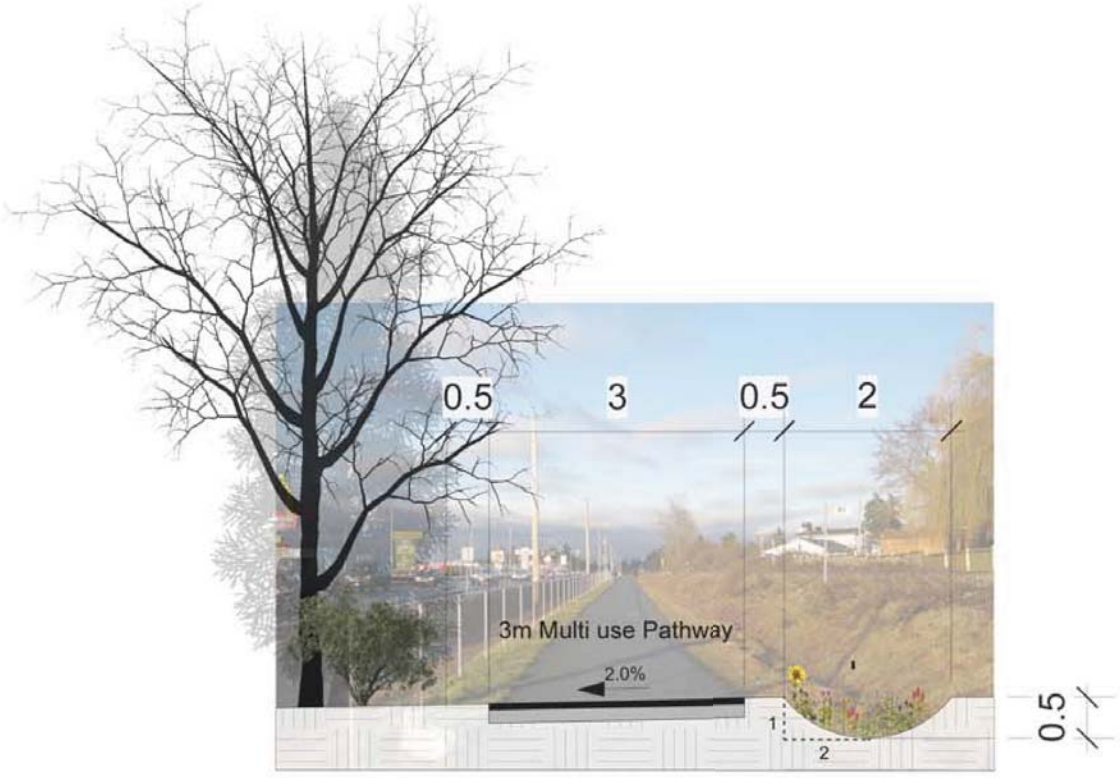
Urban

Level of Use	High to Very High
Type of Use / Accessibility	Multi-use; walking; jogging; cycling; rollerblading; wheelchair; accessible where feasible
Surface	Asphalt (50mm thick) and 150mm thick 19mm minus crushed gravel base
Width	3-4m
Vegetation Clearance/ Management	0.5m either side; 2.5 minimum vertical clearance; No vegetation taller than 30 inches (0.76 metres) is permitted within 30 feet (9.1 metres) of the rail centreline. Outside of that zone, trees and shrubs may require limbing up to ensure adequate sightlines.
Slope	Maximum 5% sustained grade; 2% cross slope
Horizontal Curves	Ensure clear sightlines for cyclists. Design in accordance with relevant Bicycle Facility Design Guidelines, if applicable.
Barriers	Post and Sleeve
Drainage	Shallow swale on uphill side and between rail bed as required
Comments/ Variations	Designed for multi-modal, commuter use. Should be designed with minimum curves for commuter efficiency. Crossings and intersections must be clearly marked.



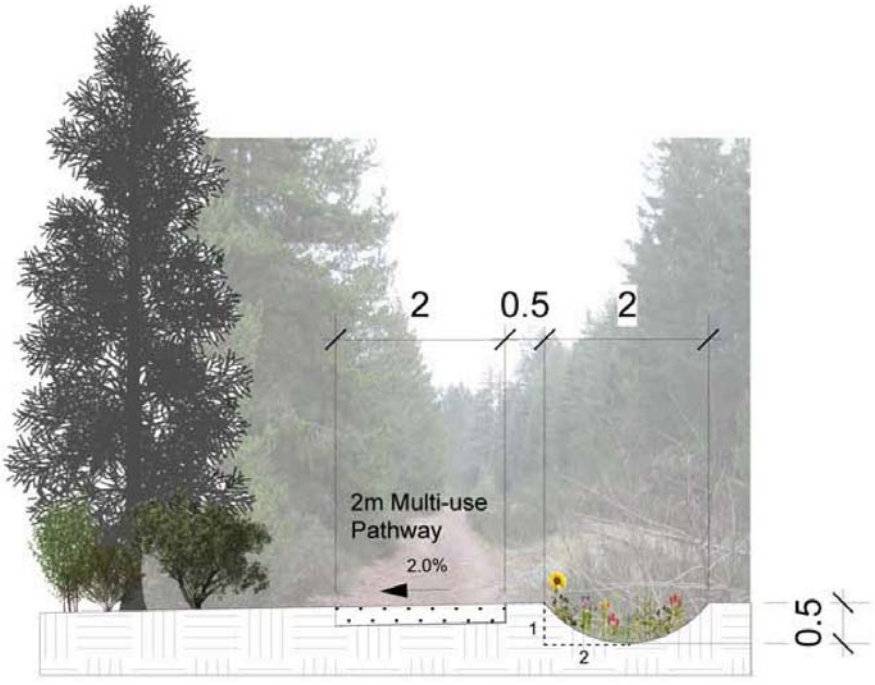
Suburban

Level of Use	Moderate to High
Type of Use / Accessibility	Multi-use; walking; jogging; cycling; accessible where feasible
Surface	Asphalt (50mm thick) if desired and 150mm thick 19mm minus crushed gravel
Width	3m
Vegetation Clearance/ Management	0.5m either side; 2.5 minimum vertical clearance; No vegetation taller than 30 inches (0.76 metres) is permitted within 30 feet (9.1 metres) of the rail centreline. Outside of that zone, trees and shrubs may require limbing up to ensure adequate sightlines.
Slope	Maximum 5% sustained grade; 2% cross slope
Horizontal Curves	Ensure clear sightlines for cyclists. Design in accordance with relevant Bicycle Facility Design Guidelines, if applicable.
Barriers	Post and Sleeve
Drainage	Shallow swale on uphill side and between rail bed as required
Comments/ Variations	Crossings and intersections must be clearly marked.



Rural

Level of Use	Low to Moderate
Type of Use / Accessibility	Multi-use; walking; jogging; cycling; accessible where feasible; equestrian where appropriate
Surface	Minimum 150mm thick 19mm minus crushed gravel
Width	Minimum of 2m
Vegetation Clearance/ Management	0.5m either side; 2.5 minimum vertical clearance; No vegetation taller than 30 inches (0.76 metres) is permitted within 30 feet (9.1 metres) of the rail centreline. Outside of that zone, trees and shrubs may require limbing up to ensure adequate sightlines.
Slope	Maximum 5% sustained grade; 2% cross slope
Horizontal Curves	Ensure clear sightlines for cyclists. Design in accordance with relevant Bicycle Facility Design Guidelines, if applicable.
Barriers	Primarily boulders or wooden baffles
Drainage	Shallow swale on uphill side and between rail bed as required
Comments/ Variations	Crossings and intersections must be clearly marked.



8. Sources

American Railway Engineering and Maintenance of Way Association. *Manual for Railway Engineering*. 2008.

BC Ministry of Environment. *Develop with Care: Environmental Guidelines for Urban and Rural Land Development*. 2006.

BC Recreation and Parks Association. *Active Communities*. www.activecommunities.bc.ca/wp

Capital Regional District. *Bicycle Strategy: TravelChoices*. 2003.

City of Nanaimo. *Trail Implementation Plan*. 2008.

City of Kelowna. *Rails with Trails Feasibility Study*. 2002.

Comox Valley Regional District. *Rail Trail Feasibility Study*. 2009.

Cowichan Valley Regional District. *CVRD Rail Trail Project: Feasibility Assessment Duncan to Ladysmith*. 2006.

Federation of Canadian Municipalities. *Partners for Climate Protection*. http://www.sustainablecommunities.fcm.ca/partners-for-climate-protection/

Government of Canada. *Railway Safety Act*. 1985, c.32 (4th Supp.))

Polster Environmental Services Ltd. *Vegetation Management Concepts: E&N Railway*. 2007

Province of BC. *Climate Action Charter.* http://www.cd.gov.bc.ca/ministry/whatsnew/climate_action_charter_update.htm

Rails to Trails Conservancy. *Rails-with-Trails: Design, Management and Operating Characteristics of 61 Trails along Active Rail Lines*. 2000

Rails to Trails Conservancy. *Rails-with-Trails: A Preliminary Assessment of Safety and Grade Crossings*. 2005.

Railway Association of Canada. *Canadian Rail Operating Rules*. TC-0 0-53. 2005.

Railway Association of Canada. *Standard Respecting Railway Clearances*. TC E-05, RSA 7(2) R.S.C. 1985, c.32 1992.

Regional District of Nanaimo. *Rail Trail Feasibility Study*. 2009.

Richard Drdul Community Transportation Planning. *Bicycle Facility Design Guidelines*. 2004.

Robinson, Anne. *Rails-with-Trails in Canada*. *Leisure Trends Monitor: Fall* 2004.

Township of Esquimalt. *West Side Rail Trail Project: Conceptual Design*

Report. 2002.

Transport Canada. RTD 10: Road/Railway Grade Crossings - Technical Standards and Inspection, Testing and Maintenance Requirements. 2002

Transportation Association of Canada. *Bikeway Traffic Control Guidelines for Canada*. 1998.

Transportation Association of Canada. *Manual of Uniform Traffic Control Devices for Canada (MUTCDC)*. 2004.

Transportation Association of Canada. *Geometric Design Guide: Railway Crossings & Utility Chapter.* 2007.

U.S. Department of Transportation. *Rails-with-Trails: Lessons Learned*. 2002.

Various Regional District and Local Government webpages.