West Shore Tram Line Assessment

Submitted to C4CR Group
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Photos: courtesy Siemens AG

Submitted by:

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INNOVATIVE SOLUTIONS

In Association with:

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Executive Summary

The C4CR Group, consisting of the communities of Langford, View Royal, Colwood, Esquimalt, Victoria and Sooke, as well as the Capital Regional District (CRD), BC Transit, Island Corridor Foundation (ICF) and Southern Railway of Vancouver Island Limited (SVI) commissioned this study.

Its purpose is to investigate the feasibility of establishing a rail service between Langford and Victoria using the existing ICF rail alignment to determine whether the concept should be advanced to a more detailed planning and design phase.

The conceptual service plan for the West Shore Tram Line (see Chapter 3) assumes an initial service designed to balance two main objectives—minimizing start-up costs (financial risk) and financial viability—in order to allow implementation within a relatively short timeframe. The service could then be expanded as market conditions, ridership and other factors dictate.

Key Findings

- A reasonable opportunity exists to develop an initial service for a capital cost of less than $16 million. These costs are sensitive to the price of the equipment that ranges from about $4 to $8 million. For purposes of this analysis, a mid-point figure of $6 million was assumed to purchase modern train equipment that would be appealing to customers.
- The annual operating costs are estimated to be less than $2 million.
- Daily ridership is estimated between 1,400 and 2,300 round trips. Assuming an average round-trip fare of $5.00 per passenger, the annual revenue is estimated to be about $950,000 to $1.7 million.
- The average annual operating shortfall is estimated to be $500,000 or $1.02 per revenue passenger. This compares to a shortfall of $1.22 for Victoria conventional transit in 2006/07.
- The proposed tram system could be implemented in a relatively short timeframe on the underutilized ICF rail corridor that connects downtown Victoria with the West Shore communities that are the fastest growing communities in the Capital Regional District.
- Careful development of the tram system, beginning in Greater Victoria, could rejuvenate rail on Vancouver Island by creating an iconic, proactive way to manage regional growth and road traffic congestion in an environmentally responsible manner.

- Viability of the tram service critically depends on building ridership through service quality and customer satisfaction. The most important attributes for customers are: on-time reliable service, convenience (frequency, service hours, bus links/integration), pricing (value for money), comfort and safety.
- A key concern is that the existing Victoria terminus adjacent to the Johnson Street Bridge is not conveniently located near the Douglas Street corridor where the majority of the central business district employment is located. One potential solution is to add a station at City Hall and extend the rail line, likely along Pandora Avenue. This would provide travelers with the option of two downtown station stops.

Recommendations

1. The West Shore Tram Line concept should be advanced to a more detailed project planning phase. A key next step in this regard is to begin discussions with rail equipment suppliers to obtain firm price quotations and determine the lead the time to acquire equipment.

2. To ensure an on time, reliable and safe operation, the issue of public road-rail level crossings must be addressed. It is recommended that a more detailed review of the crossings on the route be undertaken in conjunction with SVI, the municipalities of Langford, View Royal, Esquimalt and Victoria, as well as the Esquimalt and Songhees Nations to determine a strategy for addressing this issue.

3. Use transportation demand management measures such as managing and pricing parking at destinations (e.g., downtown Victoria and other worksites) as a way to encourage shifts from driving to rail transit.

4. Identify potential funding sources and mechanisms to contribute to the funding of costs in order to advance the concept.

1. Introduction

1.1 Purpose and Approach

The C4CR Group consisting of the communities of Langford, View Royal, Colwood, Esquimalt, Victoria and Sooke, as well as the Capital Regional District (CRD), BC Transit, Island Corridor Foundation (ICF) and Southern Railway of Vancouver Island Limited (SVI) commissioned this study to investigate the feasibility of establishing a rail service between Langford and Victoria. The scope of this study and the proposed service is based on using the existing alignment and rail infrastructure owned by ICF.[1]

To accomplish these objectives the approach used for this study:

- Identifies the **market demand** and estimated revenue potential for the proposed service;
- Develops a **conceptual service plan** to meet the demand, including equipment options and estimates of capital and operating costs;
- Provides a **business case** as input to a decision on whether to advance the concept to a more detailed planning and design phase.

The study also considers the general potential for future expansion of the service to communities north of Langford using the ICF corridor.

1.2 Previous Rail Studies

Rail-based transit options in the CRD are often viewed as a major undertaking. Some of the alternatives that have been considered include Light Rail Transit (LRT) using a Galloping Goose trail alignment, significant infrastructure renewal of the E&N right-of-way and acquisition of a passenger car fleet of 10 vehicles. The corresponding capital costs associated with these options are significant—at least $55 million and in some cases well above $100 million. [2]

With considerable private and public sector support already in place, the proponents for this study envision a modest tram service (see Section 3) that would be considerably less costly and less risky to initiate. Such an approach would allow implementation within about two years with future service expansion phased in as market conditions, ridership and other factors warrant.

[1] The Island Corridor Foundation completed its acquisition of the transportation corridor from Victoria to Courtenay (formerly E&N Railway) from CPR and RailAmerica in March 2006. Southern Railway assumed operation of the existing freight and passenger (VIA Rail) services on July 1, 2006.

[2] Sources: CRD *Travel Choices Strategy* (2003); BC Transit's *Victoria Light Rail Transit Implementation Strategy* by N.D. Lea Consultants (1996).

1.3 A Tram Service—Why Now? [3]

Efficient urban transportation networks are a key element of successful cities. There has generally been a renaissance in rail transportation across North America as planners and developers view rail as a catalyst for sustainable development. Some urban rail transit systems that have been implemented recently have attracted ridership levels well beyond expectations.

The future of Vancouver Island lies in sustainable green communities and balanced growth. CRD's regional growth strategy promotes compact urban settlement through the development of major downtown centres, building more complete communities and protecting rural communities (see Appendix A for regional growth strategy vision and initiatives summary).[4]

The timing is appropriate for a tram service between Langford and Victoria for several reasons. First, a "rail transit village" combining high density development with **an integrated rail and bus system in the provincial capital would provide an iconic, proactive solution to manage regional growth** in an environmentally responsible manner. It supports the CRD's energy plan and provincial environmental goals by emphasizing conservation and energy efficiency.

In addition, rail is likely to be popular because it provides an eco-friendly way for workers to commute to jobs. This is particularly important for West Shore communities that are experiencing the fastest growth in the CRD and where the roadways are the most congested of any in the region.

[3] See Appendix A for a hierarchy of passenger rail technology such as LRT and commuter rail.

[4] Urban sprawl threatens the Island's quality of life and is an inefficient use of tax dollars to support. Research by Colorado State University estimates that every dollar brought in by sprawl development costs $1.65 in local services to support (*How Sprawl Contributes to Local Governments' Woes*, 2003).

2. Context for Passenger Rail in Greater Victoria

This Chapter reviews the overall market setting by reviewing population growth trends, existing travel patterns, receptiveness to rail and the key factors that will influence ridership for the proposed West Shore Tram Line.

2.1 Greater Victoria Demographics

2.1.1 Population Growth Trends

As shown in Exhibit 1, the population of the Victoria Metropolitan Area (VMA) was 330,000 in 2006, of which about 70% live in the Core communities. Another 58,000 (18%) live in West Shore communities and the remaining 38,000 (12%) live on the Saanich Peninsula. The regional population is projected to increase to 407,600 by 2026.

Downtown Victoria will remain the regional employment, business and cultural centre. However, the majority of growth in the region is being driven by West Shore communities. As shown in Exhibit 2, these communities are

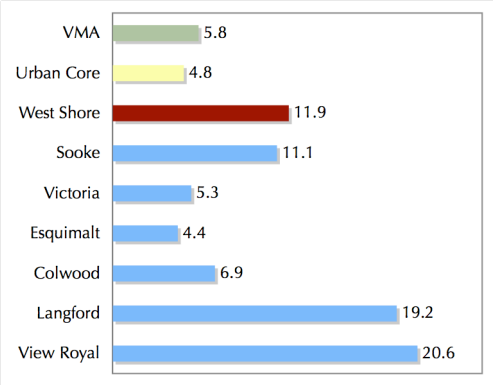
EXHIBIT 1: CAPITAL REGION POPULATION PROFILE

	2006	2026F	Gain
Esquimalt	16,840	21,100	
Oak Bay	17,908	19,100	
Saanich	108,265	119,300	
Victoria	78,057	84,700	
View Royal	8,768	10,700	
Urban Core	**229,838**	**254,900**	**25,062**
Central Saanich	15,745	17,700	
North Saanich	10,823	13,000	
Sidney	11,315	15,600	
Saanich Peninsula	**37,883**	**46,300**	**8,417**
Colwood	14,687	30,200	
Highlands	1,903	2,200	
Juan de Fuca	4,250	6,300	
Langford	22,459	42,100	
Metchosin	4,795	5,300	
Sooke	9,704	15,500	
West Shore	**57,798**	**101,600**	**43,802**
Indian Reserves	4,569	4,800	
Victoria Metropolitan Area	**330,088**	**407,600**	**77,512**

Source: CRD

growing at double the growth rate of the VMA. The population increased by more than 10% from 2001 to 2006 in the communities of Sooke, View Royal and Langford compared with increases in the Urban Core of 4.8% and 5.8% for the VMA. If these trends continue, the West Shore communities will account for more than half of the overall population growth in the VMA by 2026 and account for 25% of the regional population (versus 18% in 2006).

EXHIBIT 2: FIVE-YEAR POPULATION GROWTH
(% increase, 2001-2006)



2.1.2 West Shore Development Trends

The West Shore communities have pro-growth policies and significant undeveloped land that will support mixed-use comprehensive developments. The number of dwellings in the Western Communities is forecast to increase from 21,200 in 1996 to 46,600 by 2026.[5] This represents 48% of the increase in the Greater Victoria area. Exhibit 3 provides examples of the major new comprehensive neighbourhood developments including one of the largest mixed-use developments in the province (Bear Mountain Golf Resort).

EXHIBIT 3: WEST SHORE DEVELOPMENTS

Development	# Residential Units	Single Family Dwellings	# People
Bear Mountain – Langford, Highlands	5,150	1,000	12,360
Westhills – Langford	5,950 *	1,500	16,000
Royal Bay – Colwood	2,800	0	7,000
Olympic View – Colwood and Langford	920 **	0	2,000
Colwood Corners	3,800	0	4,900
Aquattro – Colwood	560	0	980

* 5 million square feet. ** Includes hotel and commercial development.

[5] Source: CRD Regional Growth Strategy; includes single-family detached/duplex units, apartments and other ground-oriented dwellings.

The majority of new residential growth is occurring in **Colwood** and Langford. Colwood is becoming a more urban community and projects such as Colwood Corners are transforming the area into an attractive town centre. The District of **Langford** has a cohesive town centre with pedestrian areas, commercial districts and a central community focus. The 20-year Westhills development in Langford features a variety of commercial, retail, educational, recreational and cultural offerings. It will be the first entire neighbourhood in North America built to Leadership in Energy and Environmental Design (LEED) sustainability standards. Rail is intended as an integral part of this development to minimize traffic congestion.

View Royal will have a series of economic centres that provide expanded retail, professional financial and convenience services. Single-family detached housing will remain the predominant form with some provision made for other types of housing.

Highlands development remains primarily residential on rural acreages or large lots with no planned role for urban development. **Metchosin** is primarily a rural community and the village is the main commercial centre with some room for limited expansion. **Sooke** will encourage more population and commercial development, yet remain largely a rural character with a choice of rural lifestyle options.

Esquimalt, although not considered a West Shore community, is situated in the Langford to Victoria corridor. The Wardroom/Hospital DND site has clusters of low and medium density multiple family housing surrounded by green space. Esquimalt plans to strengthen its commercial/retail sector to market its central location to businesses and high-tech industries.

2.1.3 Other Demographic Characteristics

Exhibit 4 provides several key demographic indicators. The highlights for Western Communities are:

- triple the growth rate of the VMA (and six times the growth rate of communities in the central Core);
- relatively more persons and workers per household;
- much lower average population density;
- home to 21% of the vehicles in the region (with 18% of the population);
- far more likely to have more than one vehicle per household.

Total employment in the Greater Victoria area is expected to increase by about 50,000 jobs from 152,000 in 2006 to 200,000 in 2026. Western Communities are expected to account for 19,000 or about 40% of this growth. This will have

a major impact on travel and the transportation system in the Langford to Victoria corridor by adding vehicular traffic to an already congested system. The growth also has important implications for travel patterns. With the many new commercial and mixed-use developments coming on stream in western communities, there is likely to be a significant increase in trips to destinations *within* these communities as workers travel to jobs in the area.

EXHIBIT 4: DEMOGRAPHIC & VEHICLE OWNERSHIP PROFILE

	CRD	Western Communities
Population growth to 2026 (%/year)	1.1	2.9
Labour Force	238,250	43,410
Employment	151,590	13,590
Total # Households	155,220	23,770
Persons per Household	2.13	2.45
Labour Force per Household	1.53	1.83
Population Density (population/hectare)	1.66	0.34
Household size: 1 to 2	68%	56%
2 to 4	32%	44%
Total # Vehicles	208,390	44,250
Households with no Vehicles	10%	3%
Households with 1 Vehicle	46%	32%
Households with > 1 Vehicle	45%	65%

Source: CRD planning; 2006 CRD Origin and Destination Household Travel Survey, May 2007

2.2 Transportation and Travel Characteristics

2.2.1 CRD Travel Mode Profile [6]

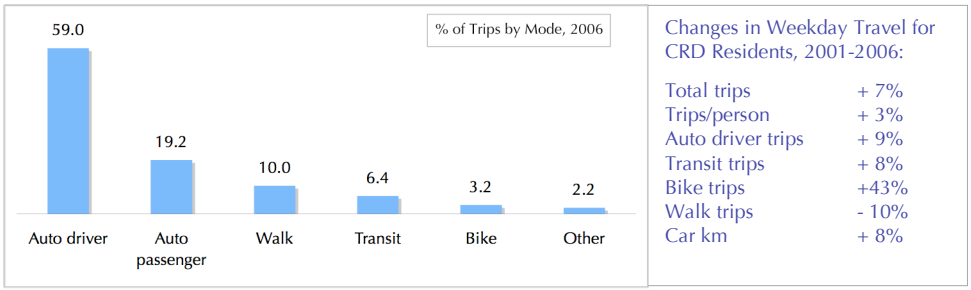
In 2006, CRD residents made some 1.24 million trips per day on weekdays—a daily average of about 3.4 trips per person. The daily trip rates are similar on weekends and have remained fairly stable since 2001. As shown in Exhibit 5, private vehicles are the most common choice of travel (78.2% of total trips) either as a driver (59.0%) or passenger (19.2%). Walking is the next most common method. Since 2001, walking has declined and bike trips have increased.

Transit trips have remained stable at 6.4% of total trips (and 3.8% on weekends). The average number of transit trips per person per week is 1.7, while residents of Western Communities make comparatively fewer transit trips at 1.3 per week. About one in ten residents in the CRD are heavy transit users, making ten or more one-way transit trips per week.

[6] Adapted from 2006 CRD's *Origin-Destination Household Travel Survey*, May 2007 and the *Victoria Regional Transit System Tracking Survey*, April 2007.

Most weekday trips are for personal business (60%) and work/post secondary education trips account for 28% of daily travel. On Saturdays, personal trips are 90% of daily travel. Travel purpose has remained stable since 2001.

EXHIBIT 5: CRD WEEKDAY TRAVEL CHARACTERISTICS



2.2.2 Suburban Travel Growth

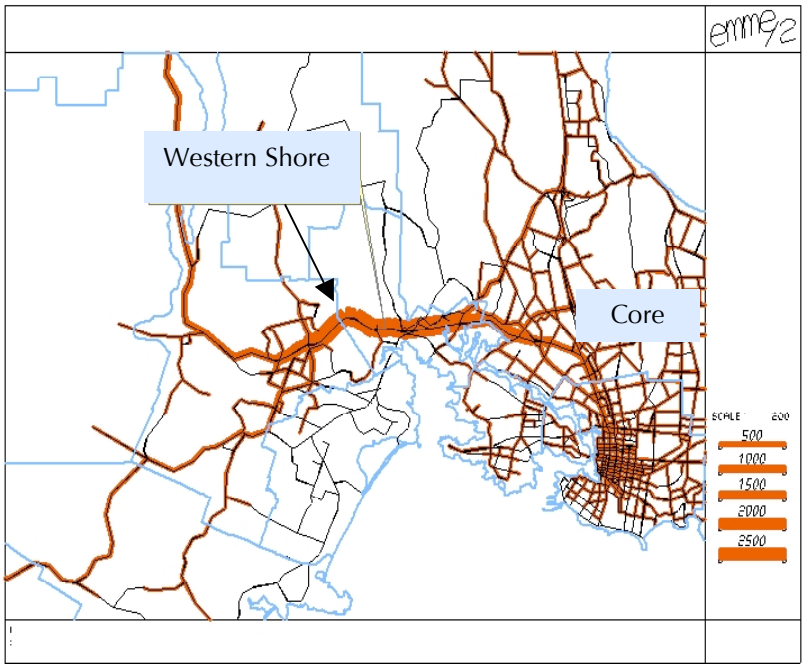
Since 2001, 60% of the travel growth is between suburbs involving an origin or destination outside the Urban Core. This is due to "high population and employment growth on the West Shore."[7] Based on the 2006 origin-destination survey, **there are approximately 115,000 daily person trips between the Western Communities and the Urban Core**, the largest suburban travel market in the CRD. The exiting transit mode share is about 8% for this corridor.

The main roadways on the corridor between the metropolitan core and Western Communities—the Trans-Canada Highway, Old Island Highway (Hwy. #1A) and Sooke Road (Hwy. #14)—are congested during peak periods. The Trans-Canada Highway from downtown Victoria to Colwood and Goldstream Park is the busiest highway in the region. Exhibit 6 illustrates the heavy travel volumes in the corridor between downtown and West Shore. About 5% of peak-hour travel on this corridor is north to the Cowichan Valley.

The congestion delays are projected to increase with future population growth. Based on modeling analysis by regional planners, the overall network speed is forecast to decline from an average of 44 km/hr in 1996 to 41 km/hr in 2010 and 40 km/hr in 2018. The duration of congested travel periods each day will also increase.

[7] CRD Travel Choices.

EXHIBIT 6: REGIONAL TRAVEL PATTERNS ON THE ROAD NETWORK
(Peak hour vehicle traffic volumes)



2.3 Receptiveness to Rail

Greater Victoria has a relatively high per capita transit ridership compared with other Canadian cities. Residents in the region use transit about 38% more than the average for mid-size Canadian cities (population of 150,000 to 400,000). Cities with greater transit ridership such as Calgary, Vancouver and Edmonton are significantly larger and have rail transit service.

Considerable support exists in the region for rail service. One of the most commonly cited criticisms of the existing regional transportation plan is the lack of a specific program to develop rail transit service to serve the corridor to the Western Communities. A recent survey found that 70% of respondents strongly support an LRT system between Victoria and the Western Communities when asked about alternative solutions to transportation problems.[8] Rail has a broader appeal and "upscale" image than buses, partly based on features such as a smoother, more comfortable ride. This can allow rail to attract "choice riders" who opt to leave their automobiles at home.

[8] The survey was conducted by Agency Research Consultants and is reported in the Business Examiner – Vancouver Island "*LRT: Business Wants It, People Want It. But Can we Get It*", January 8, 2008.

3. West Shore Tram Line Service Plan

A conceptual service plan for the proposed West Shore Tram Line is presented in this Chapter. It includes a preliminary schedule and potential station stops, equipment options and supporting infrastructure requirements. The initial tram service concept assumes a weekday only service designed to balance two main objectives—minimizing start-up costs (financial risk) and financial viability—in order to allow implementation within a relatively short timeframe.

The initial service model is designed to be scalable in order to provide the flexibility for enhanced service that can be rolled out in future based on favourable market conditions and other factors.

3.1 Alignment, Stations and Schedule

The only alignment considered within the scope of this study is the ICF corridor alignment (former E&N Railway line) from Victoria to Langford and northward to Courtenay. Exhibit 7 shows Phase 1 encompassing a route of about 18 km and proposed five stations located at Westhills, Langford, Atkins Road, Esquimalt and Victoria. These stations were selected as appropriate for the initial service plan based on the following criteria:

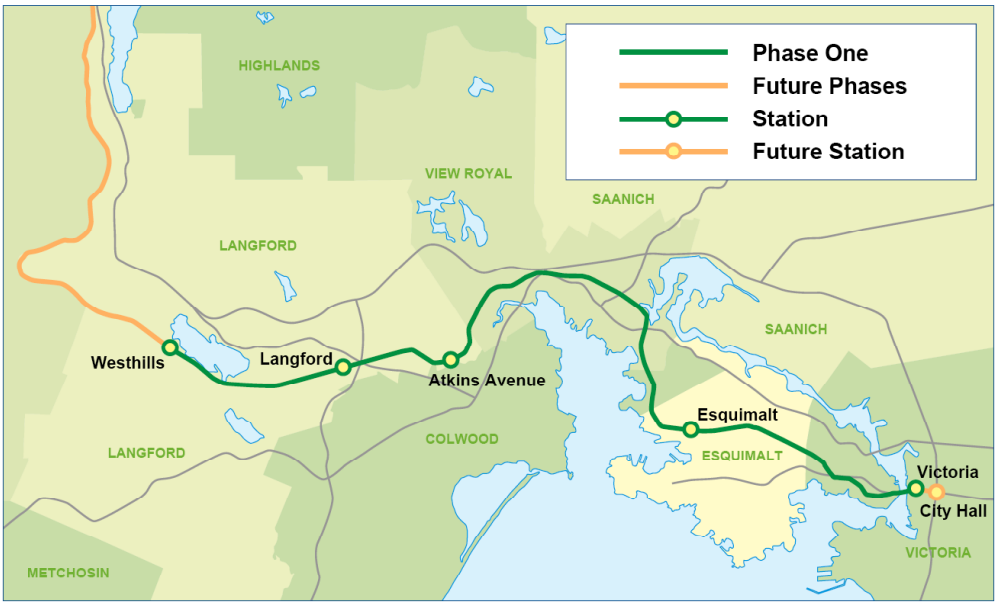
- located at major population and employment/activity centres to provide convenience and build ridership;
- presence of existing, albeit small stations, at Langford and Victoria;
- maintaining schedule integrity and a competitive transit time with other modes (mainly automobile) by minimizing the number of stops.

In future, the service could be extended about 0.5 km from the Victoria station to City Hall. This would provide improved access to Douglas Street where about one-third of the region's employment is located. Future phases could also include points as far north as Duncan and Nanaimo. Service to the Cowichan Valley and Nanaimo Regional Districts would provide access to growing markets and address criticisms of the Malahat Corridor Study for a more integrated Vancouver Island transportation system to reduce sprawl, traffic congestion and greenhouse gas emissions.

A preliminary schedule for Phase 1 is also shown in Exhibit 7. The schedule has been designed to make it easy for customers to remember by ensuring that a train departs each endpoint station on the hour and on the half-hour. In order to help minimize operating costs, the service would operate on weekdays only from 0600 to 1100 in the morning and from 1500 to 2000 in the afternoon, a total of 10 hours per day. The daily service period could be adjusted as experience with the service evolves and tailored to serve customer needs.

Existing other users of the corridor will not affect the schedule. VIA Rail is the only user with its scheduled inter-city service operated by SVI. There are two VIA trains per day, a morning northbound and afternoon southbound train. ICF is working to establish an enhanced service that would originate in Nanaimo in the morning and travel southbound to Victoria. In future, the West Shore Tram service may be expanded to serve points north of Langford.

EXHIBIT 7: WEST SHORE TRAM ROUTE & SCHEDULE



Preliminary Schedule – Departure Times

	Southbound			Northbound	
Westhills	06:00	07:00	Victoria	06:30	07:30
Langford	06:05	↓	Esquimalt	06:37	↓
Atkins	06:09		Atkins	06:44	
Esquimalt	06:16	↓	Langford	06:48	↓
Victoria (arrival)	06:23	07:23	Westhills (arrival)	06:53	07:53

3.1.1 Station Platforms

The service plan includes the construction of a simple platform at each station stop to facilitate safe access/egress and to provide wheelchair accessibility. A simple structure will also be provided to provide shelter from rain and wind.

3.1.2 Rail-Road Level Crossings

There are approximately twenty-five road-rail level crossings between Langford and Victoria. This is a large number of crossings for such a short (16 km) route.[9] The majority of crossings are located in Esquimalt, Langford and View Royal (see Appendix B). In order to ensure an on time, reliable and safe operation, as many as possible existing level crossings should be eliminated.

The regulatory requirements regarding crossing protection on the corridor are already being met due to the existing VIA Rail service on the line. Locations with higher vehicular traffic volumes already have signals/safety gates. Any unprotected crossings will require the train whistle to be sounded. There may be some locations that require increased protection or grade separation (underpass/overpass) depending on the degree of accident risk exposure. Decisions in this regard ultimately rest with the road authority and the rail operator and are not addressed within this report.

The ICF and local communities adjacent to the rail corridor support an integrated recreational and mixed use of the corridor. The Galloping Goose and other regional trails provide an important recreational and travel corridor and also provide walking and bike access to the West Shore Tram Line. In cases where the trails cross the rail right-of-way there is no regulatory requirement to install gates or other crossing protection, as is the case with road-rail crossings. However some municipalities may wish to ensure public safety by installing signage and automatic warning devices at some locations.

3.1.3 Park-and-Ride Facilities

Park-and-ride facilities are a common feature of most urban rail systems to provide access/egress for rail stations from a broad catchment area.[10] Experience with West Coast Express and TransLink for long-haul peak period express bus and commuter rail services indicate that park-and-ride access can account for 30-60% of the total demand.

In the case of the West Shore tram, park-and-ride facilities would likely be the most beneficial in the Westhills/Langford area that is one of the endpoints of the line. At present, there is no room for such a facility at the Victoria station and its usefulness at this stage is questionable. West Shore development trends favour high-density mixed-use construction, walkability and reduced automobile reliance. For example, the value of multiple-family construction

[9] The number of crossings is not a particular issue with respect to schedule integrity for the existing VIA operation since there are only 2 trains a day. However, the proposed tram service would add 20 trains a day (1 northbound and 1 southbound train each hour for 10 hours).

[10] The typical guideline is that the majority of demand from the home location commonly originates within a 4 km radius of the park and ride lot. At the work location end, users are typically destined to locations up to a 2 km radius depending on the mode of egress. Source: Spillar (1997), Halcrow (2006).

under development in Langford was up by about 25% in 2007 compared with 2006. The Westhills project is predicated on walking as the preferred choice of travel.

In conclusion, park-and-ride facilities were excluded from the service plan at this conceptual stage. Their absence is assumed to have no significant impact on ridership or financial viability of the proposed service. This is because some parking is available at the existing Langford station and on adjacent streets at all other existing stations. Some modest parking facility may be included at the new Westhills station, however that will depend in part on whether such a facility is consistent with the neighbourhood development concept.

3.1.4 Integration with BC Transit

It is assumed that BC Transit is receptive to developing an integrated rail service with its existing bus operations for several reasons. First, efficient bus-rail integration at origin and destination is important to ensure seamless and timely transfers and competitive end-to-end travel times with automobiles.

Second, an integrated fare collection system is important for those customers wanting to purchase one ticket/pass that allows access to the bus and rail network. There are also benefits from a marketing, promotion and customer acceptance standpoint if the new rail service can be included effectively and efficiently under the BC Transit umbrella, or operate as a subsidiary of other British Columbia rail-based transit operators.

3.2 Tram Equipment

Customers are the foundation of any successful business. To be successful, the West Shore Tram Service must provide outstanding customer satisfaction and service value. The equipment used in the service will play a major role in attracting and retaining customers and should have an enhanced passenger appeal or “wow” factor.

Three different equipment options were examined as shown in Exhibit 8. Each light rail option includes a back-to-back bio-diesel electric multiple unit (B-DMU) that combines comfort, safety and reliability with compatible environmental technology. These self-propelled units can operate in two directions, avoiding the need to turn the train at the endpoint, and are compatible with up to two non-power units that can be inserted between the drive units to expand capacity, as required.

Example of a B-DMU Train Configuration

It is proposed that a properly equipped maintenance structure will be in place at the end of the run near Westhills. Generally, given the nature of the equipment being considered, a maintenance service agreement can be provided by the equipment supplier under contract.

EXHIBIT 8: EQUIPMENT OPTIONS & SPECIFICATIONS

	SIEMENS DESIRO CLASSIC	COLORADO RAILCAR DMU	BOMBARDIER TALENT
			
Seating Capacity	128 (B-DMU)	94 (B-DMU) 188 (double deck B-DMU) 102 (coach) 218 (double-deck coach)	98 (RegioBahn) to 160 (Class 644 DB)
Capital Cost [1]	US$6.5-8 million	US$4.5 million (B-DMU) US$3.5 million (coach)	US$4-7 million
Maximum Speed	120 km/h	145 km/h	100 km/h
Weight	69 tonnes	N/A	55.0 tonnes
Fuel	N/A Complies with Euro III and EPA TIER 2 emissions standards	2-3 mpg (single power car) Biofuel compatible (5%)	1.32 l/km
Manufacturing Location	Germany	Ft. Lupton, Colorado	Zurich, Switzerland
Approximate order lead time	24 months	14 months	N/A

1. Based on pricing research from November 2007 to January 2008. Capital costs shown in the table are for a two-car train based on budget approximations and previous sales orders for selected customers. The three suppliers contacted were reluctant to provide firm price quotations at this pre-feasibility stage.

4. Feasibility Assessment

This Chapter examines the feasibility of the conceptual service plan based on preliminary capital and operating cost estimates and the ridership and revenue potential. This financial assessment involves a number of assumptions regarding the project scope and current cost factors that should be carefully noted as actual results can vary materially. All results should be interpreted as order of magnitude estimates. Further analysis will be required to refine the estimates if a decision is made to advance the concept to a more detailed project planning phase.

4.1 Capital Costs

Exhibit 9 provides a breakdown of the major capital cost estimates based on the existing alignment and assumed technology/equipment. The key assumptions and a description of what is included within each item are described in each subsection below.

EXHIBIT 9: ESTIMATED CAPITAL COSTS ($ MILLIONS)	
Rail Infrastructure	6.0
Station-Related	1.9
Equipment and Maintenance Facility	6.5
Other	0.3
Sub-Total	14.7
Contingency	1.0
Total	15.7

4.1.1 Rail Infrastructure Costs

In order to provide a structure for the tram service that will allow operating speed of up to 80 km/h and ensure reliability, the existing rail infrastructure must be rehabilitated and enhanced. Until the SVI assumed operation and maintenance of the line in 2006, there had not been a major capital track program on the line for decades.

The rail infrastructure costs included herein were obtained from SVI and include—for an 11 mile (18 km) section of the line between Westhills and Victoria—welding the joints of the existing 85 pound rail,[11] replacement of the existing track ties with untreated yellow cedar ties, other track materials, the addition of two new sidings[12] and a storage track, enhanced road crossing

[11] The existing rail line uses joint connections that need to be replaced with a welded connection to reduce normal annual maintenance costs.

[12] The initial service could function adequately with one siding. However, two sidings have been assumed in order to accommodate potential future expansion to serve communities

protection at three locations (new signals without gates), five new track switches, grading, surfacing (ballast) and associated labour costs. The cost of $6 million is a preliminary budget estimate and includes an overhead/ contingency factor of 20%.

4.1.2 Station-Related Costs

There are several different alternatives that could be considered with respect to the provision of stations depending on the desires and objectives of different communities and developers. Elaborate station buildings could be designed and built that includes various amenities and that contribute to the overall image and customer appeal of the tram service (see text box). Development of station concepts and detailed design are beyond the scope of this analysis.

Station Considerations

Discretionary transit travel is sensitive to the quality of stops and stations. If stations are easy to access and pleasant places to wait, more travelers will shift from driving to public transit. Station service quality depends on:

- Passenger comfort (shelter, temperature, seating, cleanliness, washrooms) and security.
- Ease of access (by walking, bicycle, public transit and automobile).
- Integration of the station with nearby attractions and activities.
- Automobile and bicycle parking (availability, price and security).
- Amenities (e.g., refreshments, WiFi services) and aesthetics.

The station costs in this report are based on consultant estimates for the provision of a basic shelter and platform at each of the five station stops to provide safe and easy access/egress. Also included with station-related items is the cost of a fare collection system based on the Ottawa O-Train cost experience. This is a reasonable approximation because it involves a similar light rail operating environment on an 8 km route. There are no costs included herein for parking facilities or land acquisition.

4.1.3 Equipment Costs

As indicated in Chapter 3, there are several possible equipment options and train configurations that could be used to serve the Vancouver Island market. Equipment selection will also depend on C4CR's objectives, whether new or lightly used modern equipment is purchased or leased and other factors such as financial limitations and the availability/lead time to obtain the equipment.

For purposes of this study it is assumed that the initial operation will use two back-to-back powered units. Based on preliminary pricing information research in January 2008, the equipment capital costs range from $4 to $8 million, excluding delivery charges. A mid-point figure of $6 m is assumed to be representative for purposes of this analysis. To this cost is added the cost of a basic maintenance facility and security system ($475,000).

located north of Langford that would involve operation of additional train sets. The sidings are assumed to be located within the existing right-of-way and therefore no land acquisition costs have been included in the analysis.

4.1.4 Other Costs

A provision of $320,000 is made to cover other cost items such as project management, communications equipment, operator training, and a nominal amount for start up marketing based on the assumption that marketing costs could be covered under a general transit system marketing envelope.

A contingency amount of $1 million is used which is 10% of the capital costs excluding track-related items which already include a contingency factor as noted above.

4.2 Operating Costs

Exhibit 10 provides a breakdown of the major operating cost estimates based on the service plan outline in Chapter 3 for a weekday only operation of 10 hours per day. Each cost item is described in the following subsections.

EXHIBIT 10: ESTIMATED OPERATING COSTS ($ PER YEAR)

Train Crew	270,000
Fuel	145,000
Communications & Office Equipment	30,000
Track Occupancy	305,000
Equipment Maintenance	450,000
Other	598,000
Total	1,798,000

4.2.1 Train Crew

The equipment being considered is suitable to be operated by one-person. It is assumed that three employees are sufficient to cover the daily operating period and allow some back-up capability. The estimated annual labour cost including benefits is assumed to be $270,000.

4.2.2 Bio-Fuel

Bio-fuel consumption is based on a weekday only service that generates a workload of 84,000 train-km per year. The average bio-fuel consumption rate is assumed to be 1.32 litres per train-km based on Ottawa O-Train fuel consumption experience for a similar train consist running on an 8 km route with five stations. The assumed average fuel price is $1.30 per litre.

4.2.3 Train Control

Train control will be the existing Occupancy Control System that is currently employed by SVI with the enhancement of other communications equipment for tram performance monitoring. The sidings, equipped with automatic spring-switches will be utilized to meet the VIA train twice a day.

4.2.4 Track Occupancy (Maintenance)

Track occupancy is the fee paid by the user to cover the costs of rent and maintaining the track.[13] The precise charges for this item will depend on the particular contractual arrangements that are put in place between SVI and the tram operator. The O-Train corridor lease is $535,000 per year for 9 vehicles (3 train sets of 3 cars each).

For the purposes of this analysis, the track occupancy charge is assumed to be two-ninths of the Ottawa lease rate to reflect the two-unit Island tram operation ($125,000), plus the costs of a two-man track crew and associated vehicle and equipment ($180,000), for a total of $305,000.

4.2.5 Equipment Maintenance

The equipment maintenance costs are based on guidance from the equipment manufacturers and experience with the Ottawa O-Train. The estimated annual cost is $450,000.

4.2.6 Other Operating Costs

Other operating costs include insurance that is assumed added as a rider on BC Transit's policy ($125,000), the costs of operating the public information and fare collection system ($20,000), equipment cleaning ($78,000), supervision and administration (1 supervisor at $150,000 and 2 administrative staff at $75,000 each including benefits) and miscellaneous/communications costs of $75,000.

4.3 Ridership and Revenue

4.3.1 Ridership Potential

The viability of the tram service critically depends on building ridership through **service quality and customer satisfaction**. The most important attributes for customers will be: on-time reliable service, convenience (frequency, service hours, bus links/integration), pricing (value for money), comfort and safety.

The **peak period commuter market** and the degree to which rail transit is able to attract travelers who would otherwise use automobiles is of particular interest. To appeal to this segment, rail must be time competitive with automobile for the *overall* trip from origin to final destination. For this market, service quality tends to be more important than price, although fares and other factors such as parking charges will influence ridership.

[13] In the case where the track is shared with freight and/or other passenger operations, the occupancy charge also covers additional operating costs such train control to ensure an efficient and safe operation.

The tram service can also be expected to serve the **broader market for business and personal travel** (shopping, dining, recreation, social activities, etc.) and be used as a tool to shape demand. Experience in other markets with rail-based transit shows that travelers will adjust their schedules around a reliable and convenient rail service. This is important not only from the perspective of building ridership, but relative to the benefits of rail in reducing road congestion, vehicle emissions, accident risk and energy consumption.

It is common practice to carry out broad market surveys and traveler intercept surveys to gain an understanding of the propensity to use rail (market potential) and to test fare assumptions. Such surveys and/or other market research may be required at some stage.[14] Within the scope of this study, the approach used to estimate demand (passenger trips) is to assume that the tram service plan offers a service quality and value that will attract a proportion of the existing travelers in the Langford to Victoria corridor. Travel data for the corridor is derived from the daily travel characteristics in the CRD's *2006 Origin and Destination Household Travel Survey* as follows:

Victoria to Langford Corridor (PM peak, 1500-1800):[15]	
Total person trips	31,330
Total auto driver trips	20,980
Transit trips	**2,680**
Transit proportion	8.6%

Given the relatively rapid population growth projected in the Western Communities, BC Transit is implementing bus service improvements and various incentives to encourage ridership (e.g., commute trip reduction programs by area employers). This is consistent with the CRD goal of increasing regional transit use from the existing 6.4% to 10% by 2026.

In general, studies have shown that rail transit tends to attract 20-40% more riders than bus transit offering a similar service.[16] To be conservative, a lower range of 10-20% is assumed. In addition, rail is expected to attract a proportion of existing automobile users due to its superior comfort, prestige and assumed service quality (time competitive, convenient, etc.); the calculations below assume 2-3%. Therefore, given the above corridor trip volume and assuming those travelers' origins and destinations are conveniently served by the tram service, a "base" demand range is estimated as follows:

[14] It is noted that a recent online survey reported that 89% of respondents would either strongly or moderately support the development of LRT between downtown and the West Shore. The survey also found that 72% of respondents would actually use rail.

[15] The PM peak period trips represent 28% of the total daily weekday trips in the region.

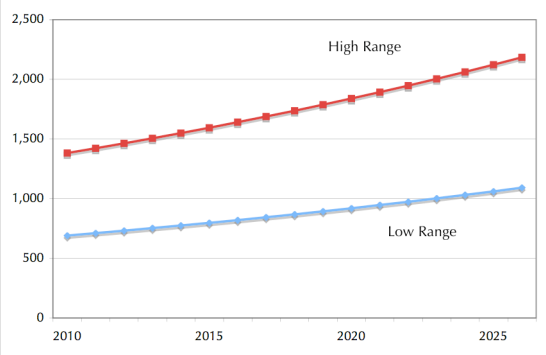
[16] This proportion varies with specific conditions such as the relative speed (travel time), frequency of service and comfort of rail and bus travel.

Estimated Tram Demand:		
Daily transit riders	2,680	
Potential rail users (10-20%)	268 to 536	(1)
Daily auto occupant trips	20,980	
Potential rail users (2-3%)	420 to 629	(2)
Daily Rail Demand (one-way)	**688 to 1,165**	(1+2)

Given this estimated rail travel demand in the corridor, it is assumed that the ridership potential within one to two years of start up is approximately 1,400 to 2,300 daily riders (round trip). Although not included in the above numbers, an estimated 3,600 Cowichan Valley residents travel daily to the CRD.[17] This potential market should be considered seriously in future phases.

Given the relatively high population growth trend for the Western Communities (2.9% a year to 2026) and the major high-density mixed-use developments being put in place, the overall market for rail looks promising. For illustrative purposes, Exhibit 11 provides an indication of the demand outlook for rail under two broad scenarios. The low range scenario assumes that rail captures 20% of the transit trips and 3% of the auto occupant travelers. The high range assumes a greater rail market penetration at 40% of the transit travelers and 6% of the auto occupant travelers. Actual rail ridership levels will depend on the service quality and convenience, station quality and location, pricing, land use factors and ridership incentives.

EXHIBIT 11: RAIL TRAM DEMAND OUTLOOK
(Daily round trip travel – Langford-Victoria Corridor)

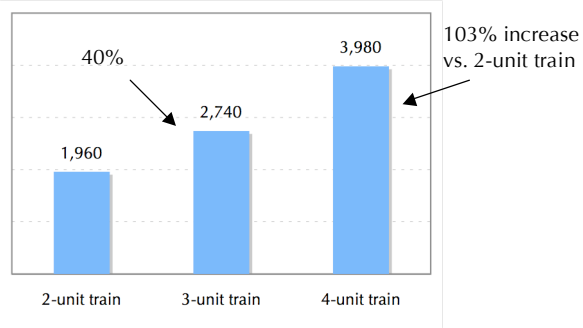


An important advantage of the rail service model considered in this report is the flexibility to scale up service levels to meet demand growth in a highly cost effective manner. Train capacity can be increased with a small impact on annual operating costs. For example, up to two additional non-power coaches can be added to the initial two-unit B-DMU train consist. Additional train sets may also be added based on achieving pre-established demand targets. The latter option would have a limited impact on operating costs, but would entail further capital outlays (or lease costs).

[17] BC Transit *"Short Term Transit Feasibility Study"*, November 2006, Halcrow Consulting Inc.

Such capacity additions may be accommodated using the same or slightly expanded train crew and with the train control system identified in the service plan. Exhibit 12 illustrates the capacity gains that are possible by adding coaches to the train consist.

EXHIBIT 12: DAILY TRAIN CAPACITY
(Revenue passenger-seats per day)



4.3.2 Key Challenges

Two key issues have been raised that may impact ridership levels and the viability of the rail service:

Victoria Terminus – The concern is that the existing station adjacent to the Johnson Street Bridge at the foot of Pandora Avenue is not located close enough to Douglas Street corridor where the majority of the central business district employment is located. Therefore, train users destined to the Douglas Street area would either have to walk (about 0.5 km+) and/or an integrated shuttle bus service would have to be instituted that could decrease the attractiveness of rail by involving a transfer and possibly added cost unless some sort of "fareless" shuttle service can be arranged.

One potential solution is to move the rail terminus to City Hall by extending the line along Pandora Avenue and adding a station platform (and possibly a more elaborate station building) to provide an iconic and appealing transportation hub at a central location. This would provide travelers with the option of two downtown station stops.

E&N Alignment – A related concern is that the E&N alignment does not adequately serve the Douglas Street corridor. The CRD Travel Choices Strategy envisions a transit system within the next 25 years consisting of a broad range of services. Rapid LRT between Langford and Victoria has been considered that would operate on a separate roadway part of the route via the Town and Country and along Douglas Street to downtown. The major capital cost of an alternative alignment and possible disruption of businesses located along the proposed route during construction and when fully operating at least make the E&N alignment and proposed service plan of higher immediate value.

4.3.3 Estimated Revenue

Although rail-based transit tends to attract higher income travelers who are more sensitive to service quality than cost, fares will affect ridership. Typically, one factor in the decision to use rail is the out-of-pocket cost compared with the same trip using bus or automobile. Other price factors are: fare structure and discounts; ease of purchasing tickets (the initial service plan calls for 5 automated vending machines); fare bundling options (i.e., with bus, and the inclusion of rail tickets special events and excursions); and park and ride charges.

Current BC Transit fares for trips between the downtown core and West Shore communities are $3.00 per trip (adult, two zone one-way fare). The fare is $2.70 for purchases of 10 tickets and discounts are available for seniors and youths.

Rail fares can be higher than bus fares without a significant negative impact on rail ridership due to the "premium" service and prestige image of rail and as long as a quality service is offered that meets customer needs. It would not be unreasonable to adopt a one-way adult tram fare of $4.00 for a two-zone trip (between the endpoints of Westhills and Victoria). When discounts and one-zone trips are considered, the average one-way fare for the purposes of this report is assumed to be $2.50 per person.

Therefore, the estimated annual fare revenue is determined as follows:

Daily riders	688 to 1,165 (from above)
# Operating days/year	260
Annual trips (two-way)	357,760 to 605,800
Average fare/trip	$2.50
Estimated Annual Fare Revenue	**$894,000 to $1,515,000**

There are several other potential revenue sources including advertising and promotion, sponsorships, excursions and parking (depending on whether park and ride facilities are developed), station-related (assuming station buildings are constructed. A nominal advertising and promotion figure of $50,000 to $150,000 is assumed to be possible in the early years of operation.

4.4 Benefits

When all costs are considered, transit is often the most cost effective way to reduce urban traffic congestion and improve regional mobility. The rail-based transit solution examined herein will provide several different benefits to users and communities in the Greater Victoria region:

Reduced Road Traffic Congestion – the use of rail instead of automobiles will reduce vehicular traffic and help reduce congestion. Initially, rail will not remove a large number of vehicles—perhaps in the range of 500 to 600 vehicles per day—however the incremental effect is significant because it would occur on the most congested roads in the region that are used to travel between the downtown core and the Western Communities. Over time, as rail use increases the corresponding benefits in reducing congestion will increase.

Reduced Greenhouse Gas Emissions – rail is one of the most environmentally sustainable modes of transportation. Per passenger-km, rail emissions are 50% less than cars.[18] Therefore, increased rail use will reduce the air quality impacts of transportation in the CRD and contribute towards the provincial environmental and CRD energy resource efficiency targets.

More Efficient Land Use – rail transit travel requires less land for roads and parking facilities compared with automobile travel. There is a growing parking problem in Victoria and increased rail travel could play an important role in reducing parking costs as land availability leads to more parking shortages. The development of rail-based transit using the existing ICF route is also far less expensive than the costs of road improvements that can easily run into hundreds of millions of dollars.

Rail-based transit also provides a catalyst for more accessible land use patterns, called *transit-oriented development (TOD)*. Some research suggests that because of these land use changes, each passenger-kilometer of rail transit results in 1.4 to 9 km in reduced automobile travel. In addition, TOD often leads to reduced vehicle ownership as residents adjust their travel behaviour around the availability and convenience of the rail transportation system.

Economic Development – research by the Conference Board of Canada and others recognizes that efficient urban transportation networks are critical to competitiveness and productivity. They are key to business investment and growth since companies depend on the efficient movement of workers and goods around urban areas.

Other benefits of rail-based travel include: road accident reduction by reducing the exposure levels; reduced commuter stress and improved quality of life; increased land values for some properties located adjacent to the rail system; and support for strategic land use objectives (reduces sprawl).

[18] Source: VIA Rail.

5. Findings and Conclusions

Based on the West Shore Tram Line conceptual service plan in Chapter 3 and the various assumptions contained in this report, a reasonable opportunity exists to develop a successful rail-based transit system. This system could be implemented in a relatively short timeframe on the underutilized ICF rail corridor that connects downtown Victoria with the West Shore communities that are the fastest growing communities in the CRD.

The order-of-magnitude capital costs to rehabilitate the existing rail line that will provide a safe and efficient platform for the service and acquire modern bio-diesel electric train equipment are estimated at $15.7 million. The estimated annual operating cost for an initial weekday only tram service is $1.8 million.

5.1 Estimated Revenue Shortfall

Based on the revenue figures presented in subsection 4.3.3, the anticipated annual operating shortfall is:

Fare Revenue	894,000 to 1,515,000
Other Revenue	50,000 to 150,000
Total Estimate Revenue	$944,000 to $1,665,000
Operating Costs	$1,798,000
Estimated Shortfall	**$133,000 to $854,000**
Mid-point	**$500,000**

Based on these figures, the cost recovery ratio for the tram service is estimated in to be 52% to 93%. The shortfall translates to $0.22 to $2.39 per revenue passenger, or an average of $1.02. This compares to the average subsidy for Victoria conventional transit of $1.22.

If the ridership turned out to be 50% lower than estimated above, the shortfall could be as high as $1.13 million and the cost recovery 37%.

5.1.1 Funding Sources

It would be worthwhile for the C4CR Group, at the appropriate time and with the appropriate information, to influence the provincial and federal governments to provide cost contributions. The timing is good given today's general interest in rail-based systems as an environmentally responsible means of transport. There is also an opportunity for the provincial government to demonstrate a greater interest in communities other than the Lower Mainland that just received a major provincial commitment for transit development.

C4CR should emphasize in any approach to governments that it already has developed a good level of public-private sector support for the concept among communities located along the corridor. Furthermore, one of the main proponents, the ICF already owns the corridor asset[19] and has the goal of connecting communities and promoting business, tourism, recreational and cultural opportunities.

Transit-oriented development (TOD) often increases property values in an area.[20] It is possible to institute some mechanism to capture this value in order to fund the tram system. Other potential revenue sources include the joint development and leasing of sites near stations (including parking), advertising and sponsorships. For example, there could be a Westhills or Bear Mountain train painted with logos and providing other on-board promotional features. Tickets could also be sold to use the train for cultural, recreational and other special events and some transit-oriented developers may decide to fund rail passes for their customers. Station buildings could be developed as activity centres with commercial facilities and office space, refreshments, etc.

5.2 Advancing the Tram Concept

5.2.1 Strategies to Build Acceptance and Ensure Ridership

Apart from the service quality, equipment selection (comfort, aesthetics, convenience, etc.), transit-oriented development and the provision of attractive stations, several strategies can be used to build/increase ridership:

- Provide convenient and accurate information on transit routes, schedules and fares, including real-time information on train and bus arrival and warnings of delays to trains, buses or highway traffic.
- Integrate rail with other transit services so transfers are convenient.
- Provide appropriate, targeted fare discounts and bundled services.
- Develop regional mobility management programs. Maximize the portion of employees and students with commute trip reduction programs that promote and subsidize alternative modes.
- Promote rail transit as a convenient, comfortable and prestigious way to travel for certain types of trips, and insure that service quality actually meets what is promised.

[19] Since ICF already owns the corridor, it avoids the costs of land acquisition associated with constructing public transit facilities that is typically one of the major costs of rail-based transit developments.

[20] Transit-oriented development refers to residential and commercial centres designed to maximize access by transit and non-motorized transportation and with other features to encourage transit ridership. Proximity to transit impacts property values in three different ways: *nuisance effects* such as noise and air pollution (negative impact); *location advantage* in attracting residential/commercial development (positive impact); and productivity gains by reducing total transport costs and as a catalyst for clustered development (positive impact).

- Manage and price parking efficiently at destinations (such as downtown Victoria and other worksites) as a way to encourage shifts from driving to transit.

5.2.2 Crossing Elimination

As discussed in subsection 3.1.2, the relatively high number of rail-road level crossings on the short route and the addition of 20 trains per day to the rail system will make it difficult to maintain schedule integrity and raises safety concerns. Therefore, in order to ensure an on time, reliable and safe operation, the crossing issue must be addressed.

It is recommended that a more detailed review of the crossings be undertaken in conjunction with SVI and the municipalities of Langford, View Royal, Esquimalt and Victoria, as well as the Esquimalt and Songhees Nations to determine a strategy for addressing this issue. There may be some benefits for local residents if a through street is closed since it creates a cul-de-sac and may increase property values. There will also be concerns raised by some residents and businesses regarding the closure of some crossings.

Appendices

Appendix A
Rail Terminology

	Heavy/Light Rail		Light Rail	
	Rapid Transit	**Commuter Rail (Regional)**	**Light Rail Transit (LRT)**	**Tram/Urban Shuttle**
Examples	Metro systems: Montreal, Toronto, SkyTrain	West Coast Express, Toronto GO Train	Ottawa O-Train, Calgary C-Train, Portland MAX-Light	Toronto street cars, many European cities (Rouen, France), U.S. (Houston, Portland)
Right-of-Way	Grade-separated, dedicated	Existing rail corridor, shared with other rail services	Mixed traffic, reserved lanes (or dedicated)	Dedicated ROW and shared street use with road vehicles optional
Capital Cost	High	Moderate	High-moderate	Low-moderate
Characteristics	High service frequency, high capacity and volume	Lower service frequency, mid-market volumes	Frequent service, lower volume, light loads, fast	Frequent/moderate frequency
Power Supply	Electrified	Diesel locomotive or self-propelled	Electrified	Generally self-propelled
Access	Walk, bus	Park & ride, bus	Walk, bus	Walk, bus, park & ride
Typical Trips	Short-medium distance, all day	Long distance, peak periods only	Short-medium distance, all day	Short distance, all day

Appendix B
Langford to Victoria Corridor Road-Rail Level Crossings

Crossing	Municipality/First Nation	Comments
Humpback Road (M10.7)	**Langford**	
Langford (M10.3)		Proposed
Pedestrian (M9.3)		
Leigh Road		Proposed
Jacklin Road (M8.52)		
Peatt Road (M8.3)		Proposed
Goldstream Ave (M7.9)		
Atkins Ave (M6.9)		
Private (M5.6)	**View Royal**	
Private (M5.0)		
Burnett Road (M4.81)		
Hallowell Road (M3.65)		New signal/gates?
Thomas Road (M3.37)	**Esquimalt Nation**	New signal/gates?
Maple Bank Road (M3.12)	**Songhees Nation**	New signal/gates?
Admiral Road (M2.53)	**Esquimalt**	Add gates?
Intervale Ave (M2.29)		New signal/gates
Hutchison Ave (M2.14)		
Lampson St (M1.78)		High volume
Fairview/Devonshire (M1.57)		High volume
Wilson Road (M1.10)		
Esquimalt Road (M0.95)		
Russell St (M0.88)		Signals?
Mary St (M0.83)		Signals?
Catherine St (M0.77)		
M0.57		Proposed crossing?
M0.45		Proposed pedestrian crossing?
Tyee (M0.37)		
M0.25	**Victoria**	Pedestrian crossing?

Note: mileages indicate approximate location on the Victoria Subdivision rail line.

Appendix C
About the Authors

Colledge Transportation Consulting Inc.
INNOVATIVE SOLUTIONS

David Colledge is President of Colledge Transportation Consulting Inc. (CTC), a transportation planning, policy and research company located in Surrey, BC. He has worked in transportation for more than twenty years on various federal and provincial policy reviews and Royal Commissions. He gained rail industry experience with Canadian Pacific and VIA Rail Canada, and is the former Vice President of the Western Transportation Advisory Council (WESTAC).

Since its formation in 2002, Colledge Transportation has completed several major projects in BC and was the lead consultant for the B.C. Ports Strategy. CTC also completed several recent rail projects on Vancouver Island. These include assisting the Island Corridor Foundation negotiate an operating agreement with Southern Railway (with DRE Transportation) and the *Vancouver Island Rail Corridor Socio-Economic Assessment*. CTC also collaborated with DRE for the *Calgary-Edmonton High Speed Rail Pre-Feasibility Assessment* involving large potential capital expenditures in that corridor.

DRE Transportation Solutions Inc.

Rick Evans formed DRE in 2002 with expertise and knowledge in rail transportation including: business development, railway operations management, transportation economics, government affairs, regulatory and transportation law in commuter, passenger, light rail and heavy-haul freight operations. Rick and has accumulated more than thirty years of multimodal transportation knowledge and he is the Board Chair for the BC Rapid Transit Company (SkyTrain) and West Coast Express Limited in Vancouver, BC.

He has been directly responsible for the critical components of a high-volume railway infrastructure, at various times, between the Great Lakes and the West Coast including Vancouver Island. He has experience in an international setting with US operations and has knowledge of the best practices in business development, railway capacity assessment and operations management. The consultant is a skilled negotiator and communicator that is able to foster trust, respect and a positive relationship within the community at large.

Victoria Transport Policy Institute

Todd Litman is founder and executive director of the *Victoria Transport Policy Institute*, an independent research organization dedicated to developing innovative solutions to transport problems. His work helps to expand the range of impacts and options considered in transportation decision-making, improve evaluation methods, and make specialized technical concepts accessible to a larger audience. His research is used worldwide in transport planning and policy analysis.

Mr. Litman has worked on numerous studies that evaluate transportation costs, benefits and innovations. He authored the Online TDM Encyclopedia, a comprehensive Internet resource for identifying and evaluating mobility management strategies; Transportation Cost and Benefit Analysis: Techniques, Estimates and Implications, a comprehensive study which provides cost and benefit information in an easy-to-apply format; and Parking Management Best Practices, the most comprehensive book available on management solutions to parking problems.