MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

ISLAND RAIL CORRIDOR CONDITION ASSESSMENT

COMMUTER RAIL ASSESSMENT

APRIL 27, 2020
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1 SCOPE OF WORKS

This appendix report accompanies the primary Island Rail Corridor (IRC) Condition Assessment Report. It includes the assessment of:

1. Inter-City and Commuter rail operations
2. Inter-City and Commuter rail stations

Summaries and key takeaways from this appendix report are included in the body of the main report. This final report incorporates comments from the Ministry of Infrastructure and Transportation as well as a third-party reviewer received between December 2019 and March 2020.

Some supplemental information to this report is provided in the Inter Rail Corridor Assessment – Commuter Rail Addendum memo, dated March 10, 2020.
2 INTER-CITY AND SOUTH ISLAND COMMUTER OPERATIONS

2.1 FIRST OPERATING SCENARIO OPTIONS

WSP initially evaluated several operating scenarios as part of this preliminary assessment. These scenarios were developed to compare their impacts on likely commuter demand and the varying requirements on stations and track alignments as they were understood at the time of the inception of the project. This understanding evolved over time, largely as a result of this first-round analysis, and the final scenarios are discussed in the main body of the report.

The first scenarios all assumed a priority for commuter service between Victoria (inbound) and Langford (outbound), with less frequent service between Langford (inbound) and Courtenay (outbound). As commuter lines, they also assumed Monday-Friday service only. These are discussed in more detail below but include:

- Scenario 1 – Peak Service only with slower maximum speeds – 4 trains inbound am, 4 trains outbound pm – similar to Vancouver’s West Coast Express Service (with 1 of the four trips to/from Courtenay)
- Scenario 2 – Peak Service only with improved maximum speeds – 4 trains inbound, 4 trains outbound (1 trip to/from Courtenay)
- Scenario 3 – Peak Service only with improved maximum speeds – 8 trains inbound, 8 trains outbound (2 trips to/from Courtenay)
- Scenario 4 – All Day 2-way service with improved maximum speeds – 24 trips inbound, 24 trips outbound (4 trips to/from Courtenay, 10 during traditional peak periods)

For all scenarios, feasible operating profiles and time tables were developed that conform to the assumed track conditions: 1) either those that existed when the rail line was decommissioned in 2011 (identified as “2011” speeds) or those that could exist at their ultimate condition when track improvements had been completed (identified as “Ultimate” track speeds).

Service plans and time tables were calculated for these different scenarios. The comparative speeds and service types were used to forecast likely ridership for each scenario – in the form of boardings per station during the AM and PM peak periods. In all instances, travel times between stations were calculated based on average speeds, known chainage distances, an assumed 15 seconds – 30 seconds dwell time at each station, and some contingency for normal delays and track switching.

Scenarios 1-3 (above) were peak-direction services only; meaning that trains originate and travel inbound-only to Victoria in the AM and outbound-only to either Westhills (Langford) or Courtenay in the PM, depending on whether it was an Inter-City or Commuter service.

Trains were assumed to require daytime storage at or near the southernmost, Victoria Station between the AM and PM service times and then stored overnight either near the Westhills Station in Langford or in Courtenay.

Electrification of the line was currently not considered feasible for the length of track and volume of traffic considered. Further discussion on electrification considerations can be seen in Appendix A. The operating scenarios outlined below assumed a single train between Courtenay and Victoria – no transfer at Westhills.
2.1.1 ROLLING STOCK (RAIL CARS)

This assessment of rolling stock options assumes the following (see also Table 1):

- All the track related deficiencies will be addressed to accommodate the safe operation of the selected type of rolling stock up to the maximum track design speed.
- The existing infrastructures such as bridges and rail crossings will be accommodating a rolling stock with a similar or smaller dynamic envelope (space occupied by rail car while in motion) as Via Budd Rail Diesel cars.
- Existing tunnels may need to be modified to accommodate a larger rolling stock envelope, such for bilevel coaches.
- Acceleration and deceleration efforts would be affected by a series of factors including technology selection, number of cars in one trainset, brake system type, and axle load which are not being considered at this stage of the report.
- Selection of any fleet will require a provision of spare vehicles to ensure that service levels can be maintained throughout the project life, regardless of possible vehicle failures or planned maintenance intervals. The number of spares will depend on the reliability of the type of vehicle selected, the size of the fleet, and the concept of Operations and Maintenance for the system.

Table 1 – rolling stock types and applications

<table>
<thead>
<tr>
<th>Criteria</th>
<th>100% LFLRV (Elec)</th>
<th>Diesel Multiple Unit (DMU) Commuter Class</th>
<th>Diesel Locomotive, Bilevel Coach</th>
<th>Budd Rail Diesel Car (legacy fleet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seated+ standing Capacity</td>
<td>200 (2 car)</td>
<td>135+150 (3 car)</td>
<td>162 per car, 12 car set</td>
<td>70 to 90</td>
</tr>
<tr>
<td>Commute Distance (km)</td>
<td>5 to 40</td>
<td>5 to 150</td>
<td>20 to 200</td>
<td>20 to 400</td>
</tr>
<tr>
<td>Max Op. Speed (km/hr)</td>
<td>50 to 80</td>
<td>140</td>
<td>160</td>
<td>137</td>
</tr>
<tr>
<td>Reference Vehicle</td>
<td>Bombardier Flexity</td>
<td>Alstom LINT</td>
<td>Bombardier Bi-Level</td>
<td>Budd Company</td>
</tr>
<tr>
<td>Reference Project</td>
<td>Waterloo LRT</td>
<td>Ottawa Trillium Line</td>
<td>West Coast Express</td>
<td>Vancouver Island Rail Corridor</td>
</tr>
</tbody>
</table>

Canadian reference projects that employ the use of these rolling stock options are listed below:

- The Waterloo LRT is an integrated urban LRT which provides 5-minute headways and a rapid service using electrified 100% low floor LRVs.
- The Ottawa Trillium Line features a modern DMU (diesel multiple unit) and provides a high level of service and reliability. It runs a diesel LRT service on an existing mainline freight corridor which features numerous sections of single track, 15-minute headways, and stations spaced at intervals of typically one to two kilometers apart.
- Bilevel cars have been providing commuter service in Canada’s largest cities for several decades using conventional diesel locomotive technology. These systems are characterized as having very high capacity ridership, stations further apart, with a higher operating speed and longer trip durations. GO Transit in Greater Toronto and Hamilton Area in Ontario and West Coast Express in the Lower Mainland both employ the use of bilevel rolling stock.

See Figure 1, overleaf, for example options. For further discussions on these options please refer to Appendix B.
2.1.2 DOUBLE-TRACKING

The corridor is constrained with regards to right of way and capacity to widen or double track the rail service for additional capacity and redundancy (see current track diagram below). However, some opportunities do exist for double tracking and shared rail platforms between Victoria to Langford and Shawnigan Lake to Courtenay. The Malahat area poses significant challenges to double tracking given the elevation change and geometry. Significant blasting and tunnelling would be required to accommodate.

Double-tracking portions of the line permits greater flexibility for maintenance and fewer track-switching delays to Inter-City and Commuter Services. A peak-direction service with only four trains will not likely require double-tracking upgrades. Figure 2 shows the current state of the track in this section.

However, should additional trains be added, or if two-way service is introduced, more double-track capacity will need to be added to minimize train conflicts and delays. These levels of service are not considered in this study and costs for double tracking have not been included in this assessment.

While double-tracking provides greater flexibility and high-level constraints identified, double-tracking has not been costed within this report.
Scenario 1 assumed a 4-train inbound/outbound service based on the reported 2011 track operating speeds. These are maximum speeds that one of the typical rolling stock vehicle types noted in this report can achieve with relatively minimal work to the existing track:

- 10 mph between Victoria Station (Station 1) and Esquimalt Station (Station 2)
- 20 mph between Esquimalt Station (Station 2) and Six Mile Station (Station 3)
- 25 mph between Six Mile Station (Station 3) and Atkins Station (Station 4)
- 27.5 mph (average between 25 mph and 30 mph) between Atkins Station (Station 4) and Westhills Station (Station 6)
- 30 mph between Westhills Station (Station 6) and Courtenay Station (Station 13)

Based on these maximum operating speeds and distances; average travel times, dwell times, and time tables were back-calculated for sections between Victoria and Westhills, shown here in Figure 3:

And Westhills to Courtenay, shown here in Figure 4. Service north of Westhills assumes a 15-minute layover in Duncan for schedule adjustment and operator and crew breaks.
Figure 4: Scenario 1 operating profile and time table between Westhills and Courtenay

The service assumes four inbound trips per day; scheduled to arrive at Victoria Station at 07:02, 07:32, 08:02, and 08:32 on weekdays. Three inbound trips will originate at Westhills and one will come from Courtenay, arriving in Westhills in time to serve as the fourth and final inbound trip of the day.

The order is reversed in the PM peak, with trains scheduled to depart Victoria Station at 17:00, 17:30, 18:00, and 18:30. The first outbound trip travels through to Courtenay and the others terminate at Westhills, to repeat the AM schedule the following weekday.

Scenario 1 provides a 37-minute, one-way trip between Westhills and Victoria; 20 minutes faster than a typical peak-period driving trip and 30 minutes faster than direct transit service between Westhills and downtown.¹ Service to Nanaimo is shown at just under three hours. Travelling the full length of the route – Courtenay to Victoria – will take approximately five hours.

¹ BC Transit commuter service terminates at Government Transit Exchange.
2.1.4 SCENARIO 2 – PEAK SERVICE, ULTIMATE SPEEDS, 4 TRAINS

Scenario 2 assumed a 4-train inbound/outbound service based on the reported “Ultimate” track operating speeds. These are maximum speeds that one of the typical rolling stock vehicle types noted in this report can achieve with a more advanced, though-still-feasible amount of work to the existing track:

- 15 mph between Victoria Station (Station 1) and Esquimalt Station (Station 2)
- 25 mph between Esquimalt Station (Station 2) and Atkins Station (Station 4)
- 32 mph between Atkins Station (Station 4) and Westhills Station (Station 6)
- 45 mph between Westhills Station (Station 6) and Shawnigan Lake Station (Station 7)
- 60 mph between Shawnigan Lake Station (Station 7) and Courtenay Station (Station 13)

Based on these maximum operating speeds and distances; average travel times, dwell times, and time tables were back-calculated for sections between Victoria and Westhills, shown in Figure 5:

![Figure 5: Scenario 2 operating profile and time table between Victoria and Westhills](image)

And Westhills to Courtenay, shown here in Figure 7. Service north of Westhills assumes a 15-minute layover in Duncan for schedule adjustment and operator and crew breaks.

![Figure 6: Scenario 2 operating profile and time table between Westhills and Courtenay](image)
Phase 2 speeds permit Victoria-Westhills service in just under 30 minutes. The service still assumes four inbound trips per day; scheduled to arrive at Victoria Station at several minutes before the half-hour mark at 06:58, 07:28, 07:58, and 08:58 on weekdays. Three inbound trips will originate at Westhills and one will come from Courtenay, arriving in Westhills in time to serve as the fourth and final inbound trip of the day.

The order is reversed in the PM peak, with trains scheduled to depart Victoria Station at the same times as in Scenario 1: 17:00, 17:30, 18:00, and 18:30. The first outbound trip travels through to Courtenay and the others terminate at Westhills, to repeat the AM schedule the following weekday.

Scenario 2 provides a 28-minute, one-way trip between Westhills and Victoria. Service to Nanaimo is shown at just under two hours. Travelling the full length of the route – Courtenay to Victoria – will take just over three hours.
2.1.5 SCENARIO 3 – PEAK SERVICE, PHASE 2 SPEEDS, 8 TRAINS

Scenario 3 retains the same Phase 2 operating speeds as assumed in Scenario 2 (28-minute service between Victoria and Westhills) but doubles the number of inbound and outbound trips. Eight inbound trips are provided during the AM and PM peaks; with two originating and terminating in Courtenay. Similar to scenarios 1 and 2, trains will be stored onsite during off-peak hours. This requires eight trains to be stored at or near Victoria Station between 09:00 and 16:30, six trains to be stored at or near Westhills Station between 20:00 and 06:00, and two trains to be stored at or near Courtenay Station from 20:45 and 05:15.

Based on these maximum operating speeds and distances; average travel times, dwell times, and time tables were back-calculated for sections between Victoria and Westhills, shown here in Figure 7:

![Figure 7: Scenario 3 operating profile and time table between Victoria and Westhills](image)

And Westhills to Courtenay, shown here in Figure 8. Service north of Westhills assumes a 15-minute layover in Duncan for schedule adjustment and operator and crew breaks.
Similar to Scenario 2, Phase 2 speeds permit Victoria-Westhills service in just under 30 minutes in Scenario 3. However, the service now assumes eight inbound trips per day; scheduled to arrive at Victoria Station with 15-30-minute frequency at 06:28, 06:58, 07:28, 07:43, 07:58, 08:13, 08:28, and 08:58 on weekdays. Six inbound trips will originate at Westhills and two will come from Courtenay, arriving in Westhills in time to serve as the last two inbound trips of the day.

The order is reversed in the PM peak, with trains scheduled to depart Victoria Station at 16:30, 17:00, 17:15, 17:30, 17:45, 18:00, 18:15, and 18:30. The second and fourth outbound trips travel through to Courtenay and the others terminate at Westhills, to repeat the AM schedule the following weekday.

Scenario 3 also provides a 28-minute, one-way trip between Westhills and Victoria. Service to Nanaimo is shown at just under two hours. Travelling the full length of the route – Courtenay to Victoria – will take just over three hours.
2.1.6 SCENARIO 4 – ALL-DAY, 2-WAY SERVICE, PHASE 2 SPEEDS, 24 ROUND TRIPS

As with scenarios 2 and 3, Scenario 4 retains Phase 2 operating speed assumptions (28-minute service between Victoria and Westhills) but provides more frequent and bi-directional service from 06:00 and 20:00 on weekdays. Maximum frequency is 15-minute service inbound and outbound during the AM and PM peaks, respectively.

Half-hour, peak service is provided in the non-peak direction and hourly service is provided off-peak. This scenario provides 24 round trips (48 1-way trips) during service periods. This includes 20 round trips between Victoria and Westhills and 4 trips between Victoria and Courtenay.

The proposed time table between Victoria and Westhills is shown in Figure 9 below and from Westhills and Courtenay in Figure 10.

---

<table>
<thead>
<tr>
<th>Station</th>
<th>Victoria to Westhills</th>
<th>Westhills to Victoria</th>
<th>Victoria to Westhills</th>
<th>Westhills to Victoria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx Change (mi)</td>
<td>0.0</td>
<td>2.66</td>
<td>2.83</td>
<td>5.0</td>
</tr>
<tr>
<td>Distance between Stations (mi)</td>
<td>0.0</td>
<td>2.66</td>
<td>2.83</td>
<td>5.0</td>
</tr>
<tr>
<td>Time from Sl 1 (Phase 2 speeds)</td>
<td>10.5</td>
<td>6.9</td>
<td>26.5</td>
<td>6.9</td>
</tr>
<tr>
<td>Avg mph based on Phase 2 speeds</td>
<td>15.0</td>
<td>26.5</td>
<td>26.5</td>
<td>6.9</td>
</tr>
</tbody>
</table>

Figure 9: Scenario 4 operating profile and time table between Victoria and Westhills
This scenario assumes less off-peak storage demand at Victoria Station but significantly more at or near Westhills. With bi-directional service throughout the day, most trains will be put back into service and not need to be stored at the southern terminus to await PM peak outbound service.

However, some storage will be needed at Victoria to accommodate the imbalance of inbound and outbound frequencies during each of the peaks. More trains will arrive in Victoria during the AM peak than will leave it. The present operating scenario shows two trains requiring off-peak storage at Victoria: the trains departing from Westhills at 07:15 and 08:15. These would return to service for 15-minute outbound frequencies in the PM peak.

Figure 10: Scenario 4 operating profile and time table between Westhills and Courtenay
2.2 FORECASTED RIDERSHIP

This assessment included forecast estimates for a potential commuter rail on Vancouver Island serving stations between Courtenay and Downtown Victoria. Initial timetable and network service options were developed to produce one-directional and bi-directional peak period ridership estimates.

The forecast analysis shows that rail trips increase with corresponding increases in track speed and service frequency. Scenarios 3 and 4 demonstrate the highest, associated number of peak period rail passengers. However, this association is not linear. The highest average number of passengers per train is highest in operating scenarios 1 and 2. This implies that given the forecast methodology; the potential, recognized demand for a commuter rail service along the corridor has a limit.

Without commensurate increases in land use density and potential catchment, the most expensive rail investments will eventually yield diminishing returns in ridership. At present, a peak-direction, 4-train service shows the highest, average ridership, with relatively little ridership difference between Phase 1 and Phase 2 track investment scenarios.

2.2.1 DATA SOURCES

The adopted approach to complete this task is grounded in actual and current commuter travel patterns on the island. Travel data was acquired in two forms:

- For the CRD from Langford to Downtown Victoria segment: the published online CRD Origin Destination Household Travel Survey (2017) was used.
- For the Courtenay to Shawnigan Lake segment: 2019 Streetlight Data was used. StreetLight Data sources anonymized information from third-party smartphone apps to deliver a nearly real-time look at a region’s traffic.

To maintain the integrity and validity of the data, each segment was assessed separately and subsequently combined. Moreover, with one data set originating in 2017 and the other in 2019, the CRD Origin Destination 2017 data set was expanded to 2019 using a population growth factor.

Other data sources included google maps and a commuter rail time table for establishing travel times as well as published and/or established research to identify applicable mode share splits, initial fares, and elasticity values.

2.2.2 METHODOLOGY

This study produces Order-of-Magnitude commuter rail ridership estimates by utilizing available mode share splits by distance and applying established elasticity values to capture impacts of commuter rail service changes and scenarios. The methodology is detailed in the following steps:

- To estimate ridership under various service scenarios, current Auto and Transit mode shares were used to establish the total commuter estimates for the AM and PM peak periods. These correspond to scenarios 1-4 noted above; with two pricing options for each scenario (see Table 2 below).
- A Commuter Service station catchment area was identified and used to estimate the ridership pool from the values in Step 1 and travel calculated times.
- The Inter-City rail catchment areas and origin-destination trips were calculated through different means, which did not allow for cross-referenced OD-journey pairs between individual Commuter-area and Inter-City area stations. For the purposes of this exercise, all station-catchment trips within the Capital Regional District (CRD) were treated as a single bloc for Inter-City riders.
- Peak period ridership was then calculated for the two segments for AM and PM peak one-directional and bi-directional scenarios using established rail mode share by distance (trip length frequency distribution).
• Elasticity values were then used to estimate impact of service variations and establish service option attributes.

Table 2: Scenario Summary

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Directionality</th>
<th>Fare Structure</th>
<th>Headway (tr/hr) – trips per hour</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>One- Directional</td>
<td>Fare Structure 1</td>
<td>1.3 tr/hr (4 trains/peak period)</td>
<td>Phase 1 Speeds</td>
</tr>
<tr>
<td>1B</td>
<td>One- Directional</td>
<td>Fare Structure 2</td>
<td>1.3 tr/hr (4 trains/peak period)</td>
<td>Phase 1 Speeds</td>
</tr>
<tr>
<td>2A</td>
<td>One- Directional</td>
<td>Fare Structure 1</td>
<td>1.3 tr/hr (4 trains/peak period)</td>
<td>Phase 2 Speeds</td>
</tr>
<tr>
<td>2B</td>
<td>One- Directional</td>
<td>Fare Structure 2</td>
<td>1.3 tr/hr (4 trains/peak period)</td>
<td>Phase 2 Speeds</td>
</tr>
<tr>
<td>2C</td>
<td>One- Directional</td>
<td>Fare Structure 1</td>
<td>2.7 tr/hr (8 trains/peak period)</td>
<td>Phase 2 Speeds</td>
</tr>
<tr>
<td>2D</td>
<td>One- Directional</td>
<td>Fare Structure 2</td>
<td>2.7 tr/hr (8 trains/peak period)</td>
<td>Phase 2 Speeds</td>
</tr>
<tr>
<td>2E</td>
<td>Bi-Directional</td>
<td>Fare Structure 1</td>
<td>3.3 tr/hr/direction (10 trains/peak period/direction)</td>
<td>Phase 2 Speeds</td>
</tr>
<tr>
<td>2F</td>
<td>Bi-Directional</td>
<td>Fare Structure 2</td>
<td>3.3 tr/hr/direction (10 trains/peak period/direction)</td>
<td>Phase 2 Speeds</td>
</tr>
</tbody>
</table>

To develop ridership estimates for various scenarios, the following assumptions were considered:

• Ridership demand is unconstrained i.e. assumption that train capacity can serve rail ridership demand.
• Estimated ridership is the established ridership i.e. the low ridership in the early years of a new service are not estimated or included.
• The island commuter rail user travel patterns are based on distances to destination in similar established commuter rail lines in Canada.
• AM peak period covers 6-9 am & PM peak period covers 3-6 pm.
• 2,500m station catchment for stations 3, 5, & 6 (View Royal & Langford) for Park-and-Ride consideration; other stations between Langford & Victoria are assumed to have a catchment of 1,200m; and stations between Langford and Courtenay are based on Streetlight Data provided station locations for catchment.
• In-vehicle Rail Travel Time elasticity to rail demand for distances shorter than 40km is -0.46 and farther than 40km is -0.86.
• Rail fare elasticity to rail demand is -0.65.
• Rail headway/frequency elasticity to rail demand is 0.5.
• Ingress/Egress time is 14.4 minutes for a 1200km catchment area.
• Auto park-to-destination walking penalty is 5 minutes. Existing, comparative journey times are shown in

Table 3 below. These travel times further assume a 5-minute ‘penalty’ for walking connections from parked vehicles and 15 minutes’ for commuter rail (journey to origin station + journey from Victoria Station).

Table 3: comparative journey times for AM peak inbound trips

<table>
<thead>
<tr>
<th>Mode</th>
<th>Phase 1 Commuter Rail</th>
<th>Phase 2 Commuter Rail</th>
<th>Auto</th>
<th>Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Victoria Station</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Esquimalt Station</td>
<td>21</td>
<td>16</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td>Six Mile Station</td>
<td>30</td>
<td>23</td>
<td>26</td>
<td>23</td>
</tr>
</tbody>
</table>
Time penalty between Downtown Victoria to the Victoria station west of Johnson St. bridge is assumed 5mins and between North and South Victoria to the station is assumed 15mins.

For fare sensitivity analysis, fare structures were chosen to match GO (Fare Structure 1) and West Coast Express (Fare Structure 2). Fare structures are detailed below in Table 4:

<table>
<thead>
<tr>
<th>Zones</th>
<th>From (Zone)</th>
<th>To (Zone)</th>
<th>Fare Structure 1 (One Way) (GO)</th>
<th>Fare Structure 2 (One Way) (WCE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>Victoria to Langford</td>
<td>Within Zone</td>
<td>$4.40</td>
<td>$5.75</td>
</tr>
<tr>
<td>Zone 2</td>
<td>Duncan to Shawnigan L.</td>
<td>To Langford or Victoria</td>
<td>$11.15</td>
<td>$9.25</td>
</tr>
<tr>
<td>Zone 3</td>
<td>Qualicum to Ladysmith</td>
<td>To Langford or Victoria</td>
<td>$21.15</td>
<td>$10.50</td>
</tr>
<tr>
<td>Zone 4</td>
<td>Courtenay</td>
<td>To Langford or Victoria</td>
<td>$27.40</td>
<td>$21.00</td>
</tr>
<tr>
<td>Zone 5</td>
<td>Courtenay to Shawnigan L.</td>
<td>Within Zone</td>
<td>$21.15</td>
<td>$10.50</td>
</tr>
</tbody>
</table>

### 2.2.3 RESULTS TABLES

The following result tables reflect peak period (AM & PM) ridership estimates. Station boarding totals inter-station travel boardings (i.e. riders boarding with destinations different from Victoria). This is necessary to capture current travel patterns.

#### 2.2.3.1 PEAK-DIRECTION TRAIN SERVICE

The case scenarios shown in Table 5 and Table 6 demonstrate ridership forecasts based on different operating peak-direction service profiles and price structures.

- Case 1A – Phase 1 operating speeds, 4 Commuter-service trains/day (3 Commuter-only + 1 Inter-City + Commuter service), Fare Structure 1
- Case 1B – Phase 1 operating speeds, 4 Commuter-service trains/day (3 Commuter-only + 1 Inter-City + Commuter service), Fare Structure 2
- Case 2A – Phase 2 operating speeds, 4 Commuter-service trains/day (3 Commuter-only + 1 Inter-City + Commuter service), Fare Structure 1
• Case 2B – Phase 2 operating speeds, 4 Commuter-service trains/day (3 Commuter-only + 1 Inter-City + Commuter service), Fare Structure 2
• Case 2C – Phase 2 operating speeds, 8 Commuter-service trains/day (6 Commuter-only + 2 Inter-City + Commuter services), Fare Structure 1
• Case 2D – Phase 2 operating speeds, 8 Commuter-service trains/day (6 Commuter-only + 2 Inter-City + Commuter services), Fare Structure 2

The totals and averages presented in these tables are therefore the combined averages of the sum of longer Inter-City + Commuter trains with more riders plus Commuter-only train services with riders between Victoria and Westhills.

As seen in the table, doubling service in cases 2C and 2D shows diminishing returns, with only modest ridership increases for the Inter-City service portion and approximately 30% more riders in the Commuter-service area.

Table 5: AM Peak Trip Boarding for peak-direction service options

<table>
<thead>
<tr>
<th>Stations</th>
<th>Case 1A</th>
<th>Case 1B</th>
<th>Case 2A</th>
<th>Case 2B</th>
<th>Case 2C</th>
<th>Case 2D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Victoria</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Esquimalt</td>
<td>134</td>
<td>108</td>
<td>149</td>
<td>120</td>
<td>209</td>
<td>167</td>
</tr>
<tr>
<td>Six Mile</td>
<td>128</td>
<td>103</td>
<td>143</td>
<td>114</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td>Atkins</td>
<td>53</td>
<td>43</td>
<td>59</td>
<td>48</td>
<td>83</td>
<td>67</td>
</tr>
<tr>
<td>Langford</td>
<td>126</td>
<td>101</td>
<td>138</td>
<td>110</td>
<td>193</td>
<td>154</td>
</tr>
<tr>
<td>West Hills</td>
<td>95</td>
<td>76</td>
<td>104</td>
<td>83</td>
<td>145</td>
<td>116</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>536</strong></td>
<td><strong>431</strong></td>
<td><strong>593</strong></td>
<td><strong>475</strong></td>
<td><strong>830</strong></td>
<td><strong>664</strong></td>
</tr>
<tr>
<td><strong>Avg. per train</strong></td>
<td><strong>134</strong></td>
<td><strong>108</strong></td>
<td><strong>148</strong></td>
<td><strong>119</strong></td>
<td><strong>104</strong></td>
<td><strong>83</strong></td>
</tr>
<tr>
<td>Shawnigan Lake</td>
<td>72</td>
<td>56</td>
<td>63</td>
<td>70</td>
<td>72</td>
<td>79</td>
</tr>
<tr>
<td>Duncan</td>
<td>105</td>
<td>96</td>
<td>91</td>
<td>131</td>
<td>104</td>
<td>136</td>
</tr>
<tr>
<td>Ladysmith</td>
<td>31</td>
<td>28</td>
<td>26</td>
<td>35</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Nanaimo</td>
<td>62</td>
<td>57</td>
<td>53</td>
<td>71</td>
<td>61</td>
<td>81</td>
</tr>
<tr>
<td>Parksville</td>
<td>66</td>
<td>61</td>
<td>57</td>
<td>75</td>
<td>65</td>
<td>86</td>
</tr>
<tr>
<td>Qualicum Beach</td>
<td>151</td>
<td>140</td>
<td>135</td>
<td>179</td>
<td>154</td>
<td>205</td>
</tr>
<tr>
<td>Courtenay</td>
<td>10</td>
<td>9</td>
<td>10</td>
<td>13</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,033</strong></td>
<td><strong>878</strong></td>
<td><strong>1,028</strong></td>
<td><strong>1,049</strong></td>
<td><strong>1,327</strong></td>
<td><strong>1,306</strong></td>
</tr>
<tr>
<td><strong>Avg. per train</strong></td>
<td><strong>258</strong></td>
<td><strong>220</strong></td>
<td><strong>257</strong></td>
<td><strong>262</strong></td>
<td><strong>166</strong></td>
<td><strong>163</strong></td>
</tr>
</tbody>
</table>

The most efficient ridership outcomes are produced by Case 2A and Case 2B (Scenario 2 with different fare structures), with Case 2B demonstrating slightly higher average ridership than 2A. This case is forwarded in Section 2.4 below.

The ‘B’ fare structures noted in Table 5 above provide slightly lower, comparative fares for longer journeys for stations north of Shawnigan Lake and slightly higher ones for shorter journeys between Westhills and Victoria stations. The opposite is true of the ‘A’ fare structures. The ‘A’ fare structure options (cases 1A and 2A) show higher ridership for the CRD-area trips between stations 1 and 6.

The PM service (Table 6) shows overall higher patronage but a similar relationship as the AM peak. Running eight peak-hour trains produces higher ridership but at a lower average per-train than a four-train service.
Table 6: PM Peak Trip Boarding for peak-direction service options

<table>
<thead>
<tr>
<th>Stations</th>
<th>Case 1A</th>
<th>Case 1B</th>
<th>Case 2A</th>
<th>Case 2B</th>
<th>Case 2C</th>
<th>Case 2D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Victoria</td>
<td>431</td>
<td>345</td>
<td>476</td>
<td>387</td>
<td>662</td>
<td>536</td>
</tr>
<tr>
<td>Esquimalt</td>
<td>193</td>
<td>155</td>
<td>213</td>
<td>170</td>
<td>298</td>
<td>238</td>
</tr>
<tr>
<td>Six Mile</td>
<td>61</td>
<td>49</td>
<td>66</td>
<td>53</td>
<td>92</td>
<td>74</td>
</tr>
<tr>
<td>Atkins</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Langford</td>
<td>46</td>
<td>36</td>
<td>41</td>
<td>46</td>
<td>47</td>
<td>53</td>
</tr>
<tr>
<td>West Hills</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sub-total</td>
<td>731</td>
<td>585</td>
<td>796</td>
<td>656</td>
<td>1,099</td>
<td>901</td>
</tr>
<tr>
<td>Avg. per train</td>
<td>183</td>
<td>146</td>
<td>199</td>
<td>164</td>
<td>137</td>
<td>113</td>
</tr>
<tr>
<td>Shawnigan Lake</td>
<td>182</td>
<td>169</td>
<td>157</td>
<td>208</td>
<td>179</td>
<td>238</td>
</tr>
<tr>
<td>Duncan</td>
<td>47</td>
<td>44</td>
<td>42</td>
<td>55</td>
<td>48</td>
<td>63</td>
</tr>
<tr>
<td>Ladysmith</td>
<td>76</td>
<td>71</td>
<td>65</td>
<td>86</td>
<td>74</td>
<td>98</td>
</tr>
<tr>
<td>Nanaimo</td>
<td>181</td>
<td>168</td>
<td>160</td>
<td>213</td>
<td>183</td>
<td>243</td>
</tr>
<tr>
<td>Parksville</td>
<td>242</td>
<td>225</td>
<td>214</td>
<td>284</td>
<td>245</td>
<td>325</td>
</tr>
<tr>
<td>Qualicum Beach</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Courtenay</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1,461</td>
<td>1,264</td>
<td>1,436</td>
<td>1,505</td>
<td>1,831</td>
<td>1,871</td>
</tr>
<tr>
<td>Avg. per train</td>
<td>365</td>
<td>316</td>
<td>359</td>
<td>376</td>
<td>229</td>
<td>234</td>
</tr>
</tbody>
</table>

Similarly to the AM figures, the PM boardings are higher between Victoria and Westhills for the lower ‘A’ fare structure options, while sub-totals for the Shawnigan Lake – Courtneay boardings are higher for ‘B’ fare structure options.

Also as in the AM, the doubling of service in Case 2C and 2D (from 4 trains to 8) produces relatively little added benefit. Case 2B again shows to produce the highest average ridership per train.

### BI-DIRECTIONAL TRAIN SERVICE

As shown in Table 7 and Table 8, below, an increase from eight to ten peak-direction trips increases peak-direction ridership by 10%, with lower average-per-train ridership than all other scenarios. Furthermore, the opposite-direction trains (outbound AM and inbound PM) show the lowest average ridership of all – between 71 and 135 boardings per Victoria-Courtenay trains and between 21-35 boardings between Victoria and Westhills stations in the AM and PM peaks.

Table 7: Weekday AM Trip Boarding for Bi-Directional Service

<table>
<thead>
<tr>
<th>Stations</th>
<th>Case 2E Inbound (peak direction)</th>
<th>Case 2E Outbound</th>
<th>Case 2F Inbound (peak direction)</th>
<th>Case 2F Outbound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Victoria</td>
<td>0</td>
<td>131</td>
<td>0</td>
<td>106</td>
</tr>
<tr>
<td>Esquimalt</td>
<td>239</td>
<td>49</td>
<td>191</td>
<td>39</td>
</tr>
<tr>
<td>Six Mile</td>
<td>228</td>
<td>38</td>
<td>183</td>
<td>31</td>
</tr>
<tr>
<td>Atkins</td>
<td>95</td>
<td>0</td>
<td>76</td>
<td>0</td>
</tr>
<tr>
<td>Langford</td>
<td>220</td>
<td>27</td>
<td>176</td>
<td>30</td>
</tr>
<tr>
<td>West Hills</td>
<td>166</td>
<td>0</td>
<td>133</td>
<td>0</td>
</tr>
</tbody>
</table>
### Table 8: Weekday PM Trip Boarding for Bi-Directional Service

<table>
<thead>
<tr>
<th>Stations</th>
<th>Case 2E Inbound (peak direction)</th>
<th>Case 2E Outbound</th>
<th>Case 2F Inbound (peak direction)</th>
<th>Case 2F Outbound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Victoria</td>
<td>0</td>
<td>754</td>
<td>0</td>
<td>608</td>
</tr>
<tr>
<td>Esquimalt</td>
<td>93</td>
<td>340</td>
<td>75</td>
<td>273</td>
</tr>
<tr>
<td>Six Mile</td>
<td>119</td>
<td>105</td>
<td>95</td>
<td>84</td>
</tr>
<tr>
<td>Atkins</td>
<td>33</td>
<td>0</td>
<td>27</td>
<td>0</td>
</tr>
<tr>
<td>Langford</td>
<td>76</td>
<td>47</td>
<td>61</td>
<td>53</td>
</tr>
<tr>
<td>West Hills</td>
<td>67</td>
<td>0</td>
<td>54</td>
<td>0</td>
</tr>
<tr>
<td>Sub-total</td>
<td>388</td>
<td>1,246</td>
<td>312</td>
<td>1,018</td>
</tr>
<tr>
<td>Avg. per train</td>
<td>39</td>
<td>125</td>
<td>31</td>
<td>102</td>
</tr>
<tr>
<td>Shawnigan Lake</td>
<td>36</td>
<td>179</td>
<td>40</td>
<td>238</td>
</tr>
<tr>
<td>Duncan</td>
<td>265</td>
<td>48</td>
<td>348</td>
<td>63</td>
</tr>
<tr>
<td>Ladysmith</td>
<td>21</td>
<td>74</td>
<td>28</td>
<td>98</td>
</tr>
<tr>
<td>Nanaimo</td>
<td>127</td>
<td>183</td>
<td>168</td>
<td>243</td>
</tr>
<tr>
<td>Parksville</td>
<td>85</td>
<td>245</td>
<td>113</td>
<td>325</td>
</tr>
<tr>
<td>Qualicum Beach</td>
<td>240</td>
<td>3</td>
<td>318</td>
<td>3</td>
</tr>
<tr>
<td>Courtenay</td>
<td>19</td>
<td>0</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1,181</td>
<td>1,978</td>
<td>1,352</td>
<td>1,988</td>
</tr>
<tr>
<td>Avg. per train</td>
<td>118</td>
<td>198</td>
<td>135</td>
<td>199</td>
</tr>
</tbody>
</table>

### 2.3 Refined Operating Scenario Options

Based on a first evaluation of the operating and forecast outputs above, the following scenarios were considered the most feasible to take into subsequent stages of preliminary assessment. To simplify the existing conditions review, the overall service scenarios were divided into:

1. Inter-City Service – daily trains between Courtenay and Victoria (no local commuter service between Shawnigan Lake and Admirals Road – terminus at Victoria Station)
   - Based on 2011 track speeds
• Based on Ultimate tracks speeds

2. Commuter Service – includes the Inter-City service from Courtenay, but includes five additional, local stations noted below and in next section of the appendix report and four peak period trains.

These scenarios still provide a high-level concept of what Inter-City and Commuter Rail services could look like. However, further analysis of the demands, data collection methods and scenario analysis would be required to move forward with either of these services.

The three operating scenarios are:

1. Inter-City service between Victoria and Courtenay, named the Initial Scenario, requires the least amount of track infrastructure upgrades and runs at the previously posted 2011 track speeds (average 30 mph).

2. Inter-City service between Victoria and Courtenay, named the Intermediate Scenario, requires additional upgrades to the track infrastructure beyond the Initial Scenario and runs at average track speeds of 50 mph.

3. The third scenario combines the Inter-City between Victoria and Courtenay and a Commuter Rail Service between Victoria and Langford; this is named the Ultimate Scenario. It will require additional upgrades between Victoria and Langford to the track infrastructure beyond the Intermediate Scenario. While not improving track speeds it will support the introduction of Commuter Rail Service in South Vancouver Island.

For more detailed information on the Phased Upgrade approach, the coinciding Track Class Speeds, please refer to Section 8 of this report.

A breakdown of the different service types and assumptions is shown in Table 9 below.

Table 9: Three Remaining Operating Scenarios for the IRC.

<table>
<thead>
<tr>
<th></th>
<th>Inter-City Only Initial Service</th>
<th>Inter-City Only Intermediate Service</th>
<th>Inter-City with Local Commuter Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track Speed Avg. mph</td>
<td>30</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>33 (Langford-Victoria)</td>
</tr>
<tr>
<td>Trains / day</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Stations</td>
<td>8</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>Single-direction run duration</td>
<td>5 hours 11 mins</td>
<td>3 hours 8 mins</td>
<td>3 hours 8 mins</td>
</tr>
<tr>
<td></td>
<td>28 mins (Langford-Victoria)</td>
<td>28 mins (Langford-Victoria)</td>
<td></td>
</tr>
<tr>
<td>Off-peak storage requirements</td>
<td>1 train daily at Victoria, overnight at Courtenay</td>
<td>1 train daily at Victoria, overnight at Courtenay</td>
<td>4 trains daily at Victoria, 1 overnight at Courtenay, 3 overnight at Westhills</td>
</tr>
</tbody>
</table>

For all remaining scenarios, feasible operating profiles and time tables were refined that conform to the Initial Scenario and aspirational track conditions outlined elsewhere in this report. In all instances, travel times between stations have been calculated based on average speeds, known chainage distances, an assumed 15 seconds – 30 seconds dwell time at each station, and some contingency for normal delays and track switching.

2.3.1 INITIAL SCENARIO – INTER-CITY SERVICE AT 2011 TRACK SPEEDS

In this scenario, one inter-city train makes a single return trip per day between Victoria and Courtenay. The Inter-City train runs inbound to Victoria in the AM peak period and outbound to Courtenay in the PM peak period at track speeds commensurate to what were achieved prior to the line’s decommissioning in 2011.
The daily Inter-City inbound train is scheduled to arrive in Victoria at 08:32 and depart it at 17:00. The required departure time from Courtenay (03:00) is not ideal but not uncommon for other inter-city services in Canada. The schedule was established to provide some commuter functionality for riders from Duncan and Nanaimo.

Trains would travel at the average speeds listed below for a journey time of just over five hours:

- 23 mph between Victoria Station (Station 1) and Shawnigan Lake Station (Station 2)
- 30 mph between Shawnigan Lake Station (Station 2) and Courtenay Station (Station 8)

The operating schedule assumes a 15-minute hold in Duncan for schedule adjustment, operator break, and/or contingency.

Presently all bridges and level crossing infrastructure between Victoria and Shawnigan Lake is single track. This is not proposed to change with the Initial operating scenario. Increased travel speeds will still need to share single track bridges and level crossings for later (Intermediate and Commuter) scenarios.

### 2.3.2 INTERMEDIATE SCENARIO – INTER-CITY SERVICE AT ULTIMATE TRACK SPEEDS

In this scenario, one Inter-City train makes a single return trip per day between Victoria and Courtenay; also travelling to the same six other stations listed above. The train runs inbound to Victoria in the AM peak period and outbound to Courtenay in the PM peak period at Ultimate track speeds.

The daily Inter-City inbound train is scheduled to arrive in Victoria at 08:28 and depart it at 17:00. Trains would travel at the average speeds listed below for a journey time of just over three hours:

- 33 mph between Victoria Station (Station 1) and Shawnigan Lake Station (Station 2)
- 55 mph between Shawnigan Lake Station (Station 2) and Courtenay Station (Station 8)

The operating schedule also assumes a 15-minute hold in Duncan for schedule adjustment, operator break, and/or contingency. Track and bridges would remain single-track as outlined in the Initial service.

### 2.3.3 COMMUTER SERVICE SCENARIO – ADDITION OF COMMUTER SERVICE BETWEEN LANGFORD AND VICTORIA

The Commuter Service scenario assumes a 4-train, peak-direction service based on Ultimate operating speeds. In addition to the one, daily train to and from Courtenay, local commuter service is provided between Langford and Victoria at five additional stations (station location analysis discussed in greater detail in the next section), bringing the total number of Inter-City and Commuting Service stations to 13.

The operating schedule also assumes a 15-minute hold in Duncan for schedule adjustment, operator break, and/or contingency. The travel times between Duncan and Victoria as well as Nanaimo and Victoria are unchanged from the Intermediate Scenario.

At Ultimate operating speeds, the train from Westhills Station in Langford takes twenty-eight minutes. The fourth AM inbound train will arrive at Westhills Station from Courtenay at 08:00 and continue to Victoria for a scheduled 08:28 terminus. The first PM train will depart Victoria 17:00 and continue through to Courtenay. The following three trains will terminate at Westhills.
2.4 FORECAST RIDERSHIP

A refined forecast analysis conducted as part of this report shows that rail trips increase with corresponding increases in track speed. The Intermediate and Commuter Service scenarios demonstrate a greater number of peak period rail passengers than the Initial service scenarios.

2.4.1 RESULTS TABLES

The following result tables reflect peak period (AM & PM) ridership estimates with the 4-train service for Commuters (between Victoria and Westhills) and 1-train service for Inter-City passengers (between Courtenay and Victoria) discussed in Section 2.2.3.1. The Inter-City train would be scheduled to serve double function as one of the four Commuter trains during the AM and PM peak.

As shown in Table 10, forecast ridership increases with the increase in service speeds between the Initial and Intermediate track conditions. Overall boardings increase approximately 300% over the Intermediate Service scenario with the introduction of Commuter Service between Victoria and Langford. The largest, single station boardings are at the Admirals and Six Mile stations.

As also noted in the Methodology, no destination trips are identified in the AM between individual Commuter service-area stations and stations north of the CRD. For the purposes of tracking OD trips between areas within and north of the CRD, the CRD was treated as a single catchment area with all CRD passengers assigned to Victoria Station.

Table 10: AM Peak Trip Boarding for peak-direction service options

<table>
<thead>
<tr>
<th>Stations</th>
<th>Boardings per station with 4-train service (Case 2B)</th>
<th>Initial Service</th>
<th>Intermediate Service</th>
<th>Commuter Service</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victoria</td>
<td>n/a</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Admirals</td>
<td></td>
<td></td>
<td></td>
<td>120</td>
</tr>
<tr>
<td>Six Mile</td>
<td></td>
<td></td>
<td></td>
<td>114</td>
</tr>
<tr>
<td>Atkins</td>
<td></td>
<td></td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>Langford</td>
<td></td>
<td></td>
<td></td>
<td>110</td>
</tr>
<tr>
<td>Westhills</td>
<td></td>
<td></td>
<td></td>
<td>83</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td></td>
<td></td>
<td>475</td>
</tr>
<tr>
<td>Avg. per train (4 trains)</td>
<td></td>
<td></td>
<td></td>
<td>119</td>
</tr>
<tr>
<td>Shawnigan Lake</td>
<td>72</td>
<td>70</td>
<td></td>
<td>70</td>
</tr>
<tr>
<td>Duncan</td>
<td>105</td>
<td>131</td>
<td></td>
<td>131</td>
</tr>
<tr>
<td>Ladysmith</td>
<td>31</td>
<td>35</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Nanaimo</td>
<td>62</td>
<td>71</td>
<td></td>
<td>71</td>
</tr>
<tr>
<td>Parksville</td>
<td>66</td>
<td>75</td>
<td></td>
<td>75</td>
</tr>
<tr>
<td>Qualicum Beach</td>
<td>151</td>
<td>179</td>
<td></td>
<td>179</td>
</tr>
<tr>
<td>Courtenay</td>
<td>10</td>
<td>13</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>497 – 1 train</td>
<td>574 – 1 train</td>
<td>1,049 – 3 Commuter + 1 dual Commuter / Inter-City train</td>
<td></td>
</tr>
<tr>
<td>Avg. per train</td>
<td>497 – 1 train</td>
<td>574 – 1 train</td>
<td>262</td>
<td></td>
</tr>
</tbody>
</table>
PM service shows the same pattern, but with a greater number of boardings for all scenarios and results are shown in Table 11. The PM peak is typically longer than the AM, resulting in a prolonged period of mode share elasticity for transit use relative to car use. This typically results in higher PM transit boardings, as is shown below.

As also noted in the Methodology, no origin trips are identified in the PM between individual Commuter service-area stations and stations north of the CRD. For the purposes of tracking OD trips between areas within and north of the CRD, the CRD was treated as a single catchment area with all CRD passengers assigned to Victoria Station.

Thus while it is likely that the number of passengers embarking from Westhills Station to points north in the PM is greater than zero, this figure can not be captured with the limitations of the origin-destination data available. The sum of all passengers within the CRD heading north past Westhills on the one Inter-City train is captured within the total number of passengers embarking from Victoria Station.

<table>
<thead>
<tr>
<th>Stations</th>
<th>Boardings per station with 4-train service (Case 2B)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial Service</td>
<td>Intermediate Service</td>
<td>Commuter Service</td>
</tr>
<tr>
<td>Victoria</td>
<td>n/a</td>
<td>n/a</td>
<td>387</td>
</tr>
<tr>
<td>Admirals</td>
<td></td>
<td></td>
<td>170</td>
</tr>
<tr>
<td>Six Mile</td>
<td></td>
<td></td>
<td>53</td>
</tr>
<tr>
<td>Atkins</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Langford</td>
<td></td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>Westhills</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Sub-total</td>
<td>n/a</td>
<td>n/a</td>
<td>656</td>
</tr>
<tr>
<td>Avg. per train</td>
<td></td>
<td></td>
<td>164</td>
</tr>
<tr>
<td>Shawnigan Lake</td>
<td>182</td>
<td>208</td>
<td>208</td>
</tr>
<tr>
<td>Duncan</td>
<td>47</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Ladysmith</td>
<td>76</td>
<td>86</td>
<td>86</td>
</tr>
<tr>
<td>Nanaimo</td>
<td>181</td>
<td>213</td>
<td>213</td>
</tr>
<tr>
<td>Parksville</td>
<td>242</td>
<td>284</td>
<td>284</td>
</tr>
<tr>
<td>Qualicum Beach</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Courtenay</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>730 – 1 train</td>
<td>849 – 1 train</td>
<td>1,505 – 3 Commuter + 1 dual Commuter / Inter-City train</td>
</tr>
<tr>
<td>Avg. per train</td>
<td>730 – 1 train</td>
<td>849 – 1 train</td>
<td>376</td>
</tr>
</tbody>
</table>
3 COMMUTER RAIL STATIONS

3.1 FOOTPRINT AND AMENITIES

The following assumptions were made to develop the footprint for stations servicing the proposed commuter rail:

- Capacity for three 25m passenger cars + one additional locomotive and/or rail car = 100m length
- Single platform for single-direction peak service + contingency = 5m width (500m² area total)
- Basic concrete platform approximately 100m X 5m
- Single covered shelter approximately 5m X 2.5m
- Single ticket machine
- Dual platform (median or dual-sided) for dual-track sections and stations (where applicable)

The general opportunities and constraints for each station location are provided in the section below; focusing on the requirements to achieve reasonable, multi-modal access and the basic station template described above.

The Trillium Line in Ottawa (Bayview Station pictured below) demonstrates how trains can service a single-side platform from either direction. The platform is equipped with basic shelters and amenities for passengers.

Figure 11: Comparator Station – Bayview, Trillium Line, Ottawa (www.cbc.ca)
3.2 LOCATIONS

The revised commuter rail service includes 13 upgraded stations whose locations are described in Table 12. Stations 1 – 6 (Victoria to Westhills, for the Commuter Service scenario) were explicitly identified in the 2011 IBI report as potential future stations. This assessment has revisited those same locations and presents updated descriptions of current conditions and challenges in providing a basic, template station platform and minimal amenities (described further below).

The provision of a basic park and ride amenity is discussed in the descriptions of stations 3 (Six Mile), 5 (Langford), and 6 (Westhills). Supplemental transit connectivity is also discussed in the description of Station 1 (Victoria).

This assessment places the southern terminus of both the Inter-City and Commuter rail services at Victoria Station – located at the western approach of the Johnson Street Bridge (west shore of the Upper Harbour). Consideration for a commuter rail link directly into downtown Victoria was not considered at this point as there is no current connection in place.

Without a fixed link, it is assumed that commuters will alight just west of downtown. Some enhanced multi-modal connectivity features are discussed below to mitigate potential transfer times for commuters. However, this additional time has been worked into the demand model discussed in the previous section.

Table 12: List and Mileages of Inter-City and Commuter Rail Stations

<table>
<thead>
<tr>
<th>Station Number</th>
<th>Station Name</th>
<th>Inter-City or Commuter</th>
<th>Mileage</th>
<th>General Location Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Victoria</td>
<td>Inter-City / Commuter</td>
<td>0.00</td>
<td>West end of the Johnson Street Bridge</td>
</tr>
<tr>
<td>2</td>
<td>Admirals</td>
<td>Commuter</td>
<td>2.63</td>
<td>Lockley Road/Admirals Road intersection, Esquimalt</td>
</tr>
<tr>
<td>3</td>
<td>Six Mile</td>
<td>Commuter</td>
<td>5.50</td>
<td>Island Highway/Atkins Avenue intersection, Langford</td>
</tr>
<tr>
<td>4</td>
<td>Atkins</td>
<td>Commuter</td>
<td>6.77</td>
<td>Opposite 380 Atkins Road, Langford</td>
</tr>
<tr>
<td>5</td>
<td>Langford</td>
<td>Commuter</td>
<td>7.90</td>
<td>Opposite 827 Station Avenue, Langford (Transit Exchange)</td>
</tr>
<tr>
<td>6</td>
<td>Westhills</td>
<td>Commuter</td>
<td>10.06</td>
<td>West Shore Parkway/Landing Lane intersection, Langford</td>
</tr>
<tr>
<td>7</td>
<td>Shawnigan Lake</td>
<td>Inter-City</td>
<td>27.80</td>
<td>Shawnigan Lake Community Centre, Shawnigan Lake</td>
</tr>
<tr>
<td>8</td>
<td>Duncan</td>
<td>Inter-City</td>
<td>39.70</td>
<td>120 Canada Avenue, Duncan</td>
</tr>
<tr>
<td>9</td>
<td>Ladysmith</td>
<td>Inter-City</td>
<td>58.40</td>
<td>Transfer Beach Boulevard, Ladysmith</td>
</tr>
<tr>
<td>10</td>
<td>Nanaimo</td>
<td>Inter-City</td>
<td>72.50</td>
<td>321 Selby Street, Nanaimo</td>
</tr>
<tr>
<td>11</td>
<td>Parksville</td>
<td>Inter-City</td>
<td>95.20</td>
<td>Nicnebec Way and Alberni Highway</td>
</tr>
<tr>
<td>12</td>
<td>Qualicum Beach</td>
<td>Inter-City</td>
<td>101.80</td>
<td>198 Sunningdale Road West, Qualicum Beach</td>
</tr>
<tr>
<td>13</td>
<td>Courtenay</td>
<td>Inter-City</td>
<td>139.70</td>
<td>899 Cumberland Road, Courtenay</td>
</tr>
</tbody>
</table>
The locations of stations 7 – 13 (Shawnigan Lake to Courtenay) were identified as the nearest to the locations of the former stations that could accommodate a basic, template station platform, minimal amenities, and some provision of park and ride.

These locations north of Westhills were reviewed at high-level in the 2011 IBI report and have been examined to a similar level of detail in this report. Additional information on station conditions and future station viability is discussed in this report.

### 3.2.1 COMMUTER STATIONS

As shown in Figure 12, the proposed Commuter service would make local stops between Langford and Victoria. Each of the proposed stations is outlined below and discussed in more detail in this report. This section precedes discussion of Inter-City service within this report because these station sites are closest to Victoria and were reviewed in IBI’s 2011 Commuter Rail report.

Upon reflecting on the findings and analysis of this report, it has been determined that Atkins Station in Langford does not present a viable option for a station location. This option was originally explored to build on previous studies which evaluated this location and to validate it. Due to ridership, catchment, safety, and limited benefits per costs associated with its construction it has been identified as a non-viable station location. It is discussed in this report only to demonstrate the assessment of these factors.
Figure 12: Commuter Rail Line and Station Locations
3.2.1.1  STATION 1 – VICTORIA (INTER-CITY & COMMUTER SERVICE) – MILEAGE 0.00

EXISTING CONDITIONS

Victoria Station (Figure 13) is the southern terminus of both the Inter-City and Commuter service lines. The rail terminus location, shown in the figure below, ends to the south of and roughly parallel to Esquimalt Avenue at its intersection with Harbour Road – approximately 120m west of the Johnson Street Bridge span.

Figure 13: Victoria Station layout, context, options

The rail line is elevated approximately 4m above Esquimalt Road, Harbour Drive, and adjoining properties to the north. The linear rail property itself is bounded by a residential development immediately to the south, Harbour Drive to the east, a car dealership on the north, and Tyee Road to the west – a length of 220m. See Figure 14.

Figure 14: Rail terminus, facing West (left) and East (right)
A 4m-wide multi-use path runs adjacent and parallel to the line on its south side, which connects to the pedestrian and cycling networks across the Johnson Street Bridge for access into downtown and to a smaller bridge over Esquimalt Road.

**CHANGES SINCE 2011**

The priority of the road and rail alignments to the bridge have been reversed since the 2011 IBI report. As shown in the 2011 aerial (Figure 15), the previous alignment of Esquimalt Road and the rail line still reflected the former priority of the original rail alignment to the bridge. The connection to Esquimalt Road was indirect and ran around and under the original bridge alignment.

*Figure 15: 2011 aerial of Esquimalt Road and rail terminus (VicMap)*

The aerial from 2017, after the construction of the new Johnson Street Bridge (Figure 16), shows this priority of alignment reversed. Esquimalt Road is now the more direct connection to the bridge and the rail line’s previous bridge alignment has been severed. The former station house on the east side of the bridge (not in aerial but referenced in the 2011 report) was also removed to accommodate a new westbound alignment for Pandora Avenue vehicle traffic.

*Figure 16: 2017 aerial of Esquimalt Road and rail terminus (VicMap)*
The bridge’s reconstruction and realignment have provided significantly improved connections for pedestrians and cyclists to and from downtown. As shown in the 2011 aerial, the previous alignment only provided shared bus/cycle/bike lanes on bridge lanes. Pedestrians could only cross from the sidewalk on the south side of the bridge.

The revised alignment provides more options for both pedestrians and cyclists. The former rail bridge on the north side of the vehicle bridge has been replaced with a multi-path bridge for cyclists and pedestrians. However, on-road cycle lanes also exist on both sides of the bridge for both eastbound and westbound cyclists. Pedestrians also can cross on either side of the bridge, foregoing the need for additional crossings on both approaches to access a single side of the bridge.

For Inter-City and Commuter rail service, the primary outcome of this change has been a severing of simpler connectivity into downtown. Without significant investment in new bridge realignment or tunnel infrastructure, the fixed location of the rail line will restrict the service’s southern terminus to this location at the west end of the bridge.

3.2.1.2 FUTURE STATION VIABILITY

The main issues to consider for the viability of a station terminus at this location revolve around access and conflicts:

- Connectivity to downtown
- Conflict mitigation in limited ‘platform’ space
- Minimizing conflicts from Tyee Road

Unlike other stations on the route, double-tracking and dual-side platforms are not viable given the alignment’s adjacent topography and property constraints without significant capital commitment. This assessment therefore includes two station viability scenarios for the purpose of comparison: one with minimal infrastructure works and one that considers greater capital investment.

The single-track alignment of the existing bridge over Harbour Road (see Figure 17), as with other rail bridges along the Island Rail Corridor, limits the abutting alignment to a single track. As discussed throughout this report, this assessment has assumed no double-tracking of rail bridges.

![Figure 17: Single-track bridge alignment over Harbour Road, facing west](image-url)
Minimal Investment Scenario

Under this scenario, the station would be served only by the single track and the existing, 4m wide multi-use path on the south side of the track would serve additional duty as a passenger boarding/alighting and waiting platform. Passengers would access the station platform from either Kitma Road in the west or the existing multi-use trails to the east.

The idling and release of several hundred passengers onto a 4m wide path will introduce conflicts with existing multi-use path users, especially cyclists. If service is limited to peak-direction and peak-period only, the duration of these conflict times would be limited to those times, but they would still exist.

Options to reduce the likelihood and severity of these potential conflicts would include:

- Install ‘cyclist dismount’ signage at the eastbound and westbound approaches of the path, possibly with accompanying times outlining the likeliest times of experienced conflict.
- Close the multi-use path to cyclists and divert bridge-bound trips to an improved cycling facility on Tyee Road/Esquimalt Road, Songhees Road/Harbour Road, or some combination of these two.

Transit connectivity may be improved with changes to bus schedules and/or an extension of the existing eastbound and westbound bus bays on Esquimalt Road. Extending the bays to permit at least two buses will increase transfer capacity and options for rail passengers.

Potential conflicts across Tyee Road and Songhees Road on the west side of the station can be reduced with the installation of crossing gates to deter vehicles from crossing in anticipation of a proceeding train; in accordance with Transport Canada warrants.

Intermediate Investment Scenario

Greater capital investment in a Victoria Station would provide more space for passengers to board, alight, and wait for trains. It would also serve to reduce the potential for conflict for all modes of travel. Buying space adjacent to the current alignment is a choice between expanding to the south or north. The topography and grades are more amenable to expansion to the south, but there are hundreds of residential stakeholders who would be affected and/or displaced. Expanding to the north involves only one commercial stakeholder but is complicated by the 40% grade of the ridge between the level of the existing rail and car dealership lot to the north.

Widening the existing track area to provide a 5m-6m-wide station would require significant earthworks and retaining structures for rail-supporting catwalks and maintenance space on the new, north side of the track. This could be done either with the station located north of the existing track location or the existing track re-aligned to the north. This would also provide additional width to reduce passenger/cyclist conflicts, but it would not eliminate them, as passengers would still cross over and onto the path to access the existing pedestrian network.

Advanced Investment Scenario

To further improve transit connectivity, reduce multi-modal conflicts, and provide an overall more amenable station experience, some degree of property acquisition from the north side of the rail alignment would be required in this scenario to create either a multi-modal transit hub or exchange. The proximity of the location to downtown would not normally require the creation of an entirely new transit exchange, but an advanced investment scenario would further improve upon the basic transit connectivity options outlined in the minimal scenario. Some additional space may also be reserved for small commuter amenities such car share spaces, bike share docks, taxi stands, and/or other micro-mobility docking stations for enhanced service options to and from downtown.

TEMPORARY TRAIN STORAGE

All rail operating scenarios (Initial, Intermediate, and Commuter) require storage capacity for off-peak trains at or near Victoria Station. This ranges from one train for the Initial? and Intermediate service scenarios to four trains for the Commuter service scenario. This is temporary, daily off-peak storage only but requires between 150m and 800m total linear metres of train storage space (assuming 100m per train + 25m for gaps and contingency).
Temporary storage space for up to four trains of this assumed length is potentially available in the vicinity of Victoria Station, but this is contingent upon local development, track management capacity, and any additional car-servicing needs during off-peak storage times.

This maximum storage capacity is only achievable in a 1-direction peak service scenario because it utilizes both the full length of the existing station terminus track between Harbour Road and Tyee/Sorghees Road, the existing double-track length between Tyee Road and Sikum Road, and four storage bays in the former Island Rail Corridor (IRC) Roundhouse site, which is still zoned for rail use.
In the case of a Scenario 3 operation, with eight peak-direction trains; the first four arriving AM trains would travel to the Roundhouse site after completing their runs. The next two trains would stack nose-to-tail on the northern track between Tyee Road and Sikum Road (filling in west to east), the seventh train would terminate at the far eastern end of the existing track alignment, and the eight train would pull in on its west side, closer to Tyee Road / Sorghees Road. Passengers would disembark on the western side of the 220m-long station area.

In the PM, the procedure is reversed, with the first rail car departing from the western end of the station, followed by the eastern end of the station, then the two parked between Tyee Road and Sikum Road (after pulling into the freed-up station track), and finally the four Roundhouse trains in reverse order.

More flexibility exits for all other scenarios with fewer storage requirements. However, the potential for storage capacity at the IRC Roundhouse location is challenged by its position within the Bayviewplace development. The multi-use development advertises the current Roundhouse site as the rail-themed centrepiece of an urban market.

While a large-scale, urban development would undoubtedly benefit from its proximity to a commuter rail line, the potential for utilization of this area as an active, train operations or storage facility will need to be carefully negotiated and managed with the property owners and Bayviewplace development team.

3.2.1.3 STATION 2 – ADMIRALS ROAD – MILEAGE 2.63

EXISTING CONDITIONS

Admirals Station is located adjacent to the intersection of Admirals Road and Colville Road in Esquimalt. The station itself would be located on the north side of the westbound Admirals Road approach and to the south of the Galloping Goose trail, which runs parallel to and just north of the IRC alignment.
The station site is opposite the Esquimalt Navy Base, and many nearby land uses reflect housing, commercial, and recreational needs of naval and military personnel. Indicative of this, the 2011 IBI report placed a potential, future station at 1250 Lockley Road, a lot which has since been developed and is now occupied by a Seaspan facility.

Figure 21: Esquimalt Station layout and context

Figure 22: Seaspan facility now occupying 2011-proposed rail station site
CHANGES SINCE 2011

Aside from the introduction of the Seaspan facility and some cycling infrastructure improvements through the intersection, there have been relatively few, significant changes to the station area since 2011.

Figure 23: cycling network connectivity through the complex intersection (facing West)

3.2.1.4 FUTURE STATION VIABILITY

Although the original station shelter still exists on the north side of the original track location (see Figure 24), it now abuts the Galloping Goose cycle trail, which now occupies that portion of the original rail right of way.

Figure 24: original station shelter, now on north side of Galloping Goose Trail

On the west side of Admirals Road, the track runs along the north property line of the naval base. From an operational standpoint, this is not a viable option for non-secure passenger access and waiting. The only remaining area for a viable station platform is on the east side of Admirals Road, south of the existing rail tracks.
Unlike other potential station locations within the Capital District Region, the existing network and land use constraints around Esquimalt Station do not permit more intensive station infrastructure options. A template-standard 100m X 5m station platform could be built parallel to the south side of the track, on the north side of the Seaspan facility property line.

This area, shown in Figure 25, is mostly fallow but partially serves as a utility ROW adjacent to the north footprint of the building. This would include improved and direct connections to bus bays also located east of the intersection.

Figure 25: likely space for a typical rail platform (left) with good connections to transit (right)

The constraints noted above further preclude other typical station amenities; such as kiss and ride, vehicle pull in/drop off, and/or temporary parking. The northbound bus bay could also be extended to permit two buses for improved access and transfer opportunities to rail passengers. Alignment and visibility constraints would likely not permit the southbound bus bay on the west side of Admirals Road to be significantly altered.

3.2.1.5  STATION 3 – SIX MILE – MILEAGE 5.50

EXISTING CONDITIONS

Six Mile Station would be located near the intersection of Atkins Road and Brydon Road in Langford; approximately halfway between Island Parkway (150m to the south) and the Trans Canada Highway (150m to the north). As shown in Figure 26, this is a relatively remote area with few adjoining land uses in the immediate vicinity. There are some residences to the south and west of the station area and a mix of commercial and retail to the south on Island Highway near Six Mile Road.
Figure 26: Six Mile Station layout, context, and options

The station is situated close to the highway on/off ramps and off a major arterial; including pedestrian access to express commuter bus service directly to downtown. However, the local pedestrian infrastructure is limited to 1.5m wide sidewalks directly on the 5-7 lane arterial. It is a 360m walk along Island Highway to cross to the north at Burnside Road and 390m to cross it to the south at Six Mile Road. It is two kilometres north of Colwood Transit Exchange.

Vehicle access to the station is currently blocked from Island Highway by bollards separating a small access road to a commercial business from the Galloping Goose Trail and a park and ride for trail riders. Motorists access the park and ride from Atkins Road via Six Mile Road, 500m to the west.
The station would have direct line of sight through the park and ride, Atkins Avenue, and Island Highway. However, most of the station itself would be located in a relatively remote, wooded area and would not be visible from the street. As shown in Figure 28, the station would be aligned track’s horizontal alignment runs along a centre ridge approximately 4m higher than Atkins Road and 4m lower than the highway.

There is currently no supplemental pedestrian network on Atkins Road or nearby Brydon Road apart from the Galloping Goose Trail.

Figure 27: Park and Ride entrance for Galloping Goose Trail, facing North

Figure 28: Six Mile Station would sit atop the centre ridge (highway traffic shown at top)
CHANGES SINCE 2011

There have been relatively few, significant changes to the immediate station area since the 2011 IBI report.

3.2.1.6 FUTURE STATION VIABILITY

Given the terrain and relative isolation of this location, any station amenities here would involve significant capital outlays. The two biggest requirements would be for construction of the platform itself and direct, meaningful access to the station for daily commuters.

Assuming a second, opposite-direction bridge and track will not be built, the single-track bridge to the east of the station over Brydon Road limits the use of a possible side-track for rail shunting. The station would be further placed on the south of the track rather than the north, to reduce crossing conflict. Building the rail station platform on the south further improves direct accessibility from the direction where passengers would access the station.

However, on the side of a 4m-high ridge, this requires significant earthworks and retaining structures not only for the platform itself, but for accessible-grade pedestrian access between the platform and Atkins Road below (see Figure 29 below).

Figure 29: the ridgeline upon which the platform would be build, facing northeast (left) and southwest (right)

In addition to the logistics of building a station platform and access onto the side of a small hill, significant upgrades to and through the area of the station itself will have to be investigated. These include, but are not limited to:

- Potential for expanded park and ride from Atkins Road/Avenue for commuter rail patrons – likely to the east of the trail park and ride, to be incorporated in trail design and operations
- Potential for enhanced bus connectivity, bays, or pull-out areas on east and west sides of highway
- Consideration of vehicle access to park and ride or PUDO directly from Island Highway (removal of bollards)
- Safe, accessible, direct access any supplemental vehicle PUDO, park and ride infrastructure.
- Safe, accessible, and direct access to existing and/or future bus connections; including the potential for an activated pedestrian across the highway from the Atkins Avenue alignment or a fully-signalized (‘T’) intersection.
- Improved lighting, co-visibility enhancements, and other CPTED features for high-volume infrastructure in remote locations
3.2.1.7 STATION 4 – ATKINS STATION – MILEAGE 6.77

EXISTING CONDITIONS

The Atkins Station site is in a low-density, residential area approximately 2 kilometres southwest of the Six Mile Station site. The proposed station area is just west of the single track’s crossing of Atkins Avenue, opposite the residences at 364-380 Atkins Avenue.

Access to and around the station area is predominantly by car. There are no sidewalks in the immediate vicinity of the station and although there is a connecting link to the Galloping Goose Trail 280m to the east, there is otherwise no cycle infrastructure on Atkins Avenue; a relatively narrow, 2-lane road with a 30 km/hr posted speed.

There is currently no direct pedestrian or vehicle access to Goldstream Avenue, a major arterial and potential catchment area 300m to the south. The station site is served by BC Transit’s 53 bus route, providing local service between the Langford and Colwood transit exchanges. The only road illumination is from vehicle headlamps and lighting from the homes on the north side of the road.

As with stations 1 and 3, the rail line at Atkins Station runs atop a steep wooded ridge sloping down to the south. The crossing and station area traverses a utility corridor, further limiting any dual-track or expanded station platform capacity. Visibility from the site of a potential platform is limited to less than 50m to the west due to a 90-degree bend in the road and less than 80m to the east due to vegetation and changes to the road’s horizontal and vertical profile.

Figure 30: Atkins Station layout and context
CHANGES SINCE 2011

Local land uses and road network characteristics do not demonstrate many changes since the 2011 report.

3.2.1.8 FUTURE STATION VIABILITY

This is a low-density area with limited catchment for rail commuters and limited opportunity for significant, multi-modal connectivity enhancements. A 500m$^2$ basic station platform could be installed between the track and road, roughly in the area shown in Figure 31, below. Available space within the road’s southern boulevard ranges from 5m to 8m; enough for a platform and possibly a pullover bay for kiss and ride and/or transit.

![Figure 31: Space exists for a basic platform within the road boulevard, facing west (left) and east (right)](image)

However, the introduction of even a basic station at this location could induce local demand which can not be safely accommodated within the constraints of the existing road network. There is no capacity for on-street or off-street parking within 200m of the station. There is insufficient ROW to provide anything other than limited, parallel pullover bays. Even these would require careful engineering determination, given the visibility profile noted above (road curvature and lighting).

The station location’s relative isolation from the wider transportation network limits its potential demand catchment and therefore its overall cost-benefit consideration. Basic station access upgrades would need to include sidewalks on Atkins Avenue, an improved and accessible path up to Selica Road, and safe and highly-visible road crossing in the proximity of the station area.

More costly upgrades would increase the potential catchment base, and include:

- Improved transit connectivity and/or bus bays along Atkins Avenue – would require significant reconstruction of road way and safety features to mitigate curvature visibility issues
- Direct multi-use path connection to Goldstream Avenue via Gamble Park or Whitehead Place to the south

Upon reflecting on the findings and analysis, it has been determined that Atkins Station does not present a viable option for a station location. This is due to ridership, catchment, safety, and limited benefits per costs associated with its construction.
3.2.1.9  STATION 5 – LANGFORD STATION – MILE 7.90

EXISTING CONDITIONS

The Langford Station site is located adjacent to the existing BC Transit Langford Transit Exchange on Station Avenue between Jacklin Road and Peatt Road in central Langford. The line runs north of the existing transit exchange’s eight sawtooth bay curbs (see Figure 32). The transit exchange serves 14 bus routes, including the 50, which runs express from Langford to downtown Victoria via Island Parkway and Highway 1.

Figure 32: Langford Station layout and context

The location is surrounded by commercial and light industrial uses, with residences 200m beyond. The Langford Official Community Plan (2008, updated 2019) identifies this location as the site of a “Major Transit Exchange” and stop on a commuter rail alignment.

Figure 33: The rail line and station are adjacent to an existing bus transit exchange
Multi-modal connectivity and vehicle access are reasonable but could be improved. There is no sidewalk on the south side of Station Avenue, but the station area and rail line are served by both on-road cycle lanes and a parallel off-road cycle track on the north side of the rail ROW. There is a 2,600m², largely-unregulated and free parking lot to the east of the transit exchange. It functions on a first come – first served basis for employees of local businesses.

**CHANGES SINCE 2011**

There have been relatively few, significant changes to the immediate station area since the 2011 IBI report.

**3.2.1.10 FUTURE STATION VIABILITY**

A basic station platform and rail service could be accommodated at this location with relatively minimal investment. There is adequate space within the transit and rail ROW’s to accommodate different station and operating profiles. There is reasonable catchment from nearby employment and residential land uses. The local pedestrian, cycling, and transit connectivity and access are in good condition. There is also potential provision for over 100 park and ride spaces in the existing lot to the west of the exchange. Formalizing this lot for rail commuters – or even a portion of the spaces – would be relatively simple and may only involve a rail ticket or pass display.

There is approximately 10m of rail ROW – within the property line but north of the transit exchange pedestrian fence – to introduce some form of rail service infrastructure (see Figure 34). This provision of space allows for some planning flexibility to accommodate the service required and demand.

*Figure 34: Space exists for various rail, track, and platform options*

These options include, but are not limited to the following, ranging from minimum to more significant investment:

- Installation of an extended rail platform from the current exchange to service 1-way peak service on the existing track
- Double-tracking on the north side of the existing track to provide more service flexibility and redundancy, or improve operations in the event of a 2-way service scenario to Victoria
- Installation of both two tracks and two single-side platforms – with rail-crossing bridge to north side platform or enhanced level-crossing features
- Installation of two tracks and a single, centre platform – with rail-crossing bridge to centre platform or enhanced level-crossing features
3.2.1.11 STATION 6 – WESTHILLS STATION – MILEAGE 10.06

EXISTING CONDITIONS

The Westhills Station site is located in the Goldstream neighbourhood of Langford, just west of Langford Lake and three kilometres south of Highway 1. The 2011 reported tentatively placed a future station just north of the IRC track and to the west of the then-unbuilt portion of West Shore Parkway. This portion of West Shore Parkway is newly-constructed, as is most of the adjacent land development. The road is an arterial that connects Langford Centre and Westhills Stadium in the east to Highway 1 to the north.

![Westhills Station layout, context, and options](image)

Figure 35: Westhills Station layout, context, and options

The Goldstream neighbourhood is a developing area and consists of a mix of newly-built homes and businesses, cleared development sites, and wooded hills. It is Langford’s – and the Capital District Region’s – westernmost developing area.

Bus stops at the site currently serve the limited express 47 bus route, running twice inbound and twice outbound per weekday to downtown Victoria via Highway 1; and the local 58 route, running to Langford Transit Exchange once per hour every day.

The Langford Official Community Plan (2008, updated 2019) identifies this area off West Shore Parkway as the site of a “Major Transit Exchange“ and stop on a commuter rail alignment. However, lots to the northeast, northwest, and southeast of the general site have either been developed or are currently under development. The southwest portion of the site is a heavily-forested rise that terminates at a BC Hydro right of way corridor just south of the track.

Similar to Station 4 (Atkins), the rail intersects the road between two bends, limiting visibility to the south and north from the points of the crossing and a future station. The curvature of the roadway limits visibility to approximately 80m to the south and 100m to the north.
Figure 36: West Shore Parkway facing south (left) and north (right)

CHANGES SINCE 2011

Since the 2011 IBI report, the adjacent lots north of the track have since been developed or are currently under development. The lots to the north of the track and west of West Shore Parkway are now home to 150 residences at Kettle Point and a new commercial-area development in the West Shore Business Park. The 3.5 ha site to the north of the track and east of West Shore Parkway is the site of Aqua Langford Lake, a planned residential community of 950 residences situated on Langford Lake.

3.2.1.12 FUTURE STATION VIABILITY

The site will work for a basic station platform, but unless and until some enhanced multi-modal access can be provided, the demand catchment will be limited to those who will walk from Kettle Lake Estates, Westshore Business Park, and eventually, the Aqua development. As shown in Figure 37, adequate space exists for the template platforms on either side of the existing track.

This station will serve as the terminus and origin for the majority of trains in every operating scenario. It will be where most cars are stored overnight and weekends. Additional space is required for both storage and to service a demand catchment beyond an average, 400m walking journey.

Figure 37: the rail track facing at West Shore Parkway, facing East (left) and West (right)
This will be challenging, with three sides of the station area either developed or under development. The only remaining portion of the site available for suitable access and storage infrastructure is on the south side of the track and west of West Shore Parkway. However, as also shown in the image on the right in Figure 37, this is side of a steep, wooded slope in addition to a utility corridor. Providing level ground for direct vehicle and transit access will require significant retaining structures, cost, and utility relocation or burying.

Less expensive connectivity improvements could be provided directly from on West Shore Parkway. Transit and kiss and ride pullover facilities might be feasible directly from bays within a widened West Shore Parkway, but adequate engineering measures would need to be exercised to mitigate limited visibility of the road crossing, as noted above.

TEMPORARY TRAIN STORAGE

The operating service scenarios noted in this report require between three and six trains to be stored overnight and on weekends/non-service days at or near Westhills Station. This requires a storage facility be constructed in close proximity of the station with facilities for temporary maintenance, heating, and personnel access road. Given the local constraints noted in this section, and the alignment and topography constraints north of Westhills noted elsewhere in this report, the only viable location for is on the south side of the rail west of West Shore Parkway. This could be accommodated in the linear corridor adjacent to the existing track, but again, would likely require relocation and/or burial of the overhead utility lines.
3.2.2 INTER-CITY STATIONS

As shown in Figure 38, the proposed Inter-City service would travel up the southeast coast of Vancouver Island.

Figure 38: Inter-City Rail Line and Stations

The sections below describe these stations’ general location, accessibility, and conditions.
3.2.2.1 STATION 7 – SHAWNIGAN LAKE – MILEAGE 27.80

The Shawnigan Lake Station would be located adjacent to the former station site at the northeast shore of the lake – behind the Shawnigan Lake Commuter Centre, west of the intersection of Shawnigan Lake Road and Mill Bay. The area is a mix of local retail land uses and nearby residences. There are no sidewalks or formal cycle facilities on Shawnigan Lake Road, but it is a two-lane, narrow road through the village centre with clear sight lines to pedestrians on a 2.0m – 3.0m hard shoulder.

Figure 39: Shawnigan Lake Station location (CVRD Webmap) – approximate double track and centre platform

The Community Centre area is served by BC Transit’s Cowichan Valley Regional Service, with 7 trips per day between Shawnigan Lake and downtown Duncan; a 1 hour, 10-minute one-way trip. The Shawnigan Lake commuter service (Route 99) makes two trips to/from the Government Centre transit exchange in Victoria at 90 minutes per trip.

With a limited pedestrian and cycling catchment within 800m, the majority of station demand would be vehicle trips and park and ride. There is some space within the Community Centre and adjacent Shawnigan Lake Museum lots for additional parking, pending environmental and arboreal assessments. Additional safety mitigation and routine traffic control will need to also be investigated to accommodate peak park and ride demand.
3.2.2.2 STATION 8 – DUNCAN – MILEAGE 39.70

The station house is still located at 120 Canada Avenue, in downtown Duncan, where it was prior to the suspension of the Dayliner service in 2011. The original station house is now part of the Cowichan Valley Museum facility.

![Figure 40: Duncan Station Location](image)

The station easily accessible to the city’s multi-modal transportation network and three-hour, public parking; some of which would have to be removed if the line were to be double-tracked. The area is well-served by Cowichan Valley Regional Transit. The Canada at Station stop, located in front of the original station/museum, is a major downtown stop, served by the 2, 3, 4, 5, 6, 7, 8, 9, 36 and 44 routes.

Station catchment would be served by pedestrian, cycling, driving, and transit connections. Additional safety mitigation and routine traffic control will need to also be investigated to accommodate peak park and ride demand.
3.2.2.3  STATION 9 – LADYSMITH – MILEAGE 58.40

The former ViaRail station was located near the intersection of Trans-Canada Highway with Gatacre Street in Ladysmith. The station and track are to the northeast of the highway, but at a grade approximately 3m below the highway. The station sits on the rise of a slope overlooking the harbour and is obscured by overgrowth.

![Ladysmith Station Location](image)

The only access to the site is currently by vehicle from an access road off of Transfer Beach Boulevard. There is no transit on Trans-Canada Highway and the only pedestrian access is via the crossing at Transfer Beach Boulevard en route down to Transfer Beach Park.

A new station would require improved, multi-modal access, additional parking, and enhanced safety and lighting features. There is sufficient width for double-tracking through this location in addition to park and ride provision. Improved connectivity for transit along and across the highway would need to be negotiated with the Ministry.
3.2.2.4 STATION 10 – NANAIMO – MILEAGE 72.50

The original station building is located at 321 Selby Street in Nanaimo, approximately 500m west of central Nanaimo. The historic building is now occupied by a pub and is accessible from Selby Street via a marked pedestrian crossing over the tracks from Prideaux Street. The station is in a densely-populated neighbourhood with a mature, multi-modal network of sidewalks, cycle facilities, parking, and transit.

Figure 42: Esquimalt and Nanaimo Railway Station Location

The 9m ROW provides sufficient width double-tracking and a centre platform; should passenger demand warrant. The urban transportation network provides easy access, but rail speeds would necessarily be slow through most of Nanaimo to reduce conflicts. There are ten level crossings in the two kilometres between Seventh Street and Comox Road in central Nanaimo. Rail speeds and road operation impacts would need to be reviewed prior to determining appropriate mitigation measures.
3.2.2.5 STATION 11 – PARKSVILLE – MILEAGE 95.20

The original Parksville Station is located near the intersection of Nicnebec Way and Alberni Highway, 1.6 kilometres southwest of central Parksville. The station building still sits on Nicnebec Way on the south side of the tracks, east of Alberni Highway. The station is near two major highways and the entry point to the City of Parksville, but it is remotely located from transit, cycling, and pedestrian infrastructure.

Access is primarily by car and without significant enhancements to multi-modal connections, the demand catchment would be limited to vehicles and park and ride customers.

Figure 43: Parksville Station Location

However, should the catchment be contained primarily to park and ride, there is sufficient space adjacent to the station and ROW for double-track and platform alignments.
3.2.2.6 STATION 12 – QUALICUM BEACH – MILEAGE 101.80

The historic Qualicum Beach Station is located at 198 Sunningdale Rd W, Qualicum Beach, near the centre of the village. It can be accessed from all three adjacent roads: Harlech Road, Beach Road and Sunningdale Road and is a 15-minute walk from the beach. For a village the size of Qualicum Beach, the demand catchment is well-served by vehicle and pedestrian proximity. Parking is also available for expanded park and ride.

Figure 44: Qualicum Beach Station Location

Track-doubling and platform extension would require some additional capital outlay. The rail ROW is currently restricted by a boulevard that slopes down from Harlech Road to the south edge of the single track. Cutting back this boulevard by 2m – 5m would require retaining walls approximately 1m high and the removal of a row of mature trees on both sides of Beach Road.
3.2.2.7 STATION 13 – COURTEENAY – MILEAGE 139.70

Courtenay Station is located at 899 Cumberland Road, at the southwest end of central Courtenay and about 900m southwest of the Courtenay River. The area around the station is a mix of light industrial land uses.

![Figure 45: Courtenay Station Location](image)

There is some multi-modal access to the station area, via the #8 bus route, adjacent Rotary Connector trail, and a cycling and sidewalk network to adjacent businesses and neighbourhoods. The station building includes a parking lot on the south side, with access directly from Cumberland Avenue.

The station is already double-tracked for an additional train’s storage. As noted elsewhere in this report, this station is proposed as the terminus for between one and three trains to Victoria. Additional storage space and short-term facilities would need to be provided, presumably further to the north and/or south of the existing station area, to accommodate these operating scenarios.
4 ADDITIONAL INFORMATION

Some supplemental information to this report is provided in the Inter Rail Corridor Assessment – Commuter Rail Addendum memo, dated March 10, 2020. This memo was requested by the Ministry to provide additional, planning-related context to the siting and high-level feasibility of the Commuter Rail Service station sites.

Upon reflecting on the findings and analysis of this report, it has been determined that Atkins Station in Langford does not present a viable option for a station location. This option was originally explored to build on previous studies which evaluated this location and to validate it. Due to ridership, catchment, safety, and limited benefits per costs associated with its construction it has been identified as a non-viable station location. It is discussed in this report only to demonstrate the assessment of these factors.
A ELECTRIFICATION MEMO
ROLLING STOCK ASSESSMENT MEMO