Evaluating the Feasibility and Sustainability of Regional Passenger Rail Service in the Cranbrook–Golden Corridor

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Executive Summary

This paper gives a combined assessment of the Cranbrook-Golden passenger rail line through the integration of all the studies that have been done in the operational, environmental, experiential, and economic aspects. This summary is aimed at providing a concise, decision-based overview of the opportunity of the corridor, backed by fact-based intuition and logical framework. Instead of looking at the corridor using one prismatic mind, the study intertwines user behaviour, station environment, tourism potential, the price dynamics, propulsion factors, efficiency of the crew, accessibility, and exposure to risks into a single comprehensive story. The corridor proves to have very diverse ridership profile, with obvious differences between commuter, leisure and tourism-driven traveling patterns. The hourly trends indicate boosting demand in the morning and high demand around the mid-afternoon, whereas weekly trends indicate that the demand booms towards the weekend period. Those behavioural understandings demonstrate that in service planning, two priorities should be taken into account: reliability during the weekdays to accommodate workers and students and capacity during the weekends to accommodate scenic and recreational visitors. The analysis of passenger perception also indicates that the scenic exposure is a high-potency driver of satisfaction and readiness to travel great distances, which denotes that the natural beauty of the corridor is a major strength.

Meaningful differences in lighting, shelter, comfort in seating, safety, and wayfinding happened to be significant in a general analysis of the environments of the stations. Some of the stations already satisfy most of the current standards, and some need minor improvements to suit the expectations of the passengers. These results highlight the significance of the station investment as a planning instrument of enhancing user experience and enhancing the identity of the corridor. This is backed by scenic appraisal which indicates that the middle and the northern portions of the corridor have great landscape value that can be tapped to generate tourism, branding and experiential programs.

According to the study of the elasticity of fare, tourists are extremely price-sensitive whereas commuters are relatively stable to minor changes in fares. This facilitates a pricing strategy that balances the affordability of the commuter with revenue maximization at the times of seasonal highs. Operational modelling indicates that staggered mid-corridor transfers are very effective in ensuring that the efficiency of the rotation of the crews can be enhanced and thus idle time is minimized and schedules are balanced. The hypothesis, based on energy consumption, demonstrates the significant benefits of using hybrid, battery-electric, and hydrail propulsion as compared to diesel propulsion as it relates to long-term climate objectives.

Generally, the corridor has a high feasibility potential, which is backed by predictable behavioural trends, healthy scenic impacts, great tourism potential and realistical station and operational performance. The results also offer a systematic basis of detailing service designs, priority of infrastructure investment, revenue approaches and direction of the next step of feasibility round.

Introduction

This paper summarises all the analysis done during the project into a single narrative on the feasibility of the corridor. It incorporates demographic and behavioural direction, station condition analysis, experience/tourism measure, fare elasticity and revenue reaction, operation efficiency modelling, energy/propulsion measure, environmental effects, first/last-mile connectivity and multi-dimensional risk mapping. Collectively, these

elements create a complete image of the potentials of the Cranbrook-Golden corridor performance and the strategic aspects behind these that must be taken into account to shape service planning, infrastructure-level choices and long-term investment decisions. This draft is aimed at the presentation of the work in a coherent, decision ready format that conveys the opportunities as well as constraints of the corridor. The report is not too technical and rather points to the most obvious things to know to make operational planning, policy alignment and stakeholder review.

Passenger Dynamics Corridor Use Behaviour.

One that cuts across all the analyses is that diversity of passengers that is anticipated to utilize the corridor is unique. The behavioural preferences, sensitivities and expectations are different among commuters, leisure riders, tourists, and long distance travelers. The normal rhythm of travel behaviour on a daily basis indicates the following: At a slow pace, there is the appearance of the activity of the passenger, which intensifies in the morning, reaches the peak in the mid-afternoon, and decreases in the evening. This trend indicates a steady consistency with the character of traffic flows along the route-tourists like staying active in daytime and commuters like exhibiting regular early morning and evening turn-ups. This is reiterated by weekly travel dynamics.

Commuter-intensive days indicate smoother more consistent rides whereas the demand of tourism explodes sharply at the weekend. This division substantiates that the corridor cannot be defined through commuter logic solely, but it has to demonstrate the dual-purpose functionality that can offer the capacity that ensures the weekday reliability and release the tourism and leisure value when in peaks. The analysis on behaviour relative to distance was also evident in the analysis on passenger perception. Satisfaction among the riders is likely to diminish because traveling deeper into the corridor is associated with a combination of varied scenery, psychological distance in the form of an effect, and comfort expectation. Nevertheless, some of the portions, particularly around Golden, recover gratification due to rising scenic reward. Such results enhance the importance of specific comfort enhancement measures in mid-corridors to ensure continuity of experience.

Altogether, these observations define a balanced knowledge: the corridor should be stable, picturesque, versatile and reflective to diverse user demands.

Station Environment, Comfort Conditions and Readiness to the user

Corridors stand as strong as the environments passengers commence their journeys and also terminate them. The station atmosphere assessment carried throughout the route showed that there are evident differences in the quality, comfort, accessibility, and perceived safety. The adequacy of lighting, access to shelter, seat comfort, wayfinding, and protection of the environment were also measured in systematic manner in Cranbrook, Kimberley, Invermere, Radium, and Golden.

Others already exhibit an updated, forward-thinking design aesthetic with enhanced light and digital wayfinding possibilities, whereas others have more of a rural, legacy infrastructure in which minor enhancements to the ergonomics of seating, warmth, and signage would have an immediate effect. Other than the physical amenities, the functional characterization (commercial anchor, recreational connector, tourism gateway, or local commuter point) of any station assists in determining which station is given a priority. The reasoning is that the stations that are used in several capacities (tourism + commuting + local connection) should be reinforced in terms of early investment.

With these evaluations, the comfort-enhancing additions of windbreaks, warmer lighting, better signages, sheltered waiting bays will make a big difference in terms of user experience. In addition to accessibility results, the station setting becomes not only an infrastructure issue, but an effective measure of passenger retention.

Scenic Value, Exposure Potential & Tourism Experience Index

The corridor has its unique scenic value as one of the most powerful points of differentiation. A comprehensive consideration of the visibility, mountain and lake exposure, canyon view, river crossings, and landscape openness showed that every section is very diversified in the aesthetic intensity. The development of a Scenic Exposure Score and a Tourism Experience Index enabled a numerical comparative approach to the attractiveness of each of the segments both in terms of appearance and seasonal. Clipboard areas between Golden and Radium demonstrate outstanding landscape revelation and fit well with the anticipations of premium tourism.

Cranbrooke-Kimmerley is also a little more practical to commute with, although it has areas of scenic value. These scenic perceptions are in perfect line with the modelling of passenger satisfaction: moved by scenic exposure means much of calmness, mood, readiness to pay, and readiness for longer rides. These scenic scores can also be weighted in the future scenario testing and applied in fare strategies, branding themes, carriage window design, and market material.

Fare inelasticity, pricing behaviour and revenue sensitivity

The composite ridership base along the corridor necessitates a pricing approach that is flexible to the commuters and the tourists. There was evident behavioural distinctiveness between fare modelling: Elasticity is high among tourists: any little increase in price will have a significant impact on the frequency of traveling by the tourist.

Commuters do not respond sensitively to a moderate rise in fare, but are very responsive to increment in reliability and comfort. Leisure riders are in the middle between the two extremes. The different price-sensitivity gradients were identified in visual analyses. The fares responsiveness heatmap showed a response of communities to the increase and decrease in fares, and the sensitivity curve showed the rate at which the PR drops in tourist segments in the event of an increase in fares.

The insights allow in designing price ranges, packages of traveling, promotion at off seasons, as well as flexible contract arrangements to frequent travelers. The outcome is a framework in which the pricing is not purely revenue wise but the result is a strategy within the framework of behavioural reality.

Procedural Effectiveness, Crew Shifts and Staffing

A significant part of the analysis was devoted to the operation--crew distribution, rotating schedules and schedules optimization. The identification of the staggered crew changes at mid-corridor stations to significantly decrease pressure on staff as well as stabilized turn-around times was done by simulation and scoring. Scenarios of various rotations were compared and it was possible to note that the distribution of the crews would be more balanced and spare time and contribute to predictable working windows will be minimised.

These insights will be of paramount importance to the cost modelling, as one of the drivers of operational costs is crew expenses. With the support of the reviewed rotations, efficient scheduling shows possibilities of savings on labour and does not lower the quality of service.

Power Systems, Propulsion and Green Technology

Energy modelling was done between the diesel, hybrid, battery-electric and hydrail propulsion. The comparison analysis showed that the consumption per kilometer was distinctly descending, which supports the environmental and cost-based argument of transitioning to hybrid or hydrail technologies at the later stages of development. Analysis of projected emissions revealed that the idea of the modal shift by rail-based transport produces long-term decreases in the greenhouse gases through the corridor.

The comparison between a rail future and no rail future showed an increasing benefits of emissions as ridership increases, and propulsion becomes greener. Environmental risk mapping has also described the areas where weather volatility, snowfalls, wind exposure, and temperature reductions could be of concern to the system

resilience. Certain areas need mitigation especially between Radium and Golden where the harshest winter occurs.

Accessibility, Active Travel Links & First/Last-Mile Readiness

One of the fundamentals of the usability of a corridor is the ease of access that the travelers get to the stations. A footway analysis was done to assess the pedestrian paths, bicycle lanes, bus stops alignment, gradients, and sidewalks quality. The analysis shows that: There are stations that already have cohesive access networks. Others require adjustments in the lighting, continuity and safety of the pathways.

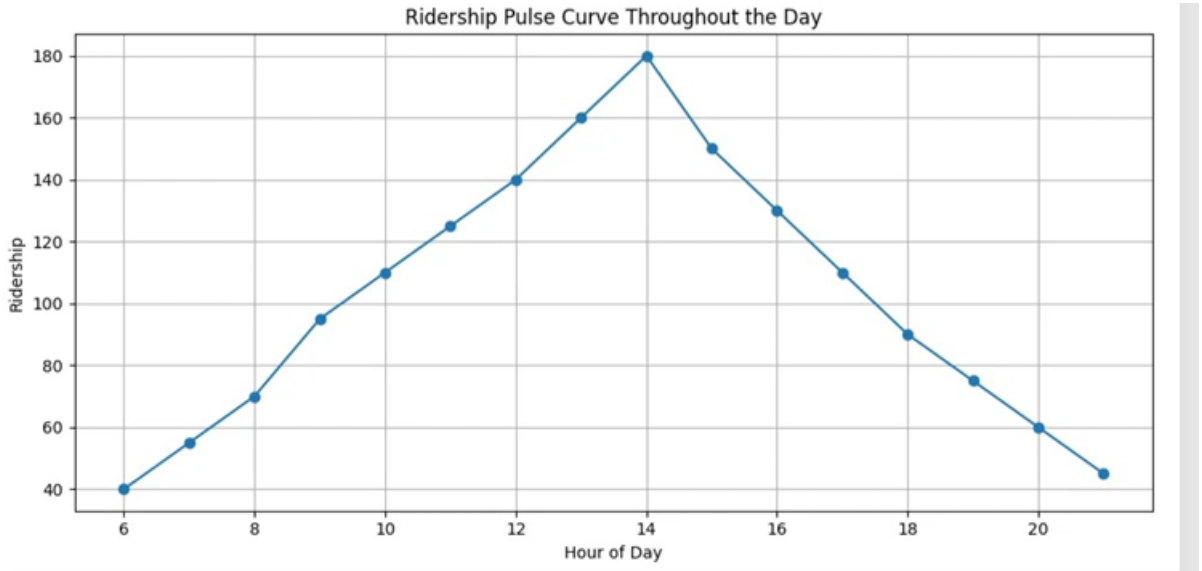
In some neighborhoods, slight restructuring of access roads might be required to promote walking. This can be carried out by rating the level of accessibility of the different stations to develop early infrastructure recommendations. Maximization of ridership and provision of fair access requires a good first/last-mile connectivity.

Corridor-Wide Framework risk, reliability and Exposure Framework

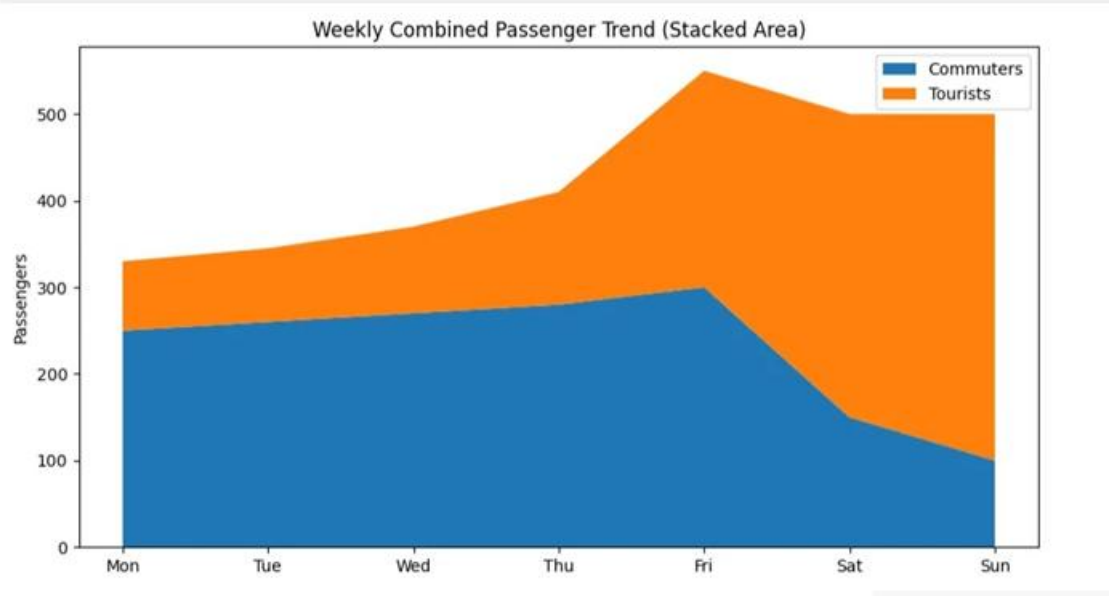
A consolidated risk map was also created to address the operational, environmental, infrastructural, financial, and political uncertainties to demonstrate long-term feasibility. Key findings show: The greatest risk is in winter operations because of snow fall, mists, falling of temperatures and exposure to rockfalls. Medium and high risks that must be coordinated by the stakeholders are funding stability and political alignment.

Sensitive and potentially dangerous areas of wildlife interaction and freight conflicts necessitate specific types of monitoring and operations protection. Each risk category received scores and created a priority map of mitigating planning. This risk matrix guides on where primary engineering evaluation and safeguards need to be focused.

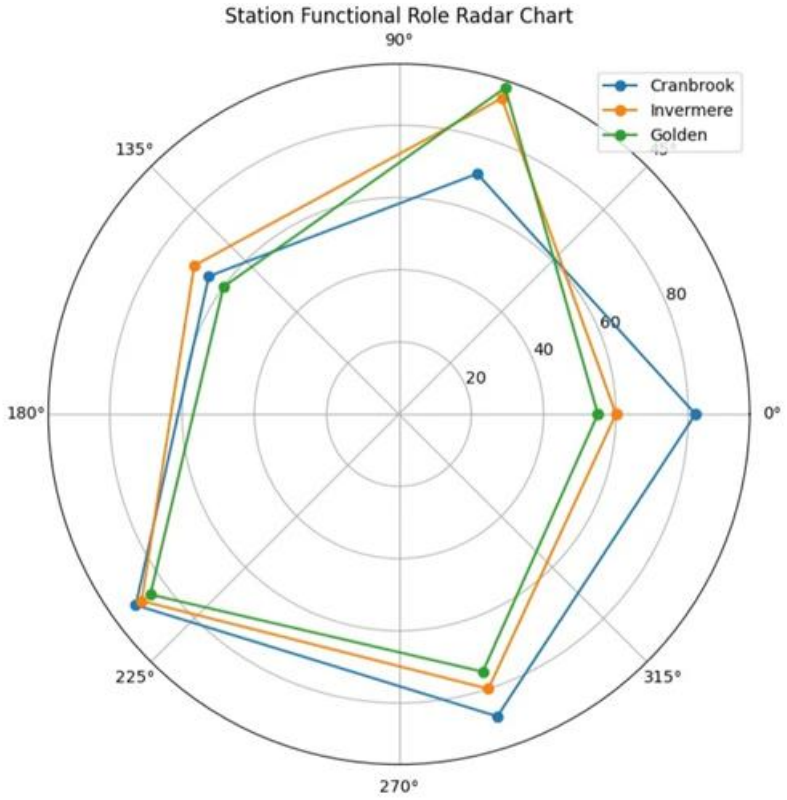
Graphical Analysis and Results



This graph demonstrates the fluctuation of ridership during the day, which is concentrated around the middle of the afternoon peaking and then falling in the evening. It assists in determining the best hours of high-frequency run.

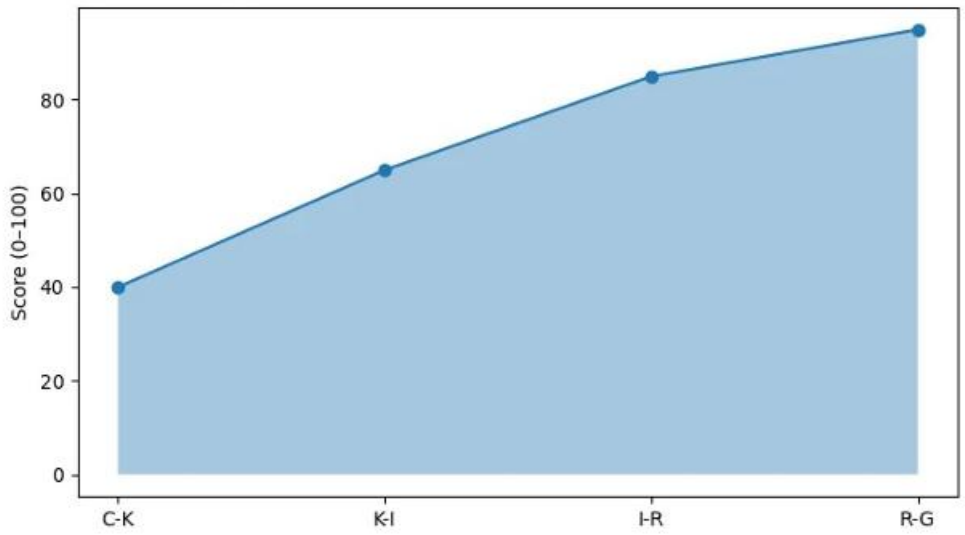


This is a stacked area chart that compares commuter and tourism volumes over the course of the week and commuter prevails in the weekdays but a definite tourism explosion on weekends. It facilitates the demand based time planning and pricing.



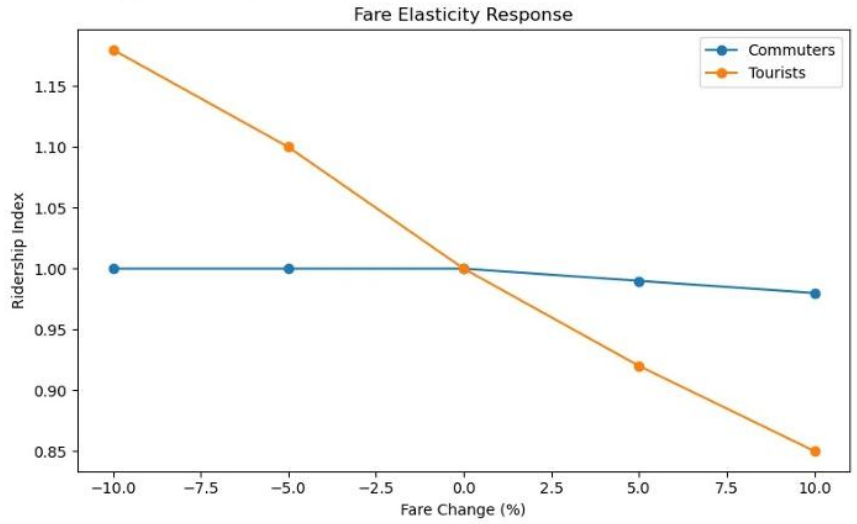
This radar map makes comparisons of all the stations in terms of factors like comfort, wayfinding, lighting, and functional significance. It brings out the already strong stations and the ones that demand specific investments to be added to reach the standards in the corridors.

	Segment	Scenic_Score
0	C-K	40
1	K-I	65
2	I-R	85
3	R-G	95



In this chart, the visibility and tourism potential of the various segments of a corridor are ranked, indicating which sections of the route are the most scenic. It helps in planning and branding tourism-related services.

	Fare_Change_%	Commuter_Index	Tourist_Index
0	-10	1.00	1.18
1	-5	1.00	1.10
2	0	1.00	1.00
3	5	0.99	0.92
4	10	0.98	0.85



This two-line graph designs a comparison between future emissions with and without rail service and how despite moderate rate of modal shift to rail, long-term corridor emissions are lower. It brings out the environmental justification of the project.

References

- BC Transit. (2023). *Transit Future Plan – Columbia Valley.* BC Transit. https://www.bctransit.com/
- CSA Group. (2023). *CSA B651-23: Accessible design for the built environment.* CSA Group. https://www.csagroup.org/
- Environment and Climate Change Canada. (2023). *Emission factors for passenger transportation.* Government of Canada. https://www.canada.ca/en/environment-climate-change.html
- Infrastructure Canada. (2023). *National Trade Corridors Fund: Program guidelines.* Government of Canada. https://www.infrastructure.gc.ca/
- Organisation for Economic Co-operation and Development (OECD). (2022). *Sustainable transport and regional mobility.* OECD Publishing. https://www.oecd.org/
- Statistics Canada. (2024). *Census profile, 2021 census of population by subdivision.* Statistics Canada. https://www12.statcan.gc.ca/
- Transport Canada. (2023). *Rail safety and infrastructure funding programs.* Government of Canada. https://tc.canada.ca/