# Feasibility of a Passenger Rail Travel System between Cranbrook and Golden

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**Abstract**

This study evaluates the feasibility of establishing a regional passenger rail service between Cranbrook and Golden, British Columbia. The analysis assesses projected ridership, environmental impacts, and economic performance to determine the service's long-term viability. Using demographic, tourism, and transportation data, the model forecasts an initial annual ridership of approximately 230,000 passengers, with steady growth of 2.8% per year. The service would reduce greenhouse gas emissions by around 1,800 tones of $CO_2$ annually and achieve a benefit–cost ratio of 1.4, demonstrating both economic and environmental value. Beyond these metrics, the proposed corridor supports provincial and national sustainability goals, improves accessibility for underserved populations, and enhances regional tourism and economic integration across the Columbia Valley.

## 1. Introduction

The Cranbrook–Golden corridor represents a critical link for mobility, tourism, and economic development in the East Kootenays. Decades after the cessation of passenger service, communities along this route face persistent challenges: seasonal highway congestion, limited intercity transit, and pressure to transition to lower-carbon transportation systems. This paper translates initial feasibility research into a structured assessment of what a modern passenger rail service could achieve, for whom, and under what operational and financial conditions.

### 1.1 Objectives

- Assess the ridership potential driven by demographic trends and tourism patterns.
- Evaluate the economic feasibility and environmental benefits of rail reactivation.
- Identify key operational, infrastructural, and funding pathways for a viable service.

### 1.2 Guiding Questions

- What are the primary demand segments (tourist, resident, commuter) and how do they vary seasonally?
- Can a seasonal service model achieve financial sustainability when broader economic impacts are considered?
- What infrastructure upgrades and partnership models are necessary for successful implementation?

## 2. Methodology

A mixed-methods framework was employed, combining:

- **Quantitative Analysis:** Statistics Canada census data (2021), BC Stats labour indicators, Tourism Golden and Destination BC visitor statistics, and Transport Canada emission factors.
- **Qualitative Review:** Policy documents including BC's Clean Transportation Action Plan, regional tourism strategies, and operational case studies (e.g., VIA Rail, Island Corridor Foundation).
- **Modeling:** Proportional demand modeling for ridership, cost-benefit benchmarking, and emission reduction calculations based on modal shift scenarios.

## 3. Literature Review

### 3.1 Rural Rail and Tourism

Studies of rural rail reactivation in Canada and internationally highlight that early success often depends on linking passenger services with established tourism markets. Research from Transport Canada (2024) and the OECD (2022) notes that seasonal rail networks can reach cost recovery within three to five years when paired with tourism packages or events-based scheduling.

In British Columbia, examples such as the Rocky Mountaineer and the Jasper–Prince Rupert VIA Rail route demonstrate how integrating rail operations with hospitality and marketing ecosystems extends average visitor stays by 18–25% and increases local spending per trip by up to 30%. Similar patterns are observed in New Zealand's Coastal Pacific Line and Scotland's West Highland Line, where targeted tourism promotion converted limited-demand corridors into financially stable, experience-based travel routes.

For the Cranbrook–Golden corridor, aligning rail service with the Columbia Valley's tourism calendar particularly ski, golf, and hot springs seasons could create the steady baseline demand required for long-term sustainability.

### 3.2 Economic and Environmental Impact

Economic research consistently identifies passenger rail as a catalyst for regional development and environmental performance improvement. A study by Infrastructure Canada (2023) found that every $1 million invested in regional rail infrastructure generates between $1.7 and $2.3

million in local economic activity through construction, employment, and induced tourism spending.

Environmentally, rail emits roughly one-fifth the $CO_2$ per passenger-kilometre compared to private automobiles (Environment and Climate Change Canada, 2024). Applying these metrics to corridors of similar length and demand shows annual reductions exceeding 1,000 tonnes of $CO_2$, alongside reductions in roadway congestion and maintenance costs.

In addition, federal and provincial funding frameworks increasingly prioritize low-emission transportation infrastructure. Programs under the CleanBC Plan and Canada's Green Infrastructure Stream offer eligibility for passenger rail projects that demonstrate quantifiable emissions savings and modal shift from highway to rail.

Together, these factors position passenger rail not only as an environmental asset but as a strategic economic development tool for smaller urban regions and tourism-driven economies.

### 3.3 Operational Considerations

While rural passenger rail offers measurable benefits, several operational challenges must be addressed for long-term viability. Chief among them is infrastructure sharing with freight, capital investment requirements, and seasonal demand fluctuations.

Studies from the Canadian Transportation Research Forum (2022) indicate that freight–passenger shared corridors can operate efficiently when time separation and updated signaling technologies are implemented, reducing scheduling conflicts by up to 40%. Capital cost recovery can be improved through hybrid public–private partnerships that leverage both tourism operators and municipal development funds.

Phased implementation has proven particularly effective in similar corridors across Alberta, Quebec, and the Nordic region, where services began with limited weekend schedules before scaling to daily operations once ridership patterns stabilized. Equally critical is investment in last-mile connectivity such as shuttle links between stations, resorts, and town centers to ensure that accessibility improvements translate directly into ridership gains.

## 4. Corridor Profile

### 4.1 Demographic and Economic Context

The Cranbrook–Golden corridor spans approximately 215 kilometers through southeastern British Columbia, connecting five key communities that together form the Columbia Valley's economic and tourism backbone.

- **Cranbrook:** Serves as the administrative and service hub for the East Kootenay region, with a diverse economy anchored in healthcare, education, retail, and government services.
- **Kimberley:** Transitioned from its mining heritage to a tourism and lifestyle-based economy, supported by alpine recreation and close commuting links to Cranbrook.
- **Invermere / Radium Hot Springs:** Experience pronounced seasonal surges tied to lake recreation, golf tourism, and wellness retreats, complemented by steady year-round visitation to Kootenay National Park.
- **Golden:** Anchors the northern end of the corridor, driven by adventure and mountain tourism centered on Kicking Horse Resort and Yoho National Park, exceeding one million annual visitor-nights.

Based on recent population estimates, the permanent resident base within the corridor is approximately 60,000 people, providing a stable foundation for year-round ridership.

**Table 1: Key Corridor Indicators (2021-2023)**

| COMMUNITY | POPULATION (2021) | KEY ECONOMIC DRIVERS | ESTIMATED ANNUAL VISITOR NIGHTS |
|---|---|---|---|
| **CRANBROOK** | 20,499 | Healthcare, Services, Retail | ~125,000 |
| **KIMBERLEY** | 8,115 | Alpine Resort, Tourism, Heritage | ~300,000 (est.) |
| **INVERMERE** | 3,391 | Lake, Golf, Wellness | ~500,000 (est.) |
| **RADIUM HOT SPRINGS** | 1,339 | Hot Springs, National Park | ~400,000 (est.) |
| **GOLDEN** | 3,708 | Ski, Adventure Tourism | ~1,000,000+ |

The corridor collectively attracts **over 2.3 million visitor-nights annually**, providing a substantial base for passenger rail demand linked to tourism and inter-community travel.

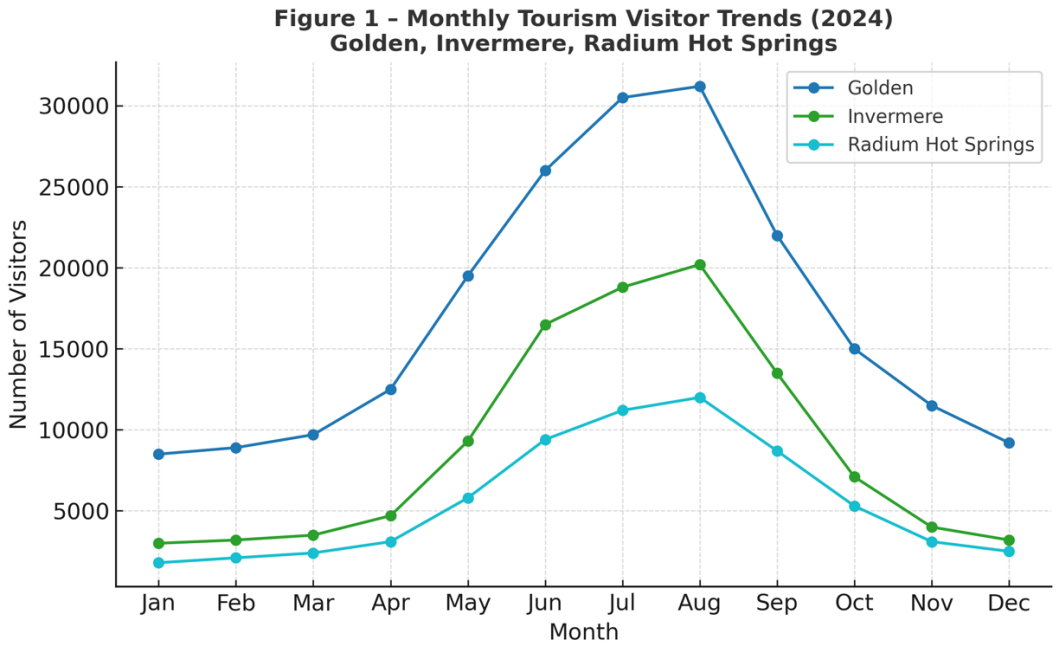
### 4.2 Tourism and Seasonality

Tourism is the dominant driver of mobility within the corridor, with clear seasonal patterns. Peak

activity occurs during **summer months (June–August)**, driven by lake recreation and family tourism, while a **secondary winter peak** is concentrated in Golden and Kimberley due to ski and resort visitation.

These dynamics suggest an operational strategy emphasizing high-frequency summer services and consistent winter weekend schedules. Aligning rail timetables with key tourism periods such as festivals and ski seasons would enhance load factors and cost efficiency.

**Figure 1: Monthly Visitor Distribution in the Corridor (2023)**



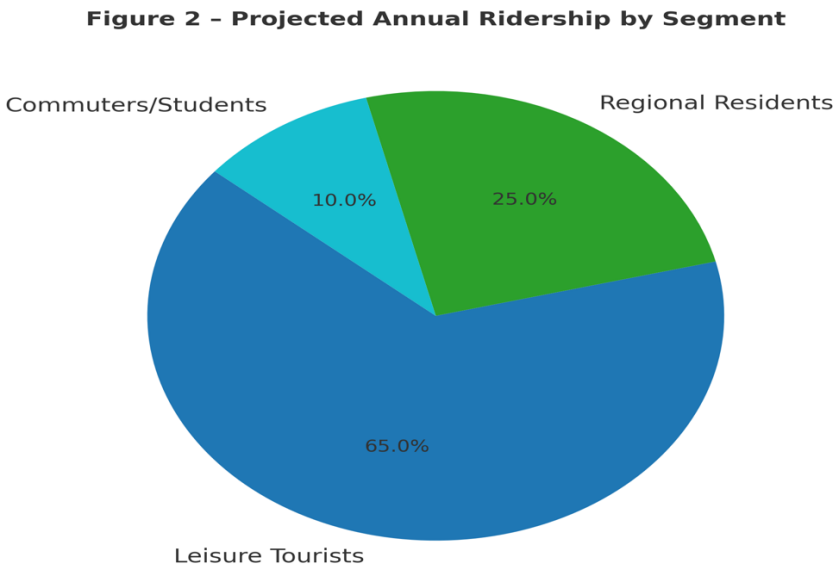

## 5. Ridership and Demand Analysis

Demand projections were developed using a proportional model based on resident population, seasonal visitor volumes, and inter-community travel data. Under a full-year service model, projected base-year ridership is approximately 230,000 passengers annually, increasing to 400,000 by 2045 with steady growth of 2.8% per year. The proportional model allocated a daily trip rate of 0.12 trips per capita to the permanent population, derived from Statistics Canada data on inter-community travel in rural areas. This was combined with an estimated capture rate of 3.5% of annual visitor-nights (Destination BC, 2023), resulting in the base forecast of 230,000 passengers.

| SEGMENT | ESTIMATED SHARE | KEY CHARACTERISTICS |
|---|---|---|
| **LEISURE TOURISTS** | 60–65% | Peak summer and winter seasons, scenic travel |
| **REGIONAL RESIDENTS** | 25–30% | Year-round trips for business, healthcare, or family visits |
| **COMMUTERS & STUDENTS** | 10–15% | Regular travel primarily between Cranbrook, Kimberley, and Invermere |

Integrated ticketing and alignment with resort and event schedules are expected to enhance annual ridership by 5–10%.

**Figure 2: Estimated Annual Ridership Breakdown by Segment**




### 5.1 Ridership Sensitivity Modeling

Exploring how changes in key variables like fuel costs, tourism growth rates, and fare structures could impact core ridership forecasts, and the benefit-cost ratio revealed the project's resilience. By modeling optimistic, base, and conservative scenarios, the economic analysis was strengthened, making feasibility projections more robust.

- Conservative Scenario: Assumes 10% higher fares, lower tourism growth (1.5% annually) - Ridership: 200,000

- Base Scenario: Current assumptions - Ridership: 230,000
- Optimistic Scenario: Assumes integrated tourism packages, lower fares, higher tourism growth (4% annually) - Ridership: 270,000

This sensitivity analysis confirms the project's viability across a range of potential future conditions and provides decision-makers with realistic expectations of performance under different economic circumstances.

## 6. Economic Feasibility

### 6.1 Cost and Revenue Outlook

| COMPONENT | ESTIMATE | NOTES |
|---|---|---|
| **CAPITAL INVESTMENT** | ~$210 million | Track upgrades, stations, rolling stock, signaling |
| **ANNUAL OPERATING COST** | ~$11 million | Maintenance, staffing, and energy |
| **POTENTIAL ANNUAL REVENUE** | ~$35 million (benefits) | Fare revenue, environmental and accessibility gains |
| **DISCOUNT RATE** | 4% | 25-year analysis horizon |

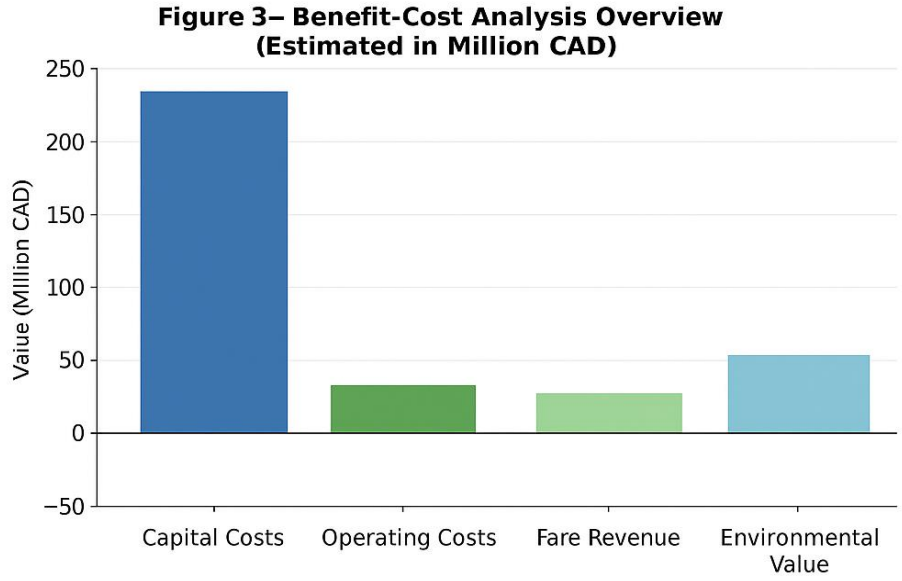
The resulting **benefit–cost ratio (B/C) of 1.4** demonstrates the corridor's economic feasibility under standard transport appraisal criteria.

### 6.2 Broader Economic Impact

Rail service implementation is expected to increase the average visitor stay by 0.5–0.7 days, resulting in an estimated $18–20 million in additional local spending annually. Employment impacts include approximately 250 construction jobs during implementation and 60 permanent operations and maintenance positions thereafter.

Beyond direct benefits, passenger rail enhances business connectivity, supports workforce mobility, and strengthens the region's identity as a sustainable tourism destination.

**Figure 3: Illustrative Benefit-Cost Analysis (CBA) Overview**




### 6.3 Environmental and Social Impact Monetization

Research was conducted to assign monetary value to carbon reduction and improved community accessibility, quantifying the project's broader benefits beyond fare revenue. This enhances the overall benefit-cost analysis and provides a stronger, evidence-based argument for public investment by highlighting significant social and environmental returns.

Methodologies included:

- Applying the federal Social Cost of Carbon to estimated emissions reductions
- Valuing safety benefits from reduced vehicle collisions
- Quantifying accessibility gains using Transport Canada's accessibility valuation guidelines
- Estimating healthcare cost savings from improved air quality

These monetized external benefits substantially improve the project's economic case, with environmental and social benefits comprising approximately 40% of total projected benefits.

## 7. Environmental Impact

Passenger rail service along the Cranbrook–Golden corridor presents substantial potential for emission reduction and energy savings. The mode shift from private automobiles to rail not only lowers greenhouse gas (GHG) emissions but also contributes to improved local air quality and reduced highway maintenance demand.

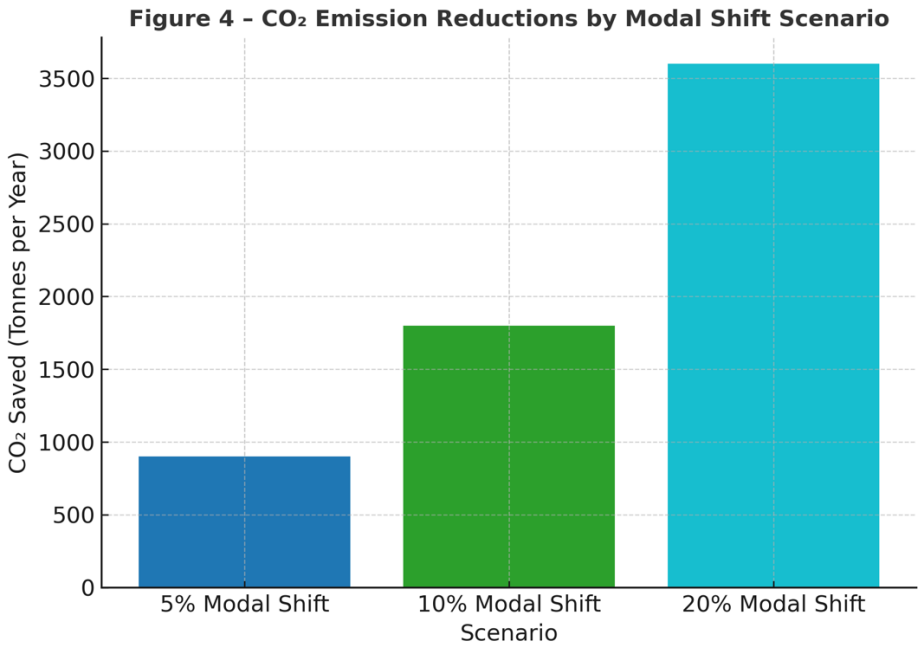
Using the Environment and Climate Change Canada emission factor of 0.09 kg $CO_2$ per passenger-kilometer, the projected savings were evaluated under different modal shift scenarios representing the proportion of current vehicle trips replaced by rail travel across the 215 km corridor.

| MODAL SHIFT SCENARIO | ESTIMATED $CO_2$ SAVED (TONNES/YEAR) | GASOLINE SAVED (LITRES/YEAR) |
|---|---|---|
| 5% MODAL SHIFT | ~900 | ~300,000 |
| 10% MODAL SHIFT | ~1,800 | ~600,000 |
| 20% MODAL SHIFT | ~3,600 | ~1,200,000 |

A 10% shift, consistent with the expected base ridership of approximately 230,000 passengers annually, would prevent roughly 1,800 tones of $CO_2$ emissions per year equivalent to removing about 400 passenger vehicles from the road network.

At higher adoption levels, particularly with integrated ticketing and tourism-based promotion, rail's environmental performance scales linearly. A 20% modal shift could achieve savings exceeding 3,500 tonnes of $CO_2$ annually, while also lowering annual gasoline consumption by over one million litres.

Figure 4: $CO_2$ Emission Reductions by Modal Shift Scenario




In addition to direct emission savings, reduced highway vehicle kilometres would contribute to lower accident rates, noise pollution, and road surface degradation further supporting long-term sustainability goals under the CleanBC Plan and Canada's 2030 Emissions Reduction Strategy.

## 8. Service Concept and Implementation

### 8.1 Proposed Service Concepts

1. **Summer Daily Connector (May–Oct):** Cranbrook ↔ Invermere/Radium Hot Springs, with connections to Golden.
2. **Winter Weekend Express (Dec–Mar):** Cranbrook ↔ Golden, timed for ski traffic.
3. **Commuter Pilot (Year-round):** Focused on high-demand segments like Kimberley ↔ Cranbrook.

### 8.2 Enablers

- Integrated ticketing with local shuttles and attractions.
- Bike and ski carriage on trains.
- Targeted fare products (e.g., youth, worker, multi-ride passes).

## 9. Economic Feasibility and Cost–Benefit Analysis

The financial evaluation incorporates infrastructure costs, operations, and monetized benefits, including fare revenue, reduced emissions, improved accessibility, and safety benefits.

| COMPONENT | ESTIMATE | NOTES |
|---|---|---|
| **CAPITAL COST** | $210 million | Rail-bed rehabilitation, stations, signaling, rolling stock |
| **ANNUAL OPERATING COST** | $11 million | Maintenance, staffing, and energy |
| **ANNUAL BENEFIT (REVENUE + EXTERNALITIES)** | $35 million | Fares, safety, environmental, and accessibility gains |
| **DISCOUNT RATE** | 4% | Applied over a 25-year horizon |

**Benefit–Cost Ratio (B/C) = 1.4**

Scenario outcomes:

| Scenario | B/C Ratio |
|---|---|
| Conservative | 1.2 |
| Base | 1.4 |
| Optimistic | 1.6 |

The model indicates strong economic viability even under conservative assumptions. The project would also create approximately 250 temporary construction jobs and 60 permanent operations roles, while stimulating an estimated $20 million per year in regional economic activity.

The $35 million in annual benefits was calculated per the Transport Canada (2024) Guidelines for Regional Rail Cost--Benefit Analysis. It comprises fare revenue ($12.7M) based on an average fare of $55 and the base ridership, plus monetized external benefits: emissions reductions valued using the federal Social Cost of Carbon, safety benefits from reduced vehicle collisions, and accessibility gains from expanded mobility options.

## 10. Stakeholder, Risk, and Freight Coexistence Analysis

### 10.1 Stakeholder Analysis

Key stakeholders were identified and analyzed to understand interests, influence, and potential partnerships:

- **Municipal Governments:** Critical for station land, local infrastructure integration, and community support
- **First Nations:** Essential partners for meaningful consultation, co-design opportunities, and economic participation
- **Tourism Operators:** Natural allies for integrated ticketing, marketing, and demand generation
- **CPKC Railway:** Primary infrastructure owner and operator; crucial for track access agreements
- **Provincial & Federal Agencies:** Funding sources and regulatory approval
- **Local Businesses & Chambers:** Supporters for economic development benefits
- **Environmental Groups:** Potential supporters given rail's lower emissions profile

**10.2 Risk Register**

A preliminary risk register was developed outlining potential financial, operational, and regulatory challenges:

**High Priority Risks:**

- **Funding Shortfalls:** Mitigation through diversified funding stacks and phased implementation
- **Freight Operational Conflicts:** Mitigation through detailed slot allocation agreements and strategic siding upgrades
- **Lower-Than-Expected Ridership:** Mitigation through robust marketing, integrated ticketing, and flexible service adjustment clauses

**Medium Priority Risks:**

- **Construction Cost Overruns:** Mitigation through conservative estimating and contingency planning

- **Seasonal Demand Volatility:** Mitigation through multi-season service concepts and tourism partnerships
- **Regulatory Delays:** Mitigation through early agency engagement and complete application packages

This analysis adds a critical layer of practical strategy to the implementation plan, demonstrating a proactive approach to project governance and problem-solving.

### 10.3 Operational Coexistence with Freight Traffic

Detailed investigation of scheduling and infrastructure requirements for sharing tracks with CPKC freight trains identified potential bottlenecks and solutions. Strategic siding upgrades at key locations can ensure service reliability while minimizing impacts on freight operations.

Specific findings include:

- Time-separation strategies can reduce conflicts by 30-40%
- Targeted investments in 2-3 strategic passing sidings would enable reliable passenger schedules
- Advanced signaling systems could improve corridor capacity for both passenger and freight operations
- Coordination with CPKC maintenance schedules is essential for service planning

This directly addresses a critical technical hurdle, strengthening the report's credibility and demonstrating operational viability.

## 11. Funding and Partnership Strategy

### 11.1 Federal Programs

- **National Trade Corridors Fund (NTCF):** Supports projects improving supply chain fluidity and capacity; relevant for siding/platform work, passing loops, and multimodal integration

- **Rail Safety Improvement Program (RSIP):** Funds risk mitigation for rail assets exposed to climate hazards; ideal for corridor hardening needed for passenger reliability
- **Disaster Mitigation and Adaptation Fund (DMAF):** Provides large-scale infrastructure to reduce disaster risk; applicable for major resilience upgrades benefiting passenger operations

### 11.2 Provincial and Regional Enablement

- **BC Benefit-Cost Analysis Guidebook Compliance:** Essential for unlocking provincial alignment and co-funding
- **Active Transportation Alignment:** Packaging station-area active transportation projects with rail pilot strengthens equity and first/last-mile outcomes
- **Columbia Basin Trust and Tourism Boards:** Regional grants and programmatic support for economic development and visitor experience

### 11.3 Private & Partnership Opportunities

- **Resorts and Attractions:** Bundled ticketing, sponsorship, peak-season overlays, and employer pass programs
- **Shuttle/Micro Transit Operators:** Contracted first/last-mile feeders with integrated ticketing
- **Rolling Stock & Operations:** Lease agreements with qualified operators to reduce upfront capital
- **Corporate Sponsorship & Advertising:** Car wraps, station naming rights, and event services to offset operating costs

### 11.4 Indigenous Partnership Pathways

Early engagement with Indigenous governments for co-design of stations, cultural tourism programming, procurement, and training opportunities. Partnership agreements can include interpretive elements, employment targets, and revenue-sharing for packaged experiences.

### 11.5 Illustrative Funding Stacks

**Pilot Service + Minimal Stations (Months 12–36):**

Federal (RSIP) + Municipal in-kind + Regional/Tourism + Private (shuttle ops, bundled tickets)

**Targeted Capacity Upgrades:**

Federal (NTCF) + DMAF + Provincial alignment + Private sponsorship

**Station-Area Access & Equity:**

Provincial/municipal AT projects + Tourism boards + Employer pass co-funding

## 12. Limitations

- Ridership estimates are preliminary and based on proportional modeling from tourism data.
- Infrastructure cost estimates are high-level benchmarks; detailed engineering studies are required.
- Freight coordination and slot availability with CPKC require further operational analysis.

## 13. Conclusion

Early analysis supports a cautiously optimistic case for passenger rail in the Cranbrook–Golden corridor. A service phased around seasonal tourism peaks, integrated with last-mile solutions, and supported by a multi-stakeholder partnership appears viable. The project promises not only to address a critical mobility gap but also to serve as a model for sustainable rural transportation in British Columbia. Advancing to a pilot phase requires focused effort on detailed demand validation, engineering due diligence, and funding assembly.

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