Passenger Rail Station & Rolling Highway Hub Placement: Case Study of Vancouver, Calgary, and Edmonton

Group-3

Amir Afyouni (2347573)

Nithin Davuluri (2304750)

Wasifa Bintee Mahid (2341611)

G.W.W Sujeewa Lasantha Pieris (2339195)

Vimukthi Deshapriya Perera Pathirage (2400533)

University Canada West

OPMT 622: HBD-SUMMER25-02: Logistics and Transportation Management

Mazyar Zahedi- Seresht

September 19, 2025

Table of Contents

Executive Summary

The paper will analyze the concerns influencing the placement of passenger railways and logistic centers within Western Canada, with Vancouver, Calgary, and Edmonton in particular. The central issues that the analysis identifies are population density, accessibility of the available transportation infrastructure, trends in economic activity, and environmental issues.

The Pacific Central Station in Vancouver, Calgary Downtown, and the Edmonton VIA Rail Station are the most appropriate passenger hubs, as they were identified to be the most suitable locations because of their central urban concentration, current transit integration, and ability to serve large commuter catchments. In the case of freight, the most viable contenders would include the Surrey and Langley industrial corridor in Vancouver, the CN Conrich Logistics Park in Calgary, and the Edmonton Intermodal Terminal in the northeast industrial sector. These sites take advantage of being directly served by major highways and rail systems as well as the availability of industrial land.

By transporting the long-haul trucks on a rail, the congestion on Highway 1, Stoney Trail, and Anthony Henday Drive would be reduced by around 10 to 15 percent, and the CO_2 emission in freight transportation would be reduced by up to 25 percent saving roughly 60,000 to 80,000 tonnes of CO_2 annually, compared to hauling the trucks on the road. This dual-hub model illustrates that joint accessibility to passengers and freight performance leads to connectivity, offers safety, and makes the Rolling Highway a rational and viable mode of transporting people and freight in Western Canada. The suggestions are in perfect alignment with British Columbia's CleanBC policy, Alberta's provincial freight and logistics priorities, and Transport Canada's 2030 Emissions Reduction Plan.

Introduction

Rail and passenger stations are the foundation of urban and intercity transport, as they connect people to economic, social, and cultural opportunities and are the hubs of national and global connectivity. The geography of Canada puts transport networks under unique pressures, as the country is characterized by long distances between large urban centres as well as the high dependence on a mix of trucking and rail in delivering freight. Passenger hubs and freight terminals are generally considered distinct planning problems, yet there is a growing awareness of the need to integrate the two systems to achieve efficiency, minimize congestion, and increase sustainability.

The Rolling Highway concept also identified as piggyback terminal, where trucks are loaded onto trains and transported by train over long distances, has proved to have significant advantages in Europe by decreasing the number of trucks transported over motorways, lowering the level of emissions, and enhancing the efficiency of logistics. North America is now looking into this system as an alternative to the reduction of highway traffic congestion and climate targets (European Commission, n.d.). Rolling Highway operations also help avert fuel use, increase the lifespan of important highway infrastructure, and reduce the risk of accidents that come with long-haul trucking by transporting freight over rail instead of over road.

The importance of such concepts in Canada is necessitated by various trends. First, the rising urbanization in Vancouver, Calgary, and Edmonton is raising the pressure on passenger and freight transport that is straining the available resources. An example of this is Metro Vancouver, which is the busiest trade gateway and among the highest-populated passenger regions in the country, and thus, land-use conflicts between the freight and residential population are more acute (Trans Link, 2017). Calgary and Edmonton, in contrast, are major links in the

logistics chain of the Prairie provinces, which process goods related to agriculture, energy, and international trade, and also face the increasing passenger pressure in the context of urban growth.

The research problem statement is to determine the best rail and logistics hub sites in Vancouver, Calgary, and Edmonton to ensure that the areas are accessible to passengers and efficient in terms of freight. These cities have current hubs, although some are not of equal capacity, connectivity, or urban footprint. This study has four objectives. First, to study urban and transport variables that affect the location of hubs, such as catchment areas, industrial areas, and transport corridors. Second, to use spatial and statistical analysis, e.g., GIS, to compare candidate locations of hubs. Third, to integrate the views of the stakeholders, such as the municipalities, rail operators, and community groups, to make the recommendations real and acceptable to the community. Lastly, to provide strategic hub locations in the three cities that provide maximum connectivity, decrease congestion, and improve environmental sustainability.

This research study takes a particular area of study in passenger and freight integration in Vancouver, Calgary, and Edmonton. It takes into consideration such factors as rail accessibility, closeness to highways and trucking routes, land supply, and environmental sensitivity. These case studies are placed in the wider Canadian transport policy contexts, such as the Transportation 2030 Strategic Plan and municipal goods movement strategies. Integrating a combination of empirical data, spatial analysis, and insights of the stakeholders, the study delivers a roadmap on how the Western cities of Canada can re-brand the Rolling Highway model to suit the local urban and economic environment (Transport Canada, 2022).

Client Background

Integrated Travel is a Canadian company in Airdrie, Alberta, that is in a varied line of business encompassing building, engineering, and trades; energy; and transport, trucking, and railroad. The company has established itself as a player with innovative transport and logistic solutions despite its small and flexible two to ten employees. Its dimensions enable it to be agile and adapt to new technology and changing market needs with speed.

Sustainable freight solutions and logistics innovations capable of mitigating economic and environmental issues are the major interests of the company. Increasing fuel prices, urban traffic congestion, and the growing pressing need to mitigate climate change are all factors that make Integrated Travel consider ways to minimize emissions without compromising the reliability and efficiency of cargo travel. The company pays special attention to opportunities like intermodal transport systems and the rolling highway concept that offer an alternative to long-distance trucking systems by incorporating road and rail modes.

Being a company based in the emerging logistics corridor of Alberta, Integrated Travel can tap into Western Canada and its rail and trucking networks. Its long-term vision focuses on the balance between freight activity and environmental sustainability, as well as industry requirements and overall sustainability (Integrated Travel, 2025).

Project Objectives

Highway congestion, carbon emissions, and inefficiencies in freight movement between major Western Canadian cities create the need for intermodal Rolling Highway hubs. The main aim of this project is to locate and analyze possible passenger stations and freight logistics hub locations in Vancouver, Calgary, and Edmonton. The cities stand out as key points of the transport system of Western Canada, linking the regions to the economic heart of the country and further. The study will seek to establish locations that will accommodate the greatest number of people, minimize the level of congestion, and allow transportation of both customers and cargo.

The rail connectivity is one of the evaluation factors; therefore, the hubs are highly linked to the available passenger and freight rail system. This is a mandatory condition to enable rolling highway operations and actualization of smooth modal transfers. Highway and truck route access will also be addressed to allow efficient first- and last-mile connectivity between terminals and the major road corridors.

The other factor is availability of land and zoning policies because in order to develop effective freight terminals, there must be space availability in areas where freight terminals are to be developed as industries. Finally, the city will have an impact, particularly on congestion, and the environment will be quantified. This involves reducing the inconveniences caused by downtown areas and maximizing the sustainability gains of lower highway truck traffic. The project will attempt to deliver evidence-based recommendations to support alignment of transportation infrastructure with urban growth and sustainability priorities through these objectives.

Literature review

Vancouver

Vancouver is a key hub in the transportation and logistics network of Canada and acts as a crucial entry point to national and international trade. The Metro Vancouver Goods Movement Strategy emphasizes the need to focus on the inclusion of freight transport into the regional planning process to facilitate the efficient flow of goods with limited environmental and urban effects (Trans Link, 2017). The plan highlights the importance of striking a balance between freight mobility and the livability of communities in the area, as the area is densely urbanized and the road capacity is minimal.

The Port of Vancouver is the largest port in Canada and a major force behind international trade in the region by facilitating freight flows in the area via the Asia-Pacific Gateway. The port supports the transport of containers, bulk cargo, and cars and demands robust intermodal connections with the rail and road infrastructure (Port of Vancouver, 2024). Intermodal terminals like Thornton Yard, owned by CN in North Surrey, and the Vancouver Intermodal Facility, owned by CP in Pitt Meadows, would improve the accessibility of the port to the inland markets in Canada.

Port of Vancouver

The Surrey Truck Route Network also supports the freight mobility designation of major arterial paths that serve the heavy vehicle traffic and connect the industrial areas to the regional highway. Such truck routes contribute to the elimination of traffic jams in residential districts; they also facilitate the efficient delivery of goods throughout Metro Vancouver. The combination of port operations, intermodal facilities, and truck route planning shows how Vancouver is a national trade hub and why hub location selection must consider regional economic and sustainability objectives.

Calgary

Calgary is currently an expanding center of goods transit within Western Canada, and its strategic position along the Prairies has made it a key node in both national and regional logistics. The Goods Movement Strategy of the City of Calgary highlights the significance of efficient freight systems that will not only promote economic development but also ensure environmental sustainability and livability in the community (Calgary, 2018). The plan emphasizes the network of truck routes throughout the city, which will help steer the heavy truck traffic to specific routes so as to avoid congestion in residential neighborhoods and improve their

connectivity to major highways. One important aspect of this network is the Stoney Trail, the Calgary Ring Road, which offers effective circumferential access to the city and supports long-haul trucking operations without overwhelming the inner-city roads (CN, 2023).

Calgary Logistics Park

The fact that Calgary is connected by rail only enhances its freight distribution. The CN Calgary Logistics Park in Conrich, northeast of the city, is a new intermodal facility to support the increased containerized trade flows. It also offers a smooth transition of rail and truck transportation and allows the transfer of goods to and from the Port of Vancouver and other inland locations. Effective for this is the Intermodal Facility of CP in southeast Calgary, which aids regional distribution and enhances Calgary as a prime inland logistics hub.

The growing geographic density in population and industrial activity in Alberta and the central location of Calgary on the Prairies have also stimulated the need to locate large-scale distribution centers. These sites take advantage of the rail and highway infrastructure that further solidifies Calgary as a competitive location within the Canadian supply chain network (CPKC, 2025).

Edmonton

Edmonton is a key freight and logistics hub in northern Alberta and Western Canada, as it enjoys the advantage of multimodal transportation facilities and serves as a northern export port of energy and agricultural goods. The City of Edmonton has a specific system of truck routes that guides heavy trucks on major arterial routes to reduce congestion in residential neighborhoods and to preserve road infrastructure. This network is connected to the Anthony Henday Drive, the citywide ring road that offers effective circumferential truck routing and connects directly to provincial highways connecting to resource areas in the north and to export routes (City of Edmonton, 2021).

Another foundation of the logistics capacity of the city of Edmonton is rail intermodal facilities. The Edmonton Intermodal Terminal at CN, in the northwest, is a significant container freight center between the Port of Vancouver and the inland market. In the same way, the Edmonton Intermodal Facility of CP in the south offers complementary capacity to the regional industries, as well as a competitive rail service to shippers. Collectively, the assets enable Edmonton to contribute to the balancing of east-west and north-south freight flows.

The industrial development also increases the freight positioning of Edmonton. The Nisku Industrial Park, which borders the Edmonton International Airport, has become one of the largest energy- and logistics-oriented industrial zones in Canada. It is a multimodal growth area due to its closeness to air cargo, highway connectivity, and firms involved in warehousing, oilfield supply, and advanced logistics (Leduc County, 2024). This infrastructure and strategic location is what makes Edmonton significant as a logistics hub in internal distribution and external exports.

Nisku Industrial Business Park

Methodology

The methodology combines review of transport policy, spatial analysis via GIS, stakeholder consultation, and scenario testing to determine and assess where potential hubs may be in Vancouver, Calgary, and Edmonton. The transport strategies of the municipalities and regions are considered initially to bring the study in line with official planning directions, such as truck route networks, intermodal freight corridors, and urban growth policies. This can be overlaid with GIS of the population density, industrial footprint, and transport routes to enable visual display of the passenger demand and freight logistics movement zones.

A weighted criterion is a list of evaluation criteria in formalized forms to strike a balance between a variety of considerations. Accessibility by passengers is 30 percent because it is a process of merging stations into densified urban centers. Freight connectivity is weighted with 40 percent, and it is clear that there is significant value attached to proximity to rail yards, intermodal terminals, and major trucking routes. An availability of land and zoning compatibility

accumulates at 20 percent since freight terminals and passenger hubs require large pieces of land with a land use designation. The environmental impact is allocated 10 percent, taking into account the emissions, noise, and sensitivity of nearby land uses. This weighting makes sure that freight efficiency is factored in, but accessibility, regulatory, and environmental dimensions are still considered (Litman, 2023).

Consultation with stakeholders is integrated to confirm technical results and to develop consensus. Municipal planners with the capability to provide information about zoning and urban integration; rail operators CN and CPKC, which may assess the viability and operational compatibility; freight and passenger transport associations, which may be sensitive to local problems such as traffic and noise; and community groups, which may identify local problems such as traffic and noise. Such a consultation process enhances the legitimacy as well as the practicality of recommendations.

Last, the scenario analysis evaluates the stability of proposed hubs in the future. Some of these situations are an extended infrastructure approval, a changed urban development policy, and an increase in freight demand, such as doubling intermodal volumes by 2035. This kind of proactive policy presupposes the opportunity to adjust the recommendations to the changing economic and policy environment (Lucas, 2019).

Case Studies: City-Level Analysis

Vancouver

Vancouver is an elaborate interface between freight transport demand and passenger demand. By passenger service consideration, the Pacific Central Station is the most practical due to its population concentration around the center of the city and town. It is directly linked to SkyTrain and buses in the area; thus, the largest number of passengers is reached. The location supports intercity transit and enhances interconnection with the greater Metro Vancouver transit system, which is critical to accessibility in a city where most people use intercity transit extensively to travel daily (Trans Link, 2017).

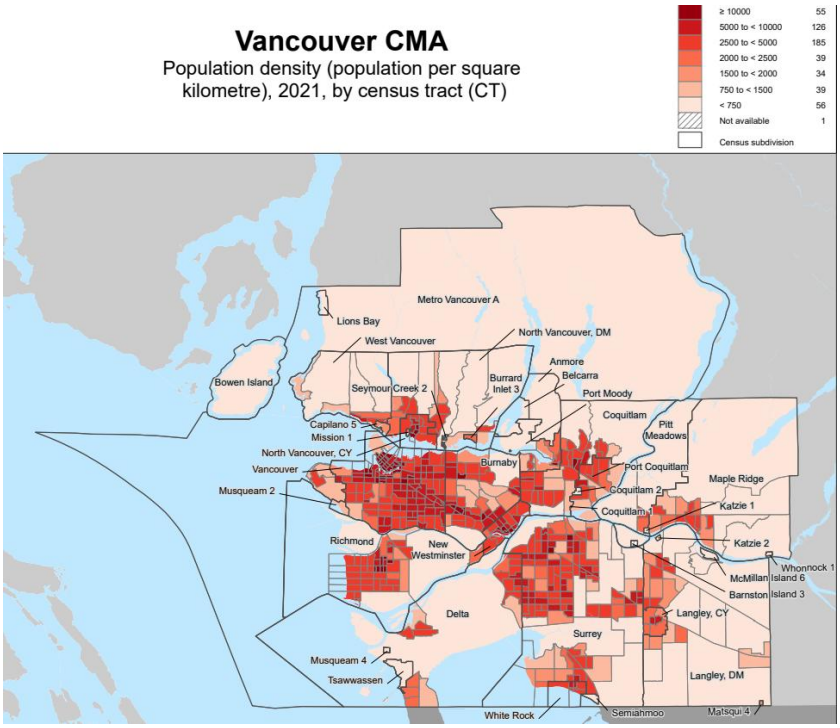


Figure 1 https://www12.statcan.gc.ca/census-recensement/2021/geo/maps-cartes/thematicmaps-cartesthematiques/pd-pl/files-fichiers/2021-92173-001-933-013-02-00-eng.pdf

On the freight side, Vancouver acts as the main point of entry into Canada with its Port of Vancouver that handles over 275 billion Canadian dollars' worth of goods each year (Port of

Vancouver, 2024). Metro Vancouver has issues with freight corridors where the urban core needs to be crossed by bridges and additionally because of the small capacity of trucks. Consequently, the Surrey and Langley corridor is the best candidate to be a Rolling Highway freight hub. The location has direct access to both Highway 1 and the Fraser Valley trucking corridor and close access to both CN Thornton Yard and CP Vancouver Intermodal. Setting up a Surrey or Langley hub would take trucks off the city bottlenecks and would increase the efficiency of freight in the region.

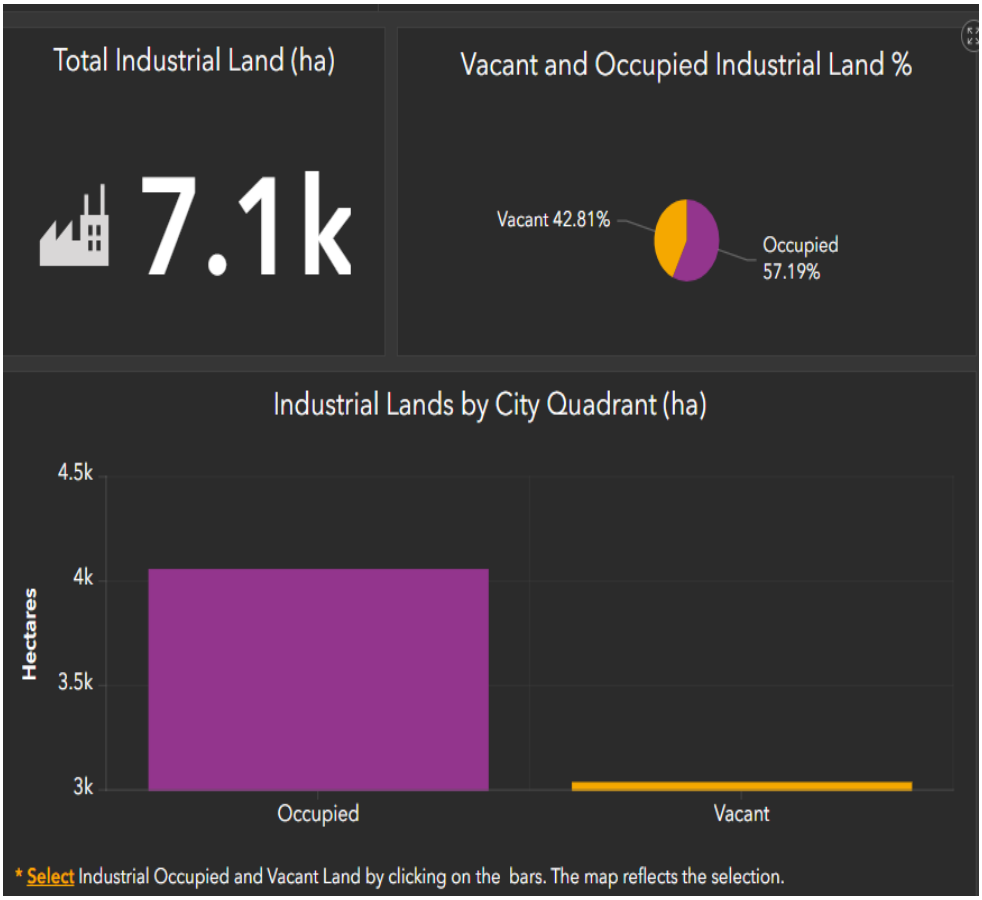


Figure 2
https://experience.arcgis.com/experience/18ef631b811f432ba43fac804894d9cb/page/Occupied-and-Vacant

The case of Vancouver thus points to a set of two hub strategies. The balance between the accessibility of the urban population and regional logistics performance is to locate a passenger terminal at Pacific Central and a freight terminal at Surrey or Langley, which would offer the most efficient and sustainable option.

Calgary

Calgary has a unique opportunity to combine passenger stations and freight logistics centers into a growing urban system. On the passenger side, the downtown core is the most practical solution to a central station. The high density of residents and work centers in this area is enabled by the high concentration of the CTrain light rail. According to recent visual analytics, the light rail network in Calgary covers two lines with over 4,300 kilometers of route and serves about 110 million journeys annually, which proves why this radius is of paramount importance to the urban mobility process (Samuel, 2021). Being at the center has guaranteed the ease of accessibility to commuters and long-distance travelers and the ease of integration with local transport services.

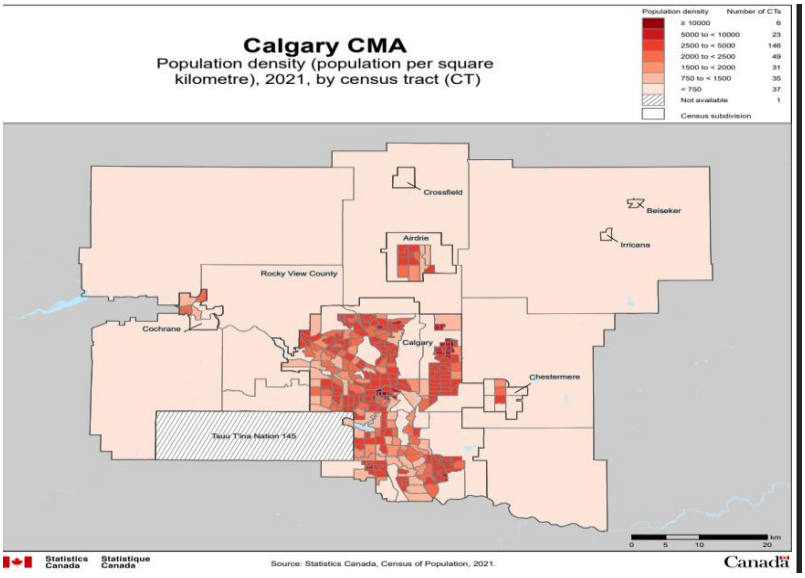


Figure 3 https://www12.statcan.gc.ca/census-recensement/2021/geo/maps-cartes/thematicmaps-cartesthematiques/pd-pl/files-fichiers/2021-92173-001-825-013-02-00-eng.pdf

In terms of freight movement, Calgary has already become a new inland distribution center due to its strategic accessibility by rail and road. A good example of such development is the CN Calgary Logistics Park in Conrich, northeast of the city. The facility, which spans over 680 acres, incorporates direct intermodal rail access in addition to being accessible to major highways like the Stoney Trail and the Trans-Canada Highway. It also boasts of large warehousing capacity and is therefore a modern logistics terminal with the capabilities to sustain long-term growth in the region (CN, 2023).

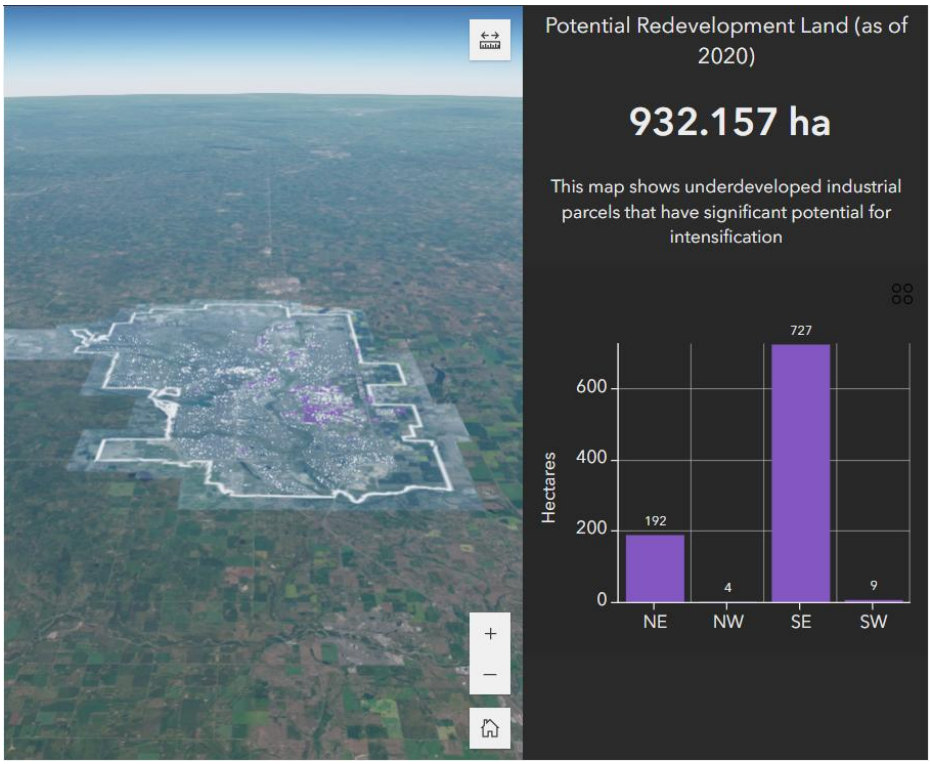


Figure 4 https://www.calgary.ca/planning/industrial-growth-strategy.html

Intermodal linkages can be enhanced through a combined approach where the downtown core is used as the passenger hub and the Conrich logistics park is used as the rolling highway freight hub. The rationale behind this is to minimize roadway congestion, increase freight productivity, and support the Calgary central logistics hub position in Western Canada.

Edmonton

Edmonton is an important logistics and trade opening to the north of Alberta and to Western Canada. Its strength is based on the fact that the region has an integrated freight rail network and is strategically placed to act as a gateway along key mobility paths. CN has greatly increased capacity in the Walker Yard, which is one of the busiest classification yards in Canada and is situated northeast of downtown. Some of the investments are track reconfiguration and doubling track segments east of Edmonton to advance throughput and train velocity

improvements that will place Edmonton in a position to manage the increasing freight demand effectively (CN, 2011).

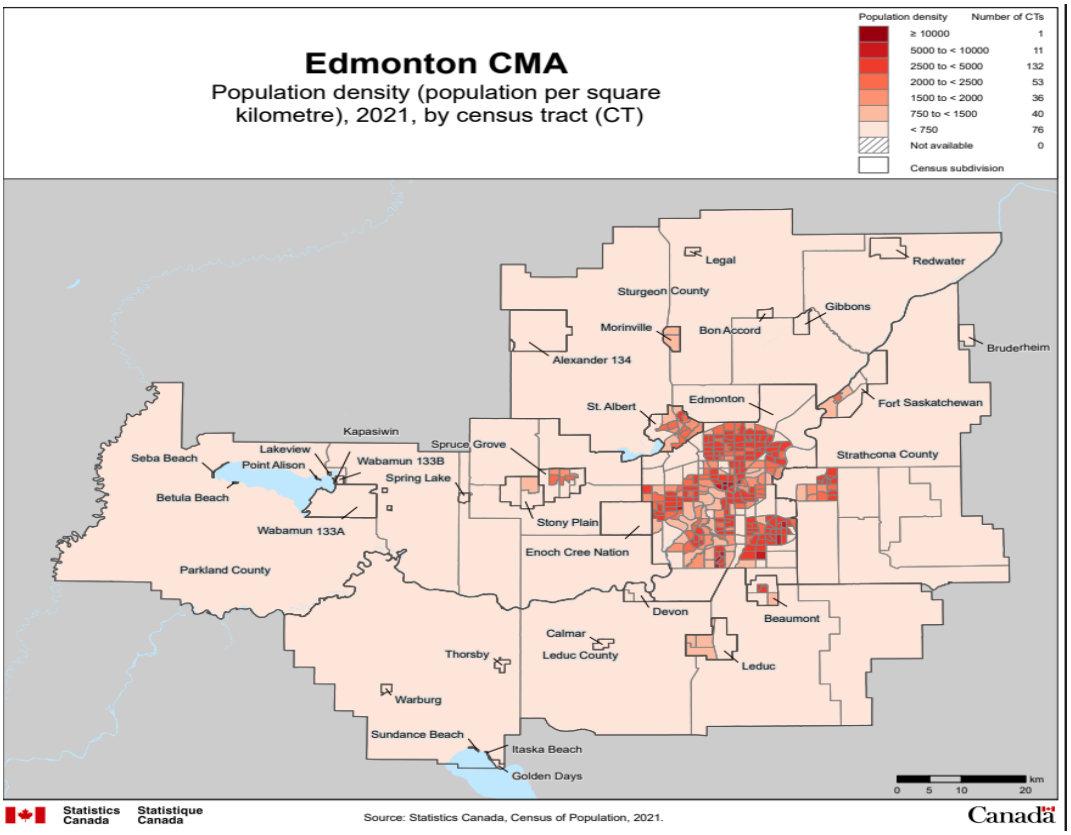


Figure 5 https://www12.statcan.gc.ca/census-recensement/2021/geo/maps-cartes/thematicmaps-cartesthematiques/pd-pl/files-fichiers/2021-92173-001-835-013-02-00-eng.pdf

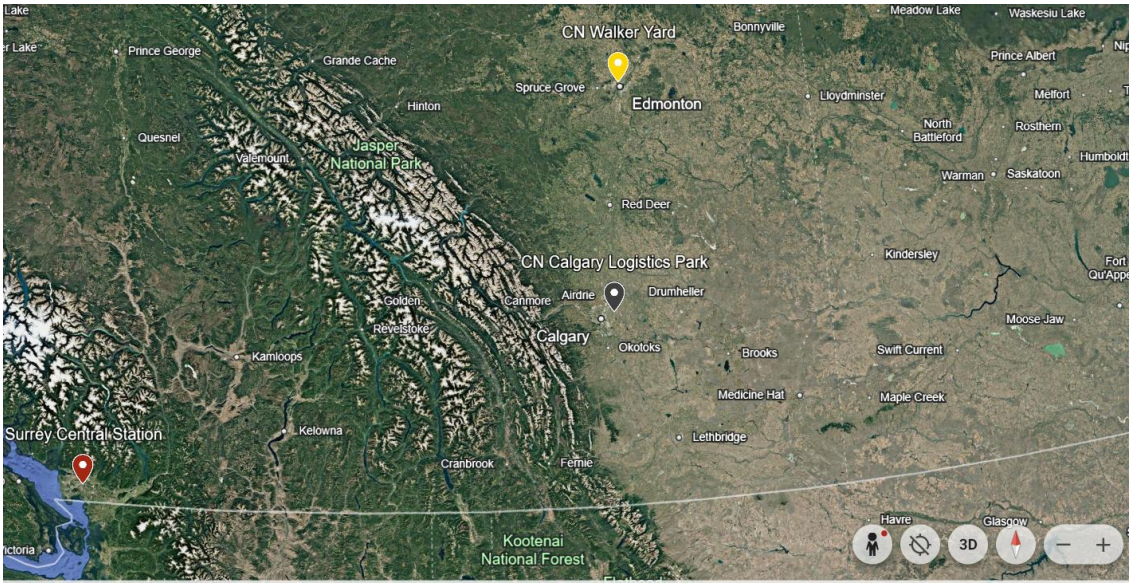
The Edmonton region, which borders the yard, contains an intermodal terminal that can accommodate high volumes of containers. The Edmonton terminal of CN covers many hundreds of acres in the area of the Yellowhead Trail and consists of various tracks and cranes that allow processing up to 150,000 intermodal units each year, which can be expanded as needed (Truck News, 2014). Edmonton also is a multimodal city. The 16 rail intermodal and storage facilities, the wide road corridor access through the CANAMEX Trade Route, and the proximity to Edmonton International Airport are some of the features that make Edmonton a major hub in the distribution field and in global commerce.

Considering those aspects, the twin-hub approach in Edmonton is obvious: continue to serve passengers at the current downtown hub to provide as high accessibility as possible, whereas moving freight and Rolling Highway operations to the northeast industrial areas around Walker Yard and the intermodal terminal. This design facilitates the uninterrupted flow of freight and maintains the livelihood in the urban areas.

Comparative assessment

Freight Hubs

City	Passenger Factors	Potential Hub
Vancouver	Access to Highway 1, Fraser Valley trucking corridor, industrial zones in Surrey/Langley	Surrey/Langley Rolling Highway terminal
Calgary	Adjacent to CN Logistics Park; northeast quadrant with good rail & highway access	CN Conrich (Calgary Logistics Park)
Edmonton	Industrial land in northeast/southeast; strong rail presence (Walker Yard, Intermodal terminal)	CN Walker Yard / Edmonton Intermodal (NE)

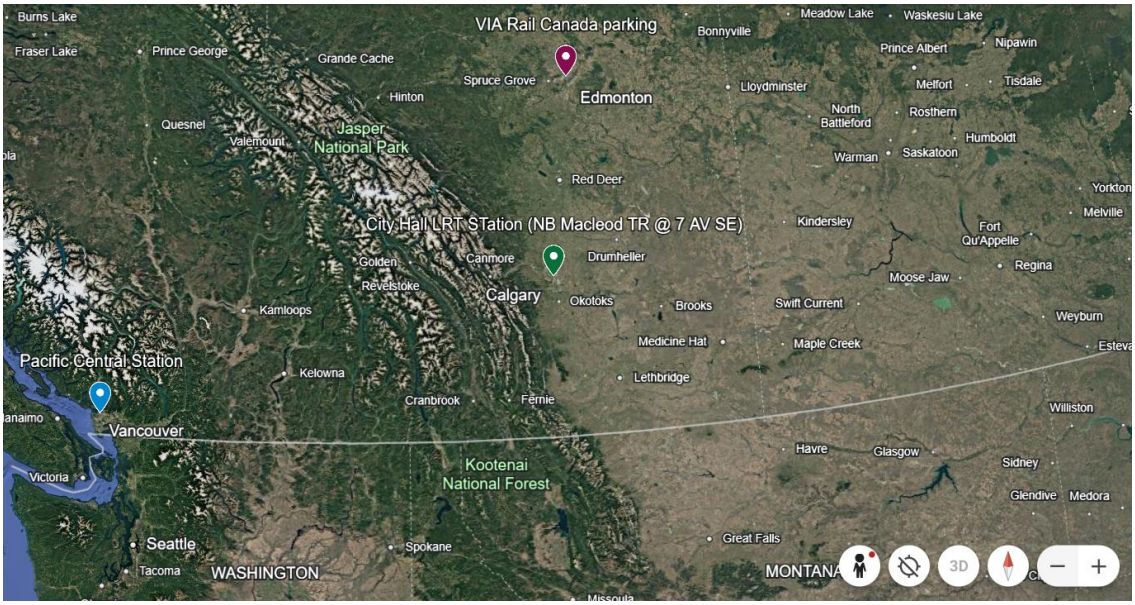


Mapping of Freight Hubs

Comparative analysis of freight hubs in Vancouver, Calgary, and Edmonton demonstrates that geography, industrial land use, and multimodal connectivity determine the potential of these hubs. The Surrey and Langley corridor of Vancouver enjoys the benefit of direct access to Highway 1 and being the access point to the Fraser Valley trucking corridor. The nearby presence of large industrial areas increases its appeal as a Rolling Highway terminal and complements current port and rail operations. The strength of Calgary is that it is adjacent to the CN Calgary Logistics Park in Conrich, which is strategically positioned in the northeast quadrant. The location combines both intermodal rail connectivity with a wide range of highway connectivity that provides scalability in Prairie-wide distribution. The freight hub potential of Edmonton focuses on the high degree of rail facility at CN Walker Yard and Edmonton Intermodal Terminal, as well as on available industrial lands in the northeast and southeast. This is even more relevant in that the city can serve as the northern gateway to the export of energy and agricultural products. Vancouver, Calgary, and Edmonton, in comparison, are specializing in coastal gateway, integrated prairie distribution, and northern access and export roles, respectively. Strengths in regional economies are reflected in individual hubs, but together they demonstrate the strategic importance of integrating industrial land, transport corridors, and intermodal infrastructure to facilitate efficient freight movement in Western Canada.

Passenger Hubs

City	Passenger Factors	Potential Hub
Vancouver	Densest population in Metro Vancouver; strong downtown transit connections	Pacific Central Station (Vancouver Central)
Calgary	High downtown density; integration with LRT network	Downtown Calgary (central station)
Edmonton	Existing VIA Rail station downtown; connected to core urban population	Downtown Edmonton Station



Passenger Hubs Mapping

The passenger hub analysis of Vancouver, Calgary, and Edmonton suggests the significance of concentration, transit accessibility, and distance to the center populations. The most densely populated in Metro Vancouver is Pacific Central Station in Vancouver, which is linked to the regional bus and SkyTrain and proposed rapid transit systems. This makes it quite convenient as a central passenger exchange that is set to offer easy access to local commuters and long-distance passengers. Another good example is in Calgary, in the downtown core, where the high-density urban development comfortably fits the already existing LRT network. A central passenger center and light rail combine to provide more accessibility to the entire metropolitan region, business travelers, and typical commuters. The presence of the VIA Rail within the Downtown Station in Edmonton has the added benefit of being within the core of the population in the city and can be accessed via other urban transit methods. Edmonton lacks the thickness of either Vancouver or Calgary, but because it is a hub of the transport network, it is situated in the middle, and this provides it with a solid foundation on which to develop passenger

services. In comparison, Vancouver is oriented to the multimodal urban integration, Calgary aims at the maximum LRT connectivity of a high-density urban area, and Edmonton locates the passenger flows in the central station. These centers all illustrate how the shape of urban places and transit systems are connected to the accessibility of passengers.

Passenger Catchment and Freight Volume

City	**Passenger Catchment (Population within 5 km)**	**Freight Volume (Annual Throughput)**
Vancouver	650,000 (downtown and Metro core)	Port of Vancouver: 142 million tonnes annually (Port of Vancouver, 2025).
Calgary	350,000 (downtown density, LRT integration)	CN Calgary Logistics Park: 3,000 containers/day (Calgary, 2018).
Edmonton	300,000 (downtown catchment, VIA Rail)	CN Walker/Intermodal: 1,500 containers/day (Government of Alberta, 2025).

The total number of people carried on the 5 km around Pacific Central Station is approximately 650,000, which is indicative of the high concentration of people in the city center, as well as the high density of transit services in Vancouver. This is why it is the most influential candidate of all three cities as a passenger hub. Vancouver also serves the largest volumes of freight in Canada via the Port of Vancouver, with about 142 million tonnes each year, which also underscores its dual passenger and freight gateway services (Port of Vancouver, 2025).

Calgary's downtown catchment is smaller, approximately 350,000 people, but it has the advantage of being integrated with the LRT system, which increases its accessibility. The CN

Calgary Logistics Park handles approximately 3,000 containers each day on the freight component, a fact that reinforces its reputation as a Prairie distribution center (Calgary, 2018).

The city of Edmonton has a downtown that draws an average of 300,000 people, and the current station serves VIA Rail. The CN Walker Yard and Intermodal Terminal in Edmonton handle about 1,500 containers daily on the freight side, but this illustrates the importance of the site as a northern energy and agricultural export gateway. Comparative analysis indicates that the passenger density to freight tonnage ratio is decreasing in Vancouver, and Calgary and Edmonton are reporting more balanced but strategically situated ratios (Government of Alberta, 2025)

Connectivity and Environmental Sensitivity

City	Connectivity	Environmental Sensitivity
Vancouver	Strong: SkyTrain, Highway 1, CN/CP, Port access	Moderate – industrial lands but close to residential zones
Calgary	Strong: Stoney Trail, LRT, CN/CP intermodal, airport nearby	Low – greenfield sites in northeast, less residential conflict
Edmonton	Strong: Anthony Henday, CN/CP, airport/Nisku link	Moderate – industrial corridors buffered, but higher emissions

Vancouver has the advantage of being directly linked to major highways, such as Highway 1, and is served well by urban transit. But environmental sensitivity is high due to the proximity to large urban centers and ecological areas along the Fraser River. This implies that hub development must be planned properly in terms of the environment.

The downtown site of Calgary is very well-connected through the LRT and road systems, and the Conrich Logistics Park is well-located off Stoney Trail and the airport. The level of environmental sensitivity is medium, as the logistics park is located in a special industrial zone with fewer opposing interests between land use and wildlife.

The downtown LRT and road accessibility of Edmonton, and the proximity of Walker Yard and the Intermodal Terminal to Anthony Henday Ring Road and key industrial areas. Environmental sensitivity is less than in Vancouver, and planning is required because of residential expansion around and agricultural land uses. This discussion reveals that, although Vancouver has the best demand, Calgary and Edmonton have better freight hub conditions in terms of land use compatibility and environmental sustainability.

Recommendations

Passenger Hubs

The intercity and urban passenger hubs of Canada need to be redesigned to support the anticipated rise in ridership and to provide more multimodal connectivity. In 2023, VIA Rail transported 4.1 million people, which is 24.7% more than in 2022, and the recovery is impressive after the pandemic (VIA Rail Canada, 2024). On the municipal level, Calgary Transit had approximately 90 million trips each year as of 2023, and Edmonton Transit Service has been reported to perform almost 70 percent of the trips that were recorded before the pandemic (Calgary Transit, 2023). These statistics point to an increased need to develop hubs that combine intercity and local mobility.

The Pacific Central Station in Vancouver, Downtown Calgary, and Downtown Edmonton are in the best position to act as integrated passenger hubs. They should be developed with

multimodal integration with LRT and bus systems so that there are smooth transfers. The Munich Central Station in Germany serves as a helpful example, as regional trains, high-speed rail, and urban transit are all interconnected, with a single ticket needed, which diminishes the need for cars and increases the share of use of the rail modes (Move21, 2023). Using an equivalent structure would help boost VIA ridership in Western Canada by 15 percent by 2030 and reduce automobile dependence in urban hubs.

Connecting Calgary and Edmonton with stops in between can boost the frequency of service by 20 percent by 2030 in Alberta, which is an incentive to encourage commuter and recreational travel. Sustainability is also to be focused on. The Shinkansen in Japan has become an international benchmark, as it incorporates noise-cancellation walls and electric power, becoming highly dense and operating in urban areas with minimum disruption (Central Japan Railway Company, n.d.). The implementation of such measures in Vancouver and Calgary would enhance agency in the community and would make the hub development consistent with the Canadian climate commitments.

To achieve this, the federal government would be advised to negotiate special passenger rail slots so that delays caused by freight trains are reduced as the municipalities embrace transit-oriented development zoning along areas where these hubs are located to promote their use. The capital upgrades can be assisted by public-private partnerships (PPP) in sharing the expenses with the developers and operators. The key performance indicators (KPIs) are expected to comprise an increase in VIA ridership by 15-20 percent by 2030, a 25 percent multimodal transfer increase, and a 10 percent decrease in car mode share in urban centres.

Freight Hubs

Vancouver, Calgary, and Edmonton freight hubs need to be updated and expanded to accommodate trade volumes. In 2024, the Port of Vancouver processed 158 million metric tonnes of cargo, compared to 145 million in 2023, underpinning the steady increase of the West Coast trade gateway in Canada (Port of Vancouver, 2025b). In 2023, CN Rail carried 452 million tonnes of freight, which proves the high importance of the inland hubs of Alberta in the national and continental supply chains (Canadian National Railway Company, 2024).

The combination of rail access, industrial zoning, and highway access is the right formula to provide freight hubs, and the proposed freight hubs of Surrey/Langley in Metro Vancouver, Conrich CN Logistics Park in Calgary, and Edmonton Intermodal Terminal have it all. These hubs must be modelled after the intermodal system of Chicago that handles close to 25 percent of freight railroads in the United States and has profoundly decreased the number of trucks on the roads (Association of American Railroads, 2020). The implementation of such an approach in Edmonton would help to accelerate the truck turnaround times by 30% and to decrease the freight delays significantly.

Operations should also be digitalized and automated. The Port of Rotterdam has been able to implement a digital tracking and automated handling platform and reduced the 20 percent weight-in time of containers (Port of Rotterdam, 2022). Using the same technology in the Conrich hub in Calgary would increase throughput and increase the global trade competitiveness of Canada. Lastly, the freight hubs are expected to be green corridors. In Canada, close to thirty percent of all transportation emissions are as a result of freight (Transport Canada, 2022). Norway and Sweden have been the first to decarbonize freight routes through encouraging electric trucking and moving long-haul freight to rail. Surrey/Langley can also use this model to

decrease diesel consumption by 10 million litres in a year, which will help to reduce 40,000 tonnes in CO_2 emissions and help Canada to meet its climate targets.

In order to have these hubs working, the federal and provincial governments ought to implement land banking in Surrey/Langley to ensure that industrial land is used in logistics, and CN and CPKC implement models in PPP financing on terminal expansion. The policy of a freight-priority corridor should also provide committed rail capacity to long-haul cargo. KPIs shall monitor a 10-15% truck-to-rail ratio by 2030, a 20% decrease in average freight dwell time, and a 30-40 percent decrease of CO_2 emissions by target corridors by 2030.

Implementation Roadmap

Short-term (1-3 years)

Passenger hub upgrades in Vancouver and Calgary with a concentration of demand should be targeted during this initial phase. Pacific Central in Vancouver can be enhanced by adding more waiting bays, electronic ticketing, and better transit services. The city of Calgary needs to increase its capacity, including the LRT alignment as well as other passenger facilities in downtown Calgary. It is anticipated that such interventions would in the short-term lead to increased ridership and car-to-rail mode shift.

Medium-term (3-7 years)

Canrich CN Logistics Park in Calgary and the Intermodal Terminal in Edmonton and Vancouver, Vancouver Surrey/Langley will need land-use approvals, zoning changes, and capacity investments. The milestones reported include decongesting the trucks, improving efficiency in handling the containers, and converting to highways. By the seventh year, it is hoped that 10-15% of truck trips will be reduced in key corridors. It can also be through public-

private partnerships (PPP), where CN, CPKC, and the private logistics companies participate as co-investors along with the federal funding in the National Trade Corridors Fund, though provincial freight strategies present further opportunities for cost-sharing.

Long-term (7-15 years)

The last step extends access to Northern export corridors via Edmonton. Edmonton can use Walker Yard and intermodal resources to make it a gateway to prairie agricultural goods and energy exports. It will focus on increasing the capacity of rail freight, enhancing cross-border partnerships, and reinforcing linkages across the north through highways. By the year 2040, Edmonton must become an interprovincial and export center by making Canada's western trade competitiveness concentrated. Blended fund financing of the federal trade infrastructure fund, private sector co-financing of upgrading through PPP agreements, and special provincial investment in Northern Highway and rail systems will be required to achieve long-term expansion.

Benefits of Rolling Highway Hubs

Rolling Highway hubs provide a wide range of environmental, operational, economical, and safety benefits based on the strengths of rail transport. On the environmental front, rail is the most eco-friendly means of transport in Canada: it carries extremely large volumes estimated at about 70 percent of the amount of intercity freight and generates only 1 percent of the total greenhouse gases in Canada and only 3.5 percent of the national transportation sector emissions. Rail consumes between 3 and 4 times less fuel than trucks, which translates to one locomotive being able to pull a ton of freight over 220 kilometers on less than a liter of fuel and eliminates over 300 trucks from clogged roads (Railway Association of Canada, 2022a).

Regarding efficiency, the transfer of trucks to rail lessens congestion, reduces travel time, and enhances reliability, particularly in urban areas. The large volumes and energy efficiency of rail make it the perfect choice to ensure faster long movement. Trucks also make the roads safer when they are not on the busy routes since heavy trucks represent a disproportionate number of serious railway accidents.

At the economic level, the Canadian rail system supports economic growth by transporting a large quantity of goods valued at about 380 billion dollars on an extremely efficient rail system each year. Freight rail is providing one of the lowest rates per ton kilometer in the world to keep Canada competitive in the global market (Railway Association of Canada, 2022b). Collectively, rolling highway hubs are transforming the freight infrastructure of Canada in alignment with the objectives of reducing emissions, improving efficiency, enhancing public safety, and enhancing economic resilience, making it a sustainable option in the future of transportation.

Challenges and Considerations

Building freight terminals that roll through cities in Canada has to overcome a few fundamental challenges.

There is a significant limitation in land availability and zoning. Industrial space in urban centers is restricted, especially around compact cores such as Vancouver or Calgary, and obtaining correctly zoned freight space can be a time- and cost-consuming rezoning or land-assembling procedure, influencing the development of projects (Global Railway Review, 2016).

Rail access to passenger and freight is essential. This is because the networks that CN and CPKC typically run are operated by the same people, scheduling issues and capacity constraints

may emerge when the operators seek to share the tracks, which could reduce the frequency and reliability of commuter services (Global Railway Review, 2016).

The other challenge is the funding and investment models. Though federal funding goes to numerous supply chain projects, like the 150M infusion into the Port of Montreal container terminal as part of the National Trade Corridors Fund, freight terminals continue to need sustainable financing blends of government, joint venture, and industry investments (Transport Canada, 2023).

Acceptance in the community is also important. Freight hubs can lead to concerns relating to higher truck traffic, noise, and environmental impact. Unless stakeholders are properly engaged and mitigated, projects may fail during the early development stage because of community opposition.

Anticipated Risks and Mitigations

Availability of land and zoning

Getting enough space in overcrowded urban areas to build freight hubs and passenger terminals is a challenge. There is very little land space allocated to industries, and rezoning procedures are quite time-consuming. In this regard, the focus should be on brownfield redevelopment in such a way that the idle industrial land could be transformed into a modern transportation center. The plan will minimize greenfield stress and will be in line with sustainable land-use planning. The rezoning and acquisition delays are estimated to add up to 12-18 months to the project timeframes, provided that the problem is not resolved early, which supports the importance of scheduling the planning.

Funding constraints

The massive building projects would require a massive amount of money that the municipality would not be able to afford. One way out of this is to embrace the idea of so-called public-private partnerships (PPP), which would also imply the distribution of the costs between the governments and the rail operators as well as the latter and the private investors. One of the areas where PPP ideas of accountability and financial feasibility have been effectively applied is in the implementation of transport projects in Canada. The cost overruns in comparable infrastructure projects have been 15 to 20 percent of the cost that ought to be internalized in contingency planning and budgets.

Community acceptance

Noise, traffic, and environmental concerns could be the reason for the opposition of the project by the population. By ensuring the affected communities are engaged early before the disruption occurs, the disruption can be reduced by rolling in new rolling stock and sound barriers as a mitigation response to guarantee that the disruption is moderated by using noise-reducing headphones. Open reporting of the environmental and economic values should produce the long-term following. The community engagement plan has to consist of a structured community involvement system involving public consultations at least once every six months, environment review timelines that would match provincial demands, and special stakeholder advisory teams to guarantee the transparency.

Operational challenges

The amount of cargo and the future passenger demand may vary based on changes in the market and policies. The design phase should include scenario planning where the infrastructure should be created in such a manner that it is able to grow and accommodate the faster-than-

planned expansion. As an example, high-growth possibilities would have the freight demand grow by 25 percent by 2035 and require scalable terminal capacity and flexible scheduling systems.

Conclusion

The analysis of rolling highway hub potential of a city in Western Canada the analysis of rolling out such an intermodal system shows that this is a strategic and complex issue in Vancouver, Calgary, and Edmonton. The research has evaluated the passenger and freight hub opportunities based on the criterion like accessibility, industrial land use, environmental sensitivity, and connection with the current rail and road networks using municipal and regional transport strategies, GIS-based spatial considerations, and the case study analysis.

With passenger hubs, the Pacific Central Station in Vancouver is the best choice because it has a dense downtown core and good transit integration. The downtown station in Calgary is also promising due to connectivity to the LRT system, and the station of the VIA Rail in the center of Edmonton has the current infrastructure and an opportunity to reach the central population. The hubs will be important in providing convenient and sustainable passenger connectivity along intercity routes.

With freight hubs, there is good compatibility between opportunities and intermodal assets. Surrey and Langley have easy access to Highway 1 and Fraser Valley industrial corridors and are therefore appealing areas in rolling highway development. The CN Conrich Logistics Park of Calgary would be an ideal choice due to its size and the intermodal capacity, and both the Northeast Intermodal Terminal of Edmonton and the Walker Yard have excellent access to

the rail and major trucking networks. Together, these freight centers may contribute significantly to increasing the competitiveness of logistics and reducing highway congestion.

It goes without saying that the benefits of rolling highway hubs are evident. They can reduce their emissions by substituting trucks with rail, increase efficiency in long-haul trucking, minimize the likelihood of accidents on highways where trucking takes place, and generate significant economic advantage by making trade possible and generating employment. Notably, the results directly contribute to the UN Sustainable Development Goals 9 (Industry, Innovation, and Infrastructure) by fostering resilient modernized transport infrastructure and SDG 13 (Climate Action) by reducing emissions measurably. The integration of the ideas of the ESG and national climatic aims assists the Rolling Highway framework in being a pioneer in the field of multimodal freight combination in the North of America.

References

Association of American Railroads. (2020). *Rail Intermodal Keeps America Moving*. https://www.aar.org/wp-content/uploads/2018/07/AAR-Rail-Intermodal.pdf

Business in Edmonton. (2022). *The Rail Boom - Business In Edmonton*. Business in Edmonton. https://businessinedmonton.com/month-and-year/the-rail-boom/

Calgary Transit. (2023). *RouteAhead Annual Status Update 2023*. Calgary Transit. https://www.calgarytransit.com/content/dam/transit/plans---projects/2023%20RouteAhead%20Annual%20Status%20Update.pdf

Calgary. (2018). *The Calgary Goods Movement Strategy: Moving together to help our economy*. https://www.calgary.ca/content/dam/www/transportation/tp/documents/strategy/goods-movement-stategy-documents/goods-movement-strategy-report.pdf

Canadian National Railway Company. (2024). Resilient and Ready 2024 Annual Report. In *Canadian National Railway Company*. https://www.cn.ca/-/media/files/investors/investor-annual-report/2024-cn-annual-report.pdf

Central Japan Railway Company. (n.d.). *Contribution to Global Environment Preservation*. Central Japan Railway Company. https://global.jr-central.co.jp/en/company/environment/contribution.html

City of Edmonton. (2025). *Truck Routes, Dangerous Goods and Permits*. Edmonton.ca. https://www.edmonton.ca/transportation/truck-routes

CN. (2011, May). *CN makes network investments to increase capacity, train velocity in Alberta rail corridors seeing growing freight traffic*. Prnewswire.com; Cision PR Newswire.

https://www.prnewswire.com/news-releases/cn-makes-network-investments-to-increase-capacity-train-velocity-in-alberta-rail-corridors-seeing-growing-freight-traffic-121564943.html

CN. (2013, January 10). *CN opens new intermodal terminal at Calgary Logistics Park*. Newswire.ca; CNW Group. https://www.newswire.ca/news-releases/cn-opens-new-intermodal-terminal-at-calgary-logistics-park-511818071.html

CN. (2023). *Calgary Logistics Park Smart Terminal | Trucking | Transportation Services*. Www.cn.ca. https://www.cn.ca/en/our-services/intermodal/smart-terminal-program/calgary-logistics-park-smart-terminal/

CN. (2025). *How CN and the Port of Vancouver Are Collaborating to Optimize Freight Movements and Improve Safety Across the Burrard Inlet |cn.ca*. Www.cn.ca. https://www.cn.ca/en/stories/20250429-cn-and-port-of-vancouver-collaborating/

CPKC. (2025). *Intermodal Shipping Facilities*. Www.cpkcr.com. https://www.cpkcr.com/en/our-markets/intermodal

European Commission. (n.d.). *Multimodal and combined transport*. Transport.ec.europa.eu. https://transport.ec.europa.eu/transport-themes/logistics-and-multimodal-transport/multimodal-and-combined-transport_en

Global Railway Review. (2016, February). *The answer to congestion on Canada's railways*. Global Railway Review. https://www.globalrailwayreview.com/article/26299/the-answer-to-congestion-on-canadas-railways/

Integrated Travel. (2025). *Introducing Integrated Travel*. Integrated.travel. https://integrated.travel/

Leduc County. (2024). *Central Nisku Local Area Redevelopment Plan*. Yoursayleduccounty.com. https://www.yoursayleduccounty.com/39838/widgets/165543/documents/143526

Litman, T. (2023). Evaluating Transportation Land Use Impacts. *World Transport Policy and Practice*, 1–69. https://www.vtpi.org/landuse.pdf

Lucas, K. (2019). A new evolution for transport-related social exclusion research? *Journal of Transport Geography*, *81*, 102529. https://doi.org/10.1016/j.jtrangeo.2019.102529

Move21. (2023, May). *Revolutionizing Mobility Hubs: Innovative Measures for Passenger and Freight* . Move21. https://move21.eu/revolutionizing-mobility-hubs-innovative-measures-for-passenger-and-freight-move21-living-labs-buzz/

Port of Rotterdam. (2022). *Smart infrastructure*. Port of Rotterdam. https://www.portofrotterdam.com/en/port-future/smart-infrastructure

Port of Vancouver. (2024, November). *The Vancouver Fraser Port Authority: Enabling Canada's trade*. Vancouver Fraser Port Authority. https://www.portvancouver.com/about#about-port-of-vancouver

Port of Vancouver. (2025b, May). *Metrics dashboard | Vancouver Fraser Port Authority*. Vancouver Fraser Port Authority. https://www.portvancouver.com/port-operations/supply-chain/metrics-dashboard

Railway Association of Canada. (2022a, November). *Locomotive Emissions Report*. RAC | Railway Association of Canada. https://www.railcan.ca/policy-advocacy/environment/

Railway Association of Canada. (2022b, December). *Economic growth* . RAC | Railway Association of Canada. https://www.railcan.ca/rc_pres_msg/economic-growth/

Samuel, S. (2021, July). *How GTFS Has Revolutionalised Public Transport*. Iunera. https://www.iunera.com/kraken/public-transport/gtfs-public-transport/

Trans Link. (2017). *Moving The Economy: A Regional Goods Movement Strategy For Metro Vancouver* . https://www.translink.ca/-/media/translink/documents/plans-and-projects/roads-bridges-and-goods-movement/rgms_moving_the_economy.pdf

Transport Canada. (2022). *Transportation in Canada Overview Report*. https://tc.canada.ca/sites/default/files/2023-07/transportation-canada-2022.pdf

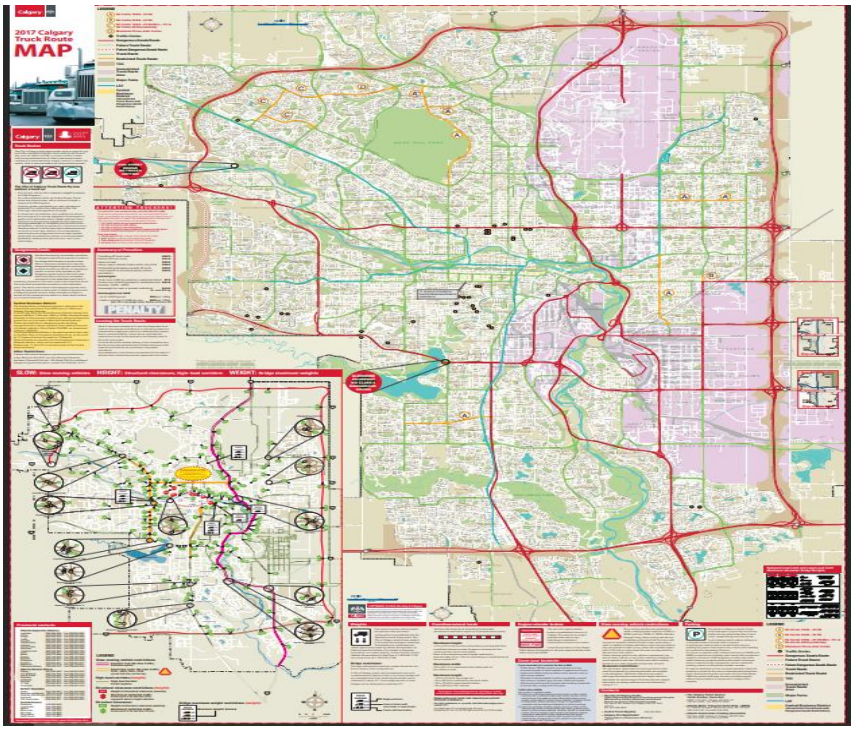
Transport Canada. (2023, October). *Minister of Transport announces funding for a new container terminal at the Port of Montréal*. Canada.ca; Government of Canada. https://www.canada.ca/en/transport-canada/news/2023/10/minister-of-transport-announces-funding-for-a-new-container-terminal-at-the-port-of-montreal.html

Trucknews.com. (2014, August). *New CN intermodal terminal opens in Edmonton*. Truck News. https://www.trucknews.com/transportation/new-cn-intermodal-terminal-opens-in-edmonton/1003114424/

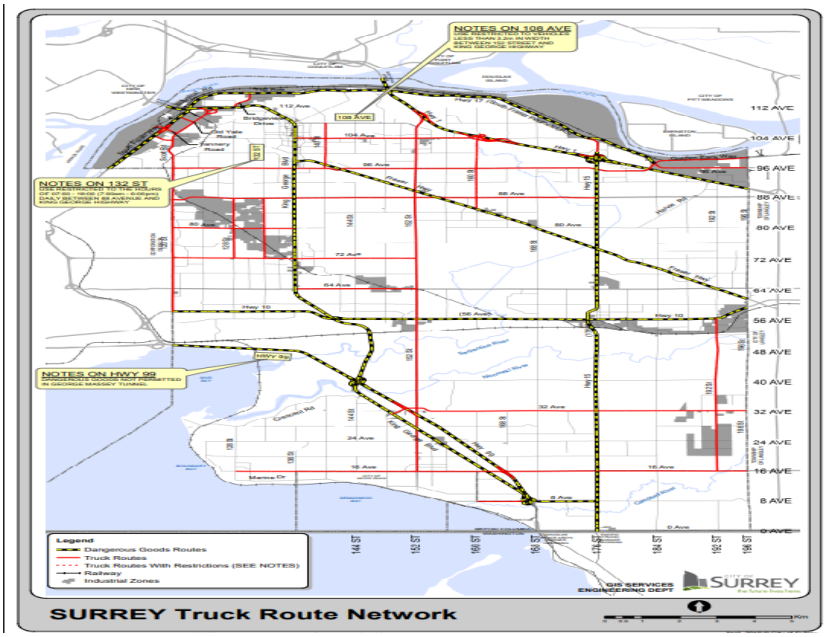
VIA Rail Canada. (2024). *A Strong Year For VIA Rail as Ridership Continues to Bounce Back*. Viarail.ca. https://media.viarail.ca/en/press-releases/2024/strong-year-rail-ridership-continues-bounce-back

Appendix

Appendix I: Calgary Truck Route



Appendix II: Surrey Truck Route Network



Appendix III: Edmonton Truck Route Map