The Calgary Goods Movement Strategy

Stage 1 Report: State of goods movement in Calgary

Approved by Council: December 17, 2018

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Executive Summary

Overview of the Goods Movement Strategy

This report is the first in a series that supports the development of The City of Calgary's Goods Movement Strategy.

Calgary is connected to local, national and international markets in several ways. Major railways, interprovincial and cross-border highways and a large international airport distribute products to and from businesses in Calgary and all over the world. Calgary residents and businesses alike rely on the timely availability of goods and products in order to meet their daily needs.

The Municipal Development Plan (MDP) and the Calgary Transportation Plan (CTP) set out the future direction for Calgary's urban form and transportation system. Both plans recognize that efficient goods movement is essential to Calgary's wellbeing and quality of life, as well as to the achievement of transportation, land use, economic and environmental aspirations and goals.

In support of this recognition, The City of Calgary has commissioned a Goods Movement Strategy (The Strategy, or sometimes the GMS). The Strategy will help determine what transportation infrastructure improvements need to be made to help Calgary thrive as an inland port over the next 30 years. The Strategy also will help The City support businesses and residents alike through continued improvements to our transportation network. These improvements will help us continue to efficiently move goods to markets in Calgary and beyond.

The objectives of the Goods Movement Strategy are to:

- Identify and prioritize short, medium and long-term actions and investments in transportation infrastructure to enhance the goods movement network in the city of Calgary.
- Support the Calgary Transportation Plan and Municipal Development Plan.
- Complement other City and regional economic development initiatives.
- Review and, where appropriate, consolidate The City's bylaws related to goods movement. This includes the truck route map and Bylaw 60M90.

The Strategy considers all modes of goods movement, namely road, active transportation, rail, air, marine, pipeline and utilities. The Strategy focuses on the city of Calgary proper but also considers goods movement activities and linkages with the surrounding region. It also considers the relationship between goods movement and Calgary's transportation network, land use and economic development. The Strategy will support the MDP, the CTP and other City policies.

The development of the Strategy has been organized according to four stages:

- Foundation establishes the basis for the Strategy, including a profile of current conditions and trends and a review of the policy context. **This report summarizes the findings of the Foundation stage**.
- Issues and challenges gathers stakeholder views on issues and challenges that relate to goods movement in and around Calgary.
- Opportunities explores how these issues and challenges can be addressed.
- Strategy and actions uses the results of the preceding stages to develop a policy framework for the Strategy, within which actions, investments and priorities are then identified. This stage also develops plans for implementing the Strategy and measures and data for subsequently monitoring the progress of this implementation. It also develops a plan for subsequent broader stakeholder engagement.

Figure ES-1 summarizes the four-stage process, along with an approximate timeline and a list of the key tasks that are conducted in each stage.

The Strategy has three types of outcomes:

- Policies specific to the Strategy and others that can be incorporated into future CTP, MDP and other City plans and strategies. These will be developed within the context of a policy framework for the GMS, in order to ensure consistency with each other and to coordinate the actions and priorities. Consolidated truck route bylaws are also policy outputs.
- Actions and investments. The Strategy will identify potential investment areas in infrastructure and operations that are under the jurisdiction of The City, other levels of government and network/terminal owners. It also will identify potential initiatives in technology, operations and practices, based on best practices in Calgary and elsewhere that could be taken up by the private sector. Business cases for these initiatives will be developed using benefit-cost analyses and will adhere to The City's Triple Bottom Line policies. Performance monitoring measures will also be identified to help The City assess progress on the implementation of the Strategy.
- Basis for continuing engagement. Through its comprehensive engagement process (described below), the Strategy has already begun to establish a dialogue among key goods movement stakeholders. The Strategy will provide the opportunity to continue this dialogue and potentially establish partnerships for implementing and possibly funding the Strategy's actions. It will also provide the opportunity for collaborating on other future initiatives.

The Strategy will complement and share a structure that is similar to other approved City transportation plans that detail the development of the transit network (Route Ahead), the pedestrian network (Step Forward) and the bicycle network (Cycling Strategy).

Figure ES-1 – Process for developing the Goods Movement Strategy

Stakeholder engagement and communications are the basis of the GMS, supported by analysis, profiles of existing conditions and trends, reviews of best practices and policies elsewhere and focused data collection. To do this, The City has developed and will administer a comprehensive engagement process.

The process provides several different ways (activities) for stakeholders to contribute to the Strategy, as follows:

- Project launch presentations at key industry and City forums at the beginning of the work, in February 2017.
- A web survey was distributed to members of the Calgary Chamber of Commerce.
- One-on-one interviews were conducted with a range of stakeholders.
- As part of the initial study work, agency meetings were conducted with internal City staff and with the City's emergency services, as well as with regional municipalities.
- Two advisory groups were struck to assist in formation of short term operational improvement opportunities and a long term strategic plan.

- Combined 'all-stakeholder' workshops provide an opportunity for all of the stakeholders to come together and review and contribute to the findings at key intervals.

There will also be opportunities to engage the public as the Stage 4 strategy and actions are developed. The basic policy framework will be presented to the public, in order to gather additional feedback on its shape and to look for gaps. There will also be a report back to the public, along with a final draft of the recommended GMS. The Strategy also will be posted online for the general public.

Figure ES-1 shows six groups of engagement opportunities, generally coinciding with the initiation and/or end of each stage.

A vision for the Goods Movement Strategy

As a first step, the Foundation stage established a vision. The vision suggests a desired or ideal future state for goods movement in Calgary. It sets the direction for the development of the policy framework for the GMS and of the subsequent actions and investments. The vision also establishes the importance of efficient goods movement in the eyes of the public and of political decision-makers. The vision further establishes goods movement as an important part of transportation, land use and economic development investments and priorities. This is especially important if, as elements of the Strategy are implemented, conflicts arise between addressing the needs of goods movement and addressing other needs, such as urban passenger movement.

A review of the CTP and other relevant City of Calgary policies and of goods movement strategies elsewhere results in the following proposed vision for goods movement in Calgary:

The goods movement strategy supports a multi-modal system that is safe, economical, reliable, efficient and environmentally sustainable.
Within Calgary, goods movement is widely recognized as an essential contributor to the economic, social and environmental wellbeing of residents and businesses.

The vision expresses how it will support all components of the goods movement system, regardless of who owns, supplies or operates these components. The vision talks to five key attributes:

- Safe for all users of the system, including passenger modes.
- Economical to implement, operate, maintain and use.
- Reliable in terms of the service offered to users, door-to-door travel times (i.e., which is not necessarily the same as offering short travel times) and network redundancy (allowing diversion between routes and modes, as situations dictate).
- Efficient in terms of directness and connectivity, including seamless interchanges between modes and efficient to operate and maintain.

- Environmentally sustainable, minimizing fuel consumption, greenhouse gas (GHG) emissions and air pollutant emissions from the process of distributing goods, equipment and the infrastructure used for goods movement, minimizing intrusions in environmentally, socially or culturally sensitive areas and the consumption of land and other resources.

These attributes appeal both to the owners and operators of the multi-modal system and to the users of the system. They signal to the private sector that the system's owners and suppliers, including The City of Calgary, recognize the importance of working collaboratively for the common good.

The proposed vision's wording links it directly to The City's Triple Bottom Line policy's basis in economic, social and environmental concepts. The proposed wording also establishes its importance to the achievement of the broader aspirations of Calgary's residents and businesses.

This last point – establishing the *importance* of goods movement – is significant also because it suggests that decision-makers must consider the extent to which goods movement investments and priorities will be balanced with those of passenger movement. While the Strategy aims to identify actions and investments that complement those already proposed elsewhere for passenger movement, the situation might arise in the future in which these proposals are in conflict with each other. Accordingly, there will be a need to ensure that the implementation of investments and priorities is balanced and that the merits of both goods and passenger needs are incorporated explicitly into the analytical, evaluation and decision-making processes as proposed investments and actions are considered for implementation.

Policy context

The GMS is informed by a comprehensive policy context. The context speaks to a range of aspirations and policies. It also provides the regulatory oversight for the use of the multi-modal goods movement network.

Among City policies, the MDP and CTP provide a context to support goods movement. They link goods movement to The City's land use, economic and sustainability policies and aspirations. The CTP notes the importance of accessibility to inter-modal facilities. It also designates the Primary Goods Movement Network, which is intended to facilitate the movement of goods and services in Calgary through measures that improve traffic flow and control access and the situation of industrial and goods-generating land uses close to the network. Other policies, such as The City's Complete Streets Policy, the Environmental Policy, the 2020 Sustainability Direction, the Triple Bottom Line Policy Framework, the Economic Development Strategy and the Industrial Lands Strategy, also support or a relevant to goods movement. The City's Bylaw 60M90 regulates the use of truck routes in Calgary. Bylaw 60M90 is supported by the Truck Route Network Development Policy, the Dangerous Goods Route Network Development Policy and the High Load Corridor Development Policy. The City of Calgary is also part of

TRAVIS, which is the Provincially-led multi-jurisdictional permitting system for over-sized and overweight loads.

At the regional level, goods movement in Calgary is informed by the Calgary Metropolitan Plan. Relevant provincial policies and regulations include the Commercial Vehicle Safety Regulations and the 2017-2020 Transportation Business Plan. Relevant Government of Canada Acts include the Canada Transportation Act and the Transportation of Dangerous Goods Act. The Asia-Pacific Gateway and Corridor Initiative and the Trade and Transportation Corridors Initiative aim to support national and international trade flows between North America and Asia through strategic infrastructure investments and policy measures in different parts of Canada.

Overview of existing conditions

Calgary is supported by a comprehensive multi-modal goods movement network, comprising the Primary Goods Movement Network, Calgary International Airport and several CN and CP intermodal terminals, transload facilities and automotive compounds.

A review of existing conditions and trends describe several key characteristics concerning the network and its use:

- Although the region surrounding Calgary is growing quickly, according to City of Calgary forecasts, the city itself is expected to continue to be the dominant hub for population (81% by 2039) and jobs (87% by 2039).
- Southeast and northeast Calgary are the primary concentrations of the region's industrial activity. They will continue to grow. Commercial and industrial activity is also expected to grow east and northeast of Calgary and along Highway 2, especially to the north.
- Transportation is an important economic sector in Calgary, employing 61,000 people in 2015. Excluding downtown, which likely represents head office employment, most transportation-related employment is clustered into two areas in Calgary: in the city's northeast, south of Calgary International Airport and in the city's southeast between the CP and CN rail networks. The airport, railways and the city's major highways and arterials provide multi-modal access to these clusters.
- A review of truck activity, based on GPS traces, indicates that these areas are also key generators of truck trips, along with industrial areas to the north and east of Calgary. The highest proportions of truck activity, as a percentage of total traffic volumes, occur on the roads and highways that serve these areas, as well as on sections of the Stoney Trail and roads in northwest Calgary.
- In absolute terms, the northeast quadrant of Stoney Trail experiences some of the highest truck volumes, which is consistent with its role in connecting the major industrial areas and the inter-city highway network. Highway 2 from the north and the south makes up the busiest truck entry points to Calgary.

- Among the city's expressways and highways, truck speeds are highest on the Stoney Trail, with nearly free flow speeds being maintained even during the commuter peak periods. However, many sections of Deerfoot Trail and Glenmore Trail are subject to some congestion. Truck volumes across the city have been growing, generally in line with growth in Calgary's population and employment, and with volumes crossing the city boundaries growing fastest. These trends are expected to continue in the future.

Some of the most significant delay bottlenecks are:

- On Deerfoot Trail north of the Trans-Canada Highway, speeds drop below 30 kilometres per hour (kph) in the northbound direction between 4:00 and 6:00 p.m., compared to a free-flow speed of almost 60 kph.
- Glenmore Trail is very slow in the a.m. peak period westbound approaching Ogden Road S.E., likely due to road construction in this area.
- Deerfoot Trail is subject to heavy truck delay northbound between 130 Avenue S.E. and Anderson Road S.E. (particularly between 7:00 and 9:00 a.m.) and southbound from 11 Street S.E. to Anderson Road S.E. (between 3-6 p.m.).
- Many of the streets in downtown Calgary are subject to significant truck delay, although speeds are generally fairly low to begin with.

The locations of delay on Deerfoot and Glenmore Trail are in line with congestion points most frequently identified by stakeholders.

- Data on the quantities and types of freight that are moved on Calgary's railways are not available. However, CP's mainline in southeast Calgary, which links Calgary with the rest of Canada to the east and to the United States Midwest, averages more than 25 freight trains per day. CP's mainline to the west has the second highest levels, between 16 and 24 trains per day. These volumes are lower than, but are approaching, the potential capacity of a single-track line. CN's rail line in southeast Calgary has lower traffic levels, between 5 and 10 trains per day.
- Calgary International Airport is a 24/7 airport, with non-stop flights to 68 cities. The airport handles approximately 135,000 tonnes of air cargo each year: although these quantities are small relative to other modes, given that most of these commodities are high-value, air cargo's share of total freight to and from Calgary by value is much higher than its share by volume. Approximately $2.1 billion worth of products was exported internationally by air in 2016. Approximately $2.9 billion worth of products delivered by air were cleared through customs at the airport. Most cargo moves in the belly of passenger aircraft. Tonnages are not available; however, as one indication, it can be noted that Calgary International Airport is third-busiest airport in Canada, with nearly 250,000 itinerant aircraft movements in 2015.

- Liquid product and natural gas pipelines operate in and through Calgary. Of note, one pipeline carries refined fuel products from refineries in the Edmonton area to distribution terminals in Calgary, carrying approximately 48,000 barrels of refined fuel products per day.
- The GMS is informed by a variety of data sources that describe goods movement in and around the city. Most of these sources cover road-based activity. The City has screenline and intersection counts throughout Calgary, as well as accident reports and TRAVIS permitting activity. GPS truck trip traces provide 24/7/365 coverage of heavy truck routings, stops, trip origins, trip destinations and travel times, from which speeds and delays can also be identified. Transport Canada data indicate the frequency of freight trains, although only on sections which have at-grade crossings. Other Transport Canada data provide inter-city and international travel times for marine, rail and truck cargo movements.
- To supplement these data, the Strategy updated a series of roadside truck origin-destination surveys that were conducted in 2000. These surveys were carried out at a cordon surrounding the city. They captured the characteristics of inter-city and inter-regional truck trip origins and destinations, the types and amounts of loads carried and routing, among other information.
- In addition to being an important Western Canada hub for goods movement, goods movement also is a key contributor to the Calgary region's economy. The Transportation and Warehousing and Wholesale Trade sectors directly accounted for nearly 8% or $9 billion (expressed in 2007 $) of the Calgary region's gross domestic product (GDP) in 2015. These sectors in turn support other economic activity, yielding a combined GDP impact of $14.5 billion (2007 $) in 2015 and directly and indirectly supporting 134,000 jobs in the Calgary region.
- Initial consultations, conducted at the launch of the Strategy in February 2017, identified several issues that were important to stakeholders. The most important of these were congestion on provincial highways in and around Calgary, congestion on other roads in and around Calgary and conflicts with other traffic, including transit, pedestrians and cyclists.

Summary

Goods movement is critical to Calgary's economic wellbeing and quality of life. Calgary and the surrounding region have a comprehensive, multi-modal goods movement network. This report, State of Goods Movement in Calgary, establishes an inventory of the goods movement system and its use. It provides a sound and robust basis for subsequent stages and stakeholder consultations to support the development of The City of Calgary Goods Movement Strategy.

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D. Recommended consolidation of the truck bylaws

Acronyms and Abbreviations

AMTA	Alberta Motor Transport Association
APGCI	Asia-Pacific Gateway and Corridor Initiative
ATRI	American Transportation Research Institute
BIA	Business improvement area
BNSF	Burlington Northern Santa Fe Railway
BRZ	Business revitalization zone
CED	Calgary Economic Development
CLC	Calgary Logistics Council
CMA	Census Metropolitan Area
CN	Canadian National Railway
CP	Canadian Pacific Railway
CRP	Calgary Regional Partnership
CTC	Calgary Transportation Club
CTP	Calgary Transportation Plan
D&B	Dun and Bradstreet Employment Location Data
EOQ	Economic order quantity
GDP	Gross domestic product
GHG	Greenhouse gas
GPS	Global Positioning System
GMS	The City of Calgary Goods Movement Strategy
LFS	Labour Force Survey (Statistics Canada)
MDP	Municipal Development Plan
MGA	Municipal Government Act (Province of Alberta)

NAICS	North American Industrial Classification System
NAPCS	North American Product Classification System
NNC	Nutrition North Canada
OAG	Operational Advisory Group
QE2	Queen Elizabeth II Highway (Highway 2)
SAG	Strategic Advisory Group
TAZ	Traffic analysis zone
TFR	Canadian Pacific Railway name for transload facilities
The Strategy	The City of Calgary Goods Movement Strategy
TTI	Travel time index
TRAVIS	Multi-jurisdictional Transportation Routing and Vehicle Information System
UP	Union Pacific Railroad
UTM	Universal Transverse Mercator
YYC	Calgary International Airport

1 Introduction

1.1 Study purpose

Calgary is connected to local, national and international markets in several ways. Major railways, interprovincial and cross-border highways and a large international airport distribute products to and from businesses in Calgary and all over the world. Calgary residents and businesses alike rely in the timely availability of goods and products in order to meet their daily needs.

The Municipal Development Plan (MDP) and the Calgary Transportation Plan (CTP) set out the future direction for Calgary's urban form and transportation system. Both plans recognize that efficient goods movement is essential to Calgary's wellbeing and quality of life, as well as to the achievement of transportation, land use, economic and environmental aspirations and goals.

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- Support the Calgary Transportation Plan and Municipal Development Plan.
- Complement other City and regional economic development initiatives.
- Review and, where appropriate, consolidate The City's bylaws related to goods movement. This includes the truck route map and Bylaw 60M90.

The City's Project Charter describes the outcomes and role of the Goods Movement Strategy in the following terms:[1]

"*The GMS will provide a list of actions and investments that support Calgary's continued development as an economic leader in multi-modal services and solutions. The City will work with representatives from goods movement industries in the development of the strategic plan. The GMS will allow The City to support the goods movement industry and the citizens of Calgary through continued improvements to the transportation and supporting networks that allow for the efficient movement of goods to markets in Calgary and beyond. The GMS will assist Council and Administration in making informed decisions on projects and initiatives to support goods movement industries in Calgary. Informed decisions on goods movement will sustain and grow a vibrant economy with Calgary's continued role as a global economic leader through a full range of multi-modal services and solutions.*"

[1] Project Charter for the Goods Movement Strategy, The City of Calgary, August 2016.

1.2 What does the GMS include?

The Goods Movement Strategy considers all modes of goods movement, namely:

- Road, which includes trucking services and couriers.
- Active transportation, comprising bicycles and pedestrians.
- Rail, focusing on intermodal terminals, transload terminals and rail corridors in and around Calgary (as opposed to rail services and routes).
- Air, focusing on the Calgary International Airport (as opposed to air services and routes).
- Marine - that is, accounting for ocean ports that serve goods moving to, from or through Calgary.
- Pipeline, primarily in their role in transmitting and delivering energy to Calgary's homes and businesses.
- Utilities, in consideration of how utilities distribute power and communications services and how these facilities interact influence right of way requirements and urban road usage.

The GMS focuses on the movement of goods (sometimes referred to as freight or cargo). However, the Strategy also considers service vehicles, which do not generally carry goods but are engaged in providing commercial services, such as appliance repair.

The GMS focuses on urban goods movement, which is primarily road-based. However, it also looks at Calgary's intermodal connections with the rest of Alberta, the rest of Canada, the United States and around the world.

The GMS is focused on the city of Calgary proper, but also considers goods movement activities and linkages with the surrounding region (the Calgary Region).

The Strategy considers the relationship between goods movement and Calgary's transportation network, land use and economic development. Although economic analysis and the development of business cases will be developed to support the Strategy's recommended actions and investments, it should be noted that taxation and financing policies are not within the scope of the strategy.

1.3 Relationship to other City initiatives

The GMS is being developed within the context of other key City initiatives – notably, the MDP, the CTP, The City's Sustainability Directions and The City's economic development aspirations and policies.2 It is intended to support and be consistent with these initiatives in several specific ways.

The Strategy will support the Municipal Development Plan by:

- Complementing and supporting the MDP's urban growth policies.
- Considering the role of Smart Freight, freight-friendly land use planning and other planning concepts that can help to manage urban growth
- Considering the relationship between Calgary and its surrounding municipalities, insofar as goods-generating land uses and development are concerned.

[2] Chapter 3 profiles these and other policies and initiatives.

- Complementing The City's growth management and industrial land strategies.

The Strategy will support the Calgary Transportation Plan by:

- Complementing and supporting the CTP's multi-modal, sustainable passenger transportation initiatives. The Strategy also will account for greenhouse gas (GHG) emissions in goods movement.
- Reviewing, enhancing and augmenting the CTP's goods movement policies.
- Providing actions and policies that show how the CTP's goods movement goals will be achieved.
- Serving as a key input to the planned 2019 update of the CTP.

The Strategy will support The City of Calgary's 2020 Sustainability Directions for a prosperous economy and smart growth by:

- Developing a list of actions and investments that support the attraction and retention of businesses that must move goods to markets in Calgary, the surrounding region, nationally and internationally.

The Strategy will support Calgary's economic development:

- By articulating the importance of goods movement to Calgary's economy and to The City's economic development aspirations. The Strategy will establish the importance of efficient goods movement to the costs and availability of goods and products, and it will examine the contributions of the goods movement industry to Calgary's economy and jobs.
- Through the Strategy's engagement (see Section 1.5) by:
    - Providing a voice for goods movement stakeholders.
    - Establishing the basis for future partnerships.
    - Identifying contacts for future consultations as needed for specific projects.

The Strategy will profile goods-generating industries, examine intermodal connectivity and consider other issues that important to goods movement stakeholders.

1.4 Study approach and outcomes

1.4.1 Approach and process

Stakeholder engagement and communications are the basis of the GMS, supported by analysis, profiles of existing conditions and trends, reviews of best practices and policies elsewhere and focused data collection. The development of the Strategy has been organized according to four stages:

1. Foundation establishes the basis for the Strategy, including a profile of current conditions and trends and a review of the policy context.
2. Issues and challenges gathers stakeholder views on issues and challenges that relate to goods movement in and around Calgary.
3. Opportunities explores how these issues and challenges can be addressed.
4. Strategy and actions uses the results of the preceding stages to develop a policy framework for the Strategy, within which actions, investments and priorities are then identified. This stage also develops plans for implementing the Strategy and for monitoring the progress of this implementation. It also develops a plan for subsequent broader stakeholder engagement.

Figure 1-1 summarizes the four-stage process, along with an approximate timeline and a list of the key tasks that are conducted in each stage.

1.4.2 Outcomes

The Strategy has three types of outcomes:

- Policies specific to the Strategy and others that can be incorporated into future CTP, MDP and other City plans and strategies. These will be developed within the context of a policy framework for the GMS, in order to ensure consistency with each other and to coordinate the actions and priorities. Consolidated truck route bylaws are also policy outputs.
- Actions and investments. The Strategy will identify potential investment areas in infrastructure and operations that are under the jurisdiction of The City, other levels of government and network/port owners. It also will identify potential initiatives in technology, operations and practices, based on best practices in Calgary and elsewhere that could be taken up by the private sector.
- Business cases for these initiatives will be developed using benefit-cost analyses and will adhere to The City's Triple Bottom Line policies. Performance monitoring measures will also be identified to help The City assess progress on the implementation of the Strategy.
- Basis for continuing engagement. Through its comprehensive engagement process (described below), the Strategy has already begun to establish a dialogue among key goods movement stakeholders. The Strategy will provide the opportunity to continue this dialogue and potentially establish partnerships for implementing and possibly funding the Strategy's actions. It will also provide the opportunity for collaborating on other future initiatives.

Figure 1-1 – Process for developing the Goods Movement Strategy

The Strategy will complement and share a structure similar to other approved City transportation plans that detail the development of the transit network (Route Ahead), the pedestrian network (Step Forward) and the bicycle network (Cycling Strategy).

1.5 Stakeholder engagement and communications

1.5.1 Stakeholder engagement

The goods movement stakeholder community is broad and diverse. Table 1-1 lists the anticipated stakeholder groups that are being consulted for the GMS: note that this list is indicative and is subject to revision as the Strategy progresses.

Table 1-1: List of stakeholder groups (indicative)

- City Council
- Internal City Divisions – Roads, Real Estate and Development Services, Growth Strategies
- Truck Route Committee
- Regional agencies
- Alberta Transportation
- Research institutes (Van Horne Institute, Mount Royal University)
- Calgary Airport Authority
- Railways – Canadian National Railway (CN), Canadian Pacific Railway (CP)
- Trucking companies and couriers
- Industries and businesses
- Industry organizations – Calgary Logistics Council (CLC), Alberta Motor Transport Association (AMTA), Calgary Transportation Club (CTC)
- Economic development organizations – Calgary Economic Development (CED), Calgary Chamber of Commerce, business revitalization zones (BRZs), business improvement areas (BIAs)
- Residents and communities
- Utility transmission companies – pipelines, fibre, electrical transmission

The stakeholders identified above represent a wide cross section of the goods movement community in Calgary. This will result in a wide array of interests and priorities. Accordingly, The City has developed and will administer a comprehensive engagement process.[3] The process provides several different ways (activities) for stakeholders to contribute to the Strategy, as follows: [4]

- Project launch presentations at key industry and City forums at the beginning of the work, in February 2017.
- A web survey was distributed to members of the Calgary Chamber of Commerce.
- One-on-one interviews were conducted with a range of stakeholders.
- As part of the initial study work, agency meetings were conducted with internal City staff and with the City's emergency services, as well as with regional municipalities.

[3] Working with City staff, the Strategy's consultant team will contribute technical content and will lead the technical discussion at in-person meetings.

[4] Additional details can be found in The City of Calgary, *Goods Movement Strategy // Engage Plan*, draft 2.1, 10 January 2017.

- Two advisory groups were struck to assist in formation of short-term operational improvement opportunities and a long term strategic plan. Further details on the role of the advisory groups are provided in Section 1.5.3.
- Combined 'all-stakeholder' workshops provide an opportunity for all of the stakeholders to come together and review and contribute to the findings at key intervals.

It should be noted that all surveys are anonymous, so that the respondent cannot be identified. Although summary reports will be prepared for each engagement opportunity, no attributions will be made to individual participants without their permission.

There will also be opportunities to engage the public as the Stage 4 strategy and actions are developed. The basic policy framework will be presented to the public, in order to gather additional feedback on its shape and to look for gaps. There will also be a report back to the public, along with a final draft of the recommended GMS. The Strategy also will be posted online for the general public.

Figure 1-1 shows six groups of engagement opportunities, generally coinciding with the initiation and/or end of each stage. Table 1-2 lists how the various engagement activities fit within each engagement opportunity.

Table 1-2: Engagement opportunities and associated activities

Engagement	Activity included
Engagement I – Introduction	• 2 meetings with The City of Calgary • 1 meeting each with Truck Route Committee, CLC, CED, plus one-page survey • 2 advisory group meetings
Engagement II – Issues and Challenges	• 2 advisory group meetings • 1 workshop with various goods movement stakeholders • Web survey through the Calgary Chamber of Commerce • One-on-one interviews
Engagement III – Issues and Challenges (report back) and Opportunities	• 2 advisory group meetings • 1 workshop with various goods movement stakeholders
Engagement IV – Opportunities (report back)	• 2 advisory group meetings • 1 workshop with various goods movement stakeholders • 1 public meeting
Engagement V – Policy Framework, Actions, Investments and Priorities	• 2 advisory group meetings • 1 workshop with various goods movement stakeholders • 1 public meeting
Engagement VI – Strategy, Actions and Implementation Plan	• 2 advisory group meetings • 1 workshop with various goods movement stakeholders
Presentations	• 1 each to Committee, Council, CED and CLC (4 total)

1.5.2 Communications strategy

The City developed a communications plan to inform stakeholders about engagement opportunities and encourage their participation in them. The communications plan includes tactics such as a dedicated page on calgary.ca for the Strategy, advertising the project using The City of Calgary's social media, e-mail newsletters and articles in community and industry newsletters.[5] Also important is an educational strategy for the general public, to be implemented by The City prior to the Stage 4 Strategy and Actions. This strategy will be used to educate and inform the public about goods movement generally and its role in the daily lives and activities of residents and businesses.

1.5.3 Role of advisory groups

The City has struck operational and strategic advisory groups as part of the strategy. The Operational Advisory Group (OAG) focuses on short-term conditions and issues, looking at short-term actions and practices that can support goods movement. The Strategic Advisory Group (SAG) focuses on long-term strategies, policies and infrastructure needs.

The two advisory groups complement each other. Examples of issues that the OAG considers include:

- Infrastructure operations and maintenance
- State-of-roads
- Traffic signal synchronization
- Load management and similar short-term actions and practices that could be taken up by the goods movement community
- Bylaws relating to goods movement in Calgary.

Examples of issues considered by the SAG include:

- Future long-term goods movement infrastructure and facilities.
- Long-term land use (development) and growth management policies as they pertain to goods movement or goods-generating uses.
- Relationship of goods movement and the City's economic development aspirations.

The members of each advisory group have been chosen in order to provide a broad range of perspectives from the stakeholder community. They are intended to speak from the perspective of their own experiences, but they do not represent their individual organizations or businesses.

As noted, the advisory groups will meet at strategic points over the course of the Strategy. The meetings will be administered by The City of Calgary, with the technical contribution provided by the Strategy's consultant.

1.6 This report

This report describes the findings of the Stage 1 Foundation tasks. It is organized into seven chapters, as follows (with the chapter number shown in parentheses):

- Introduction (Chapter 1).

[5] For details, see The City of Calgary, *Communication Plan for The Goods Movement Strategy*.

- Vision – establishing a vision and guidelines for the Strategy (Chapter 2).
- Policy context for the Strategy (Chapter 3).
- Overview of existing conditions and profile of the goods movement network (Chapter 4).
- State of goods movement data – a review of the data that The City has available for goods movement planning and analysis (Chapter 5).
- Explanation of the economic importance of goods movement in Calgary (Chapter 6).
- Summary of stakeholder engagement findings to date (Chapter 7).

The report is accompanied by two appendixes. Appendix 8.1 summarizes visions from goods movement strategies in other cities elsewhere in Canada, the United States and overseas, in support of Chapter 2. Appendix 8.2 lists the cargo facilities at Calgary International Airport, in support of the Section 4.3.3 description of the Airport as a cargo hub.

1.7 Sources of information

This report is based on a number of policy documents and reports, all of which are cited in the footnotes in the discussion. Travel and demographic forecasts and screenline counts were provided by The City's Forecasting Division: these data were analyzed by the consultant. The City also provided several digital maps. Finally, the report takes into account the results of the initial paper surveys, which were distributed at the project launch meetings.

2 A vision for the Goods Movement Strategy

2.1 Why a vision?

This chapter develops a vision for goods movement. The vision suggests a desired or ideal future state for goods movement in Calgary. As such, it sets the direction for the development of the policy framework for the GMS and of the subsequent actions and investments. The vision also establishes the importance of efficient goods movement in the eyes of the public and of political decision-makers. The vision further establishes goods movement as an important part of transportation, land use and economic development investments and priorities. This is especially important if, as elements of the Strategy are implemented, conflicts arise between addressing the needs of goods movement and addressing other needs, such as urban passenger movement.

2.2 Review of other visions

The development of the vision is based upon current City priorities and directions for transportation. It also draws on a review of vision statements from other goods movement strategies in Canada, the United States and overseas. These are discussed below.

2.2.1 Existing City visions relating to goods movement

2.2.1.1 Council Priorities

Council has defined a vision for Calgary that is expressed in terms of five Council Priorities. These are:[6]

- A prosperous city. Calgary continues to grow as a magnet for talent, a place where there is opportunity for all and the best place in Canada to start and grow a business.
- A city of inspiring neighbourhoods. Every Calgarian lives in a safe, mixed and just neighbourhood and has the opportunity to participate in civic life.
- A city that moves. People and goods can move well and safely throughout the city, using a variety of convenient, affordable, accessible and efficient transportation choices.
- A healthy and green city. We steward our air, land and water while encouraging healthy lifestyles for all Calgarians.
- A well-run city. Calgary's government is open, responsive, accountable and transparent, delivering excellent services at a fair price. We work with our government partners to ensure we have the tools we need.

Although only the third priority talks explicitly to goods movement, it is clear that goods movement contributes to the other four priorities. The third priority also introduces several concepts that important to goods movement:

- Convenience, which can be exemplified by seamless intermodal connections.

[6] The City of Calgary Action Plan, 2015-2018, Our Vision http://www.calgary.ca/CA/fs/Pages/Action-Plan/Council-Priorities.aspx.

- Affordability, for both the user and provider of goods movement services.
- Accessibility – that is, all types of goods can be moved to and from all locations.
- Efficiency, which can be defined in several ways, including reliability of journey times, directness of routes between origin and destination, a safe environment for all network users, availability of lowest cost services and so on.

2.2.1.2 Municipal Development Plan

The Municipal Development Plan (MDP) guides Calgary's long-term urban growth and development. The MDP identifies 11 Sustainability Principles for Land Use and Mobility, of which the ninth principle refers to goods movement explicitly:[7]

Connect people, goods and services locally, regionally and globally.

Other principles influence or are influenced by goods movement, notably:

- Provide a variety of transportation options. (4th principle)
- Mix land uses. (6th principle)
- Support compact development. (8th principle)
- Provide transportation services in a safe, effective, affordable and efficient manner that ensures reasonable accessibility to all areas of the city for all citizens. (10th principle)
- Utilize green infrastructure and buildings. (11th principle)

2.2.1.3 Calgary Transportation Plan

The Calgary Transportation Plan (CTP) guides the long-term development of Calgary's transportation system. While the CTP provides a vision for the future of transportation in Calgary, it does not articulate a specific vision for goods movement. However, it does express an objective for goods movement:[8]

To recognize the important economic role of goods movement by providing a safe, efficient and connective goods movement network that supports the Calgary International Airport, the Canadian National (CN) and Canadian Pacific (CP) intermodal facilities, transportation and distribution districts and goods movement routes, while also minimizing impacts on surrounding communities.

This objective speaks to the concepts of safety, efficiency and connectivity in its definition of the goods movement network that serves Calgary and its intermodal rail and air terminals. It also recognizes the importance of minimizing the less desirable impacts of goods movement on the adjoining communities.

2.2.2 Goods movement visions from other jurisdictions

[7] Municipal Development Plan, Office Consolidation, December 2015, The City of Calgary. The relevant MDP policies are examined in Section 3.1.1 below.

[8] Calgary Transportation Plan, Section 3.4 Goods Movement, The City of Calgary, 2009. The relevant CTP policies are examined in Section 3.1.2 below.

Visions from other jurisdictions in Canada, the United States and overseas can inform the development of a vision for the GMS (see Appendix 8.1 for details).

The visions can be categorized into two groups:

- Some visions are fairly broad. They are included within a broader transportation master plan and consider goods movement within that context. These provide the connection with passenger transportation and with other societal visions regarding land use, sustainability, the environment and the economy.
- Other visions are more specific to goods movement. They make a more explicit connection to the role of goods movement in achieving other societal visions, especially economic development but also sustainability and air quality. They detail various attributes of what an ideal goods movement network looks like and how it fits in more explicitly with other societal visions. They also bring the public and private sectors explicitly into the vision.

The explicitness of these more specific visions (the second group) provides a better model for the Strategy, while still ensuring that the vision is linked back to broader policy statements (the first group). Note that several other transportation master plans and goods movement strategies were also reviewed. However, they are not included in Appendix 8.1 because they do not articulate any vision, let alone one from which visions for goods movement could be derived. This matters because the presence of a vision statement signals its importance to the reader, increases awareness and education and helps to engage public and private stakeholders in the eventual implementation of a strategy and its actions.

In terms of the **scope** of the vision, the examples suggest that:

- The vision must speak to all perspectives: public aspirations such as land use, sustainability, environment, affordability, residents' quality of life and the private sector's economic viability.
- The vision must be consistent with and not contradict the wording of existing City policies.

A recent goods movement strategy in which consultant team members were involved (Halton Region in the Greater Toronto and Hamilton Area) illustrates the importance of these two points. Stakeholders identified the following elements as being most important to the vision:

- Reliability, where reliability means door-to-door travel times that are predictable with a high degree of confidence.
- Cost-efficiency, a system that provides financial benefits – for example, by increasing Halton Region's attractiveness to employers.
- A balanced system whose components (corridors) address the needs of all users in a balanced way.
- A system that optimizes 24-hour capacity - for example, through off-peak delivery.

It can be seen that these priorities reflect multiple public and private perspectives, while supporting the Region's sustainable transportation and economic development policies. In terms of the vision's **content** and **messaging**, the review of other goods movement strategy visions suggests that:

- Goods movement is explicitly recognized as being important and contributing to the wellbeing of Calgary's residents and businesses.
- Goods movement supports economic development aspirations. It does so consistently with aspirations for safety, sustainability, the environment, urban form and healthy communities.
- Goods movement is explicitly accounted for in the planning, design and operations of communities, the transportation system and private land uses and in the prioritization and funding of public infrastructure investments.

Table 2-1 lists the key **attributes** of a goods movement *system*, as explained in other goods movement strategies – that is, a goods movement *system* is the multi-modal network of infrastructure, terminals and services that serves the Calgary region. It can be seen that many of these complementary initiatives are aimed at the efficient movement of people. These attributes define what the GMS seeks to achieve.

Table 2-1: Attributes of a goods movement system: What the Strategy aims to achieve

System attribute	Description
Safe, efficient, reliable	Is safe, efficient, reliable, free of delays, especially unexpected delays, affordable to build, operate/ maintain and use, convenient spatially and temporally and accessible to all users.
Complementary use of corridors	Complements the movement of people safely, efficiently and reliably, through the use of shared corridors where appropriate.
Offers choices	Offers choices of modes as volumes, origins-destinations, shipping costs and frequencies change. Also ensures reliability by providing redundancy in the road/highway network so that drivers can switch easily to another route if an incident occurs on their primary route.
Integrated	Is integrated among all modes and their individual components, with roles and responsibilities of owners, maintainers and users clearly understood.
Multi-modal	Provides seamless transfer among modes, meaning that intermodal terminals are easily accessed and that services operate on convenient schedules.
Connectivity and directness	Meets industry's needs with a well-developed network of direct connections with goods-generating activity centres and intermodal terminals and with the major goods movement network.
Urban and inter-urban	Serves local and inter-regional needs (including access to internation ports).
Context sensitive	Recognizes and avoids sensitive areas, such as residential neighbourhoods and environmentally protected areas

Broad ownership and buy-in	Encourage cooperative expansion/upkeep and financing from both the public and private sectors
Soft attributes	Is defined as much by the quality, expertise and skills of the labour force that provides goods movement services as by infrastructure, operations and network performance.
Measureable outcomes	Is defined by measureable outcomes for all perspectives (for example, improving residents' health and improving Calgary's competitiveness by reducing delays and congestion).

2.3 A proposed vision

In sum, all of the attributes discussed above can be understood in terms of the following vision for goods movement in Calgary:

> *The goods movement strategy supports a multi-modal system that is safe, economical, reliable, efficient and environmentally sustainable.*
>
> *Within Calgary, goods movement is widely recognized as an essential contributor to the economic, social and environmental wellbeing of residents and businesses.*

The vision is drawn from the once proposed by the consultant team for recent goods movement strategies elsewhere in Canada. It expresses how it will support all components of the goods movement system, regardless of who owns, supplies or operates these components. The vision talks to five key attributes:

- Safe for all users of the system, including passenger modes.
- Economical to implement, operate, maintain and use.
- Reliable in terms of the service offered to users, door-to-door travel times (which is not necessarily the same as offering short travel times) and network redundancy (allowing diversion between routes and modes, as situations dictate).
- Efficient in terms of directness and connectivity, including seamless interchanges between modes and being efficient to operate and maintain.
- Environmentally sustainable, minimizing fuel consumption, greenhouse gas (GHG) emissions and air pollutant emissions from the process of distributing goods, equipment and the infrastructure used for goods movement, minimizing intrusions in environmentally, socially or culturally sensitive areas and the consumption of land and other resources.

These attributes appeal both to the owners and operators of the multi-modal system and to the users of the system. They signal to the private sector that the system's owners and suppliers, including The City of Calgary, recognize the importance of working collaboratively for the common good.

The proposed vision's wording links it directly to the Triple Bottom Line policy's basis in economic, social and environmental concepts. The proposed wording also establishes its importance to the achievement of the broader aspirations of Calgary's residents and businesses.

This last point – establishing the *importance* of goods movement – is significant also because it suggests that decision-makers must consider the extent to which goods movement investments and priorities will be balanced with those of passenger movement. While the Strategy aims to identify actions and investments that complement those already proposed elsewhere for passenger movement, the situation might arise in the future in which these proposals are in conflict with each other. Accordingly, there will be a need to ensure that the implementation of investments and priorities is balanced and that the merits of both goods and passenger needs are incorporated explicitly into the analytical, evaluative and decision-making processes as proposed investments and actions are considered for implementation.

3 Policy Context

The relevant policies and regulations that govern the use and development of the goods movement system in Calgary are presented below, organized by relevant jurisdiction. Consistent with the nature of a strategic plan, the perspective is that of planning, rather than operations, enforcement and engineering.

3.1 The City of Calgary

In 2007, Calgary City Council approved the Terms of Reference for an Integrated Land Use and Mobility Plan which expands Calgary's previous transportation plan (*The Go Plan* – 1995) into the Municipal Development Plan and the Calgary Transportation Plan, two policy documents that are central to informing The City's goods movement strategy.

The Plans set a long-term (60-year) strategy "*of a more sustainable city form for Calgary and the transportation networks needed to serve it. This is supported by a 30-year plan for managing growth and change, public investment and land use approval decisions. Finally, short-term, ten year, corporate decision-making, business planning, implementation and accountabilities are aligned to the strategies and plan to support Calgary's move to being a more sustainability city*."[9]

Aspects related to the movement of goods in the MDP and CTP are discussed below.

3.1.1 Municipal Development Plan (MDP)

The MDP is a statutory plan, prepared and adopted by bylaw, in accordance with Section 632 of the Municipal Government Act. It is aligned with the Provincial Land Use Framework as well as the draft Calgary Metropolitan Plan.

The MDP covers a range of topics that are focused on land use planning, development and growth management and speaks to the movement of goods in several specific ways, providing the policy framework for the GMS:

- Section 2.1.2 "*Creating a city attractive to business*" policies that support "*the transportation and logistics industry*" include:
    - Recognizing the role of the Calgary International Airport as a global logistics center while ensuring city-wide access is retained for public transit, passenger vehicles and goods movement;
    - Identifying railroad inter-modal sites as strategic destinations within the regional logistics network and plan for supporting land uses that benefit from proximity to these facilities;

[9] This and the ensuing discussions are taken from *Amendment No. 17 to the Municipal Development Plan as adopted by Calgary City Council in September 2009,* accessed March 15, 2017 from http://www.calgary.ca/PDA/pd/Documents/planning_policy_information/mdp-municipal-development-plan.pdf

    - Recognizing the access needs of the logistics industry by locating warehouses and local distribution centers in areas that provide direct roadway connections to the goods movement corridors.
- Section 2.5 "*Connecting the City*" notes that Calgary is a major hub for goods movement in western Canada and the movement of goods and services by air, rail and truck plays an important role in the Calgary economy.
    - Related policy directives under Section 2.5.1 "*Transportation Choice*" are "*respect the needs of businesses and the impact on local communities in the planning, design and maintenance of goods and service movement in the city*."
- Section 3.7 "*Industrial Areas*"[10] provides related mobility policies for both existing planned and future industrial areas including:
    - The road network should support the efficient movement of trucks, goods and services through existing planned and future industrial;
    - New inter-modal sites and warehousing facilities should develop within 1,600m of the Strategic Goods Movement Network (see discussions under CTP);
    - Protect the integrity of primary goods movement corridors by limiting direct access from truck routes to adjacent properties.
- Section 5.3 "*Monitoring and reporting*" provides core indicators for land use and mobility. As it relates to the core indicator "*Goods Access*"[11] – currently, 73% of inter-modal and warehousing facilities are located within 1,600m of the Primary Goods Movement Network with a 60-year target set at 95%.

Thus, the MDP provides the policy context for land use planning for the movement of goods by all modes of transportation and provides targets towards achieving the goals and objectives of the MDP.

3.1.2 Calgary Transportation Plan (CTP)

The CTP provides policy direction on all aspects of Calgary's transportation system. Adopted by Calgary City Council in September 2009, the most recent version of the report includes amendments from January 2014. Policy directions contained in the CTP are integrated with the MDP. [12]

[10] Defined in the MDP as areas providing a broad variety of industrial uses and intensities that support business in Calgary.

[11] Measures the percent of inter-modal and warehousing facilities within 1,600m of the Primary Goods Movement Network (see discussion under CTP)

[12] This and the ensuing discussions are taken from *the Calgary Transportation Plan (amended last in January 2013) as adopted by Calgary City Council in September in 2009,* accessed March 15, 2017 from http://www.calgary.ca/Transportation/TP/Documents/CTP2009/calgary_transportation_plan.pdf

Although the CTP emphasizes passenger movement, it recognizes commercial vehicles as a critical element of Calgary's economy with an emphasis on several key areas (airport, industrial areas, intermodal rail terminals and heavily used goods movement corridors).

Specifically, the CTP provides the policy framework for the Goods Movement Strategy as follows:

- The CTP describes seven transportation goals, of which the fifth – "*Promote economic development by ensuring the efficient movement of workers and goods*" - describes achieving a transportation system that facilitates the efficient movement of workers and goods by road, rail and air. It also recommends that transportation facilities provide access to major industrial and employment locations.
    - Transportation policies (Part 3) related to the movement of goods emphasize the efficient movement of commercial vehicles in industrial areas, along corridors defined as the Primary Goods Movement Network and to the airport and inter-modal rail facilities.

Section 3.4 deals specifically with planning the movement of goods, recognizing that Calgary is (1) a major part of the east-west trade corridor in Western Canada and (2) is a key distribution point for the movement of Asia-Pacific-related imports and exports. For planning purposes, consideration is given to the three primary modes responsible for goods movement in the Calgary region – rail, air and truck (see Table 3-1). Each mode plays a distinct role in the movement of goods, however, as a matter of policy, these modes must be capable of working together in order to drive the economy.

- As it relates to trucking, the CTP includes a new Primary Goods Movement Network "*that will facilitate the movement of goods and services in Calgary*" and defines "*high-priority goods movement routes where the most concentrated activity will occur.*" The Primary Goods Movement Network is illustrated in Figure 4-13 in Section 4.3.1.1.

- Recommendations in Section 3.4 Goods Movement include:
    - The importance of inter-modal facilities and a connected goods movement network should be recognized to ensure reliable goods movement and land accessibility;
    - Calgary, regional partners and other stakeholders should co-ordinate the development of roadway connections in the city and region, with consideration for the location of industrial land uses;
    - The integrity of major goods movement routes should be protected by limiting direct driveway access to roadways that form part of the Primary Goods Movement Network while encouraging appropriate adjacent land use planning with adequate truck accessibility.
    - Intelligent Transportation Systems (ITS)[13] should be used to improve traffic flow and travel time reliability on the Primary Goods Movement Network. The retention and expansion of existing railway corridors within city limits should be supported.
    - Calgary should consider the impact of goods movement routes on roadways in adjacent municipalities.

[13] ITS, as defined in the CTP, is the application of advanced technology to improve transportation operations, including the control and management of traffic flow and communication of relevant information to travelers and service providers so they can respond to changes in travel conditions or times as necessary.

Table 3-1: Primary transport modes for goods movement

Mode	Infrastructure characteristics related to goods movement

Air	• The Calgary International Airport is one of only two airports in Canada with direct connections to Asia and Europe
	• It operates 24 hours a day, seven days a week without curfews or noise restrictions
	• Has first-class cargo facilities including:
	  ○ Livestock handling facility
	  ○ On-site refrigeration facilities
	  ○ 17 acres of runway-side warehouse and logistics lands

Rail	• CN and CP both have major rail inter-modal facilities in southeast Calgary • There is a need for safer infrastructure related to the interaction between railway and roadway users as there are numerous level crossings within the Calgary City limits

Truck	• Calgary is a trucking hub with major highway connections passing through the City, including:
	  ○ Highway 2 (Deerfoot Trail), which is a major north/south route as part of the CANAMEX highway system (also provides connectivity to the Alberta oilsands)
	  ○ The Trans-Canada Highway, which is the major east/west route providing connectivity across Canada
	• When the Ring Road is completed, it will also play a central role in facilitating the movement of goods
	• Within the Calgary city limits, bylaws designate certain routes for trucks above a certain weight. These trucks may only deviate from assigned routes to reach their ultimate destinations using the shortest path to and from designated routes.

Source: Calgary Transportation Plan

3.1.2.1 Monitoring and Reporting Program

As part of the CTP Implementation Framework, the Transportation Data division of Calgary's Transportation Planning department developed the Monitoring and Reporting Program or "Mobility Monitor" as a mechanism through which the objectives of the CTP and MDP can be assessed.[14]

Travel time reliability on the goods movement network is one of the citywide indicators monitored by the program with results informing a baseline and 10-year targets. Bluetooth technology is used to collect data by tracking when individual signals reach various points along routes of study in order to determine travel time.

[14] This and ensuing discussion are taken from Mobility Monitor Issue #39 – June 2011, *Measuring Travel Time Reliability on Selected Goods Movement Corridors,* accessed March 17, 2017 from http://www.calgary.ca/_layouts/cocis/DirectDownload.aspx?target=http%3a%2f%2fwww.calgary.ca%2fTransportation%2fTP%2fDocuments%2fPlanning%2fTransportation-Data%2fmobility_monitor_june.pdf&noredirect=1&sf=1

The metric that measures travel time reliability is the Travel Time Buffer Index (%)[15] which measures the extra buffer time that most drivers add to their average travel time when planning trips to ensure on-time arrival. In other words, it is a measure of *expected* variability in the time spent traveling a route.

3.1.3 2015-2024 Transportation Infrastructure Investment Plan

In a report called "Investing in Mobility", The City of Calgary provides a strategic outline that defines the priority and timing of transportation-related capital projects from 2015 to 2024 and is aligned with the previously discussed CTP.[16]

Section 3 covers transport infrastructure investments in the category of goods movement and traffic growth. Projects in this category are designed to improve travel speeds and reliability for commercial vehicles and commuters on heavily used road corridors and include (1) new interchanges and bridges, (2) road widening and upgrades, (3) new road connections to provincial highways and (4) new traffic signals and noise barriers.

Specific references are made to investments in the Primary Goods Movement Network (see discussions under the CTP) which are aimed to "*improve travel time, safety and reliability for commercial vehicles conducting business in Calgary*." They also support the economy by ensuring Calgary's continued role as a major distribution hub for western Canada.

In total, $762 million has been allocated towards funding projects in the Primary Goods Movement Network including interchanges, interchange upgrades, road extensions and ramps.

3.1.4 Complete Streets Policy

Although Section 3.7 of the CTP includes 22 guiding policies for Complete Streets[17] design, as a planning document it does not provide detailed criteria to design nor the process to implement Complete Streets. Thus the Complete Streets Policy was created as a key CTP implementation deliverable. The purpose of the policy is to:[18]

- Improve safety and accessibility for all road users. The policy provides comprehensive guidelines to The City of Calgary staff and the development industry on how to incorporate Complete Streets

[15] Travel Time Buffer Index (%) = (95th percentile travel time [minutes] – average travel time [minutes]) ÷ average travel time [minutes]

[16] This and the ensuing discussions are taken from *Investing in Mobility – 2015-2024 Transportation Infrastructure Investment Plan,* accessed March 17, 2017 from http://www.calgary.ca/Transportation/TP/Documents/Planning/Investing%20in%20Mobility/investing-in-mobility.pdf

[17] Per the Complete Streets Policy, Complete Streets are defined as a new selection of multi-modal streets that incorporate elements of green infrastructure and function in the context of surrounding land uses.

[18] This and ensuing discussion are taken from *Complete Streets Policy – November 2014,* accessed March 21, 2017 from http://www.calgary.ca/_layouts/cocis/DirectDownload.aspx?target=http%3a%2f%2fwww.calgary.ca%2fCA%2fcity-clerks%2fDocuments%2fCouncil-policy-library%2fTP021-Complete-Streets-Policy.pdf&noredirect=1&sf=1

concepts into the planning, design and construction of new streets and the reconstruction of existing streets. These guidelines better accommodate pedestrians, cyclists, street trees and low-impact development while striving to maintain existing right-of-way requirements; and

- Create liveable neighbourhoods by encouraging people to travel by walking, cycling and taking transit. It will enhance the safety and security of streets for all users, promote attractive streetscapes, provide transportation options, reduce the total amount of paved lanes, promote the economic wellbeing of both businesses and residents and increase civic space.

3.1.5 Other transportation studies

3.1.5.1 RouteAhead (transit)

In 2011, Council directed that a new long-term plan for Calgary's public transit be created in accordance with the CTP and subsequently established a team to develop the plan called RouteAhead. Based on extensive public engagement and guidance from a steering committee, RouteAhead provides strategic direction for public transit in Calgary for the next 30 years. It should be noted that RouteAhead does not cover the movement of goods.[19]

3.1.5.2 Cycling Strategy

Council developed its Cycling Strategy in light of the CTP. The strategy was approved in June 2010. It sets the vision for becoming "*one of the premier cycling cities in North America by making changes that encourage people to cycle*." [20] While focusing on the movement of people, the implementation of the Cycling Strategy would support the movement of goods by bicycle.

3.1.5.3 Pedestrian Strategy

Similar to the Cycling Strategy, StepForward is a policy document that focuses on the needs of pedestrians in Calgary and provides the vision for a safe and walkable city.[21] As with the Cycling Strategy, the implementation of the Pedestrian Strategy would further support the movement of goods on foot.

3.1.5.4 Pathway and Bikeway Plan

Adopted by Council in July 2000, the Pathway and Bikeway Plan establishes "*guiding principles that will ensure that Pathways and Bikeways are planned, developed, maintained and managed as a seamlessly integrated*

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[19] RouteAhead, *A Strategic Plan for Transit in Calgary – Approved by Calgary City Council in March 2013,* accessed March 21, 2017 from https://www.calgarytransit.com/sites/default/files/content/PDF/2013-0118strategyaheadweb1.pdf

[20] *Cycling Strategy – June 2011,* accessed March 22, 2017 from https://www.calgary.ca/Transportation/TP/Documents/cycling/Cycling-Strategy/2011-cycling-strategy.pdf?noredirect=1

[21] *StepForward – A Strategic Plan for Improving Walking in Calgary – August 2016*¸accessed March 23, 2017 from http://www.calgary.ca/Transportation/TP/Documents/Planning/Calgary-Transportation-Plan/pedestrian-strategy-report-sept2016.pdf

network for transportation and recreation." Necessarily, this plan emphasizes facilitating the movement of people by non-motorized means of transportation, although again its implementation provided a network that equally could be used to move goods by active transportation modes. An updated plan will be presented to Council for approval in 2018.

3.1.6 Truck route regulations

3.1.6.1 Bylaw 60M90

Truck routes are an important consideration in the Strategy. The City of Calgary regulates the use of truck routes through Bylaw 60M90, in terms of both the movement of goods to, from and through the city and impacts associated with trucking operations.

Bylaw 60M90 defines a truck as:

"(i) a truck-type vehicle[22] with a maximum weight in excess of 5,450 kilograms; or
(ii) any self-propelled vehicle, excluding Calgary Transit buses and school buses, with a maximum weight in excess of 5,450 kilograms; or
(iii) a tractor, grader, road building or road maintenance equipment, or construction equipment, other than truck-type vehicles, regardless of weight."

Restrictions on trucking routes in Bylaw 60M90 can be categorized into two types:

- General prohibitions, which can be permanent (all times) or at certain times of day. Restrictions can be imposed in order to avoid travel through residential areas, reduce truck noise impacts on adjacent areas, or because of truck traffic safety concerns due to undesirable road geometries or a high collision history. Other factors also may apply. Exemptions can be allowed for local access, where no alternative exists.[23]
- Load restrictions, which allow heavy truck traffic but only up to certain weight or dimensional limits. The restrictions are intended to minimize damage to the pavement and road structure; specifically on sections of roads or on structures that were not designed or constructed to handle the loads, roads that have critical height or weight restrictions, or road sections where repeated loading will deteriorate the condition of the infrastructure beyond what is considered normal and acceptable. The restrictions can be year-round or seasonal (during the spring thaw period). Load restrictions commonly apply to rural roads, although not exclusively.[24]

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[22] Paraphrased from Bylaw 60M90 as a vehicle or group of attached vehicles…intended for the conveyance of goods or materials of any kind.

[23] Schedule "A" – Highways Designated as Truck Routes, Schedule "B" – highways designated as "Restricted Truck Routes", Schedule "C" – Truck Zones of Bylaw 60M90 provide named streets, avenues and highways that form the regulated routings for trucks in Calgary.

[24] Schedule "D" – High Load Corridor Routes and Schedule "E" – High Load Corridor Routes provide named street, avenues and highways designated for high load trucks in Calgary.

3.1.6.2 Expansion of Bylaw 60M90

In 2006, the City of Calgary approved three new policies that expand on Bylaw 60M90, based on an increased focus on truck and goods movement issues within the Roads, Transportation Planning and Land Use Planning and Policy business units:[25]

- Truck Route Network Development Policy: Provides guidelines and principles for identifying acceptable truck routes based on sound engineering, adherence to other City of Calgary Council policies and minimizing impacts to the environment, social fabric and economic sustainability. The policy mandates a five-year review cycle for Bylaw 60M90.
- Dangerous Goods Route Network Development Policy: Provides guidelines and principles for identifying acceptable dangerous-goods routes based on sound engineering and public safety.
- High Load Corridor Development Policy: Provides guidelines and principles for identifying acceptable high-load truck routes based on parameters discussed above in the Truck Route Network Development Policy.

These policies aim to ensure that The City of Calgary takes a more proactive approach to addressing increasing issues with trucking and goods movement.

3.1.6.3 Multi-Jurisdictional Transportation Routing and Vehicle Information System (TRAVIS)

Introduced as a pilot project in 2009, TRAVIS is a one window web-based system that allows municipalities in Alberta to issue a single permit for overweight and over-sized loads that travel on provincial and municipal roadways.[26] In 2013, TRAVIS was transitioned to a permanent program.

3.1.7 Environmental / sustainability / climate change strategies

Several other municipal-level initiatives are worthy of mention as they may inform the Strategy. These initiatives are summarized below.

3.1.7.1 Environmental Policy

Revised in 2012, The City's Environmental Policy aims to (1) conserve, protect and enhance the environment for all Calgarians and the regional community, (2) integrate environmental principles and performance objectives into all decision-making processes [relating to growth, planning, infrastructure,

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[25] This and ensuing discussions are taken from Mobility Monitor Issue #17 – September 2007, *Trucks, Commercial Vehicles and Goods Movement in Calgary,* accessed March 17, 2017 from http://www.calgary.ca/_layouts/cocis/DirectDownload.aspx?target=http%3a%2f%2fwww.calgary.ca%2fTransportation%2fTP%2fDocuments%2fdata%2fmobility_monitor_sept.pdf&noredirect=1&sf=1

[26] This and the ensuing discussions are taken from Roadata Services Ltd, *October 2011 - What Industry Needs to know about Changes to the Travis Web* accessed on March 21, 2017 from http://www.roadata.com/Trans/documents/What%20Industry%20needs%20to%20know%20about%20changes%20to%20the%20TRAVIS%20Web.pdf and The City of Calgary, *Vehicle Overweight Permit,* accessed March 21, 2017 from http://www.calgary.ca/Transportation/Roads/Pages/Traffic/Permits/Load-ban-permits.aspx

transportation and development] and (3) recognize that environmental stewardship is a shared responsibility of government, business, communities and individual citizens.[27]

3.1.7.2 Community Greenhouse Gas Reduction Strategy

City Council adopted the Calgary Community Greenhouse Gas Reduction Plan in 2011 as a matter of priority and in line with the MDP and CTP. The vision of the plan "*is for energy used in Calgary to have a low impact on health and the environment, come from a diverse set of sources, be accessible and support local prosperity and adaptability*". The goal of the plan "*is to significantly reduce GHG emissions in Calgary while realizing other environmental, economic and social benefits*" which are accomplished through the plan's "*objectives of energy conservation and efficiency and the development and use of low-carbon energy sources.*"[28]

The plan notes that GHG emissions are also a result of the creation, production and *transportation* of products and services although such emissions were not investigated within the scope of the plan (unless they are generated within city boundaries).

Based on a triple-bottom-line analysis, four focus areas were identified and ranked in order of reduction potential. The fourth focus area "*transportation choices and compact development*" includes promoting walking, cycling and transit, which are influenced by land use and transportation planning and pricing policies.

Through research and stakeholder consultations, the plan describes actions at the organizational level that can reduce GHG emissions. Organizations and related actions that are pertinent to the Strategy are summarized in Table 3-2.

The City is currently updating the Community Greenhouse Gas Reduction Strategy.

[27] The City of Calgary's Environmental Policy – Revised 2012, accessed March 21, 2017 from http://www.calgary.ca/UEP/ESM/Documents/ESM-Documents/environmental_policy.pdf

[28] This and ensuing discussions are taken from the *Calgary Community GHG Reduction Plan – Energy in the City, 2011* accessed March 21, 2017 from http://www.calgary.ca/UEP/ESM/Documents/ESM-Documents/Calgary_GHG_Plan_Nov_2011.pdf

Table 3-2: Actions by organization type that are relevant to the Strategy

Organization type	Action
Fleet operators	• Undertake driver training and feedback systems on driving habits; • Put in place idling and driving policies; • Install fuel saving devices such as auxiliary power units, on-board computers and truck plug-ins; • Keep vehicles properly maintained including proper air pressure in tires; and • Identify and work to remove barriers to new products, services and behaviours.
Companies with shipping	• Undertake freight logistics management to reduce the shipment of partial loads; and • Electrify loading docks and put in place idling policies.
Rail operators	• Use hybrid or genset switcher locomotives. • Install anti-idling devices such as auxiliary power units, automatic start/stop devices, rail yard electrification. • Identify and work to remove barriers to new products, services and behaviours.

Source: Calgary Community Greenhouse Gas (GHG) Reduction Plan, 2011

3.1.7.3 2020 Sustainability Direction

This document links imagineCALGARY's Long Range Urban Sustainability Plan (100-year vision) to The City of Calgary's three-year business plans and budgets. Plans and budgets act as reference points in moving to a 10-year horizon per the Direction.[29]

With respect to improving goods movement, strategies include (1) identifying and prioritizing capital and operational improvements to the Goods Movement Network and (2) planning and implementing ongoing improvement to reduce travel time and improve reliability of the major goods movement network. Related targets for 2020 are:

- Decrease the Travel Time Buffer Index – extra time needed to ensure on-time arrival; and
- Maintain or improve the average travel time on selected Goods Movement Network corridors, reducing traffic delays (average speed on selected goods movement corridors).

3.1.7.4 Triple Bottom Line Policy Framework

Adopted by Calgary City Council in September 2005, the Triple Bottom Line Policy Framework serves to incorporate sustainable development (economic, environmental, social and smart growth) principles into the City's decision-making processes. The policy speaks to the movement of people and goods more generally and largely incorporates policies existing under the CTP.[30]

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[29] This and ensuing discussions are taken from *2020 Sustainability Direction,* accessed March 21, 2017 from http://www.calgary.ca/_layouts/cocis/DirectDownload.aspx?target=http%3a%2f%2fwww.calgary.ca%2fCA%2fcmo%2fDocuments%2f2013-0648_ChangesTo2020SusCover_spread_web.pdf&noredirect=1&sf=1

[30] *Triple Bottom Line Policy Framework – May 2006,* accessed March 22, 2017 from http://www.calgary.ca/CA/cmo/Documents/TBL%20Framework.pdf

3.1.8 Economic development strategy

The City of Calgary's ten-year economic development strategy was updated in 2015.[31] Entitled *Building on our energy*, the strategy has six areas of focus that build on the strength of the energy sector, support entrepreneurs, give more attention to growing technology and innovation, build, attract and retain a skilled work force and promote collaboration to implement the strategy.

Transportation and logistics is recognized as an important economic sector and the strategy notes that Calgary is geographically well located to serve as Western Canada's transportation and logistics hub.

The strategy identifies several implementation actions to support its areas of focus, of which three are linked to goods movement:

- Solidify the region's position as Western Canada's premiere distribution and logistics hub, by potentially establishing the Calgary Region as a foreign trade zone (with its associated benefits to businesses located in the zone), marketing the Region's strong transportation infrastructure, increasing air access to high growth markets and establishing the Region as an inland port.[32] Four indicators are proposed to measure the progress of implementing this action:
    - Number of transportation and logistics companies and distribution centres in Calgary.
    - Volume and value of goods shipped through Calgary.
    - Capacity to receive goods for sorting and distribution.
    - Number of international air connections.
- Develop an integrated, multi-modal transportation system that supports a prosperous and competitive economy, by maintaining automobile and commercial goods vehicle mobility while increasing emphasis on alternative modes of transportation (among other potential tactics, including revenue generation and financing tools). Indicators include the amount of spending on transportation infrastructure, commute times and transit usage.
- Address greater connectivity between Calgary's primary cultural, recreation and commercial districts in the Centre City,[33] by increasing the accessibility to and within the Centre City for both people and goods. Relevant indicators include the primary modes of transportation within the Centre City (i.e., the supply, quality and level of service of the multi-modal network).

3.1.9 Industrial lands strategy

The City of Calgary adopted the Industrial Land Development Strategy in 2013, which provides a framework for developing and servicing City-owned lands for industrial and other uses. The Industrial Land Development Strategy has five guiding principles, the first of which is to support local economic development. In doing so, it notes that The City could consider requests for developing or

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[31] The ensuing discussion is drawn from *Building on our energy*, Calgary Economic Development and The City of Calgary, version 2.1, August 26, 2015.

[32] The Strategy defines an inland port as "*an area that facilitates trade through investment in multi-modal transportation assets and [promotes] value-added services as goods move through the supply chain.*"

[33] The Centre City is defined as Stampede Park to Calgary Zoo and Inglewood to Downtown West Village.

consolidating large-sized lots (larger than 10 acres), where this would support the development of an intermodal park or provide access to goods movement as a function of the lot's location.[34]

A 2015 report to The City's Land and Asset Strategy Committee noted that the 'goods movement sector' has a strong attraction to southeast Calgary, where most of the City-owned industrial lands are located. The report cites the potential growth of distribution centres in the Calgary region, given the region's established role as a Western Canada distribution hub. However, it notes that to maintain their competitive advantage, "*trucking and warehousing companies will seek locations with good linkages to major roads and regional highways (limited traffic congestion, right turn movements and few traffic signals)*," which can result in some businesses relocating from Calgary to "*industrial parks in neighbouring municipalities*."

Manufacturing for the oil and gas sector also is identified as an important economic segment. However, some of these businesses "*rely on the high and wide corridors (traffic signals need to swivel, absence of overhead wires, access to regional highways) to move high-value products out of the city*." To attract and retain these businesses, sites are needed "*with good access to regional highways and high and wide load access within Calgary*."[35]

The Industrial Land Development Strategy is currently being updated.

3.2 Calgary Regional Partnership

3.2.1 Calgary Metropolitan Plan

Developed by municipalities under the Calgary Regional Partnership, the Calgary Metropolitan Plan provides a blueprint for accommodating regional growth within the next 60 years. The Calgary Metropolitan Plan is guided by five principles. The fourth principle, "*integrating efficient infrastructure systems*," is pertinent to the Strategy as it speaks to a system that incorporates complete transportation and mobility systems for the movement of people and goods.[36]

3.3 Province of Alberta

3.3.1 Multi-Modal network strategy

The Province of Alberta operates a number of highways in Calgary (see Figure 4-12 in Section 4.3.1 below). Generally, the provincial Traffic Safety Act governs the use of highways in Calgary. Regulations under the Traffic Safety Act concern cargo securement, commercial vehicles, bus safety rules of the

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[34] 2013-22 Industrial Land Strategy: For the development of City-owned lands, approved by City Council 18 March 2018.

[35] *Industrial Land Strategy – Updated Report 2015*, Corporate Services Department Report to Land and Asset Strategy Committee, 30 April 2015.

[36] Calgary Regional Partnership, *Calgary Metropolitan Plan – May 2014*, accessed March 21, 2017 from http://calgaryregion.ca/dam/Website/reports/General/CRP-current-general-documents/Calgary-Metropolitan-Plan--June-2014/Calgary%20Metropolitan%20Plan%20-%20June%202014.pdf

road, driver training and examinations, vehicle equipment, vehicle seizure, demerit points and long-haul regulations.

From a planning perspective, two recent provincial initiatives are relevant. They are described in the next sections.

3.3.2 Commercial vehicle safety regulations

New commercial vehicle safety regulations in Alberta came into effect in July 2009. These regulations brought provincial regulations in line with current Canadian and North American standards. They were based on extensive consultations with commercial vehicle stakeholders including industry, municipal and safety organizations.[37] Key regulations for commercial vehicle include:

- Modified vehicles (manufactured on or after January 1, 2012) will need a new compliance label or a mechanical fitness certificate issued by a qualified professional engineer;
- All vehicles must be maintained in safe operating condition;
- A commercial vehicle must have brakes on all wheels (including trailers) except where the vehicle is exempted from the *Motor Vehicle Safety Act* or the *Traffic Safety Act*;
- A warning sign must be displayed on the rear of a commercial vehicle that transports flammable liquid or gas if the tank has a capacity of 5,000 litres or greater;
- A single-axle trailer (other than a semi-trailer) is prohibited from carrying petroleum products on a highway when the tank has a capacity of 3,000 litres or greater for flammable liquids or 450 litres or greater for flammable gas;
- A commercial vehicle will not be allowed to operate on a highway at a speed or with a load greater than the rating of any tire on the vehicle;
- Requirements in the *Driveway and Towaway Regulations* will be substantially simplified and updated to reflect current automotive technology;
- An advance warning triangle will be the only recognized advance warning device (flags and flares will no longer be recognized as they are obsolete); and
- The use of “working lights” on commercial vehicles will be permitted as long as it is not in motion on a highway.

[37] This and the ensuing discussions are taken from *Updated Rules for Vehicles in Alberta – May 2009,* accessed March 19, 2017 from http://www.transportation.alberta.ca/Content/docType41/production/updatedvehiclerulesAB.pdf.

See also *Traffic Safety Act, Commercial Vehicle Safety Regulation, Alberta Regulation 121/2009*, at http://www.transportation.alberta.ca/3.htm.

3.3.3 Business Plan 2017-20 Transportation

A transportation-based business plan outlines a coordinated approach to providing a safe, efficient, environmentally responsible and sustainable transportation system that is affordable and meets the needs of Albertans.[38] The plan covers the period 2017 to 2020.

As it relates to the Goods Movement Strategy, "*The Government of Alberta will work with jurisdictional partners to promote opportunities for improvements to network supply chains and information management to encourage seamless inter-modality and support collaboration between commercial carriers and shippers working toward achieving effective harmonized standards and regulations.*"

The Government of Alberta will also provide "*ongoing support toward the development of effective connections between modes of transportation (road, rail, air, marine, public and active transportation)*" to enable "*a reliable and well-integrated system*."

3.4 Government of Canada

The Government of Canada sets the rules for how certain parts of the transportation system operate through the *Canada Transportation Act* and the *Transportation of Dangerous Goods Act*. The two Acts are supported by various specific orders and regulations.

3.4.1 Transportation safety

Transport Canada develops and enforces safety regulations and standards and tests and promotes safety technologies in air, marine, rail and road transportation. In terms of road transportation relevant to goods movement, Transport Canada is limited to regulating the safety of interprovincial trucking.

Transport Canada is more active in rail safety regulation. Rail safety is regulated by the *Railway Safety Act*. The Government of Canada has developed a number of regulations pursuant to this Act that have relevance for the Strategy including regulations requiring notice be provided to municipalities of certain railway engineering work. Transport Canada also works actively with the railways to reduce trespassing on railway property.

3.4.2 Transportation of dangerous goods

The Government of Canada regulates the transportation of dangerous goods through the *Transportation of Dangerous Goods Act* and the regulations and orders made pursuant to this Act. Transport Canada works with its partners to promote public safety in the transportation of dangerous goods, including:

- Establishing safety standards and regulations for the safe transportation of dangerous goods;
- Monitoring compliance of modal shippers, consignors and importers with the Emergency Response Assistance Plan, means of containment standards and facility assessments; and

[38] This and ensuing discussions are taken from *Business Plan 2017-20 Transportation,* accessed March 19, 2017 from http://finance.alberta.ca/publications/budget/budget2017/transportation.pdf

- Operating the Canadian Transport Emergency Centre to help emergency response personnel deal with dangerous goods accidents.

3.4.3 Asia-Pacific Gateway and Corridor Initiative (and the New Trade and Transportation Corridors Initiative)

The Asia-Pacific Gateway and Corridor Initiative (APGCI) "*is an integrated set of strategic transportation infrastructure investments and policy measures that facilitate global supply chains between North America and Asia*."39 As the initiative is geographically crosscutting (see Figure 3-1), it requires regional partnerships between provincial governments (and the private sector) in order to fulfill its mission. As it relates to the Strategy, both the Province of Alberta and the Calgary International Airport are partners in the APGCI.40

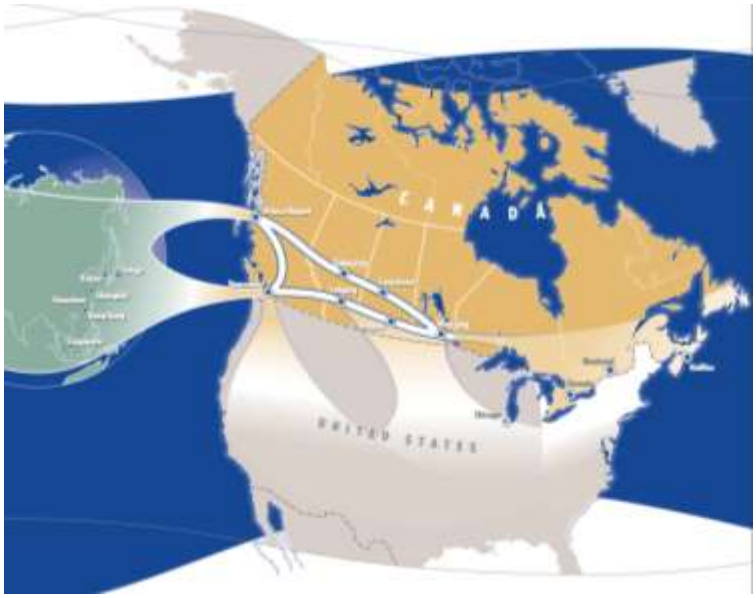

Figure 3-1: Asia-Pacific Transport Corridor

To date, the Government of Canada has worked with partners in the APGCI to invest over $1.4 billion in strategic infrastructure projects. Strategic projects include British Columbia's Lower Mainland and Prince Rupert ports, their principal road and rail connections stretching across western Canada and south to the United States, key boarder crossings and major Canadian airports.

Infrastructure projects that are relevant to the Calgary region include:

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[39] Asia-Pacific Gateway and Corridor Initiative, accessed on March 22, 2017 from www.asiapacificgateway.gc.ca/investments.html (Note that the website has since been terminated)

[40] This and ensuing discussions are taken from *APGCI Investments Map – modified in November 2015,* accessed on March 22, 2017 from http://www.asiapacificgateway.gc.ca/investments.html (Note that the website has since been terminated.)

- Twinning of the TransCanada Highway in Banff National Park to facilitate travel and trade between Alberta and British Columbia.
- Widening of 52 Street S.E. from 114 Avenue to 130 Avenue S.E. from two to four lanes and from 90 Avenue to 106 Avenue S.E. from two to six lanes; construction of a grade separation at the CP line and the Western Headwaters Canal; intersection improvements; and storm water upgrades.

Trade and Transportation Corridors Initiative

Announced in November 2016 and incorporated into the 2017 federal budget, the Trade and Transportation Corridors Initiative will see investments from the Government of Canada of $10.1 billion over the next 11 years in trade and transportation projects. The purposes of this initiative and related investments are to build stronger and more efficient transportation corridors to international markets and to help Canadian business compete, grow and create more jobs for Canadians.

Notably, under the Trade and Transportation Corridors Initiative, the Government of Canada will invest $2 billion over 11-years in the National Trade Corridors Fund, "*a merit-based program to make Canada's trade corridors more efficient and reliable.*"41 Municipalities are eligible recipients for this program. The program will fund the following types of projects:

- Prepare (for example, plan, demolish, prepare site), construct, rehabilitate and improve infrastructure assets related to transportation, such as:
    - Studies (feasibility, environmental, planning and integration), including computer and simulation modelling, to guide the development of infrastructure projects and technology applications.
    - Highway, bridge, interchange and road projects along corridors that involve more than one mode of transportation, including those that provide access to border crossing facilities.
    - Infrastructure that involves more than one mode of transportation (for example, airports, ports, rail yards, facilities, access roads) and makes the best use of the overall transportation system to support international trade.
    - Grade separations that provide more efficient and safer road and rail interaction.
    - Improvements to the transportation infrastructure in Canada's territorial north and at airports with annual passenger flows below 600,000.
- Acquire and install technologies and equipment that advance and support the efficient movement of goods and people and help integrate transportation modes in Canada's trade corridors (for example, Intelligent Transportation Systems (ITS) and radio frequency or optical identification readers).42

41 Transport Canada. 2017. Trade and Transportation Corridors Initiative, announced July 4, 2017.

42 Transport Canada. 2017. Apply for NTCF Funding.

Expressions of interest for funding were due in September 2017, and it is unclear whether there will be future funding rounds.[43]

[43] Transport Canada. 2017. Apply for NTCF Funding.

4 Overview of existing conditions

4.1 Introduction

This section profiles the existing components of the goods movement system, notably the existing and planned goods movement networks, including restrictions, land use (distinguishing industrial land use), key intermodal facilities, significant goods movement origins and destinations. It provides an inventory of goods movement infrastructure and constraints, including bridge structures and gaps in infrastructure.

4.2 Land Use, demographic and economic characteristics and trends

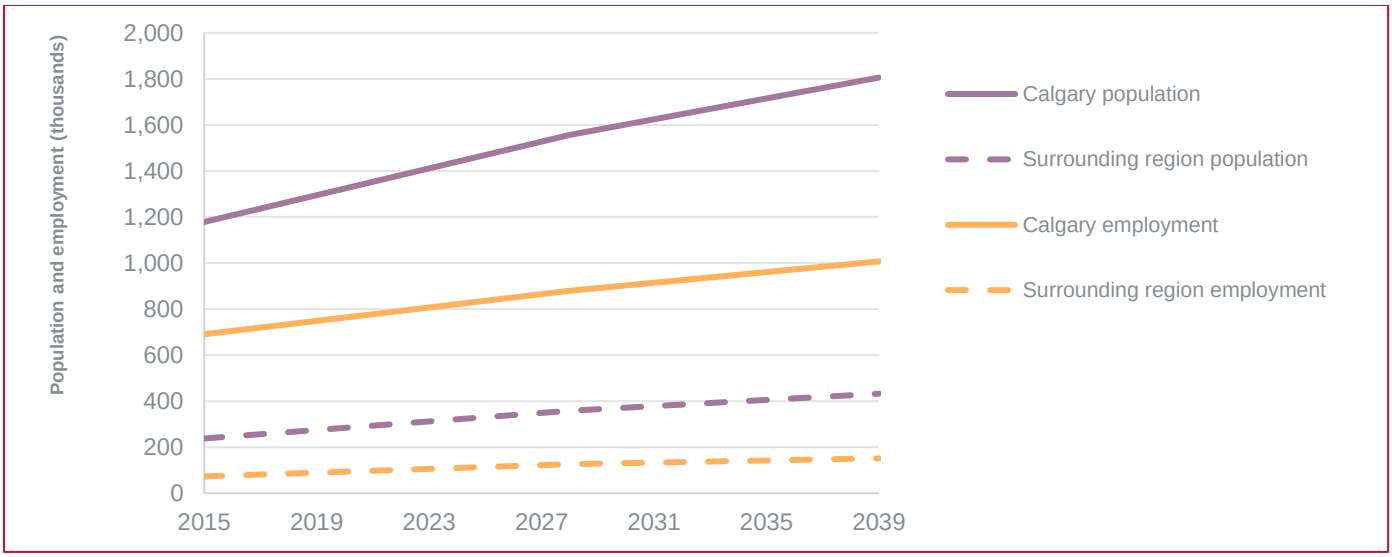
4.2.1 Population and employment

In 2015, the Calgary Region, comprising Calgary and the surrounding region, was home to 1,178,000 people and 690,000 jobs. Of these, 83% of the population and 91% of the jobs were in Calgary.

By 2039, the Region is projected to have 2,238,000 residents and 1,158,000 jobs, as illustrated in Figure 4-1. Of these, Calgary's proportions are expected to drop slightly, to 81% of the population and 87% of the jobs

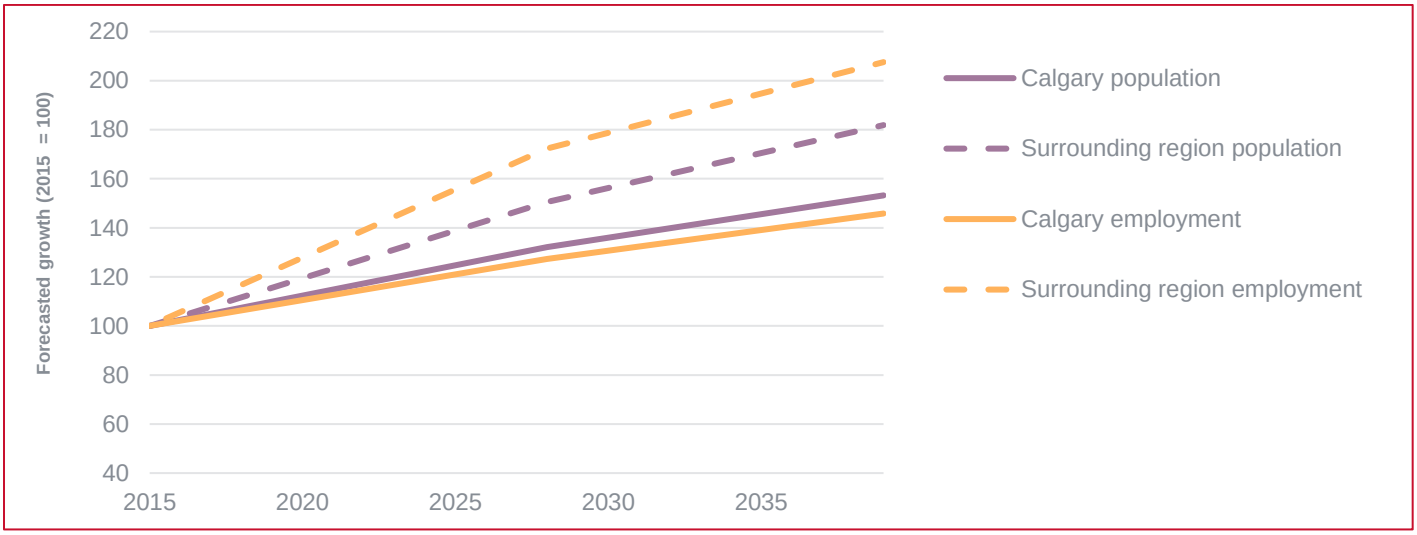
Figure 4-2 illustrates the expected growth rates in population and jobs relative to 2015. Between 2015 and 2039, the city's population is expected to grow by 1.8% annually and its jobs by 1.7% annually. In the surrounding region, the population is expected to grow by 2.5% annually and jobs are expected to grow by 3.1% annually.[44] Calgary will remain the dominant demographic and employment centre of the region. However, the growth rates in the surrounding region for both population and jobs are expected to be much greater than those inside Calgary.

[44] These growth rates are all expressed as compound annual growth rates.



Source: Consultant analysis of data provided by The City of Calgary.

Figure 4-1: Projected population and employment, 2015 – 2039

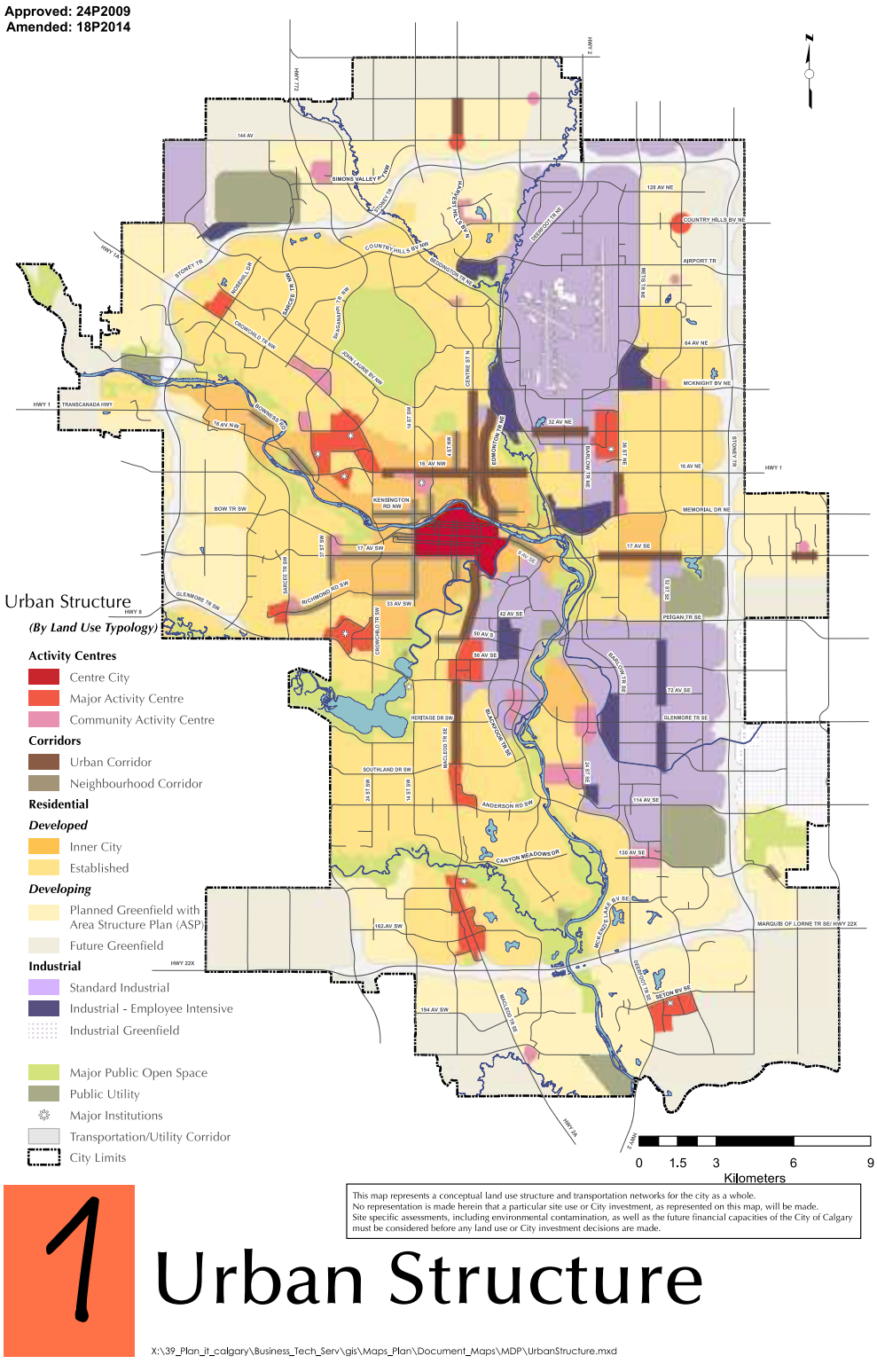


Source: Consultant analysis of City of Calgary data. All growth rates are referenced against the year 2015 (i.e., 2015 = 100)

Figure 4-2: Projected growth rates in population and employment

4.2.2 Land Use

Figure 4-3 shows Calgary's urban structure by major land use category. The map, developed as part of the MDP and amended in 2014, also shows key transportation and utility corridors. Southeast and northeast Calgary will continue to be the primary concentrations of industrial activity and will see growth in these activities. Figure 4-4 shows the expected growth areas in the surrounding regions. It can also be seen that commercial / industrial activity is expected to grow east and northeast of Calgary and along Highway 2, especially to the north.



Source: Municipal Development Plan, Map 1, as amended 2014.

Figure 4-3: Urban Structure – Municipal Development Plan (as amended 2014)

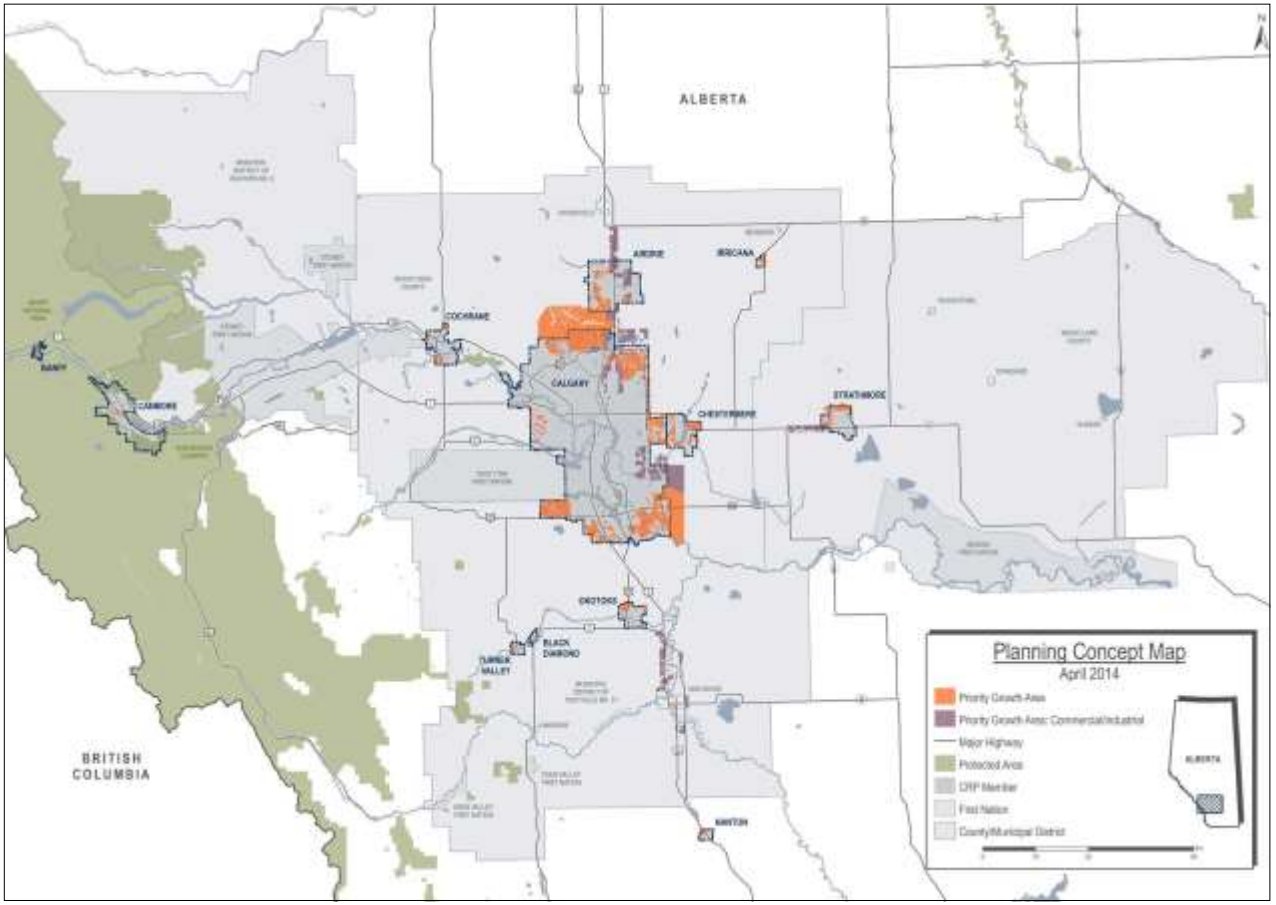
Planning concept map

The Planning Concept Map shows Calgary Metropolitan Plan (CMP) priority growth areas that are eligible for regional servicing to Calgary Regional Partnership (CRP) members.

These areas were originally defined as Compact Urban Nodes and Future Industrial/Commercial Development in the 2009 CMP, and have been relabeled as priority growth areas in this CMP update. While these priority growth areas have not changed since they were originally adopted, some municipal boundaries have changed through annexation.

Based on the land conservation and intensification goals of the CMP, priority growth areas will accommodate the growth projected for the Calgary region to 3 million people and 1.5 million jobs by 2076 *(Urban Futures, 2012, A Context for Change Management in the Calgary Regional Partnership Area)*. Almost three quarters of the land required to accommodate this growth is within CRP members' current urban boundaries.

Between 2012 and 2014, CRP and member municipalities will analyze and refine the priority growth areas (see policies 5.c.3 and 3.a.8).



Source: *Calgary Metropolitan Plan*, Calgary Regional Partnership, June 2014.

Figure 4-1: Planning concept map – Calgary Metropolitan Plan

4.2.3 Transportation-related employment levels and locations

Employment levels and business location data provide an indication of where significant freight-generators are located within Calgary. These data are only a proxy for the number of trips that are made from a given location, particularly in light of emerging trends such as the increasing automation of distribution centres. However, in general a correlation can be expected between the size of a freight-related business location (in terms of number of employees) and the number of truck trips to and from this location. Visualizing where these businesses are clustered then provides an indication of where much of the truck traffic in Calgary is likely originating or terminating.

4.2.3.1 Employment levels

On average in 2015, the transportation sector in Calgary employed 61,000 people, though not all of these are related to freight. Figure 4-5 breaks down this employment by North American Industrial Classification System (NAICS) three-digit subsector codes.[45] Most of these people are employed in trucking (16,500), which is obviously freight-related. The second highest sub-sector is air transportation (9,100); however, this figure is likely driven by the presence of WestJet's head office and main hub and by Air Canada's hub, rather than primarily by freight demand. Rail transportation employs 3,100 people. Although this employment is almost exclusively freight related, the figure is also driven by the presence of CP's head office in Calgary.

Dun and Bradstreet[46] employment data were also used to understand the geographic distribution of transportation-sector employment in Calgary, as they offer finer geographic resolution. These data are plotted on the map in Figure 4-7 under section 4.2.3.2 below. In order to validate the Dun and Bradstreet data, Table 4-1 summarizes the differences in employment counts between and the Statistics Canada Labour Force Survey (LFS) data used in Figure 4-5 and [47] Dun and Bradstreet Employment Location data. The counts from both sources are categorized by three-digit NAICS codes.

Overall, the total employment is similar within 6% (65,000 versus 61,400) between the two data sets. In addition, truck transportation is the largest transportation sector in both data sets. However, the LFS reports significantly lower employment in the rail transportation, rail transportation support and trucking sectors, and significantly higher employment in the air transportation and couriers and messengers sectors.

Some of the difference may be due to differences in the data collection method between the two surveys, including the interpretation of the classification system, although the drop in rail sector

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[45] NAICS is a standard system for categorizing businesses and economic activity. It is used by Statistics Canada and corresponding agencies in the United States and Mexico. NAICS codes have six digits, which are aggregated into sectors (two digits) and subsectors (three digits, as described in this analysis). More information can be found at http://www.statcan.gc.ca/eng/subjects/standard/naics/2017/index.

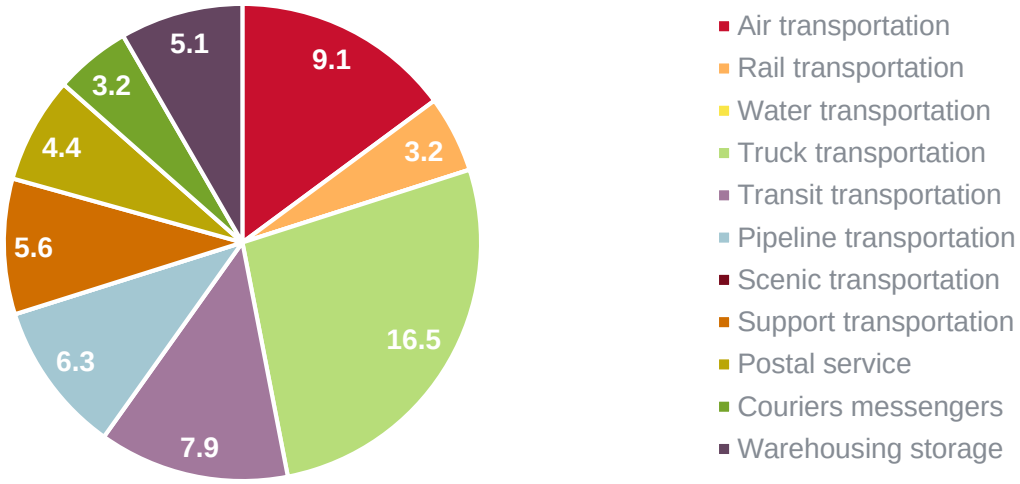
See also the discussion in Section 6.1.3 below.

[46] Dun and Bradstreeet is a company that maintains a database of commercial entities.

[47] The LFS is a monthly survey undertaken by Statistics Canada to estimate employment and unemployment.

employment is likely due to the restructuring that CP underwent post-2013, which resulted in an estimated up to 6,000 job losses company wide.[48]

The wholesale sector (NAICS 41) is also a freight-generating sector. On average in 2015, the wholesale sector employed 34,000 people. As shown in Figure 4-6, the largest fraction of these employees (9,900) were employed in the machinery equipment and supplies wholesaler subsectors, followed by building material and supplies wholesalers (7,200) subsectors.



Source: CPCS analysis of Statistics Canada Labour Force Survey data, categorized by three-digit NAICS codes.

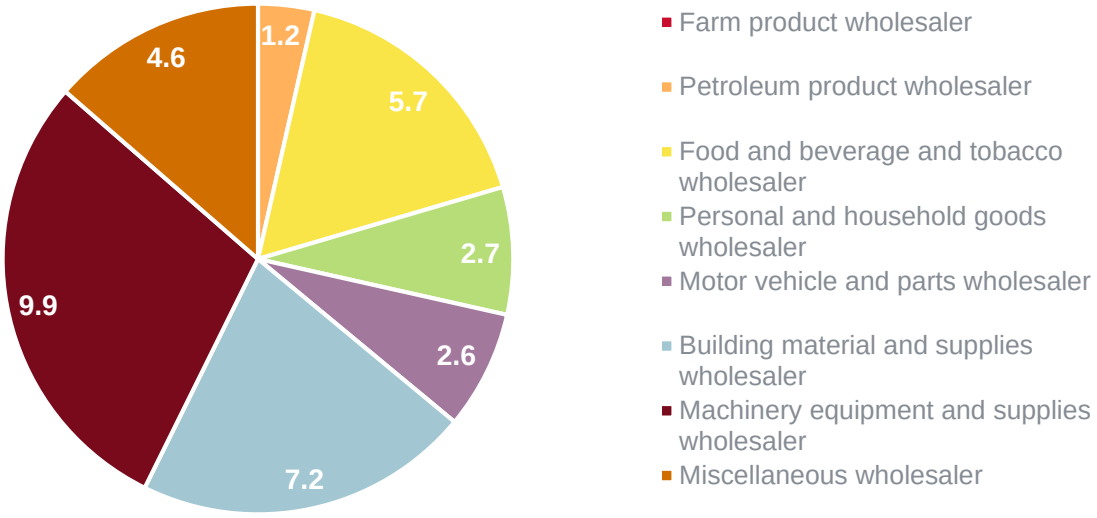
Figure 4-5: Transportation sector employment, Calgary, average 2015 (thousands)

[48] Deveau, S. 2013, *CP Rail may cut as many as 6,000 jobs*: Harrison. The Financial Post.

Table 4-1: Sector-by-sector comparison between Dun and Bradstreet (D&B) and Statistics Canada Labour Force Survey (LFS) data

NAICS (3-digit code)	Employee counts		Percent difference
	D&B (2011)	LFS (2015)	
Air transportation	2,601	9,133	251%
Rail transportation	5,877	3,192	-46%
Water transportation	208	0	-100%
Truck transportation	24,841	16,508	-34%
Transit transportation	6,562	7,925	21%
Pipeline transportation	5,466	6,317	16%
Scenic transportation	275	0	-100%
Support transportation	9,961	5,642	-43%
Postal service	3,610	4,425	23%
Couriers and messengers	54	3,158	5749%
Warehousing storage	5,565	5,117	-8%
Total	65,020	61,417	-6%

Source: CPCS analysis of D&B (Dun and Bradstreet) and Statistics Canada LFS (Labour Force Survey), categorized according to NAICS three-digit code.



Source: CPCS analysis of Statistics Canada Labour Force Survey data, categorized by three-digit NAICS codes.

Figure 4-6: Wholesale sector employment, Calgary, average 2015

4.2.3.2 Employment locations

Although the size of a business establishment in terms of total number of employees is only a proxy for freight volumes to and from those establishments, it is expected that there is likely a significant number of truck trips to and from areas where these establishments are clustered. Figure 4-7 shows employment data in the transportation sector, plotted by location[49] and subsector.[50] Excluding downtown, which likely primarily represents head office employment, most transportation-related employment is clustered into two areas in Calgary: in the city's northeast, south of Calgary International Airport and in the city's southeast between the CP and CN rail networks.

Around Calgary International Airport there is primarily air sector and support sector employment, which includes activities that relate to passenger transportation. However, there are also several warehousing and storage and trucking sector employers, which likely support the transit of freight through Calgary International Airport. In 2011, the value of freight transiting through the airport was $3.6 billion in freight value.[51]

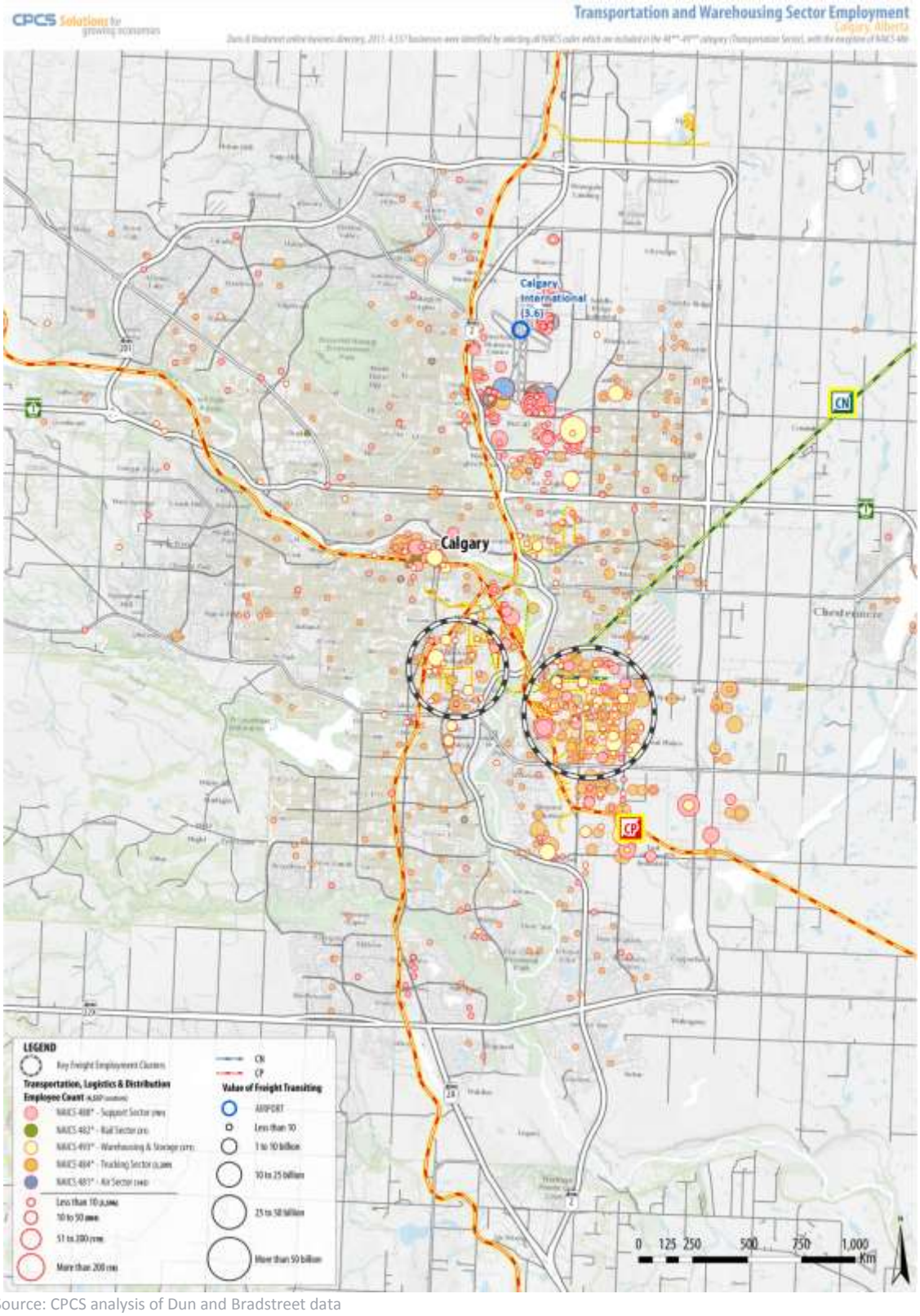
In the city's southeast, warehousing and storage, trucking and rail sector employment are clustered around areas with rail spur access, which also corresponds to locations of many transload facilities, as well as CP's intermodal terminal. In particular, this employment is clustered in the triangle formed

[49] Based on the business address.

[50] Note that Figure 4-7 and some of the other maps that are depicted in Chapter 4 are projected according to UTM (Universal Transverse Mercator) cartographical system of depicting spatial locations. As a result, the maps might appear as if they have been tilted slightly compared with other maps, such as that shown in Figure 4-15 However, the use of the UTM projection promotes the highest degree of accuracy in the scale, based on the source information. Calgary is located in UTM zone 12N.

[51] Based on data collected by Dun and Bradstreet.

between the CN and CP lines, within the area bounded by 50 Avenue S.E. to the north, Glenmore Trail to the south and the CP line to the west. There is also a smaller cluster of employment between CP's line south to Lethbridge and its line east to Regina – i.e., between Macleod Trail to the west, Highway 2 to the east and Highway 8 to the south. Figure 4-7 depicts the two clusters inside the dashed black-and-white rings.



Source: CPCS analysis of Dun and Bradstreet data

Figure 4-7 Calgary Region transportation and logistics sector employment locations

Some of these clusters are adjacent to locations of expanding industrial parks in Calgary, which can provide facilities for additional warehouse space. For example, Dufferin Industrial Park, Point Trotter Industrial Park and Great Plains Industrial Park are all located in the city's southeast to east of the existing cluster shown (i.e. closer to Stoney Trail). The proposed Aurora Business Park is located in the other cluster of freight-related employment in Calgary around Calgary International Airport. These locations are likely to be locations of additional freight generation in the future.

4.2.4 Logistics parks in and around Calgary: how logistics facilities have grown

Several business and logistics parks in Calgary are at various stages of development and provide for high quality, available serviced industrial land. Business and industrial/logistics parks in Calgary include:

- ***Dufferin Industrial Park*:** In southeast Calgary, it has direct access to the Stoney Trail ring road and is in close proximity to the CP intermodal facility. Large shippers, including Sears and Canadian Tire, have co-located distribution centres next to the CP yard. The park is fully serviced with water/wastewater, lights, sidewalks, etc. Three serviced industrial lots are available at Dufferin North. The lots are approximately 50 acres, 28 acres and 19.4 acres. Four serviced industrial lots are available at Dufferin South, between 4.25 and 6 acres. Further lots are to be released in both areas.
- ***Point Trotter Industrial Park***: Located near the Dufferin Industrial Park, this site includes 117 acres of developable land (28 lots ranging from 1.06 - 5.26 acres, of which 14 are currently available) for smaller scale manufacturing and warehousing. The park is fully serviced with water/wastewater, lights, sidewalks, etc. An additional phase of the industrial park is currently in the design phase, with an anticipated release for 2018.
- ***Great Plains Industrial Park*:** Located in the southeast quadrant of the city, this industrial park provides quick access to Stoney Trail and is home to warehousing and light manufacturing activity. The park is fully serviced with water/wastewater, lights, sidewalks, etc. However lots at this site are currently sold out.
- ***Aurora Business Park***: Located in northeast Calgary, it is immediately west of Calgary International Airport and the Deerfoot Trail (QE2) north-south highway. This business park, which is being developed by The City of Calgary, has direct links to nearby air-related logistics facilities. Comprised of 320 acres, Aurora is envisioned as an employment node with a mixture of light industrial and office uses. Fully serviced land will be available in this park by 2019.
- Other City of Calgary business parks, including Starfield, Eastlake and Shepard industrial parks, also have fully serviced available industrial land with lots ranging from 3 to 10 acres. The Forest Lawn Creek industrial park is currently under development and does not yet offer serviced land but it has over 500 acres of saleable land.
- There are additional logistics development opportunities in the broader Calgary Region. For example, CN's Calgary Logistics Park in Rocky View County has co-located land available for logistics activity.

One way to visualize recent trends is by mapping the location of large freight facilities over the last fifteen years. Figure 4-8 shows the location of distribution and manufacturing facilities with a building

footprint over 250,000 square feet, for a time period ranging from 2002 to 2017 (years selected based on the availability of Google Earth aerial imagery).

On the map, each circle denotes a single facility, with the size of the circle corresponding to the size of the facility and the shade representing the age (darker red indicates more recent construction). Notably, in the last fifteen years there has been some growth in large facilities in the southwest. There has also been significant growth in the northwest part of the region, including near the airport and outside of the city proper.

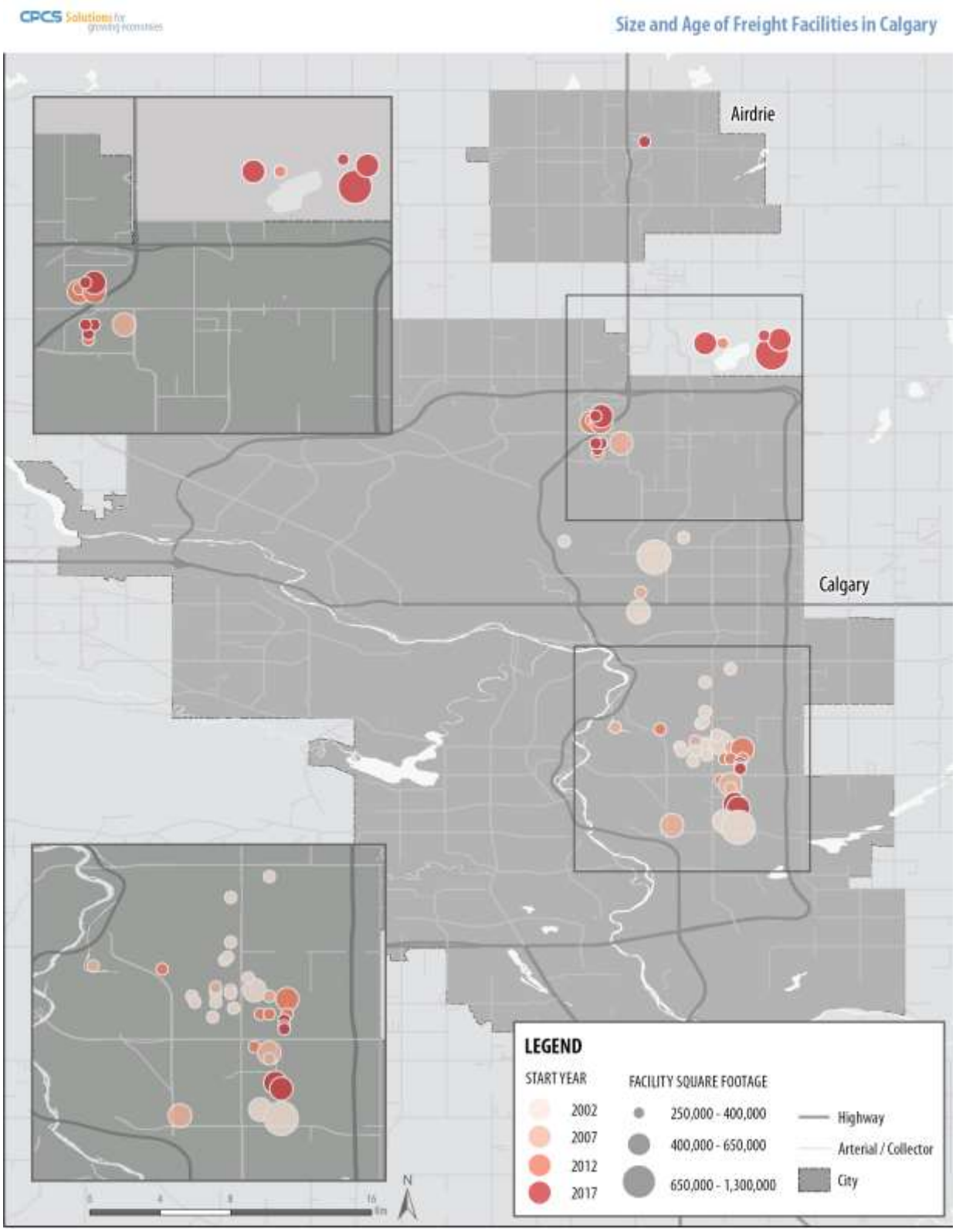


Figure 4-8: Evolution of freight facility locations in Calgary Region, 2002 - 2017

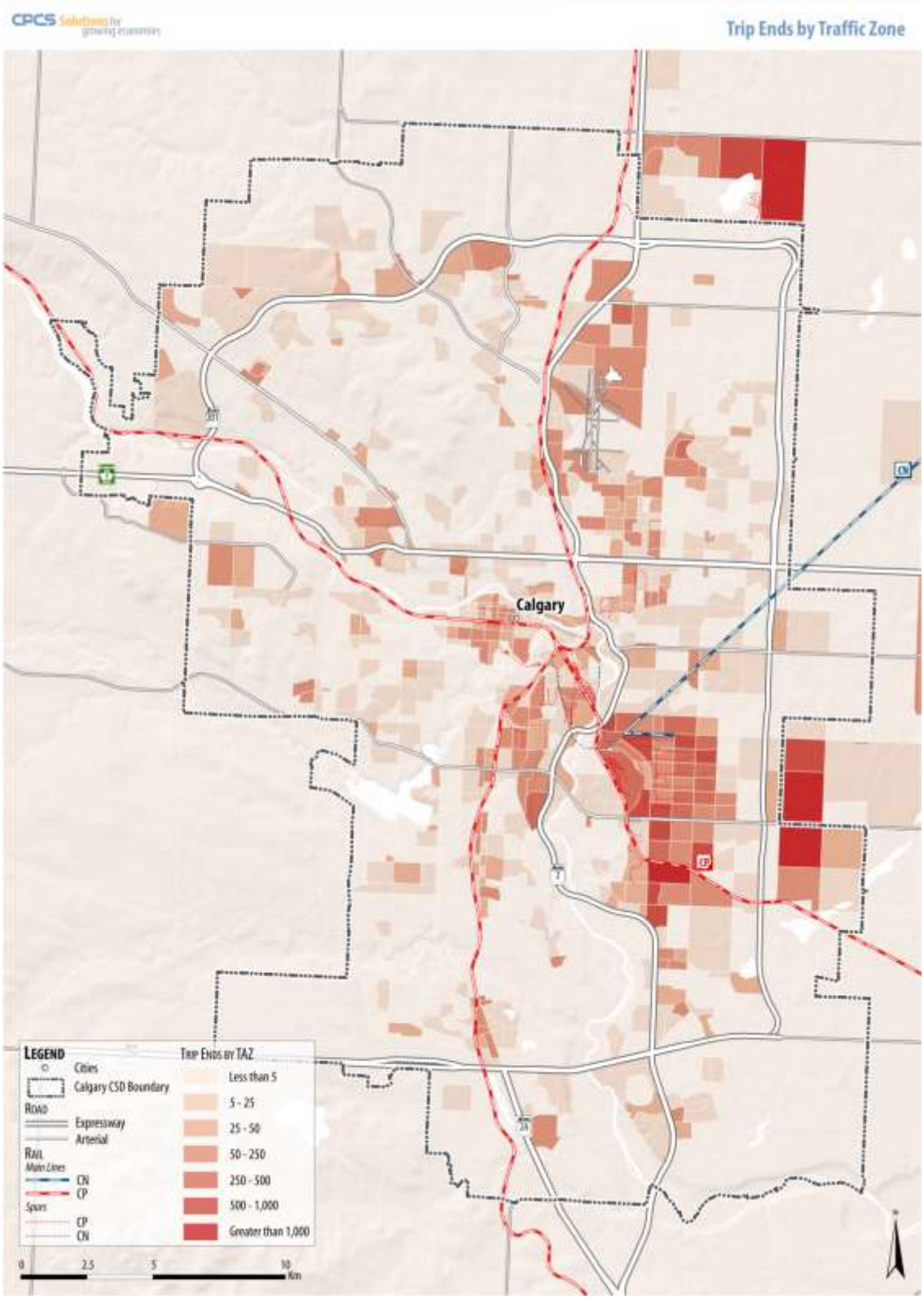
4.2.5 Truck trip ends cluster analysis

In addition to employment locations and facility locations from satellite imagery, GPS data from the American Transportation Research Institute (ATRI) were used to map trip ends by traffic analysis zone (TAZ), where a trip end is defined as a location where a truck starts or ends a trip. ATRI receives GPS data from truck fleets across North America, primarily (though not exclusively) larger trucks engaged in long-haul trucking. The data for this study were provided for weekdays within four representative two-week periods, taken in the months of March, June, September and December 2016 (generally the first two weeks of the month, with the exception of September for which the last two weeks were used).

The ATRI data go beyond employment and square footage to indicate actual *truck traffic*, i.e. the total number of truck trips "generated" within each TAZ.

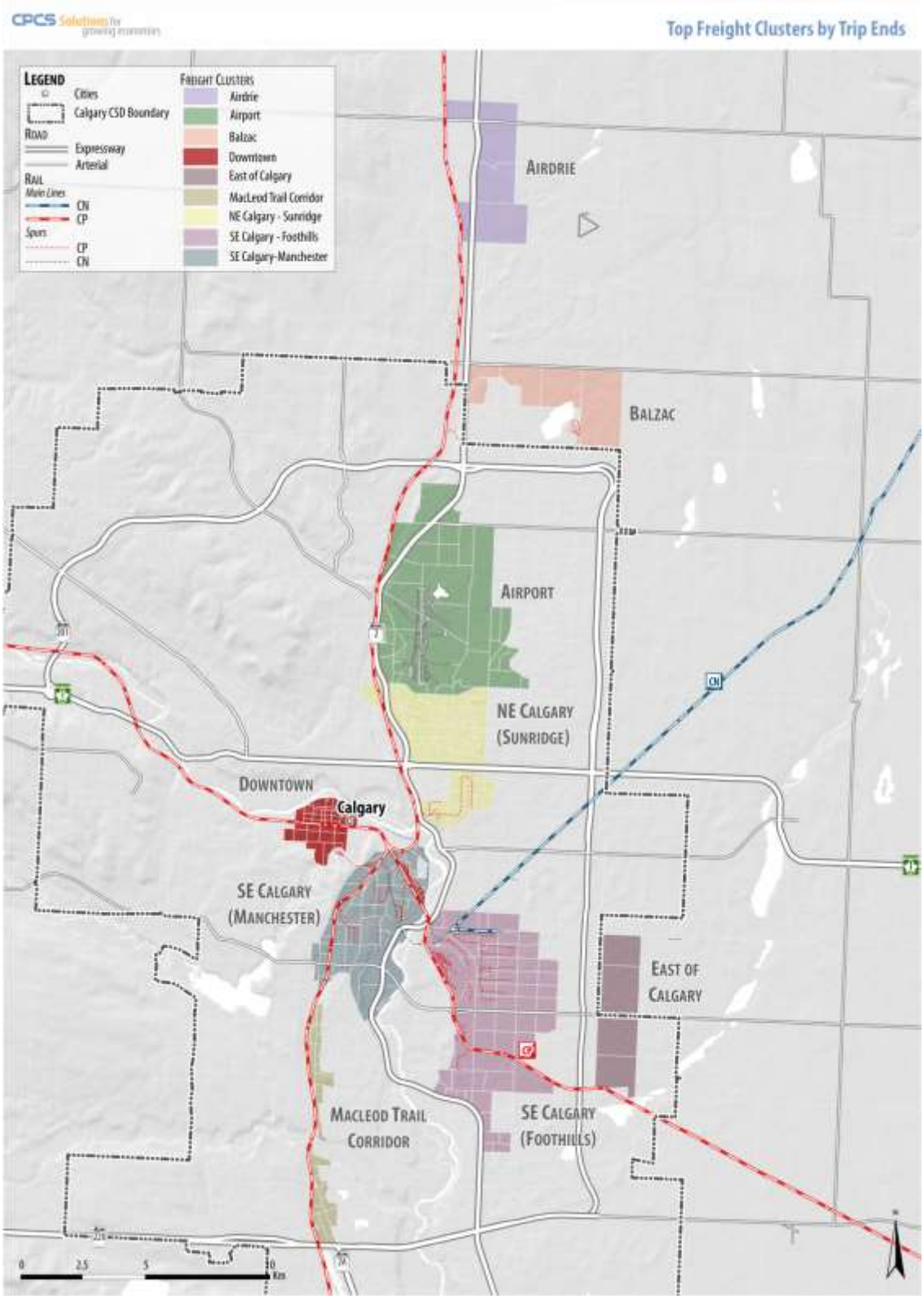
Figure 4-9 shows the location of trip ends in Calgary. The distribution of trip ends is very similar to the distribution of employment, except for the additional trip end clusters in Balzac and Airdrie, which are not shown in the employment data summarized in section 4.2.3.2. High concentrations of trip ends are apparent in certain locations, especially in the N.E. and S.E. However, it can also be seen that truck trips are generated throughout Calgary, even in zones that have relatively low levels of employment.

The trip ends were used to identify freight clusters, which are contiguous TAZs with significant truck trip generation according to the GPS trip end data. Nine major clusters were identified based on the data, as shown in Figure 4-10.



Source: CPCS analysis of ATRI GPS data (2016).

Figure 4-9: Trip ends by traffic zone



Source: CPCS analysis of ATRI GPS data (2016).

Figure 4-10: Top freight clusters by trip ends

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Source: CPCS analysis of ATRI GPS data (2016). Note: truck trip origins.

Figure 4-11: Trip generation by cluster

Figure 4-11 shows the generation of trips by freight cluster, according to the ATRI GPS data. The top cluster by truck trip generation is the Southeast Calgary-Foothills cluster with 38% of truck trip generation, followed by the area east of Calgary at 10%. Collectively, the top nine freight clusters are associated with 78% of truck trip generation in the Calgary region, with other parts of the region – "non-clusters" – generating 22% of trips.

4.3 Goods Movement Network

4.3.1 Roads and highways

4.3.1.1 Primary Goods Movement Network

Figure 4-12 shows the existing Calgary road and street network, as depicted in the CTP. Figure 4-13 shows the Primary Goods Movement Network, as depicted in the CTP. Figure 4-13 shows primary connectors, which include most sections of the provincial highway system within Calgary, as well as secondary connectors. Note that the Primary Goods Movement Network is also connected to the external road and highway network. The Primary Goods Movement Network is intended to serve as a "*safe, efficient and connective*" network that supports the airport, the intermodal rail terminals and Calgary's key industrial areas, while minimizing impacts on the surrounding communities.[52] As defined, the Primary Goods Movement Network identifies high-priority goods movement routes where the most

[52] Section 3.4, Calgary Transportation Plan.

concentrated activity is expected to occur. The Primary Goods Movement Network is not the same as a truck route system, which is updated on an ongoing basis.

The availability of more transportation options for reducing auto use is expected to mitigate the impact of congestion on commercial vehicle movements.

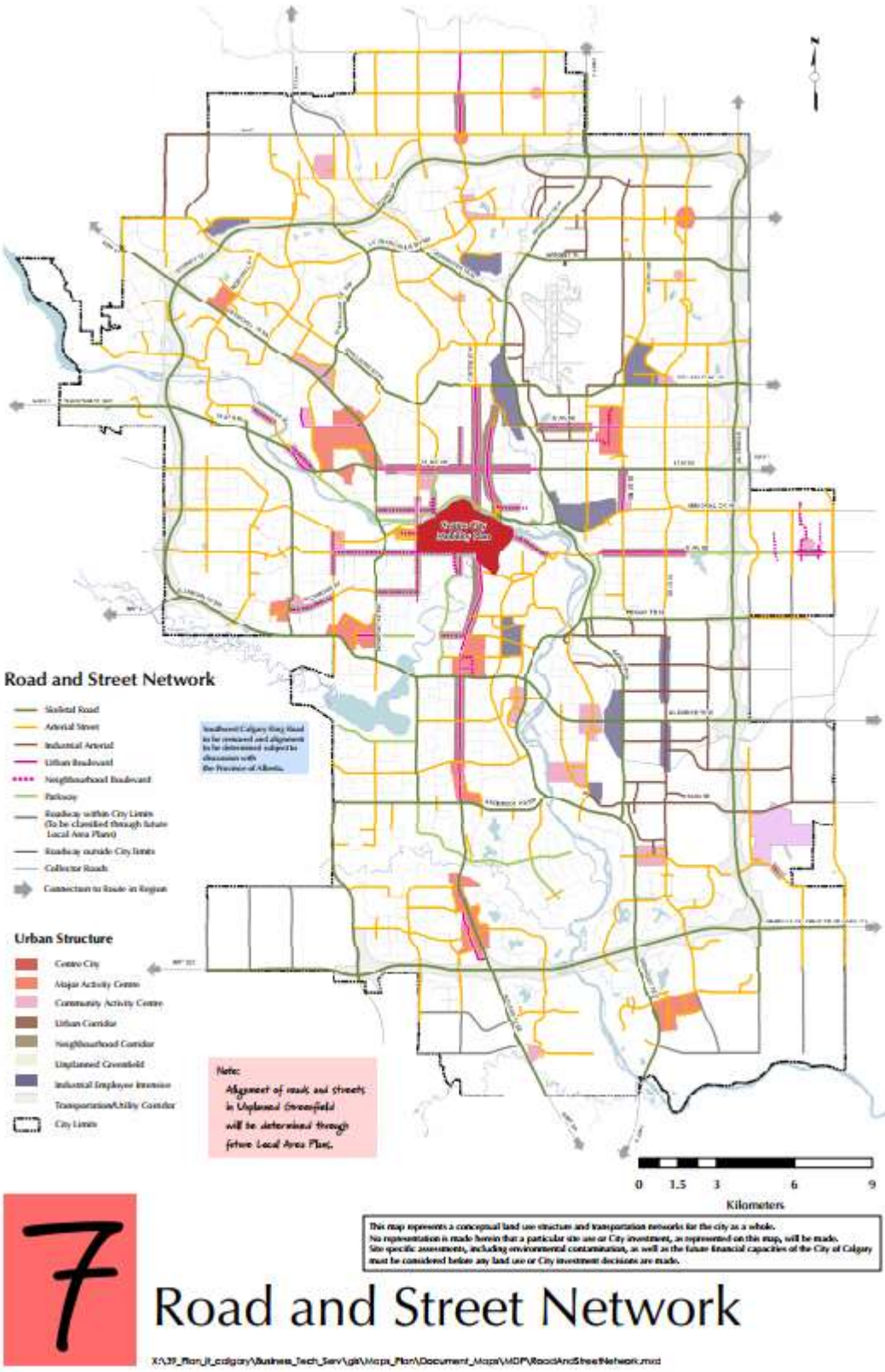

Figure 4-12: Calgary Road Network

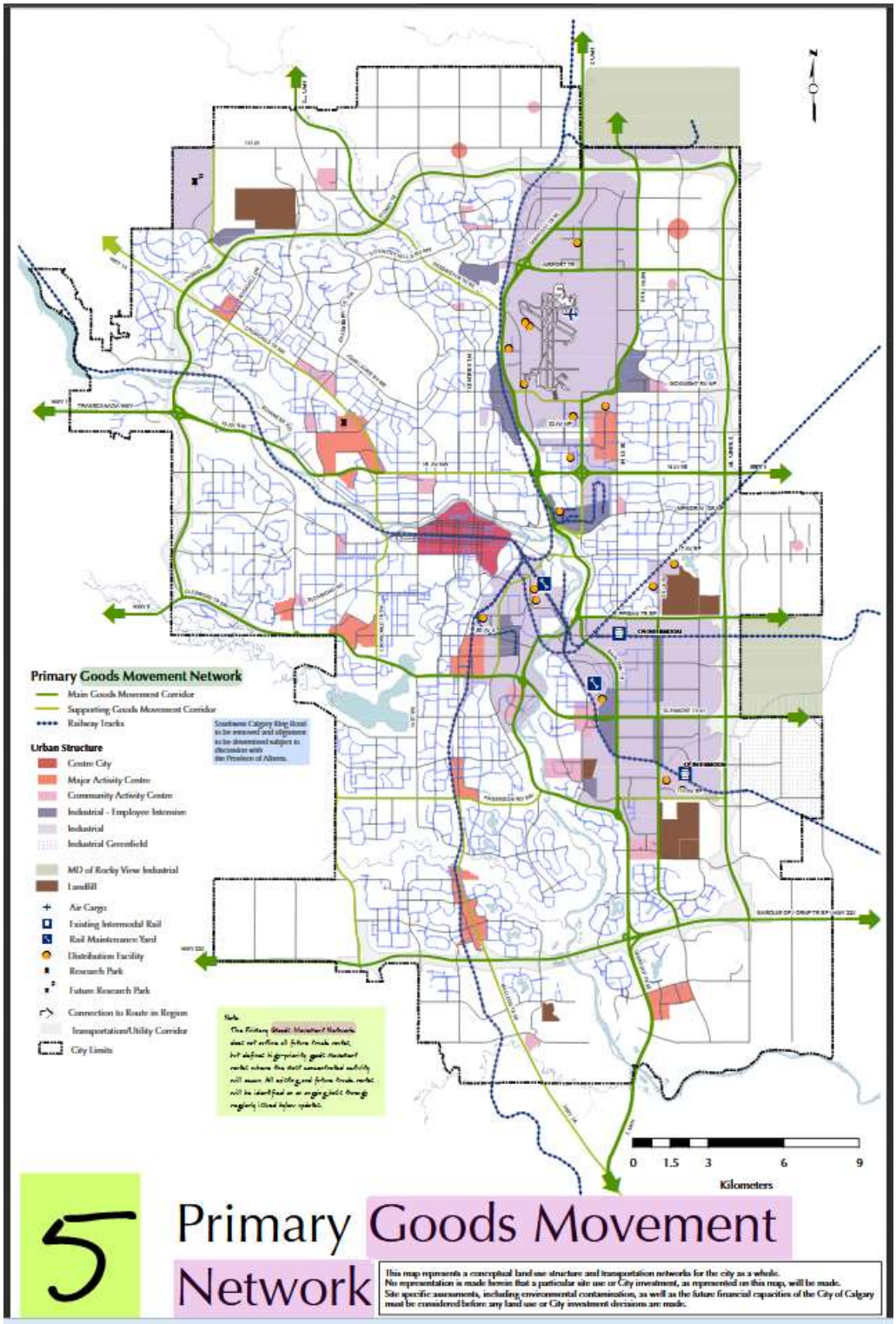

Figure 4-13: Primary Goods Movement Network

Source: Calgary Transportation Plan, Map 5

The CTP also proposes other ways to improve the efficiency of the Network: [53]

- Maintain the "integrity" of major goods movement routes by limiting direct driveway access onto Network roads.
- Promote the location of goods-generating activities close to the Network, so as to minimize intrusion through sensitive areas and provide direct and short-distance accesses to the Network.
- Use Intelligent Transportation Systems to improve traffic flow and travel time reliability.

4.3.1.2 Truck routes and restrictions

Figure 4-14 presents The City of Calgary's 2017 Truck Route Map.[54] The map depicts current and future truck routes, current and future dangerous goods routes and restricted truck routes. It also shows areas that have time-of-day restrictions as well as other areas in the southeast and northeast industrial areas that are unrestricted. The map also depicts the locations of traffic circles, structural clearance restrictions and bridge weight / load restrictions.[55]

4.3.1.3 Transit infrastructure

Figure 4-15 is a map of the existing and planned higher-order transit network. The plot superimposes the network onto a map of selected land uses, including employee-intensive industrial areas.

4.3.1.4 Network usage

Figure 4-16 plots truck volumes, expressed as a percentage of total daily volumes, overlaid on a map of industrial land uses. It can be seen that the road sections with the greatest percentage of truck traffic largely coincide with the largest concentrations of industrial lands in southeast and northeast Calgary. In addition, the plot also shows the importance of the Stoney Trail ring road as a connector among these concentrations of activity. The importance of Calgary's external connections also can be seen. A caution is noted, in that these plots represent the role of trucks proportionally relative to other traffic and not in absolute terms – meaning that some roads and highways might carry greater volumes of trucks, but these represent lower (e.g., on Deerfoot Trail) or higher (e.g., in northwest Calgary) percentages. Nonetheless, these plots visualize the importance of the road and highway network that serves Calgary's industrial areas.

Trucks are the dominant mode for moving goods in Calgary, as they are generally in cities across North America and elsewhere. It is recognized that goods are also carried on other urban modes such as bicycles, on foot, taxis, private carriers using passenger vehicles and, more recently, on-demand

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[53] Section 3.4, Calgary Transportation Plan.

[54] Note that this is a low-resolution version of The City's official Truck Route Map, which is the version that should be used for navigation purposes. It can be downloaded at http://www.calgary.ca/Transportation/Roads/Pages/Truck-and-dangerous-goods/Truck-route-map.aspx.

[55] Source: https://www.calgary.ca/Transportation/Roads/Documents/Truck-and-dangerous-goods/calgary-truck-routes-map.pdf?noredirect=1.

services such as Uber Freight and drones. However, there are no publicly available data on the use of these modes for goods movement. Nonetheless, the Strategy will take these modes into account.

4.3.1.5 Truck flows

ATRI GPS data can also be used to show truck volumes by corridor. Since the GPS data represent a sample rather than all trucks on the road, the GPS data provide an indicator of *relative* rather than *absolute* volumes. They can show where trucks operate, and whether there are more or less trucks operating on a given road, relative to another road of similar type.

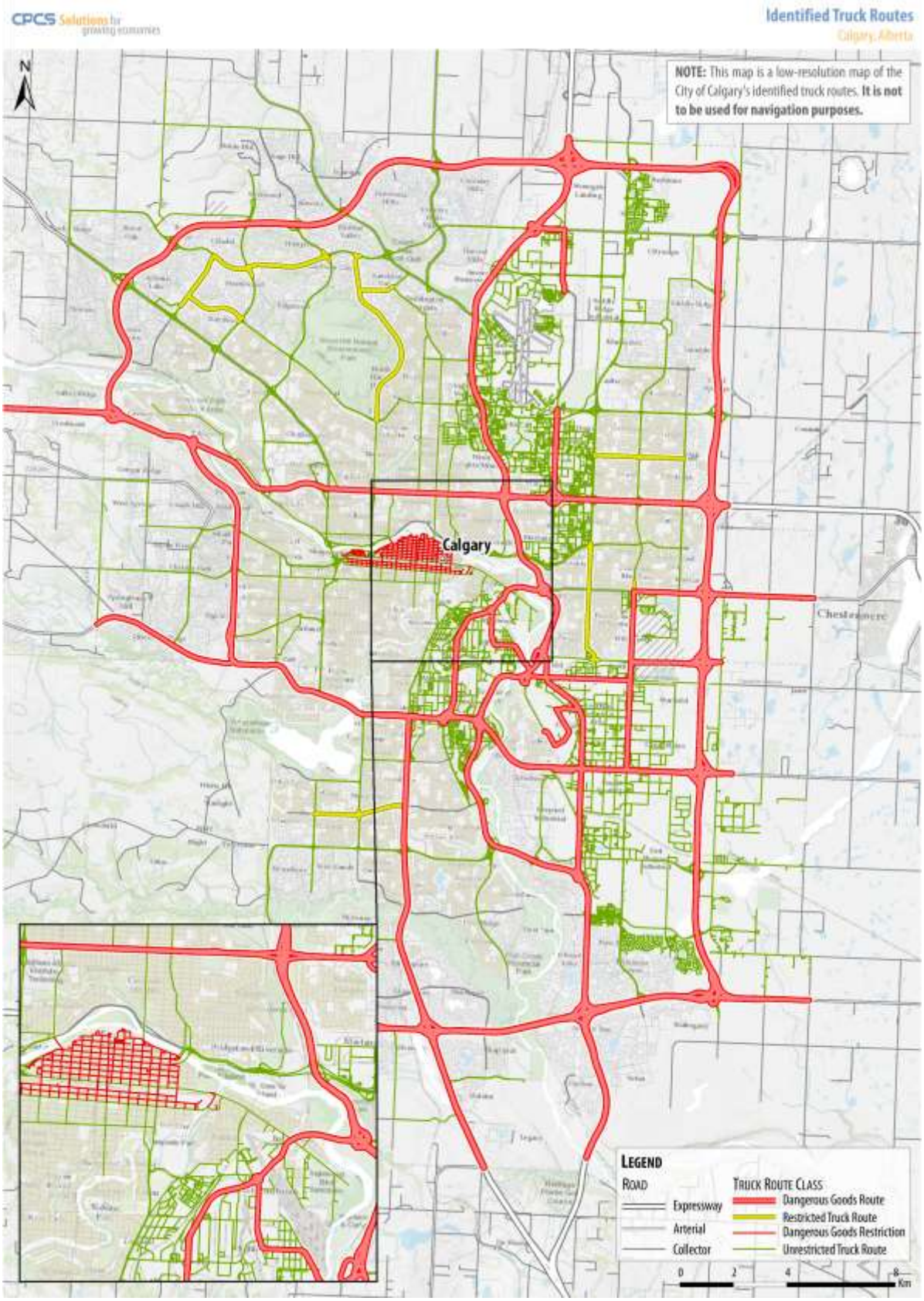
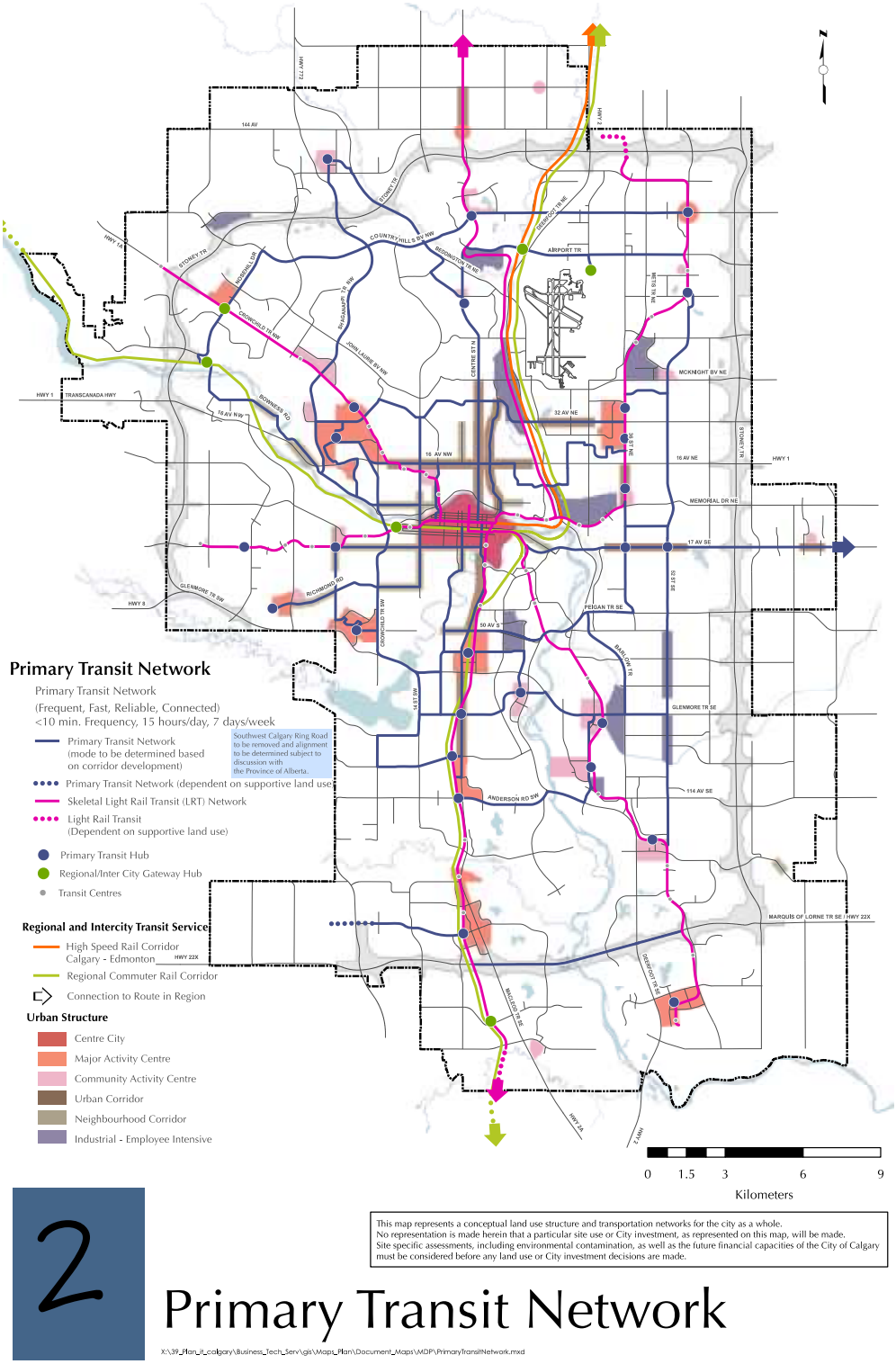


Figure 4-14: City of Calgary Truck Route Map - 2017



Source: Calgary Transportation Plan. Map amended July 2013.

Figure 4-15: Primary Transit Network (CTP, as amended 2013)

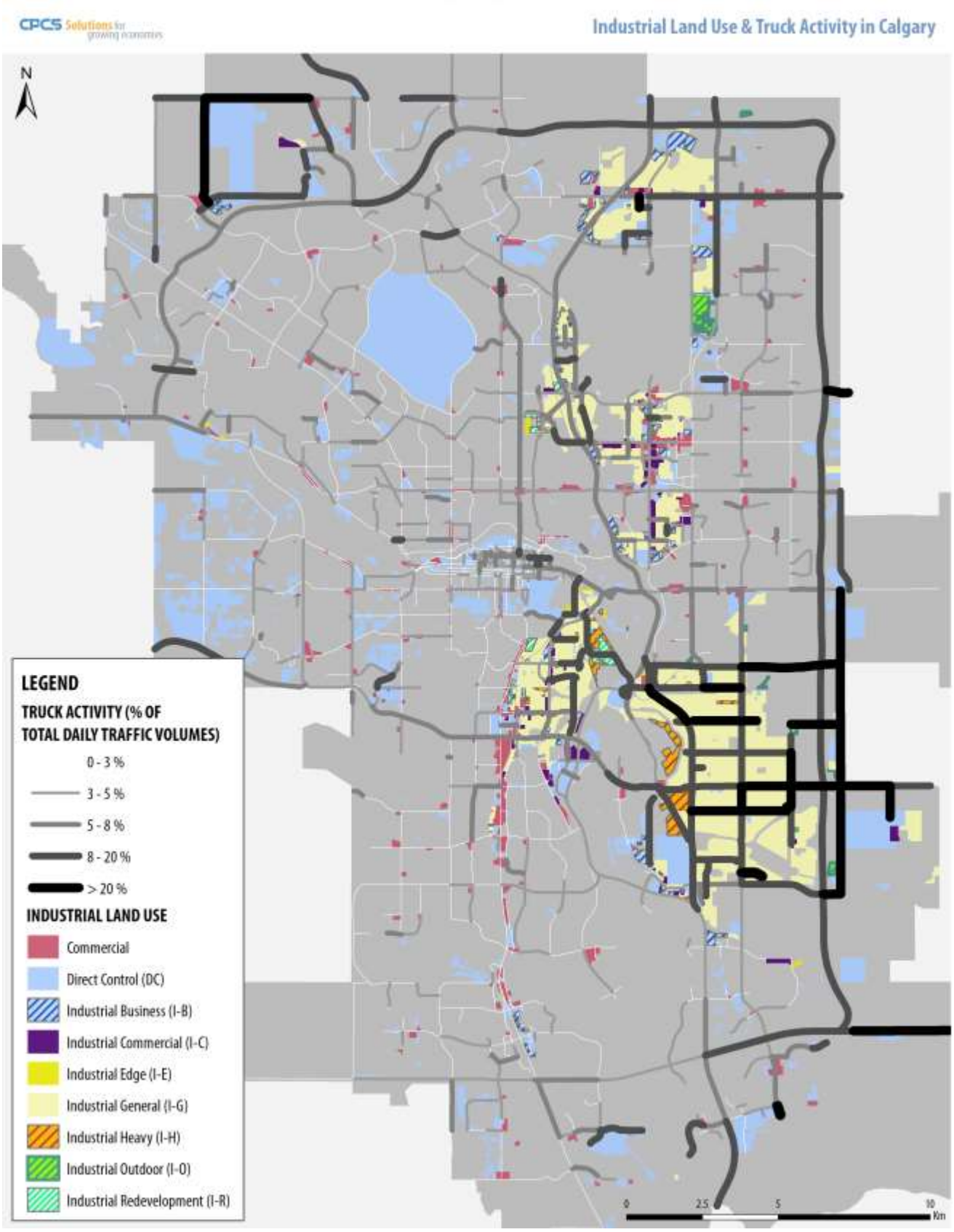


Figure 4-16: Industrial land use and truck activity

The primary advantages of the GPS data are recentness and coverage. First, the data can be used to compare truck activity on any roadway irrespective of functional classification,[56] in a clear and consistent manner. By comparison, whereas manual or automatic truck counts can be expensive to conduct in a widespread manner and often may suffer from comparison problems such as different methodologies, different collection times and vehicle classification issues including challenges associated with properly classifying buses, school buses and RVs. Second, as described in the Section 4.2.5, the data are from four representative two-week periods from 2016.

ATRI's truck GPS "pings" were linked to a detailed road network. The roads selected for analysis included arterial roads and higher, as well as some collector roads in specific areas identified as freight clusters. The absolute number of pings was translated into relative volumes using a methodology that takes into account the likelihood of a truck pinging on each segment (a function of truck travel speed and the length of the segment). Due to the the algorithm that is used to convert truck GPS "pings" into truck volumes, there is some some variability in estimated volumes between adjacent segments.

As shown in Figure 4-17, the northeast quadrant of Stoney Trail experiences some of the highest truck volumes. This finding is in line with expectations given that it connects the industrial areas in southeast Calgary to Highway 2 leading to Edmonton, as well as connecting the CN and CP intermodal terminals to distribution centres to the north of Calgary. The rest of Stoney Trail, as well as Deerfoot Trail, are also busy truck corridors.

Highway 2 appears to be the busiest truck entry point to Calgary from the north and the south of the city. From the east, Highway 22X, Glenmore Trail and Highway 1 appear to be well-used entry points, and there is truck traffic from the CN intermodal in Conrich coming in along Township Road 250 / McKnight Boulevard N.E. This last route is not included in Calgary's Primary Goods Movement Network.

It is also worth noting that the busiest truck entry point to downtown Calgary appears to be Memorial Drive, which also is not included in Calgary's Primary Goods Movement Network. (No corridors are currently identified into downtown within Calgary's Goods Movement Network.)

4.3.1.6 Truck trip origins and destinations

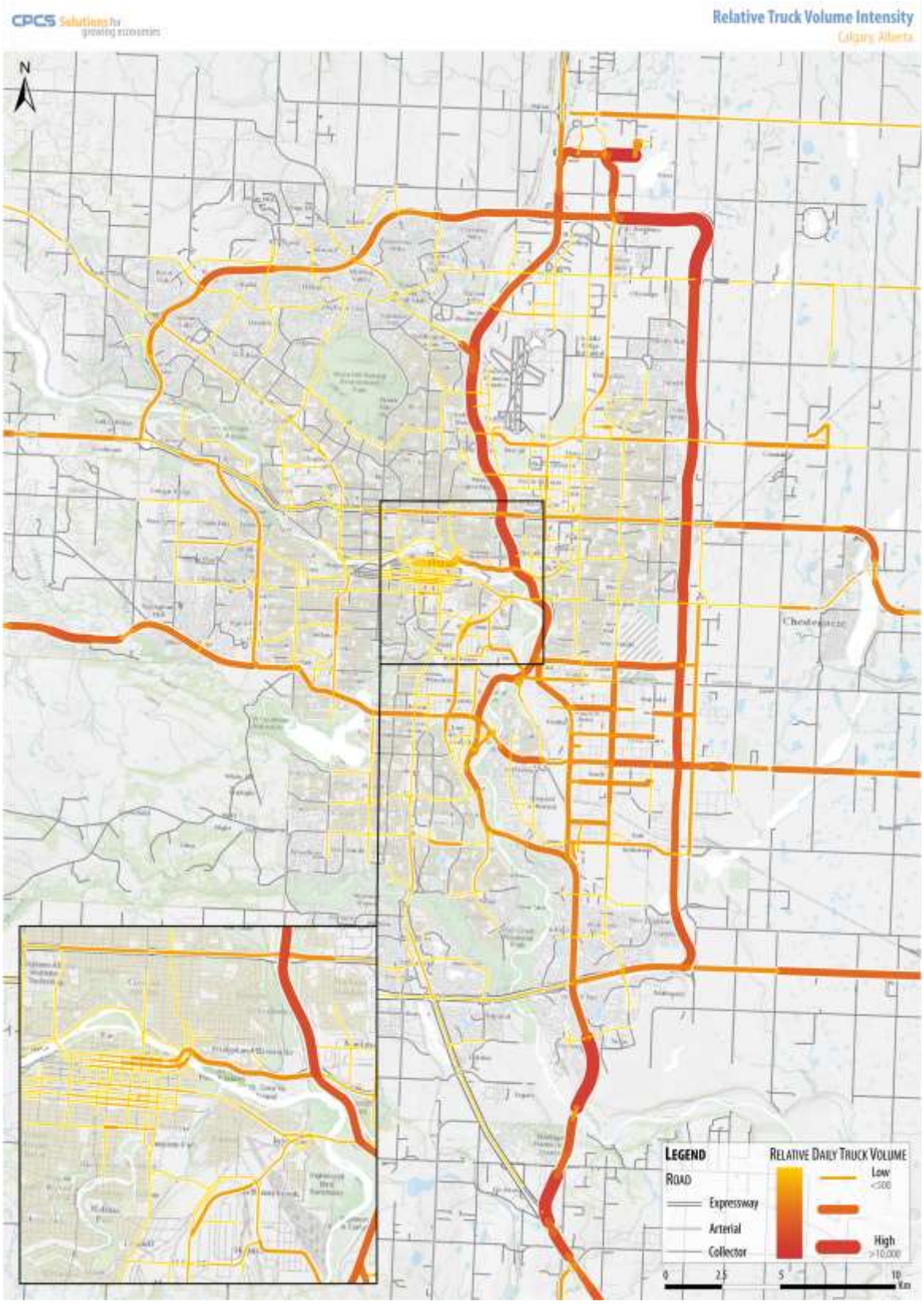
Figure 4-18 shows the destination of truck trips originating in the Calgary Region.[57] Overall, most truck traffic is headed north (36%), followed by south (27%), west (22%) and east (15%). The map displays, for each direction, the breakdown of destinations within the direction. (The distribution of trips within

[56] One limitation with these data is that on some larger roads (with a divided median) the sample truck volumes are summed for each direction, rather than for the total for both directions. As most of the busiest roads in Calgary used by trucks are divided, this limitation does not alter the usefulness of these data as an indicator of truck activity. However, it may slightly inflate the truck activity on smaller undivided roads relative to larger divided roads.

[57] It should be noted that the GPS data do not allow for differentiation between loaded and empty trips; therefore the map is more an indicator of truck activity between regions rather than specifically the destinations of loaded trucks heading outbound from Calgary (in other words, the data also include the backhauls of trucks delivering to Calgary).

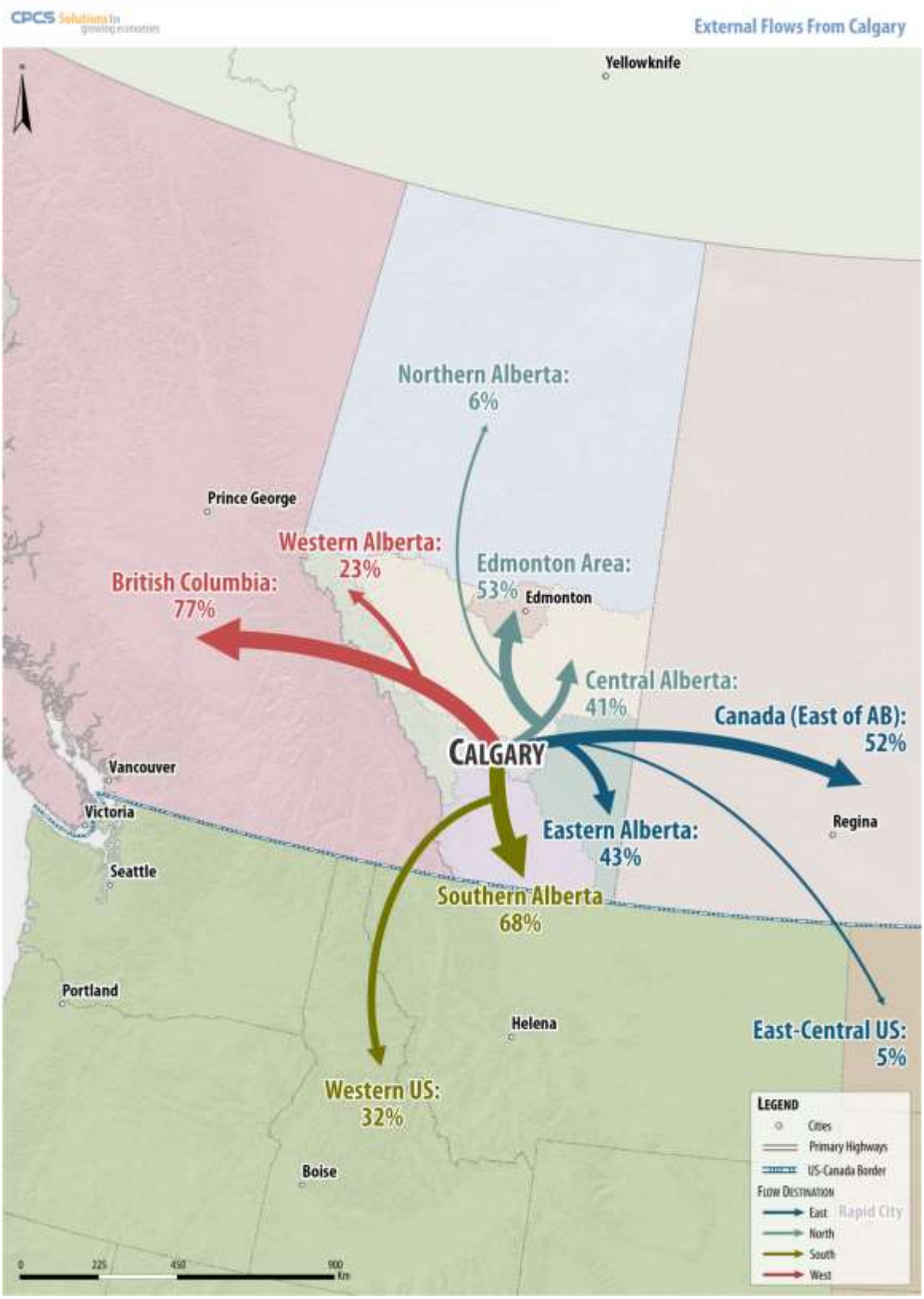
each cardinal direction sums to 100%). The Edmonton area is the single most dominant destination, at 19% of all truck trips originating in the Calgary Region.[58] Other important destinations are southern Alberta (18% of all truck trips), British Columbia (17%) and central Alberta (15%).

[58] Calculated as the product of 36% (the percent of trips that are northbound) and 53% (the Edmonton area's share of northbound trips).



Source: CPCS analysis of ATRI GPS data (2016).

Figure 4-17: Weekday relative truck volumes by corridor



Source: CPCS analysis of ATRI GPS data (2016).

Figure 4-18: Truck trip ends from Calgary Region

4.3.1.7 Trends in truck volumes

4.3.1.7.1 Historical truck trip growth

From 1999 to 2012, The City of Calgary collected truck counts crossing designated screenlines throughout the city.[59] Newer data are not available; nonetheless, these counts are indicative of historical trends. Although the absolute value of these counts is not equal to the number of truck trips, year-over-year change can be used to illustrate truck trip growth. To this end, Figure 4-19 summarizes the change in medium and heavy truck counts in Calgary between 2001 and 2012, as compared to population growth.[60,61] Though there was a spike in trucks counted in 2006, which may be partially explained by different counting methods, overall truck counts have grown approximately in line with population and employment growth, between 2001 and 2012.

Figure 4-20 shows the average number of medium and heavy trucks crossing all screenlines taken together throughout the city, compared to those trucks that cross the city boundary screenline. Between 2001 and 2012, the number of trucks crossing the city boundary screenline is comparable to the citywide average truck-count growth. Again, although newer counts are not available, the trends are informative. This growth in truck counts is higher than the growth of Calgary's population, but lower than the employment growth in the city.

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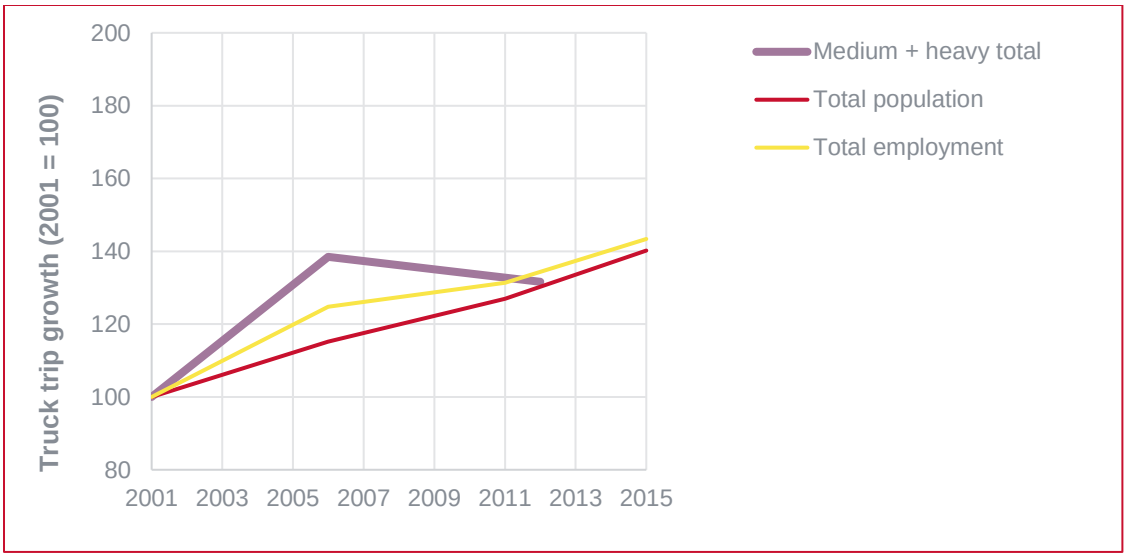
[59] Screenlines are imaginary lines that cross roads, highways and C-Train lines at strategic locations. Traffic counts are taken at these locations in each direction – for example, summarizing the traffic, by type of vehicle, that crosses each Bow River bridge in each direction, or across the city boundary in each direction. These counts are used to monitor changes in volume or mode. The truck growth rates shown in the figure reflect the aggregate of all screenlines, as explained further in the next footnote.

[60] Not every screenline is counted every year. However, counts were conducted for all screenlines in 2001, 2006 and 2012, and so the figure shows only the counts for these years. Note also that the locations where counts were conducted on some roads might have varied among the three years. Note also that a similar counting method was used (i.e. a combination of automatic and manual counts), which ensures consistency among the counts from year to year. However, it was also noted that using automatic counts often identifies larger passenger vehicles as medium trucks, and it is possible that the calculated growth rate in trucks could be influenced by passenger vehicle counts.

[61] There are three vehicle types, based on the Calgary truck bylaw, and ease of count classification (field data collection):

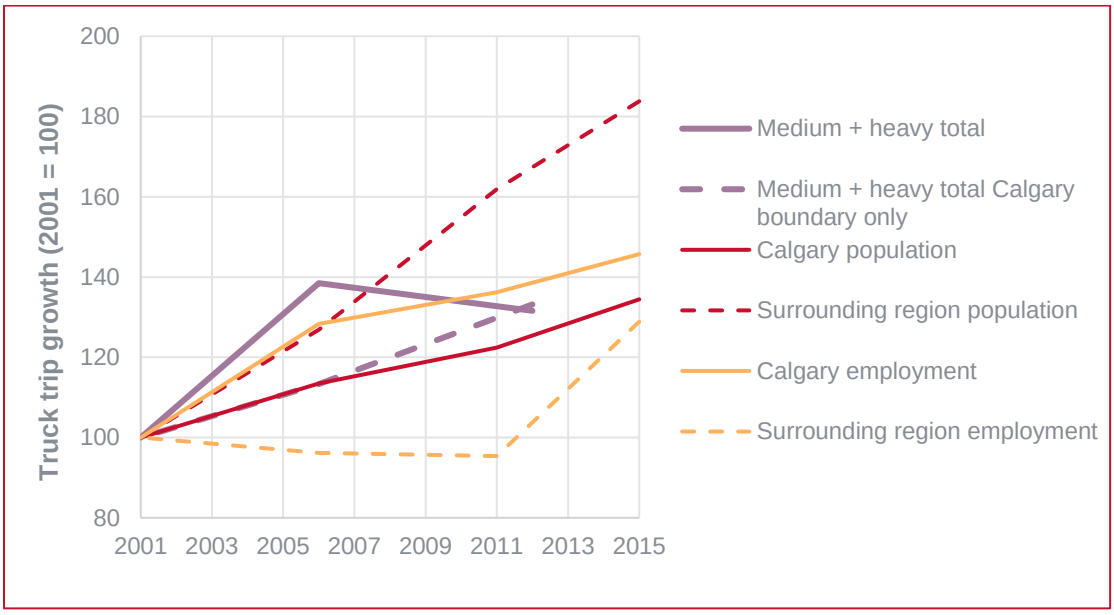
> Light: 4 tires, suitable for private use (passenger autos, pickup trucks, vans, SUVs);
> Medium: 6 tires, restricted to truck routes (Single units); and
> Heavy: 8 or more tires, restricted to truck routes (articulated vehicles, including tractor units without trailer).

The City of Calgary, Transportation Department. 2006. *2001 Regional Transportation Model: Commercial Vehicle Model Description Report*



Source: CPCS analysis of City of Calgary data.

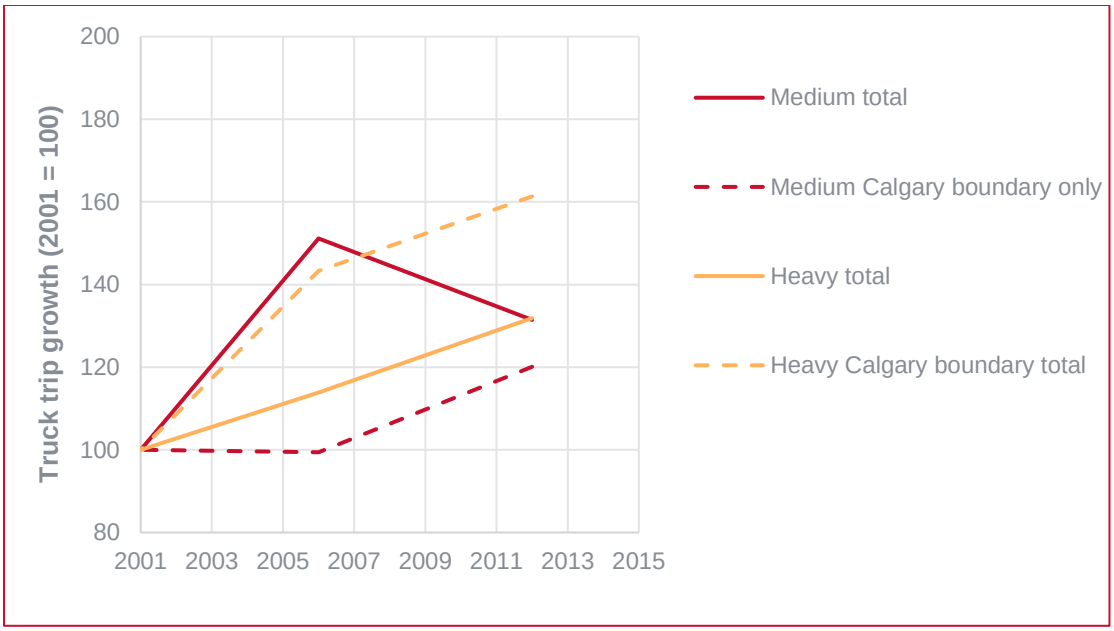
Figure 4-19: Historical truck counts, population and employment change in the city of Calgary and surrounding region



Source: CPCS analysis of City of Calgary data.

Figure 4-20: Truck trip growth in City and surrounding region

Figure 4-21 summarizes the growth in truck counts by type of truck. It also shows the growth of trucks observed at the Calgary boundary as compared to the average growth across all screenlines throughout the city. From 2001 to 2012, medium and heavy trucks saw a similar overall average growth rate. However, the heavy trucks crossing the screenline increased at a higher rate than the citywide average.

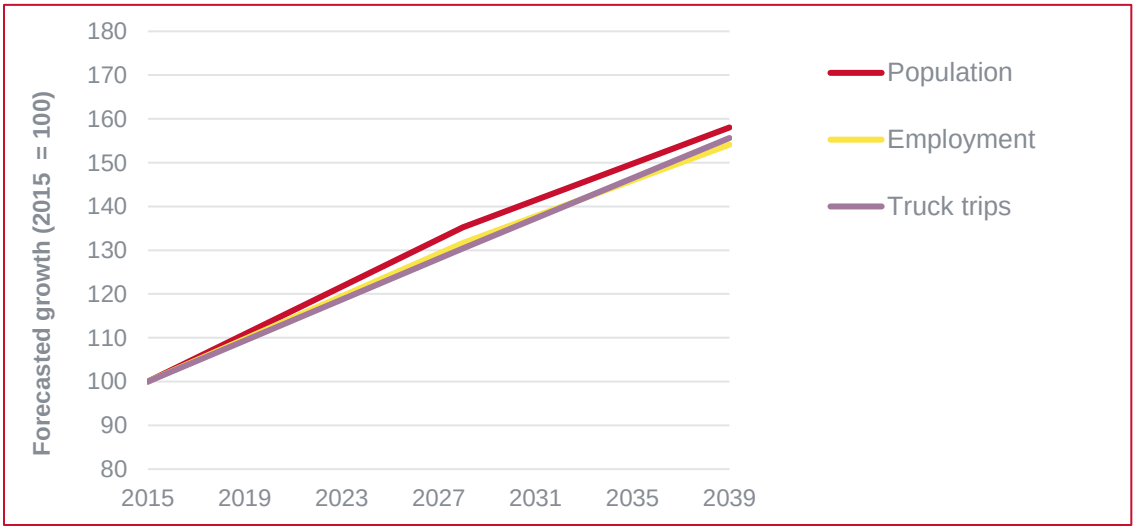


Source: CPCS analysis of City of Calgary data.

Figure 4-21: Truck trip growth by type of truck

4.3.1.7.2 Future truck trip growth

Figure 4-22 shows truck trip forecasts compared to population and employment growth for Calgary, including the surrounding region. Between 2015 and 2039, truck trips are expected to grow approximately in line with population and employment growth in Calgary, similar to what was observed in the historical truck counts.



Source: CPCS analysis of City of Calgary forecasts.

Figure 4-22: Truck trip, population and employment forecasts (2015-2039)

Figure 4-23 shows The City of Calgary's forecasts for truck trips, population and employment, for Calgary and the surrounding region separately. Population and employment in the surrounding region of Calgary is expected to increase at a quicker rate than in Calgary itself. By 2039, the surrounding region's population and employment are expected to be 19% and 13% of the total metropolitan area population and employment, up from 17% and 10%, respectively, in 2015.

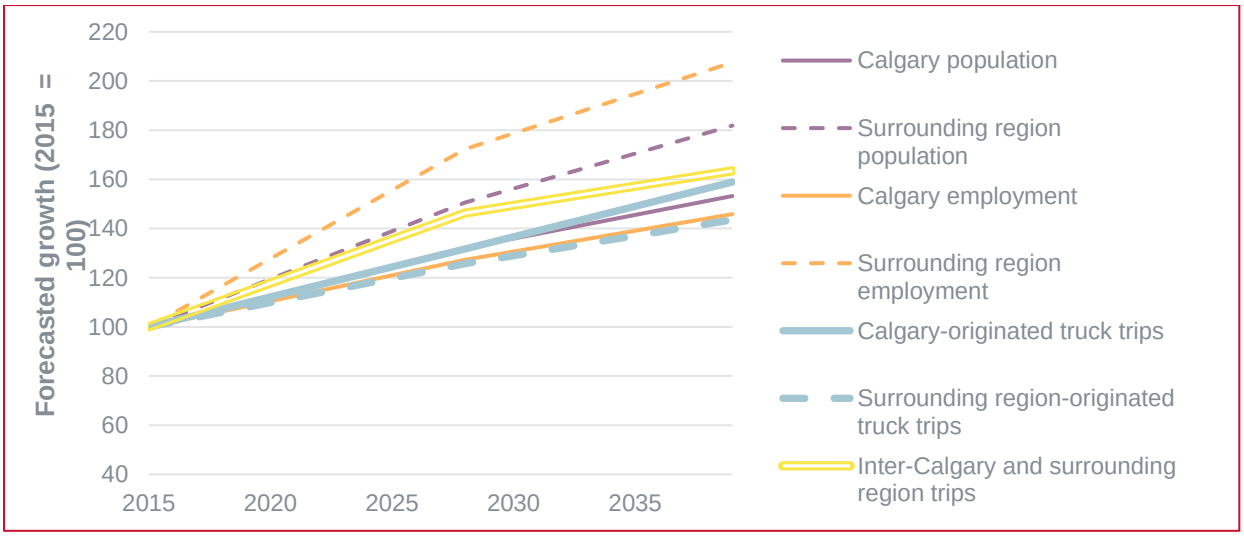
Truck trips originating outside of Calgary are expected to increase at a slower rate than those originating in Calgary itself. However, they are still expected to grow by over 40% between 2015 and 2039.62 Truck trips between Calgary and the surrounding region are expected to grow fastest overall. This is consistent with the expected population and employment growth in the surrounding region.

4.3.1.8 Volumes of Goods Transported by Trucks

The Transport Canada Trucking Commodity Origin and Destination (TCOD) survey also provides insights into the volume and type of goods moving in, out, and around Calgary.

In 2015, there was 7.2 million tonnes of goods moving by truck around the Calgary CMA. The survey reports a decline from 12.9 million tonnes in 2011. However, as the TCOD survey only captures a sample of truck carriers in any given year, so some variability from year-to-year is expected particularly when studying an urban area.

In 2015, 17 million tonnes of goods were shipped to Calgary. Most of these goods arrived from Alberta, followed by from BC, the US (Transborder) and Ontario (Figure 4-24). In 2015, the volume of goods originating in Calgary (8 million tonnes) was less than half the volume destined to Calgary. Likewise, most of these goods were destined to other areas in Alberta.



Source: Consultant analysis of City of Calgary forecasts.

Figure 4-23: Truck trip, population and employment forecasts, Calgary and surrounding region (2015-2039)

62 This calibration was based on information from 2000, which may not be representative of the current transportation and logistics activity outside of Calgary.

Figure 4-25 shows the tonnages of the top 10 commodities moving to and from Calgary by weight. The largest proportion of goods moving to and from Calgary is general freight. In 2015, there was a spike in shipments of mineral and oil products to Calgary, suggesting that potentially a pipeline was shut down or had its flow reduced. This increase could also explain the spike in shipments from the rest of Alberta to Calgary in 2015.

4.3.1.9 Travel times and delay

The ATRI data can also be used to map travel speed and delay. Each GPS ping is associated with a spot speed, the values of which can be aggregated and averaged over the study time periods (including by time of day).

Figure 4-26 shows the average weekday truck travel speed by corridor (average over the entire day). Notably, truck travel speeds are highest on Stoney Trail, Deerfoot Trail and the Trans-Canada Highway. Speeds are slowest in downtown Calgary as well as on specific short segments around the region (such as near the Conrich terminal).

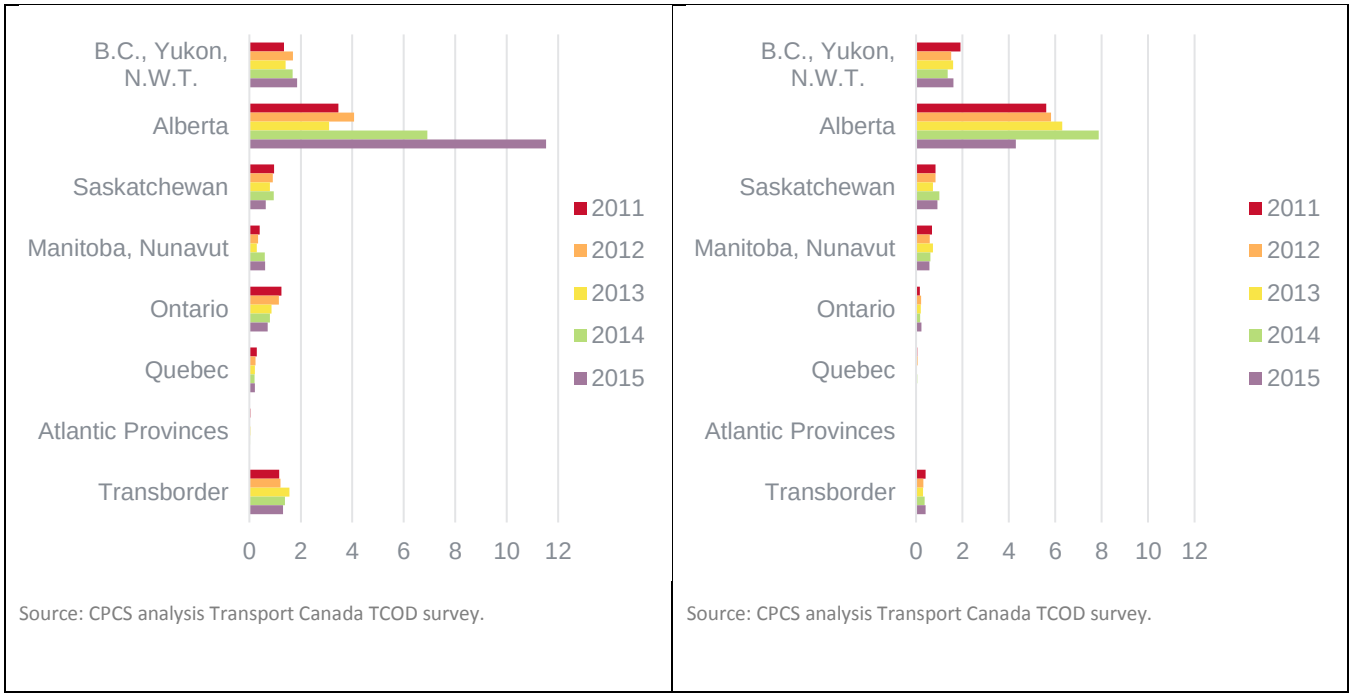
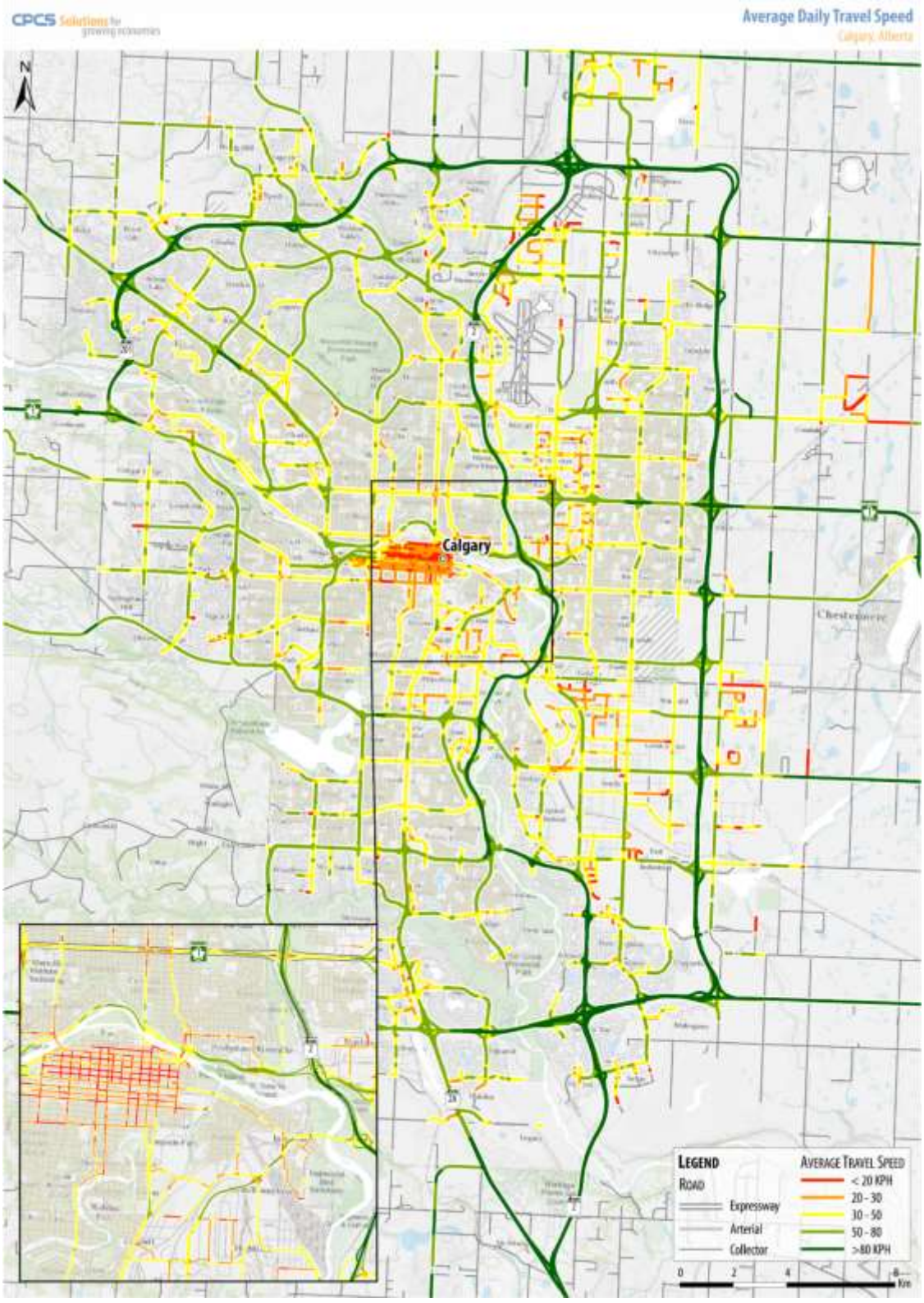


Figure 4-24: Volume of goods (in millions of tonnes) by truck travelling to (left) and from (right) Calgary, by origin and destination, respectively

Note: n.e.c. means not elsewhere classified. Source: CPCS analysis Transport Canada TCOD survey.

Note: n.e.c. means not elsewhere classified. Source: CPCS analysis Transport Canada TCOD survey.

Figure 4-25: Volume of goods (in millions of tonnes) by truck travelling to (left) and from (right) Calgary, by commodity type. Top 10 by weight shown.



Source: CPCS analysis of ATRI GPS data (2016).

Figure 4-26: Average weekday truck travel speed by corridor

Figure 4-27 examines the speed performance of each corridor in the peak periods, defined as between 6-9 a.m. and 4-7 p.m. The map shows the travel time index (TTI), which is defined as the ratio of the free-flow truck speed to actual peak truck speed. Specifically, the free-flow truck speed is defined as the average overnight speed, and the peak speed is defined as the average speed in the worst hour from among the six peak hours as defined.[63]

The Peak TTI is a measure of the gap between peak performance and free-flow performance, with a higher TTI value indicating worse performance in the peak. The metric is not weighted for the number of trucks on the road. In addition, since the TTI is calculated separately for each road segment, a 25 kph peak speed (for example) is penalized much more on a road with a free-flow speed of 60 kph than on a road with a free-flow speed of 40 kph.

In general, Stoney Trail has a lower TTI; i.e., nearly free flow speeds can be maintained in the peak. By contrast, many sections of Deerfoot Trail have a TTI exceeding 1.5, including from 64 Avenue N.E. to Memorial Drive and from Glenmore Trail S.E. to 130 Avenue S.E. Various sections of Glenmore Trail S also have TTIs exceeding 1.5.[64]

Truck delay is defined as the time difference between free-flow and actual travel times, for a specific segment, multiplied by the number of trucks affected. Since the volumes are defined on a relative rather than absolute basis, delay is necessarily evaluated on the same basis (high/low rather than absolute values).

Figure 4-28 shows the truck delay across all hours of the day, which distributed similarly to the truck delay in the peak period.

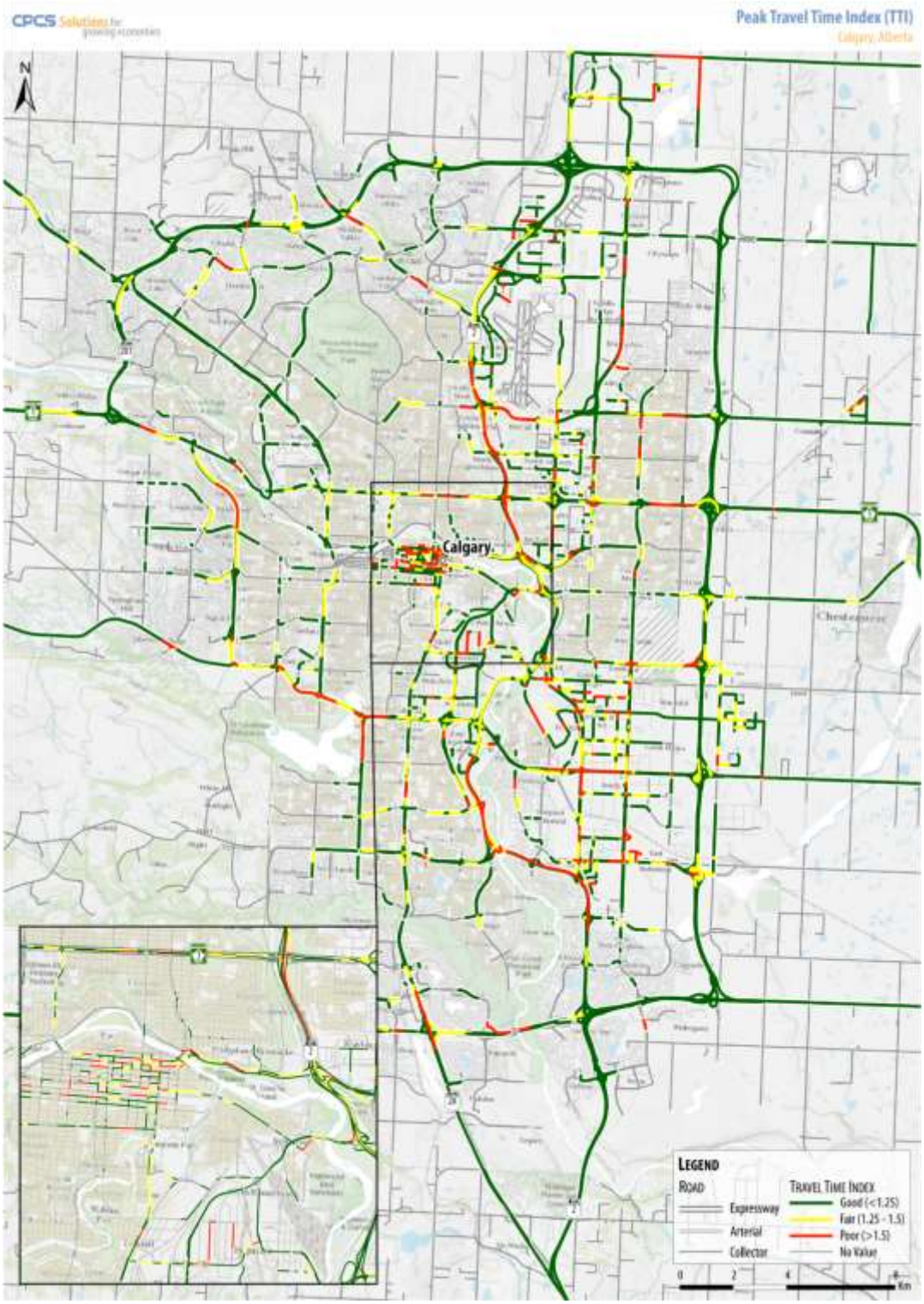
Some of the most significant delay bottlenecks are:

- On Deerfoot Trail north of the Trans-Canada Highway, speeds drop below 30 kph in the northbound direction between 4:00 and 6:00 P.M., compared to a free-flow speed of almost 60 kph.
- Glenmore Trail is very slow in the a.m. peak westbound approaching Ogden Road S.E., likely due to road construction in this area.
- Deerfoot Trail is subject to heavy truck delay northbound between 130 Avenue S.E. and Anderson Road S.E. (particularly between 7:00 and 9:00 A.M.) and southbound from 11 Street S.E. to Anderson Road S.E. (between 3:00 and 6:00 P.M.).
- Many of the streets in downtown Calgary are subject to significant truck delay, although speeds are generally fairly low to begin with.

[63] For certain segments where there are deemed to be too few observations to reliably determine an average speed for each peak hour, the average of all peak hours is used instead, so as to mitigate the influence of anomalies.

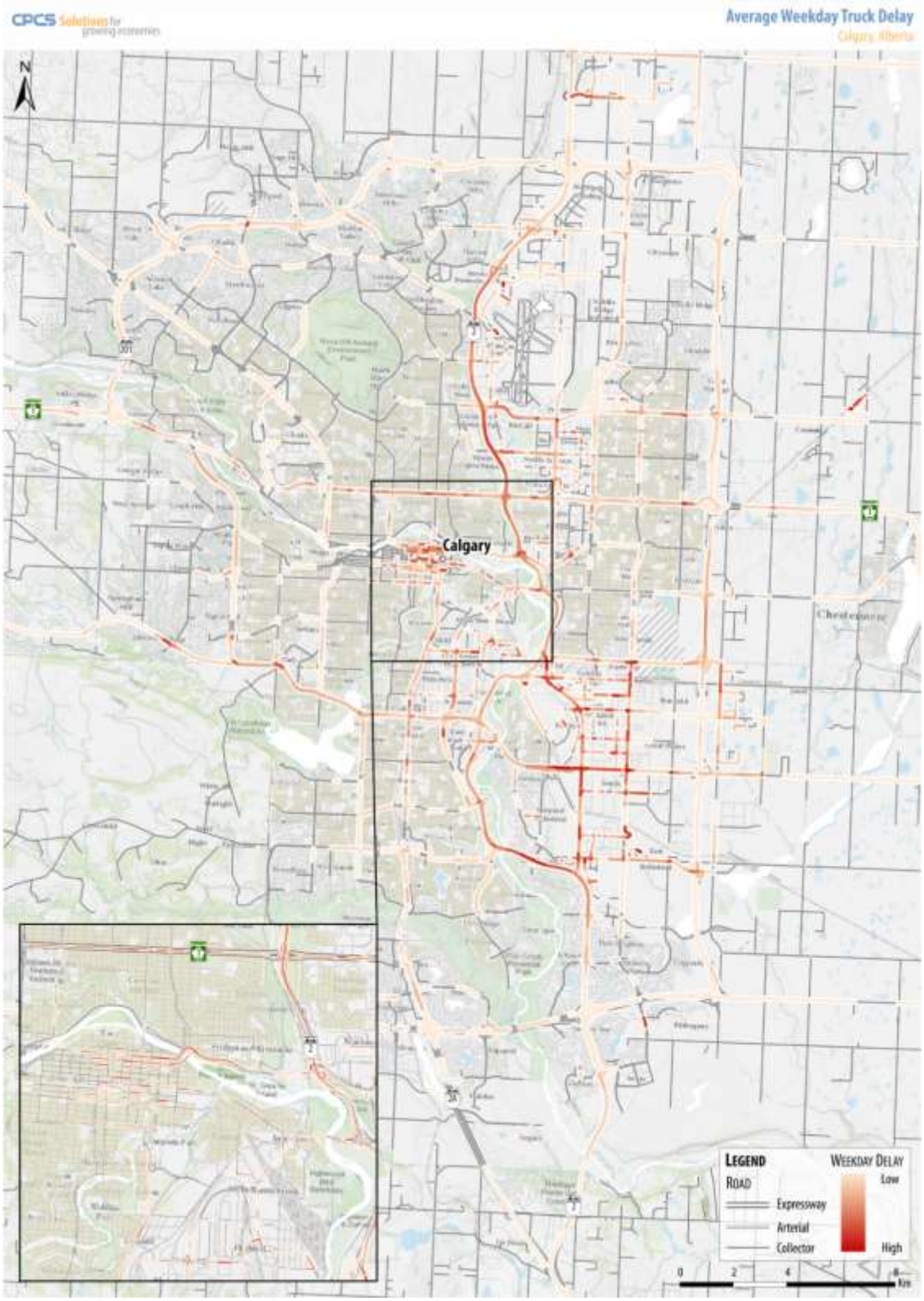
[64] 1.5 is the factor generally used by the US Federal Highway Administration for reliability-related metrics as indicative of a roadway not being reliable. "*Federal Register: National Performance Management Measures*." (2017)

The locations of delay on Deerfoot Trail and Glenmore Trail are in line with congestion points most frequently identified by stakeholders.



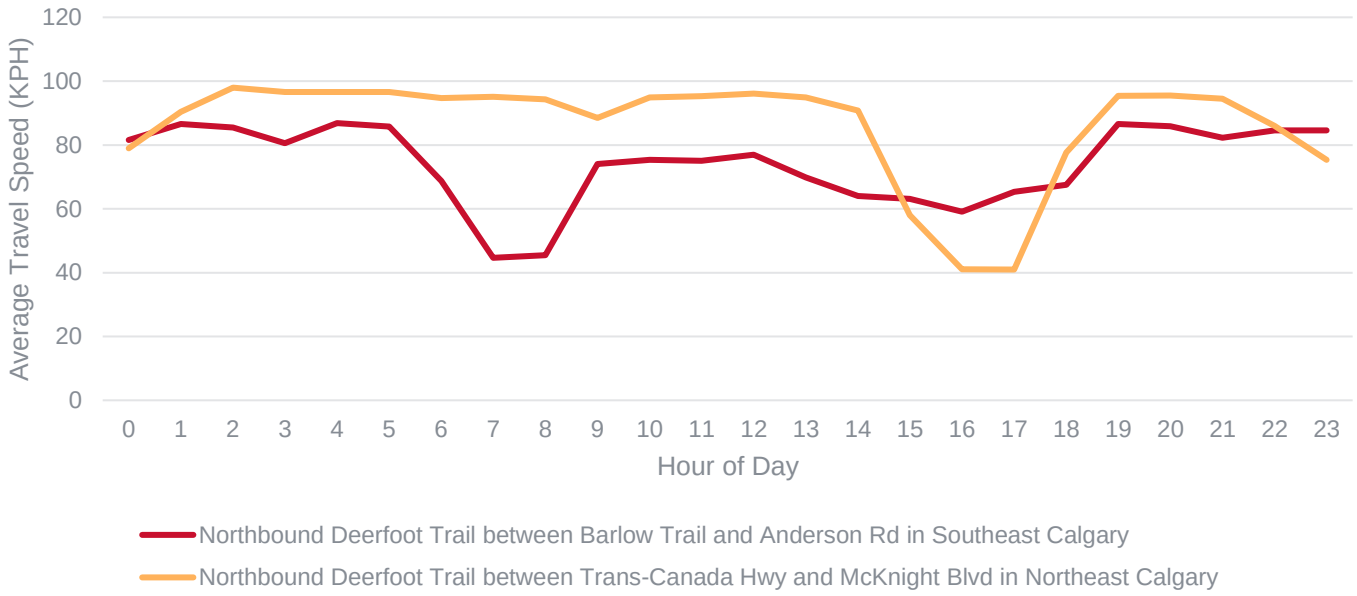
Source: CPCS analysis of ATRI GPS data (2016).

Figure 4-27: Peak truck travel time index by corridor



Source: CPCS analysis of ATRI GPS data (2016).

Figure 4-28: Average weekday truck delay by corridor



Source: CPCS analysis of ATRI GPS data (2016).

Figure 4-29: Average truck travel speed on select segments of Deerfoot Trail

Figure 4-29 examines the travel speeds on select segments of Deerfoot Trail, showing how truck speeds are distributed throughout the day. Northbound Deerfoot north of Highway 1 experiences lower travel speeds during the evening peak period only - otherwise, travel speeds of nearly 100 kph are maintained throughout the day. By contrast, northbound Deerfoot between Anderson Road and Barlow Trail experiences lower truck speeds throughout the day.

4.3.2 Rail

Rail freight play an important role in supporting the goods movement industry in Calgary, as well as bringing consumer products from North America and around the world to consumers in Calgary. This section describes the rail infrastructure in Calgary and how it connects to the national and continental rail network.

4.3.2.1 Rail corridors in Calgary

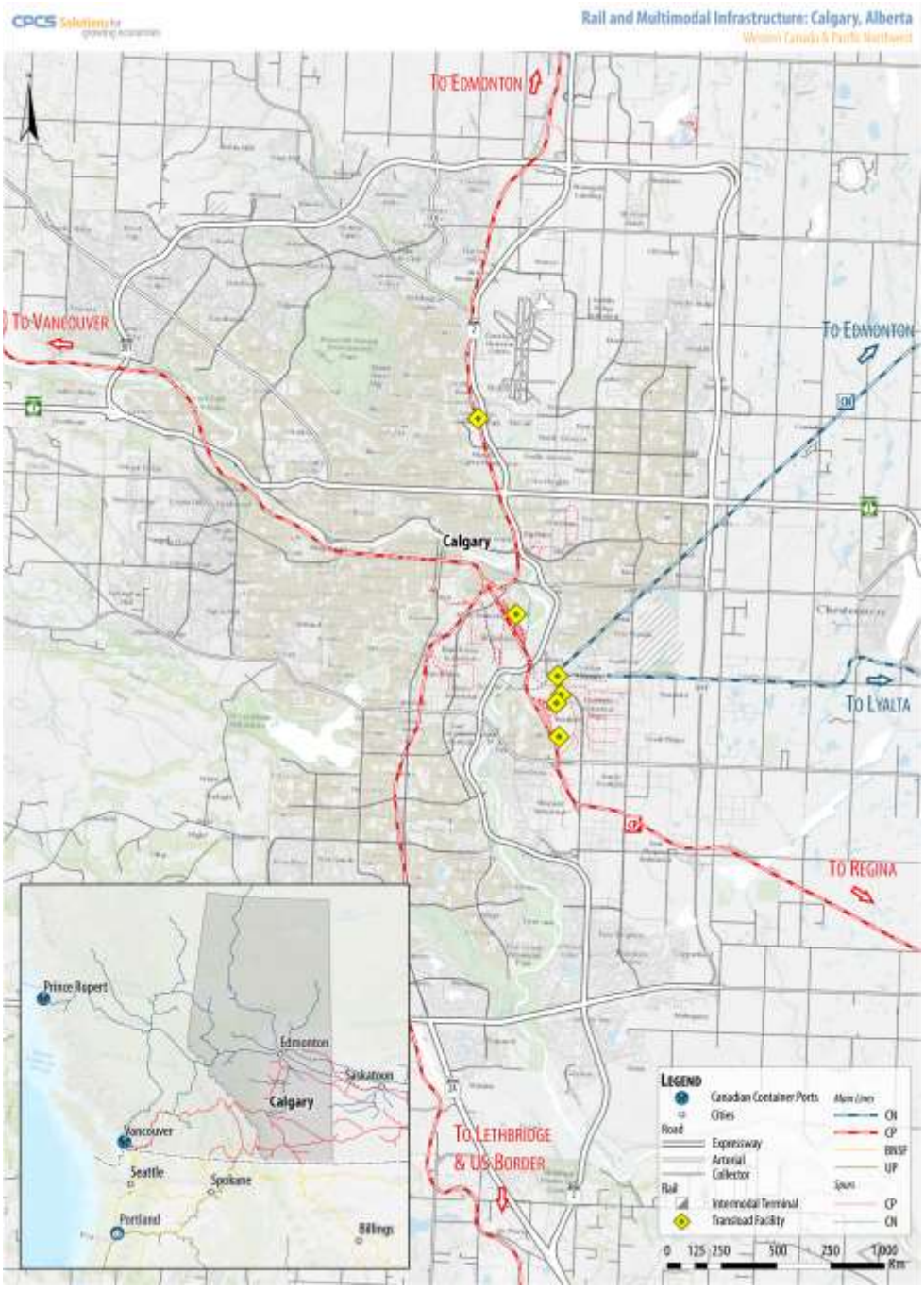
Calgary is served by two Class 1 railways, Canadian National Railway (CN) and Canadian Pacific Railway (CP), as shown in Figure 4-30.

CN's east-west mainline runs through Edmonton between the Canadian West Coast (Prince Rupert and Vancouver) and Eastern Canada, the United States Midwest and the United States Gulf Coast. As a result, CN serves Calgary from a line that

connects to the mainline through Edmonton. It also has a short branch line northeast of Calgary serving various customers in the area. This short branch line no longer connects with Saskatoon. CN's main yard in Calgary, Sarcee Yard, is located off 50 Avenue S.E., although its intermodal facility is located outside the Calgary city limits in Conrich.

CP serves Calgary primarily via its east-west mainline between Vancouver and Eastern Canada, the United States Midwest and the United States East Coast. It also has a line running north to Edmonton, which connects with CP's North Line from Winnipeg at Wetaskiwin.

This line can therefore be used as an alternative to CP's mainline for eastbound traffic from Calgary and vice-versa. [65]



Source: CPCS

Figure 4-30: Calgary's multimodal transportation system

CP also has a line running south to Lethbridge and the United States border, where it interchanges with American Class I carriers Burlington Northern Santa Fe (BNSF) and Union Pacific (UP). CP interchanges with these American Class I carriers at Coutts, Alberta and at Kingsgate, British Columbia, respectively. CP has several yards in Calgary including Alyth (southeast of downtown Calgary), Ogden (in the southeast) and Keith Yard (in the northwest).

All corridors are primarily single track with sidings. As a rule of thumb, these lines can have a capacity of between 16 and 30 trains per day, depending on the sophistication of their signalling system.[65] Railways undertake capacity capital expenditures to expand network capacity by themselves, such as adding passing track or enhancing the sophistication of its signalling system. In 2016, CP invested $150 million in capacity improvements network wide[66] and CN invested $300 million "*on initiatives to support growth and drive productivity*" network wide.[67]

CN and CP serve intermodal terminals (section 4.3.2.2), transload facilities (section 4.3.2.3) and automotive compounds (section 4.3.2.4) in and around Calgary. Intermodal terminals are key freight hubs where containers carrying goods can seamlessly be loaded to and from trucks and trains, without having to move the goods from one container to another. At transload facilities, bulk/break-bulk/project cargo can be loaded between trucks and rail cars. Automotive compounds allow finished vehicles to be unloaded from rail cars and delivered to dealerships.

The key difference between intermodal terminals and transload facilities and automotive compounds is in how goods are handled. Intermodal terminals do not handle goods directly. The container stays sealed as it moves from truck to train or vice versa. At transload facilities and automotive compounds, goods are handled directly as they are moved between rail cars and trucks.

Not having to handle the goods directly is advantageous for a few reasons. One reason is that by not handling the goods, the potential for damage or leakage is minimized. Another reason is that the process of moving the goods from one mode of transportation to another is faster, thereby minimizing the overall journey time from shipper to receiver.

Intermodal transportation is not suitable for all types of goods. Bulk commodities are often less time-sensitive and less sensitive to damage while being transferred, which eliminates the need to pay a premium for intermodal services. Some shippers may also wish to transload goods to take advantage of higher capacities offered by truck trailers. For example, typically the contents of five 40-foot intermodal containers can fit into four 53-foot truck trailers. As a result, by transloading, the number of truck trips required to deliver goods to their final destination can be reduced from five to four.

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[65] The number of trains per day can exceed these levels if traffic is entirely composed of a single train type, rather than a mix of bulk, manifest and intermodal trains. Bulk trains, hauling commodities such as potash and wheat, are typically slower and less tightly scheduled, whereas manifest and intermodal trains, hauling general freight and containers, respectively, are typically quicker and more tightly scheduled. Cambridge Systematics. 2007. National Rail Freight Infrastructure Capacity and Investment Study.

[66] CP. Annual Report 2016.

[67] CN. Annual Report 2016.

Businesses that buy or sell finished or semi-finished goods often prefer to be located close to intermodal terminals to minimize their truck transportation costs and shipment transit times. Even in the case where products are imported from overseas, the last mile truck transportation costs can be a significant portion of the total freight bill. This is because per-kilometre, truck transportation costs much more than ocean or rail transportation. Furthermore, due to urban congestion, long truck trips between shipper facilities and intermodal terminals can add a significant amount of time and transit time variability to the total journey time.[68] Being located close to intermodal terminals helps to minimize both of these concerns.

4.3.2.2 Intermodal terminals

Both CN and CP have intermodal terminals located in Calgary that allow containers to be transferred between truck and rail (Table 4-2). In 2013, CN opened the Calgary Logistics Park in Conrich, replacing its Calgary Intermodal Terminal.[69] It has 170 acres of fully serviced and zoned warehouse distribution sites (three million square feet of new warehouse space), with the possibility of future expansion of 200 acres. CP's intermodal terminal in Calgary is located in the city's southeast, with access off of 52 Street S.E.

Table 4-2: Calgary intermodal facilities

	Location
CN	250050 Lantz Way Conrich, Alberta T1Z 0A8 Northwest Township Road 250/Range Road 283
CP	33 Dufferin Place SE Calgary, Alberta T2C 4M2

4.3.2.3 Other transload facilities

CN and CP serve six other transload facilities in Calgary, as listed in Table 4-3. These facilities allow break-bulk (goods that must be loaded individually, such as steel coils, or are in individual crates or bales that must be loaded individually) and dry and liquid bulk cargo (e.g., grains and petroleum products) to be transloaded between truck and rail. These facilities are concentrated around CN and CP's yards in Calgary's southeast.

4.3.2.4 Automotive Compounds

Both CN and CP have automotive compounds to handle finished vehicles. CP's terminal is located at its Ogden Yard off Ogden Dale Road SE. CN's facility is located adjacent to its Sarcee Yard, along 50 Avenue S.E.

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[68] See also the discussion on total logistics costs in Section 6.3.3.

[69] CN. 2013. CN opens new intermodal terminal at Calgary Logistics Park. Press Release.

4.3.2.5 Freight rail traffic

Because rail infrastructure is owned by private companies (CN and CP), there is less of a role for The City of Calgary with respect to investments in new capacity to enable goods movement. However, rail traffic impacts adjoining areas in terms of noise, vibration, safety and delaying road traffic at grade crossings, among other impacts.[70] Minimizing these impacts to the broader public is an important consideration in terms of allowing for continued movement of goods by rail. Rail infrastructure can also have a direct impact on goods movement by road (e.g., delaying trucks at grade crossings or limiting access to sites). Finally, most rail traffic necessitates truck movements for first and last mile access to shippers. As such, it is important that trucks have good access to intermodal terminals and that they are able to move quickly and efficiently between those terminals and customer facilities (e.g., distribution centres and manufacturing sites).

[70] In 2015, 45 out of 46 fatalities on federally regulated railways occurred due to at-grade crossings (15) or trespassers (30). Source: Transportation Safety Board of Canada. Statistical Summary - Railway Occurrences 2015 - Data tables.

Table 4-3: Other transload facilities

Facility name	Description	Location	Types of products handled	Capacity
CN CargoFlo	Dry and liquid bulk transload facility.	Sarcee Yard, 5310-27 Street S.E., Calgary	Liquid and dry bulk, including plastics, food-grade liquids, jet fuel and diesel.	37 transfer spots
Alyth TFR *	Transloading facility for petroleum liquid bulk products, operated by Arrow Reload Systems Inc. and served by CP.	1702 30 Avenue S.E., Calgary	Jet fuel, diesel, gasoline, bio diesel, crude, condensates.	36 railcar spots
Target Transload	Small transload facility, handling break-bulk cargo. Served by both CN and CP.	3016 58 Avenue S.E., Calgary	Break-bulk (e.g., steel coils or machinery in wooden crates).	6 railcar spots
Transload Logistic Corp.	Transload facility handling break-bulk cargo and machinery.	4507-8A Street N.E., Calgary	Break-bulk (e.g. steel coils), machinery / equipment.	Not available
Calgary TFR *	Transloading facility operated by Arrow Reload Systems Inc. Served by CP.	6380 Ogden Dale Road S.E., Calgary	Steel, lumber and building materials.	16 railcar spots
Ogden TFR *	Transloading facility operated by Liquids Transloading. Served by CP.	7260 Ogden Dale Road S.E., Calgary	Energy products and chemicals.	33 railcar spots

Source: Consultant summary of facility websites

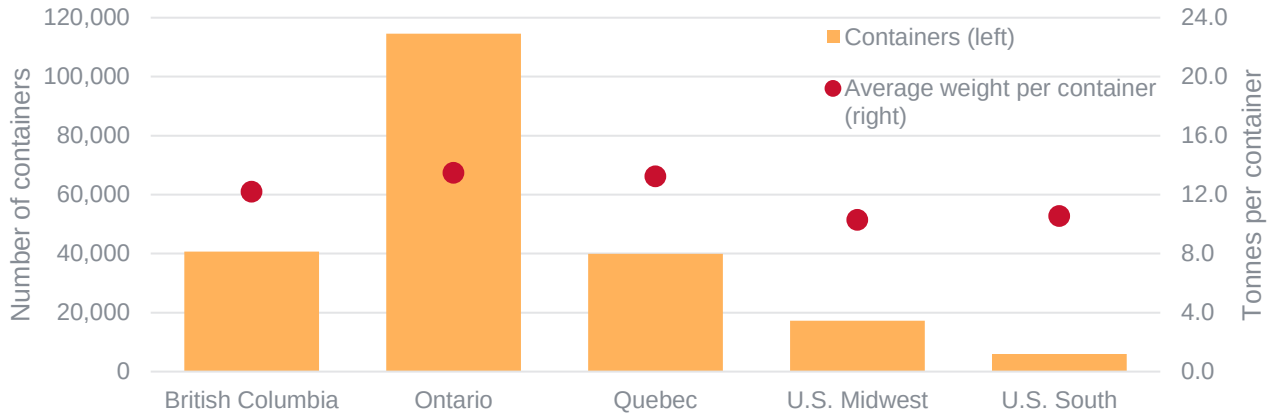
* The term "TFR" is used by CP in the designation of its transload facilities.

In 2016, 220,000 containers transporting 2.8 million tonnes of cargo were transported to Calgary, and 140,000 containers containing 1.7 million tonnes were transported from Calgary. Figure 4-31 and Figure 4-32 show the origin and destination of containers transported to and from Calgary, respectively. Most containers destined to Calgary arrive from Ontario, whereas most containers from Calgary are destined to BC. While there is no information as to what is in the containers, containers transported to BC from Calgary are lighter on average (9.8 tonnes per container), suggesting that there is a higher proportion of empty containers.

Direct estimates of train volumes are generally not available from public sources. However, Transport Canada's Grade Crossing Inventory reports the approximate number of trains per day over each at-grade crossing in Canada. The at-grade crossings in and around Calgary are shown in Figure 4-33.

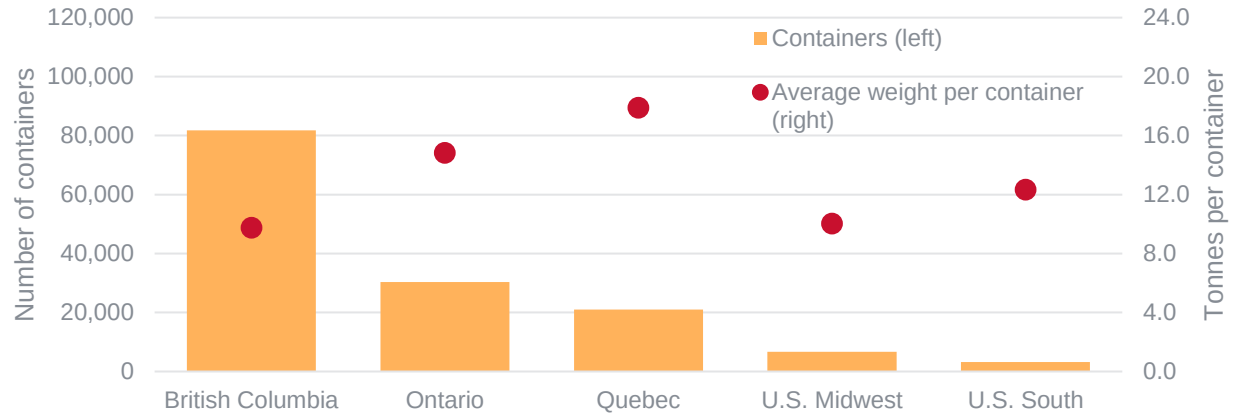
The Inventory reports were used to estimate the approximate number of freight trains that operate on each corridor on each corridor. These are also shown in Figure 4-33.

Most at-grade crossings are located in southeast Calgary, where there are numerous spurs in the area. CP's mainline in southeast Calgary, running between Calgary and eastern Canada and the United States Midwest, carries the largest number of freight trains in Calgary, with more than 25 freight trains per day. The line between Calgary and Vancouver has the second highest levels. These volumes are lower than, but are approaching, the potential capacity of a single-track line. CN's rail line in southeast Calgary has lower traffic levels, between five and 10 trains per day.[71]



Source: CPCS analysis of Transport Canada data.

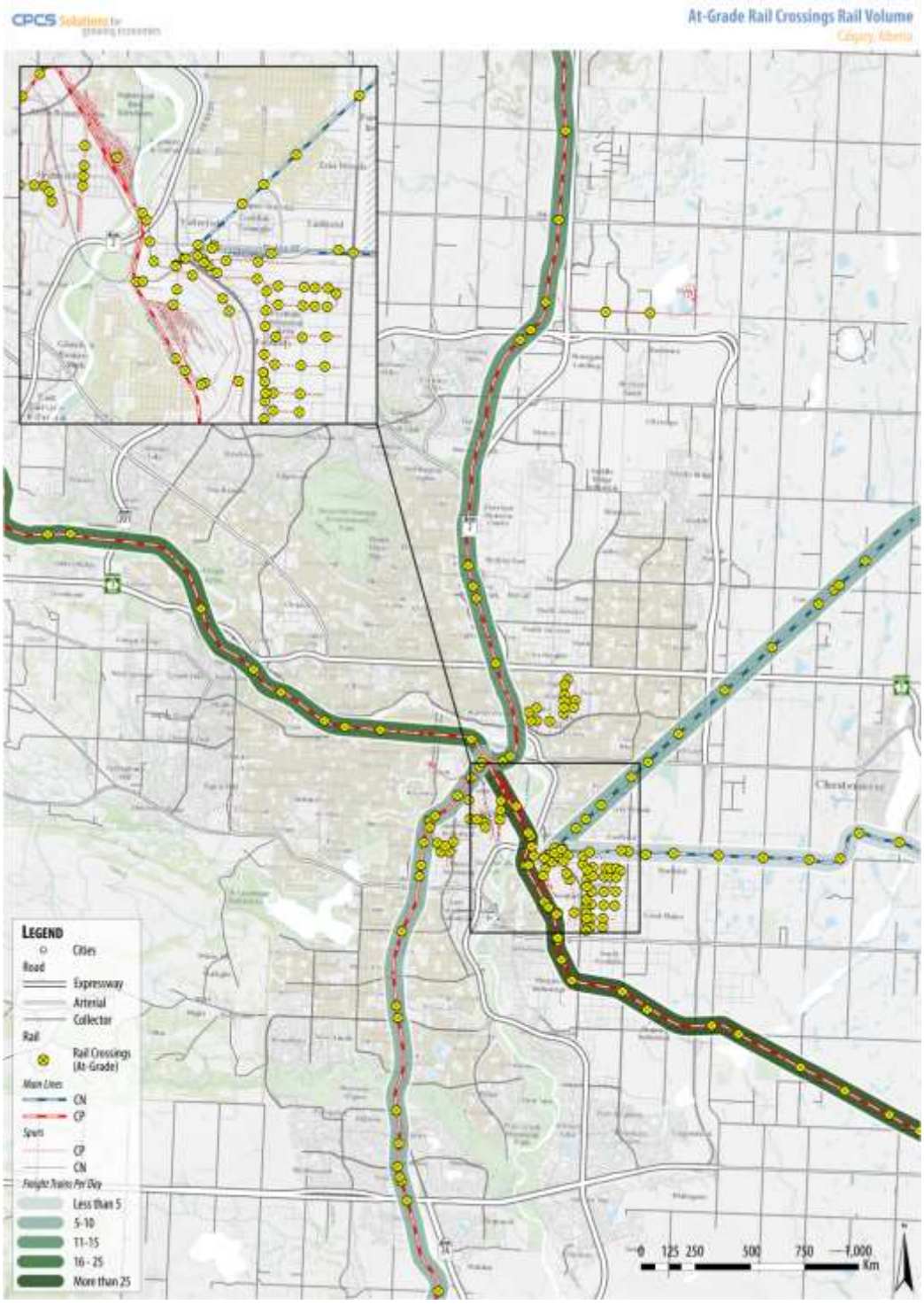
Figure 4-31 Origin of containers to Calgary transported by rail



Source: CPCS analysis of Transport Canada data.

Figure 4-32 Destination of containers from Calgary transported by rail

[71] Though the line between Calgary and Edmonton reports between five and 10 trains per day, the traffic levels in Calgary may be lower now due to the opening of CN's intermodal terminal in Rocky View County.



Note: Where a single corridor had multiple values of freight rail traffic, the largest value was selected for display. Notably, there was some discrepancy between at-grade crossings along CN's line between Calgary and its intermodal terminal in Rocky View County. Source: CPCS analysis of Transport Canada Grade Crossing Inventory

Figure 4-33 Railroad at-grade crossings and train volumes in Calgary

4.3.3 Air

The Calgary International Airport (YYC) is Canada's fourth busiest airport. It is served by major air cargo and courier services including CargoJet, DHL, FedEx, Purolator and UPS. A $2 billion expansion to add a new 14,000 foot runway and additional industrial warehousing space has increased the YYC's ability to handle cargo growth from both belly and freighter service.[72] The YYC Global Logistics Park, which occupies over 330 acres of land, is accessible by shippers and receivers in the area from Deerfoot Trail and from Airport Trail N.E. YYC operates 24/7 and cargo can be transported from YYC to anywhere in the world within 48 hours.[73] A list of cargo facilities at YYC is provided in Appendix 8.2

Shippers in Calgary who buy and sell high-value, time-sensitive products across North America and around the world will often take advantage of air cargo services to meet their needs. For example, online retailers may use air cargo for inbound transportation to fulfillment centres for high-value, time-sensitive consumer products. Cold storage distribution centres that replenish local grocery stores may use air cargo for fresh food products with short shelf lives. Cold storage distribution centres that source local fresh food products may also use air cargo to reach domestic and international customers.

Because YYC is a 24/7 airport through which cargo can be transported to virtually anywhere in the world, its presence provides a significant advantage, both to businesses that make extensive use of air cargo as well as those who may need to ship by air in emergency situations. The value of an air cargo hub is generated both through the number of destinations it can reach as well as the frequency of departures and arrivals. YYC has non-stop flights to 68 cities. Many more cities can be reached with a single connecting flight.

Approximately 135,000 tonnes of air cargo are handled at YYC each year.[74] Although this may sound small, given that most of these commodities are high-value, air cargo's share of total freight to and from Calgary by value is much higher than its share by volume.

According to the Canadian International Merchandise Trade Database, approximately $2.1 billion worth of products was exported internationally via the Calgary International Airport by air in 2016; that is, the airport was recorded as the port of export. Approximately $1.2 billion of the exports by value originated in Alberta.

The top ten export categories are shown in Figure 4-34. The largest export by value is diamonds, representing $0.8 billion in 2016. There are also significant exports related to aircraft and aircraft components. For example, other significant exports include turbo-propellers, aircrafts and services (e.g., "repairs"), which may relate to WestJet and Air Canada's hubs in Calgary. There are also several animal and food products within the top ten list. To further illustrate the importance of air cargo to

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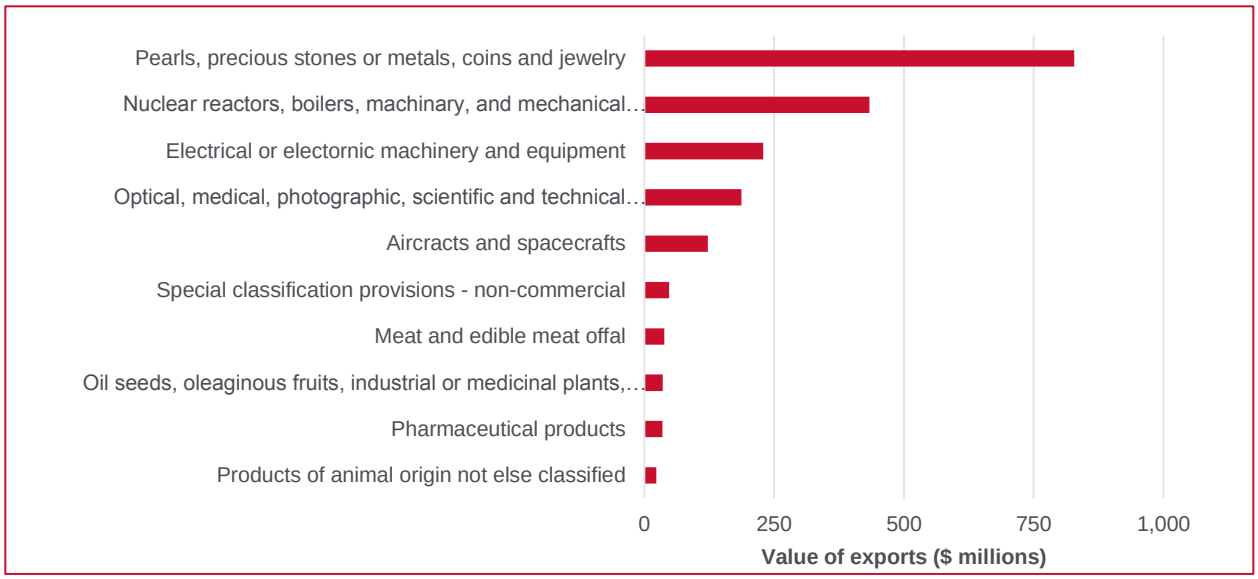
[72] Belly service refers to cargo that is carried in the belly of passenger aircraft that fly on regularly scheduled routes. Freighter service refers to cargo that is carried in cargo-only aircraft, usually on regularly scheduled routes.

[73] Calgary Airport Authority, YYC Global Logistics Park.

[74] Calgary Airport Authority, Cargo Statistics.

Calgary consumers, it is interesting to note that $1.7 million in hockey sticks was imported through the Calgary International Airport in 2016, or approximately 25,000 sticks.[75]



Source: CPCS Analysis of Canada International Merchandise Trade Database.

Figure 4-34: Top Ten exports via the Calgary International Airport, by value

In terms of imports, in 2016 the Calgary International Airport was the point of clearance for $2.9 billion worth of products delivered by air. The top ten import categories are shown in Figure 4-35. The largest two import categories are Aircrafts and Nuclear Reactors, boilers, machinery and mechanical appliances.[76] At least $0.7 billion of these imports relate to aircrafts. As noted above, these likely relate to airline operations in Calgary. However, there are also other significant imports of mechanical and electrical machinery (notably cell phones and other networking equipment); optical, medical, photographic, scientific and technical instruments; pearls, precious stones or metals, coins and jewelry (notably jewelry); pharmaceutical products (notably medication for animals); articles of iron or steel; miscellaneous chemical preparations (notably for medical diagnoses); and woven clothing and articles of apparel. In 2016, each of these product categories had at least $20 million in value cleared in Calgary.

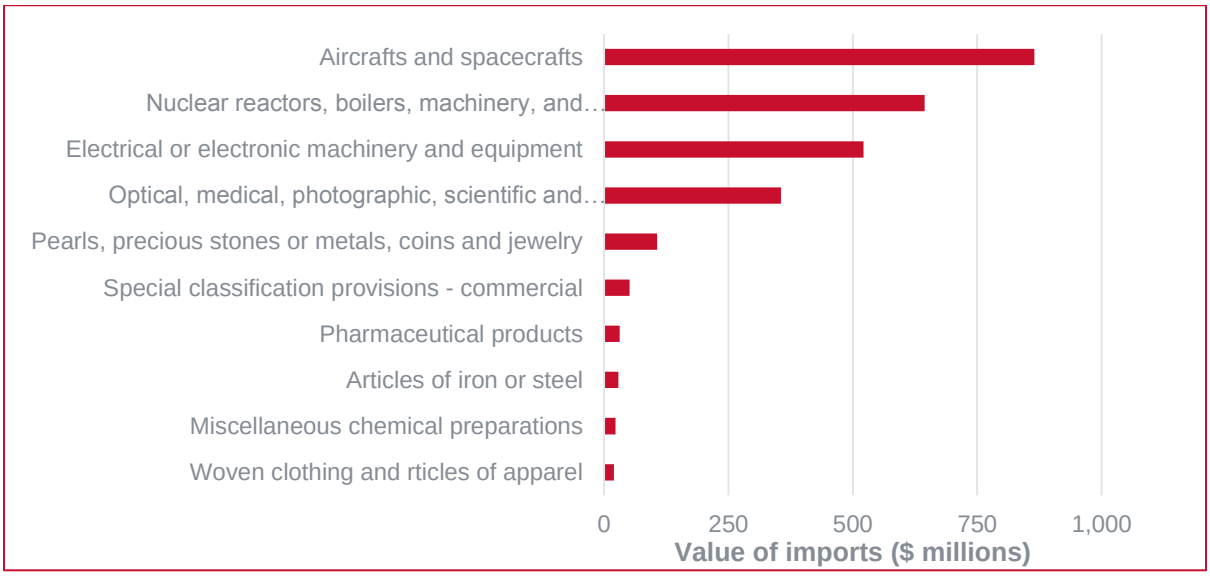
Otherwise, precise air cargo data, in terms of commodities and origin-destination flows, are generally lacking in Canada. However, as the majority of air cargo moves in the belly of passenger aircraft, a good indication of the frequency and capacity of air cargo shipments is the number of annual passenger flights. The numbers of flights are shown in the next several figures, expressed as itinerant aircraft movements.[77] Figure 4-36 shows the annual itinerant aircraft movements among large

[75] Canada International Merchandise Trade Database.

[76] The second category includes parts of turbo-jets and turbo-propellers.

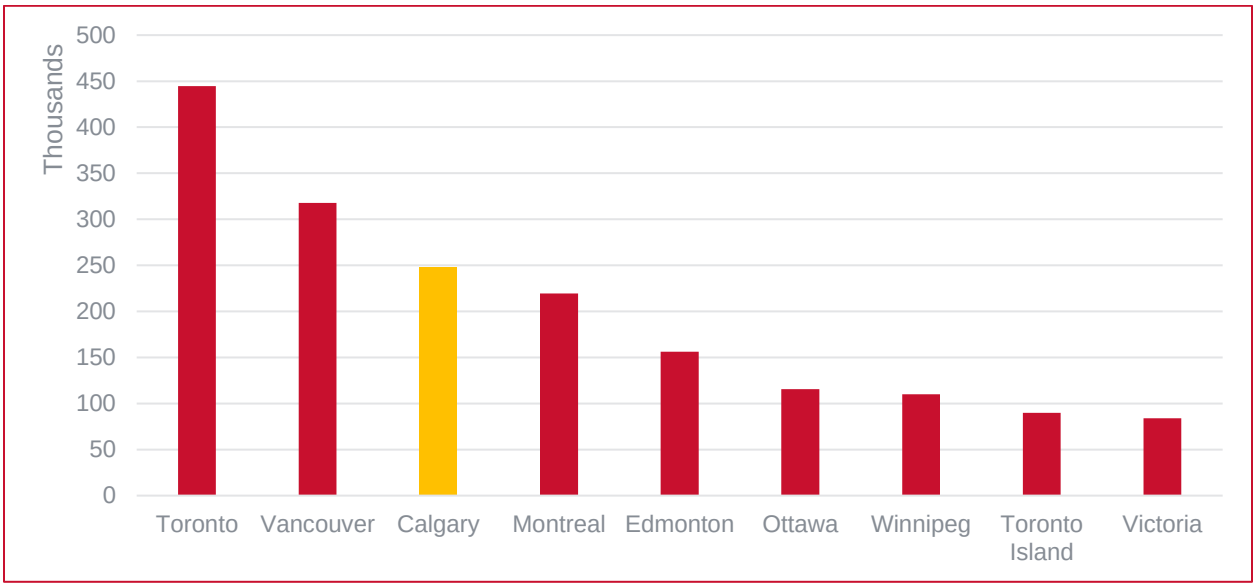
[77] At airports whose flights are controlled by control towers, such as Calgary's, an itinerant movement is one in which the aircraft proceeds to or arrives at another location, or where aircraft leave the airport but return without

Canadian airports in 2015.With nearly 250,000 itinerant aircraft movements in 2015, it can be seen that YYC is the third-busiest airport in Canada.



Source: CPCS Analysis of Canada International Merchandise Trade Database.

Figure 4-35: Top Ten imports via the Calgary International Airport, by value



Source: CPCS Analysis of CANSIM Table 401-0028

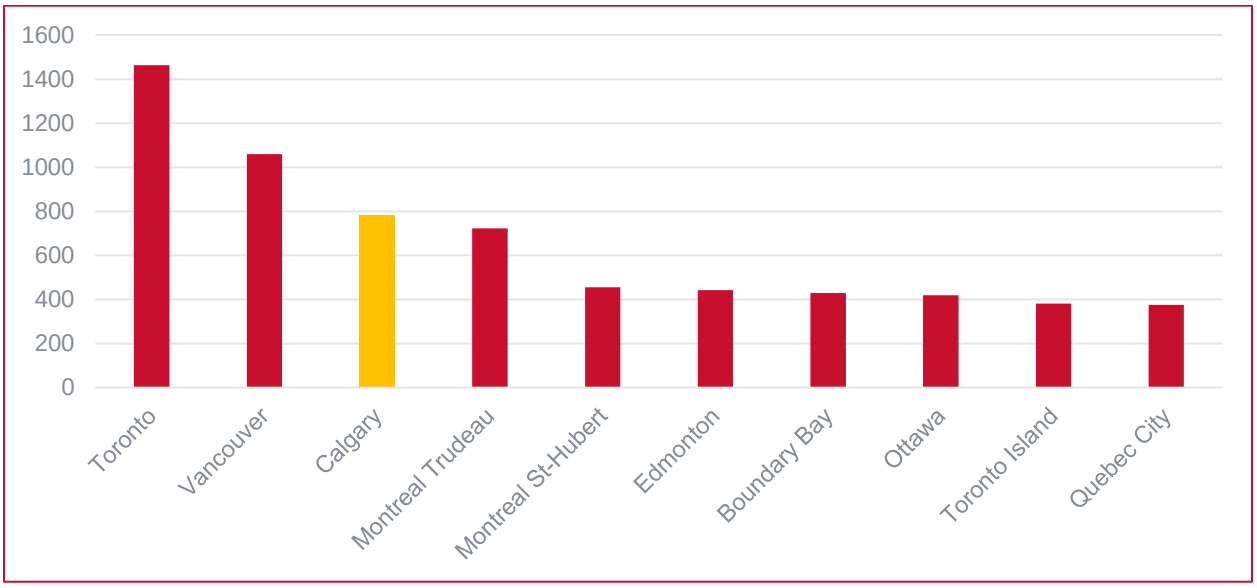
Figure 4-36: Total annual itinerant aircraft movements at Canadian airports, 2015

landing at another airport. Source: www23.statcan.gc.ca/imdb-bmdi/document/2715_D1_T9_V1-eng.htm. Note that general aviation and military flights are not included in tallies of itinerant movements.

YYC is also the third-busiest airport in Canada in terms of the number of itinerant movements on its busiest day. For example, on its busiest day in September 2016, YYC saw nearly 800 itinerant aircraft movements (see Figure 4-37). This volume is far greater than any other Western Canadian airports, other than Vancouver. During

its busiest hours of operation, YYC has reached 70 itinerant movements per hour.

With its new cargo facilities now completed, YYC's advantage to local shippers can only be expected to increase.



Source: CPCS Analysis of CANSIM Table 401-0007

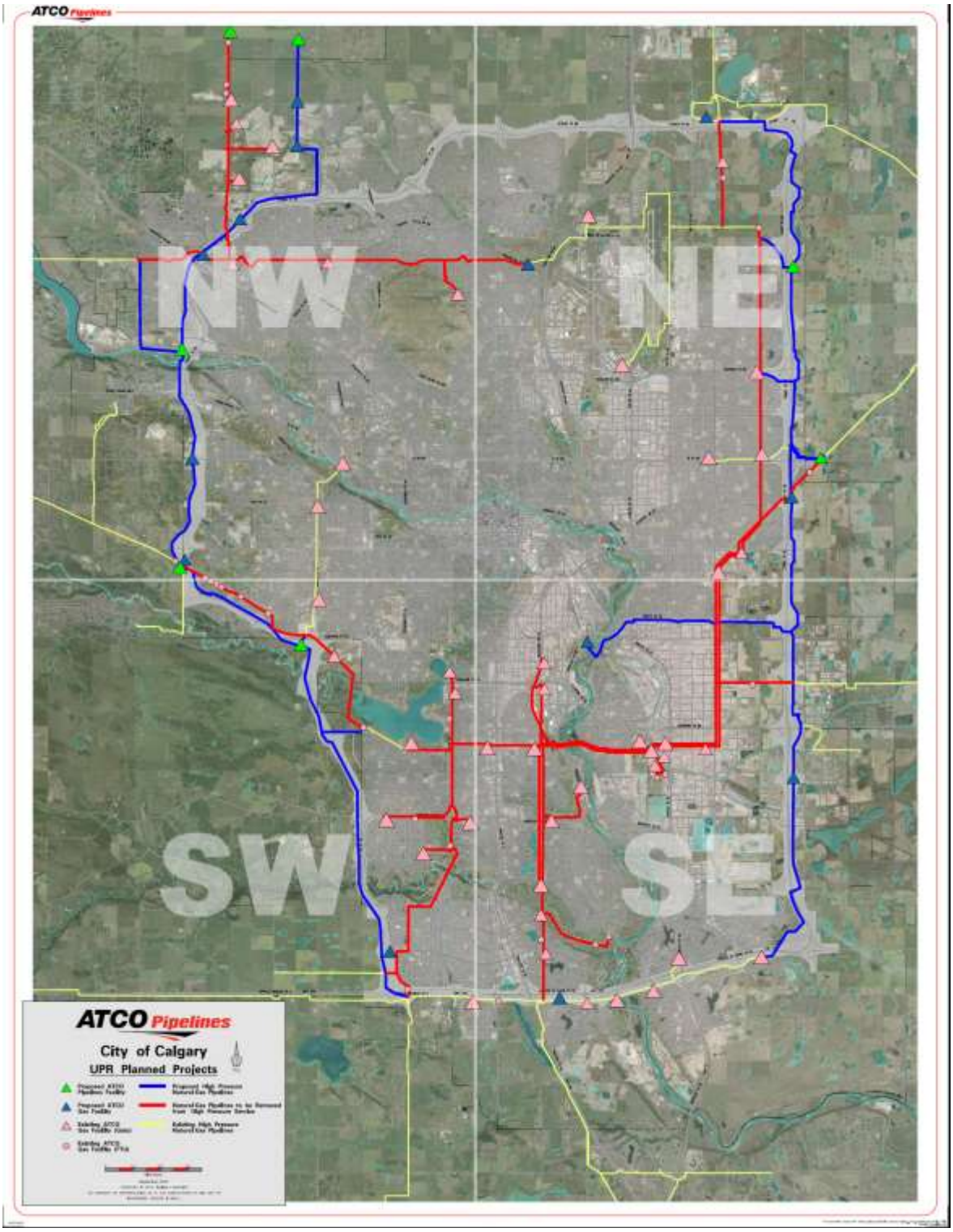
Figure 4-37: Peak day aircraft itinerant movements at Canadian airports, September 2016

4.3.4 Pipelines

Liquid product and natural gas pipelines operate in and through the city of Calgary. For example, ATCO Pipelines owns and operates natural gas transmission pipelines that deliver natural gas from producers to customers in Calgary. These pipelines largely follow the major highway corridors in Calgary. Figure 4-38 below shows existing high pressure natural gas pipelines (yellow), as well as proposed high pressure pipelines (blue) and pipelines proposed to be removed from high pressure service (red).

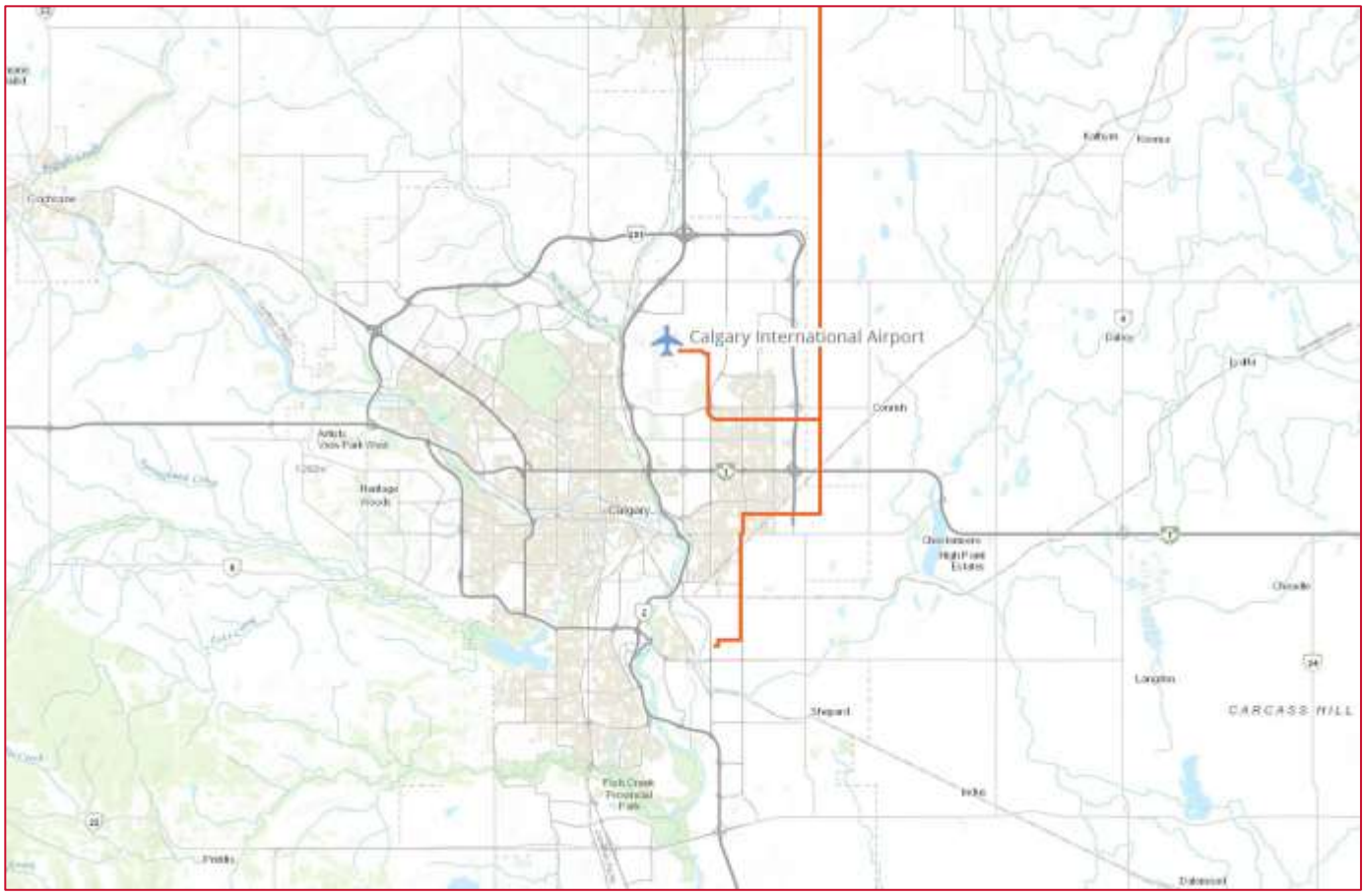
Trans-Northern owns and operates the Alberta Products Pipe Line, the main source of delivery for refined petroleum products in southern Alberta. This pipeline carries refined fuel products from refineries in the Edmonton area to distribution terminals in Calgary, including terminals at YYC – see Figure 4-39. This pipeline carries approximately 48,000 barrels of refined fuel products per day.[78]

[78] Trans-Northern, Our Pipelines.



Source: ATCO Pipelines

Figure 4-38: ATCO's natural gas pipelines in Calgary



Source: Trans-Northern Pipelines

Figure 4-39: Trans-Northern's Alberta Products Pipe Line through Calgary

5 State of goods movement data

5.1 Inventory of data

This chapter provides a brief inventory of the existing data that are available for and relevant to goods movement in Calgary. Table 5-1 lists the data sources. The table provides a brief description of the data, how the data are being used today, who owns the data, how they are collected and how the data could be applied to the GMS. Note that the focus is on the relationship of these data to the Strategy, and so other applications are not necessarily tabulated. Note also that the use of some sources are explained more fully in other chapters of this report, as referenced in the table.

It can be seen that a wide variety of sources are available to The City. Most of these are data that already are developed by, hence available to, The City. Other public agencies –i.e., the Government of Alberta and Transport Canada - already have supplied selected tabulations of the data for the Strategy. GPS truck trip traces are proving to be a key data source for the Strategy and for goods movement strategies elsewhere: However, these data must be purchased or licensed from private vendors. Nonetheless, the growing quantity and spatial/temporal coverage of GPS data are making them increasingly important sources for transportation analyses.

Note that detailed breakdowns of airfreight in terms of origins and destinations are not available. That is, the origin and destination and multi-modal movement of a cargo shipment that moves through YYC is not known. Some origin-destination data on rail container tonnages are available, as discussed in Section 4.3.2.5, although specific information on the commodities carried and intermodal movements are not available. The railways, air carriers and couriers maintain this information. However, these and other details, such as actual itineraries, are not made available, except as reported already in the previous chapter.

5.2 Data needs

In the early 2000s, The City of Calgary, The City of Edmonton, Alberta Transportation and the University of Calgary pioneered the development of sophisticated truck forecasting models for Calgary and Edmonton. These models were based on then-new surveys of establishments, which quantified the trucking activity generated by individual businesses. The surveys gathered information about the commodities generated by each surveyed establishment, along with a trip diary that captured the daily itinerary of one or more vehicles from the establishment's trucking fleet. These urban surveys were complemented by roadside truck origin-destination surveys that were conducted at cordons surrounding the two cities. These surveys captured inter-urban trucking activity.[79]

The truck models developed from these surveys have been in place since the early 2000s. Although they have been applied to transportation planning studies since then, neither the surveys nor the models have been updated in the interim. Staff of The City's Forecasting Division have indicated an

[79] These initiatives have been well documented elsewhere. See, for example, Hunt, J.D., K. Stefan, A.T. Brownlee, J.D.P. McMillan, A. Farhan, K. Tsang, D. Atkins, and M. Ishani, *A Commercial Movement Modelling Strategy for Alberta's Major Cities*, Transportation Association of Canada, 2004. The City of Calgary's model is described in The City of Calgary, *2001 Regional Transportation Model: Commercial Vehicle Model Description Report*, 2006.

interest in updating the surveys and the models; however, neither is a high priority currently, given other needs. In the meantime, an external roadside truck survey was conducted in June and July 2017. It gathered up-to-date information on truck activity to inform the Strategy. The survey findings are reported separately.[80]

[80] External Truck Origin/Destination Survey Summary Report, prepared for The City of Calgary, November 2017.

Table 5-1: Inventory of goods movement data

Data type	Description	Ownership / source	Collection method	Application to the Strategy
Screenline and cordon classification counts[81]	Counts of vehicles at strategic locations around the city, classifying vehicles by type and also counting their occupants. Cyclists and pedestrians also are counted. A cordon is an imaginary line around an area of interest, such as the Downtown. A screenline is an imaginary line that cuts through the entire city – for example, the Bow River serves as a screenline, and traffic is counted on all crossings in each direction.	Transportation Data, Transportation Planning, The City of Calgary	Manual and automatic counts, with counts conducted approximately every 5 years and, at the Downtown Cordon, every year.	Provides estimates of the growth in vehicles by type in different parts of Calgary. Trucks are categorized as light, medium and heavy, according to the number of tires and differentiating between single unit vehicles and multiple unit vehicles. See also Section 4.3.1.7.
Intersection turning movement counts[82]	6-hour counts of traffic entering and exiting individual intersections, accounting for all allowable turning movements. Some distinction by vehicle class, including trucks.	Transportation Data, Transportation Planning, The City of Calgary	Manual counts.	Provides estimates of total daily traffic throughout Calgary, and how these volumes change over time. Basis for calculating percent truck volumes on individual streets, along with automatic and permanent counts. See also Section 4.3.1.4.

[81] Source: The City of Calgary, Mobility Monitor, Carpooling and vehicle occupancy in Calgary, Issue 21, January 2008.

[82] Source: The City of Calgary, *Transportation Data* (http://www.calgary.ca/Transportation/TP/Pages/Planning/Transportation-Data/Transportation-Data.aspx); *2016 Percent Truck Downtown* map, February 2017 and *2016 Percent Truck City Wide* map, 2017.

Table 5-1: Inventory of goods movement data

Data type	Description	Ownership / source	Collection method	Application to the Strategy
Automatic and permanent counts[83]	24-hour counts of traffic along individual road sections. Some newer stations distinguish vehicle classes, including trucks, and collect data on travel speeds.	Transportation Data, Transportation Planning, The City of Calgary	Automatic (temporary) and permanent counting stations.	Provides estimates of total daily traffic throughout Calgary, and how these volumes change over time. Basis for calculating percent truck volumes on individual streets, along with intersection counts. See also Section 4.3.1.4.
GPS truck trip traces	GPS traces of truck locations and time, hence these data can yield information on itineraries (also known as tours), stops, routes used, travel times, speeds, delays and the location of delays.	ATRI and commercial GPS fleet management vendors. Data must be purchased or licensed from the vendor, and can be subjected to restrictions of use.	Data derived from GPS units that are built into or installed in vehicles. Note that not all fleets subscribe to these services, although data are robust. Data are available 24/7/365 over several years. Note that these are not true origin-destination data (see Section 5.2); rather, they show the intensity of truck activity.	Used to profile truck flows, travel patterns and speeds. See also Sections 4.3.1.5, 4.3.1.6, and 4.3.1.8.

[83] Source: The City of Calgary, Transportation Data and Transportation Data products and services; 2016 Percent Truck Downtown Map and 2016 Percent Truck City Wide map, 2017.

Table 5-1: Inventory of goods movement data

Data type	Description	Ownership / source	Collection method	Application to the Strategy
Grade Crossing Inventory Reports[84]	Location of at-grade rail crossings and frequency of freight and passenger trains. Used to assess the need for safety improvements, such as grade-separated crossings.	Transport Canada	Not known. Updated annually.	Used to profile the frequency of freight trains on rail lines in and around Calgary, as well as the location of at-grade rail crossings. See also Section 4.3.2.5.
Accident statistics[85]	Annual tabulations of accidents that involve trucks.	The City of Calgary	Calgary Police Service accident records, compiled by The City of Calgary.	Could be used in future stages to assess trends and identify accident-prone areas.
TRAVIS Permit Listing Report[86]	Lists over-weight and over-dimension permits issued by type, commodity carried and frequency (single or multi-use permits). Report is issued annually; however, data can be tabulated for any period.	Government of Alberta	Summary of permits in the TRAVIS database.	Could be used in future stages as part of the assessment of over-weight and over-dimension routes.

[84] See *Grade Crossings Inventory*, Transport Canada,, https://www.tc.gc.ca/eng/railsafety/railsafety-1000.html

[85] Information provided by The City of Calgary, March 2017.

[86] Government of Alberta, *TRAVIS Permit Listing Report By Start Date For City of Calgary*, January 1 – December 31, 2016. Report prepared March 8, 2017.

Table 5-1: Inventory of goods movement data

Data type	Description	Ownership / source	Collection method	Application to the Strategy
Freight Fluidity Index[87]	Database of inter-urban, national and trans-oceanic travel times and costs, especially for a container moving from Asia to Calgary and to other North American destinations. Database is used to develop inter-urban travel time indices (actual time / expected travel time), travel time reliability indices (95th percentile times / 50Th percentile times) and urban travel time indices (free flow speed / average speed), border delays.	Transport Canada	Based on GPS and data collected by others. Some acknowledged gaps in local data, such as daily truck traffic volumes.	Could be useful in future stages in assessing Calgary's inter-urban highway connections.
Containerized rail traffic[88]	Number of container rail cars (number of containers) and tons originating in or destinated to the Calgary region, by Province and major US region.	Transport Canada	Unknown.	Useful to give a geographical distribution of the volume of containerized shipments to and from the Calgary region and how these have changed in recent years. Note that some geographies have not been included due to confidentiality, so these are not the total numbers although they are indicative of total volumes.

[87] Information provided by Transport Canada, telephone discussion, June 8, 2017.

[88] Information provided by Transport Canada, subsequent to meeting between The City and Transport Canada, July 24, 2017.

Table 5-1: Inventory of goods movement data

Data type	Description	Ownership / source	Collection method	Application to the Strategy
Trade data imports and exports[89]	Database of road-base imports and exports between Alberta and other countries. Annual tonnages provided by commodity type and by value.	Statistics Canada	Unknown.	Limited. No further geographical breakdown is available below the Provincial (Alberta) level. Routing is not clear, nor is the port of entry/exit or the use of multiple modes.
National Roadside Survey (NRS)[90]	Occasional series of truck origin-destination data and other characteristics of long-haul trucking, captured at Canada-US border crossings.	Transport Canada	Roadside interview survey of a sample of drivers.	Limited. Can provide aggregate information on cross-border truck and commodity flows. However, note that the NRS was last collected in 2006-2007, and the origins and destinations cannot be broken down geographically for the Calgary region.
Border crossing truck volumes[91]	Quarterly summaries of total two-way truck traffic at each Canada-US border crossing.	Transport Canada	Unknown	Limited. No information on contents, origin or destination.

[89] Information provided by Transport Canada, subsequent to meeting between The City and Transport Canada, July 24, 2017. See https://www.statcan.gc.ca/eng/trade/data.

[90] Information provided by Transport Canada, subsequent to meeting between The City and Transport Canada, July 24, 2017.

[91] Information provided by Transport Canada, subsequent to meeting between The City and Transport Canada, July 24, 2017.

Table 5-1: Inventory of goods movement data

Data type	Description	Ownership / source	Collection method	Application to the Strategy
Border crossing truck and rail volumes[92]	Monthly summaries of outbound truck and rail traffic at each Canada-US border crossing. Total container trucks, broken out by full truck containers and empty truck containers, total number of freight trains, number of full rail containers and number of empty rail containers are available. However, these counts are available only for outbound (that is, entry into the US).	Bureau of Transportation Statistics, US Department of Transportation	Unknown	Limited. No information on contents, origin or destination. Data available for outbound only.
Trucking Commodity Origin and Destination Survey (TCOD)[93]	Annual summary of tonnage moved by truck within the Calgary Region (no further breakdown) and between the Calgary Region and other origins/destinations at the Provincial level or to/from the US.	Statistics Canada	Companies are asked to report electronically, via in-person visits by Statistics Canada interviewers or via a telephone interview.	Limited. TCOD is sampled from trucking establishments that have at least $1.3m in annual revenues. Can provide high-level summary of annual changes in tonnage by origin/destination. Can also provide high-level summary of annual changes by commodity tonnages, but not by origin/destination.

[92] For more information, see: https://www.bts.gov/content/border-crossingentry-data.

[93] Information provided by Transport Canada, subsequent to meeting between The City and Transport Canada, July 24, 2017. See also http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=2741.

6 The economic importance of goods movement in Calgary

6.1 Defining the economic importance of goods movement in Calgary

6.1.1 Introduction

The goods movement industry in Calgary, and in Alberta more broadly, is an important driver of the city's and province's economic prosperity. As an important Western Canadian distribution hub, Calgary is home to many transportation and logistics carriers and facilities who help to ensure that goods flow to and from Calgary, Western Canada and beyond quickly and efficiently. This activity generates income for businesses in Calgary as well as employment for Calgarians.

To illustrate this importance, in 2016 Statistics Canada produced an estimate of inter-regional trade flows in Canada, by truck and rail, entitled: "Domestic regional trade flows in Canada: Experimental estimates from the new Surface Transportation File, 2004 to 2012,"). In the latest year for which the data were available (2012), which is based on a three-year moving average, Statistics Canada estimates that there was **$10 billion** in goods moving **from** Calgary to other regions of Canada by truck and rail, and that there was **$13 billion** in goods moving **to** Calgary by truck and rail.[94]

This section quantifies the economic impact of the goods movement industry in Calgary in terms of its contribution to the city's gross domestic product (GDP) and employment. These economic impacts include the GDP that is directly generated by the sector and the workers who are directly employed by the sector, as well as the GDP and employment that is supported by the sector through its demand for materials and services from other sectors.

These economic impacts are distinct from the economic benefits generated by the industry (as described in the following section), particularly the benefits that transportation carriers and logistics companies provide to their customers (shippers) and their customers' customers (who are often customers or the general public more broadly). Among these benefits are increasing the availability of a wider range of goods and helping to make those goods available at the lowest possible cost. These benefits are of great importance, but are also more difficult to quantify.

Before estimating the economic impacts of the goods movement industry in Calgary, the geographic scope and goods movement industries must be defined and described.

6.1.2 Geographic scope

For the purpose of estimating the economic impacts of the goods movement industry at the regional level, Statistics Canada's definition of the Calgary census metropolitan area (CMA) boundaries was used to determine the geographic scope for the Calgary Region ("the Region"). The Calgary CMA

[94] These estimates exclude flows by air, for which there are no government-collected data sources. These estimates also exclude intra-Calgary flows.

includes the Census Subdivisions of Calgary, Airdrie, Rocky View County, Cochrane, Chestermere, Crossfield, Sarcee 145, Irricana and Beiseker. This geography was chosen due to the way in which the necessary underlying data are organized.

6.1.3 Defining the goods movement industry

The "goods movement industry" is not conveniently defined by a single NAICS industry code. Broadly speaking, transportation and logistics activity includes the movement of people and goods, as well as the coordination and planning related to that activity. Specifically with respect to goods movement, logistics involves the planning and coordination of that movement from primary and secondary producers through to consumers. Within this process is an array of activities, such as packaging, storage and coordinating the handoff of goods between multiple modes of transportation.

Transportation, with the exception of private or in-house truck transportation, is well defined and classified within the NAICS. For the most part, transportation activity falls within the Transportation and Warehousing sector (NAICS codes 48 and 49). Within this sector exist the following subsectors:

- Air Transportation (481)
- Rail Transportation (482)
- Water Transportation (483)
- Truck Transportation (484)
- Transit and Ground Passenger Transportation (485)
- Pipeline Transportation (486)
- Scenic and Sightseeing Transportation (487)
- Support Activities for Transportation (488)
- Postal Services (491)
- Couriers and Messengers (492)
- Warehousing and Storage (493)[95]

As indicated by the titles of the various subsectors, most transportation activity falls within this sector. Many companies, for example in the retail, construction or oil and gas industries, own and operate their own fleets of trucks. This in-house trucking activity is not captured in the Truck Transportation subsector.

The logistics component of the goods movement industry is more difficult to isolate within NAICS. This is because logistics activity is conducted by many different companies in different NAICS sectors or subsectors. For example, Support Activity for Transportation (NAICS code 488) includes the logistics functions of freight forwarding and custom brokerage, while Warehousing and Storage (493) includes the storage of goods. However, other logistics activity falls under the Wholesale Trade (41) NAICS sector. The Wholesale Trade sector also includes activity that generally falls outside of the sphere of logistics, such as marketing and sales activity. Particularly when the Wholesale Trade sector is grouped with the Retail Trade sector (44-45), as it often is for data that are available at smaller geographic scales, a large portion of the activity is unrelated to logistics. In cases where Wholesale and Retail

[95] Industry Canada, Transportation and Warehousing Definition.

Trade are grouped together, relative employment shares were used to estimate the portion of GDP that is attributable to Wholesale Trade only.

6.1.3.1 Classification of distribution centres

Distribution centres are important components of logistics supply chains. As such, the activity that occurs in and is generated by distribution centres should be included in the assessment of the economic impact of the goods movement industry. However, it is not completely clear into which NAICS sector distribution centres fall.

In 2009, the Economic Classification Policy Committee (ECPC) recognized that distribution centres were not clearly classified in the 2007 NAICS definitions and initiated discussion and solicited comments in collaboration with representatives from Canada and Mexico. An agreement was eventually affirmed at a trilateral steering committee that distribution centres generally be classified to Warehousing and Storage. It was recommended that the term "distribution centre" not be used, and rather a description of the activities usually conducted by distribution centres instead be included. This recommendation was made due to the fact that the term "distribution centre" can take on a wide variety of meanings in common usage.[96]

Because the term "distribution centre" is not actually used in the industry definitions, the reality is that such facilities may fall within Warehousing and Storage or within Wholesale Trade, depending on the specific type of activity that is conducted within those facilities. Due to this fact and the fact that other logistics activities also fall into the Wholesale Trade NAICS sector as noted above, Wholesale Trade is included in the definition of the broader goods movement industry.

6.1.3.2 Treatment of in-house trucking activity

For the purpose of defining the economic impacts of the goods movement industry, NAICS sectors 41 and 48-49 are included. This definition will overestimate the economic impact of the industry because the Transportation and Warehousing sector in particular includes some subsectors that are exclusively passenger-oriented. However, a large portion of transportation and logistics activity is missing from this definition because it does not capture in-house trucking activity.

This missing portion is very likely to represent a larger portion of economic activity and employment than the non-goods movement portion that is included in the definition. This is because both the for-hire and in-house trucking industries are very large. A direct estimate of the size of the in-house trucking industry (in terms of total GDP) is not available. However, the relative share of truck driver employment provides some indication of its size. Of the roughly 280,000 truck drivers in Canada, about 125,000 (nearly 45%) of those drivers are in subsectors other than the truck transportation subsector (NAICS 484).[97] Assuming that the GDP per truck driver is similar for both for-hire and in-house trucking, the total GDP of in-house trucking in Canada would be approximately $15 billion.

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[96] United States Census Bureau, Economic Classification Policy Committee Recommendations for Classification of Distribution Centers. (2010).

[97] According to data from the 2011 National Household Survey.

6.1.4 Defining economic impacts

The estimate of economic impact of the goods movement industry in Calgary includes the total direct, indirect and induced impacts where:

- Direct impacts are the value added (GDP), labour income, tax revenue and employment directly generated by the goods movement industry. For example, the labour income earned by truck drivers employed in the truck transportation sector is direct labour income of the goods movement industry.
- Indirect impacts are the value added, labour income, tax revenue and employment that are generated by sectors that supply goods movement industries. For example, operating a distribution centre generates demand for intermediate goods such as energy. The labour income earned by employees involved in supplying those intermediate goods is indirect labour income supported by the goods movement industry.
- Induced impacts are value added, labour income, tax revenue and employment generated as a result of employees of the goods movement sector purchasing goods and services for personal consumption. For example, truck drivers use their income to purchase goods and services from various other industries. The income earned by employees in those industries is induced income supported by the goods movement activity.

The indirect and induced impacts were first generated at the provincial level, based on the input-output structure of the provincial economy, as estimated through Statistics Canada's provincial Input-Output tables. These impacts were then estimated at the city level through the use of economic multipliers that have been calculated from The City's economic model for the Calgary Region. Because The City's economic model does not produce multipliers for induced impacts, the ratio of induced to indirect impacts at the provincial level was used to estimate the induced impacts at the city level.

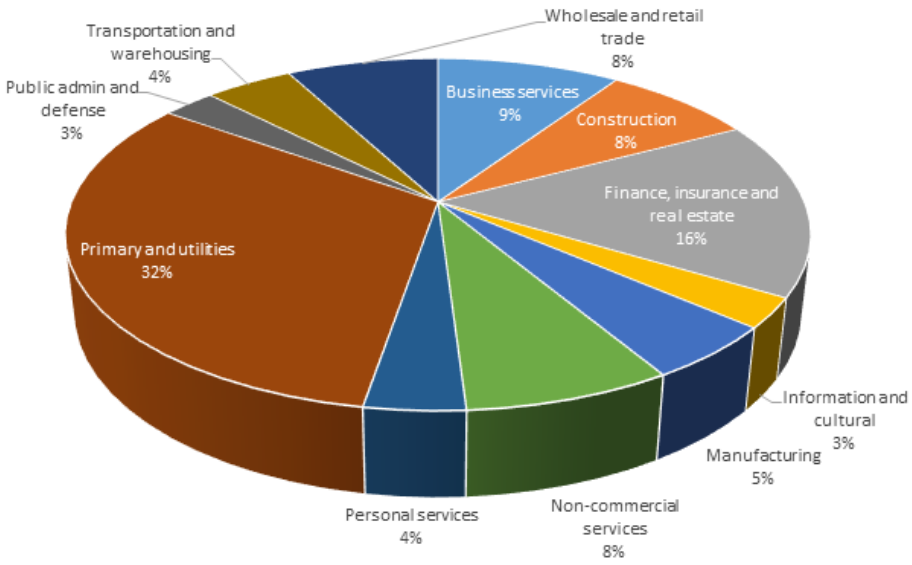
6.1.5 Direct GDP and employment

6.1.5.1 Direct GDP

The Calgary CMA's total GDP was approximately $115 billion ($ 2007) in 2015. At the two-digit NAICS level, the primary and utilities sector and the finance, insurance and real estate sector were the two largest sectors by GDP.

The transportation and warehousing sector accounted for 4% of GDP, while the wholesale and retail trade sector accounted for a further 8% of the total (see Figure 6-1).

As noted in section 6.1, much of the retail portion of wholesale and retail trade sector in particular is unrelated to transportation and logistics activity. In order to estimate the portion of wholesale and retail trade GDP in the Calgary CMA that is directly attributable to wholesale trade only, the relative employment and productivity levels were analyzed in wholesale trade and retail trade.



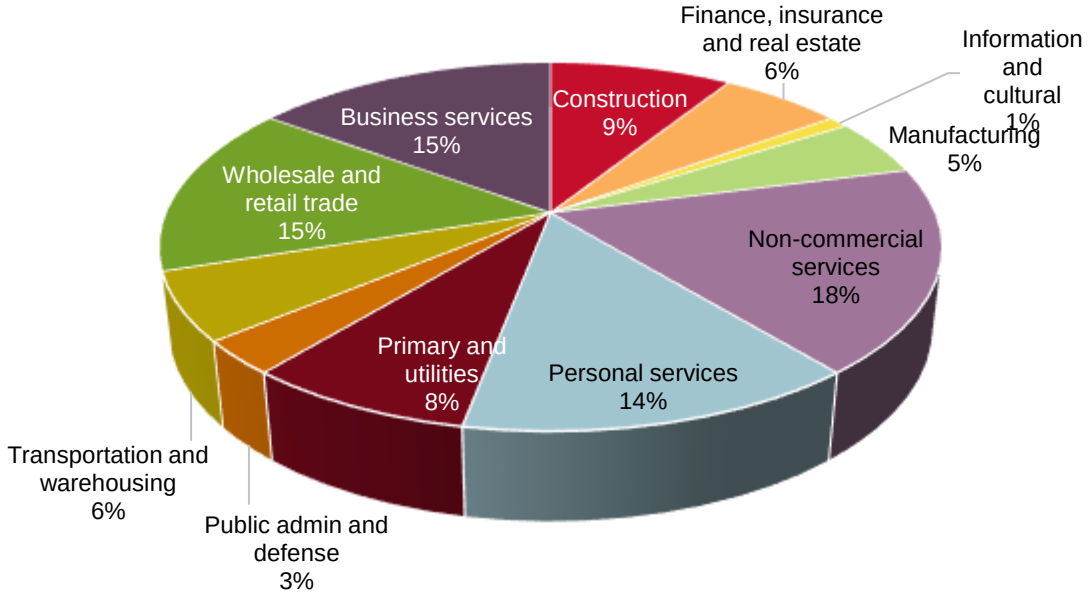
Source: CPCS Analysis of Data from the Conference Board of Canada
Note: Total may not equal to 100% due to rounding

Figure 6-1: Share of GDP by sector in the Calgary CMA, 2015

6.1.5.2 Direct employment

As of 2015, approximately 800,000 people were employed in the Calgary CMA. Nearly 50,000 (6%) people were employed in the transportation and warehousing sector, with a further 118,000 (15%) people employed in the wholesale and retail trade sectors (see Figure 6-2).

As above, data from the LFS were used to differentiate between employment in the wholesale trade sector and employment in retail trade. From these data it is estimated that total direct employment in the goods movement industry (transportation and warehousing plus wholesale trade) is approximately 80,000 jobs, or just 10% of all jobs in Calgary. Collectively, employees in these jobs earned over $5 billion ($ 2007) in labour income in 2015.



Source: CPCS Analysis of Data from the Conference Board of Canada
Note: Total may not equal to 100% due to rounding

Figure 6-2: Share of employment by sector in the Calgary CMA, 2015

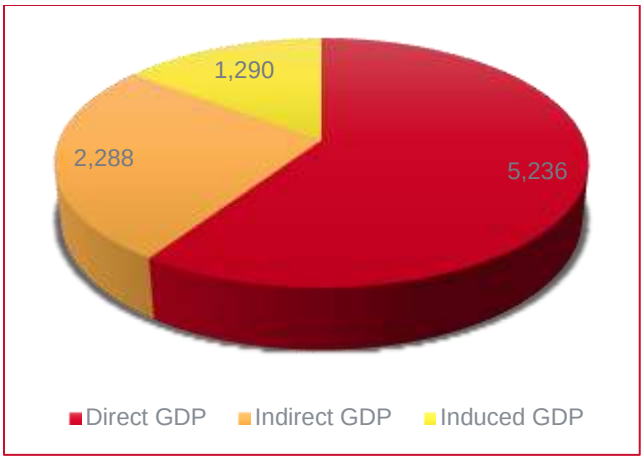
6.1.6 Direct, indirect and induced economic impact

In addition to directly generating economic output and employment in Calgary, the goods movement industry also supports economic output and employment in its supplier industries. The total direct, indirect and induced economic impacts of the industry in terms of GDP and employment are estimated below.

Note that the direct, indirect and induced economic impacts for the wholesale trade and the transportation and warehousing sectors are estimated separately. This is because some of the indirect impacts generated by the wholesale trade sector are already counted as direct impacts from the transportation and warehousing sector, and vice-versa. For these reasons the direct, indirect and induced impacts for the two sectors are shown separately and note that the combined direct, indirect and induced impacts fall somewhere in between the combined direct impacts noted above and the sum of the direct, indirect and induced impacts shown next.

6.1.6.1 Regional impacts

Figure 6-3 shows the estimated direct, indirect and induced GDP impacts from the transportation and warehousing sector at the regional level (the Calgary CMA). The direct impacts are those that are generated by transportation and warehousing businesses located in Calgary, while the indirect and induced impacts is the GDP that those businesses support in other sectors in the Calgary Region.

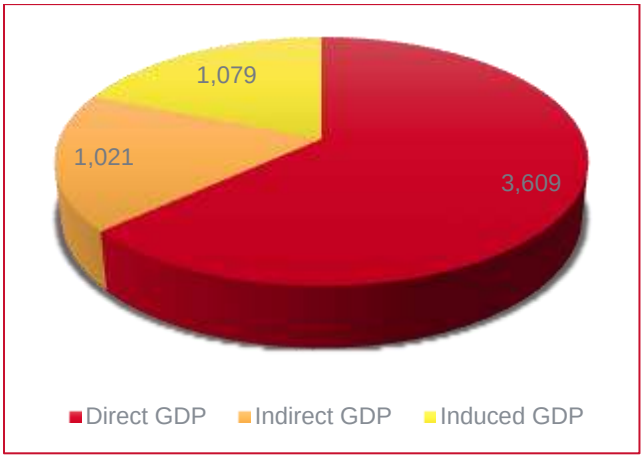


Source: CPCS Analysis

Figure 6-3 Calgary transportation and warehousing sector GDP impacts (2007 $ million)

In total, when adding the indirect and induced GDP impacts to the sector's direct GDP impacts in Calgary, total supported GDP increases from $5.2 billion to $8.8 billion ($ 2007).

Figure 6-4 shows the provincial GDP impacts from Calgary's wholesale trade sector.



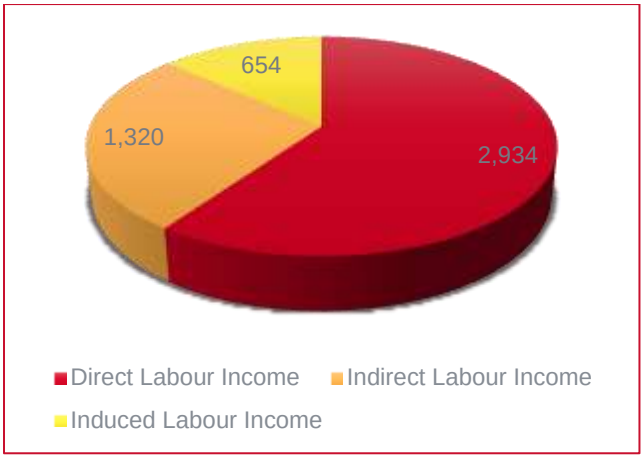
Source: CPCS Analysis

Figure 6-4: Calgary wholesale trade GDP impacts (2007 $ million)

When adding the indirect and induced GDP impacts to the sector's direct GDP impacts in Calgary, total supported GDP increases to $5.7 billion ($ 2007).

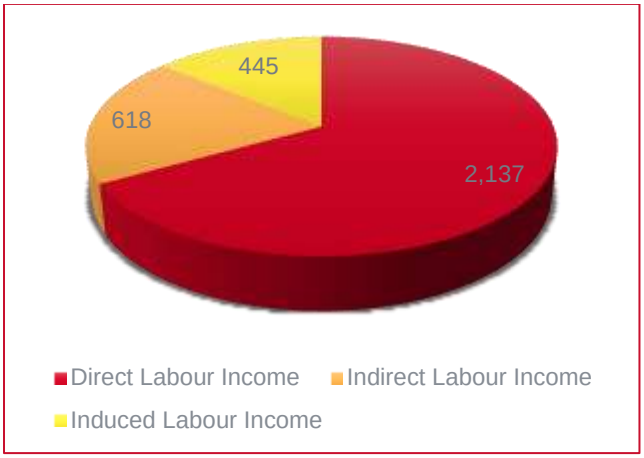
As noted, the direct, indirect and induced impacts from the transportation and warehousing and the wholesale trade sectors cannot be added together due to the potential for double counting of indirect impacts. The combined GDP impacts of Calgary's goods movement industry at the provincial level is therefore up to $14.5 billion ($ 2007).

Through a similar analysis, the goods movement industry's direct, indirect and induced labour income impact can be estimated (see Figure 6-5 and Figure 6-6).



Source: CPCS Analysis

Figure 6-5: Calgary transportation and warehousing sector labour income impacts (2007 $ million)



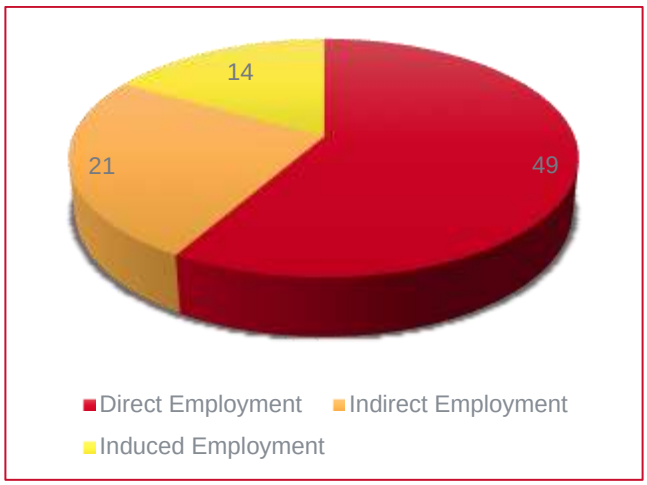
Source: CPCS Analysis

Figure 6-6: Calgary wholesale trade sector labour income impacts (2007 $ million)

Combined, the goods movement industry in Calgary supports up to $8.1 billion in labour income in the Calgary Region.

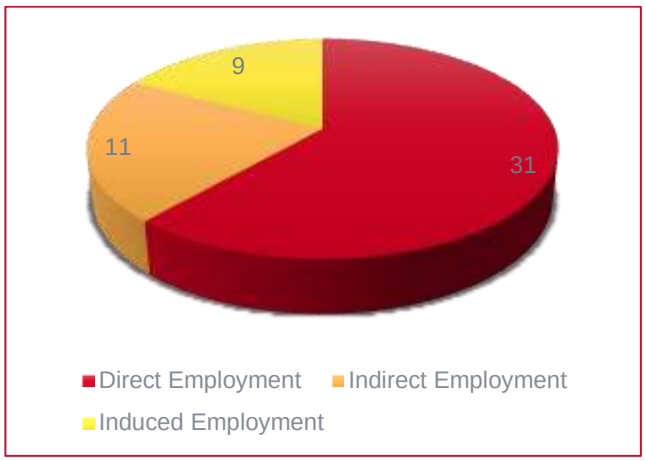
Finally, Figure 6-7 and Figure 6-8 show the direct, indirect and induced employment impacts for the transportation and warehousing and the wholesale trade sectors, respectively.

In total, Calgary's goods movement industry supports up to 134 thousand jobs in the Region.



Source: CPCS Analysis

Figure 6-7: Calgary transportation and warehousing sector regional employment impacts (thousands of jobs)



Source: CPCS Analysis

Figure 6-8: Calgary wholesale trade sector regional employment impacts (thousands of jobs)

6.1.7 Summary of Calgary's goods movement industry economic impacts

The energy industry is known to be an important source of employment and prosperity for Calgary, and for Alberta more broadly. However, as demonstrated by the above analysis, the goods movement industry is also a significant generator of employment and prosperity for Calgary.

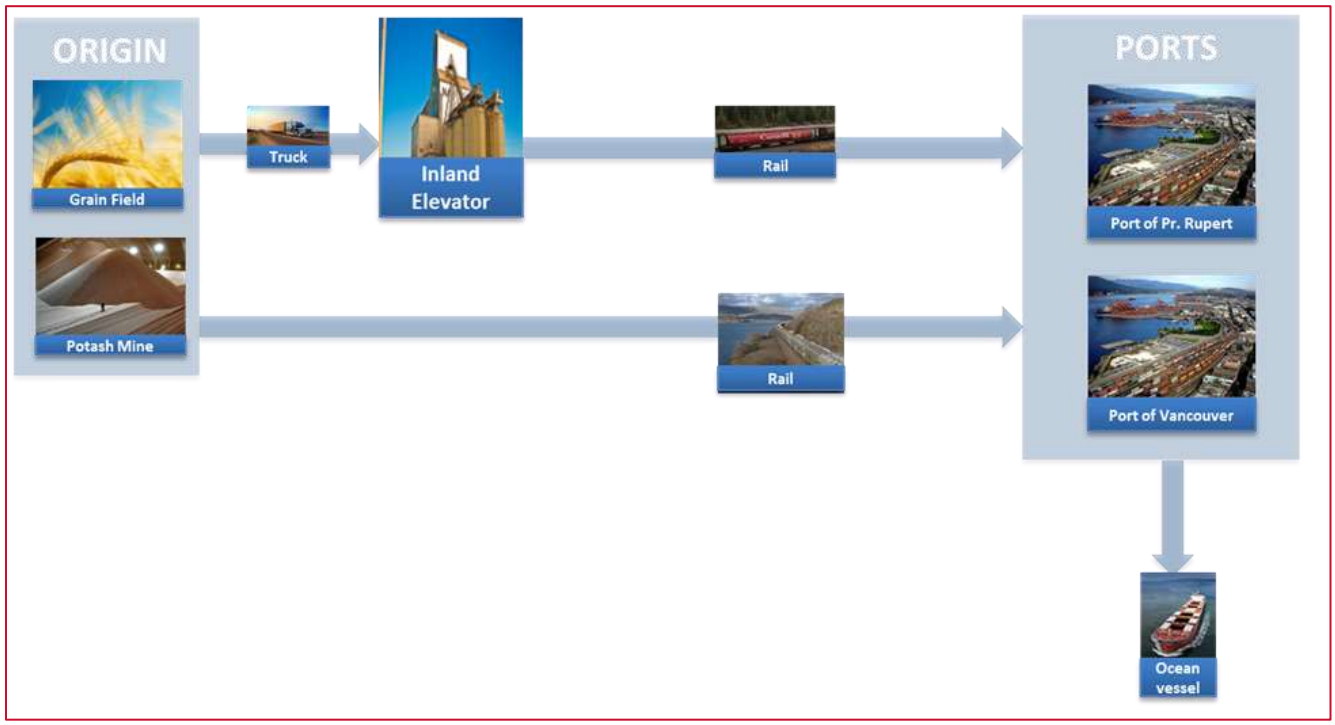
The goods movement industry's contribution to Calgary's GDP may not be as large as the energy industry's contribution, assuming that the bulk of the primary and utilities sector's direct GDP as shown in Figure 6-1 is attributable to the energy sector. However, its contribution to jobs in the Calgary Region

is likely to be larger than the energy sectors, given that a significant amount of energy industry frontline employment in Alberta is situated outside of the Calgary Region, whereas a significant number of frontline employees in the goods movement industry are employed by carriers and logistics facilities in the Region.

6.2 Measuring the impact of transportation and logistics activities on Calgary's economy

As mentioned in the previous section, the goods movement industry in Calgary is a key driver of the City's economic prosperity with transportation and warehousing and wholesale trade accounting for 8% of Calgary's GDP in 2015. Positioned as the "North American hub for the Pacific Northwest," Calgary's geographic location and well-developed and evolving transportation and logistics infrastructure have made the city a premier choice for major retailers such as Walmart, Home Depot and Costco as part of their Western Canada distribution strategy.[98]

Within Calgary's transportation and logistics chains, a myriad of planning and coordination activities ensure the movement of goods from primary and secondary producers through to consumers. Furthermore, transportation and logistics chains differ by industry and by good. For example, domestic grain production in Canada for export generally requires more coordination relative to that of potash. This is shown diagrammatically in Figure 6-9.



Source: CPCS

Figure 6-9 Transportation and gogistics: bulk grain v. potash

[98] Calgary Economic Development

Thus, the more reliable a region's transportation and logistics system are in terms of efficiency and agility, the more society can benefit from the greater availability of a wider range of goods at the lowest possible cost.[99]

So how have Calgarians benefited in terms of transportation and logistics system efficiency and agility? While it is difficult to quantify at a city level, a national level analysis can provide some insights.

At a national level, Figure 6-10 summarizes the number of types of merchandise imports and exports with a value of over C$1.5 billion sorted by the North American Product Classification System (NAPCS).[100] It should also be noted that Figure 6-10 is expressed on a balance of payments basis[101] and is seasonally adjusted.

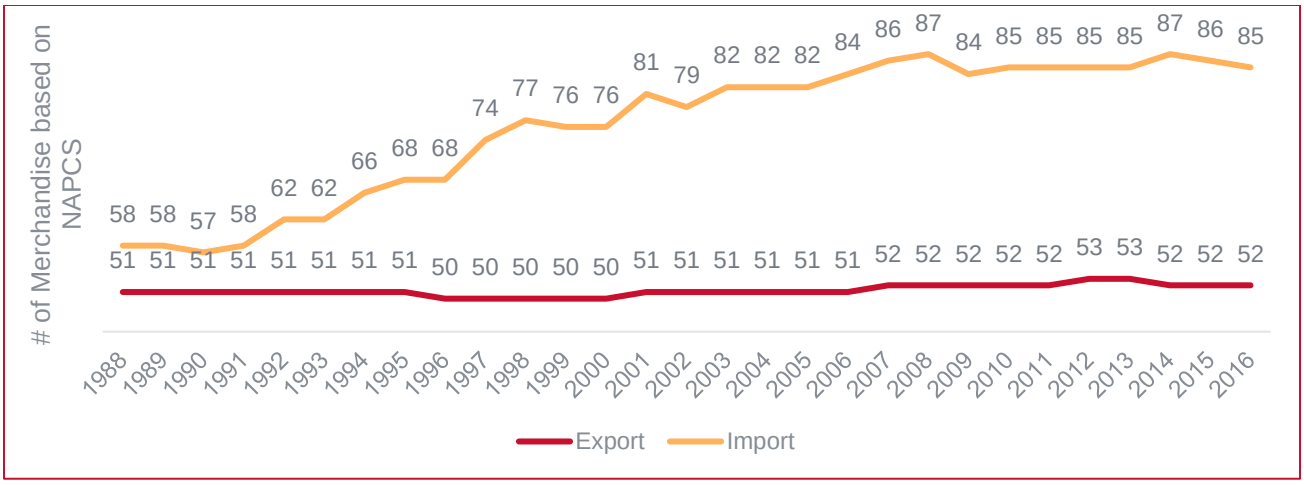
While the number of types of exported merchandise classified by NAPCS has remained relatively flat between 1988 and 2016, there is a marked increase (approximately 45%) in the number of types of imported merchandise exceeding the same threshold and for the same time period.

Thus, based on Figure 6-10, it can be inferred that on a national level and over time, Canadians have benefited from the greater availability of a wider range of goods. The increased efficiency and agility of Canada's transportation and logistics chains have contributed to this greater availability of a wider range of goods. Without increasing transportation capacity and more efficient transportation and logistics systems, these goods would not have been able to reach their domestic destinations.

[99] Efficiency is defined as the ability to move goods from origin to destination at the lowest possible cost. Agility is defined as responsiveness, flexibility and quickness.

[100] The North American Product Classification System is a classification that organizes goods and services throughout the economy in a systematic fashion.

[101] Balance of payments basis means providing a systematic summary of economic transactions of an economy with the rest of the world.



Source: CPCS Analysis of CANSIM Data Table 228-0059

Figure 6-10: Number of types of merchandise classified by NAPCS that were imported and exported nationally with a value of over C$1.5 billion on a balance of payment basis (and seasonally adjusted)

6.3 Transportation and logistics costs

In an increasingly globalized world where nations, provinces/states and cities compete among each other and internationally to attract business activity, jobs and economic growth, understanding a region's transportation and logistics advantages and disadvantages is useful.

Among individual companies (in economic terms, often referred to as 'the firm level'), understanding these advantages and disadvantages helps those firms minimize transportation and logistics costs. It helps them extend the reach of their products, or extend the reach of their sourcing. Extending the reach of their products enables these firms to grow their business, beyond what would be possible if they were constrained to a more local market. Extending the reach of their sourcing allows firms to find more competitively priced or higher quality inputs to their own products.

Understanding regional transportation and logistics costs helps firms anticipate the potential impacts of changes in technologies, infrastructure improvements or policies on their costs and the competitiveness of their products.

For policy-makers, understanding transportation and logistics chains and how they enhance or inhibit business activity helps them evaluate their own policies that affect their regions' transportation and logistics advantages and disadvantages. For example, customs processes, packaging and labeling requirements and investment in and the use of public infrastructure are among the factors that affect transportation and logistics efficiency that are within or partially within the control of the public sector.

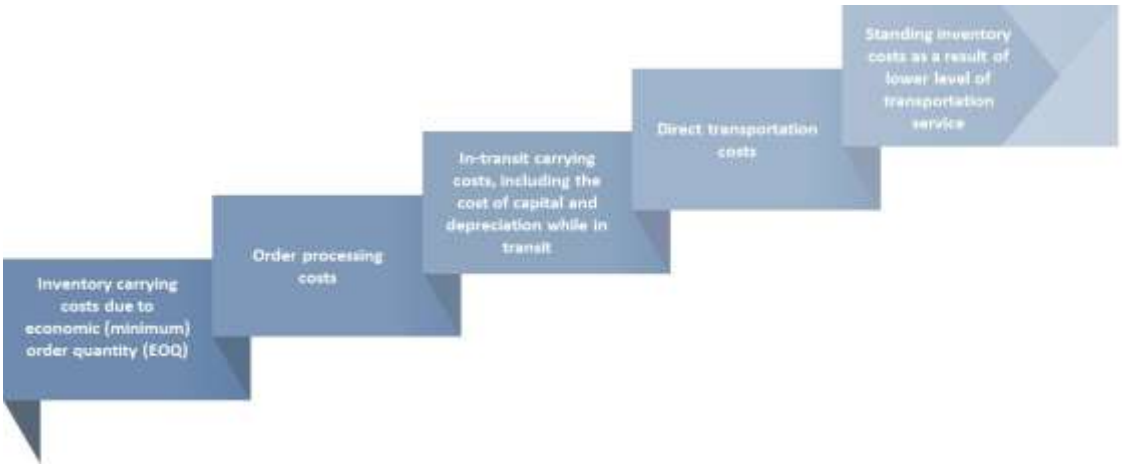
6.3.1 Transportation and logistics costs as the level of individual firms

When moving goods along transportation and logistics chains, firms are faced with a variety of choices and trade-offs as they seek to minimize related costs while maintaining or exceeding end-user satisfaction. The most obvious trade-off is the choice of transport mode (faster and more expensive or

slower and less expensive) and inventory costs (smaller inventory and lower cost or larger inventory and more cost). The optimal choice seeks to minimize the sum of transportation and inventory costs. (See Text Box – *Canada's northern grocery retail system – a story of trade-offs* for a practical example of trade-offs between transport mode and inventory costs.)

A number of other choices and trade-offs are possible, such as between packaging and transportation, packaging and product shrinkage (due to product damage while in transit, for example), order frequency and inventory levels, etc. Moreover, trade-offs can exist during the inter-firm or intra-firm movement of goods.

Firms often attempt to minimize the sum of the logistics costs either implicitly as a result of past business practices or explicitly through logistics cost modeling. These models include both transportation and logistics costs, with key components summarized in Figure 6-11.



Source: The Conference Board of Canada

Figure 6-11: Key components of a logistics cost model

Per Figure 6-11, inventory and transportation costs are primary components of the total logistics cost model. Inventory costs can occur at several stages of product movement and can vary for different reasons. For example, in the first process in Figure 6-11, inventory carrying costs occur as a result of the minimum economic order quantity (EOQ).[102] Subsequently, inventory costs are generated while products are in-transit. The longer that a product is in inventory, the higher the opportunity costs and depreciation of that product.

[102] The minimum EOQ is the quantity of inventory that is ordered that minimizes total ordering and holding costs. For example, a firm may require a pallet of a given product each week to satisfy its demand each week. However, per unit it may be much less costly to ship the product one container load at a time, meaning that a container load is the EOQ. If 20 pallets can fit into one container, the firm will have on hand an average of 10 pallets of inventory at any given time. In this case the inventory costs due to the EOQ is equal to the holding cost of 10 pallets on an ongoing basis.

Finally, when transportation and logistics chains are unreliable, resulting in high degrees of variability with respect to transit times, firms may need to hold more inventory at any given time in order to ensure that production processes are not interrupted and/or consumer demand is fulfilled when required.

Though direct transportation costs are shown as a single item in Figure 6-11, they too can be broken down in many ways, such as by freight bills for outsourced transportation services and costs incurred internally for in-house transportation services.

The above costs, along with administrative costs such as order processing costs, make up the total transportation and logistics costs at the level of individual firms.

Canada's northern grocery retail system – a story of trade-offs

In April 2011, the Government of Canada introduced the Nutrition North Canada (NNC) program, a retailer-based subsidy designed to reduce the cost to northern consumers of perishable, nutritious foods. The program supports the shipment, sale and consumption of perishable, nutritious food in 103 isolated communities across northern Saskatchewan, Manitoba, Ontario, Quebec and Labrador, as well as eligible communities in Northwest Territories, Yukon and Nunavut. Perishable foods can be fresh, frozen, refrigerated or have a shelf life of less than one year and must be shipped by air in order to be eligible under the NNC program.

It should be noted that the NNC program is structured to serve communities in the north that lack year-round surface transportation (i.e., no permanent road, rail or marine access). Naturally, these communities tend to be located in the remote areas of Canada and a greater distance from southern commercial centers where grocery resupply activities originate.

In fall 2014, the Government of Canada commissioned the Enrg Research Group to provide an analysis of the grocery retail system in northern Canada, giving consideration to the NNC program and to provide recommendations on the economics of providing perishable, nutritious food to the north.

Access to the full study can be found on the Government of Canada's website. For brevity, key conclusions as it relates to transportation and logistics chains are summarized below.

Transportation

Relative to southern retail outlets, the prices of groceries in the north are much higher. The higher prices are purely the effect of transportation. One major differentiating element is that retailers in the north are responsible for the transportation of their product and merchandise to their store, unlike most southern grocery retailers. In the south, suppliers typically assume the cost of transporting their product to the retailer for sale. Thus, not only is transportation to northern locations costly, but it is an additional cost borne directly by northern retailers whereas it is not generally an explicit cost line item for southern retailers.

The number of times a certain good is handled or 'touched' also impacts total transport and logistics costs for northern grocery retailers. In general, the more that a good is handled, the more the costs increase. Handling for southern retailers typically involves three 'touches' whereas, grocery retail goods destined for Igloolik, Nunavut or Lac Brochet, Manitoba are subject to 11 and nine 'touches', respectively.

Bricks and Mortar

Maintaining a physical retail presence in remote northern communities is significantly more costly than maintaining a retail presence in a southern community. Practically, initial construction costs in the north are higher and require significant logistical planning. Whereas upfront costs of a building investment in the south are about C$86 per square foot, it ranges between C$100 and C$155 per square foot in the north.

Warehousing requirements and related costs are also much greater in northern communities than in the south. Unlike southern retail operations that benefit from 'just in time delivery' of grocery retail goods, northern retailers must maintain a much greater amount of stock in the community and thus, require more warehousing space. In addition to upfront costs, warehouses must be properly maintained for product storage and a significant amount of space must be heated to prevent products from freezing. Such undertakings naturally increase the operating costs of running a grocery retail business in the north.

Whereas a ratio of one square foot of warehousing space to six square feet of retailing space is typical for southern retailers, in the north, the ratio is typically one square foot of warehousing space for every one to three square feet of retailing space.

Relative to southern grocery retailers, geographic and climate limitations in the north limit the degree to which northern retailers can increase the use of reliable transportation in order to minimize inventory costs. Taking the modes of transportation as fixed then, the only trade-offs that northern retailers can engage in is between lowering warehousing needs at the expense of decreased availability of goods for their customers.

Although it is an extreme example, the impact of transportation costs on product prices in the north provides a clear example of the importance of transportation and logistics efficiency for product prices and availability. While the differences in transportation and logistics cost and efficiency are smaller between urban areas in the south, differences certainly do exist and have corresponding impacts on product prices and availability in those areas.

6.3.2 The economics of logistics

Section 6.2 noted that efficient and agile transportation and logistics chains benefit society by making a wider variety of goods available at the lowest possible cost. Using a concrete example, this section demonstrates the impact of reduced reliability in transportation and logistics chains on total logistics costs and, more broadly, on consumer prices.

Figure 6-12 below illustrates the core components of firm-level logistics costs. This concept was initially defined by Baumol and Vinod in 1970[103] and further updated by other researchers such as Tyworth who added sourcing decisions to the mix.[104] The model and its concepts are elaborated in the example below (Section 6.3.2.1). Baumol originally defined the model,[105] where:

TAC	Total annual cost
Q	Order quantity
D	Annual demand
v	Unit price of the goods
w	Holding cost expressed as a percentage
A	Unit cost of an order
t	Time in days for transport
T	Per unit transportation cost
S	Safety stock

and,

1	Inventory carrying cost due to the minimum EOQ
2	Order processing costs
3	In-transit carrying costs, including the cost of capital and depreciation while in transit
4	Direct transportation costs
5	Standing inventory costs as a result of decreased reliability in transportation and logistics

[103] Baumol and Vinod, “An inventory Theoretic Model.”

[104] Tyworth, “The Inventory Theoretic Approach.”

[105] Adapted from Brady, Swan and Young, “Adopting Baumol’s inventory Theoretic,”4.

$$TAC = \left(Q * v * \frac{w}{2}\right) + A * \left(\frac{D}{Q}\right) + \left(\frac{t}{365} * (D * v * w) + (T * D) + (S * v * w)\right)$$

1 2 3 4 5

Figure 6-12: Total logistics cost modelling at the firm level

6.3.2.1 Logistics costs – the strawberry example

Though Calgary, and more generally Alberta, are not a major production area of strawberries, farmers do grow and market this fruit which is planted a year before an August harvest. As strawberries are highly perishable, transportation and logistics can play a key role in getting them to market on time.

A numerical example of transporting strawberries from the farm to the retailer illustrates how decreased reliability in transport and logistics chains impact total logistics costs. However, it is important to first explain several concepts in the build-up to the example.

Total logistics costs are a component of the 'total landed cost' - that is, the total price of a product paid by the end user (in this case, the price paid for one pound of strawberries). Figure 6-13 provides an illustrative breakdown of the total landed cost of a strawberry ($3.99/lb).

The transportation and logistics cost component ($0.45) is described in Table 6-1 and in more detail below.

Source: CPCS

Figure 6-13: Breakout of total landed costs of a strawberry

Table 6-1: Product attributes in the example case

Product Attributes	
Product value (per lb)	$2.50
Cost of capital rate	10%
Rate of obsolescence	Hyperbolic function
Customer service level (days)	0.5

1. Customer service level in this example is a function of transit time variability (in days) which is further explained below
Source: CPCS

6.3.2.2 Product value

The product value is measured at the start of its journey from producer to customer. In Figure 6-13 the cost inputs captured inside the dotted orange box reflect the product value that, in the example, equals $2.50. In the total logistics cost model in Figure 6-12, it is the unit price of the goods (*v*) which is used to calculate inventory carrying costs due to minimum EOQ, in-transit carrying costs and standing inventory costs.

6.3.2.3 Cost of capital

Reflected as the holding cost expressed as a percentage (*w*) in Figure 6-12, the cost of capital in the above example reflects the retailer's financing cost. While in transit or in storage, strawberries do not create any value for the retailer. However, the retailer must purchase the stock for sale using debt, equity, internal funds or some combination of the three. The cost of capital impacts total logistics costs namely carrying costs due to minimum EOQ, in-transit carrying costs and standing inventory costs per Figure 6-12.

6.3.2.4 Rate of obsolescence

The rate of obsolescence refers to how quickly a product depreciates in value. Obsolescence can occur for a number of reasons including physical wear and in the case of strawberries, perishability.

Under ideal cooling temperatures, strawberries can last up to 14 days[106] with the rate of obsolescence increasing as strawberries reach day 14. Thus, a hyperbolic rate of depreciation is used to apportion total logistics costs due to obsolescence as it captures the increased rate of obsolescence as strawberries reach their typical 14-day shelf life.

This increased rate of obsolescence is further captured in Figure 6-14, which provides an illustration of the rate of obsolescence for strawberries over a 14-day period. It should be noted that 14 days is ideal (under cooling temperatures at 0^0 C) but can be shorter (e.g., three to eight days) under warmer conditions.

[106] USDA - Strawberry Information Fact Sheet

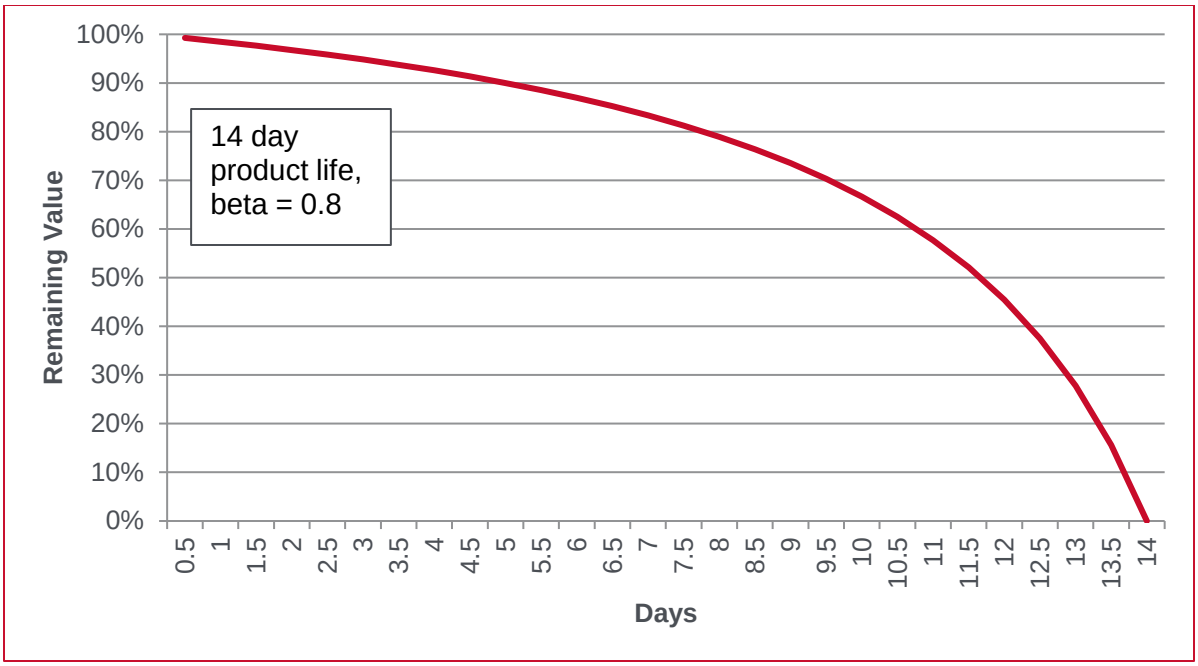
The rate of obsolescence can be captured in the holding cost expressed as a percentage (*w*) in Figure 6-12. In this example, the logistics costs associated with the rate of obsolescence are calculated separately, to illustrate the substantive impact of transit time variability for goods like strawberries that exhibit hyperbolic rates of depreciation and have a short shelf life.

6.3.2.5 Customer service level

Customer service level refers to the retailer's target of how often a product is in stock when a customer is looking to purchase it. In the above example, variability in demand is held as constant given that the example is isolating the impact of transit time variability. Volatile and uncertain demand also causes inventory costs, but these inventory costs are not caused by transportation and logistics reliability or efficiency.

The target customer service level reflects a balance of the costs or consequences of not having the product in stock when a customer wants it and the incremental transportation and logistics costs associated with higher customer service levels. **Travellers consider analogous trade-offs when they allow for longer times to travel to an airport to catch their flight (see Text Box – Catching your flight – customer services level analogy).**

For example, if a product has close substitutes, customers may be happy to choose a substitute product if their first choice is not in stock. In this case the cost to the retailer of not having stocking is low. On the other hand, if a product does not have substitutes and running out of stock means that the customer seeks to purchase the product from a competitor, then the retailer may set a higher customer service level. This is especially the case if the constant unavailability of a product results in customers permanently switching to other retailers for future purchases. How high or low the customer service level is set in either of these cases is also influenced by the transportation and logistics costs that are incurred by meeting that customer service level.



Source: CPCS

Figure 6-14: Remaining value of strawberries over a 14-day product life

In addition, a transit time variability of half a day (per Figure 6-14) is set initially. This transit time variability reflects the fact that travel times will be variable and unpredictable due to factors such as urban congestion.

As transit time variability increases, the retailer will hold more safety stock, increase order lead time, or a combination of both which increases total logistics costs. In Section 6.3.4, changes to transit time and transit time variability and its impact on total logistics costs are explained.

Catching your flight – customer service level analogy

Just as retailers set customer service levels based in part on the consequences of not having a product in stock when a customer wants it, travellers also target on-time performance based in part on the consequences of being late.

For example, individuals travelling to the airport to catch a flight will typically target a very high level of on-time performance due to the consequences of missing a flight.

A typical trip to the airport may take an hour. However, traffic conditions may make the trip shorter or longer on other days. As a result, whether it's done explicitly or implicitly, travellers build a buffer time into their trip to the airport. While the average trip may take an hour, travellers may add extra time due to transit time variability.

The added buffer time allows a given traveller to arrive at the airport on time very close to 100% of the time. This is analogous to a retailer adding an extra half a day of lead time for shipments to ensure that products are available to its customers close to 100% of the time.

6.3.3 Total logistics costs

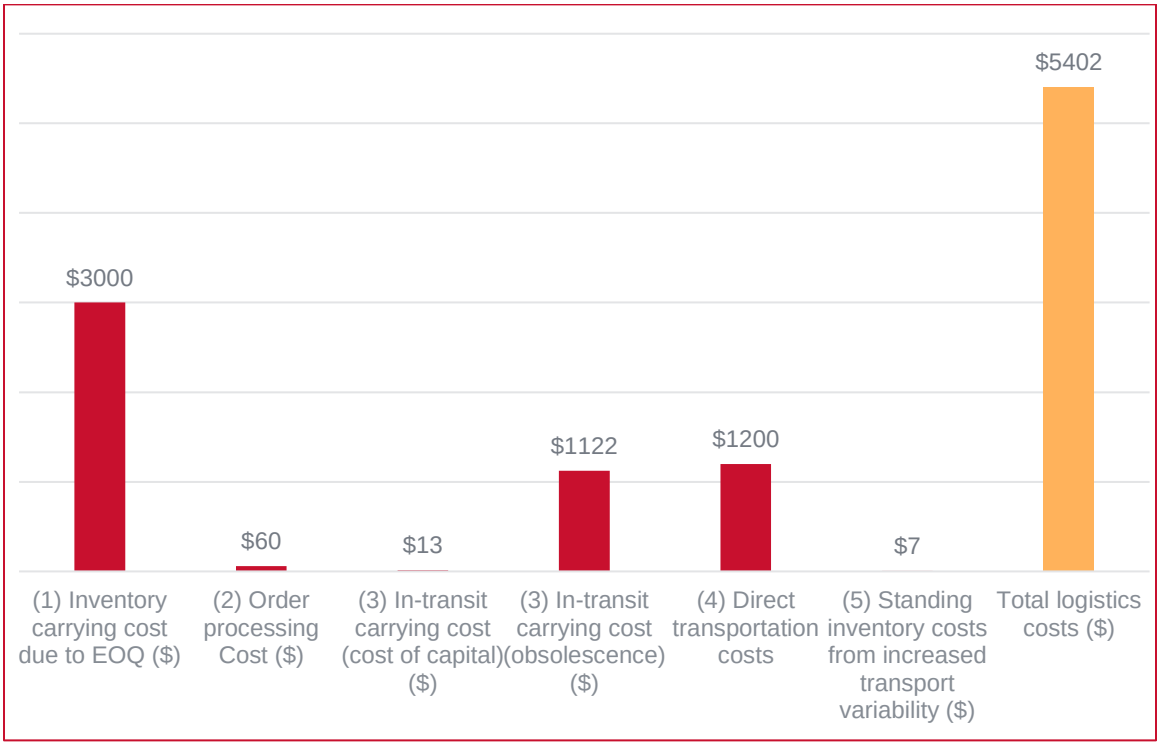
Using the attributes listed in Table 6-2, as well as the truck service level, costing and annual strawberry demand assumptions below, the total logistics costs can be calculated.

Table 6-2: Annual demand and truck level of service and costing assumptions

Assumptions	
Annual demand (lb)	12,000
Unit cost of the order	0.25
Unit price of the good (v) ($)	3.99
Per unit transportation cost (T) ($)	0.25
Transit time (days)	1
Transit time variability (days)	0.5

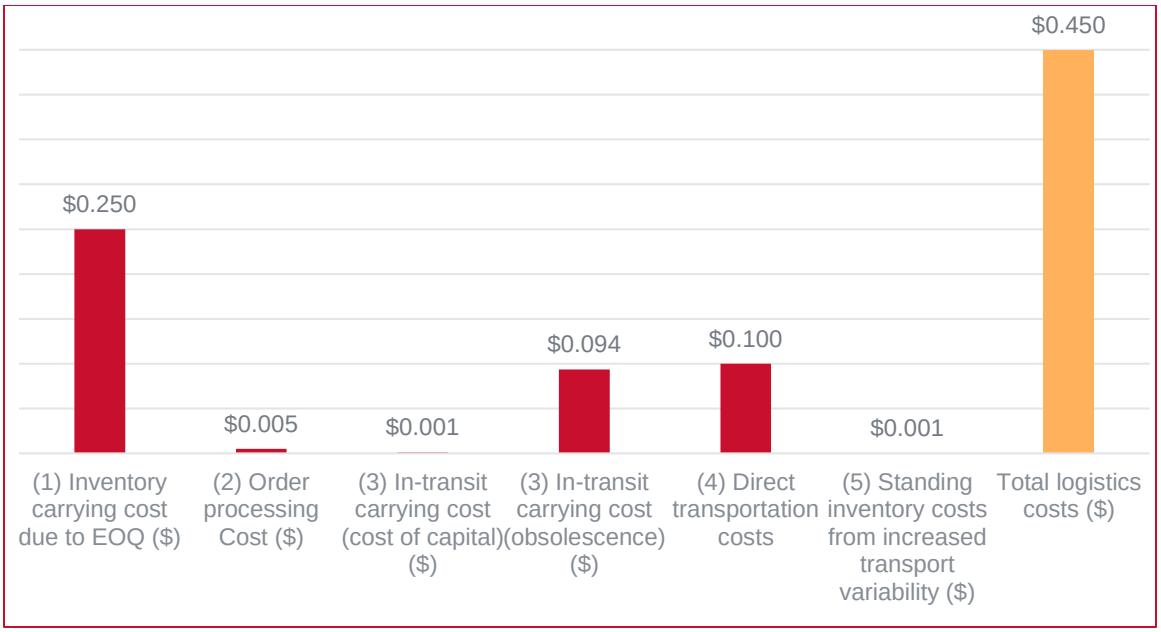
Source: CPCS

Figure 6-15 and Figure 6-16 summarize the costs of each component of total logistics costs per annum and per pound of strawberries sold during the year, respectively, per the equation in Figure 6-12. Note that in-transit carrying costs come in two forms: in-transit carrying costs due to financing and in-transit carrying costs due to obsolescence.



Source: CPCS

Figure 6-15: Total annual logistics costs



Source: CPCS

Figure 6-16: Total annual logistics costs per pound of strawberries sold

As evidenced in the figures above, apart from (1) inventory carrying costs due to EOQ, (3) in-transit carrying cost (obsolescence) forms a significant portion of total logistics costs. This is because of the high rate of obsolescence that strawberries exhibit.

6.3.4 Implications of unreliability

Taking the above analysis and illustrative cost estimates as the base case, decreased transportation reliability can have two impacts to total logistics costs, namely through (1) increased transit time (one day in the base case) and (2) transit time variability (half a day in the base case).

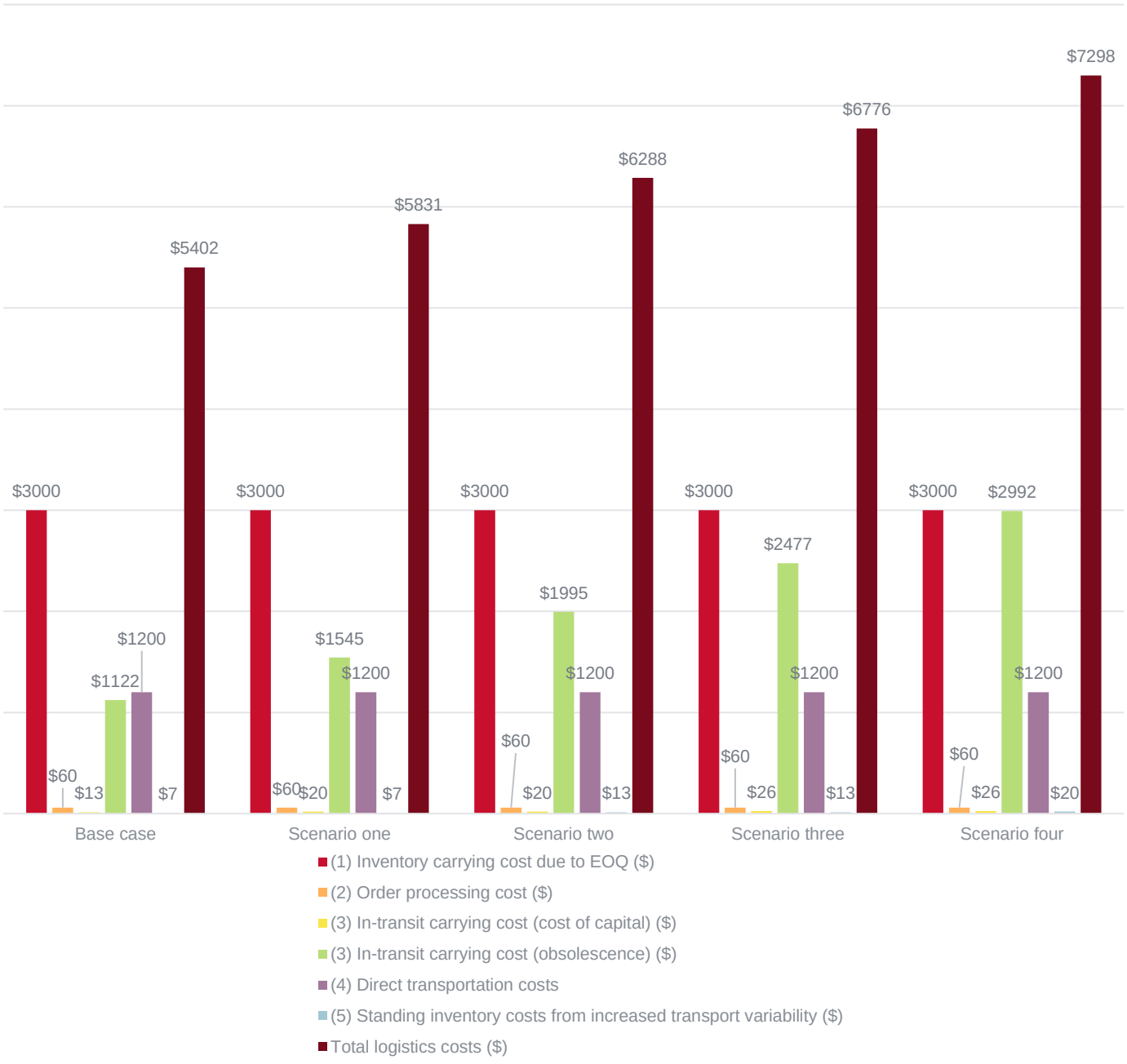
Table 6-3 provides indicative scenarios in order to illustrate the impact of decreased transportation reliability. These are hypothetical scenarios. They represent different combinations of transit time and transit time variability.

Table 6-3: Transportation reliability scenarios

Scenario	Transit Time (days)	Transit time variability (days)
Base case	1	0.5
Scenario one	1.5	0.5
Scenario two	1.5	1
Scenario three	2	1
Scenario four	2	1.5

Updated transit times and transit time variability in scenarios one to four were inputted into the logistics cost model (Figure 6-17) while holding other attributes and assumptions as constant.

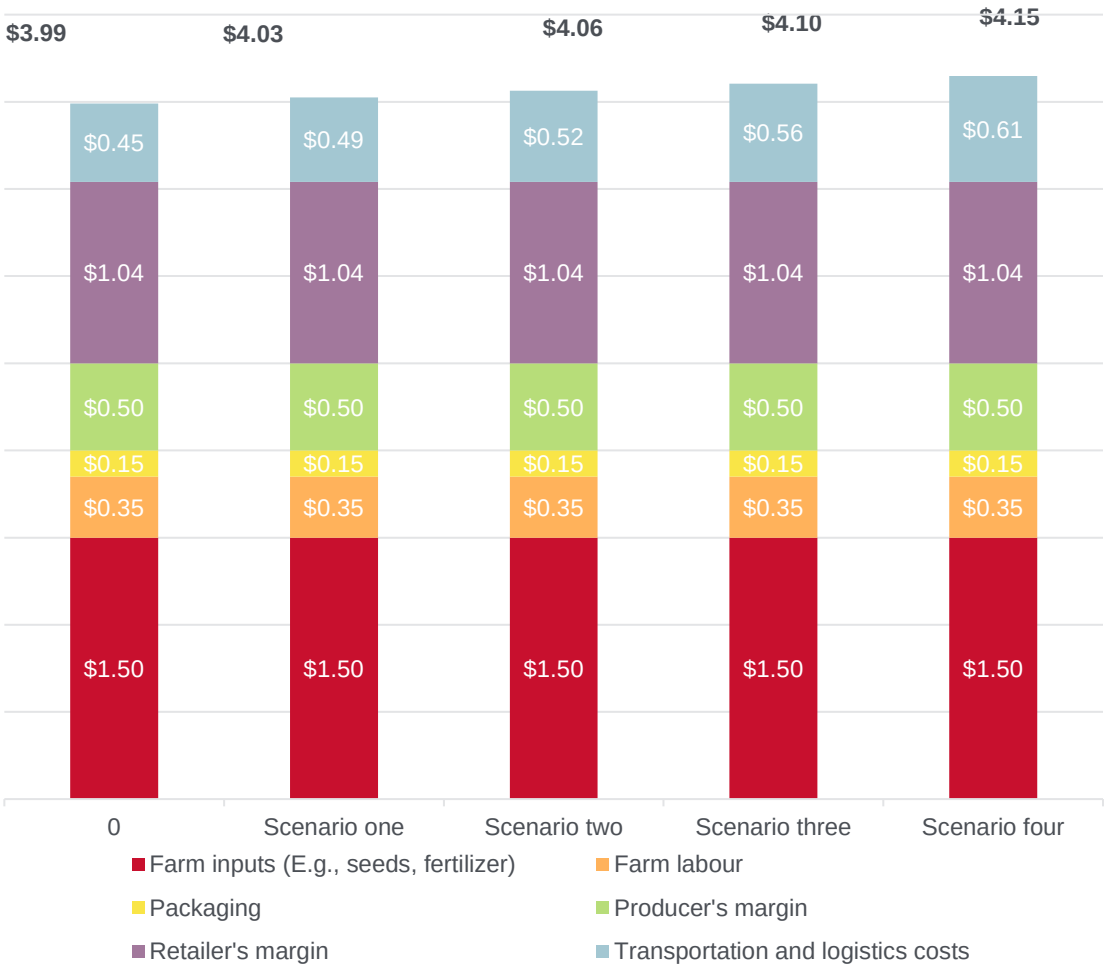
Going from the base case scenario through to scenario four, Figure 6-17 summarizes the resulting impacts to total logistics costs (by components) as transit time and/or transit time variability increase. Notably, there is a marked increase in (3) transit carrying cost, both as a function of the cost of capital and obsolescence, and in (5) standing inventory costs from increased transport variability.



Source: CPCS

Figure 6-17: Total annual logistics costs by scenario

Assuming that in each of these scenarios that the additional costs are passed on to the consumer, Figure 6-18 shows how the final price of strawberries increases from $3.99.



Source: CPCS

Figure 6-18: Impact of unreliability on the price of strawberries

The net impact is that an increase in average transit times or decrease in transit time reliability adds costs to the final product price. The impact might seem small (an increase of approximately 4% from the base case to scenario four). If the same factors that increased transit times and reliability in the examples presented, other consumer goods will also see price increases. The increases in transit times and decreases in reliability would then have broad impacts for consumer price inflation in the affected areas.

6.3.5 Summary of transportation and logistics costs

The discussion above provided examples of how transportation reliability impacts total logistics costs. To the extent that retailers can pass increased logistics costs due to decreased transportation reliability onto consumers, urban areas will face higher priced goods, although the extent to which retailers can do this depends, in part, on the elasticity of demand for the related good. Consumers may elect to consume the same product at higher prices or find cheaper substitutes. In either case, there is a loss in consumer utility.[107]

Generally, although specific impacts related to any given product, shipper or location will vary, the key takeaway that is true in all cases is that when transit times are longer or less reliable, the final price of goods will be higher or the variety of goods that are available in a given geographic area will decrease.

By living in a rapidly growing urban area with strong transportation links, Calgarians have benefited from transportation and logistics efficiencies and the more competitive product prices and a greater variety of goods that are available to them. This can be seen in the many vibrant areas in the city where new and different retail establishments and restaurants have proliferated. To continue to have access to these products and continue their rate of proliferation, it is important that The City continue to enable the conditions that are within its control to further enhance transportation and logistics efficiency in and around Calgary. Of particular importance is the need to help minimize first and last mile (or kilometre) travel times and improve travel time reliability – that is, improving the first and last stage of delivery from the manufacturer to the warehouse and from the distribution centre to the purchaser's residence.

[107] Customer utility is an economic term that is used to describe the total satisfaction that is derived from consuming goods and services.

7 Snapshot: what we've heard so far

A short survey was distributed to participants at the three February 2017 project launch meetings.[108] The survey asked respondents to select the five most important issues from a list. The findings are summarized in Table 7-1, which lists the issues in the order in which they presented, along with the number of times they were cited. The three most important issues are highlighted in yellow, with the next most important issues highlighted in grey.

Table 7-1: Summary of key issues – project launch survey

Which of the following are the most important goods movement issues in or around Calgary today? Pick the Top 5 issues and rank them, 1 = most important.	
13	Congestion on provincial highways, in or around Calgary
21	Congestion on other roads, in or around Calgary
1	Inadequate road access to rail terminals or to the airport
4	Inadequate road access to shippers / receivers
2	Inadequate intercity connectivity (road, rail or air)
3	Need for improved / additional transportation links (where?) • Glenmore (east) / Highway interchange east of Calgary
3	Supply of zoned and serviced employment and industrial lands
6	Inconsistent truck route regulations / designations
11	Changing logistics, retailing and/or distribution patterns (e.g., e-commerce)
17	Conflicts with other traffic, including transit, pedestrians and cyclists
9	Trucks moving through residential neighbourhoods or other sensitive areas
10	Traffic signal timing / coordination on arterials
12	Inadequate space for truck loading / parking, on-street or off-street
5	Operating costs for goods movement
2	Reducing greenhouse gas (GHG) emissions / air pollutants
9	Keeping up with emerging technologies and/or regulatory standards
5	Bottlenecks (where?) • Country Hills and 112 Avenue • NB Deerfoot to WB 16 Avenue • Major Arteries • Deerfoot and Anderson • Deerfoot and Glenmore
2	Other (please describe) • Urban sprawl – residential & industrial in the region / idle time at warehouse • Access points (52 Street and Glenmore Trail)

The most important issues are congestion on roads and on provincial highways in and around Calgary and conflicts with other road users. Other important issues included inadequate loading and parking space for

[108] See Section 1.5.1 for further information.

trucks, changing logistics, retailing and distribution patterns, traffic signal timing and coordination on arterials, trucks moving through residential or other sensitive areas and keeping up with emerging technologies and regulatory standards. Respondents also identified bottlenecks at various locations, including three along Deerfoot Trail. Taken

together, this early snapshot suggests that most of the issues of importance are local and solutions can be proposed through the Strategy.

Respondents were given an opportunity to provide additional comments regarding the Strategy. These comments are summarized in Table 7-2. In contrast to the issues, several respondents looked at long-range considerations. Overall, participants at the project launch meetings welcomed the GMS and looked forward to continuing collaboration with The City.

Table 7-2: Additional comments – project launch survey

Please add any comments about the Goods Movement Strategy in the space below.
• Importance of connecting regional strategies for transportation land use and economic development to those of The City of Calgary • Need to take into account future technologies & how that will impact roads • Need to reconsider road bylaws in industrial areas for example shared driveways limited all turns access • Right turns in & out for trucks into industrial areas • Industrial areas don't require "complete streets" i.e., sidewalks on both sides of road • I can assist in engagement from industry. • So many important topics, we look forward to meeting in the future. Logistics and goods movement are key to Calgary and the province. Great start! Look forward to working with you! • Goods Movement Strategy needs to be regional and long term vision should include surrounding communities • Look into future not fix only the current as the challenge will always be "catch up" • Difficult to undertake study without in depth collaboration with the Calgary Regional Partnership.

Source: Summary prepared by The City of Calgary

8 Appendices

8.1 Appendix A – Visions for goods movement strategy

Table A-1 summarizes how several other jurisdictions have described their vision for goods movement, further to the discussion in Section 2.2.2. The examples are drawn from other jurisdictions in Canada, the United States and overseas. The figure also describes what each example potentially contributes to the definition of a goods movement vision for the GMS.[109]

Table A-1: Vision Statements from other jurisdictions

Source	Potential Vision elements	Relevance to the GMS
Edmonton Goods Movement Strategy, 2014.[110]	*"The Edmonton region is a major manufacturing, logistics and distribution centre and a hub for the oil and gas industry in Alberta. … It is vital to the economy that commercial transportation moves efficiently through the city and region. Efficiency means the provision of a road network that connects all major goods-generating activity centres and intermodal terminals with each other and with the major highway system directly, safely and with minimal delays, minimizing truck intrusions through sensitive areas."*	Recent example of a goods movement strategy in Alberta. Adds connectivity and avoidance of sensitive areas.
Vancouver *Moving the Economy, A Regional Goods Movement Strategy for Metro Vancouver* (draft), 2015[111]	"As a region, we maintain our global position as one of the best places in the world to live and do business because we deliver goods and services efficiently and reliably in a way that meets the needs of our growing economy and protects the environment, public health and safety, and the livability of our neighbourhoods."	Relates efficiency and reliability of goods movement to quality of life, the environment, public health and safety.
Edmonton Goods Movement Strategy, 2014.[112]	*"The Edmonton region is a major manufacturing, logistics and*	Recent example of a goods movement strategy in Alberta.

[109] Material excerpted from *Backgrounder on Goods Movement*, prepared by the consultant team for the Metrolinx *Legislated Review of the Regional Transportation Plan*, Toronto, July 2016.

[110] *Edmonton Goods Movement Strategy*, City of Edmonton, June 2014.

[111] *Moving the Economy, A Regional Goods Movement Strategy for Metro Vancouver*, draft, TransLink, New Westminster, BC, January 2015. (Draft. Not for public release.)

[112] *Edmonton Goods Movement Strategy*, City of Edmonton, June 2014.

	distribution centre and a hub for the oil and gas industry in Alberta. … It is vital to the economy that commercial transportation moves efficiently through the city and region. Efficiency means the provision of a road network that connects all major goods-generating activity centres and intermodal terminals with each other and with the major highway system directly, safely and with minimal delays, minimizing truck intrusions through sensitive areas."	Adds connectivity and avoidance of sensitive areas.
Edmonton Goods Movement Strategy, 2014.113	*"The Edmonton region is a major manufacturing, logistics and distribution centre and a hub for the oil and gas industry in Alberta. … It is vital to the economy that commercial transportation moves efficiently through the city and region. Efficiency means the provision of a road network that connects all major goods-generating activity centres and intermodal terminals with each other and with the major highway system directly, safely and with minimal delays, minimizing truck intrusions through sensitive areas."*	Recent example of a goods movement strategy in Alberta. Adds connectivity and avoidance of sensitive areas.
Vancouver *Moving the Economy, A Regional Goods Movement Strategy for Metro Vancouver* (draft), 2015[114]	"*As a region, we maintain our global position as one of the best places in the world to live and do business because we deliver goods and services efficiently and reliably in a way that meets the needs of our growing economy and protects the environment, public health and safety, and the livability of our neighbourhoods.*"	Relates efficiency and reliability of goods movement to quality of life, the environment, public health and safety.
Peel *Long Range Transportation Plan UpdateI, 2012.*[115]	"Peel Region will have a safe, convenient, efficient, mulit-modal, sustainable and integrated transportation system that supports a vibrant economy,	Vision from Canada's largest freight hub, adding in additional network attributes (multi-modal, safety, convenience and efficiency) and identifies natural

[113] *Edmonton Goods Movement Strategy*, City of Edmonton, June 2014.

[114] *Moving the Economy, A Regional Goods Movement Strategy for Metro Vancouver*, draft, TransLink, New Westminster, BC, January 2015. (Draft. Not for public release.)

[115] Peel Long Range Transportation Plan Update 2012, Final Draft, Region of Peel, Brampton, 2012.

	respects the natural and urban environment, meets the diverse needs of residents and contributes to a higher quality of life."	and urban environments distinctly. Adds community attributes (vibrancy, diversity).
Hamilton *Goods Movement Study*, 2005[116]	Short Term – 1-5 years (selected) "*All land use planning decisions adequately consider direct and indirect impact on the ability for businesses to move goods and acknowledge the critical importance of supporting and promoting industry as the major generator of employment in Hamilton."* "*Programs to prepare the workforce to respond to existing and future job opportunities in goods movement and related fields are being implemented by governments, educators and industry working together.*" Medium Term – 5-10 years (selected) "*Industries that rely on just-in-time delivery are moving to Hamilton to take advantage of the availability of 24 hour operations at air, marine and intermodal facilities, placing Hamilton at an advantage compared to its neighbours. Sufficiently large employment lands are assembled, serviced and ready for these new industries comprising a variety of economic clusters.*" Long Term – 10-15 years (selected) "*Hamilton is benefiting to full advantage from its transportation network and strategic location which enable goods movement providers, industry and businesses exploit the many cost and time effective transportation modes available while minimizing energy costs and supporting environmental goals.*"	Vision from neighbouring city, specific to goods movement. Brings in relationship with land use and labour force, and adds network attributes (seamless, integrated). Builds on locational and infrastructure attributes. Unique in that it evolves the vision over time. The vision and the goods movement component of Hamilton's Transportation Master Plan were reviewed as part of the TMP update. The review did not result in broad changes in direction.
Halton *Goods Movement Strategy*, 2015[117]	"*The goods movement strategy will support a network that is safe,*	Recent example of a goods movement strategy. Focuses on

[116] Excerpted from Hamilton Goods Movement Study, Final Report – Executive Summary, City of Hamilton, Hamilton, June 2005.

[117] *Halton Goods Movement Strategy, Final Study Report* (draft), Halton Region, January 2015. (Draft final. Not for public release.)

	economical, reliable, efficient, and environmentally sustainable. "*Within Halton, goods movement is widely recognized as an essential contributor to the economic, social, and environmental well-being of residents and businesses.* "	the transportation network. Links operational, economic and sustainability concepts, as well as recognizing the interests of public and private sector perspectives.
Southern California, *On the Move, Southern California Delivers the Goods*, 2012.[118]	"*A world-class, coordinated Southern California goods movement system that accommodates growth in the throughput of freight to the region and nation in ways that support the region's economic vitality, attainment of clean air standards, and the quality of life for our communities.*"	Recognizes role of trans-shipment (port) activities in local economy. Links goods movement to air quality, as well as to economic and community vitality.
Philadelphia – Camden, *Connections 2040*, 2013 and *2020 Freight Vision*, no date[119]	*Connections 2040* (TMP) *Connections 2040* envisions a seamless multi-modal passenger and freight system that is safe; convenient; sufficient in its capacity; attractive and affordable to its users; accessible and equitable for all citizens and visitors to locations throughout the region; and incorporates sound growth management, urban revitalization and environmental and economic competitiveness planning principles. *2020 Freight Vision* (selected) "*In the Delaware Valley, the region boasts the nation's finest goods movement system without qualification. Freight speeds efficiently and safely to ultimate destinations by plane, railroad, ship, and truck. Facilities form a cohesive whole and connections between different modes of transportation are seamless. Freight and passenger transportation needs are skillfully meshed together. Philadelphia is synonymous with intermodalism and is the recurring subject of international scrutiny and inquiry.*	Example of a large American metropolitan area that has long-established goods movement planning program. Long-range plan adds network attributes (sufficiency in capacity, attractiveness, affordability, equitable accessibility). *Freight Vision* is widely cited as an America prototype. Adds network attributes (network cohesion, meshing with passenger network). Further defines labour needs (talented, skilled). Notes that deliberate actions are required to achieve the vision, as well as cooperation between the public and private sectors.

[118] *On the Move, Southern California Delivers the Goods, Final Report*, Southern California Association of Governments, Los Angeles, December 2012.

[119] *Connections 2040 Plan for Greater Philadelphia*, Delaware Valley Regional Planning Commission, Philadelphia, July 2013; and *2020 Freight Vision*, Delaware Valley Regional Planning Commission, Philadelphia, Pennsylvania, no date.

	"*The region's status as a freight mecca is not accidental. Public and private sector cooperation is unparalleled. Investment in physical and procedural improvements, while judicious, is sufficient and expedient. The available labor pool is talented, highly skilled, and dedicated.*"	
Chicago *GO TO 2040*[120]	"*The increased investment in our freight system called for in GO TO 2040 will improve economic competitiveness by reducing travel delays and pollution and by improving safety. The private sector will fund some improvements through the normal course of business, but public investment is needed to promote economic growth as well as residents' health, safety, and welfare.*"	Adds economic competitiveness as a key outcome of an improved freight system.
Columbus, Ohio *2012-2035 Metropolitan Transportation Plan*, 2013 update[121]	"*Vision* [*for the MTP's freight program]: Economic development will be advanced through freight transportation infrastructure, investment and policies. The planning process will place emphasis on economic development. Transportation policies, regulations and projects will support the needs of the global supply chain. The freight network is recognized as the cornerstone of efforts to foster a flourishing regional economy.*"	Identifies economic development as the desired focus. Directly links improvements in the goods movement network to support this.
Portland, Oregon *Central City Sustainable Freight Strategy*, 2012[122]	"*Increase efficient movement of goods while supporting a green economy with family wage jobs and sustaining Portland's status as a healthy, thriving community*."	Ties efficiency in goods movement to Portland's sustainability objectives and to the types of jobs it wants in its core areas ('green economy'). Adds community attributes (healthy, thriving).
Houston-Galveston Area Council *Regional Goods Movement Plan*, 2013[123]	"*The vision for the goods movement system in the [Houston-Galveston] region is to be a connected, multi-modal, world-class system that enhances the region's economic vitality while supporting the mobility and livability needs of its citizens*."	Recent example of large American metropolitan area that has global connections (in this case, through the Port of Galveston).

[120] *GO TO 2040 Comprehensive Regional Plan*, Chicago Metropolitan Agency for Planning, Chicago, October 2010.

[121] *2012-2035 Metropolitan Transportation Plan*, Mid-Ohio Regional Planning Commission, Columbus, Ohio, 9 May 2013 update and amendment.

[122] City of Portland Central City Sustainable Freight Strategy, Report and Recommendations, City of Portland, Portland, Oregon, October 2012.

[123] *Regional Goods Movement Plan, Final Report*, Houston-Galveston Area Council, Houston, Texas, June 2013.

Auckland *Regional Freight Strategy*, 2006[124]	*"Freight movement is recognised as an essential contributor to the economic, social and cultural well-being of all Aucklanders, and is facilitated by a transport system where:* • *People and goods are able to move when necessary* • *Transport supports vibrant town centres* • *Streets are important civic spaces* • *Getting around by all modes is integrated, safe and effective* • *People have choices which enable them to participate in society* The environment and human health are protected."	Explicitly states importance of goods movement to the overall wellbeing of residents. Recognizes role of transportation in developing town centres and of roads as part of the urban fabric. Recognizes need for choices.

8.2 Appendix B – YYC air cargo facilities

This appendix describes the air cargo facilities at Calgary International Airport.[125] Additional information regarding the airport can be found in Section 4.3.3.

Equipment and Services

- Main deck loader capability to 60,000 lbs.
- Crane accessibility
- On-site Canadian Food Inspection Agency and veterinary services
- 24/7 Canada Customs operations
- Third-party service providers (cargo/ramp handlers)
- Code F runway capability
- Dedicated de-icing and in-ground fuelling

McCall North Trade Park (Apron II)

- 142,687 sq. ft. airside warehouse space
- 27,997 sq. ft. airside office space
- Airside/groundside access
- Airside perishable facilities (cooler and freezer)
- On-site freight forwarding and brokerage
- 500,000 sq. ft. dedicated cargo apron
- Nose tethers and tail stands
- In-ground fuelling
- Quick turn-around platform

[124] *Auckland Regional Freight Strategy*, Auckland Regional Council, Auckland, New Zealand, December 2006.

[125] Calgary International Airport, Facilities & Equipment.

- On-site crate building operations
- 20 ft./10 ft. ground level scales
- Airside Ground Support Equipment and Unit Load Device storage area

Deerfoot South Trade Park (Apron VII)

- 512,800 sq. ft. airside warehouse space
- 36,200 sq. ft. airside office space
- 500,000 sq. ft. dedicated cargo apron
- Designated for integration with freight forwarding
- Current tenants include FedEx, Purolator and UPS
- Nose tethers

Deerfoot North Trade Park (Apron IX)

- 125,000 sq. ft. of warehouse space
- 28,000 sq. ft. of office space
- Easy airside and highway access
- 24/7 Canada Customs service
- Airside Ground Support Equipment and Unit Load Device storage
- Apron expansion: 519,897 sq. ft.
- 98,089 sq. ft. additional airside warehouse, adjacent to Apron IX
- 50,000 sq. ft. additional office space, adjacent to Apron IX

Specialized Cargo Facility (on Apron IX)

- Total area of 30,000 sq. ft.
- Canada Border Services Agency and Canadian Food Inspection Agency offices on-site
- 12 stables and 21 kennels
- Two custom loading corrals
- Load Master room
- Dog run
- Two 20 ft. by 10 ft. floor scales
- Radiant heating and drainage

Air Service Cargo Partners

- WestJet: largest hub operation in Canada with belly-hold network
- Air Canada: hub operation – domestic and international – with belly-hold network
- International belly-hold opportunities: British Airways, KLM, American, Delta and United
- Alberta Gateway for DHL, FedEx, Purolator and UPS
- Cargojet operations – scheduled nationwide freighter network
- Scheduled international freighter service to both Europe and Asia
    - Cargolux: Three-weekly B747 - 8-F flights
    - Cathay Pacific Cargo: Two-weekly B747 - 8-F flights
- Heavy lift and charter operators

Cargo Area Overview

Cargo Apron

- 1,685,000 sq. ft. dedicated cargo apron area
- An additional 519,897 sq. ft. on Apron IX under construction

Cargo Facilities with Airside Access

- Total: 729,871 sq. ft.
- Apron II: 175,871 sq. ft.
- Apron VII: 429,000 sq. ft.
- Apron IX: 125,000 sq. ft. (additional space under construction: 98,089 sq. ft.)