5.1 ATTACHMENT

Impacts of E-commerce on Industrial Lands and Transportation Systems

October 14th, 2022

Prepared for: Metro Vancouver

Colliers Strategy and Consulting Group

Introduction

Study Objectives

Colliers Strategy and Consulting Group was retained by Metro Vancouver Regional District to provide a refined, deep understanding of how the rise of e-commerce is impacting industrial lands, the distribution of goods, and associated transportation networks, within the region.

Methodology

The literature review was completed on an ongoing basis throughout the duration of the study. A range of resources were used including academic articles, government studies, and findings reports, market reports, industry reports, news articles, and other relevant media (e.g. podcasts and webinars). Summaries of key themes found from this research are found below and on subsequent pages.

Stakeholder engagement included conducting a series of interviews with post-secondary academics, public transportation authorities, regional municipalities, postal service providers, delivery couriers, and other consultants. Participants and their exact responses are kept anonymous for their privacy. A list of the guiding questions used for the interviews can be found in the appendix of this study.

Limitations

This study relies on data from multiple sources including but not limited to Colliers Strategy and Consulting Group, and Statistics Canada. The quality of the assumptions made in the background data, therefore, places limitations on the study's findings, but Colliers has tried to ensure that assumptions are based on up-to-date policies and procedures.

However, should market conditions, policies, and/or procedures change significantly, the study's data and conclusions should be re-examined, particularly due to the economic uncertainties resulting from COVID-19. The data used in the study was generated during the COVID-19 pandemic. Colliers sees COVID-19 as a generation-defining crisis, limiting the full ability to make accurate predictions.

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Executive Summary
Background & Context

Understanding E-Commerce

E-commerce, the buying and selling of goods and services online, is a sector that has grown rapidly over the past twenty years. Since spring 2020, the sector has experienced extraordinary growth as a result of pandemic protocols that changed consumer habits and pushed retailers to quickly adopt an online presence. Increasingly, the requirements for brick-and-mortar space, warehousing space, fulfilment space, and distribution space are shifting. This is resulting in changes that are putting pressure on both the commercial and industrial markets.

Additionally, e-commerce most often requires products to be delivered directly to consumers rather than the traditional method of delivering to retail spaces. This has led to increased, sporadic traffic in areas that had previously not been designated for frequent loading and unloading, such as residential areas.

The delivery methods used often employ 'gig workers' who commonly make deliveries in their own automobiles, or by alternate methods including bikes and scooters. This is increasing demand for curbside and street parking space in an unprecedented way.

Metro Vancouver Analysis

The industrial market in the Metro Vancouver region is strained with very low vacancy rates and high rental rates. E-commerce has introduced additional users seeking to occupy what little available industrial space is found in Metro Vancouver. These users are often able to pay a higher rate than other industrial uses, and are, to an extent, contributing to the increase in rental rates. Specifically, the increased need for distribution centres to be located in urban locations near residential concentrations is pushing other uses out of the urban core, to more suburban locations where rental rates are lower.

The transportation network in the region could experience issues when traffic patterns for private automobile use return to pre-pandemic levels and delivery vehicle numbers continue to rise. Related to the congestion increase, concerns of additional curb demand are developing and are anticipated to become greater concerns going forward.

Executive Summary
Key Findings

Impacts of Delivery

From a retailer perspective, curbside-management strategies help to improve the efficiency of deliveries. Time spent finding parking is time lost. As a result, many drivers are illegally or double parking.

E-commerce delivery places significantly more demand on curb space than other new services such as ride-hailing. This is due to the additional time required for delivery personnel to access the building, and in some cases travel to an upper floor.

Current traffic data can be inaccurate and unreliable for future predictions. This is caused by the difficulty in distinguishing between background traffic and 'invisible freight' gig-delivery workers in private automobiles.

Parcel boxes in both apartment and commercial buildings reduce the time required to complete a delivery. In addition to reducing curb demand, these boxes have the added benefit of reducing parcel theft.

Greater adoption of cargo bikes requires specific modifications to current transportation infrastructure. Standard bike lanes are generally not wide enough to accommodate cargo bikes. Wider lanes and additional buffers are needed to facilitate cargo bike delivery. Furthermore, there is often a lack of parking options.

Impacts of Logistics

As a result of consumer expectations of rapid delivery, significantly more middle-mile shipping is occurring with partially filled trucks. This results in lower overall utilization of truck cargo space, more deliveries per truck, more traffic and more pollution.

E-commerce warehouses typically use three times more labour than traditional warehouses. Automation could reduce labour requirements by up to five times but remains a significant investment mainly possible for large operators.

One of the most frequent comments made by developers, agents and logistics managers is that the process for rezoning and development needs to be accelerated. In many cases, zoning provisions are inflexible and not keeping up with new uses coming to market, requiring a rezoning process that is often lengthy, expensive and resource intensive.

Executive Summary
Recommendations

Rethink Curb Space

Curb Management Policies: The first step is to create up-to-date, citywide inventories of loading zones, curbs and congestion points. Expanded data can inform city strategies and local plans to address the increase in demand for curbside space.

Designated Delivery Areas: Curbside delivery areas adjacent to apartment buildings help mitigate parking flow interruptions and double parking. These areas need to be location-specific rather than applied as a blanket solution.

Rethink Zoning

Flexible Zoning: The more flexible the zoning, the more resilient a city can be when mitigating and absorbing emerging trends, while still retaining the primary intended use of the lands. Data collection can provide ongoing monitoring of the success of new pilot programs.

Population Proximity: Aligning densification of the anticipated population growth and opportunities for sustainable distribution methods are a crucial consideration for updating land use plans and policies. Municipalities should be proactively reviewing policies, especially for emerging trends such as e-commerce and ridesharing, to ensure that they are current with business needs.

Alternative Land Uses: Municipalities should explore opportunities to introduce industrial uses, such as urban logistics, to commercial areas, especially where these uses can offer dense employment opportunities connected with transit. In some cases, traditional brick-and-mortar shops could house multiple stages of the e-commerce supply chain in addition to retail. This includes processing in-store pick-ups and online returns, without compromising neighbourhood vibrancy.

Part 1

Understanding E-commerce

Understanding E-commerce

What is E-commerce?

E-commerce, for the purpose of this study, is the buying and selling of goods over the internet, that are then shipped and delivered, most often directly to the consumer, reducing the need to access a brick-and-mortar store.

The Facets of E-commerce

There is no delineated supply chain for e-commerce. Instead, there are many different ways that goods can be produced, shipped, and delivered to the end consumers. This diversity has enabled sales and business expansion into market segments that would not be accessible without online access to a wider market.

A significant component of e-commerce is the ordering of both take-out food delivery as well as the delivery of groceries. Both have had significant impacts on the management of brick-and-mortar food and beverage operations and grocery retail space allotment. While this contributes to road congestion and curb demand, it has a limited impact on industrial land due to the minimal reliance on food warehouse space. As such, the role of food delivery has been less explored in this study to allow a more comprehensive review of aspects impacting the industrial realm, a vital concern for the Metro Vancouver region.

E-commerce Lexicon

- **B2C** (business-to-consumer) is the business model of selling products or services directly to consumers. This is what is most associated with e-commerce.
- **B2B** (business-to-business) is the exchange of products, services or information between businesses. The majority of these transactions are serviced based.
- **C2C** (consumer to consumer) is the e-commerce model that allows your couch or baseball cards to be sold via sites like eBay or Craigslist to other consumers around the world, rather than limited to a local garage sale.
- **C2B** (consumer to business) this model includes product placement in content making, contract/gig service work, and other services predominantly.

Understanding E-commerce

What is E-commerce?

Readily available products online have changed the way brick-and-mortar stores and industrial lands are involved in the delivery and consumption of goods.

E-commerce vs. Traditional Retail

E-commerce is a relatively new form of retail that is quickly changing how supply chains are managed and how goods shipping is conducted, drastically changing the way consumers receive or collect goods.

Additional delivery requirements and increasing needs for rapid delivery to stay competitive have meant that some e-commerce models have not always been profitable. As a result, hybrid or omnichannel retail models have become increasingly popular.

Businesses that do tend to be most profitable are distributors that implement delivery subscription services (such as Amazon prime) and offer a wide range of products, resulting in consistent use by virtually every type of consumer.

E-commerce Lexicon

- **Wholesale** is the selling of goods in large quantities to be retailed by others.
- **Brick-and-Mortar** refers to a physical presence of an organization or business in a building or other structure.
- **Logistics** is the management of the flow of products between the point of origin and the point of consumption to meet the requirements of customers or corporations.
- **Omnichannel Retail** is an approach to e-commerce that attempts to reach and accommodate customers shopping online or in brick-and-mortar stores.
- **Click-And-Collect,** curbside pick-up, or in store pick-up are methods of goods purchasing where the initial purchase is done online, then the collection is completed by the customer at the physical store or just outside it.

Understanding E-commerce

Why study E-commerce?

Monthly paid subscriptions for rapid-delivery services of various products have helped facilitate the adoption of e-commerce as a new form of retail.

Rapid Growth

The global pandemic forced many retailers to quickly adopt an online platform to maintain their business, resulting in more options available online for consumers and more transactions occurring online as a result.

In addition, the pandemic acted as a catalyst for the increase in e-commerce activity. Other elements, including parcel delivery subscriptions such as Amazon Prime, have also driven the increase. Easier and cheaper delivery fulfilment through automation and alternative delivery/pick-up solutions have also resulted in retailers quickly adopting this method of sale, and more consumers in turn opt for e-commerce as a way to shop.

Certain retail sectors have seen more drastic increases in e-commerce uptake, most significantly 'clothing & accessories', as well as 'sporting, hobby, books & music'. The least impacted sectors are those that provide an inherent experience for consumers, such as services, and restaurant dining and entertainment. Operators that can provide subscription services (e.g. Amazon, Wal-Mart, DoorDash) subsidize their delivery costs with these fees. This enables their delivery services to cover a broader area, as well as offer a more competitive, faster delivery service.

E-commerce Lexicon

- **"Just-In-Time" Delivery** is an inventory management strategy that is intended to sync orders to suppliers with production or delivery schedules, limiting the need for warehousing.
- **Dark Stores** are retail facilities that resemble a conventional supermarket or another standard store. These are not open to the public, but instead, house goods used to fulfill online orders.
- **Invisible Freight** refers to urban delivery services that are gig-based and operate out of unmarked passenger vehicles, scooters, or e-bikes that are often unregulated and do not require business licences (e.g. UberEATS)
- **Distribution Centre** is a warehouse or other specialized building which is stocked with products to be redistributed to retailers, wholesalers, or directly to consumers.
- **Fulfilment Centre** is a third-party warehouse where incoming orders are received, processed and filled.

Understanding E-commerce

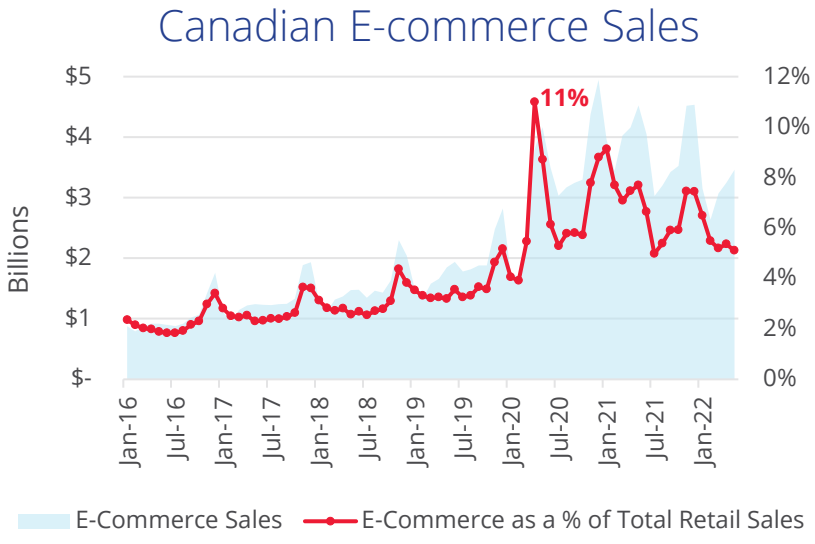
Why study E-commerce?

E-commerce has been increasingly representing a larger portion of the broader Canadian retail market, with 7% of all retail activity occurring online in 2021 compared to 2% in 2016, surging to a peak of 11% in April of 2020.

State of E-commerce in Canada

Statistics Canada estimates that 75% of the Canadian population purchased goods online in the first half of 2022.

While e-commerce sales have dropped off slightly since the easing of pandemic restrictions for in-person shopping, total e-commerce sales are still far greater than they were in 2019 and expected to stay at elevated levels.



E-commerce Lexicon

- **An estimated 55% of Canadians** made online retail purchases with their mobile devices in January 2022.
- **Approximately half of all online Canadian purchases** are made on non-Canadian websites.
- **Canadian online buying patterns** generally hit an annual peak following American Thanksgiving through to Christmas.

Understanding E-commerce

E-commerce in Urban Areas

The rise of e-commerce has added demand to the industrial real estate market, urban freight corridors, and curb-side delivery space. Understanding this demand within a city-specific context will help prepare necessary policy changes.

State of E-commerce in Cities

Dynamic urban areas are a complex network of corridors and land uses, which are both currently experiencing challenges due to the rise of e-commerce.

Supply chains and urban logistics are being strained by the number of e-commerce goods flowing through cities. Recent supply chain gaps and delays have brought urban logistics to the mainstream.

Urban residents are seeing the impacts of e-commerce daily. Consumer expectations of fast delivery are at odds with increasing delivery vehicle congestion, causing increased demand for space.

Expensive land rates and higher densities associated with cities limit the availability of industrial land and especially limit the land that can be used for warehousing, which frequently requires large footprints. Cities are facing the challenge of balancing new locational and built-form options to ensure that warehousing and other industrial uses are not pushed out.

E-commerce Lexicon

- **Urban areas only have a finite amount of space available.** Different e-commerce activities are all competing for a limited amount of space and resources, often going to the highest bidder.
- **The delicate network for urban movement can be significantly disrupted by the smallest change.** E-commerce delivery is almost exclusively done by municipally owned roads and sidewalks.

Understanding E-commerce

Impacts on Employment

E-commerce is generally believed to create additional employment for warehousing and delivery roles, while both reducing and changing the role of retail staffing needs.

Labour Changes Tied to E-commerce

Retail

To a certain extent, it is understood that e-commerce has reduced the need for retail staff. Studies have indicated reduced incomes related to employment in retail in the United States since 2018, primarily suspected to be due to reduced hours worked. Yet, an in-person shopping experience is still proven to be preferred for certain products. Retailers are frequently downsizing their spaces to offer fewer selections in stores, but more display opportunities.

Warehousing

It is somewhat anticipated that automation will over time reduce employment needs for warehousing positions in fulfilment and distribution centres. Currently, the rise in demand is creating more jobs in this sector as hiring additional staff is more cost-effective than implementing automated solutions. This will likely change as the cost of robotics reduces with increased adoption.

Delivery

Fluctuating demand for delivery personnel has opened up opportunities for what is technically considered to be 'self-employment' for delivery drivers within the 'gig economy'. This allows deliveries to be made at a reduced cost for retailers, however, also presents concerns regarding the lack of employment benefits, including safety for drivers and the public.

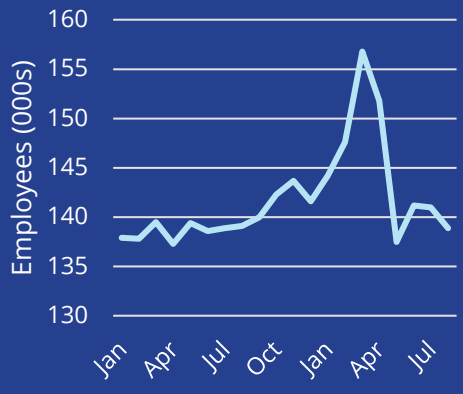
BC Employment Trends

Transport & Warehousing

2021- 2022

Retail and Wholesale Trade

2021 - 2022



Understanding E-commerce
Literature Review

Literature surrounding e-commerce and its impacts on cities has focused mostly on physical innovations, updated planning policies, and emerging delivery techniques. The wide-ranging impacts of e-commerce can be felt throughout cities, from large municipal infrastructure down to personal shopping. In general, the e-commerce and industrial industry is advancing quickly, and government has been slow to make changes. Policy changes and municipal programs that have occurred have virtually all been reactionary rather than proactive.

Brick-and-Mortar Evolution

Stores are increasing services & space to facilitate the changing support role brick-and-mortar plays in e-commerce retail.

Retail is not divided into a mutually exclusive manner between traditional brick-and-mortar and online transactions. Click-and-collect models of shopping (where the product selection and initial transactions occur online, then the pick-up of the item purchased is done in-store) are becoming increasingly in demand. As a result, stores are dedicating teller counter space specifically for package pick-ups, introducing parcel lockers, and devoting more floor space for order fulfilment.

"Hybrid retail" models, where staff split their time between in-person customer service and online order picking was a quick solution to pandemic issues, but it is largely expected to continue going forward. Despite figures that estimate half of all retailers offer free return shipping for online orders, roughly 60% of online shoppers prefer to return items in a brick-and-mortar store. As a result, this is a significant change linked to the fact that about 30% of all online purchases are returned, compared to 9% of in-person purchases.

Partnerships

Combining the efforts of industry and public sector policy making, rather than exclusively one or the other, is key.

Successful projects have been implemented most often through the combined efforts of a range of partners including municipalities, port authorities, advanced technology companies, retailers, and distributors, amongst others. The case studies in this study review this further. In general, the literature showed that government efforts alone were slow to address real issues that were arising with the increase in e-commerce. As logistics and technology companies are at the forefront of the e-commerce sector, these actors hold a greater power to assess trends than the municipalities in which they are located.

Collaborative pilot projects were often able to combine different sets of data collected by private and public sectors, revealing detailed information that hadn't been available or clear without collaboration. Access to additional tools or technologies across multiple organizations has also been an important implementation mode, allowing for the cross-pollination of ideas and increased collaboration.

Understanding E-commerce
Literature Review

Curb Management

Frequent and speedy deliveries have pushed the demand for curbside loading space to unprecedented levels.

Curbs and sidewalks have emerged as a major congestion points that are being impacted by the rise of e-commerce deliveries. Delivery companies need ample and immediate access to the curb to unload as quickly as possible to meet the consumer demands of increasingly fast delivery. These companies are also highly interested and invested in streamlining the curbside delivery process for efficiency and cost savings. The e-commerce demand for the curb conflicts with existing uses such as parking, cycling, transit, and garbage collection. Much like the congestion and conflicts that have arisen from ride-hailing curb demand, e-commerce delivery is creating a much greater need for a comprehensive loading and unloading zone strategy.

But before the curb can be managed, an inventory of the amount and type of curb space in a city must be collected. This is a significant barrier for most cities that have not been keeping an accurate inventory, or even examined the current uses of their curb space and sidewalks. While some cities like Vancouver have prescribed loading zones, many of these zones are not monitored on an ongoing basis. The first step in a curb management policy is to create an up-to-date inventory of the loading zones, curbs, and congestion points before making any decisions. From this study, various possible next steps will be examined that may be implemented after the data collection is complete.

Last Mile Distribution by Cargo Bike

The desire for energy-efficient delivery has produced a wave of cargo bike delivery experiments with a mixed reception.

Cargo bikes and e-cargo bikes are last mile delivery and distribution services increasingly explored by municipalities and parcel companies. The proposed benefits of switching from traditional delivery vehicles to cargo bikes include lower GHG emissions per delivery, less vehicle congestion, and better delivery access to dense urban areas.

While cargo bikes take up a smaller footprint than traditional delivery vans, they have a substantially lighter load capacity. With fewer parcels being delivered on each delivery route, the cost per delivery is driven up significantly. The fuel savings that come with utilizing bicycles do not seem to outweigh the labour cost of an inefficient trip. Additionally, this inefficiency increases the required number of trips, which can conflict with consumer demands for fast delivery and can cancel out the decreased vehicle congestion and replace it with cargo bike congestion.

Higher frequency cargo bike trips require a higher amount of staffing per delivery, further decreasing the feasibility of this green delivery method. Industries like e-commerce that rely heavily on the availability of the workforce, especially gig workers, have been struggling to meet staffing needs.

Understanding E-commerce
Literature Review

Alternative Delivery Methods

Drones, automated vehicles, and e-cargo bikes are some of the many solutions that are being implemented for deliveries.

Drones and self-driving vehicles are delivery solutions that are not immediately, broadly feasible in the Metro Vancouver market and context. This is due to several reasons ranging from population density, current distribution hub locations, and transportation regulations, amongst others.

As population density increases in more parts of the region, and as safety measures improve for these delivery modes, more implementation of automated delivery solutions will be employed. These are very real and effective solutions to many of the labour and congestion issues facing cities, and as such businesses will continue to pursue them.

Ensuring long-term planning efforts consider the impacts on safety, labour dynamics, and curb demand for these delivery methods will be crucial. In the current and immediate future context, other alternative delivery methods such as e-cargo bike fleets are more easily and quickly implemented as an alternative, or supplement to traditional delivery vans and trucks, when distances and other factors permit.

Port Activity

Port cities are complex networks of goods movement infrastructure and are very important to e-commerce trade.

Shipping container ports along the West Coast of North America are where a significant amount of consumer goods enter. In Vancouver, the Port is responsible for the import of approximately $240 billion of goods annually. These ports are not only the gateway for consumer goods, but they are also enormous drivers of economic activity. The Port of Los Angeles and Long Beach employs 1 in 9 residents of Southern California, about 992,000 jobs, with an additional 600,000 indirect jobs. Just like the Port of Vancouver, these ports have immense downstream economic benefits that can be felt across the region. The flow of goods into ports has increased with the rise of e-commerce, showing the importance of efficient port operations on wider economic outcomes.

The efficiency of port operations at the Port of Vancouver relies heavily on the ability to cross dock, which refers to unloading ready-for-consumers goods directly onto the next mode of transportation without requiring warehouse use. As more finished goods are entering Vancouver via the ports, and with shorter lead times, this quick and intense practice is necessary to keep port delays to a minimum. Instead of traditional warehouse forms located away from the port, cross-docking is most efficient when the warehouse is located directly adjacent to the port and requires the least amount of material transportation.

Understanding E-commerce
Emerging Trends

Private companies are instigators of change, and municipalities are reacting to the changes. There is an apparent gap in the literature on how cities can innovate to absorb the impacts of e-commerce, rather than be in conflict.

Conflict Over Space

There is a conflict over space occurring on public curbside infrastructure. Deliveries need this space to get from the vehicle to consumers, but cities still need streets for parking, sidewalks, and bike lanes. The usage of this space is hotly contested, and this conflict is causing congestion and negative outcomes for all.

Forms of Retail

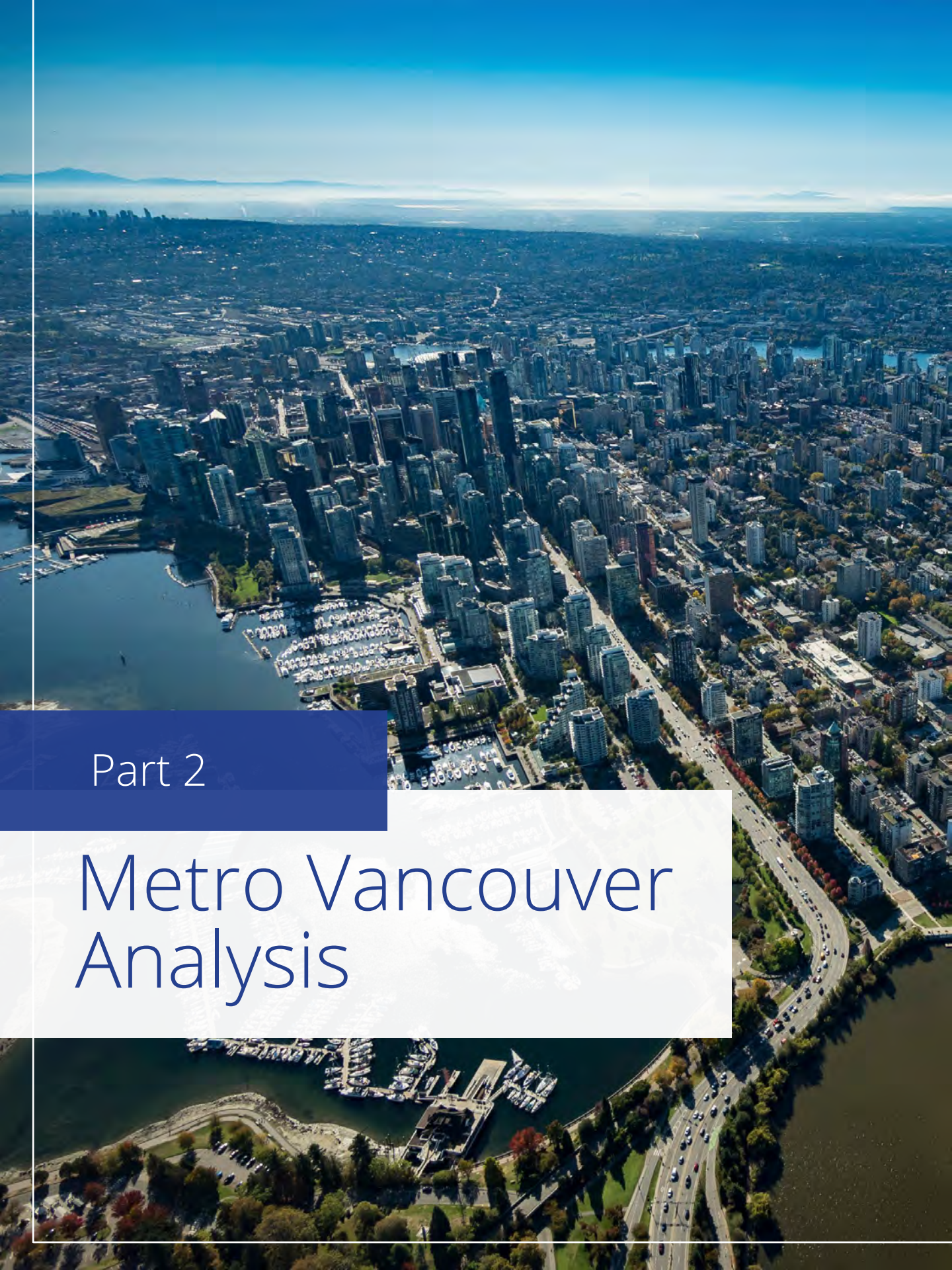
Personal shopping has shifted to a hybrid model split between in-person and online shopping. Less reliance is placed on brick-and-mortar stores for traditional shopping, and these retail outlets are being converted to facilitate order pick-up and returns. There is still a need for the brick-and-mortar retail experience, but more stages of the supply chain may be housed within one structure.

Faster and Cheaper

Deliveries are expected to be quick and cheap, with intense competition for who can provide the quickest and cheapest. Large stakeholders that set consumer trends like Amazon can increase the reliability of their supply chain, while smaller actors must find new innovative ways of meeting consumer expectations. This includes e-cargo bikes, more reliance on gig workers, and urban mobility and distribution hubs.

Industrial Strain

These changes in consumer expectations have driven industrial land to be in the shortest supply and highest demand ever experienced. E-commerce distribution is reliant on warehouse space as close as possible to the consumer, and this simply isn't available in many major cities. This has led to the innovative use of non-traditional spaces and is driving new built forms, including multi-level, and new location considerations for logistics activities.



Part 2

Metro Vancouver Analysis

Metro Vancouver Analysis
Introduction

Metro Vancouver's geographic position as a port and related infrastructure have created a prominent logistics hub, however the stressed industrial market has created barriers.

Metro Vancouver is the closest major North American region to Asia, positioning it as the first stop for incoming consumer goods. Additionally, the region also serves as an export hub for goods and resources from western Canada, including produce from interior BC and the Fraser Valley. As a result, Vancouver is home to the largest shipping port in Canada, with easy connections to air, train, and truck cargo transfers.

The industrial space vacancy rate dipped to 0.1% in Q2 2022, which is the result of a steady decline in available space that occurred during the pandemic. As comparison, the 2019 vacancy rate for the region was approximately 1%. This has compressed and stressed the distribution and warehousing market which is already seeing a higher demand due to increasing e-commerce purchasing.

Newly developed industrial land is located far into the eastern periphery of Metro Vancouver, increasingly within the Fraser Valley. Logistics and warehousing tenants prefer more central locations, but these are increasingly unavailable. Instead, tenants are locating anywhere they can find available space that meets their square footage space needs.

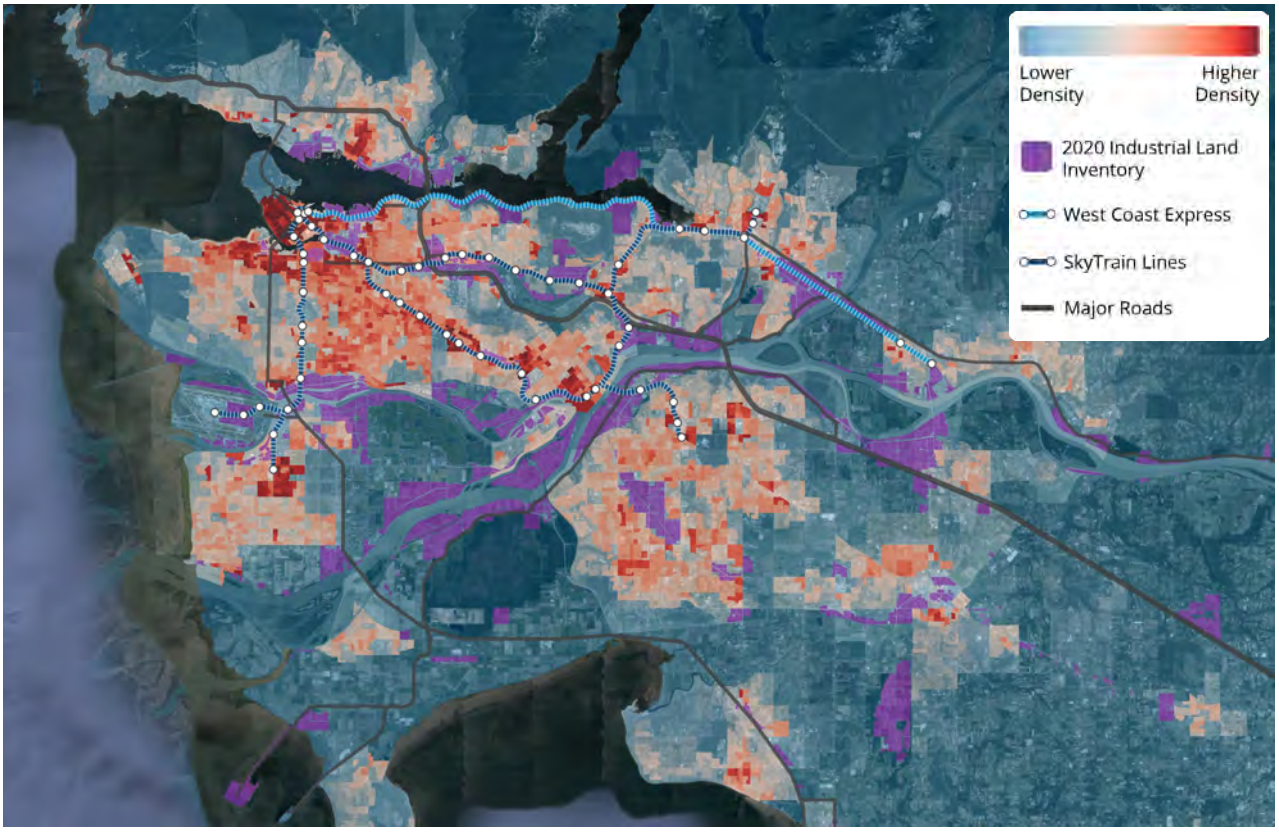
Metro Vancouver Analysis

Geographic Context

In 2020, there were 21,000 acres of industrial land, excluding retail, commercial, others uses, and vacant sites, throughout Metro Vancouver.

These industrial lands are primarily concentrated along the Fraser River between Vancouver, Richmond, and southeast Surrey. Existing legacy industrial nodes around the Port of Vancouver and Mount Pleasant support urban industrial uses but are experiencing demand that far exceeds the supply. As a response, new industrial development has been occurring in more peripheral areas like Campbell Heights, in Southeast Surrey.

Throughout Metro Vancouver, industrial land is in areas that have lower population density and consequently also have minimal access to rapid transit. This is creating more reliance on workforce vehicle use, contributing to a higher level of road congestion throughout industrial areas.



Industrial Lands Inventory and Population Density in Metro Vancouver

Metro Vancouver Analysis

Planning Context

Metro 2050 Metro Vancouver Jurisdiction

To accomplish the goal of supporting a sustainable economy, the Metro Vancouver Regional District included a strategy to protect the supply and enhance the efficient use of industrial land. Beyond protecting the current supply, Metro Vancouver aims to ensure ongoing monitoring of industrial land to make sure the supply meets capacity, and opportunities for industrial land innovation and intensification are assessed across the region.

Member jurisdictions within Metro Vancouver are tasked with aligning Industrial and Employment lands, zoning and allowable uses with the land use designations set out within the regional growth strategy. Member jurisdictions are also encouraged to increase the intensification and densification of industrial land by refining or removing any restrictive municipal policies that may be a barrier to development.

Transport 2050 Metro Vancouver Jurisdiction and TransLink

Strategies within this plan pertaining to e-commerce and industrial land include making goods movement more reliable by easing trucking congestion and coordinating industrial land uses with goods movement corridors. The impacts of last mile delivery are noted as a cause of congestion. Urban industrial lands near last mile destinations are identified as sites that could facilitate the consolidation of goods for more efficient delivery.

Vancouver Plan Vancouver Member Jurisdiction

Taking guidance from Metro Vancouver's regional growth strategy, the newly adopted Vancouver Plan's main goal for industrial land is to protect the current supply. The secondary focus is to expand the supply by modernizing and increasing the flexibility of permitted uses to relieve pressure from the current industrial land market, which is also well-aligned with regional policy.

Industrial Land Intensification Initiative Richmond Member Jurisdiction

As a response to the limited availability of industrial land in Richmond and the broader Metro Vancouver market, a study and plan was proposed to investigate different policy levers to intensify existing industrial land. More flexible zoning emerged as the main proposed change.

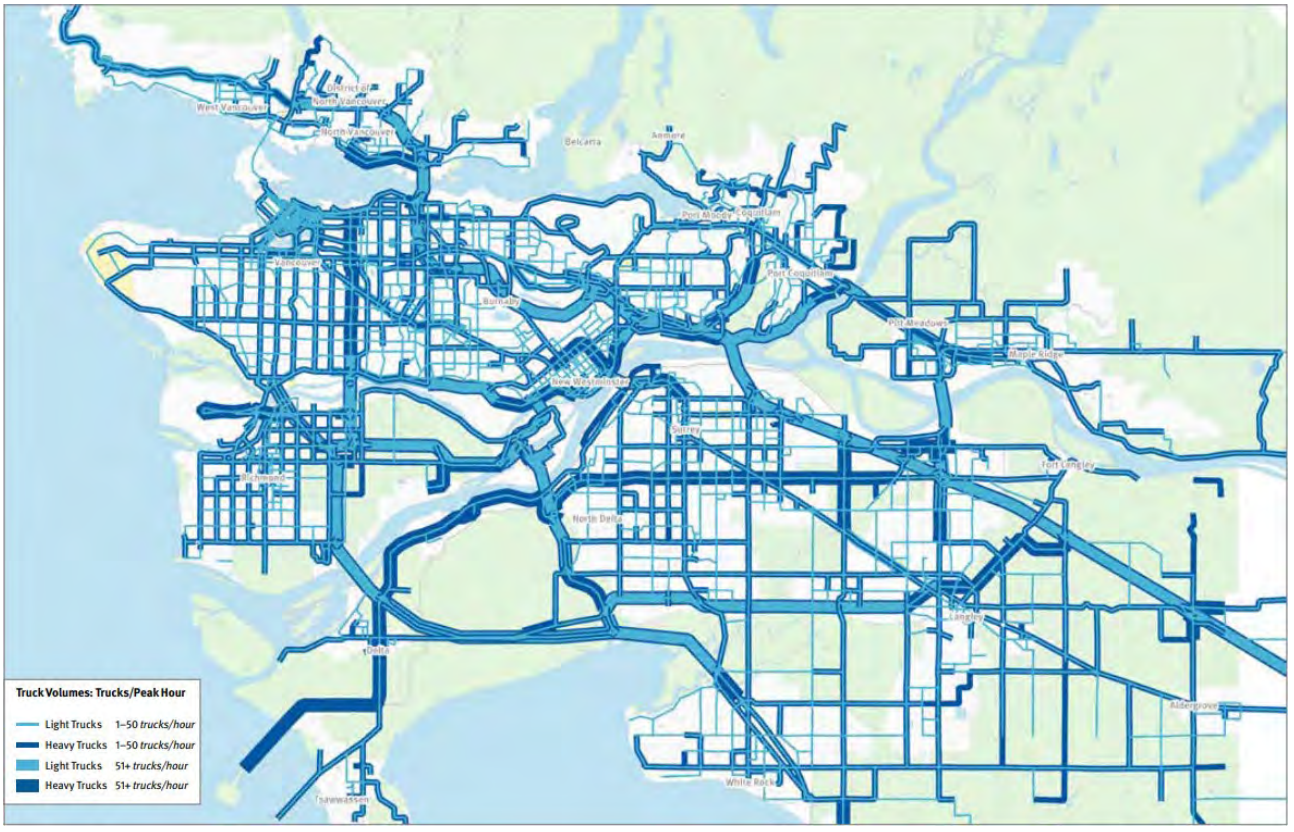
Metro Vancouver Analysis

Planning Context

Moving the Economy Regional Goods Movement Strategy for Metro Vancouver

The Goods Movement Strategy for Metro Vancouver was published in 2017 and is based on data collected in 2012. As the rise of e-commerce has taken place and disrupted the existing flow of goods, the data underpinning this report may be severely out of date. The report describes how different types of goods move within and through Metro Vancouver. It identifies the patterns of movement on the road, rail, pipeline, marine, and air networks.

Challenges that were identified in 2017 and still exist today include travel time reliability, a lack of coordinated planning and inconsistencies between member jurisdictions, limited availability of accessible land, lack of public awareness of the value of goods movement, and the struggle to balance community livability with goods movement needs. These challenges have either stayed consistent or become even more challenging with the increased demand for urban goods movement.



Truck Volumes. Source: Metro Vancouver

Metro Vancouver Analysis

Goods Movement

First Mile Overview

When consumer goods produced abroad arrive in Canada via ports in Metro Vancouver for eventual e-commerce sale, their first stage of transportation is known as the 'first mile'. Only 30% of incoming consumer and manufacturing goods stay within the Metro Vancouver area, and the remaining 70% continue their journey further into Canada. Goods are arriving by sea or by air, and traditionally these goods would be transported to warehouses. E-commerce has decreased the need for intermediate warehousing by utilizing crossdocking, described below.

By Air Vancouver International Airport

YVR has the closest cargo connection to Asia than any other airport along the west coast. This deep connection has developed over 1 million square feet of supportive warehousing on-site (i.e. Cargo Village, Sea Island), meaning that the distance from the airport to the warehouse is minimal.

By Sea Port of Vancouver

To meet consumer expectations of a quick delivery, a low idle time of each package while moving from the port to the warehouse is increasingly important. Sea cargo is increasingly being unloaded and repackaged – a process known as crossdocking. This limits the idle time that goods spend within their original shipping containers. This crossdocking takes place on port lands, or sometimes directly onboard the largest of cargo ships. New ships are built with the capacity to house these crossdocking logistics on board, which is driving the demand for larger and deeper ports, and associated infrastructure and facilities.

Metro Vancouver Analysis
Goods Movement

Middle Mile Overview

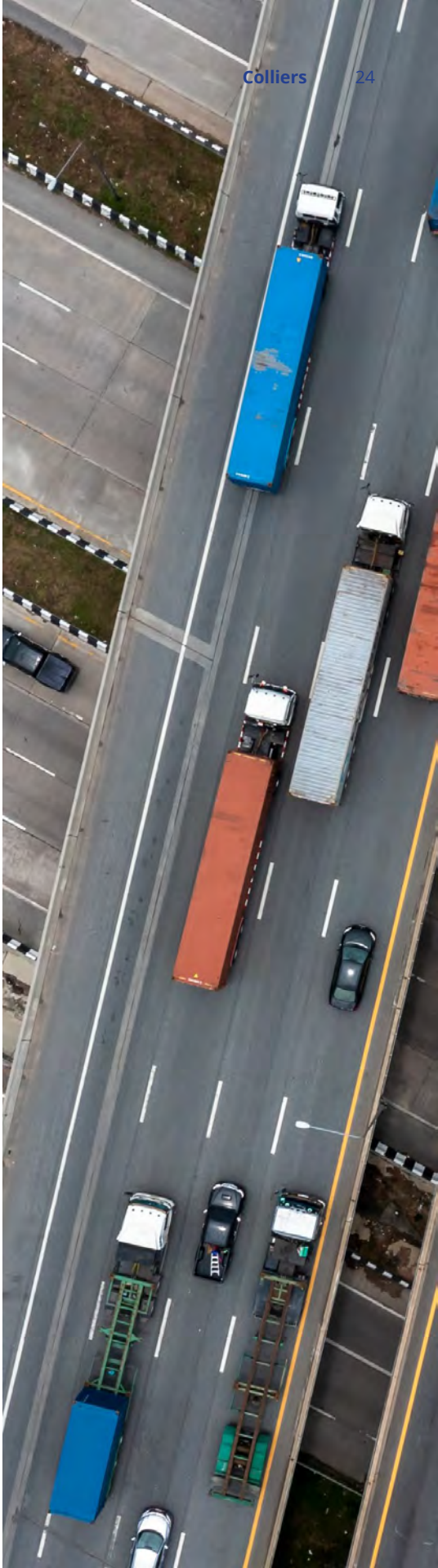
This stage of the transport system generally and traditionally has entailed the movement of goods from a warehouse to a fulfilment centre, distribution centre, or retail store. This leg of the transport system moves the product closer to the end consumer, without directly delivering it to the end customer.

Different Types of Middle Mile

The definition of the middle mile is expanding with the rise of e-commerce and expectations of rapid delivery. The middle mile has evolved in recent years to be more urbanized, with new route options such as from warehouse to micro-hub fulfilment (e.g., dark store) or distribution centre, as well as from one store to another to fulfill "click-and-collect" orders.

Middle Mile Optimization

Methods of optimizing this stage are one of the primary points of distinction between large retailers/distributors (e.g. Amazon, Wal-Mart), and smaller retailers. Larger distributors can efficiently introduce economies of scale at this stage, such as company-owned truck fleets, and reduced cost, resulting in a competitive advantage that is expected to endure.



Metro Vancouver Analysis

Goods Movement

Last Mile Overview

The last mile of logistics is the delivery to the consumer. When ordered online via e-commerce, delivery is typically completed by private, public, or invisible companies. Across the board, goods are being delivered directly to consumers by using public infrastructure like roads and sidewalks.

Private Delivery Amazon, FedEx, etc.

The single stream of deliveries that Amazon has provided to consumers is fueling demand for almost immediate delivery. When delivery routes for private delivery companies will not be profitable, these companies still rely on Canada Post to complete the delivery.

Public Delivery Canada Post

Canada Post is mandated to ensure delivery to all Canadian addresses, which protects the profits of private delivery agencies. The shift from letter mail to parcel delivery driven by e-commerce has forced Canada Post to deliver packages in higher quantities and more frequently.

Invisible Freight Gig Workers

Invisible freight is single-parcel delivery completed in private vehicles or on foot. Gig workers are more precariously employed and insured than their private and public counterparts.

Metro Vancouver Analysis

Goods Movement

First Mile Implications

Municipal infrastructure that is supportive of port and first mile activities is needed to ensure the smooth transition of goods from these terminals to the warehouses.

Middle Mile Implications

As a result of consumer expectations for rapid delivery, significantly more middle mile shipping is occurring with partially filled containers or "less-than-truckload" shipments. This, in turn, is resulting in more trucks not being used to their full potential, and also increasing congestion and GHG emissions.

Last Mile Implications

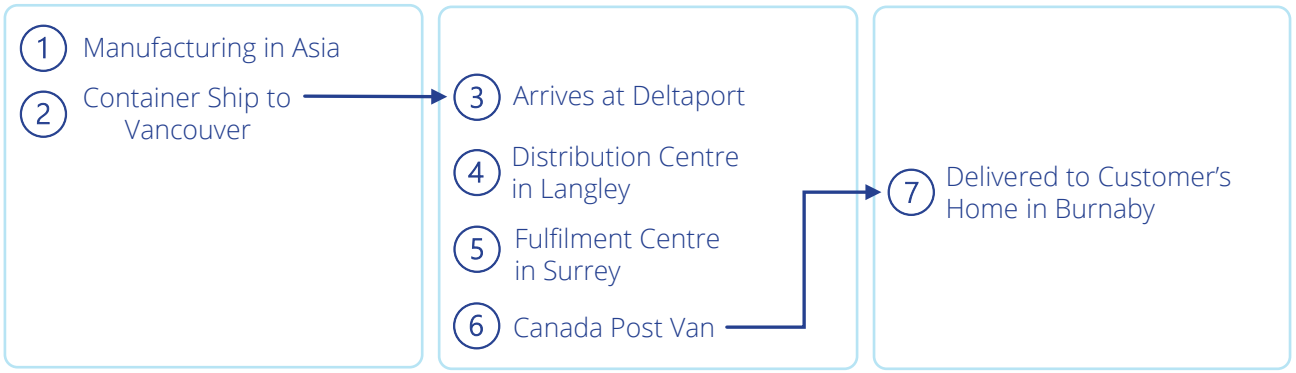
There are notably increasing congestion issues arising due to deliveries occurring in residential areas. Curbside access is in demand by more and more users. The last mile of delivery is occurring on municipal infrastructure (curbs and sidewalks) and competing for this space against several delivery providers, in addition to ride-hailing, and new forms of urban mobility.

The following page illustrates the different pathways that various goods take through Metro Vancouver. These items each have different supply chains and various levels and timing of e-commerce involvement.

Metro Vancouver Analysis

Goods Movement

Electronics



Grocery Click and Collect

Clothing

First Mile | **Middle Mile** | **Last Mile**

Metro Vancouver Analysis

Transport Systems

Fulfilment Centres

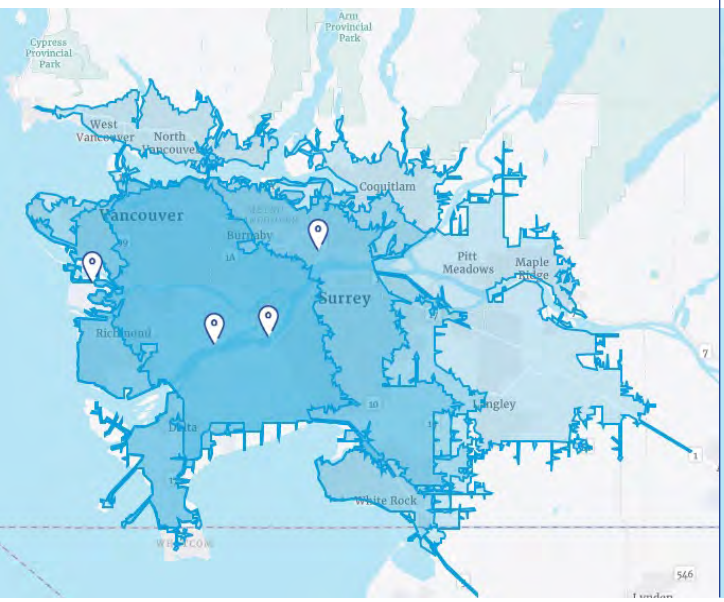
The map below illustrates the area of Metro Vancouver that can be reached within a 60-minute drive of the four-shown fulfilment centres. This timeframe was chosen due to the middle mile of logistics having a longer lead time than the 'just-in-time' delivery required of the final mile.

The majority of Metro Vancouver is covered within a 60-minute drive, meaning that these fulfilment centres can receive goods from the sea and air terminals within 60 minutes, and redistribute the goods to all delivery centres within 60 minutes.

Delivery Centres

Delivery centres ideally operate as close to consumers as possible to minimize delivery times. The map below shows the coverage from major delivery centres to consumers within 30 minutes, as this is the benchmark for on-demand delivery.

Unlike the coverage for fulfilment centres, Metro Vancouver's delivery centres are unable to reach heavily populated areas like Downtown Vancouver or Surrey within a reasonable amount of time.



60-minute Drive Time Radius from Current Select Fulfilment Centres

30-minute Drive Time Radius from Current Select Delivery Centres

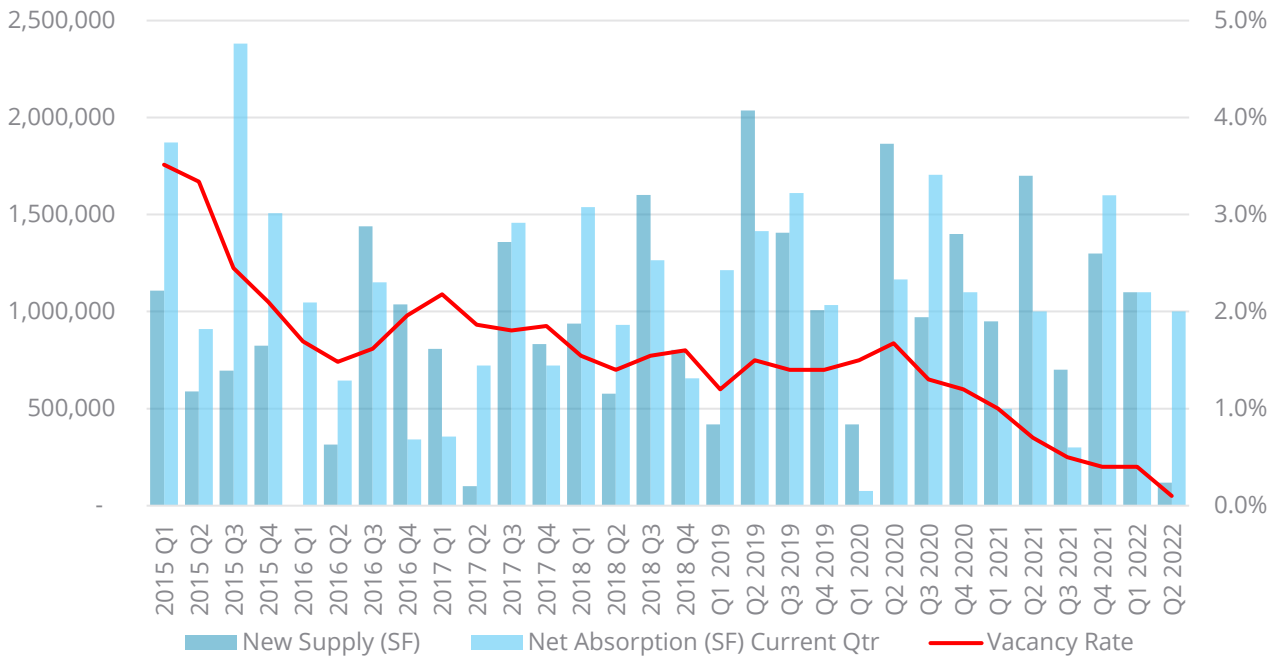
Metro Vancouver Analysis

Industrial Market

The Metro Vancouver industrial market is enduring increasingly low vacancy rates. Supply that has recently become available is often smaller than 25,000 square feet, making it unsuitable for warehousing or distribution needs.

The Metro Vancouver industrial market is one of the most highly sought-after industrial markets in North America, with very limited existing supply, resulting in some of the nation's lowest vacancy rates. Limited available space for new construction to occur is driving the lease and sale rates for existing land up, while also driving the intensification of industrial lands. In certain municipalities, such as Vancouver, Richmond, and Burnaby where there is limited industrial space and high population density, the market conditions are starting to allow for multi-storey industrial buildings to be financially feasible.

Metro Vancouver Industrial Completions, Absorption, and Vacancy
Q1 2015 – Q2 2022



Metro Vancouver Analysis

Industrial Market

The recent rise of e-commerce is significantly impacting the industrial market. This type of product consumption requires much more warehousing space than traditional retail, especially when quick delivery times are promised. This applies pressure to an already strained industrial market in the Metro Vancouver region.

For years retail was a sector that could schedule fulfilment seasonally or monthly depending on the exact type of retail. Orders with manufacturers would be placed months in advance, goods would be shipped in bulk, then sorted and distributed to brick-and-mortar stores. This process generally was two businesses coordinating, or business to business (B2B).

Today, much of the inventory ordering is done directly by consumers (business-to-consumer or B2C), resulting in more sporadic, unpredictable ordering patterns. This complicates the fulfilment step compared to the traditional retail model. Where previously, hypothetically, each shop of a certain brand in a city might receive an identical monthly order to the brick-and-mortar store, with e-commerce, each day different residents are instead ordering a unique shipment request. This requires both more staff and more space to complete fulfilment on industrial lands. Some estimates indicate this requires three to four times more industrial space. In certain cases, the space required for brick-and-mortar retail is reduced.

To mitigate delivery delays, distributors have adapted by storing more products ready-to-ship in distribution and warehouse space, resulting in decreasing vacancies in industrial buildings. When the additional layer of rapid delivery (delivery within a week) is applied, it then becomes additionally crucial to have items available in distribution centres, and to be located within dense urban populations where the consumer demand is located. For suppliers and retailers to remain competitive, they must have a larger selection of products readily available, resulting in additional space requirements. This requires not only more capital costs for the additional inventory, but also for the additional space, something larger, established companies are more capable of than smaller companies. These larger companies are generally seeking spaces over 500,000 square feet to accommodate their fulfilment requirements. When these spaces in urban areas cannot be found, companies are increasingly seeking spaces that offer vertical space (40 to 54 feet ceiling heights) to stack products vertically. This is a trend largely seen in European and Asian markets where industrial space is scarce. Vertical stacking often requires additional automation or mechanical access solutions for fulfilment work, which increases the cost. It is possible that this could increasingly be sought by the market in Metro Vancouver. Currently, there is still a strong preference for fulfilment and distribution operations on the ground floor, at grade.

The recent pandemic and supply chain issues further exasperated the vacancy and space requirement issues in the Metro Vancouver market. While it is somewhat anticipated that supply chain concerns will increasingly be mitigated and managed going forward, the trend to purchase goods online is here to stay, meaning the pressure on industrial land will not let up.

Metro Vancouver Analysis

Industrial Lands

Implications on Space Needs

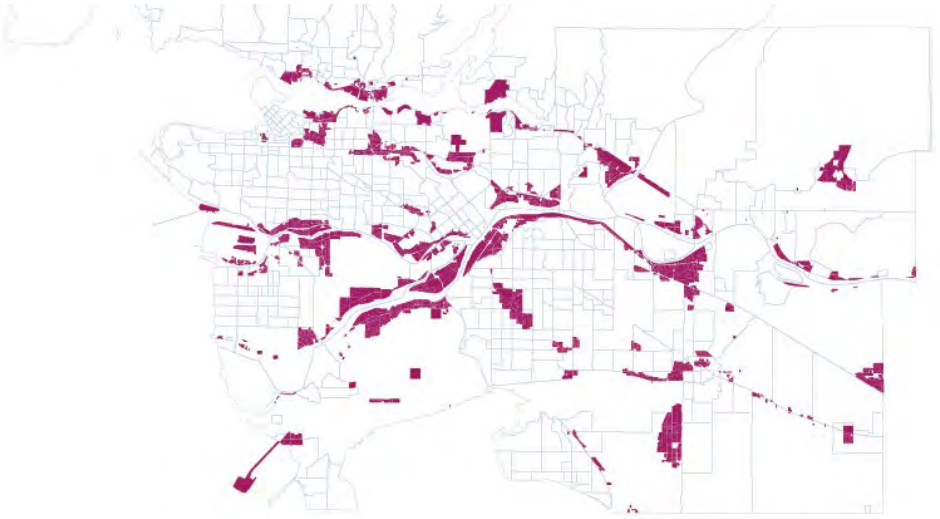
The limited available supply of industrial land in the Metro Vancouver region, record-low vacancy rates for industrial land and warehousing space, and increased rates for both strata sales and leasable space are squeezing the market. As the demand for space in urban areas close to users, customers, and the workforce drive prices up, smaller industrial users who are unable to compete with larger companies are forced to peripheral markets.

Implications on Employment

Employment in industrial jobs is generally higher paying than regional averages and supports vital sectors of a diversified and healthy economy. As some traditional industrial uses are driven further away from the urban core, there is a resulting impact on the labour force as employees are forced to travel further distances to places of employment. Conversely, if there is insufficient industrial land to meet employment demand, jobs may relocate to other markets where there is a more suitable supply of both land and facilities.

Implications on Location

There are industrial nodes spread across Metro Vancouver, however, the limited supply of urban industrial land means there is significant competition for suitable space. For other users that have additional location requirements such as water access, direct rail access, or proximity to complementary industries, there are significant constraints to operating in Metro Vancouver.



Map of Industrial Parcels throughout Metro Vancouver

Metro Vancouver Analysis

Built Forms

In the Vancouver region, the location of industrial parcels determines the final built form. In dense urban areas of Metro Vancouver, smaller building footprints and multi-storey development are occurring as a response to the demand for direct-to-consumer small-scale warehousing. In suburban areas like Richmond or Campbell Heights, the availability of large industrial parcels is driving the development of single-storey warehousing and distribution centres, some with a mezzanine for storage or additional office space.

The building height requirements for large format e-commerce warehousing and distribution centres are increasing due to the taller racking often required to store consumer goods. The higher the racking, the more items that one building can hold, and deliver 'just-in-time' to consumers. Newer industrial buildings in suburban locations are being constructed with ceiling heights upward of 36 ft, whereas older industrial buildings in urban locations can have an existing ceiling height of as low as 12 ft. The redevelopment of older industrial structures can increase the interior capacity and become more marketable to a wider variety of tenants.

Industrial built forms are increasingly including other uses (e.g. office), but this still depends on the location of the site. In urban areas, where the lightest industrial uses are likely to be located, offices and some commercial can be integrated into the development more easily. Separation between land uses are still common in suburban locations where intensification is less sought after by the market.

Parking requirements also differ between urban and suburban locations. In Mount Pleasant, 1 parking space is required per 145m^2 of floor area, while in Campbell Heights, the ratio is 1 parking space per 100m^2. Meeting these parking minimums can be costly in urban locations, while at the same time industrial tenants often require parking for staff, as well as delivery vehicles. The combination of these factors, plus the accessibility to major road networks, often results in a preference for more suburban locations.

Metro Vancouver Analysis

Built Form Trends

One of the biggest changes to occur in warehousing is the evolution of access needs, including more loading bays and ramping options. These changes have emerged with the increase in e-commerce trends. Warehouse, fulfilment, and distribution centres are accessed much more frequently, with trucks picking up and delivering more often, including throughout the night. This facilitates just-in-time delivery as well as reduces warehouse storing needs during times of limited available space. This has traffic and road impacts as well as on loading space needs.

At grade loading is still the preferred method to quickly navigate trucks and vans on site, load or unload them, then allow them to easily continue to their next destination. Increasingly more space is needed to be dedicated to these loading needs, and to accommodate the increase in vehicles completing deliveries. This is most easily done by creating large parking areas, expanding loading bay access points, and facilitating as many vehicles as possible to avoid queues.

When land availability is not able to accommodate the demand for loading by spreading out horizontally, then vertical solutions are increasingly being seen in land constraints regions, such as Hong Kong (e.g. Goodman Interlink Warehouse, bottom left image) and New York City. The ramping requirements to accommodate the loading and truck/van access are costly and are not likely to be realized soon for Metro Vancouver.

Without loading access, upper floor uses that are directly tied to e-commerce are limited to office and administrative uses. It is generally still preferred by distribution and fulfilment businesses in the Lower Mainland to obtain a site more horizontally spacious than vertically spacious, with limited column supports. There are opportunities to stack other commercial, and/or suburban office uses above warehouse uses connected to e-commerce. The warehouse activities tend to have relatively low-impacts on surrounding uses in terms of noise and pollution, allowing opportunities for integration.

Metro Vancouver Analysis
Overall Trends

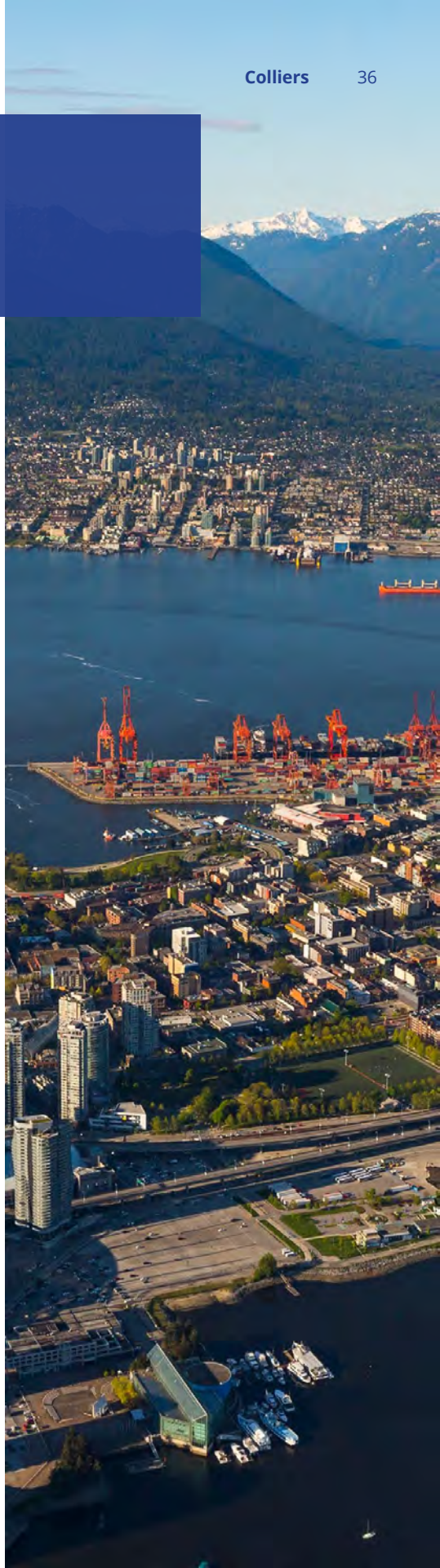
Metro Vancouver is experiencing the negative effects of a strained industrial market and is beginning to encounter urban logistic barriers. Below are some key factors that are contributing to the early various impacts of e-commerce within the market:

- The number of consumer goods entering Metro Vancouver is increasing. This increase is due to the prevalence and ease of e-commerce purchasing, as well as increasing amounts of disposable income.
- The incoming consumer goods are being stored in peripherally located warehouses before being delivered to the final consumer by smaller-scale trucking.
- The challenging market for warehousing space is favouring large distributors that have more capital power to pay higher rents for desirable locations.
- Most congestion and conflict over space occurs on Metro Vancouver streets, especially the curbside that facilitates the last mile delivery.
- Metro Vancouver is a dynamic and diverse region with municipalities that each require unique solutions to mitigate the range of impacts of e-commerce.

Part 3

Stakeholder Engagement

Stakeholder Engagement
Methodology



E-commerce in Metro Vancouver has many different participants and stakeholders. Broadly, this includes property developers, retailers, delivery companies, and municipal planners, amongst others.

Colliers conducted 15 stakeholder engagement sessions ranging from one-on-one conversations to group discussions, to gain an understanding of both broad and region-specific impacts of e-commerce. Interviews were set up between Colliers and the stakeholder(s). Participation by Metro Vancouver Staff was retained for key meetings.

The stakeholders were asked questions geared to their involvement in the e-commerce sector, derived from a general list of questions (available in the appendix of this study). In each meeting, stakeholders were asked to describe how e-commerce has impacted their sector specifically, and what challenges they're currently facing.

Using this broad overview, additional questions were posed to the stakeholders, focusing on main themes including the supply chain, location & logistics, land use requirements, and labour.

The feedback received by stakeholders has been anonymized and compiled into a comprehensive summary, organized by key themes and findings, outlined on the following pages. The key themes and findings uncovered during the stakeholder interviews, in many cases were also identified and supported through other research for the study.

Stakeholder Engagement

Key Themes & Findings

Curb Management

- One of the strongest recommendations from stakeholders has been to expand data on curb and parking inventory in municipalities and begin implementing curbside management strategies to address the increase in demand for sparse curb space. One stakeholder specifically mentioned that it's not necessarily that retail is moving away from brick-and-mortar to online, but rather brick-and-mortar is moving to the curb.

- From a retailer perspective, curb management strategies help to improve the speed and efficiency of deliveries. Time spent finding parking results in lost time and additional costs for delivery companies. As a result, many drivers are willing to illegally or double park to save time, creating safety concerns. Municipalities need to consider this when developing curb management policies.

- If parking and loading policies are not available with easy-to-interpret signage, delivery drivers likely will not follow them.

- E-commerce delivery places significantly more demand on curb space than other newly developed services such as ride-hailing, due to the additional time required for delivery personnel to access the building, and in some cases travel to an upper-level floor of a multi-storey building.

- Curb management has significant political sensitivities (e.g., removing street parking to create loading zones) that result in municipalities delaying the implementation of proactive strategies.

- Supporting better public transit is necessary for improved curb management and congestion concerns. Alleviating the need for private automobile use and ride-hailing services from residents through transit services reduces congestion and car parking needs.

- Going forward, designating loading zones adjacent to (high-density) residential land uses to mitigate parking flow interruptions and double parking should be considered.

- Curb management strategies will need to be location-specific rather than applying a blanket solution. Key areas where deliveries are most frequent should be sites that municipalities focus on initially. Consideration for both parcel delivery and food delivery should be made.

- Enthusiasm over parcel boxes was universal, as it reduces the time required to complete a delivery. This included both parcel boxes in multi-residential buildings and commercial buildings. In addition to reducing curb demand, these boxes have the added benefit of reducing parcel theft.

Stakeholder Engagement

Key Themes & Findings

Data Barriers & Opportunities

- Frequently discussed, to know the accurate impact of e-commerce on Metro Vancouver, a baseline of high-quality, comprehensive data is required. Several stakeholders identified a lack of data collection regarding curb use, traffic data, and potentially sidewalk use data as a barrier to researching e-commerce impacts.
- Data is challenging to collect due to the emerging nature of e-commerce trends. This is exacerbated by the inability of conventional municipal research agencies to access private delivery data.
- With different logistics companies using different delivery tactics, the flow of e-commerce parcels is not tracked at a high level for public or governmental disclosure.
- With improvements in Artificial Intelligence (AI), the ability to collect and analyze data will likely improve, and local governments could then take advantage of the technological advancement when it's both more accessible and cost-effective.
- For the time being, large retailers and e-commerce companies are holding much more data than local governments have access to, which is generally resulting in these companies being able to react and anticipate trends in the market much faster than the local government can.
- An additional barrier to current data collection and analytics is the impact of the pandemic and the uncertainty that virtually anything in terms of patterns and habits that have been tracked over the past two years will continue. There is a lack of confidence in general in the trends that are being forecasted from recent data collection. This is especially impacting traffic patterns and vehicle use data
- Many stakeholders believe that the pandemic has changed labour trends and shopping trends substantially and as such it is not anticipated that these trends will fully revert to pre-pandemic patterns.
- Many stakeholders commented on the fact that the public sector has to address the impact of e-commerce and allocate funding, but their lack of data and informed staff is reducing their ability to do that effectively. As such, it was recommended that the public sector should endeavour to collect more data itself, especially where it concerns curb demand.
- Methods for collecting curb inventory and affiliated demand could likely easily be completed for the region using AI. It was noted by stakeholders experienced in data collection on this topic that much of the current Google street view catalogue for the Metro Vancouver region is up-to-date and as such data collection could be done remotely from a desktop reliably, which would reduce the cost of building the data resources.

Stakeholder Engagement

Key Themes & Findings

Congestion

- Stakeholders across all sectors noted that there were no major concerns about congestion issues related to an increase in delivery vehicles. That said, much of the increase in delivery vehicles has coincided with a decrease in other traffic due to work-from-home practices (an impact of the pandemic) reducing rush-hour traffic and traffic in general.
- Traffic data that has been collected by stakeholders in recent years (during the pandemic) was generally categorized as inaccurate and unreliable to be used for future impact predictions.
- An additional hurdle to congestion data is the inability or the difficulty to distinguish between a standard private automobile and 'invisible freight' gig-delivery workers in their private automobiles.
- It was recommended by some stakeholders that ride-hailing services and their impact on congestion be studied as a comparison.
- It was noted that often e-commerce deliveries, either by invisible freight or traditional delivery van, will make use of the major goods movement corridors, which also serve trucking networks and mass transit networks. As traffic increases, these corridors will see the impacts first and most drastically.
- Industry is trending towards larger vehicles to reduce labour, which may in turn help to reduce congestion as well. However, this trend could require wider roads to maneuver larger trucks and perhaps more designated municipal truck routes.

Stakeholder Engagement

Key Themes & Findings

Zoning Barriers & Opportunities

- Several development stakeholders identified that the prescriptive zoning that Metro Vancouver's municipalities have for industrial land hinders new types of industrial uses. Currently, an inflexible zoning can limit the innovation in uses that can happen within an industrial area. While the regional growth strategy allows member municipalities to make refinements to prohibitive zoning policies, these changes have not been enacted quickly enough to meet demand from the industrial development sector.

- Opportunities for integration of micro-distribution hubs into a variety of developments (commercial, large multi-family residential, and transit-oriented communities) should be explored. Opportunities to run pilot projects should be facilitated with possibilities of permanent integration if proven to be successful. This would generally require temporary-use permit options, and flexible zoning to be explored by the local government.

- There were also opportunities identified for flexibility in traditional brick-and-mortar shops to house multiple stages of the e-commerce supply chain in addition to traditional commerce. This includes the ability to process online returns and simplified in-store pick-up. Municipalities should explore opportunities where certain industrial uses, such as logistics, can be introduced to otherwise commercially-zoned areas, especially where the industrial uses can offer dense employment opportunities and are connected with transit.

- Aligning densification of the future anticipated population growth and opportunities for sustainable distribution methods is a crucial consideration that future zoning policies need to consider at local levels. Several stakeholders noted that the market is interested in more intensive built forms for industrial developments, however, it was suggested that to help facilitate this, external circulation (e.g. balconies, ramping) should not be included in Floor Area Ratio (FAR) to better maximize available space.

- One of the most frequent comments made by local developers, agents, and logistics managers was that the process for rezoning and development permit approvals needs to be accelerated. In several cases it was noted that zoning is not keeping up with new uses coming to market, requiring site-specific rezoning processes to be taken on to accommodate the use, draining time, resources, and money from developers and end users.

Stakeholder Engagement

Key Themes & Findings

Industrial Land Inventory

- The most significant takeaway from discussions with stakeholders in the Metro Vancouver region, is that the location of current distribution centres, logistics centres, and fulfilment centres is almost purely a function of available industrial land, rather than a function of preferred or most functional location.

- Distribution facilities require substantial space dedicated to parking to accommodate the large number of vans needed to fulfill deliveries. This is a significant and unproductive use of valuable industrial land. It was recommended by several stakeholders that methods to reduce the parking footprint should be explored to optimize the use of industrial land.

- To maximize industrial land, consider opportunities, where contextually appropriate, for additional FAR if desired by developers.

- Ceiling heights and opportunities to accommodate ramps need to be explored and methods to accommodate these designs in zoning should be considered to maximize the industrial lands utilization.

- Without compromising neighbourhood vibrancy, local governments could explore where there are opportunities to incorporate delivery-oriented services and other similar light industrial uses, commonly due to the surge in e-commerce, in areas currently and intended for commercial uses.

- In certain cases, where products can be stored long term, the warehousing operations are seeking alternate markets, in some cases Kelowna, yet in most cases to the Calgary region, where industrial land is more readily available and can be secured at much lower rates.

Transportation Infrastructure

- Building on the impact of delivery van parking on industrial lands, the significant employee parking requirements need to be evaluated. Introducing improved transit connections to industrial areas that are accommodating increasingly large employment bases, should be explored.

- Currently, several large companies are providing shuttle services for employees from SkyTrain stations to the warehouses where package fulfilment is occurring, and where delivery drivers are then dispersing to the rest of the region from.

- Mass transit stations were also noted by a range of stakeholders as being excellent locations to introduce micro fulfilment hubs and parcel pick-up locations.

Stakeholder Engagement

Key Themes & Findings

Transportation Infrastructure (cont.)

- Cargo bike adoption also requires specific modifications to the current transportation infrastructure. The current standard bike lane width is generally not wide enough to accommodate cargo bikes (in addition to other modified bikes). Wider lanes and additional buffers are needed for cargo bike delivery to be facilitated.

- One of the primary challenges bicycle delivery and cargo bike delivery couriers face is parking. There often is either a lack of parking options in general for bikes, or a lack of dedicated courier/delivery bike parking which helps improve efficiency during summer months when bike racks fill up.

Safety and Community Vibrancy

- Safety was largely discussed during stakeholder engagement from a traffic lens and from a neighbourhood vibrancy lens.

- From stakeholders experienced in transportation planning, e-commerce delivery results in more vehicles frequently stopping, increasing the chances of rear-ending and other vehicular accidents.

- Risky parking behaviour and rapid driving were also anecdotally mentioned as increasing, which is possibly in turn increasing traffic incidents.

- Another safety impact resulting from the increase in e-commerce is the replacement of standard retail operations with dark stores. While the uptake of dark stores has not yet been significant in the Metro Vancouver region, there was concern regarding the potential impacts including lack of “eyes on the street” and reduced neighbourhood vibrancy.

Stakeholder Engagement

Key Themes & Findings

Sustainability

- Metro Vancouver municipalities should continue to ensure that the policies put forward to address e-commerce impacts are integrated with the sustainability goals of the region. Without mandated sustainability considerations, consumers' desires for quick delivery will be met by the market, and likely continue to increase congestion, GHG emissions and packaging waste.

- Micro hub and small-scale local distribution present the opportunity to complete deliveries by bicycle or cargo bike. While there is enthusiasm and encouragement for these modes of transportation from stakeholders, there are limitations. These included that in many cases electric delivery vans would also have nominal GHG emissions and environmental impacts while being much more capable of higher volume deliveries across larger areas.

- Fast, efficient, cost-effective, and scalable solutions were noted as more likely to require vehicle use and stakeholders noted that, except perhaps for Vancouver's West End, there simply wasn't the population density to offer the economies of scale that make bike delivery feasible long-term.

- Changes in the e-bike and e-cargo bike market may help to improve the viability of these options for delivery modes. The increase in uptake and popularity of cargo bikes during the pandemic has improved the affordability for both acquiring these types of bikes, as well as maintaining them.

- Consolidation of goods, or 'group shipping' intended to be delivered geographically is one of the most effective methods to reduce the GHG emissions from last mile delivery. Rather than a van making several trips during a week to the same street for one item to be delivered each time, consolidation could result in multiple packages all delivered to the street simply on one day, perhaps weekly. This essentially eliminates "within 15 minutes" or next-day delivery promises.

- As noted under the category of transportation infrastructure, the introduction of parcel pick-up hubs at mass transit (SkyTrain) stations was viewed by many stakeholders as one of the most effective in terms of sustainability, with additional benefits of cost and time efficiencies.

- Delivery providers and retailers understand that some consumers, for certain products, are willing to pay more or wait longer for a more sustainable delivery method. While it may be difficult to implement by local government, it was suggested that requiring carbon footprint details regarding delivery would likely influence consumer behaviour and have a positive environmental impact.

Stakeholder Engagement

Key Themes & Findings

Labour

- The recent labour market trends have impacted e-commerce and its adjacent sectors in a range of ways. Stakeholders noted that the most impactful has been the shortage of skilled labour to complete construction and new development of warehouses and fulfilment centres. This is potentially creating a backlog that will outlast labour shortage issues in the region.
- Within the fulfilment and delivery sectors, there are also impacts from the labour shortages, however, more impactful is the high rate of turnover. Some stakeholders noted that this is especially high in the current market where so much competitive hiring is occurring.
- Alternative warehouse designs, implemented mostly internationally, help reduce the amount of walking and carrying workers need to do, helping with labour retention.
- Robotics and automation are also being increasingly introduced to mitigate labour issues. Often automation needs to be accommodated with specific building designs reducing the ability to upgrade existing spaces.
- Outside of automation, e-commerce warehouses typically use 3 times more labour than traditional warehouse uses.
- Where automation is introduced, it is estimated that labour requirements can be reduced by up to 5 times. Automation remains a costly investment mainly available to large distributors.
- In general, e-commerce and shipping tend to be increasingly labour-intensive as products move along the transport system, with the first mile being the least labour-intensive, and the last mile being the most labour-intensive.

Stakeholder Engagement

Engagement Summary

The need to increase data collection and industrial land intensification were key themes vocalized throughout the stakeholder engagement.

The feedback received provides insight that can influence policy, as well as indicate the areas of further research, study, and data collection for municipalities in the Metro Vancouver region.

Across all topics, stakeholders indicated that it is difficult to fully identify enduring trends since much of the recently increased uptake in e-commerce and its impacts are a direct result of the pandemic. Many of the observations are from recent years, during the pandemic, and stakeholders anticipate these to shift. The extent and manner of the shift are unknown.

One very clear takeaway was that data collection capacity, specifically with regards to curb inventory, curb demand, congestion and other traffic impacts, need to first increase to inform future policy changes.

Additionally, the industrial market conditions and the resulting scarcity of available industrial land in the Metro Vancouver region are currently significant factors influencing the location selection of new fulfilment and distribution centres. If market conditions change, or new centrally-located land supply becomes available, distribution centres will likely move closer to dense population bases.

Finally, flexible zoning and temporary uses will allow developers to intensify the industrial lands that are available, as well as allow for pilot projects to occur. This sector is ever-changing and evolving, and the needs and impacts are also changing. Flexibility and open dialogue will allow local governments to anticipate and evolve with the changes tied to e-commerce.

Part 4

Case Studies

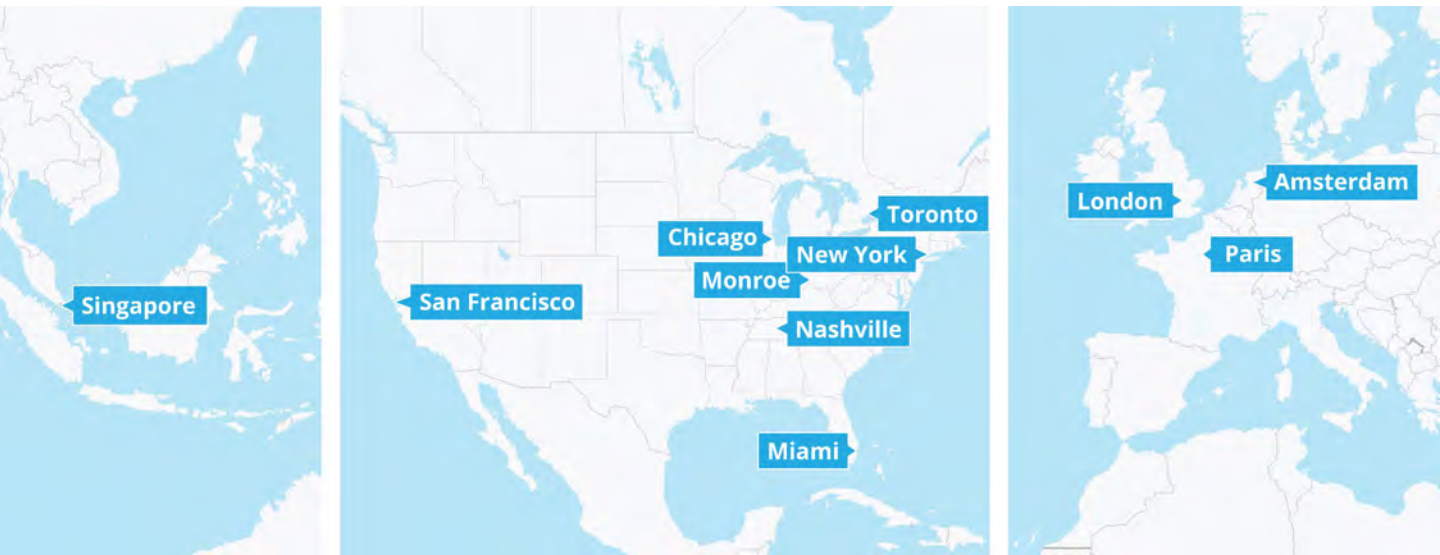
Case Studies
Introduction

Overview

The case studies that were chosen to inform the strategic recommendations for Metro Vancouver were selected based on their variety, ability to identify emerging trends and impacts, and their applicability to issues arising within Metro Vancouver. As the impacts that e-commerce can have on industrial lands and transportation systems are quite broad, there are a wide variety of methods to mitigate negative impacts and maximize the positive impacts.

Some key statistics were analyzed to compare each case study city or region to Metro Vancouver. The daytime population and population density can help inform the number of e-commerce users and the related rate of congestion, while the per capita income can determine whether solutions that increase costs for consumers are viable. Industrial land statistics such as vacancy rates and lease rates can illustrate the condition of the industrial market. Finally, the type of goods serviced illustrates that different categories of goods require different logistics solutions.

In total, 12 case studies were chosen: 6 explore different development formats that can ease the transition into heavier e-commerce reliance, and 6 explore potential policy mechanisms that allow cities to mitigate negative e-commerce impacts.



Location of Selected Case Studies

Dark Store Freeze

Amsterdam, NL

Daytime Population	1,165,898
Population Density	4,908 per km2
Per Capita Income	$41,000 USD (2020)
Industrial Vacancy Rate	1.90% (Q2 2022)
Average Industrial Class A Lease Rate	$6.20 USD per SF (Q2 2022)
Timeline	1 year
Type of Goods Serviced	Grocery

Overview

Dark stores, a new urban logistics phenomenon, store goods that would be traditionally available at retailers. Dark stores differ from standard shops as they are not publicly accessible and rely instead on staff fulfilment of online orders, then direct-to-consumer delivery. Often delivery is completed within 15 minutes of placing the online order.

Dark store customers in the Netherlands increased by 350% within a year from 200,000 in early 2021 to 700,000 in early 2022. These consumers are drawn to ultra-quick delivery and overall convenience.

Strategy

Amsterdam had received many resident complaints that the sudden presence of dark stores. Complaints claimed the stores were disrupting the public realm with increased bike courier congestion and noise. From the city's perspective, stores with covered windows and no public access severely limit the vibrancy of typical retail streets.

To slow the rapid growth and mitigate the negative effects of dark stores, Amsterdam implemented a one-year freeze on all new dark store expansion. Existing stores were still allowed to operate.

Dark Store Freeze

Amsterdam, NL

Key Components

Amsterdam's main concern with dark stores is not with the concept of urban logistics hubs, but with the locations and the impact on the surrounding neighbourhood. Dark stores fit with the zoning constraints of retail or other commercial zones and therefore have been appearing in commercial and mixed-use areas, ideally located as close as possible to their consumers.

The pause implemented on new approvals of dark stores gives the city time to produce regulatory zoning and policies that properly address the new concerns brought up with dark stores. It also allows the City to determine where the best placement of these stores will be. The one-year freeze allows Amsterdam to collect additional data about the traffic pattern implications of dark stores. This data will be collected from the existing stores still allowed to operate. This data sharing can also facilitate collaboration and cooperation between consumers, delivery companies establishing dark stores, and the city.

Results

The public perception of this year-long freeze is positive. Residents see the city as quick responders to an emerging issue. On the other hand, delivery companies utilizing dark stores see this move as hurtful to their business activity and market reach.

Currently, no regulatory or zoning decisions have been made, but the one-year freeze is set to expire in early 2023.

Fulfilment Automation

Monroe, OH

Daytime Population	16,006
Population Density	389.46 per km2
Per Capita Income	$38,000 USD (2020)
Industrial Vacancy Rate	2.3% (Q2 2022)
Average Industrial Class A Lease Rate	$5.14 USD per SF (Q2 2022)
Timeline	Ongoing, 2021 start
Type of Goods Serviced	Grocery

Overview

America's largest grocery retailer, Kroger, announced it will be opening another spoke facility in Central Ohio powered by the Ocado Group. The 61,000-square-foot spoke will work with Kroger's 375,000-square-foot, Ocado-automated customer fulfilment centre (CFC) in Monroe, Ohio. This will serve as a last mile cross-dock site up to 200 miles away from the hub.

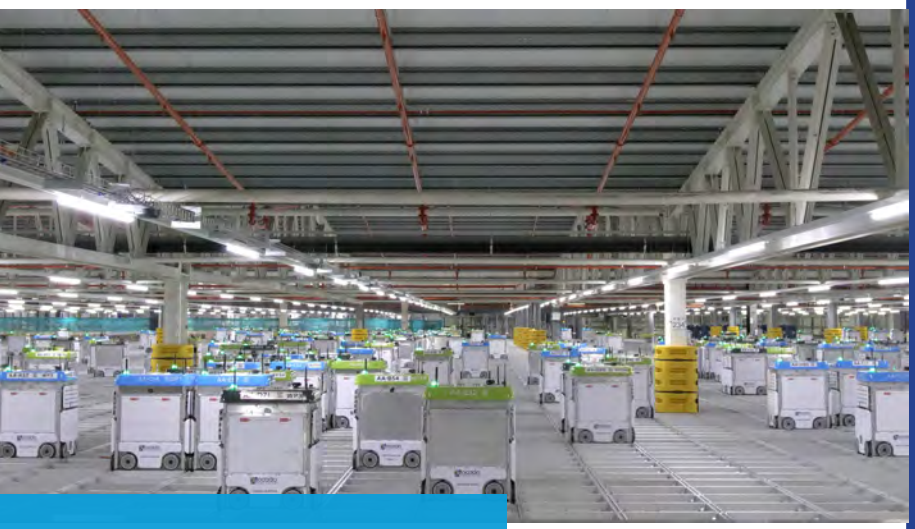
Strategy

The addition of a delivery "spoke" brings innovation and modern e-commerce to the Central Ohio area and will extend the grocer's reach and ability to provide to a far greater consumer market.

Including the new site, Kroger so far has announced nine Ocado spoke facilities with 4 being currently operational. The expansion will further accommodate orders and transportation deliveries through interconnected, automated, and last mile solutions.

Ocado is a UK-based world leader in technology and e-commerce. In 2018, the companies announced a collaboration to establish a delivery network that combines artificial intelligence, advanced robotics, and automation, creating a highly efficient systematic operation for modern-day e-commerce.

Fulfilment Automation



Monroe, OH

Key Components

The delivery network relies on highly automated fulfilment centres, at the "hub" sites. More than 1,000 automated bots navigate around a giant grid system, orchestrated by proprietary air traffic control systems.

The grid, known as “The Hive”, contains bins with products and ready-to-deliver customer orders. The bots retrieve products from The Hive, which are presented at pick stations for items to be sorted for delivery.

The delivery sorting is optimized by software systems that intelligently and efficiently pack. Goods are sorted according to a range of factors. Machine learning algorithms optimize delivery routes, considering factors such as road conditions and optimal fuel efficiency for transport up to 90 miles with orders from the hub and spoke facilities to make deliveries.

Results

This case study exemplifies the merging of advanced technology along with the hub-to-customer fulfilment centre structure. This creates a highly efficient retail goods delivery system.

Urban/Suburban Strategy

London, UK

Daytime Population	10,046,000
Population Density	5,701 per km2
Per Capita Income	$64,234 USD (2020)
Industrial Vacancy Rate	0.9% (Q1 2022)
Average Industrial Class A Lease Rate	$8.83 USD per SF (Q1 2022)
Timeline	1 year
Type of Goods Serviced	Home furnishing products

Overview

Warehousing in London, like Vancouver, is at an all-time low vacancy rate. While not experiencing all the same geographic constraints as Vancouver, planning policy in London prioritizes the intensification of industrial land over sprawl. Additionally, mobility planning trends are often at odds with existing shopping and logistics patterns.

Strategy

IKEA is traditionally a brick-and-mortar store surrounded by parking, often located in suburban areas, and they have struggled in the past with expanding their e-commerce footprint.

IKEA has been interested in shifting its warehousing and retail model to smaller footprint stores to better integrate into downtown cores and densifying suburbs.

Urban/Suburban Strategy

London, UK

Key Components

As a response to the rapid rise in e-commerce that the company was seeing, IKEA is piloting a two-pronged strategy for urban retail service: smaller 'micro-stores' located in downtown London, with the items purchased at those outlets shipped directly to consumers from their traditional suburban retail-warehouse stores.

The suburban stores will be adapted to dedicate more warehouse space to e-commerce order fulfilment and returns. This new warehousing format for IKEA will be highly automated and is projected to be 40% quicker, which meets the temporal expectations of e-commerce consumers.

IKEA is not unique in the challenge of maintaining its core business of brick-and-mortar retail while meeting e-commerce consumer demands, which is now 31% of total international sales.

IKEA has the financial capital to invest 1.3 billion Euros into this pilot project, an ability that most retailers do not have.

Results

This shift in IKEA's retail strategy began in 2022 and is slated to be completed in 2023. The downstream impacts of this large retailer shifting their order fulfilment strategy to meet new consumer trends will allow for smaller retailers to follow in IKEA's footsteps without requiring substantial investment.

Small Solutions

Miami, FL

Daytime Population	250,000
Population Density	7,000 per km2
Per Capita Income	$52,000 USD (2020)
Industrial Vacancy Rate	2.6% (Q1 2022)
Average Industrial Class A Lease Rate	$9.94 USD per SF (Q1 2022)
Timeline	Ongoing, 2021 Start
Type of Goods Serviced	Parcels

Overview

The City of Miami partnered with mobility logistics company Reef Technology to repurpose space in downtown parking lots for “mobile operation units”, or MOUs, such as dark kitchens and urban mobility hubs.

With the additional partnership of shipping company DHL Express, a small fleet of e-cargo bikes was introduced to complete DHL deliveries within a 3-mile radius of Downtown Miami.

Strategy

DHL delivery trucks bring up to nine cargo containers full of parcels to a central Downtown Miami parking lot. A handful of parking spaces have been repurposed to accommodate micro-logistics and distribution.

From here, the cargo is distributed to the cargo bikes. Couriers then set off on delivering routes across the 3-mile radius from Downtown.

In the afternoon, those same cargo containers can be reloaded from their central location in the parking lot Downtown for outbound shipments.

Small Solutions

Miami, FL

Key Components

A combination of demographics, population density, traffic patterns, and good weather made Downtown Miami an ideal pilot project location. A dense, relatively wealthy population has created a critical mass to support this type of small-scale delivery operation.

The topography in Downtown Miami is also relatively flat and easy to bike, alleviating a significant barrier to attracting a workforce. The coverage of bike lanes throughout Miami is concentrated in Downtown and South Beach, allowing preferential access to these cargo bikes instead of frequently congested vehicle lanes. E-cargo bikes in Miami have been found to make deliveries 60% faster than delivery vans, which is a favourable initial finding of the pilot project.

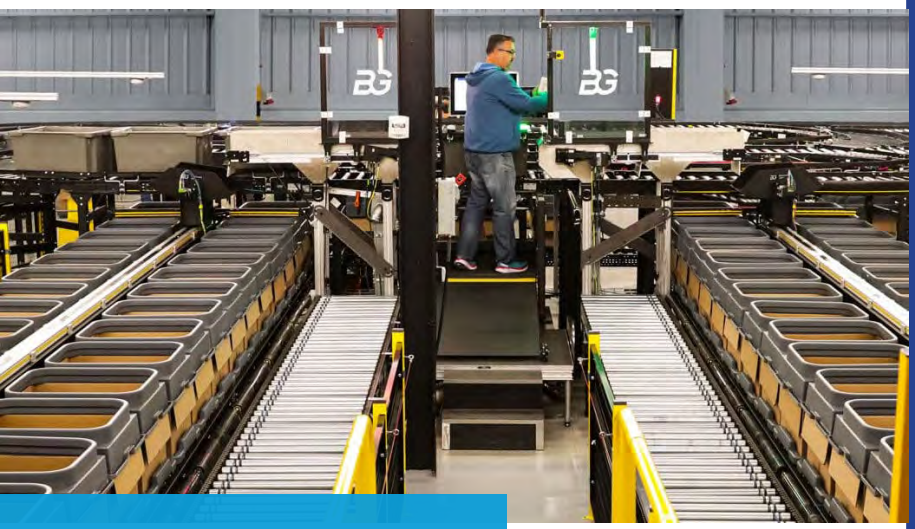
As the pilot was launched in 2021, the long-term effects on delivery patterns, consumer impressions, and GHG emissions have yet to be measured. DHL may expand the pilot within Miami or into other markets, creating a broader database to examine emerging trends.

Results

Within dense population centres with established bike infrastructure, e-cargo bikes can make deliveries 60% faster than vans.

Bikes can use the bike lanes where available or streets if needed, and they have more and easier door-side parking options. This aids in both facilitating delivery speed and efficiency.

Warehouse Automation



Queens, NY

Daytime Population	2,405,464
Population Density	8,542 per km2
Per Capita Income	$33,000 USD (2020)
Industrial Vacancy Rate	2.8% (Q2 2022)
Average Industrial Class A Lease Rate	$29.04 USD per SF (Q2 2022)
Timeline	Ongoing
Type of Goods Serviced	Small Parcels

Overview

Warehouse and fulfilment automation is being increasingly implemented to increase efficiency, safety, and speed. The number of packages moving through these warehouses and fulfilment centres has been increasing due to the accessibility of e-commerce, but also the rise of one-item deliveries which will lead to less consolidated packages. Automation is the next step in managing these small but numerous parcels.

Strategy

Noticing the number of single- or few-item parcels being delivered, FedEx Ground has implemented a Robotic Product Sortation and Identification system to sort small packages only.

A key feature of the robotic technology behind this warehouse is the ability to sort multiple forms of packages, such as boxes, tubes, and plastic bags. Other automated facilities deal with single-manufacturer parcels in uniform containers.

Warehouse Automation

Queens, NY

Key Components

FedEx handles millions of packages each day and has felt the impacts of e-commerce on this package volume. Innovating with robotic sorting at this level of the supply chain means faster consumer delivery across the board.

This automated sorting infrastructure did not require a new warehouse, but there could be downstream land use implications. As automation becomes the norm, the number of employees is likely to decrease. Warehousing is built to current workforce parking requirements and the demand could be significantly lower in the future. The future disused parking lots could be available for industrial densification in the near future.

Results

The initial time and cost savings from the Robotic Product Sorting has led to FedEx expanding its implementation to Ohio and Nevada.

Innovations like this can showcase new automation technology in real-world scenarios, creating an environment that is forward-facing and agile, while operating within an existing industrial building.

Singapore Port

Singapore

Daytime Population	5,453,600
Population Density	7,485 per km2
Per Capita Income	$51,000 CAD (2021)
Industrial Vacancy Rate	9.8% (Q4 2021)
Average Industrial Class A Lease Rate	$209 USD per SF (30-year lease) (Q4 2021)
Timeline	Ongoing
Type of Goods Serviced	Large Consumer Goods

Overview

The Port Authority of Singapore is feeling the impacts of supply chain disruption and increased consumption. A study was conducted to find methods to strengthen linkages amongst related maritime and shipping industries to find solutions to these challenges.

Strategy

The Port of Singapore has published the 2030 Strategic Review, which aims to develop more economically sustainable strategies while meeting the needs of changing global trends. The report specifically looks at cross-sector growth opportunities, mainly in the “carrier-to-marketplace”.

As demand rises for shipping and specifically faster shipping, ports will have to re-evaluate their business models and work more closely with other logistics and shipping companies.

Singapore Port

Singapore

Key Components

The Port of Singapore can expand its use of new technologies through government investment and increased revenue from higher traffic due to e-commerce.

Singapore's support of the port improvements is justified due to the downstream economic benefits that an efficient port can bring to a city. A higher number and quality of jobs, as well as better manufacturer access to markets, is anticipated.

The network of industrial activities connected to Singapore's Port is also a focal point for improvement, with the goal to enhance the link between adjacent industry and the port, as well as locate maritime-related activities in clusters around the port.

New technological innovations will be included as a strategy for port efficiency. Smaller shipping merchants will be able to book their necessary space on larger vessels, increasing the efficiency of each trip. As this practice expands, data will be collected to measure the usefulness of this strategy.

Results

Once expanded, the Port of Singapore will have a capacity of 65,000 TEU (twenty-foot equivalent units) per hectare, compared to the 2,300 TEU per hectare that is currently possible at the Port of Vancouver.

Increased digitization of port activity, as well as easier shipping for smaller e-commerce companies, will absorb that additional capacity and make Singapore a shipping hub.

Logistics Hotels

Paris, FR

Daytime Population	11,155,300
Population Density	20,515 per km2
Per Capita Income	$64,000 CAD (2021)
Industrial Vacancy Rate	6.6% (Q1 2021)
Average Industrial Class A Lease Rate	$60 CAD per SF (Q4 2021)
Timeline	Ongoing, 2013 start
Type of Goods Serviced	Large and Small Parcels

Overview

As the consumer demand for quick delivery increases, heavy vehicle traffic has increased to meet this demand. Cities are facing heightened congestion due to the rise of e-commerce and the need for innovative solutions to minimize the impacts of delivery truck traffic.

Paris has taken the lead by consolidating urban freight into “logistics hotels” that distribute goods more efficiently.

Strategy

The City of Paris has been constructing Logistics Hotels adjacent to railway lines or major highways.

These hotels are purpose-built to house multiple logistics-related uses where goods can be sorted and consolidated.

From the hotels, the goods are delivered to the consumer with smaller electric vehicles.

Logistics Hotels

Paris, FR

Key Components

The City of Paris considers logistic services as "buildings and facilities necessary for public service or collective public interest" rather than simply industrial or commercial.

The zoning of logistics as a public service allows these hubs to be located much closer to the end consumer than traditional warehousing.

Typically, Paris will build these hotels and then rent them to logistic partners at competitive rates and requires delivery firms to provide their own electric vehicles or cyclists.

The logistic partners are involved in the site development process and give the city input on efficient site configurations to meet their specific space needs.

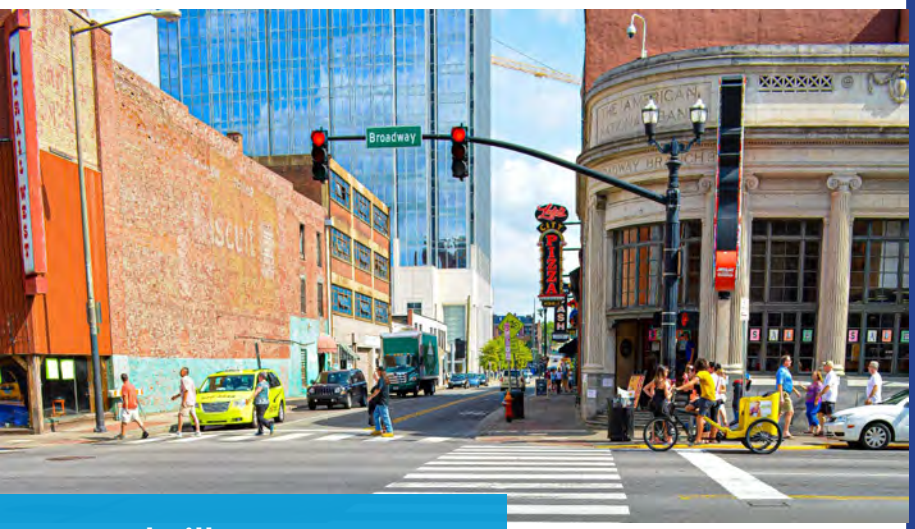
Logistics Hotels are attractive to delivery companies as they offer more efficient and cost-effective solutions. They also reflect the wider industrial need for more flexible zoning that allows for a mix of logistic and e-commerce-related uses within the same building.

Results

Since the introduction of the first hub in 2013, truck emissions related to urban freight have decreased by 50%.

Logistics Hubs are successful because they are blurring the lines between logistics, industrial, commercial, and even public uses with the support of the City.

Smart Zone Pilot



Nashville, TN

Daytime Population	823,400
Population Density	203 per km2
Per Capita Income	$36,000 USD (2020)
Industrial Vacancy Rate	2.8% (Q2 2022)
Average Industrial Class A Lease Rate	$7.37 USD per SF (Q2 2022)
Timeline	Ongoing, 2021 start
Type of Goods Serviced	Small parcels

Overview

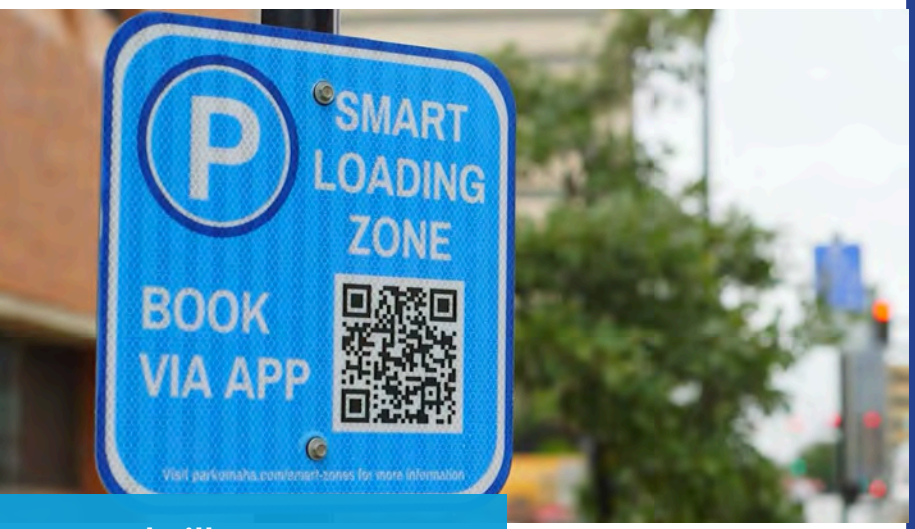
The curbside has emerged as one of the most important spaces for e-commerce logistics, and it is often occupied by competing stakeholders. Pedestrians, storefronts, ride-hailing, and last mile delivery vehicles are all fighting to use the same space simultaneously.

Downtown Nashville is a tourism-driven area where curbside uses are heavily influenced by temporal changes in traffic and users, particularly during restaurant delivery and ride-hailing peak hours.

Strategy

Pebble, formerly Coord, a subsidiary of Sidewalk Labs, is an app-based platform for curb management that improves curbside efficiency through the ability to book loading zone time slots. Pebble has been piloting in many cities throughout the US in 2020 and 2021.

Smart Zone Pilot



Nashville, TN

Key Components

In January 2021, Metro Nashville partnered with Pebble to introduce a Smart Zone to streamline curbside loading. Within this Smart Zone, drivers can locate, hold, book, and pay for loading zones.

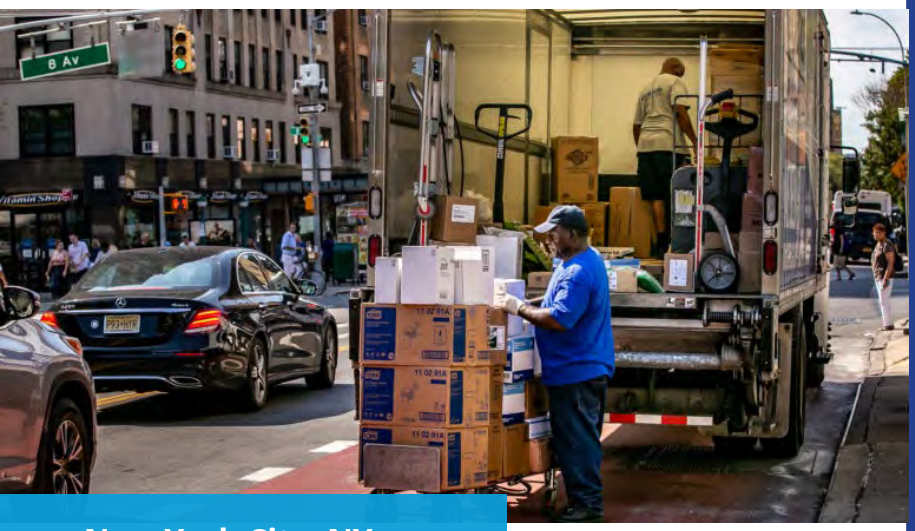
This Smart Zone is targeted at commercial delivery drivers and appeals to them by offering a more efficient unloading experience, and therefore cost savings. To the public, there will be more available curb space for public space animation and pedestrian access.

The Smart Zone booking system is all digital, which allows for a high level of flexibility and available information to be communicated directly to drivers. Metro Nashville has been erecting signage to help guide drivers into the Smart Zones and promote the program.

Results

As of September 2021, the pilot project was expanded to more Smart Zones due to the overwhelmingly positive feedback and driver uptake. This expansion now covers most major commercial arteries in Downtown Nashville.

Smart Truck Policy



New York City, NY

Daytime Population	8,467,513
Population Density	10,429 per km2
Per Capita Income	$88,000 USD (2020)
Industrial Vacancy Rate	3.8% (Q2 2022)
Average Industrial Class A Lease Rate	$23.91 USD per SF (Q2 2022)
Timeline	Ongoing, 2021 start
Type of Goods Serviced	Parcels

Overview

New York City is quickly becoming the city with the highest concentration of warehouses in the US. Every day, 2.4 million e-commerce packages are delivered in the city, all within a city that was not designed to meet these same-day logistics needs.

Warehousing, and its associated truck traffic, has been putting a strain on existing logistics hubs in the area and placing additional stress on the industrial real estate market.

Strategy

The truck traffic coming from new and proposed logistics hubs must go somewhere, and New York City streets are not able to meet the current truck traffic flows that have been intensifying with the rise of e-commerce.

In 2021, 90% of all goods moving through NYC were being transported on a truck, adding to the already high levels of congestion.

Consumer expectations of quick or same-day delivery has concentrated this congestion around last mile logistics hubs.

Smart Truck Policy

New York City, NY

Key Components

In May of 2021, the New York Department of Transportation released the Smart Truck Management Policy which provides guidance to the city's boroughs on how to strengthen their street inventory to accommodate the increased truck flows.

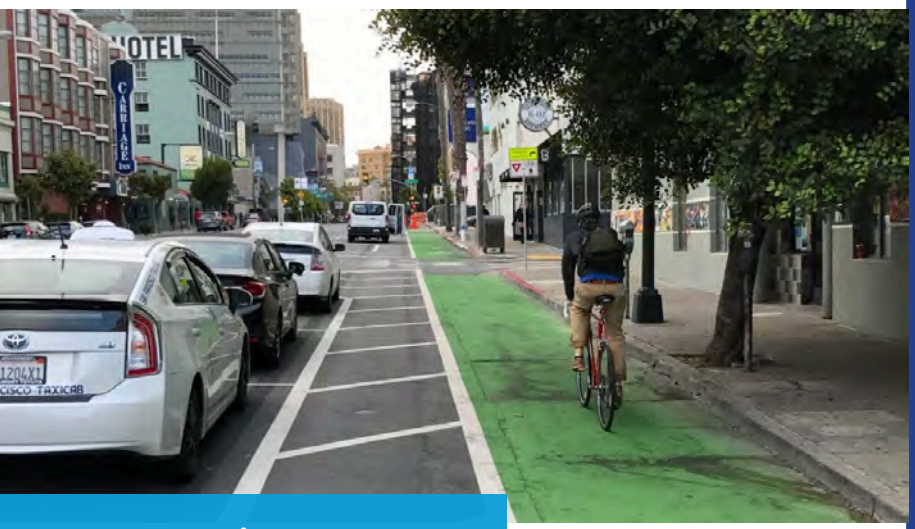
The policy aligns well with NYC's sustainability and public space planning and recognizes that the ability to build new roads to accommodate truck traffic is extremely limited. The policy also recognizes that NYC will require a slow phasing-out of single-occupancy vehicle traffic, which includes a reduction of truck traffic.

The main goal of the policy is to improve the efficiency of how urban freight delivery operates through the existing street network by improving safety, sustainability, and knowledge sharing.

Results

To improve efficiency, the following policies are proposed: promote off-hour deliveries, consolidate urban freight into fewer vehicles, employ delivery lockers for pick-up rather than direct-to-consumer deliveries, improve access to the curb, and increase investment in rail and sea to alleviate the reliance on trucking.

Curb Management



San Francisco, CA

Daytime Population	1,056,300
Population Density	7,307 per km2
Per Capita Income	$72,000 USD (2020)
Industrial Vacancy Rate	3.2% (Q2 2022)
Average Industrial Class A Lease Rate	$1.69 USD per SF (Q2 2022)
Timeline	Ongoing, 2020 start
Type of Goods Serviced	Parcels

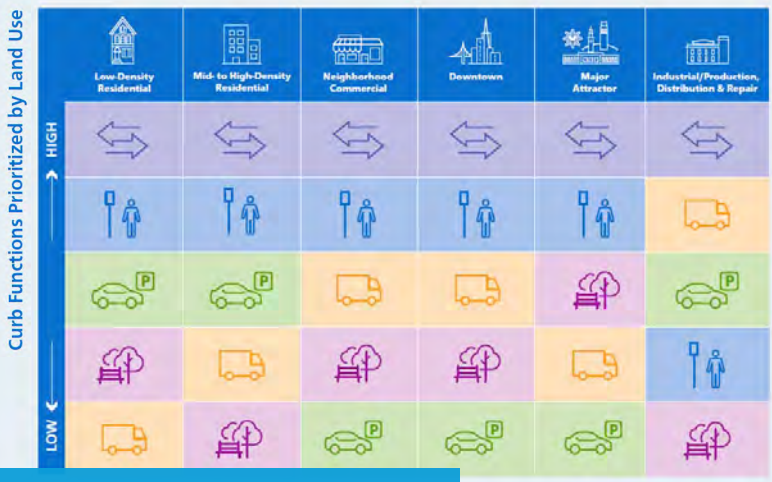
Overview

The City of San Francisco determined that 90% of curb space was allocated to parking, with only 4% for movement, 2% for public space, 2% for loading, and 1% for people loading (eg. bus stops, taxi stands). This was determined to be not only outdated within urban mobility planning but also inefficient. The 2% of space allocated to loading has been increasingly strained with the increase of e-commerce.

Strategy

San Francisco has been monitoring their curbs to determine how they are actually being used, and by whom. The Curb Management Strategy was published in early 2020 but is resilient and forward-facing enough to continue to mitigate the negative effects of e-commerce.

Curb Management



San Francisco, CA

Key Components

The objectives in the strategy respond to the impacts of increased delivery and increased curb demand. It offers methods to prioritize curb functions and space allocations based on land uses, and curb users.

Design and policy guidelines for different loading zone types (passenger only, freight only, multi-use, etc.) including time guidelines, signage, and infrastructure guidelines.

- Flexible loading zone hours and extended loading zone hours
- Loading zone times that are easier to interpret and more legible (eg. "Permitted At All Times except X-X)
- Avoid changes based on days of the week, and keep times consistent across all days
- Introduce flexible pricing mechanisms and technology to address curb space demand
- Conduct an inventory assessment of curb inventory

Results

The framework proposed in the Curb Management Strategy, while relatively new, serves as the basis for better ongoing curb data collection. Any positive impact on congestion is yet to be seen, but initial results show a promising trend.

Curbside Strategy

Toronto, ON

Daytime Population	2,794,356
Population Density	4,427 per km2
Per Capita Income	$62,000 CAD (2020)
Industrial Vacancy Rate	0.7% (Q2 2022)
Average Industrial Class A Lease Rate	$15.24 CAD per SF (Q2 2022)
Timeline	5 years
Type of Goods Serviced	Parcels

Overview

In 2017, the City of Toronto began the process to implement a curbside management policy to ease congestion and competition for curbs, with the end goal of providing curbside spaces that promote economic activity.

Street and curbside functions were prioritized for different street typologies, ranging from surface transit priority corridors with streetcars and rapid buses to mixed-use main streets with different peak and off-peak periods.

Strategy

Five different curbside functions were identified – movement, access for business, access for people, parking, and activation.

Access for business was most important to the function of mixed-use streets that were not the main street, which require access all-day for residents and businesses. Like the City of Vancouver, many of these mixed-use areas have rear laneways that can be utilized for deliveries, which is a potential strategy that was identified.

Curbside Strategy

Toronto, ON

Key Components

The implementation plan for the strategy looked 5 years into the future and set out different goals and studies to start within that timeframe.

Highlighting the 'quick wins' that can come from this strategy makes the policy attractive to stakeholders and residents who experience curbside use conflicts.

The process began with a study of the downtown to assess the needs of different users. An implementation plan was set out in 2017, but no published strategy is available yet.

The ubiquity of e-commerce had not yet happened, and this has brought a need for an even more flexible and resilient curb management policy in Toronto.

Results

For Metro Vancouver, this illustrates the challenges of managing such an important piece of infrastructure while its use is in flux.

Delivery Congestion

Chicago, IL

Daytime Population	2,816,450
Population Density	4,633 per km2
Per Capita Income	$39,000 USD (2020)
Industrial Vacancy Rate	4.4% (Q2 2022)
Average Industrial Class A Lease Rate	$6.81 USD per SF (Q2 2022)
Timeline	Ongoing
Type of Goods Serviced	Parcels

Overview

Chicago, like many cities, began experiencing a surge in e-commerce which led to faster more frequent deliveries, and unfortunately more traffic congestion. To grasp the full extent of the congestion and related impacts, City of Chicago traffic data showing general road traffic, was combined with data collected from UPS delivery vehicles. This eventually showed where and how congestion was forming, and its connection to parcel delivery.

Strategy

Analysis was conducted on a known congested area of Chicago, studying the UPS vehicle data in the area to understand routes, delivery performance, and general congestion impact. By merging traffic data and delivery activities, the pilot project demonstrated opportunities for efficient, cost-effective, and congestion-reducing road-sharing for both delivery carriers, and everyday users.

Delivery Congestion

Chicago, IL

Key Components

The study identified UPS delivery stops and assessed the impact on road congestion – which it generally found to be nominal but suggested a larger area and longer study period (versus the one-month study) would better establish a correlation between deliveries and road congestion.

The median stop duration for UPS delivery was found to be 162 seconds. The median number of packages delivered per stop was 2. This is equivalent to a median package delivery rate (number of packages delivered per minute of stop duration) to be 0.8 minutes.

Locations where there were higher rates of stopping for delivery and a greater number of packages delivered per stop were generally found to be along commercial or mixed-use corridors.

Across most routes, the longest stops to deliver occurred between 10 am and 11 am and in general drivers tended to deliver between 10 am and 3 pm.

Results

The study recommended merging specific delivery data with traffic congestion data to optimize road-sharing techniques and produce more efficient policy recommendations. It was found that commercial and mixed-use corridors and streets had conditions that resulted in longer delivery times, compared to exclusively residential areas.

Case Studies
Lessons

The Importance of Data Collection

Understanding of the impacts of e-commerce cannot take place without first measuring the current pattern of urban goods movement.

The first step in many of these case studies was to create a baseline of usage data that was built upon comprehensive data collected about real-world conditions. Once this is established, then policies can be developed, and the impacts can be measured.

The most common public spaces that require a higher granularity of collected data are the roadway and the sidewalk. Congestion data in Chicago was correlated with delivery data to begin to measure the impacts of e-commerce. In San Francisco, sidewalk users were categorized by time and type to discover that curbs were not being used efficiently for people or goods movement. The initial stage of both case studies was to gain an understanding of the goods movement network through data collection.

In a case like Nashville, the pilot program can also act as the method of data collection. The Smart Zones for loading can mitigate curb congestion while also collecting demand data. Similarly, the Singapore Port will be allowing smaller shipping companies to book space on cargo ships while collecting data on the demand and type of emerging shipping companies.

The Importance of Location

The location of logistics activities was once driven by municipal policy only, but new innovations, and thus location opportunities, are now being led by e-commerce companies.

With higher consumer demand for quick delivery, final mile delivery companies are pushing to be located as close to their consumers as possible. These innovations are trying to fit into more urban locations, through shipping containers in parking lots, dark stores, or logistics hotels located closer to consumers than traditional industrial spaces.

Middle mile logistics activities like fulfilment centres and maritime-supportive warehousing perform best when clustered together. Singapore Port's strategy to achieve maximum efficiency is for warehousing to be clustered together for easier cargo transfers and less reliance on inter-warehouse trucking.

Due to the high demand for urban industrial spaces, some companies are choosing to split their supply chain operations into different locations throughout the city, like Ikea's move to smaller retail locations within cities and maintaining their suburban stores as a form of fulfilment centres.

Case Studies
Lessons

Flexibility Promotes Innovation

The more flexible the zoning, the more resilient the city can be when mitigating and absorbing emerging trends.

The negative effects of e-commerce can arise when there is a disparity between the uses permitted by the city and the uses that are desired by the private market users.

Within the example of dark store expansion needing to be stopped, the public wanted to maintain the allowable uses of their neighbourhoods but the intense market demand for 15-minute delivery was driving dark stores into these neighbourhoods. By acting fast, Amsterdam can take time to formulate the best solution to either mitigate the impacts or reconsider the rigidity of the allowable uses.

There is a wide variety of activities that are affected by e-commerce, but the allowable uses of mixed-use spaces close to consumers often do not include logistics activities. In the example of the Logistics Hotels, Paris determined that urban goods movement is within the public interest and therefore a public good, allowing it to be located within many non-industrial zones.

Flexible and resilient urban spaces can be created in more ways than just zoning. Pilot programming with data collection can be utilized to create ongoing monitoring of new programs and give immediate assessments of success.

Supporting Existing Infrastructure

Cities are already a network of goods movement pathways that require more support to manage e-commerce impacts.

The majority of urban goods are transported on municipal roadways and delivered on municipal curbs. These publicly-managed assets facilitate the quick and efficient delivery that consumers have grown accustomed to. Since these spaces are public, there is growing concern regarding the conflict over space that has been arising with increased e-commerce delivery.

Roadway congestion has increased with a higher number of delivery vehicles entering urban areas to reach residents. Smart Trucking Policies like New York's have the goal of minimizing congestion caused by deliveries by encouraging off-peak deliveries and promoting the consolidation of shipments into the same truck.

Roads can be used to their maximum efficiency when combined with user-based technology, such as the booking system in Nashville's Smart Zones.

Sidewalks, where the deliveries are unloaded from trucks and delivered to consumers, are public spaces to be used by all. The fight for better delivery access to the curb to minimize congestion is included in curbside management programs in San Francisco and Toronto.

Case Studies
Lessons

Changes to Employment Patterns

The rise of e-commerce has produced direct and indirect impacts on employment trends.

A significant amount of e-commerce activity is taking place at the final mile delivery stage in the supply chain, and this is where most gig worker jobs are concentrated. These gigs are precarious and are far less stable than retail jobs which are declining in number. These gig jobs are disproportionately affected by market trends, as seen in the Amsterdam dark stores example of rapid growth.

Warehouse and fulfilment centre automation is a large and growing disruptor to the current employment patterns. As these warehouse-type jobs need to be progressively faster and more accurate, the reliance on automation in new warehouses and fulfilment centres is increasing. As seen in the case studies, automation is occurring at both the origin of goods, like the fulfilment centre in Ohio, and the logistics sorting facility in New York.

Built Form Opportunities

The high demand for logistics and distribution hub space in urban sites presents opportunities for innovative built forms.

Reducing last mile delivery time is highly desirable by the e-commerce sector, as this final leg of the journey is generally the costliest. Locating near urban centres allows for costs to be reduced or reallocated. This presents opportunities for investments to be made in innovative built form design and for community amenities to be incorporated into warehouse designs.

The Parisian Logistics Hotel model is an example of integrating low-impact warehouse industrial uses with adjacent residential uses. Additionally, the incorporation of public neighbourhood amenities such as soccer fields on roofs has also been proven to be possible, facilitating a more seamless integration of warehouse uses within the mixed-use neighbourhood.

Municipalities in Metro Vancouver can learn from this and identify specific lands that could host similar built forms and creative logistics solutions. Exploring the creation of innovative industrial zoning areas where built forms meet the needs of both employment lands and public amenities.

Part 5

Conclusions

Conclusions
Approach

Why does e-commerce matter to Metro Vancouver?

E-commerce is a quickly growing sector of retail, increasingly capturing a larger portion of Canadian spending. Additionally, e-commerce is closely tied to emerging technology and is quickly evolving to become more efficient in various ways. In general, the e-commerce and industrial sectors are advancing quickly, while governments have been slower to make changes. The strategies that have been implemented have virtually all been delayed and reactionary, rather than proactive.

Going forward, municipalities in Metro Vancouver would benefit from broadly considering the impacts of e-commerce when developing zoning and traffic-related policies. Additionally, combining the efforts of businesses and public sectors to develop more comprehensive policies is crucial to ensuring the policies attempting to mitigate the negative impacts of e-commerce are effective. The world of e-commerce is eager to try new pilot projects and implement new ways of doing things, and municipalities in the region can take advantage of this.

Municipalities can possibly anticipate the demand for e-commerce and rapid delivery to remain and steadily grow. Taking steps to begin monitoring the growth and uptake of e-commerce, as well as the ever-changing impacts that e-commerce has on the region, is crucial and should be considered imminently. Recognizing and understanding the priorities for this sector allows municipalities to begin implementing adequate policies in response.

The following pages outline three distinct strategic steps that Metro Vancouver municipalities could take to ensure a proactive stance against the negative impacts of e-commerce and migrate away from the reactionary changes made (or not made) so far.

Conclusions

Strategic Recommendations

1 Expand traffic data collection efforts to better cover curb and sidewalk use.

Increased curb demand and sidewalk congestion from additional vehicles and people using these spaces are some of the most significant impacts that cities are facing as a result of e-commerce. Understanding the extent of the increase in use and changes in demand requires significant data collection efforts. Municipalities in the region, Metro Vancouver, and TransLink, need to implement improved and expanded monitoring efforts to observe changes in these areas as soon as possible.

The sooner this is done, the sooner trend changes can be identified and the exact extent of changes in both general use and demand for curb space can be known. This is currently unknown for most municipalities. There is no doubt that data collection and storage are costly; however, the data collected would also be significant in improving other aspects of urban life. This information can also go towards informing policy developments that could improve safety, reduce illegal parking, or help develop strategies to implement more sustainable transportation modes.

Once more granular data is available, it will be easier to make small adjustments to zoning and policies. Revisiting policy and zoning on a more frequent basis can create resilience toward rapidly evolving movement patterns.

Potential Outcome:

Implementing additional data collection efforts could help inform future policy making. Specifically, applying the information gathered to inform curb demand management strategies at municipal levels will be crucial to mitigating some of the most significant impacts currently occurring due to the rise of e-commerce.

Conclusions

Strategic Recommendations

2 Incorporate flexibility into industrial zoning.

The supply of industrial land within Metro Vancouver does not have the capacity to mitigate the impacts and meet the growing need for space, driven by the rise of e-commerce. The current stock of industrial land needs to be intensified or expanded to grow the resilience of the supply. The first step to improving the resilience of industrial land is to identify the most restrictive characteristics of zoning, while still maintaining the primary use of the lands. Some improvements to restrictive zoning characteristics include:

i. Broadening the allowable uses, specifically additional uses that reflect the modern, creative, and fast-changing solutions to fulfilling distribution;
ii. Reconsidering FAR restrictions, recognizing opportunities to intensify industrial uses and leveraging them when they arise; and
iii. Allowing temporary uses, creating opportunities for pilot programs to operate so that local government can study and learn from a continuously evolving industry.

Revisiting applicable zoning and policies on an ongoing basis, especially regarding an emerging trend like e-commerce, increases the resilience of any planning policy.

Potential Outcome:

Flexible zoning that continues to protect the primary intent of industrial zoning, could provide the opportunity for local government to work with industry and evolve together. Large retailers and distributors have significant market influence and buying power. Finding ways to work with them to intensify industrial land uses, and/or implement alternative distribution strategies, could help.

Conclusions

Strategic Recommendations

3 Reimagine retail and commercial zoning.

Delivery fulfilment tasks are anticipated to increasingly be completed within retail stores, restaurants and other commercial spaces, changing the interaction these sites have with adjacent areas. This shift can increase curb demand on streets and in rear lanes and can reduce neighbourhood vibrancy with less foot traffic and fewer sightlines between shops/restaurants and the street. At the same time, centrally located distribution hubs that can result from partially repurposing commercial spaces for distribution uses are opportunities for low-emission last mile delivery fulfilment.

Municipalities should anticipate the possibility of these changes occurring and adjust their commercial business and land use approvals processes accordingly.

i. Impact studies should be conducted during business licences and/or rezoning application reviews to evaluate the traffic impacts and specifically evaluate the evolving curb demand needs.
ii. Consider limiting business licence approvals for businesses that operate exclusively as dark stores to mitigate negative impacts on vibrancy.

Potential Outcome:

There will be potential GHG emission reductions and improved facilitation of urban delivery by bikes or low-emission vehicles from distribution operations on sites zoned for commercial or retail use. The shift from prioritization of longer trip and vehicle-based delivery can maintain and ensure vibrant main streets and urban centres.

Part 6

Appendix

Appendix

Stakeholder Engagement Questions

The following questions were shared with participants ahead of stakeholder meetings and were used to guide the conversation with stakeholders. Additional questions were posed to address specific topics as appropriate during the conversations.

Colliers would like to extend a thank-you to the many stakeholders that took the time to meet and discuss their perspectives, share their knowledge, and provide insight as well as potential solutions to rising concerns.

- Acuere Consulting
- Amazon
- Canada Post
- City of Richmond
- City of Vancouver
- Colliers Brokerage
- Exotec
- GWL Realty Advisors
- HUB Cycling
- Port of Vancouver
- Simon Fraser University
- TransLink
- UDI
- University of British Columbia

Appendix

Stakeholder Engagement Questions

- How has the growth of e-commerce impacted your sector?
- What are the challenges your sector is facing as a result of this growth?
- What policy changes could Metro Vancouver or municipalities make to help address these challenges?
- Where do you see the future of the sector going?
- How are the goods coming into the region? (Air, sea, truck, rail)? Any noticeable trends in proportions?
- What proportion of the goods that you handle are destined for Metro Vancouver sale / consumption vs elsewhere?
- Where are they going in Metro Vancouver? Final destination -- retail store, e-commerce home delivery, or warehousing?
- How are the goods being transported, for the different parts of the trip? Any emerging trends?
- Any indication of how long goods are being stored before reaching their final destination?
- What factors do you consider in selecting a location (for distribution/warehouse/pick-up hub)?
- What road utilization changes have you seen? How does road congestion impact your operations?
- Typical timeline for goods to be delivered or warehoused? Increasing, decreasing, stable?
- Any anticipated changes in requirements for storing, handling, and transporting goods? Ex. drone deliveries, autonomous deliveries?
- What are the challenges your group faces with regards to last mile delivery?
- What are the challenges around parking/curb access, for both pick-ups and deliveries?
- What aspects of your business' transportation needs can be completed on a smaller vehicle or bike?
- Are there specific changes to parking or transportation networks to facilitate smaller vehicle, scooter or cargo bike use?
- What is the ideal accommodations / facilities for your business, in terms of location, size, access, design, etc? What are the greatest challenges in terms of acquiring these accommodations?

Appendix

Stakeholder Engagement Questions

- Could your facility be accommodated on the second floor of an urban industrial building, accessed by a freight elevator or ramp?
- Have you observed any buildings being converted to better suit e-commerce trends?
- Are there land-use restrictions that are limiting your operations from locating in more suitable locations?
- What are some prevailing trends in the design of warehousing / distribution facilities? Is conversion of retail units to distribution units a consideration? If so, what aspects of e-commerce distribution are best suited to or can be accommodated by such conversion?
- What are some prevailing trends in the location of warehousing / distribution facilities? How have employment patterns been impacted?
- What type of labour are you seeking that you are unable to attain?
- What is the biggest challenge associated with finding suitable labour to meet demand? Cost? Location? Skillset?
- Has the number of employees working in your facilities changed?
- Are you able to estimate approximately how many employees there are per 1000 sq ft of building floor space?
- What impacts are real estate market trends (low vacancy, high construction costs, high lease rates) having on your sector? Recent trends or changes?
- What policy municipal changes or measures have been taken in response to the growth of e-commerce? What are the anticipated responses? How is e-commerce shaping municipality's planning decisions?
- In your opinion, how can government policies better accommodate the e-commerce sector?

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