Innovation in Freight Transportation: Sidewalk Toronto

Smart Freight Symposium | November 4, 2019 | Sandra Rothbard

Briefing
Overview

1 The Problem

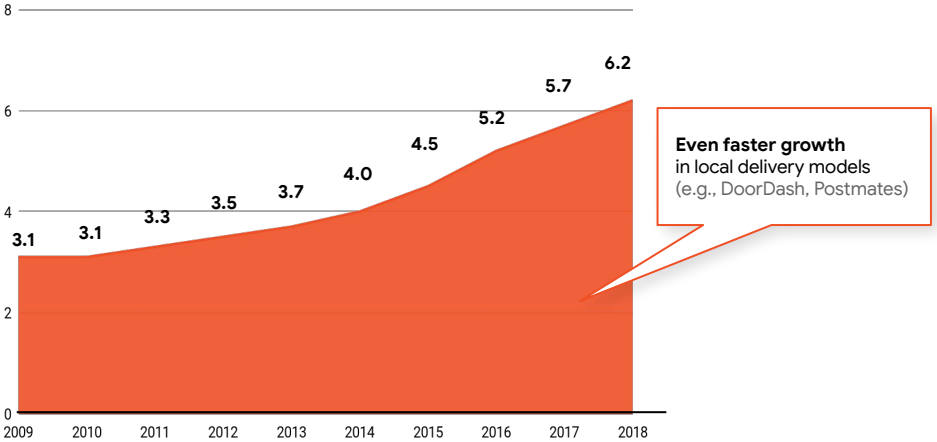
2 Solutions: Freight Innovation

3 Quayside Vision

SIDEWALK LABS

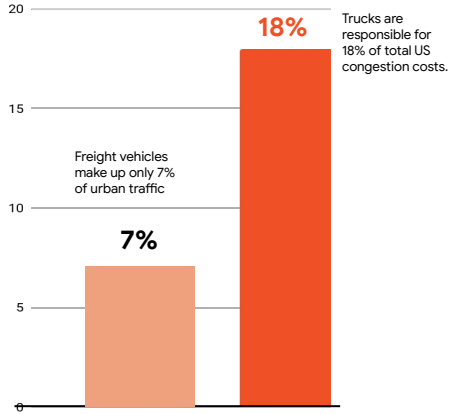
E-commerce has led to an explosion of deliveries — and increased the challenge of urban truck congestion

USPS Shipping & Package Volume Increase
(per year, in billions)



Source: https://facts.usps.com/table-facts/

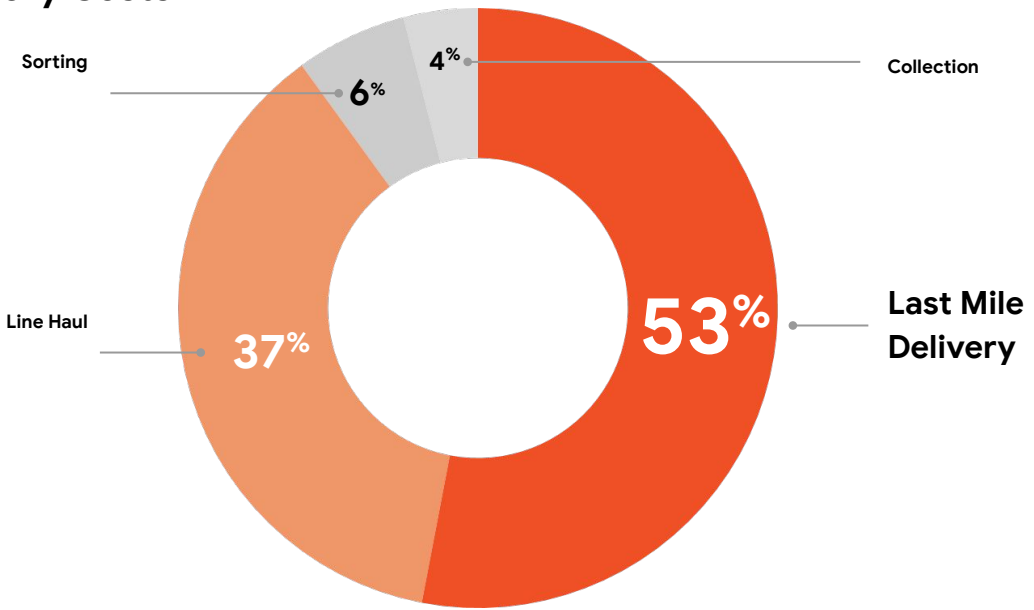
Trucks are responsible for disproportionate congestion cost



Source: TAMU's 2015 urban mobility scorecard

The last mile is known to be the biggest problem of the freight system

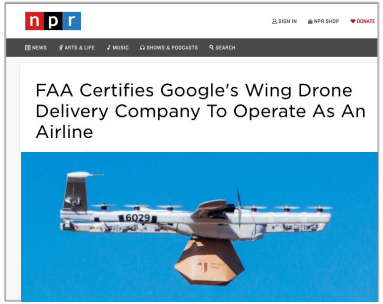
Share of Delivery Costs

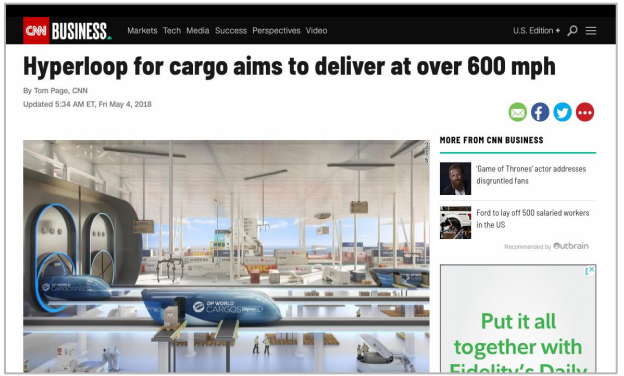


Source: Honeywell & BI Intelligence

The Problem
Inefficiencies and Pain Points

Recognition of the needs and problems of freight has sparked lots of investment





1 The Problem

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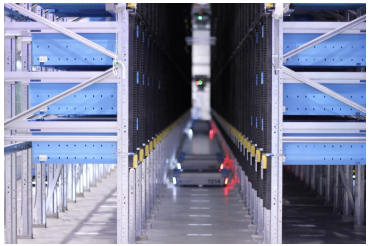
Consolidation & Fulfillment

Urban Consolidation Centers

Regent Street (England)
SimplyCite (France)
BinnenStadService (Netherlands)



Automated Warehousing

Autostore
Fabric
TakeOff

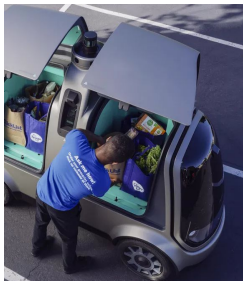
Delivery Container

Shipping Container

Multimodal
City Container

Fulfillment Tote

Transport



Delivery AV

Delivery Robot

Drone

Cargo Bike

Underground Train

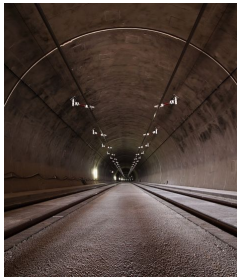
Right of Way

Bike Lane

Truck Lane

Cargotram

Covered Walkway

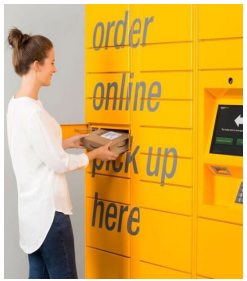


Tunnel

Final Hand Off

Delivery Robot

Automated Kiosk



Self-Service Lockers

Porch Drop Off

Micro Hub Pickup

SIDEWALK LABS

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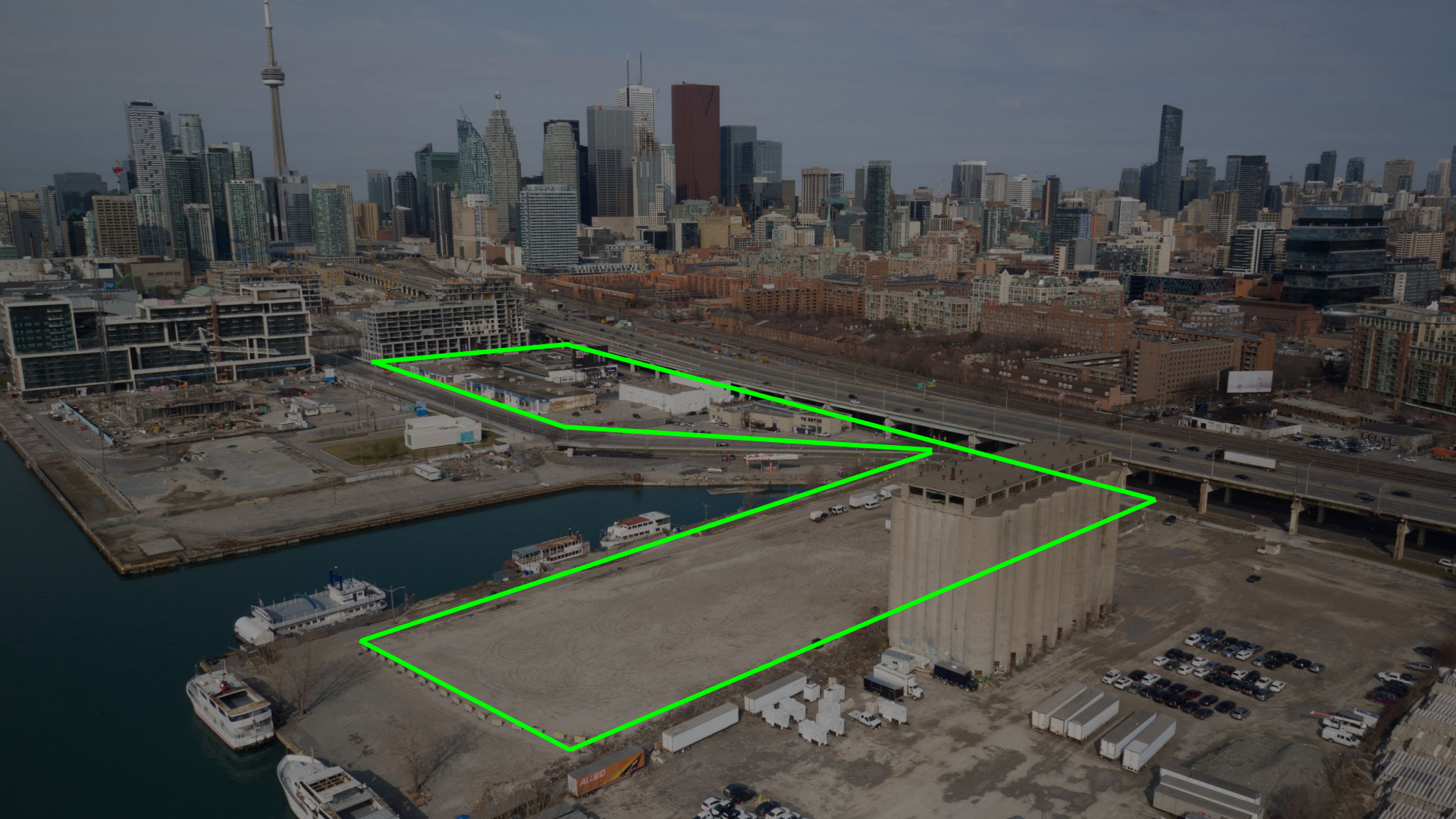
Waterfront Toronto 2017 RFP

Seeking an Innovation and Funding Partner that shares our aspirations and will help create and fund a globally-significant community that will showcase advanced technologies, building materials, sustainable practices and innovative business models that demonstrate pragmatic solutions toward climate positive urban development


QUAYSIDE
DESIGNATED WATERFRONT AREA


ALLIED

Draft Site Plan

30 Storeys (Tallest Building)

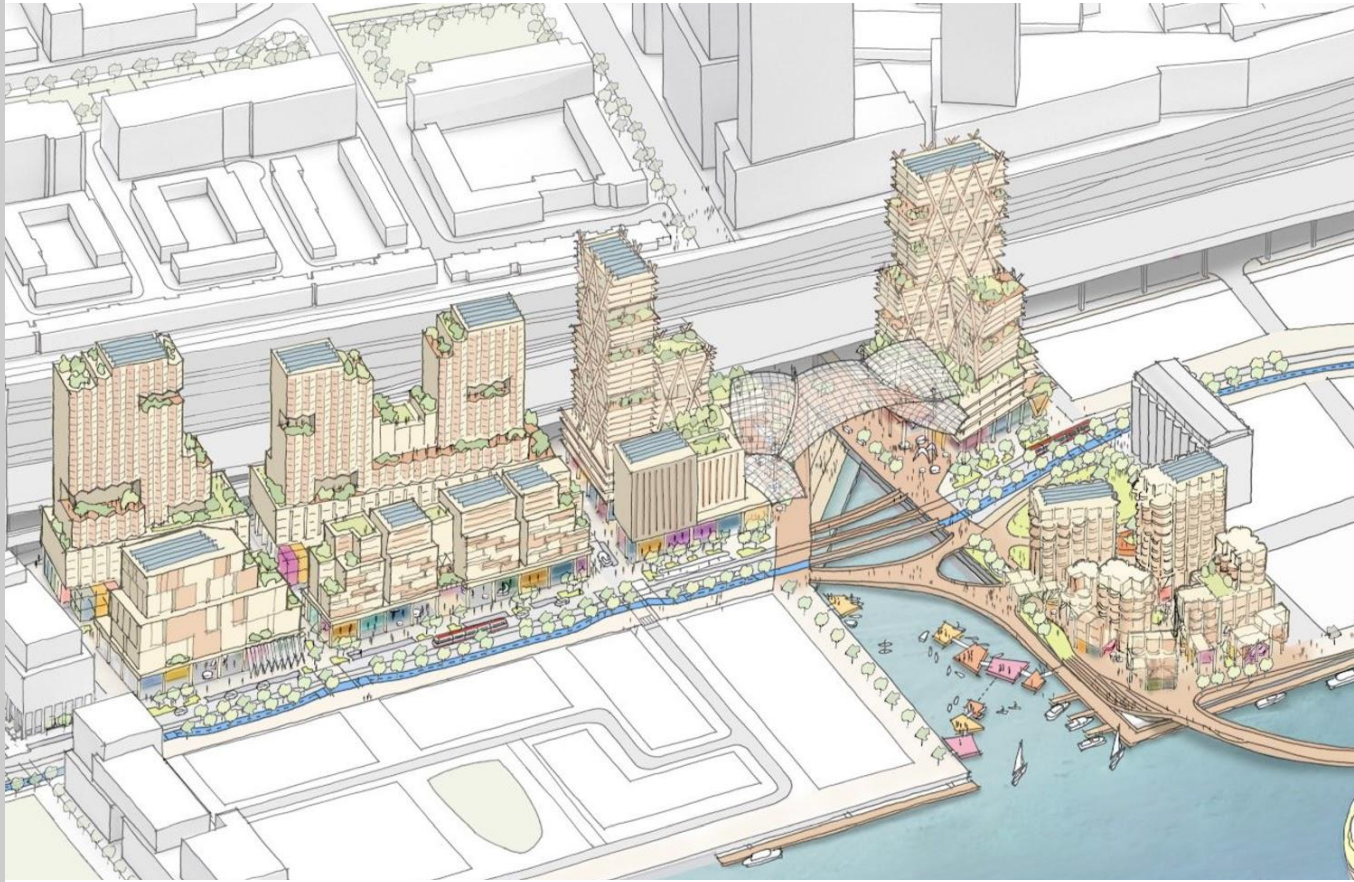
68% Residential
(11% Flexible Loft Space)

20% Commercial
(3% Flexible Loft Space)

12% Flexible Lower Floors
(Retail, Production, Arts, Community)

2,500 Residential Units

5,000 Residents (approx.)



What do you do when you have an opportunity like Quayside?

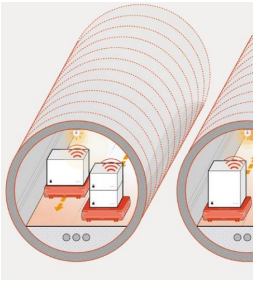
Design a freight system that dramatically reduces truck traffic on surface streets and improve convenience for residents and businesses. Reduce congestion, improve public realm, ensure that local retailers thrive, guarantee seamless deliveries.

Bring together innovations to create a smart freight system

Consolidation & Fulfillment

Delivery Tote

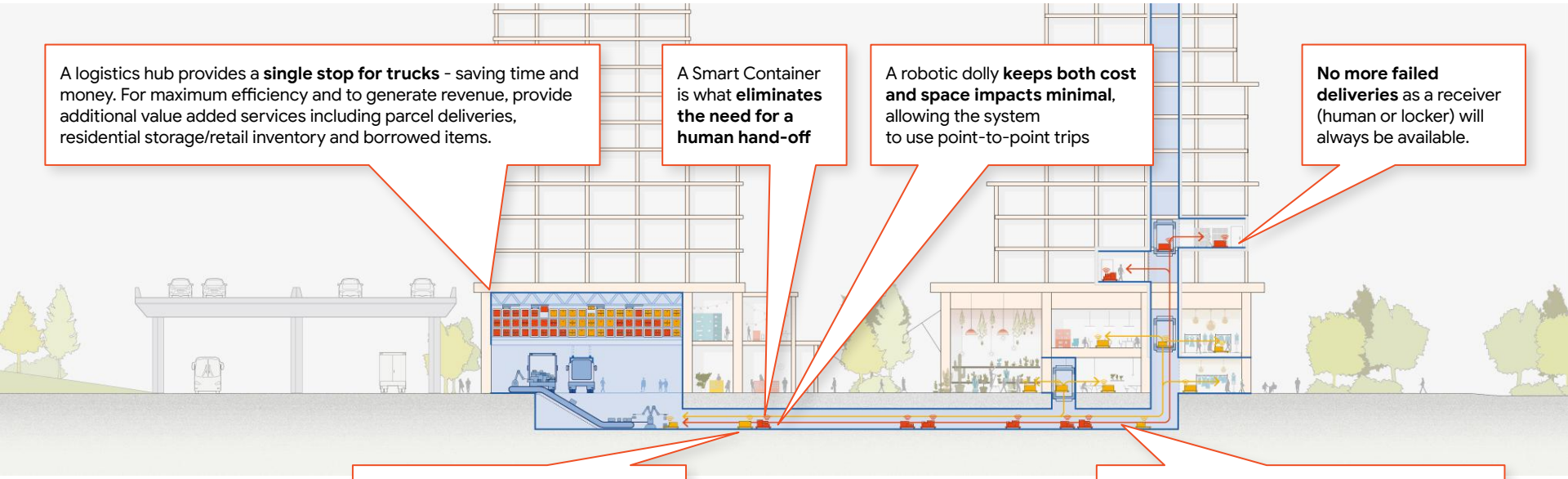
Robot Dolly



Connected Basements

Final Handoff

System overview



Comparison

Deactivated Facade

Ground Floor GSF Dedicated to Freight

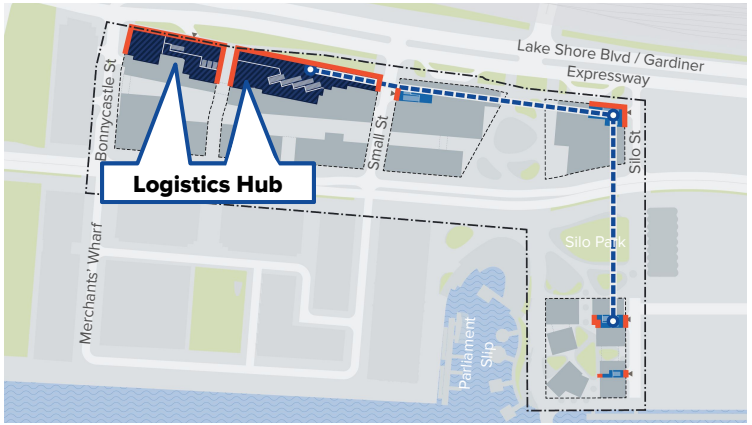
Basement Connection

Logistics Hub

Business As Usual

531 m

85,239 GSF (31 loading docks)



UCC

382 m (only 90m if you expose the UCC)

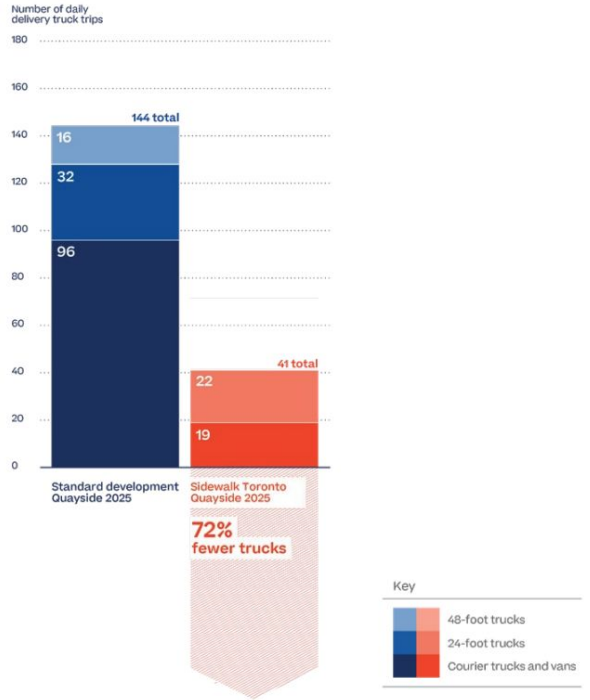
60,935 GSF (16 loading docks)

UCC results in **28% more activated facade** and **28.5% more ground floor space**

An underground freight delivery system could reduce truck traffic by 72%

95% of deliveries will go through the UCC

The logistics hub will be capable of accommodating the **over 18,000 anticipated daily parcels** flowing through the neighborhood



Basic insights incorporated into system

Inefficiency	Insight
Per-building delivery density is driven even lower by the existence of multiple carriers. Every carrier needs to cover every building	**Urban consolidation center** allows for a one stop location for truck loading and unloading and automated sorting. Only one deliverer visits each building. Space is available and deliveries are scheduled.
Multiple carriers competing for limited loading/unloading space at the same time	**Autonomous robots** can use in-building facilities (elevators, hallways, etc.), reducing human labor for the last-50-feet of delivery
Last mile delivery routes and vehicle sizes currently optimize for driver labor costs	**Autonomous robots** can allow optimizing for space efficiency and synchronized deliveries instead of labor
	Utilizing smaller vehicles can lead to decrease in environmental impacts, even if the number of trips / VMT increases, when vehicles are near zero-emission
Package management occurs at building-level and remains labor intensive, which does not have the volume to justify the high CapEx of automation	**Automated goods processing** (sorting, packing, etc.) dramatically reduces the processing costs, if volumes are high enough to amortize capital investments
Carrier hand-off: Each item needs to be handed-off individually and often, only when a receiver is present. Currently, this takes time for carriers and space for vehicle dwelling	**Delivery lockers** allow for delivery without the receiver being present
Operators of a single delivery journey have separate, disjointed tracking systems	**A digital chain of custody**, enabled by streamlined tracking, security, and authorization system, replaces the need for carrier delivery to the final recipient

Last-mile efficiencies help other systems evolve

Waste

Increase in e-commerce has also exploded the amount of recyclable cardboard coming from residences. Safe disposal of special wastes (e.g., electronic & hazardous) lags because the first-mile is so inconvenient. We've seen a "30-40% increase in corrugated cardboard in the US curbside recycling system." **Source:** Bloomberg article

Borrow

Smaller space and a growing interest in the sharing economy leading to sharing infrequently used items. But receivers must travel the last mile themselves to locations with inconvenient dates/times. Born out of tool library concept in the early half of the 20th century. Libraries of Things has grown as a result of the Financial Crisis in 2008 and improved software for online sourcing of items. **Source:** "Library of Things" article

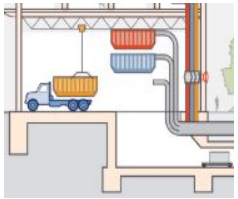
Storage

As more people move to cities and apartments get smaller, the need for off-site storage solutions for items that can't be "borrowed" increases. Only some companies provide pick up and drop off but usually at a high price, with long delivery wait times. "Self-storage has seen 7.7% annual growth from 2012-2018". **Source:** Curbed article

Freight Streams

UCC

Consolidation of inbound and outbound parcel deliveries



Waste

Neighbourhood waste would be collected here from pneumatic tubes throughout the district as well as the freight transport system for specialty waste

Resident Storage

On-demand storage service for residents who wish to store infrequently used items outside their apartment

Retail Inventory

Retail stores can act more like showrooms with excess products stored in a more efficient stockroom

Borrowing Library

Peer-to-peer “library of things” for tenants who prefer to borrow or rent items, rather than buy them

How system efficiency helps multiple players

	Carrier/Shipper	Receiver	Public
Single Carrier	Streamlined transportation. Reduced labor costs	Only need to track with one system	Reduced congestion, emissions
Available Space for Loading/Unloading	Reduced time and costs (full truck loads with fewer, larger vehicles)	Complete Deliveries	Reduced congestion, emissions
Compatible in-building infrastructure	Used for direct deliveries which accounts for small percentage of deliveries	Complete Deliveries On Demand Pick up / Drop Off Reduced building labor costs	Direct deliveries will be handled at building loading docks, not the curb Reduced congestion, emission
Complete Deliveries	Only 1 trip necessary (no fail means no need to try again)	No Fails	Reduced congestion, emissions
Good Tracking	Satisfied customer	Satisfied with carrier/shipper	Deliveries are completed fast Reduced congestion, emissions

THANK YOU

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