New Evidence-Based Methods for Cities to Actively Manage the Final 50 Feet of the Urban Goods System

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Chair, TRB Urban Freight Transportation Committee

Recorded Webinar
June 2019
The Urban Freight Movement Landscape

- Early stages of understanding
- Not at a fully-mature and transferable stage of knowledge
- Fierce competition for urban space
- Substantial and rapid changes
The Urban Freight Movement Landscape

But, there is hope:

- Increased acknowledgment of freight movement needs and stakeholder interest
- Early evidence of successful strategies
- Successful cooperative models to solve these problems
- Continued (worldwide) work on the topic
Today’s Speakers

- Barb Ivanov: Key Research Findings on Commercial Vehicles Loading/Unloading at Curbs and Alleys in Dense Urban Areas
- Anne Goodchild: Urban Freight Lab: Research Outcomes for the Final 50 Feet
- Chris Eaves: How Final 50 Feet Research is Being Used to Inform New Developments in Seattle
Learning Objectives

Help transportation professionals understand and find resources to apply new methodologies to:

- Actively manage the load/unload space network in dense urban areas;
- Make cities’ commercial vehicle load/unload spaces more productive, thereby reducing the need to add more infrastructure capacity; and
- Make new urban development less dependent on public commercial vehicle load/unload zones, while enabling urban towers to meet demand for the growth in deliveries in cities of the future.
Urban Freight Transportation Committee
Transportation Research Board

Welcome!

The Transportation Research Board’s Urban Freight Transportation Committee (AT025) is concerned with the study and research of urban freight transportation topics and issues, including urban transportation system demand and economic relationships, right-of-way issues, pick-up and delivery needs, terminal transportation needs, institutional challenges, and new technology, with an emphasis on providing support to practitioners.
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https://urbanfreight.tti.tamu.edu/ (TRB Urban Freight Transportation Committee)
https://www.mytrb.org/ (TRB site to sign up as a friend of our committee!)

http://tti.tamu.edu (Texas A&M Transportation Institute)
http://mobility.tamu.edu (Mobility Highlights)
Evidence-Based Methods for Cities to Improve Performance of the Final 50 Feet of the Urban Goods System

Barbara Ivanov
Director, Urban Freight Lab (UFL)

Transportation Research Board (TRB) Webinar
June 2019
Are Cities Ready for an Explosion of E-commerce?

A 20% e-commerce compound annual growth rate (CAGR) would more than double goods deliveries in 5 years.

If nothing changes, this could double delivery trips in cities; thereby doubling the demand for load/unload spaces.
Growth in on-demand passenger services

Ride-hailing services such as Uber and Lyft are also creating new demand for load/unload spaces at city curbs.

In 2018 Lyft averaged 50 million rides a month; while Uber averaged 450 million rides per month.

These services create a negative feedback loop affecting curb demand, as parking problems are the top reason people use the service instead of driving.

Photo by AP, Feb. 25, 2018
The Urban Freight Lab

- Partners with the Seattle Department of Transportation (SDOT) and other agencies.

- Uses a systems engineering approach to solve delivery problems that overlap cities’ and businesses’ spheres of control.

- Generates and pilot tests promising solutions inside urban towers and on city streets.

  - [https://www.youtube.com/watch?v=VphFYgcdPta](https://www.youtube.com/watch?v=VphFYgcdPta)

UFL Members

- Boeing HorizonX
- Expeditors International of Washington
- Ford Motor Company
- Kroger
- Nordstrom
- PepsiCo
- Terreno Realty Corporation
- UPS
- USPS
The Final Fifty Feet is a New Research Field

The Final 50’ projects are the first time that researchers have analyzed both the street network and cities’ vertical space as one unified goods delivery system.

The Final 50’:
• Starts when a truck driver parks;
• Includes their activities as they maneuver over curbs, along sidewalks and through intersections;
• Ends inside urban towers when they complete their deliveries.

Photo by Urban Freight Lab, UW
Final 50’ Research Goal #1

Reduce dwell time, the time a truck is parked in a load/unload space.

Public and private benefits include:

• Lower costs for delivery firms, and therefore potentially lower costs for their customers;
• More efficient use of truck load/unload spaces creates more capacity without building additional spaces; and
• Room for other vehicles to move through alleys.

Photo by Urban Freight Lab.
Final 50’ Goal #2

Reduce failed first deliveries to:

• Improve urban online shoppers’ experiences and protect retailers’ brands;

• Lower traffic congestion in cities, as delivery trucks could make up to 15% fewer trips while still completing the same number of deliveries;

• Cut costs for the retail sector and logistics firms;

• Cut crime and provide a safer environment.

Photo by Urban Freight Lab, UW.
UFL and SDOT Developed Building Blocks to Improve the Urban Goods Delivery System

These research building blocks enable city transportation professionals to move from:

- Uncertainty to evidence-based strategies, and
- Inaction to implementation of practical, tested strategies.

Each building block fits together, enabling the city, retailers, delivery firms, and building managers to meet common goals.

*CV: Commercial Vehicle
Running Real-World Pilots Requires Constant Coordination

The UFL research team’s key functions are to:

1. Listen carefully to understand priority urban delivery problems facing retailers, delivery firms, property managers, ITS firms, and cities.

2. Develop research project plans based on customers’ goals. Customers pay for the research.

3. Recruit decision makers (who control the urban delivery processes affected in the research) onto project work teams.

4. Facilitate the problem-solving work teams to goal.

5. Collect and analyze original and existent data.

6. Pilot test promising strategies in the real world.

7. Objectively report on findings.
Questions?

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To view the Final 50’ suite of published research reports please go to
http://depts.washington.edu/sctlctr/research/publications

Highlights of the Urban Freight Lab’s current research projects are at
https://depts.washington.edu/sctlctr/research-projects/current
Urban Freight Lab: Research Outcomes for the Final 50 Feet

Anne Goodchild
Professor, Civil and Environmental Engineering
SCTL Center Director
University of Washington
UFL and SDOT Developed Building Blocks to Improve the Urban Goods Delivery System

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*CV: Commercial Vehicle
87% of Seattle’s Center City buildings rely solely on deliveries from curb and alley load/unload spaces, documenting the importance of public spaces.

There are 338 private loading bays and docks in the urban core.
Commercial and passenger vehicle drivers are using CVLZs and Passenger Load Zones (PLZs) fluidly in center city.

- All vehicles parked in CVLZs: 52% were passenger vehicles; but half of these were only there 5 minutes.

- All CVs parked along the curb: 26% of all CVs at the 5 locations parked in PLZs.
Nearly three-quarters of all CVs parked for 30 minutes or less

Across the five locations, more than half (53.8%) of all commercial vehicles (CVs) parked for 15 minutes or less in all types of curb spaces.

Nearly three-quarters of all CVs (72%) parked for 30 minutes or less.

When considering just the delivery CVs (693), an even higher percentage 60% (421) parked for 15 minutes or less.

Eighty-one percent (562) of the delivery CVs parked for 30 minutes or less.

### Total CVs parked in all types of curb spaces: % (#)

<table>
<thead>
<tr>
<th>Commercial Vehicle Type</th>
<th>Total CVs by Vehicle Type</th>
<th>15 min or less</th>
<th>15 - 30 min</th>
<th>30 – 60 min</th>
<th>&gt;1 hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery CVs</td>
<td>55.3% (693)</td>
<td>33.6% (421)</td>
<td>11.3% (141)</td>
<td>6.8% (85)</td>
<td>3.7% (46)</td>
</tr>
<tr>
<td>Total CVs by Time Parked</td>
<td>100% (1,253)</td>
<td>53.8% (674)</td>
<td>18.4% (231)</td>
<td>13.9% (174)</td>
<td>13.9% (174)</td>
</tr>
</tbody>
</table>
Service CVs made up 36% of the total CVs parked

Because the total percent of service vehicles is so high, they may have an outsize impact on turn rates at the curb.

Service CVs’ parking behavior was bifurcated. While 56% (257) of them parked for 30 minutes or less; 44% (199) parked >30 minutes.

Twenty-seven percent (123) of the service CVs parked for an hour or more.

<table>
<thead>
<tr>
<th>Commercial Vehicle Type</th>
<th>Total CVs by Vehicle Type</th>
<th>&lt;15 min</th>
<th>15 -30 min</th>
<th>30 – 60 min</th>
<th>&gt;1 hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service CVs: Vans and Pick Up Trucks</td>
<td>36.4% (456)</td>
<td>15.1% (189)</td>
<td>5.4% (68)</td>
<td>6.1% (76)</td>
<td>9.8% (123)</td>
</tr>
<tr>
<td>Total CVs by Time Parked</td>
<td>100% (1,253)</td>
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</tr>
</tbody>
</table>
On average 47% of all CVs parked in unauthorized locations
But a much higher (55%-65%) percentage of them parked in unauthorized areas near the two retail centers, when compared to the predominately office and residential areas (27% - 30%).

<table>
<thead>
<tr>
<th>Curb Study Area</th>
<th>CVLZ Supply</th>
<th>Commercial Vehicle Demand</th>
<th>Ratio of Supply of Time in CVLZs to the Commercial Vehicle Demand for Curb Parking (Minutes)</th>
<th>Percent of Commercial Vehicles that Parked in Unauthorized Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>Primary land use</td>
<td>Total available parking time in CVLZs, minus the time passenger vehicles parked in CVLZs (minutes)</td>
<td>Total number of commercial vehicles parked</td>
<td>Total time commercial vehicles parked (minutes)</td>
</tr>
<tr>
<td>Four Seasons Hotel, residential retail</td>
<td>Hotel, residential retail</td>
<td>2,811</td>
<td>256</td>
<td>5,325</td>
</tr>
<tr>
<td>Westlake Center Retail</td>
<td>Retail</td>
<td>1,608</td>
<td>215</td>
<td>6,017</td>
</tr>
<tr>
<td>Seattle Municipal Tower Office</td>
<td>Office</td>
<td>486</td>
<td>152</td>
<td>4,368</td>
</tr>
<tr>
<td>Insignia Residential</td>
<td>Residential</td>
<td>4,207</td>
<td>272</td>
<td>13,323</td>
</tr>
<tr>
<td>Dexter-Horton Historic (office)</td>
<td>Historic (office)</td>
<td>10,343</td>
<td>359</td>
<td>13,749</td>
</tr>
</tbody>
</table>
Time Study Final 50 Feet Processes

Carrier visited 7 different floors on average

Mean: 27 min

SD: 6 min
Range: 15 – 34 min

Loading bay

Floor 52

Floor 48

Loading bay
Pilot Test Results: Common Carrier Locker System Reduced Total Delivery Time By 78%

- Walked from loading bay to locker: 2.6 min
- Loaded locker: 0.6 min
- Walked from locker to loading bay: 2.4 min

Total time reduced by 78%
Actively Manage the Network

The Urban Freight Lab research team, working with the Pacific Northwest National Lab, will:

• Install occupancy sensors in all commercial load spaces in an 8-block-face area.

• Apply machine learning to data streams from the sensors.

• Send real-time and predictive parking availability information to delivery drivers and dispatchers.
“Integrate Technology to Gain Commercial Efficiency…” Research Project

The UFL will create delivery density and security by placing common locker systems near load/unload zones and transit stops in the pilot test area.
“Integrate Technology to Gain Commercial Efficiency…”

Engage building managers to offer loading bay spaces to other users in off-peak delivery hours.

Seattle Municipal Tower, a 62-story office building studied in the Urban Freight Lab
Questions?

http://depts.washington.edu/sctlctrr
annegood@uw.edu
How the Final 50 Feet Research is Being Used to Inform New Developments in Seattle:
The Freight Master Plan
Seattle and Urban Goods Movement

• Signed in October 2016
• Recognized there were few data resources
• Growing anecdotal information indicated strain on the system
The Urban Freight Lab
Seattle and The University of Washington

• Create Public/Private/Academic collaboration
• Learn where public and private interests intersect
• Build trust with an arms-length data broker
• Incorporate a systems approach to goods movement
A Systems Approach

Why it matters

• Blurred the lines between private and public rights of way
• Identified previously distinct systems’ deep interactions
• Pointed to potential goods movement solutions both within and outside rights of way
The Final 50 Feet

- Private Loading Bays
- Building Operations
  - Time and motion
- Commercial Vehicle Load Zones
- Curbside activity
- Alley Operations
- Cordon Counts
  - Including the ‘Flavors of Freight’
Data Outcomes

• Identify all goods movement assets
• Maintain key delivery locations
• Support flex-time in commercial vehicle load zones
• Document delivery activity – legal and …opportunistic
• Use data to support congestion pricing, pavement analysis, grant application, etc…
Two Strategies

• Mitigate existing conditions to support building needs
• Update building designs to reduce reliance on public rights of way into the future
Seattle’s Pilot Projects

• Baseline Data
• Common Carrier Locker
• Goods Morning Delivery
• UPS E-Trike
The ‘Flavors of Freight’

- Construction
- Food - Bulk
- Food - Refrigerated
- Service
- Parcel
- Reverse logistics (trash)
- Over-Legal loads
The Future 50 (Years)

• Aging design basis - up to 60 years old
• Changing use and uses for
  • Commercial Vehicle Load Zones
  • Alleys
• Building operation impacts
• Implementing Director’s Rule
• Reviewing code change
Code Change Goals

• Engage developers and architects
• Include delivery operating envelope
• Design for full access to truck bays
• Design flexibility – Loading and reverse logistics
• Design away from peak potential use
Green Healthy Streets

• In 2017, Seattle joined 26 global cities as signatories to the Fossil-Fuel-Free Streets declaration to designate a major area of the city as zero emission by 2030

• Currently in the scoping phase

• Where do city/freight goals align

Image: The Urbanist
The Variables

• What is the good’s size/weight
• Is the route fixed/predictable
• How time-sensitive is the delivery
• Is the delivery a good or a service
• Is there an ongoing power need
Where Goals DO Align

• Local
• Predictable
• Not necessarily time-flexible
• Fewer stops
• Lower environmental needs
Thank you

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www.seattle.gov/transportation