Urban Freight in a Multi-Modal City: Curb Space Demand and Usage in New York

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Outline

- Motivation
- Case Study Location Selection
- Results
- Next Steps
Commercial Vehicle Parking in NYC

- Parking already inadequate for CV demand in many parts of the city (Jaller, Holguin-Veras, and Hodge, 2013)
- Carriers face very high parking fines (Holguin-Veras, 2011)
- Zoning requirements have not been updated to keep up with growth in freight demand (Morris, 2009)
- Alternative management strategies have been tried with mixed success
  - Implementation of commercial metered parking in midtown (Schaller et al., 2010)
  - Dedicated delivery windows (Hodge, 2015)
Supply vs. Demand

- Freight demand in NYC is growing and becoming increasingly complex
- Urban streets are becoming increasingly multimodal
- Understanding of urban freight demands is lacking in much published street design guidance

- Just-in time commercial deliveries
- Omni-channel retailing
- e-Commerce
- 400 mi bike lanes since 2007
- 60+ Complete Streets projects
- 8 SelectBus corridors since 2008

Demand ↑ while road and parking capacity ↓
Research Approach

- Analysis conducted as part of a larger research project examining the impacts of growing multimodal infrastructure on freight operations

- Goals:
  - To characterize commercial vehicle demands and parking behavior in mixed use areas
  - To improve understanding of the relationship between parking regulations and parking behavior for different carrier types
Research Approach

- Identify critical areas for detailed analysis
  - Map NYC DOF Parking Violations to NYC DCP LION Street Map
  - Evaluate violation types related to multimodal conflict (Bicycle Lane, Bus Lane, Bus Stop)
  - Examine land uses on critical blocks using NYC DCP MapPluto Data

- Conduct field observation

- Evaluate basic measures to characterize parking behavior
  - Availability of Parking Options
    - By Location/Regulations
  - Chosen Parking Locations
    - By Vehicle Type
  - Parking Duration
    - By Delivery Type
Parking Violation Data

- Bicycle Lane Violations
  - 4,452 violations over 3 mo.
  - 23 blocks with 20 + violations
  - Critical blocks dispersed across four NYC boroughs
  - Land uses ranging from heavily commercial to primarily residential

- Bus Lane/Bus Stop Violations
  - 154 stop violations; 31 lane violations over 3 mo.
  - Only one route with 5+ lane violations
## Case Study Locations

<table>
<thead>
<tr>
<th>Primary Street</th>
<th>East Broadway</th>
<th>Grand Concourse</th>
<th>W 34th St</th>
<th>W 77th St</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross Streets</td>
<td>Catherine St. and Market St.</td>
<td>184th St and Fordham Road</td>
<td>5th Ave to 6th Ave</td>
<td>Columbus Ave and Central Park West</td>
</tr>
<tr>
<td>Primary Land Use</td>
<td>Chinatown Commercial District</td>
<td>Bronx Commercial Corridor</td>
<td>Midtown Manhattan Commercial Corridor</td>
<td>Museum on north side; Residential on south side</td>
</tr>
<tr>
<td>Motor Vehicle Travel Lanes</td>
<td>Local street with single travel lane in each direction</td>
<td>Separated arterial with single local lane in each direction</td>
<td>Crosstown arterial with 2 WB and one EB travel lane, plus dedicated bus lane in each direction</td>
<td>Local street with single travel lane in each direction</td>
</tr>
<tr>
<td>Bicycle Infrastructure</td>
<td>Standard bicycle lanes in both directions</td>
<td>Buffered bicycle lanes in both directions</td>
<td>None</td>
<td>Buffered bicycle lanes in both directions</td>
</tr>
<tr>
<td>Parking Regulations</td>
<td>Primarily 1-hr metered parking, including dedicated commercial</td>
<td>Primarily 1-hr metered parking</td>
<td>No parking permitted 7 AM to 7 PM</td>
<td>Primarily open parking</td>
</tr>
</tbody>
</table>
### Summary of Commercial Vehicles Observed

<table>
<thead>
<tr>
<th></th>
<th>East Broadway</th>
<th>Grand Concourse</th>
<th>W 34th St</th>
<th>W 77th St</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Trucks</td>
<td>70</td>
<td>25</td>
<td>21</td>
<td>67</td>
<td>183</td>
</tr>
<tr>
<td>Avg Trucks/Hr</td>
<td><strong>17.5</strong></td>
<td><strong>6.25</strong></td>
<td><strong>5.25</strong></td>
<td><strong>8.38</strong></td>
<td><strong>9.15</strong></td>
</tr>
<tr>
<td>Min Trucks/Hr</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Max Trucks/Hr</td>
<td>26</td>
<td>12</td>
<td>9</td>
<td>21</td>
<td>26</td>
</tr>
<tr>
<td><strong>Vehicle Type</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Unit Truck</td>
<td><strong>65.7</strong></td>
<td>52</td>
<td>52.4</td>
<td>35.8</td>
<td>51.4</td>
</tr>
<tr>
<td>RefrigerTruck</td>
<td>2.9</td>
<td>0</td>
<td>0</td>
<td>1.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Semi-trailer</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1.1</td>
</tr>
<tr>
<td>Van</td>
<td><strong>28.6</strong></td>
<td>40</td>
<td>47.6</td>
<td>52.2</td>
<td>41</td>
</tr>
<tr>
<td>Other</td>
<td>2.9</td>
<td>8</td>
<td>0</td>
<td>7.5</td>
<td>4.9</td>
</tr>
<tr>
<td><strong>Delivery Type</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grocery</td>
<td>8.6</td>
<td>0</td>
<td>4.8</td>
<td>7.5</td>
<td>6.6</td>
</tr>
<tr>
<td>Other Food</td>
<td>38.6</td>
<td>4</td>
<td>4.8</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>Major Parcel</td>
<td><strong>21.4</strong></td>
<td>32</td>
<td>42.9</td>
<td>20.9</td>
<td>25.1</td>
</tr>
<tr>
<td>Other Parcel</td>
<td>1.4</td>
<td>8</td>
<td>9.5</td>
<td>10.4</td>
<td>6.6</td>
</tr>
<tr>
<td>Moving Truck</td>
<td>0</td>
<td>12</td>
<td>0</td>
<td>4.5</td>
<td>3.3</td>
</tr>
<tr>
<td>Service Vehicle</td>
<td><strong>10</strong></td>
<td>24</td>
<td>23.8</td>
<td>25.4</td>
<td>19.1</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
<td>16</td>
<td>14.3</td>
<td>25.4</td>
<td>16.9</td>
</tr>
<tr>
<td>Unknown</td>
<td>10</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4.4</td>
</tr>
</tbody>
</table>
## Parking Choices by Sector

<table>
<thead>
<tr>
<th></th>
<th>Observed</th>
<th>Legal Parking at Location</th>
<th>Legal Parking on Block</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Available</td>
<td>Percent</td>
</tr>
<tr>
<td>Food and Beverage</td>
<td>43</td>
<td>22</td>
<td>51</td>
</tr>
<tr>
<td>Parcel</td>
<td>58</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Moving Truck</td>
<td>6</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>Service Vehicle</td>
<td>35</td>
<td>5</td>
<td>14</td>
</tr>
</tbody>
</table>
Lessons Learned

- Demands by sector are highly variable by location/land use
- Commercial vehicles frequently have no legal parking options; seems to be worst in residential areas
  - No parking controls
  - No land use requirements
- Parking durations and choice of parking location vary by sector
  - Food/grocery → higher likelihood of legal parking available, used
  - Parcels → short durations, unlikely to spend extra time to park legally
  - Service → long durations, will park elsewhere on block
Other Observations

- Enforcement rates vary for different locations and carriers
- Obstructed lanes can lead to dangerous operator behavior for other modes
- Few trucks observed on 34th St despite high demands due to required service entrances on 33rd and 35th Streets
Conclusions and Next Steps

- Parking regulations and street designs need to consider specific commercial vehicle demands and likely driver parking choices

- Ongoing research
  - Improving understanding of demands generated by e-commerce
  - Identifying relevant curb management strategies for freight in residential areas
  - Identifying urban street designs that accommodate adequate freight access for delivery
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Questions?

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