Complete Streets:
Finding Space for Freight

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Externalities on urban streets

• Dangerous collisions
• Pollution
  – Air
  – Noise
• Traffic congestion
• Lane obstructions
• Infrastructure damage
What are the elements of a livable city?

Which of these elements can function without goods movement?
* If this tree is native and exists in a hospitable environment.
Goods movement is critical to social and economic welfare
Outline

• 7 Common Challenges and Solution Approaches

• Demand Management

• Urban Freight and COVID
Potential Areas of Guidebook Application

• Urban centers
• Suburban/exurban areas with warehousing/industrial development
• Suburban/small town main streets
• Industrial/commercial campuses
7 Common Challenges

• Selecting an appropriate design vehicle
• Vehicle navigation challenges
  – Providing adequate space for large vehicle turns
  – Reducing conflicts with vulnerable roadway users
  – Safely reducing speeds
  – Providing network connectivity and redundancy
• Curbside challenges
  – Providing adequate space for parking, loading, and emergency response operations
  – Providing curb and building access
Freight Design/ Control Vehicle Selection

- Current/expected freight traffic flows
- Freight trip generating land uses
- Street functional classes and network designations
- Applicable truck size and weight regulations
- Historic incident data involving freight vehicles
Freight Industry Engagement

- Internal agency freight experts
- Agency advisory boards
- Local freight quality partnerships
- Freight industry associations
- Business improvement district/association of local business owners
- Local businesses, building managers, or carriers operating in a project area
Large Vehicle Turns
Design Solutions

1. Asymmetrical median nose provides space for wide turn
2. Recessed stop line
3. Space available for lane encroachment

1. Space available for wide turning path
2. Painted conflict area
Regulatory Solution: Vehicle Size Restrictions

- Fixed
- Time-based

- Safety benefits of size restrictions must be carefully weighed against related impacts
  - VMT and congestion
  - Operator costs and industry participation
Operational Solution: Dedicated Signal Phases

1. Separated turn phases

2. Separated directional movement phases
Conflicts with vulnerable road users
Design Solutions: Bike Infrastructure, Clear Identification of Conflict Zones
Operational Solutions: Dedicated Signal Phases and Roadside Mirrors

1. Leading bicycle phase
2. Vehicle turning phase
Vehicle-Based Solutions

- Mirrors
- Fresnel safety lenses
- Cameras
- Side guards
- Direct vision
Education

- Drivers
- Non-motorized travelers
- General public
Speed Reducers
Design Solutions

1. Width of speed bump should be less than emergency or freight vehicle tire-to-tire axle width

1. Flush or mountable center island
2. Flush or mountable splitter island
Network connectivity/redundancy

- Change in street direction
- Network gaps
- Difficult to navigate street infrastructure
Design Solutions

- Short blocks/frequent intersections
- Reasonable alternative routes
Space for parking, loading, and delivery
Design Solutions

1. Loading zone with adequate length for maneuvering and rear loading
2. Access aisle
3. Midblock curb cut

1. Direct curb access for loading
2. Transit bulb
3. Corner bulb
Regulatory Solutions
Operational Solutions

• Building Delivery Management
  – Centralized delivery location
  – Secure storage room
  – Lockers
  – Loading dock appointment system

• Enforcement
  – Commercial vehicles
  – Loading zone obstructions
Curb and building access
Design Solutions

1. Loading zone with adequate length for maneuvering and rear loading
2. Access aisle
3. Midblock curb cut

1. Horizontal clearance zone for loading and delivery
2. 14'-0" MIN Clearance
3. 13'-0" MAX TYP.

1. Lighting free of overhead power lines
2. Vertical clearance zone free of obstructions
Demand Management

- Change the volume, spatial, or temporal distribution of demands
- May require policy change, infrastructure investment, and/or behavior change by multiple stakeholders
- Will only be implemented if costs are acceptable to decision-makers
# Off-Hour Deliveries

<table>
<thead>
<tr>
<th>Method</th>
<th>Benefits</th>
<th>Challenges/Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift deliveries to non-peak</td>
<td>For operator:</td>
<td>For operator:</td>
</tr>
<tr>
<td>hours</td>
<td>• Reduce travel time delays, fuel costs, and parking</td>
<td>• Increase driver labor costs</td>
</tr>
<tr>
<td>• Early morning</td>
<td>fines</td>
<td>• Increase safety risk</td>
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<td>• Late evening</td>
<td>For business:</td>
<td>For business:</td>
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<tr>
<td>• Overnight</td>
<td>• Receive deliveries when few customers present</td>
<td>• Additional staff costs for off-hour receipt</td>
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<tr>
<td></td>
<td>For neighborhood:</td>
<td>For neighborhood</td>
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<tr>
<td></td>
<td>• Reduce congestion impacts</td>
<td>• Generate delivery noise at night</td>
</tr>
<tr>
<td></td>
<td>• Reduce demand for shared curb space</td>
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## Consolidation Center

<table>
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<th>Method</th>
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</table>
| Transfer goods from large freight vehicles to small, green vehicles for final delivery | For operator:  
  - Avoid expensive last mile costs                                       | For operator:  
  - Increase costs for transloading  
  - Lose final delivery visibility                                         |
| Consolidate goods from multiple carriers onto shared vehicles          | For business:  
  - May provide value added services  
  - May improve reliability                                                   | For business:  
  - May have to pay premium for services                                      |
|                                                                       | For neighborhood:  
  - Reduce large vehicle trips  
  - Reduce demand for parking  
  - Reduce emissions                                                              | For neighborhood  
  - May increase local VMT  
  - May require public subsidy for start-up, operations                        |
## Lockers and Pickup Points

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<tr>
<td>Lockers:</td>
<td>For operator:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Avoid expensive failed deliveries, repeat trips</td>
<td>For operator:</td>
</tr>
<tr>
<td></td>
<td>For residents:</td>
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</tr>
<tr>
<td></td>
<td>• Provide secure location to leave package</td>
<td>For residents:</td>
</tr>
<tr>
<td></td>
<td>For neighborhood:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reduce delivery trips</td>
<td>For neighborhood:</td>
</tr>
<tr>
<td>Pick-up Points:</td>
<td>For host business:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Generate foot traffic</td>
<td>For host business:</td>
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<td></td>
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<td>• May use floor space</td>
</tr>
</tbody>
</table>

**Lockers:** Secure locker where package can be accessed via security code; may be located in residential area, public space, or local business.

**Pick-up Points:** Staffed delivery points at local businesses (e.g. pharmacy, grocery store).
COVID and Urban Goods Movement

• Access to food and medicine
  – Delivery vs. in-store
    • Availability
    • Equity
    • Prioritization
  – Commercial vs. residential supply chains
    • Restaurants
    • Offices
    • Schools

• Role of shared economy
• Role of density??
COVID and Urban Goods Movement

- Supply chain resiliency
- Supply chain safety
  - Warehouses
  - Delivery Personnel
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Guidebook can be accessed from:
https://www.metrans.org/news/new-metrofreight-publication-a-guidebook-for-considering-freight-in-complete-street-design-