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# Complete Streets Considerations for Freight

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# Freight on Complete Streets

- Dangerous collisions
- Pollution
  - Air
  - Noise
- Traffic congestion
- Lane obstructions
- Infrastructure damage

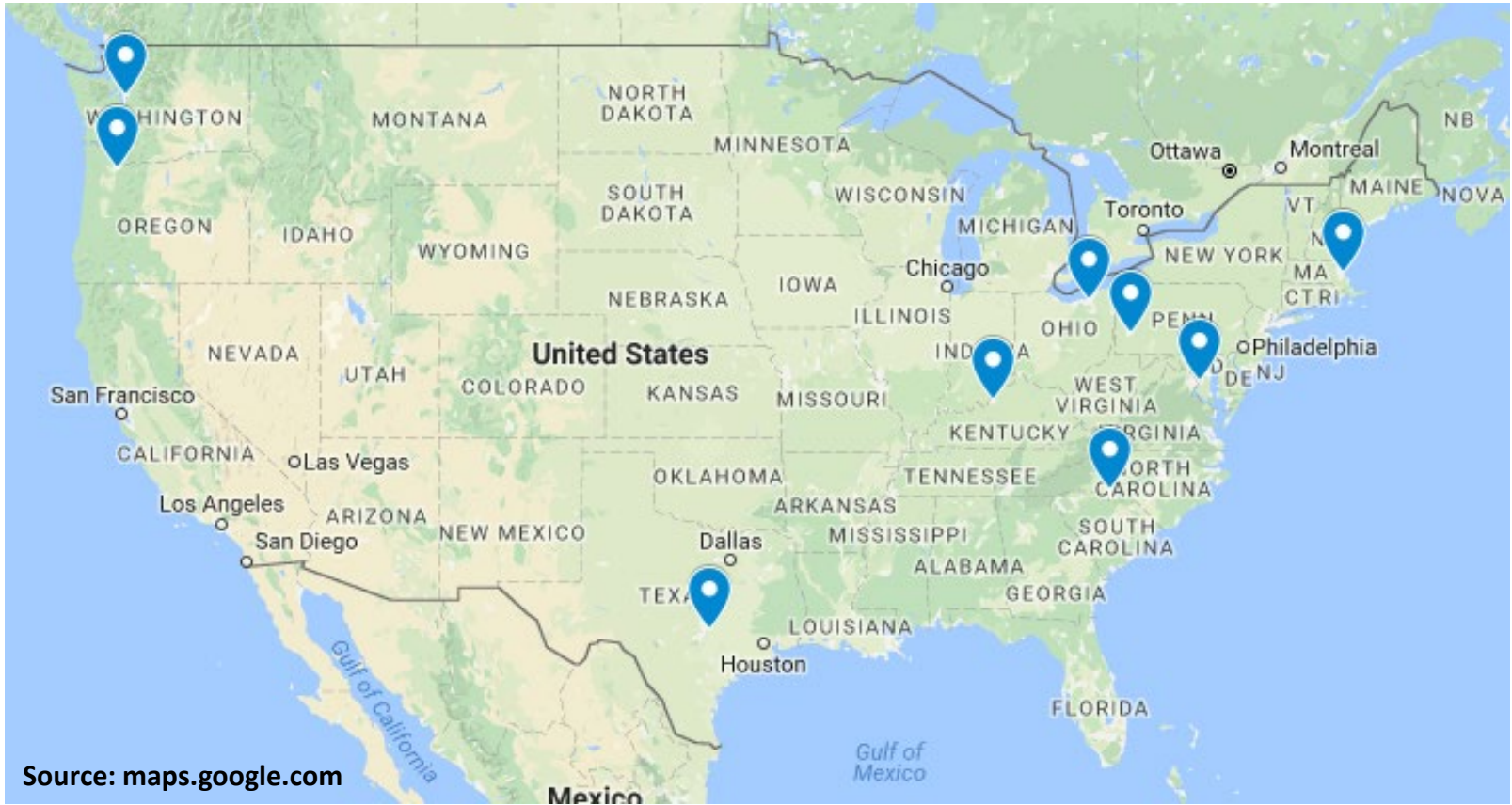


# Outline

- Guidebook Development
- 7 Common Challenges and Solution Approaches
- Examples
- Demand Management

# Guidebook Development

- Preliminary MetroFreight/VREF research examining truck-bike interactions
- Survey – 10 participating cities
  - Freight experts
  - Street design experts
- Preliminary content presentations
  - MPO Freight Advisory groups: DVRPC, LVPC, NJTPA
  - VREF Urban Freight Conference
- Agency review



Source: maps.google.com



## Contents

### Acronyms

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- 1.1 Freight Demand
- 1.2 Freight Stakeholders
- 1.3 Freight Vehicles
- 1.4 Parking and Loading Infrastructure
- 1.5 Freight Regulations
- 1.6 Common CV Challenges in Complete Streets Areas

#### 2 Fundamentals of Emergency Services

- 2.1 Demand for Emergency Services
- 2.2 Emergency Service Providers
- 2.3 Emergency Service Vehicles
- 2.4 Emergency Response Infrastructure
- 2.5 Emergency Service Regulations
- 2.6 Common Emergency Operator Challenges in Complete Streets Areas

#### 3 Street Design and Management

##### Considerations

- 3.1 Selecting an Appropriate Design and Control Vehicle
  - 3.1.1 Critical Vehicle Dimensions
  - 3.1.2 Design Vehicle vs. Control Vehicle
  - 3.1.3 Existing Recommendations
  - 3.1.4 Selection Criteria
- 3.2 Providing Adequate Space for Large Vehicle Turns
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- 3.2.2 Curbside Bicycle Lanes
- 3.2.3 Asymmetrical Median Nose
- 3.2.4 Recessed Stop Line
- 3.2.5 Mountable or Flush Curbs
- 3.2.6 Painted, Striped, or Textured Curb Extensions
- 3.2.7 Channelized Right Turn Lanes
- 3.2.8 Vehicle Size Restrictions
- 3.2.9 Dedicated Signal Phases for Turning Movements

#### 3.3 Reducing the Frequency and Severity of Conflicts Between Large Vehicles and Vulnerable Roadway Users

- 3.3.1 Bike Boxes and Two-Phase Turn Queue Boxes
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- 3.3.3 Dedicated or Leading Signal Phases for Non-motorized Travelers

- 3.3.4 Convex Safety Mirrors
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- 3.3.6 Truck Side Guards
- 3.3.7 Education Programs

#### 3.4 Reducing Speeds Without Unintended Detrimental Impacts on Operations and Safety

- 3.4.1 Speed Cushions
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#### 3.5 Providing Network Connectivity and Redundancy

- 3.5.1 Redundant Networks
- 3.5.2 Wide Bike Lanes
- 3.5.3 Mountable Medians

- 3.6 Providing Adequate Space for Vehicle Parking and Loading, and Delivery or Emergency Operations
  - 3.6.1 Dedicated On-street Loading Zones
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  - 3.6.3 Mountable Sidewalk or Sidewalk Cutouts
  - 3.6.4 Zoning Regulations
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  - 3.7.1 Mid-block Curb Cuts
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#### 4 Demand Management Strategies

- 4.1 Off-hour Deliveries
- 4.3 Lockers and Pick-up Points
- 4.2 Urban Consolidation Centers
- 4.4 Secondary Referral Services
- 4.5 Building Sprinklers

#### 5 Additional Resources

#### 6 Credits

# Potential Areas of Application

- Urban centers
- Suburban/exurban areas with warehousing/industrial development
- Suburban/small town main streets
- Industrial/commercial campuses



# Freight Operator Motivations (Chapter 1)

- Meet customer demands
  - On-time
  - Maintain quality of goods
- Minimize costs
- Provide reliable service
- Meet regulatory requirements

# 7 Common Challenges

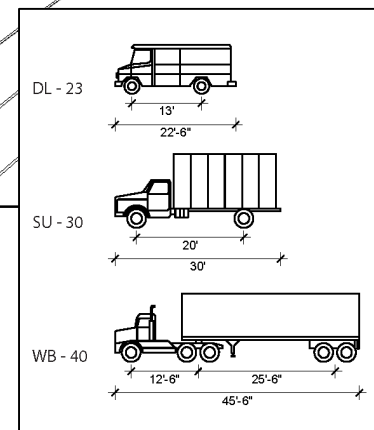
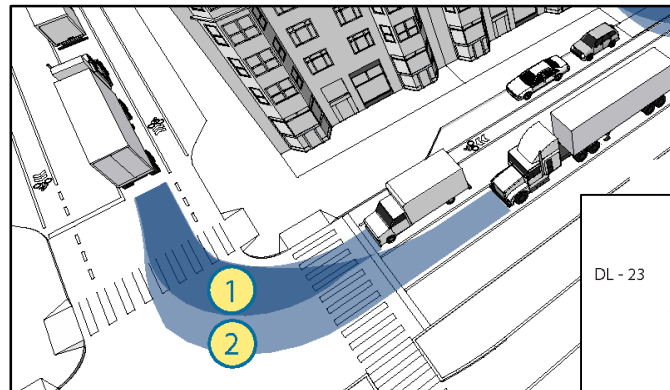
- Selecting an appropriate design vehicle
- Vehicle navigation challenges
  - Providing adequate space for large vehicle turns
  - Reducing conflicts with vulnerable roadway users
  - Safely reducing speeds
  - Providing network connectivity and redundancy
- Curbside challenges
  - Providing adequate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

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# Freight Design/ Control Vehicle Selection

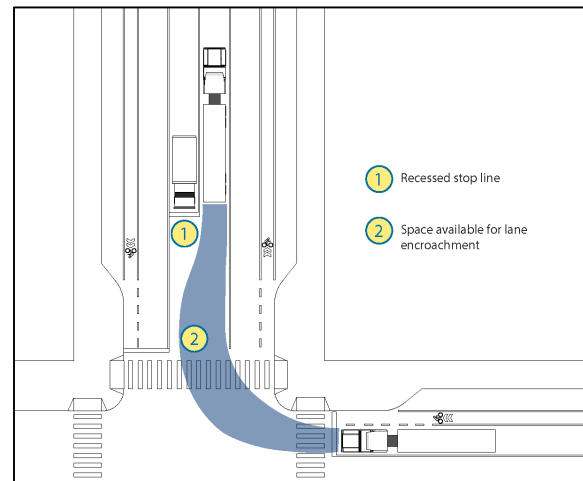
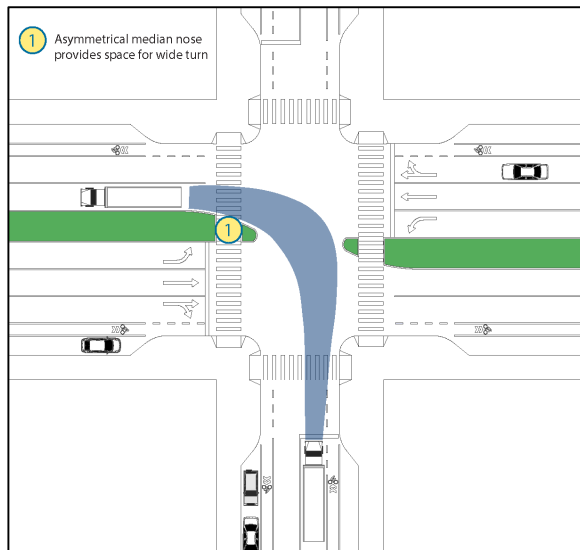
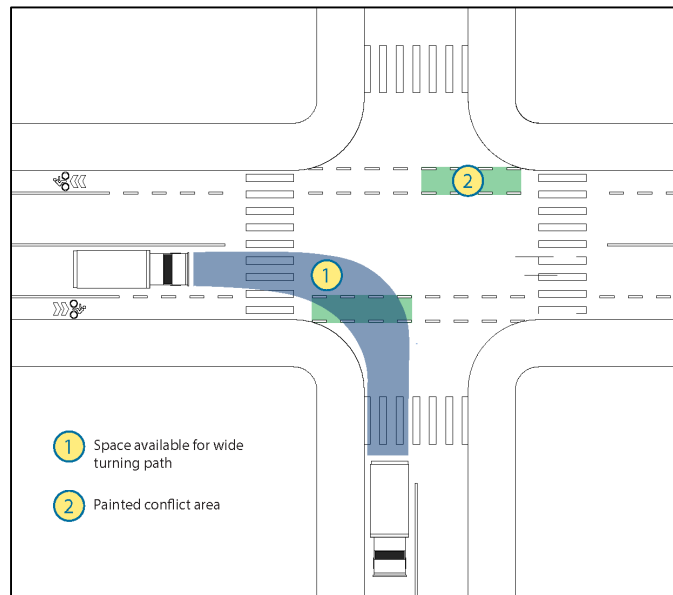
- Current/expected freight trip generating land uses
- Street functional classes and network designations
- Applicable truck size and weight regulations
- Current/expected freight traffic flows
- Historic incident data involving freight vehicles



# Large Vehicle Turns

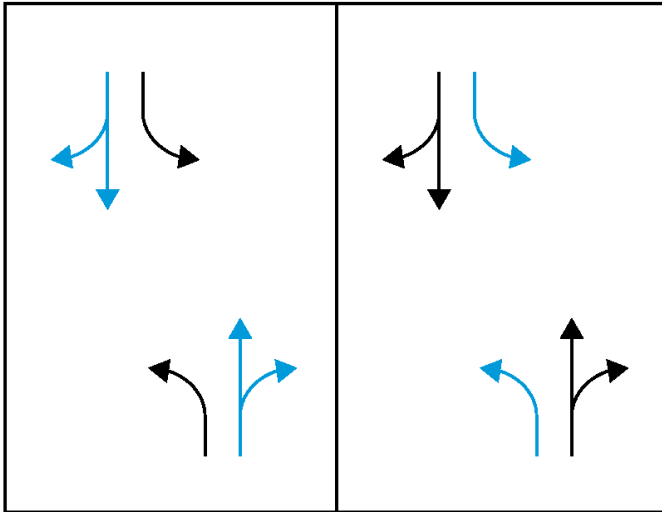


# Design Solutions

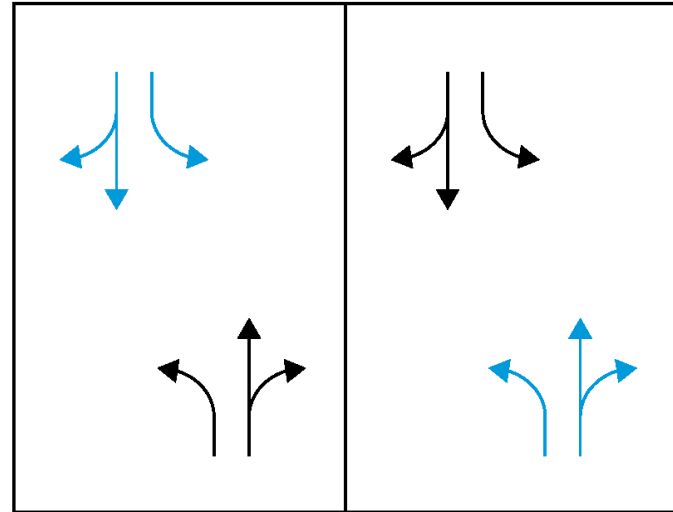


# Operational Solution: Dedicated Signal Phases

1 Separated turn phases

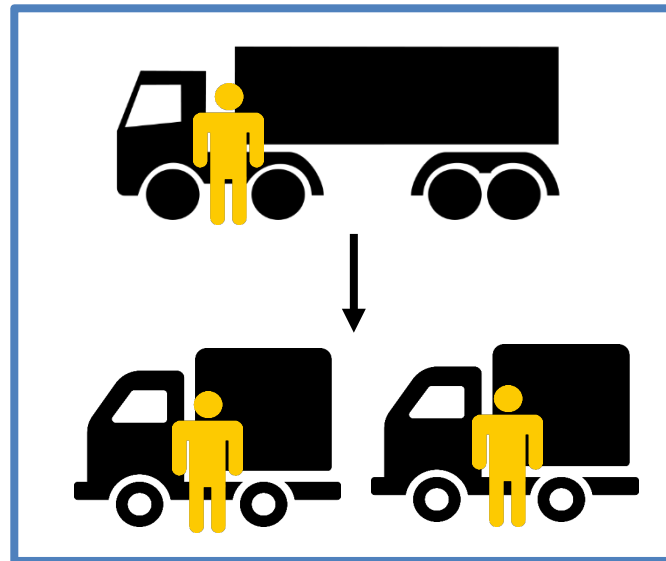


2 Separated directional movement phases



# 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





# Conflicts with vulnerable road users

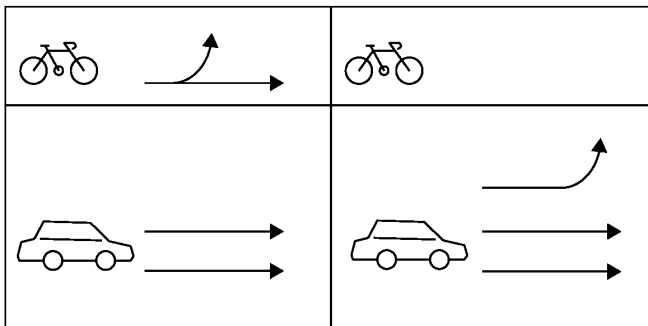


# Design Solutions: Bike Infrastructure, Clear Identification of Conflict Zones



# Operational Solutions: Dedicated Signal Phases and Roadside Mirrors

1 Leading bicycle phase



2 Vehicle turning phase



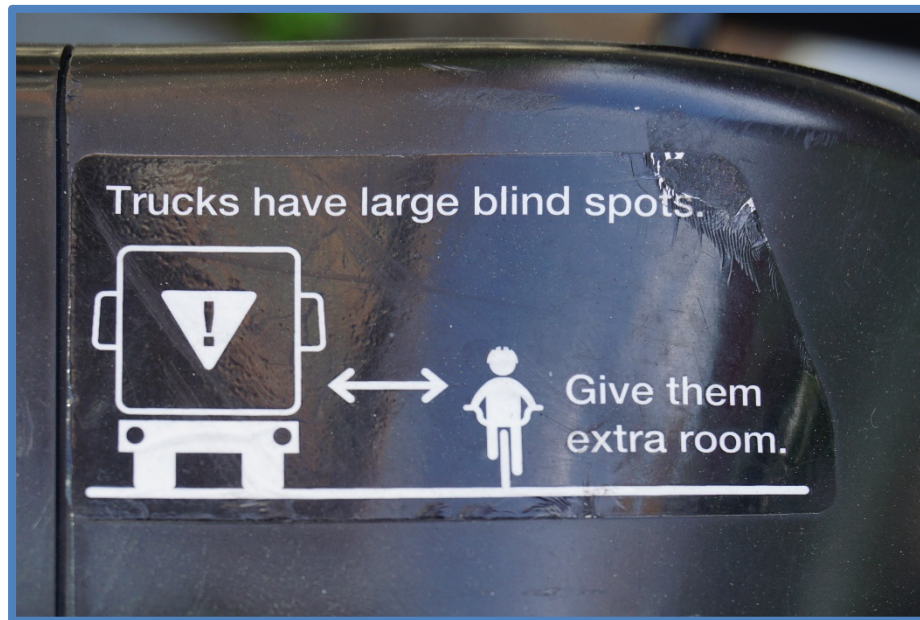
# Vehicle-Based Solutions

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



# Education

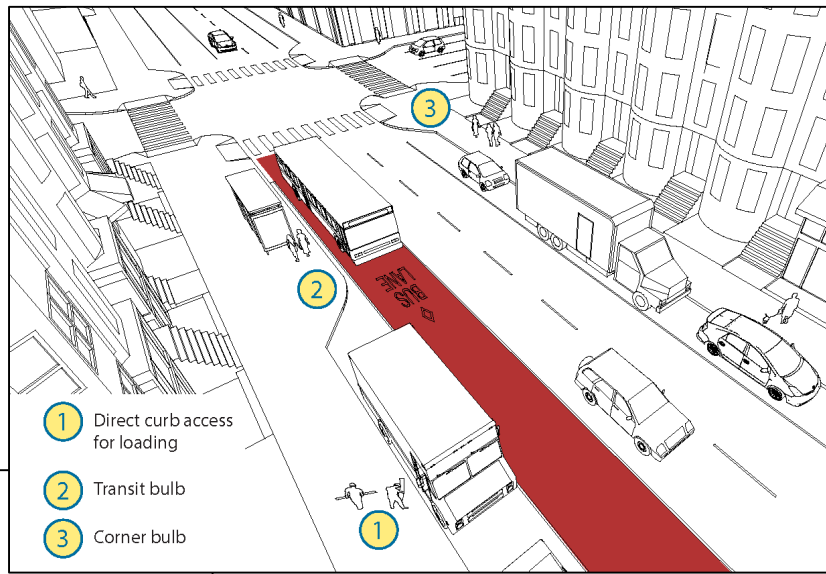
- Drivers
- Non-motorized travelers
- General public



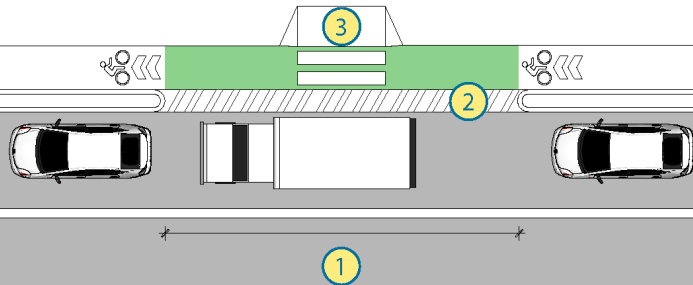
# Space for parking, loading, and delivery



# Design Solutions



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



# Regulatory Solutions



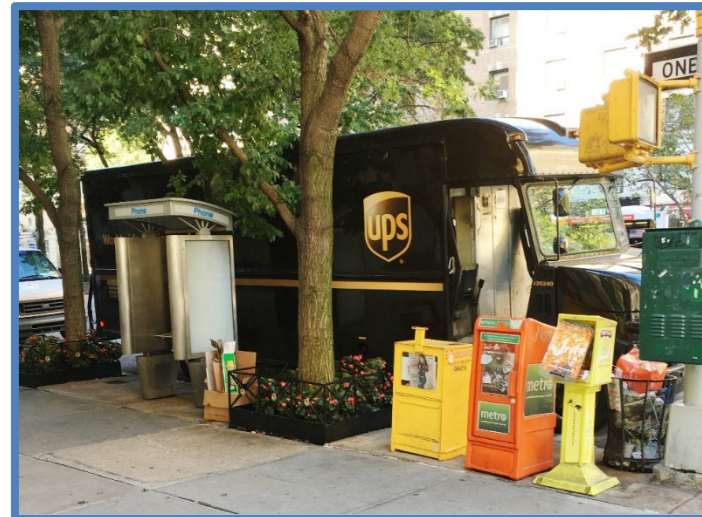


# Operational Solutions

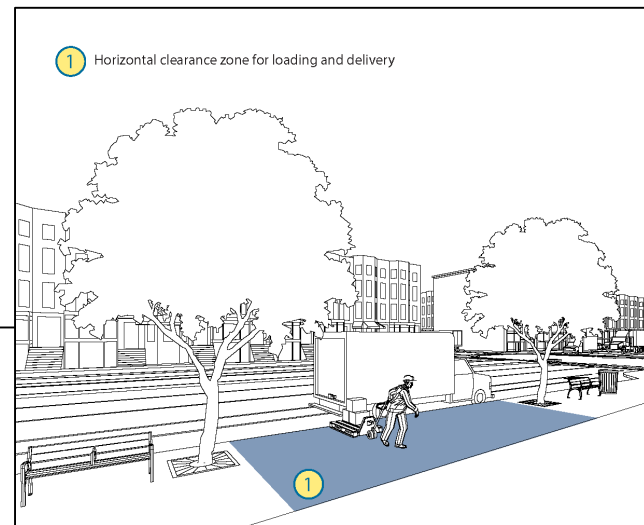
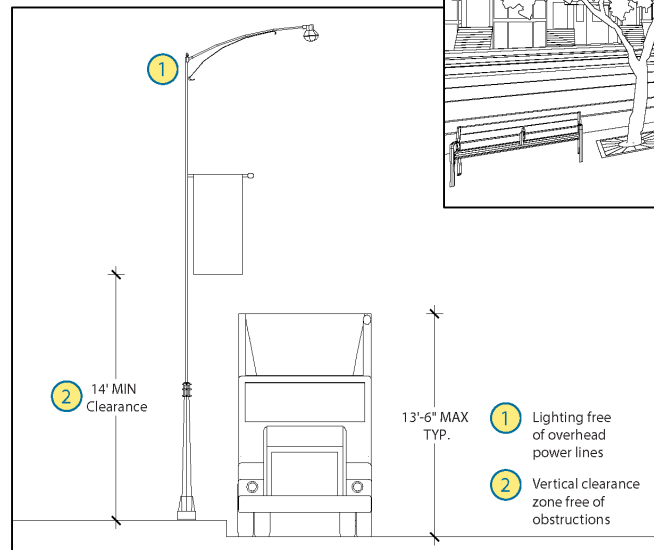
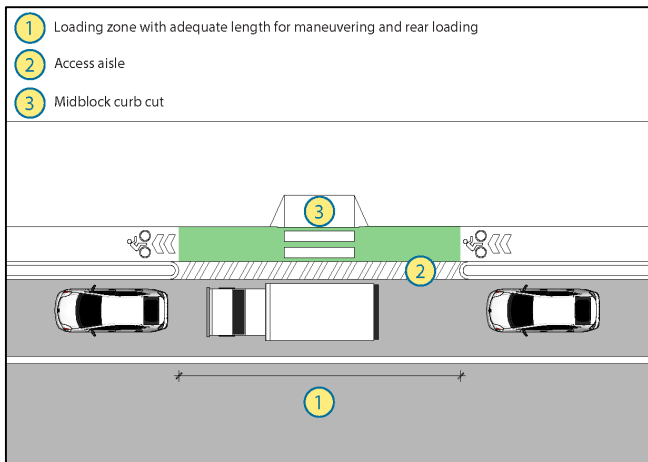
- Building Delivery Management
  - Centralized delivery location
  - Secure storage room
  - Lockers
  - Loading dock appointment system
- Enforcement
  - Commercial vehicles
  - Loading zone obstructions



# Curb and building access



# Design Solutions



# 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

Method	Benefits	Challenges/Concerns
Shift deliveries to non-peak hours <ul style="list-style-type: none"> <li>• Early morning</li> <li>• Late evening</li> <li>• Overnight</li> </ul>	For operator: <ul style="list-style-type: none"> <li>• Reduce travel time delays, fuel costs, and parking fines</li> </ul>	For operator: <ul style="list-style-type: none"> <li>• Increase driver labor costs</li> <li>• Increase safety risk</li> </ul>
	For business: <ul style="list-style-type: none"> <li>• Receive deliveries when few customers present</li> </ul>	For business: <ul style="list-style-type: none"> <li>• Additional staff costs for off-hour receipt</li> </ul>
	For neighborhood: <ul style="list-style-type: none"> <li>• Reduce congestion impacts</li> <li>• Reduce demand for shared curb space</li> </ul>	For neighborhood <ul style="list-style-type: none"> <li>• Generate delivery noise at night</li> </ul>

# Consolidation Center

Method	Benefits	Challenges/Concerns
Transfer goods from large freight vehicles to small, green vehicles for final delivery	For operator: <ul style="list-style-type: none"> <li>• Avoid expensive last mile costs</li> </ul>	For operator: <ul style="list-style-type: none"> <li>• Increase costs for transloading</li> <li>• Lose final delivery visibility</li> </ul>
Consolidate goods from multiple carriers onto shared vehicles	For business: <ul style="list-style-type: none"> <li>• May provide value added services</li> <li>• May improve reliability</li> </ul>	For business: <ul style="list-style-type: none"> <li>• May have to pay premium for services</li> </ul>
	For neighborhood: <ul style="list-style-type: none"> <li>• Reduce large vehicle trips</li> <li>• Reduce demand for parking</li> <li>• Reduce emissions</li> </ul>	For neighborhood <ul style="list-style-type: none"> <li>• May increase local VMT</li> <li>• May require public subsidy for start-up, operations</li> </ul>

# Lockers and Pickup Points

Method	Benefits	Challenges/Concerns
<b>Lockers:</b> Secure locker where package can be accessed via security code; may be located in residential area, public space, or local business	For operator: <ul style="list-style-type: none"> <li>• Avoid expensive failed deliveries, repeat trips</li> </ul>	For operator: <ul style="list-style-type: none"> <li>• Difficult to identify host business</li> </ul>
	For residents: <ul style="list-style-type: none"> <li>• Provide secure location to leave package</li> </ul>	For residents: <ul style="list-style-type: none"> <li>• May be at risk during pickup</li> </ul>
<b>Pick-up Points:</b> Staffed delivery points at local businesses (e.g. pharmacy, grocery store)	For neighborhood: <ul style="list-style-type: none"> <li>• Reduce delivery trips</li> </ul>	For neighborhood: <ul style="list-style-type: none"> <li>• May need public space</li> </ul>
	For host business: <ul style="list-style-type: none"> <li>• Generate foot traffic</li> </ul>	For host business: <ul style="list-style-type: none"> <li>• May use floor space</li> </ul>

# Acknowledgements

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Guidebook can be accessed from:

<https://www.metrotrans.org/news/new-metrofreight-publication-a-guidebook-for-considering-freight-in-complete-street-design->