Last Mile Freight Study
Overview, Methods and Approach, & Analysis Results

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Goods Movement & Transportation Finance Dept.
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www.scag.ca.gov
Overview of Key Trends

Digitally enabled consumers driving most of the eCommerce demand see bargaining power shifting toward them.

Rise of the digital consumer

Empowers:

- Greater choice
- Faster reviews
- Low switching costs

So they seek:

- Lower prices
- Greater convenience
- Seamless experience
  - Buying
  - Paying
  - Receiving
  - Returning

Retailers and Deliverers with:

- More competition
- Easier aggregation of services
- Better visibility in supply chain

So they provide:

We have crossed barriers in choice, transparency, and service expectations.

Source: Accenture analysis
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E-Commerce

E-Commerce v. In-Store Retail Sales

Source: U.S. Census Bureau: Monthly Retail Trade & Quarterly E-Commerce Reports
E-Commerce Forecast

2018 E-Commerce Sales Market Share ($515 billion)

- Amazon – 41%
- eBay, Walmart & Apple – 15%
- Remaining top 15 – 11%
- Remaining top 500 – 23%
- Remaining top 1,000 – 5%

Key Trends

The last mile, which holds key to the consumer experience, has witnessed an emergence of multiple delivery models.

Last mile delivery models

- A) Postal mail-run
- B) Courier delivery 1
- C) Courier delivery to lockers
- D) Lifestyle/Crowd-shippers' delivery to homes similar to courier
- Lifestyle/Crowd-shippers delivery to lockers
- Crowd-shippers delivery to lockers
- Parcel lockers/Access points

Consumer convenience and cost reduction have been primary objectives guiding the change.
U.S. Ride Sharing Customers & Global Demographic Makeup of Customers

Source: Statista
Study Goals

• Improve the regional understanding of last-mile delivery conditions, challenges, and solutions
• Understand the challenges and needs from a variety of users
• Quantify delivery issues and conditions
• Balance conflicting demands for street space
• Develop strategies appropriate for different areas
• Identify pilot projects for delivery improvements
• Have a stakeholder-driven process
Study Elements

• Stakeholder input
• Citywide data analysis
• Data collection
• Case study recommendations, pilot project concepts and toolbox of strategies
• Final products and resources
Stakeholder Input

- Project Advisory Committee (PAC)
- Delivery/receiver interviews
- Input used at several points to interpret data and approach
- Pilot project concept collaboration
Citywide Data Analysis

- Defined existing conditions
  - Screening parameters
  - Street typologies
- Identified case study locations

GIS Screening by Attributes
- 90,000 Blocks

Mapping Screen Locations and Visually Identify Clusters
- 605 Screened Blocks
- (35 blocks)

Visual Review of Block Clusters

Added to Draft Case Study List
- 17 Case Studies

PAC Input
Findings – Citywide Analysis

Street Typologies in Los Angeles:
20% Commercial*
10% Industrial
60% Residential
10% Alley, Service Roads

*2% CBDs
## Findings – Citywide Analysis

<table>
<thead>
<tr>
<th>Typologies</th>
<th>Blocks</th>
<th>Truck Volume</th>
<th>Collisions</th>
<th>Parking Tickets</th>
<th>Deliveries</th>
<th>Bus Stops</th>
<th>Parking Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Daily 5-Year</td>
<td>1-Year</td>
<td>Daily</td>
<td>Total</td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>Regional Commercial Major</td>
<td>1%</td>
<td>191</td>
<td>0.25</td>
<td>11.82</td>
<td>89.5</td>
<td>1.3</td>
<td>4.2</td>
</tr>
<tr>
<td>Regional Commercial Minor</td>
<td>1%</td>
<td>150</td>
<td>0.03</td>
<td>2.98</td>
<td>50.4</td>
<td>0.2</td>
<td>4.6</td>
</tr>
<tr>
<td>General Commercial Major</td>
<td>8%</td>
<td>126</td>
<td>0.24</td>
<td>0.65</td>
<td>15.8</td>
<td>0.7</td>
<td>2.0</td>
</tr>
<tr>
<td>General Commercial Minor</td>
<td>10%</td>
<td>115</td>
<td>0.02</td>
<td>0.31</td>
<td>7.6</td>
<td>0.1</td>
<td>0.8</td>
</tr>
<tr>
<td>Industrial Major</td>
<td>4%</td>
<td>234</td>
<td>0.39</td>
<td>1.25</td>
<td>21.2</td>
<td>0.6</td>
<td>0.8</td>
</tr>
<tr>
<td>Industrial Minor</td>
<td>6%</td>
<td>169</td>
<td>0.02</td>
<td>1.27</td>
<td>19.8</td>
<td>0.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Residential Major</td>
<td>5%</td>
<td>81</td>
<td>0.10</td>
<td>0.45</td>
<td>2.3</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Residential Minor</td>
<td>55%</td>
<td>20</td>
<td>0.01</td>
<td>0.04</td>
<td>1.2</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>All Commercial/Industrial Typologies</td>
<td>30%</td>
<td>147</td>
<td>0.13</td>
<td>1.15</td>
<td>17.8</td>
<td>0.3</td>
<td>1.3</td>
</tr>
<tr>
<td>All Blocks in the City</td>
<td>30%</td>
<td>60</td>
<td>0.05</td>
<td>0.38</td>
<td>6.7</td>
<td>0.1</td>
<td>0.4</td>
</tr>
</tbody>
</table>

### Citywide Data gaps
- Curb designation and regulation
- Off-street loading docks
Data Collection

- Case study areas
- Data collection plan
- Sample collection & analysis
- Full data collection (35 blocks), processing & review
- Analysis tool

<table>
<thead>
<tr>
<th>Case Study Area</th>
<th>Neighborhood</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilshire Boulevard, Bixel Street, Lucas Avenue</td>
<td>Westlake</td>
<td>5 blocks</td>
</tr>
<tr>
<td>Hill Street - Downtown</td>
<td>Jewelry District</td>
<td>2 blocks</td>
</tr>
<tr>
<td>Whitley Street</td>
<td>Hollywood</td>
<td>1 block</td>
</tr>
<tr>
<td>Santee Street</td>
<td>Garment District</td>
<td>2 blocks</td>
</tr>
<tr>
<td>Main Street and Broadway</td>
<td>Venice</td>
<td>3 blocks</td>
</tr>
<tr>
<td>6th - 8th, Grand, Hope and Olive</td>
<td>Downtown</td>
<td>6 blocks</td>
</tr>
<tr>
<td>Ventura Boulevard</td>
<td>Encino</td>
<td>2 blocks</td>
</tr>
<tr>
<td>Grand Avenue, 6th, 11th, 14th Streets</td>
<td>San Pedro</td>
<td>2 blocks</td>
</tr>
<tr>
<td>Westwood, Galey, Kinross</td>
<td>Westwood</td>
<td>4 blocks</td>
</tr>
<tr>
<td>Traction Avenue/2nd St.</td>
<td>Arts District</td>
<td>2 blocks</td>
</tr>
<tr>
<td>North Spring/North Broadway</td>
<td>Chinatown</td>
<td>4 blocks</td>
</tr>
<tr>
<td>Cesar Chavez Avenue</td>
<td>Boyle Heights</td>
<td>2 blocks</td>
</tr>
</tbody>
</table>
### Field Data Collection

#### Curb Utilization

<table>
<thead>
<tr>
<th>Curb Location</th>
<th>Time In/Out</th>
<th>Addl Location</th>
<th>Vehicle Type</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifier</td>
<td>Fill in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red Zone</td>
<td></td>
<td></td>
<td>Car/Personal Vehicle</td>
<td>Parked</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In Driveway</td>
<td>Waiting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TNC (Uber/Lyft)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Used Driveway to Park</td>
<td></td>
<td>Waiting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On Curb</td>
<td>Delivery Truck</td>
<td>Parcel Deliveries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In Travel Lane</td>
<td>Postal Truck</td>
<td>Collecting Mail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In Bus Lane</td>
<td>Service Truck/Van</td>
<td>Other pick-up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In Bike Lane</td>
<td>Food Truck</td>
<td>Other Deliveries (e.g. linen)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alley</td>
<td>Large Truck (18-wheeler)</td>
<td>Bulk Food Delivery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>Other Truck/Van</td>
<td>Food Delivery Service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Motorcycle</td>
<td>Utility Service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bus</td>
<td>Other</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bicycle</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pedestrian</td>
<td></td>
</tr>
</tbody>
</table>

#### Case Study block (Location Key)

```
Column A: Hill Street
Row 1: Red Zone
Row 2: Driveway
Row 3: Red Zone
Row 4: Metered Parking
Row 5: Driveway
Row 6: Red Zone
Row 7: Driveway
Row 8: Crosswalk
Row 9: Driveway
Row 10: Metered Parking
Row 11: Metered Parking
Row 12: Driveway
Row 13: Red Zone
Row 14: Red Zone
Row 15: Loading Zone (signed)
Row 16: Metered Parking
Row 17: Metered Parking
Row 18: Metered Parking
Row 19: Metered Parking
Row 20: Metered Parking
Row 21: Red Zone
Row 22: Driveway
Row 23: Crosswalk
Row 24: Driveway
Row 25: Loading Zone
Row 26: Driveway
Row 27: Driveway
Row 28: Metered Parking
Row 29: Metered Parking
Row 30: Red Zone
```
Field Data Collection

- How should the data be collected: Video vs. Technician
  - Video – fixed point, limited in view, visual record
  - Technician – move around obstacles, may be overloaded, no visual record
Field Data Collection

Video Technique Observations:
• 150 feet of resolution due to “Renaissance perspective”
• One point perspective – vanishing point
Field Data Collection

Technician Technique Observations:

- Technicians did not report being ‘overwhelmed’
- Could record all activity – verified with video
- No additional time to tabulate data
- Adjusting/cleaning records was required
Field Data Collection

Video Pilot on Hill Street s/o 6th Street (Downtown)
- Five cameras deployed
- 24-hour period
Field Data Collection

Video Camera Field Deployment
Field Data Collection

Video Pilot on Hill Street (Downtown) – West Side Duration

West Curb Occupancy by Activity - 9 am - 6 pm

- A lot of passenger and short delivery
- Delivery from alley
- USPS parked

Location:
A
B
### Field Data Collection

<table>
<thead>
<tr>
<th>Case Study Location</th>
<th>Delivery Frequency (from GIS Screening)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DailyDeliveries/Block</td>
</tr>
<tr>
<td></td>
<td>84 306 1,045 63 18 265 59 49 78 206 15 652 340 194 72 59 14 228</td>
</tr>
<tr>
<td></td>
<td>Citations/Block (yearly)</td>
</tr>
<tr>
<td></td>
<td>82 87 9 6 90 13 66 48 93 48 22 3 240 5 160 189 21 73</td>
</tr>
</tbody>
</table>

#### Issues

- **"Cruising" by commercial delivery vehicles**
- **Designated commercial zones occupied by non-commercial vehicles**
- **Lack of adequate alley loading**
- **Lack of adequate off-street loading bays**
- **Multiple deliveries/pick-ups from the same block throughout a day**
- **TNC (e.g., Uber/Lyft) use impedes curbside access**
- **Use of red curb zones for commercial deliveries**
- **Vehicles with handicap placards occupy majority of on-street parking spaces, reducing curbside space for commercial delivery**
- **Parking in travel lanes (aka "double parking") by commercial delivery vehicles**
- **Available curb space occupied by other elements (e.g., bike share stations, paratransits)**
- **Commercial deliveries occurring in bike lanes**
- **Private vehicles acting as commercial delivery vehicles utilizing on-street parking**
- **Deliveries blocking transit**
- **Count**

- 6 13 6 8 4 11 6 11 6 6 11 11 9 6 6 10
Findings - Field Data Collection

In case study blocks:

- White Zone: 12.2 actions per day
- Yellow Zone: 8.2 actions per day
- Red Zones 5.3 actions per day
- Parking: 4.3 actions per day
- Alleys: 3.5 actions per day

<table>
<thead>
<tr>
<th>Action</th>
<th>Parked</th>
<th>Passenger</th>
<th>Delivery</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>1.9</td>
<td>2.7</td>
<td>0.7</td>
<td>5.3</td>
</tr>
<tr>
<td>Parking</td>
<td>3.9</td>
<td>0.2</td>
<td>0.2</td>
<td>4.3</td>
</tr>
<tr>
<td>Yellow</td>
<td>5.2</td>
<td>0.4</td>
<td>2.6</td>
<td>8.2</td>
</tr>
<tr>
<td>Driveway</td>
<td>1.0</td>
<td>0.9</td>
<td>0.5</td>
<td>2.4</td>
</tr>
<tr>
<td>Crosswalk</td>
<td>0.9</td>
<td>0.3</td>
<td>0.1</td>
<td>1.3</td>
</tr>
<tr>
<td>White</td>
<td>5.6</td>
<td>5.0</td>
<td>1.6</td>
<td>12.2</td>
</tr>
<tr>
<td>Alley</td>
<td>2.4</td>
<td>0.7</td>
<td>0.4</td>
<td>3.5</td>
</tr>
</tbody>
</table>
Findings - Field Data Collection

- Parking and loading had the longest durations
- Parking was about 1:30 hour
  - Parking outside of parking spots was 25 minutes on average
- Passenger loadings was 2 minutes on average but large range
- Loading was about 30 minutes on average

<table>
<thead>
<tr>
<th>Action</th>
<th>Curb</th>
<th>Parked</th>
<th>Passenger</th>
<th>Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>0:25:05</td>
<td>0:01:07</td>
<td>0:24:22</td>
<td></td>
</tr>
<tr>
<td>Parking</td>
<td>1:30:45</td>
<td>0:07:15</td>
<td>0:36:29</td>
<td></td>
</tr>
<tr>
<td>Yellow</td>
<td>0:27:08</td>
<td>0:05:20</td>
<td>0:33:29</td>
<td></td>
</tr>
<tr>
<td>Driveway</td>
<td>0:35:52</td>
<td>0:03:22</td>
<td>0:22:31</td>
<td></td>
</tr>
<tr>
<td>Crosswalk</td>
<td>0:02:16</td>
<td>0:02:20</td>
<td>0:14:17</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>0:35:29</td>
<td>0:03:44</td>
<td>0:36:34</td>
<td></td>
</tr>
<tr>
<td>Alley</td>
<td>0:09:29</td>
<td>0:03:01</td>
<td>0:45:59</td>
<td></td>
</tr>
<tr>
<td>Bike Share</td>
<td>0:06:00</td>
<td>0:02:00</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1:04:08</td>
<td>0:02:02</td>
<td>0:29:53</td>
<td></td>
</tr>
<tr>
<td><strong>Outside Parking</strong></td>
<td>0:27:09</td>
<td>0:01:43</td>
<td>0:28:53</td>
<td></td>
</tr>
</tbody>
</table>
Findings - Delivery Vehicle Analysis

- Delivery vehicles were 61% of all deliveries – 70% package/parcel (FedEx/UPS/USPS)
- All types split evenly between zones with trucks being the exception for yellow, red and parking zones

<table>
<thead>
<tr>
<th>Type</th>
<th>All Deliveries</th>
<th>Type of Curb Area Used for Deliveries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery Vehicle</td>
<td>61%</td>
<td>Yellow: 38% White: 9% Red: 34% Parking: 11% Other (Driveway): 7%</td>
</tr>
<tr>
<td>Personal Vehicle</td>
<td>25%</td>
<td>Yellow: 31% White: 3% Red: 43% Parking: 11% Other (Driveway): 11%</td>
</tr>
<tr>
<td>Truck</td>
<td>7%</td>
<td>Yellow: 50% White: 8% Red: 15% Parking: 19% Other (Driveway): 8%</td>
</tr>
<tr>
<td>Other (e.g. Utility Truck)</td>
<td>7%</td>
<td>Yellow: 35% White: 9% Red: 43% Parking: 9% Other (Driveway): 4%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>Yellow: 37% White: 7% Red: 36% Parking: 12% Other (Driveway): 6%</td>
</tr>
</tbody>
</table>
Findings - Transportation Network Company Analysis

- TNCs were 10% of all passenger loading
- They utilized red zones nearly twice as much as personal vehicles and taxis—and less likely to use white zones

<table>
<thead>
<tr>
<th>Type</th>
<th>All Passenger Loading</th>
<th>Type of Curb Area Used For Passenger Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Red      Parking   Yellow    White       Other (Driveway)</td>
</tr>
<tr>
<td>TNC / (e.g. Uber Lyft)</td>
<td>10%</td>
<td>73%      9%         3%         5%         10%</td>
</tr>
<tr>
<td>Taxi / Shuttle</td>
<td>3%</td>
<td>44%      15%        11%        19%        11%</td>
</tr>
<tr>
<td>Bus</td>
<td>46%</td>
<td>99%      0%         0%         0%         1%</td>
</tr>
<tr>
<td>Personal Vehicle</td>
<td>41%</td>
<td>47%      12%        5%         27%        9%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>73%      6%         3%         12%        7%</td>
</tr>
</tbody>
</table>
Findings - Time of Day

- Deliveries peak during business hours in the middle of the day
- Follows general travel trends but more concentrated before and after commuting hours (delivery in-transit hours)
- Deliveries traveling during peak congestion periods
41 recommendations in case study blocks

**Loading Zone Strategies**
- Creation, extension or shifting the location of yellow zones within blocks

**Alley Strategies**
- Develop commercial-only alleys
- Implement commercial parking spots in one-way alleys

**Lane Strategies**
- Consider Floating/Offset transit lane
- Install concrete pads at loading zones
- Provide for signed median loading in two-way left turn lanes (TWLTL) where feasible and safe.

**Shared Space Recommendations**
- Consider options for making the curb and roadway area a flex area
- Consider the expanded use of removable bollards
Recommendations - Toolbox of Strategies

LMF Delivery Strategy Categories

Curb Area
1. Curb Loading Areas
2. Manage Curb Demand
3. Shared Space
4. Operating Hours
5. Restricted Locations

Delivery Cos. and Receivers
1. Delivery Consolidation
2. Building/ Parking Improvements
3. Vehicle Options

Application / Implementation
1. Enforcement
2. Technology
3. Education
Recommendations - Pilot Project Concepts

1. Cargo eBike Delivery Pilot
2. Off Peak Delivery Program
3. Data Sharing/Collection
4. Common Carrier Lockers
5. Zero Emission Infrastructure/Vehicle
6. LA Express Park Commercial Module/Permitted Parking
7. Code the Curb
8. Integration of Postal Service Guidelines into Building Code
Curb Space Management Study

8-12 cities will be selected for detailed study from the 6 counties in SCAG region.

Site recommendations and pilot project areas will be determined through public participation, stakeholder engagement, and technical analysis.

- Build from LMFS
- Expand analysis coverage
- Consider all modes/uses
- Enhance data collection framework
- Further support pilot projects & implementation strategies
Thank you for your involvement!

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