

Last Mile Freight Study

Overview, Methods and Approach, Analysis & Recommendations

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FHWA Talking Freight Seminar

November 20, 2019

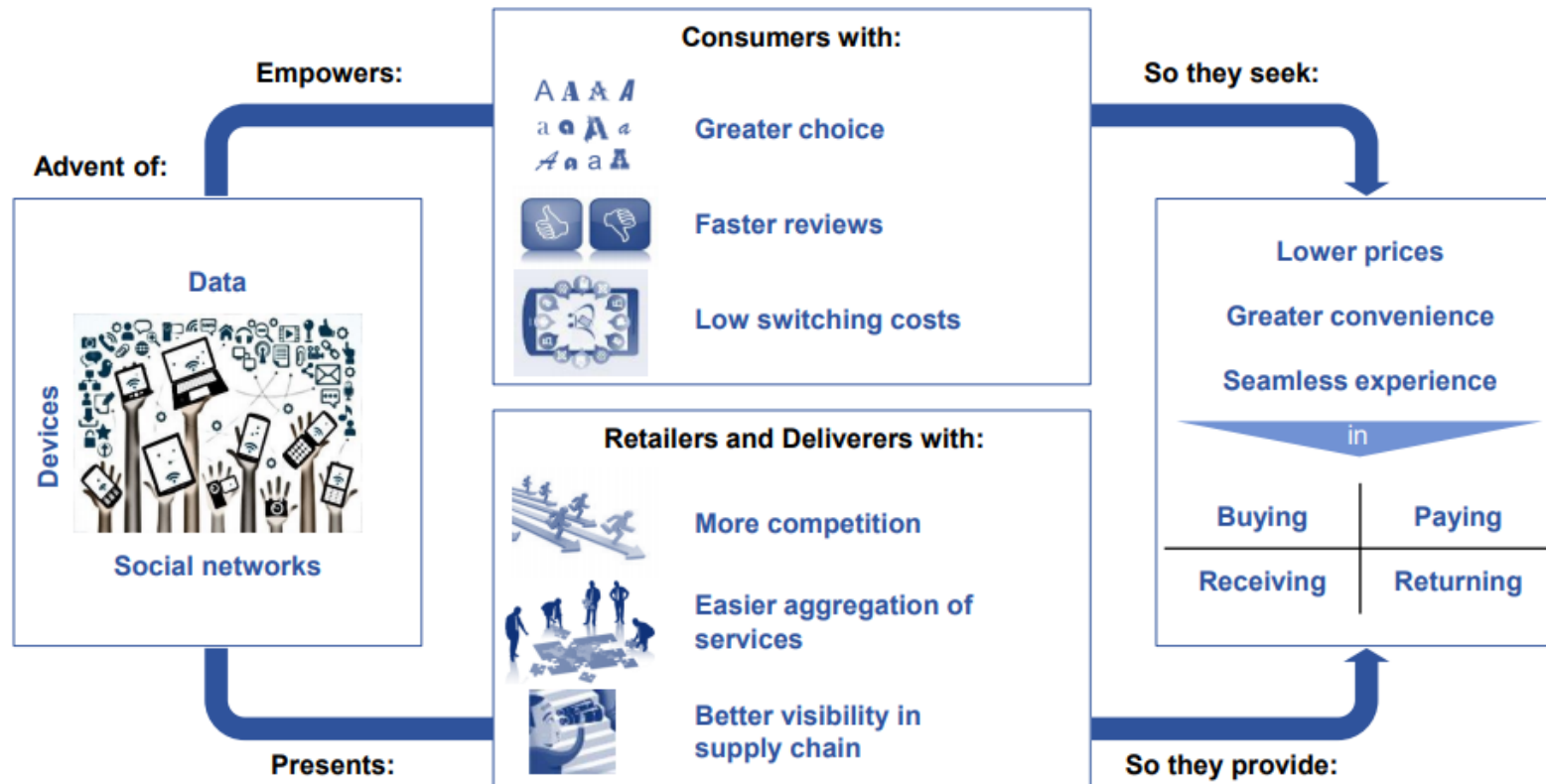
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Overview of Key Trends

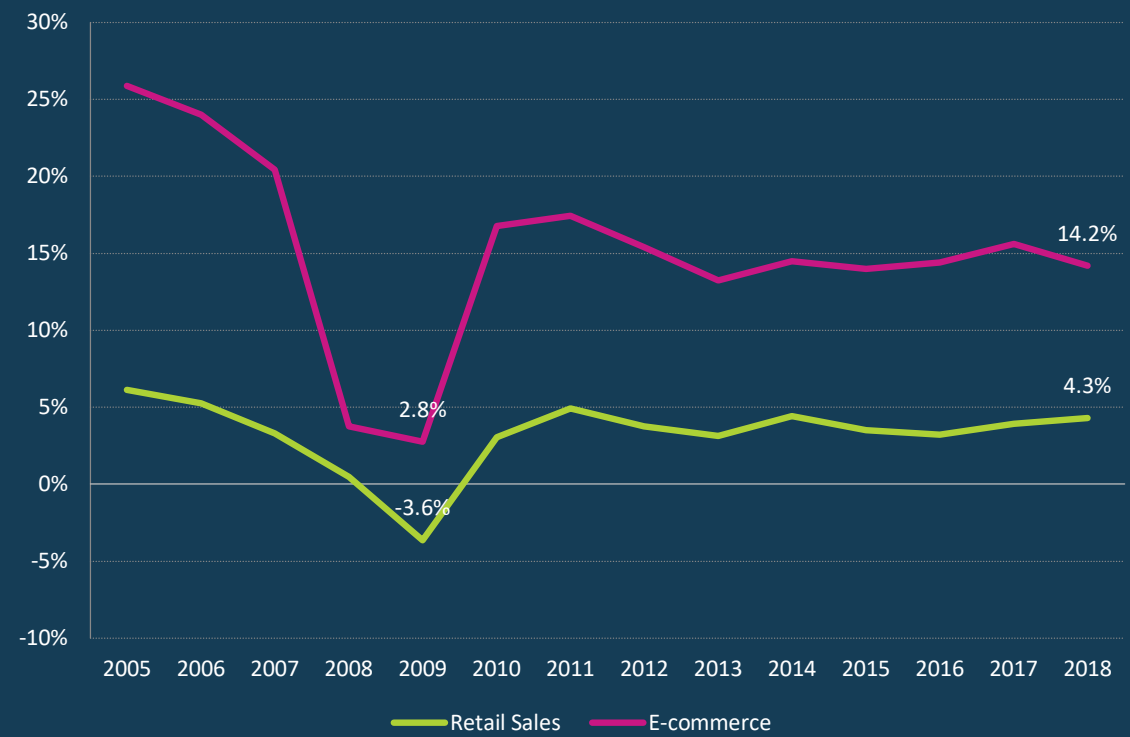
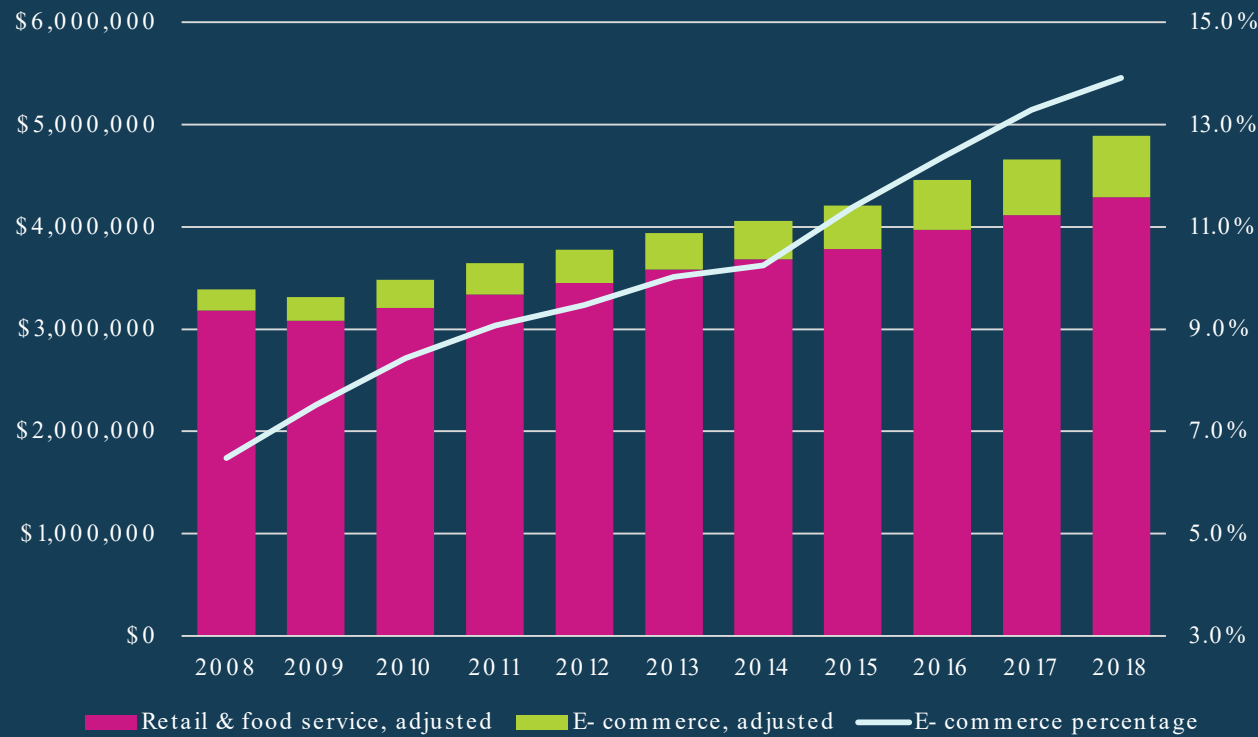
Digitally enabled consumers driving most of the eCommerce demand see bargaining power shifting toward them

Rise of the digital consumer



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

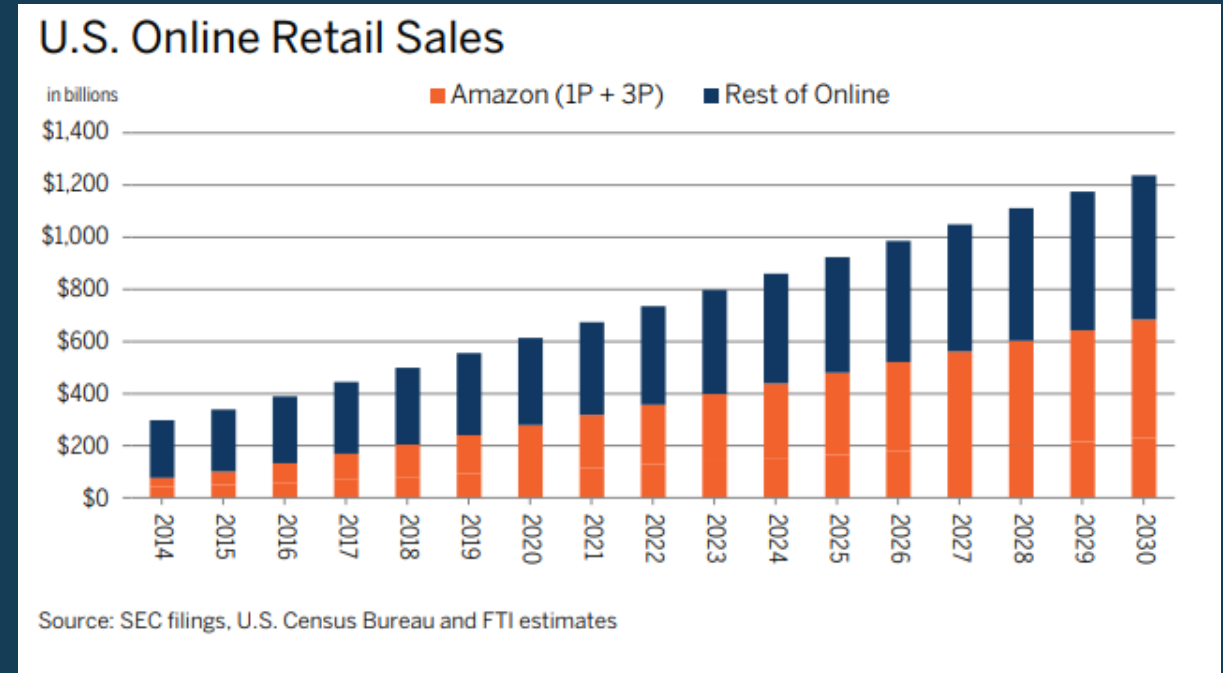
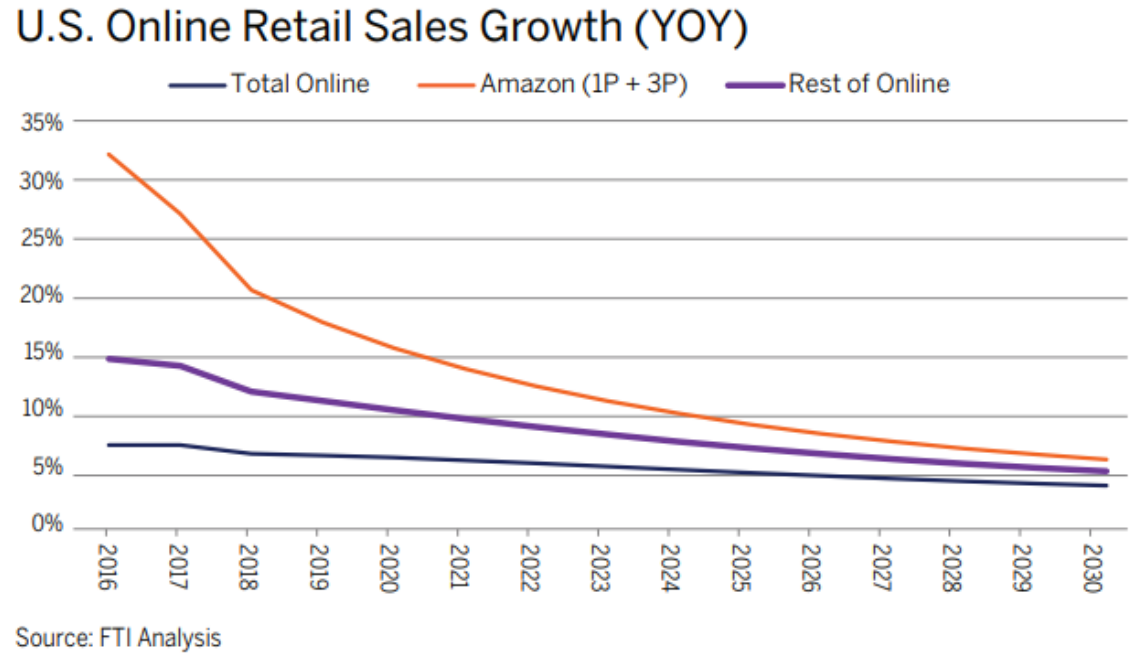
E-Commerce v. In-Store Retail Sales



E-Commerce Forecast

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

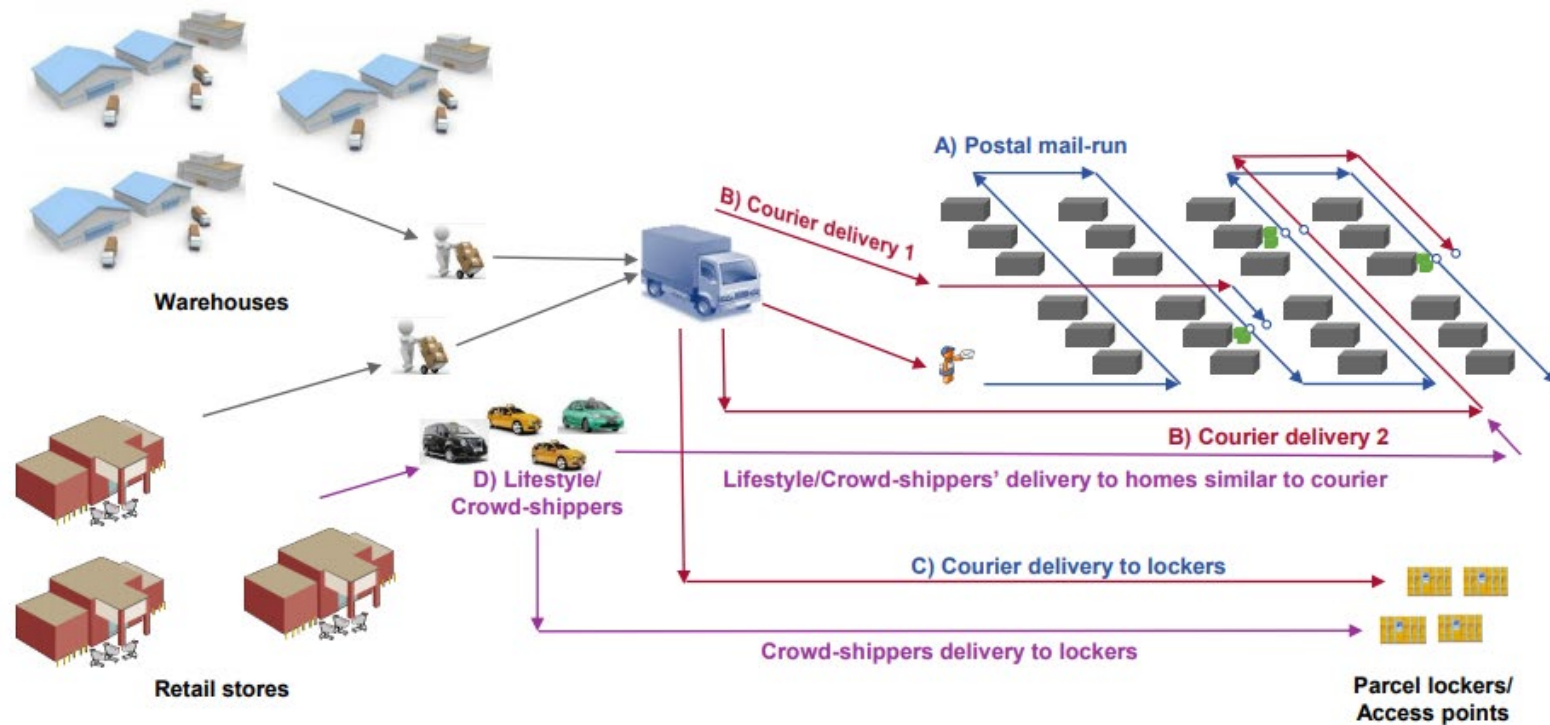
- Amazon – 41%
- eBay, Walmart & Apple – 15%
- Remaining top 15 – 11%
- Remaining top 500 – 23%
- Remaining top 1,000 – 5%



Source: FTI Consulting, U.S. Census Bureau Quarterly E-Commerce Report, SEC Filings, eMarketer, Digital Commerce 360

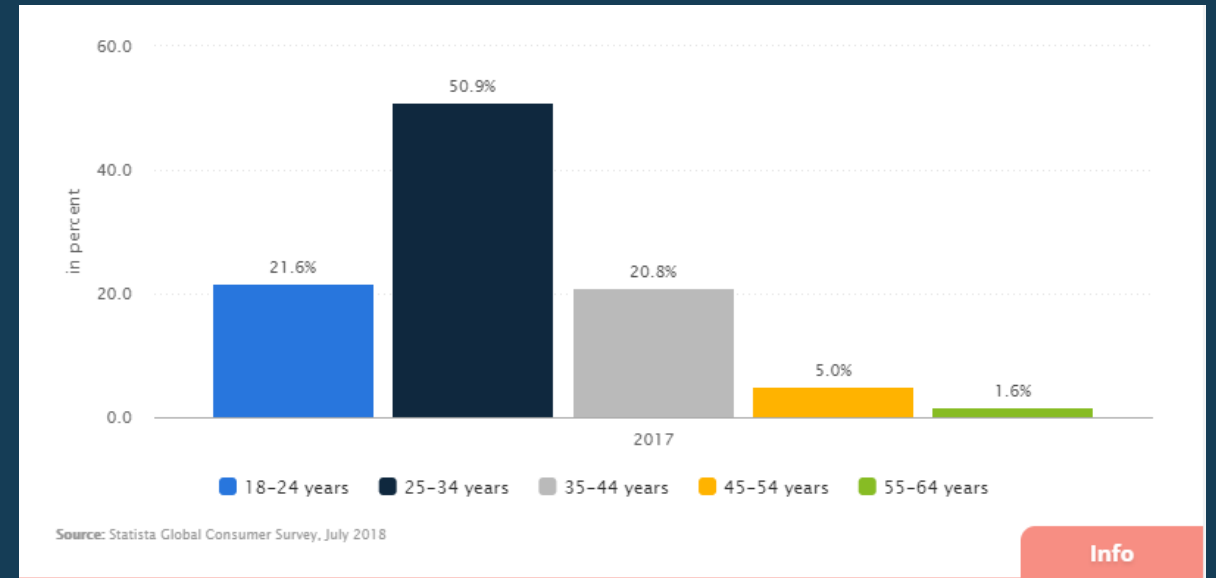
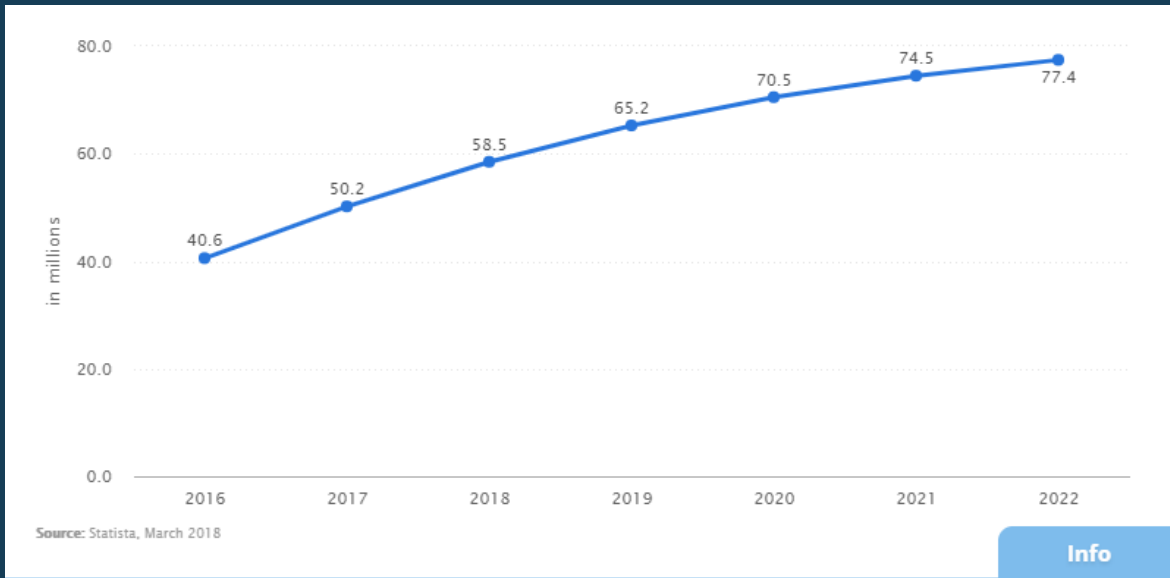
The last mile, which holds key to the consumer experience, has witnessed an emergence of multiple delivery models

Last mile delivery models



Consumer convenience and cost reduction have been primary objectives guiding the change

U.S. Ride Sharing Customers & Global Demographic Makeup of Customers



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
 - Definition of typologies
- Data collection
- Solutions
 - Literature review
 - Case study recommendations
 - Pilot project concepts
 - Toolbox of strategies
- Final products and outreach



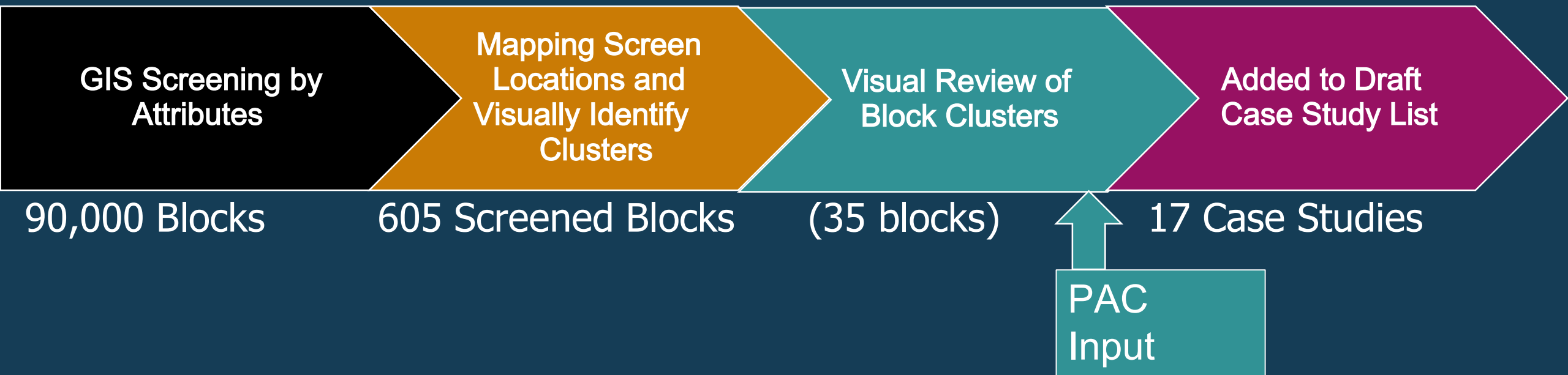
Stakeholder Input

- 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



Findings – Citywide Analysis

Street Typologies in Los Angeles:

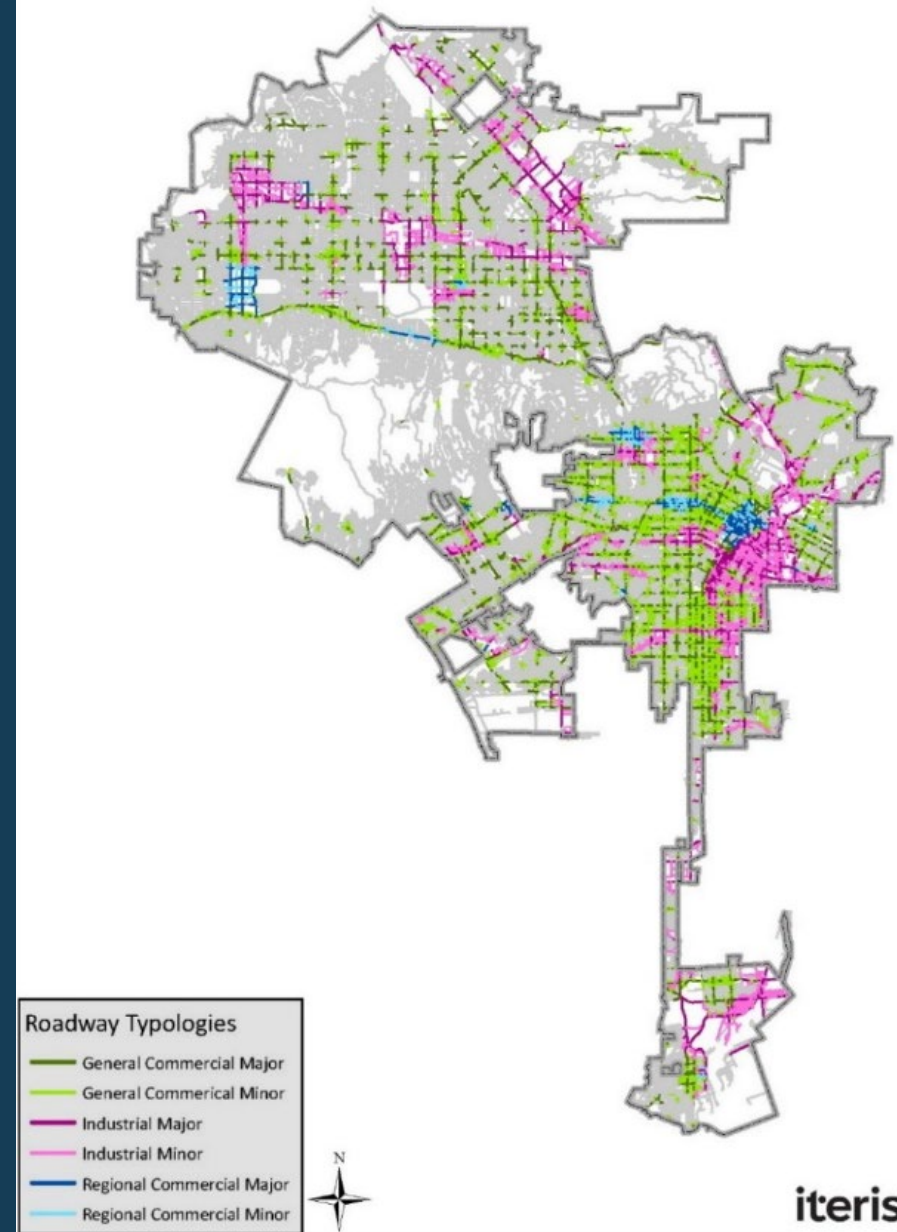
20% Commercial*

10% Industrial

60% Residential

10% Alley, Service Roads

*2% CBDs



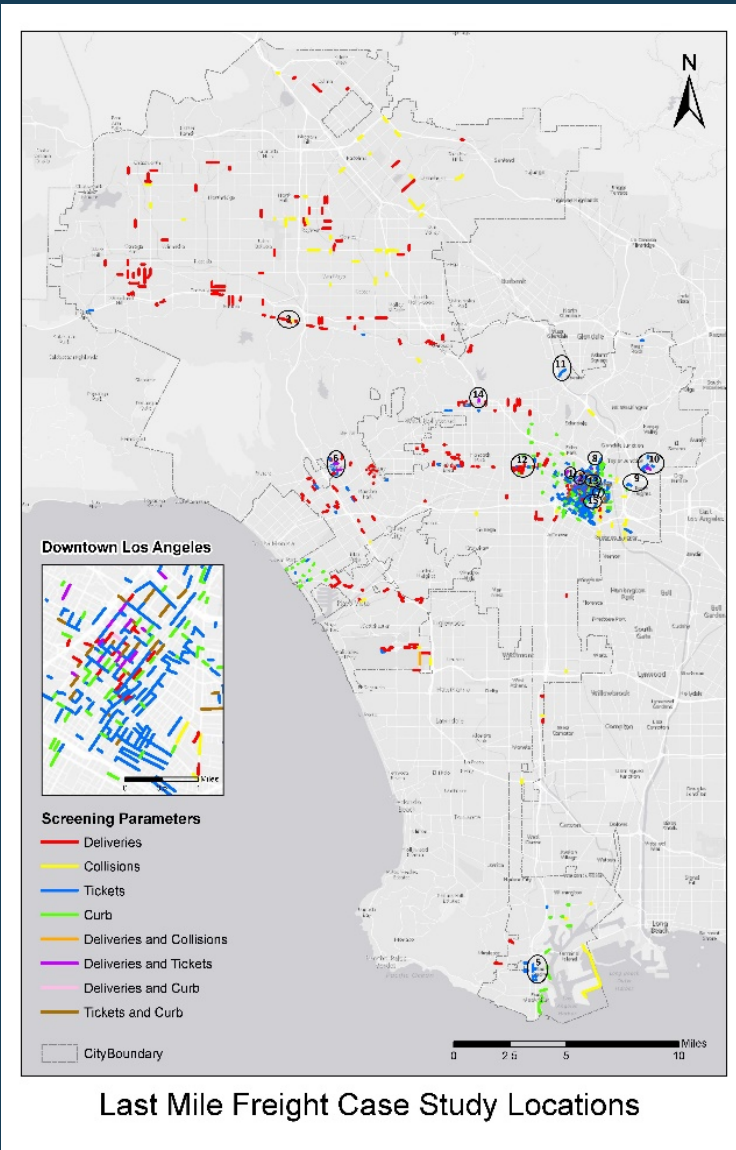
Findings – Citywide Analysis

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

Citywide Data gaps

- Curb designation and regulation
- Off- street loading docks

Data Collection

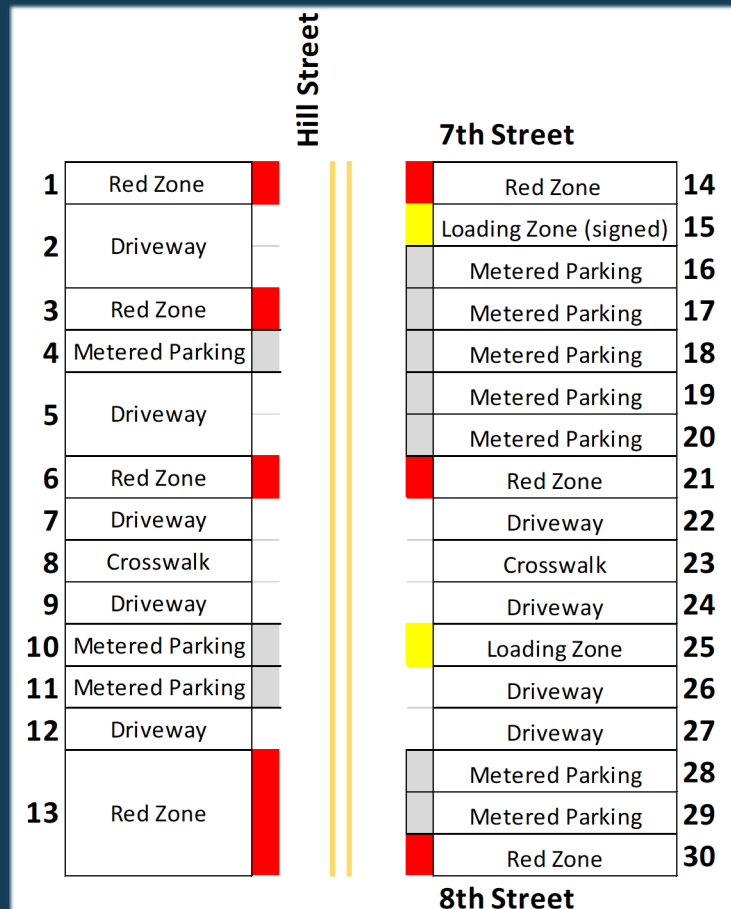


- Case study areas
- Data collection plan
- Sample collection & analysis
- Full data collection (35 blocks), processing & review
- Analysis tool

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

Field Data Collection

Case Study block (Location Key)



Curb Utilization



Curb Location	Time In/Out	Add Location	Vehicle Type	Activity
Identifier	Fill in	Blank if at Curb	Car/Personal Vehicle	Parked
		In Driveway	TNC (Uber/Lyft)	Waiting
		Used Driveway to Park	Taxi	Loading Passengers
		On Curb	Delivery Truck	Parcel Deliveries
		In Travel Lane	Postal Truck	Collecting Mail
		In Bus Lane	Service Truck/Van	Other pick-up
		In Bike Lane	Food Truck	Other Deliveries (e.g. linen)
		Alley	Large Truck (18-wheeler)	Bulk Food Delivery
		Other	Other Truck/Van	Food Delivery Service
			Motorcycle	Utility Service
			Bus	Other
			Bicycle	
			Pedestrian	

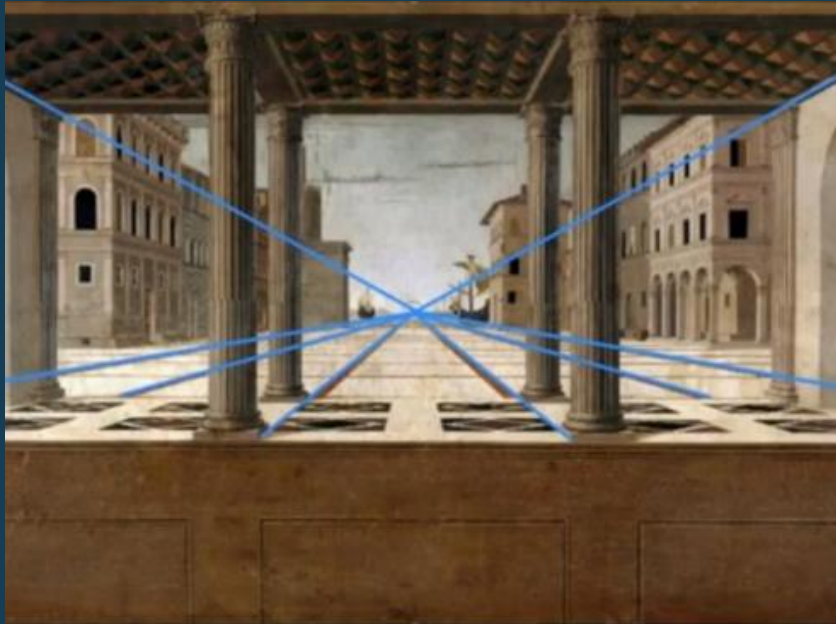
Field Data Collection

- 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

Location: Hill St bet 7th and 8th (Southside)
City: Los Angeles, CA

CURB LOCATION	ADDITIONAL LOCATION		VEHICLE TYPE:	DELIVERY? (Yes/No)	TIME IN	TIME OUT	ACTIVITY					
	At Curb	At Drwy					Parked	Waiting	Dropping off Passenger	Parcel Delivery	Other Delivery	
25	X		VAN	N	-	10:17 AM	X					
27		X	CAR	N	10:20 AM	10:21 AM			X			
27		X	CAR	N	10:29 AM	10:30 AM		X				
28	X		CAR	N	-	10:35 AM		X				
9		X	CAR	N	10:34 AM	10:35 AM			X			
9		X	UBER	N	10:36 AM	10:37 AM			X			
27		X	CAR	N	10:42 AM	10:42 AM			X			
23	X		CAR	N	10:44 AM	10:53 AM		X				
28	X		CAR	N	10:46 AM	10:46 AM		X				
26		X	CAR	N	10:51 AM	10:52 AM		X				
26		X	CAR	N	10:55 AM	10:55 AM		X				
27		X	CAR	N	10:57 AM	10:59 AM		X				
25	X		CAR	N	11:06 AM	11:11 AM			X			
28	X		VAN	N	11:06 AM	-	X					
25	X		VAN	N	-	11:14 AM	X					
25	X		VAN	Y	11:16 AM	12:00 PM					X	
27		X	CAR	N	11:24 AM	11:27 AM	X					
25	X		CAR	Y	11:26 AM	11:33 AM						X
27		X	CAR	N	11:28 AM	11:30 AM		X				
29	X		CAR	N	11:29 AM	11:30 AM	X					
25	X		CAR	N	11:34 AM	-	X					
13	X		CAR	N	11:38 AM	-			X			
25	X		CAR	N	-	11:41 AM	X					
25	X		VAN	N	11:49 AM	-	X					
29	X		CAR	N	11:50 AM	11:52 AM	X					
25	X		CAR	N	11:51 AM	11:52 AM	X					
27		X	CAR	N	11:55 AM	11:58 AM		X				

Video Camera Field Deployment



Field Data Collection

- Issues per Case Study Location from Data Collection Plan

	Case Study Location																		Average Frequency and Total Issues
	Wilshire Boulevard, Bixel Street, Lucas Avenue – Westlake	6th - 8th, Grand, Hope and Olive - Downtown	Ventura Boulevard – Encino	Van Nuys Boulevard – Van Nuys	Grand Avenue, 6th, 11th, 14th Streets - Westwood	Wilshire Boulevard, La Conte, Midvale - Westwood	Avenue/ 2nd St. - Downtown – Arts District (add)	North Spring/North Broadway - Chinatown	Cesar Chavez Avenue - Boyle Heights	USC Medical Center - Boyle Heights	Wilshire Boulevard and side streets - Koreatown	Los Feliz Boulevard - Atwater Village	Hill Street - Downtown Jewelry District	Whitley Street - Hollywood	Santee Street - Downtown Garment District	Crocker Street - Downtown – Skid Row	Main Street and Broadway – Venice		
Delivery Frequency (from GIS Screening)																			
Daily Deliveries/Block	84	306	1,045	63	18	265	59	49	78	206	15	652	340	194	72	59	14	228	
Citations/Block (yearly)	82	87	9	6	90	13	66	48	93	48	22	3	240	5	160	189	21	73	
Issues																			
“Cruising” by commercial delivery vehicles	X	X	X	X	X	X				X	X		X	X	X	X	X	13	
Designated commercial zones occupied by non - commercial vehicles	X	X	X	X	X	X		X	X		X	X	X	X	X	X		13	
Lack of adequate alley loading	X	X				X	X	X			X	X	X	X	X	X	X	12	
Lack of adequate off - street loading bays	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	15	
Multiple deliveries/pick - ups from the same block throughout a day	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	17	
TNC (e.g., Uber/Lyft) use impedes curbside access		X				X		X			X		X	X			X	7	
Use of red curb zones for commercial deliveries		X	X	X		X		X		X	X	X	X	X		X	X	12	
Vehicles with handicap placards occupy majority of on - street parking spaces, reducing curbside space for commercial delivery		X		X		X		X		X	X			X		X	X	9	
Parking in travel lanes (aka “double parking”) by commercial delivery vehicles		X				X	X	X			X		X	X	X	X		9	
Available curb space occupied by other elements (e.g., bike share stations, parklets)		X					X	X	X		X		X				X	7	
Commercial deliveries occurring in bike lanes		X		X		X											X	4	
Private vehicles acting as commercial delivery vehicles utilizing on - street parking		X					X	X	X				X		X	X		7	
Deliveries blocking transit	X	X	X	X		X		X	X	X	X	X	X				X	12	
Count	6	13	6	8	4	11	6	11	6	6	11	6	11	9	6	8	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

Curb	Action			Total
	Parked	Passenger	Delivery	
Red	1.9	2.7	0.7	5.3
Parking	3.9	0.2	0.2	4.3
Yellow	5.2	0.4	2.6	8.2
Driveway	1.0	0.9	0.5	2.4
Crosswalk	0.9	0.3	0.1	1.3
White	5.6	5.0	1.6	12.2
Alley	2.4	0.7	0.4	3.5

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

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

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

Type	All Deliveries	Type of Curb Area Used for Deliveries				
		Yellow	White	Red	Parking	Other (Driveway)
Delivery Vehicle	61%	38%	9%	34%	11%	7%
Personal Vehicle	25%	31%	3%	43%	11%	11%
Truck	7%	50%	8%	15%	19%	8%
Other (e.g. Utility Truck)	7%	35%	9%	43%	9%	4%
Total	100%	37%	7%	36%	12%	6%

Findings - Transportation Network Company Analysis

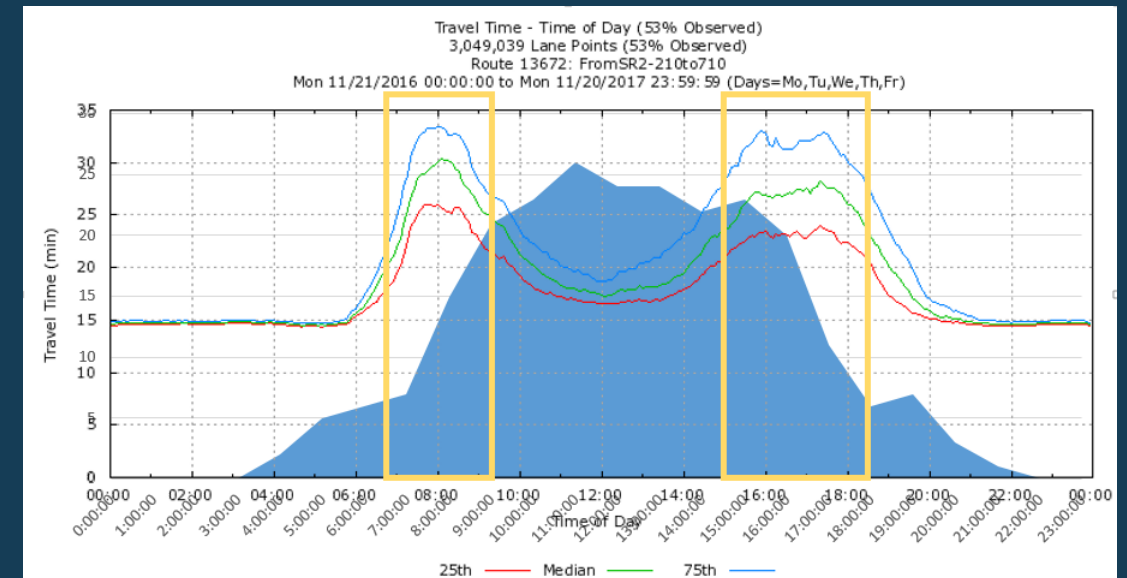
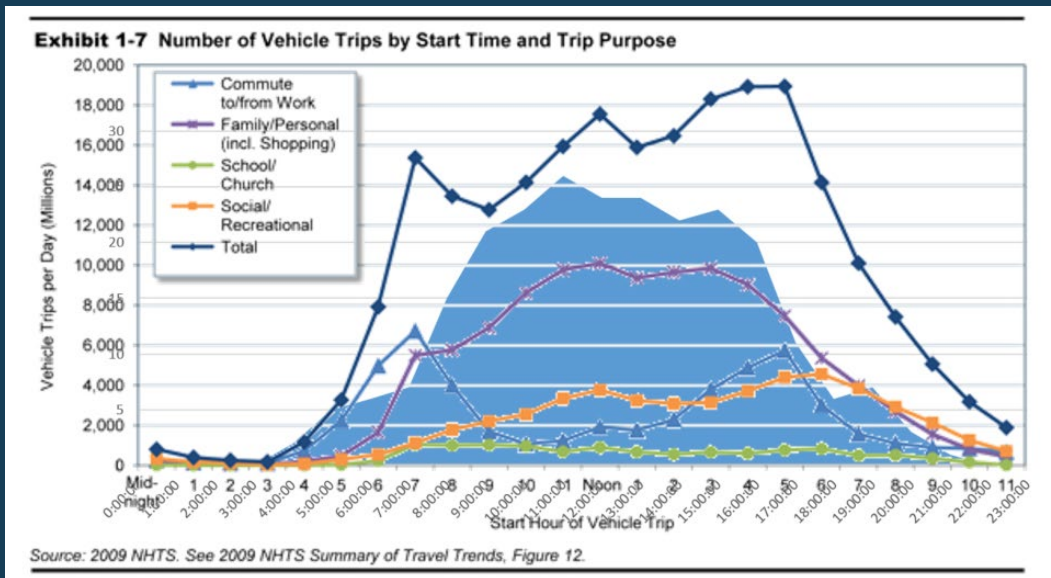


- TNCs were 10% of all passenger loading
- They utilized red zones nearly twice as much as personal vehicles and taxis — and less likely to use white zones

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

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



Three Tiers of Study Recommendations

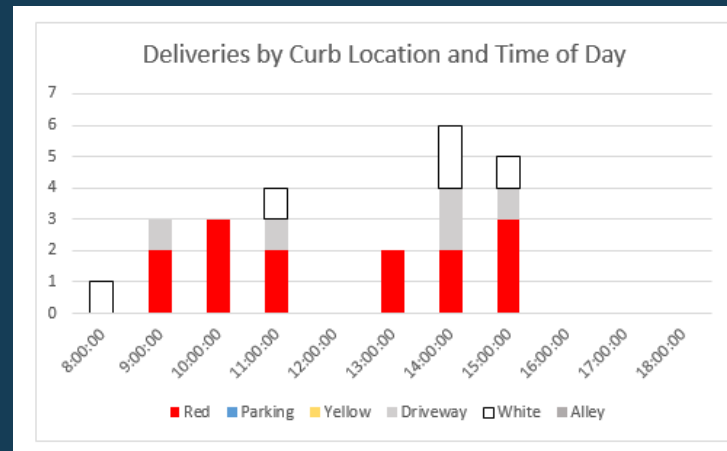
- Block - level recommendations in case study areas
- Pilot project concepts and recommendations for the area or citywide level
- Toolbox of Strategies for general application

Tier 1 - Case Study Recommendations

Case Study #1: Westlake : Wilshire Blvd., Bixel St. Lucas Ave., Witmer St.

Case Study Area Characteristics

Blocks: 12
 Parking Meters: 97
 Annual Truck Tickets (2014): 648 (45 per block)
 UPS/FedEx/USPS Locations: 4
 Bus Stops: 8
 Truck-Related Collisions: 0
 Estimated Daily Deliveries: 877 total; 73 per block
 Average Daily Truck Trips per block: 276

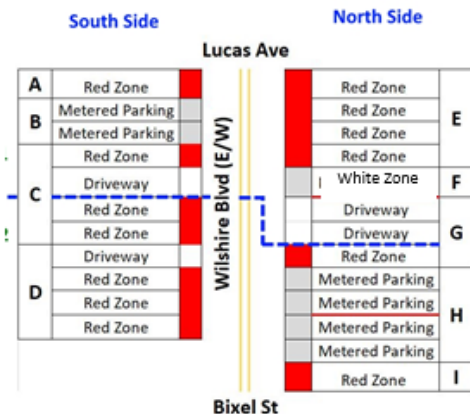


Recommendation 1A.1 Convert White Zone to Yellow Commercial Loading Zone (F) Source: Google Streetview



Recommendation 1A.2 Install Yellow Commercial Loading Zone (C) Source: Google Streetview

Data Collection - Wilshire Blvd Between Bixel and Lucas



Wilshire Blvd. from Bixel St. to Lucas Ave. 8AM to 5PM								
Location	Parked		Passenger		Delivery		Annual Citations	
	#	Avg Duration	#	Avg Duration	#	Avg Duration	Red Zone	White Zone
A Red	1	0:04:59	0		0		1	0
B Parking	10	1:21:41	0		0		2	0
C Red	8	0:02:42	1	0:00:15	2	0:11:22	35	0
D Red	35	0:02:49	65	0:00:34	4	0:16:55	19	0
E Red	13	0:02:44	58	0:00:55	8	0:14:34	11	0
F White	13	0:09:43	14	0:02:40	5	0:42:14	38	69
G Driveway	15	0:04:45	28	0:01:38	6	0:08:27	6	0
H Parking	27	0:44:19	0		0		0	0
I Red	9	0:10:24	5	0:00:33	1	0:42:40	54	0
Total	132	0:18:42	171	0:01:02	26	0:19:40	165	69

Tier 2 - 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

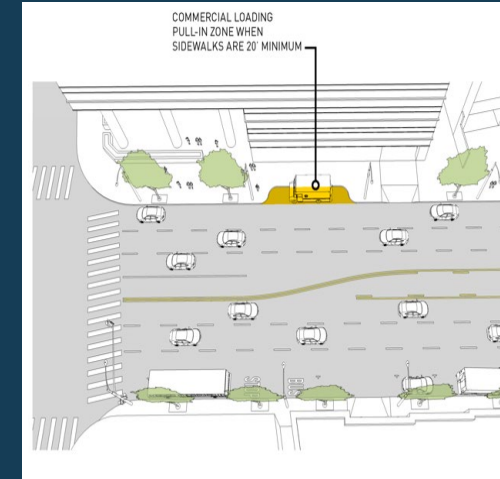
1. Enforcement
2. Technology
3. Education

Tier 2 - Toolbox of Strategies

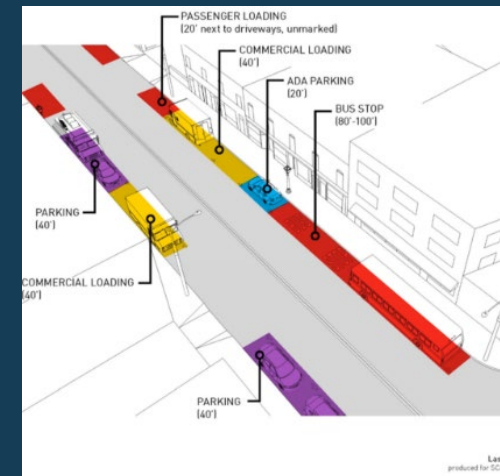
	Curb Area					Deliverers and Receivers			Administration and Application			
	Curb Loading Zone	Manage Curb Demand	Shared Space	Delivery Hours	Restricted Locations	Delivery Consolidation	Building Improvements	Vehicle Options	Enforcement	Outreach and Information	Research	Technology
Inadequate Curb Loading	High	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Excessive ticketing	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Safety of Delivery personnel	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Parking/Loading in Red Zones	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Safety of All Modes	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Inconvenient Delivery	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Passenger Loading	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Inadequate Building Loading	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Missed Deliveries	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Truck Touring	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Lack of clarity in Curb Space	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Congested sidewalk areas	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Bicycle lane infractions	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Emissions from Deliveries	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Noise from Deliveries	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Security of Deliveries	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium

Key:

Level of Correlation/ Effectiveness	
High	
Medium	
Low	



Loading Zone Enhancements



Code the Curb²⁸

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

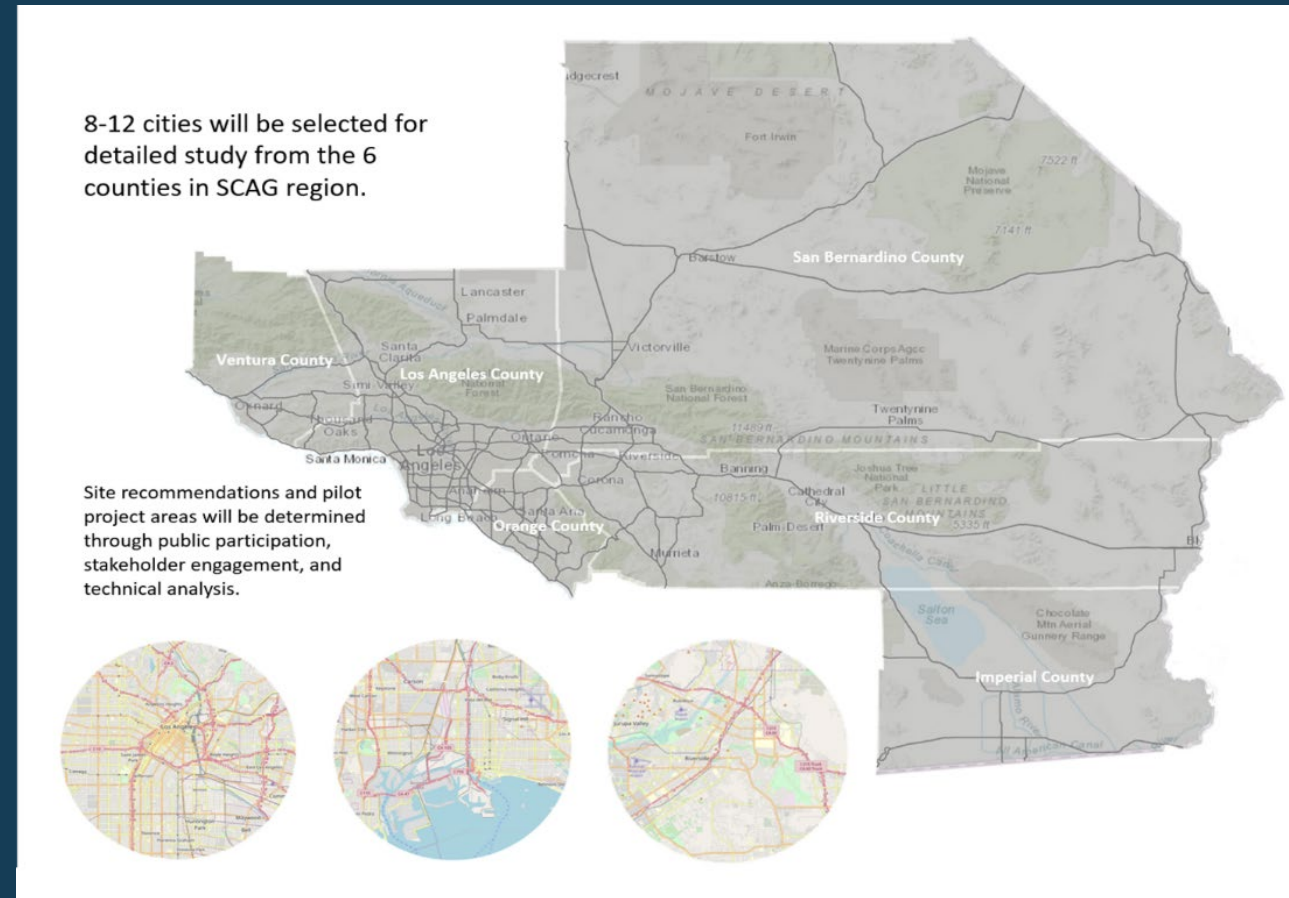
Lessons Learned

- Prioritize: Where does freight fit in with other priorities?
- Optimize: Use data to demonstrate use and need
- Collaborate: Work across departments and sectors to reach goals



Next Steps

- Curb Space Management Study
 - Build from LMFS
 - Expand analysis coverage
 - Consider all modes/uses
 - Enhance data collection framework
 - Further support pilot projects & implementation strategies
- Pilot Project Development
- Education and Outreach



Thank you for your involvement!

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