MF

METROFREIGHT

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FREIGHT IN A BICYCLE-FRIENDLY CITY: AN EXPLORATORY ANALYSIS USING NYC OPEN DATA

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Freight in New York City

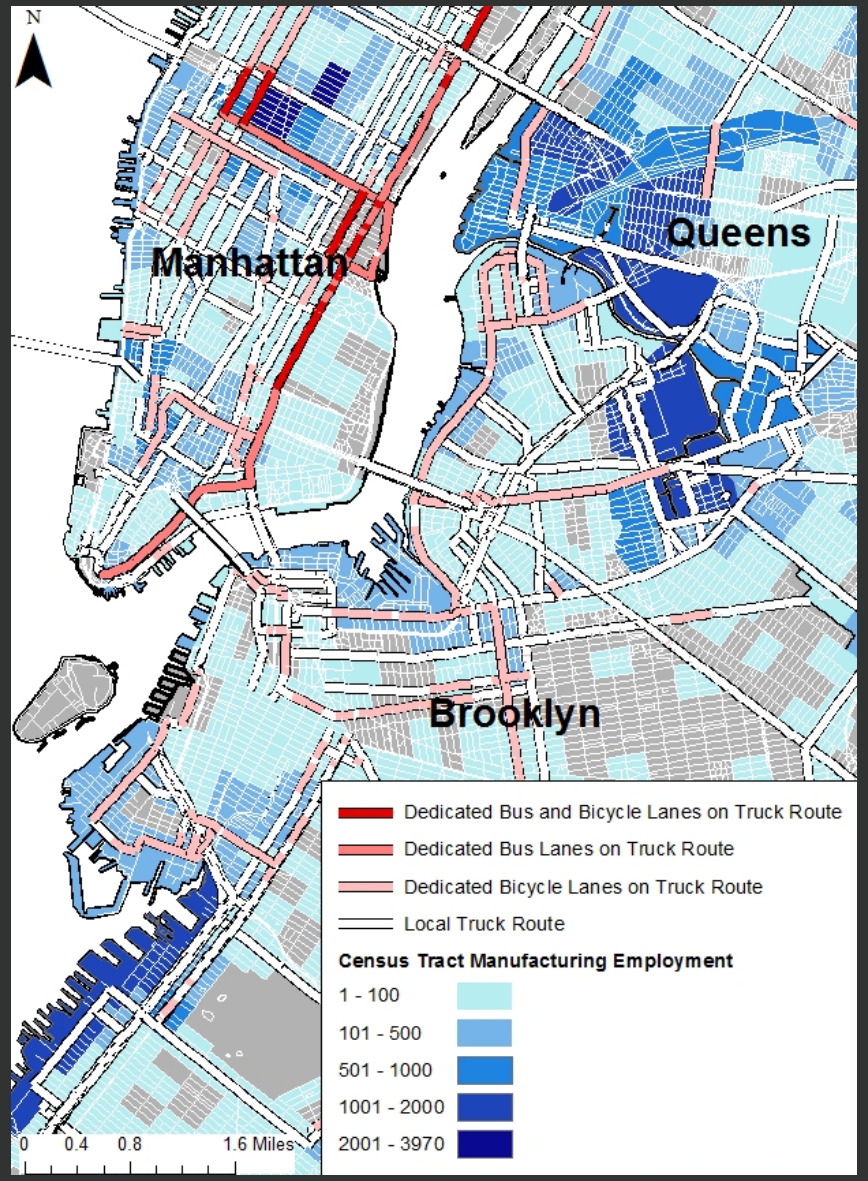
- Population
  - 8.5 million in the Five Boroughs
  - 20+ million in metro areas
- World city with a diverse economy
  - Tremendous local demand
  - Critical foreign trade gateways
- Designated truck routes

Existing Challenges to Urban Goods Movement in NYC

- Widespread traffic congestion (Lomax, Schrank, and Eisele, 2015)
- High parking fines (Holguin-Veras, 2011)
- Expensive tolls (King, Gordon, and Peters, 2014)
- Inadequate available parking for CVs (Jaller, Holguin-Veras, and Hodge, 2013)
- Parking/loading dock requirements not updated since 1950s (Morris, 2009)

New Challenges

- Urban revitalization
- e-Commerce boom
- Shrinking urban street capacity
  - Bicycle network
  - Pedestrian-friendly intersections
  - Bus rapid transit corridors



Expected Impacts

- Reduced lane capacity
- Limited turning radii
- Changes in street directionality
- Lost parking capacity
- Reduced curb access

+ congestion and idling
+ double parking
+ freight VMT

+ emissions
+ accident exposure
+ infrastructure damage
+ industry costs

Project Goal and Approach

- Goal
  - To provide basic quantitative evidence of **truck route impacts** and of **CV-bicycle interactions** on the multimodal network by visualization and basic analysis of NYC open datasets

- Analyses
  - Truck route impacts from bicycle network growth
  - Collision locations
  - Parking conflict locations

NYC Open Datasets

NYC DOT Local Truck Route Network	NYC DOT Bicycle Network	NYPD Collision Data	NYC DOF Parking Violations	NYC DCP Lion Street Centerlines

- Collision data includes only incidents that warrant an NYPD report
- Parking violations are issued only in locations where enforcement is performed

NYC DOT Local Truck Route Network

NYC DOT Bicycle Network

NYPD Collision Data

NYC DOF Parking Violations

NYC DCP Lion Street Centerlines

1. Extent of network overlap
2. Lane types on overlapping network
3. Collision locations by infrastructure type
4. Collision locations vs. freight demand factors
5. Critical violation blocks
6. Parking choices

US Census Population Data

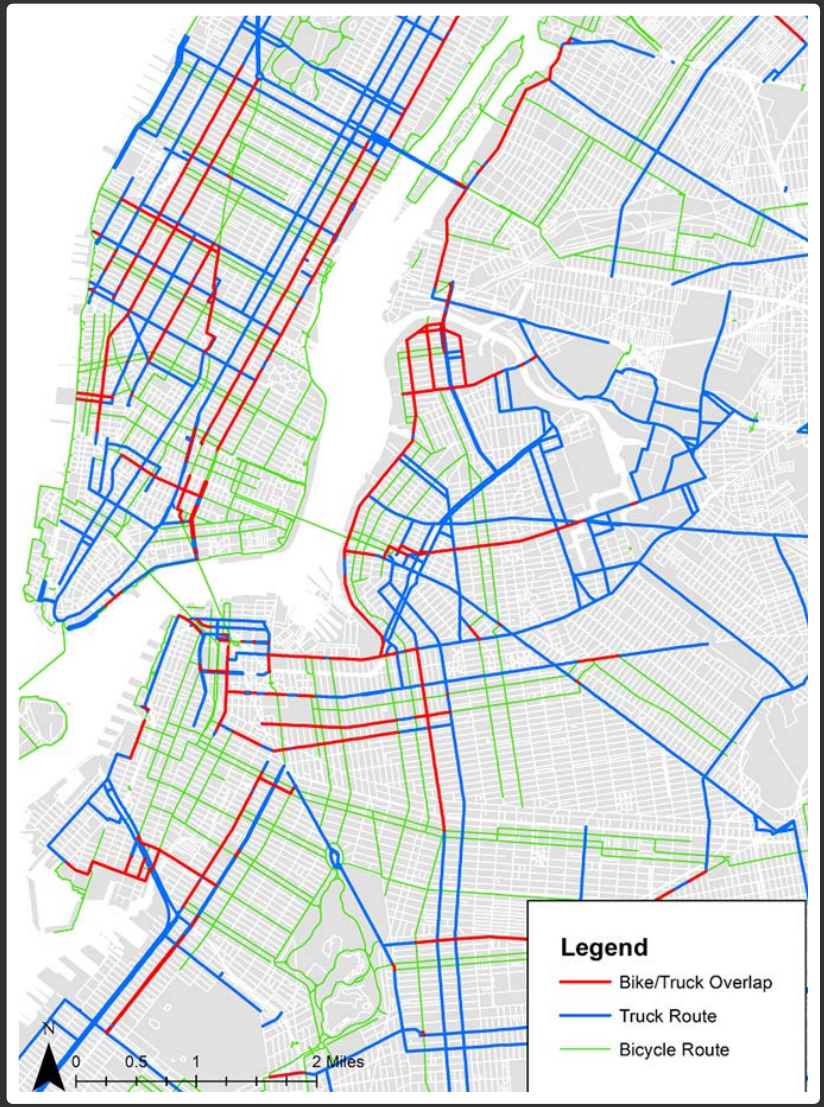
Economic Census LEHD Data

Field Observations

Networks and Overlap

- 794 mi local truck routes
- 604 mi bicycle routes

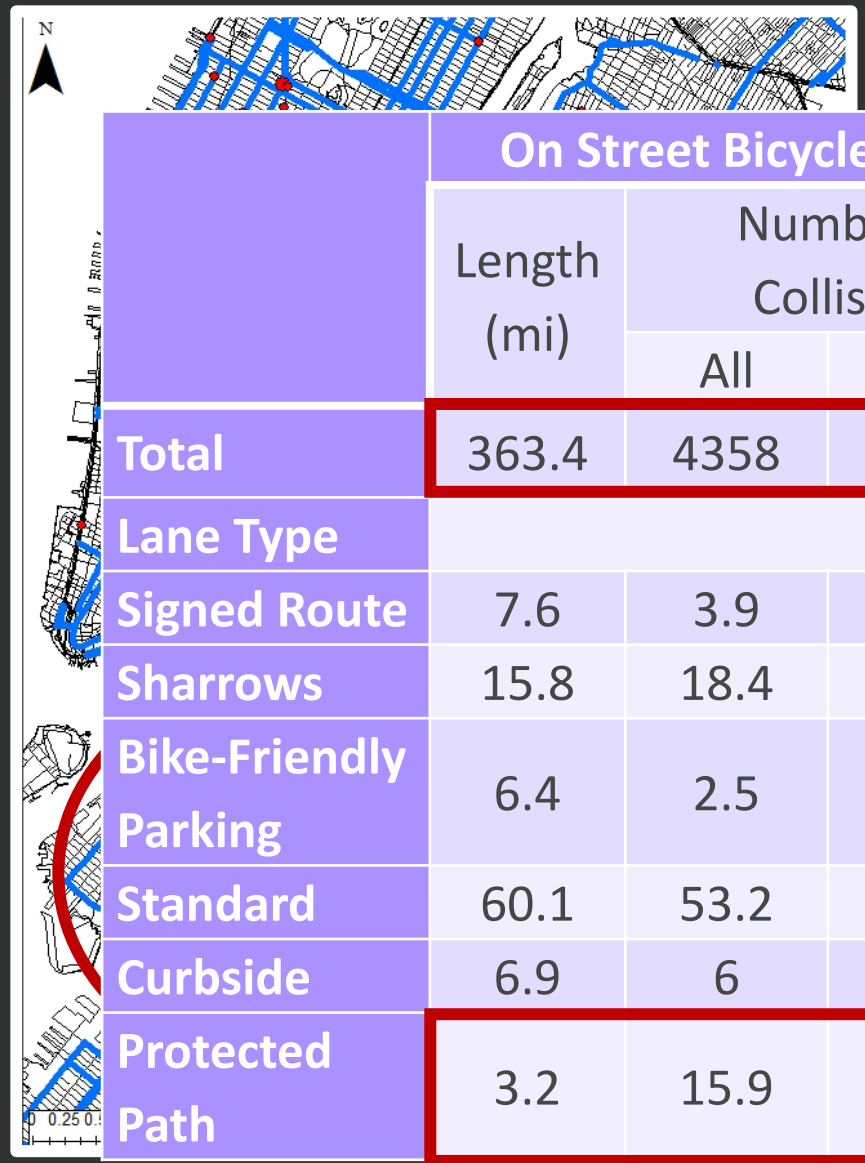
- Overlapping segments
  - 89 miles
  - About 2/3 installed since 2000



Limited Network Lane Classifications

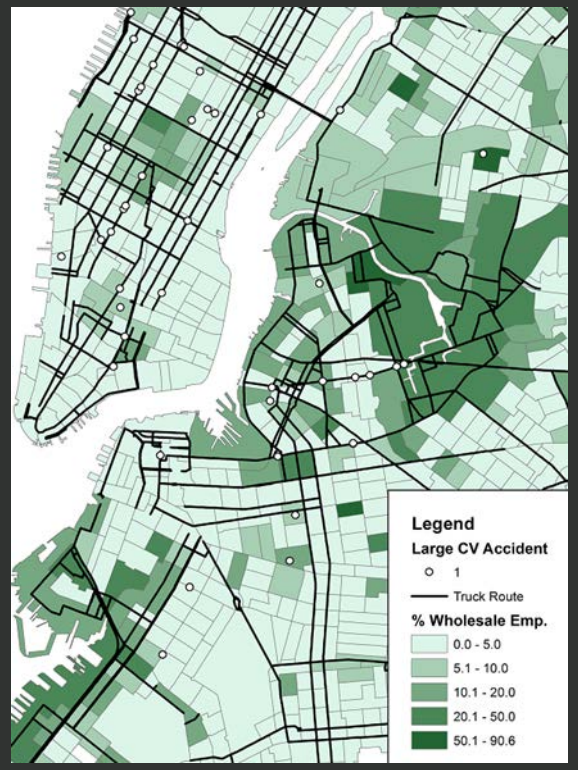
	On-Street Bike Lanes		Truck Route Overlap		Truck Route Overlap Installed Since 2000	
Total Length (mi)	363.4		70.5		55.1	
Lane type	Length	Percent	Length	Percent	Length	Percent
Signed Route	27.7	7.6	3.9	5.5	3.0	5.5
Sharrows	57.4	15.8	14.0	19.9	11.2	20.3
Bike-Friendly Parking	23.4	6.4	7.2	10.3	7.2	13.1
Standard	218.4	60.1	31.3	44.4	23.3	42.3
Curbside	25.0	6.9	6.6	9.4	3.7	6.7
Protected Path	11.7	3.2	7.5	10.6	6.7	12.1

Collision Locations



	On Street Bicycle Lanes			Truck Route Overlap		
	Length (mi)	Number of Collisions		Length (mi)	Number of Collisions	
		All	CV		All	CV
Total	363.4	4358	122	70.5	2282	78
Lane Type	Percent					
Signed Route	7.6	3.9	4.9	3.9	3	2.6
Sharrows	15.8	18.4	16.4	14	18.2	12.8
Bike-Friendly Parking	6.4	2.5	0	7.2	1.6	0
Standard	60.1	53.2	46.7	31.3	44.4	39.7
Curbside	6.9	6	9	6.6	4.3	11.5
Protected Path	3.2	15.9	23	7.5	28.5	33.3

Demand Factors



		Large CV				Small CV			
		Yes	No			Yes	No		
Observations		50	4308			73	4285		
		Median		p-value		Median		p-value	
Population Density		29824	17194	0.123		38350	17041	0.001	**
Employment Density		51023	59104	0.360		71079	59035	0.097	
Share of Employment in Sector	Construction	1.37	1.49	0.940		1.83	1.49	0.428	
	Manufacturing	1.04	0.84	0.172		1.44	0.83	0.052	*
	Wholesale	3.28	1.88	0.014	**	2.60	1.91	0.064	
	Retail	6.87	9.60	0.072	*	8.89	9.60	0.191	
	Transp. & Warehousing	0.78	0.44	0.040	**	0.77	0.44	0.039	**
	Service	60.91	58.32	0.952		61.26	58.32	0.853	
	Entertainment	12.19	14.34	0.260		15.68	14.29		

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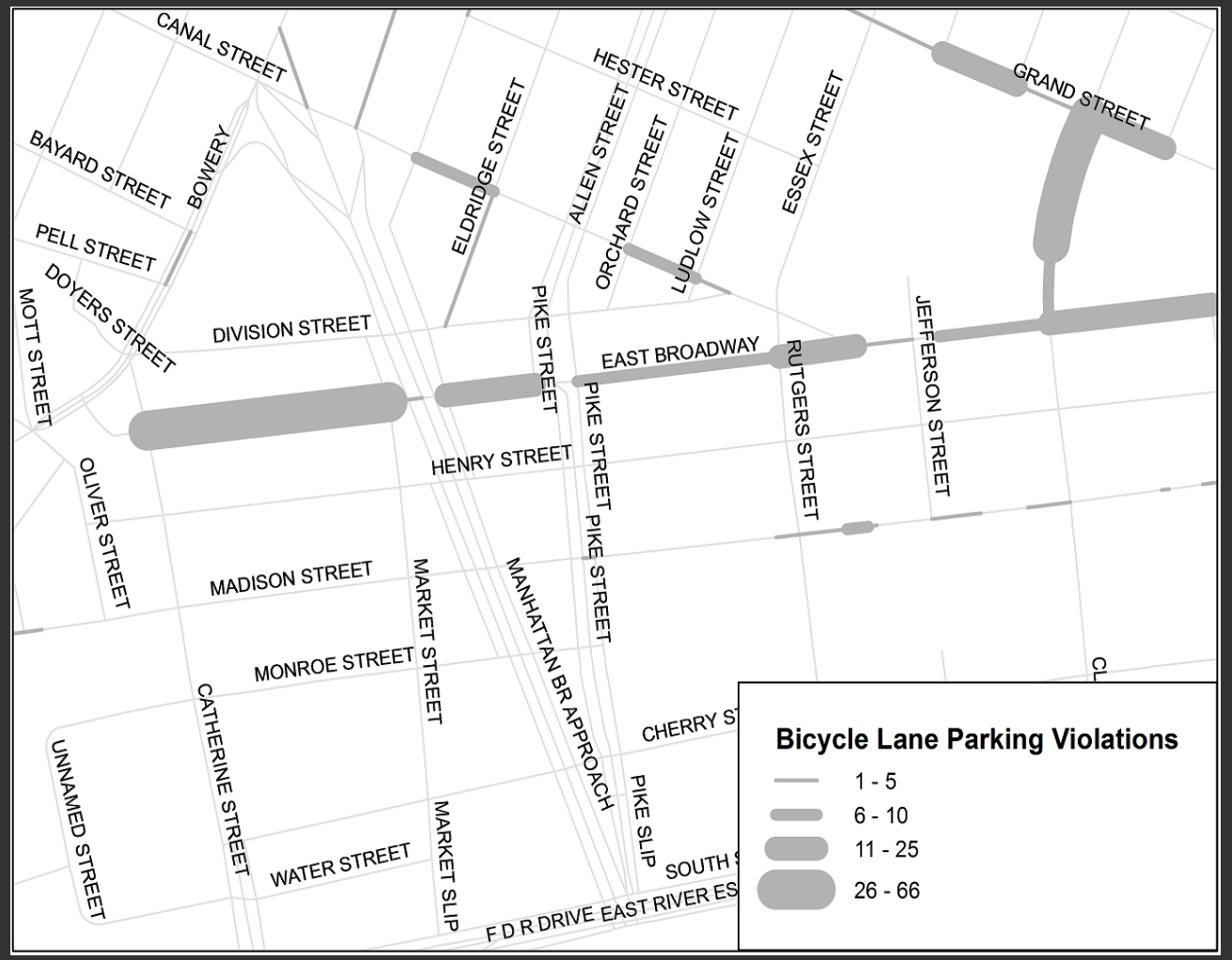
Parking Violations

- 1 million + total parking violations over 3 months
- 4,452 CV bicycle lane violations
- 4,271 on known on-street lane types
- 20+ violations on 23 blocks
  - Standard lanes
  - Four boroughs
  - Varying land uses



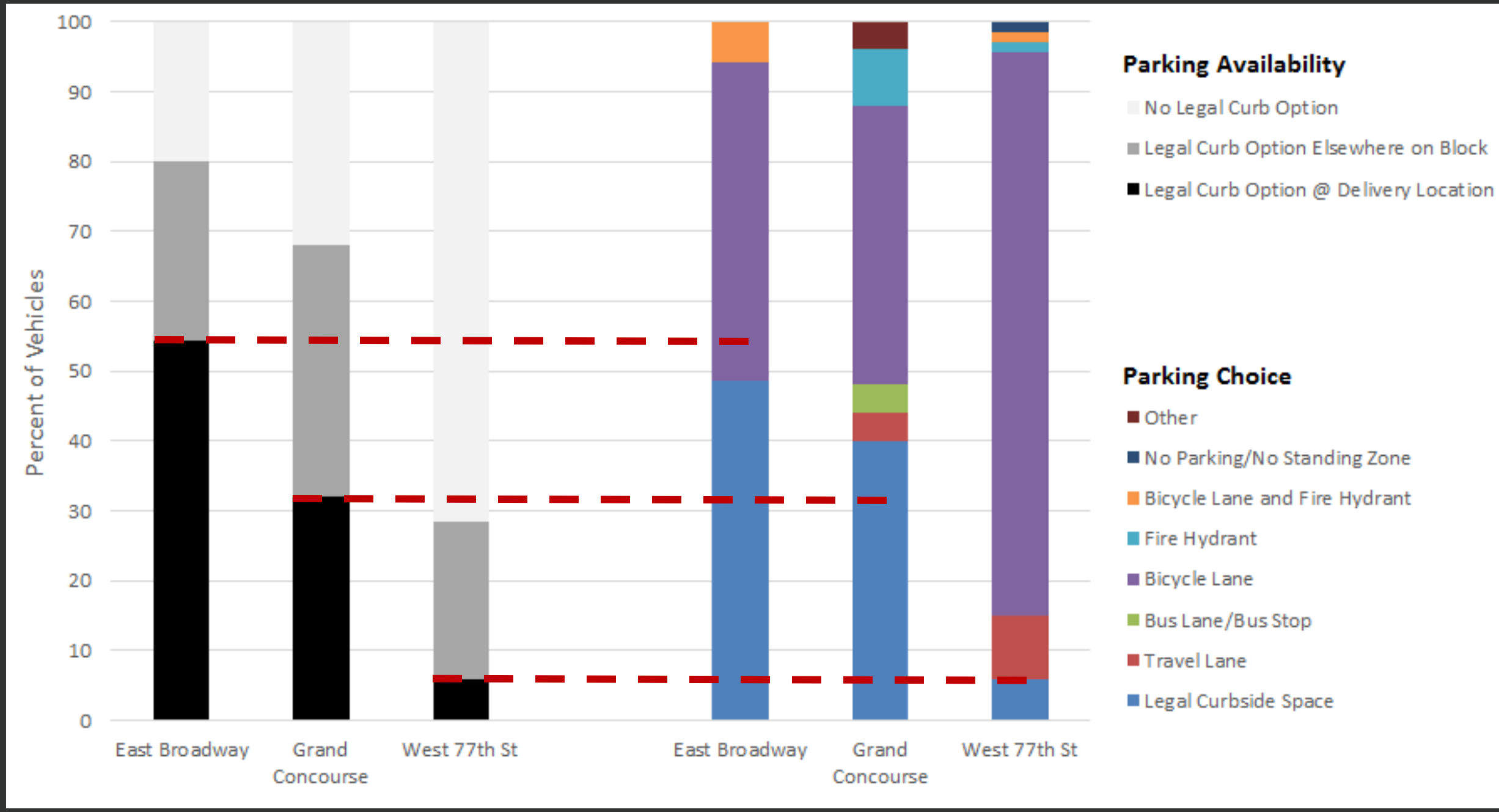
Field Observation Locations

East Broadway

Image source: Google Maps

W 77th St

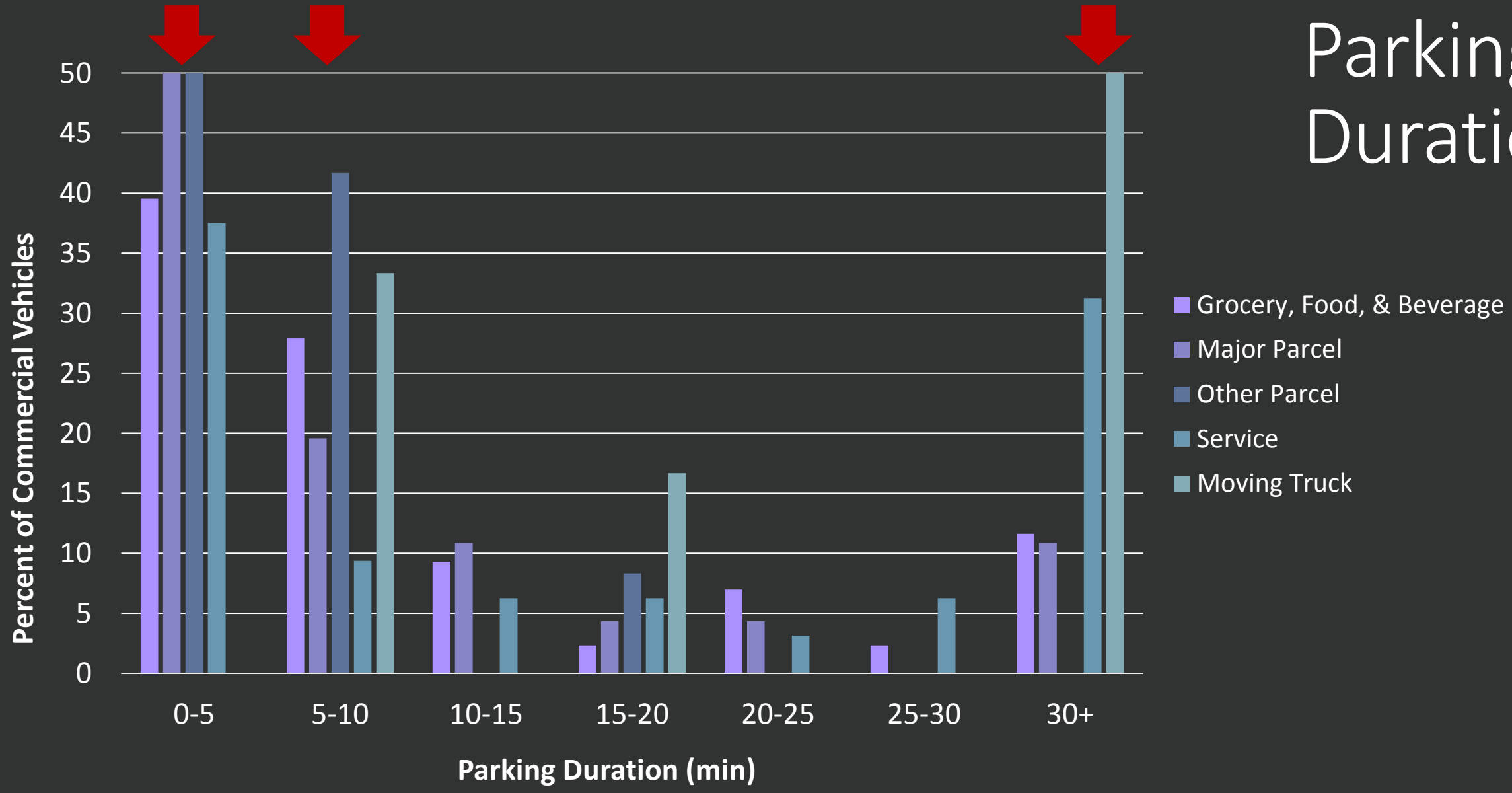
Grand Concourse


Percent of Vehicles
100
90
80
70
60
50
40
30
20
10
0
East Broadway
Grand Concourse
West 77th St
East Broadway
Grand Concourse
West 77th St
Parking Availability
No Legal Curb Option
Legal Curb Option Elsewhere on Block
Legal Curb Option @ Delivery Location
Parking Choice
Other
No Parking/No Standing Zone
Bicycle Lane and Fire Hydrant
Fire Hydrant
Bicycle Lane
Bus Lane/Bus Stop
Travel Lane
Legal Curbside Space

Parking Choices by Sector

	Observed	Legal Parking at Location		Legal Parking on Block	
	Total	% Available	% Used	% Available	% Used
Food and Beverage	43	51	68	16	43
Parcel	58	12	43	19	9
Moving Truck	6	17	100	0	---
Service Vehicle	35	14	80	34	75

Parking Durations



Key Observations

- 55 mi (41 mi dedicated) bicycle lanes installed on truck route network since 2000
- All bicycle collisions disproportionately concentrated:
  - On truck routes
  - In protected lanes
- Commercial vehicles frequently must choose whether to obstruct a single travel lane or to park illegally
- Parking availability and choices vary considerably by location and sector

Future Research

- Measure the short and long term implications of reduced capacities for CV operations and for the surrounding area
- Examine detailed accident causality on specific types of bicycle infrastructure
- Evaluate demand and operator-specific curb management strategies

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