

# On-Street Parking Requirements for Freight and Service Activity

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**FHWA Talking Freight Seminar**

- ❖ Background
- ❖ Freight and Service Trips
- ❖ Estimate of Parking Requirements
- ❖ Results
- ❖ Concluding Remarks

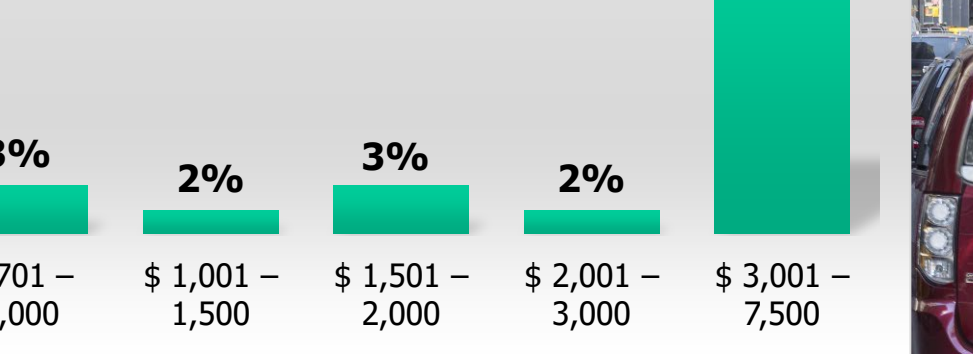
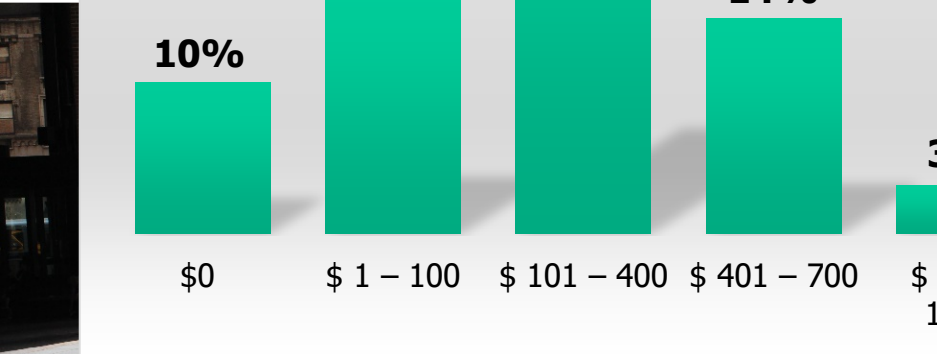
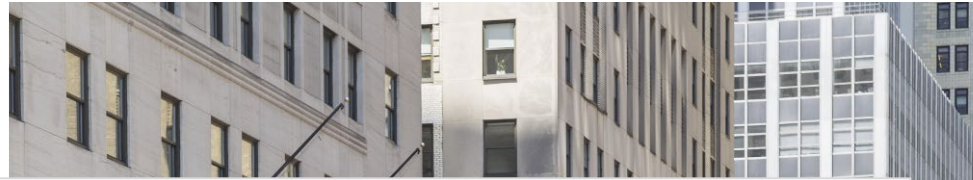
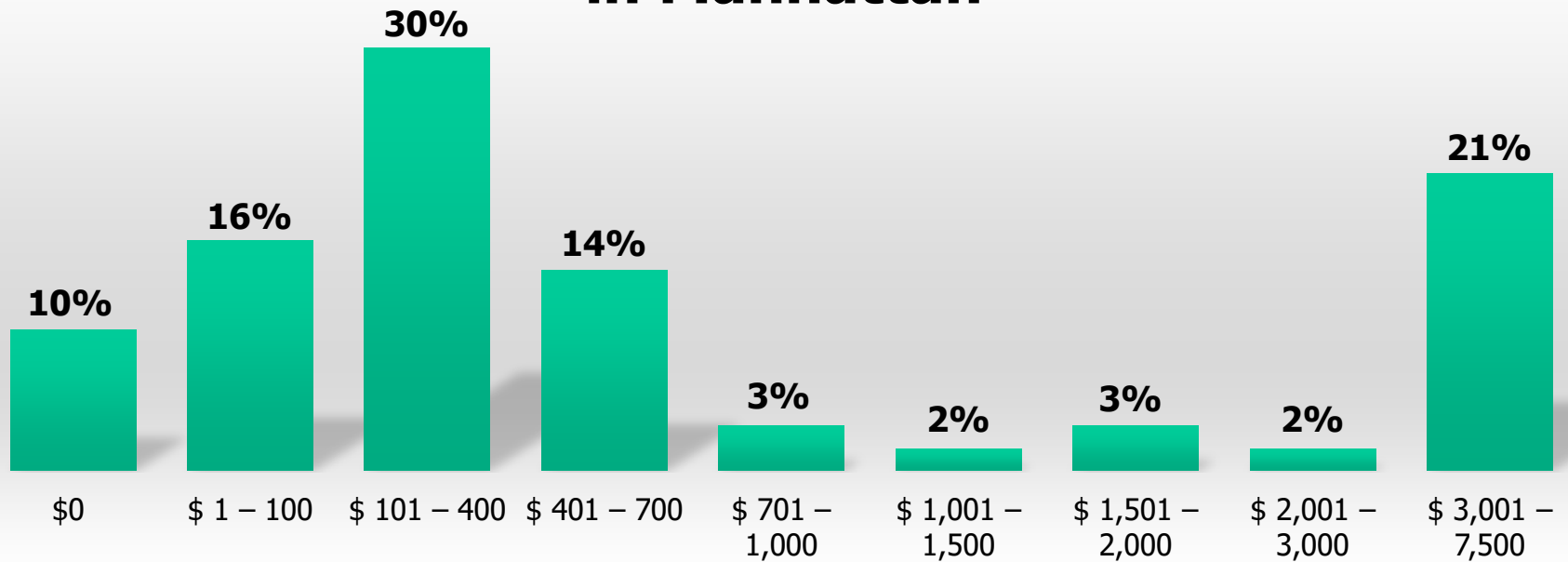


# Background



# Road Obstructions Increase Congestion

## Parking tickets paid per driver per month in Manhattan



# Key Observations

- ❖ The lack of sufficient freight parking, leads to...
  - ❖ Increases in double parking, increases in traffic due to cruising to find parking → Congestion increases
  - ❖ Increases in the cost of goods
- ❖ On top of that, there is a need to take into account the needs of service activity
  - ❖ “Commercial” parking includes: freight and service vehicles, and in some cases limos
  - ❖ Service visits are less frequent but have longer durations
- ❖ How can we address this issue?
  - ❖ Quantify on-street parking requirements
  - ❖ Take steps to allocate the space needed

# Freight and Service Trips

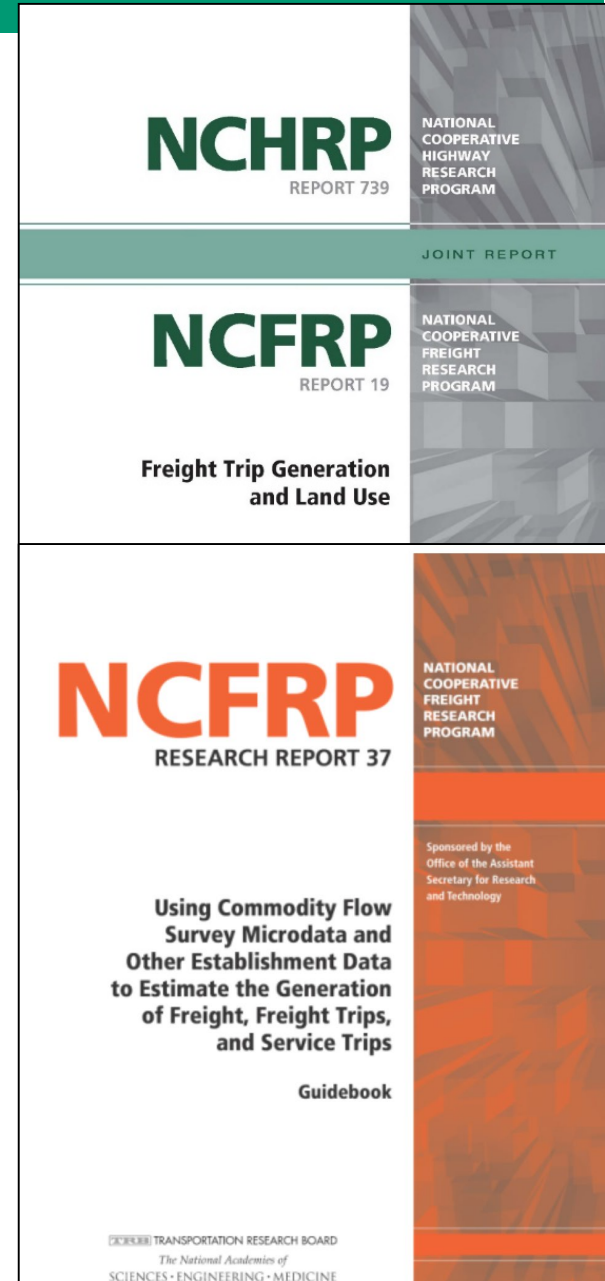


# Key concepts

- ❖ Generation of demand/cargo (FG):
  - ❖ A manifestation of the production/consumption processes
  - ❖ Implication: FG will increase with (economic) inputs
- ❖ Generation of traffic (FTG):
  - ❖ Result of logistical decisions
  - ❖ Implication: FTG do not necessarily increase with (economic) inputs (shippers can increase shipment size instead...)
- ❖ Service Trip Generation (STG):
  - ❖ A manifestation of the amount of services received or produced by an establishment

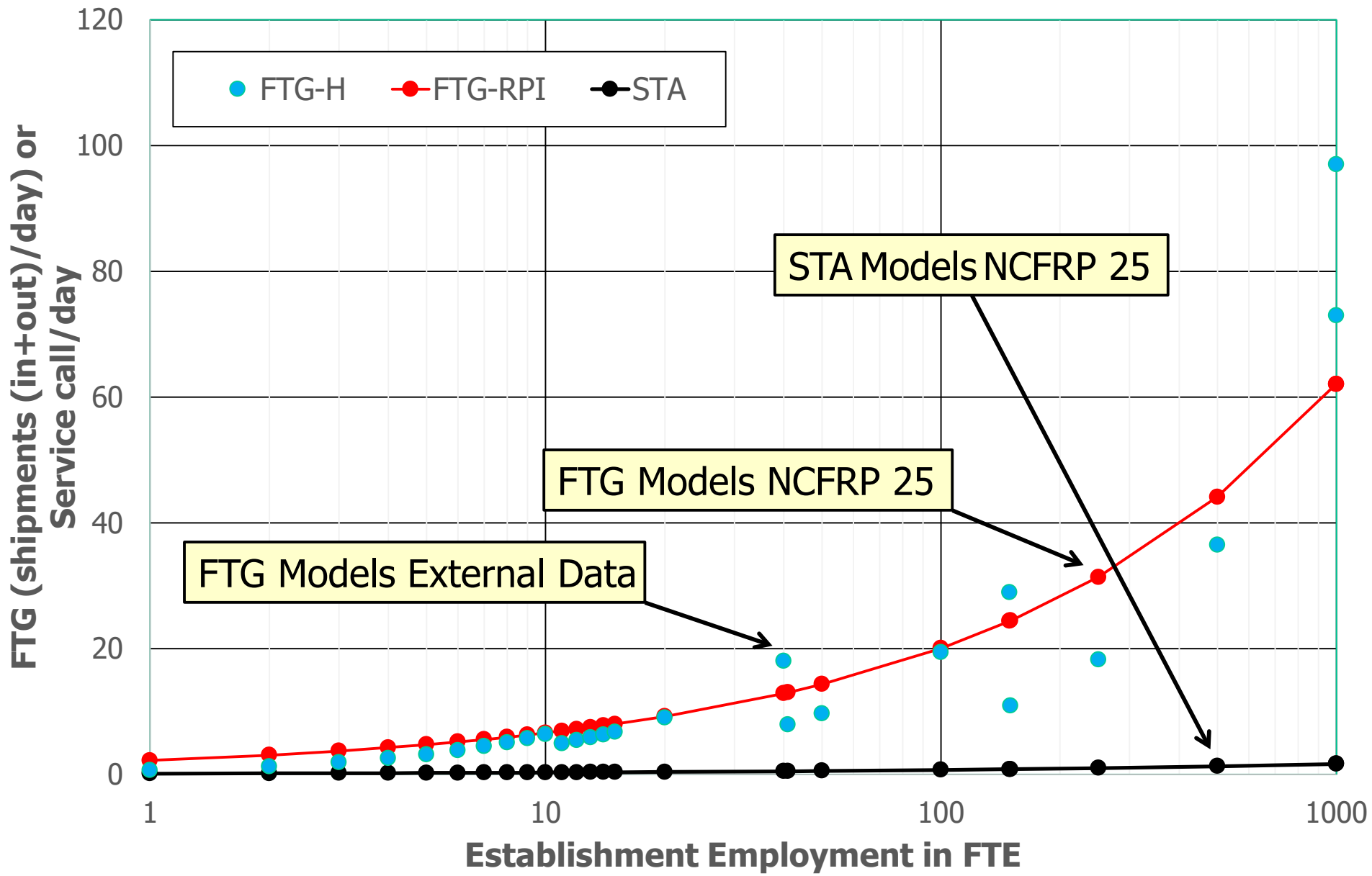
# FTG and STA

- ❖ Based on Establishment Surveys
  - ❖ Collected data about **deliveries** received, **shipments** sent out, and **service visits** received (for more than 10 years)
  - ❖ Estimated models to predict deliveries and shipments using employment
$$FTA/FTP/STA = f(Employment)$$
  - ❖ Approximately 1,000 models developed
- ❖ In addition, the team developed generation models to estimate Internet deliveries to households





# FTG for FIS, and STA for all sectors



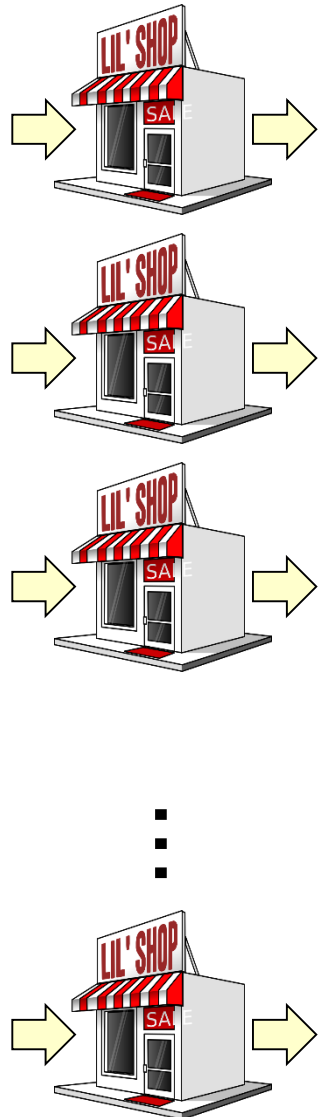
# Advantages of NAICS in FTG/STA models

- ❖ Model quality increases because employment by industry sector is a better predictor than square footage of broadly defined land use types
- ❖ The resulting models can use employment data that are routinely collected for other purposes
  - ❖ ZIP Code / County Business Patterns
  - ❖ Commodity Flow Survey Microdata
    - ❖ National sample of freight-producing firms
- ❖ If collecting data is desired → small samples could work because NAICS creates homogeneous groups
  - ❖ Sample survey instruments are available for use



# Models can be aggregated...

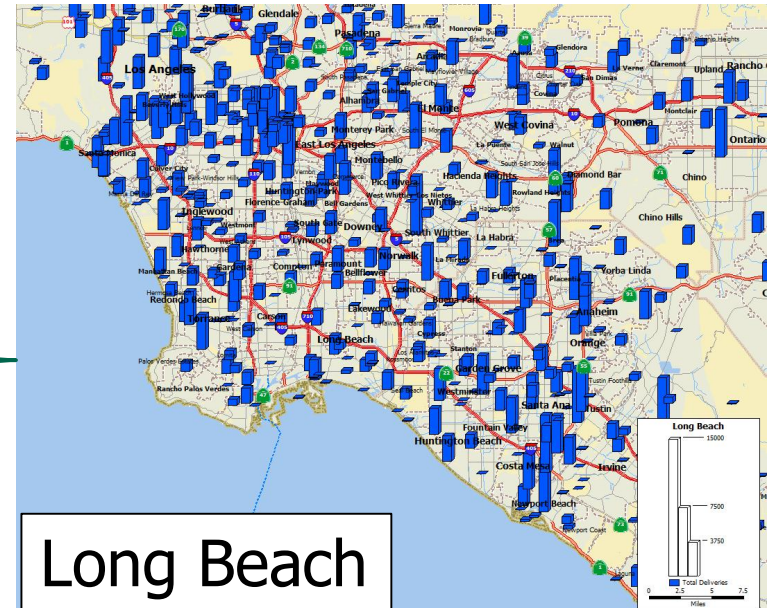
## Establishments



## Buildings



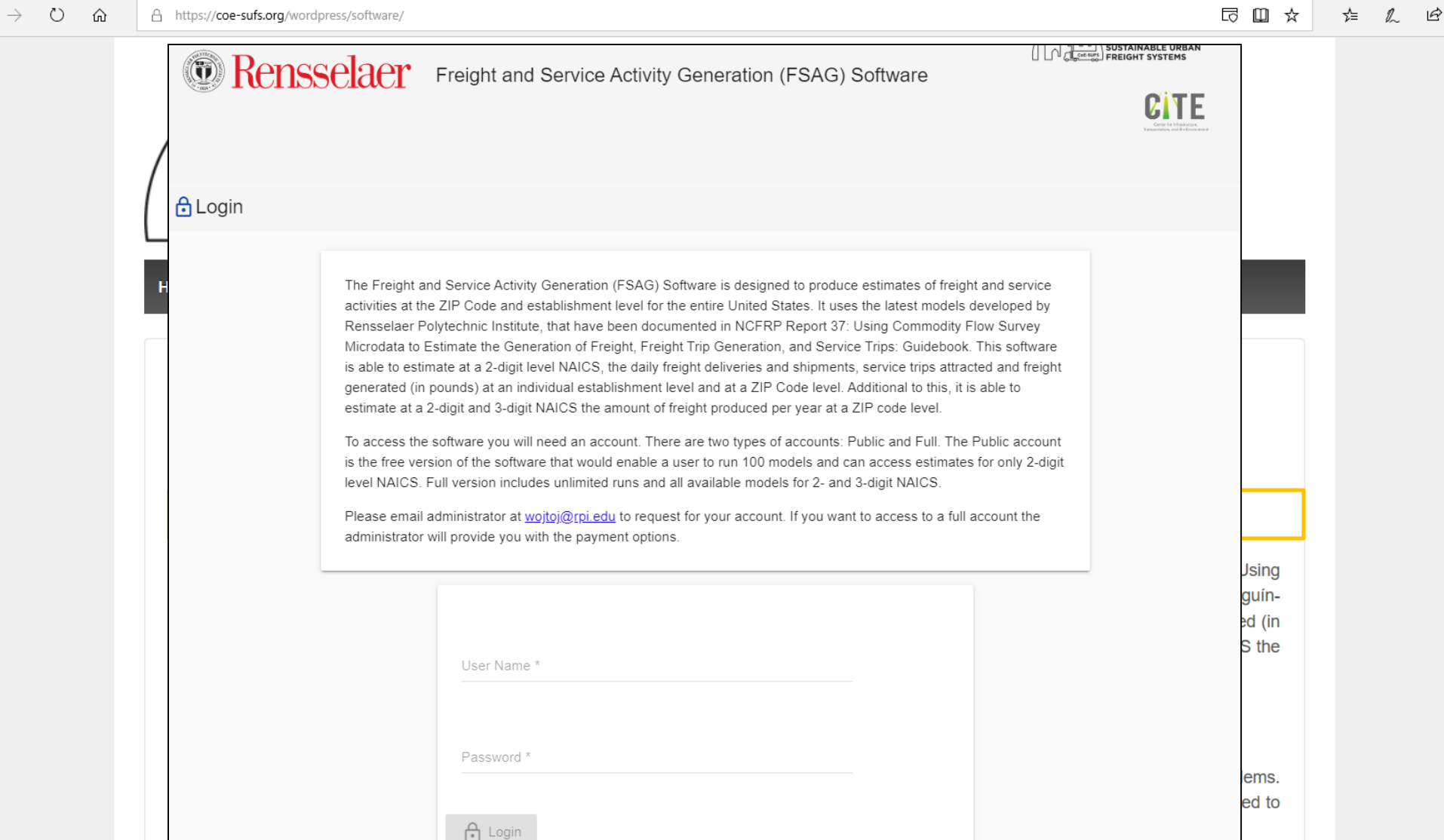
## Census tracts ... ZIP Codes



Long Beach

# Software Available at COE-SUFS Webpage

❖ <https://coe-sufs.org/wordpress/software/>



The screenshot shows a web browser window displaying the page <https://coe-sufs.org/wordpress/software/>. The page header features the Rensselaer logo and the title "Freight and Service Activity Generation (FSAG) Software". Logos for "SUSTAINABLE URBAN FREIGHT SYSTEMS" and "CITE" are also visible. A "Login" button is located on the left side of the page. The main content area contains a text box with the following information:

The Freight and Service Activity Generation (FSAG) Software is designed to produce estimates of freight and service activities at the ZIP Code and establishment level for the entire United States. It uses the latest models developed by Rensselaer Polytechnic Institute, that have been documented in NCFRP Report 37: Using Commodity Flow Survey Microdata to Estimate the Generation of Freight, Freight Trip Generation, and Service Trips: Guidebook. This software is able to estimate at a 2-digit level NAICS, the daily freight deliveries and shipments, service trips attracted and freight generated (in pounds) at an individual establishment level and at a ZIP Code level. Additional to this, it is able to estimate at a 2-digit and 3-digit NAICS the amount of freight produced per year at a ZIP code level.

To access the software you will need an account. There are two types of accounts: Public and Full. The Public account is the free version of the software that would enable a user to run 100 models and can access estimates for only 2-digit level NAICS. Full version includes unlimited runs and all available models for 2- and 3-digit NAICS.

Please email administrator at [wojtoj@rpi.edu](mailto:wojtoj@rpi.edu) to request for your account. If you want to access to a full account the administrator will provide you with the payment options.

Below the text box is a login form with the following fields:

- User Name \*
- Password \*

A "Login" button is located at the bottom of the form.

# Results



# Cities Selected for the Analyses

- ❖ Eight American cities of different sizes
- ❖ The cities were selected on the basis of population density using a geometric progression
  - ❖ New York City, NY
  - ❖ Boston, MA
  - ❖ Washington, DC
  - ❖ Seattle, WA
  - ❖ San Jose, CA
  - ❖ Columbus, OH
  - ❖ Austin, TX
  - ❖ Kansas City, KS



# Summary Results

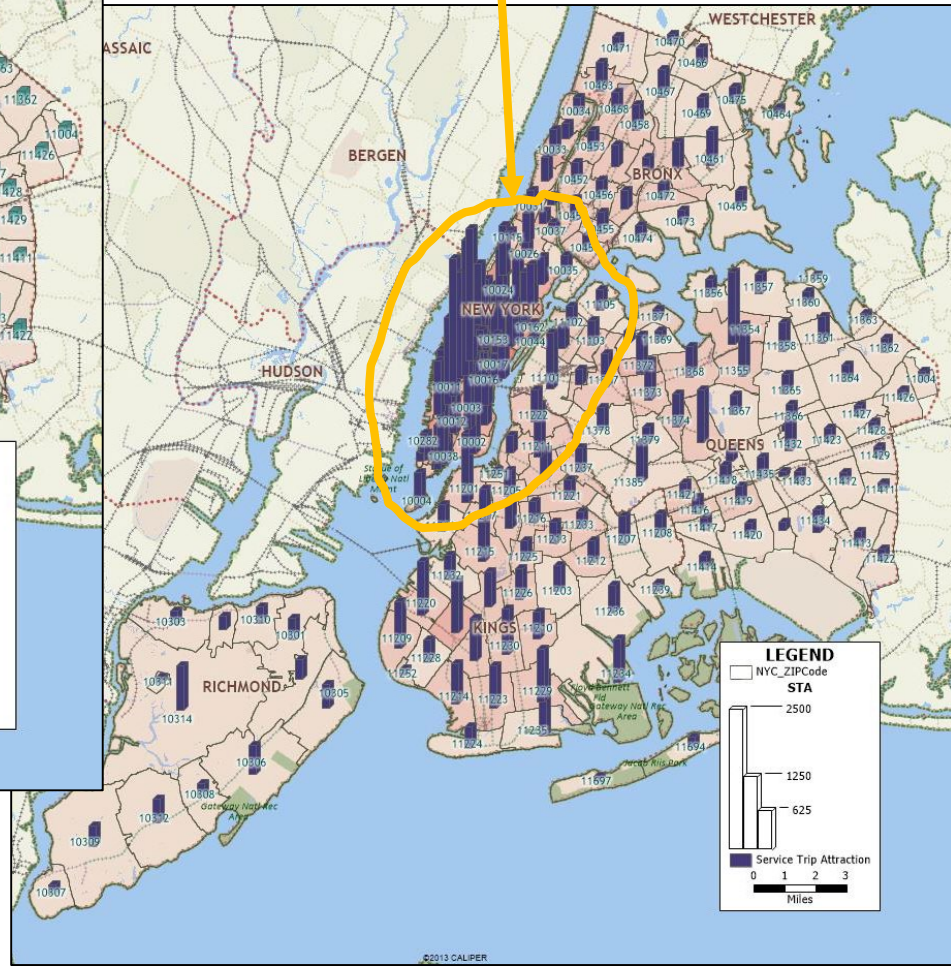
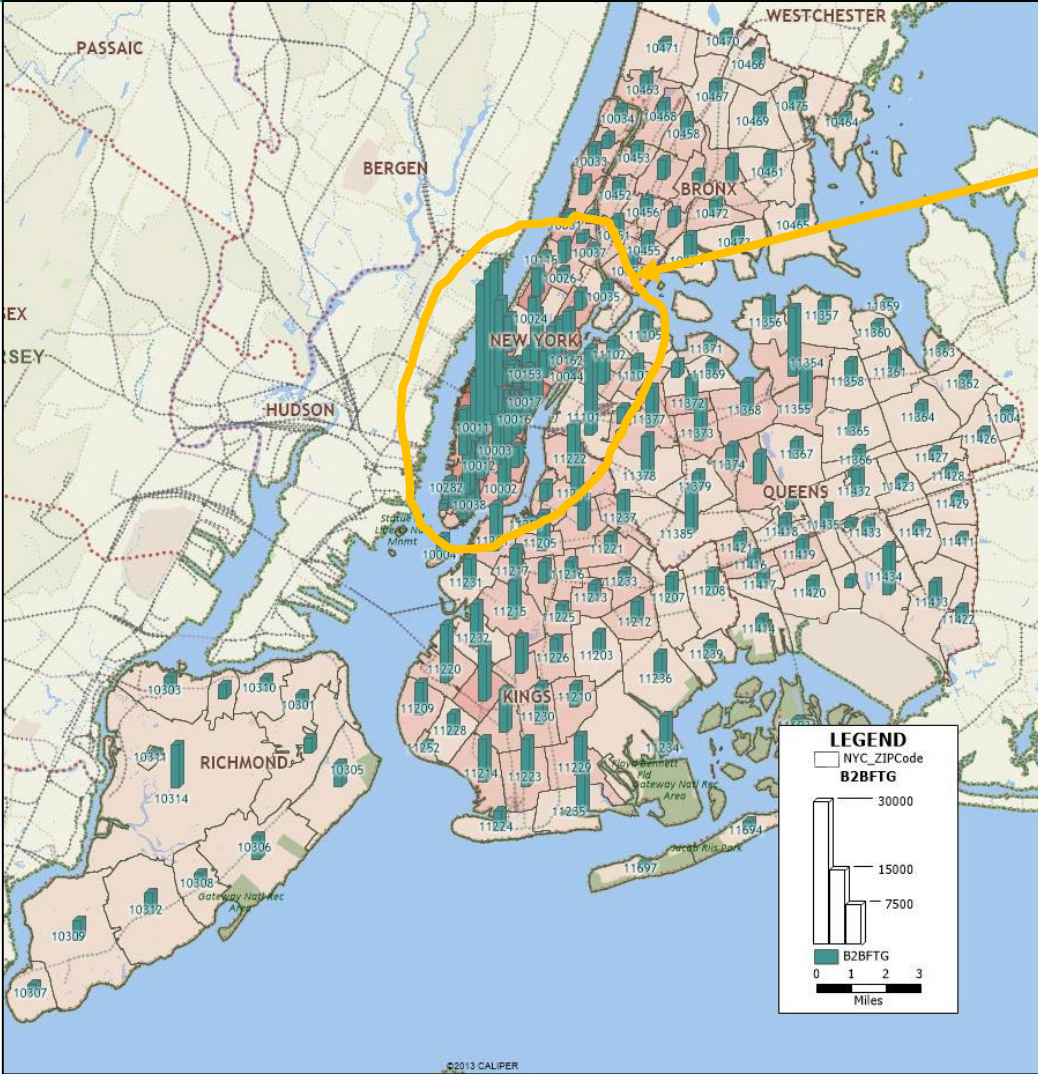
	Kansas City, KS	Austin, TX	Columbus, OH	San Jose, CA	Seattle, WA	Washington, DC	Boston, MA	New York, NY
Population (2016)	151,042	916,906	852,144	1,023,031	688,245	672,391	669,158	8,560,072
Total Area (mi <sup>2</sup> )	124.81	297.89	217.17	176.53	83.95	61.05	48.27	302.67
Pop density (people/mi <sup>2</sup> )	467.26	1188.44	1515.01	2237.53	3165.47	4252.46	5351.98	10919.69
Establishments	2,965	33,661	20,106	20,508	33,019	21,264	13,071	245,009
Employment							412	3,786,192
<b>Service trips are typically 10% of freight trips</b>								
FTG (FTA+FTP)/day	16,138	117,216	87,997	80,165	117,681	56,647	43,929	873,380
STA/day	1,493	12,222	8,176	7,495	15,082	11,695	6,824	88,640
B2C/day	15,104	91,691	85,214	122,764	68,825	67,239	93,682	1,369,612
FTG/mi <sup>2</sup> -day	129.30	393.49	405.20	454.11	1,401.84	927.88	909.98	2,885.59
<b>Including Internet Deliveries to households, the total deliveries and shipments per capita ranges from 0.23 to 0.29</b>								
FTG/STA/B2C)/person-day	0.22	0.24	0.21	0.21	0.29	0.20	0.22	0.27





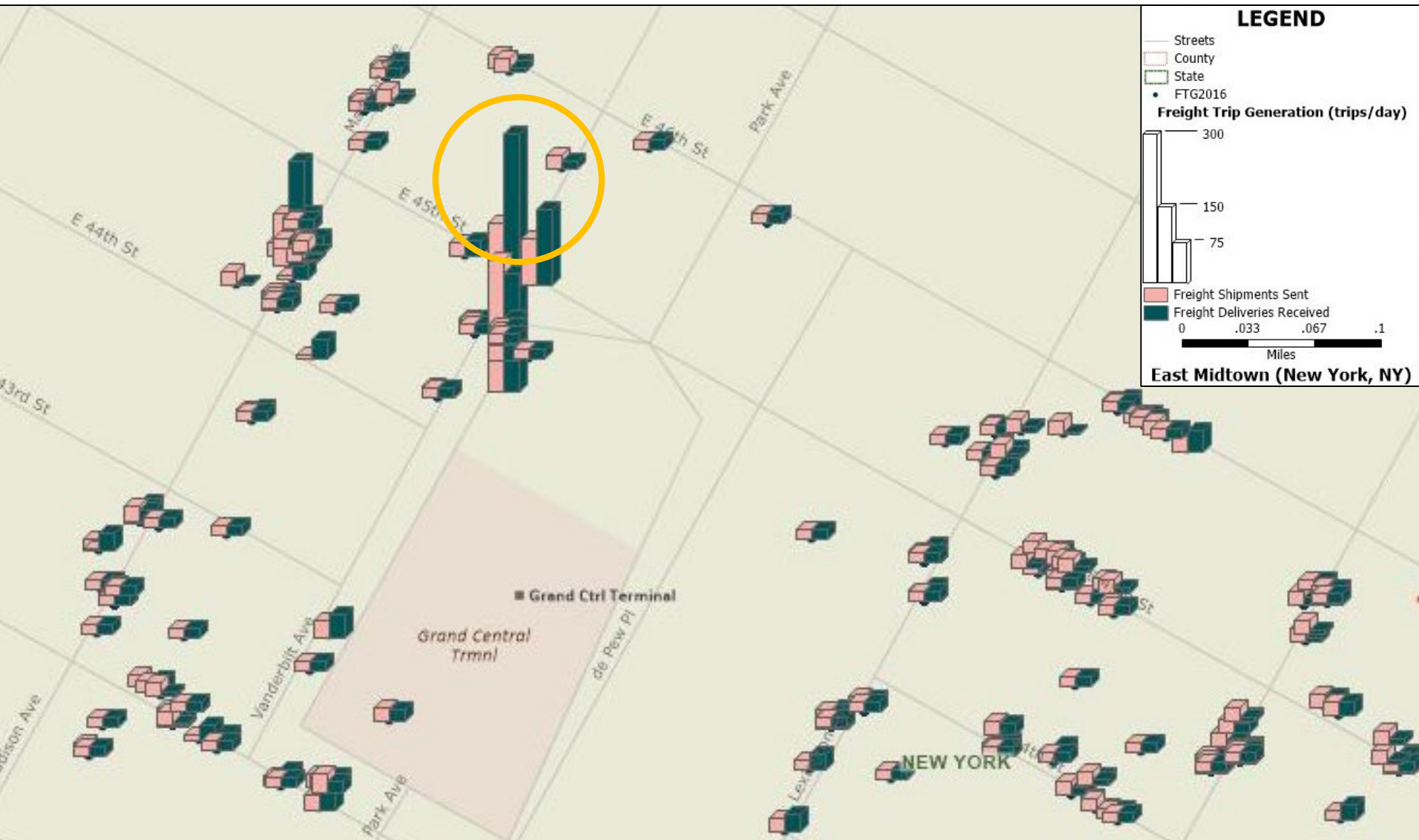
# Freight and Service at a ZIP Code Level

**The bulk of freight and service trips in lower Manhattan**





# Establishment Level Estimates



# Parking Requirements



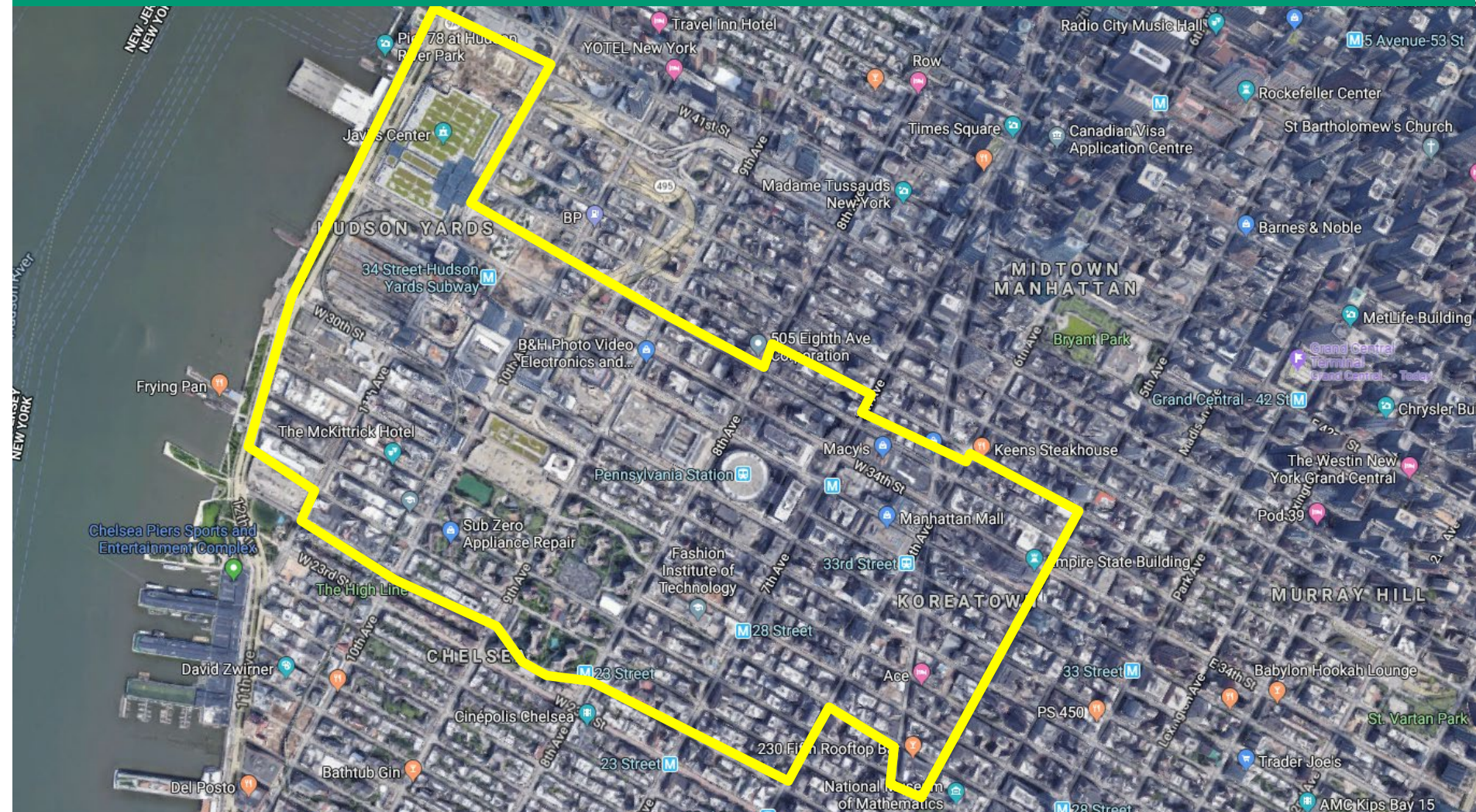
# Procedure Developed

- ❖ Most congested ZIP Codes were analyzed from the selected cities
- ❖ Daily freight and service trips were estimated at these ZIP codes
- ❖ Parking requirements were obtained from the number of estimated trips and duration of the delivery
- ❖ Parking slots required were calculated





# New York, NY: Midtown Manhattan (10001)



**ZIP Code: 10001**

**Population (2016):** 23,947

**Establishments:** 8,221

**Employment:** 174,552

Deliveries/day = 16,250 → FTA = 16,250 truck trips

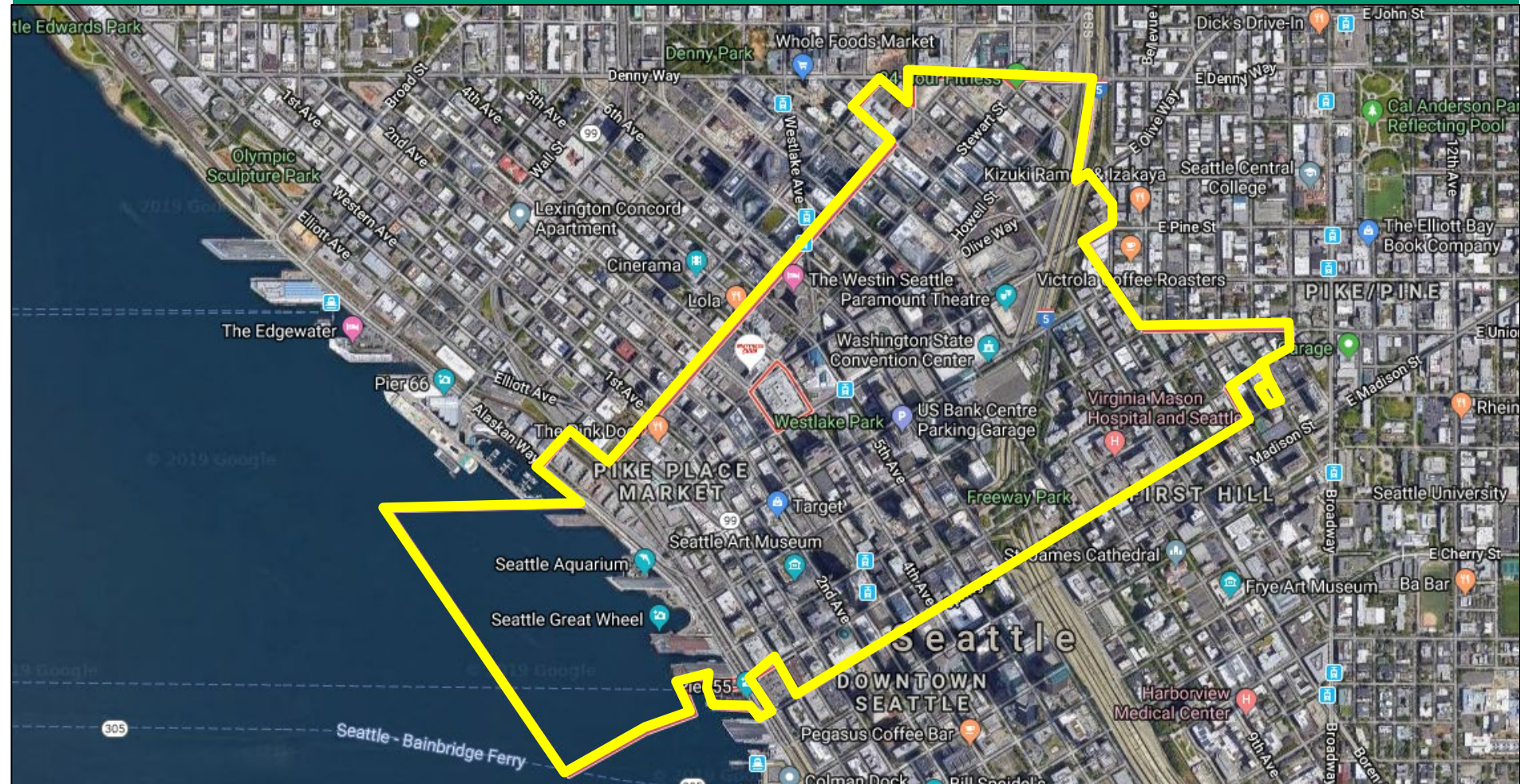
Shipments/day = 18,920 → FTP = 18,920 truck trips

B2C deliveries/day = 3,830 → FTA = 550 truck trips

Service visits = 2,400 → STA = 2,400 trips



# Seattle, WA: 98101



**ZIP Code: 98101**

**Population (2016):** 12,408

**# of Establishments:** 2,956

**Employment:** 87,500

Deliveries/day = 3,680 → FTA = 3,345 truck trips

Shipments/day = 3,598 → FTP = 3,270 truck trips

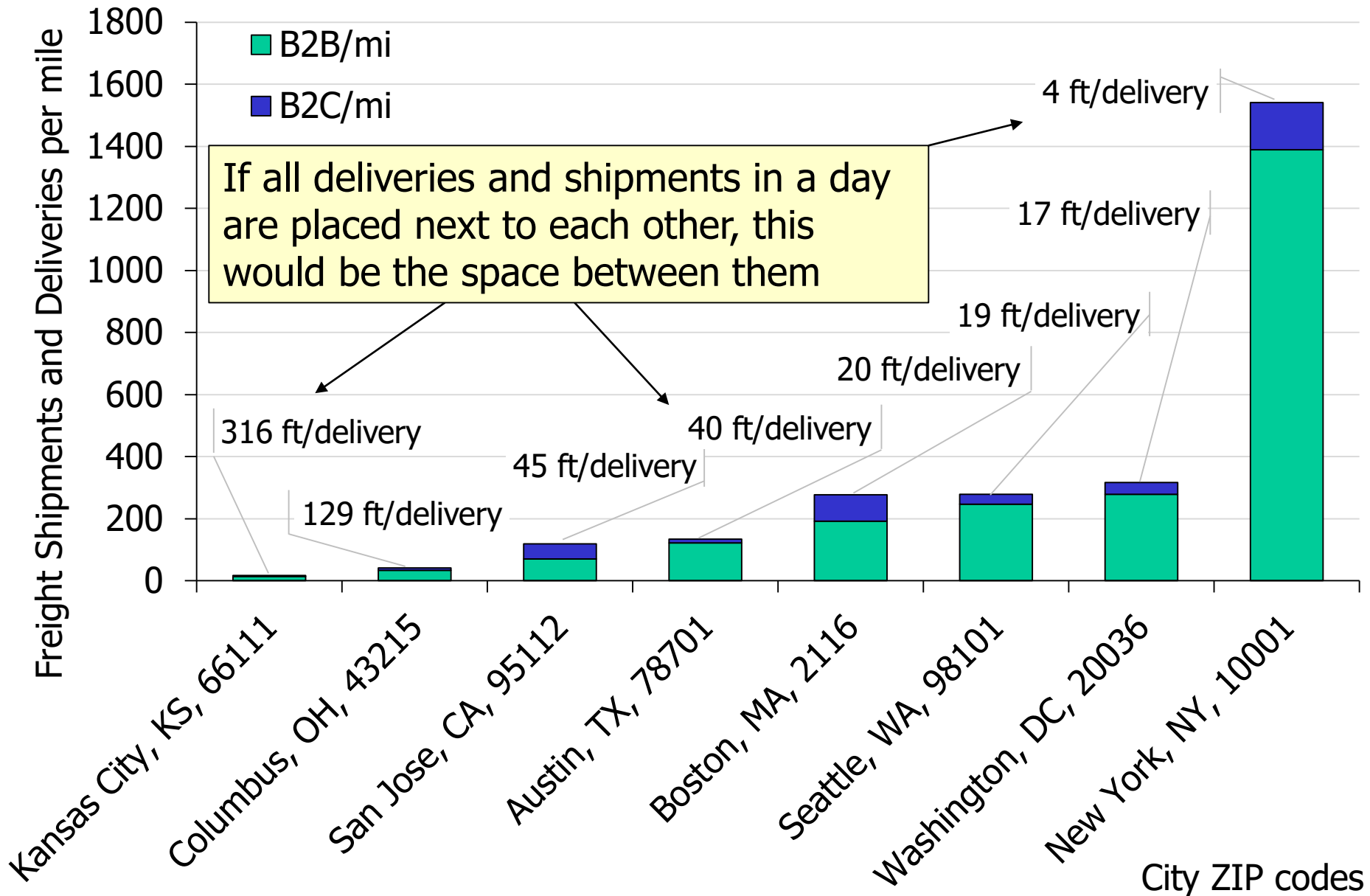
B2C deliveries/day = 1,240 → FTA = 180 truck trips

Service visits = 1,580 → STA = 2,750 trips

# Summary Results

	<b>Kansas City, KS</b>	<b>Austin, TX</b>	<b>Columbus, OH</b>	<b>San Jose, CA</b>	<b>Seattle, WA</b>	<b>Washing ton, DC</b>	<b>Boston, MA</b>	<b>New York, NY</b>
ZIP Code analyzed	66111	78701	43215	95112	98101	20036	02116	10001
Population (2016)	9691	7875	14322	62039	12408	5836	23215	23947
Total road length (mi)	305.98	59.67	187.34	155.82	38.69	15.94	38.30	25.31
Establishments	377	2,996	2,571	2,197	2,956	2,824	2,060	8,221
Employment	14,534	59,387	67,682	44,735	87,499	65,962	61,340	174,552
FTG/day	4,157	7,279	6,274	11,071	9,537	4,458	7,372	35,174
STA/day	335	970	925	747	1,583	1,474	1,180	2,748
B2C Deliveries to HH	969	788	1,432	7,445	1,241	584	3,250	3,832
FTG/mile	13.59	121.99	33.49	71.05	246.50	279.63	192.45	1,389.54
STA/mile	1.09	16.26	4.94	4.79	40.92	92.43	30.80	108.56
B2C/mile	3.17	13.20	7.64	47.78	32.07	36.60	84.85	151.36

# Delivery Densities





# Not a new problem... the reality in the 1940s...



**37<sup>th</sup> Street and 7<sup>th</sup> Ave, New York City, 1945**



# PH Parking Requirements

	Kansas City, KS	Austin, TX	Columbus, OH	San Jose, CA	Seattle, WA	Washing ton, DC	Boston, MA	New York, NY
ZIP Code analyzed	66111	78701	43215	95112	98101	20036	02116	10001
FTG/day	4,157	7,279	6,274	11,071	9,537	4,458	7,372	35,174
STA/day	335	970	925	747	1,583	1,474	1,180	2,748
B2C Deliveries to HH	969	788	1,432	7,445	1,241	584	3,250	3,832
<b>25% Peak Hour Traffic</b>								
Spaces for PH FTG	346.46	606.62	522.81	922.59	794.71	371.52	614.32	2,931.16
Spaces for PH STA	125.58	363.75	347.04	280.10	593.69	552.62	442.37	1,030.48
Spaces for PH B2C	80.76	65.63	119.35	620.39	103.40	48.63	270.84	319.29
Space Required	552.80	1,036.00	989.20	1,823.08	1,491.80	972.77	1,327.53	4,280.93
Spaces per 100 ft	0.03	0.33	0.10	0.22	0.73	1.16	0.66	3.20
<b>10% Peak Hour Traffic</b>								
Spaces for PH FTG	138.58	242.65	209.12	369.04	317.89	148.61	245.73	1,172.46
Spaces for PH STA	50.23	145.50	138.82	112.04	237.47	221.05	176.95	412.19
Spaces for PH B2C	32.30	26.25	47.74	248.16	41.36	19.45	108.34	127.72
Total Space Required	221.12	414.40	395.68	729.23	596.72	389.11	531.01	1,712.37
Spaces per 100 ft	0.01	0.13	0.04	0.09	0.29	0.46	0.26	1.28

# Concluding Remarks



# Concluding Remarks

- ❖ This research estimates parking requirements for freight and service trips
- ❖ It takes advantage of the FTG/STA models estimated by NCHRP/NCFRP Projects
- ❖ The results indicate that depending on the level of density of the cities there is a wide range of parking requirements
- ❖ PH parking needs at the most congested ZIP codes show insufficient road space for parking
- ❖ Reducing PH traffic can reduce this value considerably
- ❖ Bad as it is, the situation is bound to get worse with the effects of the on-demand economy...

Questions? Thanks!

