

# Trip Generation Study Big Box Retail in NYC

## Home Improvement Superstores



Department of Transportation

**JANETTE SADIK-KHAN, Commissioner**

City of New York

**MICHAEL R. BLOOMBERG, Mayor**



June 3, 2009

# Study Goal

- Develop trip generation rates for big box retail in NYC – Home Improvement Superstores (HISS)

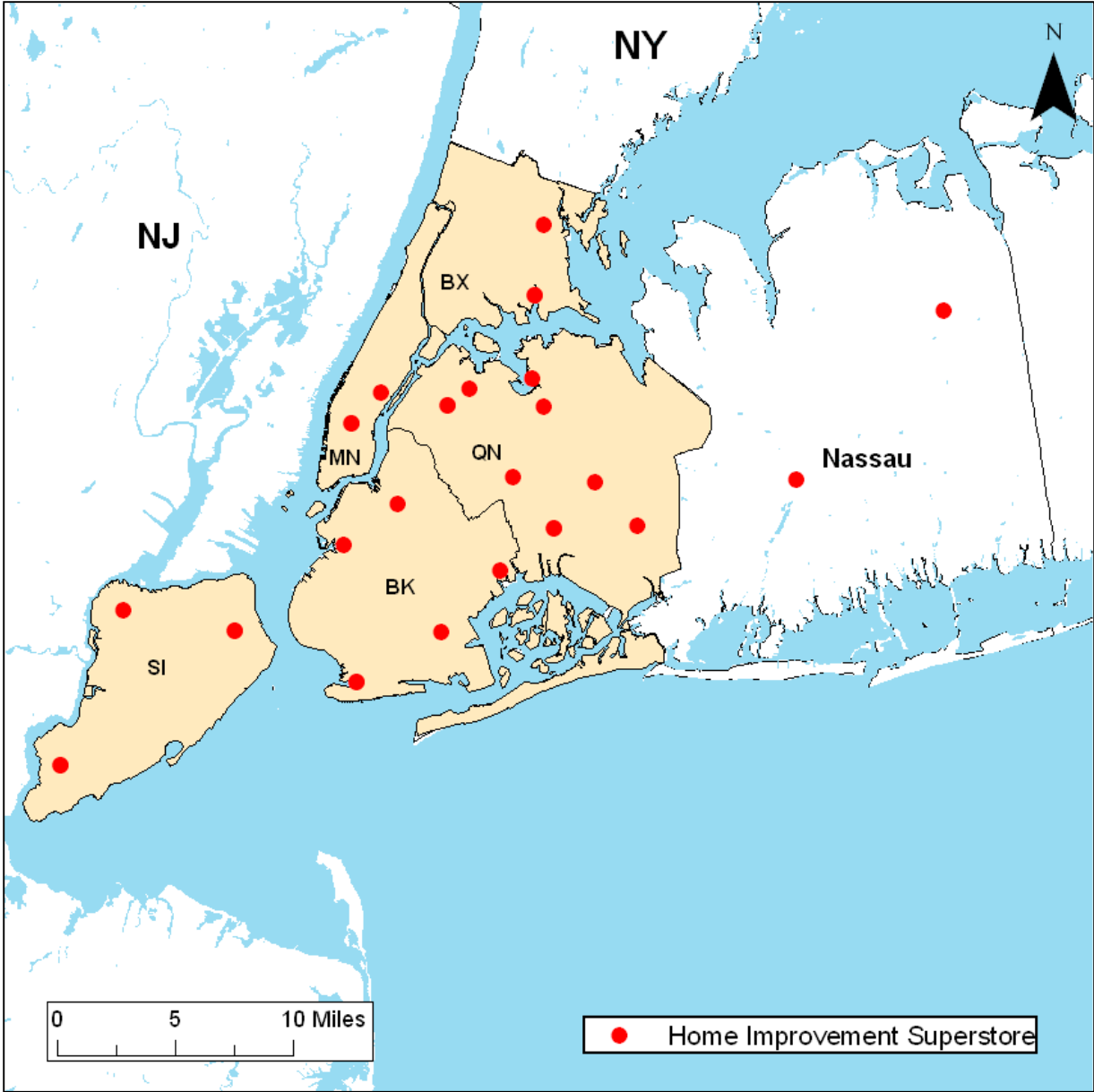
# Study Objectives

- Conduct Survey of existing facilities at various locations;
- Examine trip generation characteristics;
- Develop trip generation rates; and
- Compare the results with ITE and trip generation rates used in previous Environmental Impact Statement (EIS).

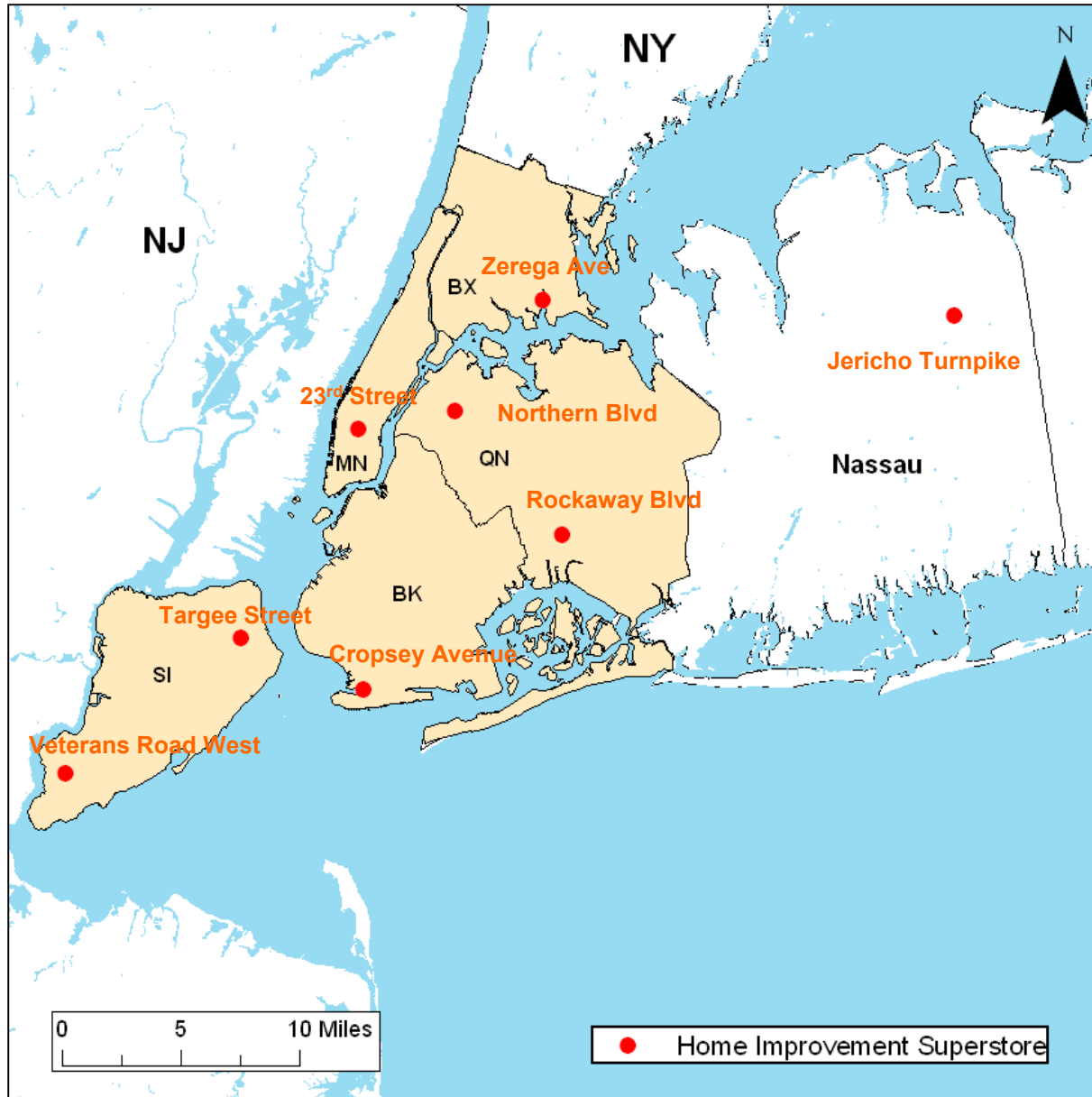
# Site Selection Process

- At least one from each borough
- One located outside NYC
- At least two sites within the City with similar characteristics
- Sites for which EIS's were prepared

# Pool of Home Improvement Superstores



# Selected Home Improvement Superstores



# Selected HISS's

- Range in size from 94,000 to 168,000 square feet
- Average size of 130,000 square feet
- Seven of eight are stand alone facilities with accessory parking

# Surveys and Analyses

- Primary Surveys
  - Traffic Count (driveways)
  - Questionnaire
- Secondary Data
  - Demographics
  - Zoning/Land Use
  - Accessibility



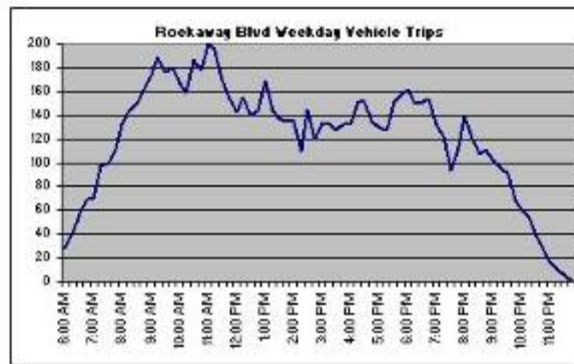
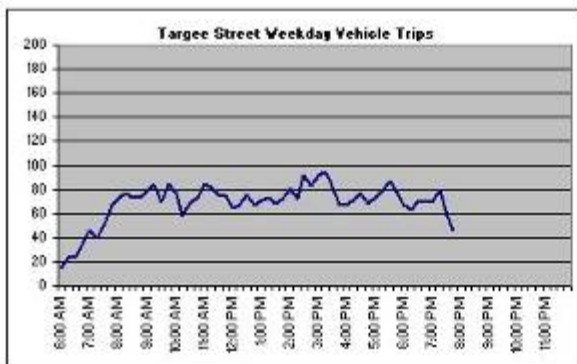
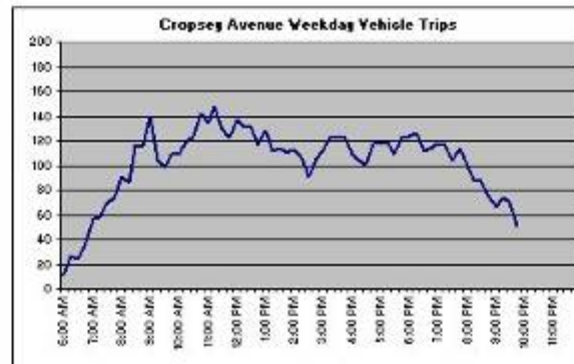
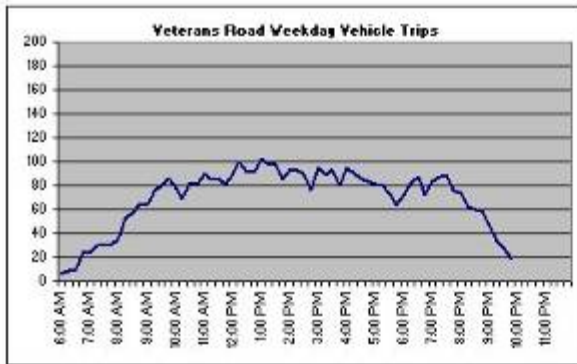
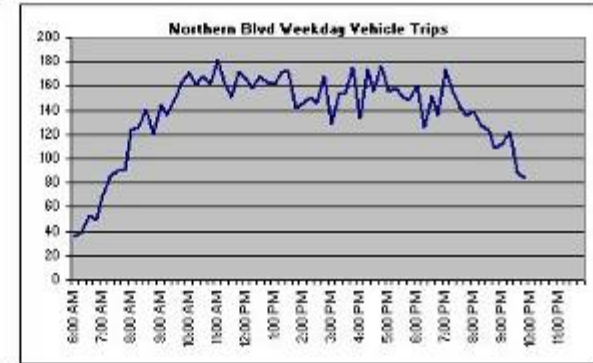
# 1. Traffic Counts

- Temporal Distribution
- Trip Mode
- Vehicle Type
- Vehicle Occupancy
- Parking Accumulation

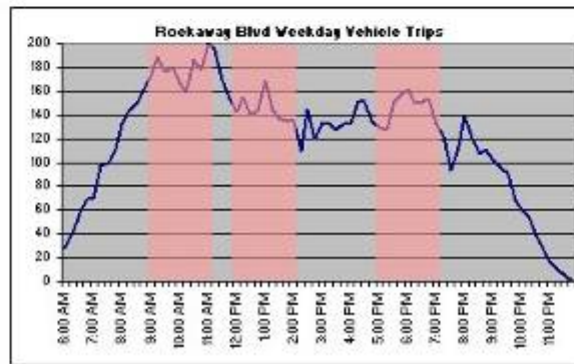
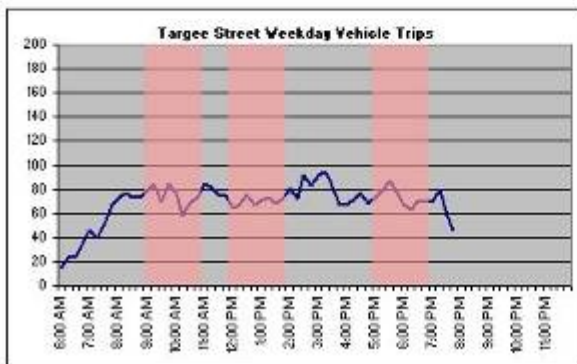
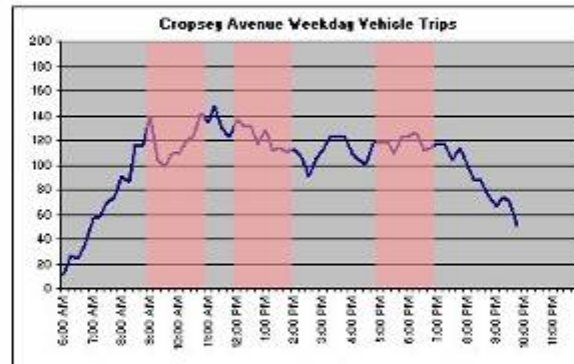
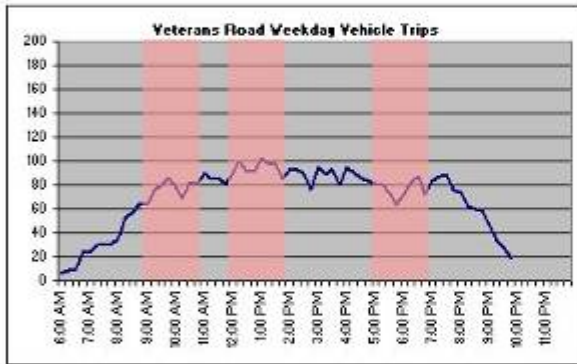
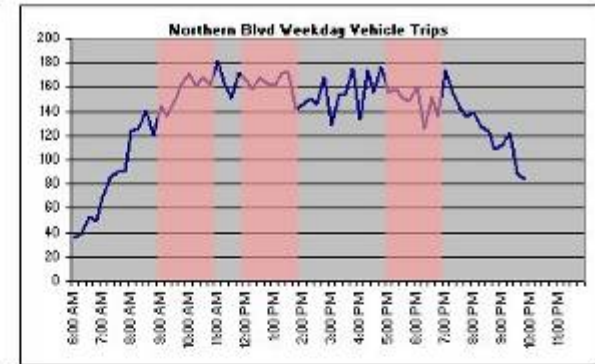
# Store Operating and Survey Hours

HISS Facility	Weekday		Saturday		Sunday	
	Operating Hours	Survey Hours	Operating Hours	Survey Hours	Operating Hours	Survey Hours
23 <sup>rd</sup> Street, Mn	7AM – 9PM	7AM – 9PM	7AM – 9PM	12PM – 6PM	8AM – 7PM	N/A
Cropsey Avenue, Bk	6AM - 10PM	6AM - 10PM	6AM - 10PM	6AM - 10PM	8AM - 7PM	8AM - 8PM
Jericho Turnpike, Nassau	6AM – 10PM	6AM – 10PM	6AM – 10PM	6AM – 10PM	8AM – 7PM	7AM – 7PM
Northern Blvd, Qn	5AM – 11PM	6AM – 10PM	5AM – 11PM	12PM – 6PM	8AM – 9PM	N/A
Rockaway Blvd, Qn	6AM - 11PM	6AM – 12AM	6AM - 11PM	12PM - 6PM	8AM - 8PM	N/A
Targee Street, SI	6AM – 8PM	6AM – 8PM	6AM – 8PM	12PM – 6PM	6AM – 8PM	N/A
Veterans Road, SI	6AM – 9PM	6AM – 10PM	8AM – 8PM	12PM – 6PM	8AM – 8PM	N/A
Zerega Ave, Bx	6AM – 10PM	6AM – 10PM	6AM – 10PM	6AM – 10PM	8AM – 7PM	8AM – 8PM

# Temporal Distribution 15 Minute Intervals



# Peak Periods 15 Minute Intervals



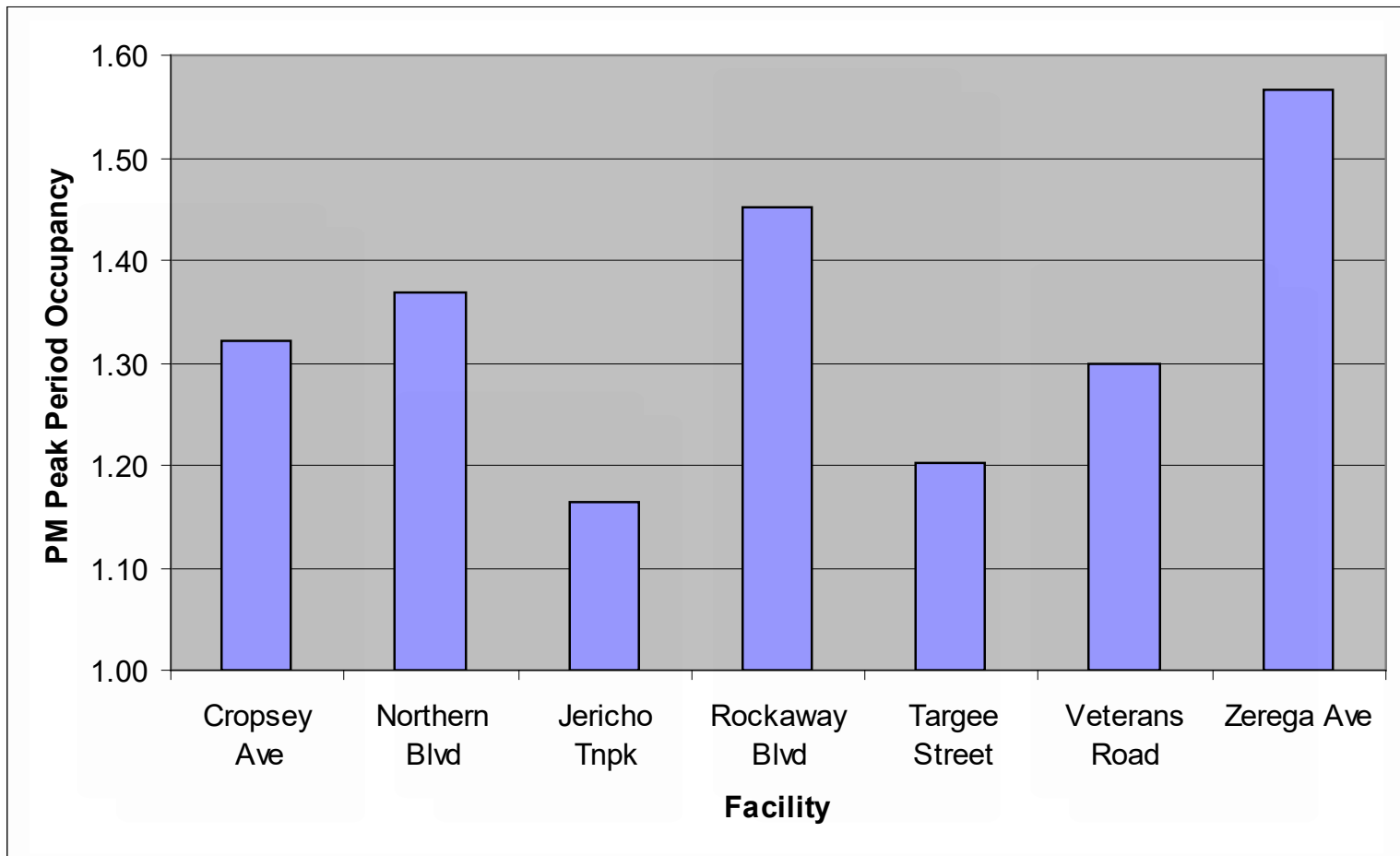
**Weekday AM: 9am – 11am**

**Weekday MD: 12pm – 2pm**

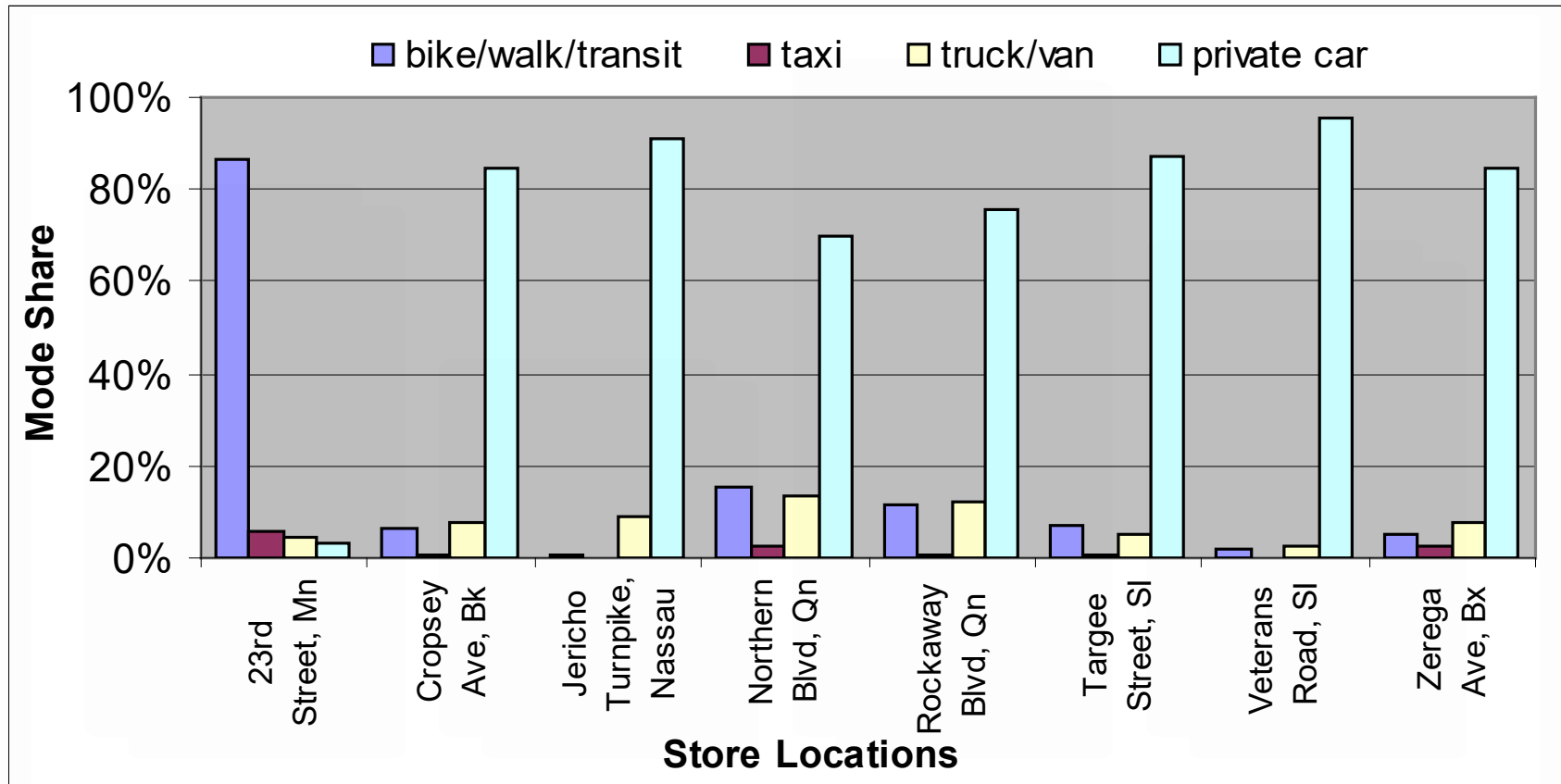
**Weekday PM: 5pm – 7pm**

**Saturday Peak: 12:45pm – 2:45pm**

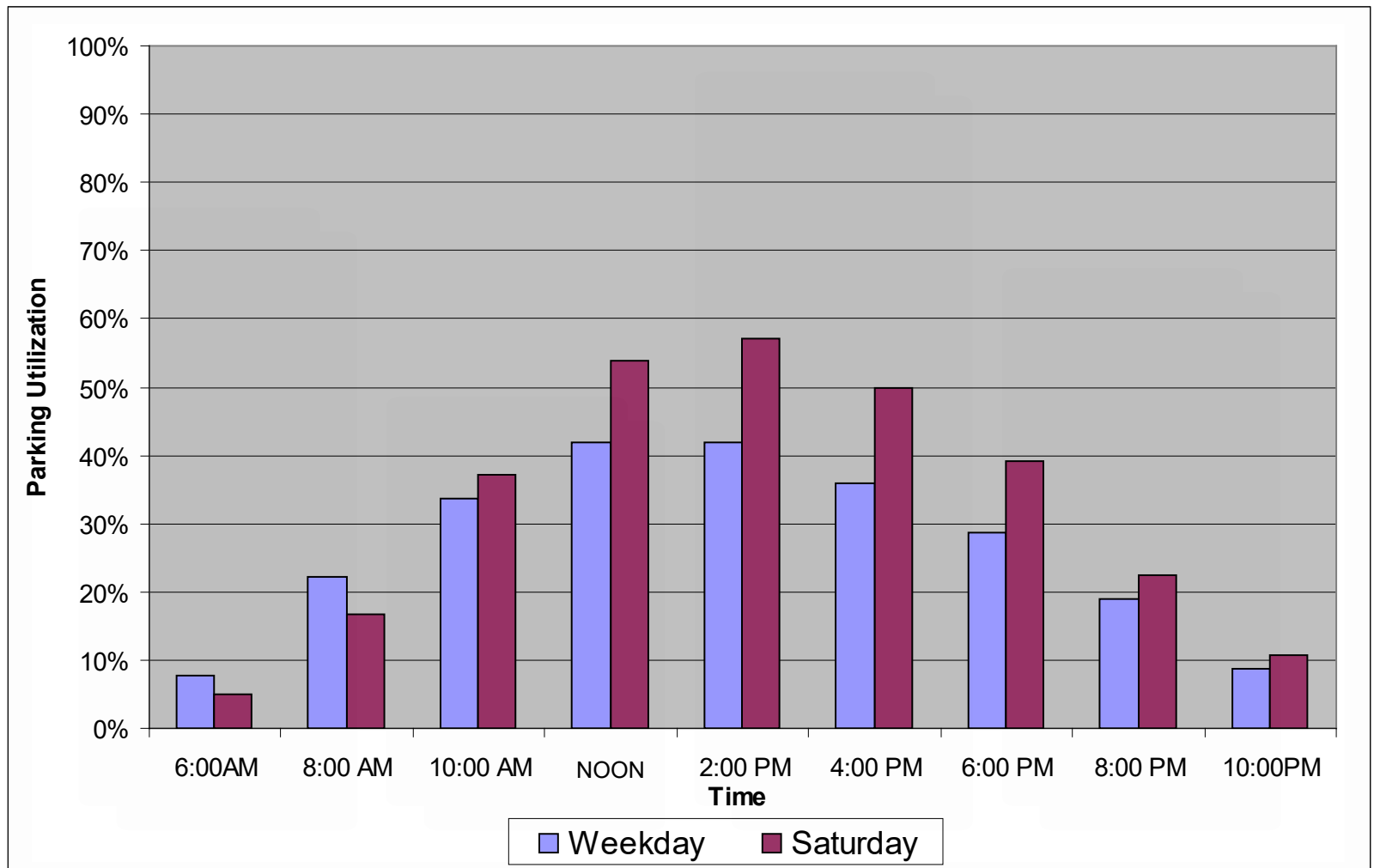
# Vehicle Occupancy: PM Peak



# Travel Mode



# Parking Utilization

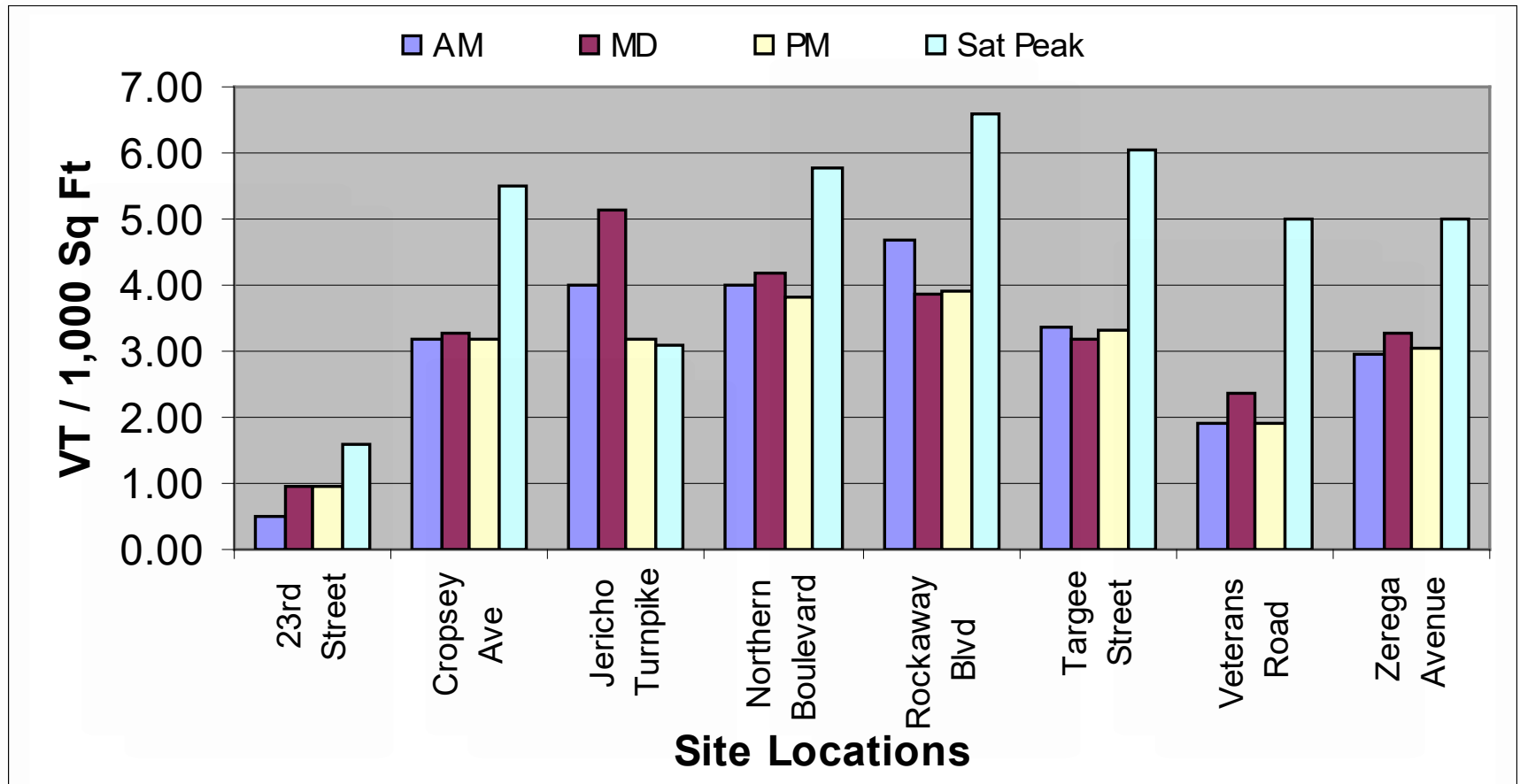


# Vehicle Trip Rates (VTR)

- Hourly Vehicle Trips per 1,000 sq ft = VTR =  
(Peak Hour Trips / Building sq ft) \* 1,000
- Example: Cropsey Avenue Facility  
( 472 trips / 148,861 sq ft ) \* 1,000 =  
**AM VTR = 3.17 Trips per 1,000 sq ft**



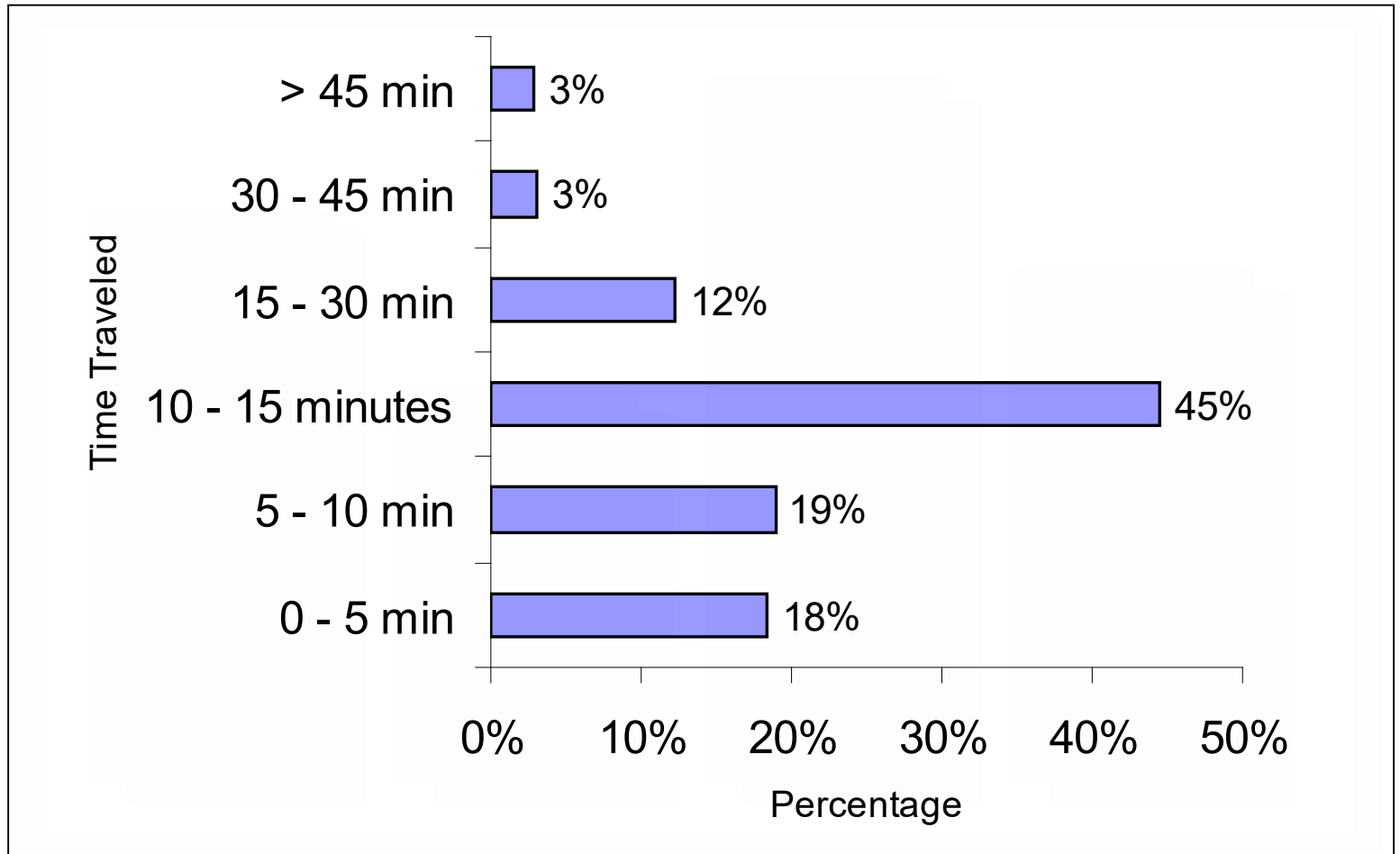
# Peak Hours Vehicle Trips/1,000 Sq Ft



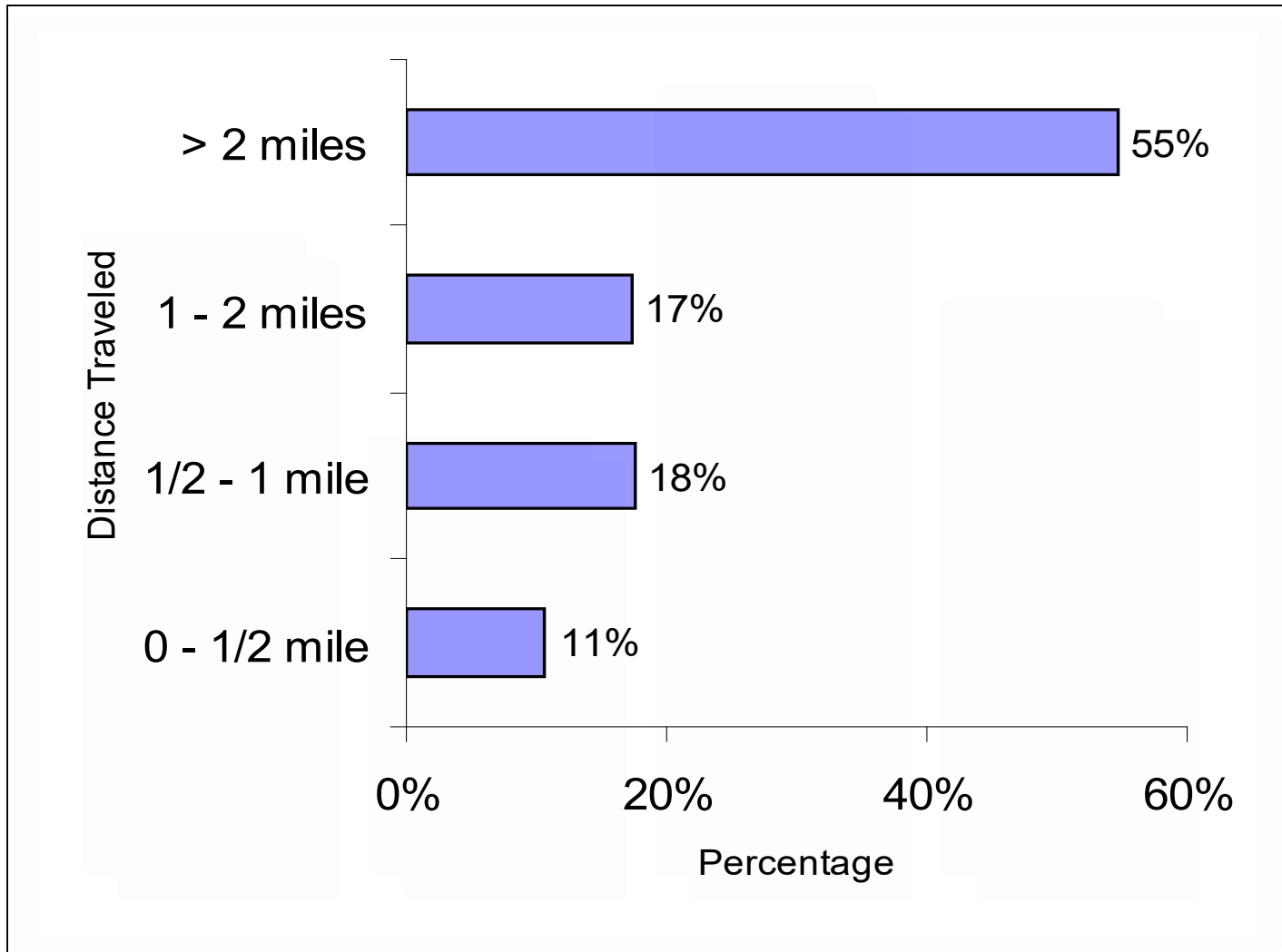
## 2. Questionnaire Survey

- Travel Time
- Trip Length
- Trip Purpose
- User Type

# Travel Time



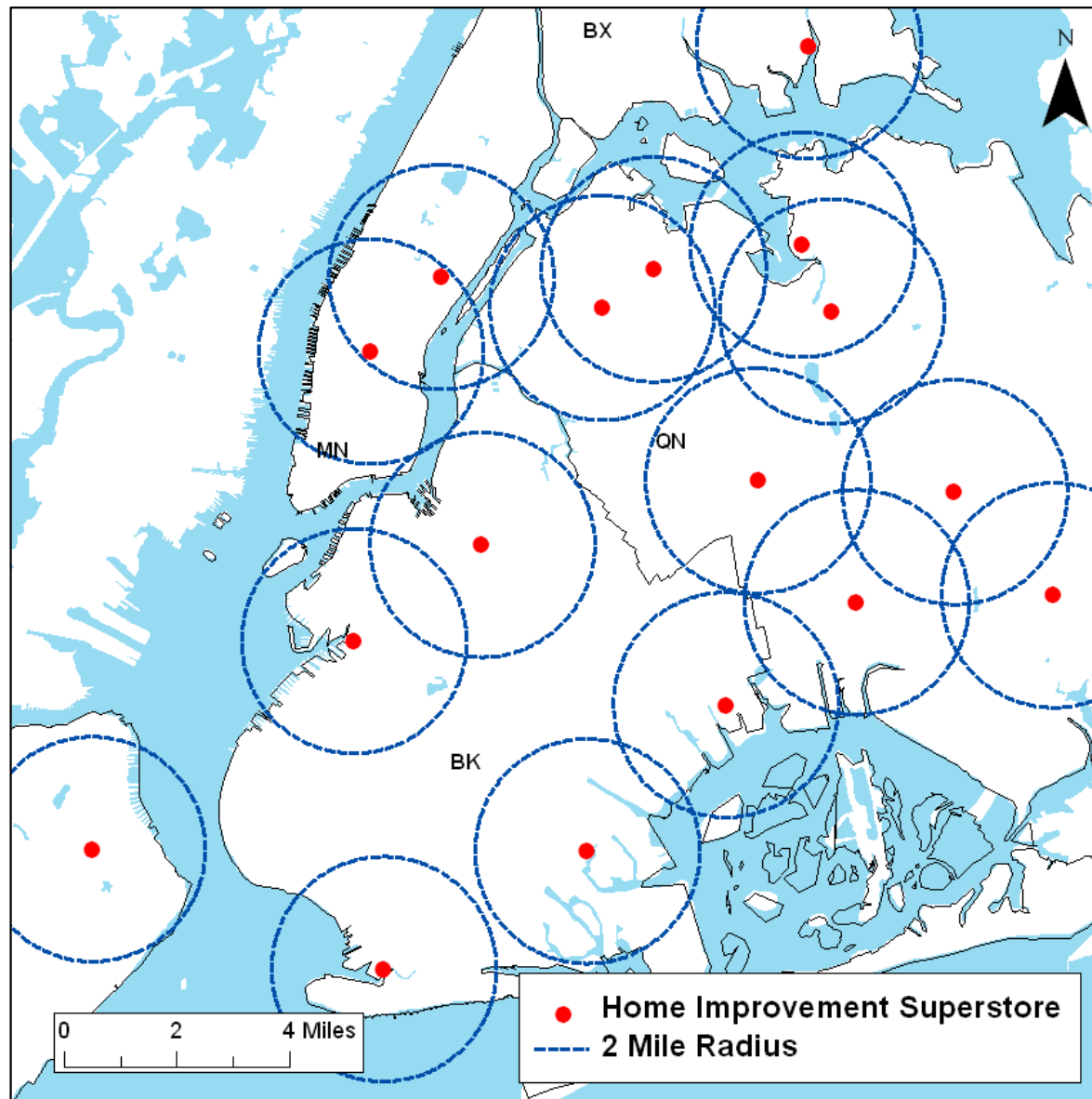
# Trip Length



# User Type

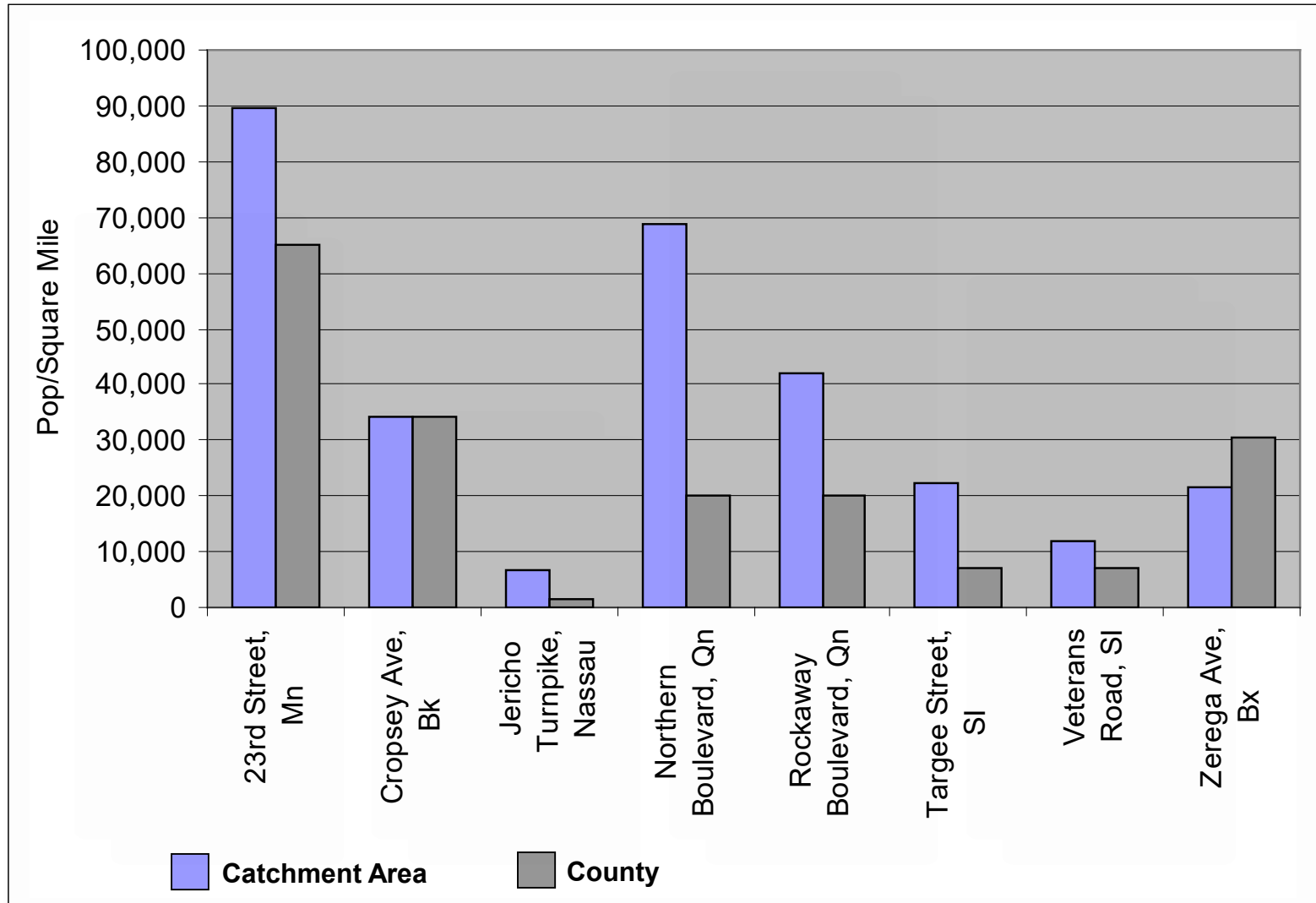
- User Type
  - 18% Contractors
  - 54% Home Owners
  - 28% Tenants
- Primary / Secondary Trips
  - 85% Primary Trips
  - 15% Linked Trips

# Defining Catchment Area



# Demographics

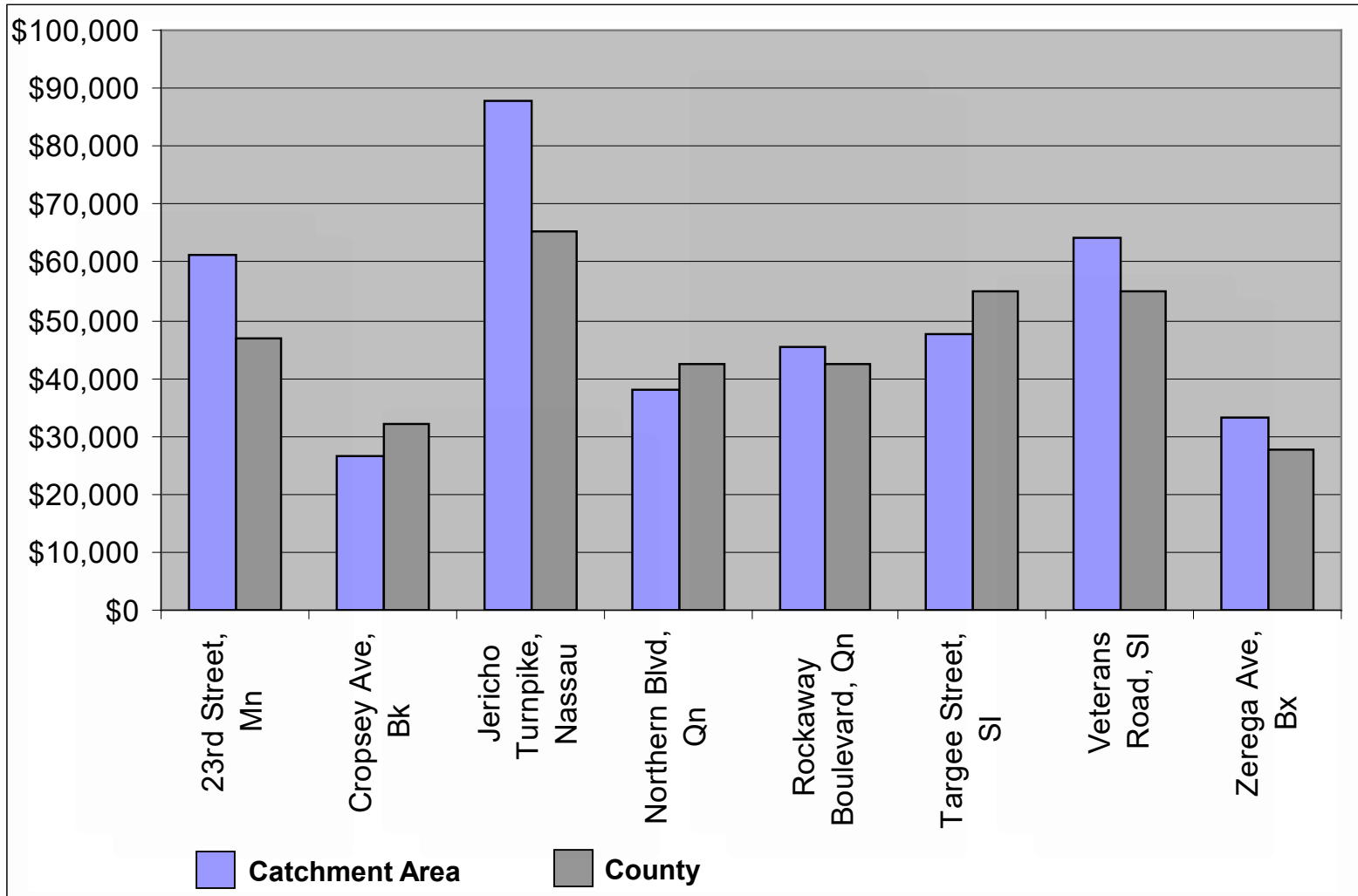
## Population Density



\*2000 Census Data

# Demographics

## Median Household Income

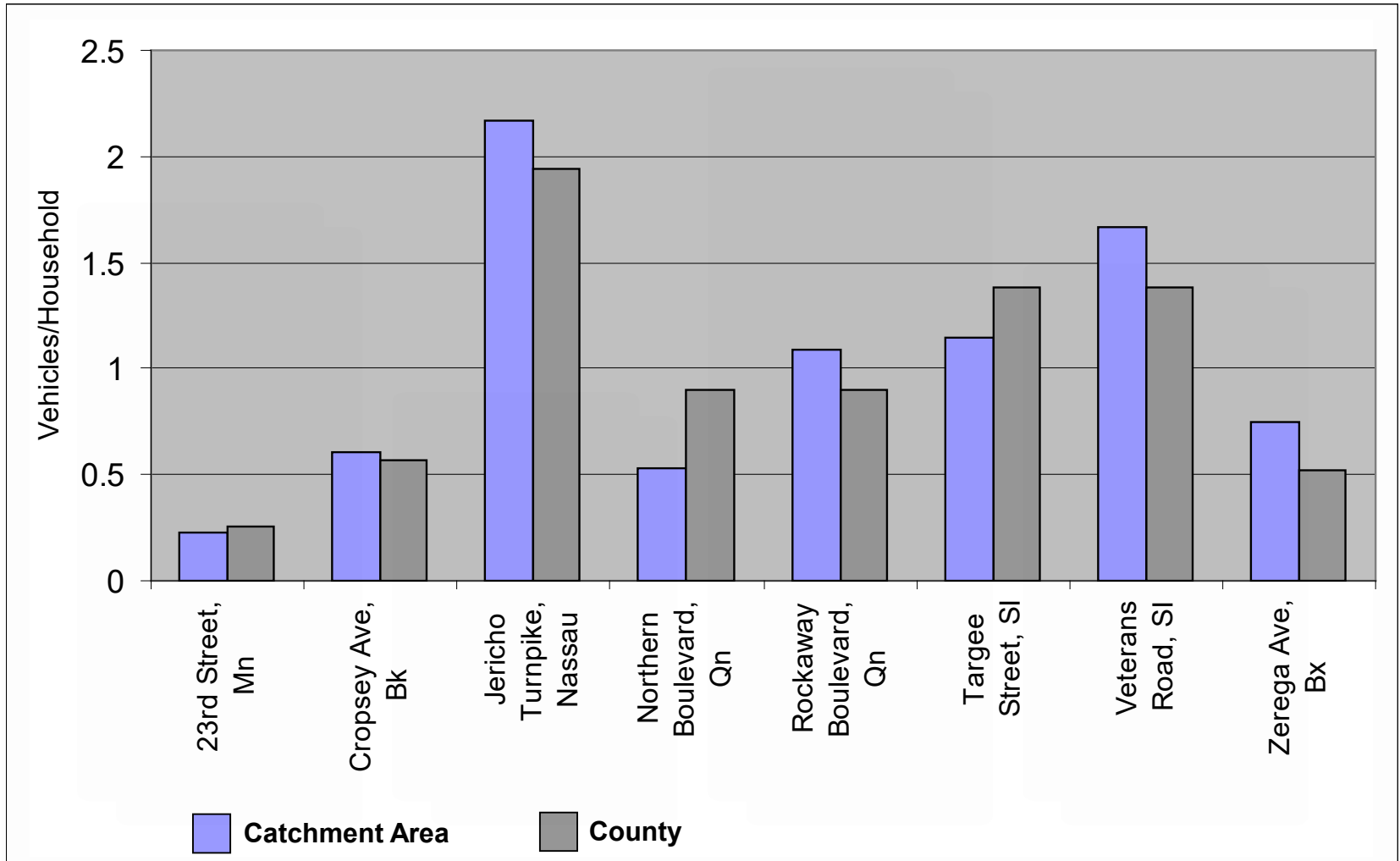


\*2000 Census Data



# Demographics

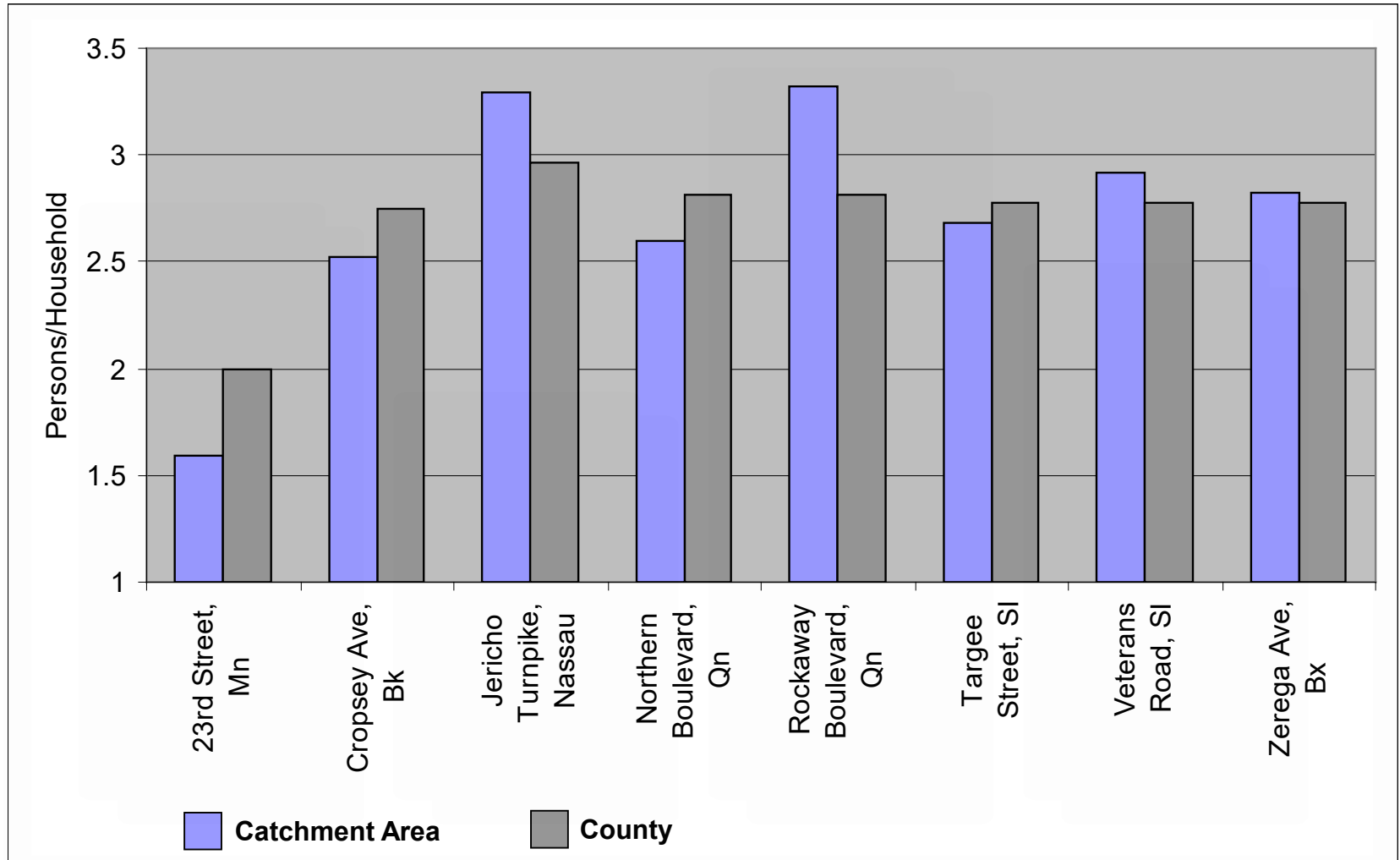
## Vehicles per Household



\*2000 Census Data

# Demographics

## Household Size



\*2000 Census Data

# Land Use High Density

## Residential

Low Density  
FAR: 0.5 - 0.9

Medium Density  
FAR: 1.0 - 4.0

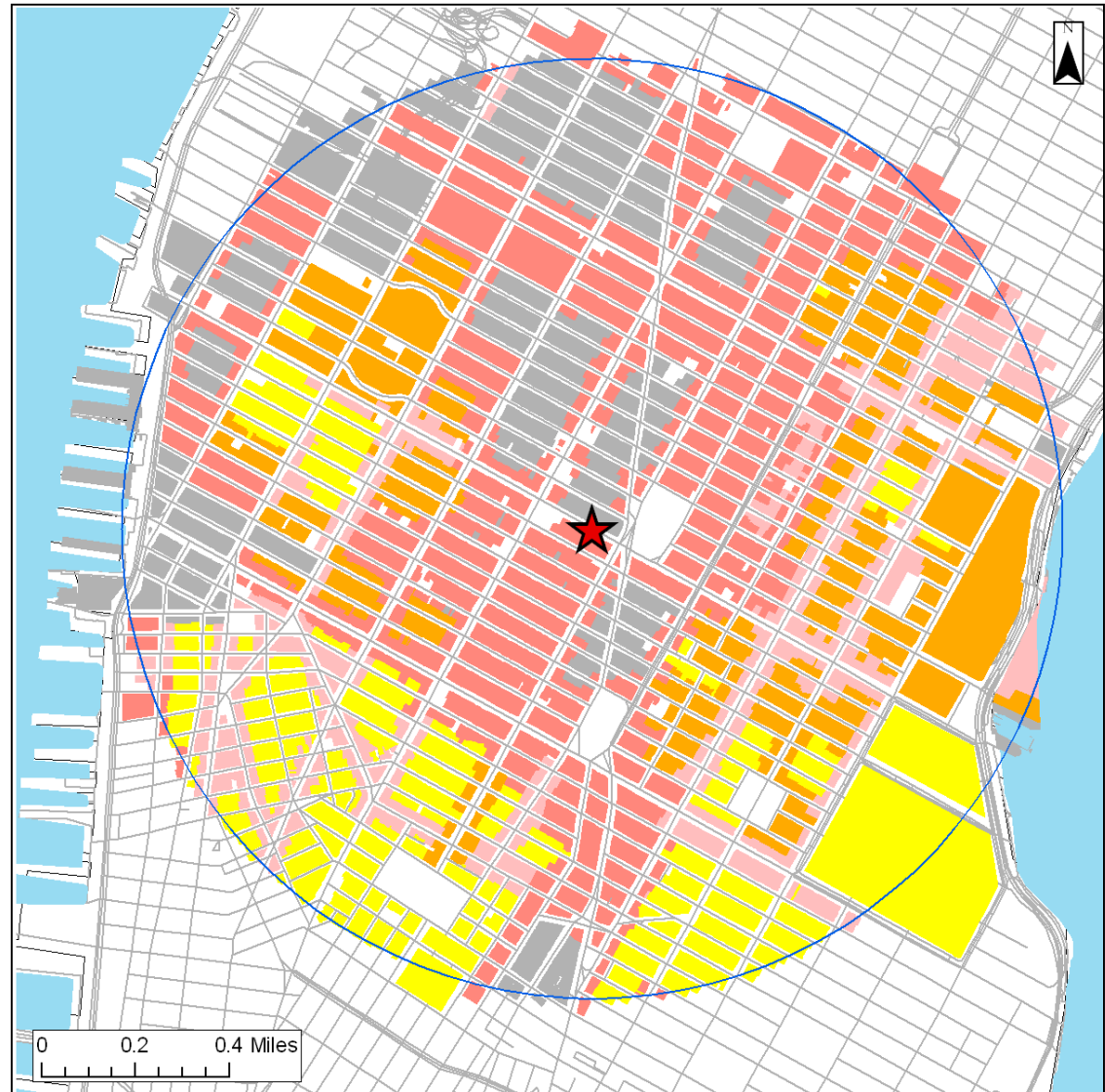
High Density  
FAR: 4.0 - 10.0

## Commercial

Low/Medium Density  
*Store Front*

High Density  
*High Rise Office*

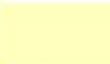

Manufacturing



23<sup>rd</sup> Street, Manhattan


# Land Use Med. Density

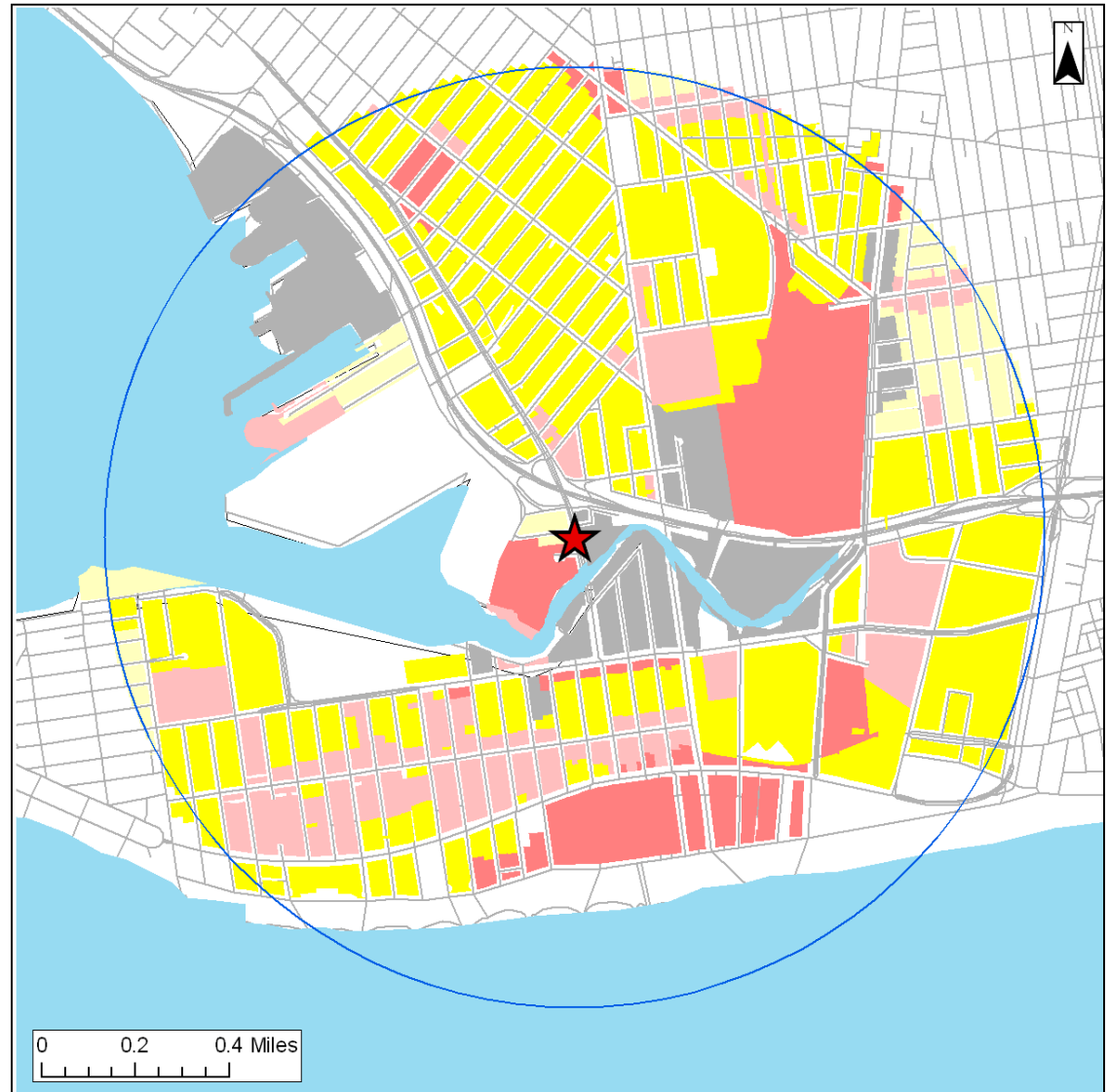
## Residential

-  Low Density  
*FAR: 0.5 - 0.9*
-  Medium Density  
*FAR: 1.0 - 4.0*
-  High Density  
*FAR: 4.0 - 10.0*

## Commercial

-  Low/Medium Density  
*Store Front*
-  High Density  
*High Rise Office*

-  Manufacturing



Croppsey Avenue, Brooklyn

# Land Use Low Density

## Residential

Low Density  
FAR: 0.5 - 0.9

Medium Density  
FAR: 1.0 - 4.0

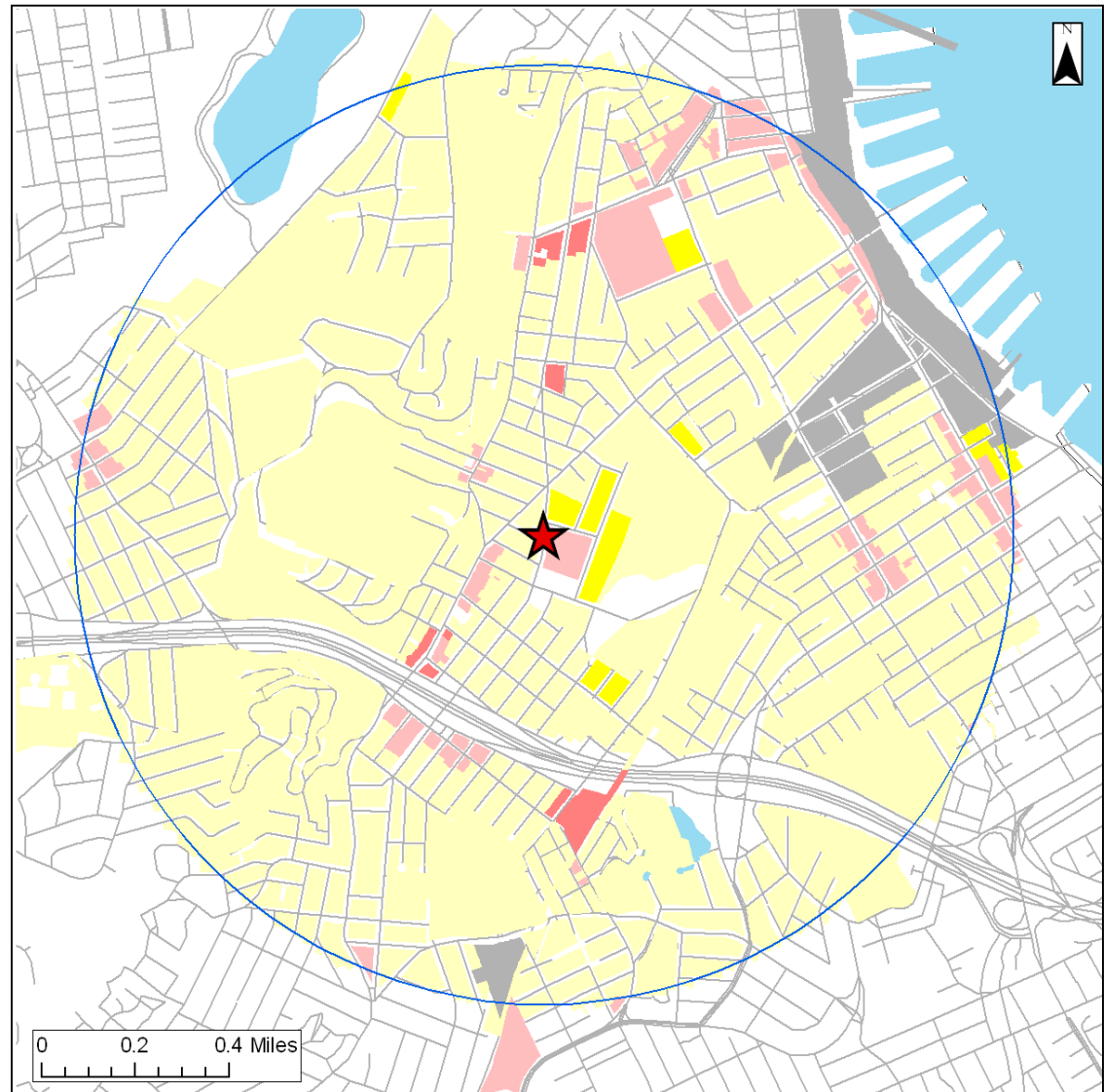
High Density  
FAR: 4.0 - 10.0

## Commercial

Low/Medium Density  
*Store Front*

High Density  
*High Rise Office*

Manufacturing



Targee Street, Staten Island

# Zoning/Land Use

HISS Sites	Zoning Categories/Groups					
	R1-R4	R5-R7	R8-R10	C1-C4	C5-C7	M1-M3
23rd Street, Mn	0%	20%	15%	10%	35%	20%
Cropsey Ave Bk	5%	50%	0%	15%	15%	15%
Jericho TPK, Nassau	80%	0%	0%	20%	0%	0%
Northern Blvd, Qn	10%	50%	0%	5%	2%	33%
Rockaway Blvd, Qn	60%	15%	0%	10%	15%	0%
Targee Street, SI	82%	3%	0%	7%	3%	5%
Veterans Road, SI	60%	0%	0%	0%	0%	40%
Zerega Ave, Bx	30%	40%	0%	7%	3%	20%

# Accessibility Criteria

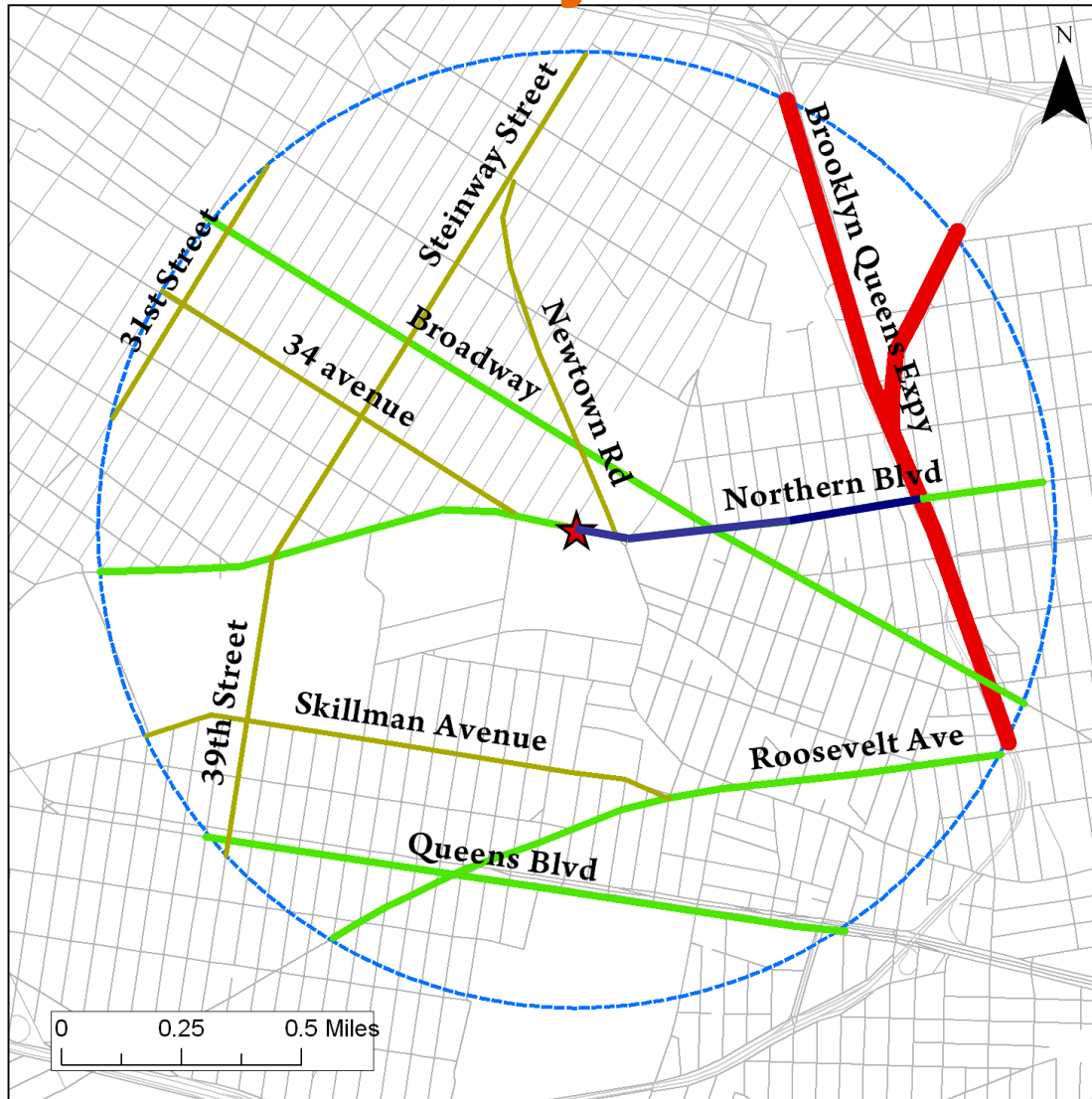
## **Vehicle**

- Number of expressways, arterials and collectors within 1 mile
- Route distance and number of signalized intersections from closest expressway

## **Transit**

- Number of bus routes and subway stops within 1 mile
- Number of bus routes and frequency on adjacent streets

# Accessibility – Vehicle



- Expressway
- Principal Arterial
- Collector

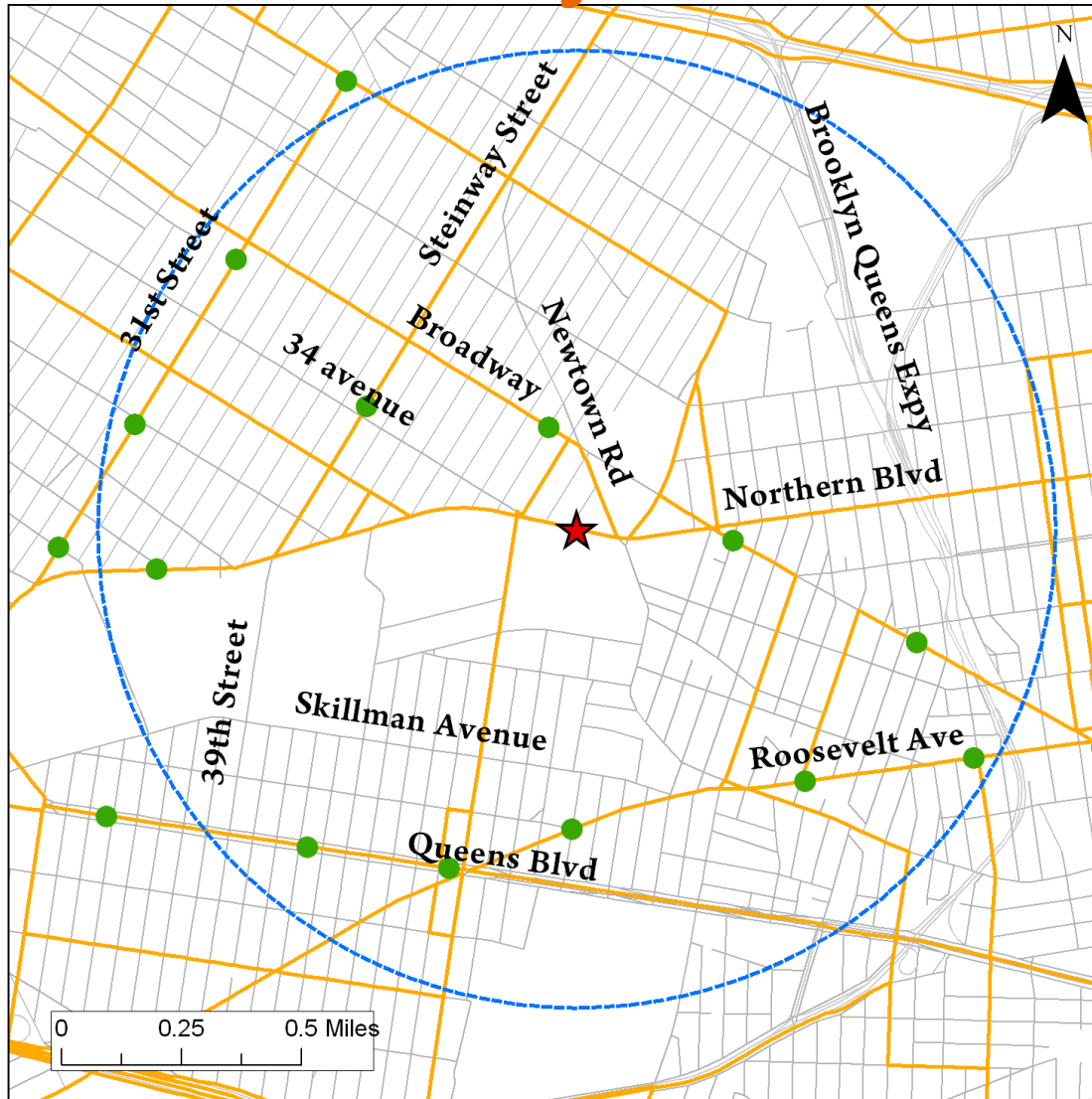
Northern Blvd, Queens



# Accessibility – Vehicle

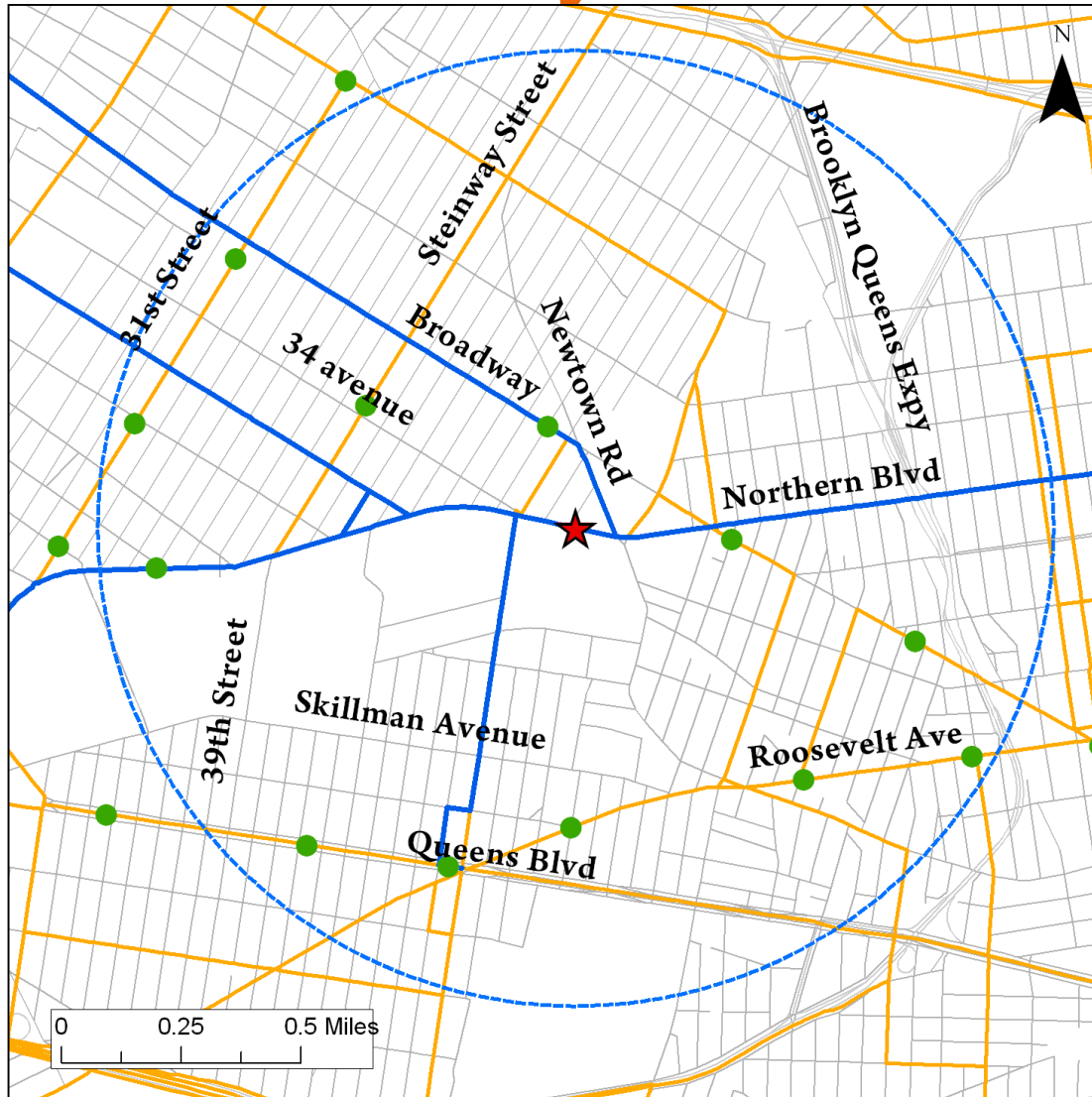
<b>Facilities</b>	<b># Expressways (1 mile)</b>	<b># Arterials (1 mile)</b>	<b># Collectors (1 mile)</b>	<b>Shortest Driving Distance to Nearest Expressway</b>	<b># Signalized Intersections Along</b>	<b>Average Time Traveled (within catchment area)</b>	<b># Parking Spaces</b>
<b>23rd Street</b>	2	14	2	5,400'	7	1:42	0
<b>Cropsey Street</b>	1	1	3	800'	2	2:05	572
<b>Jericho Turnpike</b>	2	1	5	5,000'	6	2:08	480
<b>Northern Blvd</b>	1	4	6	4,000'	8	2:07	440
<b>Rockaway Blvd</b>	3	3	4	6,500'	12	1:54	340
<b>Targee Street</b>	1	4	2	2,500'	5	2:58	360
<b>Veterans Rd</b>	2	3	3	900'	0	3:00	480
<b>Zerega Ave</b>	3	3	2	2,800'	3	2:59	550

# Accessibility – Transit



Northern Blvd, Queens

# Accessibility – Transit



- Bus Route
- Subway Station
- Adj. Bus Route

Northern Blvd, Queens

# Accessibility - Transit

<b>Facilities</b>	<b># Subway Lines (1 mile)</b>	<b># Subway Stops (1 mile)</b>	<b>Distance to Nearest Subway Stop</b>	<b># Bus Lines (1 mile)</b>	<b># Adj. Bus Lines</b>	<b>Bus Freq. (Peak Period)</b>
<b>23rd Street</b>	15	25	500'	89	7	53
<b>Cropsey Street</b>	4	7	2,000'	12	3	26
<b>Jericho Turnpike</b>	0	0	N/A	1	0	0
<b>Northern Blvd</b>	8	12	1,000'	26	5	48
<b>Rockaway Blvd</b>	1	4	3,000'	9	2	28
<b>Targee Street</b>	1	2	4,000'	36	3	26
<b>Veterans Rd</b>	1	2	4,000'	3	0	0
<b>Zerega Ave</b>	0	0	5,000'	13	0	0

# Comparative Analysis

- **Trip Rates**

- AM, MD, PM, and Sat Peaks

- **Demographics**

- Population density
- Income
- Car ownership
- Household size

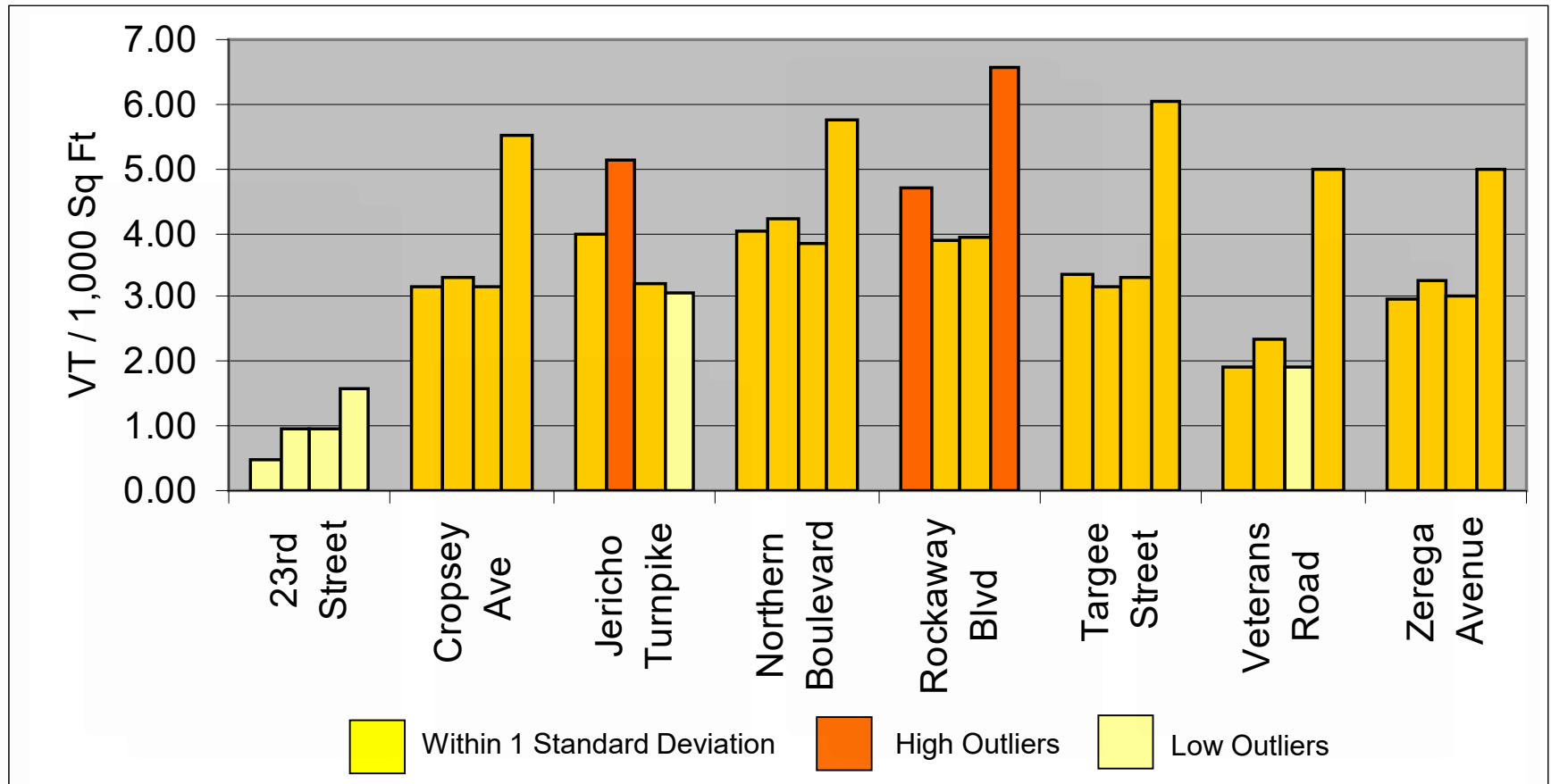
- **Land Use**

- Zoning
- Density

- **Transportation Accessibility**

- Vehicles
- Transit

# Peak Hours Vehicle Trips/1,000 Sq Ft



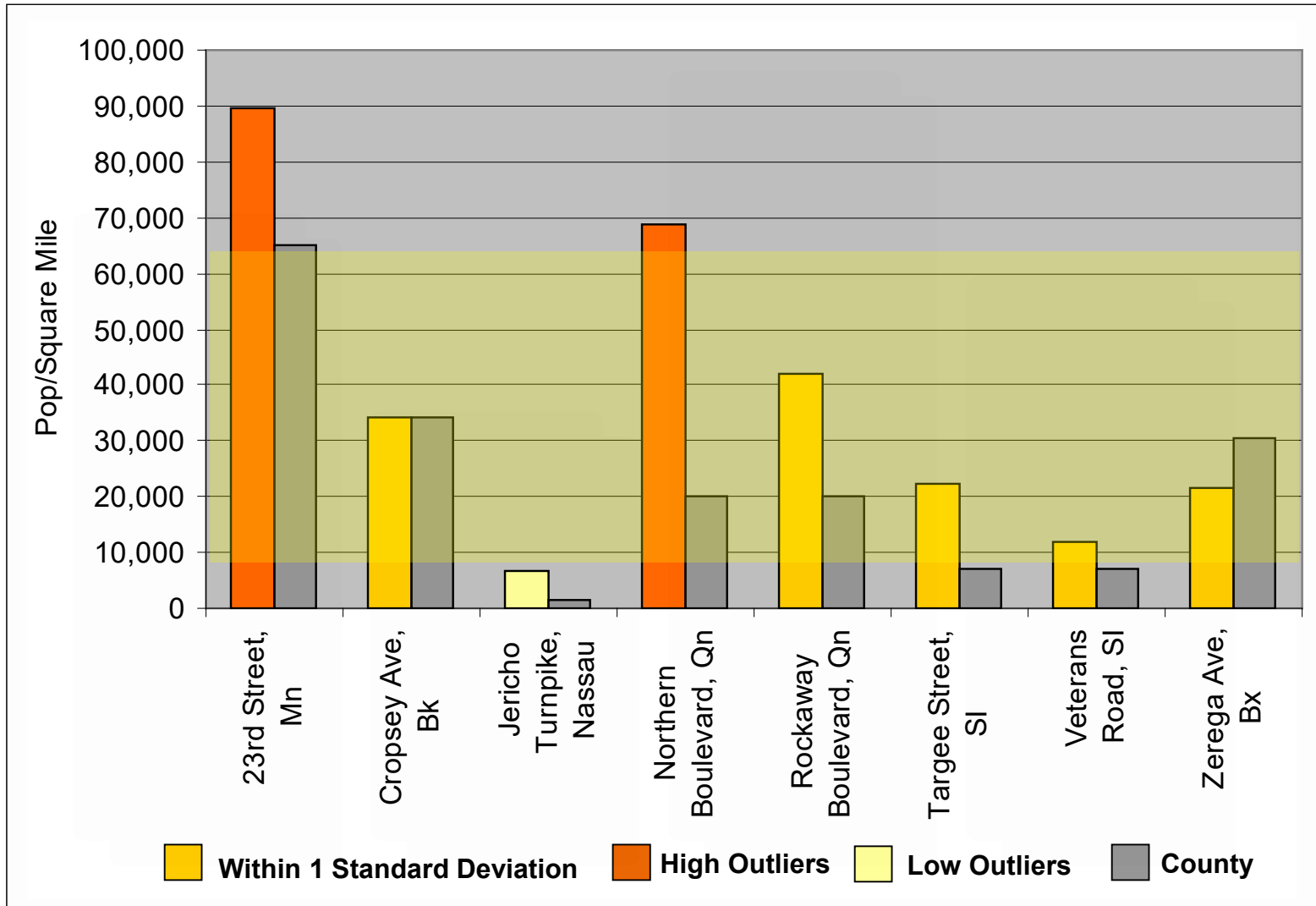
# Zoning / Land Use

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Low	Med	High
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# Demographics

## Population Density

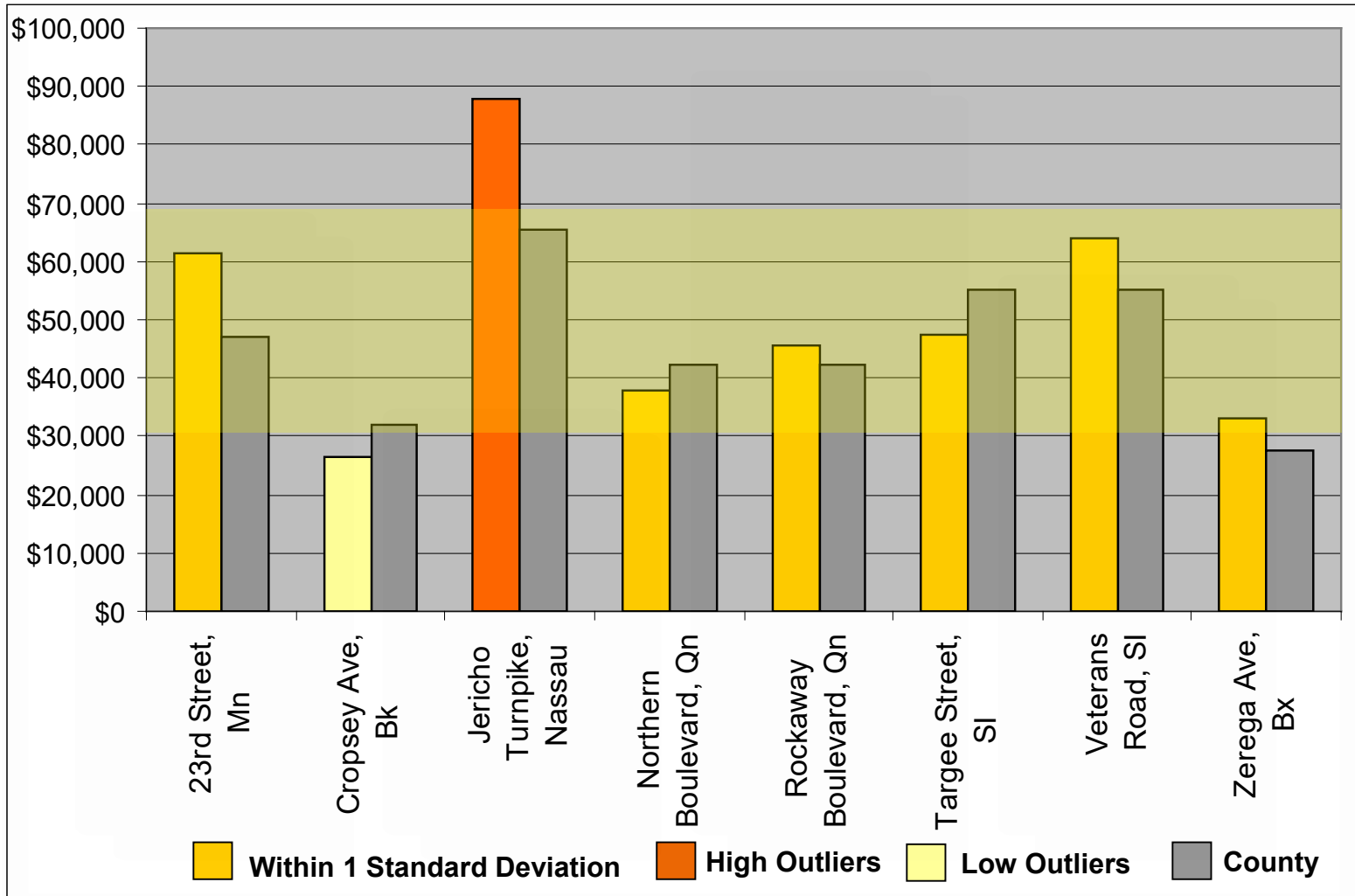


\*2000 Census Data



# Demographics

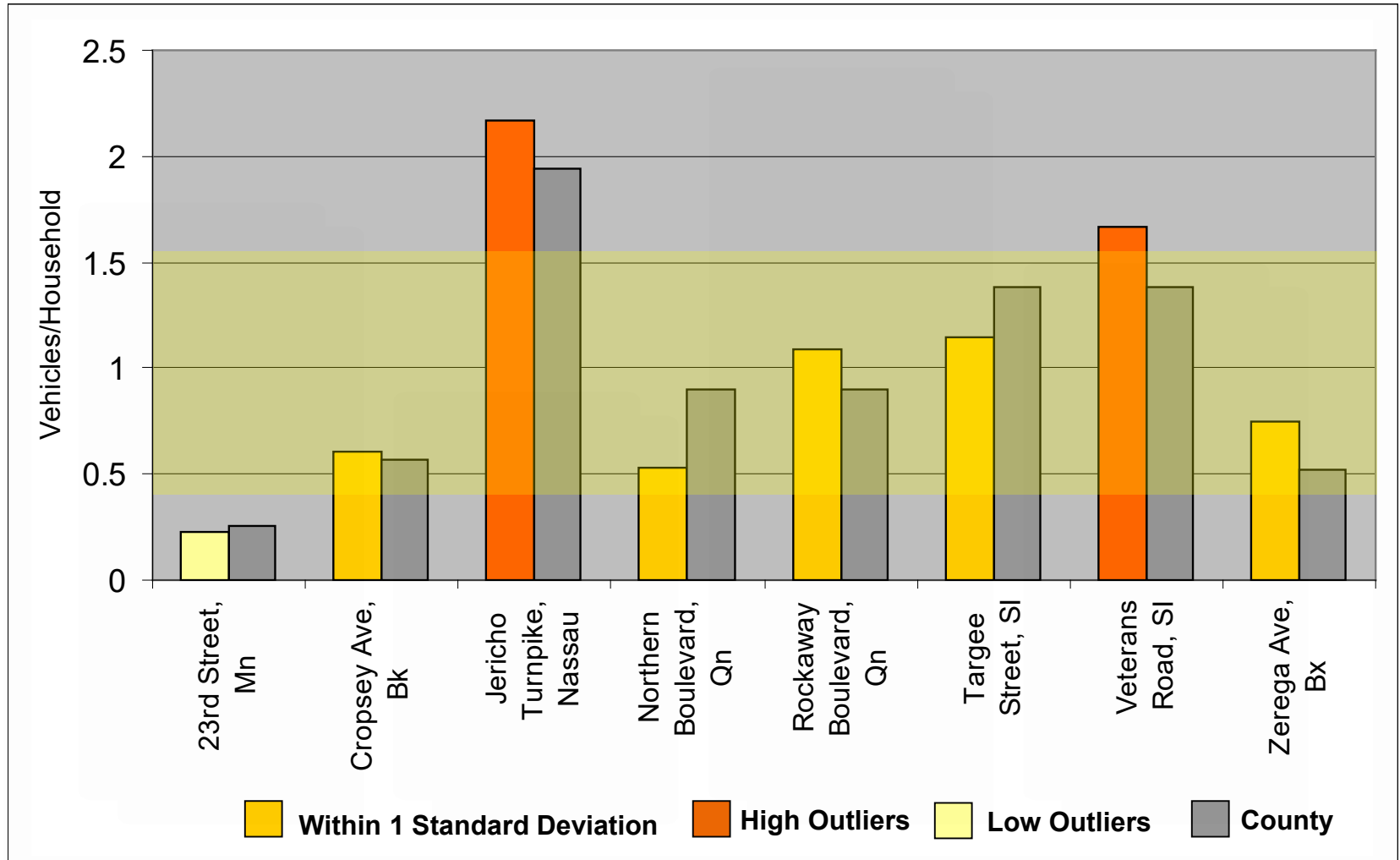
## Median Household Income



\*2000 Census Data

# Demographics

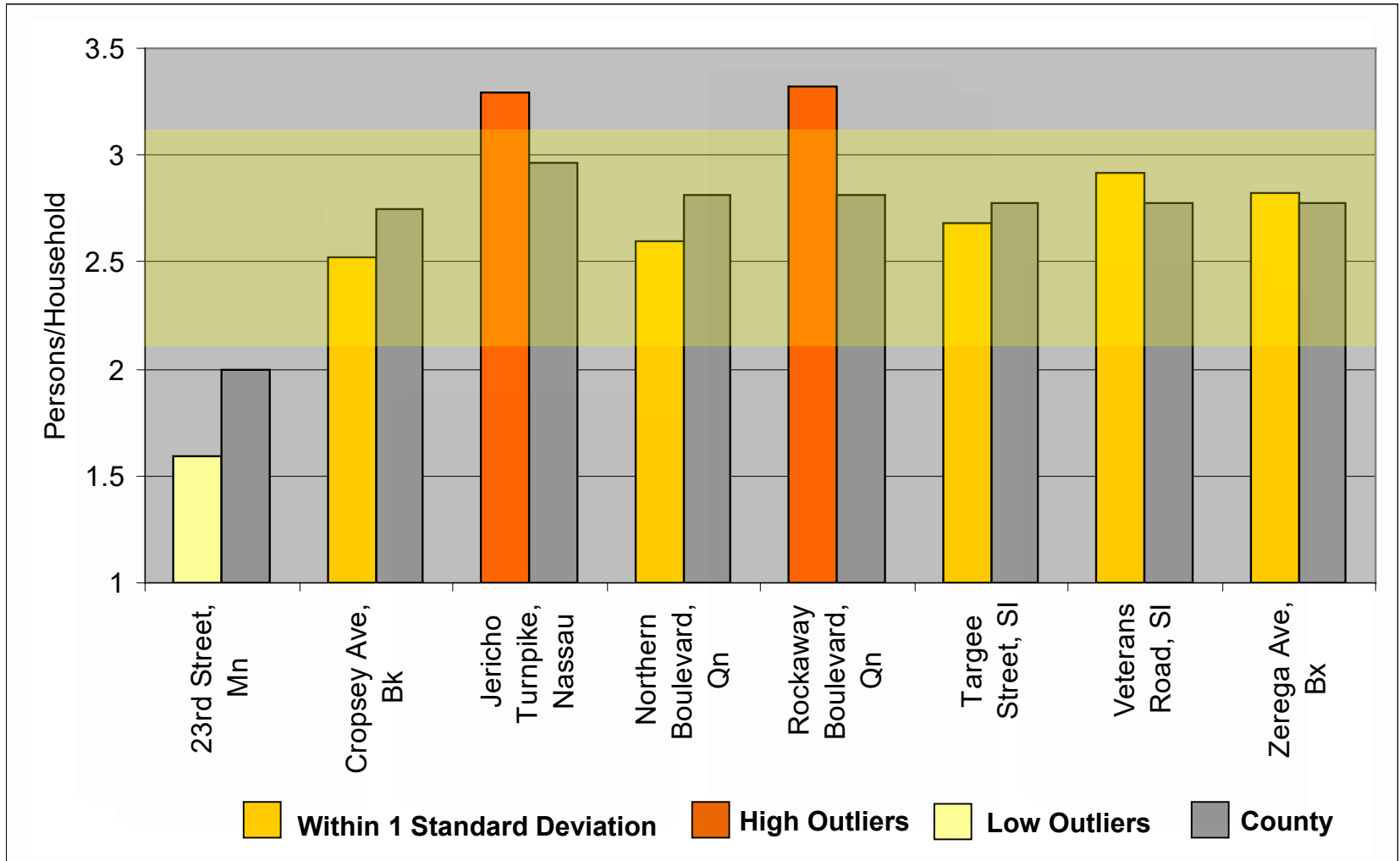
## Vehicles per Household



\*2000 Census Data

# Demographics

## Household Size



\*2000 Census Data

# Accessibility – Vehicle

Facilities	# Expressways (1 mile)	# Arterials (1 mile)	# Collectors (1 mile)	Shortest Driving Distance to Nearest Expressway	# Signalized Intersections Along	Average Time Traveled (within catchment area)	# Parking Spaces
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More Accessible
Accessible
Less Accessible

# Accessibility - Transit

Facilities	# Subway Lines (1 mile)	# Subway Stops (1 mile)	Distance to Nearest Subway Stop	# Bus Lines (1 mile)	# Adj. Bus Lines	Bus Freq. (Peak Period)
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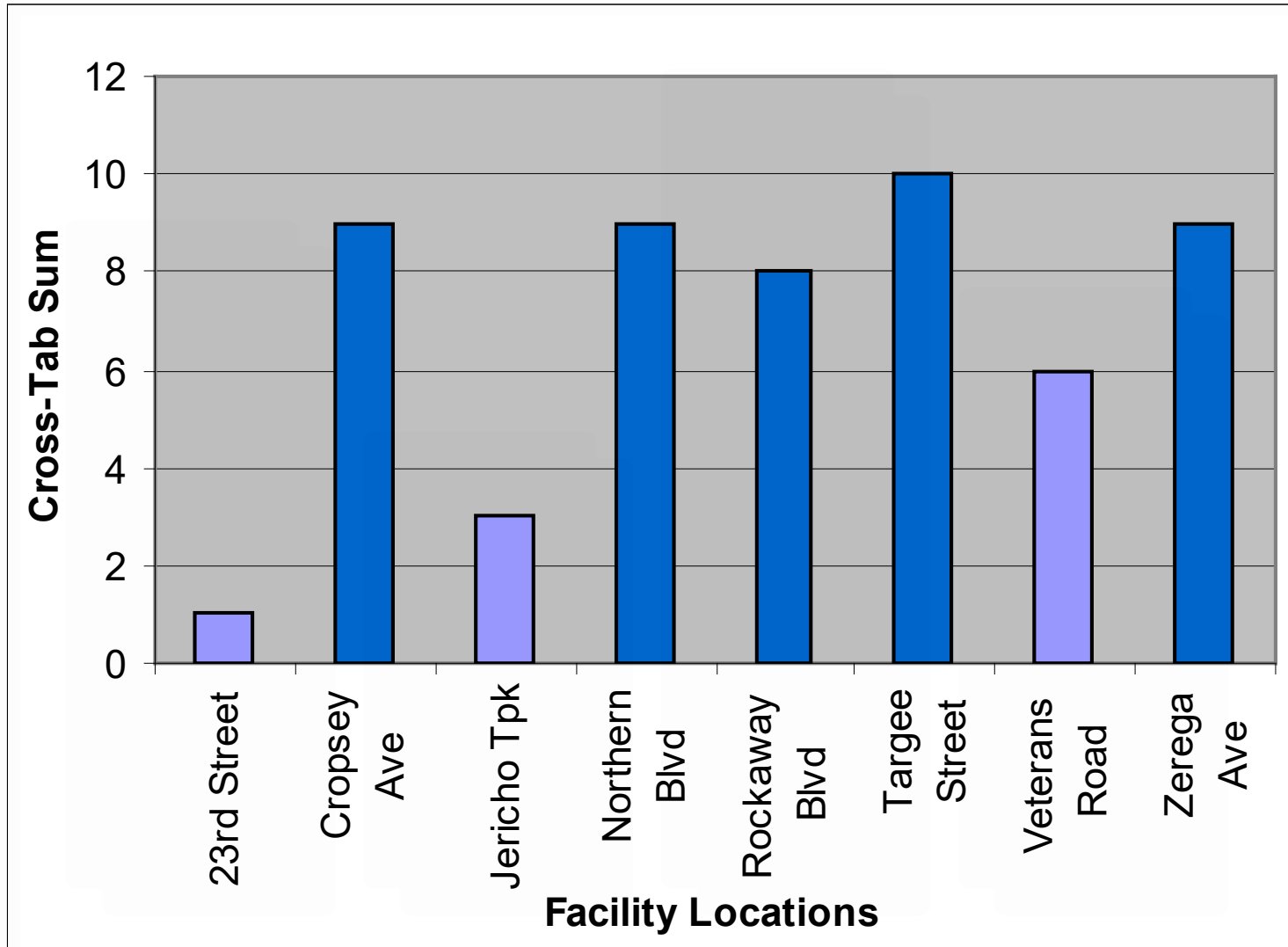
More Accessible
Accessible
Less Accessible

# Cross-Tab Analysis

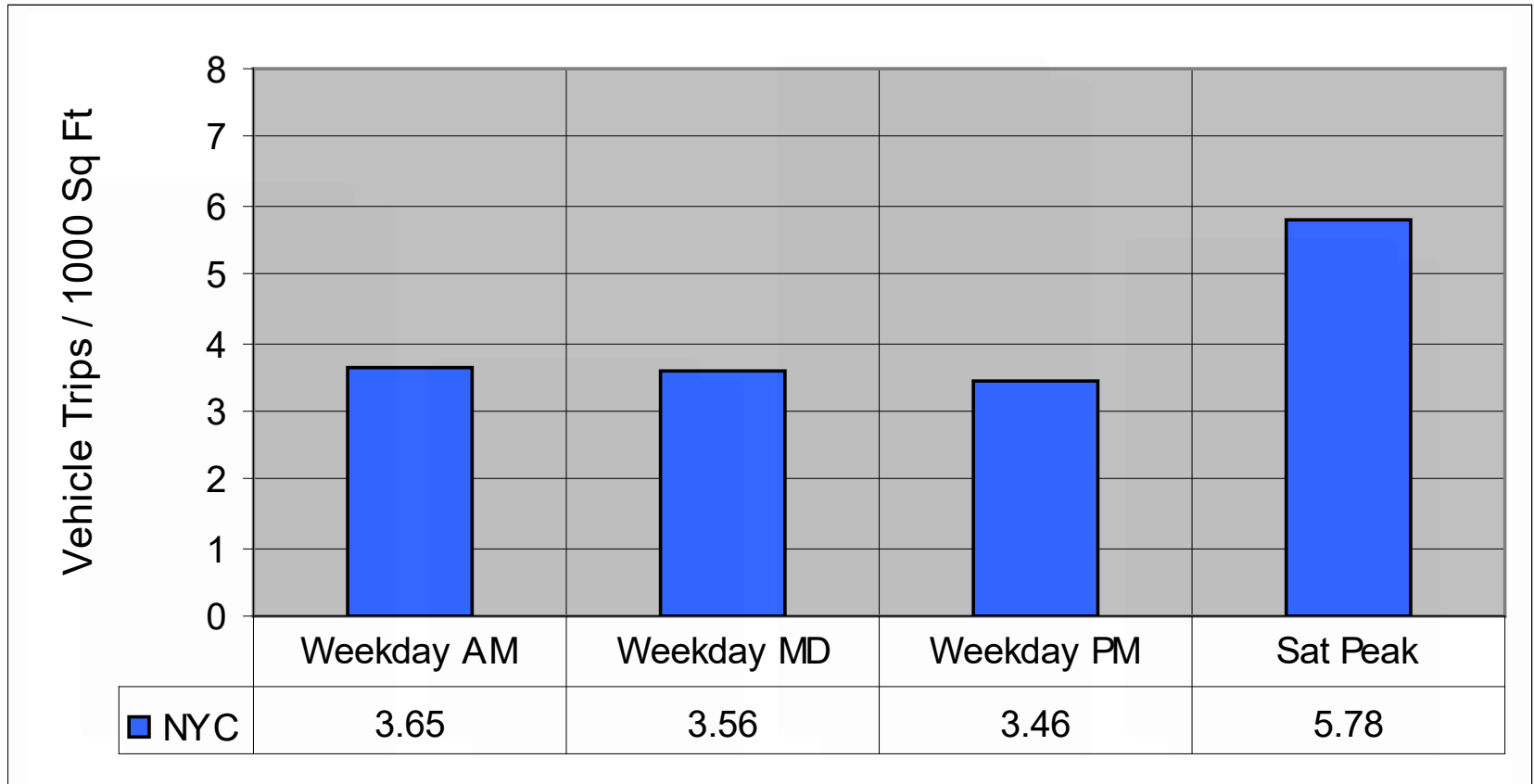
Locations	Vehicle Trip Rates				Demographics				Land Use	Access		Sum
	AM	MD	PM	Sat	Pop Density	HH Income	Vehicles / HH	HH Size		Vehicle	Transit	
Targee Street	M	M	M	M	M	M	M	M	L	M	M	10
Zerega Ave	M	M	M	M	M	M	M	M	M	H	L	9
Northern Blvd	M	M	M	M	H	M	M	M	M	M	H	9
Cropsey Ave	M	M	M	M	M	L	M	M	M	H	M	9
Rockaway Blvd	H	M	H	H	M	M	M	H	M	M	M	8
Veterans Road	M	M	L	M	M	M	H	M	L	H	L	6
Jericho Tpk	M	H	M	L	L	H	H	H	L	M	L	3
23rd Street	L	L	L	L	H	M	L	L	H	L	H	1

Low = 0
Med = 1
High = 0

# Cross-Tab Analysis

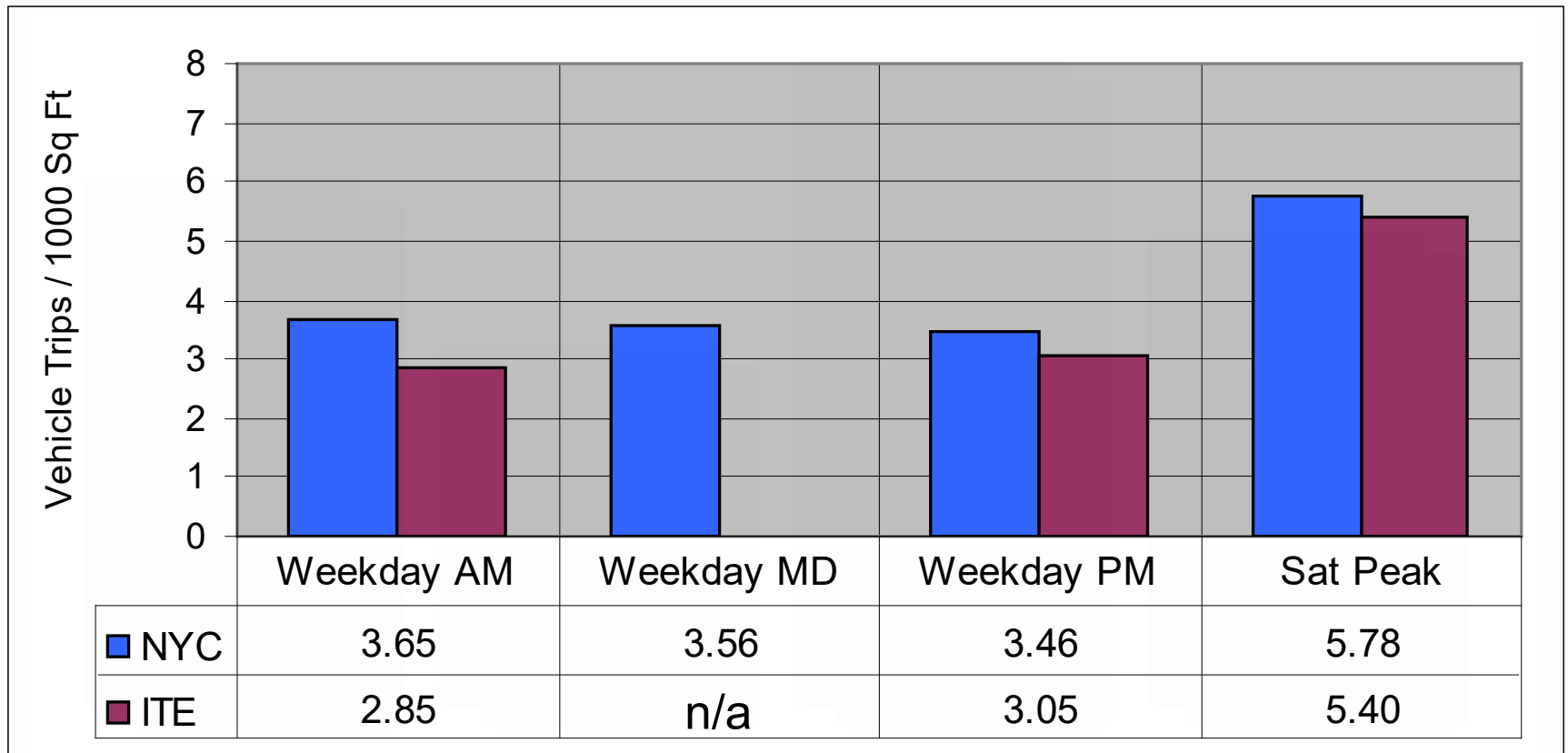


# HISS Trip Generation Rates: NYC

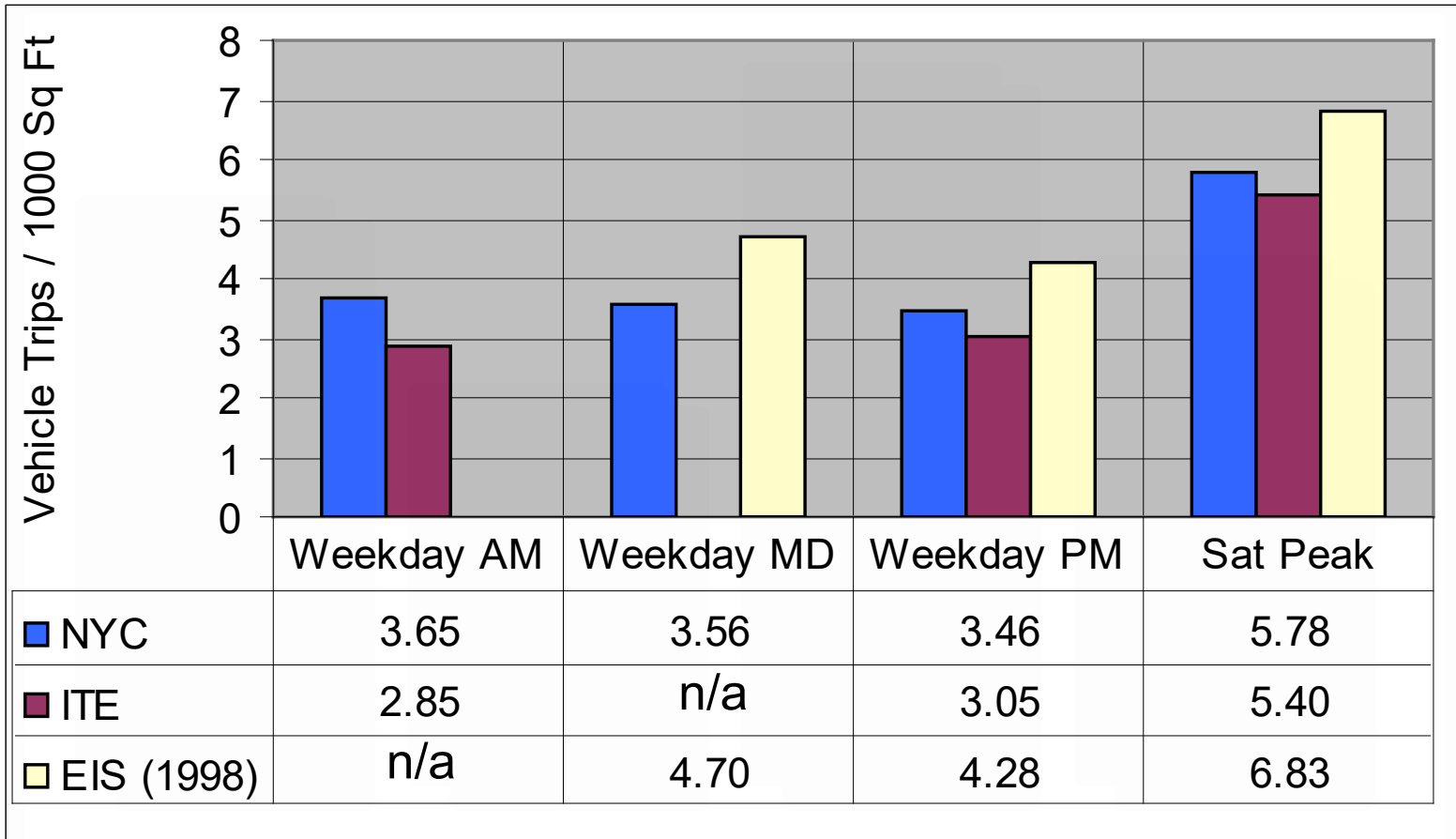




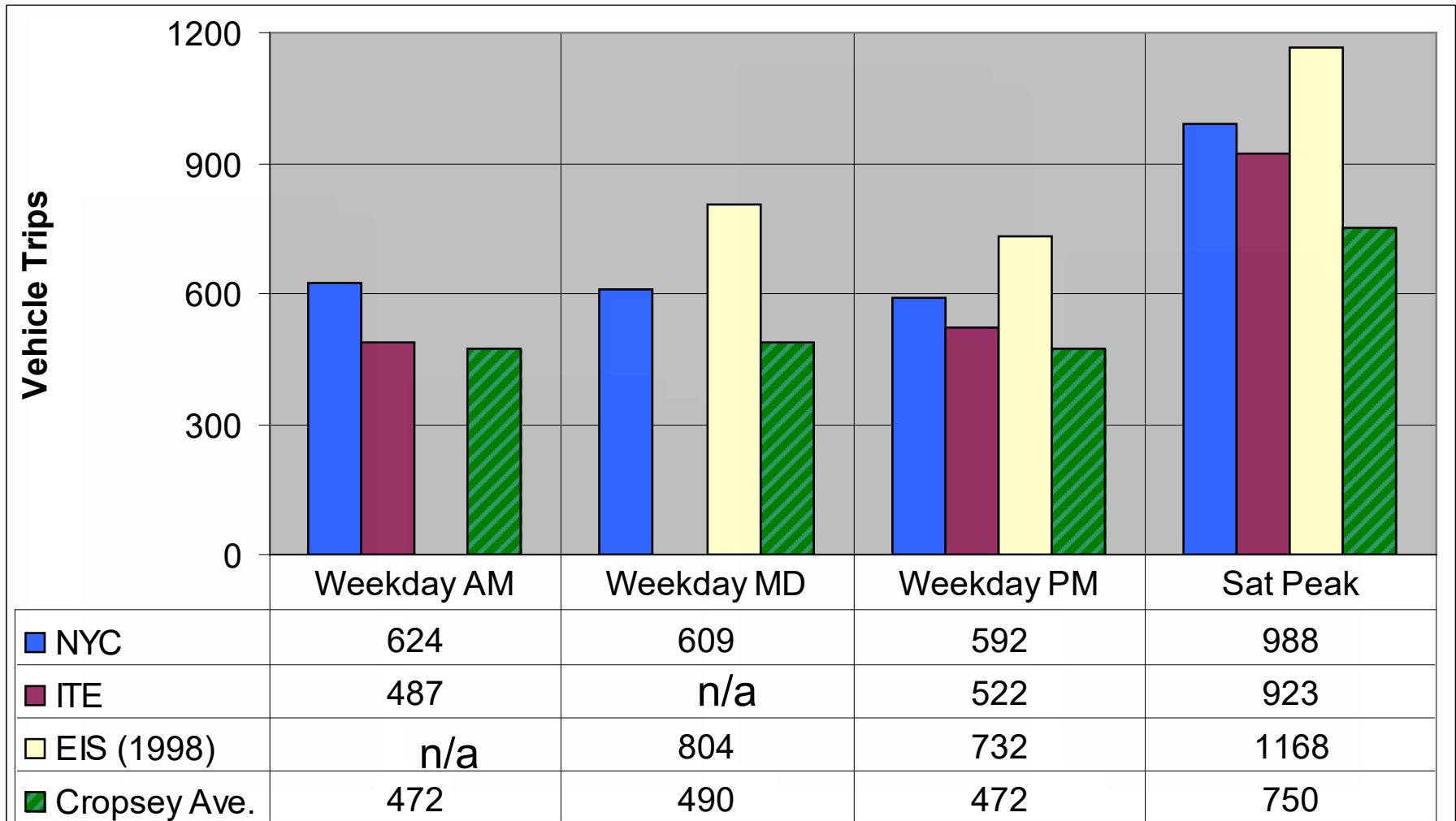
# HISS Trip Generation Rates: NYC & ITE



# HISS Trip Generation Rates: NYC, ITE, & EIS



# Cropsey Avenue: Estimated Vehicle Trips and Observed Trips



# Results

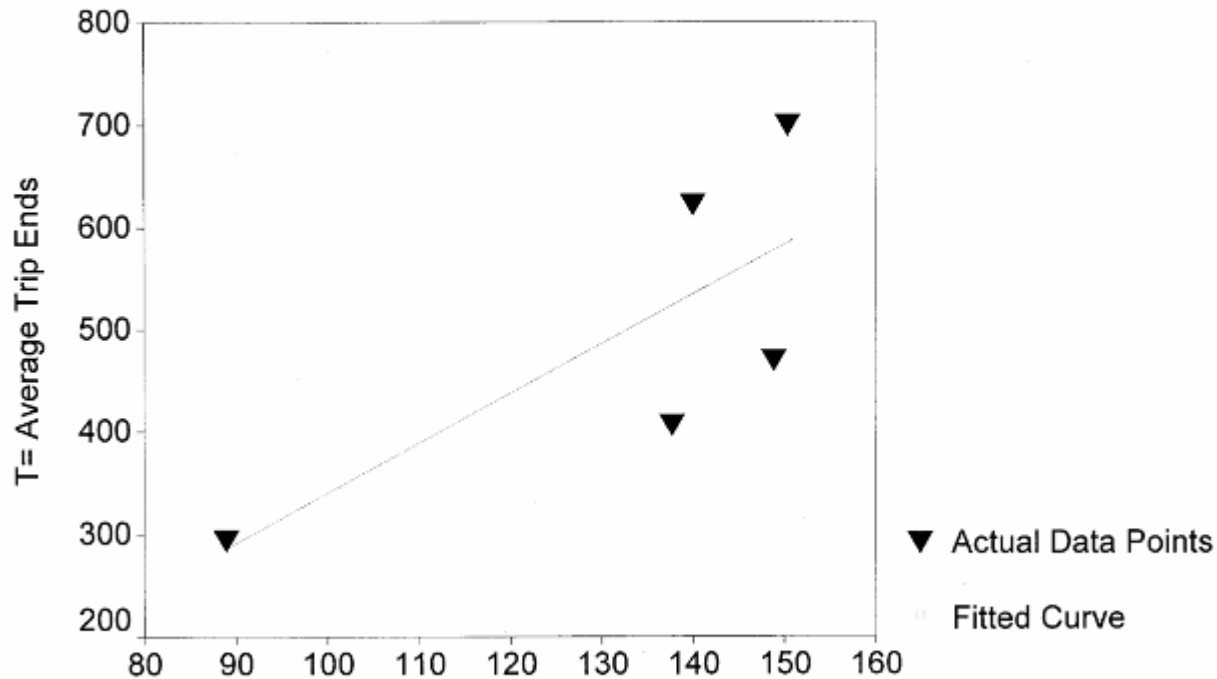
NYC HISS AVG Area (sq ft): 136,171		WD AM	WD MD	WD PM	Sat Pk
<b>Vehicle Trips per 1,000 sq ft</b>		3.65	3.56	3.46	5.78
<b>Modal Split</b>	Walk	10.4%	12.3%	10.6%	11.1%
	Bike	0.4%	0.4%	0.3%	0.3%
	Auto	73.9%	76.8%	81.2%	82.8%
	Taxi	0.9%	1.8%	1.9%	1.7%
	Van	14.4%	8.7%	6.0%	4.1%
<b>Vehicle Trip Temporal Distribution</b>		7.2%	7.1%	7.0%	9.8%
<b>Vehicle Directional Split (ins/outs)</b>		52% / 48%	50% / 50%	51% / 49%	50% / 50%
<b>Vehicular Occupancy</b>	Auto	1.24	1.33	1.40	1.52
	Taxi	1.50	1.44	1.57	1.58
	Van	1.29	1.36	1.29	1.29
<b># Truck Trips</b>		15	13	5	6
<b>Truck Trips per 1,000 sq ft</b>		0.110	0.095	0.036	0.043

# NYC Trip Generation Fitted Curve

Average Trip Ends per 1,000 Sq. Ft. GFA for AM Peak Hour of Generator = 3.76

Range of Trip Rates: 2.97 - 4.68

Number of Studies = Five



$$X = 1,000 \text{ SQ Ft GFA} \quad \ln T = X \ln 0.0111 + \ln 108.636 \quad R^2 = 0.699$$

# Questions/Comments