Exploratory Analysis to Identify

High Risk Towing Zones

KARUSH JAGGI
AMEYA JADHAVAR | PRITHVI RAJ SIROLOKAR

OSU and SAS Data Mining Certificate

AGENDA

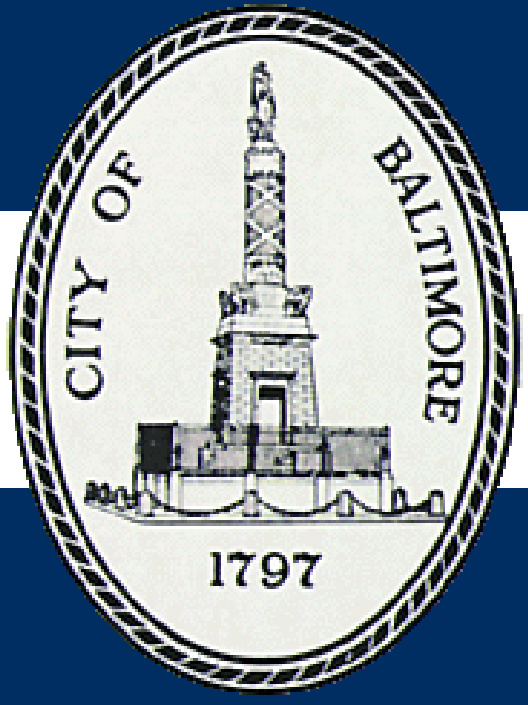
- Introduction
- Explore the data sets
- Analysis process flow
- Analysis so far
- What next?

Why?

IDENTIFY HIGH FREQUENCY TOWING ZONES

HELP TAKE RELEVANT STEPS TO REDUCE VIOLATIONS

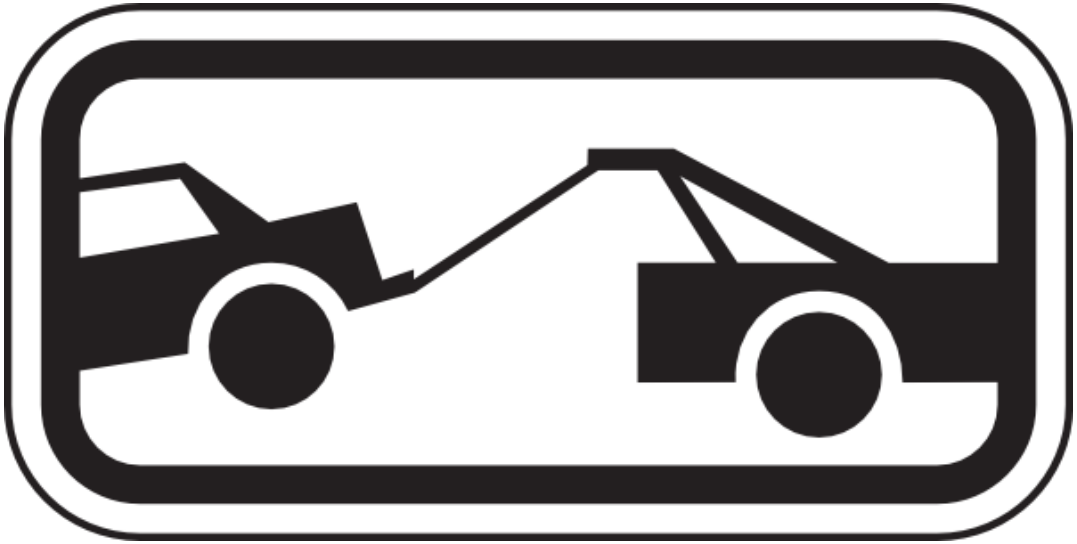
$2,116,596



OPEN BALTIMORE

City Of Baltimore

Data Sets



META DATA

Variable Name	Variable Type	Example	Description
propertynumber	Character	F409312	Unique property number for vehicles
TowedDate	Date	12/9/2014	Date on towing the car
TowedTime	Time	2:12:00.00	Time at which the car was towed
VehicleMake	Character	Dodge	Maker of the vehicle
TowCompany	Character	Universal Towing LLC	Identifies the company that towed the car
TowCharge	Currency	$130.00	Gives the towing penalty
TotalPaid	Currency	$297.00	Total penalty charge paid
TowedFromLocation	Character	2200 Park Ave	Towing location
ZIPCODE	Character	22120	Corresponding ZipCode
StorageYard	Character	Fallsway Impound Lot	Location of the impound

Getting the ZipCodes

Street Address

4600 N CHARLES ST, Baltimore, MD
4600 N CHARLES ST, Baltimore, MD
1300 N CHARLES ST, Baltimore, MD
200 E 33RD ST, Baltimore, MD
200 GUILFORD AVE, Baltimore, MD
1300 E MONUMENT ST, Baltimore, MD
700 W LOMBARD ST, Baltimore, MD
1100 N CHARLES ST, Baltimore, MD

Baltimore City DOT

USPS

Excel Scrapper

100+W+HENRIETTA+ST	=CONCATENATE("https://tools.usps.com/go/ZipLookupResultsAction!input.action?resultMode=0&companyName=&address1=",A6,"&address2=&city=Baltimore&state=MD&urbanCode=&postalCode=&zip=")	=URLregexScrape(B6,"<span class(.*)zip(.*)",1,"")	21230

Google Docs Scrapper

ZipCodes

META DATA - Parking

Variable Name	Variable Type	Example	Description
Citation	Character	22707285	Unique ticket identifier
VehicleMake	Character	Dodge	Make of the vehicle
State	Character	MD	Vehicle registration state
ParkingLocation	String	5200 FLORENCE AVE	Parking location
ZIPCODE	Character	22120	Corresponding ZipCode
Description	String	In Transit Zone/Stop	Reason for parking ticket
violFine	Currency	$52.00	Fine payable
violationDate	Date	01-04-2014	Date of violation
violationTime	Time	10:12	Time of violation

PROCESS FLOW

ZipCode Level AM/PM Drilldown

Street Level Insights

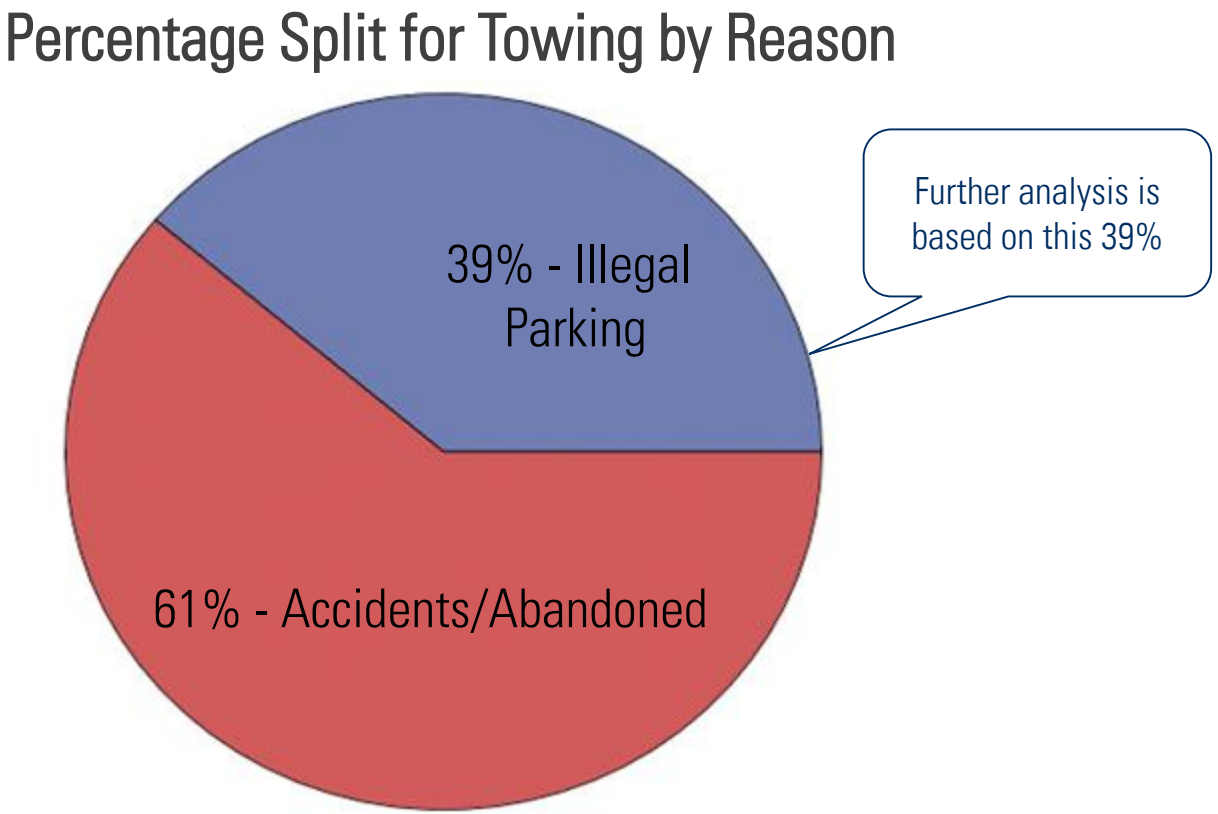
GIS Heat Mapping Using ZipCodes

ZipCode Level Distribution

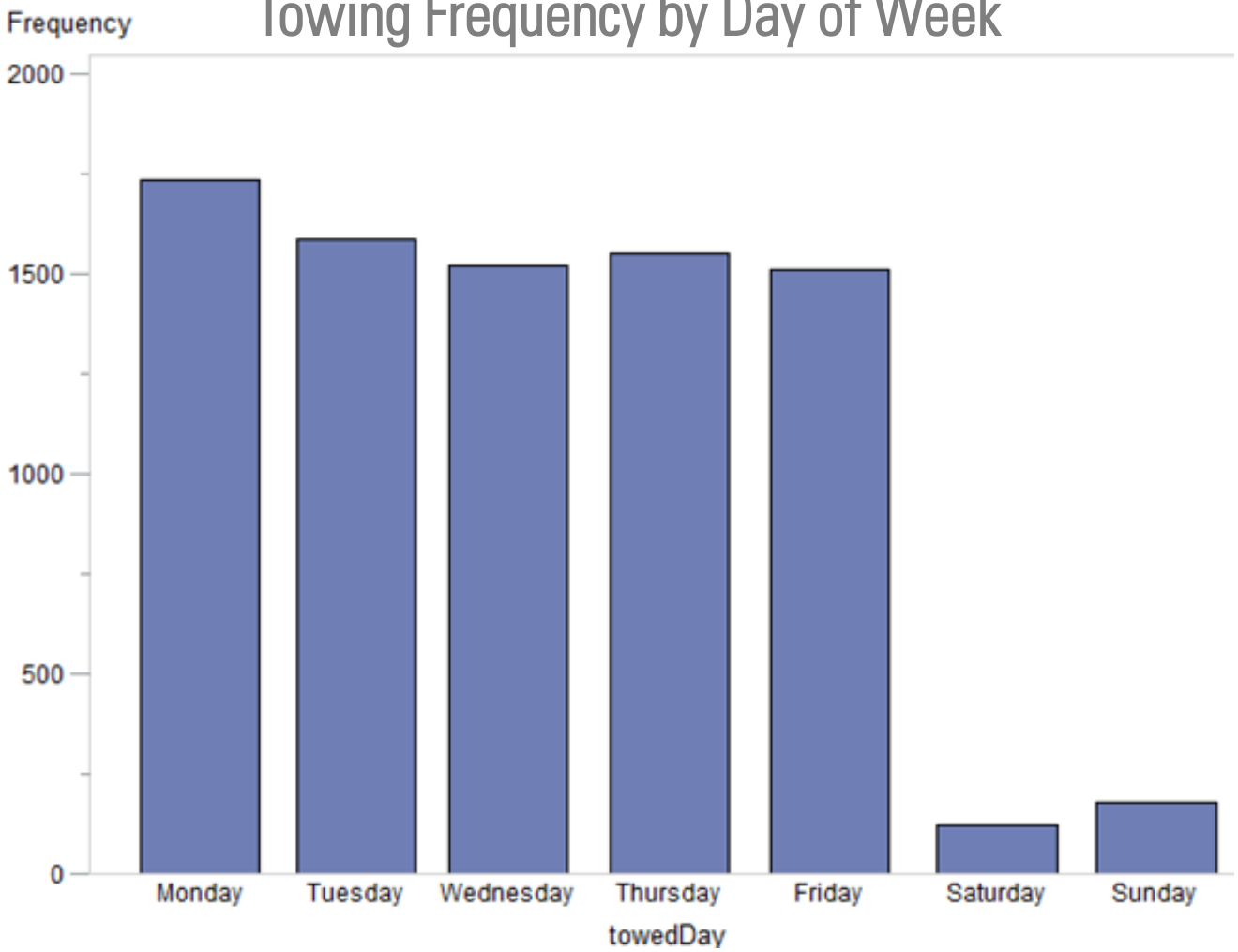
Day of Week

Time of Day

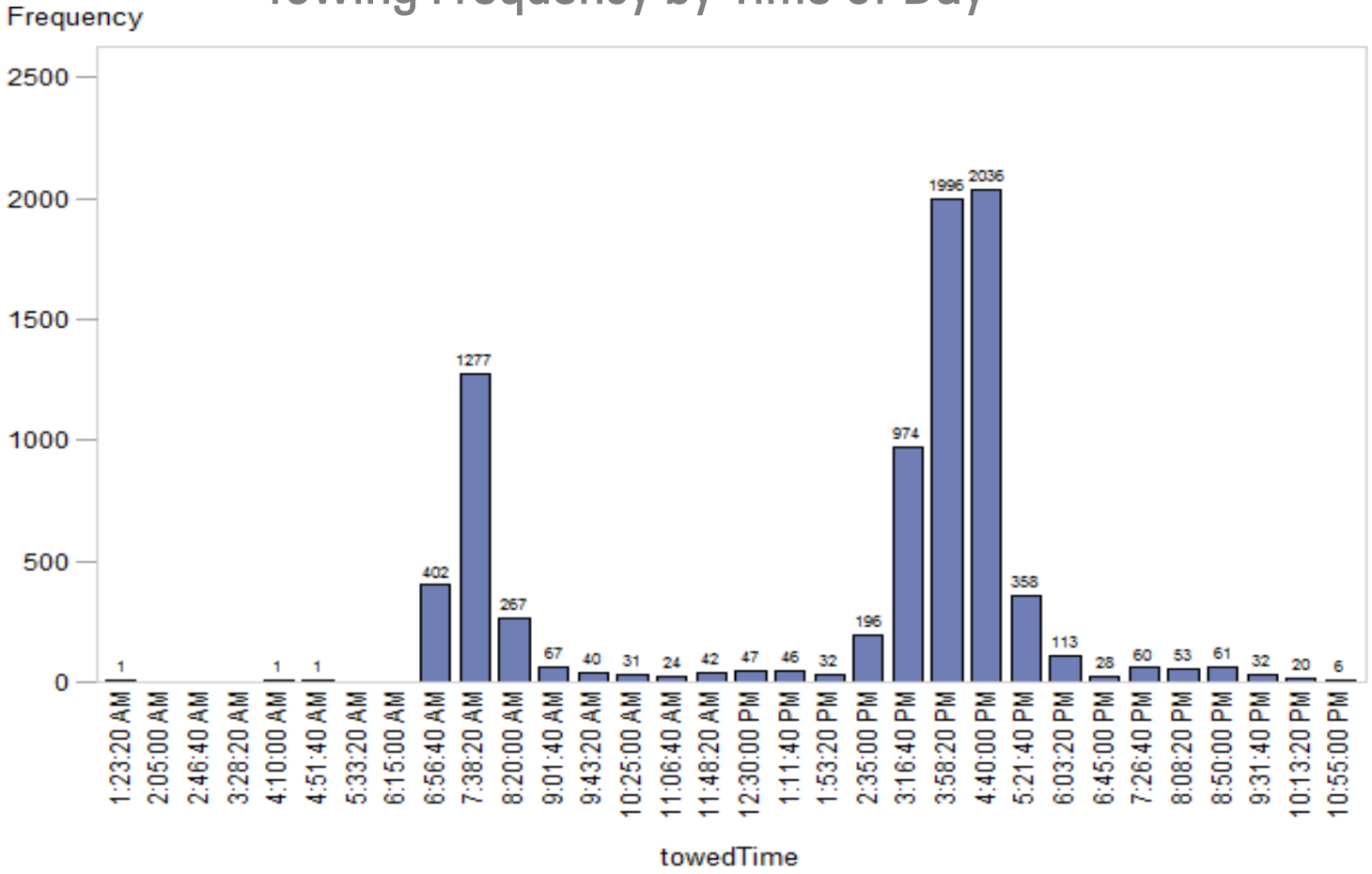
Some Statistics



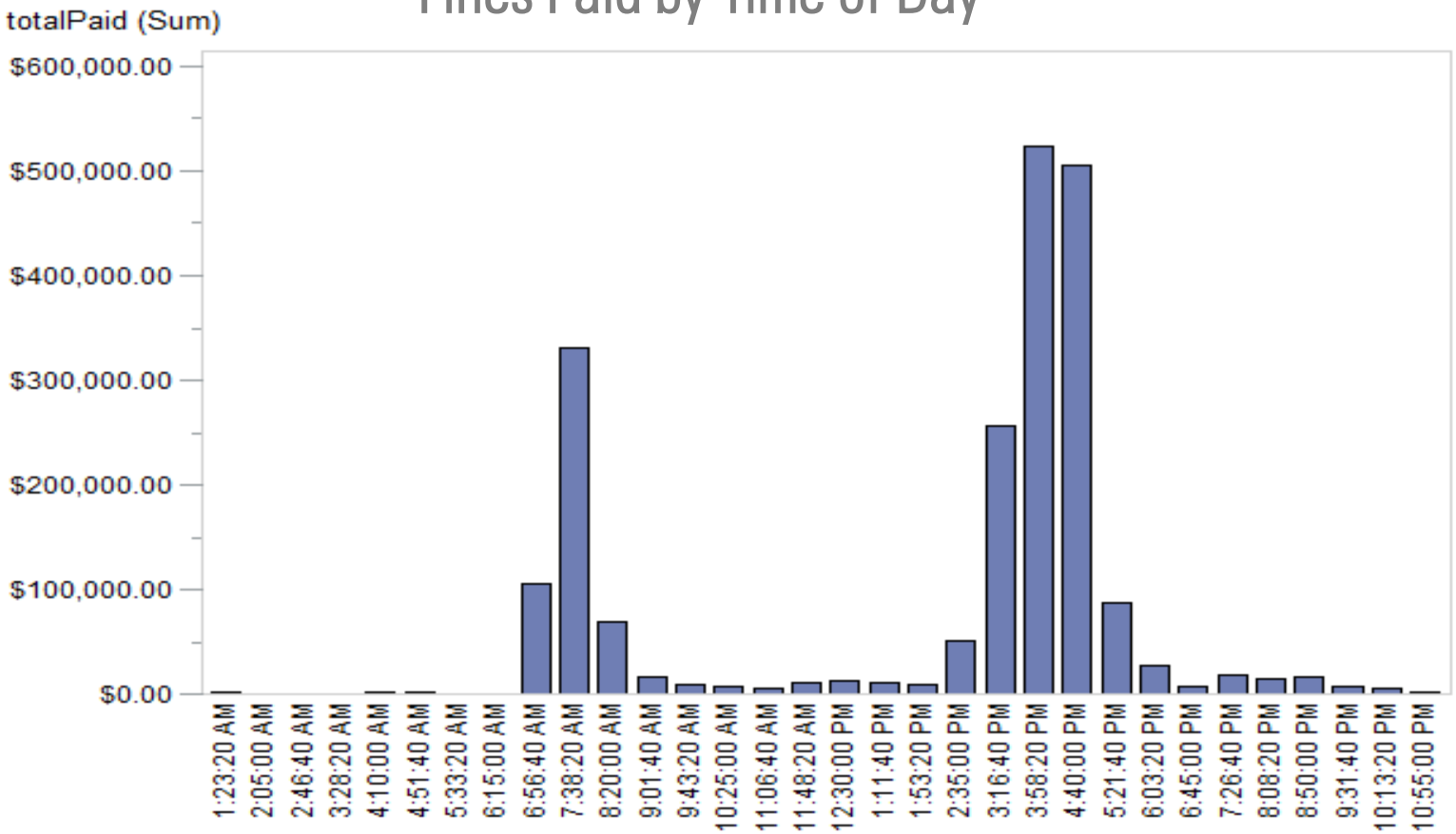
Towing Frequency by Day of Week



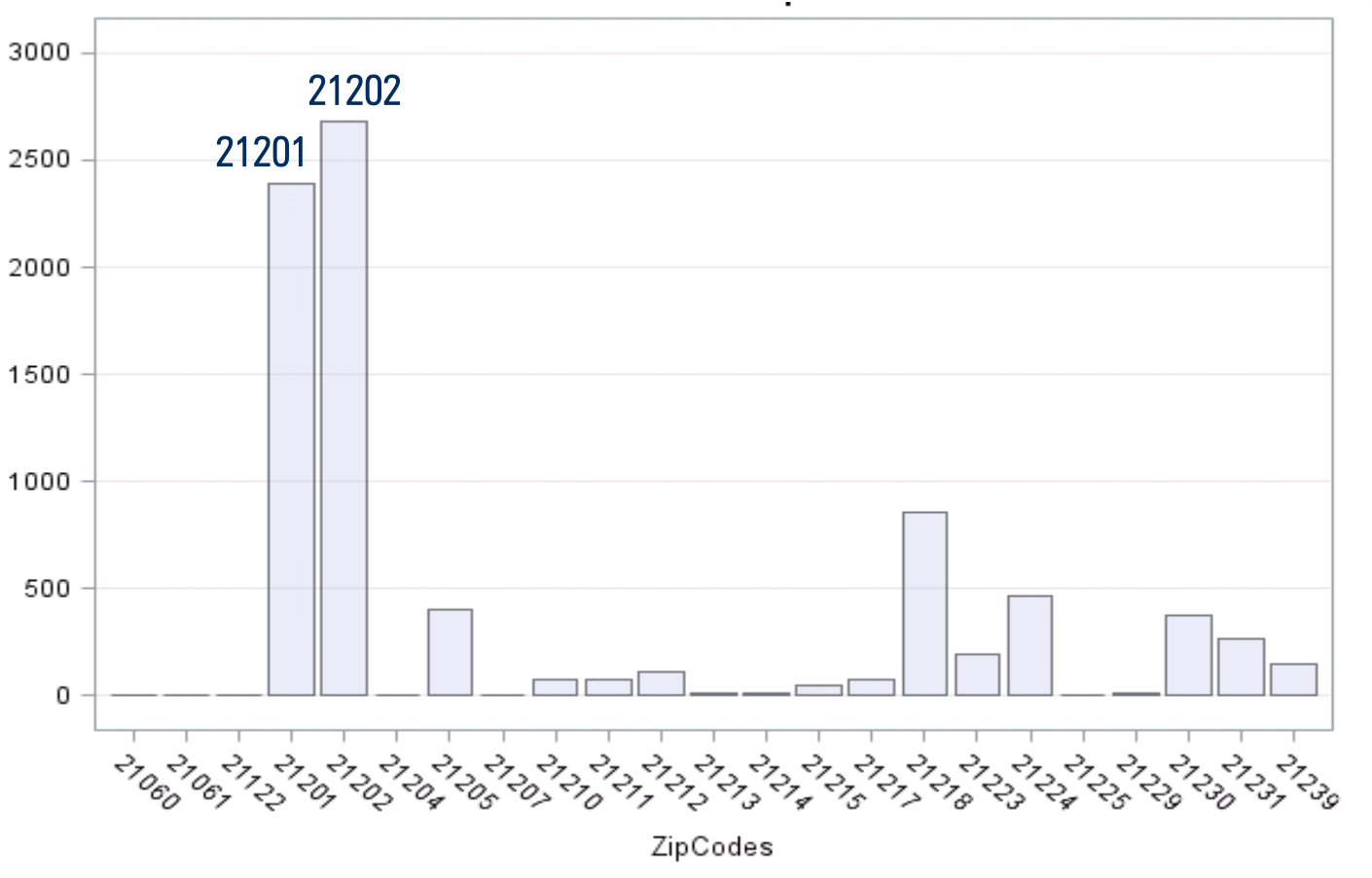
Towing Frequency by Time of Day



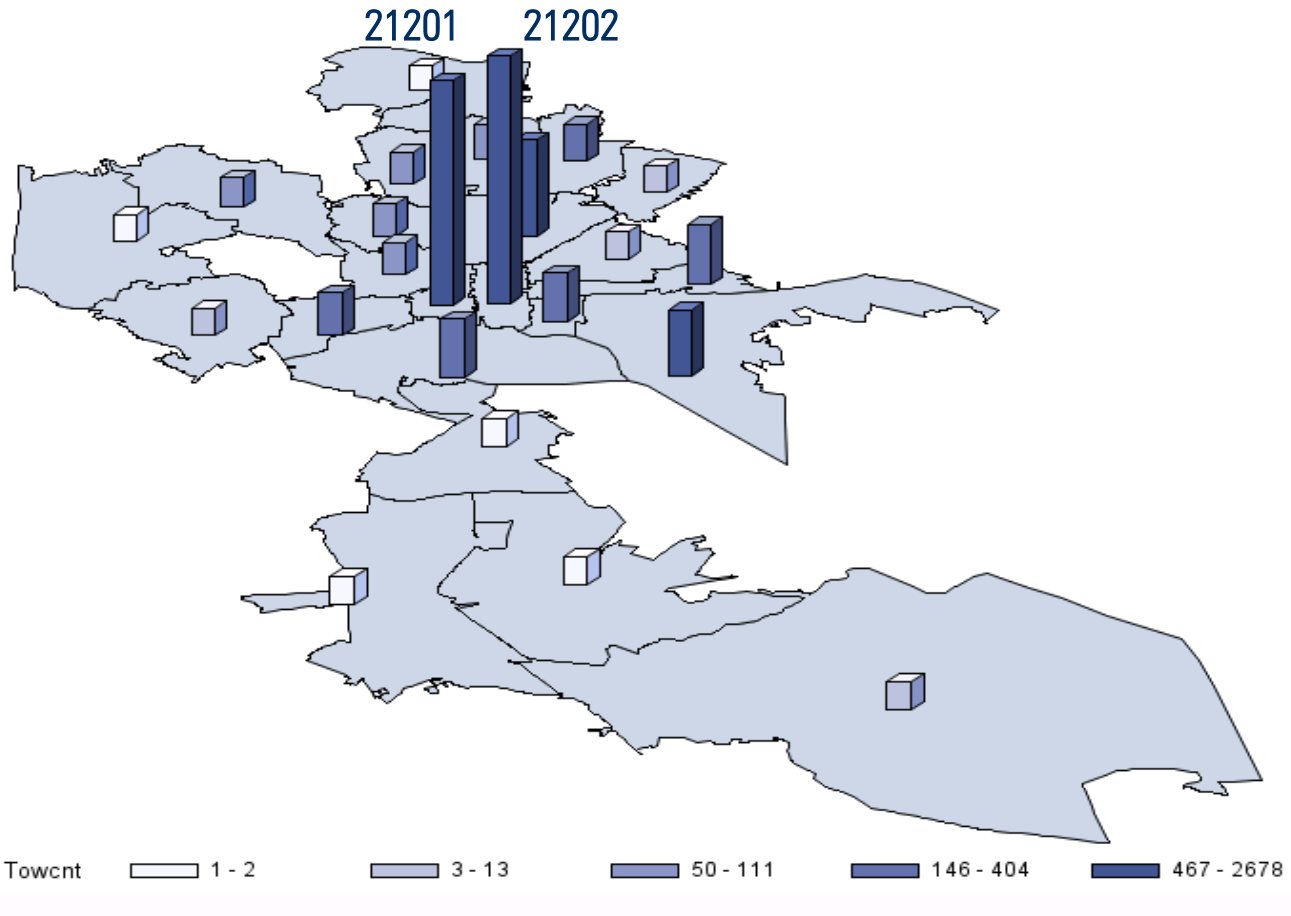
Fines Paid by Time of Day

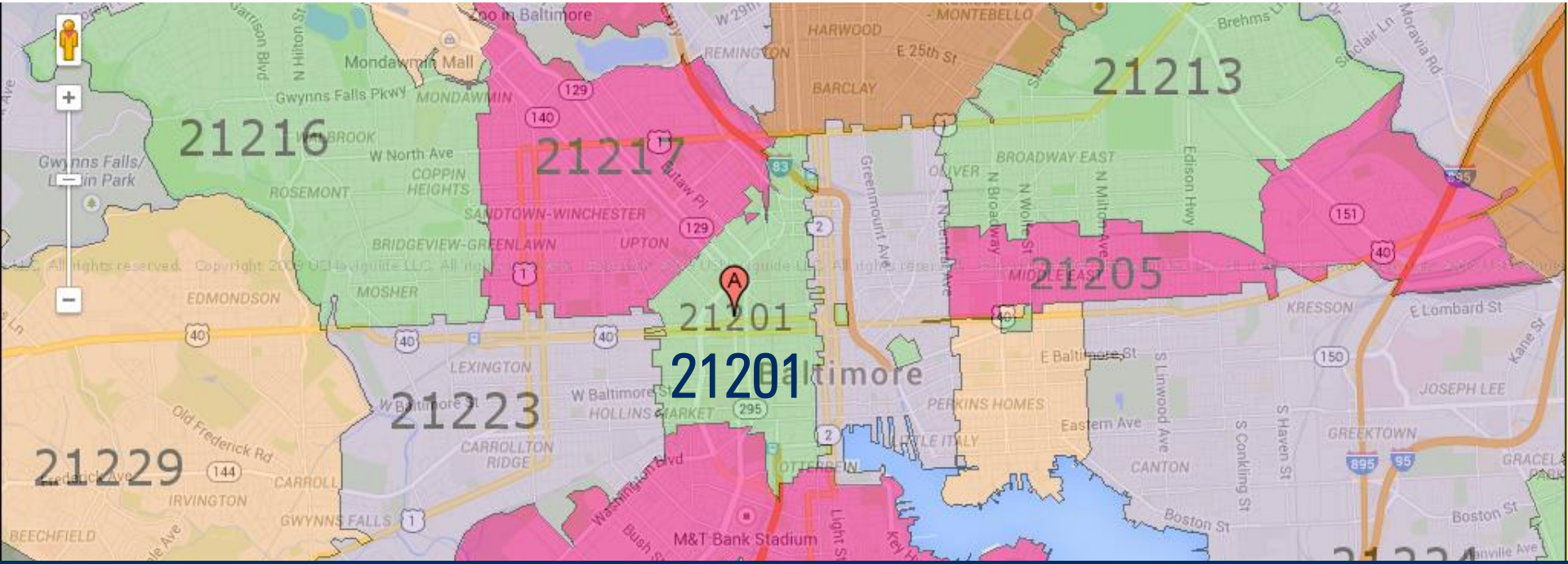


ZipCode Level Towing Distribution



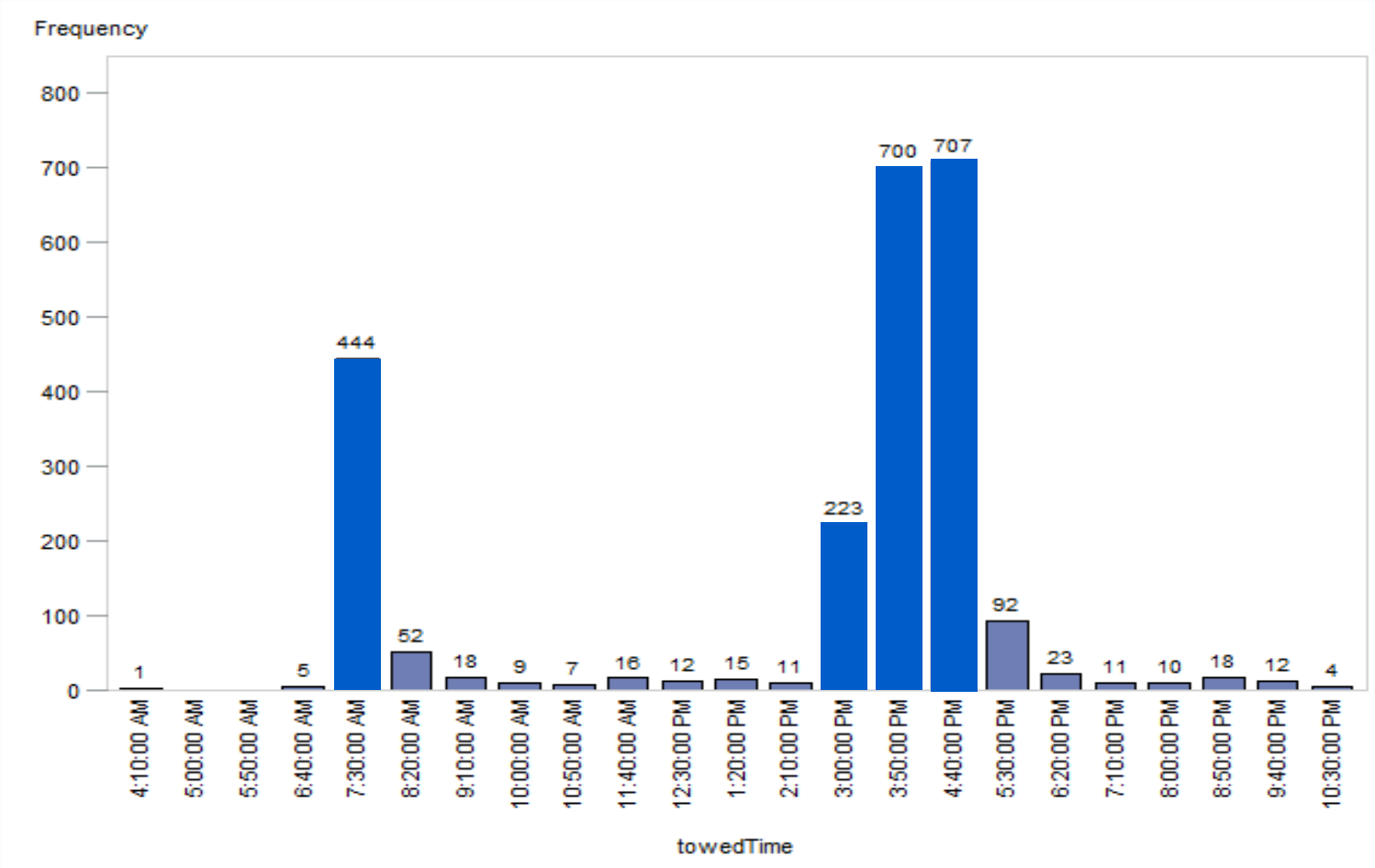
ZIP Code Wise Heat Map for Towing Frequency





Focus Area 1 - 21201

Towing Frequency in ZipCode 21201 by Time of Day



Morning

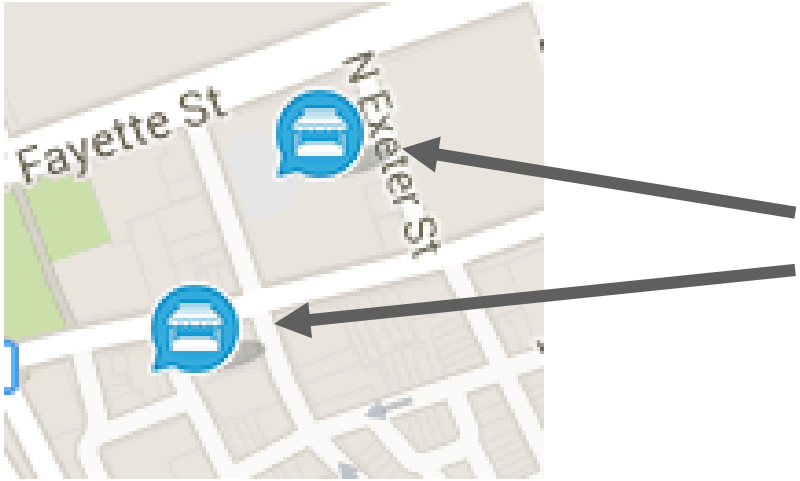
7 AM – 8 AM

Towing Hot Spots in ZipCode 21201

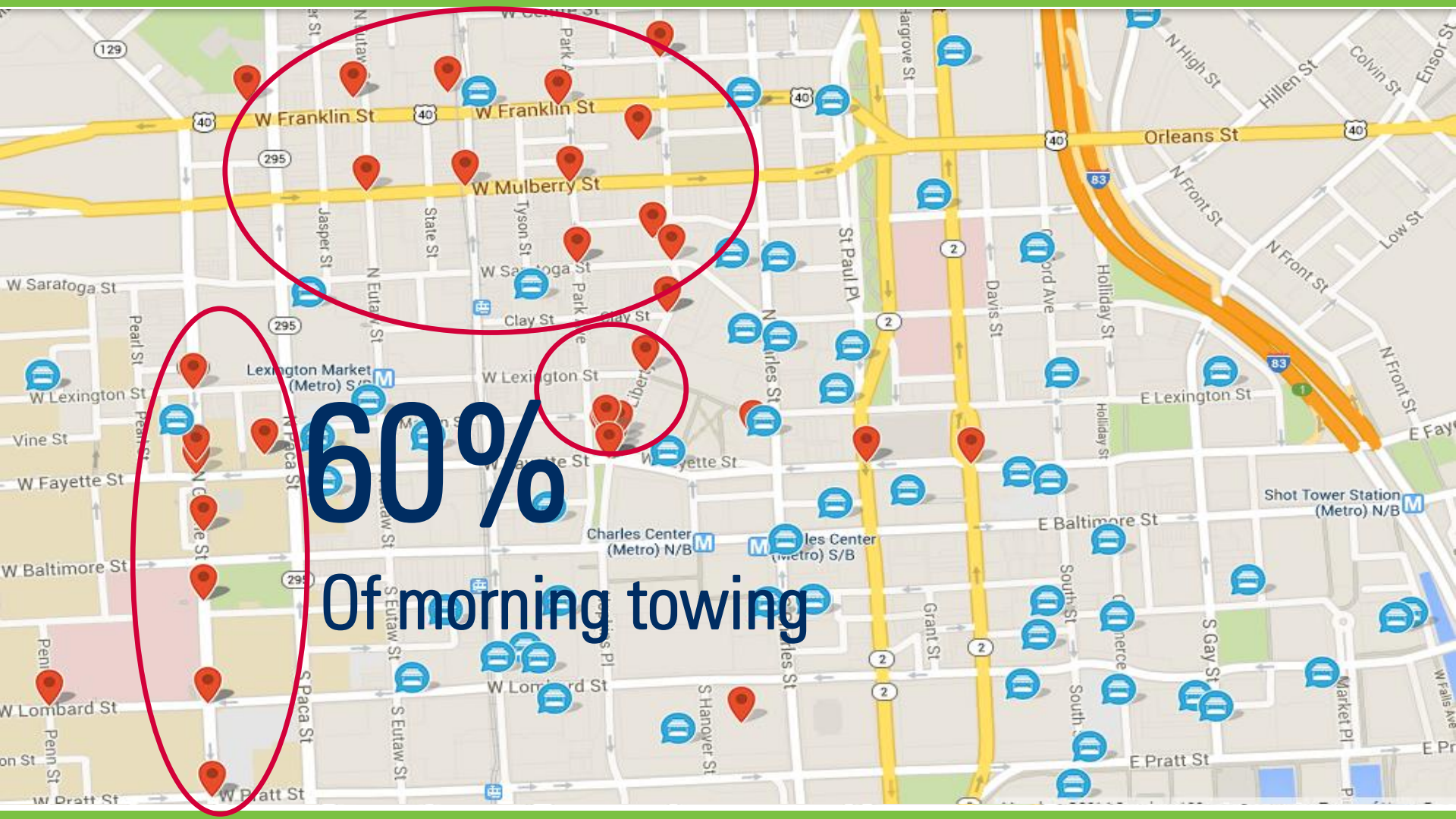
7 AM - 8 AM

towedFromLocation	Frequency	Percent	Cumulative Frequency	Cumulative Percent
UNIT S GREENE STREET, Baltimore, MD	78	16.49	78	16.49
100 N LIBERTY STREET, Baltimore, MD	32	6.77	110	23.26
100 N CHARLES STREET, Baltimore, MD	22	4.65	132	27.91
UNIT W FRANKLIN STREET, Baltimore, MD	21	4.44	153	32.35
500 W FAYETTE STREET, Baltimore, MD	20	4.23	173	36.58
200 S GREENE STREET, Baltimore, MD	19	4.02	192	40.59
300 CATHEDRAL STREET, Baltimore, MD	17	3.59	209	44.19
UNIT N GREENE STREET, Baltimore, MD	17	3.59	226	47.78
100 S GREENE STREET, Baltimore, MD	14	2.96	240	50.74
200 N LIBERTY STREET, Baltimore, MD	10	2.11	250	52.85
500 CATHEDRAL STREET, Baltimore, MD	10	2.11	260	54.97

W Franklin St
W Franklin St
Orleans St
W Mulberry St
W Saratoga St
W Saratoga St
Clay St
Clay St
Lexington Market (Metro) S/B
W Lexington St
W Lexington St
E Lexington St
Marion St
W Fayette St
W Fayette St
Charles Center (Metro) N/B
Charles Center (Metro) S/B
E Baltimore St
W Baltimore St
W Lombard St
W Pratt St
W Pratt St
E Pratt St
N Eutaw St
S Eutaw St
N Paca St
S Paca St
Park Ave
Hopkins Pl
N Charles St
S Charles St
St Paul Pl
S Hanover St
Jasper St
State St
Tyson St
Pearl St
Penn St
Davis St
Guilford Ave
Holliday St
Grant St
South St
Commerce St
S Gay St
N High St
Hillen St
N Front St
Vine St
Map data ©2014 Google
100 m



Parking Lots


60%
Of morning towing
W Franklin St
W Mulberry St
Orleans St
W Saratoga St
W Lexington St
E Lexington St
Vine St
W Fayette St
E Baltimore St
W Baltimore St
W Lombard St
W Pratt St
E Pratt St
Clay St
Lexington Market (Metro) S/B
Charles Center (Metro) N/B
Shot Tower Station (Metro) N/B
N High St
Hillen St
Colvin St
N Front St
Low St
Holliday St
Davis St
St Paul Pl
Charles St
Pearl St
Jasper St
State St
Tyson St
Park Ave
N Eutaw St
S Eutaw St
N Paca St
S Paca St
Penn St
S Hanover St
Grant St
South St
S Gay St
Market Pl
Light St
129
40
295
2
83

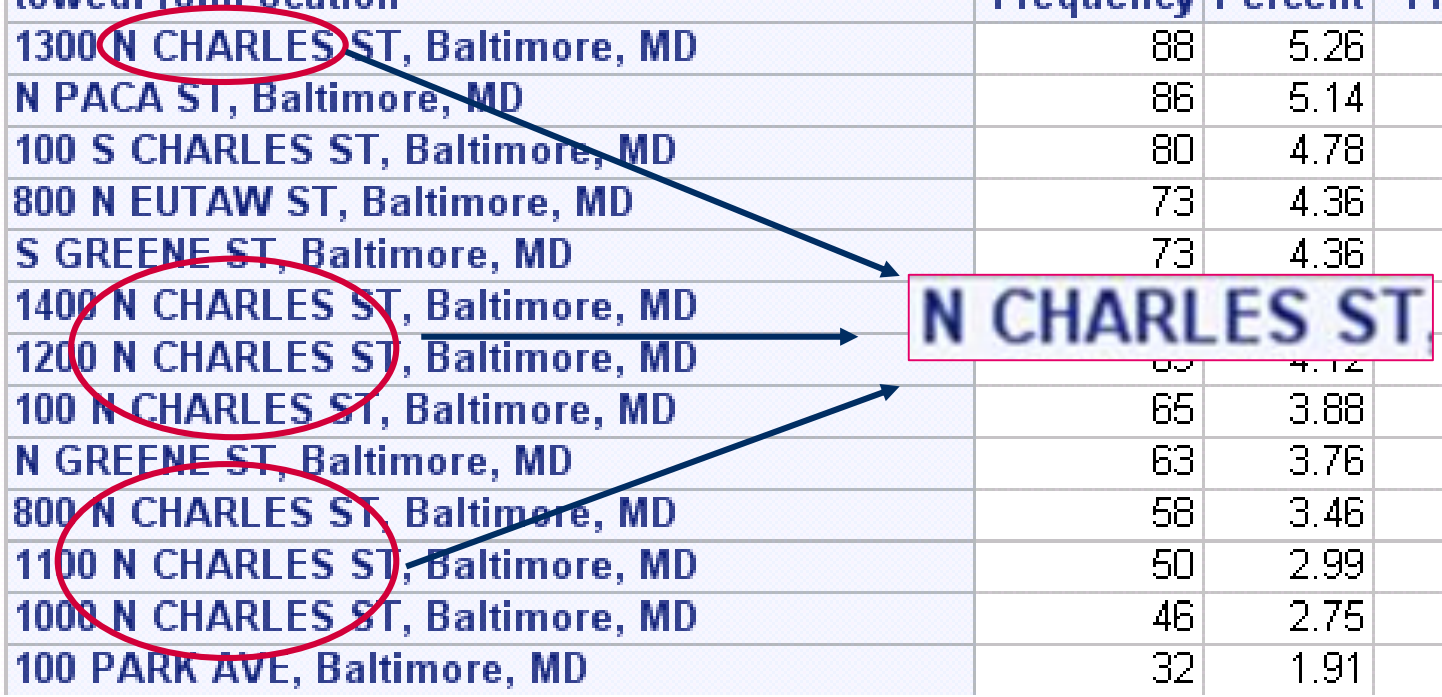
Evening

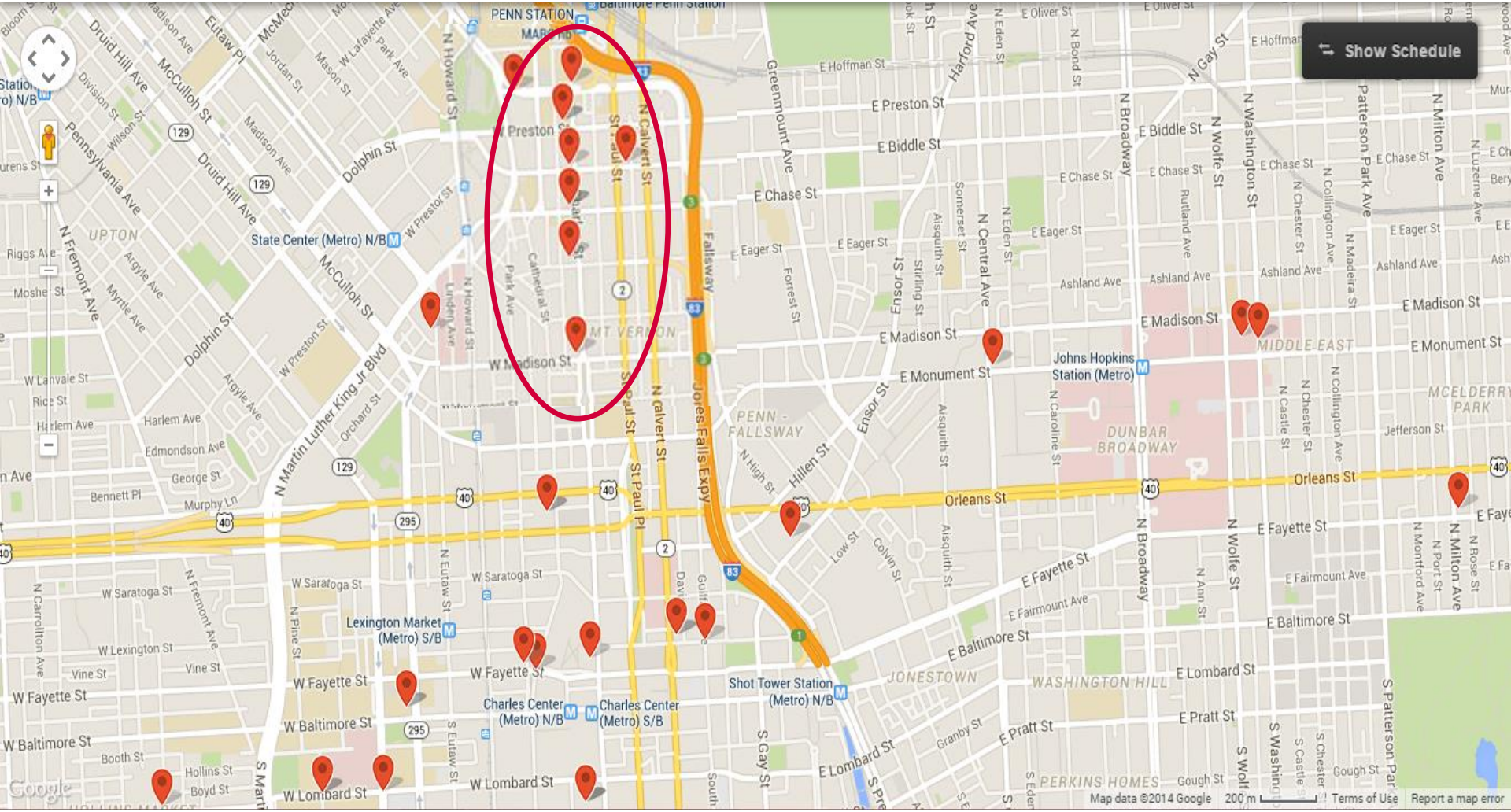
3 PM – 5.30 PM

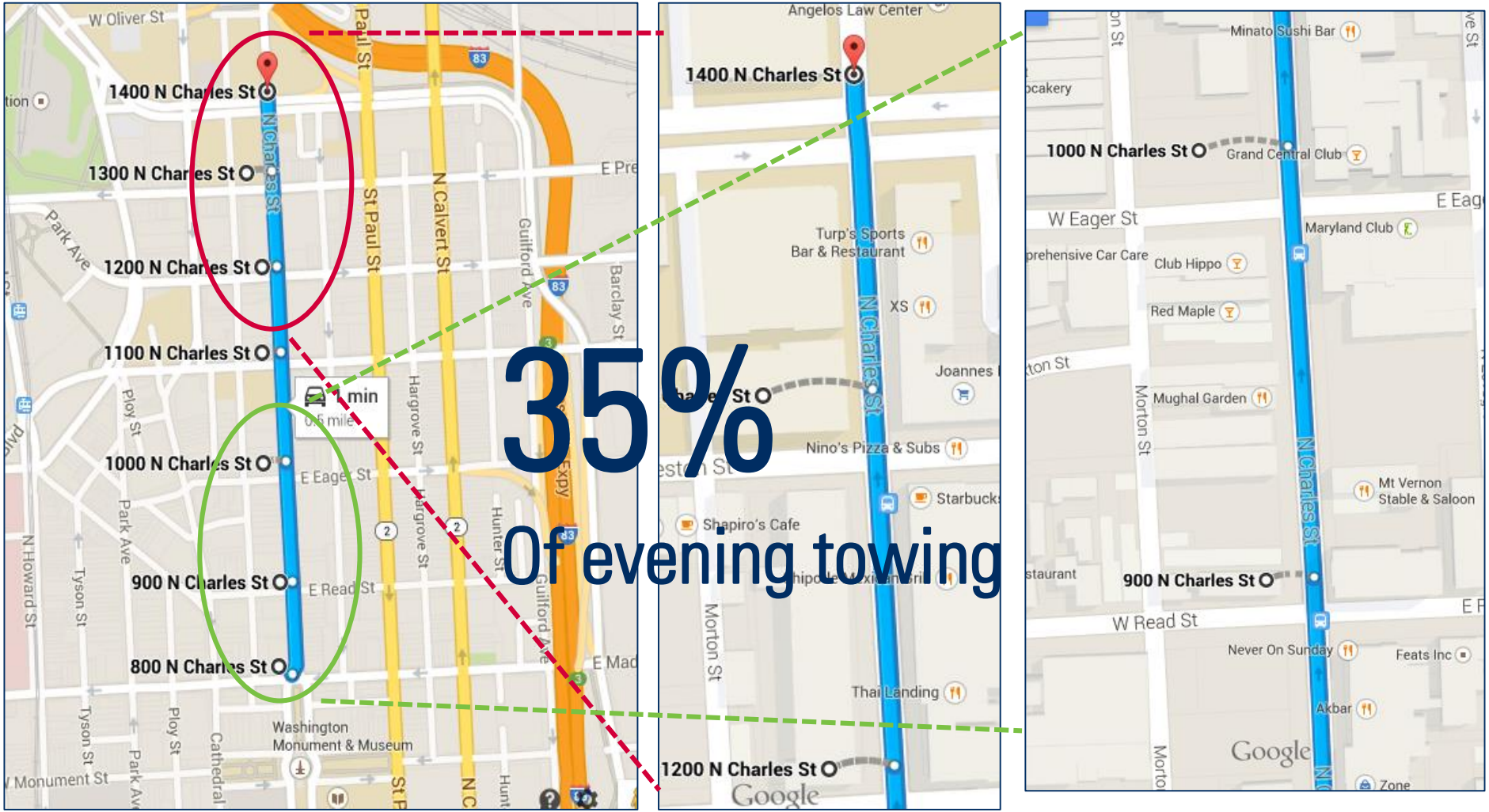
Towing Hot Spots in ZipCode 21201

3 PM – 5.30 PM

towedFromLocation	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1300 N CHARLES ST, Baltimore, MD	88	5.26	88	5.26
N PACA ST, Baltimore, MD	86	5.14	174	10.39
100 S CHARLES ST, Baltimore, MD	80	4.78	254	15.17
800 N EUTAW ST, Baltimore, MD	73	4.36	327	19.53
S GREENE ST, Baltimore, MD	73	4.36	400	23.89
1400 N CHARLES ST, Baltimore, MD			472	28.20
1200 N CHARLES ST, Baltimore, MD			541	32.32
100 N CHARLES ST, Baltimore, MD	65	3.88	606	36.20
N GREENE ST, Baltimore, MD	63	3.76	669	39.96
800 N CHARLES ST, Baltimore, MD	58	3.46	727	43.43
1100 N CHARLES ST, Baltimore, MD	50	2.99	777	46.42
1000 N CHARLES ST, Baltimore, MD	46	2.75	823	49.16
100 PARK AVE, Baltimore, MD	32	1.91	855	51.08

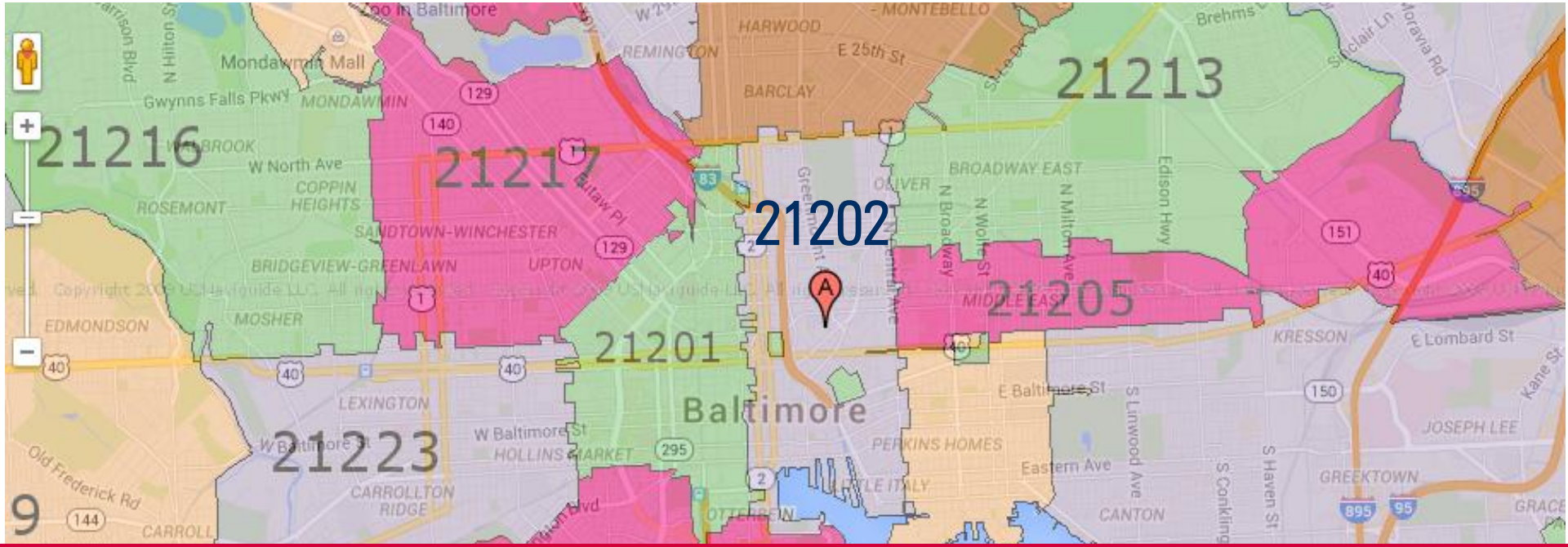



Show Schedule
PENN STATION
Baltimore Penn Station
State Center (Metro) N/B
Lexington Market (Metro) S/B
Charles Center (Metro) N/B
Charles Center (Metro) S/B
Shot Tower Station (Metro) N/B
Johns Hopkins Station (Metro)
PENN - FALLSWAY
DUNBAR BROADWAY
MIDDLE EAST
JONESTOWN
WASHINGTON HILL
PERKINS HOMES
UPTON
MT VERNON
MCELDERRY PARK
Jones Falls Expy
Fallsway
Orleans St
E Madison St
E Monument St
E Preston St
E Biddle St
E Chase St
E Eager St
E Fayette St
E Baltimore St
E Lombard St
E Pratt St
W Fayette St
W Baltimore St
W Lombard St
W Saratoga St
N Howard St
N Calvert St
St Paul St
N Charles St
N Eutaw St
N Martin Luther King Jr Blvd
McCulloh St
Druid Hill Ave
Pennsylvania Ave
N Fremont Ave
Dolphin St
Greenmount Ave
N Broadway
N Wolfe St
N Washington St
N Gay St
Harford Ave
Patterson Park Ave
N Milton Ave
Hillen St
Ensor St
Central Ave
Map data ©2014 Google
200 m
Terms of Use
Report a map error



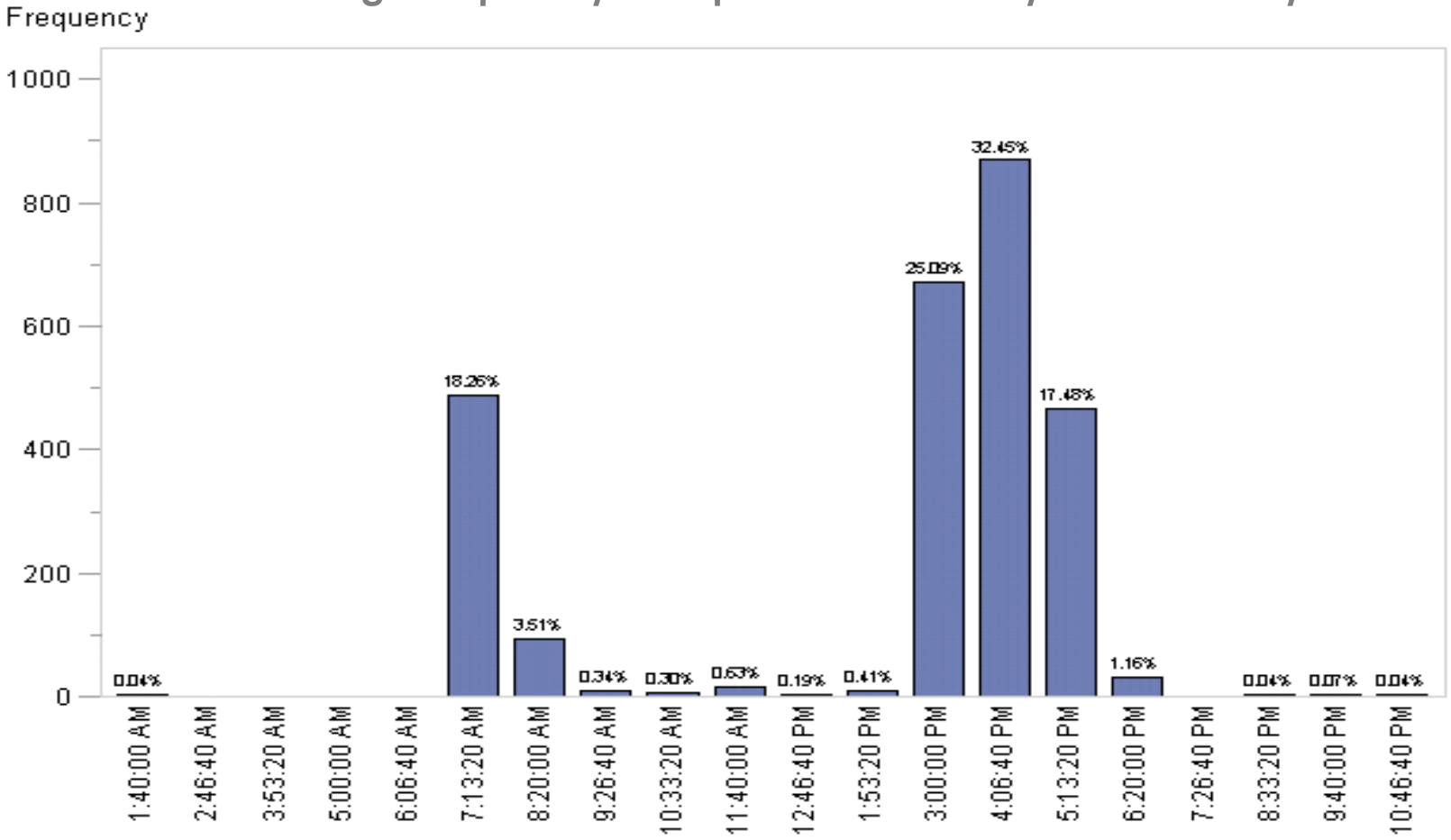
35%

Of evening towing

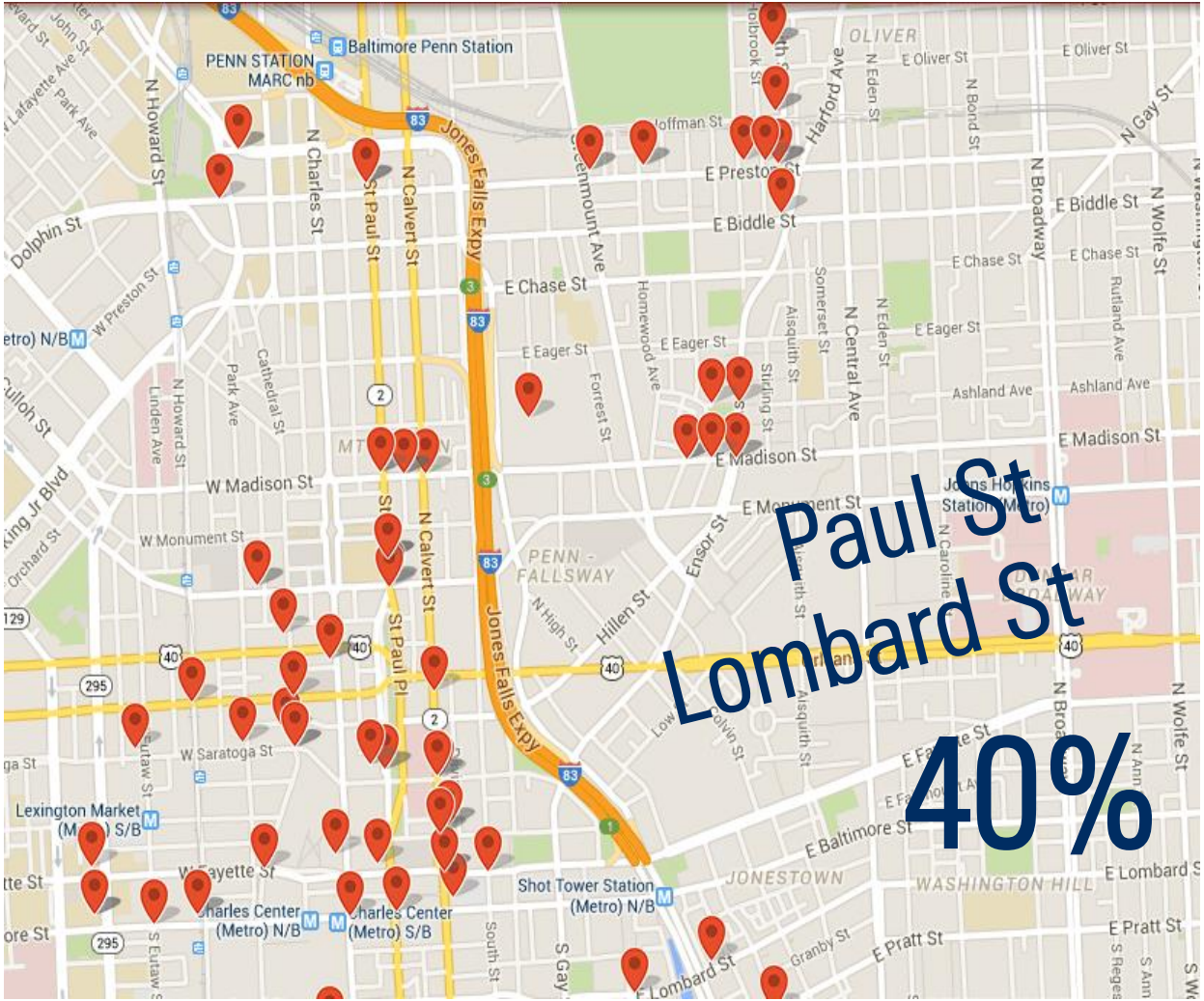


Focus Area 2 - 21202

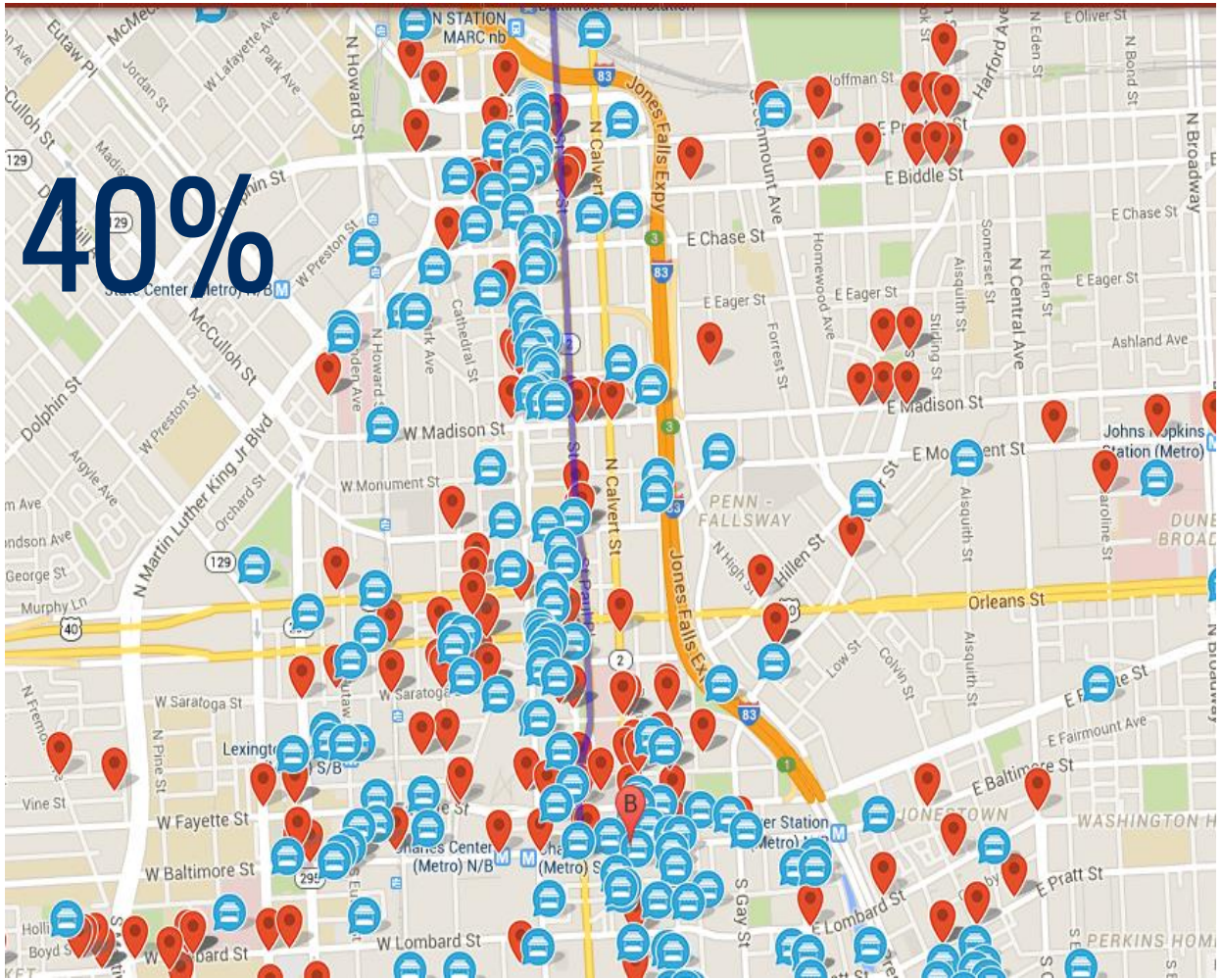
Towing Frequency in ZipCode 21202 by Time of Day



7 AM – 8 AM


Baltimore Penn Station
PENN STATION MARC nb
Jones Falls Expy
N Howard St
N Charles St
St Paul St
N Calvert St
Greenmount Ave
Hoffman St
E Preston St
E Biddle St
E Chase St
E Eager St
E Madison St
E Monument St
W Madison St
W Monument St
W Saratoga St
W Fayette St
E Baltimore St
E Lombard St
E Pratt St
Harford Ave
N Eden St
N Bond St
N Broadway
N Gay St
N Wolfe St
N Central Ave
Ashland Ave
Somerset St
Aisquith St
Stirling St
Homewood Ave
Forrest St
Ensor St
Hillen St
N High St
Colvin St
Granby St
South St
S Gay St
Cathedral St
Park Ave
Linden Ave
Dolphin St
W Preston St
Orchard St
Lexington Market (Metro) S/B
Charles Center (Metro) N/B
Charles Center (Metro) S/B
Shot Tower Station (Metro) N/B
Johns Hopkins Station (Metro)
PENN - FALLSWAY
JONESTOWN
WASHINGTON HILL
OLIVER
Paul St
Lombard St
40%

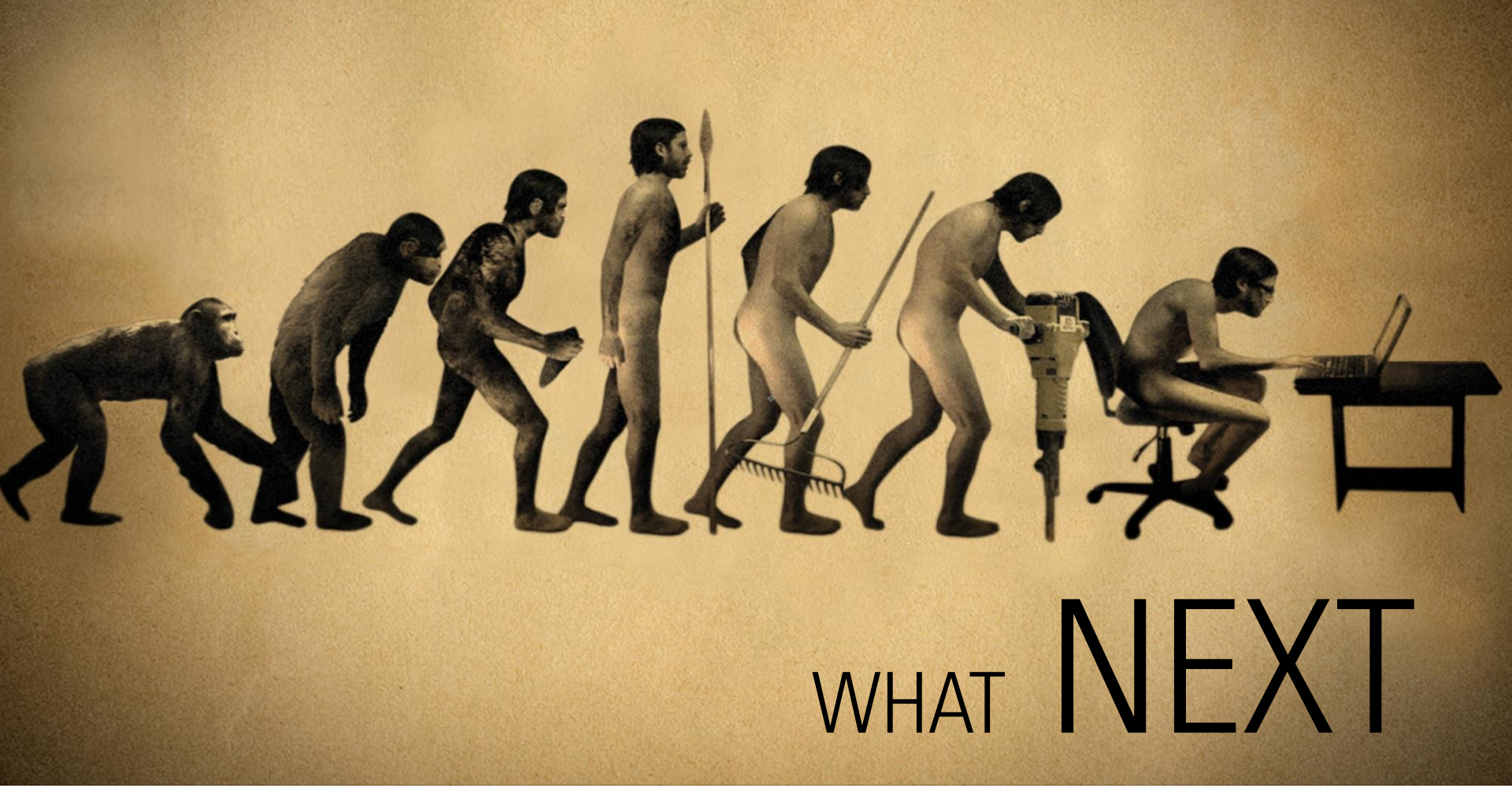
3 PM
– 5.30 PM



Calvert St
Lombard St
Lexington St

1299 N Charles St
Baltimore, Maryland
Street View - Sep 2014
Charles St
CHIPOTLE
64 NORTH AVE
N Charles St
University of Baltimore
JOSEPH MEYERHOFF SYMPHONY HALL
N Calvert St
83
Google

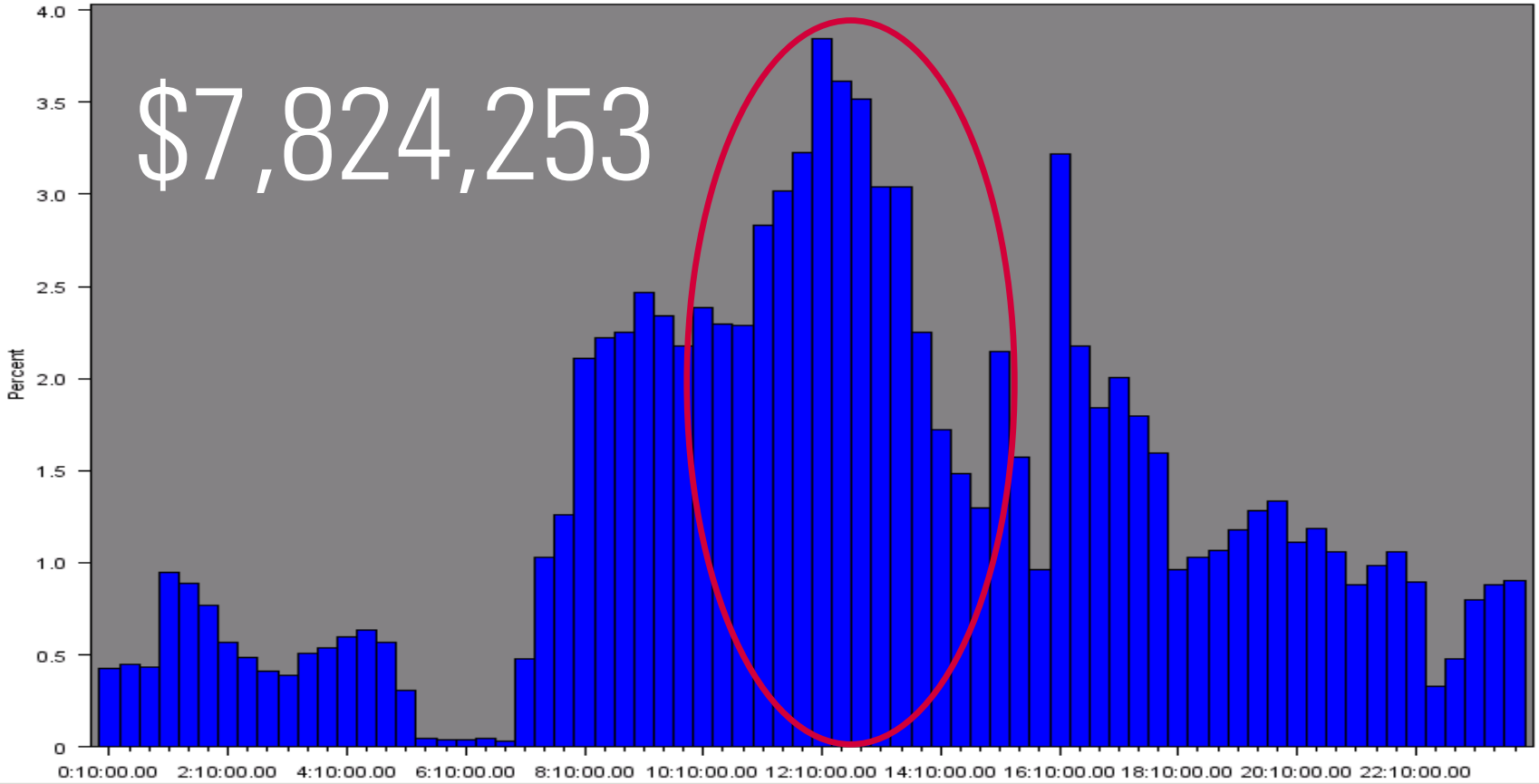
1203 St Paul St
Baltimore, Maryland
Street View - Aug 2012
St. Paul St
St Paul St
JOSEPH MEYERHOFF SYMPHONY HALL
N Calvert St
Google


WHAT NEXT

WHAT NEXT

Analyze parking tickets data and compare results

Parking Ticket Frequency Split by Time of Day



00:10 AM

12:10 PM

22:10 PM

WHAT NEXT

Analyze parking tickets data and compare results

Build models to predict the chances of towing in a given area

WHAT NEXT

Analyze parking tickets data and compare results

Build models to predict chances of towing in a given area

Look at the effect of car make on towing/parking tickets

THANK YO….U!

Karush Jaggi
405-762-1946
karush.jaggi@okstate.edu