



The I-84 Hartford Project

Public Advisory Committee Meeting #2

November 21, 2013



Purpose of This Meeting

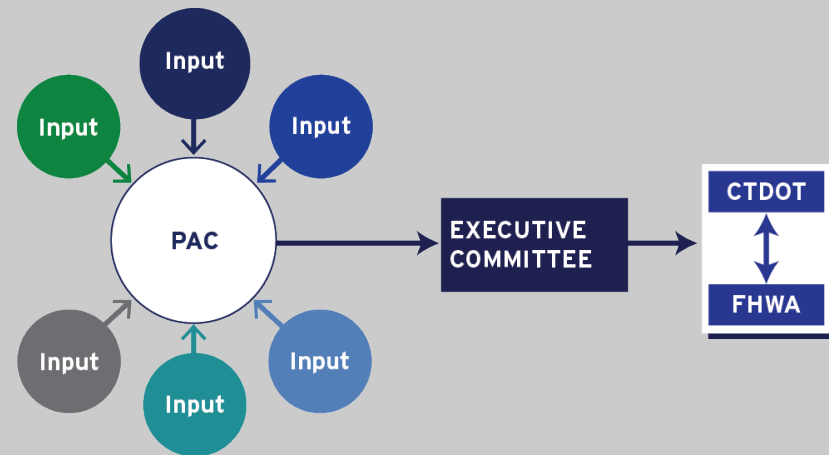
1. Provide PAC members with additional details on analysis performed to-date
 - a) Bridge condition and cost to Maintain
 - b) Traffic data and early observations
2. Establish working group on the P&N development





Summary of Last Meeting

- PAC Role and Process
- Recap of the HUB Study
- Overview of 'The I-84 Hartford Project'
- Keys to Success
 - NEPA
 - Public Involvement
 - Screening Alternatives



PAC #1 Minutes and Presentation found at:
http://i84hartford.com/project_library.html



What did we hear?

- What is the cost if we don't build the project
- What do the preliminary traffic studies tell us? How will other travel options be considered?
- The Purpose and Need statement appears to place a lower priority on local concerns and objectives



P&N will continue to evolve





P&N is the foundation...

For the development of reasonable, prudent and practicable alternatives.

– **No-build Alternative**

- Assumes maintaining a State of Good Repair and that other funded / approved projects will progress

– **Build Alternatives**

- List to include several options driven largely by the Project Needs & Deficiencies and stakeholder/ agency input



Structures and Costs:



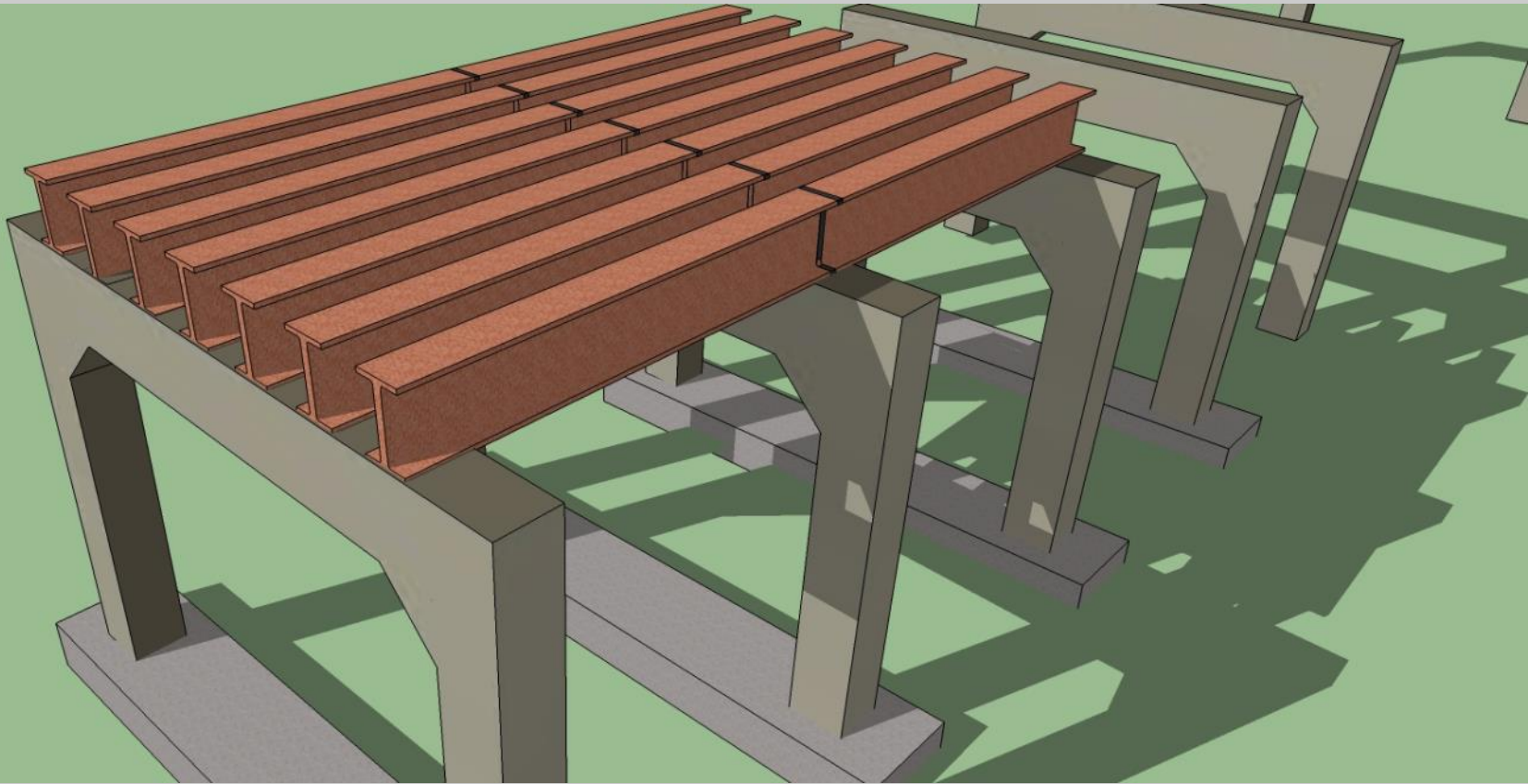
Bridges "101": Bridge Elements



Deck: The portion of the bridge that directly carries traffic.



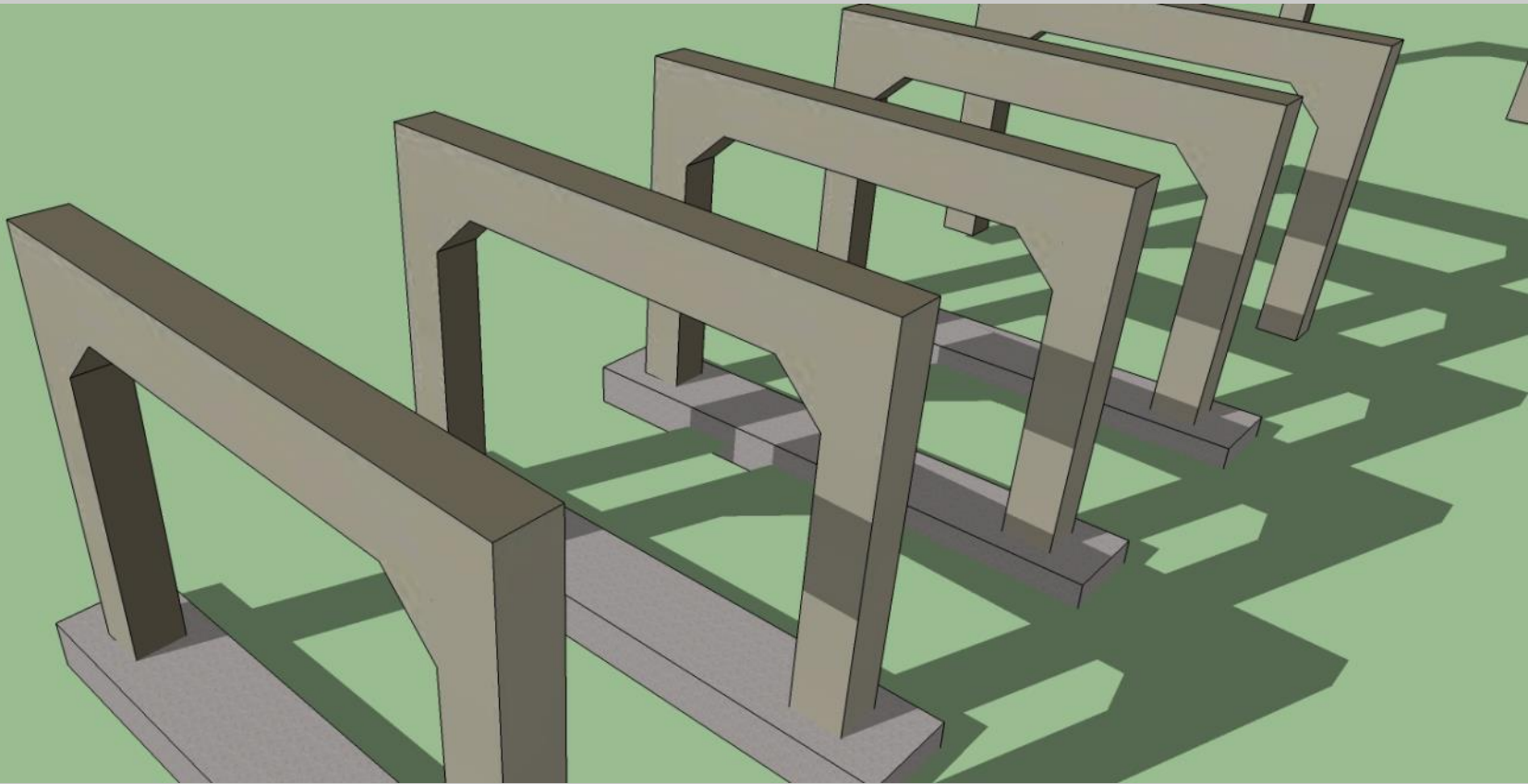
Bridges "101": Bridge Elements



Superstructure: The portion of the bridge that supports the deck and connects one substructure element to another.



Bridges "101": Bridge Elements

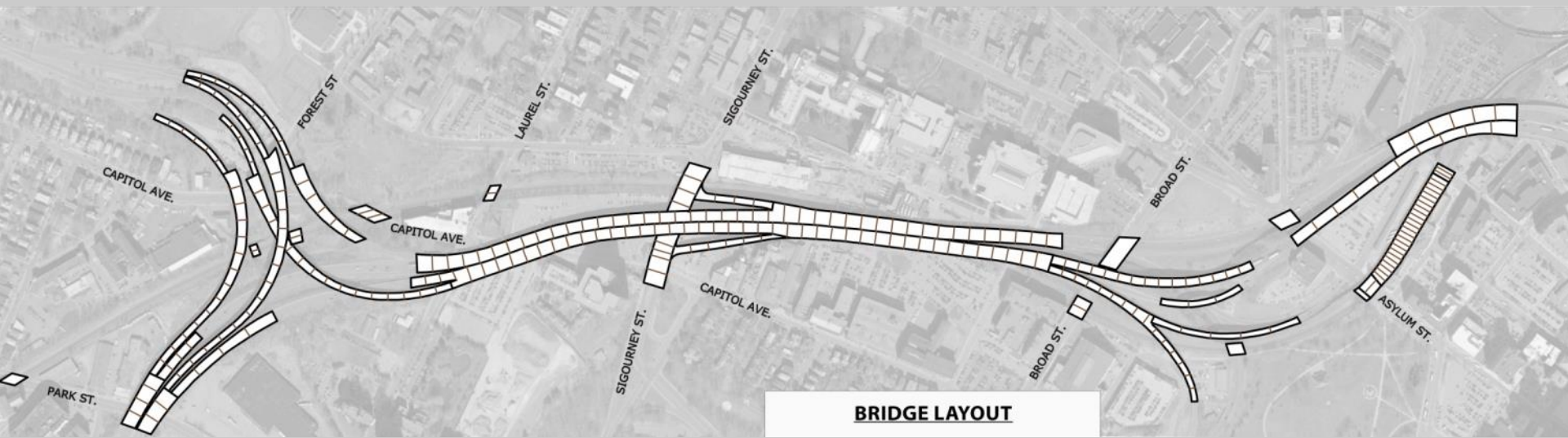


Substructure: The portion of the bridge that supports the superstructure and distributes all bridge loads to below-ground bridge footings.



Bridges "101"

- I-84 built in the 60's
- 80% of the highway on structure
- Bridges consist of many short spans
- Inexpensive design at the time
- Expected to last about 50 years





Bridge Rating Scale

9 Superior

8 Very good

7 Good

6 Satisfactory

5 Fair

4 Poor

3 Serious

2 Critical

1 Imminent failure

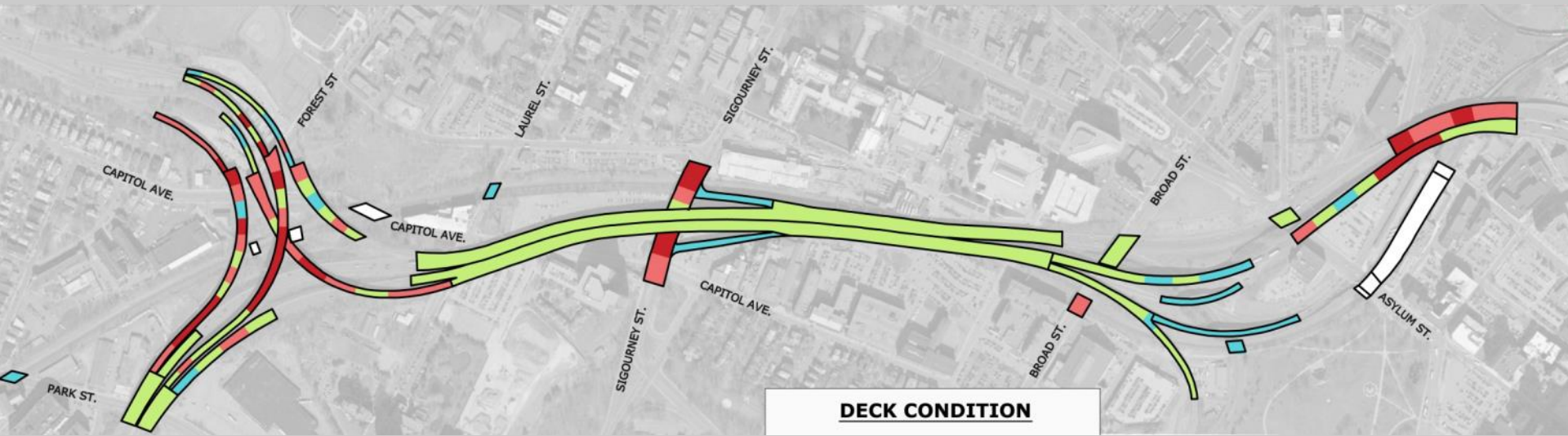
0 Bridge closed

Many of the bridges within the I-84 Hartford Corridor have ratings in the 5-4 range, which CTDOT describes as “fair to poor”



I-84 Bridge Conditions

- Deck



NBI RATING

| | |
|---|--|
|  = Very Good(8) |  = Fair(5) |
|  = Good(7) |  = Poor(4) |
|  = Satisfactory(6) |  = Serious(3) |






I-84 Bridge Conditions

- Superstructure



NBI RATING

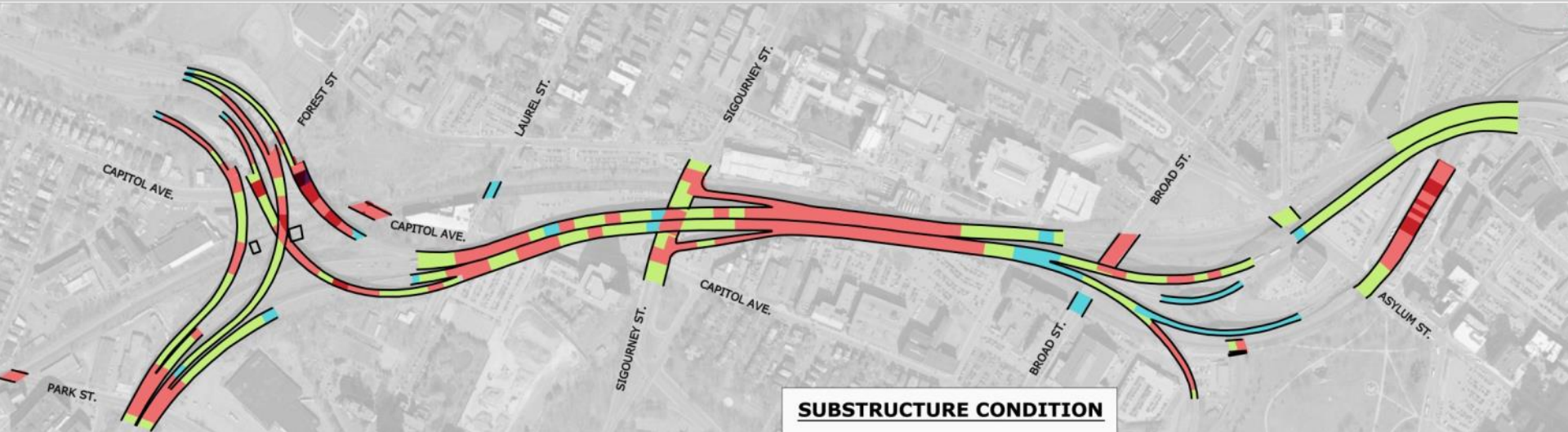
| | |
|---|--|
|  = Very Good(8) |  = Fair(5) |
|  = Good(7) |  = Poor(4) |
|  = Satisfactory(6) |  = Serious(3) |










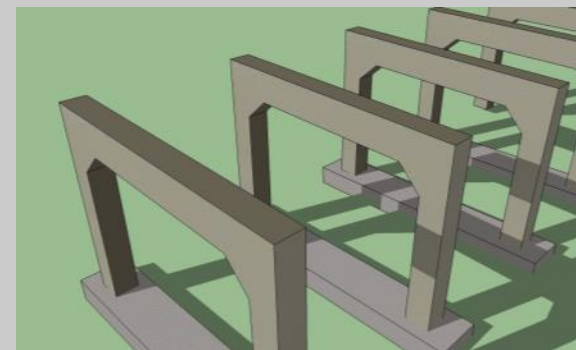
I-84 Bridge Conditions

- Substructure



NBI RATING

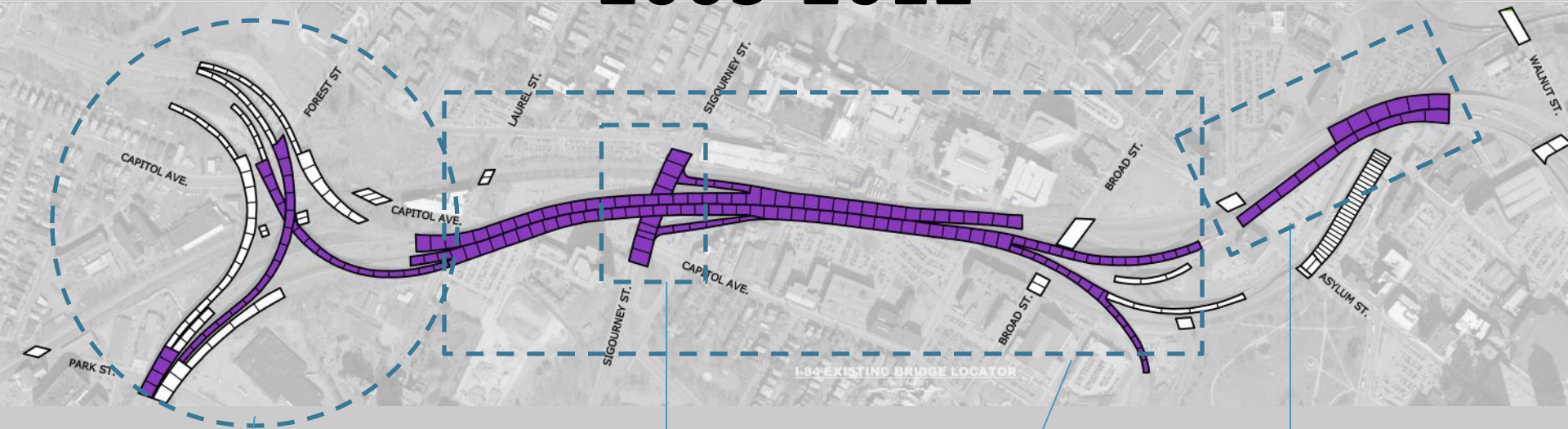
| | |
|--|---|
|  =Very Good(8) |  =Fair(5) |
|  =Good(7) |  =Poor(4) |
|  =Satisfactory(6) |  =Serious(3) |





What we've recently spent:

2005-2012



Deck rehabilitation, repairs to superstructure and substructure \$4M

Deck repair, joint replacement \$6M

Superstructure repairs, Substructure repairs, Joint replacements \$13M

Deck rehabilitation, superstructure and substructure repair \$34M

Total: \$58 Million



What we will spend:

2013-2017



Deck rehabilitation, Superstructure repairs, Substructure repairs, Joint replacements \$13M

Replace/repair longitudinal joints, and bridge deck joints, targeted structural steel repairs, bearing rehabilitation, structural steel painting and substructure repairs \$30M

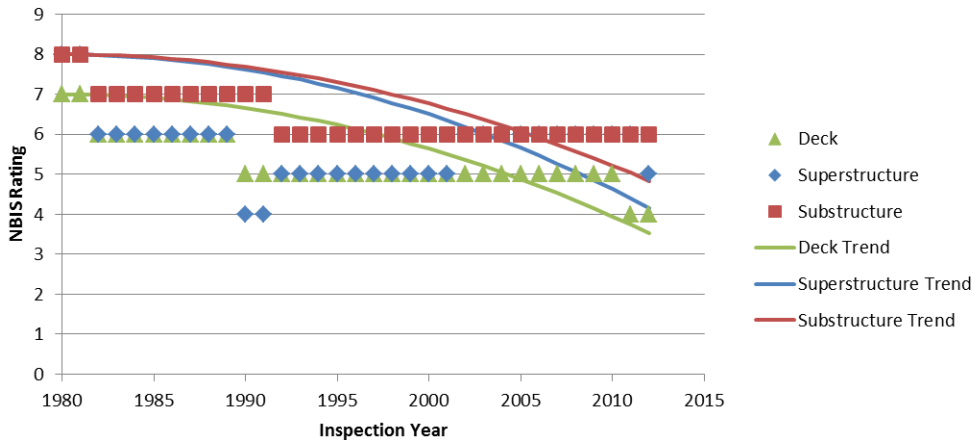
Deck replacement/rehabilitation \$TBD

Total: \$45 Million

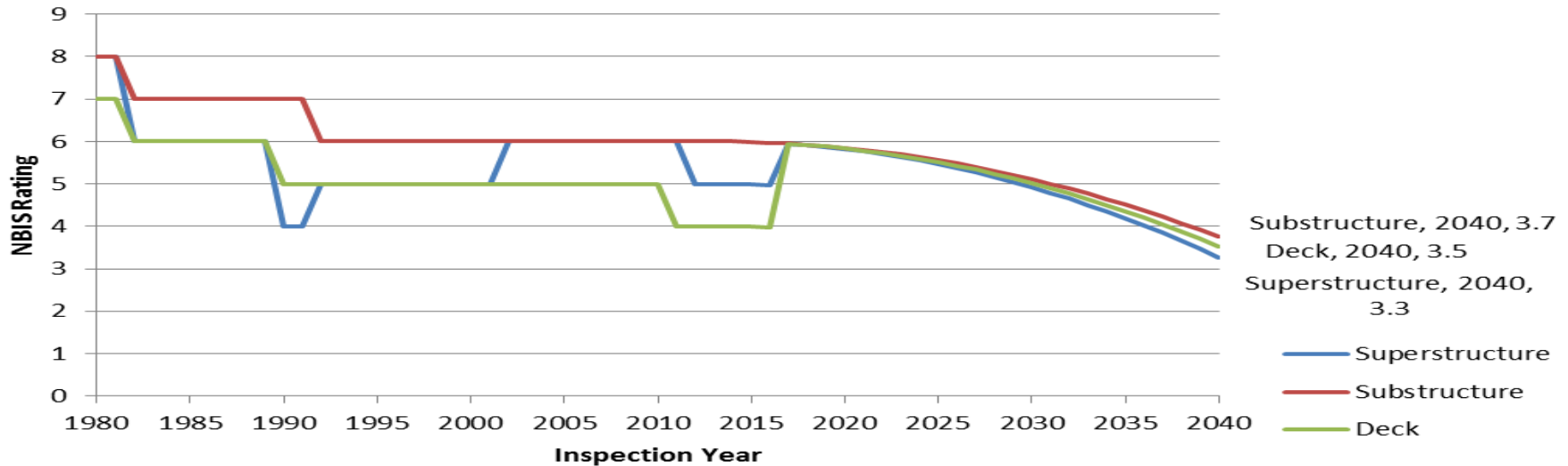


Determining need for replacement

Deterioration Calculation from Known Data



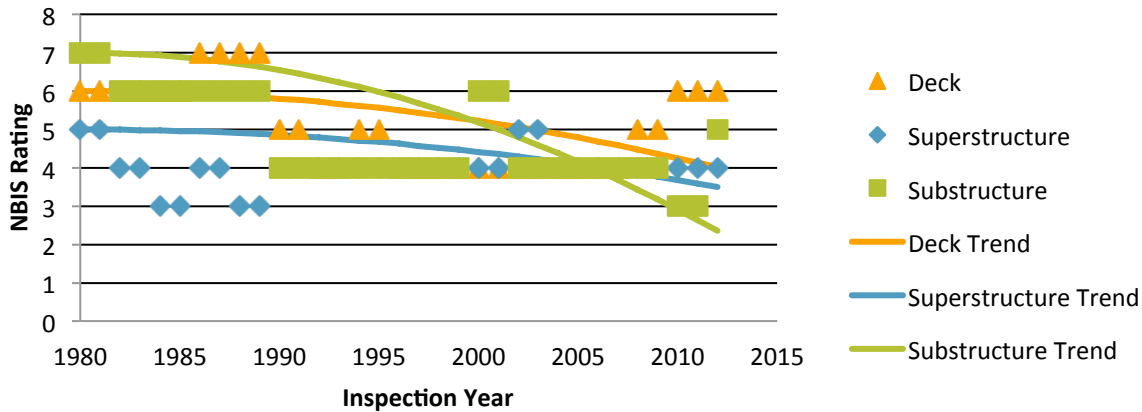
I-84 Viaduct – 01765



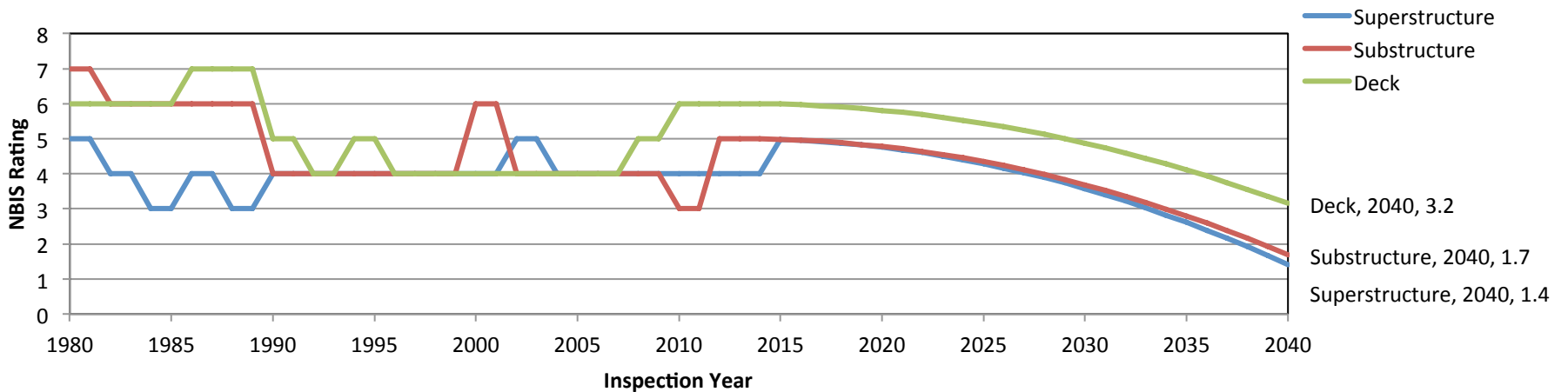


Determining need for replacement

Deterioration Calculation from Known Data



I-84 Viaduct – 03160B





Cost of the No-Build

By year 2040, costs to maintain a 'state of good repair' includes:

- Bridge rehabilitation = \$30+ Million (12 bridges)
- Superstructure replacement = \$20+ Million (1 bridge)
- Deck replacement = \$20+ Million (1 bridge)
- Full bridge replacement = \$600+ Million (6 bridges)

Total cost = **\$670 Million +**

* Estimates are preliminary and likely low (2013 dollars)



Additional costs of the No-Build

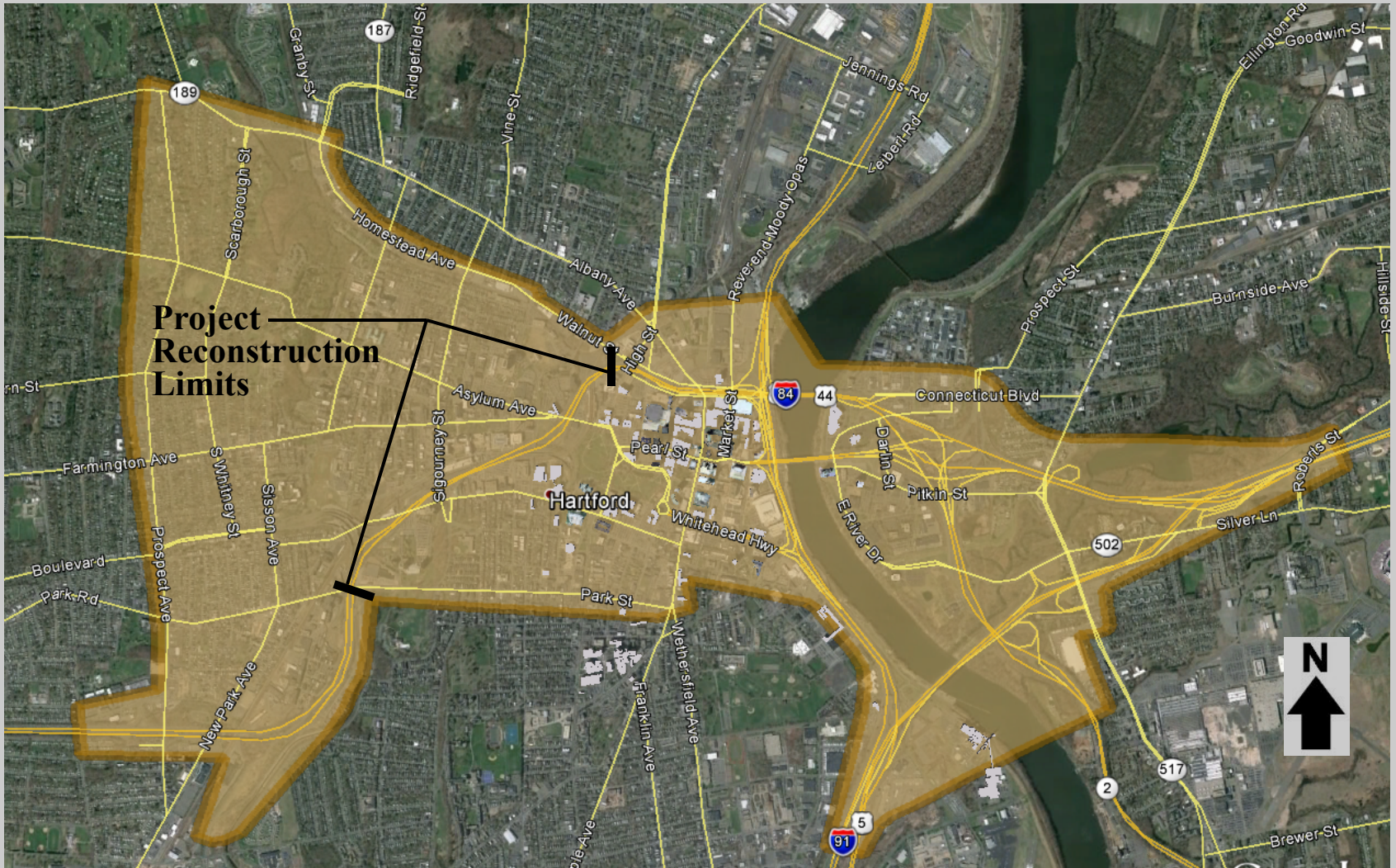
- Congestion – lost productivity, energy consumption
- Safety – property damage, injuries, loss of life, insurance, emergency responders
- Environment – air quality, noise
- Economics – freight, development
- Livability – accessibility, safety, security, aesthetics, equal opportunity
- Missed opportunities!



Traffic data collection



Traffic Analysis Study Area





Traffic Data Collection Scope

- Conventional Traffic Counting Methods
- Aerial
- GPS/ Cell Phone Technology





Traffic Data Collection

Traffic Counts

- Turning Movement Counts – Peak Period
 - Video Cameras
 - 61 Locations

- Automatic Traffic Recorder Counts – 24 Hour
 - 105 Locations





Skycomp By "WAV" – Wide Area Aerial Video

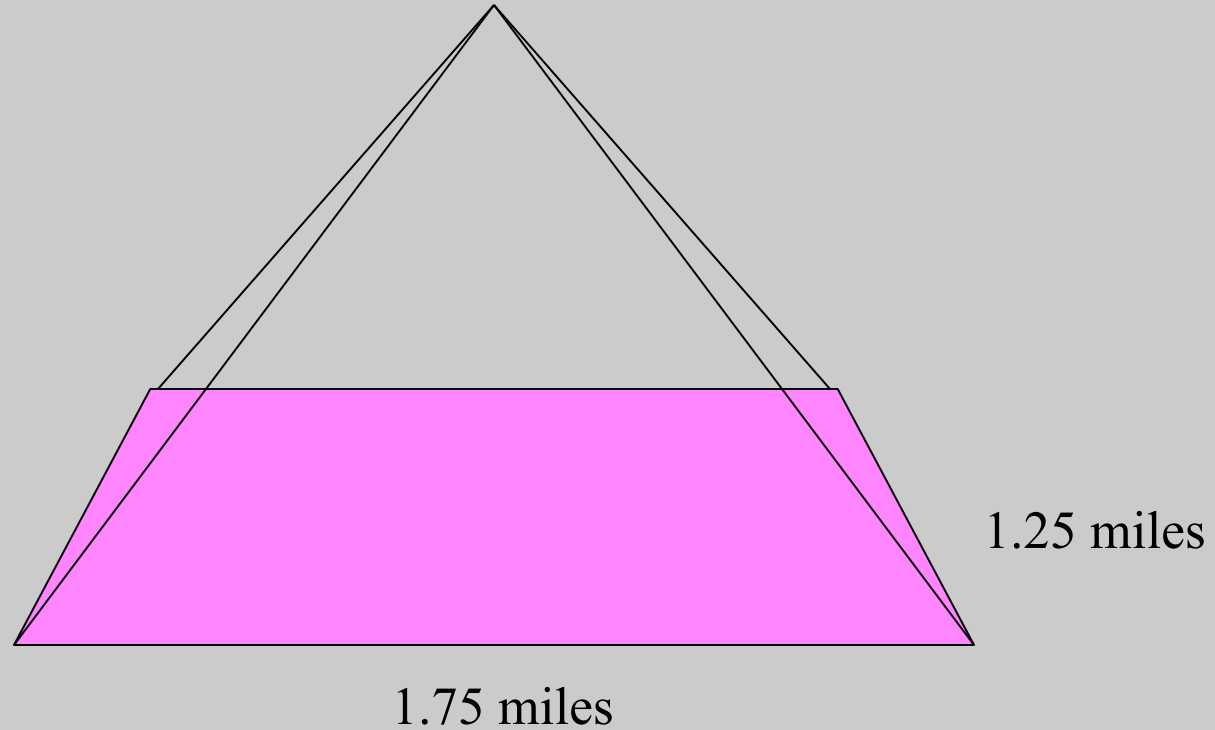
Wednesday, Nov 14, 2012

7:30 – 9:00AM and 3:00 – 4:30PM



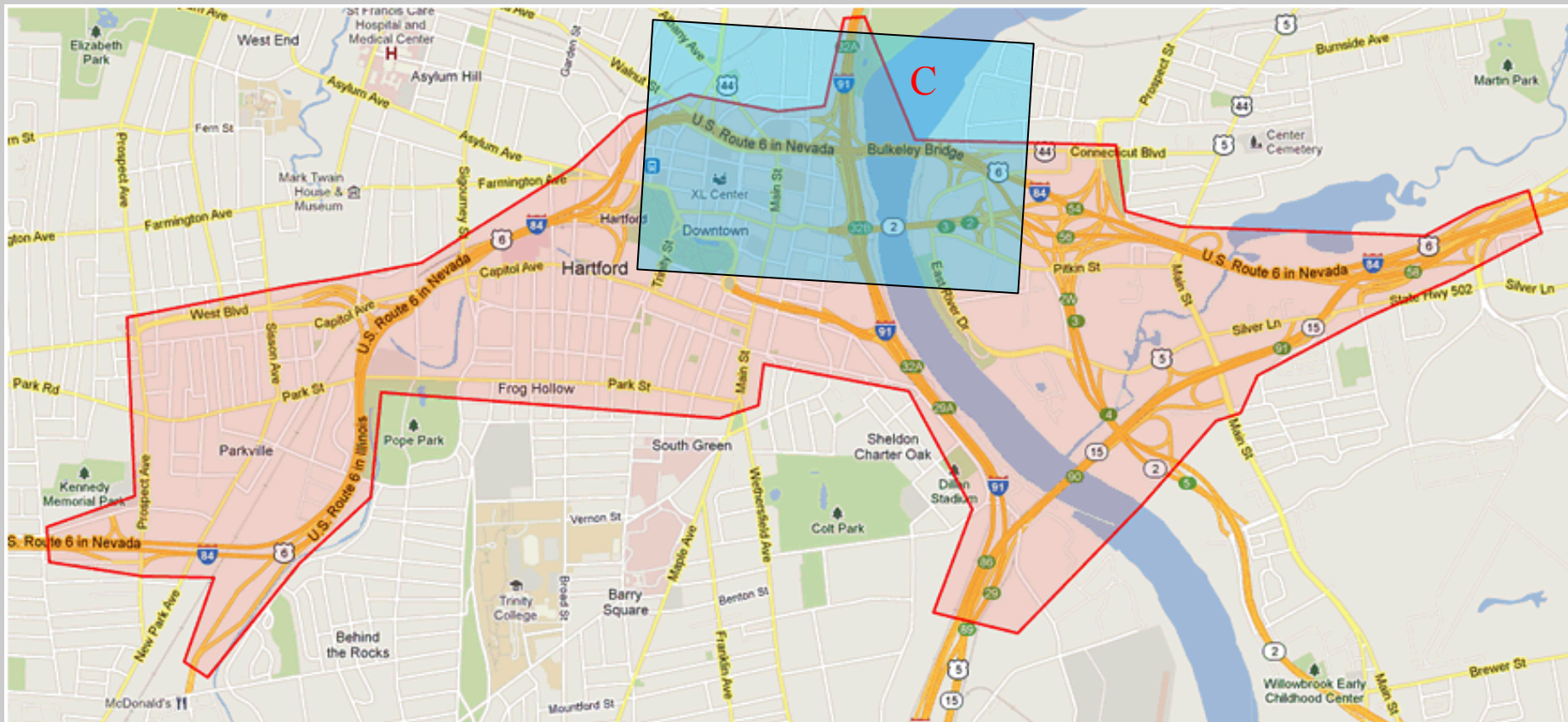


Skycomp "WAV" – Wide Area Aerial Video One Camera Configuration





Assigned Field-Of-View (FOV) Of Center Camera "C" (Aboard Helicopter 2)





Camera C View (North is “Up”)



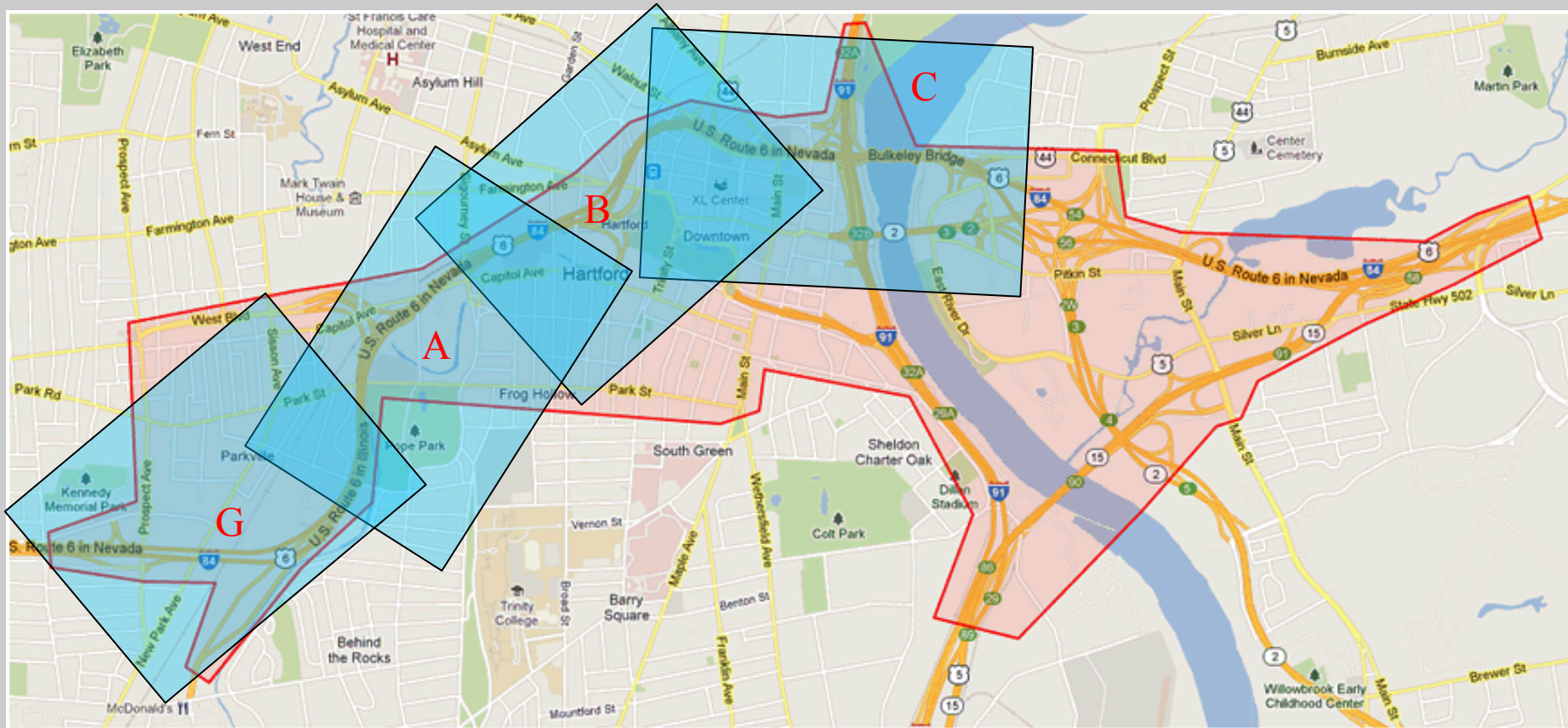


Camera C Detail at CBD



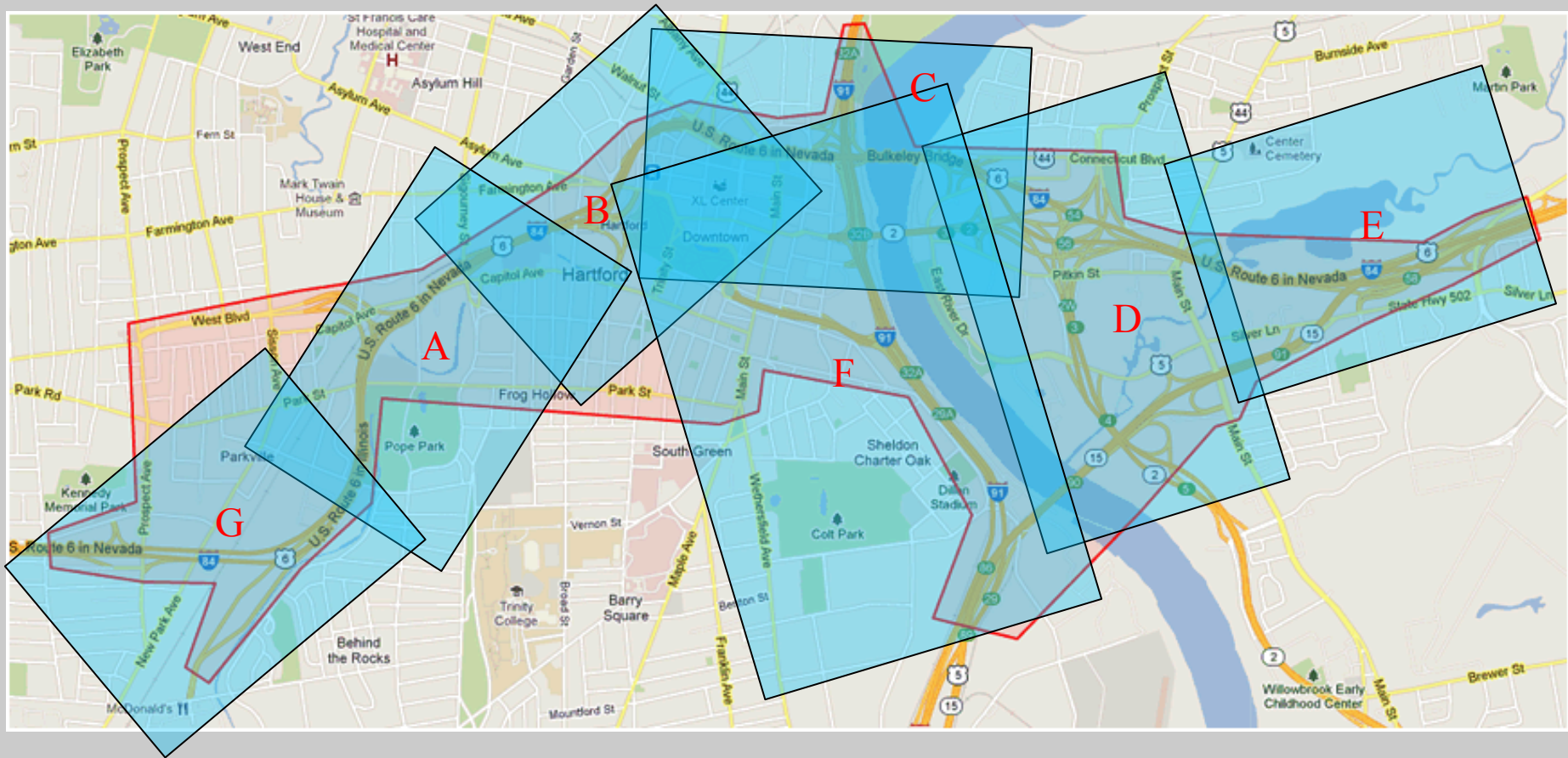


Assigned FOV's Of Three Western Cameras G,A,B (Aboard Helicopter 1)



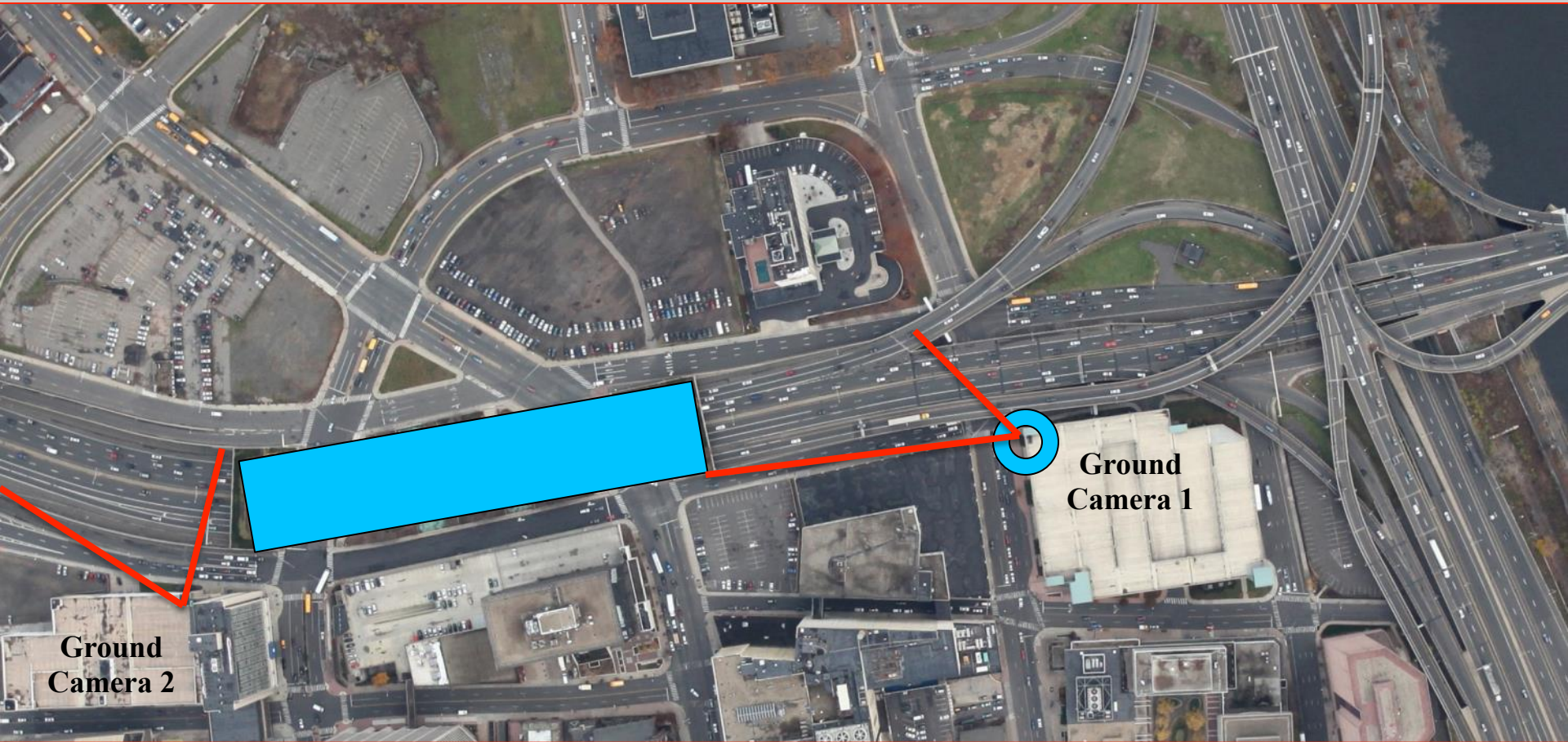


Assigned FOV's Of Three Eastern Cameras D,E,F (Aboard Helicopter 3)





Required Integration of Simultaneous Ground Cameras



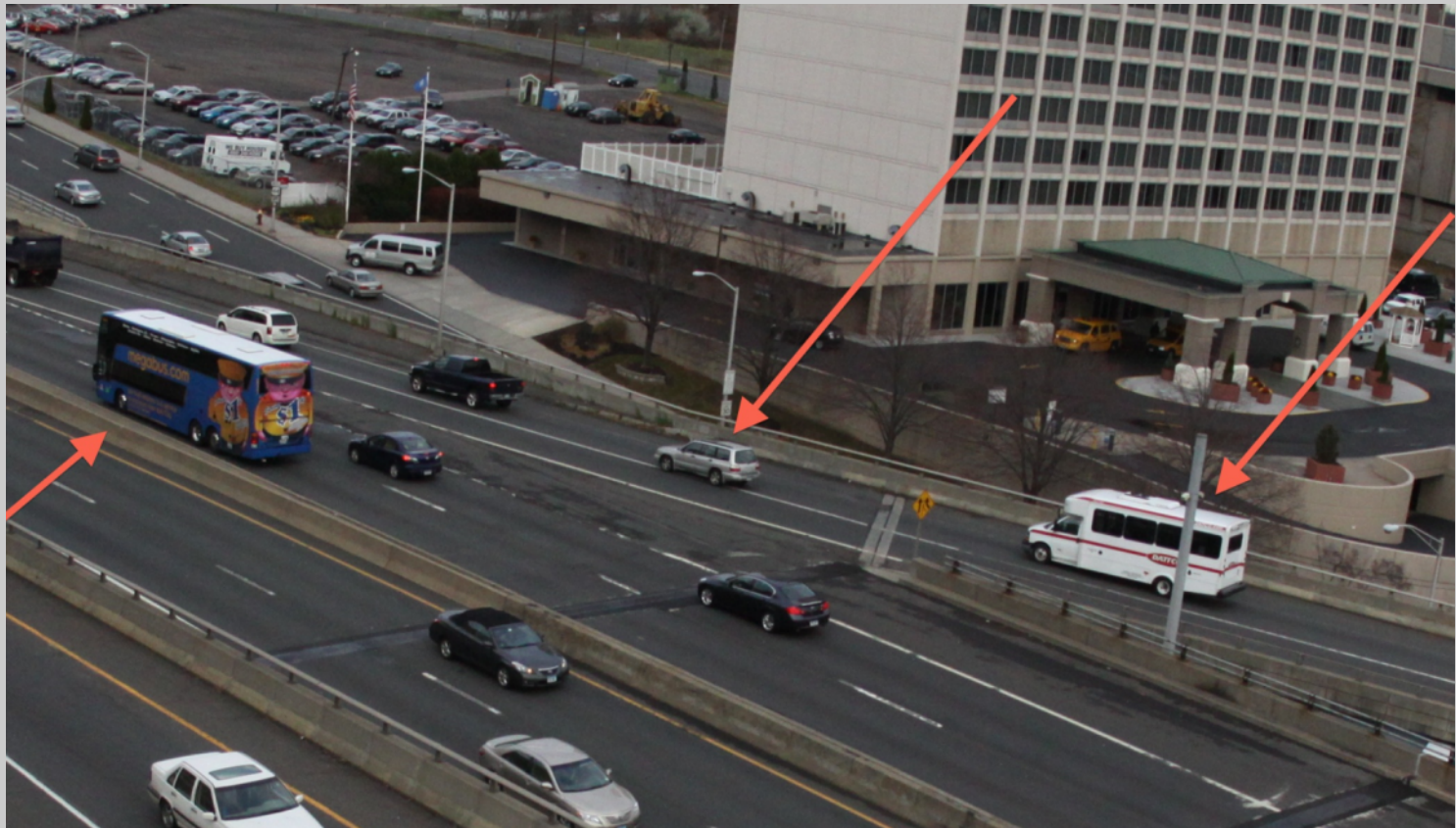


Ground Camera View (East of Tunnel Entrance)



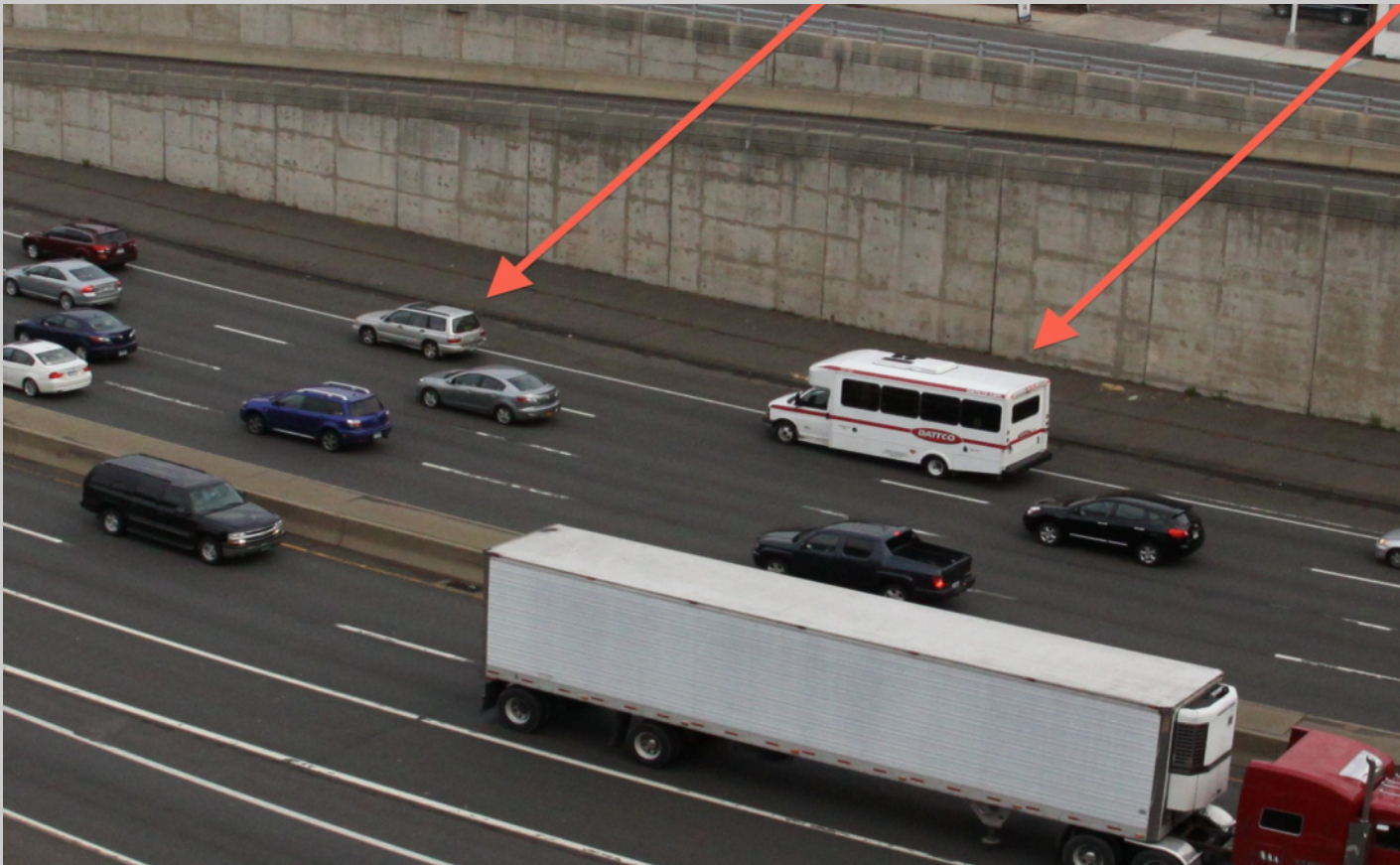


Maximum “Zoom” Before Entering The Tunnel



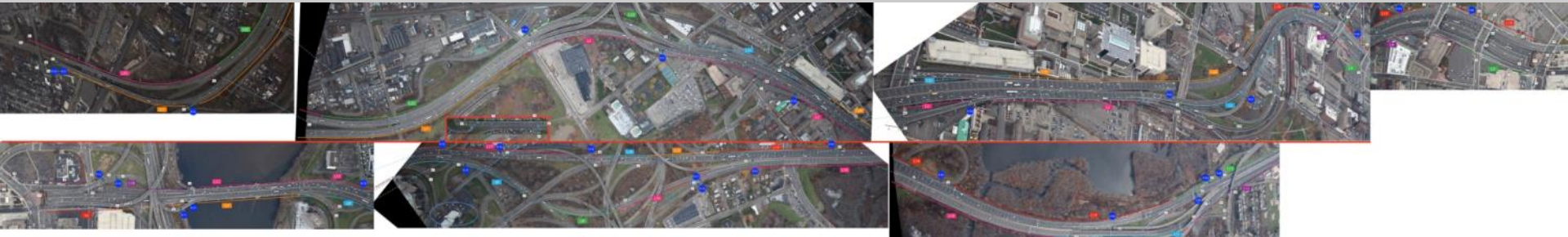


Maximum “Zoom” After Exiting The Tunnel



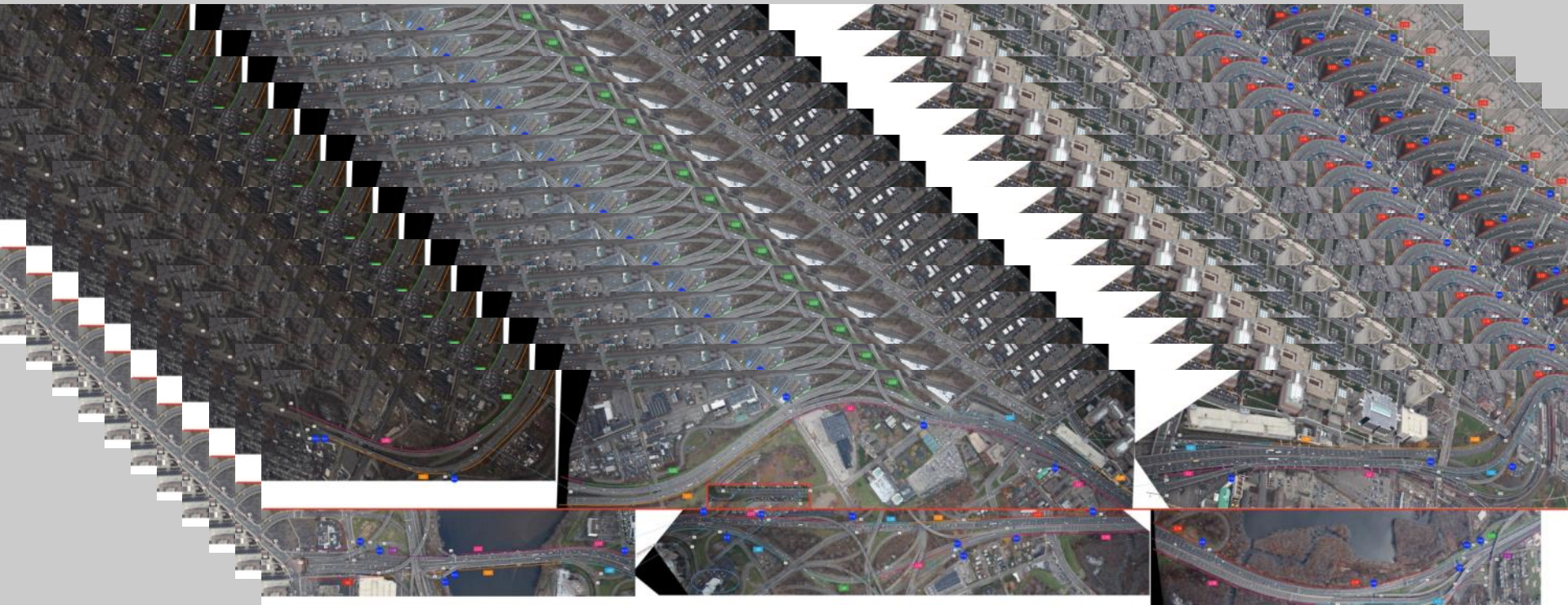


Paste-Up Board, 7 Cameras at One Instant





5,400 AM + 5,400 PM Paste-Up Boards Were Produced





West Overlay Codes VIC. Asylum Ave./St.





Findings/Deliverables

- Volume Table
- O-D Tables
- I-84 Mainline Congested Zones
- I-84 Exit Ramp Queuing
- Video Clips
- Methodology Summary Report



Volume Tables

- I-84 Entrance Ramps & Mainline Entry Points
- 15 Minute Sets by Class; 90 Minute Periods
- Linked to O-D Tables

| FLIGHT NUMBER: | FIT 2 | | | | |
|-----------------------------|--------------|----------------|----------------|----------------|----------------|
| Date | Nov 14, 2012 | | | | |
| Period | 0730-0900 AM | | | | |
| 1st count begins @ photo**: | 73001 | R-51 | R-53 | R-55 | R-57 |
| 1st count ends @ photo: | 74500 | Adj. to 15-min | Adj. to 15-min | Adj. to 15-min | Adj. to 15-min |
| ALL VEHICLES* | 1269.0 | 95.0 | 166.0 | 288.0 | |
| (Cars, other small veh's) | 1200.0 | 93.0 | 161.0 | 283.0 | |
| TRUCKS | 21.0 | 1.0 | 3.0 | 3.0 | |
| TRACTOR-TRAILERS | 40.0 | 1.0 | 2.0 | 0.0 | |
| BUSES | 8.0 | 0.0 | 0.0 | 2.0 | |
| 2nd count begins @ photo: | 74501 | R-51 | R-53 | R-55 | R-57 |
| 2nd count ends @ photo: | 80000 | Adj. to 15-min | Adj. to 15-min | Adj. to 15-min | Adj. to 15-min |
| ALL VEHICLES* | 1164.0 | 100.0 | 188.0 | 328.0 | |
| (Cars, other small veh's) | 1100.0 | 99.0 | 178.0 | 322.0 | |
| TRUCKS | 23.0 | 1.0 | 2.0 | 5.0 | |
| TRACTOR-TRAILERS | 34.0 | 0.0 | 2.0 | 1.0 | |
| BUSES | 7.0 | 0.0 | 6.0 | 0.0 | |
| 3rd count begins @ photo**: | 80001 | R-51 | R-53 | R-55 | R-57 |
| 3rd count ends @ photo: | 81500 | Adj. to 15-min | Adj. to 15-min | Adj. to 15-min | Adj. to 15-min |
| ALL VEHICLES* | 1176.8 | 87.4 | 180.4 | 375.4 | |
| (Cars, other small veh's) | 1118.6 | 86.3 | 170.5 | 368.3 | |
| TRUCKS | 19.1 | 1.1 | 0.0 | 3.0 | |
| TRACTOR-TRAILERS | 34.7 | 0.0 | 2.2 | 0.0 | |
| BUSES | 4.5 | 0.0 | 7.7 | 4.1 | |
| 4th count begins @ photo: | 81501 | R-51 | R-53 | R-55 | R-57 |
| 4th count ends @ photo: | 83000 | Adj. to 15-min | Adj. to 15-min | Adj. to 15-min | Adj. to 15-min |
| ALL VEHICLES* | 1253.0 | 89.0 | 188.0 | 350.0 | |
| (Cars, other small veh's) | 1194.0 | 85.0 | 174.0 | 341.0 | |
| TRUCKS | 19.0 | 3.0 | 10.0 | 5.0 | |
| TRACTOR-TRAILERS | 36.0 | 1.0 | 2.0 | 1.0 | |
| BUSES | 4.0 | 0.0 | 2.0 | 3.0 | |
| 5th count begins @ photo: | 83001 | R-51 | R-53 | R-55 | R-57 |
| 5th count ends @ photo: | 84500 | Adj. to 15-min | Adj. to 15-min | Adj. to 15-min | Adj. to 15-min |
| ALL VEHICLES* | 1056.0 | 97.0 | 162.0 | 292.0 | |
| (Cars, other small veh's) | 990.0 | 90.0 | 146.0 | 284.0 | |
| TRUCKS | 24.0 | 7.0 | 8.0 | 7.0 | |
| TRACTOR-TRAILERS | 39.0 | 0.0 | 3.0 | 1.0 | |
| BUSES | 3.0 | 0.0 | 5.0 | 0.0 | |
| 6th count begins @ photo: | 84501 | R-51 | R-53 | R-55 | R-57 |
| 6th count ends @ photo: | 90000 | Adj. to 15-min | Adj. to 15-min | Adj. to 15-min | Adj. to 15-min |
| ALL VEHICLES* | 1172.0 | 93.0 | 173.0 | 258.0 | |
| (Cars, other small veh's) | 1086.0 | 87.0 | 161.0 | 249.0 | |
| TRUCKS | 35.0 | 5.0 | 8.0 | 6.0 | |
| TRACTOR-TRAILERS | 48.0 | 1.0 | 1.0 | 2.0 | |
| BUSES | 3.0 | 0.0 | 3.0 | 1.0 | |
| Total Counts from photo: | 73001 | R-51 | R-53 | R-55 | R-57 |
| Total Counts to photo: | 90000 | | | | |
| ALL VEHICLES* | 7090.8 | 561.4 | 1057.4 | 1891.4 | |
| (Cars, other small veh's) | 6688.6 | 540.3 | 990.5 | 1847.3 | |
| TRUCKS | 141.1 | 18.1 | 31.0 | 29.0 | |
| TRACTOR-TRAILERS | 231.7 | 3.0 | 12.2 | 5.0 | |
| BUSES | 29.5 | 0.0 | 23.7 | 10.1 | |



Morning O-D Table A-3 (Allocated Flow Rates) / Eastbound

| TABLE A-3: ALLOCATION OF ORIGATION VOLUMES TO DESTINATIONS | | | EASTBOUND DESTINATIONS | | | | | | | | | | | | | | | | | | |
|--|---------|----------|-----------------------------|-----|-----|-----|-----|-----|----|----|----|-----|-----|-----|------|-----|-----|------|-----|-----|-----|
| FLOW RATE (VPH) | RAMP | EB O'S | 6 | 09A | 09B | 09C | 10 | 11 | 13 | 14 | 15 | 16 | 17 | 21 | 22 | 23 | 24 | 27 | 28 | 33 | 34 |
| 4727 | R-51 | 1 | 184 | 576 | 254 | 208 | 161 | 92 | 0 | 0 | 46 | 46 | 254 | 415 | 623 | 254 | 92 | 484 | 161 | 92 | 46 |
| | R-53 | 3 | | | | | | | | | | | | | | | | | | | |
| | R-53 | 4 | | | | | | | | | | | | | | | | | | | |
| 374 | R-53 | COMBINED | 10 | 34 | 22 | 10 | 10 | 5 | 5 | 0 | 2 | 7 | 15 | 66 | 63 | 12 | 5 | 32 | 17 | 5 | 5 |
| 705 | R-55 | 5 | 59 | 23 | 68 | 59 | 18 | 9 | 0 | 14 | 5 | 27 | 27 | 27 | 127 | 18 | 18 | 55 | 41 | 18 | 18 |
| 1261 | R-57 | 6 | | 81 | 130 | 49 | 0 | 0 | 8 | 16 | 0 | 33 | 57 | 228 | 203 | 41 | 8 | 163 | 41 | 8 | 24 |
| | R-59 | 7 | | | | | | | | | | | | | | | | | | | |
| | R-59 | 8 | | | | | | | | | | | | | | | | | | | |
| 487 | R-59 | COMBINED | | 6 | 19 | 25 | 6 | 3 | 0 | 6 | 3 | 35 | 9 | 119 | 101 | 19 | 19 | 25 | 25 | 9 | 6 |
| | R-61 | 09A | | | | | | | | | | | | | | | | | | | |
| | R-61 | 10 | | | | | | | | | | | | | | | | | | | |
| 602 | R-61 | COMBINED | | | | | | 4 | 0 | 4 | 0 | 35 | 16 | 130 | 177 | 20 | 16 | 83 | 16 | 16 | 12 |
| 1077 | R-71 | 22 | | | | | | | | | | | | | | 200 | 90 | 587 | 14 | 62 | 14 |
| 609 | R-73 | 19 | | | | | | | | | | | | | | 98 | 78 | 144 | 35 | 27 | 27 |
| 19 | R-75 | 23 | | | | | | | | | | | | | | | | 13 | 1 | 1 | 1 |
| 240 | R-77 | 25 | | | | | | | | | | | | | | | | | | 18 | 37 |
| 510 | R-79 | 27 | | | | | | | | | | | | | | | | | | 13 | 56 |
| 73 | R-81 | 28 | | | | | | | | | | | | | | | | | | 6 | 3 |
| 1584 | unnamed | 31 | | | | | | | | | | | | | | | | | | | |
| 93 | unnamed | 33 | | | | | | | | | | | | | | | | | | | |
| 44 | unnamed | 34 | | | | | | | | | | | | | | | | | | | |
| 5 | unnamed | 35 | | | | | | | | | | | | | | | | | | | |
| | | | 253 | 721 | 493 | 350 | 196 | 113 | 13 | 40 | 56 | 183 | 378 | 985 | 1294 | 661 | 326 | 1586 | 351 | 276 | 249 |
| | | | EXPECTED DESTINATION VOLUME | | | | | | | | | | | | | | | | | | |



Morning Congestion and Severity on I-84 Mainline (Westbound)

I-84 Mainline Congestion (Westbound) - Morning

| Time | Direction | From | To | Distance (miles) | Est. Speed (mph) |
|-----------|-----------|--------------------------------|--------------------------------|------------------|------------------|
| 7:30 a.m. | Westbound | Governor St NB exit ramp | I-91 NB exit ramp | 1.0 | 20-30 |
| 7:30 a.m. | Westbound | Tunnel exit | Walnut St entrance ramp | 0.3 | 20-30 |
| 7:45 a.m. | Westbound | Main St (US 5) | Connecticut Blvd entrance ramp | 1.0 | 10-20 |
| 7:45 a.m. | Westbound | Connecticut Blvd entrance ramp | I-91 NB exit ramp | 0.3 | 20-30 |
| 7:45 a.m. | Westbound | Tunnel exit | Walnut St entrance ramp | 0.3 | 30-40 |
| 8:00 a.m. | Westbound | Main St (US 5) | Connecticut Blvd entrance ramp | 1.0 | 10-20 |
| 8:00 a.m. | Westbound | Connecticut Blvd entrance ramp | I-91 NB exit ramp | 0.3 | 30-40 |
| 8:00 a.m. | Westbound | Tunnel exit | Walnut St entrance ramp | 0.3 | 30-40 |
| 8:15 a.m. | Westbound | Governor St NB exit ramp | Connecticut Blvd entrance ramp | 0.8 | 10-20 |
| 8:15 a.m. | Westbound | Connecticut Blvd entrance ramp | I-91 NB exit ramp | 0.3 | 30-40 |
| 8:15 a.m. | Westbound | Tunnel exit | Walnut St entrance ramp | 0.3 | 30-40 |
| 8:30 a.m. | Westbound | Governor St NB overpass | Connecticut Blvd entrance ramp | 0.6 | 10-20 |
| 8:30 a.m. | Westbound | Connecticut Blvd entrance ramp | I-91 NB exit ramp | 0.3 | 30-40 |
| 8:45 a.m. | Westbound | Governor St SB entrance ramp | I-91 NB exit ramp | 0.6 | 30-40 |

Note: No westbound congestion (< 40 mph) at 9:00 a.m.



Morning Exit Ramp Queues

| Time (Photo) | Location | Queue | Direction | Queue Length (feet) | Note |
|--------------|--------------|-----------------------------------|-----------|---------------------|--|
| 7:35:00 | Sigourney St | I-84 exit ramp (right lane) | Westbound | 400 | |
| 7:55:00 | Sigourney St | I-84 exit ramp (right lane) | Westbound | 1300 | The ramp queue extended back into the right lane on I-84 |
| 8:10:00 | Sigourney St | I-84 exit ramp (right lane) | Westbound | 600 | |
| 7:40:00 | Asylum Ave | I-84 exit ramp (right lane) | Westbound | 1800 | The ramp queue extended back into the right lane on I-84 |
| 7:45:00 | Asylum Ave | I-84 exit ramp (right lane) | Westbound | 2300 | The ramp queue extended back into the right lane on I-84 |
| 7:50:00 | Asylum Ave | I-84 exit ramp (right lane) | Westbound | 1300 | The ramp queue extended back into the right lane on I-84 |
| 7:55:00 | Asylum Ave | I-84 exit ramp (right lane) | Westbound | 2350 | The ramp queue extended back into the right lane on I-84 |
| 8:00:00 | Asylum Ave | I-84 exit ramp (right lane) | Westbound | 1300 | The ramp queue extended back into the right lane on I-84 |
| 8:05:00 | Asylum Ave | I-84 exit ramp (right lane) | Westbound | 2100 | The ramp queue extended back into the right lane on I-84 |
| 8:10:00 | Asylum Ave | I-84 exit ramp (right lane) | Westbound | 2050 | The ramp queue extended back into the right lane on I-84 |
| 8:15:00 | Asylum Ave | I-84 exit ramp (right lane) | Westbound | 2300 | The ramp queue extended back into the right lane on I-84 |
| 8:20:00 | Asylum Ave | I-84 exit ramp (right lane) | Westbound | 2500 | The ramp queue extended back into the right lane on I-84 |
| 8:25:00 | Asylum Ave | I-84 exit ramp (right lane) | Westbound | 1800 | The ramp queue extended back into the right lane on I-84 |
| 7:35:00 | SR 2 | I-84 entrance ramp (from NB SR 2) | Westbound | 1050 | |
| 7:45:00 | SR 2 | I-84 entrance ramp (from NB SR 2) | Westbound | 1300 | |
| 7:50:00 | SR 2 | I-84 entrance ramp (from NB SR 2) | Westbound | 2200 | |
| 7:55:00 | SR 2 | I-84 entrance ramp (from NB SR 2) | Westbound | 2200 | |
| 8:00:00 | SR 2 | I-84 entrance ramp (from NB SR 2) | Westbound | 2300 | |
| 8:05:00 | SR 2 | I-84 entrance ramp (from NB SR 2) | Westbound | 2300 | |
| 8:10:00 | SR 2 | I-84 entrance ramp (from NB SR 2) | Westbound | 2300 | |
| 8:15:00 | SR 2 | I-84 entrance ramp (from NB SR 2) | Westbound | 2300 | |
| 8:20:00 | SR 2 | I-84 entrance ramp (from NB SR 2) | Westbound | 2300 | (cleared quickly / gone by 8:25 a.m.) |



Final Report

I-84 CORRIDOR
HARTFORD, CONNECTICUT

**AERIAL PHOTO SURVEY DATA COLLECTION
(NOVEMBER 2012)
SUMMARY REPORT**

Prepared for Connecticut Department of Transportation
By Skycomp, Inc., Columbia, Maryland
In association with TranSystems Corporation





GPS/Cell Phone Based Traffic Data

- INRIX – Real Time and Historic Travel Speed/Travel Time Data

- AirSage – Origin and Destination Analysis
 - Confidential and Proprietary

 - Specifically Developed Software

- TranSystems Has License Agreements with Both Firms



Crowdsource: Free Apps – starting 2009



Available on the App Store



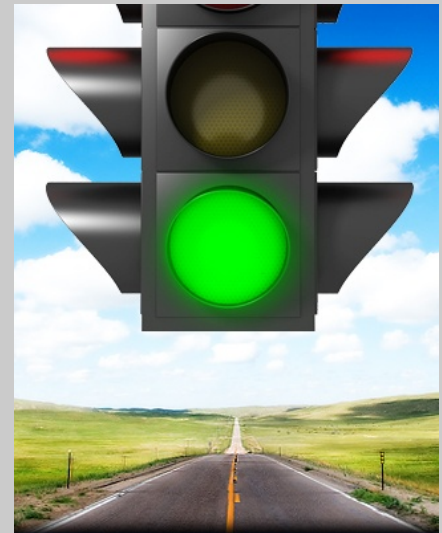
Download for Android



Download for Windows Phone 7

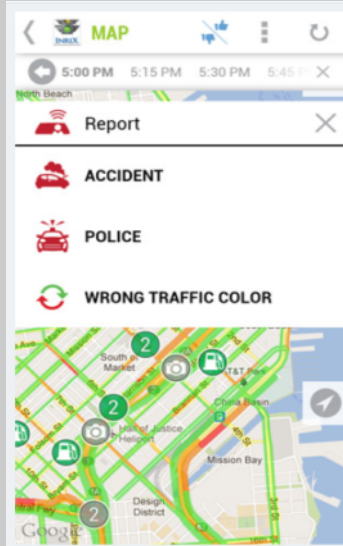
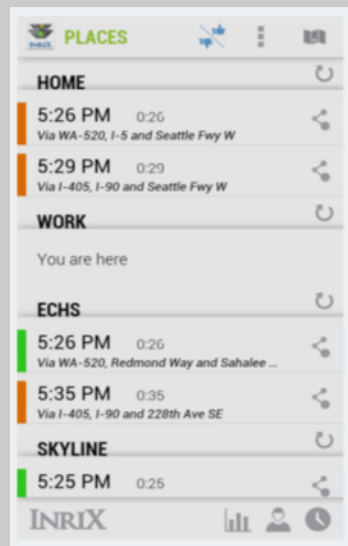
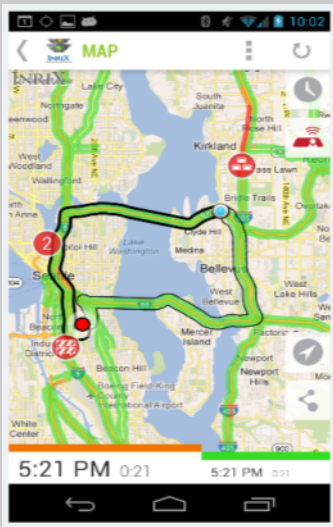


BlackBerry 6.0



INRIX

The leading provider of traffic & navigation services



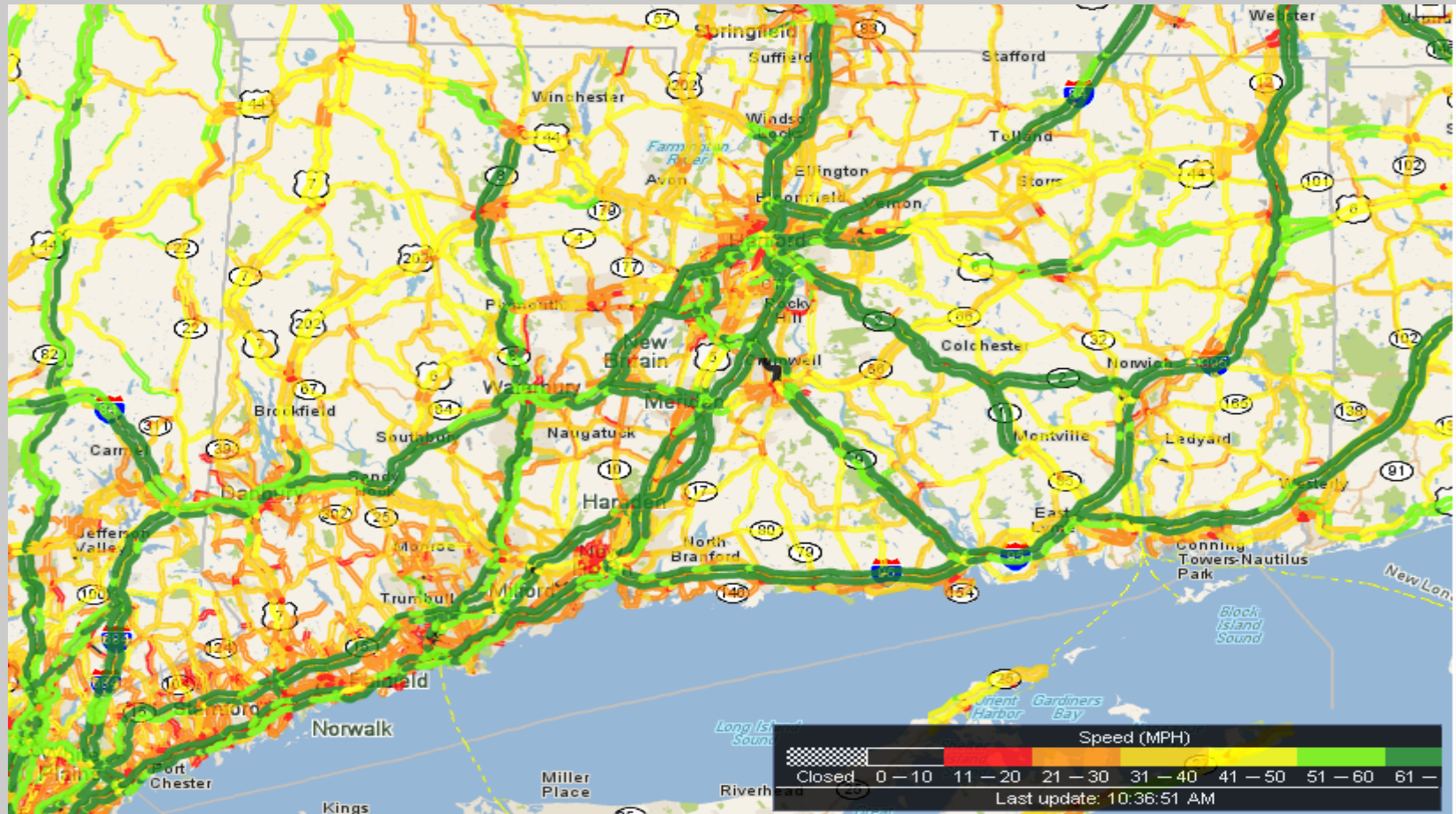
www.inrixtraffic.com





Coverage – Connecticut

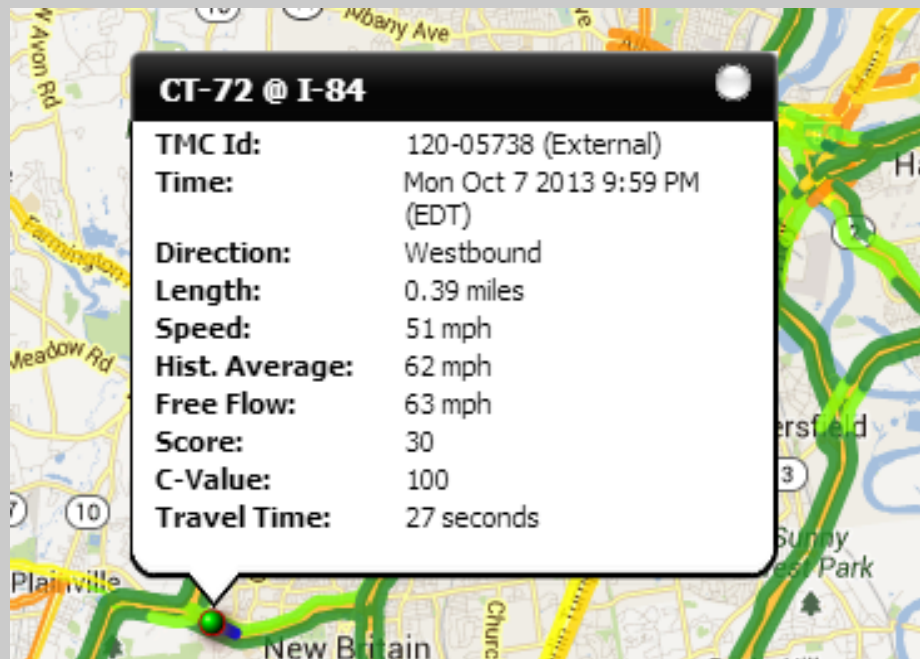
- 4,243 Centerline Miles





Real-Time & Predictive Traffic Flow

- Road segment by road segment, INRIX provides:
 - Segment information (code, road name, cross streets, direction, length)
 - Speed information (current speed, typical speed, free flow speed)
 - Travel time (in minutes through segment)
 - Congestion level (percentage of free flow)
 - Predictive traffic (speed and congestion forecast in 15 minute increments)



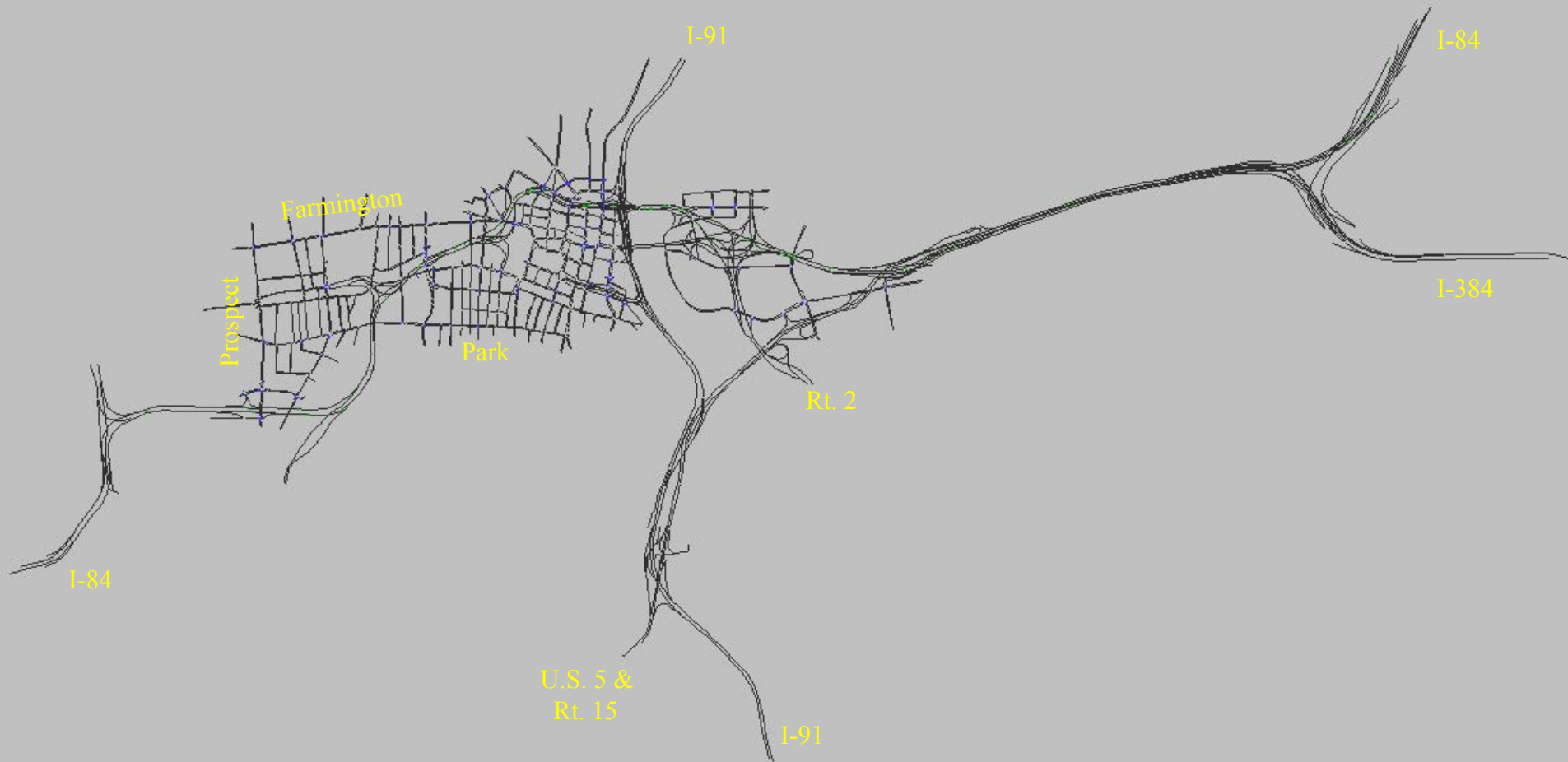


I-84 Modeling Efforts

- Regional Travel Demand modeling
 - Update of CRCOG Time of Day model
- Operations simulation of immediate influence area
 - Freeway, Local Roads & Arterials

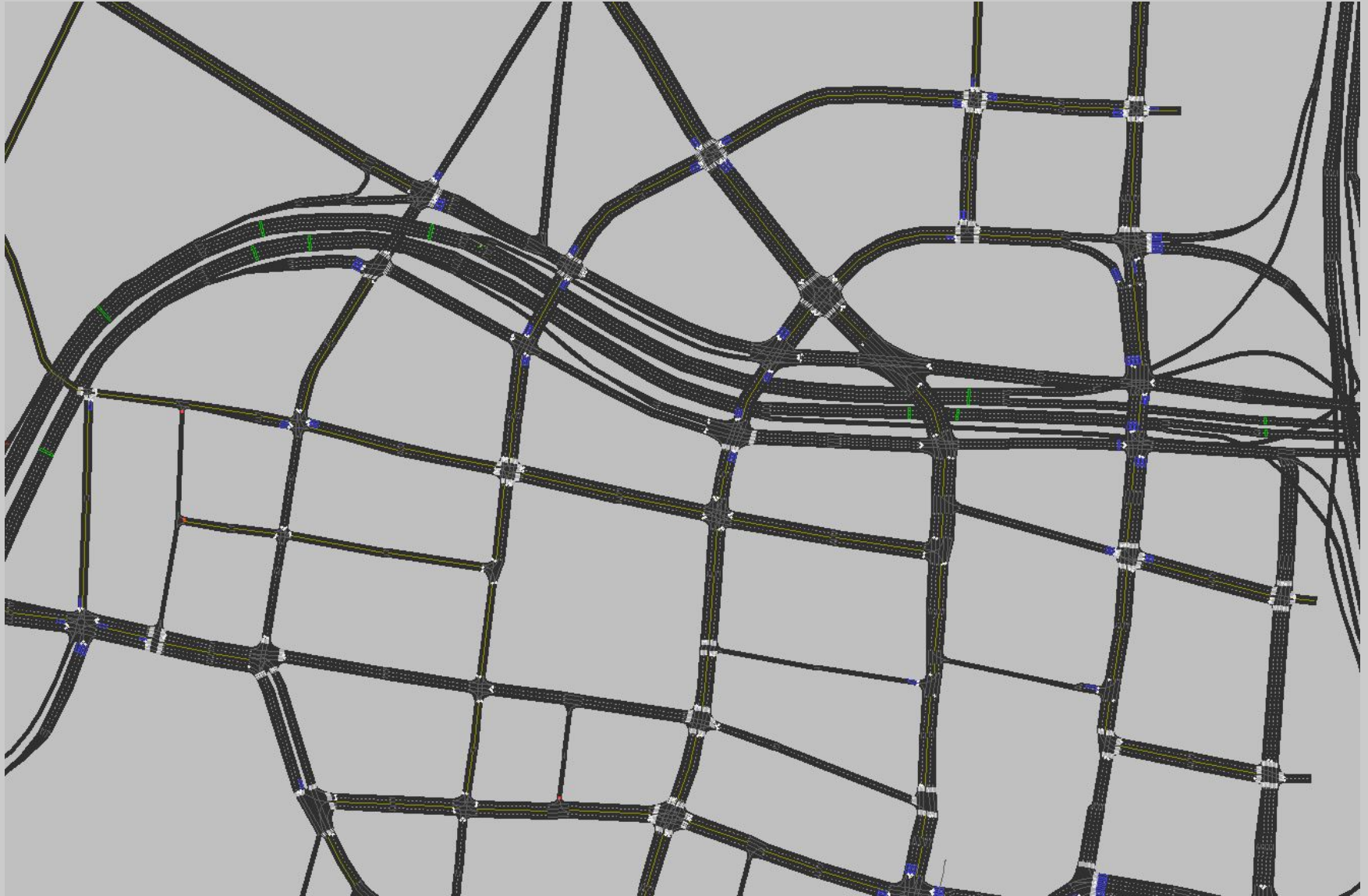


Microscopic Study Limits



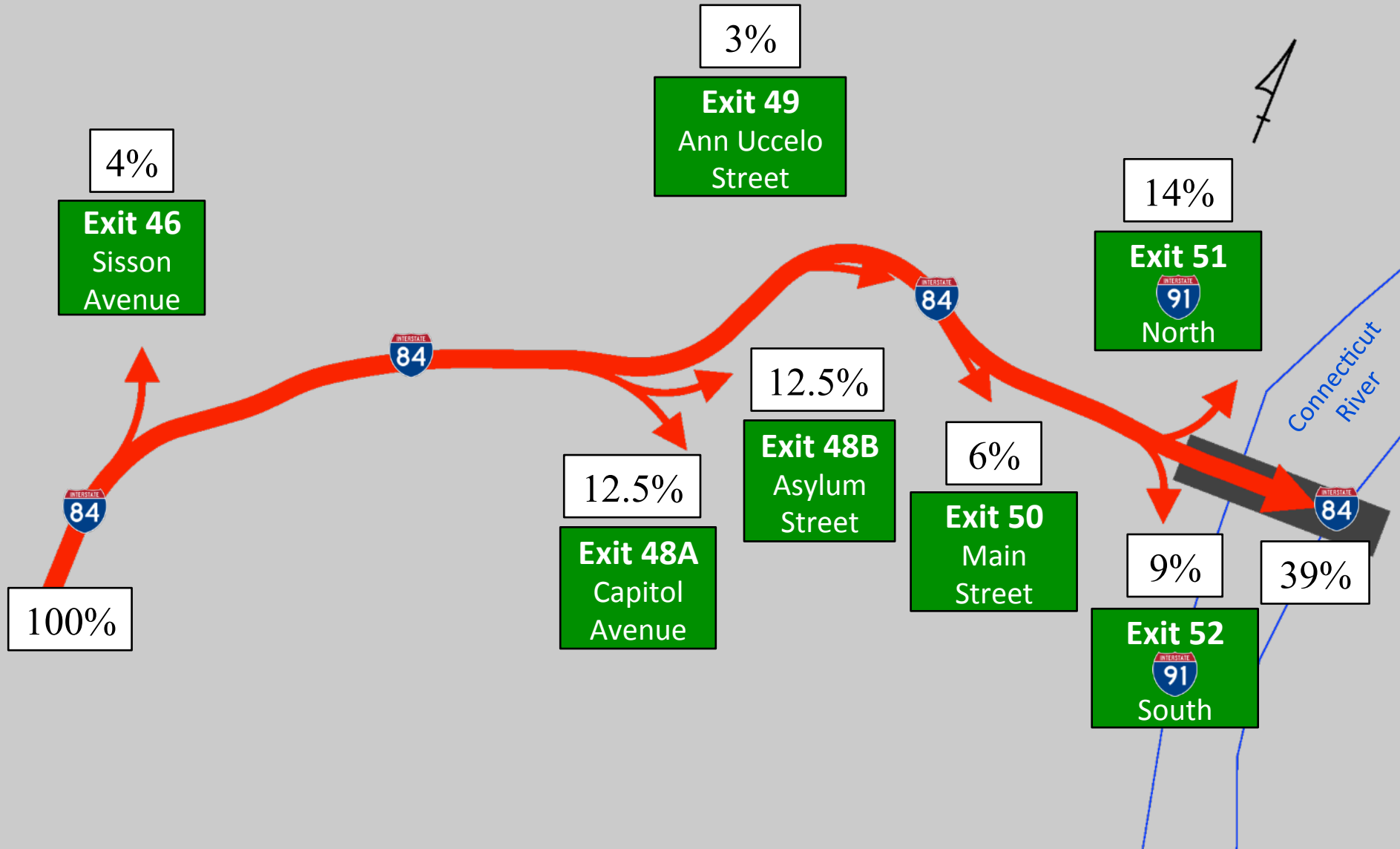


Microscopic Details



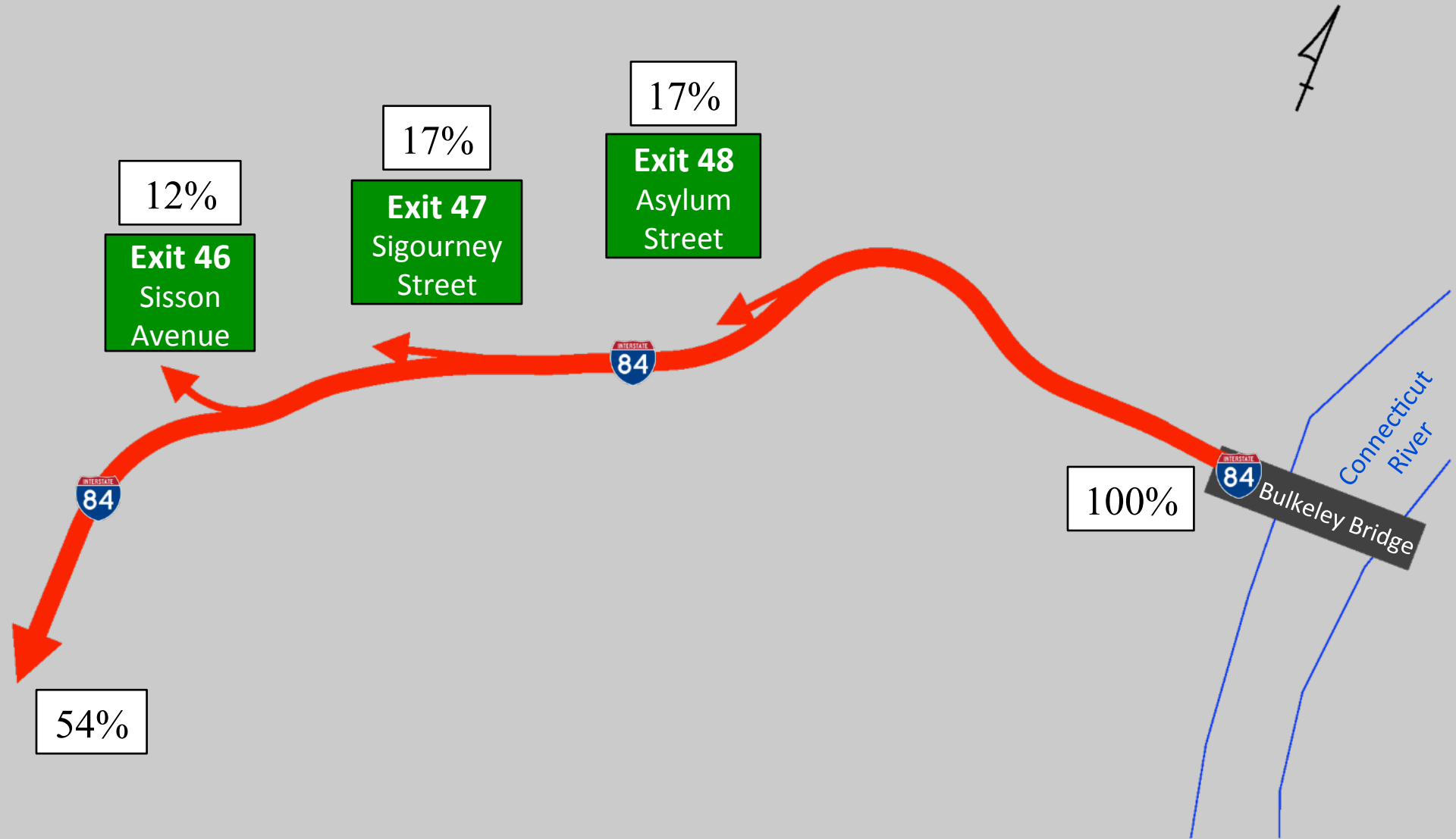


Volume Distribution Data I-84 Eastbound (AM)



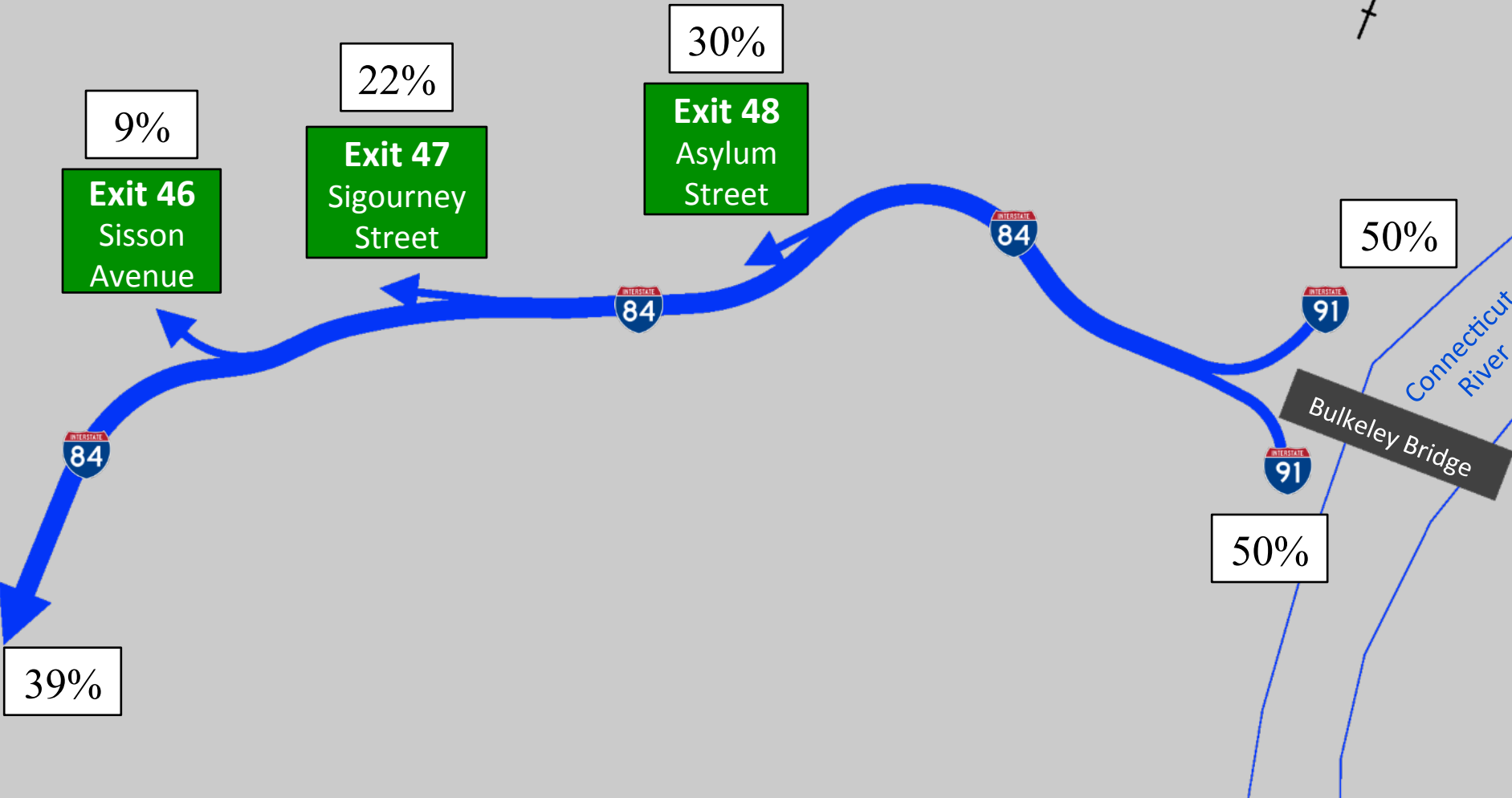


Volume Distribution Data I-84 Westbound (AM)



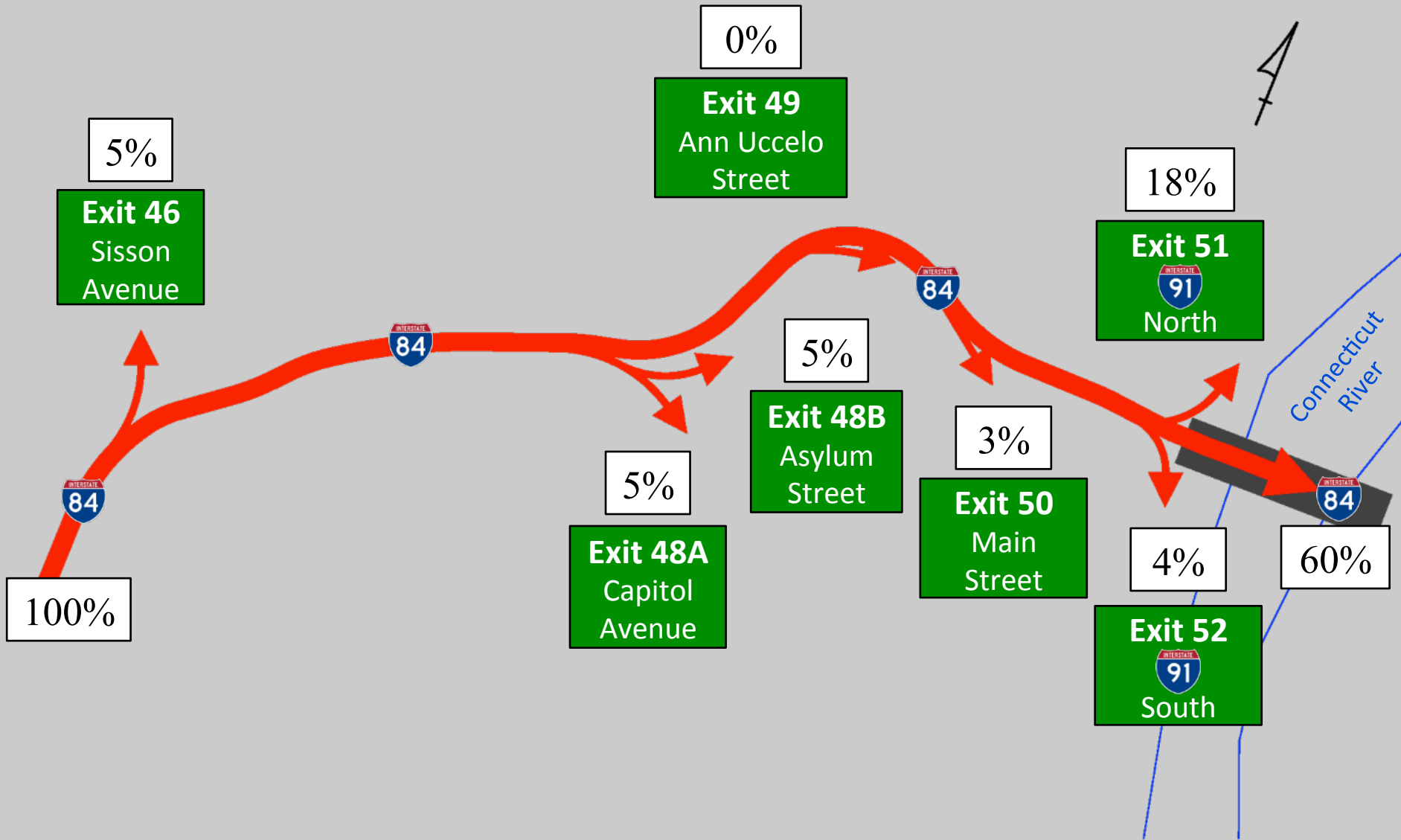


Volume Distribution Data I-91 to I-84 Westbound (AM)



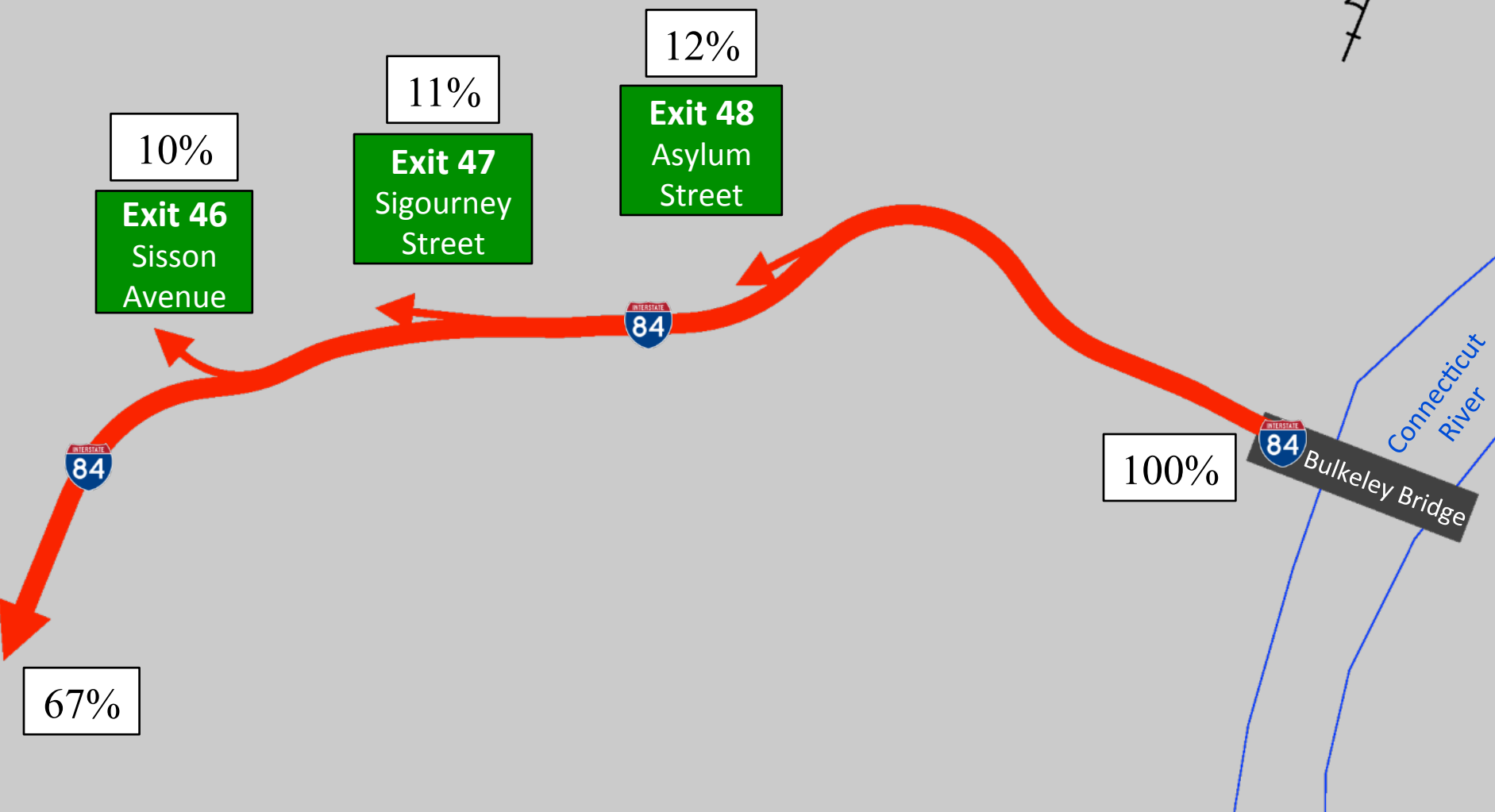


Volume Distribution Data I-84 Eastbound (PM)



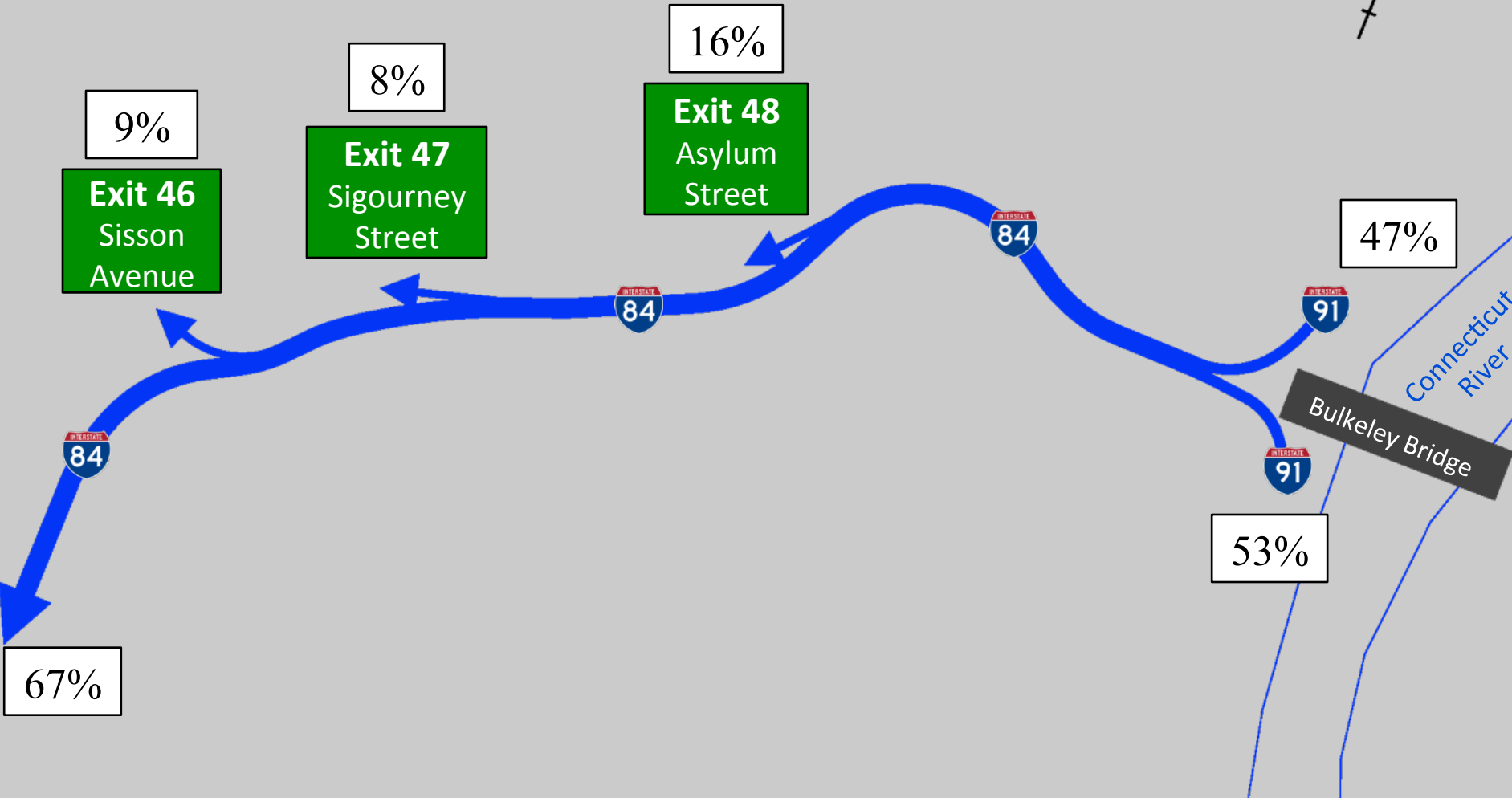


Volume Distribution Data I-84 Westbound (PM)



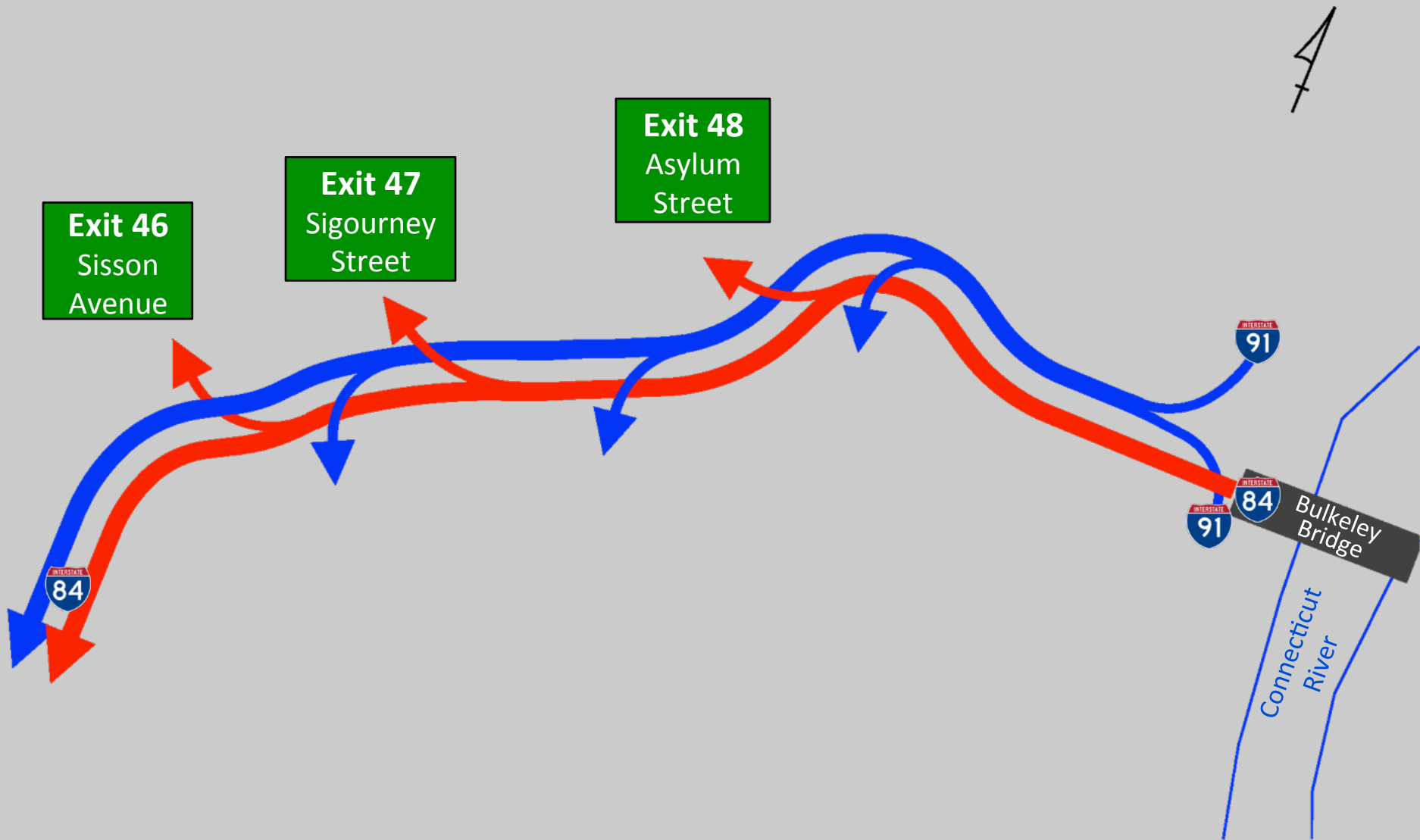


Volume Distribution Data I-91 to I-84 Westbound (PM)





I-84 Westbound Weaving (PM)





Traffic Data Summary

- Roughly half of the traffic uses the ramp system
- Data Analysis is on-going
- O&D data will be used to obtain travel patterns
- Data will be used to help guide the development of alternatives

In Closing...

Next Steps



Next Steps

- Next PAC meeting
 - Date (early 2014)
- Potential PAC agenda items
 - Rail relocation challenges and opportunities
 - Bike/ped data analysis
 - What transportation issues need to be solved? (“Needs Deficiency Analysis”)
 - Other topics?
- Working Groups
- Alternatives development



Thank You!

We deeply appreciate your time and your commitment to helping us reach the best possible solution for the State, the region and the City.

Your I-84 Hartford Project Team