RTDM Consultant Task 5
DTA Subarea Model Development

RRTPO TECHNICAL ADVISORY COMMITTEE MEETING

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PlanRVA THE REGIONAL COMMISSION

Richmond Regional Transportation Planning Organization

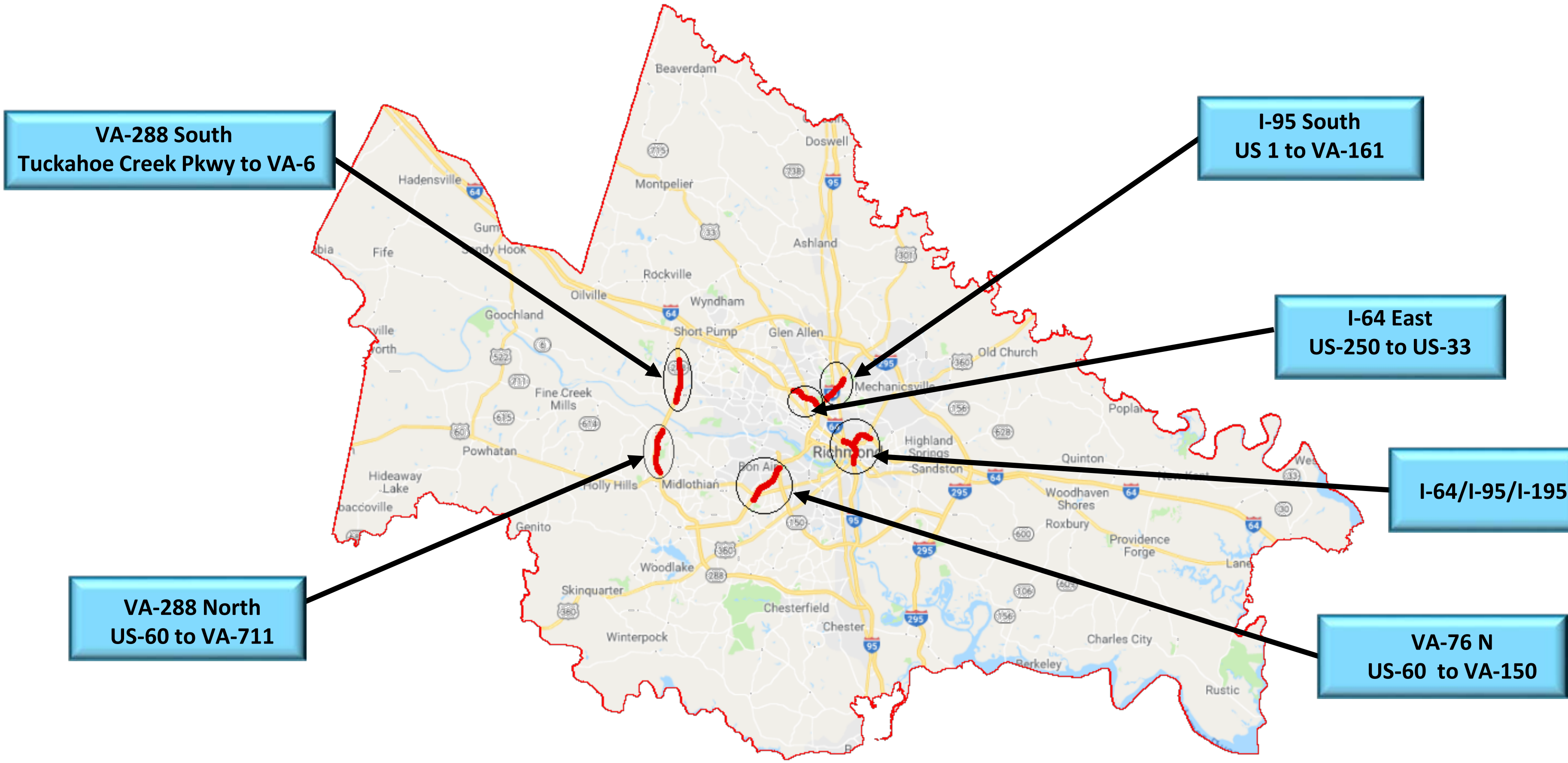
Objectives of the Study

- To develop a mesoscopic DTA application for scenario testing
- Explore the use of Big Data like Streetlight OD data/ HERE Data in the corridor-level model development
- To have a deeper look of one of the major chokepoints in the region
- Test applications such as freeway bottleneck analysis

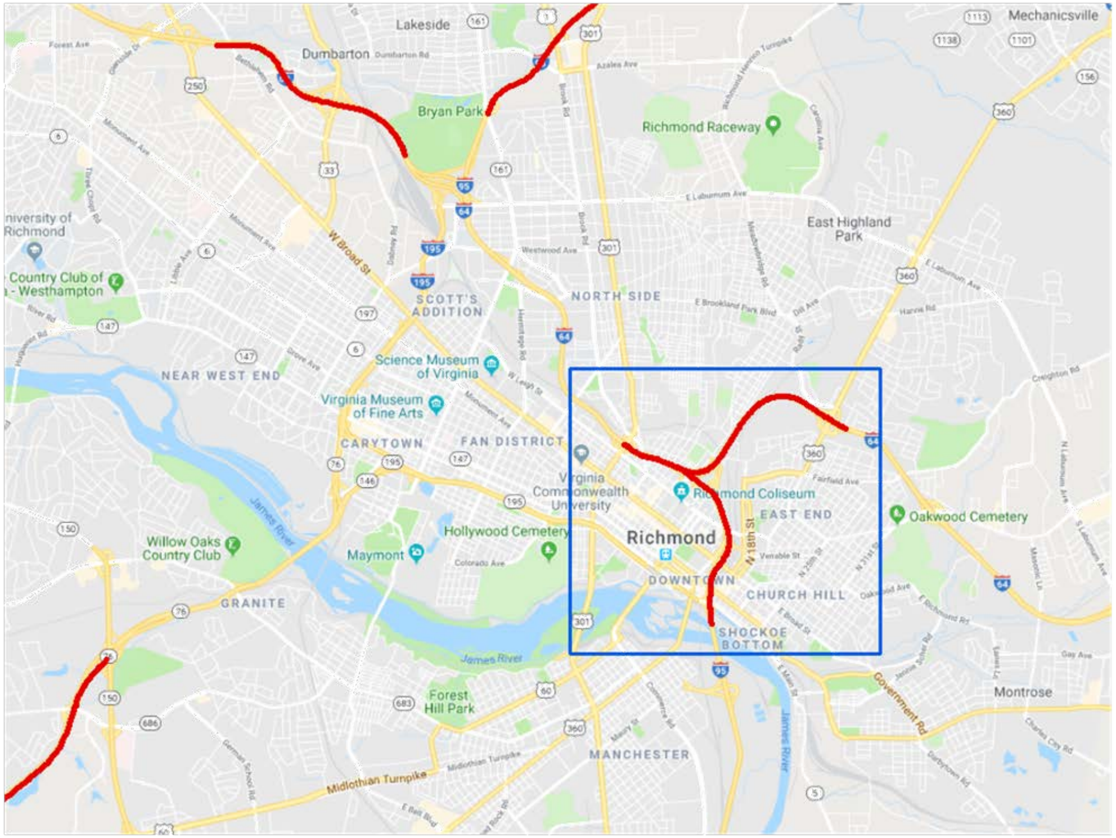
Dynamic Traffic Assignment (DTA) Principles

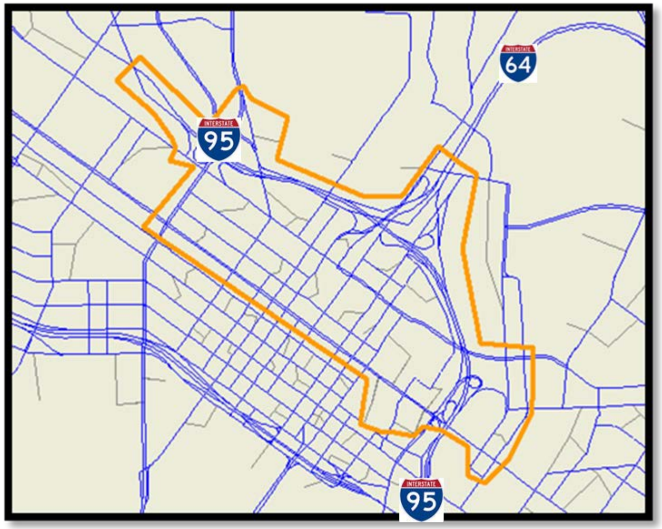
- Method of system-level assignment analysis which seeks to track the progress of a trip through the network over time
- Accounts for formation and propagation of queues due to congestion.
- A bridge between traditional regional-level static assignment models and corridor-level models (micro-simulation)
- Within a model period, shorter time segments are assumed in DTA.

Major Chokepoints in the Richmond Region



DTA Study Area



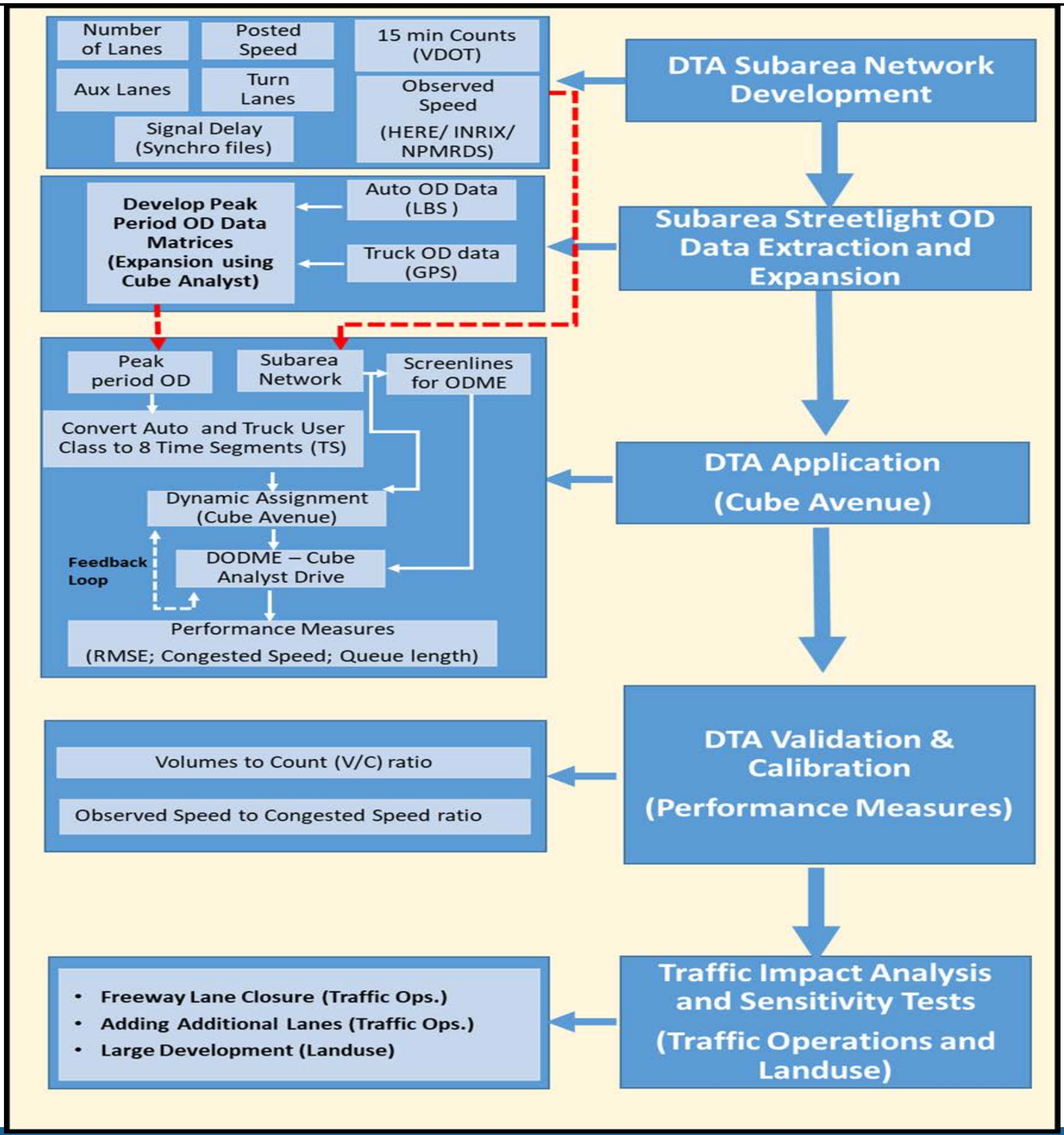


Tools Selection and Development

- Streetlight OD data and Expansion
  - LBS and GPS Navigation OD data within the subarea
  - Provides traffic flows (corridor subarea OD) using “Pass-through” zones
  - Expand using ODME (IPF) process, with a feedback loop within highway assignment

- Develop DTA Subarea Application
  - Peak period specific routine
  - AM (7 AM – 9 AM)
  - PM (5 PM – 7 PM)
  - Time slice OD expanded data to 15 minute interval
  - Validated the model using counts and observed speed at 15 minutes interval

Overall Subarea Modelling Process



Model Calibration

- Congested Speed Calibration
- Vehicle flows Vs Counts
- Visual checks, Animation, Queues

Volume Group	Count Range	Allow RMSE	No of Links	After RMSE
1	1- 5,000	45 - 55%	93	29.70%
2	5,000- 10,000	35 - 45%	16	17.20%
3	10,000- 20,000	27 - 35%	5	14.30%
13	1-500,000	32 - 39%	114	25.30%

Location	I-95 NB Observed Speeds						I-95 NB DTA Estimated Speeds					
	I-95 South End	I-95 South of I-64	I-95 North of I-64	I-95 North End	I-64 WB Ramp	I-64 WB	I-95 South End	I-95 South of I-64	I-95 North of I-64	I-95 North End	I-64 WB Ramp	I-64 WB
DIR	NBO1	NBO2	NBO3	NBO4	WBO5	WBO6	NBE1	NBE2	NBE3	NBE4	WBE5	WBE6
7:00	56	56	56	58	51	51	44	44	45	50	42	53
7:15	53	54	53	54	42	42	38	16	38	38	35	48
7:30	49	48	44	47	27	27	35	8	10	38	34	49
7:45	41	37	30	36	20	20	40	6	5	38	30	38
8:00	40	36	30	36	19	19	4	5	5	38	28	25
8:15	39	35	30	37	24	24	2	4	23	38	29	23
8:30	41	38	32	36	28	28	1	4	50	38	30	17
8:45	45	42	36	39	35	35	1	4	54	54	27	16

Scenarios Testing

1. No-Build/Existing Conditions
2. Scenario 1: 1 Additional Lane on I-95 NB/SB
3. Scenario 2: 1+1 Additional Lane on I-95/I-64 Ramps
4. Scenario 3: Stress Test- Closure of I-95 SB, South of I-64 Interchange

Scenario 1 (1 Additional Lane on I-95)

AM Period Subarea Systemwide Impacts

Scenario 2 (1+1 Additional Lane on I-95/I-64 Ramps)

AM Results- System wide: No-Build Vs. Scenario 2

Scenario 2 (1+1 Additional Lane on I-95/I-64 Ramps)

AM Results- I-95/I-64 Interchange: No-Build Vs. Scenario 2

Scenario 3: Closure of I-95 SB, South of I-64 Interchange

AM Results- System wide: No-Build Vs. Scenario 3

Conclusion

- Streetlight data was effectively used in developing the subarea demand, with careful OD expansion methods.
- DTA calibration replicates the bottleneck conditions at the I-95/I-64 interchange
  - Merges of major roadways and movements
  - Short ramp segments
  - Heavy AM/PM loads
- The DTA Model provides RRTPO with capabilities to analyze bottlenecks.
- This approach minimized the needs for expensive data collection
  - Use of already available traffic count data, OD and speed data from Big data sources- Streetlight/HERE
- Mesoscopic DTA model requires extensive calibration and sensitivity analysis
  - Delicate compromise between volume/count and congested speed calibration
  - Observed data should be carefully chosen for the calibration

Questions?

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