MMMPO Downtown Microsimulation Study

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MMMPO

Kimley»Horn

Presenters

- Bill Austin, AICP
  - Executive Director MMMPO
- Colin Frosch, PE
  - WVU BSCE, MSCE, and MBA graduate
  - Fairmont, WV Native
  - Kimley-Horn – Reston, VA
- Tim Padgett, PE
  - Kimley-Horn – Raleigh, NC

Agenda

- Project Purpose - *Bill*
- Overall Study Approach and Study Area - *Colin*
- Preliminary Existing Conditions Analysis Results - *Colin*
  - Existing and Historic Traffic Volumes
  - Origin-Destination Analysis
  - Crash Analysis
- Developing the Routing and Future volumes - *Tim*
- TransModeler microsimulation components and calibration - *Colin*

Project Need

West Virginia Regional History Center

Project Purpose

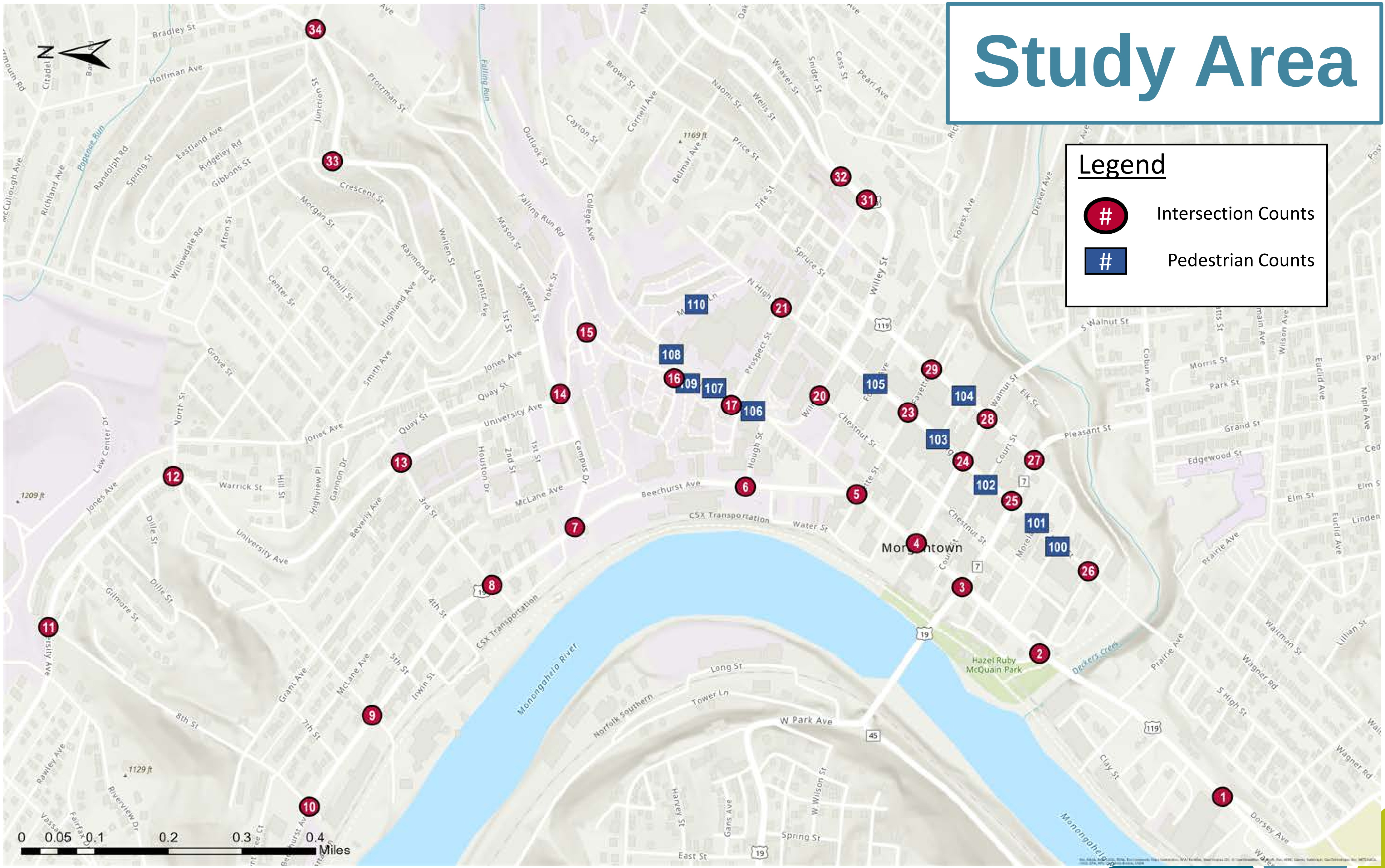
To recommend potential future reconfigurations of the downtown Morgantown transportation network based on:

- Assessment of existing safety, parking, and congestion
- Input from the community and stakeholders
- A robust microsimulation model of the network

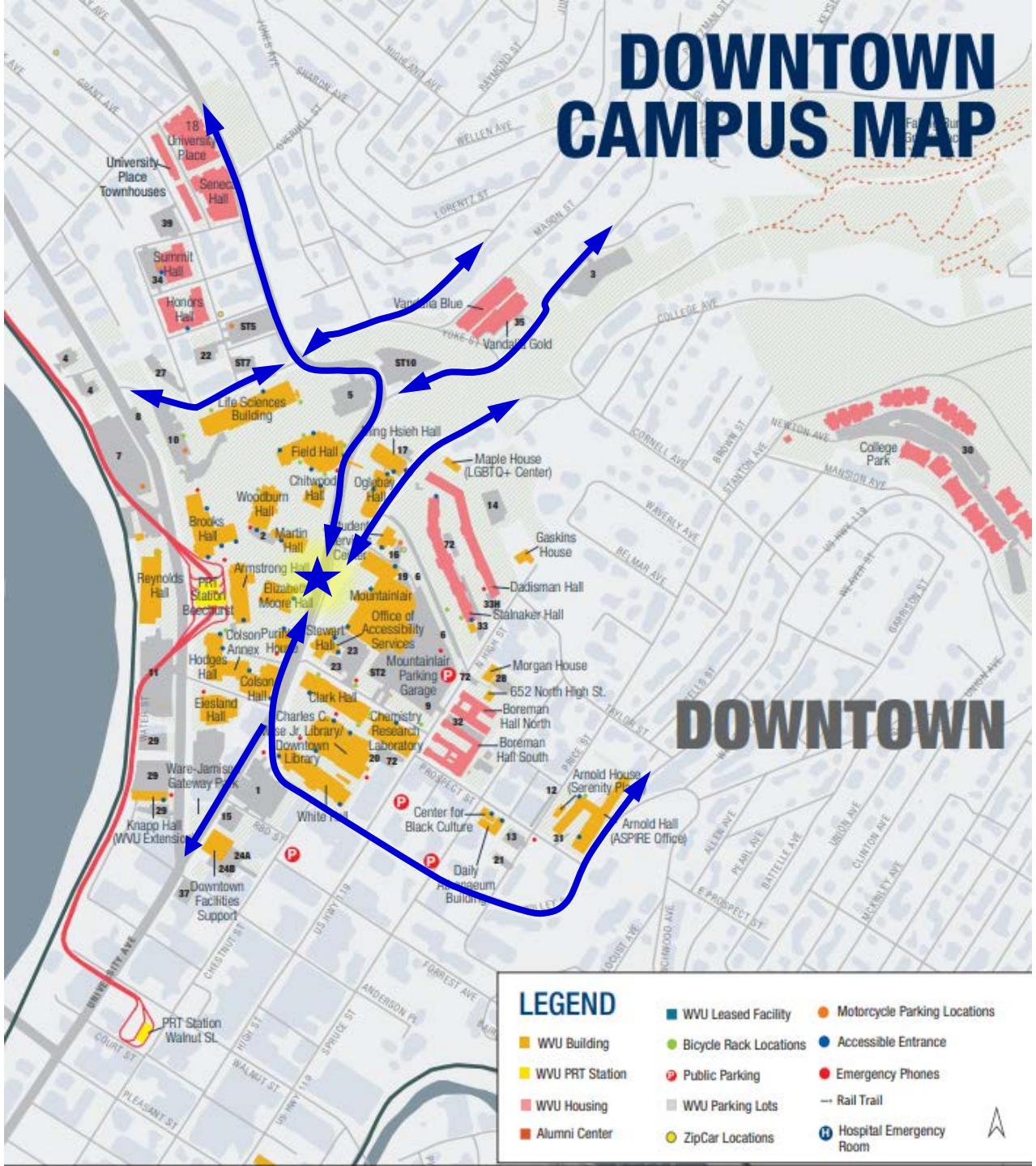
Potential reconfigurations under consideration

- Road diet(s) to promote non-motorized travel
- Closure of Grumbein’s island
- Modifications to one-way streets
- Evaluating proposed land use changes
- Signal timing changes

Study Area



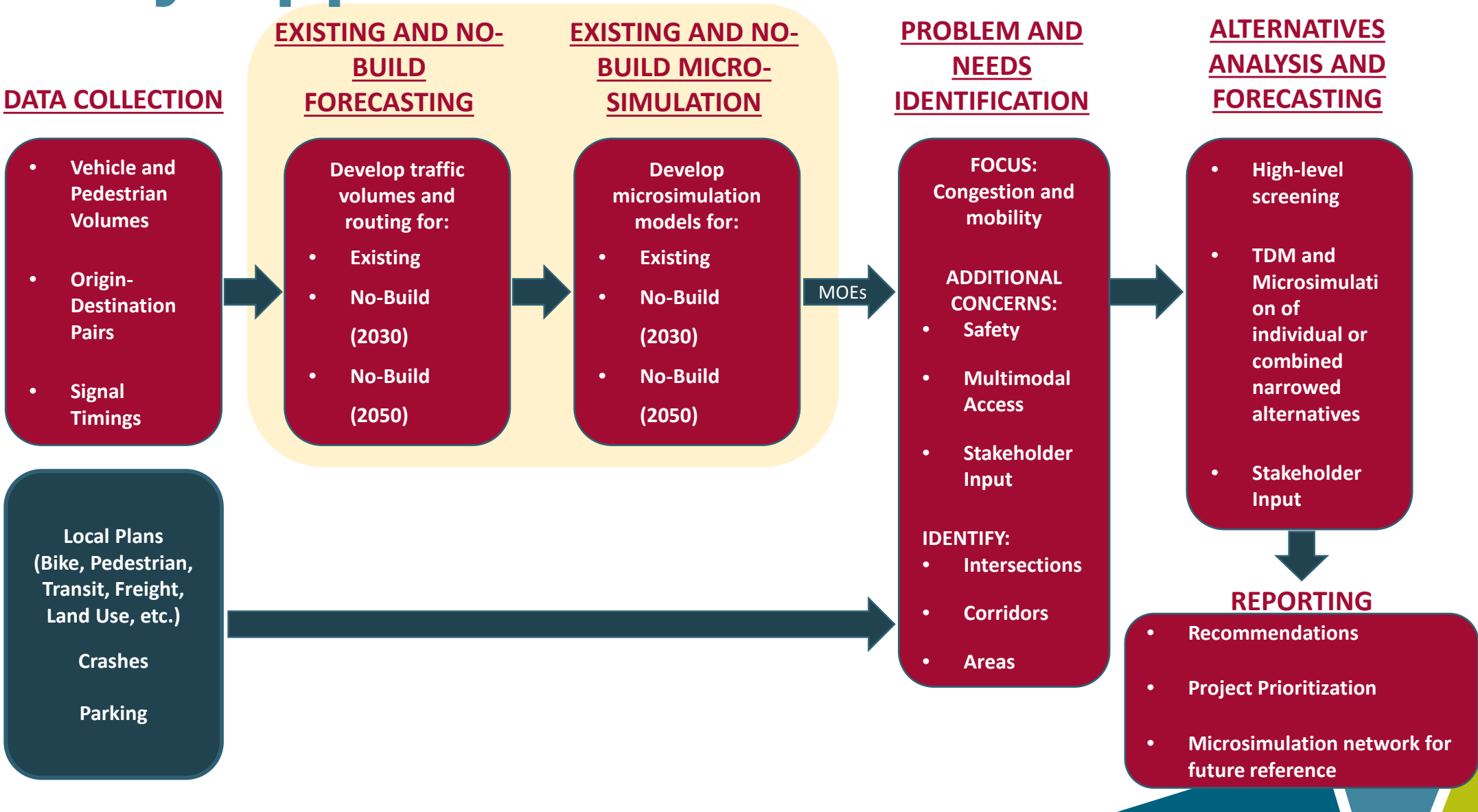
Legend
Intersection Counts
Pedestrian Counts
0 0.05 0.1 0.2 0.3 0.4
Miles
Morgantown
Monongahela River
Hazel Ruby McQuain Park
Beechurst Ave
University Ave
CSX Transportation
Water St
W Park Ave



Grumbein's Island

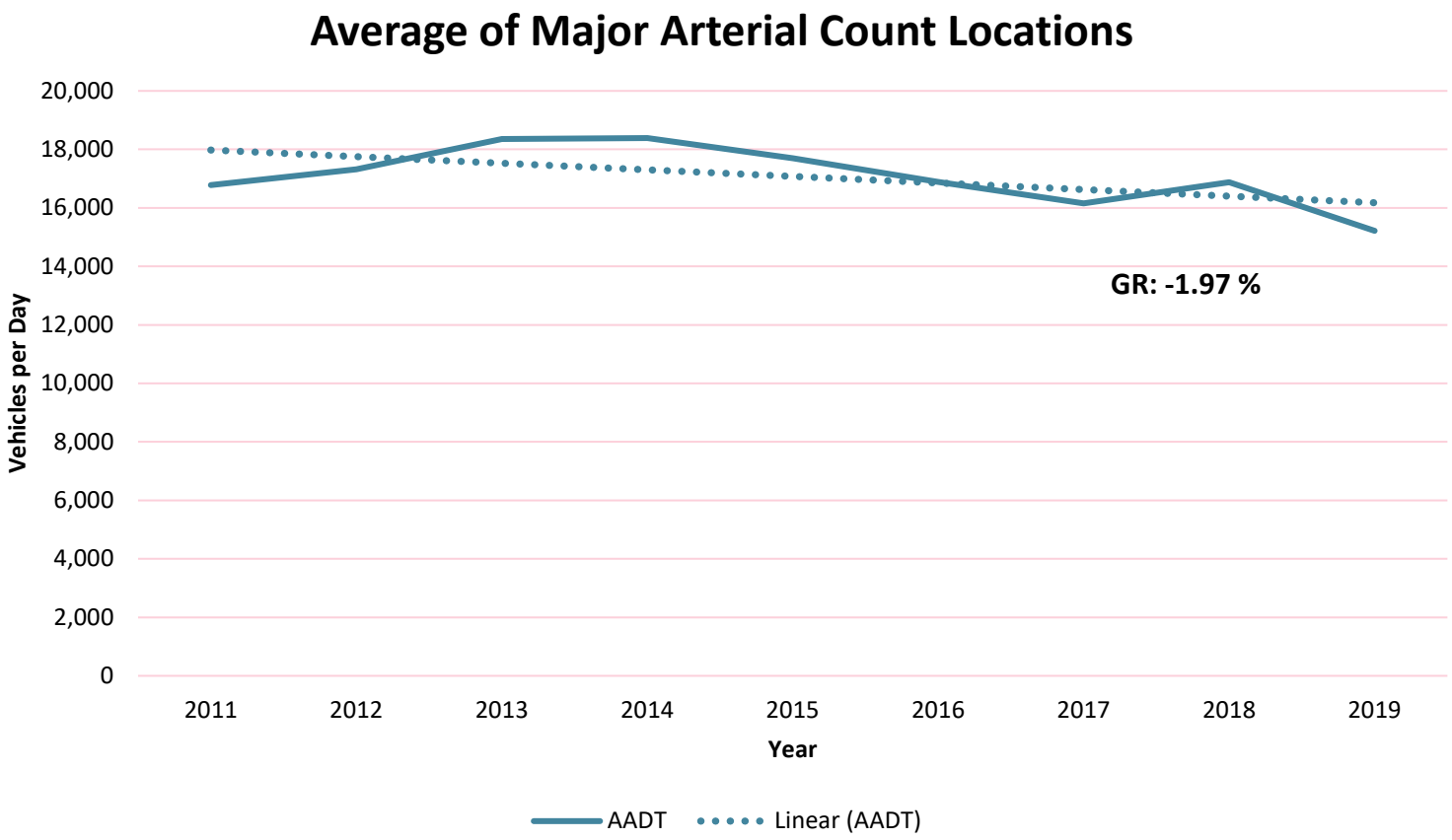
- Centrally located on WVU's Downtown campus
- High pedestrian volumes create a "choke point" for north-south vehicular traffic
- Potential closure of island will need to answer the question – "where will drivers go, and what effect will that have on the network"?
- This study will use TransCAD and TransModeler to address this question

Study Approach



Existing Conditions

Historic AADT Volume Trends



Location	Regression GR
Beechurst Ave North of 8th St	0.90%
Beechurst Ave North of Fayette St	-2.72%
University Ave Southeast of Evansdale Dr	-3.32%
University Ave Southeast of 8th St	-1.19%
University Ave South of 2nd St	-2.97%
University Ave South of College Ave	-2.85%
University Ave South of Westover Bridge	-1.15%
Willey St Northeast of Spruce St	-2.66%
Willey St Northwest of Chestnut St	-3.60%
Westover Bridge	-2.37%
All Locations	**-1.97%**

2018 – 2023 Comparison

Intersection	AM Peak Total Intersection Volumes (%Diff)	PM Peak Total Intersection Volumes (%Diff)
Beechurst Ave and 8th St	**-23%**	**-5%**
Beechurst Ave and 6th St	**-34%**	**-15%**
Beechurst Ave and 3rd St	**-31%**	**-13%**
Beechurst Ave and Campus Dr	**-9%**	**-20%**
Beechurst Ave and Hough St	**-35%**	**-19%**
Beechurst Ave and University Ave/Fayette St	**-38%**	**-13%**
University Ave and Walnut St	**-29%**	**-10%**
University Ave and Pleasant St	**-26%**	**-7%**
	9-38% Decrease	**5-20% Decrease**

Peak Hour Comparison

	2018	2023
AM Peak	7:30 – 8:30 AM	7:45 AM – 8:45 AM
Mid-Day Peak	*N/A*	12:15 – 1:15 PM
PM Peak	4:30 – 5:30 PM	4:30 – 5:30 PM

Notable Changes in Travel Patterns

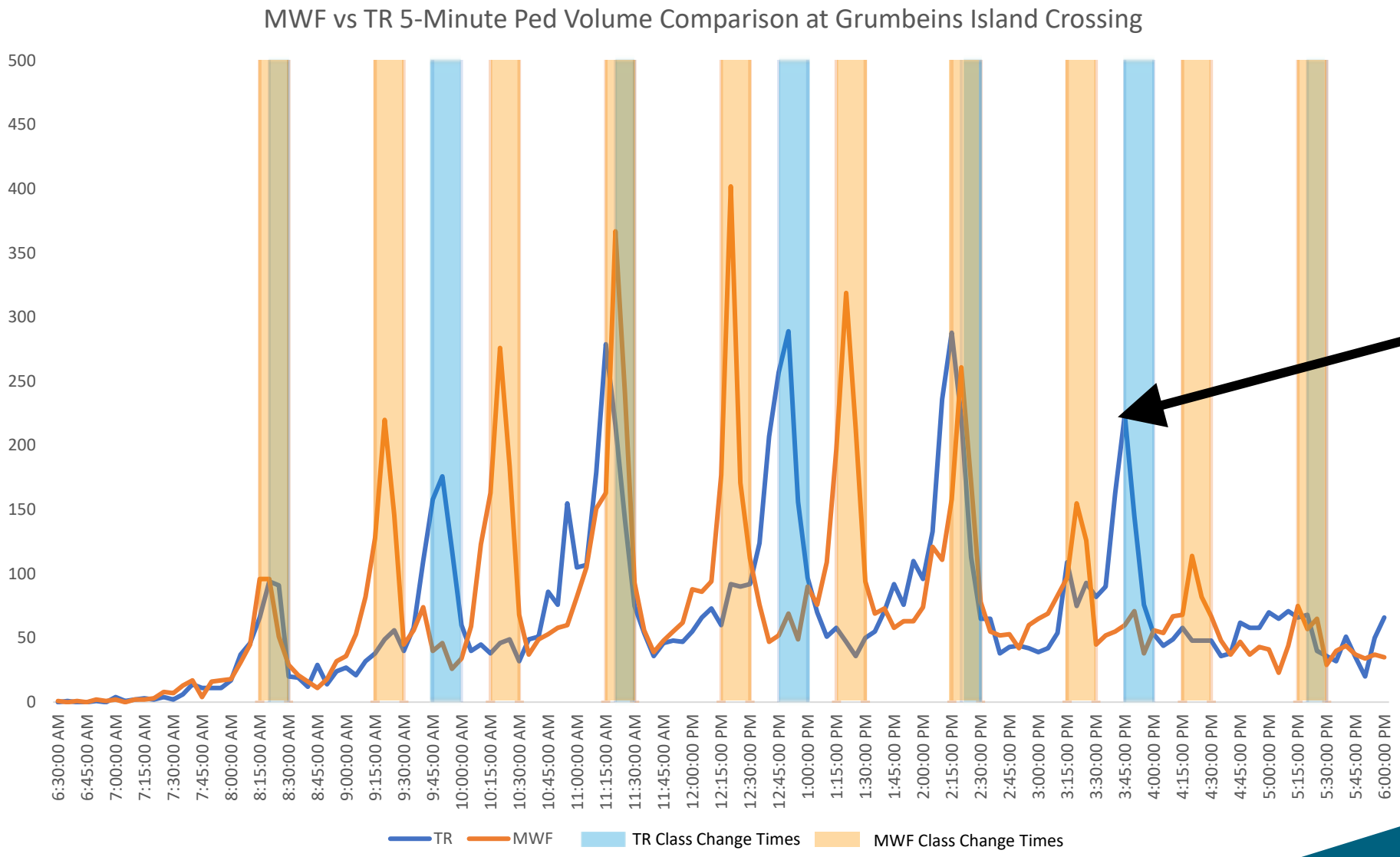
AM

- Beechurst and 3rd: 8% from NBT to NBR
- University and Pleasant: 8% from EBL to EBT

PM

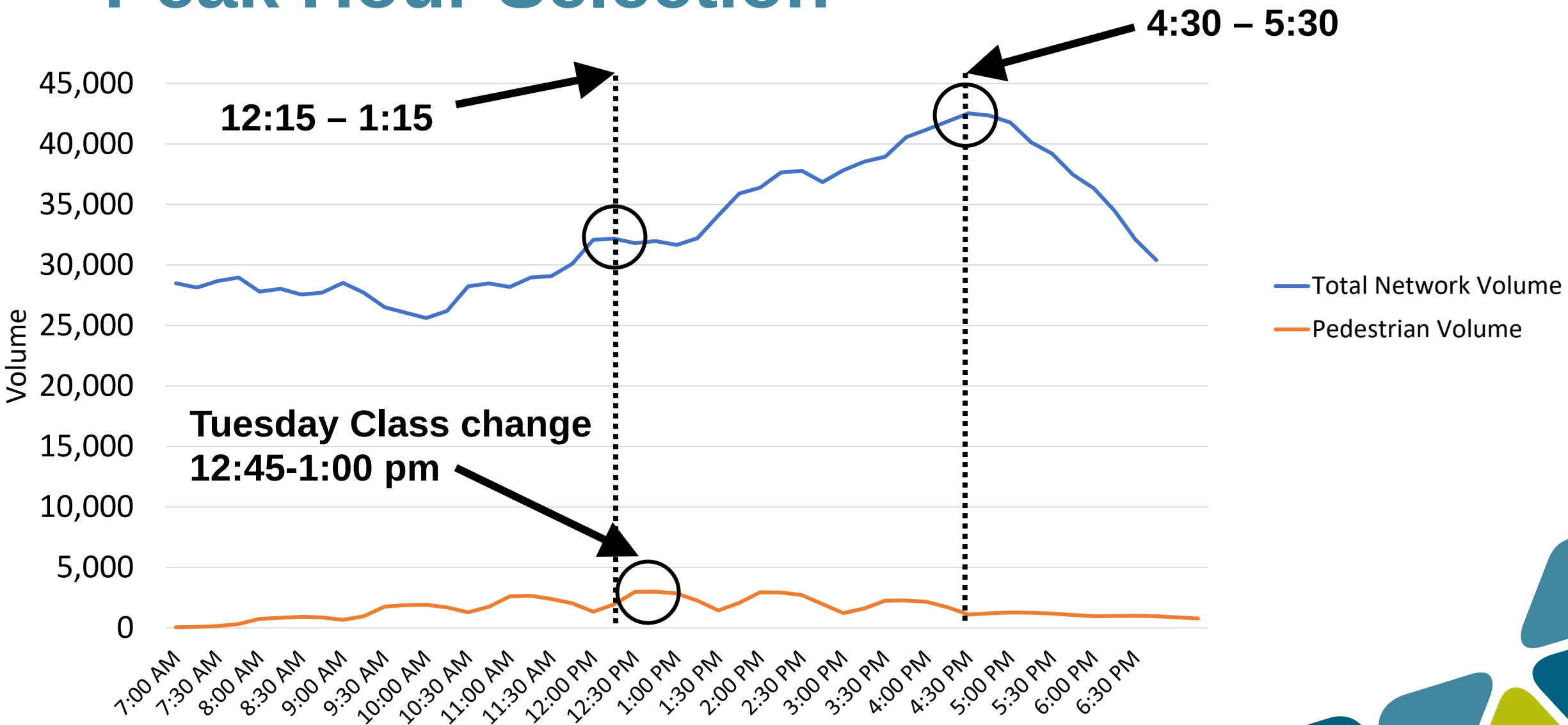
- Beechurst and 8th: 10% from WBL to WBR
- Beechurst and Campus: 7% from SBL to SBT
- University and Walnut: 8% from WBL to WBR
- University and Pleasant: 14% from EBT to EBR

Weekday Pedestrian Volumes at Grumbein's Island



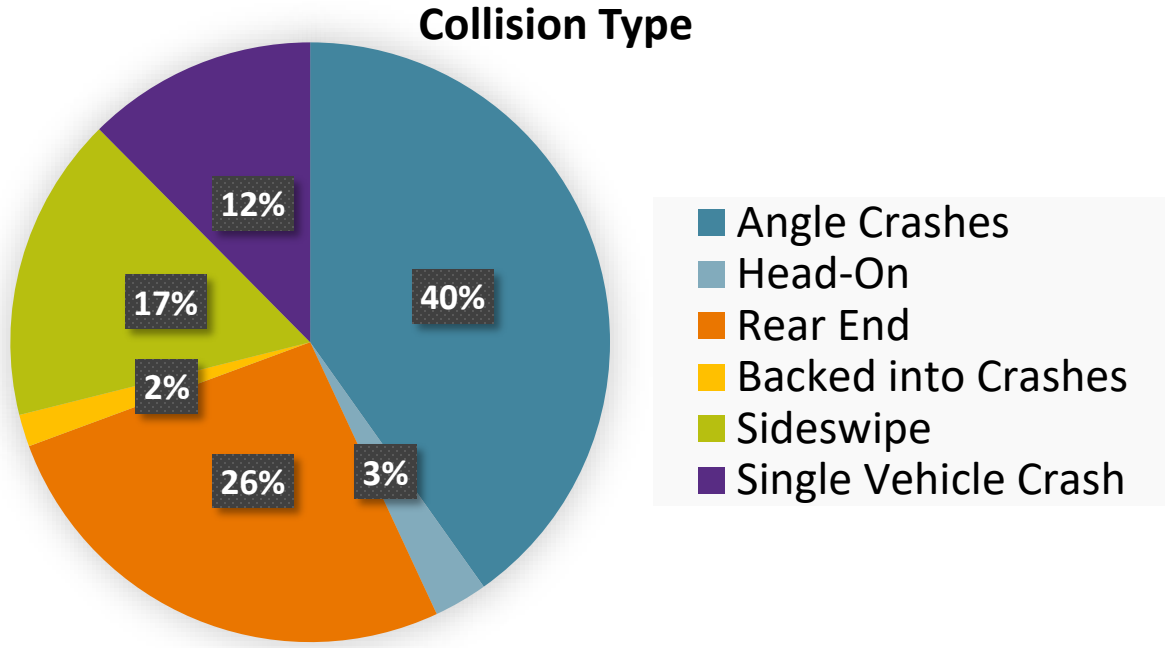
Peaks follow class schedules

Peak Hour Selection



Crash Analysis

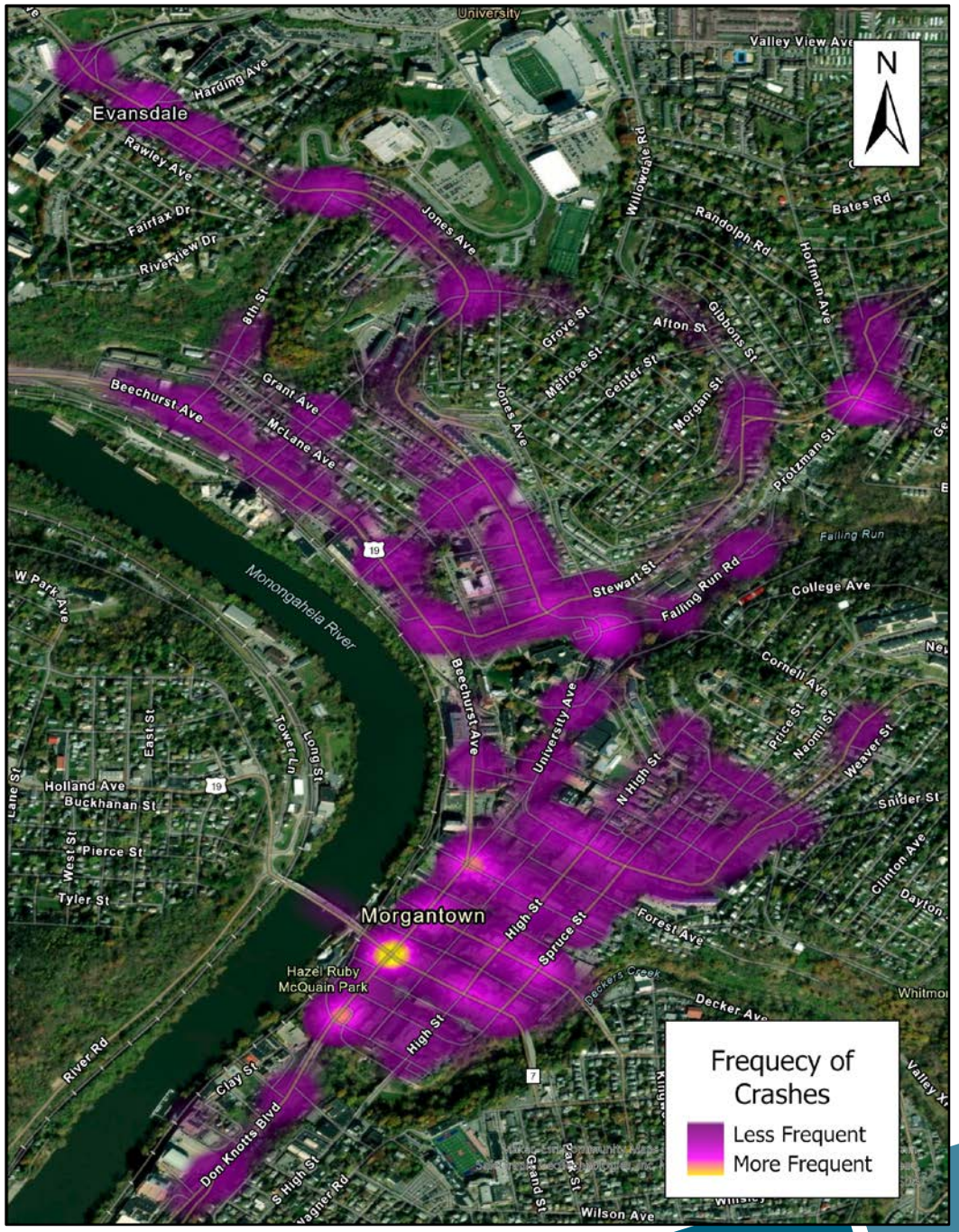
	Collision Type						
Year	Angle Crashes	Head-On	Rear End	Backed into Crashes	Sideswipe	Single Vehicle Crash	Total
2018	139	10	91	6	57	43	346
2019	124	8	86	4	46	40	308
2020	66	10	52	6	43	27	204
2021	110	7	46	3	41	55	262
2022	89	6	53	2	40	33	223
Total	**528**	**41**	**328**	**21**	**227**	**198**	**1343**



Crash Analysis

‘More Frequent’ Crash Locations:

- University Avenue and Pleasant Street
- University Avenue and Garrett Street/Foundry Street
- University Avenue and Beechurst Avenue and Fayette Street

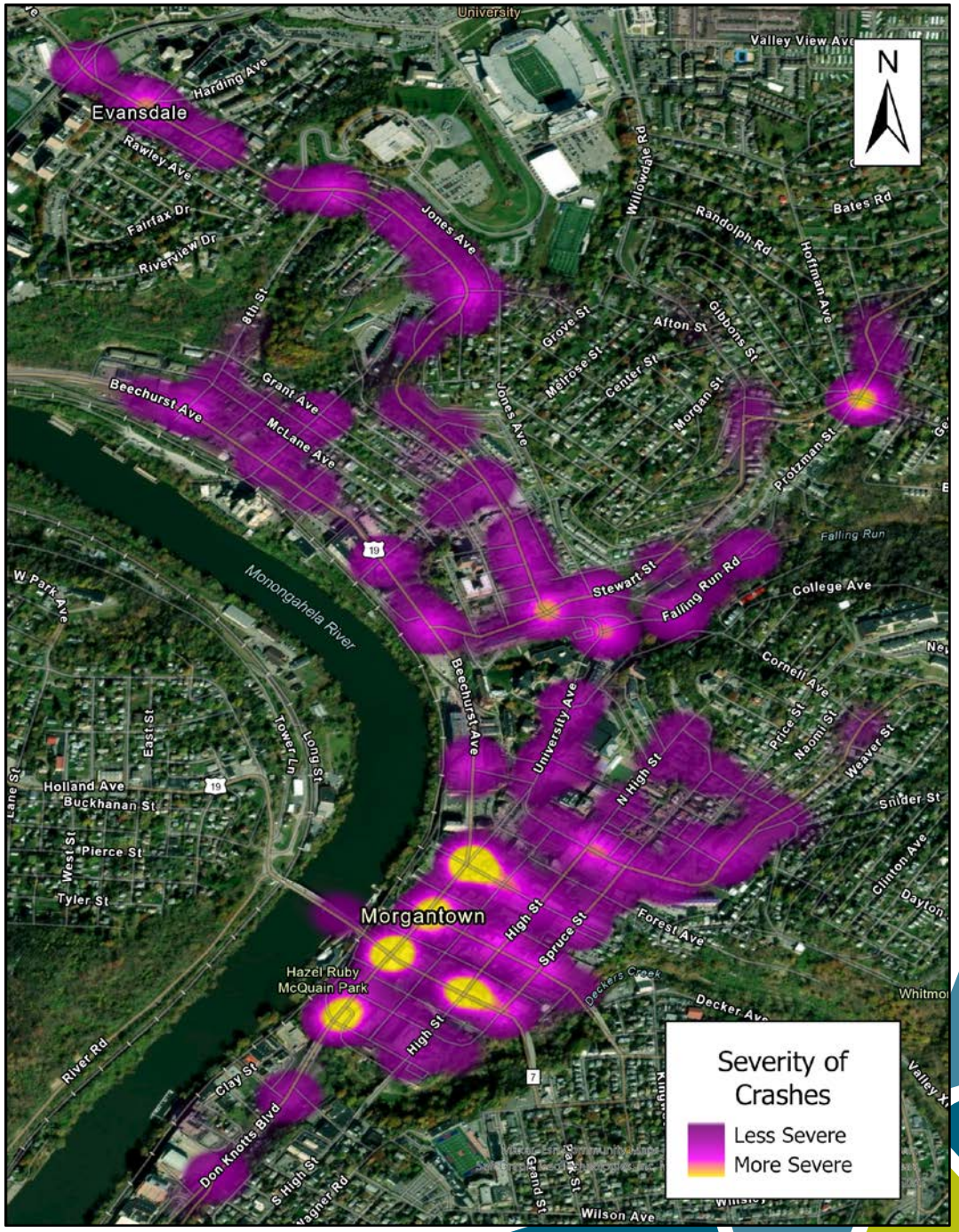


Crash Analysis

$$Severity = (\#\ of\ Injury\ Crashes\ x\ 11.2) + \#\ of\ PDO\ Crashes$$

‘More Severe’ Crash Locations:

- University Avenue and Pleasant Street
- University Avenue/Don Knotts and Garrett Street/Foundry Street
- University Avenue and Beechurst Avenue and Fayette Street
- High Street and Pleasant Street
- University Avenue and Walnut Street/Water Street
- University Avenue and Campus Drive/Stewart Street
- University Avenue and Falling Run Road
- Stewart Street and Van Gilder Avenue



Development of Routing

Existing Routing Development

- **‘Relay’ Routing** - Vehicles make decision at each intersection, then reach new decision point
  - Pros – Simple to match to TMCs
  - Cons – Not as representative of field travel patterns
- **Origin-Destination Routing** – Vehicles take one route through entire network to destination
  - Pros – Accurate representation of field data
  - Cons – Requires more data input

Streetlight – External Trips into Study Area
University Avenue (Route 119) NB

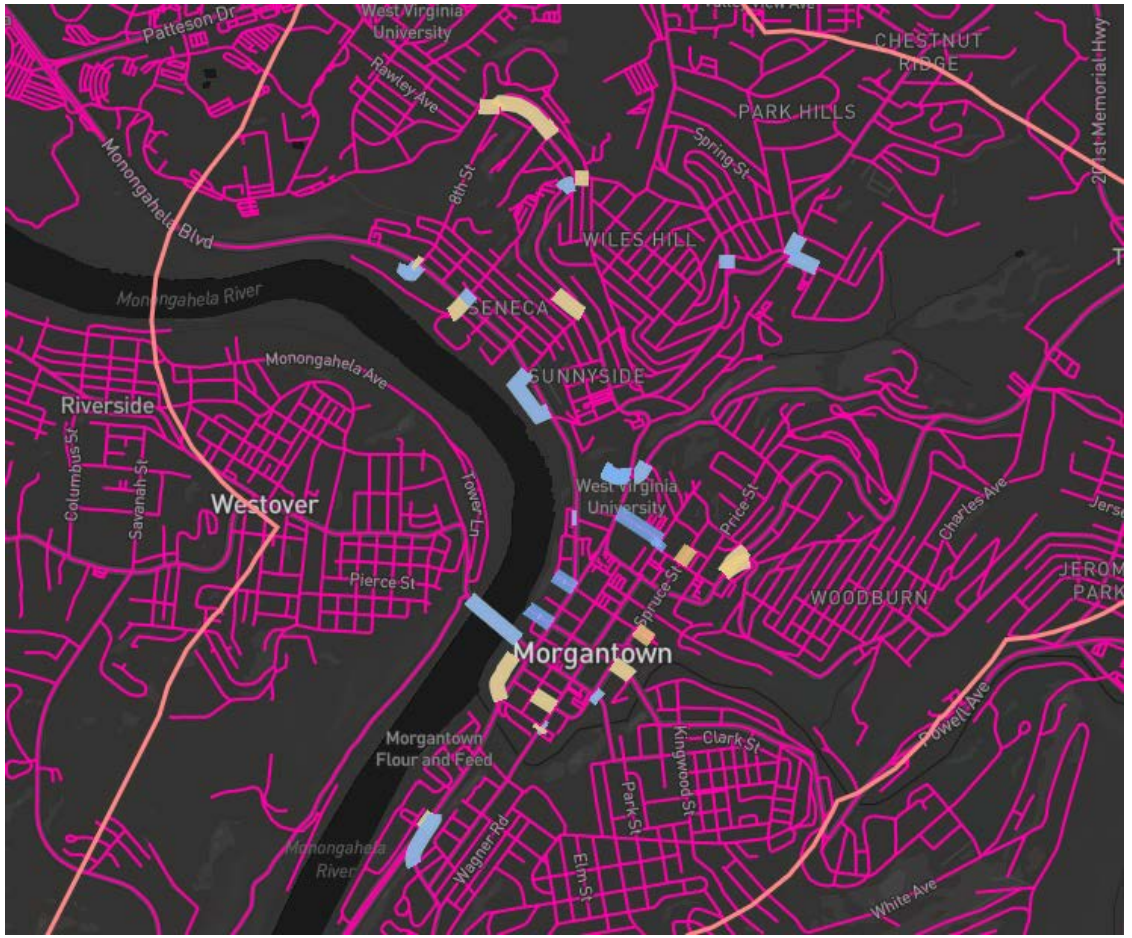
Streetlight – Trips within Study Area
University Avenue (Route 119) NB

Streetlight – External Trips into Study Area
Monongahela Boulevard SB

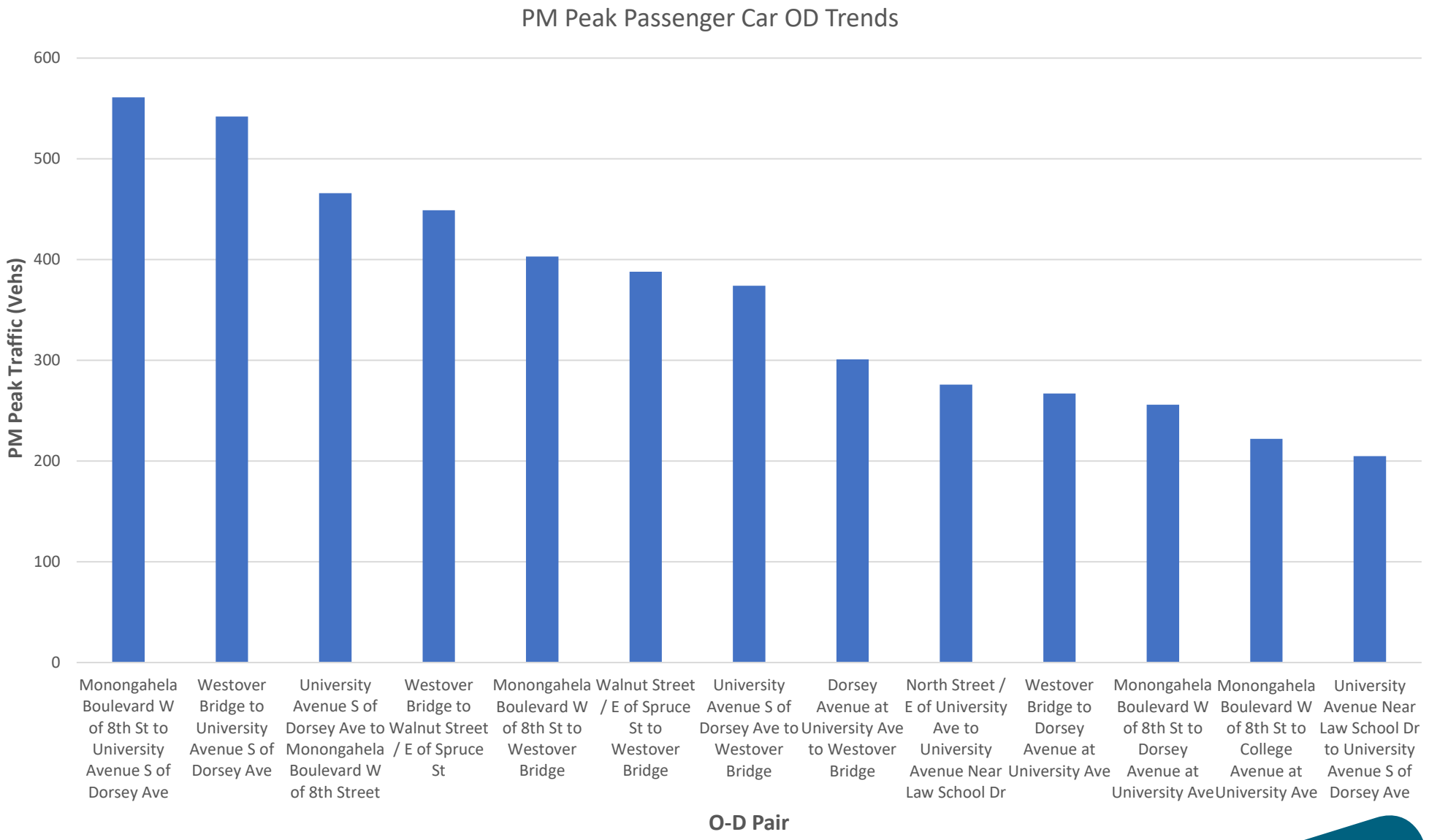
Streetlight –Trips within Study Area
Monongahela Boulevard SB

Origin-Destination Routing

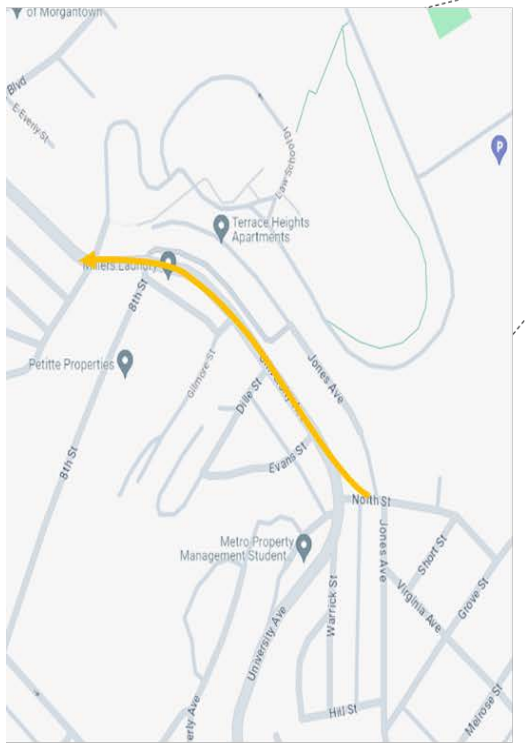
- Routing Development
  - All entrances and exits to networks
  - ~30 origins and destinations
  - Develop trends of travel patterns to and through Morgantown

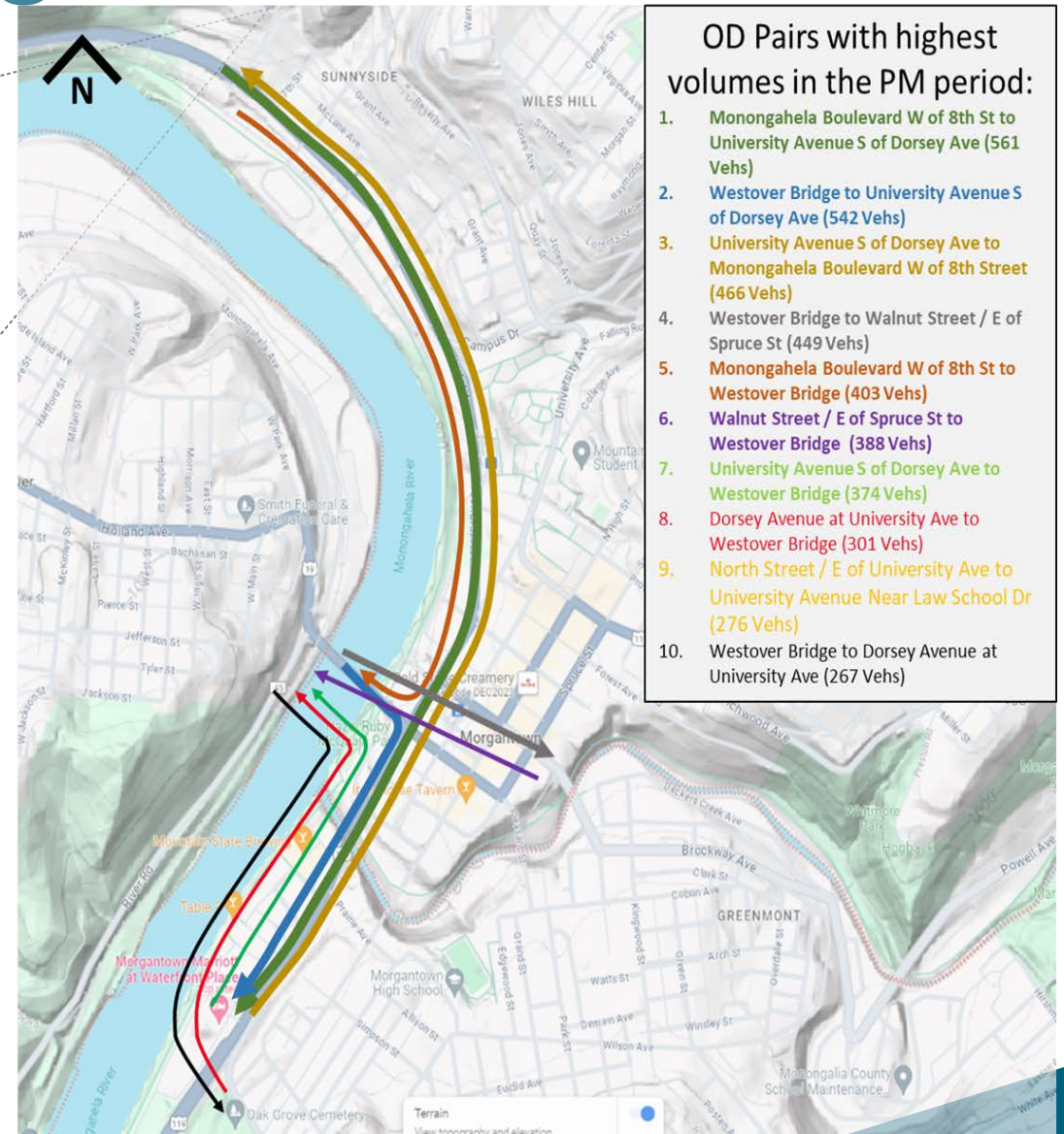


Streetlight- ODs



Streetlight Origin-Destination Analysis



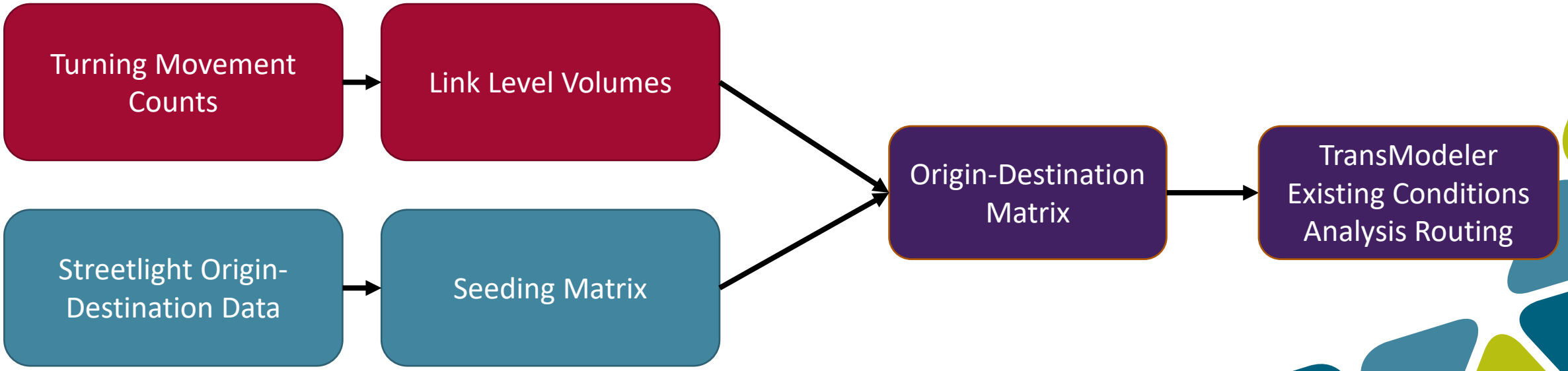


OD Pairs with highest volumes in the PM period:

1. Monongahela Boulevard W of 8th St to University Avenue S of Dorsey Ave (561 Vehs)
2. Westover Bridge to University Avenue S of Dorsey Ave (542 Vehs)
3. University Avenue S of Dorsey Ave to Monongahela Boulevard W of 8th Street (466 Vehs)
4. Westover Bridge to Walnut Street / E of Spruce St (449 Vehs)
5. Monongahela Boulevard W of 8th St to Westover Bridge (403 Vehs)
6. Walnut Street / E of Spruce St to Westover Bridge (388 Vehs)
7. University Avenue S of Dorsey Ave to Westover Bridge (374 Vehs)
8. Dorsey Avenue at University Ave to Westover Bridge (301 Vehs)
9. North Street / E of University Ave to University Avenue Near Law School Dr (276 Vehs)
10. Westover Bridge to Dorsey Avenue at University Ave (267 Vehs)

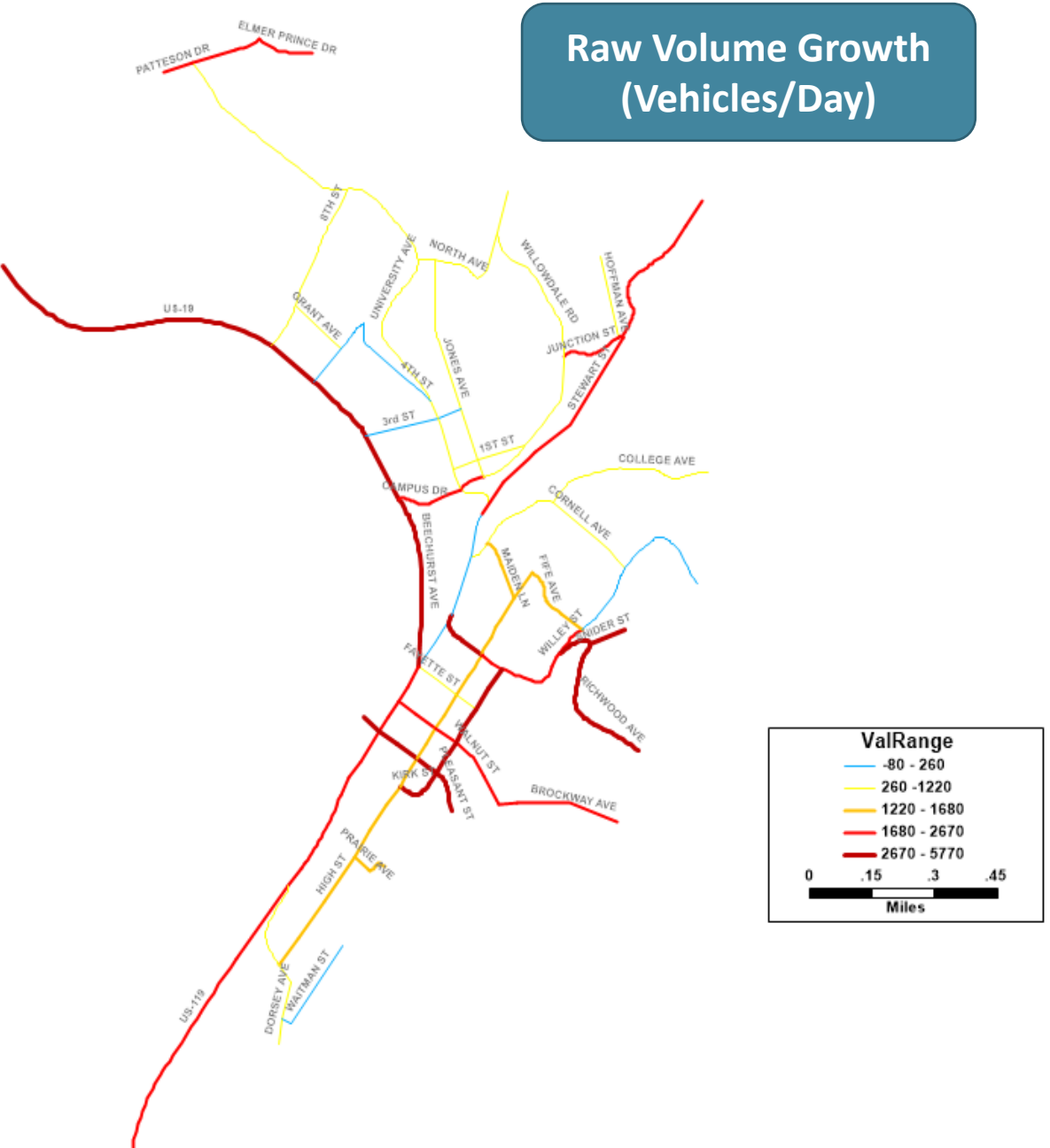
Origin-Destination Routing Development

- Collect turning movement counts
  - Calculate link level ADTs and link level hourly volumes (target matrix)
- Streetlight O-D Matrix
  - Typical distribution of traffic throughout downtown Morgantown (seeding matrix)

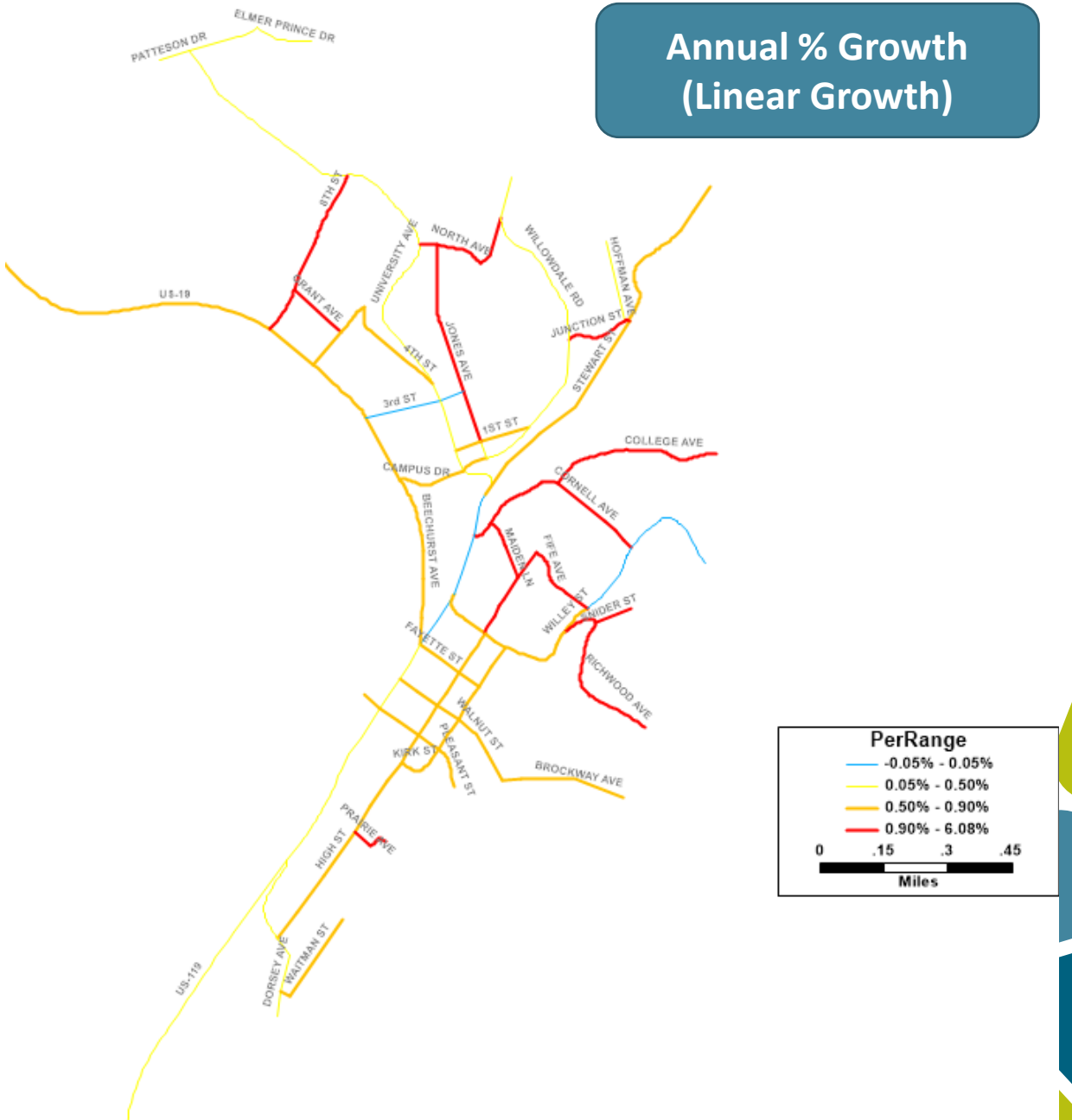


Future Forecasted Growth

Raw Volume Growth (Vehicles/Day)



Annual % Growth (Linear Growth)



Development of Microsimulation Model

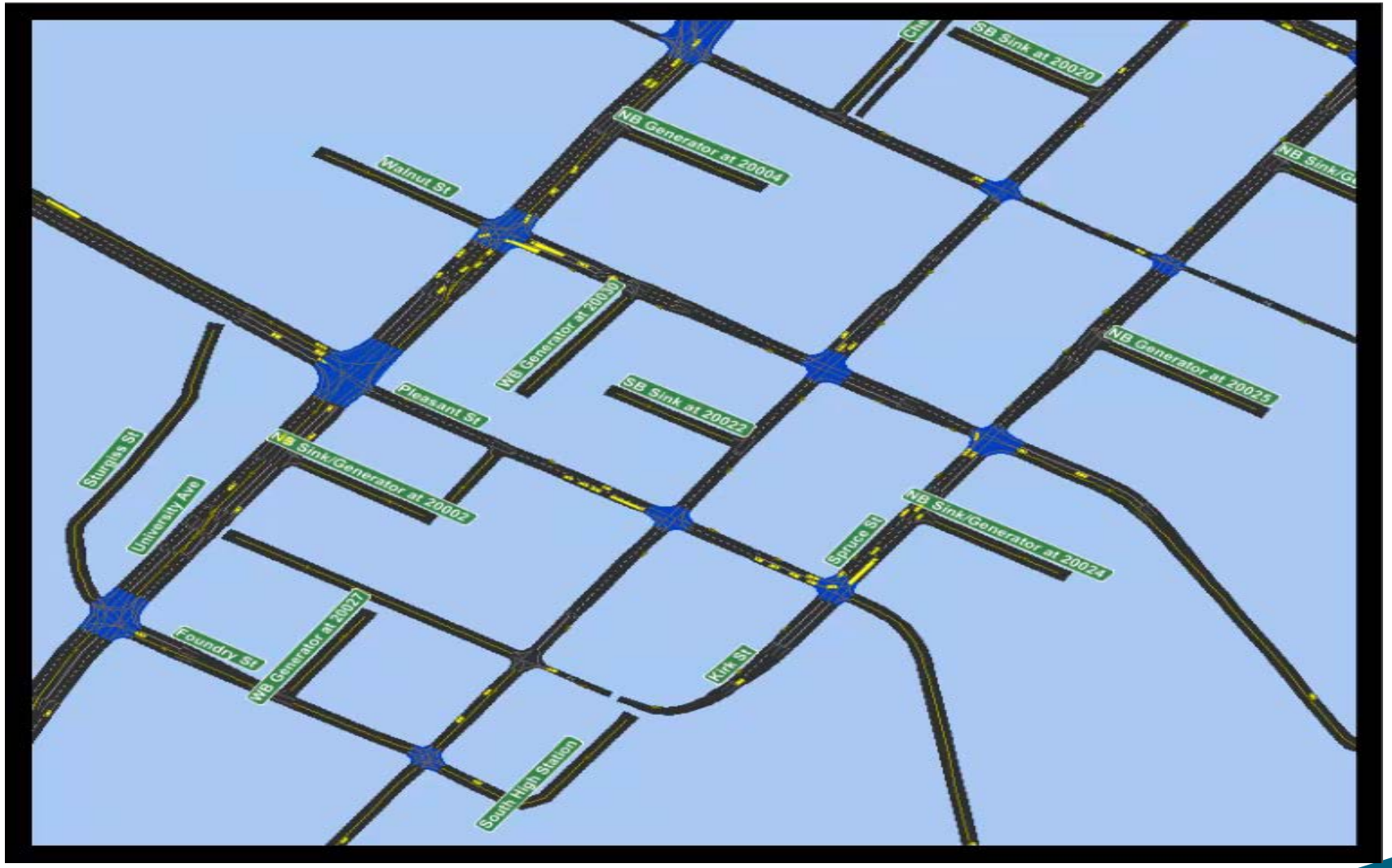
Preview of TransModeler Microsimulation

- Tool to simulate future conditions and better understand impacts of potential changes to network
- Models individual vehicles and pedestrians – simulates how they interact within the road network
- Required inputs:
  - Traffic volumes
  - Pedestrian crossings and activity
  - Traffic signal control (16 signalized, 18 unsignalized)
  - Heavy vehicle data
  - Existing O-D patterns
  - Planned projects by others
  - Road characteristics (speed, # of lanes, etc.)

Existing Simulation Calibration

- Need to verify existing conditions model reflects actual traffic conditions observed in the field before proceeding with future models
- Calibration parameters
  - Queueing
  - Travel time
  - Turning movement and throughput volumes
- Calibration is accomplished by adjusting:
  - Routing and volume matrix
  - Pedestrian crossing configuration
  - Global model characteristics such as driver behavior (if needed)

Simulation Recording from the Model



Next Steps

Stakeholder Engagement

Next Steps

- Complete calibration and summarize operational measures of effectiveness (MOEs)
- Develop wide ranging alternatives to study with steering committee
  - Signal improvements (leading pedestrian intervals)
  - Alternative intersection configurations
  - Modifications to network
- Screen alternatives and identify recommendations