Existing & In Kind Conditions Traffic Operations Analysis

April 17, 2017

Outline

- Study Area
- Data Collection
- Field Observations
- Traffic Analysis Assumptions
- Existing Traffic Analysis Results
- Future Volume Development
- 2041 In Kind Traffic Analysis Results
- Considerations for Future Concepts

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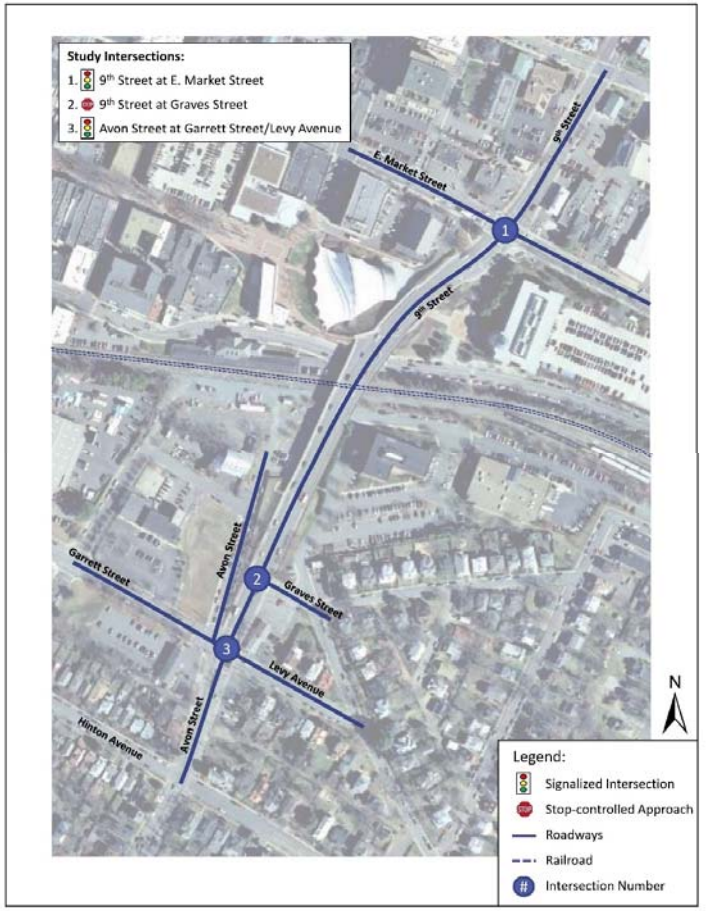
Study Area

- Extends along Avon Street/9th Street for approximately 0.25 miles
- Northern project limits:
  - 9th Street at E. Market Street
- Southern project limits:
  - Avon Street at Garrett Street/Levy Avenue
- Includes three study intersections
  - 9th Street at E. Market Street
  - 9th Street at Graves Street
  - Avon Street at Garrett Street/Levy Avenue



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Data Collection

- Preliminary field review conducted on Tuesday, February 7, 2017
- Observed AM and PM peak hour traffic conditions, pedestrians, bicyclists, and driver behavior
- Collected vehicular turning movement counts
- Collected bicycle turning movement counts
- Collected pedestrian volumes at intersections and critical junctions within the study area

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Field Observations

- In the morning, heavy pedestrian traffic traveling to the Downtown Mall from
  - Belmont neighborhood
  - Parking lot below the Belmont Bridge
  - Street parking south of the railroad tracks
- In the evening, heavy pedestrian traffic traveling in the reverse directions
- Bicyclists traveling in mixed traffic along the 9th Street/Avon Street corridor

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Field Observations

- Northbound queuing at Avon Street and Garrett Street/Levy Avenue
  - AM peak: Extended beyond Belmont Avenue
- Southbound queuing at Avon Street and Garrett Street/Levy Avenue
  - AM peak: Extended across the bridge to the railroad tracks
  - PM peak: Extended across the bridge to E. Market Street

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Field Observations

- Eastbound queuing at 9th Street and E. Market Street
  - PM peak: Extended beyond 7th Street
- Minimal queueing on other side streets within study area
- Heavy use of Graves Street mid-block pedestrian crossing
  - 62 pedestrians in AM peak period
  - 108 pedestrians in PM peak period

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Traffic Analysis Assumptions

Analysis Tools

- Synchro (Version 9)
- SimTraffic (Version 9)

Analysis Scenarios

- 2017 Existing AM and PM peak hours
- 2041 In Kind AM and PM peak hours

Measures of Effectiveness

- Control Delay (seconds per vehicle)
- HCM Level of Service (LOS)
- Maximum Queue Length (feet)

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Intersection LOS Criteria

LOS	Average Control Delay (seconds/vehicle) Signalized	Unsignalized	Description of Traffic Conditions
A	≤ 10.0	≤ 10.0	Very low delay, progression is extremely favorable; most vehicles arrive during green phase.
B	> 10.0 to 20.0	> 10.0 to 15.0	Generally good progression, low delays, more vehicles must stop at intersection red phases.
C	> 20.0 to 35.0	> 15.0 to 25.0	Fair progression, increasing number of vehicles must stop; signal cycle fails to process all traffic.
D	> 35.0 to 55.0	> 25.0 to 35.0	Traffic congestion more noticeable, increasing cycle failures, unfavorable progression, and longer delays.
E	> 55.0 to 80.0	> 35.0 to 50.0	Poor progression, generally high v/c ratios, frequent cycle failures, intersection traffic approaching capacity.
F	≥ 80.0	≥ 50.0	Arrival flow exceeds intersection capacity, many cycle failures, poor progression, and high delays.

Source: 2000 Highway Capacity Manual (HCM)

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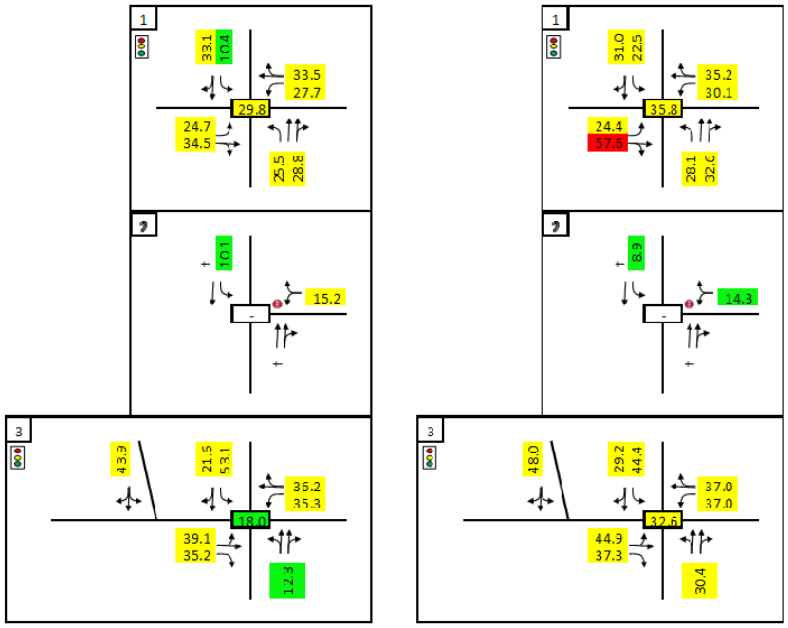
Existing Traffic Analysis - Delay/LOS Results



AM PEAK

PM PEAK

- AM peak hour
  - All intersections operate at overall LOS C or better
- PM peak hour
  - All intersections operate at overall LOS D or better
  - Eastbound E. Market Street at 9th Street through/right movement operates at LOS E

Threshold

- LOS A/B
- LOS C/D
- LOS E/F

Study Intersections:

1. 9th Street at E. Market Street
2. 9th Street at Graves Street
3. Avon Street at Garrett Street/Levy Avenue

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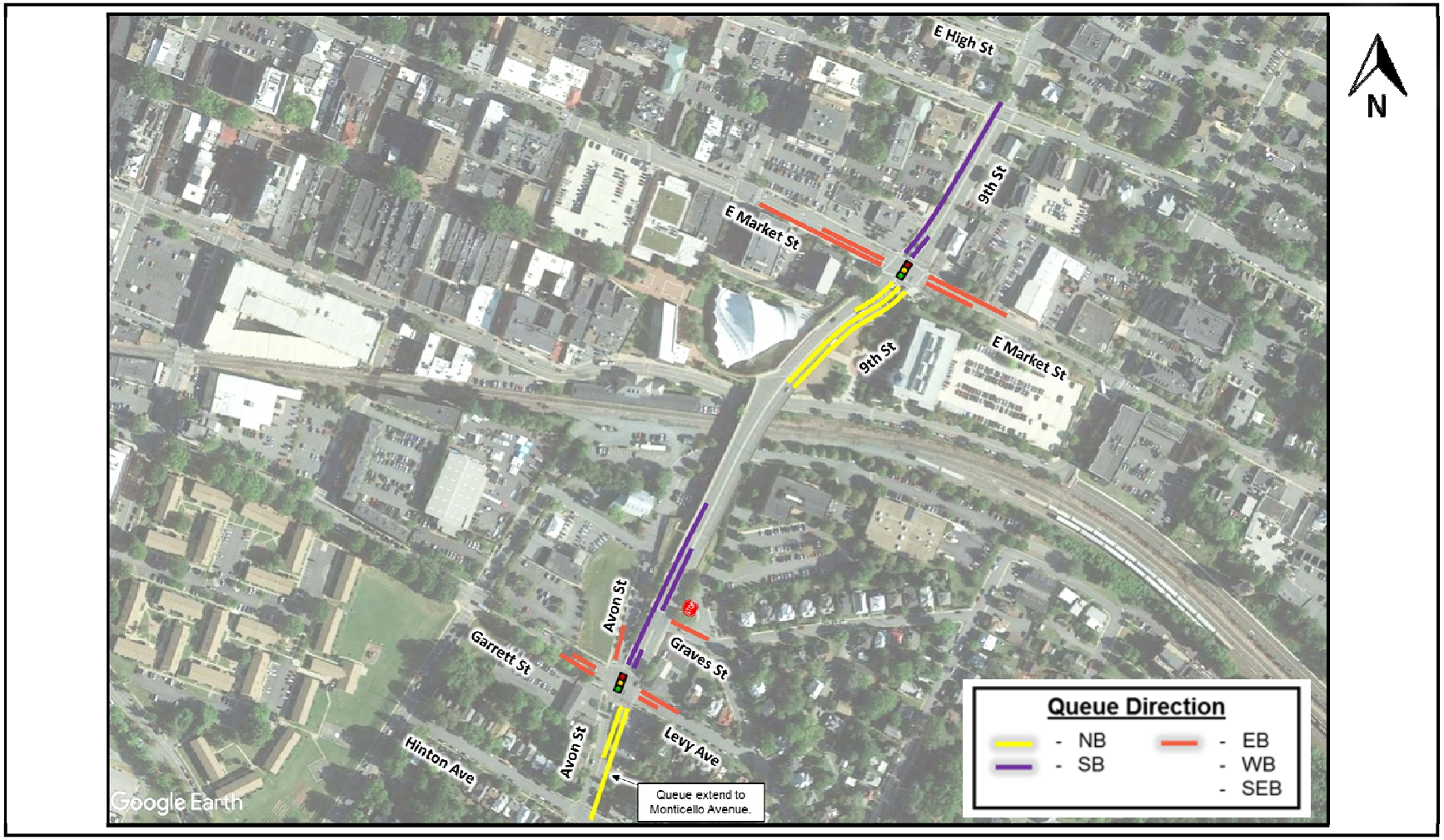
Existing Traffic Analysis - AM Queueing Results



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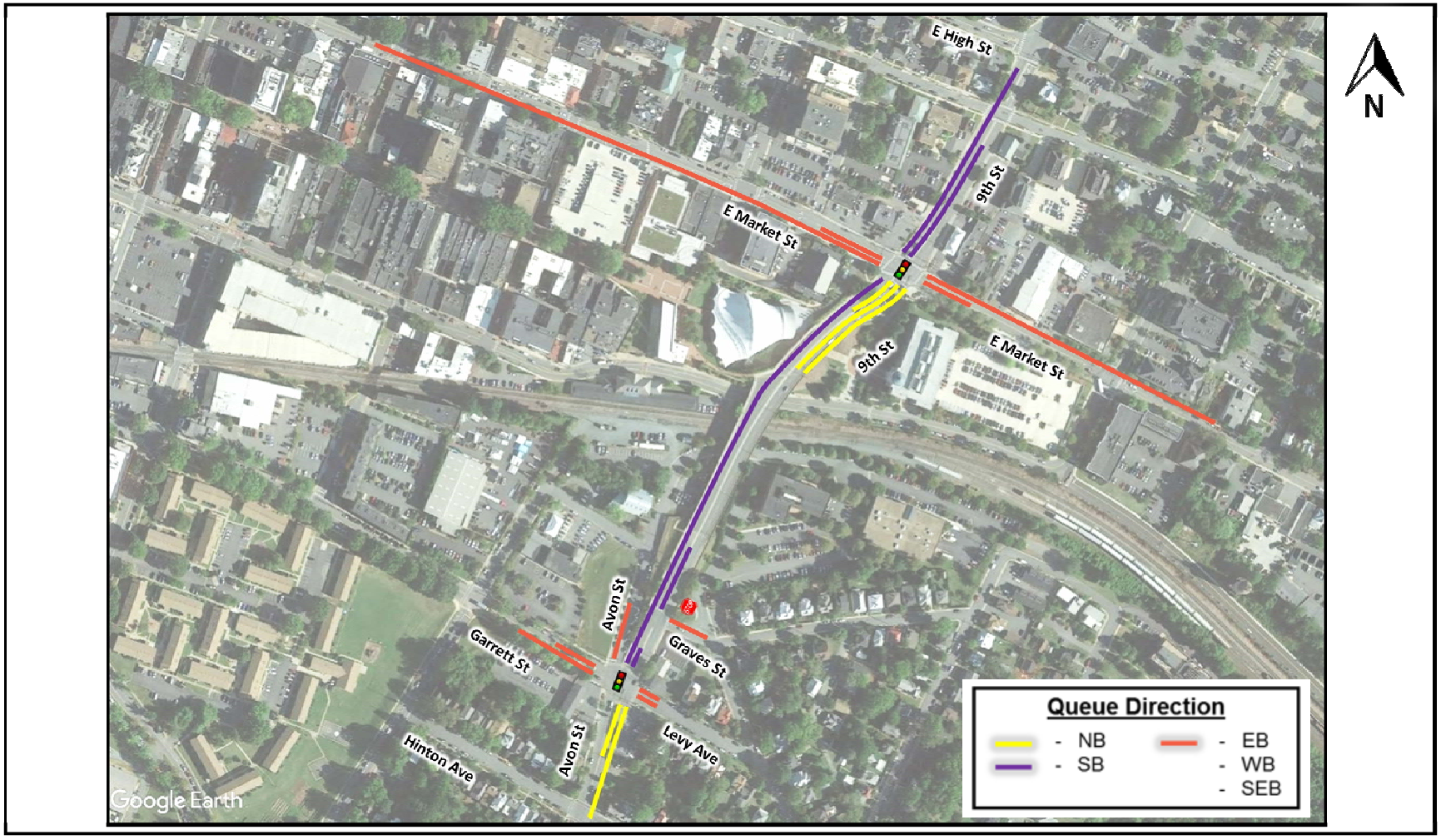
Existing Traffic Analysis - PM Queueing Results



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Future Volume Development

- Downtown Charlottesville near fully developed (some redevelopment occurring in pockets)
- Historical traffic data shows constant vehicular volume over the past 10 years
- It is anticipated that mode shift will occur from vehicles to bicycles and pedestrians within the study area
- 0.2% annual linear growth rate for vehicles
- 3.0% annual linear growth rate for pedestrians and bicycles
- Growth rates applied to existing (2017) volumes to develop opening year (2019) and design year (2041) volumes

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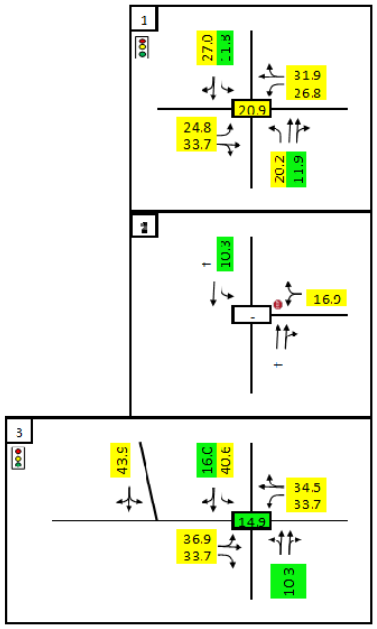
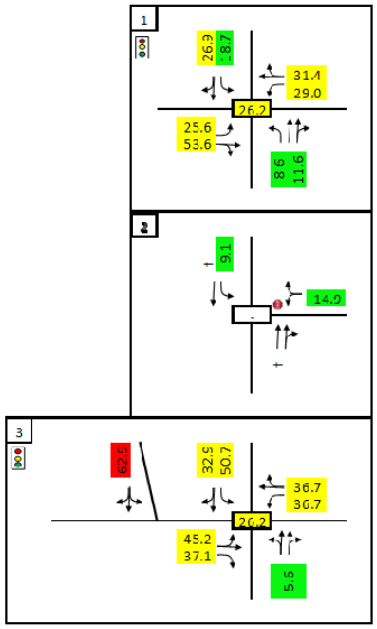
2041 In Kind Traffic Analysis - Delay/LOS Results



AM PEAK



PM PEAK

- Slight delay improvements compared to Existing because of optimized signal timings
- AM peak hour
  - All intersections operate at overall LOS C or better
- PM peak hour
  - All intersections operate at overall LOS C or better
  - South-eastbound Avon Street at Garrett Street operates at LOS E

Threshold

- LOS A/B
- LOS C/D
- LOS E/F

Study Intersections:

1. 9th Street at E. Market Street
2. 9th Street at Graves Street
3. Avon Street at Garrett Street/Levy Avenue

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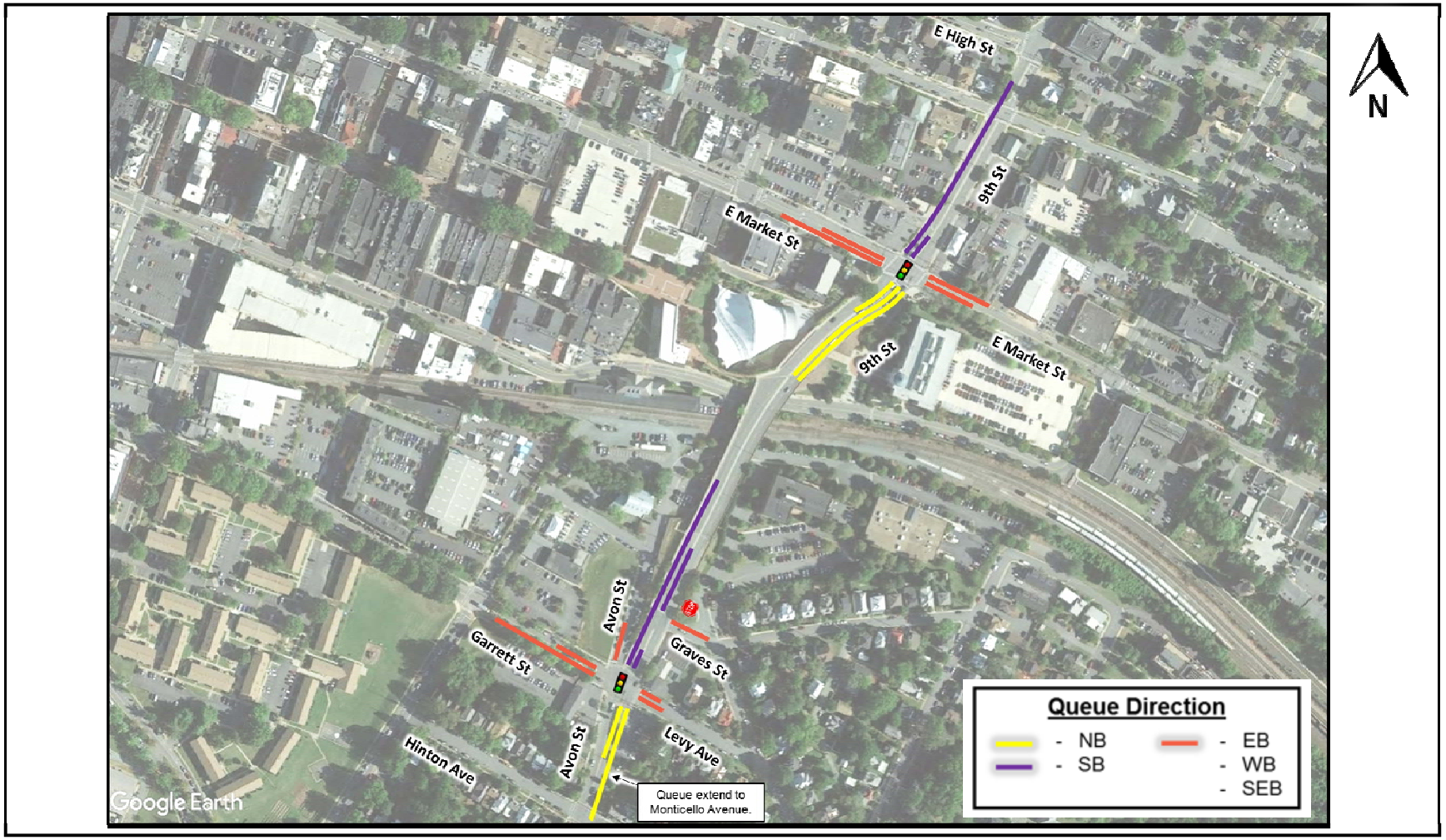
2041 In Kind Traffic Analysis - AM Queueing Results



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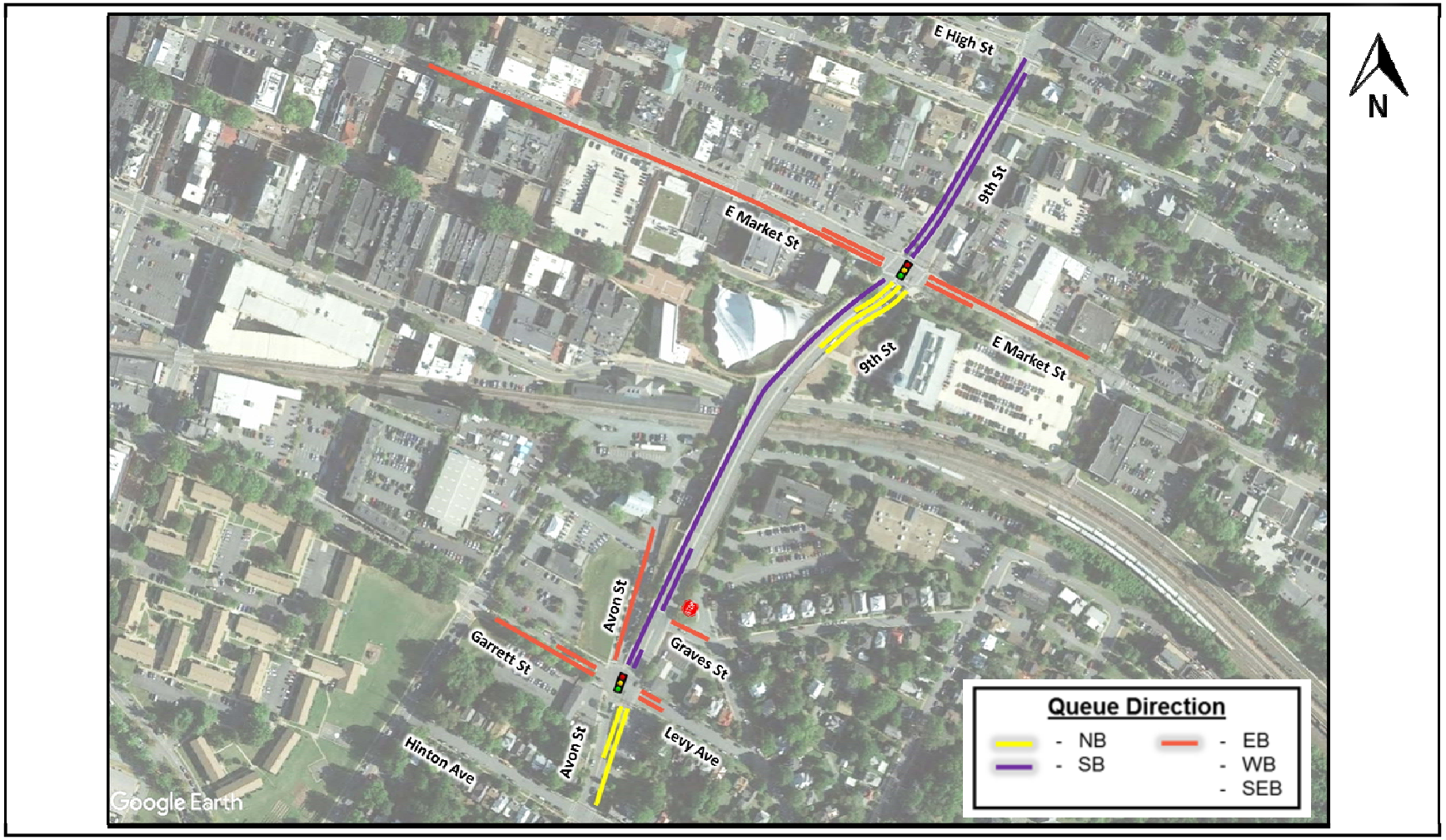
2041 In Kind Traffic Analysis - PM Queueing Results



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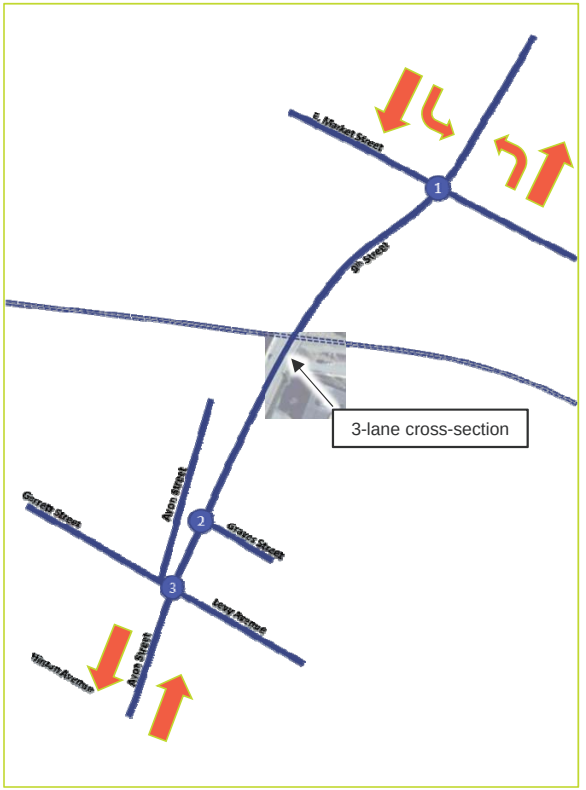
Transportation Considerations for Future Concepts

- Urban context
- Cross-section constraints north of E. Market Street and south of Garrett Street
- Limitations of side street capacity improvements
- Vehicle, pedestrian, and bicycle interactions at intersections (safe travel speeds, reduced crossing distances, dedicated safe space, traffic operations)
- Truck and emergency vehicle access
- Improvements at adjacent intersections beyond the study corridor



Existing Cross-Section Constraints Beyond the Study Area

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