

GREENVILLE AVENUE (US 11) CORRIDOR IMPROVEMENT STUDY

Study Work Group Meeting #1

April 8, 2019



AGENDA

- **Project Purpose Recap**
- **Review Existing Conditions**
 - Crash Hotspots
 - Access Spacing
 - Field Review Observations
 - Traffic Operations
 - Transit Ridership
- **Future Traffic Growth Rate**
- **No-Build Analysis Results**
- **Project Schedule and Next Steps**

Purpose of today's meeting:

- Review existing conditions
- Review No-Build analysis results



PROJECT PURPOSE RECAP

PROJECT PURPOSE

- Evaluate **safety** and **operations**
- Focus on access management and pedestrian safety
- Develop potential projects to improve safety and operations in the study area
- Identify improvements that can be advanced to funding
 - Programmed into the VDOT Six-Year Improvement Program (SYIP)

EXISTING CONDITIONS

Crash History

Access Spacing

Existing Volumes

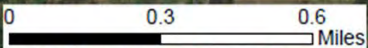
Traffic Operations

Transit Ridership

STUDY CORRIDOR

Legend

- Project Study Area
- Project Extension



Intersection No.	Description	Control Type
1	US 11 at Rolling Thunder Lane	Unsignalized
2	US 11 at SB Route 262 Ramps	Unsignalized
3	US 11 at NB Route 262 Off-Ramp	Signalized
4	US 11 Frontier Drive	Signalized
5	US 11 at Orchard Hill Circle	Signalized
6	US 11 at Barterbrook Road	Signalized
7	US 11 at Statler Boulevard	Signalized
8	US 11 at Ritchie Boulevard	Unsignalized
9	US 11 at Gay Street	Unsignalized
10	US 11 at Hampton Street	Signalized
11	US 11 at Richmond Road	Signalized
12	US 11 at Commerce Road	Signalized

LOCATIONS WITH POTENTIAL FOR SAFETY IMPROVEMENT



NORTHBOUND CRASHES ALONG THE CORRIDOR – JAN 2013-DEC 2017



SOUTHBOUND CRASHES ALONG THE CORRIDOR – JAN 2013-DEC 2017



TAKEAWAYS FROM CRASH ANALYSIS

- **3/4th of the study segment has PSI**
- **Intersections within top 100 PSI:**
 - US 11 at Commerce Road (Rank: 17)
 - US 11 at Barterbrook Road (Rank: 36)
 - US 11 at Richmond Avenue (Rank: 42)
- **The most prevalent crash type is angle collision-47%**
- **55% crashes occurred between 12 PM to 6 PM**
- **One crash related to fatality**
- **One crash involved pedestrian**

ACCESS SPACING

Minimum Spacing Standards for Commercial Entrances, Intersections, and Median Crossovers

Highway Functional Classification	Legal Speed Limit (mph) ^①	Minimum Centerline to Centerline Spacing (Distance) in Feet			
		Spacing from Signalized Intersections to Other Signalized Intersections ^②	Spacing from Unsignalized Intersections & Full Median Crossovers to Signalized or Unsignalized Intersections & Full Median Crossovers ^③	Spacing from Full Access Entrances or Directional Median to Other Full Access Entrances and Any Intersection or Median Crossover ^④	Spacing from Partial Access One or Two Way Entrances to Any Type of Entrance, Intersection or Median Crossover ^⑤
Principal Arterial	≤ 30 mph	1,050	880	440	250
	35 to 45 mph	1,320	1,050	565	305
	≥ 50 mph	2,640	1,320	750	495
Minor Arterial	≤ 30 mph	880	660	355	200
	35 to 45 mph	1,050	660	470	250
	≥ 50 mph	1,320	1,050	555	425
Collector	≤ 30 mph	660	440	225	200
	35 to 45 mph	660	440	335	250
	≥ 50 mph	1,050	660	445	360
Local Street ^⑥		See Note 6 ^⑦			

North of Rte 262 to Richmond Ave

Richmond Ave to Commerce Rd

South of Rte 262

TABLE 2-2 MINIMUM SPACING STANDARDS FOR COMMERCIAL ENTRANCES, INTERSECTIONS AND MEDIAN CROSSOVERS ^⑦










ACCESS SPACING

- **Entrance spacing is deficient along almost entire study corridor**
 - East side spacing generally better than west side (but still not good)
 - Worst areas:
 - Both sides to the south of Route 262 interchange (Auto dealership, DMV office)
 - West side between Orchard Hill Circle and Barterbrook Road
 - Both sides between Campbell St and Statler Blvd
 - West side between Hampton St and Commerce Road
- **Wide swaths of entrances exceed VDOT's maximum entrance widths**
- **High density of entrances complicate turning movements, resulting in angle crashes**

ACCESS SPACING MAP



- | | | |
|---|--|--|
|  Signalized Intersection |  Spacing between Signalized Intersection and Signalized Intersection (1320' required) |  Spacing between Partial Access Entrance and Any Entrance Intersection or Median Crossover (305' required) |
| |  Spacing between Unsignalized Intersection/Full Median Crossover and Signalized Intersection/Unsignalized Intersection/Full Median Crossover (1050' required) |  Spacing between Start/End Ramp Terminal and Right-In/Right-Out Partial Access Entrance (750' required) |
| |  Spacing between Full Access Entrance or Directional Median and Any Intersection, Full Access Entrance or Median Crossover (565' required) |  Spacing between Start/End Ramp Terminal and Any Intersection, Full Access Entrance or Median Crossover (990'/1,320') |
| | | |



ACCESS SPACING MAP



- | | | |
|--------------------------------|--|--|
| <p>Signalized Intersection</p> | Spacing between Signalized Intersection and Signalized Intersection (1320' required) | Spacing between Partial Access Entrance and Any Entrance Intersection or Median Crossover (305' required) |
| | Spacing between Unsignalized Intersection/Full Median Crossover and Signalized Intersection/Unsignalized Intersection/Full Median Crossover (1050' required) | Spacing between Start/End Ramp Terminal and Right-In/Right-Out Partial Access Entrance (750' required) |
| | Spacing between Full Access Entrance or Directional Median and Any Intersection, Full Access Entrance or Median Crossover (565' required) | Spacing between Start/End Ramp Terminal and Any Intersection, Full Access Entrance or Median Crossover (990'/1,320') |










ACCESS SPACING MAP

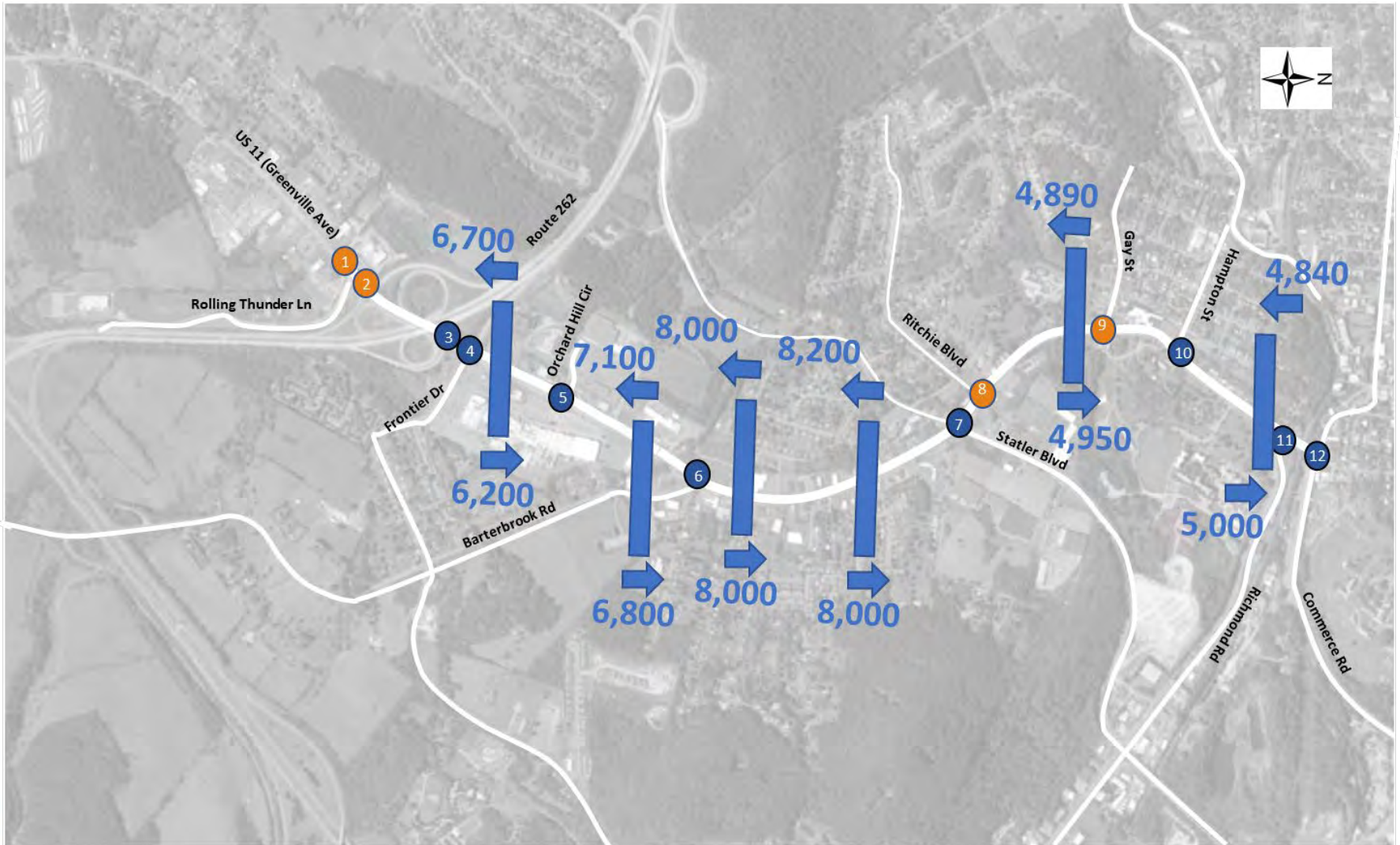


Speed Limit: 35 (Up to Richmond Rd)

Speed Limit: 25 (From Richmond Rd to Commerce Rd)

- | | | | |
|---|--|---|---|
|  <p>Signalized Intersection</p> |  <p>Spacing between Signalized Intersection and Signalized Intersection (1320' required/ 880' required)</p> |  <p>Spacing between Partial Access Entrance and Any Entrance Intersection or Median Crossover (305' required/ 200' required)</p> | |
| |  <p>Spacing between Unsignalized Intersection/Full Median Crossover and Signalized Intersection/Unsignalized Intersection/Full Median Crossover (1050' required/ 660' required)</p> | |  <p>Spacing between Start/End Ramp Terminal and Right-In/Right-Out Partial Access Entrance (750' required)</p> |
| |  <p>Spacing between Full Access Entrance or Directional Median and Any Intersection, Full Access Entrance or Median Crossover (565' required/ 355' required)</p> | |  <p>Spacing between Start/End Ramp Terminal and Any Intersection, Full Access Entrance or Median Crossover (990'/1,320')</p> |

EXISTING DAILY VOLUMES – DATA COLLECTED NOVEMBER 2018

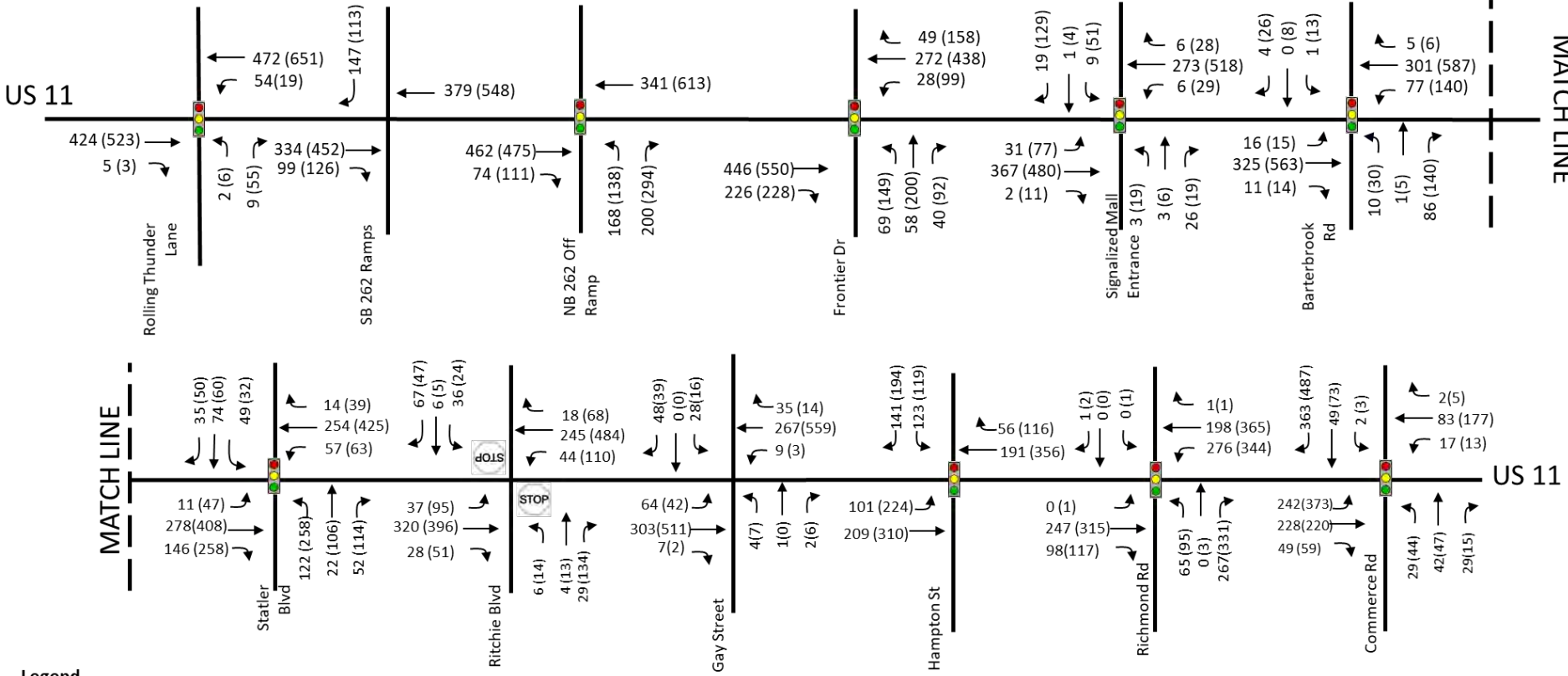


EXISTING PEAK HOUR TURNING MOVEMENT VOLUMES



MATCH LINE

US 11



Legend



Existing Roadway Lane Configuration
 Signalized Intersection
 Stop-Controlled Approach
 AM (PM) Peak Hour Vol



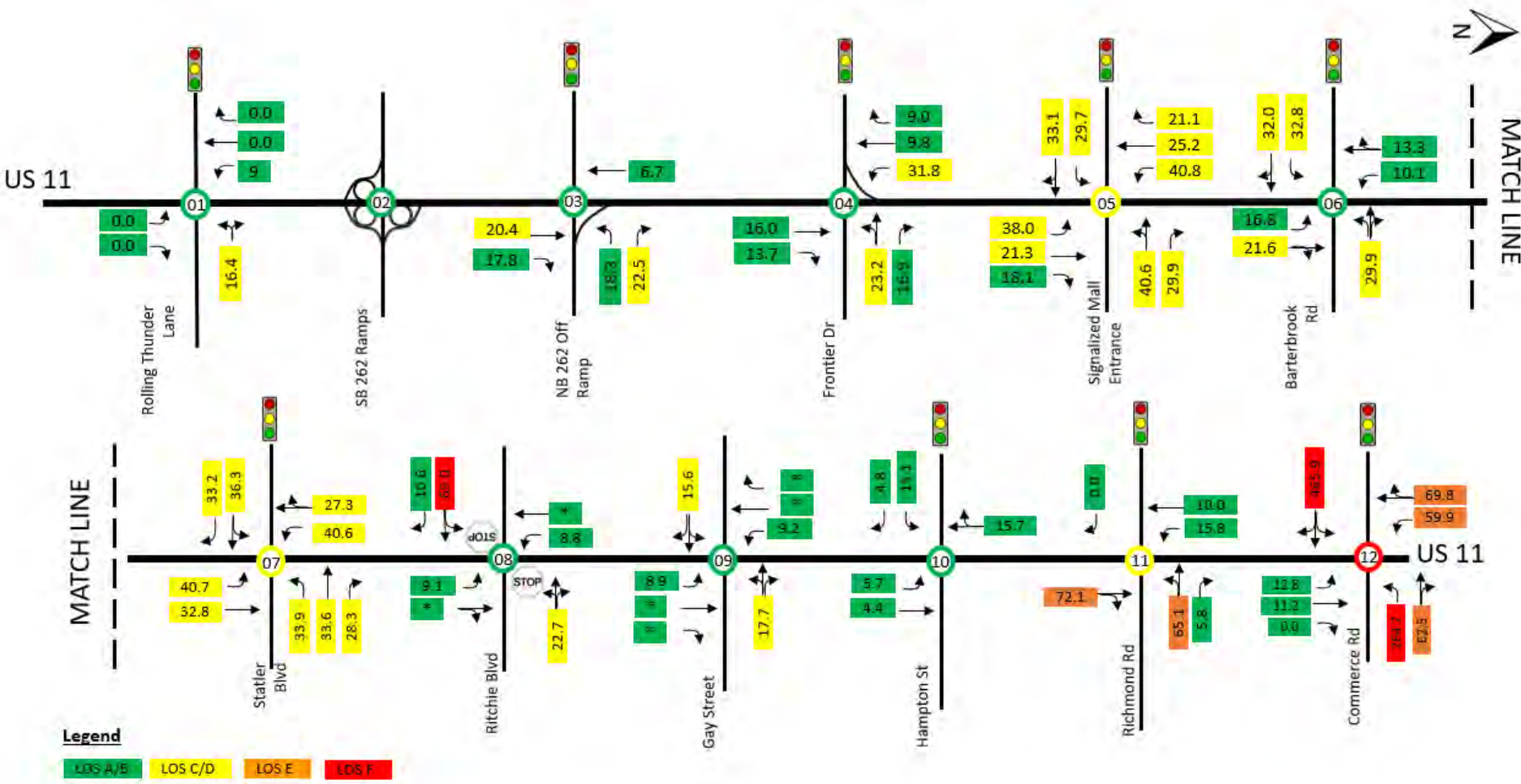
TRAFFIC OPERATIONS ASSUMPTIONS

- **AM and PM traffic volumes were reviewed**
- **PM peak hour volume governs**
- **Systemwide peak hours were determined**
- **Capacity and queueing analyses were conducted for PM peak hour traffic conditions only**
- **Synchro software was used to determine delay/LOS and 95th percentile queue lengths**

TRAFFIC OPERATIONS

- **Synchro model of existing conditions**
- **Uncoordinated signals**
- **Route 262 NB Off-Ramp and Frontier Drive signals run with a single controller**
- **Richmond Avenue and Commerce Road intersections run with a single controller**
- **Queues clear within one cycle**
- **Cycle lengths vary throughout the corridor**
- **Delays to mainline left turns and side streets**
- **Commerce Road intersection operates at LOS F**

EXISTING PM PEAK HOUR LOS



FIELD REVIEW OBSERVATIONS

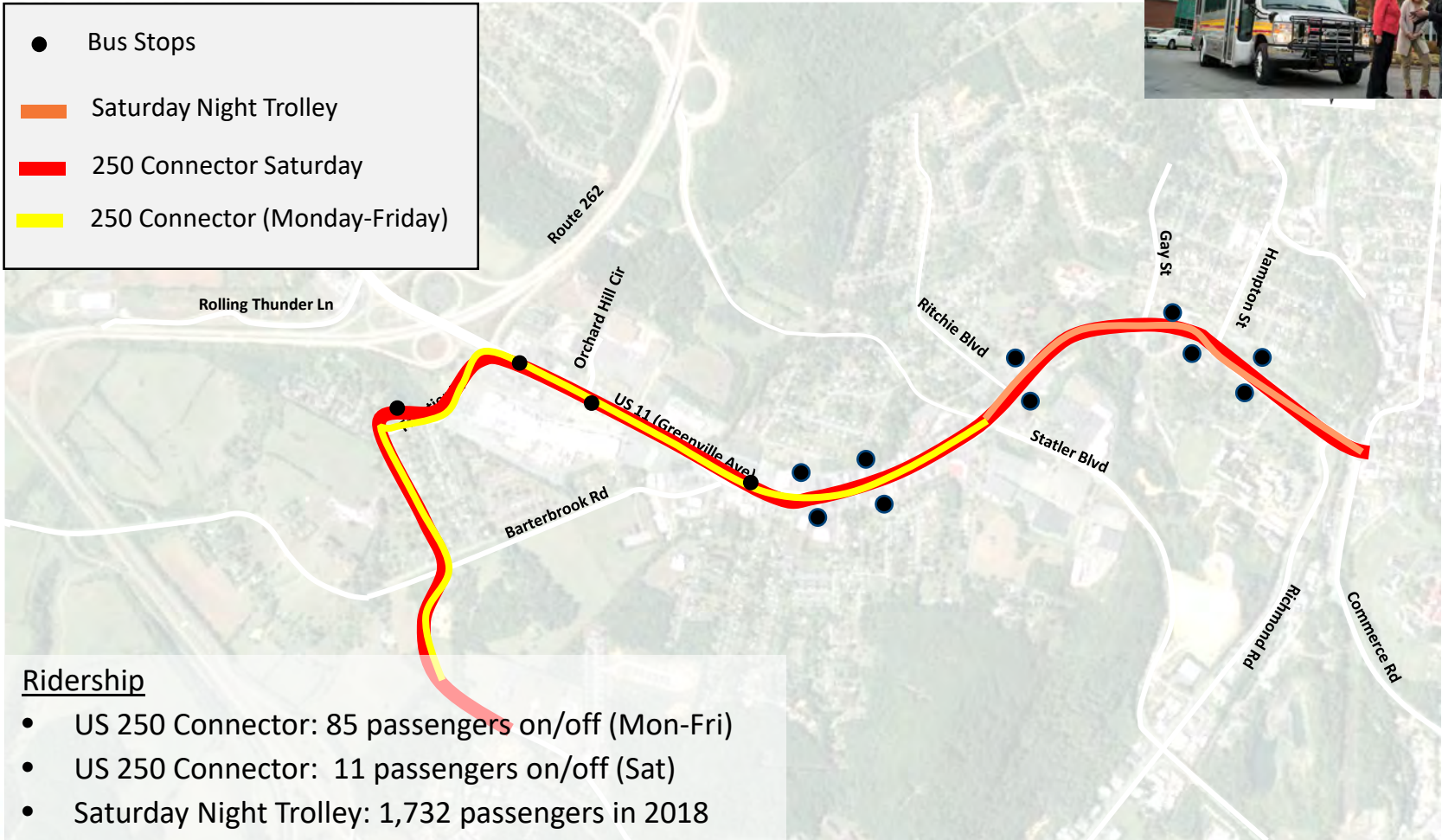
- Operations generally match Synchro analysis
- PM peak hour has longer queues than the AM peak
- The overall pavement surface and markings are not in good condition
- Significant pedestrian activity was observed throughout the day



BRITE ROUTE & RIDERSHIP



- Bus Stops
- Saturday Night Trolley
- 250 Connector Saturday
- 250 Connector (Monday-Friday)



Ridership

- US 250 Connector: 85 passengers on/off (Mon-Fri)
- US 250 Connector: 11 passengers on/off (Sat)
- Saturday Night Trolley: 1,732 passengers in 2018

BUS STOPS – ALONG NB US 11

Mary Gray Lane



Burge King (US 11 NB)



Subway



Long John Silver



Across from Federated Auto



Across from Wright



BUS STOPS – ALONG SB US 11

Wright's Dairy Rite



Federated Auto



Fast Lane Gas



Budget Inn



Arby's



Goodwill



TRANSIT RIDERSHIP FORECAST

- **The transit ridership forecast is expected to be completed in April/May**
- **Few pedestrian improvements along US 11 are recommended**
- **Crosswalks at the US 11 and Statler Boulevard intersection to accommodate transit pedestrian activity**
- **Mid-block crossing at or near Betsy Bell Road to accommodate pedestrian traffic to Betsy Bell Park**

PEDESTRIAN ACTIVITY AND CRASH



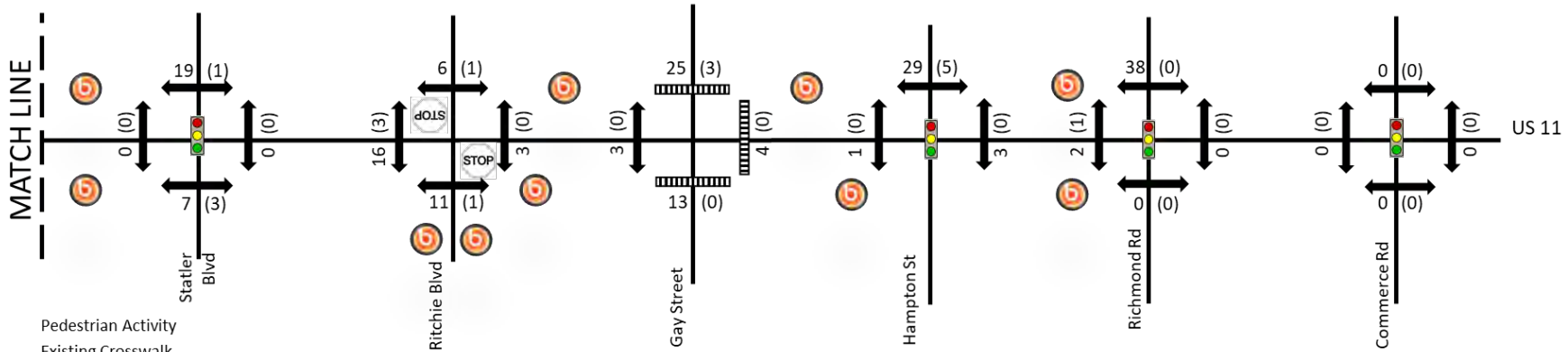
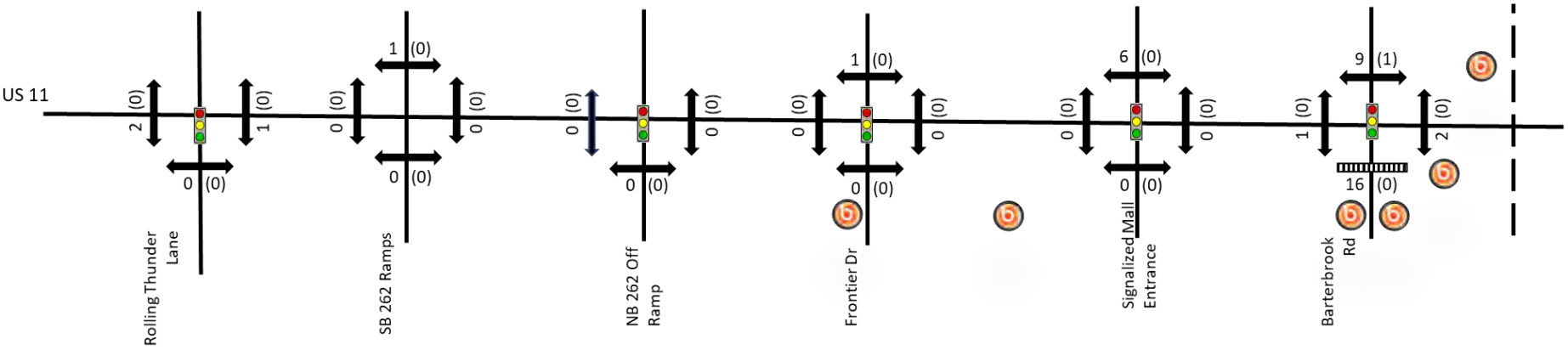
PEDESTRIAN ACTIVITY



2018 PEDESTRIAN COUNTS



MATCH LINE



- Legend**
- Pedestrian Activity
 - Existing Crosswalk
 - #(#)** 12-hr Ped Counts (PM Peak Counts)
 - Signalized Intersection
 - Stop-Controlled Approach
 - Existing BRITE Bus Stop (April 2019)



PEDESTRIAN FACILITY CONDITIONS



PEDESTRIAN FACILITY CONDITIONS

- **Sidewalk surface is deteriorated and uneven and has debris**
- **Lack of curb ramps connecting sidewalks**
- **Curb ramps, if any, are steep and non-ADA compliant**
- **At several locations sidewalks are encroached by utility poles or hydrants**
- **Lack of pedestrian crossing warning signs in advance of the marked crosswalks**
- **Our field reviewer ran to cross US 11, using the crosswalk on the north side of the Gay Street intersection, to avoid conflicting with vehicles**
- **Lack of pedestrian signals and pedestrian refuge island**

CRASH MAP LEGEND

CRASH TYPES

- Rear-End
- Angle
- Head-On
- Sideswipe – same direction
- Sideswipe – opposite direction
- Fixed Object-Off Road
- Other
- Fixed Object in road
- Deer
- Backed Into
- ★ Pedestrian

CRASH SEVERITY

- Fatality
- Injury
- Property Damage Only

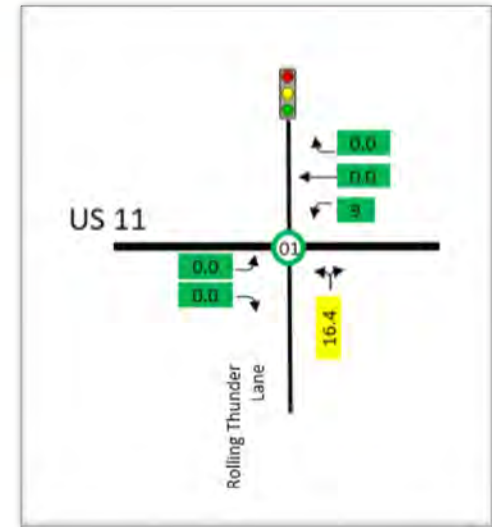
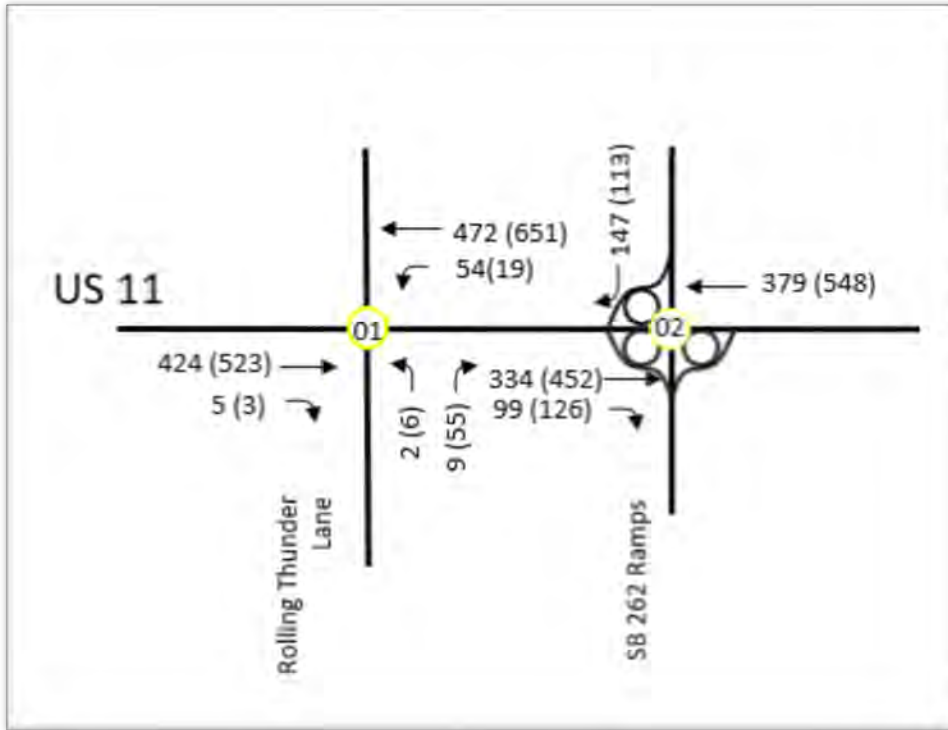


SEGMENT 1: MILEPOST 235 TO 235.75

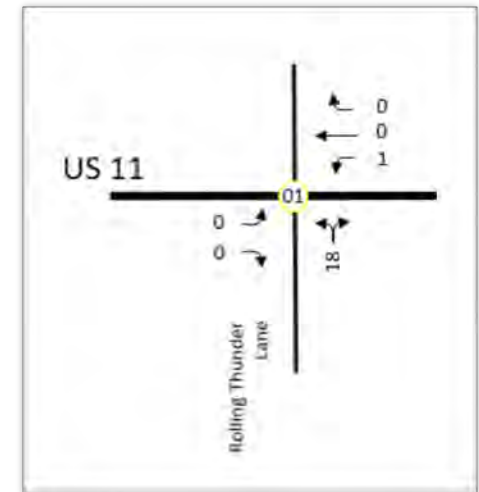


SEGMENT 1: MILEPOST 235 TO 235.75

Peak Hour Turning Movement Volumes



Control Delays (sec) and Level of Service

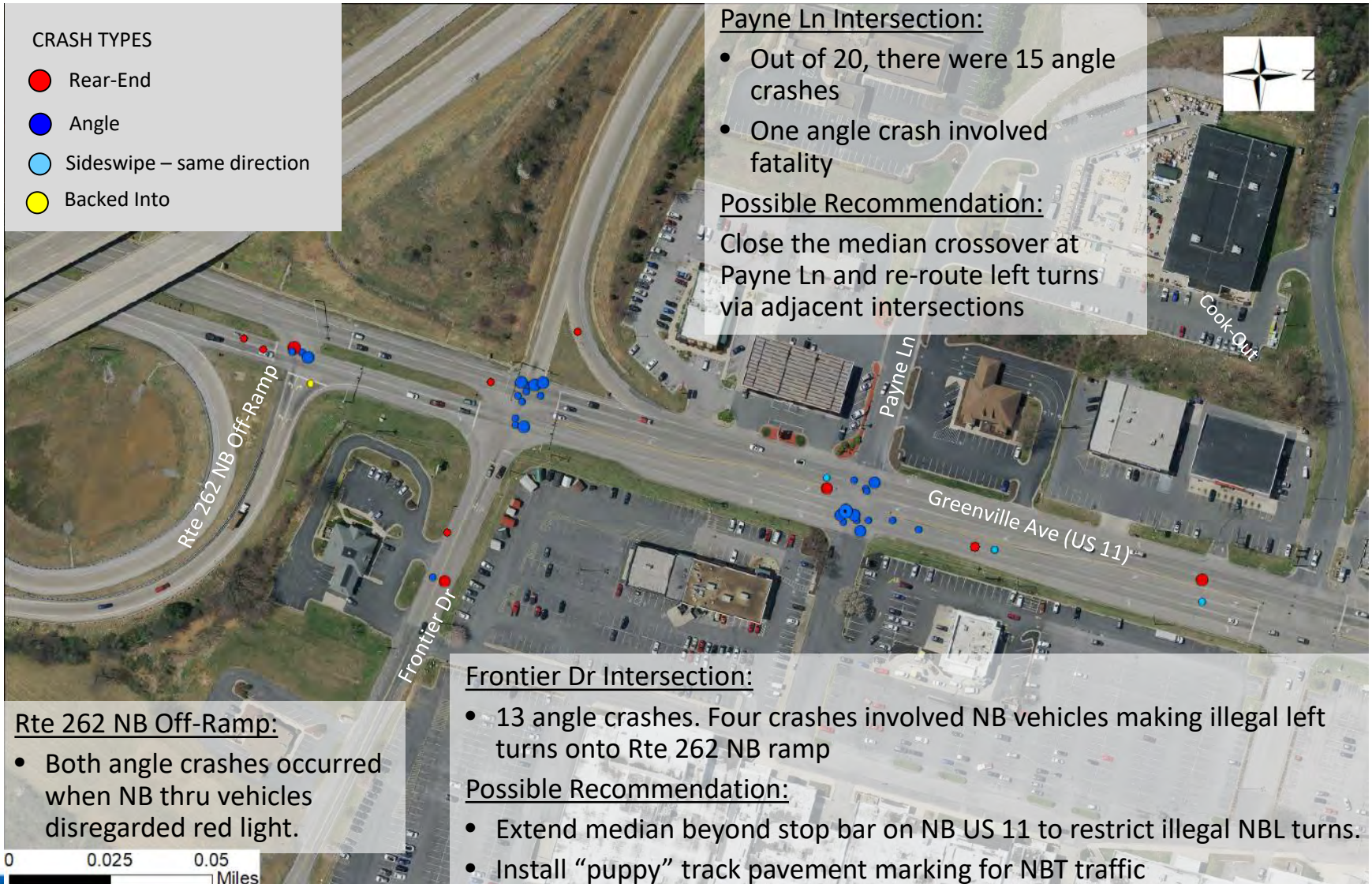


95th Percentile Queue Lengths (feet)

SEGMENT 2: MILEPOST 235.75 TO 236

CRASH TYPES

- Rear-End
- Angle
- Sideswipe – same direction
- Backed Into



Payne Ln Intersection:

- Out of 20, there were 15 angle crashes
- One angle crash involved fatality

Possible Recommendation:

Close the median crossover at Payne Ln and re-route left turns via adjacent intersections

Rte 262 NB Off-Ramp:

- Both angle crashes occurred when NB thru vehicles disregarded red light.

Frontier Dr Intersection:

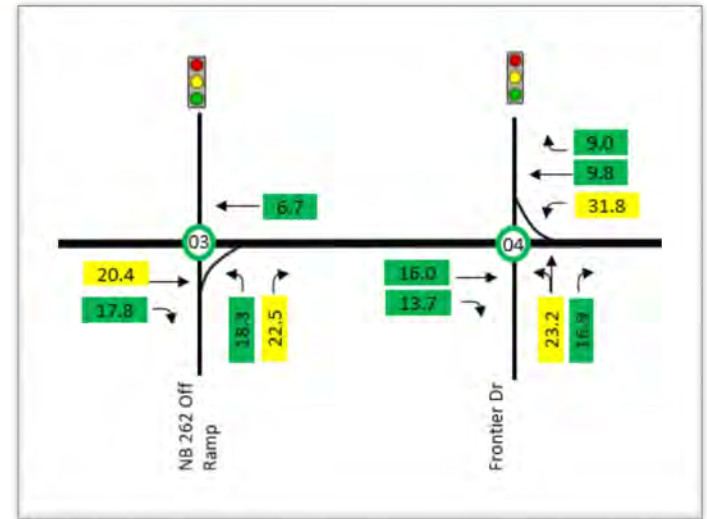
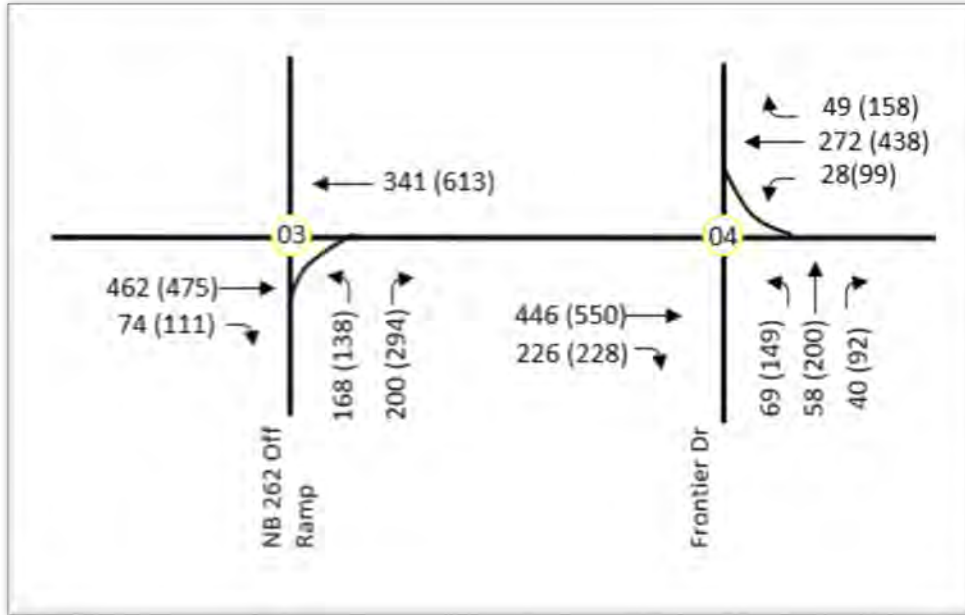
- 13 angle crashes. Four crashes involved NB vehicles making illegal left turns onto Rte 262 NB ramp

Possible Recommendation:

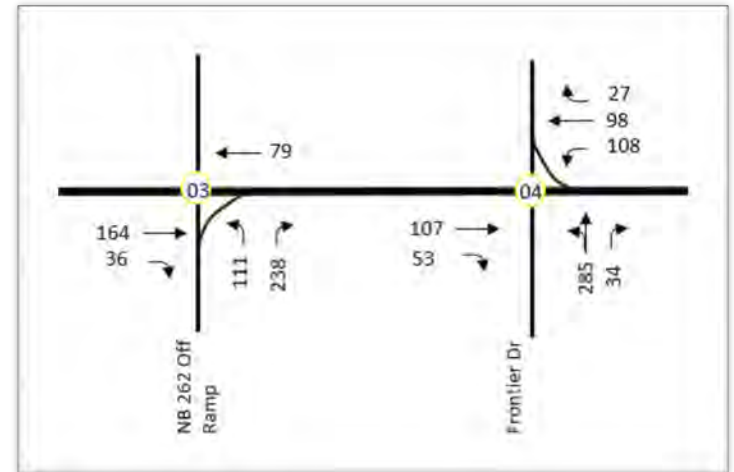
- Extend median beyond stop bar on NB US 11 to restrict illegal NBL turns.
- Install “puppy” track pavement marking for NBT traffic

SEGMENT 2: MILEPOST 235.75 TO 236

Peak Hour Turning Movement Volumes

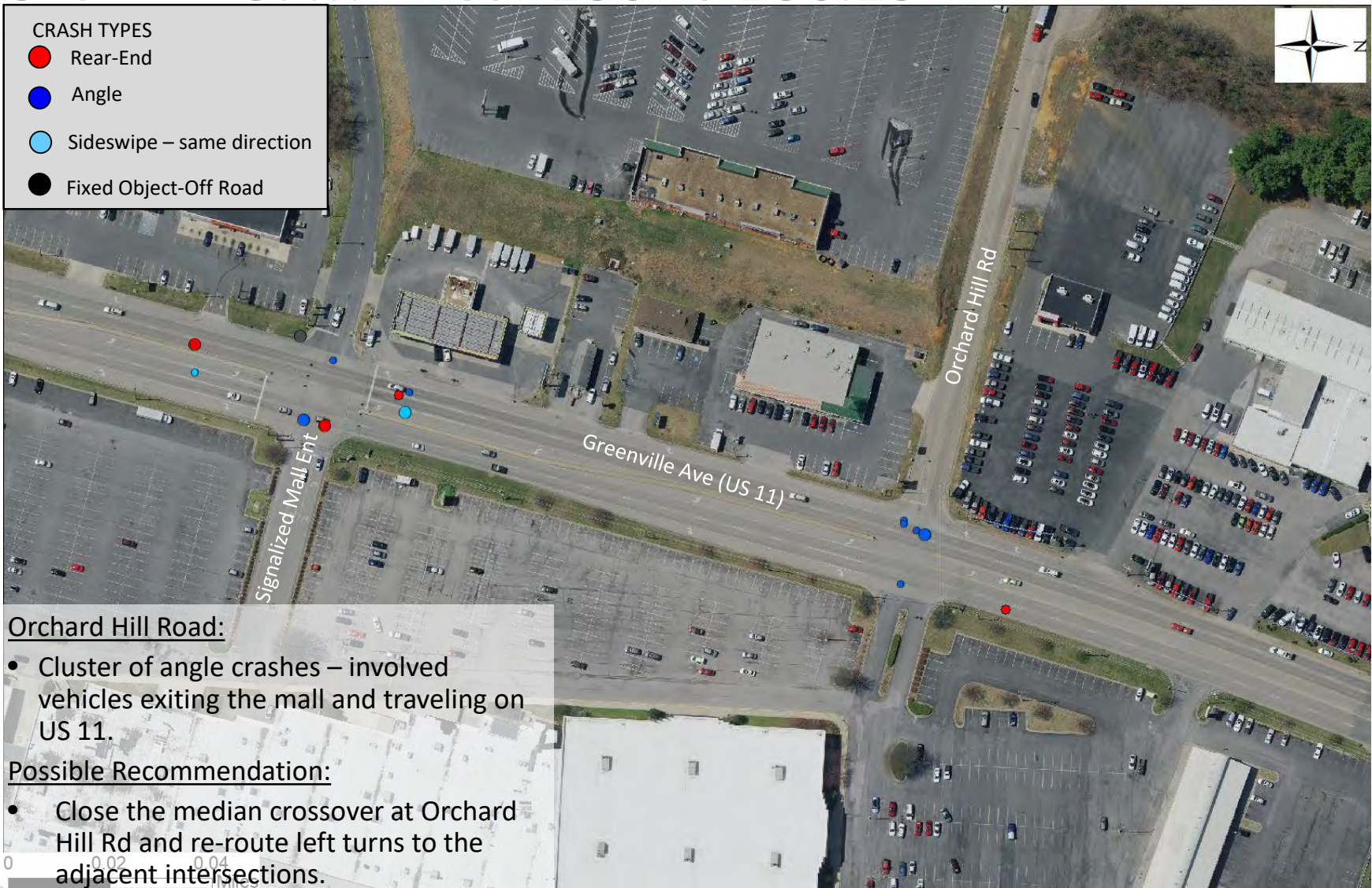


Control Delays (sec) and Level of Service



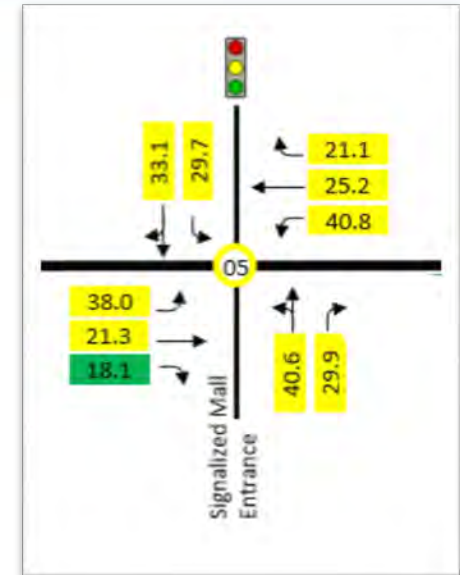
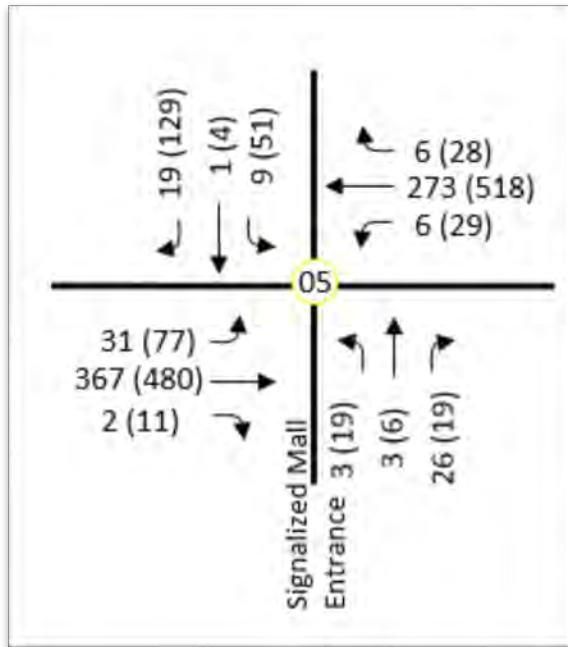
95th Percentile Queue Lengths (feet)

SEGMENT 3: MILEPOST 236 TO 236.25

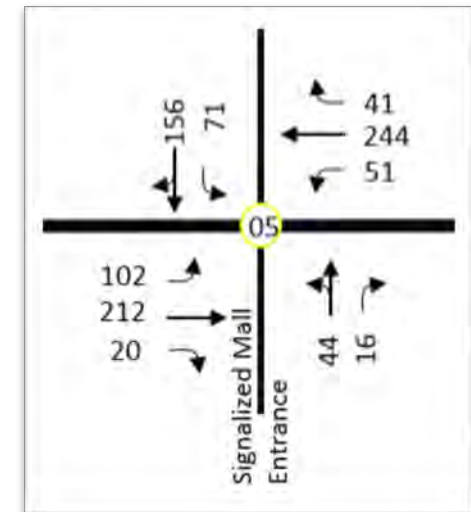


SEGMENT 3: MILEPOST 236 TO 236.25

Peak Hour Turning Movement Volumes



Control Delays (sec) and Level of Service



95th Percentile Queue Lengths (feet)

SEGMENT 4: MILEPOST 236.25-236.5

CRASH TYPES

- Rear-End
- Angle
- Sideswipe – same direction
- Other

Barterbrook Rd Intersection:

- Second highest ranked PSI in corridor.
- Clusters of angle and rear-end crashes.
- Nine angle crashes, four involved mainline left turning and through traffic

Possible recommendation:

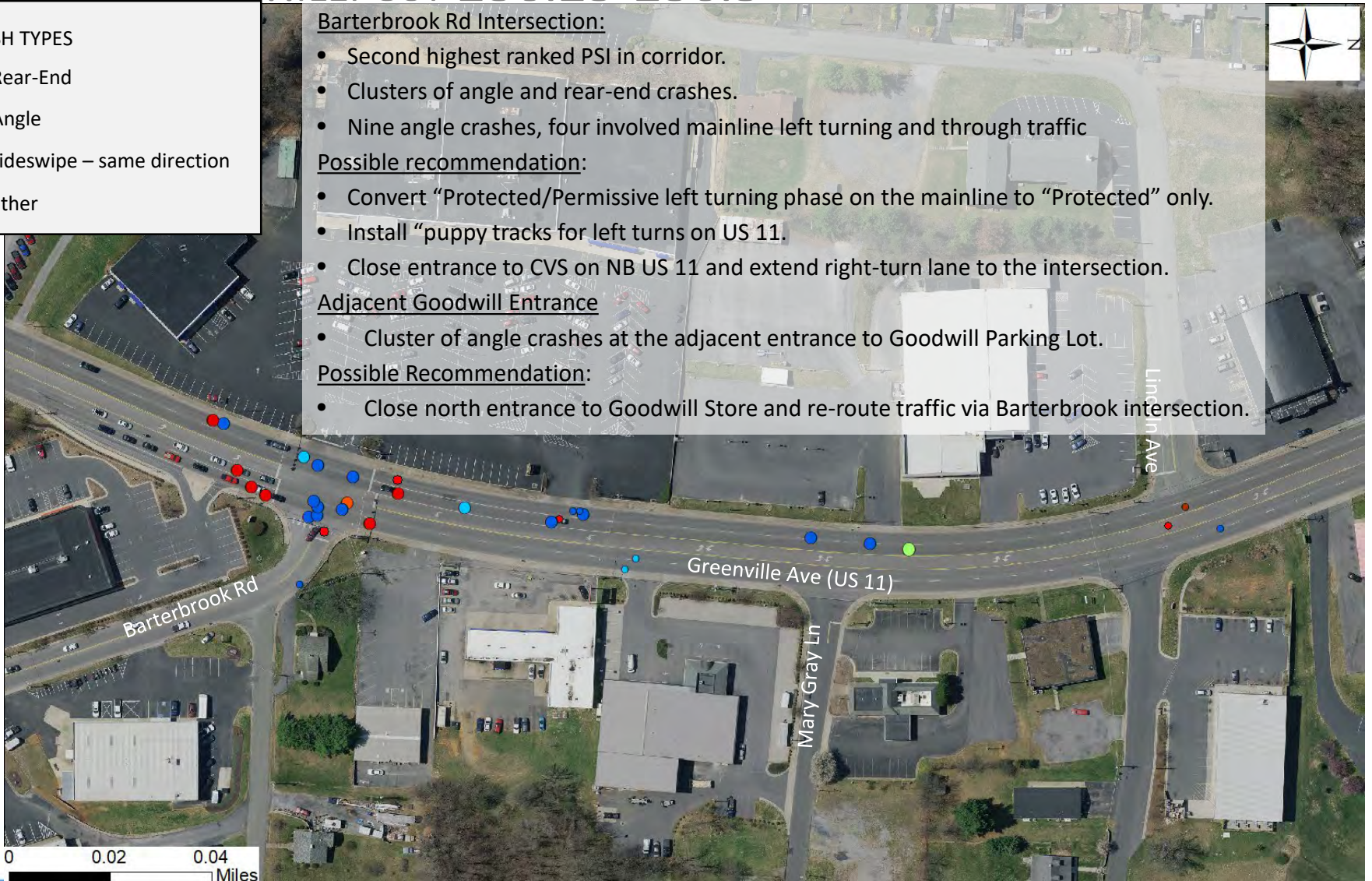
- Convert “Protected/Permissive left turning phase on the mainline to “Protected” only.
- Install “puppy tracks for left turns on US 11.
- Close entrance to CVS on NB US 11 and extend right-turn lane to the intersection.

Adjacent Goodwill Entrance

- Cluster of angle crashes at the adjacent entrance to Goodwill Parking Lot.

Possible Recommendation:

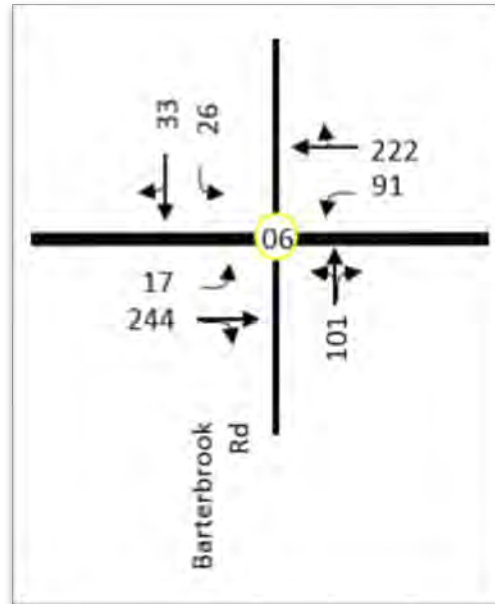
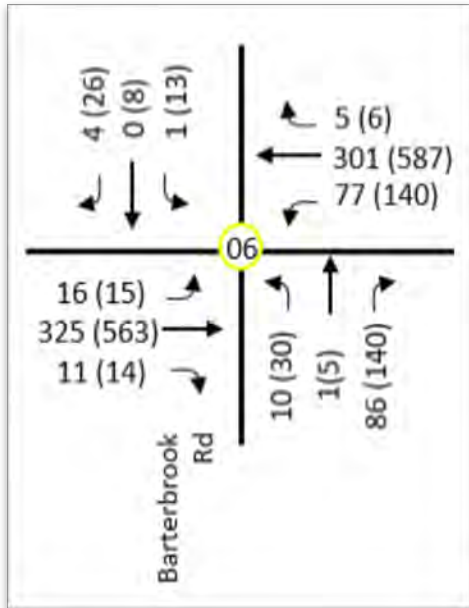
- Close north entrance to Goodwill Store and re-route traffic via Barterbrook intersection.



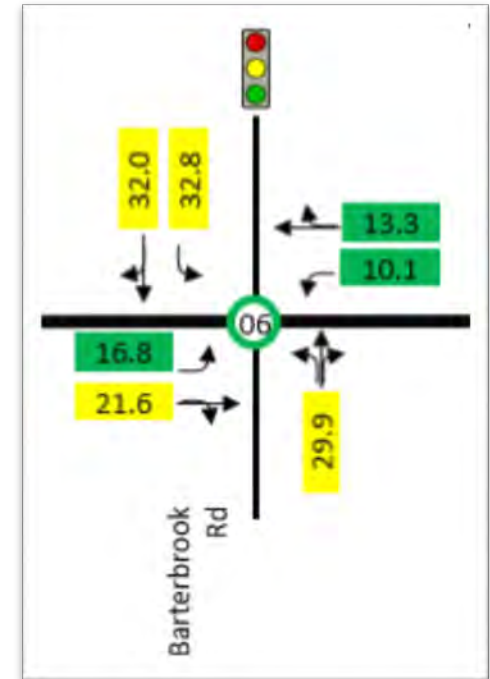
SEGMENT 4: MILEPOST 236.25-236.5

Control Delays (sec) and Level of Service

Peak Hour Turning Movement Volumes



95th Percentile Queue Lengths (feet)



SEGMENT 5: MILEPOST 236.5 TO 236.75

CRASH TYPES

- Rear-End
- Angle
- Sideswipe – same direction
- ★ Pedestrian



Betsy Bell Rd intersection:

- Cluster of rear-end and angle crashes at Betsy Bell Rd
- Rear-end crashes involved vehicles slowing down at Betsy Bell Rd

Pedestrian Crash:

- One pedestrian injury crash occurred during daylight and under dry surface condition

Potential Causes:

- Several closely spaced entrances on both sides
- Lack of right-turn deceleration lane

Possible Recommendation:

- Install right-turning lanes on both sides
- Consolidate entrances/driveways, provide service road
- Install midblock crosswalk, if warranted

SEGMENT 6: MILEPOST 236.75 TO 237



CRASH TYPES

- Rear-End
- Angle
- Head-On
- Sideswipe – same direction
- Fixed Object-Off Road
- Other
- Deer
- Backed Into

Ritchie Blvd Intersection:

- Cluster of rear-end crashes.
- Out of 13 angle crashes, 4 involved mainline left-turning and thru vehicles.
- There are several closely spaced driveways to Ritchie Blvd.

Possible Recommendation:

- Install physically divided median from Statler Blvd to the north of Ritchie Blvd and re-route left turns via Statler Blvd intersection.

Statler Blvd Intersection:

- Cluster of rear-end crashes.
- Heavy NB right-turning traffic

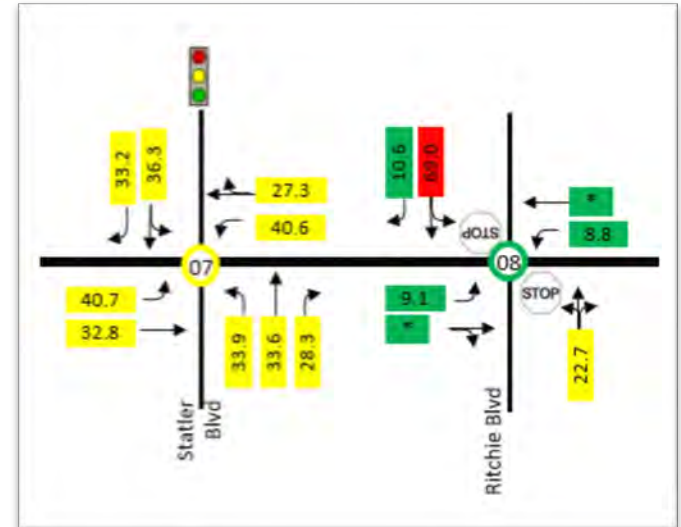
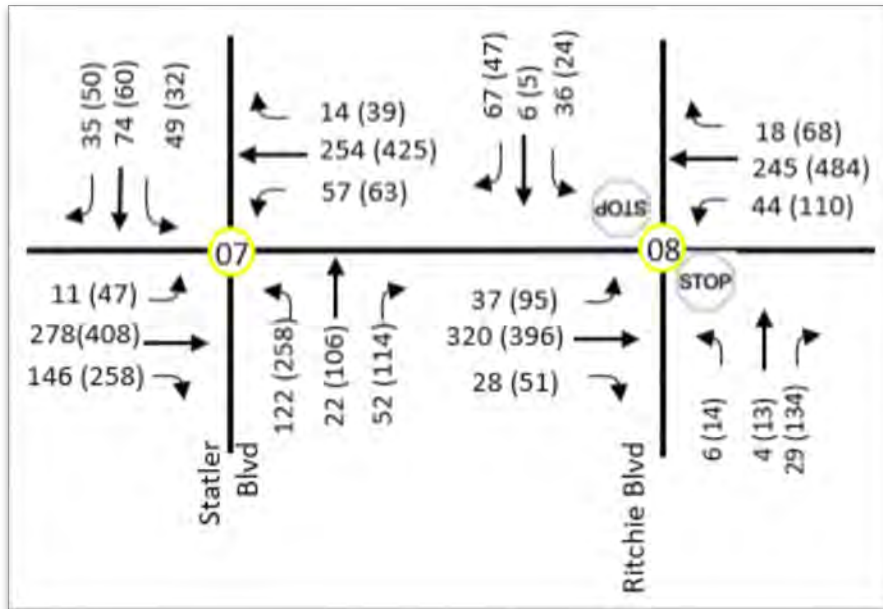
Possible Recommendation:

- Install “Signal Ahead” warning sign in advance of the intersection.
- Install NBR turn lane.
- Modify lane configuration of the side streets and signal phasing and timings.

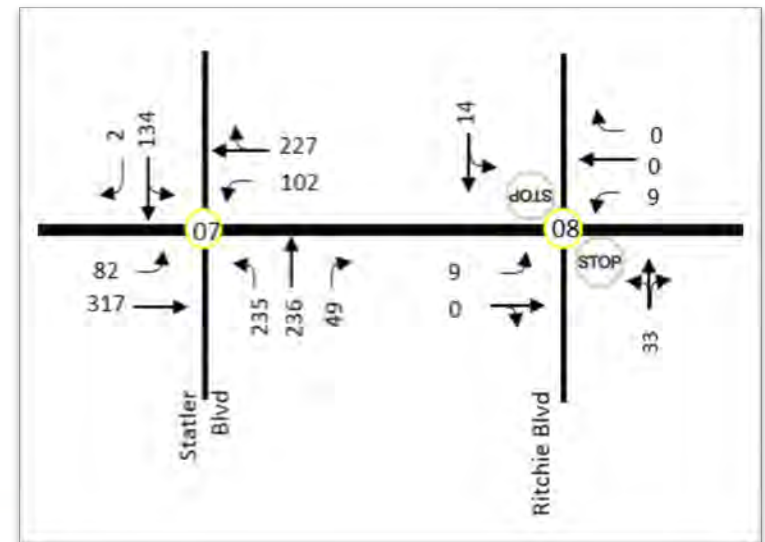
SEGMENT 6: MILEPOST 236.75 TO 237

Control Delays (sec) and Level of Service

Peak Hour Turning Movement Volumes



95th Percentile Queue Lengths (feet)



SEGMENT 7: MILEPOST 237 TO 237.25

CRASH TYPES

- Rear-End
- Head-On
- Fixed Object-Off Road
- Fixed Object in road
- Deer



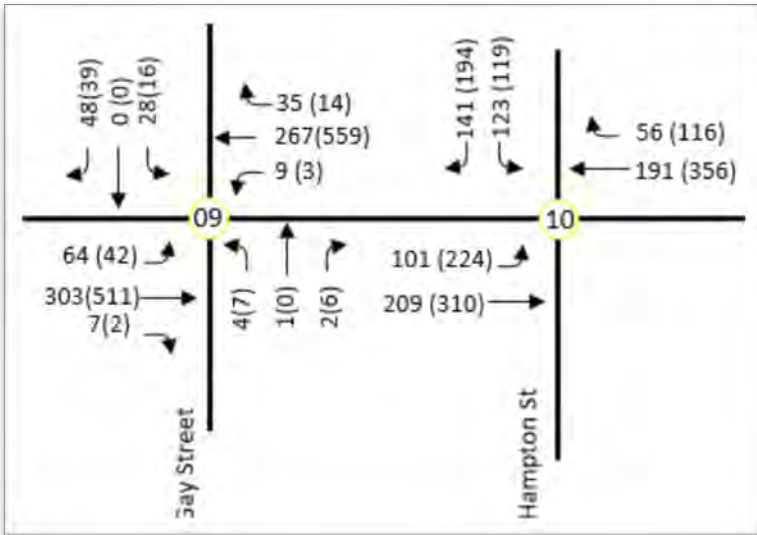
- Four deer related crashes along this segment.
- Possible Recommendation:
- Install deer crossing warning signs in both directions.

SEGMENT 8: MILEPOST 237.25 TO 237.5

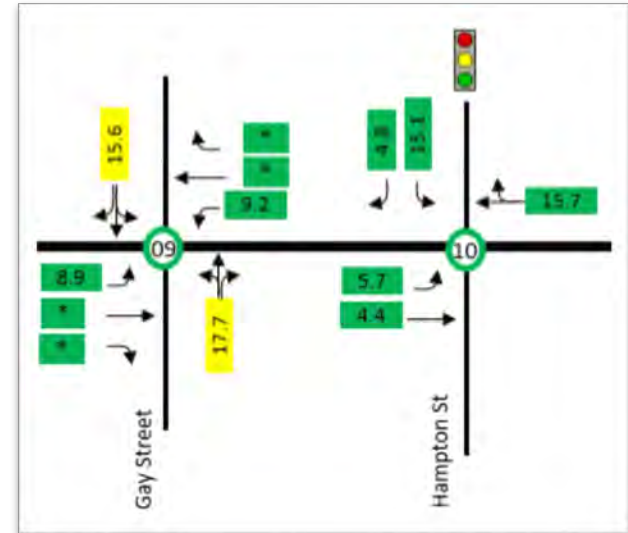


SEGMENT 8: MILEPOST 237.25 TO 237.5

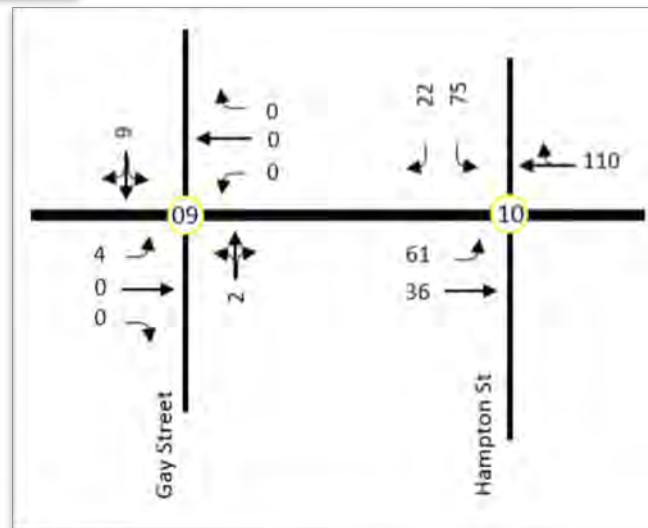
Peak Hour Turning Movement Volumes



Control Delays (sec) and Level of Service



95th Percentile Queue Lengths (feet)



SEGMENT 9: MILEPOST 237.5 TO 238



CRASH TYPES	
●	Rear-End
●	Angle
●	Sideswipe – same direction
●	Fixed Object-Off Road
●	Other

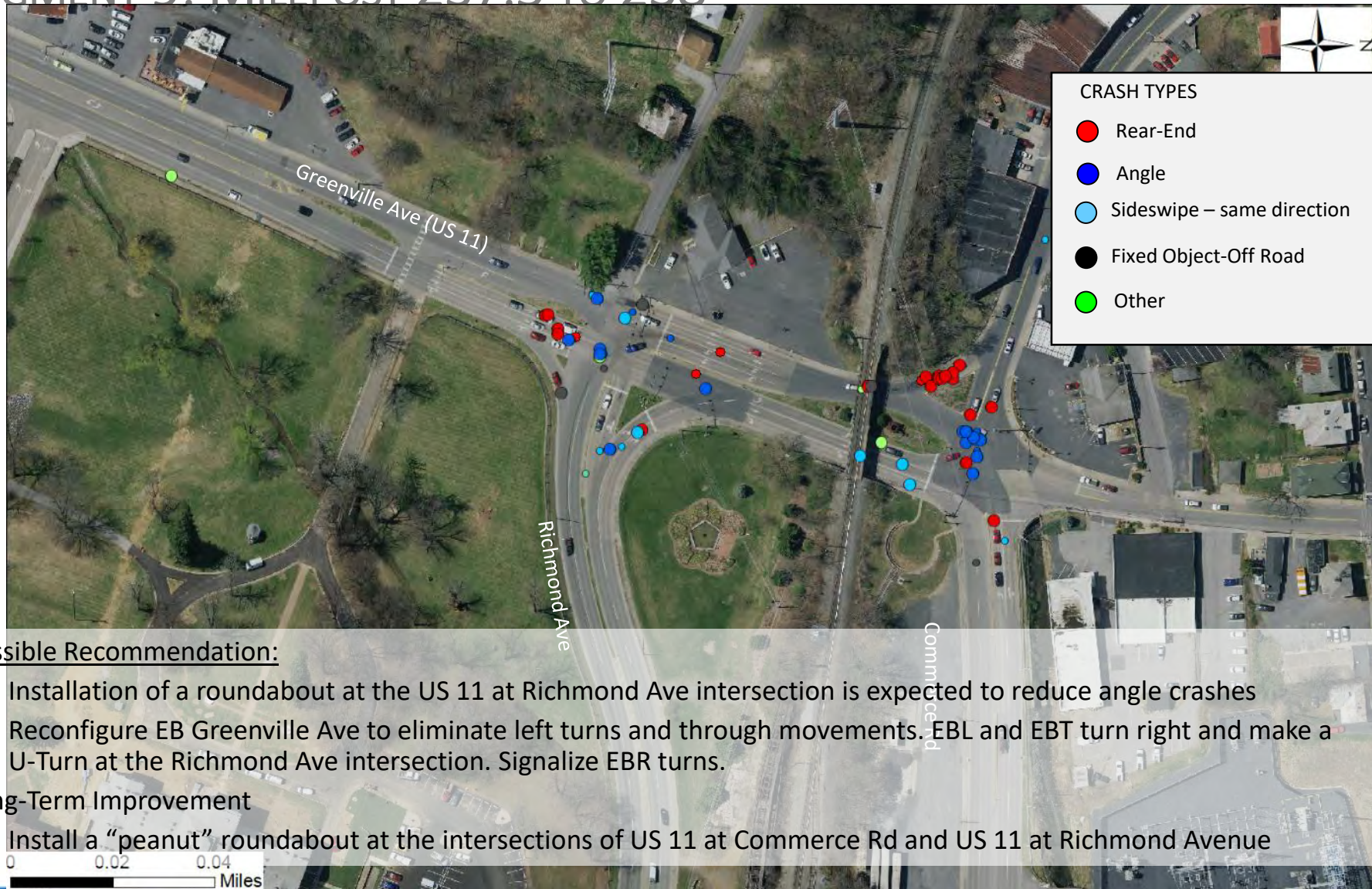
Commerce Rd Intersection:

- 1st PSI Rank within the study corridor.
- Total 44 crashes – 22 rear-end collisions.
- Cluster of EBR turn rear-end crashes.
- Angle crashes involved NBL and SBT traffic and EBL/WBL and thru vehicles.

Richmond Ave Intersection:

- Cluster of angle crashes.
- Several angle crashes involved NB vehicles making illegal left turns from through lane.

SEGMENT 9: MILEPOST 237.5 TO 238



Possible Recommendation:

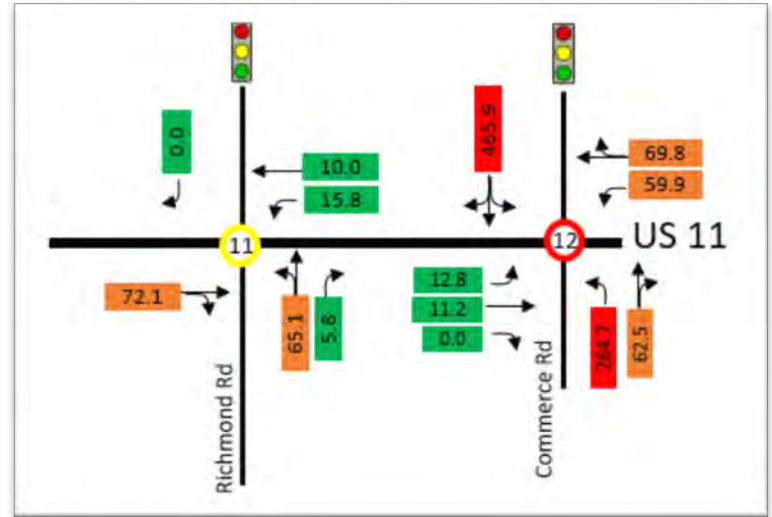
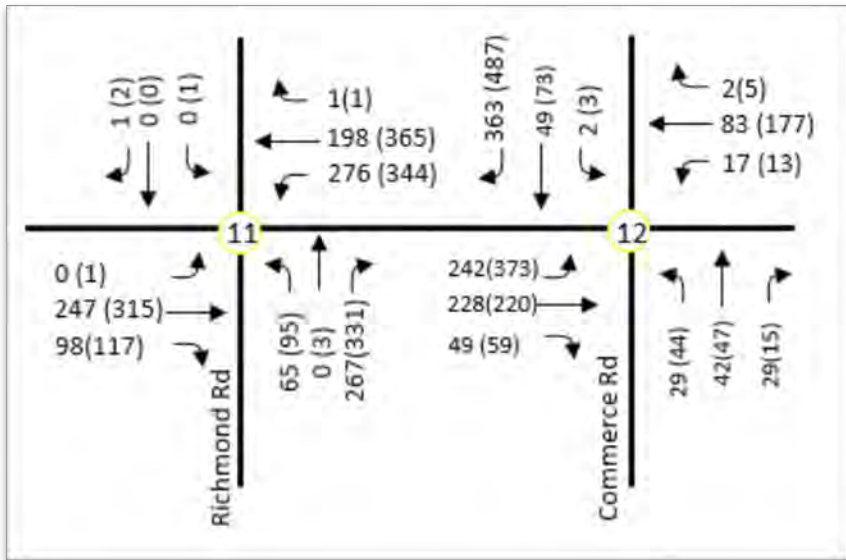
- Installation of a roundabout at the US 11 at Richmond Ave intersection is expected to reduce angle crashes
- Reconfigure EB Greenville Ave to eliminate left turns and through movements. EBL and EBT turn right and make a U-Turn at the Richmond Ave intersection. Signalize EBR turns.

Long-Term Improvement

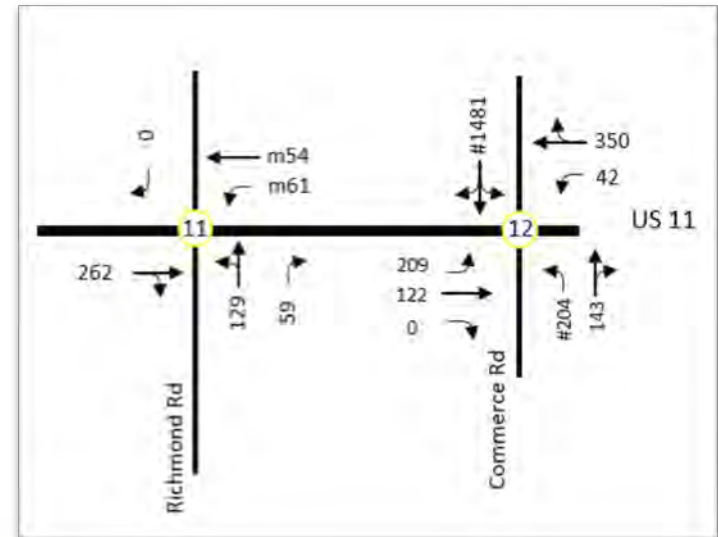
- Install a “peanut” roundabout at the intersections of US 11 at Commerce Rd and US 11 at Richmond Avenue

SEGMENT 9: MILEPOST 8.5 TO 8.75

Peak Hour Turning Movement Volumes



Control Delays (sec) and Level of Service



95th Percentile Queue Lengths (feet)

POSSIBLE RECOMMENDATIONS

- **Close median crossovers between Rolling Thunder Lane and Barterbrook Road**
- **Install right turning lanes at major intersections**
- **Close median crossover between Statler Blvd and Ritchie Lane**
- **Reconfigure Richmond Avenue and Greenville Avenue and eliminate left turns**

FUTURE TRAFFIC GROWTH RATE

HISTORICAL TRAFFIC DATA & TRAFFIC GROWTH

Road Segment	2018 ADT (Study Count)	2016 AADT	2013 AADT	2010 AADT	2007 AADT
South of Rt. 262	--	5,400	5,600	5,200	5,500
Rt. 262 to City Limits	12,900	14,000	14,000	13,900	15,900
City Limits to Statler Blvd.	15,800 *	14,000	14,000	13,900	15,900
Statler Blvd. to Hampton St.	--	11,500	12,300	13,200	13,200
Hampton St. to Richmond Rd.	9,800	10,300	10,600	11,000	12,300
Richmond Rd. to Commerce Rd.	--	15,300	15,200	15,400	16,500

Road Segment	Growth Trend (annual) 2007 - 2016	Growth Trend (annual) 2016 - 2018
South of Rt. 262	-0.2%	--
Rt. 262 to City Limits	-1.3%	-3.9%
City Limits to Statler Blvd.	--	--
Statler Blvd. to Hampton St.	-1.4%	--
Hampton St. to Richmond Rd.	-1.8%	-2.4%
Richmond Rd. to Commerce Rd.	-0.8%	--

RECOMMENDED ANNUAL TRAFFIC GROWTH RATE

- **An annual traffic growth rate of 1%**
- **12% increase in traffic volume over a 12-year period**
- **The same growth rate to be applied to pedestrian volume**
- **Different pedestrian counts at the Commerce Road and Richmond Avenue intersections**
- **Same vehicle percentages for future as in the existing conditions**

ADDITIONAL TRIPS FROM CORRIDOR DEVELOPMENT



Not to Scale

Proposed Corridor Developments Trip Generation and Distribution
 US 11 STARS Study
 Staunton District

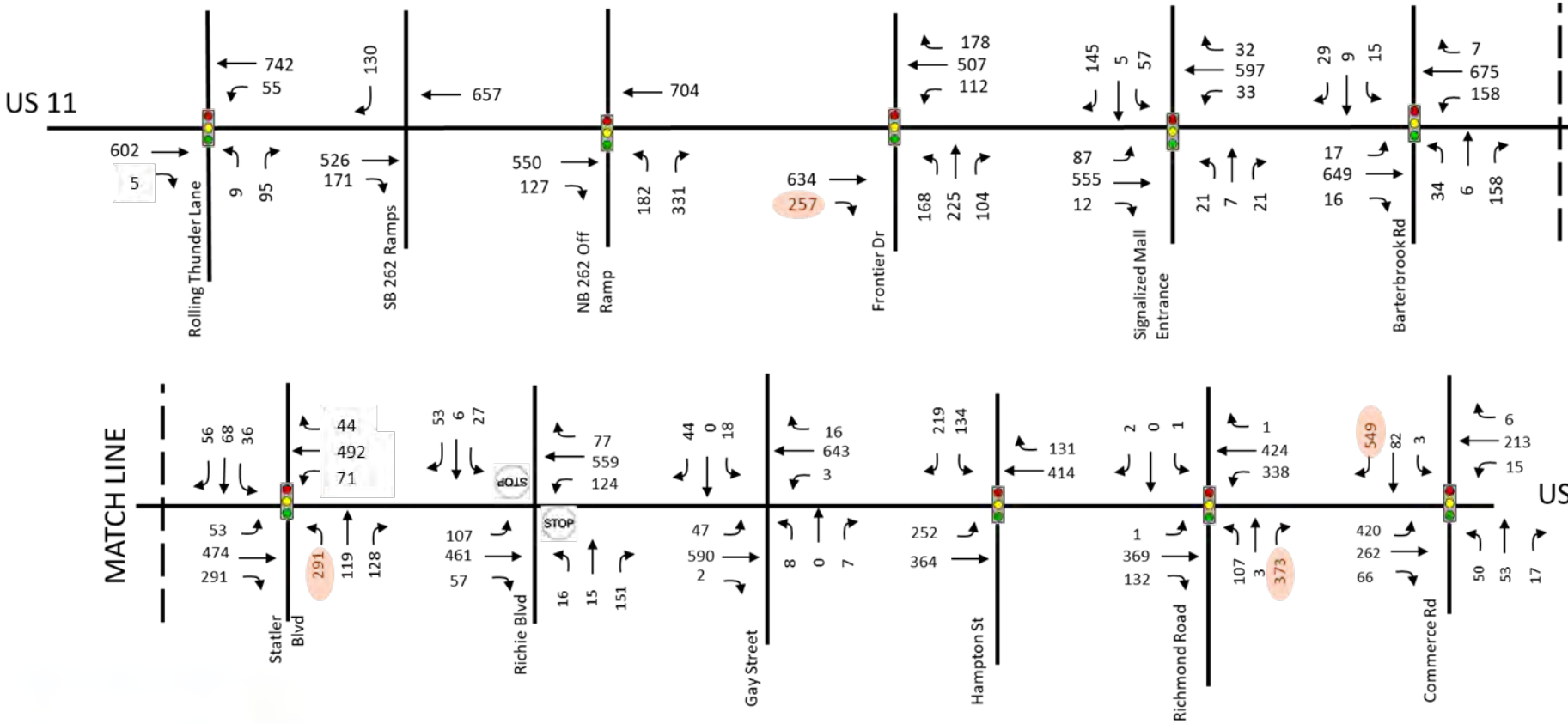


2030 No-BUILD PM PEAK HOUR TRAFFIC VOLUME

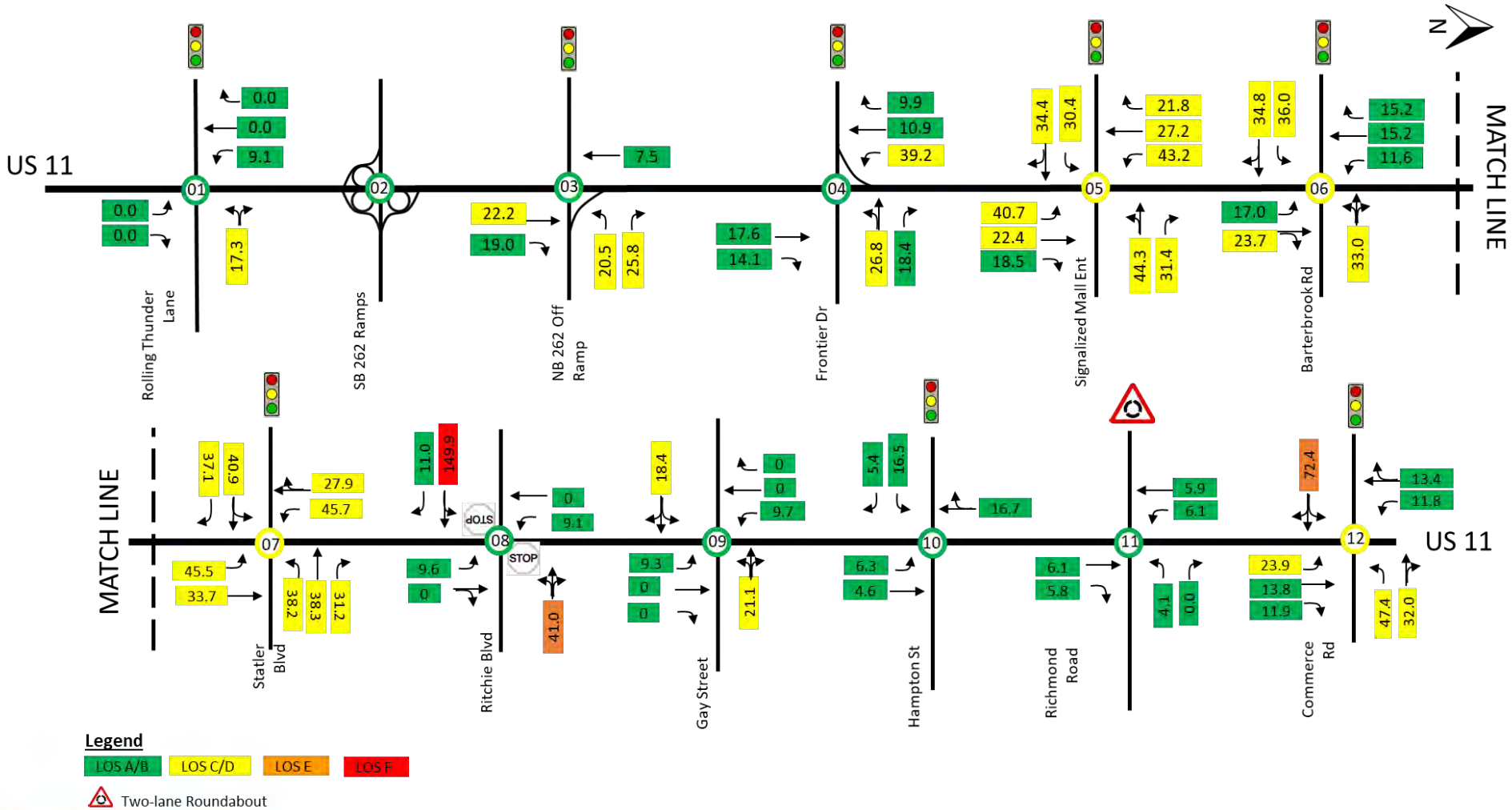


MATCH LINE

US 11



2030 No-BUILD PM PEAK HOUR LOS

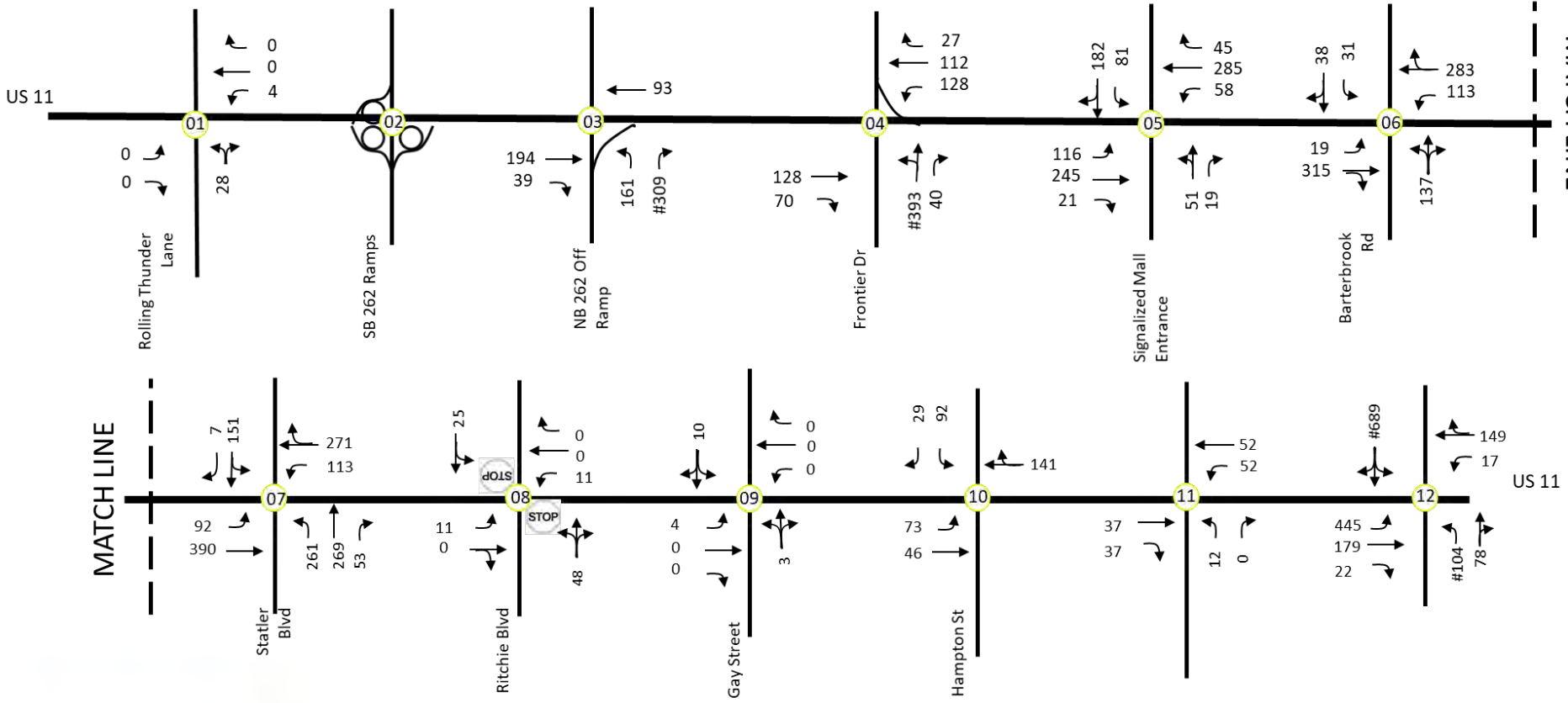


2030 No-Build PM Queue Lengths



MATCH LINE

US 11



NEXT STEP

NEXT STEPS AND MEETING

- **Identify deficiencies and potential improvements**
- **Analyze improvements**
- **Prepare Stage 1 drawings and cost estimates**
- **Prepare material for Public Information Meeting**
- **Next SWG Meeting (Week of July 8th) – Alternative Development Workshop**

GREENVILLE AVENUE (US 11) CORRIDOR IMPROVEMENT STUDY

Thank you.