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      | Signaled       
4               | US 11 Frontier Drive               | Signaled       
5               | US 11 at Orchard Hill Circle       | Signaled       
6               | US 11 at Barterbrock Road          | Signaled       
7               | US 11 at Statler Boulevard         | Signaled       
8               | US 11 at Ritchie Boulevard         | Unsignalized   
9               | US 11 at Gay Street                | Unsignalized   
10              | US 11 at Hampton Street            | Signaled       
11              | US 11 at Richmond Road             | Signaled       
12              | US 11 at Commerce Road             | Signaled       

GREENVILLE AVENUE (US 11) CORRIDOR IMPROVEMENT STUDY
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

<table>
<thead>
<tr>
<th>Highway Functional Classification</th>
<th>Legal Speed Limit (mph)</th>
<th>Minimum Centerline to Centerline Spacing (Distance) in Feet</th>
<th>Spacing from Signalized Intersections to Other Signalized Intersections</th>
<th>Spacing from Unsignalized Intersections &amp; Full Median Crossovers to Directional Median to Other Full Access Entrances or Directional Median to Other Full Access Entrances and Any Intersection or Median Crossover</th>
<th>Spacing from Partial Access One or Two Way Entrances to Any Type of Entrance, Intersection or Median Crossover</th>
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</thead>
<tbody>
<tr>
<td>Principal Arterial</td>
<td>≤ 30 mph</td>
<td>1,050</td>
<td>880</td>
<td>440</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>35 to 45 mph</td>
<td>1,320</td>
<td>1,050</td>
<td>565</td>
<td>305</td>
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<tr>
<td></td>
<td>≥ 50 mph</td>
<td>2,640</td>
<td>1,320</td>
<td>750</td>
<td>495</td>
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<tr>
<td>Minor Arterial</td>
<td>≤ 30 mph</td>
<td>880</td>
<td>680</td>
<td>355</td>
<td>200</td>
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<tr>
<td></td>
<td>35 to 45 mph</td>
<td>1,050</td>
<td>680</td>
<td>470</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>≥ 50 mph</td>
<td>1,320</td>
<td>1,050</td>
<td>555</td>
<td>425</td>
</tr>
<tr>
<td>Collector</td>
<td>≤ 30 mph</td>
<td>660</td>
<td>440</td>
<td>225</td>
<td>200</td>
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<tr>
<td></td>
<td>35 to 45 mph</td>
<td>660</td>
<td>440</td>
<td>335</td>
<td>250</td>
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<tr>
<td></td>
<td>≥ 50 mph</td>
<td>1,050</td>
<td>660</td>
<td>445</td>
<td>360</td>
</tr>
</tbody>
</table>

North of Rte 262 to Richmond Ave
Richmond Ave to Commerce Rd
South of Rte 262
**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

Stops

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

GREENVILLE AVENUE (US 11) CORRIDOR IMPROVEMENT STUDY
ACCESS SPACING MAP

- Spacing between Signalized Intersection and Signalized Intersection (1320’ required)
- Spacing between Unsignalized Intersection/Full Median Crossover and Signalized Intersection/Unsignalized Intersection/Full Median Crossover (1050’ required)
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- 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)
- Spacing between Signalized Intersection and Signalized Intersection (1320’ required/880’ required)
- Spacing between Unsignalized Intersection/Full Median Crossover and Signalized Intersection/Unsignalized Intersection/Full Median Crossover (1050’ required/660’ required)
- Spacing between Full Access Entrance or Directional Median and Any Intersection, Full Access Entrance or Median Crossover (565’ required/355’ required)

**Speed Limit:** 25 (From Richmond Rd to Commerce Rd)
- Spacing between Partial Access Entrance and Any Entrance Intersection or Median Crossover (305’ required/200’ required)
- Spacing between Start/End Ramp Terminal and Right-In/Right-Out Partial Access Entrance (750’ required)
- Spacing between Start/End Ramp Terminal and Any Intersection, Full Access Entrance or Median Crossover (990’/1320’)
EXISTING DAILY VOLUMES – DATA COLLECTED NOVEMBER 2018

GREENVILLE AVENUE (US 11) CORRIDOR IMPROVEMENT STUDY
EXISTING PEAK HOUR TURNING MOVEMENT VOLUMES

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
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
2018 PEDESTRIAN COUNTS

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
- Red: Rear-End
- Blue: Angle
- Orange: Head-On
- Light Blue: Sideswipe – same direction
- Dark Blue: Sideswipe – opposite direction
- Black: Fixed Object-Off Road
- Green: Other
- Light Green: Fixed Object in road
- Brown: Deer
- Red: Backed Into
- Yellow: Pedestrian

CRASH SEVERITY
- White Circle: Fatality
- White Square: Injury
- White Triangle: Property Damage Only
Observations:

- All three fixed object off-road crashes occurred adjacent to the Route 262 SB off-ramp
- Three angle crashes involved vehicles existing dealership driveways
- Deer crash occurred during darkness
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

**Rte 262 NB Off-Ramp:**
- Both angle crashes occurred when NB thru vehicles disregarded red light.

**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.

**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.

**CRASH TYPES**
- Red: Rear-End
- Blue: Angle
- Light blue: Sideswipe – same direction
- Yellow: Backed Into

**STARS**

# GREENVILLE AVENUE (US 11) CORRIDOR IMPROVEMENT STUDY
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

Orchard Hill Road:
- Cluster of angle crashes – involved vehicles exiting the mall and traveling on US 11.

Possible Recommendation:
- Close the median crossover at Orchard Hill Rd and re-route left turns to the adjacent intersections.
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

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

Peak Hour Turning Movement Volumes

95th Percentile Queue Lengths (feet)

Control Delays (sec) and Level of Service
**SEGMENT 5: MILEPOST 236.5 TO 236.75**

**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

Peak Hour Turning Movement Volumes

Control Delays (sec) and Level of Service

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**

E Hampton St Intersection:
- Cluster of rear-end and angle crashes.
- Out of six angle crashes, five involved mainline left-turn and thru vehicles.
- Heavy WB thru and right-turning traffic.

Possible Recommendation:
- Install SBR turning lane.
- Modify “Protected/Permissive” phase to “Protected” only.

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**CRASH TYPES**
- Rear-End
- Angle
- Sideswipe – same direction
- Sideswipe – opposite direction
- Deer

**CRASH TYPES**
- Rear-End
- Angle
- Sideswipe – same direction
- Sideswipe – opposite direction
- Deer
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**

**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.

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

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

<table>
<thead>
<tr>
<th>Road Segment</th>
<th>Growth Trend (annual) 2007 - 2016</th>
<th>Growth Trend (annual) 2016 - 2018</th>
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</thead>
<tbody>
<tr>
<td>South of Rt. 262</td>
<td>-0.2%</td>
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<tr>
<td>Rt. 262 to City Limits</td>
<td>-1.3%</td>
<td>-3.9%</td>
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<td>City Limits to Statler Blvd.</td>
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<tr>
<td>Statler Blvd. to Hampton St.</td>
<td>-1.4%</td>
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<tr>
<td>Hampton St. to Richmond Rd.</td>
<td>-1.8%</td>
<td>-2.4%</td>
</tr>
<tr>
<td>Richmond Rd. to Commerce Rd.</td>
<td>-0.8%</td>
<td>--</td>
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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

Existing Auto Dealership Expansion
9,000 SF New Addition (ITE Code 840)

251 Additional Daily Trips
AM Peak of Adjacent Street: 12 enter / 5 exit
PM Peak of Adjacent Street: 9 enter / 13 exit

Site Plan closes the northern commercial entrance to the site and shifts middle entrance approx. 35' to the south.

New Hotel
116 Rooms (ITE Code 310)

970 Daily Trips
AM Peak of Adjacent Street: 32 enter / 23 exit
PM Peak of Adjacent Street: 35 enter / 35 exit

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

*Excel trendline formula does not provide adequate accuracy for interpolating.
2030 NO-BUILD PM PEAK HOUR TRAFFIC VOLUME
2030 No-Build PM Queue Lengths
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.