Route 301/207 Arterial Preservation Plan

*February 1, 2018 – King George County*

**Agenda**

1. Introductions
2. Purpose of Study
3. Innovative Intersections
4. Preliminary Recommendations
Purpose of Study

VDOT Statewide Program Perspective

To preserve and enhance the capacity and safety of the Commonwealth’s Arterial Preservation Network, while accommodating economic development and avoiding wide-scale road widenings

• Result in a safer arterial highway system
• Preserve and enhance corridor capacity and efficiency
• Maintain Commonwealth’s mobility & thus economic competitiveness
• Lower long-term infrastructure capital and maintenance costs
Purpose of Study
VDOT Statewide Program Perspective

State Traffic Engineer approval and District Engineer/Administrator concurrence is required for Signal Justification Reports (SJR) justifying new traffic signals on the Arterial Preservation Network.

Source: IIM-TE-387.0, July 2017
Summary of King George County Comments

December 2017 Stakeholder Meeting

• More innovative intersection options need to be considered
• Further investigate improvements between University Dr and Owens Dr
• There will be significant development near and on Rte 3
• Ongoing development and/or approved plans are occurring along US301 in King George
• Pedestrian and bicycle accommodations need to be considered along US 301/Rte 207
• What is the future traffic growth from the Nice Bridge expansion and planned development?
Study team collected weekday traffic counts on April 20, 2017. Site visits were performed and available crash data was collected. This information was used to understand and analyze existing conditions.
Existing Corridor Conditions
## Level of Service Criteria

### Table 1. Level of Service Criteria for Signalized Intersections

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Average Control Delay (sec/veh)</th>
<th>General Description (Signalized Intersections)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>≤10</td>
<td>Free Flow</td>
</tr>
<tr>
<td>B</td>
<td>&gt;10 - 20</td>
<td>Stable Flow (slight delays)</td>
</tr>
<tr>
<td>C</td>
<td>&gt;20 - 35</td>
<td>Stable flow (acceptable delays)</td>
</tr>
<tr>
<td>D</td>
<td>&gt;35 - 55</td>
<td>Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)</td>
</tr>
<tr>
<td>E</td>
<td>&gt;55 - 80</td>
<td>Unstable flow (intolerable delay)</td>
</tr>
<tr>
<td>F</td>
<td>&gt;80</td>
<td>Forced flow (jammed)</td>
</tr>
</tbody>
</table>

### Table 2. Level of Service Criteria for Unsignalized Intersections

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Average Control Delay (sec/veh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0 - 10</td>
</tr>
<tr>
<td>B</td>
<td>&gt;10 - 15</td>
</tr>
<tr>
<td>C</td>
<td>&gt;15 - 25</td>
</tr>
<tr>
<td>D</td>
<td>&gt;25 - 35</td>
</tr>
<tr>
<td>E</td>
<td>&gt;35 - 50</td>
</tr>
<tr>
<td>F</td>
<td>&gt;50</td>
</tr>
</tbody>
</table>
Existing Weekday Corridor Conditions

Signalized Intersection Delay & LOS

Un-signalized Intersection Delay & LOS

AMs
PMs
LOS A/B
LOS C/D
LOS E/F
Increasing Delay

35.4s
55.1s
37.7s
55.1s

AMs
PMs
Existing Weekday Corridor Conditions

Signalized Intersection Delay & LOS

Un-signalized Intersection Delay & LOS

LOS A/B

LOS C/D

LOS E/F

Increasing Delay
Existing Weekday Corridor Conditions

Signalized Intersection Delay & LOS
- AMs
- PMs

Un-signalized Intersection Delay & LOS
- AMs
- PMs

LOS A/B
LOS C/D
LOS E/F
Increasing Delay
Rte 207/301 Arterial Management Plan
King George County Area
2040 Traffic Growth

Study team prepared 2040 weekday traffic forecasts with available information in which traffic volumes roughly doubled from existing conditions. These volumes were used to test various levels of improvements along the corridor.
2040 Minimally Managed Weekday Corridor Conditions

<table>
<thead>
<tr>
<th>AMs PMs</th>
<th>Signalized Intersection Delay &amp; LOS</th>
<th>Un-signalized Intersection Delay &amp; LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>51.4s</td>
<td>101.5s</td>
<td>116.8s</td>
</tr>
<tr>
<td>105.4s</td>
<td></td>
<td>105.4s</td>
</tr>
</tbody>
</table>
2040 Minimally Managed Weekday Corridor Conditions

Signalized Intersection Delay & LOS

Un-signalized Intersection Delay & LOS

LOS A/B

LOS C/D

LOS E/F

Increasing Delay

17.7s
43.7s
57.5s
179.8s

2040 Minimally Managed Weekday Corridor Conditions
2040 Minimally Managed Weekday Corridor Conditions

- AMs & PMs
- Signalized Intersection Delay & LOS
- Un-signalized Intersection Delay & LOS

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

Increasing Delay

Signalized Intersection Delay & LOS
Un-signalized Intersection Delay & LOS

*Side street delay significantly higher

0.7s*
11.7s*
25.0s
184.3s
13.1s
139.4s
54.5s
165.3s

2040 Minimally Managed Weekday Corridor Conditions

AMs
PMs
LOS A/B
LOS C/D
LOS E/F

Increasing Delay

*Side street delay significantly higher
Innovative Intersections
Median U-Turn (MUT)

Poplar Tent Rd and Derita Rd Rd– Concord, NC
Median U-Turn (MUT)

Video Link at
https://www.youtube.com/watch?v=fshW_O_Xggl&t=149s
Quadrant Roadway (QR)

At-grade Quadrant at Route 4 and Ross Rd
Fairfield, OH

Grade Separated Quadrant at Lee Victory Pkwy and Old Nashville Hwy
Smyrna, TN
Quadrant Roadway (QR)

US 50 and US 15, Aldie, VA
Quadrant Roadway (QR)

Strasburg Rd and N Shenandoah Ave, Warren County, VA – Under Construction
Quadrant Roadway (QR)

Video Link at
https://www.youtube.com/watch?v=ZtIL2GqQJbs

I-77 and Hwy 73, Huntersville, NC
Continuous Green-T (CGT)

Rivers Edge Rd and Columbia Pike – Howard County, MD
Continuous Green-T (CGT)

Rock Point Rd and US 301 – Newburg, MD
Continuous Green-T (CGT)

Video Link at
https://attap.gitbooks.io/muid/content/at-grade_&_signalized/continuous_green-t.html
Restricted Crossing U-Turn (RCUT)

Liberty Church Rd and Hwy 9 – Loris, SC
Restricted Crossing U-Turn (RCUT)

North Main St and Route 460 – Blacksburg, VA
Est. Completion Fall 2018
Restricted Crossing U-Turn (RCUT)

Video Link at
https://www.youtube.com/watch?v=BLwl01NCp9I&t=190s
Route 301/207 Arterial Preservation Plan – King George Area 1
**US 301 & Rte 3 Conceptual Quadrant Roadway**

**Standard Movements**
- Disallowed movements
- Re-routed movements through quadrant roadway

Conceptual design that has not been approved. Not to be used for construction.
Route 301/207 Arterial Preservation Plan – King George Area 1

US 301 & Rte 3 Conceptual Median U-turn Roadway

Standard Movements

Disallowed movements

Re-routed movements

Conceptual design that has not been approved. Not to be used for construction.
Route 301/207 Arterial Preservation Plan – King George Area 1
US 301 & Rte 205 Conceptual Median U-turn Roadway

Conceptual design that has not been approved. Not to be used for construction.
2040 Weekday Corridor Conditions – Recommended Configurations
King George Area 2

King George Area 2

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>MUT</th>
<th>Min. Managed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CGT</td>
<td>5.4s</td>
<td>17.7s</td>
</tr>
<tr>
<td></td>
<td>14.8s</td>
<td>43.7s</td>
</tr>
<tr>
<td>AMs</td>
<td>32.7s</td>
<td>56.4s</td>
</tr>
<tr>
<td>PMs</td>
<td>48.3s</td>
<td>55.4s</td>
</tr>
<tr>
<td>LOS A/B</td>
<td>57.5s</td>
<td>179.8s</td>
</tr>
<tr>
<td>LOS C/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOS E/F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Increasing Delay
Route 301/207 Arterial Preservation Plan – King George Area 2
US 301 & Rte 218 Conceptual Continuous Green-T with U-turn area

Conceptual design that has not been approved. Not to be used for construction.
Route 301/207 Arterial Preservation Plan – King George Area 2
US 301 & Rte 206 Conceptual Median U-turn

Conceptual design that has not been approved. Not to be used for construction.
2040 Weekday Corridor Conditions – Recommended Configurations

King George Area 3

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>RCUT</th>
<th>Min. Managed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signalized</td>
<td>0.3s</td>
<td>0.7s</td>
</tr>
<tr>
<td>Un-signalized</td>
<td>1.9s</td>
<td>11.7s</td>
</tr>
</tbody>
</table>

Min. Managed:
- **AMs**: 27.0s
- **PMs**: 129.5s

Quarter:
- **MIN.**
- **Managed**

**Increasing Delay**

**LOS A/B**
- 16.7s
- 34.4s
- 165.3s

**LOS E/F**
- 139.4s
- 34.4s
- 165.3s

**LOS C/D**
- 13.1s
- 34.4s
- 165.3s
Route 301/207 Arterial Preservation Plan – King George Area 3
US 301 & Market Ctr Conceptual RCUT

Conceptual design that has not been approved. Not to be used for construction
Route 301/207 Arterial Preservation Plan – King George Area 3

US 301 & Rte 614 Conceptual Quadrant Roadway

Conceptual design that has not been approved. Not to be used for construction.
### Comparison of Configurations for 2040 Weekday Traffic Conditions

<table>
<thead>
<tr>
<th>Intersecting road with US 301</th>
<th>Minimally Managed</th>
<th>RCUT/CGT</th>
<th>MUT</th>
<th>Quadrant Roadway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rte 3</td>
<td>116.8s (105.4s)</td>
<td>17.0s (30.9s)</td>
<td>11.3s (15.1s)</td>
<td></td>
</tr>
<tr>
<td>Rte 205</td>
<td>51.4s (101.5s)</td>
<td>41.3s (28.7s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rte 218</td>
<td>17.7s (43.7s)</td>
<td>5.4s (14.8s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rte 206</td>
<td>57.5s (179.8s)</td>
<td>56.4s (55.4s)</td>
<td>32.7s (48.3s)</td>
<td></td>
</tr>
<tr>
<td>Danube Dr</td>
<td>0.7s (11.7s)</td>
<td>0.3s (1.0s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University Dr</td>
<td>27.0s (129.5s)*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market Ctr</td>
<td>13.1s (139.4s)</td>
<td>0.5s (5.7s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rte 614</td>
<td>54.5s (165.3s)</td>
<td></td>
<td>16.7s (34.4s)</td>
<td></td>
</tr>
</tbody>
</table>

*University Dr does not have any recommended innovative intersections for 2040

**AM Delay (PM Delay) in seconds**
- RCUT – Restricted Crossing U-turn
- CGT – Continuous Green-T
- MUT – Median U-turn

See innovate intersection slides for explanation
Overview for Traffic Operations & Recommendations

• Traffic demand is expected to roughly double between 2017 and 2040

• Minimally managed conditions cannot provide effective traffic flow for expected growth

• Median U-turns, RCUTs, and CGT recommendations can be pursued today as a permanent or interim solutions

• Recommend further study for Rte 205 and Rte 206 to determine when lane-widening would be appropriate

• Grade separated intersections and/or expanding US 301 from 4-lane to 6-lane should be considered between Nice Bridge and Rte 206/218 area
Geometric/Access Management Recommendations

The study team included a higher level analysis for the remaining crossovers and median openings in King George County between the Town of Port Royal and the Governor Nice Bridge.
Access Management VDOT Requirements

35 – 45 MPH XXX’
>50MPH (XXX’)

Note: Footnotes are on the previous page.
Preliminary Recommendations
King George County

Signalized Intersection
Unsignalized Intersection
Median Crossovers
Recommended Crossover Removal
Milepost
## Preliminary Recommendations
### King George County

<table>
<thead>
<tr>
<th>Milepost</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>125.6</td>
<td>Reconfigure existing crossover to a directional median allowing left turns from northbound US 301</td>
</tr>
<tr>
<td>126.6</td>
<td>Lengthen existing left-turn lanes on US 301; Future VDOT project to provide actuated advance warning prior to intersection and potential project to reconfigure intersection for RCUT; Potential for road realignment (&lt; 55°)</td>
</tr>
<tr>
<td>128.3</td>
<td>Lengthen existing turn-lanes on US 301; Expand spacing between opening in median to accommodate traffic cutting median; Potential for road realignment (&lt; 50°)</td>
</tr>
<tr>
<td>129.7</td>
<td>Construct northbound and southbound left-turn lanes; Expand spacing between opening in median to accommodate trucks turning</td>
</tr>
</tbody>
</table>
### Preliminary Recommendations

#### King George County

<table>
<thead>
<tr>
<th>Milepost</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>130.2</td>
<td>Construct northbound and southbound left-turn lanes and lengthen southbound US 301 right-turn lane storage and taper; Expand spacing between opening in median to accommodate trucks turning</td>
</tr>
</tbody>
</table>
Preliminary Recommendations
King George County

Median Crossovers
Recommended Crossover
Removal
Signalized Intersection
Unsignalized Intersection
Milepost
### Preliminary Recommendations

#### King George County

<table>
<thead>
<tr>
<th>Milepost</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>131.1</td>
<td>Construct northbound and southbound left-turn lanes on US 301</td>
</tr>
<tr>
<td>132.0</td>
<td>Construct northbound and southbound left-turn lanes on US 301</td>
</tr>
<tr>
<td>132.1</td>
<td>Construct northbound and southbound left-turn lanes on US 301</td>
</tr>
<tr>
<td>134.0</td>
<td>Eliminate multiple non-residential driveways on Rte 301. Maintain, Improve, and/or eliminate Will Loop access to Rte 301</td>
</tr>
</tbody>
</table>
**Preliminary Recommendations**

**King George County**

<table>
<thead>
<tr>
<th>Milepost</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>135.5</td>
<td>Reconfigure area for RCUT. Reconfigure existing crossovers to U-turn areas and create main crossover near mini-storage. Possible site for future residential development</td>
</tr>
<tr>
<td>136.0</td>
<td>Lengthen existing southbound left-turn lane on US 301; Construct northbound left-turn lane on US 301. Potential for road realignment (&lt; 50°)</td>
</tr>
</tbody>
</table>
## Preliminary Recommendations
### King George County

<table>
<thead>
<tr>
<th>Milepost</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>135.5</td>
<td>Construct northbound and southbound left-turn lanes on US 301. Construct northbound right-turn lane on US 301.</td>
</tr>
<tr>
<td>135.8</td>
<td>Construct northbound and southbound left-turn lanes on US 301.</td>
</tr>
</tbody>
</table>
Preliminary Recommendations
King George County

- Poplar Neck Rd
- Rte 206
- Danube Dr
- University Dr
- Market Ctr
- Harry W Nice Bridge
- Barnsfield Rd
- Roseland Rd

Symbols:
- Signalized Intersection
- Unsignalized Intersection
- Median Crossovers
- Recommended Crossover Removal
- Milepost
## Preliminary Recommendations

**King George County**

<table>
<thead>
<tr>
<th>Milepost</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>138.0</td>
<td>Construct northbound left-turn lanes on US 301</td>
</tr>
<tr>
<td>138.1</td>
<td>Construct southbound left-turn lanes and lengthen existing northbound left-turn lane on US 301</td>
</tr>
</tbody>
</table>
Open Discussion