Russell Road at US 1 Jefferson Davis Highway Near Quantico Marine Corps Base

Public Involvement Coordination Virtual Update
October 2020
PRESENTATION OUTLINE

- VDOT STARS Program Overview
- Study Overview & Purpose
- Existing Roadway, Traffic & Safety Conditions
- Study Progress
- Alternatives Summary
  - Western Intersection
  - Eastern Intersection
- Next Steps
STARS Program Goals

- **Method**: Develop comprehensive and innovative transportation solutions using:
  - Data-driven approaches based on congestion & safety
  - Multi-disciplinary analysis method
  - Involvement and input from multiple stakeholders

- **Objective**: Identifying alternatives that relieve congestion and solve critical safety needs for lower cost.

- **Overall Goal**: Develop solutions that can be programmed into the VDOT SYIP (Six-Year Improvement Plan)
  - All projects compete for funding based on combination of factors including congestion mitigation, safety and overall project cost.
  - There is no current funding source identified for design or construction of specific projects.
Russell Road Corridor Overview

Key focus areas:
- US 1 at Russell Road interchange
- Russell Road from I-95 east over US 1 to the MCBQ Gate

Study Area Characteristics:
- 1 mile section of Russell Road– 2 lanes with turn bays
- 3 signalized intersections at I-95
- 2 unsignalized intersections at US 1

Traffic Volumes
- Average Daily Traffic: 12,000 vpd
- Gate Traffic: 14,000 vpd

Network Connectivity
- Classified as Minor Arterial
- Connects I-95 to US 1
- Connects eastern & western sections of MCB Quantico

Quantico Master Plan show bicycles share lanes / no pedestrian facilities
Purpose of the Russell Road at US 1 Interchange Study

1. Improve safety & reduce crashes
2. Reduce overall congestion
3. Improve access to MCB Quantico Gate
   • Eastern intersection regularly requires cones and police control in AM peak
   • Without police control, potential for queuing onto US 1
4. During I-95 incidents, diversions to US 1 restrict flow and local access.
   • Maintain access to/from MCB Quantico Gate
   • Maintain access between the Western and Eastern sections of MCB Quantico
Improvements NOT Considered for STARS Study

• Regional improvements that may be needed, but are unable to be funded as STARS program:
  • Widening of I-95
  • Widening of US 1
    • In 2013, a US 1 Corridor Study was conducted
    • Recommended US 1 widening to six-lanes with a median, outside shoulders and other improvements.

Local improvements that were examined, but are likely beyond the funding limits for STARS include:

• Improvements to US 1 at Corporate Drive signalized intersection
  • Requires widening of US 1 & access restrictions
**RUSSELL ROAD INTERCHANGE AT US 1 – SITE CONDITIONS & CONSTRAINTS**

### Condition
- No signal or left turns stopping flow on US 1
- No signals at ramp intersections with Russell Road
- Two lanes on Russell Road including existing bridge
- US 1 – no widening can occur under existing bridge

### Constraints
- Back Gate to MCB located 400 feet east of interchange
- Locust Shade Park in NW quadrant
- Wetlands & archeological site in SE quadrant
- Utility strip through SW & NW quadrant
Russell Road Gate to MCB Quantico

- 400 foot spacing from interchange
- Queuing depends on volumes, but also security status & lanes
- Russell Rd widens from 2 lanes at interchange to 5 lanes
- High volumes of left turns from ramp complicate operations & can queue back to US 1
LONG TERM - BRIDGE WIDENING FOR RUSSELL RD OVER US 1

- Built in 1957, reconstructed in 1987
- Ultimate bridge widening would require longer bridge to allow widening of US 1 in the future
- Estimated project cost for complete replacement is likely $25M
  - Likely exceeds funding available through STARS
- Intersection improvements on Russell Road more critical for reducing congestion
- May be possible to build adjacent two lane bridge and keep existing bridge for lower project cost
4 crashes on Russell Rd
34 crashes on US 1

Observations:

- Tight section on US 1 with narrow concrete median and minimal shoulders
- High percentage (42%) of rear end crashes on US 1 indicative of congested operations (stop & go)
- SB US 1 at RIRO ramp access has high volume of crashes
  - Tight merge areas
  - Occasional ramp queuing back to US 1
  - Sight distance issues due to trees
- 3 fixed object crashes under bridge
11 options were considered in 1st screening:

- Widening Russell Road & Add Signals, Partial Clover with New Ramps, Enhanced Quadrant Options, & Concepts with US 1 Signals
- Options did not include new Russell Road bridge or US 1 widening
- Screening included 2045 Traffic Capacity & Comparison Matrix

Options Eliminated:

- Quadrants & Concepts requiring US 1 Signals not viable due to US 1 congestion & required replacement of Russell Road bridge
- Partial Clover using NW Quadrant had reduced traffic benefits & impacted Park

Selected for Further Analysis:

- Russell Road Widening with Signals
- Partial Clover Options including New Ramp(s)

Due to Russell Road bridge, options for West & East intersections can be tested separately and combined in final alternative
Key Focus Area – US 1 at Russell Road Interchange

**Western Intersection:**
- Traffic signal required in short term.
- Left turn from ramp expected to have queues that extend onto US 1 without improvements.
- Westbound left to US 1 SB forecast to have queues that block westbound flow over the existing 2-lane bridge.

**Eastern intersection:**
- Left turn loop from ramp to the MCB gate is the critical movement.
- Traffic signal and widening required in short term.
- US 1 NB loop ramp queuing is forecast to extend onto US 1, particularly in the AM peak without improvements.
WESTERN INTERSECTION

No Build - Unsignalized

Alt. W1 – Minimal Improvements & Install Signal

Alt. W2 – Widen Russell Road to 4 Lanes & Install Signal
Western Intersection: No Build – Unsignalized Intersection

Existing Issues:
• No traffic signal.
• 11-foot lanes on Russell Road.
• Westbound merge on Russell Rd at intersection introduces conflict point.

Intersection Operations
• LOS F operations in 2020 in AM peak.
• By 2045, poor LOS F in AM & PM peaks.
• Queuing on the ramp approach to Russell Road nearly utilizes entirety of storage in 2020.
• Queuing back to US 1 introduces safety issues.
• “Free flow” right turns blocked.

<table>
<thead>
<tr>
<th>Western Intersection</th>
<th>2020 AM/PM LOS &amp; Queue</th>
<th>2045 AM/PM LOS &amp; Queue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of Service</td>
<td>F / F</td>
<td>F / F</td>
</tr>
<tr>
<td>Average Delay / Vehicle</td>
<td>124.5 / 253.5 sec</td>
<td>589.4 / 5110.0 sec</td>
</tr>
<tr>
<td>95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1)</td>
<td>784' / 384'</td>
<td>1,602' / 544'</td>
</tr>
</tbody>
</table>
Western Intersection: Alt. W1 - Minimal Improvements & Install Conventional Signal

Proposed Improvements
• Install traffic signal.
• Widen lanes to 12 ft.
• Remove westbound merge on Russell Rd at intersection.

Intersection Operations
• LOS F in 2045 in both peak hours.
• Queues on the ramp approach to Russell Road extend to US 1 in AM peak.
• Queuing on WB Russell Rd backs onto existing bridge in PM peak.

<table>
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<tr>
<td>Level of Service</td>
<td>F / F</td>
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<tr>
<td>Average Delay / Vehicle</td>
<td>142.0 / 87.0 sec</td>
</tr>
<tr>
<td>95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1)</td>
<td>1,096’ / 486’</td>
</tr>
<tr>
<td>95% Queue on WB Russell Rd Approach (600 ft available before extends onto bridge)</td>
<td>283’ / 705’</td>
</tr>
</tbody>
</table>

Estimated Project Cost
Low
**Proposed Improvements:**
- Install traffic signal.
- Widen Russell Road to 4 lanes between US 1 bridge & I-95.
- Convert free flow right turn from ramp to a signal controlled right turn.

**Intersection Operations:**
- LOS C or better operations in 2045.
- Queuing does not extend onto US 1 or the existing bridge on Russell Road.

**Western Intersection: Alt. W2 - Add Traffic Signal & Widen Russell Road to 4 Lanes**

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<tbody>
<tr>
<td>Level of Service</td>
<td>C / B</td>
</tr>
<tr>
<td>Average Delay / Vehicle</td>
<td>21.4 / 13.8 sec</td>
</tr>
<tr>
<td>95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1)</td>
<td>418’ / 120’</td>
</tr>
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</table>
# Alternatives Comparison – Western Intersection

<table>
<thead>
<tr>
<th>CONCEPTS</th>
<th>2045 Traffic Operations</th>
<th>Additional Factors &amp; Impacts</th>
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<tr>
<td></td>
<td>Congestion LOS AM/PM</td>
<td>Safety Critical Queues</td>
</tr>
<tr>
<td>Conventional Signal</td>
<td>F* / F</td>
<td>Queues back to US 1 NB in AM by 2020</td>
</tr>
<tr>
<td>No-Build (Unsignalized)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1 - New Ramp in SE Quadrant</td>
<td>D / C</td>
<td>Queues get close but not forecast to reach US 1</td>
</tr>
<tr>
<td>Conventional Signal plus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Widening &amp; Signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2 - New Ramp in SE Quadrant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional Signal plus</td>
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<td></td>
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<tr>
<td>Widening &amp; Signal</td>
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<td></td>
</tr>
<tr>
<td>E3 - Widen with Conventional</td>
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<td></td>
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<tr>
<td>Signal</td>
<td></td>
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<tr>
<td><strong>Legend:</strong></td>
<td><strong>Very Good</strong></td>
<td><strong>Good</strong></td>
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</tbody>
</table>
EASTERN INTERSECTION

No Build – Unsignalized
Alt. E1 – Minimal Improvements & Install Signal
Alt. E2 – Widen Russell Road to 4 Lanes & Install Conventional Signal
Alt. E3 – Widen Russell Road to 4 Lanes & Install Green Tee Signal
**Existing Issues:**

- No traffic signal.
- Marine Corps Base gate is located 400 feet to the east.
- At AM peak, traffic cones and police-controlled operations are present to allow left turns from loop ramp to turn toward MCB gate.

**Intersection Operation**

- LOS F operations in 2020 in AM peak.
- By 2045, poor LOS F in AM and PM peaks.
- Queuing on the ramp approach to Russell Road extend beyond the ramp onto US 1 as early as 2020 AM Peak.
- Queuing back to US 1 introduces safety issues.

### Western Intersection

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<tr>
<td><strong>Level of Service</strong></td>
<td>F*/C</td>
<td>F*/F</td>
</tr>
<tr>
<td><strong>Average Delay / Vehicle</strong></td>
<td>1690.9 / 17.1 sec</td>
<td>6275.6 / 120.0 sec</td>
</tr>
<tr>
<td><strong>95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1)</strong></td>
<td>2,222’ / 156’</td>
<td>3,198’ / 286’</td>
</tr>
</tbody>
</table>
Eastern Intersection: Alt. E1
Widen & Install Conventional Signal

**Proposed Improvements**
- Install traffic signal.
- Improve loop ramp - Add double left turn and convert free-flow right turn to signal control.
- Widen Russell Road to 4 lanes (2 eastbound and 2 westbound through lanes) to increase capacity.

**Intersection Operations**
- By 2045, LOS D/C in the AM/PM peak hour, respectively.
- Queuing on the loop ramp approach to Russell Road does not extend onto US 1 by 2045.

### Estimated Project Cost
- Medium

### Proposed Improvements
- Install traffic signal.
- Improve loop ramp - Add double left turn and convert free-flow right turn to signal control.
- Widen Russell Road to 4 lanes (2 eastbound and 2 westbound through lanes) to increase capacity.

### Intersection Operations
- By 2045, LOS D/C in the AM/PM peak hour, respectively.
- Queuing on the loop ramp approach to Russell Road does not extend onto US 1 by 2045.

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<tr>
<td>Average Delay / Vehicle</td>
<td>41.8 / 24.8 sec</td>
</tr>
<tr>
<td>95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1)</td>
<td>757’ / 472’</td>
</tr>
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Eastern Intersection: Alt. E2
Add Ramp to SE Quadrant & Install Signal

Proposed Improvements

• Build new 1-way ramp in SE quadrant.
• Install conventional traffic signal allowing the new SE ramp traffic to bypass signal.
• Revise loop ramp – Remove left turn and convert free-flow right turn to signal control.
• Widen Russell Road westbound and eastbound to 2 through lanes in each direction.

Intersection Operations

• LOS A/A operations in 2045 AM and PM peaks.
• No queueing on ramp.

Other Impacts

• Impacts to wetlands and archaeological site.

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<td>A / A</td>
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<tr>
<td>Average Delay / Vehicle</td>
<td>2.0 / 0.5 sec</td>
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<tr>
<td>95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1)</td>
<td>0’ / 0’</td>
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Estimated Project Cost
Very High

Estimated Project Cost
$43.6 M
Eastern Intersection: Alt. E3
Widen & Install Green-T Signal

Proposed Improvements
• Install Green-T traffic signal to allow EB throughs to maintain continuous green (even when dual left is occurring).
• Improve loop ramp - Add double left turn and convert free-flow right turn to signal control.
• Widen Russell Road westbound to 2 through lanes.
• Widen and taper Russell Road eastbound to separate from dual left turning traffic.

Intersection Operations
• LOS B/C operations in 2045 AM and PM peaks.
• Queuing on the loop ramp approach to Russell Road does not extend onto US 1 by 2045.

Other Items
• Simplifies maintenance-of-traffic when bridge is to be replaced.

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<td>Level of Service</td>
<td>B / C</td>
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<tr>
<td>Average Delay / Vehicle</td>
<td>13.9 / 31.2 sec</td>
</tr>
<tr>
<td>95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1)</td>
<td>189’ / 472’</td>
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## Alternatives Comparison – Eastern Intersection

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<td>Eastern Intersection Options</td>
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<td>No-Build (Unsignalized)</td>
<td>F* / F</td>
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<tr>
<td>E2 - New Ramp in SE Quadrant plus Widening &amp; Signal</td>
<td>A / A</td>
<td>Minimal Queuing &amp; SE ramp is free flow</td>
</tr>
<tr>
<td>E3 - Widen with Conventional Signal</td>
<td>B / C</td>
<td>Not critical</td>
</tr>
</tbody>
</table>

**Legend:**
- **Very Good**
- **Good**
- **Average or Acceptable**
- **Poor**
- **Very Poor**
• Provide responses to public input survey at the following link: www.virginiadot.org/RussellRoadStudy

• Metroquest Survey opens October 5th, 2020 and closes October 16th, 2020

• VDOT and Prince William County to identify preferred alternative and refine taking into account public feedback

• Study recommendations and final report are expected to be finalized and posted online in December 2020
Your input is essential as we evaluate potential improvement alternatives.
Please take our survey located on our project website!

www.virginiadot.org/RussellRoadStudy

Comments may also be sent to:
meetingcomments@vdot.virginia.gov