

STARS

STRATEGICALLY TARGETED AND
AFFORDABLE ROADWAY SOLUTIONS

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**

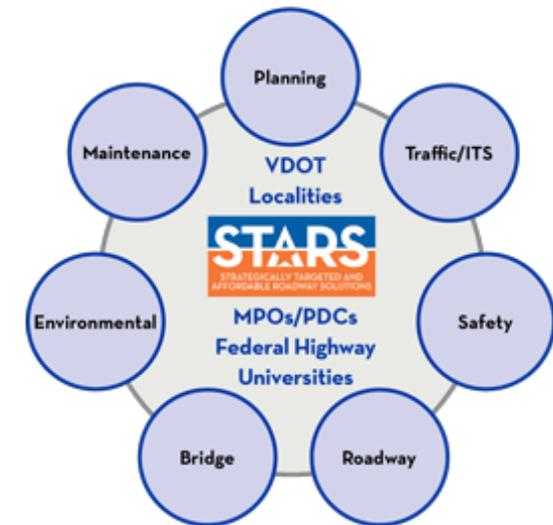


STARS Program Goals

- **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.

Strategically Targeted &
Affordable Roadways Solutions

STARS Project Stakeholders



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

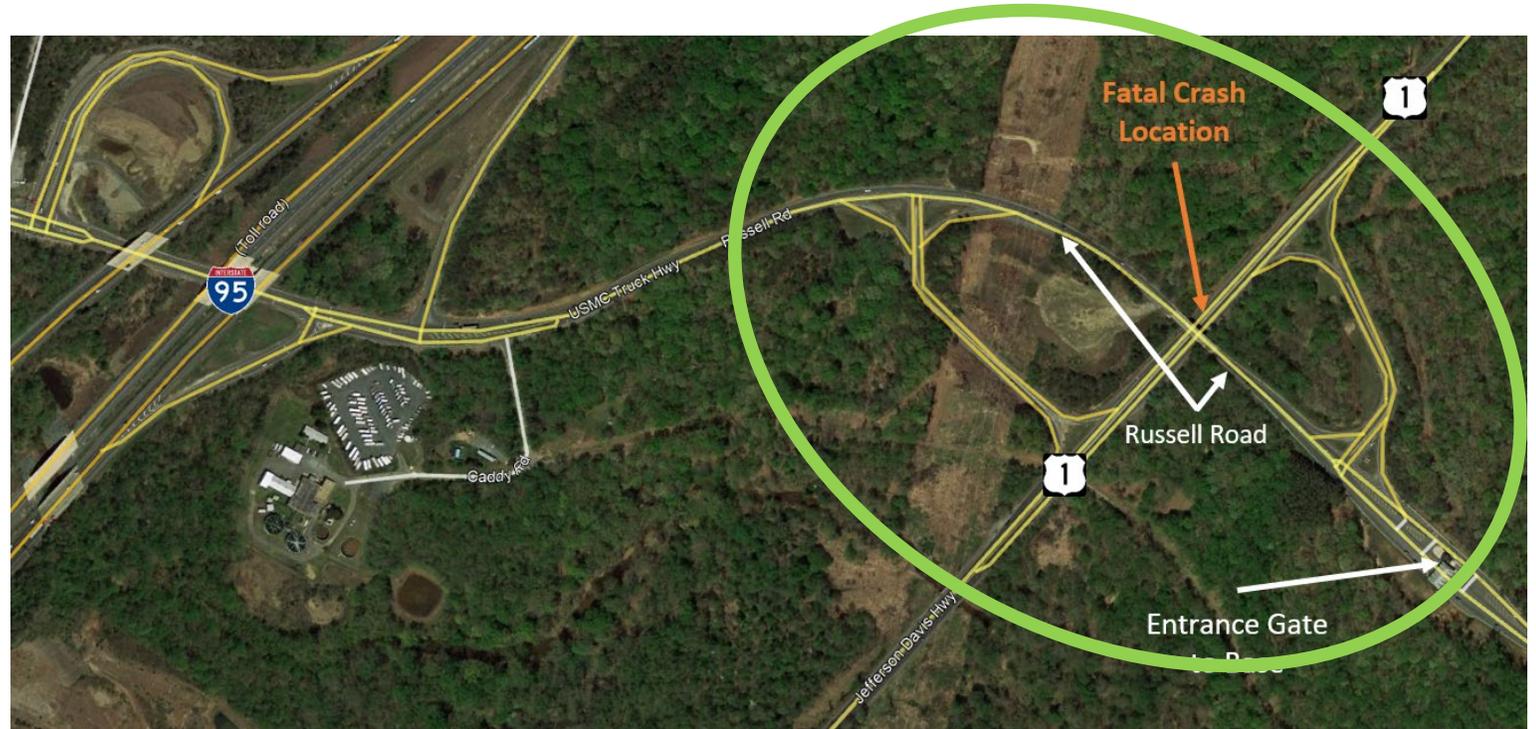
Traffic Volumes

- 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

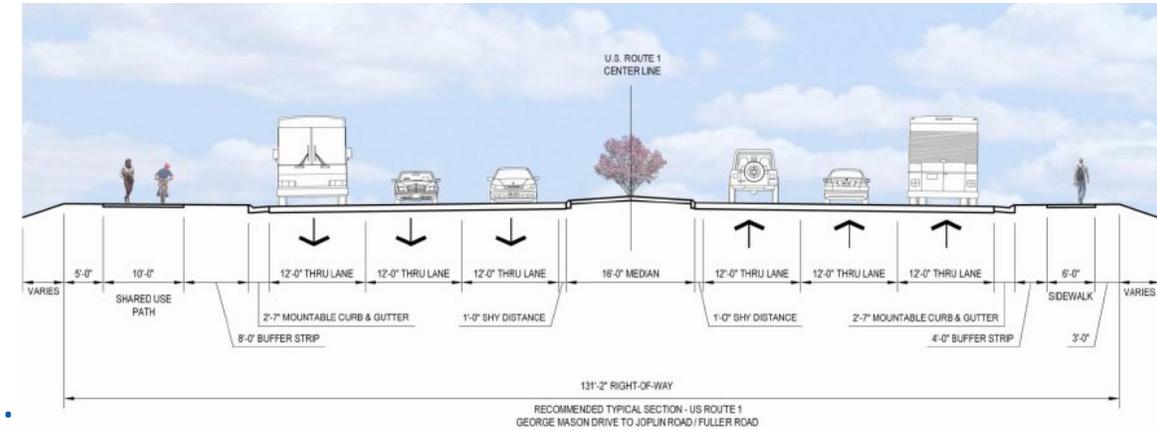


Improvements NOT Considered for STARS Study

- 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



Recommended US 1 Cross Section from 2013 US 1 Corridor Study



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

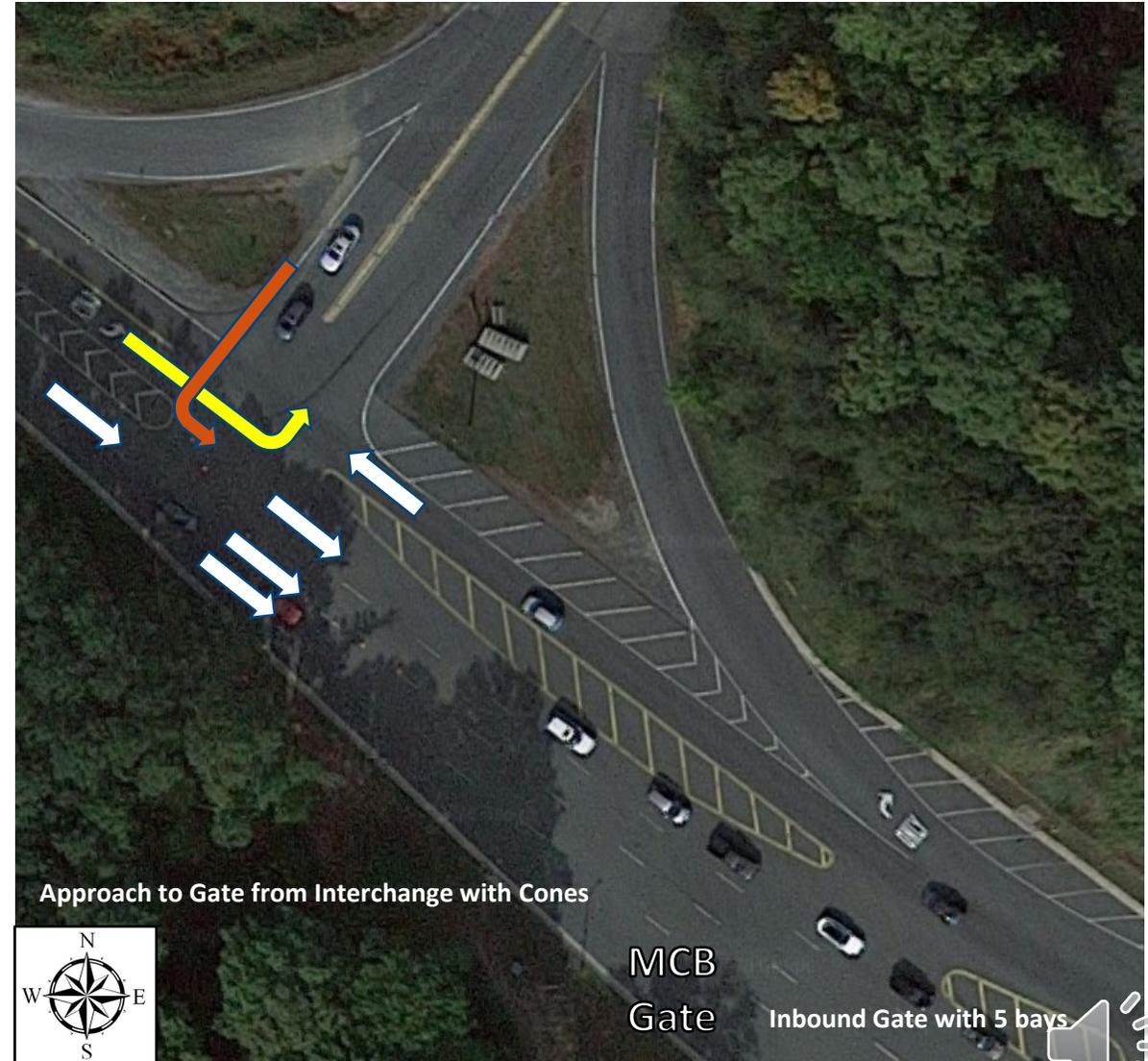
■ Constraints

- 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



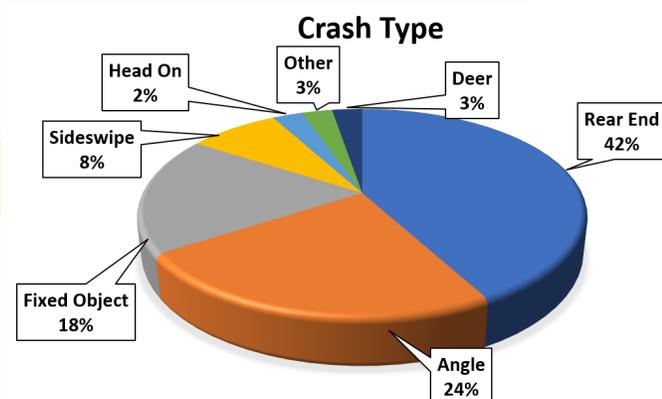
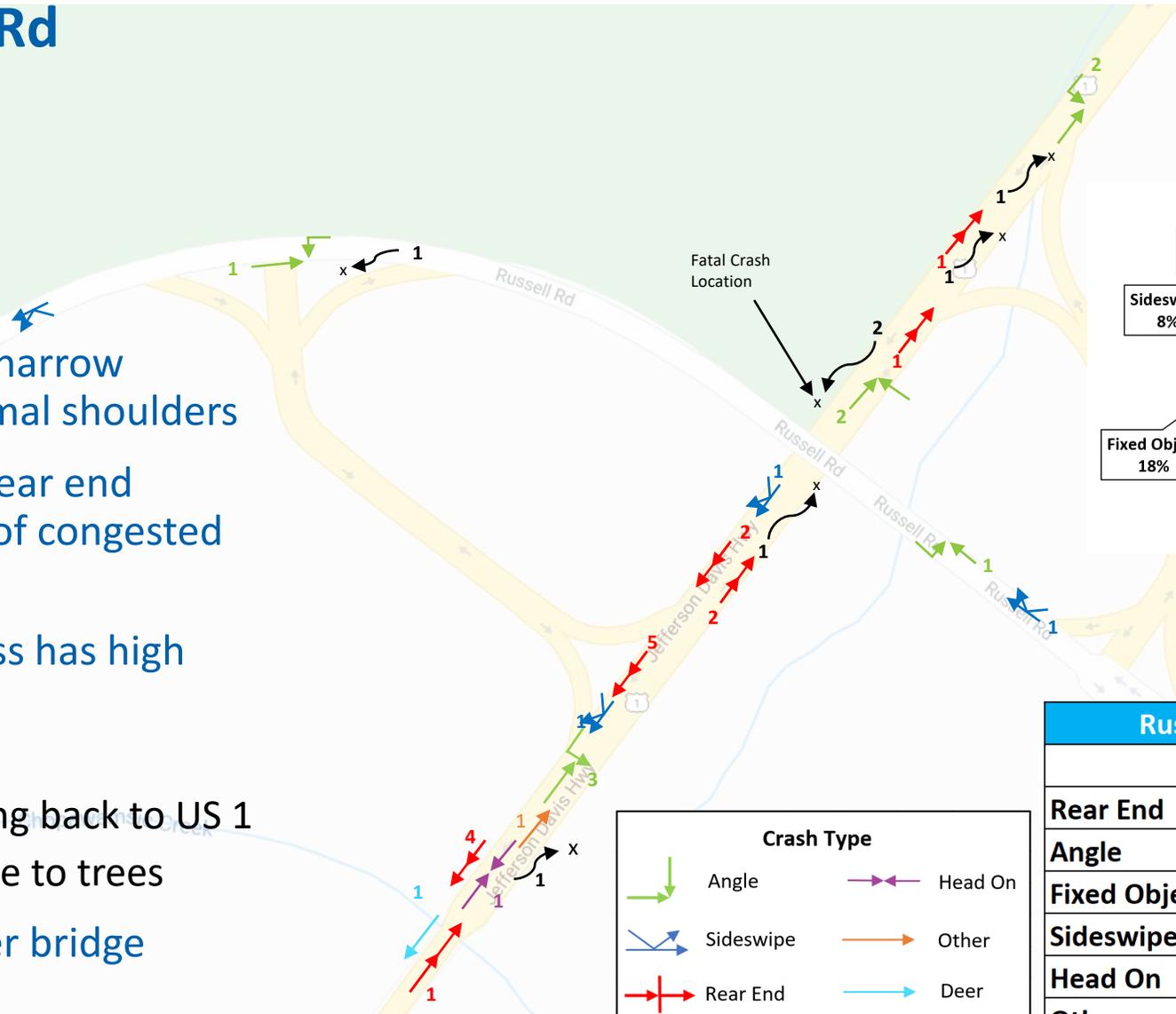
- Built in 1957, reconstructed in 1987
- Ultimate bridge widening would require longer bridge to allow widening of US 1 in the future
- Estimated project cost for complete replacement is likely \$25M
 - Likely exceeds funding available through STARS
- Intersection improvements on Russell Road more critical 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

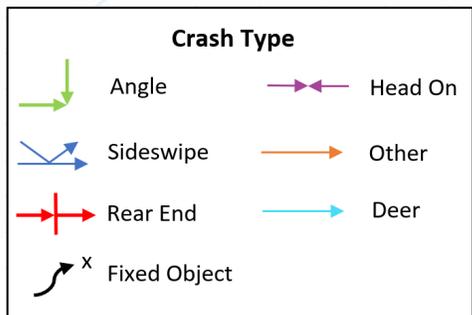
34 crashes on US 1

Observations:

- Tight section on US1 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

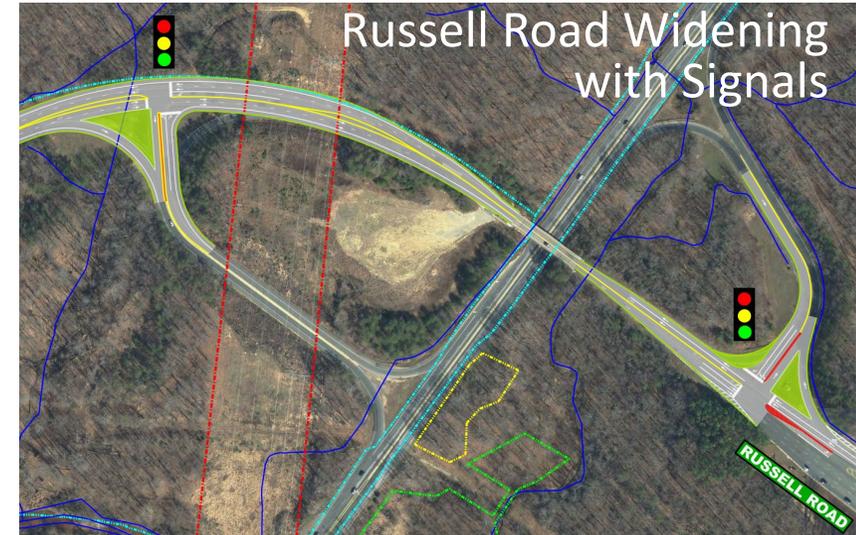


Russell Road and US-1 Interchange						
	Total	K	A	B	C	PDO
Rear End	16	0	1	2	2	11
Angle	9	0	2	1	0	6
Fixed Object	7	1	1	0	0	5
Sideswipe	3	0	1	2	0	0
Head On	1	0	1	0	0	0
Other	1	0	0	0	0	0
Deer	1	0	0	0	0	0



US 1 AT RUSSELL ROAD INTERCHANGE CONCEPTS

- **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**



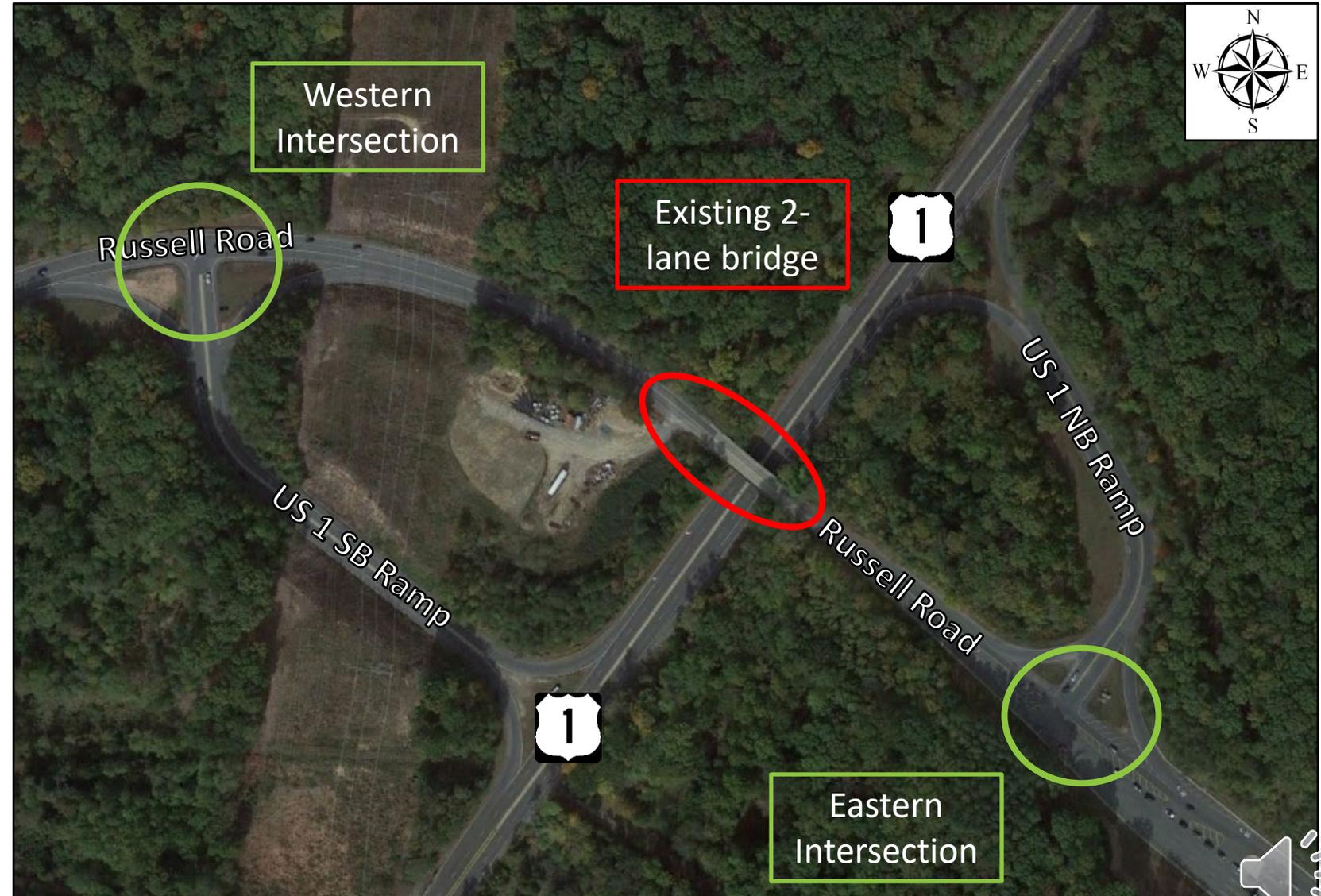
Key Focus Area – US 1 at Russell Road Interchange

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

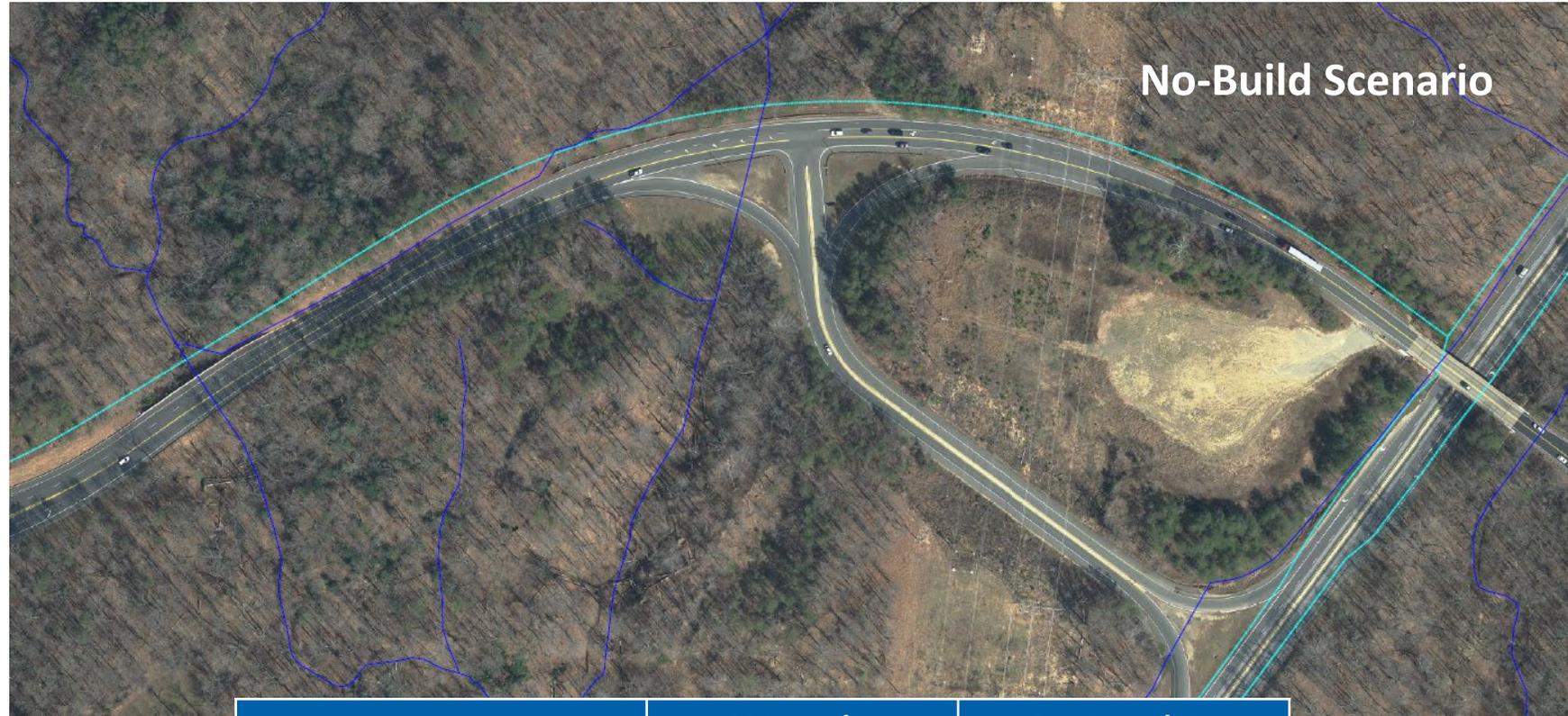
Western Intersection: No Build – Unsignalized Intersection

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.



Western Intersection	2020 AM/PM LOS & Queue	2045 AM/PM LOS & Queue
Level of Service	F / F	F / F
Average Delay / Vehicle	124.5 / 253.5 sec	589.4 / 5110.0 sec
95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1	784' / 384'	1,602' / 544'

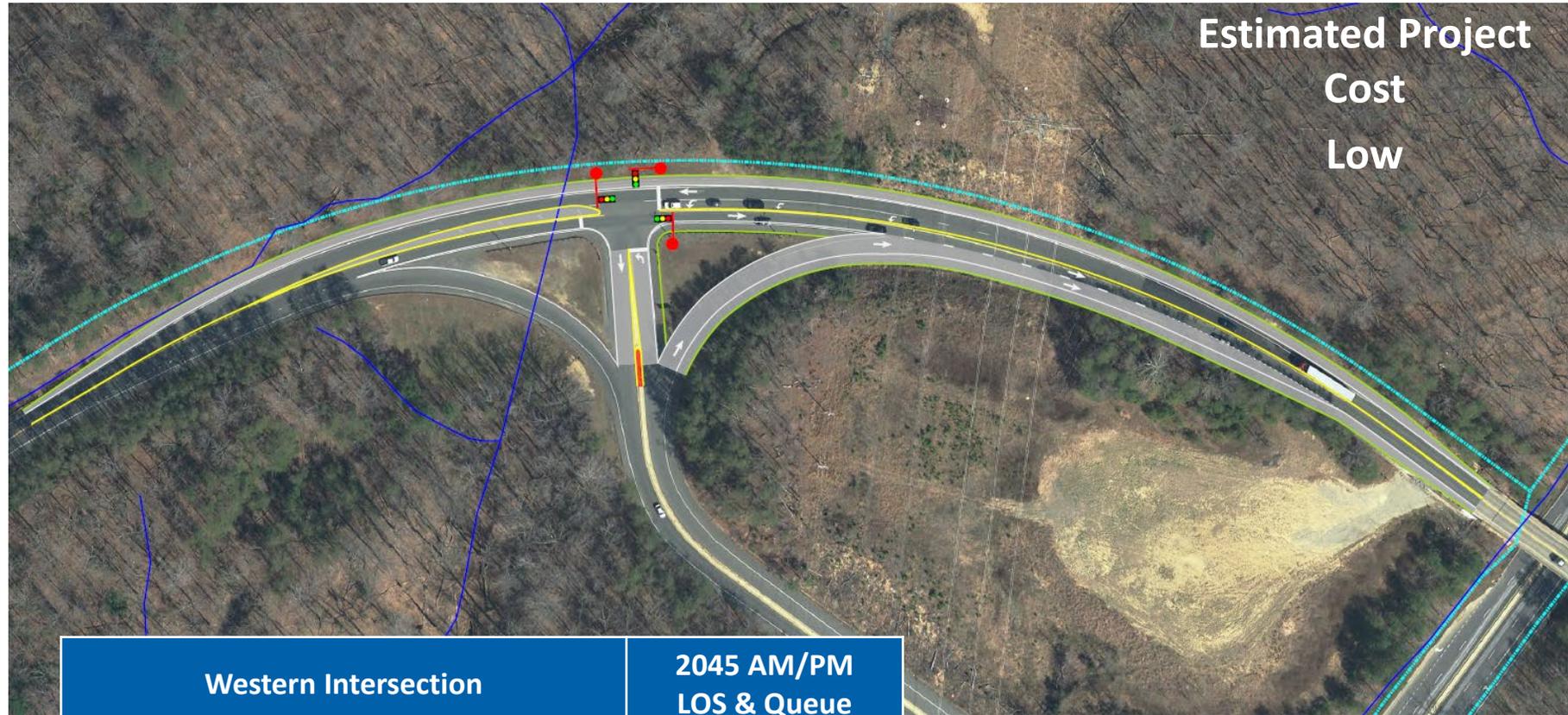
Western Intersection: Alt. W1 - Minimal Improvements & Install Conventional Signal

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.



Western Intersection	2045 AM/PM LOS & Queue
Level of Service	F / F
Average Delay / Vehicle	142.0 / 87.0 sec
95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1)	1,096' / 486'
95% Queue on WB Russell Rd Approach (600 ft available before extends onto bridge)	283' / 705'

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

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	2045 AM/PM LOS & Queue
Level of Service	C / B
Average Delay / Vehicle	21.4 / 13.8 sec
95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1	418' / 120'

ALTERNATIVES COMPARISON – WESTERN INTERSECTION

CONCEPTS	2045 Traffic Operations		Additional Factors & Impacts
	Congestion LOS AM/PM	Safety Critical Queues	
Eastern Intersection Options			
No-Build (Unsignalized)	F* / F	Queues back to US 1 NB in AM by 2020	None
E1 - Widen with Conventional Signal	D / C	Queues get close but not forecast to reach US 1	Minimal Impacts
E2 - New Ramp in SE Quadrant plus Widening & Signal	A / A	Minimal Queuing & SE ramp is free flow	Impacts archaeological site & wetlands
E3 - Widen with Conventional Signal	B / C	Not critical	Minimal Impacts Simplifies future MOT for replacing bridge

Legend:	Very Good	Good	Average or Acceptable	Poor	Very Poor
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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

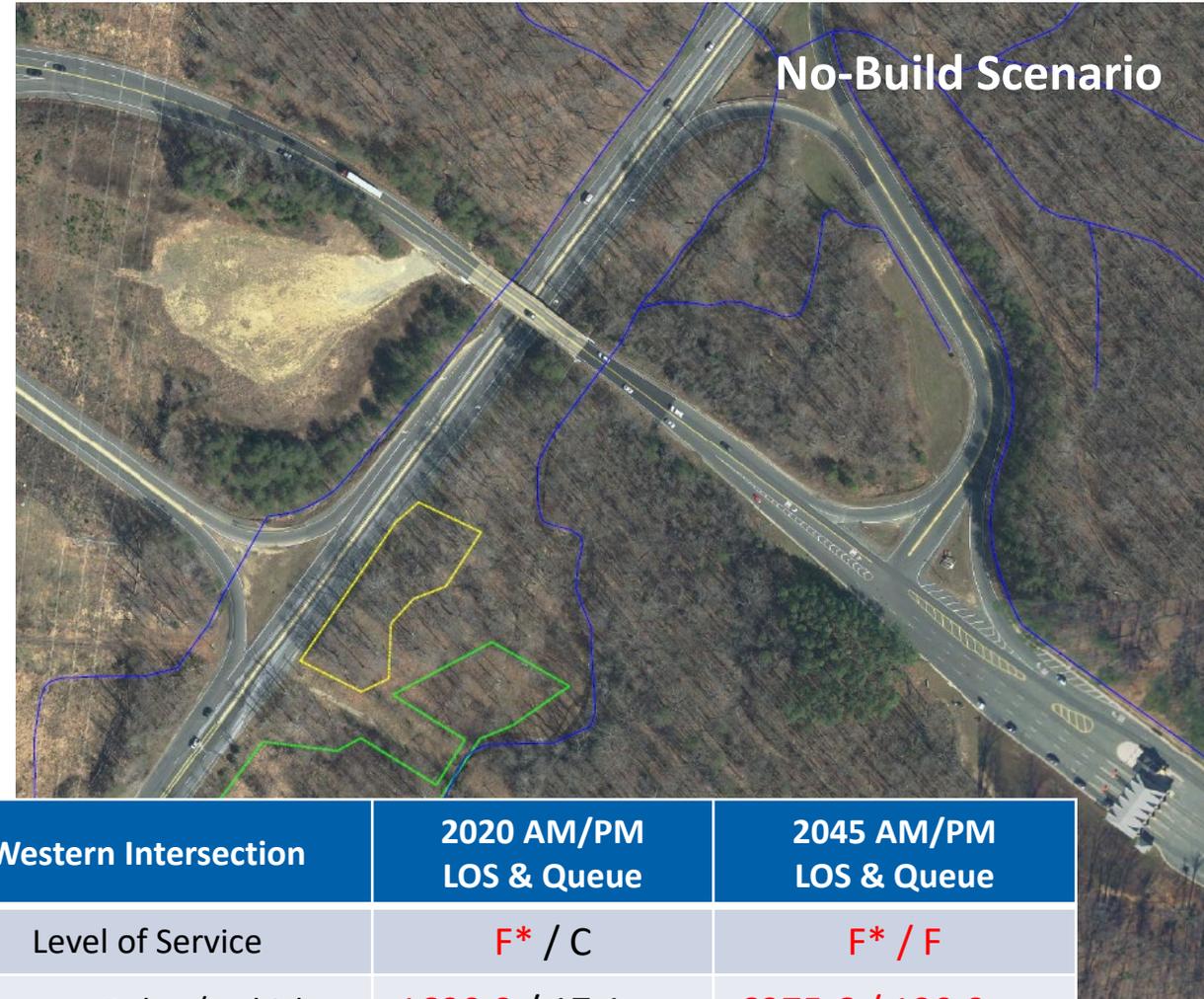
Eastern Intersection: No Build – Unsignalized Intersection

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	2020 AM/PM LOS & Queue	2045 AM/PM LOS & Queue
Level of Service	F* / C	F* / F
Average Delay / Vehicle	1690.9 / 17.1 sec	6275.6 / 120.0 sec
95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1	2,222' / 156'	3,198' / 286'

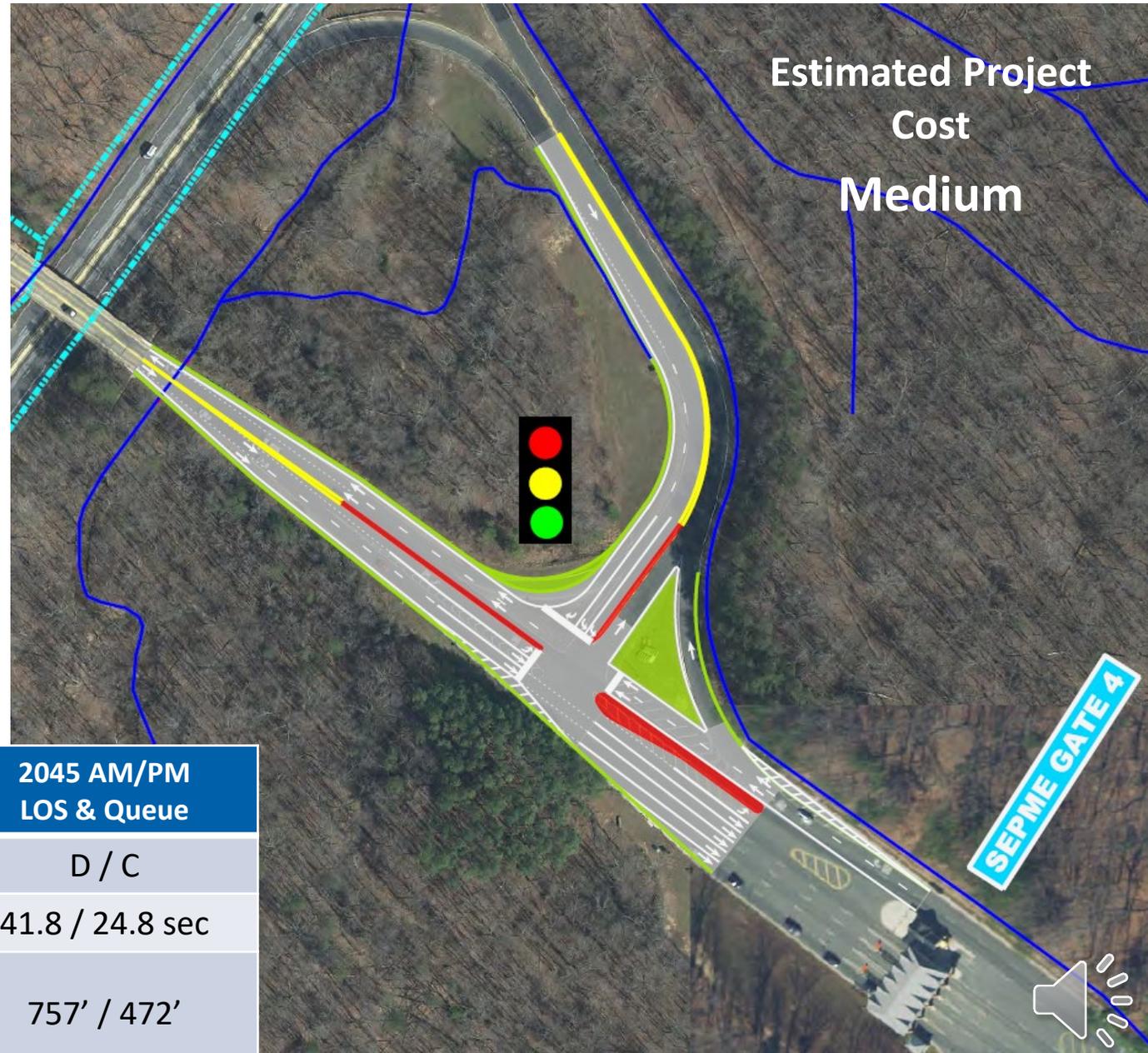
Eastern Intersection: Alt. E1 Widen & Install Conventional Signal

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.



Western Intersection	2045 AM/PM LOS & Queue
Level of Service	D / C
Average Delay / Vehicle	41.8 / 24.8 sec
95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1	757' / 472'

Eastern Intersection: Alt. E2

Add Ramp to SE Quadrant & Install Signal

Proposed Improvements

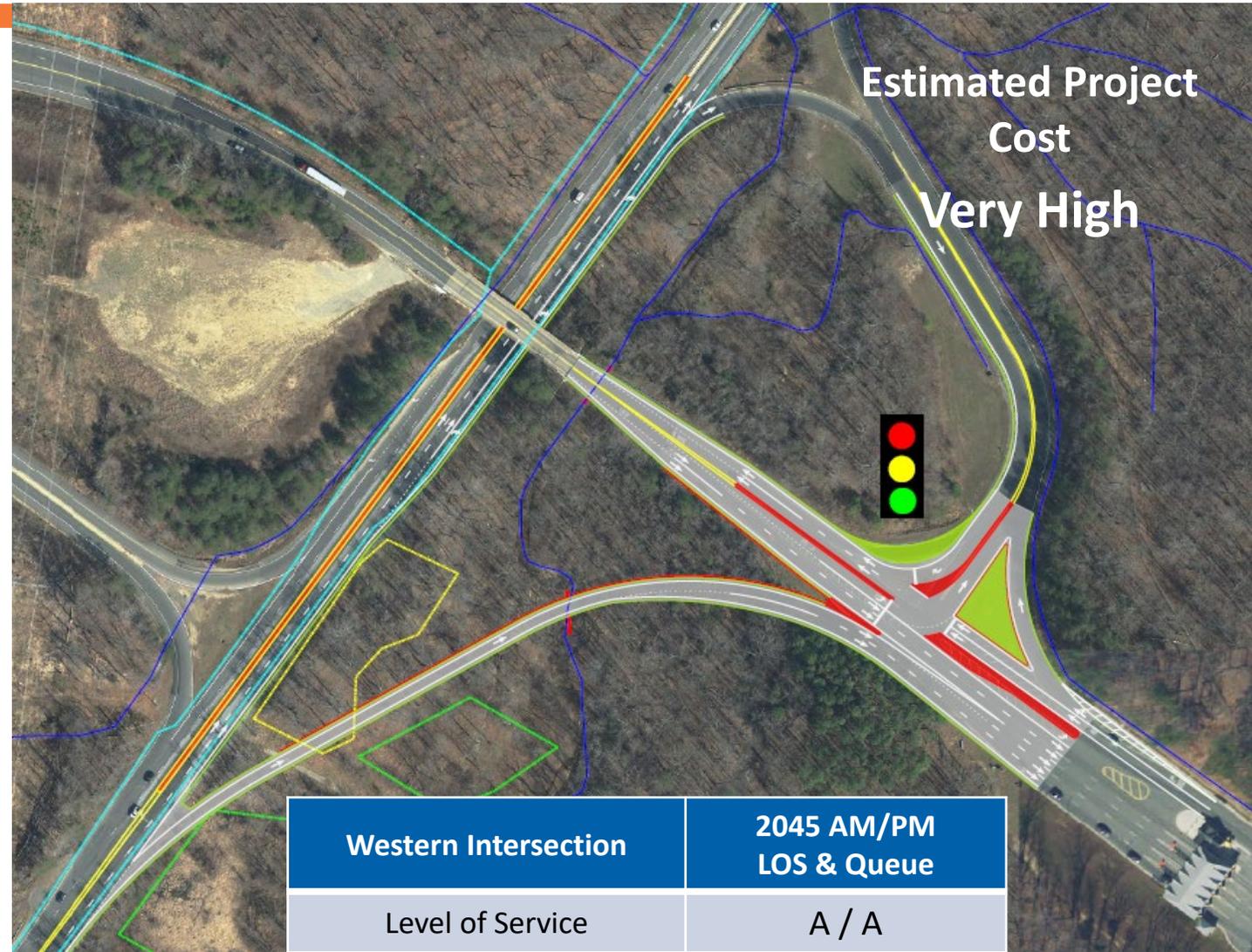
- Build new 1-way ramp in SE quadrant.
- Install conventional traffic signal allowing the new SE ramp traffic to bypass signal.
- Revise loop ramp – Remove left turn and convert free-flow right turn to signal control.
- Widen Russell Road westbound and eastbound to 2 through lanes in each direction.

Intersection Operations

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

Other Impacts

- Impacts to wetlands and archaeological site.



Western Intersection	2045 AM/PM LOS & Queue
Level of Service	A / A
Average Delay / Vehicle	2.0 / 0.5 sec
95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1)	0' / 0'

Eastern Intersection: Alt. E3 Widen & Install Green-T Signal

Proposed Improvements

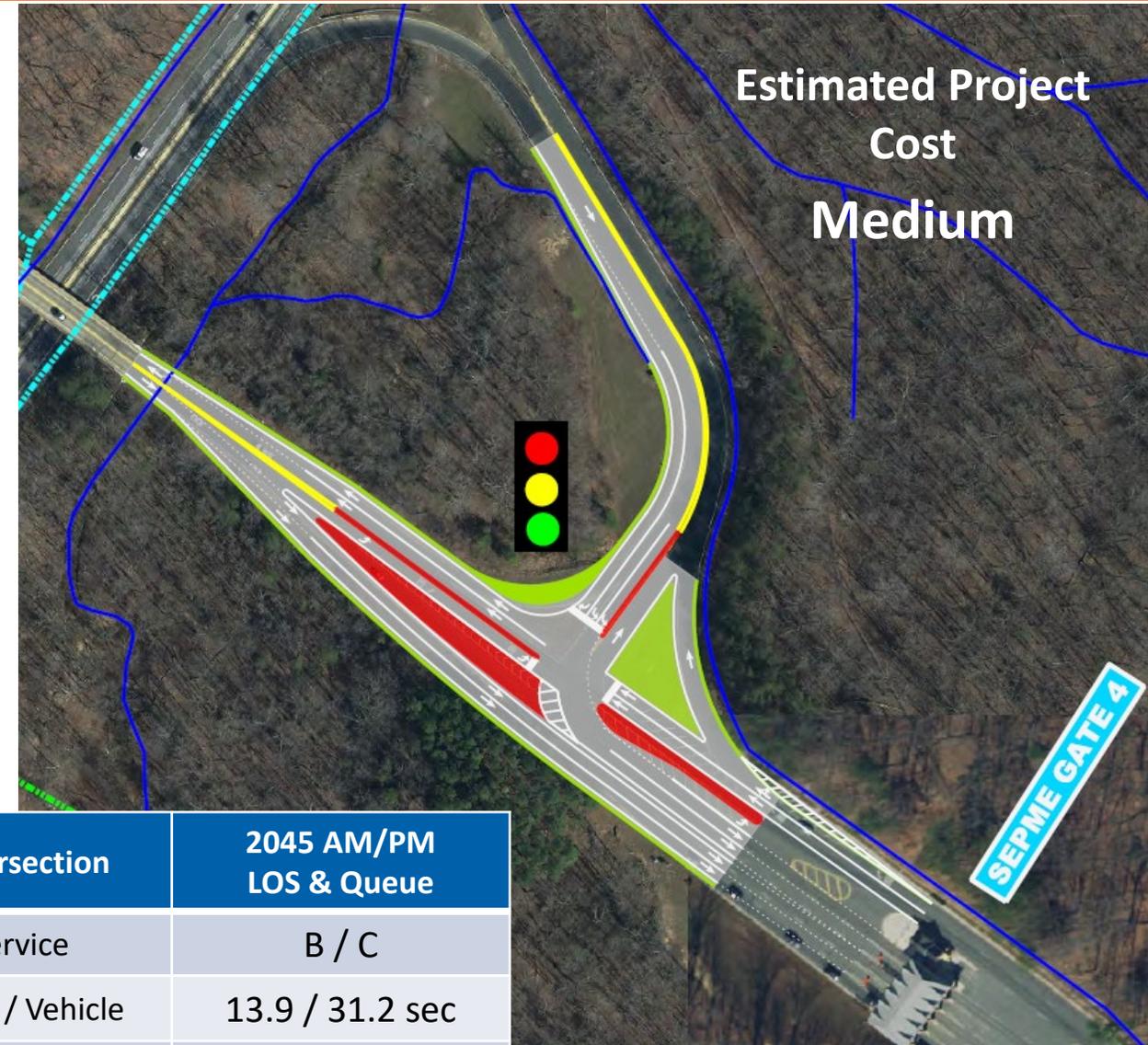
- Install Green-T traffic signal to allow EB throughs to maintain continuous green (even when dual left is occurring).
- Improve loop ramp - Add double left turn and convert free-flow right turn to signal control.
- Widen Russell Road westbound to 2 through lanes.
- Widen and taper Russell Road eastbound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



Western Intersection	2045 AM/PM LOS & Queue
Level of Service	B / C
Average Delay / Vehicle	13.9 / 31.2 sec
95% Queue on Ramp Approach (850 ft available on ramp before spills onto US 1)	189' / 472'

ALTERNATIVES COMPARISON – EASTERN INTERSECTION

CONCEPTS	2045 Traffic Operations		Additional Factors & Impacts
	Congestion LOS AM/PM	Safety Critical Queues	
Eastern Intersection Options			
No-Build (Unsignalized)	F* / F	Queues back to US 1 NB in AM by 2020	None
E1 - Widen with Conventional Signal	D / C	Queues get close but not forecast to reach US 1	Minimal Impacts
E2 - New Ramp in SE Quadrant plus Widening & Signal	A / A	Minimal Queuing & SE ramp is free flow	Impacts archaeological site & wetlands
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Legend:	Very Good	Good	Average or Acceptable	Poor	Very Poor
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NEXT STEPS

- 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

THANK YOU!

**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