Rappahannock River Crossing MOT Analysis

June 16, 2023| Presented to: VASITE ANNUAL MEETING

Opening Remarks

Kellie Dean PE, PTOE, RSP1
Project Engineer

Olaoluwa Dairo PE, PTOE
Project Engineer

Agenda

01 Project Information

02 Sequence of Construction

03 Maintenance of Traffic (MOT) Analysis

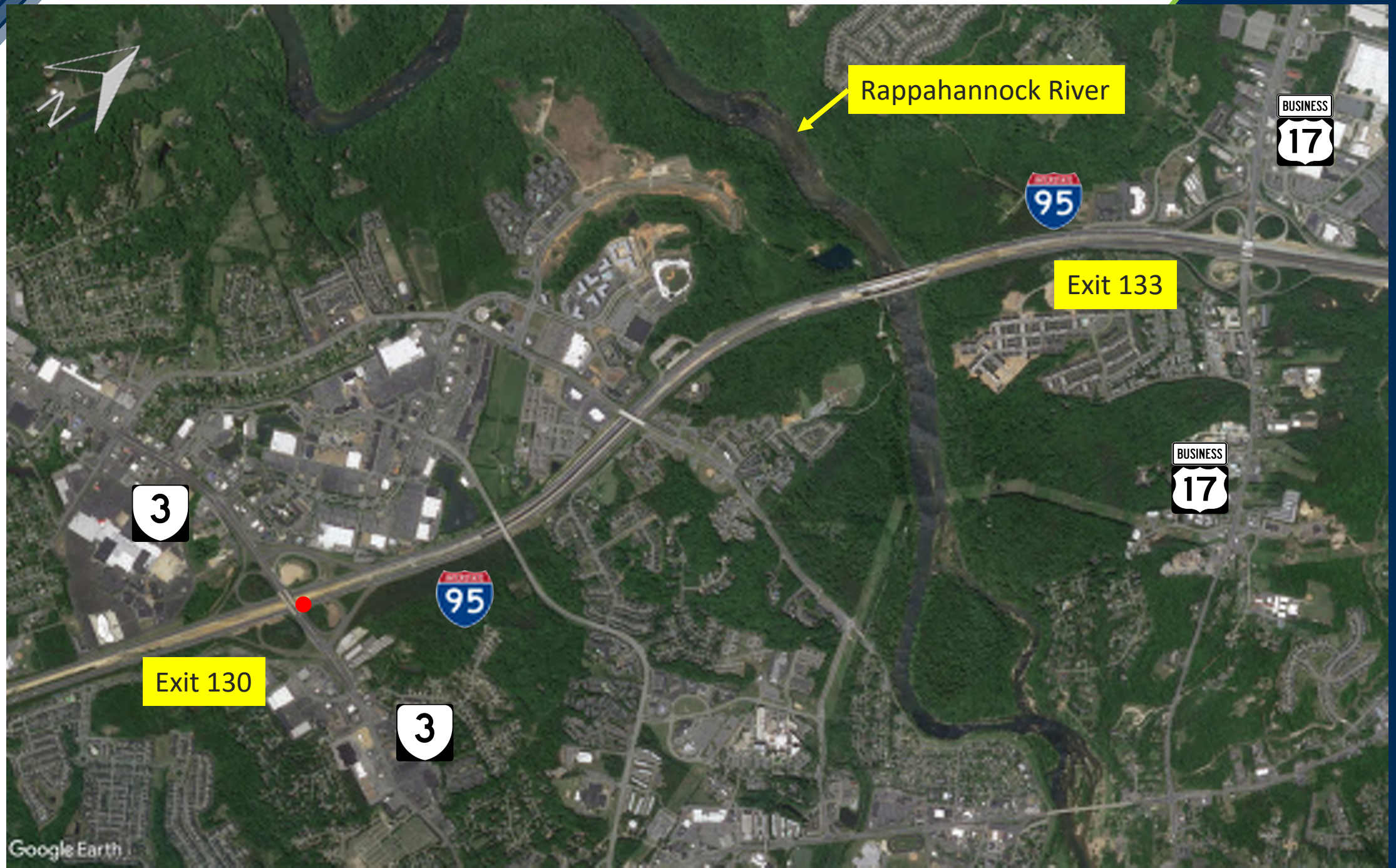
04 Timeframe of Closures

05 Communication and Public Outreach

06 Lessons Learned

Project Information

- **Limit**: Exit 130 (Route 3 Interchange) to Exit 133 (Route 17 Interchange)
  - Two of the busiest interchanges in the region
- **Purpose**: Reduce congestion between the limits
- **Type**: Design-Build Project
- **Team**: JMT, Inc. (Design Firm) and Wagman Heavy Civil, Inc.
- **Client**: VDOT


Rappahannock River
BUSINESS
17
95
Exit 133
BUSINESS
17
3
95
Exit 130
3
Google Earth

Sequence of Construction

Eight MOT Phasing

- Divided into two areas
  - North of the bridge (N1-N4)
  - South of the bridge (S1-S4)

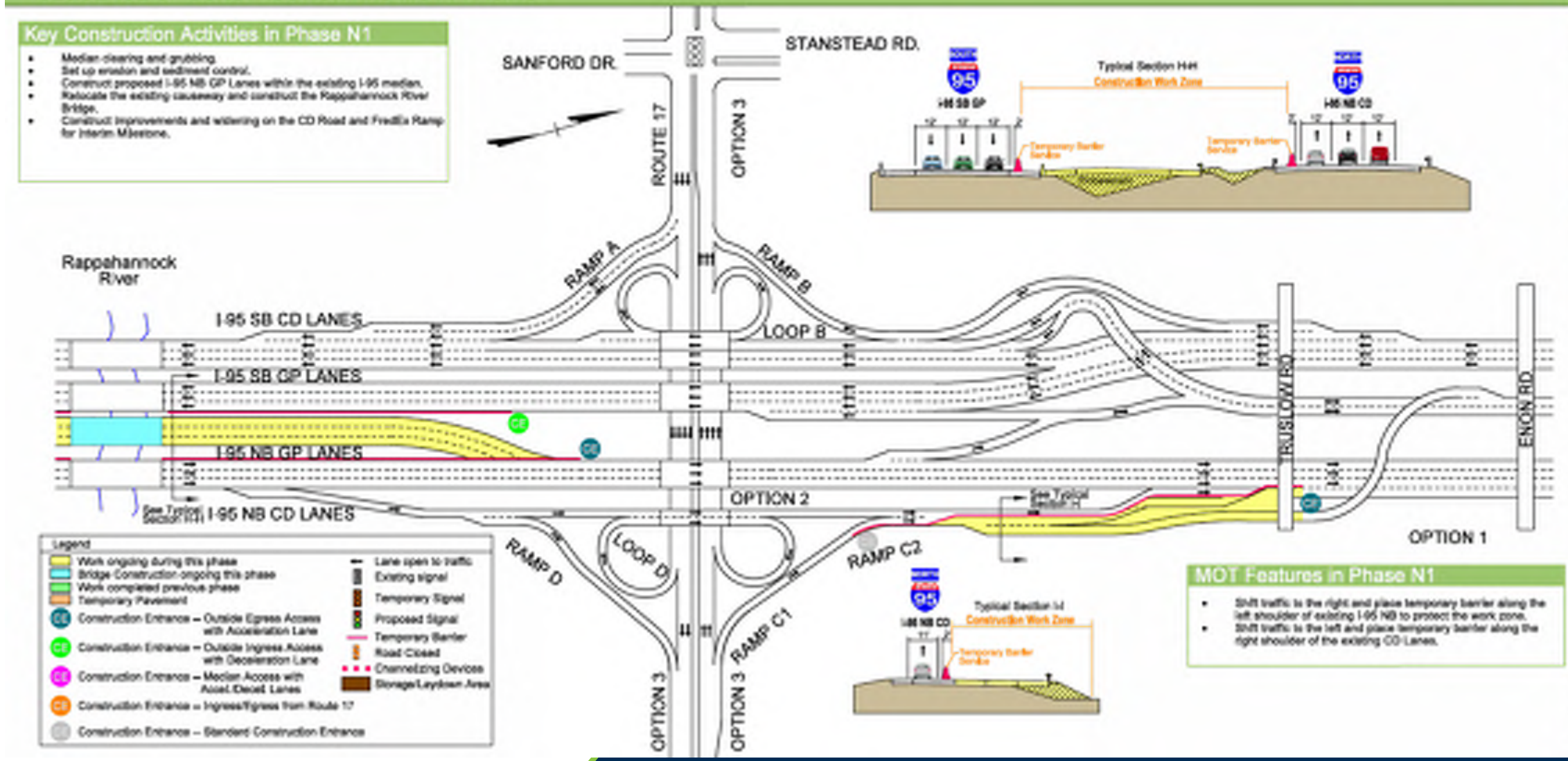
- Include
  - Lane shifting
  - Full closure
  - Lane closure
  - Detour
  - Temporary signal timing
  - Signal timing modification

GEOGRAPHICAL AREA 3
NORTH OF RAPPAHANNOCK:
SEQUENCE OF CONSTRUCTION AND MOT PHASING

PHASE N1

Key Construction Activities in Phase N1

- Median clearing and grubbing.
- Set up erosion and sediment control.
- Construct proposed I-95 NB GP Lanes within the existing I-95 median.
- Relocate the existing causeway and construct the Rappahannock River Bridge.
- Construct improvements and widening on the CD Road and Fredlls Ramp for Interim Milestone.



MOT Features in Phase N1

- Shift traffic to the right and place temporary barrier along the left shoulder of existing I-95 NB to protect the work zone.
- Shift traffic to the left and place temporary barrier along the right shoulder of the existing CD Lanes.

WAGMAN

JMT

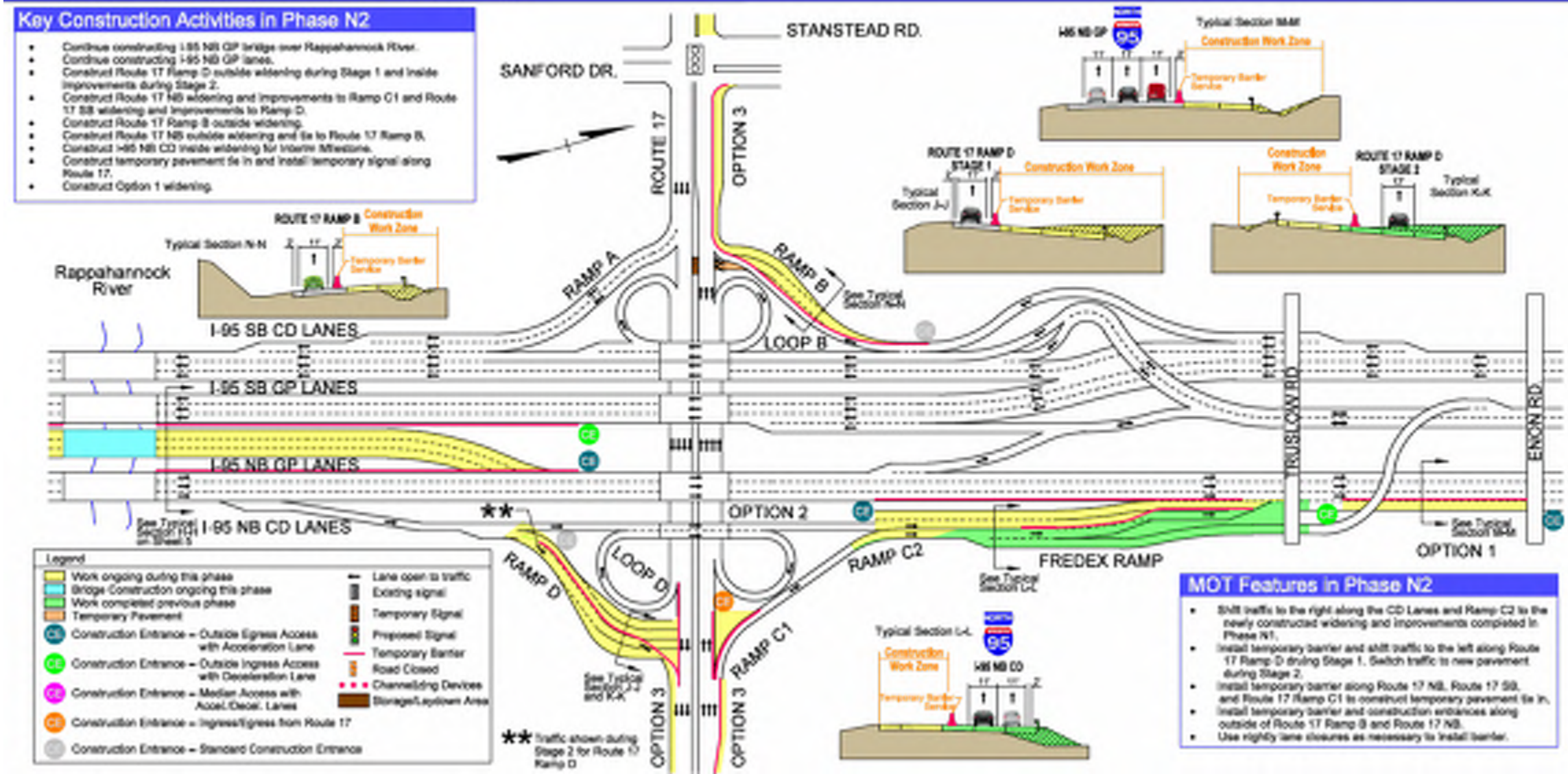
0095-111-270, PE-101, RW-201, C-601, B-609, B-609

GEOGRAPHICAL AREA 3
NORTH OF RAPPAHANNOCK:
SEQUENCE OF CONSTRUCTION AND MOT PHASING

PHASE N2

Key Construction Activities in Phase N2

- Continue constructing I-95 NB GP bridge over Rappahannock River.
- Continue constructing I-95 NB GP lanes.
- Construct Route 17 Ramp D outside widening during Stage 1 and inside improvements during Stage 2.
- Construct Route 17 NB widening and improvements to Ramp C1 and Route 17 SB widening and improvements to Ramp D.
- Construct Route 17 Ramp B outside widening.
- Construct Route 17 NB outside widening and tie to Route 17 Ramp B.
- Construct I-95 NB CD inside widening for Interim Milestone.
- Construct temporary pavement tie in and install temporary signal along Route 17.
- Construct Option 1 widening.



MOT Features in Phase N2

- Shift traffic to the right along the CD Lanes and Ramp C2 to the newly constructed widening and improvements completed in Phase N1.
- Install temporary barrier and shift traffic to the left along Route 17 Ramp D during Stage 1. Switch traffic to new pavement during Stage 2.
- Install temporary barrier along Route 17 NB, Route 17 SB, and Route 17 Ramp C1 to construct temporary pavement tie in.
- Install temporary barrier and construction entrances along outside of Route 17 Ramp B and Route 17 NB.
- Use nightly lane closures as necessary to install barrier.

WAGMAN

DESIGNED BY JMT

STATE PROJECT 0095-111-270, PE-101, RW-201, C-501, B-609, B-608

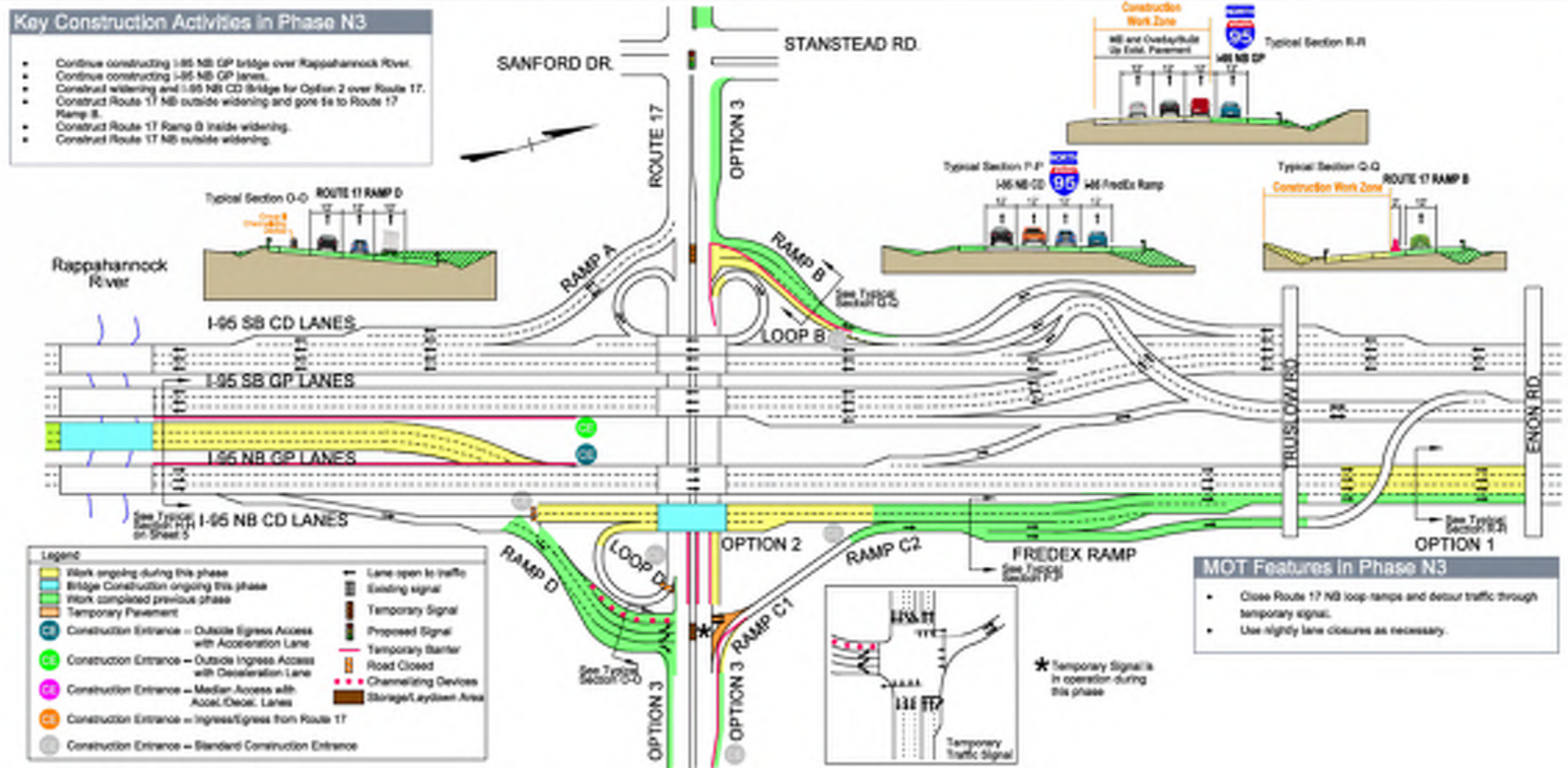
RAPPAHANNOCK RIVER CROSSING PROJECT

GEOGRAPHICAL AREA 3
NORTH OF RAPPAHANNOCK:
SEQUENCE OF CONSTRUCTION AND MOT PHASING

PHASE N3

Key Construction Activities in Phase N3

- Continue constructing I-95 NB GP bridge over Rappahannock River.
- Continue constructing I-95 NB GP lanes.
- Construct widening and I-95 NB CD Bridge for Option 2 over Route 17.
- Construct Route 17 NB outside widening and gore to Route 17 Ramp B.
- Construct Route 17 Ramp B inside widening.
- Construct Route 17 NB outside widening.



Legend

- Work ongoing during this phase
- Bridge Construction ongoing this phase
- Work completed previous phase
- Temporary Pavement
- CI Construction Entrance – Outside Egress Access with Acceleration Lane
- CE Construction Entrance – Outside Ingress Access with Deceleration Lane
- CE Construction Entrance – Median Access with Accel./Decel. Lanes
- CE Construction Entrance – Ingress/Egress from Route 17
- Construction Entrance – Standard Construction Entrance
- Lane open to traffic
- Existing signal
- Temporary Signal
- Proposed Signal
- Temporary Barrier
- Road Closed
- Channelizing Devices
- Storage/Laydown Area

MOT Features in Phase N3

- Close Route 17 NB loop ramps and detour traffic through temporary signal.
- Use nightly lane closures as necessary.

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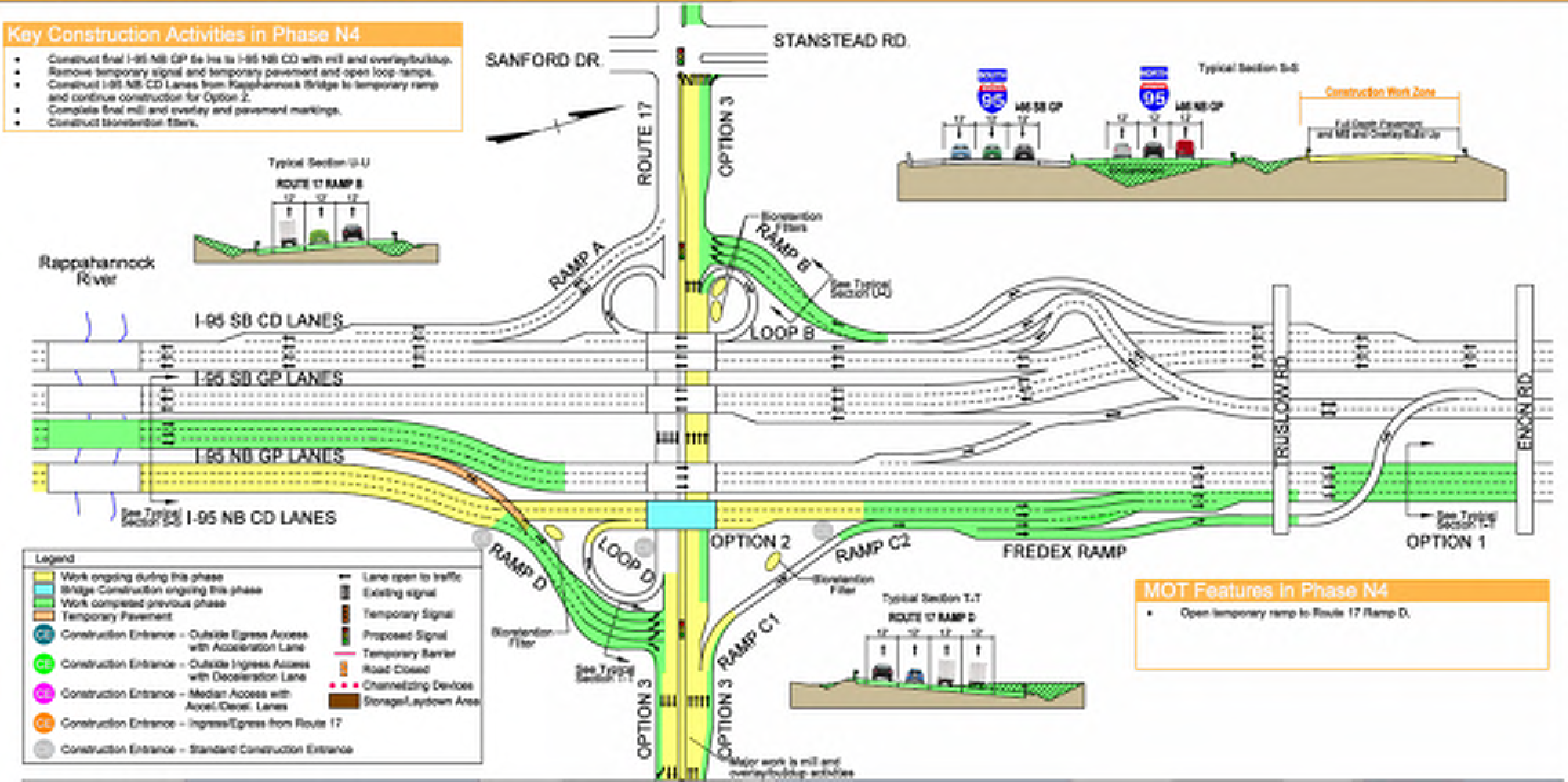
0095-111-270, PE-101, RW-301, C-501, B-609, B-609

GEOGRAPHICAL AREA 3
NORTH OF RAPPAHANNOCK:
SEQUENCE OF CONSTRUCTION AND MOT PHASING

PHASE N4

Key Construction Activities in Phase N4

- Construct final I-95 NB GP [illegible] to I-95 NB CD with mill and overlay/buildup.
- Remove temporary signal and temporary pavement and open loop ramps.
- Construct I-95 NB CD Lanes from Rappahannock Bridge to temporary ramp and continue construction for Option 2.
- Complete final mill and overlay and pavement markings.
- Construct bioretention filters.



MOT Features in Phase N4

- Open temporary ramp to Route 17 Ramp D.

MOT Analysis - Purpose

Allowable Closure Hours

Geometric Concerns

Material Availability/ Seasonal Restrictions

MOT Analysis - Technical

- VISSIM
  - Conducted queue analysis with different lane closure scenarios and time
  - Maximum queue length Threshold: 7 miles on I-95
- Highway Capacity Manual – Work Zone Capacity
  - Used to calibrate the VISSIM model to mimic reduction in capacity
- Synchro
  - Used to determine best timing at temporary signalized intersections or modified intersections

Work Zone Capacity Calculations			
Parameter	**Abbrev.**	**Value**	**Notes**
Barrier Type	f_{Br}	1	0: Concrete/Hard 1: Drum/Soft
Area Type	f_{AT}	0	0: Urban 1: Rural
Lateral Distance to barrier	f_{LAT}	1'	in feet
Day/Night	f_{DN}	1	0: Day 1: Night
Ramp Density	TRD	0.625	Ramps per mile
Pre-Work Zone Free Flow Speed (mph)	FFS	70	Field/INRIX Measured
Pre-Work Zone Speed Limit (mph)	SL	65	
Work Zone Speed Limit (mph)	SL_{wz}	65	
Pre-Work Zone # of Lanes	Ln	3	
Work Zone # of Lanes*	N_o	2	
Work Zone Lane Width	LW	12'	in feet
Lane Width Factor	f_{Lw}	0.0	
Speed Ratio	f_{Sr}	1.00	
Open Ratio (Open/Total Lanes)	OR	0.66667	
Lane Closure Severity Index	LCSI	0.750	
Queue Discharge Rate	QDR_{wz}	1,734	
% prebreakdown capacity wz	α_{wz}	13.4%	Default
Base Capacity	c	2,400	
Base Capacity of Work Zone	c_{wz}	2,002	
Capacity Adjustment Factor	CAF_{wz}	0.834	
Work Zone Free Flow Speed	**FFS_{wz}**	**62.7**	Use for VISSIM desired speed
Final Capacity of Work Zone	**c_{adj}**	**1,941**	

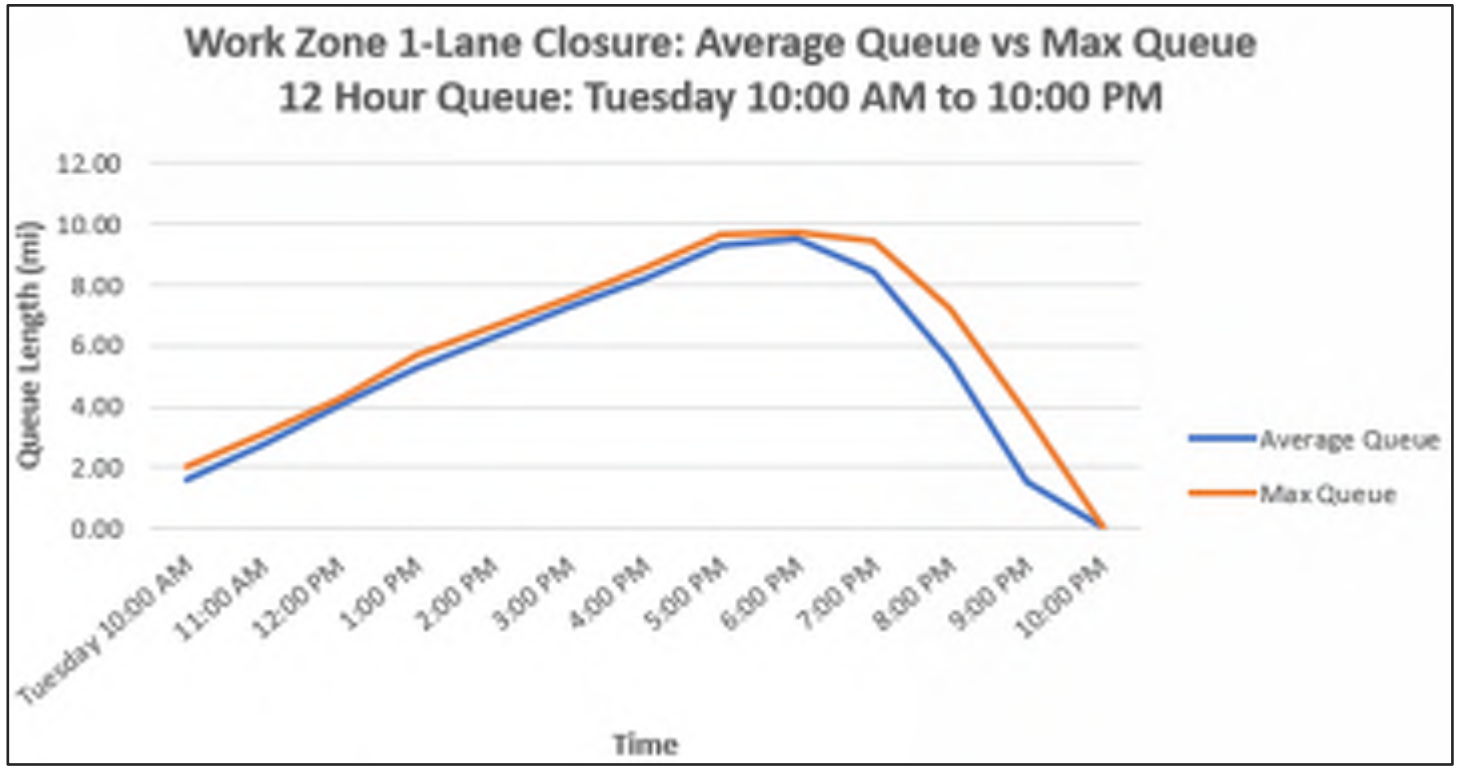
Capacity Reduction Factor		1.19	
VISSIM Driving Behavior Factors			
Standstill Distance	4.92	5.86	
Headway Time	0.9	1.07	
Following Variation	13.12	15.63	

MOT Analysis - Outcome

- 100% traffic volume
- Hourly Traffic
- Expected traffic reduction
  - Over 25%

Reduction due to :

- Public information campaign
- Live traffic applications
- Different route and departure time choice



Timeframe of Closure

Monday, December 5

5:00 PM – Single lane closure on I-95 NB.

7:00 PM – Two lane closure on I-95 NB. Single lane of triple left-turn lanes closed on Route 3 EB to I-95 NB.

Tuesday, December 6

4:30 AM – All I-95 NB lanes open in a temporary pattern.

7:00 PM – Single lane closure on I-95 NB, exit 133 off-ramp closed.

10:00 PM – Two lane closure between exit 133 (Falmouth / Warrenton) and exit 136 (Centreport Pkwy)

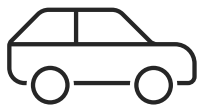
Wednesday, December 7

12:00 AM – Right lane closed north of exit 130 (Route 3). Exit 133 off-ramp closes.

4:30 AM – All I-95 NB lanes open. Exit 133 off-ramp opens.

7:00 PM – Single lane closure on I-95 NB. Exit 133 off-ramp closed.

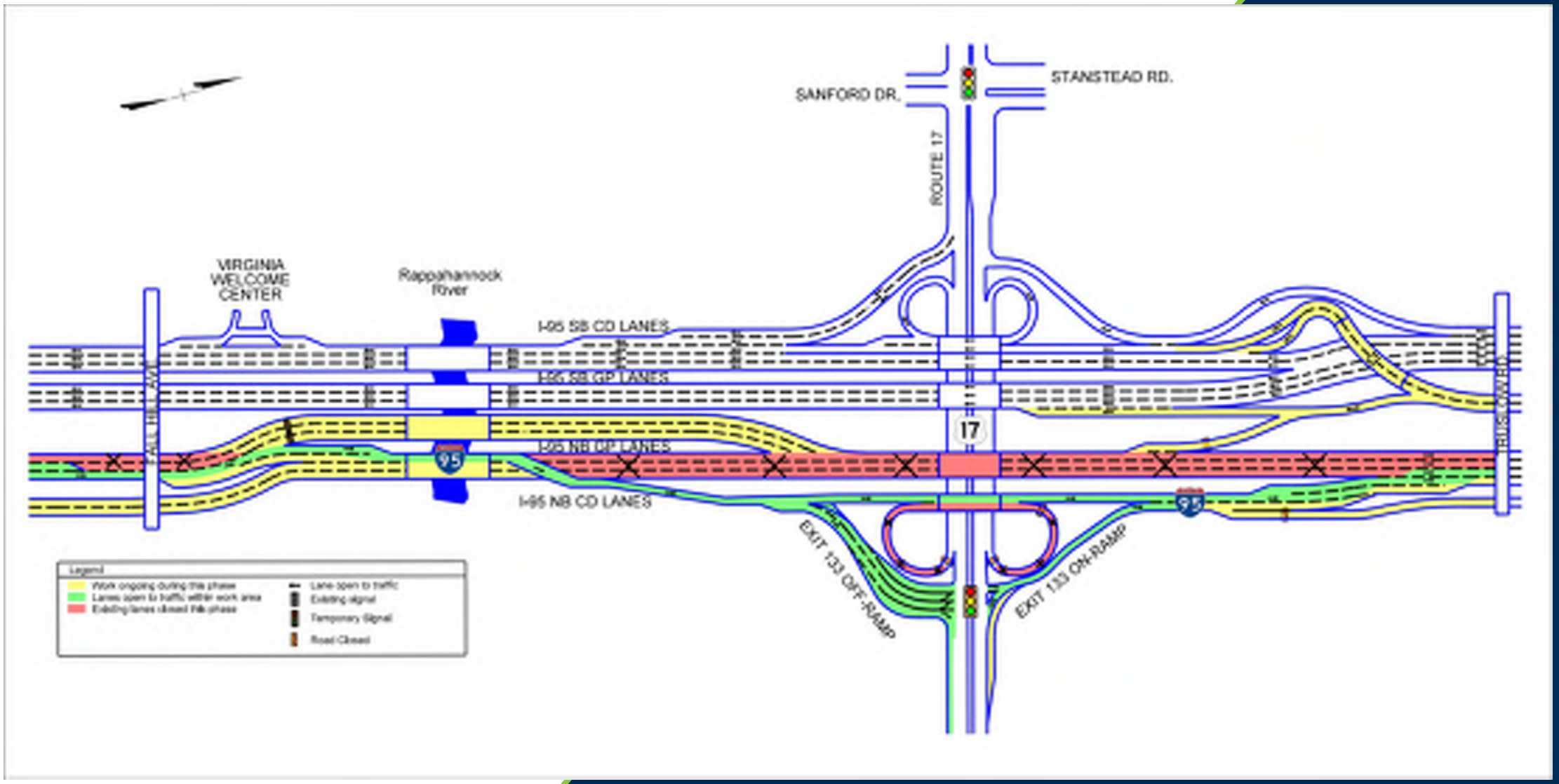
10:00 PM – Two lane closure between exit 133 (Falmouth / Warrenton) and exit 136 (Centreport Pkwy)



Thursday, December 8

4:30 AM – All I-95 NB lanes open. Exit 133 off-ramp reopens.

Transition of Closures



Communication and Public Outreach

Public Outreach Program

- Infographics
- Stakeholder outreach
- WAZE was notified
- Social Media (Twitter and Facebook)
- VDOT's I-95 Project Website
- DMS boards
- PCMS message boards

VDOT
Virginia Department of Transportation

TRAFFIC ALERT
VirginiaDOT.org

RELEASE: IMMEDIATE

Dec. 6, 2022
2:30 p.m.

CONTACT:
Kelly Hannon
(540) 656-0321 cell

Darragh Frye
(540) 907-8409 cell

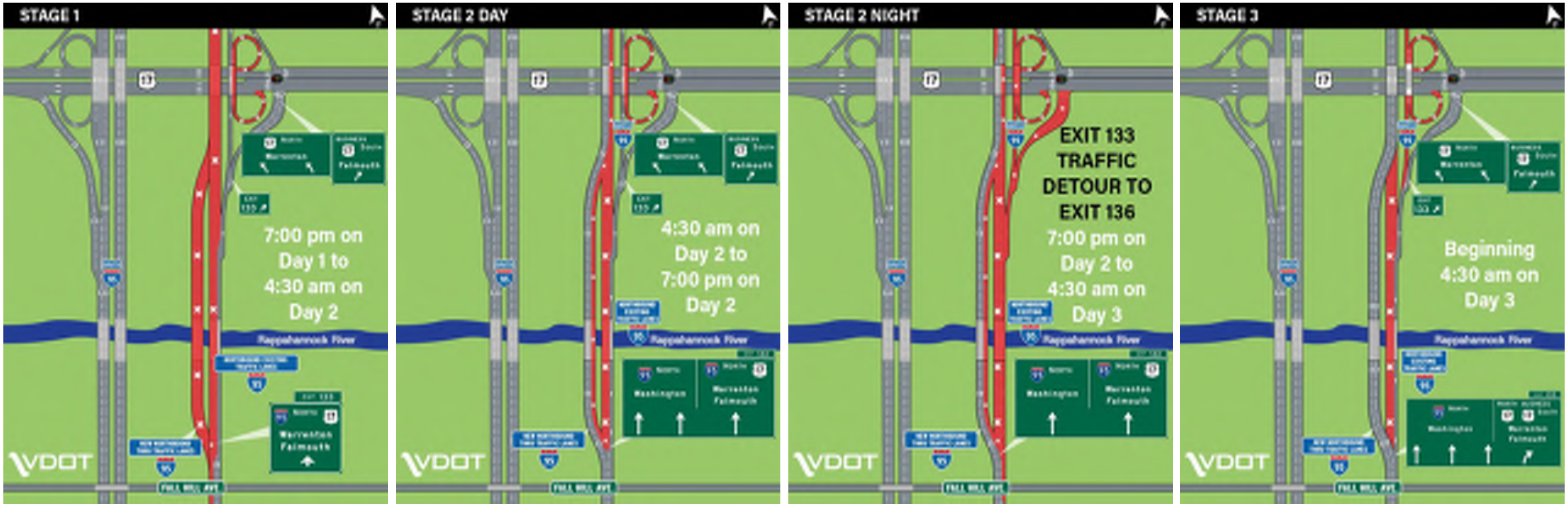
I-95 NORTHBOUND MEGA WORK ZONE IN FREDERICKSBURG AREA EXTENDED TO THURSDAY, DEC. 8

Due to rain anticipated overnight, lane closures and temporary traffic patterns will continue through 4:30 a.m. Thursday between I-95 northbound exits 130 (Route 3) and 136 (Centreport Parkway)

FREDERICKSBURG, Va. – Due to rain anticipated overnight, a work zone on Interstate 95 northbound in the Fredericksburg area has been extended to continue until 4:30 a.m. Thursday, Dec. 8.

Northbound travelers can continue to expect heavy traffic, especially at peak periods,

Communication and Public Outreach



Infographics

Similar graphics posted on Facebook, Twitter and VDOT's I-95 project website for Public Information.

Portable Changeable Message Sign Locations

- Encouraged traffic to utilized alternative routes
- Informed traffic to expect delays
- Updated for each stage of closure

I-95 SB Animation Example

Lessons Learned

- Public Communication and Outreach is critical
- Coordination with VDOT
- VDOT's Freeway Basic Work Zone Tool
  - Used in addition to estimate queue length
- Balance between closure length, impact on drivers, and project's schedule
- Impact of traffic reduction on queue length

Questions?

Contact us:

Olaoluwa Dairo PE, PTOE, RSP1

13454 Sunrise Valley Dr.
Herndon, VA 20171
703-464-7751
odairo@jmt.com

Kellie Dean PE, PTOE, RSP1

9201 Arboretum Pkwy
Richmond, VA 23236
804-267-1259
kdean@jmt.com