



COMMONWEALTH of VIRGINIA  
Office of the  
SECRETARY of TRANSPORTATION

**2023 VASITE Annual Meeting**  
**SMART SCALE Round 5 Overview and Lessons Learned**

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# Agenda

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- **Round 5 Summary**
- **Lessons Learned and Feedback**
- **Screening and Validation Improvements**
- **Congestion Mitigation Overview**
- **Congestion Mitigation Improvements**
- **Implementation Timeline**

## SMART SCALE Round 5 – Summary

Funds available: \$1.9 Billion

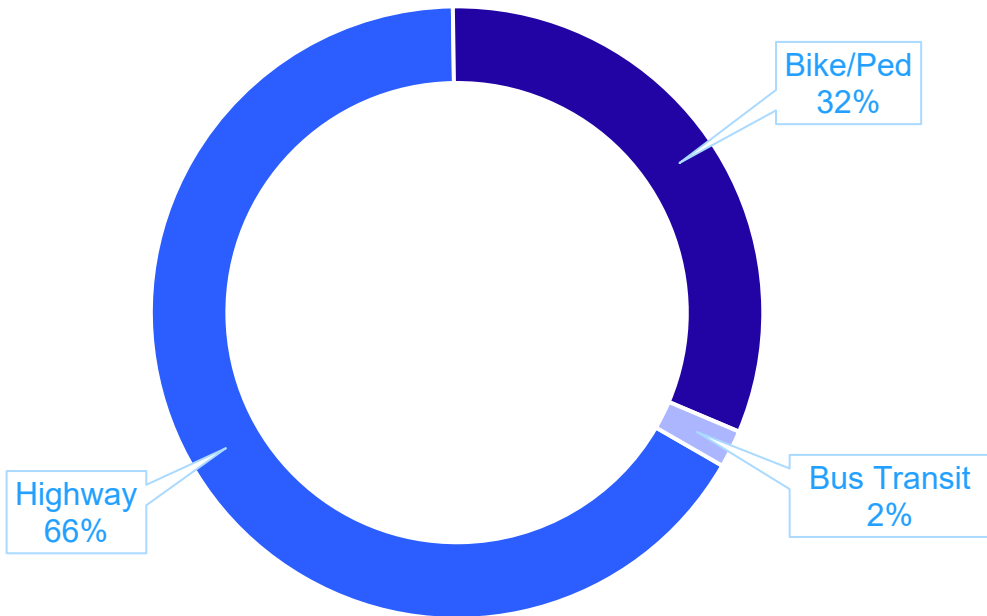
\$1.6B allocated to  
165 applications

\$252M used for  
inflation  
adjustments

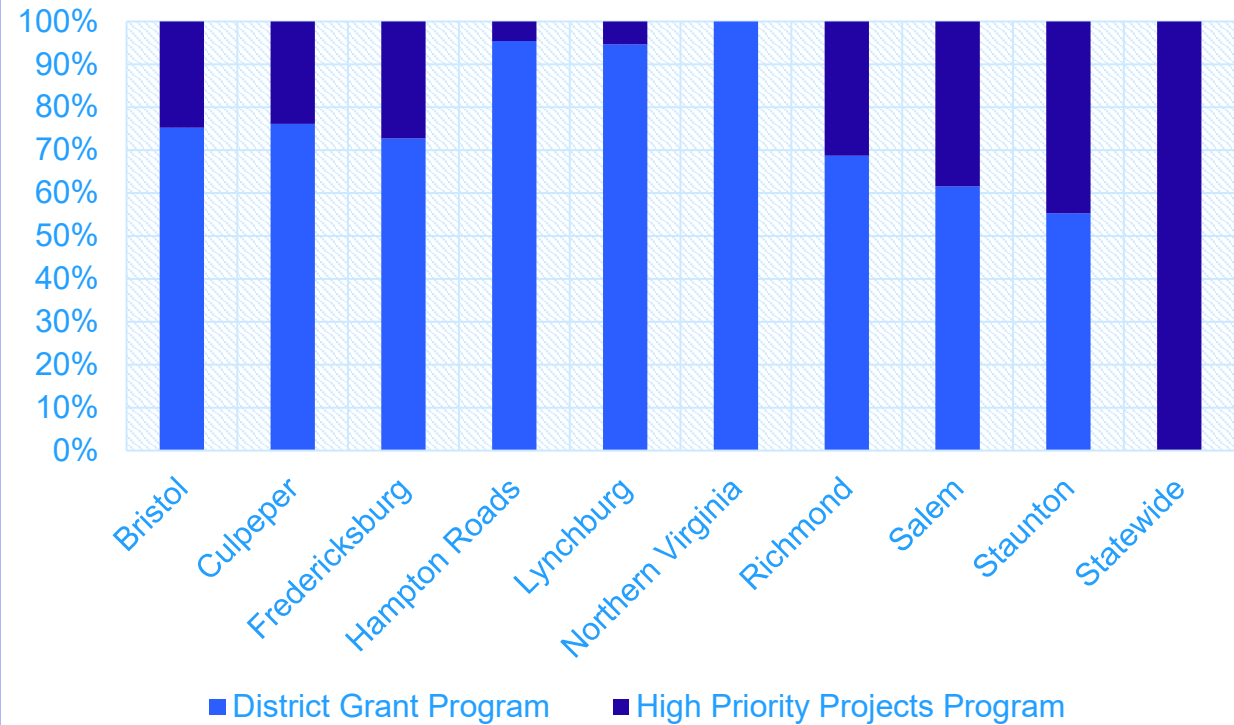
Largest SMART  
SCALE round since  
the program's  
inception

# SMART SCALE Round 5 – Summary

## Primary Improvement Type



## Funding Distribution





# SMART SCALE Round 5 – Lessons Learned and Feedback

## Internal Lessons Learned Process

- Meetings with consultants and staff, stakeholder surveys, and letters from applicants and organizations to identify process improvements across SMART SCALE

## SMART SCALE Program Review

- CTB-initiated program review including surveys, third-party analysis, and executive stakeholder meetings

## Improvement Implementation Subcommittees

- Small working groups to refine specific improvements for implementation in Round 6

# SMART SCALE Round 6 – Readiness Gates

## Round 5 Feedback

- Communication between applicants and district staff regarding readiness requirements
- Process delays due to late or insufficient required documents
- Lack of consistency in review process for critical documents

## Round 6 Improvement

- Create gated document checkpoints
- Applications cannot move forward unless the required documents are on track
- Applicants must engage VDOT staff at the appropriate time to ensure screen-in

# SMART SCALE Round 6 – Readiness Gates

## Pre-App Creation

- Applicant confirms that documents are underway

## Pre-App Screening

- Staff confirm that they are engaged in the required documents

## Full App Conversion

## Full App Submission

## Pre-App Submission

## Pre-App Feedback Delivered

## Full App Refinement

- Applicant uploads completed documents
- Staff confirms that documents fulfill requirements

# SMART SCALE Round 6 – Bike and Pedestrian Readiness

## Round 5 Feedback

- Bike and pedestrian features have very low readiness requirements
- New bike/ped policies within VDOT
- Executive focus on bike/ped projects

## Round 6 Improvements

- Rework bike/ped readiness requirements to ensure all relevant information is being captured
- Create a new document which fulfills IIM-TE-384.1
- Review logical termini and PROWAG requirements and incorporate where necessary (in process)

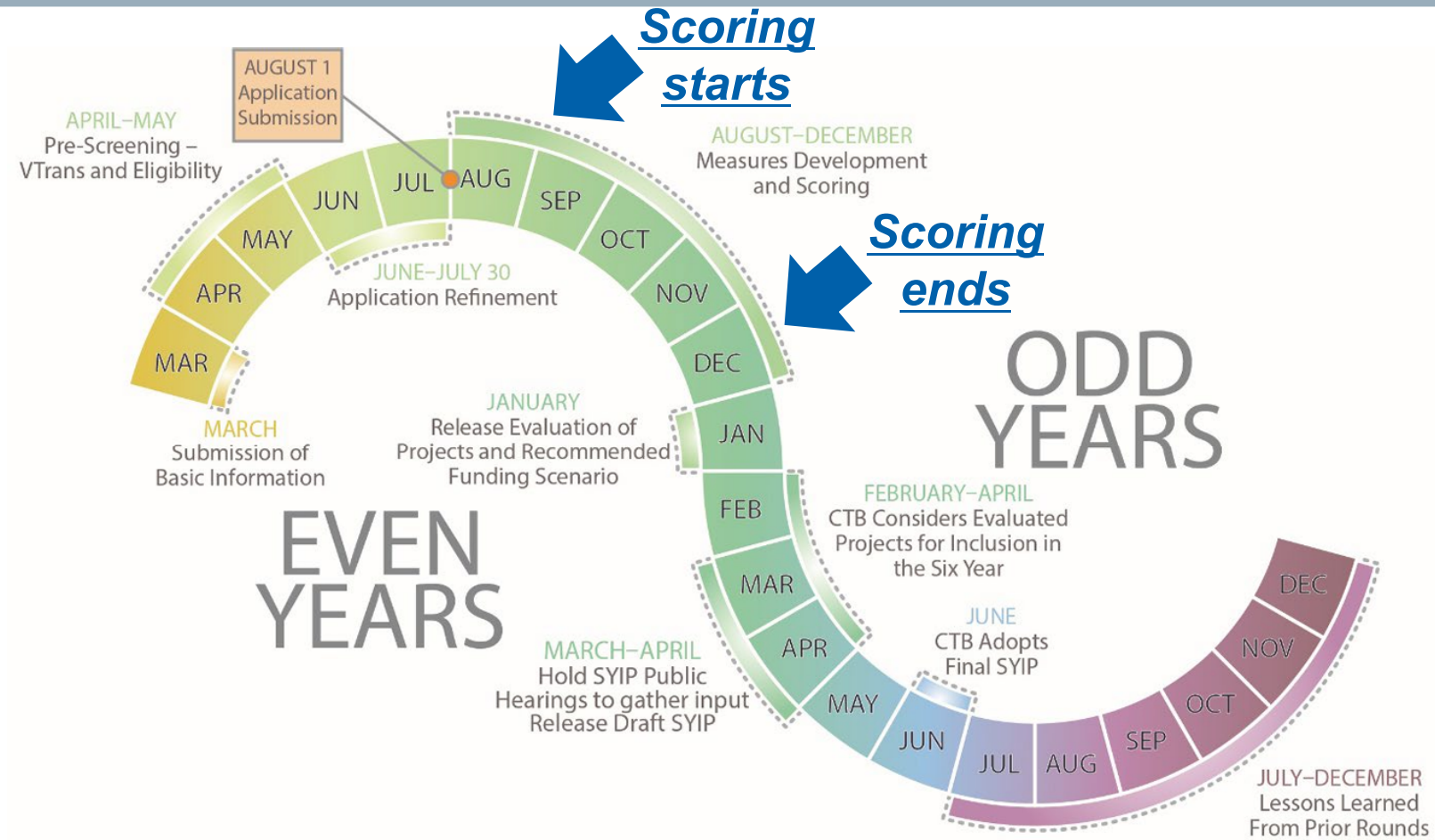
# Congestion Mitigation Measures

Factor Area	Evaluation Measures
Safety	<ul style="list-style-type: none"> <li>• EPDO of fatal and injury crashes</li> <li>• EPDO rate of fatal and injury crashes</li> </ul>
Congestion Mitigation	<ul style="list-style-type: none"> <li>• Person throughput</li> <li>• Person hours of delay</li> </ul>
Accessibility	<ul style="list-style-type: none"> <li>• Access to jobs</li> <li>• Access to jobs for disadvantaged populations</li> <li>• Access to multimodal choices</li> </ul>
Environmental Quality	<ul style="list-style-type: none"> <li>• Air quality and energy environmental effect</li> <li>• Impact to natural and cultural resources</li> </ul>
Economic Development	<ul style="list-style-type: none"> <li>• Project support for economic development</li> <li>• Intermodal access and efficiency</li> <li>• Travel time reliability</li> </ul>
Land Use	<ul style="list-style-type: none"> <li>• Transportation efficient land use</li> <li>• Increase in transportation efficient land use</li> </ul>

# Congestion Mitigation Measures

ID	Measure Name	Weight	Description
C.1	Person Throughput	50%	Increase in corridor total (multimodal) person throughput attributed to the project
C.2	Person Hours of Delay	50%	Decrease in the number of person hours of delay in the corridor

# Congestion Analysis Timeline



# Congestion Analysis Process

- Collaborative process with many team members
  - 30+ congestion scorers
  - Scoring tool (OIPI)
  - Highway (consultants and VDOT/OIPI staff)
  - Bike/ped (consultants)
  - Transit (DRPT)
  - Park and Ride (OIPI)
  - Travel Demand Model (VDOT TMPD)
- Two levels of review (scoring team and VDOT Districts)
- Coordination with safety, environmental, and accessibility teams
- 10% blind scoring

The screenshot displays the SmartScale Scoring OIPI tool interface. The main window is titled "SmartScale Scoring: OIPI" and shows a "Congestion" analysis for project "2020 ALT 1: 4893 - W Broad Street Intersection Improvements at Dominion and Cox".

**Project Details:**

- Fiscal Year: 2020
- Evaluation Type: Alternative Testing
- Unofficial Scenario: Round 4 scores using 2030 congestion horizon year
- Display ID: 4893, District: Richmond, Name: W Broad Street Intersection Improvements at Dominion and Cox, Eval ID: 1844

**Complexity Rating:** Least Complex

**Congestion Analysts:**

Congestion Analysts:		Bulk Assign
Add Primary Analyst(s)	Add QC Analyst(s)	
AFZAL, A	PERSING, O	
BOLLER, N		
COBB, DO		
BOLECEK, JT		

**Congestion Analysis Type(s):**

Analysis Type(s) Required	Comments
Cap-X	
BPR	
Bike/Ped	

**Congestion Events:**

**Step 1 - Determine Analysis Required**

Event Type	Event Begin Date	Event End Date	Comments
Analysis Type Determination	8/30/2018	8/30/2018	No PNR component because it does not add parking capacity.

**Step 2 - Congestion Analysis**

Event Type	Event Begin Date	Event End Date	Comments
CapX Analysis	10/24/2018	10/26/2018	See project folder for Volume Balancing
Bike/Ped Analysis	10/26/2018	10/26/2018	
BPR Analysis	10/26/2018	12/20/2018	BPR analysis complete - waiting for Transit BPR segments. DRPT says this is not a transit project. Removed the transit/rail event. Ready for QC

**Highway Analysis Portal:**

Facilities: CapX, BPR, Peak Expansion Factor

**Other Modes and Inputs:**

Travel Demand Model, Bike/Ped, Transit/Park and Ride



# Congestion Analysis Training



# Congestion Analysis Methodology

- **SMART SCALE congestion methodology was developed with these goals in mind**
  - Repeatable and consistent
  - Based on established methods to greatest extent possible
  - Ability to analyze high volume of projects in a compressed time period
    - 400 projects in 3 months!



Source: [www.fhwa.dot.gov](http://www.fhwa.dot.gov)

# Congestion Analysis Tools – Intersections and Interchanges

- **CAP-X Tool (Intersection and Interchange Analysis):**
  - Modified Federal Highway Administration’s (FHWA) Capacity Analysis for Planning of Junctions (CAP-X) Tool
  - Microsoft Excel-based
  - Uses critical lane volumes to provide a planning level capacity assessment
  - Calculates intersection/interchange improvement benefits (new turn lanes, installation of traffic signal, RCUT, etc.)

**Capacity Analysis for Planning of Junctions**  
Input Worksheet - Existing Condition

Project Title: 9-12 Test Project  
Eval ID: 2056 Display ID: INT\_ID: 3592  
E-V Facility: Main St  
N-S Facility: 5th St

Improvement Volume + No Improvement Volume?	Percent (%)				Truck	Volume Growth
	U-Turn	Left	Thru	Right		
Yes						
Eastbound		96	169	81	2.00%	(Entered in volume input sheet or already accounted for)
Westbound		110	193	82	2.00%	
Southbound		140	300	90	2.00%	
Northbound		82	292	134	2.00%	
Adjustment Factor	0.80	0.95		0.85		
Essential	0.80	0.95		0.85		
Truck to PCE Factor					Suggested = 2.00	2.00
Critical Lane Volume						1600

	Volume (Veh/hr)			
	U-Turn	Left	Thru	Right
Eastbound	0	245	1318	407
Westbound	0	300	1503	363
Southbound	0	11	10	28
Northbound	0	275	223	188

Configuration	Total Delay	Max V/C	Volume Denied Entry at Bottleneck	Average Delay
Existing Configuration: Conventional	2800	0.47	0	2
Proposed Configuration: Unsignalized	0.00			

Change in Person Hours Delay: 0.000  
Change in Person Throughput: [Redacted]

SCORES CURRENTLY STORED IN ORACLE  
Change in Person Hours Delay: [Redacted]  
Change in Person Throughput: [Redacted]

Notes:  
Left-Turn Adjustment Factor: Conversion of left-turning vehicles to equivalent through vehicles  
Right-Turn Adjustment Factor: Conversion of right-turning vehicles to equivalent through vehicles  
U-Turn Adjustment Factor: Conversion of U-turning vehicles to equivalent through vehicles  
Truck to PCE Factor: 1 Truck = 1 Passenger Car Equivalent  
Critical Lane Volume Sum Limit: Saturation Value for Critical Lane Volume Sum at an intersection

Fix Weirdness



# Congestion Analysis Tools – Roadway Segments

- BPR Tool (Roadway Segment Analysis):
  - Based on the Bureau of Public Roads (BPR) curves
  - Estimates speed as a function of volume-to-capacity ratio
  - Used to calculate segment improvement benefits (roadway widening, acceleration/deceleration lane extensions, transit, PNR, etc.)

## BPR Results

### Evaluation:

Display ID: Name: I-64 CORRIDOR - RC178EBINTA Eval ID: 3002

### BPR Analysis Segment:

I-64E End of Proposed Accel Lane Taper Beginning of Decel Lane Taper

### BPR Analysis Segment:

PHF	Length	Terrain	Speed Limit	% HV	Pop Factor	D-Factor	SPS Area Type	% Total Trips- P&R	Peak Hr Per Removed, T
0.96	0.70	Level	65	3	1	1	Urbanized		

### No Improvement Scenario:

No Build Facility Type	No Build Analysis Type	No Build PHV	No Build Number Weaving Lanes	No Build Weaving Volume
Interstate	Freeway	4,971		

Direction	Peak Traffic Direction?	# Lanes	Lane Width	Ramps Per Mile	Right Edge Clearance
	Yes	3	12	6	9

### Improvement Scenario:

Build Facility Type	Build Analysis Type	Build PHV	Build Number Weaving Lanes	Build Weaving Volume
Interstate	Freeway	4,971		

### Improvement Geometry:

Direction	Peak Traffic Direction?	# Lanes	Lane Width	Ramps Per Mile	Right Edge Clearance
	Yes	4	12	6	9

### No Improvement Results:

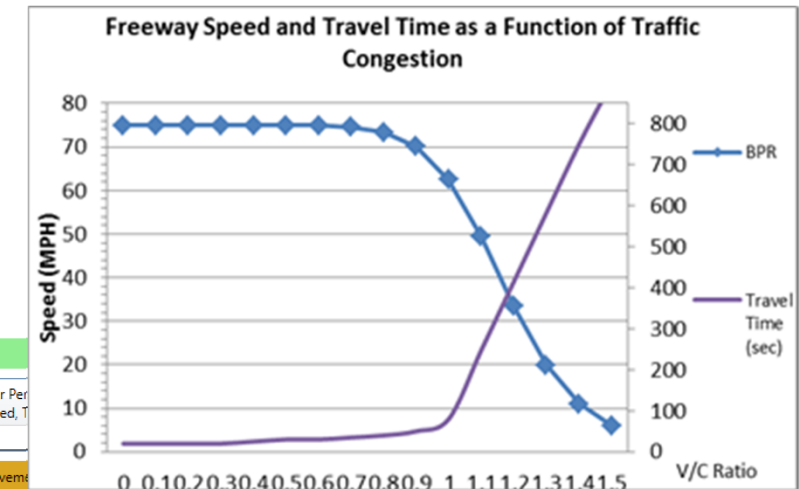
Peak Traffic Direction?	V/C	FFS	Peak Flow	Person Throughput	Person Delay	Congested Speed	Average Delay
Yes	0.90	60.9	1,751.9	5,965	16,865.2	57.0	2.8

### Improvement Results:

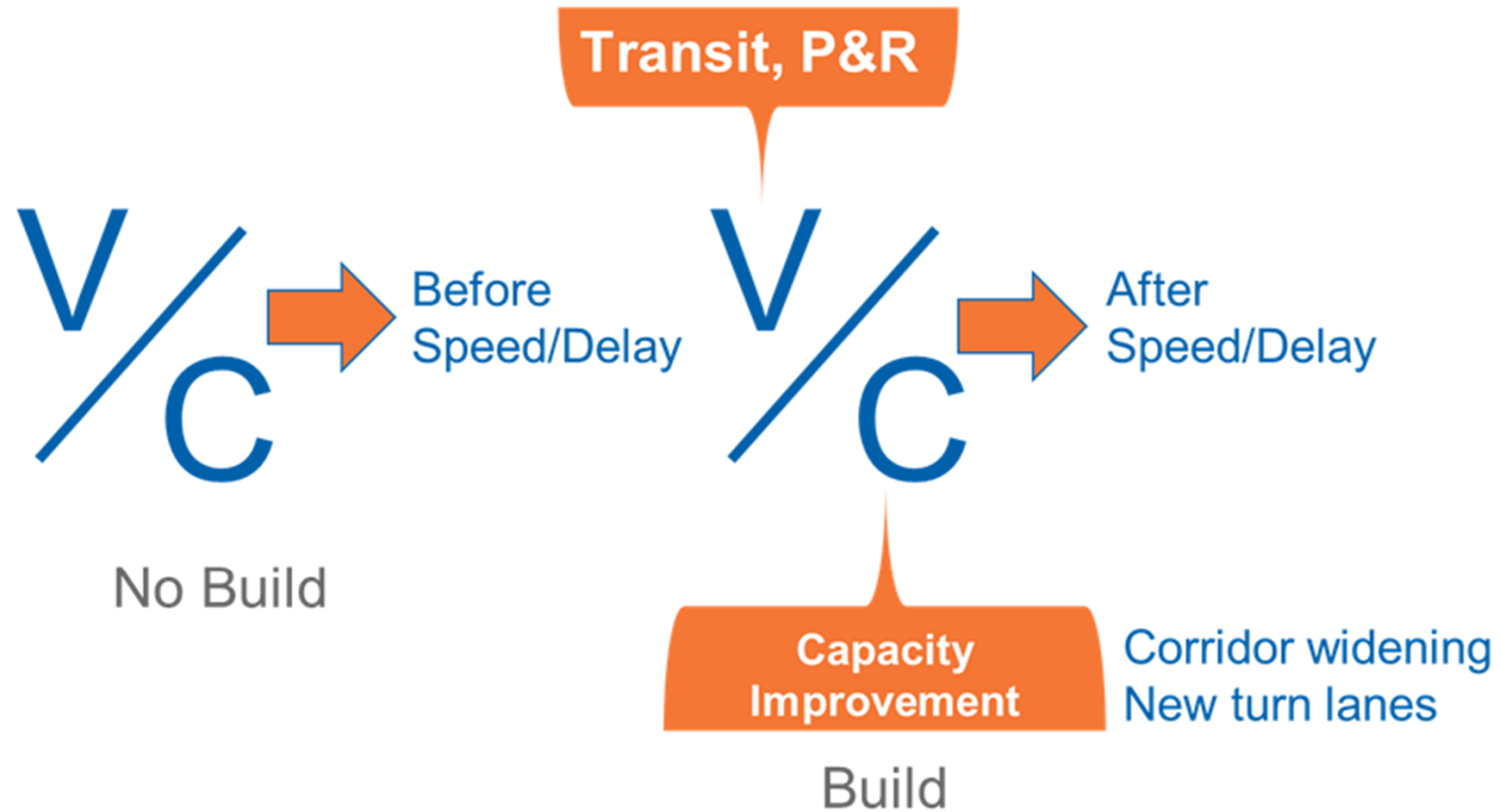
Peak Traffic Direction?	V/C	FFS	Peak Flow	Person Throughput	Person Delay	Congested Speed	Average Delay
Yes	0.67	60.9	1,313.9	5,965	949.7	60.7	0.2

### Results

Change in Person Throughput	Change in Person Hours Delay
	4.4



# Congestion Analysis in Summary



# Congestion Mitigation Process Improvements

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- **Background**
  - **Collected continuous feedback during Round 5 scoring**
  - **Collected additional feedback during two lessons learned sessions**
    - **Scoring team**
    - **District points of contact**
  - **Compiled feedback and developed workplan**
- **Top priorities**
  - **Traffic analysis tool modification feasibility**
  - **Future analysis year**

# Congestion Mitigation Process Improvements: Traffic Analysis Tool Feasibility

## Round 5 Feedback

- VDOT is spending \$\$\$ on studies where we already have analysis results – why re-analyze projects in SMART SCALE using pseudo-HCM methods?
- Can we incorporate results from Synchro, SIDRA, and HCS into the congestion scoring process?

## Round 6 Improvement

- Determine the feasibility of using traffic analyses from completed studies for SMART SCALE congestion scoring
- Phase 1: Testing and Analysis
- Phase 2: Implementation



# Congestion Mitigation Process Improvements: Traffic Analysis Tool Feasibility

- Identify a diverse cross-section of RD5 SMART SCALE projects for testing
- Compile CAP-X and BPR results from congestion scoring tool
- Update traffic analysis files for comparison to CAP-X results
- Identify list of required analysis tool assumptions
- Develop throughput methodology and conduct sensitivity analysis of assumptions
- Develop comparison table of results and identify impacts to funding scenario

The screenshot displays a traffic analysis software interface with three main components:

**VOLUME SETTINGS (Left Panel):**

Lanes and Sharing (BRL)	WBU	WBL	WBT	WBR
Traffic Volume (vph)	2	386	832	787
Development Volume (vph)	0	0	0	0
Combined Volume (vph)	2	386	832	787
Future Volume (vph)	2	386	832	787
Conflicting Peds. (B/hr)	0	0	0	0
Conflicting Bicycles (B/hr)	0	0	0	0
Peak Hour Factor	0.98	0.98	0.98	0.98
Growth Factor	1.00	1.00	1.00	1.00
Adjusted Flow (vph)	2	394	811	803
Heavy Vehicles (%)	0	2	5	3
Bus Blockages (B/hr)	0	0	0	0
Adj. Parking Lane?				
Parking Maneuvers (B/hr)				
Traffic from midblock (%)				
Link, DD Volumes				
Traffic in shared lane (%)				
Lane Group Flow (vph)	0	296	311	803

**DESIGN AND RESULTS (Middle Panel):**

Project Name:	Kempsville Rd and Battlefield Blvd Intersection Improvements	Critical Lane Volume Sum
EW Facility:	Rte 190 (Kempsville Rd)	< 1200 1200 - 1399 1400 - 1599 ≥ 1600
NS Facility:	Rte 168 (N Battlefield Blvd)	VOLUME / CAPACITY RATIO: 1.09
Date:		

**DATA INPUT AND CONFIGURATION (Right Panel):**

Enter the lane configurations in the yellow cells.

Zone 5: 1750 V/C 1.09 Delay 272.88

EB Critical Vol: 95.45

WB Critical Vol: 29.82

SB Critical Vol: 123.66

NB Critical Vol: 73.3

Share of green: SB: 0.3, WB: 0.7, EB: 0.68, NB: 0.3

Total Spine: NS: 1, EW: 1, Total Spine: 568, 0.32, 73



# Congestion Mitigation Process Improvements: Analysis Year

## Round 5 Feedback

- Projects aren't receiving the full projected benefits because they're analyzed under existing year conditions
- Future year analysis better aligns with current VDOT planning and design practices, supports land use, and considers local economic development goals

## Round 6 Improvement

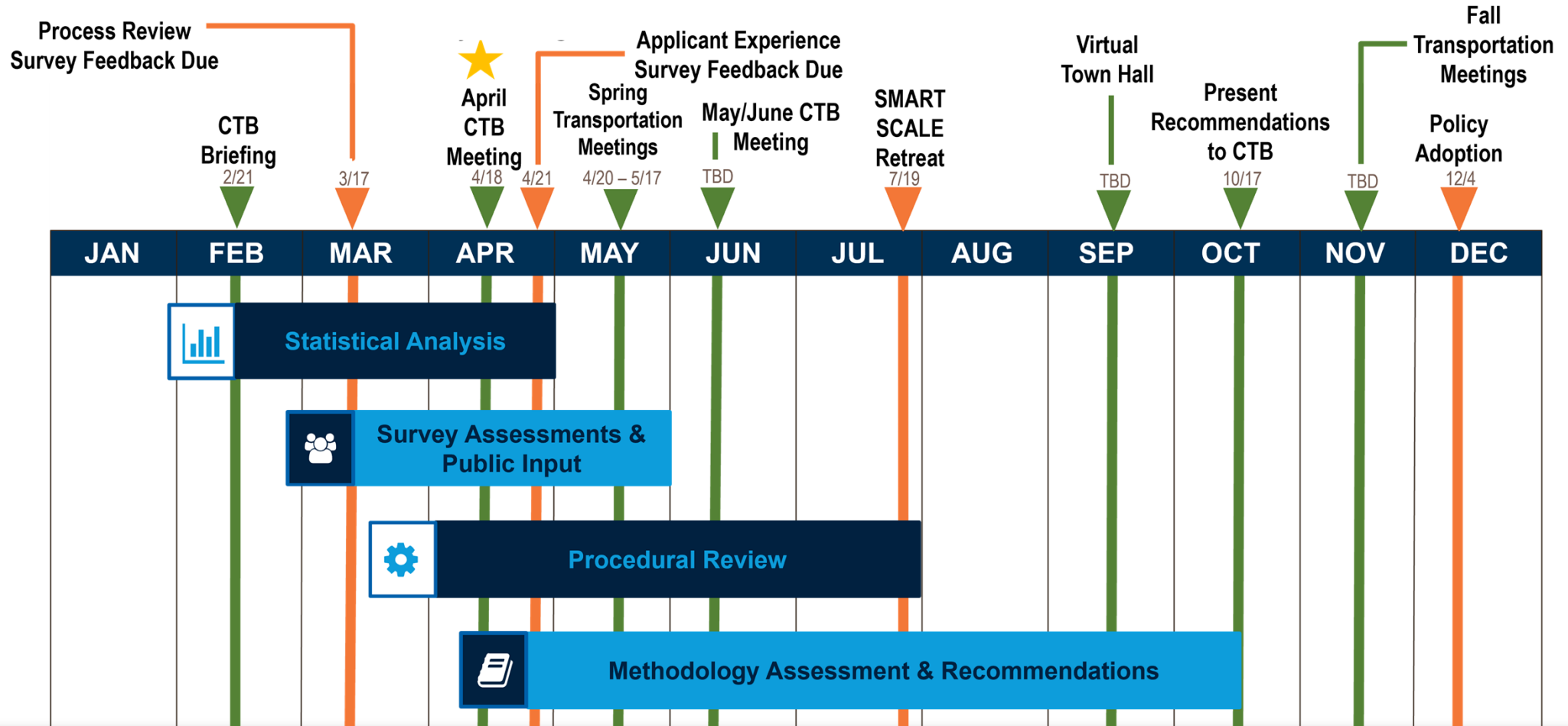
- Consider using opening or design year for SMART SCALE analysis
- Test Round 5 projects using a future year to understand how it impacts scores

# Congestion Mitigation Process Improvements: Analysis Year

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- RD1 (FY2017): 2025 future year volumes
- RD2 (FY2018): 2025 future year volumes
- RD3 (FY2020): 2017 existing year volumes
- RD4 (FY2022): 2019 existing year volumes
- RD5 (FY2024): 2019 existing year volumes
- RD6 (FY2026): ??

# Implementation Timeline



# SMART SCALE Round 5 Overview and Lessons Learned

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**Questions?**