



COMMONWEALTH of VIRGINIA

Office of the

SECRETARY of TRANSPORTATION

Congestion Analysis

SMART SCALE

Chad Tucker

SMART SCALE Program Manager

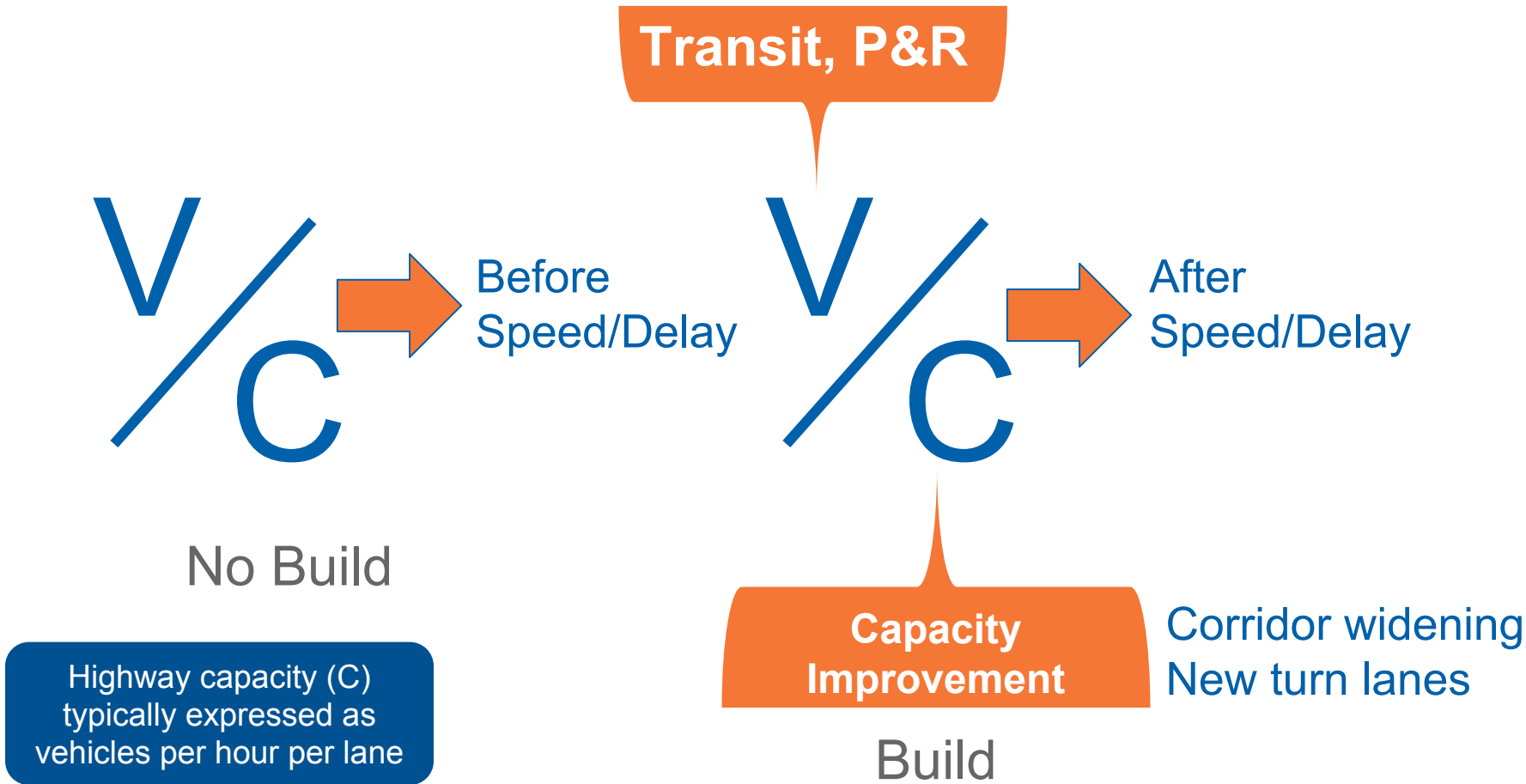
January 2019

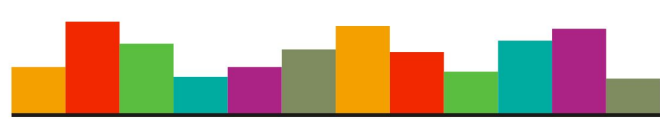


Virginia Department of Rail and Public Transportation



Congestion - How Adjusting Volume to Capacity





Design Hourly Volume

- Capacity is compared to the demand or volume (V)
- Since 1960's the use of Design Hourly Volume (DHV) has been a standard approach in transportation planning and traffic engineering
- Using the average hourly volume would mean the facility would operate effectively only 50% of the time
- Conversely, using the highest hour would necessitate costly capacity expansions that would be underutilized for most hours of the year

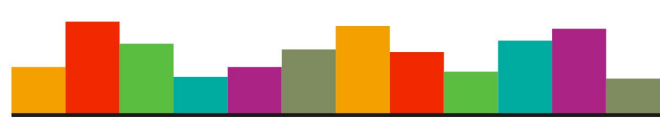
Calculating Design Hourly Volume

- $DHV = AADT \times K \text{ Factor} \times D \text{ Factor}$
- Annual Average Daily Traffic (AADT) – Sum of daily counts / 365
- K Factor - % of daily traffic occurring in an hour
- K Factor used by VDOT and most DOTs - % of AADT at the 30th highest volume hour of the year
- K Factor based on 30th highest hour mandated in federal Highway Performance Monitoring System
- D Factor - the directional split



K Factors on I-95

- 95 S between Hanover County Line to SR 207 Rogers Clark Blvd; MP 101.33 to 105 - April - Saturday
- 95 N between 88-606 Mudd Tavern Rd to Urban Boundary; MP 118.48 to 123.09 - June - Sunday
- 95 S between 88-606 Mudd Tavern Rd to Urban Boundary; MP 119.14 to 123.09 - December - Tuesday
- 95 S between US 1, US 17 to SCL Fredericksburg; MP 126.21 to 129.31 - July - Saturday
- 95 N between SR 3 Plank Rd to Stafford County Line; MP 130.15 to 132.44 - October - Sunday
- 95 S between US 17; Bus. US 17 Warrenton to Urban Boundary; MP 133.94 to 135.26 - January - Thursday
- 95 S between 89-8900 Centreport Pkwy to 89-630 Courthouse Rd; MP 136.52 to 140.63 - November - Tuesday
- 95 S between 89-360 Courthouse Rd to 89-610 Garrisonville Rd; MP 140.63 to 144.16 - February - Wednesday
- 95 N between 89-360 Courthouse Rd to 89-610 Garrisonville Rd; MP 140.44 to 143.34 - January - Friday

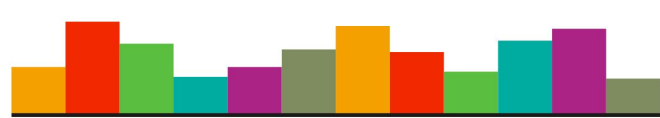


K Factors on I-95

95 S between Hanover County Line to SR 207 Rogers Clark Blvd; MP 101.33 to 105

Day of the Week	Count
Sunday	8
Tuesday	2
Friday	2
Saturday	18
Grand Total	30

87% of 30
highest hours
on weekend

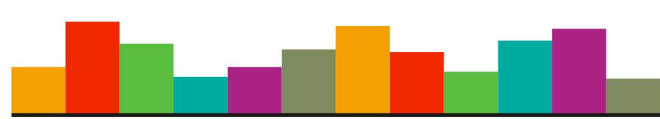


K Factors on I-95

95 N between 88-606 Mudd Tavern Rd to Urban Boundary; MP 118.48 to 123.09

Day of the Week	Count
Sunday	17
Tuesday	1
Friday	1
Saturday	11
Grand Total	30

93% of 30
highest hours
on weekend

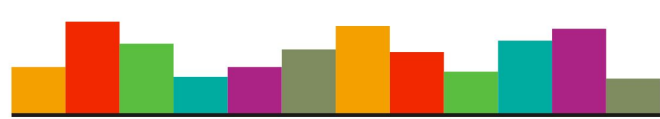


K Factors on I-95

95 S between US 1, US 17 to SCL Fredericksburg; MP 126.21 to 129.31

Day of the Week	Count
Sunday	3
Tuesday	1
Friday	12
Saturday	14
Grand Total	30

57% of 30
highest hours
on weekend



K Factors on I-95

95 N between SR 3 Plank Rd to Stafford County Line; MP 130.15 to 132.44

Day of the Week	Count
Sunday	14
Monday	1
Tuesday	1
Saturday	14
Grand Total	30

93% of 30
highest hours
on weekend

Round 3 Summary

468 applications submitted

- **24 applications screened out**
 - \$0.8 billion SMART SCALE request
 - \$1.2 billion total cost
- **11 applications withdrawn**
 - \$0.1 billion SMART SCALE request
 - \$0.1 billion total cost
- **433 applications scored**
 - \$7.4 billion SMART SCALE request
 - \$12.3 billion total cost

Factor Areas

Goals that guided measure development



- **Safety** – reduce the number and rate of fatalities and severe injuries
- **Congestion** – reduce person hours of delay and increase person throughput
- **Accessibility** – increase access to jobs and travel options
- **Economic Development** – support economic development and improve goods movement
- **Environmental Quality** – improve air quality and avoid impacts to the natural environment
- **Land Use** – support and improve non-work accessibility

Scoring focused on outcomes, not the size of the problem

Dividing by Cost

- Law requires that benefits produced by a project be analyzed on a basis of relative costs
- Results are provided to CTB based on:
 - Benefits relative to \$ request
 - Benefits relative to total costs
- Official SMART SCALE Score is



➔
$$\frac{\text{Benefit Score}}{\text{Requested \$}}$$

SMART SCALE Funding Distribution for Round 3 (in millions)



District Grant Programs	\$389.9
<i>Bristol</i>	\$22.1
<i>Culpeper</i>	\$21.7
<i>Fredericksburg</i>	\$28.9
<i>Hampton Roads</i>	\$84.7
<i>Lynchburg</i>	\$23.8
<i>NOVA</i>	\$88.5
<i>Richmond</i>	\$60.6
<i>Salem</i>	\$33.5
<i>Staunton</i>	\$26.1
High Priority Projects Program (Statewide)	\$389.9
Total	\$779.8

Comparison
Round 1: \$1.4B
Round 2: \$1.03B



Recommended Scenario - Fredericksburg

Project	Applicant	Funding	SMART SCALE Score
Rte 301 University Dr/Market Ctr Double R-Cut	King George County	\$3,500,000	10.48
FRED Transit Shelters & Benches	Fredericksburg Regional Transit	\$218,500	9.17
Lafayette Blvd/Kenmore Ave/Charles St Roundabouts	City of Fredericksburg	\$1,978,826	5.90
Rte 301 & Rte 3 Median U-Turn Intersection	King George County	\$3,300,000	5.33
New Commuter Parking Lot on Rte 3	Fredericksburg Regional Transit	\$5,055,000	5.11
Bicycle/Pedestrian Imp. on Rte 17B - Main St	Gloucester County	\$7,300,000	3.98
Dixon St/Lansdowne Rd Int. Improvements	City of Fredericksburg	\$2,200,000	3.94
Rte 3 Stars Study Improvements	George Washington Regional Commission	\$6,374,139	2.70
Rte 1/Fall Hill Ave Int. Improvements	City of Fredericksburg	\$7,200,000	2.27
Stefaniga & Mt. View Rd Int. Improvements	Stafford County	\$2,700,000	2.07

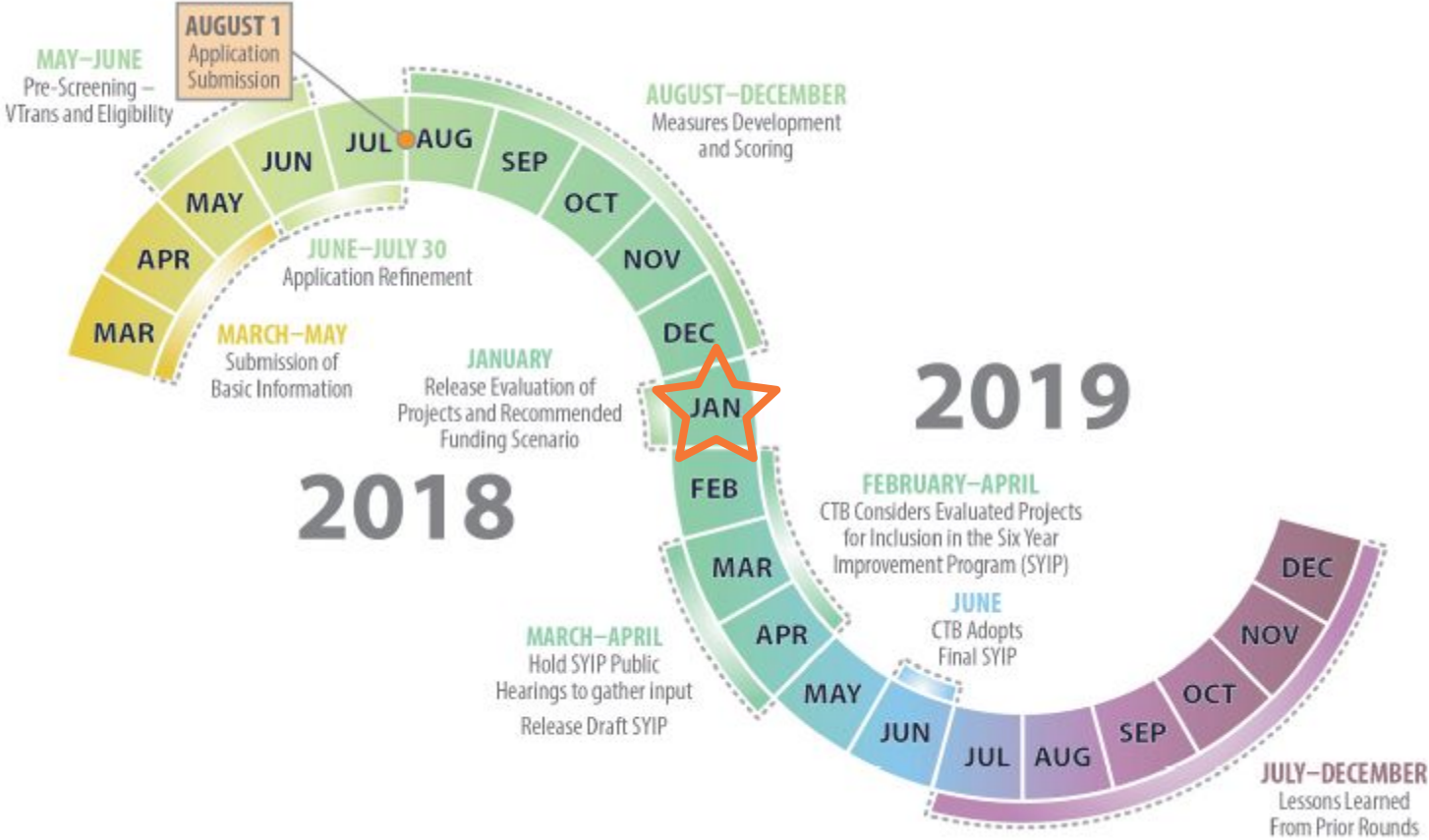
Round 3 General Observations

- Limited amount of funding available this round compared to previous rounds
- More projects competing for the limited funding
- HRBT project (\$3.7B) dampened scores for other projects throughout the state
- 76 projects \geq \$25M in total cost
 - 5 were recommended for funding
 - All 5 leveraged local and/or regional funds
 - Project costs totaling almost \$4.4B
 - Only \$391M (or 11%) funds requested

Round 4 Recommendations

- For larger improvements, must get points in as many factor areas as possible
- Non-SOV users (transit, bike, ped, HOV) affect multiple measures
 - Contribute to A.1 (Throughput) score
 - Scale A.3 (Access to Multimodal Choices) and E.1 (Air Quality and Energy) - so zero non-SOV users means 0 points in these areas
- Demand management strategies (transit, P&R capacity) as part of larger capacity improvements can be cost effective way to increase scores

Round 3 Timeline



Moving Forward

- **February** CTB meeting – Review of recommended projects
- **March to April** – Board to develop potential revisions to staff recommended funding scenario
- **April to May** – Public hearings on staff recommended scenario and any potential revisions
- **May** CTB meeting – Revised funding scenario developed
- **June** CTB meeting – Adoption of Six-Year Improvement Program
- **July to September** - identification of policy and method changes to improve the SMART SCALE process
- **March 2020** - Intake period for Round 4 begins