SMART SCALE 
Funding the Right Transportation Projects in Virginia

SMART SCALE Training Session

2017 Fall Transportation Meetings
Overview

- **SMART SCALE Refresher**
  - Legislation
  - Factors and Scoring
  - SMART Portal
- **Round 3 Proposed Changes**
- **Identifying Candidate Projects**
  - STARS Overview and Approach
- **General Observations**
- **Factor specific advice**
  - Safety
  - Congestion
  - Accessibility
  - Economic Development
  - Environment
  - Land Use
- **Rethinking Solutions**
Quick Refresher

SMART SCALE Legislation
Virginia’s Statewide Prioritization Process

• Legislation championed by Democratic Governor and the Republican Speaker of the House
  – 2014 Virginia General Assembly
  – §33.2 – 214.1 of the Code of Virginia

• Requires Commonwealth Transportation Board (CTB) use objective and quantifiable process for the allocation of construction funds
  – Board allocates construction funds for the Commonwealth
  – Programming of funds for capacity enhancing projects
  – Intent for the CTB to select the highest ranking projects however, they maintain the authority to propose adjustments to the rankings.

• Policy developed over a 16 month period and adopted by Commonwealth Transportation Board in June 2015
Reformed Funding Formulas

• In 2015 legislature adopted Administration’s recommended revisions to funding formulas
  – Replaced the “40-30-30” formula as well as the temporary “CTB formula”

• New formula distributes funds as follows:
  – 45% for State of Good Repair with funds assigned to districts based on asset conditions
  – 27.5% for District Grant Program distributed to districts based on old “40-30-30” formula for in-district competition through SMART SCALE
  – 27.5% for High Priority Projects Program for statewide distribution based on SMART SCALE

• All districts are guaranteed more funding through new formula than under old “40-30-30” formula
Quick Refresher

SMART SCALE Factors/Scoring
SMART Scale Factors

- Safety
- Congestion mitigation
- Accessibility
- Environmental quality
- Economic development
- Land use and transportation coordination (areas with over 200,000 people)
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 transportation efficient land development patterns
How Scoring Works

Everything is Relative
Everything is Relative

**Highest Value Dictates Scores**

<table>
<thead>
<tr>
<th>Project</th>
<th>Measure</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>250</td>
<td>50</td>
</tr>
<tr>
<td>B</td>
<td>300</td>
<td>60</td>
</tr>
<tr>
<td>C</td>
<td>75</td>
<td>15</td>
</tr>
<tr>
<td>D</td>
<td>15</td>
<td>3</td>
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<tr>
<td>E</td>
<td>500</td>
<td>100</td>
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<tr>
<td>F</td>
<td>150</td>
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</table>

**Change here only affects one score**

<table>
<thead>
<tr>
<th>Project</th>
<th>Measure</th>
<th>Score</th>
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<tbody>
<tr>
<td>A</td>
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<td>40</td>
</tr>
<tr>
<td>B</td>
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<tr>
<td>C</td>
<td>75</td>
<td>15</td>
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<td>D</td>
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<td>E</td>
<td>500</td>
<td>100</td>
</tr>
<tr>
<td>F</td>
<td>150</td>
<td>30</td>
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</table>

**Change here affects all scores**

<table>
<thead>
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<th>Score</th>
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<tr>
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<td>33.3</td>
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<td>40</td>
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<td>C</td>
<td>75</td>
<td>10</td>
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<td>D</td>
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<td>2</td>
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<tr>
<td>E</td>
<td>750</td>
<td>100</td>
</tr>
<tr>
<td>F</td>
<td>150</td>
<td>20</td>
</tr>
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</table>

The best project for that measure dictates the score for all other projects.
<table>
<thead>
<tr>
<th>Factor</th>
<th>Congestion Mitigation</th>
<th>Economic Development</th>
<th>Accessibility</th>
<th>Safety</th>
<th>Environmental Quality</th>
<th>Land Use</th>
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<tbody>
<tr>
<td>Category A</td>
<td>45%</td>
<td>5%</td>
<td>15%</td>
<td>5%</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Category B</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
<td>20%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Category C</td>
<td>15%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Category D</td>
<td>10%</td>
<td>35%</td>
<td>15%</td>
<td>30%</td>
<td>10%</td>
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</table>
## Sample Project Scoring

### Project "A" - located in Typology A

<table>
<thead>
<tr>
<th></th>
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<td></td>
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<td>10</td>
<td>38</td>
<td>28</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>17</td>
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<tr>
<td>Measure Weight</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>60%</td>
<td>20%</td>
<td>20%</td>
<td>50%</td>
<td>50%</td>
<td>60%</td>
<td>20%</td>
<td>20%</td>
<td>100%</td>
</tr>
<tr>
<td>Weighted Measure Score</td>
<td>31</td>
<td>24</td>
<td>10</td>
<td>16</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>19</td>
<td>14</td>
<td>18</td>
<td>4</td>
<td>4</td>
<td>17</td>
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<tr>
<td>Raw Factor Score</td>
<td>55</td>
<td>26</td>
<td></td>
<td></td>
<td>12</td>
<td></td>
<td></td>
<td>33.0</td>
<td>26.0</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Factor Weighting (Typ. A)</td>
<td>45%</td>
<td>5%</td>
<td></td>
<td></td>
<td>15%</td>
<td></td>
<td></td>
<td>10%</td>
<td>5%</td>
<td></td>
<td></td>
<td></td>
<td>20%</td>
</tr>
<tr>
<td>Weighted Factor Score</td>
<td>24.8</td>
<td>1.3</td>
<td></td>
<td></td>
<td>1.8</td>
<td></td>
<td></td>
<td>3.3</td>
<td>1.3</td>
<td></td>
<td></td>
<td></td>
<td>3.4</td>
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</table>

### Project Score

<table>
<thead>
<tr>
<th>Project Score</th>
<th>35.9</th>
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</table>

### Total Project Cost

<table>
<thead>
<tr>
<th>Total Project Cost</th>
<th>$20,000,000</th>
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</thead>
</table>

### Score Divided by Total Cost

<table>
<thead>
<tr>
<th>Score Divided by Total Cost</th>
<th>17.95</th>
</tr>
</thead>
</table>

### SMART SCALE Cost

<table>
<thead>
<tr>
<th>SMART SCALE Cost</th>
<th>$10,000,000</th>
</tr>
</thead>
</table>

### Score / SMART SCALE Cost

<table>
<thead>
<tr>
<th>Score / SMART SCALE Cost</th>
<th>35.9</th>
</tr>
</thead>
</table>
How does cost affect the SMART SCALE score?

- State 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 \[
\frac{\text{Benefit Score}}{\text{Requested $}}
\]
Quick Refresher
SMART Portal
SMART SCALE / SMART Portal

• SMART SCALE (formerly HB2) is an application based process in which projects are scored and prioritized for funding based on an objective process.

• SMART Portal is an on-line web based tool established to collect project applications for Round 1 of SMART SCALE.

• SMART Portal has been enhanced to collect project applications for Revenue Sharing, Transportation Alternatives Set-Aside (formerly TAP), and Highway Safety programs.

• The application submission period varies by program:
  - Revenue Sharing: August 1 – November 1
  - Highway Safety Programs: August 1 – November 1
  - Transportation Alternatives: September 1 – November 1
  - State of Good Repair (Bridges and Paving): TBD
  - SMART SCALE (Round 3 – Proposed): March 1 – August 1
Background / Refresher Information
All project applications must meet an identified need in the Commonwealth’s long-range transportation plan – VTrans2040
**Applicant Eligibility**

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Regional Entity (MPOs, PDCs)</th>
<th>Locality* (Counties, Cities, and Towns)</th>
<th>Public Transit Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corridor of Statewide Significance</td>
<td>Yes</td>
<td>Yes, with a resolution of support from relevant regional entity</td>
<td>Yes, with resolution of support from relevant regional entity</td>
</tr>
<tr>
<td>Regional Network</td>
<td>Yes</td>
<td>Yes, with a resolution of support from relevant regional entity</td>
<td>Yes, with resolution of support from relevant entity</td>
</tr>
<tr>
<td>Urban Development Area</td>
<td>No</td>
<td>Yes, with a resolution of support from relevant regional entity</td>
<td>No</td>
</tr>
<tr>
<td>Safety</td>
<td>No</td>
<td>Yes, with a resolution of support from relevant regional entity</td>
<td>No</td>
</tr>
</tbody>
</table>

*Locality submitted projects within MPO boundaries must include a resolution of support from the MPO*
• Projects must be sufficiently developed
• Studies are not eligible
• Projects must be a capital improvement, transportation demand management or safety project
• Projects must meet a need identified in VTrans 2040, and projects need to be on at least one of the following:
  • Corridors of Statewide Significance
  • Regional Networks
  • Improvements to promote Urban Development Areas (UDAs)
  • Safety
• Provide technical assistance to applicants:
  ○ Coordinate candidate projects with District SMART SCALE Lead
  ○ Help determine VTrans need eligibility: CoSS, UDA, Regional Network or safety need
  ○ Work with district resource team to refine project description and scope, schedule, estimates, and supporting documentation - conceptual sketch, previous studies, etc.
  ○ Develop cost estimates by phase and identifies local/regional contribution of funding
  ○ Guide applicants on information and data needed for SMART SCALE application
  ○ FOCUS on Quality over Quantity
Local/Regional applicants will be required to provide the following information when submitting a project under SMART SCALE:

- Point of contact
- Who will administer project?
- Project priority (if submitting more than one)
- Detailed project description/scope
- Project sketch
- Project status, cost estimate and duration by phase
- Measure information related to Accessibility, Economic Development, Environment, and Land Use (area types A & B)
- Amount of SMART SCALE funding requested
- Description of any non-SMART SCALE funding committed to project
- Applicable supporting documents (resolutions, plans, studies, etc.)
Project applications must include the following information:

- **Scope** - The scope should define the limits of the project, its physical and operational characteristics, and physical and/or operational footprint.

- **Cost Estimate** - Cost estimate should be as realistic as possible – considering known information and should account for possible risk and contingencies.

- **Schedule** – Anticipated schedule should be realistic and reflect complexity of project and identify phase durations (PE, RW, CN)

VDOT and DRPT will assist applicants in the development of project scopes, cost estimates, and schedules.
Web Application
How to Log-In

• Using the URL (to be provided):
  – From the Authentication page, select “Forgot Password” if you had an account in the system last year
  – You should receive an email to reset your password
  
  – If you did not have an account, we will set you up as a new user and you should receive an email that will include your password. Your email will be your username.
  – Use email notification that includes link and temporary password

• My Account
  – Review User Information
  – Change Password
User / Organization Administration

- **Enhanced/Modified Roles and Responsibilities**
  - District/Administrator POC manages permissions for District/Organization
  - Manage users through Account administration – Administrator role only
    (located as a dropdown from your name in the tool bar)

- **Setting up New Users**
  - An email address can only be associated with one organization – so
    unless person has alternate email address, they cannot be set up for
    more than one organization – ex both the MPO and the PDC

- **Archiving Users**
  - If users have left the organization, then their account should be archived
• Managing Existing Users
  – Users access can be limited by role and application programs
  – Users can be assigned roles from multiple programs
  – Each application program has the roles of Viewer, Editor, Submitter

• **Viewer** – can View applications created by others for the assigned program
• **Editor** – can View and Edit applications for the assigned program
• **Submitter** – can View, Edit, and Submit applications for the assigned program

• Example: A user is assigned only Highway Safety Improvement Application Submitter, that user can only view, edit, and submit Highway Safety Improvement Applications.
Creating/Submitting Applications

- Applications can be copied from prior submission or from other application programs
- Applications can be edited, saved, submitted
- Supporting documents can be uploaded
- New/Revised Data Fields
  - Each application program enhanced based on lessons learned and streamlining
Two new application programs
Coming Soon: State of Good Repair for Bridges and Paving
New Features

Comment and alerts improved – tag and filter to each pearls to streamline review and collaboration
Prioritize Applications

• From Dashboard, applications can be prioritized – note applications must first be submitted

• Once all application programs are available, Dashboard will display each grant program

• Once submitted, an application may be unsubmitted, edited, and resubmitted up to the deadline
**Notes/Recommendation**

- Recommend using Chrome, Firefox or Internet Explorer 11
  - If you use IE9, be sure to save you work every 5-10 minutes by clicking “Save and Continue” on bottom right portion of page

- Multiple editors – the system will allow two users to be editing the same application at the same time – last person to save wins if editing the same field

- Applicants are strongly encouraged to use the Pre-Application Coordination Form and work closely with VDOT/DRPT staff prior to entering projects into the Web Application

- Please do not respond to the email that provides the login credentials. Instead, email SmartPortal@CTB.Virginia.gov.
Round 3 - Proposed Changes

- CTB to take action in October
- Seeking input to proposed changes
- [http://vasmartscale.org/default.asp](http://vasmartscale.org/default.asp)
Biennial Schedule

- **Prepping for Round 3 – Start Now**
  - Begin application intake March 1st 2018
  - June 1st deadline for creation of an application
  - August 1st submission deadline

5 month project evaluation and scoring window - 2 more months than previous rounds

5 month application intake window - 3 more months than previous rounds
### Number of Applications

<table>
<thead>
<tr>
<th></th>
<th>Round 1</th>
<th>Round 2</th>
<th>% Change</th>
</tr>
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<tbody>
<tr>
<td>Total # Submitted</td>
<td>321</td>
<td>436</td>
<td>36%</td>
</tr>
<tr>
<td>Total # Scored</td>
<td>287</td>
<td>404</td>
<td>41%</td>
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<tr>
<td>Average # Application</td>
<td>2.2</td>
<td>2.8</td>
<td>27%</td>
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<tr>
<td>Max # of Applications</td>
<td>12</td>
<td>33</td>
<td>175%</td>
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**Recommended Limits on Number of Applications**

**June CTB Meeting Generated Significant Discussion**

- Approach modified
- Established 2 tiers based on population

<table>
<thead>
<tr>
<th>Tier</th>
<th>Localities</th>
<th>MPOs/PDCs/Transit Agencies</th>
<th>Maximum Number of Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Less than 200K</td>
<td>Less than 500K</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Greater than 200K</td>
<td>Greater than 500K</td>
<td>8</td>
</tr>
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</table>
## Recommended Limits on Number of Applications

Increases total number of applications by 111

<table>
<thead>
<tr>
<th>Tier</th>
<th>No. of Local/Regional Entities</th>
<th>Maximum Number of Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (4 apps max)</td>
<td>238</td>
<td>952</td>
</tr>
<tr>
<td>2 (8 apps max)</td>
<td>18</td>
<td>144</td>
</tr>
<tr>
<td>Grand Total</td>
<td>256</td>
<td>1096</td>
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Impact of Recommendation on Applicants

Applicants that would be limited based on population tiers
14 applicants impacted, two less than 3-tiered approach

<table>
<thead>
<tr>
<th>District/Regional Entity</th>
<th>Jurisdiction/Regional Name</th>
<th>Submitted Round 1</th>
<th>Submitted Round 2</th>
<th>Average # Apps Submitted R1 &amp; R2</th>
<th>Total Population 2010 Census</th>
<th>Max No. of Apps</th>
<th>Tier</th>
</tr>
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<tbody>
<tr>
<td>Richmond</td>
<td>Hopewell</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>22,591</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Bristol</td>
<td>Scott</td>
<td>6</td>
<td>3</td>
<td>4.5</td>
<td>23,177</td>
<td>4</td>
<td>1</td>
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<tr>
<td>Staunton</td>
<td>Frederick</td>
<td>5</td>
<td>9</td>
<td>7</td>
<td>78,305</td>
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<td>Salem</td>
<td>Roanoke</td>
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<td>4</td>
<td>4.5</td>
<td>84,278</td>
<td>4</td>
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<td>Hampton Roads</td>
<td>Suffolk</td>
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<td>7</td>
<td>6</td>
<td>84,585</td>
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<td>5</td>
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<td>97,032</td>
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<td>Culpeper</td>
<td>Albemarle</td>
<td>3</td>
<td>7</td>
<td>5</td>
<td>98,970</td>
<td>4</td>
<td>1</td>
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<td>Northern Virginia</td>
<td>Alexandria</td>
<td>4</td>
<td>5</td>
<td>4.5</td>
<td>139,966</td>
<td>4</td>
<td>1</td>
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<tr>
<td>Hampton Roads</td>
<td>Newport News</td>
<td>6</td>
<td>8</td>
<td>7</td>
<td>180,719</td>
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<td>MPO</td>
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<td>6</td>
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<td>Northern Virginia</td>
<td>Prince William</td>
<td>12</td>
<td>14</td>
<td>13</td>
<td>397,041</td>
<td>8</td>
<td>2</td>
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Project Readiness

- Formalize and strengthen policy on required level of project planning
  - **New interchange on limited access facility**
    - IJR with preferred alternative
  - **Grade separation of at-grade intersection**
    - At-grade improvement options have been assessed
  - **New signal**
    - Signal warrants have been met and signal justified
  - **Major widening**
    - Corridor optimization and alternatives to new lanes have been evaluated
- **Demonstrate** that a project has **public support**, requiring resolution of support from governing body
Project Eligibility

- Clarify the ineligibility of maintenance and State of Good Repair (SGR) projects
- If project scope is mostly the repair or replacement of existing assets then it is not eligible for SMART SCALE. Examples include:
  - Signal system replacement (mast arms, signal heads)
  - Bridge replacement with wider lane widths and/or ped accommodations
Funding and Related Elements

• Full Funding Policy
  • Program not intended to replace committed local/regional funding sources, proffers, and/or other committed state/federal funding sources
  • If $ request is to add components to existing fully funded project then requested components will be analyzed independently

• Relationship of Major Project Elements
  • Add guidance that project elements must be associated (contiguous or same improvement type)
• **Congestion**
  • Person throughput – scale based on length

• **Safety**
  • Remove DUI crashes and use blended rate for fatal and severe injury crashes

• **Accessibility – A.1 and A.2 - Access to Jobs**
  • Eliminate the 45 and 60 minute cap for auto and transit job access respectively

• **Land Use**
  • More specific definitions of mixed-use development
  • New methodology - Accessibility to key non-work destinations such as grocery, healthcare, education, etc.
Measures

• Economic Development - ED.1 - Site Development
  • Remove 0.5 points for consistent with local and regional plans - project specifically referenced in local comp plan or regional economic development strategy = 0.5 points
  • Project within economically distressed areas get up to 0.5 points
  • Zoned properties must get primary/direct access from project
  • Conceptual (0.5, 1) vs detailed site plans (2, 4 points) – points based on whether submitted or approved
  • Reduce buffer to max of 3 miles
  • Considering establishment of maximum square footage based on project type and based on current level of development - cannot exceed x% of total current square footage in jurisdiction(s)

• Economic Development - ED.2 - Intermodal Access
  • Scale freight tonnage-based measure by the length of the improvement
Identifying Candidate Projects
Readiness Challenge

• Before SMART SCALE, projects could receive $ allocations and project details could be developed during PE phase
• Under SMART SCALE, projects need to be adequately planned and developed
• Project details are needed to 1) understand the scope, 2) develop an accurate cost estimate and 3) calculate the expected benefits
• Change to project scope and/or estimate after it is funded could trigger re-evaluation and rescoring
• More complex projects require more thorough planning
• Often overlooked:

  Stormwater
  Turn Lanes
  Access Management

  Utilities
  Intersection Improvements

  Median Type
  Transit Improvements
Developing candidate projects

- Regional Plans Developed by MPOs and PDCs
- Transit Development Plans
- Local Comprehensive Plans
- Planning Studies/STARS
- Asset Condition Assessments
- Strategic Highway Safety Plan
- VTrans Multimodal Transportation Plan (VMTP)

Candidate Projects

- State of Good Repair
- Highway Safety Improvement Program

Selection

- CTB Selection
- Revenue Sharing

Six-Year Improvement Program
STARS Program

★ VDOT planning program created 10 years ago
★ Identify corridors with safety and congestion issues
  ★ Corridors, intersections, bottleneck locations, safety hot spots
★ Develop comprehensive, innovative transportation solutions
★ Advance projects to SYIP and/or Maintenance
★ Track implementation

Data Driven
73% success rate
STARS Approach

★ Links planning to operations/ITS, safety and design
★ Accelerates process of planning to design
★ Involves other disciplines in the planning process
★ Improves thoroughness of scope and accuracy of cost estimates and schedules
## STARS Approach

**Spring**
- **Data Analysis and Mapping**
  - Safety
  - Operations
  - Local input
- **Identify Project Development Corridors**
  - Align with SMART SCALE metrics
  - District input

**Summer**
- **Pre-scoping and Project Selection**
  - Application
  - Projects that need further study or design
  - Projects not selected by CTB
  - NEPA process
- **Study Scoping**
  - TMPD
  - L&D
  - Bridge
  - Environmental
  - Districts
  - Localities
  - Consultants

**6-18 Month**
- **Conduct Study/Conceptual Design**
  - Recommendations
  - Cost estimates
  - Benefit-cost
  - Study work group consensus
  - Funding sources

**Following Spring/Summer**
- **Project Prioritization**
  - Local, regional, district, and statewide
  - SMART SCALE, HSIP, revenue sharing, other
  - CLRIP and TIP/STIP
- **Advancement of Projects**
  - SYIP
  - Maintenance

---

**Continuously Advancing Projects to SYIP**

**VDOT Six-Year Improvement Program**
<table>
<thead>
<tr>
<th>Season</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>Data Analysis and Mapping: Safety, Operations, Local input</td>
</tr>
<tr>
<td></td>
<td>Identify Project Development Corridors: Align with SMART SCALE metrics, District input</td>
</tr>
<tr>
<td></td>
<td>Pre-scoping and Project Selection: Application, Projects that need further study or design, Projects not selected by CTB, NEPA process</td>
</tr>
<tr>
<td></td>
<td>Study Scoping: TMPD, L&amp;D, Bridge, Environmental Districts, Localities, Consultants</td>
</tr>
<tr>
<td></td>
<td>6-18 Month: Conduct Study/Conceptual Design: Recommendations, Cost estimates, Benefit-cost, Study work group consensus, Funding sources</td>
</tr>
<tr>
<td></td>
<td>Following Spring/Summer: Project Prioritization: Local, regional, district, and statewide, SMART SCALE, HSIP, revenue sharing, other, CLRP and TIP/STIP</td>
</tr>
<tr>
<td></td>
<td>Advancement of Projects: SYIP, Maintenance</td>
</tr>
</tbody>
</table>

**Continually Advancing Projects to SYIP**
Mapping visually represent safety and congestion data

- **Potential for Safety Improvement (PSI)**
  - Intersections
  - Segments
- **Travel Time Index (TTI)**
- **Planning Time Index (PTI)**
- **Buffer Time Index (BTI)**
- **Other**

Available for download and use at: [https://app.box.com/v/VDOTSTARS](https://app.box.com/v/VDOTSTARS)
# STARS Data/Mapping

## Planning Designations

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
<th>Measure</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corridor Length</td>
<td>Yes/No</td>
<td></td>
<td>0.5 - 10 miles</td>
</tr>
<tr>
<td>Located on CoSS</td>
<td>Yes/No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corridor Location</td>
<td>Urban/Rural</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Future Improvements</td>
<td>Yes/No</td>
<td>SYIP Project</td>
<td></td>
</tr>
<tr>
<td>Identified</td>
<td>Yes/No</td>
<td>In Long Range Transportation Plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes/No</td>
<td>In State Highway Plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes/No</td>
<td>NEPA Study</td>
<td></td>
</tr>
</tbody>
</table>

## Safety

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
<th>Measure</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historic Crash Pattern</td>
<td></td>
<td>Approximate number of crashes</td>
<td></td>
</tr>
<tr>
<td>PSI Rating - Segment</td>
<td></td>
<td>Rank</td>
<td></td>
</tr>
<tr>
<td>PSI Rating - Intersection</td>
<td></td>
<td>Rank</td>
<td></td>
</tr>
</tbody>
</table>

## Operations

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
<th>Measure</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>V/C Ratio</td>
<td></td>
<td>Percentiles</td>
<td></td>
</tr>
<tr>
<td>Travel Time Index</td>
<td></td>
<td>Percentiles</td>
<td></td>
</tr>
<tr>
<td>Planning Time Index</td>
<td></td>
<td>Percentiles</td>
<td></td>
</tr>
<tr>
<td>Buffer Time Index</td>
<td></td>
<td>Percentiles</td>
<td></td>
</tr>
</tbody>
</table>

## District Coordination

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
<th>Measure</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corridor Already Studied</td>
<td>Yes/No</td>
<td></td>
<td>What type of study conducted</td>
</tr>
<tr>
<td>District Identified Problems</td>
<td>Yes/No</td>
<td></td>
<td>Description of problems/concerns</td>
</tr>
<tr>
<td>District Administration Support</td>
<td>Yes/No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local / MPO Support</td>
<td>Yes/No</td>
<td></td>
<td>Source(s)</td>
</tr>
<tr>
<td>Funding Identified</td>
<td>Yes/No</td>
<td></td>
<td>Supporting details needed</td>
</tr>
<tr>
<td>Economic Development Impact</td>
<td>Yes/No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
STARS Data/Mapping

Map package for your district can be downloaded at - https://app.box.com/v/VDOTSTARS
Project Development Corridor

Corridor F - US 60 - MP 232.71 - 239.55, From Williamsburg Village Drive to Route 132

Planning
- Corridor Length (mi): 6.83
- Coss Corridor: Yes
- Urban or Rural: Urbanized
- SYIP Project/HB2 Project/SUMTA Project: Yes

Safety
- 2011-2015 Crashes: 538
- Max PSI Segment Rank: 187
- Max PSI Intersection Rank: 87
- Max V/C Ratio (2015/2030): 0.56/0.7
- Max TTI Percentile (2015 AM/PM Weekday): 0.82/0.93
- Max TTI Percentile (2015 AM/PM Weekend): 0.82/0.93

Operation
- Duration of Congestion (Hours): 0

Notes: SYIP DESIGN UNDERWAY (9/2012): Ironbound Rd & Longhill Rd Intersection Improvements
SYIP CONSTRUCTION COMPLETED (12/29/17): Richmond Road Intersection Improvements & #1 Rte 60 West Ramp
SYIP DESIGN UNDERWAY (1/27/14): Rebuild Existing Traffic Signal
Rte 60 @ Prime Outlet
SYIP CONSTRUCTION COMPLETED (10/7/03): Longhill Rd. Resurfacing
SYIP FUTURE PROJECT (10/6/16): I-66 Bypass Rd (Rte 60)
Improvements
SYIP SYIP SCALE: Ironbound Road Phase 2 (T)
SYIP SCALE: Ironbound Road Phase 3 (T)

Location Map - Hampton Roads District
James City County/ City of Williamsburg/ York County

VDOT Projects
SYIP
- Segments
- Intersections

HB2
- Not Funded
- Funded

SUMTA
- Not Funded
- Funded

SUMTA SCALE
- Not Funded
- Funded
STARS Deliverables

STARS Project Summary Sheets

The STARS one-page project summary sheets have proven to be an effective tool for summarizing several important project features, especially those factors that are required in many of the potential funding applications.

- Key existing safety and/or congestion issues identified
- Project description with a graphical representation of the improvement
- Project schedule summarized in three categories: preliminary engineering, right-of-way and utilities, and construction
- Summarized planning level cost estimate
- Benefits of the project in terms of safety improvement and/or congestion relief
**I-95/I-64 Corridor – Continuous Roadway Lighting**

**PROJECT GRAPHIC**

**EXISTING CONDITIONS**
- Both high mast and conventional roadway lighting exist along the I-95/I-64 study corridor.
- Existing lighting is primarily concentrated around interchanges.

**PROJECT DESCRIPTION**
- Remove existing corridor lighting and upgrade to continuous corridor-wide high mast lighting.

**ESTIMATED PROJECT COSTS**

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary Engineering</td>
<td>3,110,000</td>
</tr>
<tr>
<td>ROW and Utility Relocation</td>
<td>50</td>
</tr>
<tr>
<td>Construction</td>
<td>12,450,000</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>15,560,000</strong></td>
</tr>
</tbody>
</table>

**ESTIMATED BENEFITS**

<table>
<thead>
<tr>
<th>Safety Measure</th>
<th># of Related Crashes*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between 2007 - 2009</td>
<td>992</td>
</tr>
<tr>
<td>Crash Reduction Factor</td>
<td>0.50</td>
</tr>
<tr>
<td>Reduction in Crashes</td>
<td>181</td>
</tr>
</tbody>
</table>

**PROJECT PHOTOS**

Photograph 1: SB I-95/I-64 East Interchange – High Mast Roadway Lighting

Photograph 2: I-64 West of Bryan Park Interchange – Conventional Roadway Lighting

**PROJECT BENEFIT**

- Improve safety throughout the corridor by reducing night crashes.
Southbound I-95 Exit Ramp at Franklin Street/15th Street (Exit 74B)

**Estimated Project Costs**

- Preliminary Engineering: $240,000
- ROW and Utility Relocation: $290,000
- Construction: $1,275,000
- Total Cost: $1,805,000

**Estimated Benefits**

<table>
<thead>
<tr>
<th>Traffic Operations Measures</th>
<th>AM and PM Peak Hour Intersection Delay (Seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022 No-Build</td>
<td>130.8</td>
</tr>
<tr>
<td>2022 Build</td>
<td>50.5</td>
</tr>
<tr>
<td>Reduction in Delay</td>
<td>80.3</td>
</tr>
<tr>
<td>Annual Cost Savings</td>
<td>$166,000</td>
</tr>
<tr>
<td>Benefit-to-Cost Ratio</td>
<td>0.73</td>
</tr>
</tbody>
</table>

- Maximum Queue Length (Feet)
  - SB I-95 Exit Ramp: 159
  - 2022 No-Build: 1,459, PM = 127
  - 2022 Build: AM = 277, PM = 40

- Safety Measure:
  - No. of Related Crashes: 4
  - Crash Reduction Factor: 0.35
  - Reduction in Crashes: 1

**Existing Conditions**

- Queuing from the existing southbound I-95 off-ramp to Franklin Street occurs on a daily basis especially during the AM peak hour, as shown in Photograph 1.
- Vehicles split back onto mainline I-95 due to the 300-foot ramp length and are a safety issue due to the high-speed differential between the exit and mainline traffic.
- Geometric conditions of the ramp such as the change in grade provide poor intersection visibility to exiting drivers, as shown in Photograph 2.
- Vehicles on Franklin Street were observed during the AM peak hour stopping to drop off passengers to the Monroe Building located on the northwest quadrant of the intersection. This negatively impacted westbound thru traffic on Franklin contributing to the queuing issue on the ramp.

**Project Description**

1. Widen the southbound approach from 2 lanes to 3 lanes. The additional lane will allow for more efficient signal timing operations and provide more storage for queued vehicles.
2. Install ramp pre-emption at the intersection. Once the SB queue reaches a specific point (e.g., 250 ft. from stop bar) then the intersection controller can prioritize demand from the ramp and clear the queue before it spills back onto I-95.
3. Install actuated pedestrian push button on each signal pole on each quadrant of the intersection.

* The NB approach of 15th Street will be restriped from 2 NB lanes and 2 SB lanes to 3 SB lanes and 1 NB lane as shown in the project graphic above under a separate City of Richmond project.

**Project Benefits**

This project proposes to reduce peak hour queuing on the southbound I-95 exit ramp, improve traffic flow on Franklin Street, and ultimately improve the overall safety and operation of the study area.
## STARS Project Advancement

### Determine Priorities
- Local
- Regional
- District

### Select Projects to Advance Based on Priorities

### Prioritize on Annual Basis

### Identify Funding Sources

### Track Advancement
- SMART SCALE
- CLRPs
- MPOs TIP/STIP
- SYIP
- Phase (PE, ROW, Construction)

### Projects

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Completion Date</th>
<th>Study Corridor</th>
<th>VDOT PM</th>
<th>Jurisdiction</th>
<th>District</th>
<th>Improvement Type</th>
<th>Improvement Description</th>
<th>Eligible Funding Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lynchburg Expressway Improvement Study</td>
<td>October 2014</td>
<td>US 29 Business</td>
<td>Rick Youngblood</td>
<td>City of Lynchburg</td>
<td>Lynchburg</td>
<td>SYIP</td>
<td>Old Wards Road deceleration lane extension</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SYIP</td>
<td>Wards Road acceleration lane extension</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SYIP</td>
<td>Candlers Mountain Road auxiliary lanes and ramp realignment</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SYIP</td>
<td>Eliminate Murray Place intersection</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SYIP</td>
<td>Odd Fellows Road acceleration and deceleration lane extensions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SYIP</td>
<td>Odd Fellows Road/Carroll Avenue auxiliary lane</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SYIP</td>
<td>James Street/Stadium Road interchange reconfiguration</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SYIP</td>
<td>Carroll Avenue acceleration lane extension</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SYIP</td>
<td>Miller Street/Kemper Street auxiliary lane</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SYIP</td>
<td>Kemper Street/Grace Street auxiliary lane</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SYIP</td>
<td>Close Robins Road entrance ramp</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SYIP</td>
<td>Main Street/Church Street acceleration lane extension</td>
<td></td>
</tr>
<tr>
<td>Mount Cross Road at Stony Mill Road/ Tristan High Road Intersection Alternatives Study</td>
<td>May 2014</td>
<td>Mount Cross Road (Route 894)</td>
<td>Rick Youngblood</td>
<td>Pittsylvania County</td>
<td>Lynchburg</td>
<td>SYIP</td>
<td>Single-lane roundabout with access management improvements at the intersection</td>
<td></td>
</tr>
<tr>
<td>Main Street at Bedford Avenue Intersection Alternatives Study</td>
<td>June 2015</td>
<td>Main Street (US 29 Business)</td>
<td>Rick Youngblood</td>
<td>Town of Amherst</td>
<td>Lynchburg</td>
<td>SYIP</td>
<td>Single-lane peanut roundabout with access management and sidewalk improvements at the intersection</td>
<td></td>
</tr>
</tbody>
</table>
Developing Candidate Projects - Maximizing scoring potential

• General Observations
• Factor specific advice
  – Safety
  – Congestion
  – Accessibility
  – Economic Development
  – Environment
  – Land Use
• Rethinking Solutions
How To Maximize Scores
General Observations

• **Area Type Weighting** – keep this in mind – what is weighted high/versus low – projects that provide benefits in factor areas that are weighted high will score better

• **Project Cost** – focus scope on problem/needs
  – Project that provides 100% of the benefit at 100% of the cost will not score as well as project that provide 75% of the benefit at 30% of the cost

• **Thinking beyond Single Occupant Vehicles (SOVs)** – opportunities for bike/ped, transit, TDM

• **Economic Development** – leaving blank = 0 points

• It is very difficult to consider data/information if it is not included in application submittal – if available please be sure to upload traffic/studies/analysis
How To Maximize Scores

• Project Scope
  – Don’t forget intersections
    – Significant safety and delay benefits can be realized with innovative intersection treatments – RCUT, jug handle, Quadrant Roadway, displaced-left, etc
    – Higher Crash Modification Factor (CMF) with reduced conflicts and greater delay savings with free flow movements and reduced signal phases
  – Opportunities for access management and signal elimination
    – Opportunities to eliminate signal will eliminate delay associated with them
    – Can cross-overs be eliminate, entrances consolidate? – full movement to right-in right-out
Considerations for Projects with Transit and Rail Components

• **Identify and plan for all project components needed for calculations of benefits**
  – Bus O&M facility expansion or roadway widening projects with bus shelters
    ▪ Include plans for new or additional transit services
  – Express bus or rail services expansion projects that rely on park-and-ride facilities
    ▪ If required for the service, include plans for park-and-ride facility expansions

• **Document all services and facilities, provide all necessary data**

• **Reach out to DRPT for questions related to transit and rail components**
Measuring SAFETY

– 50% of score – Expected reduction in Equivalent Property Damage Only (EPDO) crash frequency (100% of score for transit projects)

– 50% of score – Expected reduction in Equivalent Property Damage Only (EPDO) crash rate

<table>
<thead>
<tr>
<th>Factor</th>
<th>Congestion Mitigation</th>
<th>Economic Development</th>
<th>Accessibility</th>
<th>Safety</th>
<th>Environmental Quality</th>
<th>Land Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category A</td>
<td>45%</td>
<td>5%</td>
<td>15%</td>
<td>5%</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Category B</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
<td>20%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Category C</td>
<td>15%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Category D</td>
<td>10%</td>
<td>35%</td>
<td>15%</td>
<td>30%</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>
Safety - How

- Highway Projects
  - Compile *fatal/injury crash data* for project limits (5 years)
  - Segment project for safety analysis (segments and nodes)
  - Convert crashes to EPDO
    - Weights
      - Fatal (K) - 540
      - Severe Injury (A) - 30
      - Minor Injury (B) - 10
      - Non-visible injury (C) - 5
  - Based on project scope select *Crash Modification Factor(s)*
  - Use CMF(s) to calculate reduction in crashes and rate

Propose using a blended weight for Round 3
How a CMF works

- # of crashes before project * CMF = number of crashes expected to remain after project
- Lower number is better - CMF of 0.20 means 80% of crashes are expected to be eliminated
### SMART SCALE Planning Level CMFs

<table>
<thead>
<tr>
<th>Project Extent</th>
<th>Improvement Type/Features</th>
<th>Planning Level CMF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intersections</td>
<td>Turn Lane(s)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>New Turn Lane (none present)</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>Add Turn Lane (to existing)</td>
<td>0.97</td>
</tr>
<tr>
<td></td>
<td>Extend Turn Lane</td>
<td>0.97</td>
</tr>
<tr>
<td></td>
<td>Remove Minor Approach Left Turns (use right turn and downstream U-turn)</td>
<td>0.65</td>
</tr>
<tr>
<td></td>
<td>Improve skew angle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Leg Intersection</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>4 Leg Intersection</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>Increase intersection radii</td>
<td>0.95</td>
</tr>
</tbody>
</table>

For list of planning level Crash Modification Factors used in SMART SCALE please visit the SMART SCALE Resources page - [http://smartscale.org/resources/default.asp](http://smartscale.org/resources/default.asp)
Link under safety - [http://smartscale.org/documents/hb2_planning_level_cmfs_201508_final.pdf](http://smartscale.org/documents/hb2_planning_level_cmfs_201508_final.pdf)
Safety
How to Improve Score

Poor Access Management

Look for opportunities to reduce conflict points

Good Access Management

Vehicle conflict points: Conventional intersection

Conflict Types
- Diverge: 8
- Merge: 8
- Crossing: 16
- Total: 32
Safety
How to Improve Score

Navigating a Roundabout

- Pedestrians use marked crosswalks to safely cross the intersection.
- Before entering the roundabout, look left, and yield to traffic in the roundabout.
- To turn left, exit onto the third leg.
- To turn right, exit onto the first leg.
- To go straight, exit onto the second leg.

Navigating a Restricted Crossing U-Turn (RCUT)

- Pedestrians use marked crosswalks to safely cross the intersection.
- Depending on their level of comfort, cyclists may navigate the intersection using vehicle or pedestrian paths.
- To make a left turn from the side street to the major street, turn right onto the major street, make a u-turn, and continue straight.
- To continue straight on the side street, turn right onto the major street, make a u-turn, and turn right onto the side street.
- From the major street, navigate the intersection like at a conventional intersection.
- To turn right from the side street, turn right like at a conventional intersection.

Note: For simplicity, only two directions of traffic are shown. Opposing traffic follows similar routes.
Rural Application - US 17 in Leland, NC

55% decrease in Fatal and Injury crashes

RCUTs can be implemented without signals
Safety - How

• Transit*/Travel Demand Management/New Location
  • Identify corridor(s) served - where project will reduce VMT
  • Compile fatal/injury crash data for project limits (5 years)
  • Convert crashes to EPDO
  • Use ridership/volume (new riders) reduction to calculate reduction in VMT
  • Use VMT reduction to calculate crash reduction
  • *Transit - Fatal and Injury frequency weighted at 100%
    ▪ Key inputs
      – Corridor(s) served - where transit project will reduce vehicle demand
      – Daily ridership estimate
Safety Measures
Proposed Changes for Next Round

- Many fatalities and severe injuries are the result of factors unrelated to roadway design
- Vehicle age and age of occupants plays a major role in determining whether a crash results in a fatality or severe injury
  - Statistics from 2013 NHTSA Report
    - 71% more likely to die if car is 18+ years old
    - 50% more likely to die if car is 15-17 years old
  - 2012 AAA Traffic Safety Report
    - Deaths per 100 million VMT decrease from age 16 until age 60 then it increases sharply (survivability)
- Current methodology weights fatalities 18x greater than severe injuries
Safety Measures
Proposed Changes for Next Round

• Roadway improvements often cannot address crashes resulting from driving under the influence
  – Have had a project recommended for funding due to single crash over 5-year period that involved alcohol
  – Recommend removing crashes that are the result of driving under the influence from consideration in scoring

• Difference between fatality and severe injury often related to age of vehicle and age of occupant
  – Many states used a ‘blended’ value for fatalities and severe injuries
  – Recommend the use of a ‘blended’ weighting for SMART SCALE similar to other states in Round 3 scoring
## Safety Measures
Use of *Reduced* and *Blended* Rates

<table>
<thead>
<tr>
<th>Agency</th>
<th>Fatal Injury (K)</th>
<th>Incapacitating injury (A)</th>
<th>Moderate Injury (B)</th>
<th>Minor Injury (C)</th>
<th>PDO</th>
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<tbody>
<tr>
<td>Missouri</td>
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<td>Virginia Smartscale</td>
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<td>5</td>
<td>1</td>
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</tbody>
</table>
Safety Recap

- Where are safety problem areas?
  - Good CMF + low/no crashes = lower score
- Does project include features with good CMF?
  - High crashes + low CMF = lower score
Measuring CONGESTION MITIGATION

- 50% of score – Change in peak period (multimodal) person throughput in the project corridor

- 50% of score - Change in the amount of peak period person hours of delay in the project corridor
**Congestion – How Person Throughput**

- **Highway Projects**
  - Volume to Capacity ratio for each segment and intersection calculated for peak hour
  - Calculate volume above capacity now being served by improvement – convert to person throughput
  - Apply expansion factor to account for peak period – based on INRIX Travel Time Index (TTI)

- **Transit/Travel Demand Management**
  - Identify corridor served
  - Determine peak period ridership/volume reduction (**Throughput A**)
  - Using process above for highways, calculate additional vehicle demand that can now be served based on transit diversion in corridor served (**Throughput B**)
  - Add A and B together to get total person throughput
Congestion – How Person Hours of Delay

- **Highway Projects (Existing)**
  - Delay for each segment and intersection calculated for peak hour
  - Sum delay reduction (up to posted speed limit) and convert to person hours
  - Apply expansion factor to account for peak period

- **Transit/Travel Demand Management**
  - Identify corridor served
  - Determine peak period ridership/volume reduction
  - Using process above for segments, calculate reduction in person hours
Congestion – How Adjusting Volume to Capacity

Before Speed/Delay | After Speed/Delay

No build | Transit, P&R | Build

Capacity Improvement
Projects that have impacts to regional travel patterns and require the use of travel demand model in congestion evaluation:

- Major widenings of interstates (addition of one or more travel lanes) over two miles in length
- New location facilities
- Combination projects (widening and new location)

Inputs:
- Number of lanes
- Design speed
- Proposed functional classification

Assumptions:
- Vehicle occupancy rate is held constant statewide - 1.54 persons per vehicle based on National Household Travel Survey
- Peak period from travel demand models is assumed to be 30% of the daily volume
Major Widenings on Interstates

- The total Vehicle Hours Traveled (VHT) for both No-Improvement and Improvement scenarios are summarized and used to calculate person hours of delay savings
- Total delay savings/ average trip length used to calculate person throughput
- Examples
  - I-66 Outside the Beltway
  - I-64 High Rise Bridge
  - I-95 Rappahannock River Crossing
New Location Facilities

• For standalone new facilities, only links in the regional network operating below the speed limit in the No-Improvement scenario with greater than 10% reduction of traffic in Improvement scenario are identified. The total difference in VHT for these links is calculated.

• The total Vehicle Hours Traveled (VHT) on the impacted links for both No-Improvement and Improvement scenarios are summarized.

• Examples
  – Route 460
  – Skiffies Creek Connector
  – Powhite Parkway Extension
Combination Facilities

• If a project includes a new location facility, and other improvements exist (such as widening an adjacent roadway), the congestion limits include all network segments that have been impacted. Impacted segments include any roadways that vehicles may shift to/from in response to the new facility.

• The total Vehicle Hours Traveled (VHT) for both No-Improvement and Improvement scenarios are summarized.

• Example Projects
  – Loudoun County Parkway
  – Route 1 Widening
  – I-64/I-264 Interchange Improvements
Importance of Intersections

- Reducing full movement access points
- Improving turn lanes
- Reducing # of signal phases
- Innovative intersection treatments
Urban Application - US 281 in San Antonio, TX

53% decrease in travel time

Loons to facilitate U-turns
Congestion - Recap

- Where are congested areas in your locality/region?
  - Travel Time Index (TTI)
  - Volume to Capacity
  - Buffer Time Index (reliability metric)

- What areas are growing - emerging congestion area?

- Adding through lanes by itself it not a very cost effective way to solve congestion
  - Optimization - example> adaptive signal control
  - Node (intersection/interchange) improvements
  - Travel Demand Management (TDM)
Measuring ACCESSIBILITY

- 60% of score – Change in cumulative job accessibility (within 45 minutes) (within 60 minutes for transit projects)

- 20% of score - Change in cumulative job accessibility for disadvantaged populations (within 45 minutes by automobile and 60 minutes by transit)

- 20% of score – Assessment of the project support for connections between modes, and promotion of multiple transportation choices

<table>
<thead>
<tr>
<th>Factor</th>
<th>Congestion Mitigation</th>
<th>Economic Development</th>
<th>Accessibility</th>
<th>Safety</th>
<th>Environmental Quality</th>
<th>Land Use</th>
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<tbody>
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</tbody>
</table>
Accessibility - How Access to Jobs

• All Projects
  • Using analysis for congestion measures – use *change in speed*
  • Also consider reduced travel distances from new facilities and changes in land development patterns
  • Use improvement in speed to code improvement into Accessibility GIS tool – conduct before and after analysis to get change in cumulative job access

• Accessibility Tool
  • GIS based model
  • Analysis done at Census block group level – job access between each block group within 45 minutes (60 minutes for transit) - *recommendation to remove caps for Round 3*
  • Decay factor applied based on travel time
Accessibility - How Access to Jobs

- **Accessibility Tool**

Tool analyzes existing accessibility to jobs
Accessibility - How Access to Jobs

• **Accessibility Tool**

Tool moves to next block, assessing existing accessibility
Accessibility - How Access to Jobs

• Accessibility Tool

Process is repeated for all blocks to establish existing accessibility to jobs
Project then analyzes change in access to jobs based on proposed improvement.

Projects also get credit for reducing trip time - 20 minute trip to zone 3 is now 10 minutes.

Accessibility Tool
• Accessibility Tool

Tool moves to next block, calculating change in job access
Process is repeated for all blocks – increase in access for each block is summed and used to score projects.
Disadvantaged Access to Jobs

• Similar process in previous slides used for disadvantaged access to jobs

• Main difference is the utilization of disadvantaged population data in the calculation

• Disadvantaged population
  
  • Low income, elderly, minority, and Limited English Proficiency population percentage by Census Block Group

  • Compared block group and identified block groups in the 75th percentile of the region – regions defined as PDC/MPO/NVTA
Access to Jobs
How to Improve Score

• See tips and advice from Congestion factor
• Reduce delay = higher speed + proximity to people and jobs = higher score
• Don’t forget scope details for intersections
  • Turn lanes
  • Intersection/Interchange configuration
    • Innovative intersections - opportunities to reduced signal phases - or eliminate signal
Accessibility
Access to Travel Options

• Projects receive points based on features that enhance multimodal access (Max 5 points)
  • Transit
  • Park and Ride
  • Bike
  • Pedestrian
  • HOV/HOT
  • Real time traveler info or wayfinding

• Scaled by the number of anticipated Non-SOV users
  • Transit Users + Bike Users + Pedestrians + HOV/Park and Ride

Project must be making improvements in one or more of these areas to get points for this measure
Measuring ECONOMIC DEVELOPMENT

– 60% of score – Assessment of progress made towards new economic development

– 20% of score - Rate projects based on the extent to which the project is deemed to enhance access to critical intermodal locations, interregional freight movement, and/or freight intensive industries

– 20% of score – Project’s impact to travel time reliability

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<td>30%</td>
<td>10%</td>
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</table>
Proposed Changes  
ED.1 - Site Development

• Round 2 results raise concerns about the reasonableness of the results for this measure
• Roundabout project on 2 lane roadway and a cul-de-sac scored highest in the state
• Findings
  – Zoned properties within allowable buffer contributed to anomalous results
  – Gimme points - consistency with plan and utilities

<table>
<thead>
<tr>
<th>Project - Local Plans</th>
<th>Project - Regional Plan</th>
<th>Site - Zoning</th>
<th>Site - Utilities</th>
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<td>Programmed</td>
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<td>Grand Total</td>
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<td></td>
<td></td>
<td></td>
<td>26</td>
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<tr>
<td></td>
<td></td>
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<td>1991</td>
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</table>
Feedback/Direction from June CTB meeting

- Consider additional point for economically distressed areas
  - Several data sources are available for determination of economically distressed areas
- Next several slides outline possible data sources to identify economically distressed areas in Virginia
Economic Development
Site Support

Significant changes proposed to this measure for Round 3

- Project specifically referenced in local comp plan or regional economic development strategy = 0.5 points - no points for consistency
- Project within economically distressed areas get up to 0.5 points
- Zoned properties must get primary/direct access from project
- Conceptual (0.5, 1) vs detailed site plans (2, 4 points) – points based on whether submitted or approved
- Reduce buffer to max of 3 miles
- Considering establishment of maximum square footage based on project type and based on current level of development - cannot exceed x% of total current square footage in jurisdiction(s)
Several options to measure economic distress are being evaluated. This approach is interesting as it uses several indicators.
**Economic Development**

**How buffers are set**

Buffers - Tier 1 Project Type – 0.5 mile buffer

<table>
<thead>
<tr>
<th>Access Management</th>
<th>Convert Existing Lane to Dedicated Bus Service Lane</th>
<th>ITS Improvement(s)</th>
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</thead>
<tbody>
<tr>
<td>Add/Construct Bike Lane</td>
<td>Improve Bike/Pedestrian Crossing (At Grade)</td>
<td>New Intersection</td>
</tr>
<tr>
<td>Bike/Pedestrian Other</td>
<td>Improve Bike/Pedestrian Crossing (Grade Separated)</td>
<td>New Park and Ride Lot</td>
</tr>
<tr>
<td>Bus Transit Other</td>
<td>Improve/replace existing bridge(s)</td>
<td>Provide New Service Routes</td>
</tr>
<tr>
<td>Construct Bus Stop / Shelter</td>
<td>New/Expanded Vanpool or On-Demand Transit Service</td>
<td>Rail Transit Other</td>
</tr>
<tr>
<td>Construct Shared-Use Path</td>
<td>Paved Shoulder (Minimum 4-Foot Ridable Surface)</td>
<td>Ramp Improvement(s)</td>
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<tr>
<td>Construct Sidewalk</td>
<td>Right of Way/Easements acquisition required</td>
<td>Road Diet</td>
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<tr>
<td>Highway Other</td>
<td>Roadway Reconstruction/Realignment</td>
<td>TDM Other</td>
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<tr>
<td>Improve Bus Stop/ Shelter</td>
<td>Shoulder Improvement(s)</td>
<td>Turn Lane Improvement(s)</td>
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<td>Improve Park and Ride Lot</td>
<td>Increase Existing Route Service – Addtl Vehicles or Increased Frequency</td>
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<tr>
<td>Improve Rail Crossing</td>
<td>Widen Existing Lane(s) (No New Lanes)</td>
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</table>
Economic Development
How buffers are set

Buffers - Tier 2 Project Type – 1 mile buffer  Proposed change for Round 3

<table>
<thead>
<tr>
<th>Increase Existing Rail Service – Additional Cars or Routes</th>
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<tbody>
<tr>
<td>Intersection Improvement(s)</td>
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<tr>
<td>Managed Lane(s) (HOV/HOT/Shoulder)</td>
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<tr>
<td>New Traffic Signal/Signal Optimization</td>
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<tr>
<td>Rail Yard Improvements</td>
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<tr>
<td>Station or Terminal Improvements</td>
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## Economic Development
How buffers are set

### Buffers - Tier 3 Project Type – 3 mile buffer

<table>
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<th>Project Type</th>
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<tr>
<td>Add New Through Lanes(s)</td>
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<tr>
<td>Additional Track - Rail Transit</td>
</tr>
<tr>
<td>Additional Track - Freight Rail</td>
</tr>
<tr>
<td>Freight Haul Increase</td>
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<tr>
<td>Improve Grade-Separated Interchange</td>
</tr>
<tr>
<td>New Bridge</td>
</tr>
<tr>
<td>New Interchange</td>
</tr>
<tr>
<td>New Rail Yard</td>
</tr>
<tr>
<td>New Station</td>
</tr>
<tr>
<td>New Terminal</td>
</tr>
<tr>
<td>Roadway on New Alignment</td>
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</table>

*Proposed change for Round 3*
Economic Development
How to Improve Score

• Spend time and effort on this measure - even if weighted low for your area type
• Leave blank = 0 points
• Involve local land use and/or economic development staff to compile adequate documentation for site plans
• Update local comp plan or regional economic development strategy
Economic Development – How Intermodal Access

- **Project can get up to 6 points**
  - **Improve access to distribution centers or intermodal/manufacturing facilities**
    - Within 1 mile – 2 points
    - 1 to 3 miles – 1 point
  - **Improve STAA Truck Route**
    - Improvement to STAA route - 2 points,
    - Improve access to STAA route – 1 point
  - **Improve access or reduce congestion around port/airports**
    - Within 1 mile - 2 points
    - 1-3 miles – 1 point
- **Point are scaled by freight tonnage along corridor – IHS Transearch data was used to calculate daily tonnage on the project**

<table>
<thead>
<tr>
<th></th>
<th>Improve Access to distro, intermodal and manufacturing</th>
<th>Improve STAA truck route</th>
<th>Improve access reduce congestion ports/airports</th>
<th>Tonnage (1000's) per day</th>
<th>Measure Scaled by tonnage</th>
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<td><strong>Project A</strong></td>
<td>2.00</td>
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<td>0.00</td>
<td>4.77</td>
<td>14.31</td>
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</table>
Proposed Changes
ED.2 - Intermodal Access

Current Method
- Points are awarded based on a project’s proximity to freight generators, truck routes, and freight destinations
- Total points are scaled by the maximum freight tonnage within the project area
- While the size of a project may affect its likelihood of falling within the buffer distance of freight facilities, its score does not directly scale by the size of the improvement
## Proposed Changes
### ED.2 - Intermodal Access

### Proposed Method

<table>
<thead>
<tr>
<th>District</th>
<th>Project Description</th>
<th>Total Points</th>
<th>Maximum Freight Tonnage</th>
<th>Improvement Length (miles)</th>
<th>Intermodal Access Measure</th>
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</thead>
<tbody>
<tr>
<td>Staunton</td>
<td>Extend SB Deceleration NB Acceleration lanes by 150' each, I-81 Exit 296 in Staunton</td>
<td>4</td>
<td>290000</td>
<td>0.06</td>
<td>69,600</td>
</tr>
<tr>
<td>Salem</td>
<td>Construct 1.12 mile auxiliary lane on I-81N between Exit 140 to 141</td>
<td>3</td>
<td>145000</td>
<td>1.12</td>
<td>487,000</td>
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</tbody>
</table>

### Recommendation
- Scale points by freight tonnage-miles by multiplying the freight tonnage by the length of the improvement
Economic Development – How Travel Time Reliability

• Measure looks at reliability of proposed corridor(s) served by the project
• Buffer Index (BI) - measure of the extra time traveler needs to add to trip to ensure arrival on-time - BI of 0.2 means traveler has to add 20% time to trip in order to arrive on-time
• Buffer Index is then adjusted to account for the following
  • Crashes
    ▪ Crash Frequency - how crashes are affecting reliability (value 0-5)
    ▪ Crash Impact - effectiveness of project to reduce impact of crashes (value 0-2)
  • Weather
    ▪ Frequency of weather events (snow and flooding) (value 0-2)
    ▪ Weather impact - effectiveness of project to reduce impact of weather event (Value 0-2)

**TT Reliability Measure**

\[ \text{TT Reliability Measure} = \left( \text{Crash Freq} \times \text{Crash Impact} + \text{Weather Freq} \times \text{Weather Impact} \right) \times \text{BI} \]

Measure is then scaled by the Vehicle Miles Traveled (VMT) of the project
Measuring ENVIRONMENT

- 50% of score – Air Quality and Energy Environmental Effect

- 50% of score - Impact to Natural and Cultural Resources

<table>
<thead>
<tr>
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</tr>
<tr>
<td>Category D</td>
<td>10%</td>
<td>35%</td>
<td>15%</td>
<td>30%</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>
• **Air Quality/Energy**
  • **Non-SOV**
    ▪ Points awarded based on:
      – Providing bicycle or pedestrian facilities
      – Improvements for transit
      – New or expanded Park and Ride lot
      – Provisions for hybrid/electric vehicles or energy efficient infrastructure
    ▪ **Points scaled based on number of non-SOV users**
  • **Freight**
    ▪ Points awarded based on:
      – Reduces delay at congested intersection, interchange or other bottlenecks
      – Includes improvement to freight rail network or intermodal (truck to rail) facility
    ▪ **Points scaled based on truck volume** (facilities with 8% trucks or higher)
Environment – How Natural/Cultural Resource Impact

Sum the total acreage of land (within ¼ mile of project) in four categories:

- Conservation Land
- Species/Habitat
- Cultural Resources
- Wetlands

(Data sources: VOF, VDCR, VDOF, VDGIF, NPS, VDHR, USFWS)

**Example**

<table>
<thead>
<tr>
<th>Project</th>
<th>Conservation</th>
<th>Species/Habitat</th>
<th>Cultural Resources</th>
<th>Wetlands</th>
<th>Total Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>100</td>
<td>25</td>
<td>25</td>
<td>150</td>
<td>300</td>
</tr>
</tbody>
</table>
Environmental Data Layers

- **Conservation Land:**
  - VDCR
    - 6F Properties
    - Conservation Lands
    - Easements
    - Natural Heritage Screens
  - VDOF Agricultural/Forest Districts
  - VOF Protected easements
  - TNC Protected Easements

- **Species/Habitat:**
  - VDGIF
    - Threatened and Endangered Species
    - Threatened and Endangered Species (Eagles)

- **Cultural Resources:**
  - NPS American Battlefield Protection Program Potential National Register Eligible Areas
  - VDHR
    - Architecture
    - Archaeology

- **Wetlands:**
  - USFWS National Wetlands Inventory
1. Shows ¼-mile buffer created around each submitted project.
Methodology
Buffer Area

2. Apply definition queries to the layers
   (e.g. excluding resources determined not eligible for the National Register of Historic Places)
3. Clip the individual layers to the buffer area for each project.
4. Create a union of all features within each of the four categories and dissolving the resulting shapefile based on the Application ID. (Note: Overlapping acreage within each category will only be counted once; however, acreage between categories may overlap.)
5. Acreages are then calculated for each category and Data exported to tables.
Scaling Impact and Assigning Points:

- The type of environmental document required for each project will be used to assess and scale the potential natural resource impacts.
  - *Environmental Impact Statement* – 50% of acreage will be used for scoring
  - *Environmental Assessment* – 30% of acreage will be used for scoring
  - *Categorical Exclusion* – 10% of acreage will be used for scoring
- In Round 2, the scoring method for this measure was modified - potential for impact is weighted by the benefits points in other measures
## Environment – How Natural/Cultural Resource Impact

<table>
<thead>
<tr>
<th>Project</th>
<th>Conservation</th>
<th>Species/Habitat</th>
<th>Cultural Resources</th>
<th>Wetlands</th>
<th>Total Acres</th>
<th>Enviro Doc</th>
<th>Scaled Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>100</td>
<td>25</td>
<td>25</td>
<td>150</td>
<td>300</td>
<td>EA</td>
<td>100</td>
</tr>
<tr>
<td>B</td>
<td>100</td>
<td>25</td>
<td>25</td>
<td>150</td>
<td>300</td>
<td>EIS</td>
<td>150</td>
</tr>
<tr>
<td>C</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>25</td>
<td>CE</td>
<td>2.5</td>
</tr>
</tbody>
</table>

This value gets divided by the total acres within the ¼ mile project buffer.
Round 2 Scoring Method

- Impacted buffer ratio is used to develop normalized score (0-100)
- Buffer ratio of 0 = 100 points
- Next lowest buffer ratio >0 = 95 points
- Straight line linear regression between lowest buffer ratio >0 and greatest buffer ratio (greatest buffer ratio = 0 points)

<table>
<thead>
<tr>
<th>Project</th>
<th>Buffer Ratio</th>
<th>Normalized Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project A</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Project B</td>
<td>0.05</td>
<td>95</td>
</tr>
<tr>
<td>Project C</td>
<td>15</td>
<td>73.9</td>
</tr>
<tr>
<td>Project D</td>
<td>50</td>
<td>0</td>
</tr>
</tbody>
</table>

- Normalized points are multiplied by the weighted points for the other scoring measures (Delay, Throughput, Crash freq, Crash Rate, Access Jobs….)
- Value above is renormalized 0-100 and weighting (10%*50%) applied to calculate weighted score
Environmental How to Improve Score

- **Air Quality and Energy**
  - Support bike/ped
  - Support TDM
    - Transit
    - Park and Ride

- **Environmental Impact**
  - Try to avoid environmentally/culturally sensitive areas
  - Try to maximize score throughout factor areas
Measuring LAND USE

- 70% of score – Non-work accessibility - scaled by 2030 population and employment density

- 30% of score - Non-work accessibility - scaled by change in population and employment (current to 2030)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Congestion Mitigation</th>
<th>Economic Development</th>
<th>Accessibility</th>
<th>Safety</th>
<th>Environmental Quality</th>
<th>Land Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category A</td>
<td>45%</td>
<td>5%</td>
<td>15%</td>
<td>5%</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Category B</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
<td>20%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Category C</td>
<td>15%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Category D</td>
<td>10%</td>
<td>35%</td>
<td>15%</td>
<td>30%</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>
Land Use - How

- Examines **walk access** to key non-work destinations such as grocery, healthcare, education, etc
- Targets for destinations established using Virginia observations
- Uses GIS software used for Access to Jobs measures
- Eliminate subjectivity and captures degree to which development patterns meet certain criteria
How To Score Better
Rethinking Solutions

Common Thread
Focused
Cost Effective
Solutions
Fleet Manager Analogy
Objective: Increase fuel efficiency of 100 vehicle fleet
Budget: $100,000

**Strategy 1**
Replace 2 vehicles with electric vehicles at cost of $50,000 each

**Strategy 2**
Invest $1000 in each vehicle in fleet to improve fuel efficiency of each vehicle by 10%
- New gas saver tires
- Vehicle tuning chip
- High efficiency air filters
Why Cost Effectiveness Matters

Opportunity Costs

Scenario Comparison
Objective: Reduce congestion and improve safety along corridor with 10 signalized intersections

**Strategy 1**
Widen corridor by one lane in each direction for $90,000,000

**Strategy 2**
Convert entire corridor to Superstreet and install adaptive signal controllers and transit signal priority for $30,000,000
Expanding the Toolbox of Solutions

Current Toolbox

- Traffic Signalization
- Major Capacity increase if existing facilities
- New facilities

If all you have is a hammer, everything looks like a nail

~ Law of the instrument
Expanding the Toolbox of Solutions

Expanded Toolbox

- **Access Management/Signal Reduction**
  - Improve safety
  - Improve traffic flow

- **New Technologies**
  - Adaptive controllers

- **Travel Demand Management**

- **Innovative Intersections**
  - Improve *capacity*
  - Improve *safety*
Why Innovative Intersections?

Current Situation:

- We need to improve safety
  - About half of all severe injuries occur at intersections
  - Left-Turn and angle crashes account for 60% of fatal crashes at intersections
- Congestion is increasing
- Funding is constrained
- Right-of-Way is expensive
- Projects take a long time to construct and have many impacts

Innovative Intersections can help address many of these challenges
Rethinking Solutions

What are Innovative Intersections?

Designs that:

● Improve the way traffic makes certain movements by eliminating, relocating or modifying conflict points

● Strategically improve signalization
  ○ Remove signalization, or
  ○ Reduce signal phases if signalization is required
    (Two-Phased Operation)
Impact of Signal Phases

- **Reduces Intersection and Roadway Capacity**
  - Signals reduce roadway capacity
  - Capacity reduction is a function of green time
- **Increases delay**
- **Reduced mobility**
  - Makes it difficult to coordinate traffic signals for progression
- **Inefficient Use of Green Time (Lost Time)**
  - Start up loss
  - Yellow Time
  - All-Red Time
Rethinking Solutions

- Traditional Four-Phase Signal
  - 50 sec
  - 40 sec
  - 90 sec cycle

- Two-Phased Signal (more green time per phase)
  - 90 sec cycle
Rethinking Solutions

Benefits of Alternative Intersections

- **Safety**
  - Fewer conflict points
  - Significant before/after crash reductions

- **Mobility**
  - Reduced delay
  - Reduced congestion

- **Value**
  - Less right-of-way needed
  - Lower construction costs
  - Quicker project delivery
Rethinking Solutions

Innovative Intersection Toolbox

Divergent Diamond

Displaced Left Turn Intersection

Quadrant Roadway Intersection
Restricted Crossing U-turn Intersection

- Can operate signalized or unsignalized
- Side-street left-turn movements are facilitated via a U-turn
- Pedestrians can be accommodated
- Not ideal for roadways with high thru volumes on minor street
- Also referred to as superstreet
  - Superstreet = System of RCUTs
Rethinking Solutions

Other options - Continuous Green-T

- Can operate signalized or unsignalized
  - Signalized operation involves only three phases
- Provides all traditional movements
- Minor street left turn is provided an acceleration lane so that one mainline direction does not need to stop
- Ideal for roadways with directional flows in the AM and PM peak hours
Rethinking Solutions

Other options - Displaced Left Turn

- Traditionally signalized
  - Signalized operation of full DLT involves only two phases
  - Signalized operation of partial DLT involves three phases
- Provides all traditional movements
- Crosses over left-turns prior to main junction
- Ideal for where two major roadways intersect
- Considered a lower cost alternative to grade-separation
Rethinking Solutions

Other options - Quadrant Roadway Intersection

- Can be unsignalized or signalized
  - Signalized operation only two phases at main junction
  - Signalized operation could involve three phases for other junctions
- Restricts left turns at main junction
- Left-turn movements are rerouted
- Ideal for minor streets with high thru traffic volumes
- Ideal for where two major roadways intersect
Impact of SMART SCALE

- **Greater emphasis on the planning process** and linkage to VTrans needs
- Projects must be sufficiently developed such that benefits can be calculated - requires **scoping of projects prior to funding decisions**
- Changes to project scope and/or cost may require reevaluation of benefits and scoring
- **Importance of cost** – need to focus the project scope on solving the problem/needs and don’t let perfect get in the way of good
- Wants versus Needs - Reinforcing the concept of **value engineering** – applicants are seeing the importance of **lean and focused scope of work**
- **Thinking beyond SOVs** – opportunities for bike/ped, transit, travel demand management (P&R, HOV) – non-SOV users used as scaling factor for several measures
Resources

- SMART SCALE website - [http://smartscale.org](http://smartscale.org)
- SMART Portal - [https://smartportal.virginiahb2.org](https://smartportal.virginiahb2.org)
- VTrans - [www.vtrans.org](http://www.vtrans.org)
- STARS mapping - [https://app.box.com/v/VDOTSTARS](https://app.box.com/v/VDOTSTARS)
- Innovative Intersections - [www.virginiadot.org/innovativeintersections](http://www.virginiadot.org/innovativeintersections)