



# APPENDIX H

## Development of Evaluation Matrix

# Benefit Evaluation Matrix

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*Record of Development*

*Central Virginia Long Range Transportation Plan 2040 Update*

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## Introduction

The need to develop a clear and transparent project evaluation process is the result of changes to both federal and state transportation funding programs. The new federal transportation law, known as MAP-21, mandates a performance driven, outcome-based transportation planning process that directs funding to projects that are able to clearly explain their value and benefits toward meeting desired regional outcomes and national goals.

At the state level, House Bill 2 was signed into law in Virginia in March 2014 and provides for the development of a prioritization process for projects that are funded by the Commonwealth Transportation Board. In order to allow the region's projects to be competitive for funding under both laws, the Central Virginia MPO is developing an evaluation system that can easily be adapted to each.

## Part 1: Structure

Performance evaluation frameworks that are being used in regional and statewide planning efforts around the country were reviewed as examples of ways to develop an evaluation system. Special attention was focused on examples from the Commonwealth of Virginia, including evaluation systems developed by the National Capital Region Transportation Planning Board, the Hampton Roads Transportation Planning Organization, and Fredericksburg Area Metropolitan Planning Organization.

The basic approach used by these other MPOs includes four primary parts: identifying transportation goals, identifying transportation elements related to the goals, defining a measurement and scoring methodology for each element, and weighting each element according to its overall importance.

### Introduction

*Content explained in project  
White Paper distributed on  
May 21, 2014*

### Structure

*Originally presented to Central  
Virginia MPO TTC on May 8,  
2014*

Using this as a guide, an evaluation matrix structure was developed for the region that included the following parts:

- 1) Vision Theme Categories
- 2) Goals
- 3) Performance Factors
- 4) Measurements
- 5) Weighting

## Part 2: Goals

The foundation of the Central Virginia MPO's project evaluation process was set by the ten transportation goals that were developed in the Central Virginia Long Range Transportation Plan 2035 Update. These included:

- Make it Flow
- Make it Accessible
- Make it Safe
- Promote Vitality
- Sustain Quality
- Make it Function
- Make it Efficient
- Coordinate Investments
- Balance Priorities
- Leverage Funding

In this update, these goals are being reviewed in meetings with the public and MPO representatives to determine which are most important to the region. The list of goals is not expected to change through the planning process, but may do so if it is determined to be necessary.

## Part 3: Vision Themes

### Phase I: Four Original Themes

The goals listed in Part 2 were categorized into four broad vision themes that were derived from the Vision Statement of the Long Range Transportation Plan 2035 Update. These themes included:

**Goals**  
*Originally presented to Central  
Virginia MPO TTC on May 8,  
2014*

**Vision Themes**  
*Originally presented to Central  
Virginia MPO TTC on May 8,  
2014*

- Mobility and Accessibility
- Safety
- Economy
- Community and Nature

## Phase II: VDOT/CTB Transportation Goals

In 2005, the Virginia Department of Transportation (VDOT) and the Commonwealth Transportation Board (CTB) developed a prioritization tool to analyze statewide interstate and primary highway projects. Recently, the VDOT Lynchburg District Office adapted the tool for use in their rural long range plan. Although the state is still in the process of developing an official prioritization tool, this example reflects many of the ideas and goals that are likely to be used in the development process.

This study’s original prioritization matrix shared many close similarities to the prior VDOT/CTB matrix. One difference between the two was the addition of a fifth category theme in the VDOT tool, which was described as “Preserve the existing transportation system and promote efficient system management.”

This category, which was added to this study’s evaluation matrix and given the title of “Operational Efficiency,” has been used to capture objectives previously included in “Economy” and “Mobility and Accessibility.” It was the opinion of the study team that this new category provided a helpful distinction between some of the objectives that further clarifies the evaluation process.

## Part 4: Performance Factors

### Mobility and Accessibility

*Current Performance Factors:*

**Auto Congestion-** Added as a more precise measurement of “Improved Traffic Flow.” Measures predicted 2040 traffic volumes, compared to roadway capacity. Standard traffic engineering measurement. Used in VDOT/CTB prioritization tool. (Related Goal: Make it Flow)

**Traffic Volume-** Added as a more precise measurement of “Improved Traffic Flow.” Measures the number of vehicles per

### Vision Themes: Phase II

*Presented to Central Virginia  
MPO TTC on August 28, 2014  
for consistency with state  
methodology*

### Performance Factors

*Originally presented to Central  
Virginia MPO TTC on May 8,  
2014*

hour, per lane, on a given roadway. Standard VDOT measurement. Used in VDOT/CTB prioritization tool. (Related Goal: Make it Flow)

**Freight Volume**- Originally entitled, “Capacity and Reliability of Freight.” Measures the percentage of truck traffic on a roadway. Standard traffic engineering measurement. Used in VDOT/CTB prioritization tool (Related Goal: Make it Flow)

**Alternative Transportation Facilities**- Modified from “Supports Alternative Modes of Transportation.” Accounts for the addition of facilities supporting alternative modes of transportation. Used in VDOT/CTB prioritization tool. (Related Goal: Make it Accessible)

*Eliminated Performance Factors:*

**Improved Traffic Flow**- This evaluation element was eliminated in favor of more precise measurements of traffic congestion and weighted traffic flow.

**Region-Wide Delay**- This evaluation element was eliminated due to modeling limitations.

## Safety

*Current Performance Factors*

**Traffic Accident Rate**- Originally entitled, “Addresses an Existing Safety Deficiency.” Identifies high accident locations in the region. VDOT data. (Related Goal: Make it Safe)

**General Safety Improvements**- Originally entitled, “Specifically Improves Roadway Safety.” Acknowledges road improvement projects specifically designed to improve safety, as described in the Virginia State Highway Safety Plan. (Related Goal: Make it Safe)

*Eliminated Performance Factors:*

None

## Economy

*Current Performance Factors:*

**Impact on Economic Development**- Adapted from “Access to Markets and Labor.” Acknowledges projects that have been

recommended by state and regional economic development plans. (Related Goal: Promotes Vitality)

**Commuter Use-** Adapted from “Access to Markets and Labor.” Identifies relation of project to corridors that have been identified as primary regional commuter corridors. (Related Goal: Promotes Vitality)

**Surrounding Employment Density-** Adapted from “Access to Markets and Labor.” Measures the density of employment in the area surrounding a proposed project, as reported by the US Census. (Related Goal: Promotes Vitality)

*Eliminated Performance Factors:*

**Access to Markets and Labor-** Eliminated in favor of the more precise measurements currently in use.

## **Community and Nature**

*Current Performance Factors:*

**Major Environmental Concern-** Originally entitled, “Impact on Sensitive Environmental Areas.” Identifies the proximity of a project to sensitive environmental areas. Used in VDOT/CTB prioritization tool. (Related Goal: Sustain Quality)

**Right of Way Needs-** The amount of additional right of way needed to be acquired to complete the project. Large amounts of new right of way acquisition can have a negative effect on both the community, due to the loss of private property, and on nature, due to development on previous undeveloped land. Used in VDOT/CTB prioritization tool. (Related Goal: Sustain Quality)

**Roadway Aesthetics-** Acknowledges projects specifically intended to improve corridor appearance to promote economic development or quality of life enhancements. (Related Goal: Sustain Quality)

*Eliminated Performance Factors:*

**Impact on Quality of Life Factors:** This evaluation factor was eliminated due to the wide range of opinions regarding what qualities produce a high quality of life.



## Operational Efficiency

### *Current Performance Factors:*

**Recurring Maintenance Problems-** Originally entitled, “Severe pavement or bridge condition deficiency.” Identifies roadways that require frequent maintenance due to deficient roadway or pavement design. (Related Goal: Make it Function)

**Road Functional Class-** Adapted from, “System Operation and Management.” Rates a corridor according to its VDOT functional categorization. Higher roadway classes understood to play a greater role in overall system operation. (Related Goal: Make it Efficient)

**Coordination with State, Regional, and Local Plans-** Identifies road projects that have been cited in multiple planning documents. These plans include:

- Virginia 2012-2016 Strategic Highway Safety Plan
- Virginia Statewide Multimodal Freight Study, Phase II
- Virginia Surface Transportation Plan 2035
- VTrans2035 Update
- Region 2000 Park and Ride Lot Location Study
- Commuter Services Study
- Greater Lynchburg Transit Company Transit Development Plan
- Region 2000 Bicycle Plan
- Region 2000 Comprehensive Economic Development Strategy
- Region 2000 Coordinated Human Service Mobility Plan
- Region 2000 Greenways, Blueways, and Trails Plan: 2012 Connection Vision
- Region 2000 2035 Rural Long Range Transportation Plan
- Amherst County Comprehensive Plan
- Town of Amherst 2009 Comprehensive Plan
- Bedford County 2025 Comprehensive Plan
- Campbell County Comprehensive Plan
- City of Lynchburg Comprehensive Plan

(Related Goal: Coordinate Investments)

**Distribution of Benefits-** Originally entitled, “Equal Benefits for Multiple Communities.” Identifies projects that provide benefits

for multiple jurisdictions in the region. (Related Goal: Balance Priorities)

*Eliminated Performance Factors:*

**Leverages new sources of transportation funds-** Eliminated due to the indeterminate funding sources available to most proposed projects.

## Part 5: Scoring Method

### Phase I: High, Medium, and Low

Due to the broad range of elements that are measured in these processes, it was necessary to also develop a common scoring scale that could be used across every category. Many MPOs, including Washington DC’s National Capital Region Transportation Planning Board, employ a three level scale based on how well a project advances the region’s desired outcomes. Those that strongly advance them receive a “high” score, those that somewhat advance them receive a “medium” score, and those that advance them little or not at all receive a “low” score.

The original scoring system designed to award three points for a high score, two points for a medium score, and one point for a low score.

### Phase II: The 0-100 Point Scale

Feedback indicated that the original scoring scale, which produced a range of scores from 1-3, was too narrow to clearly demonstrate the differences between two projects. In order to accomplish this, it was suggested that the projects be rated on a 100 point scale. In this new method, a high score is given 100 points, medium scores given 66.7 points, and low scores given 33.3 points.

## Part 6: Weighting Strategy

### Phase I: Reasonable Estimation

An educated estimate of the appropriate weight of each evaluation element was assigned by the study team. Feedback

### Scoring Method

*Originally presented to Central Virginia MPO TTC on May 8, 2014*

### Scoring Method: Phase II

*Presented to Central Virginia MPO TTC on August 14, 2014, in response to feedback from July 2 TTC Meeting*

### Weighting Strategy

*Originally presented to Central Virginia MPO TTC on July 2, 2014*

indicated that these weights should be set as equal until more extensive committee and public feedback.

### Phase II: Equal Weight for Measurements

An equal weight was assigned to each evaluation element. This method, however, resulted in a greater importance to goals that had a greater number of established measurements with no regard for the overall importance of each goal category. (For example, “Mobility and Accessibility” was effectively 7 times more important than safety, simply because the original method used seven mobility measurements to only one safety measurement. In reality, the relative importance of both goals is likely to be very similar.)

### Phase III: Equal Weight for Goals

Rather than assigning an equal weight to each evaluation element, the weighting division was performed among the five broader vision themes. Each vision theme was given relative weight of 20%.

### Phase IV: TTC Weighting Exercise

On August 28<sup>th</sup>, 2014, the Transportation Technical Committee held a special meeting to determine the relative weight of the five vision themes. Economy and Safety were assigned the highest importance (25% each), followed by Mobility & Accessibility (20%), followed by Operational Efficiency and Community & Nature (15% each).

### Phase V: Rating Performance Factors, Part I

On September 11, 2014, an exercise was completed by the TTC to help determine the relative importance of the performance factors used to rate each project in the Vision Themes of “Mobility and Accessibility” and “Safety.” The results are listed below:

**Mobility and Accessibility Factors:** Congestion (37%), Traffic Volume (23%), Freight Volume (20%), Alternative Modes (20%)

**Safety Factors:** Existing Safety Concern (61%), General Safety Improvement (39%)

#### Weighting: Phase II

*Presented to Central Virginia MPO Board on July 17, 2014 in response to feedback from July 2 TTC meeting*

#### Weighting: Phase III

*Presented to Central Virginia MPO TTC on August 14, 2014 for consistency with VDOT approach*

#### Weighting: Phase IV

*Presented to Central Virginia MPO TTC on September 11, 2014 in response to results from August 28 meeting*

#### Weighting: Phase V

*Exercise completed by the Central Virginia MPO TTC on September 11, 2014. Results reported to TTC on October 10, 2014.*

## Phase VI: Rating Performance Factors, Part II

On October 9, 2014 an exercise was completed by the TTC to help determine the relative importance of the performance factors used to rate each project in the Vision Themes of “Economy,” “Community and Nature,” and “Efficiency.” The results are listed below:

**Economy Factors:** Primary Commuter Corridor (44%), Located in High Density Employment Area (31%), Identified Major Economic Corridor (25%)

**Community and Nature Factors:** Remains within existing right of way (40%), Avoids Major Environmental Concerns (30%), Adds aesthetic/landscaping improvements (30%)

**Efficiency Factors:** Experiences Recurring Maintenance Problems (32%), Provides direct benefits to multiple communities (31%), Coordinates with Other Existing Plans (27%), VDOT Functional Roadway Classification (10%)

**Weighting: Phase VI**  
*Exercise completed by the Central Virginia MPO TTC on October 10, 2014.*

## Part 7: Scoring Factors

### Phase I: Benefit Analysis

The score produced by the original project benefit evaluation matrix only reflected the beneficial outcomes of the proposed project. Feedback expressed concern that this failed to account for the cost or viability of the projects. As a result, large projects that were unlikely to be built could be given consideration over smaller projects that could easily be completed.

**Scoring Factors**  
*Originally presented to Central Virginia MPO TTC on July 2, 2014*

### Phase II: Benefit/Cost Analysis

One of the primary obstacles to a project’s completion is cost. In order to account for this, the project benefit score was divided by the estimated cost (in millions of dollars) to produce a Benefit/Cost score. This score reflected the relative amount of benefit gained per million dollars of cost. The resulting scoring strongly favored low-cost projects, no matter how limited their overall benefit.

**Scoring Factors: Phase II**  
*Presented to Central Virginia MPO TTC on August 14, 2014 in response to email feedback*

### Phase III: Benefit/(Cost per User) Analysis

The Project Benefit Score was divided by the estimated cost per user. This score was intended to give more favor to projects

**Scoring Factors: Phase III**  
*Calculated in response to feedback from August 14 TTC meeting*

that were both cost effective and served large numbers of users. The resulting scores, however, indicated that road traffic volume became the dominant determining factor, regardless of project benefit.

#### **Phase IV: Cost and User Point System**

Point values were assigned to both project costs and road traffic volume and added or subtracted to the original benefit score. Using the same scoring system developed for the 2030 Long Range Transportation Plan Update, one point was subtracted for every \$2.5 million in project cost, while one point was added for every 2,000 expected vehicles. This method allowed these factors to have an influence without becoming the sole determining factor. Feedback expressed concern, however, that 2,000 vehicles and \$2.5 million dollars were arbitrary figures and could not reasonably be given a point value.

#### **Phase V: Separate Columns for Benefit Score, Cost, Users, Project Readiness**

A project evaluation table was developed that lists the benefit evaluation score, cost, cost per user, and project readiness for each project. This method eliminates the need to determine an appropriate point value for cost, users, and readiness, while still allowing decision makers to clearly consider each. Feedback requested additional research into the approach used by other MPOs to acknowledge project cost and readiness.

#### **Phase VI: Three Factor Evaluation Method**

Small refinements were made to the evaluation table produced in Phase V to enhance the clarity of the information and to have consistency with the approach used by other MPOs in Virginia. Each project is evaluated in three ways. The first evaluation, Project Benefit, measures how well the project advances the region's transportation goals. Each project is scored on a 1-100 point scale. The second evaluation, Project Readiness, measures the viability of the project in terms of environmental screenings, right of way acquisition, and continuity with previous efforts. Projects are rated on a High, Medium, Low scale. Finally, the third evaluation, Benefit/Cost, measures the benefit of the project relative to the cost per user. Projects are rated on a High, Medium, Low scale.

#### **Scoring Factors: Phase IV**

*Presented to Central Virginia MPO TTC on August 28, 2014 for consideration due to study team concerns*

#### **Scoring Factors: Phase V**

*Presented to Central Virginia MPO TTC on September 11, 2014 in response to feedback from August 28 meeting*

#### **Scoring Factors: Phase VI**

*Presented to Central Virginia MPO TTC on October 9, 2014 in response to evaluation requested in September 11 TTC meeting.*