Methodology Report

Hampton Roads Transportation Planning Organization

Program Priorities

Prepared for: Hampton Roads TPO Transportation Planning Organization; VDOT Virginia Department of Transportation

Prepared by: Kimley-Horn and Associates, Inc.

July 2010

HAMPTON ROADS TRANSPORTATION PLANNING ORGANIZATION PROGRAM PRIORITIES METHODOLOGY REPORT

Prepared in cooperation with the U.S. Department of Transportation (USDOT), the Federal Highway Administration (FHWA), and the Virginia Department of Transportation (VDOT). The contents of this report reflect the views of the Hampton Roads Transportation Planning Organization (HRTPO). The HRTPO is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the FHWA, or VDOT. This report does not constitute a standard, specification, or regulation.

Prepared by:

Kimley-Horn and Associates, Inc.

and

HAMPTON ROADS TPO TRANSPORTATION PLANNING ORGANIZATION

In Cooperation with:

VDOT Virginia Department of Transportation

July 2010

Transportation Technical Advisory Committee (TTAC) Members

Voting Members:
Kevin Abt, VPA
Guzin Akan, Norfolk
Lynn Allsbrook, Hampton
Jeffrey J. Bliemel, Poquoson
Robert R. Brown, Norfolk
W. Keith Cannady, Hampton
Joseph Carter, Poquoson
J. Mark Carter, Yorktown
Dan G. Clayton III, Williamsburg
Ellen Cook, James City County
Timothy C. Cross, Yorktown
Richard Drumwright, WATA
Anne Ducey-Ortiz, Gloucester
Sherry Earley, Suffolk
Robert K. Gey, Virginia Beach
Emily Gibson, Gloucester
Tony Gibson, VDOT
Richard A. Hartman, Portsmouth
Steven W. Hicks, James City County
Jane Hill, Isle of Wight
Jacqueline M. Kassel, Newport News
Michael S. King, Newport News
Robert E. Lewis, Suffolk
Albert M. Maddalena, Jr., Yorktown
Steve Martin, Williamsburg
Scott Mills, Suffolk
Reed T. Nester, Williamsburg
Christopher Perez, Gloucester
Phil Pullen, Virginia Beach
Jeffrey K. Raliski, Norfolk
Mark Schnaufer, Virginia Beach
Mark Shea, Chesapeake
Thomas M. Slaughter, Newport News
C. Earl Sorey, Jr., Chesapeake
Michael Stallings, Windsor
Peter M. Stephenson, Smithfield
Eric Stringfield, VDOT
Joseph Swartz, DRPT
Debbie Vest, Poquoson
Luke Vinciguerra, James City County
Gary E. Walton, Chesapeake
Susan L. Wilson, Portsmouth
Mark Yehlen, Portsmouth

Nonvoting Members:
Randy J. Brown, U. S. Army
P. Clifford Burnette, Jr., VDOA
Tony Cho, FTA
LT Tiffany Duffy, U. S. Coast Guard
Ivan P. Rucker, FHWA
Wendy Vachet, U.S. Navy

Voting Alternates:
Earl Anderson, Yorktown
Fred Brusso, Portsmouth
Travis Campbell, Virginia Beach
Amanda Christon, Norfolk
Garrey W. Curry, Jr., Gloucester
Darrel Feasel, DRPT
Jeffrey A. Florin, VPA
Robert P. Goumas, Suffolk
Heather Ham, Virginia Beach
Ray Hunt, VDOT
Carl Jackson, Newport News
John M. Keifer, Norfolk
Youssef Khalil, Portsmouth
Eric J. Martin, Chesapeake
Carolyn Murphy, Williamsburg
Terry P. O'Neill, Hampton
Amy Parker, Yorktown
Rodney S. Rhodes, Williamsburg
Tammy Mayer Rosario, James City County
W. Leon Sisco, WATA
Beverly Walkup, Isle of Wight
Karen Waterman, HRT
David T. Wilkinson, Newport News
Mark H. Woodward, Chesapeake
Edwin P. Wrightson, Isle of Wight
John Yorks, Hampton

Transportation Advisory Committee (TAC) Members

Voting Members:
Jerry Bridges, VPA
Mary Bunting, Hampton
W. Douglas Caskey, Isle of Wight
Kenneth L. Chandler, Portsmouth
Selena Cuffee-Glenn, Suffolk
William E. Harrell, Chesapeake
Dennis Heuer, VDOT
Corey Hill, DRPT
James O. McReynolds, York County
Neil A. Morgan, Newport News
Mark Rickards, WATA
Philip A. Shucet, TDCHR
James K. Spore, Virginia Beach
Jackson C. Tuttle II, Williamsburg
Sanford B. Wanner, James City County
J. Randall Wheeler, Poquoson
Regina V.K. Williams, Norfolk

Nonvoting Members:
Ivan Rucker, FHWA
Letitia Thompson, FTA

Hampton Roads Transportation Planning Organization (HRTPO) Board

Voting Members:
Jerry A. Bridges, VPA
Stan D. Clark, Isle of Wight
John A. Cosgrove, VGA
Paul D. Fraim, Norfolk
Vacant, Newport News
Bruce C. Goodson, James City County
Gordon C. Helsel, Jr., Poquoson
Dennis W. Heuer, VDOT
Corey W. Hill, DRPT
Linda T. Johnson, Suffolk
Alan P. Krasnoff, Chesapeake
John Miller, VGA
Yvonne B. Miller, VGA
G. Glenn Oder, VGA
Mark D. Rickards, WATA
Christian D. Rilee, Gloucester
William D. Sessoms, Jr., Virginia Beach
Thomas G. Shepperd, Jr., York County
Philip A. Shucet, TDCHR
Vacant, Portsmouth
Molly Joseph Ward, Hampton
Vacant, Williamsburg

Voting Alternates:
Ray Amoruso, HRT
Robert C. Barclay, IV, Suffolk
Herbert H. Bateman, Jr., Towne Bank Peninsula
Phillip A. Bradshaw, Isle of Wight
Anthony L. Burfoot, Norfolk
Traci-Dale Crawford, Poquoson
LT Tiffany A. Duffy, U. S. Coast Guard
Jeffrey A. Florin, VPA
Clyde A. Haulman, Williamsburg
Clifton E. Hayes, Jr., Chesapeake
George S. Hrichak, York County
Amy Inman, DRPT
CAPT Mary Jackson, U. S. Navy
Louis R. Jones, Virginia Beach
Ross A. Kearney, II, Hampton
James G. Kennedy, James City County
Elizabeth M. Psimas, Portsmouth
W. Leon Sisco, WATA
Eric Stringfield, VDOT
Louis D. Theberge, Gloucester

Nonvoting Members:
William C. Bell
Jeffrey W. Breeden, FAA
Mary Bunting, Hampton
Randall P. Burdette, VDOA
W. Douglas Caskey, Isle of Wight
Kenneth L. Chandler, Portsmouth
Tony Cho, FTA
Selena Cuffee-Glenn, Suffolk
Dwight L. Farmer, HRTPO
Brenda G. Garton, Gloucester
Glenn K. Grothe, U.S. Army
William E. Harrell, Chesapeake
William W. Harrison, Jr.
CAPT Kelly Johnson, U. S. Navy
James O. McReynolds, York County
Neil A. Morgan, Newport News
CAPT Mark S. Ogle, U. S. Coast Guard
Irene Rico, FHWA
Ivan P. Rucker, FHWA
Wayne E. Shank, NIA
Ken Spirito, NNWIA
James K. Spore, Virginia Beach
Letitia A. Thompson, FTA
Jackson C. Tuttle, II, Williamsburg
Sanford B. Wanner, James City County
J. Randall Wheeler, Poquoson
Regina V.K. Williams, Norfolk

Table of Contents

Executive Summary 1

1. Introduction 6

1.1 Background 7

1.2 Project Purpose and Objectives 7

1.3 SAFETEA-LU: Federal Planning Factors 9

2. Literature Review 11

2.1 VDOT and HRTPO Literature Review 11

2.1.1 Congestion Mitigation and Air Quality 11

2.1.2 Regional Surface Transportation Program 12

2.1.3 VDOT 2025 State Highway Plan 13

2.1.4 2030 Long-Range Transportation Plan 15

2.2 Economic Vitality Literature Review 16

3. Nationwide Benchmark Agency Research 22

3.1 Agency Selection 22

3.2 Fredericksburg Area Metropolitan Planning Organization 23

3.3 North Carolina Department of Transportation 24

3.4 Atlanta Regional Commission 26

3.5 Maricopa Association of Governments 27

3.6 Denver Regional Council of Governments 28

3.7 Sacramento Area Council of Governments 30

3.8 Strengths, Weaknesses, and Lessons Learned 31

4. Project Category and Evaluation Criteria Development 33

4.1 Project Categories 34

4.2 Project Evaluation Criteria - “Highways” 36

4.3 Project Evaluation Criteria – “Bridge/Tunnel” 38

4.4 Project Evaluation Criteria – “Bicycle and Pedestrian” 40

4.5 Project Evaluation Criteria – "Systems Management/Transportation Demand Management/Operational Improvements" 41
4.6 Project Evaluation Criteria – "Transit" 43
4.7 Project Evaluation Criteria – "Intermodal" 45
4.8 Application of Categories 47
5. Evaluation Criteria Weighting Development 48
5.1 Evaluation Criteria Weighting Process 48
5.2 Technical Weighting Factor Survey Process and Results 49
5.3 Public Weighting Factor Survey and Results 50
5.4 Weighting Factor Development and Final Approval 53
6. Measures of Effectiveness Development 60
6.1 Measures of Effectiveness for Project Utility 61
6.1.1 Project Utility Measures of Effectiveness – "Highways" 61
6.1.2 Project Utility Measures of Effectiveness – "Bridge/Tunnel" 64
6.1.3 Project Utility Measures of Effectiveness – "Bicycle and Pedestrian" 68
6.1.4 Project Utility Measures of Effectiveness – "Systems Management/TDM/ Operational Improvements" 70
6.1.5 Project Utility Measures of Effectiveness – "Transit" 73
6.1.6 Project Utility Measures of Effectiveness – "Intermodal" 75
6.2 Measures of Effectiveness for Project Viability 76
6.2.1 Project Viability Measures of Effectiveness – "Highways" 77
6.2.2 Project Viability Measures of Effectiveness – "Bridge/Tunnel" 77
6.2.3 Project Viability Measures of Effectiveness – "Bicycle and Pedestrian" 78
6.2.4 Project Viability Measures of Effectiveness – "Systems Management/TDM/ Operational Improvements" 79
6.2.5 Project Viability Measures of Effectiveness – "Transit" 80
6.2.6 Project Viability Measures of Effectiveness – "Intermodal" 81
6.3 Measures of Effectiveness for Economic Vitality 82

6.3.1 Economic Vitality Measures of Effectiveness – "Highways" 82

6.3.2 Economic Vitality Measures of Effectiveness – "Bridge/Tunnel" 84

6.3.3 Economic Vitality Measures of Effectiveness – "Transit" 85

6.3.4 Economic Vitality Measures of Effectiveness – "Intermodal" 88

7. Program Prioritization Tool and Project Application Form 90

7.1 General Overview/Structure of the Tool 90

7.2 Project Application Form 91

7.3 Tool Application 91

7.4 Tool Administration 91

8. Conclusions and Next Steps 93

8.1 Project Status 93

8.2 Next Steps 93

List of Tables

Table 1 - CMAQ Ranking Procedure Example 11

Table 2 - Technical and Public Survey Results for "Highways" Projects 50

Table 3 - Technical and Public Survey Results for "Bridge/Tunnel" Projects 51

Table 4 - Technical and Public Survey Results for "Bicycle and Pedestrian" Projects 51

Table 5 - Technical and Public Survey Results for "Systems Management/Transportation Demand Management/Operational Improvements" Projects 51

Table 6 - Technical and Public Survey Results for "Transit" Projects 52

Table 7 - Technical and Public Survey Results for "Intermodal" Projects 52

List of Figures

Figure 1 - Program Prioritization Process 8

Figure 2 - Project Meeting Timeline 9

Figure 3 - VDOT State Highway Plan Development 15

Figure 4: Mechanism through which Transportation System Improvements Create Growth 18

Figure 5 - Eight Federal Planning Factors Evaluation 34

Figure 6 - Project Category Frequency amongst Researched Agencies 35

Figure 7 - Iterative Weighting Factor Refinement Process 53

Figure 8 – "Highways" Project Weighting Factors 54

Figure 9 – "Bridge/Tunnel" Project Weighting Factors 55

Figure 10 – "Bicycle and Pedestrian" Project Weighting Factors 56

Figure 11 – "Systems Management/Transportation Demand Management/Operational Improvements" Project Weighting Factors 57

Figure 12 – "Transit" Project Weighting Factors 58

Figure 13 – "Intermodal" Project Weighting Factors 59

Figure 14 - Tool Application Flow Chart 91

List of Appendices

Appendix A – Compliance Description of the Eight SAFETEA-LU Federal Planning Factors

Appendix B – RSTP Criteria and Weighting Factors

Appendix C – Bibliography for Economic Vitality Literature Review

Appendix D – Nationwide Benchmark Agency Research – Additional Methodology Information

Appendix E – Technical Survey Results

Appendix F – Detailed Weighting Factors and Measures of Effectiveness

Appendix G – Program Prioritization Tool Structure and Data Inputs

Appendix H – Project Application Forms

Appendix I – Tool Validation Analysis for Project Utility and Project Viability Components

Executive Summary

Background

It has always been challenging for policy makers to allocate limited funding sources to the transportation improvement projects proposed in the Hampton Roads Long-Range Transportation Plan (LRTP), especially in recent years. Since federal law requires that regional plans be financially constrained, policy makers endeavor to consider only the most viable projects which will provide the optimum utility to the entire region and impact regional economic growth. A project's utility considers the project's ability to solve an existing transportation issue, which could be associated with congestion, safety, infrastructure condition, or ridership, while a project's viability level indicates the readiness of the project to be constructed based on available funding and completion of regulatory documentation. A third component is economic vitality, which considers a project's ability to impact regional economic growth through increased capacity and/or increased opportunity. Therefore, it is advantageous for policy makers to have the ability to develop an overall Project Prioritization process using information relative to all three project traits—utility, viability, and economic vitality.

The current 2030 LRTP consists of almost 100 projects requiring approximately $12 billion of funding; however, only a select number of projects tied to two specific funding streams are prioritized and ranked. Without a prioritization methodology in place for other funding streams, all other planned projects are viewed as being equal in importance and part of a system-wide improvement strategy. With declining revenues, there needs to be a prioritization process put in place to compare benefits of similar potential project types amongst each other. There is no longer funding available for a system-wide improvement strategy.

In order to obtain consensus-based support for regionally beneficial projects, planning officials must evaluate factors such as costs, benefits, project readiness, and the impact of a project on the region's economic growth to determine the relative priority of individual projects. When combined with a project's technical merit, these additional factors help policy makers to select projects which will form a solid transportation plan that addresses the key needs of the area with the recognition of limited funding. The Hampton Roads Transportation Planning Organization (HRTPO) sought to develop a process by which policy makers are given an initial scoring system to help make informed decisions on how to efficiently identify the most beneficial, practical, and feasible future LRTP projects. This document provides an overview of this process, herein identified as the Program Prioritization Process.

Kimley-Horn and Associates, Inc. (Kimley-Horn) was commissioned in July 2009, through its on-call contract with the Virginia Department of Transportation's (VDOT) Transportation and Mobility Planning Division, to assist the HRTPO with developing a living process and methodology that provides insight into the utility and viability of future regional projects. This document outlines the development of this overall process, which is in the form of a scoring tool. The eight SAFETEA-LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users) Federal Planning Factors were addressed when developing this methodology to ensure consistency with federal guidelines.

To assist Kimley-Horn, a Program Prioritization Steering Committee (Steering Committee) consisting of Kimley-Horn and a select number of members from the Transportation Technical Advisory Committee (TTAC), including representatives from VDOT, Hampton Roads Transit (HRT), Williamsburg Area Transit Authority (WATA), branches of the United States Military, Virginia Port Authority (VPA), and each of the Hampton Roads localities, was assembled. The Steering Committee convened multiple times between July and December of 2009 to develop, validate, and refine the Program Prioritization Process. Additionally, during each month between September and December 2009, presentations were made to both the TTAC and HRTPO Board to provide updates on the project status and to obtain their endorsement on the progress to date.

Methodology

Understanding that funding sources are often specific to certain project types, the first task in the development of the Program Prioritization Process was to establish a set of groups or categories to evaluate similar projects separately. It was acknowledged that comparisons should only be made between similar projects, allowing consideration of unique categories and specific attributes. Within each of the categories, specific utility, viability, and economic vitality criteria pertinent to that category were developed as applicable. Six categories were established based on a review of benchmark agencies and numerous discussions with the Steering Committee, TTAC, and HRTPO Board. These categories included the following: "Highways," "Bridge/Tunnel," "Bicycle and Pedestrian," "Systems Management/Transportation Demand Management/ Operational Improvements," "Transit," and "Intermodal."

Within each category, the Steering Committee was challenged with determining the appropriate number of criteria to find a balance between ensuring that all important aspects of each project category were being considered in the scoring while avoiding having too many criteria, which could reduce or dilute the significance of any one. Additionally, it was essential to ensure that all criteria addressed the requirements outlined in the eight SAFETEA-LU Federal Planning Factors. Within each category, numerous criteria accounted for the utility of a project while several other criteria captured project viability. For four of the six project categories, additional criteria were established to account for economic vitality. A detailed explanation of each evaluation criterion is included in Chapter 4.

After establishing the appropriate categories and evaluation criteria, the next step was to develop proposed weighting factors for each criterion. Understanding that these weights are subjective in nature, it is anticipated that they may be modified in the future to address different regional priorities. The weighting process was based on an independent, 100-point cumulative scale for each trait (project utility, project viability, and economic vitality) within each category. With this process, each project would start with zero points and then be awarded points from each evaluation criterion up to a maximum of 100 points for each traits. Because the scale is out of 100 points, each evaluation criterion's point value is equivalent to its weighting percentage.

To assist the Steering Committee in developing initial weighting factors, a survey process was used to gather input from the Steering Committee, TTAC, HRTPO Board, and general public. Both technical and non-technical stakeholders were surveyed using an online survey site to receive input. Two separate versions of the survey were administered: a technical version for Steering Committee and TTAC members and a public version for the general public and elected officials. Both versions required detailed input on the categories and primary criteria while the technical version required additional detailed input on the subcriteria. From the survey results, weighting factors were established and refined iteratively through multiple meetings with the Steering Committee, TTAC, Transportation Advisory Committee (TAC), and HRTPO Board. As noted frequently within this document, the refinement process will continue throughout the life of this project as regional visions, priorities, and individual characteristics of the projects being evaluated change and evolve.

Concurrent with the weighting factor development was the measure of effectiveness (MOE) development. MOEs are a key component of the project scoring process and are the foundation for determining scores for the three utility, viability, and economic vitality measures of a project. When selecting an appropriate MOE for each individual evaluation criterion, the metric should be measureable and able to capture a project's fulfillment of the evaluation criterion (e.g., volume to capacity ratios measure congestion while crash rates measure safety).

In this methodology, MOEs for the project utility and project viability evaluation criteria were developed through numerous meetings with VDOT, Kimley-Horn, and the Steering Committee. Specific MOEs for the economic vitality evaluation criteria were developed by HRTPO staff, in consultation with the Steering Committee, the Port of Virginia, HRT, WATA, TTAC, and Freight Technical Advisory Committee. All MOEs were classified as being either obtained, calculated (from other obtained parameters), multiple choice (e.g., high/medium/low, etc.), or either/or response format (e.g., yes/no).

Project Timeline

During the initial development of the prioritization process during July through December 2009, one individual score was assigned to each project inclusive of all three traits (utility, viability, and economic vitality). Project viability and economic vitality were considered incorporated as part of the multiple evaluation criteria under each project category. Under this one-part process, the maximum weighting factor assigned to the project viability or economic vitality criterion was 10 percent. Because top projects under the one-part approach received scores in the mid to upper 70s, a project could have received zero of the ten points under project viability or economic vitality and still have been considered a top project.

In November 2009, members of the TTAC, TAC, and HRTPO Board suggested that a project's utility and viability be evaluated separately, recognizing that each trait has a separate importance depending on which question the user is trying to answer. A project high in both utility and viability is more likely to receive consensus-based support for funding than a project high in utility but low in viability. When developing an LRTP with a 20-year horizon, a project's utility is paramount; however, to maximize the use of current funding opportunities, project viability takes on greater importance. Therefore, a two-part

scoring process considering project utility and project viability separately would clearly provide delineation between both of these pieces of information. With the support of the Steering Committee, the process was updated and finalized in January 2010 to consider project viability as a standalone scoring indicator by which a project is evaluated based on its current level of funding, phase of the planning process, backing by federal mandates, and readiness of construction. This two-part process still included economic vitality as one of several criteria under project utility.

At subsequent meetings of the TTAC, TAC, and HRTPO Board in early spring 2010, it was further determined that economic vitality also should be evaluated separately, again understanding the crucial nature of identifying high impact projects with the ability not only to solve existing transportation problems but also to support economic enhancements to the region. HRTPO staff conducted extensive economic research and determined evaluation criteria and weighting factors to evaluate economic vitality for the four project categories which considered economic vitality. This report documents the updated methodology of a three-part scoring process which provides policy makers with three distinct pieces of information—project utility, project viability, and economic vitality. Each of the three traits uses a separate, 100-point cumulative scale; however, the totals are independent of each other and are not added together. To reduce the potential for users to combine the three traits into one score, letter grades were assigned to the project viability and economic vitality values, with A/B projects being easily implementable or highly supportive of economic growth while D/E projects are much less viable in the immediate term or provide little support for economic growth. This configuration provides policy makers with a parallel analysis by which they can evaluate how viable projects with high utility scores actually are and how they support the economic growth of the region.

As the process and application have evolved over the past year, it has been acknowledged that the methodology presented in this document will serve as a solid foundation to further refinements, as needed. This document is designed to be a living methodology generated by consensus-based decisions made relative to the current environment and regional vision. Recognizing that the future will bring changes to how projects are planned and funded, this methodology provides the flexibility to be updated and modified as needed to accommodate the most current process. Similarly, a project scoring tool was designed to readily accommodate future updates easily and efficiently.

Project Tool

The categories, evaluation criteria, weighting factors, and MOEs comprise the necessary components of the prioritization methodology. In conjunction with the development of the methodology, a Program Prioritization tool was developed. The goals of the Program Prioritization tool include providing a convenient, interactive, user-friendly, simple, and versatile method to score and sort projects, while providing users with a variety of information to aid in the funding decisions of the financially constrained LRTP.

The tool was developed in an electronic spreadsheet (Excel) format with Visual Basic Macro programs in order to take advantage of a widely used format with which multiple users are familiar. The tool was set

up to allow users to easily modify project weighting factors through an interactive system which updates results instantaneously. The tool is versatile in that it allows for a more detailed output of "Highways" or "Bridge/Tunnel" projects being sorted by individual criteria or by their associated roadway system. Technical scores are tabulated for each project using available background information, evaluation criteria, and associated weighting factors established through benchmark agency research, input from technical and public surveys, and meetings with the Steering Committee, TAC, TTAC, and HRTPO Board.

To test the validity of the prioritization tool's process and structure, an initial tool validation analysis was performed at the completion of the two-step methodology which included the separate project utility and project viability components. The tool validation analysis was performed on a sampling of 41 initial projects spanning all six project categories. The projects included both regionally significant mega projects such as the Hampton Roads Bridge-Tunnel and the Widening of I-64 (Southside and Peninsula) and local/multijurisdictional projects including minor road widening and bike paths. There are three main steps in the tool validation analysis, as illustrated in **Figure ES-1**.

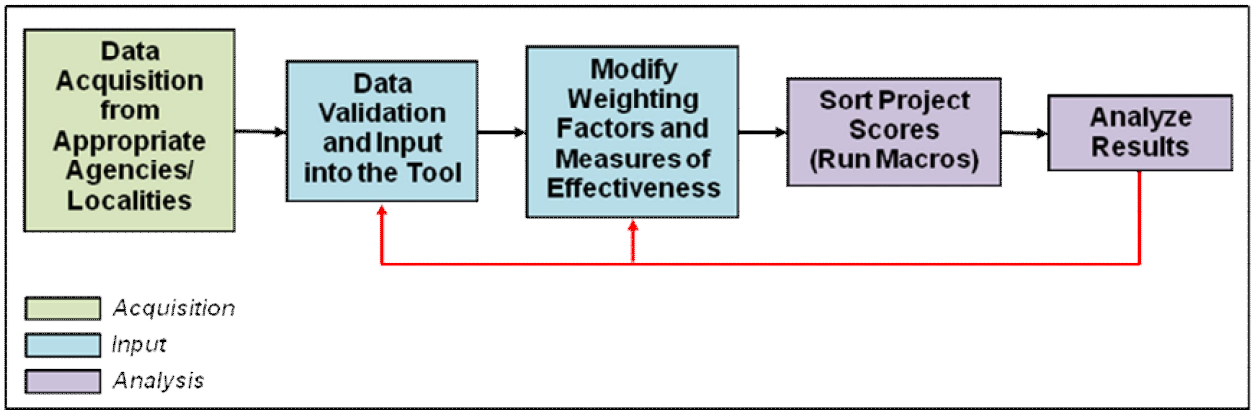

Figure ES-1 Tool Application Flow Chart

Revision efforts will still be an ongoing task after the project tool has been handed to the HRTPO for use in developing the 2034 LRTP. Further refinements may still be needed to align project-specific funding sources with the six categories, find an appropriate way to capture *Cost Effectiveness* for "Intermodal" projects, and better quantify project viability. The tool and methodology should be reviewed and reevaluated concurrent with the development of each LRTP update. When reevaluating the methodology and tool, the vision and goals of the region should serve as the benchmark for any modifications. If modifications are deemed necessary, the proposed revisions should be presented to and endorsed by the HRTPO Board prior to inclusion.

1. Introduction

Detailed planning processes are essential in building a consensus-based vision for long-range transportation needs of the Hampton Roads region. These processes outline how factors such as congestion, safety, infrastructure condition, and ridership are considered when establishing the vision. In identifying meaningful projects, planning officials must evaluate factors such as costs, benefits, and project readiness to determine the priority of individual projects. These technical evaluations are necessary when endeavoring to plan a solid transportation network which addresses the key needs of the area with the recognition of limited funding. This challenge necessitates a methodology to help compare benefits of similar potential projects amongst each other. Kimley-Horn and Associates, Inc. (Kimley-Horn) was commissioned in July 2009, through its on-call contract with the Virginia Department of Transportation's (VDOT) Transportation and Mobility Planning Division, to assist the Hampton Roads Transportation Planning Organization (HRTPO) with the development of a living process and methodology that provides insight into the utility, viability, and economic vitality of future regional projects. A project's utility considers the project's ability to solve an existing transportation issue, which could be correlated to congestion, safety, infrastructure condition, or ridership, while a project's viability level indicates the readiness of the project to be constructed based on available funding and completion of regulatory documentation. The third component of the three-legged stool of prioritization is economic vitality, which considers a project's ability to impact regional economic growth through increased capacity and/or increased opportunity.

1.1 Background

The HRTPO is the body comprised of the Hampton Roads localities and appropriate state and federal agencies to perform the duties of a Metropolitan Planning Organization (MPO) under stipulated federal regulations. Membership consists of both voting and non-voting representatives. Voting members consist of a representative from each locality, Williamsburg Area Transit Authority (WATA), Transportation District Commission of Hampton Roads [the governing board of Hampton Roads Transit (HRT)], VDOT, Virginia Department of Rail and Public Transportation (DRPT), Virginia Port Authority (VPA), and four General Assembly Representatives (two senators and two delegates). Non-voting members consist of a representative from the Virginia Department of Aviation, Federal Transit Administration (FTA), Federal Highway Administration (FHWA), Federal Aviation Administration (FAA), Peninsula Airport Commission (PAC), Norfolk Airport Authority (NAA), Chief Administrative Officers for all member localities, Chair of the Citizens Transportation Advisory Committee (CTAC), and the Chair of the Freight Transportation Advisory Committee (FTAC). Military participation and input also are encouraged at HRTPO meetings; however, formal votes are not allocated to the representatives in attendance. Mandatory qualifications necessary for each member type, in addition to alternate eligibility, are contained within the *HRTPO Bylaws*.

The HRTPO has the primary responsibility in developing the regional Long-Range Transportation Plan (LRTP). The current 2030 LRTP consists of almost 100 projects requiring approximately $12 billion of funding; however, only a select number of projects tied to two specific funding streams are prioritized and ranked. Without a prioritization methodology in place for other funding streams, all other planned projects are viewed as being equal in importance and part of a system-wide improvement strategy. The HRTPO is seeking to establish an improved methodology and related tool which can apply a weighted set of performance measures to each project within the future LRTP and provide policy makers with an initial scoring system to help make informed decisions on how to efficiently distribute limited federal, state, and local funds.

1.2 Project Purpose and Objectives

The purpose of this project is to develop a process by which policy makers are given a set of objective measures to identify the most practical and feasible future LRTP projects. All identified projects are intended to maximize the opportunity to optimally use federal and state transportation funding within the Hampton Roads transportation network, which is consistent with VDOT's current programming strategy. This document outlines the development of this overall process, which is in the form of a scoring tool. The eight Federal Planning Factors[1] were addressed when developing this methodology to ensure consistency with federal guidelines. While it is anticipated that the initial application will be used to develop the regional 2034 LRTP update, the methodology may be applied for interim decisions such as the recent stimulus funding opportunities. This document is designed to be a living methodology generated by consensus-based decisions made relative to the current environment and regional vision. Recognizing that

[1] As documented in 23 CFR 450.306(a)

the future will bring changes to how projects are planned and funded, this methodology provides the flexibility to be updated and modified as needed to accommodate the most current process.

As illustrated in **Figure 1**, there are three distinct components of the developed Program Prioritization Process: Project Scoring Tool, Project Ranking, and Project Priority List. The methodology presented throughout this document focuses primarily on the Project Scoring Tool and a small portion of the Project Ranking (preliminary ranking of a selection of tool validation projects).

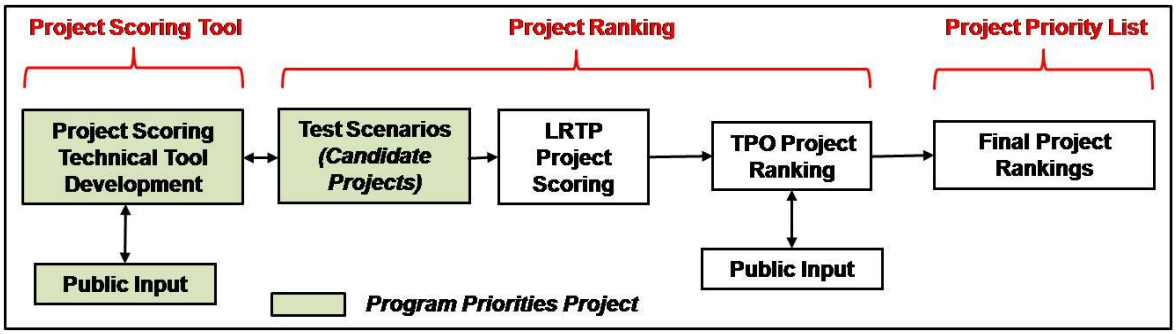

Figure 1 - Program Prioritization Process

The Project Scoring Technical Tool Development consisted of developing a consensus-based living methodology (and tool) which ultimately scores projects on their distinct utility, viability, and economic vitality traits. Input from both technical [Transportation Technical Advisory Committee (TTAC)] and non-technical (HRTPO Board and general public) bodies were received throughout the development of the Project Scoring Tool component, including the development of project categories, evaluation criteria, and weighting factors.

Upon completion of developing the project scoring tool, an initial project ranking phase began. During this phase, a tool validation analysis was completed for a sampling of projects considering the project utility and project viability components. The purpose of completing this tool validation analysis was to assess the tool's validity, explore the potential measures of effectiveness (MOEs), determine any associated data availability issues, and evaluate how effective the inputs (evaluation criteria, weighting factors, and MOEs) for project utility and project viability were at producing reasonable results. It is essential to understand that this report's objective is to provide a very efficient and valid first attempt at a highly iterative process. Input of additional projects and further refinement of data, weighting factors, and MOEs will be necessary hereafter to further refine the project ranking tool. Further refinements will be the responsibility of HRTPO staff, in coordination with their member agencies.

To ensure a broader range of input beyond VDOT, Kimley-Horn, and HRTPO staff, a Program Prioritization Steering Committee consisting of Kimley-Horn and a select number of members from the TTAC, including representatives from VDOT, HRT, WATA, branches of the United States Military, VPA, and each of the Hampton Roads localities, was assembled. The Steering Committee convened multiple times between July and December of 2009 to develop the initial Program Prioritization Process. Additionally, during each

month between September and December of 2009, presentations were made to both the TTAC and HRTPO Board to provide updates on the project status and to obtain their endorsement on the progress to date. After the third component of economic vitality was recommended, the Steering Committee convened once again in April 2010, and presentations were made to both the TTAC and HRTPO Board in both May and July 2010. **Figure 2** illustrates the project meeting timeline.

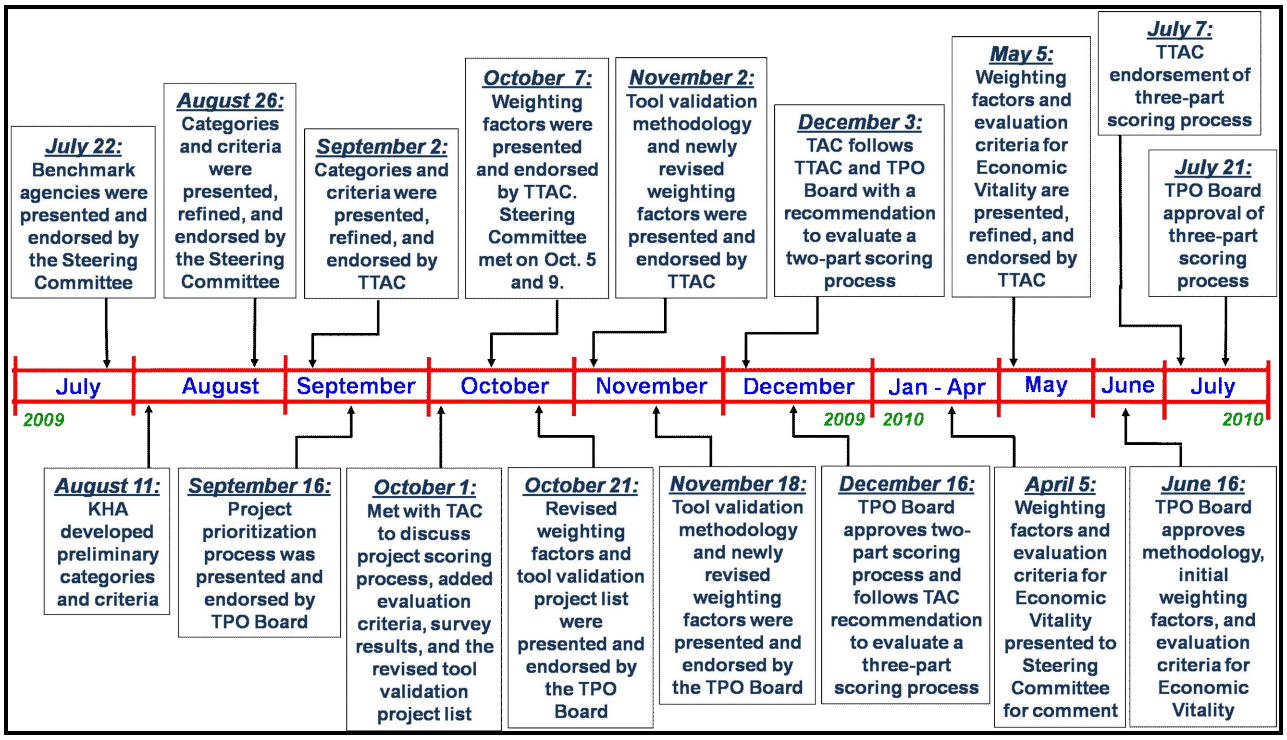

Figure 2 - Project Meeting Timeline

It was essential to the project that buy-in was achieved at each step of the process to assure that the project was progressing in the proper manner and all assumptions and applications were transparent. These same stakeholders also will participate in the development of the 2034 LRTP and will continue to provide input on the criteria and MOEs as actual projects are evaluated in the development of the regional plan.

1.3 SAFETEA-LU: Federal Planning Factors

As with all federally related projects, it is critical that all assumptions be consistent with the eight SAFETEA-LU Federal Planning Factors. SAFETEA-LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users) is the Federal authorization of funding for surface transportation programs for highways, highway safety, and transit for the five-year period from 2005 to 2009. Along with identifying federal funding for a range of transportation programs and other transportation related regulations, SAFETEA-LU updated requirements for metropolitan transportation planning, where all newly adopted regional transportation plans (RTP) must comply with federal regulations. Throughout the

development process of the Hampton Roads Program Prioritization methodology, all assumptions were based upon the eight SAFETEA-LU Federal Planning Factors, which are as follows:

1. *Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.*
2. *Increase the safety of the transportation system for all motorized and non-motorized users.*
3. *Increase the ability of the transportation system to support homeland security and to safeguard the personal safety of all motorized and non-motorized users*
4. *Increase accessibility and mobility of people and freight*
5. *Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns*
6. *Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight*
7. *Promote efficient system management and operation*
8. *Emphasize the preservation of the existing transportation system*

Understanding the importance of consistency between local prioritization, federal requirements, and ultimate federal funding, the proposed categories and criteria (as identified in Chapter 4) were referenced to these specific planning factors to illustrate their compatibility. **Appendix A** provides further detail on how the eight Federal Planning Factors were considered in the prioritization process. It should be noted that the federal transportation bill is currently being reviewed for reauthorization, so planning factors may need to be adjusted to reflect the final bill.

2. Literature Review

2.1 VDOT and HRTPO Literature Review

Prior to developing the Program Prioritization Process, existing programs currently being used by the HRTPO and VDOT were researched. A literature review of the existing programs helped provide an understanding of the other processes currently in place as well as a basis to examine any lessons learned. The literature review included the HRTPO Congestion Mitigation and Air Quality (CMAQ) and Regional Surface Transportation Program (RSTP) processes, the HRTPO 2030 LRTP, and VDOT's VTrans 2025 State Highway Plan. A summary of each of these existing processes is detailed below.

2.1.1 Congestion Mitigation and Air Quality

The Congestion Mitigation and Air Quality Act was established in 1990 by Congress in order to meet National Ambient Air Quality Standards (NAAQS). The CMAQ program provides more than $8.6 billion in funds to state DOTs, MPOs, and transit agencies to invest in projects which reduce air pollutants.

From 1993 to 2003, the Hampton Roads region received more than $90 million of CMAQ funding *(HRMPO CMAQ/RSTP Report, 2003)*. These funds were allocated to bikeway/pedestrian, new transit service, bus replacement, transportation demand management (TDM), signal system integration, intersection geometric improvement, and Intelligent Transportation System (ITS) projects. CMAQ project funding allocations are dependent on the amount of air quality improvement expected per dollar spent. Improvements in air quality are measured by the reduction in the emissions of volatile organic compounds (VOC) and nitrogen oxides (NOx).

As a region, the total project cost has always exceeded the funding available. Therefore, in 1992, the HRTPO established a process for determining the appropriate level of funding for proposed projects. This process was initially developed following the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) and was revised in 1995 and 2001. In order to receive full funding for larger projects, a phased approach is used to provide funding over a period of several years. Projects receive a ranking for both VOC and NOx emission improvements individually within each category. These rankings provide an overall score by which the projects receive a composite ranking. Projects are then prioritized in increasing order of composite rankings for funding allocation. This is illustrated in a hypothetical example in **Table 1** below.

Project	VOC Rank	NOx Rank	Composite Ranking (VOC + NOx)	Overall Ranking
A	1	6	7	4
B	6	5	11	6
C	2	2	4	1
D	5	4	9	5
E	4	1	5	2
F	3	3	6	3

Table 1 - CMAQ Ranking Procedure Example

2.1.2 Regional Surface Transportation Program

Established in 2005, the SAFETEA-LU provides Regional Surface Transportation Program (RSTP) funding through the end of 2009. All projects consistent with the eight Federal Planning Factors are eligible for funding. To ensure that projects in each region are allocated funds, each MPO receives specific CMAQ and RSTP allocations. This allows projects to compete on a regional, rather than statewide, level.

From 1993 to 2003, the Hampton Roads region received more than $200 million of RSTP funding *(HRMPO CMAQ/RSTP Report, 2003)*. Approximately 69 percent of these funds were allocated to highway projects, while approximately 31 percent were allocated to non-highway projects such as transit, bikeway/pedestrian, and ITS projects. Similar to the CMAQ funding process, the HRTPO established a process in December 1999 to more objectively allocate available funding. When assigning funding allocations to individual projects, all potential projects are first categorized by project similarity. These categories include:

- **Highway Capacity, Accessibility, and Operational Improvements**
  - *Roadway Widening, New Facilities, High Occupancy Vehicle (HOV) Lanes, New Interchanges, Intersection/Interchange Improvements, Corridor Operational Improvements, and Bridge Rehabilitation*
- **Intermodal Transportation Projects**
  - *Passenger and Freight Facilities*
- **Transit Projects**
  - *New Service, Expansion of Existing Service, Bus Shelters/Facilities, Vehicle Replacement/Purchase, Fixed Guideway, and Other Transit and ITS Projects*
- **Planning Studies**
  - *Alternatives Analysis and Other Planning Studies*
- **TDM Projects**
  - *Regional Rideshare, Marketing and Outreach Program, HOV Express Bus Service, and Park-and-Ride Lots*
- **ITS**
  - *Intelligent Transportation Systems*

Once projects are categorized, each project is assigned points based on specific criteria that are weighted differently within each category. A maximum of 100 points can be obtained by a project, regardless of category. These criteria can be found in **Appendix B**. As with the CMAQ process, the RSTP process was established through the TTAC committee, and criteria and weighting factors were agreed to by the committee. An application process was established to obtain specific information from municipalities such that the HRTPO staff can evaluate and rank each project using the agreed-upon criteria. Once scored, projects are ranked from highest to lowest. Funding is then distributed based on project score/ranking, available funding, and any other factors such as prior commitment and federal mandates. The number of projects which receive funding varies based on decisions made by the CMAQ/RSTP Subcommittee. Funds

are allocated by ranking, and the Subcommittee tries to ensure that selected projects are fully funded. The highest ranked project is fully funded, and subsequent projects are funded fully until all funds have been distributed. This funding distribution is given to projects in order, based on rank. Once all funds have been distributed the remaining projects receive no funding from the TTAC.

2.1.3 VDOT 2025 State Highway Plan

The 2025 State Highway Plan (SHP) is the most recently adopted statewide plan identifying solutions to interstate and highway deficiencies throughout the Commonwealth. The 2025 SHP is a key element to Virginia's Statewide Long-Range Multimodal Transportation Plan (VTrans2025), assisting decision makers in identifying the key needs of the interstate and primary highway systems. The 2025 SHP is only one component of the statewide planning process which also includes the Highway Needs Assessment (HNA) and a Project Prioritization methodology. Combined, these three steps establish a technical method for identifying specific recommendations and ranking them in order of importance and necessity for funding.

The statewide planning process is designed to identify the most feasible, practical, and viable recommendations for the Virginia interstate and highway networks. The first component of the planning process, the HNA, identifies performance deficiencies without financial constraint. Each of the performance deficient areas is identified through the use of Statewide Planning System (SPS) data which also captures population, employment, and land use growth projections. The HNA neither identifies the need for new facilities or alignments nor accounts for system continuity but rather assesses current infrastructure deficiencies.

Upon completion of the HNA, the second stage of the statewide planning level process, the plan development stage, is begun. This stage is what decision makers refer to as the SHP. The SHP is a "vision plan" and, similar to the HNA, does not require the plan to be financially constrained. Therefore, the SHP is a comprehensive list of corridor studies, urban area studies, MPO constrained LRTPs, and field reviews needed, assuming funding is not an issue. One main difference between the SHP and the HNA is that in the SHP, a planning level cost is provided to perform the proposed project. The SHP focuses on five main goals:

1) Provide a transportation system that facilitates the efficient movement of people and goods, including reducing congestion; maximizing benefits for the greatest number of users; and enhancing access and connections to ports, airports, transit stations, or other intermodal facilities.

2) Provide a safe and secure transportation system. This includes facilitating the military and citizens during emergency situations.

3) Retain and increase business/employment opportunities by enhancing the movement of goods and providing transportation investments in economically disadvantaged areas.

4) Improve the quality of life and minimize environmental impacts, including cultural, environmental, and community impacts.

5) Preserve the existing transportation system and promote efficient system management. This involves encouraging access management, reducing reliance on single occupancy vehicles (SOV), minimizing long-term maintenance costs, and maximizing the use of limited highway funding.

The final stage of the planning process is highway prioritization (HP). This step involves taking the list of recommendations presented in the SHP and using an established set of categories, criteria, and weighting factors to prioritize the recommendations for future funding. The main objective of this prioritization is to ensure that funds are allocated to the most practical and necessary projects first. Criteria used in the HP evaluation include crash rates, level of service (LOS), volume to capacity (V/C) ratios, project viability, public feedback, and the amount of funding available. However, before any prioritization is performed, all recommendations are categorized within a three-tier system. In this system, each tier is defined by the time span in which a recommendation is expected to be needed/occur. The first tier is defined as those projects or phases of a project occurring in the next six years. The second tier includes projects thought to occur in the next seven to 15 years. The final tier includes all long-range projects set to occur more than 15 years out.

Beginning with the first tier, projects are analyzed qualitatively and quantitatively to obtain results which will be compared to the established criteria previously described. Once ranked from high to low priority, funds are allocated. Not all projects are fully funded. Projects which are not fully funded may or may not be completed. These projects are monitored, and options for short-term resolutions are explored in the following three categories:

1) Access Management: Consolidating or eliminating access points can delay the need for adding new lanes or building new facilities.
2) Travel Demand Management: Encouraging people to carpool, use transit, or modify their work schedule to avoid peak commute times can greatly reduce the demand currently placed on facilities.
3) ITS: Technology provides the traveling public with information regarding their trip and travel options in advance of their departure.

Additional funds may be allocated to make improvements in one of the aforementioned categories. Often, these minor changes relieve the burden on the existing roadway and allow the project to be pushed to a later date.

The following diagram (**Figure 3**) is referenced from VDOT's VTRANS2025 SHP Technical Report. The diagram serves as an illustration to the VDOT planning process from the development of the HNA to the final Project Prioritization.

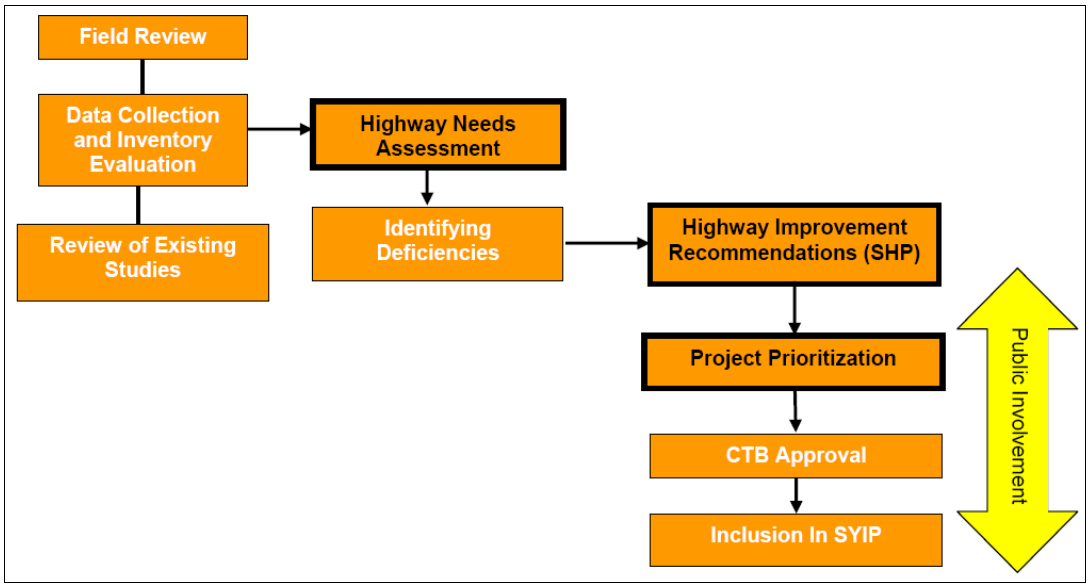

Figure 3 - VDOT State Highway Plan Development[2]

(Bolded boxes indicate Statewide Planning Process phases)

After Project Prioritization is completed a project must be approved by the Commonwealth Transportation Board (CTB) before being included in the Six-Year Improvement Plan (SYIP). The SYIP includes all highway and transit construction projects and project staging statewide for interstate, primary, secondary, and urban systems. Following the final Project Prioritization within each VDOT district, each district review team recommends from one to three interstate system priorities and five primary system priorities from the first tier. These projects are presented to the CTB for approval.

Not all projects presented to the CTB are passed and become a part of the SYIP. Various factors are taken into consideration before CTB approval, including available funding, project viability, and public feedback. These factors and others impact the passage of a project into the SYIP.

2.1.4 2030 Long-Range Transportation Plan

To date, there is no formalized process used by the HRTPO in prioritizing future candidate LRTP projects. Therefore, HRTPO staff used a variety of evaluation criteria to evaluate projects included in the most recent fiscally constrained plan. In addition to funding constraints, the LRTP also must be evaluated under a rigorous air quality conformity plan. Overall, candidate projects were evaluated by the HRTPO using ten criteria which are described in more detail below:

1) **Volume of Vehicles Served**: The difference between the expected amount of traffic *with* the project and the amount of traffic expected *without* the project.

[2] Obtained from the 2025 VDOT State Highway Plan Technical Report (December 2005)

2) **Existing and Future LOS**: Existing LOS from the 2005 Congestion Management System Report (based on traffic counts from 2001-2003) versus the future LOS from the 2030 LRTP.

3) **Speed:** The difference in speed in the project area, both with and without the project.

4) **Congested Travel Time per Highway Trip**: The impact of each candidate project on the average travel time of all regional trips (obtained from the LRTP), measured in minutes. Additionally, the expected impact of each candidate project on the average travel time of trips to each transportation analysis zone (TAZ) also was calculated.

5) **Nearby Roadways**: The LOS on the nearby alternate route, with and without the project, was observed.

6) **Impact on Minority and Low-Income Residents**: The percentage of households in poverty as well as the percentage of households headed by persons of minority groups near each project.

7) **Cost Effectiveness**: A ratio of total project cost per vehicle-mile traveled.

8) **Safety**: Existing crash rate from the "Hampton Roads Regional Safety Study" was prepared for each project.

9) **System Continuity**: The degree to which the proposed project completed a missing link or improved a congested link in the transportation network.

10) **Air Quality:** This criterion was dependent on the change in speed, where it was used to forecast whether the project would reduce NOx and hydrocarbon (HC) emissions.

2.2 Economic Vitality Literature Review

As previously mentioned, the SAFETEA-LU transportation authorization bill, which was signed into law on August 10, 2005, describes eight Federal Planning Factors which must be considered in long-range planning. One of these factors stipulates that an LRTP support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency. Additionally, the economic downturn, which started in December 2007, encouraged states and MPOs to maximize the benefit of their transportation dollars, and thus planners increasingly focused on ensuring that infrastructure projects both offer utility and enhance long term growth, easing the burden of the poor economy. This literature review represents the efforts of the HRTPO to understand the economics of transportation and the economic development impacts that might result from transportation improvements within the Hampton Roads region. The literature review process developed the foundation for the MOEs used for the economic vitality component of the prioritization process. A full bibliography of this literature review is provided in **Appendix C**.

HRTPO staff examined two types of transportation economics software to aid in the economic vitality process: *TREDIS* and *REMI Transight*. While both models attempt to measure the economic impacts of

transportation projects, they have slightly different outputs. *REMI Transight* focuses on measuring economic growth impacts from regional ground transportation projects. *TREDIS* evaluates various modes of travel and focuses on the costs and benefits of transportation improvements. The methodology employed by the two models supported staff findings from the literature review, and the schematics of both models assisted in developing the methodology for the weighting structure of the economic vitality components.

Staff also reviewed the prioritization processes of multiple MPOs and State DOTs to determine the norms for economic prioritization. While many organizations have not attempted to formally incorporate economic vitality into their prioritization process, both Ohio and Utah developed unique systems that incorporate a detailed economic development component. Ohio DOT has developed a Transportation Review Advisory Committee (TRAC) composed of experts and appointees, and this group considers how major projects increase the accessibility of a region for economic development, including how it impacts job creation and job retention. The Utah criteria also had influence over how the MOEs were designed for the economic vitality component, as well as in developing a framework for designating economic choke points. While similar strands of economic analysis are present in their various prioritization processes, the distinctive methodologies demonstrated by different MPOs and State DOTs reveal that measures of economic vitality need to be specifically tailored to the unique economies of the regions they are working to evaluate.

There are numerous ways to interpret economic vitality. Several key concepts as identified by the Oregon Department of Transportation are as follows:[3]

- Diversified, Competitive Regional Economy
- Long Term Economic Growth
- New and Expanding Business Opportunities
- Healthy, Efficient Markets
- Plentiful Jobs, Suitable workers

The concepts address many of the key points related to economic vitality, but for Hampton Roads these items clearly need to be addressed as well:

- Access to transportation for all who reside in, or travel to, the region
- Enhance regional productivity and competitiveness
- Remove economic choke points

[3] Reiff, B. and Gregor, B. Transportation Planning Performance Measures- Final Report. Oregon Department of Transportation. October 2005 <Accessed June 15th>
http://www.oregon.gov/ODOT/TD/TP_RES/docs/Reports/PlanningPerformanceMeasures.pdf?ga=t

Figure 4 illustrates the mechanism through which transportation system improvements create growth. Transportation improvements create new capability, increased reliability, and decreased total travel time for an area; effectively lowering the cost of transportation and increasing business productivity. Additionally, these elements shorten commutes, effectively expanding businesses' labor pool creating economies of scale and scope which also increase a business' competitiveness. As regional businesses become more competitive, the twin effect of growing businesses and new business starting in the region creates a long term increase in economic growth.

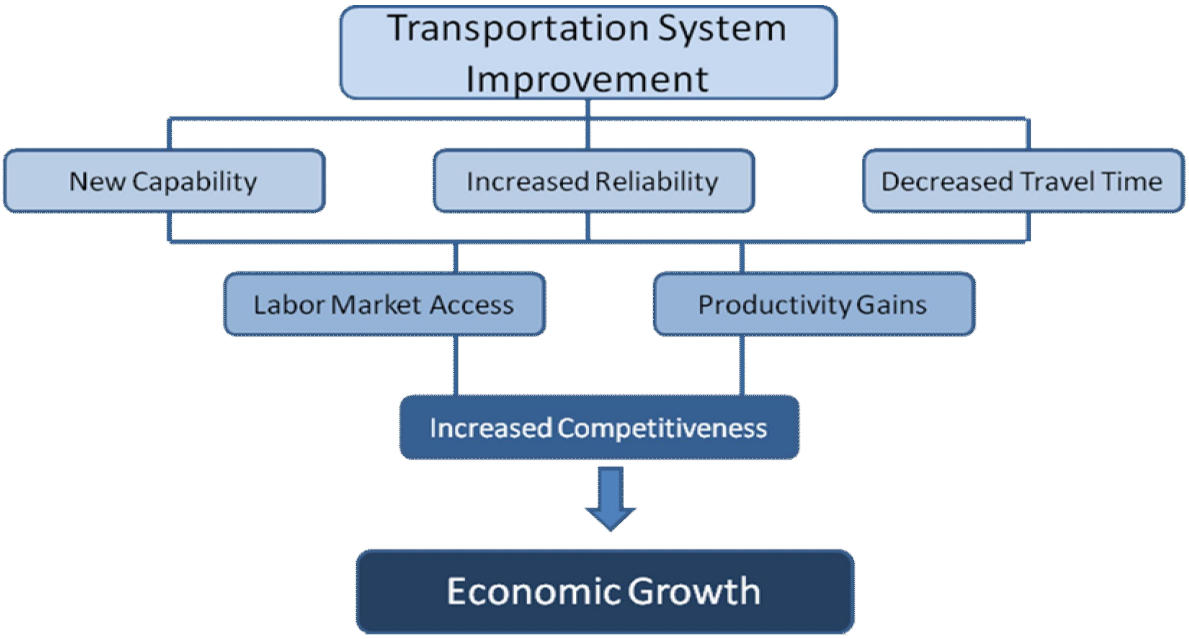

Figure 4: Mechanism through which Transportation System Improvements Create Growth

The link between transportation and economic development was noted by Adam Smith in his seminal work of 1776, *The Wealth of Nations*, and clearly this has been a powerful idea since the control of the spice routes and the silk road have been the major drivers of international politics for a millennium. The development of towns and cities has revolved around providing access to producers and customers through transportation routes and market creation. As a region's transportation infrastructure improves, its economy can influence an increasing amount of workers, producers, and markets, and grow as it incorporates these into its regional market.[4]

It is important when analyzing the impacts of transportation on the regional and national economy to understand that the U.S. has been investing in transportation for over two centuries, beginning with canals around the 1800s and railroads from the 1840s through 1900. The Eisenhower interstate system first authorized by the Federal-Aid Highway Act of 1956 began the process of creating over 45,000 miles of

[4] Weisbrod, G. (2006)

U.S. interstate, binding the nation together and providing large economic benefits as regional markets were linked by efficient freight for the first time. These years of investment have created an extremely strong transportation infrastructure across the nation. Due to the law of diminishing returns, it is unlikely that any new road building project (or even series of projects) will see the economic development boost that the U.S. previously experienced.[5] This does not preclude localized benefits from a project, but it does explain the focus that State DOTs and MPOs have placed on maintaining the nation's already strong infrastructure.

Economics literature stresses that transportation plays a vital role in economic development but cannot by itself create economic development. There is an appropriate mathematical term that summarizes this concept: transportation is a necessary but not sufficient condition for economic development. It is important to recognize that transportation supports economic growth when the other conditions are already in place, but transportation will fail to induce growth (the bridge to nowhere would be an example of this).[6] Furthermore, it is difficult to establish the direct effect between transportation and economic development, so no single specification for the econometric models has been settled upon, and thus even measuring the effect of completed infrastructure projects relies on many subjective decisions and analysis by the economist.[7] In many ways, economic analysis of this topic is shaped by the unique geographies and idiosyncratic features of each regional economy, and thus there is no "one size fits all" tool that is suitable for such an analysis.

Traditional economic analysis of transportation infrastructure focused on cost-benefit analysis of items which were easy to measure, including safety improvements, lower vehicle operating costs, and particularly the economic benefits of travel time savings. Travel time was particularly important in early analysis, as 80% of the monetized benefits in the cost-benefit analysis are attributable to travel time savings.[8] Accurately estimating the economic value of time was crucial for this kind of analysis, but for the purposes of the HRTPO selection process this proves unnecessary. Since the tool ranks projects within the region, social value of time can be held constant. Travel time savings alone can be used as a part of the ranking, and travel time will accurately reflect the relative benefits to the region.

Using surveys to measure the impact of infrastructure projects on businesses is another method of evaluating the economic impact of a transportation project, and this is often used because the impact on employment was often reported in the survey. Surveys also seem to solve a variety of data issues, as much of the data, especially as they relate to freight or commute times, were difficult to parse out historically. It allowed planners to access relevant details, as explained here:

[5] Ewing 2008- "comparatively small improvements to interregional accessibility."

[6] Schultz and McGee 2009

[7] Gkritza et al. 2007

[8] Mackie et al 2001

> "The evaluation of transportation projects has traditionally been made by assessing changes in travel time, vehicle operating cost, and safety. The broad long-term effects on economic development (job, income, and business growth) are a concern to transportation planners and decision makers, but have been often overlooked due to the lack of reliable…data."[9]

Surveys would allow one to estimate job, income, and business growth, but unfortunately there are two significant flaws with surveys. First, surveys are extremely blunt tools that expect business owners not only to know future economic conditions but also to understand the complex interactions a major project would have with their business. Second, conducting a statistically significant quality survey tends to be prohibitively expensive. Given their expense and the fact that they mask data issues rather than solve data issues, surveys are not the correct tool for measuring economic vitality.

Another technique examines land value changes that occur around infrastructure projects. Quite easily executed, this method uses a multi-linear regression analysis to isolate the effect that a transportation project had on growth in real property values. This method measures accurately the change in land value created by existing projects, but when forecasting the impacts of future projects it becomes less robust because other variables that influence land values must also be forecasted, including population, regional economic growth, and demographic characteristics of the population; the errors from all of these forecasted variables become excessive when included in one model. Furthermore, economists question the validity of including this method in a cost benefit analysis. Certainly, at least a portion of the change in economic development around a project was relocated within the region, and once a certain level of infrastructure has been achieved, these projects tend to merely move development within the region.[10]

The interaction between land use, development, and transportation infrastructure retains an important role in the economic prioritization decision because infrastructure determines how the region will grow. Infrastructure projects determine the geographic extent of the region, as well as influence the regional land use pattern. Determining that proposed projects fall within long-range development plans has shown to be key in selecting projects that do not impede long-term development. It also is important to develop roads that improve access to currently vital economic areas, thereby removing economic choke points and providing access to new opportunities for growth.[11]

Labor force access remains the primary influence over the business location decision, and any assessment of a transportation project's enhancement of economic vitality needs to estimate the labor market impact

[9] Gkritza 2006

[10] Cervero 2009- "Moreover, evidence shows that land-use impacts are more redistributive than generative, shifting growth that would have occurred somewhere to one part of the region."

[11] CSI et al 2008, Schrank and Lomax 2007, Kymel 2009

of that project. Most businesses consider it essential to locate in proximity to large population centers in order to access fully developed labor markets.[12] Projected areas of high employment are well developed labor markets by definition, and projects that increase accessibility to these areas will have a significant impact on regional growth. Reducing travel time uncertainty serves as a further method of increasing the effective size of the labor force.[13] While reducing travel time has a major impact on commutes, understanding the approximate time in transit prevents scheduling issues through either lateness or early arrivals, significantly impacting a worker's willingness to commute. Additionally, centers of higher education have a large impact on a business' ability both to access highly skilled labor and to train the workers that they already employ.[14]

Lastly, basic sector industries, which serve demand external to the region (i.e., they export goods and services from the region), bring new money into the regional economy and allow for greater economic development through indirect and induced growth.[15] These are key drivers of regional growth, and part of ensuring economic vitality comes from maintaining or growing these assets. Hampton Roads has three basic sector industries of significant size already developed in the tourism industry, ports, and Department of Defense. Projects that increase access to these industries and increase their productivity are most likely to have long-term impacts on the region's growth rates. Enhancements to productivity drive changes in econometric modeling software such as *TREDIS* and *REMI Transight*, but because the HRTPO compares only projects within the region, a simple measure of increased access to these industries in Hampton Roads will present an accurate picture of a project's ability to enhance productivity.

[12] CSI et al 2008

[13] Hymel 2009

[14] Gkritza et al 2007

[15] Stimson et al 2006.

3. Nationwide Benchmark Agency Research

In an effort to develop a reputable prioritization methodology in an efficient and timely manner, Kimley-Horn and the Steering Committee sought to benchmark other agencies around the country. A range of agencies were considered for peer review that included a cross section of agency types, locations, and organizations so that this process could benefit from lessons learned and an understanding of the strengths and weaknesses of established methodologies. Information gathered from these reviews was considered in the development of categories, evaluation criteria, and weighting factors for the HRTPO.

3.1 Agency Selection

Kimley-Horn queried its internal database of 62 offices in 15 states to seek input on potential benchmarking agencies. This query generated a list of 20 potential benchmark agencies. Kimley-Horn gathered information regarding the area population for each agency, the number of members within each agency, approximate age of its prioritization process, and approximate number of projects evaluated. Based on this information, Kimley-Horn narrowed the list to ten agencies, which was reviewed by the Steering Committee to identify which agencies would be interviewed in detail. Given the time and budget constraints associated with the scope of this project, six agencies for benchmarking were selected for phone interviews—three conducted by Kimley-Horn and three conducted by members of the Steering Committee. The Steering Committee selected the following agencies to be contacted by Kimley-Horn based on their attributes:

- **Fredericksburg Area Metropolitan Planning Organization (FAMPO)**
  - *In-state MPO*
  - *Comprehensive process*
  - *Recently updated process*
- **North Carolina Department of Transportation (NCDOT)**
  - *Neighboring state*
  - *Statewide process (not just one MPO)*
  - *Process has been in place for more than 20 years and is currently being updated*
- **Atlanta Regional Commission (ARC)**
  - *Large urban area with many member agencies*
  - *Significant number of projects in TIP*
  - *Strong reputation with established and published process*

Since the above three agencies were all located along the east coast, the Steering Committee requested that the additional three agencies be considered to obtain a more “nationwide” assessment. Several Steering Committee members agreed to provide additional support to maintain the original project budget and timeline. These additional agencies were chosen based on strong attributes that would

provide the Steering Committee with a broader range of variables. The three other agencies that were contacted by members of the Steering Committee included:

- **Maricopa Association of Governments (MAG) – Phoenix**
  - *Serves as the Regional Agency for the metropolitan Phoenix area*
  - *Program Prioritization process has been in effect since 2004*
- **Denver Regional Council of Governments (DRCOG)**
  - *Serves as the Regional Agency for the metropolitan Denver area*
  - *Program Prioritization process has been in effect since the early 1980s*
- **Sacramento Area Council of Governments (SACOG)**
  - *Association of local governments in the six-county Sacramento Region (22 Cities)*
  - *Program Prioritization process has been in effect since 1999*
  - *Received the 2008 Honorable Mention Award for Excellence in Metropolitan Transportation Planning from the Association of Metropolitan Planning Organizations (AMPO) for their prioritization work for their 2035 Metropolitan Transportation Plan*

In an effort to collect consistent and relevant information on each benchmark agency's prioritization methodologies, Kimley-Horn presented a draft list of questions to the Steering Committee for review. Once the list of questions was finalized, a formal questionnaire was developed. The questionnaires were then administered to each of the six benchmark agencies through individual phone interviews. The questionnaires and phone interviews helped to not only determine actual inputs into the existing programs, but also to determine the strengths and weaknesses of each agency's approach and the timelines needed to develop a consensus-based methodology.

3.2 Fredericksburg Area Metropolitan Planning Organization

FAMPO is part of the George Washington Regional Commission (GWRC) and was established in 1993. FAMPO serves a population of more than 310,000 and includes the City of Fredericksburg and Counties of Caroline, King George, Spotsylvania, and Stafford. FAMPO is responsible for creating, developing, and reviewing multiple transportation plans. Major efforts of this organization include the development of the 25-year Long-Range Transportation Plan (LRTP), three-year Transportation Improvement Program (TIP), the annual Unified Planning Work Program (UPWP), the Bicycle and Pedestrian Plan (BPP), the Public Participation Plan (PPP), travel models, thoroughfare plans, and transit plans. Each of these transportation plans is designed to identify transportation programs, funding opportunities, and projects.

Under the LRTP, there are typically more than 200 projects identified on the unconstrained needs list totaling approximately $8 billion in needs. This list is greatly reduced to a list of 45 to 50 projects once the constrained LRTP budget of $1.5 billion is applied. Each year, approximately 15 to 20 projects are programmed for funding. LRTP projects are categorized based on roadway functional classification.

LRTP projects are prioritized by the MPO based on a ranking methodology established in 2008. Under the recently developed LRTP ranking methodology, a technical committee facilitates the prioritization process. Initial highway project requests are sent to the MPO by local members, typically as part of a local comprehensive plan. These highway projects are then divided by roadway functional classification and proposed year of implementation. MPO staff and the technical committee then rank the projects for each class and submit the ranked list to the policy board, which is comprised of elected officials, for approval and adoption.

Long-Range Transportation Plan

The methodology for ranking highway projects in the LRTP uses a point based system in which each project can receive a total of up to 100 possible points. The project ranking process for the LRTP took about one month. However, it took about five months to build consensus on the prioritized list due to an iterative process with ongoing communication between MPO staff, staff from local agencies, and political decision makers. The prioritization process is anticipated to be reviewed every four years as part of the LRTP updates. The evaluation criteria used to prioritize projects for the LRTP are consistent with FAMPO's mission to provide a cooperative, continuous, and comprehensive ("3C") transportation planning process. The 100 points are allocated among these criteria as follows:

- Congestion Relief – 30 Points
- Safety and Security – 30 Points
- Environmental Impacts – 16 Points
- Public and Community Support – 8 Points
- Funding and Implementation Considerations – 8 Points
- Smart Growth/Mobility – 8 Points

Total Possible Score – 100 Points

Furthermore, these criteria meet the eight federal SAFETEA-LU planning factors and consider prioritization methodologies used in other areas. Further details of the LRTP program prioritization process are provided in **Appendix D**.

3.3 North Carolina Department of Transportation

Transportation plans developed by NCDOT include the 25-year Long-Range Statewide Multimodal Transportation Plan, ten-year Program and Resource Plan, and five-year Work Program. Each of these transportation plans is designed to identify transportation programs, funding opportunities, and individual projects.

The current seven-year Transportation Improvement Program (TIP) for NCDOT identified approximately 3,000 projects, though not all were funded. The estimated five-year total budget for NCDOT is $20 billion (or approximately $4 billion per year). At the statewide level, TIP projects account for approximately $1.2 billion per year, not including planning and engineering costs.

Currently, the NCDOT relies on Project Prioritization performed by the state's MPOs and rural planning organizations (RPO). Within the state of North Carolina, there are 17 MPOs serving urban areas having a population of 50,000 or more and 20 RPOs representing the remaining planning areas across the state. At least half of the MPOs and RPOs rank their own projects using some form of data-driven prioritization methodology, while the others use a qualitative analysis. NCDOT is developing a program prioritization process that is expected to be in place by 2010 and will be administered by the Strategic Planning Office of Transportation (SPOT). The new program prioritization methodology will focus on prioritizing projects for years six through ten contained in the ten-year Program and Resource Plan. Projects identified for years one through five are already included in the five-year Work Program (which includes the TIP) and therefore will not be reprioritized.

Under the new process, the SPOT will rank highway projects submitted by the MPOs and RPOs and present the unconstrained list to management. Management will then determine the amount of money available for each of the nine project categories. With the help of the financial division, funding constraints and regional equity will be applied to develop the constrained list. This draft statewide TIP will then go through a public hearing process for final approval by the Board of Transportation. The public hearing process typically takes seven to nine months.

The prioritization process under development will include a combination of quantitative and qualitative data including a weighted ranking system based on tier, goal, and MPO/RPO rankings. Highway projects will first be classified into one of nine categories representing three tiers (Statewide, Regional, and Subregional) and three goals (Mobility, Safety, and Infrastructure Health). The simple matrix below illustrates the nine potential categories:

Statewide Mobility Projects	Regional Mobility Projects	Subregional Mobility Projects
Statewide Safety Projects	Regional Safety Projects	Subregional Safety Projects
Statewide Infrastructure Health Projects	Regional Infrastructure Health Projects	Subregional Infrastructure Health Projects

A quantitative score will be developed for each project on a 100-point scale relative to congestion, safety, and pavement condition, which reflect the three established goals. Additionally, a qualitative score also will be established based on the rankings provided by local MPOs and RPOs as well as the qualitative divisional ranking. The qualitative and quantitative scores will then be combined to obtain the overall project score to rank each project within the nine categories. Project prioritization for non-highway

projects is performed by the appropriate modal division for the state. Not all modes have a data-driven methodology at this time.

The prioritization process, which is based on the mission and goals of NCDOT, is anticipated to be reviewed every two years as part of the ten-year plan updates. Further details of the proposed NCDOT prioritization process are provided in **Appendix D**.

3.4 Atlanta Regional Commission

ARC is the regional planning and intergovernmental coordination agency serving the 10-county area of Georgia including Cherokee, Clayton, Cobb, DeKalb, Douglas, Fayette, Fulton, Gwinnett, Henry, and Rockdale counties, as well as the City of Atlanta. ARC is responsible for creating, developing, and reviewing multiple transportation plans including the 20-year Regional Transportation Plan (RTP), six-year Transportation Improvement Program (TIP), annual Unified Planning Work Program (UPWP), regional Bicycle and Pedestrian Plan, and Transportation Public Participation Plan as well as various travel models, thoroughfare plans, and transit plans. Each transportation plan is designed to identify transportation programs, funding opportunities, and individual projects.

There are approximately 1,500 projects included in the 20-year RTP, 900 of which are included in the TIP. The TIP represents the first six years of the RTP. The overall annual budget is approximately $700 million to $800 million, which is driven by local bond funding for local projects.

Although projects are typically solicited from the localities, given the severe financial constraints facing the region, projects for the current plan were identified through a Needs Assessment Report conducted by ARC. This regional assessment looks at trends and sets the goals, policies, objectives, and vision for the long-range plan. Each project was then categorized under one of three investment priority areas approved by the ARC Board including:

1. System Management, Optimization, and Operations – Smart Corridors
2. Demand Management – Transportation Demand Management, Bicycle/Pedestrian, Livable Centers Initiative, and Others
3. System Expansion – Transit and Road

Once projects are categorized under the three priority investment areas, they are then prioritized using an approved methodology. Managing current assets, which includes the projects in Category 1, is given the highest priority. Managing demand, which includes the projects in Category 2, is given the next highest priority. System expansion projects are given the next priority and are evaluated by ARC staff using a quantitative scoring methodology. ARC has been using this type of methodology to rank projects for ten years. Due to the need for travel demand modeling, the project ranking process typically takes three to four months. During the previous plan update, it took an additional six months for the Policy Board to build consensus and approve the prioritized program.

The evaluation criteria and weighting factors are developed based on the goals and vision of the RTP and are reevaluated with each RTP update (every three to four years). Unlike system and demand management projects which do not compete for funds, system expansion projects are evaluated on a 100 percent basis against four major components, with congestion relief accounting for 70 percent of the overall scoring as directed by the Governor's Congestion Mitigation Task Force. The rationalization for this is that both system management and demand management projects have much higher priorities than system expansion projects, since management generally involves easier and cheaper alternatives. Available funding is allocated to all of these types of projects before system expansion. The technical analysis of system expansion projects includes the following criteria and their associated weights:

1. Recurring Delay – 50 percent
2. Non-Recurring Delay – 20 percent
3. Environmental Impact – 15 percent
4. Regional Development Plan Policy Support – 15 percent

Points also are established within each of the four components, and each project receives an overall score for the combined points from each of the criteria. In addition, benefit/cost analyses are prepared for each project after determining the technical score to provide additional prioritization of each project type. After projects are evaluated technically, they are further evaluated for funding and placed into one of the following tiers:

1. RTP and TIP Project List – Financially constrained list
2. "Unfunded Needs" Project List – Funding currently unavailable, but still a regional priority
3. Aspirations Plan Project List – Proposed future projects that are not a regional priority

The eight federal SAFETEA-LU planning factors also were incorporated into the RTP planning process, with some being directly included as project evaluation criteria. Further details of the ARC prioritization process are provided in **Appendix D**.

3.5 Maricopa Association of Governments

MAG is a Council of Governments (COG) that serves as the designated MPO for transportation planning in the Maricopa County region of Arizona, which includes Maricopa County, the City of Phoenix, and 25 other incorporated cities and towns within the county. MAG conducts long-range planning relative to freeways, arterials, safety, bicycle/pedestrian facilities, and transit facilities.

The Regional Transportation Plan (RTP) typically includes approximately 500 projects while the five-year Transportation Improvement Program (TIP) typically includes approximately 2,000 projects with the addition of local projects. A typical annual TIP budget is approximately $1.2 billion per year. Projects are categorized based on type of mode. Funding allocation is determined based on sales tax legislation. Current funding has been allocated as follows—57 percent for freeway, 33 percent for transit, and 10 percent for arterial projects. With regards to bicycle/pedestrian and safety projects, they are not in the

RTP, but rather are programmed annually in the TIP. RTP projects are prioritized by MAG staff with the assistance of a Transportation Review Committee (city engineers and planners) based on a ranking methodology established in 2004. The ranked program is then submitted to a Management Committee (city managers), followed by the Transportation Policy Committee (elected officials and private sector representatives), and finally the Regional Council (representatives from each member agency) for approval.

The project ranking process was applied to the 2003 RTP but has not been updated since, given that a limited budget has precluded MAG from undertaking a major RTP update. In total, it took about two years to develop consensus and approve the transportation program. A number of evaluation criteria consistent with regional goals are used for each project category to prioritize each project. The prioritization methodology does not use a point-based system but rather a subjective evaluation of the following criteria:

1. Extent of local public and private funding participation
2. Social and community impacts
3. Establishment of a complete transportation system for the region
4. Construction of projects to serve regional transportation needs
5. Construction of segments that provide connectivity with other elements of the regional transportation system
6. Other relevant criteria developed by the regional planning agency

The eight federal SAFETEA-LU planning factors also were incorporated into the RTP planning process, with some being directly included as project evaluation criteria. Further details of the MAG prioritization process are provided in **Appendix D**.

3.6 Denver Regional Council of Governments

DRCOG is the designated MPO for transportation in the Denver region, which includes Adams, Arapahoe, Boulder, Clear Creek, Douglas, Gilpin, and Jefferson Counties; the City and County of Broomfield; the City and County of Denver; and southwest Weld County. DRCOG works with the Colorado Department of Transportation (CDOT), Regional Transportation District (RTD), and others to prepare transportation plans and programs. DRCOG conducts long-range planning related to transportation, land use/development, open space, and water quality.

The Transportation Improvement Program (TIP), which is updated every four years, currently includes approximately 200 projects using federal and state funds as well as local transit funding. The overall annual budget for the TIP is approximately $610 million to $660 million, which includes $300 million in local transit funding. TIP projects, which can include highway, transit, bicycle/pedestrian, and air quality projects, are currently prioritized by three different agencies—DRCOG, CDOT, and RTD—based on the proposed funding source. DRCOG evaluates projects using Surface Transportation Program (STP)-Metro, STP-Enhancement, and CMAQ funds. CDOT evaluates projects using state and other federal highway funds

while the RTD evaluates projects for other federal transit funds and local transit funds. Projects from all three agencies are then integrated into a draft TIP by DRCOG staff, which is posted for public hearing and reviewed by the Transportation Advisory Committee and Regional Transportation Committee. Finally, the TIP is submitted to the DRCOG Board of Directors for approval and adoption.

Projects submitted to the DRCOG for inclusion in the TIP are further separated into categories based on project type:

- Roadway capacity projects
- Roadway operational improvements
- Roadway reconstruction
- Rapid transit
- Transit passenger facilities
- New bus service
- Bicycle/pedestrian projects
- Other enhancement projects
- Air quality improvement projects
- Transportation studies
- Congestion management programs/pools (including transportation demand management, traffic signal systems, and ITS)

Projects are evaluated by DRCOG staff based on an established point-based ranking system for each category. The total possible score for each project is 100 points. DRCOG has used a prioritization process since the early 1980s. DRCOG staff typically spends about two months ranking projects. Typically, it takes an additional three to four months to build consensus on the prioritized list and go through the public hearing and approval process. The overall prioritization process is reviewed every four years as part of the TIP updates. The projects are ranked and prioritized under each category on the point-based scoring system using specific evaluation criteria approved by each committee and board.

During the first phase of project selection for the TIP, 75 percent of the not-yet-programmed funding is allocated directly to projects with the highest scores. During the second phase of project selection, 25 percent of the not-yet-programmed funding is allocated to additional projects based on the following qualitative criteria:

- Financial equity of project awards among DRCOG members at the county level
- Potential cost savings from merging projects
- Projects in strategic corridors
- Project readiness for construction
- Projects in very small communities

Further details of the DRCOG prioritization process are provided in **Appendix D**.

3.7 Sacramento Area Council of Governments

SACOG is an association of local governments in the six-county Sacramento, California region. Its members include the Counties of El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba as well as 22 cities within the region, with a population of approximately 2,056,900 people. SACOG prepares the region's long-range transportation plan and assists in planning for transit, bicycle networks, clean air, and airport land uses.

The Metropolitan Transportation Plan (MTP) is a 28-year long-range plan updated every four years to identify transportation improvements based on projections for growth in population, housing, and jobs. In addition to preparing the MTP, SACOG develops a Metropolitan Transportation Improvement Program (MTIP) which is updated every two years. In the most recent MTP, there were more than 1,400 projects identified with a total budget of $41.7 billion for the 28-year plan.

During development of the most recent MTP, technical and advisory committees comprised of local public works agencies, transit operators, local planning staff, and advocates made recommendations regarding investment priorities to be considered by the Board of Directors. The collaborations with local agency partners included the development of county-scale transportation scenarios for each county participating in SACOG and reflected different emphases on specific investments in roads, transit, bicycle and pedestrian modes, and transportation programs. Citizen feedback on priority investments was gathered through a robust public involvement process including more than 150 presentations, 17 community workshops, and an Elected Officials Summit.

Following this effort, SACOG staff and agency partners combined the most popular and well-performing county investment priorities into regional scenarios and tested the scenarios against a number of performance measures. Projects nominated by local agencies were then analyzed against the citizen priorities identified through the public outreach, technical performance, and financial constraint requirements.

SACOG has seven funding programs that were established as part of the adoption of the region's MTP in 2002. They include the following:

- Air quality funding program
- Bicycle/pedestrian funding program
- Community design funding program
- Transportation demand management funding program
- Regional/local funding program
- Road rehabilitation funding program
- Transit funding program

The transit funding program is used for projects programmed with FTA funds. All other funding programs are funded with a combination of federal CMAQ funds, STP funds, and funds from the State Transportation Improvement Program (STIP) process. Projects are categorized based on the applicable funding sources and then evaluated using the prioritizing process.

SACOG works in coordination with the state, transit operators, and local agencies to prioritize the projects. These recommendations then go through a designated interagency consultation group, known as the Regional Planning Partnership, and then are forwarded to SACOG's Transportation Committee and subsequently to the SACOG Board. SACOG has had an established prioritization process for at least ten years. The development of the current MTP took more than two years due to extensive public involvement and local agency partner review. In addition, the MTIP process typically ranges from three to six months. The prioritization process is reviewed every two years as part of the MTIP updates and every four years as part of MTP updates.

Depending on the funding program, projects can be prioritized based on an established point based ranking methodology out of a total possible 100 point scale. Prioritization of the investment scenarios is based on the following six guiding principles adopted by the SACOG Board of Directors in 2005:

1. Smart land use
2. Environmental quality and sustainability
3. Financial stewardship
4. Economic vitality
5. Access and mobility
6. Equity and choice

Further details of the SACOG prioritization process are provided in **Appendix D**.

3.8 Strengths, Weaknesses, and Lessons Learned

One of the most important reasons for interviewing each benchmark agency was to identify any recognized strengths and weaknesses of the respective methodologies and then document the "lessons learned" when developing the Hampton Roads methodology.

The most common strength observed among the benchmark agencies was the presence of regional agreement and consensus of all participating agencies. This allowed the methodologies to be transparent and brought all stakeholders to the same level. Additionally, by obtaining consensus, opportunities for both stakeholder and public input are generated. It also was noted that maintaining a consensus-driven methodology allowed for the rules to be clearly defined. Benchmarks also indicated that by using an electronic (or web-based) scoring tool, insight could be provided into how a project could be improved to receive a higher score. The use of a very data-driven and systematic methodology was identified as an additional strength of the benchmark methodologies.

In addition to strengths, the six benchmark agencies also identified a number of recognized weaknesses throughout the development of their prioritization methodologies. The most common weakness pertains to the data inputs necessary to score the projects. Subjective MOEs, the difficulty in accurately estimating project costs, and trying to balance the amount of time/effort needed to obtain specific data were all identified as major weaknesses. Another data input weakness noted was the inability to accurately forecast future conditions. Furthermore, a difficult and complex methodology would require significant reeducation of both new and existing applicants each time a revision is made, as the type of data required from the individual localities changes to address current issues.

The Hampton Roads Program Prioritization Process will incorporate lessons learned from both the strengths and weaknesses identified by the benchmark agencies. First, complete disclosure of all assumptions and decisions will be made between the Steering Committee, TTAC, and HRTPO Board to ensure that the methodology remains transparent and open to both stakeholder and public input. Secondly, the Hampton Roads methodology will be applied in a very common, easy to use, and convenient manner—an electronic spreadsheet (Excel) format. The spreadsheet will provide detailed output for each project so that the user can identify individual evaluation criteria for which a project is not receiving many points. The methodology will be as user-friendly as possible with dropdown menus and commented descriptions of what each input or output is. Changes to MOEs will be simple modifications within the spreadsheet with internal checks to ensure that all weighting factors sum to 100. An application form will be developed such that each applicant understands which information will be required by each agency in order to submit strong projects that meet the established criteria to achieve optimal scores.

With respect to data inputs, the Hampton Roads methodology will use as many data driven inputs as possible to eliminate sources of subjectivity. It is understood that removing full subjectivity from the prioritization process is unattainable and impractical. Therefore, distinct rules will be established to provide guidance on the level of subjectivity used. Also, it will be recommended that all subjective input reviews be performed by an impartial committee (that has not yet been formed). Finally, cumbersome and tedious data that would result in little additional improvement to project scoring are not recommended to be used.

4. Project Category and Evaluation Criteria Development

Once all research was completed, the next step in the prioritization process (Phase I - Project Tool Development) was to establish a set of groups or categories to evaluate similar projects separately. It was acknowledged that comparisons should only be made between similar projects, allowing consideration of unique categories and specific attributes. Developing categories also brings the projects into better alignment with potential primary funding sources. Within each of the categories, all utility, viability, and economic vitality criteria pertinent to that category were developed. While some criteria were unique to a single category, other criteria were common to all categories. However, actual measurement of the criteria is specific to each project.

The inherent challenge in determining the appropriate number of criteria was to find a balance between having too many criteria, which could reduce or dilute the significance of any one, while also ensuring that all important aspects of each project category are considered in the scoring. Initial categories and evaluation criteria were developed by Kimley-Horn based on a review of the methodologies from the benchmark agencies as outlined in Chapter 3. The evaluation criteria within each category were reviewed against the eight Federal Planning Factors to ensure there was a direct correlation. **Figure 5** summarizes the project categories and their correlation to the eight Federal Planning Factors based on the individual evaluation criteria contained within each category. **Appendix A** provides further detail on how the eight Federal Planning Factors were considered in the prioritization process. The categories and criteria were then presented to the TTAC before being officially endorsed and agreed to by the HRTPO Board on July 21, 2010.

Planning Factor	Highways	Bridge/Tunnel	Bike and Ped	Transit	Sys Mngmt/ TDM/Op. Imp	Intermodal
Support the Economic Vitality of the Metropolitan Area	✓	✓		✓		✓
Increase Safety for Motorized and Non-Motorized Users	✓	✓	✓		✓	✓
Support Homeland Security	✓	✓			✓	
Accessibility and Mobility of People and Frieght	✓	✓	✓	✓	✓	✓
Environment, Conservation, Quality of Life, Planned Growth & Economic Development Patterns	✓	✓	✓	✓	✓	✓
Enhance Connectivity Across and Between Modes, for People and Freight	✓	✓	✓	✓		✓
Management and Operations	✓	✓		✓	✓	✓
Preservation of Existing Transportation Network	✓	✓			✓	

Figure 5 - Eight Federal Planning Factors Evaluation

4.1 Project Categories

In developing the project categories, heavy reliance was placed on the methodologies currently used by the HRTPO for CMAQ, RSTP, and LRTP; by VDOT; and by the six benchmark agencies. Project categories from each of the ten methodologies were recorded, and the frequencies of each category were tallied. Project category frequency results are included below in **Figure 6**, which shows how many times a specific category appeared amongst the ten agencies researched.

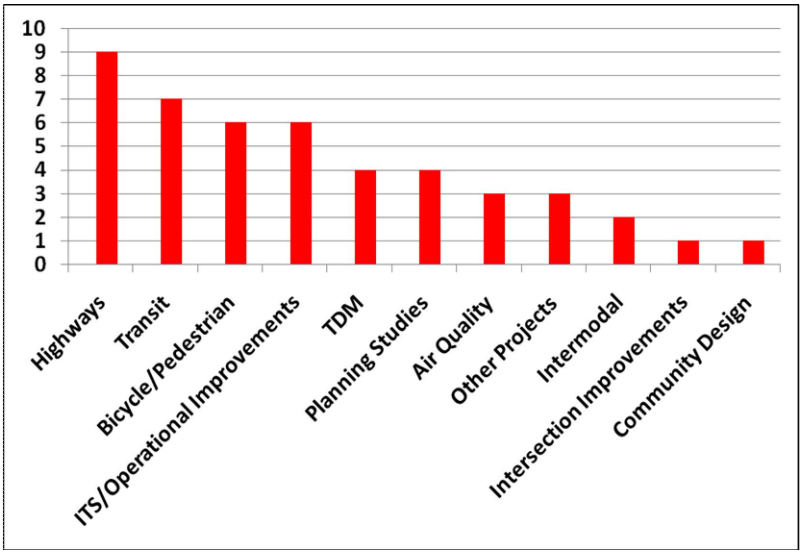

Figure 6 - Project Category Frequency amongst Researched Agencies

The initial project category recommendation for the Hampton Roads Program Prioritization methodology focused on selecting categories that appeared in a minimum of three benchmark agencies, which included the following six categories: "Highways," "Transit," "Bicycle and Pedestrian," "ITS/Operational Improvements," "TDM," and "Planning Studies." However, through discussions with the Steering Committee and TTAC, it was determined that "TDM" projects could be included with "Intersection Improvements" (formerly "Operational Improvements") and "Systems Management" (formerly "ITS") projects to form one separate category. The "Planning Studies" category was excluded as the consensus of the Steering Committee was that standalone planning projects are not in the LRTP. Furthermore, the planning phase of a potential LRTP project is completed before becoming part of the LRTP. The "Intermodal" category was determined to include both airport and seaport projects. Lastly, given the number of water crossings throughout the Hampton Roads region, there are a significant number of bridges and tunnels. It was recognized that these types of structures are extremely costly and that it would not be reasonable to have a "Bridge/Tunnel" project compete directly with a "Highways" project. Therefore, a separate "Bridge/Tunnel" category was established.

The following list briefly describes the types of projects included within the six approved categories:

1) **"Highways" Projects**: *"Highways" projects will include the full spectrum of roadways (interstate, arterial/state highway, and local). Although each has different levels of functionality, the governing criteria for their functionality are the same. While the current version of the tool scores all "Highways" projects with the same methodology, it does have the capability to sort projects by functional classification. This allows the user to compare a subsection of "Highways" projects if, for example, a certain roadway funding source is specific to a functional classification.*

2) **"Bridge/Tunnel" Projects**: *Projects placed in this category will have a primary focus on a bridge or tunnel structure, while it was recognized that each of these projects also will have some type of*

roadway facility associated with it. Significant lengths of roadway included to either side of the structure do not prevent the project from being included within this category, as long as the primary focus of the project is the actual bridge/tunnel structure.

3) **"Bicycle and Pedestrian" Projects:** *Projects included in this category include bicycle and pedestrian facilities such as bike paths, bikeways, and multiuse path projects, along with any other projects which accommodate bicycle or walking modes of transportation.*

4) **"Systems Management / Transportation Demand Management (TDM) / Operational Improvements" Projects:** *These projects include the most diverse types of projects, ranging from transportation demand management (such as ridesharing), signal system design, corridor signal timing projects, and any other project which would qualify as an ITS project at either a local or statewide level.*

5) **"Transit" Projects:** *"Transit" projects include rail guideways, bus service, intercity rail, or any other projects involving the movement of a significant number of people where the primary mode is other than personally owned vehicles (POV), bicycle, or walking, excluding multimodal (these are included under the "Intermodal" category).*

6) **"Intermodal" Projects:** *"Intermodal" projects include projects which ease the transition of goods or passengers between two or travel modes. Given the heavy port influence in Hampton Roads, these types of projects most commonly involve the movement of freight (e.g., from road to air, rail, and/or sea).*

4.2 Project Evaluation Criteria - "Highways"

Throughout the CMAQ, RSTP, LRTP, VDOT, and benchmark agency literature reviews, more than 35 criteria were observed for "Highways" projects. From that list, there were 12 criteria which were common amongst at least three agencies *(Existing and Future Congestion Levels, Safety, Cost Effectiveness, Multimodal Enhancements, Infrastructure Condition, Additional Funding Availability, Air Quality/Emissions Reduction, Travel Demand/ADT, System Continuity, Environmental Impacts, Project Viability,* and *Social/Community Impacts).* After observing commonalities amongst each of the researched agencies, it was determined that the criteria below would yield the most beneficial projects to the Hampton Roads region. A brief description regarding MOEs is included for each criterion. As previously described, the challenge is in identifying the appropriate number of criteria which will achieve the end result. For instance, if all 12 criteria were weighted evenly from 100 available points, each criterion would only be worth approximately eight points. Information concerning how the criteria will be weighed and measured is described in more detail in Chapters 5 and 6, respectively.

Project Utility Criteria:

- ***Congestion Level:*** *Existing and future levels of congestion will be captured and compared through V/C ratios obtained from the LRTP.*

- ***System Continuity and Connectivity****: This criterion will take into account the extent to which Hampton Roads is directly affected by the project, ranging from regionally as a whole to just locally within a municipality.*
- ***Cost Effectiveness****: This criterion is in the form of a ratio representing the total cost of the project per vehicle-mile traveled (VMT), in dollars/VMT.*
- ***Existing and Future Land Use Compatibility****: This criterion examines the compatibility of the project relative to adjacent land uses. Given the wide range of documentation possible to establish compatibility, points are awarded based on documentation that has been approved by an agency's elected body (such as a Comprehensive Plan).*
- ***Safety and Security****: This criterion is based on the critical crash ratio (CCR) within the project area, corrections to any existing geometric deficiencies, and the extent of impact to incident management/evacuation routes.*
- ***Infrastructure Condition****: This criterion is based on the score received on the Critical Condition Index (CCI), which is a process used to classify pavement conditions of roadways.*
- ***Modal Enhancements****: Projects are awarded points if they include any bicycle and pedestrian, transit, HOV, TDM/ITS, or intermodal accommodations and considerations.*

Project Viability Criteria:

- ***Amount of additional local match or private funding committed to the project:*** *Projects are awarded points if there are any additional local or private funds (such as private funds (e.g., Public-Private Transportation Act), tolls, or additional local matches) committed to the project beyond the required match.*
- ***Prior Commitment:*** *This criterion classifies whether a project has prior commitment such as inclusion in the LRTP.*
- ***Federal Mandates:*** *This criterion is based on whether a project is backed by federal mandates. Emergency bridge replacements, projects addressing significant existing design deficiencies, and projects with soon to expire federal funding previously allocated to the project are a few examples of federally mandated projects.*
- ***Degree of Project Readiness:*** *This criterion assesses how quickly a project could begin construction by determining whether the project has its plans complete and is ready for advertisement, whether the necessary environmental permits are complete, and whether the project is completely funded.*

Economic Vitality Criteria:

- ***Total Reduction in Travel Time:*** *This criterion is based on research suggesting that the majority of monetized benefits that result from an investment in new transportation infrastructure are a direct result of travel time savings. Travel time savings enable increased productivity, resulting in a more competitive environment for regional businesses.*

- ***Labor Market Access:*** *Increasing access to the region's labor force through improved transportation infrastructure is a critical component in providing business and industry with the access to human capital that is vital to their success. Efficient access to labor markets for residents increases efficiency, productivity, and quality of life.*

- ***Addresses the Needs of Basic Sector Industries:*** *Basic sector industries are those that bring outside dollars into the region, creating new income and additional spending power in the regional economy, thus providing the foundation of the regional economy. Increasing the competitiveness in a basic sector industry that is built on a regional competitive advantage is vital in ensuring continued success both within the basic sector industry and to the entire regional economy.*

- ***Increases Opportunity:*** *This criterion measures the ability of a project to meet the needs of jurisdictional comprehensive plans and areas that are designated as planned growth areas within the region. It also evaluates the ability of a project to develop access to new opportunities for growth.*

4.3 Project Evaluation Criteria – "Bridge/Tunnel"

In most of the CMAQ, RSTP, VDOT, and benchmark literature reviews, bridge and/or tunnel projects were included with the "Highways" projects. However, given the nature of Hampton Roads with the high number of water crossings compounded by the aging infrastructure, it was determined that bridge and/or tunnel projects should have a separate category. While the evaluation criteria are the same as those used in "Highways," the details associated with the MOEs are different. Furthermore, costs associated with structures are significantly higher than those of highways, which was another driving factor to separate "Bridge/Tunnel" from "Highways." Evaluation criteria for "Bridge/Tunnel" projects used in the proposed methodology include:

Project Utility Criteria:

- ***Congestion Level****: Existing and future levels of congestion will be captured and compared through V/C ratios obtained from the LRTP.*

- ***System Continuity and Connectivity****: This criterion will take into account the extent to which Hampton Roads is directly affected by the project, ranging from regionally as a whole to just locally within a municipality.*

- ***Cost Effectiveness****: This criterion is in the form of a ratio representing the total cost of the project per VMT, in dollars/VMT.*
- ***Existing and Future Land Use Compatibility****: This criterion examines the compatibility of the project relative to adjacent land uses. Given the wide range of documentation possible to establish compatibility, points are awarded based on documentation that has been approved by an agency's elected body (such as a Comprehensive Plan).*
- ***Safety and Security****: This criterion is based on the CCR within the project area, corrections to any existing geometric deficiencies, the extent of impact to incident management/evacuation routes, and the failure impact to traffic (volume and length of detour) if the structure fails.*
- ***Infrastructure Condition****: The "Bridge/Tunnel" infrastructure condition criterion is further refined within the category based on the type of structure. For bridge projects, this criterion is based on the Bridge Sufficiency Rating, which takes into account factors for structural condition, bridge geometry, and traffic considerations. The sufficiency rating formula is contained in the December 1995 edition of the "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges." For tunnel projects, this criterion takes into account the age of the structure, the number of years since the last major improvement (in excess of $5 million), and the current cost of repairs needed on the structure.*
- ***Modal Enhancements****: Projects are awarded points if they include any bicycle and pedestrian, transit, HOV, TDM/ITS, or intermodal accommodations and considerations.*

Project Viability Criteria:

- ***Amount of additional local match or private funding committed to the project:*** *Projects are awarded points if there are any additional local or private funds (such as private funds (e.g., Public-Private Transportation Act), tolls, or additional local matches) committed to the project beyond the required match.*
- ***Prior Commitment:*** *This criterion classifies whether a project has prior commitment such as inclusion in the LRTP.*
- ***Federal Mandates:*** *This criterion is based on whether a project is backed by federal mandates. Emergency bridge replacements, projects addressing significant existing design deficiencies, and projects with soon to expire federal funding previously allocated to the project are a few examples of federally mandated projects.*
- ***Degree of Project Readiness:*** *This criterion assesses how quickly a project could begin construction by determining whether the project has its plans complete and is ready for advertisement, whether the necessary environmental permits are complete, and whether the project is completely funded.*

Economic Vitality Criteria:

- ***Total Reduction in Travel Time:*** *This criterion is based on research suggesting that the majority of monetized benefits that result from an investment in new transportation infrastructure are a direct result of travel time savings. Travel time savings enable increased productivity, resulting in a more competitive environment for regional businesses.*

- ***Labor Market Access:*** *Increasing access to the region's labor force through improved transportation infrastructure is a critical component in providing business and industry with the access to human capital that is vital to their success. Efficient access to labor markets for residents increases efficiency, productivity, and quality of life.*

- ***Addresses the Needs of Basic Sector Industries:*** *Basic sector industries are those that bring outside dollars into the region, creating new income and additional spending power in the regional economy, thus providing the foundation of the regional economy. Increasing the competitiveness in a basic sector industry that is built on a regional competitive advantage is vital in ensuring continued success both within the basic sector industry and to the entire regional economy.*

- ***Increases Opportunity:*** *This criterion measures the ability of a project to meet the needs of jurisdictional comprehensive plans and areas that are designated as planned growth areas within the region. It also evaluates the ability of a project to develop access to new opportunities for growth.*

4.4 Project Evaluation Criteria – "Bicycle and Pedestrian"

The benchmark and literature reviews identified more than 25 different criteria pertinent to "Bicycle and Pedestrian" projects. From this list, there were five criteria which were common amongst at least three agencies *(Cost Effectiveness, Air Quality Benefits/Emissions Reduction, Additional Funding Availability, Safety,* and *System Continuity and Connectivity).* However, after observing commonalities amongst each of the researched agencies, it was determined that the following criteria would yield the most beneficial projects to the Hampton Roads region:

Project Utility Criteria:

- ***System Continuity and Connectivity****: There are four components to this criterion. The first is the extent to which Hampton Roads is directly affected by the project, ranging from regionally as a whole to just locally within a municipality. Second is whether the project would eliminate a major barrier such as crossing a busy roadway or body of water. The third component is whether the project connects to an existing bicycle or pedestrian facility. The last component takes into account how many regional destinations the project would provide access to (such as schools, commercial employment centers, recreation facilities, or high density residential areas).*

- ***Safety****: This criterion awards points to projects based on the number of crashes that have occurred between vehicles and pedestrians or bicycles in the last three years as well as to projects that will address an existing safety concern.*
- ***Cost Effectiveness****: This criterion is in the form of a ratio representing the total cost of the project per population served within a 1.5-mile radius of the project, in dollars/person.*
- ***Enhancements to Other Categories****: Projects are awarded points if they include any transit, highways/bridge/tunnel, TDM/ITS, or intermodal considerations.*
- ***Existing and Future Land Use Compatibility****: This criterion examines the compatibility of the project relative to adjacent land uses. Given the wide range of documentation possible to establish compatibility, points are awarded based on documentation that has been approved by an agency's elected body (such as a Comprehensive Plan).*

Project Viability Criteria:

- ***Amount of additional local match or private funding committed to the project:*** *Projects are awarded points if there are any additional local or private funds (such as private funds (e.g., Public-Private Transportation Act) or additional local matches) committed to the project beyond the required match.*
- ***Prior Commitment:*** *This criterion classifies whether a project has prior commitment such as inclusion in a comprehensive plan.*
- ***Federal Mandates:*** *This criterion is based on whether a project is backed by federal mandates. Emergency bridge replacements, projects addressing significant existing design deficiencies, and projects with soon to expire federal funding previously allocated to the project are a few examples of federally mandated projects.*
- ***Degree of Project Readiness:*** *This criterion assesses how quickly a project could begin construction by determining whether the project has its plans complete and is ready for advertisement, whether the necessary environmental permits are complete, and whether the project is completely funded.*

CMAQ funds are one source of funding for bicycle and pedestrian projects. HRTPO's CMAQ scoring process has been well-accepted among the member localities.

4.5 Project Evaluation Criteria – "Systems Management/Transportation Demand Management/Operational Improvements"

Under this category, there is a widespread range of project types, with each having numerous criteria associated with it. It was generally observed through the literature reviews that "Systems Management" and "Operational Improvement" projects have similar attributes common amongst at least two agencies

(Improvements to Peak Hour Traffic Flow, Air Quality/Emissions Reduction, Additional Funding Availability, Mobility/Accessibility, Improvements to Various Operating Agencies, Component of the Regional ITS Plan, and *Safety)*. However for "TDM" projects, the literature reviews revealed that these project types required a unique set of criteria including *Number of Employers Offering TDM Programs, Percent of Employees Ridesharing, Percent of Employees Walking/Biking, Parking Management,* and *Vehicle Occupancy Rates,* which are not easily applied to the other projects. Therefore, it was decided that "TDM" projects would have additional criteria, applicable to only those projects. This would allow some overlap in the overall category with "TDM" projects requiring one additional step to determine an overall score. The exact weighting within this category will be discussed in more detail in Chapter 5. The final approved criteria for "Systems Management/TDM/Operational Improvements" projects are as follows:

Project Utility Criteria:

- ***Congestion Level****: This criterion represents the existing congestion level only within the area the project serves, as classified in the LRTP (low, moderate, or severe).*
- ***Cost Effectiveness****: This criterion is in the form of a ratio representing the total cost savings per user of the project per dollar spent of the total cost.*
- ***Air Quality****: This criterion is based on the total amount of emissions (tons of VOC and NOx) reduced if the project is constructed.*
- ***Safety:*** *Projects are awarded points if they improve an evacuation or incident management route, include emergency preemption or incident detection, or reduce the number of crashes.*
- ***Regional Significance****: Projects are awarded points if they address mobility or accessibility needs of the Hampton Roads region, improve communications among various operating agencies, or are part of the Regional ITS Strategic Plan.*
- ***Enhancements to Other Categories:*** *Projects are awarded points if they include any transit, highways/bridge/tunnel, bicycle and pedestrian, or intermodal accommodations and considerations.*

Project Utility Criteria for "TDM" Projects *Only*:

- ***Employers Offering* TDM *Programs****: This criterion represents the number of additional employers offering TDM programs if the project is implemented.*
- ***Employee Ridesharing Participation****: This criterion represents the percentage of employees who would participate in ridesharing initiatives if the project is implemented.*
- ***Employee Walk/Bike Participation****: This criterion represents the percentage of employees who would walk or bike to work instead of using a POV if the project is implemented.*
- ***Parking Management****: This criterion awards points to projects which will incorporate parking management initiatives.*

Project Viability Criteria:

- ***Amount of additional local match or private funding committed to the project:*** *Projects are awarded points if there are any additional local or private funds (such as private funds (e.g., Public-Private Transportation Act), tolls, or additional local matches) committed to the project beyond the required match.*

- ***Prior Commitment:*** *This criterion classifies whether a project has prior commitment such as inclusion in an official document.*

- ***Federal Mandates:*** *This criterion is based on whether a project is backed by federal mandates. Emergency bridge replacements, projects addressing significant existing design deficiencies, and projects with soon to expire federal funding previously allocated to the project are a few examples of federally mandated projects.*

- ***Degree of Project Readiness:*** *This criterion assesses how quickly a project could begin construction by determining whether the project has its plans complete and is ready for advertisement, whether the necessary environmental permits are complete, and whether the project is completely funded.*

4.6 Project Evaluation Criteria – "Transit"

More than 35 unique evaluation criteria were identified throughout the literature reviews for "Transit" projects. From the criteria list, there were five criteria which were common amongst at least three agencies *(Cost Effectiveness, Air Quality Benefits, Traffic Congestion Relief, Additional Funding Availability,* and *Usage/Ridership).* Through discussions with HRT and WATA, additional criteria were discussed to provide consistency with the federal guidelines outlined specifically for transit *(User Benefit, Land Use Compatibility,* and *Enhancements to other Categories).* The following criteria were chosen to be the most critical in evaluating all types of "Transit" projects:

Project Utility Criteria:

- ***Usage****: For new projects this criterion is based on the estimated proposed ridership to result from the project, whereas existing projects are based on the existing ridership of the project.*

- ***System Continuity and Connectivity****: This criterion will take into account the extent to which Hampton Roads is directly affected by the project, ranging from regionally as a whole to just locally within a municipality, as well as the extent to which the project will improve access to freight distribution facilities, ports, major industrial clients, or employment and population centers.*

- ***User Benefit****: This criterion is in the form of a ratio representing the annual travel time savings per annual rider, in hours/person.*

- ***Existing and Future Land Use Compatibility****: This criterion examines the compatibility of the project relative to adjacent land uses. Given the wide range of documentation possible to establish compatibility, points are awarded based on documentation that has been approved by an agency's elected body (such as a Comprehensive Plan).*
- ***Cost Effectiveness****: This criterion is in the form of a ratio representing the total annualized cost of the project per user (annual riders), in dollars/person.*
- ***Air Quality****: This criterion is based on the total amount of emissions (VOC and NOx) reduced if the project is constructed, in tons.*
- ***Enhancements to Other Categories****: Projects are awarded points if they include any TDM/ITS, highways/bridge/tunnel, bicycle and pedestrian, or intermodal accommodations and considerations.*

Project Viability Criteria:

- ***Amount of additional local match or private funding committed to the project:*** *Projects are awarded points if there are any additional local or private funds (such as private funds (e.g., Public-Private Transportation Act), tolls, or additional local matches) committed to the project beyond the required match.*
- ***Prior Commitment:*** *This criterion classifies whether a project has prior commitment such as inclusion in the LRTP.*
- ***Federal Mandates:*** *This criterion is based on whether a project is backed by federal mandates. Emergency bridge replacements, projects addressing significant existing design deficiencies, and projects with soon to expire federal funding previously allocated to the project are a few examples of federally mandated projects.*
- ***Degree of Project Readiness:*** *This criterion assesses how quickly a project could begin construction by determining whether the project has received FTA approval for final design or environmental clearance.*

Economic Vitality Criteria:

- ***Labor Market Access:*** *Increasing access to the region's labor force through improved transportation infrastructure is a critical component in providing business and industry with the access to human capital that is vital to their success. Efficient access to labor markets for residents increases efficiency, productivity, and quality of life.*
- ***Addresses the Needs of Basic Sector Industries:*** *Basic sector industries are those that bring outside dollars into the region, creating new income and additional spending power in the regional economy, thus providing the foundation of the regional economy. Increasing the competitiveness*

in a basic sector industry that is built on a regional competitive advantage is vital in ensuring continued success both within the basic sector industry and to the entire regional economy.

- ***Increases Opportunity:*** *This criterion measures the ability of a project to meet the needs of jurisdictional comprehensive plans and areas that are designated as planned growth areas within the region. It also evaluates the ability of a project to develop access to new opportunities for growth.*

- ***Economic Distress Factors:*** *Ensuring labor market access and increasing the opportunity for those residing in distressed areas is vital in increasing the region's economic vitality. The provision of transportation alternatives for those with limited means results in greater access to goods, services, and the labor market, thus removing barriers and improving quality of life.*

4.7 Project Evaluation Criteria – "Intermodal"

"Intermodal" projects had more than ten unique evaluation criteria identified through the literature reviews. From these, there were four which were common to multiple agencies *(Modal Enhancements/Multimodal Accommodations, Better Accommodates Intermodal Movements, Improves Rail or Vehicular Access,* and *Project Readiness/Funding Availability/Prior Commitment/Federal Mandates).* After extensive review, the following criteria were selected to evaluate "Intermodal" projects:

Project Utility Criteria:

- ***Intermodal Movement Accommodation****: This criterion is based on the conflicts created between the intermodal movements and other modes (e.g., no conflict projects such as a grade separated rail crossing, limited conflict projects involving the crossing of a low volume roadway, or full conflict projects involving the crossing of a high volume roadway).*

- ***Access Improvements (Rail or Vehicular)****: Points are awarded to projects which improve access to freight distribution facilities, airports/seaports, major industrial clients, employment and population centers, or rail stations/terminals based on the regional impact of the access.*

- ***Cost Effectiveness:*** *A detailed MOE for this evaluation criterion has not been developed at this point. The Steering Committee will continue to work closely with the VPA to develop an appropriate MOE.*

- ***Enhancements to Other Categories****: Projects are awarded points if they include any TDM/ITS, highways/bridge/tunnel, bicycle and pedestrian, or transit considerations.*

Project Viability Criteria:

- ***Amount of additional local match or private funding committed to the project:*** *Projects are awarded points if there are any additional local or private funds (such as private funds (e.g., Public-Private Transportation Act), tolls, or additional local matches) committed to the project beyond the required match.*

- ***Prior Commitment:*** *This criterion classifies whether a project has prior commitment such as inclusion in the LRTP.*

- ***Federal Mandates:*** *This criterion is based on whether a project is backed by federal mandates. Emergency bridge replacements, projects addressing significant existing design deficiencies, and projects with soon to expire federal funding previously allocated to the project are a few examples of federally mandated projects.*

- ***Degree of Project Readiness:*** *This criterion assesses how quickly a project could begin construction by determining whether the project has its plans complete and is ready for advertisement, whether the necessary environmental permits are complete, and whether the project is completely funded.*

Economic Vitality Criteria:

- ***Total Reduction in Travel Time:*** *This criterion is based on research suggesting that the majority of monetized benefits that result from an investment in new transportation infrastructure are a direct result of travel time savings. Travel time savings enable the more efficient movement of freight, resulting in increased productivity and a more competitive environment for regional businesses.*

- ***Labor Market Access:*** *Increasing access to the region's labor force through improved transportation infrastructure is a critical component in providing business and industry with the access to human capital that is vital to their success. Efficient access to labor markets for residents increases efficiency, productivity, and quality of life.*

- ***Impact on Truck Movement:*** *As truck movement is an integral component of intermodal projects, it is imperative to reduce congestion and improve the flow of traffic on freight corridors. Reducing the travel time on roadways with high volumes reduces the economic choke points associated with intermodal movement.*

- ***Improves Interaction between Modes of Travel:*** *An improved system of transfer between modes of transportation improves efficiency and productivity for businesses throughout the region. This criterion measures the ability of a new project to aid the transition between modes of travel in the region, including rail, airports, and seaports.*

- ***Increases Opportunity:*** *This criterion measures the ability of a project to meet the needs of jurisdictional comprehensive plans and areas that are designated as planned growth areas within the region. It also evaluates the ability of a project to develop access to new opportunities for growth.*

4.8 Application of Categories

The primary reason for the development of this prioritization methodology was to assist in creating a tool for use in the LRTP development. However, it also was an opportunity to examine prioritization, in its many forms, from around the country. LRTPs are designed to individually list those projects that are deemed regionally significant. The 2030 Hampton Roads LRTP made a distinction between "individually listed" and "not individually listed" projects[16]. Individually listed projects in the 2030 Hampton Roads LRTP included lane additions on highways classified as arterial and higher, bridge replacements, major interchange work, and fixed guideway transit projects. All other types of work (e.g., bike lanes, turn lanes, ITS, widening of collector and local roadways, regular bus routes, etc.) were not listed individually in the LRTP but rather were included as a group and still accounted for in the financial constraint of the 2030 LRTP. A similar concept and definition of "individual" versus "grouped" projects is being used for the 2034 LRTP, currently in development.

The "Highways," "Bridge/Tunnel," "Transit" (specifically fixed guideway), and "Intermodal" categories fit well with the types of projects which are individually listed in the LRTP. The "Bicycle and Pedestrian" and "Systems Management/TDM/Operational Improvements" types of projects would generally fall into the grouped project category, meaning that these two categories of the tool would not be used in the LRTP development. However, the CMAQ and RSTP processes already in use by HRTPO are well-accepted by its member organizations and are commonly used for "Bicycle and Pedestrian" projects and the "Systems Management/TDM/Operational Improvements" types of projects. The initial research and validation of all categories of projects as a part of this prioritization task will certainly be instructive as the tool evolves and requires revisions.

[16] "Hampton Roads 2030 Long-Range Transportation Plan", December 2007, page 72 describes the definition of "listed" and "non-listed" projects.

5. Evaluation Criteria Weighting Development

With the development of the categories and evaluation criteria complete, the next challenge was to determine the relative importance of each evaluation criterion within each of the six categories. The importance of each evaluation criterion is dependent on the current regional vision and availability of funding. Understanding that these weights are subjective in nature, it is anticipated that they may be modified in the future to address different regional priorities. The important goal in this methodology was to ensure that even though the importance of any given factor is subjective, the final weighting factors were approved by the TTAC and HRTPO Board.

5.1 Evaluation Criteria Weighting Process

From the various literature reviews conducted for this project, the most common weighting process observed was an independent, 100-point cumulative scale within each individual category. In this process, each project starts with zero points and is then awarded points from each evaluation criterion, which together constitutes a maximum of 100 points. Because the scale is out of 100 points, each evaluation criterion's point value is equivalent to its weighting percentage. Therefore, if Evaluation Criterion A is worth 30 points and Evaluation Criterion B is worth 15 points, then Evaluation Criterion A is twice as important as Evaluation Criterion B.

Through discussions with the Steering Committee, TTAC, TAC, and HRTPO Board, it was determined that each project has three distinct traits—utility, viability, and economic vitality. By using just a single 100-point scale inclusive of all three traits, it is possible that the overall significance of each trait could become diluted. Since each trait has a different importance depending on which questions the user is trying to answer, it may sometimes be preferable to select a project with high utility that may not be viable or to select a viable project that does not achieve a high utility. For example, when developing a LRTP with a 20-year timeframe, a project's utility is paramount; however, to maximize the use of current funding opportunities, project viability takes on greater importance. Furthermore, if two projects provide similar utility and are both viable, the deciding factor may be impacts associated with economic vitality.

Therefore, a three-part scoring process was developed which separately considers project utility, project viability, and economic vitality. Each of these traits is evaluated using a 100-point, cumulative scale; however, the totals are independent of each other and are not added together. Letter grades were then assigned to both the project viability and economic vitality scores. This configuration provides policy makers with a parallel analysis by which they can evaluate how viable projects with high utility scores actually are and how they may influence the economic vitality of the region.

The utility score is an *independent*, 100-point cumulative scale, meaning that each project has equal potential to receive the maximum points for each utility evaluation criterion. In this methodology, there are no relative scales (best project gets "X" points, and the next best project gets "X-1" points, etc.). If a project has the ability to earn the maximum amount of points, then it will be allowed to do such. This

approach allows projects to be easily evaluated and scored within a specific category without having to reevaluate previous projects.

In order to determine initial point allocations/weighting factors, both technical and non-technical stakeholders were asked a series of questions using an online survey site, Survey Monkey, to provide input. Two separate versions of the survey were administered: a technical version for Steering Committee and TTAC members and a public version for the general public and elected officials. Both versions required detailed input on the categories and primary criteria while the technical version required additional detailed input on the subcriteria.

Since conducting the survey, however, certain evaluation criteria have been added and removed based on HRTPO Board input along with the ability to obtain valid data and the capability of criteria to differentiate a project's utility within a category. Therefore, the results depicted in this chapter and in **Appendices E1 and E2** reflect preliminary recommendations from the surveys and will not coincide exactly with the final approved evaluation criteria detailed in Chapter 4. As noted frequently within this document, the refinement process will continue throughout the life of this project as regional visions, priorities, and individual characteristics of the projects being evaluated change and evolve. Weighting factor adjustments based on changes in evaluation criteria were established through discussions with HRTPO staff and were approved by both the TTAC and HRTPO Board.

5.2 Technical Weighting Factor Survey Process and Results

The Technical Weighting Factor Survey (TWFS) was structured into 36 questions and was administered online to all members of the Steering Committee and TTAC and additional individuals recommended by the Steering Committee. The first six questions helped to understand the respondent's commuting habits. These questions prompted the respondent for the agency they represent, how long they have lived in Hampton Roads, the transportation modes they use and how often, how long their typical one-way commute was on average (by length and time), and which bridges and/or tunnels are crossed on their typical daily commute. The remaining 30 questions were specific to the weighting factors for each of the six categories. For each category, the first question was asked to determine relative importance of the criteria within the category. For each individual evaluation criterion, the respondent had to provide a rating on a scale from one to five with one being "Very Important," two being "Somewhat Important," three being "Neutral," four being "Somewhat Not Important," and five being "Not at All Important." This question was critical as it would serve as a validation aid for the questions to follow, which were quantitative in nature. Subsequent questions prompted the participant to provide a quantitative response, rating each criterion's importance on a scale between one and 100, with the grand total of all criteria summing to exactly 100.

A summary of technical survey results is presented in **Appendix E1**, while detailed technical survey results are presented in **Appendix E2**.

5.3 Public Weighting Factor Survey and Results

While the initial focus of the project was from a technical approach, the HRTPO Board directed that a public outreach effort, similar to that of the technical effort, be performed. Therefore, the Steering Committee suggested that a public version of the Weighting Factor Survey be developed with less technical dialogue and less detailed input on subcriteria. This version is referred to as the Public Survey. The primary goal was to gather public thoughts and opinions on the relative importance of evaluation criteria and potential weighting factors. The Public Survey also had a secondary goal of increasing awareness about transportation planning processes and HRTPO's roles and responsibilities.

The Public Survey mirrored the Technical Survey and included explanatory information about the process and key definitions of important terminology. Nearly 900 surveys were completed out of approximately 1,300 started. The Steering Committee compared the results of both the Technical and Public versions when determining appropriate weighting factors. **Tables 2 through 7** provide a summary of the results from both surveys.

Due to the numerous comments received during the Public Survey, the HRTPO, in coordination with subject-matter experts at Christopher Newport University and the Hampton Roads Center for Civic Engagement, conducted a series of focus groups during March 2010. The focus groups helped gather feedback regarding transportation priorities from area residents and will complement the future LRTP processes as well as augment HRTPO's efforts to inform, increase awareness, and engage all of Hampton Roads' interested parties.

HIGHWAYS		
Evaluation Criteria	**Response Average (Technical Survey)**	**Response Average (Public Survey)**
Congestion Level	18%	24%
System Continuity and Connectivity	14%	12%
Cost Effectiveness	12%	12%
Land Use Compatability	12%	10%
Safety and Security	12%	11%
Infrastructure (Pavement) Condition	9%	11%
Modal Enhancements	9%	6%
Project Progress	8%	6%
Air Quality / Emissions Reduction	6%	8%

Table 2 - Technical and Public Survey Results for "Highways" Projects

BRIDGE/TUNNEL		
Evaluation Criteria	**Response Average (Technical Survey)**	**Response Average (Public Survey)**
Congestion Level	19%	25%
Infrastructure Condition (Bridge Sufficiency Rating or Tunnel Condition)	18%	11%
System Continuity and Connectivity	12%	11%
Safety and Security	9%	11%
Cost Effectiveness	10%	11%
Land Use Compatability	10%	10%
Modal Enhancements	8%	6%
Project Progress	7%	6%
Air Quality / Emissions Reduction	6%	8%

Table 3 - Technical and Public Survey Results for "Bridge/Tunnel" Projects

BICYCLE AND PEDESTRIAN		
Evaluation Criteria	**Response Average (Technical Survey)**	**Response Average (Public Survey)**
System Continuity and Connectivity	25%	17%
Safety	23%	26%
Cost Effectiveness	17%	21%
Enhances Other Categories	13%	11%
Project Progress	11%	8%
Air Quality / Emissions Reduction	11%	17%

Table 4 - Technical and Public Survey Results for "Bicycle and Pedestrian" Projects

SYSTEMS MANAGEMENT, TDM, OPERATIONAL IMPROVEMENTS		
Evaluation Criteria	**Response Average (Technical Survey)**	**Response Average (Public Survey)**
Congestion Level	19%	28%
Cost Effectiveness	17%	16%
Air Quality / Emissions Reduction	17%	12%
Safety	14%	14%
Regional Significance	15%	13%
Project Progress	9%	8%
Enhances Other Categories	9%	10%

Table 5 - Technical and Public Survey Results for "Systems Management/Transportation Demand Management/Operational Improvements" Projects

TRANSIT		
Evaluation Criteria	**Response Average (Technical Survey)**	**Response Average (Public Survey)**
Existing Usage and/or Prospective Ridership and Coverage Area / Population Served	19%	14%
System Continuity and Connectivity	18%	13%
Land Use Compatability	12%	13%
User Benefit	13%	16%
Cost Effectiveness	14%	16%
Air Quality / Emissions Reduction	9%	11%
Enhances Other Categories	8%	9%
Project Progress	6%	7%

Table 6 - Technical and Public Survey Results for "Transit" Projects

INTERMODAL		
Evaluation Criteria	**Response Average (Technical Survey)**	**Response Average (Public Survey)**
Better Accomodates Intermodal Movements	26%	24%
Improves Rail/Vehicular Access	27%	26%
Cost Effectiveness	22%	22%
Project Progress	12%	12%
Enhances Other Categories	13%	17%

Table 7 - Technical and Public Survey Results for "Intermodal" Projects

As can be seen in the preceding tables, the results from the technical and public surveys are very similar, serving to increase the confidence in the overall results of both surveys.

5.4 Weighting Factor Development and Final Approval

Results were compiled and organized for both the technical and public versions of the survey and served as the basis of discussion during an interactive workshop between VDOT, Kimley-Horn, and the Steering Committee to establish initial, consensus-based weighting factors. Given the changes in categories and criteria since the workshop, the draft weighting factors have been further refined through an iterative process illustrated in **Figure 7** below.

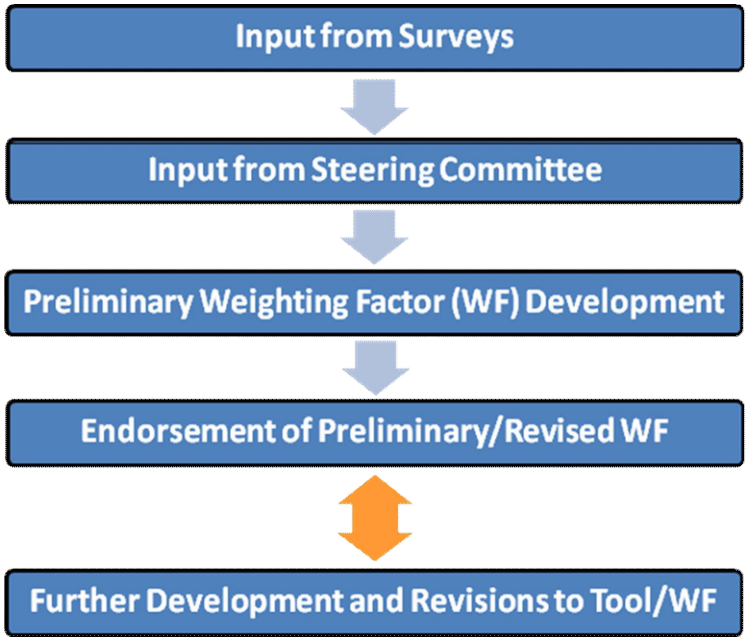

Figure 7 - Iterative Weighting Factor Refinement Process

The final approved evaluation criteria and weighting factors for each project category are summarized in **Figures 8 through 13** below.

"Highways" Weighting Factors	
Criteria and *Subcriteria*	**Weighting**
PROJECT UTILITY	
Congestion Level:	**30.0**
% Reduction in Existing and Future V/C Ratios	*10.0*
Existing V/C Ratio	*10.0*
Impact to Nearby Roadways	*10.0*
System Continuity and Connectivity	**25.0**
Safety and Security:	**10.0**
Critical Crash Ratio	*4.0*
Improvement to Geometric Deficiencies	*3.0*
Improvements to Incident Management or Evacuation Routes	*3.0*
Cost Effectiveness (Cost/VMT)	**15.0**
Land Use/Future Development Compatibility	**10.0**
Modal Enhancements:	**5.0**
Enhances Other Categories	*3.0*
Improves Vehicular Access	*2.0*
Infrastructure (Pavement) Condition	**5.0**
PROJECT UTILITY TOTAL	***100.0***
PROJECT VIABILITY	
Additional Funding	**40.0**
Prior Commitment	**10.0**
Federal Mandates	**10.0**
Project Readiness	**40.0**
PROJECT VIABILITY TOTAL	***100.0***
ECONOMIC VITALITY	
Total Reduction in Travel Time	**30.0**
Labor Market Access:	**20.0**
Increases Travel Time Reliability	*10.0*
Increases Access for Major Employment Centers	*10.0*
Addresses the Needs of Basic Sector Industries:	**30.0**
Increases Access to Tourist Destinations	*10.0*
Increases Access for Defense Installations	*10.0*
Increases Access to Port Facilities	*10.0*
Increases Opportunity:	**20.0**
Provides New or Increased Access	*10.0*
Supports Plans for Future Growth	*10.0*
ECONOMIC VITALITY TOTAL	***100.0***

Note: Orange criteria are utility-based, blue criteria are viability-based, and green criteria are vitality based.

Figure 8 – "Highways" Project Weighting Factors

"Bridge/Tunnel" Weighting Factors	
Criteria and *Subcriteria*	**Weighting**
PROJECT UTILITY	
Congestion Level:	**30.0**
% Reduction in Existing and Future V/C Ratios	*10.0*
Existing V/C Ratio	*10.0*
Impact to Nearby Roadways	*10.0*
Infrastructure Condition (Bridge Sufficiency, Tunnel Condition, Obsolescence)	**20.0**
System Continuity and Connectivity	**10.0**
Safety and Security:	**10.0**
Critical Crash Ratio	*2.5*
Improvement to Geometric Deficiencies	*2.0*
Improvements to Incident Management or Evacuation Routes	*3.0*
Failure Impact (Impact of Detour to Alternate Crossing)	*2.5*
Cost Effectiveness (Cost/VMT)	**15.0**
Land Use/Future Development Compatibility	**10.0**
Modal Enhancements:	**5.0**
Enhances Other Categories	*1.5*
Improves Vehicular Access	*2.0*
Provides Continuous Maritime Crossing	*1.5*
PROJECT UTILITY TOTAL	***100.0***
PROJECT VIABILITY	
Additional Funding	**40.0**
Prior Commitment	**10.0**
Federal Mandates	**10.0**
Project Readiness	**40.0**
PROJECT VIABILITY TOTAL	***100.0***
ECONOMIC VITALITY	
Total Reduction in Travel Time	**30.0**
Labor Market Access:	**20.0**
Increases Travel Time Reliability	*10.0*
Increases Access for Major Employment Centers	*10.0*
Addresses the Needs of Basic Sector Industries:	**30.0**
Increases Access to Tourist Destinations	*10.0*
Increases Access for Defense Installations	*10.0*
Increases Access to Port Facilities	*10.0*
Increases Opportunity:	**20.0**
Provides New or Increased Access	*10.0*
Supports Plans for Future Growth	*10.0*
ECONOMIC VITALITY TOTAL	***100.0***

Note: Orange criteria are utility-based, blue criteria are viability-based, and green criteria are vitality based.

Figure 9 – "Bridge/Tunnel" Project Weighting Factors

"Bicycle and Pedestrian" Weighting Factors	
Criteria and *Subcriteria*	**Weighting**
PROJECT UTILITY	
System Continuity and Connectivity:	**30.0**
Regional Significance	*4.0*
Elimination of barriers to major destinations	*7.0*
Access to transit, local or regional destinations	*11.0*
Connections to Existing Bicycle/Pedestrian Facilities	*8.0*
Safety:	**30.0**
Crash History	*15.0*
Safety Improvement	*15.0*
Cost Effectiveness (Cost/Population Served in 1.5 Mile Radius)	**20.0**
Enhances Other Categories	**10.0**
Land Use/Future Development Compatibility	**10.0**
PROJECT UTILITY TOTAL	***100.0***
PROJECT VIABILITY	
Additional Funding	**40.0**
Prior Commitment	**10.0**
Federal Mandates	**10.0**
Project Readiness	**40.0**
PROJECT VIABILITY TOTAL	***100.0***

Note: Orange criteria are utility-based while blue criteria are viability-based

Figure 10 – "Bicycle and Pedestrian" Project Weighting Factors

"Systems Management, TDM, and Operational Improvement" Weighting Factors	
Criteria and *Subcriteria*	**Weighting**
PROJECT UTILITY	
Congestion Level	**30.0**
Cost Effectiveness (Travel Cost Savings/Total Cost)	**15.0**
Safety	**15.0**
Air Quality/Emissions Reduction	**15.0**
Regional Significance:	**15.0**
Addresses Mobility or Accessibility Needs of Region	*6.0*
Improves Communications Among Various Operating Agencies	*3.0*
Part of the Regional ITS Strategic Plan	*6.0*
Enhances Other Categories	**10.0**
PROJECT UTILITY TOTAL	***100.0***
TDM Projects Only:	**25.0**
Number of Employers Offering TDM Programs	*6.25*
Percent of Employees Ridesharing	*6.25*
Percent of Employees Walking/Biking	*5.0*
Parking Management	*7.5*
PROJECT VIABILITY	
Additional Funding	**40.0**
Prior Commitment	**10.0**
Federal Mandates	**10.0**
Project Readiness	**40.0**
PROJECT VIABILITY TOTAL	***100.0***

Note: Orange and purple criteria are utility-based while blue criteria are viability-based

Figure 11 – "Systems Management/Transportation Demand Management/Operational Improvements" Project Weighting Factors

"Transit" Weighting Factors	
Criteria and *Subcriteria*	**Weighting**
PROJECT UTILITY	
Existing Usage/Ridership, Coverage Area/Population	**20.0**
System Continuity and Connectivity:	**20.0**
Regional Significance	*9.0*
Improves access to employment and population centers	*11.0*
User Benefit (Annual Travel Time Savings per Rider)	**15.0**
Land Use/Future Development Compatibility	**15.0**
Air Quality/Emissions Reduction	**10.0**
Cost Effectiveness (Annualized Costs/Annual Riders)	**15.0**
Enhances Other Categories	**5.0**
PROJECT UTILITY TOTAL	***100.0***
PROJECT VIABILITY	
Additional Funding	**40.0**
Prior Commitment	**10.0**
Federal Mandates	**10.0**
Project Readiness	**40.0**
PROJECT VIABILITY TOTAL	***100.0***
ECONOMIC VITALITY	
Labor Market Access:	**45.0**
Increases Access for Major Employment Centers	*20.0*
Increases Travel Time Reliability	*10.0*
Increases Frequency of Service	*10.0*
Provides Access to Institutions of Higher Education	*5.0*
Addresses the Needs of Basic Sector Industries:	**20.0**
Provides or Improves Access for Defense Installations	*10.0*
Increases Access to Tourist Destinations	*10.0*
Increases Opportunity:	**20.0**
Provides New Access to the Network	*5.0*
Supported by Plans for Increased Density and Economic Activity	*15.0*
Economic Distress Factors:	**15.0**
Provides Access to Areas with High Unemployment	*5.0*
Provides Access to Low Income Areas	*10.0*
ECONOMIC VITALITY TOTAL	***100.0***

Note: Orange criteria are utility-based, blue criteria are viability-based, and green criteria are vitality based.

Figure 12 – "Transit" Project Weighting Factors

"Intermodal" Weighting Factors	
Criteria and *Subcriteria*	**Weighting**
PROJECT UTILITY	
Better Accommodates Intermodal Movements	**30.0**
Improves Vehicular Access	**30.0**
Cost Effectiveness	**25.0**
Enhances Other Categories	**15.0**
PROJECT UTILITY TOTAL	***100.0***
PROJECT VIABILITY	
Additional Funding	**40.0**
Prior Commitment	**10.0**
Federal Mandates	**10.0**
Project Readiness	**40.0**
PROJECT VIABILITY TOTAL	***100.0***
ECONOMIC VITALITY	
Total Reduction in Travel Time	**20.0**
Labor Market Access:	**20.0**
Increases Travel Time Reliability	*15.0*
Increases Access for Major Employment Centers	*5.0*
Impact on Truck Movement	**15.0**
Improves Interaction between Modes of Travel:	**15.0**
Increases Access to the Port	*5.0*
Improves Freight Movement by Rail	*5.0*
Increases Access to Airports	*5.0*
Increased Opportunity:	**30.0**
Provides New or Increased Access	*20.0*
Supports Plans for Future Growth	*10.0*
ECONOMIC VITALITY TOTAL	***100.0***

Note: Orange criteria are utility-based, blue criteria are viability-based, and green criteria are vitality based.

Figure 13 – "Intermodal" Project Weighting Factors

6. Measures of Effectiveness Development

MOEs are a key component of the project scoring process and are the foundation of determining scores for all three utility, viability, and economic vitality components of a project. It has become apparent that the numerous MOE refinements made throughout the development of the Program Prioritization process will continue as the process evolves in the future. When selecting appropriate MOEs for each individual evaluation criterion, the metric should be measureable and able to capture a project's fulfillment of the evaluation criterion (e.g., V/C ratios measure congestion while crash rates measure safety). Additionally, all data required must be readily available, easily manipulated, and validated by the HRTPO before incorporation in the process.

In this Project Prioritization methodology, every evaluation criterion has an MOE which is applied to each project in one of four ways:

- **Obtained MOEs**: These MOEs are obtained from the current LRTP, VDOT, and individual localities. Examples of this MOE type include LOS, average daily traffic (ADT) volumes, and crash rates. Once the data were obtained for a given MOE, thresholds were established to score the project relative to the evaluation criterion. The threshold values represent the expected range within which most, to all, projects would fall. Projects with values outside the threshold range would either receive all or none of the total points (depending on whether the value exceeds or falls short of the range) while projects within the threshold range would receive points based upon a straight-line interpolation (a percentage point system based on where a value falls within the range). The benefits of using these MOEs are their objective nature and ability to assign points on technical merit. The primary disadvantage for this MOE type is that point allocations are completely dependent on the defined threshold range, which can considerably change ultimate point allocations. Therefore, threshold evaluations must be included as part of the prioritization process and should only be revised by consensus at a technical committee meeting.

- **Calculated MOEs**: Calculated MOEs are a subset of the Obtained MOEs. These MOEs are obtained by manipulating different Obtained MOEs within an equation to generate a specific result. For example, the *Cost Effectiveness* criterion for "Highways" is determined by calculating the ratio of project cost per VMT. Similar to Obtained MOEs, these MOEs are highly objective in nature; however, threshold ranges and interpolation are used, requiring the same threshold provisions associated with Obtained MOEs.

- **Multiple Choice MOEs**: These MOEs consist of a list of quantitative or qualitative choices and are the most common MOE type used in this prioritization methodology. These MOEs do not rely on obtained or calculated numbers and can be much more subjective in nature than the two previous MOE types. However, the benefits of using this type of MOE are the ease of data acquisition and application and the ability of the user to classify similar projects within a category without becoming too data-driven (e.g., classifying roadways as either over capacity roadways, at

capacity roadways, or under capacity roadways). This MOE also is effective when there are numerous different project input values with only minor differences (narrow spread). It is then more efficient to limit the number of responses to simplify differentiating between projects. The disadvantage is that for criteria that lack empirical data, one user may interpret the choices differently from another. As with any subjective criteria, the chosen MOEs rely on user interpretation of the available choices.

- **Either/Or MOEs**: MOEs of this type include basic yes/no ("it either is or it isn't") inputs. As the simplest type, these MOEs are intended to be highly objective with empirical measures (e.g., is the project included in the current LRTP).

The following sections briefly describe the MOEs used for each evaluation criterion within each project category. For a detailed description of the MOEs, thresholds, and point allocations, please refer to **Appendix F**.

6.1 Measures of Effectiveness for Project Utility

A project's utility considers the project's ability to solve an existing transportation issue, which could be correlated to congestion, safety, infrastructure condition, or ridership. Each of the six project categories has independent evaluation criteria to assess project utility based on the perceived technical merits that that particular type of project should achieve. The evaluation criteria and accompanying MOEs for each project category are described below.

6.1.1 Project Utility Measures of Effectiveness – "Highways"

To assess a project's utility for the "Highways" category, a total of seven evaluation criteria were selected with a distinct set of MOEs for each. The seven criteria used to evaluate the utility of highway projects are as follows:

Congestion Level: Under this criterion, a project is evaluated based on both the degree of existing congestion within the project area and the project's potential to improve congestion levels after construction. In order to assess existing and future levels of congestion, three subcriteria were developed for this criterion:

- *Percent reduction of existing V/C ratios:* This subcriterion uses a Calculated MOE based upon the overall reduction between existing and projected future V/C ratios for the project area. The points awarded for this subcriterion are calculated automatically from the user-input existing V/C ratio and forecasted V/C ratio. The calculation finds the difference between the existing and future V/C ratios and then divides this difference by the existing V/C ratio to calculate the percent change. Points are then awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

- *Existing V/C ratio:* This subcriterion uses an Obtained MOE to evaluate the existing level of congestion within the project area. Points are awarded in a manner similar to a Multiple Choice MOE where if the existing V/C ratio falls within one of three identified ranges, points are awarded accordingly. This was done because small differences in V/C ratios generally do not indicate significantly different levels of congestion for a roadway (e.g., a roadway with a V/C ratio of 0.90 will seem as congested as a roadway with a V/C ratio of 0.95).

- *Impact to nearby roadways:* This subcriterion uses a Calculated MOE based on the volume of traffic that will be attracted to the project roadway from adjacent roadways as a result of construction. The points awarded for this subcriterion are calculated automatically by taking the difference between the user-input future ADT and existing ADT for the project area. Although it is understood that the difference between future and existing ADTs may include latent demand, it was assumed that this difference would be the best representation of relief on adjacent facilities. Points are then awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

***System Continuity and Connectivity*:** This evaluation criterion uses a Multiple Choice MOE to evaluate the extent to which a project will impact the overall continuity and connectivity of the region's transportation network. The user has a multiple choice selection of the level at which a project will impact continuity and connectivity: Regional, Multijurisdictional, or Local. For a project to be classified as Regional, it would have to be regionally significant with regards to connectivity and continuity and provide considerable benefit to the regional transportation system. Projects not classified as Regional may be classified as Multijurisdictional if they impact continuity and connectivity or provide benefit to at least two local jurisdictions. Projects having only local significance and providing benefit to only one local jurisdiction are classified as Local. Points are awarded accordingly for each classification. It is important to note that this criterion is not a measure of the physical project boundaries spanning separate jurisdictions (e.g., a roadway project traversing an entire city and extending into another city) but rather a measure of the project's impact to the overall roadway system connectivity for multiple jurisdictions. It also is important to note that because this criterion is not based on a tangible, statistical MOE, it can be very subjective. Therefore, decisions about how to classify a project under this criterion should be made objectively by HRTPO staff or an objective prioritization committee.

***Cost Effectiveness*:** This evaluation criterion uses a Calculated MOE to evaluate the ratio of the overall cost of the project with respect to the number of users the project will serve. The points awarded for this criterion are calculated automatically by taking the ratio of the estimated project cost divided by the 2030 VMT (both of which are user-input values). Points are then awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

***Compatibility with Existing Land Use Patterns and Future Plans and Development*:** This evaluation criterion uses a Multiple Choice MOE to assess a project's compatibility with both existing and future land uses. The user must select between three classifications for a project with points awarded accordingly:

Compatible and Officially Documented, Compatible but Not Officially Documented, and Not Compatible. For a project to be classified as Compatible and Officially Documented and receive full points, it must be compatible with both existing land use patterns and future plans (as determined by the user) and must be formally adopted by a body of elected officials, such as in the form of a comprehensive plan. A project is classified as Compatible but Not Officially Documented and receives partial points if it is compatible with existing and future land use patterns (as determined by the user) but has not been formally adopted by a body of elected officials. If a project is not compatible with existing and future land use patterns (as determined by the user), it is classified as Not Compatible and receives no points.

***Safety and Security*:** Under this criterion, a project is evaluated based on its impact to evacuation/incident management routes and its potential to improve safety. In order to assess safety and security impacts, three subcriteria were developed for this criterion:

- *Critical Crash Ratio:* This subcriterion uses a Calculated MOE based upon the CCR for the project area. The CCR is calculated by taking the ratio of the actual crash rate for the project area to the average jurisdictional crash rate for where the project resides. The actual crash rate for the project area is a calculated value based on the user input of project length, existing ADT, and total crashes in the past three years. Using these values, the actual crash rate is calculated in number of crashes per million VMT. The average jurisdictional crash rate is a user-input value and is obtained from the Department of Motor Vehicles. Points awarded for this subcriterion are calculated automatically based on the CCR according to the designated threshold range with straight-line interpolation for values falling within the range.

- *Improvement of Geometric Deficiencies:* This subcriterion uses a Multiple Choice MOE to determine the extent to which a project will improve existing geometric deficiencies. Geometric deficiencies are generally defined as physical roadway features that do not meet current design standards. Common geometric deficiencies include horizontal and vertical curvature, sight distance limitations, lane/shoulder widths, clear zone requirements, and multimodal conflicts. The user has a multiple choice selection of the number of geometric deficiencies a project will eliminate.

- *Improvement to Incident Management or Evacuation Routes:* This subcriterion uses an Either/Or MOE to classify whether a project will improve incident management or evacuation routes within the region. A “Yes” is entered for this subcriterion only if a project will improve an established and documented incident management or evacuation route and then full points are awarded; otherwise, a “No” is entered and no points are awarded.

***Infrastructure Condition*:** This evaluation criterion uses an Obtained MOE called the CCI to evaluate the existing pavement conditions within the project area; however, points are awarded in a Multiple Choice MOE fashion. The CCI is a numerical value assigned to a roadway to describe its physical condition. Points are assigned to projects based on five pre-established ranges.

***Modal Enhancements*:** Under this criterion, a project is evaluated based on its impact to other modes of transportation aside from personal vehicles. In order to assess modal enhancements, two subcriteria were developed for this criterion:

- *Improving vehicular access to freight distribution facilities, ports, major industrial clients, or employment and population centers:* This subcriterion uses a Multiple Choice MOE to determine the extent to which a project will improve existing access to freight distribution facilities, ports, etc. The user must choose between three classifications: Yes and Regional, Yes but Not Regional, or No. For a project to be classified as Yes and Regional and receive full points, it must improve vehicular access to one of the following: seaport, airport, military facility, connections between jurisdictions, or connections between major industrial/employment centers. If a project will improve vehicular access but will not include one of the regional facilities mentioned above, then it is classified as Yes but Not Regional and receives partial points. If the project does not improve access to any of these types of facilities, it should be classified as No and receives no points.

- *Enhances Other Categories:* This subcriterion uses a Multiple Choice MOE to classify the degree to which a project will enhance other project categories. Enhancement to other categories could include the installation of bus shelters ("Transit" enhancement), installation of sidewalks or bike paths ("Bicycle and Pedestrian" enhancement), improvement to a water crossing ("Bridge/Tunnel" enhancement), the implementation of a TDM initiative or ITS improvement ("Systems Management/TDM/Operational Improvements" enhancement), or an improvement to intermodal movements ("Intermodal" enhancement). The user has a multiple choice selection of how many enhancements are included (None, One, Two, or Three or More), and points are allocated accordingly.

6.1.2 Project Utility Measures of Effectiveness – "Bridge/Tunnel"

To assess a project's utility for the "Bridge/Tunnel" category, a total of seven evaluation criteria were selected with a distinct set of MOEs for each. The seven criteria used to evaluate bridge/tunnel projects are as follows:

Congestion Level: Under this criterion a project is evaluated based on both the degree of existing congestion within the project area and the project's potential to improve congestion levels after construction. To assess existing levels of congestion and future improvement, three subcriteria were developed for this criterion:

- *Percent reduction of existing V/C ratios:* This subcriterion uses a Calculated MOE based upon the overall reduction between existing and projected future V/C ratios. The points awarded for this subcriterion are calculated automatically from the user-input existing V/C ratio and forecasted V/C ratio. The calculation finds the difference between the existing and future V/C ratios and then divides this difference by the existing V/C ratio to calculate the percent change. Points are then

awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

- *Existing V/C ratio:* This subcriterion uses an Obtained MOE to evaluate the existing level of congestion within the project area. Points are awarded in a manner similar to a Multiple Choice MOE where if the existing V/C ratio falls within one of three identified ranges, points are awarded accordingly. This was done because small differences in V/C ratios generally do not indicate significantly different levels of congestion for a roadway (e.g., a roadway with a V/C ratio of 0.90 will seem as congested as a roadway with a V/C ratio of 0.95).

- *Impact to nearby roadways:* This subcriterion uses a Calculated MOE based on the volume of traffic that will be attracted to the project roadway from adjacent roadways as a result of construction. The points awarded for this subcriterion are calculated automatically by taking the difference between the user-input future ADT and existing ADT for the project area. Although it is understood that the difference between future and existing ADTs may include latent demand, it was assumed that this difference would be the best representation of relief on adjacent facilities. Points are then awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

Infrastructure Condition: Under this criterion, a project is evaluated based on the existing condition of the bridge or tunnel infrastructure. To assess infrastructure conditions, two subcriteria were developed for this criterion (one for bridges and one for tunnels):

- *Bridge Sufficiency Rating (**bridges only**):* This subcriterion uses an Obtained MOE called the Bridge Sufficiency Rating (BSR) to evaluate the existing structural condition of the bridge; however, points are awarded in a Multiple Choice MOE manner. The BSR is a nationwide program that assesses bridges based on a 0 to 100 scale with ratings of less than 50 indicating structures in poor condition. The BSR allocates points using three ranges, with similarly ranged projects being awarded the same number of points.

- *Tunnel Condition (**tunnels only**):* This subcriterion is essentially a series of three Either/Or MOEs to assess the existing structural condition of a tunnel facility. Points are awarded cumulatively for answering "Yes" to each of the three following questions:

    - Is the tunnel more than 40 years old?
    - Was the last major repair more than 20 years ago?
    - Is the estimated cost of necessary repairs greater than $10 million, or has the facility never had a major repair?

***System Continuity and Connectivity*:** This evaluation criterion uses a Multiple Choice MOE to evaluate the extent to which a project will impact the overall continuity and connectivity of the region's transportation

network. The user has a multiple choice selection of the level at which a project will impact continuity and connectivity: Regional, Multijurisdictional, or Local. For a project to be classified as Regional, it would have to be regionally significant with regards to connectivity and continuity and provide considerable benefit to the regional transportation system. A project not classified as Regional may be classified as Multijurisdictional if it impacts continuity and connectivity for or provides benefit to at least two local jurisdictions. A project having only local significance and providing benefit to only one local jurisdiction is classified as Local. Points are awarded accordingly for each classification. It is important to note that this criterion is not a measure of the physical project boundaries spanning separate jurisdictions (e.g., a bridge project extending between two cities) but rather a measure of the project's impact to the overall system connectivity for multiple jurisdictions. It also is important to note that because this criterion is not based on a tangible, statistical MOE, it can be very subjective. Therefore, decisions about how to classify a project under this criterion should be made objectively by HRTPO staff or an objective prioritization committee.

***Safety and Security*:** Under this criterion, a project is evaluated based on its impact to evacuation/incident management routes and its potential to improve safety. In order to assess safety and security impacts, four subcriteria were developed for this criterion:

- *CCR:* This subcriterion uses a Calculated MOE based upon the CCR for the project area. The CCR is calculated by taking the ratio of the actual crash rate for the project area to the average jurisdictional crash rate for where the project resides. The actual crash rate for the project area is a calculated value based on the user inputs of project length, existing ADT, and total crashes in the past three years. Using these values, the actual crash rate is calculated in number of crashes per million VMT. The average jurisdictional crash rate is a user-input value and is obtained from the Department of Motor Vehicles. Points awarded for this subcriterion are calculated automatically based on the CCR according to the designated threshold range with straight-line interpolation for values falling within the range.

- *Improvement of Geometric Deficiencies:* This subcriterion uses a Multiple Choice MOE to determine the extent to which a project will improve existing geometric deficiencies. Geometric deficiencies are generally defined as physical roadway features that do not meet current design standards. Common geometric deficiencies include horizontal and vertical curvature, sight distance limitations, lane/shoulder widths, clear zone requirements, and multimodal conflicts. The user has a multiple choice selection of the number of geometric deficiencies a project will eliminate.

- *Improvement to Incident Management or Evacuation Routes:* This subcriterion uses an Either/Or MOE to classify whether a project will improve incident management or evacuation routes within the region. A "Yes" is entered for this subcriterion only if a project will improve an established and documented incident management or evacuation route and then full points are awarded; otherwise, a "No" is entered and no points are awarded.

- *Diversion Impact Due to Failure:* This subcriterion uses an Obtained MOE to measure the impact on the region if a bridge or tunnel fails or is temporarily impassable. Although this is a distinct numerical value, points are awarded in a manner similar to a Multiple Choice MOE. This subcriterion divides the range of possible values into three segments and awards the same number of points for all values falling within the same segment. Diversion impact is measured by the daily VMT along the required route to detour around the failed facility. This VMT is the sum of the affected ADT multiplied by the length of the required detour in miles (which must be input manually by the user) and the current daily VMT along the detour route. The intent of using VMT was to capture lengthy detours with lower traffic demand in addition to relativity short detours with high traffic demand. Based on the magnitude of the detoured VMT, the impact is categorized as Regional, Multijurisdictional, or Local.

***Cost Effectiveness*:** This evaluation criterion uses a Calculated MOE to evaluate the ratio of the overall cost of the project with respect to the number of users the project will serve. The points awarded for this criterion are calculated automatically by taking the ratio of the estimated project cost divided by the 2030 VMT (both of which are user-input values). Points are then awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

***Compatibility with Existing Land Use Patterns and Future Plans and Development*:** This evaluation criterion uses a Multiple Choice MOE to assess a project's compatibility with both existing and future land uses. The user must select between three classifications for a project with points awarded accordingly: Compatible and Officially Documented, Compatible but Not Officially Documented, and Not Compatible. For a project to be classified as Compatible and Officially Documented and receive full points, it must be compatible with both existing land use patterns and future plans (as determined by the user) and must be formally adopted by a body of elected officials, such as in the form of a comprehensive plan. A project is classified as Compatible but Not Officially Documented and receives partial points if it is compatible with existing and future land use patterns (as determined by the user) but has not been formally adopted by a body of elected officials. If a project is not compatible with existing and future land use patterns (as determined by the user), it is classified as Not Compatible and receives no points.

***Modal Enhancements*:** Under this criterion, a project is evaluated based on its impact to other modes of transportation aside from personal vehicles. In order to assess modal enhancements, three subcriteria were developed for this criterion:

- *Improving vehicular access to freight distribution facilities, ports, major industrial clients, or employment and population centers:* This subcriterion uses a Multiple Choice MOE to determine the extent to which a project will improve existing access to freight distribution facilities, ports, etc. The user must choose between three classifications: Yes and Regional, Yes but Not Regional, or No. For a project to be classified as Yes and Regional and receive full points, it must improve vehicular access to one of the following: seaport, airport, military facility, connections between jurisdictions, or connections between major industrial/employment centers. If a project will

improve vehicular access but will not include one of the regional facilities mentioned above, then it is classified as Yes but Not Regional and receives partial points. If the project does not improve access to any of these types of facilities, it should be classified as No and receives no points.

- *Enhances Other Categories:* This subcriterion uses a Multiple Choice MOE to classify the degree to which a project will enhance other project categories. Enhancement to other categories could include the installation of bus shelters ("Transit" enhancement), installation of sidewalks or bike paths ("Bicycle and Pedestrian" enhancement), inclusion of HOV service ("Highways" enhancement), the implementation of a TDM initiative or ITS improvement ("Systems Management/TDM/Operational Improvements" enhancement), or an improvement to intermodal movements ("Intermodal" enhancement). The user has a multiple choice selection of how many enhancements are included (None, One, Two, or Three or More), and points are allocated accordingly.

- *Continuous maritime crossing:* This subcriterion uses an Either/Or MOE to classify whether a project will provide uninterrupted maritime crossing. A "Yes" is entered for this subcriterion only if the project will provide new uninterrupted maritime crossings (e.g., an elevated fixed-span bridge) and then full points are awarded; otherwise, a "No" is entered and no points are awarded. If a facility already provides this attribute, full points are awarded.

6.1.3 Project Utility Measures of Effectiveness – "Bicycle and Pedestrian"

To assess a project's utility for the "Bicycle and Pedestrian" category, a total of five evaluation criteria were selected with a distinct set of MOEs for each. The five criteria used to evaluate bicycle and pedestrian projects are as follows:

***System Continuity and Connectivity*:** Under this criterion, a project is evaluated based on its impact to the connectivity and continuity of the greater Hampton Roads network of bicycle and pedestrian facilities. To assess system continuity and connectivity, four subcriteria were developed for this criterion:

- *Regional Significance:* This subcriterion uses a Multiple Choice MOE to evaluate the extent to which a project will impact bicycle and/or pedestrian facilities in the region. The user has a multiple choice selection of the level at which a project will impact continuity and connectivity: Regional, Multijurisdictional, or Local. For a project to be classified as Regional, it would have to be regionally significant with regards to connectivity and continuity and provide considerable benefit to the regional bicycle/pedestrian system. A project not classified as Regional may be classified as Multijurisdictional if it impacts continuity and connectivity for or provides benefit to at least two local jurisdictions. A project having only local significance and providing benefit to only one local jurisdiction is classified as Local. Points are awarded accordingly for each classification. It is important to note that this criterion is not a measure of the physical project boundaries spanning separate jurisdictions (e.g., a bike path project traversing an entire city and extending into another city) but rather a measure of the project's impact to the overall bicycle/pedestrian system

connectivity for multiple jurisdictions. It also is important to note that because this criterion is not based on a tangible, statistical MOE, it can be very subjective. Therefore, decisions about how to classify a project under this criterion should be made objectively by HRTPO staff.

- *Elimination of barriers or completion of gaps across major barriers:* This subcriterion uses an Either/Or MOE to classify whether a project will eliminate barriers or will complete gaps across major barriers in the bicycle/pedestrian network. For example, will the project provide a crossing of a major arterial or water crossing, or will it move bicycle and pedestrian paths away from the roadway? The project description must describe the barrier being eliminated such that the evaluation committee may assess if the proposed facility is actually a major barrier. A "Yes" is entered for this subcriterion only if a project will eliminate at least one barrier or complete at least one gap and then full points are awarded; otherwise, a "No" is entered and no points are awarded.

- *Connection of existing bicycle and pedestrian facilities:* This subcriterion uses an Either/Or MOE to classify whether a project will connect existing bicycle and pedestrian facilities. A "Yes" is entered for this subcriterion only if a project will connect at least two existing bicycle and pedestrian facilities and then full points are awarded; otherwise, a "No" is entered and no points are awarded.

- *Project provides access to transit, local, or regional destinations:* This subcriterion uses a Multiple Choice MOE to classify the degree to which a project will enhance access to transit, local, or regional destinations. Examples of local or regional destinations include schools, employment centers, parks, or high density residential areas. The user has a multiple choice selection of how many destinations will have enhanced access (None, One, Two, or Three or More), and points are allocated accordingly.

***Safety*:** Under this criterion, a project is evaluated based on its potential to improve safety. In order to assess safety impacts, two subcriteria were developed for this criterion:

- *Crash history:* This subcriterion uses an Obtained MOE (average number of crashes per year during a predetermined three-year period) to measure the pedestrian and bicycle crash history within the project area. Crash data are obtained from the Department of Motor Vehicles (DMV) and are input by the user. Although the number of crashes is a distinct numerical value, points are awarded in a manner similar to a Multiple Choice MOE. This subcriterion allocates points amongst three distinct ranges. For all projects falling within the same segment, equal points are awarded.

- *Project is being completed to address an existing safety issue or concern:* This subcriterion uses an Either/Or MOE to classify whether a project will address an existing safety issue or concern. Safety remedies could include the installation of a dedicated bike lane or shifting bicycle traffic to a multiuse path located behind a curb line. Signage plans also would be considered a safety improvement. If a project will address at least one existing safety issue or concern, then a "Yes"

should be entered and full points are awarded; otherwise, a "No" is entered and no points awarded.

***Cost Effectiveness*:** This evaluation criterion uses a Calculated MOE to evaluate the ratio of the overall cost of the project with respect to the number of users the project will serve. The points awarded for this criterion are calculated automatically by taking the ratio of the estimated project cost divided by the population within a 1.5-mile radius of project (both of which are user-input values). Points are then awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

***Enhances Other Categories*:** This evaluation criterion uses a Multiple Choice MOE to classify the degree to which a project will enhance other project categories. Enhancement to other categories could include the installation of bus shelters ("Transit" enhancement), inclusion of HOV service ("Highways" enhancement), improvement to a water crossing ("Bridge/Tunnel" enhancement), the implementation of a TDM initiative or ITS improvement ("Systems Management/TDM/Operational Improvements" enhancement), or an improvement to intermodal movements ("Intermodal" enhancement). While there are a total of six overall project categories, "Bridge/Tunnel" and "Highways" are considered one enhancement for this criterion, given their similarities. Therefore, a project which enhances both "Highways" and "Bridge/Tunnel" can only receive credit for one enhancement. The user has a multiple choice selection of how many enhancements are included (None, One, Two, or Three or More), and points are allocated accordingly.

***Compatibility with Existing Land Use Patterns and Future Plans and Development*:** This evaluation criterion uses a Multiple Choice MOE to assess a project's compatibility with both existing and future land uses. The user must select between three classifications for a project with points awarded accordingly: Compatible and Officially Documented, Compatible but Not Officially Documented, and Not Compatible. For a project to be classified as Compatible and Officially Documented and receive full points, it must be compatible with both existing land use patterns and future plans (as determined by the user) and must be formally adopted by a body of elected officials, such as in the form of a comprehensive plan. A project is classified as Compatible but Not Officially Documented and receives partial points if it is compatible with existing and future land use patterns (as determined by the user) but has not been formally adopted by a body of elected officials. If a project is not compatible with existing and future land use patterns (as determined by the user), it is classified as Not Compatible and receives no points.

6.1.4 Project Utility Measures of Effectiveness – "Systems Management/TDM/ Operational Improvements"

To assess a project's utility for the "Systems Management/TDM/Operational Improvements" category, a total of six evaluation criteria were selected with a distinct set of MOEs for each. The six criteria used to evaluate "Systems Management/TDM/Operational Improvements" projects are as follows:

***Existing Congestion Level*:** This evaluation criterion uses a Multiple Choice MOE to classify the level of congestion within the project's impact area. The user must select between three classifications for a project with points awarded accordingly: Severe, Moderate, and Low. These classifications are obtained from the LRTP for all roadway sections within Hampton Roads. While this is a subjective metric, it is anticipated that the projects with a broader area of influence would generally be classified as Severe with more localized projects generally being classified as Low.

***Cost Effectiveness*:** This evaluation criterion uses a Calculated MOE to evaluate the ratio of the total travel cost savings to the total cost of the project. The total travel cost savings are obtained from CMAQ sources by HRTPO staff. Points are then awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

***Air Quality*:** This evaluation criterion uses an Obtained MOE to evaluate the total reduction (in tons) of VOC and NOx emissions annually if the project were constructed. These values are obtained from CMAQ sources by HRTPO staff with assistance from the submitting organization. Points are then awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

***Safety*:** This evaluation criterion is essentially a series of three Either/Or MOEs to assess how a project will improve safety. Points are awarded cumulatively for answering "Yes" to each of the three following questions:

- Does the project improve an established and documented evacuation or incident management route?
- Does the project include the implementation of emergency vehicle preemption or incident detection systems?
- Is the project expected to reduce the number of crashes annually based on crash data obtained from the past three years? (*If the project is addressing a known cause of crashes, then it is expected that the project would decrease the number of crashes throughout the study area.)*

***Regional Significance*:** Under this criterion, a project is evaluated based on the degree to which it will improve mobility, access, or communications within the region. To assess *Regional Significance*, three subcriteria were developed for this criterion:

- *Mobility or accessibility needs:* This subcriterion uses a Multiple Choice MOE to evaluate the extent to which a project will impact mobility or accessibility needs within the region. The user has a multiple choice selection of three levels: Regional, Multijurisdictional, or Local. For a project to be classified as Regional, it would have to be regionally significant with regards to mobility and accessibility and provide considerable progress in meeting regional needs. A project not classified as Regional may be classified as Multijurisdictional if it improves mobility and accessibility for or

provides benefit to at least two local jurisdictions. A project having only local significance and providing benefit to only one local jurisdiction is classified as Local. Points are awarded accordingly for each classification. It is important to note that this criterion is not a measure of the physical project boundaries spanning separate jurisdictions (e.g., a project impacting an entire city and extending into another city) but rather a measure of the project's impact to overall mobility and accessibility needs for multiple jurisdictions. It also is important to note that because this criterion is not based on a tangible, statistical MOE, it can be very subjective. Therefore, decisions about how to classify a project under this criterion should be made objectively by HRTPO staff or an objective prioritization committee.

- *Improves communications between operating agencies:* This subcriterion uses an Either/Or MOE to classify whether a project will improve communications between operating agencies (e.g., police, fire, VDOT 511, City Traffic Operation Centers, etc.). A "Yes" is entered for this subcriterion only if a project will improve communications between at least two agencies and then full points are awarded; otherwise, a "No" is entered and no points are awarded.

- *Project is part of the Regional ITS Strategic Plan:* This subcriterion uses an Either/Or MOE to classify whether a project is part of the Regional ITS Strategic Plan. A "Yes" is entered for this subcriterion only if a project is officially documented within the plan and then full points are awarded; otherwise a "No" is entered and no points are awarded.

***Enhances Other Categories*:** This evaluation criterion uses a Multiple Choice MOE to classify the degree to which a project will enhance other project categories. Enhancement to other categories could include the installation of bus shelters ("Transit" enhancement), installation of sidewalks or bike paths ("Bicycle and Pedestrian" enhancement), inclusion of HOV service ("Highways" enhancement), improvement to a water crossing ("Bridge/Tunnel" enhancement), or an improvement to intermodal movements ("Intermodal" enhancement). While there are a total of six overall project categories, "Bridge/Tunnel" and "Highways" are considered one enhancement for this criterion, given their similarities. Therefore, a project which enhances both "Highways" and "Bridge/Tunnel" can only receive credit for one enhancement. The user has a multiple choice selection of how many enhancements are included (None, One, Two, or Three or More), and points are allocated accordingly.

***TDM Specific Criterion (TDM projects only)*:** Under this criterion, a TDM project is evaluated based on the degree to which it will encourage alternate modes of transportation or offer new TDM programs. In order to assess TDM projects, four subcriteria were developed for this criterion:

- *Number of new employers offering TDM programs:* This subcriterion uses an Obtained MOE based upon the number of new employers offering TDM programs to their employees after the completion of a project. Points are then awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

- *Resulting percentage of employees ridesharing:* This subcriterion uses an Obtained MOE to evaluate the percentage of employees ridesharing if a project were implemented. Although the percentage is a discrete numerical value, points are awarded in a manner similar to a Multiple Choice MOE. Instead of using a threshold range and straight line interpolation for percentage values falling within the threshold range, this subcriterion divides the range of possible percentages into three segments and awards the same number of points for all percentages falling within the same segment.

- *Resulting percentage of employees walking/biking:* This subcriterion uses an Obtained MOE to evaluate the percentage of employees that will walk or bike to work if a project were implemented. Although the percentage is a discrete numerical value, points are awarded in a manner similar to a Multiple Choice MOE. Instead of using a threshold range and straight line interpolation for percentage values falling within the threshold range, this subcriterion divides the range of possible percentages into three segments and awards the same number of points for all percentages falling within the same segment.

- *Parking Management:* This subcriterion uses an Either/Or MOE to classify whether a project includes parking management strategies. A "Yes" is entered for this criterion only if a project includes parking management strategies such as long- vs. short-term parking, special carpool/hybrid parking, or implementation of parking fees, and then full points are awarded. Otherwise, a "No" is entered and no points are awarded.

6.1.5 Project Utility Measures of Effectiveness – "Transit"

To assess a project's utility for the "Transit" category, a total of seven evaluation criteria were selected with a distinct set of MOEs for each. The seven criteria used to evaluate transit projects are as follows:

***Existing Usage or Prospective Ridership*:** This evaluation criterion uses an Obtained MOE based upon the existing average daily ridership for an improvement project or the forecasted daily ridership for a new project. Points are awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

***System Continuity and Connectivity*:** Under this criterion, a project is evaluated based on the degree to which it will improve continuity and connectivity of transit systems within the region. In order to assess system continuity and connectivity for transit systems, two subcriteria were developed for this criterion:

- *Regional significance:* This subcriterion uses a Multiple Choice MOE to evaluate the extent to which a project will impact the overall continuity and connectivity of the region's transit network. The user has a multiple choice selection of the level of significance of a project: Regional, Multijurisdictional, or Local. For a project to be classified as Regional, it would have to be regionally significant with regards to connectivity and continuity and provide considerable benefit to the regional transit system. A project not classified as Regional may be classified as

Multijurisdictional if it impacts continuity and connectivity for or provides benefit to at least two local jurisdictions. A project having only local significance and providing benefit to only one local jurisdiction is classified as Local. Points are awarded accordingly for each classification. It is important to note that this criterion is not a measure of the physical project boundaries spanning separate jurisdictions (e.g., a project traversing an entire city and extending into another city) but rather a measure of the project's impact to the overall transit system connectivity for multiple jurisdictions. It also is important to note that because this criterion is not based on a tangible, statistical MOE, it can be very subjective. Therefore, decisions about how to classify a project under this criterion should be made objectively by HRTPO staff or an objective prioritization committee.

- *Improving transit access to freight distribution facilities, ports, major industrial clients, or employment and population centers:* This subcriterion uses a Multiple Choice MOE to determine the extent to which a project will improve existing access to freight distribution facilities, ports, etc. The user must choose between three classifications: Yes and Regional, Yes but Not Regional, or No. For a project to be classified as Yes and Regional and receive full points, it must improve transit access to one of the following: seaport, airport, military facility, connections between jurisdictions, or connections between major industrial/employment centers. If a project will improve transit access but will not include one of the regional facilities mentioned above, then it is classified as Yes but Not Regional and receives partial points. If the project does not improve access to any of these types of facilities, it should be classified as No and receives no points.

***User Benefit*:** Under this criterion, a project is evaluated based on the degree to which it will reduce travel times for users and whether the project results in a new amenity. In order to assess system user benefit, two subcriteria were developed:

- *Annual travel time savings per rider:* This subcriterion uses a Calculated MOE based upon the annual travel time savings per rider after completion of a project. The points awarded for this subcriterion are calculated automatically from the user input of annual travel time savings in hours (obtained from the agency submitting the project) and estimated annual ridership. Points are then awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

- *New Project:* This subcriterion uses an Either/Or MOE to classify whether a project will result in new transit amenities (e.g., service, route, etc.). A "Yes" is entered for this criterion only if a project results in the creation of new transit amenities and then full points are awarded; if a project is simply an upgrade of an existing system, then a "No" is entered and no points are awarded.

***Compatibility with Existing Land Use Patterns and Future Plans and Development*:** This evaluation criterion uses a Multiple Choice MOE to assess a project's compatibility with both existing and future land

uses. The user must select between three classifications for a project with points awarded accordingly: Compatible and Officially Documented, Compatible but Not Officially Documented, and Not Compatible. For a project to be classified as Compatible and Officially Documented and receive full points, it must be compatible with both existing land use patterns and future plans (as determined by the user) and must be formally adopted by a body of elected officials, such as in the form of a comprehensive plan. A project is classified as Compatible but Not Officially Documented and receives partial points if it is compatible with existing and future land use patterns (as determined by the user) but has not been formally adopted by a body of elected officials. If a project is not compatible with existing and future land use patterns (as determined by the user), it is classified as Not Compatible and receives no points.

***Cost Effectiveness*:** This evaluation criterion uses a Calculated MOE to evaluate the ratio of the annual capital and operating costs of the project with respect to the number of users the project will serve. The points awarded for this criterion are calculated automatically by taking the ratio of the sum of the estimated total capital cost of the project (annualized) and the estimated total operating cost of the project (annualized) divided by the estimated annual ridership (all of which are user-input values). Points are then awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

***Air Quality*:** This evaluation criterion uses an Obtained MOE to evaluate the total reduction (in tons) of VOC and NOx emissions annually if the project were constructed. These values are obtained from CMAQ sources by HRTPO staff with assistance from the submitting organization. Points are then awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

***Enhances Other Categories*:** This evaluation criterion uses a Multiple Choice MOE to classify the degree to which a project will enhance other project categories. Enhancement to other categories could include installation of sidewalks or bike paths ("Bicycle and Pedestrian" enhancement), inclusion of HOV service ("Highways" enhancement), improvement to a water crossing ("Bridge/Tunnel" enhancement), the implementation of a TDM initiative or ITS improvement ("Systems Management/TDM/Operational Improvements" enhancement), or an improvement to intermodal movements ("Intermodal" enhancement). While there are a total of six overall project categories, "Bridge/Tunnel" and "Highways" are considered one enhancement for this criterion, given their similarities. Therefore, a project which enhances both "Highways" and Bridge/Tunnel" can only receive credit for one enhancement. The user has a multiple choice selection of how many enhancements are included (None, One, Two, or Three or More), and points are allocated accordingly.

6.1.6 Project Utility Measures of Effectiveness – "Intermodal"

To assess a project's utility for the "Intermodal" category, a total of four evaluation criteria were selected with a distinct set of MOEs for each. The four criteria used to evaluate intermodal projects are as follows:

***Better Accommodates Intermodal Movements*:** This evaluation criterion uses a Multiple Choice MOE to classify the level at which a project will improve the efficiency of intermodal movements. The user must select between three classifications for a project with points awarded accordingly: Conflict Free Intermodal Movements (e.g., a grade-separated rail crossing), Limited Conflict Intermodal Movements (e.g., an at-grade rail crossing on facilities with low ADT), and Intermodal Movements Conflict (e.g., an at-grade rail crossing on a busy arterial with high ADT). It also is important to note that this criterion can be somewhat subjective with respect to the definition of a conflict. Therefore, decisions about how to classify a project under this criterion should be made objectively by HRTPO staff or an objective prioritization committee.

***Improving Vehicular Access to Freight Distribution Facilities, Ports, Major Industrial Clients, or Employment and Population Centers*:** This subcriterion uses a Multiple Choice MOE to determine the extent to which a project will improve existing access to freight distribution facilities, ports, etc. The user must choose between three classifications: Yes and Regional, Yes but Not Regional, or No. For a project to be classified as Yes and Regional and receive full points, it must improve vehicular access to one of the following: seaport, airport, military facility, connections between jurisdictions, or connections between major industrial/employment centers. If a project will improve vehicular access but will not include one of the regional facilities mentioned above, then it is classified as Yes but Not Regional and receives partial points. If the project does not improve access to any of these types of facilities, it should be classified as No and receives no points.

***Cost Effectiveness*:** This evaluation criterion uses a Calculated MOE to evaluate the ratio of revenue increase to overall cost of the project. The points awarded for this criterion are calculated automatically by taking the ratio of the estimated revenue increase divided by the estimated cost of the project (both of which are user-input values). Points are then awarded according to the designated threshold range with straight-line interpolation for values falling within the range.

***Enhances Other Categories*:** This evaluation criterion uses a Multiple Choice MOE to classify the degree to which a project will enhance other project categories. Enhancement to other categories could include the installation of bus shelters ("Transit" enhancement), installation of sidewalks or bike paths ("Bicycle and Pedestrian" enhancement), inclusion of HOV service ("Highways" enhancement), improvement to a water crossing ("Bridge/Tunnel" enhancement), or the implementation of a TDM initiative or ITS improvement ("Systems Management/TDM/Operational Improvements" enhancement). The user has a multiple choice selection of how many enhancements are included (None, One, Two, or Three or More), and points are allocated accordingly.

6.2 Measures of Effectiveness for Project Viability

A project's viability level indicates the readiness of the project to be constructed based on available funding and completion of regulatory documentation. In general, the evaluation criteria used to assess project viability are the same for each of the six project categories. The evaluation criteria and accompanying MOEs for each project category are described below.

6.2.1 Project Viability Measures of Effectiveness – "Highways"

To assess a project's viability for the "Highways" category, a total of four evaluation criteria were selected with a distinct set of MOEs for each. The four criteria and their MOEs are as follows:

Amount of additional local match or private funding committed to the project: This criterion uses an Obtained MOE to evaluate the amount (in percentage of total project budget) of additional local or private funding committed to the project beyond the required match; however, points are awarded in a Multiple Choice MOE manner. Additional funding matches are divided into six segments, and points are awarded based on these levels of funding matching. It is important to note that even with 100 percent of additional match to local/state/federal funding, a project may still not be fully funded; however, the intent is to provide higher points to projects based on the degree of outside funding provided.

Prior Commitment: This criterion uses an Either/Or MOE to classify whether a project has prior commitment. A "Yes" is entered for this subcriterion only if a project is currently included in the LRTP and then full points are awarded; otherwise, a "No" is entered and no points are awarded.

Federal Mandates: This criterion uses an Either/Or MOE to classify whether a project is backed by federal mandates. A "Yes" is entered for this criterion only if a project is backed by documented federal mandates and then full points are awarded; otherwise, a "No" is entered and no points are awarded. Emergency bridge replacements, projects addressing significant existing design deficiencies, and projects with soon to expire federal funding previously allocated to the project are a few examples of federally mandated projects.

Degree of Project Readiness: This criterion is essentially a series of two Either/Or MOEs and one Multiple Choice MOE to assess how quickly a project could begin construction. Points are awarded cumulatively for answering "Yes" to each of the two following questions:

- Are the design plans complete, and is the project ready for advertisement?
- Is the project completely funded?

Additionally, full or partial points are awarded for the following question based on the level of environmental documentation completed to date.

- Have the necessary environmental plans/permitting been completed?

Full documentation includes all right-of-way and environmental permits. Partial documentation includes partial permitting or an approved environmental impact statement (EIS) document.

6.2.2 Project Viability Measures of Effectiveness – "Bridge/Tunnel"

To assess a project's viability for the "Bridge/Tunnel" category, a total of four evaluation criteria were selected with a distinct set of MOEs for each. The four criteria and their MOEs are as follows:

Amount of additional local match or private funding committed to the project: This criterion uses an Obtained MOE to evaluate the amount (in percentage of total project budget) of additional local or private funding committed to the project beyond the required match; however, points are awarded in a Multiple Choice MOE manner. Additional funding matches are divided into six segments, and points are awarded based on these levels of funding matching. It is important to note that even with 100 percent of additional match to local/state/federal funding, a project may still not be fully funded; however, the intent is to provide higher points to projects based on the degree of outside funding provided.

Prior Commitment: This criterion uses an Either/Or MOE to classify whether a project has prior commitment. A "Yes" is entered for this subcriterion only if a project is currently included in the LRTP and then full points are awarded; otherwise, a "No" is entered and no points are awarded.

Federal Mandates: This criterion uses an Either/Or MOE to classify whether a project is backed by federal mandates. A "Yes" is entered for this criterion only if a project is backed by documented federal mandates and then full points are awarded; otherwise, a "No" is entered and no points are awarded. Emergency bridge replacements, projects addressing significant existing design deficiencies, and projects with soon to expire federal funding previously allocated to the project are a few examples of federally mandated projects.

Degree of Project Readiness: This criterion is essentially a series of two Either/Or MOEs and one Multiple Choice MOE to assess how quickly a project could begin construction. Points are awarded cumulatively for answering "Yes" to each of the two following questions:

- Are the design plans complete, and is the project ready for advertisement?
- Is the project completely funded?

Additionally, full or partial points are awarded for the following question based on the level of environmental documentation completed to date.

- Have the necessary environmental plans/permitting been completed?

Full documentation includes all right-of-way and environmental permits. Partial documentation includes partial permitting or an approved EIS document.

6.2.3 Project Viability Measures of Effectiveness – "Bicycle and Pedestrian"

To assess a project's viability for the "Bicycle and Pedestrian" category, a total of four evaluation criteria were selected with a distinct set of MOEs for each. The four criteria and their MOEs are as follows:

Amount of additional local match or private funding committed to the project: This criterion uses an Obtained MOE to evaluate the amount (in percentage of total project budget) of additional local or private funding committed to the project beyond the required match; however, points are awarded in a Multiple Choice MOE manner. Additional funding matches are divided into six segments, and points are awarded

based on these levels of funding matching. It is important to note that even with 100 percent of additional match to local/state/federal funding, a project may still not be fully funded; however, the intent is to provide higher points to projects based on the degree of outside funding provided.

Prior Commitment: This criterion uses an Either/Or MOE to classify whether a project has prior commitment. A "Yes" is entered for this subcriterion only if a project is currently included in a comprehensive plan and then full points are awarded; otherwise, a "No" is entered and no points are awarded.

Federal Mandates: This criterion uses an Either/Or MOE to classify whether a project is backed by federal mandates. A "Yes" is entered for this criterion only if a project is backed by documented federal mandates and then full points are awarded; otherwise, a "No" is entered and no points are awarded. Emergency bridge replacements, projects addressing significant existing design deficiencies, and projects with soon to expire federal funding previously allocated to the project are a few examples of federally mandated projects.

Degree of Project Readiness: This criterion is essentially a series of two Either/Or MOEs and one Multiple Choice MOE to assess how quickly a project could begin construction. Points are awarded cumulatively for answering "Yes" to each of the two following questions:

- Are the design plans complete, and is the project ready for advertisement?
- Is the project completely funded?

Additionally, full or partial points are awarded for the following question based on the level of environmental documentation completed to date.

- Have the necessary environmental plans/permitting been completed?

Full documentation includes all right-of-way and environmental permits. Partial documentation includes partial permitting or an approved EIS document.

6.2.4 Project Viability Measures of Effectiveness – "Systems Management/TDM/ Operational Improvements"

To assess a project's viability for the "Systems Management/TDM/Operational Improvements" category, a total of four evaluation criteria were selected with a distinct set of MOEs for each. The four criteria and their MOEs are as follows:

Amount of additional local match or private funding committed to the project: This criterion uses an Obtained MOE to evaluate the amount (in percentage of total project budget) of additional local or private funding committed to the project beyond the required match; however, points are awarded in a Multiple Choice MOE manner. Additional funding matches are divided into six segments, and points are awarded based on these levels of funding matching. It is important to note that even with 100 percent of additional

match to local/state/federal funding, a project may still not be fully funded; however, the intent is to provide higher points to projects based on the degree of outside funding provided.

Prior Commitment: This criterion uses an Either/Or MOE to classify whether a project has prior commitment. A "Yes" is entered for this criterion only if a project is currently included in an official document and then full points are awarded; otherwise, a "No" is entered and no points are awarded.

Federal Mandates: This criterion uses an Either/Or MOE to classify whether a project is backed by federal mandates. A "Yes" is entered for this criterion only if a project is backed by documented federal mandates and then full points are awarded; otherwise, a "No" is entered and no points are awarded. Emergency bridge replacements, projects addressing significant existing design deficiencies, and projects with soon to expire federal funding previously allocated to the project are a few examples of federally mandated projects.

Degree of Project Readiness: This criterion is essentially a series of two Either/Or MOEs and one Multiple Choice MOE to assess how quickly a project could begin construction. Points are awarded cumulatively for answering "Yes" to each of the two following questions:

- Are the design plans complete, and is the project ready for advertisement?
- Is the project completely funded?

Additionally, full or partial points are awarded for the following question based on the level of environmental documentation completed to date.

- Have the necessary environmental plans/permitting been completed?

Full documentation includes all right-of-way and environmental permits. Partial documentation includes partial permitting or an approved EIS document.

6.2.5 Project Viability Measures of Effectiveness – "Transit"

To assess a project's viability for the "Transit" category, a total of four evaluation criteria were selected with a distinct set of MOEs for each. The four criteria and their MOEs are as follows:

Amount of additional local match or private funding committed to the project: This criterion uses an Obtained MOE to evaluate the amount (in percentage of total project budget) of additional local or private funding committed to the project beyond the required match; however, points are awarded in a Multiple Choice MOE manner. Additional funding matches are divided into six segments, and points are awarded based on these levels of funding matching. It is important to note that even with 100 percent of additional match to local/state/federal funding, a project may still not be fully funded; however, the intent is to provide higher points to projects based on the degree of outside funding provided.

Prior Commitment: This criterion uses an Either/Or MOE to classify whether a project has prior commitment. A "Yes" is entered for this criterion only if a project is currently included in the LRTP and then full points are awarded; otherwise, a "No" is entered and no points are awarded.

Federal Mandates: This criterion uses an Either/Or MOE to classify whether a project is backed by federal mandates. A "Yes" is entered for this criterion only if a project is backed by documented federal mandates and then full points are awarded; otherwise, a "No" is entered and no points are awarded. Emergency bridge replacements, projects addressing significant existing design deficiencies, and projects with soon to expire federal funding previously allocated to the project are a few examples of federally mandated projects.

Degree of Project Readiness: This criterion consists of a series of two Either/Or MOEs to assess how quickly a project could begin construction. Points are awarded cumulatively for answering "Yes" to each of the two following questions:

- Has the project received Federal Transit Authority (FTA) approval for final design?
- Has the project received environmental clearance?

6.2.6 Project Viability Measures of Effectiveness – "Intermodal"

To assess a project's viability for the "Intermodal" category, a total of four evaluation criteria were selected with a distinct set of MOEs for each. The four criteria and their MOEs are as follows:

Amount of additional local match or private funding committed to the project: This criterion uses an Obtained MOE to evaluate the amount (in percentage of total project budget) of additional local or private funding committed to the project beyond the required match; however, points are awarded in a Multiple Choice MOE manner. Additional funding matches are divided into six segments, and points are award based on these levels of funding matching. It is important to note that even with 100 percent of additional match to local/state/federal funding, a project may still not be fully funded; however, the intent is to provide higher points to projects based on the degree of outside funding provided.

Prior Commitment: This criterion uses an Either/Or MOE to classify whether a project has prior commitment. A "Yes" is entered for this criterion only if a project is currently included in the LRTP and then full points are awarded; otherwise, a "No" is entered and no points are awarded.

Federal Mandates: This criterion uses an Either/Or MOE to classify whether a project is backed by federal mandates. A "Yes" is entered for this criterion only if a project is backed by documented federal mandates and then full points are awarded; otherwise, a "No" is entered and no points are awarded. Emergency bridge replacements, projects addressing significant existing design deficiencies, and projects with soon to expire federal funding previously allocated to the project are a few examples of federally mandated projects.

Degree of Project Readiness: This criterion is essentially a series of two Either/Or MOEs and one Multiple Choice MOE to assess how quickly a project could begin construction. Points are awarded cumulatively for answering "Yes" to each of the two following questions:

- Are the design plans complete, and is the project ready for advertisement?
- Is the project completely funded?

Additionally, full or partial points are awarded for the following question based on the level of environmental documentation completed to date.

- Have the necessary environmental plans/permitting been completed?

Full documentation includes all right-of-way and environmental permits. Partial documentation includes partial permitting or an approved EIS document.

6.3 Measures of Effectiveness for Economic Vitality

While transportation plays a vital role in economic development, it cannot by itself create economic development. Using both literature and staff analysis, HRTPO staff have developed evaluation criteria on which to rank four of the six project categories based on economic vitality for the regional LRTP. This ranking is not a cost-benefit analysis, but rather an attempt to measure a particular project's potential to aid economic development throughout the entire region, as compared to the potential of other proposed projects within that category. The evaluation criteria and accompanying MOEs for the four project categories that will impact economic vitality are described below.

6.3.1 Economic Vitality Measures of Effectiveness – "Highways"

To assess a project's impact on economic vitality for the "Highways" category, a total of four evaluation criteria were selected with a distinct set of MOEs for each. The four criteria and their MOEs are as follows:

Total Reduction in Travel Time: Economic theory and empirical studies confirm that it is the travel time savings which result from an infrastructure project that creates both increased regional competitiveness and the opportunity for economic development. Using the HRTPO's travel demand model, each project will be measured for its ability to decrease travel time for the entire region, and will receive points based on its success meeting this measure.

Labor Market Access: This criterion measures the ability of workers to reach job sites within a region, as the availability of skilled labor plays a major role in business location decisions (this does not include temporary job sites that result from construction). This criterion measures how each project enhances economic vitality through improvements to labor market access based on the following two subcriteria:

- *Increases Travel Time Reliability:* Part of reducing the effective distance that workers travel is removing uncertainty about travel time, as travelers are less tolerant of unexpected delays and

schedule variations that cause them to be late for work or important personal appointments (e.g., picking up children from daycare or doctor's appointments). Staff analysis utilizing crash data, traffic counts, and variance of delay as well as technical expertise will be used to measure the impact each project would have on system wide travel time reliability.

- *Increases Access for Major Employment Centers:* The travel demand model will be used in conjunction with the most current long-range map of employment in Hampton Roads to determine the impact that each transportation project will have on access to high employment TAZs. This measure will utilize travel time savings for all trips that end in those TAZs.

Addresses the Needs of Basic Sector Industries: Basic sector industries are those that bring outside dollars into the region and create new income and additional spending power to the regional economy. Any increase in a basic sector industry's competitiveness will produce a correspondingly widespread effect on the regional economy (as opposed to changes in other industries that might only cause a realignment of incomes within a region). HRTPO staff have identified Defense, Commercial Maritime, and Tourism as the "super basic" sector industries in Hampton Roads on the basis of employment and outside dollars that are brought into the region. In order to assess whether a project addresses the needs of basic sector industries, three subcriteria were developed:

- *Increases Access for Defense Installations:* Defense installations are determined as TAZs that touch upon major military bases in the region. A project increases access to defense installations if it significantly reduces travel time for trips that end in those TAZs.

- *Increases Access to Tourist Destination:* Tourist destinations were determined to be those TAZs with tourism employment that is more than one standard deviation greater than average tourism employment for the region. A project increases access to tourist destinations if it significantly reduces travel time for trips that end in those TAZs.

- *Increases Access to Port Facilities:* Port facilities are those TAZs that provide critical access to a port. A project increases access to port facilities if it significantly reduces travel time for trips that end in those TAZs.

Increases Opportunity: This criterion measures a project's ability to bring in new dollars or businesses. The subcriteria included here are focused on the ability of a project to encourage economic development through encouraging the expansion of existing businesses or by the attraction of new businesses. This includes expanded and improved access to business locations as well as the role of a project locality's long term development plans. The two subcriteria are as follows:

- *Provides New or Increased Access:* This subcriterion looks at the ability of a project to allow new or increased access into an area in a way that would encourage economic development in that area.

- *Supports Plans for Future Growth:* This subcriterion examines whether a project has been included in a locality's (or multiple localities') comprehensive plan. It takes time to ensure that the proper infrastructure and zoning laws are in effect to account for the impact of new transportation projects, and this subcriterion therefore awards points for localities having already begun planning for this type of investment. Improvements that are located in areas specifically designated as a growth area in local comprehensive plans will receive the maximum number of points, and projects that are otherwise supported by a local comprehensive plan will receive partial points. HRTPO staff will assess jurisdictional comprehensive plans to determine the relative score.

6.3.2 Economic Vitality Measures of Effectiveness – "Bridge/Tunnel"

To assess a project's impact on economic vitality for the "Bridge/Tunnel" category, a total of four evaluation criteria were selected with a distinct set of MOEs for each. The four criteria and their MOEs are as follows:

Total Reduction in Travel Time: Economic theory and empirical studies confirm that it is the travel time savings which result from an infrastructure project that creates both increased regional competitiveness and the opportunity for economic development. Using the HRTPO's travel demand model, each project will be measured for its ability to decrease travel time for the entire region, and will receive points based on its success meeting this measure.

Labor Market Access: This criterion measures the ability of workers to reach job sites within a region, as the availability of skilled labor plays a major role in business location decisions (this does not include temporary job sites that result from construction). This criterion measures how each project enhances economic vitality through improvements to labor market access based on the following two subcriteria:

- *Increases Travel Time Reliability:* Part of reducing the effective distance that workers travel is removing uncertainty about travel time, as travelers are less tolerant of unexpected delays and schedule variations that cause them to be late for work or important personal appointments (e.g., picking up children from daycare or doctor's appointments). Staff analysis utilizing crash data, traffic counts, and variance of delay as well as technical expertise will be used to measure the impact each project would have on system wide travel time reliability.

- *Increases Access for Major Employment Centers:* The travel demand model will be used in conjunction with the most current long-range map of employment in Hampton Roads to determine the impact that each transportation project will have on access to high employment TAZs. This measure will utilize travel time savings for all trips that end in those TAZs.

Addresses the Needs of Basic Sector Industries: Basic sector industries are those that bring outside dollars into the region and create new income and additional spending power to the regional economy. Any increase in a basic sector industry's competitiveness will produce a correspondingly widespread effect on the regional economy (as opposed to changes in other industries that might only cause a realignment of

incomes within a region). HRTPO staff have identified Defense, Commercial Maritime, and Tourism as the "super basic" sector industries in Hampton Roads on the basis of employment and outside dollars that are brought into the region. In order to assess whether a project addresses the needs of basic sector industries, three subcriteria were developed:

- *Increases Access for Defense Installations:* Defense installations are determined as TAZs that touch upon major military bases in the region. A project increases access to defense installations if it significantly reduces travel time for trips that end in those TAZs.

- *Increases Access to Tourist Destination:* Tourist destinations were determined to be those TAZs with tourism employment that is more than one standard deviation greater than average tourism employment for the region. A project increases access to tourist destinations if it significantly reduces travel time for trips that end in those TAZs.

- *Increases Access to Port Facilities:* Port facilities are those TAZs that provide critical access to a port. A project increases access to port facilities if it significantly reduces travel time for trips that end in those TAZs.

Increases Opportunity: This criterion measures a project's ability to bring in new dollars or businesses. The subcriteria included here are focused on the ability of a project to encourage economic development through encouraging the expansion of existing businesses or by the attraction of new businesses. This includes expanded and improved access to business locations as well as the role of a project locality's long term development plans. The two subcriteria are as follows:

- *Provides New or Increased Access:* This subcriterion looks at the ability of a project to allow new or increased access into an area in a way that would encourage economic development in that area.

- *Supports Plans for Future Growth:* This subcriterion examines whether a project has been included in a locality's (or multiple localities') comprehensive plan. It takes time to ensure that the proper infrastructure and zoning laws are in effect to account for the impact of new transportation projects, and this subcriterion therefore awards points for localities having already begun planning for this type of investment. Improvements that are located in areas specifically designated as a growth area in local comprehensive plans will receive the maximum number of points, and projects that are otherwise supported by a local comprehensive plan will receive partial points. HRTPO staff will assess jurisdictional comprehensive plans to determine the relative score.

6.3.3 Economic Vitality Measures of Effectiveness – "Transit"

Transit (e.g., ferries, light rail, buses, and bus rapid transit) plays an important role in a regional economy by providing transportation alternatives to congestion and regional mobility and improving air quality. To assess a project's impact on economic vitality for the "Transit" category, a total of four evaluation criteria were selected with a distinct set of MOEs for each. The four criteria and their MOEs are as follows:

Labor Market Access: One goal of a transit system is to reduce the effective distance that workers have to travel to get to work. Transit does this by providing workers with an alternative to avoid congestion and allowing those workers who do not have access to a vehicle the ability to achieve regional mobility. In order to measure labor market access, four subcriteria were developed:

- *Increases Access for Major Employment Centers:* Research suggests that the location of employers has a far greater impact on ridership than the location of population,[17] partly because of the greater incentive of population to move to a line that allows access to a work location. Generally accepted planning practices suggest that the utility of transit project is maximized when transit terminals are set at a distance of no greater than ¼ mile from the point of origin or destination.[18] Staff ascertains that greater density of employment lends itself to greater transit ridership, and thus this subcriterion sums up all employment along the transit line in the TAZs where employment is one standard deviation above the regional mean. Points are awarded accordingly based on employment levels.

- *Increases Travel Time Reliability:* Part of reducing the effective distance that workers travel (i.e., the real cost of transit) is removing uncertainty about travel time reliability, as travelers are less tolerant of unexpected delays and schedule variations that cause them to be late for work or important personal appointments (e.g., picking up children from daycare or doctor's appointments). Confidence in travel time reliability enables travelers to have greater assurance in making their travel decisions, increasing the likelihood of utilizing the transit line. Points are awarded based on staff analysis of a project's ability to enhance travel time reliability. Staff recognizes that this measure will tend to reward projects that have a dedicated right of way.

- *Increases Frequency of Service:* This subcriterion estimates the number of times the transit line provides service to the stop. The HRTPO staff will use data from HRT and WATA and make a judgment of the frequency of service to award points.

- *Provides Access to Institutions of Higher Education:* A highly educated/skilled workforce is critical for regional competitiveness, and anything that aids a region in developing its workforce will increase its long term economic growth. Full points are awarded for transit projects that have either a two or four year academic institution within ½ mile of its route.[19]

[17] Tsai, Yu-Hsin. (2009) "Impacts of self-selection and transit proximity on commute mode choice: evidence from Taipei rapid transit system." Annals of Regional Science 43: 1073-1094

[18] Wu, C., & Murray, A. T. (2005). Optimizing Public Transit Quality and System Access: the Mulitple-route, Maximal covering/shortest-path problem. Environment and Planning B: Planning and Design , 32, 163-178.

[19] The literature review indicated that two groups have lower sensitivity to walking distance from transit: students, because they tend to be younger, and the economically disadvantaged, because they have fewer options.

Addresses the Needs of Basic Sector Industries: Basic sector industries are those that bring outside dollars into the region and create new income and additional spending power for the regional economy. Any increase in a basic sector industry's competitiveness will produce a correspondingly widespread effect on the regional economy (as opposed to changes in other industries that might only cause a realignment of incomes within a region). HRTPO staff have identified Defense, Commercial Maritime, and Tourism as the "super basic" sector industries in Hampton Roads on the basis of employment and outside dollars that are brought into the region. In order to assess whether a transit project addresses the needs of basic sector industries, two subcriteria were developed (Ports were not included because staff analysis determined that port activity is not significantly affected by transit access):

- *Provides or Improves Access for Defense Installations:* This subcriterion awards points to transit projects that pass within ¼ or ½ mile of a major defense installation.

- *Increases Access to Tourist Destinations:* Tourist destinations were determined to be those TAZs with tourism employment that is more than one standard deviation greater than average tourism employment for the region. Points are awarded accordingly to transit projects having high density tourism employment within a ¼ or ½ mile of the line that falls within a designated range based on the total tourism employment in the region of approximately 160,000.

Increases Opportunity: This criterion measures a project's ability to bring in new dollars or businesses. The subcriteria included here are focused on developing an improved transit network as a measure of the region's amenities for both workers and business location decisions, as well as whether the transit project is included in the long-range plan of the city. The two subcriteria are as follows:

- *Provides New Access to the Network:* This measure looks at the enhancement that an individual project makes to the overall transit network in the region, including all forms of transit. It is clear that synergies develop as a transit network reaches a certain level of maturity, and this subcriterion attempts to capture an individual project's ability to improve the network and enhance the general amenity level of the region. Points are awarded based on staff assessment of the project.

- *Supported by Plans for Increased Density and Economic Activity:* This subcriterion examines whether a project has been included in a locality's (or multiple localities') comprehensive plan. It takes time to ensure that the proper infrastructure and zoning laws are in effect for the area along a new transit line, and this subcriterion therefore awards points for localities having already begun planning for this type of investment. Full points are awarded to projects with strategic growth areas (such as enterprise zones, empowerment zones, and technology zones), and partial points are awarded to projects located in areas that have plans for increased density. HRTPO staff will assess jurisdictional comprehensive plans to determine the relative score.

Economic Distress Factors: It is clear that economic justice requires that the transportation system include those who live in economically disadvantaged areas, and thus points are included for projects that pass

through an area in some level of economic distress. Also, as these areas often have lower costs of rental/ownership, this category also increases access to affordable housing for the entire workforce. In order to assess a transit project's level of access to economically disadvantaged areas, two subcriteria were developed:

- *Provides Access to Areas with High Unemployment:* This subcriterion looks at the unemployment rate as a measure of economic distress. In order to capture areas of extreme economic distress, this measures the unemployment in the most distressed TAZ along the route and compares it to the regional average.

- *Provides Access to Low Income Areas:* This subcriterion examines the area median income of the TAZs within ¼ mile and ½ mile of the transit line and compares it to the poverty level.[20] Points are awarded to projects based on the proximity of TAZs that have income levels falling within a designated threshold when compared to the poverty level.

6.3.4 Economic Vitality Measures of Effectiveness – "Intermodal"

To assess a project's impact on economic vitality for the "Intermodal" category, a total of five evaluation criteria were selected with a distinct set of MOEs for each. The five criteria and their MOEs are as follows:

Total Reduction in Travel Time: Economic theory and empirical studies confirm that it is the travel time savings which result from an infrastructure project that creates both increased regional competitiveness and the opportunity for economic development. Using the HRTPO's travel demand model, each project will be measured for its ability to decrease travel time for the entire region, and will receive points based on its success meeting this measure.

Labor Market Access: This criterion measures the ability of workers to reach job sites within a region, as the availability of skilled labor plays a major role in business location decisions (this does not include temporary job sites that result from construction). This criterion measures how each project enhances economic vitality through improvements to labor market access based on the following two subcriteria:

- *Increases Travel Time Reliability:* Part of reducing the effective distance that workers travel is removing uncertainty about travel time, as travelers are less tolerant of unexpected delays and schedule variations that cause them to be late for work or important personal appointments (e.g., picking up children from daycare or doctor's appointments). Staff analysis utilizing crash data, traffic counts, and variance of delay as well as technical expertise will be used to measure the impact each project would have on system wide travel time reliability.

- *Increases Access for Major Employment Centers:* The travel demand model will be used in conjunction with the most current long-range map of employment in Hampton Roads to

[20] See footnote 21 about why ½ mile rather than ¼ mile radius was used.

determine the impact that each transportation project will have on access to high employment TAZs. This measure will utilize travel time savings for all trips that end in those TAZs.

Impact on Truck Movement: HRTPO Transportation staff will analyze the impact of an intermodal project on regional truck movement using freight volumes, crash data, and capacity estimates. Movements of goods are critical for the region's economic growth, and thus elements that greatly increase the movement of trucks will be awarded the category's full allotment of points.

Improves Interaction between Modes of Travel: Intermodal traffic refers to traffic that moves containers of goods from one mode of travel to another with limited re-handling. Ease of handling will be a primary driver for the use of Hampton Roads as a thoroughfare for the nation's cargo. HRTPO Transportation staff will analyze the impact of projects on access to each of the other modes of travel (seaport, airport, and rail).

Increased Opportunity: This criterion measures a project's ability to bring in new dollars or businesses. The subcriteria included here are focused on the ability of a project to encourage new or increased development by businesses, with particular focus on the transportation and warehousing industry. The two subcriteria are as follows:

- *Provide New or Increased Access:* This subcriterion looks at the ability of a project to allow increased or expanded access to an existing area, or to open a new access to an area that is primed for development, but was previously inaccessible.

- *Supports Plans for Future Growth:* This subcriterion examines whether a project has been included in a locality's (or multiple localities') comprehensive plan. It takes time to ensure that the proper infrastructure and zoning laws are in effect to account for the impact of new intermodal projects, and this subcriterion therefore awards points for localities having already begun planning for this type of investment. Improvements that are located in areas specifically designated as a growth area in local comprehensive plans will receive the maximum number of points, and projects that are otherwise supported by a local comprehensive plan will receive partial points. HRTPO staff will assess jurisdictional comprehensive plans to determine the relative score.

7. Program Prioritization Tool and Project Application Form

In conjunction with the development of a methodology, a Program Prioritization tool was developed, allowing users to easily apply the weighted MOEs to projects within the LRTP. The prioritization tool was structured to provide a convenient, interactive, user-friendly, simple, and versatile method to score and sort projects. A project application form was also developed to gather the data necessary to score each project.

7.1 General Overview/Structure of the Tool

The Program Prioritization tool was developed to provide a user-friendly method to efficiently input data and generate a project score for projects within the LRTP based on established evaluation criteria and MOEs. The tool was developed in an electronic spreadsheet (Excel) format with Visual Basic Macro programs. The spreadsheet contains individual tabs for each project category's inputs, project weighting factors, a reference tab containing drop-down menu inputs to improve data entry efficiency, and individual project category results. The tool contains a separate tab for each of the six project categories:

1. "Highways"
2. "Bridge/Tunnel"
3. "Bicycle and Pedestrian"
4. "Systems Management/TDM/Operational Improvements"
5. "Transit"
6. "Intermodal"

Once all category and background inputs are entered, individual project scores are tabulated from the established weighting factors. Macros were developed to automatically sort projects by a project utility score and a project viability grade. Additional macros were developed to further sort "Highways" and "Bridge/Tunnel" projects by roadway system as well as by individual evaluation criteria to provide further guidance on project evaluation. As the tool is refined in the future, consideration may be given to slightly restructuring the result outputs to more closely sort projects with specific funding sources.

Given the interactive nature of the prioritization process, the tool was structured to allow users to easily modify project weighting factors or MOE thresholds. While it is understood that project parameters change, revisions to project weighting factors and MOE thresholds should only be based upon project attributes. If and when inputs are adjusted, project scores are automatically recalculated and organized with the assigned macros. User-friendly alerts also are incorporated into the tool, which will notify the user if project point values do not equal 100 points. Additionally, with the use of cell notes and drop-down menus, the tool provides a straightforward data entry platform.

A detailed summary of the tool structure and data inputs is presented in **Appendices G1 and G2**.

7.2 Project Application Form

In order to obtain project specific data inputs for the tool such as background information and evaluation criteria information for each project, an application form was developed. This form will be made available by the HRTPO such that each municipality or agency will be responsible for providing a portion of the objective inputs while all subjective inputs will be entered by a neutral party. Given the different evaluation criteria established for each of the six project categories, separate application forms were developed for each category. The application forms are included in **Appendix H**.

7.3 Tool Application

Application of the Program Prioritization tool includes three main steps as illustrated in **Figure 14**. Pertinent project data is obtained from the submitting agency via the project application form. Additional data may be obtained from HRTPO staff and/or VDOT depending on the nature of the project and required data needed. Further refinement may be required as more subjective values will need to be re-examined. The user has the ability to modify the weighting factors and MOEs and immediately observe the new project scores within each category. However, it is suggested that if the results appear inconsistent, the user should first review the accuracy of the data followed by evaluating the thresholds associated with the MOEs, and then only as a final effort, consider adjusting the weighting factors.

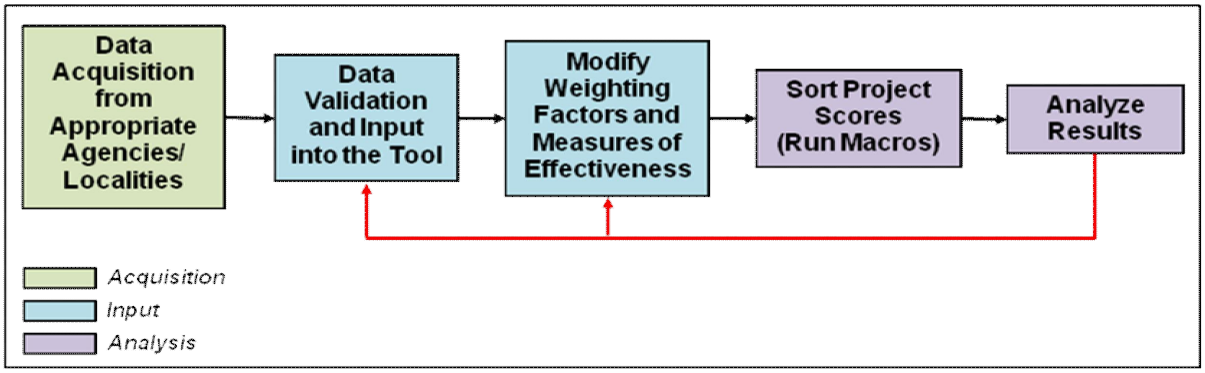

Figure 14 - Tool Application Flow Chart

It is essential to understand that this report's objective is to provide a very efficient and valid first attempt at a highly iterative process. A tool validation analysis was completed for a sampling of projects considering the project utility and project viability components and is included in **Appendix I**. Input of additional projects and further refinement of data, weighting factors, and MOEs will be necessary hereafter to complete the project ranking. However, this effort will be the responsibility of the agency who inherits the scoring tool.

7.4 Tool Administration

The HRTPO will have the primary responsibility in maintaining the tool. However, future refinements of the methodology (categories, evaluation criteria, weighting factors, MOEs, and point allocations) should be consensus-based with the support of TTAC and HRTPO Board approval. The tool and methodology

should be reviewed and reevaluated concurrent with the development of each LRTP update. When reevaluating the methodology and tool, the vision and goals of the region should serve as the benchmark for any modifications. If modifications are deemed necessary, the proposed revisions should be presented to and endorsed by the HRTPO Board prior to inclusion.

If new projects are proposed in between scheduled LRTP updates, it is the responsibility of HRTPO staff to maintain the projects and background inputs included within the tool. This includes validating any and all new input data obtained for either new projects or new MOEs.

8. Conclusions and Next Steps

The Program Prioritization methodology and tool is intended to provide policy makers with three pieces of project information: a valid and representative ranking of projects based on technical merit, the current viability of the project to be implemented, and the project's relative contribution to the economic vitality of the region. While the Program Prioritization process provides a ranking of projects through a validated methodology, the ultimate determination of the region's top priorities and how available funding is allocated still requires a consensus-based decision making process with the HRTPO Board members. The intent of the Program Prioritization process is to provide a scoring and ranking of projects which will aid the HRTPO members when making a consensus-based decision on the overall program and priority projects.

8.1 Project Status

At the onset of this project, it was understood that the Program Prioritization methodology and tool would be a living process and document that would be modified and refined through time, as priorities and funding change and the tool is tested more extensively. This report concludes the development of the initial tool. The initial tool, which included a one-part scoring process, was refined twice based on input from the TTAC, TAC, and HRTPO Board members; HRTPO staff; and the Steering Committee to incorporate a three-part scoring process which evaluates project utility, project viability, and economic vitality separately. It is anticipated that the Program Prioritization methodology and tool will be utilized by HRTPO staff in the development of the 2034 LRTP after some additional refinement as follows:

- Initial Program Prioritization methodology and tool utilizing a one-part scoring process completed by KHA – Fall 2009
- Program Prioritization methodology and tool refined by KHA to include a two-part (project utility and project viability) scoring process – Winter 2009/2010
- Program Prioritization methodology and tool refinement by HRTPO staff and KHA to include a three-part (project utility, project viability, economic vitality) scoring process –Spring 2010
- Development of a LRTP candidate application form for application within the prioritization tool - Spring 2010
- HRTPO Board approval of final Program Prioritization methodology and tool for use in development of 2034 LRTP – Summer 2010

8.2 Next Steps

Recognizing this is a living document, revision efforts will still be an ongoing task after the current Program Prioritization tool has been provided to HRTPO staff for use in developing the 2034 LRTP. The current tool will likely need further refinements to a number of data inputs and MOEs. Some data inputs, such as cost effectiveness measures for "Intermodal" projects, pavement condition scores, and crash history, were

difficult to obtain within the time constraints of the initial tool development. Further efforts will need to be made to obtain more reliable and exact data or perhaps to determine a substitute MOE which utilizes more readily available data. Some of the more subjective MOEs may need to be clarified with a numerical scale, and the project viability and economic vitality components may need to be better quantified with refined MOEs such that applicants can identify and improve on selected projects to meet predefined measureable objectives. Based on discussions with HRTPO staff and the Steering Committee, TTAC, TAC, and HRTPO Board members, it also is anticipated that the tool may be further refined to align project-specific funding sources within the six categories.

It is recommended that these further refinements be considered and addressed after using the tool to develop the 2034 LRTP. In implementing the tool to develop the 2034 LRTP, immediate efforts will be necessary to obtain input data for the approximately 200 candidate projects so that they can be properly scored and ranked. This will require consistent coordination between HRTPO staff and the Steering Committee, TTAC, and HRTPO Board members to obtain the appropriate information and background data for each project from the project applicants. A reevaluation of the linear interpolation thresholds for various criteria under each of the six categories also will be necessary as the ultimate project scoring is performed.

With subsequent plan updates after the 2034 LRTP (i.e., 2038 and beyond), the evaluation criteria and weighting factors should be reevaluated and updated as needed to reflect changing regional goals and visions for Hampton Roads.