Richmond Regional Transportation Planning Organization

Connect RVA 2045

AGENDA

ConnectRVA 2045 Advisory Committee
December 14, 2020
1:00 p.m.
Zoom Meeting

Members of the public may observe the meeting via YouTube Live Streaming on the PlanRVA YouTube Channel. Opportunities for sharing comments are described in the Public Participation guide.

WELCOME AND INTRODUCTIONS
(Pompei)

STATEMENT REGARDING VIRTUAL MEETINGS
(Pompei) page 1

ATTENDANCE BY ROLL CALL
(Pompei)

1. **Consideration of Amendments to the Agenda**
   (Pompei/5 minutes)
2. **Approval of October 22, Meeting Summary**
   (Pompei/5 minutes) page 2
   ACTION REQUESTED
3. **Public Comment Period**
   (Pompei/5 minutes)
4. **LRTP Process Update Task 2: Vision, Goals and Objectives**
   (Jacocks/5 minutes) page 5
5. **LRTP Process Update Task 3: Planning**
   (Aryal/5 minutes)
   Universe of Project Screening and Development Update
6. **LRTP Process Update Task 4: Programming**
   (Aryal/40 minutes) page 7
   Project Evaluation and Scoring Methodology Review
7. **LRTP Schedule for 2021**
   (Aryal/5 minutes)
8. **Next Meeting**: *January 28, 2021 – 9:00 AM*
   (Pompei/5 minutes)

Richmond Regional Transportation Planning Organization

Opening Statement for Electronic Meetings

Due to the 2020 COVID-19 virus and current guidance regarding physical distancing to reduce the potential for spread, meetings of the Richmond Regional Planning District Commissions have transitioned to a virtual format in accordance with provisions of Virginia Code § 2.2-3708.2 and related legislation approved by the General Assembly of Virginia during the period of the Governor's State of Emergency Declaration for COVID-19.

While we meet in a remote/virtual format, we remain committed to public accessibility and opportunity to participate. Staff provided notice of this meeting to members and the public on December 7, 2020 through electronic posting on the PlanRVA website and email distribution of notice to members, alternates, and known interested parties, including the media.

This meeting will be recorded. Audio and visual recordings of the meeting and materials will be posted on the PlanRVA website within 48 hours of this meeting.

Any member of the public participating as an observer during the meeting today may submit comments or questions at any time prior to or during the meeting via email at rrtpoinput@PlanRVA.org. All comments and questions submitted at this time will be reviewed following the meeting and to the extent practical, responses will be provided or posted on the PlanRVA website.

We ask that members identify themselves first when speaking so we can more accurately record the activities of the meeting. All lines should be muted to minimize additional noise and feedback. You may unmute your line at any time to request acknowledgement from the Chair.

Please let us know if you have any questions regarding the process for assuring effective facilitation of this meeting or for how members of the public may participate.

By providing this statement, staff certifies that we have followed the approved procedures for appropriate notice of this meeting and the means by which we are convening.

Please indicate your presence by saying "HERE" when your name is called during a roll call. Anyone who wishes to identify themselves following the roll call of members will be invited to do so.

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Connect RVA 2045

Long-Range Transportation Plan Advisory Committee

MEETING SUMMARY
Zoom Virtual Meeting
October 22, 2020
9:00 a.m.

MEMBERS and ALTERNATES (A) PRESENT:

Charles City County		**Chesterfield County**		**City of Richmond**	
		Barbara K. Smith		Dironna Moore Clarke	x
		Kathryn Benedict (A)	x	Travis A. Bridewell (A)	x
				Sera Erickson (CTAC Rep)	x
				Bill Steele (CTAC Rep)	
Goochland County		**Hanover County**		**Henrico County**	
Thomas Coleman	x	Joseph E. Vidunas	x	Sharon Smidler	x
Todd Kilduff		J. Michael Flagg (A)		Rosemary D. Deemer (A)	
New Kent County		**Powhatan County**		**Town of Ashland**	
Kelli Le Duc	x	Andrew Pompei	x	Nora Amos	x
		Ed A. Howland (A)		Will Tucker (A)	
Capital Region Airport Commission (CRAC)		**GRTC Transit System**		**RMTA**	
John B. Rutledge		Adrienne Torres	x	Theresa Simmons	
		Emily Del Ross (A)	x		
PlanRVA		**RideFinders**		**DRPT**	
Chet Parsons	x	Von S. Tisdale		Tiffany Dubinsky	
Sulabh Aryal (A)	x	John O'Keeffe (A)	x	Grant Sparks (A)	
VDOT		**VCU**		**NAACP**	
Liz McAdory		John Leonard (CTAC Rep)	x	Walter Johnson (CTAC Rep)	
Jacob Herrman (A)					
Richmond Area Bicycling Association (RABA)		**VA Asian Chamber of Commerce**		**Senior Connections (CAAA)**	
Champe Burnley (CTAC Rep)	x	My Lan Tran		Tony Williams	x
RVA Rapid Transit		**Bike Walk RVA**		**Port of Virginia/RMT**	
Ben Campbell	x	Louise Lockett Gordon	x	Barbara Nelson	x
				Dustin Rinehart (A)	
Southern Environmental Law Center		**VA Center for Inclusive Communities**		**Virginians for High Speed Rail**	
Trip Pollard	x	Nelson Reveley	x	Daniel Plaugher	
Federal Highway Administration		**Tri-Cities MPO**			
Richard Duran	x	Ron Sveikowski	x		

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9211 Forest Hill Avenue, Suite 200
Richmond, VA 23235

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The RRTPO LRTP Advisory Committee meeting was held by electronic communication means as set forth by the April 22, 2020 actions of the General Assembly in response to the continued spread of novel coronavirus, or COVID-19. The technology used for this meeting was a web-hosted service created by Zoom and YouTube Live Streaming and was open and accessible for participation by members of the public. A recording of this meeting is available on our Plan RVA YouTube Channel.

Call to Order:
The LRTP Advisory Committee Chair, Andrew Pompei, presided and called the October 22, 2020 LRTP meeting to order at 9:00 a.m.

1. **Consideration of Amendments to the Agenda**
   There were no requested changes to the meeting agenda. Seeing and hearing no objections, the agenda was approved by acclamation as distributed on October 15, 2020.

2. **Approval of August 28, 2020 LRTP-AC Meeting Summary**
   There were no comments or corrections to the August 28, 2020 LRTP-AC meeting summary. The LRTP Advisory Committee unanimously approved by acclamation the meeting summary of the August 28, 2020 meeting as presented.

3. **Public Comment Period**
   There were no requests to address the LRTP Advisory Committee.

4. **LRTP Process Update Task 2: Vision, Goals and Objectives**
   Staff synthesized the following survey responses and presented them to the LRTP-Advisory Committee (AC) on their October 22 meeting.
   Survey Results:
   - The Vision Survey resulted in a visual representation of buzzwords that give greater prominence to words that appear more frequently (word cloud). Examples of some of the most frequently used words were equitable, green, bike, connected, and accessible.
   - The Regional Goals and Priorities Survey went live on June 24, 2020 and closed on August 15th with 501 completed surveys. Safety was chosen as the most important transportation priority followed by environmental quality and accessibility. Response patterns to rank regional goals were similar to ranking transportation priorities.
   - The Vision, Goals, and Strategies Survey went live on August 25, 2020 and closed on October 11th with 949 completed responses. 265 examples of unique ideas for vision statements were received.

   An interactive breakout session took place where the guiding principles and the proposed vision statement were workshopped.

   During the next segment of the meeting, Sulabh Aryal presented the following five goals including examples of measurable objectives:
   Goal 1. Safety: Improve the safety of the transportation system for all people.
   Goal 2. Environment/Land Use: Reduce the negative impact the transportation system has on the natural and built environment.

Goal 3. Equity/Accessibility: Improve accessibility and mode choice for all people.
Goal 4. Economic Development: Improve connectivity and mobility for strong economic vitality.
Goal 5. Mobility: Increase travel efficiency and mode choice and maintain the transportation system in a state of good repair.

**A copy of the presentation given by Sulabh Aryal is available at:
LRTP Process Update Task 2, Task 3, and Task 4

5. LRTP Process Update Task 3: Planning

Staff is working with the committee and the Project Champions to develop regionally significant transportation projects within the RRTPO's Metropolitan Planning Area (MPA) Boundary. The product will be a streamlined list of regional transportation projects which will be called the Universe of Projects. Staff anticipate completing the list by the end of the year. The Universe of Projects is targeted for approval by the LRTP Advisory Committee by January 2021.

6. LRTP Process Update Task 4: Programming

Staff developed objectives within each goal and performance measures which measure each objective. The development of project scoring, ranking and prioritization methodology or guidelines are based on established performance measures (FHWQ recommendation). The performance measures feed into Task 4.0 Project Selection, Prioritization Process and Scoring. Additionally, staff will obtain the financial revenue projections from VDOT and DRPT to be able to develop the allocation guidelines for different time bands based on those revenue projections.

The final product for Task 4 is a constrained list of projects for the long-range transportation plan by time band. Private local projects that are regionally significant and are funded by other sources (outside of the constrained list) as well as unfunded regional projects need to be included in the plan. Task 4.1 LRTP Fiscally Constrained Plan Development is the core product of this task.

The categorization of the following prioritization approaches (project selection performance measures) will be discussed in detail at the next LRTP AC meeting:

- Goal-Based Subjective
- Goal-Based Qualitative
- Performance-Based
- Hybrid Goal and Performance-Based

7. Next LRTP Advisory Committee Meeting: TBD

The next meeting will be scheduled in December after utilizing Doodle online polling to vote on the dates that best fit each member's schedule.
The meeting was adjourned at 11:00 a.m. on October 22, 2020.

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Connect RVA 2045

Vision

Transportation in the Richmond Region will reliably connect people, prioritize interconnected opportunities for all to thrive and live healthy lives, promote economic development, respect environmental stewardship, and support an exceptional quality of life.

Guiding Principles

1. A safe, well-maintained and interconnected transportation system that accommodates advances in technology.
2. Choice among all travel options (passenger vehicle, truck, rail, barge, air, vanpooling/carpooling, transit, bike, walk, micromobility) regionwide.
3. Prioritize completion of regional bicycle & pedestrian networks for the benefit of individual and community health.
4. A transit network which delivers comprehensive, effective service including areas of greatest need and key destinations.
5. Equity and inclusion in all transportation spending decisions in the region with a focus on historically disregarded communities.
6. Efficient movement of goods across the transportation network.
7. Alignment of transportation investment with land use, community health, and environmental stewardship.

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Goals & Objectives

Safety

Improve the safety of the transportation system for all people.

1A. Reduce the number of crashes
1B. Reduce fatalities and serious injuries

Environment/Land Use

Reduce the negative impact the transportation system has on the natural and built environment.

2A. Address roadways prone to flooding
2B. Reduce transportation related pollutants
2C. Reduce VMT (vehicle miles travelled) per capita
2D. Increase number of trips traveled through active transportation modes
2E. Tie the land use potential to transportation investments

Equity/Accessibility

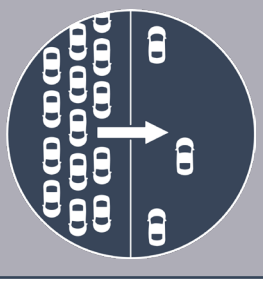
Improve accessibility and mode choice for all people.

3A. Reduce peak period travel times
3B. Reduce trip lengths for all populations with a focus on Environmental Justice (EJ) populations
3C. Increase access to jobs and community services via transit, walking and biking for all populations with a focus on Environmental Justice (EJ) populations

Economic Development

Improve connectivity and mobility for strong economic vitality

4A. Increase transportation investment which focuses on economic development
4B. Improve reliability of travel to and within regional activity centers
4C. Reduce freight bottlenecks and restrictions
4D. Increase multimodal access to tourist destinations



Mobility

Increase travel efficiency and mode choice, and maintain the transportation system in a state of good repair

5A. Increase the percent of the network that incorporates complete streets elements
5B. Increase system efficiency through technology-based projects
5C. Improve system reliability

ConnectRVA2045 Project Evaluation and Scoring Process (Draft)

1.0 Introduction

The purpose of this report is to describe the methodology which RRTPO staff will be using in the evaluation (Task 4.0) of the universe of transportation projects as vetted and approved by the LRTP-Advisory Committee (AC) for consideration and inclusion in the fiscally constrained 2045 Long Range Transportation Plan, also known as ConnectRVA 2045 or simply the plan. The scale and type of projects eligible to be specifically listed in the plan are described in the 'ConnectRVA 2045 Project Inclusion Guideline' (included here in the Appendices) and are generally thought of as projects of regional significance which will potentially be funded with federal and state funding sources.

An overall objective of the project evaluation process is to fully comply the RRTPO transportation planning process in the direction of a 'Performance-Based Planning and Programming (PBPP)' as directed by the federal transportation authorization bill 'Moving Ahead with Progress in the 21st Century Act' (MAP-21)' of 2012. which calls on metropolitan planning organizations, like the RRTPO, to establish a performance and outcome-based program for federal funding sources, and to invest resources in projects that collectively addresses the ten federal planning factors and make progress towards seven national goals. The 'Fixing America's Surface Transportation Act (FAST Act) of 2015 continued the performance-based planning and programming requirements of MAP-21.

A first step in applying PBPP principles was taken by the RRTPO staff by developing vision, guiding principles, goals and objectives for the plan (Task 2.0). RRTPO conducted a series of public surveys targeted for public input in defining what vision, goals, and objectives should be for the plan. The surveys were successful with around 1500 completed surveys. Based on the results of these surveys, staff synthesized the responses, closely aligned them with federal and state transportation goals and presented them to the LRTP-Advisory Committee for their input. The Vision, Guiding Principles, Goals and Objectives for the plan was then endorsed by the LRTP Advisory Committee (LRTP- AC) and RRTPO Policy Board (pending public review and adoption by the Policy Board in early January).

RRTPO staff have developed a performance-based evaluation method in which staff will be assessing the degree to which any given project will advance the region toward achieving one or multiple transportation goals and objectives and would be evaluated by a set of performance measures. This will be done through quantitative evaluation of project benefits to the extent possible given data and staff capacity constraints, in a way that is logically considered, uniform and consistent. Staff have tried to align some of the performance measures to the those used in the **Commonwealth's Smart Scale** project evaluation process.

RRTPO staff's intention is to assist LRTP-AC Members/Project Champions by providing full transparency prior to the project evaluation process and to come up with a **Needs-Based**, **Goal-Based** and **Performance-Based** fiscally constrained transportation project list for the

Richmond Metropolitan Planning Area. Any project not specifically listed in the plan, but which has a logical connection or potential impact on advancing one or multiple LRTP goals and objectives will be considered as Local/Programmatic Projects and will be 'consistent with the LRTP' in the future.

2.0 Project Evaluation Goals and Performance Measures

Each project in the 'Universe of Project' (Task 3.0) will be evaluated based on the five LRTP goals as established in Task 2.0:

- Safety
- Mobility
- Equity and Accessibility
- Economic Development
- Environment/Land Use

RRTPO conducted public on-line surveys from June to October 2020 to gain an understanding of the public opinions on the of transportation goals and priorities in the region. Exhibits 1 and 2 display the survey results.

Exhibit 1: Survey Results - Transportation Priorities

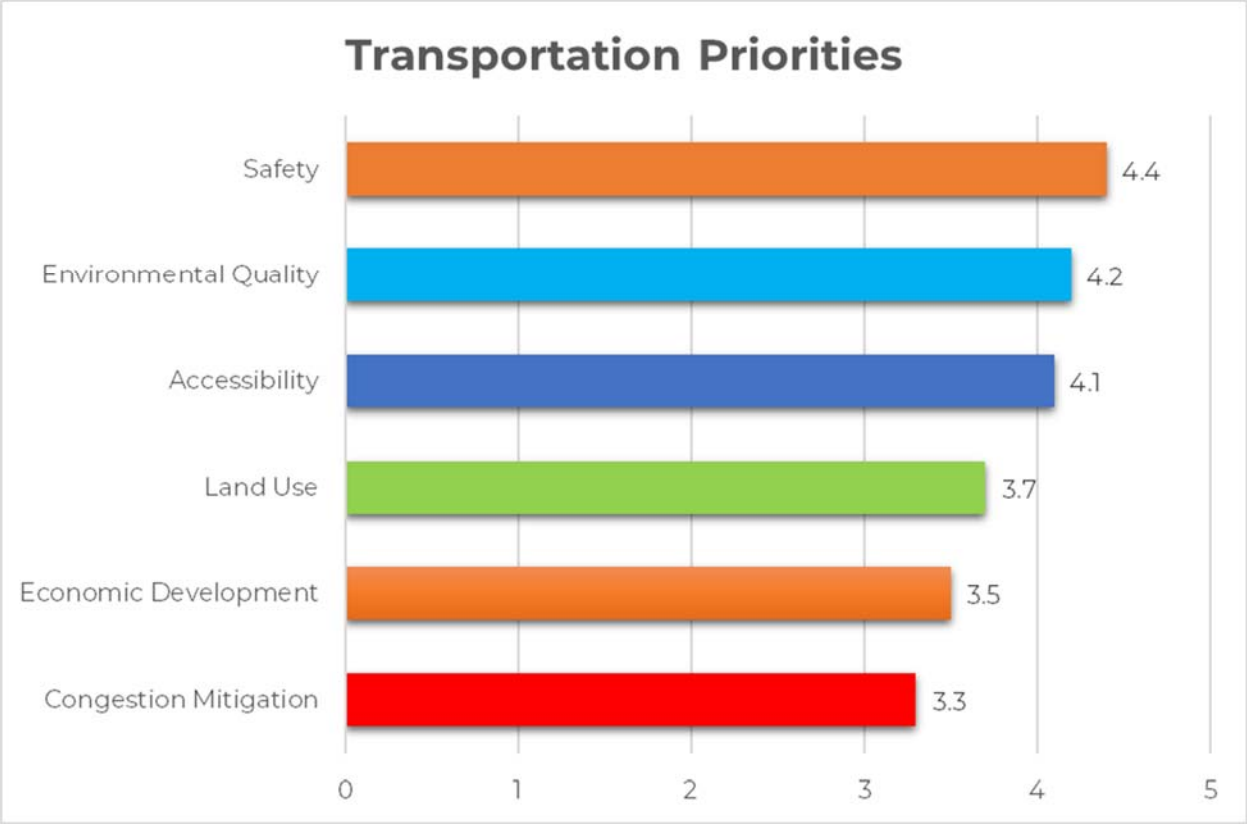
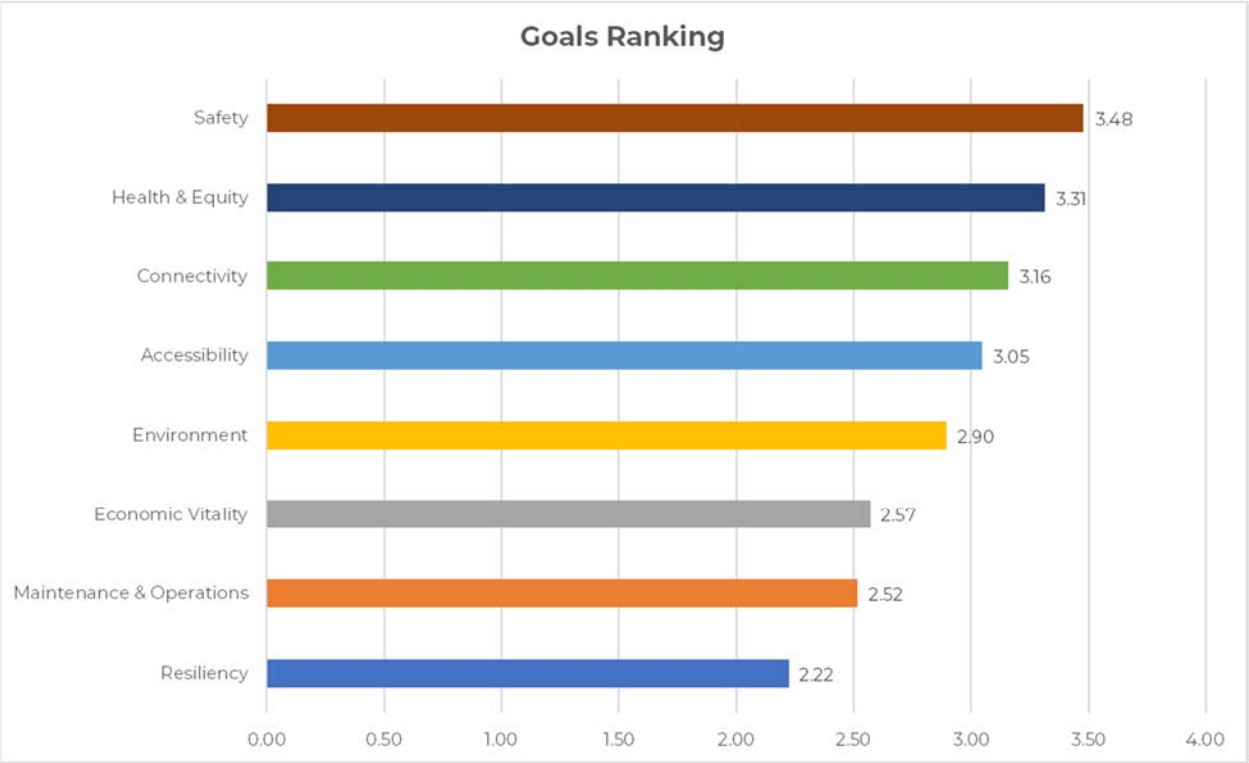


Exhibit 2: Survey Results - Transportation Goals



Guided by the survey inputs which provides priority of each goal, RRTPO staff recommend the following goal weights for project scoring in the LRTP. Performance Measures within each goal area would have different weights as well.

Exhibit 3: LRTP Goal Weights for Project Scoring

LRTP Goal	Goal Weight
Safety	25%
Mobility	10%
Equity and Accessibility	25%
Economic Development	15%
Environment/Land Use	25%
Total	100%

2.1 Safety

Safety is weighted at **25%** of the total project score. Safety will be evaluated based on two performance measures weighted as shown in Exhibit 4. These performance measures are based on Smart Scale Project Evaluation Measures and are modified and customized to suit RRTPO needs.

Exhibit 4: Safety Performance Measure Weights

Performance Measure (PM)	PM Weight
S1. Crash Frequency	70%
S2. Crash Rate	30%
Total	100%

For roadway (including bike/ped) projects both of the measures would be used. For transit and freight projects only the first measure is used

S.1. Crash Frequency

Description:

Reduction in Equivalent Property Damage Only (EPDO) of Fatal and Injury Crashes due to project implementation.

Explanation of Measure:

Equivalent Property Damage Only (EPDO) is a method used to standardize crashes based on severity. Virginia has adopted a statewide weighting for use in the Smart Scale program. For example, a crash resulting in a fatality or severe injury is weighted as heavily as 85 times that of a crash with only property damage. The full crash severity is listed below in Exhibit 5.

Exhibit 5: Crash Severity

Crash Severity	Rounded Value	Weighting
Fatality/Severe Injury	$850,000	85
Moderate Injury	$100,000	10
Mild Injury	$50,000	5
Property Damage Only	$10,000	1

This measure looks at the average number of fatal and injury crashes over a five-year period before and after the proposed improvement, weighted by severity. The expected change in crashes is calculated using a crash modification factor (CMF). Virginia has adopted

standardized CMFs for most project types based on research compiled by the Federal Highway Administration (FHWA) and state agencies.

Outcome Measured:

The change in the annual expected number of fatal and injury crashes weighted by severity (equivalent property damage only)

Data Requirements/Analytical Tools:

- Most recent five years of crashes from VDOT Roadway Network System (RNS) geospatial (GIS) data prepared by Traffic Engineering Division, removing alcohol-related crashes.
- SYIP to determine if and when improvements have been implemented in proximity to the project in the last five years
- ConnectRVA 2045 simplified Planning Level Crash Modification Factors (CMF) drawn from Virginia SMART Scale Panning Level Crash Modification Factors.

Methodology:

1. Compile five years of fatal and injury crashes within project limits. Project limits are defined at the start and end mile marker for any roadway or bike/ped segment improvements. The project limits for different types of project will be based on standard tiered approach. The project tier for each type of the project is listed in the appendices.
2. Review the SYIP to determine if any improvements have been made within the project limits. If so, shorten analysis period to the post-improvement period only.
3. Weight the severity of each crash by EPDO using the statewide Smart Scale weighting and calculate the average annual EPDO.
4. For roadway and bike/ped projects, find the appropriate crash modification factor (CMF) for the project improvements. The percent expected crash reduction (PECR) is calculated as follows: PECR = 1 – CMF. Most improvements have been standardized for statewide usage. For transit, passenger rail, and park and ride lots, the expected reduction in VMT will be used to calculate crash reduction. For freight rail, the expected reduction in truck traffic (and corresponding truck crashes) will be used.
5. Multiply the PECR by the annual average EPDO of fatal and injury crashes to determine the expected reduction

S.2. Crash Rate

Description:

Reduction in Equivalent Property Damage Only (EPDO) of Fatal and Injury Crashes per 1 Million Vehicles Miles Travelled (VMT) or 1 Million Vehicles

Explanation of Measure:

This measure builds on the data and expected crash reductions in Measure S.1. Whereas Measure S.1. is focused on the overall number of fatal and injury crashes, this measure is focused on the rate of fatal and injury crashes per million vehicle miles (segments) or million entering vehicles (intersections). This measure allows for better comparison between projects on routes with different traffic volumes.

Outcome Measured:

The change in the annual rate of fatal and injury crashes weighted by severity (equivalent property damage only) per 1 million vehicle miles (segments) or 1 million entering vehicles (intersections)

Data Requirements/Analytical Tools:

- All data used in S.1.
- Latest available VDOT Annual Average Daily Traffic (AADT) data

Methodology:

1. Determine the project limits as defined in S.1. For segments calculate the annual traffic volume for the base year in million vehicle miles (MVM = Length * ADT * 365 / 1,000,000). For projects that cross multiple segments, the annual traffic volume is calculated as the average volume for all segments. For intersections the measure is million entering vehicle (MEV = ½ * sum of ADT on all approaches * 365 / 1,000,000).
2. Calculate annual EPDO of fatal + injury crashes avoided (S.1.). Convert into crash rate using the following formula: Crash Rate Reduction = EPDO of fatal + injury crashes avoided / MVM or MEV as appropriate.

2.2 Mobility

Mobility is weighted at **10%** of the total project score. Mobility will be evaluated based on two performance measures weighted as shown in Exhibit 6. These performance measures are based on Smart Scale Project Evaluation Measures and are modified and customized to suit RRTPO needs.

Exhibit 6: Mobility Performance Measure Weights

Performance Measure (PM)	PM Weight
M1. Person Throughput	50%
M2. Person Hours of Delay	50%
Total	100%

M1. Person Throughput

Description:

Increase in corridor total (multimodal) person throughput attributed to the project.

Explanation of Measure:

The number of vehicles successfully entering the system (project limit) during the analysis period (peak period) is defined as vehicle throughput. By multiplying the vehicle throughput by the average vehicle occupancy rate person throughput can be determined. An average occupancy rate of 1.54 persons per vehicles will be used based on 2009 National Household Travel Survey (NHTS) Virginia Add-On. Peak period for the analysis is defined as AM Peak Period (6:30 AM-8:30 AM) or PM Peak Period (4:30 PM-6:30 PM).

Outcome Measured:

The potential benefit of the project in increasing the number of users (persons) served within the peak-period.

Data Requirements/Analytical Tools:

- 2017 -2045 Richmond-Tri-Cities (RTC) Regional Travel Demand Model
- Existing and Committed Highway and Transit Networks (E+C)
- Project Limit Shapefile
- Project Conceptual Sketches (for complex projects like interchanges)

Methodology:

1. Highway Projects

   This analysis requires the use of the RTC Travel Demand Model to estimate of future no-build (without project) and build (with project) person throughput. The project is added to the regional travel demand model and model outputs are then used to summarize project vehicle throughput.

   - Code the new facility into the RTC Travel Demand Model with assumed posted speed limit, facility type, and number of lanes.
   - Calculate total difference in Vehicles Hours Travelled (VHT) between the no-build model and the build model.
   - Multiplying the difference between the no-build VHT from the build VHT by 30% to convert to peak period delay reduction (expressed in vehicle hours).
   - Compute the average system project vehicle throughput by multiplying the difference between the no-build VHT from the build VHT by 60 to convert to vehicles minutes traveled and dividing this difference by the average trip length (expressed in minutes).
   - Multiply by average vehicle occupancy rate (1.54) to get the person throughput.

2. Transit/Active Transportation/Freight Projects

   For trips on other modes, estimate total person throughput for existing and new users in the peak period. For transit projects, compute the number of equivalent vehicles on roadway(s) within the impacted area using a forecasted ridership per hour and an assumed transit occupancy. Once the number of vehicles on impacted roadway(s) is computed, determine the peak period person throughput for no-build and build conditions by multiplying an average vehicle occupancy rate by the vehicle throughput.

M2. Person Hours of Delay

Description:

Decrease in the number of person hours of delay in the corridor attributed to the project.

Explanation of Measure:

The travel time (for all vehicles entering and attempting to enter the system during the analysis period) minus the theoretical travel time at the free-flow speed. This difference is divided by the number of vehicle trips to obtain mean delay per trip. The free-flow speed is defined as the minimum of the maximum safe speed.

Outcome Measured:

The potential benefit of the project in reducing peak-period person hours of delay.

Data Requirements/Analytical Tools:

- 2017 -2045 Richmond-Tri-Cities (RTC) Travel Demand Model
- Existing and Committed Highway and Transit Networks (E+C)
- Project Limit Shapefile
- Project Conceptual Sketches (for complex projects like interchanges)

Methodology:

1. Highway Projects

   This analysis requires the use of the RTC Travel Demand Model to estimate of future no-build (without project) and build (with project) person throughput and congested travel speeds. The project is added to the regional travel demand model and model outputs are then used to summarize project build vehicle delay. The total vehicle delay reduction is the cumulative effect at a system level.

   - Code the project into the RTC Travel Demand Model with assumed posted speed limit, facility type, and number of lanes.
   - Calculate total difference in Vehicles Hours Travelled (VHT) between the no-build model and the build model.
   - Multiply the difference between the no-build VHT from the build VHT by 30% to convert to peak period delay reduction (expressed in vehicle hours)
   - Compute the person peak period delay by multiplying the average vehicle delay by an average vehicle occupancy rate (1.54).

2. Transit/Active Transportation/Freight Projects

   For trips from other modes, estimate total person travel time savings for existing and new users in the peak hour. The person travel time savings for existing users is associated with any improvement in frequency or travel time associated with the project. No reduction in person hours of delay is assumed for active transportation projects.

2.3 Equity and Accessibility

Equity and Accessibility is weighted at **25%** of the total project score. Equity and Accessibility will be evaluated based on four performance measures weighted as shown in Exhibit 7. Fifty percent of the project score for this goal measure is only applicable to Environmental Justice Areas (EJ Areas) to make the project scoring process equitable. Overall, **Equity** is weighted as **10%** of the total project score.

Exhibit 7: Equity and Accessibility Performance Measure Weights

Performance Measure (PM)	PM Weight
EA1. Access to Jobs	30%
EA2. Access to Jobs (EJ Areas)	20%
EA3. Access to Destinations	30%
EA4. Access to Destinations (EJ Areas)	20%
Total	100%

EA1. Access to Jobs

Description:

Increase in average job accessibility per person (Travel Time of 30 minutes by auto, walking and biking, and 45 minutes by transit) for all population.

Explanation of Measure:

All the four accessibility performance measures are essentially calculating the change (Delta) in average access to jobs or destinations as a result of planned project improvements. The Delta comes from improvements in travel speed, pedestrian quality of service, or transit frequency, among other types of improvements. This Delta is evaluated by making modifications to the transportation network by specifying changes in travel speeds, added stops, new routes, reduced headway, etc. A decay factor reflecting decrease in the value resulting from reduced access to opportunities because of increased travel time.

Access to jobs is calculated for all areas within the RRTPO Metropolitan Planning Area (MPA) boundary and for all population residing within the MPA boundary.

Outcome Measured:

The average change in access to employment opportunities as a result of project implementation for all population.

Data Requirements/Analytical Tools:

- RRTPO Accessibility Analysis Tool
- Richmond-Tri-Cities (RTC) Travel Demand Model
- 2017 and 2045 Auto and Transit Skims from RTC Model for highway and transit projects

- Bicycle or pedestrian system connectivity changes for active transportation projects (as it relates to filling gaps in existing bike/ped network or the last mile connection to transit service).
- 2017 Base Year and 2045 Horizon Year total employment
- Existing and Committed Highway and Transit Networks (E+C)
- Project Limit Shapefile
- Project Conceptual Sketches (for complex projects like interchanges)

Methodology:

1. For all Highway, Transit and Active Transportation Projects

   This analysis requires the use of the RTC model and the RRTPO Accessibility Analysis Tool to estimate of future no-build (without project) and build (with project) job accessibility. The project is added to the RRTPO Accessibility Tool and outputs are then used to summarize average job accessibility.

   - Code the project into the RTC Travel Demand Model with assumed posted speed limit, facility type, and number of lanes for highway projects and additional stops, new routes, or reduced headway for transit projects. Flag the links for any connectivity changes due to any active transportation projects.
   - Extract the Auto and Transit Skims for the build and the no-build model runs and input it to the RRTPO Accessibility Analysis Tool.
   - The RRTPO Accessibility Analysis Tool calculates the improvement in number of jobs reachable within that travel time resulting from a proposed transportation improvement and generates job accessibility scores for each project. The average number of jobs reachable represents the total jobs accessible from each TAZ to every other TAZ.
   - Dividing the total reachable job divided by the TAZ population gives the total jobs per person. This calculation is done for all TAZ sets to get the average job accessibility per person.

2. For all other projects

   The change in average job accessibility per person is not measured for freight and rail projects.

EA2. Access to Jobs (EJ Areas)

Description:

Increase in average job accessibility per person (Travel Time of 30 minutes by auto, walking and biking, and 45 minutes by transit) for Environmental Justice (EJ) population

Explanation of Measure:

This measure is similar to the previous measure (EA2) except the fact that Access to Jobs (EJ areas) is calculated only for Environmental Justice Areas (EJ Areas or Disadvantaged Population Areas or Communities of Concern) within the RRTPO Metropolitan Planning Area (MPA) boundary and for EJ population residing within EJ Areas. Exhibit 8 show the EJ Areas in the Richmond region.

Outcome Measured:

The change in average access to employment opportunities as a result of project implementation for the Environmental Justice (EJ) population.

Data Requirements/Analytical Tools:

- All Data/Analytical tools required for EA1.
- EJ areas in the Richmond Region (EJ Flagged TAZs)
- EJ Population (Minority, Low Income, Elderly, Disabled, Limited English Proficiency (LEP) and Zero-Car Household population) for 2017 and 2045.

Methodology:

1. For all Highway, Transit and Active Transportation Projects

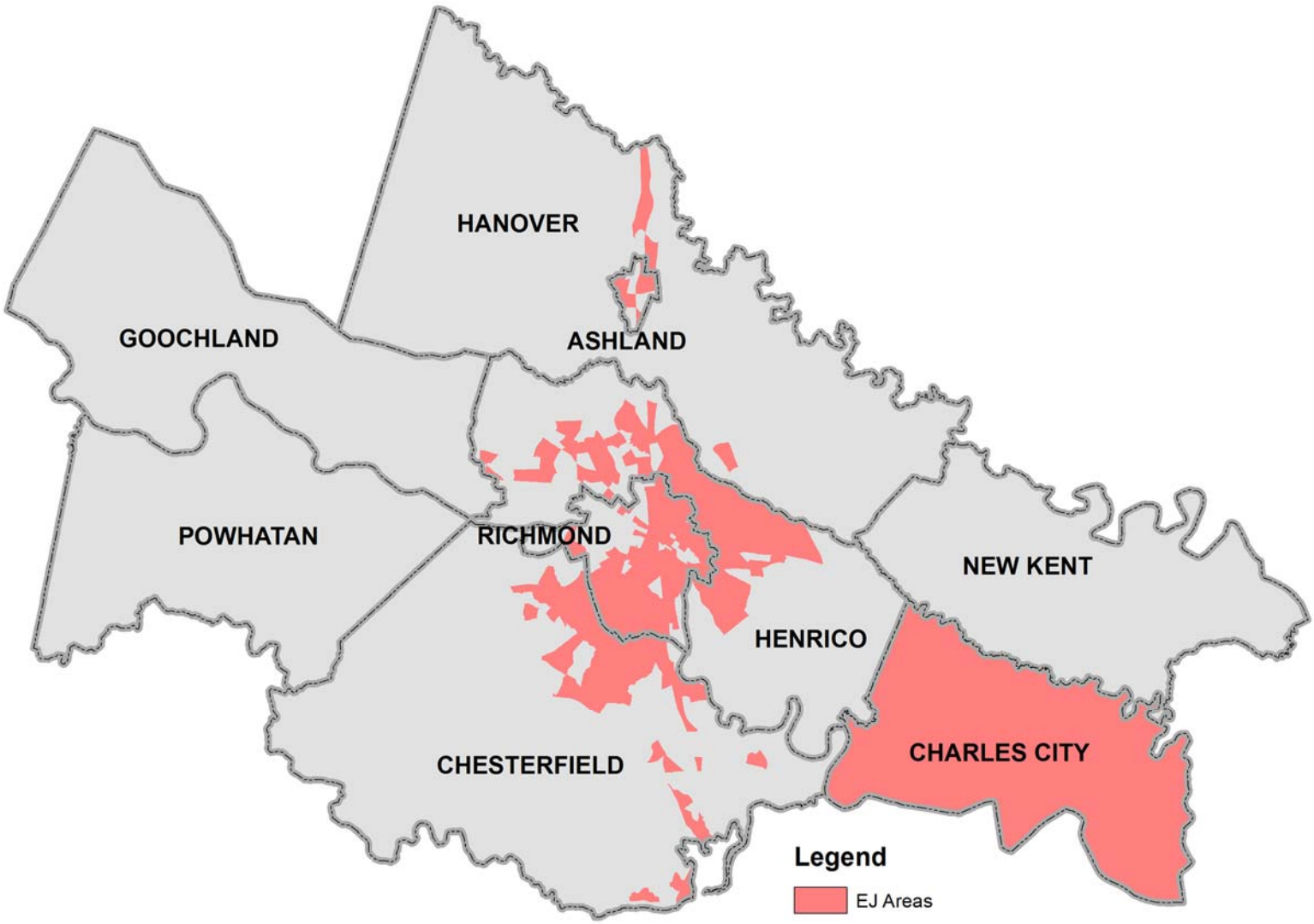
   The methodology is identical to EA2 with the following differences.

   - The average number of jobs reachable represents the total jobs accessible from EJ flagged TAZ to every other TAZ
   - To get the average job accessibility per person only EJ population residing within the EJ areas are considered.

2. For all other projects

   The change in average job accessibility per person for Environmental Justice (EJ) population is not measured for freight and rail projects.

Exhibit 8: EJ Areas in the Richmond Region



EA3. Access to Destinations

Description:

Increase in average access to weighted destinations per 1000 persons (Travel Time of 30 minutes for all modes) for all population.

Explanation of Measure:

This measure is similar to EA1 but instead of jobs it measures the change in average access to destinations as a result of planned project improvements. For this analysis - grocery stores, pharmacies, schools, colleges, health care facilities, parks, libraries and government centers are considered as destination. Each destination within each destination type is given a weighted

score in the range of 1 to 5. Each destination type is also weighted as essential (multiplier of 1.5) or non-essential (multiplier of 1) to establish a destination score by TAZ.

Outcome Measured:

The change in average access to weighted destinations per 1000 persons as a result of project implementation for all population.

Data Requirements/Analytical Tools:

- RRTPO Accessibility Analysis Tool
- Richmond-Tri-Cities (RTC) Travel Demand Model
- 2017 and 2045 Auto and Transit Skims from RTC Model for highway and transit projects
- Bicycle or pedestrian system connectivity changes for active transportation projects (as it relates to filling gaps in existing bike/ped network or the last mile connection to transit service).
- Destinations (Grocery Stores, Pharmacies, Schools, Colleges, Health Care Facilities, Parks, Libraries and Government Centers) location by TAZs.
- Existing and Committed Highway and Transit Networks (E+C)
- Project Limit Shapefile
- Project Conceptual Sketches (for complex projects like interchanges)

Methodology:

1. For all Highway, Transit and Active Transportation Projects

   This analysis requires the use of the RTC model and the RRTPO Accessibility Analysis Tool to estimate of future no-build (without project) and build (with project) destinations accessibility. The project is added to the RRTPO Accessibility Tool and outputs are then used to summarize average destinations accessibility.

   - Code the project into the RTC Travel Demand Model with assumed posted speed limit, facility type, and number of lanes for highway projects and additional stops, new routes, or reduced headway for transit projects. Flag the links for any connectivity changes due to any active transportation projects.
   - Extract the Auto and Transit Skims for the build and the no-build model runs and input it to the RRTPO Accessibility Analysis Tool.
   - The RRTPO Accessibility Analysis Tool calculates the improvement in number of weighted destinations reachable within that travel time resulting from a proposed transportation improvement and generates destination accessibility scores for each project. The average number of weighted destinations reachable represents the total weighted destinations accessible from each TAZ to every other TAZ.
   - The total reachable weighted destinations divided by the TAZ population gives the total weighted destination per person. Since this number is likely to be small, multiplying this by 1000 gives the total weighted destinations per 1000 people.

This calculation is done for all TAZ sets to get the average weighted destinations per 1000 people.

2. For all other projects

The change in average access to weighted destinations per 1000 persons is not measured for freight and rail projects.

EA4. Access to Destinations (EJ Areas)

Description:

Increase in average access to destinations per 1000 persons (Travel Time of 30 minutes for all modes) for Environmental Justice (EJ) population.

Explanation of Measure:

This measure is similar to the previous measure (EA3) except the fact that Access to Destinations (EJ areas) is calculated only for the EJ population residing within EJ Areas.

Outcome Measured:

The change in average access to weighted destinations per 1000 persons as a result of project implementation for the Environmental Justice (EJ) population.

Data Requirements/Analytical Tools:

- All Data/Analytical tools required for EA3.
- EJ areas in the Richmond Region (EJ Flagged TAZs)
- EJ Population (Minority, Low Income, Elderly, Disabled, Limited English Proficiency (LEP) and Zero-Car Household population) for 2017 and 2045.

Methodology:

1. For all Highway, Transit and Active Transportation Projects

The methodology is identical to EA3 with the following differences.

- The number of destinations reachable represents the total destinations accessible from EJ flagged TAZ to every other TAZ.
- To get the average weighted destinations per 1000 persons only EJ population residing within the EJ areas are considered.

2. For all other projects

The change in average access to weighted destinations per 1000 persons for Environmental Justice (EJ) population is not measured for freight and rail projects.

2.4 Economic Development

Economic Development is weighted at **15%** of the total project score. Economic Development will be evaluated based on four performance measures weighted as shown in Exhibit 8.

Exhibit 9: Economic Development Performance Measure Weights

Performance Measure (PM)	PM Weight
ED1. Job Growth	50%
ED2. Connection to Truck Intensive Areas	25%
ED3. Truck Throughput	25%
Total	100%

ED1. Job Growth

Description:

Increase in the decay weighted quantity of 2015-2040 job growth adjacent to the project.

Explanation of Measure:

This measure is focused on the relation between job growth and proposed improvements. The approach is adapted from Smart Scale Project Evaluation Measures following an approach proposed for the Harrisonburg MPO. The RRTPO has adopted standardized buffers for each project tier as shown below in Exhibit 9. This measure looks at the change in jobs by TAZ from 2017 to 2045. Projects are given credit based on the percentage of the TAZ within the buffer. Depreciation is used to reduce credit for jobs farther from the project but within the buffer. The depreciation schedule is shown below in Exhibit 10. The project tier for each type of the project is listed in the appendix.

Exhibit 10: Project Tier Buffer and Depreciation

Project Tier	Buffer	Depreciation
Tier 1	0.5 miles	50%
Tier 2	1 mile	25%
Tier 3	2 miles	12.50%

Outcome Measured:

Total number of expected new jobs served by the project.

Data Requirements/Analytical Tools:

- 2017 Base Year and 2045 Horizon Year employment data by Traffic Analysis Zones (TAZs)
- Richmond Region's TAZs boundary shapefile

- Project limits shapefile

Methodology:

1. Add the project to the GIS map. For each project, create a multiple ring buffer at ¼ mile increments up to the influence buffer distance based on the project type. The dissolve option should be left at the default when creating the multiple ring buffer to create distinctive rings.
2. Use the intersect tool to calculate the overlap between each project ring and each TAZ. Filter results to remove features with no overlap.
3. Calculate job increases credited to project for each overlap area using the following formula: Jobs Served = (Future Year Employment - Base Year Employment) * (Overlap Area / Total TAZ Area) * (1 – ((Buffer Ring Distance – 0.25) / 0.25) * Depreciation Rate))
4. Sum jobs served in all overlaps to get the total number of new jobs served by the project.

ED2. Connection to Truck Intensive Areas

Description:

Increase in the Truck Intensive Units adjacent to the project from 2017 to 2045.

Explanation of Measure:

This measure calculates the connection of a project to the truck intensive areas in the Richmond region. Truck intensive areas are areas where the rate of truck trip ends per employee is higher than usual because they contain a concentration of industrial or warehousing land uses or a specific truck generating activity, such as a truck stop, an intermodal transfer facility, or a trucking firm office. The truck intensive areas were determined based on local knowledge and by reviewing aerial satellite photos of the Richmond region. Exhibit 11 shows the truck intensive areas in the Richmond region. Using the standardize project tier buffers, the areas within truck intensive areas served by a project can be identified. The percentage of the truck intensive area served is used to calculate the number of New truck Intensive Units attributed to a project. The standard project buffers as shown in Exhibit 9 will be used.

Outcome Measured:

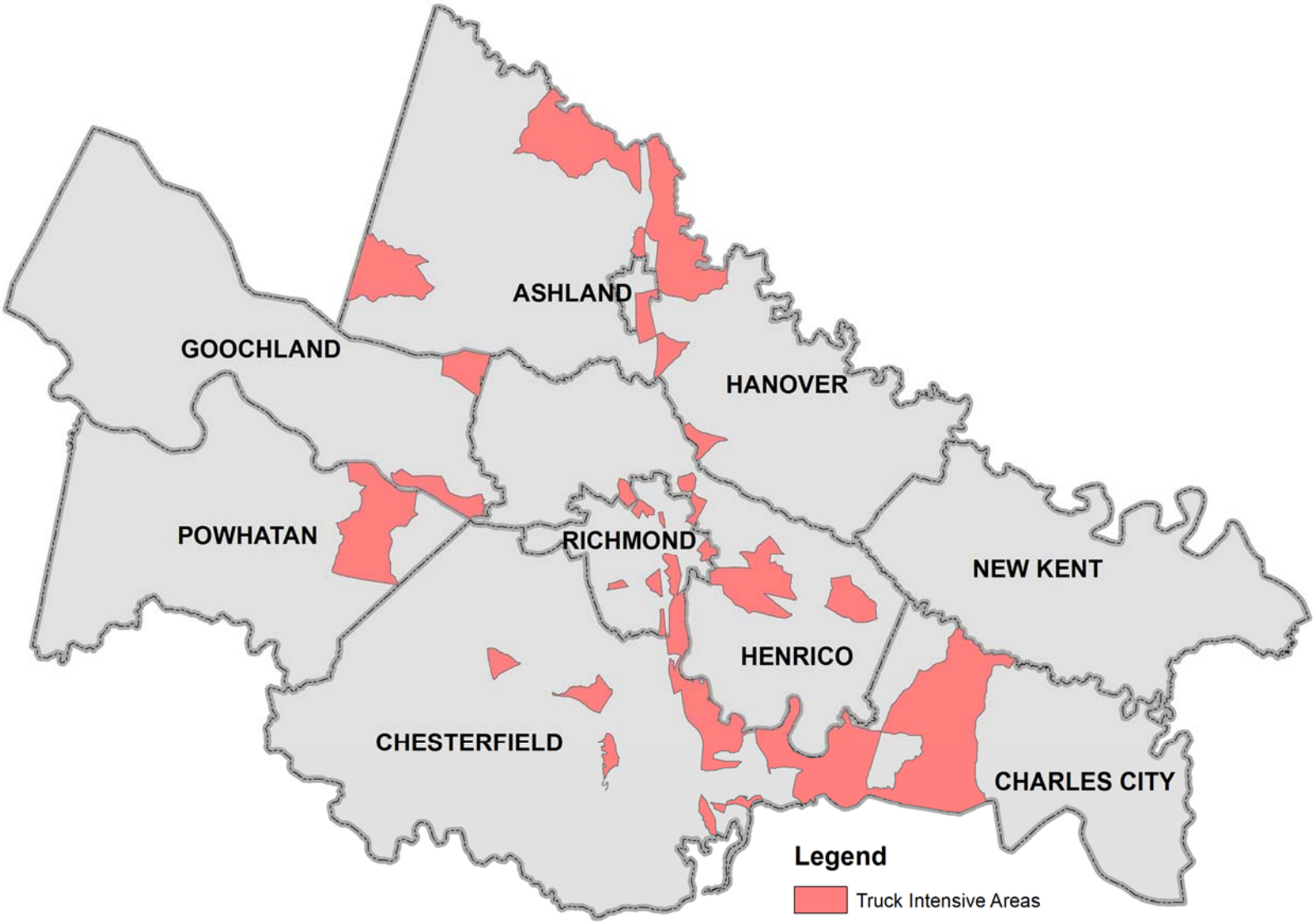
New Truck Intensive Units from 2017 to 2045 in the Truck Intensive Areas served by the project.

Data Requirements/Analytical Tools:

- Truck Intensive Areas geographical dataset

- 2017 Base Year and 2045 Horizon Year total employment and truck intensive employment by Truck Intensive Area. Truck Intensive employment is defined as employment related to Freight Intensive 'North American Industry Classification System (NAICS) 2-digit' sectors like agriculture, mining, construction, manufacturing, transportation, and retail and wholesale trade within the Truck Intensive Areas.
- Project limit shapefile

Exhibit 11: Truck Intensive Areas in the Richmond Region



Methodology:

1. Buffer each project using the standard project buffer for the project tier.
2. Use the intersect tool to calculate the overlap between Truck Intensive Areas and the buffer.
3. Calculate the percentage of each Truck Intensive Areas within the buffer (overlap area / total activity center area). Where multiple Truck Intensive Areas are overlapped, calculate each separately.
4. Calculate the change in Truck Intensive Units for overlapped Truck Intensive Areas: (2045 Total Employment + 2045 Truck Intensive Employment) – (2017 Total Employment + 2017 Truck Intensive employment)
5. Calculate the change in Truck Intensive Units served by the project using the following formula - Truck Intensive Units Served = Change in Truck Intensive Units * Percentage of Truck Intensive Units Overlapped by Buffer
6. If multiple Truck Intensive Units are overlapped, sum the results from Step 5 to get the total number of new units served

ED3. Truck Throughput

Description:

Increase in corridor total truck throughput attributed to the project

Explanation of Measure:

The number of trucks present at the start plus those attempting to enter and successfully entering the system (project limit) during the analysis period (24-hour period) is defined as truck throughput. Truck means heavy trucks, defined as those with three or more axles or pulling a trailer. In the FHWA standard classification scheme, this is classes 6 through 13.

Outcome Measured:

The potential benefit of the project in increasing the number trucks served through the project within a day (24-hour period).

Data Requirements/Analytical Tools:

- 2017 -2045 Richmond-Tri-Cities (RTC) Regional Travel Demand Model
- Existing and Committed Highway and Transit Networks (E+C)
- Project Limit Shapefile
- Project Conceptual Sketches (for complex projects like interchanges)

Methodology:

1. Highway Projects

   This analysis requires the use of the RTC Travel Demand Model to estimate of future no-build (without project) and build (with project) truck throughput. The project is added to the regional travel demand model and model outputs are then used to summarize project vehicle throughput.

   - Code the new facility into the RTC Travel Demand Model with assumed posted speed limit, facility type, and number of lanes.
   - Calculate total difference in Truck Hours Travelled (THT) between the no-build model and the build model.
   - Compute the average system project truck throughput by multiplying the difference between the no-build THT from the build THT by 60 to convert to truck minutes traveled and dividing this difference by the average trip length (expressed in minutes).

2. Transit/Active Transportation/Freight Projects

   For trips on other modes, estimate total truck throughput for existing and new trucks in the 24-hour period. For Transit and Active Transportation project no truck throughput is attributed to the project.

2.5 Environment/Land Use

Environment/Land Use is weighted at **25%** of the total project score. Environment/Land Use will be evaluated based on four performance measures weighted as shown in Exhibit 12.

Exhibit 12: Environment/Land Use Performance Measure Weights

Performance Measure (PM)	PM Weight
EL1. Sensitive Features	15%
EL2. Air Pollution	30%
EL3. VMT per Capita	30%
EL4. Connection to Activity Centers	25%
Total	100%

EL1. Sensitive Features

Description:

Percentage of Wetlands, Resiliency Water Hazard Zones, Conserved Land, Habitat, and Cultural Resources in 1/4 mile of the project limit.

Explanation of Measure:

Infrastructure projects have impacts on watersheds, wetlands, and habitats among many other aspects of the natural environment. Additionally, building in environmentally sensitive areas such as floodplains or storm surge areas can result in reduced functionality during storms. Beyond the natural areas, lands are sometimes set aside for public use or conserved from development due to natural, agricultural, or historic value – a value that can be impaired by adjacent development. This measure seeks to weigh the potential for negative impacts on the environment and conserved lands from a project.

Outcome Measured:

Percentage of environmentally sensitive and conservation lands within ¼ mile of the project. This measure is an inverse measure meaning that a project with no impacts will receive the highest score.

Data Requirements/Analytical Tools:

Following geographic features datasets in a spatial format like shapefile:

- National Wetlands Inventory
- Department of Game and Inland Fisheries (DGIF) Species Habitats
- DGIF Conservation Lands
- Department of Conservation and Recreation (DCR) Easements
- Department of Forestry (DOF) Agricultural/Forestry Lands
- Department of Historic Resources (DHR) National Register Listed Sites

- National Park Service Potential National Register Battlefield
- Storm Surge from Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model - Category 2
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) (100-Year Floodplain)
- National Oceanic and Atmospheric Administration (NOAA) sea level rise (2-ft)
- Project limits shapefile

Methodology:

1. Dissolve all environmentally sensitive areas into one feature.
2. Create a ¼ mile buffer around each project.
3. Run the union tool to determine the areas of overlap between the buffer and the environmental and conservation areas feature.
4. Calculate the percentage of the buffer area in a sensitive or conserved area by dividing the area of the union by the total area of the buffer.

EL2. Air Pollution

Description:

Reduction of annual VOC and NOx emissions in metric tons attributed to the project.

Explanation of Measure:

Environmental Protection Agency (EPA) has set National Ambient Air Quality Standards (NAAQS) for six common air pollutants (also known as "criteria air pollutants"). These pollutants can harm our health and the environment, and cause property damage. Some of these pollutants are emitted to the atmosphere through passenger vehicle transportation. The pollutant emissions from passenger vehicle transportation includes ozone precursors-volatile organic compounds (VOC) and nitrogen oxides (NOx), and other pollutants particulate matter (PM2.5 and PM10), sulfur oxides (SOx) and carbon monoxide (CO). Since the Richmond region historically had issues meeting the ozone standard, the current Air Pollution measure analysis has been streamlined to limit to ozone precursors only i.e. VOC and NOx. Transportation-related SOx, CO, and PM2.5, PM10 are not a concern in the Richmond region. These emissions can be calculated at the project scale on the basis of per-mile factors. This measure seeks to weigh the potential emission reduction due to the change in travel characteristics attributed to the project. If there is reduction in pollutant emission attributed to the project, then the project be will given a score.

Outcome Measured:

Annual reduction of the pollutant emissions in metric ton.

Data Requirements/Analytical Tools:

- 2017 -2045 Richmond-Tri-Cities (RTC) Regional Travel Demand Model
- Existing and Committed Highway and Transit Networks (E+C)
- Project Limit Shapefile
- Project Conceptual Sketches (for complex projects like interchanges)
- National average on-road passenger vehicle fuel economy from Environmental Protection Agency (EPA) data i.e. 22miles/gallon of gasoline.
- National average criteria pollutant emissions rates from the EPA Motor Vehicle Emission Simulator (MOVES) model (Exhibit 13)

Exhibit 13: National average criteria pollutant emissions rates

Pollutant	Average Emission Rates	Emission Calculation
NOx	0.9018 grams/mile	(VMT/Fuel economy) * NOx Emission Rate
VOC	0.686 grams/mile	(VMT/Fuel economy) * VOC Emission Rate

Methodology

1. Highway Projects

   This analysis requires the use of the RTC Travel Demand Model to estimate of future no-build (without project) and build (with project) annual pollutant emissions in metric tons. The project is added to the regional travel demand model and model outputs are then used to summarize annual pollutant emissions.

   - Code the project into the RTC Travel Demand Model with assumed posted speed limit, facility type, and number of lanes.
   - Calculate daily emissions for each pollutant as shown in exhibit 12.
   - Calculate the total annual emissions for all pollutants. Total Annual Emissions = Daily emissions (NOx + VOC) * 365 tons.
   - Calculate total difference in annual emissions between the no-build model and the build model.

2. Transit/Active Transportation/Freight Projects
   For other modes, estimate reduction in total VMT due to the implementation of the project. The VMT reduction is associated with a shift of demand from auto to the other modes. For the highway network, total VMT may be reduced, because of the new demand in other mode or parallel facilities.

EL3. VMT Per Capita

Description:

Reduction in daily Vehicle Miles Travelled (VMT) per capita attributed to the project.

Explanation of Measure:

Vehicle miles traveled (VMT) is a measure used extensively in transportation planning. It measures the amount of travel for all vehicles in a geographic region over a given period of time (daily or 24-hour period for this analysis). It is calculated as the sum of the number of miles traveled by all vehicles on all roadways. When divided by the total population of a geographical unit (RTC Model Area) the VMT per capita is determined. Decrease in VMT per capita is an indicator attributed to a project for a better integration of transportation planning and land use planning.

Outcome Measured:

The potential benefit of the project by the reduction of daily VMT per capita

Data Requirements/Analytical Tools:

- 2017-2045 Richmond-Tri-Cities (RTC) Travel Demand Model
- Existing and Committed Highway and Transit Networks (E+C)
- Project Limit Shapefile
- Project Conceptual Sketches (for complex projects like interchanges)

Methodology:

1. Highway Projects

   This analysis requires the use of the RTC Travel Demand Model to estimate of future no-build (without project) and build (with project) VMT per capita. The project is added to the regional travel demand model and model outputs are then used to summarize project build VMT per capita. The VMT per capita is the calculated at the system level.

   - Code the project into the RTC Travel Demand Model with assumed posted speed limit, facility type, and number of lanes.
   - Calculate total difference in VMT per capita between the no-build model and the build model.

2. Transit/Active Transportation/Freight Projects

   For other modes, estimate reduction in total VMT per capita. The VMT reduction is associated with a shift of demand from auto to the other modes. For the highway

network, total VMT may be reduced, because of the new demand in other mode or parallel facilities.

EL4. Connection to Activity Centers

Description:

Increase in the Activity Center Units adjacent to the project from 2017 to 2045.

Explanation of Measure:

This measure calculates the connection of a project to activity centers, or areas with concentrations of population and employment within the region that are the hubs of regional activity. Exhibit 14 shows the 20 Activity Centers in the Richmond region. Methodology used for the delineation of the regional Activity Centers can be found in the *2045 Long Range Growth Forecast Analysis* report. Using the standardize project tier buffers as shown in Exhibit 9, the areas within activity centers served by a project can be identified. The percentage of the activity center served is used to calculate the number of new activity units attributed to a project.

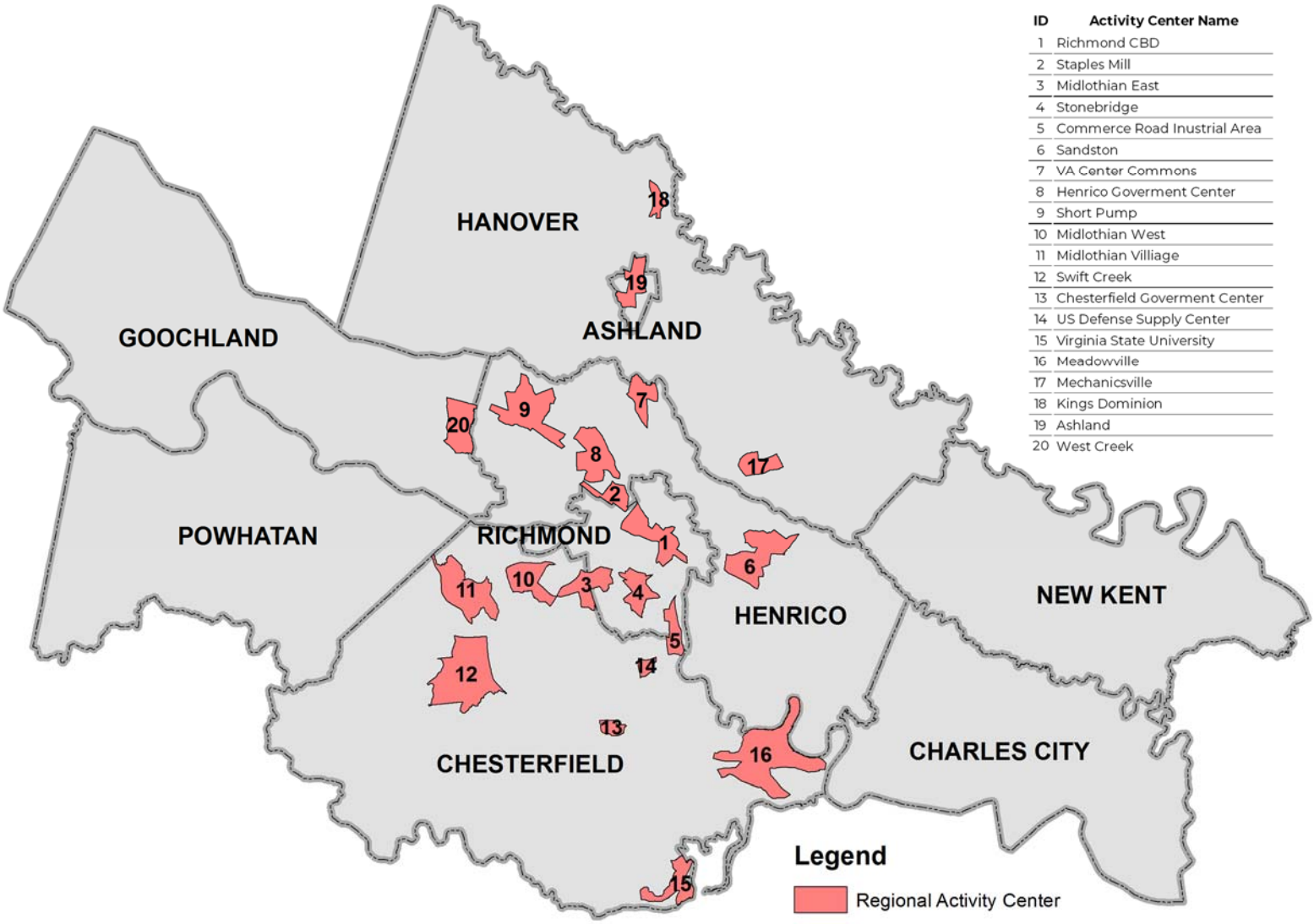
Outcome Measured:

New Activity Center Units from 2017 to 2045 in the Activity Centers served by project.

Data Requirements/Analytical Tools:

- Regional Activity Centers geographical dataset
- 2017 Base Year and 2045 Horizon Year employment by Activity Center
- 2017 Base Year and 2045 Horizon Year population by Activity Center
- Project limit shapefile

Exhibit 14: Regional Activity Centers



ID	Activity Center Name
1	Richmond CBD
2	Staples Mill
3	Midlothian East
4	Stonebridge
5	Commerce Road Inustrial Area
6	Sandston
7	VA Center Commons
8	Henrico Goverment Center
9	Short Pump
10	Midlothian West
11	Midlothian Villiage
12	Swift Creek
13	Chesterfield Goverment Center
14	US Defense Supply Center
15	Virginia State University
16	Meadowville
17	Mechanicsville
18	Kings Dominion
19	Ashland
20	West Creek

Methodology:

1. Buffer each project using the standard project buffer for the project tier.
2. Use the intersect tool to calculate the overlap between activity centers and the buffer.
3. Calculate the percentage of each activity center within the buffer (overlap area / total activity center area). Where multiple activity centers are overlapped, calculate each separately.
4. Calculate the change in activity units for overlapped activity centers: (Future Employment + Future Population) – (Base Employment + Base Population)

7. Calculate the change in activity units served by the project using the following formula: Activity Units Served = Change in Activity Units * Percentage of Activity Center Overlapped by Buffer
8. If multiple activity centers are overlapped, sum the results from Step 5 to get the total number of new units served.

3.0 Project Scoring

The following steps will be used to score all the projects:

1. Calculate raw value for all the 15 Performance measures within the Five Goal categories for each project.
2. For each performance measure the highest value is determined after calculating the raw values for all the projects. The highest value is given a normalized value of 100. Other values are normalized by providing the percentage value of the highest value. This process is repeated for all projects.
3. Once the normalized value has been assigned for all the performance measures within the goal categories, they will be applied the performance measure weights.
4. Once the performance measure weights are applied, the sum of the normalized performance measure value will produce the Goal value.
5. The goal weight is then applied to the goal value. This is repeated for all the goal categories.
6. This gives us the Weighted Goal value
7. Summing all the weighted goal value gives the project Benefit Score
8. The total project cost of the project is recorded.
9. The project Benefit Score is then divided by the total project Cost (in $10 million) to determine the ConnectRVA 2045 Project Score.

All the projects in the 'Universe of Projects' will be ranked based on the ConnectRVA 2045 Project Score. The project getting the highest score will be ranked first, followed by the project ranking second and so on.
The ConnectRVA 2045 project Scoring Sheet is provided in the appendices.

Project Readiness

The Project Readiness component is intended to provide an additional criterion to evaluate the relative merits of similar scoring projects and be used to determine which Timeband a project falls into. Project Readiness will not directly factor into the ConnectRVA 2045 Project Score. Projects which have completed EA (Environment Assessment) or EIS (Environment Impact Statement) as required by the National Environmental Policy Act (NEPA); completed IMR (Interchange Modification Report) or IJR (Interchange Justification Report) or conducted any public outreach (public meeting, survey, etc.) will be eligible for Project Readiness.

4.0 Appendices

Appendix 1. ConnectRVA 2045 Project Scoring Sheet

Steps	LRTP Goals	Safety		Mobility		Equity and Accessibility				Economic Development			Environment/Land Use			
	Project Performance Measure (PM)	Crash Frequency	Crash Rate	Person Throughput	Person Hours of Delay	Access to Jobs	Access to Jobs (EJ)	Access to Destinations	Access to Destinations (EJ)	Job Growth	Connection to Truck Intensive Areas	Truck Throughput	Sensitive Features	Air Pollution	VMT per Capita	Connection to Activity Centers
1	PM Value															
2	Normalized PM Relative to other Submissions															
3	PM Weight	70%	30%	50%	50%	30%	20%	30%	20%	50%	25%	25%	15%	30%	30%	25%
4	Goal Value															
5	Goal Weight	25%		10%		25%				15%			25%			
6	Weighted Goal Value															
7	Project Benefit															
8	Project Cost															
9	ConnectRVA 2045 Project Score Benefit divided by cost in tens of millions															

Appendix 2. Regional Projects based on Project Inclusion Guidelines and Project Tiers

1. Roadway Projects
   For projects located on roads in the Richmond/Tri-Cities travel demand model network

   A. Capacity Change (add/remove lane; change use of lane e.g. HOV or HOT lanes, bus lanes) **– Tier 3 for Major Arterial and above, Tier 2 for minor arterial and below**
   B. Realignment, extension, or relocation **– Tier 3 for Major Arterial and above, Tier 2 for minor arterial and below**
   C. New interchange or interchange modification **– Tier 3**
   D. Grade separation (overpass or underpass) **– Tier 3 for Major Arterial and above, Tier 2 for minor arterial and below**
   E. Intersection improvements on arterials **– Tier 2**
   F. New road or alignment that will be added to the Richmond/Tri-Cities travel demand model network **– Tier 3 for Major Arterial and above, Tier 2 for minor arterial and below**

2. Bridge Projects
   A. Replacement of National Bridge Inventory (NBI) structure in the National Highway System (NHS) **– Tier 3 for Major Arterial and above, Tier 2 for minor arterial and below**
   B. Major Rehabilitation of National Bridge Inventory (NBI) structure in the National Highway System (NHS) **– Tier 3 for Major Arterial and above, Tier 2 for minor arterial and below**

3. Transit Projects
   A. New dedicated transit right-of-way **– On-Road: Tier 3 for Major Arterial and above, Tier 2 for minor arterial and below, Off-Road: Tier 3**
   B. New transit routes with limited stations and high operating speed (BRT/Express Routes) **– Tier 2**
   C. New fixed route or on-demand service that crosses jurisdictional boundaries **– Tier 1**
   D. New or relocated transit stations or centers **– Tier 2**
   E. New park and ride lots with 100 or more spaces **– Tier 3**
   F. Park and ride lot expansion of 100 or more spaces **– Tier 3**

4. Active Transportation Projects
   A. Projects on separated facilities within dedicated right-of-way **– Tier 1**
   B. Projects that are part of a multi-jurisdictional network **– Tier 1**
   C. Projects that fill gaps identified in the Regional Bicycle and Pedestrian network -**Tier 1**
   D. Projects that directly connect to existing transit service **– Tier 1**

5. Intermodal Projects
   A. Capacity change in intermodal corridors including highways, navigable waterways, and rail **– Tier 3**

B. New or relocated rail stations **– Tier 3**
C. Major rail improvements **– Tier 3**