Promising Greenhouse Gas Reduction Strategies for the Boston Region

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EXECUTIVE SUMMARY

The Commonwealth of Massachusetts enacted the Global Warming Solutions Act (GWSA) in 2008, creating a framework for reducing greenhouse gas (GHG) emissions statewide. The transportation sector has a key role to play in meeting the emission reduction goals set by the GWSA: 1) emission reductions between 10 and 25 percent below 1990 levels by 2020; and 2) 80 percent below 1990 levels by 2050.

Supporting the Commonwealth's aims, the Boston Region MPO established a Clean Air and Clean Communities goal in its Long-range Transportation Plan (LRTP), *Charting Progress to 2040*, and stated its objective to "reduce GHGs generated in the Boston region by all transportation modes." As an organization engaged in performance-based planning, the MPO will measure progress toward this objective and support the Massachusetts Department of Transportation (MassDOT)'s emission impacts reporting requirements by tracking the projected GHG emissions of projects programmed in its LRTP and Transportation Improvement Program (TIP).

Further, the MPO has been exploring GHG emission reduction strategies that could be implemented through its own funding programs and strategies the MPO could encourage other entities in the Boston region to advance. Transportation investment approaches for reducing GHG emissions were analyzed for cost-effectiveness and relevance in the 2016 *Greenhouse Gas Reduction Strategy Alternatives: Cost-Effectiveness Analysis* report. This report, *Promising Greenhouse Gas Reduction Strategies for the Boston Region*, follows up on that previous study's recommendations, in particular, detailing the results of an effort to identify cost-effective strategies employed by other transportation agencies and MPOs in the Northeast and Mid-Atlantic states. The findings may help inform the Boston Region MPO's investment decisions and planning processes as it works towards achieving the aforementioned emission reduction goals.

Nine promising GHG emission reduction strategies were the focus of this research:

- Workplace Transportation Demand Management
- Teleworking
- Individualized Marketing of Transportation Service
- Ridesharing
- Carsharing
- Pedestrian Improvements
- Bicycling Improvements

- Information on Vehicle Purchases (primarily policies to promote electric vehicle purchases)
- Parking Management

This report details the experience of these agencies with these strategies. Nearly all the organizations we interviewed completed GHG inventories for identifying GHG reduction strategies, but few reported having measured the progress of their GHG emission reduction initiatives. Several have integrated GHG emission reduction considerations into their scenario planning work.

All of the MPOs interviewed have incorporated GHG considerations into their decision-making processes for project selection. Most use GHG emission reduction as a criterion when reviewing project benefits, but none consider GHG emission reduction potential as the sole reason to advance projects or policies. GHG emission reduction strategies tend to be implemented because of their potential to assist in the progress of achieving statewide and national GHG emission reduction targets, not because they are inherently cost-effective.

Although the Boston Region MPO is very much in line with, and often ahead of, its regional peers in terms of GHG emission reduction strategies, we found that it awards a lower percentage of TIP evaluation points specifically for emissions reduction than all but one of the interviewed MPOs outside of Massachusetts that presently use project ranking systems. Compared to the project evaluation schemes of other MPOs in Massachusetts, the Boston Region MPO ranks 8 out of 13 in terms of the focus it puts on emissions reduction.

We therefore concluded that the most concrete area of potential enhancement regarding GHG emission reduction strategies for the Boston Region MPO is in the planning process, specifically the evaluation criteria used for the TIP and the LRTP. A greater percentage of points should be awarded for the emissions reduction criterion. The overall scoring system should be refined to further favor and reward projects that implement any of the nine GHG emissions reduction measures discussed in this report. Potential scoring would thus be structured so that projects could earn points for as many components that characterize the selected strategies as possible and give maximum value to projects that reduce GHG emissions.

Further, as part of its work towards achieving its GHG reduction goals, we recommend that the MPO design and put into place tools for the measurement and evaluation of the progress of GHG emission reduction initiatives that it has implemented. Future scenario planning efforts by the Boston Region MPO should specifically incorporate the nine strategies previously mentioned.

Methodologies used for estimating and predicting GHG emissions are also discussed in this report, including spreadsheet analyses, travel demand modeling, and sketch planning. We recommend that the MPO devote further study to two profiled modeling tools: the Federal Highway Administration's Energy and Emissions Reduction Policy Analysis Tool (EERPAT) and the Levelized Cost of Carbon (LCC).

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Chapter 1—Determining Effective GHG Reduction Strategies

1.1 PROJECT BACKGROUND AND REPORT STRUCTURE

One of the goals of *Charting Progress to 2040*, the most recently adopted Long-Range Transportation Plan (LRTP) of the Boston Region Metropolitan Planning Organization (MPO), is to create an environmentally friendly transportation system. An objective of the Clean Air and Clean Communities goal is to "reduce greenhouse gases [GHGs] generated in the Boston region by all transportation modes as outlined in the Global Warming Solutions Act [GWSA]." In 2008, the Commonwealth of Massachusetts enacted the GWSA, aiming to create a framework for reducing GHGs to levels believed to be relatively benign in terms of climate change effects. This act set two statewide GHG emission reduction goals:

- emission reductions of between 10 and 25 percent below 1990 levels by 2020, including a 7.6 percent reduction from the transportation sector
- emission reductions of 80 percent below 1990 levels by 2050

The Boston Region MPO has worked closely with the Massachusetts Department of Transportation (MassDOT) and other involved agencies to achieve these goals. In June 2010, MassDOT issued the GreenDOT Policy Directive. Three primary goals were set in this sustainability initiative:

- reduction of GHG emissions
- promotion of walking, bicycling, and public transit
- support of smart growth development

In January 2015, the Massachusetts Department of Environmental Protection (DEP) promulgated 310 CMR 60.05: *Global Warming Solutions Act (GWSA) Requirements for the Transportation Sector and the Massachusetts Department of Transportation*. This regulation, amended in August 2017, establishes emission reduction goals that MassDOT must achieve. The requirements set in the regulation are as follows:

- MassDOT must demonstrate that its aggregate GHG emission reduction targets are achieved.
- MPOs must evaluate and report the aggregate transportation GHG emission impacts of projects programmed in LRTPs and Transportation Improvement Programs (TIPs).

- MPOs, in consultation with MassDOT, must develop and utilize procedures to prioritize and select projects in LRTPs and TIPs based on factors that include aggregate transportation GHG emission impacts.
- MassDOT must evaluate and report the aggregate transportation GHG emission impacts of State Transportation Improvement Programs (STIPs) and state-funded projects that are not included in STIPs.

As directed by MassDOT and DEP, the MPO staff tracks the projected GHG emissions that would be produced in the region from individual projects implemented through the LRTP and the TIP. As an agency engaged in performance-based planning, the MPO desires the wisest expenditure of resources and optimal results. MPO staff has undertaken this study to identify cost-effective and efficient GHG reduction strategies among its geographic peers that can help inform the MPO's investment decisions and planning processes as it works towards achieving the aforementioned emissions reduction goals and mandates. Prior to interviewing these geographic peers, MPO staff reviewed previously identified GHG reduction strategies and selected a subset of them for further examination.

1.2 REVIEW OF 2016 REPORT FINDINGS

In 2016, the Boston Region MPO published *Greenhouse Gas Reduction Strategy Alternatives: Cost-Effectiveness Analysis*. This report, based upon national research, identified 14 GHG emission reduction strategies for further study by the MPO. Priority consideration was given to the strategies that the MPO has the ability to implement through its own funding programs or those strategies that could be advanced by other entities in the region with encouragement from the MPO. Specifically, strategies were chosen only if they could be funded through the LRTP or TIP, studied through the UPWP and eventually funded in the LRTP or TIP, or publicized through the MPO's public outreach avenues. These criteria consequently precluded the selection of many high-profile GHG reduction strategies such as carbon pricing and taxing, congestion pricing, reduced speed limits, and vehicle-miles traveled (VMT) fees. Table 1 displays these 14 national strategies grouped into five broad categories.

Table 1.
National Strategies Recommended for Further Study from the Boston Region MPO's *Greenhouse Gas Reduction Strategy Alternatives* Study

Travel Demand Management	Transportation System Planning, Funding, and Design	Transportation System Management and Operations	Public Education	Land-Use Policies
Workplace Transportation Demand Management	Pedestrian Improvements	Increased Transit Service	Driver Education and Eco-Driving	Parking Management
Ridesharing	Bicycling Improvements	Truck-Idling Reduction	Information on Vehicle Purchases	
Individualized Marketing of Transportation Services	Expansion of Urban Fixed-Guideway Transit			
Teleworking	Rail Freight Infrastructure			
Car Sharing				

Source: Central Transportation Planning Staff.

1.3 SELECTING EFFECTIVE STRATEGIES

The first task of this study was to select the best GHG emission reduction strategies for the Boston region from the 14 approaches recommended in the aforementioned 2016 report. Two main evaluative criteria identified in that report were used for this purpose: cost-effectiveness and GHG emission reduction potential. Cost-effectiveness was defined as the direct cost per ton of carbon dioxide (CO_2) or carbon dioxide equivalent (CO_2e) reduced, while GHG emission reduction potential was defined as the percentage reduction of projected emissions.

Two recent GHG-related studies – conducted by MassDOT and the Georgetown Climate Center (GCC) – included Massachusetts in their study areas, and provided useful cost-effectiveness data and data on GHG emission reduction potential. Since the authors of both reports were able to isolate and quantify the effects of individual GHG emission reduction strategies, these studies informed the determination of strategies to pursue.

1.3.1 MassDOT Analysis: Energy and Emissions Reduction Policy Analysis Tool

The May 2016 MassDOT report, *Application of the EERPAT Greenhouse Gas Analysis Tool in Massachusetts,* documents the use of the Federal Highway Administration's (FHWA) Energy and Emissions Reduction Policy Analysis Tool (EERPAT) for policy analysis in Massachusetts. EERPAT is a rapid-response policy-analysis tool that can be used to evaluate individual policies as well as alternatives involving complex policy interactions. The EERPAT tool is discussed in detail in Section 2.2.5.

MassDOT developed a list of 12 discrete statewide GHG emission reduction policies based upon the plausibility of their implementation by the Massachusetts public sector and upon their previous identification in the GreenDOT Policy Directive and in the state's 2015 Clean Energy and Climate Plan. The Clean Energy and Climate Plan, in addition to providing a GHG inventory, outlines policies that will enable the state to meet the GWSA emission reduction targets. Following the development of GHG emission projections for a 2030 horizon year scenario reflecting Massachusetts transportation policies and funding circa 2015, these 12 GHG emission reduction policies were individually tested. Table 2 displays how the tested policies measure in terms of cost-effectiveness and GHG reduction potential, and the GHG reduction strategies (identified in the 2016 MPO report) associated with each policy. Eight other strategies were also tested, but these policies lacked analogues among the 14 MPO-supportable strategies identified in the 2016 MPO report, and thus are not listed in Table 2.

Table 2.
Evaluation of Relevant Strategies from MassDOT's EERPAT Study

Policy	Direct In-state Transportation Sector Emissions Reduction Percentage by 2030	Annual Cost Per Metric Ton of GHG	GHG Reduction Strategy
Transit Investment/ Service	0.37%	$1,700	Increased Transit Service, Expansion of Urban Fixed-Guideway Transit
Bicycle Infrastructure	0.91%	$510	Bicycling Improvements
Travel Demand Management	0.10%	$300	Workplace Transportation Demand Management, Teleworking, Individualized Marketing of Transportation Service, Ridesharing
Electric Vehicles	0.34%	$370	Information on Vehicle Purchases
Parking Pricing	0.07%	$71	Parking Management

Source: Cambridge Systematics, *Application of the EERPAT Greenhouse Gas Analysis Tool in Massachusetts* (Boston, MA: Massachusetts Department of Transportation, May 2016), 1-7.

1.3.2 Georgetown Climate Center Study

The November 2015 GCC report, *Reducing Greenhouse Gas Emissions from Transportation: Opportunities in the Northeast and Mid-Atlantic*, was another key source for quantifying the impacts of various GHG emission reduction policies. One of the major areas of study of this effort was the analysis of opportunities for GHG emission reduction in the Transportation and Climate Initiative (TCI) region. The TCI is composed of the transportation, energy, and environmental agencies of 11 northeast and mid-Atlantic states and the District of Columbia; the TCI includes Massachusetts. Various strategies for GHG emission reduction were analyzed using cost-effectiveness and GHG emission reduction potential as evaluative criteria.

Table 3 displays the approaches that were directly related to the 14 GHG reduction strategies identified in the 2016 MPO report and provides a measure of their cost-effectiveness and GHG emission reduction potential. Not every strategy was quantified for both evaluative metrics.

Table 3.
Evaluation of Relevant Strategies from Georgetown Climate Center Study

Policy	Transportation Sector Emission Reduction Percentage by 2030	Annual Cost Per Metric Ton of GHG	GHG Reduction Strategy
Transit	0.10%	$3,500 - $19,300	Increased Transit Service, Expansion of Urban Fixed-Guideway Transit
Bicycle and Pedestrian Infrastructure	0.70%	$790 -$13,425	Bicycling Improvements, Pedestrian Improvements
Employer / Worksite Travel Demand Management		$30 - $420	Workplace Transportation Demand Management, Teleworking
Rideshare Programs		$80	Ridesharing
Miscellaneous Travel Demand Management		$40 - $7,486	Individualized Marketing of Transportation Service, Car Sharing
Electric / Alternative Fuels Vehicles	2.7% - 5.4%		Information on Vehicle Purchases
Freight / Intermodal Infrastructure and Operations		$172 - $86,500	Rail Freight Infrastructure

Source: G. Pacyniak, K. Zyla, V. Arroyo, M. Goetz, C. Porter, D. Jackson, et. al., *Reducing Greenhouse Gas Emissions from Transportation: Opportunities in the Northeast and Mid-Atlantic – Appendix 2* (Washington, DC: Georgetown Climate Center, November 2015), 28-41.

1.3.3 Strategies Selected for Further Research

As seen in the right-most columns of Tables 2 and 3, GHG reduction strategies that can be implemented with low capital investment and those that have low operating and maintenance costs perform well in terms of cost-effectiveness in Massachusetts and the surrounding TCI region. These include transportation demand management (TDM) strategies, parking management, and "information on vehicle purchases," such as the promotion of electric vehicles and Zero-Emissions Vehicles (ZEVs). While the promotion of ZEVs and electric vehicles is subsumed in the "information on vehicle purchases" strategy, actual electric vehicle and ZEV deployment are not. Also, bicycle and pedestrian improvements rank among the leading strategies for reducing emissions. Hence, nine of the proposed strategies, including all in the TDM and land-use policies categories, were selected for further examination among peer agencies in the TCI region:

- Workplace Transportation Demand Management
- Teleworking
- Individualized Marketing of Transportation Service
- Ridesharing
- Carsharing
- Pedestrian Improvements
- Bicycling Improvements
- Information on Vehicle Purchases (primarily policies to promote electric vehicle purchases)
- Parking Management

1.3.4 Strategies Not Pursued

Five GHG reduction strategies identified in the 2016 MPO study were deemed to be either not cost-effective or to have limited potential for reducing GHG emissions. These strategies are discussed below.

Transit

The two transit-related strategies–increasing transit service and expanding urban fixed-guideway transit–were not chosen for further research due to their low cost-effective ratios. As seen in Tables 2 and 3, both the GCC and MassDOT reports estimated that the annual cost to implement the strategies would be greater than $1,500 for each ton of CO_2 reduced. Capital, operating, and maintenance expenditures are the main contributors to the high costs of these strategies.

Rail Freight Infrastructure

The GHG emission reduction potential of improved rail freight infrastructure is hard to gauge because of the lack of data and specific analytical methodologies for assessing this potential.

According to the GCC study, “The level of uncertainty related to freight investment GHG benefits is perhaps even higher than for other strategies evaluated. There are few studies that quantify freight infrastructure GHG benefits, and freight analysis methods are not well-developed so broad assumptions about mode shift potential are generally employed.”[1]

Furthermore, most of the rail freight projects studied were not cost-effective in terms of GHG emission reduction, most likely due to capital costs. Of the six

[1] G. Pacyniak, K. Zyla, V. Arroyo, M. Goetz, C. Porter, D. Jackson, et. al., *Reducing Greenhouse Gas Emissions from Transportation: Opportunities in the Northeast and Mid-Atlantic – Appendix 2* (Washington, DC: Georgetown Climate Center, November 2015), 40-41.

projects examined in the TCI area, two-thirds had cost-effectiveness ratios greater than $1,000 per ton. The rail freight investments recommended in Massachusetts' 2010 Freight Plan were found to be the least cost-effective, having a ratio of $86,500 per ton.[2]

Truck-Idling Reduction

The truck-idling reduction strategy was not examined in the aforementioned MassDOT and GCC studies. The strategy appears to have extremely negligible potential for GHG emission reduction. The three largest truck stop electrification (TSE) facilities in the TCI region each only removed between 16 and 25 metric tons of CO_2 annually between 2013 and 2015, according to the *Interstate Electrification Improvement Project,* a study sponsored by the US Department of Energy.[3] For an order of magnitude comparison, the EERPAT model estimated that in 2015 the transportation sector in Massachusetts produced 27.2 million metric tons of GHG emissions.[4] A large TSE facility would, at best, reduce GHG emissions by 0.000092 percent. Furthermore, truck stop electrification does not appear to be cost-effective or sustainable from a business point of view.[5] Successful business models for maintaining and operating electrified truck stops apparently have not yet been discovered.

Driver Education and Eco-Driving

Neither driver education nor eco-driving were sufficiently examined in the MassDOT and GCC studies. The GCC report chose not to investigate eco-driving for several reasons:

- Eco-driving is not currently a strategy with a proven public track record.
- Large-scale public adoption of eco-driving would need to occur to achieve significant GHG emission reductions.
- There are currently too many uncertainties associated with eco-driving.

The report states the following:

"While ecodriving has theoretically significant potential to reduce fuel use (on the order of 5 to10 percent or more if implemented by all drivers), there are few

[2] Ibid., 41.

[3] Calculations based on data present on p. 27 and p. 68 of Shorepower Technologies, *Interstate Electrification Improvement Project Final Report*. (Portland, OR: US Department of Energy, July 2015).

[4] Cambridge Systematics, A*pplication of the EERPAT Greenhouse Gas Analysis Tool in Massachusetts*, (Boston, MA: Massachusetts Department of Transportation, May 2016), 1-6.

[5] In the course of interviews with the New York State Energy Research and Development Authority and the Maryland Department of Transportation, both mentioned that they had previously sponsored TSE projects designed to reduce truck-idling. However, the operators of these facilities discontinued them after short initial pilot periods, deeming them to be unprofitable, even with state government subsidies.

examples of demonstrated programs successfully reaching a large population. Most successful ecodriving examples have focused on a small number of commercial fleets. … Over the long-term, ecodriving benefits may occur through connected vehicles and infrastructure strategies. These benefits are potentially significant if they can help achieve the theoretical potential of ecodriving, but are not quantified … due to uncertainty over the timeframe of deployment and the extent to which ecodriving practices will be implemented."[6]

[6] G. Pacyniak, et. al., *Reducing Greenhouse Gas Emissions from Transportation: Opportunities in the Northeast and Mid-Atlantic – Appendix 2*, (Washington, DC: Georgetown Climate Center, November 2015), 37.

Chapter 2—Research into Northeastern Agencies

2.1 AGENCY EXPERIENCES WITH SELECTED STRATEGIES

As previously stated, the 2016 MPO report based its GHG emission reduction strategy recommendations upon national data. That study did not investigate their potential based on local or regional data. This report focuses on investigating GHG emission reduction practices employed by government agencies geographically close to the Boston region; agencies within this geographic area were thought to be most analogous in terms of experiences with GHG emission reduction given similarities in topography, political and legislative culture, and weather.

The TCI region (the District of Columbia and 11 states in the northeast and mid-Atlantic) was selected as the geographic area for analysis. MPOs, state Departments of Transportation (DOTs), and other relevant agencies were contacted to learn more about their experience with GHG emission reduction. Ultimately six MPOs, three DOTs, and three other government bodies were interviewed. Data were gathered from a number of other agencies that were not interviewed. A complete list of the agencies consulted for this study is available in Appendix A.

The first realm of inquiry focused on the experience agencies had with the nine GHG emission reduction strategies identified for further research in Chapter 1, Section 1.3.3. Each agency was asked if they have implemented any of the nine strategies and, if so, if they have evaluated the effect of the approach on GHG emission volumes. The intent was to determine from empirical evidence which strategies may work best in practice.

2.1.1 Evaluation of Strategies

Surprisingly, although nearly all of the interviewed agencies have completed GHG inventories in the hopes of being able to best identify, pursue, and implement GHG reduction strategies, only two have put monitoring and evaluation programs in place. Both agencies are located in the Baltimore-Washington, DC area.

Metropolitan Washington Council of Governments

The Metropolitan Washington Council of Governments (MWCOG) is the only surveyed agency that has empirically measured the impact of any implemented GHG emission reduction strategy. An emissions monitoring program arose as a

byproduct of MWCOG's efforts toward meeting the conformity requirements of federal transportation and clean air mandates.

As early as 1997, MWCOG began quantifying the air quality impacts of five Transportation Emission Reduction Measures (TERMs)—teleworking, Guaranteed Ride Home programs, employer TDM outreach, targeted marketing, and ridesharing—that were undertaken to decrease nitrogen oxides, volatile organic compounds, and particulate matter emissions. In 2008, CO_2 was added to the list of measured pollutants. Approximately every three years, an analysis is performed to evaluate the TERMs for their efficacy towards achieving MPO-set emissions reduction targets.

Table 4 displays the latest quantifications of MWCOG's TERMs. Collectively in 2016, these five measures yielded slightly more than a one percent reduction in GHG emissions, a reduction of more than 250,000 tons of CO_2. Greater reduction had actually been anticipated from the teleworking and Guaranteed Ride Home program strategies; these TERMs did not meet the reduction targets that had been set for them.

Table 4.
Annual Quantification of TERMs' Effect upon the MWCOG Region's Transportation Sector GHG Emissions – 2016

TERM	Tons CO_2e Reduced	Percent CO_2e Decreased
Telework Assistance	23,528	0.11%
Guaranteed Ride Home Program	21,891	0.10%
Employer Outreach	135,753	0.62%
Mass Marketing	18,840	0.09%
Ridesharing	61,484	0.28%
Totals	**261,496**	**1.19%**

Sources:

National Capital Region Transportation Planning Board (NCRTPB), *Financially Constrained Long-Range Transportation Plan (CLRP) for the Nation Capital Region: 2016 CLRP Amendment Documentation* (Washington, DC: Metropolitan Washington Council of Governments, November 16, 2016), 81.

Commuter Connections and MWCOG/NCRTPB staff, *Washington Metropolitan Region Transportation Demand Management Resource Guide and Strategic Marketing Plan FY2017 Final Report*, (December 2016), 194.

Maryland Department of Transportation and Baltimore Metropolitan Council

Maryland DOT annually publishes an evaluative report of the performance of the state's transportation system, known as the *Annual Attainment Report on Transportation System Performance* (AR). Performance measures were established from the goals set in the Maryland Transportation Plan and the Consolidated Transportation Program, which is the six-year budget for financing transportation projects.[7]

Direct measurement of the impact on GHG emissions of the nine selected strategies was not available; however, transportation-related GHG emissions dropped statewide by more than eight percent between 2007 and 2016. The overall statewide impacts of TERMs were measured in the AR by vehicle-miles traveled (VMT) and vehicle-trip reduction, not by GHG emission reduction. Specific TERMs that Maryland DOT operates in the Baltimore Metropolitan Council (BMC) regional area, such as the Commuter Choice Maryland Program, were also measured in this fashion.[8]

2.1.2 Promotion and Implementation of Strategies

Since it became clear that the majority of the agencies have not measured the success of their GHG reduction strategies, other questions were also asked. The interviewed agencies were asked about how they have promoted and implemented the nine selected GHG reduction strategies. Recall that while the promotion of ZEVs and electric vehicles is subsumed in the "information on vehicle purchases" GHG reduction strategy, an actual electric vehicle implementation program is not.

Baltimore Metropolitan Council

The last LRTP prepared by BMC, *Maximize 2040 – A Performance-Based Transportation Plan for a Greater Baltimore Region*, lists several of the nine selected strategies among its long-term goals and objectives. The plan promotes investment in non-motorized transportation infrastructure and GHG emission reduction programs, encourages the private sector's participation in erecting bicycle and pedestrian facilities, advocates for the development of new TDM programs, and suggests offering incentives for zero-emissions vehicles. However, none of these strategies are specified or detailed.[9]

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[7] Maryland Department of Transportation, *2017 Annual Attainment Report on Transportation System Performance*, 1.

[8] Ibid., 48-50.

[9] Baltimore Regional Transportation Board, *Maximize 2040 – A Performance-Based Transportation Plan for a Greater Baltimore Region: Goals and Strategies* (Baltimore, MD: Baltimore Metropolitan Council, April 29, 2014), 7-9.

Capital District Transportation Committee

The Capital District Transportation Committee (CDTC), the MPO for the Albany, New York area, encourages the nine strategies through a variety of initiatives. CDTC has made its GHG emissions inventory available to its local municipalities and has encouraged them to adopt VMT reduction measures. Many TDM strategies are promoted, including employer TDM programs, household TDM programs, and ridesharing programs. CDTC sponsors Capital CarShare (a regional carsharing program), manages a ridesharing program, and maintains a regional travel options website, www.capitalmoves.org. CDTC also has sponsored bike-sharing pilot programs.[10] The CDTC's LTRP, the *2040 New Visions Plan,* noted that the Capital District Transportation Authority (CDTA), which is the regional transit provider, has made significant strides in employer TDM cooperation since CDTC's *1995 Transit Futures Report,* but the impacts of these TDM strategies were not quantified.[11]

CDTC's Community and Transportation Linkage Program provides MPO discretionary funding for municipalities to prepare and implement land-use and transportation plans that align with the principles established in the LRTP, such as Complete Streets (which incorporate bicycle and pedestrian facilities), road diets, parking management, and smart growth. Between 2000 and 2016, two parking management studies and 15 bicycle and pedestrian studies were undertaken courtesy of this program.[12]

Since 2001, CDTC has coordinated the Capital District Clean Communities Program, a local public-private partnership under the federal Clean Cities Program. The group encourages the adoption of alternative fuel vehicles and investment in electric vehicle charging infrastructure.[13]

Capitol Region Council of Governments

While the Capital Region Council of Governments (CRCOG) in Hartford, Connecticut, actively promotes TDM, parking management, bicycle and pedestrian infrastructure, and electric vehicles through the adoption of policy recommendations, the agency does not actually fund or implement any of them. Instead, CRCOG serves as a data clearinghouse for its member communities. CRCOG has produced model sustainable land-use regulations (including parking policies), Complete Streets guidance (for non-motorized infrastructure), and TDM

[10] Capital District Transportation Committee, *CDTC New Visions 2040: New Visions for a Quality Region*, (Albany, NY: Capital District Transportation Committee, March 2016), 40, 77.
[11] Ibid., 80.
[12] Ibid., 36.
[13] Ibid., 39.

instruction. The agency makes these tools available to the public and encourages their use.

Like most of the interviewed MPOs, CRCOG's LRTP calls for encouraging TDM, bicycle and pedestrian infrastructure, and other VMT reduction strategies, but not for the express purpose of GHG emission reduction. Actually, CRCOG is the only interviewed agency that has not conducted a GHG assessment. One of the policy recommendations of the *2014 Capitol Region Plan of Conservation and Development* is to conduct a regional GHG inventory to better identify specific mitigation strategies.

Chittenden County Regional Planning Commission

In 2011, the Chittenden County Regional Planning Commission (CCRPC) in Winooski, Vermont, received a grant from the FHWA's Transportation, Community, and System Preservation Program to build a more robust, comprehensive, and coordinated regional TDM program. CCRPC helped to establish an integrated TDM program, known as Go!Chittenden County (gochittendencounty.org), among the agencies that provide transportation services in the region, such as CarShare Vermont, the Chittenden Area Transportation Management Association (CATMA), Local Motion, Chittenden County Transportation Authority, Vermont Energy Investment Corporation (VEIC), Vermont Department of Health, and GoVermont (VTrans).[14] Go!Chittenden County offers information and assists individuals and businesses to find sustainable options to single-occupant-vehicle trips. With CATMA's expansion in 2015 to serve the county as a comprehensive TDM resource, Go!Chittenden County will sunset in 2017.

In addition to promoting bicycle and pedestrian infrastructure in its Regional Bicycle/Pedestrian Plan, CCRPC administered a municipal sidewalk grant program for its communities. Over $2 million was spent on 26 projects in 10 municipalities.[15]

Delaware Valley Regional Planning Commission

GHG emission reduction is one of the goals listed in *Connections 2040,* the Delaware Valley Regional Planning Commission's (DVRPC) most recently adopted LRTP. DVRPC, based in Philadelphia, encourages and administers efforts involving nearly all of the nine GHG emission reduction strategies; *Connections 2040* specifically notes the role that these programs, and many other ones, play in GHG emission reduction. DVRPC facilitates and coordinates the regional Mobility Alternatives Program (MAP), which encourages various

[14] Chittenden County Regional Planning Commission, *2013 Chittenden County ECOS Plan Amended*, (Burlington, VT: Chittenden County Regional Planning Commission, May 2016), 169.
[15] Ibid., 166.

employer-based TDM strategies, including the Ride ECO commuter benefit program. DVRPC also offers the *Share-a-Ride* ridesharing service. A significant funding commitment, $500 million, was made in *Connections 2040* for bicycle and pedestrian improvements, primarily focusing on completing the 750-mile regional trail network, the Circuit. Recently, DVRPC has taken a key role in promoting alternative vehicle technology, leading the Pennsylvania Partnership to Promote Natural Gas Vehicles and preparing several electric vehicle action plans over the past decade. [16]

Maryland Department of Transportation

Reducing GHG emissions is among the top two transportation-related environmental priorities of Maryland DOT.[17] Maryland DOT chairs and staffs the Maryland Electric Vehicle Infrastructure Council (EVIC), which is responsible for developing a statewide infrastructure plan, a legislative action plan, and policies to promote the successful integration of electric vehicles into Maryland's transportation system. To these ends, in 2012, EVIC issued 32 recommendations for promoting electric vehicle adoption.[18] In conjunction with the Maryland Energy Administration, the Maryland Department of the Environment, the Motor Vehicle Authority, the State Highway Administration, and other state agencies, Maryland DOT promotes electric vehicle adoption and use. Federal income tax credits, Maryland excise tax credits, and rebates for charging systems and stations are available. Electric vehicles are also permitted to use all high-occupancy-vehicle (HOV) lanes in the state.

The Maryland Transit Administration, which is part of Maryland DOT, manages the Commuter Choice Maryland Program. This worksite-based TDM program operates statewide, but is primarily focused on the Baltimore area.

Metropolitan Washington Council of Governments

In addition to its aforementioned TERM work, MWCOG advances and promotes other GHG reduction strategies. The Constrained Long-Range Plan (CLRP) and the supporting *2014 Regional Transportation Priorities Plan* outline support for non-motorized infrastructure and electric vehicles.[19] One project advanced in the

[16] Delaware Valley Regional Planning Commission, *Connections 2040: Plan for Greater Philadelphia* (Philadelphia, PA: Delaware Valley Regional Planning Commission, September 2013), 81, 106, 125.

[17] Maryland Department of Transportation, *2035 Maryland Transportation Plan: Moving Maryland Forward* (January 2016), 10.

[18] Maryland Electric Vehicle Infrastructure Council, *Interim Report* (Baltimore, MD: Maryland Department of Transportation, January 2017), 6.

[19] National Capital Region Transportation Planning Board, *Financially Constrained Long-Range Transportation Plan (CLRP) for the Nation Capital Region: 2016 CLRP Amendment*

2016 CLRP Amendment is the expansion of the District of Columbia's dedicated bicycle lane network by nearly four miles.[20]

New York State Department of Transportation

The New York State Department of Transportation (NYSDOT) is involved in both TDM and active transportation and demand management programs at both regional and statewide levels. NYSDOT's 511NY service (511ny.org) broadcasts information on real-time travel conditions around the state and presents a myriad of transportation resources for travelers, including a multi-modal trip planning component, and information on alternative transportation options such as shuttles and carpools. NYSDOT also maintains 511NY Rideshare (511nyrideshare.org), an open-source platform that helps match travelers and employers with potential carpool options. The 511NY Rideshare website also disseminates multimodal travel data, alternative travel information, and guides for employers that wish to get involved with TDM efforts. Travelers can register at both of these websites and customize them to receive updates, alerts, and information pertinent to their commutes and travel routes.

New York State Energy Research and Development Authority

The New York State Energy Research and Development Authority (NYSERDA) spearheads the state's electric vehicle program and administers Charge NY, the state initiative to get more electric vehicles on the New York transportation system. In addition to promoting electric vehicles, NYSERDA administers rebates for electric vehicle purchases, provides information on tax credits for both electric vehicles and charging stations, and disseminates information about electric vehicle infrastructure. Electric vehicles pay reduced tolls on the New York State Thruway and are permitted to use its HOV facilities regardless of vehicle occupancy.

2.2 METHODOLOGIES FOR ESTIMATING AND PREDICTING GHG EMISSIONS AND COST-EFFECTIVENESS

2.2.1 MassDOT GHG Tracking for Massachusetts MPOs

MassDOT requires that MPOs in Massachusetts assess all transportation projects considered for inclusion in a TIP either quantitatively or qualitatively for GHG emissions impact. Each year, the agency provides spreadsheets to MPOs that are used to determine whether projects are eligible for Congestion

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Documentation, (Washington, DC: Metropolitan Washington Council of Governments, November 16, 2016), 6.

[20] Ibid., 31.

Management and Air Quality Improvement (CMAQ) Program funding. These spreadsheets can be modified to quantify CO_2. MassDOT delivers these CMAQ spreadsheets and a set of emission factors each year for use in that year's TIP development process.[21] These spreadsheets can be found in Appendix B.

GHG emission reduction associated with bicycle and pedestrian infrastructure and with alternative fuel vehicles can be modeled using the CMAQ spreadsheet models. However, MassDOT does permit MPOs to use alternative methodologies to quantify the GHG emission impacts from these projects. Qualitative GHG emissions impacts must be assessed if a project cannot be quantitatively measured. Proposed projects should be classified according to one of three categories: 1) increases GHG emissions; 2) decreases GHG emissions; or 3) has no/negligible impact on GHG emissions.[22]

2.2.2 Methodologies for Estimating and Predicting GHG Emissions Used in Other States

Measuring the impact of GHG emission reduction strategies for agencies outside of Massachusetts revolves around VMT reduction. Travel demand models, sketch planning tools, and other methods are used to calculate decreases in VMT that would be caused by proposed transportation projects. Following this computation, emissions factors from the Motor Vehicle Emissions Simulator (MOVES) model, which is provided by the US Environmental Protection Agency (EPA), are applied to the VMT reduction calculations to produce estimated GHG emission savings. MOVES estimates emission factors and emissions for on-road motor vehicles under a wide range of user-defined conditions. MOVES can also estimate emission factors for non-road equipment mobile sources, such as snowblowers, recreational boats, and construction vehicles.

Travel Demand Models

Nearly all the surveyed agencies use either a statewide or regional travel demand model to estimate VMT impact, after which MOVES emissions factors

[21] An emission factor is a value relating the amount of a pollutant released into the atmosphere (emissions) from a causal activity. Examples of this are weight of pollutant per activity distance traveled (grams/mile), weight of pollutant per activity duration (grams/hour), and weight of pollutant per volume of substance consumed during the activity (grams/gallons of gasoline). The factors are then used in emissions calculations.

[22] Massachusetts Department of Transportation, Office of Transportation Planning, Sustainable Transportation, *Transportation Improvement Program Greenhouse Gas Assessment and Reporting Guidance - Guidelines to assist Metropolitan Planning Organizations in complying with 310 CMR 60.05: Global Warming Solutions Act Requirements for the Transportation Sector and the Massachusetts Department of Transportatio*n, (Boston, MA: Massachusetts Department of Transportation, December 2016), 6.

are applied. CDTC currently uses MOBILE emission factors in conjunction with their regional travel demand model, but this agency is in the process of upgrading to MOVES.[23] Some statewide DOTs, such as those in New Jersey, Connecticut, and Maryland, also have used EPA's State Inventory Tool (SIT), particularly for off-road GHG emission calculations. SIT is a spreadsheet model using state-specific and default data combined with VMT and transportation fuel consumption data.

Sketch Planning Tools

Several agencies use sketch planning tools to estimate VMT reductions due to initiatives, such as TDM measures, that are not easily represented in travel demand models. The majority of these tools are spreadsheet based:

- COMMUTER – An EPA spreadsheet model used to evaluate voluntary mobile-source emission reduction from commuter choice incentive programs. COMMUTER is used by MWCOG to estimate the impact of their TERMs programs.
- Trip Reduction Impacts for Mobility Management Strategies (TRIMMS) – A spreadsheet model used to estimate the impact of transportation demand initiatives. TRIMMS was used in a recent MWCOG study to estimate VMT for TDM measures.[24]
- Travel Efficiency Assessment Method (TEAM): An approach using available travel model data and the TRIMMS sketch planning tool to estimate VMT reduction from TDM, employer incentives, transit, land-use, and pricing strategies. MOVES emissions factors are applied to the VMT to estimate the associated GHG emission reductions. EPA has advocated this method for estimating GHG emission reductions. Case studies using the TEAM approach were conducted in the Tucson, Kansas City, and Boston metropolitan areas.
- Maryland Air Quality Off-Network Estimator (MAQONE) – A customized sketch planning tool used in conjunction with MOVES emissions factors by BMC and Maryland DOT to estimate reductions in GHG emissions and VMT resulting from TDM projects and non-motorized infrastructure improvements.
- Pennsylvania Air Quality Off-Network Estimator (PAQONE) – A customized sketch planning emissions estimate tool used in conjunction with MOVES or MOBILE emission factors by Pennsylvania agencies to

[23] EPA's MOBILE emission factor model was superseded by the MOVES model. The last version was released in 2004.

[24] ICF International, Renaissance Planning, & Mondre Energy, *Multi-Sector Approach to Reducing Greenhouse Gas Emissions in the Metropolitan Washington Region – Final Technical Report* (Washington, DC: Metropolitan Washington Council of Governments, January 2016).

estimate GHG emissions and VMT for projects that are typically not addressed within a regional or statewide travel demand model.

Other Methods

Two agencies have used other methods for GHG quantification besides the specific use of MOVES-generated emissions factors in conjunction with VMT calculations.

For its *2040 New Visions Plan*, CDTC did not forecast GHG emission reduction for proposed investment strategies. Instead, VMT reductions per household, an analogous measure, were estimated. GHG emission reduction was assumed to be equivalent to VMT reductions per household, as one of the findings from the *Capital District 2010 Regional GHG Inventory* was that the percentage of transportation-related GHG emission reductions was directly correlated and identical to the percentage of VMT reduction.[25]

New Jersey Transit uses a multifaceted GHG-savings-estimation model, based on an approach suggested by the American Public Transportation Association. The model considers three distinct areas of GHG emission reduction: 1) VMT reduction, calculated as in the EPA SIT model; 2) land use; and 3) congestion relief. These elements are summed, and the amount of new GHG emissions produced by additional transit service is subtracted from this number.[26] Appendix C presents more details about this methodology.

[25] Capital District Transportation Committee, *CDTC New Visions: Environment and Technology Task Force White Paper January 2015 Draft*, 47.

[26] D. Deka, *Off Peak Rail Transit Service Study – Importance for Auto Reduction and Peak Ridership Growth. Final Report*, (Trenton, NJ: New Jersey Department of Transportation, December 2011), NJDOT/FHWA, FHWA-NJ-2011-008, 57-58.

2.2.3 Projections of GHG Emissions for Selected Strategies

Several agencies forecast future GHG emissions for a few of the nine selected strategies. Not surprisingly, the replacement of current vehicles by electric vehicles in the transportation system has the largest impact. Again, while electric vehicle promotion falls under the "information on vehicle purchases" strategy, direct electric vehicle adoption does not.

Table 5.
Projected GHG Emission Reduction from Baseline Scenarios

	2040			2050	
Strategy	**CDTC**	**MWCOG**	**BMC**	**MWCOG**	**NJDEP**
TDM	0.50%	1.30%	1.08%	2.90%	
Non-motorized	1.50%	10.9%		9.0%	
Electric Vehicles		4.10%	1.51%	4.70%	52.4% / 71.7%

BMC = Baltimore Metropolitan Council. CDTC = Capital District Transportation Committee. MWCOG = Metropolitan Washington Council of Governments. NJDEP = New Jersey Department of Environmental Protection. TDM = Transportation Demand Management.

Notes:

The TDM strategy includes workplace TDM as well as teleworking, ridesharing, carsharing, guaranteed ride programs, and individual marketing of transportation services

The Non-motorized strategy includes bicycle and pedestrian improvements. The MWCOG projections include land-use changes, such as sustainable development patterns and urban design.

The Electric Vehicles strategy includes subsidies as well as, in the NJDEP case, two different assumptions (45%/90%) about electric vehicle adoption in the light duty vehicle fleet. The MWCOG 's projections assume an electric vehicle adoption rate of 15% in 2040 and 25% in 2050 for the light duty and public vehicle fleets. BMC's projection assumes an adoption of 7.2% ZEVs and 9.8% hybrid-electric vehicles in the light duty vehicle fleet.

Data calculations were made using the following sources:

Baltimore Regional Transportation Board, *How Far Can We Get?* (December 2015), 17-21.

Capital District Transportation Committee, *CDTC New Visions: Environment and Technology Task Force White Paper January 2015 Draft* (Albany, NY: Capital District Transportation Committee, January 2015), 47.

ICF International, Renaissance Planning, & Mondre Energy, *Multi-Sector Approach to Reducing Greenhouse Gas Emissions in the Metropolitan Washington Region – Final Technical Report* (Washington, DC: Metropolitan Washington Council of Governments, January 2016), Appendix A.

State of New Jersey Department of Environmental Protection, *2050 GHG Emissions Report On-Line* (2017), http://www.nj.gov/dep/aqes/oce-resources-2050.html

2.2.4 Other Models

The Delaware Valley Regional Planning Commission (DVRPC), based in Philadelphia, is currently at work on a new regional-fleet-emissions and energy-content spreadsheet tool, which will be able to test the emissions impacts and energy use of fleets that use a mix of energy sources, including alternative fuels. The agency is also working with the University of California-Davis to customize its GIS EV Planning Toolbox for MPOs using Pennsylvania Division of Motor Vehicles data and US Census Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) data. This toolbox, while not directly estimating GHG reduction from electric vehicle use, does generate the location and magnitude of expected demand for charging stations. Presumably, emission reductions could be deduced from this information.

The Argonne National Laboratory, under the sponsorship of the US Department of Energy, developed the Alternative Fuel-Cycle Environmental and Economic Transportation (AFLEET) tool. Although AFLEET can be used to estimate the benefits and costs of alternative fuel vehicles, it is rather complex measuring "wells-to-wheels" petroleum use and GHG generation. Furthermore, it relies on MOVES for tailpipe emissions.[27]

2.2.5 Methodologies for Estimating and Predicting Cost-Effectiveness of GHG Emission Reduction Strategies

Only a few of the contacted agencies have tried to quantify the cost-effectiveness of GHG emission reduction strategies and policies using methods more advanced than simple sketch planning. BMC, Maryland DOT, and MassDOT have used the aforementioned FHWA EERPAT model. Researchers at the University of Massachusetts-Amherst, under contract to MassDOT, tested several projects for GHG emission reduction using an approach called the Levelized Cost of Carbon (LCC).

Energy and Emissions Reduction Policy Analysis Tool (EERPAT)

EERPAT, based on Oregon's GreenSTEP model and Regional Strategic Planning Models, is an open-source code program designed to estimate GHG emissions for surface transportation on a statewide level using disaggregate household-level models. It is a rapid-response policy-analysis tool that can be used to evaluate individual policies as well as alternatives involving complex policy interactions. Unlike many travel demand models, it accounts for both

[27] Argonne National Laboratory, *AFLEET Model*, https://greet.es.anl.gov/afleet

feedback from congestion and induced demand. Outputs include travel delay, VMT, GHG emissions, and fuel consumption.[28]

Levelized Cost of Carbon (LCC)

LCC is grounded in the concept of the time value of money. "It is well recognized that there is a time value to money, so that money spent now and money spent ten years from now are not equivalent."[29] This method uses life cycle costs, carbon costs, and discount rates for money and GHG emissions over time to calculate a cost-effective metric called annualized lifetime costs. LCC is powerful enough to compute cost-effectiveness metrics for choosing projects when there are specific constraints on resource allocation/policy selection ("the knapsack problem") as well as if there are no constraints (investing in overall social welfare).[30]

Limitations of LCC and EERPAT Methods

While analytically robust, the EERPAT and LCC models are extremely data intensive. EERPAT requires household-level data on a statewide basis. The LCC model requires a lot of speculative information such as the changing rates of the value of reducing a ton of CO_2 over time. Moreover, much of the data necessary for running the LCC model are not typically calculated for LRTP projects. For example, the GHG emissions resulting from transportation projects planned for long-term implementation are usually quantified for the project's opening year as well as for a horizon year. The LCC requires life-cycle details, meaning that construction, capital, operating, and maintenance costs would need to be calculated for every single year of the project, as would GHG emissions. This would represent a fundamental shift in how projects are analyzed. While this might not be an issue for TIP evaluation (as the TIP has a five-year timeframe), it would be an issue for LRTP evaluation (as the LRTP has a 20-year timeframe). Furthermore, all projects would need to be judged within the same timeframe; again, this might not be a problem for short-range planning efforts.

The LCC authors note that "while the LCC is valid to determine whether a particular project is cost-effective of not, it faces a weakness when used to compare projects."[31] This weakness is chiefly due to the model's inability to adequately capture the societal cost of carbon. They add that the analysis is only valid when considering projects *solely* as GHG emission reduction projects and

[28] Cambridge Systematics, *Application of the EERPAT Greenhouse Gas Analysis Tool in Massachusetts* (US Department of Transportation), 1-1. *EERPAT – Energy and Emissions Reduction Policy Analysis Tool*, https://www.planning.dot.gov/FHWA_tool/default.aspx

[29] E.D. Baker & S.N. Khatani, *Developing a Metric for the Cost of Green House Gas Abatement*, (Boston, MA: Massachusetts Department of Transportation, March 2017), 7.

[30] Ibid., 14.

[31] Ibid., 11.

ignoring all other potential benefits, such as congestion reduction, safety, or other environmental improvement.[32]

While EERPAT offers some advantages over traditional travel demand models, it does have some drawbacks. Since it is not a network model, it cannot provide outputs for specific facilities. Instead, the model is spatially aggregate and performs analyses at either the statewide, regional, or metropolitan area level; it is not granular enough to perform at finer levels of geographic detail. EERPAT also has limitations in regard to the types of specific inputs it can accept. Not every GHG emission reduction policy can be explicitly modeled.

As the authors note, "the inputs related to transit service provision include rate of growth of vehicle-revenue miles (VRM), bus fuel type and efficiency, and rail percent electrification. Policies such as increasing frequency, coverage, or reliability of service, or adding new rail service, could not be modeled except as an increase in VRM. Similarly, land-use policies are modeled based on the fraction of households in "mixed-use" versus "single-use" neighborhoods and the amount of population in urban versus rural areas. Policies such as transit-oriented development cannot be explicitly modeled."[33]

2.3 INFORMING PROJECT EVALUATION

Interviewed agencies were asked how they use GHG emissions as an evaluative metric in project selection. The Transportation Evaluation Criteria (TEC) used by Massachusetts MPOs were compared to the Boston Region MPO's metrics for TIP project prioritization. First, TEC were scrutinized for metrics explicitly mentioning GHG emission reductions. Five of the 12 Massachusetts MPOs (not including the Boston Region MPO) and three of the agencies outside of Massachusetts have a GHG emission reduction criterion. Seven of the other Massachusetts MPOs and three of the agencies outside of Massachusetts use a more general criterion for "emissions reduction." Second, agencies' TEC were examined for metrics under which the nine selected GHG emission reduction strategies might qualify and be viewed as favorable.

2.3.1 Evaluation of TIP Projects by Massachusetts MPOs

Since 2012, MassDOT has recommended that MPOs in Massachusetts assess and track GHG emissions as part of their TIP project evaluation and prioritization process. Appendix D contains the TIP TEC for the Massachusetts MPOs. Formal assessment and tracking of GHG emission reductions achieved by transportation

[32] Ibid., 25.
[33] Cambridge Systematics, *Application of the EERPAT Greenhouse Gas Analysis Tool in Massachusetts*, 1-3.

projects was legally codified in January 2015 by the aforementioned DEP regulation, 310 CMR 60.05: *Global Warming Solutions Act (GWSA) Requirements for the Transportation Sector and the Massachusetts Department of Transportation*. The quantitative and qualitative methodologies described in Section 2.2 are used to complete necessary annual reporting. GHG data are reported to MassDOT during each TIP development cycle in the TIP Template provided by MassDOT. MPOs are also required to annually track the quantitative GHG impacts of completed TIP projects to measure the progress that has been achieved towards the state's Clean Energy and Climate Plan.

Boston Region

The Boston Region MPO evaluates projects for its TIP according to 28 criteria spanning six categories that represent the MPO's goals: Safety; System Preservation; Capacity Management/Mobility; Clean Air/Clean Communities; Transportation Equity; and Economic Vitality. Appendix E presents these TIP metrics in detail. A project can earn a maximum of 134 points. CO_2 reduction is a specific criterion in the Clean Air/Clean Communities category; a project can earn a maximum of five points in this category. Projects can earn additional points for the following evaluative criteria that are applicable to the nine selected strategies:

- Maximum of five points for improving bicycle safety
- Maximum of five points for improving pedestrian safety
- Maximum of three points for improving substandard sidewalks
- Maximum of five points for improving pedestrian network and accessibility under the Americans with Disabilities Act (ADA)
- Maximum of three points for improving bicycle network
- Maximum of six points for improving intermodal accommodations and connections to transit
- Maximum of five points for reducing other transportation-related emissions
- One point for providing bicycle access to an activity center
- One point for providing pedestrian access to an activity center
- Ancillary points for particular geographic locations (a maximum of 25 points)

Berkshire Regional Planning Commission

GHG Emission Reduction is one of eight evaluative categories used by the Berkshire Regional Planning Commission (BRPC) in the development of its TIP. A project that would have a positive effect in terms of GHG emission reduction would earn a point. A project that supports increasing the use of alternate modes,

such as active transportation, would earn a point for the Livability category.[34] Therefore a quarter of the total points can be earned by evaluative criteria that are applicable to the nine selected strategies.

Cape Cod Commission

The Cape Cod Commission (CCC) rates potential TIP projects across seven distinct categories. A maximum of 100 points can be earned. A project that would result in GHG emission reductions alone can earn two points for that benefit. Projects can earn additional points for the following evaluative criteria that are applicable to the nine selected strategies:

- One point for improving healthy transportation options
- Maximum of 10 points for enhancing sidewalks and other infrastructure
- Maximum of three points for improving mobility of non-motorists
- Maximum of five points for improving safety of non-motorists
- Additional points if the project is in a designated economic area and increases mobility to/from the location.[35]

Central Massachusetts Regional Planning Commission

The Central Massachusetts Regional Planning Commission (CMRPC) ranks potential TIP projects across 10 categories. Projects can earn a maximum score of 36. Although GHG emission reduction is not a specific criterion, one point can be garnered for reducing emissions. Projects can earn additional points for the following evaluative criteria that are applicable to the nine selected strategies:

- One point for pedestrian facilities if the project has ADA-compliant components
- One point for enhancing existing pedestrian facilities
- One point for increasing bicycle lane miles
- One point for TDM
- One point for bicycle improvements near an employment center
- One point for pedestrian improvements near an employment center
- Additional points if the project increases mobility within or to/from a tourist attraction
- Additional points if the project is deemed to combat sprawl.[36]

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[34] Berkshire Regional Planning Commission, *Berkshire County Metropolitan Planning Organization Transportation Improvement Program October 1, 2016 – September 30, 2021*, (Pittsfield, MA: Berkshire Regional Planning Commission, 2016), 6.

[35] Cape Cod Commission, *Cape Cod Transportation Improvement Program Federal Fiscal Year 2018-2022*, (Barnstable, MA: Cape Cod Commission, May 22, 2017). Appendix A, 3-7.

[36] Central Massachusetts Metropolitan Planning Organization, *CMMPO Endorsed 2018-2022 Transportation Improvement Program (TIP) (*Worcester, MA: Central Massachusetts Metropolitan Planning Organization, May 17, 2017), 23.

Franklin Regional Council of Governments

The Franklin Regional Council of Governments (FRCOG) ranks its TIP projects according to 19 criteria across six categories: Condition; Mobility; Safety; Community Effects and Support; Land Use and Economic Development; and Environmental Effects. Three points are available for each metric. Points for criteria within each category are averaged; all the category averages are then summed. A maximum of 18 total points can be garnered. *Air quality or climate effects* is a specific criterion in the Environmental Effects category, even though GHG emissions reduction is not specifically mentioned. Other criteria related to the nine selected strategies are as follows:

- Effect on travel time and connectivity/access
- Effect on other modes using facility
- Effect on bicycle and pedestrian safety
- Business effects – TDM[37]

Martha's Vineyard Commission

Martha's Vineyard Commission (MVC) uses seven evaluative TIP categories. One has GHG emissions reduction as a major component: Environment, Climate Change / Greenhouse Gas Emissions / Air Quality (GHG/AQ). The other six categories are Safety, Alternate Modes, Congestion, Infrastructure Preservation / Improvement, Character, and Project Readiness. Bicycle and pedestrian safety are specifically mentioned in the Safety metric and the Alternate Modes metric is defined as a mode other than the private automobile.

A project can earn as many as three points for each category, after which the points are weighted. Interestingly, the GHG/AQ metric is weighted the least, while the safety metric is weighted the most. A project can earn a maximum of 39 points.[38]

Merrimack Valley Planning Commission

The Merrimack Valley Planning Commission (MVPC) rates its TIP projects according to 22 criteria across six categories: Condition; Mobility; Safety and Security; Community Effects and Support; Land Use and Economic Development; and Environmental Effects. Three points are available for each

[37] Franklin County Transportation Planning Organization, *Draft 2018-2022 Transportation Improvement Program for the Franklin Region: Appendix B*. (Greenfield, MA: Franklin Regional Council of Governments, April 25, 2017), 3.

[38] Martha's Vineyard Commission, *Martha's Vineyard Transportation Improvement Program (TIP) for Federal Fiscal Years (FFY) 2018-2022*. (Oak Bluffs, MA: Martha's Vineyard Commission, April-May 2017), 5-6.

metric. Points for criteria within each category are averaged; all the category averages are then summed. A maximum of 18 total points can be garnered. *Air quality or climate effects* is a specific criterion in the Environmental Effects category, even though GHG emissions reduction is not specifically mentioned. Other criteria related to the nine selected strategies are as follows:

- Effect on travel time and connectivity/access
- Effect on other modes using facility
- Effect on bicycle and pedestrian safety
- Business effects – TDM[39]

Montachusetts Regional Planning Commission

The Montachusetts Regional Planning Commission (MRPC) rates potential TIP projects according to 25 criteria across six categories. A project can earn a maximum of 100 points. As many as four points can be earned by a project if it has a positive impact on air quality, follows climate-change standards, and/or reduces GHG emissions. Projects can earn additional points for the following evaluative criteria that are applicable to the nine selected strategies:

- One point for positive effects on pedestrian facilities for environmental-justice communities
- One point for positive impacts on bicycle safety
- One point for enhancing bicycle mobility
- One point for enhancing pedestrian mobility
- One point for improving sidewalks
- One point for Complete Streets[40]

Nantucket Planning and Economic Development Commission

The Nantucket Planning and Economic Development Commission (NP&EDC) rates potential TIP projects according to 23 criteria across four categories. A project can earn a maximum of 100 points. A project can earn one point if it improves air quality and mitigates climate change. Additional points can be scored by the nine selected strategies as follows:

- One point for improvements to sidewalks
- One point for improving travel time, connectivity, or access

[39] Merrimack Valley Planning Commission, *Merrimack Valley Metropolitan Planning Organization Federal Fiscal Years 2018 to 2022 Transportation Improvement Program: Appendix Final Report*. (Haverhill, MA: Merrimack Valley Planning Commission, May 2017), Appendix D.

[40] Montachusetts Regional Planning Commission, *Montachusetts Metropolitan Planning Organization Transportation Improvement Program Federal FY 2018-2022*, (Fitchburg, MA: Montachusetts Regional Planning Commission, May 17, 2017), 74-76.

- One point for improving bike and pedestrian access
- One point for improving bicycle and pedestrian infrastructure with regards to safety[41]

Northern Middlesex Council of Governments

The Northern Middlesex Council of Governments (NMCOG) rates potential TIP projects according to 18 criteria across six categories: Condition; Mobility; Safety; Community Effects and Support; Land Use and Economic Development; and Environmental Effects. Three points are available for each criterion. Points for criteria within each category are averaged; all the category averages are then summed. A project can earn a maximum of 18 total points. *Air quality or climate change effects* is a specific criterion in the Environmental Effects category, even though GHG emission reduction is not specifically mentioned. Other criteria related to the nine selected strategies are as follows:

- Consistency with state bicycle and pedestrian plans
- Effect on Bicycle Compatibility Index
- Effect on pedestrian safety
- Business effects – TDM[42]

Old Colony Planning Council

The Old Colony Planning Council (OCPC) ranks its projects differently than the other Massachusetts MPOs. Roadway projects, bicycle and pedestrian projects, and non-bicycle and non-pedestrian enhancements are rated by slightly different criteria under the same six evaluative categories: Condition and Service Quality; Mobility; Safety; Community Effects and Support; Land Use and Economic Development; and Environmental and Air-Quality Effects. Roadway projects are judged by 21 criteria, bicycle and pedestrian projects by 19 criteria, and non-bicycle and non-pedestrian enhancements by 17 criteria. Three points are available for each metric. Points for criteria within each category are averaged; all the category averages are then summed. A project can earn a maximum of 18 total points. *Air quality or climate effects* is a specific criterion in the Environmental Effects category of each project type, even though GHG emissions reduction is not specifically mentioned. Other criteria related to the nine selected strategies in the non-bicycle and non-pedestrian category types are as follows:

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[41] Nantucket Planning and Economic Development Commission, *Transportation Improvement Program FFY 2018-2022* (Nantucket, MA: Nantucket Planning and Economic Development Commission, 2017), Appendix A.

[42] Northern Middlesex Council of Governments, *Northern Middlesex Regional Transportation Improvement Program Federal Fiscal Years 2018-2022 Draft* (Lowell, MA: Northern Middlesex Metropolitan Planning Organization, May 2017), 84.

- Roadway projects
  - Magnitude of improvement of other infrastructure elements
  - Effect on travel time and connectivity/access
  - Effect on other modes using facility
  - Effect on bicycle and pedestrian safety
  - Business effects

- Non-bicycle and non-pedestrian enhancements
  - Extent to which the project improves the transportation system
  - Extent to which the project provides other benefits
  - Business effects[43]

Pioneer Valley Planning Commission

The Pioneer Valley Planning Commission (PVPC) uses specific TEC to rank potential projects for their TIP. Projects are rated according to these metrics and can earn a maximum of 100 points across eight categories. GHG emission reduction is a specific criterion in the Environment and Climate Change category. A project can earn a maximum of one point for CO_2 reduction and an additional point can be earned for *air quality improvement*. Projects can earn additional points for the following evaluative criteria that are applicable to the nine selected strategies:

- Maximum of three points for Complete Streets
- Maximum of two points for providing multi-modal access to a downtown, village center, or employment center
- Maximum of two points for reducing auto dependency – TDM strategies specifically
- Maximum of three points for completing the off-road bike and pedestrian network
- Maximum of four points for improving intermodal connections to transit
- Maximum of five points for promoting a safe and accessible pedestrian and bicycle environment
- One point for promoting mode shift
- Ancillary points for particular geographic locations (maximum of 10 points)[44]

[43] Old Colony Planning Council, *FFY 2018-2022 Old Colony Transportation Improvement Program (TIP) (*Brockton, MA: Old Colony Metropolitan Planning Organization, May 16, 2017), Appendix I.

[44] Pioneer Valley Planning Commission, *2017 TEC Form Official*, http://www.pvpc.org/projects/transportation-evaluation-criteria-information-center

Southeastern Regional Planning and Economic Development District

The Southeastern Regional Planning and Economic Development District (SRPEDD) evaluates potential TIP projects according to 25 criteria across six categories: Maintenance and Infrastructure; Mobility and Congestion; Safety and Security; Community Impact and Support; Livability and Sustainable Development; and Environmental and Climate Change. A project can earn a total of 87 points. As many as three points can be earned for positively impacting air quality, even though GHG emissions reduction is not specifically mentioned. Points can be earned by criteria related to the nine selected strategies as follows:

- Maximum of three points for improving substandard pavement
- Maximum of three points for improving bicycle and pedestrian safety
- Maximum of six points for improving multimodal mobility, connectivity, or access
- Maximum of three points for meeting all of the Complete Streets criteria and reducing auto dependency
- Maximum of three points for improving quality of life
- Maximum of three points for providing or improving multimodal access to/from/within environmental-justice areas, transit-oriented developments (TODs), 43D sites, priority development areas, economic opportunity areas, or economic target areas[45]

2.3.2 Evaluation of Projects by Agencies Outside of Massachusetts

All but two of the eight interviewed agencies listed in this section use GHG or emission reduction as a criterion in their project evaluation processes. Additionally, many of the nine selected GHG emission reduction strategies qualify under the prioritization schema. However, all the agencies contacted reported that although GHG emissions reduction was an important criterion, no projects or policies were pursued for that benefit alone. Each agency's detailed TEC can be found in Appendix F.

Baltimore Metropolitan Council

Although GHG emissions reduction is not explicitly mentioned as a measure for prioritizing projects in the BMC's latest TIP, nearly half of the 14 TIP evaluative criteria include elements pertaining to the nine selected strategies:

- Implements emissions reduction measures

[45] Southeastern Massachusetts Regional Planning and Economic Development District, *2018-2022 Transportation Improvement Program for the Southeastern Massachusetts Metropolitan Planning Organization* (Taunton, MA: Southeastern Massachusetts Regional Planning and Economic Development District, May 16, 2017), Appendix C.

- Implements Transportation Alternatives activities defined in the Moving Ahead for Progress in the 21st Century Act (MAP-21)[46]
- Enhances social, energy, and environmental activities
- Facilitates transit and/or alternatives to the single-occupant vehicle
- Improves pedestrian safety and access for transportation
- Improves bicycle safety and access for transportation[47]

GHG emission reduction is, however, explicitly mentioned as an evaluative criterion in the *Maximize 2040* LRTP. As much as 10 percent of the maximum of 50 total technical points can be earned by GHG and other emission reductions. A project can earn as many as five additional points for each of the following:

- Complete Streets elements
- Increasing access to job and activity centers
- Connection to a designated sustainable community[48]

Capital District Transportation Committee

CDTC clearly has made GHG emissions reduction an important criterion in its transportation planning efforts; it underpins much of the TIP project rating process. Six of the 11 merit categories in CDTC's TIP project evaluation system involve either the promotion of GHG emissions reduction or one of the nine selected strategies:

- A project can earn a point in the Regional Benefit category if it involves a TDM plan.
- A project that promotes bicycling, carpooling, or carpooling within or connected to an environmental-justice area can earn two points in the Community Quality-of-Life and Equity category
- A project that preserves or renews bicycle and pedestrian infrastructure can earn as many as four points in the Appropriate Infrastructure category
- A project that improves bicycle or pedestrian infrastructure can qualify for varying degrees of Complete Streets status, which can result in the earning of between two and five points in the Appropriate Infrastructure category

[46] MAP-21 was superseded by the Fixing America's Surface Transportation Act (FAST Act). Funding for transportation alternatives and pedestrian and bicycle facility projects are now included in the FAST Act's Surface Transportation Block Grant Program.

[47] Baltimore Regional Transportation Board, *Baltimore Region Transportation Improvement Program 2017-2020* (Baltimore, MD, 2016), 395.

[48] Baltimore Regional Transportation Board, *Maximize 2040 – A Performance-Based Transportation Plan for a Greater Baltimore Region: Final* (Baltimore, MD: Baltimore Metropolitan Council, November 24, 2015), Appendix F.

- Projects can earn as many as two points for improving bicycle infrastructure and as many as three points for improving pedestrian infrastructure in the Multi-Modalism category.
- A project can earn as many as two points in the Environment and Health category if it encourages the use of electric vehicles.
- A project can earn as many as three points in the Safety and Security category if it includes particular elements of pedestrian infrastructure.
- GHG emissions reduction is its own specific subcategory in the Environment and Health category. A proposed project can earn two points if its primary purpose (and over 50 percent of its budget) is devoted specifically to GHG emissions reduction or one point if it includes features likely to reduce GHG emissions. A project could lose a point if it is likely to increase GHG emissions.

The range of possible total points in this ranking system is between -28 and 67. Two later steps occur before the final project score is tallied.[49]

Capitol Region Council of Governments

While CRCOG does not explicitly uses GHG emissions reduction or other emission reductions as evaluative metrics for its project selection process for the Local Transportation Capital Improvements Program (LOTCIP), the nine selected GHG emission reduction strategies do figure in the project rating process. With the exception of bridge improvement projects, proposed projects are rated by project type: reconstruction projects; pavement rehabilitation projects; and bicycle and pedestrian projects and stand-alone sidewalk projects.

Points can be earned in the Pavement Rehabilitation category if the project includes elements of Complete Streets. As many as 50 points can be earned for bicycle and pedestrian projects and stand-alone sidewalk projects. Of the 120 points available for reconstruction projects, roughly 10 percent can be potentially earned via the nine selected GHG emission reduction strategies. As many as three points can be earned for pedestrian supportive projects and for bicycle supportive projects. An additional three points can be earned if the pedestrian improvements are transit supportive. A maximum of five points can be earned by a project if it is deemed to be supportive of TOD; enhancement of bicycle and pedestrian connections are explicitly mentioned as TOD components. Air quality improvement is one of the potential environmental improvements for which as

[49] O'Neill, C. *CDTC New Qualitative Merit Score for Project Evaluation*. Presentation at 2017 AMPO Planning Tools and Training Symposium, (St. Louis, MO: 23 May 2017).

many as two points can be earned in the environmental and historic preservation category. [50]

Chittenden County Regional Planning Commission

One of CCRPC's products is the 2014 Climate Action Guide. The purpose of the guide is to establish a common understanding of the regional issues associated with climate change, establish goals and priorities that are most appropriate for Chittenden County and identify actions to address the regional priorities. The focus of the guide is on both reducing the ways the region contributes to climate change (climate mitigation) and adapting in ways that make the region more resilient to a changing climate (climate adaptation). The guide is not a policy document, rather it is intended to support interested municipalities, businesses, and individuals in developing policy and regulations to address climate change. It also includes a comprehensive accounting of greenhouse gas emissions produced by heating, electricity generation, transportation, solid waste and waste-water management, and agriculture for all 19 towns in the region.

CCRPC developed an evaluative criteria matrix to help prepare the Climate Action Guide and used it to prioritize strategies as being most effective for climate adaption and mitigation. One of the climate-mitigation criteria in the matrix is potential GHG emission reduction. It is actually the most influential metric in the matrix as it comprises nearly half of the overall available score. Possible strategies were rated for their mitigation effectiveness as either *Low*, *MedLo*, *MedHi*, or *High*, corresponding to a score between four and 12. The ranking scale is very different for the other criteria used in the mitigation effectiveness analysis; the scoring range for them is between -3 and 3. Adaptation effectiveness is scored separately and GHG emission reduction is not a criterion. Thus, this tool is heavily weighted toward GHG emission reduction.[51]

Delaware Valley Regional Planning Commission

In February 2014, DVRPC adopted an updated TEC list. There is no specific GHG emission reduction metric listed among the nine TIP evaluation criteria and measures, but one of the scoring categories concerns air quality and green design. GHG emissions reduction is merely one listed element of the air quality improvement component of this category; other components include VMT reduction and low- or zero-emissions vehicles. However, additional points can be

[50] Capitol Region Council of Governments, *Capitol Region Council of Governments LOTCIP Program: Project Selection Policy,* (Hartford, CT: Capitol Region Council of Governments, May 2017), 8-12.

[51] Chittenden County Regional Planning Commission, *Creating a Climate for Resilience: Chittenden County Regional Climate Action Guide* (Burlington, VT: Chittenden County Regional Planning Commission, May 2014), Appendix F.

earned for bicycle and pedestrian infrastructure projects, which are two of the selected strategies. Rewards can be earned for the following:

- Incorporating FHWA-proven safety countermeasures, which include pedestrian infrastructure
- Pursuing pedestrian/bicycle improvements or marketing for TDM services in a designated Congestion Management Process (CMP) Priority or Congested Sub-corridor
- The volume of projected or existing daily bicycle/pedestrian users in a project area
- A new bicycle/pedestrian facility[52]

Maryland Department of Transportation

A directive known as the Maryland Open Transportation Investment Decision Act – Application and Evaluation, took effect on July 1, 2017. This law requires Maryland DOT to develop a project-based scoring system as a model to rank "major transportation projects" being considered for inclusion in the Consolidated Transportation Program (CTP). However, Maryland DOT is not required to use the ranking model as a prioritization tool for the CTP.[53] It remains to be seen how or if GHG emission reduction will be incorporated into the scoring scheme.

Metropolitan Washington Council of Governments

MWCOG has historically not used GHG emissions reduction as a specific evaluative criterion in its transportation planning processes or products. In fact, GHG-focused studies that culminated in reports such as *What Would it Take?* in 2010 and *Multi-Sector Approach to Reducing Greenhouse Gas Emissions in the Metropolitan Washington Region* in 2016 were published in parallel with mandated MPO planning efforts such as the LRTP and TIP. In early 2017, a Multi-Sector Working Group—convened by MWCOG and comprised of experts from local governments and regional and state transportation, planning, and environmental agencies—published its proposed recommendations for reducing GHG emissions. MWCOG has adopted these findings and hopes to use them to inform its upcoming planning work.

New York State Department of Transportation

NYSDOT facilitates consideration of GHG emission reduction strategies in the transportation planning and programming processes at the local level through its GreenLITES Program. NYSDOT, in conjunction with several MPOs, developed

[52] Delaware Valley Regional Planning Commission, *Draft DVRPC FY2017 TIP for Pennsylvania* (Philadelphia, PA: Delaware Valley Regional Planning Commission, July 2016).

[53] Maryland General Assembly, *Senate Bill 307: Maryland Open Transportation Investment Decision Act – Application and Evaluation*, 2017 Session.

the GreenLITES project solicitation tool. The tool is voluntary, and helps municipalities and MPOs gauge how well a proposed transportation infrastructure project aligns with other community sustainability goals such as economic development, protecting and enhancing the environment, energy efficiency, and overall how well the project supports a sustainable society. This tool assesses projects according to their consistency with the state's and locality's sustainability goals. Of 26 possible points a project can earn, one point is dedicated to GHG emissions reduction.[54]

2.3.3 TIP Decision-Making—Comparison with Boston Region MPO

As displayed in Table 6, the Boston Region MPO awards a lower percentage of its TIP evaluation points specifically for emissions reduction than all but one of the interviewed agencies outside of Massachusetts that presently use project ranking systems. Compared to the other Massachusetts MPO's TEC schemes, the Boston Region MPO ranks 8 out of 13 in terms of the focus it puts on emissions reduction. Interestingly enough, the MPOs serving Massachusetts' three largest metropolitan areas—Boston, Worcester, Springfield—put the least emphasis on emissions reduction, despite having the highest vehicle traffic and emissions in the state.

[54] New York State Department of Transportation, *GreenLITES Project Solicitation Tool*, Albany, NY.

Table 6.
Maximum Percentage of Total Evaluative Points Specifically Available for GHG and Other Emission Reductions

Agency	Percentage
BMC	*7.1%*
*BMC**	*10.0%*
BRPC	12.5%
CCC	2.0%
*CCRPC***	*50.0%*
CDTC	*3.0%*
CMRPC	2.8%
CRCOG	*2% - 4%*
DVRPC	*11.1%*
FRCOG	5.3%
MRPC	4.0%
MVC	7.7%
MVPC	4.5%
NMCOG	5.6%
NP&EDC	1.0%
NYSDOT	*3.8%*
OCPC	4.8% - 5.9%
PVPC	1.0%
SRPEDD	3.4%
Boston Region MPO	**3.7%**

*Evaluative scheme for LRTP

**Evaluative scheme for Climate Action Guide

Because of the wide variation in specificity and detail of the evaluative metrics and the variety of weighting schema, it is very difficult to make comparisons with other agencies regarding point awards for criteria advancing the nine selected strategies. However, every agency provides for the reward of non-motorized improvements. The Boston Region MPO offers as many as nine specific points for bicycle improvements and as many as 14 specific points for pedestrian improvements. An additional 36 points might be garnered for non-pedestrian improvements from ancillary criteria that reward the promotion of inter-modalism, targeted development, and reduction of other non-GHG emissions. Given that as many as five of the 134 total points can be awarded for GHG emission reduction,

a non-motorized project could earn between 37 and 41 percent of the maximum total score from these criteria alone.

No agency, including the Boston Region MPO, explicitly rewards alternative fuel modes (for example, electric vehicles). The Boston Region MPO does not award points for TDM strategies, while several other Massachusetts MPOs do reward such programs.

2.4 CONSIDERATION OF GHG EMISSION REDUCTION STRATEGIES IN SCENARIO PLANNING

Only a few of the interviewed agencies have undertaken scenario planning and, of those that have, very few have actually broached the topic of GHG emissions reduction. Only one agency, CCRPC, integrated the testing of packages of GHG emissions strategies into its LRTP and transportation scenario planning efforts. Three other agencies—BMC, EPA, and MassDOT—performed scenario planning independently of other planning efforts to isolate the impacts of the GHG reduction strategies.

Baltimore Metropolitan Council

BMC's most recent LRTP effort focused on scenario planning for climate change adaptation, not for mitigation. Three distinct future scenarios were discussed in the "Scenario Thinking exercise," and emissions reduction was deemed to be important.[55] Bonafide scenario planning was performed for BMC's previous *How Far Can We Get?* study. Seven different alternatives were modeled, each testing a different combination of TERMs. The Vehicle Technology Plus/Marketing Scenario was ultimately recommended. This scenario was composed of vehicle-use optimization and eco-driving programs, employer and household TDM programs, truck-idling reduction, and a low-rolling resistance-tire rebate program.[56]

Chittenden County Regional Planning Commission

CCRPC performed scenario planning for its ECOS Plan, which combines the agency's Regional Plan, Metropolitan Transportation Plan (MTP), and Comprehensive Economic Development Strategy into a single document. CCRPC did not individually model GHG emission reduction strategies but instead modeled packages of strategies in three distinct transportation scenarios. The most aggressive scenario, the Energy Conservation/Social Equity Alternative, included some of the nine selected strategies—TDM, carsharing, and non-

[55] Baltimore Regional Transportation Board, *Maximize 2040 – A Performance-Based Transportation Plan for a greater Baltimore Region: Final*, Appendix C.
[56] Baltimore Regional Transportation Board, *How Far Can We Get* (December 2015), 28.

motorized infrastructure—as well as other emission reduction strategies—transit system expansion, passenger rail, increase in vehicle operating costs, intelligent transportation systems (ITS) improvements, and park-and-ride lot expansion. All of these elements combined were estimated to decrease GHG emissions by 20 percent; the difficulty of modeling the effects of a single project or strategy was noted.[57]

Many of this scenario's components, several of which had not been included in the initial scenario, were ultimately reflected in the adopted MTP.[58]

US Environmental Protection Agency—TEAM Case Study

The Boston Region MPO area was one of the locations selected for a case study on EPA's TEAM approach to emissions-reduction estimation. The study team worked with MassDOT, the Metropolitan Area Planning Council, Central Transportation Planning Staff, and GCC to develop and test five different future scenarios for the 2035 horizon year. In one of these scenarios, the Expanded Healthy Modes Program, participation in the MassRIDES worksite TDM program was expanded by 25 percent. Additionally, employees presently eligible to use MassRIDES would be offered a monthly monetary incentive of $70.[59]

Three other scenarios tested emission reduction strategies other than the nine addressed in this report, and another alternative was the Business as Usual scenario, in which no new emission reduction strategies were included. The Expanded Healthy Modes Program scenario decreased GHGs by 2.8 percent regionally compared with the Business as Usual scenario. The Expanded Healthy Modes Program's impact was much greater for the affected population—the existing 650,000 MassRIDES users would reduce their VMT by 16 percent, while the 150,000 new MassRIDES users would reduce their VMT by 20 percent.[60]

MassDOT—EERPAT Study

In addition to modeling individual GHG emission reduction strategies as aforementioned, packages of strategies were modeled in different scenarios in MassDOT's EERPAT study. One scenario, called Additional MassDOT Policies, considered investments that MassDOT could make if additional funding was available. The scenario was comprised of two of the nine selected strategies—

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[57] Chittenden County RPC, *2013 Chittenden County ECOS Plan Amended*, 90

[58] Ibid., 90-91

[59] ICF International, *Estimating Emission Reductions from Travel Efficiency Strategies: Three Sketch Modeling Case Studies* (Washington, DC: US Environmental Protection Agency, June 2014) EPA-420-R-14-003a, 28.

[60] Ibid., 35.

bicycle infrastructure, TDM—and a few other approaches—transit investment in increased transit service, ITS, and clean buses. The other major scenario, called Other State and Local Policies, considered policies outside of MassDOT's direct control. Two of the nine selected strategies—parking pricing and electric vehicles—were present in this scenario as well as four other approaches—land use and smart growth, VMT fees, congestion pricing, and an enhanced clean fuels standard. Table 7 compares the results of these scenarios with a projected future baseline scenario.

Table 7.
GHG Reduction from Baseline Scenario

Scenario	2030	2040	2050
Additional MassDOT Policies	1.90%	2.30%	2.70%
Other State and Local Policies	4.50%	4.80%	4.90%

Source: Cambridge Systematics, *Application of the EERPAT Greenhouse Gas Analysis Tool in Massachusetts* (Boston, MA: Massachusetts Department of Transportation, May 2016), 1-6.

2.4.1 Ancillary Discussion of GHG Strategies in Scenario Planning Work

The Northeast States for Coordinated Air Use Management (NESCAUM) modeled GHG emission reduction scenarios for the states of Connecticut and Rhode Island, but did not focus on the transportation sector; these alternatives assumed 100 percent market penetration by electric vehicles.

DVRPC's scenario planning effort for its latest LRTP, *Connections 2040*, centered on different future funding levels for transportation infrastructure. Three distinct transportation investment scenarios (high, medium, low) were modeled. Consequently, GHG emission reduction strategies were not explicitly modeled for their potential to reduce GHG emissions. Instead, their presence in the scenarios was only due to their impacts on the overall operation of the transportation system. Furthermore, although a GHG emission reduction alternative was not modeled explicitly, it was noted that the high investment scenario would allow the region to make progress towards attaining its stated goal of lowering of GHG emissions.[61]

[61] Delaware Valley Regional Planning Commission, *Connections 2040: Transportation Investment Scenarios* (Philadelphia, PA: Delaware Valley Regional Planning Commission, October 2012), 24.

Chapter 3—Findings and Recommendations

3.1 FINDINGS

The Boston Region MPO appears to be in line with its peers in terms of GHG emission reduction strategies. Many other agencies have undertaken the same approaches as the Boston Region MPO—TDM, electric vehicle promotion via "information on vehicle purchases," non-motorized infrastructure, and parking policies. However, no agency appears to have discovered a truly cost-effective GHG emission reduction strategy that is a panacea.

Few agencies have actually measured the progress of GHG emission reduction initiatives that they have implemented. Several have integrated GHG emission reduction considerations into their scenario planning. All have incorporated GHG considerations into their decision-making processes as criteria for project selection.

However, every contacted agency reported that GHG emissions reduction is never the primary motivation for pursued policies. The nine selected strategies have been undertaken for other overarching planning purposes—congestion relief, increased accessibility and mobility, healthy communities, smart growth, and TOD, for example; associated GHG emission reductions are merely co-benefits. There appears to be consensus among transportation agencies nationwide that GHG emission reduction is a worthy aim, and that aim is evident in the regional planning goals and strategies of the agencies interviewed for this study. GHG emission reduction, however, does not significantly factor into the criteria used to prioritize transportation projects among these agencies.

Because GHG emission reduction is merely seen as a co-benefit of the implementation of projects, it is neither the primary goal not the main driver for initiatives. Notwithstanding, GHG emission reduction approaches often mutually support other initiatives and usually comprise components of potential projects and policies; projects, including those designed to reduce GHG emissions, never occur in a vacuum. Projects that proponents will advocate for will likely have GHG emission reduction benefits because GHG emission reduction is correlated and enmeshed with other regional planning goals. Although GHG emission reduction does not appear to be prominent in the project prioritization process, GHG emission reduction frequently occurs as a complementary co-benefit from the implementation of projects.

Cost-effectiveness, with regards to GHG emission reduction, does not seem to play a large role in project prioritization. GHG emission reduction strategies tend to be implemented because of their potential to assist in the progress of achieving statewide and national GHG emission reduction targets, not because they are inherently cost-effective.

The Boston Region MPO and the other Massachusetts MPOs appear to be ahead of their peers in many respects. In fact, many of the contacted agencies reported that they look to the Boston Region MPO for guidance on GHG emission reduction strategies.

3.2 PLANNING RECOMMENDATIONS

As part of its work towards achieving its GHG reduction goals, the MPO should design and put into place tools for the measurement and evaluation of the progress of GHG emission reduction initiatives that it has implemented. Future scenario planning efforts by the Boston Region MPO should specifically incorporate the nine selected strategies.

The two modeling tools examined for cost-effectiveness deserve further study. LCC needs more investigation and enhancement. With some assumptions, more of the social costs of carbon might be quantified and incorporated into the analysis. LCC might be useful for analysis of short-term planning efforts where annual costs and emissions are either already known or relatively simple to compute.

Since an EERPAT analysis can be conducted at the regional level as well as at the statewide level, the MPO should consider using it to test some of its policies. Although the aforementioned MassDOT EERPAT study was chiefly conducted at the MPO level of geography, MassDOT policies, not individual MPO ones, were tested. BMC enlisted the help of Maryland DOT to do this for their 2015 study, *How Far Can We Get?* Maryland DOT, which maintains the EERPAT model for Maryland, calibrated the model to the BMC area before testing some policies provided by BMC; results were then presented at the BMC regional level. At the very least, such an analysis can serve to confirm and support MPO decisions and calculations made using other models and methods.

The most concrete area of potential enhancement of the Boston Region MPO's GHG emission reduction strategies is the TEC used for the TIP and the LRTP. A greater percentage of points should be awarded for the emissions reduction criterion. If the GHG emissions reduction criterion used the TEC's greatest point range (-6 to 6), GHG-emissions reduction could comprise approximately 4.5 percent of the total maximum score that projects could earn in the evaluation process. Then the Boston Region MPO would be tied for sixth place among the 13 Massachusetts MPOs in terms of the focus put on emissions reduction. Raising the point range by another point would place the MPO in roughly fifth place; another additional point (raising it to eight possible points) would place it squarely in third place. Additionally, points should be specifically awarded for TDM programs, as they are in several other Massachusetts MPOs.

The overall scoring system should be refined to further favor and reward projects that implement any of the nine GHG emissions reduction measures discussed in this study. Potential scoring would thus be structured so that projects could earn points for as many components that characterize the selected strategies as possible and give maximum value to projects that reduce GHG emissions.

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Appendix A—Agencies Consulted for This Study

Interviewed Agencies

Metropolitan Planning Organizations

- Baltimore Metropolitan Council (BMC) – Baltimore, MD
- Capital District Transportation Committee (CDTC) – Albany, NY
- Capitol Regional Council of Governments (CRCOG) – Hartford, CT
- Chittenden County Regional Planning Commission (CCRPC) – Winooski, VT
- Delaware Valley Regional Planning Commission (DVRPC) – Philadelphia, PA
- Metropolitan Washington Council of Governments (MWCOG) – Washington, DC

State Departments of Transportation

- Massachusetts Department of Transportation (MassDOT)
- New York State Department of Transportation (NYSDOT)
- Maryland Department of Transportation (MDOT)

Other Government Agencies

- Environmental Protection Agency (EPA)
- New York State Energy Research and Development Authority (NYSERDA)
- Northeast States for Coordinated Air Use Management (NESCAUM)

Other Researched Agencies

- Massachusetts Metropolitan Planning Organizations
- Rhode Island Department of Transportation (RIDOT)
- Connecticut Department of Transportation (ConnDOT)
- New Jersey Transit
- New Jersey Department of Transportation (NJDOT)
- Pennsylvania Department of Transportation (PennDOT)
- Delaware Department of Transportation

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Appendix B—MassDOT CMAQ Worksheets for GHG Quantification

Appendix 1: CMAQ Spreadsheet Examples

Bus Replacement

CMAQ Bus Replacement Air Quality Analysis Worksheet

FILL IN SHADED BOXES ONLY

TIP YEAR:	**Bus Replacements**
MPO:	
RTA:	

Project 1 - Replace # (model year) Buses with # (model year) Buses

Emission Rates in grams/mile at assumed operating speed of : 18 MPH

Scenario Comparison		Model Year	**Summer VOC** (grams/mile)	**Summer NOx** (grams/mile)	**Winter CO** (grams/mile)	**Summer CO2** (grams/mile)
Existing Model*	=					
New Bus Purchase*	=	2016	0.195	0.776	0.383	872.900

HDDV 3 — Enter vehicle type used for New Bus emission factors (For example, HDGV 6 or HDDV 2b)

*Please refer to the 'Emission Factors' tab to determine the most appropriate 'New Bus' factors based on fuel type and gross vehicle weight. If you require factors for an operating speed other that 18MPH, or for the 'Existing Model' being replaced, please contact Ethan Britland at 857-368-8840 or at Ethan.Britland@state.ma.us

Change (Buy-Base)	0.195	0.776	0.383	872.900

Calculate fleet vehicle miles per day:

Revenue miles per year	X Deadhead factor	= fleet miles per year	/ operating days per year	= fleet miles per day
1,623,050	1.15	1,866,508	**301**	6,201

Calculate emissions change in kilograms per summer day

Change	rate change grams/mile	/ 1000 g/kg	X fleet miles per day	X seasonal adj factor	= change/day in kg
Change in Summer VOI	0.195	1,000	6,201	1.0188	**1.232**
Change in Summer NO:	0.776	1,000	6,201	1.0188	**4.902**
Change in Winter CO	0.383	1,000	6,201	0.9812	**2.330**
Change in Summer CO:	872.900	1,000	6,201	1.0000	**5412.872**

Calculate emissions change in kilograms per year

Pollutant	= change/day in kg	X op. days per year	= change per year in kg
Summer VOC	1.232	301	370.812
Summer NOx	4.902	301	1475.640
Winter CO	2.330	301	701.433
Summer CO2	5412.872	301	##########

Calculate cost effectiveness (cost per kg of emissions reduced)

Pollutant	Total Project Cost	/ Project Life in years	/ reduction per year in kg	= annual cost per kg
Summer VOC		**12**	-370.812	**$0**
Summer NOx		**12**	-1475.640	**$0**
Winter CO		**12**	-701.433	**$0**
Summer CO2		**12**	-1629274.397	**$0**

New/additional transit service

CMAQ New Bus Service Air Quality Analysis Worksheet

FILL IN SHADED BOXES ONLY

FILL IN SHADED BOXES ONLY

TIP YEAR:	**2013**
MPO:	
RTA:	
Project:	

Summary of Vehicle Emission Rates:

Emission Rates by Vehicle Type	Milestone Year for Rates	Oper. Speed (mph)	**Summer VOC** (grams/mile)	**Summer NOx** (grams/mile)	**Winter CO** (grams/mile)	**Summer CO2** (grams/mile)
Auto	2016	20	0.280	0.215	11.340	368.1
Bus*	2016	18	0.195	0.776	0.383	872.9
HDDV 3	Vehicle type used for Bus emission factors (For example, HDGV 6 or HDDV 2b)					

*Please refer to the 'Emission Factors' tab to determine the most appropriate 'Bus' factors based on fuel type and gross vehicle weight. If you require 'Bus' factors for an operating speed other that 18MPH, or for 'Auto' factors other than 20 MPH, please contact Ethan Britland at 857-368-8840 or at Ethan.Britland@state.ma.us

Calculate VMT and emissions savings from private vehicles:

Convert daily bus ridership into private auto VMT savings:

Daily one way person trips (reduced)	/ average veh. occupancy	= daily one-way auto trips	x avg. auto trip length (miles)	= daily savings auto VMT
169	1.18	143	7.8	1,117

Calculate emissions change from auto VMT savings: Pollutant	Daily Auto VMT change (net)	X Emission factor (auto)	/ 1000g per kg	**= change/day in kg**
Summer VOC	-1,117	0.280	1000	**-0.313**
Summer NOx	-1,117	0.215	1000	**-0.240**
Winter CO	-1,117	11.340	1000	**-12.668**
Summer CO2	-1,117	368.100	1000	**-411.211**

Calculate bus route mileage and emissions per day:

Pollutant	Total Route distance (miles)	X # of round trips per day	= fleet miles per day	X Emission factor (bus)	/ 1000g per kg	= change/day in kg
Summer VOC	12	10	120	0.195	1000	**0.023**
Summer NOx	12	10	120	0.776	1000	**0.093**
Winter CO	12	10	120	0.383	1000	**0.046**
Summer CO2	12	10	120	872.900	1000	**104.748**

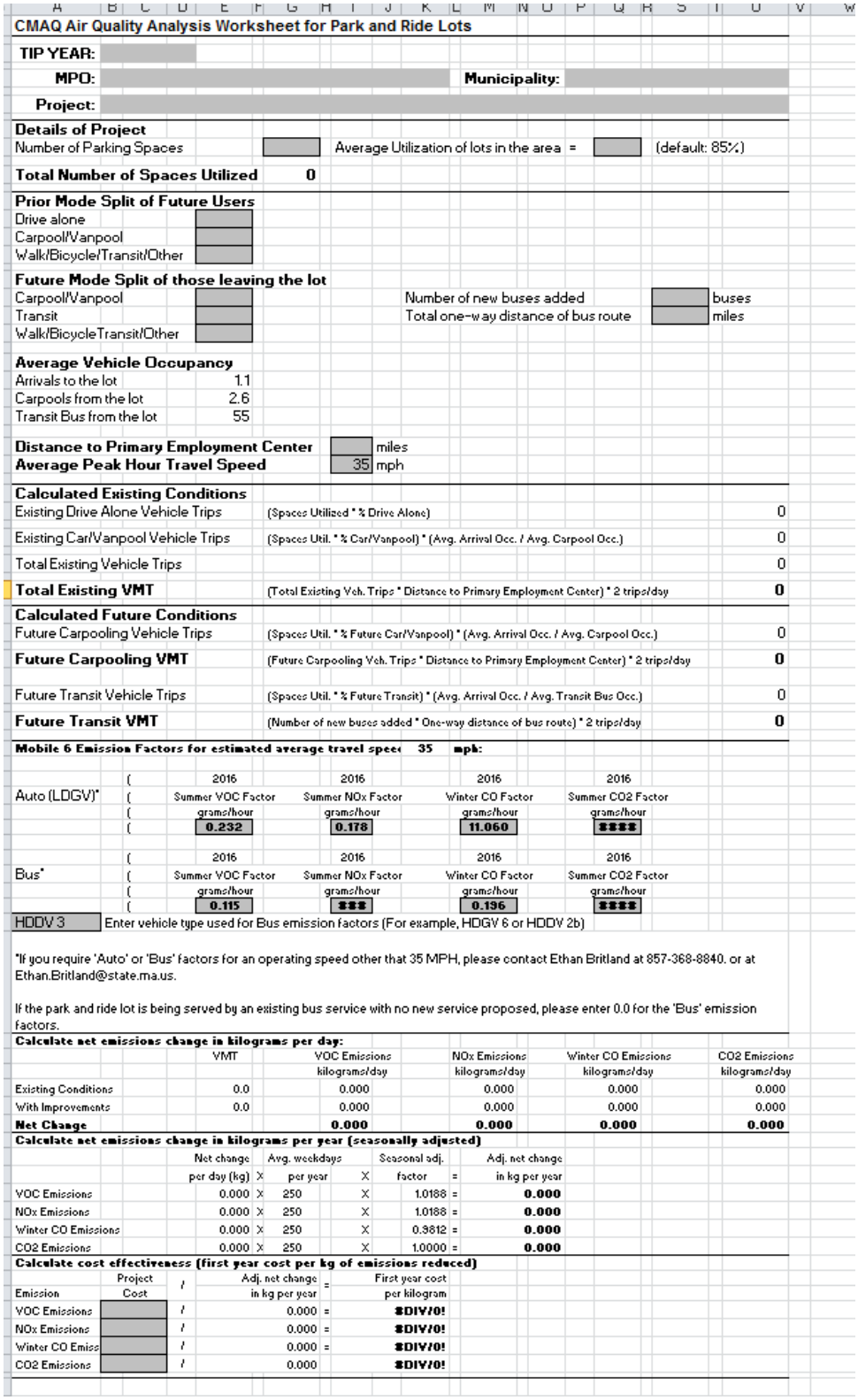
Add impact of bus emissions to emission savings from private vehicles

Pollutant	change/day auto (kg)	+ change/day bus or van (kg)	= change/day (NET) in kg
Summer VOC	-0.313	0.023	**-0.289**
Summer NOx	-0.240	0.093	**-0.147**
Winter CO	-12.668	0.046	**-12.622**
Summer CO2	-411.211	104.748	**-306.463**

Calculate net emissions change in kilograms per year (seasonally adjusted)

Pollutant	change/day (NET) in kg	X operating days per year	X seasonal adj factor	= change per year in kg
Summer VOC	-0.289	250	1.0188	-73.708
Summer NOx	-0.147	250	1.0188	-37.456
Winter CO	-12.622	250	0.9812	-3096.217
Summer CO2	-306.463	250	1.0000	-76615.843

Park and Ride lot



CMAQ Air Quality Analysis Worksheet for Park and Ride Lots

TIP YEAR:

MPO: **Municipality:**

Project:

Details of Project

Number of Parking Spaces | Average Utilization of lots in the area = | (default: 85%)

Total Number of Spaces Utilized 0

Prior Mode Split of Future Users

Drive alone	
Carpool/Vanpool	
Walk/Bicycle/Transit/Other	

Future Mode Split of those leaving the lot

Carpool/Vanpool		Number of new buses added	buses
Transit		Total one-way distance of bus route	miles
Walk/BicycleTransit/Other			

Average Vehicle Occupancy

Arrivals to the lot	1.1
Carpools from the lot	2.6
Transit Bus from the lot	55

Distance to Primary Employment Center miles

Average Peak Hour Travel Speed 35 mph

Calculated Existing Conditions

Existing Drive Alone Vehicle Trips	(Spaces Utilized * % Drive Alone)	0
Existing Car/Vanpool Vehicle Trips	(Spaces Util. * % Car/Vanpool) * (Avg. Arrival Occ. / Avg. Carpool Occ.)	0
Total Existing Vehicle Trips		0
Total Existing VMT	(Total Existing Veh. Trips * Distance to Primary Employment Center) * 2 trips/day	**0**

Calculated Future Conditions

Future Carpooling Vehicle Trips	(Spaces Util. * % Future Car/Vanpool) * (Avg. Arrival Occ. / Avg. Carpool Occ.)	0
Future Carpooling VMT	(Future Carpooling Veh. Trips * Distance to Primary Employment Center) * 2 trips/day	**0**
Future Transit Vehicle Trips	(Spaces Util. * % Future Transit) * (Avg. Arrival Occ. / Avg. Transit Bus Occ.)	0
Future Transit VMT	(Number of new buses added * One-way distance of bus route) * 2 trips/day	**0**

Mobile 6 Emission Factors for estimated average travel speed 35 mph:

	2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
Auto (LDGV)*	0.232	0.178	11.060	####
Bus*	0.115	###	0.196	####

HDDV 3 Enter vehicle type used for Bus emission factors (For example, HDGV 6 or HDDV 2b)

*If you require 'Auto' or 'Bus' factors for an operating speed other that 35 MPH, please contact Ethan Britland at 857-368-8840. or at Ethan.Britland@state.ma.us.

If the park and ride lot is being served by an existing bus service with no new service proposed, please enter 0.0 for the 'Bus' emission factors.

Calculate net emissions change in kilograms per day:

	VMT	VOC Emissions kilograms/day	NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	CO2 Emissions kilograms/day
Existing Conditions	0.0	0.000	0.000	0.000	0.000
With Improvements	0.0	0.000	0.000	0.000	0.000
Net Change		**0.000**	**0.000**	**0.000**	**0.000**

Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X	Avg. weekdays per year	X	Seasonal adj. factor	=	Adj. net change in kg per year
VOC Emissions	0.000	X	250	X	1.0188	=	**0.000**
NOx Emissions	0.000	X	250	X	1.0188	=	**0.000**
Winter CO Emissions	0.000	X	250	X	0.9812	=	**0.000**
CO2 Emissions	0.000	X	250	X	1.0000	=	**0.000**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/	Adj. net change in kg per year	=	First year cost per kilogram
VOC Emissions		/	0.000	=	**#DIV/0!**
NOx Emissions		/	0.000	=	**#DIV/0!**
Winter CO Emiss		/	0.000	=	**#DIV/0!**
CO2 Emissions		/	0.000		**#DIV/0!**

Complete Streets projects

CMAQ Air Quality Analysis Worksheet for Complete Streets Project rev. 12/31/2014

FILL IN SHADED BOXES ONLY

TIP YEAR:

MPO: Municipality:

Project:

Step 1: Calculate New Walk and Bike Miles Traveled:

If VMT reduction per year is known then go to Step 2B, if not proceed with Step 1 :

				User Input (blank for default)	Default
A.	Facility Length **(L)**:	1.0	Miles		
B	Types of Improvements Implemented:	Both	(select Pedestrian, Bicycle, or Both from list)		
B.	Service Area Radius for Bicycling **(RB)**:	0.5	Miles		0.5
C.	Service Area Radius for Walking **(RW)**:	0.25	Miles		0.25
D.	Service Area of Community(ies) **for Bicycling (SAB)**: L * 2RB = SAB	1	Sq. Miles		
E.	Service Area of Community(ies) **for Walking (SAW)**: L * 2RW = SAW	0.5	Sq. Miles		
F.	Land Area of Neighborhoods Served **(AN)**:	1.0	Sq. Miles		
G.	Population of Neighborhoods Served **(PN)**:	10,000	Persons		
H.	Population Density of Neighborhoods Served **(PD)**:	10,000	Persons/Sq. Mile		
I.	Population Served by Facility for Bicycling **(PB)**: PD * SAB = PB	10,000	Persons		
J.	Population Served by Facility for Walking **(PW)**: PD * SAW = PW	5,000	Persons		
K.	Trips per Person per Day in Service Area **(T)**:	4.7	Trips		4.7
L.	Baseline Bicycle Mode Share in Service Area **(MSB)**:	1.7%	Percent		
M.	Baseline Walk Mode Share in Service Area **(MSW)**:	30.2%	Percent		
N.	Relative Increase in Service Area Bicycle Mode Share from Improvements **(BI)**:	30.0%	Percent		30.0%
O.	Relative Increase in Service Area Walk Mode Share from Improvements **(WI)**:	7.5%	Percent		7.5%
P.	New Bike Trips **(BT)**: PB * T * MSB * BI = BT	240	1-Way Trips/Day		
Q.	New Walk Trips **(WT)**: PW * T * MSW * WI = WT	532	1-Way Trips/Day		
R.	Average Bike Trip Length **(LB)**:	2.3	Miles		2.3
S.	Average Walk Trip Length **(LW)**:	0.7	Miles		0.7
T.	New Bike and Walk Miles of Travel **(BWM)**:	935	Miles per Day		

Default Mode Shares by Population Density

	>7,500	1,000-7,500	<1,000
Bicycle	1.7%	0.6%	0.6%
Walk	30.2%	7.2%	4.7%

Step 2: Calculate the VMT Reduction:

U.	Prior Drive Mode Share of New Bike and Walk Trips **(MSD)**:	59.0%	Percent	59%	
V.	VMT Reduced per Day **(VMTR)**: BWM * MSD = VMTR	551	Miles per Day		
W.	VMTR * Operating Days Per Year 551 * 365 =	201,255	VMTR Per Year		
	If the Vehicle Miles Traveled Reduction is known enter in the box to the right.		VMTR Per Year		

Note: A manual entry of the VMTR will override the calculated cell.

Step 3: Emission Factors for Average Commuter Travel Speed:

Note: Use 35 MPH as a default if average speed is not known. Speed Used: 35 MPH

2016 Auto Summer VOC Factor grams/mile	2016 Auto Summer NOx Factor grams/mile	2016 Auto Summer CO Factor grams/mile	2016 Auto Summer CO2 Factor grams/mile
0.232	0.178	3.540	368.100

Step 4: Calculate emissions reductions in kilograms per year (Seasonally Adjusted):

Summer VOC	Summer NOx	Summer CO	Summer CO2
47.6	36.5	725.8	74,081.9

Step 5: Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost		Emission Reduction in kg per year		First year cost per kilogram
Summer VOC		/	47.6	=	$0
Summer NOx	$0	/	36.5	=	$0
Summer CO	$0	/	725.8	=	$0

Bicycle and pedestrian infrastructure

CMAQ Air Quality Analysis Worksheet for Bicycle and Pedestrian Project

FILL IN SHADED BOXES ONLY

	TIP YEAR:			
	MPO:		Municipality:	
	Project:			

Step 1: Calculate Estimated Reduction in Vehicle Miles Traveled (VMT):

If VMT reduction per year is known then go to Step 2B, if not proceed with Step 1 :

A.	Facility Length **(L)**:	1.8	Miles	
B.	Service Area Radius **(R)**:	1.0	Miles	(Default = 1 Mile)
C.	Service Area of Community(ies) **(SA)**: L * 2R = SA	3.6	Sq. Miles	
D.	Total Land Area of Community(ies) **(T)**:	25	Sq. Miles	
E.	Service Area % of Community(ies) Land Area **(LA)**: SA / T = LA	14.4%		
F.	Total Population of Community(ies) **(TP)**:	50,000	Persons	
G.	Population Served by Facility **(P)**: LA * TP = P	7,200	Persons	
H.	Total Number of Households in Community(ies) **(HH)**:	20,000	HH	
I.	Number of Households Served by Facility **(HS)**: LA * HH = HS	2,880	HH	
J.	Total Number of Workers Residing in Community(ies) **(W)**:	25,000	Persons	
K.	Workers Per household **(WPHH)**: W / HH = WPHH	1.25	Persons	
L.	Workers in Service Area **(WSA)**: HS * WPHH = WSA	3,600	Persons	
M.	Population Density of the Service area **(PD)**: P / SA = PD	2,000	Persons Per Sq. Mile	
N.	If the bicycle and pedestrian commuter mode share is known, enter the percentage at the right.		**(BMS)**	2.5%
	If not, use US Census - American Community Survey data to determine the mode share and enter the percentage.			
	http://www.census.gov/programs-surveys/acs/guidance/estimates.html			
O.	Bike and Ped. Work Utilitarian Trips **(BWT)**: WSA * BMS = BWT	90	One-Way Trips	
P.	Bike and Ped. Non-Work Utilitarian Trips **(BNWT)**: BWT * 1.7 = BNWT	153	One-Way Trips	
	(Latest planning assumptions estimate non-work utilitarian trips to be 1.7 times the work utilitarian.)			

Step 2: Calculate the VMT Reduction Per Day:

A.	((2 * BWT) + (2 * BNWT)) * (0.5* L) = VMTR			437.4	VMTR Per Day
B.	VMTR * Operating Days Per Year	437.4	* 200 =	87,480	VMTR Per Year
	If the Vehicle Miles Traveled Reduction is known enter in the box to the right.				VMTR Per Year
	Note: A manual entry of the VMTR will override the calculated cell.				

Step 3: MOVES 2014 Emission Factors for Urban Unrestricted PM:

Note: Use 35 MPH as a default if average speed is not known. Speed Used: 35 MPH

2016 Passenger Summer VOC Factor	2016 Passenger Summer NOx Factor	2016 Passenger Summer CO Factor	2016 Passenger Summer CO2 Factor
grams/mile	grams/mile	grams/mile	grams/mile
0.047	0.163	2.460	378.555

Step 4: Calculate emissions reductions in kilograms per year (Seasonally Adjusted):

Summer VOC	Summer NOx	Summer CO	Summer CO2
4.2	14.5	219.3	33,116.0

Step 5: Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost		Emission Reduction in kg per year		First year cost per kilogram
Summer VOC		/	4.2	=	$0
Summer NOx		/	14.5	=	$0
Summer CO		/	219.3	=	$0
Summer CO2		/	33,116.0	=	$0

Traffic operational improvement

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR:

MPO: **Municipality:**

Project:

Step 1: Calculate Existing AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Main St.	NB	6	###	22.9	145	338	###	22.9	8,148	401	###	22.9	9,666	17,958
Main St.	SB	72	###	12.8	970	205	###	12.8	2,762	6	###	12.8	81	3,813
Plain St	EB	352	###	54.8	20,305	205	###	54.8	11,825	107	###	10.4	1,171	33,301
Keith Ave	WB		###	0.1	0		###	0.1	0		###	0.1	0	0
												Total Intersection Delay/Seconds		**55,073**

Step 2: Calculate Existing PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Main St.	NB	5	###	11.9	63	351	###	11.9	4,397	272	###	11.9	3,407	7,867
Main St.	SB	195	###	180.0	36,947	397	###	180.0	75,221	13	###	180.0	2,463	114,632
Plain St	EB	427	###	57.4	25,800	114	###	57.4	6,888	60	###	10.0	632	33,319
Keith Ave	WB		###	0.1	0		###	0.1	0		###	0.1	0	0
												Total Intersection Delay/Seconds		**155,817**

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM: PM Total Intersection Delay: 155,817

Step 4: Calculate the exi: PM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Main St.	NB	5	###	6.0	32	351	###	6.0	2,232	272	###	6.0	1,729	3,993
Main St.	SB	185	###	4.2	810	397	###	4.2	1,738	13	###	4.2	57	2,605
Plain St	EB	427	###	13.6	6,090	114	###	13.6	1,626	51	###	13.6	727	8,444
Keith Ave	WB	8	###	13.8	117	38	###	13.8	554	53	###	13.8	772	1,442
												Total Intersection Delay/Seconds		**16,484**

Step 5: Calculate vehicle delay in hours per day:

	(Delay in seconds	X	Hours per day)	/ Seconds per hour	= Delay in hours / day
Existing peak hour intersection delay	(155,817	X	10)	/ 3600	= 432.8
Peak hour intersection delay w/	(16,484	X	10)	/ 3600	= 45.8

Step 6: MOVES 2014 emission factors for Urban Unrestricted idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
0.519	**###**	**6.363**	**#####**

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	432.8	0.225	0.598	2.754	1,707.569
With Improvements	45.8	0.024	0.063	0.291	180.648
Net Change		**-0.201**	**-0.535**	**-2.463**	**#######**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X Avg. weekdays per year	X Seasonal adj. factor	= Adj. net change in kg per year
Summer VOC Emissions	-0.201	X 250	X 1.0188	= **-51.155**
Summer NOx Emissions	-0.535	X 250	X 1.0188	= **-136.300**
Winter CO Emissions	-2.463	X 250	X 0.9812	= **-604.066**
Summer CO2 Emissions	-1,526.921	X 250	X 1.0000	= **-381,730.336**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/ Adj. net change in kg per year	= First year cost per kilogram
Summer VOC		/ -51.155	= **$0**
Summer NOx		/ -136.300	= **$0**
Winter CO		/ -604.066	= **$0**
Summer CO2		/ -381,730.336	= **$0**

Alternative fuels vehicles

CMAQ Air Quality Analysis Worksheet for Alternative Fuel Vehicles

FILL IN SHADED BOXES ONLY

TIP YEAR:

MPO: Municipality:

Project:

Step 1: Details of Project:

A. Existing Fuel Type Vehicle:	Gasoline Car	
B. Alternative Fuel Type/Technology Vehicle:	Propane Car	
C. Number of Vehicles:	10	Vehicles
D. Annual Miles Traveled per Vehicle:	10,000	Miles

Step 2: Emission Factors for Average Commuter Travel Speed:

Note: Use 35 MPH as a default if average speed is not known. Speed Used: 35 MPH

	Summer VOC Factor grams/mile	Summer NOx Factor grams/mile	Summer CO Factor grams/mile	Summer CO2 Factor grams/mile
Existing Fuel Type Vehicle	0.153	0.221	2.524	334.689
Alt. Fuel Type/Tech. Vehicle	0.135	0.196	2.231	295.865

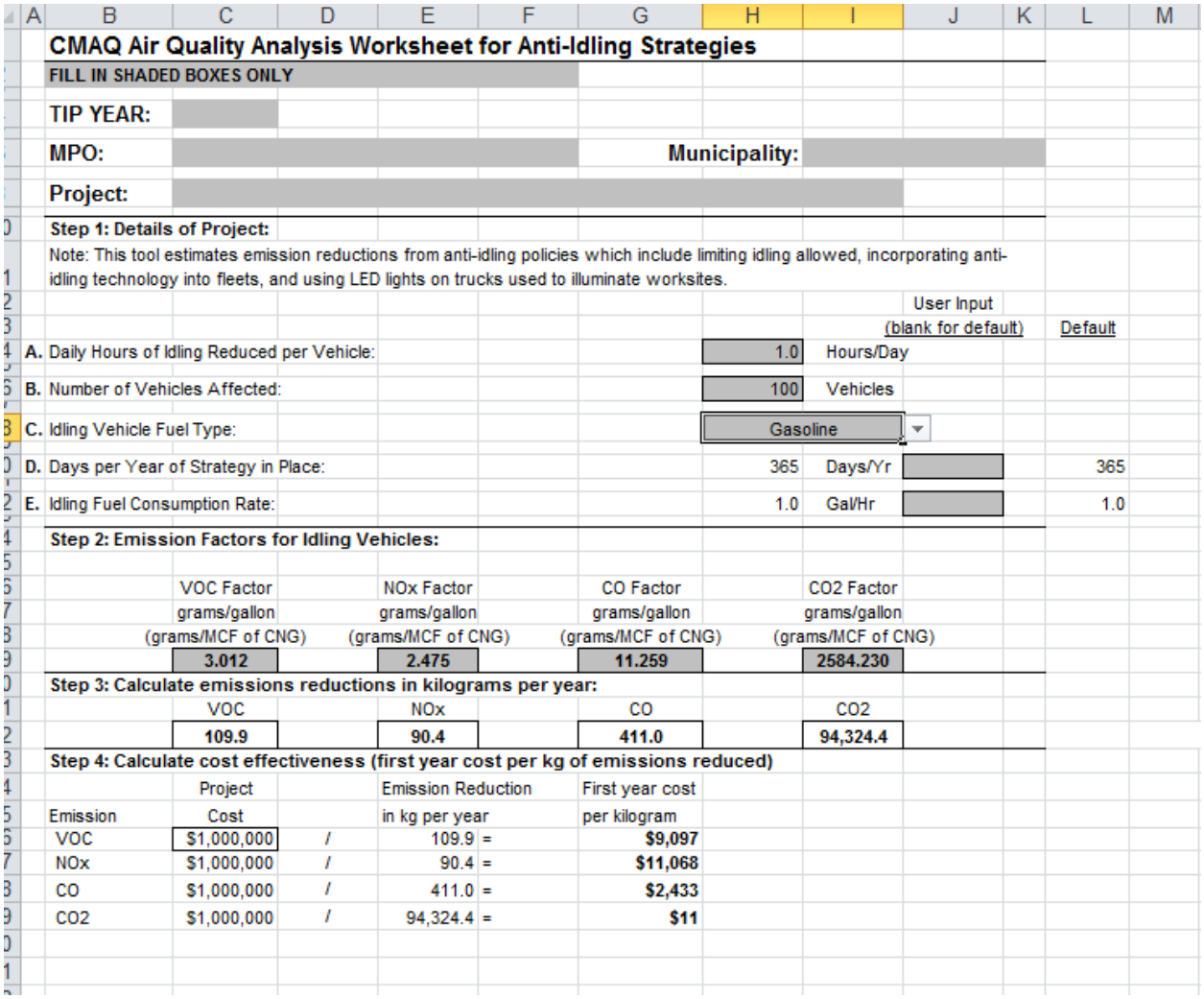
Step 3: Calculate emissions reductions in kilograms per year (Seasonally Adjusted):

Summer VOC	Summer NOx	Summer CO	Summer CO2
1.8	2.6	29.8	3,955.4

Step 4: Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost		Emission Reduction in kg per year		First year cost per kilogram
Summer VOC	$1,000,000	/	1.8	=	$552,938
Summer NOx	$1,000,000	/	2.6	=	$382,076
Summer CO	$1,000,000	/	29.8	=	33527.66441
Summer CO2	$1,000,000	/	3,955.4	=	$253

Anti-idling strategies



CMAQ Air Quality Analysis Worksheet for Anti-Idling Strategies

FILL IN SHADED BOXES ONLY

TIP YEAR:

MPO: **Municipality:**

Project:

Step 1: Details of Project:

Note: This tool estimates emission reductions from anti-idling policies which include limiting idling allowed, incorporating anti-idling technology into fleets, and using LED lights on trucks used to illuminate worksites.

		User Input (blank for default)		Default
A.	Daily Hours of Idling Reduced per Vehicle:	1.0	Hours/Day	
B.	Number of Vehicles Affected:	100	Vehicles	
C.	Idling Vehicle Fuel Type:	Gasoline		
D.	Days per Year of Strategy in Place:	365	Days/Yr	365
E.	Idling Fuel Consumption Rate:	1.0	Gal/Hr	1.0

Step 2: Emission Factors for Idling Vehicles:

VOC Factor grams/gallon (grams/MCF of CNG)	NOx Factor grams/gallon (grams/MCF of CNG)	CO Factor grams/gallon (grams/MCF of CNG)	CO2 Factor grams/gallon (grams/MCF of CNG)
3.012	2.475	11.259	2584.230

Step 3: Calculate emissions reductions in kilograms per year:

VOC	NOx	CO	CO2
109.9	90.4	411.0	94,324.4

Step 4: Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost		Emission Reduction in kg per year		First year cost per kilogram
VOC	$1,000,000	/	109.9	=	**$9,097**
NOx	$1,000,000	/	90.4	=	**$11,068**
CO	$1,000,000	/	411.0	=	**$2,433**
CO2	$1,000,000	/	94,324.4	=	**$11**

Bike share project

CMAQ Air Quality Analysis Worksheet for Bike Sharing Project

FILL IN SHADED BOXES ONLY

TIP YEAR:

MPO: **Municipality:**

Project:

Step 1: Details of Project:

				User Input (blank for default)	Default
A.	Number of Bikes in Project:	603	Bikes		
B.	Average Bike Trip Length:	1.1	Miles		1.1
C.	Average Number of Trips per Bike per Day:	3.7	Trips		3.7
D.	Bike Sharing Operating Days per Year:	251	Days		251

Step 2: Mode Substitution by Bike Sharing Project:

Note: A bike sharing project would attract new riders from different modes. Actual surveys can determine the extent of the transition from different modes to such program. If site specific data is unavailable, use the defaults provided below.

E.	Percentage of Bikes Used Shifted from Walking:	25%	Percent		25%
F.	Percentage of Bikes Used Shifted from Public Transit:	41%	Percent		41%
G.	Percentage of Bikes Used Shifted from Taxis:	5%	Percent		5%
H.	Percentage of Bikes Used Shifted from Cars:	12%	Percent		12%
I.	Percentage of Bikes Used Shifted from Private Bikes:	8%	Percent		8%
J.	Percentage of Bikes Used Shifted from Motorcycles:	4%	Percent		4%
K.	Percentage of Bikes Used Shifted from Other/New Trips:	5%	Percent		5%
L.	Total Percentage of Bikes Used Shifted from Other Modes **(Must be 100%)**:	100%	Percent		
M.	Public Transit Vehicle Occupancy:	40	Persons		40
N.	Taxi Vehicle Occupancy:	1.18	Persons		1.18
O.	Car Vehicle Occupancy:	1.18	Persons		1.18
P.	Motorcycle Vehicle Occupancy:	1.16	Persons		1.16

Step 3: Emission Factors for Average Commuter Travel Speed:

Note: Use 25 MPH as a default if average speed is not known. Speed Used: 25 MPH

	Summer VOC Factor grams/mile	Summer NOx Factor grams/mile	Summer CO Factor grams/mile	Summer CO2 Factor grams/mile
2016 Bus	**0.014**	**0.023**	**0.150**	**22.645**
2016 Auto	**0.169**	**0.252**	**2.879**	**398.914**
2016 Motorcycle	**1.362**	**0.466**	**13.331**	**342.739**

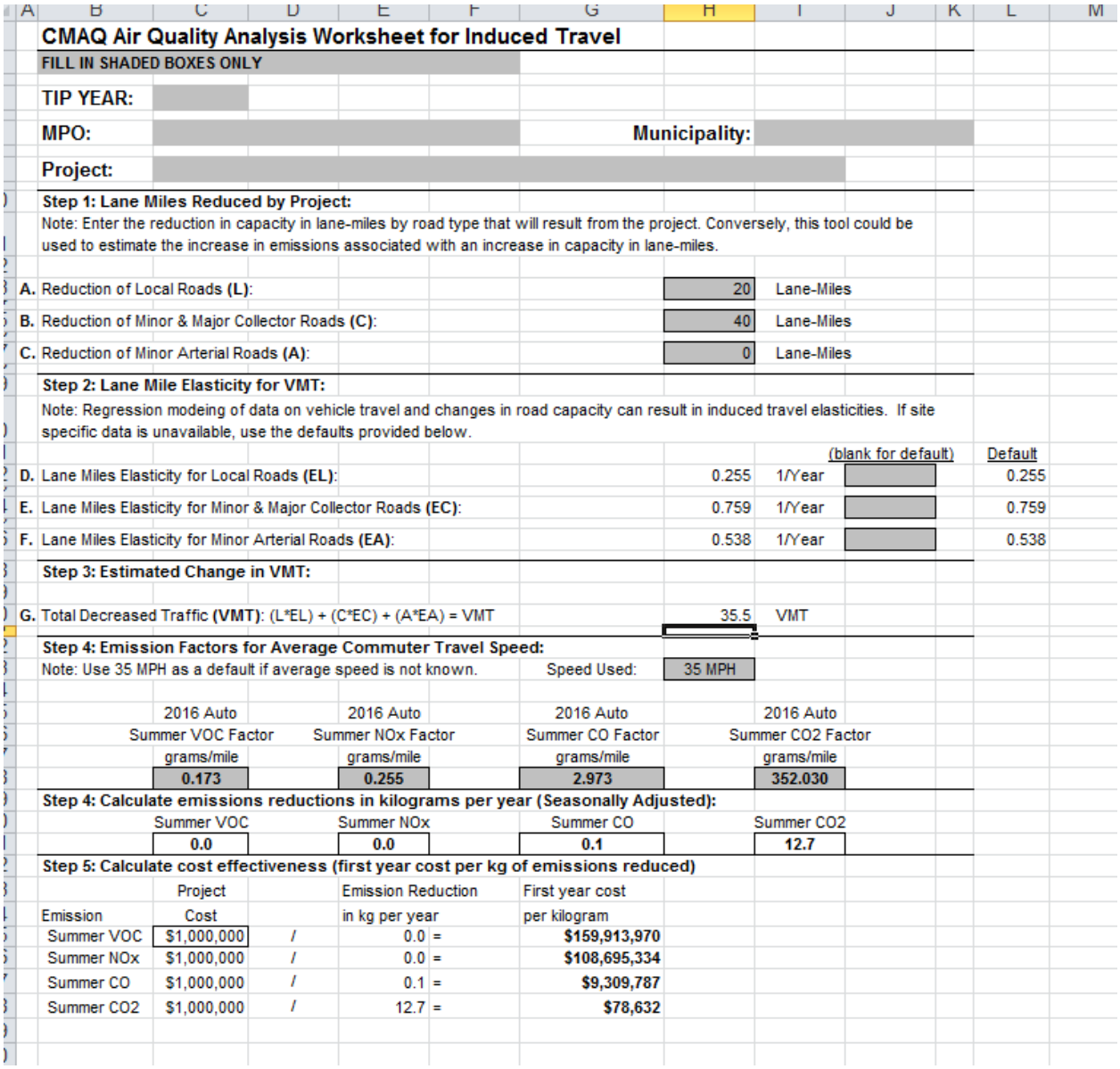
Step 4: Calculate emissions reductions in kilograms per year (Seasonally Adjusted):

Summer VOC	Summer NOx	Summer CO	Summer CO2
44.8	**33.0**	**549.8**	**43,630.7**

Step 5: Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost		Emission Reduction in kg per year		First year cost per kilogram
Summer VOC	$1,000,000	/	44.8	=	**$22,303**
Summer NOx	$1,000,000	/	33.0	=	**$30,312**
Summer CO	$1,000,000	/	549.8	=	**$1,819**
Summer CO2	$1,000,000	/	43,630.7	=	**$23**

Induced travel



CMAQ Air Quality Analysis Worksheet for Induced Travel

FILL IN SHADED BOXES ONLY

TIP YEAR:

MPO: Municipality:

Project:

Step 1: Lane Miles Reduced by Project:

Note: Enter the reduction in capacity in lane-miles by road type that will result from the project. Conversely, this tool could be used to estimate the increase in emissions associated with an increase in capacity in lane-miles.

A. Reduction of Local Roads **(L)**:	20	Lane-Miles	
B. Reduction of Minor & Major Collector Roads **(C)**:	40	Lane-Miles	
C. Reduction of Minor Arterial Roads **(A)**:	0	Lane-Miles	

Step 2: Lane Mile Elasticity for VMT:

Note: Regression modeing of data on vehicle travel and changes in road capacity can result in induced travel elasticities. If site specific data is unavailable, use the defaults provided below.

			(blank for default)	Default
D. Lane Miles Elasticity for Local Roads **(EL)**:	0.255	1/Year		0.255
E. Lane Miles Elasticity for Minor & Major Collector Roads **(EC)**:	0.759	1/Year		0.759
F. Lane Miles Elasticity for Minor Arterial Roads **(EA)**:	0.538	1/Year		0.538

Step 3: Estimated Change in VMT:

G. Total Decreased Traffic **(VMT)**: (L*EL) + (C*EC) + (A*EA) = VMT 35.5 VMT

Step 4: Emission Factors for Average Commuter Travel Speed:

Note: Use 35 MPH as a default if average speed is not known. Speed Used: 35 MPH

2016 Auto Summer VOC Factor	2016 Auto Summer NOx Factor	2016 Auto Summer CO Factor	2016 Auto Summer CO2 Factor
grams/mile	grams/mile	grams/mile	grams/mile
0.173	0.255	2.973	352.030

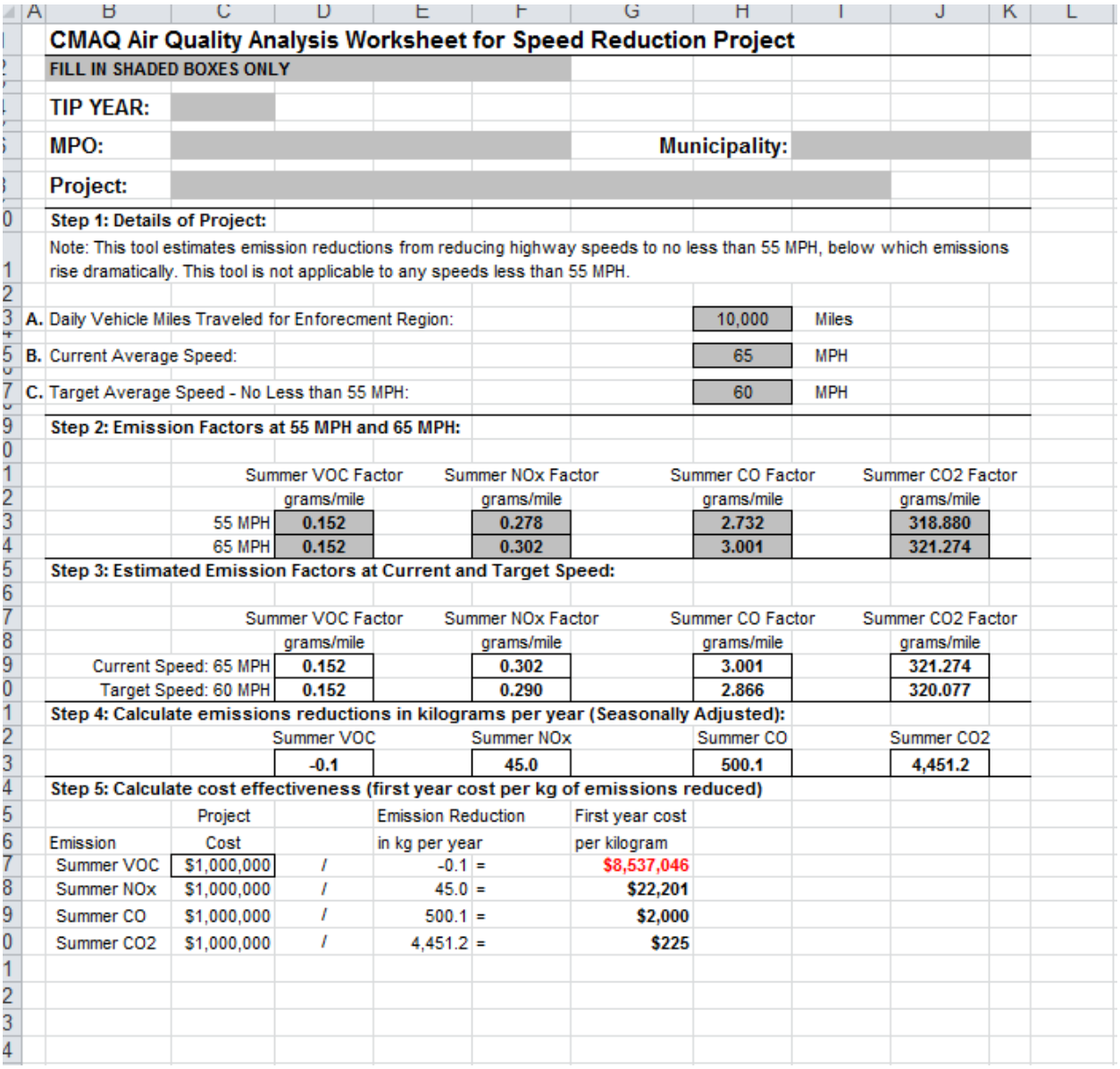
Step 4: Calculate emissions reductions in kilograms per year (Seasonally Adjusted):

Summer VOC	Summer NOx	Summer CO	Summer CO2
0.0	0.0	0.1	12.7

Step 5: Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost		Emission Reduction in kg per year		First year cost per kilogram
Summer VOC	$1,000,000	/	0.0	=	**$159,913,970**
Summer NOx	$1,000,000	/	0.0	=	**$108,695,334**
Summer CO	$1,000,000	/	0.1	=	**$9,309,787**
Summer CO2	$1,000,000	/	12.7	=	**$78,632**

Speed reduction projects



CMAQ Air Quality Analysis Worksheet for Speed Reduction Project

FILL IN SHADED BOXES ONLY

TIP YEAR:

MPO: **Municipality:**

Project:

Step 1: Details of Project:

Note: This tool estimates emission reductions from reducing highway speeds to no less than 55 MPH, below which emissions rise dramatically. This tool is not applicable to any speeds less than 55 MPH.

A.	Daily Vehicle Miles Traveled for Enforecment Region:	10,000	Miles
B.	Current Average Speed:	65	MPH
C.	Target Average Speed - No Less than 55 MPH:	60	MPH

Step 2: Emission Factors at 55 MPH and 65 MPH:

	Summer VOC Factor	Summer NOx Factor	Summer CO Factor	Summer CO2 Factor
	grams/mile	grams/mile	grams/mile	grams/mile
55 MPH	**0.152**	**0.278**	**2.732**	**318.880**
65 MPH	**0.152**	**0.302**	**3.001**	**321.274**

Step 3: Estimated Emission Factors at Current and Target Speed:

	Summer VOC Factor	Summer NOx Factor	Summer CO Factor	Summer CO2 Factor
	grams/mile	grams/mile	grams/mile	grams/mile
Current Speed: 65 MPH	**0.152**	**0.302**	**3.001**	**321.274**
Target Speed: 60 MPH	**0.152**	**0.290**	**2.866**	**320.077**

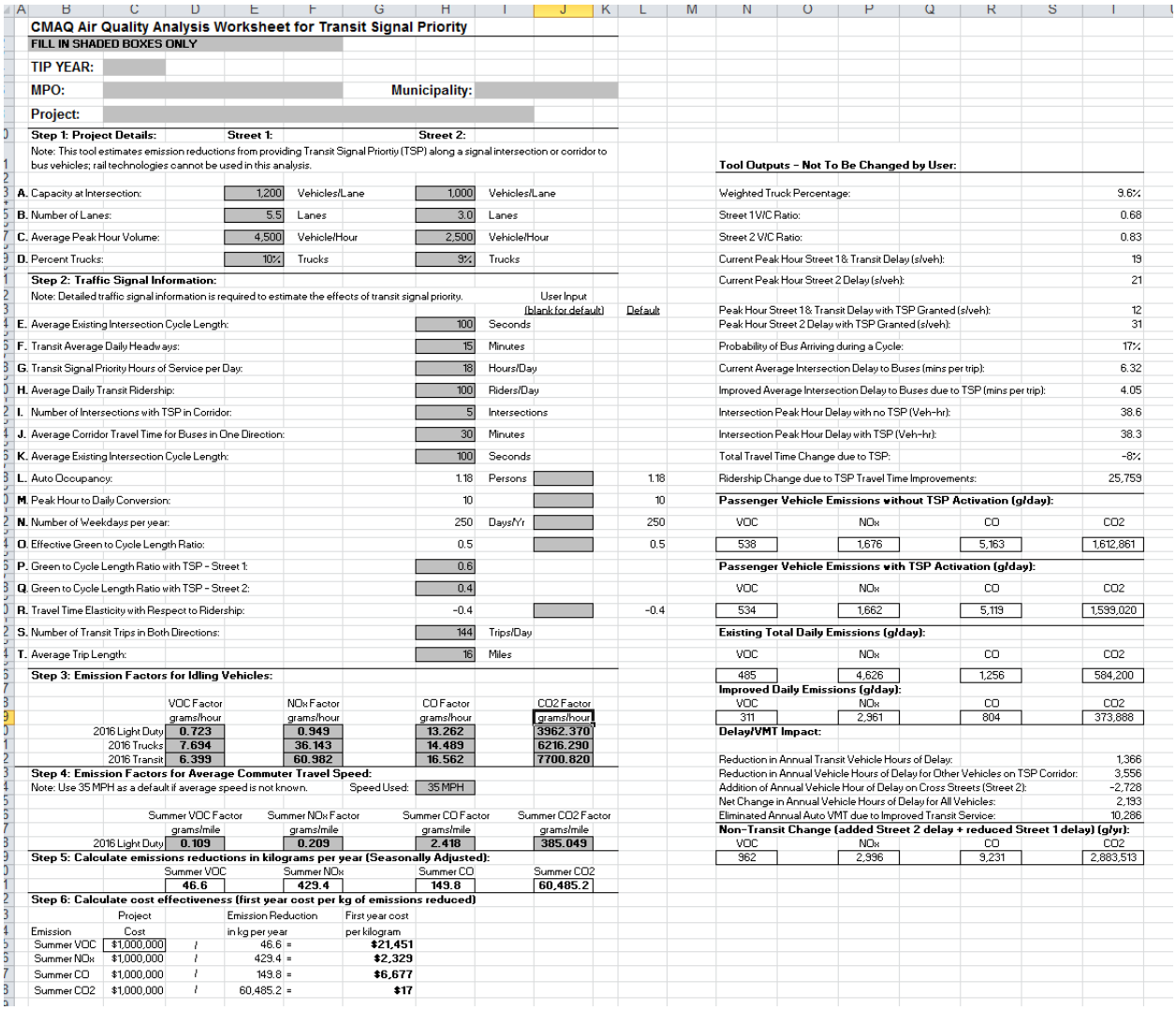
Step 4: Calculate emissions reductions in kilograms per year (Seasonally Adjusted):

Summer VOC	Summer NOx	Summer CO	Summer CO2
-0.1	**45.0**	**500.1**	**4,451.2**

Step 5: Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost		Emission Reduction in kg per year		First year cost per kilogram
Summer VOC	$1,000,000	/	-0.1	=	**$8,537,046**
Summer NOx	$1,000,000	/	45.0	=	**$22,201**
Summer CO	$1,000,000	/	500.1	=	**$2,000**
Summer CO2	$1,000,000	/	4,451.2	=	**$225**

Transit signal priority



CMAQ Air Quality Analysis Worksheet for Transit Signal Priority

FILL IN SHADED BOXES ONLY

TIP YEAR:

MPO: Municipality:

Project:

Step 1: Project Details: Street 1: Street 2:

Note: This tool estimates emission reductions from providing Transit Signal Priority (TSP) along a signal intersection or corridor to bus vehicles; rail technologies cannot be used in this analysis.

		Street 1:		Street 2:	
A.	Capacity at Intersection:	1,200	Vehicles/Lane	1,000	Vehicles/Lane
B.	Number of Lanes:	5.5	Lanes	3.0	Lanes
C.	Average Peak Hour Volume:	4,500	Vehicle/Hour	2,500	Vehicle/Hour
D.	Percent Trucks:	10%	Trucks	9%	Trucks

Step 2: Traffic Signal Information:

Note: Detailed traffic signal information is required to estimate the effects of transit signal priority.

			User Input (blank for default)	Default
E.	Average Existing Intersection Cycle Length:	100	Seconds	
F.	Transit Average Daily Headways:	15	Minutes	
G.	Transit Signal Priority Hours of Service per Day:	18	Hours/Day	
H.	Average Daily Transit Ridership:	100	Riders/Day	
I.	Number of Intersections with TSP in Corridor:	5	Intersections	
J.	Average Corridor Travel Time for Buses in One Direction:	30	Minutes	
K.	Average Existing Intersection Cycle Length:	100	Seconds	
L.	Auto Occupancy:	1.18	Persons	1.18
M.	Peak Hour to Daily Conversion:	10		10
N.	Number of Weekdays per year:	250	Days/Yr	250
O.	Effective Green to Cycle Length Ratio:	0.5		0.5
P.	Green to Cycle Length Ratio with TSP - Street 1:	0.6		
Q.	Green to Cycle Length Ratio with TSP - Street 2:	0.4		
R.	Travel Time Elasticity with Respect to Ridership:	-0.4		-0.4
S.	Number of Transit Trips in Both Directions:	144	Trips/Day	
T.	Average Trip Length:	16	Miles	

Step 3: Emission Factors for Idling Vehicles:

	VOC Factor grams/hour	NOx Factor grams/hour	CO Factor grams/hour	CO2 Factor grams/hour
2016 Light Duty	0.723	0.949	13.262	3962.370
2016 Trucks	7.694	36.143	14.489	6216.290
2016 Transit	6.399	60.982	16.562	7700.820

Step 4: Emission Factors for Average Commuter Travel Speed:

Note: Use 35 MPH as a default if average speed is not known. Speed Used: 35 MPH

	Summer VOC Factor grams/mile	Summer NOx Factor grams/mile	Summer CO Factor grams/mile	Summer CO2 Factor grams/mile
2016 Light Duty	0.109	0.209	2.418	385.049

Step 5: Calculate emissions reductions in kilograms per year (Seasonally Adjusted):

Summer VOC	Summer NOx	Summer CO	Summer CO2
46.6	429.4	149.8	60,485.2

Step 6: Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost		Emission Reduction in kg per year		First year cost per kilogram
Summer VOC	$1,000,000	/	46.6	=	$21,451
Summer NOx	$1,000,000	/	429.4	=	$2,329
Summer CO	$1,000,000	/	149.8	=	$6,677
Summer CO2	$1,000,000	/	60,485.2	=	$17

Tool Outputs - Not To Be Changed by User:

Weighted Truck Percentage:	9.6%
Street 1 V/C Ratio:	0.68
Street 2 V/C Ratio:	0.83
Current Peak Hour Street 1 & Transit Delay (s/veh):	19
Current Peak Hour Street 2 Delay (s/veh):	21
Peak Hour Street 1 & Transit Delay with TSP Granted (s/veh):	12
Peak Hour Street 2 Delay with TSP Granted (s/veh):	31
Probability of Bus Arriving during a Cycle:	17%
Current Average Intersection Delay to Buses (mins per trip):	6.32
Improved Average Intersection Delay to Buses due to TSP (mins per trip):	4.05
Intersection Peak Hour Delay with no TSP (Veh-hr):	38.6
Intersection Peak Hour Delay with TSP (Veh-hr):	38.3
Total Travel Time Change due to TSP:	-8%
Ridership Change due to TSP Travel Time Improvements:	25,759

Passenger Vehicle Emissions without TSP Activation (g/day):

VOC	NOx	CO	CO2
538	1,676	5,163	1,612,861

Passenger Vehicle Emissions with TSP Activation (g/day):

VOC	NOx	CO	CO2
534	1,662	5,119	1,599,020

Existing Total Daily Emissions (g/day):

VOC	NOx	CO	CO2
485	4,626	1,256	584,200

Improved Daily Emissions (g/day):

VOC	NOx	CO	CO2
311	2,961	804	373,888

Delay/VMT Impact:

Reduction in Annual Transit Vehicle Hours of Delay:	1,366
Reduction in Annual Vehicle Hours of Delay for Other Vehicles on TSP Corridor:	3,556
Addition of Annual Vehicle Hour of Delay on Cross Streets (Street 2):	-2,728
Net Change in Annual Vehicle Hours of Delay for All Vehicles:	2,193
Eliminated Annual Auto VMT due to Improved Transit Service:	10,286

Non-Transit Change (added Street 2 delay + reduced Street 1 delay) (g/yr):

VOC	NOx	CO	CO2
962	2,996	9,231	2,883,513

Truck stop electrification

CMAQ Air Quality Analysis Worksheet for Truck Stop Electrification

FILL IN SHADED BOXES ONLY

TIP YEAR:

MPO: Municipality:

Project:

Step 1: Details of Project:

			User Input (blank for default)	Default
A.	Average Daily Hours of Elecitrification Utilization per Bay:	2.0 Hours/Day		
B.	Number of Electrification Bays:	10 Bays		
C.	Days per Year Electrification Bays Available:	365 Days/Yr		365
D.	Diesel Truck Idling Fuel Consumption Rate:	1.0 Gal/Hr		1.0
E.	Use of Electricity by Each Electrification Bay:	7.5 kWh/hr		7.5

Step 2: Emission Factors for Electricity Usage:

VOC Factor pounds/MWh	NOx Factor pounds/MWh	CO Factor pounds/MWh	CO2 Factor pounds/MWh
0.012	0.408	0.105	637.900

Step 3: Emission Factors for Idling Vehicles:

VOC Factor grams/gallon	NOx Factor grams/gallon	CO Factor grams/gallon	CO2 Factor grams/gallon
7.694	36.143	14.489	6216.290

Step 3: Calculate emissions reductions in kilograms per year:

VOC	NOx	CO	CO2
55.9	253.7	103.2	29,536.9

Step 4: Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost		Emission Reduction in kg per year		First year cost per kilogram
VOC	$1,000,000	/	55.9	=	**$17,902**
NOx	$1,000,000	/	253.7	=	**$3,942**
CO	$1,000,000	/	103.2	=	**$9,693**
CO2	$1,000,000	/	29,536.9	=	**$34**

Appendix C—New Jersey Transit GHG Quantification Methodology

The following material is from pages 57-58 of *Off Peak Rail Transit Service Study – Importance for Auto Reduction and Peak Ridership Growth*. (Final Report. Trenton, NJ: NJDOT/FHWA, FHWA-NJ-2011-008.)

The NJ TRANSIT model can be described as follows:
Net CO_2e avoided = VMT CO_2e avoided + Land Use CO_2e avoided + Congestion CO_2e avoided - Additional CO_2e generated by transit.

VMT CO_2e avoided = (Annual VMT saved/Miles per gallon gasoline used) X Metric Tons CO_2e per gallon of gasoline
Where,
Miles per gallon used by automobile=20.2
Metric Tons CO_2e per gallon of gasoline =0.0092

Land Use CO_2e avoided = (Annual VMT saved/Average vehicle occupancy) X Emissions per passenger mile in Kg
Where,
Average vehicle occupancy=1.9
Emissions (kg) per passenger mile=0.436

Congestion CO_2e avoided = VMT CO_2e avoided X Ratio of Congestion avoidance and Total avoidance
Where,
Ratio of Congestion avoidance and Total avoidance=0.22

Additional CO_2e generated = Additional annual passenger miles X Metric tons CO_2e per passenger mile by fully loaded transit X Factor to convert kg to metric tons X Estimated percent of future growth that will not use existing infrastructure and therefore create additional energy consumption
Where,
Additional Annual passenger miles = 1.04 X Annual VMT saved
Metric tons CO_2e per passenger mile by fully loaded transit =0.00020633
Factor to convert kg to metric tons=1,000
Estimated percent of future growth that will not use existing infrastructure and therefore create additional energy consumption=0.75

Appendix D—TIP Evaluation Criteria for Massachusetts MPOs

Transportation Enhancement projects are subject to a statewide eligibility determination process, and are prioritized at the regional level.

Priorities for highway projects that are subject to regional funding targets are calculated on the basis of evaluation criteria developed in 2011 and revised in 2015 to measure road condition, mobility, regional connectivity, goods movement, safety, environment, GHG emissions and livability factors. A project could score a maximum of 8 points based on the current evaluation criteria as explained below. Table on the next page shows the list of projects that were evaluated for FFY 2017 – 2021 TIP development:

- **Road Condition:** 1 Point (Project will construct new road, or will strengthen pavement structure (not surface only) of existing road or will improve sub-standard or poorly functioning drainage).

- **Mobility:** 1 Point (Project will reduce vehicle delay at intersections (LOS C or worse) and/or improve through lane(s) capacity along a corridor).

- **Regional Connectivity:** 1 Point (Improves Principal Arterial, or minor arterial/collector with no alternative route).

- **Goods Movement:** 1 Point (Project will make geometric improvements at intersections or along a corridor to facilitate truck movement (3 axle ADT greater than 50).

- **Safety:** 1 Point (Improves safety at location where accident rates exceeds the state average).

- **Environment:** 1 Point (Project has positive (not neutral) effect on water quality, wildlife, or other natural features).

- **GHG Emissions:** 1 Point (Project has positive (not neutral) effect on GHG emissions reduction/ air quality).

- **Livability:** 1 Point (Meets at least two of these standards: Supports economic development, increase use of alternate modes, or benefits 3 or more defined EJ populations).

Transit projects funded by formula grants and special earmarks have not been rated with the evaluation criteria, since they are not competing against other projects, but it is expected that such projects will be prioritized in future TIPs. Transit projects that must compete for discretionary funding would be prioritized on the basis of maximum ridership benefit per dollar expenditure and/or other factors, but there are no such projects proposed for the Berkshire region at this time.

It is recognized that other considerations, which are not readily quantified, can result in projects being programmed or deferred in apparent conflict with these calculated priorities. In particular, programming decisions are strongly influenced by project readiness and the realities of project cost in relation to financial constraint.

Cape Cod TIP Project Evaluation - Detailed Scoring Template

Category	Criteria	Points (out of 100)
System Preservation and Modernization	• Pavement and signal equipment improvement • Sidewalks and other infrastructure enhancement • Use of modern technology	35
Mobility	• Motorist congestion • Non-motorist congestion • Connectivity / access • Mobility / accommodation of non-motorists	10
Safety	• Motorist crash history and anticipated safety impact • Non-motorist crash history and anticipated safety impact	10
Economic Impact	• Access to or within a regionally-designated economic development area • Access to or within a locally-designated business district • Connections between housing, job, cultural centers, and essential services	10
Environmental and Health Effects	• Wetlands, wildlife, or other resource protection • Water quality through stormwater management and treatment • Air quality / GHG emission • Coastal Resiliency / Sea Level Rise Vulnerability • Cultural resources or open space • Healthy Transportation Options	10
Cost Effectiveness	• Project cost per user	15
Policy Support	• Regional plans/policies • Local plans/policies • State or MassDOT Policies and goals	10

Notes on Project Scoring

Points within each criterion should be seen as guides. Points should be given based on the best match and may be awarded in between increments as appropriate. Project receiving a negative score on any question should be further analyzed.

A - System Preservation and Modernization Scoring

	Criterion	Factor	Points
1	**Primary asset condition / effect on condition**	Poor or failing / substantial improvement	15
		Fair / moderate improvement	8
		Good / minor improvement	4
		Excellent / no improvement	0
2	**Enhancements to other assets** (Projects elements included in the project, but not part of the primary project focus ie. Sidewalks with repaving project)	Poor or falling / substantial improvement	10
		Fair / moderate improvement	7
		Good / minor improvement	4
		Excellent / no improvement	0
3	**Use of modern technology to improve efficiency and support ITS regional efforts** (ie. continuous traffic counting equipment, adaptive signal control, emergency preemption systems)	Use of innovative technology and/or incorporation of traffic counting technology	10
		Improvement in technology to current best practices	7
		Maintain/repair existing technology	4
		Not applicable	0
			Total Score = up to 35

B - Mobility Scoring

	Criterion	Factor	Points
1	**Existing motorist congestion / effect on motorist congestion** (Projects identified in Congestion Management Plan network are able to receive maximum points)	Location identified in the CMP network/ substantial improvement	4
		Significant existing / substantial improvement	3
		Significant existing / moderate or minor improvement	2
		Minimal existing / minor improvement	1
		No change	0
		Negative effect	-1
2	**Effect on mobility / accommodation of non-motorists**	Substantial improvement	3
		Moderate improvement	2
		Minimal improvement	1
		No effect for non-motorists	0
		Negative effect on mobility / accommodation	-1
3	**Effect on connectivity / access** (emphasis placed on key emergency and evacuation routes)	Substantial improvement to connectivity through the corridor	3
		Moderate improvement to connectivity	2
		Minimal effect on connectivity	1
		No effect on connectivity	0
		Negative effect on connectivity	-1
			Total Score = up to 10

C - Safety

	Criterion	Factor	Points
1	**Motorist crash history and anticipated safety impact** (Note: Highway Safety Improvement Program (HSIP) eligible locations are determined by MassDOT and includes the 5% percent of locations in the region based on a severity weighted crash rate)	Location is HSIP eligible and project is anticipated to improve motorist safety	5
		Location has a demonstrated crash problem and project is anticipated to improve motorist safety	3
		No demonstrated crash problem, but project is anticipated to improve motorist safety	2
		No safety improvement anticipated	0
		The project many adversely affect motorist safety	-1
2	**Non-motorist crash history and anticipated safety impact**	Location identified as a HSIP Bicycle or Pedestrian Cluster and project is anticipated to improve non-motorist safety	5
		Location has a demonstrated safety deficiencies for non-motorists and project is anticipated to improve non-motorist safety	3
		Location has a demonstrated safety deficiencies for non-motorists and project is anticipated to improve non-motorist safety	2
		No safety improvement anticipated	0
		The project many adversely affect non-motorist safety	-1
			Total Score = up to 10

D - Economic Impact Scoring

	Criterion	Factor	Points
1	**Effect on access to or within a regionally-designated economic development area** (ie. Economic Center, GIZ, etc.)	Substantial improvement	4
		Moderate improvement	3
		Minor improvement	1
		No effect	0
		Negative effect	-1
2	**Effect on access to or within a locally-designated business district**	Substantial improvement	3
		Moderate improvement	2
		Minor improvement	1
		No effect	0
		Negative effect	-1
3	**Effect on connections between housing, job, cultural centers, and essential services within and beyond the region or effect on the freight network**	Substantial improvement	3
		Moderate improvement	2
		Minor improvement	1
		No effect	0
		Negative effect	-1
			Total Score = up to 10

E - Environmental and Health Effects Scoring

	Criterion	Factor	Points
1	**Effect on wetlands, wildlife, or other resource protection**	Anticipated improvement	2
		Minor contribution to preservation	1
		No anticipated impact or negative impacts adequately mitigated	0
		Negative impact	-1
2	**Effect on water quality through stormwater management and treatment with an emphasis on for nitrogen** (points for anticipated improvements may also be given for projects involving culvert widening)	Anticipated improvement in stormwater management and treatment	2
		Anticipated improvement in stormwater management	1
		No anticipated impact or negative impacts adequately mitigated	0
		Negative impact	-1
3	**Effect on air quality / GHG emission**	Significant, quantifiable decrease in GHG anticipated	2
		Minor, quantifiable or qualitative decrease in GHG anticipated	1
		No effect on GHG anticipated	0
		Anticipated increase in GHG	-1
4	**Coastal Resiliency / Sea Level Rise Vulnerability** (Vulnerable areas include those identified as a Special Flood Hazard Area (SFHA), areas identified by the Sea, Land, and Overland Surges from Hurricanes (SLOSH) model, or areas susceptible to sea level rise	Project vulnerable area with resilient design	2
		Project in not in a vulnerable area but includes with resilient design elements	1
		Project not in vulnerable area and not special consideration given to resilient design	0
		Project in a vulnerable area and is not a resilient design	-1
5	**Effect on cultural resources or open space**	Anticipated improvement	1
		No anticipated impact or negative impacts adequately mitigated	0
		Negative impact	-1
6	**Healthy Transportation Options**	Increase in healthy transportation options	1
		No anticipated impact or negative impacts adequately mitigated	0
		Negative impact	-1
			Total Score = up to 10

F - Cost Effectiveness Scoring

	Criterion	Factor	Points
1	**Project cost per user** (Use cost/ADT/lane mile calculation as a general indicator, but flexibility is appropriate when considering unique project circumstances particularly for projects involving bicyclists and pedestrians. Low cost safety measures can be given full points.)	See reference table below, but consider unique circumstances	up to 15
		High cost project serving a small number of users	-1
			Total Score = up to 15

		Notes	Value
	Cost Estimate		
	ADT	For intersections, enter combined ADT of intersecting roads. For projects where ADT is unknown, use regional data to approximate.	
	Length (in miles)	For intersections, enter total length of all approaches within project limits.	
	Number of Lanes	Travel lanes only	
	Project Service Life	7, 14, or 21 years	

Reference

*Cost/ADT/Lane Mile**	*Points*
is less than $50	*15*
is less than $100	*12*
is less than $200	*8*
is less than $500	*4*
is less than $1000	*0*
is more than $1000	*-1*

**Multiply by 2/3, 1, or 1.5 for service life of 7, 14, or 21 years, respectively*

G - Policy Support Scoring

	Criterion	Factor	Points
1	**Community support** (as indicated through collective statements or actions of the highest elected officials in the effected communities)	Stated support of the project by the highest elected officials	3
		Actions by highest elected officials indicate general support of the project	2
		Neutral	0
		Collective opposition voiced by the highest elected officials	-1
2	**Regional plans/policies** (ie. RTP, Regional Policy Plan, CEDS)	Project specifically identified in Regional Plan	3
		Strongly supports Regional Plans/Policies	2
		Moderately supports Regional Plans/Policies	1
		Neutral	0
		Inconsistent with Regional Plans/Policies	-1
3	**Local plans/policies**(ie. LCP, local ordinances, bylaws, etc.)	Project specifically identified in Local Plan	2
		Consistent with Local Plans/Policies	1
		Neutral	0
		Inconsistent with Local Plans/Policies	-1
4	**Project supports Federal or State (including MassDOT) policies and goals not accounted for in other criteria** (GreenDOT, Healthy Transportation, Complete Streets, TZD etc.)	Project specifically identified in a existing Federal or State Plan	2
		Consistent with Federal or State Policies or Principles	1
		Neutral	0
		Inconsistent with Federal or State Policies or Principles	-1
			Total Score = up to 10

CENTRAL MASSACHUSETTS
Regional Planning Commission

Regional Performance Measures Scoresheet
2018 - 2022

Candidate TIP Projects 2022

	OBJECTIVE	TARGET/MEASURE	#608432 $3.500 Million (STP) Rutland - Route 56 (Pommogussett Rd) Reconstruction	#608171 $4.400 Million (STP) Uxbridge - Route 122 (S Main St) Reconstruction	#608038 $4.800 Million (STP) Webster - Klebart Ave & Lake Parkway Resurfacing	#608433 $4.800 Million (CMAQ/HSIP/STP) Webster - Route 16 & I-395 & Sutton Rd Intersection Improvements	#27260 $5.000 Million (CMAQ/HSIP/STP) Worcester - Quisigamond Ave (Gateway I) Reconstruction (Phase II)	Comments
SAFETY	Reduce the Incidence of Crashes with Resultant Casualties	Reduce Number and Rate of Injuries and Deaths and Lower the Average EPDO	X	X	X	XX	XX	X - if project will help reduce vehicle crashes X - if project has an identifed vehicle crash cluster
SAFETY	Improve Safety along Freight Routes	Reduce Number and Rate of Injuries and Deaths along Primary Freight Routes	-	-	-	XX	XX	X - if project will help reduce vehicle crashes along a primary freight route X - if project has an identifed vehicle crash cluster
SECURITY	Enhance Security Preparedness and Coordination	Evacuation Routes Established; Preparedness Campaign Complete	XX	XX	-	XX	XX	X - if it is a secondary established evacuation route XX - if it is a primary established evacuation route
STATE OF GOOD REPAIR	Improve Accessibility for all Modes	Increase ADA-Compliant Ramps	XX	XX	XX	XX	XX	X - project is improving existing ADA ramps X - project is building new sidewalks and ADA ramps
STATE OF GOOD REPAIR	Maintain the Condition of the Region's Roadways	Rehabilitate 50 Lanes Miles of Roadways in Poor Condition; Improve Sidewalks in Poor Condition	-	-	X	-	XX	X - project is improving a roadway with an OCI btwn 0 - 48 "poor condition" X - project is improving existing sidewalks in poor condition
STATE OF GOOD REPAIR	Maintain Condition of Bridges	Decrease Number of Structurally-Deficient Bridges by 10% Annually	-	-	-	-	-	X - improving a functionally obsolete "FO" bridge XX - improving a structurally-deficient "SD" bridge
STATE OF GOOD REPAIR	Maintain Transit Vehicles in State of Good Repair	Average Age should be Maintained	-	-	-	-	-	X - retrofit existing transit vehicle XX - purchasing new vehicle
CONGESTION	Reduce Travel Delay and Increase Connectivity	Reduce Delay along Identified Corridors, Improve LOS at Identified Intersections and Install Transit Signal Priority	-	-	-	XX	XX	X - improving existing signalized intersection XX - installing new signalized control or roundabout
MULTIMODALITY	Expand the Bicycle, Pedestrian and Transit Network in the Region	Increase Bike Lane Mileage and Storage Rack Availability; Increase Number of Bus Routes Served by Sidewalks	X	X	X	X	XX	X - project is increasing bike lane mileage X - project is served by fixed route transit
MULTIMODALITY	Increase the Number of Communities with Complete Streets Policies	Work with Communities to Increase Participation	XX	-	-	-	-	X - if the community has a complete policy X - if the community is working towards a prioritization plan (Tier 2)
GHG/SUSTAIN	Combat sprawl and its effects	Project provides opportunities to avoid, minimize, or mitigate environmental effects in PPA or PDA area	-	-	-	X	-	X - If the project is within a PPA or PDA area X - project includes extensive environmental mitigation work
GHG/SUSTAIN	Reduce Emissions	Institute and Encourage TDM Policies	-	-	-	X	X	X - project is reducing emissions X - project includes infrastructure to support TDM policies
EQUITY	Assure that Improvements are Fairly Distributed among Populations and Subregions	Equitable TIP Project Distribution; Increase Percent of Vulnerable Population that can Access Transit Service	-	-	X	X	XX	X - project is in an identified EJ or vulnerable population area X - project area is serviced by fixed route transit
ECONOMIC	Speed Shipping in the Region	Reduce Delay along Established Primary Freight Routes, 2 every 5 Years	-	-	-	XX	XX	X - project is along an established primary freight route X - project is reducing average vehicle delay
ECONOMIC	Make Employment Opportunities Accessible and Available Allowing for Job Expansion	Improve the Bicycle, Pedestrian and Transit Networks Near Two Major Employment Centers Every Five Years	X	X	-	X	XX	X - project improves either bike, ped, or transit near an employment center X - project improves bike, ped and transit near an employment center
STORMH2O MGMT	Assure that transportation networks in 100 and 500 year flood zones are viable	Retrofit or rebuild vulnerable assets in flood zone areas and ensure that region's roadways can handle flooding events	XX	XX	X	X	X	X - project is within a identified 100 or 500 year flood zone X - project will improve resiliency and ability to function in a flood scenario
STORMH2O MGMT	Identify vulnerable infrastructure; evaluate resiliency, establish priority areas and vital links	Evaluate and strengthen the most vulnerable assets in each of the subregions over the next 10 years	X	X	X	X	X	X - project area is considered a vital link X - project is improving the vulnerable infrastructure
TRAVEL & TOURISM	Enhance region's travel and tourism opportunities	To improve traveler access, mobility and linkages to sites of touristic value and balance the travel demand needs of area residents and visitors	XX	-	-	-	-	X - project has a tourist attraction/recreational area within project limits X - project is improving the mobility to/from these tourist attractions/recreational areas
		TOTAL SCORE:	**14**	**10**	**8**	**19**	**23**	

X = 1pt
XX = 2pts

TRANSPORTATION EVALUATION CRITERIA
Highway-funded Roadway Improvement/Expansion Projects

Project ID
Project Description
Design Status
Est. Cost
Project Length
AADT
Project Scope

TRANSPORTATION CRITERIA	Cost Effectiveness	Cost per lane Mile		
		Cost per AADT		
		Cost per AADT per lane mile		
	Condition	Magnitude of pavement condition improvement	0	Avg. Score (-3 to +3)
		Magnitude of improvement of other infrastructure elements	0	0
	Mobility	Effect on magnitude and duration of congestion	0	Avg. Score (-3 to +3)
		Effect on travel time and connectivity/access	0	
		Effect on other modes using facility	0	
		Effect on regional and local traffic	0	0
	Safety	Effect on crash rate compared to state average	0	Avg. Score (-3 to +3)
		Effect on bicycle and pedestrian safety	0	0
OTHER IMPACT CRITERIA	Community Effects and Support	Residential effects: right-of-way, noise, aesthetics, cut-through traffic, other	0	Avg. Score (-3 to +3)
		Environmental Justice effects	0	
		Public, local government, legislative, and regional support	0	
		Effect on development and redevelopment of housing stock	0	0
	Land Use and Economic Development	Business effects: right-of-way, access, noise, traffic, parking, freight access, other	0	Avg. Score (-3 to +3)
		Sustainable development effects	0	
		Consistent with regional land-use and economic development plans	0	
		Effect on job creation.	0	0
	Environmental Effects	Air Quality/Climate effects	0	Avg. Score (-3 to +3)
		Water quality/supply effects; wetlands effects	0	
		Historic and cultural resource effects	0	0
			Total Score (-18 to +18)	**0**

A. Requirements and Process

The TIP must identify priorities within estimated available funds. Priority projects must include all federally funded projects to be funded under Title 23 for highway and transit. Other regionally significant projects must be listed because regionally significant projects may affect air quality. As a Regional Planning Agency (RPA) that operates as an MPO in Massachusetts, the Martha's Vineyard Commission receives federal funding along with a state match to perform a comprehensive, continuing, and cooperative, or "3C" planning process. The federal planning factors that must be considered in preparing the TIP are found in federal legislation and listed below.

The federal transportation legislation related to state and regional transportation planning began with The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), and continued with subsequent federal legislation and extensions, such as, the Transportation Equity Act for the 21st Century (TEA-21) and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), Moving Ahead for Progress and Growth in the 21st Century Act (MAP-21), and the most recent federal legislation: Fixing America's Surface Transportation Act, or "FAST Act" for short.

B. FAST Act (Fixing America's Surface Transportation Act)

The FAST Act was signed into law by President Obama on December 4, 2015. This Act continued basic programs, consolidated others, and established two additional planning factors to add to the eight from previous federal legislation.

The 10 planning factors direct transportation planning efforts toward a sustainable, efficient, and comprehensive process, and are:

1) Support the economic vitality of the United States, the States, non-metropolitan areas, and metropolitan areas, especially by enabling global competitiveness, productivity, and efficiency;
2) Increase the safety of the transportation system for motorized and non-motorized users;
3) Increase the security of the transportation system for motorized and non-motorized users;
4) Increase the accessibility and mobility of people and for 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 throughout the State, for people and freight;
7) Promote efficient system management and operation;
8) Emphasize the preservation of the existing transportation system;
9) improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation; and
10) enhance travel and tourism.

C. Project Evaluation Process and Priorities

Proposed TIP projects are first discussed and reviewed during review of the existing transportations system and safety issues, etc., in the latest Regional Transportation Plan: Martha's Vineyard Transportation Plan (MVTP). In general, projects are reviewed initially in the planning process to assess whether they promote or conform to other goals in the latest *Transportation Plan* and *Island Plan.* Projects evolve from the plans, local officials and public input and/or other local problem areas or needs. Projects are reviewed and scored, typically on an annual basis, using the following criteria:

- Safety: Promotes greater roadway, bicycle, and pedestrian safety.
- Alternative Modes: Favors the use of modes of transportation other than the private automobile.
- Congestion: Reduces traffic congestion with physical improvements, particularly at the most

problematic locations.

- Infrastructure Preservation/Improvement: Reconstructs deteriorated existing road and bridge infrastructure, improve drainage, enable Americans with Disabilities Act (ADA) compliance, and increases amenities.
- Project Readiness: A measure of the project's ability to move forward. Project selection and prioritization also include consideration of a project's cost in context of available funding.
- Character: Respects and reinforces the scenic, historic and natural values of the Vineyard.
- Environment, Climate Change/ Greenhouse Gas Emissions / Air Quality (GHG/AQ): considers whether the project has a qualitative or quantitative environmental benefit or detriment

The evaluation process for this year's TIP occurred at the regularly scheduled open public JTC meeting on March 15, 2017. Each project and its aspects was briefly discussed by members and others at the meeting. Each of the criterion listed above is scored from 0-3. The criteria are also weighted as follows Safety 3, Alternate Modes 2, Congestion 2, Infrastructure Preservation 2, Project Readiness 2, Character 1, and Environmental GHG AQ 1. A table below includes the projects, scores, and cost estimates.

1. Table of Projects with Evaluation Scores and Cost Estimates, March 2017

State ID	Martha's Vineyard Commission Brief Project Description	Town	Total Score (Maximum of 39)	Length in miles if applicable	Estimated Cost at Proposed Year of Expenditure	2017 TIP Programming Notes
607411	Beach Road Bike / Multimodal Path	Tisbury	38	0.5	$4,599,296	Programmed in Draft TIP years 2019-2020
608142	Beach Road Bike / Multimodal Path	Oak Bluffs	32	0.65	$2,247,622	Programmed in Draft TIP years 2021-2022
608529	DCR - State Forest Bike Path Resurfacing	WT - EDG	31	2.15	$547,888	(1st resurfacing phase in 2017)
MY2000	Electric bus purchase - VTA	Island wide	27	n/a	$550,000	Programmed in Draft TIP year 2018
MY1000	Permanent traffic counters at five locations	EDG - OB - TIS	26	n/a	$140,000	Programmed in Draft TIP year 2018
607586	Edgartown-Vineyard Haven Road drainage	EDG - OB - TIS	20	6.5	$1,513,168	Still support for drainage improvements; obtained consultant's estimate to further MassDOT 25/75 % inhouse design; may need to be phased
608066	Tashmoo Overlook	Tisbury	12	n/a	$1,000,000	State highway; town reduced scale, proposed reduced project cost estimate (would need scope adj to PRC), and proposed advancing design to 25%
				Total	**$10,597,974**	
	TIP 2018-2022 Estimated Available Target Funds				$3,561,606	
	TIP 2018-2022 Estimated Available Statewide CMAQ Funds				$3,970,932	CMAQ funds are targeted for projects 607411 and 608142
					-$3,065,436	A supplemental list of Projects in Need of Funding will be in the Appendix

Sample Project Evaluation Worksheet
Merrimack Valley Planning Commission and MassDOT Evaluation Criteria
Project: Andover - Reconstruct Rt. 133 from Lovejoy Rd to Rt. 28 Project #: 608336
Project Cost: $7,245,000 AADT: 12,773 Distance: 2.2 Linear Lane Miles: 4.4

Condition	Score	Additional Comments
A. Magnitude of pavement condition improvement.	2	PNF indicates longitudinal & lateral pavement cracking, utility patch failure, shoving and rutting of pavement along route.
B. Magnitude of improvement of other infrastructure.	2	Current shoulder width 0' to 2', project to increase shoulder width to 4' or 5' for bikes and > safety for pedestrians, upgrade signals, drainage improvements
Condition Average	**2.0**	

Mobility	Score	Additional Comments
A. Effect on magnitude and duration of congestion.	3	Adding left turn lanes at intersection at MA-133/ Lovejoy /Greenwood. Also Rt 133/ Rt 28 improvements
B. Effect on travel time and connectivity / access.	2	Widening shoulder, realigning Rt 133/ Lovejoy and adding left turn lanes.
C. Effect on other modes using the facility.	3	Widening shoulder for bicycles, sidewalks on both sides.
D. Effect on regional and local traffic.	3	Widening shoulder, adding left turn lanes. Additional connector I-495 to I-93. NHS roadway.
Mobility Average	**2.75**	

Sample Project Evaluation Worksheet (Cont.)

Project: Andover - Reconstruct Rt. 133 from Lovejoy Rd to Rt. 28 Project #: 608336

Safety and Security	Score	Additional Comments
A. Effect on crash rate compared to State average.	3	PNF Rt 133/ Lovejoy / Greenwood has a crash rate of .94, District 4 average is .78 and the arterial between two signalized intersections is 3.8, Avg. is 2.12. Have had 1 pedestrian with injuries and 1 bicycle crash. HSIP eligible per MassDOT "Crash Cluster" 2 intersections.
B. Effect on bicycle and pedestrian safety.	2	Widening shoulder for bicycles, sidewalks on both sides.
C. Effect on transportation security and evacuation routes/	1	Is an NHS roadway. Is an evacuation route.
Safety and Security Average	**2.00**	

Community Effects and Support	Score	Additional Comments
A. Residential effects: ROW, noise, aesthetics, cut through traffic, and other.	2	For the most part all within ROW. General appearance and less noise from better pavement conditions.
B. Public, local government, legislative, and regional support.	2	
C. Effect on service to minority or low-income neighborhoods. (Title VI and EJ)	0	Not Title VI or EJ area.
D. Other impacts / benefits to minority or low-income neighborhoods. (Title VI and EJ).	0	Not Title VI or EJ area.
E. Effect on development and redevelopment of housing	1	
Community Effects and Support Average	**1.00**	

Sample Project Evaluation Worksheet (Cont.)

Project: Andover - Reconstruct Rt. 133 from Lovejoy Rd to Rt. 28 Project #: 608336

Land Use and Economic Development	Score	Additional Comments
A. Business effects; ROW, noise, traffic, parking, freight access, other.	2	Improve access to existing businesses.
B. Sustainable development effects. Consistent with MVPGS.	2	Access to MVPGS Rolling Green Regional PDA. Improves transportation choice (walk/bike) for area residents.
C. Consistent with regional land-use and economic development plans and PGS.	2	Access to MVPGS Rolling Green Regional PDA. Improves transportation choice (walk/bike) for area residents.
D. Effect on job creation.	1	Should provide better access to Brickstone Square State PDA.
Land Use and Economic Development Average	**1.75**	

Sample Project Evaluation Worksheet (Cont.)

Project: Andover - Reconstruct Rt. 133 from Lovejoy Rd to Rt. 28 Project #: 608336

Environmental Effects	Score	Additional Comments
A. Air quality / Climate effects. GHG Impact Description – Assumed Nominal Decrease in Emissions from Other Improvements	2	Adding bike lanes and sidewalks. Reducing delays at intersections.
B. Water quality/supply effects; wetlands effects.	1	There will be deep sump catch basins
C. Historic and cultural resources effects.	3	Shawsheen Village Historic District
D. Effect on wildlife habitat and endangered species.	0	Not endangered species habitat area.
Environmental Effects Average	**1.5**	
Overall Project TEC score	**11.00**	

Montachusett Regional Planning Commission

TRANSPORTATION EVALUATION CRITERIA (version 3.0)

Federal Aid Funded Roadway Improvement, Expansion & Preservation Projects

Community	
MassDOT Project No.	
Description	
Design Status	
Est Ad Date	

Category	Line Item #				Scoring Range +4 to -4
Condition	1	**What is the magnitude of impact to the pavement condition?** Based on PCI (MRPC)			0
		Execellent to Poor (-4)	Poor to Execellent (+4)	(-4 or +4)	
		Excellent to Fair (-3)	Fair to Excellent (+3)	(-3 or +3)	
		Excellent to Good (-2)	Good to Excellent (+2)	(-2 or +2)	
		Excellent to Excellent or No Change (+1)	Excellent to Excellent or No Change (+1)	(+1)	
	2	**Are there impacts (positive or negative) to other infrastructure elements, i.e. utilities, drainage, sewage, sidewalks, traffic control devices, etc?**			0
			Drainage (Culverts & Sewers)	(-1 to +1)	
			Sidewalks	(-1 to +1)	
			Traffic Control Devices	(-1 to +1)	
			Utilities	(-1 to +1)	
	3	**Average Daily Traffic (ADT) of Road and/or Intersection**			0
			Less than 1,000 ADT (0)	(0 to +3)	
			1,001 to 5,000 ADT (+1)		
			5,001 to 10,000 ADT (+2)		
			Greater than 10,000 ADT (+3)		
	4	**Does the project incorporate Complete Street concepts?**			0
			Yes (+1)	(+1)	
			No (0)	(0)	
Mobility	5	**Does the project have any impact or change (positive or negative) to the magnitude and/or duration of any known congestion issue?**			0
			Roadway Congestion	(-2 to +2)	
			Intersection Congestion	(-2 to +2)	
	6	**Does the project have any impact or change (positive or negative) to the travel time, connectivity or access of the facility?**			0
			Reduction/increase in travel time	(-2 to +2)	
			Network connection or acces change	(-2 to +2)	
	7	**Does the project have any impact or change (positive or negative) to any other mode such as transit, bicycles or pedestrians that utilize the facility?**			0
			Transit Service Impact - Fixed Route	(-1 to +1)	
			Transit Service Impact - Other	(-1 to +1)	
			Bicycle enhancement	(-1 to +1)	
			Pedestrian enhancement	(-1 to +1)	
	8	**Does the project have any impact or change (positive or negative) to regional or local traffic on the road network outside of the facility itself?**			0
			Reduction/increase in travel time	(-2 to +2)	
			Network connection change	(-2 to +2)	

Safety	9	**Does the project have an effect (positive or negative) on the crash rate of the facility?**		0
		Yes (+1)	(+1)	
		No (0)	(0)	
		Magnitude of effect (-4 to +4)	(-4 to +4)	
	10	**Does the project have an effect (positive or negative) on bicycle or pedestrian safety?**		0
		Yes (+1)	(+1)	
		No (0)	(0)	
		Magnitude of effect (-4 to +4)	(-4 to +4)	
	11	**Does the project address a known safety issue on the facility?**		0
		Yes (+1)	(+1)	
		No (0)	(0)	
		Magnitude of effect (-4 to +4)	(-4 to +4)	
	12	**Will the project address crash severity on the facility?**		0
		Yes (+1)	(+1)	
		No (0)	(0)	
		Magnitude of effect (-4 to +4)	(-4 to +4)	
Community Effects and Support	13	**Is there any impact or change (positive or negative) to residential areas or neighborhoods related to right-of-way, noise, aesthetics, cut-through traffic, or the development/redevelopment of any housing stock?**		0
		Right-of-way	(-1 to +1)	
		Noise/aesthetics	(-1 to +1)	
		Traffic flow	(-1 to +1)	
		Housing stock	(-1 to +1)	
	14	**Does the project have an effect (positive or negative) on any services to minority, low income or Environmental Justice areas (ex. Transit service, sidewalks, lighting, utilities, etc.)?**		0
		Transit services	(-1 to +1)	
		Sidewalks/lighting	(-1 to +1)	
		Utilities	(-1 to +1)	
		Emergency response	(-1 to +1)	
	15	**Does the project have any other impacts or benefits (positive or negative) to minority, low income or Environmental Justice areas (ex. Job access, development and/or redevelopment of any housing stock, etc.)?**		0
		Job access	(-1 to +1)	
		Housing stock	(-1 to +1)	
		Safety	(-1 to +1)	
		Other	(-1 to +1)	
	16	**Is there support for the project from local, regional, legislative governments and the general public?**		0
		Local governments	(-1 to +1)	
		Multiple Local governments	(-1 to +1)	
		Legislative government	(-1 to +1)	
		General public	(-1 to +1)	
	17	**Is there active participation from the community in the MPO, MRPC and MJTC?**		0
		MPO	(-1 to +1)	
		MRPC	(-1 to +1)	
		MJTC	(-2 to +2)	

Land Use and Economic Development	18	**Is there any impact or change (positive or negative) to business (commercial and/or industrial) areas related to right-of-way, general access, noise, traffic, parking, freight access or other?**			0
		Right-of-way		(-1 to +1)	
		Noise/aesthetics		(-1 to +1)	
		Traffic flow/parking		(-1 to +1)	
		Freight access/Other		(-1 to +1)	
	19	**Is the project in accordance with state, regional or local concepts related to sustainable development?**			0
		Local plans		(-1 to +1)	
		Regional plans		(-1 to +1)	
		State plans		(-1 to +1)	
		Other plans (ex. Federal, etc.)		(-1 to +1)	
	20	**Is the project consistent with any regional land-use and/or economic development plans and does it have any effect on job creation?**			0
		Regional land use		(-1 to +1)	
		Regional economic development		(-1 to +1)	
		Support job creation		(-2 to +2)	
	21	**Is the project part of or located on any transportation security or evacuation route or provide access to any major emergency facility?**			0
		Local evacuation route		(-1 to +1)	
		Regional evacuation route		(-1 to +1)	
		Access to emergency facilities		(-2 to +2)	
Environmental Effects	22	**Does the project have an impact (positive or negative) on Air Quality, Climate standards and/or Green House Gas (GHG) emmissions?**			0
		Air quality impact	Positive/Negative/None	(-4 to +4)	
	23	**Does the project have an impact (positive or negative) on water quality, supply or wetlands?**			0
		Water quality/supply/wetlands impact	Positive/Negative/None	(-4 to +4)	
	24	**Does the project have an impact (positive or negative) on historic and/or cultural resources?**			0
		Historic/cultural impact	Positive/Negative/None	(-4 to +4)	
	25	**Does the project have an impact (positive or negative) on wildlife habitats and/or endangered species?**			0
		Wildlife/endangered species impact	Positive/Negative/None	(-4 to +4)	
				Total TEC Score	0

Roadway Project Criteria	Factor	Measure	Score +1 = Positive Impact 0 = No Impact -1 = Negative Impact	Surfside @ Bartlett	Fairgrounds @ OSR	First Way	Four Corners	Milestone Rotary	Milestone @ Polpis	Milestone @ Monomoy	Washington @ Francis	Pleasant @ Williams	Winn St	Friendship Lane	Industry & Shadbush Rds	Boulevarde to Airport Rd
Condition:	Magnitude of Pavement Improvement	Extent of Pavement Improvement	(+1 to -1)	0	0	1	1	0	0	0	1	1	1	1	1	1
	Magnitude of Other Infrastructure Improvements	Improvements to Municipal Utilities, Drainage, Sidewalks, Traffic Control Devices	(+1 to -1)	1	1	1	1	0	1	1	0	0	1	1	1	1
		Average Condition Score:		**0.5**	**0.5**	**1**	**1**	**0**	**0.5**	**0.5**	**0.5**	**0.5**	**1**	**1**	**1**	**1**
Mobility:	Capacity	Improvement in Volume to Capacity (V/C) Ratio	(+1 to -1)	1	1	0	1	1	0	0	0	0	0	0	0	0
		Improvement in Intersection Level of Service	(+1 to -1)	1	1	0	1	1	0	0	0	0	0	0	0	0
	Travel Time, Connectivity, and Access	Improvement in travel time, connectivity, and/or access?	(+1 to -1)	1	1	1	1	1	0	0	1	0	1	1	0	1
	Intermodal	Will project improve bike and pedestrian access?	(+1 to -1)	0	0	1	0	1	0	0	0	0	1	1	0	1
	Regional and Local Traffic	Improvement to Collector Street System	(+1 to -1)	1	1	0	1	1	1	1	1	0	0	0	0	0
		Average Mobility Score:		**0.8**	**0.8**	**0.4**	**0.8**	**1**	**0.2**	**0.2**	**0.4**	**0**	**0.4**	**0.4**	**0**	**0.4**
Safety:	Crash Rate	Improvement to Documented Safety Problem	(+1 to -1)	1	1	1	1	1	1	0	1	1	1	0	0	1
	Bicycle and Pedestrian Safety	Improvement to Bicycle and Pedestrian Infrastructure	(+1 to -1)	1	1	1	1	1	0	0	0	0	1	0	0	0
		Average Safety Score:		**1**	**1**	**1**	**1**	**1**	**0.5**	**0**	**0.5**	**0.5**	**1**	**0**	**0**	**0.5**
Sustainability:	Residential Effects	Extent of Right-of-Way Acquisition	(+1 to -1)	0	0	0	-1	-1	0	0	-1	0	0	-1	0	-1
		Extent of Noise Impacts	(+1 to -1)	0	0	-1	0	0	0	0	0	0	-1	-1	0	-1
		Extent of Decreased Cut-Through Traffic	(+1 to -1)	1	1	-1	1	1	0	0	0	0	-1	-1	0	-1
	Environmental Justice Effects	Located Near Affordable Housing	(+1 to -1)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Public Support	Listed in an NP&EDC Study or Plan	(+1 to -1)	1	1	1	1	1	1	1	1	1	1	1	0	0
	Development/ Redevelopment of Housing Stock	Located Near Housing Development or Redevelopment?	(+1 to -1)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Business Effects	Extent of Access Improvement	(+1 to -1)	0	0	0	0	0	0	0	0	0	0	0	1	0
		Reduction in Parking Need	(+1 to -1)	0	0	0	0	0	0	0	0	0	0	0	0	0
		Extent of Improved Freight / Delivery Access	(+1 to -1)	1	1	1	1	0	0	0	1	0	1	1	1	1
	Environmental Effects	Extent of Air Quality and Climate Improvement	(+1 to -1)	1	1	0	1	1	0	0	0	0	0	0	0	0
		Affect on Water Quality	(+1 to -1)	0	0	0	0	0	0	0	0	0	0	0	0	0
		Affect on Wetlands	(+1 to -1)	0	0	0	0	0	0	0	0	0	0	0	0	0
		Affect on Priority Habitats of Endangered Species	(+1 to -1)	0	0	0	0	0	0	0	0	0	0	0	-1	0
	Historical and Cultural Effects	Affect on Historic and Cultural Resources	(+1 to -1)	0	0	0	0	0	0	0	0	0	0	0	0	0
		Average Sustainability Score:		**0.29**	**0.29**	**0.00**	**0.21**	**0.14**	**0.07**	**0.07**	**0.07**	**0.07**	**0.00**	**-0.07**	**0.07**	**-0.14**
		Total Score:		**11**	**11**	**6**	**11**	**9**	**4**	**3**	**5**	**3**	**6**	**3**	**3**	**3**
		Total Average Score:		0.48	0.48	0.26	0.48	0.39	0.17	0.13	0.22	0.13	0.26	0.13	0.13	0.13

Bike and Pedestrian Criteria	Factor	Measure	Score +1 = Positive Impact 0 = No Impact -1 = Negative Impact	Mill Hill Path	Milk St Ext	In-Town P1	In-Town P2 (Orange)	In-Town P3 (Washington)	Sparks Ave	First Way	Tom Nevers	Bartlett Farm	Somerset Ln	Wauwinet	Quidnet	Morrimoy Rd	Boulevarde	Hummock Pond to Vesper	OSR - South link	Eel Point Path Ext
Condition:	Magnitude of Pavement Improvement	Extent of Pavement Improvement	(+1 to -1)	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1
	Magnitude of Other Infrastructure Improvements	Improvements to Municipal Utilities, Drainage, Sidewalks, Traffic Control Devices	(+1 to -1)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		Average Condition Score:		**1**	**1**	**1**	**1**	**1**	**0.5**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**0.5**	**1**
Mobility:	Capacity	Improvement in Volume to Capacity (V/C) Ratio	(+1 to -1)	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	1
		Improvement in Intersection Level of Service	(+1 to -1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Travel Time, Connectivity, and Access	Improvement in travel time, connectivity, and/or access?	(+1 to -1)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
	Intermodal	Will project improve bike and pedestrian access?	(+1 to -1)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
	Regional and Local Traffic	Improvement to Collector Street System	(+1 to -1)	1	1	1	1	1	1	0	1	0	0	1	1	0	0	1	1	0
		Average Mobility Score:		**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**0.8**	**0.8**	**0.6**	**0.6**	**0.8**	**0.2**	**0.6**
Safety:	Crash Rate	Improvement to Documented Safety Problem	(+1 to -1)	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
	Bicycle and Pedestrian Safety	Improvement to Bicycle and Pedestrian Infrastructure	(+1 to -1)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		Average Safety Score:		**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**1**	**0.5**	**0.5**	**0.5**	**0.5**	**1**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
Sustainability:	Residential Effects	Extent of Right-of-Way Acquisition	(+1 to -1)	0	-1	-1	-1	-1	0	0	0	-1	-1	-1	-1	-1	-1	-1	0	-1
		Extent of Noise Impacts	(+1 to -1)	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Extent of Decreased Cut-Through Traffic	(+1 to -1)	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Environmental Justice Effects	Located Near Affordable Housing	(+1 to -1)	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0
	Public Support	Listed in an NP&EDC Study or Plan	(+1 to -1)	1	1	1	1	1	1	1	1	0	0	1	1	0	0	1	1	1
	Development/ Redevelopment of Housing Stock	Located Near Housing Development or Redevelopment?	(+1 to -1)	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0
	Business Effects	Extent of Access Improvement	(+1 to -1)	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1	0	1
		Reduction in Parking Need	(+1 to -1)	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0
		Extent of Improved Freight / Delivery Access	(+1 to -1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Environmental Effects	Extent of Air Quality and Climate Improvement	(+1 to -1)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		Affect on Water Quality	(+1 to -1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Affect on Wetlands	(+1 to -1)	0	0	0	0	0	0	0	0	-1	0	-1	-1	-1	0	0	0	-1
		Affect on Priority Habitats of Endangered Species	(+1 to -1)	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	0	0	-1
	Historical and Cultural Effects	Affect on Historic and Cultural Resources	(+1 to -1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Average Sustainability Score:		**0.07**	**0.21**	**0.07**	**0.14**	**0.29**	**0.36**	**0.43**	**0.21**	**0.07**	**0.14**	**0.00**	**0.00**	**0.00**	**0.07**	**0.21**	**0.21**	**0.00**
		Total Score:		**8**	**10**	**8**	**9**	**11**	**11**	**12**	**9**	**7**	**8**	**8**	**7**	**6**	**7**	**10**	**6**	**6**
		Total Average Score:		0.38	0.46	0.38	0.42	0.50	0.48	0.54	0.42	0.33	0.38	0.38	0.33	0.29	0.33	0.46	0.27	0.29

TRANSPORTATION EVALUATION CRITERIA

Highway-funded Bicycle/Pedestrian Improvement/Expansion Projects

Project Name: BILLERICA - YANKEE DOODLE PATHWAY
Project Cost: $8,808,035
Project Number: 608227
Design status PRELIMINARY DESIGN
Jurisdiction MassDOT

PROJECT TYPE	TRANSPORTATION CRITERIA				OTHER IMPACT CRITERIA		
	Condition	**Mobility**	**Safety**	**Cost Effectiveness**	**Community Effects and Support**	**Land Use and Economic Development**	**Environmental Effects**
Bicycle/Pedestrian Facilities	Magnitude of surface condition improvement **3**	Number of New Users **3**	Effect on Bicycle Compatability Index **3**	Cost per User	Residential effects: right-of-way, noise, aesthetics, cut-through traffic, other **1**	Business effects: right-of-way, access, noise, traffic, parking, freight access other **1**	Air Quality/Climate effects **3**
	Magnitude of improvement of other infrastructure elements **1**	Effect on travel time/access/connectivity/access for existing users **3**	Effect on pedestrian safety **3**	Cost per Linear Mile	Environmental Justice effects **0**	Sustainable development effects **2**	Water quality/supply effects; wetlands effects **-1**
		Consistency with State Bicycle and/or Pedestrian Plans **3**			Public, local government, legislative, and regional support **3**	Consistent with regional land-use and economic development plans **3**	Historic and cultural resource effects **1**
					Effect on development and redevelopment of housing stock. **1**	Effect on job creation. **1**	
	Avg. Score (-3 to +3) **2**	**Avg. Score (-3 to +3)** **3**	**Avg. Score (-3 to +3)** **3**		**Avg. Score (-3 to +3)** **1.25**	**Avg. Score (-3 to +3)** **1.75**	**Avg. Score (-3 to +3)** **1.00**

Total Score (-18 to +18)
12.00

STATE PROJECT EVALUATION CRITERIA

Highway-funded Preservation Projects

PROJECT TYPE				OTHER IMPACT CRITERIA		
	Condition	**Usage**	**Cost Effectiveness**	**Community Effects and Support**	**Land Use and Economic Development**	**Environmental and Air Quality/ Climate Effects**
Roadway Maintenance **Roadway Resurfacing** **Roadway Reconstruction**	Extent of light and moderate cracking (Main) ☐	Annual Average Daily Traffic (AADT) ☐	Cost per Unit Change in Condition	Residential effects: right-of-way, noise, aesthetics, other ☐	Business effects: right-of-way, access, noise, traffic, parking, freight access other ☐	Air Quality/Climate effects ☐
	Measure of skid resistance (Main/Resurf) ☐	Percentage of Trucks ☐	Cost per Linear Mile	Public, local government, legislative, and regional support ☐	Sustainable development effects ☐	Water quality/supply effects; wetlands effects ☐
	Measure of rideability (Resurf/Recon) ☐	NHS Status ☐		Effect on service to minority or low income neighborhoods ☐		
	Measure of surface condition (Resurf/Recon) ☐		Cost per AADT	Other Impact/benefit to minority or low income neighborhoods ☐	Consistent with regional land-use and economic development plans ☐	Historic and cultural resource effects ☐
	Pavement structural adequacy (Recon) ☐			Effect on development and redevelopment of housing stock ☐	Effect on job creation. ☐	
	Avg. Score (-3 to +3) ☐	**Avg. Score (-3 to +3)** ☐		**Avg. Score (-3 to +3)** ☐	**Avg. Score (-3 to +3)** ☐	**Avg. Score (-3 to +3)** ☐

Total Score (-18 to +18) ☐

STATE PROJECT EVALUATION CRITERIA

Highway-funded Improvement/Expansion Projects

PROJECT TYPE	THRESHOLD TRANSPORTATION CRITERIA				OTHER IMPACT CRITERIA		
	Condition and Service Quality	**Mobility**	**Safety and Security**	**Cost Effectiveness**	**Community Effects and Support**	**Land Use and Economic Development**	**Environmental and Air Quality/ Climate Effects**
Arterials/Intersection **Major Highways**	Magnitude of pavement condition improvement ☐	Effect on magnitude and duration of congestion ☐	Effect on crash rate compared to state average ☐	Cost per Unit Change in Condition	Residential effects: right-of-way, noise, aesthetics, other ☐	Business effects: right-of-way, access, noise, traffic, parking, freight access other ☐	Air Quality/Climate effects ☐
	Magnitude of improvement of other infrastructure elements ☐	Effect on travel time and connectivity/access ☐	Effect on bicycle and pedestrian safety ☐	Cost per Linear Mile	Public, local government, legislative, and regional support ☐	Sustainable development effects ☐	Water quality/supply effects; wetlands effects ☐
			NHS Status ☐		Effect on service to minority or low income neighborhoods ☐		
		Effect on other modes using facility ☐		Cost per AADT	Other Impact/benefit to minority or low income neighborhoods ☐	Consistent with regional land-use and economic development plans ☐	Historic and cultural resource effects ☐
		Effect on regional and local traffic ☐			Effect on development and redevelopment of housing stock ☐	Effect on job creation. ☐	
	Avg. Score (-3 to +3) ☐	**Avg. Score (-3 to +3)** ☐	**Avg. Score (-3 to +3)** ☐		**Avg. Score (-3 to +3)** ☐	**Avg. Score (-3 to +3)** ☐	**Avg. Score (-3 to +3)** ☐

Total Score (-18 to +18) ☐

STATE PROJECT EVALUATION CRITERIA

Highway-funded Other Enhancements (non-bike/ped) Projects

PROJECT TYPE	THRESHOLD TRANSPORTATION CRITERIA				OTHER IMPACT CRITERIA		
	Condition and Service Quality	**Mobility**	**Safety and Security**	**Cost Effectiveness**	**Community Effects and Support**	**Land Use and Economic Development**	**Environmental and Air Quality/ Climate Effects**
Other Enhancements (non-bike/ped)	The extent to which the project improves the transportation system ☐	Number of users ☐	Effect on user safety/ security ☐	Cost per user ☐	Residential effects: right-of-way, noise, aesthetics, other ☐	Business effects: right-of-way, access, noise, traffic, parking, freight access other ☐	Air Quality/Climate effects ☐
		The extent to which the project is coordinated with other projects ☐			Public, local government, legislative, and regional support ☐	Sustainable development effects ☐	Water quality/supply effects; wetlands effects ☐
		The extent to which the project provides other benefits ☐			Effect on service to minority or low income neighborhoods ☐		
					Other Impact/benefit to minority or low income neighborhoods ☐	Consistent with regional land-use and economic development plans ☐	Historic and cultural resource effects ☐
					Effect on development and redevelopment of housing stock ☐	Effect on job creation. ☐	
	Avg. Score (-3 to +3) ☐	**Avg. Score (-3 to +3)** ☐	**Avg. Score (-3 to +3)** ☐		**Avg. Score (-3 to +3)** ☐	**Avg. Score (-3 to +3)** ☐	**Avg. Score (-3 to +3)** ☐

Total Score (-18 to +18) ☐

STATE PROJECT EVALUATION CRITERIA

Highway-funded Bicycle Pedestrian Enhancement Projects

PROJECT TYPE	THRESHOLD TRANSPORTATION CRITERIA				OTHER IMPACT CRITERIA		
	Condition and Service Quality	**Mobility**	**Safety and Security**	**Cost Effectiveness**	**Community Effects and Support**	**Land Use and Economic Development**	**Environmental and Air Quality/ Climate Effects**
Bicycle/ Pedestrian Facilities Enhancements	Magnitude of surface condition improvement ☐	Number of users ☐	Effect of Bicycle Comfort Index ☐	Cost per user ☐	Residential effects: right-of-way, noise, aesthetics, other ☐	Business effects: right-of-way, access, noise, traffic, parking, freight access other ☐	Air Quality/Climate effects ☐
	Magnitude of improvement of other infrastructure elements ☐	Effect on travel time/ access/ connectivity for existing users ☐	Effect on pedestrian safety ☐	Cost per linear mile ☐	Public, local government, legislative, and regional support ☐	Sustainable development effects ☐	Water quality/supply effects; wetlands effects ☐
		Consistent with State Bicycle and/ or Pedestrian Plans ☐			Effect on service to minority or low income neighborhoods ☐		
					Other Impact/benefit to minority or low income neighborhoods ☐	Consistent with regional land-use and economic development plans ☐	Historic and cultural resource effects ☐
					Effect on development and redevelopment of housing stock ☐	Effect on job creation. ☐	
	Avg. Score (-3 to +3) ☐	**Avg. Score (-3 to +3)** ☐	**Avg. Score (-3 to +3)** ☐		**Avg. Score (-3 to +3)** ☐	**Avg. Score (-3 to +3)** ☐	**Avg. Score (-3 to +3)** ☐

Total Score (-18 to +18) ☐

Evaluation Criteria
Pioneer Valley Planning Commission

Community: Agawam **Project Type:** Intersection Improvement **SID #:**

Year Project was initiated: **MassDOT Design Status:** 0%

Cost Estimate: **Year of Cost Estimate:**

Is the project located primarily in an urban area? Yes **Roadway Functional Class:** Arterial

ADT: **Year of ADT:** **# Lanes:** **Length (miles):**

Cost/ADT: #DIV/0! **Cost/Lane Mile:** #DIV/0! **Cost/ADT/Lane Mile:** #DIV/0!

MassDOT Project Name: Insert Name of Project here

Section	Name	Score
1	SYSTEM PRESERVATION, MODERNIZATION AND EFFICIENCY	0
2	LIVABILITY	0
3	MOBILITY	0
4	SMART GROWTH AND ECONOMIC DEVELOPMENT	0
5	SAFETY AND SECURITY	0
6	ENVIRONMENT AND CLIMATE CHANGE	0
7	QUALITY OF LIFE	0
8	ENVIRONMENTAL JUSTICE	0
	Grand Total	0
	Cost/Point	#DIV/0!

Transportation Project Evaluation Criteria
Pioneer Valley Planning Commission
TEC Form_Official.xls

1	SYSTEM PRESERVATION, MODERNIZATION AND EFFICIENCY				SID #	0
				Maximum Points for this Subsection:	19	0
	Criterion	**Factor**	**Instructions**	**Details**	**Max Score**	**Actual Score**
a	Improves substandard pavement	OCI rating less than 48.5 (arterial) or 47.5 (Collector): Poor, and pavement improvements are included in the project – 8 points OCI rating between 48.5 and 69.5 (arterial) or 47.5 and 68.5 (collector): Fair, and pavement improvements are included in the project – 4 points OCI rating greater than 69.5 (arterial) or 68.5 (collector): Good or better – 1 point OCI rating greater than 85 or the project is an intersection improvement or off-road bicycle facility – 0 points	Select one only	Based on Pavement Condition Ratings as defined in current RTP. Attach Photos	8	0
b	Improves intersection operations (signal equipment upgrades, adaptive signal controls and coordination with adjacent signals, roundabout, geometric improvements, adds turn lanes, improves alignment, improves sight distance.)	Meets or addresses criteria to a high degree - improves multiple locations– 6 points Meets or addresses criteria to a medium degree - improves at least one locations with multiple upgrades – 4 points Meets or addresses criteria to a low degree - improves one location – 2 points Does not meet or address criteria – 0 points	Select one only		6	0
c	In a Congestion Management Process Identified Area	CMP data indicates project improves a corridor of Severe congestion– 5 points CMP data indicates project improves a corridor of Serious congestion – 3 points CMP data indicates project improves a corridor of Moderate congestion – 1 points CMP data indicates project improves a corridor of Minimal congestion or corridor is not currently monitored – 0 points	Select one only	Based on most recent regional CMP data	5	0

Transportation Project Evaluation Criteria
Pioneer Valley Planning Commission
TEC Form_Official.xls

2	LIVABILTY				SID #	0
					Maximum Points for this Subsection:	12	0
	Criterion	**Factor**	**Instructions**	**Details**	**Max Score**	**Actual Score**
a	Design is consistent with complete streets policies. Complete Streets are designed and operated to enable safe access for all motorists, pedestrians, cyclists, and transit users. Applicant must provide supporting documentation that project is consistent with a locally adopted complete	Project is a "complete street" consistent with a locally adopted complete streets policy – 1 point Project provides bicycle facilities or accommodations – 1 point Project provides pedestrian facilities – 1 point Does not provide any complete streets components – 0 points	Select all criteria that apply to project.	Provide plans illustrating facilities provided. MassDOT Project Development and Design Guide FHWA Livability in Transportation Guidebook	3	0
b	Provides multi-modal access to a downtown, village center or employment center.	Provides continuous bicycle access (i.e. bike lanes or bike path) to a downtown or center – 1 point Provides pedestrian access to a downtown or center – 1 point Does not provide multimodal access – 0 points	Select all criteria that apply to project.	Project proponent must provide plans illustrating facilities provided and information on the downtown or village district..	2	0
c	Reduces auto dependency	Project completes a known gap in the bicycle or pedestrian network – 0.5 point Project provides for a new bicycle facility – 0.5 point Project provides for a new pedestrian facility – 0.5 point Project implements a transportation demand management (TDM) strategy – 0.5 point Does not provide any of the above measures – 0 points	Select all criteria that apply to project.	Project proponent must provide plans illustrating facilities provided.	2	0
d	Project serves a targeted development site (Priority Development Area identified in Valley Vision, rail station area, Chapter 40R or 43D or 43E District)	Project mostly serves a targeted development site – 1 points Project partly serves a targeted development site – 0.5 point Project supports local zoning or other regulations that are supportive of smart growth – 0.5 point Project provides for bicycle or pedestrian access to or within a targeted development site – 0.5 point	Select all criteria that apply to project.	Project proponent must provide map of project location, and identify project location in relation to identified targeted development site. Information on special districts should also be provided.	2	0
e	Completes off-road bike and pedestrian network (copy of the most recent regional bicycle/trail map is attached.)	Project provides an important link or component of the region's off-road bicycle and pedestrian network – 3 points Project includes an off-road bike and pedestrian component as part of a road project or a community adopted bicycle sharing program – 2 points Project provides a connection to a regional bikeway/walkway – 1 point	Select one only	Based on Regional Bicycle/Trail Map (provided) or the Regional Bike Linkages Map (proposed pending adoption)	3	0

Transportation Project Evaluation Criteria
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3	MOBILITY				SID #	0
					Maximum Points for this Subsection:	17	0
	Criterion	**Factor**	**Instructions**	**Details**	**Max Score**	**Actual Score**
a	Improves Efficiency, Reliability and Attractiveness of Public Transit	Project increases fixed route bus transit service efficiency and attractiveness through design or ITS technology – 1 point Project provides new or improved linkages to adjacent existing or planned public transit stations/stops – 0.5 point Project prioritizes signals for transit vehicles – 1 points Project provides for a dedicated busway – 1 points Project provides for bus bump out – 0.5 point	Select all criteria that apply to project.	Identify affected bus service, design features, and/or ITS components	4	0
b	Improves existing peak hour level of service (LOS)	Source data indicates project improves a location that operates at LOS F in an urban area or LOS E in a rural area – 6 points Source data indicates project improves a location that operates at LOS E in an urban area or LOS D in a rural area – 5 points Source data indicates project improves a location that operates at LOS D in an urban area or LOS C in a rural area – 3 points	Select one only	Attach Functional Design Report or recent planning study.	6	0
c	Reduces traffic congestion without adding unnecessary turn lanes.	Reduces congestion to a high degree – project significantly improves traffic flow for a location in the Regional Bottlenecks Report or Regional Congestion Management Process – 7 points Reduces congestion to a medium degree – project improves vehicle storage, installs exclusive turn lanes as warranted, improves access management at more than two locations– 5 points Reduces congestion to a low degree – provides modest improvements such as signal retiming, lane striping, upgraded detection, turn restrictions, or access management upgrades at a single location – 2.5 points Does not reduce congestion – 0 points	Select one only	Attach Functional Design Report or recent planning study.	7	0

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4	SMART GROWTH AND ECONOMIC DEVELOPMENT				SID #	0
					Maximum Points for this Subsection:	10	0
	Criterion	**Factor**	**Instructions**	**Details**	**Max Score**	**Actual Score**
a	Encourages Development around Existing or Enhanced Infrastructure.	Public water and sanitary sewer lines serve the project area. - 2 points For rural areas, project is within a 1/4 mile radius of a village center. - 2 points The community will invest in the expansion of existing public water and sanitary sewer lines or install new infrastructure to compliment the project. - 2 points **Or** Public water and sanitary sewer lines are within close proximity (within 150 feet) of the project ROW – 1 point For rural areas, project is within a ½ mile radius of a village center – 1 point Public water and sanitary sewer lines do not serve the project area. – 0 points	Select only one	Provide a site map illustrating the project and any related public water or sewer lines or village center.	2	0
b	Prioritizes Transportation Investments that Support Land Use and Economic Development Goals	Project is identified in the most recently adopted Comprehensive Economic Development Strategy (CEDS) for the region – 0.5 points Project serves an area that is targeted as a Priority Development Area (PDA) in Valley Vision Map – 0.5 points Project serves an area that is targeted as a Priority Protection Area (PPA) in Valley Vision Map - (-1 points)	Select if applicable	Submit plan excerpts	1	0
c	Provides service to a Transit Oriented District (TOD), Traditional Neighborhood District (TND), and Cluster or Open Space Development District	Project serves an area that is identified in an existing or planned transit oriented development, traditional neighborhood development, cluster or open space development district in an adopted plan	Select if applicable	Submit plan excerpts referencing the appropriate district.	0.5	0
d	Support Mixed-Use Downtowns and Village Centers	Project serves an existing or planned mixed use downtown or village center	Select if applicable	Identify the downtown	0.5	0
e	Improves intermodal accommodations/connections to transit (project enhances access, amenities, or service to an existing transit intermodal center or pulse point.)	Meets or addresses criteria to a high degree – project enhances service for three or more transit routes– 4 points Meets or addresses criteria to a medium degree – project results in multiple upgrades for one or two transit routes – 2 points Meets or addresses criteria to a low degree - project enhances service for a single transit route – 1 points Does not meet or address criteria– 0 points	Select one only	Include most recent PVTA route ridership data.	4	0
f	Reduces Congestion on Freight Routes	Project will reduce congestion on roadways with more than 5% trucks per day – 1 point	Select all criteria that apply to project.	Attach Truck Count	2	0

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4	SMART GROWTH AND ECONOMIC DEVELOPMENT				SID #	0
				Maximum Points for this Subsection:	10	0
	Criterion	**Factor**	**Instructions**	**Details**	**Max Score**	**Actual Score**
		Project implements a strategy identified in the State or Regional Freight Plan – 1 point				

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5	SAFETY AND SECURITY				SID #	0
					Maximum Points for this Subsection:	16	0
	Criterion	**Factor**	**Instructions**	**Details**	**Max Score**	**Actual Score**
a	Reduces Number and Severity of Collisions	Project includes ITS elements that will reduce crashes or adds/improves guardrails.		Identify specific ITS components	1	0
		A roadway safety audit has been completed for the project.	Select if applicable	Submit RSA report	2	0
		Project addresses a safety problem as identified in the PVPC "Top 100" High Crash Intersections Report, Top 25 High Crash Roadway Segments or is identified as a High Bicycle or Pedestrian Crash Cluster by MassDOT - 4 points	Select one (if applicable)	Submit report excerpts. Documented crashes per Million Entering Vehicles/Million Vehicle Miles	4	0
		The location has a history of lane departure crashes and the project will remove hazardous objects such as utility poles and trees from the roadside – 4 points				
		The location has a history of lane departure crashes and the project will install rumble strips, improve visibility through enhanced edge lines, or enhance pavement to improve skid resistance – 2 points				
		The location has a crash rate greater than the state or district average. – 2 points				
b	Promotes Safe and Accessible Pedestrian and Bicycle Environment	Project includes bike safety improvements – 2 points	Select if applicable	Identify the safety improvements	5	0
		Project includes pedestrian safety improvements – 2 points				
		Project provides bike amenities, such as bike racks or lockers, off-road bike lanes, connections to bike paths, or bike-sharing infrastructure – 1 point				
c	Improves Emergency Response	Project is identified as an existing or planned priority emergency response route by one or more Local Public Agencies and is projected to decrease response times for EMS, fire, and police agencies – 2 points	Select all criteria that apply to project.	Attach EMS plan excerpts or other documents	4	0
		Project improves an evacuation route to, or in proximity to, an emergency support location – 2 points				

6	**ENVIRONMENT AND CLIMATE CHANGE**				**SID #**	**0**
				Maximum Points for this Subsection:	**12**	**0**
	Criterion	**Factor**	**Instructions**	**Details**	**Max Score**	**Actual Score**
a	Preserves Floodplains and Wetlands (310 CMR)	Project is not located in a floodplain.	Select all criteria that apply to project.	Submit floodplain map.	0.5	0
		Project is not located in an existing wetland			0.5	0
b	Promotes Green Infrastructure and Low Impact Development to Reduce Stormwater Impacts	Project involves use of green infrastructure or low impact development (LID) best management practices (BMPs) to reduce stormwater impacts. Eligible BMPs include: rain gardens, green streets, tree box filters, bioretention areas, sheet flow runoff, permeable pavement, vegetated swales, engineered soils for expanded root growth, and measures to improve infiltration	Select if applicable	Identify best management practices	2	0
c	Reduces Impervious Surfaces	Project reduces impervious surface area, or reduces stormwater runoff discharge rate and volume, from pre-existing conditions.	Select if applicable	Identify design features	0.5	0
d	Protects or Enhances Environmental Assets	Project will improve high priority regional environmental assets or enhance protection of Priority Protection Areas (PPAs) identified in Valley Vision.	Select if applicable	Identify affected assets from map	0.5	0
e	Supports Brownfields Redevelopment	Project serves a brownfield redevelopment site. **Or** Project helps to implement an adopted brownfield redevelopment plan	Select one only, if applicable	Supply map	0.5	0
f	Improves Air Quality Major improvements include projects that demonstrate significant reduction in single occupant vehicles. Minor improvements include reductions in vehicle idling.	Project includes major elements improving air quality – 1 point Project includes minor elements improving air quality – 0.5 point Project has no significant air quality impact – 0 points Project has negative air quality impacts – (-1) points	Select if applicable	Show CMAQ Analysis (PVPC). The level of improvement based on CMAQ analysis shall be considered in determining major and minor improvements.	1	0
g	Reduces CO2 Emissions	Project significantly reduces CO2 emissions – 1 point Project modestly reduces CO2 emissions – 0.5 point Project has no significant CO2 emissions impact – 0 points	Select one only.	Provide information documenting CO2 reduction strategy, for example, purchase of fuel efficient or electric vehicles or LED traffic lights or solar panels or wind generators. Provide Greenhouse Gas Analysis (PVPC)	1	0

6	ENVIRONMENT AND CLIMATE CHANGE				SID #	0
					Maximum Points for this Subsection:	12	0
	Criterion	**Factor**	**Instructions**	**Details**	**Max Score**	**Actual Score**
		Project increases CO2 emissions impacts – (-1) points				
h	Promotes Mode Shift	Project will provide significant reduction in single occupancy vehicle trips through a shift to another transportation mode (i.e. bicycling)	Select if applicable	Identify how project will accomplish mode shift.	1	0
i	Improves Fish and Wildlife Passage	Project includes stream crossing or culvert improvements designed to improve fish and wildlife passage, in accordance with Massachusetts River and Stream Crossing standards MA Stream Crossings Handbook	Select if applicable	Identify design features in accordance with Massachusetts River and Stream Crossing Standards.	1	0
j	Supports Green Communities	Project is located in an approved Green Community, in accordance with the MA Green Communities Act	Select if applicable	See MA Green Communities map Link to MA Green Communities Map	0.5	0
k	Improves Storm Resilience	Project addresses a flooding problem or increases resilience of the transportation system to floods – 1 point Project improves storm flows by enlarging culverts or stream crossings, where there is demonstrated likelihood of extreme weather damage, while improving fish and wildlife passage – 2 points **Or** The Project incorporates stormwater BMPs or implements improvements that meet National Pollutant Discharge Elimination System (NPDES) requirements – 2 points	Select all criteria that apply to project.	Document BMPs	3	0

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7	QUALITY OF LIFE				SID #	0
					Maximum Points for this Subsection:	11	0
	Criterion	**Factor**	**Instructions**	**Details**	**Max Score**	**Actual Score**
a	Enhances or and Preserves Greenways and Blueways	Project is adjacent to, AND incorporates enhanced public access or trails or protection related to a designated National Scenic River (Westfield River), National Blueway (Connecticut River), the Baystate Greenway, a National Scenic Trail, a National Recreation Trail, or regional greenway as identified in the Pioneer Valley Greenways Plan	Select if applicable	Identify the designated greenway or blueway, and the public access or land to be protected	1	0
b	Improves Access to Parks and Open Space	Project improves the public's direct access to identified municipal or state parks and/or open space	Select if applicable	Identify the park, and/or open space	1	0
c	Improves Access to Jobs	Project will serve an existing or planned area identified as a major employment center in the Comprehensive Economic Development Strategy (CEDS) for the region. 2013 CEDS	Select if applicable	Identify the major employment center	2	0
d	Preserves Historical and Cultural Resources	Project itself involves preservation of property designated as a National Historic site or in National Historic District, or is a Historical or Cultural resource as defined by state, local, or federal inventories.	Select if applicable	Identify property and source of listing.	0.5	0
e	Preserve Prime Agricultural Land	Project will not decrease the amount of adjacent farmland in active agricultural production Project makes financial contribution to farmland preservation fund to mitigate impacts to active farmland	Select if applicable	Utilize aerial photos to identify lands in active agricultural production	0.5	0
f	Provide Safe and Reliable Access to Education	Project includes design elements to improve safety and/or access (regardless of mode) to an existing or planned educational facility (sidewalks, traffic calming measures, crosswalk signals) Project helps to implement an accepted Safe Route to School or the recommendations of a Safe Route to School study Safe Routes to Schools	Select if applicable	Identify the educational facility and the design elements	0.5	0
g	Support Designated Scenic Byways	Project implements a recommendation of a Corridor Management Plan for a designated National or State Scenic Byway Link to MA Scenic Byways Map	Select if applicable	Identify the recommendation and Corridor Management Plan	0.5	0
h	Implements ITS strategies other than traffic signal operations	Project includes ITS equipment (e.g. variable message signs) – 2 points No proposed ITS equipment – 0 points	Select one only	Improves traffic flow as identified by an identified ITS strategy for the municipality or state	2	0
i	Improve Network Wayfinding/Retro-reflectivity	Project includes improved wayfinding signage – 1 point Project upgrades existing signs to meet current retro-reflectivity standards – 1 point	Select only one		1	0

7	**QUALITY OF LIFE**				**SID #**	**0**
				Maximum Points for this Subsection:	**11**	**0**
	Criterion	**Factor**	**Instructions**	**Details**	**Max Score**	**Actual Score**
j	Health Impact Assessment	A health impact assessment was completed for the project per MassDOT guidelines - 1 point	Select one if applicable	Attach completed analysis	1	0
k	Length of Time Project has been in queue for TIP funding	< 3 years - 0 points 3 - 5 years - 0.5 points > 5 years - 1 point	Select Only One	Length of time calculated from date of the first TEC review for the project	1	0

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8	ENVIRONMENTAL JUSTICE				SID #	0
				Maximum Points for this Subsection:	**3**	**0**
	Criterion	**Factor**	**Instructions**	**Details**	**Max Score**	**Actual Score**
a	Reduce and Limit Disproportionate Environmental Impacts on EJ Communities	Project is located within one or more identified Environmental Justice (EJ) Areas, has no adverse impacts projected, and will reduce travel time to work	Select if applicable	Identify project on EJ map	1	0
b	Improve Transit or pedestrian connections for EJ Populations	Project is located within half-mile buffer of, or affects, an environmental justice area and will provide new transit or pedestrian access – 2 points Project is located within half-mile buffer of, or affects, an environmental justice area and will provide improved transit or pedestrian access – 1 points Project provides no improvement in transit or pedestrian access or is not in an environmental justice area – 0 points	Select one only.	Identify project on EJ map	2	0
c	Reduce Burdens on EJ Areas	Project creates a burden or negative impact in identified EJ Area	Select if applicable	Identify project on EJ map	-5	0

Transportation Evaluation Criteria

Several years ago, the Southeastern Massachusetts Metropolitan Planning Organization (SMMPO) determined that the selection of highway projects for funding in southeastern Massachusetts will be based on evaluation criteria. The SMMPO directed the SRPEDD Transportation Planning Staff and the Joint Transportation Planning Group (JTPG) to develop and maintain an evaluation process in selecting transportation projects for inclusion in the regional Transportation Improvement Program (TIP). Each project is reviewed to estimate the impact on, or sensitivity to each of the criteria categories as follows:

- **Community Impact & Support** – the community and public support of a project;
- **Maintenance & Infrastructure** - infrastructure to be repaired;
- **Safety & Security** – improvements to all modes for safer operation;
- **Mobility/Congestion** – to improve efficiency of transportation;
- **Livability/Sustainable Development** – examining the potential impacts to the surrounding land use, neighborhoods, and community; and
- **Environmental & Climate Change** – determining the positive/negative environmental impacts of the project.

The application of the evaluation criteria requires documentation to explain the assumptions, measures of effectiveness, source of data, potential impacts and proof of public outreach and support. Providing this information assists the SRPEDD Transportation Planning Staff to score and prioritize projects within the TIP. This prioritization process is a means to properly fund projects under the fiscal constraints of the TIP. This process also informs communities and state agencies on what should be done by the project proponent to maximize the benefits of federal funding.

The evaluation of transit projects for the Southeastern Regional Transit Authority (SRTA) and the Greater Attleboro Taunton Regional Transit Authority (GATRA), bridge projects and major transit investments to be implemented by the Massachusetts Department of Transportation (MassDOT) are not covered in this document.

The SMMPO, through SRPEDD, operates its programs, services and activities in compliance with Title VI of the Civil Rights Act of 1964, the Civil Rights Restoration Act of 1987 and all related statutes and regulations. Title VI prohibits discrimination on the grounds of race, color, national origin (including limited English proficiency), as well as on the grounds of age,

gender or disability. Additionally, related federal and / or state laws provide similar protections on the basis of a person's religion, sexual orientation, veteran's status and other protected characteristics and requires that no one be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity or service receiving federal assistance.

COMMUNITY IMPACT & SUPPORT (15 Total Points Possible)

Within this section, questions are intended to determine if the project has the support of the community, including residents and business owners, as well as federal, state, or local elected officials and designated representatives of the town and the residents. It requests documentation as proof of this support through public participation and outreach or discussion with the affected surrounding residents and businesses. It also asks for determination on the impact of the surrounding land use and impact to Environmental Justice areas.

As well as operating programs, services and activities in compliance with Title VI of the Civil Rights Act of 1964, the Civil Rights Restoration Act of 1987 and all related statutes and regulations, the evaluation of every project must also consider Environmental Justice (EJ) principles as defined by the U.S. Department of Transportation and the SMMPO's Public Participation Program. These principals are designed:

- To avoid, minimize, or mitigate disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority populations and low-income populations,
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process,
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority populations and low-income populations.

A chief measure for meeting the community impact and support criteria will be documentation of a public participation process early in the planning of a project and as it progresses from the concept stage to an accepted project by MassDOT. A review of the proponent's efforts to inform all affected parties will be considered, and the community support or opposition duly noted.

Question 1 - Has the project been identified as a need in the Regional Transportation Plan or is it part of a planning or engineering study? (Max 3 Points)

Scoring Guidance

Positive points can be awarded if the project results from an SRPEDD traffic study, an independent study endorsed by the SMMPO, an environmental impact statement or report.

Zero points if a project is simply initiated by a town without support or study.

Negative points might result from a project that is not supported or contradicts recommendations from an engineering/traffic study.

Questions 2 - Has there been adequate public outreach performed? (Range -3 to 3 Points)

Scoring Guidance

Positive points are awarded to a project where public informational meetings were held to inform and gather local support, especially before and/or at the inception of the project. This includes town meetings, city council meetings and similar forums where a project's details are presented and allowed to be commented on by elected officials and local citizens. Points are awarded if the project proponent has reached out to surrounding businesses and/or local residents neighborhoods to obtain their input and support through site visits or group meetings. Federal or State legislative support is also a plus. Documentation of all public outreach efforts are required.

Negative points are applied if no public outreach was attempted, or a meeting was held and the project received significant opposition or criticism.

Question 3 - If the project falls within or near an Environmental Justice area, has the proponent made adequate efforts to reach the affected populations? (Range -3 to 3 Points)

Positive points are awarded if the project proponent has reached out to surrounding Environmental Justice areas to obtain input and support including LEP populations through site visits or group meetings with

translations and interpreters. Documentation of all public outreach efforts is required.

Zero points are awarded when the project is not located within or near an EJ area.

Negative points are applied if the project falls within an Environmental Justice area and no public outreach was attempted, or a meeting was held and the project received significant opposition or criticism.

Question 4 - Does the project negatively affect or improve an Environmental Justice area? (Range -6 to 6 Points)

Scoring Guidance

Positive points are awarded if a project specifically improves an Environmental Justice (EJ) area, promotes alternative transportation including transit or bicycle/pedestrian facilities that are ADA compliant, or implements noise or traffic calming measures within the project area.

Zero points if project does not fall within or near an EJ area.

Negative points can be applied when the project adversely impacts EJ areas and the proponent does not make any effort to mitigate those impacts.

“Does the project benefit the neighborhood or simply the people passing through the neighborhood?”

MAINTENANCE & INFRASTRUCTURE (12 Total Points Possible)

Within this section, questions are intended to determine if a project is correcting documented physical defects within the project’s traveled way. This could entail pavement conditions, drainage or culverts, as well as signal equipment. A pavement condition survey may be required. In the absence of a municipally prepared survey, information gathered by SRPEDD or MassDOT can be used. The survey rating process should consider various types of pavement distress (longitudinal, transverse, alligator, and edge cracking; surface rutting, and drainage issues, etc). The survey should recommend a repair strategy that is used to determine the extent of pavement deterioration. The proposed improvement should be consistent with the recommended repair strategy from a Pavement Management Program or engineering evaluation.

Questions 1 - Does the project improve substandard pavement conditions? (Range -3 to 3 Points)

Scoring Guidance

Positive points are awarded if a project improves the substandard pavement. Points can also be awarded if the current pavement condition will change prior to the need for federal or state transportation funding because of a pending utility project or if the condition is already poor. Positive points are awarded if the project improves pavement condition where traffic flow is slowed or forced to drive erratically to avoid damage to vehicles, additional points can be considered.

Zero points can be applied when the project does not change or improve the existing pavement condition or applies improvements to a pavement that is currently considered to be in good to excellent condition according to a pavement condition survey.

Negative points may be applied when the project does not include measures to address any obvious or documented pavement issues.

Question 2 - Has the project been identified as a need through a Pavement Management program? (Range -3 to 3 Points)

Scoring Guidance

Positive points are awarded if a project is identified through SRPEDD, Transportation Consulting firm, or highway maintenance department with an established pavement management program.

Zero points are applied when there are no pavement issues to be addressed.

Negative points can be applied when the project claims specific pavement conditions, but lacks documentation from a qualified pavement management program. Negative points can apply if the project will unnecessarily improve pavement documented in currently good to excellent condition.

Question 3 - Does the project improve traffic control devices? (Range -3 to 3 Points)

Scoring Guidance

Positive points are awarded if a project includes the improvement or replacement of an outdated traffic control devices. This includes conduits, loop detectors, pavement markings, signage, etc. that make up a signalized / unsignalized intersection.

Zero points are applied if the project simply replaces the existing traffic control devices.

Negative points can be applied when the need for updated traffic controls has been identified and the project simply replaces the traffic control devices (loop detectors, pavement markings, signs, etc) as part of the project.

Question 4 - Does the project address drainage issues? (Range -3 to 3 Points)

Scoring Guidance

Positive points are awarded if a project improves structures that maintain adequate drainage of precipitation from the paved surface. Points can be awarded if those structures were identified by the SRPEDD GRRIP program, MEPA, or other documented study.

Zero points applied if there are no drainage issues to be addressed.

Negative points can be applied when the project does not improve structures that are known to be or identified as a drainage problem or does not address a drainage problem identified through GRRIP, MEPA or any other documents studies or agencies.

SAFETY & SECURITY (21 Total Points Possible)

Safety has traditionally been considered the foremost element of a project's importance in the SRPEDD region. The SMMPO's Regional Transportation Plan currently considers safety problems as pre-existing conditions that merit maximum consideration for corrective measures. The project must address the documented safety problem. Paving a corridor that has a high crash problem may not score high if specific relevant safety improvements are not planned. The proponent must provide SRPEDD with copies of the last 3 most current years of police crash reports to substantiate the predominant safety problem(s), or the results of a safety analysis.

The project should identify all improvements to be made to the corridor or intersection that impact the element of safety. It should take into account utility improvements, drainage or stormwater improvements, traffic signals, sidewalk and bicycle accommodations and document how they will improve safety.

Question 1 - Is the project identified on High Crash Listings from SRPEDD or MassDOT? (Range -6 to 6 Points)

Scoring Guidance

Positive points are awarded if a project is proposed for a location listed in SRPEDD's Top Crash Location List, MassDOT Top 100, or documented in the Regional Transportation Plan and the project intends to improve an identified safety issue. In addition to the crash ranking the EPDO and ACC/MEV or ACC/MVM should be calculated to determine if it is above or below the statewide average and to validate necessary improvements to further assist in calculating how valuable the project was through the Performance Measure evaluation.

Zero points are applied if there are no documented or minor safety issues involved.

Negative points can be applied when the project is proposed for a location on a documented safety list but does not include measures to address the safety issues.

Question 2 - Does the design address the primary safety concerns identified through safety analysis? (Range -6 to 6 Points)

Scoring Guidance

Positive points are awarded if a project is a result of a documented safety study or Road Safety Audit completed by SRPEDD, MassDOT or an engineering firm and includes identified recommendations in the design or documents viable reasons for not including the recommendations.

Zero points can be applied if the project has no safety issues or is a non safety project.

Negative points can be applied when the project has no documentation of an identified safety issue or claims it will resolve a safety issue but provides no documented proof of a safety issue.

Question 3 - Does the project affect bicycle and pedestrian safety? (Range -3 to 3 Points)

Scoring Guidance

Positive points are awarded if a project provides accommodations for improved pedestrian and bicycle safety. This includes increased shoulder width, sidewalks, bike path, markings, etc.

Zero points are applied when no improvements for pedestrian or bicycle safety are proposed and there are no documented safety problems.

Negative points can be applied when the project does not address an identified pedestrian or bicycle safety problem.

Question 4 - Does the project improve an emergency evacuation route or access to emergency facilities? (Range -3 to 3 Points)

Scoring Guidance

Positive points are awarded if a project is part of a community or regional evacuation route or is part of a route that provides access to hospitals or emergency facilities (Police, Fire, ambulance, shelters).

Zero Points are applied when the project is not part of an evacuation route or routing to an emergency facility.

Negative points can be applied when the project is part of an evacuation route or routing to emergency facilities, yet does nothing to improving congestion or safety issues that might inhibit emergency response.

Question 5 - Does the project improve freight related safety issues? (Range -3 to 3 Points)

Scoring Guidance

Positive points are awarded if a project improves documented issues related to the movement of freight. This might include the elimination of curves on ramps to minimize rollovers, increased height to bridges for greater clearance, greater turning radii at intersections, etc.

Zero Points are awarded if there are no known freight safety issues related to the project.

Negative points can be applied when the project does not address documented safety problems related to the transportation of freight.

MOBILITY & CONGESTION (18 Total Points Possible)

Traffic congestion adversely impacts the movement of people and goods. Congestion is measured based on traffic volume and its impact on the road or intersections' ability to handle that volume. It is calculated in terms of volume to capacity (v/c) ratio and travel delay, and is normally expressed as level of service from A thru F; A being free flow conditions and F being congested.

Traffic congestion can be either an existing measurable condition or it can be a projected future condition. Within the SRPEDD region, we generally consider conditions to warrant attention if the volume to capacity ratio of a corridor is at or above 0.8. This is calculated using the regional Travel Demand Model which determines v/c ratios for all major roadways in a base year (currently year 2010) and future years (to the year 2035).

Intersections are generally handled through a detailed capacity analysis that determines the level of service (LOS) and delay for the intersection as a whole or in fine detail by specific turning movement. Generally, a location with a LOS of D or worse is considered to have a congestion problem. Any changes in traffic controls must be determined by a detailed analysis of the overall characteristics of the intersection. An appropriate warrants analysis should be used as an important component in the ultimate decision to change or install traffic controls.

In addition to the V/C ratio and the LOS, the intersection delay will be evaluated to determine how valuable the project was through the Performance Measure evaluation.

Question 1 - Does the project address an existing or projected congestion problem (Bottlenecks)? (Range -6 to 6 Points)

Scoring Guidance

Positive points are awarded if a project is determined to improve an identified congestion problem or congested area through a documented study/analysis.

Zero Points are awarded if no known congestion problem is evident.

Negative points can be applied when the project does not address or worsens the identified congestion problem.

Question 2 - Does the project improve mobility, connectivity or access for multi modes of travel? (Range -6 to 6 Points)

Scoring Guidance

Positive points are awarded if a project improves access to park n ride lots ,ferry parking, multi-modal hubs and/or transit connections, enables ridesharing or carpooling, includes ITS technology or enhances pedestrian and bicycling connections and facilities, etc.

Zero Points are awarded if there are no known congestion issues addressed by the project.

Negative points can be applied when the project if it improves congestions but does not accommodate other modes of transportation as part of those improvements. This might include the lack of Pre-emptive signal controls, high occupancy travel lanes, bicycle/pedestrian accommodations, etc.

Question 3 - Is the project on an existing freight route AND does it address issues identified by a State or SMMPO documented Freight Plans? (Range -3 to 3 Points)

Scoring Guidance

Positive points are awarded if a project is on an existing Freight route and addresses issues outlined in a documented study by the SMMPO or MassDOT.

Zero Points are awarded if there are no known freight issues with the project.

Negative points can be applied when the project is on an existing Freight route and does not address issues outlined in a documented study by the SMMPO or MassDOT.

Question 4 - Does the project improve reliability for Transit/Emergency Vehicles and/or includes pre-emptive technologies (ITS)? (Range -3 to 3 Points)

Scoring Guidance

Positive points are awarded if a project includes ITS prioritization for transit and emergency vehicles.

Zero Points are awarded if there are no opportunities to incorporate ITS in the project.

Negative points can be applied when the project does not include ITS prioritization for emergency or transit vehicles.

LIVABILITY / SUSTAINABLE DEVELOPMENT EFFECTS (12 Total Points Possible)

The surrounding area of a project will ultimately be impacted by a project. At times, a project can be interpreted as a positive impact with enhanced safety and mobility or as a negative where the project further separates and isolates neighborhoods from the rest of the community or degrades the overall aesthetic appeal of the impacted neighborhood. This particular section looks at the impact from a project in regards to the concepts of Complete Streets, access to transportation options including TOD, Residential Effects and Quality of Life as well as Land Use, Priority Areas and Economic Development.

These particular questions are subjective and require staff to address various issues and questions to determine a project's true impact to the surrounding area.

Question 1 - Does the project meet all of the Complete Streets criteria and reduce auto dependency? (Range -3 to +3 Points)

Scoring Guidance

Positive points are awarded if a project will implement the concepts of complete streets to enhance safe access and travel for pedestrians, bicyclists, and transit users to assist in reducing auto dependency. The total points will depend on specifics regarding complete streets to be implemented with the project.

Zero Points are awarded if there are no issues applicable to the project with regards to the complete street criteria.

Negative points can be applied when the project does not include complete streets as part of the improvements for a known issue or inhibits safe access and travel for modes of transportation other than the automobile.

Question 2 - Does the project improve residential effects or Quality of Life? (Range -3 to +3 Points)

Scoring Guidance

Positive points are awarded if a project provides a positive improvement to the neighborhood or surrounding land use. This might include improved access, aesthetic improvements, the reduction of additional traffic, discouragement of cut-through traffic or enhanced modes of alternative transportation facilities.

Zero points are awarded if there are no discernible effects on quality of life or residential or neighborhood effects.

Negative points can be applied when the project negatively impacts the quality of life, increasing traffic or noise or decreasing access, etc.

Question 3 - Does the project provide or improve multimodal access to / from / within Economic Target Areas, Economic Opportunity Areas, Priority Development Areas, 43D sites, Transit Oriented Developments (TOD's) or Environmental Justice areas? (Range -3 to +3 Points)

Scoring Guidance

Positive points are awarded if a project provides or improves multimodal access to / from / within areas identified in SRPEDD's Comprehensive Economic Development Strategy document, and identified as Economic Target Areas, Economic Opportunity Areas, Priority Development Areas, 43D sites, TOD's and Environmental Justice areas.

Zero Points are awarded if the project does not fall within or near these identified areas.

Negative points can be applied when the project does not provide improved or multimodal access to an identified economic development or priority area.

Question 4 - Does the project have a negative or positive impact on or access to Historical/Cultural Resources? (Range -3 to 3 Points)

Scoring Guidance

Positive points are awarded if a project positively impacts, improves or preserves access to historical or cultural resources or scenic and recreational resources.

Zero Points are awarded if there are no historical or cultural resources are near the project.

Negative points can be applied when the project adversely access to impacts historical or cultural resources or scenic and recreational resources.

ENVIRONMENTAL & CLIMATE CHANGE (9 Total Points Possible)

In addition to the impacts surrounding land use, the impact of a project specific to the environment needs to be considered. MassDOT's GreenDOT policy requires a reduction in air pollutants by 25% by 2020. SRPEDD's Geographic Roadway Runoff Inventory Program (GRRIP) identifies drainage or stormwater problems on federally eligible roadways. There is also growing evidence that climate change and tidal rise are beginning to impact infrastructure along the coastal communities as documented in SRPEDD's Flood Hazard Reduction study of 2012. More than ever before, these particular issues pertaining to the environment need consideration with project development.

The Green House Gas reduction will be calculated to determine how valuable the project will be through the Performance Measure evaluation.

Question 1 - Does the project have a negative or positive impact on Air Quality? (Range -3 to 3 Points)

Scoring Guidance

Positive points are awarded if a project demonstrates the reduction in emissions as part of the documented analysis.

Zero Points are awarded if there are no applicable air quality impacts

Negative points can be applied when the project if a project demonstrates a negative impact as part of a documented analysis.

Question 2 - Does the project have a negative or positive impact on Water Quality? (Range -2 to 2 Points)

Scoring Guidance

Positive points are awarded if a project is identified in the GRRIP analysis, includes stormwater or drainage improvements (mitigates stormwater runoff or improves water flow within drainage structures), seeks to replicate, repair or improve on any negative impact to the surrounding environment.

Zero Points are awarded if there are no impacts to the surrounding environment.

Negative points can be applied when the project impacts or adversely affects wetlands, public or private water supplies or any other environmental issue related to water.

Question 3 - Does the project have a negative or positive impact on Habitat / Wildlife? (Range -2 to 2 Points)

Scoring Guidance

Positive points are awarded if a project positively mitigates or impacts any habitat or wildlife in the form of runoff, noise, or other undue hardship as a result of the project.

Zero Points are awarded if there are no applicable impacts identified.

Negative points can be applied when the project does have significant impact to habitat or wildlife in the form of runoff, noise, or other undue hardship as a result of the project.

Question 4 - Does the project have a negative or positive impact on an identified flooding and/or sea level rise area? (Range -2 to 2 Points)

Scoring Guidance

Positive points are awarded if a project was identified in a SRPEDD, MassDOT or other documented analysis and the project will specifically address and/or resolve the issue of impacts from river/tidal flooding.

Zero Points are awarded if there are no applicable impacts identified.

Negative points can be applied when the project contributes to, worsens, or will be significantly damaged by continual impacts related to repeat flooding and/or sea level rise.

Community : **Project Description:**

COMMUNITY IMPACT & SUPPORT (15 Total Points)	Explanation / Additional Comments	Point Range	POINTS
Has the project been identified as a need in the Regional Transportation Plan or is it part of a planning or engineering study?		0 to +3	
Has there been adequate public outreach performed?		-3 to +3	
If the project falls within or near an Environmental Justice area, has the proponent made adequate effforts to reach the affected populations?		-3 to +3	
Does the project negatively affect or benefit an Environmental Justice area?		-6 to +6	
	Total COMMUNITY IMPACT & SUPPORT Points		0
MAINTENANCE & INFRASTRUCTURE (12 Points Total)	**Explanation / Additional Comments**	**Point Range**	**POINTS**
Does the project improve substandard pavement conditions?		-3 to +3	
Has the project been identified as a need through a Pavement Management program?		-3 to +3	
Does the project improve traffic control devices?		-3 to +3	
Does the project address drainage issues?		-3 to +3	
	Total MAINTENANCE & INFRASTRUCTURE Points		0
SAFETY & SECURITY (21 Points Total)	**Explanation / Additional Comments**	**Point Range**	**POINTS**
Is the project identified on High Crash Listings from SRPEDD or MassDOT?		-6 to +6	
Does the design address the primary safety concerns identified through safety analysis?		-6 to +6	
Does the project affect bicycle and pedestrian safety?		-3 to +3	
Does the project improve an emergency evacuation route or access to emergency facilities?		-3 to +3	
Does the project improve freight related safety issues?		-3 to +3	
	Total SAFETY & SECURITY Points		0

Community : **Project Description:**

MOBILITY/CONGESTION (18 Points Total)	Explanation / Additional Comments	Point Range	POINTS
Does the project address an existing or projected congestion problem (*Bottlenecks*)?		**-6 to +6**	
Does the project improve mobility, connectivity or access for multi modes of travel?		**-6 to +6**	
Is the project on an existing freight route AND does it address issues identified by a State or SMMPO documented Freight Plans?		**-3 to +3**	
Does the project improve reliability for Transit/Emergency Vehicles and/or includes B23pre-emptive technologies (ITS)?		**-3 to +3**	
	Total MOBILITY/CONGESTION Points		0
LIVABILITY / SUSTAINABLE DEVELOPMENT EFFECTS (12 Points Total)	**Explanation / Additional Comments**	**Point Range**	**POINTS**
Does the project meet all of the Complete Streets criteria and reduce auto dependency?		**-3 to +3**	
Does the project improve residential effects or Quality of Life?		**-3 to +3**	
Does the project provide or improve multimodal access **to/ from/within** Economic Target Areas, Economic Opportunity Areas, Priority Development Areas, 43D sites, Transit Oriented Developments (TOD's) or **Environmental Justice areas?**		**-3 to +3**	
Does the project have a negative or positive impact on or access to Historical/Cultural Resources?		**-3 to +3**	
	Total LIVABILITY / SUSTAINABLE DEVELOPMENT EFFECTS Points		0
ENVIRONMENTAL & CLIMATE CHANGE (9 Points Total)	**Explanation / Additional Comments**	**Point Range**	**POINTS**
Does the project have a negative or positive impact on Air Quality?		**-3 to +3**	
Does the project have a negative or positive impact on Water Quality?		**-2 to +2**	
Does the project have a negative or positive impact on Habitat/Wildlife?		**-2 to +2**	
Does the project have a negative or positive impact on an identified flooding and/or sea level rise area?		**2 to +2**	
	Total ENVIRONMENTAL & CLIMATE CHANGE Points		0
	Total Project Possible Score 87 Points - Total PROJECT SCORE		0

Appendix E—Boston Region MPO TIP Evaluation Criteria

B APPENDIX

Roadway Project Funding Application Forms & Evaluations

This appendix provides an explanation of the project funding application form for roadway projects that is used to understand requests for funding and to evaluate projects for possible programming. MPO staff and project proponents update these project funding application forms when new information becomes available. The forms are used to evaluate projects using criteria that reflect MPO visions and policies. Some information is provided specifically by the project proponent and other information is provided by MPO staff or by various state agencies.

Project funding application forms are available on the MPO website, http://www.ctps.org/. Proponents enter the project information on-line. Other information is input by MPO staff or automatically updated through links to other databases.

ROADWAY PROJECT FUNDING APPLICATION FORMS

Overview Tab

Project Background Information

1 ID Number

The MassDOT Project Information System (PROJIS) number assigned to the project. If the project does not have a PROJIS number, an identification number will be assigned to the project by the MPO for internal tracking purposes.

2 Municipality(ies)

The municipality (or municipalities) in which the project is located.

3 Project Name

The name of the project. (Source: MassDOT)

4 Project Category

(determined by MPO staff):

- Arterial and Intersection – Arterial roadway and intersection projects
- Major Highway – Limited access roadway projects
- Bridge – Bridge projects
- Bicycle and Pedestrian – Projects dedicated solely to bicycle and pedestrian facilities such as walkways, paths, and trails
- Transit – Transit projects consisting of improvements to trains, buses, and ferries
- Enhancement – Streetscape improvements and enhancements to transportation facilities
- Regional Mobility – Transportation demand management (TDM) and Transportation Systems Management (TSM) programs or projects

5 MassDOT Highway District

The MassDOT Highway District in which the project is located.

6 MAPC Subregion

The MAPC subregion in which the project is located.

7 MAPC Community Type

The MAPC community type in which the project is located as defined by land use and housing patterns, recent growth trends, and projected development patterns.

8 Estimated Cost

The estimated total cost of the project. (Source: MassDOT)

9 Evaluation Rating

The number of points scored by the project, if it has been evaluated.

10 Description

A description of the project, including its primary purpose, major elements and geographic limits. (Source: MassDOT).

11 Project Length (Miles)

Total length of project in miles.

12 Project Lane Miles

Total lane miles of project.

Project Background Information

P1 Community Priority

The priority rank of the project as determined by the community. (Source: Proponent)

Additional Status

13 MPO/CTPS Study

Past UPWP-funded studies or reports conducted within the project area.

14 Air Quality Status

The air quality status of the project in the MPO's travel demand model. Projects with "exempt" status do not add capacity to the transportation system. Projects with "model" status add capacity to the transportation system and are included in the travel demand model.

Readiness Tab

"Readiness" is a determination of the appropriate year of programming for a project. In order to make this determination, the MPO tracks project development milestones and coordinates with the MassDOT Highway Division to estimate when a project will be ready for advertising.

All **non-transit** projects programmed in the first year of the Transportation Improvement Program (TIP) must be advertised before the end of the federal fiscal year (September 30). That funding authorization is not transferred to the next federal fiscal year, therefore any "leftover" funds are effectively "lost" to the region. If a project in the first year of the TIP is determined as "not ready to be advertised before September 30," it

will be removed from the TIP and replaced with another project by amendment.

For projects in the first year of the TIP, it is important to communicate any perceived problems that may affect the schedule to the Boston Region MPO as soon as possible.

Project Background Information

15 Transportation Improvement Program (TIP) Status

Advertised, Programmed, Pre-TIP, or Conceptual (Source: MPO database):

- **Advertised –** projects have been advertised by the implementation agency for bids.
- **Programmed –** projects have been identified for funds in the current TIP.
- **Pre-TIP –** projects have received Project Review Committee (PRC) approval from MassDOT Highway Division and have an "active" PROJIS number, but do not have funds identified in the TIP.
- **Conceptual –** projects are project concepts or ideas that are not yet under design.

16 Functional Design Report (FDR) Status

The year that a functional design report was completed, if one has been conducted for the project.

17 Design Status

Current design status of the project in the MassDOT Highway Division Design Process. Dates are provided where available. (Source: MassDOT Project Info)

- Project Review Committee (PRC) Approved
- 25% Submitted
- 25% Approved
- 75% Submitted
- 75% Approved
- 100% Submitted
- 100% Approved
- PS&E Submitted

18 Right-of-Way (ROW) Requirement

(Source: MassDOT Project Info):

Required – ROW action is required for completion of the project

Not Required – No ROW action required for completion of the project

19 Right-of-Way (ROW) Responsibility

(Source: MassDOT Project Info):

MassDOT Responsibility – Providing the required right-of-way is the responsibility of MassDOT.

Municipal Responsibility – Providing the required right-of-way is the responsibility of the municipality.

Municipal Approval – Municipal approval has been given to the right-of-way plan (with date of approval):

20 Right-of-Way (ROW) Certification

(Source: MassDOT Project Info):

Expected – Expected date of ROW plan and order of taking

Recorded – Date the ROW plan and order of taking were recorded at the Registry of Deeds

Expires – Expiration date of the rights of entry, easements, or order of taking

21 Required Permits

Permits required by the Massachusetts Environmental Policy Act (MEPA). (Source: MassDOT Project Info.)

Possible required permits include:

- Environmental Impact Statement
- Construction Engineering Checklist
- Clean Water Act Section 404 Permit
- Rivers and Harbors Act of 1899 Section 10 Permit
- MEPA Environmental Notification Form
- MEPA Environmental Impact Report
- Massachusetts Historical Commission Approval
- M.G.L. Ch. 131 Wetlands Order of Conditions
- Conservation Commission Order of Conditions

Safety Tab

The evaluation criteria below serve as a way to guide investments that implement the following MPO safety objectives:

- Reduce the number and severity of crashes, all modes
- Reduce serious injuries and fatalities from transportation
- Protect transportation customers and employees from safety and security threats

Project Background Information

22 Top 200 Rank

Ranks of highest crash intersection clusters in the project area listed within MassDOT's top 200 high crash intersection locations. The crash rankings are weighted by crash severity as indicated by Equivalent Property Damage Only (EPDO) values. (Source: MassDOT Highway Division 2011-2013 Top Crash Locations Report)

23 EPDO/Injury Value

An estimated value of property damage. Fatal crashes are weighted by 10, injury crashes are weighted by 5 and property damage only or nonreported is weighted by 1. (Source: MassDOT Highway Division, 2011-2013)

24 Crash Rate/Crashes per Mile

Intersection projects list the crash rate as total crashes per million vehicle entering the intersection. Arterial projects list the crash rate as total crashes per mile. (Source: MassDOT Highway Division, 2011-2013)

25 Bicycle-Involved Crashes (Total EPDO)

Total EPDO value of bicycle-involved crashes in the project area. (Source: MassDOT Highway Division, 2011-2013)

26 Pedestrian-Involved Crashes (Total EPDO)

Total EPDO value of pedestrian-involved crashes in the project area. (Source: MassDOT Highway Division, 2011-2013)

27 Truck-Involved Crashes (Total EPDO)

Total EPDO value of truck-involved crashes in the project area. (Source: MassDOT Highway Division, 2011-2013)

Proponent Provided Information

P2 What is the primary safety need associated with this project and how does it address that need?

Describe the need for the project from a local and a regional perspective. What are the existing safety needs/improvements the project is designed to address? How will this design accomplish those needed improvements? Please be as specific as possible. When applicable, this information should be consistent with project need information provided in the MassDOT Highway Division Project Need Form. (Source: Proponent)

Evaluation

Safety Evaluation Scoring (30 total points possible):

Crash Severity Value: Equivalent Property Damage Only (EPDO) index (up to 5 points)

+5 EPDO value of 300 or more
+4 EPDO value between 200-299
+3 EPDO value between 100-199
+2 EPDO value between 50-99
+1 EPDO value less than 50
+0 No EPDO value

Crash Severity Rate: Equivalent Property Damage Only (EPDO) index per VMT (up to 5 points)

+5 Average annual EPDO per 1,000,000 VMT of 20 or more
+4 Average annual EPDO per 1,000,000 VMT between 15-20
+3 Average annual EPDO per 1,000,000 VMT between 10-15
+2 Average annual EPDO per 1,000,000 VMT between 5-10
+1 Average annual EPDO per 1,000,000 VMT less than 5
+0 No EPDO rate

Improves truck-related safety issue (up to 5 points)

+3 High total effectiveness of truck safety countermeasures
+2 Medium total effectiveness of truck safety countermeasures
+1 Low total effectiveness of truck safety countermeasures
+0 Does not implement truck safety countermeasures

If project scores points above, then it is eligible for additional points below:
+2 Improves truck safety at HSIP Cluster

Improves bicycle safety (up to 5 points)

+3 High total effectiveness of bicycle safety countermeasures
+2 Medium total effectiveness of bicycle safety countermeasures
+1 Low total effectiveness of bicycle safety countermeasures
0 Does not implement bicycle safety countermeasures

If project scores points above, then it is eligible for additional points below:

+2 Improves bicycle safety at HSIP Bicycle Cluster
+1 Improves bicycle safety at HSIP Cluster

Improves pedestrian safety (up to 5 points)

+3 High total effectiveness of pedestrian safety countermeasures
+2 Medium total effectiveness of pedestrian safety countermeasures
+1 Low total effectiveness of pedestrian safety countermeasures
0 Does not implement pedestrian safety countermeasures

If project scores points above, then it is eligible for additional points below:

+2 Improves pedestrian safety at HSIP Pedestrian Cluster
+1 Improves pedestrian safety at HSIP Cluster

Improves safety or removes an at-grade railroad crossing (up to 5 points)

+5 Removes an at-grade railroad crossing
+3 Significantly improves safety at an at-grade railroad crossing
+1 Improves safety at an at-grade railroad crossing
0 Does not include a railroad crossing

System Preservation Tab

The evaluation criteria below serve as a way to guide investments that implement the following MPO system preservation objectives:

- Improve the condition of on- and off-system bridges
- Improve pavement condition on the MassDOT-monitored roadway system
- Maintain and modernize capital assets throughout the system
- Maintain and modernize capital assets throughout the system (surface condition of sidewalks)
- Prioritize projects that support planned response capability to existing or future extreme conditions (sea level rise, flooding, and other natural and security-related man-made hazards)
- Protect freight network elements, such as port facilities, that are vulnerable to climate-change impacts

Project Background Information

28 Existing Pavement Condition

(Source: MassDOT Roadway Inventory File)

Pavement Roughness (IRI) – International Roughness Index (IRI) rating reflects the calibrated value in inches of roughness per mile. IRI ratings are classified as follows:

- Good – Ranges of 0 - 190
- Fair – Ranges of 191- 320
- Poor – Above 320

29 Equipment Condition

Existing signal equipment condition. (Source: CMP, Massachusetts permitted signal information, municipal signal information, submitted design).

*30 Natural Hazard Zones***

- Project lies within a flood zone
- Project lies within a hurricane surge zone
- Project lies within ¼ mile of an emergency support location
- Project lies within an area of liquefiable soils

**Please refer to the All-hazards Planning Application (hyperlink to http://www.ctps.org/map/www/apps/eehmApp/pub_eehm_index.html) for more information on natural hazard zones.

Proponent Provided Information

P3 What are the infrastructure condition needs or issues of the project area?

Please include additional pavement information from municipal pavement management programs. In addition, qualitative descriptions of existing problems or anticipated needs can be provided. When applicable, this information should be consistent with project need information provided in the MassDOT Project Need Form. (Source: Proponent)

P4 How does this project address the infrastructure condition needs or issues in the project area?

Please include detail regarding the pavement management system employed by the community or agency, and of how this system will maximize the useful life of any pavement repaired or replaced by the project. (Source: Proponent)

P5 What is the primary security need associated with this project and how does it address that need?

Describe the need for the project from a local and a regional perspective. What are the existing security needs/improvements the project is designed to address? How will this design accomplish those needed improvements? Please be as specific as possible. When applicable, this information should be consistent with project need information provided in the MassDOT Highway Division Project Need Form. (Source: Proponent)

Evaluation

System Preservation Evaluation Scoring (29 total points possible):

Improves substandard roadway bridge(s) (up to 3 points)

+3 Condition is structurally deficient and improvements are included in the project

+1 Condition is functionally obsolete and improvements are included in the project
+0 Does not improve substandard bridge or does not include a bridge

Improves substandard pavement (up to 6 points)

+6 IRI rating greater than 320: Poor and pavement improvements are included in the project
+4 IRI rating between 320 and 191: Fair and pavement improvements are included in the project
0 IRI rating less than 190: Good or better

Improves substandard signal equipment condition (up to 6 points)

+6 Poor condition, improvements are included in the project
+4 Fair condition, improvements are included in the project
0 Does not meet or address criteria

Improves transit asset(s) (up to 3 points)

+2 Brings transit asset into State of Good Repair
+1 Meets an identified-need in an Asset Management Plan
+0 Does not meet or address criteria

Improves substandard sidewalk(s) (up to 3 points)

+3 Poor condition and sidewalk improvements are included in the project
+2 Fair condition and sidewalk improvements are included in the project
+0 Sidewalk condition is good or better

Improves emergency response (up to 2 points)

+1 Project improves an evacuation route, diversion route, or alternate diversion route
+1 Project improves an access route to or in proximity to an emergency support location

Improves ability to respond to extreme conditions (up to 6 points)

+2 Addresses flooding problem and/or sea level rise and enables facility to function in such a condition
+1 Brings facility up to current seismic design standards
+1 Addresses critical transportation infrastructure
+1 Protects freight network elements
+1 Implements hazard mitigation or climate adaptation plans

Capacity Management/Mobility Tab

The evaluation criteria below serve as a way to guide investments that implement the following MPO capacity management/mobility objectives:

- Improve reliability of transit
- Implement roadway management and operations strategies, constructing improvements to the bicycle and pedestrian network, and supporting community-based transportation
- Create connected network of bicycle and accessible sidewalk facilities (at both regional and neighborhood scale) by expanding existing facilities and closing gaps

- Increase automobile and bicycle parking capacity and usage at transit stations
- Increase the percentage of population and places of employment within one-quarter mile of transit stations and stops
- Increase the percentage of population and employment with access to bicycle facilities
- Improve access to and accessibility of transit and active modes
- Enhance intermodal connections
- Support community-based and private-initiative services and programs to meet last mile, reverse commute and other non-traditional transit/ transportation needs, including those of the elderly and persons with disabilities
- Eliminate bottlenecks on the freight network

Project Background Information

31 *Bicycle and Pedestrian Facilities*

(Source: MassDOT Bicycle Facility Inventory and Roadway Inventory File and MPO bicycle GIS coverage)

Pedestrian Facilities:

- Sidewalks – Indicates if sidewalks are present on one side or on both sides of the roadway.
- Shared Use Path – Facilities with a stabilized firm surface and separated from motor vehicle traffic by an open space or barrier.
- Minimally Improved Path – Facilities with a rough surface and separated from motor vehicle traffic by an open space or barrier.

Bicycle Facilities:

- Cycle Track – Bikeways separated from parallel motor vehicle roadway by a line of parked cars, landscaping, or another form of physical barrier that motor vehicles cannot cross.
- Striped Bicycle Lane – A portion of a roadway (greater than or equal to 4 feet) which has been designated by striping, and pavement markings for preferential or exclusive use by bicyclists.
- Marked Shared Lane – Travel lanes with specific bicycle markings, often referred to as *sharrows*.
- Signed Route – Roadway is designated and signed as a bicycle route.
- Shared Use Path – Facilities with a stabilized firm surface and separated from motor vehicle traffic by an open space or barrier.
- Minimally Improved Path – Facilities with a rough surface and separated from motor vehicle traffic by an open space or barrier.

32 *Transit Vehicles Use of Roadway*

Identifies the fixed route transit vehicles using the roadway

33 *Usage*

- Average Daily Traffic Volumes
- Average Daily Truck Volumes
- Average Weekday Transit Rider Volumes
- AM Peak Hour Pedestrian Volumes
- AM Peak Hour Bicyclist Volumes
- PM Peak Hour Pedestrian Volumes
- PM Peak Hour Bicyclist Volumes

*34 A.M./P.M. Travel Time Index****

Travel Time Index directly compares peak-period travel time conditions with free-flow travel time conditions. Travel time Index indicates how much contingency time should be considered to ensure an on-time arrival during the peak period versus optimum travel times.

Travel time index = average peak-period travel time / free-flow travel time

Information provided is determined by the Boston Region MPO's CMP Arterial Performance Dashboard. If a Project Funding Application Form does not have any CMP data listed, this does not necessarily mean that the roadway or intersection does not experience congestion problems; this simply means that data from the CMP are not available.

*35 A.M./P.M. Speed Index****

Speed index is equal to the average speed divided by the posted speed limit of a Traffic Message Channel (TMC). Speed index indicates congestion more accurately than travel speeds alone because low travel speeds may be a result of low speed limits on certain facilities.

Speed Index = average speed / posted speed limit

Information provided is determined by the Boston Region MPO's CMP Arterial Performance Dashboard. If a Project Funding Application Form does not have any CMP data listed, this does not necessarily mean that the roadway or intersection does not experience congestion problems; this simply means that data from the CMP are not available.

***Please refer to the CMP Arterial Performance Dashboard (hyperlink to http://www.ctps.org/map/www/apps/arterialHighwayPerformanceDashboard/index.html) for data on roadway congestion in the MPO region.

Proponent Provided Information

P6 What is the primary mobility need for this project and how does it address that need?

Describe the need for the project from a local and a regional perspective. What are the existing or anticipated mobility needs the project is designed to address? Please include information on how the project improves level of service and reduces congestion, provides multimodal elements (for example, access to transit stations or parking, access to bicycle or pedestrian connections), enhances freight mobility, and closes gaps in the existing transportation system. For roadway projects, it is MPO and MassDOT policy that auto congestion reductions not occur at the expense of pedestrians, bicyclists, or transit users. Please explain the mobility benefits of the project for all modes. When applicable, this information should be consistent with project need information provided in the MassDOT Project Need Form. (Source: Proponent)

P7 What intelligent transportation systems (ITS) elements does this project include?

Examples of ITS elements include new signal systems or emergency vehicle override applications. (Source: Proponent)

P8 How does the project improve access for pedestrians, bicyclists, and public transportation? How does the project support MassDOT's mode shift goal of tripling the share of walking, biking, and transit travel?

Describe what improvements are in the project for pedestrians, bicyclists, and public transportation, and what level of improvement will be achieved over existing conditions. (Source: Proponent)

Evaluation

Capacity Management/Mobility Evaluation Scoring (29 total points possible):

Reduces transit vehicle delay (up to 4 points)

+3 5 hours or more of daily transit vehicle delay reduced
+2 1-5 hours of daily transit vehicle delay reduced
+1 Less than one hour of daily transit vehicle delay reduced
+0 Does not reduce transit delay

If project scores points above, then it is eligible for additional points below:

+1 Improves one or more key bus route(s)

Improves pedestrian network and ADA accessibility (up to 5 points)

+2 Adds new sidewalk(s) (including shared-use paths)
+2 Improves ADA accessibility
+1 Closes a gap in the pedestrian network
0 Does not improve pedestrian network

Improves bicycle network (up to 4 points)

+3 Adds new physically separated bicycle facility (including shared-use paths)
+2 Adds new buffered bicycle facility
+1 Adds new standard bicycle facility
+1 Closes a gap in the bicycle network
+0 Does not improve bicycle network

Improves intermodal accommodations/ connections to transit (up to 6 points)

+6 Meets or addresses criteria to a high degree
+4 Meets or addresses criteria to a medium degree
+2 Meets or addresses criteria to a low degree
+0 Does not meet or address criteria

Improves truck movement (up to 4 points)

+3 Meets or addresses criteria to a high degree
+2 Meets or addresses criteria to a medium degree
+1 Meets or addresses criteria to a low degree
+0 Does not meet or address criteria

If project scores points above, then it is eligible for additional points below:

+1 Addresses MPO-identified bottleneck location

Project reduces congestion (up to 6 points)

+6 400 hours or more of daily vehicle delay reduced
+4 100-400 hours of daily vehicle delay reduced
+2 Less than 100 hours of daily vehicle delay reduced
0 Does not meet or address criteria

Clean Air/Clean Communities Tab

The evaluation criteria below serve as a way to guide investments that implement the following MPO clean air/clean communities objectives:

- Reduce GHGs generated in the Boston Region by all transportation modes as outlined in the Global Warming Solutions Act
- Reduce other transportation-related pollutants
- Minimize negative environmental impacts of the transportation system, when possible
- Support land use policies consistent with smart and healthy growth

Project Background Information

36 CO_2 Impact

The quantified or assumed annual tons of carbon dioxide estimated to be reduced by the project. (Source: MPO Database)

37 Located in a Green Community

Project is in an Executive Office of Energy and Environmental Affairs (EOEEA) certified Green Community. (Source: EOEEA)

38 Located in an Area of Critical Environmental Concern

Areas designated as Areas of Critical Environmental Concern by the Massachusetts Secretary of Environmental Affairs. (Source: MassGIS)

39 Located adjacent to (within 200 feet of) a waterway

Hydrographic (water related) features, including surface water (lakes, ponds, reservoirs), flats, rivers, streams, and others from MassGIS. Two hundred feet from the hydrographic feature is the distance protected by the Massachusetts Rivers Protection Act. (Source: MassGIS)

Proponent Provided Information

P9 How does the project relate to community character?

Is the project located in an existing community or neighborhood center or other pedestrian-oriented area? Explain the community context (cultural, historical, other) in which the project will occur and indicate the positive or negative effect this project will have on community character. (Source: Proponent)

P10 What are the environmental impacts of the project?

How will this project improve air quality, improve water quality, or reduce noise levels in the project area and in the region? Air quality improvements can come from reductions in the number or length of vehicle trips or from reductions in vehicle cold

starts. Water quality improvements can result from reductions in runoff from impervious surfaces, water supply protection, and habitat protection. Noise barriers can reduce noise impacts. (Source: Proponent)

Evaluation

Clean Air/Clean Communities Evaluation Scoring (16 total points possible):

Reduces CO_2 (up to 5 points)

+5 1,000 or more annual tons of CO_2 reduced
+4 500-999 annual tons of CO_2 reduced
+3 250-499 annual tons of CO_2 reduced
+2 100-249 annual tons of CO_2 reduced
+1 Less than 100 annual tons of CO_2 reduced
0 No impact
-1 Less than 100 annual tons of CO_2 increased
-2 100-249 annual tons of CO_2 increased
-3 250-499 annual tons of CO_2 increased
-4 500-999 annual tons of CO_2 increased
-5 1,000 or more annual tons of CO_2 increased

Reduces other transportation-related emissions (VOC, NOx, CO) (up to 5 points)

+5 2,000 or more total kilograms of VOC, NOx, CO reduced
+4 1,000-1999 total kilograms of VOC, NOx, CO reduced
+3 500-999 total kilograms of VOC, NOx, CO reduced
+2 250-499 total kilograms of VOC, NOx, CO reduced
+1 Less than 250 total kilograms of VOC, NOx, CO reduced
0 No impact
-1 Less than 250 total kilograms of VOC, NOx, CO increased
-2 250-499 total kilograms of VOC, NOx, CO increased
-3 500-999 total kilograms of VOC, NOx, CO increased
-4 1,000-1999 total kilograms of VOC, NOx, CO increased
-5 2,000 or more total kilograms of VOC, NOx, CO increased

Addresses environmental impacts (up to 4 points)

+1 Addresses water quality
+1 Addresses cultural resources/open space
+1 Addresses wetlands/resource areas
+1 Addresses wildlife preservation/protected habitats
0 Does not meet or address criteria

Project is in an Executive Office of Energy and Environmental Affairs (EOEEA)-certified "Green Community" (up to 2 points)

+2 Project is located in a "Green Community"
0 Project is not located in a "Green Community"

Transportation Equity Tab

The evaluation criteria below serve as a way to guide investments that implement the following MPO transportation equity objectives:

- Target investments to areas that benefit a high percentage of low income and minority populations

- Minimize any burdens associated with MPO-funded projects in low income and minority areas
- Break down barriers to participation in MPO-decision making

Proponent Provided Information

P11 Are any other transportation equity issues addressed by this project?

This answer should only be addressed by those projects that serve Title VI/non-discrimination populations. Please be specific. (Source: Proponent)

Evaluation

Transportation Equity Evaluation Scoring (12 total points possible):

Serves Title VI/non-discrimination populations (up to 12 points)

+2 Serves minority (high concentration) population
+1 Serves minority (low concentration) population
+2 Serves low-income (high concentration) population
+1 Serves low-income (low concentration) population
+2 Serves limited-English proficiency (high concentration) population
+1 Serves limited-English proficiency (low concentration) population
+2 Serves elderly (high concentration) population
+1 Serves elderly (low concentration) population
+2 Serves zero vehicle households (high concentration) population
+1 Serves zero vehicle households (low concentration) population
+2 Serves persons with disabilities (high concentration) population
+1 Serves persons with disabilities (low concentration) population

+0 Does not serve Title VI or non-discrimination populations
-10 Creates a burden for Title VI/non -discrimination populations

Economic Vitality Tab

The evaluation criteria below serve as a way to guide investments that implement the following MPO economic vitality objectives:

- Prioritize transportation investments that serve targeted development sites
- Prioritize transportation investments that support development consistent with the compact growth strategies of MetroFuture
- Minimize the burden of housing and transportation costs for residents in the region

Proponent Provided Information

P12 How is the project consistent with local land use policies? How does the project advance local efforts to improve design and access?

Explain how this project will support existing or proposed local land use policies. (Source: Proponent)

P13 How does the zoning of the area within ½ mile of this project support transit-oriented development and preserve any new roadway capacity?

Will the project have an impact on adjacent land uses? Please review the land use information if the project is expected to have an impact on land use. Is there a local project currently under development that would provide a better balance between housing and jobs in this corridor? If so, please provide details on the project status. (Source: Proponent)

P14 How is the project consistent with state, regional, and local economic development priorities?

Explain how this project will support economic development in the community or in the project area (Source: Proponent)

Evaluation

Economic Vitality Evaluation Scoring (18 total points possible):

Serves targeted development site (up to 6 points)

+2 Provides new transit access to or within site
+1 Improves transit access to or within site
+1 Provides for bicycle access to or within site
+1 Provides for pedestrian access to or within site
+1 Provides for improved road access to or within site
+0 Does not provide any of the above measures

Provides for development consistent with the compact growth strategies of MetroFuture (up to 5 points)

+2 Mostly serves an existing area of concentrated development
+1 Partly serves an existing area of concentrated development
+1 Supports local zoning or other regulations that are supportive of smart growth development
+2 Complements other local financial or regulatory support that fosters economic revitalization in a manner consistent with smart growth development principles
0 Does not provide for any of the above measures

Provides multimodal access to an activity center (up to 4 points)

+1 Provides transit access (within a quarter mile) to an activity center
+1 Provides truck access to an activity center
+1 Provides bicycle access to an activity center
+1 Provides pedestrian access to an activity center
0 Does not provide multimodal access

Leverages other investments (non-TIP funding) (up to 3 points)

+3 Meets or addresses criteria to a high degree (>30% of the project cost)
+2 Meets or addresses criteria to a medium degree (10-30% of the project cost)
+1 Meets or addresses criteria to a low degree (<10% of the project cost)
0 Does not meet or address criteria

Other Tab

Cost per Unit

These two measures of cost per unit are derived by dividing project cost by quantified data in the MPO database. These measures can be used to compare similar types of projects.

40 $ per User

Cost divided by ADT (ADT for roadway projects or other user estimate)

41 $ per Lane Mile

Cost divided by proposed total lane miles

Additional Project Background Information

Targeted Development Areas

A targeted development area is located within ½ mile of the project area. Eligible targeted development areas include 43D, 43E, and 40R sites, Regionally Significant Priority Development Areas, Growth District Initiatives, and MBTA transit station areas.

- **43D Priority Development Site**: The Chapter 43D Program offers communities expedited permitting to promote targeted economic and housing development. Sites approved under the program are guaranteed local permitting decisions on priority development sites within 180 days. (Source: Executive Office of Housing and Economic Development)
- **43E Priority Development Site:** The Chapter 43E Program promotes the expedited permitting of commercial, industrial, residential and mixed-use projects on sites with dual designation as a Priority Development Site and Growth District. Sites approved under the program are guaranteed state permitting decisions on priority development sites within 180 days. (Source: Executive Office of Housing and Economic Development)
- **40R Smart Growth Zoning Overlay District:** The program encourages communities to zone for compact residential and mixed-use development in "smart growth" locations by offering financial incentives and control over design. (Source: Department of Housing and Community Development)
- **Regionally Significant Priority Development Area:** A site or district that has been identified by the local municipality as an eligible and desirable site for housing and/or economic development, and which has been identified as a "regionally significant" site by MAPC through a subregional screening process that considers development potential, accessibility, environmental impacts, equity, and other factors.
- **Growth District Initiative**: The EOHED initiative focuses on expediting commercial and residential development at appropriate locations for significant new growth. (Source:

Executive Office of Housing and Economic Development)

- **Eligible MBTA Transit Station Area**: Areas within ½ mile of existing or proposed subway, trolley, commuter rail, or ferry service, with the exception of "Undeveloped" station areas as defined by MAPC (www.mapc.org/TOD); or areas within ¼ mile of an MBTA "Key Bus Route."

Municipality Provides Financial or Regulatory Support for Targeted Development

The proposed project will improve access to or within a commercial district served by a Main Street organization, local business association, Business Improvement District, or comparable, geographically targeted organization (i.e., not a city/town-wide chamber of commerce).

Local Efforts to improve Design and Access:

- Form-based codes
- Official design guidelines for new development/redevelopment
- Official local plan for pedestrian/bike/handicap access, the recommendations of which are reflected in the proposal

Appendix F—Transportation Evaluation Criteria for Agencies Outside of Massachusetts

Baltimore Metropolitan Council

Criteria for prioritizing projects in the TIP

Project sponsors must consider a range of criteria when submitting projects for consideration in the TIP. Sponsors ascertain the ability of projects to meet the following criteria which supports long-range plan goals. Additionally, capacity projects must come from the region's approved long-range transportation plan.

1. Preserves the regional transportation system.
2. Implements emission reduction measures.
3. Reduces congestion and prevents congestion where it does not yet occur.
4. Is consistent with all applicable short-range and long-term comprehensive land use plans.
5. Implements MAP-21 Transportation Alternatives activities, including historic resource preservation where related to transportation facilities.
6. Provides or enhances accessibility and/or intermodal connectivity among major destinations important to the regional economy.
7. Provides for connectivity of transportation facilities within the metropolitan area with transportation facilities outside the metropolitan area.
8. Enhances social, energy and environmental efforts.
9. Facilitates the use of transit and/or alternatives to the single occupant vehicle.
10. Implements transportation system management strategies so as to meet transportation needs by using existing facilities more efficiently.
11. Improves pedestrian safety and access for transportation.
12. Improves bicycle safety and access for transportation.
13. Permits timely advancement and continuity of transportation projects.
14. Enhances transportation safety.

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Appendix F: Project Evaluation and Scoring

Evaluation and Scoring Process

As indicated in Chapter 4, the local jurisdictions, in consultation with the Maryland Transit Administration and the Maryland State Highway Administration, submitted projects for consideration for *Maximize2040*.

Technical Score

BMC staff members scored each project for technical merit, based on consistency with regional goals and strategies.

See the table on the following page for explanations of criteria and methodologies. Unless otherwise indicated, a candidate project receives 5, 3, or 1 points, depending on the degree to which it addresses a problem or provides benefits. High = 5 points; medium = 3 points, low = 1 point. A "not applicable" condition scores 0 points.

The maximum technical score for transit and highway projects is 50 points.

Policy Score

Each submitting jurisdiction and agency provided a policy score, depending on priority and demonstrated support.

- High Priority (up to 5 projects can have this rating) – 30 points
- Medium Priority (up to 4 projects can have this rating) – 20 points
- Low Priority (an unlimited number of projects can have this rating) – 10 points
- Demonstrated MDOT Financial Support – 10 points added to priority score

Maximum Score

The maximum total score (technical score + policy score) is 90 points.

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Technical Criteria and Scoring Methodologies		
Modes	**Criteria**	**Methodologies**
Goal: Safety		
Highway	Crash severity (injuries and fatalities) – 5, 3, or 1 points	Total number of injuries and fatalities for most recent 3 years, multiplied by 2 and added to total number of injuries; divide this total by annual VMT in millions for this segment to determine accident severity per 1,000,000 VMT
Goal: Accessibility		
Highway	Complete Streets features – 5, 3, or 0 points	Degree to which project delivers safety / accessibility benefits for all modes (ADA improvements, improved bike facilities, etc.) – total population first, then EJ population – per mile benefits Significant features = 5 points Moderate features = 3 points Not applicable = 0 points
Highway	Access to Job/Activity Centers – 5, 3, or 1 points	Degree to which project improves infrastructure enabling access to and supporting major Job/Activity Centers – 1/2 mile buffer analysis – per mile benefits
Transit	Transit station/stops – 10, 6, or 2 points	Degree to which project supports access to specific destinations – EJ population – 1/4 mile buffer analysis Improve existing station/stops = 10 points New station/stops = 6 points Operations improvement plan = 2 points
Transit	Access to Job/Activity Centers – 10, 6, or 2 points	Degree to which project improves infrastructure enabling access to and supporting major Job/Activity Centers – 1/4 mile buffer analysis – per mile benefits
Goal: Mobility		
Highway	2020 Level of Service (LOS) – 7, 4, or 1 points	2020 LOS (with Existing + Committed) – LOS E-F = 7 points LOS D = 4 points LOS C-A = 1 point
Highway	2040 LOS – 3, 2, or 1 points	2040 LOS (with Existing + Committed) – LOS E-F = 3 points LOS D = 2 points LOS C-A = 1 point
Transit	Transit options – 5, 3, or 1 points	Extent to which project provides options (from TAZ) – Transit project focused on mobility (MARC, BRT, commuter bus) = 5 points Metro or light rail project = 3 points Local bus project = 1 point
Transit	Ridership – 5, 3, or 1 points	Average daily number of riders in Year 2040 per mile of project (using data generated from BMC's travel demand model based on all-project network)

Appendix F: Project Evaluation and Scoring

Technical Criteria and Scoring Methodologies		
Modes	**Criteria**	**Methodologies**
Goal: Environmental Conservation		
Highway and Transit	Effects on ecologically significant lands / historical properties – 5, 3, or 0 points	Geographic proximity to ecologically significant lands (using Maryland green infrastructure mapping data) / geographic proximity to culturally significant properties and resources (using National Register of Historic Places, Maryland Inventory of Historic Properties) Little to no effects = 5 points Moderate effects = 3 points Significant effects = 0 points
Highway and Transit	Emissions and greenhouse gas (GHG) Reductions – 5, 3, or 1 points	Degree to which project includes components that reduce GHG emissions (e.g., Transportation Demand Management or Transportation System Management components, carbon sequestration, electric vehicle infrastructure)
Goal: Security		
Highway	Evacuation route or parallels – 5, 3, or 0 points	Degree to which project falls on an existing evacuation route (as defined in *Evacuation Traffic Management Support* document) or improves a critical link to an existing evacuation route – Falls on evacuation route = 5 points Improves critical link = 3 points No evacuation function = 0 points
Goal: Economic Prosperity		
Highway and Transit	Connection to Priority Funding Area (PFA) – 5, 3, or 0 points	Points assigned depending on project location relative to PFA – Within PFA = 5 points Connecting to PFA = 3 points Outside PFA = 0 points
Highway and Transit	Connection to Sustainable Community – 5, 3, or 0 points	Points assigned depending on project location relative to Sustainable Community – Within Sustainable Community = 5 points Connecting to Sustainable Community = 3 points Outside Sustainable Community = 0 points

CHITTENDEN COUNTY RPC
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TEMPLATE

Item	Climate Action and Analysis	Strategy Type	Potential GHG reduction (M)	Potential risk protection (A)	Feasibility	Cost effectiveness	Applicable scale	Climate Score (Max = 21)	Other benefits	Adverse effects	Adjusted Score (Max=24)
		Mitigation or Adaptation	Low=**4** MedLo=**6** MedHi=**8** High=**12**	Low=**4** MedLo=**6** MedHi=**8** High=**12**	None=**0** Low=**1** Med=**2** High=**3**	None=**0** Low=**1** Med=**2** High=**3**	None=**0** Low=**1** Med=**2** High=**3**		None=**0** One=**1** Two=**2** >Two=**3**	None=**0** One=**-1** Two=**-2** >Two=**-3**	
AA-#	**Strategy/Action Title**										
Description & Analysis	***Strategy/Action*** *: Brief description of strategy or action* **Implementation level:** Regional, Municipal, Employer, etc. **Comments:** Additional background/discussion on why the strategy/action is presented. May include some examples of what strategy/action might include, but not intended to be a detailed discussion of how strategy/action would be implemented. **Related Policies/Programs in Place:** Identification of what is already being done. **Implementation speed:** Educated guess at how fast strategy can be done. **Other benefits**: Climate Mitigation/Adaptation + ECOS goals + financial benefits **Results timeframe:** Educated guess at how fast strategy benefits occur. **Adverse effects**: Climate Mitigation/Adaptation + ECOS goals adversely affected **Net Cost/MtCO2e reduced:** Reported values from literature **Source**: Where strategy/action was identified; see References										

Evaluation Criteria:

Strategy Type: Mitigation or Adaptation (not a scored criteria)

Potential GHG reduction: A measure of mitigation effectiveness. High = Directly reduces GHGs from transportation or thermal energy use OR Directly increases carbon sequestration. MedHi = Directly reduces GHGs from non-transportation or non-thermal sources. MedLo = Indirectly reduces GHGs from transportation or thermal use OR indirectly increases carbon sequestration. Low = Indirectly reduces GHGs from non-transportation or non-thermal sources. (Rationale: Actions that directly reduce GHGs are more effective than activities that indirectly reduce GHGs. Transportation and thermal sources are ~80% of county GHG emissions and must be reduced to reduce overall county GHGs)

Potential risk protection: A measure of adaptation effectiveness. High = Directly protects > 50% of impacted people, properties, or public assets. MedHi = Directly protects >33% of impacted people, properties or public assets. MedLo = Indirectly protects > 50% of impacted people, properties or public assets. Low = Directly protects < 33% of impacted people, properties or public assets OR Indirectly protects <50%.

Feasibility: A measure of whether strategy/action can be implemented in near term. High = Technology/methodology, program and implementing organization all currently exist. Med = Technology/methodology currently exists, either program or implementing organization currently exist. Low = Technology/methodology currently exists, neither program nor implementing organization currently exists. None = Technology/methodology doesn't currently exist.

Cost effectiveness: Professional judgment of benefits to costs at scale implemented. High = High benefits/costs OR positive financial benefits. Med = Moderate benefits/costs. Low = Low benefits/costs.

Applicable scale: A measure of scale at which strategy/action can be effectively implemented. High = Applied regionally to benefit >50% of county population or towns. Med = Applied regionally to benefit >33 % of population or towns OR Applied locally with high transferability (model suitable for other locations). Low = Applied locally.

Other benefits: # of other goals + cost savings benefited by strategy/action. (Importance of other goals is not weighted.) Other goals are based on ECOS Project goal topics: Land use, Housing, Transportation, Energy, Infrastructure, Economy, Household financial security, Ecological systems, Scenic and recreational resources, Working lands, Education and Knowledge, Health, Public Safety and Hazard Mitigation, Civic engagement and Governance, and Social connectedness. Climate mitigation may be a benefit for predominantly adaptation strategies; climate adaptation may be a benefit for predominantly mitigation strategies. Other benefits may exist that are not addressed by this list.

Adverse effects: # of other goals adversely affected by strategy/action. (Importance of other goals is not weighted.) Other goals are based on ECOS Project goal topics: Land use, Housing, Transportation, Energy, Infrastructure, Economy, Household financial security, Ecological systems, Scenic and recreational resources, Working lands, Education and Knowledge, Health, Public Safety and Hazard Mitigation, Civic engagement and Governance, and Social connectedness. Climate mitigation may be adversely affected by predominantly adaptation strategies; climate adaptation may be adversely affected by predominantly mitigation strategies. Other adverse effects may exist that are not addressed by this list.

PROJECT NAME:

MERIT CATEGORIES	NUMERIC VALUES					SCORE
REGIONAL BENEFIT (5 POINTS POSSIBLE)						
Benefit beyond project to transportation system or quality region	SCORE	-2	to	+5		
	SUBTOTAL	**-2**	**to**	**+5**		**0**
COMMUNITY QUALITY OF LIFE & EQUITY (10 POINTS POSSIBLE)						
Land Use Compatability	SCORE	-1	to	+3		0
Smart Growth	SCORE	-1	to	+3		0
Environmental Justice	SCORE	-1	to	+2		0
Accessibility / ADA / Universal Design/Human Services Transport	SCORE	-1	to	+2		0
	SUBTOTAL	**-4**	**to**	**+10**		**0**
APPROPRIATE INFRASTRUCTURE (10 POINTS POSSIBLE)						
Preservation/Renewal of Existing	SCORE	-2	to	+5		0
Complete Streets	SCORE	-2	to	+5		0
	SUBTOTAL	**-4**	**to**	**+10**		**0**
MULTI-MODALISM (10 POINTS POSSIBLE)						
Transit	SCORE	-2	to	+5		0
Pedestrian	SCORE	-1	to	+3		0
Bicycle	SCORE	-1	to	+2		0
	SUBTOTAL	**-4**	**to**	**+10**		**0**
ENVIRONMENT & HEALTH (8 POINTS POSSIBLE)						
Sensitive Area Preservation/Mitigation	SCORE	-1	to	+2		0
Greenhouse Gas Emissions Reduction	SCORE	-1	to	+2		0
Alternative Fuels Support	SCORE	-1	to	+2		0
Other Health Benefit	SCORE	-1	to	+2		0
	SUBTOTAL	**-4**	**to**	**+8**		**0**
ECONOMIC DEVELOPMENT (5 POINTS POSSIBLE)						
Economic Impact	SCORE	-2	to	+5		0
	SUBTOTAL	**-2**	**to**	**+5**		**0**
SAFETY & SECURITY (5 POINTS POSSIBLE)						
Additional Safety Benefit Beyond Crash History	SCORE	-1	to	+3		0
Security and Resiliency to Natural Hazards and Human Caused Events	SCORE	-1	to	+2		0
	SUBTOTAL	**-2**	**to**	**+5**		**0**
OPERATIONS & TECHNOLOGY (5 POINTS POSSIBLE)						
Traffic Operations & Reliability Improvements	SCORE	-1	to	+3		0
Use of Beneficent Advanced Technologies	SCORE	-1	to	+2		0
	SUBTOTAL	**-2**	**to**	**+5**		**0**
FREIGHT (5 POINTS POSSIBLE)						
Freight and Goods Movement	SCORE	-2	to	+5		0
	SUBTOTAL	**-2**	**to**	**+5**		**0**
INNOVATION (2 POINTS POSSIBLE)						
Innovative Solutions	SCORE	0	to	+2		0
	SUBTOTAL	**0**	**to**	**+2**		**0**
PROJECT DELIVERY (2 POINTS POSSIBLE)						
On Schedule/On Budget	SCORE	-2	to	+2		0
	SUBTOTAL	**-2**	**to**	**+2**		**0**
PROJECT MERIT CATEGORY SUB TOTAL						
Total from Line Items Above	**SUBTOTAL**	**-28**	**to**	**+67**		**0**
Scaled to 50 points						**0.0**

MERIT POINTS TOTAL

B/C RATIO						
B/C Ratio Value (imported from separate analysis)	**SUBTOTAL**	**0**	**to**	**+50**		

B/C SCORE CONVERTED TO POINT SCALE

PROJECT TOTAL (UP TO 100 POINTS)						
Merit Categories + B/C Value	**TOTAL**	**-21**	**to**	**100**		**0.0**

TOTAL PROJECT SCORE

PROJECT NAME:

MERIT CATEGORIES	SCORE
REGIONAL BENEFIT (5 POINTS POSSIBLE)	
Benefit beyond project to transportation system or quality region (5 points)	
Project implements a substantial portion of one or more of the following CDTC "Big Initiatives": • Regional Greenway Program • Riverfront Access and Urban Development Program • Street Reconstruction and Reconfiguration • Suburban Town Center Development • Guideway Transit System with Transit-Oriented Development • Integrated Corridor Management Program • Demand Management Program	5
Up to 4 points cumulatively (award 1 point for each of the below): • Project implements a small portion of one or more of CDTC's "Big Initiatives." • Project contributes to a region-wide (inclusive of 3 or more municipalities) initiative, or initiative of broad geographic scope and impact, aimed at one or more of the following: revitalize urban areas, improve community structure in growing suburbs, preserve open space and agricultural land, make communities more livable, increase communities' transportation options, manage congestion and mobility at a regional or intermunicipal level, improve region-wide or multiple municipalities' safety. • Project is partially funded by innovative funding sources/mechanisms or intermunicipal partnerships, such as: impact or mitigation fees, user fees, dedicated transportation fees, public/private partnerships, intermunicipal financial partnering, etc. • Project requires, or is an outcome from, a Travel Demand Management (TDM) Plan, a plan which goes beyond a traffic engineering study and includes other travel demand management strategies, such as: carpooling, vanpooling, walking, biking, carshare, bikeshare, transit, commuter buses, park & ride lots, alternative parking strategies which encourage reduced auto use.	1 to 4
Project has neutral effect (no known impact, positive or negative) on the region as a whole. Projects positive or negative effects are contained to the immediate project surroundings or project locale.	0
Project supports an impediment or barrier to a CDTC "Big Initiative" OR has a negative impact of regional scale (a negative impact is any impact described below in any category which results in a negative score).	-1
Project supports an impediment or barrier to a CDTC "Big Initiative" AND has a negative impact of regional scale (a negative impact is any impact described below in any category which results in a negative score).	-2
REGIONAL BENEFIT SUBTOTAL SCORE	
COMMUNITY QUALITY OF LIFE & EQUITY (10 POINTS POSSIBLE)	
Land Use Compatibility (3 points)	
2 points for the following: • Project implements a recommendation from a Linkage Study, town center plan, or similar plan and aligns transportation system with existing or desired land uses.	0 to 2
1 point for one or both of the following • Project implements access management features (e.g. shared driveways, raised medians, service roads, dedicated turning lanes, driveway reduction, and cross-easement access) which remove transportation/land use conflicts. • Project includes, utilizes, introduces, or implements local mitigation fees, such as by means of a Municipal GEIS, or other significant developer or business contributions for any potential degradation from increased facility utilization or from conflicts between transportation and development.	0 or 1
Project has neutral effect (no known impact, positive or negative) on land use compatibility. Project maintains existing or implements changes with neutral impacts with regard to land use.	0
Project introduces a new, significant conflict between transportation system and land use.	-1
LAND USE COMPATIBILITY SCORE	
Smart Growth (3 points)	
Project supports 5 or more of the following New York State Smart Growth criteria; • To advance projects for the use, maintenance or improvement of existing infrastructure • To advance projects in municipal centers • To advance projects in developed areas or areas designated for concentrated infill development in a municipally approved comprehensive land use plan, local waterfront revitalization plan and/or brownfield opportunity area plan • To protect, preserve and enhance the state's resources, including agricultural land, forests surface and ground water, air quality, recreation and open space, scenic areas and significant historic and archeological resources • To foster mixed land uses and compact development, downtown revitalization brownfield redevelopment, the enhancement of beauty in public spaces, the diversity and affordability of housing in proximity to places of employment, recreation and commercial development and the integration of all income groups • To provide mobility through transportation choices including improved public transportation and reduced automobile dependency • To coordinate between state and local government and municipal and regional planning • To participate in community based planning and collaboration • To ensure predictability in building and land use codes • To promote sustainability by strengthening existing and creating new communities which reduce greenhouse gas emissions and do not compromise the needs of future generations, by among other means encouraging broad based public involvement in developing and implementing a community plan and ensuring the governance structure is adequate to sustain and implement.	3
Project serves existing development and/or encourages one or more of the following: rehabilitation or densification of existing development; development of infill; growth in an existing corridor within or contiguous to existing development; brownfield or greyfield redevelopment.	2
Project serves new development which encourages one or more of the following development characteristics: mixed use development; compact development; range of housing types; jobs-housing balance; support for compact growth; or growth within or adjacent to an activity center.	1
Project has neutral effect (no known impact, positive or negative) on smart growth or only replaces appropriately scaled infrastructure.	0
Project contradicts smart growth by: encouraging creation of new sprawl; inducing new greenfield development not contiguous to existing development; supporting creation or expansion of new low-density single-use development; providing capacity expansion to induce remote development or unknown future development. NOTE: Transportation investment serving existing low-density suburban or rural development is to be supported and not penalized with a negative score.	-1
SMART GROWTH SCORE	
Environmental Justice (2 points)	
Project is within or directly connected to an EJ area and has a primary purpose or significant focus on transit, bicycling, walking, or carpool. Significant focus means that the improvements are provided over a portion of the project which is significant relative to the overall project.	2
Project is within or directly connected to an EJ area and maintains existing infrastructure, with a primary purpose or significant focus on automobiles. Included are most highway resurfacing, traffic operations improvement, bridge deck repair, and preservation and rehabilitation type projects.	1
Project excludes EJ areas and maintains existing infrastructure, with a primary purpose or significant focus on automobiles. Included are most highway resurfacing, traffic operations improvement, bridge deck repair, and preservation and rehabilitation type projects.	0
Project is either A) within or directly connected to an EJ area and is new construction, vehicle capacity improvements, or reconstruction projects which add auto capacity or B) excludes EJ areas and has a primary purpose or significant focus on transit, bicycling, walking, or carpool.	-1
ENVIRONMENTAL JUSTICE SCORE	
Accessibility / ADA / Universal Design/Human Services Transport (2 points)	
Project's primary purpose is to upgrade accessible features, introduce new accessible features, or remove barriers to universal access and is in an area identified as a high priority for access improvement/compliance in an ADA Transition Plan. Alternatively, project's primary purpose is improved operation or coordination of human services transport.	2
Project includes the addition or upgrade of accessibility features such as upgrading or adding ADA curb ramps, audio-visual signals, etc.	1
Project has neutral effect (no known impact, positive or negative) on accessibility/ADA/universal design/human services transport.	0
Project removes an accessible element without replacing or upgrading, adds features(s) which impede universal access, or otherwise compromises accessibility. Alternatively, project impedes operation or coordination of human services transport.	-1
ACCESSIBILITY/ADA/UNIVERSAL DESIGN/HUMAN SERVICES SCORE	
COMMUNITY QUALITY OF LIFE & EQUITY SUBTOTAL SCORE	**0**
APPROPRIATE INFRASTRUCTURE (10 POINTS POSSIBLE)	
Preservation/Renewal of Existing (5 points)	
Project reconstructs, renews, or preserves infrastructure (highway and bridge) with regional significance (inclusive of 3 or more municipalities) to the transportation system, such as a port, airport, transit system, or interstate system.	5

Project preserves or renews critical infrastructure or critical linkages (defined as facilities with greater importance to the transportation system, such as: bridges lacking a reasonable redundant parallel route, major arterial providing community access or connectivity, etc.); and includes preservation, renewal, or upgrade to adjacent or associated facilities, such as: sidewalks, pedestrian crossings, ADA compliant features, safety components, bike lanes, etc.	4
Project preserves or renews critical infrastructure or critical linkages; or reduces future maintenance burden such as by reducing travel lanes of a roadway or removing a significantly underutilized facility from regional inventory.	3
Project has a primary or substantial portion of scope devoted to preservation of pavement, bridges, sidewalks, or other elements; and includes preservation, renewal, or upgrade to adjacent or associated facilities, such as: sidewalks, pedestrian crossings, ADA compliant features, safety components, bike lanes, etc.	2
Project has a primary or substantial portion of scope devoted to preservation of pavement, bridges, sidewalks, or other elements.	1
Project has neutral effect (no known impact, positive or negative) on preservation/renewal of existing infrastructure.	0
Project purpose is to add new auto capacity to an existing facility rather than improving existing system conditions or operational efficiency.	-1
Project purpose is to create an entirely new substantial roadway or other major auto capacity initiative which is not justified by a regional economic development project or a demonstrated serious congestion problem (e.g., an output from traffic model showing deterioration to unacceptable level of service).	-2
PRESERVATION/RENEWAL OF EXISTING SCORE	
Complete Streets (5 points)	
Project is transformative in nature, replacing infrastructure which primarily serves high or moderate speed through traffic with a facility that fully or substantially implements complete street design, i.e. includes 8 or more of the following 11 features:	5
• multimodalism • transit infrastructure improvement • sidewalk/bike trail connections or improvements • appropriate road dieting • speed reduction • lane reduction • lane width reduction • shoulder improvements • improved freight access • green infrastructure substantially managing stormwater on local sites • access management, as described above in the Land Use Compatibility category	
Project includes introduction of new or rehabilitation/upgrade of substantial complete streets features (those 11 features listed above). For the addition of 6 or 7 features, assign 4 points; for the addition of 4 or 5 features, assign 3 points; and for the addition of 2 or 3 features, assign 2 points.	2 to 4
Project is a preservation/maintenance project but scope is inclusive of rehabilitation/upgrade to minor complete streets features such as sidewalks, pavement markings, plantings, etc. Alternatively, if road is rural in character with minimal demand for complete streets, shared use, or purposes other than through traffic, scope addresses one place-appropriate complete streets oriented rehab/upgrade such as to green infrastructure, plantings, adjacent/nearby trail, adequate shoulder width for occasional bicycle travel, etc.	1
Project has neutral effect (no known impact, positive or negative) on complete streets.	0
Project removes, without replacement/upgrade, complete streets features (those 11 features listed above). For the removal of 1 or 2 features, assign -1 point; and for the removal of 3 or more features, assign -2 points.	-1 to -2
COMPLETE STREETS SCORE	
APPROPRIATE INFRASTRUCTURE SUBTOTAL SCORE	**0**
MULTI-MODALISM (10 POINTS POSSIBLE)	
Transit (5 points)	
Project substantially furthers a major CDTA regional transit initiative or a transit-related CDTC "Big Ticket" initiative. Project implements a new transit priority network or substantially expands transit or transit access.	5
Project is on or physically connects to a transit priority network and adds 3 or more transit components. Alternatively, project's primary purpose is transit improvement and over 50% of cost is directed to transit components. Transit components include: • Bus-only travel lane • Transit shelters, including concrete pad and access to board transit • Concrete transit pull-offs (bus bays) adjacent to the roadway • Curb extension at bus stops • Sidewalks • Transit signal priority Queue jumps • Park and Ride lots of at least 25 spaces • Innovative pedestrian crossings • Accessibility above ADA guidelines • Pedestrian signage throughout project area • Land set aside for future transit components • Multi-use paths	4
Project is on or physically connects to a transit priority network, and includes at least one new transit component or upgrade (renew or repair) to existing transit components. If transit components are removed, there must be a net gain, with other transit component(s) added and/or upgraded.	3
Project is not on and does not physically connect to a transit priority network but does have a transit route present and the project adds transit component(s).	2
Project is not on and does not physically connect to a transit priority network, nor is a transit route present, and the project adds transit component(s).	1
Project has neutral effect (no known impact, positive or negative) on transit, and does not add, upgrade, or remove transit components.	0
Project is not on or does not physically connect to a transit priority network and removes transit component(s) without replacement/upgrade.	-1
Project is on or physically connects to a transit priority network and removes transit component(s) without replacement/upgrade. Alternatively, project is determined to have a serious negative impact on transit.	-2
TRANSIT SCORE	
Pedestrian (3 points)	
Project improves accessibility, safety, or connectivity of pedestrian infrastructure ~AND~ is within, or making a connection to, a Tier 1 Pedestrian District.	+3
Project improves accessibility, safety, or connectivity of pedestrian infrastructure ~AND~ is within, or making a connection to, a Tier 2 Pedestrian District	+2
Project improves accessibility, safety, or connectivity of pedestrian infrastructure while not being located within a defined pedestrian district.	+1
Project has neutral effect (no known impact, positive or negative) on pedestrian infrastructure.	0
Project removes pedestrian infrastructure (e.g., . sidewalk, crosswalk, ped signals, signage, etc.) without replacing or enhancing it.	-1
PEDESTRIAN SCORE	
Bicycle (2 points)	
Project is on, or making a connection to, the linear Bike Network and the project's primary purpose or significant focus is on bicycle infrastructure/accommodations.	2
Project is not on or directly connected to the linear Bike Network but it improves accessibility, safety, or connectivity of bicycle infrastructure in a non-incidental way (e.g., project installs bike lane, widen shoulders specifically for bike usage, or implements comprehensive bicycle signage program). Projects such as highway repaving which may incidentally improve bicycle travel (e.g. by improving pavement condition) are excluded from receiving point value and are considered neutral.	1
Project has neutral effect (no known impact, positive or negative) on bicycle infrastructure/accommodations.	0
Project removes bicycle infrastructure/accommodations (e.g., bike lane, multi-use path, signage, pavement markings, etc.) without replacing or enhancing it.	-1
BICYCLE SCORE	
MULTI-MODALISM SUBTOTAL SCORE	**0**
ENVIRONMENT & HEALTH (8 POINTS POSSIBLE)	
Sensitive Areas Protection/Mitigation (2 points)	
Project includes a significant sustainable feature AND is not within 1/4 mile of an environmentally sensitive feature. (See lists below.)	2
Significant sustainable features include: • retention/detention ponds • new or improved wetlands • green infrastructure (bioswales, porous pavement, etc.) • native plant species planting • invasive plant species removal • historic building restoration • stream restoration • wildlife crossing construction • other environmental mitigation strategies or significant sustainable features	

Environmentally sensitive features include: • sole source aquifers • aquifers • reservoirs • water features (streams, lakes, rivers) • wetlands • watersheds • 100 year flood plains • rare animal populations • rare plant populations • significant ecological sites • significant ecological communities • state historic sites • national historic sites • national historic register districts • federal parks and lands • state parks and forests • state unique areas • state wildlife management areas • county forests and preserves • municipal parks and lands • land trust sites • NYS DEC lands • Adirondack Park • agricultural districts • agriculture parcels taxed as farmland • agriculture parcels in farm use • Class I & II soils	
Project includes a significant sustainable feature which proposes to fully mitigate any impact/risk AND is within 1/4 mile of an environmentally sensitive feature. (See lists above.)	1
Project has neutral effect (no known impact, positive or negative) on environmentally sensitive areas OR includes identified minor environmental impact or risk of impact but proposes to fully mitigate any and all impact/risk.	0
Project is within 1/4 mile of an environmentally sensitive feature, is believed to have a potential impact on the feature, and the scope does not propose to fully mitigate the impact/risk. Alternatively, project is deemed to include a serious environmental risk or significant negative impact.	-1
SENSITIVE AREA PROTECTION/MITIGATION SCORE	
Greenhouse Gas Emissions Reduction (2 points)	
Project reduces transportation greenhouse gas emissions through a travel demand reduction program or a mode shift to transit or non-motorized vehicles. 2 points for project with a primary purpose (and over 50% of budget) devoted specifically to GHG Emissions Reduction 1 point for project which includes features likely to reduce GHG emissions, including travel demand management, compact mixed-use development, etc.	1 or 2
Project has neutral effect (no known impact, positive or negative) on GHG emissions reduction.	0
Project is judged likely to increase transportation-related GHG emissions.	-1
GREENHOUSE GAS EMISSIONS REDUCTION SCORE	
Alternative Fuels Support (2 points)	
Project includes infrastructure/programs which encourage electric, biofuel, natural gas, or other alternative fuel usage, or encourage high efficiency vehicles, at the following levels of magnitude: • 2 point for displacement of over 1000 gas gallon equivalents (GGE's) • 1 points for displacement of 1 to 1000 gas gallon equivalents (GGE's)	1 or 2
Project has neutral effect (no known impact, positive or negative) on alternative fuels.	0
Project removes without upgrading infrastructure/programs which encourage alternative fuel usage.	-1
ALTERNATIVE FUELS SUPPORT SCORE	
Other Environmental / Health Benefit (2 points)	
Project includes other features beneficial to the environment or to public health not captured in another category. Other environmental features include warm mix asphalt, recycled pavements, use of recycled plastics and other recycled materials, and other energy-saving strategies. Other health features include improvements which increase access to medical care, healthy foods, parks, and recreation; and which increase access to jobs and affordability which reduces financial stress. For the addition of 4 or more features, assign 2 points; and for the addition of 3 or less features, assign 1 point.	1 or 2
Project has neutral effect (no known impact, positive or negative) on any additional environmental/health issues.	0
Project reduces existing use of the above environmental and health features or includes other features harmful to the environment or to public health.	-1
OTHER HEALTH BENEFIT SCORE	
ENVIRONMENT & HEALTH SUBTOTAL SCORE	**0**
ECONOMIC DEVELOPMENT (5 POINTS POSSIBLE)	
Economic Impact (5 points)	
2 points for the following: Project supports development that is consistent with the Capital Region Economic Development Council's 8 regional strategies listed below. See the CREDC website for descriptions of each strategy. For the consistency with 5-8 strategies, assign 2 points; and for the consistency with 1-4 strategies, assign 1 point. • Leverage & Collaborate • Open New Doors • Prepare For Tomorrow • Build A SuperHighway • Bring Cities To Life • Sustain & Optimize Our Surroundings • Showcase Our Beauty • Spotlight Our Strengths	0, 1, or 2
1 point each (up to 2 points available in total): • Project creates (or retains) permanent jobs, for example by improving access to areas of high job concentration or otherwise improves labor market access. • Project provides multimodal access to an urban center, activity center, or area of high residential density. • Project improves access to a major recreation or community facility	0, 1, or 2
1 point for the following: Project supports access to education-related economic drivers: job-related training locations, educational opportunities (including vocational schools, proprietary higher-educational institutions, community colleges, colleges, and universities), educationally affiliated research facilities, or educationally affiliated business incubators OR has positive impact on a specific industry cluster, innovative business, or industry target, e.g. project enhances region's technology sector.	0 or 1
Project has neutral effect (no known impact, positive or negative) on economic development.	0
-1 point each (up to -2 points available in total): • Project reduces access to job training locations; education; jobs; or manufacturing, technology, or intermodal centers. • Project creates negative impacts to local businesses including economic competitiveness; ability to manufacture, import, or export; increased transportation costs; significantly increased traffic congestion; significantly decreased traffic, etc.	-1 to -2
ECONOMIC DEVELOPMENT SUBTOTAL SCORE	
SAFETY & SECURITY (5 POINTS POSSIBLE)	
Additional Safety Benefit Beyond Crash History (3 points)	
Project includes new features intended to reduce the risk of fatal or serious injury crashes at locations with limited crash history (a proactive approach), or is part of a larger corridor or area-wide safety effort which includes education and enforcement activities. For the addition of 6 or more features, assign 3 points; for the addition of 3-5 features, assign 2 points; for the addition of 2 or less features, assign 1 point.	

Features include: • Traffic Signal Back plates with Retro Reflective Borders • Enhanced Delineation and Friction for Horizontal Curves • Safety Edge • Medians and Pedestrian Crossing Islands • Pedestrian Hybrid Beacon • Road Diet • Centerline Audible Roadway Delineators (CARDS) • Pedestrian Countdown Timers • High Visibility Crosswalks • Sidewalks • Signal Re-timing • Additional Warning and Regulatory Signs (for drivers, pedestrians, etc.) • Leading Pedestrian Intervals • Accessible Pedestrian Signals • No Turn on Red Signs (standard or electric) • Intersection Lighting • Education campaign • Enforcement campaign	1 to 3
Project has neutral effect (no known impact, positive or negative) on safety beyond crash history.	0
Project introduces features which have negative safety implications.	-1
ADDITIONAL SAFETY BENEFIT SCORE	
Security and Resiliency to Natural Hazards and Human Caused Events (2 points)	
Project implements an initiative identified in a county, state, or other hazard/security/emergency plan, such as: improving a vulnerable evacuation route; providing enhanced access to critical needs or facilities such as hospitals, medical care, emergency care, or emergency services; enabling emergency response; or assisting in recovery activities.	2
Project provides for redundancy or makes facility more resilient by improving/remediating critical components on a facility defined in a risk analysis or vulnerability assessment as sensitive, high-exposure, or high consequence to natural or human-caused disaster.	1
Project has neutral effect (no known impact, positive or negative) on security or resiliency.	0
Project makes an asset or the system more vulnerable (for example, by impeding/reducing an evacuation route or access to emergency services) or project conflicts with a county, state, or other hazard/security/emergency plan.	-1
SECURITY AND RESILIENCY SCORE	
SAFETY & SECURITY SUBTOTAL SCORE	**0**
OPERATIONS & TECHNOLOGY (5 POINTS POSSIBLE)	
Traffic Operations & Reliability Improvements (3 points)	
Project is a significant investment in operations or reliability such as installation of new roundabout, corridor signalization improvements, TMC operations funding, or an initiative involving adaptive signal control, self-organizing signals initiative, speed harmonization, dynamic lane assignment or other appropriate active traffic management strategy.	3
Project is located on the ITS priority network and includes substantial features targeting operations and reliability improvements such as traffic signal intersection improvements (including signal coordination, transit signal priority, and/or pedestrian signals), or ITS/CCTV signage or infrastructure.	2
Project is not located on the ITS priority network but includes substantial features targeting operations and reliability improvements such as traffic signal intersection improvements (including signal coordination, transit signal priority, and/or pedestrian signals), or ITS/CCTV signage or infrastructure.	1
Project has neutral effect (no known impact, positive or negative) on operations and reliability.	0
Project introduces a new impediment to or reduction of traffic operations or reliability.	-1
TRAFFIC OPERATIONS & RELIABILITY IMPROVEMENTS SCORE	
Use of Beneficial Advanced Technologies (2 points)	
Project's primary purpose is, and over 50% of budget is devoted to, upgrades to advanced technological features or introduction of new advanced technological features, such as signal coordination, transit signal priority, pedestrian signals, adaptive signal control, self-organizing signals, bluetooth based detection, CCTV, variable message signs, central software, in pavement detection, speed harmonization, variable speed limits, dynamic lane assignment, queue warning, etc.	2
Project includes appropriate upgrades to advanced technological features or introduction of new advanced technological features.	1
Project has neutral effect (no known impact, positive or negative) on advanced technology.	0
Project removes useful advanced technology without replacing or upgrading or fails to include appropriate advanced technology in scope.	-1
USE OF BENEFICENT ADVANCED TECHNOLOGIES SCORE	
OPERATIONS & TECHNOLOGY SUBTOTAL SCORE	**0**
FREIGHT (5 POINTS POSSIBLE)	
Freight and Goods Movement (5 points)	
Award 1 point for each of these criteria (for a cumulative total of up to 5 maximum): • Project improves a MPO or NYSDOT identified freight movement issue • Project removes/substantially improves a freight related land-use compatibility, noise, or safety issue • Project is located on, or provides access to, the CDTC Freight Priority Network, and provides a travel time and/or reliability benefit(s) • Project enhances access to a key freight generator (Ex: Airport, Ports, Major Distribution Centers, Industrial Park/cluster of industrial land uses) • Project enhances access to any intermodal freight movement (Ex: air to truck/rail, rail to truck/water, water to rail/truck/air, etc.)	1 to 5
Project has neutral effect (no known impact, positive or negative) on freight and goods movement.	0
Project is located on, or provides access to, the CDTC Freight Priority Network, and increases travel time and/or decreases reliability.	-1
Project negatively affects freight movement or safety in an area with a known MPO or NYSDOT identified freight movement or freight-related safety issue; alternatively, project introduces a specifically freight-related land use incompatibility (e.g., substantial increase to freight traffic load in residential area, introduction of significant freight traffic noise or other significant freight related nuisance).	-2
FREIGHT SUBTOTAL SCORE	
INNOVATION (2 POINT POSSIBLE)	
Innovative Solutions (2 points)	
Project includes a significantly innovative feature not captured elsewhere in merit criteria which is a new model for the state.	2
Project includes a significantly innovative feature not captured elsewhere in merit criteria which is a new model for the region.	1
Project includes no identified significantly innovative features not captured elsewhere in merit criteria.	0
INNOVATION SUBTOTAL SCORE	
PROJECT DELIVERY (2 POINT POSSIBLE)	
On Schedule/On Budget (2 points)	
Includes the sponsor's latest projects, a minimum of 2 and a maximum of 3). On schedule is defined as completing all project phases in the original programmed year. On budget is defined as completing the project within 10% of the original total cost.	
At least 2 of their projects are on schedule AND on budget	2
At least 2 of their projects are on schedule OR on budget	1
Sponsor does not have 2 applicable projects programmed on a TIP or no other score can be applied.	0
At least 2 of their projects are NOT on schedule AND NOT on budget	-1
At least 1 project was not completed as originally scoped in the project justification package. If this criteria applies, no other criteria in this category applies and the project only receives this score.	-2
PROJECT DELIVERY SUBTOTAL SCORE	
PROJECT MERIT CATEGORY SUB TOTAL (-28 to 67 POINTS)	**0**
Scaled to 50 points	**0.0**

B/C RATIO (0 to 50 POINTS)		
B/C Ratio Value	**SUBTOTAL**	

PROJECT TOTAL (-21 to 100 POINTS)		
Scaled Merit Categories + B/C Ratio Value	**TOTAL**	**0.0**

II. Project Rating Criteria

Each project proposal is ranked using the criteria listed below for each project type. **It is up to each applicant** to provide a description and explanation of how they meet any of these criteria.

Bridge improvement proposals are to be ranked, based primarily on need as determined by inspection data, and secondarily on demonstrated completed project efforts towards accelerating project delivery. For all other project types, proposal will be rated based on a point system, with the maximum number of possible points assigned to the criteria reflecting the relative importance of the criteria. Points are awarded on the basis of how well the project meets the criteria. For example, a reconstruction project that provides a major traffic flow and safety improvement will be awarded the maximum 15 points for the traffic improvement criterion. A project with no traffic flow or safety improvement will be given a score of zero on the traffic improvement criterion. CRCOG staff will review each application and determine the number of points warranted for the benefits described by the applicant.

BRIDGE IMPROVEMENT PROJECTS

Bridge Improvement Project proposals will be ranked based on the bridge's condition as determined from an inspection report (bridges with the worst conditions will be ranked highest) provided by the town. For many eligible bridges (including all bridges over 20 feet in length), recent inspection reports are available through CTDOT's online ProjectWise/Digital Project Resources platform. Alternately, independently prepared inspection reports may be submitted, however they need to be developed in accordance with National Bridge Inspection Standards (NBIS) and stamped/signed by a CT licensed professional engineer with experience in bridge inspection.

The bridge inspection report will need to rate the condition of the decking, superstructure, and substructure, as appropriate, each on a scale of 1 to 9 per NBI standards. Ideally the inspection report will also include a sufficiency rating. All bridge improvement proposals that include inspection reports with sufficiency ratings shall be ranked and complete for funding based on their sufficiency ratings (lowest rating will be ranked highest) and any demonstrated efforts to accelerate project delivery. As such, prior to their rankings staff will deduct up to 5 (five) sufficiency rating percentage points for projects with Letters-of-Intent that demonstrate the completion of design phase efforts to enable accelerated project delivery.

Bridges with inspection reports without calculated sufficiency ratings, and bridges without recent inspection reports (within 10 years), will compete separately for reserved set-aside funds. If an inspection report is not provided with the Letter-of-Intent, CTDOT's bridge inspection staff will be contacted and requested to provide a professional opinion-of-condition based on data that has been collected as part of their current on-going comprehensive statewide inspection efforts. These ratings will be utilized to select for set-aside funding those structures CRCOG staff deems most in need of improvements. In the event of equivalent project ratings, staff will favor the selection of projects with Letters-of-Intent that demonstrate the completion of design phase efforts to enable accelerated project delivery.

All Letters-of-Intent shall include statements that indicate that either the proposed project has either not been selected to receive funds from other state or federal programs; or that the project had been selected to receive these type of funds, but has withdrawn from the funding program prior to the date of the Letter-of-Intent.

RECONSTRUCTION PROJECTS

Rating Criteria	Max. Points
1. Structural Improvement (Pavement, Drainage, Bridge/Culvert)	15
2. Traffic Improvement (Flow, Safety, & Geometrics)	15
3. Traffic Volume or Transit Ridership	15
4. Regional Significance	17
❑ Benefit to Regional Public Facilities (10 points)	
❑ TOD Supportive (5 points)	
❑ Economic Development (2 points)	
5. Environmental	15
❑ Environmental & Historic Preservation (2 points max.)	
❑ Green Infrastructure (5 points max.)	
❑ Environmental Justice (8 points max.)	
6. Complete Streets	14
❑ Vulnerable Users	
❑ Pedestrian Supportive (3 points max.)	
❑ Bicycle Supportive (3 points max.)	
❑ School Zones (2 points max)	
❑ Traffic Calming (3 points max)	
❑ Transit Supportive (3 points max)	
7. Derived from Corridor Study / Long Range Transportation Plan	4
8. Municipal Road	10
9. Leveraging of Other Finances	5
10. Municipality has not recently secured LOTICP funding	5
11. Demonstrated Ability to Accelerate Project Delivery	5
TOTAL Possible Points	**120**

1. Structural Improvement: Pavement, Drainage, Bridge/Culvert (15 points)

The structural improvement rating provides an indication of the extent to which the project will help correct or reduce a structural problem with a road, a bridge, or a culvert. A municipality must provide documentation of: (1) the existing structural problems, and (2) how the proposed project will correct the problem. The municipality should provide any available deficiency ratings such as the municipality's own pavement condition inventory or the State's ratings on local bridges. Photographs would also be helpful. The municipality should also describe how the project will address each of the deficiencies it identifies.

For pavement projects, please attach core or test pits data to provide a representative sample of the existing roadway conditions. If varying pavement conditions exist along roadway indicating the possibility of different pavement conditions, a core/test pit should be performed in each roadway section. Pavement thickness and type, subbase thickness and type, and the presence of fines and/or groundwater should be noted.

CRCOG staff will review the documentation on each project. They will then rate each project based on their professional judgment, the general criteria listed below, and the municipality's documentation.

General criteria: (indicate existing conditions & conditions after improvement)

Roadway Pavement: pavement condition rating (e.g., good, fair, poor)

Roadway Drainage System: adequacy of subsurface drainage system (water in base?)
adequacy of surface drainage system (icing or ponding?)

Bridges & Culverts: bridge condition rating (super structure, deck)
hydraulic capacity (adequate for 25, 50, or 100 year flood?)

When assigning a project rating, staff will consider the range of existing problems (pavement, drainage, and culvert/bridge), the severity of the problems, and the degree to which the problem will be reduced.

2. Traffic Improvement: Flow, Safety, & Geometrics (15 points)

The traffic improvement criterion provides an indication of whether or not the proposed project will help improve traffic flow, traffic safety, or roadway geometrics. The applicant must provide documentation of: (1) the nature and severity of the existing problems, and (2) how the problems will be corrected by the proposed project. CRCOG staff will review the documentation and determine whether the improvement qualifies as major, moderate, minor, or none. Points to address in the documentation:

	Existing Problem	Proposed Improvement	Appropriate Criteria
Traffic Flow	Is there an existing **congestion** problem? What is the severity of the problem?	Will the proposal reduce the congestion problem? To what degree will it reduce it?	**Level-of-service (LOS)** before & after the proposal is implemented. Highway Capacity Manual procedures recommended but not required.
Traffic Safety	How many **accidents** occurred in the last **3 years**? Provide accident records, summary of accident types, or collision diagrams.	How many of those accidents would the proposed project have eliminated (**3 years**)?	Expected **accident reduction** over a **3-year** period.
Roadway Geometry	Are there any **geometric deficiencies** on the road? Examples: excessive grade, substandard width, excessive horizontal curvature, poor sight line, improper super elevation. Describe the problems & their severity.	Will the proposed project correct the problem and to what degree?	Indicate degree of improvement in appropriate measure such as: expected improvement in sight distance, or increase in design speed from 25 to 35 mph.

3. Traffic Volume or Transit Ridership (15 points)

This criterion provides a general indication of the number of people who benefit from the proposed project. Measurement method is dependent on the type of project proposed. For roadway improvement projects, the applicant must supply data on either the annual average daily traffic (AADT) or the peak hour volume of traffic (PHV). For transit projects, the applicant

must supply data on the number of transit riders who will benefit from the project. For projects other than road or transit improvements, the applicant must provide some other estimate of the number of people who will benefit and give an explanation of how the estimate was prepared. Submit documentation on one of the following:

1. **ADT,**
2. **PHV,**
3. **Transit Riders**

When using ADT, the score is calculated by the following formula: **Score = ADT/12,000 x 15** (where ADT = Average Daily Traffic, and the maximum ADT that will be considered is 12,000)

4. Regional Significance (17 points)

Regional significance provides an indication of how widespread or localized the *transportation* benefits of the project are. The applicant must describe the area of impact of the project. For example, does the project benefit only a very small area, an entire municipality, multiple municipalities, or most of the region? Proposals can receive up to seventeen extra points if the proposed project has any of the benefits listed below.

- **Benefit to Regional Public Facilities** (maximum 10 points)

  A proposal can receive rating points if it helps improve access to regional **public** facilities such as hospitals, colleges, and airports; on an evacuation route; or to an emergency shelter.

  The applicant should provide documentation on (1) the size of the area that benefits from the proposed project, and (2) information on any regional **public** facilities that benefit from the proposed project. The documentation should demonstrate how the area or regional facilities benefit.

  CRCOG staff will review the documentation and determine whether the project qualifies as regional, sub-regional, town-wide, or localized.

- **TOD Supportive** (maximum 5 points)

  A proposal can receive rating points if it is supportive of transit-oriented development (TOD). The applicant should provide documentation showing that the proposed project is within a half mile of a transit station on the CT***fastrak*** line or CT***rail***'s Hartford Line. If the project is within a quarter mile of a transit station, the applicant should document that as well. Also key to supporting TOD, any elements of the project that enhance bicycle and pedestrian connections within the project area should be clearly stated and documented.

- **Economic Development** (maximum 2 points)

  Projects that help the economic development goals of the community will receive additional points.

5. Environmental (15 points)

Proposals can receive up to fifteen extra points if the proposed project has any of the benefits listed below.

- **Environmental & Historic Preservation** (maximum 2 points)

  If the project will have a positive environmental impact, or will serve to advance recognized historic preservation goals of the community, the project is eligible for additional points.

When considering environmental benefits, CRCOG staff will consider a wide range of potential environmental improvements such as air quality, water quality & flow, wetlands mitigation, open space improvements, etc.

- **Green Infrastructure** (maximum 5 points)

  If the project includes the implementation of new technologies and methodologies that reduce environmental impacts associated with transportation infrastructure, it can receive up to an extra five points. These new initiatives seek to reduce stormwater runoff and associated pollutants, promote the use of recycled materials, bring natural elements into streets, reduce "heat island" effects, and improve the access and accommodations for pedestrians and bicycles.

  Green Streets strategies include the use of permeable pavement, bioslopes and bioswales, bioretention cells, and vegetated filter strips to reduce and filter stormwater runoff. Additional strategies to reduce environmental impacts include use of reclaimed or recycled pavements and integration of natural elements into streets. Additional strategies to reduce environmental impacts include use of in-place reclaiming of existing pavements for use as a road granular base on lower-volume roads, partial depth cold-in-place recycling of pavements up to 8,000 ADT, use of reclaimed asphalt pavement (RAP) into hot-mix-asphalt, warm-mix asphalt (WMA) technology, and integration of natural elements into streets.

- **Environmental Justice** (maximum 8 points)

  A proposal will be awarded up to eight extra points if the proposed project benefits low income and/or minority neighborhoods. A map of the environmental justice target areas is included in this document.

6. Complete Streets (14 points)

- **Vulnerable Users**
  - **Pedestrian Supportive** (maximum 3 points)

    Proposals that improve pedestrian mobility and/or safety will receive up to three additional points. Proposals should indicate pedestrian measures that are being proposed such as new sidewalks, crosswalks, or pedestrian traffic signal equipment and how the measures will improve pedestrian safety.

  - **Bicycle Supportive** (maximum 3 points)

    If the project helps to improve the mobility and safety of bicyclists, or helps achieve the goals of the Regional Bicycle Plan, it can receive up to an extra three points. Proposals should indicate how bicycle provisions (i.e. pavement striping to provide exclusive bicycle lane) will advance the vision of safety, convenience and improved linkages. Considerations should be given to the viability of reducing vehicle lane widths (for example from 12' to 11'), where appropriate, to provide additional shoulder width for cyclists.

  - **School Zones** (maximum 2 points)

    Projects that assist in addressing vehicular, pedestrian, or bicycle safety in school zones.

- **Traffic Calming** (maximum 3 points)

  If the project will have a positive effect on reducing vehicular travel speeds, altering driver behavior and/or reducing the negative effects of automobile use, the project is eligible for

additional points. When considering traffic calming benefits, CRCOG staff will evaluate a wide range of potential traffic calming improvements such as speed humps, reduced lane width, streetscaping elements, or other measures appropriate to the type of street. Proposals should indicate the severity of the existing problem and the degree to which the proposed improvements will reduce the problem.

- **Transit Supportive** (maximum 3 points)

  If a proposal benefits the region's transit system or transit users it can receive up to an extra three points. Proposals should indicate if bus shelters are being proposed or if sidewalks to bus stops are being improved or installed.

7. Derived From Corridor Study/ Long Range Transportation Plan (4 points)

A proposal will be awarded up to four extra points if the project is the result of a recommendation from a corridor study initiated through CRCOG and/or is contained in CRCOG's Long Range Transportation Plan.

8. Municipally Owned Arterial or Collector Road (10 points)

A proposal will be awarded 10 extra points if the project is located on an arterial or collector road that is owned by the municipality (as versus State ownership).

9. Leverages other Finances (5 points)

A proposal will be awarded up to five extra points if the proposed project leverages other finances. Leveraging other finances is defined as using LOTCIP funds to supplement other existing funds to fully fund a project. The number of points awarded will depend on how complete the planning or design processes are. To receive points, the existing funding must be secure and cannot be in the form of an earmark. With difficult financial times expected, multiple funding sources will offer great flexibility towards completion of projects.

10. Municipality has not recently secured LOTCIP funding (5 points)

A proposal will be awarded five extra points if it is from a municipality that either has not yet been awarded a LOTCIP project, or does not have a project from a prior solicitation queued in a pre-construction phase in the region's LOTCIP programs. A project will be considered in a pre-construction phase until such time as it has been bid and received CTDOT authorization to be awarded to the lowest responsible bidder.

11. Accelerated Project Delivery (5 points)

A proposal will be awarded five extra points if it is demonstrated that significant design phase efforts have already been completed in a commitment to accelerate project delivery.

PAVEMENT REHABILITATION PROJECTS

Rating Criteria	**Max. Points**
1. Structural Improvement (Pavement)	20
2. Traffic Volume or Transit Ridership	15
3. Regional Significance	5
❑ Benefit to Regional Public Facilities (3 points)	
❑ Economic Development (2 points)	
4. Environmental Justice	5
5. Municipality has not recently secured LOTCIP funding	5
TOTAL Possible Points	**50**

Pavement rehabilitation projects will be evaluated on, but not limited to, the following criteria: structural deficiencies including existing roadway issues, pavement deficiencies, and above surface drainage issues (such as ponding); traffic volumes based on average daily traffic (ADT) or peak hour volume of traffic (PHV); regional significance including how widespread or localized the benefits of the project are (including the facilities it will benefit, and economic development); project location in relation to environmental justice areas; and whether the municipality has recently secured LOTCIP funding. In support of complete streets, considerations should be given to the viability of reducing vehicle lane widths (for example from 12' to 11'), where appropriate, to provide additional shoulder width for cyclists.

BICYCLE AND PEDESTRIAN PROJECTS and STAND-ALONE SIDEWALK PROJECTS

Rating Criteria	**Max. Points**
1. Improves Mobility (including filling gaps/connecting destinations)	20
2. Improves Safety (including volume of conflicting traffic)	15
3. Especially Vulnerable Users	5
4. Environmental Justice	5
5. Municipality has not recently secured LOTCIP funding	5
TOTAL Possible Points	**50**

Bicycle and Pedestrian projects and Stand-alone sidewalk projects primarily rated on their ability to improve bicycle and pedestrian mobility and safety. These projects will be evaluated, but not limited to the following criteria: whether or not the improvement fills a gap or connects destinations; the effectiveness in providing alternatives to driving; safety benefit to the community; if there are especially vulnerable users (i.e. elementary school children, handicap individuals, teenagers, elderly); the project's location in relation to environmental justice areas; and whether the municipality has recently secured LOTCIP funding.

DVRPC TIP PROJECT BENEFIT CRITERIA

An update to the criteria used to evaluate projects that are added to the Transportation Improvement Program (TIP) was adopted by the DVRPC Board on February 27, 2014. Universal criteria were established that can be used to evaluate a variety of modes (roadway, transit, bike, pedestrian, freight) and project types, and can be used in the New Jersey and Pennsylvania counties in the DVRPC region. Using evaluation criteria is one means to most effectively balance programming the region's needs and resources. Other factors that are considered for new TIP project candidates include local and regional priorities, asset management system rankings, public input, political support, geographic distribution, fund eligibility, project readiness, leveraging investments, and ensuring that various project types are considered in the TIP project selection process, such as all types of non-major roadway, transit, bike/pedestrian, preservation, operational improvement, and freight projects.

More specific project criteria will continue to be used to evaluate specific, large-scale major regional long-range plan projects, or those using special fund categories. Specific funding sources that have their own criteria developed for very specific analysis include Transportation Alternatives Program (TAP), Highway Safety Improvement Program (HSIP), and Congestion Mitigation and Air Quality (CMAQ). In these instances, the more specific project evaluation criteria will be used in conjunction with or in place of the TIP benefit criteria. During the development of the Draft FY2016 TIP for New Jersey, only new TIP candidate projects were assessed by DVRPC's universal benefit criteria.

The criteria were developed with New Jersey and Pennsylvania members of a working subcommittee of the DVRPC Regional Technical Committee (RTC) and were designed to align directly with the multimodal goals of the *Connections 2040* Plan as well as reflect the increasingly multimodal nature of projects in the TIP. The criteria generally consider one of two key questions:

- Is this project in a location where we want to make investments? Or,
- How beneficial or effective is this project?

The TIP Benefit Criteria were developed to represent the following characteristics:

- Align with the Long-Range Plan and other regional objectives;
- Be relevant to different types of TIP projects;
- Indicate differences between projects;
- Avoid measuring the same goal(s) multiple times;
- Cover the entire 9-county region;
- Be more quantitative than qualitative;
- Use readily available data with a strong likelihood of continued availability; and
- Be simple and understandable

The following briefly summarizes the criteria for project evaluation.

- **Facility/Asset Condition** – brings a facility or asset into a state-of-good repair, extends the useful life of a facility, or removes a functionally obsolete bridge rating.

- **Safety** – impacts safety-critical element for transit, high-crash road location, or incorporates an FHWA proven safety countermeasure.

- **Reduce Congestion** – location in CMP (Congestion Management Process) congested corridors, or appropriate everywhere CMP strategy; AADT per lane, and daily transit riders per daily seats.

- **Invest in Centers** – location in Connections 2040 Center or Freight Center, or high, medium-high, or medium transit score areas, or connection between two or more key centers.

- **Facility / Asset Use** – levels of daily vehicle miles traveled (VMT), trucks, and transit ridership.

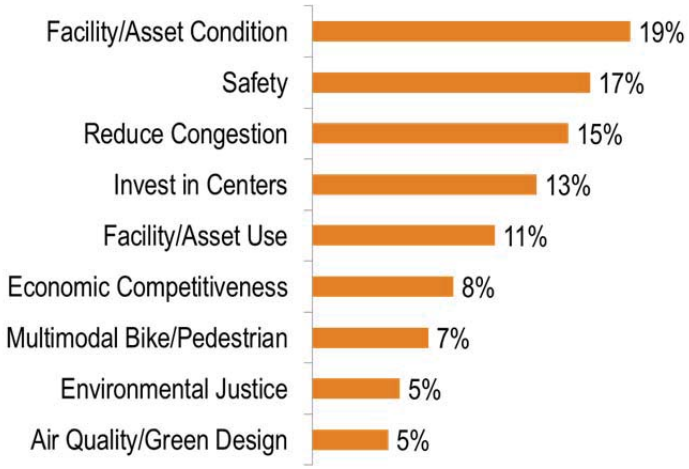
- **Economic Competitiveness** – provides reduced operating/maintenance costs, or is part of an economic development or TOD project.

- **Multimodal Bike/Pedestrian** – accounts for bicyclists and pedestrians using the facility; new trails, sidewalks, or bike lanes, and connections to other multimodal facilities.

- **Environmental Justice** – benefits census tracts with high Indicators of Potential Disadvantage (IPD – previously known as Degrees of Disadvantage or "DOD") communities.

- **Air Quality/Green Design** – Stresses air quality benefits and incorporates environmentally friendly principals.

After defining the criteria, a web-based decision-making tool was used to weigh the criteria. The higher the weight, the higher the priority for the DVRPC region.



Each criterion could receive up to a maximum of 1 point. Each project can receive a total score that is the sum of the weight times the rating for each criteria. The tool can compare the projects estimated total state and federal cost to the total score, as a benefit-cost ratio. Other sources of funding that may increase a project's benefit-cost ratio, such as additional local funding beyond match requirements; non-traditional funding grants; and developer or private contributions, will not count toward a project's cost for the benefit-cost ratio. The tool provides a ranking of projects with the highest benefit-cost ratios, but the Regional Technical Committee recommends and ultimately the DVRPC Board makes the final decisions to determine TIP project selections.

TIP EVALUATION CRITERIA AND MEASURES

The following sections detail each of the proposed criteria.

1. FACILITY / ASSET CONDITION

This criterion relates to the *Connections 2040* goal of rebuilding and maintaining the region's transportation infrastructure. The region has a substantial backlog of road, bridge, and transit infrastructure repair needs. These "fix-it-first" projects need to be the regional priority until a state-of-good repair is achieved. Data will come from road, bridge, and transit asset management systems.

Transit Project Rating

☐ 1 point if the improvement brings the asset into a state of good repair, or
☐ 0.5 points if project extends the useful life of a facility/asset not in poor condition.

Roadway and Bridge Project Rating

☐ 1 point if the project will bring a Bridge deck/super/sub/culvert rating of 3 or less, a posted or weight-restricted bridge, an interstate road segment with an IRI of ≥ 180, an NHS facility with an IRI ≥ 200, a roadway with more than 2,000 vehicles per day with an IRI ≥ 230, or a roadway with less than 2,000 vehicles per day and an IRI of ≥ 260 into a state-of-good repair;

☐ 0.8 points if the project will bring a facility or asset with a "Poor/Worst on four or five point scale" asset management system rating into a state-of-good repair;

☐ 0.5 points if the project will extend the useful life of a facility that is not in poor condition, or resolves a fracture critical issue on a bridge;

☐ 0.25 points if project eliminates a functional obsolete issue on a bridge.

2. SAFETY

This criterion relates to the *Connections 2040* Plan goal of creating a safer transportation system. Projects that improve DOT identified high-crash locations and have a safety component will score 0.5 points per high-crash location. In addition, projects that incorporate one or more FHWA proven safety countermeasure can score 0.5 points per countermeasure, (defined at: http://safety.fhwa.dot.gov/provencountermeasures/).

Transit projects that are deemed safety critical will receive one point.

Transit Safety Rating

1 point if project is a safety critical transit project.

Roadway Safety Rating

Up to a maximum of 1 point:

☐ 0.5 points per safety improvement in 1 or more DOT identified high crash location (up to 1 point),

☐ Pennsylvania Roadway Departure Improvement Program (RDIP) – the project must implement the specific identified safety improvement: enhanced signs and markings for curves (CSM), enhanced signs and markings

for curves + high friction surfaces (CMS-HFS), centerline rumble strips (CLRS), edge line rumble strips or shoulder rumble strips (ELRS/SRS), wider shoulders / edge line rumble strips (WS-ELRS), center and edge line pavement markings (C&EL PM), alignment delineation / lighting (ADL), high friction surfaces (HFS), guiderail relocations / safety enhancements (GR), tree removal / safety enhancements (TR), utility pole removal / safety enhancements (UP), enforcement and education – alcohol related (EEA), enforcement and education – speeding related (EES), enforcement and education – restraint related (EER), infrastructure improvements – speeding related (II), or install cable median barrier (CMB);

☐ Pennsylvania Intersection Safety Improvement Program (ISIP) – the project must implement the specific identified safety improvement: STOP, SIGNAL, LEFT TURN, PED, or SPEED;

☐ 0.5 points per incorporated FHWA proven safety countermeasure (up to 1 point);
- ☐ Roundabouts;
- ☐ access management;
- ☐ signal back-plates with retro-reflective borders;
- ☐ longitudinal rumble strips and stripes on two-lane roads;
- ☐ enhanced delineation and friction for horizontal curves;
- ☐ safety edge;
- ☐ medians and pedestrian crossing islands in urban and suburban areas;
- ☐ pedestrian hybrid beacons; or
- ☐ road diets.

3. REDUCE CONGESTION

Reducing congestion is a goal in the *Connections 2040* plan. This has a significant impact on the region's economy, as competitiveness within a global economy means the region needs to be able to efficiently move people and goods. This criterion considers location in CMP corridors and the facility's existing level of congestion or overcrowding.

Is the project located in a CMP Priority or Congested Subcorridor?

The CMP has conducted considerable analysis of the regional transportation network and the impact of congestion. Developed with the counties, DOTs, transit operators, and other regional stakeholders, the CMP has identified a subset of Priority Sub-corridors for transportation investment with specific strategies for mitigating congestion. This criterion also considers Congested Sub-corridors and Emerging Corridors as additional rating factors. In areas where Priority, Congested Sub-corridors, or Emerging Corridors overlap, only the higher value will be counted.

<u>CMP Rating</u>

Maximum of A or B:

A. 0.5 points if project implements an appropriate everywhere strategy in the CMP.
CMP appropriate everywhere strategies include:
- ☐ safety improvements and programs;
- ☐ signage;
- ☐ context sensitive design;
- ☐ improvements for walking and bicycling;
- ☐ basic upgrade of traffic signals;
- ☐ signal prioritization for emergency vehicles;

- ☐ making transfers easier for passengers;
- ☐ intersection improvements of a limited scale;
- ☐ bottleneck removal of a limited scale;
- ☐ environmental justice outreach for decision-making;
- ☐ access management;
- ☐ marketing/outreach for transit and TDM services;
- ☐ revisions to existing land use or transportation regulations;
- ☐ growth management;
- ☐ smart growth; or
- ☐ complete streets.

B. (Project length in priority corridor x 100 percent + project length in congested corridor x 70 percent + project length in emerging corridor x 30 percent) divided by total project length.

What is the average AADT divided by the average number of lanes or transit ridership divided by the number of seats?

This criterion looks at facility or route specific congestion or overcrowding. AADT and average lanes data will come from the Roadway Management System (RMS). Transit seats will be computed by seats per vehicle multiplied by average number of vehicles (for rail routes) multiplied by daily service frequency. This data will come from annual route statistics reports, or the transit agency itself.

Congestion / Overcrowding Rating

- ☐ For limited-access facilities: 1 point if Daily AADT/Lane is greater than 25,000; else AADT/Lane divided by 25,000.
- ☐ For arterials, collectors, and local roads: 1 point if Daily AADT/Lane is greater than 12,500; else AADT/Lane divided by 12,500.
- ☐ For Transit Facilities: 1 point if Daily Passengers/Daily Seats (# of vehicles * seats per vehicle * Total Daily Service frequency) is greater than 1; else Daily Passengers/Daily Seats.

4. INVEST IN CENTERS

This criterion reflects the *Connections 2040* core plan principle to create livable communities within more than 120 regional development centers and 44 freight centers. Identifying focus areas for future development creates a better linkage between land use and transportation.

Projects will be rated on how well they serve centers by their location within centers, or high, medium-high, or medium transit score areas. A hybrid GIS layer has been created with a ¼ mile around all *Connections 2040* centers (from the metro center to rural and neighborhood centers), and all non-center areas of the region are high, medium-high, or medium transit score locations, or none of the above. All project limits within the Centers and Center buffer areas, or within high transit score areas will receive one point. All project areas within medium-high transit score areas will receive 0.75 points. All project limits within medium transit score areas will receive 0.5 points. The sum of the project within these three limits (multiplied by the rating), will then be divided by the total project length to get a centers/transit score rating.

Projects can also be rated for being a critical link between two or more centers. Projects that either maintain or improve service on a facility that links centers will get 0.25 points added to their centers/transit score rating (up to a maximum of one point).

Centers Rating

(100% x Project length within ¼ mile or inside Plan and Freight Centers + 100% x project length in high transit score areas + 75% x project length in medium-high transit score areas + 50% x project length in medium transit score areas)/total project length.

Bonus: +0.25 points (up to 1 point maximum) if the project improves or maintains a critical facility that links two or more regional Plan or freight centers.

5. FACILITY/ASSET USE

This criterion looks at how much use the facility or asset receives in a multimodal manner, to determine the scale of the project's impact on the transportation system. Use will be determined by the total number of vehicle miles traveled (VMT), average number of daily trucks, or affected daily transit riders. The greater the facility's use, the more important it is in terms of risk to negative regional impacts, and the broader the benefits are that can be delivered by implementing the project. Only existing users are counted, and the evaluation criteria do not attempt to estimate future users as a result of the project.

Vehicle Miles Traveled

Vehicle miles traveled will be determined by using the average AADT for all segments multiplied by facility length. Data will come from the Roadway Management System (RMS). Projects that are located at specific intersection(s) and bridge(s) will assume a project length of 1 mile, essentially using AADT as the proxy for usage. Intersections and bridges that are improved as part of a larger corridor project will be embedded into the overall project length (and will not use the one mile assumption). New segments will use their length multiplied by the average AADT for the facilities they connect to (beginning and endpoints only). Data will come from the Roadway Management System (RMS).

Daily VMT Rating

1 point if the average AADT of all road segments multiplied by the total length of the segments within the project limits is more than 500,000; else, total daily VMT divided by 500,000.

Daily Trucks

Daily trucks will be determined by multiplying the percent daily trucks by the average AADT for all segments. Data will come from the Roadway Management System (RMS). For freight rail projects, DVRPC will work with the private rail company to estimate daily truck equivalents.

Daily Trucks Rating

1 point if the average road segment has more than 7,500 trucks or truck equivalents per day; else trucks or truck equivalents per day divided by 7,500.

Daily Affected Transit Riders

Daily affected transit riders will account for the average daily ridership using the route in question, or routes the asset depends on. For example the Jenkintown Substation powers the Lansdale-Doylestown, Warminster, and West Trenton lines. A project to improve the Jenkintown substation affects the riders of all three lines.

Daily Affected Transit Riders Rating

Ridership values will come from annual route ridership reports published by the transit agencies, or direct transit agency data. 1 point if the number of daily transit riders affected is 50,000 or above; else daily affected ridership divided by 50,000.

6. ECONOMIC COMPETIVENESS

This criterion rewards projects that build the regional economy by investing in transportation improvements related to economic development or transit-oriented development (TOD); reducing agency operating or maintenance costs; or reducing transportation system user costs. Projects rated for economic development or TOD must indicate the specific development it is supporting.

Economic Competiveness Rating

Sum of each checkbox, up to a maximum of 1 point:

- ☐ Does the project reduce agency maintenance or operating costs?
  (0 points if cost increases; 0.25 points if no change; 0.5 points if cost decreases)
- ☐ Does the project reduce public/private transportation system user vehicle maintenance or operating costs? (0 points if cost increases; 0.25 points if no change; 0.5 points if cost decreases)
- ☐ Does project support a known economic development project or a transit-oriented development (TOD)? (0.5 points if it supports)

7. MULTIMODAL BIKE/PEDESTRIAN

This criterion relates to the *Connections 2040* Plan goal of fostering a multimodal transportation system. It will rate new facilities based on length and connections to existing multimodal facilities; or existing use of facilities. In some cases a road may add a bike lane, where there is already significant bicycle use. This project will be able to score based on both the new bike lane and the existing use.

The rating for existing facilities will be based on daily bicyclists and pedestrian use. This data will come from DVRPC counts, and can be supplemented with county counts if no DVRPC counts are available. New bike and pedestrian facilities will be rated based on project length and connections to other existing bike and pedestrian facilities, transit stations, or bus routes. Projects that make a critical last mile transit connection or link facilities over a difficult connection, such as a bridge, will receive a 0.5 point bonus.

Sum of each checkbox, up to a maximum of 1 point:

- ☐ 1 point if the number of daily bicyclists and pedestrians is 1,000 or above; else daily bicyclists and pedestrians divided by 1,000.
- ☐ Up to 0.5 points for a new trail, sidepath, bike lane, or sidewalk; total length in miles divided by 10.
  - ☐ 0.1 points for each bus route, each train station, or each existing bike/ped facility the proposed new bike/ped facility connects to.
  - ☐ +0.5 points for new sidewalks and bike facilities to fill a difficult gap, such as on a bridge, or new ‘first/last mile’ bike/ped connection to a public transit station or key destination.

8. ENVIRONMENTAL JUSTICE

Does the project serve Environmental Justice communities and the additional population groups with additional transportation needs, as defined by the DVRPC Indicators of Potential Disadvantage (IPD) methodology? This indicator also helps to ensure that these communities do not suffer from worse overall infrastructure condition than other communities.

Environmental Justice Rating

(100% x project length in 7-8 IPD communities + 70% x project length in 5-6 IPD communities + 30% x project length in 3-4 IPD communities) divided by total project length.

9. AIR QUALITY/GREEN DESIGN

This criterion relates to the *Connections 2040* Plan goal of limiting transportation impacts on the natural environment. Projects will rate if they provide air quality benefits, incorporate green design principles, use green or recycled materials, or reduce environmental impact. Examples of projects for each category are shown below, but this list is not intended to be limited to these examples only. Other green design principles not listed here can also be considered with TIP subcommittee group consensus.

Air Quality Rating

0.5 points for air quality improvements:

- ☐ Air quality: low emissions vehicles (hybrid, hydrogen, LPN, genset/clean diesel); trees, sound walls or other buffers that reduce exposure to transportation noise and emissions; separating freight and diesel traffic from local roads, schools, parks, or residential areas; reduce vehicle hours of driving, vehicle miles traveled, greenhouse gas emissions, or vehicle idling.

Green Design Rating

0.5 points for incorporating any one of the checkboxes below:

- ☐ Green design: bioswales/rain gardens, tree trenches, vegetated medians (more than just grass)/vegetated curb bump-outs, naturalized stormwater basins.
- ☐ Green or recycled materials: use warm-mix asphalt, long-life pavement materials, pervious pavement, or smog absorbing concrete; use of recycled materials (fly ash, glass, plastic, etc.), or project supports or enhances recycling efforts.
- ☐ Reduced environmental impact: alternative energy generation (solar, wind, regenerative braking); climate adaptability/resiliency components; enhance habitat connectivity or wildlife crossings.

FUTURE REVISIONS

It is intended that these evaluation criteria are part of a living document. The criteria will need to be revisited and updated as appropriate, particularly as new data or analysis techniques become available. A known future impact will be better aligning with MAP-21 performance measures.

MAP-21 Performance Measures

Moving Ahead for Progress in the 21st Century (MAP-21) is the current federal transportation legislation. Among its reforms is to create 13 performance measures related to the nation's Interstate and National Highway System road networks, and a set of criteria related to the transit system. While the exact criteria have not yet been identified, they will measure the following goals.

Interstate and National Highway System

- ☐ Infrastructure condition - To maintain the highway infrastructure asset system in a state of good repair.
  - Pavement Condition (Interstate/NHS)
  - Bridge Condition (NHS)
- ☐ System reliability - To improve the efficiency of the surface transportation system.
- ☐ Safety - To achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
  - Injuries / VMT;
  - Fatalities / VMT;
  - # of Serious Injuries;
  - # of Fatalities
  - Measures used to address safety on all public roads
- ☐ Congestion reduction - To achieve a significant reduction in congestion on the National Highway System.
- ☐ Environmental sustainability- To enhance the performance of the transportation system while protecting and enhancing the natural environment.
- ☐ Freight movement and economic vitality - To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
- ☐ Reduced project delivery delays - To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices.

Transit System

- ☐ Safety
- ☐ Condition

OTHER ISSUES

On the roadway side, the TIP project benefit criteria have a measure related to nearly all the goals; only the system reliability and reduced project delivery delay measures could be considered missing. Project delivery will be determined in the LPN process in Pennsylvania and the Concept Development Screening in New Jersey. Project selection discussion can also consider project readiness. System reliability is partially addressed through the CMP process, where the most critical congested corridors have been identified. Investments in these areas should help to improve system reliability.

What the actual MAP-21 indicators will be is still to be determined. Once these national indicators have been defined, the TIP evaluation criteria may need to be revised to better reflect the federal measures.

RISK

While the TIP project evaluation does not include a specific measure for the risk involved with a project, it is effectively captured through three of the criteria:

- ☐ Safety
- ☐ Use
- ☐ Facility/Asset Condition

Health in All Policies

The *Connections 2040* plan calls for a 'health in all policies' framework, which encourages the integration of health in policy assessment, decision-making, and public investments. While the TIP project evaluation criteria do not employ a specific health measure, they can help to anticipate better health outcomes. Key transportation related health outcomes were identified by the American Public Health Association in *The Hidden Health Costs of Transportation* report. These outcomes include physical activity and body weight, air pollution, traffic safety, household expenses and equity. There is a TIP project evaluation criteria related to improving each of these outcomes.

ransportation Health Outcome	TIP Project Evaluation Criteria
Physical Activity and Weight	Multimodal Bike/Pedestrian – does the project add new bike or pedestrian facilities?
Air Pollution	Air Quality/Green Design – does the project help to lower emissions?
Traffic Safety	Safety – does the project improve a high-crash road location, or incorporate an FHWA proven safety countermeasure.
Household Expenditures on Transportation	Economic Competitiveness – does the project reduce user vehicle operating or maintenance cost.
Equity	Environmental Justice – does the project benefit high indicators of potential disadvantage (IPD) communities.

TSOURCE: DVRPC 2014. MODIFIED FROM APHA 2010

DETAILED EVALUATION CRITERIA

MAIN CRITERIA	SUB-CRITERIA	DATA SOURCE	RATING SCALE (EACH MAIN/SUB CRITERIA CAN SCORE UP TO 1 POINT)
Invest in Centers	-	*Connections 2040* Centers, Freight Centers, Transit Score Index	+ (100% x Project length within ¼ mile or inside Plan or Freight Centers + 100% x project length in high transit score areas + 75% x project length in medium-high transit score areas + 50% x project length in medium transit score areas) /total project length. + 0.25 points if project improves or maintains a *critical* facility that links two or more regional Plan or freight centers.
Reduce Congestion	CMP	CMP Appropriate Everywhere Strategies, CMP Priority Corridors	Maximum of A or B below: A. 0.5 points if project implements an appropriate everywhere strategy in the CMP ☐ safety improvements and programs; ☐ signage; ☐ context sensitive design; ☐ improvements for walking and bicycling; ☐ basic upgrade of traffic signals; ☐ signal prioritization for emergency vehicles; ☐ making transfers easier for passengers; ☐ intersection improvements of a limited scale; ☐ bottleneck removal of a limited scale; ☐ environmental justice outreach for decision-making; ☐ access management; ☐ marketing/outreach for transit and TDM services; ☐ revisions to existing land use or transportation regulations; ☐ growth management; ☐ smart growth; or ☐ complete streets. B. (project length in priority corridor x 100 percent + project length in congested corridor x 70 percent + project length in emerging corridor x 30 percent)/total project length.
	Congestion / Overcrowding	Roadway Management System (RMS)	A. Limited-access facilities: 1 point if Daily AADT/Lane is greater than 25,000; else AADT/Lane divided by 25,000. B. Arterials, collectors, and local roads: 1 point if Daily AADT/Lane is greater than 12,500; else AADT/Lane divided by 12,500. C. Transit facilities: 1 point if daily passengers/daily seats (# of vehicles * seats per vehicle * total daily service frequency) >1; else daily passengers/daily seats.
Environmental Justice	-	Indicators of Potential Disadvantage (IPD)	(100% x project length in 7-8 IPD communities + 70% x project length in 5-6 IPD communities + 30% x project length in 3-4 IPD communities)/total project length.
Facility / Asset Use	Daily VMT	Roadway Management System (RMS),	1 point if the average AADT of all road segments multiplied by the total length of the segments within the project limits is more than 500,000; else total daily VMT divided by 500,000. For computation of VMT, projects that only involve bridges or intersections assume that each of these facilities is 1 mile in length. In this case the value will be the average AADT multiplied by the number of bridges or intersections. Projects where bridge or intersection improvements are a part of a larger scope will rely on the limits of the larger project.
	Daily Trucks	Roadway Management System (RMS),	1 point if the average road segment has more than 7,500 trucks or truck equivalents per day; else trucks or truck equivalents per day divided by 7,500.
	Daily Transit Riders	Transit Agencies,	1 point if the number of daily transit riders affected is 50,000 or above; else daily affected ridership divided by 50,000.
Multimodal – Bike and Pedestrian	New facilities	DVRPC multi-use trail network, bus routes, train/trolley/subway stations; DVRPC Bike/Ped counts	Up to a maximum of 1 point: ☐ Up to 0.5 points for any new trail, sidepath, bike lane, or sidewalk: total length in miles divided by 10; ☐ 0.1 points for each bus route, each train station, or each existing bike/ped facility that a proposed new bike/ped facility connects to; ☐ 0.5 points if new sidewalks and bike facilities fill a difficult gap, such as on a bridge, or new 'first/last mile' bike/ped connection to a public transit station or key destination; and ☐ 1 point if number of daily bicyclists and pedestrians is 1,000 or above; else daily bicyclists and pedestrians divided by 1,000.

DETAILED EVALUATION CRITERIA (CONTINUED)

MAIN CRITERIA	SUB-CRITERIA	DATA SOURCE	RATING SCALE (EACH MAIN/SUB CRITERIA CAN SCORE UP TO 1 POINT)
Air Quality / Green Design	-	Project sponsor / project scope	☐ 0.5 points for air quality benefits such as: low emissions vehicles (hybrid, hydrogen, LPN, genset/clean diesel); trees, sound walls or other buffers that reduce exposure to transportation noise and emissions; separating freight and diesel traffic from local roads, schools, parks, or residential areas; reduce vehicle hours of driving, vehicle miles traveled, greenhouse gas emissions, or vehicle idling; and/or 0.5 points for any one of the green design checkboxes below: ☐ Green design such as bioswales/rain gardens, tree trenches, vegetated medians (more than just grass)/vegetated curb bump-outs, naturalized stormwater basins; ☐ Green or recycled materials such as: use warm-mix asphalt, long-life pavement materials, pervious pavement, or smog absorbing concrete; use of recycled materials (fly ash, glass, plastic, etc.), or project supports or enhances recycling efforts; ☐ Reduced environmental impact, such as: alternative energy generation (solar, wind, regenerative braking); climate adaptability/resiliency components; enhance habitat connectivity or wildlife crossings.
Economic Competitiveness	-	Project sponsor, RTC, DVRPC	Up to a maximum of 1 point: ☐ Project saves or reduces agency operating/maintenance costs: 0 points if project increases costs; 0.25 points if no change; 0.5 points if cost decreases; ☐ Project saves user or public/private vehicle operating costs: 0 points if project increases costs; 0.25 points if no change; 0.5 points if cost decreases); ☐ 0.5 points if project supports a known economic development (ED) project or a transit-oriented development (TOD).
Safety	-	Transit agency, DOT, project sponsor/scope	Transit Projects Only: safety critical transit project =1 point Roadway/Bike/Ped. Projects: 0.5 points per safety improvement/critical safety location (up to 1 point) ☐ The project is in 1 or more DOT identified high crash location: ☐ Pennsylvania Roadway Departure Improvement Program (RDIP) – the project must implement the specific identified safety improvement: enhanced signs and markings for curves (CSM), enhanced signs and markings for curves + high friction surfaces (CMS-HFS), centerline rumble strips (CLRS), edge line rumble strips or shoulder rumble strips (ELRS/SRS), wider shoulders / edge line rumble strips (WS-ELRS), center and edge line pavement markings (C&EL PM), alignment delineation / lighting (ADL), high friction surfaces (HFS), guiderail relocations / safety enhancements (GR), tree removal / safety enhancements (TR), utility pole removal / safety enhancements (UP), enforcement and education – alcohol related (EEA), enforcement and education – speeding related (EES), enforcement and education – restraint related (EER), infrastructure improvements – speeding related (II), or install cable median barrier (CMB); ☐ Pennsylvania Intersection Safety Improvement Program (ISIP) – the project must implement the specific identified safety improvement: STOP, SIGNAL, LEFT TURN, PED, or SPEED; ☐ The project incorporates one or more FHWA proven safety countermeasures (see http://safety.fhwa.dot.gov/provencountermeasures/): ☐ roundabouts; ☐ access management; ☐ signal backplates with retroreflective borders; ☐ longitudinal rumble strips and stripes on two-lane roads; ☐ enhanced delineation and friction for horizontal curves; ☐ safety edge; ☐ medians and pedestrian crossing islands in urban and suburban areas; ☐ pedestrian hybrid beacons; and ☐ road diets.

DETAILED EVALUATION CRITERIA (CONTINUED)

MAIN CRITERIA	SUB-CRITERIA	DATA SOURCE	RATING SCALE (EACH MAIN/SUB CRITERIA CAN SCORE UP TO 1 POINT)
Facility / Asset Condition	-	Asset Management System Rating	Transit Projects (up to 1 point): ☐ 1 point if the improvement brings the asset from a poor condition into a state of good repair; ☐ 0.5 points if project extends the useful life of a facility / asset not in poor condition. Roadway and Bridge Projects (up to 1 point): ☐ 1 point if the project will bring a bridge deck/super/sub/culvert rating of 3 or less, a posted or weight-restricted bridge, an interstate road segment with an IRI of ≥ 180, an NHS facility with an IRI ≥ 200, a roadway with more than 2,000 vehicles per day with an IRI ≥ 230, or a roadway with less than 2,000 vehicles per day and an IRI of ≥ 260 into a state-of-good repair; ☐ 0.8 points if the project will bring a facility or asset with a "poor/worst on four or five point scale" asset management system rating into a state-of-good repair; ☐ 0.5 points if project extends the useful life of a facility not in poor condition, or resolves a fracture critical issue on a bridge; ☐ 0.25 points if project removes a functional obsolescence issue on a bridge.

GreenLITES Recognizing Leadership in Transportation Environmental Sustainability

GreenLITES for Sustainable Planning

The New York Department of Transportation (NYSDOT) is committed to a transportation system that supports a sustainable society and has initiated the **GreenLITES** program as a way to achieve this goal. The integration of **GreenLITES** into the transportation planning and programming process will help to ensure a more balanced approach in making transportation decisions. By incorporating sustainable practices in the planning phase, communities will begin the process of securing a more sustainable, vibrant and healthy environment.

Although the preservation of our existing transportation infrastructure is vitally important, finding new solutions that enhance our communities is also important. This can be accomplished by incorporating planning practices that promote more liveable, vibrant communities and at the same time, preserve the environment.

The NYSDOT examined various ways of addressing **GreenLITES** in planning, including incorporating sustainable goals in long range plans and in the development of the Department's capital program. Another option involved promoting **GreenLITES** in planning at the local level The project solicitation tool was developed to assist municipalities in planning projects in the earliest stage.

GreenLITES for Sustainable Planning

The 13 metropolitan planning organizations (MPOs) in New York State periodically reach out to the local municipalities to identify projects for inclusion in the State's transportation program. A **GreenLITES** project solicitation tool has been developed to assist municipalities in identifying their projects. Emphasis is placed on projects that support sustainability by improving the community's transportation infrastructure and quality of life, contributing to a vibrant economy, and minimizing impacts to the environment.

This DRAFT **GreenLITES** project solicitation tool has been developed by NYSDOT in collaboration with several New York State MPOs. The tool's purpose is to ensure a more balanced approach in selecting projects and making sustainable transportation decisions. This helps municipalities assess how closely projects are aligned with transportation planning practices that support a sustainable society.

Municipalities may use the **GreenLITES** project solicitation tool posted on this site to self rate their proposed projects. The rated projects are then submitted to the appropriate MPO (http://www.nysmpos.org/) and reviewed for:

- Completeness and accuracy for appropriate points.
- Verification of information – the MPO may follow-up with questions concerning the proposed project and alignment with specific criteria.

Rated projects will be considered by the MPOs for inclusion in the transportation program, known as the Transportation Improvement Program (TIP). Additional screening of projects will take place at the MPO through their project selection process.

Comments or questions regarding the Planning project solicitation tool may be submitted to the **GreenLITES** program manager at: GreenLITES@dot.state.ny.us

How to Use This DRAFT Tool

This rating tool will provide a mechanism to determine how closely your project is consistent with these sustainability goals. Points are awarded for each criterion that supports these goals, with each "yes" answer receiving one point. If the criterion is not applicable to the project, the "no" box can be checked or "NA" written in the comment box. The comment box is an opportunity to briefly explain how the project addresses the specific criteria.

The criteria below are preceded by a question which provides context to the criteria. For example, the first question focuses on the comprehensive plan and all the subsequent questions relate to the plan.

1. Is the project consistent with current local comprehensive plan? If the community does not have a plan, answer "no" to the questions.

		YES	NO	Comments
1a.	Has the Plan been developed within the last 10 years?	☐	☐	
1b.	Does the Plan provide a vision of community objectives and priorities?	☐	☐	
1c.	Does the Plan incorporate "walkable communities" and /or "complete streets" concepts?	☐	☐	
1d.	Has the Plan been developed through an enhanced public outreach effort? This would involve reaching out to all members of the community.	☐	☐	
1e.	Does the Plan promote population and development densities that are sufficient to warrant public transit?	☐	☐	
1f.	Is the project consistent with the objectives of the Plan?	☐	☐	

Total Points (Maximum points= 6) _____

2. Does this project support many of the "liveability principles"?

		YES	NO	Comments
2a.	Does the project provide for more transportation choices (modes) that are safe, reliable, and affordable?	☐	☐	
2b.	Does the project enhance economic competitiveness through reliable and timely access to employment centers, housing, educational **o**pportunities, and expanded business access to markets?	☐	☐	
2c.	Does the project contribute toward the revitalization of existing communities through transit–oriented, mixed used development?	☐	☐	
2d.	Does the project enhance the unique characteristics of the community by investing in healthy, safe & walkable neighborhoods?	☐	☐	

Total Points (Maximum points = 4) _____

3. Does this project protect and enhance the environment?

		YES	NO	Comments
3a.	Does the project encourage the efficient use of energy resources and renewable alternatives? Examples are: • Energy & Atmosphere – reduce petroleum consumption and air emissions by improving traffic flow through coordinated signal systems, installing of a transit express system, and limiting access points along a highway. • Electrical consumption – use LED street lighting and LED traffic lights. • Petroleum consumption – reduce petroleum consumption by providing new park & ride lots; increasing bicycle amenities at Park & Rides and transit stations; incorporating ITS technology to improve traffic flow.	☐	☐	

3b.	Does the project consider aesthetics in design – context sensitive design, landscaping, visual easements, etc.?	☐	☐	
3c.	Does the project include Ecology and Habitat Enhancements, such as species protection, wetlands protection, and native communities?	☐	☐	
3d.	Does the project involve redevelopment or reuse of Brownfields? The redevelopment of Brownfields leads to public benefits through the removal of hazardous wastes.	☐	☐	
3e.	Does the project contribute toward reducing Greenhouse Gas Emissions (GHGs)?	☐	☐	

Total Points (Maximum Points = 5) _____

4. Does the project support the economic vitality of the affected area, and at the same time, minimize adverse environmental impacts?

		YES	NO	Comments
4a.	Does the project enhance the region's attractiveness to new/ existing businesses?	☐	☐	
4b.	Does the project support use of or reinvestment in high density mixed use urban areas or villages?	☐	☐	
4c.	Does the project avoid previously undeveloped land (open spaces or greenfields)?	☐	☐	
4d.	Does the project avoid or minimize impacts to social/environmental resources (parklands, wetlands, historic sites, farmlands, and viewsheds,)?	☐	☐	

Total Points (Maximum Points =4) _____

5. Does the project contribute toward increasing accessibility and mobility options?

		YES	NO	Comments
5a.	Does the project improve bicycle and pedestrian facilities, such as shoulder widening to provide for on-road bike-lane, new pedestrian signals, new or extended sidewalks, etc.?	☐	☐	
5b.	Does the project improve access to transit facilities for multiple users? This may include new /expanded transit infrastructure, such as platforms, stations, parking and rail lines.	☐	☐	
5c.	Does the project enhance accessibility for persons with disabilities and meet ADA requirements?	☐	☐	

Total points (Maximum Points=3) _____

6. Does the project employ unique financing arrangements?

		YES	NO	Comments
6a.	Does the project uses Public/Private partnerships to finance the initial cost, or some aspect of this project (operating costs)?	☐	☐	
6b.	Is the project located in a special assessment district, and is it being financed through taxes or fees collected from developments in the district?	☐	☐	
6c.	Does the project use other innovative financing arrangements?	☐	☐	

Total points (Maximum Points= 3) _____

7. Other considerations – Does the project address other sustainable transportation practices that are not included in this guidance? For example, does the project employ methods that will lead to a longer life of that facility, (i.e. life cycle cost savings)?

_____
_____
_____
_____

Add 1 point for additional considerations.

TOTAL POINTS (Maximum points = 26) _____

NOTE: A higher score does not necessarily equate to a more sustainable project. The rater must consider the context and purpose of the project, and how the project addresses both community and transportation needs. The tool simply demonstrates whether a project has been vetted through a comprehensive planning process, with consideration given to environmental, social and economic factors.