



Appendix D

Plan-TIP Project Evaluation Criteria

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PLAN-TIP

PROJECT EVALUATION CRITERIA



DELAWARE VALLEY
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REGIONAL
PLANNING COMMISSION

OCTOBER 2023





The Delaware Valley Regional Planning Commission

is the federally designated Metropolitan Planning Organization for the Greater Philadelphia region, established by an Interstate Compact between the Commonwealth of Pennsylvania and the State of New Jersey. Members include Bucks, Chester, Delaware, Montgomery, and Philadelphia counties, plus the City of Chester, in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer counties, plus the cities of Camden and Trenton, in New Jersey.

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DVRPC's vision for the Greater Philadelphia Region is a prosperous, innovative, equitable, resilient, and sustainable region that increases mobility choices by investing in a safe and modern transportation system; that protects and preserves our natural resources while creating healthy communities; and that fosters greater opportunities for all.

DVRPC's mission is to achieve this vision by convening the widest array of partners to inform and facilitate data-driven decision-making. We are engaged across the region, and strive to be leaders and innovators, exploring new ideas and creating best practices.

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SUMMARY

The *Plan–TIP Project Evaluation Criteria* are used to evaluate candidate transportation projects relative to the vision and goals of the *Connections 2050 Long-Range Plan* ('Plan') and federal Transportation Performance Management performance measure (PM) targets for roadway safety (PM-1), bridge and pavement condition (PM-2), and system performance (PM-3); and transit safety and asset management. The criteria were developed in collaboration with DVRPC's Financial Planning Subcommittee of the Regional Technical Committee (RTC). There are two tiers to the evaluation: (1) a screening to compare candidate consistency with the Plan's equity, sustainability, and resiliency principles, and to ensure Major Regional Projects (MRPs) are funded in the region's Plan before being programmed in the region's Transportation Improvement Program (TIP); and (2) a set of evaluation criteria based on the Plan's focus areas—the environment, communities, transportation, and the economy—and the federal PMs.

Screening

- ▶ Does the candidate meet the definition of an MRP? (see Appendix A)
- ▶ **Resiliency:** Is the project located in a 100- or 500-year floodplain?
- ▶ **Sustainability:**
 - › **Roadway and Transit Network Expansion:** Is the project consistent with the regional land use vision?
 - › **Roadway Network Expansion:** Is the project consistent with the regional Congestion Management Process (CMP)?
- ▶ **Equity:** Is the project potentially burdensome for populations of interest under Environmental Justice (EJ) and/or does it equally distribute benefits experienced by populations under Title VI?

Evaluation Criteria

Projects that advance through the screening are evaluated by ten criteria. The Financial Planning Subcommittee voted to apply weights to the criteria [shown in brackets]. These weights are multiplied by each project's rating from a rating scale developed

for each criterion which are summed to determine a total benefit points score.

■ Environmental Criteria

- ▶ **Impervious Surface Coverage [5.5%]** – Aligns with Plan goals to improve water quality, prepare communities for the impacts of climate change, reduce flooding risks, and mitigate the heat island effect. Projects score by reducing impervious surface coverage, and can receive bonus points by incorporating green design techniques.
- ▶ **Greenhouse Gas Emissions and Air Quality [7.2%]** – Pertains to the Plan's goals to attain net-zero greenhouse gas (GHG) emissions by the year 2050, reduce vehicle miles traveled (VMT), and improve air quality. TIP projects score on their ability to reduce GHG and National Ambient Air Quality Standards (NAAQS) pollutant emissions. MRPs score based on their ability to reduce VMT.

■ Communities Criteria

- ▶ **Centers and Form [13.7%]** – Supports the Plan's goals to focus growth in mixed-use, walkable Centers across the region; promote

vibrant main streets and downtowns, and live/work opportunities; and PM-3. Projects score based on location relative to Plan and Freight Centers, and regional Development Intensity Zones (DIZ) based on density and proximity.

- **Equity Benefits and Burdens [12.4%]** – Applies to the Plan’s goals to foster racially and socioeconomically integrated communities and advance EJ for all the region’s inhabitants. Candidates score based on a set of potential benefits and burdens and the concentration of historically and currently marginalized populations living within the project’s limits.

■ Transportation Criteria

- **Safety [23.2%]** – Corresponds to the Plan’s goal to achieve Vision Zero—no transportation-related deaths or serious injuries—by 2050 and meet transit and roadway safety PM targets. Roadway projects score by implementing safety strategies with high-crash reduction potential, and by addressing department of transportation (DOT)-identified high-crash locations, crashes in communities of concern, or safety concerns on a city, county, or regionally identified high-injury network. Transit projects score by implementing safety strategies at locations with documented safety issues.
- **Facility / Asset Condition [12.5%]** – Relates to the Plan’s goal to rebuild and modernize the region’s transportation assets and meet transit and roadway asset condition PM targets. Projects score by being consistent with lowest life-cycle cost analysis (LLCA) recommendations in pavement and bridge asset management models or by improving the state-of-repair for transit assets.

■ Economic Criteria

- **Connectivity [8.3%]** – Considers project benefits to the overall transportation system, the Plan’s multimodal transportation network vision, and ability to meet PM-3

targets. TIP candidates score by enhancing existing or making new connections. MRPs score by analyzing their potential to increase job accessibility.

- **Reliability [6.9%]** – Reflects Plan goals to increase reliability and mobility, reduce congestion and VMT, and meet PM-3 targets. Projects score by being on or surrounded by roads with a high Planning Time Index (PTI) or improving on-time performance for fixed guideway transit routes.
- **Congestion Management [6.4%]** – Aligns with the Plan’s goals to increase reliability, reduce congestion and VMT, and meet PM-3 targets. Projects score based on location in a CMP congested subcorridor only if they implement a CMP strategy appropriate for that subcorridor.
- **Truck Volumes [3.9%]** – Relates to the Plan’s goal to improve global connections by facilitating goods movement, intercity connections, and access to aviation as well as support PM-3 targets. Candidates rate based on the number of daily trucks using the facility, if the project is on a facility appropriate for truck use and it maintains or enhances freight activity.

Ranking Projects

The criteria scores are summed to determine total benefit points. The candidates are then ranked by:

- total benefit points;
- total benefit points to capital cost;
- total benefit points to capital cost per multimodal user; and
- total benefit points to capital plus additional operating and maintenance costs per multimodal user.

These four rankings are also averaged and the results are provided to the Financial Planning Subcommittee to provide a data-informed analysis for which candidates to prioritize for funding in the TIP and Plan.

BACKGROUND

The Delaware Valley Regional Planning Commission (DVRPC) is federally mandated to produce a long-range plan ('Plan') that identifies a vision for the orderly growth and development of the nine-county, bi-state Greater Philadelphia region. DVRPC is also federally charged to create a Transportation Improvement Program (TIP) that identifies all transportation projects eligible for federal funding, although it is not a guarantee of funding. Both of these documents are critical to identify, prioritize, plan, design, and implement regional transportation projects.

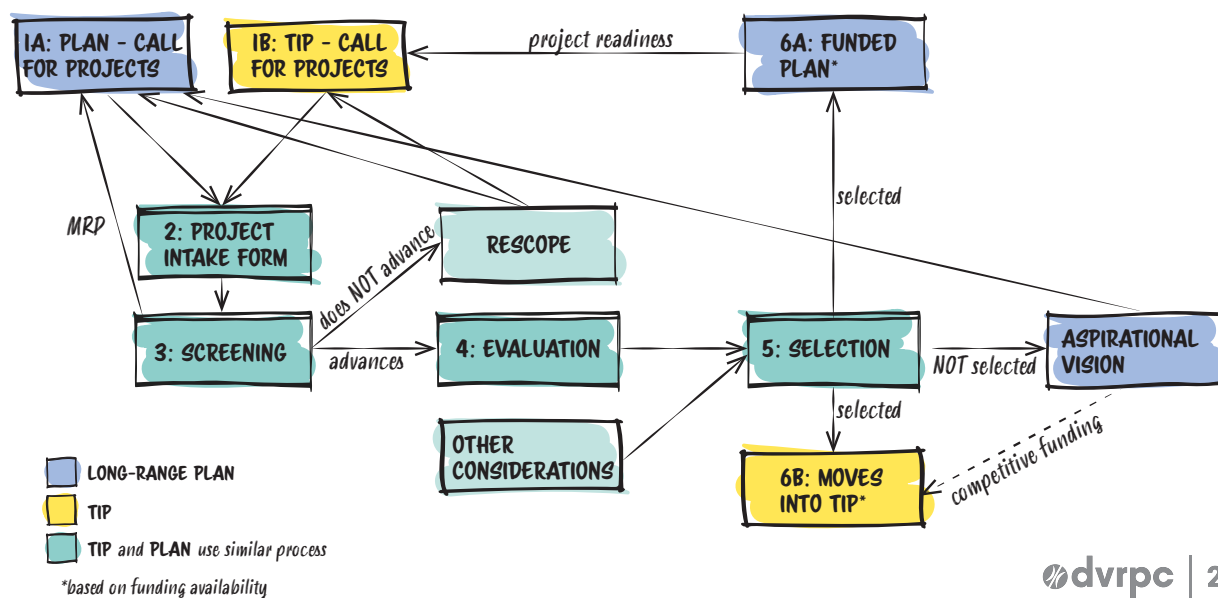
The *Plan–TIP Project Evaluation Criteria* is a tool for data-informed investment decisions for new candidate transportation projects in the TIP and most candidate Major Regional Projects (MRPs) in the Plan that have not used federal funding to date. At a minimum, the criteria are needed to meet the Federal Highway Administration (FHWA) requirements to use a project evaluation process for selection of projects to be programmed in the TIP and the Plan. Beyond that, the criteria are seen as an effective way to inform regional decision making to ensure that transportation investments: (1) align with the vision and goals of the *Connections 2050 Long-Range Plan for Greater Philadelphia*; and (2) help achieve FHWA and Federal Transit Administration (FTA) Transportation Performance Management (TPM) performance measure targets and related safety, asset management, and Congestion Mitigation and Air Quality (CMAQ) performance plans.

The criteria are one part of DVRPC's project identification and selection process for both the TIP and the Plan, see Figure 1. This process starts with a call for projects to the MPO's planning partners via a project intake form that asks project sponsors to provide relevant data needed for project evaluation. The initial step of project evaluation is a screening to test for consistency with the Plan's vision and goals and to ensure MRPs are funded in the Plan before moving into the TIP. Some projects that do

not pass portions of the screening are excluded from the evaluation and are not included in the Plan or TIP.

Candidates that pass the screening undergo an evaluation to score their relevance to the Plan's goals and TPM measures. The results are used along with other considerations—geographic equity, regional and local priorities, stakeholder support, funding eligibility, performance-based planning and asset management, project readiness, ability to leverage other investments, and system-level Environmental Justice (EJ) analysis—to select projects. Requirements for fiscal constraint, where neither the long-range plan nor the TIP can plan to spend more on transportation investments than its reasonably expected revenue, serves as a limit to how many projects can be included in each. Project selection is facilitated by DVRPC staff with decisions ultimately made by planning partners that represent the MPO's governing board. MRPs that pass the screening are then evaluated with the criteria. Those that the Financial Planning Subcommittee recommends and then the Board selects to be funded within reasonably anticipated revenue are listed in the Funded Plan. Those that cannot be afforded within fiscal constraint are generally shown in the Plan through an aspirational, unfunded vision list. These projects can advance into the funded Plan or TIP if additional funding, including competitive funding, becomes available.

Figure 1: Project Identification, Evaluation, and Selection Process



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MRPs funded in the Plan can move into the TIP based on project readiness and funding availability. These projects are reevaluated as part of the TIP project selection process.

The *Plan–TIP Project Evaluation Criteria* are designed to be mode neutral to roadway, transit, bike, pedestrian, and freight projects in order to evaluate and compare a variety of project types—road and transit preservation, operational improvements, and network expansion, along with non-motorized projects—and to be used in both the New Jersey and Pennsylvania counties in the DVRPC region. The evaluation is meant to highlight some of the trade-offs that occur within a given investment or set of investments, as the region strives to develop a diverse set of projects that support and advance equity, sustainability, and resiliency. The criteria draw from many existing analytical processes already conducted by DVRPC, most notably the Congestion Management Process (CMP).

Externally funded and competitively funded projects are shown in the TIP and the Plan, but are not

included in the evaluation process.¹ Table 1 lists project categories and whether and when they are evaluated in both the TIP and Plan development. Bridge and pavement preservation and Circuit Trail network projects are not evaluated in the Plan. While asset management models predict which bridges and pavement segments will be most in need of repair in the future, actual performance may vary from these predictions. MRPs that incorporate system preservation elements along with substantial safety, operational improvements, system expansion, or green transportation are evaluated in the Plan. Likewise, challenges in right-of-way acquisition, obtaining funding for design, and determining maintenance and operations responsibility makes it difficult to determine when specific Circuit Trails segments will be ready for construction. Instead, funding is set aside in the Plan for these project categories—not assigned to explicit projects—and projects are evaluated as they are ready to move into the TIP. Substantive Safety, Operational Improvements, System Expansion, non-Circuit Green Transportation roadway, and all transit

¹Externally funded projects are largely developed outside the regional planning process and are funded by a sponsoring transportation funding authority such as a tolling authority. Competitively funded projects receive grant dollars outside of the region's regular formula funding, through Pennsylvania's Multimodal Fund, New Jersey's Local Freight Infrastructure Fund, and federal competitive grant programs such as through the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA).

Table 1. Non-MRP and MRP Evaluation in TIP and Plan Updates

PROGRAM	PROJECTS EVALUATED	PROJECTS NOT EVALUATED
TIP	<ul style="list-style-type: none"> ▶ All new non-Interstate Management Program (IMP) candidates 	<ul style="list-style-type: none"> ▶ IMP projects^a ▶ Projects funded in existing TIP ▶ Externally and competitively funded projects
PLAN	<ul style="list-style-type: none"> ▶ Most new candidates that meet the definition of a Major Regional Project (MRP); exceptions listed in Plan Projects Not Evaluated cell to the right^b 	<ul style="list-style-type: none"> ▶ IMP projects ▶ System preservation projects^c ▶ Circuit Trail projects^d ▶ Existing MRPs that have utilized federal funding^e ▶ Externally and competitively funded projects

Notes

^a The IMP applies only to Pennsylvania. Projects in this program fund Interstate pavement and bridge preservation projects, which are identified, evaluated, and selected by PennDOT at the state level.

^b See Appendix A for MRP definitions.

^c System preservation projects are shown in an 'illustrative' list in the Plan. These projects are consistent with the Plan's vision and goals and can advance into the TIP based on project readiness, funding availability, and regional prioritization. MRPs where roadway preservation is only one element within a larger scope are (re)evaluated as part of Plan development.

^d Circuit Trail projects are shown in an 'illustrative' list in the Plan. These projects are consistent with the Plan's vision and goals and can advance into the TIP based on project readiness, funding availability, and regional prioritization.

^e MRPs that have spent federal funds are not re-evaluated in order to avoid federal reimbursements.

Source: DVRPC, 2023.

candidates that meet the definition of an MRP and are seeking federal and state formula funding through DVRPC are evaluated using the Plan (MRP) version of this criteria. Projects that have spent federal dollars are not reevaluated, in order to avoid the risk of having to repay federal funds.²

Some funding sources require more specific project criteria to evaluate candidate projects, and those will continue to be used as necessary. Some specific funding programs that have developed their own criteria for use in conjunction with, or in place of, the *Plan-TIP Project Evaluation Criteria*. These include the Transportation Alternatives Set Aside (TASA), the Highway Safety Improvement Program (HSIP), and CMAQ.³ Several of these programs are vital to constructing Circuit Trail network segments.

Criteria Development Process

DVRPC worked with the Financial Planning Subcommittee of the RTC to update and set weights to the criteria through a consensus-driven process. Criteria development followed good project evaluation practices that:

- ▶ avoid measuring the same goal(s) multiple times,
- ▶ are more quantitative than qualitative,
- ▶ use readily available data with a strong likelihood of continued availability,
- ▶ consider network-level interactions, and
- ▶ use simple and understandable criteria.

² Once a project has spent federal money for any phase (from preliminary engineering to construction) it starts a federal clock to be complete within ten years. Projects not completed within 10 years have to repay the federal funds they have spent to date. MRPs that have spent federal funds are considered to be 'federalized', and are not reevaluated in each long-range plan update.

³ The Carbon Reduction Program created by the IIJA is likely to develop a specific set of project evaluation criteria in the future.

In addition, DVRPC staff and the Financial Planning Subcommittee developed a set of objectives for this update:

- ▶ Simplify the evaluation process and increase weights of key criteria.
- ▶ Communicate results more clearly.
- ▶ Improve alignment with the vision and goals of the *Connections 2050* Plan, specifically:
 - › Incorporate Vision Zero goals into Safety.
 - › Apply Lowest Life-cycle Cost Analysis (LLCA) to Facility / Asset Condition.
 - › Include resiliency.
 - › More directly account for greenhouse gas (GHG) emissions as part of a net-zero emissions goal by 2050.
- ▶ Strengthen ties to FHWA and FTA TPM performance measures and targets.
- ▶ Add TIP screening for eligibility to use federal funds, and check if a candidate is an MRP that should be first funded in the Plan before moving into the TIP.
- ▶ Expand the equity / EJ criterion through separate benefits and burdens analyses.
- ▶ Incorporate the *Dispatches from Alternate Futures* scenarios and a new Development Intensity Zones (DIZ) regional transect.

Not all of these objectives were achieved in this update. For example, the *Dispatches* scenarios were unable to be incorporated.

Development of the criteria and goals for the update were shaped by *The State of the Practice: A Study of DVRPC's Peer Metropolitan Planning Organizations' Long-Range Plans* (DVRPC publication #23109). This effort included the preparation of a *State-of-the Practice in MPO Long-Range Planning: Project Evaluation* technical memo (DVRPC publication #23112) detailing the project evaluation practices of the 14 peers identified in this research.

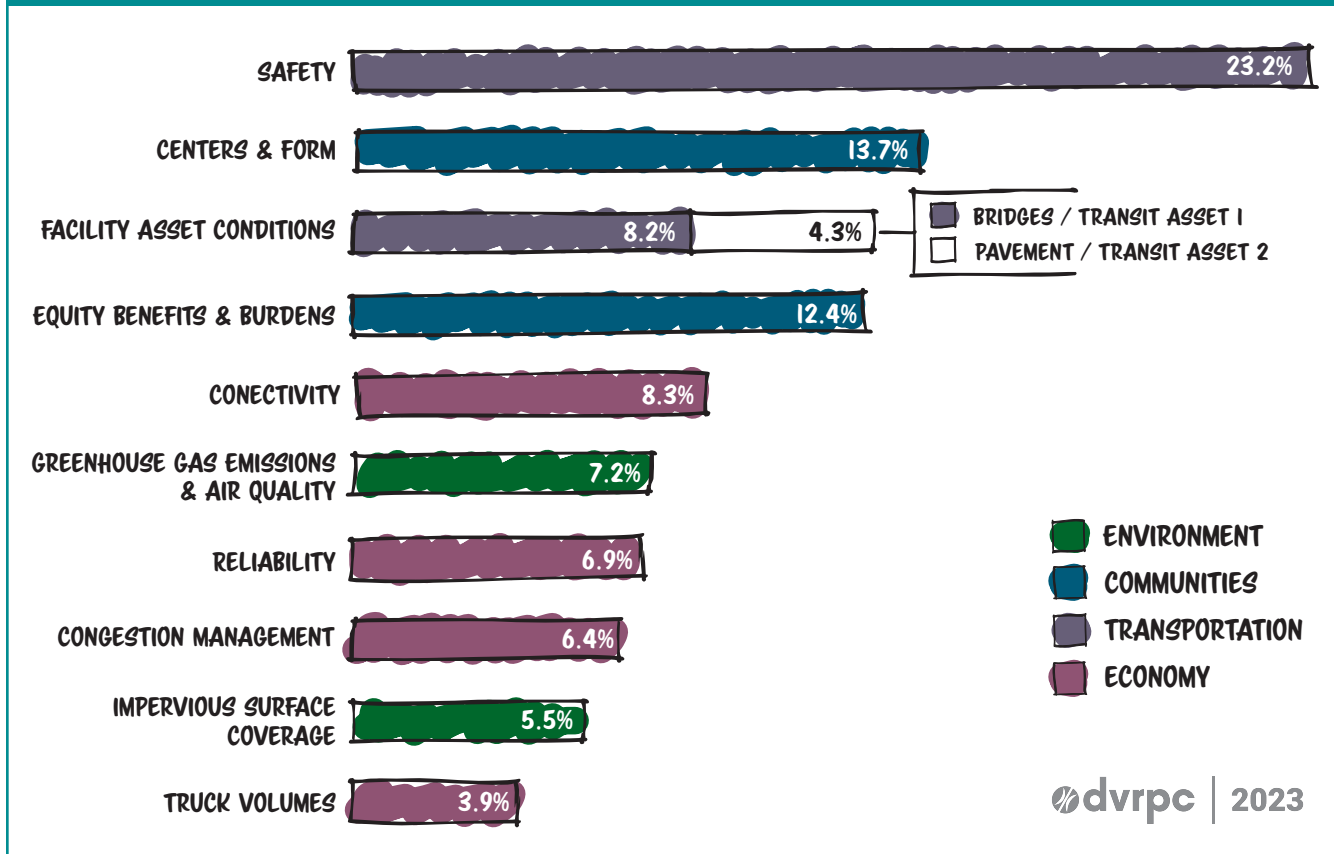
The subcommittee met 14 times as part of this

update and reviewed draft materials before they were finalized. These meetings also included an update to how projects are categorized in the TIP and Plan, a listening session for the subcommittee to talk about the previous set of criteria and ideas they have for improving them, and a DVRPC staff presentation of what's working and where there are opportunities to improve the current criteria. Each individual screening and evaluation criterion were presented and discussed over a series of three separate meetings. The first meeting presented an initial draft of the proposed criterion, followed by a discussion and suggestions made by the subcommittee. The second meeting presented the revised criteria based on subcommittee suggestions, gave more time for discussion and review, and then held a vote on where the subcommittee stood on the criteria as proposed and revised. The third meeting presented any additional changes based on the second meeting, followed by an ask for subcommittee consensus on the project. One criterion failed to achieve consensus on its first round, and went through a major revision before it was repropose. The final subcommittee meeting set weights for the evaluation criteria. The DVRPC Board adopted the October 2023 update to the *Plan-TIP Project Evaluation Criteria* on October 26, 2023.

Figure 2 summarizes the final set of criteria and their weights. The criteria were weighted through pairwise comparison voting by members of the Financial Planning Subcommittee, using a proprietary software program called Decision Lens. In each pairwise comparison, voting members compare two indicators in a head-to-head vote to determine which of the two is more important and by how much. Voting results are tallied to weight each criterion. The weights are a reflection of the relative importance placed on each criterion by the subcommittee.

Two of these criteria—connectivity and impervious surface coverage—are new to the evaluation. They were identified through DVRPC's *State-of-the-*

Figure 2. TIP-Plan Project Benefit Criteria Weighting



Practice research. The other eight are carried over from the previous iteration, but have undergone some degree of revision in order to improve the overall evaluation process. Larger changes occurred with Safety, Centers and Form, Facility / Asset Condition, Equity Benefits and Burdens, and Greenhouse Gas Emissions and Air Quality. Safety separates out and scores now only for substantive strategies, which are more likely to reduce transportation fatalities and serious injuries. Centers and Form incorporates the new regional DIZ transect. Facility / Asset Condition moves from a worst-first approach to project prioritization to one based on LLCA as determined by state DOT asset management models. Equity benefits and burdens considers how different types of transportation projects impact communities with high Indicators of Potential Disadvantage. Greenhouse Gas Emissions and Air Quality now measures anticipated emissions impacts from all types of projects.

Each criterion has a detailed rating scale that shows how a project is scored. The rating is multiplied by the criterion's weight and then summed for all the criteria to arrive at a total benefits score for each candidate.

The next sections detail the use of DVRPC's travel demand model to evaluate MRPs and show the relationships between the criteria and federal TPMs. After that, the screening analysis steps are detailed, followed by in-depth rating scales for each criterion. The evaluation concludes with four different ranking systems that compare results: total benefit points determined by the criteria, total benefit points to capital costs, benefit points to capital cost per multimodal facility or asset user, and benefit points to capital plus additional operating and maintenance costs per multimodal user. A fifth ranking system considers how the project scored on average across these four approaches. The results

of these analyses are published as part of the TIP and Plan documentation.

Modeling Major Regional Projects

Greenhouse Gas Emissions and Air Quality (measuring VMT) and Connectivity (measuring accessibility to jobs) criteria use regional-level activity-based travel demand model outputs for MRPs. In addition, Truck Volumes are based on facility level model results for new roads, while new transit facilities utilize the model's projected ridership for multimodal use in the project ranking.⁴ Each MRP that is not yet federalized is run for the AM peak period (6:00 - 10:00 AM) in the year 2050, and compared with the "no-build" results for the same time period.⁵ The no-build analysis incorporates the existing transportation network at the time of analysis, all existing and committed TIP projects with construction dollars that fully fund the project scope in the Pennsylvania twelve-year program and the New Jersey ten-year program, and all toll authority projects listed in the Plan's Externally Funded Projects—Funded Plan table. Existing projects are already built and open to traffic and committed projects are those in the TIP with construction funds programmed. More specific details on the use of travel demand model data outputs can be found in the Greenhouse Gas Emissions and Air Quality, Connectivity, Truck Volumes, and Ranking Projects sections. MRPs use TIP scoring methods if modeling analysis cannot be performed. Each project's study area in the Travel Demand model is defined by a one-mile buffer around the Census blocks that the project is located within. The model data reported will then compare the build–no-build differences within that study area. Project study areas will not overlap in the same model run.

Relationships Between Evaluation Criteria and Transportation Performance Management

The evaluation criteria align with the TPM metrics, but cover a wider geography since they are applied to all types of facilities—including roads, transit, bike and pedestrian facilities, and other types of transportation infrastructure. Table 2 identifies how the evaluation criteria correspond to the various TPM measures. A key difference between the two is that the TPMs measure system-level performance, while the evaluation criteria compare how proposed transportation investments meet various regional goals, including meeting TPM targets, at the facility level. A second major difference is the TPM metrics specify specific geographies and facilities, while the evaluation criteria aim to evaluate any publicly funded road, transit, or bike pedestrian infrastructure.

⁴ Multimodal use is defined in the 'Ranking Projects' section.

⁵ Federalized projects have spent federal dollars on any phase. These projects are not included in the evaluation. See Table 1 and associated text for more information.

Table 2. Relationships Between Project Evaluation Criteria and Transportation Performance Management (TPM) Metrics

TPM AREA	TPM METRIC(S)	TPM GEOGRAPHY	RELATED EVALUATION CRITERIA
SAFETY (PM-1)	Number of Fatalities	All public roads	Safety
	Fatality Rate (per 100 million VMT)		
	Number of Serious Injuries		
	Serious Injury Rate (per 100 million VMT)		
	Number of Non-Motorized Fatalities and Serious Injuries		
BRIDGE AND PAVEMENT CONDITION (PM-2)	Good Pavement Miles	Interstates and National Highway System (NHS)	Facility / Asset Condition
	Poor Pavement Miles	Interstates and NHS	
	Good Bridge Deck Area	NHS	
	Poor Bridge Deck Area	NHS	
SYSTEM PERFORMANCE (PM-3)	Non-Single Occupant Vehicle Commute Modeshare	Urbanized Areas (UZAs)	Connectivity
	Person-Miles Traveled with Reliable Travel Times	NHS	Reliability, Congestion Management
	Peak-Hour Excessive Delay	Peak periods for all NHS facilities in UZAs	Reliability, Congestion Management
	Truck-Travel Time Reliability	Interstates	Reliability, Congestion Management, Truck Volumes
TRANSIT ASSET MANAGEMENT	Rolling Stock	Revenue vehicles	Facility / Asset Condition
	Equipment	Non-revenue vehicles	
	Facilities	Passenger, administrative, and maintenance facilities	
	Infrastructure	Rail track	
TRANSIT SAFETY	Fatalities	Entire transit service area	Safety
	Injuries		
	Safety Events		
	System Reliability		

Source: DVRPC, 2023.

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SCREENING CRITERIA

The first component of the evaluation is to screen candidates in order to ensure that major regional projects are funded in the Plan before moving into the TIP, and to test for consistency with the *Connections 2050* principles of equity, resiliency, and sustainability. The screening is used to filter out some projects that are inconsistent with the Plan's vision and policies, flag projects for further analysis or public engagement, and ensure MRPs are funded in the Plan before being programmed in the region's TIP. Candidates that do not pass the screening are not listed in the Plan's aspirational vision project list.

Screening for TIP Candidates Only

MRP Screening

Does the candidate meet the definition of an MRP?⁶

1. If yes, is it funded in the current Board-adopted Long-Range Plan?
 - a. If yes, the candidate project advances.
 - b. If no, the candidate must first be funded in the Plan before it can be added to the TIP. Project may advance with a concurrent Plan amendment, with the agreement of a state department of transportation (DOT), transit agency, or other implementation agency.
2. If no, project advances.

Screening for Plan and TIP Candidates

Resiliency Screening

Is the project located in a 100- or 500-year Federal Emergency Management Agency (FEMA) floodplain (see Figure 3)?

1. If yes, the project advances, but it is flagged for environmental mitigation design needs and higher costs.

⁶ See Appendix A for *Connections 2050* MRP definitions.

2. If no, the project advances.

Sustainability Screening

Consistency with regional land use vision (Roadway and Transit Network Expansion Only):

Is the candidate located in, or does it provide access to, an area marked as appropriate for development on the Plan's Land Use Vision map? Appropriate areas are shown in Figure 4 as Centers (red shading), Infill and Redevelopment (tan shading), or Emerging Growth (yellow shading).

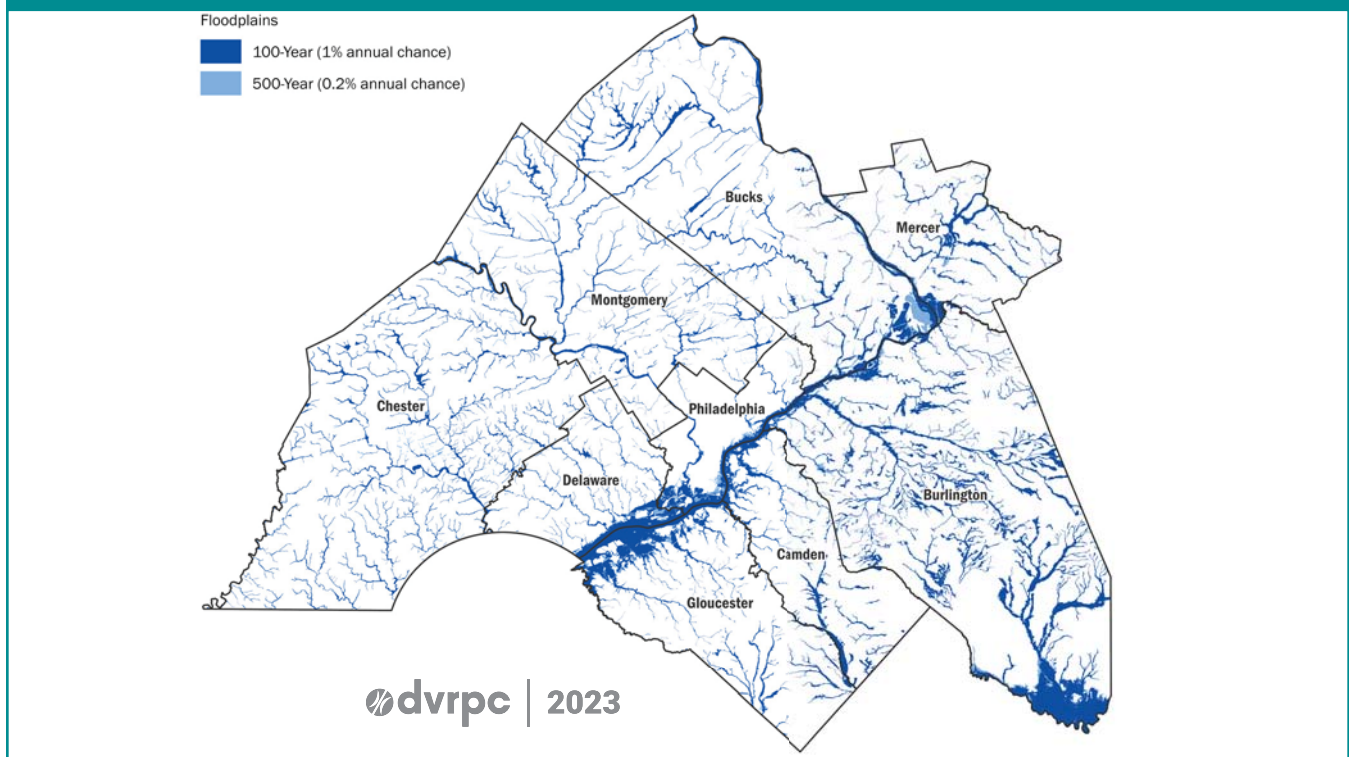
- ▶ Limited access roadways: All new interchanges located in Centers, Existing Infill and Redevelopment, or Emerging Growth areas.
- ▶ Non-limited access roadways: At least 75 percent of total project limits in Centers, Existing Infill and Redevelopment, or Emerging Growth areas.
- ▶ Transit fixed guideway rail and Bus Rapid Transit: At least 75 percent of new station stops located in Centers, Existing Infill and Redevelopment, or Emerging Growth areas.

Projects inconsistent with the Land Use Vision are excluded from further evaluation.

Consistency with the regional CMP (Roadway Network Expansion Only):

Is the project located on a facility where major single-occupant vehicle (SOV) capacity-addition

Figure 3. 100-Year and 500-Year Floodplains in Greater Philadelphia



is listed as a very appropriate or secondary appropriate strategy for the primary CMP subcorridor area and the roadway is the primary subcorridor area facility identified in the subcorridor area name. (see Figure 5)?⁷

1. If the project is not located in a CMP corridor, or if adding SOV capacity is not a strategy for the subcorridor where the project is located, the project must follow the *CMP Procedures Manual* before it can be considered in this evaluation.
 - a. If a proposed project adds major SOV road capacity outside of a CMP congested corridor, then a detailed analysis must be conducted.⁸ The Plan and TIP development processes consider this analysis and how it compares to other capacity-adding projects funded in the region.

EJ Screening

Is the project potentially burdensome for populations of interest under EJ?⁹

- a. If candidate is located in or within a quarter-mile of a census tract where Racial Minority (see Figure 6), Ethnic Minority (see Figure 7), or Low-Income population (see Figure 8) are above average or well above average in DVRPC's Indicators of Potential Disadvantage (IPD) webmap go to 'b.' Project advances if not located in one of these communities.
- b. If potential Equity Benefits \geq potential Equity Burdens, candidate project advances.
- c. If potential Equity Benefits < potential Equity Burdens:
 - i. Project advances if there has been (or will be for a Plan MRP) documented community

⁷ Primary subcorridor refers to the CMP corridor with the largest percentage of the project's limits, with consideration for the most appropriate subcorridor for the specific location if there are overlapping subcorridors.

⁸ For projects located outside a subcorridor and facility listed as appropriate for SOV capacity addition, the required *CMP Procedures* analysis steps are: (1) Does the project advance the goals and strategies of the regional long-range plan and adopted plans of the municipality(s) or county(ies)? (2) Does the facility or nearby road contain a Travel Time Index greater than 1.5, and a Planning Time Index greater than 3.0 for the peak hour? (3) Is the volume-to-capacity ratio of the facility, or nearby road, equal to or greater than 0.85 for the peak hour? (4) Is the project in an emerging growth corridor? (5) Are congested conditions going to be remedied by the proposed project? (6) How does congestion along the larger facility or corridor area change under the no-build and build scenarios? (7) What are the probable land use changes attributable to the project, and how would these changes likely impact future traffic? (8) As part of the federal regulations, does the project identify all reasonable strategies to manage SOV capacity effectively (or to facilitate its management in the future)? (9) How are the strategies evaluated chosen?

⁹ This screening follows U.S. DOT guiding principles for EJ "to avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority or low-income populations," consistent with the Plan's Equity principle.

Figure 4. Connections 2050 Land Use Vision

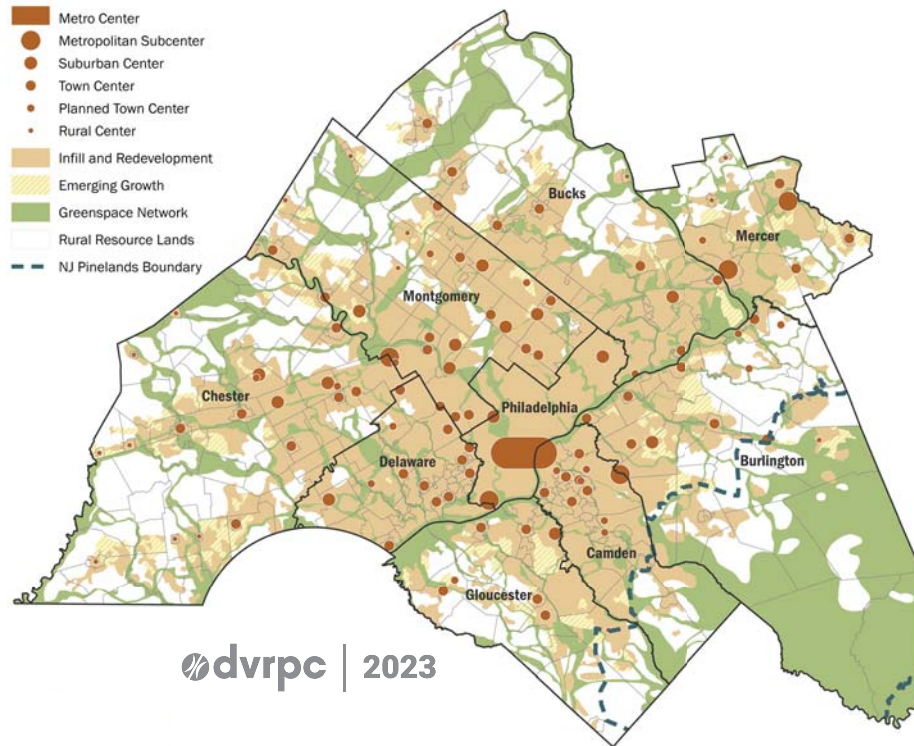


Figure 5. CMP Subcorridors with Facilities that have Roadway SOV-Capacity as an Appropriate Strategy

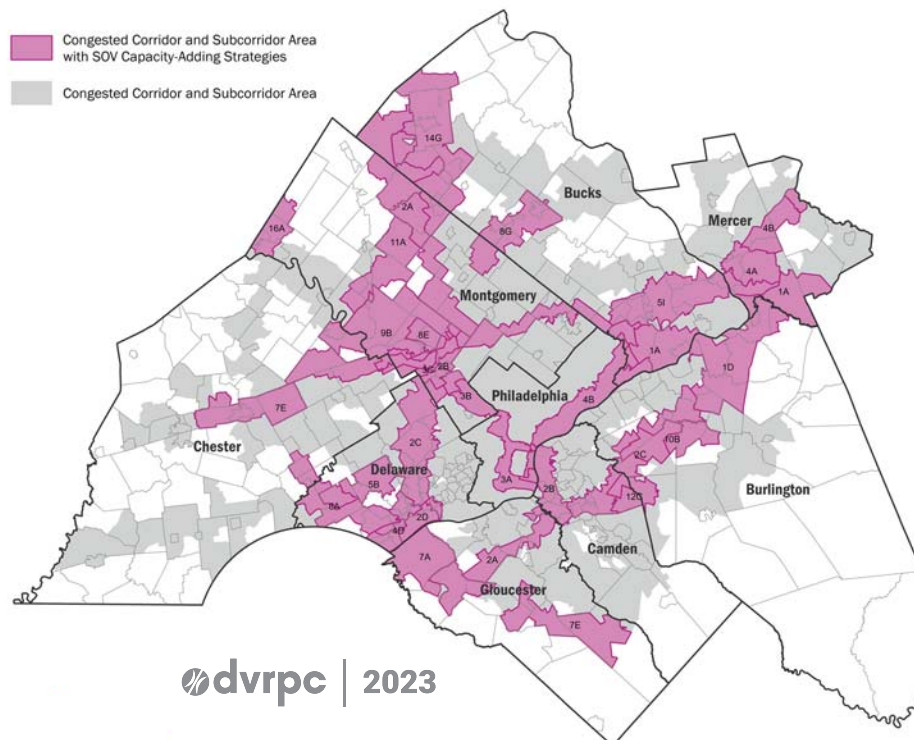
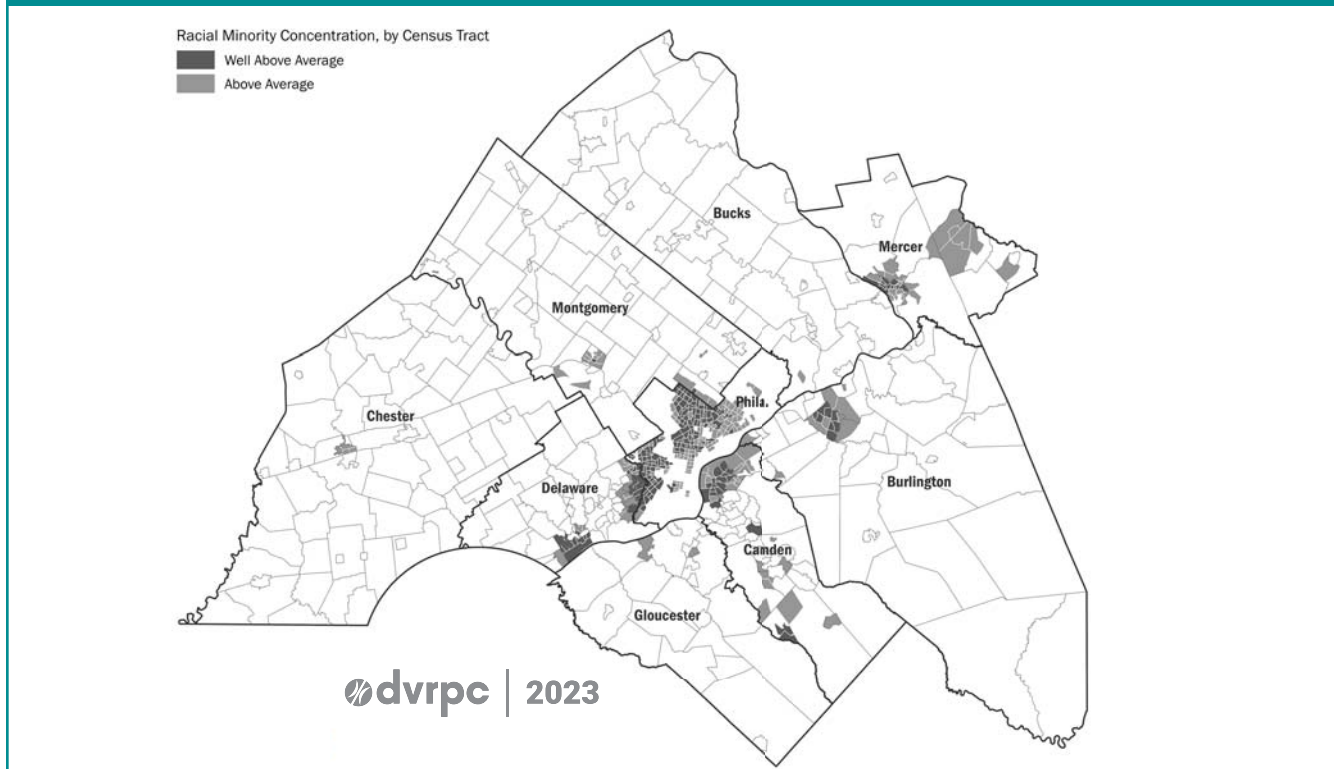


Figure 6. Racial Minority Population Concentration



engagement in the affected IPD community(ies).¹⁰ If a project is advancing with identified potential disproportionate and adverse burdens, DVRPC is available to assist local, state, and federal planning partners to identify and document strategies that avoid, mitigate, or minimize these impacts, as needed.

- ii. Project does not advance if there is no documented engagement.

Table 3 identifies benefits and burdens anticipated to result from different types of transportation investments. Table 4 provides a scoring matrix that relates benefits and burdens to the Plan's project categories. The project categories in Table 4 are used to classify investments in order to communicate and comprehend how the region is investing in transportation infrastructure.¹¹ The table scores projects based on these categories as

a starting point, and additionally based on scope and mapping of the candidate's location. Nearly every project category has at least one benefit (shown as +1 on the table) or burden (shown as -1 on the table). Benefits and burdens scoring was developed through research and a series of EJ focus groups conducted as part of the update to the *Connections 2050 Plan*. Table 4 indicates additional scoring based on project location and scope. Project location considerations include if there is a negative impact to job connections (such as by closing a bridge), or if the project creates a new environmental or cultural resource or improves a connection to one. Project scope scoring considers if the candidate risks increasing travel times or costs, or harms an environmental or cultural resource.¹²

¹⁰ See Appendix B for community engagement guidance.

¹¹ See Appendix C for more information about each project category.

¹² Among the data points used is historic significance identified in item 37 of the bridge management system. Bridges rated '1' (listed on the National Register of Historic Places), or '2' (bridge is eligible for listing on the National Register of Historic Places) score in this category.

Figure 7. Ethnic Minority Population Concentration

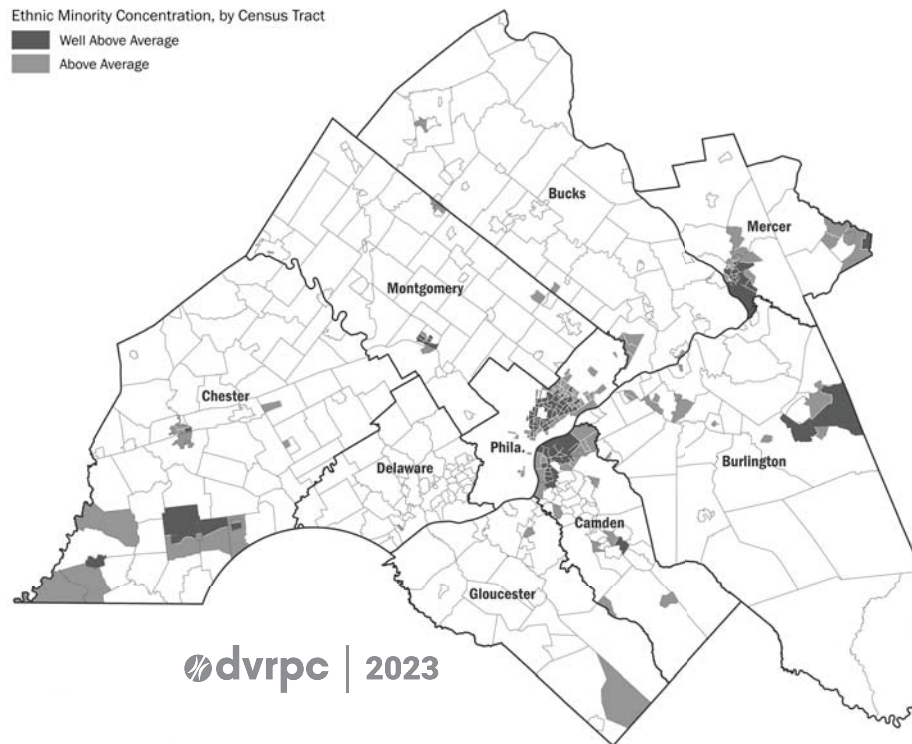


Figure 8. Low-Income Population Concentration

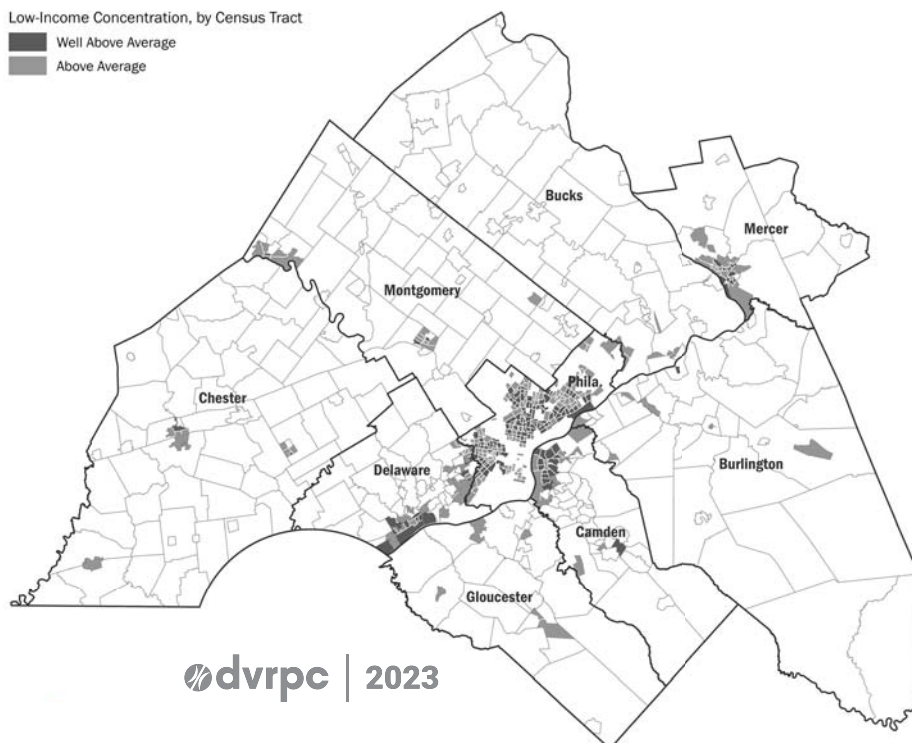


Table 3. Transportation Project Benefits and Burdens

ISSUE	BENEFITS	BURDENS
ACCESS, COHESION, AND WELLNESS	Increased through removed barriers (such as a cap over a limited access facility or pedestrian bridge), better access to transit options, new active transportation options, and/or Americans with Disabilities Act (ADA) improvements.	Physical division of communities and new barriers that reduce access to bicycling and walking or essential opportunities such as healthcare, education, employment, and grocery shopping.
TRAVEL TIME / COST	Savings through new connection, service, or increased frequency; mitigating a facility closure.	Increased travel time due to removal of choice.
QUALITY OF SERVICE	Improved quality of transit service, more lighting, crime prevention through environmental design, and similar techniques.	—
AIR POLLUTION	Improved air quality; increased access to less-polluting transportation options, such as buses retrofitted with increased emissions-control technologies or powered by clean fuels.	Increased air and water pollution, soil contamination.
JOB	Increased access to job opportunities.	Adverse impacts on economic vitality, such as barriers to local businesses during construction.
ENVIRONMENTAL EXTERNALITIES	Countermeasures for noise, vibration, and air pollution, such as sound walls.	Increased noise and vibration, often as a result of increased traffic speeds or volumes.
CLIMATE RESILIENCY	Reduced flood risk through elevated bridges, green infrastructure, and conventional drainage approaches.	Increased vulnerability to climate change, including through increased impervious surface coverage or GHG emissions.
TRAVEL SAFETY	Improved road conditions, multimodal Complete Streets, safety countermeasures, and reduced speeds.	Exposure to transportation safety risks, including from higher traffic speeds or volumes.
ENVIRONMENTAL AND CULTURAL RESOURCES	Addition or improvement to community or social space or to parks or open space.	Destruction or disruption of cultural or natural resources.

Source: DVRPC, 2023. Adapted from: Audrey Wennink and Agustina Krapp, "Equity-Oriented Performance Measures in Transportation Planning," American Planning Association, PAS Memo, March/April 2020; and Federal Transit Administration, Environmental Justice Policy Guide, 2012, www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_EJ_Circular_7.14-12_FINAL.pdf.

Table 4. Benefits and Burdens Scoring Matrix

PROJ. CAT. ^a	DESCRIPTION	ACCESS, COHESION, & WELLNESS	TRAVEL TIME COST	SERVICE QUALITY	AIR POLLUTION	JOBS	ENV. EXTERNALITIES	CLIMATE RESILIENCY	TRAVEL SAFETY	ENV. / CULTURAL RESOURCES
Candidate Project Scope			-1							+1
Candidate Project Location						-1				-1
R1.01	Interstate Pavement Pres.			+1					+1	
R1.02	Non-Int. Pavement Pres. & Modernization			+1					+1	
R1.03	Local Federal Aid Roads			+1					+1	
R2.01	Interstate Bridge Pres.		+1	+1					+1	
R2.02	Non-Interstate Bridge Pres.		+1	+1					+1	
R2.03	Bridge Removal		-1							
R2.04	Local Bridge Preservation		+1						+1	
R3.01	Substantive Safety	+1							+1	
R3.02	Incident Management								+1	
R4.01	Accessibility Improvements	+1	+1		-1	+1		-1		
R4.02	Intersection Improvements		+1	+1	-1			-1	+1	
R4.03	Transportation System Maintenance & Operations		+1	+1						
R4.04	Vehicle Technology			+1	+1					
R5.01	Major Road Network Expsn.	-1	+1		-1	+1	-1	-1	-1	
R5.02	Minor Road Network Expsn.		+1		-1	+1	-1	-1	-1	
R6.01	Bicycle & Ped. Network Expsn.	+1	+1		+1				+1	

CONTINUED - Table 4. Benefits and Burdens Scoring Matrix

PROJ. CAT.*	DESCRIPTION	ACCESS, COHESION, & WELLNESS	TRAVEL TIME COST	SERVICE QUALITY	AIR POLLUTION	JOBS	ENVIRONMENTAL EXTERNALITIES	CLIMATE RESILIENCY	TRAVEL SAFETY	ENVIRONMENTAL CULTURAL RESOURCES
R6.02	Off-Road Trail Pres.			+1						+1
R6.03	Community Connections	+1	+1		+1					+1
R6.04	Env. Mitigation & Resiliency	+1		+1	+1		+1	+1		+1
R6.05	Travel Demand Management	+1	+1		+1	+1				
R6.06	Rail Improvements	+1	+1	+1	+1					
R6.07	Regional Programs									
T1	Transit Preservation & Modernization		+1	+1					+1	
T2	Transit Operational Imp.	+1	+1	+1	+1	+1				
T3	Transit Network Expansion	scope / map	+1		+1	+1	scope / map			

* See Appendix C for more information about each project category.

Source: DVRPC, 2023.

Transit system expansion projects further consider whether the proposed line creates local access barriers or improves access to transit in EJ communities; and whether the proposed line includes appropriate countermeasures for noise, vibration, and air pollution in EJ communities. Scoring is meant to be a starting point, and DVRPC screening staff uses judgment based on scope and mapping to determine benefits and burdens of each individual candidate project.

Concentrations of Low-Income, Racial Minority, and Ethnic Minority population groups comes from the IPD webmap using the current version at the time of the analysis.¹³ These layers are compared to the project area in Geographic Information System (GIS), checking for above-average or well-above-average concentrations of EJ populations within the project's limits.

¹³ Access the IPD webmap at: www.dvrpc.org/webmaps/ipd/.

EVALUATION CRITERIA

The second component of the evaluation is a set of criteria that help to evaluate candidate projects for funding prioritization in either the TIP or the Plan. The evaluation criteria are developed around *Connections 2050's* four focus areas—the environment, economy, communities, and transportation—and are consistent with the Plan's principles, which are further represented in the project screening. The criteria are also aligned with the federal TPMs. Each criterion is rated on a utility scale that ranges from zero to one, with one being the highest score and zero being the lowest, consistent with the Decision Lens approach. The evaluation utilizes the latest available data as of the beginning of the analysis for all criteria. Any new data that becomes available after the start of the analysis is not used so that all projects are scored using the same information.

■ Environmental Criteria

Environmental criteria measure change to Impervious Surface Coverage and Greenhouse Gas Emissions and Air Quality.

Impervious Surface Coverage

This criterion aligns with the Plan's goals to improve water quality, prepare communities for the impacts of climate change, reduce flooding risks, and mitigate the heat island effect. Projects score by reducing impervious surface coverage, or can receive bonus points by incorporating green design techniques (See Table 5). Impervious surface coverage is determined through scope review and GIS mapping, and accounts for how the project changes the number of through and turning lanes, lane widths, shoulder widths, and provision of bicycle and pedestrian facilities. This criterion offers a green design bonus for any projects that can demonstrate a reasonable commitment to the inclusion of green stormwater infrastructure (GSI), non-GSI techniques to address a documented flooding issue, the use of pervious pavement, or improved wildlife connectivity or facility crossings.

Greenhouse Gas Emissions and Air Quality

This criterion pertains to the Plan's goals to attain net-zero GHG emissions by the year 2050, reduce VMT, and improve air quality. TIP projects score on their ability to reduce GHG and National Ambient Air Quality Standards (NAAQS) pollutant emissions. The criterion uses published research and federal laws and policies to evaluate a project's impacts on emissions.¹⁴ The rating scale for each project category was developed using FHWA criteria pollutant reduction potential, project category GHG emissions reductions analysis developed by the Colorado DOT,¹⁵ eligibility for federal CMAQ improvement programs, and Clean Air Act definitions of air quality significant projects. TIP projects with a component anticipated to increase emissions score zero points;¹⁶ other projects are rated based on their highest scoring component. TIP analysis scores projects based on the ability to reduce trip lengths and/or promote mode shift to lower emissions modes, such as walking, biking, and transit. MRPs score based on their ability to reduce VMT—which serves as a proxy for emissions reduction—as analyzed with DVRPC's travel demand model. The analysis compares change in VMT

¹⁴ Work underway nationally as part of Carbon Reduction Strategy development for GHG emissions will better inform this body of evidence on what can reduce GHG and NAAQS emissions for the next update to the evaluation criteria.

¹⁵ Colorado DOT, Greenhouse Gas Emissions Mitigation Measures Policy Directive, June 2022, www.codot.gov/programs/environmental/greenhousegas/assets/pd-1610-0-greenhouse-gas-mitigation-measures-june2022.pdf.

¹⁶ Projects in the "anticipated to increase emissions" category (0 points) can score in the "projects with little to no emissions reduction potential" category (0.125 points) with a documented analysis that shows a projected reduction in emissions.

Table 5. Impervious Surface Coverage Criterion for TIP and Plan Candidate Projects

IMPERVIOUS SURFACE COVERAGE RATING SCALE	DATA SOURCE
<p>Project changes impervious surface coverage by:</p> <ul style="list-style-type: none"> ▶ decrease ≥ 1 lane mile^a = 1 point; ▶ decrease $\geq \frac{1}{2}$ lane mile^a and < 1 lane mile^a = 0.8 points; ▶ decrease $< \frac{1}{2}$ lane mile^a = 0.6 points; ▶ no change = 0.4 points; ▶ increase $\leq \frac{1}{2}$ lane mile^a = 0.2 points; or ▶ increase $> \frac{1}{2}$ lane mile^a = 0 points. 	GIS and Project Scope
<p>Green Design Bonus: +0.25 points each for projects that go beyond stormwater requirements and incorporate any of the following:</p> <ul style="list-style-type: none"> ▶ bioswales/rain gardens, tree trenches, vegetated medians (more than just grass)/vegetated curb bump-outs; ▶ naturalized stormwater basins; ▶ other non-GSI solutions to address a documented flooding issue; ▶ use of pervious pavement; or ▶ enhances habitat connectivity or wildlife crossings. <p>Bonus points are added to the impervious surface coverage score (up to a maximum score of 1 point).</p>	

^a Based on a 12-foot lane width. One lane mile equals 63,360 square feet. Each new turn lane is estimated at 300-feet long and 12- feet wide, unless better design data is readily available.

Source: DVRPC, 2023.

within the study area between build and no-build model runs.

Table 6 presents the Greenhouse Gas Emissions and Air Quality criterion's rating scale. Modeling system preservation projects compare a no-build run where the facility is removed from the network—in the case of a closed bridge—or speeds are slowed down—due to significantly poor pavement conditions. The baseline modeling results are then used as the "build" analysis where the facility remains open for use in comparison.

■ Communities Criteria

Communities criteria include Centers and Form, and Equity Benefits and Burdens.
Centers and Form

The Centers and Form criterion ties in with the Plan's goals to focus growth in mixed-use, walkable Centers across the region, and to promote vibrant main streets, downtowns, and live/work

opportunities. Density serves as a proxy for facility use. Rating is based on a candidate project's location relative to Plan and Freight Centers, and the regional DIZ based on density and proximity (see Table 7). Roads and fixed-guideway transit routes are often the boundaries for Census geographies, and scoring may be different on either side of the facility. As a result, projects are scored using ten-meter offsets on either side of the roadway or transit ROW centerline and use the maximum score of these three geometries. Figure 9 presents the highest, high, medium-high, and medium DIZs, overlaid with Freight and Plan Centers

Equity Benefits and Burdens

Equity seeks fairness in mobility and accessibility to meet the needs of all community members, based on the needs of populations being served. This criterion relates to the Plan's goals to foster racially and socioeconomically integrated communities, and advance EJ for all the region's inhabitants.

Table 6. Greenhouse Gas Emissions and Air Quality Criterion for TIP and Plan Candidate Projects

GHG EMISSIONS AND AIR QUALITY RATING SCALE		DATA SOURCE
TIP: Projects score 0 if they have a component anticipated to increase emissions; all other projects score based on their highest scoring individual component.		Project Scope
Points	Project Categories	
0	Projects anticipated to increase emissions: Bridge Removal (R2.03); Major Regional Roadway Network Expansion (R5.01); Minor Regional Roadway Network Expansion (R5.02); or Additionally Funded Roadway Expansion (R5.03). ^b	
0.125	Projects with little to no emissions reduction potential: New Multimodal Gridded Streets (R4.01); connected vehicle infrastructure (R4.04); sharrows (R6.01); Regional Programs (R6.07); demand-response transit service (T3); or default value for anything else not specifically called out on these lists.	
0.25	Projects with minor benefits for emissions reductions: Pavement Preservation (R1.01-R1.03); Bridge Preservation (R2.01, R2.02, R2.04); road diets (R3.01); bike / scooter-share ^c (R6.01); rehabilitation of existing bike/ped facilities (R6.02); Community Connections (R6.03); trip reduction marketing (R6.05); transit non-service Improvements (T1 and T2); or waive transit fees.	
0.5	Projects with good benefits for emissions reductions: replace signalized intersection with roundabout (R3.01); Incident Management (R3.02); Intersection Improvements (R4.02); optimize arterial signals and Transportation System Management and Operations (R4.03); bike lane, pedestrian facility, Circuit Trail, or shared-use path (R6.01); replace diesel school bus or medium duty truck with electric (R6.04); carshare program, trip or voluntary trip reduction program (R6.05); intermodal freight (R6.06); replace diesel transit bus with hybrid (T1); or new park-and-ride facility (T3).	Travel Demand Model
1.0	Projects with the highest emissions reduction potential: build medium or heavy duty truck charger or hydrogen refueling infrastructure (R4.04); replace heavy duty truck with electric and other resiliency and environmental mitigation (R6.04); rail improvements using road funding (R6.06); replace diesel transit bus with compressed natural gas or hybrid or diesel transit bus with electric (T1); implement bus priority treatments or other transit operational improvements that increase service frequency (T2); or new transit station on existing line in urban area, new electric fixed-route transit service (T3).	
MRP: GHG Emissions and Air Quality Score = $\text{Regional VMT}_{\text{No Build}} - \text{Regional VMT}_{\text{Build}}$ → If Build > No Build, 0 Points; Max (No Build – Build) = 1 point; All Other Projects: (No Build – Build) / Max(No Build – Build)		

^aSee Appendix C for more information about each project category shown by category ID in parentheses throughout this table.

^bProjects anticipated to increase emissions can score in the 'projects with little to no emissions reduction potential' category (0.125 points) with a documented analysis that shows a projected reduction in emissions.

^cScooter-sharing services are not currently legal in Pennsylvania^a.

Source: DVRPC, 2023.

Unlike the EJ Screening, this analysis considers all nine populations that are included as IPDs in DVRPC’s Equity Analysis (see Figure 10). These include: Youth, Older Adults, Female, Racial Minority, Ethnic Minority, Foreign-Born, Limited English Proficiency, Disabled, and Low-Income persons. The IPD analysis methodology generates an “IPD score.”¹⁷ Candidate projects score in this criterion based on a set of potential benefits and burdens using the same approach as in the EJ screening

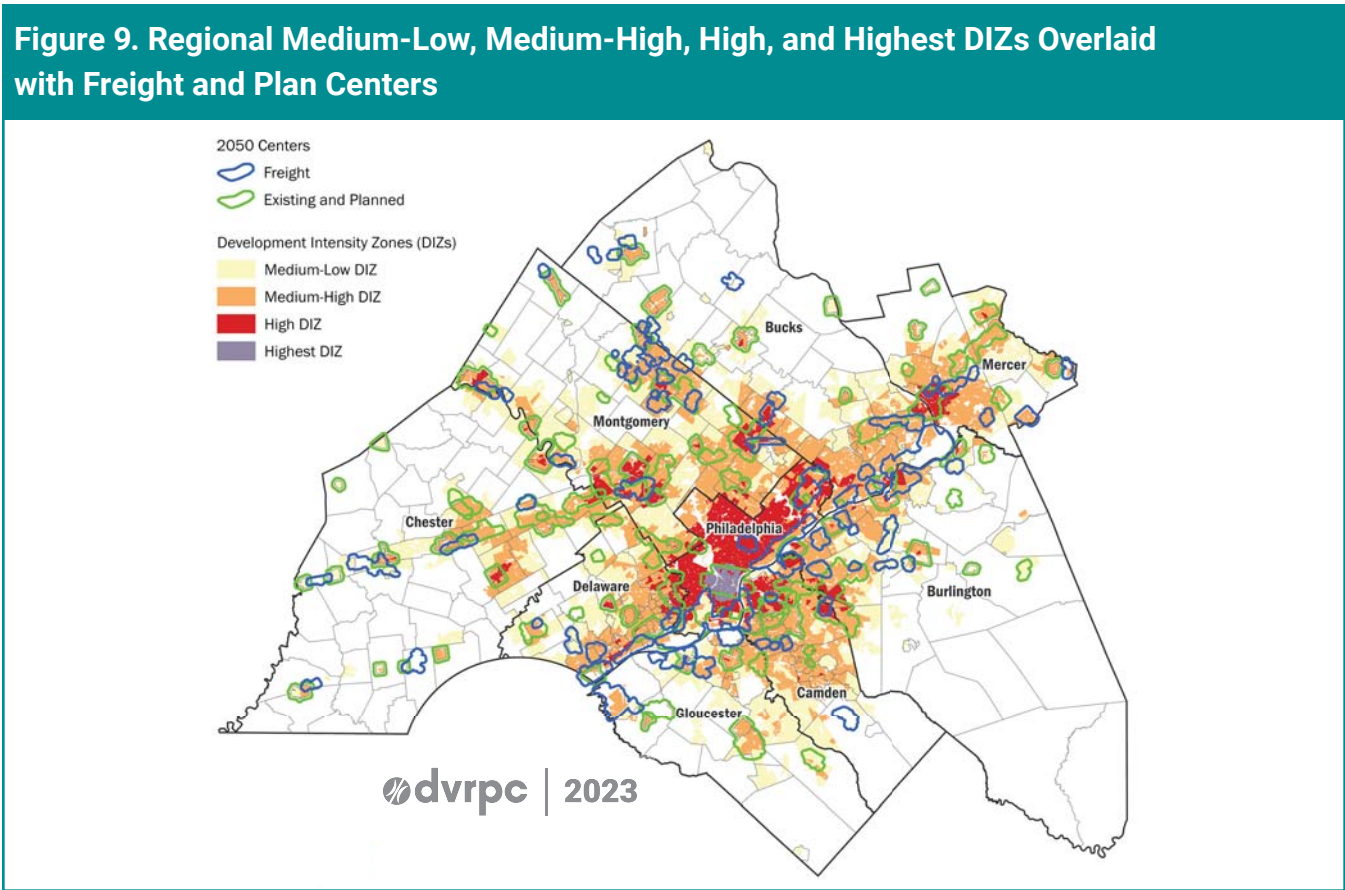
(see Tables 3 and 4) multiplied by the max composite IPD score within a quarter-mile buffer of the project’s limits (see Table 8). Projects located entirely in Census Tracts with no population score zero for IPD score.

Additionally, there is a quarter-point bonus for candidates that implement multimodal improvements in areas with zero-car households higher than the county average where the project is located (see Figure 11).

¹⁷ IPD scoring is used to meet the non-discrimination requirements and recommendations of Title VI and EJ for DVRPC’s plans, programs, and decision-making processes. Figure 10 displays composite IPD scores for census tracts across the region. The composite score is calculated by standard deviations relative to an indicator’s regional average.

Table 7. Centers and Form Criterion for TIP and Plan Candidate Projects	
CENTERS AND FORM RATING SCALE	DATA SOURCE
<p>TIP and MRP:</p> <p>Centers and Form Score = $(1.0 \times \text{Project length within quarter-mile buffer of Plan and Freight Centers} + 0.9 \times \text{project length in highest and high Development Intensity Zones (DIZ)} + 0.6 \times \text{project length in medium-high DIZ} + 0.3 \times \text{project length in medium-low DIZ}) \div \text{total project length}$.</p>	Project Location Relative to Regional Plan and Freight Centers and DIZ

Source: DVRPC, 2023.



■ Transportation Criteria

Transportation criteria include Safety and Facility / Asset Condition.

Safety

This criterion corresponds with the Plan’s goal to achieve a Vision Zero—no transportation-related deaths or serious injuries—goal by 2050. It also relates to national TPM goals to reduce the number of fatalities and serious injuries, including for non-motorized system users, on roadways and transit networks. These goals also aim to reduce transit safety events, and improve transit system reliability. Roadway projects score by implementing safety strategies with high-crash reduction potential and by addressing DOT-identified high-crash locations; crashes in communities of concern; or safety concerns on a city, county, or regionally identified high-injury network.

FHWA Crash Modification Factor (CMF) clearinghouse crash reduction factors (CRFs) with four- or five-star ratings were averaged across strategy types to identify substantive safety strategies. Where FHWA identified a higher CRF for *Proven Safety Countermeasures*,¹⁸ DVRPC uses that value instead of the averaged analysis. Substantive safety improvements are defined as those with an average CRF greater than 10. Strategies are

sorted into three different substantive safety classifications. Projects with an average CRF over 50 will score 0.6 points for safety; those with a CRF over 25 will score 0.4 points; and those with a CRF over 10 will score 0.2 points (see Table 9). Proven safety countermeasures that are routinely implemented in all projects are deemed nominal safety improvements, unless they are being implemented to address a specific crash cluster or trend. Proven safety countermeasures that currently fall into this classification include: signal backplates with retroreflective borders and wider edge lines.

New roads will require nuanced safety scoring. These facilities will not score for proven safety countermeasures that respond to outdated designs, such as applying pavement friction management on ramps or horizontal curves that don’t meet current design standards. Some strategies score in different classifications depending on their context—either based on surrounding land use or road conditions where the project is being implemented. Land use context will be determined as within the region’s census-designated urbanized area (UZA) for urban and suburban, and outside the UZA for rural.

Recognizing there may be important strategies (such as a slow turn wedge) not specified in the evaluation methodology because they are new, or have not yet been fully studied, innovative safety

¹⁸ FHWA Proven Safety Countermeasures website: www.safety.fhwa.dot.gov/ped_bike/tools_solve/ped_tctpepc/.

Table 8. Equity Criterion for TIP and Plan Candidate Projects

EQUITY BENEFITS AND BURDENS RATING SCALE	DATA SOURCE
<p>TIP and MRP: $Equity\ Score = (Benefits + Burdens) \times Census\ Tract\ with\ Highest\ Indicators\ of\ Potential\ Disadvantage\ Composite\ Score\ within\ Project\ Right-of-Way$</p> <p>→ If Equity Score < 0 = 0 points; Max Equity Score = 1 point All other projects score proportional to max equity score.</p> <p>Equity Bonus for projects located in one or more census tracts with zero-car households higher than the county average where it is located: If Benefits – Burdens > 0 and the project makes a multimodal improvement + 0.25 (up to a max score of 1 point).</p>	Project Scope

Source: DVRPC, 2023.

Figure 10. DVRPC Indicators of Potential Disadvantage

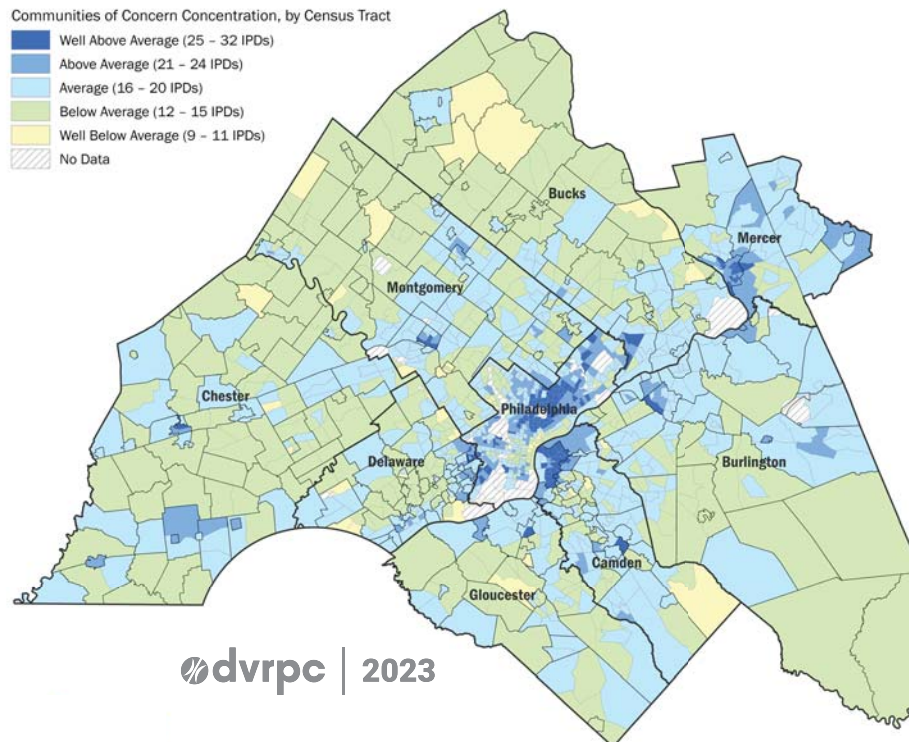
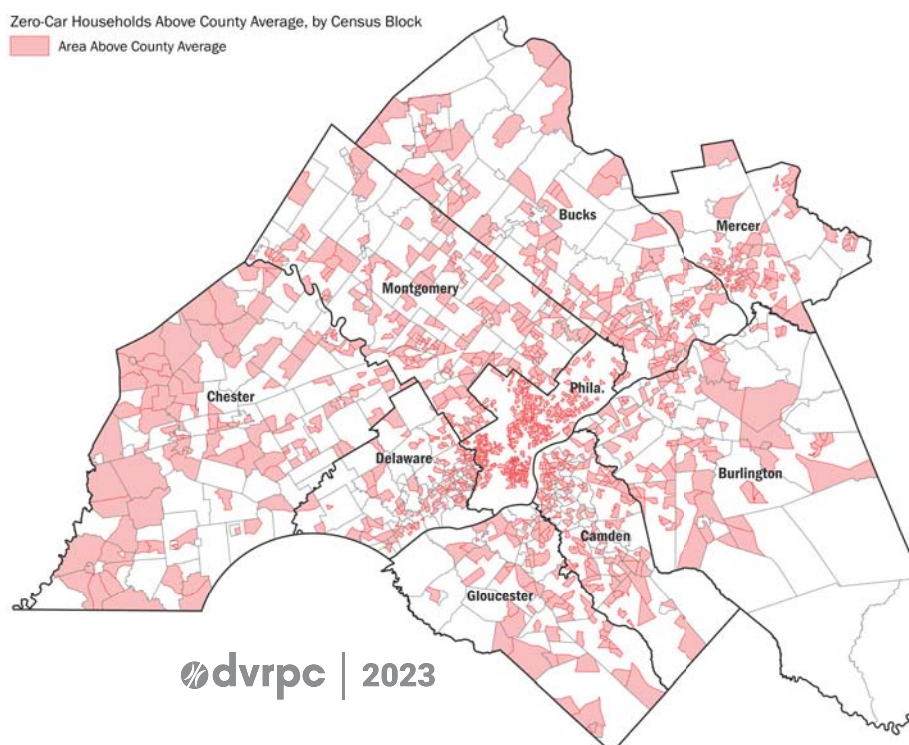


Figure 11. Areas with Zero-Car Households Above County Average



treatments can score 0.2 points, with the potential to increase the score if research demonstrating a higher CRF is provided.

The second half of the safety evaluation is whether the project improves safety at a location with an identified safety issue, as shown in Figure 12. A variety of different resources are used to test this, including:

- ▶ City of Philadelphia High-Injury Network;
- ▶ state-DOT HSIP analysis; or
- ▶ regional studies, such as a roadway safety audit or DVRPC's *Crashes in Communities of Concern* analysis.

Transit projects score by implementing safety strategies at locations with documented safety issues. Documented safety concerns are identified in each agency's transit safety action plan.

TIP projects must score based on safety strategy benefit in order to score location points. Since most MRPs are earlier in their project development, they are scored for location even if they do not currently have an identified strategy. It is expected that safety issues within the limits of candidate MRPs will be addressed during the design phases, which generally occur after project selection.

Facility / Asset Condition

This criterion relates to the Plan's goal to rebuild and modernize the region's transportation assets. It also aligns with national TPM goals to improve national highway system (NHS) bridge and pavement conditions, and transit assets.

These targets further set a maximum value of no more than five percent of Interstate lane miles and ten percent of NHS bridge deck area in poor condition. This criterion considers roadway pavement and bridges, and the two highest-cost transit asset classes.

Roadway candidate projects score by being consistent with state DOT pavement and bridge asset management model recommendations based on an LLCA approach, or by improving the state-of-repair for transit assets. The scoring prioritizes preservation projects that keep facilities in fair or better condition (see Table 10). State DOT asset management models recommend treatments at specific times in order to achieve LLCA, and recognize that meeting cyclical repair schedules is essential to asset maintenance.

PennDOT has developed a set of bridge and pavement asset management tools—BridgeCare and RoadCare—that project future conditions based on deterioration rates and the estimated cost and effectiveness of various interventions, which are applied based on available budgets identified in the model. PennDOT aims to add any local bridges that are not included in BridgeCare into the model before undergoing project evaluation.¹⁹

The bridge model recommendation year represents the opening of a window of time in which the project can be completed, following the LLCA approach. This window closes if too much time passes without completing the project. Scope alignment is based on maintenance, preservation, or rehabilitation categories, and not the specific project type. The model's scope recommendation is compared with the candidate project scope for matching project category. Bridge model runs are based on the capital vision funding levels identified in the region's current Plan and do not include 'committed' projects that are programmed in the TIP. Table 11 details specific bridge project types included in each category. Although bridge maintenance projects are not typically included in the TIP, they are occasionally funded in it using capital funds.

Pavement model runs are based on the capital vision funding levels identified in the region's current Plan and do not include 'committed' projects programmed in the TIP. RoadCare's

¹⁹ To add a local bridge to PennDOT's bridge asset management system (BAMS), the project sponsor needs to provide, at a minimum, the bridge's length and width, and either a recent bridge inspection report or the year the bridge was built. DVRPC can work with project sponsors to add bridges to BAMS.

Table 9. Safety Criterion for TIP and Plan Candidate Projects

SAFETY RATING SCALE	DATA SOURCE
<p><u>Roadway Safety Strategy effectiveness – up to 0.6 points for single highest ‘scoring’ strategy</u></p> <ul style="list-style-type: none"> ▶ CRF > 50 = 0.6 points: roundabouts; variable speed limits; speed safety cameras (fixed and point-to-point); medians and pedestrian refuge islands in urban and suburban areas; pedestrian hybrid beacons; walkways; sequential dynamic chevrons for horizontal curves;^b centerline rumble strips; pavement friction management at ramps and horizontal curves; install median cable barriers on rural four-lane (or more) freeways; or reduce or decrease lane width; ▶ CRF > 25 = 0.4 points: corridor access management; dedicated left-turn lanes at intersections; bicycle lanes; high-visibility crosswalks; intersection lighting; advance yield or stop markings and signs; rectangular rapid flashing beacons (RRFB); road diets; in-lane warning pavement markings for horizontal curves; shoulder rumble strips; wider edge lines;^a systemic application of multiple low-cost countermeasures at stop controlled intersections in rural locations; install a traffic signal or convert to all-way stop control; install a "Vehicles Entering When Flashing" system; install intersection conflict warning system; reduce posted speed limit or mean speed; or traffic calming with vertical deflection strategies (including speed humps, raised pedestrian crosswalks, or similar); or ▶ CRF > 10 = 0.2 points: dedicated right-turn lanes at intersections; speed safety cameras (mobile unit); leading pedestrian interval; chevron signs and curve signs; safety edge; backplates with retroreflective borders;^a systemic application of multiple low cost countermeasures at stop controlled intersections in suburban and urban locations; pavement friction management at intersections;^a extend yellow change intervals; traffic calming (general, if specific details are not known); or install red-light indicator lights. <p><u>Roadway Safety Location – up to 0.4 points</u> TIP: Only scores if points awarded for strategy score (strategy score > 0). MRP: Scores whether or not points are awarded for strategy.</p> <p><u>Very High Criticality = 0.4 Points</u></p> <ul style="list-style-type: none"> ▶ Project comes from a road safety audit, is located in census tracts identified through DVRPC's <i>Crashes in Communities of Concern</i> analysis; is on a city, county, or regional high-injury network; or meets the following state safety analysis: <ul style="list-style-type: none"> » Pennsylvania Roads: project is located on a Highway Safety Network Screening segment or intersection with the highest level of expected crash cost (XCC) reduction: <ul style="list-style-type: none"> ■ urban segments > \$2,212,716; ■ rural segments > \$271,000; ■ urban Intersections > \$581,400; and ■ rural Intersections > \$611,638. » New Jersey Roads: project is located on a New Jersey HSIP Eligible State or Local Road (Intersections, Ped. Intersections, High-Risk Rural Roads, Ped Corridors) with a state rating to be determined, DVRPC rating of 100 or less, or a county rating of 20 or less. 	<p>Project Scope and location relative to regional high injury network(s), Pennsylvania Department of Transportation Crash Cluster analysis, PennDOT Highway Safety Screening tool, and New Jersey Department of Transportation Highway Safety Program layers, Transit Safety Management Plans.</p>

CONTINUED: Table 9. Safety Criterion for TIP and Plan Candidate Projects

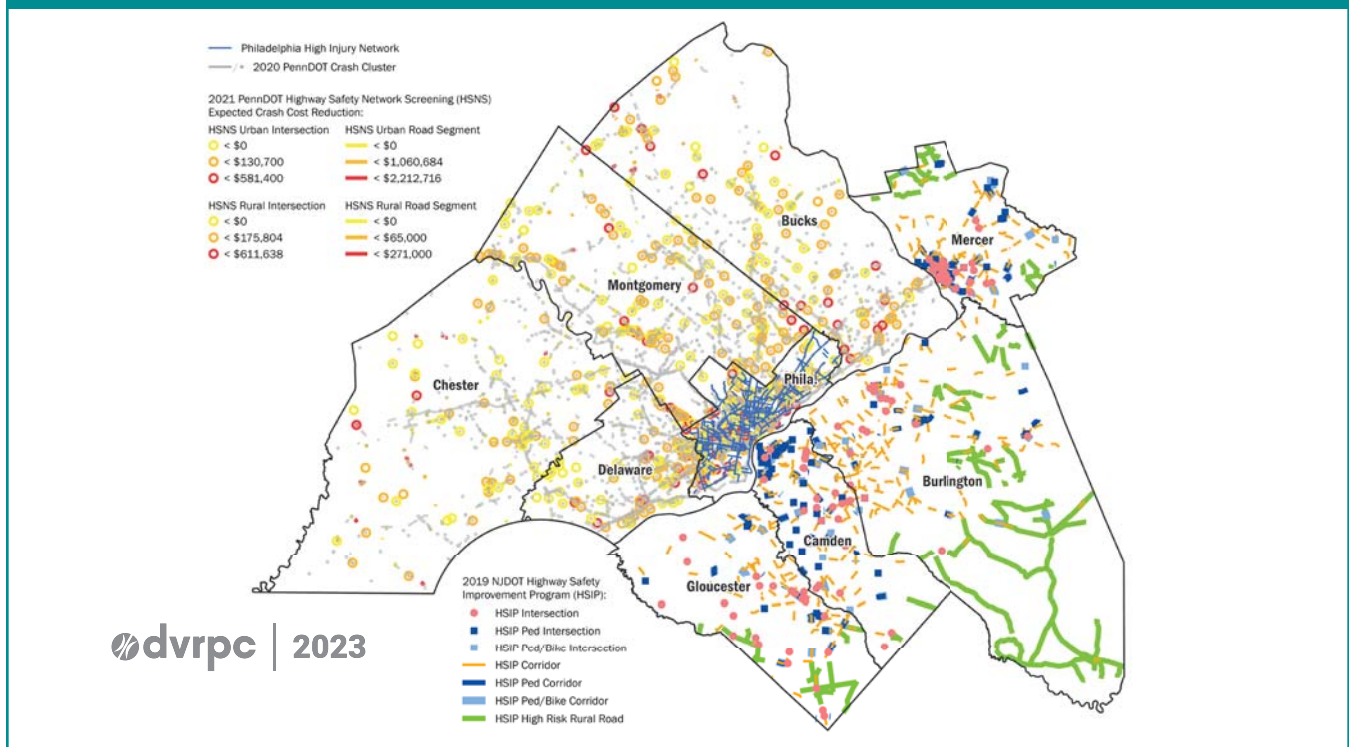
SAFETY RATING SCALE	DATA SOURCE
<p>High Criticality = 0.2 points</p> <ul style="list-style-type: none"> ▶ Pennsylvania Roads: project is located on a Highway Safety Network Screening segment or intersection with a medium XCC reduction rating: <ul style="list-style-type: none"> » urban segments > \$1,060,684; » rural segments > \$65,000; » urban Intersections > \$130,700; » rural Intersections > \$175,804; or » project is located on and clearly responds to a DOT-identified high-crash location issue ▶ New Jersey Roads: project is located on a New Jersey HSIP Eligible State or Local Road. <p>Moderate Criticality = 0.1 points</p> <ul style="list-style-type: none"> ▶ Pennsylvania Roads: project is located on a Highway Safety Network Screening segment or intersection with an XCC reduction rating greater than 0, or project is located on a DOT-identified high-crash location. <p>Transit</p> <ul style="list-style-type: none"> ▶ 0.4 points for greater safety benefit when compared to vehicle travel on roads; ▶ 0.7 points for projects that enhance safety beyond regulatory requirements (substantive safety); or ▶ 1.0 points for projects that mitigate a documented high-priority safety issue (substantive safety at documented safety concern location) and/or address pedestrian safety or safe access to transit on or beyond transit property. 	

^a Proven safety countermeasure only score if addressing a specific crash cluster. Retroreflective backplates score if addressing a running red light crash cluster and wider edge line score in locations where run-off road/hit fixed object crashes are an identified issue.

^b New facilities are not be scored for proven safety countermeasures that are intended to resolve issues from outdated road designs.

Source: DVRPC, 2023.

Figure 12. Roadway Safety Problem Locations



recommendation year represents the start of a window of time where the project can be completed. The following methodology is used to forecast Surface Distress Index (SDI) pavement declines in New Jersey in order to determine project timing appropriateness:

- ▶ SDI condition rating greater than 4.75: annual decrease of 0.125;
- ▶ SDI condition rating less than or equal to 4.75 and greater than 2.5: 0.25 annual decrease; and
- ▶ SDI condition less than or equal to 2.5: annual decrease of 0.125.

Pavement preservation projects are only applied to pavement in fair condition within asset management systems. NJDOT does not program resurfacing, rehabilitation, or reconstruction for pavement with an SDI above 2.5. The department aims for preservation to occur when pavement has an SDI rating between 3.5 and 4.5.

Pavement maintenance projects, shown in Table 12, almost never show up in the TIP. Table 13 shows different options for rating local pavement conditions where more precise pavement data is not available. It includes the City of Philadelphia's Pavement Condition Index (PCI) and estimated International Roughness Index (IRI) that aligns with the visual description.

Table 14 shows the types of preservation projects associated with different types of transit assets.

■ Economic Criteria

Economic criteria include Connectivity, Congestion Management, Reliability, and Truck Volumes.

Connectivity

Connectivity considers how the project benefits the overall transportation network, including making connections between modes (multimodalism) and/or facilities to increase access to different areas of the region. It supports the Plan's multimodal transportation network vision. It further aligns

with the national TPM goals to increase non-SOV commute modes share in UZAs, to increase person-miles traveled with reliable travel times, to limit peak-hour excessive delay, and improve truck-travel time reliability.

Projects score by enhancing existing connections or making new connections in the TIP analysis (see Table 15). For MRPs in the Plan, the travel demand model is used to analyze a candidate's potential to increase job accessibility.

TIP projects score based on the category that best describes the overall project. Improving multimodal transfers suggests making upgrades to existing connections. This could mean adding bike racks at a transit station or stop or on a new transit vehicle; improved real-time information at a transit station or stop; or provision of new shelters at a bus or trolley stop. Candidates with a larger scope that must make ADA improvements to meet legal requirements do not score for making a difficult-to-achieve connection, but could score for other enhancements in the project scope.

Reliability

Reliability focuses on operational, safety, and other approaches to respond to non-recurring congestion. The Reliability criterion aligns with Plan goals to increase reliability and mobility, and reduce congestion and VMT. It also relates to national TPM goals to increase the number of person-miles traveled with reliable travel times, reduce peak-hour excessive delay, and improve truck-travel time reliability. The Planning Time Index (PTI) uses proprietary data purchased from INRIX. It is defined as the 95th percentile travel time divided by free-flow travel time, where free-flow travel time (or reference speed) is the 66th percentile travel time for all time periods. A PTI value of 1.5 suggests that a traveler should budget 30 minutes to complete a trip that normally takes 20 minutes in order to arrive on time 95 percent of the time. Free-flow traffic is not the goal, but the measure, based on available datasets, used for comparison. It is normal and

Table 10. Facility / Asset Condition Criterion for TIP and Plan Candidate Projects

FACILITY / ASSET CONDITION RATING SCALE	DATA SOURCE
<p>State-Maintained Bridges Bridge Improvement Score (BIS) [Sum for all bridges in project] $= 1.0 \times \text{Deck Area with same Bridge Model}^a \text{ scope and recommendation year}^b \leq \text{timing} \leq \text{recommendation year} + 2^c$ $+ 0.7 \times (\text{Deck Area with same Bridge Model}^a \text{ scope and recommendation year}^b + 3 \leq \text{timing} \leq \text{recommendation year} + 5^c \text{ or Deck area with rehabilitation / replacement on bridge with lowest condition rating} \leq 3)$ $+ 0.5 \times \text{Deck Area with Bridge Model}^a \text{ recommendation year}^b \leq \text{timing} \leq \text{recommendation year} + 2^b$ $+ 0.3 \times \text{Deck Area Bridge Model}^a \text{ recommendation year}^b + 3 \leq \text{timing} \leq \text{recommendation year} + 5^c$</p> <p>Locally Maintained Bridges BIS [Sum for all bridges in project] $= 1.0 \times \text{Deck area with preservation project on bridge with lowest condition rating for deck, superstructure, or substructure from 6 to 7}$ $+ 0.7 \times \text{Deck area with rehabilitation / replacement project on bridge with lowest condition rating of 3}$ $+ 0.3 \times \text{Deck area with preservation project on bridge with lowest condition rating of 5 or rehabilitation / replacement of bridge with lowest condition rating of 4}$</p> <p>→ Max BIS = 1 point; for all other projects: $BIS \div \text{Max BIS}$</p>	<p>PennDOT BridgeCare, NJ DOT Bridge Asset Management System</p>
<p>State-Maintained Pavement Pennsylvania (State-Maintained): Pavement Improvement Score (PAVIS) $= 1 \times \text{lane miles with same RoadCare scope and recommendation year}^b \leq \text{timing} \leq \text{recommendation year} + 2^c$ $+ 0.7 \times (\text{lane miles with same RoadCare scope and recommendation year}^b + 3 \leq \text{timing} \leq \text{recommendation year} + 5^c \text{ or lane miles of rehabilitation or reconstruction with } PCI \leq 2.0)$ $+ 0.5 \times \text{lane miles with RoadCare recommendation year}^b \leq \text{timing} \leq \text{recommendation year} + 2^c$ $+ 0.3 \times \text{lane miles with RoadCare recommendation year}^b + 3 \leq \text{timing} \leq \text{recommendation year} + 5^c$</p> <p>New Jersey: PAVIS $= 1 \times \text{Lane miles of pavement preservation with Surface Distress Index (SDI)} \geq 3.5 \text{ and } \leq 4.5$ $+ 0.7 \times \text{Lane miles of pavement resurfacing, rehabilitation, or reconstruction with } SDI < 2.4$ $+ 0.3 \times \text{Lane miles of pavement preservation with } SDI \geq 2.4 \text{ and } < 3.5$</p>	<p>PennDOT RoadCare, and NJDOT Pavement Asset Management System</p>

CONTINUED: Table 10. Facility / Asset Condition Criterion for TIP and Plan Candidate Projects

FACILITY / ASSET CONDITION RATING SCALE	DATA SOURCE
<p><u>Locally Maintained Pavement</u> PAVIS $= 1 \times \text{Lane miles of pavement preservation on facility last resurfaced between 3 and 8 years ago or pavement with "Good" Visual Rating}^d$ $+ 0.7 \times \text{Lane miles of pavement resurfacing, rehabilitation, reconstruction on facility last resurfaced more than 12 years ago, or a "Poor" or "Very Poor" Visual Rating}$ $+ 0.3 \times \text{Lane miles of pavement preservation on facility between 9 and 12 years ago, or "Fair" Visual Rating}$</p> <p>For All Projects → Max PAVIS = 1 point; for all other projects: $\text{PAVIS} \div \text{Max PAVIS}$.</p>	<p>Local Asset Management Systems</p>
<p><u>Transit</u> Score for two highest-cost asset classes in project scope, substituting for roadway pavement and bridge criteria.</p> <ul style="list-style-type: none"> ▶ Transit Stations: <ul style="list-style-type: none"> » 1.0 points for a project that improves a transit station with a Transit Economic Requirements Model (TERM) rating of 2.0 or less for the entire facility; » 0.8 points for a project that improves a transit station with a TERM rating of 3.0 for the entire facility; or » 0.5 points for a project that improves one or more components of a transit station with a TERM rating of 3.0 or less. ▶ Transit vehicles, rail track, and all other infrastructure: If $\text{Age} \div \text{Useful Life Benchmark} < 0.75$, 0 points; if $\text{Age} \div \text{Useful Life Benchmark} \geq 1.5$, 1 point; for all other projects: $\text{Age} \div \text{Useful Life Benchmark} - 0.5$. 	<p>Transit Asset Management Systems, National Transit Database</p>

^a Bridge model refers to BridgeCare in Pennsylvania and the AASHTOWare Bridge Model 6.0 (BrM6) in New Jersey.

^b Recommendation year comes from the bridge or pavement model for when the candidate should be programmed in the Plan or TIP. Timing is when the project is proposed to be funded in the Plan or the TIP. For major regional projects in the Plan in later fiscal years beyond the twelve-year program in Pennsylvania and the ten-year program in New Jersey, target date is within the same funding period.

^c Recommendation year comes from the bridge or pavement model and is compared to the timing of where the candidate is proposed to be programmed in the TIP or Plan. For MRPs in the Plan in later fiscal years beyond the twelve-year program in Pennsylvania and the ten-year program in New Jersey, target date is within plus or minus one funding period. Bridge and pavement model runs are based on the capital vision funding levels identified in the region's current Plan.

^d See Table 13 for Visual Rating description.

Source: DVRPC, 2023.

Table 11. Bridge Project Categories and Detailed Project Types

FHWA BRIDGE CATEGORY	BRIDGE PROJECT TYPE
EMERGENCY REPAIRS	Resulting from severe deck spalls, over-height trucks hitting the girders, or severe scour or undermining.
PREVENTATIVE MAINTENANCE^a	Cleaning, deck seal cracks, joint repair / replacement, reseal base plates, concrete repair, lubricate bearings, seal concrete, or repair erosion / scour.
PRESERVATION	Epoxy overlay, structural overlay, bituminous overlay, or steel superstructure painting (full or spot/zone/joint).
REHABILITATION	Partial or complete deck replacement, superstructure rehabilitation, culvert rehabilitation, superstructure replacement, and superstructure strengthening.
REPLACEMENT	Full bridge replacement.

^aMovable bridges have additional preventative maintenance needs, which are not shown here.

Source: NJDOT 2019.

Table 12. Pavement Project Categories and Detailed Project Types

FHWA PAVEMENT CATEGORY	PAVEMENT PROJECT TYPE
ROUTINE MAINTENANCE	Crack seal, pothole repair, manual patch, mechanized patch, mill manual patch, spray patch, skin patch, mill and mechanized patch, base repair and manual patch, or base repair and mechanized patch.
PRESERVATION	Seal coat, level and seal coat, scratch level and seal coat, widening and seal coat, micro-surfacing, or chip or slurry seal.
MINOR REHABILITATION	Thin asphalt overlay or level and resurface.
MAJOR REHABILITATION	Mill, concrete patch, level, and resurface; concrete slab repair; level, resurface, and base repair; mill, level, and resurface; mill, base repair, level, and resurface; or construct paved shoulder.
RECONSTRUCTION	Removal of pavement and replacement along with new drainage systems.

Source: NJDOT 2019 and PennDOT 2023.

Table 13. Pavement Visual Description Rating for Local Roads

RATING	IRI ^a	PHILA PCI ^b	VISUAL DESCRIPTION
EXCELLENT	0–52	85–100	Only new (or nearly new) pavements are likely to be smooth enough and sufficiently free of cracks and patches to qualify for this category.
GOOD	53–119	55–85	Pavements are not quite as smooth as those in excellent condition, but give a first-class ride and exhibit few, if any, visible signs of surface deterioration. Flexible pavements may be beginning to show evidence of rutting and fine random cracks. Rigid pavements may be beginning to show evidence of slight surface deterioration, such as minor cracks and spalling.
FAIR	120–213	40–55	The riding qualities of pavements in this category are noticeably inferior to those of new pavements and may be barely tolerable for high-speed traffic. Surface defects of flexible pavements may include rutting, map cracking, and extensive patching. Rigid pavements in this group may have a few joint failures, faulting and cracking, and some pumping.
POOR	214–374	25–40	Pavement has deteriorated to where free-flow traffic speed is affected. Flexible pavement may have large potholes and deep cracks. Distress includes raveling, cracking, and rutting that occurs over more than 50 percent of the surface. Rigid pavement distress includes joint spalling, faulting, patching, cracking, and scaling; and may include pumping and faulting.
VERY POOR	375+	0–25	Pavement is in extremely deteriorated condition. The facility is passable only at reduced speeds and with considerable ride discomfort. Large potholes and deep cracks exist. Distress occurs over 75 percent or more of the surface.

^a IRI = International Roughness Index.

^b PCI = Pavement Condition Index.

Source: *Highway Economic Requirements System, 2004, and City of Philadelphia, 2023.*

appropriate for PTI to increase during peak hours.

Projects score by:

- ▶ being located on a road with a high PTI for existing facilities; on-road transit projects score based on the PTI within their route or project limits;
- ▶ being surrounded by high PTI roads for new facilities or off-road trails; or
- ▶ improving a transit route on a dedicated right-of-way with a low on-time performance using data published by the transit agency operating the line.

The highest hourly average weekday PTI value for the most recent year available is used in this analysis, regardless of which time period it occurs: morning peak (6:00 am to 10:00 am), mid-day (10:00 am to 3:00 pm), evening peak (3:00 pm to 7:00 pm), or overnight (7:00 pm to 6:00 am), see Figure 13. PTI data is not available for some local roads. Roadway, trail, and other projects without a PTI score based on the average PTI for all roadway facilities within a one-quarter mile buffer of the project's limits, see Table 16.

Table 14. Transit Asset Classes and Example Preservation Projects

ASSET CLASS	PROJECT EXAMPLES
RAIL INFRASTRUCTURE	Track rehabilitation, resurfacing, or replacement; catenary rehabilitation or replacement; signal replacement; rail bridge rehabilitation or replacement; substation improvements.
VEHICLE REHABILITATION / REPLACEMENT	New or overhauled buses, paratransit, commuter rail, light rail, or heavy rail vehicles; maintenance and storage facilities rehabilitation; vehicle maintenance equipment.
STATION PRESERVATION	Station rehabilitation and improvements; roof replacement; elevator or escalator replacement; parking facility maintenance.

Source: DVRPC, 2023.

Figure 13. Planning Time Index

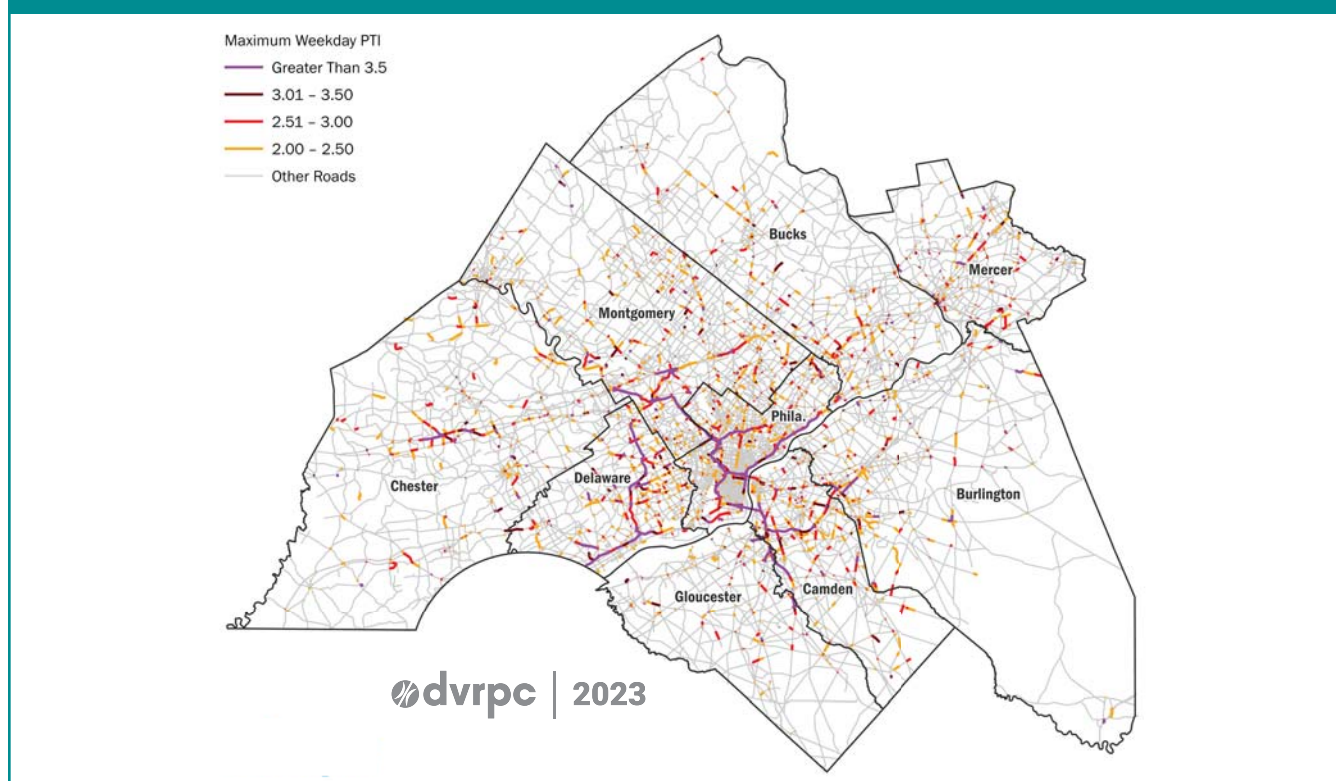


Table 15. Connectivity Criterion for TIP and Plan Candidate Projects

CONNECTIVITY RATING SCALE	DATA SOURCE
<p>TIP: Projects score by category, as shown below.</p> <p><u>Points</u> <u>Project Categories</u></p> <p>0.0 Project reduces connectivity by decreasing intersection density,^a restricting movements, or eliminating multimodal options.</p> <hr/> <p>0.4 No change in connectivity. Intersection density and modal options remain the same.^a</p> <hr/> <p>0.7 Project enhances network connectivity by increasing traveler information, such as through Intelligent Transportation Systems (ITS); repairing a bridge at risk of closing (one or more components—deck, superstructure, substructure, or culvert—with a rating of 3 or less); enables new transit system movements (such as a new interlocking); prevents or removes a transit rail slowdown or outage; implements transit signal priority; builds new sidewalks, bike lanes, or trails; or improves multimodal transfers.</p> <hr/> <p>1.0 Project makes a difficult-to-achieve connection—for example, completes missing movement(s) at an interchange; increases the road network’s intersection density;^a makes a new connection to a transit station; increases transit coverage area or service frequency; connects two or more islands of sidewalks or low-stress bike networks; connects two or more Circuit Trail segments or makes a new connection between another mode and a Circuit Trail; creates an intermodal freight connection; or has ADA access improvement as its primary purpose.</p>	Project Scope
<p>MRP: Job accessibility index calculated as the sum of the jobs in each traffic analysis zone (TAZ) that can be reached by all other TAZs in 45 minutes or less of travel time by transit (including wait and transfer time) or roadway network during the AM peak period in the Plan’s horizon year. For analyzing preservation projects, no-build assumes the facility does not exist in future.</p> <p><i>Change in Job Accessibility = Job Accessibility Index_{Build} – Job Accessibility Index_{NoBuild}</i> → Max Change in Job Accessibility = 1 Point; if Change in Job Accessibility < 0, 0 points; for all other projects: Connectivity Score = Change in Job Accessibility ÷ Max Change in Job Accessibility</p>	Travel Demand Model

^a Intersection density is defined as the number of intersections per acre where two or more road segments come together in a node, regardless of how many legs or connections there are (so a T-intersection counts the same as a five-point intersection), so long as movements can be made between the segments.

Source: DVRPC, 2023.

Congestion Management

The Congestion Management criterion aligns with the Plan’s goals to increase reliability, and reduce congestion and VMT. It also relates to national TPM goals to increase the number of person-miles traveled with reliable travel times, reduce peak-hour excessive delay, and improve truck-travel time reliability. Projects score based on location

in a CMP congested subcorridor, or implementing a CMP strategy appropriate for that subcorridor, see Table 17. Figure 14 shows different congested subcorridors: priority, secondary, and growth, in order from more congested to less congested.

Table 16. Reliability Project Criterion for TIP and Plan Candidate Projects

RELIABILITY RATING SCALE	DATA SOURCE
<p>Roads and Surface Transit: Use highest hourly average annual Planning Time Index (PTI) value.^a If PTI >3.5, 1 Point; PTI <1.5, 0 points; for all other projects: Rating = (PTI – 1.5) ÷ 2.^b</p> <p>Transit Routes with dedicated right-of-way (ROW): On-Time Performance (OTP) averaged over the past 12 months.</p> <ul style="list-style-type: none"> ▶ Heavy Rail and Commuter Rail (NJT): If OTP ≥ 95%, 0 points, if OTP ≤ 75%, 1 point; for all other projects: 5 × (0.95 – OTP); and ▶ Regional Rail (SEPTA): If OTP ≥ 90%, 0 points, if OTP ≤ 70%, 1 point; else 5 × (0.9 – OTP). 	<p>INRIX data accessed through the PDA Suite; Southeastern Pennsylvania Transportation Authority (SEPTA) Ridership statistics</p>

^a PTI = 95% travel time ÷ Free-Flow Travel Time. The 95th percentile refers to the 95th percent longest travel time on the segment for all time periods. Free-flow travel time is based on 66th percentile of all travel times. Data comes from INRIX.

^b Roadway, trail, and other projects without a PTI score based on the average the PTI for all roadway facilities within a one-quarter mile buffer of the project's limits.

Source: DVRPC, 2023.

Truck Volumes

The Truck Volumes criterion relates to the Plan's goal to improve global connections by facilitating goods movement, aviation, and intercity connections. It also relates to the national TPM goal to increase truck-travel time reliability. This criterion scores projects based on the number of trucks using the facility each day (see Table 18). Figure 15 maps truck volumes on the region's roadway network using data from the Highway Performance Monitoring System (HPMS). NJDOT does not report truck volumes to HPMS outside of those for NHS facilities. The evaluation criteria use an approach that combines DVRPC traffic count and DOT Roadway Management System (RMS) data by spatially matching projects to DVRPC class counts in GIS.

- ▶ For projects with a DVRPC class count – staff manually assigns representative truck volume counts to score projects.
- ▶ For projects without a DVRPC class count – truck volume score is based on the max average average annual daily truck traffic (AADTT) for all segments by facility within the project limits in the RMS GIS layer.

This may lead to slightly different scoring than is shown in Figure 15. The estimated truck percent by functional class in Table 19 is used to convert average annual daily traffic (AADT) to truck volumes on non-NHS New Jersey roads. New road facilities use projected segment-level truck volumes from the travel demand model.

To ensure projects are benefitting goods movement, candidates do not score any Truck Volumes points if there are “freight burdens”—where truck movements are inhibited on a roadway appropriate for heavy duty truck use or trucks are using a facility deemed inappropriate for heavy duty vehicle use.

Table 17. Congestion Management Criterion for TIP and Plan Candidate Projects

CONGESTION MANAGEMENT RATING SCALE	DATA SOURCE
<p>TIP and MRP: Strategy based on the primary subcorridor the project is located in (the largest percentage of total project length and/or the most appropriate subcorridor for the specific location):</p> <p><u>CMP Strategy (Single Highest-Scoring Strategy in Project Scope)</u> 0.5 Points: Project implements a Very Appropriate Strategy for Primary Subcorridor. 0.3 Points: Project implements a Secondary Strategy for Primary Subcorridor 0.1 Points: Project implements an Appropriate Everywhere Strategy</p> <p><u>CMP Corridor, scores only if CMP Strategy Score is >0.</u> = 0.5 × Percentage of project length in Priority Subcorridor + 0.3 × Percentage of project length in Secondary Subcorridor + 0.1 × Percent of project length in Growth Corridor.</p> <p><i>Congestion Management Score = CMP Strategy + CMP Corridor</i></p>	CMP and Project Scope

Source: DVRPC, 2023.

Table 18. Truck Volumes Criterion for TIP and Plan Candidate Projects

TRUCK VOLUMES RATING SCALE	DATA SOURCE
<p>TIP and MRP: Daily Trucks^a > 8,000 = 1 point; for all other projects: $\sqrt[3]{\text{Daily Trucks}} \div 20$</p> <p>New Facilities: Use 2050 AM peak truck volumes from the travel demand model links. The following multipliers are used to convert AM peak to daily volumes:^b</p> <ul style="list-style-type: none"> ▶ Limited Access Facilities: 0.053; ▶ Major Arterial: 0.047; ▶ Minor Arterial: 0.042; and ▶ Collector and Local: 0.039. <p>Freight Burdens: Projects that could negatively impact goods movement or local communities are flagged. DVRPC subject matter experts and sponsors will discuss if flagged projects could have negative freight outcomes. Those determined to have negative freight outcomes score zero for the Truck Volumes. Examples of projects that may have negative impacts include:</p> <ul style="list-style-type: none"> ▶ Highway to boulevard conversions; or ▶ Traffic calming on facilities with more than 5 percent truck volume and at least 100 daily trucks. 	PennDOT, NJDOT, and DVRPC truck counts; Travel Demand Model

^a Daily Trucks in the Roadway Management System (RMS) comes from FHWA's vehicle classifications and includes buses (class 4), single-unit trucks (classes 5 to 7), and combination trucks (classes 8 to 13). More information is available at: www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/13091/002.cfm.

^b These values are based on the percentage AM peak out of daily truck traffic from the 2021 Pennsylvania Traffic Report (https://gis.penndot.gov/BPR_PDF_FILES/Documents/Traffic/Traffic_Information/Annual_Report/2021/2021_Traffic_Information_Report.pdf). Since similar data is not available in New Jersey, the same multipliers are used on both sides of the river.

Source: DVRPC, 2023.

Figure 14. DVRPC CMP Priority and Secondary Corridors, and Growth Subcorridors

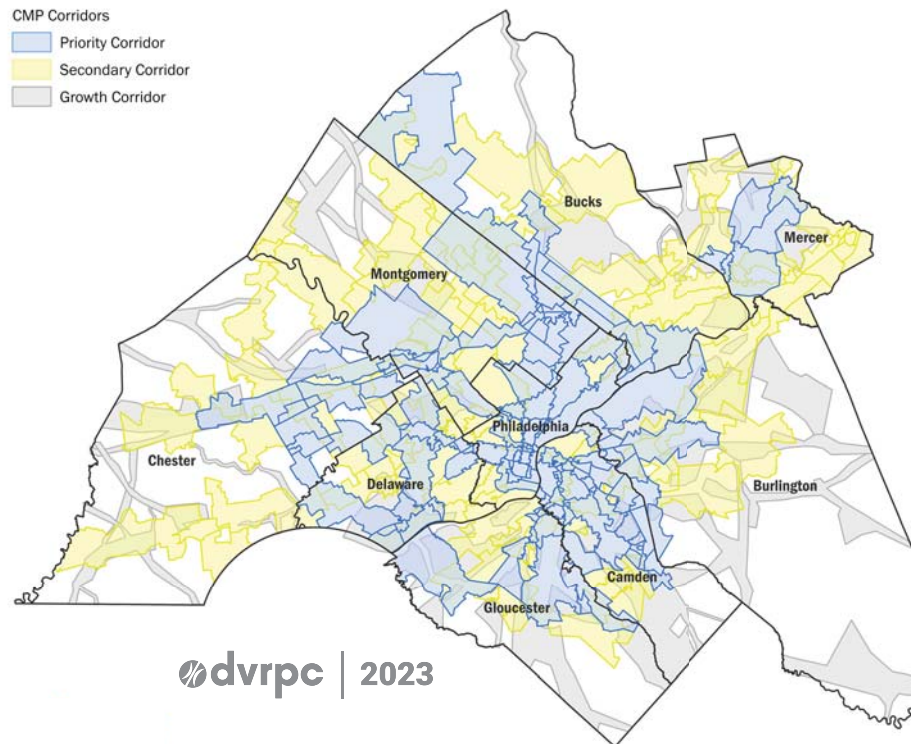
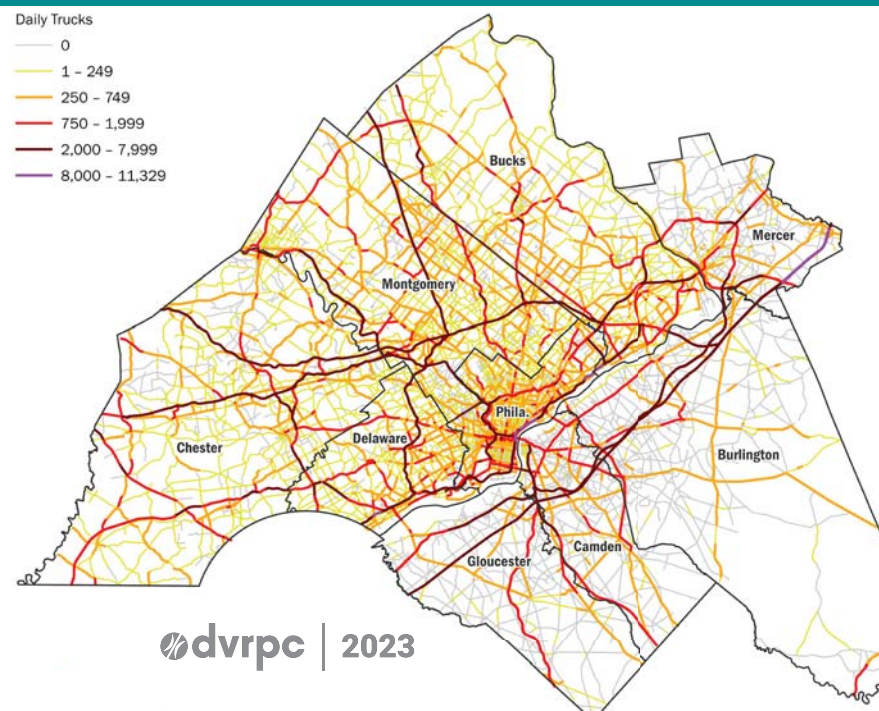


Figure 15. Regional Truck Volumes



Note: This figure shows truck volumes from the Highway Performance Monitoring System (HPMS). NJDOT does not report truck volumes to HPMS outside of those for NHS facilities. The evaluation criteria uses DVRPC traffic count data, which may lead to slightly different scoring than is shown here. Sources: PennDOT, NJDOT, and the Highway Performance Monitoring System (HPMS).

Table 19. New Jersey Truck Volumes as a Percent of AADT by Functional Class

FUNCTIONAL CLASS CATEGORY	HPMS FUNCTIONAL CLASS CODE	TRUCK TRAFFIC PERCENTAGE	
		RURAL	URBAN
INTERSTATE	1	18.93%	9.40%
OTHER FREEWAY & EXPRESSWAY	2	6.41%	6.41%
OTHER PRINCIPAL ARTERIAL	3	8.28%	5.25%
MINOR ARTERIAL	4	7.24%	4.94%
MAJOR COLLECTOR	5	6.80%	4.50%
MINOR COLLECTOR	6	7.10%	3.83%
LOCAL	7	8.15%	4.72%

The following Vehicle Class Codes were used to compile the percentages shown above: 2D; 3A and 4A; and 2-S2 thru 3-S2-2 from "Travel Activity By Vehicle Type" table from NJDOT's Bureau of Transportation Data and Support, Roadway Systems Section.

Source: NJDOT, 2021.

RANKING PROJECTS

Each candidate project receives a total benefit point score determined by the project's rating score multiplied by the weight for each criterion, which are then summed for all criteria. The end product from the project evaluation criteria analysis is a set of ranked project lists scored by:

- ▶ total benefit points;
- ▶ total benefit points divided by state and federal capital costs;
- ▶ total benefit points divided by state and federal capital costs per multimodal user; and
- ▶ total benefit points divided by state and federal capital costs plus additional operating and maintenance costs per multimodal user.

The first of these is the total benefit point score, based on the sum of each individual criterion's rating. The second compares that score to the project's state and federal formula funding request, 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—do not count toward a project's cost in this analysis.

The third option divides federal and state formula funding cost by the number of users, then compares that value to the project's total benefit points. The number of multimodal users is defined as the total number of person trips using the facility(ies) within the project's scope each day.

Total daily person trips = driver trips + passenger trips + transit trips + bike trips + pedestrian trips,
where:

- ▶ Driver trips are determined by multiplying the facility's length by its average annual daily traffic minus truck volumes to get daily VMT, which is divided by the average regional light duty vehicle trip length from the current DVRPC

household travel survey. *The 2012–2013 Household Travel Survey for the Delaware Valley Region* results find an average regional light duty vehicle trip length of 7.6 miles.²⁰

- ▶ Daily passenger trips are estimated using average vehicle occupancy from the most recent household travel survey. The 2012–2013 *Household Travel Survey* estimates an average of 1.58 occupants per vehicle per trip, including the driver. An average of 0.58 passenger trips are estimated for every auto driver trip (removing trucks from the AADT).
- ▶ Transit trips are allocated along road segments using transit stop boarding and alighting data. DVRPC's *Regional Transit Screening Platform* (RTSP) shows this by clicking on Surface Transit Reliability, then Access the Data, then toggling to SEPTA Surface Transit Loads.²¹ Projects on roads with NJ Transit or Pottstown Area Rapid Transit (PART) buses score based on an average ridership per mile multiplied by the project length. New transit facilities use ridership projections from the travel demand model.

²⁰ More information about the 2012-2013 Household Travel Survey for the Delaware Valley Region is available at www.dvrpc.org/products/14033. An updated household travel survey is planned for 2025–2026.

²¹ Access the RTSP at www.dvrpc.org/webmaps/rtsp/.

- Bicycle and pedestrian trips come from counts done by DVRPC.²²

Not all projects have data for the number of multimodal users: for example, new facilities without a modeled projection, or existing facilities with no data available. In these cases, the model fails because the equation leads to a division by zero error. As a result, any candidate project where the baseline number of multimodal users is not known, a minimum threshold of 100 users in total for all modes is assumed.

The fourth scoring approach includes additional operating costs from new facilities by adding these into the project's estimated capital cost. The comparison is benefit points per capital plus operating costs per multimodal user. Additional operating costs includes all life-cycle operating and maintenance costs that start from initial deployment of the asset. Table 20 details projected operating costs for new facilities or additional transit service frequency. Data comes from DOT and transit agency transportation asset management plans. In Pennsylvania, statewide costs are increased by 30 percent to reflect higher regional costs and wider roads on average. Differences in operating and maintenance costs between New Jersey and Pennsylvania may reflect the different types of treatments applied along with differences between what is considered a capital expense versus an operating expense. The additional operating cost analysis uses either 50 years or the identified life-cycle for the new asset, whichever is shorter.

The fifth scoring option takes the average rank across all approaches, creating a list of the best to the worst scoring across all four rankings.

The scoring and ranking results are distributed to Financial Planning Subcommittee representatives in advance of any decision making. The highest-scoring projects are the most appropriate for

inclusion in either the Plan or TIP, assuming funding is available. The lowest-scoring projects are generally not funded and may consider rescoping for future evaluations. Scoring and ranking inform the subcommittee on which projects to prioritize for available funding, along with a number of other factors, including project readiness, funding eligibility, budgets for project categories, geographic equity, system level EJ analysis, federal TPM targets, regional and local priorities, political support, and ability to leverage other investments. The RTC then makes a recommendation to the DVRPC Board on which projects to include in the Funded Plan and constrained TIP. The Plan may list aspirational projects as part of the Capital Vision, although these projects must pass the screening portion of the evaluation. The Board makes the ultimate decision over which projects receive funding. The results of these analyses are published as part of the TIP and Plan documentation.

²² Bicycle and Pedestrian counts can be found at www.dvrpc.org/webmaps/trafficcounts/.

Table 20. Projected Annual Operating and Maintenance Costs for New Facilities or Increased Transit Service Frequency (in 2021 \$s)

INFRASTRUCTURE	PA ANNUAL UNIT COST ^a	PA LIFE-CYCLE ^b	PA UNITS	NJ ANNUAL UNIT COST	NJ LIFE-CYCLE ^b	NJ UNITS
BRIDGE	\$3,900 + \$4.20/sq ft.	85	Square Ft. Deck Area	\$103/sq ft.	N/A	Square Ft. Deck Area
PAVEMENT MAINTENANCE & PRESERVATION	\$10,690	65	Segment Miles	\$0.30	N/A	Linear Foot
NON-NHS FACILITY RESURFACING	\$21,060	65	Segment Miles	N/A	N/A	N/A
BUS ROUTE	\$93	N/A	Revenue Service Hour	\$110	N/A	Revenue Service Hour
TROLLEY / LIGHT RAIL ROUTE	\$137	N/A	Revenue Service Hour	\$723	N/A	Revenue Service Hour
REGIONAL / COMMUTER RAIL ROUTE	\$210	N/A	Revenue Service Hour	\$304	N/A	Revenue Service Hour
HEAVY RAIL ROUTE	\$88	N/A	Revenue Service Hour	N/A	N/A	N/A
TRAFFIC SIGNAL	\$4,875	20	Signal	5%	20	Capital Cost
ITS EQUIPMENT	5%	20	Capital Cost	5%	20	Capital Cost

^a PennDOT statewide costs are increased by 30 percent to reflect higher costs in the region and wider roads, on average.

^b The additional operating cost analysis uses the shorter period of either 50 years or the identified life-cycle in Table 20.

Sources: National Transit Database, 2021; PennDOT Transportation Asset Management Plan, 2023; New Jersey DOT Transportation Asset Management Plan, 2022.

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APPENDIX A.

MAJOR REGIONAL PROJECT DEFINITIONS

The *Connections 2050* Plan defines MRPs as large-scale projects that have a significant impact on regional travel.²³ Almost all network expansion projects are MRPs, as are large-scale reconstruction projects on the region's freeways and bridges. Major Operational Improvement initiatives, such as SEPTA's Trolley Modernization project, are listed in the Plan, as are large-scale bike and pedestrian initiatives, such as the Circuit Trails network. MRPs are further defined as follows.

Network Expansion

- **Roads:** Addition of new through lanes by widening, extending, or building new limited access highways of any length; creating a new interchange between highways (HPMS functional classes 1 or 2) and arterials (HPMS functional classes 3 or 4); widening, extending, or building new principal arterials (HPMS functional classes 3 or 4) for more than three lane miles; or a project cost greater than \$25 million in the Plan's base year dollars. Some projects listed in network expansion also have operational improvement components. These include adding flex lanes or part-time shoulder use lanes to existing facilities, and adding missing movements to existing partial interchanges.
- **Transit:** New stations on existing lines (including station parking needs), extension of existing lines, or new rail and BRT routes.

Operational Improvement and System Preservation

- **Roads:** Projects that improve the condition of or reconstruct NHS facilities, or facilities with more than 25,000 vehicles per day, have more than 25,000 square feet of bridge deck area, cover more than 20 lane miles, cost more than \$25 million in the Plan's base year dollars, or would need to be included in air quality conformity analysis because they would significantly alter regional travel patterns.
- **Transit:** Projects that improve or make major repairs to existing rail lines at a cost greater than \$25 million in the Plan's base year dollars; make major improvements to stations (generally aimed at rehabbing/upgrading the full facility; but can include major ADA initiatives to bring a station into compliance or roof replacements greater than 50,000 square feet) with more than 5,000 daily boardings or alightings, or cost greater than \$25 million; make procurements that replace five or more vehicles in existing rail fleets; double track or add sidings to existing passenger rail lines; upgrade a traditional bus route with BRT service; or would need to be included in air quality conformity analysis because they would significantly alter regional travel patterns.

Many MRPs fit into more than one of the above categories. Any project with a network expansion component—no matter the size—is listed in the network expansion category in the Plan. Any project that makes operational improvements, but does not contain network expansion elements, is listed in the operational improvements category. System

²³ MRP definitions are shown pages 167–168 in the *Connections 2050 Process & Analysis Manual*. The next plan will update these definitions.

preservation projects that do not make operational or network expansion improvements is listed in the system preservation category. Only projects that deal exclusively with bike and pedestrian facilities are listed in this category, although nearly all system preservation, operational improvement, and network expansion MRPs include some bike and pedestrian components. Only projects that do not fit into any of these categories are listed as Other.

APPENDIX B.

COMMUNITY ENGAGEMENT AND EQUITY GUIDANCE

For projects that do not pass the initial EJ screening, documented community engagement must be conducted by sponsors that includes participation by “interested parties” who are given a reasonable opportunity to comment on the project.²⁴ This includes racial minority, ethnic minority, and low-income persons living in the census tracts affected by the proposed investment. In order to effectively engage the community in a discussion about desired system performance outcomes and priorities, information must be presented in ways that are easy to understand by all audiences.

The project development process offers additional outreach opportunities to help identify and mitigate potential EJ burdens. Some best practices in engagement with EJ communities include:

- ▶ seeking out and considering the needs of EJ communities;
- ▶ adequate public notice of public participation activities and time for public review and comment at key decision points;
- ▶ timely notice and reasonable access to information about transportation issues and processes;
- ▶ visualization techniques to describe projects or programs;
- ▶ making public information (technical information and meeting notices) available in electronically accessible formats;
- ▶ holding any public meetings at convenient and

accessible locations and times;

- ▶ demonstrating explicit consideration and response to public input received during the development of the project;
- ▶ providing an additional opportunity for public comment, if the project differs significantly from the version that was made available for public comment initially.

FTA provides further guidance in *Promising Practices for Meaningful Public Involvement in Transportation Decision-Making*.²⁵ Planning partners are encouraged to use DVRPC’s *Public Participation Plan* to guide their outreach and use and/or adopt DVRPC’s *Title VI Plan* to comply with non-discrimination requirements of all projects that use federal funding.²⁶

While the project evaluation criteria provides a high-level screening for EJ benefits and burdens, the National Environmental Policy Act (NEPA) conducts a much more in-depth analysis. NEPA analysis occurs after projects are evaluated and selected for inclusion in either the TIP or the Plan. Both PennDOT and NJDOT evaluate potential adverse effects on low-income and minority populations as part of the NEPA process. Recognizing that certain types of actions are unlikely to generate disproportionately high and adverse effects on these populations, PennDOT, in consultation with the FHWA, Pennsylvania Division Office, has developed a list of projects exempt from detailed project-level EJ/Title VI analysis. These include certain pavement and bridge

²⁴ 36 23 CFR 450.316(a) and 23 CFR 450.210(a)(1)(i).

²⁵ Access FTA’s *Promising Practices for Meaningful Public Involvement in Transportation Decision-Making* at www.transportation.gov/priorities/equity/promising-practices-meaningful-public-involvement-transportation-decision-making.

²⁶ Access DVRPC’s *Public Participation Plan* at www.dvrpc.org/products/tm18012/ and the commission’s *Title VI Plan* at www.dvrpc.org/products/tm14010/.

preservation, rehabilitation, and reconstruction projects; non-complex intersection improvements, traffic operations, bicycle and pedestrian, and slope restoration projects; emergency projects; and projects where the Secretary of Transportation has identified a transportation-related hazard in need of immediate action. This process includes evaluation to ensure that impacts to right-of-way and traffic patterns are minimal and that there are no significant public controversies on Title VI issues pertaining to the project before declaring any specific projects exempt. For more information, see *PennDOT Publication #746*.²⁷ DVRPC utilizes this document to evaluate projects in both Pennsylvania and New Jersey in order to apply a similar, federally approved methodology.

For non-exempt projects (anything not defined as exempt in PennDOT Publication #746), information on disadvantaged populations gathered during the planning process is evaluated, and additional information about populations in the project area is gathered if necessary. This includes going beyond the immediate project location to assess impacts from detour routes or impacts to transit services, as applicable. DVRPC helps provide data and guidance to this process as requested at the project level.

The NEPA and exempt/non-exempt analyses identify and discuss both direct impacts and indirect, cumulative effects that would result from a given project, then determine if there are potential disproportionately high and adverse effects on EJ populations. If it is determined that there are potential disproportionate impacts that cannot be offset by project benefits, where feasible, strategies to minimize those effects are incorporated into the project. If a project is advancing with identified potential disproportionate and adverse burdens, DVRPC is available to assist local, state, and federal planning partners in identifying and documenting strategies that avoid, mitigate, or minimize these impacts, as needed.

In addition to the *Plan–TIP Project Evaluation Criteria*, DVRPC conducts system-level analysis for both the Plan and TIP programs as a whole. For example, bridge and pavement asset condition and safety data are analyzed alongside candidate projects and demographic information, including low-income, racial minority, and ethnic minority populations, in order to facilitate conversations among regional stakeholders about how to maintain and improve the region’s transportation network equitably, avoiding disproportionate impacts or levels of investment.

Through its Title VI Compliance Program, DVRPC continues to explore the benefits and burdens associated with transportation projects, particularly those that can be identified during the programming phase, in an effort to avoid, minimize, or mitigate disproportionate burdens. DVRPC’s analysis of benefits and burdens considers all projects, including those that are typically categorized by PennDOT in consultation with FHWA as exempt in the *Project Level Environmental Justice Guidance* framework, in order to provide a comprehensive, high-level evaluation of the potential impacts of the projects on the TIP and the Plan.

²⁷ Access PennDOT’s Publication #746 at www.dot.state.pa.us/public/pubsforms/Publications/Pub%20746.pdf.

APPENDIX C.

PROJECT CATEGORIES

Table C-1 lists the 23 road and 3 transit subcategories for the update to *Connections 2050*. These categories are used to classify transportation investments, help to better understand how transportation revenues are being allocated, and in some instances they are used in the project evaluation criteria.

There are nine higher-level categories (R1 to R6 and T1 to T3) that group these subcategories together. They are:

- ▶ R1 Pavement Preservation and Modernization
- ▶ R2 Bridge Preservation
- ▶ R3 Substantive Safety
- ▶ R4 Mobility Operational Improvements
- ▶ R5 Roadway Expansion
- ▶ R6 Green Transportation
- ▶ T1 Transit Preservation and Modernization
- ▶ T2 Transit Operational Improvements
- ▶ T3 Transit System Expansion

Table C-1. Update to *Connections 2050* Project Categories

CAT ID	SUBCATEGORY	DESCRIPTION
R1.01	INTERSTATE PAVEMENT PRESERVATION	Projects that improve or reconstruct regional Interstate facilities, including preventive maintenance, resurfacing, reconstruction, and appurtenances. Appurtenances include signs, guardrail/guide barriers, drainage, pavement markings, lighting, and retaining walls. Funding for these projects in Pennsylvania come from the Interstate Management Program (IMP).
R1.02	NON-INTERSTATE PAVEMENT PRESERVATION & MODERNIZATION	Projects that improve or reconstruct regional national highway system (NHS) facilities, including preventative maintenance, resurfacing, reconstruction, and appurtenances on state-maintained roadway facilities. This category includes modernization of existing roadways to bring them to current safety standards, as well as preservation of existing bike and pedestrian facilities. It also contains appurtenances like signs, guardrail/guide barriers, drainage, pavement markings, lighting, and retaining walls.
R1.03	LOCAL FEDERAL AID ROADS	Preventative maintenance, resurfacing, and reconstruction for local federal aid roads. This category includes modernization of existing roadways to bring them to current safety standards, as well as preservation of existing bike and pedestrian facilities. It also contains appurtenances like signs, guardrail/guide barriers, drainage, pavement markings, lighting, and retaining walls
R2.01	INTERSTATE BRIDGE PRESERVATION	Projects that improve or reconstruct regional Interstate bridge facilities, including maintenance, rehabilitation, and replacement of Interstate bridge facilities, as well as dam rehabilitation and reconstruction. Maintenance can include scouring, washing, or replacement of expansion joints, rocker bearings, or underpinnings. Rehabilitation includes fixing or replacing one or more of the three main bridge components (the deck, the superstructure, or the substructure), and can include painting metal bridges and deck overlays. Funding for these projects in Pennsylvania comes from the IMP.

CONTINUED: Table C-1. Update to *Connections 2050* Project Categories

CAT ID	SUBCATEGORY	DESCRIPTION
R2.02	NON-INTERSTATE BRIDGE PRESERVATION	Projects that improve or reconstruct regional NHS bridge facilities, including maintenance, rehabilitation, and replacement following the same schedule as Interstate bridge maintenance, as well as dam rehabilitation and reconstruction. This category includes preservation of existing bike and pedestrian facilities on non-Interstate bridges.
R2.03	BRIDGE REMOVAL	Removal of bridges that will not be replaced. These are air-quality-significant projects that also carry long-term funding implications, as federal money can never be used to build a bridge at that location again if it has been used to fund the bridge in the past.
R2.04	LOCAL BRIDGE PRESERVATION	Projects that improve or reconstruct county and local bridge facilities including maintenance, rehabilitation, and replacement, as well as dam rehabilitation & reconstruction. This category includes preservation of existing bike and pedestrian facilities on local federal aid bridges.
R3.01	SUBSTANTIVE SAFETY	Projects that go beyond adherence to design criteria and safety standards in a way that improves the safety performance of a roadway and reduce roadway fatalities and serious injuries. Includes Highway Safety Improvement Program (HSIP) projects; FHWA Proven Safety Countermeasures improving speed management, roadway departures, intersections, crosscutting, and safety enhancements to existing bicycle and pedestrian facilities; grade-separated rail crossings; and portions of Complete Streets projects that include road diets and other safety countermeasures.
R3.02	INCIDENT MANAGEMENT	Capital and operating funds for safety service patrols, local traffic incident management task forces, emergency communication networks, security, and other tools related to responder safety.
R4.01	ACCESSIBILITY IMPROVEMENTS	New gridded road segments with three lanes or fewer and intersections spaced no more than every 600 feet.
R4.02	INTERSECTION IMPROVEMENTS	Intersection/interchange improvements, roadway realignments, channelization, access management, new turning lanes, and diverging diamond and single-point urban intersection treatments.
R4.03	TRANSPORTATION SYSTEM MAINTENANCE AND OPERATIONS	Capital and operating costs for maintaining and restoring the performance of an existing transportation system before extra capacity is needed. Strategies and investments include traffic signal management and coordination, Intelligent Transportation Systems infrastructure (ITS), active traffic management systems; as well as Integrated Corridor Management (ICM). Funds support DOT, county, and local operations.
R4.04	VEHICLE TECHNOLOGY	Deployment of connected vehicle, automated vehicle, and electric vehicle (EV)-charging infrastructure and establishment of an interconnected network to facilitate data collection, access, and reliability, as well as mobility hubs for intermodal transfers. EV investments include funding from the National Electric Vehicle Infrastructure (NEVI) Formula Program.
R5.01	MAJOR ROAD NETWORK EXPANSION	Large-scale projects that have a significant impact on regional travel. These include addition of new through lanes by widening, extending, or building new limited access highways of any length; creating new interchanges between highways (Highway Performance Monitoring System [HPMS] functional classes 1 or 2) and arterials; widening, extending, or building new principal arterials (HPMS functional classes 3 or 4) for more than three lane miles; or adding additional capacity for flex lanes or part-time shoulder use to existing facilities.

CONTINUED: Table C-1. Update to *Connections 2050* Project Categories

CAT ID	SUBCATEGORY	DESCRIPTION
R5.02	MINOR ROAD NETWORK EXPANSION	Network expansion projects that do not rise to the level of Major Regional Project but have a significant impact on regional travel. These projects are generally less than three lane miles in length on minor arterial, collector, or local roads.
R5.03	ADDITIONALLY FUNDED ROAD NETWORK EXPANSION	Network expansion projects that are awarded to the region from competitive funding or other non-formula funded sources. These projects are often funded through PennDOT's Multimodal Fund and NJDOT's Local Freight Impact Fund, and are often focused on enhancing goods movement or multimodal improvements. Since these investment decisions are made outside regional control, they are not counted against caps on system expansion investments.
R6.01	BICYCLE & PEDESTRIAN NETWORK EXPANSION	Bicycle lanes, protected bicycle lanes, sidepaths, trails, sidewalks, bicycle and pedestrian bridges, overpasses or tunnels, project engineering, curb ramps and other ADA improvements. Includes new bike/ped facilities built as part of Complete Streets projects. Bike and pedestrian facilities are listed as FHWA Proven Safety Countermeasures, but are listed here to highlight expansion needs and investments. Preservation, modernization, and safety improvements for existing on-road bike and pedestrian facilities are captured in categories R1, R2, and R3.
R6.02	OFF-ROAD TRAIL PRESERVATION	Resurfacing and reconstruction of existing trails. Preservation, modernization, and safety improvements for existing on-road bike and pedestrian facilities are captured in categories R1 and R2.
R6.03	COMMUNITY CONNECTIONS	Expressway-to-boulevard conversions, and highway capping that converts airspace into green space or other parcels to reconnect communities.
R6.04	ENVIRONMENTAL MITIGATION & RESILIENCY	Streetscaping improvements that include enhancing tree canopy, installing green stormwater infrastructure, landscaping, cooling features, and GHG-emission mitigation strategies; existing fleet diesel retrofits or replacements with electric vehicles, as well as non-project-specific needs like wetland mitigation and cultural resource preservation; and environmental remediation and testing associated with underground storage tanks, lead-based paint, asbestos, soil and groundwater, and air quality (sometimes included as part of project costs in other funding categories). Specific funding programs include CMAQ project engineering, Air Quality Action Program, CARBON, and PROTECT.
R6.05	TRAVEL DEMAND MANAGEMENT	Carpool and vanpool programs, telecommuting, variable work hours, and other policies that provide alternatives to SOVs. Funding for transportation management associations (TMAs), marketing for the Mobility Alternatives Program (MAP), Assisting Commuters After COVID, and Share-A-Ride. Some of these programs require a local match, which is not reflected in the Capital Vision.
R6.06	RAIL IMPROVEMENTS	Roadway funds dedicated for rail improvements to both the freight and passenger rail network, including new park-and-ride facilities at existing stations; as well as rubber-tire transit investments, including shelters, wayfinding, real-time information, passenger amenities, and street repaving and marking to support bus operations.
R6.07	REGIONAL PROGRAMS	Local and regional planning and studies, regional GIS support, the regional travel demand model, and other miscellaneous items, such as equipment purchases and maintenance and storage facilities. This project category is for DVRPC work program items or pass-through funds for county work programs.

CONTINUED: Table C-1. Update to *Connections 2050* Project Categories

CAT ID	SUBCATEGORY	DESCRIPTION
T1	TRANSIT PRESERVATION & MODERNIZATION	Projects that improve or make repairs to existing transit assets; replace or rehabilitate transit vehicles, guideway systems, storage, or maintenance facilities or equipment; or renovate transit stations, including to meet ADA accessibility requirements. Replacement of bridges, as well as set-aside program funding to address future infrastructure and vehicle needs as they arise. This category also includes trackage fees that support state-of-good repair maintenance on Amtrak assets.
T2	TRANSIT OPERATIONAL IMPROVEMENTS	Projects that advance transit capacity or operational improvements, such as adding guideway or sidings to existing passenger rail lines, or upgrading a traditional bus route with BRT service. This category also includes traffic signal prioritization for transit at roadway intersections, as well as improvements to transit operations centers, facilities, and other assets.
T3	TRANSIT NETWORK EXPANSION	New stations, parking, or other facilities on existing lines (including station parking needs), extension of existing lines, new rail and BRT routes, or new ferry service.

Source: DVRPC, 2023.

Plan-TIP Project Evaluation Criteria

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Geographic Area Covered: Nine-County Delaware Valley Region, comprised of Bucks, Chester, Delaware, Montgomery, and Philadelphia counties in Pennsylvania, and Burlington, Camden, Gloucester, and Mercer counties in New Jersey.

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Abstract: The *Plan-TIP Project Evaluation Criteria* are used to evaluate candidate transportation projects relative to the vision and goals of the *Connections 2050* Long-Range Plan ('Plan') and federal Transportation Performance Management (TPM) targets for safety, asset condition, and system performance. The criteria were developed in collaboration with DVRPC's Financial Planning Subcommittee of the Regional Technical Committee (RTC). There are two tiers to the evaluation: (1) a screening to compare candidate consistency with the Plan's equity, sustainability, and resiliency principles, and to ensure Major Regional Projects (MRPs) are funded in the region's Plan before being programmed in the region's Transportation Improvement Program (TIP); and (2) a set of ten project evaluation criteria based on the Plan's focus areas—the environment, communities, transportation, and the economy—and the federal TPMs. Candidate projects are rated with the evaluation criteria to score 'benefit points.' The benefit points are used to create four different ranking systems that compare total benefit points on their own and then with capital costs, capital costs per multimodal user, and capital plus additional operating costs per multimodal user. These four different rankings are also averaged and shared with the Financial Planning Subcommittee to provide a data-informed analysis to guide project prioritization in the Plan and TIP.

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