



RCIS REFINEMENT AND STRATEGY EFFECTIVENESS

DRAFT TECHNICAL MEMORANDUM TASK 2



NJTPA

DATE: JANUARY 2024

WSP
WSP.COM

PRODUCTION TEAM

WSP

Project Manager

Scott Trommer

Project Lead

Muhammad Haider

Project Support

Bryan Kiel

Project Support

Jack Schwab



TABLE OF CONTENTS

1	INTRODUCTION	1
2	PROJECT SELECTION AND PRIORITIZATION PRACTICES	1
2.1	NJTPA’s Current Project Prioritization Criteria.....	1
2.2	Relevant Project Selection and Prioritization Documents	2
2.3	Project Selection	4
2.3.1	Case Study: Wales Road Review	5
2.4	Project Prioritization	6
2.4.1	Case Study: Virginia SMART SCALE	6
2.4.2	Case Studies: Atlanta Regional Commission Performance Planning (RTP 2050), Oregon Metro TIP	7
3	PROJECT IMPLEMENTATION AND PERFORMANCE	8
3.1	State of Good Repair/Maintenance.....	8
3.2	Public Transit.....	9
3.3	Safety.....	11
3.4	Roads.....	12
3.5	Freight	14
3.6	Intelligent Transportation Systems	15
3.7	Active Transportation	16
3.8	Travel Demand Management.....	17
4	DATA COLLECTION	19
4.1	Data collection and evaluation framework	21



5	TECHNICAL ADVISORY COMMITTEE (TAC) FINDINGS	22
6	CONCLUSION	23

TABLES

TABLE 1: LITERATURE REVIEW DOCUMENT SUMMARY	2
TABLE 2: WALES ROAD REVIEW – PURPOSE AND CONDITIONS FOR PROJECT INVESTMENT	5
TABLE 3: VIRGINIA SMART SCALE CRITERIA	6
TABLE 4: ASSET MANAGEMENT PROGRAM/PROJECT BENEFITS	9
TABLE 5: TRANSIT PROGRAM/PROJECT BENEFITS	10
TABLE 6: SAFETY PROGRAM/PROJECT BENEFITS	11
TABLE 7: ROADWAY ENHANCEMENT/EXPANSION PERFORMANCE MEASURES	13
TABLE 8: FREIGHT PROJECT PERFORMANCE MEASURES	14
TABLE 9: FREIGHT PROJECT BENEFITS	14
TABLE 10: ITS PROJECT PERFORMANCE MEASURES	15
TABLE 11: ACTIVE TRANSPORTATION PROGRAM/PROJECT PERFORMANCE MEASURES	16
TABLE 12: ACTIVE TRANSPORTATION PROGRAM/PROJECT BENEFITS	17
TABLE 13: DATA COLLECTION AND MODELING SOURCES	19

1 INTRODUCTION

The purpose of this technical memorandum is to provide an overview of best practices for project funding prioritization and post-implementation project performance assessment. The goal is to support the refinement of the North Jersey Transportation Planning Authority's (NJTPA) Regional Capital Investment Strategy (RCIS) and provide an analysis on how the agency can adapt new methods of selecting and prioritizing projects, as well as measuring the performance of projects based on a set of recommended metrics after project implementation.

The objective of the overall project is to obtain greater transparency for the RCIS with the goal of increasing its accessibility to the community, improving how the impacts of various types of transportation investments are assessed, and refining the project categories, recommended funding allocations, and project prioritization guidelines contained within to support the advancement of the NJTPA's planning priorities and desired performance outcomes. For Task 2, the objectives were to:

- Conduct a literature review to outline the best practices for project funding/investment prioritization.
- Provide a set of measures of effectiveness and/or performance metrics to assess the performance of various types of projects as they pertain to each RCIS funding category.
- Provide an overview of potential benefits that can be observed from the implementation of various project types for each RCIS funding category.
- Provide relevant data collection/tracking sources and tools to assist in the periodic performance assessment process.

Ultimately, the results of this literature review will be the starting point for the RCIS refinement which will be undertaken in Task 3 and will inform the detailed recommendations to be completed as part of that task.

2 PROJECT SELECTION AND PRIORITIZATION PRACTICES

To achieve specific policy goals that relate to the transportation network, decision-makers and planners may benefit from project prioritization tools or other investment strategies that inform how potential projects may meet these goals. Embedding performance-based project selection and prioritization processes helps agencies achieve accessibility, mobility, sustainability, and positive economic outcomes through their capital program. The focus of this section is to review the NJTPA's current project prioritization criteria and highlight opportunities for further implementation with a review of best practices used across the US and internationally.

2.1 NJTPA'S CURRENT PROJECT PRIORITIZATION CRITERIA

The NJTPA Transportation Improvement Program (TIP), which is updated every two years, is the mechanism for allocating federal and state funding for preliminary engineering, final design, right-of-way purchases and construction of transportation projects. In a typical year, the NJTPA considers more than 300 project proposals eligible for funding in the TIP. There are rarely enough resources to move forward with all project proposals in the TIP. Hence, the NJTPA uses a prioritized (ranked) list of projects and provides this list to the state's two principal implementing agencies, NJDOT and NJ TRANSIT. Like other metropolitan planning organizations across the country, the NJTPA has established a prioritization procedure to evaluate and score projects. Other factors such as the feasibility of project delivery, funding availability, and project timing are considered through consultation and negotiation among metropolitan planning organization (MPO) staff, county/municipal staff and elected officials, NJDOT and NJ TRANSIT.

The NJTPA Project Prioritization Criteria were originally developed in 1993 based on efforts of the agency's Transportation Advisory Committee (this Committee has been reformulated and is now known as the Regional Transportation Advisory Committee, or RTAC) and the NJTPA Central Staff. The Board has updated evaluation criteria to match federal guidance, national goals, and state goals, such as those adopted in federal transportation legislation (MAP-21 or the FAST Act) or the NJDOT state capital investment strategy (SCIS). The NJTPA uses the criteria to evaluate proposed future investments systematically and objectively, scoring them according to how well they satisfy the goals of the NJTPA's federally required long range transportation plan (LRTP). Criteria are grouped in accordance with major transportation goals ranging from environmental benefits to user experience and each criteria has a maximum number of associated points. As of the draft 2024-2027 TIP, some examples of the included criteria are:

- Traffic congestion relief
- Air quality improvements and other environmental factors like stormwater management
- Impacts to environmental justice (EJ) or underserved communities
- Access to jobs and existing transportation systems
- Access for non-motorized users
- Replace facilities in poor condition
- Improve safety on existing facilities
- Enhance freight movement

Each criteria category poses a series of questions which relate to the project's characteristics with each question having the option of low, medium, or high as an answer, each answer equating to a number of points allotted for the question. The questions may be qualitative or quantitative in nature, and may relate to modeled outcomes of a project (such as changes in travel delay) or its geographic location and other project attributes (e.g., will the project lead to the redevelopment of Brownfields?)

The summation of these points represents the total score for a project. Project scores resulting from the process are considered during the development of the NJDOT Capital Construction Program, which is the basis for development of the TIP.

2.2 RELEVANT PROJECT SELECTION AND PRIORITIZATION DOCUMENTS

A series of planning documents were reviewed to identify project prioritization strategies in place around the US and internationally. Table 1 shows a summary of these documents, including their purpose and methodology for prioritizing investment.

Table 1: Literature Review Document Summary

Document	Purpose	Methodology
USDOT FHWA Performance-Based Planning and Programming Guidebook	A guidebook designed to help in understanding elements of a performance-based planning and programming process.	Guidebook provides a section-by-section overview of the basic principles of performance-based planning. This includes developing goals, performance measure selection, identifying targets, and evaluating results, with the overall goal of improved decision making and resource allocation.

Virginia SMART SCALE	Used to prioritize funding of planned projects based on their connection to statewide goals (Virginia Transportation Plan, VTrans).	SMART SCALE quantifies project benefits for six categories, each with their own weightage factors which vary based on the geography of the project location. The overall project benefit is computed relative to its cost to derive a benefit-cost ratio.
Delaware Valley Regional Planning Commission – TIP-LRP Project Benefit Criteria	Used to prioritize funding for proposed projects in the Transportation Improvement Plan (TIP) based on their alignment with “Connections 2050 Long-Range Plan”.	The prioritization process uses a project benefit evaluation criteria that consists of seven categories which score projects and create a ranking between them based on their total benefit to cost ratio. This ranking is then used to make final recommendations.
Knoxville TPO TIP & Mobility Plan 2045	Used to prioritize funding for proposed projects in the TIP based on connection to their Mobility Plan 2045	The TIP uses a project weighting criteria, which consists of eight categories drawn from their regional goals to create a common ranking of projects. Projects are then recommended based on fiscal constraints and community feedback.
Boston Region MPO TIP 2024-2028	Used to prioritize funding for proposed in the TIP in connection with the MPO’s Long-Range Transportation Plan	The TIP uses different project weighting criteria based on project type using five to six MPO goal areas to generate a score, which is used by the MPO board in allocating funding.
City of Fort Collins Transportation Capital Projects Prioritization Study	Used to prioritize funding for proposed in the TIP in connection with the Fort Collins’ Active Modes Plan	The TIP uses a three-phase project analysis. Phase one identifies the arteries with highest potential for safety and congestion improvements. Phase two scores those projects based on quantitative and qualitative criteria. Finally, phase three prioritizes a list of projects to carry forward
Broward County MTO MTP – Needs Assessment	Evaluates projects to develop a cost feasible plan for roadway investment as part of Broward County’s 2045 long-range plan	The Needs Assessment follows a seven-step process. First, data is gathered to generate five different 2045 scenarios, which are then hybridized to create a

		needs assessment. Projects are then scored based on six metrics across six funding programs, which are then used to generate the investment plan.
Atlanta Regional Commission Planning (RTP 2050)	Ensures that investments connect to regional goals across a variety of measures and metrics to justify funding.	The evaluation process mirrors the approach of the FHWA performance-planning framework and is done for current needs, as well as future impact. Both current and future scenarios have a set of defined metrics which require project benefit calculation. System performance is modeled using an Activity-Based Model (ABM) and an air quality assessment. Results for each metric show current performance against future performance in an investment versus no investment scenario to justify funding for each project.
Oregon Metro 2021 – 2024 TIP	Evaluates consistency of projects in the 2021-2024 TIP with the 2018 Regional Transportation Plan (RTP) which sets the long-range vision, goals and outcomes for regional transportation network.	Uses four policy priorities from the RTP as evaluation categories and utilizes analytical tools such as the travel demand model, Motor Vehicle Emissions Simulator (MOVES) model and Geographic Information Systems (GIS) to explain impacts of proposed package of investments on the four evaluation categories. This is done for a base case scenario, a future scenario (No Build) and a future scenario (Build) to compute project impacts and prioritize funding.
Wales Road Review	Used to examine alignment of projects with Welsh Government’s vision and policies and provide a recommendation for funding consideration.	Uses a qualitative framework consisting of a set of project purpose/conditions, and a criterion of nine categories to suggest if a project should or should not proceed for funding.

2.3 PROJECT SELECTION

Project selection is the lifecycle phase in which agencies select specific infrastructure projects for further development in the context of long-term regional plans and goals. Best practices suggest that clear criteria should be developed to identify

whether projects should move forward or remain dormant based on their alignment with national and state needs. The broad development goals set by the government in their long-term planning processes are refined into clearer project approaches. Qualitative criteria can assist as an initial screening project for future infrastructure strategies.

2.3.1 CASE STUDY: WALES ROAD REVIEW

The Wales Road Review is an international example of project selection based on qualitative criteria. Most road projects currently in development in Wales were conceived before the adoption of comprehensive plans and visioning like Net Zero Wales, the Wales Transport Strategy and Future Wales. The Wales Roads Review consisted of a panel that was formed in October 2021 to examine the current pipeline of road investment by the Welsh Government. The aim of the review was to ensure that road investment aligned with the delivery of the priorities of the Welsh Government. This helped to develop criteria which identify appropriate circumstances for the expenditure of Welsh Government’s funds, as well as to consider how any savings can be allocated in order to tackle other road network problems such as maintenance.

The Wales Road Review recommends that to be consistent with the Welsh Government policy and be further considered for investment, all projects should only be used for one (or more) of the four purposes and meet all four conditions as highlighted in Table 2. This set of purpose and conditions acts as a first stage filter to ensure that current and future strategies match the department’s goals.

Table 2: Wales Road Review – Purpose and Conditions for Project Investment

Purpose	
1	Shift trips to sustainable transport to reduce carbon emissions
2	Reduce casualties where they are high, through small-scale changes
3	Adapting roads to the impacts of climate change
4	Supporting prosperity by providing access to development sites that will achieve sustainable transport mode share
Conditions	
1	The project should minimize carbon emissions in construction
2	The project should not lead to higher vehicle speeds that increase emissions
3	The project should not increase road capacity for cars
4	The project should not adversely affect ecologically valuable sites

Assuming the project has one of the four purposes and meets all four conditions, the project undergoes a detailed selection criteria. The criteria are not weighted in a quantitative manner, rather the criteria focus on a set of categories that were developed for analyzing each road project to guide the overall recommendation for investment. This methodology can also be used for other modes of travel. The review uses nine criteria to determine a final recommendation as outlined below:

- Has the case for change been made?
- Are the objectives of the project aligned with current policy?
- Did the project development process examine all appropriate options?
- What is the effect on carbon dioxide emissions?
- Will the project be good for people and communities?
- Will the project be good for the environment?
- Will the project be good for places and the economy?
- Will the project be good for culture and the Welsh language?
- Is the project robust for different futures?

Depending on the overall review of the project, the panel then provides one of the four following recommendations regarding project funding/investment:

- Could proceed, in some cases with changes
- Should not proceed (but some elements may proceed)
- Should not proceed
- Insufficient information, outside scope of the review, or the Panel issued advice but not a recommendation

Overall, the Wales Road Review helps to make decision-making processes more efficient for sponsors of potential transportation strategies when assessing which project investments are justifiable and appropriate. Although this form of review may not remove or reduce the requirement for systematic appraisal, it can save significant abortive development work on inappropriate strategies and can prevent the need for future retrospective exercises repeating the work completed within the review.

2.4 PROJECT PRIORITIZATION

Project prioritization is the next step once projects have been filtered during project selection. The goal of the RCIS is to invest into the right projects that meet the NJTPA’s critical needs. There are several methodologies that can be adopted when selecting projects, commonly these are multi-criteria decision tools which might utilize software or modeling-based tools to make decisions. The following section uses case studies from the literature review to highlight best practices for project prioritization.

2.4.1 CASE STUDY: VIRGINIA SMART SCALE

The Virginia SMART SCALE is formally known as the System for the Management and Allocation of Resources for Transportation. Virginia’s SMART SCALE is used to identify transportation projects for funding and ensure the best use of limited tax dollars. It is a method based on scoring planned projects against one another and funding projects that meet one or more transportation needs identified in Virginia’s Transportation Plan. Once projects are scored and prioritized, the Commonwealth Transportation Board (CTB) has the best information possible to select the recommended projects for funding. SMART SCALE requires that the measures be quantifiable in terms of a project’s benefits relative to its cost. The scale considers six factor areas as part of its criteria shown in Table 3.

Table 3: Virginia SMART SCALE Criteria

Factor areas	Measure	Measure name	Measure weight
Safety	S.1	Equivalent property damage only (EPDO) of Fatal and Injury Crashes*	70%
	S.2	EPDO Rate of Fatal and Injury Crashes	30%
Congestion mitigation	C.1	Person Throughput	50%
	C.2	Person Hours of Delay	50%
Accessibility	A.1	Access to jobs	60%
	A.2	Access to jobs for disadvantaged persons	20%
	A.3	Access to multimodal choices	20%
	E.1	Air quality and environmental effect	100%

Environmental quality	E.2	Impact to natural and cultural resources	0% - Subtract up to 5 points
Economic development	ED.1	Project support for economic development	60%
	ED.2	Intermodal access and efficiency	20%
	ED.3	Travel time reliability	20%
Land use	L.1	Transportation-efficient land use	50%
	L.2	Increase in transportation-efficient land use	50%

A strength of the SMART SCALE is that it recognizes the diversity of transportation needs in different areas of the state. Hence, the Commonwealth Transportation Board (CTB) created four weighting frameworks and assigned frameworks by planning district commission (PDC) and metropolitan planning organization (MPO) boundaries. This allows for project scoring to be affected by regional goals and priorities within the state.

The overall scores of projects for each category are calculated and compared by normalizing project benefits within each category, by using the highest project score and applying the respective weighting factors. The overall score for each project is measured as the project benefit value divided by the project cost (the SMART SCALE funded cost of the project) to derive benefit-cost ratio.

2.4.2 CASE STUDIES: ATLANTA REGIONAL COMMISSION PERFORMANCE PLANNING (RTP 2050), OREGON METRO TIP

Similar to the multi-criteria decision methodology used by the Virginia SMART SCALE, some agencies have adapted to using evaluation processes which rely on software or modeling based tools to forecast project benefits in terms of their expected outcome and impact on their region’s transportation network. The Atlanta Regional Commission and the Oregon Metro are examples of agencies that utilize data-driven tools such as regional travel demand models, regional air quality simulators, and geographic information systems (GIS) to assess the impacts of proposed projects on the transportation network and compare them to the baseline/existing transportation system performance.

Both the Atlanta Regional Transportation Plan (RTP 2050) and the Oregon Metro TIP used an Activity-Based Model (ABM) to reflect and analyze different scenarios – current conditions of the region’s transportation system, as well as the system with and without project investments. The ABM reflects and responds to detailed demographic information, including household structure, age, income, and other key attributes. The model was calibrated using data from household travel surveys, transit on-board surveys, and observational data from partners (DOTs). USEPA’s Motor Vehicle Emissions Simulator (MOVES) model is typically used to explain the impacts of the proposed package of investments on travel behaviors and transportation emissions. The ArcGIS TIP and MTP Interactive Map Tool developed by the Atlanta Regional Commission supports geospatial analysis of investments. Using the support of data-driven tools can allow agencies, including the NJTPA project prioritization methodology, to better demonstrate the consistency with the region’s long-range transportation plan and show progress towards advancing the goals and outcomes identified in their long-term plans.

3 PROJECT IMPLEMENTATION AND PERFORMANCE

To understand how measurement of the impact of the NJTPA's RCIS investments can be put into practice, a literature review of performance metrics based on project type was conducted. This review identified key metrics and indicators that are used to evaluate a project. Furthermore, based on the literature review, an overview was provided of certain benefits that can be achieved for different project types within each funding category. In each case, documented impacts by project category are meant to be examples; actual impacts can vary widely based on program/project specifics. These observed impacts, beyond the statistics, give an idea of how investments can actually change performance. This review looks largely at the direct impacts of projects and programs, and not broader, important indirect impacts that are more challenging to quantify, such as impacts on the economy, equity, land use, and health.

3.1 STATE OF GOOD REPAIR/MAINTENANCE

The NJTPA's RCIS places heavy emphasis on the management and upkeep of current transportation assets. The current allocation targets dedicate a majority of funds (73%) to maintenance and preservation, consisting of: 17% to Road Maintenance and Preservation, 20% to Bridge Maintenance and Preservation, and 36% to Public Transit Maintenance and Preservation. Between 2009 and 2022, the NJTPA dedicated 78.5% to maintenance and preservation work, with transit preservation representing nearly half of the total TIP between 2018 and 2022. This high priority is emphasized in the NJTPA's Fix it First investment principle, which seeks to counteract the slow deterioration of existing aging infrastructure. Best practice for asset management investment involves bringing infrastructure into a state of good repair and reducing long-term costs:

- Increasing the percentage of assets in a state of good repair according to federal performance measures
- Reducing operations and maintenance (O&M) costs for NJ TRANSIT and NJDOT
- In addition to budget and financial efficiencies, state of good repair is critical to maintain system safety, reliability, and mobility performance

Some MPOs studied in our literature review place a similarly high priority on asset management issues in selecting projects to prioritize. The Delaware Valley Regional Planning Commission (DVRPC) gives special priority to projects based on the amount of bridge and pavement improvements or bringing an asset from poor condition into a state of good repair. DVRPC also considers how a project will reduce or increase overall agency costs. Knoxville weights Maintenance and Efficiency (or System Preservation) as its most important category for investment and lists a variety of strategies it pursues:

- Ensuring adequate investment for continuous improvement of pavement, bridge, sidewalk, and greenway conditions
- Maximizing the efficiency of existing transportation assets by prioritizing limited resources on rehabilitating and replacing aging infrastructure over system expansion
- Employing life-cycle analyses with expansion projects to demonstrate resources for future O&M

Additionally, the American Society for Civil Engineers' Report Card for American Infrastructure recommends planning for resilience in asset management investments by encouraging the development of community resilience plans, improving land use planning across all levels of decision making, and incorporating green infrastructure.¹

¹ [Resilience | ASCE's 2021 Infrastructure Report Card](#)

The literature review provided examples of successful projects used by systems that maintain strong ratings for asset management shown in Table 4.

Table 4: Asset Management Program/Project Benefits

Program/Project Type	Observed Results
Rehabilitation and Preservation²	<ul style="list-style-type: none"> • Rhode Island implemented a new asset management approach with life cycle costing and strict funding accountability in the nation’s worst bridge system • Between 2016 and 2021³ <ul style="list-style-type: none"> ○ Increased structurally sufficient bridge deck area from 74.4% to 79.7% ○ Decreased the total number of bridges in poor condition from 247 to 189
Project Bundling⁴	<ul style="list-style-type: none"> • By employing alternative delivery methods, PennDOT replaced and repaired 558 similar small bridges in poor condition in only three years
Life-Cycle Planning Strategies⁵	<ul style="list-style-type: none"> • Life-cycle planning allows asset holders to identify the lowest cost methods to maintain states of good repair in their systems • Through Highway Pavement Management Application software, MnDOT to identify a preferred maintenance strategy that was \$2,000 cheaper per lane-mile than their minimum maintenance strategy • Tennessee DOT implemented a what-if system that allowed them to understand alternatives and identify a spending pathway to reduce poor pavement conditions to below 5% on Interstates and highways • NJDOT has used a life-cycle planning approach to establish a pavement investing strategy to achieve the highest conditions over the long term with limited funding

3.2 PUBLIC TRANSIT

The RCIS targets 8% of the NJTPA’s investment towards public transit enhancement and expansion, 4% to each. These objectives are reflected in the NJTPA’s investment principle Expand Public Transit, which references the importance of

²[RhodeWorks - Rhode Island Rhode Island Department of Transportation \(ri.gov\)](https://www.ri.gov)

³[RI bridges improving after 5 years of RhodeWorks; tolls still in legal limbo | WPRI.com](https://www.wpri.com)

⁴[Rapid Bridge Replacement Project \(pa.gov\)](https://www.pa.gov)

⁵[Transportation Asset Management Plans Case Study 3: Life Cycle Planning Practices \(bts.gov\)](https://www.bts.gov)

public transit for air quality, economic development, and congestion reduction as described in Plan 2050, Together North Jersey, and other regional planning initiatives. Spending on transit enhancement and expansion has the potential to boost revenue and ridership while potentially lowering automobile use. This could help to sustain NJ TRANSIT financially and provide an array of benefits associated with reduced vehicle miles traveled (VMT). Key metrics in understanding the success of public transit are:

- Growth in overall ridership
- Increase in ridership as a percentage of all trips within a city/region
- Transit system reliability
- Transit area coverage (geographic and population)

In reviewed capital plans, transit spending is generally scored in the context of promoting multimodality including park-and-rides and transit to active transportation connections. Rather than examining transit in a vacuum, multimodal criteria look at how projects contribute to encouraging a variety of transportation types. DVRPC’s Multimodal Use criteria examines how facilities or assets are used in a multimodal manner, looking at a project’s holistic impact on the transportation system:

- person trips weighted for a diversity of modes
- use for freight trucking
- reduction in trip length for multimodal users

In the Wales Road Review, one of the four purposes for recommending a road project is a focus on “shifting trips to sustainable transport to reduce carbon emissions,” which include public transit and active transportation uses. Knoxville’s criteria seek to improve access to services and employment with bicycle and pedestrian facilities and transit services; projects are scored on length of regional transportation infrastructure and sidewalks within a jurisdiction within the TPO, percentage of commuters using non-SOV modes, households within a ¼ mile of high frequency ridership, and transit ridership. Boston’s program includes points for projects that enable the use of non-SOV modes where previously impossible.

Best strategies for public transit investment generally involve investment that accounts for this holistic look at modes as seen in Table 5.

Table 5: Transit Program/Project Benefits

Program/Project Type	Observed Results
Coordinated Bus-Rail Investment and Networking⁶	<ul style="list-style-type: none"> • In examining different effects on ridership levels across U.S. metro areas, TransitCenter found that rail investment alone does not increase ridership • Seattle and Houston combined new investments in rail along with a re-routing to their existing bus network to align with the new rail investments and deliver frequent service to neighborhoods that previously had low transit accessibility • Houston saw a 6.8% ridership increase across bus and light rail in one year solely by rerouting to match resident needs for frequency⁷

⁶ [There's a Reason Transit Ridership is Rising in These 7 Cities - TransitCenter](#)

⁷ [Redrawing a Bus Map Leads to a Dramatic Increase in Transit Ridership | ASCE's 2021 Infrastructure Report Card](#)

Bus Rapid Transit and Dedicated Bus Lanes⁸	<ul style="list-style-type: none"> • Dedicated bus lanes improve reliability by reducing travel times by 10-25%, and up to double that during periods of peak delay, resulting in less travel time variability and increasing ridership by 5% or more
--	--

3.3 SAFETY

The current NJTPA RCIS includes a 4% target allocation for direct safety improvements, and encouragement for all other spending to include requisite safety measures, with particular attention to priority crash types. All plans that were researched in the literature review contain criteria based around safety, with a common theme of computing rates of crashes. Some of the key metrics that are most commonly in practice today and can be used to measure safety in a specified project area include the following:

- Change in total number of crashes at a specified project location (fatal, injury, non-injury crashes)
- Change in number of crashes resulting in injuries or fatalities
- Rate of injury/death per capita and/or VMT
- Total rail-miles traveled between collisions with a person or vehicle
- Level of investment to address fatalities and serious injuries

To reduce and eliminate roadway injuries and fatalities where they frequently occur, NJTPA has adopted a set of regional safety performance targets that seek to achieve the complete elimination of fatalities and serious injuries on roads by 2050. Several agencies have adopted similar policies, known variously as Vision Zero, Toward Zero Deaths, and others. FHWA also recommends the Safe System Approach, based on five principles: safe roads, safe speeds, safe road users, safe vehicles, safe post-crash response and care..

Hundreds of design improvements have been reviewed across the country and internationally based on the impact of the new design on the number of crashes. This has allowed researchers to quantify their typical or average effects on safety. The expected safety benefits of many infrastructure treatments have been cataloged in many sources, including the AASHTO Highway Safety Manual, the FHWA CMF (crash modification factor) Clearinghouse, and research from several planning agencies. These guiding documents cite academic and industry research to provide an estimation of reduced crashes by severity, vehicle type, and crash type based on the investment made.

Examples of targeted and systematic safety approaches were reviewed, which included programs such as complete street policies, safe routes to school programs, intersection improvement programs, and pedestrian/bicycle safety plans. Research conducted nationwide has demonstrated that effective implementation of such programs has improved safety and decreased the probability of crashes and injuries/fatalities.

Based on the literature review, a range of key safety improvements were observed based on direct infrastructure investments nationwide as shown below in Table 6.

Table 6: Safety Program/Project Benefits

Program/Project Type	Observed Results
----------------------	------------------

⁸ [MoveThatBus-FINAL.pdf \(nacto.org\)](#)

<p>Implementation of Complete Streets⁹</p>	<ul style="list-style-type: none"> • Motor vehicle crash reduction of 6 percent in California and Washington cities • 70 percent of complete street projects reduced pedestrian collisions after their redesigns • New York City Department of Transportation found that total crash rates (motor vehicles, bicycles, pedestrians) declined 40-50 percent after bike lanes were installed in the cities
<p>Intersection Safety Improvements¹⁰</p>	<ul style="list-style-type: none"> • A 31 percent reduction in number of annual serious injury and fatal crashes at 13 high-crash intersections was observed in Austin, Texas following intersection engineering treatments as part of their Vision Zero Transportation Program
<p>Traffic Calming¹¹</p>	<ul style="list-style-type: none"> • NYC observed a 10 percent overall reduction in crashes with injuries, and a 27 percent reduction in vehicle crash injuries with the installation of 26 Neighborhood Slow Zones which included gateway signage, 20 mph pavement markings, and speed humps
<p>Safe Routes to School Program¹²</p>	<ul style="list-style-type: none"> • Efforts by NJDOT and NYCDOT to improve safety in priority school zone areas have shown to reduce pedestrian injuries. Improvements include sidewalk improvements, pedestrian crossing islands, high visibility pavement marking, proper lighting at crossings, proper signage which have shown a pedestrian crash reduction in a range of 25 – 40 percent

3.4 ROADS

The NJTPA’s investment goals target 3% toward investment in roadway enhancements and a 1% toward investment in roadway expansion. This low investment in roadway expansion reflects the NJTPA’s investment principle of Improve Roads but Add Few. In line with its regional goals, projects supported by the NJTPA need to balance roadway improvements that serve the most travelers while mitigating the numerous costs that come with expansion that might hinder environmental and social equity. With safety being its own category, this section focuses on improvement of roads for the sake of sustainability through emissions reductions from decreasing miles traveled as well as congestion management to improve reliability as well as efficiency and emissions goals. Thus, roadway expansions are meant to address current bottlenecks that affect quality of life rather than enable future sprawl.

All but one plan studied in the literature review assessed emissions criteria in the context of prioritizing road projects. This reflected a spectrum from purely the emissions from travel to the life cycle of the project including construction, as well as

⁹ MDOT. [Evaluating the Effects of Complete Streets on Mode Choice, A Case Study in the Baltimore-Washington Area \(maryland.gov\)](https://www.maryland.gov)

¹⁰ Austin, Texas Government. [Final major intersections VZ Analytics 20220718.pdf \(austintexas.gov\)](https://www.austintexas.gov)

¹¹ USDOT FHWA, Traffic Calming Case Studies. [Module 8: Traffic Calming Case Studies | FHWA \(dot.gov\)](https://www.fhwa.dot.gov)

¹² New Jersey Safe Routes. [Proven Safety Countermeasures in School Zones - New Jersey Safe Routes \(saferoutesnj.org\)](https://www.saferoutesnj.org)

limiting the use of natural areas for new road development. At the same time, nearly all plans scored projects based on their successful proposal of a congestion management element in their road improvements. The exception was the Wales Road Review, which only seeks to manage automobile congestion through the reduction of personal vehicle trips and mode shifts to active and public transit.

The core metric to consider remains travel time reliability, measured through a preferred statistic. Beyond directly shortening the route, reductions in emissions per trip will result from improving this environmental statistic. Improving travel time through increased lane capacity can often be counterintuitive in the long-term. The phenomenon of induced demand means that as lanes are added the increase in users will eliminate any short-term travel time reduction. The most-frequently cited example is the 26 lane (including frontage) Katy Freeway in Houston, TX, which after its last expansion in 2018 had longer peak travel times than before the expansion.¹³

Roadway enhancements using technology and user information, direct safety improvements, and creating dedicated freight facilities are addressed separately in the RCIS. Smart technologies will represent a key tool for future congestion management, and though covered in the category of technology, future roadway enhancement projects should prepare roadways for easier installation of smart technologies as a means to reduce congestion, especially paving the way for smart traffic light management, which is being piloted in Columbus with potential for both congestion and safety benefits.¹⁴ Additionally, the NJTPA's RCIS leaves open room for roadway enhancements to include retrofitting facilities for safe access and mobility for active transportation and transit. Reducing vehicle trips through promoting other modes is a valuable way to decrease congestion on streets, and improvements that make roads more accessible to alternate uses reduce the need to drive. With that in mind, enhancing road connections to park-and-ride facilities and developing parallel active transportation corridors will help reduce congestion by shifting trips out of single occupant vehicles.

Based on the literature review, performance measures used to assess the impact of roadway enhancements and expansion include:

Table 7: Roadway Enhancement/Expansion Performance Measures

Program/Project Type	Observed Results
Highway Expansion ¹⁵	<ul style="list-style-type: none"> <li data-bbox="634 1230 1427 1409">• The impact of highway expansion on VMT has generally been observed in elasticity terms, where a hypothetical elasticity of 1.0 indicates that VMT will increase at the same rate of lane miles (i.e. a 1% increase in lane-miles equals a 1% increase in VMT). <li data-bbox="634 1430 1427 1698">• An induced demand calculator developed for CalTrans in California used estimates for VMT elasticity around 1.0 for interstates, based on a number of studies that observed VMT increases between 0.772 and 1.34. For smaller arterials, an elasticity of 0.75 is used, based on observed elasticities between 0.67 and 0.89. These studies reviewed examples across the US.

¹³ [Widening Highways Doesn't Fix Traffic. So Why Do We Keep Doing It? - The New York Times \(nytimes.com\)](https://www.nytimes.com/2018/07/26/us/politics/widening-highways-doesnt-fix-traffic-so-why-do-we-keep-doing-it/)

¹⁴ [Smart Technology Makes Managing Traffic a Breeze for Transportation Departments | StateTech Magazine](https://www.statetechmagazine.com/smart-technology-makes-managing-traffic-a-breeze-for-transportation-departments/)

¹⁵ Volker, Lee and Handy. "Induced Vehicle Travel in the Environmental Review Process." UC Davis Institute of Transportation Studies. 2020 <https://journals.sagepub.com/doi/full/10.1177/0361198120923365#bibr2-0361198120923365>

Signal optimization, throughput improvements, speed reduction mechanisms, other roadway improvements¹⁶	<ul style="list-style-type: none"> • Generally, stop-and-go traffic on arterials and highways produces greater emissions than continuously moving, low speed movement. • Roundabouts and other projects that improve continuous movement have shown to improve air quality on these local roads by over 20%
High Occupancy Tolled (HOT) Lanes¹⁷	<ul style="list-style-type: none"> • Washington State DOT measures the performance of HOT lanes by measuring average weekday travel times and 95th percentile travel times between general purpose and HOT lanes. Along the 11 miles of road, travel time in HOT lanes was between 33-50% faster, with significantly less deviation between average travel times and the 95th percentile travel times.

3.5 FREIGHT

The current NJTPA RCIS includes a 3% target allocation for dedicated freight facilities. New Jersey’s freight system is a critical component for promoting commerce, creating jobs, and improving quality of life. The freight system includes trucking, water transport, air cargo, and rail freight carriers. With more than 375 million tons of freight moving each year in New Jersey, investment and management of the freight network is crucial. Based on the literature review, some performance measures dedicated specifically to the highway and rail freight network are outlined in Table 8.¹⁸

Table 8: Freight Project Performance Measures

Performance Measure	Metrics
Highway Performance	Truck Travel Time Reliability, Truck Hours Delay, Percentage of Travel Time Meeting LOS
Rail Performance	Rail Tonnage (total freight carried by rail in a specified time), Rail Travel Time Reliability, Rail Safety (number of crashes or incidents)

The literature review showed a series of freight planning methods, as well as their observed benefits. Table 9 shows a list of different freight project types and their demonstrated benefits as observed in the literature review.¹⁹

Table 9: Freight Project Benefits

Project Type	Observed Results
--------------	------------------

¹⁶ California Air Resources Board. “Strategies to Reduce Air Pollution Exposure Near High-Volume Roadways” 2017. https://ww2.arb.ca.gov/sites/default/files/2017-10/rd_technical_advisory_final.pdf

¹⁷ NCHRP. Evaluation and Performance Measurement of Congestion Pricing Projects. 2011. <https://nap.nationalacademies.org/download/13648#>

¹⁸ FDOT Freight Mobility and Trade Plan. [fntp-tm3_performance-and-conditions.pdf \(windows.net\)](fntp-tm3_performance-and-conditions.pdf)

¹⁹ University of Washington, Freight and Transit Lane Case Study. [SCTL_FAT_Lane_Report.pdf \(washington.edu\)](SCTL_FAT_Lane_Report.pdf)

Exclusive Truck Facilities	<p>A six-month pilot test in Norwich, United Kingdom and the Texas Department of Transportation evaluated the potential benefits of exclusive truck facilities on selected Interstate highways. The results showed:</p> <ul style="list-style-type: none"> • Reduced trip time of 2-4 minutes on a 25-minute average trip <p>Positive changes on LOS and volume to capacity ratios when peak hours volumes exceeded 1800 vehicles per hour</p>
Truck-only-Toll (TOT) Facilities	<p>A study was undertaken by the State Road and Tollway Authority (SRTA) to examine TOT feasibility in the Atlanta region and results showed:</p> <ul style="list-style-type: none"> • Total vehicle hours travelled were reduced by 6.5 percent • Congestion in general-purpose lanes improved significantly with free flow conditions increasing from 40 to 46 percent
Truck Lane Restrictions	<p>Microsimulation analysis by Florida State University assessed truck restrictions on urban arterials in the left, middle, and right lanes. Results showed that for segments where trucks were restricted from the left lane:</p> <ul style="list-style-type: none"> • Average travel time decreased in range of 1-10 percent • Passenger cars and trucks had higher average speeds

3.6 INTELLIGENT TRANSPORTATION SYSTEMS

The NJTPA RCIS includes a 4% target allocation for Intelligent Transportation Systems (ITS), particularly in ITS technology as it pertains to public transit. New Jersey is the most densely populated state in the nation and needs a fully operable ITS to effectively manage traffic. New Jersey’s 10-year Investment Strategy from 2007 – 2016 committed to \$1 billion in ITS investment, further emphasizing the need to provide an efficient mechanism for its transportation network, including the Smart Moves Program²⁰. In November 2023, NJ Transit launched its pilot program of NaviLens technology to provide digital information to customers including departure times and service info with enhanced features for visually impaired customers at 51 bus stops across New Brunswick²¹. Recent funding in the TIP supports continuous projects such as NJDOT’s Intelligent Traffic Signal Systems, the Smart and Connect Corridors Program, the statewide traffic operations and support program, and the ITS Resource Center. Table 10 outlines a list of performance measures and metrics that can be used to monitor ITS system performance²².

Table 10: ITS Project Performance Measures

Performance Measure	Metrics
Travel Time/Mode	Change in travel time along routes with ITS systems, Change in traffic flow along routes with ITS systems, Change in mode-share along routes with ITS systems (these could be represented as a percentage)

²⁰ NJDOT, ITS Investment Strategy. [Intelligent Transportation Systems Investment Strategy \(nj.gov\)](https://www.nj.gov/transportation/its/its-investment-strategy/)

²¹ NJ Transit. [NJ TRANSIT LAUNCHES PILOT PROGRAM OF NEW TECHNOLOGY TO PROVIDE DIGITAL TRAVEL INFORMATION TO BUS CUSTOMERS | NJ TRANSIT | New Jersey Transit Corporation | New Jersey](https://www.njtransit.com/newsroom/2023/11/23/navilens-pilot-program/)

²² European Union. [2016-its-kpi-for-the-eu.pdf \(europa.eu\)](https://ec.europa.eu/transport/its/2016-its-kpi-for-the-eu.pdf)

Safety	Change in number of reported accidents along routes with ITS systems
Emission	Change in annual CO2 emissions (tons) where ITS has been implemented

Measuring the benefits of ITS projects is a complex matter, especially when the ITS system is incorporated with other improvements. Many of the benefits consist of increased awareness for the driver so that better decisions can be made by the public to provide an overall improvement to the safety and mobility of the system for all. Some of the observed benefits of deploying ITS programs are outlined below²³:

- **Improved Network Capacity:** Lane management techniques such as High Occupancy Vehicle (HOV) lanes, reversible flow lanes, variable speed limits and enforcement systems have shown best use of road capacity and increased throughput
- **Improved Traveler Mobility:** Reduced delay, minimized congestion, and travel time reliability have been observed
- **Route Finding and Navigation:** Better directions and route finding information, as well as pre-trip travel information make for better route planning.
 - Advanced routing and decision-making software for the routing of time-sensitive deliveries increased deliveries per driver hour by 24 percent in the Baltimore-Washington metropolitan area, according to the World Road Association
- **Safety Improvement:** Speed enforcement, red light enforcement, driver assistance, accident detection and response can improve overall safety:
 - Intelligent Speed Adaptation (ISA) in Sweden has shown potential for a 20 percent reduction in injury accidents with a 3-4% reduction in average speeds in urban areas
 - Speed enforcement cameras on sections of a major route in Norway reduced injury accidents by 26%

3.7 ACTIVE TRANSPORTATION

The NJTPA RCIS includes a 2% target allocation for bike and pedestrian facilities to encourage the development of a multi-modal network that includes active transportation modes. Planning and designing for pedestrians and bicyclists requires the use of performance measures to help prioritize projects, evaluate appropriate facility types, and track system performance over time. Standards available for a quantitative assessment of such facilities are less established than those for vehicles. Based on the literature review, some of the performance measures dedicated to active transportation are depicted in Table 11.

Table 11: Active Transportation Program/Project Performance Measures

Performance Measure	Metrics
Safety	Number of Collisions in a geographical location
Access/Connectivity	Proximity to Transit, school access, first mile/last mile connection, trails connection
Network Quality	User Delay, Average Travel Time, Level of Service, Bicycle Level of Compatibility/Stress
Facility Use	Mode Split, VMT per Capita, Facility Throughput
Equity	Proximity to Vulnerable Populations, ADA Access

²³ World Road Association. [Types of Benefit | RNO/ITS - PIARC \(World Road Association\)](#)

Justifying investments in bicycle and pedestrian facilities can be more complex than road and highway project investments, as guidance on quantifying benefits and reliable demand and economic forecasting is typically less established than metrics tied to roadway projects. However, active transportation investments provide a range of benefits that are in Table 12 below.²⁴

Table 12: Active Transportation Program/Project Benefits

Benefit Category	Observed Results
Mobility	<ul style="list-style-type: none"> • Walking share saw an increase of 15.8 percent and biking share an increase of 44 percent in communities selected under non-motorized transportation pilot programs for walking/biking funding • 77 percent of biking trips in America are within 1 block of a transit station • Creating a new trail increases use of bikes by 2% – 15%
Safety	<ul style="list-style-type: none"> • 44 percent decrease in pedestrian injuries in school zones due to Safe Routes to School interventions which promote development of active transportation facilities • Number of accidents between a bicycle and a motor vehicle decreased from a rate of nearly 16 to 7 accidents per million bicycle trips based on a study in Seville, Spain
Health	<ul style="list-style-type: none"> • A 15-minute walk or bike ride to work for a total of 30 minutes a day would be sufficient to meet the CDC’s recommended physical activity guidelines • Access to sidewalks equates to a 20% more likelihood to be physically active than those with no access to sidewalks • Proximity to trails is associated with people being 50 percent more likely to meet physical activity guidelines and 73% - 80% more likely to use a bicycle
Environment	<ul style="list-style-type: none"> • 53 percent of trips are within 3 miles or less; hence, shift of these trips to biking and walking can reduce emissions

3.8 TRAVEL DEMAND MANAGEMENT

The RCIS states that investments should encourage growth while protecting the environment and minimizing sprawl in accordance with relevant state and federal plans and guidance. The RCIS encourages fewer motor vehicle trips by committing to a 2% allocation of transportation funds to travel demand management, which it frames in its Help Northern New Jersey Grow Wisely investment principle. This principle seeks to align the NJTPA’s investments with its ideals of development planning that focus on eliminating sprawl. Ideas for implementing travel demand management were found in

²⁴ Rails to Trails Report. [activetransport_2019-report_finalreduced.pdf \(railstotrails.org\)](https://railstotrails.org/activetransport_2019-report_finalreduced.pdf)

two reviewed plans. The Wales Road Review suggests one purpose for a road improvement project is “supporting prosperity by providing access to development sites that will achieve high sustainable transport mode share.” This essentially only allows for the commitment of road funds towards economic development if the development is expected to be compact. Knoxville MPO’s TIP prioritizes preserving natural and cultural areas and focuses its investment on existing transportation and utility corridors or new community centers along transit lines and major transportation corridors.

The achievement of travel demand management through development planning relies on increasing density around transit to increase the effectiveness of the current transit system and reduce motor vehicle trips. Metrics for successfully measuring TDM performance depending on the program/policy can vary and may overlap with metrics for other categories of the RCIS. General metrics for measuring performance that align with TDM goals includes the following:

- Transit Accessibility (Number of households within a set distance of a transit stop)
 - New Jersey’s current Transit Village Program uses a half mile radius distance
- VMT Reduction (total, per capita, per employee, per mode or TDM program)
- Mode Shift (percentage)
- Facility Usage (bike and pedestrian volume changes, park & ride occupancy change)
- TDM Strategy Adoption
 - Number of municipalities that have adopted specific masterplans with TDM elements
 - Number of transit agencies offering discounts to user groups
 - Number of workplaces offering telework programs, discount transit programs, and other financial incentives

Promoting TDM strategies would involve the NJTPA funding planning studies and funding for master planning and development efforts. Coordination of TDM projects with municipalities that control localized planning decision-making is crucial. Some examples of successfully implemented TDM strategies include the following:

- Denver E-Bike Program: The program offered residents \$400 to \$1,200 vouchers to purchase electric bikes. In total, 9,500 people applied and 4,734 received vouchers, of which 67% were lower-income. E-Bikes reduced at least 22 weekly vehicle-miles or about 20% of total vehicle travel by the end of nine months.²⁵
- Virginia’s Pulse Bus Rapid Transit (BRT): Carried 7,000 daily passengers in its first year, which was twice the expected ridership. Helped system wide transit trips increase by 17 percent.²⁶
- Parking Pricing Reforms: Responsive parking prices and direct parking fees can reduce parking demand by 10-30 percent and help with a shift in mode share from personal vehicles to transit and active transportation options.
- Georgia Commute Options Program: A regional program designed to help commuters shift from driving alone to walking, bicycling, ridesharing, public transit, and teleworking. The program offers incentives and benefits including \$5 a day for trying an efficient commute option, \$50 for referring a new vanpool rider after that new rider has completed three consecutive months on a vanpool, and up to five free rides, by taxi or rental car, to their home or car in case of emergency.²⁷
- Arlington, Virginia’s Rosslyn-Ballston Corridor: County officials developed a “Bulls Eye” concept that allowed for intensive mixed-use development around metro stations in the Rosslyn-Ballston Corridor, laying out each as a

²⁵ Victoria Transport Policy Institute. [TDM Success Stories \(vtpi.org\)](https://vtpi.org)

²⁶ Victoria Transport Policy Institute. [TDM Success Stories \(vtpi.org\)](https://vtpi.org)

²⁷ Atlanta Regional Commission. [Georgia Commute Options - ARC \(atlantaregional.org\)](https://atlantaregional.org)

distinct urban village with plans for “public improvements, urban design, retail locations, infrastructure and open space.” By developing a planning code that allowed for this development, the population doubled within a quarter-mile of metro stations accounting for around a fourth of the county’s total population growth.²⁸

- New Jersey Transit Villages: A program developed in the 1990s, which continues today. The program allows NJ municipalities to be eligible for extra funding from NJDOT, if they commit to redeveloping the area around their transit facilities into compact, mixed-use neighborhoods. In Somerville, NJ, a master-planned development around Somerville station is anchored by a 374-unit apartment building with further development to follow. Municipalities with transit stations account for 70.8% of population growth in NJ between 2010 and 2020, up from 27.8% between 2000 and 2010.^{29 30}

4 DATA COLLECTION

This section provides an overview of the key data collection/tracking sources that could be used for the periodic performance assessment of each of the RCIS funding categories. The sources include dashboards that provide data that can be used as a baseline to conduct performance analysis for the proposed metrics in each RCIS category. Furthermore, the sources also include guidelines and frameworks that can assist in understanding the goals, targets, and processes for each RCIS category.

Table 13: Data Collection and Modeling Sources

RCIS Category	Data Sources	Metrics
Public Transit	Transit Operations Dashboards, Transit Ridership Reports/Boardings & Alightings as tracked by NJ TRANSIT	<ul style="list-style-type: none"> • Change in ridership as a percentage of all trips in a specified area • Change in transit system reliability (on-time percentage) • Change in transit area coverage (geographic area and population)
State of Good Repair/Maintenance	NJDOT Asset Management Report, NJ TRANSIT Asset Management Performance Targets	<ul style="list-style-type: none"> • Change in number of system/asset failures • Change in delay due to repairs or failures • Change in repair costs or emergency crew labor hours
Safety	FHWA CMF Clearinghouse, NJDOT Crash Database	<ul style="list-style-type: none"> • Change in total crashes in an improvement area (fatal, injury, non-injury) • Change in number of at grade transit incidents in an improvement area

²⁸ [Rosslyn-Ballston Corridor – Official Website of Arlington County Virginia Government \(arlingtonva.us\)](http://arlingtonva.us)

²⁹ [How Transit Villages Are Reshaping New Jersey’s Urban Landscape | Planetizen Blogs](#)

³⁰ [AvalonBay marks debut of 374-unit Somerville apartment community – Real Estate NJ \(re-nj.com\)](http://re-nj.com)

		<ul style="list-style-type: none"> • Change in rate of injury per capita and/or VMT Change in rail-miles traveled • Change in rail-miles traveled between collisions with a person or vehicle
Roads	NJDOT Traffic Volume Counts, NJTPA Congestion Management Process, NJTPA's Travel Demand Model (NJRTM-E), Induced Demand Calculators	<ul style="list-style-type: none"> • Change in travel time delay and LOS • Change in travel time reliability • Change in average VMT per trip
Freight	New Jersey Freight Plan, NJDOT Multimodal/Freight Dashboards, Freight Analysis Framework	<ul style="list-style-type: none"> • Change in highway travel time reliability • Change in rail time reliability • Change in truck travel time delay • Change in amount of total freight carried
Intelligent Transportation Systems	ITS Pilot Studies, Monitoring systems included during project installation	<ul style="list-style-type: none"> • Change in travel time delay along ITS routes • Change in mode-share along ITS routes • Change in number of accidents along ITS routes • Change in CO2 emissions along ITS routes along ITS routes
Active Transportation	NJDOT bicycle and pedestrian safety and traffic data, Bike counts and estimates from network models (Replica), Bike mode share as a percentage of trips for different purposes (commute trips, errand trips, recreational trips)	<ul style="list-style-type: none"> • Change in total bicycle trips in an area (mode split, bicycle VMT per capita, facility throughput) • Change in bicycle collisions in an area • Change in bicycle travel time, delay, LOS
Travel Demand Management	NJTPA Transportation Demand Management & Mobility Plan, NJDOT Traffic Volume Counts, NJTPA's Travel Demand Model (NJRTM-E), Land Use and Municipal	<ul style="list-style-type: none"> • Change in access/proximity to transit stops (population and/or number of households within a specified radius of transit stop) • Change in VMT (total, per capita) • Change in mode shift

	Development Plans (CoStar), Tax maps which reflect land-value near transit amenities	
--	--	--

4.1 DATA COLLECTION AND EVALUATION FRAMEWORK

Transportation planning relies on thorough data collection and evaluation, a process encompassing the identification and prioritization of safety concerns, the establishment of goals and objectives, selecting strategies and countermeasures, and the formulation of action plans. This process forms the framework for conducting an assessment of the latest data for each of the project performance categories/metrics. This process is shown in Figure 1.

Figure 1: Data Collection and Evaluation Framework



The general framework for the evaluation of project performance can be summarized as the following:

- 1) **Defining Goals and Objectives:** Outlining the broader goals and vision of a region, program, and/or project based on the identified challenges/needs. Defining the goals can establish the scope and criteria for performance evaluation.
- 2) **Identify Performance Indicators/Metrics:** Developing the categories and key performance indicators to be assessed for evaluating project performance based on the goals and scope. This also includes setting specific targets or benchmarks that the region, program, and/or project hopes to achieve from the outcome of a project.
- 3) **Data Collection and Monitoring:** The collection and tracking of data over a period of time as it relates to the project performance metrics/indicators. The data collection process can involve several techniques/tools and can be used to identify baseline conditions, trends, and patterns. Section 4 shows a detailed list of data collection sources relevant to the NJTPA's funding categories. If a project is implemented, data collection will be used to monitor data to support the periodic assessment of the project to measure the overall benefits (performance before versus after implementation). If a new project is proposed, data collection/monitoring supports in evaluating baseline conditions, and collected data for similar projects that have already been implemented can be used to assess expected project performance.
- 4) **Assess Program/Project Performance:** Analyzing collected data as it pertains to each performance category/metric to compute the outcomes of a program/project. This step quantifies the benefits of a project over a period of time by measuring the change in performance from before and after implementation.
- 5) **Select Future Strategies:** The project performance results guide decision-makers to strategize future action plans and allow them to efficiently allocate future funding /investment.

Simple evaluations of performance prior to the implementation of a project or program and after can be completed quickly and do not require extensive training. It is important that evaluation considers controls for other factors that might influence outcomes to properly identify the true effectiveness of the project or program. Ideally, a database should contain all the information needed to perform a before and after evaluation in one location. Essential data include the location and description of completed improvements, and other historical geometric and traffic information. This can also assist with future planning by allowing for comparing the observed results of a group of improved/treated sites to a group of similar but untreated sites. Though advanced modeling can help add precision to performance evaluation, planners can work to assess performance more generally by comparing outcomes of projects or programs that have been implemented in places similar in geography, in socioeconomic conditions, or where users of the project or program have similar characteristics.

5 TECHNICAL ADVISORY COMMITTEE (TAC) FINDINGS

Initial findings on project prioritization and performance metrics were presented to the TAC. During the meeting, feedback was received on how other project prioritization tools and capital planning strategies may relate to the NJTPA's capital planning and programming process. TAC members agreed that the RCIS has a "feedback" relationship with capital planning, and many performance measures and project prioritization metrics align with guidelines for the RCIS. There was commentary that because the project prioritization process is being refined in the coming months, it may make sense to consider clear connections between the RCIS and capital planning as part of the RCIS refinement. Other recent developments and criteria updates in topics such as environmental justice should also be considered in the RCIS refinement.

The TAC then reviewed performance measures for RCIS categories and provided feedback on their effectiveness in rating projects and how well they match actual needs in the transportation network. For categories like Public Transit and Safety, the TAC provided other measures that are used by transportation planners that are important to these projects, such as coverage area for public transit or exposure-based metrics for measuring crashes, which helps consider safety across travel modes. Other performance measures may benefit from improved methodologies like data collection for active transportation, or ITS where benefits such as time savings or travel reliability can be measured.

Finally, it was also noted how competing priorities and/or resource constraints hinder the ability to achieve and measure certain performance goals. This was discussed in the context of safety improvements, where limitations such as costs, project delivery constraints, and leadership-driven priorities might hinder safety programs or specific features that could improve safety performance, even if a project is needed for many other reasons. This critique of the effectiveness of some performance measures was somewhat similar to the discussion of performance measures for TDM, where TAC members noted that transit oriented development-related metrics do not fully address the benefits of TDM investment.

6 CONCLUSION

This tech memo provides an overview of best practices for project prioritization strategies and assessing the performance impacts of projects. The literature review highlighted examples of project prioritization criteria from peer agencies and from suggested metrics in line with the NJTPA's RCIS for analyzing the success of projects. The review shows how many of the RCIS's current investment principles and spending categories align with peer agencies, while identifying criteria drawn from them that can improve the NJTPA's ability to assess projects. The studies show the need for carefully scoring projects across categories to make a project prioritization procedure that is inclusive of a diversity of needs. As part of this analysis, a few key actions have been completed:

- An analysis of how peer agencies prioritize projects, which points to the importance of creating a holistic prioritization tool for projects rather than discrete categories to better engage with projects that overlap spending categories.
- A set of measures of effectiveness on which to rate existing spending targets in each RCIS funding category, which will assist with the creation of a clear recommendation in task 3
- Outlining relevant data collection sources and planning documents to assist in the periodic assessment of system performance and to help with future funding decision-making
- Case studies of successful projects within the current spending categories that will assist in understanding potential effects of projects in order to estimate the expected benefits from current projects and also to find areas of particular need for future investment

This led to key opportunities and lessons learned that will be incorporated into task 3. The RCIS refinement should consider the way other capital investment strategies might better align the RCIS with NJTPA's current capital planning processes. Additionally, social, environmental, and economic outcomes can tie back to key mobility metrics that are traditionally tracked, like VMT or travel time reliability. The RCIS refinement should consider these metrics in establishing its investment categories. In this context, project metrics are only as good as data quality and tracking standards, which makes it more difficult to assess projects in more novel categories that lack a history of investment. Many metrics that track project performance do not neatly fit within one RCIS category, and the RCIS refinement must consider impacts between spending categories.

The next step of this project will feature detailed recommendations for RCIS refinement. The output of those recommendations will include recommendations on spending categories that can help the NJTPA achieve its investment goals with key metrics and strategy recommendations for how to prioritize investments. The results of that analysis will complement this literature review and the previous RCIS review to create a transparent and evidence-based strategy for refining the NJTPA's RCIS.