

4.0 Policy Guidance

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4.1 General Framework

On October 16, 2019, the Transportation Policy Board endorsed a Policy Framework intended to articulate its approach to updating the Regional Transportation Plan. The framework provides a general overview of the Board's authority, the purpose of the Plan, shared responsibilities of the participating jurisdictions, guiding principles, and a set of regional goals and objectives to help ensure that the desired outcomes of the Plan are being achieved over the short- and long-term.

Decision-making Authority of the Transportation Policy Board

The Transportation Policy Board is empowered by federal law to serve as the primary forum for collaboration among local elected officials, public transit operators, TDOT, and other state and federal agencies in order to negotiate a mutually beneficial plan that invests in roadways, bridges, public transit, and other transportation facilities across the greater Nashville metropolitan area.

Purpose of the Plan

The purpose of the Regional Transportation Plan is to direct the investment of public funds to provide for a safe and reliable transportation system that helps local communities thrive and contributes to the economic productivity of the region and state.

Shared Responsibilities of Participating Jurisdictions

- Work cooperatively across political boundaries, levels of government, socioeconomic groups, and economic sectors to identify a shared vision for the region.
- Be willing to prioritize transportation needs according to the known constraints, fiscal or otherwise.
- Identify strategies and resources to overcome anticipated obstacles to success.
- Consider future generations and long-term trends while determining short-range priorities.
- Think comprehensively about the relationship between transportation decisions and those related to housing, the economy and jobs, land use and community design, conservation and preservation, social services, among others.
- Measure performance to monitor progress and improve the effectiveness of future decisions.

Guiding Principles

Working through a collaborative effort which included its member governments, area non-profit organizations, the business community, and citizens, the Transportation Policy Board adopted four guiding principles to ensure regional plans and programs contribute to a broad array of community benefits.

- **Livability** - Enhance quality of life by prioritizing initiatives that increase opportunities for housing, learning, employment, recreation, and civic involvement while maintaining affordability.
- **Prosperity** - Contribute to the region's economic productivity by prioritizing solutions that connect workforce with jobs, improve access to markets, and leverage additional investment.
- **Sustainability** - Encourage growth and prosperity without sacrificing the health, natural or historical assets, or financial stability of this or future generations.
- **Diversity** - Find solutions that balance the variety of perspectives across Middle Tennessee and ensure local context, community character, and cultural identity are respected in the process.

4.2 Federal Planning Factors and National Goals

Federal Transportation Planning Factors

The Fixing America’s Surface Transportation Act (FAST Act) passed by Congress and into law in 2015 defines ten specific planning factors to be considered when developing transportation plans and programs. This directive ensures that federally-funded projects and initiatives within metropolitan areas are consistent with national goals and objectives.

Key Topics	Planning Factor
<i>Economic Vitality</i>	Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.
<i>Public Safety</i>	Increase the safety of the transportation system for motorized and non-motorized users.
<i>National Security</i>	Increase the security of the transportation system for motorized and non-motorized users
<i>Accessibility and Options</i>	Increase the accessibility and mobility options available to people and for freight.
<i>Environmental Sustainability, Livability, Planned Growth</i>	Protect and enhance the environment, promote energy conservation, improve quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns.
<i>Integration, Connectivity</i>	Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.
<i>Management and Operations</i>	Promote efficient system management and operation.
<i>Maintenance</i>	Emphasize the preservation of the existing transportation system.
<i>Resilience, Reliability, Storm Water Impacts</i>	Improve the resiliency and reliability of the transportation system and reduce or mitigate storm water impacts of surface transportation.
<i>Travel, Tourism</i>	Enhance travel and tourism.

Performance Based Planning

Pursuant to the Moving Ahead for Progress in the 21st Century Act (MAP-21) Act enacted in 2012 and the FAST Act enacted in 2015, states and metropolitan areas must adhere to a performance management approach in carrying out their federally-required transportation planning and programming activities. The process requires the establishment and use of a coordinated performance-based approach to transportation decision-making to support national goals for the federal-aid highway and public transportation programs. As a result, State DOTs, Transit Providers, and regional transportation planning organizations are required to periodically set performance targets for achieving seven national transportation goals.

National Goal	Description
<i>Safety</i>	Achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
<i>Infrastructure Condition</i>	Maintain the highway infrastructure asset system in a state of good repair.

<i>Congestion Reduction</i>	Achieve a significant reduction in congestion on the National Highway System.
<i>System Reliability</i>	Improve the efficiency of the surface transportation system.
<i>Freight Movement & Economic Vitality</i>	Improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
<i>Environmental Sustainability</i>	Enhance the performance of the transportation system while protecting and enhancing the natural environment.
<i>Reduce Project Delivery Delays</i>	Reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices.

4.3 Regional Goals, Objectives, and Strategies

Goals and Objectives

The Transportation Policy Board has endorsed six regional goals and 24 measurable objectives to help ensure that the desired outcomes of the plan are being achieved through the implementation of its recommendations.

Regional Goal	Corresponding Objectives
<i>Goal 1. Maintain a State of Good Repair</i>	Objective 1 – Maintain roadway pavement conditions Objective 2 – Maintain bridge deck conditions Objective 3 – Repair or replace deficient bridges Objective 4 – Maintain transit assets
<i>Goal 2. Improve Safety for all Users</i>	Objective 5 – Reduce crashes and traffic incidents Objective 6 – Reduce traffic fatalities Objective 7 – Reduce serious injuries from crashes Objective 8 – Improve safety for pedestrians and cyclists
<i>Goal 3. Mitigate Congestion to Keep Region Moving</i>	Objective 9 – Minimize travel delays Objective 10 – Improve corridor-level travel time reliability Objective 11 – Increase access to non-single occupant vehicles options Objective 12 – Reduce travel distances
<i>Goal 4. Increase Access to Economic Opportunity</i>	Objective 13 – Increase system capacity to support economic growth Objective 14 – Improve connectivity between jobs and workforce Objective 15 – Ensure availability of affordable transportation options Objective 16 – Increase efficiency of freight movements
<i>Goal 5. Minimize Disruptive Impacts of Transportation Projects</i>	Objective 17 – Build resiliency into the transportation network Objective 18 – Minimize pollution from vehicle emissions Objective 19 – Minimize impacts on vulnerable communities Objective 20 – Minimize conflict with environmental assets
<i>Goal 6. Align with Local, Statewide, and National Policies</i>	Objective 21 – Help implement national transportation policy Objective 22 – Support statewide transportation plans Objective 23 – Provide investment to build livable communities Objective 24 – Invest incrementally to implement long-range vision

Core Strategies for Achieving Regional Goals and Objectives

Goal 1. Maintain a State of Good Repair

Transportation assets deteriorate over time due to age, climate and extreme weather, and travel demand and intensity, and ongoing investment in maintenance is necessary to adequately preserve the system. Over the next 25 years, the region's federal-aid network needs \$38 million and \$420 million annually for bridge and pavement maintenance, respectively, to maintain the current condition level through 2045. The region is committed to maintaining a state of good repair for roadways, bridges, and transit systems. The following approaches can be deployed by transportation stakeholders in the region to maintain the condition of pavement, bridges, and transit assets.

Adopt a Fix-it-First Approach

A commitment to annual maintenance protects the value of the region's more than 26,000 roadway lane miles, nearly 1,600 bridges, 500 roadway miles of sidewalks, and hundreds of transit vehicles that represent the existing transportation system. The prioritization of maintenance of the transportation system over capital expansion projects can help ensure funding levels are sufficient and reliable for the ongoing maintenance of the system.

Reinvest in Existing Infrastructure

Reinvestment in existing infrastructure maximizes the economic impact of limited transportation dollars and ensures that roadway networks are not overextended beyond the region's ability to maintain its assets. Emphasis should be placed on the modernization of the major corridors in the region are predominately designed for motorized vehicles in order to retrofit them to improve access for bicyclists, pedestrians, and transit vehicles. In addition to accommodating nonmotorized users, reinvestment can consist of upgrading outdated traffic signals and technology to leverage emerging technologies.

Implement Pavement Management Systems

Pavement management systems allow asset owners to assess the maintenance needs of their transportation assets to determine the appropriate funding levels and prioritize the most pressing roadway needs. Currently, only a select number of larger cities within the region maintain a pavement management system. Expanded adoption and implementation of pavement management systems by communities across the region can ensure that assets beyond the federal-aid network are also properly maintained.

Shift Maintenance Focus to Non-Interstate Routes

High levels of funding dedicated to Interstates have resulted in an increasing share of the Interstate miles in good condition. Currently, 97 percent of the interstate segments are in good condition while pavement condition on non-Interstate segments have declined since 2008. Shifting the maintenance focus to non-interstate routes can help ensure that pavement condition also improves off the interstate system.

Increase Maintenance for Off System Bridges

A greater percentage of city and county bridges are rated in poor condition than bridges owned by the state. As of 2018, 5 percent of state-owned bridges were rated in poor condition, while the percentage of city and county bridges in poor condition were 9% and 7%, respectively. Increasing maintenance resources on off system bridges can help ensure that overall bridge condition improves in the region.

Explore New Technologies and Recycled Materials

Advancements in technology over the past decade have increased the types and uses of recycled materials in transportation construction as it has been shown to reduce cost, save time, and in some cases superior performance and long-term environmental benefits. Improved coordination with the solid waste providers in the

region can increase the amount of recycled material used in transportation infrastructure, and requires the identification or implementation of suitable processing facilities to refine construction debris, tires, and glass so material is more easily integrated.

Goal 2. Improve Roadway Safety for all Users

As the region continues to rapidly grow and develop, there are more people and more daily trips on the transportation system – increasing the opportunity for conflicts between users. The transportation network has become increasingly dangerous for users of the system, particularly pedestrians. Between 2015 and 2019, there were 167 pedestrian fatalities and 521 pedestrian-related serious injuries. In addition, pedestrians account for a disproportionate share of those fatalities, nearly 20 percent of the region’s total annually. The region is committed to improving safety in the region, and the following approaches can be deployed by transportation stakeholders in the region to improve safety for the traveling public and freight haulers.

Set Ambitious Safety Targets

To make progress toward the national safety goal to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, the Transportation Policy Board can do its part by setting ambitious goals and performance targets to reduce crashes, traffic fatalities, and serious injuries from crashes. As part of the 2045 RTP, the Transportation Policy Board endorsed a goal to reduce traffic fatalities by one percent annually over the life of the Plan. Through project evaluation and prioritization, and ongoing monitoring, the region will track progress toward the achievement of safety targets.

Modernize Corridors with Multimodal Accommodations

With decades of auto-oriented investments behind us, the time is now for retrofitting roadways to include options for all. The major corridors in the region are predominately designed for motorized vehicles, yet pedestrians and bicyclists also depend on these pikes to access key transit routes and destinations. The modernization of these major corridors to provide safe access for nonmotorized users will require upgrades to provide sidewalk continuity along the corridor and safe and frequent opportunities to cross the corridor. These solutions depend on additional funding allocations to the Transit and Technology Program and the Active Transportation Program to implement projects that facilitate transit use and improve safety and livability for pedestrians. In addition, these solutions elevate the need to pursue local and regional dedicated funding to build and operate high capacity transit projects and will provide the region with reliable and convenient travel options other than driving alone.

Improve Intersection Controls to Reduce Severity

Intersections are a source of conflict between roadway users and are a common location of severe crashes. Approximately 230% of serious injuries and 20% of fatalities in the region occur at intersections. In addition about one third of all bicycle and pedestrian crashes occur at intersections. Thus, improvements at traffic signal infrastructure, implementation of safer intersection design, and investment in ITS improvements can help reduce the number of severe crashes in Middle Tennessee. Safety countermeasures such as constructing crossing islands, roundabouts, and raised crossings can also reduce crash severity for nonmotorized users at intersections in the region.

Provide Dedicated Facilities for Non-Motorized Users

Investing in safety improvements for vulnerable users can improve safety for all users. Pedestrians and cyclists represent a disproportionate amount of crashes resulting in serious injuries and fatalities. Prioritizing these vulnerable users over drivers through complete streets, vision zero, and policies geared towards people with disabilities can greatly improve the non-motorized user experience and increase the amount of people walking and bicycling, which can alleviate congestion, improve public health, and mitigate environmental issues.

The creation of a connected network for active transportation users that provides separation from vehicles where necessary and possible protects the vulnerable users of the transportation system. Currently, only 14% of roadways

in the region have pedestrian facilities and only 3% have bicycle facilities. Building non-motorized infrastructure not only improves the safety of bicyclists and pedestrians using the system currently, but also encourages potential users to make the switch to active transportation modes.

Enforce Motor Carrier Safety

Tennessee has more through trucks on its roadways than any other state in the country. The high prevalence of trucks and their greater potential to result in severe crashes elevates the importance of enforcing laws and regulations of commercial motor vehicles (CMVs). Strategies to update weigh stations, target enforcement, and increase inspections can help reduce the occurrence, frequency, and severity of CMV crashes.

Promote Safety Education

Safety education is necessary to complement engineering improvements to address safety. Through coordination between safety agencies, education stakeholders, and others from the transportation community, education and outreach efforts such as Safe Routes to School can be implemented throughout the region to increase awareness for both drivers and active transportation users.

Enforce Traffic Laws with Technology

The safety consequences of running red lights, speeding, and other dangerous driving practices can be serious, if not fatal. Investing in automated enforcement technologies like Automated Speed Enforcement Cameras and Red-Light Cameras can dramatically improve high crash corridors and save numerous lives. Enforcement technology is critical in changing unsafe driving behaviors and can help prevent severe crashes.

Enhance Safety Data Collection and Analysis

Traffic safety data is vital in order to analyze and identify locations with greater safety needs in the region. Existing crash data does not account for all crashes, only those reported crashes. Thus, augmenting existing crash data with supplemental databases can provide traffic safety specialists with a more complete and comprehensive understanding of safety needs through Roadway Safety Audits and other safety analysis efforts in order to guide priority high crash locations for safety improvements.

Improve Incident Response

With nearly 200 crashes per day throughout the region, crashes are a frequent occurrence on the transportation system. Roadway traffic incident management can help minimize injury and potential fatalities through swift action and coordination from all first responders. Continued investment in the operation of incident response is essential in Tennessee to improve emergency response and improve safety outcomes in the region.

Goal 3. Mitigate Congestion to Keep Region Moving

Embedded within federal transportation legislation is a requirement that metropolitan areas of 200,000 or more people implement a Congestion Management Process (CMP) as part of the transportation planning process to help ensure that America's larger urban areas are effectively managing traffic congestion with the resources provided by the federal government. Federal guidance encourages regions to examine options beyond traditional roadway widening projects.

Middle Tennesseans are on the roadways for far greater distances than residents of peer regions. In the future, additional traffic volumes will increase demands on the transportation system. Increased congestion will impact mobility within the region as residents will not be able to travel as far in the same amount of time. Based on the percent of free flow speeds, congestion is expected to extend from 1,900 miles of the region's federal-aid network today to 2,800 miles by 2045, impacting nearly half of the region's system on a typical weekday.

GNRC is committed to mitigating congestion to keep the region moving, and looking beyond traditional roadway widening projects to deploy approaches by TDOT, area transit agencies, local public works and planning

departments, and employers in the region to manage travel demand, improve operations, and shift to alternative modes.

Transportation Demand Management Strategies

Demand management programs attempt to address congestion at the root of the problem by reducing the number of vehicles on the road. These initiatives work to modify driver behavior by encouraging people to make fewer single-occupancy trips, travel in off-peak hours when possible, and support land use policies that reduce the demand for automobile transportation.

Coordination with Land Use Decisions: In order to preserve that mobility for users of the system, coordination of transportation and land use decisions can be enhanced by establishing corridor management agreements among TDOT and local elected officials along key state routes, encouraging the adoption of local complete streets policies and design guidelines can improve the transportation network for transit and active transportation users, and commissioning a study to identify revenue sources for transportation improvements to manage future growth and development.

Outreach, Incentives, and Rewards: Expand marketing and outreach to employers and schools to manage transportation demand, especially during peak travel by leveraging the existing Transportation Demand Management (TDM) providers that encourage flexible schedules and offer and incentivize alternatives to driving alone.

Telework and Staggered Work Shifts: Encouraging travelers to avoid peak travel periods can help manage demand on the transportation system when it is most burdened. Demand management strategies consist of employer-led efforts to promote telecommuting and flexible work hours. These cost-effective strategies can be implemented in the short term and can avoid costly investments to expand capacity of the roadway system.

Operations and Management Strategies

Operational Improvements are geared toward improving the “supply side” of the transportation system. These efforts are intended to enhance the operation of the transportation system and make it as efficient as possible. Operational Improvements include intersection upgrades, access management, reversible lanes, traffic signal improvements, and Intelligent Transportation Systems. Operational strategies can maximize the performance of the existing transportation system in a cost-effective manner through managed lanes, variable speed limits, intersection improvements, access management, and special event coordination and management.

Remove Capacity Bottlenecks: Capacity of the roadway system is often impeded by “bottlenecks” locations where there are reductions in travel lanes or conflicts at interchanges and junctions. Eliminating capacity constraints throughout the system can address daily delay for motorists. The removal of a physical constriction that delays travel, such as widening of underpasses, providing lane continuity (i.e. replacing a two-lane bridge that connects pieces of four-lane roadway), improving acceleration/deceleration at ramp interchanges, or eliminating a sight barrier can provide consistent capacity and improve traffic flow along key commute corridors.

Improve Traffic Signalization: Optimize traffic management and operations by upgrading outdated devices and investing resources in ongoing staff and equipment to properly maintain traffic-control devices. In addition, commit to developing new policy and practice standards for sharing real-time information, encourage interoperability with regional clearinghouses and other information sites, and support future deployment of “smart corridors” across the region based on the lessons learned from I-24 Smart Corridor improvements implemented by TDOT.

Incident Management and Crash Reduction: With nearly 200 crashes per day throughout the region, crashes are a frequent occurrence that routinely disrupt the transportation system. As the capacity of the roadway network is expected to be further utilized by 2045, it will be less able to recover from crashes – leading to greater variation in congestion. Incident management technology and programs for detecting crashes, disabled vehicles, or other incidents that impede travel and resolving or removing the obstructions will remain critical to minimize the system disruptions associated with crashes.

Traveler Information and Alerts: Real-time information can help identify where, when, and why congestion is occurring. Access to real-time information through smart phones, in-dash displays, or electronic message boards can benefit all users of the system- allowing transit riders to know when the next bus arrives, bicyclists to locate available bike shares, and motorists to change routes to avoid congestion. Collectively, informed travelers making optimal choices can divert excess traffic to alternate routes and promote the use of public transit options to reduce congestion and maintain reliability of the transportation system.

Implement Managed Lanes: The downtown interstate loop is a source of conflict between local and pass-thru traffic as they navigate the maze of interchanges. Reducing competition between local and pass-thru traffic can help ease congestion on at the biggest bottleneck in the region. Strategies to divert freight traffic around the downtown interstate loop, separate vehicles as they pass through loop, or provide incentives for high occupancy vehicle travel can reduce the duration and intensity experience by users, especially during the weekday morning and evening commutes.

Multimodal Opportunities

Improving access to alternative modes of transportation can help reduce the burden placed on roadways to support travel demand. Multimodal strategies include programs and projects that give people choices beyond just driving alone in their cars.

As the region’s roadway capacity is expected to become increasingly overwhelmed by travel demand, travelers will seek options that can get them to destinations timely and dependably. The region will need to move people more efficiently than driving alone. High capacity transit service will be necessary to ensure reliable and convenient travel along the region’s main corridors and active transportation investments will help ensure safe access to transit and reduce the need for shorter automobile trips that can be made by walking and bicycling. These solutions will depend on ongoing investment through the Transit and Technology Program and the Active Transportation Program and require future pursuit of local and regional dedicated funding to build and operate high capacity transit projects.

Building dedicated lanes in areas of the region that experience congestion delay and poor travel time reliability can prioritize non-single occupancy vehicle travel and increase transit ridership. Strategies like dedicated transit lanes and transit signal priority along key principal arterial corridors can improve the on-time performance of transit service and reliability for its customers. In addition, strategies to implement managed lanes along interstate corridors can provide incentives for high occupancy vehicle travel such as transit and carpooling

Capacity Improvements

As a last resort, expanding the physical capacity of a roadway can provide relief to traffic congestion, though this relief is often short-lived due to the induced demand that additional capacity often generates. This includes new roadway and roadway widening projects.

Goal 4. Increase Access to Economic Opportunity

Economic development and transportation infrastructure have a symbiotic relationship. Development locations influence regional travel patterns and infrastructure investments, and in turn, the degree of access provided by the transportation system can influence land development trends. Given the area’s rapid growth and limited transportation funding, it is becoming increasingly important that development decisions do not place demand in areas where infrastructure is not planned. It is also important that transportation facilities are built to appropriately serve their markets.

Align the Regional Transportation Plan with the region’s Economic Development Strategy

Effective October 1, 2017, GNRC became responsible for carrying out the staffing and administrative functions of the Nashville Area MPO. The integration of the transportation planning program into GNRC is one major step towards improving the efficiency and effectiveness of regional decision-making and to better align transportation planning programs with other regional activities related to economic development, infrastructure investment, and

quality of life. GNRC is responsible for the development of a Comprehensive Economic Development Strategy (CEDS). The CEDS is a federally-required document that serves as a regional blueprint for creating a stronger, more diverse economy. It is a strategy-driven plan for regional economic development and is the result of a regionally owned planning process designed to build capacity and guide the economic prosperity and resiliency of the greater Nashville area. The CEDS provides information to serve decision-makers as they determine the region's economic development goals and appropriate plans for action. It allows business and government leaders throughout the region to set priorities for investments in both physical and human capital to solidify how the area as a whole will adapt to a constantly changing global economy.

The development of the CEDS is facilitated by the Greater Nashville Regional Council (GNRC) which is designated by the U.S. Economic Development Administration (EDA) of the U.S. Department of Commerce as the Economic Development District for northern Middle Tennessee. GNRC works on behalf of 13 counties and 52 municipalities across a diverse region which includes metropolitan, urban, suburban and rural areas connected by a single regional economy.

Goal 5. Minimize Disruptive Impacts of Transportation Projects The region's population is growing rapidly and projected to reach 2.7 million by 2045, a 64% increase. The region's development pattern poses a threat to the region's environment development pattern as the number of developed parcels is expected to increase by 65,500 parcels. As a result of development, existing open space, forest, and agricultural lands will be lost – leading to disruptions in wildlife corridors and habitat, fragmenting agricultural lands making farming more difficult, increasing infrastructure needs and costs, and contributing to more vehicle miles traveled.

Projected population, development patterns, and transportation investments are likely to threaten environmental assets and resources that are important to the region. The region is committed to minimizing disruptive impacts of transportation systems and improvements by working with project proponents to take advantage of strategies in the transportation project delivery process to help minimize the impacts a specific project or parts of the transportation system have on natural and sociocultural resources. The following strategies span stakeholders, phases of project development, and geographic scale.

Set Ambitious Goals

The region should identify a set of environmental indicators and performance goals or targets that reflect the region's priorities for the conservation and preservation of natural and sociocultural resources. The set of indicators should be capable of providing feedback at the project scale and at the broader landscape or regional scale. Based on the series of environmental assets and conditions, members of the Technical Coordinating Committee and Transportation Policy Board have a strong foundation for baseline conditions and future targets. Additionally, GNRC's Regional Environmental Roundtable can play a significant role in identifying, refining and tracking performance against these targets over time.

Planning and Environmental Linkages

The region should continue its work to implement a formal Planning & Environmental Linkages (PEL) process that connects analysis derived from regional transportation planning processes with ongoing transportation project planning and development. This effort would provide ongoing interagency consultation and support to project sponsors and other stakeholders that should be aimed at two specific and overlapping objectives: 1) improving the environmental performance of specific transportation projects and 2) accelerating work flows tied to National Environmental Policy Act compliance requirements that can be burdensome to project sponsors and slow the project delivery process. This effort would allow the GNRC, TDOT and FHWA to establish more robust and consistent project-level information sharing that results in more and better environmental information being made available to project stakeholders, including project sponsors, regulators and the public. Additionally, this effort could expand upon and complement the purpose of the Tennessee Environmental Streamlining Agreement (TESA) and the coordination that takes place among its signatory agencies.

Planning for Climate Scenarios

Through the Federal Climate Assessment, the Federal government has called for action to plan for and enhance the adaptability of the nation's infrastructure to future climate scenarios. Because of the substantial capital investment and long life cycles inherent in most transportation infrastructure, it is critical that project sponsors and stakeholders engage in long-term evaluation of how a transportation asset will perform under a range of future climate scenarios. Currently, policy recommendations are being developed and considered at the Federal level to incentivize planning and investment in climate resilient infrastructure. Future transportation bills could include new funding earmarked for this purpose and the region should be ready to compete for this funding and to lead the way in Tennessee.

For most of the region's transportation assets this will implicate the design, engineering and maintenance of bridges and roadways that cross or are near surface water bodies that may experience more frequent and severe flood events. At the same time, potential drought events could cause near-surface aquifer drawdowns that could cause sinkhole formations or other structural impacts to roadbeds or other structural elements. Together, these future impacts could significantly impact the level of service, reliability and safety of the transportation system.

Additionally, port and rail operations may face the same types of challenges described above yet may have their own unique climate adaptation needs. For example, waterfront port infrastructure along the Cumberland River system may require greater operational flexibility to accommodate a broader range of water levels.

Protection/Preservation

Protection and preservation strategies help preserve natural or sociocultural resources by implementing enhanced land protection mechanisms that often go beyond the protections allowed by local land use policy and zoning codes. These strategies typically require public sector programs to fund or administer the land protection mechanisms and/or nonprofit partners and local governments that are willing to own or maintain lands consistent with conservation-oriented objectives. Key protection and preservation strategies include land banking, transfer of development rights, greenbelt exemptions, and historic tax credit programs.

Transportation Corridor Preservation Tools including Corridor Management Agreements and other access management and permitting tools could be used to integrate local and regional environmental conservation priorities into the transportation project development process and ensure more in-depth analysis of transportation-related environmental impacts. This could lead to improved management of water resources (water quantity and water quality), protection of high-quality habitat, maintenance of wildlife corridors and the preservation of historic structures or districts, among other environmental factors and objectives.

Enhanced Engagement with Environmental Stakeholders

The region should expand the purpose of the Regional Environmental Roundtable to capitalize on its early success and role in strengthening the environmental approach of the 2045 Regional Transportation Plan update. The Roundtable can continue to make significant contributions to regional transportation planning by helping to develop and broker a shared vision for the region's resource conservation and preservation priorities. The Roundtable has indicated strong support for the development of a Regional Conservation Strategy, that could serve as a foundational reference to guide future long-range planning cycles and project-specific decision-making processes. A Regional Conservation Strategy could help broker new conservation-oriented partnerships and collaboration and attract new funding to the region in support of transportation and conservation investments.

Avoidance of Potential Environmental Impacts

Avoidance strategies prevent negative environmental impacts before they happen by implementing projects in places or with features that minimize environmental conflicts or challenges. These strategies are best deployed by project sponsors and their design and engineering teams. Key avoidance strategies consist of: 1) design modifications that may result in raising a transportation asset out of a regulatory floodplain, utilizing a clear-span bridge to cross a river or stream, green infrastructure to improve the quality of stormwater discharge, or culverts

to allow safe crossings for wildlife migration, and 2) alternative alignments to connect logical termini of a project in a manner that reduces the direct overlap or intersection with natural or sociocultural resources.

Mitigation of Potential Environmental Impacts

Mitigation strategies recognize that an environmental conflict may be unavoidable and therefore attempt to compensate for that impact by investing in resource conservation or restoration within the project vicinity or elsewhere in the region. These strategies likely require significant participation from project sponsors but may also require participation from other project partners or collaborators. Key mitigation strategies include restoration/compensation programs, excavation and relocation, and wetland/stream mitigation banking.

During the RTP update, GNRC enhanced its ability to evaluate proposed transportation projects against a broader set of environmental data sets. As a result, GNRC staff and project sponsors each have more and better information about how each transportation project will interact with its surrounding environment and that puts project sponsors in a stronger position to effectively manage environmental impacts early in the project development process.

Prioritize Vulnerable Communities in Planning and Investments

Transportation systems are intended to serve residents, so having the input of residents in the planning process is critical to developing a system that serves the community. Public engagement is challenging and historically has not been inclusive. Vulnerable populations have specific transportation challenges and are often underserved by transportation systems. To build transportation systems that are equitable and meet the needs of all residents, it is critical to prioritize vulnerable populations in the transportation planning process to both address historical inequities and ensure a more equitable future.

GNRC and its transportation planning partners can expand outreach opportunities to target vulnerable populations and design engagement strategies to meet the specific needs of residents such as providing translation, childcare, and meeting at untraditional places and times. Greater input from residents can help ensure that their priorities are captured in the project scope and help address inequities in safety or access to opportunity.

The Transportation Policy Board also prioritizes investments in highly vulnerable areas through the project evaluation process as projects are assessed based on their ability to improve safety and/or enhance mobility for vulnerable populations. Continual analysis and tracking of these vulnerable population and the burdens they experience are necessary in order to gauge progress toward addressing inequities in the region.

Accelerate Transportation Electrification

Electric Vehicle (EV) utilization is steadily increasing in the region's personal automobile and commercial truck fleets, which in turn is increasing demand for EV charging infrastructure. State and local governments need to play an increased role in coordinating with and supplementing private sector investments in EV charging infrastructure. This will ensure the region's current and future EV users have easy access to a robust network of charging stations.

At the Federal level, recent plans were announced to build over 500,000 new public charging stations across the country. In Tennessee, the Tennessee Department of Environment & Conservation (TDEC) and the Tennessee Valley Authority (TVA) announced a partnership to develop a statewide EV fast charging network to reduce barriers to transportation electrification and power the growth of EV usage across Tennessee. The region should leverage these Federal and State commitments and accelerate coordination and investment in EV charging infrastructure across Middle Tennessee. This strategy will also generate co-benefits associated with improving local air quality, reducing energy consumption and mitigating impacts of greenhouse gas emissions.

Goal 6. Align with Local, Statewide, and National Policies

The region's ability to manage future growth and development requires effective coordination of land use policies, economic development initiatives, and transportation investments across levels of government. The alignment of plans and policies leverages investments, uses resources effectively, and improves quality of life. Over the next 25

years, the region will add approximately one million new residents and invest nearly \$10 Billion in transportation projects to support the safety and mobility needs of the population.

The region is committed to aligning with local, region, and statewide policies and plans. The following approaches can be deployed by cities, counties, transit agencies, and TDOT to align local land use decisions and regional transportation decisions.

Land Use and Urban Design

Land use and urban design policies can help manage development patterns in a way that complement and optimize transportation investments. Through updates to local comprehensive plans, zoning ordinances, and design guidelines, communities can guide new development that supports transportation infrastructure. Areas that are targeted for high-quality transit service must be supported through land use and zoning policies that support transit-oriented development and reflect the benefits of increased access to alternative modes of travel. Policy examples include appropriate densities and intensities for supporting transit use, parking ratios that reflect reduced reliance on the automobile, and setback and design.

Corridor Preservation for Right-of-Way

As the region looks to a future that increasingly relies on transit solutions, considerations must be taken in the near-term to implement right-of-way preservation strategies to protect future transportation corridors from escalating land acquisition costs.

These additional strategies should be pursued in an effort to ensure the alignment of plans and policies.

- Establish Corridor Management Committees for key state routes to coordinate access management and land development decisions.
- Commission a study to review best practices for land development impact fees for transportation.
- Conduct a comprehensive review of local parking policies, pricing, and management.
- Convene periodic meetings among state and local ECD officials and transportation planners to evaluate potential sites for development.
- Implement right-of-way preservation strategies to protect future transportation corridors from escalating land acquisition costs.
- Update local comprehensive plans, zoning ordinances, and design guidelines to enable transit-oriented development.
- Adopt Regional or Corridor Level Access Management Standards.

4.4 Key Metrics for Measuring Performance

The following table provides a list of key metrics that will be used by GNRC to track performance of the transportation system over the life of the Plan. Each measure corresponds with one or more regional goals and objectives. Additional information about how the GNRC will track performance measures after the adoption of the Plan is presented in *Chapter 6. Implementation and Monitoring*.

2045 Regional Transportation Plan Policy Framework Initial Set of Performance Measures

ID	Type	Performance Measure	Goals	Objectives	CMP	FED	Modal Element
1	Condition	Percent of Federal-Aid routes in good or poor condition	1	1			Roadway
2	Condition	Percent of Interstate pavement in good or poor condition	1	1		X	Roadway
3	Condition	Percent of Non-Interstate NHS in good or poor condition	1	1		X	Roadway
4	Condition	Percent of NHS bridge decking in good or poor condition	1	2		X	Roadway
5	Condition	Number of bridges that are functionally obsolete	1	3			Roadway
6	Condition	Number of bridges that are structurally deficient	1	3			Roadway
7	Condition	Percent of transit facilities rated < 3 on the Transit Economic Requirements Model Scale	1	4		X	Roadway
8	Condition	Percent of public transit non-revenue vehicles exceeding useful life benchmark	1	4		X	Transit
9	Condition	Percent of public transit revenue vehicles exceeding useful life benchmark	1	4		X	Transit
10	Condition	Percent of track segments that have performance restrictions	1	4		X	Transit
11	Capacity	Roadway vehicle lane miles	1,4	1,2,9,10			Roadway
12	Capacity	Miles of Federal-Aid routes with bicycle facility	1,3,4	11,15	X		Non-Motorized
13	Capacity	Miles of Federal-Aid routes with sidewalks	1,3,4	11,15	X		Non-Motorized
14	Capacity	Number of transit revenue hours	1,3,4	11,13,14,15	X		Transit
15	Capacity	Frequency of transit service (headway)	3,4	11,13,14,15	X		Transit
16	Capacity	Percent of park-n-ride lots with transit service	3,4	11,13,14,15	X		Transit
17	Utilization	Vehicle miles traveled (VMT)	1,3	1,2,12	X		MultiModal
18	Utilization	Roadway volumes	1,3	1,2,12	X		MultiModal
19	Utilization	Percent of roadway volume classified as freight	1,3,4	1,2,12,16	X		Freight
20	Utilization	Number of transit boardings and alightings at stops	3	11	X		Transit
21	Utilization	Number of transit trips (ridership)	3	11	X		Transit
22	Utilization	Number of transit passenger miles	3	11	X		Transit
23	Utilization	Percent of commute destinations within county of residence	3,4	12,14,15	X		MultiModal
24	Utilization	Percent of trips made by non-single occupant vehicles	3,4	11	X		MultiModal
25	Utilization	Number of employers participating in transit pass programs	3,4	11,15	X		Transit
26	Utilization	Number of employers participating in other formal TDM programs	3,4	11,15	X		MultiModal
27	Outcome	Number of crashes (traffic incidents)	2,3	5,9	X		MultiModal
28	Outcome	Fatality rate resulting from crashes	2	6		X	MultiModal
29	Outcome	Number of fatalities resulting from crashes	2	6		X	MultiModal
30	Outcome	Serious injury rate resulting from crashes	2	7		X	MultiModal
31	Outcome	Number of serious injuries resulting from crashes	2	7		X	MultiModal
32	Outcome	Number of traffic crashes involving non-motorized traveler	2	5,8			Non-Motorized
33	Outcome	Number of pedestrian fatalities	2	8		X	Non-Motorized
34	Outcome	Number of seriously injured pedestrians	2	8		X	Non-Motorized
35	Outcome	Number of cycling fatalities	2	8		X	Non-Motorized
36	Outcome	Number of seriously injured cyclists	2	8		X	Non-Motorized
37	Outcome	Number of crashes involving public transit	2	5			Transit

2045 Regional Transportation Plan Policy Framework Initial Set of Performance Measures

ID	Type	Performance Measure	Goals	Objectives	CMP	FED	Modal Element
38	Outcome	Number of crashes involving freight	2,3,4	5,16	X		Freight
39	Outcome	Roadway volume to capacity ratio	3,4	9,13	X		Roadway
40	Outcome	Travel speed as a percentage of expected free flow	3	9	X		MultiModal
41	Outcome	Peak hour excessive delay	3,4	9,13	X		MultiModal
42	Outcome	Percent of VMT on congested routes	3,4	9,10	X		Roadway
43	Outcome	Percent of Freight VMT on congested routes	3,4	9,10,16			Freight
44	Outcome	Vehicle hours traveled (VHT)	3,4	9,14,15	X		MultiModal
45	Outcome	Interstate reliability	3,4	10	X	X	MultiModal
46	Outcome	Non-Interstate NHS reliability	3,4	10	X	X	MultiModal
47	Outcome	Public transit service reliability (on-time)	3,4	10,15	X		Transit
48	Outcome	Freight reliability on NHS	3,4	10,16	X	X	Freight
49	Outcome	Average commute travel distance	3,4	12,14	X		MultiModal
50	Outcome	Average commute travel time	3,4	9,14	X		MultiModal
51	Outcome	Pedestrian level of service	1,3	1,8,11,15	X		Non-Motorized
52	Outcome	Bicycle level of service	1,3	1,8,11,15	X		Non-Motorized
53	Outcome	Carbon Monoxide (CO) from vehicle emissions	5	18			MultiModal
54	Outcome	Oxides of Nitrogen (NOx) from vehicle emissions	5	18			MultiModal
55	Outcome	Particulate Matter (PM 2.5) from vehicle emissions	5	18			MultiModal
56	Outcome	Volatile Organic Compound (VOC) from vehicle emissions	5	18			MultiModal
57	Outcome	Carbon Dioxide (CO2) levels vehicle emissions	5	18,19			MultiModal
58	Proximity	Percent of households within 1/4 miles of frequent transit service	3,4	11,12,14,15,17	X		Transit
59	Proximity	Percent of households within 2 miles of park-n-ride lot	3,4	11,12,14,15,17	X		Transit
60	Proximity	Percent of jobs within 1/4 miles of frequent transit service	3,4	11,12,14,15,17	X		Transit
61	Proximity	Number of jobs within 30 minute transit commute	4	9,11,12,14,15			Transit
62	Proximity	Percent of jobs within 30 minute commute	4	9,12,14			MultiModal
63	Proximity	Acres of impervious surface within environmentally sensitive areas*	5	19			MultiModal
64	Proximity	Miles of right-of-way within environmentally sensitive areas*	5	19			MultiModal

KEY:							
Condition	Measure of the physical condition of infrastructure including a facility or equipment						
Capacity	Measure of the capacity of the transportation system including roadways and transit service						
Utilization	Measure of the demand or usage of the transportation system						
Outcome	Measure related to the resulting effects of the use of the transportation system						
Proximity	Measure of value within a distance of the transportation facility or related feature						