

# 2040



## Regional Transportation Plan



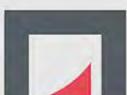
Memphis MPO  
METROPOLITAN PLANNING ORGANIZATION



# Table of Contents

<b>1.0</b>	<b>Introduction .....</b>	<b>1-1</b>
1.1	Regional and Transportation Context for the Memphis MPO Region .....	1-1
1.2	The Memphis Urban Area MPO .....	1-3
1.3	Federal Transportation Plan Requirements .....	1-7
1.4	Planning Context .....	1-9
1.5	Travel Demand Model Enhancements .....	1-10
1.6	Key Outcomes .....	1-13
1.7	Plan Development and Document Outline .....	1-14
<b>2.0</b>	<b>Public Participation.....</b>	<b>2-1</b>
2.1	Participation Activities .....	2-1
2.1.1	<i>Introduction .....</i>	<i>2-1</i>
2.1.2	<i>Livability Campaign Kickoff.....</i>	<i>2-1</i>
2.1.3	<i>Stakeholder Identification and Meetings .....</i>	<i>2-2</i>
2.1.4	<i>Public Outreach .....</i>	<i>2-2</i>
2.1.5	<i>Online Outreach .....</i>	<i>2-10</i>
2.2	Plan Review and Approval Milestones .....	2-15
<b>3.0</b>	<b>Performance-Based Plan Approach .....</b>	<b>3-1</b>
3.1	Performance-Based Planning .....	3-1
3.2	Livability 2040 Performance Framework .....	3-2
<b>4.0</b>	<b>System Conditions and Investment Needs .....</b>	<b>4-1</b>
4.1	Roadway Preservation .....	4-4
4.1.1	<i>Pavement.....</i>	<i>4-4</i>
4.1.2	<i>Bridge.....</i>	<i>4-6</i>
4.2	Roadway Congestion .....	4-9
	<i>Existing Congested Conditions .....</i>	<i>4-9</i>
4.2.1	<i>Future Congested Conditions .....</i>	<i>4-13</i>
4.3	Safety and Security .....	4-37
4.3.1	<i>Crash Analysis .....</i>	<i>4-38</i>
4.3.2	<i>Roadway-Rail Grade Crossings .....</i>	<i>4-41</i>
4.3.3	<i>Strategic Highway Safety Plans .....</i>	<i>4-43</i>
4.3.4	<i>Other Safety Programs and Activities .....</i>	<i>4-45</i>
4.3.5	<i>Transit System Safety and Security.....</i>	<i>4-46</i>
4.3.6	<i>Bicycle and Pedestrian Safety .....</i>	<i>4-46</i>
4.3.7	<i>Highway and Freight Rail Security .....</i>	<i>4-47</i>
4.3.8	<i>Airport Security.....</i>	<i>4-49</i>
4.3.9	<i>Port Security.....</i>	<i>4-50</i>
4.3.10	<i>Security Related to Seismic Events .....</i>	<i>4-50</i>

4.4	Multimodal Access and Connectivity .....	4-53
4.4.1	<i>Bicycle and Pedestrian</i> .....	4-53
4.4.2	<i>Transit</i> .....	4-56
4.4.3	<i>Complete Streets</i> .....	4-60
4.4.4	<i>Intercity Passenger Rail and Bus</i> .....	4-63
4.5	Transportation Disadvantaged .....	4-64
4.5.1	<i>Environmental Justice Communities</i> .....	4-65
4.5.2	<i>Persons with Disabilities</i> .....	4-67
4.5.3	<i>Persons 65 or Older</i> .....	4-69
4.5.4	<i>Multimodal Access for the Transportation Disadvantaged</i> .....	4-71
4.6	Economic Growth/Freight Movement.....	4-75
4.7	Land Use – Mobility and Livability Corridor Assessment .....	4-79
<b>5.0</b>	<b>Investment Solutions</b> .....	<b>5-1</b>
5.1	Direction 2040 RTP and Call for Projects.....	5-1
5.2	Public and Stakeholder Input .....	5-1
5.3	Congestion Analysis .....	5-2
5.4	Transit Gap Analysis for Environmental Justice Communities .....	5-2
5.5	Mobility/Livability Corridor Assessment.....	5-3
<b>6.0</b>	<b>Alternative Investment Concept Analysis</b> .....	<b>6-1</b>
6.1	Regional Roadway Connections .....	6-1
6.2	Expanded Travel Options .....	6-3
6.3	Comparison of Alternatives .....	6-5
<b>7.0</b>	<b>Financially Feasible Plan</b> .....	<b>7-1</b>
7.1	Project Prioritization Methodology .....	7-1
7.2	Revenue Projections .....	7-4
7.2.1	<i>Capital Revenue</i> .....	7-4
7.2.2	<i>Operations and Maintenance (O&amp;M) Revenue</i> .....	7-7
7.2.3	<i>Revenue Forecast Methodology</i> .....	7-8
7.3	Project Costs .....	7-11
7.3.1	<i>Roadway Projects</i> .....	7-11
7.3.2	<i>Transit Projects</i> .....	7-12
7.3.3	<i>Multimodal (Bicycle, Pedestrian and Complete Streets)</i> .....	7-12
7.3.4	<i>Operations and Maintenance Costs</i> .....	7-12
7.4	Fiscal Constraint.....	7-17
7.5	Potential Alternative Funding Strategies .....	7-21
7.5.1	<i>Fuel Tax Related</i> .....	7-21
7.5.2	<i>Vehicle and Driver Related</i> .....	7-21
7.5.3	<i>Tolling, Road Pricing, and Other User Fees</i> .....	7-21
7.5.4	<i>General Taxes</i> .....	7-22
7.5.5	<i>Specialized Taxes</i> .....	7-22
7.5.6	<i>Beneficiary Charges and Value Capture</i> .....	7-22
7.5.7	<i>Freight-Related Taxes and Fees</i> .....	7-22



<b>8.0</b>	<b>Investment Priorities</b> .....	<b>8-1</b>
8.1	Investment Summary .....	8-1
8.2	Livability 2040 Project List .....	8-3
<b>9.0</b>	<b>Plan Performance</b> .....	<b>9-1</b>
9.1	Summary of System Impacts .....	9-1
9.2	Environmental Consultation and Mitigation .....	9-2
9.2.1	<i>Purpose</i> .....	9-2
9.2.2	<i>Environmental Screening of Proposed RTP Projects</i> .....	9-3
9.2.3	<i>Environmental Mitigation Strategies</i> .....	9-8
9.2.4	<i>Climate Change</i> .....	9-10
9.3	Transportation Disadvantaged Analysis.....	9-12
9.3.1	<i>Identification of Environmental Justice Communities</i> .....	9-13
9.3.2	<i>Analysis of Benefits and Burdens of Livability 2040</i> .....	9-18
<b>10.0</b>	<b>Congestion Management Process</b> .....	<b>10-1</b>
10.1	CMP Summary .....	10-1
10.1.1	<i>Future Year Congested Network</i> .....	10-2
10.1.2	<i>Identification of CMP Strategies</i> .....	10-2
10.1.3	<i>Effectiveness of CMP Strategies</i> .....	10-3
10.1.4	<i>Project Evaluation and Project List</i> .....	10-7
<b>11.0</b>	<b>Air Quality</b> .....	<b>11-1</b>
11.1	Introduction .....	11-1
11.2	Background .....	11-1
11.2.1	<i>Ozone (O<sub>3</sub>)</i> .....	11-2
11.3	Interagency Consultation and Public Participation .....	11-4
11.4	Methodology and Results .....	11-4
11.5	Conclusion .....	11-5

**Appendix A: Literature Review**

**Appendix B: Memphis MPO Model Update - Model Estimation and Validation Report**

**Appendix C: Public Participation**

**Appendix D: Supplemental Pavement and Bridge Information**

**Appendix E: Projects with Potential Environmental Impacts**

**Appendix F: Projects with Potential Environmental Justice Area Impacts**

**Appendix G: CMP Analysis Summary Table**

**Appendix H: Shelby County Conformity Demonstration**

**Appendix I: Desoto County Conformity Demonstration**

# List of Tables

Table 1.1	Member Jurisdictions .....	1-5
Table 1.2	Existing Plans and Studies Reviewed.....	1-6
Table 1.3	Federal Planning Factors .....	1-7
Table 1.4	Partnership for Sustainable Communities Livability Principles .....	1-9
Table 2.1	Public Meetings and Dates.....	2-4
Table 3.1	Livability 2040 Goals, Objectives, and Performance Measures.....	3-5
Table 4.1	Summary of Key Needs and Gaps .....	4-2
Table 4.2	Current Bridge Performance and Annual Funding Needed.....	4-9
Table 4.3	Socioeconomic Data from Travel Demand Model .....	4-13
Table 4.4	Existing Plus Committed (E+C) Project List <sup>a</sup> .....	4-20
Table 4.5	FY 2014 to 2017 Transportation Improvement Program (TIP) Projects .....	4-23
Table 4.6	Crashes in the Memphis MPO region by Location and Severity 2011through 2013 .....	4-40
Table 4.7	Top 10 Roadway-Rail Grade Crossings Ranked by Predicted Accidents (FRA) .....	4-43
Table 4.8	SHSP Critical Emphasis Areas Relevant to the Memphis MPO Region .....	4-44
Table 4.9	Examples of Countermeasures Used to Improve Safety.....	4-44
Table 4.10	FY 2014 to 2017 Transportation Improvement Program <i>Transit Projects Only</i> .....	4-57
Table 4.11	Transportation Mode to Work by Environmental Justice Communities.....	4-67
Table 4.12	Transportation Mode to Work for Persons with a Disability in Shelby County .....	4-69
Table 4.13	Transportation Mode to Work for Elderly and Nonelderly Population.....	4-71
Table 4.14	Cargo Tonnage Traded in Memphis MPO Region 2012.....	4-77
Table 4.15	Mobility and Livability Corridors .....	4-82
Table 6.1	Alternative Investment Concept Performance Assessment .....	6-5
Table 7.1	Consolidation of Highway Programs .....	7-8
Table 7.2	Consolidation of Transit Programs .....	7-8
Table 7.3	Revenue Forecast – Tennessee <i>Millions</i> .....	7-10
Table 7.4	Revenue Forecast – Mississippi .....	7-10
Table 7.5	(Historic) Annual Average Operations and Maintenance (O&M) Costs <i>Current Year Dollars</i> .....	7-14
Table 7.6	Balanced O&M Revenue and Costs (Year of Expenditure Dollars).....	7-16
Table 7.7	Balanced Revenue and Costs for Livability 2040 (Year of Expenditure Dollars) .....	7-19
Table 8.1	Highlights of Major Investments .....	8-2
Table 8.2	Fiscally Constrained Project List .....	8-7
Table 8.3	Vision Project List.....	8-22
Table 9.1	Summary of Plan Performance, in Relation to Key Performance Measure Categories .....	9-2
Table 9.2	Number of Projects with Potential Direct Impacts by Resource Type .....	9-8
Table 9.3	Potential Mitigation Activities .....	9-10

# List of Figures

Figure 1.1	Memphis Urban Area MPO Planning Boundary .....	1-4
Figure 1.2	Travel Demand Model Geography .....	1-12
Figure 1.3	Fund Split by Investment Category, Livability 2040 .....	1-13
Figure 1.4	Steps of Livability 2040 Development .....	1-15
Figure 2.1	Public Meeting Locations.....	2-3
Figure 3.1	Steps of a Performance-Based Planning Process.....	3-1
Figure 4.1	National Highway System in Memphis MPO Region .....	4-5
Figure 4.2	Pavement Network Existing Conditions.....	4-6
Figure 4.3	Bridges by Ownership .....	4-7
Figure 4.4	Existing Bridge Deficiency Status.....	4-7
Figure 4.5	Map of Existing Bridge Deficiency Status .....	4-8
Figure 4.6	Existing Congestion in Memphis MPO Region, Year 2013 .....	4-10
Figure 4.7	Base Year (2010) Congestion, Memphis MPO Travel Demand Model.....	4-12
Figure 4.8	2010 Employment Density.....	4-14
Figure 4.9	2040 Employment Density.....	4-15
Figure 4.10	2010 Population Density .....	4-16
Figure 4.11	2040 Population Density .....	4-17
Figure 4.12	Functional Classification of Existing 2010 Network .....	4-19
Figure 4.13	Future Year (2040 E+C) Congestion, Memphis MPO Travel Demand Model.....	4-36
Figure 4.14	High-Crash Corridors.....	4-38
Figure 4.15	Crashes per Square Mile.....	4-39
Figure 4.16	Fatalities by Road User Type .....	4-41
Figure 4.17	Fatal and Injury Crashes Reported at Roadway-Rail Grade Crossings 2009 through 2013.....	4-42
Figure 4.18	Strategic National Security Networks Versus Congestion .....	4-49
Figure 4.19	New Madrid Seismic Zone Activity .....	4-52
Figure 4.20	Existing Bicycle Network in the Memphis MPO Region .....	4-54
Figure 4.21	Existing Pedestrian Network in the Memphis MPO Region.....	4-55
Figure 4.22	Existing Transit System .....	4-60
Figure 4.23	Complete Streets Example Roadway Cross Section .....	4-61
Figure 4.24	Obesity Prevalence by Area.....	4-62
Figure 4.25	High-Speed Rail Concept by the Federal Railroad Administration, 2009.....	4-63
Figure 4.26	Combined Environmental Justice Areas <i>Minority, Low Income, and Limited English Proficiency Areas</i> .....	4-66
Figure 4.27	Areas with Persons with a Disability.....	4-68
Figure 4.28	Areas with Persons 65 or Older .....	4-70
Figure 4.29	Environmental Justice Communities in Relation to Transit and Nonmotorized Networks ..	4-72

Figure 4.30	Locations of Persons Age 65 and Older in Relation to Transit and Nonmotorized Networks.....	4-73
Figure 4.31	Locations of Persons with a Disability in Relation to Transit and Non-Motorized Networks.....	4-74
Figure 4.32	Memphis MPO Regional Freight Transportation System, 2012 .....	4-76
Figure 4.33	Modal Breakdown of Cargo in Memphis MPO Region 2012 .....	4-77
Figure 4.34	Growth in Cargo Volumes in the Memphis MPO Region 2012 versus 2040.....	4-78
Figure 4.35	Mobility and Livability Corridor Designations .....	4-81
Figure 6.1	Potential Investment Areas – <i>Regional Roadway Connections Concept</i> .....	6-2
Figure 6.2	Potential Investment Areas – <i>Expanded Travel Options Concept</i> .....	6-4
Figure 8.1	Fiscally Constrained Projects – 2018 through 2020 .....	8-4
Figure 8.2	Fiscally Constrained Projects – 2021 through 2030 .....	8-5
Figure 8.3	Fiscally Constrained Projects – 2031 through 2040 .....	8-6
Figure 9.1	Identified Natural Resources.....	9-4
Figure 9.2	Cultural/Historic Resources.....	9-5
Figure 9.3	Community Resources.....	9-6
Figure 9.4	Locations in Environmental Monitoring Programs .....	9-7
Figure 9.5	Minority Populations.....	9-14
Figure 9.6	Low-Income Populations .....	9-15
Figure 9.7	Populations with Limited English Proficiency (LEP) .....	9-16
Figure 9.8	Combined Environmental Justice Populations <i>Minority, Low Income, and Limited English Proficiency Populations</i> .....	9-17
Figure 11.1	Memphis, TN-MS-AR 2008 8-Hour Ozone Non-Attainment Area.....	11-3



# List of Acronyms

3-C	Comprehensive, Continuing, and Cooperative
AADT	Annual Average Daily Traffic
ACS	American Community Survey
ADA	Americans with Disabilities Act
ADHS	Appalachian Development Highway System
AHTD	Arkansas State Highway and Transportation Department
ARRA	American Recovery and Reinvestment Act
BRT	Bus Rapid Transit
BSNF	Burlington Northern and Santa Fe Railway
CAA	Clean Air Act
CAAA	Clean Air Act Amendment
CBD	Central Business District
CBO	Congressional Budget Office
CDC	Centers for Disease Control and Prevention
CEA	Critical Emphasis Area
CESA	Congressional Earmark Special Appropriation
CFR	Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality Improvement Program
CMP	Congestion Management Process
CN	Canadian National Railway Company
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CSS	Context Sensitive Solution

DEMO	Demonstration
DOT	Department of Transportation
DUI	Driving Under the Influence
E+C	Existing Plus Committed
E-E	External-External
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
ETC	Engineering and Technical Committee
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FY	Fiscal Year
GARVEE	Grant Anticipation Revenue Vehicle
GDL	Graduated Driver License
GHG	Greenhouse Gas
GIS	Geographic Information System
GPS	Global Positioning System
HERS	Highway Economic Requirements System
HERS-ST	Highway Economic Requirements System State Version
HOT	High-Occupancy Toll
HOV	High-Occupancy Vehicle
HPMS	Highway Performance Monitoring System
HSIP	Highway Safety Improvement Program
HSR	High-Speed Rail



HTF	Highway Trust Fund
HVAC	Heating, Ventilation, and Air Conditioning
IAC	Interagency Consultation Committee on Air Quality
I/M	Inspection and Maintenance
IM	Interstate Maintenance
IRI	International Roughness Index
ITS	Intelligent Transportation Systems
JARC	Jobs Access and Reverse Commute Program
LED	Light-Emitting Diodes
LEP	Limited English Proficiency
LOS	Level of Service
LRT	Light-Rail Transit
MAP-21	Moving Ahead for Progress in the 21 <sup>st</sup> Century Act
MATA	Memphis Area Transit Authority
MDEQ	Mississippi Department of Environmental Quality
MDOT	Mississippi Department of Transportation
MEMA	Mississippi Emergency Management Agency
MOA	Memorandum of Agreement
MOVES	Motor Vehicle Emissions Simulator
MPO	Metropolitan Planning Organization
MSCAA	Memphis-Shelby County Airport Authority
MSCPC	Memphis-Shelby County Port Commission
MVEB	Motor Vehicle Emission Budget
NAAQS	National Ambient Air Quality Standards
NBI	National Bridge Inventory
NBIAS	National Bridge Investment Analysis System

NCIP	National Corridor Infrastructure Improvement Program
NDRC	National Disaster Resilience Competition
NEPA	National Environmental Policy Act
NHPP	National Highway Performance Program
NHS	National Highway System
NMSZ	New Madrid Seismic Zone
NO <sub>x</sub>	Oxides of Nitrogen
NPMRDS	National Performance Management Research Data Set
NSRR	Norfolk Southern Railroad
O&M	Operations and Maintenance
OPD	Office of Planning and Development
PDO	Property Damage Only
PLAC	Planning and Land Use Advisory Committee
PM	Particulate Matter
RTP	Regional Transportation Plan
RTPAC	RTP Advisory Committee
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SFP	State Funded Project (MS DOT)
SGR	State of Good Repair
SHSP	Strategic Highway Safety Plan
SIP	State Implementation Plan
SOV	Single-Occupant Vehicle
S RTP	Short Range Transit Plan
SRTS	Safe Routes to School
SSEP	System Security and Emergency Preparedness Plan
STP	Surface Transportation Program



STRAHNET	Strategic Highway Network
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TAP	Transportation Alternatives Program
TAZ	Traffic Analysis Zone
TCM	Transportation Control Measure
TCSP	Transportation, Community, and System Preservation
TDM	Travel Demand Management
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
TEA-21	Transportation Equity Act for the 21 <sup>st</sup> Century
TEMA	Tennessee Emergency Management Agency
TEU	Twenty-foot Equivalent Unit
TIP	Transportation Improvement Program
TMA	Traffic Management Authority
TPB	Transportation Policy Board
TWRA	Tennessee Wildlife Resources Agency
UDC	Unified Development Code
UP	Union Pacific Railroad
U.S. EPA	United States Environmental Protection Agency
USC	United States Code
U.S. HUD	United States Department of Housing and Urban Development
USCBP	US Customs and Border Patrol
V/C	Volume to Capacity
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
YOE	Year of Expenditure

# 1.0 Introduction

## 1.1 Regional and Transportation Context for the Memphis MPO Region

Located on the bluffs of the Mississippi River, midway between St. Louis and Vicksburg, Memphis has long been viewed as an ideal location for a variety of transportation options. Today, transportation takes on several forms, including automobiles, airplanes, trains, bikes, walking, trolleys, and barges. These transportation elements are a result of the plans and actions of the area's earlier residents. The region's rich and long history is highlighted with countless instances of people coming to the area and discovering a great base for travel across the state, region, and nation. With such a fertile environment for travel and settlement, it is natural that transportation has become an integral part of the identity and the continued economic success of the region.

In 1818, a treaty between the Chickasaw nation and the United States was signed, granting land in western Tennessee to the U.S. government. Shortly thereafter, James Winchester recommended the formation of a new county in western Tennessee. On November 24, 1819, the State General Assembly created Shelby County, 30 miles wide and 25 miles long bordering the Mississippi River. Memphis (named for the ancient Egyptian city) was laid out on the banks of the Mississippi around 1819. The town had 362 lots with broad avenues, public squares, and a public promenade along the river. Though the surveyed lots and new town were advertised in newspapers throughout the South, the first lots were purchased by settlers who already resided on the land. Memphis was incorporated as a town on December 9, 1826.

To the south, DeSoto County in Mississippi formed in February 1836 with 140 residents. The county steadily added people to its tax rolls and by 1837, 204 settlers lived in and paid taxes to the new county. Settlement in the area that would become Fayette County began as early as 1820. Within a few years, enough settlers called the land home to justify the formation of a county. Fayette County, named for a French general and statesman, was established by the Tennessee General Assembly on September 29, 1824. Marshall County, named for Chief Justice John Marshall, was founded in 1836. The economy for the region was driven by river transportation that eventually spawned additional trade and industry growth. By operating as the South's newfound economic hub, business and economic opportunities spurred growth throughout the region. With its strategic location on the Mississippi River, the Memphis region positioned itself as one of the nation's crossroads, where multiple transportation options allow people and freight to travel north to the Midwest, south to the Gulf of Mexico, and all points between the Atlantic and Pacific Oceans.



Within the region, daily travel was usually on foot or by horse in the early to mid-19<sup>th</sup> century, with street cars emerging in the later 19<sup>th</sup> century. This meant trips were close to home.

Much has changed in transportation since the 19<sup>th</sup> century. In 30 minutes a traveler by car can cover distances not imagined by earlier settlers to the region. Whereas trips were taken almost entirely within the bounds of one neighborhood, now regional, multi-jurisdictional trips are the norm. Residents travel to their destinations not knowing or caring which jurisdiction owns the road on which their car, bus, or bike is riding, but just that they have a seamless and safe trip.

In this context, planning at a *regional* level is critical. Investments need to be driven by local input but with a regional perspective.

The Memphis Urban Area Regional Transportation Plan (RTP), “Livability 2040” is a planning document that will guide the expenditure of federal transportation funds for all modes of transportation over the next 25 years. The RTP is more than a document, but a process, and it is the process by which local, state, and federal policy-makers and the citizens, business owners, and stakeholders who are most impacted by transportation decisions come together to create a vision for the region's future transportation system.

As in the 19<sup>th</sup> century, with its central location and position on the Mississippi River, the Memphis region continues to be a major transportation and logistics center from a national – and increasingly international – perspective. With the world's second busiest air-cargo airport, railyards and intermodal terminals, multiple trucking terminals, the nation's fourth-largest inland water port, and 11 Interstate and U.S.-designated highways, the region is a national distribution hub.

The Memphis region is centrally located on the inland waterway system, 640 river miles north of New Orleans and 400 miles south of St. Louis and possesses the fourth largest inland water port in the United States. Memphis is also central in the national rail network (with over 200 trains per day traveling through Memphis) and is served by five Class I railroads, Burlington Northern and Santa Fe (BNSF) Railway, Canadian National (CN) Railway Company, CSX Transportation, Norfolk Southern Railway, and Union Pacific (UP) Railroad. In addition to its position in the nation's waterways and railroad systems, Memphis is pivotally positioned in the national highway network and in the nation's highway freight corridors. This includes four Interstate corridors, I-40, I-55, I-240, and I-69 that all provide major connections to the rest of the country. Major U.S.-designated highways include U.S. 51, U.S. 61, U.S. 64, U.S. 70, U.S. 72, U.S. 78, and U.S. 79. The region is home to nineteen airports that serve commercial passenger service, freight, military operations, and general aviation needs with the most notable including Memphis International Airport, Millington Jetport, and the Olive Branch Airport. FedEx keeps its world headquarters at Memphis International Airport.

In an increasingly competitive, global economy, it is critical that a region work together with a single voice and a single vision. The health or failure of a single community can mean the health or failure of the region on the international competitive landscape. It is within this context, too, that regional transportation planning, and the RTP process, is so crucial to the Memphis region.

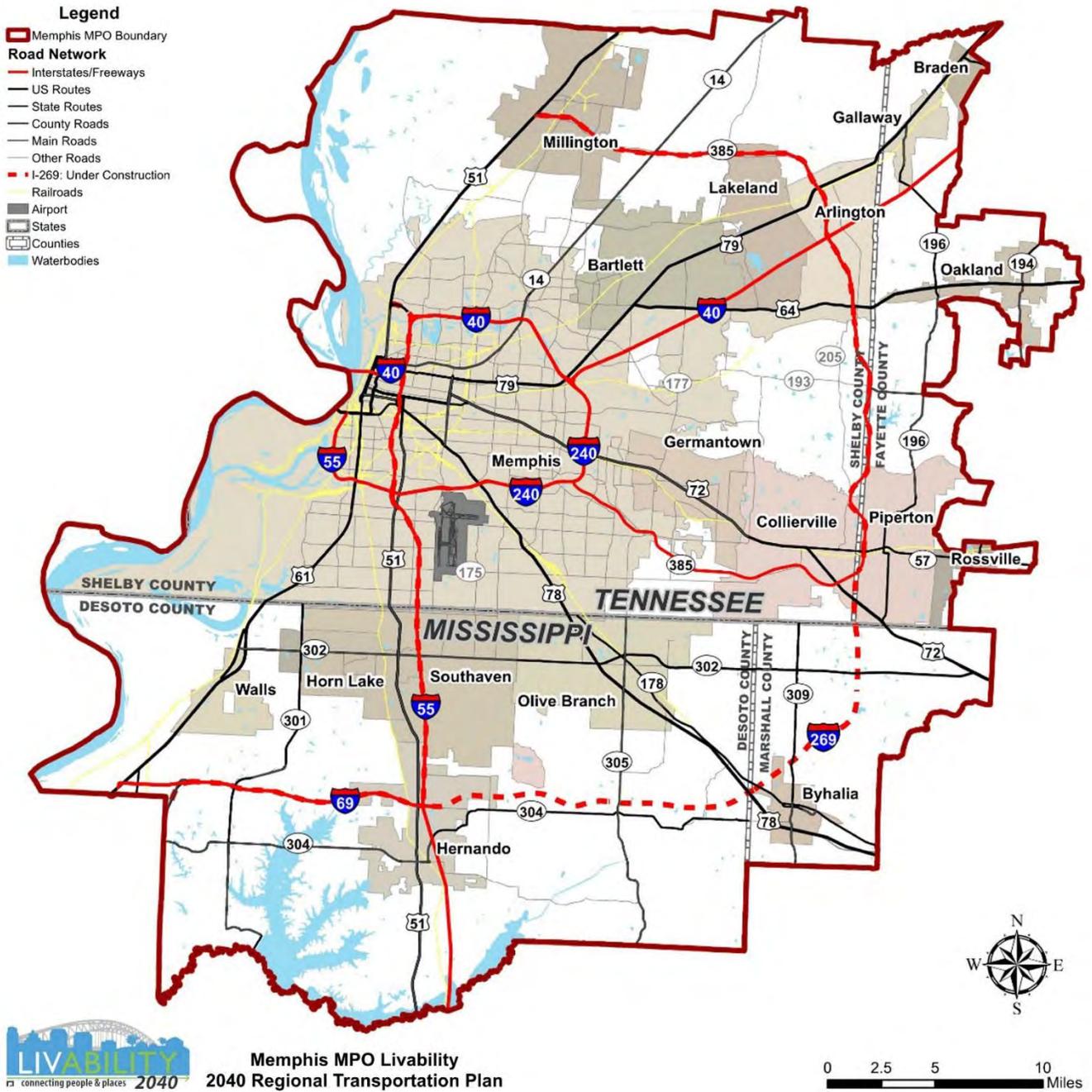
The role of transportation in the region's economic health is critical, and an important reminder that transportation is not an end in itself, but a means to an end. It is economic prosperity. It is quality of life. It is livability.

## 1.2 The Memphis Urban Area MPO

The Memphis Urban Area Metropolitan Planning Organization (MPO), created in 1977, is responsible for the transportation policy development, planning, and programming for the counties of Shelby County, Tennessee and DeSoto County, Mississippi and portions of Fayette County, Tennessee and Marshall County, Mississippi, as shown in **Figure 1.1** and **Table 1.1**. This is defined as the "Memphis MPO Region". The mission of the Memphis MPO is "to encourage and promote the development of a balanced, efficient, and affordable regional transportation system to meet the needs of people and goods moving within and through the region, while minimizing the effect of transportation-related air pollution."

The Memphis MPO consists of elected officials from the jurisdictions shown in **Table 1.1**, the Governors of Tennessee and Mississippi, Memphis Area Transit Authority (MATA), Memphis-Shelby County Airport Authority (MSCAA), Memphis-Shelby County Port Commission (MSCPC), and representatives from the Tennessee Department of Transportation (TDOT) and Mississippi Department of Transportation (MDOT). The Shelby County Department of Regional Services provides staff to the Memphis MPO and serves as its fiscal and administrative agent.

Figure 1.1 Memphis Urban Area MPO Planning Boundary



**Table 1.1 Member Jurisdictions**

<b>Shelby County, TN</b>
Arlington
Bartlett
Collierville
Germantown
Lakeland
Memphis
Millington
<b>Fayette County, TN</b>
Braden
Gallaway
Oakland
Piperton
Rossville
<b>DeSoto County, MS</b>
Hernando
Horn Lake
Olive Branch
Southaven
Walls
<b>Marshall County, MS</b>
Byhalia

Federal Regulations require that a MPO be designated to carry out a comprehensive, continuing and cooperative (“3-C”) transportation planning process for urbanized areas with a population of 50,000 or more. Using federal regulations for guidance, short and long-term transportation plans that meet community objectives are developed and implemented. A multi-modal planning approach is used to assure a vibrant and growing system of roads, rail, transit systems, pedestrian/bicycle facilities, airports and waterways. In particular the Memphis MPO is responsible for developing Regional Transportation Plans (RTP) and Transportation Improvement Programs (TIP) for the region.

In preparation for developing the Livability 2040 RTP, a review of a wide array of existing plans and studies in the Memphis MPO region was conducted. Table 1.2 shows selected key studies reviewed and maps them to the goal areas described in Section 1.4. These studies vary in geography from broad regional plans, such as the Mid-South Regional Greenprint and Sustainability Plan, to project-specific and topic-specific studies. **Appendix A** provides a literature review of these documents.

**Table 1.2 Existing Plans and Studies Reviewed**

Study	Safety	Maintenance	Economic Vitality	Congestion	Mobility/Accessibility	Environment	Land Use
A Coordinated Human Services Transportation Plan for the Memphis Area					●		
Aerotropolis	●		●	●	●	●	●
Bus Transit to Workplace Studies					●		
DeSoto County I-69/I-269 Corridor Stewardship Plan			●				●
DeSoto County Comprehensive Plan			●	●	●	●	●
DeSoto County Transit Feasibility Study					●		
Direction 2040 Long Range Transportation Plan	●	●	●	●	●	●	●
Edge Innovation District			●		●		●
Environmental Reports			●			●	●
Fair Housing and Equity Assessment (Mid-South Regional Greenprint)			●		●		●
Greater Memphis Neighborhoods Plan			●				●
Health Impact Assessment (Mid-South Regional Greenprint)			●		●	●	●
Houston Levee Road/Center Hill Road Alternatives Study					●	●	
I-269 Small Area Plan – Town of Collierville					●		●
I-269 Tennessee Corridor Study: A Regional Vision Study			●	●		●	●
Lamar Avenue			●	●			
Main to Main Project		●			●	●	
MATA Short-Range Transit Plan					●		
Memphis and Shelby County Community Redevelopment Agency			●				●
Memphis MPO Household Travel Survey (January – June 2014)				●	●		
Memphis Regional Freight Infrastructure Plan				●	●		
Memphis Urban Area Regional Intelligent Transportation Systems (ITS) Architecture and Deployment Plan	●			●			
Mid-South Regional Greenprint and Sustainability Plan					●	●	
Midtown Alternatives Analysis					●		
Other Local Plans			●	●	●	●	●
Poplar Southern Corridor Study	●			●	●	●	●
Regional Bicycle and Pedestrian Plan	●				●	●	
Sears Crosstown Redevelopment			●				●
Shelby Farms Master Plan			●		●	●	
Southern Gateway Project (Mississippi River Crossing Feasibility and Location Study)				●	●		
State of Employment (Mid-South Regional Greenprint)					●		
TN-385/I-269 Corridor: Economic Development/Environmental Study			●			●	●
Transportation Demand Management Strategies				●	●		
West Memphis-Marion Area Transportation Study	●	●	●	●	●	●	●



## 1.3 Federal Transportation Plan Requirements

Priority and regionally significant transportation projects and programs are allocated Federal, state, and local transportation dollars via the RTP and TIP. Regional transportation plans must be updated at a minimum every four years in air quality nonattainment areas like the Memphis MPO region (five years otherwise). Regional transportation planning by legislative definition must be *comprehensive* (including all modes), *cooperative* (involving a broad array of stakeholders and other interested parties), and *continuous* (ever improving and evolving). Regional transportation plans must also address a broad set of planning factors, outlined in Federal transportation funding legislation, the most recent being the Moving Ahead for Progress in the 21<sup>st</sup> Century Act (MAP-21). These planning factors are defined in **Table 1.3**.<sup>1</sup>

**Table 1.3 Federal Planning Factors**

As Required by MAP-21	
1.	Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.
2.	Increase the safety of the transportation system for motorized and nonmotorized users.
3.	Increase the security of the transportation system for motorized and nonmotorized users.
4.	Increase the accessibility and mobility of people and for freight.
5.	Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements, and state and local planned growth and economic development patterns.
6.	Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.
7.	Promote efficient system management and operation.
8.	Emphasize the preservation of the existing transportation system.

This trend in Federal guidance, along with practical, changing needs “on the ground” across the United States, has resulted in regions slowly shifting their investments to be more *comprehensive*.

The Memphis MPO Region has done the same with Livability 2040.

Livability 2040 serves as the RTP within the Memphis MPO region through the planning horizon year of 2040.<sup>2</sup> Livability 2040 was adopted by the Memphis MPO Transportation Policy Board (TPB) on January 2016 (pending), and the associated RTP conformity determination was approved by the United States Department of Transportation (U.S. DOT), in consultation with the United States Environmental Protection Agency (U.S. EPA), on March 2016

*Over time, Federal requirements have moved to better support a balanced, multimodal transportation network, developed through transparent, performance-based planning.*

<sup>1</sup> 23 CFR 450.306 (a).

<sup>2</sup> 23 CFR 450.322(a).

(pending). Livability 2040 establishes the purpose and need for major transportation investments, identifies activities to address major transportation and growth issues, and prioritizes investments to improve system condition and performance.

While it is a federal requirement for regional transportation plans to be updated a minimum of every four years in air quality nonattainment areas, there are opportunities to amend the plan prior to the adoption of the next regional transportation plan. The RTP is a planning document looking at the next 25 years, but priorities for the region can change and funding, for example, could become available for a project that is not included in the plan. In this case, the RTP would need to be amended so that the project could be added to the regional transportation plan and subsequently, the short-range plan or the Transportation Improvement Program (TIP). Once the Memphis MPO is aware of the change that needs to be made, the Memphis MPO would begin by conducting air quality modeling analysis to ensure that the changes to the plan do not cause or contribute to any new violations of the National Ambient Air Quality Standards (NAAQS) for 2008 8-hour ozone and 1971 carbon monoxide. For more information regarding the air quality conformity analysis, reference **Chapter 11.0 Air Quality**.

Once the modeling is complete, the results are submitted to the Interagency Consultation Committee (IAC), who provides assistance to the MPO in regards to air quality monitoring and compliance efforts, for a 30-day review. The IAC is made up of local representatives, state agencies and agencies responsible for air quality control programs and regional representatives from FHWA, EPA, and FTA. The IAC has a 30-day review period for amendments to the Regional Transportation Plan. A 30-day public review and publishing of a public notice is also part of the amendment process, which is consistent with the Memphis MPO's Public Participation Plan. Once the review process has ended the amendment to the Regional Transportation Plan is taken to the MPO's Engineering Technical Committee (ETC) followed by the Transportation Policy Board (TPB), which serves as a public hearing, for approval. Once the TPB approves the amendment it is submitted to FHWA for a final review period along with EPA and FTA. The RTP amendment is considered approved once the final concurrence letter is received from FHWA.

Livability 2040 is a major update of the Direction 2040 Long Range Transportation Plan, adopted on February 23, 2012. It meets all Federal transportation planning requirements including:

- A minimum 20-year plan horizon;
- Reflects latest available land use, population and employment, travel and economic activity assumptions;
- Identifies long-range transportation goals and specific long- and short-range investment strategies across all modes of transportation to support meeting those goals;
- Supports regional land use and economic development policies and plans;
- Demonstrates fiscal constraint for all funded projects;
- Demonstrates air quality conformity; and
- Reflects a broad set of public and stakeholder input.

As shown in **Table 1.4**, Livability 2040 also is guided by the six livability principles supported at the Federal level through the Partnership for Sustainable Communities, an interagency partnership between the U.S. Department of Housing and Urban Development (HUD), the U.S. Department of Transportation (DOT), and the U.S. Environmental Protection Agency (EPA). The US Department of Transportation (DOT) defines livable communities as “places where transportation, housing

*Livability is supporting and enhancing communities with more affordable and reliable transportation choices that provide access to employment, education, and other basic needs.*

and commercial development investments have been coordinated so that people have access to adequate, affordable and environmentally sustainable travel options."

**Table 1.4 Partnership for Sustainable Communities Livability Principles**

- |   |
|---|
| 1. Support existing communities.                |
| 2. Provide more transportation choices.         |
| 3. Promote equitable, affordable housing.       |
| 4. Enhance economic competitiveness.            |
| 5. Coordinate policies and leverage investment. |
| 6. Value communities and neighborhoods          |

## 1.4 Planning Context

Livability 2040 reflects the performance-based planning approach that is required by MAP-21 and best suited for the region. This approach is guided by the region's vision for transportation:

The vision, along with the transportation goals of the plan and the region, help guide transportation investments when there is limited transportation revenue. The following goals, described more in Section 3 (and mapped to MAP-21 national goals in Table 3.1), were created using input from Memphis MPO members and the general public, legislation, and past planning initiatives:

- **Maintain existing transportation assets and infrastructure;**
- **Increase the safety and security of the transportation system for all users;**
- **Minimize adverse impacts of transportation investment on the (social, natural, historic) environment and improve public health;**
- **Advance corridor and community redevelopment opportunities to improve economic development and quality of life;**
- **Ensure the region is well positioned to remain a leader in global logistics and freight movement;**
- **Improve multimodal access to community and employment resources; and**
- **Reduce travel delay for people and goods**

*The RTP aims for a future Greater Memphis region with a high quality-of-life, economic and environmental sustainability, and access to prosperity – in short, a region where people choose to live.*



Livability 2040 has been developed in a planning environment with several key elements that are impacting regional transportation plans across the nation, and similarly serve as key context for this plan:

- Transportation needs are increasing, while funding streams remain steady or decreasing in real terms, and are sometimes unstable.
- MAP-21 introduced a number of program changes designed to provide for additional flexibility, transparency, and accountability within the plan development process, and places clear emphasis on the need to first maintain and preserve existing assets before expanding the system. This emphasis on asset management, when coupled with less revenue, has serious implications on revenue availability for new infrastructure.
- MAP-21 requires states and regions to use a transparent, performance-based process for preparing transportation plans and identifying investments.

In response to these challenges, the Memphis MPO has shifted its investment focus from one that prioritizes new roadway capacity to one that ensures existing transportation assets are managed, maintained, and maximized to the extent possible, before the system is expanded. To support these advances, the Memphis MPO implemented a number of new innovative planning and technical methods. These include:

- Application of a new, more comprehensive travel demand model (Section 1.5);
- A broad stakeholder and public engagement process that included the establishment of an RTP Advisory Committee (RTPAC), multiple rounds of public meetings, “pop-up” and “tag-on” meetings, and the use of several online tools to gather significantly more input than in past plans (Section 2.0);
- Use of performance-based planning methods to understand project-level performance evaluation in the context of long-range goals and objectives, as an input into project selection (Section 3.0); and
- Integration of asset-management principles and policies coupled with a system preservation funding analysis that identified optimal funding levels needed to maintain roads and bridges in safe and adequate condition over the life of the plan (Section 4.1 and Section 8.1).

## 1.5 Travel Demand Model Enhancements

The Memphis MPO Regional Travel Demand Model supports the RTP development through the assessment of needs (e.g., congestion, multimodal access, and environmental justice) in the present and future, and by testing the impacts of projects and sets of projects on regional performance. A Travel Demand Model is a software tool that incorporates networks for the transportation system, as well as existing and projected population, employment, and other socioeconomic data. The Model estimates the amount of travel within, into, and out of the region, calibrated to actual existing conditions. With such a tool, the transportation network in the model can be modified to include new projects or sets of projects; when running the model, one can see how travel patterns, transportation modes utilized, and congestion change under these new conditions.

The previous Memphis MPO travel demand model was a state-of-the-practice four-step model with a journey to work four-based component. The updated model keeps this structure and builds upon it. The model is a traditional four-step model (inclusive of trip generation, distribution, mode choice, and assignment steps). The model is calibrated to, and validated against, a base year of 2010. It produces highway and transit travel information for peak and off-peak periods of travel for nine trip types: journey to work, home-based school, home-based university, home-based shopping, home-based social recreational, home-based escort, home-based other, work-based other, and

nonhome/nonwork based. A total of 54 external stations were applied to estimate vehicle traffic entering, exiting, and traveling through the region. Several key transportation data sources, which are described in more detail in Section 3.3 of Appendix B, were used to support the development of the travel demand forecasting model, including:

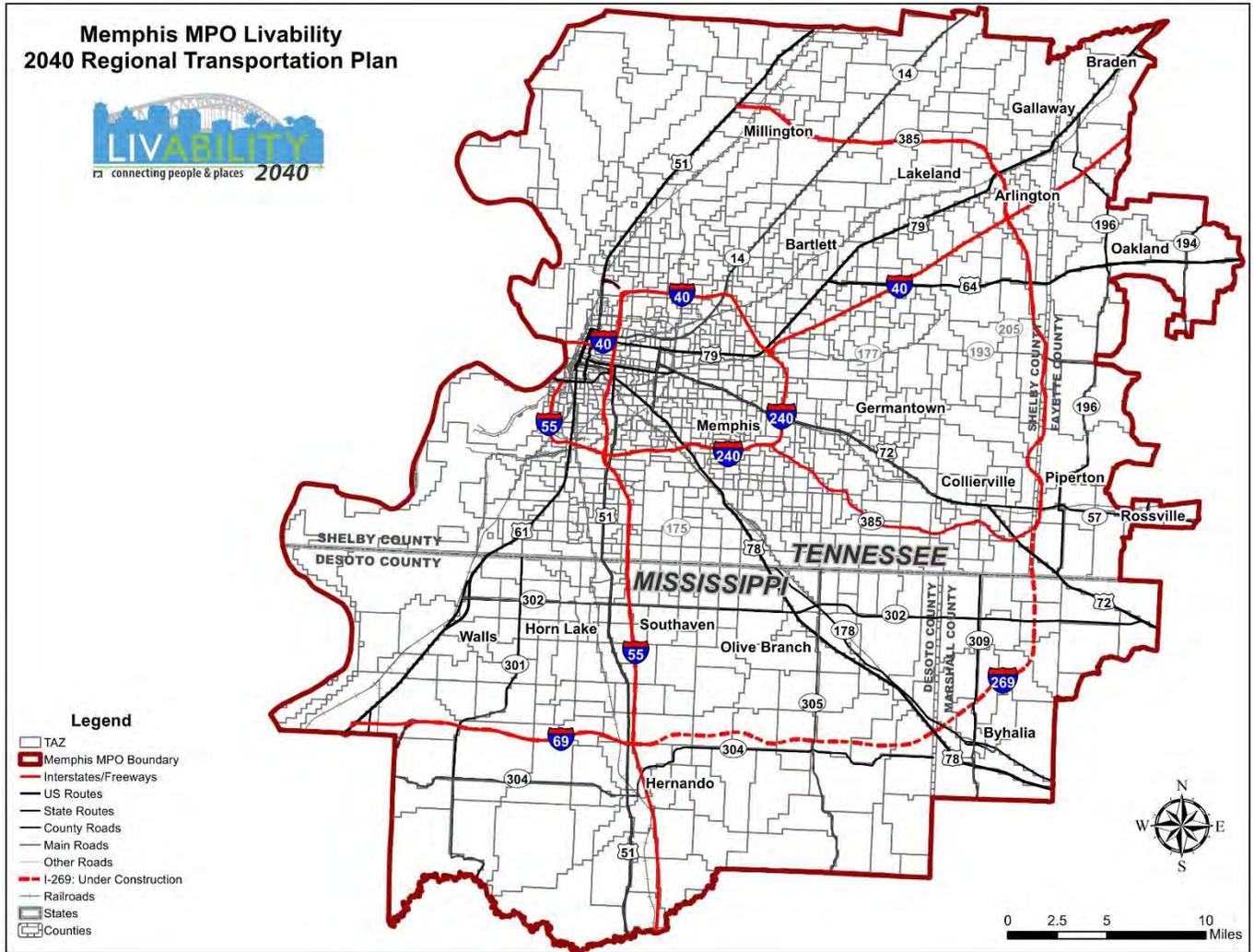
- **Household Travel Survey** – A new household travel survey was conducted in the Memphis MPO modeling area, over a multi-month period starting the second week of January 2014 and ending the second week of June 2014, specifically for this model update. It obtained a representative sample of the region's 450,000 households using an address-based sample, along with a multimodal recruit and retrieval effort to improve response rates.
- **Transit On-board Survey** – A new transit on-board survey was conducted on MATA's 35 bus routes and three trolley lines in fall 2013, specifically for this model update. It collected 3,277 surveys to represent more than 10 percent of riders.
- **Freight/Truck Survey Data** – TDOT provided a variety of freight data from a multiuse dataset, including truck GPS data from the American Transportation Research Institute and TRANSEARCH commodity flow information. Additionally, telephone interviews were conducted with industry experts in special generator locations.

There were four key changes to the modeling framework that were implemented. These changes include the following:

- Extend the modeling area for the Memphis MPO model to account for regional growth;
- Use income as a key segmentation variable in the model to help with environmental justice assessments;
- Develop an updated freight model that uses state of the art GPS-based data to better capture freight data; and
- Streamline the travel demand model so that it incorporates outputs from the regional land-use model to support future year forecasts.

A map of the model geography is shown in **Figure 1.2**. Each of the above changes, and a description of the development and validation of the updated model, is described in greater detail in Appendix B.

Figure 1.2 Travel Demand Model Geography

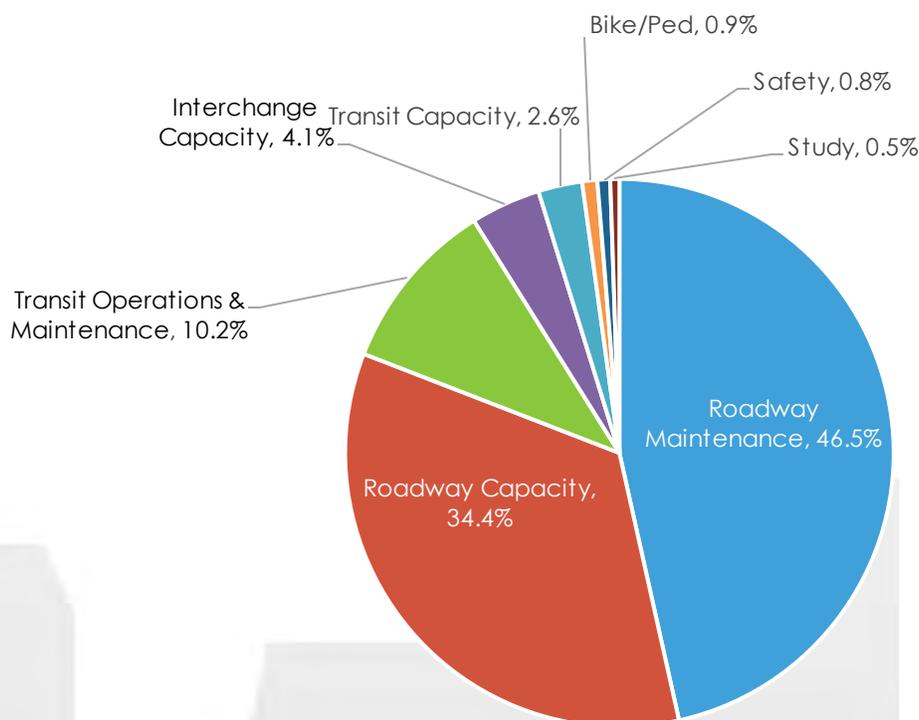


## 1.6 Key Outcomes

**Figure 1.3** summarizes the fund split across major investment categories in the Livability 2040 RTP. The funding allocations represent a strategic shift, in line with public and stakeholder input and with the principles of livability, away from purely building new roadway capacity in the region. In particular, Livability 2040 represents a doubling of system preservation funding levels to ensure adequate maintenance of the existing transportation system as a priority investment. In line with this focus on preservation, where new road and transit capital investments are proposed, preservation needs are considered as well: long-term operations and maintenance costs are incorporated into project-level cost estimates.



**Figure 1.3 Fund Split by Investment Category, Livability 2040**



Nearly 13 percent of funds are dedicated to transit, again with a focus on maintaining and operating the existing system. Roadway maintenance and other roadway improvements may also help improve transit operations. About one percent of funds are dedicated to bicycle and pedestrian improvements as a set aside for communities to build these types of livability-focused projects, with guidance from the Regional Bicycle and Pedestrian Plan; additionally, many of the proposed roadway capacity capital projects include bicycle and pedestrian improvements (such as new sidewalks or bike lanes) as part of the design.

In Section 8 of the plan, specific roadway and transit major capacity projects are called out. These represent strategic improvements to ensure the efficient movement of people and goods at critical locations in the region, in keeping with the community and context of those improvements.

## 1.7 Plan Development and Document Outline

The basic steps of plan development are summarized in **Figure 1.4**: They reflect the traditional steps of most long-range planning processes and have been used as part of Livability 2040, and serve as the basic structure of the document. Sections 3.0 to 9.0 of this document summarize the results of these steps, with public engagement activities, summarized in Section 2.0, occurring throughout plan development and informing each of these steps. Similarly to the timeline for development of the Livability 2040 RTP, the next planned update for the RTP will kick-off in 2018, approximately two years before the next adoption date of 2020. A minimum of 18-24 months is needed to ensure that there is adequate time for development of the plan to include, data collection, needs assessment, public and stakeholder outreach, revenue forecasting, the call for projects, air quality conformity, and the appropriate review periods to name a few.

An overview of each section of this Livability 2040 report is below.

**Section 2.0 – Public Participation** – Summary of public and stakeholder outreach activities that informed plan development.

**Section 3.0 – Performance-Based Plan Approach** – Using input from Memphis MPO members and the general public, legislation, and past planning initiatives, a performance-based framework consisting of goals, objectives, and performance measures was created to guide the development of the RTP.

**Section 4.0 – Investment Needs** – Detailed examination of existing conditions and future deficiencies to identify investment needs over the life of the plan.

**Section 5.0 – Investment Solutions** – Overview of various methods used to identify project solutions to address transportation needs.

**Section 6.0 – Alternative Investment Concept Analysis** – Summary of process used to bundle solutions into high level investment concepts to help determine the region's preferred funding allocation.

**Section 7.0 – Financially Feasible Plan** – Detailed overview of project evaluation approach, including the evaluation of all projects submitted by MPO jurisdictions, according to scoring criteria and the RTP goals and objectives; process for projecting transportation revenue and developing project costs; and developing a fiscally constrained plan.

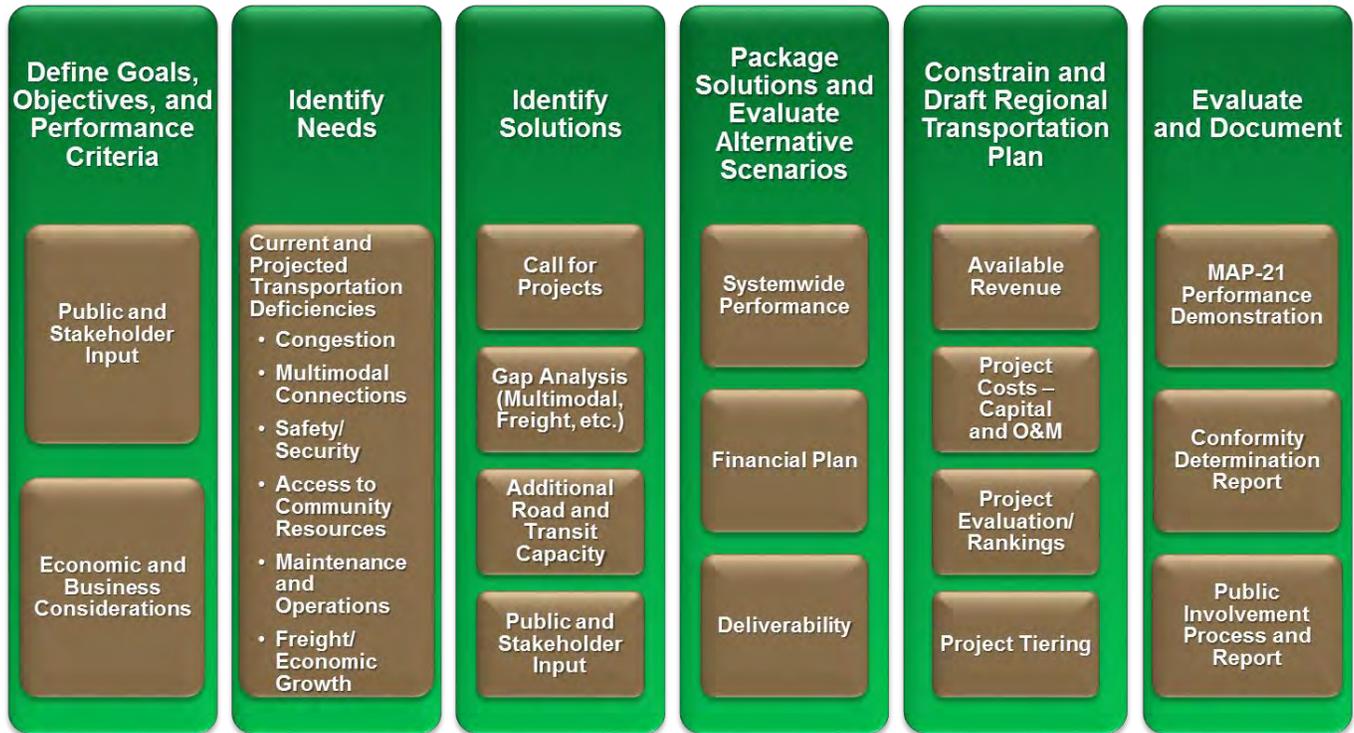
**Section 8.0 – Investment Priorities** – Summary of the investment strategy that achieves the RTP's goals and objectives, including a fiscally-constrained list of all funded projects.

**Section 9.0 – Plan Performance** – A summary of the performance impacts of Livability 2040 investment priorities from Section 8, across a select set of performance categories that align with MAP-21 national transportation goals and regional goals established as part of the RTP.

**Section 10.0 – Congestion Management Process** – A summary of the Congestion Management Process (CMP) and integration with Livability 2040.

**Section 11.0 – Air Quality Conformity** – RTP compliance with the federal regulations that govern air quality requirements.

Figure 1.4 Steps of Livability 2040 Development



## 2.0 Public Participation

### 2.1 Participation Activities

#### 2.1.1 Introduction

Outreach for the Regional Transportation Plan (Livability 2040) involved a multiplatform approach designed with the goal of taking advantage of new outreach methods to ensure effective and inclusive interaction with the communities for which the plan is being developed. Additionally, the MPO engaged stakeholders in ways that meet the Federal requirements of MAP-21 and the MPO's public participation plan requirements.

The parties engaged in the Regional Transportation Plan included: local government agencies; providers of public transportation services; community groups; transportation disadvantaged communities (i.e., persons with disabilities and minorities); users of public transportation; students, bicycle and pedestrian interest groups; and the general public. Others, such as freight shippers and freight transportation service providers, were included via a stakeholder survey.

"Traditional" forms of outreach can sometimes limit public involvement to the highly specific times of Town Hall-type meetings, where constraints on personal schedules and responsibilities, including work and child care, often limit the participation of many members of the public. To be more inclusive, the Livability 2040 public engagement process provided for an increased online presence, including a regularly updated project website, online surveys, a public participatory online mapping tool known as *Community Remarks*, an increased visual presence of the Memphis MPO in the community, Twitter, and Facebook. In expanding the process to include new platforms for feedback, the plan allowed not only for individual members of the public to be able to stay informed and involved in the RTP process on their own schedules at any time, but also to be more specific in directing attention towards issues affecting their daily lives.

#### 2.1.2 Livability Campaign Kickoff

In December 2013, the MPO launched the Livability Campaign with a series of three livability videos to begin a regional dialogue for the planning process of the RTP and to build greater awareness of the regional role of the MPO. The videos featured Mayors and Supervisors throughout the Memphis MPO region and were watched by over 900 viewers. The image below is a clip from a Constant Contact announcement that the MPO sent out with links to the Livability videos. The video clips were shared through Facebook and also posted on the project website, [livability2040.com](http://livability2040.com), [memphismpo.gov](http://memphismpo.gov) and [youtube.com/memphismpo](http://youtube.com/memphismpo). These videos were also released with Spanish subtitles.



In January 2014, following the launch of the Livability videos, the Memphis MPO surveyed the public to determine the best methods of distributing information, gaining public input, and reaching a broader range and number of citizens. Over 200 responses were received indicating that weekday evenings were the best time to hold public

meetings, online questionnaires were the preferred method for providing input, and topic and time were the most important influences in deciding whether or not to attend a public meeting. The January 2014 survey was one tool which was used to develop the public involvement process for the RTP. The complete survey results can be found in **Appendix C** of this document.

### **2.1.3 Stakeholder Identification and Meetings**

#### **Regional Transportation Plan Advisory Committee**

The Regional Transportation Plan Advisory Committee (RTPAC) was formed with representatives from various governmental agencies, transportation agencies, private businesses and general public in the Memphis MPO region. The committee met on the following dates to be apprised of the progress of the RTP (including public outreach efforts) and to discuss and provide input on the direction of the plan. The presentations and minutes, from the RTPAC meetings, were made available to the public via postings on the project's website:

- September 15, 2014 – Goals and objectives, policy synthesis, and initial outreach efforts;
- November 13, 2014 – Project ranking criteria, performance measures and public input process, existing conditions, and complete streets;
- March 18, 2015 – Alternative concept analysis, existing and future conditions and needs assessment, and Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, and draft revenue projections; and
- May 28, 2015 – Project evaluation and ranking process, and project implementation and funding.

#### **Stakeholders Meetings**

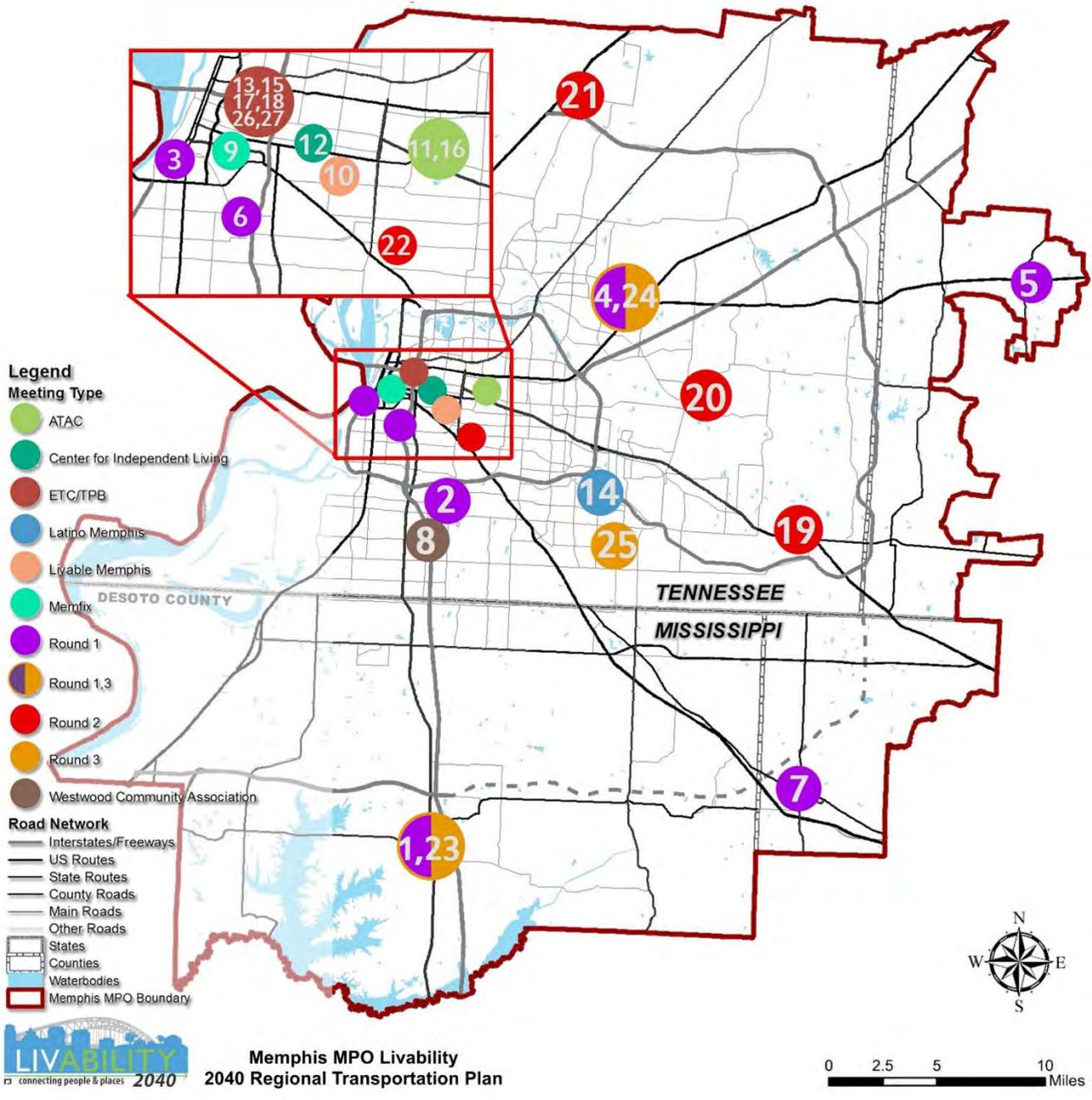
As part of the RTP public outreach plan, the MPO engaged not only the general public but also took steps to specifically reach African Americans, Latinos, school-aged and university students, and community groups servicing persons with disabilities.

### **2.1.4 Public Outreach**

Public outreach was utilized to provide opportunities for public review and comment by the community at key decision points in the creation of the Livability 2040 Regional Transportation Plan (RTP) for the Memphis MPO region. This dialogue naturally evolved over the life of this project. The process began with an exchange of information about the steps of the study as well as insight into issues and concerns raised by local neighborhoods and citizens in regards to their current and future transportation system. In establishing the story of the local communities with an extensive series of round one meetings and additional outreach, the MPO gained valuable information which guided the determination of local issues and objectives. Through the utilization of technology, the MPO expanded the timeframe by which community feedback could be collected, allowing for this information to be collected up to the establishment of finalized objectives and goals. The MPO then conducted a second round of public outreach designed to continue the dialogue and keep the public engaged. This second round of public meetings provided the communities of the Memphis MPO region with information about the current progress and the next steps of the RTP process, including the goals and policies to be recommended, the findings for project recommendations, and the decision-making processes with the adoption of the Plan. Importantly, this dialogue incorporated feedback to the public about how their prior involvement helped to shape the process and contributed to a plan responsive to the communities' needs.

Three rounds of general public meetings were utilized in the development of Livability 2040 in order to ensure that the community was able to review and comment on the plan at key milestones. The meetings were spread geographically across the region and held at locations on transit routes whenever possible to provide greater accessibility to stakeholders in all areas of the MPO region. **Figure 2.1** and **Table 2.1** detail the locations and dates of the public meetings for the multiple rounds of outreach.

**Figure 2.1 Public Meeting Locations**



**Table 2.1 Public Meetings and Dates**

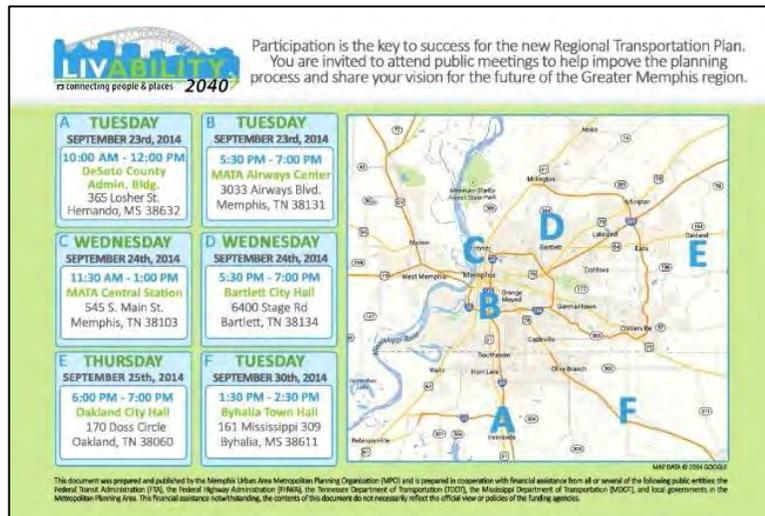
Public Meeting	Meeting Number	Date
First Round Public Meetings – DeSoto County	1	September 23 <sup>rd</sup> , 2014
First Round Public Meetings – MATA Airways Center	2	September 23 <sup>rd</sup> , 2014
First Round Public Meetings – MATA Central Station	3	September 24 <sup>th</sup> , 2014
First Round Public Meetings – Bartlett City Hall	4	September 24 <sup>th</sup> , 2014
First Round Public Meetings – Oakland City Hall	5	September 25 <sup>th</sup> , 2014
First Round Public Meetings – Soulsville Charter School	6	September 25 <sup>th</sup> , 2014
First Round Public Meetings – Byhalia Town Hall	7	September 30 <sup>th</sup> , 2014
Westwood Community Association/Whitehaven Partnership	8	October 10 <sup>th</sup> , 2014
MemFix Event	9	October 18 <sup>th</sup> , 2014
Livable Memphis – Pizza with Planners Event	10	October 22 <sup>nd</sup> , 2014
Active Transportation Advisory Committee	11	October 28 <sup>th</sup> , 2014
Memphis Center for Independent Living	12	November 4 <sup>th</sup> , 2014
Engineering and Technical Committee	13	November 6 <sup>th</sup> , 2014
Latino Memphis	14	November 20 <sup>th</sup> , 2014
Transportation Policy Board	15	November 20 <sup>th</sup> , 2014
Active Transportation Advisory Committee	16	March 30 <sup>th</sup> , 2015
Engineering and Technical Committee	17	April 9 <sup>th</sup> , 2015
Transportation Policy Board	18	April 30 <sup>th</sup> , 2015
Second Round Public Meetings – Collierville	19	July 21 <sup>st</sup> , 2015
Second Round Public Meetings – Cordova	20	July 21 <sup>st</sup> , 2015
Second Round Public Meetings – Millington	21	July 22 <sup>nd</sup> , 2015
Second Round Public Meetings – Orange Mound	22	July 22 <sup>nd</sup> , 2015
Third Round Public Meetings – Bartlett City Hall	23	November 16 <sup>th</sup> , 2015
Third Round Public Meetings – DeSoto County Admin Building	24	November 17 <sup>th</sup> , 2015
Third Round Public Meetings – Hickory Hill Community Center	25	November 17 <sup>th</sup> , 2015
Engineering and Technical Committee	26	January 28 <sup>th</sup> , 2016 (pending)
Transportation Policy Board	27	January 28 <sup>th</sup> , 2016 (pending)

Note: All public presentations were posted on the website and were easily accessible to the public seeking more information on the development of the RTP.

## Public Outreach Round 1

### Meeting Advertisement and Outreach

Notification of the public meetings was distributed by postal and electronic mail. 7,500 postcards were produced, of which over 5,300 were mailed to local businesses, community groups, and residents located within a ½ mile radius of each meeting location, with the remainder provided to the MPO and Regional Transportation Plan Advisory Committee for further distribution. In addition, email blasts were sent to approximately 450 community groups, member jurisdictions, and individuals with requests for further dissemination. The meetings were also publicized on the Livability2040 Website, and the Memphis MPO's Twitter, and Facebook accounts. Further public outreach methods included press releases, newspaper advertisements, and ads on Memphis Area Transit Authority (MATA) buses. The RTP was briefly covered in local newspaper articles as well as TV news.



Postcard Mailer to Local Residents, Businesses, and Community Groups.



Ads were placed on the exterior (left) and interior (right) of MATA buses. Ads ran from September 2014 through September 2015.

### Input Meetings

#### General Public Meetings

Round 1 of the Public Outreach process began in September, 2014, with a series of six public meetings at a variety of locations in the Memphis MPO region, i.e., all of Shelby County and DeSoto County and parts of Fayette County in Tennessee and Marshall County in Mississippi (**Figure 2.1**). Additional meetings were also held to engage

youth, minority populations, and individuals with disabilities. Materials from these meetings, such as minutes and presentations, are included **Appendix C**.

Round 1 Public Meeting Locations Included:

- DeSoto County Administration Building, Hernando, MS (9/23);
- MATA Airways Center, Memphis, TN (9/23);
- MATA Central Station, Memphis, TN (9/24);
- Bartlett City Hall, Bartlett, TN (9/24);
- Oakland City Hall, Oakland, TN (9/25); and
- Byhalia Town Hall, Byhalia, MS (9/30).

### Meeting Presentation and Communication Tools

At the beginning of the Round 1 public meeting, a presentation was given detailing the RTP process along with a brief video describing the concept of “livability.” Citizens were introduced to the various methods available to stay informed and remain involved throughout the process, including the Livability2040 Website and the *Community Remarks* public participatory Geographic Information System (GIS). *Community Remarks* is an online mapping application which allows users, such as members of the public, to provide geolocated comments, with an additional option to upload site pictures (further information on this tool is provided in **Section 2.1.5**). Each meeting also included an interactive session with the public, which was conducted via a real-time survey utilizing the touch-pad system known as *Turning Point*, followed by a question and answer session which incorporated the results of the just completed survey to guide the discussion. *Turning Point* is an interactive meeting tool which allows for real-time audience polling as a means to gain feedback and segue into discussion. Meeting notes are included as a part of **Appendix C** of this document.



Above: Excerpts from the MPO Livability videos played during the public meetings.

Feedback from the public meetings varied by location. As a whole, the real-time survey showed an audience who primarily lived in an urban or suburban area, many of whom experience little to no congestion and short commute times to work. A third of the respondents work in Downtown Memphis. However, regardless of living or working location, people generally drive their cars (95.31%), and drive primarily because of the travel distance (21.52%),

inconvenience of alternative modes (17.72%), speed and reliability of alternative modes (12.03%), or because they cannot access their destination on these alternative modes (11.81%). Survey data also indicates that while congestion is not an actual issue, given specific responses, congestion is a perceived issue given the relatively high response rate indicating congestion as being one of the top three issues in the Memphis MPO region. Better public transit, safety improvements, and better traffic signals were ranked the top three improvements desired by respondents.

Results from the *Turning Point* surveys for each meeting are included in **Appendix C**, as well. Comments during the question and answer sessions conducted after each presentation also varied by location; however, a large number of the comments indicated a need to improve the public transportation system. The public also indicated a need to improve multimodal transportation and maintain local roadways. As with the survey, audience respondents indicated a lack of alternative options to driving to reach their destination, also noting the unreliability of the current mass transit system, which does not allow them to reach work or classes on time, or which, due to their schedule, does not allow them a viable return trip.

### Youth Engagement

Two outreach sessions were held at Soulsville Charter School in Memphis on September 24, 2015. These meetings with the students involved a presentation on the RTP process and the planning profession, and included an interactive session using *Turning Point* and *Community Remarks*.



Above: Students at Soulsville High School provide feedback on the future of their community after a presentation on the Livability 2040 planning process and the planning profession.

### Environmental Justice Special Outreach

Additional meetings were conducted by the MPO between Round 1 and Round 2 public meetings to engage Latino and African American citizens, as well as low-income communities and persons with disabilities. Outreach meetings conducted by the MPO included presentations with the Whitehaven Partnership, Westwood Community Center, the Center for Independent Living, and Latino Memphis. These meetings included a presentation on the role of the MPO and the RTP, and a discussion of the major issues the groups experienced with the transportation system. The MPO also solicited feedback from participants via the survey available online and in paper format. The feedback provided demonstrated a strong desire for improvements to the public transportation system through better or expanded bus services, light rail, and park/ride facilities.

### Special Events and Community Meeting Tag-Alongs

Additional outreach was conducted through a series of "Tag-Along" meetings. These included presentations of the RTP process at MemFix, which is a series of local events which showcase a neighborhood and present opportunities possible to "rethink and activate streets and vacant storefronts" in Memphis through good



Above: MPO Transportation Planner Mitchell Lloyd Presents the Livability 2040 Planning process to Latino Memphis on 11/20/14.

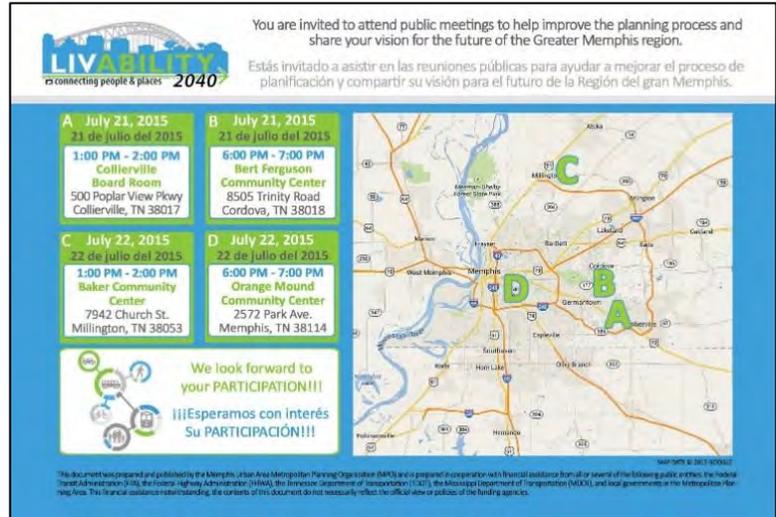
planning and community revitalization. In another example, the MPO also presented at one of the “Pizza with Planners” meetings hosted by Livable Memphis.

**Public Outreach Round 2**

*Meeting Advertisement and Outreach*

Round 2 of the Public Outreach process began in July 2015, with a series of four public meetings at a variety of locations in the Memphis MPO region. The meeting locations were:

1. Collierville Board Room, Collierville, TN (7/21);
2. Bert Ferguson Community Center, Cordova, TN (7/21);
3. Baker Community Center, Millington, TN (7/22); and
4. Orange Mound Community Center, Memphis, TN (7/22).



Half of these meetings were held during the day, and the other half in the evening so as to reach a broader range of citizens.

A campaign was kicked-off to inform the public about these meetings, utilizing email blasts, postcards to residents and businesses within one-half mile of each meeting location, the placement and distribution of posters, and press releases. This campaign was conducted in both English and Spanish.

*Input Meetings*

During this portion of the outreach, the public was briefed on the progress and draft recommendation of the RTP as well as how their participation in the various forms of public engagement helped guide the process. Through the course of the Round 2 meeting presentations, the public was presented with the results of the online survey and *Community Remarks* interactive mapping tool which was utilized to extend discussion beyond the first round of public meetings. This information included feedback on what modes of transportation were used, the driving factors on the decisions behind specific modal choices, and the top issues the public felt were impacting the Memphis MPO region. The specific improvements documented on *Community Remarks* were also noted to the public as having been considered in the plan’s recommendations as potential needs.



Posters were printed and distributed by the MPO in an effort to increase the public’s knowledge of their opportunity to further participate in the RTP process.

The presentation noted the steps undertaken in the analysis portion of the planning process, informing the public of the findings of the study. Summarizing the implications of economics on regional transportation needs, the MPO indicated needs and trends of future growth in the region which would require additional improvements to the transportation infrastructure.

This future growth includes freight development, and the public was provided with information regarding the assumptions about future growth, tying in freight developments and multimodal access to the various land uses in the plan.

Preservation of the existing system, an important factor noted by the public in Round 1, was specifically noted to the public as being a key consideration of the plan. This was presented to the public during the Round 2 meetings along with the discussion of projected revenue and a general breakdown of how projects will be funded.

The presentation of the analysis' key aspects, such as pedestrian and bicycle mobility, freight performance now and in the future, and other topics then led into a discussion of the projects and tradeoffs in funding. An important aspect of the funding breakdown was the tradeoff between various projects based on limited revenues and transportation priorities. Along these lines, the MPO utilized these meetings as a forum by which the public could be educated about funding, as well as the decision-making processes related to various competing interests and the metrics for project evaluation.

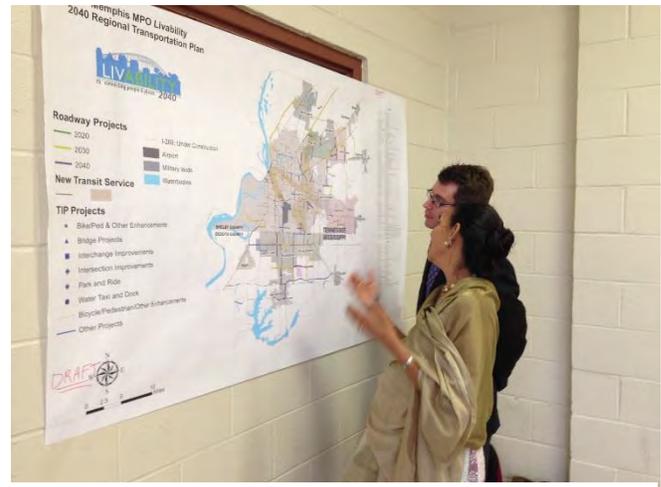
To further transparency in the public engagement process, details of the evaluation metrics, such as safety, land use, and economic viability, along with others, were presented to the audience, allowing them to better understand the relationship between the goals and objectives and the final recommendations.

Feedback from the audience ranged from questions asking to clarify how the planning and funding processes work for the MPO, to specific feedback about additional considerations in the RTP study recommendations. Most of the questions involved funding and project selection procedures or a clarification on the next steps within the study. Comments provided by attendees at these meetings have been documented as part of the minutes for the Round 2 Public Outreach and are included in **Appendix C**.

### Public Outreach Round 3

#### Meeting Advertising and Outreach (Pending)

Outreach for the Round 3 public meetings was conducted in a similar fashion as the previous two rounds. A campaign was kicked-off to inform the public about



Above: MPO Transportation Planner Nicholas Oyler speaks with a member of the public on the Livability 2040 RTP.



Above: After presenting to the audience about the Plan, the presentation went into a question and answer mode. Participants included Mayor Mark H. Luttrell, Jr.

these meetings in November 2015. The MPO utilized email blasts, postcards to residents and businesses within one-half mile of each meeting location, the placement and distribution of posters, and press releases. This campaign was conducted in both English and Spanish.

### Input Meetings

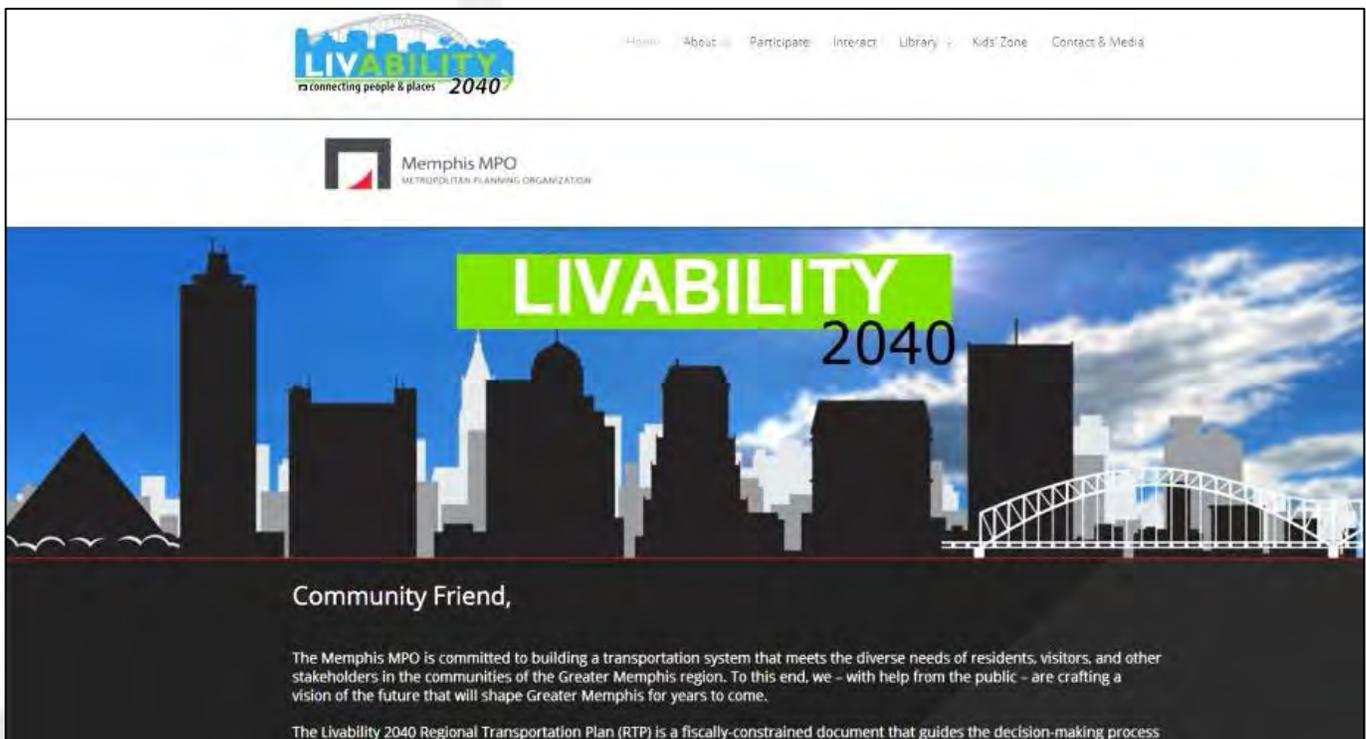
The purpose of the Round 3 meetings was to allow the public a final review of the complete draft plan before its adoption by the MPO's Transportation Policy Board. The presentation during the meetings included a general overview of the plan's development and input received from the public, key findings of the analyses, and themes of the document's recommendations. Attendees also had the opportunity to review the plan's list of projects.

## 2.1.5 Online Outreach

### Dedicated Website

An interactive website ([www.livability2040.com](http://www.livability2040.com)) was launched in August, 2014. With regular updates, the website provided the public with the ability to remain involved in the process, even if they were unable to attend the public meetings. By maintaining an online presence, public engagement was accessible anytime during any day of the week. Comments and suggestions submitted online became part of the official record and forwarded to the appropriate agency for a response. Input received online is included in **Appendix C**.

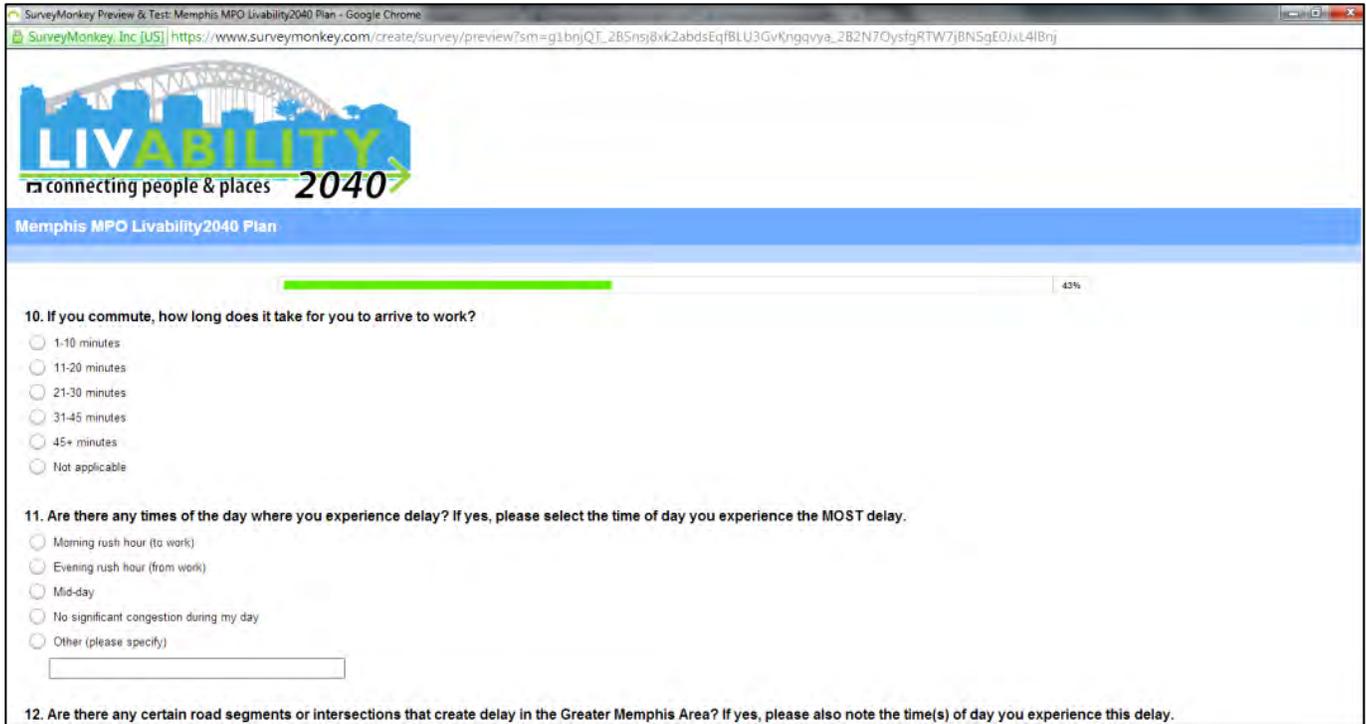
By visiting the website, the public was able to obtain a schedule of upcoming meetings, view details of the study as they emerged, provide feedback via the online survey link as well as provide geo-located comments via *Community Remarks*. In addition, the website included language translation capabilities allowing for increased involvement from non-English or limited English proficiency users.



Above: Livability2040 Homepage: ([www.Livability2040.com](http://www.Livability2040.com)).

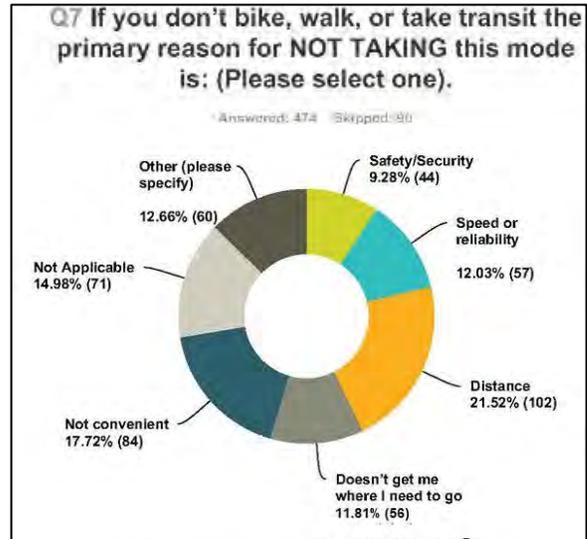
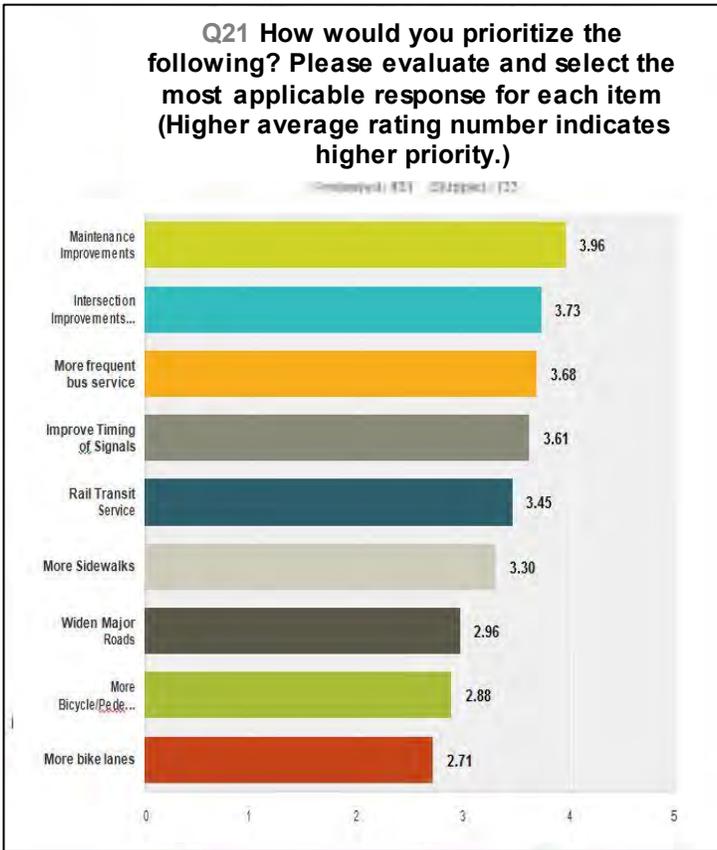
## On-Line Survey

To provide a platform for public feedback as part of the outreach plan, the MPO developed a questionnaire which was available online and also printed for distribution at events. The online survey portion of this outreach, with twenty three (23) questions, was active between September 22, 2014 and October 31, 2014.



Above: Livability2040 Survey posted on Survey Monkey. The survey garnered over 560 responses

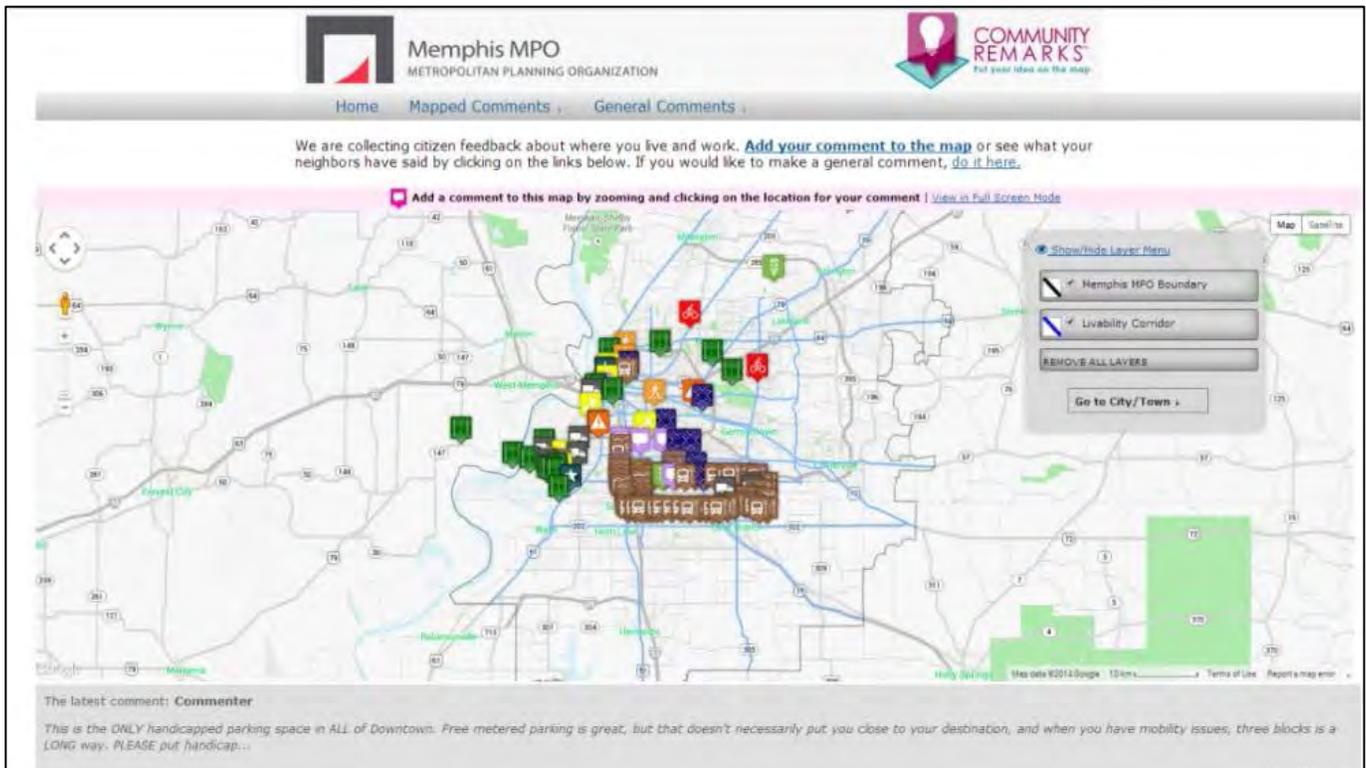
The survey was available online as well as in a printed format at the public meetings and events such as MemFix. Over 560 responses were collected during the survey period. Persons in the age group of 35 to 54 were the largest single component of survey participants (approximately 35 percent), with a lesser but similarly equal distribution in participation among other age groups. While the majority of the respondents surveyed indicated they normally utilized their car, many expressed a desire for improved transit access and reliability. "Better Public Transit" was ranked the most important project type and "New Roads" and "Better Bicycle Routes" being ranked the two least-important types of projects. Survey results are included in **Appendix C** of this document.



Survey results were simplified into easily understood graphics.

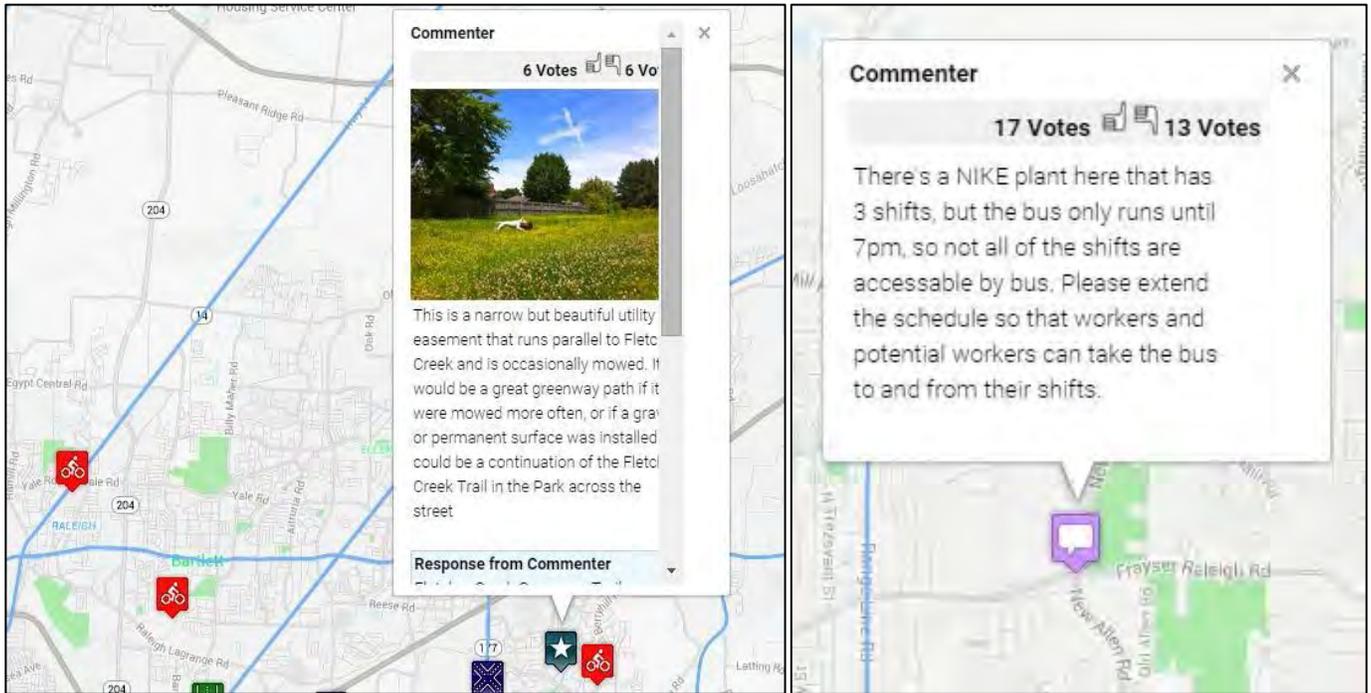
**Community Remarks ([www.communityremarks.com/MemphisMPO](http://www.communityremarks.com/MemphisMPO))**

Community Remarks is an online application where users place location-specific comments on a map, with an option to upload and attach pictures to those comments. This tool was active from September 15<sup>th</sup>, 2014 to February 2<sup>nd</sup>, 2015. Short videos provided instructions on how to use Community Remarks, which received over 100 views. Over 200 original comments were registered, with additional comments to these made by other constituents.



Above: Community Remarks page, with geo-located comments. Over 200 comments were generated from constituents in the region.

More than a third of the comments provided on Community Remarks were categorized as Transit Stop Improvements, indicating a need for transit amenities. Street connectivity was also a major concern. Comments and suggestions submitted online, which were located throughout the Memphis MPO region, were recorded as part of the official record and forwarded to the appropriate agency for a response.



Above: Example Comments from Community Remarks respondents from the greater Memphis MPO area.

### Twitter and Facebook

Public outreach was also conducted via Twitter and Facebook with links to the survey, the public outreach meeting locations, and other aspects of the Livability 2040 plan.



## 2.2 Plan Review and Approval Milestones

---

Livability 2040 has undergone a robust process of review and comment, with comments documented and the plan revised accordingly before being adopted. The review and adoption process has adhered to the following key steps:

- September 8, 2015 – Draft provided to TDOT, MDOT, IAC, and resource agencies for review;
- November 5, 2015 – Revised draft provided to FHWA and public for review; (pending)
- January 28<sup>th</sup>, 2016 – Plan approved by Engineering and Technical Committee (ETC) and adopted by TPB; (pending)
- February 17, 2016 – Final adopted plan submitted for conformity finding from FHWA and FTA, with assistance from EPA (pending); and
- March 30, 2016 – Received conformity finding from FHWA and FTA (pending).

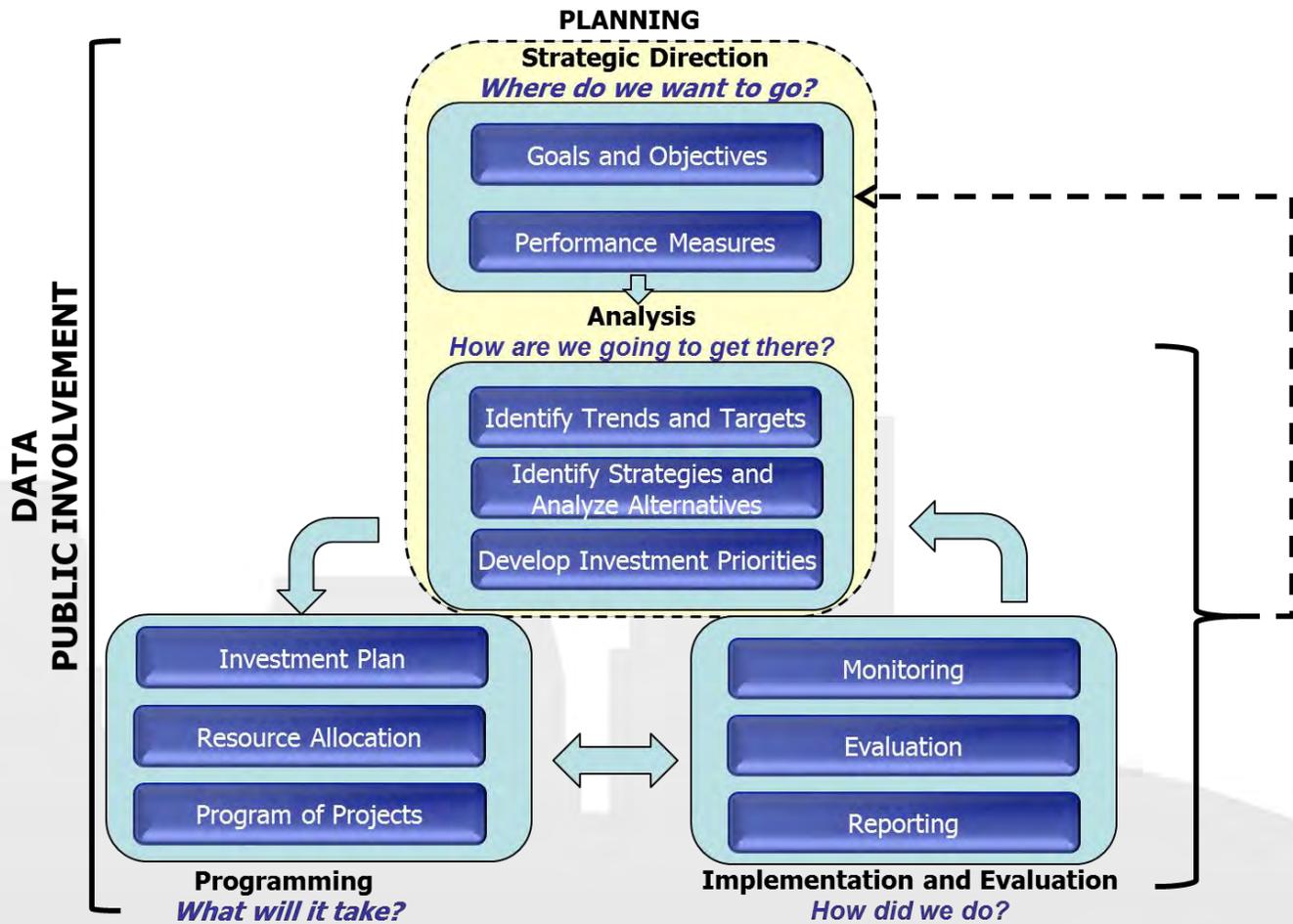
Changes will occur to this document to address comments received during review. All public comments and MPO responses to those comments can be found in **Appendix C**.

# 3.0 Performance-Based Plan Approach

## 3.1 Performance-Based Planning

Performance-based planning is an approach that uses system information to make policy and investment decisions to achieve performance goals. Organizations, particularly in the private sector, have used this approach for years, but it has become more widespread among transportation agencies and the public sector over the last few decades. Agencies and organizations implement performance-based planning in different ways, but overall the literature has coalesced around six key components of performance-based planning at transportation agencies (Figure 3.1). Performance-based planning is considered best practice in developing regional transportation plans, and is now codified into law through the MAP-21 Federal transportation legislation. USDOT's final rulemaking for the performance measures and metropolitan planning stemming from MAP-21 are still pending and the MPO will work with its Federal, State, and transit partners to update the Livability 2040 RTP as necessary.

Figure 3.1 Steps of a Performance-Based Planning Process



Source: FHWA, Performance-Based Planning and Programming Guidebook, September 2013.

**Goals and objectives.** Goals and objectives describe the strategic direction of an agency and a region. These generally stay stable over time, and are only revisited as agency priorities change. Most successful performance-based planning programs start with a small number of goals (broad statement about the end result an agency wants to achieve) and objectives (break-down goals into attainable components and stated in measurable terms) tied to a discrete set of performance measures. MAP-21 delineates national goals, but a region can include additional goals specific to itself. In the development of Livability 2040, goals and objectives were developed based on public and stakeholder outreach, as discussed in Section 2.0, vetted through the RTPAC, and approved by the ETC and TPB.

Linking **performance measures** to an agency's priorities or strategic direction and the availability of high-quality data is critical to successful measurement. Measures track the accomplishment of goals and objectives, and evolve over time as data sources, tools, and the state-of-the-practice advance. Measures can be at the project or plan level. Criteria for selecting good measures include ability to calculate, policy sensitivity, and understandability. Performance measures were developed for Livability 2040 by adhering to these best practices and linking back to the goals and objectives.

A continuous cycle of **target setting, resource allocation, and performance monitoring** links goals and measures to specific policy and investment decisions. This process includes evaluating alternative policies, programs, and projects to assess the likely performance impacts of different strategies and funding scenarios. How much money should an agency spend on various programs or on specific projects? How do these decisions impact current or future performance? Section 7 describes the evaluation methodology for resource allocation utilized for Livability 2040.

**Tracking actual performance results**, comparing actual results to expectations to help evaluate the effectiveness of programs and projects, and providing performance information to internal and external audiences are critical to maintain accountability and drive better decision-making. As a result of MAP-21, Federal requirements will be set in the future for performance reporting for the MPO and the States.

All elements of the process should be supported by **quality data** – bad data will lead to badly informed decisions and can be worse than having no data, since it may lead internal and external audiences to question the value of performance-based planning. In the Memphis MPO region, these data (and tools) include recent travel surveys, the travel demand model, and State and national level datasets on freight movement and road and bridge condition, for example.

## 3.2 Livability 2040 Performance Framework

Livability 2040 goals and objectives were developed based on extensive outreach conducted in the fall of 2014 (documented in Section 2.0), as well as best practices from around the country and Federal guidance.

Much of the public input received during initial outreach efforts was very consistent in relation to investment goals for the Memphis MPO region. Several key themes were repeated and focused around investments to improve the condition, quality and efficiency of the EXISTING transportation system. This input was consistent regardless of the jurisdiction or demographic providing feedback. These themes orient very much towards the *user experience* of the current transportation system and were almost universally voiced through the outreach efforts. While these themes were largely consistent, initial input on how to address these challenges varied. A spectrum of potential investment strategies was discussed, either through public outreach or through the outcomes and recommendations of key studies. Strategies were often discussed from a perspective of advancing either regional mobility or local livability considerations, but not both. A general summary of this input can be categorized into mobility and livability issues.

From a mobility perspective, traffic flow to, from, and within the region is essential if the Memphis MPO region is to maintain a competitive economic advantage, in particular as it relates to the movement of freight and goods. This

implies the need for major road and intermodal improvements. At the same time, jobs are decentralizing to areas where non-motorized transportation is very difficult. Improvements are needed to ensure the multimodal mobility of the region's workforce to avoid negative economic ramifications, and to avoid exacerbating a fast-growing economic gap.

From a livability perspective, though the region depends heavily on the freight sector to provide employment opportunities and for economic success, it is crucial to achieve compatibility between those activities and neighborhood quality of life. More efficient and more rapid freight movement generally means faster travel times but must be balanced with non-motorized transportation in a context sensitive manner, as residents have indicated a need for these additional transportation options. This is consistent with the region's definition of livability as "supporting and enhancing communities with more affordable and reliable transportation choices that provide access to employment, education, and other basic needs."

*Understanding the existing (and desired) form and function of a roadway will be critical to advancing both mobility and livability objectives.*

This feedback gathered through the public outreach activities (documented in Section 2.0) was used to shape the goals and objectives for Livability 2040 and served as the foundation for the performance-based planning approach. The performance framework developed for the Livability 2040 RTP was specifically designed to support an investment decision-making process that effectively and fairly navigates these types of regional mobility and local livability tradeoffs, while being compliant with proposed MAP-21 Federal rules, thereby supporting the national transportation system as well. To operationalize this approach within the performance framework, a set of five investment context types was defined to infuse land use context and a sense of investment "scale" into the plan development process. This scale supports livability considerations at the community level without impeding mobility considerations at regional level. It helps support more targeted investment decisions that better match a broad range of transportation solutions to a broad range of transportation needs.

Based on input from the RTPAC, the following investment contexts were applied within the performance framework to help balance consideration of regional and local needs. Potential projects were assigned to a context based on their function within the region and then evaluated by criteria tailored to reflect the appropriate balance between livability and mobility:

1. **Interregional** – Investments aligned with big-ticket capital or maintenance needs to ensure the region is well connected within the state and the nation to maintain regional economic competitiveness. Investments support interstate mobility, intermodal connections, and freight/logistics hubs.
2. **Regional Centers** – Investments support strategic connections between regional activity and economic centers through improved mobility and travel time reliability on corridor connections to key centers and last-mile connectivity to ensure effective access to a regional system.



**3. Town Centers** – Investments support economically viable and thriving community centers; specifically, redevelopment opportunities, multimodal connections and access to a mix of business, retail and residential uses



**4. Neighborhood Communities** – Investments support healthy, thriving communities through improved system operations and multimodal access to community resources within primarily residential areas.



**5. Undeveloped** – Investment strategies that protect and preserve undeveloped or environmentally sensitive areas.



A set of systems and project-level performance measures was established across a broad set of performance categories aligning with Livability 2040 goals and objectives including: system preservation, congestion reduction, economic growth/freight movement, environmental sustainability, reliability, and safety and security (**Table 3.1**). These categories also align with national transportation goals established in MAP-21, with input provided by the public, and with direction provided by the RTPAC. Detail on performance evaluation criteria and the project evaluation process applied for Livability 2040 is provided in Section 7.0. The Memphis MPO continues to await further Federal guidance on target setting for corresponding performance measures; however, target-setting for bridge and pavement condition, under the first goal in Table 3.1, is described in Section 7.0.

The Livability 2040 Performance Framework, inclusive of goals/objectives and performance metrics for systems and project level evaluation, was reviewed by the RTPAC in November 2014, with modifications before moving forward to the Memphis MPO's ETC. The Goals and Objectives were approved by the ETC on November 6, 2014, and were approved by the Memphis MPO's Transportation Policy Board (TPB) on November 20, 2014.

**Table 3.1 Livability 2040 Goals, Objectives, and Performance Measures**

MAP-21 National Goal	Direction 2040 Planning Emphasis Area	Livability 2040 Planning Emphasis Area	Livability 2040 Goal	Livability 2040 Objectives <sup>1</sup>	System-Level Performance Measures	Project Level Performance Measures
Infrastructure Condition	Maintenance	Condition	<b>Goal 1.</b> Maintain existing transportation assets and infrastructure	<p><b>Objective 1.1</b> Maintain existing assets as a priority, before system expansion is considered</p> <p><b>Objective 1.2</b> Prioritize strategies to better manage travel demand on existing infrastructure before adding new infrastructure</p> <p><b>Objective 1.3</b> Promote construction/maintenance techniques, materials and practices that minimize maintenance needs over the plan horizon</p>	<p>Pavement: Percent Lane Miles in Good/Fair Condition, National Highway System, NHS<sup>2</sup></p> <p>Bridge: Percent Deck Area Non-Structurally Deficient<sup>2</sup></p>	NA – Ensuring the adequate maintenance of existing infrastructure as a priority will be addressed through a network level analysis of pavement and bridge maintenance needs over the plan horizon. This analysis will define a system maintenance funding level that will be set aside to support maintenance needs as they are identified and prioritized by local jurisdictions and the TDOT/MDOT.
Safety	Safety	Quality	<b>Goal 2.</b> Increase the safety and security of the transportation system for all users	<p><b>Objective 2.1</b> Support projects that address an existing, identified safety or security need</p> <p><b>Objective 2.2</b> Support projects, programs and policies that advance safe and secure travel over the plan horizon</p> <p><b>Objective 2.3</b> Initiate crash data management system to improve data collection, safety analysis, and performance reporting</p>	Reduction in Number and Rate of Fatal and Serious Crashes <sup>2</sup>	Project is on corridor of safety concern and includes countermeasure(s) to address RTP Safety Emphasis Area  Project Addresses Security or Emergency Response Need

MAP-21 National Goal	Direction 2040 Planning Emphasis Area	Livability 2040 Planning Emphasis Area	Livability 2040 Goal	Livability 2040 Objectives <sup>1</sup>	System-Level Performance Measures	Project Level Performance Measures
Environmental Sustainability	Environment		<b>Goal 3.</b> Minimize adverse impacts of transportation investment on the (social, natural, historic) environment and improve public health.	<b>Objective 3.1</b> Provide multimodal, active transportation options that reduce vehicle miles travelled and air pollution and improve public health <b>Objective 3.2</b> Preserve and protect natural resources <b>Objective 3.3</b> Support integrated and expanded greenway/multiuse plans	VMT/Capita Air Pollutant Emissions <sup>2</sup> Land Preserved	VMT reduction Project requires minimal right of way or land acquisition
	Land Use		<b>Goal 4.</b> Advance corridor and community redevelopment opportunities to improve economic development and quality of life	<b>Objective 4.1</b> Encourage context sensitive solutions derived from integrated transportation/land use planning efforts <b>Objective 4.2</b> Support complete streets implementation (on regional livability corridors) <b>Objective 4.3</b> Encourage access management planning and design to maintain minimum level of service (on regional mobility corridors) <b>Objective 4.4</b> Identify and mitigate freight/residential community conflict	Number of projects identified through integrated planning effort (transportation/land use/economic development)	Project is in keeping with community priorities Project supports community or corridor redevelopment
Economic Vitality/ Freight Movement	Economic Vitality	Efficiency	<b>Goal 5.</b> Ensure the region is well positioned to remain a leader in global logistics and freight movement	<b>Objective 5.1</b> Reduce truck delay on critical freight corridors and within key freight hubs <b>Objective 5.2</b> Reduce intermodal conflict and delay <b>Objective 5.3</b> Advance an Airport/Aerotropolis Traffic Management Authority (TMA)	Annual Truck Hours Delay (Interstate System) <sup>2</sup>	Truck Hours Delay Reduced •Freight Corridor •Freight hub/intermodal facility

MAP-21 National Goal	Direction 2040 Planning Emphasis Area	Livability 2040 Planning Emphasis Area	Livability 2040 Goal	Livability 2040 Objectives <sup>1</sup>	System-Level Performance Measures	Project Level Performance Measures
	Mobility/ Accessibility		<b>Goal 6.</b> Improve multimodal access to community and employment resources	<b>Objective 6.1</b> Improve bicycle and pedestrian access to educational, health, and recreational opportunities <b>Objective 6.2</b> Expand transit service to unserved regional employment markets <b>Objective 6.3</b> Focus complete streets upgrades in underserved regional markets with latent demand <b>Objective 6.4</b> Expand rural human services transportation services into areas not currently served <b>Objective 6.5</b> Improve system access for all system users <b>Objective 6.6</b> Advance Travel Demand Management (TDM) strategies so support last mile connections for key employment origins and destination	Bicycle and Pedestrian Mileage (New Infrastructure, Total System)  Population, Employment Served by Transit  Mode Split	Project fills gap in, or expands, multimodal system • Access to community resources • Addresses last mile connectivity for employment origin/destination Project enhances transit ridership
Congestion Reduction  System Reliability	Congestion		<b>Goal 7.</b> Reduce travel delay for people and goods	<b>Objective 7.1</b> Address critical highway bottlenecks as a priority <b>Objective 7.2</b> Focus capacity investment on corridor connections to regional employment centers <b>Objective 7.3</b> Improve system operations through technology applications	Annual Congestion Costs, Trucks/Auto  Annual Vehicle Hours Delay National Highway System (NHS) <sup>2</sup>	Vehicles Hours Delay Reduced • Corridor connection to employment center
Project Delivery	Collaboration Funding	Addressed via agency business practice				

<sup>1</sup> Objectives and corresponding performance measures may support more than one goal area.

<sup>2</sup> Proposed/expected MAP-21 systems level performance measure.

## 4.0 System Conditions and Investment Needs

An analysis of existing and future transportation system needs was conducted as part of the Livability 2040 Regional Transportation Plan development. The analysis included an evaluation of existing and future conditions of the transportation system in the Memphis Urban Area Metropolitan Planning Organization (MPO) region. This analysis was used to identify and evaluate potential transportation investment strategies:

- Section 5.0 describes how the results from Section 4 were used to formulate additional project concepts that could be evaluated through the performance-based process outlined in Section 7;
- Section 7.0 describes how the Section 4 conditions analysis supports the project evaluation process; and
- Section 8.0 then lists the prioritized, fiscally constrained set of project recommendations.

The analysis focused on a number of planning emphasis areas that align with the Livability 2040 Regional Transportation Plan (RTP) goals and objectives<sup>3</sup> to include: roadway conditions for pavement and bridge; roadway performance in terms of congestion, safety/security, and freight movement; multimodal mobility; and multimodal access and connectivity for transportation disadvantaged communities. A complete list of the Goals and Objectives can be found in Chapter 1.0 Introduction of this document. A Mobility and Livability Corridor Assessment was also conducted as part of the needs analysis to define investment needs and investment strategies for a sample of strategic corridors in the region based on the desired mobility or livability function of the corridor.

The overarching themes resulting from the needs analysis, across the various areas evaluated include:

- Preservation of existing infrastructure is important to the region: the roadway system performs well today, but will deteriorate below acceptable levels without additional funding;
- The distribution of population (including transportation disadvantaged populations) and employment is changing in the region; there is a need to better align transportation services to changing travel patterns and travel needs;
- There are significant opportunities to advance multimodal options in the region; investment should be targeted to focus less on how much the system is expanded and more on how the system is connected and enhanced to ensure safe and comfortable travel for all system users; and
- Freight logistics and goods movement is key to the region; there is a need to focus on removing barriers to freight movement and related development.

<sup>3</sup> Livability 2040 RTP goals and objectives were adopted by the Memphis MPO Transportation Planning Board in November 2014.

Each of these themes is described in greater detail in the following sections. A brief summary of some of the key specific needs or gaps is provided in **Table 4.1**.

**Table 4.1 Summary of Key Needs and Gaps**

Topic	Selected Needs/Gaps
Roadway preservation	84% of NHS pavement good or fair; \$74-\$110 million/year to maintain or improve over 40 years
Bridge preservation	92% of NHS bridge deck area non-structurally deficient; \$18.5 - \$33 million/year to meet MAP-21 requirements, maintain, or improve over 40 years
Roadway congestion	<p>Most congested segments currently include:</p> <ul style="list-style-type: none"> <li>• I-240 in Shelby County, particularly at I-40 and SR-385;</li> <li>• I-40 northeast of I-240 in Shelby County;</li> <li>• SR-385 southeast of I-240 in Shelby County;</li> <li>• Lamar Avenue in Shelby County;</li> <li>• I-55 in Shelby and Desoto County; and</li> <li>• Several arterial roadways in Shelby County east of I-240.</li> </ul> <p>By 2040, additional segments include:</p> <ul style="list-style-type: none"> <li>• US-78/Lamar Avenue;</li> <li>• Several arterial roadways in southern Shelby County/northern Desoto County; and</li> <li>• Several arterial roadways near Bartlett, TN northeast of I-240</li> </ul>
Safety/Security	<p>Higher crash rates at intersections and involving vulnerable road users.</p> <p>High crash corridors include:</p> <ul style="list-style-type: none"> <li>• US 72 / Poplar Avenue;</li> <li>• MS 302 /Goodman Road;</li> <li>• Winchester Road;</li> <li>• US 78 / Lamar Avenue;</li> <li>• TN 177 / Germantown Parkway;</li> <li>• Airways Boulevard; and</li> <li>• Hacks Cross Road.</li> </ul>
Multimodal mobility/access	<p><b>Transit</b></p> <p>Connections to major employment centers, particularly from population centers and major EJ populations</p> <p>North-south connectivity</p> <p>Access for large EJ populations outside MATA's service area, including Lakeland, Gallaway, Braden, east of Millington, less urbanized portions of east central Shelby County, Horn Lake, Lynchburg, and Marshall County west of Cayce Road</p>

Topic	Selected Needs/Gaps
	<p><b>Bicycle</b></p> <p>Only 1/3 of bicyclists feel safe, and most prefer separate paths/protected lanes Links to more densely populated areas such as Southaven, Horn Lake and Olive Branch.</p> <p>Marshall County portion of the MPO lacks formal bicycle infrastructure to serve the EJ communities</p> <p><b>Pedestrian</b></p> <p>Whitehaven, the Raleigh community, Bartlett, Germantown, the Capleville community, Lakeland, Gallaway, and Braden have portions with limited or no pedestrian infrastructure</p>
Freight movement	<p>49% growth in cargo volumes by 2040, with increased activity in all modes. Truck movements projected to increase by 79%, with key corridors including Lamar Avenue, Holmes Road, and the overall interstate system (I-40, I-55, and future I-69/269)</p> <p>Last mile connectivity to intermodal facilities, particularly port and airport</p>
Mobility/livability corridors and complete streets	<p>Raleigh-Millington, Bartlett-Braden, and Olive Branch-Walls corridors have limited congestion (i.e., not a commute-oriented corridor), town center connections, and redundant (parallel) capacity; may benefit from complete streets improvements</p>



## 4.1 Roadway Preservation

### 4.1.1 Pavement

Roadway pavement condition in the Memphis MPO region was determined using the latest available, complete (2008) Highway Performance Monitoring System (HPMS) data submitted by Mississippi Department of Transportation (MDOT) and Tennessee Department of Transportation (TDOT) to the Federal Highway Administration (FHWA). The HPMS is a national-level highway information system that includes data on the extent, condition, performance, use and operating characteristics of the nation's highways. HPMS data is sample data, collected across the entire Federal-aid eligible system, for Interstate, arterial, and collector networks.



Above: Maintaining the existing roadway network in the Memphis region.

Pavement condition is reported as percent of lane-miles in good/fair/poor condition based on the International Roughness Index (IRI), consistent with the expected pavement condition performance metric to be required via the Moving Ahead for Progress in the 21<sup>st</sup> Century Act (MAP-21). The following definitions are used:

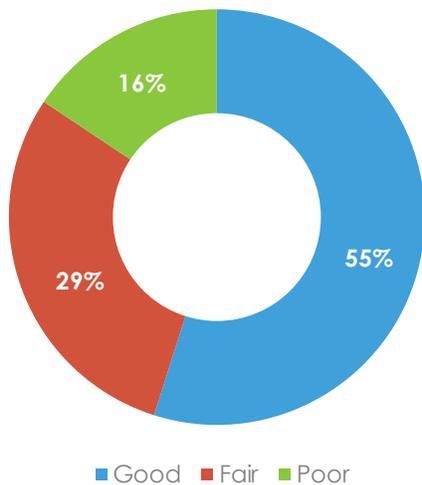
- Good Condition: IRI<95;
- Fair Condition: IRI between 95 and 170, inclusive; and
- Poor Condition: IRI>170.

The NHS in the Memphis MPO region consists of 2,048 lane-miles, which are mainly on interstates and principal arterials with a small amount of mileage on lower road types (**Figure 4.1**). Out of these 2,048 lane-miles on the NHS, 55 percent are in good condition, 29 percent are in fair condition; and 16 percent are in poor condition (**Figure 4.2**), for a total of 84 percent of the system in good/fair condition. Because HPMS is sample data, these results are presented as network-level summaries.

Figure 4.1 National Highway System in Memphis MPO Region



**Figure 4.2 Pavement Network Existing Conditions**



Source: Analysis of 2008 HPMS data.

Future pavement network condition was forecast using FHWA's state version of the Highway Economic Requirements System (HERS-ST). HERS-ST is a computer model used to estimate investment requirements for pavement preservation and system expansion, and to evaluate alternative highway investment levels based on performance objectives. HERS-ST is designed to minimize maintenance costs by generating an optimal set of preservation actions based on life-cycle user and agency costs, and engineering standards of maintenance needs.

For this analysis, the region was divided into three subparts: the Memphis MPO region as a whole, the Tennessee portion of the region, and the Mississippi portion of the region. For each of the three subparts, the NHS and Interstate System (as a subset of the NHS) future pavement needs were assessed separately.

HERS-ST estimates that an average annual investment equivalent to \$110 million per year (2014 dollars) is required to achieve the maximum performance level at which maintenance needs are cost-effectively addressed for the MPO region. To maintain the current network condition of the NHS through 2040, an annual investment equivalent to \$74 million (2014 dollars) is necessary.

Additional information regarding funding requirements to maintain current network conditions in the Tennessee and Mississippi portions of the MPO is available in Appendix D. Also included in the appendix are performance curves displaying the estimated percent of pavement in fair or better condition relative to different annual funding levels.

### 4.1.2 Bridge

Inventory and condition data for bridges in the Memphis MPO region were assembled from the 2013 National Bridge Inventory (NBI) data submitted by TDOT and MDOT to FHWA as part of their requirements for the National Bridge Inspection Standards.

Currently, there are 1,435 structures in the Memphis MPO region. Of these, 1,026 are bridges and the remaining 409 are culverts at or exceeding 20 feet in length (a requirement for inclusion in the NBI database). It is important to note that the existing condition assessment and future needs in this section pertain to bridges only. Of the 1,026 bridges in the Memphis MPO region, the majority are owned and maintained by TDOT (457 bridges), along with local agencies (437 bridges), while MDOT owns and maintains a smaller portion (123 bridges), as shown in **Figure 4.3**.

Per Federal inspection standards, bridges are assigned a deficiency status based on structural assessments and ratings of the physical condition of key bridge components:

- **Structurally Deficient** – Bridges are considered structurally deficient if significant load carrying elements are found to be in poor condition due to deterioration and/or damage. A structurally deficient bridge requires



Above: Bridge maintenance is critical for maintaining the region's connectivity

significant maintenance and repairs to remain in service. The classification of a bridge as “structurally deficient” does not imply that it is unsafe for travel.

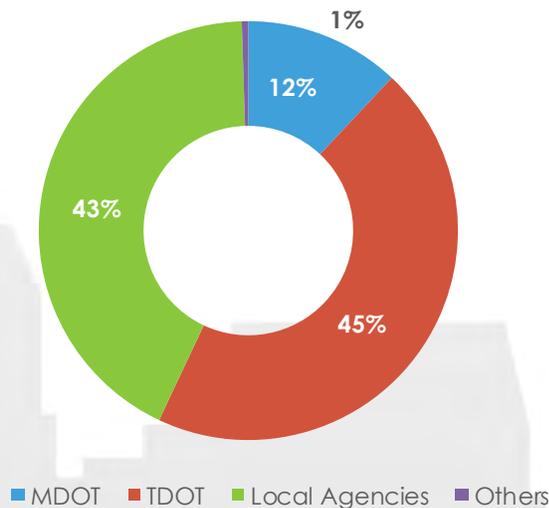
- **Functionally Obsolete** – Describes a bridge that, by design, is no longer functionally adequate for its purposes (for example, due to lack of compliance with current bridge design standards, clearance, or lane width constraints), although the bridge may be structurally sound.
- **Not Deficient** – Bridges that are neither structurally deficient nor functionally obsolete.

Of the 1,026 bridges in the Memphis MPO region, 8 percent are structurally deficient, 23 percent are functionally obsolete, and 69 percent are not deficient (Figures 4.4 and 4.5).

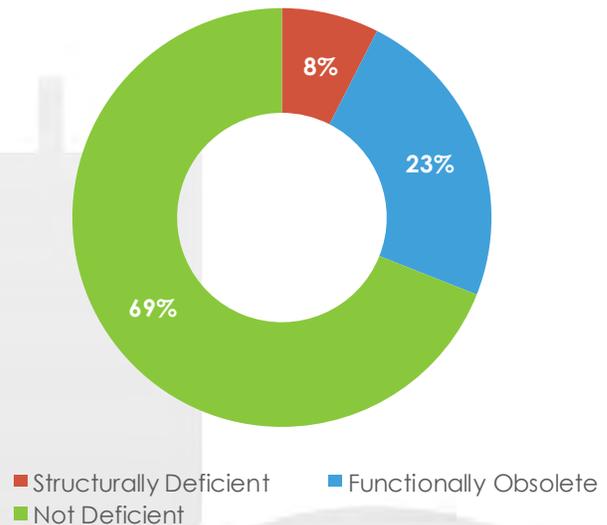
As of 2014, the average age of the bridges in the Memphis MPO region was 38 years. Thirty-two percent of the existing bridges currently exceed the 50-year average design life of bridges. By 2040, 67 percent of the bridges will exceed their average design life, implying a potentially large increase in structurally deficient bridges over the next 25 years.

Bridge funding needs were estimated based on the annual budget required to maintain the same percentage of non-structurally deficient deck area as exists today through 2040, and the annual budget required to achieve maximum bridge performance through 2040. FHWA's National Bridge Investment Allocation System (NBIAS) tool was used to forecast future bridge condition under different annual budget levels in order to determine the minimum budget required to maintain existing conditions or optimize bridge performance for all years in the study horizon. NBIAS is designed to minimize maintenance costs by generating the optimal set of preservation actions for bridge elements based on life-cycle user and agency costs and engineering standards of bridge maintenance needs. Funding needs for four classifications of bridges were estimated: all bridges on the NHS, interstate bridges (subset of NHS bridges), NHS non-interstate bridges, and non-NHS bridges.

**Figure 4.3 Bridges by Ownership**

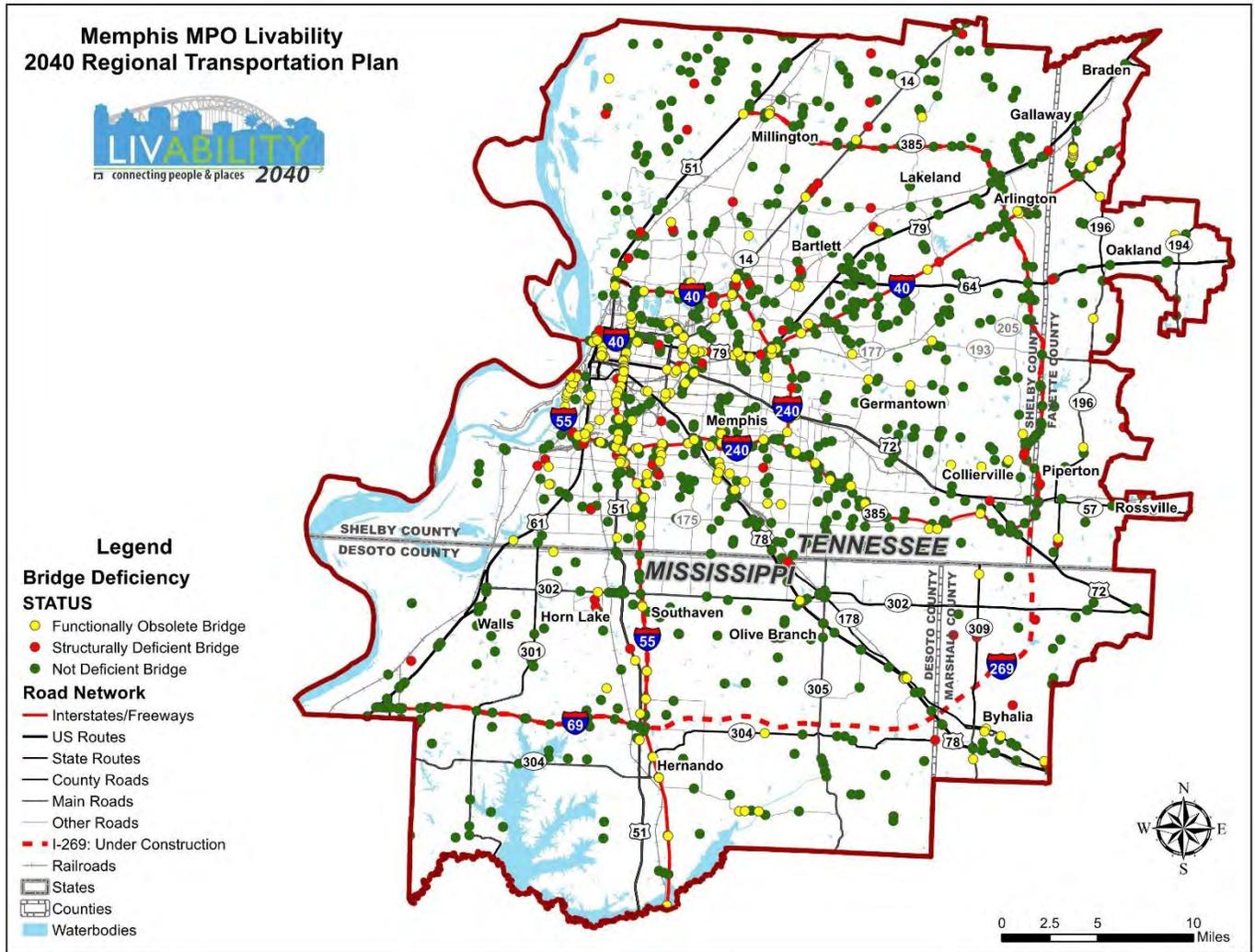


**Figure 4.4 Existing Bridge Deficiency Status**



Source: Cambridge Systematics (CS) analysis of 2013 National Bridge Inventory.

Figure 4.5 Map of Existing Bridge Deficiency Status



Source: Cambridge Systematics analysis of 2013 National Bridge Inventory.

The current performance of these four classifications as well as the estimated annual funding required to maintain, exceed, or met MAP-21 requirements is shown in **Table 4.2**. Approximately six percent of the bridges on the NHS network are structurally deficient; this meets the minimum bridge condition threshold established under MAP-21 of not more than 10 percent structurally deficient deck area on NHS bridges. To maintain this condition, \$22 million is required annually for all bridges on the NHS. To meet the minimum Federal requirement, \$18.5 million is required annually and \$35 million is needed to reach maximum performance.

**Table 4.2 Current Bridge Performance and Annual Funding Needed**

Bridge Classification	Current Percent Deck Area Structurally Deficient	Annual Funding Needed (2014 Dollars, in Millions)		
		Maintain Current Performance	Maximum Performance	MAP-21 Requirements
All Bridges on NHS	6%	\$22	\$35	\$18.5
Interstate Bridges	5%	\$8.6	\$12	\$7.8
Non-Interstate Bridges on NHS	6%	\$18	\$30	\$14
Non-NHS Bridges	11%	\$10.6	\$16	N/A

Note: No MAP-21 target is expected for non-NHS bridges.  
 Source: Cambridge Systematics analysis of 2013 National Bridge Inventory.

Performance curves displaying the estimated percentage of the deck area structurally deficient relative to different annual funding levels is available in Appendix D.

## 4.2 Roadway Congestion

Roadway congestion occurs regularly on numerous roads in the region as traffic approaches and exceeds the roadway’s carrying capacity. Roadway congestion has significant implications for employee commute travel time, efficient freight and goods movement in and through the region, and overall quality of life for the residents of the Memphis MPO region; all factors that can directly impact overall economic and community stability.

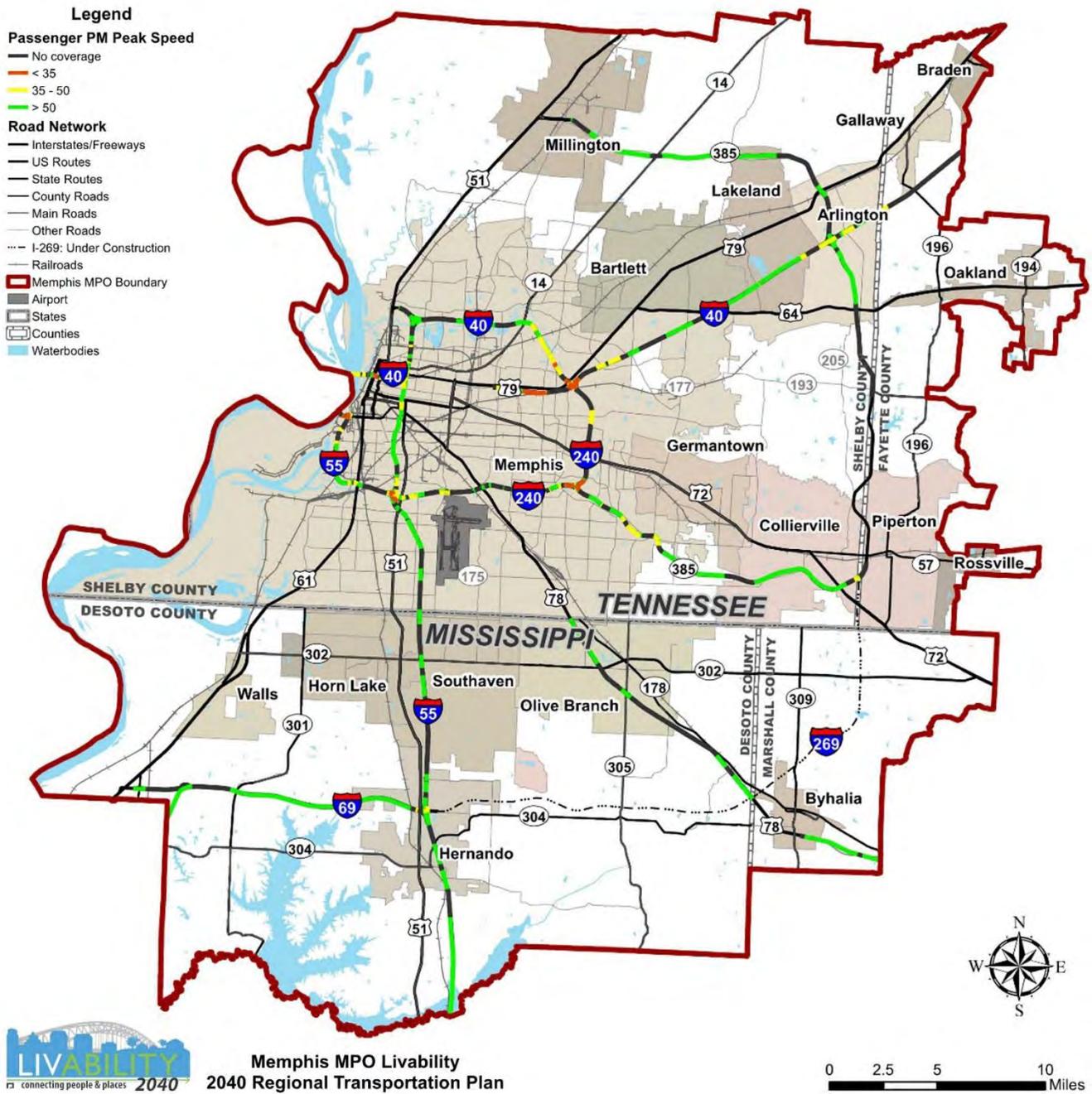


Above: Roadway congestion has been identified at several key hotspots around the Memphis region.

### Existing Congested Conditions

Two data sources are used to examine existing congestion: a Federal Highway Administration (FHWA) dataset and the Memphis MPO Travel Demand Model. The FHWA National Performance Management Research Data Set (NPMRDS) travel time dataset is newly available to transportation agencies as a result of recent MAP-21 performance monitoring requirements established at the Federal level. It is a vehicle probed-based travel time data set collected on the NHS, providing a very valuable and empirical method of measuring and identifying congested facilities and hot spots. **Figure 4.6** presents a snapshot of existing roadway congestion, based on roadway speeds, in the Memphis MPO region for auto travel as derived from NPRMDS data.

**Figure 4.6 Existing Congestion in Memphis MPO Region, Year 2013**



Source: Cambridge Systematics analysis of FHWA National Performance Research Dataset (NPRMDS)

Current congestion hot spots according to the FHWA dataset include:

- I-240 at SR 385;<sup>4</sup> and
- I-40 at I-240.<sup>4</sup>

The Memphis MPO's Travel Demand Model was also used to define areas of existing, as well as projected, congestion. **Figure 4.7** illustrates estimated congestion levels derived from the regional travel model for its base year 2010. These data are validated against actual existing conditions, but as an estimate may vary from Figure 4.5; however, as the model covers much more of the regional roadway network, it paints a broader picture of relative congestion in the region. The travel demand model produces congestion levels for four weekday time periods – AM Peak (6:00 a.m. to 9:00 a.m.), Mid-day (9:00 a.m. to 3:00 p.m.), PM Peak (3:00 p.m. to 7:00 p.m.), and Overnight (7:00 p.m. to 6:00 a.m.). The AM peak is represented here as an illustration of the worst-case congested conditions.

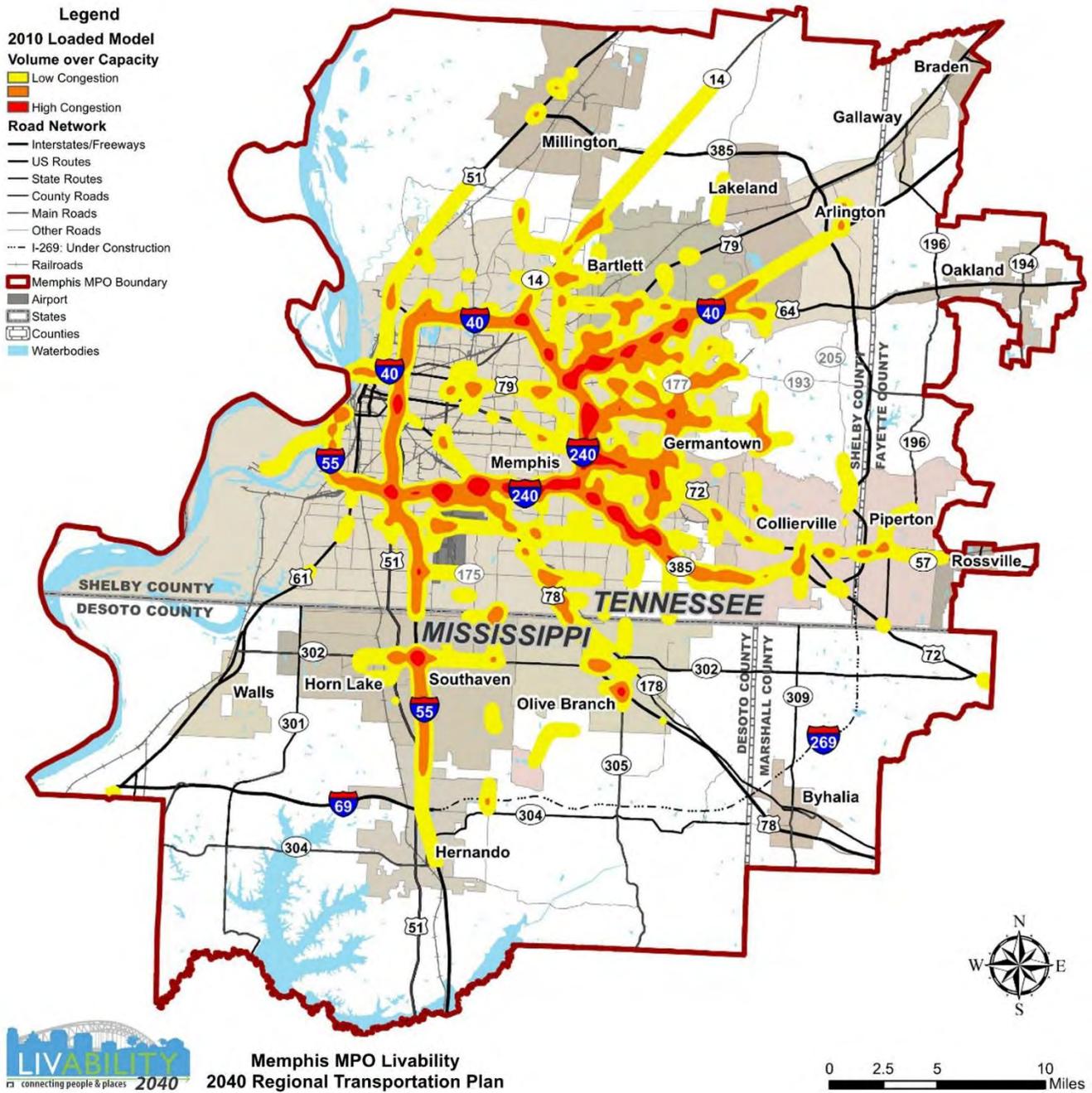
Current congestion hot spots according to the travel demand model, as shown in **Figure 4.7**, include:

- I-240 in Shelby County;
- I-40 northeast of I-240 in Shelby County;
- SR-385 southeast of I-240 in Shelby County;
- Lamar Avenue in Shelby County;
- I-55 in Shelby and Desoto County; and
- Several arterial roadways in Shelby County east of I-240.

---

<sup>4</sup> Note: Recent construction in this area may be contributing to congestion.

**Figure 4.7 Base Year (2010) Congestion, Memphis MPO Travel Demand Model**



Source: Memphis MPO Travel Demand Model

## 4.2.1 Future Congested Conditions

### Population and Employment Growth

As part of Livability 2040, the Memphis MPO’s land use model was updated for use in allocating forecasted population and employment growth in the region. A Planning and Land Use Advisory Committee (PLAC) was formed to guide the development of the land use model, and was made up of local planning and engineering professionals. The PLAC met three times during the development of the land use model and help a joint workshop with the ETC to provide feedback on future population and employment projections. The land use model takes base year and future year control totals for regional population and employment and allocates them across traffic analysis zones (TAZ) based on a number of factors including carrying capacity and land suitability. The base year control totals for population and employment are based on recent 2010 Census data and 2014 Infogroup data respectively. The future year control totals for both population and employment are based on a combination of base year data and TDOT county-level forecasts for population and employment. The resulting future year control totals were vetted through the MPO’s PLAC and ETC as part of a workshop dedicated to the land use model update, and adjustments were made based on feedback from the workshop. The allocated population and employment by TAZ predicted by the land use model are used as input to the the travel demand model. Additional information on the methodology used to develop base and projected population and employment in the region can be found in Appendix B, Section 3.1 and in the March 2015 report entitled “Memphis MPO Land Use Model Update,” which is available on the Memphis MPO website.<sup>5</sup>

The results of the population and employment projections show that the Memphis MPO region is expected to experience moderate growth over the plan horizon. As shown in **Table 4.3**, the socioeconomic projections being used for the travel demand model show about 34 percent growth in employment, 19 percent growth in total households, and 23 percent growth in total population between 2010 and 2040. **Figure 4.8** and **Figure 4.9** show employment density in employees per square mile for 2010 and 2040, respectively. In general, the trend for employment growth shows increasing densities around current employment centers, such as those in Midtown and Downtown Memphis, with continued decentralization of employment activity near the Memphis International Airport and along regional corridors such as Lamar Avenue and along I-40 heading to the northeast. **Figure 4.10** and **Figure 4.11** show population density in persons per square mile for 2010 and 2040, respectively.

**Table 4.3 Socioeconomic Data from Travel Demand Model**

Memphis MPO Region	Total Employment	Total Households	Total Population
2010	638,082	491,198	1,316,100
2020	733,292	526,353	1,431,429
2030	846,484	564,823	1,561,824
2040	970,635	606,331	1,701,986
Percent Change 2010 to 2040	34.26%	18.99%	22.67%

Source: Memphis MPO travel demand model.

<sup>5</sup> [http://www.memphismpo.org/sites/default/files/public/01%20-%20Memphis\\_LUM\\_MDR\\_03-23-2015.pdf](http://www.memphismpo.org/sites/default/files/public/01%20-%20Memphis_LUM_MDR_03-23-2015.pdf).

Figure 4.8 2010 Employment Density

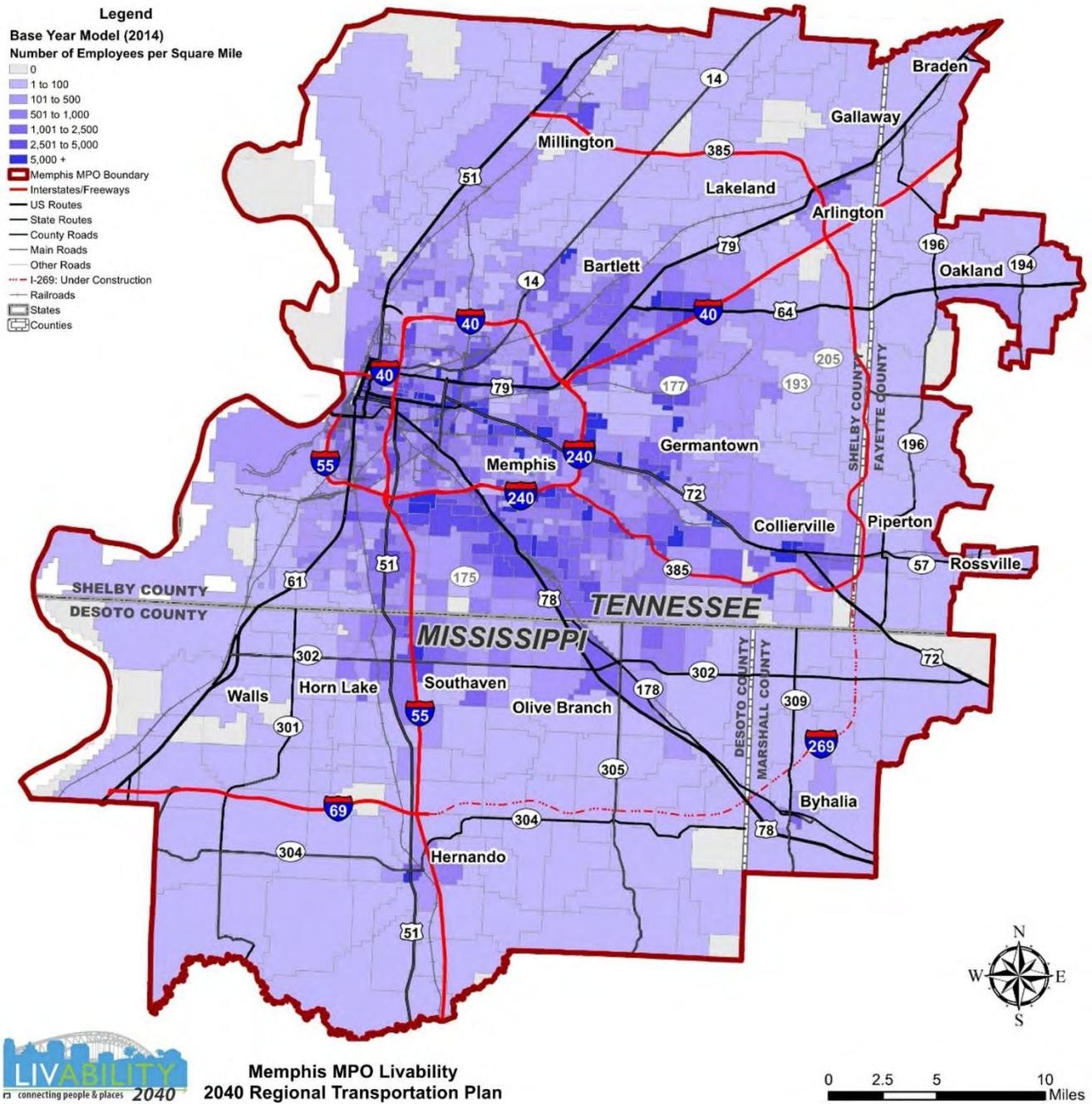


Figure 4.9 2040 Employment Density

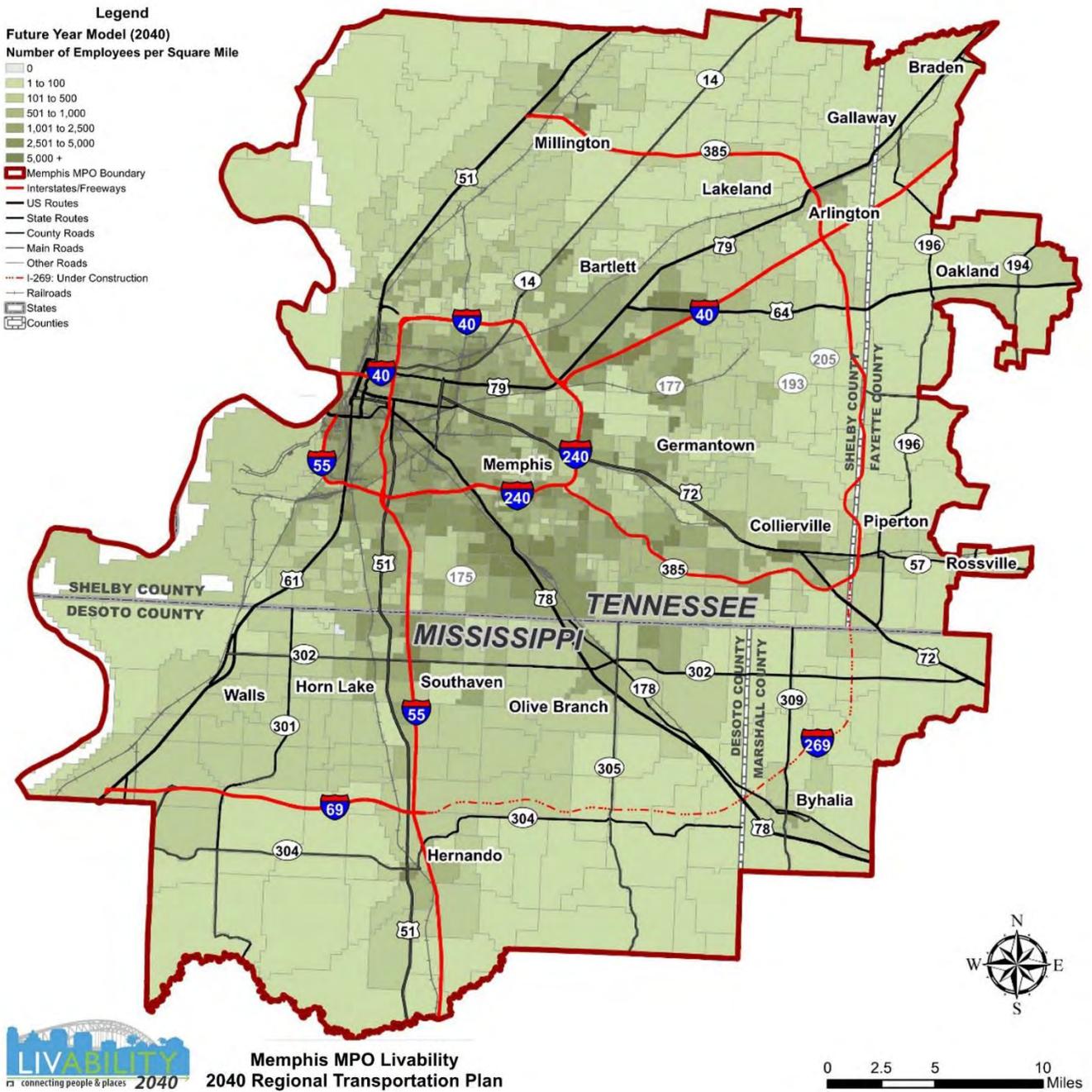
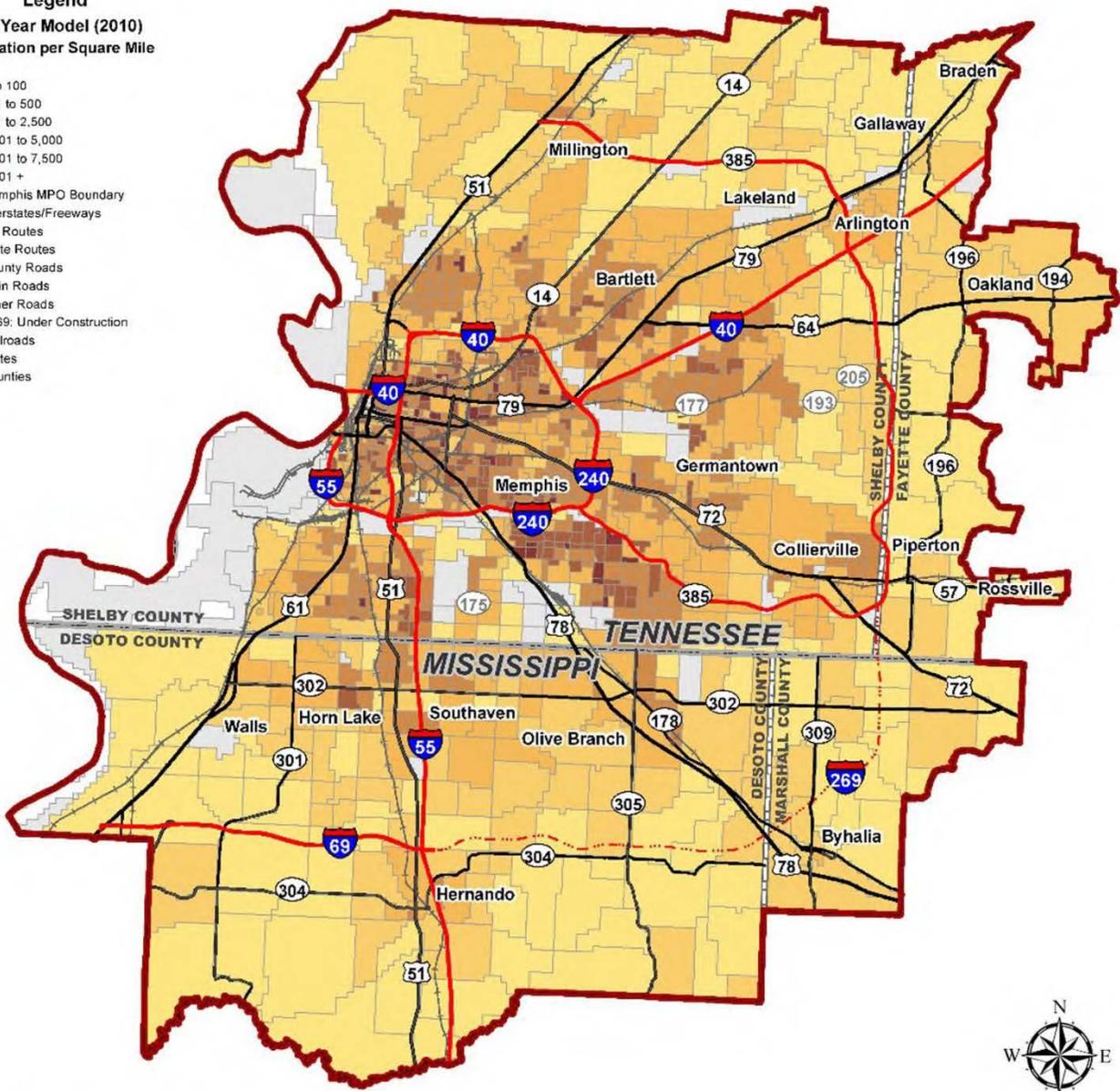


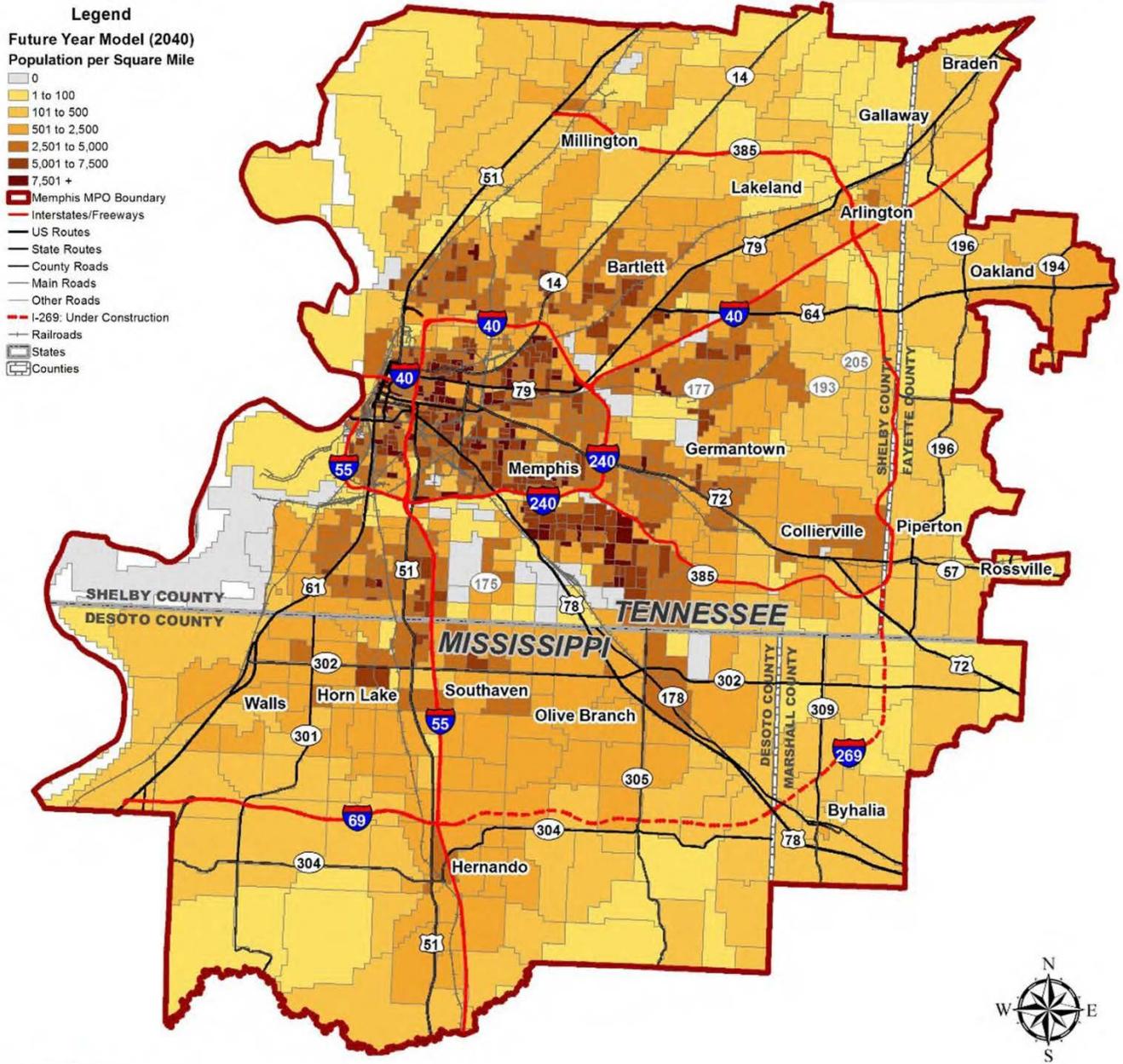
Figure 4.10 2010 Population Density

- Legend**
- Base Year Model (2010)**  
**Population per Square Mile**
- 0
  - 1 to 100
  - 101 to 500
  - 501 to 2,500
  - 2,501 to 5,000
  - 5,001 to 7,500
  - 7,501 +
- Memphis MPO Boundary  
 Interstates/Freeways  
 US Routes  
 State Routes  
 County Roads  
 Main Roads  
 Other Roads  
 I-269: Under Construction  
 Railroads  
 States  
 Counties

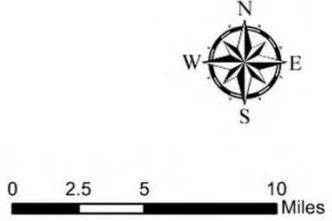


Memphis MPO Livability  
 2040 Regional Transportation Plan

Figure 4.11 2040 Population Density



Memphis MPO Livability  
 2040 Regional Transportation Plan



## Future Congestion

Population and employment growth will exacerbate congestion challenges in the region by increasing the demand for both auto and truck travel over the plan horizon.

The travel demand model was used to forecast 2040 congestion levels in the region, accounting for anticipated population and employment growth. The 2040 congestion analysis assumed no additional investment over the 2040 RTP horizon, other than those projects defined as “committed.”<sup>6</sup> This provides a baseline for comparison of various future investment scenarios. The 2040 baseline network is referred to as the 2040 Existing plus Committed (E+C) network. **Figure 4.12** shows the existing 2010 network and the functional classification of all roadways on this network.<sup>7</sup> The E+C network is basically made up of capacity enhancing projects from the fiscal year (FY) 14-17 TIP that will be complete by the end of FY 2017. The E+C project list is provided in **Table 4.4**. The remaining Transportation Improvement Program (TIP) projects not listed in **Table 4.4** are shown in **Table 4.5**. This list represents those projects that were not included as part of the Existing and Committed (E+C) project list. These projects are not part of the Committed Network because they will not be completed by the end of the current TIP cycle, FY 2017, or they represent a grouping of funding for various programs, such as maintenance, safety, or air quality improvements. A grouping is a set-aside of funds for similar type projects. Projects that are funded within a grouping are small enough in scale that they do not warrant individual identification. While funds may not be dedicated for a specific project, the planning process requires that projects in the TIP provide either proposed or possible funding sources. The transit related TIP projects are listed separately on **Table 4.9** in the Transit Section of this chapter.

The three tables, **Tables 4.4, 4.5, and 4.10** represent all of the projects in the FY 2014-17 TIP at the time of the Livability 2040 Regional Transportation Plan adoption. At the time of the RTP adoption the Memphis MPO is in the process of developing the next TIP cycle, FY 2017-20. Major road projects, such as widening, realignment, major intersection improvements, and new roadways must first be included in the Fiscally Constrained Project List, **Table 8.2** of the RTP, prior to inclusion in the TIP. Federal law requires expenditures in the TIP to be consistent with the RTP and the RTP will serve as the guide to the development of the TIP. For more information about the funding that is available or committed, refer to the latest copy of the TIP, which is available on the Memphis MPO's website ([www.memphismpo.org](http://www.memphismpo.org)).

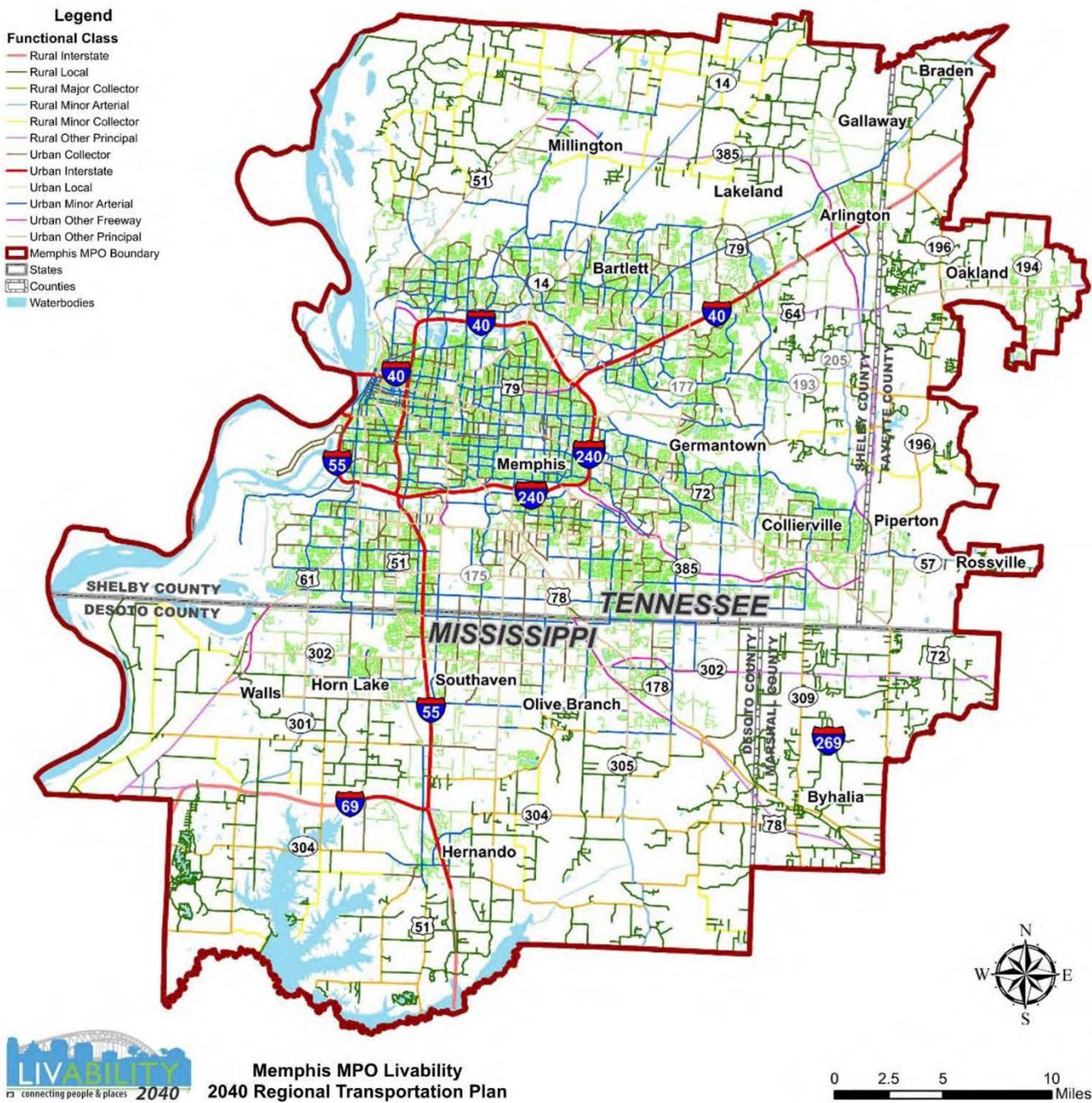
**Figure 4.13** shows the congestion results from the Memphis MPO Travel Demand Model's E+C network. Future congestion hot spots predicted by the model's E+C network are similar to the model's current congestion hot spots, but with increased intensity. Also, a few new hot spots show up including:

- US-78/Lamar Avenue;
- Several arterial roadways in southern Shelby County/northern Desoto County; and
- Several arterial roadways near Bartlett, TN northeast of I-240.

<sup>6</sup> The E+C project list includes all existing regionally significant transportation infrastructure (as shown in 2010 base year model) plus new regionally significant capacity programmed for construction completed by 2017.

<sup>7</sup> Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the role it plays in the overall system of the local, state and nation's street and highway network. There are seven roadway categories, which include: Interstate, Freeway/Expressway, Principal Arterial, Minor Arterial, Major Collector, Minor collector, and Local. These seven roadway categories are further classified as either rural or urban creating 14 possible functional classification types. For further information, please visit the FHWA website at [http://www.fhwa.dot.gov/planning/processes/statewide/related/highway\\_functional\\_classifications/](http://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functional_classifications/).

Figure 4.12 Functional Classification of Existing 2010 Network



**Table 4.4 Existing Plus Committed (E+C) Project List<sup>a</sup>**

Lead Agency	TIP No.	Project Name	Termini/Intersection	Full Project Description
TDOT	NHS-2002-04	I-40	Interchange at Canada Road	Interchange improvements including replacing bridges, reconstructing acceleration and deceleration lanes and tapers, including the widening of I-40 within the interchange limits LM 23.69 to LM 24.06.
TDOT	NHS-2004-01	I-40	Interchange @ I-240	Construct I-40 flyover ramp at I-240 East of Memphis (Phase 2).
TDOT	TN-NHPP-2014-03	SR-14	(Austin Peay Highway) From SR-204 (Singleton Pkwy) to east of Old Covington Pike	Reconstruct and widen from two lanes to five lanes.
MDOT	MS-HSIP-2015-02	MS 302	MS 302 from I-55 to the Marshall County Line	Access management study and geometric improvements/equipment upgrades at five signalized intersections along MS 302 – Southcrest Parkway, Tchulahoma Road, Getwell Road, Craft Road, and Center Hill Road.
Collierville	STP-M-2011-06	Byhalia Road Widening	South of Shelby Post Road to SR-385	Widen Byhalia Rd from two lanes to four lanes divided between Shelby Drive and SR-385 including intersection improvements at Byhalia Road and Shelby Drive Construct Shelby Drive from approximately 1,100 feet west of Byhalia Road to Byhalia Road Connect Byhalia Road to the five lane section south of the Byhalia Road/Shelby Drive intersection.
Memphis	STP-M-2000-04	Poplar (US 72)/ Sweetbriar Interchange	Poplar at Sweetbriar	Modify the Poplar/Sweetbriar interchange by widening the ramp from Sweetbriar to westbound Poplar Avenue (Ramp B) to two lanes. Poplar will be widened as necessary to accommodate the merging of traffic from the new ramp lane. Project scope will include ADA accessible pedestrian improvements.
Memphis	STP-M-2000-09	North Second Street	I-40 to US 51	Improve North Second Street corridor to a parkway design including right-of-way acquisition, reconstruction of sidewalks, provisions for bicycles, landscaping, and utility relocation. From I-40 to A.W. Willis Avenue, Second Street, and Third Street will both be improved to provide two-lane two-way roadways with two-way left-turn lanes. From A.W. Willis Avenue to Henry Avenue Second Street will be improved to provide a two-lane two-way roadway. From A.W. Willis Avenue to Chelsea Avenue, Third Street will be improved to provide a two-lane two-way roadway. North

Lead Agency	TIP No.	Project Name	Termini/Intersection	Full Project Description
				Third Street will be extended on new alignment as a two-lane roadway from Chelsea Avenue to intersect North Second Street at Henry Avenue at a roundabout. From Chelsea Avenue to the Wolf River Bridge, Second Street will be widened to four lanes with a raised median. From the Wolf River bridge to Harvester Lane, North Second Street will be constructed on new alignment as a four-lane divided roadway. From Harvester Lane to US 51, North Second Street/Whitney Avenue will be widened from two to four lanes. Bicycle lanes will be provided along the improved North Second Street corridor. This project will be undertaken in phases as funding allows. Phase 1 will be from I-40 to Cedar Avenue as approved in TDOT contract #080029.
Memphis	STP-M-2002-14	Holmes Road – West	Mill Branch to Tchulahoma	Widen existing four and two lane roadway to seven lanes. Project will include sidewalk improvements, crosswalks, bike facilities, curb ramps, and modern traffic signals with camera detection and emergency vehicle preemption.
Memphis	STP-M-2006-09	Holmes Road – East	Malone to Lamar	Widen existing two lane roadway to seven lanes. Project will include sidewalk improvements, crosswalks, bike facilities, curb ramps, and modern traffic signals with camera detection and emergency vehicle preemption.
Memphis	TIGER-IV-2012-01	Mainstreet to Multimodal Connector	Henry Avenue at North Main Street in Memphis, Tennessee to Broadway Avenue at Club Road in West Memphis, Arkansas	<p>Refloor old Harahan Bridge for bike and pedestrian use and road/street improvements to accommodate bikes. The project will be done in different sections as follows:</p> <p>Section 1: Henry Street to the MATA North End Terminal to the Main Street Mall. Section 1 will include on-street bikeways, ADA and pedestrian improvements, drainage improvements, and trolley improvements.</p> <p>Section 2: Main Street Mall. Section 2 will include ADA and pedestrian improvements, streetscaping, drainage improvements, and trolley repairs. Sections 2 and 3 will include transit-related improvements to the trolley system that will be paid for by FTA (5309) funds and administered by MATA.</p> <p>Section 3: Main Street Mall to AMTRAK Central Station including the Cleaborn and Foote Loop. Section 3 will include ADA and pedestrian improvements, streetscaping, drainage improvements, and trolley repairs.</p>

Lead Agency	TIP No.	Project Name	Termini/Intersection	Full Project Description
				Section 4: AMTRAK Central Station to Harahan Bridge (includes Harahan Bridge). Section 4 will include curb, gutter, and sidewalk repair. It will eliminate ADA barriers and trip hazards. It will connect the end of the trolley line with Cleaborn and Foote Bike Loop. Pedestrian, bicycle and vehicular traffic will cross under the railroad structure on West Carolina on City of Memphis right of way. Within the structure, pedestrians will be separated from traffic by a 54" fence. The pedestrian path will be lit. Bicycle traffic will utilize new sharrows placed on the existing roadway. At Virginia Avenue, the street will be reconfigured to accommodate two-way traffic with parking areas for visitors to the Harahan Bridge. Virginia Avenue will be the direct approach to access the Harahan Bridge Trail. Section 5: Bridgeport Cove Road, I-55 Bridge to Club Road. Section 5 will include new bike-pedways in Arkansas.
Millington	STP-M-2009-09	Church Street at Navy Road Intersection	South of Buford Ave to Navy Road	Widening Church Street north of Navy Road to provide additional southbound lane, drainage improvements, and replacement of traffic signal including emergency vehicle preemption and video detection.
Olive Branch	MS-LSTP-2004-01	Craft Road	Goodman Road (MS 302) to U.S. 78	Widen existing rural two-lane road to 5-lane urban cross-section. Project scope will include ADA accessible pedestrian improvements.
Southaven	MS-LSTP-2002-02	Getwell Road	Goodman Road to Tennessee State Line	Widen existing two-lane roadway without curbs and stormdrains to a (two-mile) five-lane typical section with curbs and stormdrains and a (one-quarter mile) seven-lane typical section with curbs and stormdrains.
Horn Lake	MS-LSTP-2012-02	Tulane Road Connector	From Approximately 1,800 feet north of Goodman Road to Pentail Dr.	New two-lane road with curb and gutter.

<sup>a</sup> Note: Reference the latest copy of the TIP on the Memphis MPO's website ([www.memphismpo.org](http://www.memphismpo.org)), which includes additional information on these TIP projects.

**Table 4.5 FY 2014 to 2017 Transportation Improvement Program (TIP) Projects<sup>a</sup>**

TIP Number	Project Name	Termini/Intersection	Project Description
TN-IM-2011-01	I-55	Interchange at Crump Boulevard	Interchange modification
NHS-2002-01	I-240 Midtown	I-40 to I-55	Widen six lanes to eight lanes
TN-IM-2012-01	I-240	Interchange at Airways Boulevard	Modify interchange in Memphis
TN-NHPP-2014-01	I-240 Bridges	Replacement of 3 Overhead Bridges	Replacement of 3 Overhead Bridges; Norfolk Southern RR (LM 15.45), Poplar Ave (SR-57 EB LM 15.57), and Poplar Ave (SR-57 WB LM 15.73)
TN-NHPP-2014-04	National Highway Performance Program (NHPP) Grouping	Various	Projects for the preservation and improvement of the conditions and performance of the National Highway System (Tennessee Department of Transportation)
TN-STP-2014-01	Surface Transportation Program (STP) Grouping	Various	Projects for the preservation and improvement of the conditions and performance of the Federal-aid highways and public roads (Tennessee Department of Transportation)
TN-HSIP-2014-01	Highway Safety Improvement Program (HSIP) Grouping	Various	Any strategy, activity, or project on a public road that is consistent with the data-driven State Strategic Highway Safety Plan (SHSP) and corrects or improves a hazardous road location or feature or addresses a highway safety problem, including workforce development, training, and education activities (Tennessee Department of Transportation)
MS-NHS-2006-01	I-55/I-69	Church Road to MS-302 (Goodman Road)	Widen to eight lanes
MS-NHS-2006-02	I-55	Relocated SR 304 to Church Road	Widen to eight lanes
MS-NHS-2008-02	Star Landing Corridor	Star Landing Road to approx. Tulane Road to Getwell Road	Widen from two to four lanes (divided)
MS-SSTP-2006-04	SR-304/I-269	SR-304/I-269 from east of I-55 to	Paving of a new four-lane freeway

TIP Number	Project Name	Termini/Intersection	Project Description
		SR-305	
MS-SSTP-2008-02	SR-304/I-269	SR-304/I-269 from SR-305 to the Marshall County Line	Paving of a new four-lane freeway
MS-SSTP-2011-01	SR-304/I-269	I-55 to Marshall County Line (Debt Service)	Repayment of bonds for the construction of SR-304/I-269 in DeSoto County
MS-SSTP-2014-01	Intersection US-51 and Star Landing Road	Intersection US-51 and Star Landing Road and License Drive	Intersection Improvements
MS-SSTP-2011-02	Maintenance and Repair Grouping	Various locations	Funds will be used for operation, maintenance, or minor reconstruction works
MS-SSTP-2014-02	I-55	I-55 Slide Repair	Slide Repair
MS-NHPP-2016-01	I-55	I-55 at Commerce Street	I-55 and Commerce Street Reconstruction of the Interchange and Relocated Frontage Roads
MS-NHPP-2016-02	SR-304 and McIngvale Road Interchange	SR-304 at McIngvale Road	Interchange Construction
CMAQ-2014-02	Congestion Mitigation and Air Quality Group	Nonattainment portion of DeSoto County	This project will fund programs to reduce congestion and improve air quality in DeSoto County in accordance with CMAQ guidelines. These projects and programs include, but are not limited to: Signal Corridor Timing on MS-302, Stateline Road and Airways Boulevard; Active Traffic Signal Management on MS-302, and US-51; and the MPO's Regional ITS Architecture
STP-M-2011-01	Airline Road Improvement Phase 1 Hall Creek Bridge	Airline Road Bridge over Hall Creek	Widen the existing two-lane bridge over Hall Creek to a five-lane bridge. The roadway capacity approaching the bridge is not being increased, and the bridge and roadway approaches will be striped for one through lane in each direction. Project scope will include designated bicycle facilities and ADA accessible pedestrian improvements.
STP-M-2014-09	Highway 70 at Jetway Road Improvements	US 70 at Jetway Road	Widen Highway 70 from four lanes to five lanes from just east of SR-385 to just west of Airline Road. The widening is to provide for a left turn lane associated with the installation of

TIP Number	Project Name	Termini/Intersection	Project Description
STP-M-2014-10	SR-205 (Airline Road) North Widening	From the Hall Creek Bridge at I-40 north to 1,100 feet north of Airline – Milton Wilson Intersection	<p>a traffic control signal, which will not increase roadway capacity. Project includes the installation of a traffic signal at the Highway 70 – Jetway Road intersection. Project scope will include designated bicycle facilities and ADA accessible pedestrian improvements.</p> <p>The project includes the widening of SR-205 (Airline Road) from two lanes to five lanes, with the addition of curb and gutter, drainage improvements, sidewalks, bike lanes and other amenities. The project extends from I-40 on the south end to 1,100 feet north of the Airline-Milton Wilson Intersection.</p>
ENH-2013-01	Bike and Pedestrian Connector – Phase 2A and 2B	Memphis-Arlington Road, between Milton Wilson Road and Jetway Avenue	This project consists of the design and construction of bike and pedestrian facilities along Memphis-Arlington between Milton Wilson and Jetway as required to complete the connection between Arlington Elementary and Middle Schools.
TCSP-2012-01	Donelson Farms Parkway	From SR-385 (Future I-269) to Airline Road	This project consists of the design and construction of approximately 2,400 linear feet of two-lanes of the Donelson Farms Parkway. The ultimate roadway is intended to be a four-lane urban collector with a median, bike and pedestrian facilities.
STP-M-2006-03	Old Brownsville Road	Austin Peay to Kirby Whitten	Widen to a four-lane divided roadway with a raised median and median openings and turn lanes for access to existing driveways. Project scope will include designated bicycle facilities and ADA accessible pedestrian improvements.
STP-M-2014-01	SR-57 Widening	Collierville-Arlington Road/Eastley Street to SR-385	Project involves the widening of SR-57 from an existing two-lane rural cross section to a five lane urban cross section. Project scope will include designated bicycle facilities and ADA accessible pedestrian improvements.
ENH-2012-05	Collierville Center Connect – Phase I	Center Street from South Rowlett to South Street	Streetscape and Pedestrian Improvements

TIP Number	Project Name	Termini/Intersection	Project Description
STP-M-2014-02	Germantown Road Realignment	Poplar Pike/McVay to 1000 Feet South of Poplar	Realignment and construction of a five-lane road to make Germantown Road continuous through the City of Germantown. The project includes the realignment of West Street and Old Germantown Roads to form an intersection with the Realigned Germantown Road north of the Norfolk Southern Railroad (NSRR) tracks. As part of the project, the railroad at-grade crossing will be improved to current NSRR standards and Old Germantown Road will be improved from Poplar Pike to the intersection of Old Germantown Road with Germantown Road Realigned. Project scope will include shared auto/bike facilities and ADA accessible pedestrian improvements.
STP-M-2014-07	Germantown Road at Wolf River Boulevard Intersection Improvements	Germantown Road at Wolf River Boulevard Intersection	Project provides intersection improvements consisting of a double left turn for Southbound Germantown Road and a double left for westbound Wolf River Blvd, and related traffic signal modifications. Project scope will include shared auto/bike facilities and ADA accessible pedestrian improvements.
STP-M-2006-01	New Canada Road	I-40 to US-70	Design and Construction of a new four lane divided highway between Interstate 40 (Exit 20) and U.S. Highway 70 (State Route #1). Project scope will include designated bicycle facilities and ADA accessible pedestrian improvements.
STP-M-2000-11	Walnut Grove Road (SR-23) Middle	Kirby/Whitten Pkwy to Germantown Pkwy	Walnut Grove Road will remain four lanes. Access management measures will be provided to limit left turn movements across Walnut Grove traffic. These include construction of a "green bridge" type grade separated intersection approximately one mile west of Germantown Parkway. The new "green bridge" will connect to the internal road network of Shelby Farms Park and the Agricenter allowing wildlife, pedestrians, bicyclist, and vehicles to cross Walnut Grove. The "green bridge" design will include landscaping, vehicular travel lanes, bicycle and pedestrian facilities, and connections to Walnut Grove. All

TIP Number	Project Name	Termini/Intersection	Project Description
			intersecting streets and drives between the Kirby Whitten Project (Shelby Farms Parkway) and the “green bridge” will be converted to right in, right out operation. The project will include installation of a shared use trail on the north side of Walnut Grove from Patriot Lake to Germantown Parkway and pavement reconstruction of Walnut Grove.
STP-M-2000-16	Walnut Grove Road (SR-23) East	Walnut Bend Road to Rocky Point Road	Widen existing four and two lane roadway to six lanes with a median, eliminate sharp curves and realign Rocky Point Road intersection to improve safety. This project will provide wide outside lanes for bikes. Project scope will include ADA accessible pedestrian improvements.
STP-M-2000-22	Forest Hill Irene	Walnut Grove (SR-23) to Macon Road (SR-193)	Construct new six lane roadway with a median, adjacent bike path, sidewalks, and curb ramps. The project also includes an 1,100 foot extension of Trinity Road from Sanga Creek Road to Forest Hill Irene. Trinity Road will maintain a seven lane cross section.
STP-M-2004-01	Winchester/Perkins Interchange	Winchester at Perkins	Reconstruct interchange to allow for the removal of the center pier in Winchester and construct more travel lanes on Winchester. Project scope will include ADA accessible pedestrian improvements.
STP-M-2006-04	Plough Boulevard	Plough Boulevard Interchange with Winchester Road	Improve 3,000 feet along Plough-Airways Boulevard south from Brooks Road and improve 3,000 feet along Winchester east of original at-grade section. The improvements will provide a grade-separated interchange to replace the existing at-grade condition at the Plough-Airways/Winchester Road intersection. The final design will maintain the present direct connectors between Plough Boulevard and the airport. the preliminary planning will include coordination with MATA to address future light rail service to the airport
STP-M-2006-10	Kirby/Whitten Parkway (Shelby Farms Parkway)	Walnut Grove Road (SR-23) to Macon Road (SR-193)	Widen Walnut Grove Road from four lanes to six lanes from just east of the Wolf River to the proposed Walnut

TIP Number	Project Name	Termini/Intersection	Project Description
			Grove/Kirby-Whitten interchange with a heavily landscaped median. Construct a four-lane heavily landscaped roadway with a variable width median from the proposed interchange to Mullins Station Road. Construct and/or widen Kirby-Whitten from two lanes to four lanes with a two-way left-turn lane from Mullins Station Road to Macon Road. The proposed interchange at Walnut Grove Road and Kirby-Whitten and the associated ramps are included in the project. Adjacent pedestrian and bicycle paths will be designed in conjunction with this project. Two grade separated trail crossings will be provided along Kirby-Whitten and one grade separated trail crossing will be provided along Walnut Grove.
TN-NHPP-2014-02	SR-4 (US-78/Lamar Avenue)	Mississippi State Line to South of Shelby Drive	Reconstruct and widen from four lanes to six lanes (divided).
ENH-2008-01	I-40/ Riverside Drive Gateway Enhancements	Riverside Drive from Interstate 40, Tennessee Exit 1A Ramp to Jefferson Avenue	The landscaping enhancements planned for the I-40 and Riverside Drive gateway consist of tree plantings and ground cover for three sections of the exit area. Trees will be planted along a median strip primarily visible by traffic entering Downtown from westbound I-40. Another cluster of trees and ground cover will be planted in an exit area median strip that is visible to traffic exiting from both I-40 eastbound and westbound lanes. In addition, landscaping will be replaced adjacent to the Tennessee Visitors Center. A welcome entry sign will be installed at the bottom of the Exit 1A ramp.
ENH-2010-01	Elvis Presley Boulevard	Shelby Drive (SR-175) to Brooks Road	Construct a six-lane heavily landscaped roadway adjacent to Graceland, which includes median, wide outside lanes for bikes and a bus stop turn-out lane. From Craft to Winchester widen from four to six lanes with a median. The other two segments will have the same existing laneage, but the entire project will have improved ped/bike/bus stop and landscaping.
ENH-2012-02	University of Memphis Railroad	North of Southern Avenue and	Construction of pedestrian crossings, bollards, signage,

TIP Number	Project Name	Termini/Intersection	Project Description
	Pedestrian Project	south of Walker Avenue; Norfolk Southern rail on south side of University of Memphis Campus	landscaping, fencing, and lighting
ENH-2012-03	Walker Avenue Streetscape	Highland Avenue to Brister Street	Modification of existing roadway to accommodate new streetscape including new curb and gutter, sidewalks, landscaping, lighting, bike lanes, and street parking.
ENH-2012-04	Highway 61 – Blues Trail	Tennessee/Mississippi State Line to I-40	Trail marker signage, way finding signage, historic site designation signage, blues music crosswalks, gateway art projects and landscaping along Highway 61.
ENH-2012-06	Wolf River Greenway – Phase 4	McLean Avenue to Hollywood Street	1.1 mile segment of 10 foot asphalt trail for multipurpose use.
ENH-2014-01	Walker Avenue Streetscape Phase 2	Brister Street to Patterson Street	Modification of existing roadway to accommodate new streetscape including new curb and gutter, sidewalks, landscaping, lighting and bike lanes.
FBD-2012-01	Beale Street Landing Water Taxi and Dock Connections	Riverside Drive and Beale Street, Memphis, Tennessee	Design and construction of water taxi service for Wolf River Harbor, to include design and construction of docking connections and the purchase of water taxis.
HPP-2006-04	Biomedical Planning District		Reconstruction of sidewalks and curbs and streetscape improvements along roadways in this district
DEMO-2014-01	Cobblestone Landing Railroad Pedestrian Improvements	Court Avenue, Monroe Avenue, and Union Avenue Railroad Crossings	Railroad safety improvements to Court Avenue, Monroe Avenue, and Union Avenue. Project also includes ADA upgrades for pedestrians, signage, pedestrian signals, and crossing surfaces.
STP-M-2014-05	Navy Road Streetscape and Median	US-51 to Veterans Parkway	This is the second phase of the Navy Road Streetscape project. It includes the construction of additional medians, paved crosswalks, sidewalk improvements, streetscape improvements, and the realignment of the intersection of Navy and Easley. Project scope will include shared auto/bicycle facilities.
STP-M-2014-08	Singleton Parkway	Navy Road to Bethuel Road	Construct an extension of Singleton Parkway from Navy

TIP Number	Project Name	Termini/Intersection	Project Description
			Road north and east to Bethuel Road consisting of four lanes (divided) with bike lanes. Project scope will include ADA accessible pedestrian improvements.
STP-M-2014-11	Wilksville Road	US-51 to Veterans Parkway	Extension of a five-lane road through a newly developing area of the City. This project will create a pedestrian friendly roadway through a mixed use center that will function as the town center, cross the CNRR and connect to Veterans Parkway in the Millington Industrial Park. Project scope will include designated bicycle facilities and ADA accessible pedestrian improvements.
STP-M-2014-03	Houston Levee Road Widening	Walnut Grove Road (SR-23) to Wolf River Bridge	This project improves Houston Levee Road by widening the segment from Walnut Grove Road to the Wolf River Bridge from two to four lanes. The roadway segment will include a median and landscaping. Project scope will include designated bicycle facilities and ADA accessible pedestrian improvements.
STP-M-2014-04	Walnut Grove Road (SR-23) Widening	Rocky Point Road to Houston Levee Road	This project widens Walnut Grove Road from two to six lanes from Rocky Point Road to Houston Levee Road with a bridge over Gray's Creek. Project scope will include designated bicycle facilities and ADA accessible pedestrian improvements.
STP-M-2014-06	Macon Road (SR-193) Widening	Berryhill Road to Houston Levee Road	This project provides improvements for widening of Macon Road from two to four lanes from Berryhill Road to Houston Levee Road with a bridge over Gray's Creek. Project scope will include designated bicycle facilities and ADA accessible pedestrian improvements.
ENH-2011-01	Shelby Farms Bicycle, Pedestrian, and Equine Trails		Facilities for pedestrian or bicycles and landscaping or other scenic beautification
ENH-2012-01	Elvis Presley-Brooks Roadscape Project	Elvis Presley Boulevard @ Brooks Road	Pedestrian and Landscape Improvements
STP-M-2009-04	Bike and Pedestrian Grouping		This grouping will be used to fund Greenways, Sidewalks,



TIP Number	Project Name	Termini/Intersection	Project Description
			Bicycle Facilities and Amenities, Streetscaping, etc. throughout the Tennessee portion of the Memphis MPO area.
STP-M-2009-06	Signalization Grouping		This grouping will be used to fund Upgrades, Replace, Improve Traffic Signals and Signal Systems throughout the Tennessee portion of the Memphis MPO area.
STP-M-2009-03	Resurfacing Grouping		This grouping will be used to fund road resurfacing and other preventative maintenance throughout the Tennessee portion of the Memphis MPO area.
STP-M-2014-12	Bridge Grouping		This grouping will be used to fund bridge replacement, rehabilitation, preservation, systematic repairs and Seismic retrofit projects throughout the Tennessee portion of the Memphis MPO area.
TAP-2014-01	Transportation Alternatives		This grouping will be used to fund the Transportation Alternatives Program, which provides funding for programs and projects defined as transportation alternatives, including on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving nondriver access to public transportation and enhanced mobility, community improvement activities, and environmental mitigation; recreational trail program projects; safe routes to school projects; and projects for the planning, design or construction of boulevards and other roadways largely in the right-of-way of former Interstate System routes or other divided highways under MAP-21 throughout the Tennessee portion of the Memphis MPO area.
SRTS-2008-01	Safe Routes to School (SRTS) Grouping		This grouping funds annual Safe Routes to School grant awards to Tennessee MPO jurisdictions. Amounts may be amended or adjusted as the Governor awards new grants. Safe Routes to School programs represented a good mix of educational activities, major projects such as sidewalk segments and shared-use paths and minor improvements

TIP Number	Project Name	Termini/Intersection	Project Description
			such as sign packages, crosswalks, and pedestrian signals.
MS-LSTP-2015-03	Stateline Road Bridge	Stateline Road (east of Highway 178)	Replacement of the existing structurally deficient bridge by replacing the timber supports with a new concrete box culvert.
MS-TE-2015-01	City of Olive Branch – Walking/Bike Path	Church Road from Craft Road to soccer fields	Construction of a five-foot bicycle lane on the North and Southsides of Church Road from Craft Road to the City of Olive Branch entrance to the soccer fields.
MS-LSTP-2014-01	Getwell Road	Star Landing Road to Church Road	Widen existing variable width road to a four-lane divided typical section with curbs and storm drains. A 10 foot wide multiuse Bike-Ped lane will be provided.
MS-LSTP-2015-04	Stateline Road Pedestrian Project	Highway 51 to Northwest Drive and Northwest Drive to Municipal Center	Install sidewalks (5 feet wide) on both sides of Stateline Road from Highway 51 to Northwest Drive and Northwest Drive to library/police dept/city hall.
MS-LSTP-2014-06	I-55/I-69 Interchange at Nail Road	Interchange at Nail Road	I-55/I-69 Interchange at Nail Road Hydraulic Study
MS-LSTP-2015-01	Getwell Road	Star Landing Road to Pleasant Hill Road	Widen existing two lane road to a four-lane divided typical section with curb and gutter and sidewalks.
MS-LSTP-2015-02	Commerce Street Extension	Commerce Street to Jaybird Road	New two-lane road, with roadbed for future expansion to four-lane divided.
MS-LSTP-2014-03	Bullfrog Corner Intersection Improvements	Highway 51 and Goodman Road	Install shared-use sidewalk (8 feet wide) and Pedestrian Signals/Crossings on all four corners of the intersection.
MS-LSTP-2014-04	Resurfacing Grouping		This grouping will be used to fund road resurfacing and other preventative maintenance throughout the Mississippi portion of the Memphis MPO area.
MS-LSTP-2014-05	Signalization Grouping		This grouping will be used to fund for Upgrade, Replace, Improve Traffic Signals and Signal Systems throughout the Mississippi portion of the Memphis MPO area.
MS-TAP-2014-01	Transportation Alternatives		This grouping will be used to fund the Transportation Alternatives Program, which provides funding for programs



TIP Number	Project Name	Termini/Intersection	Project Description
			and projects defined as transportation alternatives, including on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving nondriver access to public transportation and enhanced mobility, community improvement activities, and environmental mitigation; recreational trail program projects; safe routes to school projects; and projects for the planning, design or construction of boulevards and other roadways largely in the right-of-way of former Interstate System routes or other divided highways under MAP-21 throughout the Mississippi portion of the Memphis MPO area.
CMAQ-2002-09	Congestion Management Program	Various Locations	This project is the continuation of a very effective program to provide improvements to intersections throughout Shelby County, including the installation of coordinated signal systems, vehicle detection improvements, isolated signal improvements, and isolated unsignalized intersection improvements in accordance with the approved Shelby County Congestion Management Program.
CMAQ -2012-01	50 Mile Bike/Ped Project	Various Locations	Installation of Approximately 50 miles of bicycle facilities along Memphis city streets.
CMAQ-2012-02	Shelby County Greenline	Farm Road to Cordova	This project is a continuation of the existing Shelby Farms Greenline, beginning at Farm Road and continuing east 4.3 miles to the Old Cordova Train Station utilizing inactive CSX Railroad right-of-way.
CMAQ-2014-01	PM 2.5 Diesel Emission Reduction Strategies Grouping		This grouping will be used for projects that reduce PM 2.5 emissions from on-road heavy-duty diesel engines and non-road construction equipment.
CMAQ-2008-02	Air Quality Outreach		The Memphis and Shelby County Health Department will demonstrate the air quality benefits of improved public awareness through establishing a major public education and outreach campaign on clean air. The goal of this project is to educate the public, area leaders and

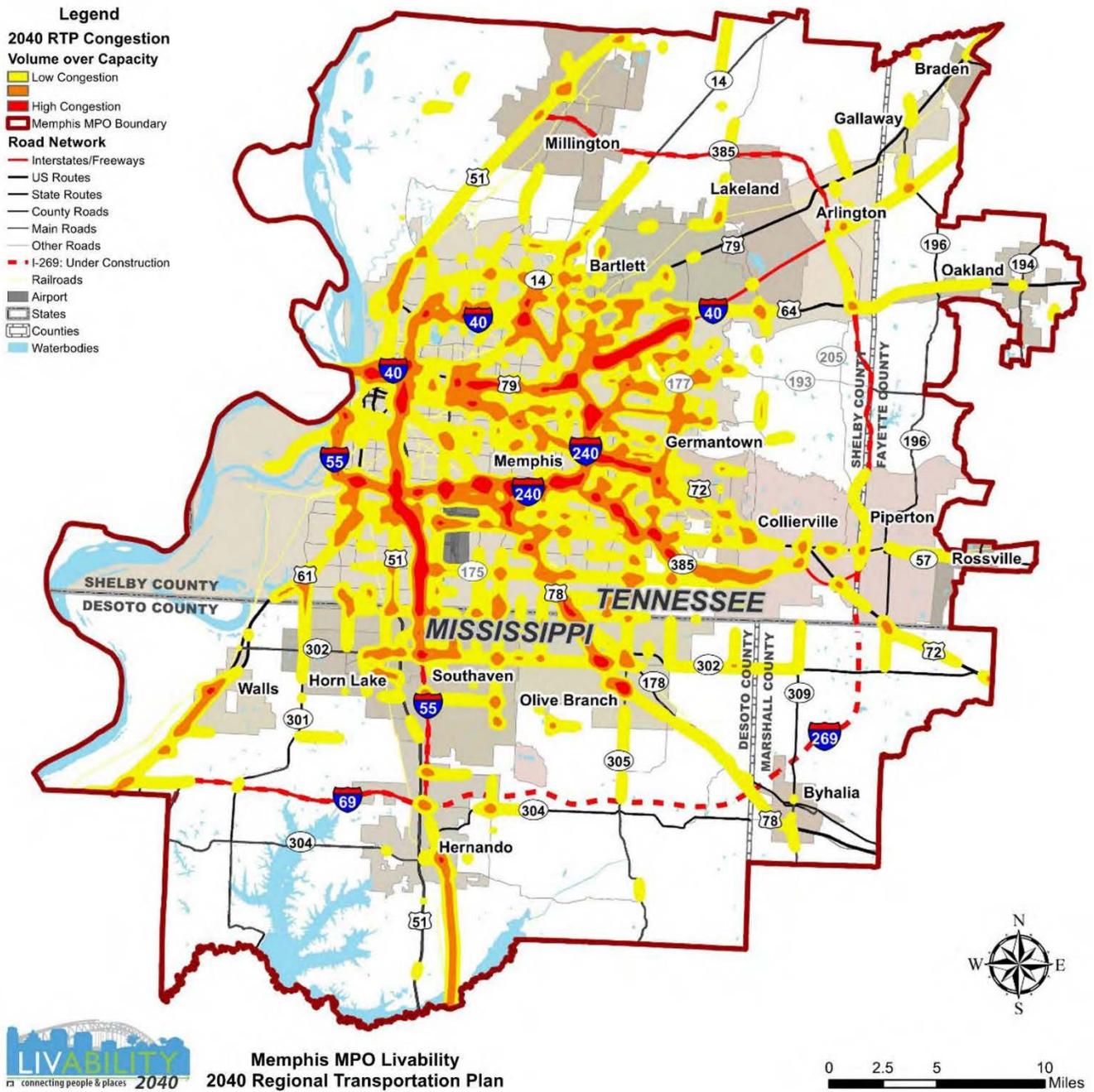
TIP Number	Project Name	Termini/Intersection	Project Description
			businesses about connections among trip making and transportation alternatives, traffic congestion and air quality. This campaign will help the Shelby-Crittenden nonattainment area reduce emissions and congestion by inducing drivers to change their transportation choices.
CMAQ-2014-03	Memphis Heavy Duty CNG Truck Deployment		As part of Memphis Light Gas and Water's Compressed Natural Gas (CNG) market development, Dillon Transport, Inc. has committed to a public-private partnership to invest in the conversion of 20 heavy duty trucks of their fleet to CNG vehicles in the Memphis area. Dillon plans to use these trucks to transport goods throughout the state of Tennessee. This commitment creates an anchor customer for Memphis Light Gas and Water's South CNG Fueling Center and will significantly contribute to emissions reduction and better air quality in the Memphis and Shelby County area.
CMAQ-2014-04	Traffic Signal Equipment Replacement	Walnut Grove from I-240 to City Limits	This project provides for improvements to the Walnut Grove Road corridor by upgrading obsolete signal equipment with new ITS technologies enabling interconnected operation of traffic signals within the project limits.
CMAQ-2015-01	I-40 Corridor/Shelby Farms Transit Service Improvements		MATA plans to provide transit service on three new routes and to two new park and ride locations under the Congestion Mitigation and Air Quality (CMAQ) program. The three routes include the I-40 Corridor Circulator, the Route 34 Express and the Shelby Farms Circulator. The two new park and ride lots will serve the Route 53 Express-Greenline and the Route 34 Express-Agricenter
CMAQ-2015-02	TDOT HELP Truck Program Expansion		To expand the existing TDOT Freeway Service Patrol Program by acquiring six new HELP trucks, adding six operators and adding/expanding routes to provide coverage and services during peak hours in the Memphis-Shelby County area.
CMAQ-2015-03	Commute Options Travel Demand Management Initiative		Develop employer program to reduce drive-alone commuting and increase use of transit, bicycling, rideshare

TIP Number	Project Name	Termini/Intersection	Project Description
			and walking among employees and students. Develop marketing and outreach tools, pilot strategies with six employers during grant period, and establish replicable program for ongoing use.
CMAQ-2015-04	Central Station Phase 2 Redevelopment	Main Street and G.E. Patterson	Funding for the public infrastructure improvements at Central Station to improve the multimodal functionality of the project and increase the utilization of transit, biking, and walking as alternative modes of transportation. Major components will include a new trolley station, transit connector concourse, and other pedestrian and bike-friendly streetscape improvements.
CMAQ-2015-05	Memphis Area Rideshare Program		This project will provide funds to continue the Memphis Area Rideshare Program (vanpooling and carpooling).
CMAQ-2015-06	Shelby Farms Greenline: Cordova to Lenow	B Street to Lenow Road	Extend the Shelby Farms Greenline from the old Cordova Train Station to the TVA Substation on Lenow Road along an inactive CSX Railroad right-of-way. The proposed improvements will convert the railbed to an asphalt bicycle/pedestrian trail approximately 2.5 miles in length.
CMAQ-2015-07	New Transit Service/Operating Assistance		New Transit Service for four proposed routes that will expand bus service to employment centers in the Memphis area. The four routes include: (1) Wolfchase Connector, (2) Airways Transit Center Express, (3) Getwell Connector, and (4) Airport Shuttle Express.

Source: FY 2014-2017 Transportation Improvement Program.

° Note: Reference the latest copy of the TIP on the Memphis MPO's website ([www.memphismpo.org](http://www.memphismpo.org)), which includes additional information on these TIP projects.

Figure 4.13 Future Year (2040 E+C) Congestion, Memphis MPO Travel Demand Model



Source: Memphis MPO Travel Demand Model

## 4.3 Safety and Security

Based on a review of recent available crash data, most safety issues in the Memphis MPO region are typical of major metropolitan areas. A significant portion of crashes occur at intersections, both for motor vehicle crashes and for those involving bicyclists and pedestrians.

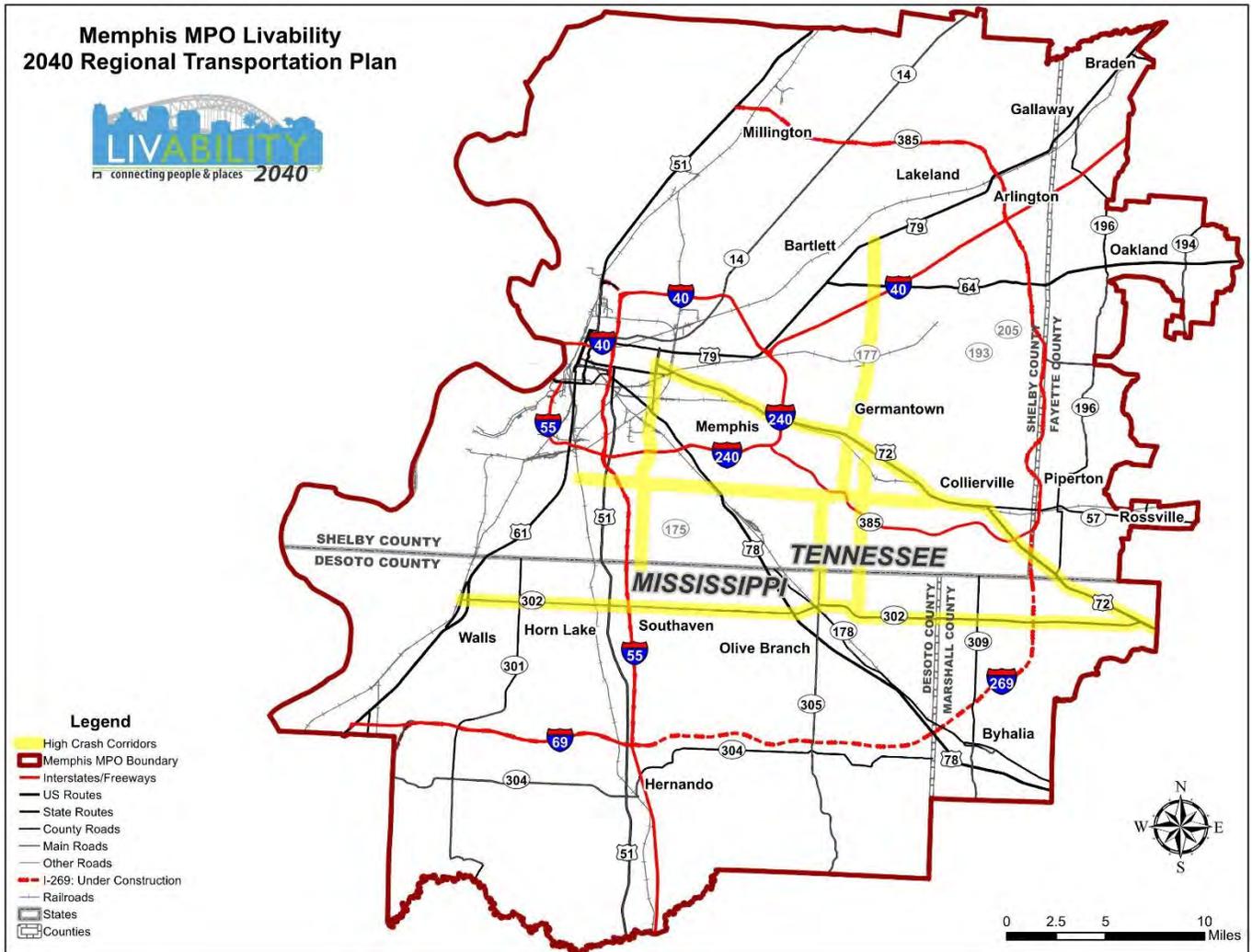
High crash corridors in the region include many of its most heavily-traveled major arterial routes (**Figure 4.14**):

- US 72 / Poplar Avenue;
- MS 302 / Goodman Road;
- Winchester Road;
- US 78 / Lamar Avenue;
- TN 177 / Germantown Parkway;
- Airways Boulevard; and
- Hacks Cross Road.

These roadways are typically 5-lane or 7-lane cross sections, with excess vehicle capacity that provides opportunities for speeding, and are bordered on both sides by commercial development with very little access management. A mix of heavy trucks and commuter traffic on corridors such as Lamar Avenue also increases the potential for crashes between vehicles with significantly different operating characteristics.

One of the region's most notable safety issues is the high rate of pedestrian crashes. The MPO's Regional Bicycle and Pedestrian Plan and other recent planning efforts have identified the need to improve walkability and bikeability, not only within neighborhoods but also around employment centers. The City of Memphis is a bicycle and pedestrian focus area for FHWA and will receive technical assistance from FHWA's safety experts.

**Figure 4.14 High-Crash Corridors**

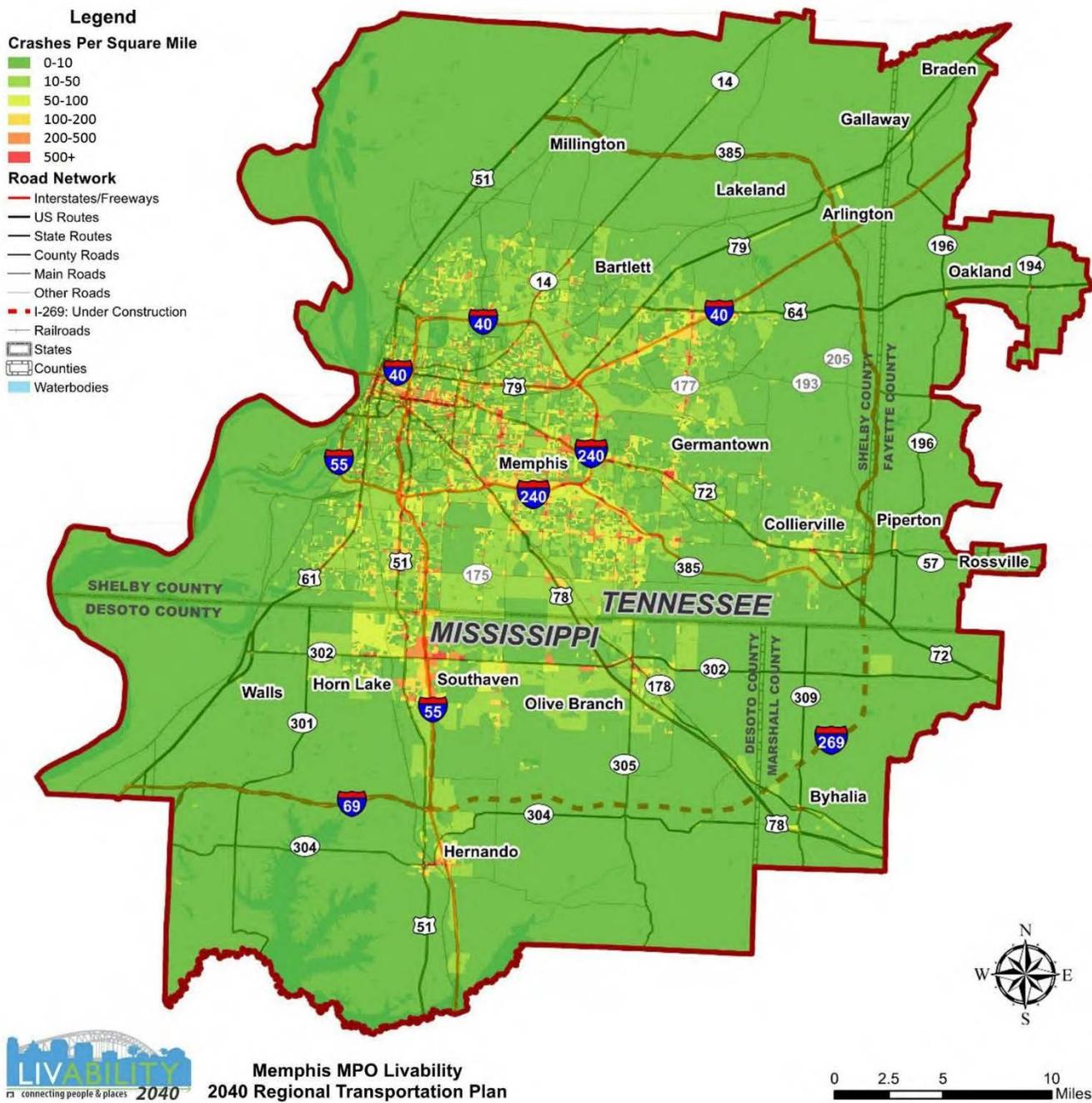


Source: Tennessee Department of Transportation and Mississippi Department of Transportation Crash Data

### 4.3.1 Crash Analysis

Crash data helps identify corridors or intersections with high levels of crash activity that cause non-recurring congestion. **Figure 4.15** displays the intensity of crashes per square mile for blocks within the region. High crash areas generally are seen along corridors that have high traffic volumes. Higher crashes are also noticed at intersections along the same corridors, which correlates with the locations that have higher population and commercial activities.

Figure 4.15 Crashes per Square Mile



Source: Tennessee Department of Transportation and Mississippi Department of Transportation Crash Data

As part of the RTP development, characteristics of crashes occurring between 2011 and 2013 were analyzed in order to identify the safety needs of the Memphis MPO region. During this time period, nearly 119,000 roadway crashes occurred, 340 of which resulted in at least one fatality. Most of these crashes were in Shelby County, as shown in **Table 4.6**, which is expected due to the county being the most populous. On average, there are 10.3 traffic fatalities per 100,000 people in the Memphis MPO region, which is lower than the national average of 10.5.

**Table 4.6 Crashes in the Memphis MPO region by Location and Severity 2011 through 2013**

	Property Damage Only (PDO) Crashes	Injury Crashes	Fatal Crashes	Total Crashes
<b>MPO Total</b>	<b>92,186</b>	<b>26,303</b>	<b>340</b>	<b>118,829</b>
DeSoto	10.6%	11.8%	14.1%	10.9%
Marshall	<1%	<1%	3.2%	<1%
<b>Total – Mississippi</b>	<b>11.1%</b>	<b>12.7%</b>	<b>17.4%</b>	<b>11.5%</b>
Fayette	<1%	<1%	<1%	<1%
Shelby	88.2%	86.4%	82.1%	87.7%
<b>Total – Tennessee</b>	<b>88.8%</b>	<b>87.3%</b>	<b>82.6%</b>	<b>88.5%</b>

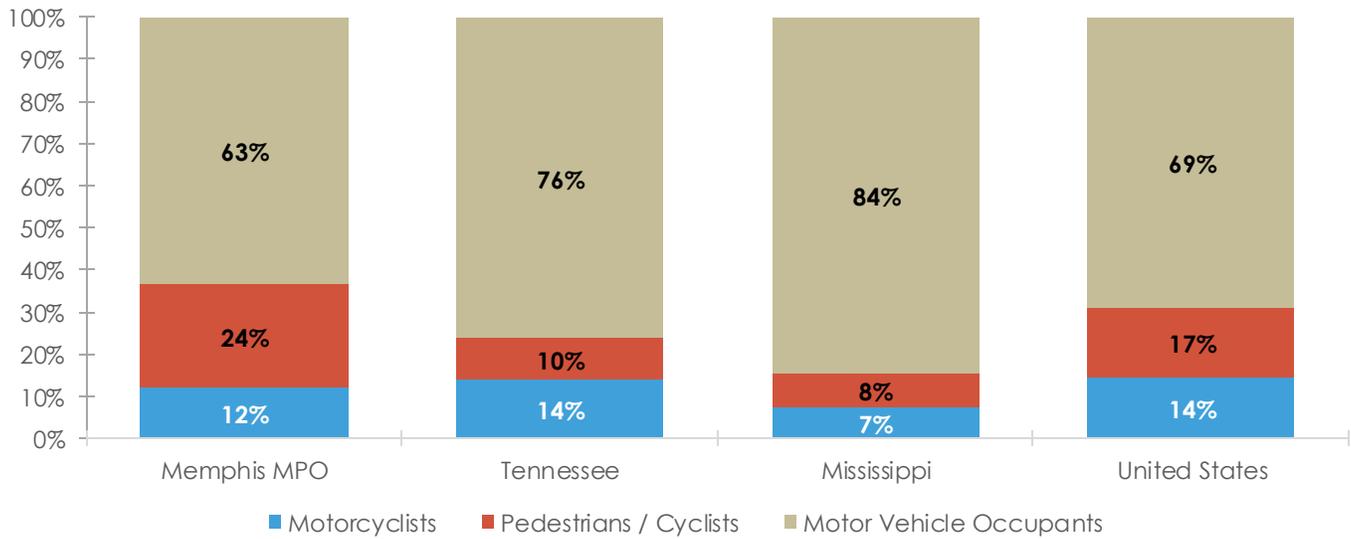
Source: Compilation of crash data from the National Highway Traffic Safety Administration's Fatality Analysis Reporting System (FARS), the Tennessee Department of Safety and the Mississippi Department of Transportation.

Nearly half of the crashes in the Memphis MPO region occurred at or near intersections. By their nature, intersections generate a greater number of potential conflict points between vehicles. Given the number of intersections in a road network for a major metropolitan area like the Memphis MPO region, one could expect this crash type to comprise a significant proportion of the total.

What is notable is that the region has a higher rate of fatalities resulting from intersection-related crashes, with 38 percent in the region compared to 28 percent nationally. A cursory review did not reveal any clear pattern related to weather, daylight or intersection type. However, several of the intersection-related fatal crashes involved pedestrians, which may partly account for the higher rate of fatalities. Lane departures was another common crash characteristic, with approximately 45 percent of the region's traffic fatalities involving a vehicle either drifting out of its lane or departs the roadway.

Another notable crash characteristic is the type of users involved. The Memphis MPO region experiences a higher portion of traffic fatalities involving "vulnerable road users," including pedestrians, bicyclists, and motorcyclists. In fact, 1 in every 3 fatalities involved a vulnerable road user, as shown in **Figure 4.16**: Higher than the average for the states of Tennessee and Mississippi as a whole, and higher than the national average.

**Figure 4.16 Fatalities by Road User Type**



Source: Compilation of crash data from the National Highway Traffic Safety Administration's Fatality Analysis Reporting System (FARS), the Tennessee Department of Safety and the Mississippi Department of Transportation.

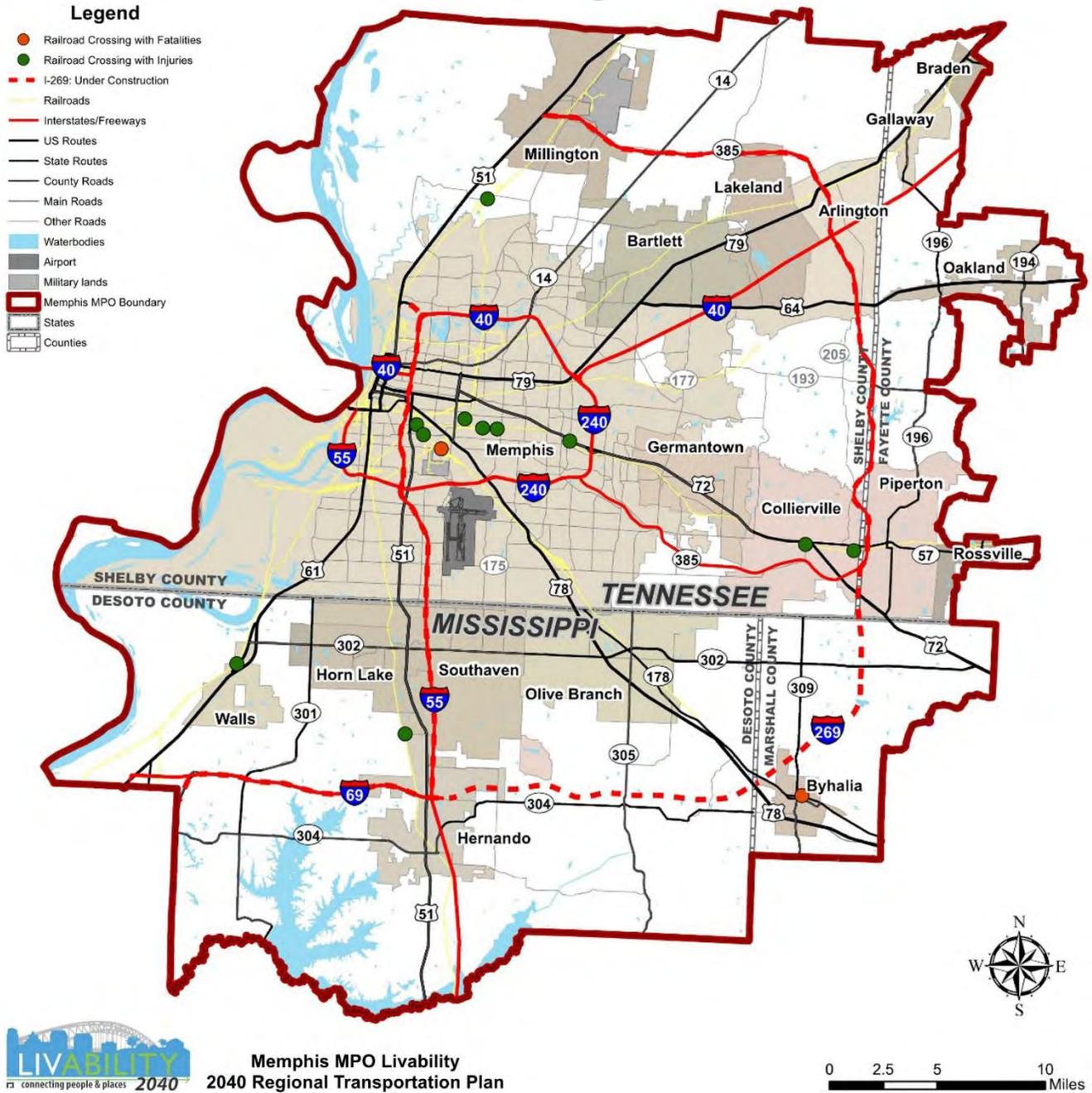
### 4.3.2 Roadway-Rail Grade Crossings

Crashes were reported at 41 public roadway-rail grade crossings in the Memphis MPO region during the most recent available five-year period of data (2009-2013). A total of 13 crossings, shown in **Figure 4.17**, had crashes resulting in injury or death. According to FRA data, all of the crossings where crashes occurred have passive warning devices, though some may be worn. Additionally, all have active warning devices, except one. That one has crossbucks, stop signs and pavement markings. The active warning devices include flashing light signals and automatic gates which lower when motorists are not permitted to cross the tracks. These warning devices are equivalent to a red vehicular traffic signal at a road intersection. Legally motorists must remain stopped until the gates are lifted, but some drive around the gates, sometimes resulting in crashes.



Above: Roadway-rail grade crossings can cause safety issues, in addition to being bottlenecks at high traffic locations.

**Figure 4.17 Fatal and Injury Crashes Reported at Roadway-Rail Grade Crossings 2009 through 2013**



Source: Federal Rail Administration, Office of Safety Analysis.

Accident prediction reports for public roadway-rail grade crossings can be generated using a database and analysis system provided by the Federal Railroad Administration (FRA). The predictions are based on a crossing's basic physical and operating characteristics as well as its past five years of accident history. It provides a useful screening tool, although it should be noted that some states use additional factors to identify crossings for safety improvements, such as sight distance or the number of school buses using the crossing.

In the Memphis MPO region, the top ten public highway-rail grade crossings were identified by the FRA accident prediction model and shown in **Table 4.7**. These crossings are primarily in areas with the highest traffic, both in terms of annual average daily roadway traffic (AADT) and by the number of trains per day.

**Table 4.7 Top 10 Roadway-Rail Grade Crossings Ranked by Predicted Accidents (FRA)**

	City/County	Crossing	Street	AADT	Trains per Day
1	Memphis	663399G	Parkway Drive S	10,455	86
2	Memphis	663401F	Castilia Street	7,947	38
3	Collierville	732125W	Byhalia Road	30,030	22
4	Memphis	732169W	Mendenhall Road	17,214	20
5	Germantown	732149K	Hacks Cross Road	18,830	20
6	Byhalia	664494F	Fuller Street	500	22
7	Memphis	663415N	Shelby Drive	38,211	38
8	Memphis	663404B	Pendleton Street	8,241	138
9	Memphis	732161S	Kirby Parkway	25,900	15
10	Memphis	732181D	Semmes Street	4,454	16

Source: Federal Rail Administration, Web Accident Prediction System.

### 4.3.3 Strategic Highway Safety Plans

The Federal Highway Safety Improvement Program provides funding to state and local agencies for highway safety strategies, activities, and infrastructure projects, contingent on meeting certain requirements to promote a data-driven, strategic approach to reducing highway fatalities and injuries. In order to receive funds, states are required to develop a Strategic Highway Safety Plan (SHSP) that provides a comprehensive framework for reducing fatalities and injuries on all of the state's public roads.

Both *Tennessee and Mississippi's SHSPs*, published in 2014, identify several Critical Emphasis Areas (CEAs), priority safety issues that contribute to high crashes, fatalities, and injuries. As shown in **Table 4.8**, both states have adopted several of the same CEAs, although in some cases the terminology or categorization differs slightly. The Memphis MPO will continue to work with TDOT and MDOT to align regional goals and objectives with the statewide SHSP and consequently the HSIP project selection.

**Table 4.8 SHSP Critical Emphasis Areas Relevant to the Memphis MPO Region**

Critical Emphasis Area	Applicable Plan
Restraint usage	Mississippi
Occupant protection	Tennessee
Impaired driving	Mississippi
Driver behavior (including impaired driving)	Tennessee
Suspended and unlicensed drivers	Mississippi
Older drivers	Tennessee
Younger drivers	Tennessee
Lane/roadway departure crashes	Mississippi
Infrastructure improvements (including lane and roadway departure crashes)	Tennessee
Crashes at intersections, both signalized and nonsignalized	Mississippi
Infrastructure improvements (including crashes at intersections)	Tennessee
Vulnerable road users (pedestrians, bicyclists, motorcyclists)	Tennessee

To address the identified CEAs, the states proposed countermeasures to help reduce the total number of crashes and severity. Some countermeasures are infrastructure-related while others involve safety programs or initiatives, as shown in **Table 4.9**.

**Table 4.9 Examples of Countermeasures Used to Improve Safety**

Emphasis Area	Example Countermeasures
<b>Driver Behavior</b>	
Restraint Usage	<ul style="list-style-type: none"> <li>Highly publicized seatbelt and child restraint device enforcement campaigns</li> <li>Provide local sites for instruction in proper use of child restraint devices</li> </ul>
Impaired driving	<ul style="list-style-type: none"> <li>Regular, well-publicized Driving Under the Influence (DUI) checkpoints and special DUI patrols</li> <li>Requiring ignition interlocks as a condition for reinstating licenses for first offenders</li> </ul>
Suspended and unlicensed drivers	<ul style="list-style-type: none"> <li>Routinely linking citations to driver records</li> </ul>
Young drivers	<ul style="list-style-type: none"> <li>Provide high-risk driver education programs in schools</li> <li>Inform young drivers and parents of the graduated driver license (GDL) restrictions and encourage strict law enforcement of the GDL laws</li> </ul>
Older drivers	<ul style="list-style-type: none"> <li>Larger, more legible roadway signs and improved roadway delineation, especially under low light and poor weather conditions</li> <li>Teach older drivers to self-assess their driving skills and adapt driving techniques as needed to compensate for limitations</li> </ul>
Vulnerable road users (pedestrians, bicyclists, motorcyclists)	<ul style="list-style-type: none"> <li>Encourage driver education courses to include information on sharing the road safely and yielding right-of-way to pedestrians</li> <li>Promote the three-foot law for passing bicyclists</li> </ul>



Emphasis Area	Example Countermeasures
<b>Infrastructure-Related</b>	
Lane departure crashes	<ul style="list-style-type: none"> <li>• Rumble strips on roadway sections with narrow or unpaved shoulders</li> <li>• Improve shoulder drop-offs, widening, and/or paving shoulders</li> <li>• Skid-resistant pavement surfaces</li> <li>• Enhanced pavement markings</li> </ul>
Crashes at unsignalized intersections	<ul style="list-style-type: none"> <li>• Enhance signage, markings, and/or lighting to make intersections more visible</li> <li>• Restrict or eliminate turning movements through channelization or closing median openings</li> <li>• Clear vegetation and other items blocking the sight triangles on stop- or yield-controlled intersections</li> </ul>
Crashes at signalized intersections	<ul style="list-style-type: none"> <li>• Restrict or eliminate turning movements, including right turns on red or permitted left turns</li> <li>• Improve signal visibility and street signs at intersections</li> <li>• Minimize driveways and cross-median access near intersections</li> <li>• Enforce red-light running</li> </ul>

### 4.3.4 Other Safety Programs and Activities

In addition to the official countermeasures contained in the SHSPs, local agencies and other partners carry out a number of programs and activities to improve the safety of both motorized and non-motorized users of the transportation system. These include high visibility enforcement campaigns, roadside sobriety checkpoints and alcohol education programs operated by various local police departments throughout the MPO region, including the University of Memphis police.

Several successful Safe Routes to School projects have brought recognition to the region during the past several years, such as the “walking school bus” formed by students in Hernando and the comprehensive Safe Routes to School plan developed for Frayser Elementary School and the surrounding community, which involved important contributions from partners such as the University of Memphis and the Memphis Police Department’s North Precinct.

Local governments’ engineering and public works departments also serve a key role in promoting the safety of the transportation system through installation and maintenance of pavement markings, signs, and signals, and the ongoing repair of pavement and sidewalks. Traffic calming programs such as the one operated by the City of Memphis measure vehicular speeds and volumes to determine whether local streets may qualify for speed humps or similar measures to slow neighborhood traffic. The City of Memphis has also recently released a Pedestrian and School Safety Action Plan to prioritize and construct pedestrian infrastructure based on analysis of crash data, proximity to schools and other public facilities, current use and predicted pedestrian demand, and the condition of existing facilities. The plan includes a \$200 million improvement list, phased over a twenty year period of time, with recommended funding opportunities.

### **4.3.5 Transit System Safety and Security**

#### **MATA**

The Memphis Area Transit Authority has significantly enhanced the safety and security of its riders and drivers through the implementation of on-board cameras on all vehicles as well as video monitoring of transit facilities. Automatic vehicle locators (AVL), which are often installed to collect information about travel times, also help to increase security by allowing the transit agency to know where its drivers are at all times. Security guards are also stationed at MATA facilities throughout the city to monitor activities directly and deter crimes, such as theft and vandalism. These security guards are also equipped with body cameras in order to provide accurate accounts of events. Furthermore, the North End Terminal will soon house a precinct of the Memphis Police Department.

MATA maintains and updates the System Security and Emergency Preparedness Plan (SSEP), which addresses items such as hiring and training of agency personnel, strengthening community involvement in safety/security systems, and enhancing coordination with other agencies like the TDOT Multi-Modal Transportation Resources Division. MATA conducts regular training programs for its drivers and other staff on safety procedures. The agency also carries out a number of programs and activities to maintain and improve system safety. These include checklists and procedures for vehicle and facility inspection; ongoing employee safety training, internal safety audits, and participation in drills with the Memphis/Shelby County Emergency Management Agency and other partners. MATA also has adopted formal processes for hazard identification/response and for notification, investigation, and corrective action for accidents.

#### **Amtrak Passenger Rail Service**

To assist in security and safety issues for protecting passenger rail service, Amtrak has its own police department. The Amtrak Police Department is a national police force dedicated to protecting the passengers, employees, and patrons of Amtrak, by working with the Transportation Security Administration and other federal, state, and local law enforcement and counter-terrorism agencies across the country. Another feature of Amtrak security is a program implemented by the Amtrak Police Department known as the Partners for Amtrak Safety and Security program (PASS). The PASS program is based on the neighborhood watch philosophy and encourages community members to assist the Amtrak police by alerting them to any potential security or safety problems.

### **4.3.6 Bicycle and Pedestrian Safety**

Much attention has been given in recent years to bicycle and pedestrian safety in the Memphis MPO region. *Dangerous by Design*, a report regularly issued by Smart Growth America, ranked Memphis 5<sup>th</sup> on its "Pedestrian Danger Index" for metro areas over 1 million in population. The report notes that the true danger to pedestrians in these metro areas may be even higher, since its rankings are based on a federal database which tracks only fatal crashes.

Based on the data analyzed for 2011-2013, collisions with bicyclists and pedestrians made up only 1.2 percent of total crashes, but nearly all of them were severe:

- 94% of crashes involving pedestrians resulted in death or injury; and
- 84% of crashes involving bicyclists resulted in death or injury.

Crash density is highest in areas inside the I-240 loop, particularly downtown and midtown Memphis. As noted in the Memphis MPO Regional Bicycle & Pedestrian Plan, these areas have a greater number of destinations clustered

within walking and bicycling distance, as well as a higher number of pedestrians overall. Concentrations of bicycle crashes are also seen in the “first ring” suburbs of the Memphis MPO region including Bartlett, Germantown and Southaven, according to the plan.

Factors identified as potential contributors to bicycle crashes include slip lanes that allow turning vehicles to yield rather than stop, lack of dedicated space for bicyclists at intersections, and insufficient vehicle detection for bicycles at signalized intersections. Factors identified as potential contributors to pedestrian involved crashes include poor signage and signalization, poor or non-existent crosswalks, and poor sidewalk conditions.

### **4.3.7 Highway and Freight Rail Security**

The planning and management of the transportation system can affect user security in three key ways:

- Preventing events that could harm the transportation system and its users, including adapting the transportation system with an understanding of its vulnerability to extreme weather, climate change, or man-made disasters;
- Management of threats through coordination of transportation agencies with emergency management agencies;
- The role of the transportation system to provide evacuation and detour routes in response to emergency events.

The Memphis MPO has participated in an effort led by TDOT to perform an extreme weather vulnerability assessment of transportation infrastructure in the state. The geographical scope of the vulnerability assessment included all major transportation infrastructure located within Tennessee. The scope of the project extends through calendar year 2040, which matches the horizon year of MPO’s Livability 2040 Regional Transportation Plan. The study performed five basic tasks:

- Developed an inventory of transportation assets.
- Identified the assets considered critical to transportation system operation.
- Determined extreme weather scenarios to which critical transportation assets may be exposed.
- Assessed the impacts to the assets should an extreme weather scenario occur.
- Combined the information into an overall measure of vulnerability.

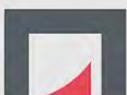
Finally, the study represents a starting point for TDOT in understanding the impacts of extreme weather on transportation assets across the state. MPOs will continue to work with TDOT in selecting specific critical assets identified as highly vulnerable and will become more familiar with the policies and procedures in the case of extreme weather events.

Threats to the transportation system and its users can be managed through the coordination of transportation agencies with emergency management responsibilities, to make sure that each agency understands its roles in the event of an emergency. The emergency management agencies are responsible for leading efforts for emergency planning and coordination to support large scale incidents and disasters. In the event of a disaster or other large scale emergency these agencies are responsible for operating the emergency operations center, which serves as a central point of command and control. The Tennessee Emergency Management Agency (TEMA) and the Mississippi Emergency Management Agency (MEMA) are in charge of this element of transportation security.

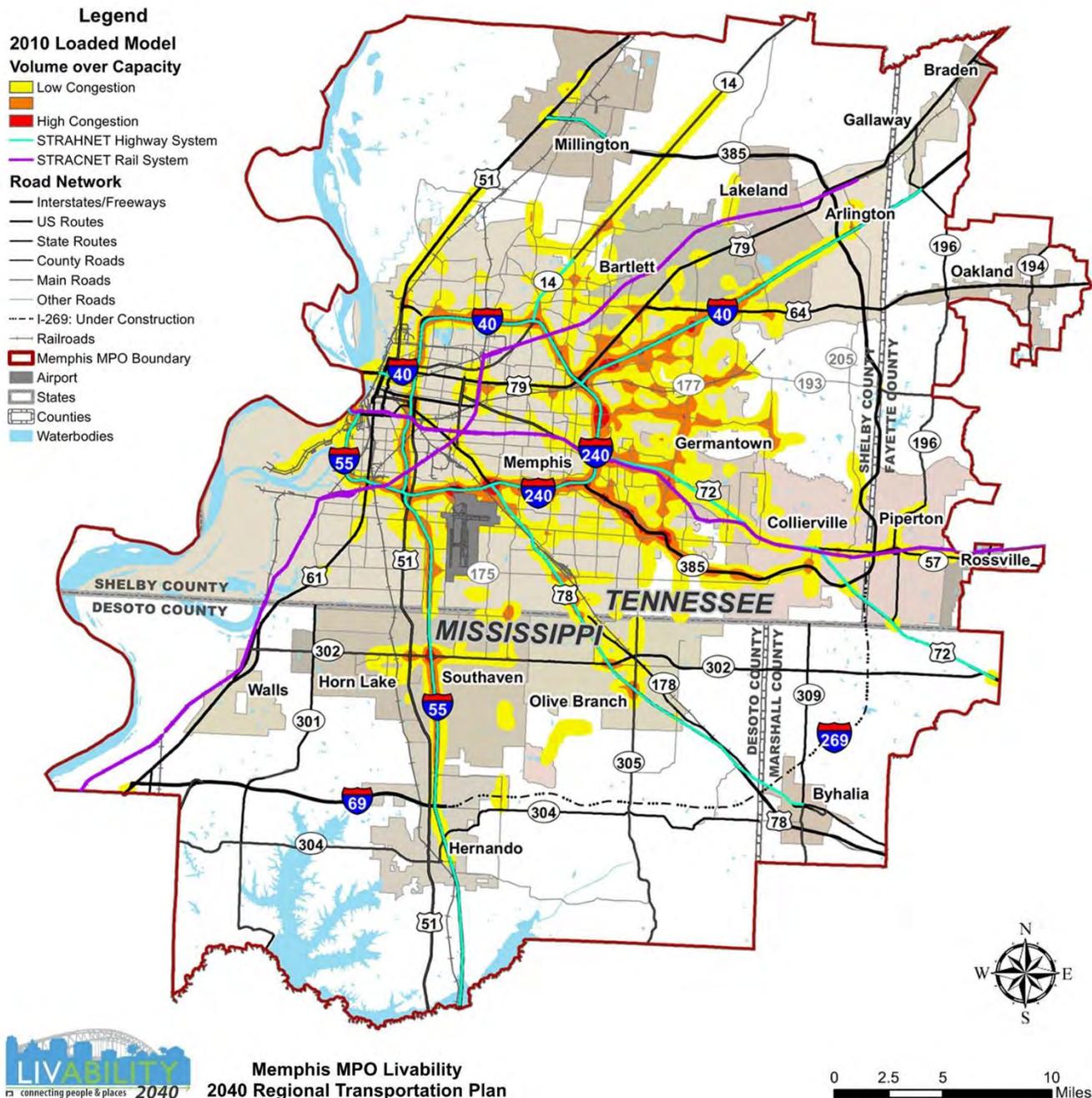
The Strategic Highway Network (STRAHNET) is a roadway system that is designated by FHWA, with input from the Department of Defense. The roadways include connector links to important military installations and ports. There are approximately 61,000 miles of roadway included in the STRAHNET system. The network is made up of about 45,400 miles of Interstate and defense highways, and about 15,600 miles of other public highways. Included in the other public highways are approximately 2,000 miles of connector roadways that link military installations and port facilities. In the Memphis MPO region, there are approximately 140 miles of roadway in the STRAHNET system. Figure 4.14 shows the locations of these routes.

These routes are important for national defense, but also serve as a key network for evacuation in case of natural or man-made emergencies. Figure 4.14 compares these critical routes to existing congestion, estimated from the travel demand model. These routes represent some of the most congested segments of the roadway network, particularly portions of I-40 and I-240. Also, STRAHNET in the Memphis region includes a Mississippi River crossing, representing a potentially vulnerable piece of infrastructure from a system perspective.

Similarly, the Strategic Rail Corridor Network (STRACNET) is a continuous and interconnected rail line that consists of over 38,000 miles of track serving over 170 defense installations. There are approximately 92 miles of rail line in the STRACNET system in the Memphis MPO region. **Figure 4.18** also shows the locations of these routes. STRACNET, like STRAHNET, includes a Mississippi River crossing in the Memphis region.



**Figure 4.18 Strategic National Security Networks Versus Congestion**



Source: FHWA and Regional Travel Demand Model.

### 4.3.8 Airport Security

Similar to other major airports around the nation, the Memphis International Airport employs a number of security strategies to manage threats at the airport itself and on airplanes that arrive and depart from Memphis International. Since 2001, security checkpoints and baggage screening operations have been updated to use the most advanced security technologies, such as explosive detection systems and “puffer” machines that detect explosive residue. These technologies allow extremely thorough security screening while minimizing intrusiveness and delays for

passengers. US Customs and Border Patrol (USCBP) also provides protection at the airport with security screening of incoming passengers and goods from abroad. In light of the significant amounts of freight volumes passing through the airport from foreign points of origin, USCBP officers offer an important level of security.

Being home to Federal Express Corporation (FedEx), the largest express transportation company in the world, creates unique security needs at the airport. Because this facility has operations within the secure area of the airport, FedEx must maintain the same level of security as is maintained at the airport. In addition, FedEx implements a number of other security measures, employing hundreds of specially trained security officers and safety specialists. These employees aggressively support and work closely with law enforcement officials, government agencies, and public health officials in the investigation of any attempt to compromise safety and security. At the sorting facility, employees must pass through a security screening process as they enter the hub. FedEx has constructed barrier walls at key locations to enhance the safety and security of its operations.

### **4.3.9 Port Security**

The main transportation security concern at the Port of Memphis on President's Island is the single evacuation route on Jack Carley Causeway. Since this is the only roadway that provides access to the island and since peak period volumes are currently approaching capacity, a secondary access point may need to be considered in the future. A secondary access point would provide system redundancy in case of an emergency along the Jack Carley Causeway or elsewhere on the island.

According to the Memphis Police Department, the port and surrounding area are attractive environments for organized crime due to the dense network of transportation facilities and large quantity of manufactured goods. The Memphis Police Department, the Shelby County Sheriff's Office, the local Federal Bureau of Investigation (FBI) office, the United States Customs Service, and the National Insurance Crime Bureau organized themselves through a memorandum of understanding into the Tennessee, Arkansas, Mississippi Auto Cargo Theft Task Force. This is a multi-agency, investigative law enforcement unit targeting organized vehicle theft, including heavy equipment and farm and construction machinery, and associated criminal activity and thefts from interstate cargo shipments.

Since 2005, the Port of Memphis received a \$6.5 million grant from the Department of Homeland Security (DHS) to update its security system. The funds were used to purchase and install 44 cameras with night-vision features and protective fencing along the Interstate 44 and Interstate 40 bridges across the Mississippi River. DHS has also selected the Port of Memphis as a "best practices" model for high-tech security measures, including early warning detection sensors for biological, chemical, and radiological releases.

### **4.3.10 Security Related to Seismic Events**

A major security concern for the region pertains to the risk of a potential seismic event and the resulting impact to the area's infrastructure. The Memphis MPO boundary is located within the New Madrid Seismic Zone (NMSZ). **Figure 4.19** illustrates the location of the NMSZ and historic seismic activity and magnitude. This zone has had four of the largest North American earthquakes in recorded history, with moment magnitudes estimated to be as large as 8.0, all occurring within a three-month period between December 1811 and February 1812. There are four bridges across the Mississippi River that operate as critical infrastructure components for the Memphis area that could be greatly impacted by a significant seismic event. These bridges are:

- The Frisco Bridge (owned by Burlington Northern Santa Fe Railway)
- The Harahan Bridge (owned by Union Pacific Railroad)
- The Memphis/Arkansas Bridge carrying I-55
- The Hernando DeSoto Bridge carrying I-40

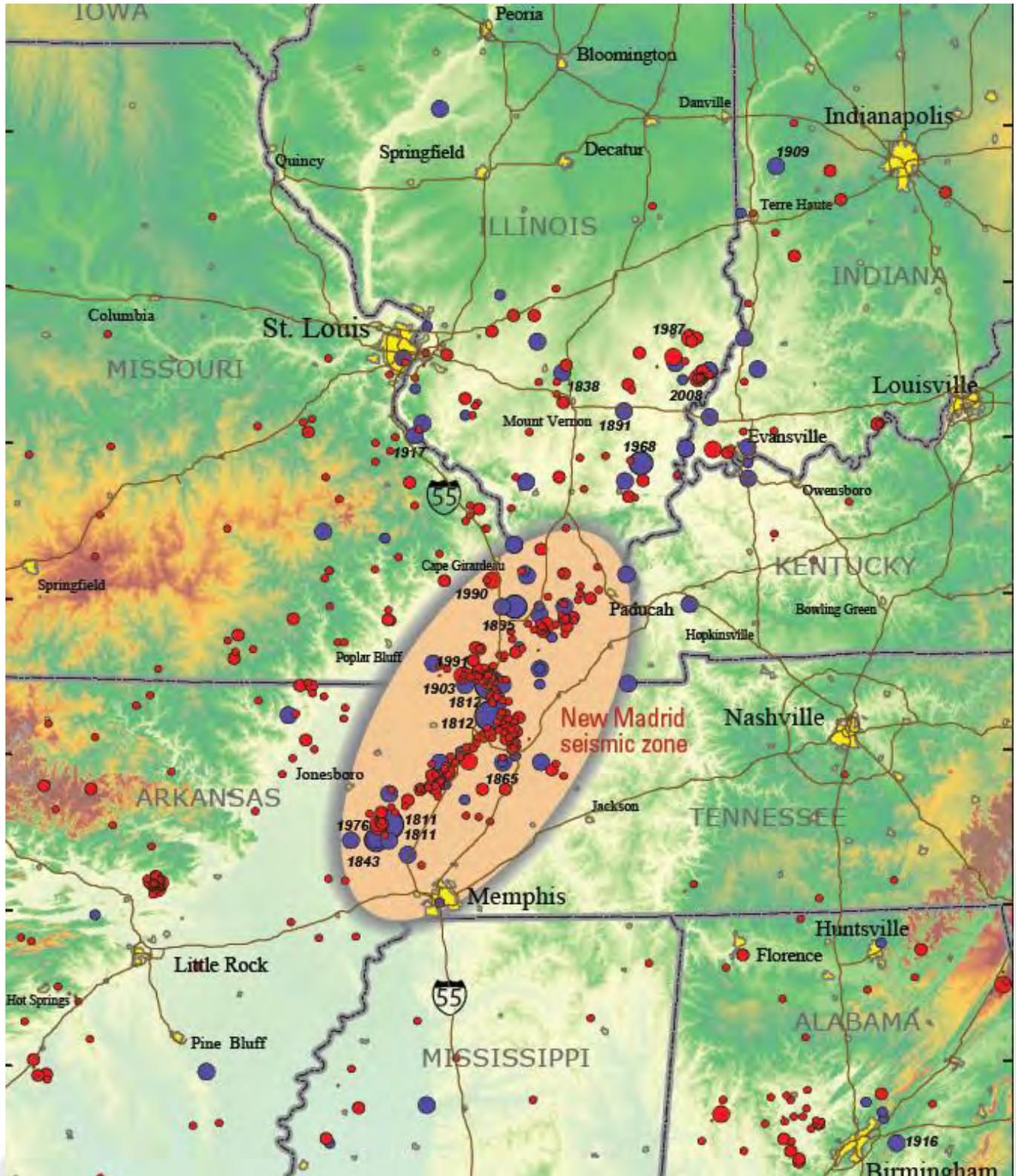
None of the existing Memphis area bridges were originally designed to withstand major earthquakes, the Hernando DeSoto Bridge underwent a seismic retrofit that is designed to withstand an earthquake up to magnitude 7.7. The Frisco Bridge, the Harahan Bridge, and the Memphis/Arkansas Bridge have not been upgraded to current seismic standards and could collapse during a major earthquake. The risk of individual bridge failure due to an earthquake is related to three primary factors:

- The underlying geology and soils,
- The probability of a seismic event of sufficient magnitude and frequency to inflict major structural damage requiring repair, and
- The ability of the bridge to withstand movements and forces generated by a design seismic event at a specific location.

The continued ability of the Frisco, Harahan, Memphis/Arkansas, and Hernando DeSoto Bridges to carry railroad freight, truck freight, passenger vehicles, and national defense related infrastructure without disruptions is vital to the region, and the entire nation.

The potential for a major seismic event remains a critical threat to the region's security and safety. When roads become damaged or closed due to natural disasters, emergency response can be impacted, evacuation routes can be hampered, and difficulties may arise in moving goods and supplies to those affected by the event. Therefore, it is important to provide for transportation improvements that will help safeguard the region against these impacts.

Figure 4.19 New Madrid Seismic Zone Activity



## 4.4 Multimodal Access and Connectivity

### 4.4.1 *Bicycle and Pedestrian*

A variety of bicycle and pedestrian facilities exist in the Memphis MPO region and are primarily concentrated in the downtown, Midtown, and Shelby Farms area, as shown in **Figures 4.20 and 4.21**. The recent Regional Bicycle and Pedestrian Plan prepared by the Memphis MPO defined the current conditions of bicycle and pedestrian infrastructure through a series of analyses. Also included are a list of projects that improve safety and accessibility, increase connectivity, and can potentially shift trips to bicycle or pedestrian travel.

To identify the usage and perception of bicycling in the Memphis MPO region, surveys were distributed by the Memphis MPO and their partnering organizations in March through July of 2014. Over 1,100 responses were collected and the results were used to understand bicycling and walking activities in the region. Approximately 28 percent of respondents ride a bike at least once a week for a specific purpose such as going to work, school, or shopping. Similarly, 57 percent of respondents make a walking trip for a specific purpose. Only one-third feel very safe or generally safe while bicycling with most respondents preferring bicycle paths separated from roads or protected bicycle lanes. Respondents had a higher perceived level of safety as a pedestrian with 60 percent feeling very safety or generally safe.

Some areas that could support bicycle and pedestrian infrastructure are in locations with smaller blocks and high-demand locations such as grocery stores and parks. This includes downtown and midtown Memphis, Collierville, Germantown, Whitehaven, Hernando, and other areas throughout the region. Continuous sidewalks along corridors as well as curbed ramps are vital to improve accessibility of pedestrian facilities. Bicycle facilities can also benefit from continuous networks, along with appropriate infrastructure for the adjoining facility in order to be comfortable and safe for all riders. For example, bicycle lanes may be more appropriate on roadways with higher speed limits while marked shared lanes are better suited on narrow lanes. The Memphis MPO Regional Bicycle and Pedestrian Plan identifies future potential bicycle and pedestrian projects to strengthen this network. The lump funding sum specified for bicycle and pedestrian projects can fund these and other projects that improves connections between existing and new infrastructure.



Above: Painted on-street bike lanes in the Memphis region.



The Memphis MPO Regional Bicycle and Pedestrian Plan identifies future projects to strengthen multimodal access and connectivity.

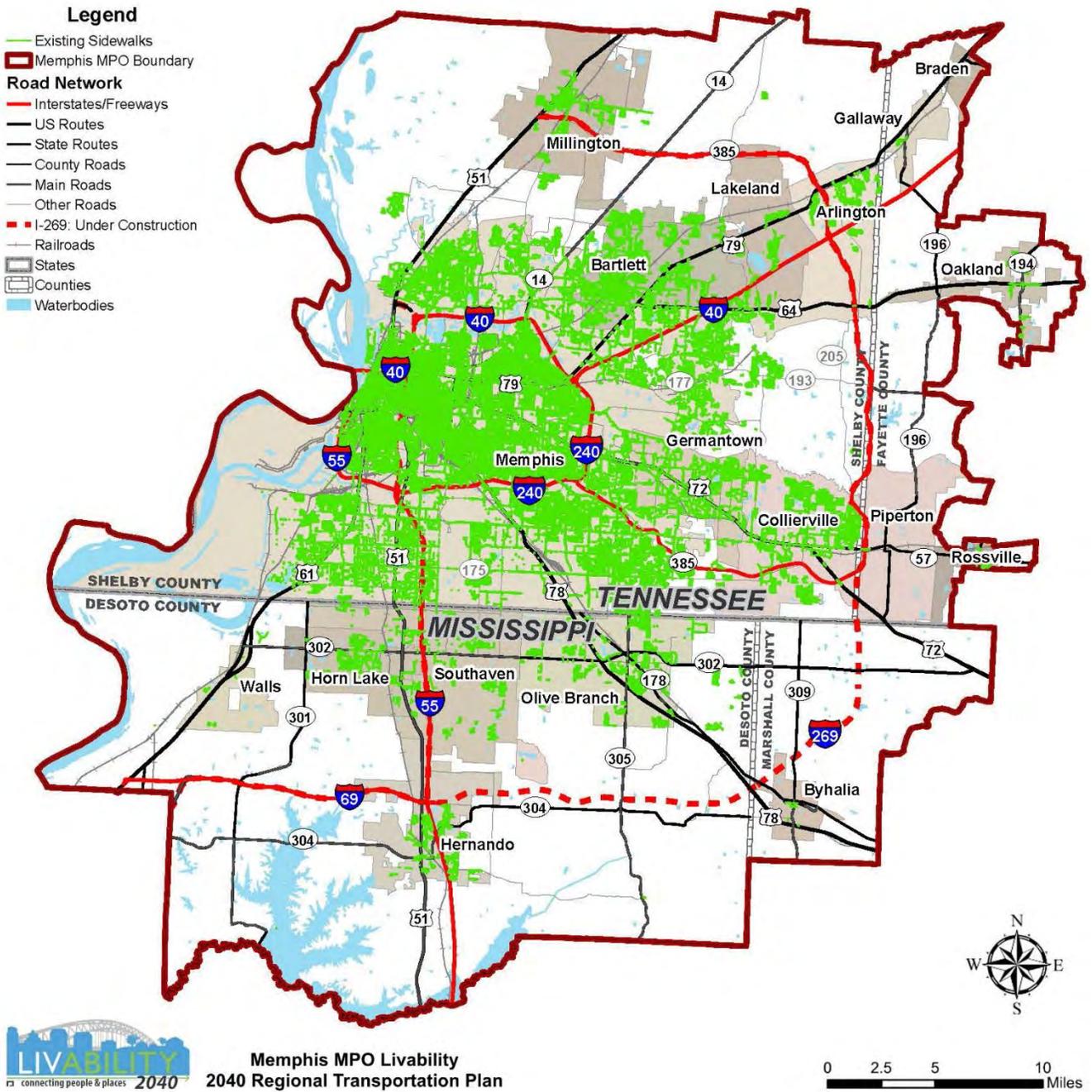
Figure 4.20 Existing Bicycle Network in the Memphis MPO Region



Memphis MPO Livability  
2040 Regional Transportation Plan

0 2.5 5 10 Miles

Figure 4.21 Existing Pedestrian Network in the Memphis MPO Region



## 4.4.2 Transit

Public transportation currently is provided by the Memphis Area Transit Authority (MATA) with a service area including Shelby County as well as West Memphis, Arkansas. There is currently no transit service in the Mississippi portion of the Memphis MPO, but Livability 2040 recommends extending service into DeSoto County, MS in the future (see Sections 8 to 9 and specifically Table 8.1 and Section 9.3.2). Three different modes of transportation are available through MATA: bus, demand response<sup>8</sup>, and trolley<sup>9</sup>, with a total of over 10.4 million unlinked trips in 2013.<sup>10</sup> In recent years, the overall ridership and number of routes has decreased due to slow or negative growth of population within the service area as well as service cuts due to a lack of funding. Ridership projections from the travel demand model for 2040 are expected to be only slightly higher than 2010 (see transit mode share in Table 9.1) The travel demand model assumes that transit-dependent populations (low-income, elderly, etc.) represent the same percentage of the total population in 2040 as they do in 2010 (see Appendix B, Section 3.1).

To address this, MATA recently developed a Short-Range Transit Plan with the goal of providing easier and simplified service, with a frequency and service type that matches ridership demand.<sup>11</sup> This includes providing service to emerging markets and communities, such as southeast and northeast Memphis and major areas of employment in suburban Shelby County. New and altered routes were developed to address these needs and are set to be finalized and implemented over a five-year period, starting in 2014.

TDM strategies to provide transit solutions to key job clusters in the Memphis MPO region have also been discussed. This includes implementing service in areas without transit, forming employee shuttles/carpools to expand mobility options, and establishing mobility managers to work with employees to improve transit conditions.

In addition, an alternatives analysis focusing on potential transit modes in the Midtown area currently is underway and is set to be publically available by Spring of 2016. This analysis is investigating the addition of bus rapid transit (BRT), modern trolley, and/or light rail transit (LRT) in the Midtown Memphis area.

Transit related projects are also included as part of the FY 2014-17 Transportation Improvement Program (TIP). The following



Above: The trolley bringing passengers down Main Street.

Below: MATA service is critical for connecting people to jobs.



<sup>8</sup> According to the National Transit Database, demand response is a transit mode comprised of passenger cars, vans or small buses operating in response to calls from passengers or their agents to the transit operator, who then dispatches a vehicle to pick up the passengers and transport them to their destinations.

<sup>9</sup> The vintage trolley rail system is currently suspended due to required maintenance on all trolley cars.

<sup>10</sup> National Transit Database.

<sup>11</sup> Nelson Nygaard (2012). *Short Range Transit Plan*. Memphis Area Transit Authority. Retrieved from <http://www.memphismpo.org/sites/default/files/public/mata-short-range-transit-plan.pdf>.

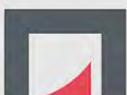
**Table 4.10** lists the transit projects for FY 2014 to FY 2017 that were included in the TIP at the time of the Livability 2040 Regional Transportation Plan adoption. The transit projects and improvements identified include purchasing and capital projects, operating expenses, maintenance, transit service, and advanced technology. For more information about the funding that is available or committed, refer to the latest copy of the TIP, which is available on the Memphis MPO's website ([www.memphismpo.org](http://www.memphismpo.org)). **Figure 4.22** shows the existing transit network.

**Table 4.10 FY 2014 to 2017 Transportation Improvement Program<sup>12</sup>**  
*Transit Projects Only*

TIP Number	Project Name	Project Description
5307-2006-01	ADA Paratransit Services	MATA is permitted to use up to 10% of their annual apportionments under Section 5307 to cover operating expenses for its demand-response service known as MATAplus.
5307-2006-02	Advanced Public Transportation Systems Phase II	Advanced Public Transportation Systems apply advanced technologies to address public transportation needs. These systems may include communication systems, fare collection systems, security systems, mobility management software, project administration, and other management systems.
5307-2006-03	Bus Facility Improvements	Includes various routine improvements to bus-related facilities, such as construction and repairs to maintenance, operations, and passenger facilities. Typical items include roof repairs, equipment repairs, painting, security elements, HVAC modifications, paving, etc.
5307-2006-04	Computer Hardware and Software	These systems are used to maintain accurate records and keep various department tasks such as finance, purchasing, scheduling, transportation, maintenance, grants, planning, marketing and human resources operational.
5307-2006-05	Fixed Route Buses	This project provides funding for the purchase of up to 12 buses between FY 2014 and FY 2017 using Section 5307 funds. These buses generally have a service life of 12 years or 500,000 miles, whichever comes first, and will replace up to 12 diesel buses that have met their useful service life. All buses will be replaced in accordance with FTA's currently rolling stock policy.
5307-2006-06	Paratransit Vehicles	This project provides funding for the purchase of paratransit vehicles between FY 2014 and FY 2017 using Section 5307 funds as follows: up to six in FY 2014; up to six in FY 2015; up to six in FY 2016, and up to six in FY 2017. These vehicles will replace up to 24 diesel paratransit buses that have met their useful life. All vehicles will be replaced in accordance with FTA's currently rolling stock policy.
5307-2006-07	Preventative Maintenance	Preventive Maintenance provides funds for materials and supplies, inspections and routine maintenance needed to maximize the efficiency and service life of MATA's capital assets, including MATA's fixed-route and demand-response bus fleets, rail fleets, service vehicles, infrastructure and facilities.

<sup>12</sup> Reference the latest copy of the TIP on the Memphis MPO's website ([www.memphismpo.org](http://www.memphismpo.org)), which includes additional information on these TIP projects.

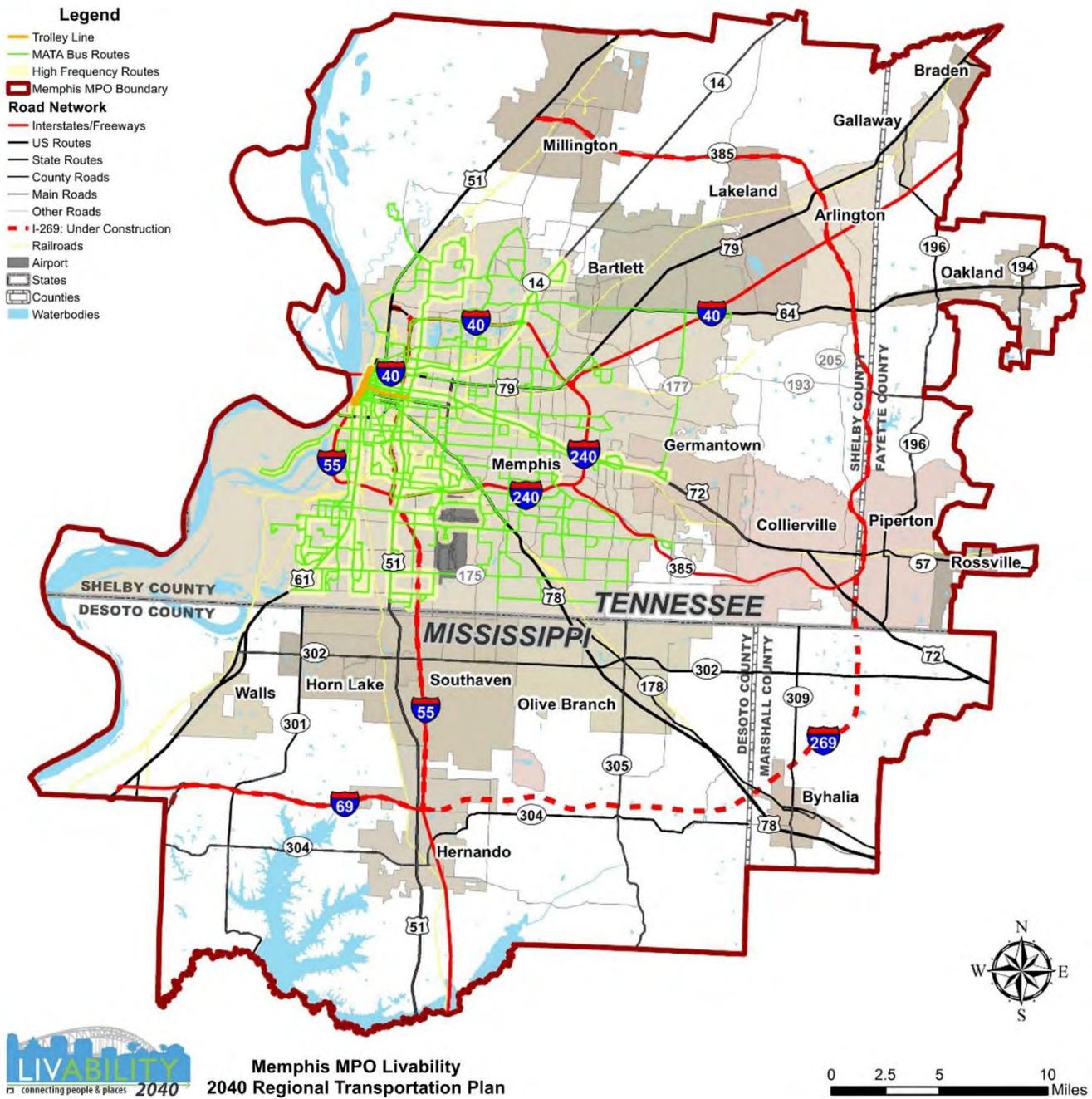
TIP Number	Project Name	Project Description
5307-2006-09	Transit Centers	MATA plans to construct a system of transit centers in various locations throughout MATA's service area. Bus routes in each area will be adjusted to serve the centers, and schedules will be adjusted to minimize waiting time for transfers. The Transit Center Program may be funded with a combination of Section 5307, Section 5339 and possibly CMAQ funds. Transit centers typically consist of a small off-street passenger waiting area and bus berthing area.
5307-2006-11	Service Vehicles	This project involves periodic replacement of MATA's service vehicles between FY2014 and FY2017 using Section 5307 funds as follows: up to five in FY2015; up to five in FY2016 and up to five in FY2017. The service life of these vehicles is typically four years or 100,000 miles, whichever comes first. These vehicles will replace service vehicles that have met their useful service life.
5307-2012-02	Furniture, Fixtures, and Equipment	Includes various purchases and replacement of MATA's capital assets such as furniture, office equipment or site furnishings.
5307-2013-01	Associated Transit Improvements	Includes various projects designed to enhance public transportation service or use and that is physically or functionally related to transit. Eligible projects include: historic preservation, rehabilitation and operation of historic public transportation buildings, structures, and facilities intended for use in public transportation service; bus shelters; landscaping and streetscaping, including benches, trash receptacles, and street lights; pedestrian access and walkways; bicycle access or storage equipment; signage; or enhanced access for persons with disabilities to public transportation.
5337-2013-01	Preventive Maintenance – Rail Only	Preventive Maintenance provides funds for materials and supplies, inspections and routine maintenance needed to maximize the efficiency and service life of MATA's capital assets, including MATA's rail fleet, service vehicles, infrastructure and facilities.
5337-2014-01	Rail Facility Improvements	This project includes various routine improvements to rail related facilities. Such improvements include repairs to tracks, switches, crossties, the catenary system, bridges, substations, stations and the Trolley Maintenance and Storage Facility.
5339-2013-01	Fixed-Route Buses	This project provides funding for the purchase of up to 12 buses between FY2014 and FY2017 using Section 5339 funds. These buses generally have a service life of 12 years or 500,000 miles, whichever comes first, and will replace up to 12 diesel buses that have met their useful service life. All buses will be replaced in accordance with FTA's currently rolling stock policy.
5339-2013-02	Bus Facility Improvements	Includes various routine improvements to bus-related facilities such as construction and repairs to maintenance, operations and passenger facilities. Typical items include roof repairs, equipment repairs, painting, security elements, HVAC modifications, paving, etc.



TIP Number	Project Name	Project Description
5339-2014-01	Bus Operations and Maintenance Facility	MATA completed a feasibility study in 2012 which recommended gradual relocation of MATA's existing Bus Operations, Maintenance and Administration functions from 1370 Levee Road to another site as funding permits. The existing facility was built on a former landfill and continues to sink causing numerous problems that are expected to worsen in the future. Funding is programmed in FY2016 for land acquisition and in FY2017 for the design and engineering.
5310-2014-01	Capital Equipment	This project provides funding for the purchase of 2 Rear Lift Conversion Vans, 1 Cutaway Minibus, and 1 Center Aisle Raised Roof Passenger Van using Section 5310 funds. This capital equipment has been awarded to the Shelby Residential & Vocational Services, Inc.
5310-2014-02	Capital Equipment	This project provides funding for the purchase of 1 Passenger Bus using Section 5310 funds. This capital equipment has been awarded to the Goodwill Homes Community Services, Inc.
5307-2014-01	Jobs Access/Reverse Commute Bus Service	MATA plans to implement new bus service in the northeastern part of Memphis along Goodlett Farms Parkway as a Jobs Access/Reverse Commute (JARC) project.
5309-2014-01	Bus Facility Improvements	Includes various routine improvements to bus-related facilities such as construction and repairs to maintenance, operations and passenger facilities. Typical items include roof repairs, equipment repairs, painting, security elements, HVAC modifications, paving, etc.
5310-2015-01	Enhanced Mobility of Seniors and Individuals with Disabilities Program	MATA plans to use Section 5310 funds for eligible operating projects under the Section 5310 Enhanced Mobility of Seniors and Individuals with Disabilities Program.
5310-2015-02	Enhanced Mobility of Seniors and Individuals with Disabilities Program	MATA plans to use Section 5310 funds for eligible capital projects under the Section 5310 Enhanced Mobility of Seniors and Individuals with Disabilities Program.
5310-2015-03	Enhanced Mobility of Seniors and Individuals with Disabilities Program	MATA plans to use Section 5310 funds for Project Administration costs associated with administering projects under the Section 5310 Enhanced Mobility of Seniors and Individuals with Disabilities Program.
5310-2015-04	Enhanced Mobility of Seniors and Individuals with Disabilities Program	MDOT plans to use Section 5310 funds for eligible operating projects under the Section 5310 Enhanced Mobility of Seniors and Individuals with Disabilities Program.
5310-2015-05	Enhanced Mobility of Seniors and Individuals with Disabilities Program	MDOT plans to use Section 5310 funds for eligible capital projects under the Section 5310 Enhanced Mobility of Seniors and Individuals with Disabilities Program.

Source: FY 2014-2017 Transportation Improvement Program.

Figure 4.22 Existing Transit System

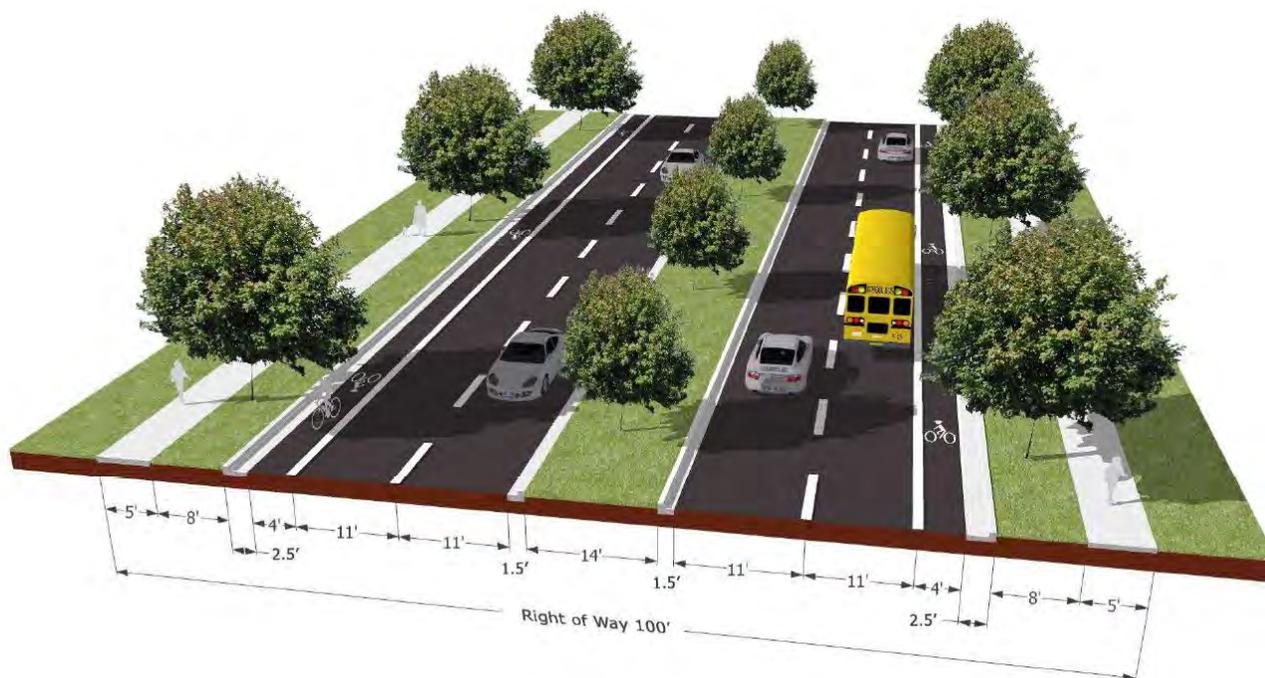


### 4.4.3 Complete Streets

Complete Streets design standards are policy-based strategies to improve multimodal options. The goal of Complete Streets policies is to incorporate designs for pedestrian, bicycle, and transit facilities into regular roadway design guidelines to ensure that consideration is given for these multimodal facilities in all roadway projects. For

example, **Figure 4.23** shows an illustration of a roadway cross section with dedicated bicycle lanes and sidewalks. In the Memphis MPO region, the Tennessee Department of Transportation (TDOT) and Mississippi Department of Transportation (MDOT) each have a statewide Complete Streets policy along with the local municipalities of Memphis, Tennessee, Hernando, Mississippi, and Byhalia, Mississippi. The City of Memphis' Complete Streets Project Delivery Manual (<https://bikepedmemphis.wordpress.com/plans-and-publications/complete-streets-project-delivery-manual/>) was developed through the Mid-South Regional Greenprint as a result of a mayoral executive order in 2013.

**Figure 4.23 Complete Streets Example Roadway Cross Section**



Source: Memphis MPO, *Direction 2040 RTP*.

The Complete Streets policy for the City of Memphis<sup>13</sup> demonstrates the desire to accommodate all users, regardless of age or ability, and transportation modes. Signed into law in 2013 by Mayor A C Wharton, Jr., the goal of this executive order is to:

- Foster economic growth;
- Prioritize safety;
- Create greater connectivity between neighborhoods and amenities;
- Meet the mobility needs of all users;
- Be context sensitive and aesthetically pleasing;

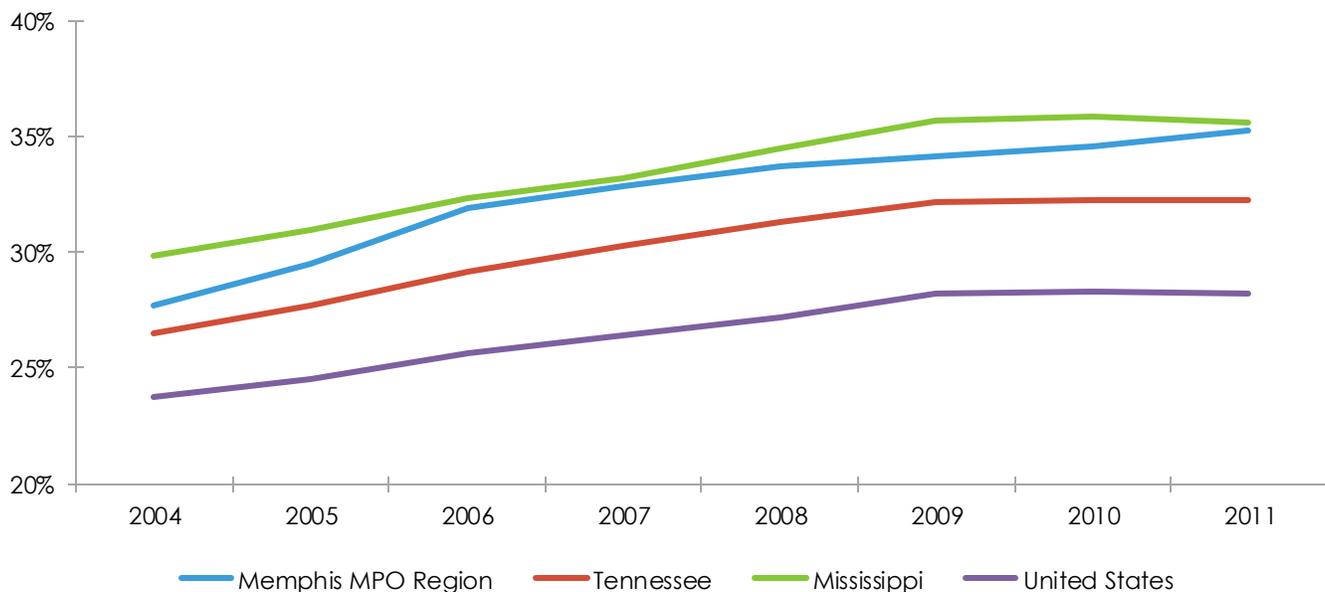
<sup>13</sup> <http://www.smartgrowthamerica.org/documents/cs/policy/cs-tn-memphis-executiveorder.pdf>.

- Reduce traffic congestion; and
- Positively impact the health of the community.

Incorporating all transportation modes into roadway design guidelines not only improves the access and safety for all users but can impact regional health. The availability and quality of active transportation options, such as bicycling and walking, directly impacts the amount of physical activity we receive every day. Studies have concluded that the automobile lifestyle contributes to decreased physical activity, increase emotional stress, respiratory illnesses, and a high fatality risk.<sup>14</sup>

In the Memphis MPO region obesity is a major concern, with obesity prevalence higher than the national average. As shown in **Figure 4.24**, approximately 35 percent of residents in the Memphis MPO region (Shelby, DeSoto, Fayette, and Marshall Counties) are obese.<sup>15</sup> This is compared to 28 percent of the United States and is similar to the State of Mississippi, which is tied with West Virginia as the most obese State.<sup>16</sup> These figures have increased from 2004 to 2011 for the region. A comprehensive transportation network can help combat this growing problem, not only improving accessibility and quality of life but providing more opportunities to incorporate physical activity into everyday travel.

**Figure 4.24 Obesity Prevalence by Area**



Source: Cambridge Systematics analysis of Centers for Disease Control and Prevention (CDC) Obesity Prevalence data.

<sup>14</sup> American Public Health Association (2010 March). *The Hidden Health Costs of Transportation*. Retrieved from [http://www.apha.org/~media/files/pdf/topics/transport/hidden\\_health\\_costs\\_of\\_transportation\\_background.as hx](http://www.apha.org/~media/files/pdf/topics/transport/hidden_health_costs_of_transportation_background.as hx).

<sup>15</sup> Cambridge Systematics, Inc. analysis of Centers for Disease Control and Prevention (CDC) Obesity Prevalence data available at: [http://www.cdc.gov/diabetes/atlas/countydata/County\\_ListofIndicators.html](http://www.cdc.gov/diabetes/atlas/countydata/County_ListofIndicators.html).

<sup>16</sup> <http://www.cdc.gov/obesity/data/prevalence-maps.html>.

### 4.4.4 Intercity Passenger Rail and Bus

Amtrak operates one long distance Superliner train through Tennessee, the City of New Orleans route. The daily overnight service includes stops at Chicago; Memphis; Jackson, Mississippi; and New Orleans, operating on a track owned by Canadian National Railway (CN). Full dining and sleeper service cars are available for the 19-hour, 926-mile trip.

By rail, travel time between Jackson and Memphis is about 4 hours and 15 minutes. Travel time between Memphis and Chicago is slightly more than 10 hours. On-time performance for the City of New Orleans service was about 70% for travel during 2014, with a ridership of approximately 251,000.

Within Memphis, Amtrak's passenger rail service connects to the MATA trolley system via Central Station (constructed in 1914 and recently restored), located on South Main Street.

*Studies or efforts are currently underway by the Tennessee Department of Transportation, Arkansas State Highway and Transportation Department (AHTD), and Amtrak to increase intercity passenger rail options to and from Memphis; however, at this time no funds have been committed for implementation.*

High-speed rail connections for the Memphis MPO region are also being explored. Although the Federal Railroad Administration's initial High-Speed Rail Strategic Plan (**Figure 4.25**) did not show Memphis on the South Central Corridor running from southern Texas to the Chicago Hub, subsequent planning efforts and funds were allocated for AHTD to evaluate the feasibility of extending the South Central High-Speed Rail Corridor from Little Rock to Memphis.

**Figure 4.25 High-Speed Rail Concept by the Federal Railroad Administration, 2009**



Source: Federal Railroad Administration, 2009

The FRA 2009 High Speed Rail Strategic Plan defines three categories of high speed service based on distance between markets, top speeds of service, and existence of dedicated right of way:

- **HSR Express** – operates in corridors 200-600 miles in length, with top speeds over 150 mph on primarily dedicated tracks;
- **HSR Regional** – operates at top speeds of 110-150 mph on a mix of dedicated tracks and tracks shared with slower passenger and freight trains; and
- **Emerging HSR** – corridors of 100-500 miles in length with service operating at top speeds of 90-110 mph on tracks shared with freight and/or commuter services.



Intercity buses also connect the Memphis MPO Area to other regions. Currently two companies serve the area: Megabus and Greyhound.

Megabus provides direct connections between Memphis and Atlanta, Birmingham, Chicago, Dallas/Fort Worth, Little Rock, New Orleans, St. Louis, and Oxford and Jackson, Mississippi. Buses arrive and depart from the south side of MATA's North End Terminal located just off North Second Street.

Greyhound bus services arrive and depart from 203 Union Avenue. In addition to their regular service network, Memphis is one of the markets where Greyhound provides its Express Routes, which offer faster service due to limited stops as well as extra amenities such as wireless internet access, electrical outlets and seating with more legroom than their standard buses. Currently Greyhound Express service in Memphis is available to and from Little Rock, Dallas, Texarkana, Birmingham, Atlanta, Chicago, Milwaukee, and Effingham and Champaign, Illinois.

## 4.5 Transportation Disadvantaged

Transportation disadvantaged communities comprise a range of demographic and socioeconomic groups in need of targeted transportation solutions designed to support a set of unique mobility needs. For the purposes of Livability 2040, transportation disadvantaged communities reflect:

- **Environmental justice communities** – Low income, limited English proficiency (LEP), and minority populations;
- **Persons with a disability** – An individual with a hearing, vision, cognitive, ambulatory, self-care, and/or independent living difficulty; and
- **Persons 65 and older.**

The following principles are cornerstones of environmental justice:

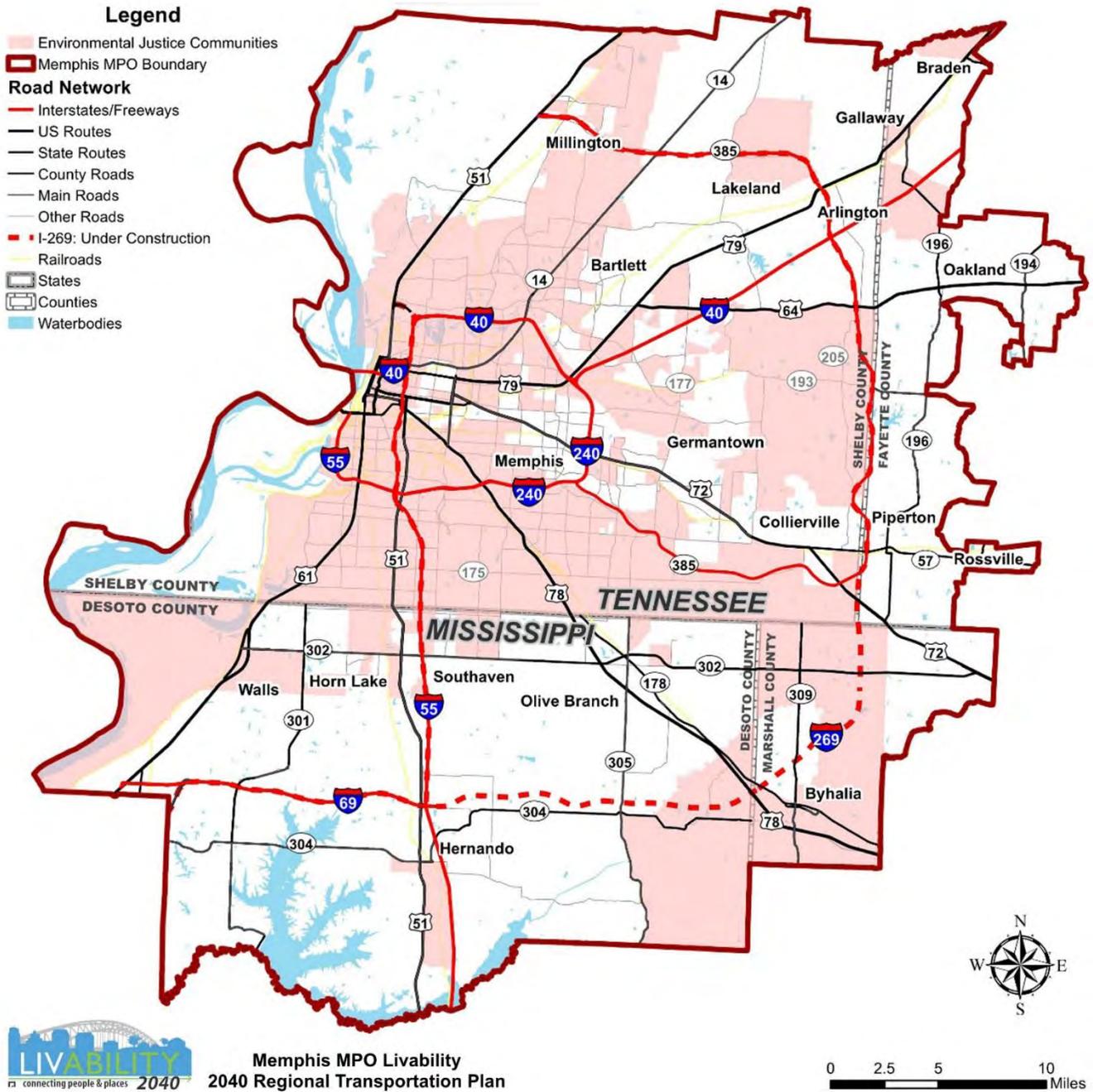
- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation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

These principles of environmental justice will be considered throughout transportation planning, project development, and through all public outreach.

### **4.5.1 Environmental Justice Communities**

Environmental Justice (EJ) communities were identified as areas with a higher than average portion of minority persons, low-income persons, and/or persons with Limited English proficiency (LEP). See Section 9.3.1 for details on the data and calculation methods used to identify EJ communities. These areas are shown in **Figure 4.26** and are important to ensure equitable transportation access and solutions for all users.

**Figure 4.26 Combined Environmental Justice Areas**  
*Minority, Low Income, and Limited English Proficiency Areas*



US Census Bureau data can be used to understand the access of EJ communities to various transportation modes. **Table 4.11** shows a summary of this US Census travel mode to work data, which outlines what transportation mode environmental justice communities use on a daily basis and if the use is similar to the modes used by the general population (above the povertyline, nonminority, or non-LEP). If travel for EJ and non-EJ communities were similar, the overall distribution of travel mode to work would be similar; however, EJ communities have differing travel characteristics. In particular, low-income persons are more likely to carpool, ride transit, and walk to work when compared to the general population. Similarly, minority persons are more likely to carpool and ride transit while 36 percent of persons with LEP carpool. Improved transit service and expanding opportunities for ride sharing not only increases mobility options for all residents but also greatly impacts mobility and accessibility for EJ communities.

**Table 4.11 Transportation Mode to Work by Environmental Justice Communities**

Environmental Justice Communities	Drove Alone		Carpool		Public Transportation		Walked		Other		Worked at Home	
Below 100 Percent of the Poverty Level	22,074	62.10%	7,070	19.90%	2,239	6.30%	2,049	5.80%	1,129	3.20%	973	2.70%
100 to 149 Percent of the Poverty Level	26,931	73.30%	6,305	17.20%	1,364	3.70%	719	2.00%	665	1.80%	752	2.00%
At or Above 150 Percent of the Poverty Level	373,092	85.10%	41,821	9.50%	3,829	0.90%	4,261	1.00%	4,011	0.90%	11,235	2.60%
Minority	194,807	78.10%	35,306	14.20%	6,805	2.70%	4,284	1.70%	3,977	1.60%	4,212	1.70%
Nonminority	228,620	86.70%	20,021	7.60%	627	0.20%	3,623	1.40%	1,866	0.70%	9,000	3.40%
LEP	13,425	57.00%	8,561	36.40%	384	1.60%	605	2.60%	281	1.20%	282	1.20%
Non-LEP	410,002	83.70%	46,766	9.60%	7,048	1.40%	7,302	1.50%	5,562	1.10%	12,930	2.60%
Population Distribution	423,427	82.50%	55,327	10.80%	7,432	1.40%	7,907	1.50%	5,843	1.10%	13,212	2.60%

Source: 2006-2010 American Community Survey 5-Year Estimates.

Note: "Other" includes taxicab, motorcycle, bicycle, and other non-drive-alone auto means.

### 4.5.2 Persons with Disabilities

Persons with a disability may be at a disadvantage when utilizing different transportation modes. For example, a person with epilepsy may not be eligible for a driver's license, or wheelchair users may not be able to commute using the sidewalk network due to a lack of curb ramps. The areas with a higher than average portion of persons with a disability are shown in **Figure 4.27**, illustrating a dispersed and largely decentralized population distribution. Several areas with high percentages of persons with disabilities lie outside of the MATA fixed route service area as shown in **Figure 4.30**.



The travel mode to work between those with and without a disability is shown in **Table 4.12**. A slightly lower portion of persons with a disability drive alone to work. Public transportation and working at home are used more among those with a disability.

**Table 4.12 Transportation Mode to Work for Persons with a Disability in Shelby County**

Travel Mode to Work	With a Disability		Without a Disability		Without a Disability	
	Count	Percentage	Count	Percentage	Count	Percentage
Drove Alone	15,315	73.00%	316,186	82.40%	331,450	81.90%
Carpool	2,916	13.90%	41,442	10.80%	44,517	11.00%
Public transportation	818	3.90%	5,756	1.50%	6,475	1.60%
Walked	399	1.90%	5,756	1.50%	6,071	1.50%
Other	587	2.80%	3,837	1.00%	4,452	1.10%
Worked at Home	923	4.40%	10,360	2.70%	11,332	2.80%

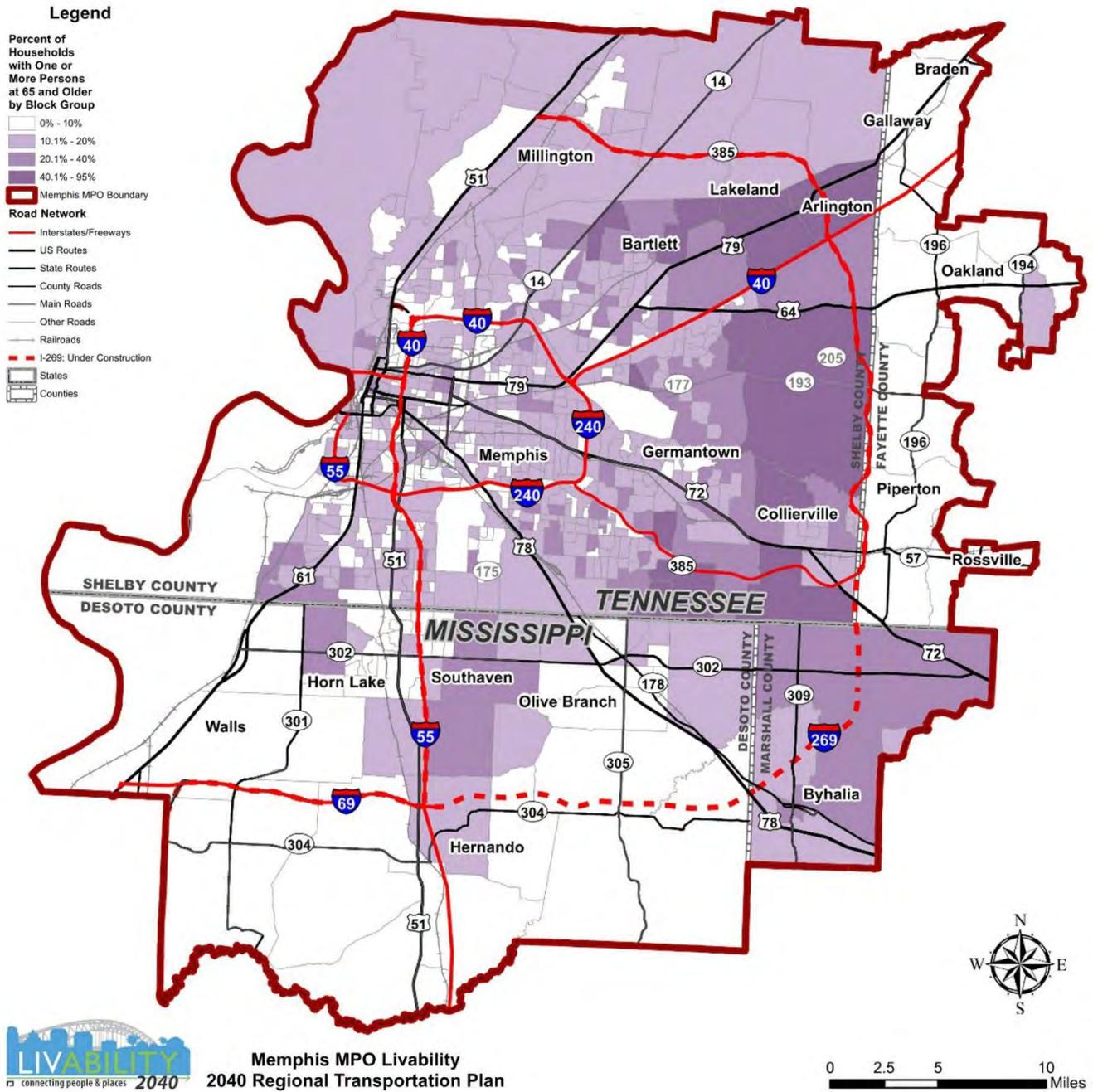
Source: 2008-2010 American Community Survey 3-Year Estimates.

Note: "Other" includes taxicab, motorcycle, bicycle, and other nondrive-alone auto means. Persons with a disability is defined as an individual with hearing, vision, cognitive, ambulatory, self-care, or independent living difficulty. This data was not available for DeSoto, Fayette, and Marshall Counties and only includes noninstitutionalized civilians.

### 4.5.3 Persons 65 or Older

The areas with a higher concentration of persons 65 or older is shown in **Figure 4.28**. The rates are higher outside of the fixed route transit service coverage area, providing additional mobility challenges for this population that may require alternative modes of transportation.

Figure 4.28 Areas with Persons 65 or Older



For the four counties that are entirely or partially in the Memphis MPO, approximately four percent of residents who are employed are 65 years old or older. The transportation mode to work for these individuals is shown in **Table 4.13**. The primary mode to commute to work for both elderly and nonelderly is driving alone at 83.4 percent and 82.5 percent, respectively. However, approximately 5.0 percent of elderly workers work at home, which is twice as high as nonelderly individuals. Otherwise, the distribution for the remaining modes to work are fairly even between elderly and nonelderly workers.

**Table 4.13 Transportation Mode to Work for Elderly and Nonelderly Population**

Travel Mode to Work	Elderly		Nonelderly		General Population	
Drove Alone	15,402	83.40%	408,025	82.50%	423,427	82.50%
Carpool	1,492	8.10%	53,835	10.90%	55,327	10.80%
Public transportation	224	1.20%	7,208	1.50%	7,432	1.40%
Walked	245	1.30%	7,662	1.50%	7,907	1.50%
Other	182	1.00%	5,661	1.10%	5,843	1.10%
Worked at Home	921	5.00%	12,291	2.50%	13,212	2.60%

#### 4.5.4 Multimodal Access for the Transportation Disadvantaged

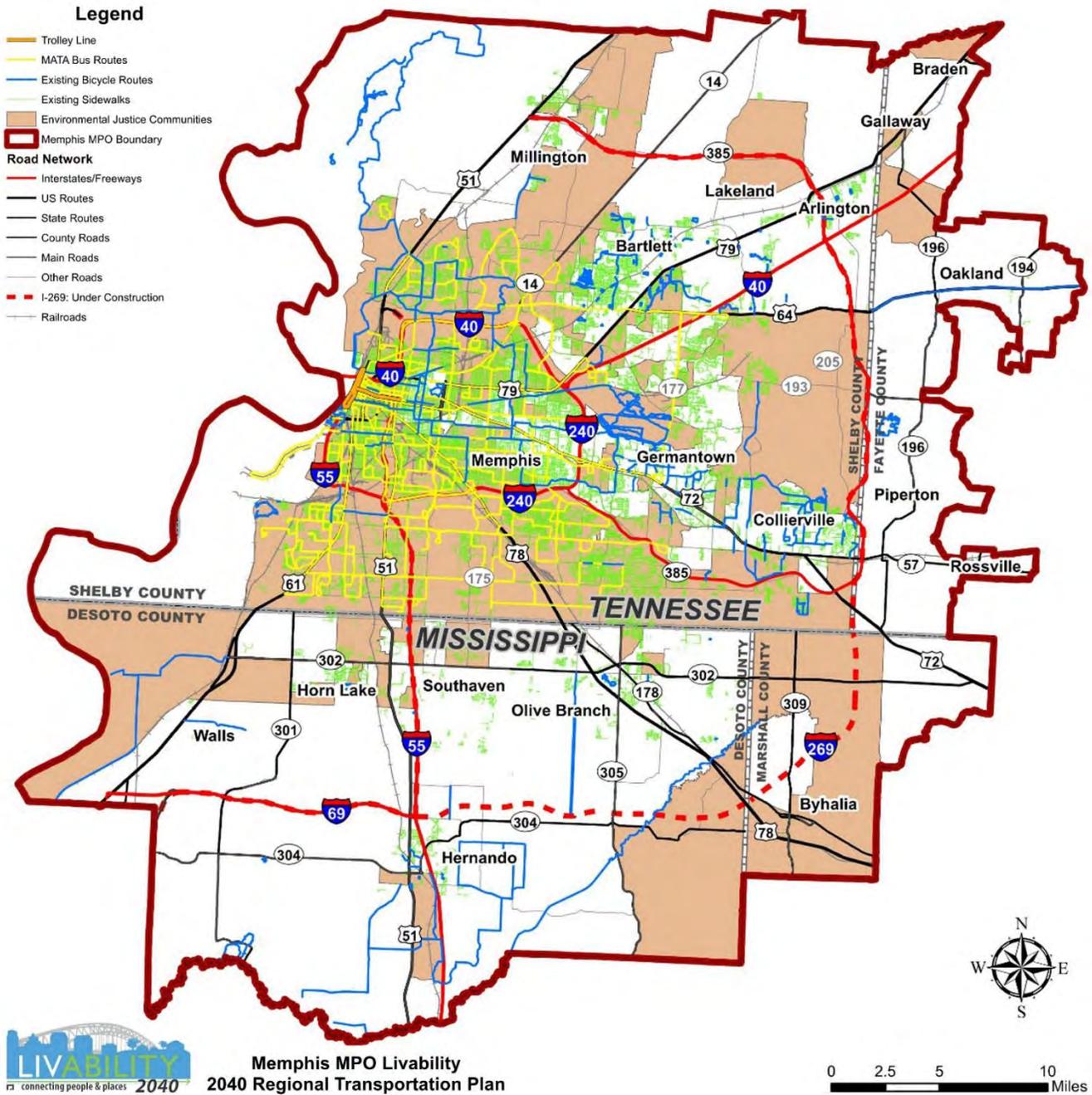
To supplement the transportation disadvantaged analysis a GIS analysis was conducted to evaluate the relationship of existing transit, bicycle, and pedestrian facilities to the transportation disadvantaged.

Many of the region's most populous EJ communities are within the corporate limits of Memphis where MATA operates fixed route and paratransit services. However, **Figure 4.29** shows a number are located outside MATA's service area, including Lakeland, Gallaway and Braden; residents who live east of Millington, and the less urbanized portions of east central Shelby County. Also included are parts of Horn Lake and Lynchburg in DeSoto County. In Marshall County, much of the area west of Cayce Road consists of EJ communities without access to fixed route transit.

Bicycle access is expanding across the region though it is not yet linked to more densely populated areas such as Southaven, Horn Lake and Olive Branch. The Marshall County portion of the MPO currently lacks formal bicycle infrastructure to serve the EJ communities.

In addition, a number of EJ communities are currently underserved in terms of sidewalk infrastructure. In Shelby County, these include Whitehaven; the Raleigh community and portions of Bartlett; Germantown; and the Capleville community. Lakeland, Gallaway and Braden have almost no pedestrian infrastructure, nor do the EJ communities located outside Millington and in east central Shelby County. In DeSoto County, most municipalities and developed areas have sidewalk networks while the only pedestrian infrastructure in the Marshall County portion of the MPO is in Byhalia.

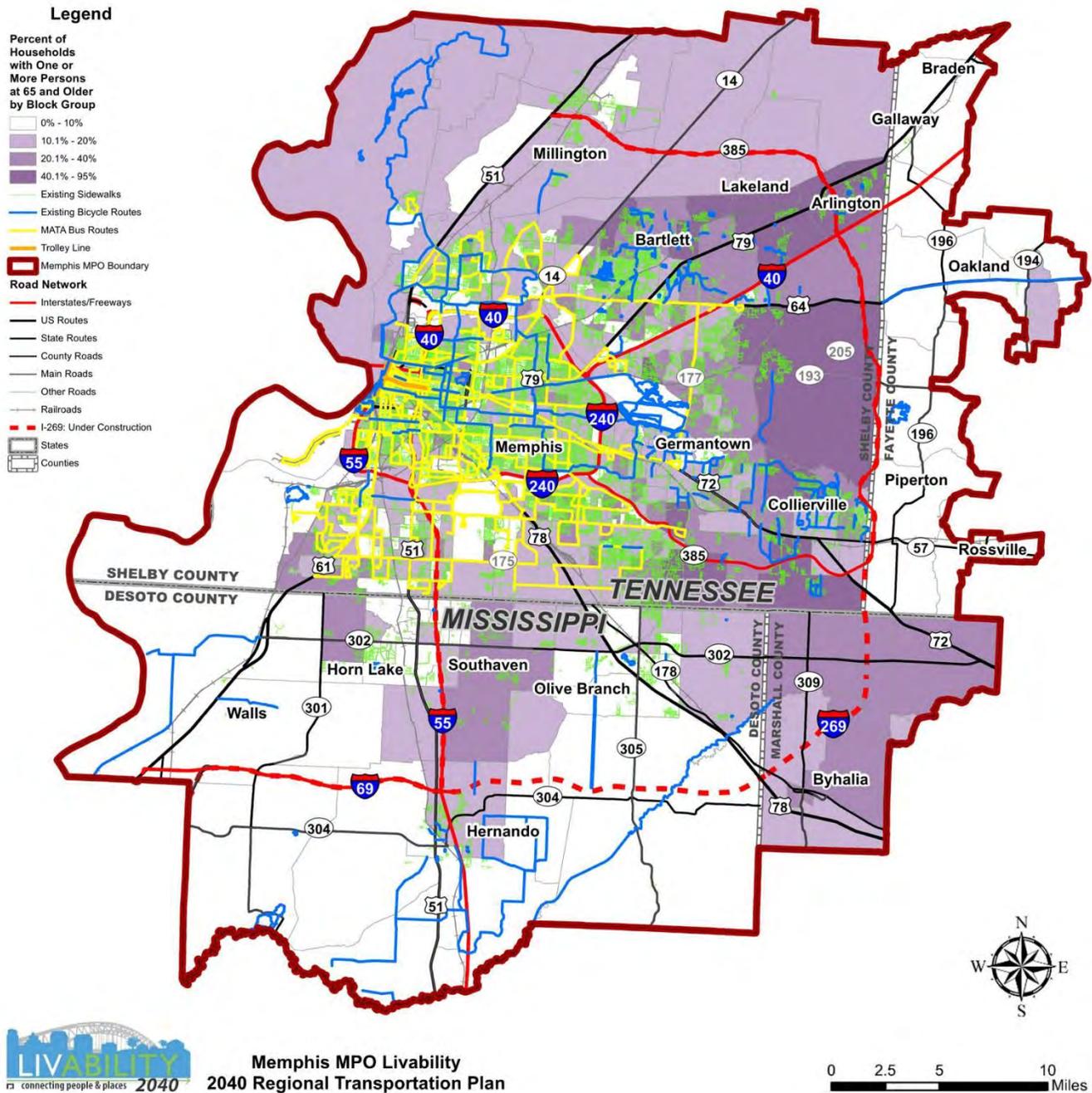
**Figure 4.29 Environmental Justice Communities in Relation to Transit and Nonmotorized Networks**



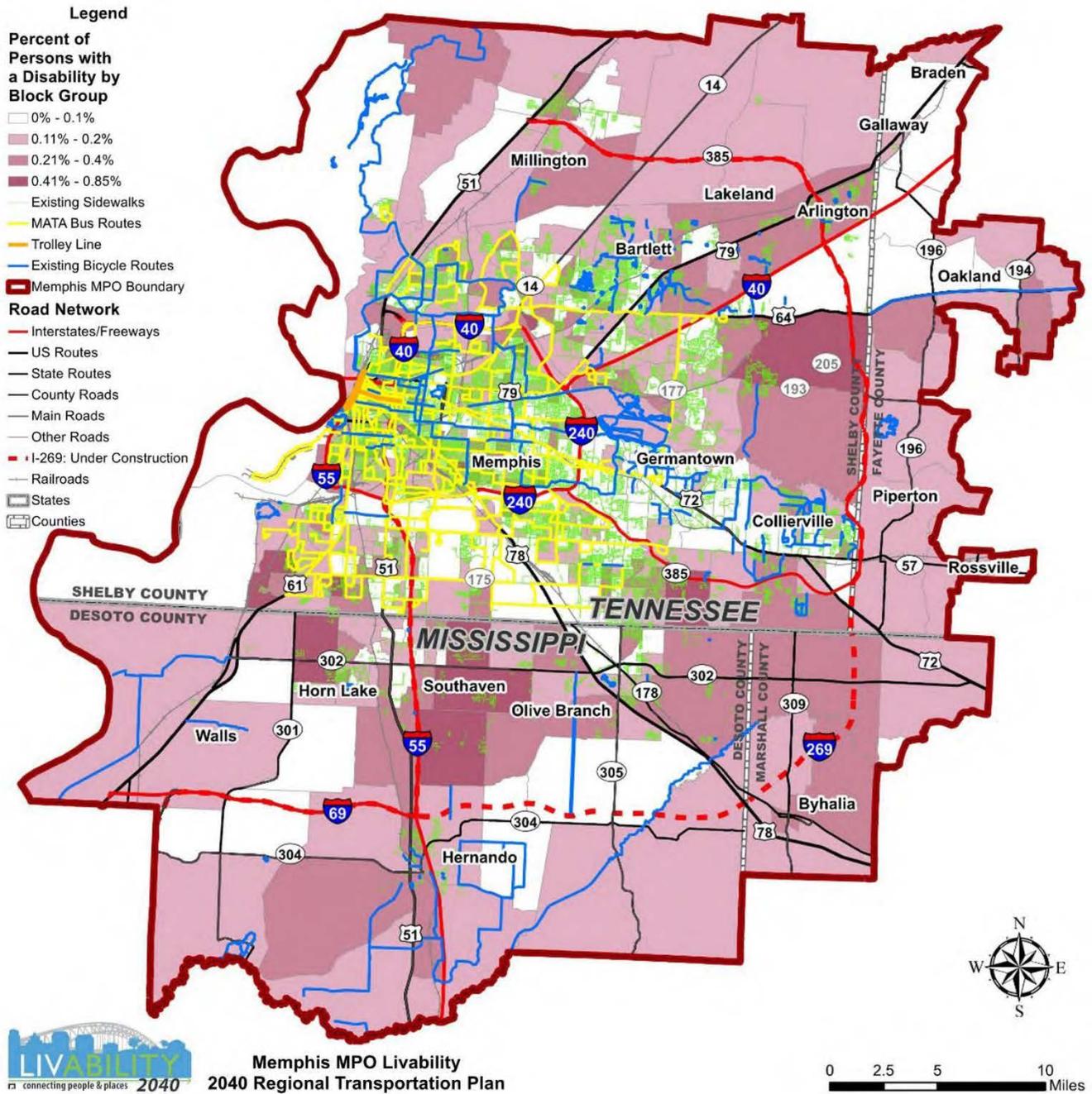
A similar analysis of access was performed for areas with higher than average concentrations of persons age 65 and older, and for persons with a disability. As seen in **Figures 4.30 and 4.31**, there is significant geographic overlap among these groups and identified EJ communities.

For persons age 65 and older and persons with a disability in DeSoto and Marshall counties, the additional geographic areas that emerged for analysis are in Southaven, and in less developed areas of the county where fixed route transit and sidewalks may be challenging to provide in a cost-effective manner.

**Figure 4.30 Locations of Persons Age 65 and Older in Relation to Transit and Nonmotorized Networks**



**Figure 4.31** Locations of Persons with a Disability in Relation to Transit and Non-Motorized Networks

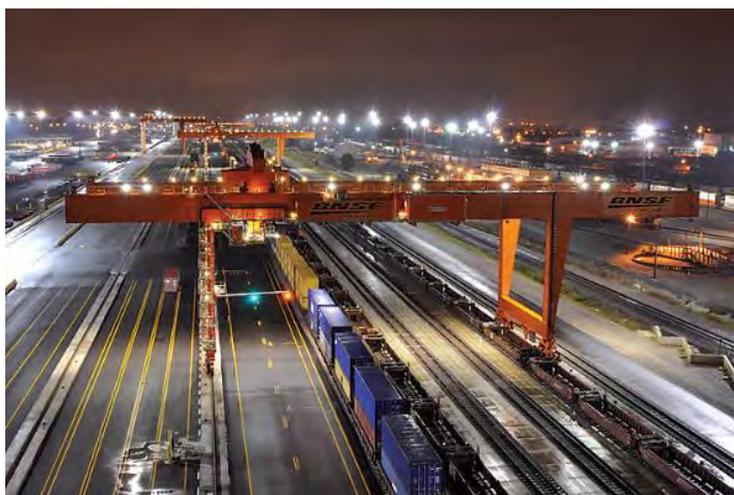


## 4.6 Economic Growth/Freight Movement

The efficient movement of people and goods greatly influences the economic competitiveness of the region. This is especially true in the Memphis MPO region where the area's regional economy is centered on transportation, distribution, and logistics, with Transportation and Warehousing as the largest economic sector. With the Memphis International Airport serving as the busiest cargo airport in the United States and the second busiest cargo airport in the world, and FedEx headquartered in Memphis, these global logistics and multimodal assets will continue to provide a platform for growth.

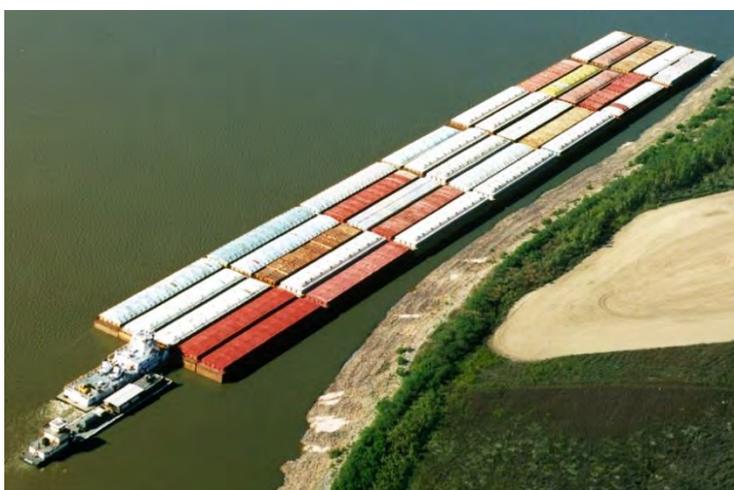


The Memphis MPO region has a competitive advantage with an intensive freight network, including trucks, rail, inland waterways, and air cargo. The interstate system includes I-40, which serves as a long-haul east-west route, I-55 which serves as a long-haul north-south route, I-240 which circulates goods within the Memphis region, and Lamar Avenue which transports goods between the freight-intensive southeast portion of the region and other destinations throughout the southeast portion of the U.S.



The area also has an extensive rail network, with five Class I railroads and with nine intermodal rail yards. Memphis freight rail facilities also serve as one of a few connecting locations between the major west coast railroads (Burlington Northern and Santa Fe Railway (BNSF) and Union Pacific Railroad (UP)) and the major east coast railroads (CSX Transportation and Norfolk Southern Railway (NS)). Connections to north-south routes (Canadian National Railway Company (CN)) also exist in Memphis.

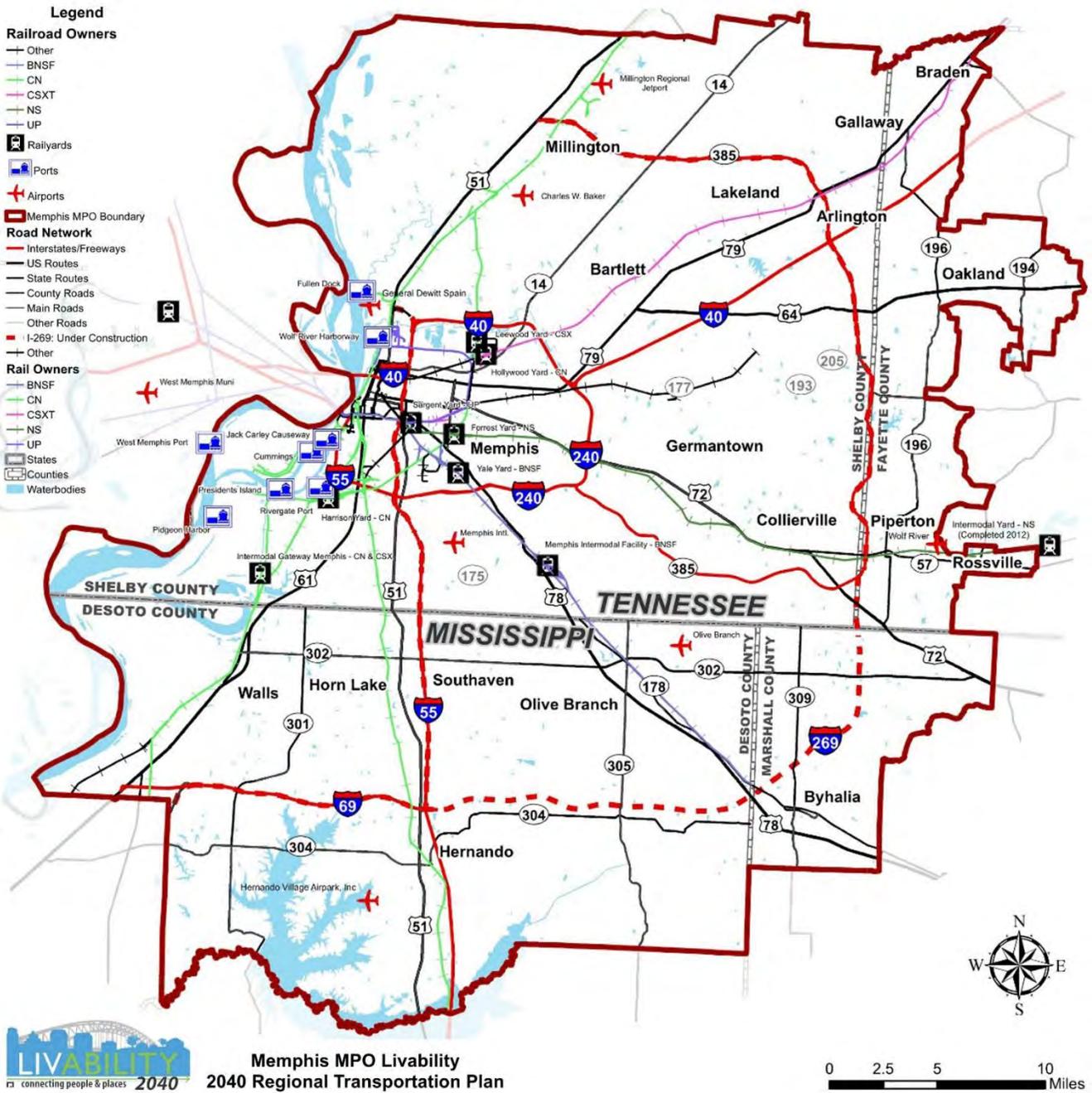
Above and below: Memphis is a major intermodal freight hub for the nation.



The Port of Memphis is the primary port facility in the Memphis MPO region. It has five river terminals and almost 100 public and private individual terminals, and it is primarily used to transport bulk and break-bulk goods to locations along the Mississippi River. The Memphis International Airport is the largest domestic hub for FedEx and is the second largest airport in the world in terms of tonnage moved. There are also six general aviation airports in the Memphis MPO region, which are located in Hernando (1), Olive Branch (1), Rossville (1), Memphis (1), and Millington (2).

**Figure 4.32** shows the location of freight facilities in the Memphis MPO region, including airports, railyards, ports, rail lines, and major highways.

Figure 4.32 Memphis MPO Regional Freight Transportation System, 2012

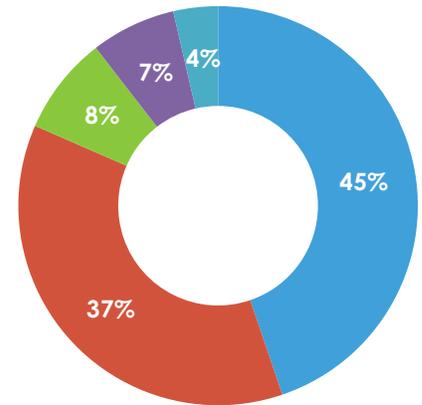


Source: Direction 2040 RTP, 2012.

In 2012 over 122 million tons of cargo moved in, out, and around the freight network in the Memphis MPO region. **Table 4.14** shows the tonnage distribution of freight flows by trip type and mode, while **Figure 4.33** shows the percentage distribution between modes. Trucks are the largest mode in terms of tonnage accounting for 45 percent of all movements within the region. This is followed closely by carload rail which moved 37 percent of the total flows. Combining carload and intermodal rail results in total rail tonnage that are similar in volume to the trucking mode. Nearly 10 million tons of goods are shipped by waterways in the Memphis MPO region representing 8 percent of all flows. Over 4 million tons of cargo (4 percent of all flows) were shipped by air with virtually all of this flowing through the Memphis International Airport. The low volume of air cargo activity in the Memphis MPO region is based on this mode being a high-value, but relatively low-weight, mode.

In 2012, freight goods in the Memphis Region exceeded a value of \$126 billion, with top commodities by tonnage including coal and petroleum products, nonmetallic mineral products, and gasoline. Goods originating in the Memphis Region destined for domestic locations primarily traveled to Kentucky, Mississippi, Arkansas, and New Orleans, but had destinations as far as Alaska.

**Figure 4.33 Modal Breakdown of Cargo in Memphis MPO Region 2012**



■ Truck ■ Rail ■ Water ■ Intermodal ■ Air

Source: TRANSEARCH, Memphis International Airport, Cambridge Systematics, Inc. analysis.

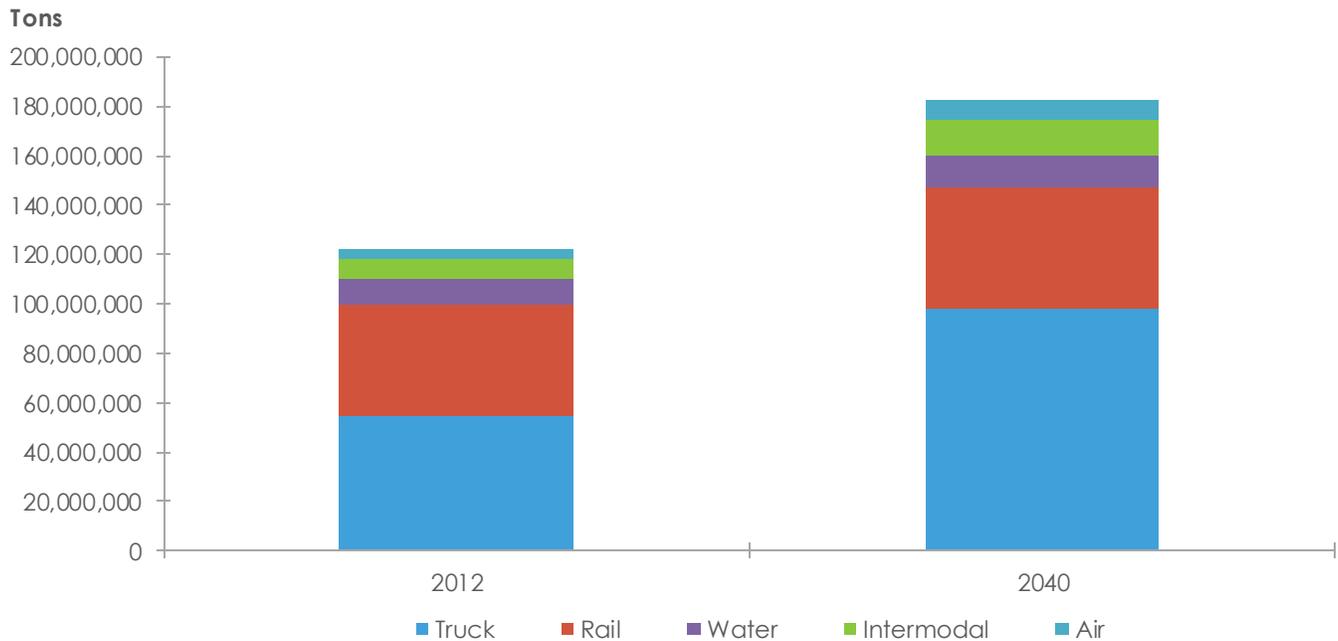
**Table 4.14 Cargo Tonnage Traded in Memphis MPO Region 2012**

Mode	Inbound	Outbound	Internal	Total
Truck	33,947,020	33,139,249	12,186,443	54,899,825
Carload Rail	24,725,217	20,484,401	128,364	45,081,254
Water	6,792,540	2,990,305	21,073	9,761,773
Intermodal	3,728,640	4,691,880	–	8,420,520
Air	2,153,767	2,274,013	–	4,427,779
<b>Total</b>	<b>69,320,700</b>	<b>61,415,186</b>	<b>12,335,879</b>	<b>118,400,006</b>

Source: TRANSEARCH, Memphis International Airport, Cambridge Systematics, Inc. analysis.

Freight activity is forecast to increase across all modes between 2012 and 2040, as shown in **Figure 4.34**. Over this time, cargo volumes are anticipated to grow at a rate of 1.4 percent annually for a total growth of 49 percent. The largest net growth is anticipated to be due to truck movements, increasing from roughly 55 million tons each year to 98 million tons annually. This amounts to an annual growth rate of 2.1 percent for a total growth of 79 percent. Carload rail movements are anticipated to grow the slowest at an annual rate of only 0.3 percent. Intermodal rail movements are shown to have a much higher growth rate of 2.0 percent and are forecast to overtake waterway movements as the third-highest based on tonnage.

**Figure 4.34 Growth in Cargo Volumes in the Memphis MPO Region  
2012 versus 2040**



Source: TRANSEARCH, Memphis International Airport, Cambridge Systematics, Inc. analysis.

Current freight infrastructure needs to be maintained, upgraded, and constructed in order to anticipate this 49 percent increase in overall total cargo volumes. The Memphis Regional Freight Infrastructure Plan, prepared for the Greater Memphis Chamber and completed in 2010, examined freight issues in the region and identified deficiencies and potential solutions to help meet the growing needs of the freight community. Based on the capacity analysis, global supply chain trends, and stakeholder interviews, specific recommendations were identified. These projects were selected based on their potential for implementation in the medium term (3 to 10 years), which have known or defined funding sources, and which would have a notable impact on supporting freight movements. The most critical recommendations from this study are Lamar Avenue Corridor Improvements, Holmes Road Corridor Improvements, I-40/I-55 Interchange Modifications, the construction and completion of I-69/I-269, and the third Mississippi River Bridge Crossing.

Continued economic growth needs to build up the region's strengths and opportunities while mitigating and removing any weaknesses and threats. The region's strategic connections have served as a major strength and contributed to attracting seven Fortune 1000 companies. In addition, recent construction of major production facilities for Mitsubishi Electric and Electrolux could signal a renewed manufacturing base in the region, complementing the region's strong Transportation and Logistics sector. However, educational attainment levels below the national average, serves as a barrier for economic growth in other industries. This has led to a prevalence of low wage and temporary jobs in the region, with temporary jobs accounting for much of the employment growth in the Memphis MPO region since 2010.

In addition, recent reduced availability of flights increased the cost of getting into or out of the region, both in terms of time and monetary costs. This lack of easy, affordable access to the Memphis MPO region could impede business attraction initiatives as well; however, efforts are underway to attract more air service and to lower airfares.

Other opportunities for continued regional growth have merged. The Memphis MPO region has world-class research assets, which can be built upon to diversify the economic. There is growth potential in medical device research and technology with companies such as Medtronic, Smith & Nephew, and Wright Medical already located in the region. The Memphis Bioworks Foundation has a successful track record in fostering research and innovation in the biomedical sector.

A recent study conducted for Memphis and Shelby County Regional Economic Development also identified increasing foreign exports as an opportunity for the region. From commodities to high-value medical devices, The Memphis MPO region has the potential to grow exports and leverage existing global logistics assets.

## 4.7 Land Use – Mobility and Livability Corridor Assessment

An assessment was conducted on 20 major non-Interstate highway transportation corridors in the region to characterize each corridor's transportation function in the context of existing and future land use needs. The Mobility and Livability Corridor Assessment applied both transportation and land use criteria to characterize each individual corridor as either a **Mobility Corridor** (emphasis on the efficient movement of people and goods to advance regional economic development goals) or as a **Livability Corridor** (emphasis on multimodal enhancements to improve access to community resources and advance regional quality of life goals). The Mobility and Livability Corridor Assessment provides a critical mechanism to integrate land use into the transportation planning and investment decision-making process in three key ways:

1. By supporting tailored transportation investments that better match the function of the roadway which is directly linked to land use context;
2. By helping to align projects on these corridors to the scales of the 2040 RTP performance framework, so that proposed investments are evaluated in a manner that respects the investment context; and
3. By providing a means to tailor land use policy on these corridors so that land development over time supports the intended function of the roadway.

As part of the Mobility and Livability Corridor Assessment, all 20 corridors were evaluated against the following criteria:

- **Total Volume** – A measure of travel demand for the corridor.
- **Trips Passing Through the Region** – A measure of through-trip demand/interregional movement for the corridor, identified as external-external (E-E) volume in the regional travel demand model;
- **Congestion Management Process (CMP) route** – A measure of corridor significance from a congestion management perspective;
- **Key Truck Route** – Designation as a critical freight route;
- **Connection to Regional Employment Center** – A measure of corridor significance for commuter mobility;

- **Connection to City/Town Center** – A measure of corridor significance for commute or non-commute access to activity centers throughout the region, as defined through the Mid-South Regional Greenprint and Sustainability Plan (Greenprint); and
- **Key On-Street Connector** – Designation as a critical multimodal mobility link, as defined through the Greenprint.

The presence of bicycle, pedestrian, and transit infrastructure also was captured for all corridors. This information was not used to define the function of the roadway. It will be used to help shape proposed investments for the 2040 RTP given the corridor designation.

The 20 corridors included in the analysis, along with their Mobility or Livability designations are shown in **Figure 4.35**<sup>17</sup> and tabulated in **Table 4.15**.

---

<sup>17</sup> Note that all Interstates are considered Mobility Corridors and are not subject to this analysis or classification system.

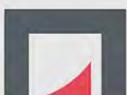
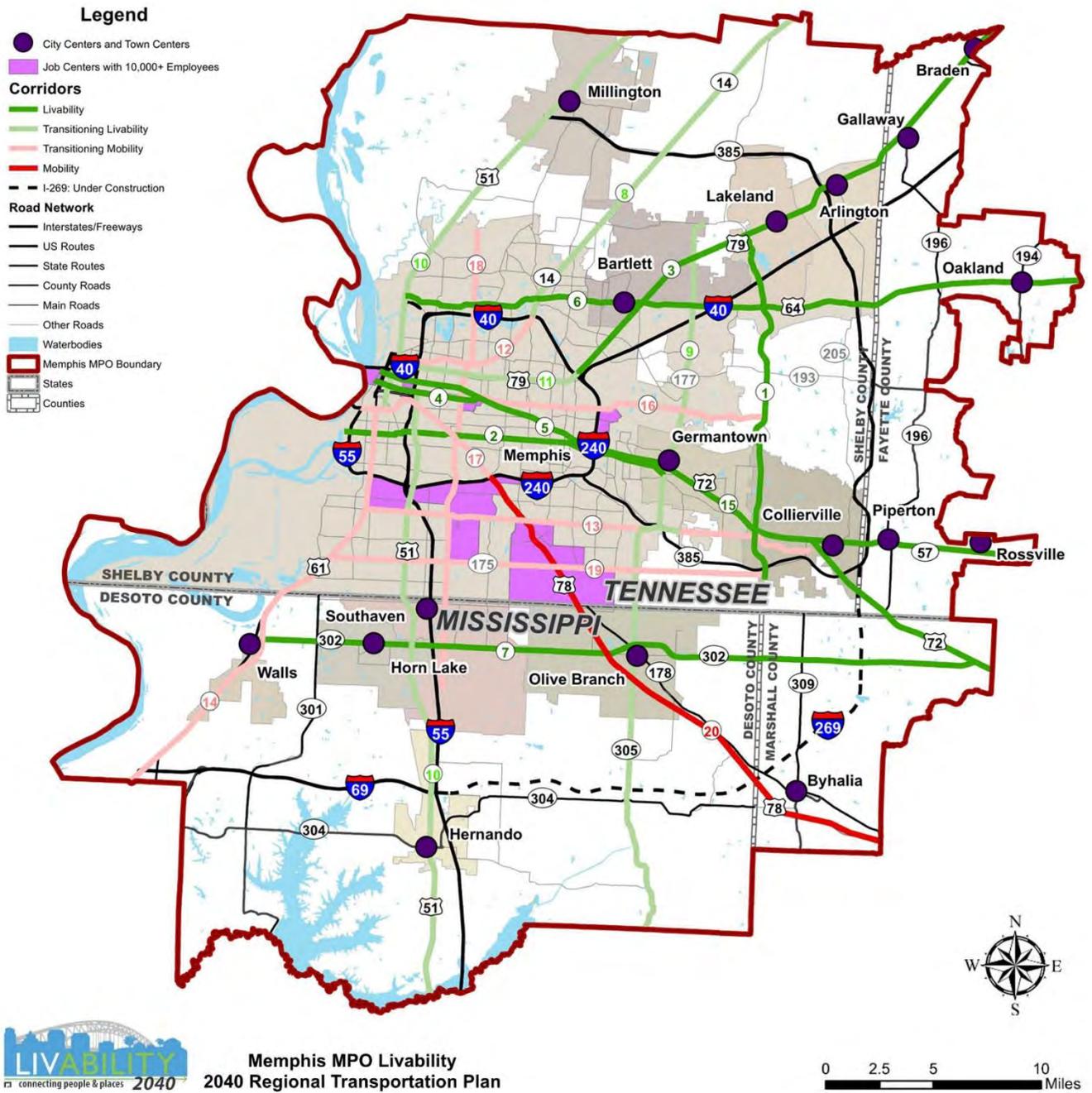


Figure 4.35 Mobility and Livability Corridor Designations



**Table 4.15 Mobility and Livability Corridors**

Mobility/Livability Designation	Corridor Number	Corridor
Livability	1	Houston Levee Road
	2	Park Avenue
	3	Summer Avenue–Outside I-40
	4	Union Avenue/Walnut Grove Road - Inside I-240
	5	US 72/Poplar Avenue - Inside I-240
	6	U.S. 64
	7	Goodman Road
Transitioning Livability	8	Austin Peay Highway– Outside I-40
	9	Germantown Road
	10	U.S. 51
	11	Summer Avenue – Inside I-40
Transitioning Mobility	12	Austin Peay Highway – Inside I-40
	13	Winchester Road
	14	U.S. 61
	15	U.S. 72/Poplar Avenue - Outside I-240
	16	Walnut Grove Road - Outside I-240
	17	U.S. 78/Lamar Avenue and E EH Crump Boulevard – Inside I-240
	18	Airways Boulevard
	19	Shelby Drive
Mobility	20	U.S. 78/Lamar Avenue and E EH Crump Boulevard – Outside I-240



## 5.0 Investment Solutions

Potential investment solutions for the broad range of transportation needs outlined in Section 4.0 were identified through a number of different means during RTP development. These potential solutions comprised the pool of projects analyzed and considered for funding in the RTP. Various project sources are outlined in the following sections, and include input from communities; input from stakeholders and the public; projects identified in previous studies; and needs from the need analysis in Section 4.0 that were not met by projects in any of the other sources. Section 8.0 provides the fiscally constrained, prioritized lists of projects that resulted from these investment solutions.

### 5.1 Direction 2040 RTP and Call for Projects

The project list from the Direction 2040 RTP, as well as the latest FY 2014-2017 TIP, were used as a starting point for a “call for projects” discussion with the counties, municipalities, transit agency, port authority, economic development agency, and airport in the Memphis MPO region. Attendees for each one-on-one meeting identified updates, edits, deletions, and additions. Key changes included:

- Projects that were already being programmed or constructed (moved to E+C list);
- Projects that were no longer priorities;
- Projects that were still priorities, and how that changed from Direction 2040 (e.g., the year or decade that the project was likely to be a priority need);
- Changes to definitions of projects, such as extents; and
- New local priority projects not previously identified in Direction 2040.

Both TDOT and MDOT supplied their lists of priority projects as well to incorporate into the project lists.

### 5.2 Public and Stakeholder Input

Public and stakeholder outreach activities performed in the early months of the study were mined for an understanding of the types of projects and issues of most concern to the region. While these were not project specific, they did help support the projects that were selected from other sources. These overarching themes included:

- Improve the condition, quality, and efficiency of the transportation network and surrounding communities; and
- Strategies varied, with a range of regional mobility or local livability investments discussed, including roadway, transit, bicycle, and pedestrian recommendations.

Further, results from the Community Remarks tool described in Section 2.0 provided more location-specific issues and concerns. These were incorporated into the assessment of needs and cross referenced against projects emanating from other sources. For example, numerous comments related to transit needs in south Memphis; these comments are consistent with transit needs identified through the needs analysis.

## 5.3 Congestion Analysis

---

Along with the Congestion Management Process, the 2010 AM peak and PM peak period congestion maps were used to identify corridors in need of capacity improvements through roadway widening projects. More information about the Congestion Management Process can be found in Chapter 10.1. Road widening projects were considered for roadway segments that exceeded a volume to capacity ratio of 1.0 and did not already have a project to address that congestion. Since the previous RTP and call for projects process already provided many widening projects for consideration, only three additional projects were added to the list from this analysis:

- #311, Stage Rd. – Western Segment, Alfaree St. to Bartlett Blvd.;
- #312, Stage Rd. – Eastern Segment, I-40 to Berryhill Rd.; and
- #313, Democrat Rd., Plough Blvd. to Lamar Ave.

## 5.4 Transit Gap Analysis for Environmental Justice Communities

---

The transit gap analysis identifies potential new transit routes and extensions that can improve transit access for environmental justice (EJ) communities. For many individuals located in EJ communities, identified in Section 4.5, transit is vital for accessing work, school, and shopping. This analysis concentrated on areas in the current transit network where transit travel times far exceed travel time in a personal automobile. As discussed in MATA's Short Range Transit Plan, there are limited opportunities to travel north and south, with riders often needing to travel west into downtown Memphis in order to transfer to a different route to reach their destination. This additional length and need to transfer increases the overall transit travel time.

Using travel times derived from the travel demand model, the origin and destination pairs with the highest difference in travel time between transit and automobile were selected. This only included areas that currently have access to transit. In addition the focus of this selection was on transit gaps where service could connect EJ communities to employment opportunities. Only origins, or starting points of a trip, that were within an EJ community were selected. Destinations were limited to major employment areas such as the Memphis International Airport or midtown.

The analysis identified several key gaps that would not be met by projects identified in Sections 5.1 or 5.2:

- The resulting origins were primarily along Highway 64 / Stage Road with the destinations clustered around the BNSF Railway / Memphis Intermodal Facility and other industrial employment destinations in the Lamar Avenue corridor. For better transit access between these two locations, an express route traveling along I-240 with select stops around the intermodal facility could fulfill this need.
- In addition, because there are dozens of companies and distribution centers located in the fairly large area, a circulator shuttle could also satisfy this mobility and accessibility need, allowing a more direct connection to these places of employment.
- Additional north-south connections would strengthen transit access between EJ communities and major employment centers, improving travel time as well as expanding employment opportunities.

## 5.5 Mobility/Livability Corridor Assessment

The Mobility/Livability Corridor Assessment described in Section 4.7 was used as a basis to estimate the cost of general complete streets upgrades for a lump sum line item in the RTP. Three livability corridors (Raleigh-Millington, Bartlett-Braden, and Olive Branch-Walls) were identified as good candidates for complete streets upgrades based on three criteria:

- Limited congestion (i.e., not a commute-oriented corridor);
- Town Center connections; and
- Redundant (parallel) capacity (to address any overflow traffic that may be shifted off of livability corridor).

The mileage of these three corridors were multiplied by unit costs of complete street upgrade items, such as sidewalks, bike lanes, mixed-use paths, and road diets. This calculation was used to estimate a reasonable amount of money to set-aside for complete streets upgrades on various corridors in the future. About \$22 million was set aside on the Tennessee side of the MPO and about \$14 million was set aside on the Mississippi side of the MPO.

## 6.0 Alternative Investment Concept Analysis

An alternative concept analysis was conducted as part of Livability 2040 development to package the broad potential solution sets into various concepts. Building on identification of needs, the high-level analysis of alternative investment choices helped to develop a preferred investment direction before the plan development process moved into evaluation of projects. This type of analysis is often a key analytical and public involvement technique during this phase of plan development. The consequences of alternative investment choices on transportation system performance are analyzed by applying the performance measures that link directly to the RTP's goals and objectives.<sup>18</sup>

The analysis was used to illustrate the benefits of two "bookend" investment concepts that emphasize two different directions for the region:

- **Regional Roadway Connections** – This concept emphasized a radial, highway-focused investment strategy, consistent with past development; and
- **Expanded Travel Options** – This concept emphasized a "livability" grid system to improve connections between decentralized employment centers and the regional core, and to each other.

The alternative concepts were not built upon actual projects but rather were considered at a high, conceptual level for comparison and discussion. The RTPAC helped define the options through their input, identifying concepts that made sense within the regional context. Their intent was to advance policy discussions around the mobility and livability corridor analysis summarized in Section 4.7.

The alternative investment concepts were developed as two distinct options for advancing consideration of the mobility/livability corridor concept within Livability 2040. These concepts relate to the long term vision of the RTP and were used to help guide investment decisions for the financially-constrained plan.

### 6.1 Regional Roadway Connections

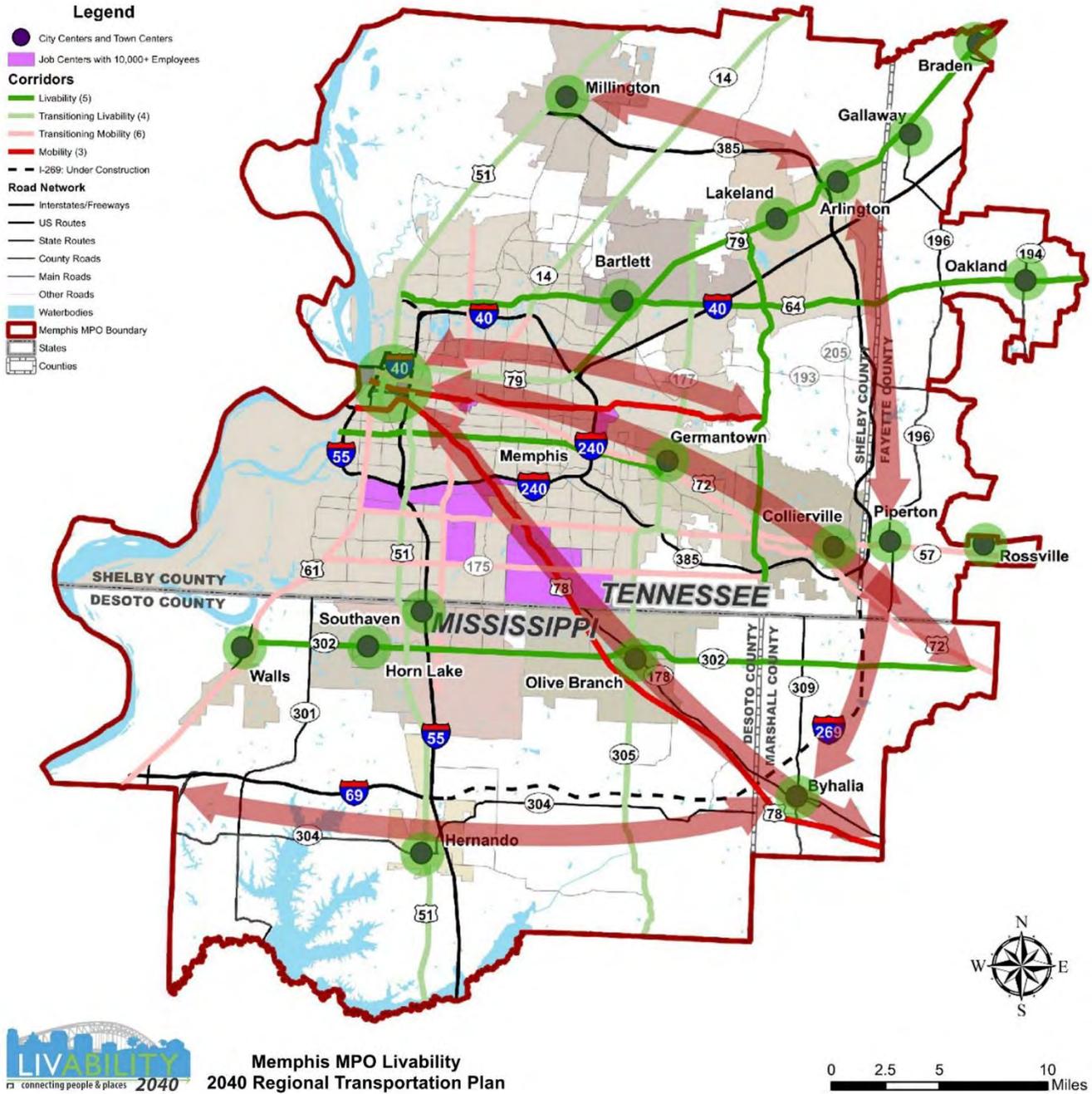
This concept focused on a radial development and investment strategy, recognizing the trend of outward growth that is extending linearly along major transportation corridors, including:

- Upgrading a strategic set of radial corridors with focus on improving roadway level of service for autos and freight;
- Maximizing delay reduction for autos and freight along key radial corridors to improve connections between the regional core and decentralized employment and activity centers; and
- Targeting multimodal investment within employment and activity centers to improve multimodal access for current businesses and increase attractiveness for new businesses and development.

<sup>18</sup> FHWA, *Model Long - Range Transportation Plans: A Guide for Incorporating Performance-Based Planning*, 2014.

Potential investment areas are highlighted in **Figure 6.1** as an illustrative concept only. Red denotes a mobility focus, with green a livability focus.

**Figure 6.1 Potential Investment Areas –  
Regional Roadway Connections Concept**



## 6.2 Expanded Travel Options

---

This concept moves toward a regional “livability” grid system to improve connections between decentralized employment centers and the regional core, and to each other, focusing on:

- Aligning investment approach to incorporate a regional grid system that improves upon the current radial pattern of the transportation network;
- Modifying facility design along key north-south connections to maximize multimodal level of service;
- Providing more connections within the system to disperse traffic along an expanded grid that channels commute/freight traffic to corridors that maximize delay reduction and non-commute travel to corridors that maximize safe, multimodal access to community resources.

Potential investment areas are highlighted in **Figure 6.2** as illustrative concept only. Red denotes a mobility focus, and green a livability focus.



## 6.3 Comparison of Alternatives

The performance impacts of each concept are presented in **Table 6.1** on a relative scale from “low” to “high” for criteria that align with the RTP’s goals and objectives. At this level of analysis, simplified performance measures were identified that related to the project-level performance measures identified in Section 3. The assessment of these measures for each high-level concept utilized local knowledge and results of the needs analysis and existing and future conditions assessment.

*Both ETC and TPB members confirmed Concept Two – Expanded Travel Options as the preferred direction for the region based on the assessment and ongoing input from the public.*

The results of the high-level performance assessment were used to help guide the ETC and TPB in making a decision on the preferred direction for the Memphis MPO region. Both ETC and TPB members confirmed **Concept Two – Expanded Travel Options** as the preferred direction for the region based on the assessment and ongoing input from the public.

**Table 6.1 Alternative Investment Concept Performance Assessment**

MAP-21 Goals	Criteria	Concept One: “Regional Roadway Connections”	Concept Two: “Expanded Travel Options”
Infrastructure Condition	Limits long-term maintenance burden	○	●
Safety	Improves multimodal safety	◐	●
Economic Vitality/Freight Movement; Environmental Sustainability	Provides new facility coverage (by mode) – roadway	●	◐
	Provides new facility coverage (by mode) – transit	○	◐
	Provides new facility coverage (by mode) – bicycle/pedestrian	◐	●
Environmental Sustainability	Limits environmental and social impacts	◐	●
Environmental Sustainability	Improves access for disadvantaged populations	◐	●
Environmental Sustainability	Reduces VMT	○	◐
Environmental Sustainability; Economic Vitality/Freight Movement	Provides additional complete streets	◐	●
Congestion Reduction/System Reliability; Economic Vitality/Freight Movement	Reduces congestion and delay for autos and trucks	●	◐

High
  Medium
  Low

## 7.0 Financially Feasible Plan

The Memphis MPO used a performance-based approach to rank projects for Livability 2040 and incorporated state and local priorities to produce an overall prioritized list of projects to include in the Financially Feasible Plan. Section 7.1 describes this process for prioritizing projects. Section 7.2 summarizes the revenue projections used to financially constrain the Plan, Section 7.3 describes the cost estimation methods for projects, and Section 7.4 describes how those costed projects were funded within the bounds of the revenue projections.

### 7.1 Project Prioritization Methodology

The project evaluation and scoring process supports the performance framework developed for Livability 2040, which was designed to advance funding decisions that effectively reflect both regional mobility and local livability needs. While the transportation goals, objectives, and performance measures adopted for Livability 2040 RTP are broad-based and regional in nature, the performance framework defines a set of five specific investment context types to provide a sense of investment “scale” for refining the performance measurement and project evaluation process:

1. **Interregional** – Investments aligned with big-ticket capital or maintenance needs to ensure the region is well connected within the state and the nation to maintain regional economic competitiveness. Investments support interstate mobility, intermodal connections, and freight/logistics hubs.



2. **Regional Centers** – Investments support strategic connections between regional activity and economic centers through improved mobility and travel time reliability on corridor connections to key centers and last-mile connectivity to ensure effective access to a regional system.



3. **Town Centers** – Investments support economically viable and thriving community centers; specifically, redevelopment opportunities, multimodal connections and access to a mix of business, retail and residential uses



- 4. Neighborhood Communities** – Investments support healthy, thriving communities through improved system operations and multimodal access to community resources within primarily residential areas.



- 5. Undeveloped** – Investment strategies that protect and preserve undeveloped or environmentally sensitive areas.



Within each investment context, the project-level performance measures (project evaluation criteria) are weighted differently to reflect the level of significance of each measure within each context type. As an example, Delay Reduction is not as significant a factor in determining project benefits within Neighborhood Communities, as transportation needs within this context often focus on slower, safer, multimodal trips. This factor is of great significance (and therefore of greater weight) within the Interregional and Regional scales, as the efficient movement of people and goods is vital to the regional economy. The different weighting system allowed projects to be scored and ranked according to unique needs of each investment context, and followed the recommendations of the RTPAC and the ETC.

Over 270 roadway and transit capacity projects were considered in the project evaluation process for Livability 2040<sup>19</sup>. The sources of these projects are described in Section 5.0. The steps applied for project evaluation are:

#### **Step 1. Assign project to investment context type**

Each project was tagged to an investment context type based on a combination of the project's need and purpose, its location and proximity to regional, community or environmental assets, and its functional classification. This process was supported through guidance and review of the RTPAC and ETC. The investment context of the project was needed to apply the appropriate performance measure weights, enabling the significance of various evaluation criteria to vary given the geographic scale of each project and its role in the transportation system.

<sup>19</sup> Smaller scale bicycle/pedestrian, safety, and operations investments were not evaluated through this process. They will be reflected in the long-range transportation plan as lump sum funding set-asides as opposed to individual projects.

## Step 2. Evaluate performance impacts of projects

Within each investment context category, projects were evaluated relative to one another (regardless of project type) for each of the 10 project-level performance measures identified in the performance framework (see Section 3):

- Project is on corridor of safety concern and includes countermeasure(s) to address safety emphasis areas identified in Section 4;
- Project Addresses Security or Emergency Response Need;
- VMT reduction;
- Project requires minimal right of way or land acquisition;
- Project is in keeping with community priorities;
- Project supports community or corridor redevelopment;
- Truck Hours Delay Reduced, particularly for Freight Corridors or on connectors to Freight hubs / intermodal facilities;
- Project fills gap in, or expands, multimodal system, particularly for access to community resources and last mile connectivity for employment centers;
- Project enhances transit ridership; and
- Vehicles Hours Delay Reduced, particularly along corridor connections to employment centers.

Points were assigned for each criteria given the impact of the project. A few key points on project scoring include:

- The Memphis MPO's Travel Demand Model was used to measure vehicle miles travelled (VMT) and auto/truck delay reduction impacts for each project. For these measures, points were assigned (up to the maximum allowed for each criteria) based on the level of VMT or delay reduction.
- Additional auto delay reduction points were applied if the delay benefit was achieved on a corridor connection to a regional employment center.
- Additional truck delay reduction points were applied if the delay benefit was achieved on the freight network or on a corridor connection to regional freight hub.
- All other performance measures were evaluated qualitatively as "Yes" or "No" in terms of positive or negative impact for the criteria of interest. For these criteria, all points were assigned for "Yes", zero points for "No".

Weights were applied for each measure given the scale of project and points were summed across all 10 measures to produce individual project scores up to 100 points. Projects were then combined into one scored list, across the five scales, based on project score.

**Step 3. Rank projects**

Projects were assigned a rank tier based on a quartile distribution of project scores. The top 25 percent of projects, based on total score, were grouped into "rank 1", for example. In total, 4 tiers were developed.

The ranking provides an assessment of relative performance impacts of proposed investments, in the context of regional goals. It was provided to the MPO, its committees, and local government stakeholders to help guide the funding discussions for Livability 2040.

The rankings from the process described were then adjusted based on TIP projects with incomplete funding, TDOT/MDOT priorities, and local priorities. This produced a prioritized list of projects that were funded in order during the fiscal constraint process described in Section 7.4.

## 7.2 Revenue Projections

Title 23 United States Code (U.S.C.) Section 134 requires that a long-range transportation plan contain a financial plan that demonstrates how the adopted plan can be implemented, indicate resources from public and private sources that are reasonably expected to be made available to carry out the plan, and recommend any additional financing strategies for needed projects and programs. The purpose of the financial plan is to demonstrate fiscal constraint, which ensures that the transportation plan reflects realistic assumptions about future revenues for investment.

Revenue forecasts are based on current Federal, state, and local funding programs that support highway and transit-related investments. The historical funding sources that have been utilized (or programmed) by the Memphis MPO between FY 2008 and FY 2017 are described in the following sections. Revenue forecasts are presented in three programming tiers: 2018-2020, 2021-2030, and 2031-2040. Revenue projections for the FY 2014-2017 TIP are included in Table 7.7. The Tennessee Department of Transportation, the Mississippi Department of Transportation, and MATA, the public transit operator, were all included in the cooperative development of funding estimates for the financial plan.

### 7.2.1 Capital Revenue

Federal funds are the main source of capital revenue for projects in the MPO region. Based on historical funds expended between FY 2008 and FY 2014, Federal funds accounted for close to 70 percent of highway capital funds from Tennessee and Mississippi, and accounted for close to 80 percent of transit capital funds. These Federal funds are available through various programs administered by the States for roadway construction and other multimodal projects including, but not limited to, pedestrian, bicycle, and transit facilities and major planning and/or environmental studies. Local agencies and state DOTs provide the local matching funds for the Federal funding programs, when required.

#### Federal Funding - Federal Highway Administration

On July 6, 2012, the Moving Ahead for Progress in the 21st Century Act (MAP-21) was signed into law. This new transportation bill, effective on October 1st, 2012, replaced the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), which was passed in 2005, and eliminated earmarks and most discretionary programs. The new core formula programs include:

- National Highway Performance Program (NHPP),
- Surface Transportation Program (STP),

- Congestion Mitigation and Air Quality Improvement Program (CMAQ),
- Highway Safety Improvement Program (HSIP),
- Railway-Highway Crossings (set-aside from HSIP),
- Metropolitan Planning (core formula funds) and State Planning and Research (2% set-aside funds), and
- Transportation Alternatives.

The following list summarizes the historical Federal funding programs utilized in the region between FY 2008 and FY 2014 and programmed for FY 2014-2017, under the MAP-21 transportation bill funding program structure:

**National Highway Performance Program (NHPP)** – Under MAP-21, the enhanced NHS includes the Interstate System, all principal arterials (including some not previously designated as part of the NHS) and border crossings on those routes, highways that provide motor vehicle access between the NHS and major intermodal transportation facilities, and the network of highways important to U.S. strategic defense (STRAHNET) and its connectors to major military installations. The new NHPP combined the functions of the former NHS, Interstate Maintenance (IM), Bridge Programs (on-system bridge, i.e., a bridge on a public highway eligible for assistance other than a highway functionally classified as a local road or rural minor collector, no more than 85% of total Bridge Program funds), and Appalachian Development Highway System (ADHS).

**Surface Transportation Program (STP)** – MAP-21 continues the STP and this program provides States and localities funding for projects to preserve or improve conditions and performance on any Federal-aid highway, bridge projects on any public road, facilities for nonmotorized transportation, transit capital projects and public bus terminals and facilities. STP combined the functions of the former STP, Bridge Programs (off-system bridge, i.e., a highway bridge located on a public road not on a Federal-aid highway, no less than 15% of total Bridge Program funds), and ADHS (ADHS routes, including local access roads). The Memphis MPO receives a sub-allocation of these funds.

**Highway Safety Improvement Program (HSIP)** – Safety throughout all transportation programs remains DOT's number one priority. The purpose of HSIP is to achieve a significant reduction in fatalities and serious injuries on all public roads, including non-state-owned public roads and roads on tribal lands. The HSIP requires a data-driven, strategic approach to improving highway safety on all public roads that focuses on performance. The funding level for HSIP under MAP-21 has significantly increased from the past. HSIP maintains the same structure as existed under prior legislation that has been historically utilized in the Region.

**Railway-Highways Crossing Program** – MAP-21 continues this program as a set-aside from HSIP apportionment. Funds are eligible for projects at all public crossings including roadways, bike trails and pedestrian paths. Fifty percent of a State's apportionment is dedicated for the installation of protective devices at crossings. The remainder of the funds apportionment can be used for any hazard elimination project, including protective devices.

**Congestion Mitigation and Air Quality Improvement Program (CMAQ)** – The CMAQ program provides a flexible funding source to State and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. The flexibility of the funds means eligible transportation projects can be from various modes, and can be infrastructure, operations, or policy oriented, as long as they can reduce air emissions. Generally, projects eligible under the former CMAQ program remain eligible with the new authorization. While eligibilities are continued, there is some modification with new language placing considerable emphasis on select project types including electric and natural gas vehicle infrastructure and diesel retrofits.

**Transportation Alternatives Program (TAP)** – MAP-21 establishes a new program to provide for a variety of alternative transportation projects that were previously eligible activities under separately funded programs. The TAP replaces

the funding from pre-MAP-21 programs including Transportation Enhancements, Recreational Trails, Safe Routes to School, and other programs, wrapping them into a single funding source. This program is funded at a level equal to two percent of the total of all MAP-21 authorized Federal-aid highway and highway research funds, with the amount for each State set aside from the State's formula apportionments. Fifty-percent of TAP funds are distributed to areas based on population (suballocated), similar to the STP, with the remaining 50% available for use in any area of the State. The Memphis MPO receives a sub-allocation of these funds.

**Discretionary funding** – The MPO Region has historically received discretionary grants to support planning and research activities, provide for transportation project development, and to repair Federal-aid highways or roads that have been seriously damaged by natural disasters or by catastrophic failures from an external cause. Discretionary Federal funds historically utilized in the region include: Demonstration (DEMO); National Corridor Infrastructure Improvement Program (NCIIP); Transportation, Community, and System Preservation (TCSP); Delta; and Congressional Earmark Special Appropriations (CESA). These sources are not considered stable transportation funding sources; however, the funds historically received from these programs, together with the funds received from repealed SAFETEA-LU programs (e.g., High Priority Projects Program, and Highway Infrastructure Program), were combined into a single group to develop a conservative forecast of discretionary funding given that many of the eligibilities of the eliminated programs are covered in other programs. Funding from the American Recovery and Reinvestment Act of 2009 (ARRA, C230) were excluded as these are considered one-time funding sources.

### Federal Funding - Federal Transit Administration

MAP-21 also restructured core transit grant programs from its predecessor, SAFETEA-LU. The new act provided significant authority to strengthen the safety of public transportation systems and gave emphasis on restoring and replacing the aging public transportation infrastructure by establishing new needs-based formula programs and new asset management requirements. The new core formula programs include:

- Urbanized Areas (Section 5307);
- State of Good Repair (Section 5337);
- Bus and Bus Facilities (Section 5339);
- Enhanced Mobility of Seniors and Individual with Disabilities (Section 5310); and
- Rural Areas (section 5311).

The following list summarizes the historical Federal funding programs utilized in the MPO region between FY 2008 and FY 2014 and programmed for the FY 2014-2017 period, under the MAP-21 transportation bill funding program structure:

**Urbanized Areas (5307)** – Section 5307 is a formula grant program for urbanized areas providing capital, operating, and planning assistance for mass transportation. Funds are apportioned to urbanized areas utilizing a formula based on population, population density, and other factors associated with transit service and ridership. MAP-21 expands 5307 to include the former Jobs Access and Reverse Commute (JARC) program.

**State of Good Repair Program (SGR) (5337)** – MAP-21 establishes a new grant program to maintain public transportation systems in a state of good repair. This program replaces the Fixed Guideway Modernization Program (Section 5309). Funding is limited to fixed guideway systems (including rail, bus rapid transit, and passenger ferries) and high intensity bus (high intensity bus refers to buses operating in high occupancy vehicle (HOV) lanes). Projects are limited to replacement and rehabilitation, or capital projects required to maintain public transportation systems in

a state of good repair. Projects must be included in a transit asset management plan to receive funding. The new formula comprises: (1) the former fixed guideway modernization formula; (2) a new service-based formula; and (3) a new formula for buses on HOV lanes. SGR replaces the functions of the former 5309 Fixed Guideway Modernization Program that has been historically utilized in the Region.

**Bus and Bus Facilities Program (5339)** – A new formula grant program is established under Section 5339, replacing the previous Section 5309 discretionary Bus and Bus Facilities program that has been historically utilized in the Region. This capital program provides funding to replace, rehabilitate, and purchase buses and related equipment, and to construct bus-related facilities.

**Enhanced Mobility of Seniors and Individuals with Disabilities (5310)** – This program provides formula funding to increase the mobility of seniors and persons with disabilities. Funds are apportioned based on each State's share of the targeted populations and are now apportioned to both States (for all areas under 200,000) and large urbanized areas (over 200,000). The former New Freedom program (5317) is folded into this program. Activities eligible under New Freedom are now eligible under the Enhanced Mobility of Seniors and Individuals with Disabilities program. At least 55% of program funds must be spent on the types of capital projects eligible under the former section 5310 -- public transportation projects planned, designed, and carried out to meet the special needs of seniors and individuals with disabilities when public transportation is insufficient, inappropriate, or unavailable. The remaining 45% may be used for: public transportation projects that exceed the requirements of the ADA; public transportation projects that improve access to fixed-route service and decrease reliance by individuals with disabilities on complementary paratransit; or, alternatives to public transportation that assist seniors and individuals with disabilities. Using these funds for operating expenses requires a 50% local match while using these funds for capital expenses (including acquisition of public transportation services) requires a 20% local match. Enhanced Mobility of Seniors and Individuals with Disabilities Program combined the functions of the former New Freedom Program and Transportation for Elderly or Persons with Disability Program (5310) has been historically utilized in the Region.

## 7.2.2 Operations and Maintenance (O&M) Revenue

The maintenance and operations of non-transit facilities within the MPO region is currently funded through a combination of state funds and local funds. Local governments provide funding for the facilities that are not state or Federal routes, such as local streets, and some bicycle and pedestrian facilities. State DOTs provide funding to operate and maintain state and Federal facilities such as state highways and the interstate system. O&M revenue activities include:

- Paving;
- Signs and painting;
- Right-of-way maintenance;
- Traffic Signal maintenance;
- Surveillance and Inspection;
- Street Lighting; and
- Others (e.g., weight stations, bridge maintenance).

### 7.2.3 Revenue Forecast Methodology

This section describes the process used to generate the transportation revenue projections for the Memphis Urban Area MPO. The methodology, including the inflation rates and year of expenditure dollars, were developed cooperatively by the MPO, MDOT, TDOT and MATA, the public transit operator.

**Step 1: Federal funding programs restructured and base revenues redistributed to be in line with MAP-21.** Historic expenditures, previously programmed under SAFETEA-LU funding programs, were redistributed to MAP-21 funding programs based on **Table 7.1** for highways and **Table 7.2** for transit.

**Table 7.1 Consolidation of Highway Programs**

MAP-21	SAFETEA-LU
STP	BRR-L
NHPP	IM, NHS, BRR-S
HSIP	HSIP
TAP	ENH, SRTS
CMAQ	CMAQ

**Table 7.2 Consolidation of Transit Programs**

MAP-21	SAFETEA-LU
5307	5307, 5316
5337	5309 (Fixed guideway)
5339	5309 (Bus and bus related)
5310	5310, 5317

**Step 2. Ten-year historic average Federal revenues calculated (in nominal dollars).** The ten-year Federal revenues for each program between FY 2008 and FY 2017 were calculated and used as the base revenues for forecasting (i.e., year 2015). A conservative forecast was developed for discretionary funds given the uncertainty of these sources. Historical data shows that discretionary funds have ranged between 8 and 13 percent of the Tennessee annual funding and from 6 to 19 percent in Mississippi. Eight percent was assumed for Tennessee and 6 percent was assumed for Mississippi.

**Step 3. Annual growth rates estimated.** The short- and long-term trend of FHWA obligations to the State of Tennessee and Mississippi were assessed to determine what could reasonably be expected over the life of the plan. FHWA obligations to Tennessee and Mississippi increased from FY 2000 to FY 2008 at an average annual rate of 1.9 percent. Obligations to both states declined from FY 2008 to FY 2014 at an average annual rate of 0.3 percent.

Over the long-term, the Congressional Budget Office (CBO) estimates that revenues of the Highway Trust Fund (HTF) will remain relatively flat, increasing at an average annual rate of less than 1 percent through 2025.

Combining the short- and long-term historical trend obligated to both states along with the foreseeable future of Federal transportation funding, three annual growth rates were used to estimate future revenues:

- FY 2016 and FY 2017 – An annual growth rate of 0.5 percent was applied to the Federal funding program base revenues;
- FY 2018 to FY 2025 – A growth rate of 1 percent was assumed, consistent with CBO's projection of the annual revenues of the HTF; and
- FY 2026 to FY 2040 – A growth rate of 2.3 percent was assumed, consistent with the average annual inflation rate as measured by the consumer-price index for the southern U.S.

**Step 4. State and local match estimated.** The Federal share of transportation expenditures is generally 80 percent for all programs. For interstate projects, Federal share is 90 percent. For CMAQ funds in Tennessee, the historical data show that, on average, the Federal share is 87 percent, with state and locals providing the 13 percent match. A 50%/50% split between state and local contributions for the CMAQ match is assumed for projections. For CMAQ funds in Mississippi, the state provides 100 percent of the 20 percent local match. Required match estimates were calculated assuming these share allocations and were applied to Federal revenue estimates, by program, to calculate state and local match revenues.

**Step 5. Debt service obligations and net transportation revenue estimated.** In addition to Federal funds, the state of Mississippi uses bond proceeds to finance transportation projects in Desoto and Marshall counties. The outstanding Grant Anticipation Revenue Vehicles (GARVEE bonds) issued by MDOT are being paid from Federal grant revenues and state revenue sources. The outstanding debt service estimates were provided by MDOT to refine revenue projections. Currently, debt service payments extend through FY 2040. It is assumed that no additional bonds are issued during the time frame of the plan and that the state share is 30 percent. Debt service obligations were subtracted from gross revenue projections for the final (net) financially constrained forecast to reflect debt repayment needs as a priority, before additional transportation investments are considered. Debt service is not incurred in Tennessee and is not reflected in revenue projections.

**Step 6. State and local O&M revenues estimated.** The local share for O&M expenditures were collected from the FY 2014-2017 TIP. The state shares for O&M were provided by TDOT and MDOT. A constant annual growth rate of 2.3 percent was assumed, consistent with the average annual inflation rate as measured by the consumer-price index for the southern U.S.

Tables 7.3 through 7.4 present the resulting Federal, state, and local revenues projected for the Memphis Urban Area MPO from 2018 to 2040 for surface transportation investments.

**Table 7.3 Revenue Forecast – Tennessee**  
*Millions*

Funding Programs	2018-2020	2021-2030	2031-2040	Total
NHPP	\$210.2	\$762.9	\$946.3	\$1,919.39
STP - State	\$21.0	\$76.3	\$94.6	\$191.94
STP - Urban	\$54.1	\$196.3	\$243.5	\$493.96
HSIP	\$6.2	\$22.4	\$27.8	\$56.45
CMAQ	\$22.3	\$80.8	\$100.2	\$203.23
TAP	\$4.6	\$16.8	\$20.9	\$42.34
Discretionary Funding	\$31.8	\$115.6	\$143.3	\$290.73
State Sources <sup>a</sup>	\$380.9	\$1,269.6	\$1,269.6	\$2,920.02
Local Sources	\$189.1	\$726.9	\$911.3	\$1,827.27
FTA-Fed	\$83.9	\$304.9	\$378.5	\$767.27
FTA-State	\$11.1	\$40.2	\$49.9	\$101.19
FTA-Local	\$21.5	\$70.0	\$87.1	\$178.65
<b>Total</b>	<b>\$1,036.6</b>	<b>\$3,682.7</b>	<b>\$4,273.1</b>	<b>\$8,992.50</b>

<sup>a</sup> Includes the state match for Federal funding and state revenues (e.g., motor fuel taxes) allocated to the region for O&M and capital expenditures.

**Table 7.4 Revenue Forecast – Mississippi**  
*Millions*

Funding Programs	2018-2020	2021-2030	2031-2040	Total
National Highway Performance Program	\$3.9	\$22.0	\$109.2	\$135.12
Surface Transportation Program - State	\$2.5	\$13.8	\$68.3	\$84.47
Surface Transportation Program - Urban	\$1.3	\$7.3	\$36.5	\$45.12
HSIP	\$0.2	\$1.1	\$5.6	\$6.87
CMAQ	\$0.2	\$1.3	\$6.6	\$8.22
TAP	\$0.1	\$0.3	\$1.7	\$2.12
Discretionary Funds	\$0.5	\$2.8	\$13.7	\$16.92
State Sources	\$134.2	\$499.8	\$184.4	\$818.38
Local Sources	\$24.4	\$93.8	\$117.5	\$235.72
<b>Total</b>	<b>\$167.3</b>	<b>\$642.2</b>	<b>\$543.4</b>	<b>\$1,352.90</b>

Note: Debt payments are already subtracted from revenues to provide these net transportation revenues available for projects.

## 7.3 Project Costs

Planning level cost estimates were developed for all new projects identified using available TDOT and MDOT methodologies. Estimated costs include (as appropriate) preliminary engineering, right-of-way, construction, and operation and maintenance costs. Unit costs for implementation of the transportation improvements accounted for build area type, terrain, and type of improvement.

Current (2015) project costs were forecast to the appropriate year of expenditure as required by Federal regulations<sup>20</sup> for preliminary engineering, right-of-way, and construction. Based on the historic change in construction cost experienced by the TDOT, an annual inflation rate of 3.6 percent was used on both the Tennessee and Mississippi side of the MPO to forecast year of expenditure costs. MDOT agreed that this inflation rate from TDOT was reasonable for Mississippi as well.

### 7.3.1 Roadway Projects

Planning-level cost estimates for new roadway projects in the Tennessee portion of the MPO were developed using TDOT's typical per-mile unit costs for interstates, state routes and local routes.

The base unit cost for right-of-way from TDOT's Long Range Planning Division is currently \$1,233,000 per mile. Factors are then applied to adjust that base cost depending on the intensity of adjacent development:

- Central Business District (CBD);
- CBD Urbanized;
- Heavy Commercial (High Rise, Large Building);
- Strip Commercial;
- Fringe (Mixed, Residential/Commercial);
- Industries (Factories, Warehouse);
- Light Residential (1/4- Acres);
- Medium Residential (Acres+);
- Heavy Residential (Apartments);
- Public Use (Parks, School); and
- Rural.

<sup>20</sup> 23 CFR 450.322 (f)(10)(iv).

Current base unit costs for construction are \$5,980,000 per mile for local roads and \$7,793,000 per mile for state and interstate routes. This represents assumed construction costs for building a new two-lane road in flat terrain. An adjustment factor is applied if portions of the new road will traverse more rolling terrain. Adjustment factors are also applied based on the type of improvement, such as route on new alignment, reconstruction, and median type. When included in the project, the additional costs associated with major river crossings, tunnels, and interchanges were added to the construction cost. In accordance with TDOT's planning-level cost estimating methodology, preliminary engineering was estimated at 10 percent of the construction cost and a 15 percent contingency was added.

Planning-level cost estimates for roadway projects in the Mississippi portion of the MPO were developed and furnished by MDOT. MDOT's experienced engineers have a standardized methodology and set of tools for project cost estimation that they use throughout the State.

### **7.3.2 Transit Projects**

Planning-level capital cost estimates for proposed new and expanded transit service are based on the estimated number of vehicles needed for the new/expanded service, given the specified route length, headways, and hours of service. Calculations include a spare ratio of 0.2 and the cost of establishing stops (spaced between one-quarter and one-eighth of a mile for local bus service). Since DeSoto County does not currently operate any fixed-route transit service, the construction of new bus storage and maintenance facilities was also added to the capital costs.

Assumed unit costs were \$450,000 per vehicle, with the associated costs of stops/shelters, etc. estimated as 0.5 percent of total vehicle costs in the case of express routes, and as 2 percent of total vehicle costs in the case of local service.

### **7.3.3 Multimodal (Bicycle, Pedestrian and Complete Streets)**

Planning-level cost estimates for the general line items for future bicycle and pedestrian investment are based on typical per-mile costs that assume sidewalks on one side of the roadway, 10-foot wide asphalt mixed-use trails, and the development of bike lanes through restriping of existing roadway.

Cost estimates for proposed Complete Streets projects were based on typical per-mile costs (\$3 million to \$3.3 million) provided by the City of Memphis Engineering Department from recent project-level studies. The same unit cost was used on both the TN and MS side of the MPO.

### **7.3.4 Operations and Maintenance Costs**

The additional maintenance costs associated with the re-surfacing *new-lane miles* were estimated and included in the total project cost of widening and new roadway projects. Resurfacing unit costs of \$180,000 per lane-mile for interstate facilities and \$63,000 per lane-mile for other roadways were used based on the TDOT Long Range Planning Division cost estimation tool. The same unit costs were used on both the TN and MS side of the MPO. These costs were inflated to the appropriate year of re-surfacing for each project based on a 3.6 percent inflation rate recommended by TDOT and used elsewhere in this Plan for capital cost inflation. Based on an FHWA report,<sup>21</sup> it was assumed that re-surfacing will occur every 12 years and reconstruction will occur every 24 years. Since the Plan spans only 25 years, reconstruction costs were not included for any new project.

<sup>21</sup> <https://www.fhwa.dot.gov/pavement/preservation/ppc0609.cfm>.

Note that operations and maintenance costs for *existing transportation facilities* was addressed through a separate systems preservation analysis documented in Section 4.1. **Table 7.5** shows historic annual average operations and maintenance costs applied by Memphis MPO jurisdictions (municipalities plus TDOT, MDOT, and MATA) for routine operations and maintenance of the existing system. The costs incurred by local jurisdictions to maintain transportation infrastructure equate to approximately \$84 million per year. In the past, these historic expenditures were carried forward to estimate operations and maintenance costs for the existing system over the life of the Plan horizon. As documented in Section 4.1, however, these historic expenditures will not keep pace with growing maintenance needs. Total annual operations and maintenance costs for the existing system were therefore greatly increased in the Livability 2040 RTP to approximately \$140 million per year (2015 dollars). This level of set-aside funding equates to a doubling of system preservation funding over the life of the Plan from the previous Direction 2040 RTP. Table 7.6 shows the estimated revenues and expenditures for operation and maintenance activities for both non-transit (pavement and bridge) and transit over the life of the plan.

Final project costs – reflecting preliminary engineering, right-of-way, construction, and operations and maintenance– are shown in the fiscally constrained (funded) project list in Table 8.2.

**Table 7.5 (Historic) Annual Average Operations and Maintenance (O&M) Costs**  
*Current Year Dollars*

Jurisdiction	Paving	Signs and Painting	ROW Maintenance	Traffic Signal Maintenance	Surveillance and Inspection	Street Lighting	Other	Total
Shelby County	\$3,000,000	\$450,000	\$1,200,000	\$55,000	\$400,000	–	\$150,000	\$5,255,000
Arlington	\$290,000	\$21,000	\$110,000	\$14,000	\$43,000	\$295,000	\$30,000	\$803,000
Bartlett	\$1,925,000	\$120,000	\$495,000	\$30,000	\$296,828	\$1,207,000	–	\$4,073,828
Collierville	\$907,000	\$23,000	\$204,000	\$34,000	\$50,000	\$1,233,000	\$137,000	\$2,588,000
Germantown	\$1,100,000	\$25,000	\$485,000	\$45,000	\$50,000	\$800,000	–	\$2,505,000
Lakeland	\$270,000	–	–	–	–	–	\$81,000	\$351,000
Memphis	\$12,600,000	\$2,644,000	\$2,500,000	\$3,050,000	\$1,250,000	\$12,000,000	–	\$34,044,000
Millington	\$67,500	\$6,750	\$243,000	\$67,500	\$135,000	\$202,500	\$20,250	\$742,500
<b>Subtotal</b>	<b>\$20,159,500</b>	<b>\$3,289,750</b>	<b>\$5,237,000</b>	<b>\$3,295,500</b>	<b>\$2,224,828</b>	<b>\$15,737,500</b>	<b>\$418,250</b>	<b>\$50,362,328</b>
Fayette County	–	–	–	–	–	–	\$465,000	\$465,000
Braden	\$18,225	–	–	–	–	–	\$9,450	\$27,675
Gallaway	\$30,645	–	–	–	–	–	\$15,390	\$46,035
Oakland	–	–	–	–	–	–	\$28,000	\$28,000
Piperton	\$45,000	\$1,500	\$10,000	\$500	–	\$4,000	–	\$61,000
Rossville	–	–	–	–	–	–	\$29,000	\$29,000
<b>Subtotal</b>	<b>\$93,870</b>	<b>\$1,500</b>	<b>\$10,000</b>	<b>\$500</b>	<b>–</b>	<b>\$4,000</b>	<b>\$489,840</b>	<b>\$656,710</b>
DeSoto County	\$1,226,347	\$62,775	–	\$67,500	\$371,250	–	\$221,128	\$1,949,000
Hernando	\$250,000	\$800	–	–	–	–	–	\$250,800
Horn Lake	\$250,000	\$10,000	\$40,000	\$45,000	\$30,000	\$160,000	\$40,000	\$575,000
Olive Branch	\$189,000	–	–	–	–	–	\$189,000	\$378,000
Southaven	\$1,990,000	\$56,000	\$400,000	\$15,000	\$120,000	\$720,000	\$270,000	\$3,571,000
Walls	–	–	–	–	–	–	\$51,000	\$51,000
<b>Subtotal</b>	<b>\$3,905,347</b>	<b>\$129,575</b>	<b>\$440,000</b>	<b>\$127,500</b>	<b>\$521,250</b>	<b>\$880,000</b>	<b>\$720,128</b>	<b>\$6,774,800</b>

Jurisdiction	Paving	Signs and Painting	ROW Maintenance	Traffic Signal Maintenance	Surveillance and Inspection	Street Lighting	Other	Total
Marshall County	–	–	–	–	–	–	\$55,000	\$55,000
Byhalia	–	–	–	–	–	–	\$450,000	\$450,000
<i>Subtotal</i>	–	–	–	–	–	–	\$505,000	\$505,000
Tennessee								
Department of Transportation	\$13,553,299	\$381,248	\$2,193,030	–	–	–	\$2,330,536	\$18,458,113
Mississippi								
Department of Transportation	\$780,000	\$445,000	\$3,132,700	\$85,000	\$107,000	\$22,000	\$2,117,000	\$6,688,700
Memphis Area Transit Authority	–	–	–	–	–	–	\$795,290	\$795,290
<i>Subtotal</i>	\$14,333,299	\$826,248	\$5,325,730	\$85,000	\$107,000	\$22,000	\$5,242,826	\$25,942,103
<b>Total MPO Area</b>	<b>\$38,492,016</b>	<b>\$4,247,073</b>	<b>\$11,012,730</b>	<b>\$3,508,500</b>	<b>\$2,853,078</b>	<b>\$16,643,500</b>	<b>\$7,376,044</b>	<b>\$84,240,941</b>

Notes: Annual cost data from FY 2014-2017 TIP; maintenance funds include paving, signs and painting, right-of-way maintenance, traffic signal maintenance, surveillance and inspection, street lighting, and other O&M costs; Maintenance funds also include those used for bicycle and pedestrian facilities; Previous plans have assumed an inflation factor of 3 percent for costs and revenues.

**Table 7.6 Balanced O&M Revenue and Costs (Year of Expenditure Dollars)**

	2014-2017			2018-2020			2021-2030			2031-2040		
	Cost	Revenue	Balance	Cost	Revenue	Balance	Cost	Revenue	Balance	Cost	Revenue	Balance
<b>Non-Transit</b>												
Tennessee	\$287,644,310	\$287,644,310	\$0	\$409,133,324	\$409,133,324	\$0	\$1,584,113,522	\$1,584,113,522	\$0	\$1,988,578,037	\$1,988,578,037	\$0
Mississippi	\$57,831,380	\$57,831,380	\$0	\$61,857,462	\$61,857,462	\$0	\$239,504,428	\$239,504,428	\$0	\$300,656,006	\$300,656,006	\$0
<b>Transit</b>												
Tennessee	\$75,319,603	\$75,319,603	\$0	\$108,331,969	\$108,331,969	\$0	\$390,156,900	\$390,156,900	\$0	\$515,496,683	\$515,496,683	\$0
Mississippi	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>TOTAL MPO (Non-transit)</b>	<b>\$345,475,690</b>	<b>\$345,475,690</b>	<b>\$0</b>	<b>\$470,990,786</b>	<b>\$470,990,786</b>	<b>\$0</b>	<b>\$1,823,617,950</b>	<b>\$1,823,617,950</b>	<b>\$0</b>	<b>\$2,289,234,043</b>	<b>\$2,289,234,043</b>	<b>\$0</b>
<b>TOTAL MPO (Transit)</b>	<b>\$75,319,603</b>	<b>\$75,319,603</b>	<b>\$0</b>	<b>\$108,331,969</b>	<b>\$108,331,969</b>	<b>\$0</b>	<b>\$390,156,900</b>	<b>\$390,156,900</b>	<b>\$0</b>	<b>\$515,496,683</b>	<b>\$515,496,683</b>	<b>\$0</b>
<b>TOTAL MPO</b>	<b>\$420,795,293</b>	<b>\$420,795,293</b>	<b>\$0</b>	<b>\$579,322,755</b>	<b>\$579,322,755</b>	<b>\$0</b>	<b>\$2,213,774,850</b>	<b>\$2,213,774,850</b>	<b>\$0</b>	<b>\$2,804,730,726</b>	<b>\$2,804,730,726</b>	<b>\$0</b>



## 7.4 Fiscal Constraint

MAP-21 requires that the RTP be financially feasible and demonstrate fiscal constraint for all funded projects through the 25-year planning horizon. Implementation of transportation improvements is contingent on available funding and a plan is considered fiscally constrained when the project costs do not exceed the projected revenues. The RTP must demonstrate reasonably expected sources of funds and project revenues available to projects and programs identified in the plan as well as identify any additional financial strategies used to implement the plan.

As documented in Section 7.2, the Memphis MPO prepared forecasts of Federal, state and local revenues over the 2040 plan horizon. Funding tiers were defined for 2018-2020, 2021-2030, and 2031-2040.<sup>22</sup> Costs were estimated at a high level for all projects from the sources described in Section 5, adjusted to reflect inflation in the future. The prioritized list of projects described in Section 7.1 were then matched to potential revenue given project eligibility (by fund source), availability of local match, and availability of funding within each funding tier of the Plan. Projects were funded in order based on their priority with higher priority projects funded in earlier funding tiers and lower priority projects funded in later funding tiers. This was an iterative process, requiring repeated balancing across fund sources and funding tier of the RTP (2020, 2030, or 2040). Projects that did not receive funding were placed in the Vision Plan (see **Table 8.3**).

**Table 7.7** summarizes total revenue and expenditures by fund source and Livability 2040 funding tier, demonstrating that Livability 2040 revenues and expenditures are balanced.<sup>23</sup> All expenditures are presented in year of expenditure (YOE) dollars. The FY 2014-2017 time period is also included in this for informational purposes to document balanced revenues and expenditures for the FY 2014-2017 TIP. Note that there are no Transportation Control Measures (TCMs) in the Memphis MPO region requiring priority funding or finance strategies. The Inspection and Maintenance (I/M) Program implemented in the City of Memphis was a tailpipe emissions test used to ensure vehicles complied with CO emission standards. In July 2013, the City of Memphis discontinued the I/M program. The Shelby County Health Department recently prepared and submitted a Maintenance Plan revision to EPA to address the City of Memphis' elimination of the vehicle Inspection and Maintenance (I/M) Program by removing the program. When the Maintenance Plan is approved by EPA, the I/M program will no longer be an enforceable control measure in the State Implementation Plan (SIP). There are no other current enforceable control measures identified in the SIP for the Memphis/Shelby County region.

There are no voluntary TCMs identified in the current SIP; however, there have been other ongoing efforts in the region:

- Implementation of projects identified in the MPO's Bicycle and Pedestrian Plan,
- Adoption of the Unified Development Code that contains growth and access management strategies, and
- Continuation of the Memphis Area Rideshare Program.

Detailed project tables for projects included in the fiscally constrained 2040 RTP are provided in Section 8.0 to include design concept, scope, descriptions, and funding source.<sup>24</sup>

<sup>22</sup> 23 CFR 450.322 (b).

<sup>23</sup> 23 CFR 450.322 (f)(10).

<sup>24</sup> 23 CFR 450.322 (f)(6).

This page is intentionally blank.

**Table 7.7 Balanced Revenue and Costs for Livability 2040 (Year of Expenditure Dollars)**

Tiers	2014-2017			2018-2020			2021-2030			2031-2040			Total		
	Revenues	Expenditures	Balance	Revenues	Expenditures	Balance	Revenues	Expenditures	Balance	Revenues	Expenditures	Balance	Revenues	Expenditures	Balance
<b>Tennessee</b>															
National Highway Performance Program	\$301,600,000.00	\$301,600,000.00	-	\$210,193,543.36	\$210,117,026.62	\$76,516.74	\$762,892,383.62	\$762,892,383.62	-	\$946,307,137.73	\$946,234,663.12	\$72,474.62	\$1,919,393,064.72	\$1,919,244,073.36	\$148,991.36
Surface Transportation Program - State	\$16,560,000.00	\$16,560,000.00	-	\$21,019,354.34	\$20,997,002.29	\$22,352.04	\$76,289,238.36	\$76,289,238.36	-	\$94,630,713.77	\$92,118,706.55	\$2,512,007.22	\$191,939,306.47	\$189,404,947.20	\$2,534,359.27
Surface Transportation Program - Urban	\$128,416,829.00	\$127,023,116.00	\$1,393,713.00	\$54,093,926.60	\$54,091,398.97	\$2,527.63	\$196,332,598.73	\$196,332,598.73	-	\$243,534,925.15	\$221,127,191.01	\$22,407,734.14	\$493,961,450.48	\$471,551,188.71	\$22,410,261.77
HSIP	\$13,950,000.00	\$13,950,000.00	-	\$6,182,163.04	\$6,182,163.04	-	\$22,438,011.28	\$22,438,011.28	-	\$27,832,562.87	\$27,832,562.87	-	\$56,452,737.20	\$56,452,737.20	-
CMAQ	\$43,574,126.00	\$43,574,126.00	-	\$22,255,786.94	\$22,255,786.94	-	\$80,776,840.62	\$80,776,840.62	-	\$100,197,226.35	\$100,197,226.35	-	\$203,229,853.91	\$203,229,853.91	-
TAP	\$3,090,100.00	\$3,090,100.00	-	\$4,636,622.28	\$4,636,622.28	-	\$16,828,508.46	\$16,828,508.46	-	\$20,874,422.16	\$20,874,422.16	-	\$42,339,552.90	\$42,339,552.90	-
Discretionary Funds	\$55,286,392.00	\$55,286,392.00	-	\$31,838,139.66	-	\$31,838,139.66	\$115,555,758.11	\$65,712,587.22	\$49,843,170.89	\$143,337,698.80	-	\$143,337,698.80	\$290,731,596.57	\$65,712,587.22	\$225,019,009.35
State Sources	\$57,513,778.00	\$57,513,778.00	-	\$380,872,156.00	\$371,205,748.23	\$9,666,407.77	\$1,269,573,853.33	\$1,269,573,853.33	-	\$1,269,573,853.33	\$1,214,744,187.27	\$54,829,666.07	\$2,920,019,862.67	\$2,855,523,788.83	\$64,496,073.84
Local Sources	\$61,762,203.00	\$61,762,203.00	-	\$189,099,933.67	\$184,452,662.75	\$4,647,270.92	\$726,881,396.74	\$726,881,396.74	-	\$911,292,091.71	\$911,292,091.71	-	\$1,827,273,422.12	\$1,822,626,151.20	\$4,647,270.92
FTA-Fed	\$73,404,551.00	\$73,404,551.00	-	\$83,851,245.64	\$83,851,245.64	-	\$304,904,255.04	\$304,904,255.04	-	\$378,510,875.76	\$378,510,875.76	-	\$767,266,376.44	\$767,266,376.44	-
FTA-State	\$9,129,944.00	\$9,129,944.00	-	\$11,060,086.76	\$11,060,086.76	-	\$40,213,340.78	\$40,213,340.78	-	\$49,919,125.09	\$49,919,125.09	-	\$101,192,552.63	\$101,192,552.63	-
FTA-Local	\$9,784,944.00	\$9,784,944.00	-	\$21,544,410.67	\$21,544,410.67	-	\$70,039,304.44	\$70,039,304.44	-	\$87,066,682.39	\$87,066,682.39	-	\$178,650,397.50	\$178,650,397.50	-
<b>Total</b>	<b>\$774,072,867.00</b>	<b>\$772,679,154.00</b>	<b>\$1,393,713.00</b>	<b>\$1,036,647,368.97</b>	<b>\$990,394,154.20</b>	<b>\$46,253,214.76</b>	<b>\$3,682,725,489.51</b>	<b>\$3,632,882,318.62</b>	<b>\$49,843,170.89</b>	<b>\$4,273,077,315.13</b>	<b>\$4,049,917,734.28</b>	<b>\$223,159,580.85</b>	<b>\$8,992,450,173.60</b>	<b>\$8,673,194,207.10</b>	<b>\$319,255,966.50</b>
<b>Mississippi</b>															
National Highway Performance Program	\$33,900,000.00	\$33,900,000.00	-	\$3,933,606.10	\$3,117,609.53	\$815,996.57	\$22,006,695.61	\$11,866,066.44	\$10,140,629.17	\$109,180,586.76	\$109,180,586.76	-	\$135,120,888.46	\$124,164,262.72	\$10,956,625.74
Surface Transportation Program - State	\$56,013,977.00	\$56,013,977.00	-	\$2,459,159.70	\$2,456,044.16	\$3,115.55	\$13,757,854.17	\$11,507,542.30	\$2,250,311.87	\$68,256,071.58	\$68,256,071.58	-	\$84,473,085.45	\$82,219,658.03	\$2,253,427.42
Surface Transportation Program - Urban	\$25,285,444.00	\$21,975,989.00	\$3,309,455.00	\$1,313,534.09	\$1,283,190.84	\$30,343.25	\$7,348,612.01	\$7,340,121.33	\$8,490.68	\$36,458,257.29	\$36,458,257.29	-	\$45,120,403.40	\$45,081,569.46	\$38,833.93
HSIP	\$3,150,000.00	\$3,150,000.00	-	\$200,090.95	\$200,090.95	-	\$1,119,415.73	\$1,119,415.73	-	\$5,553,694.59	\$5,553,694.59	-	\$6,873,201.26	\$6,873,201.26	-
CMAQ	\$8,664,000.00	\$8,664,000.00	-	\$239,269.59	\$239,269.59	-	\$1,338,602.03	\$1,338,602.03	-	\$6,641,131.29	\$6,641,131.29	-	\$8,219,002.91	\$8,219,002.91	-
TAP	\$346,668.00	\$346,668.00	-	\$61,741.35	\$61,741.35	-	\$345,414.12	\$345,414.12	-	\$1,713,683.73	\$1,713,683.73	-	\$2,120,839.20	\$2,120,839.20	-
Discretionary Funds	\$7,609,600.00	\$7,609,600.00	-	\$492,444.11	-	\$492,444.11	\$2,754,995.62	-	\$2,754,995.62	\$13,668,205.51	\$1,887,377.54	\$11,780,827.97	\$16,915,645.24	\$1,887,377.54	\$15,028,267.70
State Sources	\$138,894,496.00	\$138,894,496.00	-	\$134,219,531.67	\$133,507,281.06	\$712,250.61	\$499,801,390.26	\$442,027,985.53	\$57,773,404.73	\$184,361,160.06	\$184,361,160.06	-	\$818,382,081.99	\$759,896,426.66	\$58,485,655.34
Local Sources	\$6,308,065.00	\$6,308,065.00	-	\$24,407,456.31	\$24,044,864.98	\$362,591.33	\$93,766,198.36	\$83,097,038.42	\$10,669,159.94	\$117,542,737.79	\$117,542,737.79	-	\$235,716,392.46	\$224,684,641.19	\$11,031,751.27
<b>Total</b>	<b>\$280,172,250.00</b>	<b>\$276,862,795.00</b>	<b>\$3,309,455.00</b>	<b>\$167,326,833.87</b>	<b>\$164,910,092.46</b>	<b>\$2,416,741.41</b>	<b>\$642,239,177.90</b>	<b>\$558,642,185.88</b>	<b>\$83,596,992.02</b>	<b>\$543,375,528.60</b>	<b>\$531,594,700.63</b>	<b>\$11,780,827.97</b>	<b>\$1,352,941,540.37</b>	<b>\$1,255,146,978.97</b>	<b>\$97,794,561.40</b>

Tiers	2014-2017			2018-2020			2021-2030			2031-2040			Total		
	Revenues	Expenditures	Balance	Revenues	Expenditures	Balance	Revenues	Expenditures	Balance	Revenues	Expenditures	Balance	Revenues	Expenditures	Balance
<b>Total Tennessee and Mississippi</b>															
National Highway Performance Program	\$335,500,000.00	\$335,500,000.00	-	\$214,127,149.46	\$213,234,636.15	\$892,513.31	\$784,899,079.23	\$774,758,450.06	\$10,140,629.17	\$1,055,487,724.49	\$1,055,415,249.87	\$72,474.62	\$2,054,513,953.18	\$2,043,408,336.08	\$11,105,617.10
Surface Transportation Program - State	\$72,573,977.00	\$72,573,977.00	-	\$23,478,514.04	\$23,453,046.45	\$25,467.59	\$90,047,092.53	\$87,796,780.66	\$2,250,311.87	\$162,886,785.35	\$160,374,778.13	\$2,512,007.22	\$276,412,391.92	\$271,624,605.24	\$4,787,786.69
Surface Transportation Program - Urban	\$153,702,273.00	\$148,999,105.00	\$4,703,168.00	\$55,407,460.70	\$55,374,589.82	\$32,870.88	\$203,681,210.73	\$203,672,720.05	\$8,490.68	\$279,993,182.45	\$257,585,448.30	\$22,407,734.14	\$539,081,853.87	\$516,632,758.17	\$22,449,095.70
HSIP	\$17,100,000.00	\$17,100,000.00	-	\$6,382,253.99	\$6,382,253.99	-	\$23,557,427.01	\$23,557,427.01	-	\$33,386,257.46	\$33,386,257.46	-	\$63,325,938.46	\$63,325,938.46	-
CMAQ	\$52,238,126.00	\$52,238,126.00	-	\$22,495,056.54	\$22,495,056.54	-	\$82,115,442.65	\$82,115,442.65	-	\$106,838,357.64	\$106,838,357.64	-	\$211,448,856.82	\$211,448,856.82	-
TAP	\$3,436,768.00	\$3,436,768.00	-	\$4,698,363.63	\$4,698,363.63	-	\$17,173,922.58	\$17,173,922.58	-	\$22,588,105.89	\$22,588,105.89	-	\$44,460,392.10	\$44,460,392.10	-
Discretionary Funds	\$62,895,992.00	\$62,895,992.00	-	\$32,330,583.76	-	\$32,330,583.76	\$118,310,753.73	\$65,712,587.22	\$52,598,166.51	\$157,005,904.32	\$1,887,377.54	\$155,118,526.78	\$307,647,241.81	\$67,599,964.76	\$240,047,277.05
State Sources	\$196,408,274.00	\$196,408,274.00	-	\$515,091,687.67	\$504,713,029.29	\$10,378,658.38	\$1,769,375,243.59	\$1,711,601,838.86	\$57,773,404.73	\$1,453,935,013.39	\$1,399,105,347.33	\$54,829,666.07	\$3,738,401,944.66	\$3,615,420,215.48	\$122,981,729.18
Local Sources	\$68,070,268.00	\$68,070,268.00	-	\$213,507,389.98	\$208,497,527.73	\$5,009,862.25	\$820,647,595.10	\$809,978,435.16	\$10,669,159.94	\$1,028,834,829.50	\$1,028,834,829.50	-	\$2,062,989,814.58	\$2,047,310,792.39	\$15,679,022.19
Federal-Transit	\$73,404,551.00	\$73,404,551.00	-	\$83,851,245.64	\$83,851,245.64	-	\$304,904,255.04	\$304,904,255.04	-	\$378,510,875.76	\$378,510,875.76	-	\$767,266,376.44	\$767,266,376.44	-
State-Transit	\$9,129,944.00	\$9,129,944.00	-	\$11,060,086.76	\$11,060,086.76	-	\$40,213,340.78	\$40,213,340.78	-	\$49,919,125.09	\$49,919,125.09	-	\$101,192,552.63	\$101,192,552.63	-
Local-Transit	\$9,784,944.00	\$9,784,944.00	-	\$21,544,410.67	\$21,544,410.67	-	\$70,039,304.44	\$70,039,304.44	-	\$87,066,682.39	\$87,066,682.39	-	\$178,650,397.50	\$178,650,397.50	-
<b>Total</b>	<b>\$1,054,245,117.00</b>	<b>\$1,049,541,949.00</b>	<b>\$4,703,168.00</b>	<b>\$1,203,974,202.84</b>	<b>\$1,155,304,246.66</b>	<b>\$48,669,956.18</b>	<b>\$4,324,964,667.41</b>	<b>\$4,191,524,504.50</b>	<b>\$133,440,162.90</b>	<b>\$4,816,452,843.73</b>	<b>\$4,581,512,434.91</b>	<b>\$234,940,408.82</b>	<b>\$10,345,391,713.98</b>	<b>\$9,928,341,186.07</b>	<b>\$417,050,527.91</b>

## 7.5 Potential Alternative Funding Strategies

Current revenue sources fall short of funding the entire needs of the region. While the fiscally constrained plan presented in Section 8.0 is funded by the existing revenue streams identified in Section 7.4, there are other potential sources of revenue that could be explored in the future. Historically, public support for developer impact fees, higher gas taxes, and toll roads have received the highest level of community support.

Examples of different types of funding sources are identified below. Generally, a mix of funding strategies may be more palatable to the region as it does not focus the burden on one revenue source.

### 7.5.1 Fuel Tax Related

#### Example: Fuel tax

Nationally, the fuel tax is the standard transportation revenue source. The Federal excise tax on gasoline is 18.4 cents per gallon and 24.4 cents per gallon for diesel fuel. In Mississippi it's 18.79 and 18.4, and in Tennessee it's 21.4 and 18.4, cents per gallon for gasoline and diesel fuel, respectively. Usually the tax is a fixed value; however, fuel taxes can be indexed to the consumer price index or indexed to the price of fuel to allow the value to vary over the time in an equitable manner.

### 7.5.2 Vehicle and Driver Related

#### Example: Vehicle Registration Fees

A vehicle registration fee is a surcharge collected by the Division of Motor Vehicles at the time of vehicle registration and registration renewal within a defined jurisdiction. It is usually a fixed dollar amount. The fee can be levied on any combination of vehicle types (private, commercial, etc.). Currently, all vehicles in Shelby County are assessed a \$50 wheel tax when registered. The majority of this tax is used to fund nontransportation needs. Shelby County could consider reallocation of a portion of these funds to meet the needs for transportation projects. The surrounding counties also could consider this as a source of funding.

### 7.5.3 Tolling, Road Pricing, and Other User Fees

#### Example: Tolling

Nationwide, toll road revenues tend to be dedicated for use on the same roadway. When existing roads are tolled, the proceeds will sometimes be used for complementary transportation infrastructure or services within or affecting the same corridor.

Tolling existing interstates and other Federally funded roads and bridges is not allowed under current Federal law, except in cases of major reconstruction of a bridge or tunnel and as specifically authorized by Congress. Unless limited to state routes, tolling of highways would require a change in Federal law to execute. Tolling only makes sense on well-studied, high-traffic pieces of infrastructure.

Tennessee has studied tolling for the construction of several new facilities. Toll facilities allow agencies to design, construct, and operate projects while using the toll concessions to offset the cost of constructing and operating the facility.

### Example: Road Usage Fee (VMT Tax)

Road usage charges or VMT fees are per-mile charges for using all the roadways in a jurisdiction. They are generally intended as a replacement for fuel taxes. Instead of a per-gallon charge, road usage charges are based on the number of miles driven. Road usage charges have the advantage over fuel taxes in that they are resilient to increasing fuel economy, and apply equally regardless of engine type/technology. These two advantages would give Road Usage Charges greater stability than fuel taxes in the long run.

## 7.5.4 *General Taxes*

### Example: Local Option Sales Tax

Local governments may elect to adopt a general-purpose sales tax to fund transportation improvements. This, however, requires state legislative authority. For Shelby County, a ½ cent sales tax could potentially generate \$63 million per year (estimated based on similar sized counties and retail employees). This has been a popular option in many other communities across the country. The revenue stream should grow in proportion to population growth, and will keep pace with inflation because the tax is a set percentage of the price of goods sold.

## 7.5.5 *Specialized Taxes*

### Example: “Sin” Taxes

Often referred to as “sin” taxes, these taxes are applied to particular goods and activities, such as alcohol, tobacco, and gambling. These taxes are unique in that their amount is meant to be a disincentive to engaging in certain behavior, yet they have the potential to raise considerable revenue for states and local governments. While lottery proceeds have long been used to support education programs, some states with legalized gambling or a statewide lottery have designated revenues generated through these activities for public transportation services.

## 7.5.6 *Beneficiary Charges and Value Capture*

### Example: Impact Fees

Impact fees are a one-time charge to developers on new development. Revenues are used to pay for infrastructure improvements – such as schools, sewers, and roads – to support growth generated by development. These fees have been applied by municipalities and county governments. The revenue potential of impact fees is low, and since the fees are entirely dependent on new development, they are highly speculative, and not easily bondable.

## 7.5.7 *Freight-Related Taxes and Fees*

### Example: Container Fees

Container fees are a flat fee charged for all shipping containers transported into a port by any means (roadway, rail, or ship). Container fees are expressed in dollars per TEU, where one TEU is one Twenty-foot Equivalent Unit, equal to the size of the smallest intermodal shipping container.

States and port districts that impose container fees are constantly balancing the need for transportation infrastructure funding to keep the freight transportation system working properly, against the need to keep shipping rates and fees economically competitive with freight destinations and ports in other jurisdictions. This is particularly true if the ports handle a large percentage of discretionary cargo that could easily be transported through a competing port if the fees become too disadvantageous.

## 8.0 Investment Priorities

As is often the case in regions across the country, the total needs in the Memphis MPO region (approximately \$19 billion) exceed the total funding available (approximately \$10 billion). As a fiscally constrained plan, Livability 2040 must contain a prioritized list of investments that stay within this \$10 billion, with funding available for the designated time period of project implementation and for the specific type of project.

In order to identify the constrained investments, a tradeoff analysis was first performed to look at available funding for capital and maintenance. By varying the amount of funding available for roadway and bridge maintenance, the public and stakeholders can see the range of potential projected pavement and bridge conditions, as well as the number of capital projects that can be built with the remaining funds.

Following this high level tradeoff analysis, the capital funds were allocated to specific capital projects and “set-asides” were allocated for various types of smaller investments (e.g., bicycle and pedestrian improvements). For specific, larger capital projects, the prioritization process was determined through extensive outreach with community and agency leaders, guided by the results of a performance-based project prioritization process (see Section 7).

Ultimately, this plan focuses on maintaining and preserving the existing transportation system *first*. This conforms with the direction provided to the planning process from the public and stakeholders, and adheres to expected targets for bridge and pavement condition performance.<sup>25</sup> While the requirements for meeting minimum condition standards are applied to the State level, with focus on the National Highway System and Interstate Highway System, the MPO is committed to working with the states of Tennessee and Mississippi to help reach and exceed the national targets.



Above: Livability 2040 focuses on maintaining and preserving the existing system.

Within capital investments it strikes a balance between livability and mobility. Livability 2040 meets air quality requirements and supports regional economic development policies. Both short and long-range transportation investments are summarized in Section 8.1. Specific project listings can be found in **Table 8.2** which includes details related to proposed transportation facilities including design concept, scope, and descriptions and source of funds. **Table 8.3** provides a listing of projects included in the unconstrained Vision Plan.

### 8.1 Investment Summary

The fiscally constrained plan funds more than \$10 billion worth of projects and lump sum set asides. **Table 8.1** highlights major investments by key project type. Some specific projects are called out and included in the capital project lists in Section 8.2. These are projects that are larger in scope and scale. The set aside categories often apply to smaller, more localized improvements that are not specifically called out and separately analyzed; however, recommendations for focus areas for these monies are included in the table.

<sup>25</sup> 23 U.S.C. 119(f)(1) and 23 U.S.C. 119(f)(1).

**Table 8.1 Highlights of Major Investments**

Category	Funding (Millions)	Percent of Total	Description or Examples
Roadway Maintenance	\$4,618	46.51%	Livability 2040 doubles the system preservation funding levels for the MPO region, in keeping with regional priorities indicated through stakeholder and public outreach, as well as Federal guidance. The plan fully funds long-term needs on the NHS system to meet MAP-21 performance targets. The plan assumes non-NHS roadways will continue to be funded, with approximately \$1 billion set aside.
Roadway Capacity	\$3,413	34.37%	Widening many interstates in the region including I-40, I-55, and I-240 Construction of new I-69 in northwest Memphis A wide array of widening, new roadway, and roadway reconfiguration projects on arterial roads
Transit Operations and Maintenance	\$1,014	10.21%	Transit operations and maintenance continue to be of paramount concern to MATA and to the region's public and stakeholders: ensuring the existing system functions well
Interchange Capacity	\$410	4.13%	A series of three new interchanges on US-78/SR-4 (Lamar Ave.) A number of major interchange modifications including I-240/Airways Blvd., Plough Blvd./Winchester Rd., and I-55/Commerce St. among several others
Transit Capacity	\$258	2.60%	New east/west local bus service along Goodman Rd. in Desoto County and two north/south routes to connect this new route with the existing MATA system in Shelby County New east Memphis north-south express bus to provide direct transit service between Stage Rd. (SR-15) area and industrial employment areas in the Lamar Avenue corridor without having to transfer in downtown Memphis
Bicycle/Pedestrian and Complete Streets	\$88	0.89%	Follow the recommendations of the Regional Bicycle and Pedestrian Plan, adopted by the Transportation Policy Board on November 20, 2014. Complete streets upgrades for three livability corridors: <ul style="list-style-type: none"> <li>• Raleigh-Millington</li> <li>• Bartlett-Braden</li> <li>• Olive Branch - Walls</li> </ul> City of Memphis complete streets investments

Category	Funding (Millions)	Percent of Total	Description or Examples
Safety	\$75	0.75%	Targeted safety funding set aside for projects that address safety emphasis areas and/or address safety need on corridors of safety concern.
			High crash corridors (non-interstate) include:
			<ul style="list-style-type: none"> <li>• US 72 / Poplar Avenue</li> </ul>
			<ul style="list-style-type: none"> <li>• MS 302 (Goodman Road)</li> </ul>
			<ul style="list-style-type: none"> <li>• Winchester Road</li> </ul>
			<ul style="list-style-type: none"> <li>• US 78 / Lamar Avenue</li> </ul>
			<ul style="list-style-type: none"> <li>• TN 177 / Germantown Pkwy</li> </ul>
			<ul style="list-style-type: none"> <li>• Airways Blvd</li> </ul>
			<ul style="list-style-type: none"> <li>• Hacks Cross Road</li> </ul>
			Safety Emphasis areas include:
			<ul style="list-style-type: none"> <li>• Intersection crashes</li> </ul>
			<ul style="list-style-type: none"> <li>• Vulnerable road users</li> </ul>
			<ul style="list-style-type: none"> <li>• Younger, older drivers</li> </ul>
			<ul style="list-style-type: none"> <li>• Seatbelt use, impaired driving</li> </ul>
Studies	\$53	0.53%	Southern Gateway Bridge EIS
			Two transit studies: streetcar service from Downtown to Airport and BRT-lite service along Union/Poplar corridor connecting Downtown, Midtown, University of Memphis, and Germantown

## 8.2 Livability 2040 Project List

Figures 8.1 through 8.2 and Table 8.2 represents the fiscally constrained projects for 2018 through 2040. The fiscally constrained project list includes the projects in the FY 2014-17 TIP that are expected to be completed after FY 2017, the last year in the current TIP cycle. The projects which will be completed by the end of FY 2017 are shown in Table 4.3, Existing Plus Committed (E+C) project list.

Figure 8.1 Fiscally Constrained Projects – 2018 through 2020

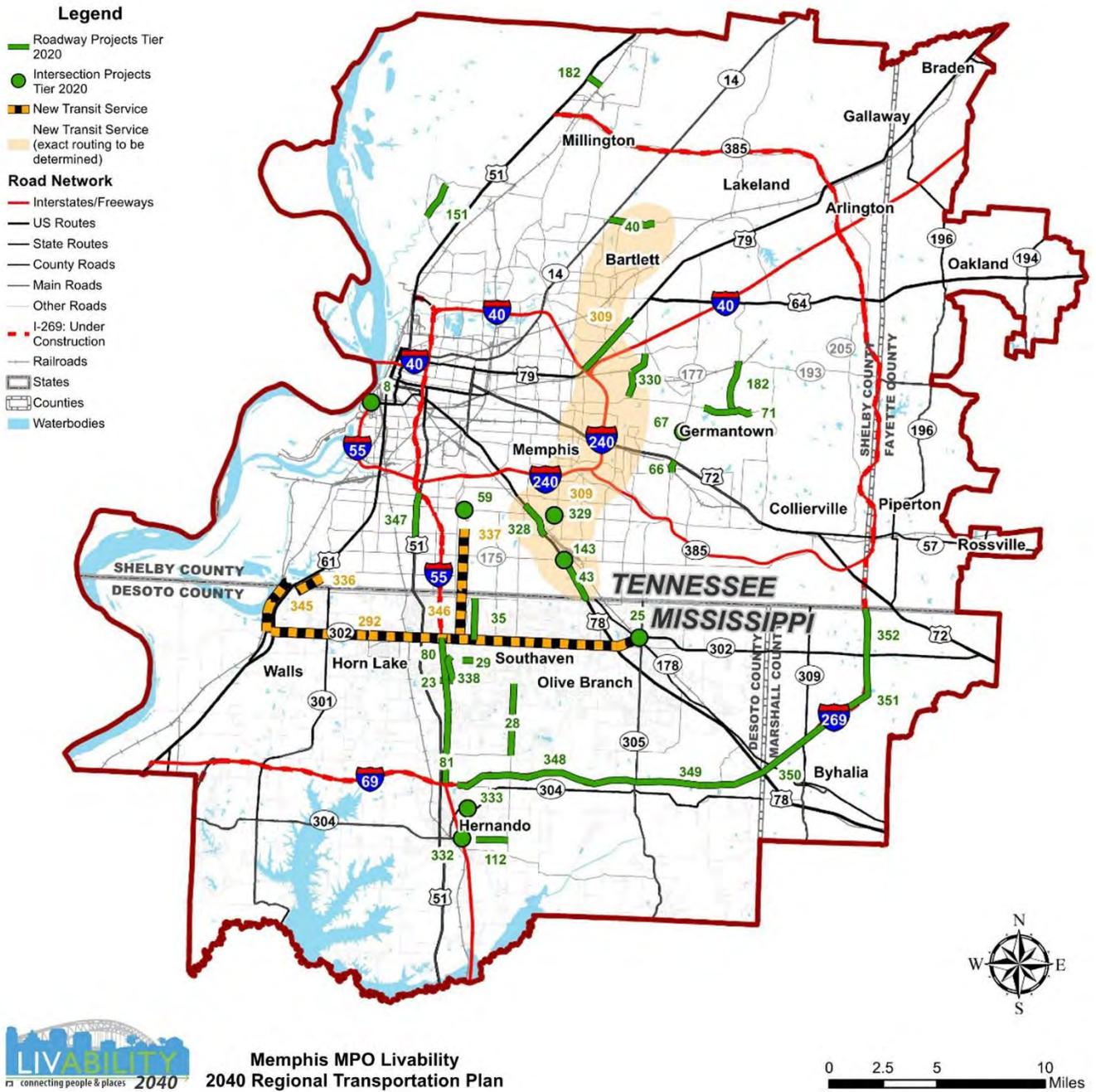
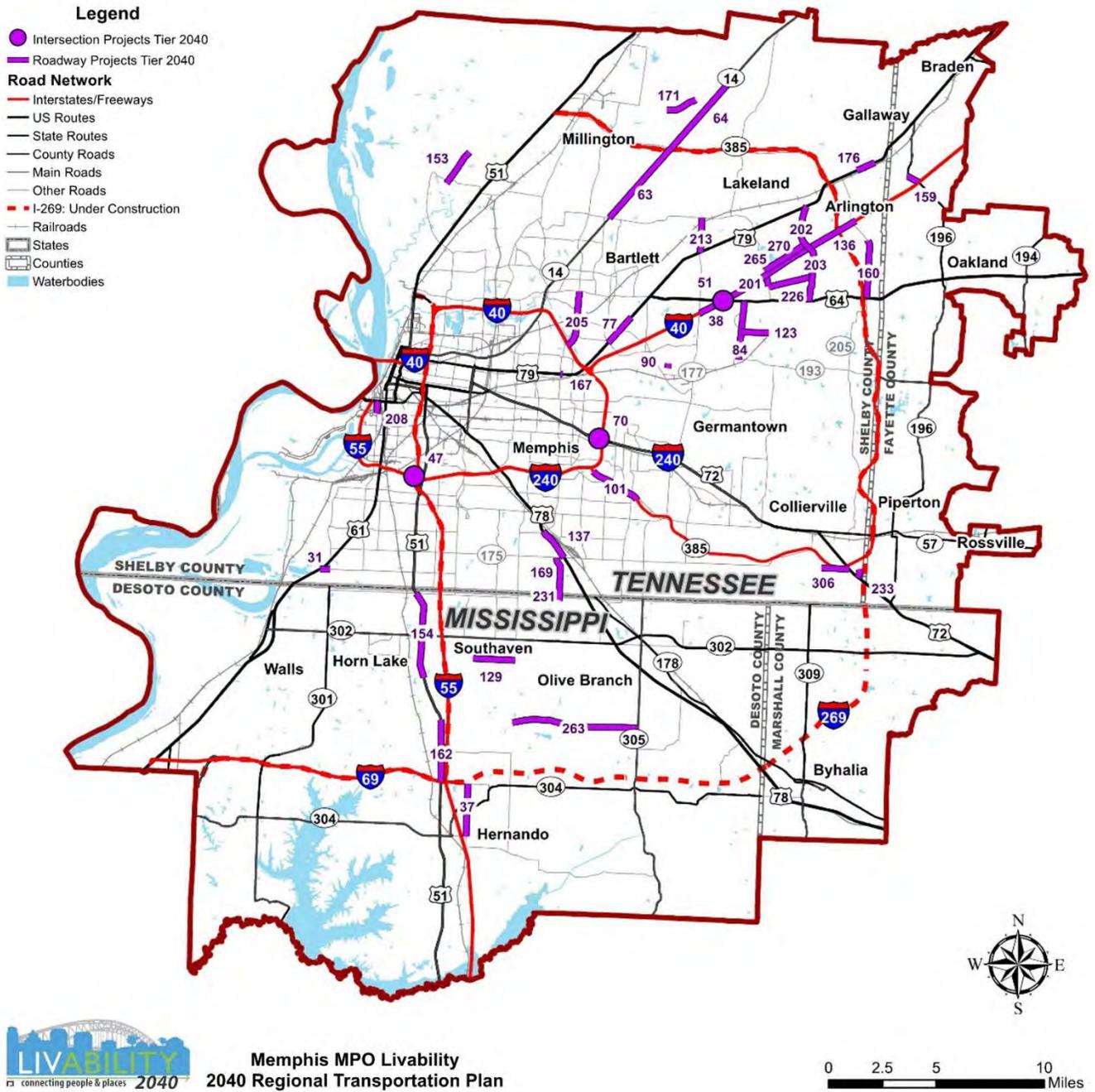


Figure 8.2 Fiscally Constrained Projects – 2021 through 2030



Figure 8.3 Fiscally Constrained Projects – 2031 through 2040



**Table 8.2 Fiscally Constrained Project List**

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	Completion State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
<b>2018-2020 TN Projects</b>																		
1000	-	NHS Pavement O&M		N/A	Operations and Maintenance (O&M) set aside for pavement on the National Highway System (NHS)	O&M	Regionwide	TN	2019	2018-2020	\$272,307,306.59	NHPP: 61%	\$166,064,705	61%	\$79,011,871	29%	\$27,230,731	10%
1003	-	NHS Bridge O&M		N/A	Operations and Maintenance (O&M) set aside for bridges on the National Highway System (NHS)	O&M	Regionwide	TN	2019	2018-2020	\$53,789,097.60	NHPP: 61%	\$32,802,905	61%	\$15,607,283	29%	\$5,378,910	10%
1006		non-NHS Pavement and bridges		N/A	Operations and Maintenance (O&M) set aside for pavement and bridges that are not on the National Highway System (NHS)	O&M	Regionwide	TN	2019	2018-2020	\$83,036,919.42	None	\$0	0%	\$8,303,692	10%	\$74,733,227	90%
1009	-	Bike/ped/Complete Streets/Transit Operations		N/A	The costs equal the total funds available from these sources: (HSIP, CMAQ, TAP) and costs of Livability Corridors Projects	Bike/Ped/Transit	Regionwide	TN	2019	2018-2020	\$38,246,212.20	HSIP: 16%	\$6,182,163	86%	\$439,195	6%	\$527,466	7%
												CMAQ: 58%	\$22,255,787	86%	\$1,581,104	6%	\$1,898,878	7%
												TAP: 12%	\$4,636,622	86%	\$329,397	6%	\$395,600	7%
												Total Federal: 86%	\$33,074,572	86%	\$2,349,696	6%	\$2,821,944	7%
1013	-	Transit O&M		N/A	The transit O&M costs equal the available Transit funds minus transit capital projects	O&M	Regionwide	TN	2019	2018-2020	\$108,331,968.51	FTA: 72%	\$77,532,226	72%	\$10,247,709	9%	\$20,552,033	19%
40	STP-M-2006-03	Old Brownsville Rd	SR-14 (Austin Peay) to Kirby Whitten	2.3	Widen to four lane divided roadway with a raised median and median openings and turn lanes for access to existing driveways. Project scope will include designated bicycle facilities and ADA accessible pedestrian improvements.	Road Widening	Bartlett	TN	2020	2018-2020	\$27,708,788.43	STP-Urban: 6%	\$1,648,673	6%	\$0	0%	\$26,060,116	94%
66	STP-M-2014-02	Germantown Road Realignment	Poplar Pike/McVay to 1000 feet south of Poplar Pike	0.5	Realignment and construction of a 5 lane road to make Germantown Road continuous through the City of Germantown. The project includes the realignment of West Street and Old Germantown Roads to form an intersection with the Realigned Germantown Road north of the NSRR tracks. As part of the project, the railroad at-grade crossing will be improved to current NSRR standards and Old Germantown Road will be improved from Poplar Pike to the intersection of Old Germantown Road with Germantown Road Realigned.	Road Widening	Germantown	TN	2020	2018-2020	\$4,327,395.38	STP-Urban: 75%	\$3,245,547	75%	\$0	0%	\$1,081,849	25%

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
67	STP-M-2014-07	Germantown Road at Wolf River Boulevard Intersection Improvements	Germantown Road at Wolf River Boulevard Intersection	0.34	Reconstruct intersection of Wolf River Blvd and Germantown Road, with widening and reconstruction of traffic signals on Germantown Road from Brierbrook Rd to Wolf Trail Cove.	Roadway Reconfiguration	Germantown	TN	2020	2018-2020	\$1,904,053.97	STP-Urban: 75%	\$1,428,040	75%	\$0	0%	\$476,013	25%
8	TN-IM-2011-01	I-55	Interchange at Crump Blvd	N/A	Interchange Modification	Interchange Modification/ Reconstruction	Memphis	TN	2020	2018-2020	\$72,644,910*							
42		US-70/US-79/SR-1 (Summer Ave)	Summer Avenue, From I-40 to 0.1 Mile North of Sycamore View Road	1.66	Widen from four or five lanes to seven lanes	Road Widening	Memphis	TN	2020	2018-2020	\$33,519,370.22	None	\$0	0%	\$33,519,370	100%	\$0	0%
43	TN-NHPP-2014-02	SR-4 (US-78/Lamar Ave)	Mississippi state line to South of Shelby Drive	1.1	Reconstruct and widen from four lanes to six lanes (divided)	Road Widening	Memphis	TN	2020	2018-2020	\$43,101,215.33	NHPP: 26%	\$11,249,417	42%	\$15,490,343	58%	\$0	0%
												STP-State: 16%	\$6,883,264	42%	\$9,478,191	58%	\$0	0%
												Total Federal: 42%	\$18,132,681	42%	\$24,968,534	58%	\$0	0%
59	STP-M-2006-04	Plough Blvd	Plough Blvd. Interchange with Winchester Rd.	1.5	Improve 3,000 feet along Plough-Airways Blvd. south from Brooks Road and improve 3,000 feet along Winchester east of original at-grade section. The improvements will provide a grade-separated interchange to replace the existing at-grade condition at the Plough-Airways/Winchester Rd. intersection. The final design will maintain the present direct connectors between Plough Blvd. and the airport. the preliminary planning will include coordination with MATA to address future light rail service to the airport	Interchange Modification/ Reconstruction	Memphis	TN	2020	2018-2020	\$29,690,132.33	STP-Urban: 4%	\$1,187,605	4%	\$0	0%	\$28,502,527	96%
71	STP-M-2000-16	Walnut Grove Road East	Walnut Bend Road to Rocky Point Road	2.5	Widen existing four and two lane roadway to six lanes with a median, eliminate sharp curves and realign Rocky Point Road intersection to improve safety. This project will provide wide outside lanes for bikes	Road Widening	Memphis	TN	2020	2018-2020	\$11,445,876.39	STP-Urban: 75%	\$8,584,407	75%	\$0	0%	\$2,861,469	25%
143		US-78/SR-4 (Lamar Ave)	Interchange at SR-175 (Shelby Dr)	N/A	Construct new interchange	New Interchange	Memphis	TN	2020	2018-2020	\$145,730,350.11	None	\$0	0%	\$145,730,350	100%	\$0	0%
309		East Memphis North-South Express Bus	IRS Park and Ride Lot; American Way Transit Center; Stage Rd (SR-15)/Summer Ave (US64/US79)	18	New express bus service with 30 min headways during AM and PM peak; 60 minute headways during off-peak times	Transit Service	Memphis	TN	2020	2018-2020	\$3,886,063.11	FTA: 80%	\$3,108,850	80%	\$388,606	10%	\$388,606	10%

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
314		MidtownAA LPA	Downtown- Midtown- University of Memphis- Germantown	N/A	BRT- Lite service along the Union/Poplar coridor, Environmental Impact Statement	Study	Memphis	TN	2020	2018-2020	\$3,000,000.00	FTA: 74%	\$2,220,000	74%	\$300,000	10%	\$480,000	16%
325	STP-M-2000-22	Forest Hill Irene	Walnut Grove (SR-23) to Macon Road (SR-193)	3.03	Construct new six lane roadway with a median, adjacent bike path, sidewalks, and curb ramps. The project also includes an 1,100 foot extension of Trinity Road from Sanga Creek Road to Forest Hill Irene. Trinity Road will maintain a seven lane cross section.	New Roadway	Memphis	TN	2020	2018-2020	\$14,457,937.48	STP-Urban: 70%	\$10,113,327	70%	\$0	0%	\$4,344,610	30%
329	STP-M-2004-01	Winchester/Perkins Interchange	Winchester at Perkins	0.3	Reconstruct interchange to allow for the removal of the center pier in Winchester and construct more travel lanes on Winchester. Project scope will include ADA accessible pedestrian improvements.	Interchange Modification/ Reconstruction	Memphis	TN	2020	2018-2020	\$1,564,044.33	STP-State: 80%	\$1,251,235	80%	\$312,809	20%	\$0	0%
330	STP-M-2006-10	Kirby/Whitten Parkway (Shelby Farms Parkway)	Walnut Grove (SR-23) to Macon Road (SR-193)	2.5	Widen Walnut Grove Road from four lanes to six lanes from just east of the Wolf River to the proposed Walnut Grove/Kirby-Whitten interchange with a heavily landscaped median. Construct a four-lane heavily landscaped roadway with a variable width median from the proposed interchange to Mullins Station Road. Construct and/or widen Kirby-Whitten from two lanes to four lanes with a two-way left-turn lane from Mullins Station Road to Macon Road. The proposed interchange at Walnut Grove Road and Kirby-Whitten and the associated ramps are included in the project. Adjacent pedestrian and bicycle paths will be designed in conjunction with this project. Two grade separated trail crossings will be provided along Kirby-Whitten and one grade separated trail crossing will be provided along Walnut Grove.	New Roadway	Memphis	TN	2020	2018-2020	\$25,000,000.00	STP-Urban: 70%	\$17,500,000	70%	\$0	0%	\$7,500,000	30%

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
331	STP-M-2000-11	Walnut Grove Road Middle	Kirby/Whitten Pkwy to Germantown Pkwy	3	Walnut Grove Road will remain four lanes. Access management measures will be provided to limit left turn movements across Walnut Grove traffic. These include construction of a "green bridge" type grade separated intersection approximately one mile west of Germantown Parkway. The new "green bridge" will connect to the internal road network of Shelby Farms Park and the Agricenter allowing wildlife, pedestrians, bicyclist, and vehicles to cross Walnut Grove. The "green bridge" design will include landscaping, vehicular travel lanes, bicycle and pedestrian facilities, and connections to Walnut Grove. All intersecting streets and drives between the Kirby Whitten Project (Shelby Farms Parkway) and the "green bridge" will be converted to right in, right out operation. The project will include installation of a shared use trail on the north side of Walnut Grove from Patriot Lake to Germantown Parkway and pavement reconstruction of Walnut Grove.	Road Widening	Memphis	TN	2020	2018-2020	\$16,078,128.42	STP-State: 80%	\$12,862,503	80%	\$3,215,626	20%	\$0	0%
336		Short Range Transit Plan (SRTP) Route 39 South Third	Holmes Rd. to TN/MS state line	1.5	Extend SRTP Route 39 into Desoto County to connect with the new Goodman Rd. route.	Transit Service	Memphis	TN	2020	2018-2020	\$493,008.01	FTA: 80%	\$394,406	80%	\$49,301	10%	\$49,301	10%
337		SRTP Route 32 Whitehaven	FedEx Blvd. to TN/MS state line	3	Extend SRTP Route 32 into Desoto County to connect with the new Goodman Rd. route	Transit Service	Memphis	TN	2020	2018-2020	\$744,703.45	FTA: 80%	\$595,763	80%	\$74,470	10%	\$74,470	10%
347	ENH-2010-01	US 51/SR-3 (Elvis Presley)	Shelby Drive (SR-175) to Brooks Road	2.85	Construct a six lane heavily landscaped roadway adjacent to Graceland, which includes median, wide outside lanes for bikes and a bus stop turn-out lane. From Craft to Winchester widen from four to six lanes with a median. The other two segments will have the same existing laneage but the entire project will have improved ped/bike/bus stop and landscaping.	Road Widening	Memphis	TN	2020	2018-2020	\$32,976,485*							
182	STP-M-2014-11	Wilksville Rd	US-51 to Veterans Parkway	0.74	Extension of a 5 lane road through a newly developing area of the City. This project will create a pedestrian friendly roadway through a mixed use center that will function as the town center and connect to Veterans Parkway.	New Roadway	Millington	TN	2020	2018-2020	\$13,845,065.60	STP-Urban: 75%	\$10,383,799	75%	\$0	0%	\$3,461,266	25%

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
151	I-69		From South of SR-388(North Watkins Street) to South of Fite Road	2.3	New four-lane Interstate	New Roadway	Shelby Co	TN	2020	2018-2020	\$58,186,517.33	None	\$0	0%	\$58,186,517	100%	\$0	0%
<b>2018-2020 TN Projects Subtotal:</b>											<b>\$990,394,154.20</b>	<b>\$402,131,246</b>		<b>\$382,265,835</b>		<b>\$205,997,073</b>		
<b>2021-2030 TN Projects</b>																		
1001	-	NHS Pavement O&M		N/A	Operations and Maintenance (O&M) set aside for pavement on the National Highway System (NHS)	O&M	Regionwide	TN	2021	2021-2030	\$1,054,340,142.50	NHPP: 58%	\$612,008,605	58%	\$286,838,808	27%	\$155,492,729	15%
1004	-	NHS Bridge O&M		N/A	Operations and Maintenance (O&M) set aside for bridges on the National Highway System (NHS)	O&M	Regionwide	TN	2021	2021-2030	\$208,264,719.51	NHPP: 58%	\$120,891,005	58%	\$56,758,801	27%	\$30,614,914	15%
1007		non-NHS Pavement & bridges		N/A	Operations and Maintenance (O&M) set aside for pavement and bridges that are not on the National Highway System (NHS)	O&M	Regionwide	TN	2021	2021-2030	\$321,508,660.74	None	\$0	0%	\$32,150,866	10%	\$289,357,795	90%
1010	-	Bike/ped/Complete Streets/Transit Operations		N/A	The costs equal the total funds available from these sources: (HSIP, CMAQ, TAP) and costs of Livability Corridors Projects	Bike/Ped/Transit	Regionwide	TN	2021	2021-2030	\$138,813,702.47	HSIP: 16% CMAQ: 58% TAP: 12% Total Federal: 86%	\$22,438,011 \$80,776,841 \$16,828,508 \$120,043,360	86% 86% 86% 86%	\$1,594,049 \$5,738,577 \$1,195,537 \$8,528,164	6% 6% 6% 6%	\$1,914,426 \$6,891,933 \$1,435,819 \$10,242,178	7% 7% 7% 7%
1012		Livability Corridors		N/A	The costs equal the total funds available from these sources: (HSIP, CMAQ, TAP) and costs of Livability Corridors Projects	Livability Corridors	Regionwide	TN	2021	2021-2030	\$22,063,295.96	None	\$0	0%	\$11,031,648	50%	\$11,031,648	50%
1014	-	Transit O&M		N/A	The transit O&M costs equal the available Transit funds minus transit capital projects	O&M	Regionwide	TN	2021	2021-2030	\$390,156,900.25	FTA: 73%	\$284,904,255	73%	\$37,713,341	10%	\$67,539,304	17%
32	STP-M-2014-10	SR-205 (Airline Road) North Widening	From the Hall Creek bridge at I-40 north to 1,100' north of the Airline - Milton Wilson intersection	0.75	The project includes the widening of SR-205 (Airline Road) from two lanes to five lanes, with the addition of curb & gutter, drainage improvements, sidewalks, bike lanes and other amenities. The project extends from I-40 on the south end to 1,100' north of the Airline - Milton Wilson Intersection.	Road Widening	Arlington	TN	2025	2021-2030	\$8,444,793.13	STP-State: 80%	\$6,755,835	80%	\$1,688,959	20%	\$0	0%

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
33	STP-M-2014-09	Highway 70 at Jetway Rd Improvements	US 70 at Jetway Rd	0.3	Widen Highway 70 from 4 lanes to 5 lanes from just east of SR-385 to just west of Airline Road. The widening is to provide for a left turn lane associated with the installation of a traffic control signal, which will not increase capacity. Project includes the installation of a traffic signal at the Highway 70 - Jetway Road intersection. Project scope will include designated bicycle facilities and ADA accessible pedestrian improvements.	Road Widening	Arlington	TN	2025	2021-2030	\$2,992,273.59	STP-State: 80%	\$2,393,819	80%	\$598,455	20%	\$0	0%
69		US-70/US-79/SR-1	Airline Rd to Collierville Rd/Chester Rd	0.6	Widen from 4 to 5 lanes	Road Widening	Arlington	TN	2030	2021-2030	\$9,323,999.99	STP-Urban: 74%	\$6,906,896	74%	\$0	0%	\$2,417,104	26%
83	TCSP-2012-01	Donelson Farms Pkwy	From SR-385 (Future I-269) to Airline Rd	0.5	This project consists of the design and construction of approximately 2,400 linear feet of 2-lanes of Donelson Farms Parkway. The ultimate roadway is intended to be a 4-lane urban collector with a median, bike and pedestrian facilities.	New Roadway	Arlington	TN	2025	2021-2030	\$6,319,238.91	STP-Urban: 60%	\$3,791,543	60%	\$0	0%	\$2,527,696	40%
100		SR-205 (Airline Rd)	Donelson Farm Pkwy to I-40	0.95	Widen from 2 to 4 lanes (divided)	Road Widening	Arlington	TN	2030	2021-2030	\$16,576,000.00	Discretionary Funds: 80%	\$13,260,800	80%	\$0	0%	\$3,315,200	20%
136		I-40	From 1.0 mile East of Canada Road to SR-205 (Collierville-Arlington Road)	3.9	Widen from 4 lanes to 6 lanes (includes high occupancy vehicle lanes)	Road Widening	Arlington	TN	2025	2021-2030	\$63,432,435.50	None	\$0	0%	\$63,432,435	100%	\$0	0%
41	STP-M-2014-01	SR-57 Widening	Collierville Arlington Rd/Eastley St to SR-385	0.91	Project involves the widening of SR 57 from an existing two lane rural cross section to a five lane urban cross section. Project scope will include designated bicycle facilities and ADA accessible pedestrian improvements.	Road Widening	Collierville	TN	2025	2021-2030	\$30,759,970.47	STP-State: 80%	\$24,607,976	80%	\$6,151,994	20%	\$0	0%
96		SR-175 (Shelby Dr)	Jasper Park to Shelby Post	0.96	Widen from 2 to 6 lanes (divided)	Road Widening	Collierville	TN	2030	2021-2030	\$20,720,000.00	STP-Urban: 70%	\$14,504,000	70%	\$0	0%	\$6,216,000	30%
145		Winchester Rd	Byhalia Rd to US-72/SR-86	1.04	New 4 lane Rd (divided)	New Roadway	Collierville	TN	2030	2021-2030	\$24,958,077.56	Discretionary Funds: 80%	\$19,966,462	80%	\$0	0%	\$4,991,616	20%
11		SR-196 (Hickory Withe Rd)	US-64/SR-15 to I-40 (Intersections)	5.14	Add Shoulder	Road Widening	Fayette Co	TN	2025	2021-2030	\$1,041,698.95	STP-State: 80%	\$833,359	80%	\$208,340	20%	\$0	0%
52		I-40	Interchange at SR-196 (Hickory Withe Rd)	N/A	Construct new interchange	New Interchange	Fayette Co	TN	2025	2021-2030	\$37,743,609.30	STP-Urban: 30%	\$11,323,083	30%	\$0	0%	\$26,420,527	70%

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
56	STP-M-2006-01	New Canada Rd	I-40 to US-70/SR-1	2.3	Design and Construction of a new four lane divided highway between Interstate 40 (Exit 20) and U.S. Highway 70 (State Route #1).	New Roadway	Lakeland	TN	2025	2021-2030	\$19,631,174.69	STP-Urban: 60%	\$11,778,705	60%	\$0	0%	\$7,852,470	40%
6		Holmes Rd	Weaver to Horn Lake Rd	1.6	Widen from 2 to 5 lanes	Road Widening	Memphis	TN	2025	2021-2030	\$30,660,629.34	STP-Urban: 50%	\$15,330,315	50%	\$0	0%	\$15,330,315	50%
7		I-240	NB I-55 to I-240 N	1.4	Widen from 2 to 3 lanes	Road Widening	Memphis	TN	2025	2021-2030	\$26,497,649.02	STP-Urban: 30%	\$7,949,295	30%	\$0	0%	\$18,548,354	70%
12		SR-3 (North Second St)	Interchange at I-40	N/A	Interchange Modification	Interchange Modification/ Reconstruction	Memphis	TN	2025	2021-2030	\$18,059,960.98	STP-Urban: 30%	\$5,417,988	30%	\$0	0%	\$12,641,973	70%
14		Union Avenue (US 79)	Flicker to Cleveland	2.5	Reduce Union from 6 lanes to 5 lanes, and include bicycle lanes, permitted/protected left turns at signalized intersections, transit and pedestrian improvements, and access management	Roadway Reconfiguration	Memphis	TN	2025	2021-2030	\$10,682,153.58	STP-Urban: 30%	\$3,204,646	30%	\$0	0%	\$7,477,508	70%
15		US-78/SR-4 (Lamar Ave)	Interchange at Holmes Rd	0.5	Construct new interchange and widen Holmes 1000 feet east to 7 lanes with service roads	New Interchange	Memphis	TN	2025	2021-2030	\$52,271,338.17	None	\$0	0%	\$52,271,338	100%	\$0	0%
16		Winchester Rd	Ridgeway to Hacks Cross	2.7	Add median	Road Widening	Memphis	TN	2025	2021-2030	\$10,496,996.25	STP-Urban: 30%	\$3,149,099	30%	\$0	0%	\$7,347,897	70%
38		I-40	From SR-177 (Germantown Road) to 1.0 mile East of Canada Road	4.5	Widen from 6 lanes to 8 lanes (includes high occupancy vehicle lanes)	Road Widening	Memphis	TN	2025	2021-2030	\$86,748,294.12	None	\$0	0%	\$86,748,294	100%	\$0	0%
39	STP-M-2000-09	North Second Street (Phase II)	Cedar to South of the Wolf River Bridge	1.02	Improve North Second Street corridor to a parkway design including right-of way acquisition, reconstruction of sidewalks, provisions for bicycles, landscaping, and utility relocation. From Cedar Avenue to the Wolf River Bridge, widen Second Street from two to four lanes with a raised median. Bicycle lanes will be provided along the improved North Second Street corridor.	Road Widening	Memphis	TN	2025	2021-2030	\$18,474,029.74	STP-Urban: 60%	\$11,084,418	60%	\$0	0%	\$7,389,612	40%
48	TN-IM-2012-01	I-240	Airways Blvd	0.48	Reconstruct interchange	Interchange Modification/ Reconstruction	Memphis	TN	2025	2021-2030	\$64,186,924.41	STP-State: 42%	\$26,958,508	42%	\$37,228,416	58%	\$0	0%

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
49	TN-NHPP- 2014-01	I-240	Replacement of 3 Overhead Bridges; Norfolk Southern RR (LM 15.45), Poplar Avenue (SR-57 EB LM 15.57), and Poplar Avenue (SR-57 WBLM 15.73)	0.28	Replacement of 3 Overhead Bridges; Norfolk Southern RR (LM 15.45), Poplar Avenue (SR-57 EB LM 15.57), and Poplar Avenue (SR-57 WBLM 15.73)	Bridge Maintenance	Memphis	TN	2025	2021-2030	\$33,937,914.06	STP-State: 43%	\$14,739,741	43%	\$19,198,173	57%	\$0	0%
58		Poplar Avenue	Bellevue to Front	1.8	Reduce Poplar from 6/7 lanes to 5 lanes, and include; bicycle lanes, traffic signal modernization, transit and pedestrian improvements, and access management.	Roadway Reconfiguration	Memphis	TN	2025	2021-2030	\$8,545,722.86	STP-Urban: 30%	\$2,563,717	30%	\$0	0%	\$5,982,006	70%
60		Shelby Dr	Sewanee Rd to Weaver Rd	1.69	Widen from 2 to 4 lanes with grade separation at railroad track	Road Widening	Memphis	TN	2025	2021-2030	\$38,805,440.26	STP-Urban: 35%	\$13,581,904	35%	\$0	0%	\$25,223,536	65%
61		Shelby Dr Extension	Paul Lowry Rd to Sewanee Rd	1.9	New 4 lane road (divided) with grade separation at rail crossing	New Roadway	Memphis	TN	2025	2021-2030	\$31,425,368.37	STP-Urban: 35%	\$10,998,879	35%	\$0	0%	\$20,426,489	65%
104		US-78/SR-4 (Lamar Avenue)	Interchange at Winchester Rd	1	Construct new interchange	New Interchange	Memphis	TN	2025	2021-2030	\$149,194,078.28	None	\$0	0%	\$149,194,078	100%	\$0	0%
116	NHS- 2002-01	I-240 Midtown	I-40 to I-55	6	Widen from 6 to 8 lanes	Road Widening	Memphis	TN	2025	2021-2030	\$58,560,922.48	NHPP: 51%	\$29,992,773	51%	\$28,568,149	49%	\$0	0%
150		I-69	From 0.8 Mile East of US-51 to 0.5 Mile South of SR-388	5.6	New 4 lane Interstate	New Roadway	Memphis	TN	2025	2021-2030	\$169,073,772.02	None	\$0	0%	\$169,073,772	100%	\$0	0%
161		US-78/SR-4 (Lamar Avenue)	Raines Road/Perkins Road Interchange to Getwell Road (SR-176)	1.8	Widen from 4 to 6 lanes (divided)	Road Widening	Memphis	TN	2025	2021-2030	\$116,430,780.97	None	\$0	0%	\$116,430,781	100%	\$0	0%
227	STP-M- 2000-09	North Second Street (Phase III)	South of Wolf River Bridge to US-51	2.7	Improve North Second Street corridor to a parkway design including right-of-way acquisition, reconstruction of sidewalks, provisions for bicycles, landscaping, and utility relocation. From the Wolf River bridge to Harvester Lane, North Second Street will be constructed on new alignment as a 4 lane divided roadway. From Harvester Lane to US 51, North Second Street / Whitney Avenue will be widened from 2 to 4 lanes. Bicycle lanes will be provided along the improved North Second Street corridor.	Road Widening	Memphis	TN	2025	2021-2030	\$19,214,740.97	STP-Urban: 60%	\$11,528,845	60%	\$0	0%	\$7,685,896	40%
291		Midtown Area	Downtown to Airport	N/A	Streetcar Service - Study	Study	Memphis	TN	2025	2021-2030	\$25,000,000.00	FTA: 80%	\$20,000,000	80%	\$2,500,000	10%	\$2,500,000	10%
3		Dexter Rd	Whitten Rd to Appling Rd	0.25	Widen from 2 to 4 lanes	Road Widening	Shelby Co	TN	2025	2021-2030	\$2,354,373.03	STP-Urban: 60%	\$1,412,624	60%	\$0	0%	\$941,749	40%

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding	
5		Hacks Cross Rd	Stateline Rd to SR-175 (Shelby Dr)	1.78	Widen from 2 to 7 lanes	Road Widening	Shelby Co	TN	2025	2021-2030	\$37,210,540.82	STP-Urban: 50%	\$18,605,270	50%	\$0	0%	\$18,605,270	50%	
46	STP-M-2014-03	Houston Levee Road Widening	Walnut Grove Road (SR-23) to Wolf River Bridge	1.67	This project improves Houston Levee Road by widening the segment from Walnut Grove Road to the Wolf River Bridge from two to four lanes. The roadway segment will include a median and landscaping.	Road Widening	Shelby Co	TN	2025	2021-2030	\$24,362,239.60	STP-Urban: 60%	\$14,617,344	60%	\$0	0%	\$9,744,896	40%	
54	STP-M-2014-06	Macon Rd Widening	Berryhill Rd to Houston Levee Rd	1.73	This project provides improvements for widening of Macon Road from two to four lanes from Berryhill Road to Houston Levee Road with a bridge over Gray's Creek.	Road Widening	Shelby Co	TN	2025	2021-2030	\$28,731,606.22	STP-Urban: 60%	\$17,238,964	60%	\$0	0%	\$11,492,642	40%	
62		Southern Gateway	West Memphis to Shelby Co/DeSoto Co	N/A	Construct new multimodal bridge over Miss. River - Environmental Impact Statement	Study	Shelby Co	TN	2025	2021-2030	\$25,000,000.00	Discretionary Funds: 80%	\$20,000,000	80%	\$5,000,000	20%	\$0	0%	
152		I-69	From 0.5 Mile North of Woodstock-Cuba Road to 0.2 Mile East of US-51	5	New 4 lane Interstate	New Roadway	Shelby Co	TN	2025	2021-2030	\$150,957,707.67	Discretionary Funds: 8%	\$12,485,325	8%	\$138,472,382	92%	\$0	0%	
181	STP-M-2014-04	Walnut Grove Road (SR-23) Widening	Rocky Point Rd to Houston Levee Rd	1	This project widens Walnut Grove Road from two to six lanes from Rocky Point Road to Houston Levee Road with a bridge over Gray's Creek.	Road Widening	Shelby Co	TN	2025	2021-2030	\$18,908,441.92	STP-Urban: 60%	\$11,345,065	60%	\$0	0%	\$7,563,377	40%	
<b>2021-2030 TN Projects Subtotal:</b>												<b>\$3,632,882,318.62</b>		<b>\$1,526,174,423</b>		<b>\$1,309,787,194</b>		<b>\$796,920,701</b>	
<b>2031-2040 TN Projects</b>																			
1002	-	NHS Pavement O&M		N/A	Operations and Maintenance (O&M) set aside for pavement on the National Highway System (NHS)	O&M	Regionwide	TN	2031	2031-2040	\$1,323,540,024.45	NHPP: 58%	\$761,504,047	58%	\$272,572,979	21%	\$289,462,998	22%	
1005	-	NHS Bridge O&M		N/A	Operations and Maintenance (O&M) set aside for bridges on the National Highway System (NHS)	O&M	Regionwide	TN	2031	2031-2040	\$261,440,004.83	NHPP: 58%	\$150,420,553	58%	\$63,077,107	24%	\$47,942,345	18%	
1008		non-NHS Pavement & bridges		N/A	Operations and Maintenance (O&M) set aside for pavement and bridges that are not on the National Highway System (NHS)	O&M	Regionwide	TN	2031	2031-2040	\$403,598,007.46	None	\$0	0%	\$201,799,004	50%	\$201,799,004	50%	
1011	-	Bike/ped/Complete Streets/Transit Operations		N/A	The costs equal the total funds available from these sources: (HSIP, CMAQ, TAP) and costs of Livability Corridors Projects	Bike/Ped/Transit	Regionwide	TN	2031	2031-2040	\$172,187,323.24	HSIP: 16% CMAQ: 58% TAP: 12% Total Federal: 86%	\$27,832,563 \$100,197,226 \$20,874,422 \$148,904,211	86% 86% 86% 86%	\$1,977,291 \$7,118,247 \$1,482,968 \$10,578,507	6% 6% 6% 6%	\$2,374,693 \$8,548,893 \$1,781,019 \$12,704,605	7% 7% 7% 7%	
1015	-	Transit O&M		N/A	The transit O&M costs equal the available Transit funds minus transit capital projects	O&M	Regionwide	TN	2031	2031-2040	\$515,496,683.24	FTA: 73%	\$378,510,876	73%	\$49,919,125	10%	\$87,066,682	17%	

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
160		SR-205 (Airline Rd)	US-64/SR-15 to Donelson Farm Pkwy	3.1	Widen from 2 to 5 lanes	Road Widening	Arlington	TN	2035	2031-2040	\$61,819,933.96	NHPP: 56%	\$34,310,063	56%	\$27,509,871	45%	\$0	0%
176		US-70/US-79/SR-1	Collierville Arlington Rd/Chester Rd to Milton Wilson Rd	0.95	Widen from 2 to 5 lanes	Road Widening	Arlington	TN	2035	2031-2040	\$24,727,973.59	STP-State: 80%	\$19,782,379	80%	\$4,945,595	20%	\$0	0%
213		Germantown Rd Extension	US-70/US-79/SR-1 to Old Brownsville Rd	1.68	Widen from 2 to 4 lanes (divided)	Road Widening	Bartlett	TN	2035	2031-2040	\$41,084,083.30	STP-Urban: 35%	\$14,379,429	35%	\$0	0%	\$26,704,654	65%
306		Shelby Dr.	Sycamore Rd. to US-72	1.3	Widen from 2 lanes to 4 lanes divided	Road Widening	Collierville	TN	2035	2031-2040	\$30,909,966.97	STP-Urban: 61%	\$18,855,080	61%	\$0	0%	\$12,054,887	39%
159		SR-196 (Hickory Withe Rd)	I-40 to Main Street	0.62	add shoulder	Road Widening	Fayette Co	TN	2035	2031-2040	\$3,090,996.69	STP-Urban: 35%	\$1,081,849	35%	\$0	0%	\$2,009,148	65%
201		Canada Rd	North of Kingsridge Dr to I-40	0.59	Widen from 4 to 6 lanes (divided)	Road Widening	Lakeland	TN	2035	2031-2040	\$10,850,708.23	STP-Urban: 35%	\$3,797,748	35%	\$0	0%	\$7,052,960	65%
202		Chambers Chapel Rd	I-40 to US-70/US-79/SR-1	2.14	Widen from 2 to 4 lanes (divided)	Road Widening	Lakeland	TN	2040	2031-2040	\$56,736,016.87	STP-Urban: 35%	\$19,857,606	35%	\$0	0%	\$36,878,411	65%
203		Chambers Chapel Rd	US-64/SR-15 to I-40	2.65	Widen from 2 to 4 lanes (divided)	Road Widening	Lakeland	TN	2040	2031-2040	\$70,254,852.73	STP-Urban: 35%	\$24,589,198	35%	\$0	0%	\$45,665,654	65%
226		New E-W Rd	Canada Rd to Chambers Chapel Rd	2.15	New 4 lane road (divided)	New Roadway	Lakeland	TN	2035	2031-2040	\$59,106,487.86	STP-Urban: 50%	\$29,553,244	50%	\$0	0%	\$29,553,244	50%
265		Beverle Rivera Dr	Canada Rd to Seed Tick Rd	0.7	Widen 2-4 lanes	Road Widening	Lakeland	TN	2035	2031-2040	\$17,118,537.10	STP-Urban: 50%	\$8,559,269	50%	\$0	0%	\$8,559,269	50%
270		Beverle Rivera Dr	Seed Tick Rd to Chambers Chapel Rd	1.36	New 2 lane road	New Roadway	Lakeland	TN	2035	2031-2040	\$34,048,053.03	STP-Urban: 50%	\$17,024,027	50%	\$0	0%	\$17,024,027	50%
31		Holmes Rd	US-61/SR-14 (South Third St) to SR-175 (Weaver Rd)	0.49	Widen from 2 to 5 lanes with intersection improvements at US 61	Road Widening	Memphis	TN	2040	2031-2040	\$16,138,352.40	STP-Urban: 30%	\$4,841,506	30%	\$0	0%	\$11,296,847	70%
47		I-240	SBI-240 to I-55 S	1	Widen from 3 to 4 lanes	Road Widening	Memphis	TN	2040	2031-2040	\$32,296,072.76	STP-State: 80%	\$25,836,858	80%	\$6,459,215	20%	\$0	0%
51		I-40	US-64/SR-15	0.5	Reconstruct interchange	Interchange Modification/ Reconstruction	Memphis	TN	2040	2031-2040	\$9,223,990.80	STP-State: 80%	\$7,379,193	80%	\$1,844,798	20%	\$0	0%
70		US-72/SR-57 (Poplar Ave)	I-240 off ramp to Yates	0.31	Add WB lane	Road Widening	Memphis	TN	2040	2031-2040	\$5,626,392.29	STP-State: 80%	\$4,501,114	80%	\$1,125,278	20%	\$0	0%
77		US-70/US-79/SR-1 (Summer Ave)	Summer Avenue, From 0.1 Mile North of Sycamore View Road to 0.1 Mile North of Elmore Road	1.77	Widen from 4 to 7 lanes	Road Widening	Memphis	TN	2035	2031-2040	\$72,778,780.48	None	\$0	0%	\$72,778,780	100%	\$0	0%

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
84		Forest Hill-Irene Rd	Grove Rd to US-64/SR-15	2.82	Widen Berryhill Rd from 3 lanes to 5 lanes and include bicycle lanes.	Road Widening	Memphis	TN	2040	2031-2040	\$55,828,143.76	STP-Urban: 25%	\$13,957,036	25%	\$0	0%	\$41,871,108	75%
101		SR-385	I-240 to Ridgeway Rd	2.51	auxiliary lane WB	Road Widening	Memphis	TN	2040	2031-2040	\$62,970,078.89	STP-Urban: 30%	\$18,891,024	30%	\$0	0%	\$44,079,055	70%
137		US-78/SR-4 (Lamar Ave)	South of Shelby Drive to Raines/Perkins Road Interchange	1.9	Widen from 4 to 6 lanes (divided)	Road Widening	Memphis	TN	2040	2031-2040	\$116,304,597.85	None	\$0	0%	\$116,304,598	100%	\$0	0%
167		Summer Avenue	Perkins to Stratford	0.1	access management	Access Management	Memphis	TN	2035	2031-2040	\$811,437.55	STP-Urban: 35%	\$284,003	35%	\$0	0%	\$527,434	65%
169		Pleasant Hill Rd	Holmes Rd to SR-175 (Shelby Dr)	1.06	Widen from 5 to 7 lanes	Road Widening	Memphis	TN	2040	2031-2040	\$29,468,350.65	STP-Urban: 30%	\$8,840,505	30%	\$0	0%	\$20,627,845	70%
205		Covington Pike	Macon Rd to I-40	0.56	Widen from 4 to 6 lanes	Road Widening	Memphis	TN	2040	2031-2040	\$10,792,795.53	STP-Urban: 35%	\$3,777,478	35%	\$0	0%	\$7,015,317	65%
208		Florida St	McLemore Ave to US-61/SR-1 (Crump Blvd)	0.58	Widen from 2 to 5 lanes	Road Widening	Memphis	TN	2040	2031-2040	\$21,372,543.50	STP-Urban: 35%	\$7,480,390	35%	\$0	0%	\$13,892,153	65%
231		Pleasant Hill Rd	Stateline Rd to Holmes Rd	1	Widen from 2 to 5 lanes	Road Widening	Memphis	TN	2040	2031-2040	\$30,131,703.27	STP-Urban: 35%	\$10,546,096	35%	\$0	0%	\$19,585,607	65%
153		I-69	From South of Fite Road to 0.5 Miles North of Woodstock-Cuba Road	2.5	New 4 lane Interstate	New Roadway	Millington	TN	2040	2031-2040	\$121,638,049.75	None	\$0	0%	\$121,638,050	100%	\$0	0%
171		SR-205 (Navy Rd)	Armor to SR-14	1.66	New 4 lane road	New Roadway	Millington	TN	2035	2031-2040	\$43,273,953.76	STP-State: 80%	\$34,619,163	80%	\$8,654,791	20%	\$0	0%
63		SR-14 (Austin Peay)	East of Old Covington Pike to SR-385;	3.99	Widen from 2 to 4 (divided)	Road Widening	Shelby Co	TN	2035	2031-2040	\$64,825,839.18	None	\$0	0%	\$64,825,839	100%	\$0	0%
64		SR-14 (Austin Peay)	SR-385 (Paul Barrett Pkwy) to East of Kerville-Rosemark Road	4.7	Widen from 2 to 4 (divided)	Road Widening	Shelby Co	TN	2035	2031-2040	\$119,159,603.75	None	\$0	0%	\$119,159,604	100%	\$0	0%
90		Appling Rd	Cordova Club to Dusty Lane	0.2	New 4 lane road	New Roadway	Shelby Co	TN	2035	2031-2040	\$9,739,279.16	STP-Urban: 80%	\$7,791,423	80%	\$0	0%	\$1,947,856	20%
95		SR-14 (Austin Peay)	East of Kerville-Rosemark Road to Tipton County Line	4.2	Widen from 2 to 4 (divided)	Road Widening	Shelby Co	TN	2035	2031-2040	\$121,470,172.17	None	\$0	0%	\$121,470,172	100%	\$0	0%
123		Dexter Rd	Forest Hill-Irene Rd Ext. to Houston Levee Rd	0.86	New 2 lane road	New Roadway	Shelby Co	TN	2040	2031-2040	\$20,057,943.24	STP-Urban: 35%	\$7,020,280	35%	\$0	0%	\$13,037,663	65%
2031-2040 TN Projects Subtotal:											\$4,049,917,734.28		\$1,786,895,648		\$1,264,663,312		\$998,358,774	
<b>2018-2040 TN Projects Subtotal:</b>											<b>\$8,673,194,207.10</b>		<b>\$3,715,201,317</b>		<b>\$2,956,716,341</b>		<b>\$2,001,276,549</b>	

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	Completion State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
<b>2018-2020 MS Projects</b>																		
1000	-	NHS Pavement O&M		N/A	Operations and Maintenance (O&M) set aside for pavement on the National Highway System (NHS)	O&M	Regionwide	MS	2019	2018-2020	\$35,971,459.02	None	\$0	0%	\$35,971,459	100%	\$0	0%
1003	-	NHS Bridge O&M		N/A	Operations and Maintenance (O&M) set aside for bridges on the National Highway System (NHS)	O&M	Regionwide	MS	2019	2018-2020	\$7,059,819.06	None	\$0	0%	\$7,059,819	100%	\$0	0%
1006		non-NHS Pavement & bridges		N/A	Operations and Maintenance (O&M) set aside for pavement and bridges that are not on the National Highway System (NHS)	O&M	Regionwide	MS	2019	2018-2020	\$18,826,184.16	None	\$0	0%	\$0	0%	\$18,826,184	100%
1009	-	Bike/ped/Complete Streets/Transit Operations		N/A	The costs equal the total funds available from these sources: (HSIP, CMAQ, TAP) and costs of Livability Corridors Projects	Bike/Ped/Transit	Regionwide	MS	2019	2018-2020	\$1,266,520.11	HSIP: 16%	\$200,091	40%	\$251,171	50%	\$54,462	11%
												CMAQ: 19%	\$239,270	40%	\$300,351	50%	\$65,126	11%
												TAP: 5%	\$61,741	40%	\$77,503	50%	\$16,805	11%
												Total Federal: 40%	\$501,102	40%	\$629,024	50%	\$136,394	11%
80	MS-NHS-2006-01	I-55/I-69	Church Rd to MS-302 (Goodman Rd)	1.75	Widen from 4 to 8 lanes and construct frontage roads.	Road Widening	DeSoto Co	MS	2020	2018-2020	\$16,053,151.15	None	\$0	0%	\$16,053,151	100%	\$0	0%
112	MS-LSTP-2015-02	Commerce Street Extension (SR-304)	Commerce Street to Jaybird Road	0.5	New 2-lane road, with roadbed for future expansion to four-lane divided.	New Roadway	DeSoto Co	MS	2020	2018-2020	\$1,809,293.37	None	\$0	0%	\$1,809,293	100%	\$0	0%
292		Goodman Road (MS 302)	US-61 to MS-305 in downtown Olive Branch	17.8	Part of new transit service to DeSoto County	Transit Service	DeSoto Co	MS	2020	2018-2020	\$3,944,064.05	STP-Urban: 10%	\$394,406	10%	\$2,800,285	71%	\$749,372	19%
328	MS-LSTP-2015-01	Getwell Road (MS 747)	Star Landing Road to Pleasant Hill Road	1.4	Widen existing two lane road to a four-lane divided typical section with curb and gutter and sidewalks.	Road Widening	DeSoto Co	MS	2020	2018-2020	\$5,267,415.75	None	\$0	0%	\$5,267,416	100%	\$0	0%
333	MS-NHPP-2016-02	SR 304 and McIngvale Rd Interchange	SR-304 at McIngvale Road	N/A	Interchange Construction	Interchange Construction	DeSoto Co	MS	2020	2018-2020	\$19,967,838.67	STP-State: 12%	\$2,456,044	12%	\$17,511,795	88%	\$0	0%
345		SRTP Route 39 South Third	TN/MS state line to Goodman Road (MS 302)	2.5	Extend SRTP Route 39 into Desoto County to connect with the new Goodman Rd. route.	Transit Service	DeSoto Co	MS	2020	2018-2020	\$821,680.01	STP-Urban: 10%	\$82,168	10%	\$0	0%	\$739,512	90%
348	MS-SSTP-2006-04	SR-304/I-269	East of I-55 to SR-305	10	New 4-lane freeway	New Roadway	DeSoto Co	MS	2020	2018-2020	\$67,000,000*							
349	MS-SSTP-2008-02	SR-304/I-269	SR-305 to the Marshall County Line	7	New 4-lane freeway	New Roadway	DeSoto Co	MS	2020	2018-2020	\$49,200,000*							
332	MS-NHPP-2016-01	I-55	I-55 at Commerce Street	N/A	Interchange Reconstruction	Interchange Modification/ Reconstruction	Hernando	MS	2020	2018-2020	\$24,418,873.91	NHPP: 10%	\$2,473,632	10%	\$21,945,242	90%	\$0	0%

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
350	MS-SSTP-2016-01	SR-304/I-269	Marshall County Line to East of Mason Road	0.5	New 4-lane freeway	New Roadway	Marshall County	MS	2020	2018-2020	\$12,600,000*							
351	MS-SSTP-2016-02	SR-304/I-269	East of Mason Road to SR-302	7.5	New 4-lane freeway	New Roadway	Marshall County	MS	2020	2018-2020	\$35,100,000*							
23		Church Rd	Pepper Chase Rd to Airways Blvd	0.74	Widen from 5 to 7 lanes	Road Widening	Southaven	MS	2020	2018-2020	\$8,041,478.95	STP-Urban: 5%	\$402,074	5%	\$7,639,405	95%	\$0	0%
28	MS-LSTP-2014-01	Getwell Road (MS 747)	Star Landing Road to Church Road	4	Widen existing variable width road to a four-lane divided typical section with curbs and storm drains. A 10' wide multi-use Bike-Ped lane will be provided.	Road Widening	Southaven	MS	2020	2018-2020	\$7,514,514.01	None	\$0	0%	\$7,514,514	100%	\$0	0%
29		Nail Rd Extension	Elmore Road to Swinnea Road	0.51	Widen two lane to five lanes;	Road Widening	Southaven	MS	2020	2018-2020	\$3,079,986.92	None	\$0	0%	\$0	0%	\$3,079,987	100%
35		Swinnea	Stateline to Goodman Road (MS 302)	2.02	widen 2 to 3 lanes	Road Widening	Southaven	MS	2020	2018-2020	\$8,687,407.37	STP-Urban: 4%	\$347,496	4%	\$8,339,911	96%	\$0	0%
338		I-55	Relocate frontage roads	N/A	Roadway Reconfiguration	Roadway Reconfiguration	Southaven	MS	2020	2018-2020	\$1,609,944.00	NHPP: 40%	\$643,978	40%	\$965,966	60%	\$0	0%
346		SRTP Route 32 Whitehaven	TN/MS state line to Goodman Road (MS 302)	2.3	Extend SRTP Route 32 into Desoto County to connect with the new Goodman Rd. route	Transit Service	Southaven	MS	2020	2018-2020	\$570,461.94	STP-Urban: 10%	\$57,046	10%	\$0	0%	\$513,416	90%
<b>2018-2020 MS Projects Subtotal:</b>											<b>\$164,910,092.46</b>		<b>\$7,357,946</b>		<b>\$133,507,281</b>		<b>\$24,044,865</b>	
<b>2021-2030 MS Projects</b>																		
1001	-	NHS Pavement O&M		N/A	Operations and Maintenance (O&M) set aside for pavement on the National Highway System (NHS)	O&M	Regionwide	MS	2021	2021-2030	\$139,277,031.17	None	\$0	0%	\$139,277,031	100%	\$0	0%
1004	-	NHS Bridge O&M		N/A	Operations and Maintenance (O&M) set aside for bridges on the National Highway System (NHS)	O&M	Regionwide	MS	2021	2021-2030	\$27,334,744.44	None	\$0	0%	\$27,334,744	100%	\$0	0%
1007		non-NHS Pavement & bridges		N/A	Operations and Maintenance (O&M) set aside for pavement and bridges that are not on the National Highway System (NHS)	O&M	Regionwide	MS	2021	2021-2030	\$72,892,651.83	None	\$0	0%	\$36,446,326	50%	\$36,446,326	50%
1010	-	Bike/ped/Complete Streets/Transit Operations		N/A	The costs equal the total funds available from these sources: (HSIP, CMAQ, TAP) and costs of Livability Corridors Projects	Bike/Ped/Transit	Regionwide	MS	2021	2021-2030	\$5,622,560.26	HSIP: 20%	\$1,119,416	50%	\$928,014	41%	\$197,669	9%
											CMAQ: 24%	\$1,338,602	50%	\$1,109,723	41%	\$236,374	9%	
											TAP: 6%	\$345,414	50%	\$286,354	41%	\$60,994	9%	
											Total Federal: 50%	\$2,803,432	50%	\$2,324,091	41%	\$495,037	9%	

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
81	MS-NHS-2006-02	I-55/I-69	Commerce St to Church Rd	7.7	Widen to 6 lanes from Commerce Street to Relocated MS 304 and widen to 8 lanes from Relocated 304 to Church Road	Road Widening	DeSoto Co	MS	2025	2021-2030	\$79,154,886.24	STP-State: 9%	\$7,225,645	9%	\$71,929,241	91%	\$0	0%
82	MS-NHS-2008-02	Star Landing Corridor	Star Landing Road from approx. Tulane Road to Getwell Road	6	Widen from 2 to 4 lanes (divided)	Road Widening	DeSoto Co	MS	2025	2021-2030	\$47,251,276.31	STP-Urban: 5%	\$2,362,564	5%	\$42,526,149	90%	\$2,362,564	5%
194		Craft Rd	I-269 to Church Rd	4.35	Widen from 2 to 5 lanes	Road Widening	DeSoto Co	MS	2025	2021-2030	\$65,137,312.26	None	\$0	0%	\$61,880,447	95%	\$3,256,866	5%
344		Airways Road	From Existing Sidewinder Road (north of Pleasant Hill) to Old Airways Blvd (south of Star Landing)	1.2	(New 2 lane Road)	New Roadway	DeSoto Co	MS	2030	2021-2030	\$9,008,909.01	STP-Urban: 50%	\$4,504,455	50%	\$0	0%	\$4,504,455	50%
26		MS-747 (Getwell Road)	Byhalia Road (SR-309) to Pleasant Hill Road	1.14	Widen from 2 to 4 lanes	Road Widening	Hernando	MS	2030	2021-2030	\$17,127,588.10	STP-State: 25%	\$4,281,897	25%	\$12,845,691	75%	\$0	0%
113		Hacks Cross Road	College Road to US-78	0.66	Widen from 2 to 5 lanes (undivided)	Road Widening	Olive Branch	MS	2025	2021-2030	\$8,601,872.82	STP-Urban: 6%	\$473,103	6%	\$0	0%	\$8,128,770	95%
195		Pleasant Hill Road	Church Road to Nail Road	1	Widen from 2 to 4 lanes (divided)	Road Widening	Olive Branch	MS	2025	2021-2030	\$27,903,021.27	None	\$0	0%	\$0	0%	\$27,903,021	100%
147	MS-LSTP-2014-06	I-55/I-69	Interchange at Nail Road	N/A	Construct new overpass	New Bridge	Southaven	MS	2025	2021-2030	\$59,330,332.18	NHPP: 20%	\$11,866,066	20%	\$47,464,266	80%	\$0	0%
<b>2021-2030 MS Projects Subtotal:</b>											<b>\$558,642,185.88</b>		<b>\$33,517,162</b>		<b>\$442,027,986</b>		<b>\$83,097,038</b>	
<b>2031-2040 MS Projects</b>																		
1002	-	NHS Pavement O&M		N/A	Operations and Maintenance (O&M) set aside for pavement on the National Highway System (NHS)	O&M	Regionwide	MS	2031	2031-2040	\$174,838,003.23	NHPP: 34%	\$58,592,317	73%	\$17,139,639	21%	\$5,027,160	6%
												STP-State: 39%	\$68,256,072	73%	\$19,966,516	21%	\$5,856,300	6%
												Total Federal: 73%	\$126,848,389	73%	\$37,106,154	21%	\$10,883,460	6%
1005	-	NHS Bridge O&M		N/A	Operations and Maintenance (O&M) set aside for bridges on the National Highway System (NHS)	O&M	Regionwide	MS	2031	2031-2040	\$34,314,000.63	None	\$0	0%	\$32,613,866	95%	\$1,700,134	5%
1008		non-NHS Pavement & bridges		N/A	Operations and Maintenance (O&M) set aside for pavement and bridges that are not on the National Highway System (NHS)	O&M	Regionwide	MS	2031	2031-2040	\$91,504,001.69	None	\$0	0%	\$45,752,001	50%	\$45,752,001	50%
1011	-	Bike/ped/Complete Streets/Transit Operations		N/A	The costs equal the total funds available from these sources: (HSIP, CMAQ, TAP) and costs of Livability Corridors Projects	Bike/Ped/Transit	Regionwide	MS	2031	2031-2040	\$17,840,386.03	HSIP: 31%	\$5,553,695	78%	\$1,376,564	19%	\$193,442	3%
												CMAQ: 37%	\$6,641,131	78%	\$1,646,100	19%	\$231,319	3%
												TAP: 10%	\$1,713,684	78%	\$424,761	19%	\$59,690	3%

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Total Costs (YOE)	Federal Funding Category	Federal Funds	Percent Federal Funding	State Funds	Percent State Funding	Local Funds	Percent Local Funding
												Total Federal: 78%	\$13,908,510	78%	\$3,447,425	19%	\$484,451	3%
1012		Livability Corridors		N/A	The costs equal the total funds available from these sources: (HSIP, CMAQ, TAP) and Livability Corridors costs of Livability Corridors Projects	Livability Corridors	Regionwide	MS	2031	2031-2040	\$14,388,321.70	None	\$0	0%	\$7,194,161	50%	\$7,194,161	50%
37		McIntosh	Greentea to Commerce	2.53	2 to 5 Lanes	Road Widening	Hernando	MS	2035	2031-2040	\$27,892,743.73	STP-Urban: 70%	\$19,524,921	70%	\$0	0%	\$8,367,823	30%
162		US-51	I-69 to Star Landing Road	2.86	Widen from 2 to 4 lanes (divided)	Road Widening	Hernando	MS	2035	2031-2040	\$51,380,828.17	NHPP: 9%	\$4,624,275	9%	\$46,756,554	91%	\$0	0%
154		US-51	Church Rd to Stateline Road	4.16	Widen from 5 to 7 lanes	Road Widening	Horn Lake	MS	2035	2031-2040	\$57,454,993.43	NHPP: 80%	\$45,963,995	80%	\$11,490,999	20%	\$0	0%
129		Nail Road	Swinnea to Getwell Road (MS 747)	2.52	New 4 lane road (divided)	New Roadway	Southaven	MS	2040	2031-2040	\$61,981,422.03	STP-Urban: 27%	\$16,933,337	30%	\$0	0%	\$38,832,469	70%
												Discretionary Funds: 3%	\$1,887,378	30%	\$0	0%	\$4,328,239	70%
												Total Federal: 30%	\$18,820,714	30%	\$0	0%	\$43,160,708	70%
<b>2031-2040 MS Projects Subtotal:</b>												<b>\$531,594,700.63</b>		<b>\$229,690,803</b>		<b>\$184,361,160</b>		<b>\$117,542,738</b>
<b>2018-2040 MS Projects Subtotal:</b>												<b>\$1,255,146,978.97</b>		<b>\$270,565,911</b>		<b>\$759,896,427</b>		<b>\$224,684,641</b>
<b>TN and MS Projects Total</b>																		
<b>2018-2020 TN and MS Projects Total:</b>												<b>\$1,155,304,246.66</b>		<b>\$409,489,192</b>		<b>\$515,773,116</b>		<b>\$230,041,938</b>
<b>2021-2030 TN and MS Projects Total:</b>												<b>\$4,191,524,504.50</b>		<b>\$1,559,691,585</b>		<b>\$1,751,815,180</b>		<b>\$880,017,740</b>
<b>2031-2040 TN and MS Projects Total:</b>												<b>\$4,581,512,434.91</b>		<b>\$2,016,586,451</b>		<b>\$1,449,024,472</b>		<b>\$1,115,901,512</b>
<b>2018-2040 TN and MS Projects Total:</b>												<b>\$9,928,341,186.07</b>		<b>\$3,985,767,228</b>		<b>\$3,716,612,768</b>		<b>\$2,225,961,190</b>

\*Funds for this project are programmed in the FY 2014-17 TIP.

Table 8.3 Vision Project List

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Funding Source	Total Costs (YOE)
121		SR-205 (Collierville Arlington Rd)	SR-57 (Poplar Ave) to Fletcher Rd	0.45	Widen from 2 to 5 lanes	Road Widening	Collierville	TN	2041	Vision		\$19,614,079.24
233		Progress Road	Shelby Dr (SR-175) to US-72/SR-86	0.41	New 4 lane road	New Roadway	Collierville	TN	2041	Vision		\$13,938,188.53
53		I-55	Holmes	0.5	Construct new interchange	New Interchange	Memphis	TN	2041	Vision		\$78,379,711.81
87		I-240	NB I-55 ramp to I-55	1.27	Widen to 2 lanes	Road Widening	Memphis	TN	2041	Vision		\$45,247,040.03
92		Poplar Avenue	Bellevue to E Parkway	2.2	Reduce Poplar from 6/7 lanes to 5 lanes, and include; bicycle lanes, traffic signal modernization, transit and pedestrian improvements, and access management.	Roadway Reconfiguration	Memphis	TN	2041	Vision		\$17,807,870.52
97		SR-175 (Shelby Dr)	US-78/SR-4 (Lamar Ave) to Mendenhall Rd	0.97	Widen from 5 to 6 lane (divided)	Road Widening	Memphis	TN	2041	Vision		\$45,372,447.57
103		US-72/SR-57 (Poplar Ave)	I-240 Interchange	0.3	Add one through lane per direction	Road Widening	Memphis	TN	2041	Vision		\$16,037,116.07
117		I-40	SR-14 (Jackson Ave) to Chelsea Ave	0.9	Widen from 6 to 8 lanes	Road Widening	Memphis	TN	2041	Vision		\$32,668,663.88
118		I-40	Chelsea Ave to SR-300	1.35	Widen from 6 to 8 lanes	Road Widening	Memphis	TN	2041	Vision		\$49,001,741.75
158		I-40	SR-204 (Covington Pike) to I-240	1.79	Widen from 6 to 8 lanes	Road Widening	Memphis	TN	2041	Vision		\$56,669,158.68
180		US-78/SR-4 (Lamar Ave)	Semmes St to American Way	0.91	Widen from 5 to 7 lanes (excluding bridge)	Road Widening	Memphis	TN	2041	Vision		\$55,229,480.13
276		I-40	Interchange at Chambers Chapel Rd.	0.5	Construct new interchange	New Interchange	Lakeland	TN	2041	Vision		\$109,731,596.54
68		US-61/SR-14	Stateline Rd to SR-175 (Shelby Dr)	3.17	Widen from 4 to 5 lanes	Road Widening	Memphis	TN	2041	Vision		\$71,222,673.47
105		Winchester Rd	SR-176 (Getwell Rd) to SR-385	0.25	Reconstruct Interchange (add turn lanes)	Interchange Modification/Reconstruction	Memphis	TN	2041	Vision		\$11,177,017.13
172		SR-385	Winchester Rd to Forest Hill-Irene Rd	3.71	Widen from 4 lanes to 6 lanes	Road Widening	Shelby Co	TN	2041	Vision		\$102,207,144.20
219		Holmes Rd	Byhalia to US 72	3.1	New 4 lane road	New Roadway	Collierville	TN	2041	Vision		\$109,771,726.95
234		Raines Rd	Interchange at SR-176 (Getwell Rd)	N/A	Construct new interchange	New Interchange	Memphis	TN	2041	Vision		\$188,111,308.35
238		SR-176 (Getwell Rd)	American Way to Park Ave	2.11	Widen from 5 to 7 lanes	Road Widening	Memphis	TN	2041	Vision		\$68,678,184.60

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Funding Source	Total Costs (YOE)
240		SR-204 (Covington Pike)	I-40 to SR-14 (Stage Rd)	2.72	Widen from 4 to 6 lanes	Road Widening	Memphis	TN	2041	Vision		\$88,532,706.16
241		SR-277 (Airways Blvd)	US-78/SR-4 (Lamar Ave) to S Parkway	0.64	Widen from 5 to 6 lanes	Road Widening	Memphis	TN	2041	Vision		\$20,832,700.36
243		SR-385	Raleigh Lagrange Rd to SR-193 (Macon Rd)	3.71	Widen from 4 to 6 lanes	Road Widening	Shelby Co	TN	2041	Vision		\$84,996,213.56
244		SR-385	SR-193 (Macon Rd) to US-64/SR-15	3.94	Widen from 4 to 6 lanes	Road Widening	Shelby Co	TN	2041	Vision		\$90,265,838.35
245		SR-385	Forest Hill-Irene Rd to SR-175 (Byhalia Rd)	3.91	Widen from 4 lanes to 6 lanes	Road Widening	Shelby Co	TN	2041	Vision		\$89,578,605.04
246		Stateline Rd	MS Stateline to Crumpler Road	1	New 5 lane road	New Roadway	Shelby Co	TN	2041	Vision		\$35,410,072.68
250		US-64/SR-15	Canada Rd to SR-385	4.4	Widen from 5 to 6 lanes (divided)	Road Widening	Memphis	TN	2041	Vision		\$63,102,565.42
259		US-78/SR-4 (Lamar Ave)	S Parkway to Trezevant St	0.53	Widen from 5 to 7 lanes	Road Widening	Memphis	TN	2041	Vision		\$24,855,774.21
268	-	Walnut Grove Rd	Houston Levee to SR-385	5.06	Construct 4 lane road on new alignment	New Roadway	Shelby Co	TN	2041	Vision		\$138,399,759.93
312		Stage Road - Eastern Segment	I-40 to Berryhill Rd.	1.2	Widen from 4 to 6 lanes to connect existing six lane area to planned widening east of Berryhill Rd.	Road Widening	Memphis	TN	2041	Vision		\$33,200,391.85
13		SR-57 (Poplar Ave)	SR-385 to SR-196	0.95	Widen from 2 to 5 lanes	Road Widening	Piperton	TN	2041	Vision		\$24,379,225.56
44		Holmes Rd	Horn Lake Rd to Tulane	1.4	Widen from 2 to 5 lanes	Road Widening	Memphis	TN	2041	Vision		\$47,619,750.67
85		Holmes Rd	Tulane to Elvis Presley Blvd	1	Widen from 2 to 5 lanes	Road Widening	Memphis	TN	2041	Vision		\$33,870,068.11
98		SR-176 (Getwell Rd)	State line to SR-175 (Shelby Dr)	1.53	Widen from 4 to 5 lanes	Road Widening	Memphis	TN	2041	Vision		\$42,701,266.99
99		SR-193 (Macon Rd)	SR-385 to SR-196	0.96	add shoulder and geometric improvement	Road Widening	Fayette Co	TN	2041	Vision		\$37,316,916.89
102		US 51/SR-3 (Elvis Presley)	Stateline Rd to SR-175 (Shelby Dr)	2.04	Widen from 4 to 6 lanes (divided)	Road Widening	Memphis	TN	2041	Vision		\$47,712,374.17
119		Macon Rd	Houston Levee to SR-385	5.18	Widen to 4 lanes (divided)	Road Widening	Shelby Co	TN	2041	Vision		\$154,286,386.96
122		SR-177 (Germantown Rd)	Winchester to Callis Creek	0.69	Widen from 2 to 7 lanes	Road Widening	Memphis	TN	2041	Vision		\$34,780,526.84
125		SR-175 (Weaver Rd)	Holmes Rd to US-61/SR-14 (South Third St)	0.47	Realign Intersection at Third Street and widen Weaver to 3 lanes. Add left turn lanes on US 61	Road Widening	Memphis	TN	2041	Vision		\$19,109,600.78
132		Shelby Dr	Byhalia Rd to US-72	1.8	Widen from 2 lanes to 4 lanes divided	Road Widening	Collierville	TN	2041	Vision		\$54,208,662.76
133		Sycamore Rd	Shelby Dr (SR-175) to	1.1	Widen from 2 lanes to 5 lanes	Road Widening	Collierville	TN	2041	Vision		\$38,231,742.31

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Funding Source	Total Costs (YOE)
			US-72									
138		Houston Levee Rd	Macon Rd to Morning Sun	1.8	Widen to 4 lanes (divided)	Road Widening	Shelby Co	TN	2041	Vision		\$78,128,896.73
139		Houston Levee Rd	Morning Sun to US-64	1.7	Widen to 4 lanes (divided)	Road Widening	Memphis	TN	2041	Vision		\$50,040,116.17
142		Tchulahoma Rd	SR-175 (Shelby Dr) to Christine Rd	1.59	Widen from 2 to 5 lanes	Road Widening	Memphis	TN	2041	Vision		\$53,320,777.39
166		Forest Hill-Irene Rd	Winchester Rd to Poplar Pike	1.06	Widen from 2 to 4 lane (divided) with bike lanes	Road Widening	Germantown	TN	2041	Vision		\$32,505,634.08
168		Malone Rd	Stateline Rd to Holmes Rd	1	Widen from 2 to 5 lanes	Road Widening	Memphis	TN	2041	Vision		\$33,536,484.05
173		SR-57 (Poplar Ave)	SR-196 to SR-194	4.53	Widen from 2 to 5 lanes	Road Widening	Piperton	TN	2041	Vision		\$183,865,009.08
174		US-64/SR-15	Berryhill Rd to Canada Rd	1.23	Widen from 5 to 7 lanes	Road Widening	Lakeland	TN	2041	Vision		\$37,404,052.55
175		US-70/US-79/SR-1	Canada Rd to SR-385	4.2	Construct a raised median (4 lanes divided)	Road Widening	Lakeland	TN	2041	Vision		\$59,764,216.74
177		US-70/US-79/SR-1 (Summer Ave)	SR-177 (Germantown Rd) to Oliver Creek	2.8	Widen to 4 lanes (divided)	Road Widening	Bartlett	TN	2041	Vision		\$78,410,394.02
178		US-72/SR-57 (Poplar Ave)	Dogwood Rd to Brachtton Ave	1.61	Widen from 5 to 7 lanes	Road Widening	Germantown	TN	2041	Vision		\$48,959,103.19
198		Billy Maher	Sycamore View to Old Brownsville Rd	3.75	Widen from 2 to 4 (divided)	Road Widening	Bartlett	TN	2041	Vision		\$21,743,159.09
211		Forest Hill-Irene Rd Extension	Wolf River Blvd to the Wolf River (City of Memphis project from Wolf River, including the bridge, to Forest Hill Irene Road)	0.9	New 4 lane road (divided)	New Roadway	Germantown	TN	2041	Vision		\$31,868,563.78
214		Germantown Rd Extension	SR-385 to SR-14 (Austin Peay)	2.35	Widen from 2 to 4 lanes (divided)	Road Widening	Shelby Co	TN	2041	Vision		\$77,762,706.72
217		Holmes Rd	Kirby Parkway to Riverdale Rd	1	Widen from 2 to 4 lanes (divided)	Road Widening	Shelby Co	TN	2041	Vision		\$29,786,798.64
221		Houston Levee Rd	Center Hill to SR-175 (Shelby Dr)	4.64	New 4 lane road (divided)	New Roadway	Collierville	TN	2041	Vision		\$164,301,433.01
223		Market Blvd	Winchester to US-72/SR-57 (Poplar)	0.57	New 4 lane road	New Roadway	Collierville	TN	2041	Vision		\$20,185,597.46
235		Shelby Dr (SR-175)	SR-175 (Byhalia Rd) to US-72	0.25	Widen from 2 to 4 lanes (divided)	Road Widening	Collierville	TN	2041	Vision		\$10,258,336.68
236		Shelton Rd	Peterson Lake to	0.79	Widen from 2 to 4 lanes (divided)	Road Widening	Collierville	TN	2041	Vision		\$23,531,470.60

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Funding Source	Total Costs (YOE)
			Collierville Arlington Rd									
237		SR-175 (Byhalia Rd)	SR-385 to US-72/SR-57 (Poplar Ave)	0.87	Widen from 5 to 7 lanes	Road Widening	Collierville	TN	2041	Vision		\$28,317,022.28
242		SR-277 (Airways Blvd)	S Parkway to Young Ave	0.34	Widen from 5 to 6 lanes	Road Widening	Memphis	TN	2041	Vision		\$9,490,842.54
248		US-51/SR-3	Babe Howard to Veterans Parkway	2.31	Access Management	Access Management	Millington	TN	2041	Vision		\$23,217,951.75
249		US-64/SR-15	SR-385 to Sammons	1.53	Widen from 4 to 6 lanes (divided)	Road Widening	Arlington	TN	2041	Vision		\$39,154,741.79
256		US-72/SR-57 (Poplar Ave)	Kirby Parkway to New Riverdale Road	0.87	Widen from 6 to 7 lanes	Road Widening	Germantown	TN	2041	Vision		\$24,281,407.68
279		SR-177 (Germantown Rd)	Intersection at Wolf River Blvd	0.5	Construct Interchange	New Interchange	Germantown	TN	2041	Vision		\$172,435,365.99
280		SR-385	Walnut Grove Rd (SR-23)	0.5	Construct new interchange	New Interchange	Shelby Co	TN	2041	Vision		\$141,083,481.26
282		US-78/SR-4 (Lamar Ave)	McLean Blvd to S Parkway	0.72	Widen from 5 to 7 lanes	Road Widening	Memphis	TN	2041	Vision		\$45,548,018.13
45		Houston Levee Rd	Wolf River Blvd to the Wolf River	0.71	Widen from 4 lane (divided) to 6 lane (divided)	Road Widening	Collierville	TN	2041	Vision		\$15,823,923.26
55		Malone Rd	Holmes Rd to SR-175 (Shelby Dr)	0.96	Widen from 2 to 5 lanes	Road Widening	Memphis	TN	2041	Vision		\$32,194,623.39
57		New Frontage Rd	South of US-64/SR-15 at Cherry Road to SR-196	2.17	New 2 lane road	New Roadway	Fayette Co	TN	2041	Vision		\$21,896,156.29
65		SR-177 (Germantown Rd)	Callis Creek to Crestridge Rd	0.53	Widen from 2 to 4 lanes (divided)	Road Widening	Memphis	TN	2041	Vision		\$20,092,795.88
86	-	Houston Levee Rd	Walnut Grove Rd (SR-23) to Macon Rd (SR-193)	2.14	Widen from 2 to 4 lanes (divided)	Road Widening	Shelby Co	TN	2041	Vision		\$58,778,513.48
89		Mullins Station Rd	Whitten Rd to Raleigh Lagrange Rd	1.13	Widen from 2 to 4 lanes (divided)	Road Widening	Memphis	TN	2041	Vision		\$33,659,383.44
91		SR-194	US 64 to Sellers	2.9	add shoulder	Road Widening	Oakland	TN	2041	Vision		\$15,588,157.09
120		Raleigh Millington Rd	Egypt Central to New Allen Rd	1.5	Widen from 2 to 4 lanes (divided) and intersection improvements at New Allen and Raleigh Millington Rd	Road Widening	Memphis	TN	2041	Vision		\$44,963,619.00
124		Dexter Rd	Raleigh Lagrange Rd to SR-177 (Germantown Rd)	2.4	Widen from 2 to 4 lanes (divided)	Road Widening	Memphis	TN	2041	Vision		\$71,484,805.32
126		Dexter Rd	Dewberry Lane to Forest Hill-Irene Rd Ext.	0.71	Widen from 2 to 4 lanes divided on Dexter from Dewberry Lane to east of Millbrey Street and construct	Road Widening	Memphis	TN	2041	Vision		\$35,410,072.68

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Funding Source	Total Costs (YOE)
					4 lane divided roadway from Millbrey Street to Forest Hill-Irene							
135	SR-194		US 64 to Stevens	2.3	add shoulder	Road Widening	Oakland	TN	2041	Vision		\$12,447,952.31
144	West Union Rd		Veterans Parkway to Quito Rd	1.9	Widen from 2 to 5 lanes	Road Widening	Millington	TN	2041	Vision		\$58,858,774.31
163	Canada Rd Extension		US-70/US-79/SR-1 (Summer Ave) to Old Brownsville Rd	0.73	Widen from 2 to 4 lanes (divided)	Road Widening	Lakeland	TN	2041	Vision		\$20,050,157.32
164	Crumpler Rd		Stateline Rd to SR-175 (Shelby Dr)	1.8	Widen from 2 to 4 lanes (divided)	Road Widening	Memphis	TN	2041	Vision		\$53,614,231.03
165	Egypt Central Rd		Raleigh-Millington Rd to Coleman Rd	0.64	Widen from 2 to 5 lanes	Road Widening	Memphis	TN	2041	Vision		\$21,462,246.21
170	SR-204 (Covington Pike)		SR-15 (Stage Rd) to SR-14 (Austin Peay)	2.02	Widen from 4 to 6 lanes	Road Widening	Memphis	TN	2041	Vision		\$65,748,664.49
179	US-78/SR-4 (Lamar Ave)		Melrose St Willet St	0.23	Widen from 2 to 5 lanes	Road Widening	Memphis	TN	2041	Vision		\$58,113,853.53
183	Wolf River Blvd		Almadale Farms Pkwy to Stillwind Dr	2.09	Widen from 2 to 4 lanes (divided)	Road Widening	Collierville	TN	2041	Vision		\$62,252,302.31
197	Appling Rd Extension		Memphis Arlington Rd to Jon Stone Ln	0.96	New 4 lane road	New Roadway	Bartlett	TN	2041	Vision		\$33,995,475.64
199	Byhalia Rd		Stateline Rd to SR-175 (Shelby Dr)	1.68	Widen from 2 to 5 lanes	Road Widening	Collierville	TN	2041	Vision		\$56,340,590.93
200	Byhalia Rd Extension		Wolf River Blvd to Walnut Grove	3.12	New 4 lane road (divided)	New Roadway	Collierville	TN	2041	Vision		\$110,479,025.47
204	Collierville Rd		Park Ridge Pkwy to 2,500 ft east of Byhalia Rd	1.64	Widen from 2 to 4 lanes (undivided)	Road Widening	Collierville	TN	2041	Vision		\$48,848,744.55
206	Crooked Creek Rd		1,000 feet east of Houston Levee Rd to Bailey Station Rd	0.53	New 4 lane road (undivided)	New Roadway	Collierville	TN	2041	Vision		\$18,768,492.27
207	Dexter Rd		Forest Hill-Irene Rd Ext. to Houston Levee Rd	0.86	Widen from 2 to 4 lane (divided)	Road Widening	Shelby Co	TN	2041	Vision		\$25,615,743.90
209	Forest Hill-Irene Rd		State Line to Holmes Rd	0.8	Widen 2 to 4 lane roadway	Road Widening	Shelby Co	TN	2041	Vision		\$23,829,940.54
210	Forest Hill-Irene Rd		Holmes Rd to SR-175 (Shelby Dr)	1.01	Widen 2 to 4 lane roadway	Road Widening	Shelby Co	TN	2041	Vision		\$30,085,268.58
212	Frank Rd		Houston Levee Rd to	1.43	Widen from 2 to 4 lanes (undivided)	Road Widening	Collierville	TN	2041	Vision		\$42,593,416.51

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Funding Source	Total Costs (YOE)
			Bray Station Rd									
215		Hacks Cross Rd Extension	Poplar Pike to US-72/SR-57 (Poplar Ave)	0.68	New 4 lane road (divided)	New Roadway	Germantown	TN	2041	Vision		\$24,080,755.62
216		Highland St	US-72/SR-57 (Poplar Ave) to SR-23 (Walnut Grove Rd)	0.29	Widen from 5 to 6 lanes (divided)	Road Widening	Memphis	TN	2041	Vision		\$7,810,381.52
218		Holmes Rd	Reynolds to Byhalia	2.5	Widen from 2 to 4 lanes (divided)	Road Widening	Collierville	TN	2041	Vision		\$74,464,488.45
220		Holmes Rd	Hacks Cross Rd to Reynolds	3.55	Widen from 2 to 4 lanes	Road Widening	Shelby Co	TN	2041	Vision		\$105,738,620.50
222		Houston Levee Rd	US-72/SR-57 (Poplar Ave) to 750 feet north of Poplar Ave	0.34	Widen from 2 to 3 lanes northbound	Road Widening	Collierville	TN	2041	Vision		\$6,287,934.00
224		Market Blvd	Green Oaks Ln to Fox Run Dr	0.51	Widen from 2 to 5 lanes	Road Widening	Collierville	TN	2041	Vision		\$17,103,080.15
228		Old Brownsville Rd	Kirby Whitten to Germantown	2.48	Widen from 2 to 5 lanes	Road Widening	Bartlett	TN	2041	Vision		\$92,465,486.58
229		Park Ave	Getwell Rd to Goodlett St	0.25	Widen from 5 to 7 lanes	Road Widening	Memphis	TN	2041	Vision		\$6,731,876.69
230		Perkins Rd	Chip Rd to Park Ave	0.26	Widen from 2 to 5 lanes	Road Widening	Memphis	TN	2041	Vision		\$8,720,840.25
232		Poplar Pike	West St/Germantown Rd to US-72/SR-57 (Poplar Ave)	4.26	Widen from 2 to 5 lanes	Road Widening	Germantown	TN	2041	Vision		\$142,859,252.01
239		SR-177 (Germantown Rd)	Stout Rd to Poplar Pike	0.52	Widen from 5 to 7 lanes	Road Widening	Germantown	TN	2041	Vision		\$14,514,668.55
247		Sycamore View Rd	US-70/US-79/SR-1 to Pleasant View Rd	0.11	Widen from 6 to 7 lanes, add NB through lane	Road Widening	Memphis	TN	2041	Vision		\$2,034,110.28
251		US-70/US-79/SR-1	Milton Wilson Rd to SR-59	6.85	Add shoulders	Road Widening	Gallaway	TN	2041	Vision		\$152,370,159.76
252		US-72/SR-57 (Poplar Ave)	Bedford Ln to Houston Levee Rd	0.45	Widen from 5 to 7 lanes	Road Widening	Collierville	TN	2041	Vision		\$12,560,819.10
253		US-72/SR-57 (Poplar Ave)	SR-175 (Byhalia Rd) to US-72/SR-86	0.26	Construct new WB lane	Road Widening	Collierville	TN	2041	Vision		\$5,537,996.92
254		US-72/SR-57 (Poplar Ave)	Brachton Ave to Ashmont Dr	0.57	Widen from 5 to 7 lanes	Road Widening	Germantown	TN	2041	Vision		\$15,909,200.38
255		US-72/SR-57 (Poplar Ave)	Ashmont Dr to Forest Hill-Irene Rd	0.33	Widen from 5 to 7 lanes	Road Widening	Germantown	TN	2041	Vision		\$9,212,437.81
257		US-72/SR-57 (Poplar Ave)	Houston Levee Rd to	0.55	Widen from 5 to 7 lanes	Road Widening	Collierville	TN	2041	Vision		\$15,352,390.91

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Funding Source	Total Costs (YOE)
		Ave)	Bailey Station Rd									
258		US-72/SR-57 (Poplar Ave)	Bailey Station Rd to Bray Station Rd	1.03	Construct new EB lane	Road Widening	Collierville	TN	2041	Vision		\$17,160,767.62
267		US-70/US-79/SR-1 (Summer Ave)	elmore to SR-177 (Germantown Rd)	3.26	Add two way left turn lane (TWLTL)	Road Widening	Bartlett	TN	2041	Vision		\$69,877,080.67
271		Forrest St	Milton Wilson Rd to SR-196	1.61	Widen from 2 to 4 lanes	Road Widening	Arlington	TN	2041	Vision		\$47,955,842.87
272		Germantown Rd	Poplar Pike to Poplar Ave	0.59	Widen from 5 to 7 lanes	Road Widening	Germantown	TN	2041	Vision		\$15,886,627.03
278		Inglewood Rd	US-64/SR-15 to Donelson Farm Pkwy	2.18	Widen from 2 to 4 lanes (divided)	Road Widening	Arlington	TN	2041	Vision		\$59,877,083.52
307		Raleigh Millington Rd	Egypt Central to New Allen Rd	1	Widen from 2 to 4 lanes (divided) and intersection improvements at New Allen and Raleigh Millington Rd	Road Widening	Memphis	TN	2041	Vision		\$29,786,798.64
281		US-70/US-79/SR-1 (Summer Ave)	Elmore to Stage Rd	1.36	Add two way left turn lane (TWLTL)	Road Widening	Bartlett	TN	2041	Vision		\$28,969,141.49
308		Billy Maher	St. Elmo Road to Old Brownsville Rd	1.87	Widen from 2 to 4 (divided)	Road Widening	Bartlett	TN	2041	Vision		\$55,698,504.33
321		E. Commerce St. Extension (SR-304)	Jaybird Rd to MS 747 (Getwell Rd)	1	New 4 lane road (divided)	New Roadway	DeSoto Co	MS	2041	Vision		\$35,136,162.55
25		MS-302 (Goodman Rd)	Old Lamar Off Ramp	0.25	Reconfigure ramp for safety	Highway Safety	Olive Branch	MS	2041	Vision		\$4,274,087.56
34		MS-302 (Goodman Rd)	Airways Blvd to Tchulahoma Rd	2.02	Widen from 5 to 7 lanes (divided)	Road Widening	Southaven	MS	2041	Vision		\$29,001,366.35
264		Stateline Rd	US-78 to State Line	0.5	New 5 lane road	New Roadway	Olive Branch	MS	2041	Vision		\$13,677,080.19
75		Nail Rd	FedEx Lane to Pleasant Hill Rd	3.96	New 5 lane road	New Roadway	Olive Branch	MS	2041	Vision		\$79,811,848.66
78		Hacks Cross Rd	MS-302 (Goodman Rd) to Stateline Rd	2.23	Widen from 5 to 7 lanes (divided)	Road Widening	Olive Branch	MS	2041	Vision		\$34,276,239.45
130		Laughter Road	Byhalia to Pleasant Hill	2.29	widen 2-4 lane divided	Road Widening	Desoto Co	MS	2041	Vision		\$38,178,940.72
191		MS-305 (Germantown Ext)	Lewisburg Rd to Church Rd	4.92	Widen from 2 to 5 lanes	Road Widening	DeSoto Co	MS	2041	Vision		\$155,265,538.92
196		Byhalia Rd (SR-309)	Getwell to MS 305	0.86	widen 2-4 lanes divided	Road Widening	Desoto Co	MS	2041	Vision		\$27,684,862.94
261		Fogg Rd	MS-304 to Dean Rd	3.05	Widen from 2 to 4 lanes (divided)	Road Widening	DeSoto Co	MS	2041	Vision		\$67,850,168.61
266		Craft Rd	Old Lamar to Stateline Rd	1.03	New 4 lane road (divided)	New Roadway	Olive Branch	MS	2041	Vision		\$28,162,351.48
24		Commerce St	Sloans Way to	0.3	Widen from 4 to 6 lanes (divided)	Road Widening	Hernando	MS	2041	Vision		\$14,844,634.15

Livability 2040 ID	TIP No.	Facility	Termini	Length (Miles)	Description	Type of Improvement	Project Location	State	Completion Date	Tier	Funding Source	Total Costs (YOE)
			McIngvale Rd									
73		Horn Lake Rd	DeSoto Rd to Stateline Rd	1	Widen from 2 to 3 lanes (undivided)	Road Widening	Southaven	MS	2041	Vision		\$22,330,488.52
76		Stateline Rd	Kirby Rd to Hacks Cross Rd	3.01	Widen from 2 to 5 lanes	Road Widening	Shelby County	MS	2041	Vision		\$77,254,132.62
79		Hacks Cross Rd	Nail Rd to MS-302 (Goodman Rd)	1.05	Widen from 5 to 7 lanes (divided)	Road Widening	Olive Branch	MS	2041	Vision		\$16,123,995.32
127		Stateline Rd	Horn Lake Rd to US-51	2.17	Widen from 2 to 5 lanes	Road Widening	Southaven	MS	2041	Vision		\$62,291,992.17
128		Nail Rd widening	Hurt to US51	1	2 to 5 lanes	Road Widening	Horn Lake	MS	2041	Vision		\$16,271,457.62
146		Davidson Rd Extension	Church Rd to Davidson Rd	2	New 2 lane road	New Roadway	Olive Branch	MS	2041	Vision		\$34,260,697.32
148		Malone Rd	Church Rd to Nail Rd	0.99	New 3 lane road	New Roadway	Southaven/Olive branch	MS	2041	Vision		\$16,924,739.14
149		Nail Rd	MS-301 to Tulane Rd	2.98	Widen from 2 to 5 lanes	Road Widening	Horn Lake	MS	2041	Vision		\$76,467,311.96
190		College Rd Extension	College Rd to Pleasant Hill Rd	0.86	New 2 lane road	New Roadway	DeSoto Co	MS	2041	Vision		\$14,142,569.18
262		Pleasant Hill Rd	Bethel Rd to Church Rd	3.4	Widen 2-4 lanes (divided). New 2 lane road ?	Road Widening	DeSoto Co	MS	2041	Vision		\$53,444,800.43
269		MS-305 (Germantown Rd)	MS-302 (Goodman Rd) to Stateline Rd	1.48	Widen from 5 to 6 lane (divided)	Road Widening	Olive Branch	MS	2041	Vision		\$18,934,693.58
322		Nail Rd	Hacks Cross Rd to Center Hill Road	3.02	New 2 lane road	New Roadway	DeSoto Co	MS	2041	Vision		\$48,406,417.11
36		Swinnea	Church to Star landing	2.01	widen 2-3 lanes	Road Widening	Southaven	MS	2041	Vision		\$30,587,585.97
72		Forest Hill-Irene Rd	MS-302 (Goodman Rd) to Stateline Rd	2.23	New 3 lane road	New Roadway	DeSoto Co	MS	2041	Vision		\$38,191,562.69
74		Malone Rd	MS-302 (Goodman Rd) to Stateline Rd	2.03	Widen from 2 to 5 lanes	Road Widening	Olive Branch	MS	2041	Vision		\$51,939,877.67
260		Center Hill Rd	US-78 to State Line	6.53	Widen from 2 to 4 lanes (divided) with Bike Lanes	Road Widening	DeSoto Co	MS	2041	Vision		\$145,213,419.98
263		Star Landing Rd	MS-747 (Getwell Rd) to MS-305 (Germantown Rd) at Jones Rd	6.03	New 3 lane road	New Roadway	DeSoto Co	MS	2041	Vision		\$108,479,736.26

## 9.0 Plan Performance

### 9.1 Summary of System Impacts

Plan performance is shown in **Table 9.1** for the existing 2010 base year, all projects programmed in the TIP, and 2040 RTP (fiscally constrained plan). Highlights of plan performance follow, including environmental impacts in Section 9.2.

Impacts of the plan are shown for selected measures that tie to the goals and objectives outlined in Section 3. The evaluation includes the major regional projects that can be evaluated via the travel demand model, and does not include the numerous smaller projects that would likely be implemented by local communities via the set-asides. Livability 2040 helps move the region towards these goals, but with growth in population, employment, and freight movement, challenges still exist. As described in Section 7.5, additional transportation revenues would be needed to make progress beyond what is shown in Table 9.1.

The Memphis MPO has committed as part of Livability 2040 to ensuring adequate maintenance of the existing transportation system as a priority funding consideration. Pavement and bridge needs – for the existing system – were funded at recommended levels, given the results of the pavement funding analysis using the Highway Economic Requirements System – State Version (HERS-ST) and bridge funding analysis using the National Bridge Investment Analysis System (NBIAS) funding analyses documented in Section 4.1.

Funding set-aside in the RTP to address pavement needs amount to \$92 million (2014 dollars) per year. At this spending level, HERS-ST estimates that 90 percent of the lane miles in the NHS system will be in good/fair condition by 2040. A continuation of the historic funding level, approximately 22 percent of the recommended level, would decrease the NHS network condition to about 50 percent of lanes miles in good/fair condition.

The funding set-aside for the regional bridges is adequate to maintain the current network condition of 92 percent of the bridge deck area not structurally deficient. A continuation of the historic funding level, approximately 36 percent of the recommended level, would decrease the network condition to nearly 51 percent deck area not structurally deficient.

The major projects implemented through the plan are projected to reduce congestion by 17 percent overall, and by 19 percent on the NHS. These roadway delay reductions also help to improve the flow of transit vehicles on routes where improvements are made. For trucks specifically the reduction is even greater, with a 22 percent reduction in delay overall and 27 percent reduction on the NHS. This has a significant impact on the movement of freight through the region, and therefore on the economy.

Additional delay benefit (unable to be captured by the travel demand model) will be supported through the set aside system operations and safety funding. System operations funding will be directed towards investments that improve the reliability and efficiency of the transportation system, while safety funding will be directed towards emphasis areas that will reduce incidents and associated nonrecurring (incident) delay.

**Table 9.1 Summary of Plan Performance, in Relation to Key Performance Measure Categories**

Performance Measure Categories	System-Level Performance Measure	2010 Base <sup>a</sup>	2040 E+C	2040 RTP
Infrastructure Condition	Percent Lane Miles Fair/Good Condition – NHS System	85%	50% <sup>b</sup>	90%
	Percent Deck Area Non-Structurally Deficient	93%	51% <sup>c</sup>	93%
Environmental Sustainability	VMT/capita	19.3	20.3	20.2
	Air Pollutant Emissions	See Conformity Determination Report		
Economic Vitality/Freight Movement	Annual Truck Hours Delay (Interstate System)	2,490,530	9,157,237	6,662,306
	Annual Truck Hours Delay (entire network)	7,946,229	21,039,656	16,484,692
Mobility/Accessibility	New Complete Streets Mileage	0	50	56
	Mode Split (auto)	91.4%	92.1%	92.1%
	Mode Split (transit)	0.5%	0.6%	0.6%
	Mode Split (bike/walk)	4.8%	4.1%	4.1%
	Mode Split (school bus)	3.4%	3.3%	3.3%
Congestion Reduction	Annual Vehicle Hours Delay (NHS)	28,363,016	59,877,268	48,734,617
	Annual Vehicle Hours Delay (entire network)	41,131,412	81,083,617	67,605,225

Source: Cambridge Systematics analysis of Memphis MPO travel demand model results, 2008 HPMS pavement condition, and 2013 National Bridge Inventory

<sup>a</sup> 2010 base year for system maintenance analysis is year 2008/pavement and 2013/bridge.

<sup>b</sup> Assumes an annual investment level of \$20 million based on current trends.

<sup>c</sup> Assumes an annual investment level of \$9 million based on current trends.

## 9.2 Environmental Consultation and Mitigation

### 9.2.1 Purpose

The first portion of this section presents the environmental screening conducted to determine whether recommended actions in the RTP might impact certain identified environmental resources in the region. Potential impacts would vary according to the location and scope of the actions being taken. This plan proposes a broad range of transportation investments that include intersection improvements, widening and construction of new roads, addition of bicycle and pedestrian facilities, establishing new transit services and expanding existing transit services. Impacts from construction of a new four-lane road are likely greater than the impacts that could be expected from adding a bike lane to an existing road.

The second part of this chapter evaluates the extent to which the investment decisions of the RTP meet the requirements of Title VI of the Civil Rights Act of 1964 and Executive Order 12898, which address non-discrimination in all aspects of the transportation planning process on the basis of race, color or national origin.

It is important to note that the locations shown for RTP projects are still at a planning level of detail and do not necessarily represent the final limits or exact design of each project. For this reason, the screening performed for the RTP is not intended to produce the same level of detail as a project-level environmental study. All Federally-funded transportation projects must still go through the more detailed review of potential impacts required by the National Environmental Policy Act (NEPA). As a project is further developed, its footprint will continue to be refined and impacts will be better known, including potential indirect impacts from project-related activities.

At this long-range planning stage, the purpose is to identify the general nature of potential impacts and broad, planning-level strategies that could be used to avoid or mitigate those impacts.

## 9.2.2 Environmental Screening of Proposed RTP Projects

A review of available databases was performed to identify and locate significant natural, cultural/historic, and community resources, as well as key sites in the region designated for environmental monitoring due to past or existing issues. These various resources are shown in **Figures 9.1 through 9.4**.

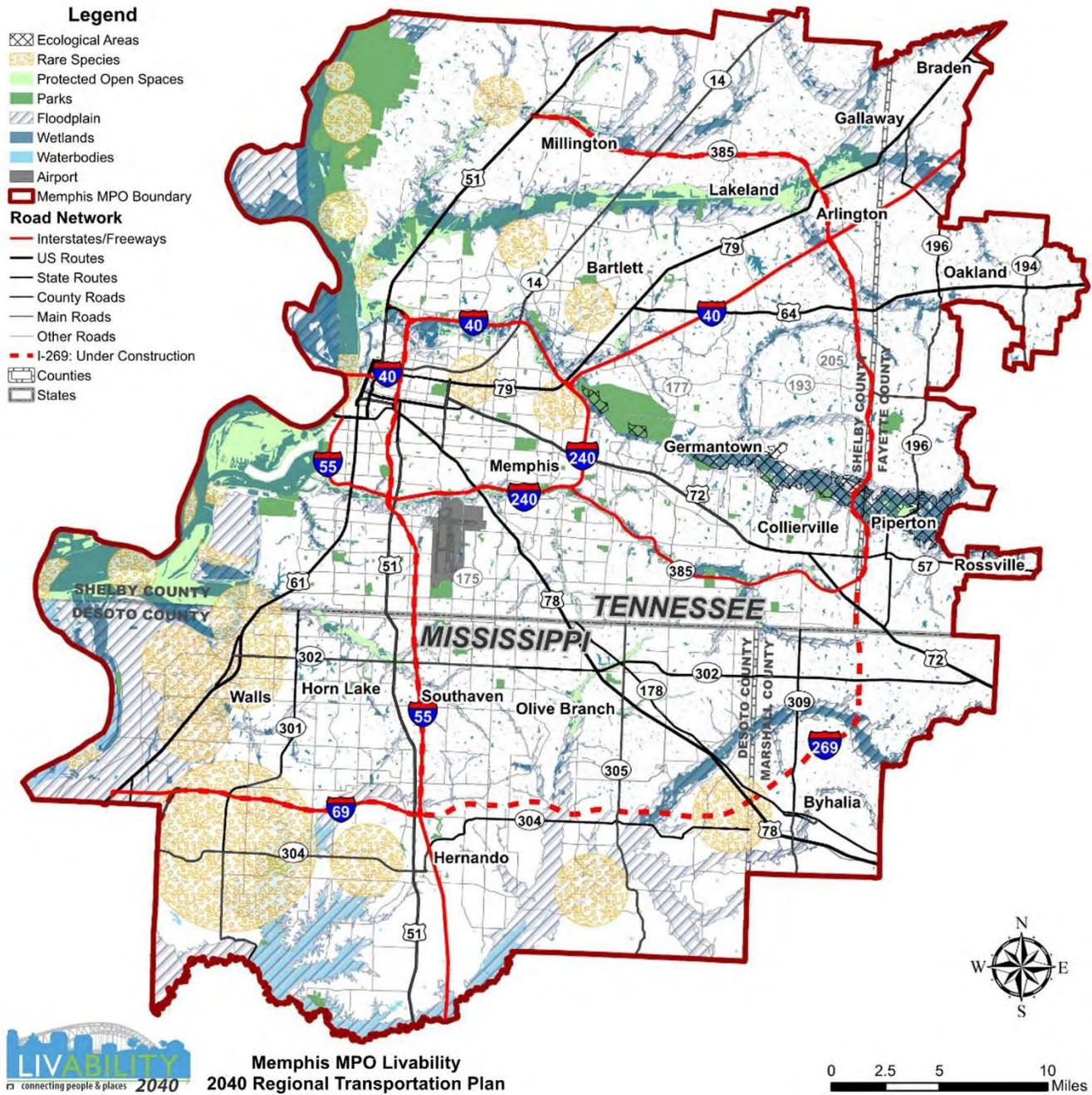
Locations of proposed RTP projects were then reviewed in conjunction with the locations of these identified environmental resources and sites of concern. About half of the proposed projects (65 of the total 112 projects) are located in proximity to identified floodplains, wetlands, historic sites, community facilities, or other resources described in this chapter. A full listing is provided in Appendix E.

**Figure 9.1** displays the natural resources identified for the Memphis MPO region. These include major water features such as the Mississippi River, Loosahatchie River, Wolf River, Nonconnah Creek, Horn Lake and Arkabutla Lake. Also shown are parklands within the region, including significant areas such Meeman-Shelby Forest State Park in northwest Shelby County, T.O. Fuller State Park in southwest Memphis, Shelby Farms Park east of I-240 off Walnut Grove Road, and Overton Park in central Memphis.

Locations of rare species and protected open spaces were assembled from the Tennessee Department of Environment and Conservation, the Mississippi Natural Heritage Program, and the National Conservation Easement Database.

Floodplain data from the Federal Emergency Management Agency was mapped along with wetland information from the U.S. Fish & Wildlife Services and National Wetlands Inventory, and locations of priority ecological sites identified as part of the Southeastern Ecological Framework.

**Figure 9.1 Identified Natural Resources**

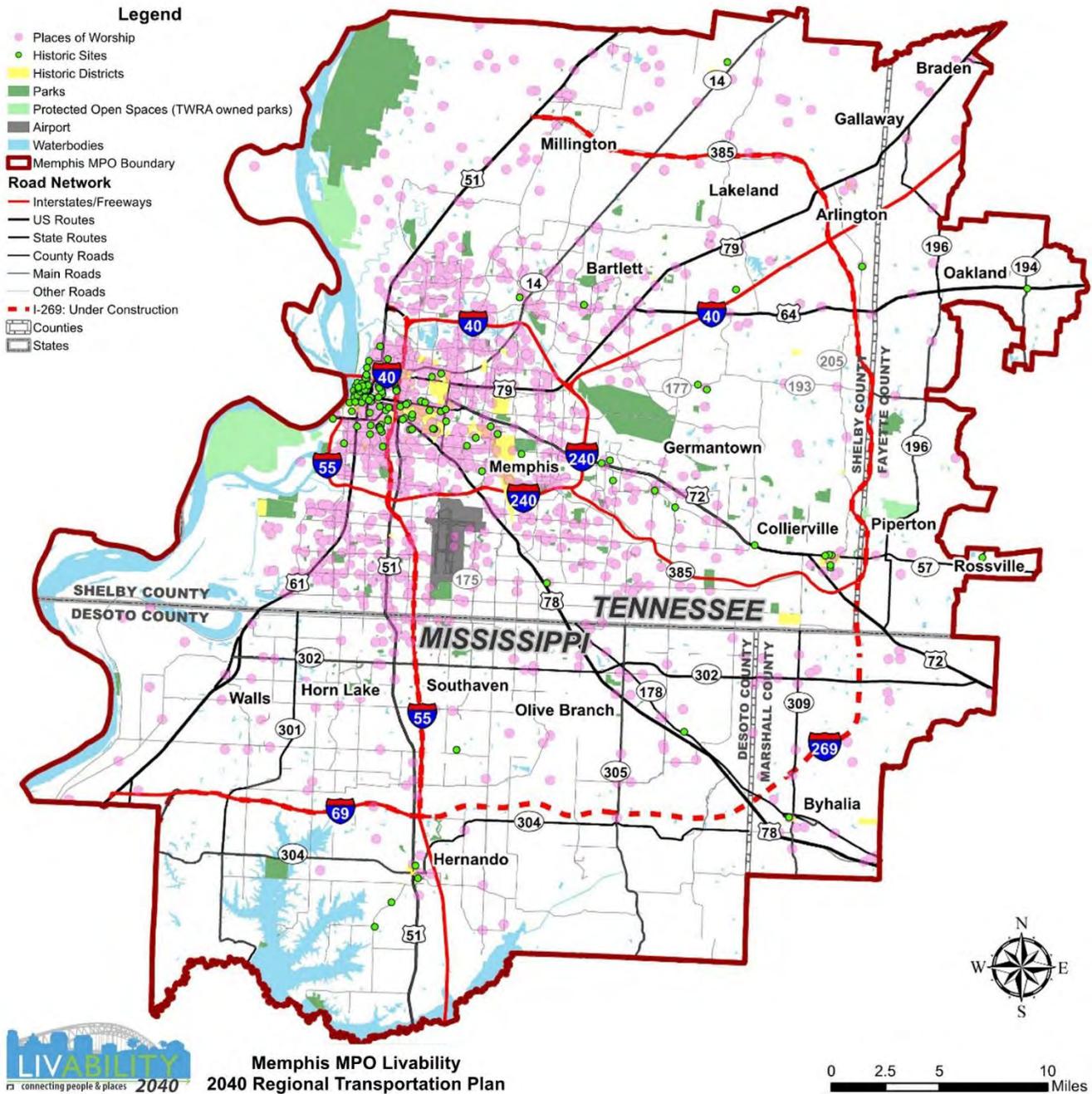


Figures 9.2 and 9.3 depict community resources throughout the MPO region. These include important structures, sites and districts listed on the National Register of Historic Places, which serves as the official list of cultural resources worthy of preservation.

Locations of schools, hospitals, and places of worship were also considered in the development of the RTP and were part of the environmental screening. It is not surprising that a number of the recommended projects are located

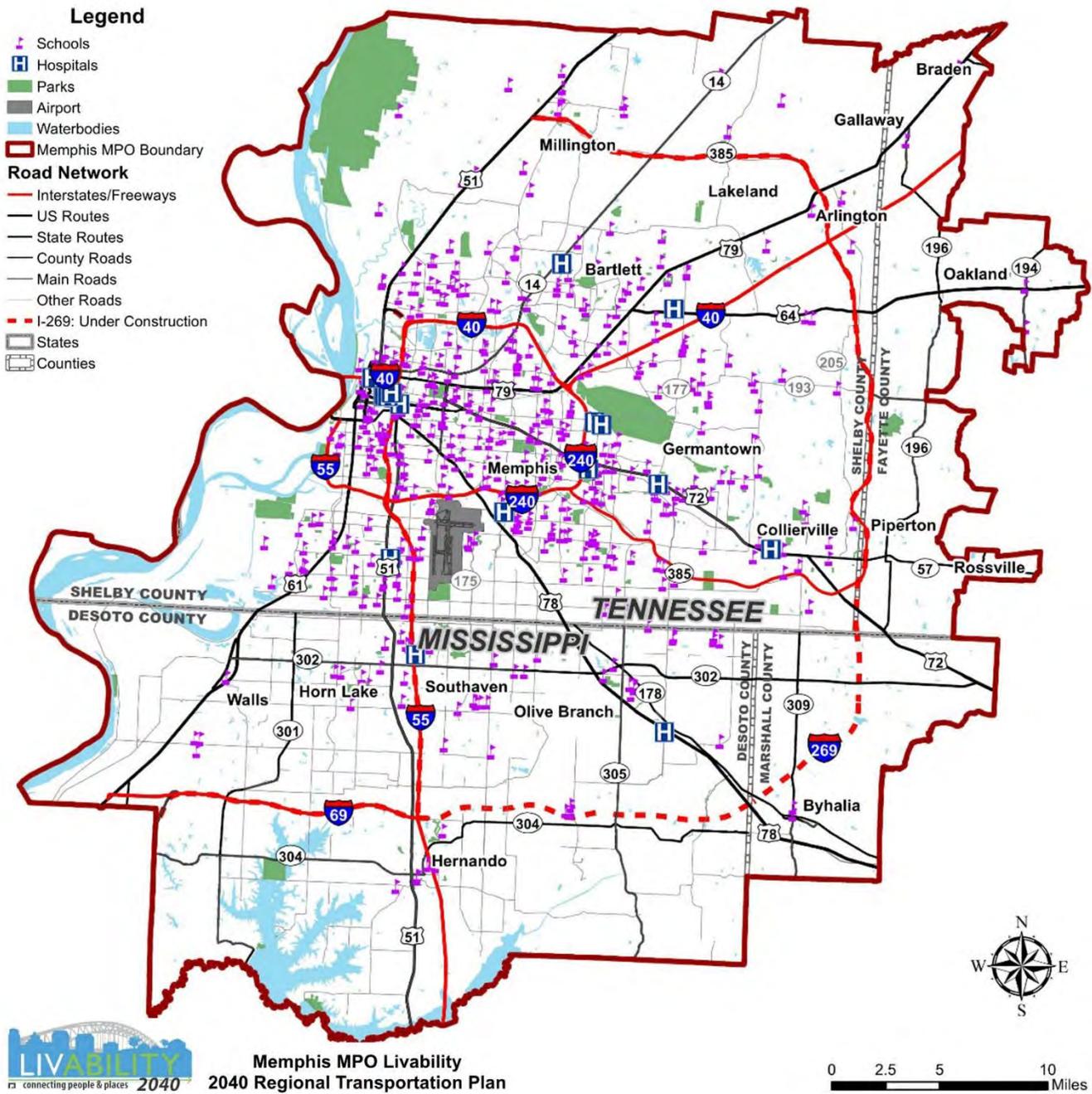
near schools, since schools often generate localized roadway congestion issues due to the increase in the number of students who drive (or are driven) to school instead of riding school buses. Increasing vehicular access to community resources such as schools and medical facilities can be an improvement but must be balanced with careful project design to ensure that safety is not negatively impacted for pedestrians. This is one reason the 2040 RTP also includes projects to address congestion near schools by providing improved non-motorized facilities for students who live within walking or biking distance.

**Figure 9.2 Cultural/Historic Resources**



TWRA – Tennessee Wildlife Resources Agency.

**Figure 9.3 Community Resources**



**Figure 9.4** shows areas across the Memphis MPO region that are designated as part of various environmental monitoring programs. This includes sites identified through the Comprehensive Environmental Response, Compensation, and Liability Act program, also known as the Superfund program, whose purpose is to locate, investigate and clean up the nation’s most serious hazardous waste sites. Sites in other programs include those registered as hazardous waste generators and those with permits to release toxic chemicals, air pollutants, or discharges into local waterways.



**Table 9.2 Number of Projects with Potential Direct Impacts by Resource Type**

Resource Types	Projects with Potential Impacts
Floodplains	47
Wetlands	26
Protected openspaces and ecological sites	3
Rare species	5
Hazardous waste or toxic release site	17
Community resources	16
Cultural/historic resources	25

### 9.2.3 Environmental Mitigation Strategies

In addition to identifying potential impacts on environmental resources, Federal law requires metropolitan transportation plans to consider potential planning-level strategies to mitigate those impacts. Strategies being used by the Memphis MPO to address and consider environmental impacts early in the planning process include the use of GIS information to identify environmental features (both physical and cultural) early in the planning process, as in the screening process described in this chapter, in order to avoid impacts and/or to establish early corrective action plans prior to project construction.

The MPO's strategies also include partnering with local, state, and federal resource agencies early in the planning process to identify potential issues relative to projects under consideration in the MPO's plans and programs to develop appropriate solutions prior to actually beginning the project development process. An environmental consultation process was conducted as part of Livability 2040 to facilitate this partnership. The Memphis MPO identified projects with potential impacts using data available from local, state, and federal agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation. Resource agencies were invited to review project maps and discuss proposed projects as they relate to environmentally sensitive areas as well as appropriate mitigation strategies. The following resource agencies were consulted:

- **Federal Agencies**
  - Federal Highway Administration – Tennessee Division;
  - Federal Highway Administration – Mississippi Division;
  - Federal Transit Administration – Region 4;
  - Environmental Protection Agency;
  - Army Corps of Engineers – Memphis District;
  - United States Coast Guard;
  - United States Fish & Wildlife Service;

- United States Forest Service; and
- National Park Service.
- **State Contacts**
  - Tennessee Department of Transportation;
  - Tennessee Department of Environment and Conservation;
  - Mississippi Department of Transportation;
  - Mississippi Department of Environment and Conservation;
  - Tennessee Wildlife Resource Agency;
  - Tennessee Historical Commission; and
  - Tennessee Valley Authority.
- **Local Contacts;**
  - Memphis & Shelby County Health Department;
  - Memphis & Shelby County Division of Planning & Development;
  - Memphis & Shelby County International Airport Authority;
  - International Port of Memphis;
  - The University of Memphis;
  - Memphis Area Transit Authority (MATA); and
  - West Memphis MPO.

Environmental impacts cannot always be avoided. Mitigation is the attempt to offset potential adverse effects of human activity on the environment. Potential mitigation activities should be consistent with the requirements of agencies who have responsibility for the human and natural environments. Steps to take in the project development process include:

- **Avoid Impacts.** The first strategy in the environmental process is to avoid adverse impacts altogether;
- **Minimize Impacts.** Minimizing a proposed activity / project size or its involvement may be an option;
- **Mitigate Impacts.** Precautionary, special operational management features and/or abatement measures may be used to reduce construction impacts and repair or restore existing resources; and
- **Compensate for Impacts.** Compensation could be made for environmental impacts by providing suitable replacement, or by substituting environmental resources of equivalent or greater value on or off-site.

The Memphis MPO will continue to work with resource agencies in the long range planning process and in the actual project development process, if appropriate. The MPO recognizes that not every project will require the same level of mitigation. All impacts on environmentally sensitive areas will be analyzed on a project by project basis to determine what mitigation strategies are appropriate.

For major construction projects, such as new roadways, or for projects that may have a regionwide environmental impact, a context sensitive solution (CSS) process should be considered in which considerable public participation and alternative design solutions are used to lessen the impact of the project.

**Table 9.3** outlines the types of mitigation activities that could be used where proposed projects may impact particular types of regional resources.

**Table 9.3 Potential Mitigation Activities**

Resource	Potential Mitigation Activities
Wetlands or water resources	Mitigation sequencing requirements involving avoidance, minimization, compensation such as wetland banking/creation; design exceptions and variances; environmental compliance monitoring.
Forested and other natural areas	Avoidance, minimization; replacement of open space easements with property of similar fair market value and usefulness; design exceptions and variances; environmental compliance monitoring.
Rare species	Avoidance, minimization; time of year restrictions; construction sequencing; design exceptions and variances; species research; Memorandum of Agreement (MOA) for species management; environmental compliance monitoring.
Ambient air quality	Transportation control measures and emissions reduction measures, such as ridesharing, trip reduction ordinances, flexible work schedules, or incentives for shifting trips to non-motorized modes.
Neighborhoods, communities, homes and businesses	Avoidance, minimization; context sensitive solutions including use of appropriate functional and/or aesthetic design features.
Cultural resources	Avoidance, minimization; landscaping or historic properties; preservation in place or excavation for archaeological sites; MOA with the Department of Historic Resources; design exceptions and variances; environmental compliance monitoring.
Parks and recreation areas	Avoidance, minimization, mitigation; design exceptions and variances; environmental compliance monitoring.

### 9.2.4 Climate Change

In addition to evaluating impacts on particular geographic locations of natural and cultural resources, MPOs have also begun in recent years to consider the relationship of the natural environment and the transportation system at a much broader scale, in terms of climate change and the network’s resiliency to extreme weather events.

## Climate Change Strategies

Because greenhouse gas (GHG) emissions from transportation sources (fuel combustion and vehicle air conditioning systems) account for a large percentage of the total U.S. GHG emissions, the transportation sector will likely play a large role in the ongoing discussion of national GHG reduction goals. Various entities in the Memphis MPO region have already been engaged in some of the activities that the region can undertake to reduce transportation GHG emissions. Strategies include:

### Introduction of Low-Carbon Fuels

The objective of this group of strategies is to develop and introduce alternative fuels that have lower carbon content and therefore generate fewer transportation GHG emissions. These alternative fuels include ethanol, biodiesel, natural gas, liquefied petroleum gas, low-carbon synthetic fuels (such as biomass-to-liquids), hydrogen, and electricity.

Members of the Memphis MPO have sponsored and obtained funds for projects to promote the use and availability of alternative fuels, including a project in which a public/private partnership was created to convert 20 of their heavy duty trucks to compressed natural gas (CNG). This project will provide cleaner transport of goods within the region and will help the a local utility company build a customer base for its CNG fueling station.

### Improving Transportation System Efficiency

These strategies seek to improve transportation system operations through reduced vehicle travel time, improved traffic flow, decreased idling, and other efficiency of operations, which can also result in lower energy use and GHG emissions. Strategies range from truck-idle reduction, to reducing congestion through ITS and other innovative forms of traffic management, to air traffic control systems that route aircraft more efficiently and reduce delays.

The Memphis MPO's member agencies are implementing multiple technologies to cut energy consumption and improve traffic flow. This includes upgrading city traffic signals to use light-emitting diodes (LED), deployment of coordinated signal systems that can adapt to changing traffic conditions, and providing real-time information to citizens about congestion at recurring bottleneck areas.

### Reducing Carbon-Intensive Travel Activity

The objective of this group of strategies is to influence travelers' activity patterns to shift travel to more efficient modes, increase vehicle occupancy, eliminate the need for some trips, or take other actions that reduce energy use and GHG emissions associated with personal travel.

Some of the many efforts within the Memphis MPO region include a vanpool program, recommended actions to streamline local public transit system to boost ridership and route efficiency, rehabilitation of the Harahan Bridge for pedestrian use, and an initiative to construct 50 miles of new bikeways throughout the region.

## Adaptation to Climate Change

Climate change has various weather-related effects that are affecting the types of expenditures the region needs to make for its infrastructure. These include:

### More Intense and Longer Lasting Heat Waves

Intense heat is damaging to transportation infrastructure, causing kinks in steel rails, placing stress on bridge joints, and softening asphalt. On routes with a large percentage of heavy truck traffic, it is not uncommon to see the

roadway become heavily rippled at the approaches to intersections, a type of damage generated from the force of braking trucks on hot asphalt. Sustained heat waves could result in the need for more frequent road maintenance.

### More Intense Precipitation Events

The Memphis MPO region is no stranger to flooding, but a number of record rainfall events over recent years have resulted in costly damages to area roads and forced the closure of major roadways. Even smaller amounts of rainfall can significantly impact the transportation system when it is received in short, intense bursts. If water is moving too quickly to be absorbed into the ground, it instead becomes surface runoff, causing dangerous ponding on urban streets and ultimately requiring the expansion/upgrade of stormwater drainage systems.

The Memphis MPO has been participating in an effort led by TDOT to assess the vulnerability of the transportation infrastructure to climate change effects and extreme weather, and to consider various risk reduction strategies and their cost. This may lead to opportunities to incorporate additional strategies into the MPO's transportation planning activities.

Shelby County is currently applying for the National Disaster Resilience Competition (NDRC) held by the U.S. Department of Housing and Urban Development (HUD). For Shelby County, the NDRC could help address unmet needs from the 2011 storms and flooding and long-term resilience efforts, including implementing the Mid-South Regional Greenprint.

## 9.3 Transportation Disadvantaged Analysis

Federal laws require that MPOs work to ensure Federal funds are used fairly and without discrimination. Title VI of the Civil Rights Act of 1964 states that "No person in the United States shall, on the ground of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."

Environmental Justice Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice (EJ) in Minority and Low-Income Populations*, clarified the need to involve minority and low-income populations in transportation decision-making processes and the need to assess the equity of transportation investments. The EO calls for identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. Low-income population is defined as one whose median household income is at or below the Department of Health and Human Services poverty guidelines.

In addition, Executive Order 13166 requires improved access to services for persons with Limited English Proficiency (LEP). Once the percentage of an LEP population (such as the Hispanic/Latino population) becomes 5% or greater, Federal departments and agencies are required to extend financial assistance to develop programs to provide services (both orally and in writing) in languages other than English.

The intent of EOs 12898 and 13166, and the U.S. Department of Transportation's corresponding guidance, is to ensure that these groups are included in the transportation decision-making process, and to ensure that they may benefit equally from the transportation system without shouldering a disproportionate share of its burdens.

A disproportionately high and adverse effect is one that is:

- Predominantly borne by a minority and/or low-income population; or

- Suffered by a minority and/or low income population more severely or in greater magnitude than the adverse effect suffered by the non-protected population.

Disproportionately high and adverse effects are not determined solely by the size of the population, but rather the comparative effects on these populations in relation to either non-minority or higher income populations. In this EJ assessment, U.S. Census data was used to identify the demographics of the area in order to recognize potential "communities of concern." Communities of concern are areas where the percentage of low-income households or minorities is greater than that of the entire MPO area.

It is important to note that impacts from transportation projects can be either positive or negative. For example, positive impacts could be improved traffic conditions, decreased accidents, and new/improved sidewalks and bikeways. In order to construct some of these projects, a negative impact could be disruption to residents and businesses during the construction period and right-of-way that may need to be acquired. As projects progress through the planning and design stages, these areas should be carefully addressed.

### 9.3.1 Identification of Environmental Justice Communities

An analysis of regional census data was used to identify areas which warrant particular consideration under environmental justice principles. American Community Survey (ACS) five-year estimates for 2009-2013 were used to identify census block groups in which a higher than average percentage of residents meet one or more of the following criteria: minority persons, persons living below the poverty level, and persons with limited English proficiency (LEP).

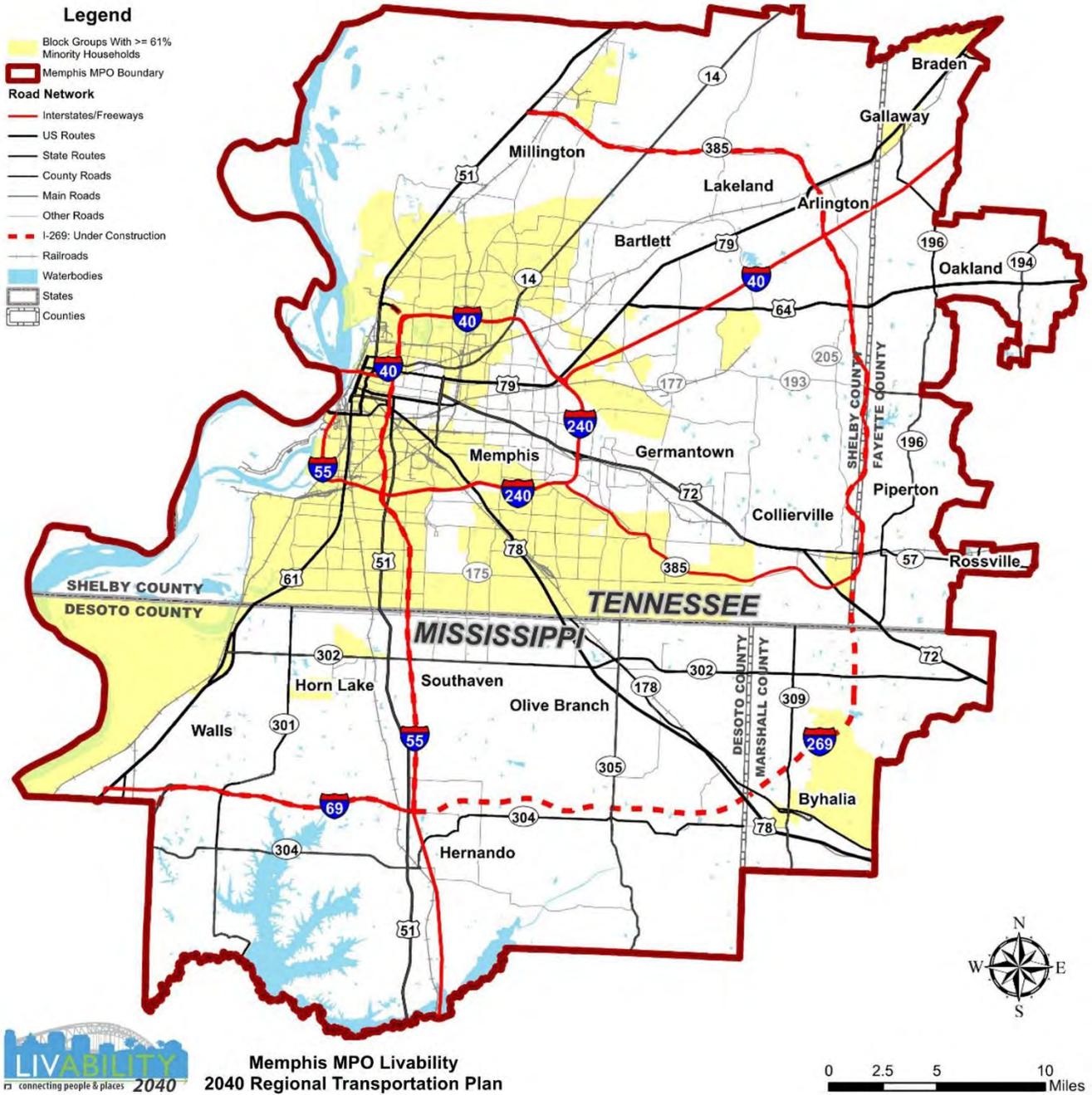
In this analysis, the minority population was obtained from two ACS tables: Table B02001, *Total Population by Race* (summed responses from persons identifying themselves as African American, Asian American, American Indian and Alaskan Native, Native Hawaiian or Other Pacific Islander) and Table B03002, *Hispanic or Latino Origin by Race*.

The number of persons living below the poverty level was obtained from ACS Table B17021, *Poverty Status in the Past 12 Months*. In developing this table, the Census Bureau determines whether an individual is living at or below the poverty level by using a set of dollar value thresholds that vary by family size and composition. The poverty guidelines established by the U.S. Department of Health and Human Services (HHS), referenced in the EJ Executive Order as the standard, are a simplified version of the Census Bureau's poverty thresholds that are updated annually and used for program eligibility purposes.

The number of persons with limited English proficiency was obtained from Table B16002, *Household Language by Household Limited English Speaking Status*. The ACS defines a limited English-speaking household as "one in which no member 14 years old and over 1) speaks only English or 2) speaks a non-English language and speaks English 'very well.'" In other words, all members 14 years old and over have at least some difficulty with English."

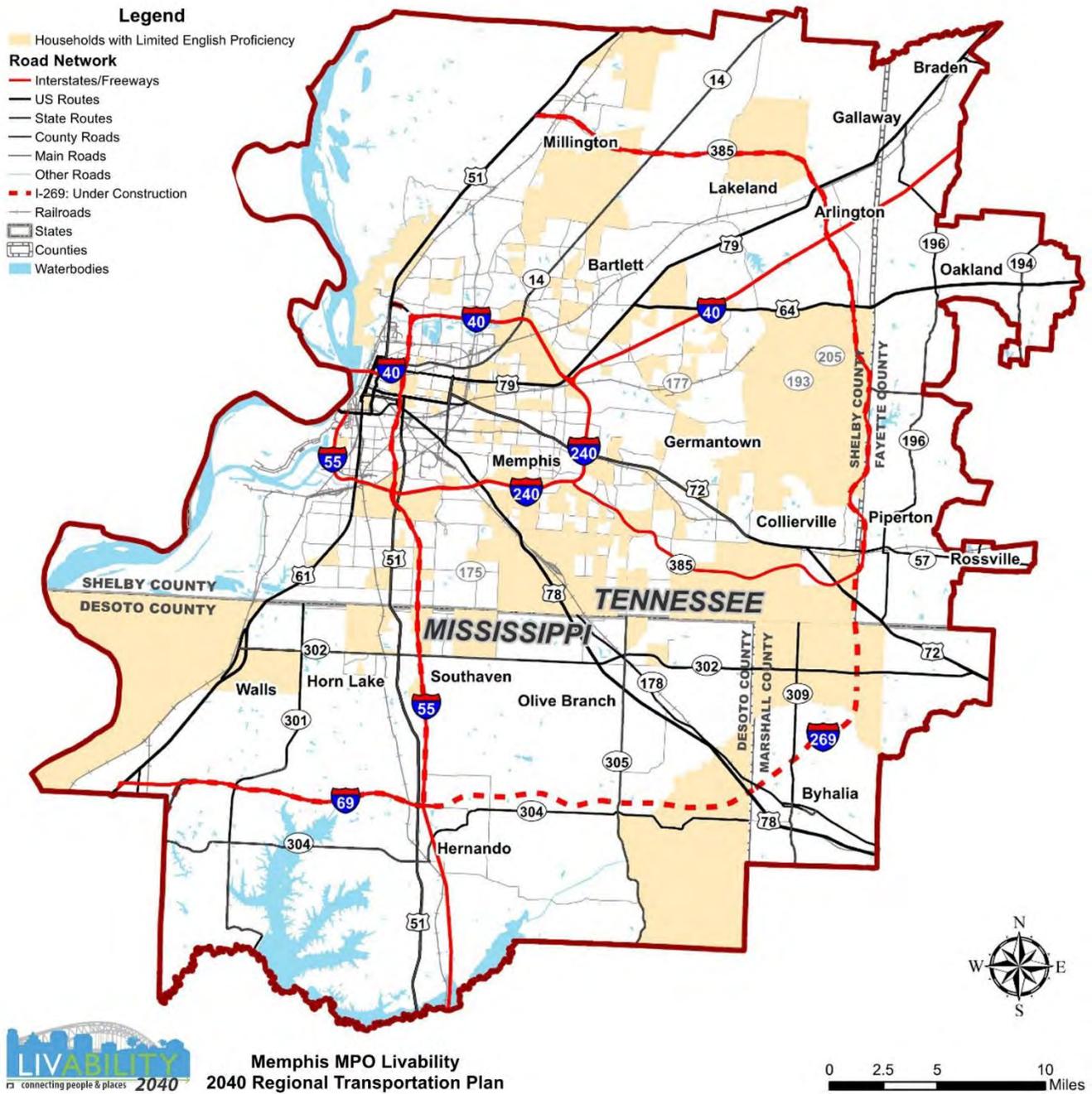
Thresholds for identifying EJ communities were established by computing the regional average for each of the three categories. Census data at the block group level was then compared to the applicable thresholds to determine locations with an above-average proportion of minority persons (61% or greater), low-income persons (23% or greater), and persons with limited English proficiency (2% or greater). These thresholds were applied to the Census ACS data to create the maps shown in **Figure 9.5** through **Figure 9.7**, which show minority populations, low-income populations, and populations with Limited English Proficiency (LEP) respectively. **Figure 9.8** combines these three maps to show overall environmental justice communities (communities that fall into at least one of the three categories of minority, low-income, or Limited English Proficiency (LEP)).

Figure 9.5 Minority Populations

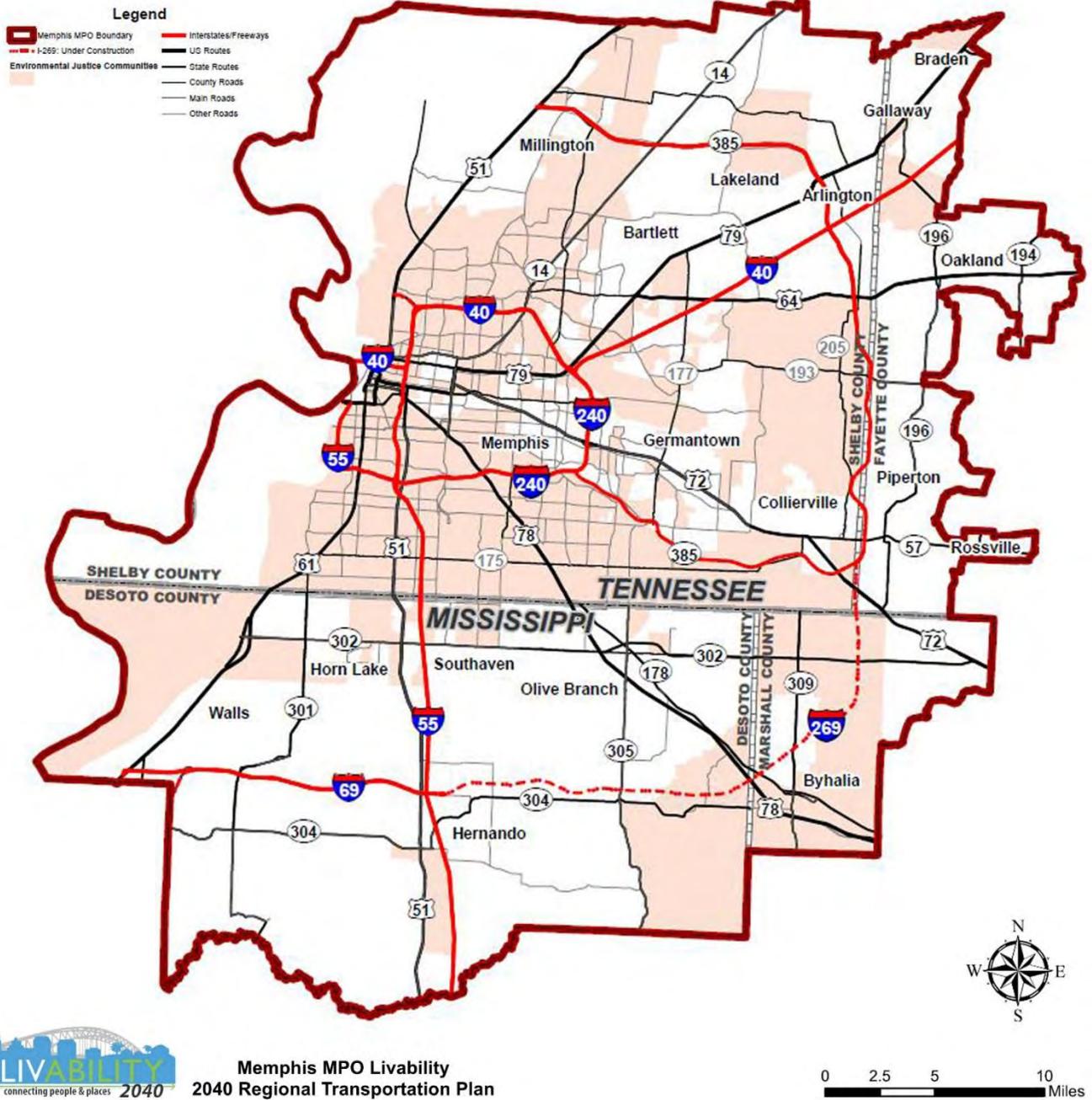




**Figure 9.7 Populations with Limited English Proficiency (LEP)**



**Figure 9.8 Combined Environmental Justice Populations**  
 Minority, Low Income, and Limited English Proficiency Populations



Memphis MPO Livability  
 2040 Regional Transportation Plan



### 9.3.2 *Analysis of Benefits and Burdens of Livability 2040*

An analysis was performed to determine the level of investment proposed in the identified EJ communities, relative to total regional investment, and to identify the likely positive and negative impacts of the projects and services that are proposed.

#### Highway Capital Projects

Approximately \$3.8 billion in highway capital improvements are planned throughout the MPO region through the implementation of the RTP. This includes projects to increase physical roadway capacity, new technologies to improve traffic flow without adding lanes, and address roadway safety issues at various locations.

More than half of the planned investment (\$2.1 billion) is for specific roadway improvements that are totally or partially located in environmental justice communities. Improving access to central city areas, where many EJ communities are located, can provide benefits by encouraging reinvestment in areas that can be readily accessed by walking, biking, and public transit. Road widening projects in suburban and exurban areas also provide the opportunity to add standard bicycle/pedestrian facilities and transit stops to roads that previously may not have offered even paved shoulders. However, projects that add new lanes can have negative impacts in areas where many residents travel on foot or bike because they can potentially lead to increased speeds and crossing distances for pedestrians. Such projects should utilize careful design and community input to help anticipate and mitigate these potential negative impacts.

Some of the planned roadway improvements in EJ communities actually involve reducing the number of lanes and adding improved facilities for pedestrians, cyclists and transit users. Examples include projects on Union Avenue and portions of Poplar Avenue to reconfigure these roadways so they meet Complete Streets principles that accommodate all users, not just automobiles. An additional \$36 million in investment is recommended to make similar improvements to the Livability Corridors, nearly all of which run through identified EJ communities.

Roadway safety and ITS projects, many of which will be identified for specific locations as issues arise during the 25-year planning horizon, will be scattered throughout the MPO region. These improvements typically require little or no right-of-way acquisition and are expected to have a significant positive impact on the communities in which they occur since they address existing safety or bottleneck problems.

A full list of roadway capital projects located partially or totally within EJ communities is provided in Appendix E.

#### **Complete Streets**

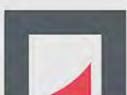
*Complete street concepts include considerations for better accommodation of all roadway users, including the following elements:*

- *Safer and more convenient walkways, sidewalks, and crosswalks*
- *Safer and more convenient bikeways*
- *Access management to improve public safety and reduce congestion*
- *Transit implementation and incorporation*

*The following principles embody the most important aspects of a successful complete streets program:*

- *Achieve community objectives.*
- *Blend street design with the character of the area served.*
- *Capitalize on a public investment by working diligently with property owners, developers, economic development experts, and others to spur private investment in the area.*
- *Design in balance so that traffic demands do not overshadow the need to walk, bike, and ride transit safely, efficiently, and comfortably. The design should encourage people to walk.*
- *Empower citizens to create their own sense of ownership in the success of the street and its characteristics.*

*More information on Complete Streets can be found in Direction 2040*



## Transit Projects

More than \$1 billion of the RTP's recommended investment will fund the continuing improvement and expansion of transit service. The proposed new service along MS 302 (Goodman Road) – and the connection of that route to the MATA system through extension of the Whitehaven (Airline Road) and South Third Street routes – will provide transit service to EJ community residents in northern DeSoto County who have previously been unserved.

The proposed East Memphis North-South Express Route, which will provide linkages between jobs and homes in south Memphis and the northeastern corridor, is anticipated to provide greater mobility and travel time savings for citizens who live and work in those communities by enabling crosstown trips to be made without making a downtown transfer.

Overall, increasing the frequency and span of service for MATA routes has significant benefits for the EJ communities served, by reducing wait time (and thus the total time needed for travel) and providing the option of evening and weekend trips. This not only expands the range of job opportunities for residents of EJ communities, who often rely on transit service to a greater degree than in other communities, but also enables them to participate more fully in community activities and basic human services, such as health care and schools.



Above: Improvements to MATA service has significant benefits for EJ communities.

The transit project recommended in this RTP are consistent with the recommendations of the July 2007 document "A Coordinated Human Services Transportation Plan for the Memphis Area" and preliminary findings from the ongoing study to update this document. The 2007 Plan calls for reviewing routes and schedules relative to origin and destinations, especially where there are high concentrations of transit dependent persons. Similarly, the ongoing study identifies service to job centers such as warehouses or industrial areas as a current gap. Section 5.4 of this document describes just such an origin-destination analysis for areas with transit dependent persons. This analysis resulted in a proposed East-Memphis North-South Express Route that provides new transit service from environmental justice and disabled communities in the Stage Road portion of northeast Memphis to the Lamar Avenue industrial area near the BNSF Railway intermodal center in Southeast Memphis. Additionally, the new transit service proposed for the Goodman Road corridor in DeSoto County will serve environmental justice, disabled, and elderly communities. Regarding recommendations from the 2007 Plan for promoting walkable communities, this RTP has set aside funding for the implementation of complete streets, bicycle, pedestrian, and livability corridor projects in both the Tennessee and Mississippi portions of the MPO.

## Bicycle and Pedestrian Projects

Nearly \$375 million in investment is identified in the RTP for providing and/or improving bicycle and pedestrian facilities. These projects will be scattered throughout the MPO region. Some will be developed in conjunction with proposed highway improvements. The bicycle and pedestrian improvements that are independent projects will require little or no right-of-way acquisition and are not expected to involve any displacements of businesses or residents.

The benefits of improved bicycle and pedestrian facilities are particularly significant for EJ community residents, since EJ communities often have a larger percentage of residents traveling on foot or bike, or walking to a transit stop in order to use bus service. Making bicycle or pedestrian improvements even in non-EJ communities can be beneficial to EJ community residents who make trips to those adjacent areas in order to access jobs and other services. More broadly, these projects provide opportunities for exercise and health benefits.

# 10.0 Congestion Management Process

## 10.1 CMP Summary

The identification and evaluation of projects for the Livability 2040 Regional Transportation Plan (RTP) was a multiple step process. The needs for transportation improvement projects were identified through the Memphis MPO's Congestion Management Process (CMP), the involvement of key stakeholders, the public involvement process, and the results of the existing conditions and needs assessment. Projects were then evaluated using a set of criteria based on the Vision, Goals and Objectives of the Plan.

In order to measure and manage congestion throughout the Memphis MPO region, multimodal performance measures were developed in order to assess system performance for various modes of travel. These measures include:

1. Volume to Capacity Ratio
2. Travel Time Index, Planning Index, and Buffer Index
3. Number of Crashes
4. Transit Passenger Trips and Bus On-Time Performance
5. Miles of Bike Lanes or Shoulders
6. Truck Hours of Delay

More information on the CMP analysis process can be found in the CMP document ([http://www.memphismpo.org/sites/default/files/public/CMP%20Report\\_FINAL.pdf](http://www.memphismpo.org/sites/default/files/public/CMP%20Report_FINAL.pdf)).

The Transportation Policy Board of the Memphis MPO adopted the CMP on August 27, 2015. The CMP complies with the requirements of the Moving Ahead for Progress in the 21st Century Act (MAP-21). Further, consideration of the results of the CMP in the RTP is consistent with the Federal requirement provided in Title 23 of the Code of Federal Regulations (23 CFR 450.322(f)(4)).

The CMP is an important component of the Memphis MPO's transportation planning process and is integral to the development of the RTP. The CMP describes processes used to identify existing and future congestion and provides strategies to mitigate congestion and improve mobility throughout the region. The CMP identifies strategies that manage demand, reduce single occupant vehicle (SOV) travel, and improve transportation system management and operations.

The CMP provides a consistent basis to evaluate transportation investment decisions relating to traffic congestion that provide for the safe and effective management and operation of the region's multimodal transportation system. The projects evaluated through the CMP provide multimodal strategies to reduce congestion and improve air quality in the region by providing for improved access and mobility using a broad range of strategies and solutions.

### **10.1.1 Future Year Congested Network**

The RTP horizon year 2040 congested roadway network was estimated using the Regional Travel Demand Model to screen roadway segments based on the volume to capacity ratio (v/c ratio) and Level of Service (LOS). The Memphis MPO defines congestion as those roadways that operate with LOS E or F. The Existing and Committed (E+C) roadway network is used to estimate where congestion is likely to occur in the future if no other transportation improvements are implemented. The roadways in the E+C network are those roadways currently open for traffic and those that are identified in the Transportation Improvement Program (TIP) with construction funding anticipated to be open for traffic before the end of the current TIP cycle.

Therefore, the horizon year 2040 demographic and employment data was evaluated using the E+C roadway network in the evaluation of projected future congestion. Using the E+C roadway network with the future year employment and demographic data demonstrates the traffic impact of not constructing roadway capacity improvement projects beyond those projects that have been committed. Once the horizon year 2040 congested network was identified, applicable strategies from the CMP were applied to the congested corridors to estimate the impacts to congestion.

### **10.1.2 Identification of CMP Strategies**

The CMP identifies potential strategies to mitigate existing and future year congestion. Categories of strategies include demand management, operational improvements, multimodal strategies, and strategic capacity enhancements. There were ten congestion management strategies from the CMP evaluated as part of the RTP development. A listing and description of each strategy by category is provided below:

#### **Demand Management**

1. Land use – Developing areas of employment, shopping, and recreation with high concentrations of both workers and users that allows use of alternative travel modes.
2. Commuter programs – Carpooling, vanpooling, guaranteed ride home programs, alternative work hours, telecommuting, paratransit services, and park and ride facilities to encourage reduction in SOV use.

#### **Operational Improvements**

3. Operational improvements & ITS – Access management, one-way flow operation, constructing two-way left turn lanes, parking management, and weather or incident alerts for motorists to improve traffic flow and provide information about alternative routes.
4. Incident management – Traffic surveillance, dynamic message signs, and control systems to reduce recurring and non-recurring congestion.
5. Intersection improvements – Interconnected and coordinated signals, and addition of exclusive lanes to improve traffic flow and reduce congestion.
6. Freight improvements – Freight diversion, increase in capacity on truck freight routes, and improvement of alternative freight modes to reduce travel time.

## Multimodal Strategies

7. Transit improvements – Increased frequency of service, decreased travel times, and transit information systems to encourage more transit use.
8. Bicycle & Pedestrian facilities – Facilities to accommodate bicyclists and pedestrians to reduce SOV use.

## Strategic Capacity Enhancements

9. General purpose lanes – Adding capacity by providing additional unrestricted laneage on existing roadways or by providing routes on new location to improve traffic flow and reduce congestion.
10. Dedicated lanes – High Occupancy Vehicle (HOV), bus bypass lanes, and High-Occupancy Toll (HOT) to reduce SOV use.

Each of the corridors on the congested network were reviewed to determine the strategies most appropriate to resolve congestion. Some of the strategies are more regional, while others are corridor specific. The selection of these strategies also considered the future congestion network to ensure that the strategies selected will address both the existing and future congestion networks.

### 10.1.3 Effectiveness of CMP Strategies

The ability of CMP strategies to reduce congestion varies greatly depending on a number of factors. To determine the future level of effectiveness, historic data from both local programs and from national research was consulted to identify the effectiveness of these strategies in the region. The following describes each specific strategy and the evaluation of its effectiveness.

## Land Use

Local governments play a crucial role in the development of the community through land use planning, zoning, and development ordinances. The Memphis and Shelby County Office of Planning and Development (OPD) developed the Unified Development Code (UDC) to guide future growth and development in the City of Memphis and the unincorporated areas of Shelby County. As is often the case with this type of ordinance, it is also used as a guide for other municipalities in the region.

A stated purpose of the UDC is that it is designed and enacted for “promoting the health, safety and welfare of the residents of the City of Memphis and Shelby County by lessening or preventing congestion in the public streets...and encouraging such distribution of population and such classification of land uses as will tend to facilitate and conserve adequate provisions for transportation....”

Tools used to guide development to cause less impact on the transportation infrastructure include:

- Compact residential development,
- Compact employment and activity centers,
- Mixed land uses,
- Connectivity,

- Transit and pedestrian-oriented development,
- Jobs/Housing balance,
- Affordable housing, and
- Development impact mitigation.

Activity center strategies involve developing areas of employment, shopping, and recreation with high concentrations of both workers and users. Dense mixed-use development generally corresponds well with high transit ridership.

Access management is a tool to control the design, spacing, and location of driveways, medians and median openings, intersections, and interchanges. Access management improves the efficiency of the arterial and major collector roadways. Generally, as the number of driveways increases on a roadway, the capacity of the roadway decreases. Conversely, with fewer driveways, or access points, to the roadway, the capacity of the roadway typically increases. A related benefit associated with a reduction in the number of driveways along a roadway is a potential for decrease in the number of crashes. Although difficult to quantify, a reduction in the number of crashes will result in reduced congestion on the arterial roadways.

Planning and education is critical to implementation of access management, as some of the techniques may be perceived as resulting in adverse impacts to existing access to residents and businesses along the roadway. Example roadways in the metropolitan area that currently employ access management techniques are:

- Germantown Parkway from the Wolf River to U.S. 64/Stage Road, Memphis;
- U.S. 72/SR 86 from Poplar Avenue to Quinn Road, Collierville;
- Singleton Parkway from Austin Peay Highway to Paul Barrett Parkway, Shelby County; and
- Houston Levee Road from Poplar Avenue to the Wolf River, Collierville.

## Commuter Programs

Rideshare programs include carpooling, vanpooling, guaranteed ride home programs, alternative work hours, telecommuting, paratransit services, and park and ride facilities. This strategy for reducing congestion may be employer based, government sponsored, or based on agreements between private individuals. There is an existing government-sponsored rideshare program in the metropolitan area maintained by the Shelby County Health Department.

Generally rideshare programs are more productive if there are employee or provider incentives, if the cost of parking is high, and if the average one-way trip length is 30 miles or greater. Information related to the Memphis Area Rideshare program can be found on the website ([www.vride.com](http://www.vride.com)).

Guaranteed Ride Home Programs provide rides for people using the carpool, vanpool or rideshare programs that, due to extenuating circumstances, require a ride separate from their standard mode of transportation. For instance, if someone participating in a vanpool program has a family emergency and must leave work early, the guaranteed ride home program would provide a means for that person to leave early to attend to the emergency. The benefits of this strategy typically are applied with and considered a part of the carpool, vanpool, or rideshare program.

Alternative work hours require cooperation from employers and are currently conducted locally on a relatively small scale. There are several large employers in the Memphis MPO region, such as FedEx, that maintain operations in the off peak periods. If an aggressive campaign to promote alternative work hours was executed, a reduction in vehicular traffic during the peak periods could be experienced.

Park and ride lots are facilities provided for motorists to park and transfer to public transit, carpool, vanpool, or other means of transportation with a higher occupancy rate. In the metropolitan area there are existing park and ride facilities, and a number of future park and ride facilities are identified as part of the RTP.

## Operational Improvements and ITS

Intelligent transportation systems (ITS) include advanced public transportation system technology, incident management, and motorist information services. The U.S. Department of Transportation defines ITS as “the integration of current and emerging technologies in fields such as information processing, communications, and electronics applied to solving surface transportation problems.” ITS utilizes a large range of technologies and techniques including:

- Traffic signal control systems,
- Freeway management systems,
- Transit management systems,
- Incident management systems,
- Railroad grade crossing warning systems,
- Emergency management systems, and
- Regional multimodal traveler information systems.

ITS has the potential to reduce both recurring and non-recurring congestion. The Memphis MPO Regional ITS Architecture provides for transportation system integration. The MPO Regional ITS Architecture update was completed in October, 2014; with approval from FHWA on November 12, 2014. More information on the Memphis MPO's ITS Architecture can be found at <http://www.memphismpo.org/its/web/index.htm>.

Incident management is an effective tool for reduction of delays and non-recurring congestion subsequent to an incident. In Tennessee, the incident management is addressed as part of the SmartWay system. The SmartWay system includes TN511, the HELP program, and the overall Intelligent Transportation System. The SmartWay system provides up to date traffic information for motorists on traffic congestion, incidents, construction zones, and roadway conditions. Additional information about TDOT's SmartWay System can be found at [www.TNSmartWay.com](http://www.TNSmartWay.com).

TDOT's TN511 system allows for telephone callers to use an automated voice response system to guide them through a series of requests related to the roadway system throughout Tennessee. With this system, motorists can dial 511 on a cellular phone or land line, and receive information about traffic congestion, construction delays, tourism, or other travel related data. Additionally the Freeway Management System provides dynamic message signs (DMS) along the freeway system, which can be used to alert motorists of delays and provide general information on roadway and traffic conditions.

MDOT is currently working on training programs for first responders. A 511 system covers major highways in Mississippi, and a TMC in Southaven monitors traffic conditions.

Highway information systems consist of changeable message signs, highway advisory radio, and/or in-vehicle navigation and information systems. These systems are provided to convey information to the traveler on the roadway or prior to departure regarding delays from non-recurring congestion, construction delays, speed limits, weather conditions, and other items.

Commonplace in-vehicle and phone global positioning systems (GPS) allow travelers to navigate and to notify travelers of non-recurring congestion issues, construction delays, and weather alerts. In-vehicle information systems are generally developed by non-governmental agencies to provide data available from government agencies to the motorist.

Coordinated traffic signal systems are in place or are planned for implementation throughout the region. These projects are located on major and minor arterial roadways. Traffic signal coordination and synchronization increases intersection capacity and reduces delay by providing progressed traffic flow along a corridor. Traffic signal coordination is a congestion management strategy usually applied to urban major and minor arterial roadways.

### Intersection Improvements

Intersection capacity can also be improved through a number of operational modifications with the addition of exclusive lanes on intersection approaches for right and left turns. This allows for more free-flow movement of the through lanes at the intersection while the turning movements are stored in an exclusive lane waiting to be served by the signal or find a gap in traffic to make the turning movement. The benefit of adding turn lanes at intersections depends on the volume of turning vehicles and their opposing volume. Additional intersection improvements can involve widening lanes, establishing proper curb radii, utilizing roundabouts, upgrading traffic control devices, or other innovative intersection treatments that can promote better traffic flow and reduce delays and queues.

### Freight improvements

A reduction in delay and congestion could be realized for truck freight by freight diversion or an increase in capacity on truck freight routes. An alternative to the truck freight mode in the region includes rail, waterways, and air. Capacity for freight rail systems can be increased by improving or adding to the infrastructure, increasing rolling stock, and allowing for higher speeds and more efficient operations. To be effective for a reduction in truck freight congestion in this region, these types of improvements must be implemented across a regional or national rail network. Depending on the location, type, and frequency of intermodal operations, freight diversion to rail could result in an increase in delay due to intermodal operations. Freight diversion to waterways is limited due to the type of bulk commodity that is generally shipped using this mode. Because of these issues, the effectiveness of truck freight related congestion management strategies is limited to increases in capacity of truck freight routes.

### Transit Improvements

Improvements to transit encourage a mode shift from single occupant vehicles, which can help to reduce congestion. Transit improvements include transit service enhancement or expansion, transit information service, transit traffic signal preemption, exclusive transit right-of-way, and mode change facilities. Transit service could be enhanced on arterial and major collector roadways with the installation of transit traffic signal preemption. Traffic signal preemption for transit vehicles provides an extended amount of green time for an approaching bus or trolley. On-street transit vehicle preemption is generally limited to the extension of green time for the approach on which the transit vehicle is traveling. It will not truncate the green phase for an opposing direction. For transit vehicles in separate rights-of-way, preemption of traffic signals occurs in a manner similar to railroad preemption.

Providing real time transit information to those accessing the transit system is an enhancement that may increase ridership over time. Information regarding the status of the service may include bus arrival times, headways, and

route identification of the next bus. This real time information could be provided to those at the local bus stop, via the Internet or mobile devices, or through in-vehicle systems. Further study should be conducted to determine the potential impact of this strategy in increasing transit ridership. This strategy becomes more important with the expansion of the fixed rail transit systems. MATA currently provides real time transit information for its riders.

## Bicycle and Pedestrian Facilities

Provision for bicyclists and pedestrians promotes their use as a travel mode and has the potential to reduce single occupant vehicle use. The Memphis MPO's updated Regional Bicycle and Pedestrian Plan provides a proposed bicycle and pedestrian network intended to guide the implementation of the RTP.

Recommendations and strategies to expand the network of sidewalks, on-street bicycle facilities, and off-street facilities such as shared-use paths are provided in Section 8.1, with details in the Regional Bicycle and Pedestrian Plan. Recommendations for engineering, education, encouragement, enforcement, and evaluation strategies to maintain safe and efficient facilities are provided.

## Dedicated Lanes

HOV and bus bypass lanes and ramps are facilities used to improve the travel time associated with high occupancy vehicles. In the Memphis area, HOV lanes have been considered a method to increase vehicle occupancy on interstate type facilities. Used alone, these lanes are effective for commuters arriving from suburban areas. As HOV's attempt to enter or exit the HOV lanes, friction between HOV's and other vehicles in the general-purpose lanes occur as these vehicles move toward the access points to the freeway system. This problem is made worse as the interchange density increases. Several methods have been developed to address this issue. These include HOV and bus bypass lanes and ramps. These exclusive facilities enable HOV's to access the freeway system without encountering delay either by providing direct exclusive access to the freeway system or by providing separate non-metered ramps. These strategies are effective in increasing HOV use when coupled with other HOV strategies.

## General Purpose Lanes

In cases where the other strategies will not provide congestion relief, the addition of general purpose lanes may be required. It generally has the highest cost and tends to increase vehicle miles traveled (VMT) and, in some cases, emissions. Therefore, the addition of general purpose lanes is considered only after all of the other strategies have been evaluated and found to be ineffective. Evaluation of the impact of adding general purpose lanes is conducted using the Memphis Travel Demand Model.

### **10.1.4 Project Evaluation and Project List**

As applicable, CMP strategies 1 through 8 and 10 were applied to corridors in the future year congested network based on the facility type, area type, and type of strategy. These strategies do not provide capacity through the addition of general purpose lanes on the roadway network. The benefit of each of these strategies was evaluated using an off-model approach to identify the resulting Level of Service. For those facilities that remained congested following application of the non-capacity adding strategies, the addition of general purpose lanes (strategy 9) was evaluated using the Travel Demand Model. Projects were coded into the Travel Model and the resulting level of services was identified. The results of the evaluation of the existing and committed congested corridors for the RTP Plan horizon year of 2040 are shown in Appendix G. The table in this appendix shows the limits of each congested corridor, volume to capacity ratio (v/c), LOS, and peak hour volume of the congested corridors before application of the CMP strategies. The off-model CMP strategies evaluated and the resulting Level of Service are also provided.

# 11.0 Air Quality

## 11.1 Introduction

This chapter of the plan addresses compliance with the federal regulations that govern air quality requirements. For a more in-depth discussion on the conformity determination, please refer to Appendix H (Shelby County Conformity Demonstration) and Appendix I (DeSoto County Conformity Demonstration).

## 11.2 Background

The 1990 Clean Air Act Amendments (CAAA), Tennessee Transportation Conformity Rules, and Mississippi Conformity Rules require transportation plans, transportation improvement programs (TIP), and transportation projects to conform to the purpose of the Tennessee SIP. Conformity to a SIP means that federal funds will not be spent on projects that cause or contribute to any new violations of the National Ambient Air Quality Standards (NAAQS); increase the frequency or severity of NAAQS violations; or delay timely attainment of the NAAQS or any required interim milestone. The Transportation Equity Act for the 21st Century (TEA-21) and its successor legislations, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) and Moving Ahead for Progress in the 21st Century (MAP-21) reinforce the need for coordinated transportation and air quality planning through the metropolitan planning provisions. This conformity determination was prepared based on the Carbon Monoxide (CO) and 2008 8-hour Ozone NAAQS.

Conformity analysis was done to demonstrate that the Shelby County non-attainment and maintenance area as well as Desoto County non-attainment area supports the implementation of the financially constrained Livability 2040 Regional Transportation Plan (RTP) by contributing to improved air quality and will therefore not jeopardize Shelby County's or Desoto County's attainment of the 8-hour ozone NAAQS or Shelby County's carbon monoxide NAAQS. The conformity determination was performed according to procedures prescribed by the following federal and state regulations: United States Federal Register, Volume 69, Page 40004 (69 FR 40004); United States Code of Federal Regulations, Title 40, Parts 51 and 93 (40 CFR 51 and 93, i.e. Transportation Conformity Rule Requirements); the Tennessee and Mississippi Transportation Conformity Rules; and Metropolitan Planning Organization (MPO) Planning Regulations (23 CFR 450) implementing MAP-21 Requirements. For each transportation plan (RTP), program (Fiscal Year 2014-2017 TIP), and Federal Highway Administration (FHWA)/Federal Transit Administration (FTA) project to be found to conform, the MPO and United States Department of Transportation (USDOT) must demonstrate that the applicable criteria and procedures have been satisfied (40 CFR 93.109-a). The following criteria for non-attainment areas are found to be applicable and are described as:

1. The TIP and RTP must pass an emissions budget test with a budget that has been found to be adequate by the Environmental Protection Agency (EPA) for transportation conformity purposes, or an interim emissions test;
2. The conformity determinations must be based upon the most recent planning assumptions;
3. The conformity determinations must be based upon the latest emission estimation model available;
4. MPOs and state departments of transportation must provide reasonable opportunity for consultation with state air agencies, local air quality and transportation agencies, USDOT, and the EPA;

5. Timely implementation of Transportation Control Measures (TCM) in the applicable SIP must be provided for (Shelby County); and
6. The conformity determination must comply with MAP-21 and MPO Planning Regulations.

Conformity Determination was conducted from the Shelby and DeSoto Counties' portions of the Livability 2040 RTP and the FY 2014-2017 TIP. The Marshall and Fayette Counties' portion of the Memphis MPO are in attainment with all EPA standards, therefore all transportation projects are exempted. EPA's Motor Vehicle Emissions Simulator (MOVES) version MOVES2014 model was used to derive emissions as required by the EPA. An interagency consultation process was conducted throughout the development of the conformity determination documents. The details of the consultation process can be found in Appendix H and Appendix I.

### **11.2.1 Ozone (O<sub>3</sub>)**

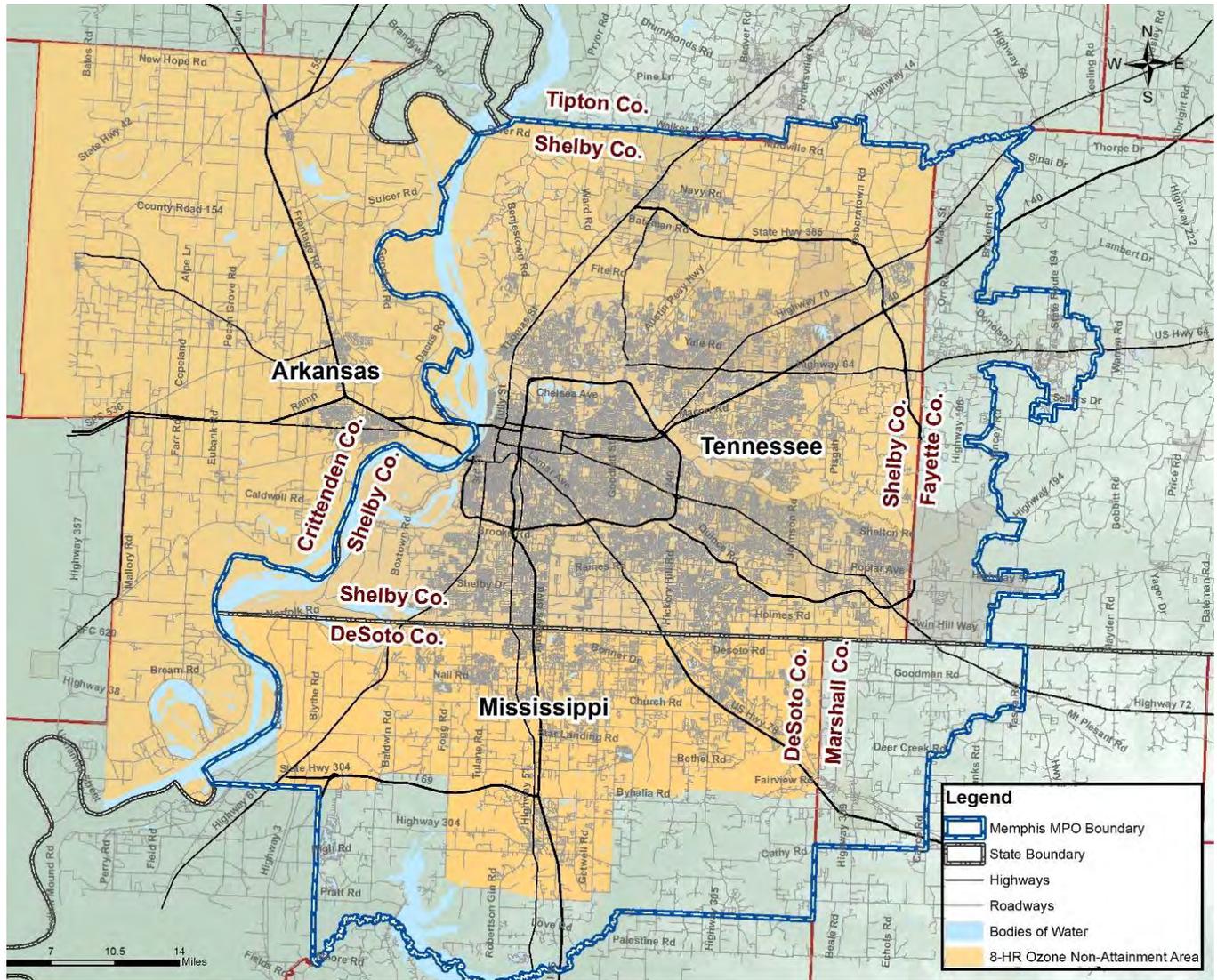
#### **Shelby County and Desoto County**

On April 30, 2004 the United States Environmental Protection Agency (EPA) designated Memphis, TN-AR as a 1997 8-hour ozone moderate non-attainment area (69 FR 23858). Included in this designation were two counties: Shelby, TN and Crittenden, AR. The 8-hour ozone area designation was effective on June 15, 2004. On September 15, 2004 EPA reclassified the area from moderate to marginal. This reclassification indicated the area was expected to reach attainment sooner than originally anticipated. Following this reclassification, the Memphis, TN-AR area was able to demonstrate attainment of the 1997 8-hour ozone standard in January 2010 (75 FR 56, January 4, 2010). EPA designated Memphis, TN-MS-AR as a 2008 8-hour ozone marginal non-attainment area effective July 20, 2012. The final ruling was published in the Federal Register (77 FR 30088) on May 21, 2012. Included in this designation were Crittenden County, AR in the West Memphis MPO area and Shelby County, TN, and the portion of DeSoto County, MS in the Memphis Urban Area Metropolitan Planning Organization (MPO) boundary. The 2008 8-hour ozone SIP Requirements Rule revoked the 1997 8-hour ozone standards for all purposes, including transportation conformity on April 6, 2015.

#### **DeSoto County**

Desoto County was designated marginal non-attainment for Ozone for the 2008 8-hour ozone standards, effective July 20, 2012. The same month EPA issued the companion guidance to the Conformity Rule that addresses ozone and air quality standards. The guidance further clarified how conformity determinations and the regional emissions analyses that support them are completed in existing and new non-attainment and maintenance areas. The guidance noted that states in a multi-state area have the option of submitting SIPs with budgets for their own portion of the area that, when taken together, meet the applicable Clean Air Act requirement. Where states have done so and EPA has found such budgets adequate or approved, the MPO or MPOs in each state with such budgets can determine conformity completely independently of the other states. Furthermore, all affected agencies need to be included in the decision-making process for the area as required by the conformity rule described in the Code of Federal Regulations, Title 40, Part 93, Section 105 (40 CFR 93.105). During the interagency consultation process, it was decided that DeSoto County would not be judged within the overall SIP budget established for Shelby County, but would instead be subject to an independent conformity demonstration using the interim emissions test. Therefore this conformity determination was conducted separately for Shelby and DeSoto Counties of the 2008 8-hour ozone non-attainment area. See **Figure 11.1** for ozone non-attainment area for 2008 HR standards.

Figure 11.1 Memphis, TN-MS-AR 2008 8-Hour Ozone Non-Attainment Area



### Carbon Monoxide (CO)

On March 3, 1978, EPA designated Shelby County, TN, a moderate (less than 12.7 parts per million) non-attainment area for carbon monoxide (CO). Due to improvements in ambient air quality, EPA redesignated Shelby County to attainment for the CO standard on August 31, 1994. EPA's reclassification of the Memphis non-attainment area to attainment status for the CO standard was published in 59 FR 44958 (August 31, 1994). Shelby County entered into two 10-year maintenance periods for CO during which the area would have to demonstrate continued compliance with the 1990 CAAs.

Shelby County's attainment status for CO was revisited in the second 10-year maintenance plan for CO and the motor vehicle emission budget (MVEB) contained in it. The approval of the 10 year maintenance plan for CO for Shelby County was documented in 71 FR 62384 (October 25, 2006) and had an effective date of December 26, 2006. In addition to a new budget value established for the MVEB in the 10 year plan, the last year of the plan is now 2017. The 2017 MVEB for CO is 839,990 tons/day. It is required that a conformity demonstration be made for the last year of the maintenance plan, which in the case of Shelby County is 2017.

## 11.3 Interagency Consultation and Public Participation

---

Interagency consultation is the central coordinating mechanism for public agency involvement and input to the conformity determination. The conformity determination must be made according to the requirements of 40 CFR 93.105, 40 CFR 93.112, and 23 CFR 450. Since the conformity determination for Shelby County is being done concurrently with DeSoto County, consultation and requirements for both Tennessee and Mississippi were considered.

The Memphis MPO coordinated its activities for this conformity determination with numerous stakeholders and review agencies, including Shelby County, Shelby County Health Department, DeSoto County, Tennessee Department of Environment and Conservation (TDEC) Division of Air Pollution Control, Mississippi Department of Environmental Quality (MDEQ), TDOT, MDOT, FHWA, FTA, EPA, and other necessary agencies. The Memphis MPO held teleconference calls and email correspondence to discuss the issues pertinent to the Shelby County Conformity Demonstration (e.g., latest planning assumptions). Verbal and written comments from these calls have been addressed (see Appendix H and Appendix I). To more fully communicate the assumptions being made as a part of the conformity analysis, a pre-consensus plan was developed for the ozone and CO analyses. This document, titled "Livability 2040 Regional Transportation Plan Air Quality Conformity Demonstration Pre-consensus," was reviewed by the interagency consultation group and modified based on comments received.

The Memphis Urban Area MPO's Public Participation Plan, adopted on November 20, 2014, specifies procedures to ensure public involvement in the planning process. All Transportation Policy Board (TPB) and ETC meetings are open to the public for comments on any item. The public was notified of the opportunities to comment on this conformity demonstration. All comments received from the public, committee members, and review agencies were addressed; these are provided in Appendix C.

## 11.4 Methodology and Results

---

The Clean Air Act (CAA) requires EPA to regularly update its mobile source emission models. EPA continuously collects data and measures vehicle emissions to make sure the Agency has the best possible understanding of mobile source emissions. This assessment, in turn, informs the development of EPA's mobile source emission models. MOVES represent the Agency's most up-to-date assessment of on-road mobile source emissions. MOVES also incorporates several changes to EPA's approach to mobile source emission modeling based upon recommendations made to the Agency by the National Academy of Sciences. In addition to the MOVES model, the Memphis MPO's Travel Demand Model was used to estimate the vehicle miles travelled (VMT) information. The emissions factors are based on a number of inputs including temperature, presence of inspection and maintenance programs, and vehicle type mix. It was determined that the emissions estimates for CO and the ozone precursors, Volatile Organic Compound (VOC) and Oxide of Nitrogen (NO<sub>x</sub>) are lower than the corresponding emission budgets for each horizon year. More details, including the detailed calculation methodology, are provided in Appendix H and Appendix I.

Analysis Year	Shelby County Emissions (Tons/Day)					
	VOC		NO <sub>x</sub>		Carbon Monoxide (CO)	
	Budget	Modeled	Budget	Modeled	Budget	Modeled
2017	18.323	11.440	55.173	31.468	839.990	124.197
2020	18.323	9.040	55.173	22.611	839.990	105.485
2021	13.817	8.656	54.445	21.504	839.990	101.077
2030	13.817	5.203	54.445	11.541	839.990	61.410
2040	13.817	3.898	54.445	10.675	839.990	45.290

Pollutant	Desoto County Emissions (Tons/Day)			
	2011 <sup>a</sup>	2020	2030	2040
VOC	5.178	1.783	1.197	1.031
NO <sub>x</sub>	8.969	4.318	2.810	2.984

<sup>a</sup>Baseline Analysis Year.

## 11.5 Conclusion

The analysis indicates that projected emissions levels based on the projects contained in the Memphis Urban Area Livability 2040 Regional Transportation Plan (RTP) and FY 2014-2017 Transportation Improvement Program (TIP) meets the conformity tests for both Shelby and Desoto Counties for Ozone and Shelby County for Carbon Monoxide (CO). It is the determination of this analysis that the FY 2014-2017 TIP and the RTP conform under 8-hour ozone National Ambient Air Quality Standards and the CO National Ambient Air Quality Standards.