



TECHNICAL REPORT #2

Transportation Performance Management

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1.0 Performance Management

The Memphis Urban Area Metropolitan Planning Organization (Memphis MPO) MOVING TOGETHER 2050 Regional Transportation Plan (RTP) follows the principles of performance-based planning and programming and related federal regulations laid out in MAP-21, the FAST Act, and the Infrastructure Investment and Jobs Act (IIJA). These performance-based regulations require all MPOs to track specific transportation performance measures related to national goals and to set targets for these measures.

Federal regulations also require establishment of responsibilities related to development and maintenance of performance measures and targets between MPO's, DOT's, and transit agencies through Memoranda of Understanding (MOU). The Memphis MPO's Transportation Policy Board executed an MOU between TDOT, Memphis MPO, and MATA on April 19, 2018 and between MDOT and Memphis MPO on May 21, 2018. The MOUs were established as an agreement for cooperatively developing, sharing, and reporting information related to performance measures and performances targets.

Performance management uses system information to make investment and policy decisions to achieve goals for the multimodal transportation systems in an MPO study area.

Performance-Based Planning and Programming (PBPP) refers to the methods transportation agencies use to apply performance management as standard practice in their planning and programming processes. The goal of PBPP is to ensure that transportation investment decisions—both long-term planning and short-term programming—depend on the ability to meet established goals. As a federal requirement, states will invest resources in projects to achieve individual targets that make collective progress toward national goals. MPOs are also responsible for developing RTPs and TIPs through a performance-driven, outcome-based approach to planning. The Memphis MPO has been following PBPP process as required by federal regulations—which includes requirements to track specific measures and set targets—and to meet the unique planning needs of the region.

This report only addresses the specific performance measures required by federal transportation performance management regulations.

2.0 National Goal Areas and Measures

Through the federal rule-making process, the FHWA requires state DOTs and MPOs to monitor the transportation system using specific performance measures associated with the national goal areas prescribed in MAP-21 and the FAST Act. The following list describes these national goal areas for highway performance as well as performance measures. However, the Memphis MPO may choose to take on additional measures beyond what is described.

2.1 Safety Performance (PM1)

To achieve a significant reduction in traffic fatalities and serious injuries on all public roads

1. Number of fatalities
2. Fatality rate (per 100 million vehicle miles traveled)
3. Number of serious injuries
4. Serious injury rate (per 100 million vehicle miles traveled)
5. Number of non-motorized fatalities and non-motorized serious injuries

2.2 Bridge/Pavement Performance (PM2)

To maintain the highway infrastructure asset system in a state of good repair

1. Percentage of pavements on the Interstate System in good condition
2. Percentage of pavements on the Interstate System in poor condition
3. Percentage of pavements on the non-Interstate National Highway System (NHS) in good condition
4. Percentage of pavements on the non-Interstate NHS in poor condition
5. Percentage of NHS bridges classified as in good condition
6. Percentage of NHS bridges classified as in poor condition

2.3 System Performance (PM3)

1. Percent of person-miles traveled that are reliable (Interstate)
2. Percent of person-miles traveled that are reliable (non-Interstate)
3. Truck Travel Reliability
4. Percent of Non-Single Occupancy Vehicle Travel (Tri-State Target)
5. Annual Hours of Peak-Hour Excessive Delay (Tri-State Target)
6. Volatile Organic Compound (VOC) Reduction
7. Nitrogen Oxides (NOx) reduction

2.4 Transit Asset Management Performance (TAM)

Public transit fund recipients—which can include states, local authorities, and public transportation operators—are required to establish performance targets for safety and state of good repair, to develop transit asset management and safety plans, and to report their progress toward achieving targets. Public transportation operators must share information with MPOs and states so that all plans and performance reports are coordinated. Memphis Area Transit Authority (MATA) has developed information and targets for the following four state of good repair performance measures:

1. **Rolling Stock:** The percentage of revenue vehicles (by type) that exceed the useful life benchmark (ULB).
2. **Equipment:** The percentage of non-revenue service vehicles (by type) that exceed the ULB.
3. **Facilities:** The percentage of facilities (by group) that are rated less than 3.0 on the Transit Economic Requirements Model (TERM) Scale.
4. **Infrastructure:** The percentage of track segments (by mode) that have performance restrictions, considered to have a rating less than 3.0 on the TERM Scale.

2.5 Transit Safety

As part of the FAST Act and continued in the IIJA, the Federal Transit Administration (FTA) added safety requirements for transit providers in order to satisfy the new Public Transportation Agency Safety Plans (PTASP) rule. The PTASP rule requires certain operators of public transportation systems that receive federal funds under FTA's Urbanized Area Formula Grants to develop safety plans that include the processes and procedures to implement Safety Management Systems (SMS).

As the Memphis Area Transit Authority (MATA) is a recipient and sub-recipient of federal financial assistance under the Urbanized Area Formula Program (49 U.S.C. § 5307) that operates public transportation, MATA will be required to set safety performance targets for the following measures:

1. **Fatalities:** Total number of reportable fatalities and rate per vehicle revenue miles by mode.
2. **Injuries:** Total number of reportable injuries and rate per vehicle miles by mode.
3. **Safety Events:** Total number of reportable events and rate per vehicle revenue miles by mode.
4. **System Reliability:** Mean distance between major mechanical failures by mode.

2.6 Federal Requirements

Targets

- The Memphis MPO is required to establish performance targets no later than 180 days after TDOT, MDOT, or MATA sets performance targets.
- For each performance measure, the policy committee will either decide to support a statewide target or establish a quantifiable target specific to the planning area.
- TDOT, MDOT, the Memphis MPO, and MATA must coordinate performance measure targets to ensure consistency to the extent practicable.

Reporting

- The MOVING TOGETHER 2050 RTP update must describe the performance measures and targets, evaluate the performance of the transportation system, and report on progress made.
- The TIP must link investment priorities to the targets in MOVING TOGETHER 2050 and describe, to the extent practicable, the anticipated effect of the program on achieving established targets.
- The Memphis MPO must also report to TDOT and MDOT the baseline roadway transportation system condition, performance data, and progress toward achieving targets.

Assessments

- FHWA and FTA will not directly evaluate the Memphis MPO's progress toward meeting performance measure targets. Instead, the Memphis MPO's performance will be assessed as part of regular cyclical transportation planning process reviews, including Transportation Management Area certification reviews and the Federal Planning Finding, which is associated with approval of the STIP.
- FHWA and FTA will determine if TDOT, MDOT, and MATA have met or made significant progress toward selected targets for the transportation system.

2.7 MOVING TOGETHER 2050 Performance Framework

MOVING TOGETHER 2050 goals and objectives were updated and modified from the previous regional transportation plan goals and objectives to be in line with updated federal guidance and performance measure requirements. **Technical Memo 4 Plan Development** provides an in-depth insight into the plan development process. The entire process involved extensive

stakeholders and the public engagement, that reflects the community’s vision for the future of the transportation system.

2.7 Performance Targets

PM1 Targets

	Tennessee (TDOT)		Mississippi (MDOT)		Adoption Date MPO’s TPB
	Baseline (2017-2021)	Target (2019-2023)	Baseline	Target (2019-2023)	
No. of Fatalities	1148.6	1308.2	706.6	761	16-Feb-23
Fatality Rate	1.417	1.601	1.74	1.87	
No. of Serious Injuries	5995.6	6069.4	2001.6	3098	
Serious Injury Rate	7.416	7.424	4.95	7.64	
No. of Non-Motorized Fatalities and Serious Injuries	546.4	600.9	216.8	258	

PM2 Targets

	Tennessee (TDOT)			Mississippi (MDOT)			Adoption Date MPO’s TPB
	Baseline	2-Year Target	4-Year Target	Baseline	2-Year Target	4-Year Target	
Percent of Pavement in Good Condition (Interstate)	70.80%	58.00%	58.00%	71.20%	>55%	>55%	16-Feb-23
Percent of Pavement in Poor Condition (Interstate)	0.20%	1.00%	1.00%	0.70%	<5%	<5%	
Percent of Pavement in Good Condition (Non-Interstate NHS)	40.30%	36.00%	36.00%	37.70%	>25%	>25%	
Percent of Pavement in Poor Condition (Non-Interstate NHS)	4.10%	6.00%	6.00%	4.20%	<10%	<10%	
Percentage of NHS bridges classified as in Good condition (deck area)	32.50%	32.00%	32.00%	55.80%	>50%	>50%	
Percentage of NHS bridges classified as in Poor condition (deck area)	5.00%	6.00%	6.00%	2.80%	<5%	<5%	

PM3 Targets

	Memphis, TN-MS-AR Urbanized Area (includes West Memphis MPO)			Adoption Date MPO's TPB
	Baseline	2-YEAR TARGET (2024)	4-Year Target (2026)	
Percentage of Non-SOV Travel	16.80%	16.20%	16.20%	19-May-22
Annual Hours of Peak-Hour-Excessive Delay	8.4h (2021 data)	9.6h	9.6h	

	Tennessee (TDOT) (includes Knoxville MPO)			Mississippi (MDOT)			Adoption Date MPO's TPB
	Baseline	2-Year Target	4-Year Target	Baseline	2-Year Target	4-Year Target	
Total Emissions Reductions (VOC) KG/DAY	51.44 (2018-2021)	33.968	42.072	0	>/= 0	>/= 0	19-May-22
Total Emissions Reductions (NOX) KG/DAY	201.137 (2018-2021)	32.670	50.671	0	>/= 0	>/= 0	

	Tennessee (TDOT)			Mississippi (MDOT)			Adoption Date MPO's TPB
	Baseline	2-Year Target	4-Year Target	Baseline	2-Year Target	4-Year Target	
Percent of the person-miles traveled on the Interstate that are reliable	92.10%	88.20%	88.20%	99.60%	>93%	>93%	16-Feb-23
Percent of the person-miles traveled on the non-Interstate NHS that are reliable	93.40%	89.40%	89.40%	95.00%	> 85%	> 85%	
Truck Travel Time Reliability (TTTR) Index on the Interstate System	1.32	1.35	1.35	< 1.4	< 1.4	< 1.4	

Transit Targets

Memphis Area Transit Authority (MATA)				Adoption Date MPO's TPB	
Transit Asset Management	Asset Type/Group	Baseline (2018)			Target (2019)
Rolling Stock (All Revenue Vehicles)	Streetcars	71%		50%	23-Aug-18
	Regular Buses	27%		20%	
	MATA Plus Buses	31%		20%	
Equipment (Non-Revenue Vehicles)	Truck & Wreckers	90%		50%	
	Auto Service Cars	95%		50%	
Facilities (All Buildings or Structures)	Improvements	40%		30%	
	Shop & Garage	89%		50%	
	Structure & Building	35%		30%	
	Misc. Equipment	81%		50%	
Infrastructure	Streetcar	Tracks	0%	0%	
		Signals	100%	50%	
		Systems	0%	0%	

Memphis Area Transit Authority (MATA) – 2020 Safety Performance								
	2020 Motor Bus (fixed Route) Vehicle Revenue Miles = 5,754,934			2020 Demand Response Vehicle Revenue Miles = 1,723,825			2020 Streetcar Rail Vehicle Revenue Miles = 79,811	
	Number of Fatalities	Rate of Fatalities per 100K VRM	Number of Injuries	Rate of Injuries Per 100K VRM	Number of Safety Events	Rate of Safety Events Per 100 VRM	Total of Major Mechanical Failures	Miles between Major Mechanical Failures
MB	2	0.035	23	0.4	14	0.24	1519	3,789
DR	0	0	4	0.23	0	0	185	9,318
SR	0	0	0	0	4	5.01	49	1,629

Memphis Area Transit Authority – 2021-22 Safety Performance Targets & Benchmark*								
	2021-22 Targets Number of Fatalities	2021-22 Targets Rate of Fatalities per 100K VRM	2021-22 Targets Number of Injuries	2021-22 Targets Rate of Injuries Per 100K VRM	2021-22 Targets Number of Safety Events	2021-22 Targets Rate of Safety Events Per 100 VRM	2021-22 Targets Total of Major Mechanical Failures	2021-22 Targets Miles between Major Mechanical Failures
MB	1	0.017	12	0.21	7	0.12	759	7,582
DR	0	0	2	0.12	0	0	93	18,536
SR	0	0	0	0	2	2.51	25	3,192

PTASP Adoption Date MPO's TPB August 19, 2021

3.0 Plan Performance

3.1 Summary of System Impacts

Impacts of the plan are shown for the following measures. The evaluation includes the major regional projects to 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. MOVING TOGETHER 2050 helps move the region towards these goals, but, with growth in population, employment, and freight movement, challenges still exist.

Summary of Plan Performance

Modeled Plan	Performance	2020	2050 E+C	2050 RTP
Environmental Sustainability	VMT/capita	TN - 25.6	TN - 28.2	TN - 28.7
		MS - 29.6	MS - 26.9	MS - 27.4
Mobility/Accessibility	Mode Split (auto)	93.5%	93.9%	93.9%
	Mode Split (transit)	0.4%	0.4%	0.4%
	Mode Split (bike/walk)	6.1%	5.7%	5.7%

A summary of the modeled plan performance for 2020, the 2050 E+C, and the MOVING TOGETHER 2050 scenarios by functional classification of roadway is shown below for all vehicles and for trucks. Arrows indicate the direction of change for VMT and VHT between the E+C and the MOVING TOGETHER 2050 scenarios.

Summary of Modeled Plan Performance by Functional Classification

Functional Class	Scenario	VMT				VHT			
		TN		MS		TN		MS	
Interstate/Freeway	2020		7,618,135		2,596,493		171,177		41,249
	2050 E+C		8,576,620		3,890,819		211,606		78,324
	2050 RTP	↑	9,491,962	↑	4,325,946	↑	224,314	↑	80,935
Arterial	2020		13,650,491		2,178,571		441,475		58,469
	2050 E+C		16,676,630		3,633,902		576,240		123,852
	2050 RTP	↓	16,361,737	↓	3,572,710	↓	552,831	↓	112,602
Collector	2020		1,748,364		650,970		61,450		18,449
	2050 E+C		2,301,525		1,653,310		83,771		55,985
	2050 RTP	↓	2,156,728	↓	1,520,852	↓	78,306	↓	50,144
Functional Class	Scenario	VHD-Truck				VHD			
		TN		MS		TN		MS	
Interstate/Freeway	2020		7,126		728		49,126		5,107
	2050 E+C		12,023		3,888		74,526		24,166
	2050 RTP	↓	11,364	↓	2,887	↓	73,572	↓	20,891
Arterial	2020		7,843		845		93,652		11,170
	2050 E+C		13,384		3,357		152,156		44,768
	2050 RTP	↓	12,367	↓	2,910	↓	137,629	↓	34,840
Collector	2020		495		66		6,731		1,172
	2050 E+C		966		702		12,073		12,514
	2050 RTP	↓	911	↓	649	↓	10,931	↓	10,162

3.2 Planning for Performance Analysis

In addition, a Planning for Performance (PfP) tool was developed to analyze the future performance of the plan. The design of the tool was patterned from a similar tool that was developed for the Mississippi Department of Transportation (MDOT), the Georgia Department of Transportation (GDOT), the Nevada Department of Transportation (NDOT), and the Massachusetts Department of Transportation (MassDOT), among others. For the 2050 RTP, data was customized by bringing the state level information and assumptions to the MPO level. Due to the change in scale, there are certain limitations in the performance and usability of the tool at the MPO level.

For each performance area, the PfP tool evaluates the impacts of the plan investments compared to the baseline performance.

The general process for determining the impact of investment levels for each performance area included;

1. Gathering project-level or other data on the expenditures and estimated (or historically observed) benefits (i.e., improvement in the performance metric) see table below;
2. Plotting the expenditure and benefit data;
3. Fitting a curve to the data points to show the relationship between expenditures and performance.

These curves are developed using research and data from various sources (such as the National Bridge Investment Analysis System (NBIAS) and Highway Economic Requirements System State Version [HERS-ST]) depending on the performance areas.

Performance Metrics

Investment Program	Performance Metric	Data Source(s)
Bridges	Percent of Deck Area in Fair/Good Condition	<ul style="list-style-type: none"> • Baseline Conditions: National Bridge Inventory • Future Conditions: National Bridge Investment Analysis System (NBIAS)
Pavements	Percent of Lane-Miles in Fair/Good Condition	<ul style="list-style-type: none"> • Baseline Conditions: Highway Performance Monitoring System • Future Conditions: Highway Economic Requirements System State Version (HERS-ST)
Capacity	Percent of Lane-Miles with an Acceptable Level of Service (A/B/C/D)	<ul style="list-style-type: none"> • Baseline Conditions: 2050 E+C Regional Travel Demand Model • Future Conditions: 2050 RTP Regional Travel Demand Model
Operations	Average Annual Weekday Vehicle Hours of Delay	<ul style="list-style-type: none"> • Baseline Conditions: 2050 E+C Regional Travel Demand Model • Future Conditions: 2050 RTP Regional Travel Demand Model
Active Transportation	Annual Mileage of Sidewalks, Bike Lanes, and Multiuse Trails Constructed	<ul style="list-style-type: none"> • Baseline Conditions: Memphis MPO active transportation assets data, Highway Performance Monitoring System (HPMS) • Future Conditions: Average per-mile construction cost data for active transportation assets from Memphis MPO, TDOT, and MDOT

Future transportation system performance using the MOVING TOGETHER 2050 funding levels is analyzed using the PfP tool and a summary of the results are shown below.

Summary of Future Plan Performance

Investment Program	Performance Metric	Baseline Performance	Target Performance	2050 RTP Performance
Bridges: NHS	Percent of Deck Area in Fair/Good Condition	TN – 95.0	TN – 94.0	TN – 95.0
		MS – 97.2	MS – 95.0	MS – 98.7
Bridges: Non-NHS	Percent of Deck Area in Fair/Good Condition	TN – 93.9	N/A	TN – 98.1
		MS – 99.5	N/A	MS – 99.8
Pavement: NHS Interstate	Percent of Lane-Miles in Fair or Good Condition	TN – 99.8	TN – 99.0	TN – 99.1
		MS – 99.3	MS – 95.0	MS – 100.0
Pavement: Non-Interstate NHS	Percent of Lane-Miles in Fair or Good Condition	TN – 95.9	TN – 94.0	TN – 98.5
		MS – 95.8	MS – 90.0	MS – 97.8
Capacity	Percent of Lane-Miles with LOS D or Better	TN – 73.0	N/A	TN – 76.1
		MS – 72.0	N/A	MS – 75.0
Operations	Average Annual Weekday Vehicle Hours of Delay (thousands)	TN – 259.7	N/A	TN – 242.4
		MS – 90.4	N/A	MS – 71.4
Active Transportation	Number of Shared-Use Pathway Miles	TN – 180.3	N/A	TN – 367.9
		MS – 56.5	N/A	MS – 101.3

In this summary table, for each investment program, a baseline performance value by state, corresponding performance target value (where available) and an estimated 2050 performance value are shown. The results indicate that the funding levels planned in the MOVING TOGETHER 2050 are adequate to meet the set targets for pavement and bridge conditions, improve the roadway capacity and operations and add additional mileage to the active transportation system. Safety is emphasized in all of these investment programs in addition to dedicated funding for safety improvements. This focused emphasis to improve safety for all users is expected to reduce fatalities and serious injuries within the region.