

MISSISSIPPI'S UNIFIED LONG-RANGE TRANSPORTATION INFRASTRUCTURE PLAN



2035



MISSISSIPPI DEPARTMENT OF TRANSPORTATION

FINAL REPORT

APPENDIX B: FRAMEWORK TO SUPPORT PERFORMANCE-BASED PLANNING

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1. INTRODUCTION

An important objective of the MULTIPLAN 2035 effort is to expand the use of performance measurement in Mississippi's planning processes. Specifically, measures will be used to help quantify and/or qualify the different system outcomes and benefits the final recommendations and directions of the plan could provide. Additionally, the measures will establish a platform to be used in the future to track plan implementation or otherwise monitor system performance.

Like most state departments of transportation, MDOT currently uses performance measures in one form or another to influence a wide range of investment decisions and system operations strategies. These include everything from formally-reported metrics, such as safety outcomes related to fatality and crash rates, to more internal considerations, such as the Pavement Condition Rating (PCR), which helps MDOT assess roadway preservation needs and prioritize resurfacing projects. Some of these current measures can be applied to support evaluation of plan findings, but there also are places where new or additional measures are needed.

1.1 Strategic Framework of Goals

A critical step in the development of planning-level performance measures is to establish a strategic framework (goals, objectives, strategies, etc.) that form the basis of measurement needs. As part of the existing MULTPLAN platform, MDOT developed a well-defined set of goals that defines their vision for Mississippi's future transportation system and provides a meaningful framework for the plan measures. These goal areas are as follows:

1. Accessibility and Mobility;
2. Safety and Security;
3. Maintenance and Preservation;
4. Environmental Stewardship;
5. Economic Development;
6. Awareness, education and Cooperative Processes; and
7. Finance.

The remainder of this report is organized by these seven goal areas. For each goal area, except the last two (numbers 6 and 7) for which planning-level performance measures are not really applicable, the report provides:

- An overview and assessment of the suitability and applicability of existing MDOT measures for use in MULTIPLAN;
- Identification and discussion of other potential performance measures; and
- Recommendations for specific measures to be adopted by MDOT and incorporated into the MULTIPLAN update.

1.2 Primary Considerations

In identifying, assessing, and recommending potential performance measures, the primary consideration is to keep the overall list of measures manageable, straightforward, and practical. Other factors that are considered include the following:

- **Legal Requirements** – are measures consistent or do they conflict with potential future federal requirements?
- **Causality** – what is the strength of the relationship between agency investment decisions and the performance result being measured?
- **Outcome Focus** – is the measure assessing changes to system performance (i.e., outcomes) or simply what is spent or built (i.e., outputs)?
- **Data/Analysis Burden** – can measures be supported by existing data collection and analysis activities?

1.3 Summary of Performance Measure Recommendations

Based on the discussion provided below, **Figure 1-1** provides a summary of the recommended MULTIPLAN 2035 Performance Measures.

Figure 1-1: Recommended MULTIPLAN Performance Measures

Goal Area	Recommended Measures
Accessibility and Mobility	<ul style="list-style-type: none"> • Number of rural state highway miles improved • Percentage of roadway miles or amount of VMT at “tolerable” congestion levels • Percent of system airports meeting runway length objective for the primary runway
Safety	<ul style="list-style-type: none"> • Illustrative benefits
Maintenance and Preservation	<ul style="list-style-type: none"> • Percent of lane miles in “fair” condition or better • Level of unmet bridge improvement needs • Percent of system airports with “good” pavement condition on their primary runways
Environmental Stewardship	<ul style="list-style-type: none"> • VMT growth
Economic Development	<ul style="list-style-type: none"> • Same as mobility and accessibility measures for roads • Percent of system airports meeting business user needs
Awareness, Education and Cooperative Processes	N/A
Finance	N/A

2. GOAL AREA 1: ACCESSIBILITY AND MOBILITY

Goal area 1 is Accessibility and Mobility – *Improve Accessibility and Mobility for Mississippi’s People, Commerce, and Industry*

Perhaps the most important reason for developing and maintaining a transportation system is to ensure that individuals and businesses enjoy a high level of accessibility and mobility. To accomplish this, MDOT must continue to expand the scope of Mississippi’s transportation system and improve both system capacity and connections. Additionally, the Department must work with and support its local partners in their efforts to improve mobility, accessibility, and connectivity. Key considerations that need to be defined to describe the likely outcomes from different investment strategies include the following:

- Congestion/Reliability – What changes will occur in travel time, congestion, and reliability?
- Accessibility – How will accessibility for people and businesses be improved?

2.1 Current MDOT Measures and Measurement Capabilities

While MDOT does not formally track and report performance information related to transportation accessibility and mobility, the Department does regularly collect traffic volume data as part of its federal reporting requirements for the Highway Performance Monitoring System (HPMS), which can be used to determine traffic congestion levels and forecast travel times. Similarly, the Department maintains (or has access to) an inventory of transportation facilities and services throughout the State (e.g., roads, bus routes, airports, and rail lines). In combination with demographic data, this information can be combined to assess improvements in the level of transportation accessibility provided.

2.2 Potential Measures

Based on the MDOT’s current data, analytical capabilities, and the focus of the accessibility and mobility goal, the following are measures that can be applied to help describe likely plan outcomes:

Accessibility

1. Number of rural state highway miles improved – Although an output measure, there is a reasonable correlation between expanding roads from two to four lanes and making other [modernization] improvements and better rural accessibility.
2. Percent of rural population within XX miles (or XX minutes travel time) of the state system (or a four-lane facility) – This is a fairly pure measure of highway accessibility; the major limitation will be the ability of existing GIS data and analytical capabilities to support it.
3. Level of illustrative increase in rural transit services – Given that we will not know how funds allocated to rural transit would be spent, a meaningful approach could be to provide

examples of what allocation might buy such as X thousands of hours of additional annual bus service, addressing XX% of vehicle replacement needs, or amount of service extensions.

Mobility

4. Percentage of roadway miles or amount of vehicle miles traveled (VMT) at “tolerable” congestion levels (i.e., volume/capacity ratios) – Treats all congestion and associated investments as essentially the same priority (although “tolerable” levels vary by road class) and focuses on accommodating vehicle movement (as opposed to people and goods movement). At a programming level, this measure essentially emphasizes capacity expansion that addresses the most congested road miles per dollar invested (although this can be muted, as needed).
5. Average speed during peak periods in urban areas – Assesses the quality of travel and focuses on projects that improve throughput of the system. At the programming level, this will clearly favor urban projects and could lead to an emphasis on arterial improvement and modernization-type projects (as opposed to pure capacity expansion projects).
6. Total annual (or average daily) hours of delay – Also an assessment of travel quality with an urban emphasis, the measure will tend to emphasize operational-type improvements, such as signalization and ITS applications that address both recurring and non-recurring delay.

2.3 Recommendations for Goal Area 1

For purposes of keeping the MULTIPLAN 2035 performance measures straightforward, it is recommended that just performance measures #1 and #4 be used. These measures are fairly easily supported by available analytical tools, such as HERS-ST and the Mississippi Statewide Travel Demand Model and provide a fairly clear picture of the types or extent of accessibility and mobility the implementation of the plan could achieve.

3. GOAL AREA 2: SAFETY

Goal area 2 is Safety - *Ensure High standards of Safety in the Transportation System*

The Department has a current, near-term goal to reduce road-related fatalities by 5 percent in five years, and to then continue to improve system safety performance in perpetuity. To achieve this, transportation and safety officials have established a Strategic Highway Safety Plan (SHSP) that identifies a range of strategies associated with the “three Es” – Engineering, Education, and Enforcement.

While the impacts of associated actions are quite easy to measure after the fact, or often can be forecast fairly effectively at the project level, estimating likely long-term, program-wide safety

outcomes under different investment strategies is difficult. Additionally, given the multi-agency effort that is made to improve transportation safety, isolating the outcomes that are directly attributable to investments or actions MDOT controls can be a challenge. That said, the overall focus of safety performance measures can be narrowed to general areas:

- **Crashes** – How will different investment choices reduce the number of crashes that occur each year?
- **Fatalities** – How will investments influence the number of deaths that occur on Mississippi’s transportation system each year?

3.1 Current MDOT Measures and Measurement Capabilities

The Department, in conjunction with the Mississippi Department of Public Safety (DPS) and in cooperation with its safety partners, collects and reports a wide range of safety-related data, including both general and more detailed metrics concerning fatalities, crashes, injuries, and property damage. This information, maintained within the national Fatality Analysis Reporting System (FARS) and MDOT’s Safety Analysis Management System (SAMS) database, provides MDOT and the state with strong baseline information against which to compare potential or actual future safety performance. In addition, the Department maintains data on “crash reduction factors” that can be used in illustrative fashion to identify the hypothetical safety benefits that could be achieved at different spending levels for specific activities.

3.2 Potential Measures

Based on practices used in other states and MDOT’s current data and analytical capabilities, two types of safety measures could be used to describe the likely outcomes of the plan:

1. *Illustrative benefits* – While technically not a performance metric, safety factors could be used to provide examples of the safety benefits that could be provided under different investment scenarios.
2. *Number of fatalities/crashes* – Number of fatalities and crashes in total, as well as related to Critical Emphasis Areas identified in the state’s SHSP.

3.3 Recommendations

Given both the disbursed approach to how safety programs are delivered in Mississippi and the nature of the plan findings, it is recommended that the first method described above to be used – providing illustrative examples of the types of safety improvements plan implementation could achieve. The second method should continue to be used to monitor the performance of the SHSP.¹

¹ White Paper 7: Urban – Rural Safety Framework.

4. GOAL AREA 3: MAINTENANCE AND PRESERVATION

Goal area 3 is Maintenance and Preservation - *Maintain and Preserve Mississippi's Transportation System*

Just as a state must seek to expand and improve its transportation systems, it also must maintain its investments and preserve transportation assets such as roadways, bridges, and runways. Achieving and sustaining good system conditions requires MDOT to conduct ongoing performance monitoring of the following key factors:

- **Highway pavement** – How will surface conditions and/or remaining surface life change?
- **Bridges** – What will be the overall health of Mississippi's bridges?
- **Non-highway modes** – What will happen to the health of new and existing modal facilities?

4.1 Current MDOT Measures and Measurement Capabilities

The Department regularly collects data on roadways and bridges to monitor system conditions. To assess pavement conditions and determine resurfacing or reconstruction, MDOT uses its own Pavement Condition Rating (PCR); the value at which a road is resurfaced is dependent upon the road's functional class (i.e., Interstate, principal/minor arterials, collectors and below).

The Department is currently in the process of developing a pavement management system that will help it better track preservation performance, assess needs, and prioritize investments. While this system is not available to support development of MULTIPLAN 2035, the road condition data MDOT collects does support use of HERS-ST to forecast future preservation needs and evaluate likely outcomes from different preservation investment levels. The Department also monitors bridge conditions in conjunction with collecting and submitting National Bridge Inventory (NBI) data and uses Pontis (FHWA's bridge analysis system) to identify bridge rehabilitation and replacement needs. This data can be used in conjunction with FHWA's NBIAS (National Bridge Investment Analysis System) tool to identify future needs and determine outcomes at different investment levels.

Since MDOT is not directly responsible for the preservation and maintenance of non-highway modes, it does not directly collect data on or monitor the conditions of other modal assets such as transit fleets. Instead, the Department relies on the responsible entities to report information to them.

4.2 Potential Measures

Based on both MDOT's current data and analytical capabilities and common practices used in other states, the Department could use the following measures to describe the likely outcomes from different investment approaches:

1. **Pavement: percent of lane miles in “fair” condition or better** – This can be stratified for different parts of the system and is reliant on developing a definition to translate HERS-ST outputs into the mileage of facilities meeting “fair” or better conditions under different investment levels.
2. **Bridge: level of unmet bridge improvement needs** – NBIAS can be used to identify the number of bridge needs that would not be addressed under different investment scenarios; requires definition of what conditions trigger the need for “improvement.”
3. **Aviation: Percent of system airports with “good” pavement condition on their primary runways** – The current aviation plan establishes a current baseline for this metric.
4. **Number of Posted Bridges** – The Department could simply look at the number of bridges that will require “being posted” (meaning their conditions have deteriorated to a state where trucks over a certain weight cannot safely use them) under different investment scenarios.
5. **Non-highway modes: percent of rural transit preservation needs met** – This is a simple output measure that provides some insight in how different investment approaches help reduce the backlog of non-highway preservation needs.

4.3 Recommendations

The first three measures are commonly used throughout the country and provide a good barometer of the overall system conditions that will be achieved under a given investment scenario. The highway-related measures could be further delineated by type of facility, such as “Interstate,” “arterial,” and “collector” roads.

5. GOAL AREA 4: ENVIRONMENTAL STEWARDSHIP

Goal area 4 is Environmental Stewardship – *Ensure that Transportation system Development is sensitive to Human and Natural Environmental Concerns*

A critical part of MDOT’s mission is to plan, build, and maintain Mississippi’s transportation system in a manner that preserves the environment and enhances communities. Many of the policies, actions, and activities associated with good environmental stewardship come into play at the project level – it largely relates to how you plan, design and implement projects – thus it can be difficult to quantify the environmental performance implications of different long-term transportation investment strategies. For example, MDOT environmental strategies such as adopting natural resource protection plans or implementing a green connectivity approach to transportation planning and system development will not be directly affected by MULTIPLAN policies related to the allocation of funds to different investment types. Nonetheless, it is important compare the potential impacts of different spending choices, at least qualitatively, with respect to one or more of the following:

- **Air Quality** – How will MDOT activities influence total emissions of various targeted pollutants, particularly green house gases?
- **Water Quality** – What impacts will MDOT investments have on water quality?
- **Natural Resources** – What impact could MDOT’s investment decisions have on natural resources such as wetlands and wildlife?

5.1 Current MDOT Measures and Measurement Capabilities

Mississippi is currently in statewide compliance for all federally-regulated air quality factors, but does have the capability to model air quality in urban areas. In addition, the Department monitors and can forecast total state wide travel growth (i.e., VMT). Lastly, the state conducts an active wetland banking program and closely monitors the amount of wetland acres mitigated or replaced.

5.2 Potential Measures

As noted above, the environmental goal area is one where the development of meaningful quantitative measures (for purposes of comparing investment strategies) is challenging, instead, most states rely on “proxy measures” (i.e., measures that are indirectly related to the intended goal or objective) or identify illustrative outcomes to help describe the likely impacts from different investment decisions. With this in mind, potential environmental measures that MDOT could use in conjunction with MULTIPLAN 2035 development include:

1. **VMT growth** – This is a widely used measure throughout the country; it is measurable (although it requires a lot of assumptions) and presumably provides a differentiating assessment of different AICs.
2. **Illustrative Examples** – The planning team could simple identify examples of environmental activities or outcomes that could be achieved under different investment strategies.

5.3 Recommendations

VMT growth is widely used throughout the country as a means of assessing environmental performance at the planning level. While it is not a direct indicator of air quality or other emissions, it can generally be said that the less traffic growth, the less negative impact there will be on the environment. The identification of illustrative examples could then be used as needed to bolster the discussion of environmental benefits that could be achieved under the plan.

6. GOAL AREA 5: ECONOMIC DEVELOPMENT

Goal area 5 is Economic Development – *Provide a transportation system that encourages and supports Mississippi’s economic development.*

Directly related to the level of mobility and accessibility it provides, a state’s transportation system should encourage and support economic development. It is therefore important to

consider how different investment choices and/or a selected investment strategy will enhance regional and inter-regional system reliability and connectivity, improve access to markets and jobs, encourage private investment, and enhance productivity. Key factors that could be considered in assessing the potential economic development benefit of different investment strategies include:

- **Competitiveness** – What can MDOT do to the system to make Mississippi’s economy more efficient and competitive?
- **Job Creation** – How many jobs can be created/sustained through investment activities?
- **Responsiveness** – How will different investment choices enable MDOT to better respond to economic development opportunities in the state?

6.1 Current MDOT Measures and Measurement Capabilities

Although MDOT does not currently track and report specific measures related to economic develop, measures and data that are used in other areas could be applied to assess economic development impacts of transportation investments. In particular, the measures suggested above for accessibility and mobility also could be used to help quantify or qualify the impact of different investment decisions.

6.2 Potential Measures

The following are possible approaches MDOT could use to quantify and/or qualify the potential economic development benefits that would accrue from plan implementation:

1. **Use selected mobility and accessibility measures** – This approach would help make the message that improvements in these areas contribute to economic development.
2. **Percent of system airports meeting business user needs** – The current system aviation plan defines the requirements for airports to meet these needs.
3. **Change in net user costs** – The analytical tools can be used to generate estimates of total user costs (e.g., safety, delay, vehicle operations, etc.) as a function of VMT. These, in turn, serve as an indication of the economic benefit transportation investments are providing.
4. **Hours of delay on selected freight routes** – Fully developing and applying the measure could be based on the Corridors of Statewide Significance² identified in MULTIPLAN 2035, which encompass the six freight corridors defined in a previous study.³
5. **Annual number of jobs directly created by transportation spending** – While this measure does not tend to show differences between different investment strategies (at the same funding level), it does show the extra benefits from increased investment – changing how money is allocated will not change results.

² White Paper 13: Corridors of Statewide Significance – the Next Steps.

³ Mississippi Goods Movement and Trade Assessment Study.

6.3 Recommendations

In part to help keep the overall number of measure small and manageable, but also because of both current MDOT analytical capabilities and the need to stress the importance of improving mobility and accessibility to support Mississippi's economic development, we recommend simply applying the same measure as suggested for Goal 1 for highways. The additional aviation measure (#2 above) is also fairly simple to apply and meaningful. The other suggested measures offer opportunities for further development to support plan implementation.

7. GOAL AREA 6: AWARENESS, EDUCATION AND COOPERATIVE PROCESSES

Goal area 6 is Awareness, Education and Cooperative Processes – *Create effective transportation partnerships and cooperative processes that enhance awareness of the needs and benefits of an intermodal system.*

This goal area is focused on planning and public processes rather than specific transportation system performance considerations, thus performance measures are not applicable at the planning level.

8. GOAL AREA 7: FINANCE

Goal area 7 is Finance – *Provide a Sound Financial Basis for the Transportation System*

This goal area is primarily focused on the Department's future efforts to effectively manage financial resources and develop new funding sources. As such, performance measures are not applicable at the planning level.

