8. Regional Performance

Introduction

Measuring and tracking the performance of the region's transportation system is a fundamental component of the Metropolitan Transportation Plan (MTP) and the performance-based planning process. Performance measurement allows planners to assess the current state of the system to develop recommendations for improvements, evaluate the effectiveness of recently implemented improvements, and forecast the effectiveness of planned improvements.

The North Central Texas Council of Governments (NCTCOG) monitors two kinds of performance as part of its performance-based planning efforts.

Observed Performance: Performance is measured based on data collected in the field from sources, including air quality monitoring, traffic counts, on-board transit surveys, pavement condition assessments, and travel time datasets. Performance measurement based on observed data allows planners to assess current conditions and respond to short-term issues.

Forecasted or Modeled Performance: Using NCTCOG's calibrated four-step travel demand model, planners can forecast the performance of the region's transportation system, considering both planned system improvements and forecasted demographics. Performance-based planning using these measures has a long history at NCTCOG, informing the projects recommended in this MTP and those in multiple previous MTPs.

National Performance Requirements

Federal legislation passed in 2012 introduced a new requirement to incorporate a performance-based approach into the transportation planning process. The legislation, the Moving Ahead for Progress in the 21st Century Act, known as MAP-21, requires state Departments of Transportation, Metropolitan Planning Organizations (MPO), and transit authorities to set coordinated targets, report on a required set of performance measures, and prioritize projects using a coordinated performance-based planning process. These performance requirements were continued and bolstered by the Fixing America's Surface Transportation (FAST) Act, which was signed into law in 2015.

Required measures and related procedures were not specified by the legislation and had not been released during development of the previous MTP, Mobility 2040. However, since then, four Transportation Performance Management final rules have been released by the Federal Highway Administration and the Federal Transit Administration, passed through standard rulemaking procedure, and are now effective. Each final rule lists required measures, data sources, and calculation procedures. The final rules include:

- Highway Safety Improvement Program, known as PM1[1]
- Assessing Pavement Condition for the National Highway Performance Program and Bridge Condition for the National Highway Performance Program, known as PM2[2]
- Assessing Performance of the National Highway System, Freight Movement on the Interstate System, and Congestion Mitigation and Air Quality Improvement Program (CMAQ), known as PM3[3]
- Transit Asset Management[4]

A summary table of the currently required measures and their implementation dates is provided in appendix **G. Regional Performance**. Forthcoming rulemaking will likely include additional required measures and processes including, but not limited to, transit safety and infrastructure asset management plans.

Addressing Performance in Mobility 2045

Federal performance measure final rules establish deadlines for target setting and reporting for each of the required performance measures. For the measures identified in each final rule, MPOs are required to include adopted targets, baseline performance measures, and progress toward the targets in

[1] 81 FR 13881, 23 CFR 490

[2] 82 FR 5886, 23 CFR 490

[3] 82 FR 5970, 82 FR 22879, 23 CFR 490

[4] 81 FR 48889, 49 CFR 625, 49 CFR 630

MTPs adopted two years after the effective date of the final rule. The four performance measure final rules currently effective were established at different times, and therefore have different target-setting and implementation deadlines, as seen in **Exhibit 8-1**.

Exhibit 8-1: Federally Required Performance Measure Implementation Schedule

Final Rule	Rule Effective Date	Target Setting Deadlines			Required to be Included in MTPs
		Provider	State DOT	MPO	
Safety (PM1)	4/14/2016	N/A	8/31/2017	2/27/2018	4/14/2018
Pavement and Bridge Condition (PM2)	5/20/2017	N/A	5/20/2018	11/16/2018	5/20/2019
System Performance/Freight/CMAQ (PM3)	5/20/2017	N/A	5/20/2018	11/16/2018	5/20/2019
Transit Asset Management	10/01/2016	1/01/2017	10/01/2017	12/27/2017	10/01/2018

At the adoption date of Mobility 2045, the following apply:

- All four performance measure rules are effective.
- The adoption of official targets is required in Mobility 2045 for the Safety (PM1) and Transit Asset Management rules.
- The Safety rule must be included in Mobility 2045.

Preparatory steps, including target-setting coordination and data acquisition, are under way for measures in the Pavement and Bridge Condition (PM2) and System Performance/Freight/CMAQ (PM3) final rules. In the spirit of implementing a comprehensive performance-based planning process, preliminary discussion and some draft measures from all the final rules are included alongside the currently required measures.

Mobility 2045 includes performance measures that go above and beyond those that are, or will soon be, required by the final rules. These supplemental performance measures affirm the importance of tracking performance measures and performance-based planning processes across all aspects of the transportation system. While these measures are in various stages of development, all are measures that NCTCOG intends to track, report on, and eventually incorporate into planning processes.

Performance measurement also played an integral role in project selection and prioritization for Mobility 2045 and was used in forecasting future conditions of the region's transportation system, considering the benefits and impacts of planned improvements.

The performance measures presented in this chapter (both required and otherwise) are mentioned throughout Mobility 2045 in relevant sections. This demonstrates how the measures apply to and are integrated into planning processes. It also demonstrates NCTCOG's commitment to a performance-based transportation planning process. Additionally, some programs in the appendices identify tangible performance dimensions to evaluate their effectiveness. In some cases, these may become tracked performance measures upon full implementation of the program.

Required Performance Measures

Safety (PM1)

The Safety performance measure final rule includes five measures related to the safety of the transportation system:

1. Five-year rolling averages for the number of fatalities
2. The rate of fatalities per 100 million vehicle miles traveled
3. The number of serious injuries
4. The rate of serious injuries per 100 million vehicle miles traveled
5. The number of non-motorized fatalities and non-motorized serious injuries

NCTCOG worked closely with the Texas Department of Transportation (TxDOT) to establish annual targets for each of these measures. Coordination between stakeholders is key when setting targets for performance measures. As part of the TxDOT Strategic Highway Safety Plan (SHSP) development process, stakeholders from TxDOT, NCTCOG, local governments, law enforcement, emergency medical services, educators, and others worked collaboratively utilizing a data-driven, multi-year process to develop both statewide and regional safety performance measure targets. Due to increasing

population in both the region and the state, volume on the roadway system, and congestion, it is unlikely that a decrease in the number of crashes could be achieved, so the consensus of the SHSP stakeholder and executive teams was to establish targets that by 2022 would reduce the rate at which each measure is increasing. Specifically, the targets call for a 2 percent reduction from the original projection for 2022. The proposed reduction of 2 percent by 2022, which only applies to trends where measures are increasing over time, would be achieved by reducing each intermediate year by the following reduction percentages:

Year	Reduction	Year	Reduction	Year	Reduction
2017	0.0%	2019	0.8%	2021	1.6%
2018	0.4%	2020	1.2%	2022	2.0%

Measure 1: Five-Year Rolling Averages for the Number of Fatalities

2018 Target: NCTCOG supports TxDOT's targets for this measure. These targets seek to reduce the expected increase in fatalities between 2015 and 2018. This would reduce the projected number of fatalities in 2018 from 3,907 to 3,891 for the state and a reduction in the region from 727 to 724. However, in adopting these targets, the Regional Transportation Council included a policy statement that even one death on the transportation system is unacceptable and that staff should work with regional partners to develop projects, programs, and policies that eliminate serious injuries and fatalities across all modes of travel. This is consistent with MTP Policy TSSF3-003. The 2018 target expressed as a five-year rolling average is shown in **Exhibit 8-2**.

Exhibit 8-2: Five-Year Rolling Average for the Number of Fatalities

		Statewide Data			Regional Data	
Year	Source	Projection or Actual Data	Percent Reduction	Target or Actual Data	Projection or Actual Data	Target or Actual Data
2014	FARS	3,536	N/A	3,536	596	596
2015	ARF	3,516	N/A	3,516	619	619
2016	CRIS	3,775	N/A	3,775	690	690
2017	Target	3,801*	0.0%	3,801	697	697
2018	Target	3,907*	0.4%	3,891	727	724
2018 target expressed as 5-year average				**3,703.8**		**665.2**

*Based on linear trend analysis from 2011-2015 FARS data.

FARS: National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System
ARF: FARS Annual Report File
CRIS: TxDOT Crash Records Information System

Measure 2: The Rate of Fatalities per 100 Million Vehicle Miles Traveled

2018 Target: NCTCOG supports TxDOT's targets for this measure. These targets seek to reduce the expected increase in deaths per 100 million vehicle miles traveled between 2015 and 2018. Statewide, this would reduce the projected deaths per 100 million vehicle miles traveled in 2018 to not more than 1.46 per 100 million vehicle miles traveled. The regional target for 2018 is less than 1 death per 100 million vehicle miles traveled. However, in adopting these targets, the Regional Transportation Council included a policy statement that even one death on the transportation system is unacceptable and that staff should work with regional partners to develop projects, programs, and policies that eliminate serious injuries and fatalities across all modes of travel. This is consistent with MTP Policy TSSF3-003. The 2018 target expressed as a five-year rolling average is shown in **Exhibit 8-3**.

Exhibit 8-3: Five-Year Rolling Average for the Rate of Fatalities

		Statewide Data			Regional Data	
Year	Source	Projection or Actual Data	Percent Reduction	Target or Actual Data	Projection or Actual Data	Target or Actual Data
2014	FARS	1.45	N/A	1.45	0.92	0.92
2015	ARF	1.36	N/A	1.36	0.92	0.92
2016	CRIS	1.44	N/A	1.44	0.99	0.99
2017	Target	1.45*	0.0%	1.45	0.98	0.98
2018	Target	1.46*	0.4%	1.46	0.99	0.99
2018 target expressed as 5-year average				**1.432**		**0.96**

*Based on linear trend analysis from 2011-2015 FARS data.

Measure 3: The Number of Serious Injuries

2018 Target: NCTCOG supports TxDOT's targets for this measure. These targets seek to reduce the expected increase in serious injuries between 2016 and 2018. Statewide, this would reduce the expected increase in serious injuries from 18,203 to not more than 18,130 in 2018. At the regional level, the target would be a reduction from 3,938 to 3,922. The 2018 target expressed as a five-year rolling average is shown in **Exhibit 8-4**.

Exhibit 8-4: Five-Year Rolling Average for the Number of Serious Injuries

		Statewide Data			Regional Data		
Year	Source	Projection or Actual Data	Percent Reduction	Target or Actual Data	Projection or Actual Data	Target or Actual Data	Serious Injury Crashes Reduced
2014	CRIS	17,133	N/A	17,133	3,420	3,420	
2015	CRIS	17,096	N/A	17,096	3,453	3,453	
2016	CRIS	17,578	N/A	17,578	3,641	3,641	
2017	Target	17,890*	0.0%	17,890	3,787	3,787	
2018	Target	18,203*	0.4%	18,130	3,938	3,922	16
2018 target expressed as 5-year average				**17,565.4**		**3,647.8**	

*Based on linear trend analysis from 2012-2016 CRIS data.

Measure 4: The Rate of Serious Injuries per 100 Million Vehicle Miles Traveled

2018 Target: NCTCOG supports TxDOT's targets for this measure. These targets seek to reduce the expected increase in the rate of serious injuries per 100 million vehicle miles traveled between 2016 and 2018. This would reduce the rate of serious injuries per 100 million vehicle miles traveled statewide to 6.64 in 2018. The regional target is a reduction to 5.09. The 2018 target expressed as a five-year rolling average is shown in **Exhibit 8-5**.

Exhibit 8-5: Five-Year Rolling Average for the Rate of Serious Injuries

		Statewide Data			Regional Data	
Year	Source	Projection or Actual Data	Percent Reduction	Target or Actual Data	Projection or Actual Data	Target or Actual Data
2014	CRIS	7.05	N/A	7.05	5.30	5.3
2015	CRIS	6.62	N/A	6.62	5.14	5.14
2016	CRIS	6.71	N/A	6.71	5.22	5.22
2017	Target	6.68*	0.0%	6.68	5.15	5.15
2018	Target	6.64*	0.4%	6.64	5.11	5.09
2018 target expressed as 5-year average				**6.740**		**5.18**

*Based on linear trend analysis from 2012-2016 CRIS data.

Measure 5: The Number of Non-Motorized Fatalities and Non-Motorized Serious Injuries

2018 Target: NCTCOG supports TxDOT's targets for this measure. These targets seek to reduce the expected increase in non-motorized fatalities and serious injuries between 2016 and 2018. Statewide, this would reduce the number of non-motorized fatalities and serious injuries from 2,318 to not more than 2,309 in 2018. At the regional level, the target is a reduction from 643 non-motorized fatalities and serious injuries to not more than 639 in 2018. However, in adopting these targets, the Regional Transportation Council included a policy statement that even one death on the transportation system is unacceptable and that staff should work with regional partners to develop projects, programs, and policies that eliminate serious injuries and fatalities across all modes of travel. This is consistent with MTP Policy TSSF3-003. The 2018 target expressed as a five-year rolling average is shown in **Exhibits 8-6 and 8-7**.

Exhibit 8-6: Five-Year Rolling Average for the Number of Non-Motorized Fatalities and Serious Injuries (statewide)

Year	Source	Projection or Actual Data	Percent Reduction	Target or Actual Data
2014	FARS-CRIS	1,893	N/A	1,893
2015	FARS-CRIS	2,023	N/A	2,023
2016	CRIS	2,304	N/A	2,304
2017	Target	2,224*	0.0%	2,224
2018	Target	2,318*	0.4%	2,309
2018 target expressed as 5-year average				**2,150.6**

*Based on linear trend analysis from 2011-2015 FARS and CRIS data.

Exhibit 8-7: Five-Year Rolling Average for the Number of Non-Motorized Fatalities and Serious Injuries (regional)

		Fatalities			Serious Injuries		
Year	Source	Projection/Actual Data Bike & Ped (Fatal)	Target/Actual Data	Fatalities Reduced	Projection/Actual Data Bike & Ped (Incap. Injury)	Target or Actual Data	Serious Injury Crashes Reduced
2014	FARS-CRIS	107	107	N/A	334	334	N/A
2015	FARS-CRIS	160	160	N/A	381	381	N/A
2016	CRIS	163	163	N/A	413	413	N/A
2017	Target	171	171	0	433	433	0
2018	Target	184	182	2	459	457	2
2018 target expressed as 5-year average			**156.6**			**403.6**	

Infrastructure Condition (PM2) and Asset Management Plans

The MAP-21/FAST Act requirements have placed a greater emphasis on transportation system preservation and asset management. Asset management can generally be defined as a strategic process to maintain and replace assets in a desired state of good repair over their lifecycles at a minimum practicable cost. Existing federal statutes and regulations now require that each state Department of Transportation (DOT) and each MPO establish performance targets to assess and monitor the condition of pavements and bridges on the National Highway System (including the Interstate System).[5] As with other performance measures rules, the MPO has the option to either adopt the same performance targets set by the state DOT or establish its own regional targets.

Based on year 2016 data provided by TxDOT, the National Highway System (NHS) facilities within the 12-county North Central Texas region include an estimated 11,459 lane miles of pavement (about 72 percent are state highways under the jurisdiction of TxDOT and about 28 percent are county roads, city streets, and non-TxDOT toll roads managed by other agencies). NHS facilities in the region also include an estimated 3,279 bridges (about 87 percent managed by TxDOT and about 13 percent managed by other agencies). [6,7]

The national performance measures for pavement established in the final rule are the percentage of pavements of the Interstate System and the Non-Interstate NHS in "good" or "poor" condition as defined in the MAP-21 regulations. Using established Highway Performance Management System methodologies, pavement conditions will be assessed on four metrics: International Roughness Index, cracking, rutting, and faulting. The MAP-21 regulations have also established a minimum level that stipulates that the percentage of lane miles on the Interstate System in "poor" condition cannot exceed 5 percent. If the Federal Highway Administration (FHWA) makes a determination that a state DOT has not made "significant progress" toward meeting the minimum level or its adopted targets for NHS pavement conditions, the state DOT may be subject to fiscal penalties that would require it to obligate and transfer portions of its federal-aid highway apportionments to meet these performance requirements.

The national performance measures for bridges (including ramps and culverts) established in the final rule are the percentage of NHS bridges classified in "good" or "poor" condition as defined in the MAP-21 regulations. Bridge conditions will be classified using established National Bridge Inventory ratings for the bridge deck (also referred to as the road bed, but may also include walkway and rail crossings) and the bridge support system (also referred to as the bridge superstructure and substructure). MAP-21 regulations have also established a "minimum level" that stipulate that not more than 10 percent of the total deck area of the NHS bridges in its state can be classified as structurally deficient (i.e. poor or worse condition). If FHWA makes a determination that a state DOT has not made "significant progress" towards meeting the "minimum level" or its adopted targets for NHS bridge conditions, the state DOT may be subject to penalties that would require it to obligate and

[5] 23 U.S.C. 150 and 23 CFR 490

[6] 23 U.S.C. 119 and 23 CFR 515

[7] Pavement and bridge statistics provided by TxDOT Headquarters Data Management via email on January 12, 2018, and January 22, 2018, respectively.

transfer portions of its federal-aid highway apportionments to meet these performance requirements.

In addition to setting performance targets for pavement and bridge conditions, existing federal statutes and regulations now require that each state DOT develop and implement a risk-based transportation asset management plan (TAMP) for the NHS facilities within each state.[8] In addition to NHS facilities owned by the state DOT, the TAMP requirement is also applicable to NHS facilities owned by other agencies. Although not required, the state DOT may include other types of infrastructure assets and other roadways not included on the NHS in the TAMP. At a minimum, the TAMP must include 1) a summary listing of National Highway System pavement and bridge assets and their condition; 2) identification of asset management objectives, measures and performance gaps; and 3) a lifecycle cost and risk management analysis, financial plan, and identification of investment strategies. In addition, it is recommended that state DOTs identify and quantify the risks that may affect the ongoing condition and performance of these NHS assets, including risks associated with current and future environmental conditions, such as extreme weather events. If FHWA makes a determination that a state DOT has not developed and implemented a fully compliant TAMP, the state DOT may be subject to fiscal penalties that would involve a reduction or suspension of a portion of its federal-aid highway apportionments.

FHWA encourages state DOTs to coordinate with MPOs on the development and implementation of the TAMP. It is anticipated that NCTCOG will provide input into the TAMP process through its participation with the FHWA Asset Management Expert Task Group, asset management committees associated with the Transportation Research Board and American Association of State Highway and Transportation Officials, the Texas Association of Metropolitan Planning Organizations, and NCTCOG's continued association with other state and federal regulatory agencies.

System Performance, Freight, and CMAQ (PM3)

Observed System Performance

Observing the current performance of the roadway system is an important component of assessing the system's needs and planning for its future. NCTCOG has data collection programs in place to observe the current roadway system. Additionally, several of the new federal performance measures are designed to summarize the observed performance. With these new federal requirements have come data-sharing agreements that allow NCTCOG to access powerful new datasets of observed travel time. These datasets will allow for calculation of the required measures and additional analyses.

Despite efforts to reduce roadway congestion, the region's increasing population and inadequate transportation funding may make congestion worse despite the improvements recommended in Mobility 2045. While all congestion has social, economic, and environmental impacts, congestion that is inconsistent and difficult to predict has greater impacts than congestion that can be readily anticipated. With this in mind, federal performance final rules related to congestion have tended to focus on the reliability and predictability of travel as opposed to absolute measures of congestion. Reliability is addressed by the following required measures:

- Percent of person miles traveled on the Interstate System that are reliable
- Percent of person miles traveled on the Non-Interstate National Highway System that are reliable

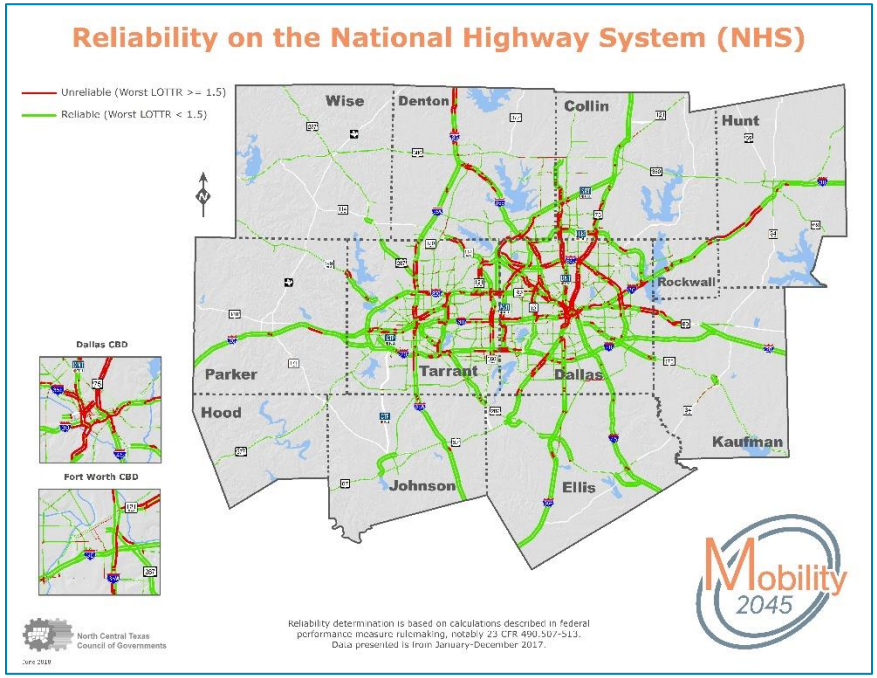
Both measures are primarily calculated using the National Performance Management Research Dataset (NPMRDS). This travel time dataset is available in its second edition from January 2017 to the present. Calculations presented below are for the time period from January 2017 to December 2017 and are calculated using formulas specified in the final rule:

- *Reliable person miles of travel on the Interstate System*: **77.4%**
- *Reliable person miles of travel on the Non-Interstate National Highway System*: **71.2%**

While a majority of person miles of travel on both the Interstate System and Non-Interstate NHS are reliable in the Metropolitan Planning Area, reliability can be increased by implementing programs and projects that reduce non-recurring congestion and boost the overall reliability of the system. Segment-level reliability calculations are depicted in **Exhibit 8-8**.

[8] 23 U.S.C. 119 and 23 CFR 515

Exhibit 8-8: Reliability on the National Highway System



The North Central Texas Council of Governments will continue to monitor and track the current performance of the roadway network using the NPMRDS and other datasets. Preparations to fully incorporate federal performance measure final rules into existing planning and data monitoring processes for the roadway network will continue. Targets for PM3 performance measures are anticipated to be adopted in mid-2018, and the next MTP will fully respond to these measures.

Freight Movement

The PM3 rulemaking also directly addresses freight movement with a required Truck Travel Time Reliability Index measure in the System Reliability/Freight/CMAQ (PM3) rulemaking. As with the Interstate/Non-Interstate Reliability measures, this measure is primarily calculated using the NPMRDS.

However, unlike other NPMRDS-derived measures, this measure does not need to be adjusted for auto occupancy and is reported as a simple regional index. A value of 1.0 indicates that any congestion on a facility that affects freight movement is consistent and predictable. Values above 1.0 indicate decreasing reliability. As depicted in **Exhibit 8-9** and in the below preliminary calculation of the measure, there are areas on the region's Interstate facilities that have significant reliability issues.

Truck Travel Time Reliability Index: **1.75**

This figure can be used as a multiplier for planned travel times to depict the magnitude of reliability issues. In this case, if a truck trip in the region takes 30 minutes on average, to ensure the truck arrives on time a majority of trips, logistics planners may need to plan for as much as 52.5 minutes (representing 30 minutes x 1.75) of travel time because of reliability issues. NCTCOG will set a target in mid-2018, track this measure over time, and fully respond to the final rule in the next MTP.

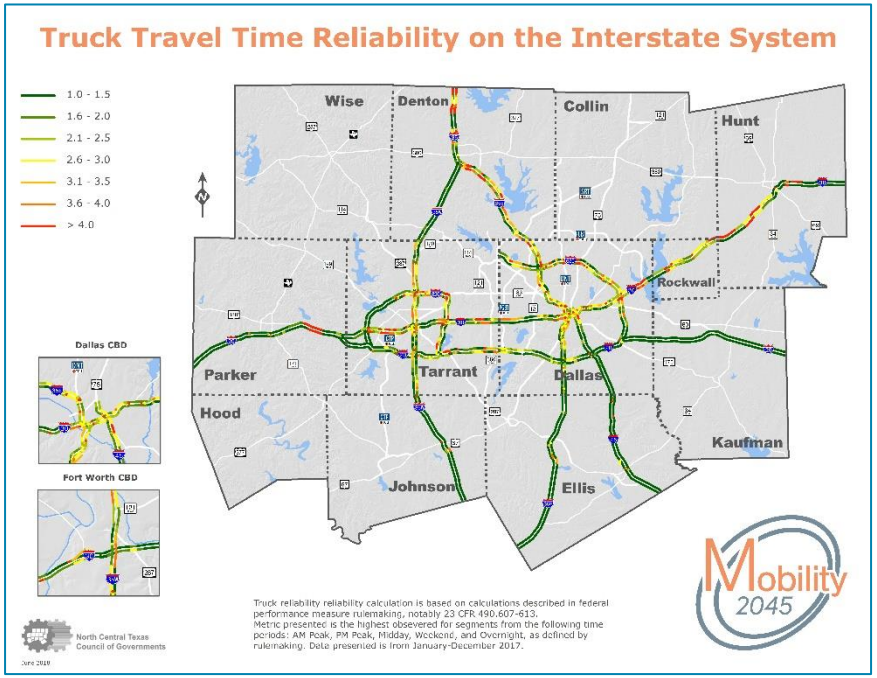
CMAQ/Air Quality

Three of the performance measures required by the PM3 performance measure final rule evaluate the effectiveness of the Congestion Mitigation and Air Quality Improvement Program:

1. Annual Hours of Peak Hour Excessive Delay Per Capita
2. Percent of Non-Single-Occupant Vehicle Travel
3. Total Emissions Reductions

NCTCOG anticipates setting targets for these measures in mid-2018.

Exhibit 8-9: Truck Travel Time Reliability on the Interstate System

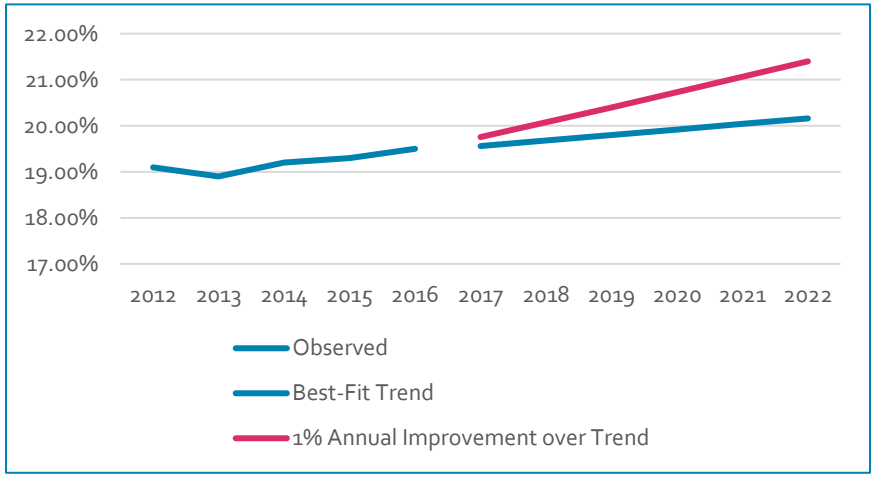


Work is ongoing for all of these measures, but preliminary analysis and results have been produced for the Percent of Non-Single-Occupant Vehicle Travel measure. This measure quantifies the mode share diversity of the region's transportation system by reporting the total percentage of commuters that use a mode of transportation other than driving alone. This includes carpooling, using transit, biking, walking, telecommuting, and other modes. Federal rulemaking allows for a variety of data sources for this measure but strongly encourages use of 5-Year American Community Survey (ACS) results for the sake of consistency with state and federal partners. Since TxDOT is likely to use the ACS for target-setting and reporting, NCTCOG will also use the ACS source to set targets and report this measure. While results of the ACS are generally not available in the year they were collected, federal guidance explicitly allows the reporting agency to use the latest available ACS results. As of plan adoption, 2016 is the latest year that data for this measure has been released. Unlike other required measures, this and the other CMAQ measures initially only apply to the Dallas-Fort Worth-Arlington Urbanized Area.

Percent of Non-Single Occupant Vehicle Travel (2016): **19.5%**

This data source is available back to 2012 in a consistent format, so a limited trend analysis is possible despite the limitations of working with data from the 5-Year ACS. Generally speaking, the percentage of Non-SOV travel increases slightly over time during 2012-2016, and various projections of these trends may be used to set targets for this measure. The 2012-2016 trend data and these basic projections are presented in **Exhibit 8-10**.

Exhibit 8-10: Percentage of Non-SOV Travel Trend Analysis



Additionally, initial calculations have also been performed for the Peak Hour Excessive Delay measure. This measure recognizes that excessive congestion can have a detrimental impact on air quality. As with the travel time reliability and freight measures, this measure is primarily calculated using travel time data from the NPMRDS; it has also been preliminarily calculated for January 2017 to December 2017. As defined in the final rule, excessive delay is extra time spent in congested conditions where speed thresholds are lower than a normally expected delay threshold. If the excessive delay threshold on a hypothetical one-mile segment of road is 30 mph and the observed travel speed on that segment was 25 mph during a specific time interval, the 5 mph difference between the two would result in 24 seconds of excessive delay for each traveler on that segment during that time interval. These segment-level values are summed into a regional total for the calendar year. For the purposes of calculating the measure, the excessive delay threshold is specifically defined as travel occurring where speed is below 20 mph or 60 percent of the posted speed limit, whichever is greater.

Annual Hours of Peak Hour Excessive Delay per Capita: **14.5**

This means that on average, each resident of the urbanized area experiences 14.5 hours of delay on the region's road network greater than the defined threshold for excessive delay. Similar metrics from the Texas A&M Transportation Institute Urban Mobility Scorecard[9] indicate that the number of hours of excessive delay may be increasing, but long-term monitoring of this measure will be needed to fully assess trends. NCTCOG will set a target in mid-2018, track this measure over time, and fully respond to the final rule in the next MTP.

Transit Asset Management

Public transportation provides thousands of people in North Central Texas with daily access to life-essential opportunities. It is critical to have well maintained, reliable transit assets to help ensure safe, dependable, and accessible transit services. The North Central Texas region has a variety of transit assets. The three major transit authorities, Dallas Area Rapid Transit, Trinity Metro (formerly the Fort Worth Transportation Authority), the Denton County Transportation Authority, and smaller transit providers have transit assets, including over 700 buses, 300 small buses, and 150 light rail vehicles; 150 miles of rail track; transit support vehicles like service trucks and police cars; and stations, park-and-ride locations, and maintenance facilities.

Transit asset management (TAM) is a business model that prioritizes funding based on the condition of transit assets to achieve or maintain transit networks in a state of good repair. TAM supports a series of practices to achieve a transit state of good repair including, but not limited to:

- Regular maintenance
- Inspections
- Tracking asset condition over time
- Planning for maintenance and replacement costs
- Replacing each asset at the appropriate time

Based on the federal performance measure final rule on TAM issued in July 2016, MPOs are required to coordinate with transit providers, set performance targets, and integrate performance targets and performance plans into planning documents. NCTCOG reached out to all transit providers in the region and requested transit asset data and agency-level metrics and targets. Based on the data received from transit providers, the Regional Transportation Council has set regional targets for transit asset categories.

Exhibit 8-11 lists the regional metrics and associated targets. The metrics consider the condition of transit assets against a federally defined default metric. The adopted regional targets are for none of the transit assets to be in worse condition than the federal default metric. **Exhibit 8-12** shows a baseline for the region's transit asset management performance, showing the targets and current status in achieving those targets. Transit agencies may have agency-level targets that differ from the proposed regional targets. These agency-level targets may better meet their needs in planning for state of good repair. NCTCOG will continue to coordinate with transit agencies to report, track, and adjust the metrics and targets over time. Transit agencies are also in the process of completing their transit asset management plans. NCTCOG will incorporate those plans into required planning documents as they are finalized.

Exhibit 8-12 presents Fiscal Year 2017 performance for rolling stock compared to the Fiscal Year 2018 target. The Fiscal Year 2017 performance for rolling stock was developed from Fiscal Year 2017 National Transit Database forms prepared by transit agencies. The performance of infrastructure, equipment, and facilities will be available starting with Fiscal Year 2018 when reporting on the condition of those transit asset categories will be mandatory.

[9] https://static.tti.tamu.edu/tti.tamu.edu/documents/ums/congestion-data/dallas.pdf

Exhibit 8-11: Transit Asset Management Targets for 2018

Asset Category	Target	Metric
Rolling Stock (transit vehicles)	0%	Vehicles that meet or exceed the industry standard*, defined as the Federal Transit Administration's Default Useful Life Benchmark
Infrastructure (rail track)	0%	Rail track segments with performance restrictions
Equipment (transit support vehicles)	0%	Vehicles that meet or exceed the industry standard*, defined as the Federal Transit Administration's Default Useful Life Benchmark
Facilities (buildings, stations, park-and-rides)	0%	Transit facilities rated below "Adequate" (3.0) on the industry standard Transit Economic Requirements Model scale.

*Vehicles are as old as or older than the industry standard.

Exhibit 8-12: Rolling Stock Performance Compared to Targets
(Percent of revenue vehicles that have met or exceeded their useful life benchmark)

Asset Type	Fiscal Year 2018 Target	Fiscal Year 2017 Performance
Bus*	0%	6%
Small Bus*	0%	3%
Light Rail Vehicle*	0%	0%
Commuter Rail Locomotive*	0%	0%
Commuter Rail Passenger Car*	0%	0%
Articulated Bus	0%	0%
Commuter Rail Passenger Coach**	0%	35%
Streetcar	0%	0%
Van	0%	13%

*RTC policy emphasis area
**This asset category includes a number of assets that were rebuilt near the end of their useful life. The analysis above assumes a minimum extension of 10 years of useful life, which may be too conservative (i.e. vehicles may be in better condition than expected based on completed rebuild activities).

Additional Performance Measures and Processes

Observed System Performance (Beyond Rulemaking)

Large travel time datasets like the NPMRDS have proven useful for observed performance analyses other than those required by the federal performance final rules. While the focus of the federal performance final rules are on reliability and predictability of congestion, an understanding of absolute congestion is still important to the planning process.

Absolute congestion is commonly represented using a travel time index, which is the ratio of congested travel during peak periods to hypothetical free-flow travel. Higher values indicate more congestion. **Exhibits 8-13 and 8-14** depict areas of the region's freeway system that experienced congestion during typical peak-period weekday travel in 2017. These congested areas may warrant improvements. These figures also reveal that congestion during peak periods on some facilities is directional. For example, travel toward a central business district may be considerably worse during the AM peak period than during the PM peak period. This means some facilities may benefit from reversible managed lanes, peak-period technology lanes, and other innovative operational solutions.

The results of this index can be used validate other planning tools, including NCTCOG's Travel Demand Model.

Exhibit 8-13: AM Peak-Period Travel Time Index

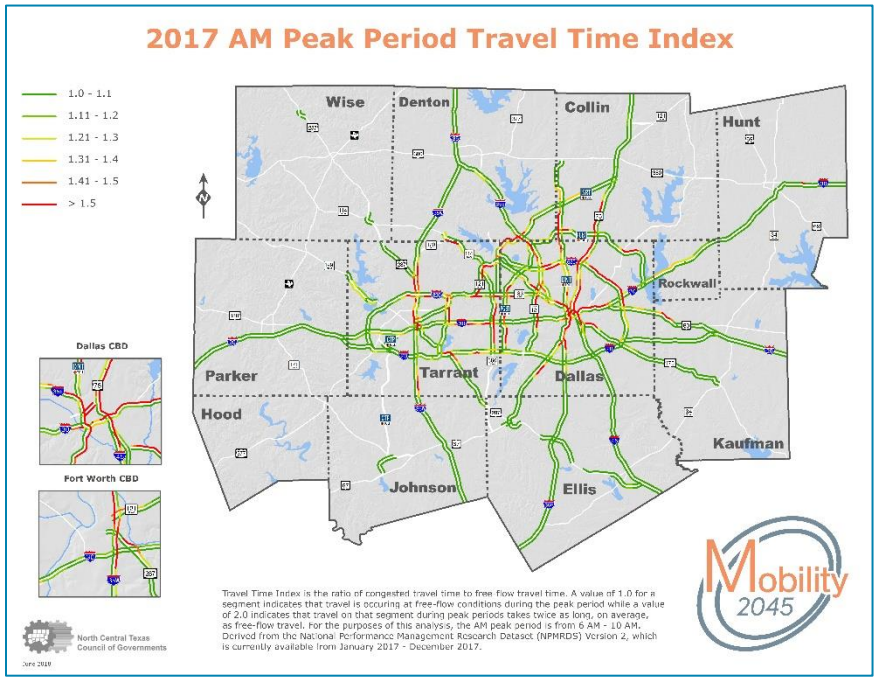
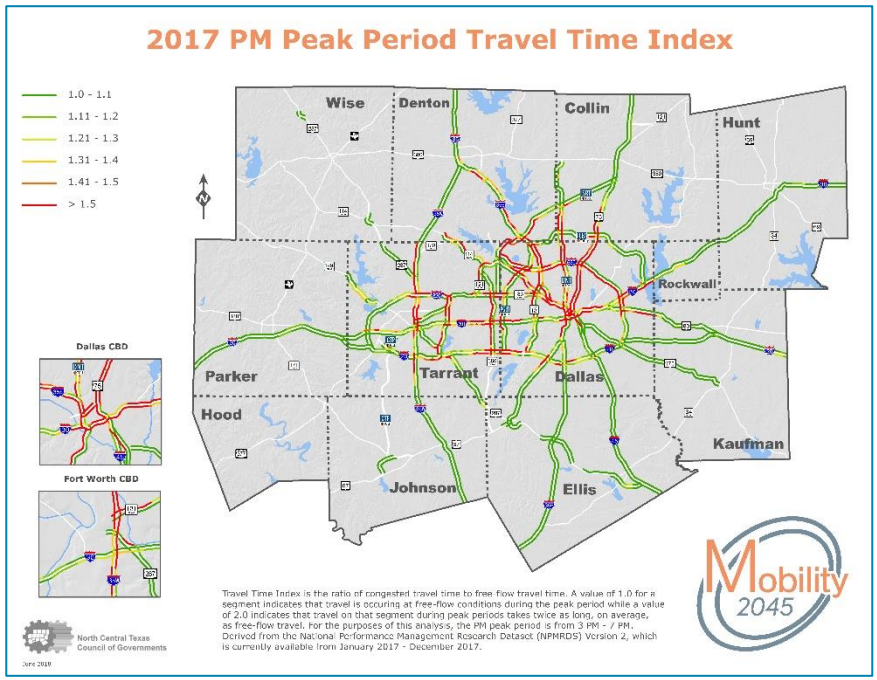


Exhibit 8-14: PM Peak-Period Travel Time Index

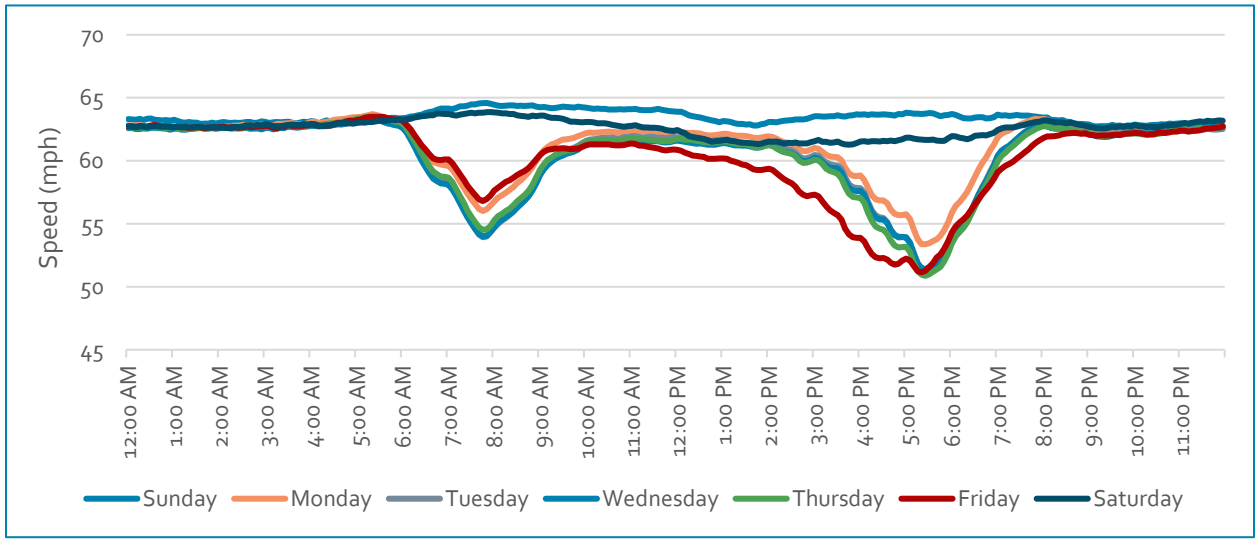


Travel time datasets like NPMRDS have other applications. They can be converted to speed datasets, allowing planners to visualize the data for different times of the day and times of the week. As depicted in **Exhibit 8-15**, freeway speeds in the region in 2017 make a predictable dip during morning and evening peak travel periods. This highlights the systemic nature of the region's congestion issues, confirms assumptions about the time and duration of the peak periods, and illustrates the demand that peak-period travel places on the roadway network.

The NPMRDS and Level of Travel Time Reliability metric defined in the PM3 rule can also be applied on the scale of individual roadway corridors. NCTCOG used this dataset and metric to evaluate projects during the project selection process described in the **Mobility Options** chapter. Additionally, NCTCOG has developed a heat chart to illustrate speeds from the NPMRDS on individual corridor segments to demonstrate the variability of congestion throughout the region over small time periods. This information can be used to evaluate non-recurring congestion events.

While NPMRDS has benefited NCTCOG's efforts to observe the region's current performance, the agency already has a framework for collecting observed performance data. This data includes traffic counts, crash data, and other datasets discussed in other sections. As new, advanced datasets like NPMRDS become available, NCTCOG will collect these data to strengthen the performance-based planning process.

Exhibit 8-15: Average Freeway Speeds by Time of Day



Forecasted System Performance

The North Central Texas Council of Governments models travel demand to forecast regional congestion considering both planned projects and forecasted demographic changes. In 2018, travel in the region is estimated to take approximately 41 percent longer in the congested conditions that occur during peak travel times than in uncongested conditions. Forecasts indicate that by 2045, trips in congested conditions will take nearly 59 percent longer to complete than in uncongested conditions assuming Mobility 2045 recommendations are implemented. This indicates that the transportation system's performance will decline even if the plan's recommendations are implemented. However, if no improvements are made, by 2045, the average trip would take 102 percent longer to complete in congested conditions than in uncongested conditions.

Exhibit 8-16 briefly summarizes the performance of the regional transportation system. Additional details on the system's performance for each of the 12 counties in the Metropolitan Planning Area are found in appendix **G. Regional Performance**.

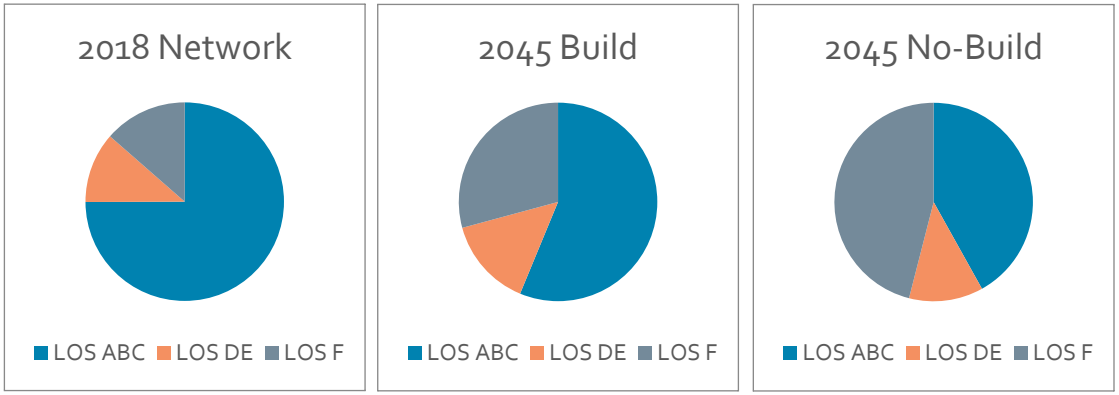
In addition to regional performance measures, the Travel Demand Model generates congestion indicators for individual roadway facilities. These indicators include, but are not limited to, level-of-service (LOS). An LOS analysis measures the operational performance of a roadway during the most congested times of the day.

Exhibit 8-16: Regional System Performance

Regional System Performance	2018	2045	No-Build
Population	7,429,723	11,246,531	11,246,531
Employment	4,793,363	7,024,227	7,024,227
Vehicle Miles of Travel (Daily)	212,232,952	331,495,638	332,500,169
Hourly Capacity (Miles)	44,794,000	54,330,341	44,297,513
Vehicle Hours Spent in Delay (Daily)	1,680,685	3,788,105	6,654,772
Increase in Travel Time Due to Congestion	40.94%	59.32%	101.65%
Annual Cost of Congestion (Billions)	***$12.1***	***$27.3***	***$47.9***

Exhibit 8-17 illustrates the percentage of lane miles with LOS conditions categorized as ABC (free flowing), DE (slower speeds/difficulty changing lanes), and F (gridlock) for the year 2018, 2045, and No-Build scenarios. The charts show that LOS conditions of ABC will decrease and LOS conditions of F will increase, while conditions of DE will remain relatively constant. An additional LOS analysis was performed on each of the region's major roadway corridors; the results are provided in appendix **G. Regional Performance**.

Exhibit 8-17: Lane Miles at Level of Service ABC, DE, and F



Environmental Justice

The North Central Texas Council of Governments strives to ensure that environmental justice populations do not face disproportionately high and adverse impacts from the plans and projects recommended in the MTP. This includes tracking forecasted performance measures related to the impact of planned projects on environmental justice populations. NCTCOG used a component of its Travel Demand Model to forecast the impacts related to accessibility and mobility for protected groups.

Results from the environmental justice analysis are found in the **Social Considerations** chapter and in appendix **B. Social Considerations**.

Air Quality

NCTCOG participates in a cooperative, collaborative process with local, state, and federal agencies to improve air quality across the region. Federal and state requirements dictate maximum levels of nitrogen oxides (NO_X) and volatile organic compounds (VOC) that can be attributed to transportation. Regional Transportation Council (RTC) initiatives, including Transportation Control Measures (TCM) and other elements of the RTC Air Quality Program, were instrumental in meeting NO_X budgets in analysis year 2017.

Results from the air quality analysis are found in the **Environmental Considerations** chapter.

Active Transportation

The performance of the active transportation system for pedestrians, bicyclists, and other non-motorized users is an essential component of a comprehensive, multimodal performance-based planning process. To build on the required Percent of Non-Single-Occupant Vehicle Travel and Non-Motorized Fatalities/Non-Motorized Serious Injuries performance measures, NCTCOG is developing and tracking additional active transportation performance measures that will be integrated into subsequent MTPs.

Freight Movement

Supporting the economy and freight movement are key roles for the region's transportation system. In 2017, the region accounted for 30 percent of the

Texas gross domestic product.[10] To remain a key player in the state and national economy, the region must continue to provide facilities that allow for the steady flow of people and goods.

Data collection and monitoring efforts (above and beyond those mandated by the required freight performance measure) have been established to aid in ensuring adequate capacity for the region's logistical centers. Current travel model data show that nearly 1.02 million truck trips are made daily on the region's roadway network; by 2045, this number is expected to increase to almost 1.10 million. It is important that this type of data be monitored, evaluated, and considered as the transportation system is developed and improved. The continued efficient movement of goods will have a positive impact on the region's economy and the quality of life experienced by the region's residents.

Project Selection/Prioritization Process

Performance measurement played an integral role in the major roadway project selection and prioritization process for Mobility 2045. As detailed in the **Mobility Options** chapter, MAP-21 and the FAST Act require MPOs to select and prioritize projects based on the seven national performance goals:

- **Safety:** To achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
- **Infrastructure Condition:** To maintain the highway infrastructure asset system in a state of good repair.
- **Congestion Reduction:** To achieve a significant reduction in congestion on the National Highway System.
- **System Reliability:** To improve the efficiency of the surface transportation system.
- **Freight Movement and Economic Vitality:** To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
- **Environmental Sustainability:** To enhance the performance of the transportation system while protecting and enhancing the natural environment.
- **Reduced Project Delivery Delays:** To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices.

NCTCOG identified specific performance measures related to each of these goals, and used these performance measures to evaluate roadway segments to determine those most in need of improvements. The scoring process is summarized in **Exhibit 8-18** and discussed in greater detail in the **Mobility Options** chapter.

The process was supplemented by an environmental justice review of project prioritization. This review identified whether:

- The transit and roadway recommendations in Mobility 2045 provide equitable benefits to environmental justice populations.
- The prioritization of these recommendations over time would result in the significant delay in the receipt of benefits to environmental justice populations.

The review found no disparity in the equity or timing of benefits. Results from this review are found in the **Mobility Options** chapter.

[10] North Texas Commission, 2017 Profile of North Texas, http://ntc-dfw.org/publications/profile/

Exhibit 8-18: Performance Measures Used in Mobility 2045 Project Selection Process

MAP-21/FAST Act goal	Weight	Performance Measure	Data Source
Congestion Reduction	10%	V/C[11] on various modeled networks	MOBLOS[12]
	10%	V/C change between build and no-build networks	MOBLOS
System Reliability	10%	Level of Travel Time Reliability	National Performance Management Research Dataset
Safety	20%	Crash Rate (fatal and incapacitating injury crashes)	Agency-curated crash data
Infrastructure Condition	10%	Good/Fair/Poor Pavement condition	Simplified TxDOT pavement dataset (2016)
	10%	Bridge Sufficiency Rating	National Bridge Inventory
Freight Movement	10%	Truck Vehicle Miles Traveled Percentage	MOBLOS Truck Volumes and/or Truck Counts
Economic Vitality	5%	Activity Density Change - Recent (2000-2017)	Demographic Forecasts/Census
	5%	Activity Density Change - Future (2017-2045)	Demographic Forecasts
Environmental Sustainability	10%	Project Type (new location, increased capacity, or Asset Optimization)	Project Listings

Future Considerations Affecting Performance

New technologies, including automated vehicles and ridesharing, are poised to dramatically alter how the transportation system is used. These changes could have positive or negative effects on the transportation system's capacity and congestion, depending on how new technologies are implemented. More discussion of these effects is included in the **Transportation Technology** chapter. These effects will need to be studied as they continue to develop.

The forecasts in Mobility 2045 using NCTCOG's Travel Demand Model are based on a long-standing series of assumptions that future travel patterns will generally be the same as they are today. Changing transportation technology and traveler behavior may mean that future performance deviates significantly from forecasted performance. With this in mind, the agency conducted a preliminary scenario planning exercise to test these assumptions and current analysis tools.

This analysis concluded that better analysis tools are needed. It did yield useful information about the strengths and weaknesses of current assumptions.

While many scenario analyses focus on land use, the scenarios tested in NCTCOG's exercise focused on travel patterns and characteristics of the transportation system. NCTCOG recognizes the importance of scenario planning to a comprehensive performance-based planning process, and it will therefore be explored further and integrated into future MTPs.

Much of the data now available to the agency for its observed performance measures is the output of new observation and data collection technologies that were unavailable or much less reliable in previous years. This includes large datasets providing near real-time travel times (National Performance Management Research Dataset), crowdsourced incident data (Waze), and continuous traffic counters. NCTCOG anticipates that this trend of a greater quantity and quality of observed transportation data will continue and further strengthen observed performance measurement. In-house data infrastructure will need to continue to adapt to support this continuing influx of data.

[11] V/C is the ratio of a roadway's volume to capacity.

[12] MOBLOS is a measure of the Mobility Level of Service. This measure of performance is produced by NCTCOG's Travel Demand Model.

Summary

NCTCOG has a robust performance-based planning process in place, which has been bolstered in Mobility 2045 by new federal performance requirements. These requirements are being incorporated into planning processes. Current processes include performance measures based on both observed and forecasted data sources, both of which will continue to be strengthened in future Metropolitan Transportation Plans.

The region faces a continuing challenge to implement transportation improvements that will have a lasting positive benefit for the region. These improvements must address continued population growth, yet they are constrained by financial resources that are insufficient to meet the needs created by that growth. By continuing to evaluate and monitor the region's transportation system using a performance-based planning process, policymakers can ensure that the most beneficial and effective projects and programs are implemented. Additional information on regional performance is found in appendix **G. Regional Performance**.

THIS PAGE INTENTIONALLY LEFT BLANK