

8. Regional Performance

Introduction

Measuring and tracking the performance of the region's transportation system is a fundamental component of the Metropolitan Transportation Plan and the performance-based planning process used at NCTCOG (North Central Texas Council of Governments). Performance measurement allows planners to assess the current state of the system relative to regional goals to develop recommendations for improvements, evaluate the effectiveness of recently implemented improvements, and forecast the effectiveness of planned improvements.

Performance measurement activities in the Mobility 2045 Update fall into three categories:

- **Performance Relative to Plan Goals:** Measures quantifying the transportation system's performance relative to the Mobility 2045 Update's nine goals are covered in this section. See the **Introduction** chapter for more information on the plan's goals.
- **Federal Performance Measures:** Measures quantifying the transportation system's performance relative to federal goals as required by Federal Highway Administration and Federal Transit Administration rules mandated by the Moving Ahead for Progress in the 21st Century Act and the Fixing America's Surface Transportation Act. For more information, see the **Federal Performance Measures** section of this chapter.
- **Additional Performance Measurement Processes:** Additional performance measurement activities and components of NCTCOG's performance-based transportation planning process. This is located in the *Additional Performance-Based Planning Efforts* section of this chapter.

Performance Relative to Plan Goals

The Mobility 2045 Update includes a suite of nine goals to guide the planning process nested into four goal themes, as discussed in the **Introduction** chapter. Since these goals are integral to plan development, it is important to understand how the region's transportation system is currently performing relative to these goals, in order to identify policies, programs, and projects that can contribute to their achievement. As equity is considered throughout the planning process, several of the measures in this framework directly address equity as well, where appropriate data is available. Equity will play a growing role in the plan's performance measurement activities as better datasets become available.

NCTCOG has used performance-based planning processes for some time, but performance relative to plan goals is a new addition to the Metropolitan Transportation Plan process with the adoption of the Mobility 2045 Update. It will eventually become a larger component of subsequent plans, possibly including targets and direct integration into project selection and prioritization processes.

Since the Mobility 2045 Update retains the core components of Mobility 2045, its existing goals are being carried forward. A comprehensive goal development process is planned for future new Metropolitan Transportation Plans, and some new performance measures may be needed to describe the performance of the transportation system relative to new goals at that time.

In this framework, performance measures are tied to goals through objective statements. Goals remain broad statements of desired outcomes while objectives are statements of specific activities that can lead to achievement of goals. Performance measures quantify progress towards specific objectives and therefore progress toward

achieving broader goals. Each goal contains one or more objectives, and each objective contains one or more performance measure.

The following measures are grouped by goal theme and goal and are referenced throughout the document. Additionally, these measures will be reported on an annual basis as part of general reporting on progress toward implementing the plan.



Chapter Connections

The performance measures outlined in this chapter are part of a comprehensive effort to improve transportation for North Texans. Efforts to achieve the plan's goals are embodied in the projects, programs, and policies discussed throughout this document.

Performance measures serve as a vital way to tie specific efforts to improve the transportation system with the broader goals of the plan.

Connections to chapters containing more information about efforts and funded projects, programs, and policies are shown throughout this chapter, in a box like this. Here are some of the chapters this section will reference:

-  **Financial Reality**
-  **Social Considerations**
-  **Environmental Considerations**
-  **Operational Efficiency**
-  **Mobility Options**
-  **Transportation Technology**

Goal Theme 1: Mobility

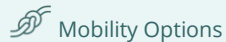
Goal 1: Improve the availability of transportation options for people and goods

The Mobility 2045 Update includes a suite of policies, programs, and projects addressing the region's broad range of transportation needs. Objectives and measures related to this goal quantify continuing progress toward implementing a multimodal transportation system.

Objective: Expand the region's network of active transportation facilities

- ➔ **Measure:** Number of Miles of Existing Regional Veloweb
- ➔ **Measure:** Number of Miles of Existing Community Shared-Use Paths
- ➔ **Measure:** Number of Miles of Existing On-Street Bikeways

Chapter Connection



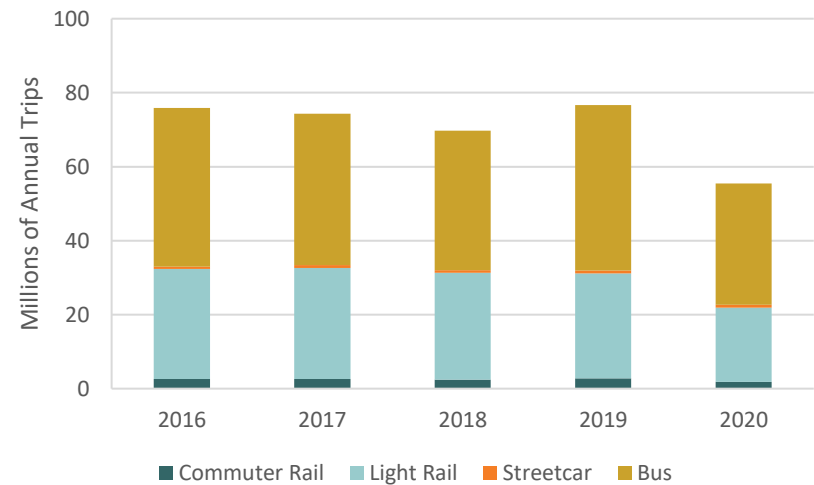
Mobility Options

As discussed in the **Mobility Options** chapter, the region's growing network of off-street and on-street active transportation facilities provides a number of benefits to the region's population and transportation system, including benefits to quality of life, health, air quality, congestion, and others. Quantifying the growth of this network over time is an important component of understanding the growth of transportation options across the region. As shown in **Exhibit 8-1**, the mileage of this network has been steadily increasing.

The Mobility 2045 Update recommends a number of policies, programs, and projects that will continue to expand the region's active transportation network in the future, including new dedicated trail facilities, bicycle/pedestrian facilities constructed as part of

roadway improvements, and policies and programs that generally incentivize their construction. For more information on these recommendations and their benefits to the region's transportation system, refer to the **Mobility Options** chapter. For a more detailed breakdown of these measures, along with similar statistics for funded and planned facilities, refer to the **Mobility Options** appendix.

Exhibit 8-1: Annual Transit Trips



To develop a balanced transportation system that enhances access and mobility for users, investment in the expansion of the region's transit system is necessary, especially as the metroplex continues to experience tremendous growth in population and employment. Strategic investment in the expansion of the transit system supports the development of an efficient system that helps to control capital and operating costs while appropriately fulfilling transit needs and demand, thereby maximizing return on investment.

Exhibits 8-2 and **8-3** depict the annual transit trips (i.e., ridership) across various modes over a five-year period. Prior to the pandemic,

annual performance for each transit mode experienced variation year over year; the adverse impact of the ongoing COVID-19 pandemic on transit performance is seen in 2020. Additionally, **Exhibit 8-3** includes trips by vehicle revenue hour to get an indication of service effectiveness, and rail track mileage by mode and the

associated stations for each type of rail service is shown as of 2020. System mileage will be monitored moving forward to monitor system expansion. National Transit Database is the data source for the first two metrics listed in the exhibit; information on provider websites is used for the last metric (rail track/stations).

Exhibit 8-2: Existing Active Transportation Facilities

Measure	Mobility 2040 (2016)	Mobility 2045 (2018)	Mobility 2045 Update (2022)
Number of miles of existing Regional Veloweb	442	455	538 ▲
Number of miles of existing community shared-use paths	333	318	470 ▲
Number of miles of existing on-street bikeways (urbanized areas)	200	212	276 ▲
Totals	975	985	1,284 ▲

Exhibit 8-3: Annual Transit Trips and System Mileage

Measure	2016		2017		2018		2019		2020		
Annual Unlinked Trips by Mode	CR	2,599,251	CR	2,602,597	CR	2,458,282	CR	2,808,114	CR	1,827,400	
	LR	29,762,161	LR	29,993,849	LR	28,873,235	LR	28,335,785	LR	20,081,036	
	SR	651,628	SR	769,392	SR	667,829	SR	798,297	SR	775,259	
	Bus	42,859,582	Bus	40,965,435	Bus	37,708,698	Bus	44,737,516	Bus	32,736,580	
Annual Unlinked Trips per Vehicle Revenue Hour by Mode ¹	CR	35.3	CR	26.2	CR	26.5	CR	24.2	CR	17.4	
	LR	62.9	LR	61	LR	63	LR	56.7	LR	41.7	
	SR	43	SR	41.8	SR	35.5	SR	38.4	SR	34.4	
	Bus	16.3	Bus	15.3	Bus	13.7	Bus	15.9	Bus	12.3	
Rail Track Mileage and No. of Stations										CR	82 miles 25 Stations
										LR	93 miles 65 Stations
										SR	7.05 miles 6 Stations

CR: Commuter Rail; LR: Light Rail; SR: Streetcar

¹ This metric represents a weighted average by mode (except streetcar) to account for the relative contribution of a transit provider's trips to the cumulative total

Objective: Expand the region's transit system to provide more transportation options while improving its effectiveness


- ➔ **Measure:** Annual Unlinked Passenger Trips by Mode
- ➔ **Measure:** Annual Unlinked Passenger Trips per Vehicle Revenue Hour by Mode
- ➔ **Measure:** Rail Track Mileage and Number of Stations

Chapter Connection
 Mobility Options

Effective and efficient expansion of the region’s transit system will remain a priority, while ensuring that appropriate transit modes are utilized to match varying transit needs and current and future demand in communities.

Objective: Increase the share of non-traditional transportation modes

- ➔ **Measure:** Percent Non-Single-Occupant Vehicle Travel

Chapter Connection
 Operational Efficiency

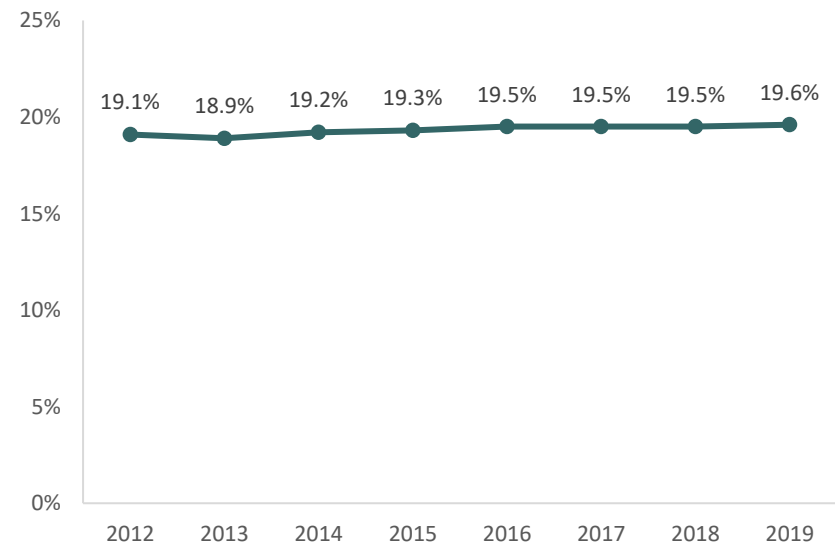
Driving alone is an inefficient use of resources and the transportation system when compared to other modes. This measure quantifies the proportion of commute travel that uses modes other than driving alone in the Dallas-Fort Worth-Arlington Urbanized Area. This includes transit, carpooling, telecommuting, bicycling, walking, and other modes. This measure is part of the suite of performance measures required by federal rulemaking. For more information, see *PM3 (System Performance, Freight, and CMAQ)* in the **Federal Performance Measures** section of this chapter. The data source for this measure is US Census Bureau American Community Survey 5-Year Estimates.

During the time period for which reliable data is available, this measure has been either steady or slightly improving, as seen in **Exhibits 8-4** and **8-5**. Recent changes to traveler behavior due to the ongoing COVID-19 pandemic are likely to have a significant impact on traveler behavior that is not yet reflected in the available data for this measure. Any policy, program, or project recommended by the Mobility 2045 Update that improves or incentivizes carpooling, nonmotorized travel, transit, and other modes may improve this measure in the future.

Exhibit 8-4: Percent Non-Single-Occupant Vehicle Travel

2012	2013	2014	2015	2016	2017	2018	2019
19.1%	18.9%	19.2%	19.3%	19.5%	19.5%	19.5%	19.6%

Exhibit 8-5: Percent Non-Single-Occupant Vehicle Travel



Goal 2: Support travel efficiency measures and system enhancements targeted at congestion reduction and management

Many of the policies, programs, and projects recommended by the Mobility 2045 Update seek to directly address current and future congestion while ensuring the region's transportation system operates more efficiently. Measures related to this goal seek to quantify both absolute congestion and the impacts of policies and programs related to operational efficiency.

Objective: Reduce congestion on the region's roadway network

Measure: PM Peak Period Travel Time Index on Freeways

Addressing congestion on the region's roadway network is a key priority of the Mobility 2045 Update. Roadway congestion has a variety of impacts to the region's economy and quality of life, as discussed in more detail in the **Mobility Options** chapter.

Chapter Connection

- Operational Efficiency
- Mobility Options

This measure quantifies the average magnitude of congestion on the region's freeway network during peak travel times. A travel time index, as used for this measure, is a ratio of peak travel times to free-flow travel times. If travel on a specific roadway segment typically takes 30 seconds during off-peak times but takes 45 seconds during peak times, the travel time index for that segment would be 1.5. The data source for this measure is the National Performance Measurement Research Dataset, a travel time dataset provided to Metropolitan Planning Organizations by Inrix and the University of Maryland's CATT Lab.

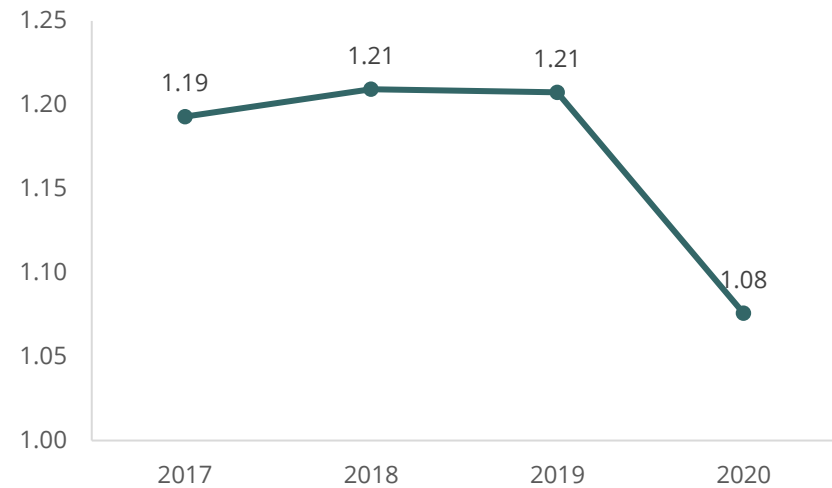
As depicted in **Exhibits 8-6** and **8-7**, congestion held relatively steady during 2017 to 2019 but declined notably in 2020 as a result of the

ongoing COVID-19 pandemic. A wide variety of policies, programs, and projects recommended by the Mobility 2045 Update will directly address roadway congestion.

Exhibit 8-6: PM Peak Period Travel Time Index on Freeways

Measure	2017	2018	2019	2020
PM Peak Period Travel Time Index on Freeways	1.19	1.21	1.21	1.08 ▼

Exhibit 8-7: PM Peak Period Travel Time Index on Freeways



Objective: Improve congestion issues that disproportionately impact freight movement

Measure: Percentage Difference Between Truck Congestion and Passenger Vehicle Congestion

Chapter Connection

- Mobility Options

The efficient movement of freight and freight vehicles in the region is a key

component of the region’s economic success. However, the region’s congestion issues are often more acute for trucks than for passenger vehicles. This can be caused by issues with roadway geometry, lack of merging space, and intermittent (“stop-and-go”) congestion, all of which can be difficult for trucks to navigate efficiently. Disproportionate truck congestion can be alleviated by policies, programs, and projects that:

- Address overall congestion issues, as a reduction in overall congestion can shrink the gap between congestion for trucks and passenger vehicles.
- Construct or otherwise incentivize the use of managed lanes, as the guaranteed travel times provided by managed lanes have proven to be a popular option for freight operators.
- Address geometric and merging issues through Asset Optimization and other projects.
- Improve the overall reliability of the roadway network, as trucks are less able to navigate unpredictably congested facilities.

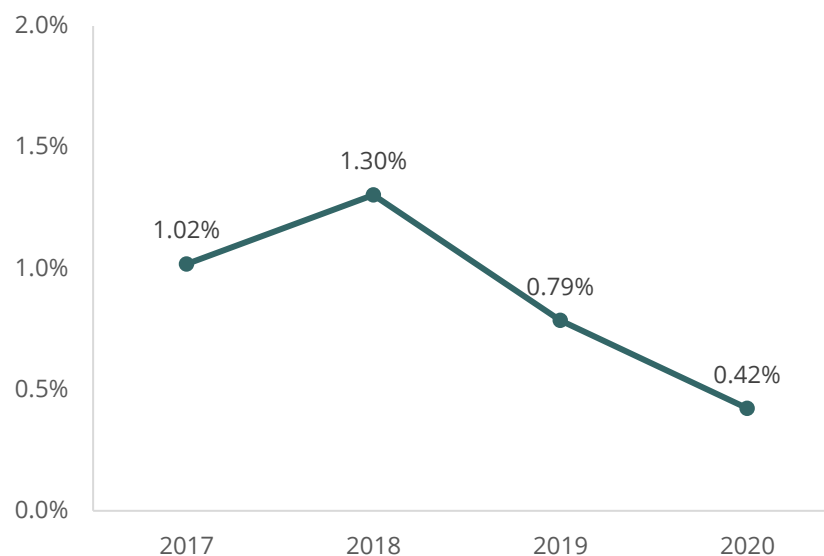
This measure is the percentage difference between an independent PM peak period travel time index (as discussed above) for both passenger vehicles and trucks. Travel time indices are almost always higher for trucks than for passenger vehicles. The data source for this measure is the National Performance Measurement Research Dataset, a travel time dataset provided to Metropolitan Planning Organizations by Inrix and the University of Maryland’s CATT Lab.

As depicted by **Exhibits 8-8** and **8-9**, truck travel time indices have generally been around 1 percent higher for trucks than for passenger vehicles in recent years, with a significant decrease in 2020 as the ongoing COVID-19 pandemic significantly reduced all congestion across the system.

Exhibit 8-8: Percentage Difference Between Truck Congestion and Passenger Vehicle Congestion

Measure	2017	2018	2019	2020
Percentage Difference Between Truck Travel Time Index and Passenger Vehicle Travel Time Index	1.02%	1.30%	0.79%	0.42% ▼


Exhibit 8-9: Percentage Difference Between Truck Congestion and Passenger Vehicle Congestion



As discussed in the **Mobility Options** chapter, the Mobility 2045 Update recommends a variety of policies, programs, and projects that may help to improve this measure in the future.

Objective: Provide training for first responders to manage crash incidents quickly and effectively

Measure: Entities that Have Sent One or More Personnel to Freeway Incident Management Training

Chapter Connection
 Operational Efficiency

Crash incidents on the region’s freeway network are a significant cause of nonrecurring congestion. Nonrecurring congestion contributes both to absolute/average congestion and to reliability issues. The primary responsibility of first responders on the scene of freeway crashes is to protect the safety of involved parties, other first responders, and the traveling public. Secondary responsibilities are to investigate the crash incident and clear the crash from travel lanes as expeditiously as possible. Freeway Incident Management training can give first responders the best practices they need to manage a crash site as safely and quickly as possible, therefore reducing the amount of time it impedes upstream traffic.

This measure documents the cumulative total number of local entities (generally cities and counties) that have sent personnel from their police or fire department to these training sessions as tracked by NCTCOG staff, the current totals of which are shown in **Exhibit 8-10**. Ultimately this may be replaced with a measure more directly related to average crash clearance time pending the availability of better data sources.

Exhibit 8-10: Entities that Have Sent One or More Personnel to Freeway Incident Management Training


Measure	2021 ²
Entities that have sent one or more personnel to Freeway Incident Management training (Police Departments)	95
Entities that have sent one or more personnel to Freeway Incident Management training (Fire Departments)	53

Goal 3: Ensure all communities are provided access to the regional transportation system and planning process

Building an equitable transportation system that meets the transportation needs of all of the region’s diverse population now and in the future and making sure that all populations have a voice in public involvement processes are two key priorities of the Mobility 2045 Update. Both are good planning practice and are required by federal legislation and rulemaking. Measures related to this goal quantify existing efforts towards improving the equity of the system and planning processes.

Objective: Improve transit access for the region’s population across multiple transit modes

- Measure:** Percentage of the Region’s Population with Access to Frequent Fixed-Route Service
- Measure:** Percentage of the Region’s Employment with Access to Frequent Fixed-Route Service
- Measure:** Percentage of the Region’s Population with Access to Microtransit

Chapter Connection
 Mobility Options

² Developed from data collected during development of the Mobility 2045 Update.

➔ Measure: Percentage of the Region’s Employment with Access to Microtransit

The less time people have to wait at a bus stop or rail station to access transit service, the more attractive transit becomes to them as a viable transportation option. The frequency at which transit service operates at a stop/station, therefore, is an important service component to monitor as the region's transit system expands. For the purposes of these measures, stops or stations have frequent fixed-route service if they are served with a 15-minute or better headway by a combination of all bus and rail routes that serve the stop or station during peak periods. A buffer of one-half mile around stops is used to determine access to this transit service.

Microtransit, a nontraditional transit option, is similar to frequent fixed-route service in that it aims to reduce the average wait time of users by providing quicker, more frequent service. It is typically operated as an on-demand service that provides curb-to-curb transportation *within* a designated zone boundary (i.e., service area).

As shown in **Exhibit 8-11**, a substantial proportion of the region’s population and employment has access to microtransit, but somewhat fewer have access to frequent fixed-route service.

Exhibit 8-11: Population and Employment with Access to Frequent Transit

Measure	Population	Employment
Percent of Population and Employment Opportunities Near Frequent Fixed-Route Service	15.42%	33.15%
Percent of Population and Employment Opportunities within Microtransit Service Areas	26.73%	28.98%

These measures are currently reported at a single point in time using the latest data available but will be tracked on an annual basis in the future. The data sources for this measure are General Transit Feed


Specification feeds provided by Dallas Area Rapid Transit, Trinity Metro, Denton County Transportation Authority, and STAR Transit; the Census Bureau’s American Community Survey 5-Year Estimates; the Census Bureau’s Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics; and a transit service area boundary dataset maintained by NCTCOG.

A common purpose for which people use transit (both fixed-route and microtransit) is to connect to employment opportunities. Making transit available to people to get to/from work provides users *flexibility* to utilize a range of transportation options to meet their diverse, changing travel needs. Transit often provides an affordable transportation option to get to/from work, which can help to reduce transportation costs for many—especially for transportation-disadvantaged communities who may experience a disproportionate burden of transportation costs.

As the Mobility 2045 Update aims to balance the needs of transportation users by supporting the development of a multimodal transportation system, it is important to monitor the progress of the region's expanding transit system to ensure it accommodates the diverse mobility needs of a growing region.

Objective: Maintain an open dialog with the public through public comment processes

➔ Measure: Number of Public Comments Received through Multiple Channels

Chapter Connection
 Social Considerations

As discussed in the **Social Considerations** chapter, North Central Texas is home to a diverse population with a variety of transportation needs. NCTCOG’s transportation planning processes, including, but not limited to, the Mobility 2045 Update, are stronger when they incorporate feedback

from communities across the region. Public comments relevant to the plan can come from two primary means:

- Comments submitted to the Map Your Experience mapping/comment tool
- Comments received through traditional public involvement processes specific to mobility plans, including public meetings, outreach events, and emails directly to the department's transinfo@nctcog.org email address.

As detailed in **Exhibit 8-12**, this measure is an annual summation of comments received from these sources by year. Additional sources for plan-related public comments may be added as this measure is tracked in the future.

Exhibit 8-12: Public Comments Received Relevant to Mobility Plans

Comment Source	2020	2021	2022 (To June 9)
Map Your Experience	200	235	217
Metropolitan Transportation Plan Traditional Public Involvement	2	1	16
Totals	202	236	233

Since its launch in early 2020, Map Your Experience has become a valuable tool for receiving feedback from the public relevant to mobility plans, and similar tools will likely be used into the future as the public involvement state of practice evolves in response to the ongoing COVID-19 pandemic. Comments submitted to Map Your Experience are received in a context that differs from traditional public involvement processes, but the two are aggregated together with this measure for the purposes of painting a holistic picture of plan-related public involvement processes. The relative lack of comments received by traditional means during 2020 and 2021 reflects the fact that public involvement processes for the plan were not active during this time, but Map Your Experience proved to be a valuable tool to bridge this gap.

This measure can be improved by continuing to seek out and implement new means of accepting public feedback and continuing to invest in public involvement processes in general. Policies and programs recommended by the Mobility 2045 Update that encourage and support public involvement processes will be essential as well.

Objective: Improve access to the internet for all populations across the region

 **Measure:** Access to the Internet

As discussed in the **Social Considerations** chapter, a goal of the Mobility 2045 Update is for all residents of the NCTCOG region to have access to the public involvement process. Especially following stay-at-home orders and other social distancing measures associated with the ongoing COVID-19 pandemic, many government organizations have increased the use of virtual meetings and virtual services, held online in lieu of in-person activities. Access to internet service is increasingly a key determinant of access to services and the public process. The NCTCOG Transportation Department intends to facilitate discussions with local partners about expanding access to broadband internet service. Reliable access to the internet at home also facilitates telecommuting, which can unburden trips from the region's transportation system during peak commute times. As shown in **Exhibit 8-13**, lower-income households (defined here as households earning less than \$35,000 last year) are more likely to be without internet access at home. Likewise, minority populations are more likely than the general population to be without a computer and/or internet access. The data source for this measure is the 2019 American Community Survey 5-Year Estimates.

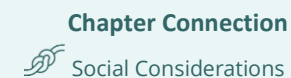


Exhibit 8-13: Internet Access, by Minority Status and Income

Minority Status/Income	Percent
Households Without Internet	13.9%
Lower-Income Households Without Internet (Household Income Below \$35,000/Year)	32.7%
Population Without Computer and/or Internet	12.4%
Minority Population Without Computer and/or Internet	16.8%

This measure can be improved by policies and programs that improve internet access for populations across the region, both for the sake of facilitating telecommuting and for access to the planning process.

Goal Theme 2: Quality of Life

Goal 4: Preserve and enhance the natural environment, improve air quality, and promote active lifestyles

Transportation can have significant impacts on the natural environment and public health, and the policies, programs, and projects recommended by the Mobility 2045 Update seek to quantify and manage these impacts. Measures related to this goal quantify environmental impacts of the transportation system and related economic development.

Objective: Preserve the region's open and natural areas

Measure: Percentage of Regional Land Developed

Chapter Connection
Environmental Considerations

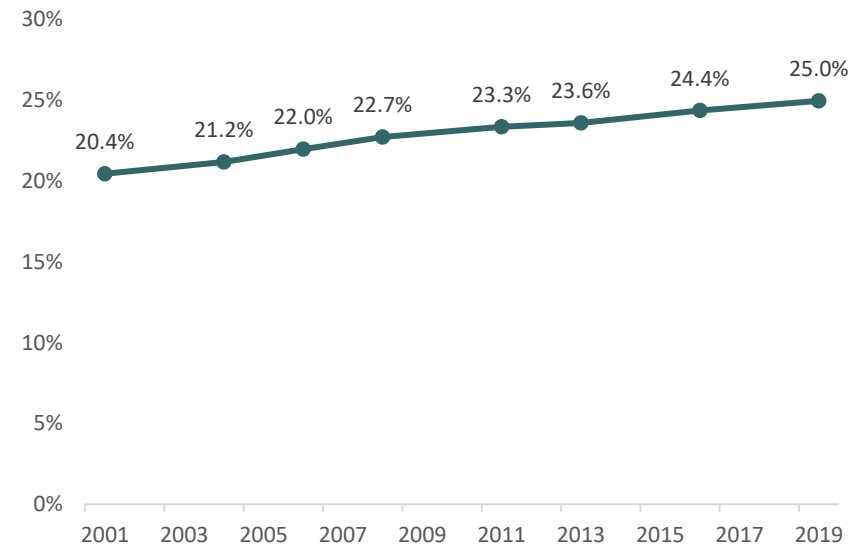
As discussed in the **Environmental**

Considerations and **Operational Efficiency** chapters, development patterns, including highways and transit lines, can negatively impact the natural environment and ecosystems. This measure can be influenced through policies that encourage denser, more mixed-use development in the region and through implementing projects that do not incentivize suburban sprawl while still encouraging responsible, sustainable economic development. As shown in **Exhibits 8-14** and **8-15**, developed areas in the NCTCOG region have increased steadily from 2001 to 2019. Increasing densities in the region, coupled with Mobility 2045 Update's suite of policies, programs, and projects, may affect this measure in the future. The data source for this measure is the National Land Cover Database's "Developed Area" classifications. The total land area classified as "Developed" by National Land Cover Database in the Metropolitan Planning Area is compared to the region's total land area to determine the final percentage.

Exhibit 8-14: Percentage of Regional Land Developed


Year	Percentage of Regional Land Developed
2001	20.45%
2004	21.18%
2006	21.96%
2008	22.72%
2011	23.35%
2013	23.60%
2016	24.36%
2019	24.96% ▲

Exhibit 8-15: Percentage of Regional Land Developed



Objective: Implement resilient roadway and transit projects that are protected from floods and minimize impact on the natural environment

➔ **Measure:** National Highway System Lane Miles in Flood Zones

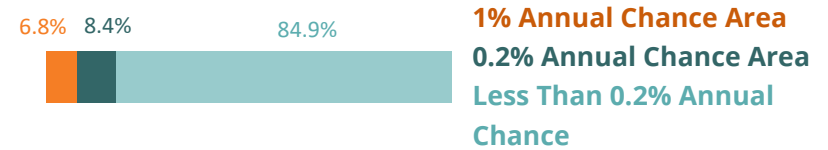
Chapter Connection
 Environmental Considerations

As discussed in the **Environmental Considerations** and **Operational Efficiency** chapters, development in floodplains, including highways and transit lines, can have negative stormwater impacts and may be counter-productive to resiliency goals. Floodplains are often also environmentally sensitive areas that may be harmed by the construction of transportation infrastructure. As shown in **Exhibits 8-16** and **8-17**, of the 18,563 lane miles in the region on the National Highway System, 6.8 percent intersect the 100-year floodplain, and 8.4 percent intersect the 500-year floodplain. This measure can be influenced through selecting roadway projects that do not intersect regional flood plains. The data source for this measure is the Texas Department of Transportation’s Geospatial Roadway Inventory Database and the Federal Emergency Management Agency’s Flood Insurance Rate Map. While only one year is currently reported for this measure, this measure will be tracked into the future as floodplains are updated and the region’s roadway network evolves.

Exhibit 8-16: National Highway System Lane Miles in Flood Zones


	NHS Lane Miles	Percent of Total
National Highway System Lane Miles in 12-County Region	18,563	-
Lane Miles in 1% Annual Chance Area	1,258	6.8%
Lane Miles in 0.2% Annual Chance Area	1,551	8.4%

Exhibit 8-17: National Highway System Lane Miles in Flood Zones



Objective: Work to reduce transportation-related emissions of air pollutants, including ozone precursors

➔ **Measure:** 8-Hour Ozone NAAQS Design Value (ppb)

Chapter Connection
 Environmental Considerations

Poor air quality can significantly impact health and quality of life. Ground-level ozone is a significant pollutant that can be created by emissions of nitrogen oxides and volatile organic compounds by the transportation system. Recognizing the impact ground-level ozone can have on health, the Environmental Protection Agency, Texas Commission on Environmental Quality, NCTCOG, and others are all working to reduce emissions of these precursors. Ozone levels are closely monitored, and specific regulatory actions are triggered when ozone values exceed the NAAQS (National Ambient Air Quality Standards). These regulations have significant impacts on the transportation planning process.

As discussed in the **Environmental Considerations** chapter, nine counties in North Central Texas are in nonattainment of the 2015 8-Hour Standard NAAQS for ozone, and 10 counties are in nonattainment of the earlier 2008 8-Hour Standard NAAQS as well, though the region narrowly missed attainment of the 2008 Standard. Per NAAQS, attainment is reached when, at each monitor, the Design Value (three-year average of the annual fourth-highest daily maximum eight-hour average ozone concentration) is equal to or less

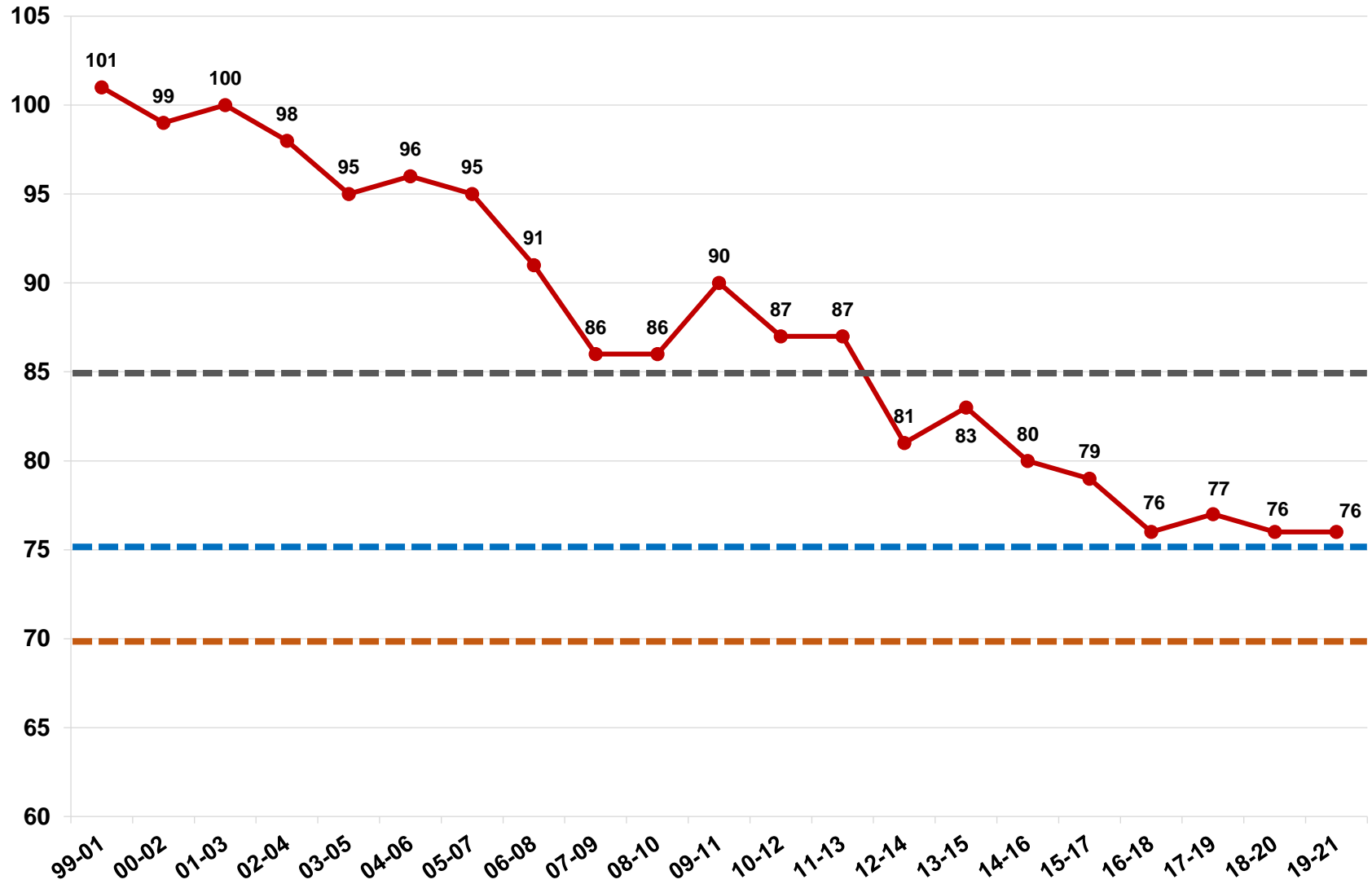
than the standard value established by the rulemaking: 70 ppb for the 2015 Standard and 75 ppb for the 2008 Standard. NCTCOG closely monitors the region's design values over time to track progress towards achieving attainment and creating healthier air quality for the region's population, as shown in **Exhibits 8-18** and **8-19**.

Exhibit 8-18: 8-Hour Ozone NAAQS Design Value (ppb)

Year	Regional Design Value
1999-2001	101
2000-2002	99
2001-2003	100
2002-2004	98
2003-2005	95
2004-2006	96
2005-2007	95
2006-2008	91
2007-2009	86
2008-2010	86
2009-2011	90
2010-2012	87
2011-2013	87
2012-2014	81
2013-2015	83
2014-2016	80
2015-2017	79
2016-2018	76
2017-2019	77
2018-2020	76
2019-2021	76 ▶


Ground-level ozone can be reduced by policies, programs, and projects that reduce the emissions of ozone precursors by the transportation system by reducing congestion, incentivizing fleet turnover, encouraging the adoption of alternative fuels, Intelligent Transportation Systems deployment, encouraging nonmotorized trips and/or telecommuting, shortening commutes, and other strategies. Refer to the **Environmental Considerations** chapter for more information on these strategies and air quality regulations.

Exhibit 8-19: 8-Hour Ozone NAAQS Design Value (ppb)



Objective: Encourage a transition to more sustainable fuel sources for the region’s vehicles

- ➔ **Measure:** Electric Vehicle Registrations
- ➔ **Measure:** Electric Vehicle Charging Infrastructure (Number of Plugs)
- ➔ **Measure:** Public Agency Fleet Greenhouse Gas Reductions (Dallas-Fort Worth Clean Cities)

Chapter Connection
 Environmental Considerations

Alternative Fuels

An increasing proportion of the region’s vehicle fleet uses alternative fuels, including, but not limited to, electricity and natural gas. Many of these fuel sources substantially reduce the air quality impact of transportation. For this reason, continuing to support the growth of alternative fuels is a key priority for the Mobility 2045 Update that is supported by a number of policies, programs, and projects it recommends.

Electric Vehicles

The market share of EVs (electric vehicles) is growing worldwide and EV registration trends in North Texas are following suit. As of December 2021, approximately 38,134 EVs were registered in North Texas, as shown in **Exhibit 8-20**. Approximately 104,907 EVs were registered across the state, giving North Texas the highest share of EVs registered out of the entire state, accommodating for approximately 36 percent of the total EVs registered in Texas.

³ International Energy Agency, “Global EV Outlook 2021”, <https://www.iea.org/reports/global-ev-outlook-2021>

Exhibit 8-20: Electric Vehicle Registrations

Measure	December 2021
Electric Vehicle Registrations	38,134

Tracking North Texas EV registration trends informs and enables NCTCOG staff to respond through respective air quality projects and programs, including air quality initiatives involving fleets, consumers, and communities. The national market share of EVs in 2020 was approximately 2 percent while the current percentage of EVs out of the total North Texas vehicle fleet is approximately 0.62 percent.³ A number of policies and programs recommended by the Mobility 2045 Update enable NCTCOG staff to educate and assist consumers, fleets, and local government communities about EVs and ultimately reduce the barriers to EV adoption in the region.

Charging Infrastructure

Providing charging infrastructure for the region’s growing fleet of electric vehicles is a key priority as well. In January 2021, there were 641 available public electric vehicle charging stations, comprising 1,474 total plugs across North Texas. Of these, 1,294 are level 2 plugs and 180 are Direct Current Fast Charge plugs, as shown in **Exhibit 8-21**.

Exhibit 8-21: Electric Vehicle Charging Infrastructure

Measure	January 2021
EV Charging Infrastructure – Level 2 Plugs	1,294
EV Charging Infrastructure – Direct Current Fast Charge Plugs	180
EV Charging Infrastructure – Total Plugs	1,474

The location of these public charging stations is closely correlated to the location of current registered EVs across the region. This correlation also mimics areas of higher income populations,

highlighting many equity gaps for charging accessibility for lower income and minority environmental justice populations.

The DOE (Department of Energy) released a National Plug-In Electric Vehicle Infrastructure Analysis that states a ratio of how many charging stations are needed to support a certain amount of EVs. To support current EV registration in North Texas, this DOE ratio recommends 1,373 level 2 plugs and 57 Direct Current Fast Charge plugs. Compared to existing regional infrastructure, this puts North Texas with a level 2 deficit of 79 plugs; however, North Texas has a surplus of Direct Current Fast Charge plugs of 123 more plugs than minimally recommended.

Regionwide, roughly 55 percent of total stations and plugs across the region are within environmental justice areas. The DOE also states that over 80 percent of people charge their EV at home, but for those without personal garage spaces, such as many multifamily tenants, accessibility of publicly available EV charging stations is critical in the feasibility of owning an EV.

Air quality policies and programs recommended by the Mobility 2045 Update will allow for focused work with various jurisdictions and private entities to encourage greater infrastructure investments and educate on charging infrastructure gaps and opportunities to accommodate for the fast growing electric vehicle fleet and increase regional accessibility of charging infrastructure, with a focus on multifamily and environmental justice populations.

Fleets

Many public vehicle fleets around the region are taking steps to reduce the air quality impact of their operations as well. Each year, the DFWCC (Dallas-Fort Worth Clean Cities) Coalition surveys Dallas-Fort Worth area fleets on the use of electric and alternative fuel

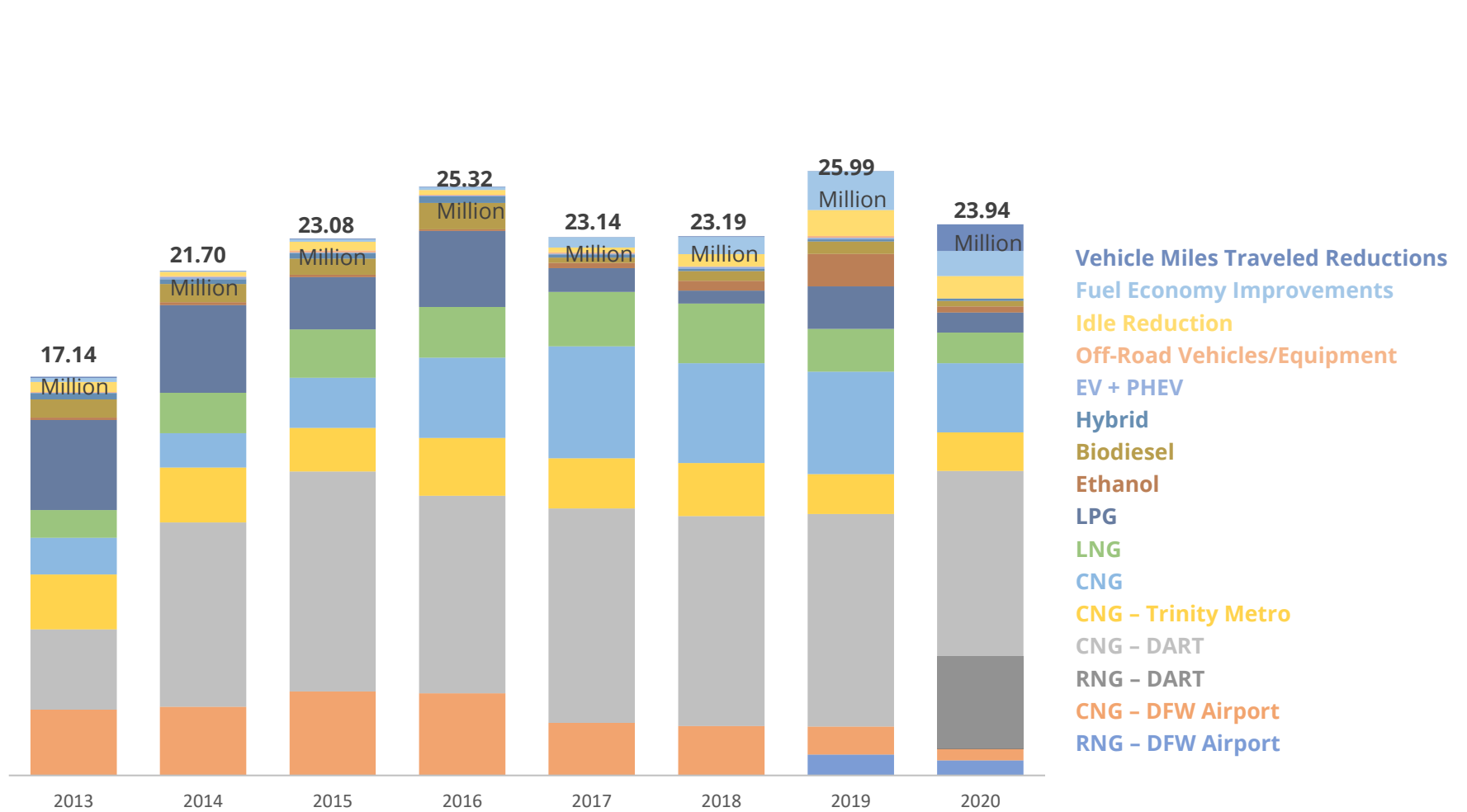
vehicles and equipment and other fleet efficiency and energy impact strategies. Over 50 fleets completed the survey for 2020, the highest number of respondents to date, and approximately 15 percent of the total public agency fleets in the region. Through the use of over 10,000 alternative fuel vehicles and equipment, fuel economy improvements, and reducing vehicle miles traveled and idling, these fleets reduced approximately 23.94 million gasoline gallon equivalents in 2020, as detailed in **Exhibits 8-22** and **8-23**. This resulted in an estimated reduction of over 125,000 tons of greenhouse gas emissions and approximately 367 tons of ozone-forming nitrogen oxides in 2020. The nitrogen oxides reduction of approximately one ton per day contributes to the approximately 2.12 tons of nitrogen oxides per day in Regional Transportation Council initiatives credited in conformity. This DOE required data collection effort sets goals for each Clean Cities Coalition: a 16 percent increase in gasoline gallon equivalents reduced and a 20 percent increase in greenhouse gas reductions year over year.

Exhibit 8-22: Reported Gasoline Gallon Equivalents Reduced (DFWCC Annual Fleet Survey)

Gasoline Gallon Equivalents Reduced, In Millions							
2013	2014	2015	2016	2017	2018	2019	2020
17.14	21.70	23.08	25.32	23.14	23.19	25.99	23.94 ▶

A number of air quality-related policies, programs, and projects recommended by the Mobility 2045 Update will continue to support DFWCC and help operators of public vehicle fleets to continue ongoing transitions to alternative fuels.

Exhibit 8-23: Reported Gasoline Gallon Equivalents Reduced (DFWCC Annual Fleet Survey)



Goal 5: Encourage livable communities which support sustainability and economic vitality

Transportation is a key component of livable communities. The policies, programs, and projects recommended by the Mobility 2045 Update seek to maintain and improve the overall livability of the region through improvements that lead to efficient, timely travel. Measures related to this goal measure the ability of the transportation system to move travelers more quickly and sustainably.

Objective: Encourage shorter, more sustainable trips across the region and across modes

Measure: Percentage of Commute Trips Less than 3 Miles in Length

As discussed in the **Operational Efficiency** and **Mobility Options**

chapters, longer trips place a greater burden on the transportation system than shorter trips. Shorter trips are also more likely to occur by transit or nonmotorized modes, indirectly increasing the region's mode share diversity. This measure can be influenced by policies that encourage denser, more mixed-use development in the region that moves residents closer to their destinations, and by implementing projects like off-street bicycle-pedestrian facilities that make shorter trips safer and easier. As shown in **Exhibits 8-24** and **8-25**, this measure has been decreasing modestly in recent years, but increasing densities in the region, coupled with the Mobility 2045 Update's suite of policies, programs, and projects, may significantly improve this measure in the future. The data source for this measure is the Census Bureau's

Chapter Connection
 Operational Efficiency
 Mobility Options

Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics.

Exhibit 8-24: Percentage of Commute Trips Less than 3 Miles in Length

Measure	2015	2016	2017	2018	2019
Percent Commute Trips <= 3.0 miles in length	11.21%	11.09%	10.77%	10.73%	10.70% ▼

Exhibit 8-25: Percentage of Commute Trips Less than 3 Miles in Length



Objective: Provide for and maintain timely job commutes across modes

Measure: Mean Regional Commute Time (Minutes)
Measure: Mean Regional Commute Time (Minutes) by Income

Chapter Connection
 Social Considerations
 Operational Efficiency

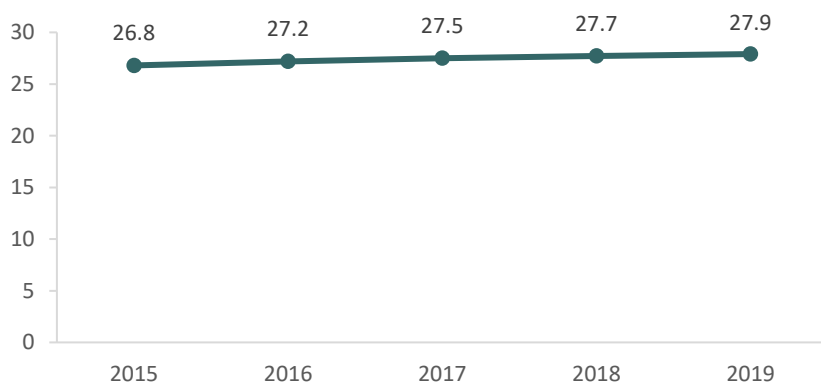
As discussed in the **Social Considerations** and **Operational Efficiency** chapters, shorter commute times support livable communities and improve the region's quality of life. Therefore,

implementing policies, programs, and projects that can shorten commute times on any mode of transportation and across incomes are an important component of the Mobility 2045 Update. Strategies to improve this measure can include those that reduce congestion, those that encourage telecommuting, and those that encourage workers to live closer to their places of employment. As shown in **Exhibits 8-26** and **8-27**, commute times have increased slightly over the past several years, though the ongoing COVID-19 pandemic is expected to significantly impact this measure in subsequent years. The source for this measure is the US Census Bureau’s American Community Survey 5-Year Estimates.

Exhibit 8-26: Mean Regional Commute Time
(All Incomes, American Community Survey)

Measure	2015	2016	2017	2018	2019 ⁴
Mean Regional ⁵ Commute Time (Minutes)	26.8 mins	27.2 mins	27.5 mins	27.7 mins	27.9 mins ▲

Exhibit 8-27: Mean Regional Commute Time in Minutes
(All Incomes, American Community Survey)



⁴ Years in this table represent the last year of data collection for the 5-Year Estimate. “2019” includes American Community Survey responses collected between 2015-2019.

⁵ Dallas-Fort Worth-Arlington Urbanized Area.

For workers in households whose income was less than \$35,000 per year, the average commute time in 2016 was lower than the regional average, at 27.9 minutes, as shown in **Exhibit 8-28**. This data came from the Census Transportation Planning Products, a special tabulation of the 2016 American Community Survey 5-Year Estimates.⁶

Exhibit 8-28: 2016 Mean Regional Commute Time
(by Income, 2016 Census Transportation Planning Products)

Measure	Weighted Average Commute Time
Lower-Income Households (Household Income Below \$35,000/Year)	27.9 minutes
All Households	30.2 minutes

Objective: Maintain transportation affordability for all populations and income levels

➔ **Measure:** Housing and Transportation Costs as a Percentage of Household Income

Chapter Connection

- Social Considerations
- Operational Efficiency

As discussed in the **Social Considerations** and **Operational Efficiency** chapters, housing and transportation costs are a key determinant in the ability for households to obtain quality employment and access essential products and services. Several online tools exist that analyze costs of housing and transportation, but none are reliable or updated regularly. NCTCOG Transportation Department staff are developing an in-house analysis using data

⁶ The Census Transportation Planning Products is an infrequent tabulation of American Community Survey data that aggregates differently than the original ACS. While we cannot compare the two datasets directly, the CTPP data shows the valuable breakout of regional commute time by income, which is helpful in planning for equity.

from federal partners that will provide estimated housing and transportation costs for different demographic groups, and the results will be published in the next Metropolitan Transportation Plan.

Goal Theme 3: System Sustainability




Goal 6: Ensure adequate maintenance and enhance the safety and reliability of the existing transportation system

Maintaining a safe, reliable transportation system is a key goal for the Mobility 2045 Update. While new infrastructure is needed to accommodate the region's growth, maintenance and optimization of existing infrastructure is also needed to maintain the system's overall capacity. Measures related to this goal quantify the reliability, physical condition, and safety of the existing system.

Objective: Improve the reliability of travel on the region's roadway network

- ➔ **Measure:** Percentage of Person Miles of Travel that is Reliable on Interstates
- ➔ **Measure:** Percentage of Person Miles of Travel that is Reliable on the Non-Interstate National Highway System

Chapter Connection

-  Operational Efficiency
-  Mobility Options
-  Regional Performance

In the context of transportation planning, reliability refers to the variability or predictability of travel times. A commute on a freeway in the region that almost always takes 30 minutes could be considered to be reliable, while a similar commute that takes 30 minutes some days and 60 minutes on others would be considered to be unreliable, regardless of overall congestion on the corridor. Reliability has become an increasingly important metric in examining roadway congestion because, in many cases, unpredictability of travel can be more economically impactful than congestion itself.

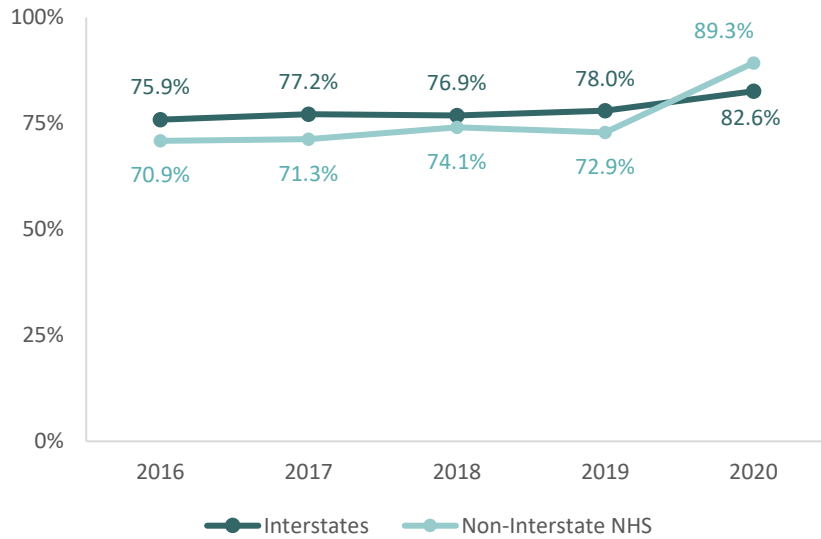
This measure is part of the suite of performance measures required by federal rulemaking. For more information, see *PM3 (System Performance, Freight, and Congestion Mitigation and Air Quality Improvement Program)* in the **Federal Performance Measures** section. As defined by rulemaking, these measures are the percentage of person miles of travel that meets a predefined threshold for reliability. Higher values indicate higher reliability and more predictable travel. The data source for this measure is the National Performance Measurement Research Dataset, a travel time dataset provided to Metropolitan Planning Organizations by Inrix and the University of Maryland's CATT Lab.

As depicted by **Exhibits 8-29** and **8-30**, reliability increased slowly during 2016 to 2019, but increased dramatically in 2020 as the ongoing COVID-19 pandemic reduced overall congestion and increased reliability.

Exhibit 8-29: Percentage of Travel Meeting Threshold for Reliability (Metropolitan Planning Area)

Measure	2016	2017	2018	2019	2020
Interstate Reliability	75.9%	77.2%	76.9%	78.0%	82.6% ▲
Non-Interstate Reliability	70.9%	71.3%	74.1%	72.9%	89.3% ▲

Exhibit 8-30: Percentage of Travel Meeting Threshold for Reliability (Metropolitan Planning Area)

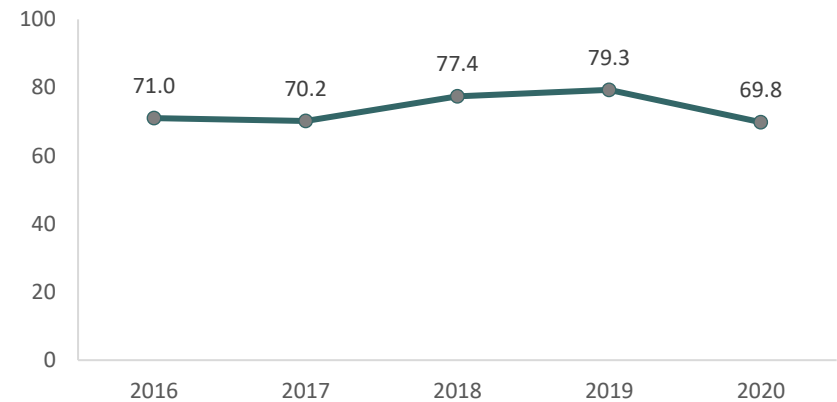


Information System via NCTCOG’s Transportation Safety Program Performance Measure Reports.

Exhibit 8-31: Annual Regional Crash Rates per 100 Million Vehicles Miles of Travel

Measure	2016	2017	2018	2019	2020
Regional Average Crash Rate per 100 Million Vehicle Miles of Travel	71.00	70.21	77.4	79.32	69.83 ▼

Exhibit 8-32: Annual Regional Crash Rate per 100 Million Vehicle Miles of Travel



Objective: Improve the safety of travel on the region's roadway network

Measure: Annual Regional Crash Rate per 100 Million Vehicle Miles of Travel

Chapter Connection
Operational Efficiency

The safety of the region’s roadway network is a key objective of the Mobility 2045 Update, NCTCOG, and of all transportation planning partners. A number of policies, programs, and projects recommended by the Mobility 2045 Update seek to lower the rate at which roadway crashes occur. This measure is the rate of all crashes per 100 million vehicle miles of travel in the Metropolitan Planning Area in a calendar year. Recent trends for this measure are shown in **Exhibits 8-31** and **8-32**. The source for this measure is the Texas Department of Transportation’s Crash Records

The safety of the transportation system is also a key federal priority as well, and a suite of safety-related federal performance measures are included in and addressed by the Mobility 2045 Update. See *PM1 (Highway Safety)* in the next section for more information.

Objective: Improve safety for nonmotorized users of the region’s transportation system

Measure: Bicycle and Pedestrian Crashes Involving a Motor Vehicle by Race/Ethnicity

Chapter Connection
Operational Efficiency

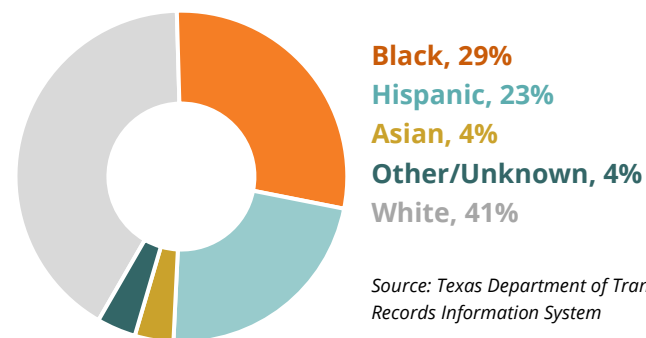
As discussed in the **Operational Efficiency** chapter, increasing pedestrian and bicyclist safety is an objective of the Mobility 2045 Update. This measure can be influenced through safety-oriented programs and projects, as well as projects that enhance and expand existing bicycle and pedestrian networks. As shown in **Exhibits 8-33** and **8-34**, there were an average of 2,735 annual vehicular collisions in the 12-county region that involved a pedestrian or bicyclist. While Black residents make up 15.7 percent of the 12-county population, they make up 28.6 percent of the region’s pedestrians or bicyclists that were struck by a motor vehicle from 2016 through 2020. The data source for this measure is the Texas Department of Transportation’s Crash Records Information System. For this plan, this measure only reports a single snapshot in time. In future iterations, this measure will compare crash rates over time.

Exhibit 8-33: Race/Ethnicity of Bicycle and Pedestrian Crashes Involving a Motor Vehicle

	Percent of Total Crashes	Percent Population in Region*
Average Annual Incidents, 2016–2020	2,735	
White	41.2%	46.3%
Black	28.6%	15.7%
Hispanic	22.7%	28.8%
Asian	3.8%	6.8%
Other/Unknown	3.8%	--

*Region population defined using 2019 American Community Survey 5-Year Estimates

Exhibit 8-34: Bicycle and Pedestrian Crashes Involving a Motor Vehicle by Race/Ethnicity



Source: Texas Department of Transportation Crash Records Information System

Objective: Reduce the number of at-grade railroad crossings in the region

Measure: Percent of Total Rail Crossings that are Grade-Separated

Active passenger and freight rail corridors can create transportation delays and safety issues where railways intersect roads and sidewalks at-grade. Living near intersections of this type may cause transportation delays when performing daily trips such as commuting to work or completing household errands. As discussed in the **Operational Efficiency** chapter, it is an objective of the Mobility 2045 Update to improve the reliability of travel on the region’s roadway network. This measure can be improved through roadway and rail projects that remove grade conflicts between the two transportation modes or close low-volume crossings. **Exhibits 8-35** and **8-36** show the percent of total rail crossings that are grade-separated is higher in areas where protected populations are above the regional percentage. For this plan, this measure only reports one moment in time. In future iterations, this measure will track rail grade separations over time. The source of this data is the Federal Railroad Administration’s Railroad Safety Map and American Community Survey 5-Year Estimates.

For more information on policies, programs, and projects recommended by the Mobility 2045 Update that may improve this measure in the future, refer to the **Operational Efficiency** and **Mobility Options** chapters.

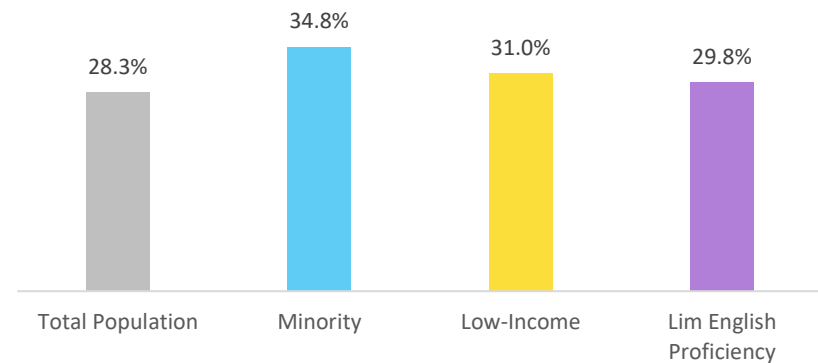
Chapter Connection

- Operational Efficiency
- Mobility Options

Exhibit 8-35: Percent of Total Rail Crossings that are Grade-Separated, by Areas Above Regional Percentage for Protected Groups

Measure	Percent of Rail Crossings that are Grade-Separated
Whole Region/Total Population	28.3%
Areas Above Regional Average for Minority Population	34.8% ▲
Areas Above Regional Average for Low-Income Population	31.0% ▲
Areas Above Regional Average for Limited English Proficiency Population	29.8% ▲

Exhibit 8-36: Percent of Total Rail Crossings that are Grade-Separated, by Areas Above Regional Percentage for Protected Groups



Objective: Adequately maintain and improve the condition of the region's pavements and bridges in an equitable way

- ➔ **Measure:** Pavement Condition by Minority Status, Income, and Limited English Proficiency
- ➔ **Measure:** Bridge Condition by Minority Status, Income, and Limited English Proficiency

Chapter Connection

- 🌀 Social Considerations
- 🌀 Operational Efficiency
- 🌀 Regional Performance

As discussed in the **Social Considerations** and **Operational Efficiency** chapters, local road and bridge conditions may impact communities' access to the regional transportation system. Good pavement and bridge conditions support Mobility 2045 Update's objective of adequately maintaining and improving the condition of the region's roadway network. These measures examine PM2 (Federal Pavement and Bridge Condition Measures), discussed next in the **Federal Performance Measures** section, relative to environmental justice populations. As shown in **Exhibits 8-37** and **8-38**, a higher percentage of minority, low-income, and limited English proficiency individuals live near National Highway System roadways categorized as "fair" or "poor" condition compared to the general population. As shown in **Exhibits 8-39** and **8-40**, a similar pattern is seen in populations near bridges in "fair" and "poor" condition. All percentages are relative to the region's total population of that group. The data source for this measure is the American Community Survey 5-Year Estimates and pavement datasets provided by the Texas Department of Transportation for analysis related to PM2 (Pavement and Bridge Condition) federal performance measures, as discussed next in **Federal Performance Measures**.

Exhibit 8-37: Pavement Condition by Minority Status, Income, and Limited English Proficiency

	"Good" Road Condition	"Fair" Road Condition	"Poor" Road Condition
Percent Total Population Living in Proximity to ...	29.3%	47.6%	37.6%
Percent Minority Population Living in Proximity to ...	32.4%	54.2%	44.4%
Percent Low-Income Individuals Living in Proximity to ...	31.5%	52.5%	42.9%
Percent LEP Individuals Living in Proximity to ...	30.5%	53.9%	47.8%

LEP: limited English proficiency

Exhibit 8-38: Pavement Condition by Minority Status, Income, and Limited English Proficiency

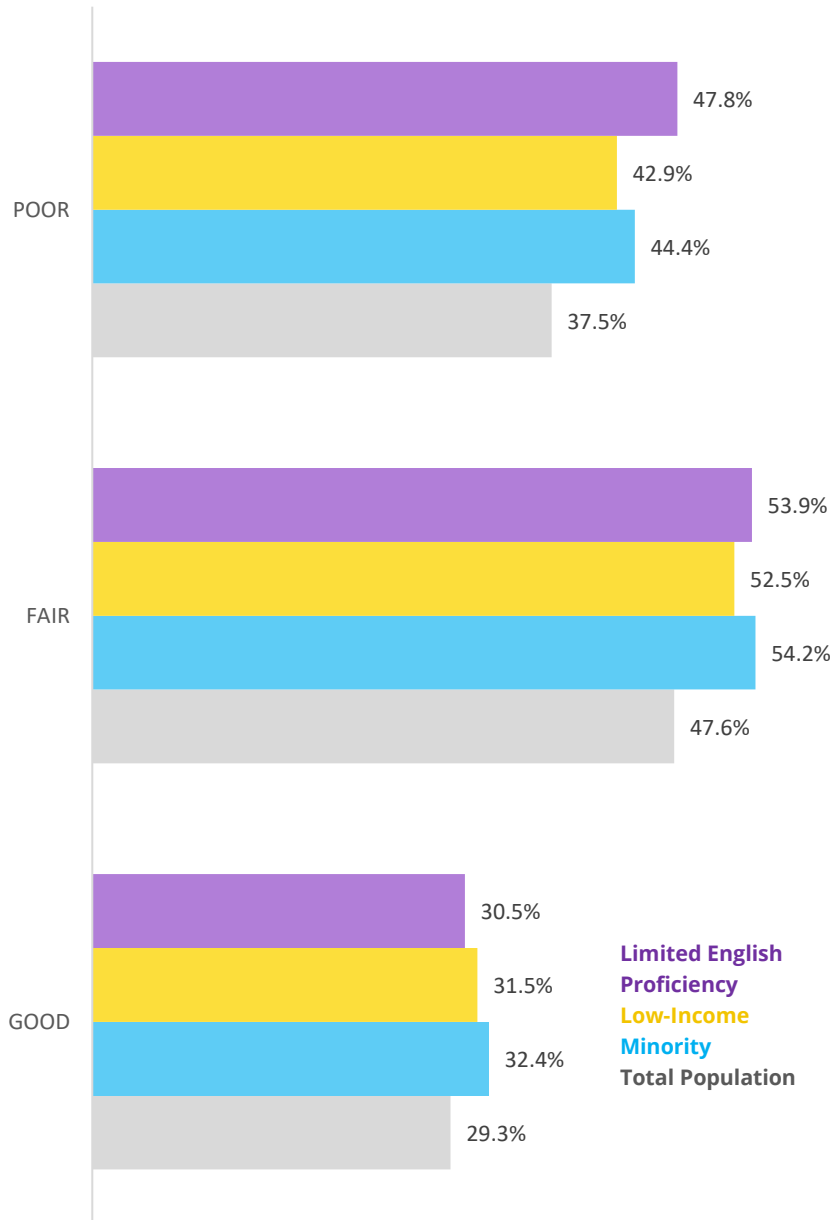


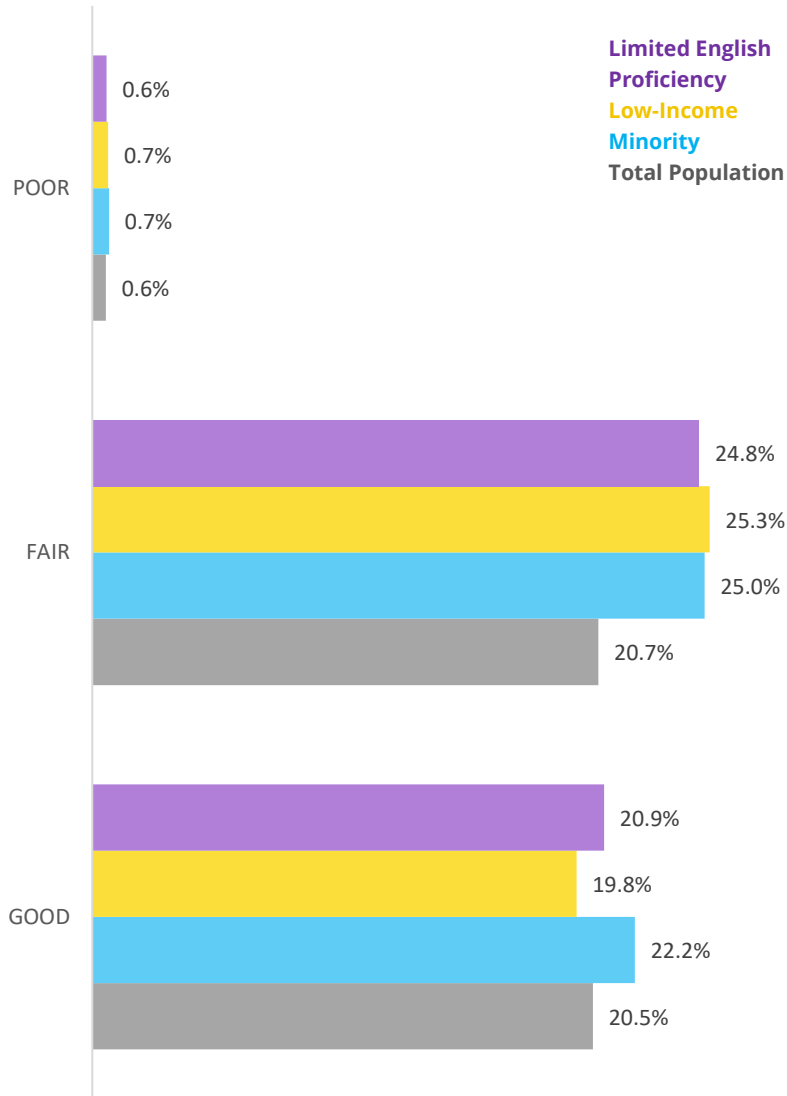
Exhibit 8-39: Bridge Condition by Minority Status, Income, and Limited English Proficiency

	"Good" Bridge Condition	"Fair" Bridge Condition	"Poor" Bridge Condition
Percent Total Population Living in Proximity to ...	20.5%	20.7%	0.6%
Percent Minority Population Living in Proximity to ...	22.2%	25.0%	0.7%
Percent Low-Income Individuals Living in Proximity to ...	19.8%	25.3%	0.7%
Percent LEP Individuals Living in Proximity to ...	20.9%	24.8%	0.6%

LEP: limited English proficiency

These measures can be improved by implementing policies, programs, and projects that improve pavement and bridge conditions around the region with a focus on equity. New construction brings more "good" pavement into the system, but to address equity concerns, a holistic perspective on maintenance also includes maintenance and restoration of typically older pavements found in areas of environmental justice concern. Previous analysis has found that many of the region's "poor" pavements are found on arterials maintained by municipalities in the core of the region in areas that largely overlap areas of environmental justice concern, so programmatically assisting municipalities with roadway maintenance activities may simultaneously address these equity considerations.

Exhibit 8-40: Bridge Condition by Minority Status, Income, and Limited English Proficiency



Goal 7: Pursue long-term sustainable revenue sources to address regional transportation system needs

As discussed in the **Financial Reality** chapter, the Mobility 2045 Update is a fiscally constrained plan that identifies realistic funding for recommended policies, programs, and projects. The financial forecasting process used in the Mobility 2045 Update represents the latest step in a long line of financial forecasts from previous mobility plans that vary based on the financial reality in which they were created. Measures related to this goal show both increasing sophistication in the forecasting process and a greater variety of innovative means to fund transportation projects.

Objective: Maintain a level of anticipated funding sufficient to meet the region's population growth

Measure: Plan Revenue per Capita per Year

As discussed in the **Social Considerations** chapter, Mobility 2045 Update's demographic forecasts call for continued significant growth in the region's population through 2045. Keeping up with this growth by implementing new policies, programs, and projects means the

Chapter Connection

- Financial Reality
- Social Considerations

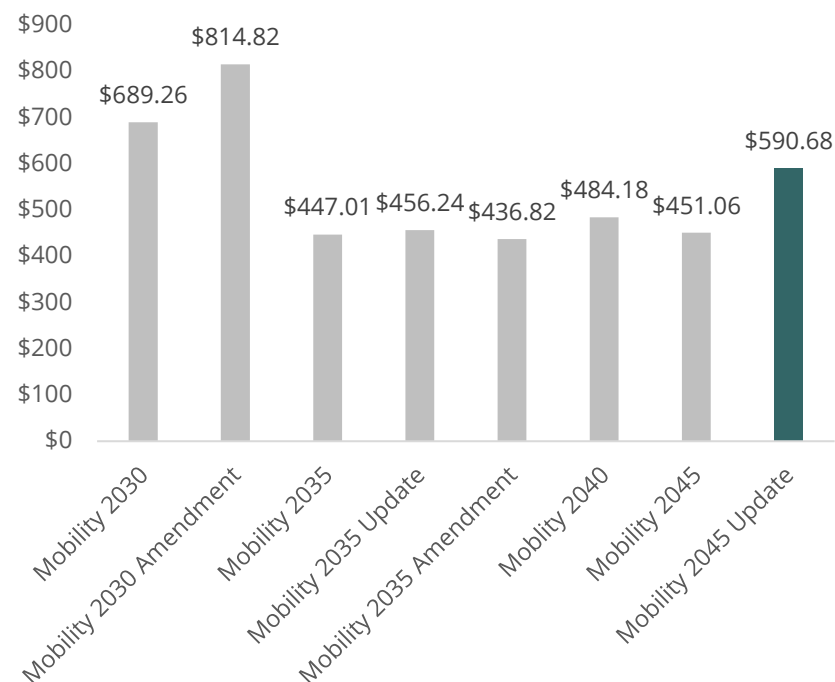
plan’s revenue sources also have to keep up with this growth over the duration of the plan, since Metropolitan Transportation Plans must maintain fiscal constraint. This measure quantifies the total forecasted plan revenue per capita per year. This makes plan spending more personal for individuals, and normalizing by both person and year helps to track how the plan is keeping up with growth.

As shown in **Exhibits 8-41** and **8-42**, recent mobility plans have revenue estimates between \$400 to \$500 per person per year, with some variation introduced by changes to revenue, recommendations, and the timespan of the plan.

Exhibit 8-41: Plan Revenue per Capita per Year

Metropolitan Transportation Plan	Adoption Year	Plan Revenue per Capita per Year	Horizon Year Population Estimate
Mobility 2030	2007	\$689.26	8.5 million
Mobility 2030 – 2009 Amendment	2009	\$814.82	8.5 million
Mobility 2035	2011	\$447.01	9.8 million
Mobility 2035 – 2013 Update	2013	\$456.24	9.8 million
Mobility 2035 – 2014 Amendment	2014	\$436.82	9.8 million
Mobility 2040	2016	\$484.18	10.7 million
Mobility 2045	2018	\$451.01	11.2 million
Mobility 2045 Update	2022	\$590.68 ▲	11.4 million

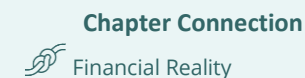
Exhibit 8-42: Plan Revenue per Capita per Year



For more information on plan revenue per capita and the overall financial forecasting process, refer to the **Financial Reality** chapter.

Objective: Maintain flexible and sustainable funding sources

➔ **Measure:** Percentage of Plan Costs Funded by Revenue Enhancements



As discussed in the **Financial Reality** chapter, a Metropolitan Transportation Plan must be fiscally constrained, and the policies, programs, and projects recommended must have identified funding sources. The Mobility 2045 Update meets this requirement by identifying a variety of funding sources, including traditional fuel taxes, tolls, local revenue (including sales

taxes, transit farebox recovery), and many others. Some of these sources are assumed revenue enhancements that may involve future action by committees, legislators, or voters that, while they can be reasonably expected, may or may not actually occur. A Metropolitan Transportation Plan is in a stronger financial position if it relies less on these enhancements to fund its recommendations. Therefore, quantifying the percentage of the plan’s revenue that comes from these enhancements is a valuable metric for holistically understanding the plan’s financial forecast.

As shown in **Exhibits 8-43** and **8-44**, the percentage of plan revenue derived from revenue enhancements has been shrinking with recent plans, and the Mobility 2045 Update derives approximately 5 percent of its revenue from revenue enhancements. This is down from a high of 14 percent with the Mobility 2035 Amendment, which was adopted in 2014.

Exhibit 8-44: Percentage of Plan Costs Funded by Revenue Enhancements

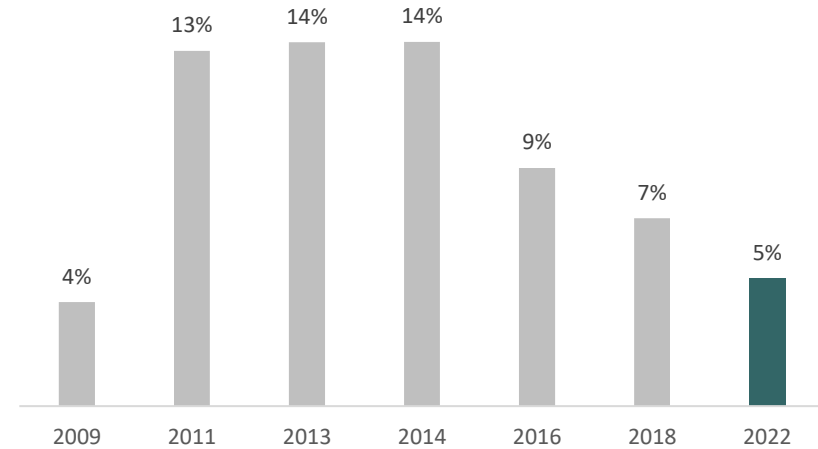


Exhibit 8-43: Percentage of Plan Costs Funded by Revenue Enhancements


Metropolitan Transportation Plan	Adoption Year	Percentage of Revenue Derived from Enhancements
Mobility 2030 – 2009 Amendment	2009	4%
Mobility 2035	2011	13%
Mobility 2035 – 2013 Update	2013	14%
Mobility 2035 – 2014 Amendment	2014	14%
Mobility 2040	2016	9%
Mobility 2045	2018	7%
Mobility 2045 Update	2022	5% ▼

Goal Theme 4: Implementation

Goal 8: Provide for timely project planning and implementation

Providing means for transportation projects to quickly move from planning to implementation stages is an important priority for the Mobility 2045 Update. Timely project implementation ensures the region is progressing towards the plan's overall vision for the region's transportation system. Measures related to this goal measure the expediency with which projects progress through short-range planning processes like the TIP (Transportation Improvement Program).

Objective: Ensure that funded projects are moving to construction expediently

 **Measure:** Number of Projects on Current Milestone Policy List

Short-range implementation of programs and projects recommended by the Mobility 2045 Update is carried out through the TIP, which programs specific funding for individual projects over a four-year timeframe. Occasionally, projects funded by the TIP may spend excessive amounts of time in project development processes after they are programmed by the TIP but before they are let and go to construction. This locks up funding in the TIP that could be used for other projects and slows down the overall process of implementing the holistic set of transportation system improvements recommended by the Metropolitan Transportation Plan. In response to this, the Metropolitan Planning Organization Milestone Policy was adopted by the Regional Transportation Council to ensure that funded projects are being implemented in a timely manner. The first

Metropolitan Planning Organization Milestone Policy implementation resulted in 51 of the 57 projects on the list advancing to construction. Since then, a second round of projects have been identified by staff as Milestone Policy projects. The 30 initially identified projects were funded between 2006 and 2010 and had not begun construction as of early 2021; however, many of the listed projects have since let and gone to construction or have been cancelled, as shown in **Exhibit 8-45**.

Exhibit 8-45: Number of Projects on Current Milestone Policy List

Update Presented to Regional Transportation Council	Number of Projects on Milestone Policy List (Round 2)
February 2021 (Initial Round 2 List)	30
July 2021	23
October 2021	20
February 2022	18 ▼

There are a number of factors that can lead to delays in project development after they are programmed in the TIP, including issues related to project design, coordination with other entities, environmental clearance, utility/right-of way issues, and many others. Many of these factors are out of the control of implementing agencies but recommending more projects in the Metropolitan Transportation Plan that have more of their planning and design work completed and those that can be constructed within existing rights-of-way (including, but not limited to, Asset Optimization projects) may help with overall project implementation schedules.


Staff will continue to monitor the current round of Milestone Policy projects and will continue to generally evaluate projects that may not be implemented in a timely manner.




Goal 9: Develop cost-effective projects and programs aimed at reducing the costs associated with constructing, operating, and maintaining the regional transportation system

New infrastructure projects can be expensive, and in many cases, more value can be derived from investments in strategic operational improvements and smaller optimization projects that aim to take advantage of existing infrastructure. Measures related to this goal measure the extent to which these kinds of projects are recommended by the plan.

Objective: Focus on cost-efficient projects that optimize the existing transportation system

 **Measure:** Proportion of Major Roadway Recommendations that are Asset Optimization

Chapter Connection
 Mobility Options

As discussed in the **Mobility Options** chapter, Asset Optimization seeks to more efficiently use both existing roadway infrastructure and funding for expansion by recommending lower cost optimizations of existing limited-access roadway infrastructure, including, but not limited to, frontage roads, peak-use lanes, restriping, auxiliary lanes, parallel capacity, and others. This measure quantifies the proportion of Mobility 2045 Update projects that are Asset Optimization by centerline mileage. As shown in **Exhibit 8-46**, the Mobility 2045 Update recommends a higher proportion of Asset Optimization relative to Mobility 2045.

This measure can be improved by continuing to find opportunities to apply Asset Optimization principles on more corridors throughout the region. For more information, refer to the **Mobility Options** chapter.

Exhibit 8-46: Proportion of Major Roadway Recommendations that are Asset Optimization

Mobility Plan	Adoption Year	Percent of Asset Optimization
Mobility 2045	2018	24.98%
Mobility 2045 Update	2022	27.70% ▲

Conclusion

Tracking the performance of the region's transportation system relative to the goals of the Mobility 2045 Update is a key component of the plan development process and will continue to be more strongly integrated into the performance-based planning processes in subsequent plans. During the period Mobility 2045 Update is in effect, these measures will continue to be tracked and updated as new data is available, generally on an annual basis. These updates will be a key component of staff's efforts to update stakeholders on progress toward implementing the plan, and will be made available through presentations, dashboards, and other means as appropriate.

8. Regional Performance: Federal Performance Measures

Introduction

MPOs (Metropolitan Planning Organizations) like NCTCOG (North Central Texas Council of Governments) are required by the Moving Ahead for Progress in the 21st Century Act and the Fixing America's Surface Transportation Act to monitor and set targets for a specific set of performance measures covering various aspects of the transportation system. A series of rulemakings by the Federal Highway Administration and Federal Transit Administration specifically define the measures, calculation procedures, target-setting processes, and reporting requirements.

For these measures, local, regional, and state partners are committed to cooperatively developing and sharing information, including raw transportation performance data, performance targets, and performance reporting.

As appropriate, the Regional Transportation Council continues to take target-setting actions for these measures. These measures are a key component of NCTCOG's broader push into performance measurement and performance-based planning and are being incorporated into planning documents like this Metropolitan Transportation Plan and the Transportation Improvement Program, as required.

Federal Performance Measures

NCTCOG has long used a performance-based planning process, but 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, required state Departments of Transportation, MPOs, 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 by the Fixing America's Surface Transportation Act, which was signed into law in 2015, and subsequently by the 2021 Infrastructure Investment and Jobs Act.

This component of the performance-based planning process has grown over time as federal rulemaking processes established five final performance measurement-related rules relevant to MPOs like NCTCOG. Each final rule lists required measures, data sources, calculation procedures, and target-setting requirements. The final rules include:

- Highway Safety Improvement Program, known as PM1⁷
- Assessing Pavement Condition for the National Highway Performance Program and Bridge Condition for the National Highway Performance Program, known as PM2⁸
- Assessing Performance of the National Highway System, Freight Movement on the Interstate System, and Congestion Mitigation and Air Quality Improvement Program, known as PM3⁹
- Transit Asset Management¹⁰
- Public Transit Agency Safety Plans¹¹

⁷ 81 FR 13881, 23 CFR 490

⁸ 82 FR 5886, 23 CFR 490

⁹ 82 FR 5970, 82 FR 22879, 23 CFR 490

¹⁰ 81 FR 48889, 49 CFR 625, 49 CFR 630

¹¹ 83 FR 34418, 49 CFR 673

Each of these rules establishes deadlines for target setting and reporting processes. For the measures identified in each rule, MPOs are required to report adopted targets, baseline performance measures, and progress toward the targets in Metropolitan Transportation Plans and Transportation Improvement Program projects adopted two years after the effective date of the final rule. Each of the performance measure final rules were established at different times and, therefore, have different target-setting and implementation deadlines, as seen in **Exhibit 8-47**. A more detailed summary table of the currently required measures is provided in the **Regional Performance** section of this appendix.

As of this writing, NCTCOG has adopted targets and established update processes for all five performance measure rules as required. Many of these measures have been incorporated directly into project selection processes and all are used as part of Mobility 2045 Update's performance-based planning process. Updates on these measures, including assessments of progress towards achieving adopted targets are reported regularly to the Regional Transportation Council and Surface Transportation Technical Committee.

Exhibit 8-47: Implementation and Target-Setting Schedules for Federal Performance Measures

Final Rule	Rule Effective Date	Required to be Included in Metropolitan Transportation Plans Adopted After ¹²	Last Target-Setting Action	Next Target-Setting Action (Anticipated)	Target-Setting Schedule
PM1 (Highway Safety)	4/14/2016	4/14/2018	2/14/2019	Early 2023	Annually (targets established as reductions over five-year period)
PM2 (Pavement and Bridge Condition)	5/20/2017	5/20/2019	12/10/2020	Late 2022	Biennially (four-year performance periods)
PM3 (System Performance, Freight, and Congestion Mitigation and Air Quality Improvement Program)	5/20/2017	5/20/2019	9/10/2020	Late 2022	Biennially (four-year performance periods)
Transit Asset Management	10/01/2016	10/01/2018	2/14/2019	Mid 2022	Every four years
Public Transportation Agency Safety Plans	07/19/2018	7/20/2021	5/13/2021	Early 2025	Every four years

¹² 23 CFR 450.340(f)

PM1 (Highway Safety)

The safety performance measure rule includes five measures related to the safety of the transportation system, including:

- ➔ The number of traffic fatalities
- ➔ The rate of fatalities per 100 million vehicle miles traveled
- ➔ The number of serious injuries
- ➔ The rate of serious injuries per 100 million vehicle miles traveled
- ➔ The number of nonmotorized fatalities and nonmotorized serious injuries

This rule establishes an annual reporting and target-setting schedule. The Regional Transportation Council initially adopted targets for these measures in December 2017. While the Regional Transportation Council has adopted quantitative targets for this measure as required, this has been accompanied by a policy that even one death on the transportation system is unacceptable. Subsequently, the Regional Transportation Council directed NCTCOG staff to work with regional and state partners to develop projects, programs, and policies that assist in eliminating serious injuries and fatalities across all modes of travel. The Transportation Improvement Program has incorporated these measures in project selection processes and includes many projects that may directly lead to improvements in these measures.

NCTCOG worked closely with TxDOT (Texas Department of Transportation) to establish annual targets for these measures. As part of the TxDOT Strategic Highway Safety Plan development process, stakeholders from TxDOT, NCTCOG, local governments, law enforcement, emergency medical services, educators, and others worked collaboratively utilizing a data-driven, multiyear process to develop both statewide and regional safety performance measure targets. Due to increasing population in both the region and the state, number of vehicles on the roadway system, and congestion, it

is unlikely that a decrease in the number of crashes could be achieved. Therefore, the consensus of the Strategic Highway Safety Plan 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 reduction percentages listed in **Exhibit 8-48**.

In May 2019, the Texas Transportation Commission adopted Minute Order 115481, directing TxDOT to work toward the goal of reducing the number of deaths on Texas roadways by half by the year 2035 and to zero by the year 2050. As a result of this action, TxDOT modified its fatality and fatality rate performance measures and target calculations, accordingly, starting with the 2021 target year. The serious injury and serious injury rate, as well as the nonmotorized fatalities and serious injury rate, targets of a 2 percent reduction by 2022 remains the same. NCTCOG will continue to utilize the identified 2 percent reduction schedule for all targets through the 2022 target year.

Exhibit 8-48: Growth Reduction Percentages for PM1 Measures

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

Number of Traffic Fatalities

The 2021 targets seek to reduce the expected increase in fatalities by 2021. As shown in **Exhibit 8-49**, this target would reduce the projected number of fatalities to 3,384 for the state and a reduction in the region to 604. The 2021 target expressed as a five-year rolling average is 572.4.

Exhibit 8-49: Five-Year Rolling Average for the Number of Traffic Fatalities

Year	Source	Statewide Data			Regional Data			
		Projection or Actual Data	Percent Reduction	Target or Actual Data	Projection or Actual Data	Percent Reduction	Target or Actual Data	Fatalities Reduced
2017	FARS	3,732	N/A	3,732	603	N/A	603	-
2018	FARS	3,656	0.4%	3,642	539	0.4%	536.8	2
2019	FARS	3,639	0.8%	3,610	569	0.8%	564.4	4
2020	Target	4,117	1.2%	4,068	593*	1.2%	585.5	7
2021	Target	3,438	50% by 2035	3,384	604*	1.6%	594.7	9

*Based on linear trend analysis from 2017-2021 Fatality Analysis Reporting System data
 FARS: National Highway Traffic Safety Administration Fatality Analysis Reporting System

Rate of Fatalities per 100 Million Vehicle Miles Traveled

The 2021 targets seek to reduce the expected increase in deaths per 100 MVMT (million vehicles miles traveled) in 2021 to less than 1.25 per 100 MVMT statewide. As shown in **Exhibit 8-50**, the regional target for 2021 is 0.753, which is less than one death per 100 MVMT. The 2021 regional target expressed as a five-year rolling average is 0.762.

Exhibit 8-50: Five-Year Rolling Average for the Rate of Fatalities

Year	Source	Statewide Data			Regional Data			
		Projection or Actual Data	Percent Reduction	Target or Actual Data	Projection or Actual Data	Percent Reduction	Target or Actual Data	Rate Reduction
2017	FARS	1.37	N/A	1.37	0.84	N/A	0.84	
2018	FARS	1.315	0.4%	1.31	0.738	0.4%	0.736	0.002
2019	FARS	1.27	0.8%	1.26	0.756	0.8%	0.750	0.006
2020	Target	1.50*	1.2%	1.48	0.769*	1.2%	0.760	0.009
2021	Target	1.29*	50% by 2035	1.25	0.765*	1.6%	0.753	0.012

*Based on linear trend analysis from 2017-2021 Fatality Analysis Reporting System data
 FARS: National Highway Traffic Safety Administration Fatality Analysis Reporting System

Number of Serious Injuries

The 2021 targets seek to reduce the expected increase in serious injuries in 2021 to not more than 18,835 statewide and 3,109 at the regional level, as shown in **Exhibit 8-51**. The 2021 target expressed as a five-year rolling average is 3,375.3.

Exhibit 8-51: Five-Year Rolling Average for the Number of Serious Injuries

Year	Source	Statewide Data			Regional Data			
		Projection or Actual Data	Percent Reduction	Target or Actual Data	Projection or Actual Data	Percent Reduction	Target or Actual Data	Serious Injury Crashes Reduced
2017	CRIS	17,538	N/A	17,538	3,990	N/A	3,990	
2018	CRIS	14,997	0.4%	14,937	3,174	0.4%	3,161.3	12
2019	CRIS	15,970	0.8%	15,843	3,530	0.8%	3,501.8	27
2020	Target	18,825	1.2%	18,602	3,293*	1.2%	3,253.3	39
2021	Target	19,136	1.6%	18,835	3,160*	1.6%	3,109.0	51

*Based on linear trend analysis from 2017-2021 TxDOT Crash Records Information System data
 CRIS: TxDOT Crash Records Information System

Rate of Serious Injuries per 100 Million Vehicle Miles Traveled

The 2021 targets seek to reduce the expected increase in the rate of serious injuries per 100 MVMT statewide to 6.51 in 2021. As shown in **Exhibit 8-52**, the regional target is a reduction to 3.832. The 2021 target expressed as a five-year rolling average is 4.856.

Exhibit 8-52: Five-Year Rolling Average for the Rate of Serious Injuries

Year	Source	Statewide Data			Regional Data			
		Projection or Actual Data	Percent Reduction	Target or Actual Data	Projection or Actual Data	Percent Reduction	Target or Actual Data	Rate Reduction
2017	CRIS	6.42	N/A	6.42	5.609	N/A	5.609	
2018	CRIS	5.32	0.4%	5.30	4.357	0.4%	4.339	0.018
2019	CRIS	5.57	0.8%	5.53	4.690	0.8%	4.653	0.037
2020	Target	6.64*	1.2%	6.56	4.221*	1.2%	4.170	0.051
2021	Target	6.72*	1.6%	6.51	3.894*	1.6%	3.832	0.062

*Based on linear trend analysis from 2017-2021 TxDOT Crash Records Information System data
CRIS: TxDOT Crash Records Information System

Number of Nonmotorized Fatalities and Nonmotorized Serious Injuries

The 2021 targets seek to reduce the expected increase in nonmotorized fatalities and serious injuries in 2021 to not more than 2,560 statewide, as shown in **Exhibit 8-53**. At the regional level, the target is a reduction in nonmotorized fatalities and serious injuries to not more than 478 in 2021. The regional target is shown in **Exhibit 8-54**. The 2021 targets expressed as a five-year rolling average are 2,316.40 statewide and 437.7 in the region.

Exhibit 8-53: Five-Year Rolling Average for the Number of Nonmotorized Fatalities and Serious Injuries (Statewide)

Year	Source	Percent Reduction	Target or Actual Data
2017	FARS-CRIS	N/A	2,146
2018	FARS-CRIS	0.4%	2,099
2019	FARS-CRIS	0.8%	2,300
2020	Target	1.2%	2,477
2021	Target	1.6%	2,560
2021 Target expressed as 5-year average			2,316.40

FARS: National Highway Traffic Safety Administration Fatality Analysis Reporting System
CRIS: TxDOT Crash Records Information System

Exhibit 8-54: Five-Year Rolling Average for the Number of Nonmotorized Fatalities and Serious Injuries (Regional)

Year	Source	Fatalities			Serious Injuries			
		Percent Reduction	Projection/Actual Data Bike & Ped (Fatal)	Target or Actual Data	Fatalities Reduced	Projection/Actual Data Bike & Ped (Incap. Injury)	Target or Actual Data	Serious Injury Crashes Reduced
2017	FARS-CRIS	N/A	156	156		403	403	
2018	FARS-CRIS	0.4%	162	161.4	1	440	438.2	2
2019	FARS-CRIS	0.8%	151	149.8	1	424	420.6	4
2020	Target	1.2%	161.1*	159.2	2	469.8*	464.2	5
2021	Target	1.6%	155.1*	152.6	3	486.5*	478.7	8

*Based on linear trend analysis from 2017-2021 Fatality Analysis Reporting System and TxDOT Crash Records Information System data.

FARS: National Highway Traffic Safety Administration Fatality Analysis Reporting System

CRIS: TxDOT Crash Records Information System

Addressing Highway Safety in the Mobility 2045 Update

The Mobility 2045 Update directly addresses many of the measures in the PM1 rulemaking and has recommended policies, programs, and projects using criteria that improve the safety of the region’s transportation system for many years. When conducting project evaluation and selection, safety is one of the major considerations. Safety criteria (total crash rate and fatal/incapacitating crash rate) are part of quantitative project selection components in the Mobility 2045 Update and the region’s 10-Year Plan (and eventually the Transportation Improvement Program). Additionally, the Mobility 2045 Update includes a number of safety-related policies, notably including policies in support of the state’s Toward Zero Deaths initiative.

PM2 (Pavement and Bridge Condition)

The Pavement and Bridge Condition measures (commonly collectively known as PM2) are six measures related to roadway infrastructure condition. As with PM3 (System Performance, Freight, and Congestion Mitigation and Air Quality Improvement Program) measures discussed below, the final rule for these measures establishes a cycle of four-year performance periods, the first of which began on January 1, 2018. Most measures require a target for both the midpoint and end of the performance period. In the case of the initial performance period, the relevant target years are 2020 and 2022. Target-setting action in late 2022 may establish targets for the 2022-2026 performance period. The Mobility 2045 Update incorporates these measures into project selection processes and includes many projects that may directly lead to improvements in these measures.

Measures in this rulemaking include:

- ➔ Percentage of Pavements on the Interstate System in “Good” Condition
- ➔ Percentage of Pavements on the Interstate System in “Poor” Condition
- ➔ Percentage of Pavements on the Non-Interstate National Highway System in “Good” Condition
- ➔ Percentage of Pavements on the Non-Interstate National Highway System in “Poor” Condition
- ➔ Percentage of Bridge Deck Area on the National Highway System in “Good” Condition
- ➔ Percentage of Bridge Deck Area on the National Highway System in “Poor” Condition

“Good” and “Poor” condition are defined using specific infrastructure condition metrics in the rulemaking. With these and most other

measures, Metropolitan Planning Organizations have the option to either support the state Departments of Transportation targets or to adopt their own quantitative targets. In 2018, NCTCOG chose to support the state’s initial targets for these measures for the first performance period, with policy statements related to certain pavements and bridges in poor condition. In 2020, TxDOT exercised its option to adjust statewide 2022 targets for these measures, after which NCTCOG reaffirmed its support for the state’s adjusted targets.

The NHS (National Highway System) network within the 12-county North Central Texas region is the largest among the 25 metropolitan areas in Texas with over 12,000 lane miles of pavement. Approximately 70 percent of the NHS network in this region are state highways under the jurisdiction of TxDOT (i.e., “on-system” roadways) and about 30 percent are county roads, city streets, and non-TxDOT toll roads managed by other agencies (i.e., “off-system” roadways). The NHS network in the region also includes more than 3,600 bridges with about 87 percent maintained by TxDOT and about 13 percent maintained by other agencies. Managing the condition of these assets is a priority for NCTCOG, TxDOT, local governments, and other agencies that fund and/or maintain the region’s transportation system.

Related rulemaking requires each state Department of Transportation (including TxDOT) to develop a risk-based Transportation Asset Management Plan that includes an assessment of existing infrastructure conditions; identification of asset management objectives, measures, and performance gaps; and a lifecycle cost and risk management analysis, financial plan, and identification of investment strategies. In recognition of the importance of holistic asset management planning to the region’s transportation system, NCTCOG supports and is working with TxDOT on its asset management process.

Pavement Condition

NCTCOG has chosen to support the pavement performance targets set by TxDOT. In recognizing that NHS local Off-System Arterials only represent about 24 percent of Dallas-Fort Worth's NHS network but have a disproportionately high "poor" rating of about 74 percent, NCTCOG also approved a policy statement to work with local governments to focus on the improvement of NHS local Off-System Arterials in "poor" condition. NCTCOG initially adopted this policy statement in 2018 and reaffirmed it in 2020, along with its reaffirmation of support for the state's adjusted 2022 targets.

Bridge Condition

NCTCOG has chosen to support the bridge performance targets set by TxDOT. In addition, NCTCOG approved a policy statement to expedite the programming of funding to improve NHS bridges in "poor" condition.

Addressing Pavement and Bridge Condition in the Mobility 2045 Update

Many of the roadway projects recommended by the Mobility 2045 Update will improve the condition of the region's roadway infrastructure, reflecting the North Central Texas Council of

Governments' response to these measures and commitment to holistically managing transportation assets. As previously discussed, most NHS facilities in the region are TxDOT facilities. Staff is seeking to reduce the number of deficient pavement lane miles and bridges on these facilities by incorporating pavement and bridge condition as a criterion in the technical project selection processes for the Mobility 2045 Update and the regional 10-Year Plan. Corridors that have poorer pavement conditions and/or a lower Bridge Sufficiency Rating are given more priority during project selection. Pavement and bridge conditions are also improved when roadway capacity is increased, and the project includes the reconstruction of existing pavement.

Staff also has pursued other sources of funding to improve pavement and bridge conditions in the region. A specific example is NCTCOG's partnership with TxDOT on the submittal of a grant application to the Infrastructure for Rebuilding America Program for the North Texas Strategic NHS Bridge Program, which involves the reconstruction or replacement of multiple NHS bridges in the counties of Dallas, Denton, Hunt, Johnson, Kaufman, Parker, and Tarrant. As a result of this effort, a total of \$8,775,000 was awarded and will be utilized on a \$45 million overall project addressing 7 of the 14 bridges originally identified for the program.

PM3 (System Performance, Freight, and Congestion Mitigation and Air Quality Improvement Program)

The System Performance, Freight, and Congestion Mitigation and Air Quality Improvement Program measures (commonly collectively known as PM3) cover a broad variety of observed measures across multiple modes of the transportation system. As with PM2 (Pavement and Bridge Condition) measures, the final rule for these measures establishes a cycle of four-year performance periods, the first of which began on January 1, 2018. Most measures require a target for both the midpoint and end of the performance period. In the case of the initial performance period, the relevant target years are 2020 and 2022. NCTCOG has been monitoring these measures continuously since initial target adoption and exercised its option to revisit 2022 targets for most of these measures in late 2020. Subsequent target-setting action in late 2022 may establish targets for the 2022-2026 performance period. With these and most other measures, MPOs have the option to either support the state Departments of Transportation targets or to adopt their own quantitative targets.

For most PM3 measures, NCTCOG chose to adopt its own targets. The Transportation Improvement Program has incorporated these measures in project selection processes and includes many projects that may directly lead to improvements in these measures.

Measures in this rulemaking include:

- ➔ Percent of Person Miles of Travel on the Interstate System that is Reliable (Interstate Reliability)
- ➔ Percent of Person Miles of Travel on the Non-Interstate National Highway System that is Reliable (Non-Interstate Reliability)
- ➔ Truck Travel Time Reliability
- ➔ Percent Non-Single-Occupant Vehicle Travel
- ➔ Peak-Hour Excessive Delay

- ➔ Total Emissions Reductions (nitrogen oxides and volatile organic compounds)

Interstate and Non-Interstate Reliability

These measures quantify the proportion of travel occurring on Interstate segments and Non-Interstate NHS segments where travel times are reliable throughout the day. Reliable travel is predictable, though it may be consistently congested or consistently free flowing. Unreliable travel is unpredictable; on some days it may be congested, while on others it may be free flowing. Reliability can be influenced by operational inefficiencies, bottlenecks, crashes, weather, and other factors.

As seen in **Exhibits 8-55** and **8-56**, these measures have been improving for the Metropolitan Planning Area during the time period for which reliable data is available, and the region appears to currently be on track to meet or exceed existing targets. Recent changes to travel behavior due to the ongoing COVID-19 pandemic are reflected in the latest available data and are having a substantial impact on these measures. As a result, observed values for 2020 greatly exceeded NCTCOG's original 2020 targets. These measures will be monitored to track long-term impacts of the pandemic and resulting changes to traveler behavior, and any lasting impacts may be reflected in the next round of target-setting for these measures. The latest observed values for these measures and adopted targets are listed in **Exhibit 8-57**.

Exhibit 8-55: Observed Data, Trends, and Targets for Interstate Reliability

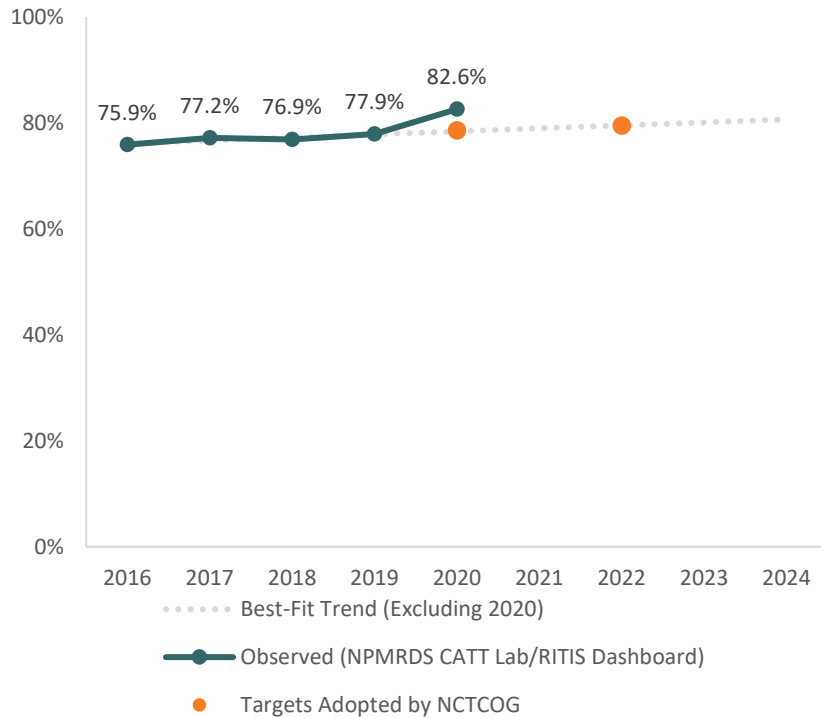


Exhibit 8-56: Observed Data, Trends, and Targets for Non-Interstate Reliability

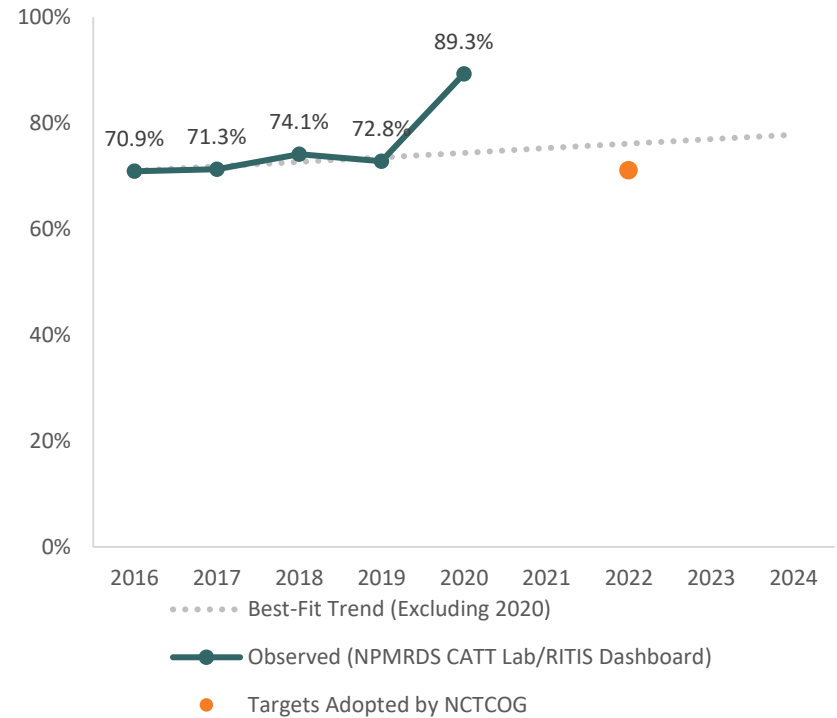


Exhibit 8-57: Latest Observations and Targets for Interstate and Non-Interstate Reliability

	Latest Observed Value (2020)	2020 Target	2022 Target
Interstate Reliability	77.9%	78.6%	79.5%
Non-Interstate Reliability	72.8%	N/A*	71.1%

While a majority of person miles of travel on both the Interstate System and Non-Interstate NHS are reliable in the region, reliability can be increased by implementing programs and projects that reduce nonrecurring congestion and boost the overall reliability of the system. Improvements in these measures, seen as a result of

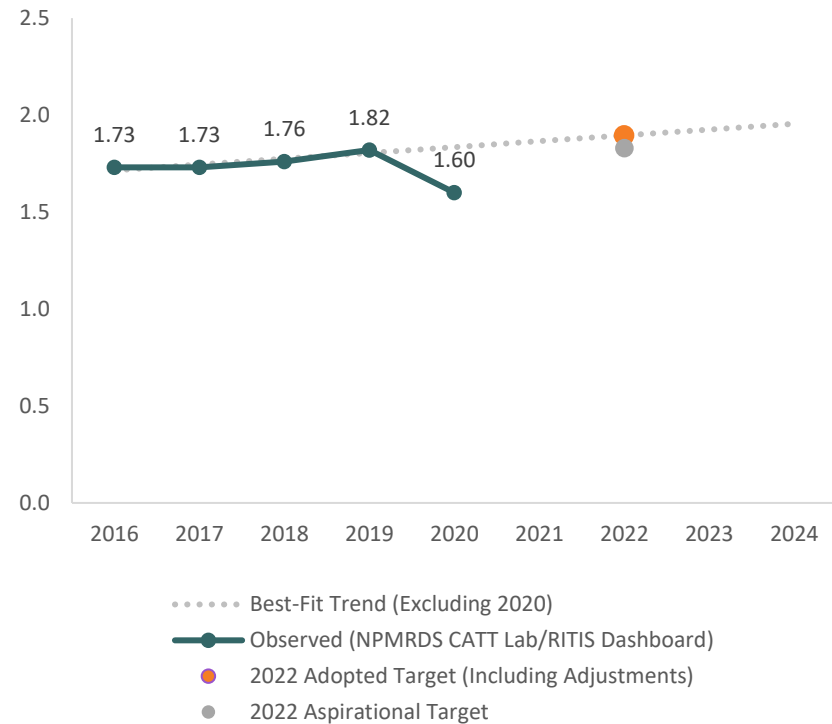
changes to traveler behavior in response to the ongoing COVID-19 pandemic, reflect the strong influence traveler behavior has on these measures as well. NCTCOG is actively using these performance measures to select programs and projects in the Mobility 2045 Update. See *Addressing System Performance, Freight, and CMAQ Measures in the Mobility 2045 Update* below for more information.

Truck Travel Time Reliability

Efficient and predictable freight movement in the region is key to the region’s economic health. This measure quantifies the reliability of the region’s Interstate system for freight movement. It is calculated as an index representing the amount of extra travel time drivers and logistics planners need to factor into trips in the region to consistently arrive on time. Higher values indicate worsening reliability and less predictable travel times. As with the preceding Interstate and Non-Interstate Reliability measures, Truck Travel Time Reliability is influenced by operational inefficiencies, bottlenecks, crashes, and weather, but operational issues for trucks near freight hubs and other freight-specific issues can contribute to this measure.

As seen in **Exhibit 8-58**, this measure has been worsening in the Metropolitan Planning Area for the time period for which reliable data is available. This measure gradually worsened during 2016 to 2019, but recent changes in travel behavior due to the ongoing COVID-19 pandemic caused a significant improvement in this measure during 2020. Additionally, there is evidence to indicate the previously adopted targets were set based on data that may have been inconsistent with the current data. Due to the sharp decrease from 2013 to 2014, the past downward trend proved to be misleading, causing staff to calculate more aggressive targets. It is important to realize the source of data for 2013 to 2016 was from a different data set than the current observations for 2017 to 2019, as the Federal Highway Administration changed data providers.

Exhibit 8-58: Historic Adjusted Truck Travel Time Reliability Trends



To evaluate the targets set in 2018, further analysis was completed using the new or trusted data (2016-2019 Trends), and the trendline matches cohesively with the observed data. This means the 2018 targets need to be adjusted. See **Exhibit 8-59** to see how the different targets compare. NCTCOG exercised its option to adjust the 2022 target for this measure to 1.90 based on this analysis, with an additional aspirational target to hold this measure steady at 1.83, as illustrated in **Exhibit 8-59**.

Exhibit 8-59: Truck Travel Time Reliability Trends

Trend	2020	2022
Original Targets (Adopted 2018)	1.71	1.66
2016-2019 Trends (New Targets)	1.83	1.90

The latest observed value and adopted targets are listed in **Exhibits 8-60** and **8-61**.

Exhibit 8-60: Latest Observations and Targets for Truck Travel Time Reliability

Measure	Latest Observed Value (2020)	2020 Target	2022 Target (Adjusted)	2022 Target (Aspirational)
Truck Travel Time Reliability	1.60	1.71	1.90	1.83

Exhibit 8-61: Observed Data, Trends, and Targets for Truck Travel Time Reliability

2013	2014	2015	2016
1.87	1.72	1.70	1.74

Source: NCTCOG

This measure will be monitored closely during the recovery from the COVID-19 pandemic to determine if previous worsening trends resume. Regardless, the Metropolitan Transportation Plan, Transportation Improvement Program, 10-Year Plan, and other planning processes will need to continue to develop, recommend, and program projects and programs that prioritize freight reliability. Freight considerations have been incorporated into Mobility 2045 Update's project selection processes, and the plan's recommendations include many projects that will directly address freight movement on the region's transportation system. See *Addressing System Performance, Freight, and CMAQ Measures in the Mobility 2045 Update* below for more information.

Percent Non-Single-Occupant Vehicle Travel

Driving alone is an inefficient use of resources and the transportation system when compared to other modes. This measure quantifies the proportion of commute travel that uses modes other than driving alone in the Dallas-Fort Worth-Arlington Urbanized Area. This

includes transit, carpooling, telecommuting, bicycling, walking, and other modes.

During the time period for which reliable data is available, this measure has been either steady or slightly improving, as seen in **Exhibit 8-62**. Recent changes to traveler behavior due to the ongoing COVID-19 pandemic are likely to have a significant impact on traveler behavior that is not yet reflected in the available data for this measure. The latest observed value and adopted targets are listed in **Exhibit 8-63**.

Exhibit 8-62: Latest Observed Data and Targets for Non-Single-Occupancy Vehicle Travel

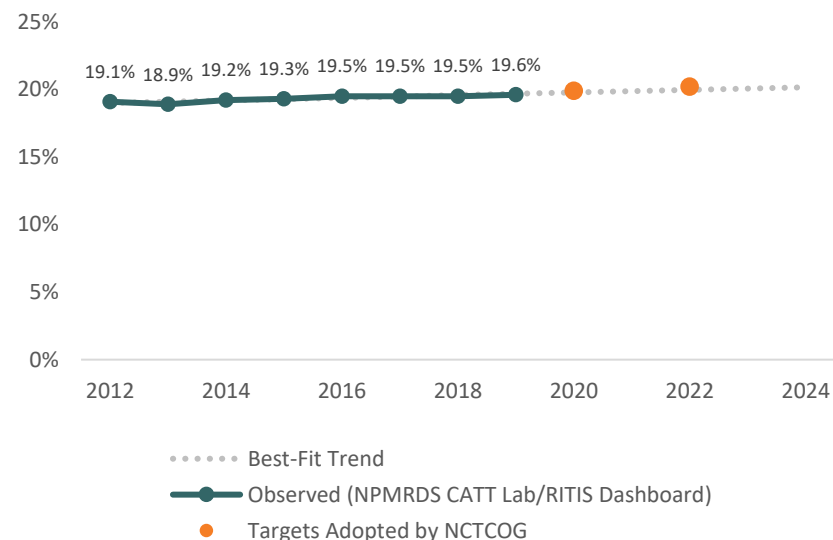


Exhibit 8-63: Latest Observation and Targets for Non-Single-Occupant Vehicle Travel

Measure	Latest Observed Value (2019)	2020 Target	2022 Target
Percent Non-Single-Occupant Travel	19.6%	19.9%	20.2%

While this measure may already be improving slightly or at least holding steady in the region, the rate of increase for this measure can be improved by implementing programs and projects that shift mode share to alternative modes. NCTCOG is actively using this performance measure to select programs and projects for the Mobility 2045 Update. See *Addressing System Performance, Freight, and CMAQ Measures in the Mobility 2045 Update* below for more information.

Peak Hour Excessive Delay

Excessive congestion delay impacts both roadway users and the region’s air quality. This measure quantifies excessive delay by calculating the number of hours of delay above an established threshold the average resident of the region experiences in a year during peak travel times on NHS facilities in the Dallas-Fort Worth-Arlington Urbanized Area. This is an absolute measure of congestion that quantifies overall congestion rather than its variability. Variability in congestion, or “non-recurring congestion,” is addressed by the reliability measures discussed above.

As seen in **Exhibit 8-64**, this measure improved slightly during 2016 to 2019 but dropped dramatically in 2020 due to significant changes in traveler behavior due to the ongoing COVID-19 pandemic. The latest observed value and adopted targets are listed in **Exhibit 8-65**.

Exhibit 8-64: Observed Data, Trends, and Targets for Peak Hour Excessive Delay

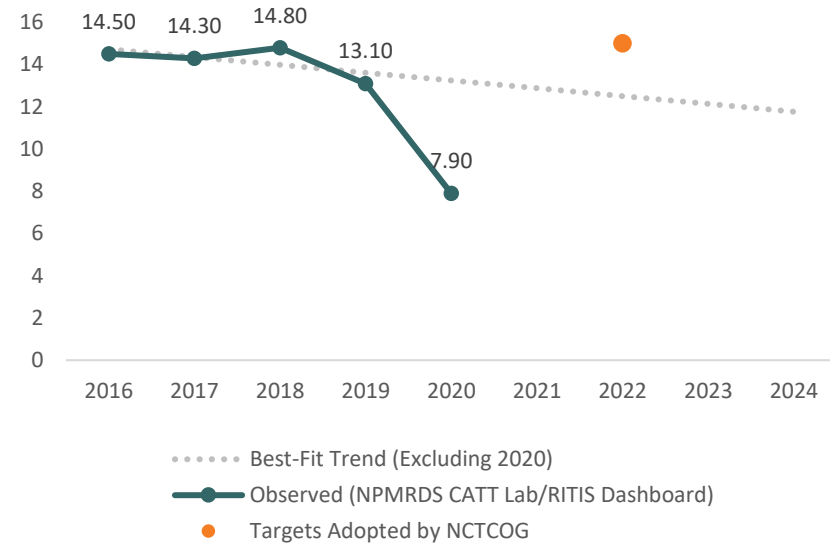


Exhibit 8-65: Latest Observations and Targets for Peak Hour Excessive Delay

Measure	Latest Observed Value (2020)	2020 Target	2022 Target
Truck Travel Time Reliability	7.90 hours	N/A ¹³	15.00 hours

While Peak Hour Excessive Delay was already improving in the region, even prior to the COVID-19 pandemic, congestion can be further improved by implementing programs and projects that reduce recurring congestion. NCTCOG is actively using this performance measure to select programs and projects for the Mobility 2045 Update. See *Addressing System Performance, Freight, and CMAQ Measures in the Mobility 2045 Update* below for more information.

¹³ As part of phase-in requirements in the rulemaking, Metropolitan Planning Organizations were only required to adopt a 2022 target for Peak Hour Excessive Delay.

Total Emissions Reductions

The on-road mobile source emissions performance measure is the total emissions reduction (two- and four-year cumulative estimated emissions reductions) for all CMAQ (Congestion Mitigation and Air Quality Improvement Program), or air quality, funded projects of each applicable criteria pollutant and precursor. For the Dallas-Fort Worth nonattainment area, the pollutants measured are nitrogen oxides and volatile organic compounds.

To develop the baseline, NCTCOG staff compared existing local TIP (Transportation Improvement Program) projects from 2014 to 2017 with projects included in the Federal Highway Administration's UPACS (User Profile and Access Control System) database for the same period. The results showed only a certain percentage of TIP projects were reported in the database, due to the nature of UPACS reporting. UPACS was found to include an average of 78 percent of emissions benefits reported in the TIP for nitrogen oxides and 75 percent for volatile organic compounds. The averages were applied to the total emission reductions for CMAQ-funded TIP projects (2014-2017). Due to NCTCOG's 2019-2022 TIP not being fully programmed at the time, staff chose these amounts as the established baseline provided in **Exhibit 8-66**.

NCTCOG coordinates with local stakeholders and TxDOT in the selection of CMAQ projects for deployment in the Dallas-Fort Worth ozone nonattainment area. These projects are selected to meet the program goals of reducing congestion and/or reducing emissions of ozone precursor pollutants. Emissions estimates for these projects are estimated by NCTCOG using methodologies developed as part of the Texas Guide to Accepted Mobile Source Emission Reduction Strategies. In cases where no practical Mobile Source Emission Reduction Strategies methodology exists, verified past emission reduction performance is used to create an emissions reduction estimate.

To establish targets for these measures, staff analyzed the behavior of emission factors over time and applied percentage reductions to the baseline in an effort to better correlate with potential future reductions. In late 2020, NCTCOG exercised its option to revise 2022 targets for these measures due to better-than-expected performance. These cumulative targets are reported in **Exhibit 8-66**.

Exhibit 8-66: Emissions Reductions Measures and Targets

Pollutant	Baseline	2020 Target	2022 Target (Original)	2022 Target (Adjusted)
Nitrogen Oxide (kg/day)	2,410.80	2,892.96	5,062.68	7,403.95
Volatile Organic Compound (kg/day)	499.72	599.67	1,079.40	1,814.02

Addressing PM3 (System Performance, Freight, and Congestion Mitigation and Air Quality Improvement Program) Measures in the Mobility 2045 Update

The Mobility 2045 Update directly addresses many of the measures in the PM3 rulemaking and has selected policies, programs, and projects using similar criteria for many years. Many of the measures in this rulemaking have been incorporated as appropriate into the plan's project selection processes (see *Project Selection/Prioritization Processes* below), and all measures are considered when developing the plan's suite of recommendations. Upon implementation, these recommendations will directly address congestion, reliability, freight movement, and therefore lead to improvements in these measures and achievement of targets.

Some examples of specific programs and projects included in the Mobility 2045 Update that are anticipated to address the PM3 measures are listed in **Exhibit 8-67**.

Table 8-67: PM3 Performance Impacts of Selected Programs and Projects

Program/Project Name	PM3 Measures Addressed	Potential Impact
Signal Retiming Program	Interstate Reliability, Non-Interstate Reliability, Peak-Hour Excessive Delay, Total Emission Reductions	Retiming signals on the region’s arterials lead to more efficient utilization of the system and higher Interstate and Non-Interstate Reliability with resulting air quality benefits as well.
SH 360 from IH 30 to SH 183 Asset Optimization Project	Interstate Reliability, Truck Travel Time Reliability, Peak-Hour Excessive Delay	Strategically adding capacity and operational improvements to this corridor are anticipated to improve Interstate Reliability and Truck Travel Time Reliability.
Southeast Connector Corridor Project on US 287/IH 820/IH 20 in Tarrant County	Interstate Reliability, Truck Travel Time Reliability, Peak-Hour Excessive Delay	Adding capacity to this key transportation corridor is anticipated to alleviate recurring congestion and improve reliability of the system.
Regional Veloweb Trail in Grand Prairie, Cotton Belt Trail, South Clark Road Trail	Non-Single-Occupancy Vehicle Travel, Total Emission Reductions	Completing these portions of the Regional Veloweb enables more of the region’s population to switch to nonmotorized commutes.

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), and 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 rail stations, park-and-ride locations, and maintenance facilities. NCTCOG coordinated with public transportation providers in the region to ensure all agencies either developed their own TAM (Transit Asset Management) Plan or participated in a group-sponsored plan offered by NCTCOG or TxDOT. There are five transit providers, listed below, that participate in NCTCOG's TAM Plan.

- City of Arlington
- City of Grand Prairie
- City of McKinney
- City of Mesquite
- Northeast Transportation Services

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

The TAM final rule establishes four performance measures related to the condition of transit assets:

- ➔ Rolling Stock (transit vehicles)
- ➔ Infrastructure (rail track)
- ➔ Equipment (transit support vehicles)
- ➔ Facilities (buildings, stations, park-and-rides)

Metropolitan Planning Organizations are required to coordinate with transit providers to report on these measures, establish regional targets, and integrate individual transit providers' performance targets and TAM plans into planning documents. The North Central Texas Council of Governments 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 established initial regional targets for the four transit asset categories in December 2017. These targets have been reaffirmed regularly since that time, with the latest action occurring in February 2019. **Exhibit 8-68** lists the measures and adopted targets.

Exhibit 8-68: Transit Asset Management Targets for 2020

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

Rolling Stock: Percentage of Revenue Vehicles Met or Exceeded Useful Life Benchmark

This measure assesses the percentage of rolling stock revenue vehicles, such as buses and paratransit vehicles, a transit provider operates that have met or exceeded the ULB (Useful Life Benchmark). The ULB is the expected lifecycle of a capital asset for a particular transit provider’s operating environment, based on recommended mileage or the acceptable period of use in service. NCTCOG has set the regional target for this measure with the goal that the percent of revenue vehicles that have met or exceeded their ULB does not exceed the target percentage. **Exhibit 8-69** summarizes the Fiscal Year (FY) 2020 target and comparative performance in FY2017, FY2018, and FY2019 for rolling stock revenue vehicles in the region.

Exhibit 8-69: Rolling Stock Performance Compared to Targets

Percent of revenue vehicles that have met or exceeded their useful life benchmark

Asset Type ¹	Fiscal Year 2017 Performance	Fiscal Year 2018 Performance	Fiscal Year 2019 Performance	Fiscal Year 2020 Target
Bus	6%	4%	5%	0%
Small Bus	3%	9%	18%	0%
Light-Rail Vehicle	0%	0%	0%	0%
Commuter Rail Locomotive	0%	0%	0%	0%
Commuter Rail Passenger Car	0%	0%	0%	0%
Articulated Bus	0%	0%	0%	0%
Commuter Rail Passenger Coach ²	35%	40%	18%	0%

¹ Rolling stock assets include a small number of vehicles reported to the National Transit Database as “inactive”

² Includes assets rebuilt near the end of their useful life with the assumption of a minimum useful life extension of 10 years, which may be too conservative (i.e., vehicles may be in better condition than expected based on completed rebuild activities)

NCTCOG is actively using this performance measure to select programs and projects for the Mobility 2045 Update. See *Addressing Transit Asset Management in the Mobility 2045 Update* below for more information.

Infrastructure: Percentage of Track Segments with Performance Restrictions

This measure assesses the performance of rail infrastructure operated by transit providers in the region by measuring the percentage of track segment with performance restrictions. A performance restriction exists on a segment of rail fixed guideway when the maximum permissible speed of transit vehicles is set to a value that is below the guideway’s full-service speed. These restrictions are often referred to as “slow zones.” NCTCOG has set the regional target for this measure with the goal that the percentage of

track segments with performance restrictions does not exceed the target percentage. **Exhibit 8-70**, below, summarizes the FY2020 target and comparative performance in FY2018 and FY2019 for rail infrastructure.

Exhibit 8-70: Infrastructure Performance Compared to Targets

Rail Mode	Fiscal Year 2018 Performance	Fiscal Year 2019 Performance	Fiscal Year 2020 Target
Light Rail	0.20%	0.20%	0%
Commuter Rail	0.09%	0.05%	0%
Streetcar Rail	0%	0%	0%
Hybrid Rail	2.05%	0%	0%

Equipment: Percentage of Non-Revenue Vehicles Met or Exceeded Useful Life Benchmark

This measure assesses the percentage of non-revenue vehicles, including transit service and maintenance vehicles, which have met or exceeded their ULB. NCTCOG has set the regional target for this measure with the goal that the percent of revenue vehicles that have met or exceeded their ULB does not exceed the target percentage.

Exhibit 8-71, below, summarizes the FY2020 target and comparative performance in FY2018 and FY2019 for non-revenue equipment.

Exhibit 8-71: Equipment Performance Compared to Targets

Asset Type	Fiscal Year 2018 Performance	Fiscal Year 2019 Performance	Fiscal Year 2020 Targets
Automobiles	32%	15%	0%
Steel Wheel Vehicles	0%	25%	0%
Trucks & Other Rubber Tire Vehicles	19%	52%	0%

Facilities: Percentage of Facilities Assets with Condition Rating below 3.0 on Federal Transit Administration Transit Economic Requirements Model

This measure tracks the percentage of facility assets, such as maintenance, administrative, passenger, and parking facilities, with a condition rating below 3.0 on the Federal Transit Administration Transit Economic Requirements Model scale. NCTCOG set the regional target for this measure with the goal that the percent of facilities with a condition rating below 3.0 on the Transit Economic Requirements Model scale does not exceed the target percentage.

Exhibit 8-72, below, summarizes the FY2020 target and comparative performance in FY2018 and FY2019 for this measure.

Exhibit 8-72: Facilities Performance Compared to Targets

Asset Type	Fiscal Year 2018 Performance	Fiscal Year 2019 Performance	Fiscal Year 2020 Targets
Administrative/Maintenance	0%	5%	0%
Passenger/Parking	0%	0%	0%

Addressing Transit Asset Management in the Mobility 2045 Update

The Mobility 2045 Update directly addresses many of the measures in the TAM rulemaking and projects are selected with TAM principles in mind. Given the goal of TAM to achieve and maintain transit fleets, non-revenue vehicles, rail infrastructure, and facilities in a state of good repair, NCTCOG has advanced several policies and programs that center on planning, procurement, and implementation of projects that would further the maintenance or replacement of transit assets. As of FY2021, TAM has been addressed in the Transportation Improvement Program through regular maintenance of transit assets and the purchasing of new vehicles in cooperation with the region's transit agencies and NCTCOG's subrecipients using the Federal Transit Administrations 5307 (Urbanized Area Formula) and 5339 (Bus and Bus Facilities) funds.

Staff are undertaking a CVP (Cooperative Vehicle Procurement) on behalf of small transit providers, nonprofits, and health and human service agencies. The CVP will ease the administrative burden on several small transit providers by leveraging nearly \$6 million in funding for both replacement and expansion of Americans with Disabilities Act accessible transit fleets across the region. Through this CVP, NCTCOG will ensure compliance with federal procurement requirements, deliver savings and efficiencies to regional partners, and continue efforts to implement regional transit vehicle standards. The CVP will help meet the regional targets for the rolling stock performance measure.

A summary of specific programs and projects included in the Transportation Improvement Program that will help address the TAM measures are listed in **Exhibit 8-73**. The current transit listings will be updated each cycle as the Federal Transit Administration releases additional funds for each fiscal year.

Exhibit 8-73: Summary of Transportation Improvement Program Projects that Address TAM Performance Measures

Project Description	Performance Measures
Purchase Replacement Vehicles	Rolling Stock, Equipment
Bus Preventive Maintenance	Rolling Stock
Preventive Maintenance	All
System Preventive Maintenance	All
Rail Preventive Maintenance	Infrastructure
Purchase Replacement Vehicles – Trinity Railway Express Service	Equipment
Acquisition of Security Equipment	Equipment

Public Transportation Agency Safety Plans

Public Transit Agency Safety Plans are a means for transit providers and Metropolitan Planning Organizations to monitor and improve the agency of transit systems under their jurisdiction. A core component of the process is monitoring and establishing targets for four required performance measures:

- Fatalities (total number of reportable fatalities and rate per total vehicle revenue miles by mode)
- Injuries (total number of reportable injuries and rate per total vehicle revenue miles by mode)
- Safety Events (total number of reportable events and rate per total vehicle revenue miles by mode)
- System Reliability (mean distance between major mechanical failures by mode)

Transit providers in the region were required to establish initial safety targets by December 31, 2020, after which NCTCOG had 180 days to establish regional targets in a cooperative process with transit providers. Transit provider targets are established annually. Regional targets will be updated every four years.

Regional transit providers have all established and published their safety targets for each of the required performance measures in their agency safety plans. NCTCOG assessed each of these agency safety plans and coordinated with the transit providers, the Texas Department of Transportation, and the Federal Transit Administration Public Transit Agency Safety Plans Technical Assistance Center to determine the method and overall goal for the regional safety targets. **Exhibit 8-74**, below, summarizes NCTCOG's regional safety targets for each of the seven performance measures. While individual providers created targets for each mode they operate, the regional safety performance data is aggregated for the regional baseline average performance and safety targets to ensure consistency and applicability across the region. The overall goal of the targets is to achieve a 5 percent improvement over the regional baseline average performance by FY2025. However, fatality targets are set to zero, in line with the regional safety position that, "Even one death in the transportation system is unacceptable." These targets were approved by the Regional Transportation Council on May 13, 2021.

Exhibit 8-74: Public Transit Agency Safety Plans Baseline Average Performance and Regional Safety Targets

Performance Measure	Baseline Average	Regional Safety Target
Fatalities – Total Number	6.00	0.00
Fatalities – Rate per 100k Miles	0.01	0.00
Injuries – Total Number	150.50	142.98
Injuries – Rate per 100k Miles	0.23	0.22
Safety Events – Total Number	516.00	490.20
Safety Events – Rate per 100k Miles	0.81	0.77
System Reliability – Average Miles Between Major Mechanical Failures	18,896.00	19,841.00

Addressing Public Transportation Agency Safety Plans in the Mobility 2045 Update

Strategies for addressing transit safety will become clearer in the coming years as transit safety principles are more strongly integrated into planning processes. However, the safety of the transit system is an important regional value and many programs and projects that are currently recommended by the Mobility 2045 Update directly or indirectly address the safety of the transit system. An example of a recently implemented project is the implementation of positive train control along the Trinity Railway Express and Dallas Area Rapid Transit rail systems. The Regional Transportation Council previously funded the larger positive train control program, and this latest effort represents the final steps to bring this important safety measure to fruition. Double-tracking projects represent added capacity to the rail system, but they also provide important safety functions. The rail will be reconstructed, allowing for higher speeds on a previously speed restricted corridor. In addition, by allowing the trains to pass one another on separate tracks, potential conflicts are reduced, thereby increasing safety across the system.

Conclusion

Tracking the performance of the region's transportation system relative to the goals of previous and current federal legislation is a required component of the plan development process. However, data and insights gleaned from the federal performance measures can be applied in useful ways as there is overlap between Mobility Plan Update goals and federal emphasis areas. During the period Mobility 2045 Update is in effect, these measures will continue to be tracked and updated as new data is available, generally on an annual basis.

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8. Regional Performance: Additional Performance-Based Planning Efforts

Introduction

Measuring and tracking the performance of the region's transportation system is a fundamental component of the Metropolitan Transportation Plan and the performance-based planning process used at NCTCOG (North Central Texas Council of Governments). As mentioned previously in this chapter, performance measurement activities in the Mobility 2045 Update fall into three categories:

- Performance Relative to Plan Goals
- Federal Performance Measures
- Additional Performance Measurement Processes

This section outlines additional performance measurement processes used in the Mobility 2045 Update planning process.

Project Selection/Prioritization Process

Performance measurement played an integral role in the major roadway project selection and prioritization process for the Mobility 2045 Update. As detailed in the **Mobility Options** chapter, the Moving Ahead for Progress in the 21st Century Act and the Fixing America's Surface Transportation Act require Metropolitan Planning Organizations 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 8-75** and discussed in greater detail in the **Mobility Options** chapter. A similar process is used for project selection for NCTCOG's 10-Year Plan.

The process was supplemented by a nondiscrimination review of project prioritization. This review identified whether:

- The transit and roadway recommendations in the Mobility 2045 Update provide equitable benefits to protected populations.

- The prioritization of these recommendations over time would result in the significant delay in the receipt of benefits to protected populations.

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

Exhibit 8-75: Performance Measures Used in Mobility 2045 Update Project Selection Process

MAP-21/FAST Act Goal	Performance Measure	Data Source
Congestion Reduction	V/C ¹⁴ on various modeled networks	MOBLOS ¹⁵
	V/C change between Build and No-Build networks	MOBLOS
System Reliability	Level of Travel Time Reliability	National Performance Management Research Dataset
Safety	Fatal and Incapacitating Crash Rate	Agency-curated CRIS crash data
	Total Crash Rate	
Infrastructure Condition	Good/Fair/Poor Pavement Condition	Texas Department of Transportation pavement datasets associated with PM2 Performance Measures
	Good/Fair/Poor Bridge Condition	Texas Department of Transportation bridge datasets associated with PM2 Performance Measures and/or National Bridge Inventory
Freight Movement	Truck/Car Travel Time Ratio	National Performance Management Research Dataset
	Truck Volume Percentage	Transportation Analysis and Forecasting Tool model runs
Economic Vitality	Activity Density Change – Recent (2000-2023)	Demographic forecasts/Census
	Activity Density Change – Future (2023-2045)	Demographic forecasts
Environmental Sustainability	Estimate of Environmental Impact by Project Type	Project listings

CRIS: Texas Department of Transportation Crash Records Information System

Additional Performance Measurement Processes

Forecasted System Performance

NCTCOG models travel demand to forecast regional congestion considering both planned projects and forecasted demographic changes using TAFT (Transportation Analysis and Forecasting Tool). In 2023, travel in the region is estimated to take approximately 37.17

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 59.47 percent longer to complete than in uncongested conditions, assuming Mobility 2045 Update recommendations are implemented. This indicates the transportation system’s performance will decline even if the plan’s recommendations are implemented. However, if no

¹⁴ V/C is the ratio of a roadway’s volume to capacity.

¹⁵ MOBLOS is a measure of the Mobility Level of Service. This measure of performance is produced by NCTCOG’s TAFT Travel Demand Model.

improvements are made by 2045, the average trip would take 103.76 percent longer to complete in congested conditions than in uncongested conditions.

Exhibit 8-76 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 the **Regional Performance** section.

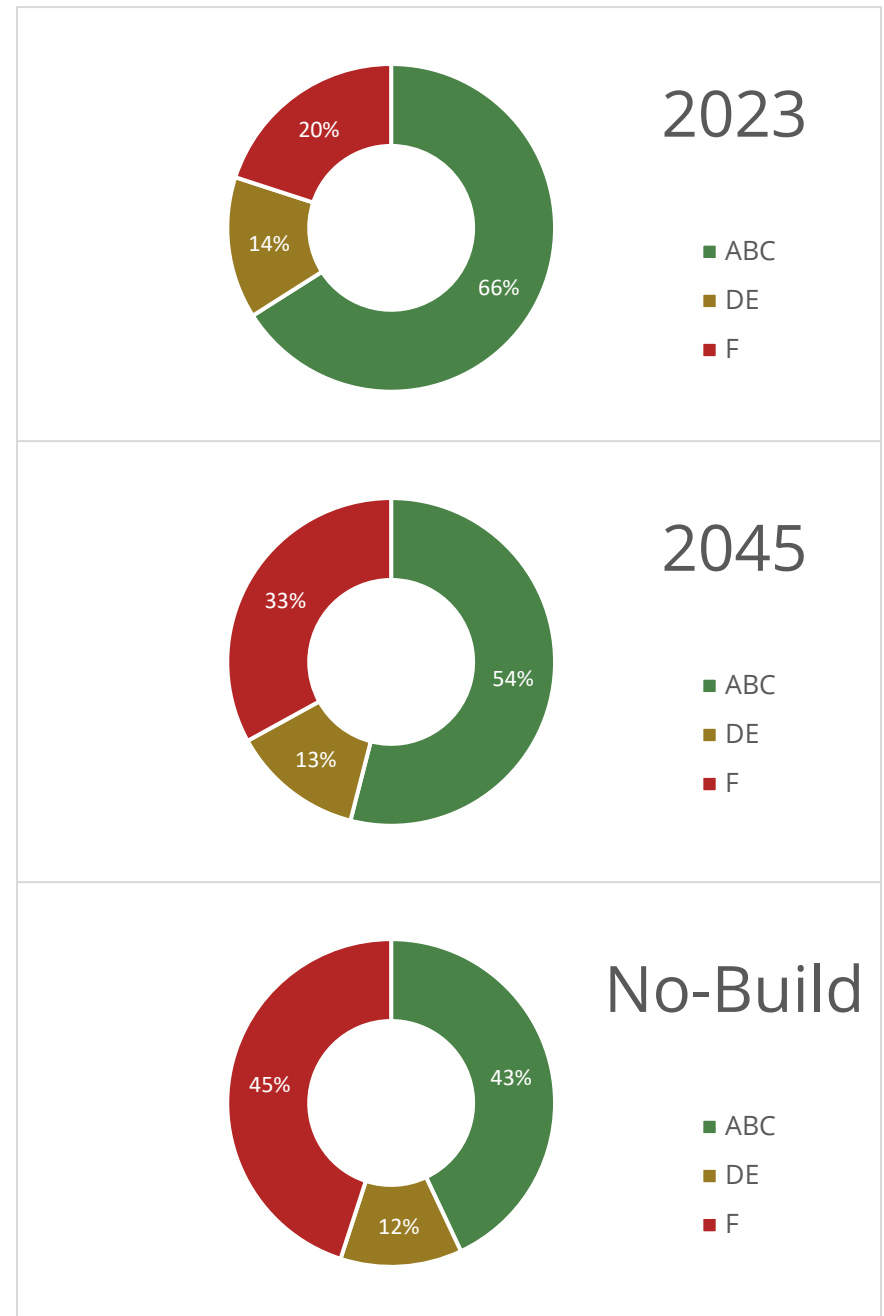
In addition to regional performance measures, the Travel Demand Model generates congestion indicators for individual roadway facilities. These indicators include, but are not limited to, LOS (level-of-service). An LOS analysis measures the operational performance of a roadway during the most congested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

Exhibit 8-76: Regional System Performance

Regional System Performance	2023	2045	No-Build
Population	8,153,519	11,411,548	11,411,548
Employment	5,724,039	8,111,082	8,111,082
Vehicle Miles of Travel (Daily)	226,394,004	325,569,161	312,635,113
Hourly Capacity (Miles)	44,614,494	54,175,507	44,178,060
Vehicle Hours Spent in Delay (Daily)	1,805,247	4,103,096	7,068,676
Increase in Travel Time Due to Congestion	37.17%	59.47%	103.76
Annual Cost of Congestion (Billions)	\$13.25	\$30.11	\$51.87

Exhibit 8-77 illustrates the percentage of lane miles with LOS conditions categorized as ABC (free flowing), DE (slower speeds/difficulty changing lanes), and F (gridlock) for year 2023, 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 the **Regional Performance** section.

Exhibit 8-77: Lane Miles at Level-of-Service ABC, DE, and F



Nondiscrimination

NCTCOG strives to ensure that populations protected by civil rights-related rules and guidance do not face discrimination from the plans and projects recommended in the Metropolitan Transportation Plan. This includes tracking forecasted performance measures related to the benefits of planned projects to protected populations. NCTCOG used a component of its TAFT Travel Demand Model to forecast the benefits related to accessibility and mobility for protected groups.

Results from the nondiscrimination analysis are found in the **Social Considerations** chapter and appendix.

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 and volatile organic compounds that can be attributed to transportation. Regional Transportation Council initiatives, including Transportation Control Measures and other elements of the Regional Transportation Council Air Quality Program, were instrumental in meeting nitrogen oxides budgets.

Results from the air quality analysis are found in the **Environmental Considerations** chapter. Recognizing the importance of monitoring the region's air quality, many performance measures related to air quality are included in this chapter as well.

Additional Uses for New Observed Datasets

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 this trend of a greater quantity and quality of

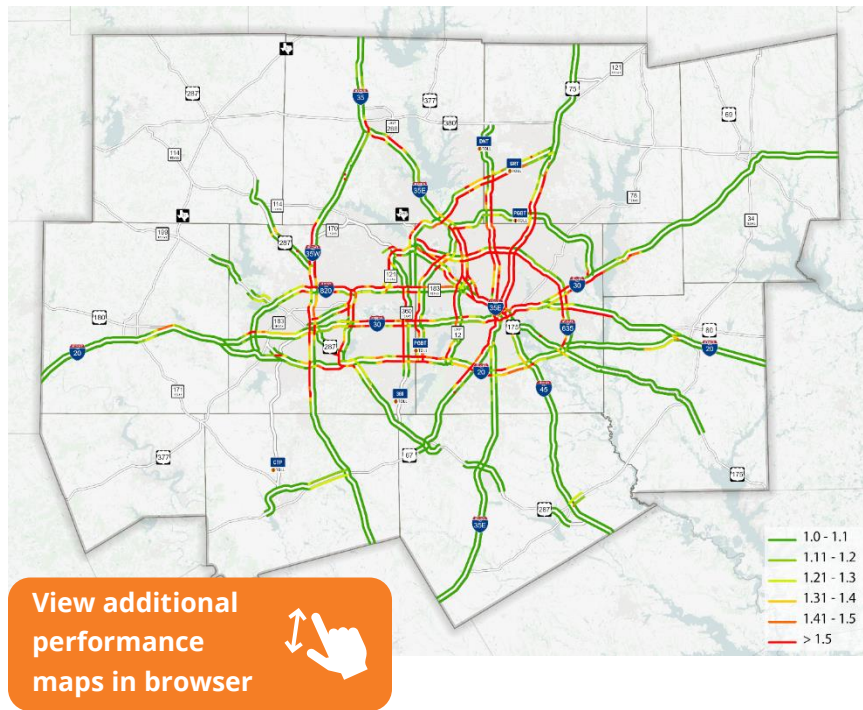
observed transportation data will continue and further strengthen observed performance measurement. In-house data infrastructure will need to continue to adapt to support this continuing influx of data.

The NPMRDS (National Performance Management Research Dataset) was made available to Metropolitan Planning Organizations like NCTCOG as part of an agreement between the Federal Highway Administration and HERE (and later, Inrix) to provide data needed to calculate the federally required performance measures in PM3 (System Performance, Freight, and Congestion Mitigation and Air Quality Improvement Program) rulemaking. However, large observed travel time datasets like NPMRDS have proven useful for observed performance analyses beyond those required by the federally required performance measures and are a valuable tool for data-driven transportation planning.

While the focus of the federal performance final rules is on the 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 8-78** and **8-79** depict areas of the region's freeway system that experienced congestion during typical PM peak period weekday travel in 2019 and 2020.

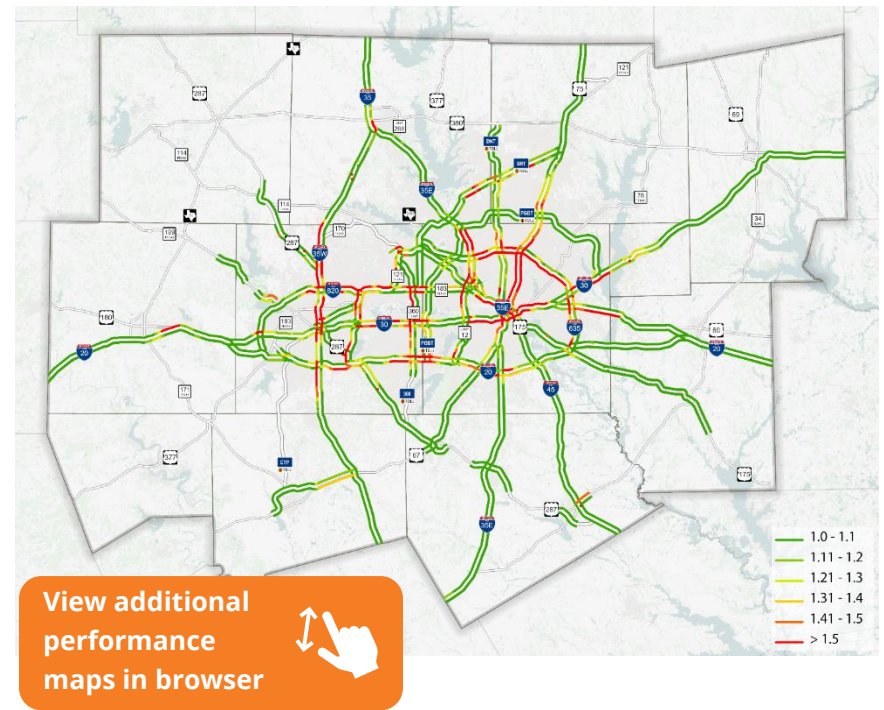
Particularly notable is the dramatic impact the ongoing COVID-19 pandemic had on overall congestion in 2020. Near-real-time datasets like NPMRDS have been an essential component in ongoing efforts to assess the impact of the pandemic on the region's transportation system.

Exhibit 8-78: PM Peak-Period Travel Time Index (2019)



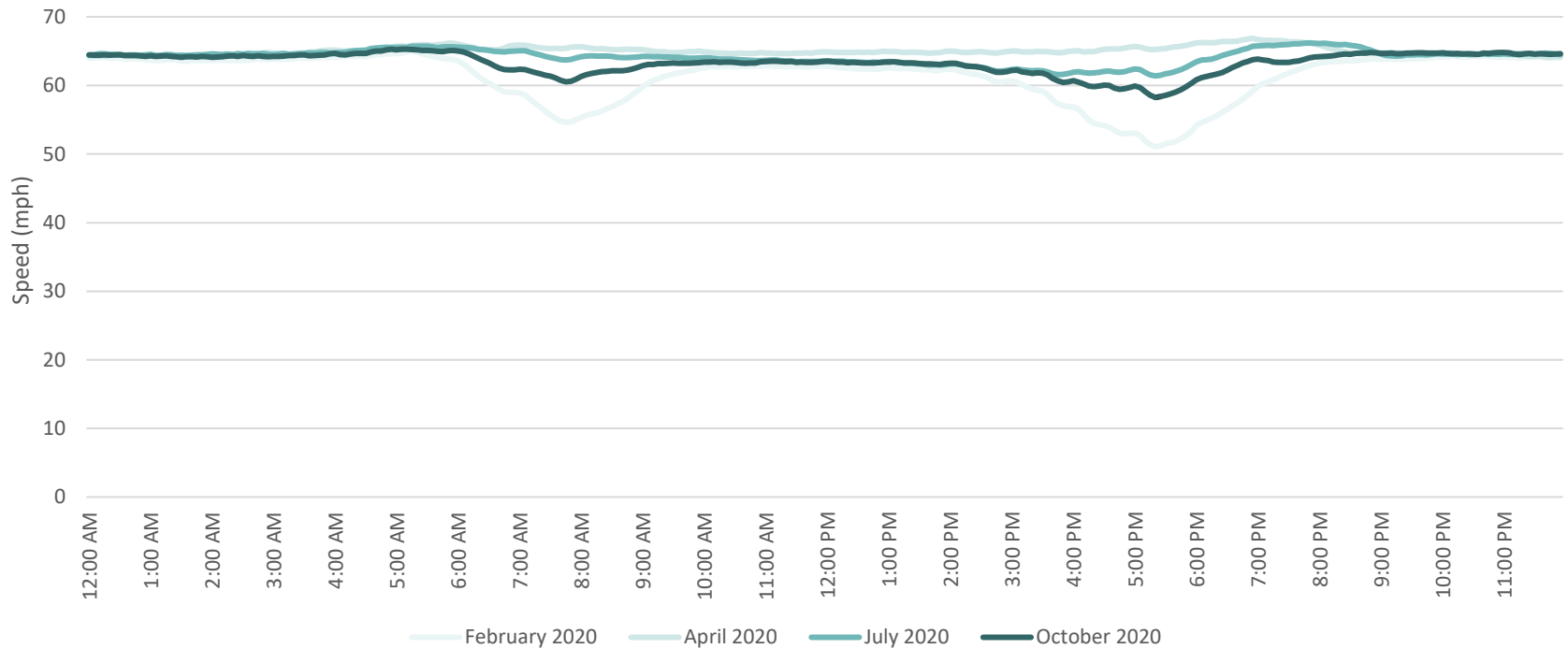
Additionally, these figures also reveal that congestion during peak periods on some facilities is directional. For example, travel toward a central business district may be considerably worse during the AM peak period than during the PM peak period. This means some facilities may benefit from reversible managed lanes, peak-period technology lanes, and other innovative operational solutions.

Exhibit 8-79: PM Peak-Period Travel Time Index (2020)



Travel time datasets can be converted to speed datasets, allowing planners to easily visualize the data for different times of the day in aggregate forms, and to easily compare time periods during which average speeds are changing. This was an important component of NCTCOG's performance monitoring efforts during the ongoing COVID-19 pandemic as well. As depicted in **Exhibit 8-80**, average freeway speeds in the region dipped dramatically during the AM and PM peak travel periods in February 2020, but these dips were largely absent in April 2020 as the COVID-19 lockdown removed most commuters from the region's freeway network. The dips slowly returned in subsequent months as more commuters returned.

Exhibit 8-80: Average Freeway Speeds by Time of Day (2020)



Additionally, 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 process 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 nonrecurring congestion events. NPMRDS was also an essential component of the validation process for the TAFT Travel Demand Model used to model future congestion in the Mobility 2045 Update.

While NPMRDS has benefited NCTCOG’s efforts to observe the region’s current performance, the agency already has a robust 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 and analyze these data to strengthen the performance-based planning process.

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 the Mobility 2045 Update using NCTCOG's TAFT 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, traveler behavior, and other external factors may mean that future performance deviates significantly from forecasted performance. With this in mind, the agency has conducted various preliminary scenario planning exercises to test these assumptions and current analysis tools, though more research and development is needed in this regard.

While many scenario analyses focus on land use, NCTCOG's most recent scenario planning exercise focused on evaluating external impacts that could change the ways in which the transportation system is used, planned for, and funded. The ongoing COVID-19 pandemic is a perfect example of an external factor that was unforeseen and had significant impacts on the transportation system, and scenario planning can help the Metropolitan Transportation Plan process adapt to future events of a similar magnitude. 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 Metropolitan Transportation Plans.

Summary

NCTCOG has a robust performance-based planning process in place, which has been bolstered in the Mobility 2045 Update by a new suite of performance measures related to the plan's goals and federal performance requirements. 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 the **Regional Performance** section of this appendix.