

Congestion Management Process – 2021 Update

CHAPTER 3

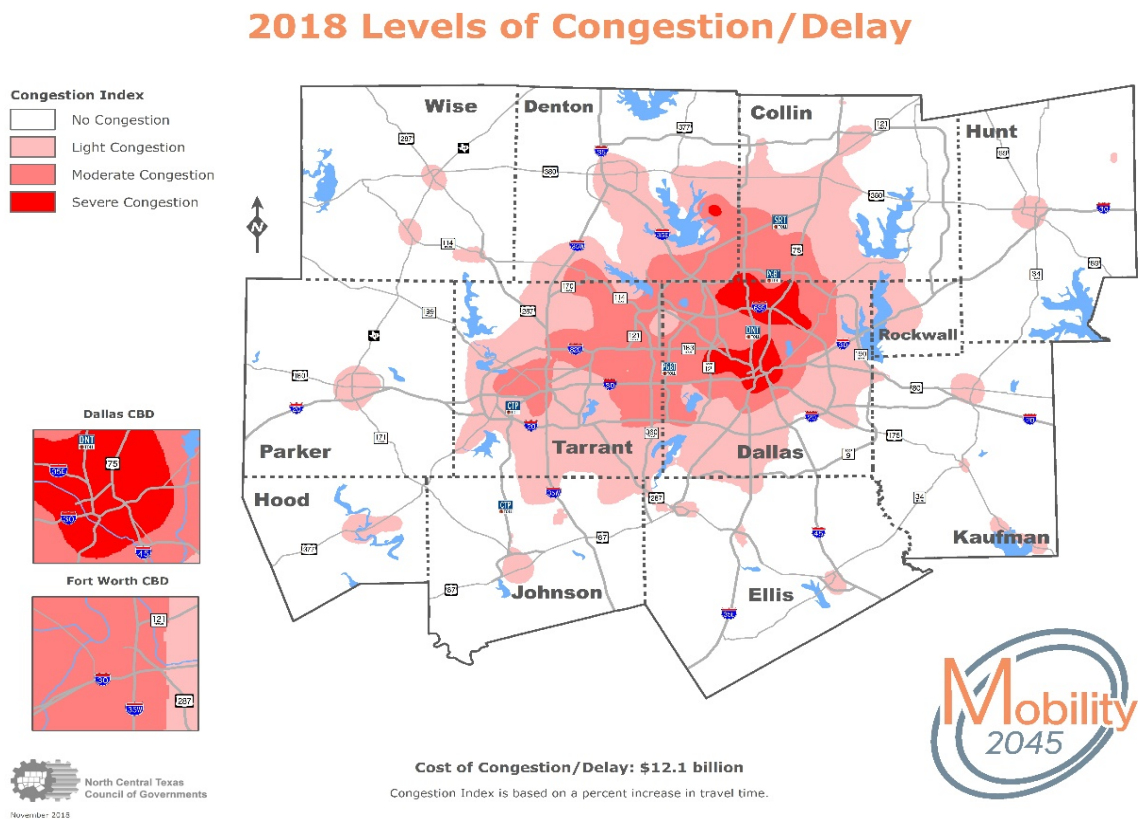
TRANSPORTATION SYSTEM PERFORMANCE CRITERIA AND ASSET INVENTORY

System Performance

A transportation system's performance can be measured in several ways, especially when that system is multimodal. A successful multimodal transportation system is often measured in terms of efficiently reducing roadway traffic congestion and providing reliable and accessible modal options. If multimodal options, trip reduction programs, system management projects, and other travel policies are effective, the result will be reflected through reduced congestion and increased traveler through-put. However, demographic growth may increase faster than transportation system capacity can be provided, either due to implementation issues or financial constraint.

In 2018, the regional daily vehicle miles of travel were over 212 million. Currently, travel throughout the region takes approximately 41 percent longer to complete due to congestion, resulting in nearly 1.7 million daily vehicles hours spent in delay. This delay equates to an annual cost of congestion of \$12.1 billion for the region. Exhibit 3-1 illustrates the regional peak period congestion levels for 2018.

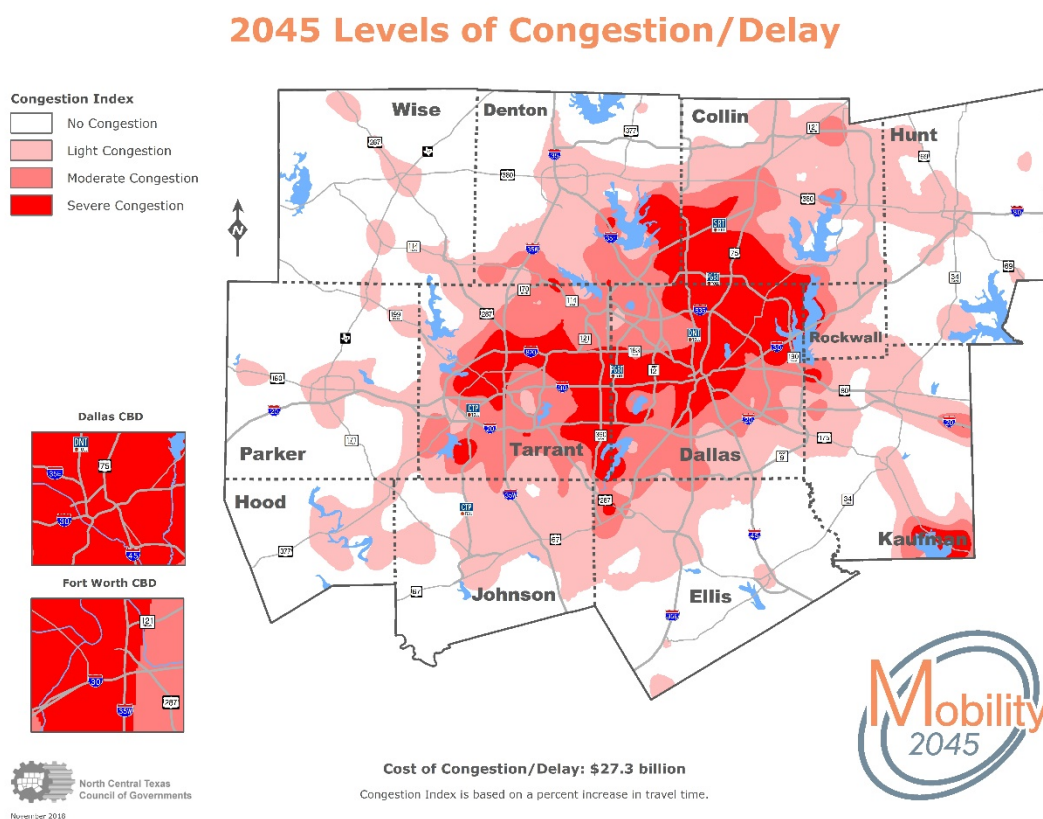
Exhibit 3-1: 2018 Peak Period Congestion Levels



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If the projects, programs, and policies contained in Mobility 2045 are implemented, the travel time increase due to congestion is expected to be approximately 59 percent, with an annual congestion cost of \$27.3 billion in 2045. Severe congestion will spread to include southeast Denton County, central and eastern Tarrant County, northwest and southeast Kaufman County, and additional portions of northern and western Dallas and southern Collin counties. Financial, environmental, and social constraints will make it difficult to accommodate the increased demand for travel, resulting from the regional growth. If the region is to meaningfully reduce congestion levels, additional congestion mitigation strategies aimed at reducing drive-alone travel and enhancing the efficiency of transportation system operations will need to be pursued. Exhibit 3-2 highlights the regional peak period congestion levels for 2045, with planned improvements.

Exhibit 3-2: 2045 Peak Period Congestion Levels



The implementation of congestion mitigation strategies continues to involve the public sector, private sector, and public/private partnerships. Transportation policies need to be developed to strengthen land-use/transportation decision-making processes and to guide investment toward cost-effective solutions. Mobility 2045 emphasizes that we cannot afford to build our way out of our traffic congestion problem. While the construction of new facilities will take place, we must also find effective and practical solutions to address the air quality and travel congestion challenges that confront us.

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Data Collection and System Performance Monitoring

Data collection and system performance monitoring provide a high-level overview and the severity of congested facilities. The mix of data collection and performance measures evaluated through the Congestion Management Process (CMP) examine multiple elements that affect traffic congestion on our metropolitan transportation system. Some of those data elements include corridor analysis, reliability and speed data, crash rate, truck lane restrictions, light rail and commuter rail coverage, and availability of alternative routes.

The mix of data collection and performance measures outlined in this chapter were chosen to study specific elements that affect traffic congestion on our metropolitan transportation system. These performance measures focus on congestion, condition and availability of assets, and safety. The data collection and performance measures continue to expand over time as more data becomes available and as other performance measures mature. There are multiple levels of performance measures collected and monitored through programs and projects. Performance measures are collected and monitored at the federal, state, regional, area, corridor, or project-level. The CMP focuses on two of these areas; corridor- and project-level. Corridor level performance measures are used to evaluate the performance of the corridor to identify deficiencies and recommend strategies to remedy the deficiencies. Project-level performance measures evaluate the effectiveness of an implemented project or strategy.

Exhibit 3-3 highlights the CMP goals and actions as well as asset inventory elements that help us identify needed infrastructure, modal, or operational project.

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Exhibit 3-3: CMP Goals, Objectives, and Assets

| CMP Goals and Action | Asset Inventory |
|---|---|
| <p>Goal: Identify quick-to-implement low cost strategies and solutions to better operate the transportation system.</p> <p>Action: Implement quick-to-implement low cost strategies and solutions to better operate the transportation system.</p> | <p>Operational Assets ITS coverage, HOV/Tolled Managed Lane, Truck Lane Restrictions, Regional Freight Routes, TIM Attendance Coverage, Mobility Assistance Patrol Routes and Shoulders</p> |
| <p>Goal: More evenly distribute congestion across the entire transportation corridor and evaluate alternative routes that can be utilized during crashes.</p> <p>Action: Conduct inventory of corridor system to identify availability of existing options.</p> | <p>Infrastructure Assets Parallel Arterials, Frontage Roads, Parallel Freeway/Tollways</p> |
| <p>Goal: Ensure corridors have options and available alternate modes to relieve daily congestion and utilized during crashes.</p> <p>Action: Prioritize corridors based on available options and alternate modes.</p> | <p>Alternative Modal Assets Park-and-Ride Facilities, Light Rail, Commuter Rail and Bus Routes</p> |

Corridor-Level Analysis

System performance for the transportation system is measured in several different ways. Performance measures are used to show both recurring (expected) and non-recurring (unexpected) congestion on controlled access facilities. The CMP utilizes various performance measures to conduct a transportation system corridor analysis to evaluate the overall transportation system. The initial step in the process is to conduct a corridor performance analysis to determine the causes of congestion using criteria including recurring congestion, safety, non-recurring congestion and pavement and bridge conditions. As corridors are evaluated on each of these criteria the corridor deficiencies are identified.

The second step is to conduct a corridor-level asset inventory to determine various options that exist along the corridor that may assist in alleviating congestion on the main roadway facility. This asset inventory looks at three types of assets, roadway infrastructure, alternative modes, and operational assets. This section provides an overview of the performance criteria and the asset inventory to complete this two-step process.

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Performance Criteria

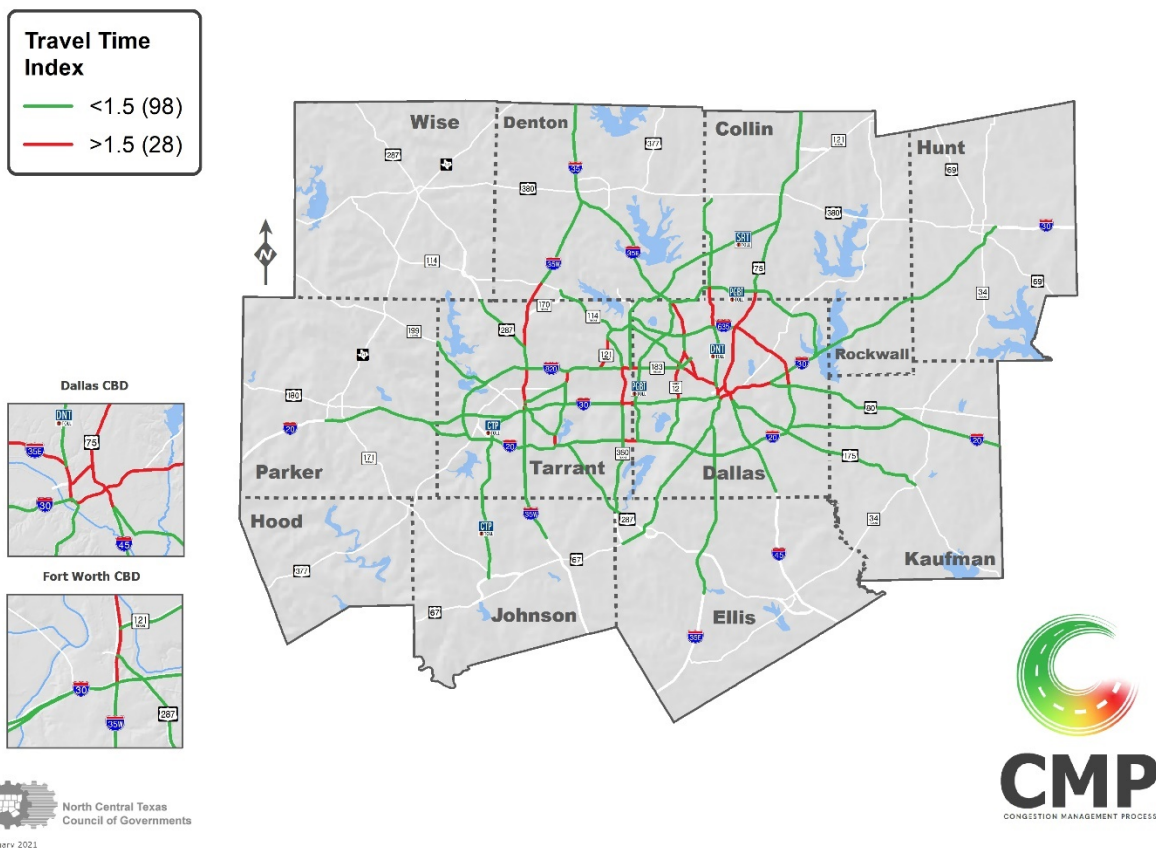
Recurring Congestion (Expected Delay) – Travel Time Index

NCTCOG receives the Travel Time Index (TTI) information through the Federal Highway Administration (FHWA) National Performance Management Research Data Set (NPMRDS). This metric was calculated from the NPMRDS travel time dataset using observed travel times on weekdays in 2019. This metric is an index comparing median travel times during peak periods to median travel times during free-flow conditions. If a corridor has a travel time index of 1.0, travel takes the same amount of time during peaks as it does during free-flow conditions. If a corridor has a travel time index of 2.0, travel takes twice as long during the peak.

Exhibit 3-4 displays the TTI ranking by corridor. The corridors with deficiencies in the TTI ranking are shown in red, while corridors in green are sufficient in this performance rating.

Exhibit 3-4: Travel Time Index

Travel Time Index



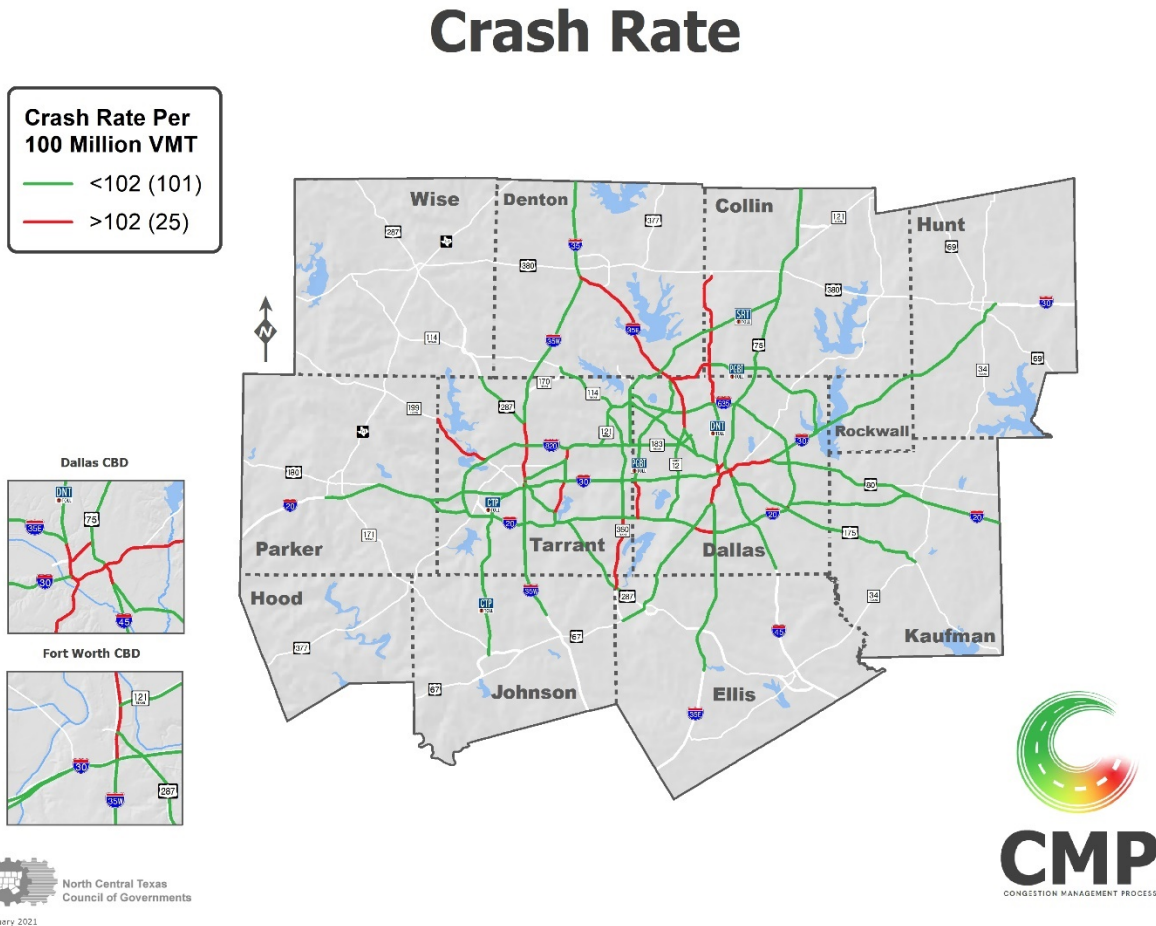
Safety - Crash Rate

NCTCOG receives crash data from Texas Department of Transportation (TxDOT's) Crash Records Information System (CRIS) annually. The collected data helps to identify crash hotspots and assist in the development of safety improvement projects, programs, and strategies. This metric includes crash data from 2014-2018. The rate is calculated by taking all

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reported crashes per 100 million Vehicle Miles of Travel (VMT) on each corridor. Exhibit 3-5 displays crash rates ranking by corridor. The corridors with deficiencies in crash rate ranking are shown in red, while corridors in green are sufficient in this performance rating.

Exhibit 3-5: Regional Crash Rates



Non-Recurring (Unexpected Delay) – Level of Travel Time Reliability

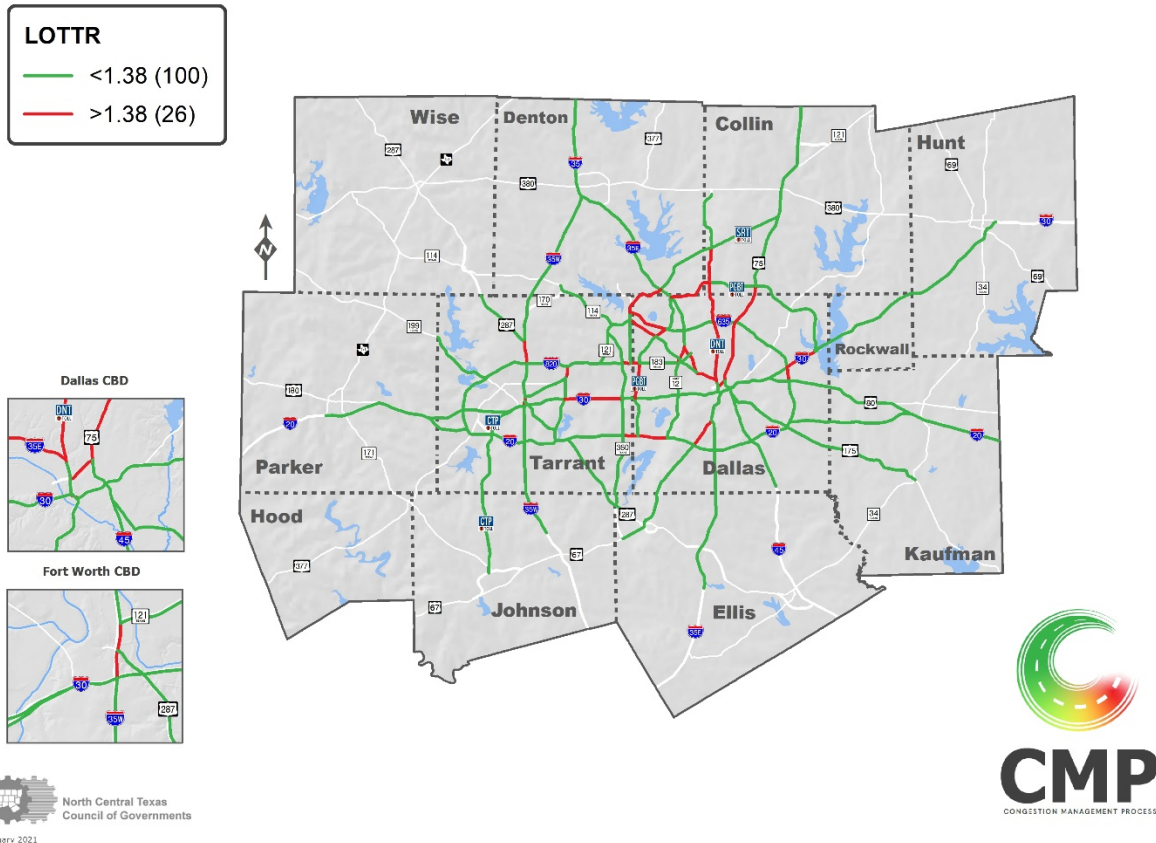
Like the TTI, the Level of Travel Time Reliability (LOTRR) is also calculated from the NPMRDS travel time dataset using observed travel times on weekdays in 2019. It uses a similar calculation procedure to the reliability measures in the PM3 Federal performance measure rulemaking. This metric is essentially an index indicating how much extra time needs to be added to trip planning time to arrive on time 80% of the time. If a corridor’s median travel time is 5 minutes and the LOTRR index is 1.0, no additional time needs to be added to trip planning. If the same corridor’s LOTRR is 1.5, 7.5 minutes (1.5 x 5 minutes) needs to be planned for travel time.

Exhibit 3-6 displays the LOTRR ranking by corridor. The corridors with deficiencies in LOTRR ranking are shown in red, while corridors in green are sufficient in this performance rating.

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Exhibit 3-6: Level of Travel Time Reliability by Corridor

Level of Travel Time Reliability



Bridge and Pavement Conditions – Percentage of Pavement and Bridges in Poor Condition

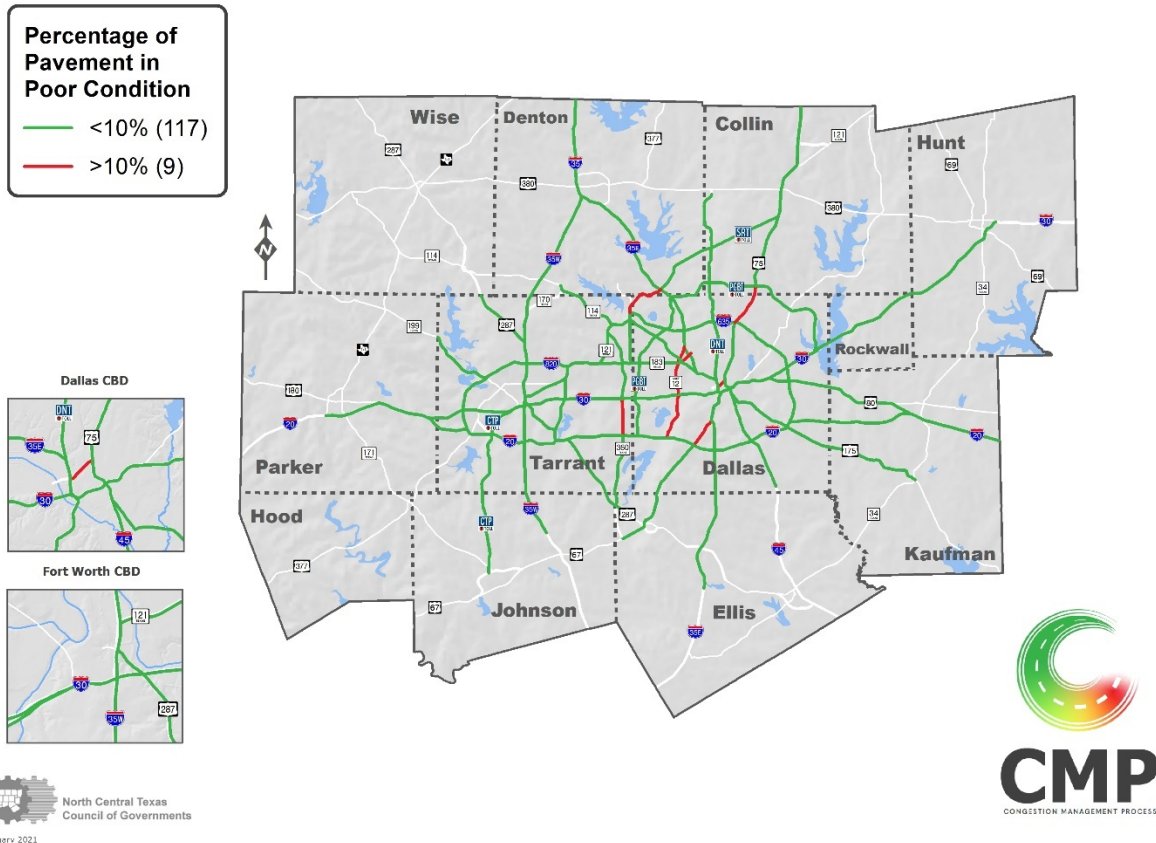
The percentage of pavement in poor condition was calculated from the 2018 Texas Department of Transportation Pavement Management Information System (PMIS) data set. This is the same data that is used to calculate the PM2 Federal pavement condition measures. As part of the PM2 measure calculation process, small pavement segments are assigned scores of “Good”, “Fair”, or “Poor”. Dozens to hundreds of these segments nest into CMP corridors. This metric is the percentage of the corridor’s length that is classified as “Poor” for pavement conditions. In addition, data from the North Texas Tollway Authority pavement condition data set was used for the roadway operated by NTTA.

Exhibit 3-7 displays the percentage of pavement in poor condition ranking by corridor. The corridors with deficient rating in percentage of pavement in poor condition ranking are shown in red, while corridors in green are sufficient in this performance rating.

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Exhibit 3-7: Pavement Condition Ranking by Corridor

Pavement Condition



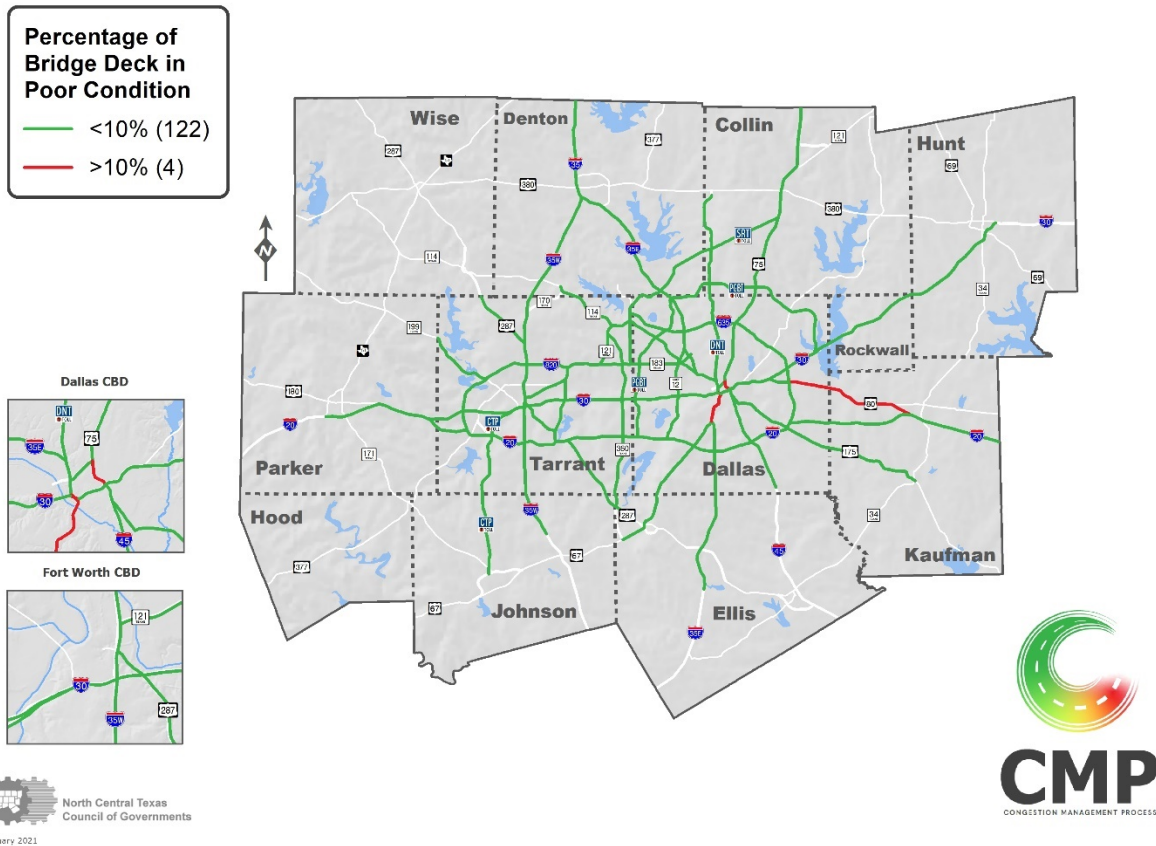
The percentage of bridge deck area in poor condition was calculated from the 2018 TxDOT MPO Bridge Dashboard dataset. This is the same data that was used to calculate the PM2 Federal bridge condition measures. As part of the PM2 measure calculation process, individual bridges are assigned scores of “Good”, “Fair”, or “Poor”. This metric is the percentage of the total bridge deck area of bridges on the corridor that are classified as “Poor.”

Exhibit 3-8 displays the percentage of bridge deck area in poor condition ranking by corridor. The corridors with the deficient percentage of bridge deck area in poor condition ranking are shown in red, while corridors in green are sufficient in this performance rating.

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Exhibit 3-8: Bridge Deck Condition Ranking by Corridor

Bridge Condition



Asset Inventory

The asset inventory is the second step in the process following the performance criteria for each corridor. The performance criteria identify deficiencies and in the next step in the process will determine if other assets are available in the corridor to remedy the deficiencies identified. The asset inventory collects information in three areas, roadway infrastructure, modal options, and operational assets. Each of these areas are outlined in the following sections.

Roadway Infrastructure Assets

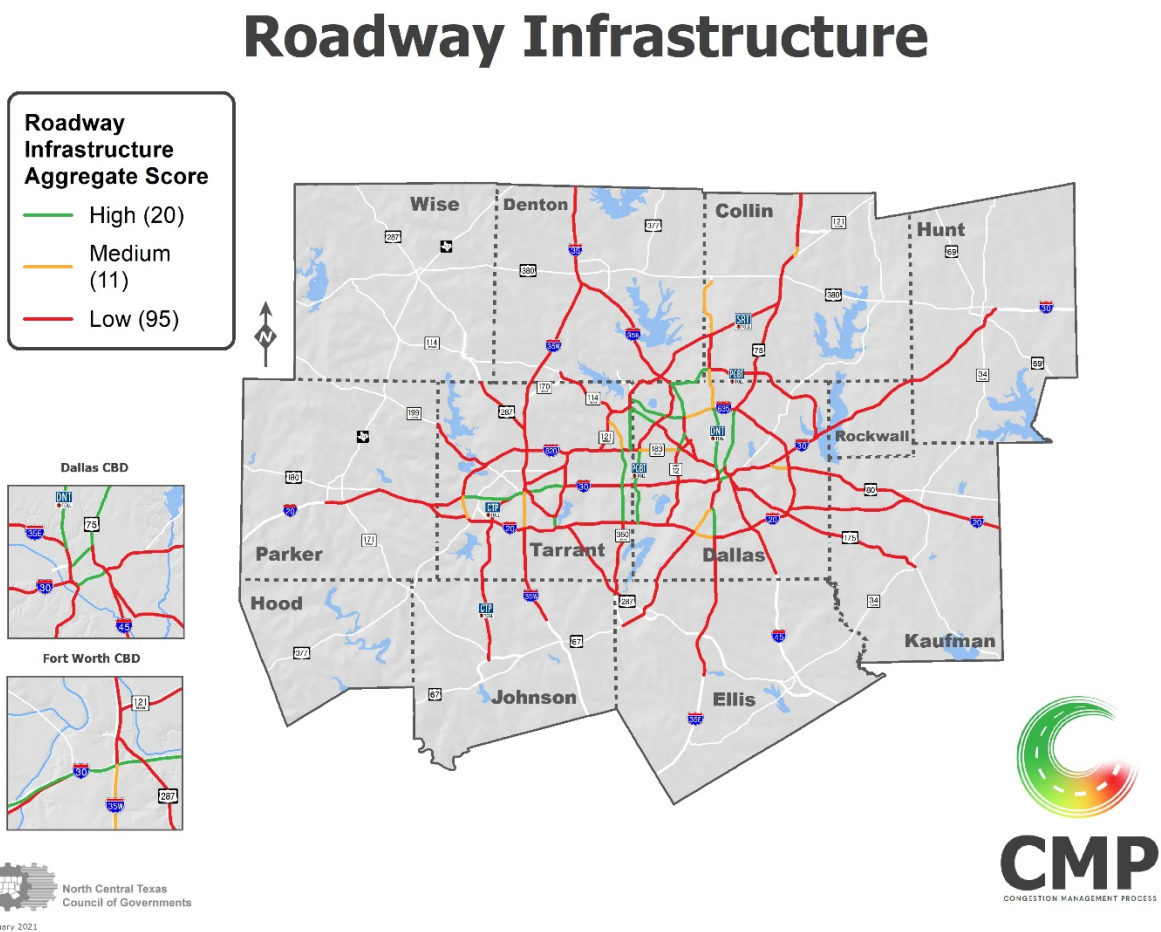
The factors that influence roadway infrastructure include the presence of parallel freeways, toll roads, frontage roads, and parallel arterials. These elements are critical components of the regional transportation system. Freeways and tollway facilities in North Central Texas are characterized by controlled-access lanes. The freeway and tollway system accounts for a small percentage of the total roadway lane miles in the DFW Metropolitan Area but carries nearly half of all vehicular travel in the region.

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In addition to freeway and tollway system, regionally significant arterials are identified based on their role to complement and enhance the major roadway and transit systems by providing the necessary transportation support and access to and from local land uses. This network is comprised of several key components including facilities which serve regional transportation needs, provide service to regional activity centers, aid in intra-community connectivity, and maintain access to and from areas outside of the region. More information on these components is included in Chapter 2 System Identification.

Exhibit 3-9 highlights the corridors within the DFW region that have alternative roadway infrastructure assets that can help balance the demand on the primary corridor. The corridors highlighted with red do not have available infrastructure, corridors highlighted in yellow have some available infrastructure and corridors highlighted in green have roadway infrastructure available to balance the demand.

Exhibit 3-9: Alternative Roadway Infrastructure by Corridor



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Alternative Modal Assets

The factors that influence alternative modes include the presence of transit options including bus and rail as well as park-and-ride facilities. The following section describes these assets in more detail.

Transit Rail and Bus

Transit rail services are provided by multiple transit providers within the region including Dallas Area Rapid Transit, Denton County Transportation Authority and Trinity Metro. The rail system carries a large portion of transit riders and operates as a system to allow seamless connections for regional commuters. To compliment the rail system, bus routes provide connections to allow users to reach local land use destinations. Transit provides another modal option for travelers in our region to access the places they need to travel and allow transportation operators to balance the demand across a corridor to improve the commuters travel. More information on transit system components is included in Chapter 2 System Identification.

Park-and-Ride Facilities

Park-and-ride facilities serve as collection areas for persons transferring to higher-occupancy vehicles. They are normally located and designed to serve bus or rail transit, but many are used by car- and vanpoolers as well. Park-and-ride facilities can be located near a central business district to serve public transit and pedestrian activity areas or in suburban areas to collect riders near the origin of their trips. Combined with Express/HOV Lanes and Tolled Managed Lanes, park-and-ride facilities can be an effective incentive for increasing vehicle occupancy, thus reducing congestion and vehicle emissions. Existing, planned, and candidate park-and-ride facilities in the DFW region are provided in Exhibit 3-10.

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Exhibit 3-10: Existing, Planned, and Candidate Park-and-Ride Facilities

Park and Ride

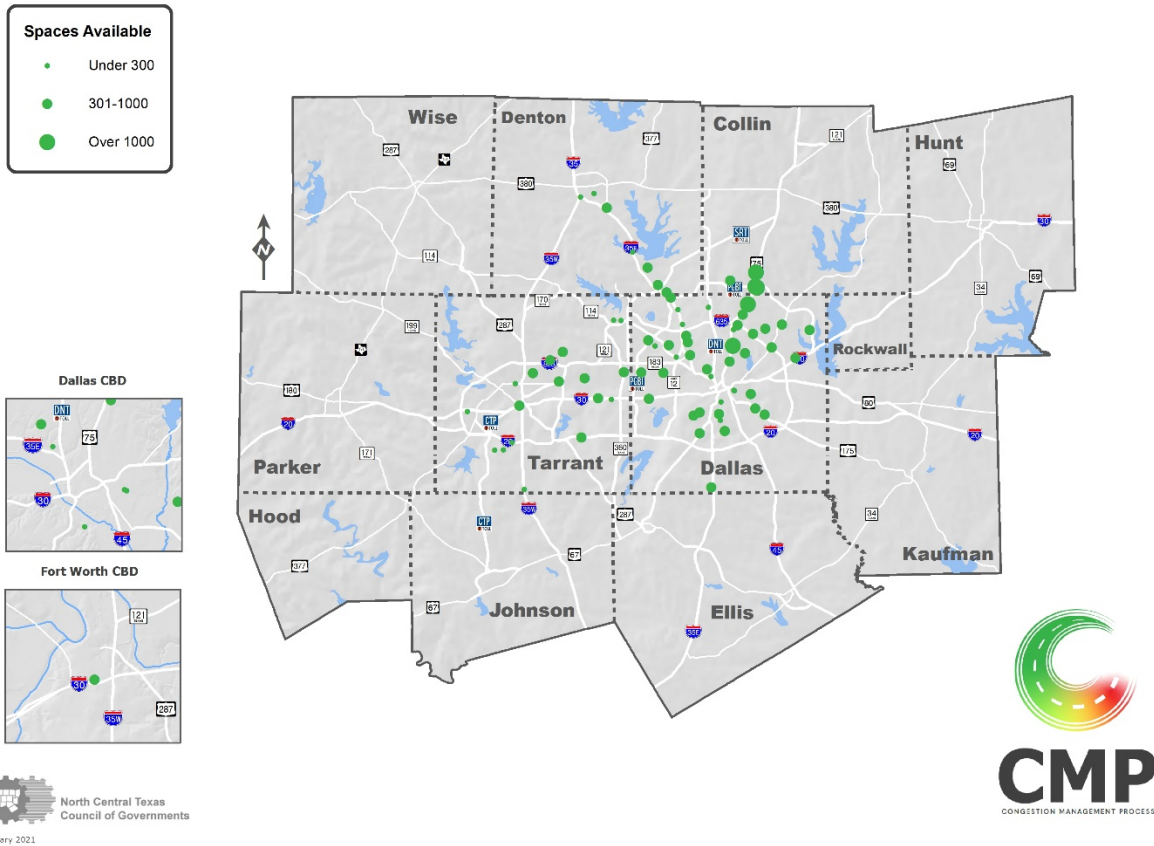
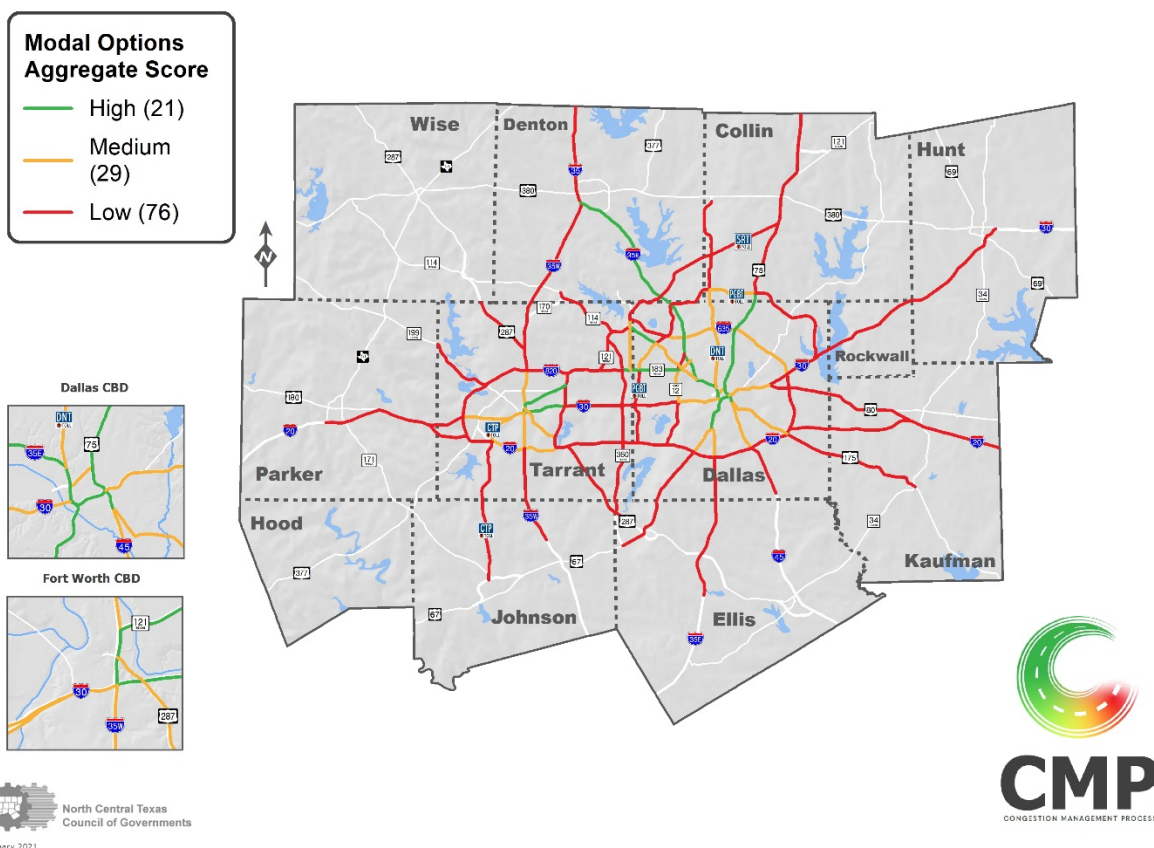


Exhibit 3-11 highlights the corridors within the DFW region that have alternative modal options available that can help balance the demand on the primary corridor. The corridors highlighted with red do not have alternative modal available, corridors highlighted in yellow have some alternative modal options available and corridors highlighted in green have an adequate modal option available to balance the demand.

Exhibit 3-11: Alternative Modal Options

Modal Options



Another model option is active transportation that consists of regional shared-use paths (Regional Veloweb), supporting community shared-use paths, and on-street bikeway network (including on-street wide shoulders in rural areas). The Regional Veloweb was not included in the analysis of modal option assets due to the nature of the short trips or last mile connections. Although, the regional veloweb should be highlighted as a complimentary system to the assets used in the modal option evaluation. The veloweb provides another option for user to get to their destination by using a combined trip scenario.

The Regional Veloweb is a network of off-street shared-use paths designed for use by bicyclists, pedestrians, and other non-motorized forms of transportation. The Veloweb serves as the regional expressway for bicycle transportation. Facilities of this type have a proven track of attracting users and provide recreational, air quality, health, economic development, and mobility benefits to communities across the nation. Linking high quality facilities together to provide intraregional routes which favor bicycle travel will encourage increased use of the bicycle for utilitarian trip purposes. More information on Regional Veloweb is included in Chapter 2 System Identification section.

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Operational Assets

In addition to roadway and transit assets, operational assets were inventory through the CMP to determine if existing operational infrastructure can be utilized to improve the flow of commuters and safety of commuters along the corridor. The operational assets that were inventoried include Intelligent Transportation System deployment, tolled managed and express/HOV lanes, availability of shoulders along the corridor and location of truck lane restrictions. The operational assets inventoried are outlined in the following section.

Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) applies advanced technologies of electronics, communications, computers, control, sensing and detection to transportation systems in order to improve safety, efficiency and service, and travel time reliability through transmitting and applying real-time information.² In the DFW region, ITS aids transportation operators and emergency response personnel as they monitor traffic, detect and respond to incidents, and inform the public of traffic conditions via mobile devices/vehicles, roadway devices, and the media.

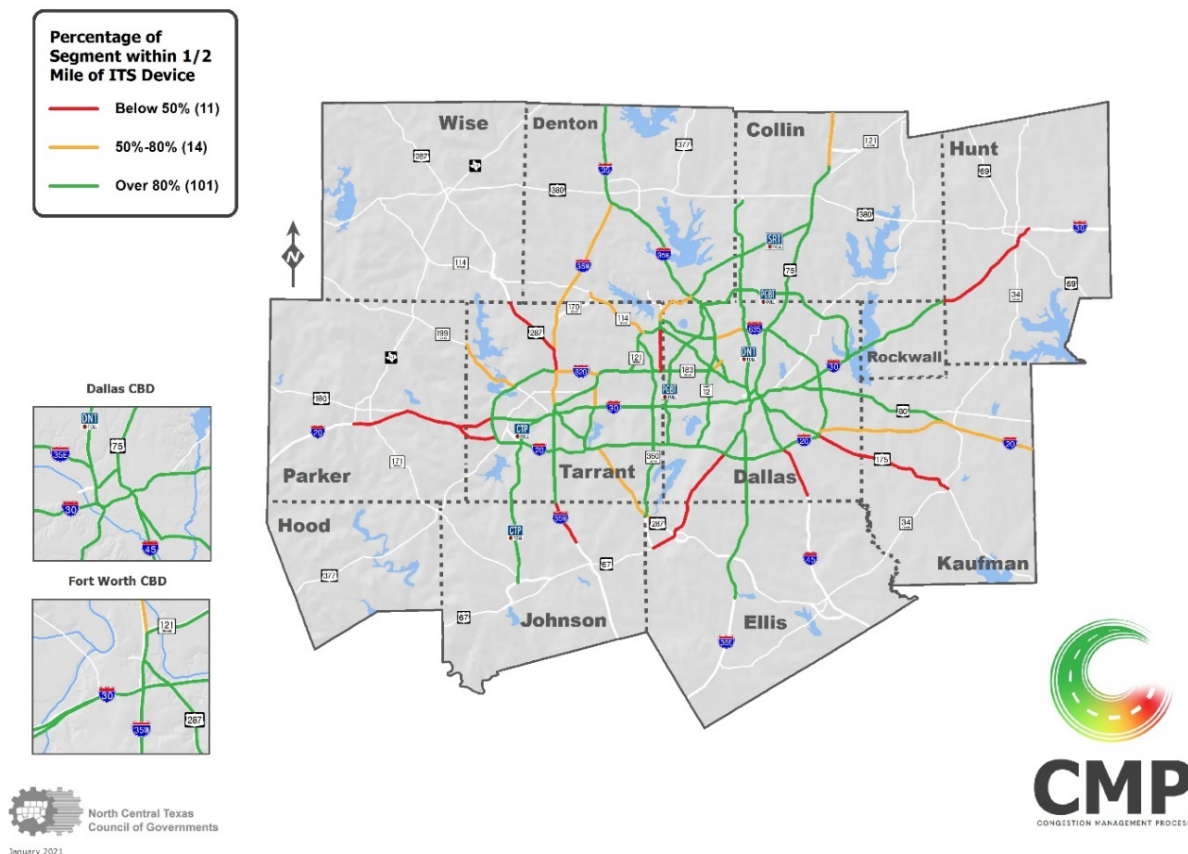
Traffic monitoring and incident detection and response systems are operating on portions of the freeway system in Collin, Dallas, Denton, and Tarrant counties. TxDOT Dallas and Fort Worth Districts each manage and operate traffic management centers (TMC) in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant counties. In addition, the North Texas Tollway Authority (NTTA) manages and operates the TMC for the tolled facilities and LBJ/NTE Express manages and operates the TMC for the tolled managed lane corridors. The ITS components of the TxDOT, NTTA, and LBJ/NTE Express TMCs include closed-circuit television, lane control signals, dynamic message signs, and vehicle detectors on controlled access facilities that have ITS deployed. The corridors highlighted in red do not have good coverage of ITS, corridors highly in yellow have some coverage of ITS and corridors highlighted in green have adequate coverage of ITS to allow the traffic monitoring and responses. Exhibit 3-12 highlights regional corridor ITS coverage.

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<http://www.freeway.gov.tw/UserFiles/File/Traffic/A1%20Brief%20introduction%20to%20Intelligent%20Transportation%20System,%20ITS.pdf>.

Exhibit 3-12: Regional ITS Technology

Intelligent Transportation Systems



Tolled Managed Lanes and Express/HOV Lanes

Tolled managed lanes are another operational strategy for the DFW regions transportation system. These lanes are dynamically priced to allow the price to change based on travel demand within the corridor. These lanes also allow for a 50% discount for vehicles with two or more people during the peak periods. Similar to the tolled managed lanes, the express/HOV lanes allow for demand to be managed by encouraging travelers to ride together or carpool to reduce the number of vehicles on the roadway. These users are provided with a dedicated lane to provide an incentive for quicker travel through the corridor. The tolled managed lanes and express/HOV lanes are integrated to provide a system for travelers to use within the region. The corridors within our region that have tolled managed lanes or express/HOV lanes available for travelers are highlighted in Chapter 2 System Identification section.

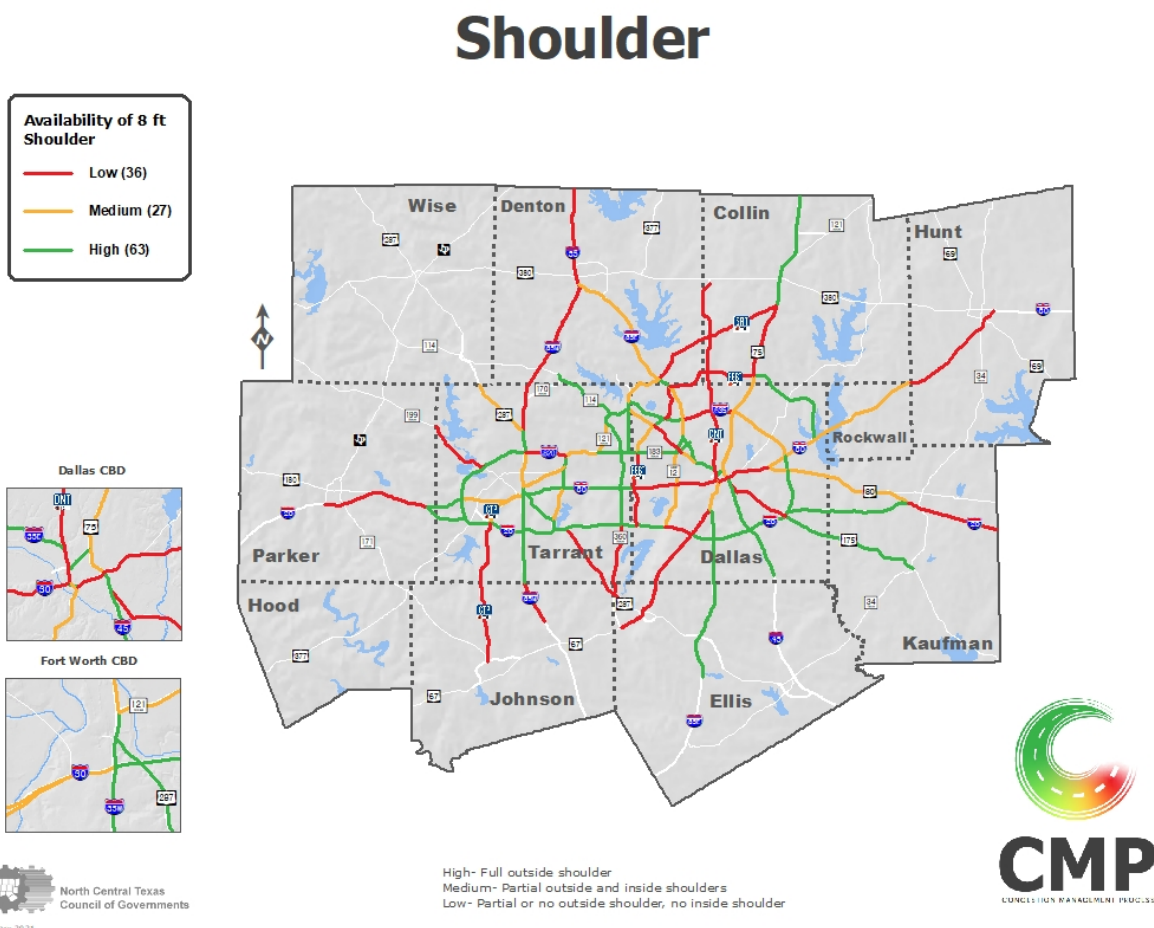
Shoulders

As it relates to system reliability, shoulders are extremely important in the management of traffic crashes. One advantage of shoulders is that the space can be used for vehicles to stop because of mechanical difficulties or other emergencies. Emergency vehicles and responders can also utilize the shoulder when responding to traffic crashes or making traffic stops. The

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effective utilization of shoulders during traffic crashes is a main component of the NCTCOG Traffic Incident Management (TIM) Training Course. Exhibit 3-13 highlights the corridors within the DFW region that have shoulders available. The corridors in red have no shoulders available, corridors in yellow have some shoulders available, and corridors in green have both inside and outside shoulders.

Exhibit 3-13: Regional Controlled Access Facilities with Shoulders



Truck Lane Restrictions

The concept of a truck lane restriction is to improve safety and mobility on the roadway system by providing additional guidance to the interaction of two classes of vehicles with very different operating characteristics. Based on traffic studies, truck lane restrictions have been shown to improve mobility, safety, and air quality. For a corridor to be eligible to be considered for truck lane restrictions there must be three or more traffic lanes (excluding frontage roads) in each direction, be a controlled access facility, on the State system, and there cannot be left exits/entrances.

Truck lane restrictions currently exist along sections of IH 20 in Dallas, Kaufman, and Tarrant Counties; IH 30 in Tarrant County; IH 45 in Dallas and Ellis Counties; and IH 820 in Tarrant County. The majority of the operational truck lane restrictions are in Dallas and Tarrant counties.

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Plans for future truck lane restrictions, which will eventually reach Denton County. Combined, these truck lane restrictions are expected to improve highway safety and mobility and the region’s air quality. Exhibit 3-14 provides a map of corridors with existing and planned corridors for truck lane restrictions.

Exhibit 3-14: Potential Truck Lane Restriction Corridors

Truck Lane Restrictions

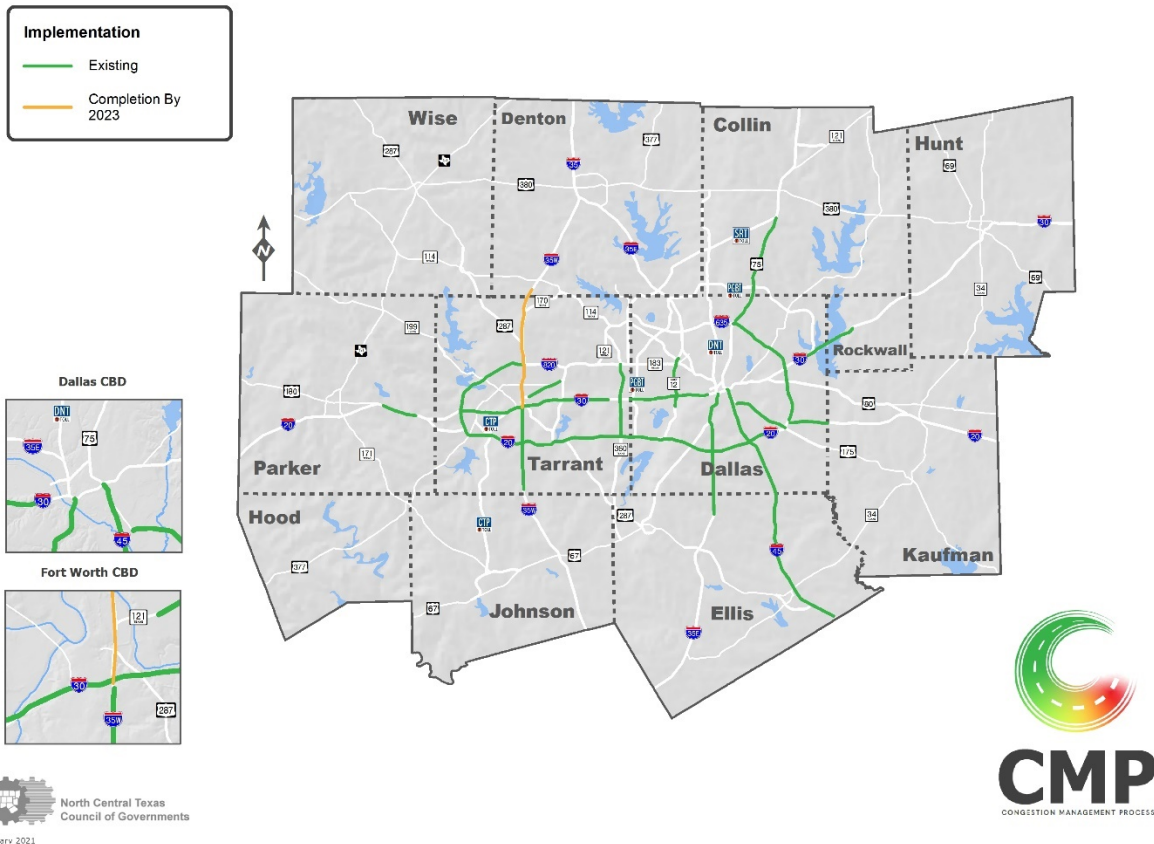
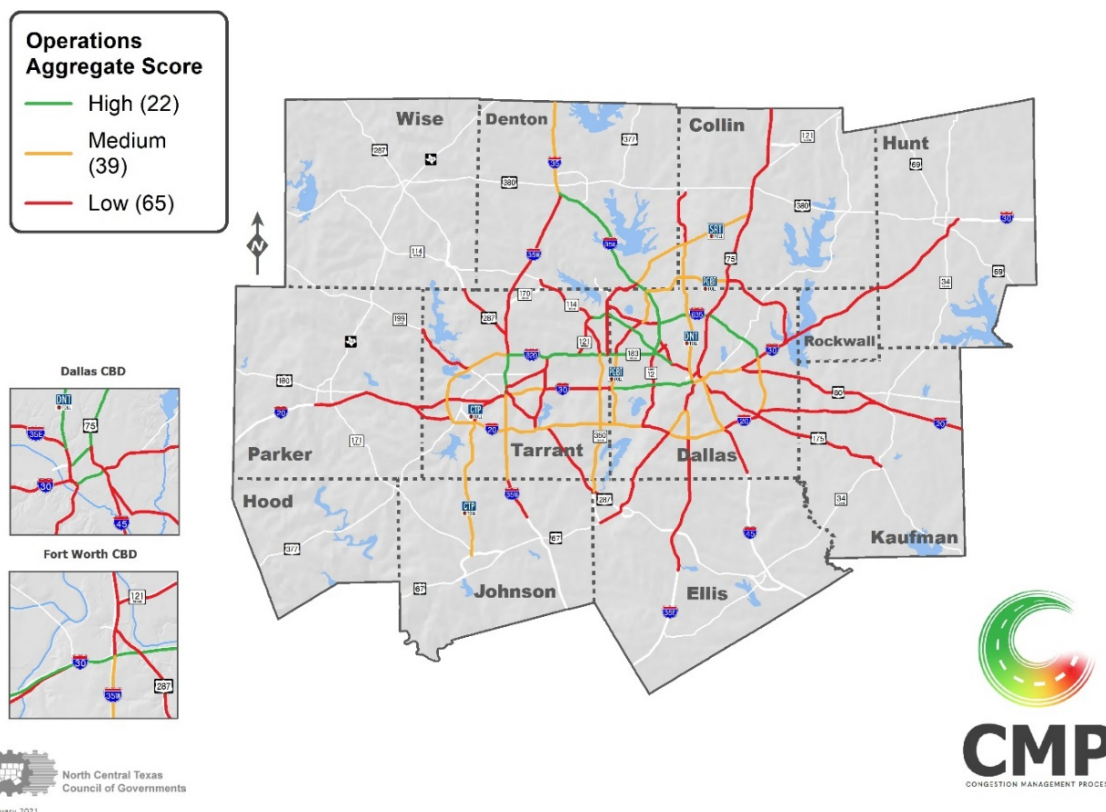


Exhibit 3-15 highlights the corridors within the DFW region that have operational assets that can improve the operations of the existing corridor. The corridors highlighted with red do not have operational assets available, corridors highlighted in yellow have some operational assets available and corridors highlighted in green have an adequate operational asset available to improve the operations of the corridor.

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Exhibit 3-15: Operational Asset Evaluation

Operations



The following two criteria were not utilized in the operational asset evaluation but are complimentary assets that improve corridor flow as well as improve the safety of the corridor.

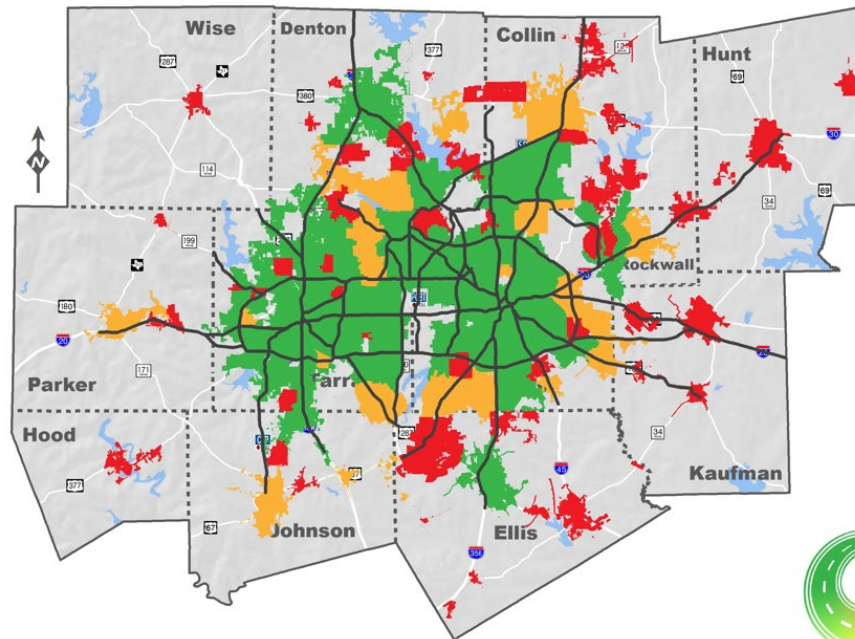
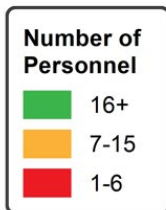
Traffic Incident Management Training

NCTCOG was the first agency in the nation to formalize incident management training for all responders in the region. Initiated in 2003, the goal of the FIM training course is to initiate a common, coordinated response to traffic incidents that will build partnerships, enhance safety for emergency personnel, reduce upstream traffic accidents, improve the efficiency of the transportation system, and improve air quality in the DFW region. The courses are designed to increase awareness of responder safety issues, improve multi-agency coordination, reduce response and clearance times for traffic incidents, and reduce confusion over roles, responsibilities, and jurisdictional lines. The inventory of agencies that participate in this training identifies corridors that have been trained and support quick, safe clearance of crashes to improve the safety and reliability of the transportation system. Exhibits 3-16 and 3-17 display police and fire department attendance for the FIM Training courses.

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Exhibit 3-16: Traffic Incident Management Training, Police Attendance Map
2003 – October 2020

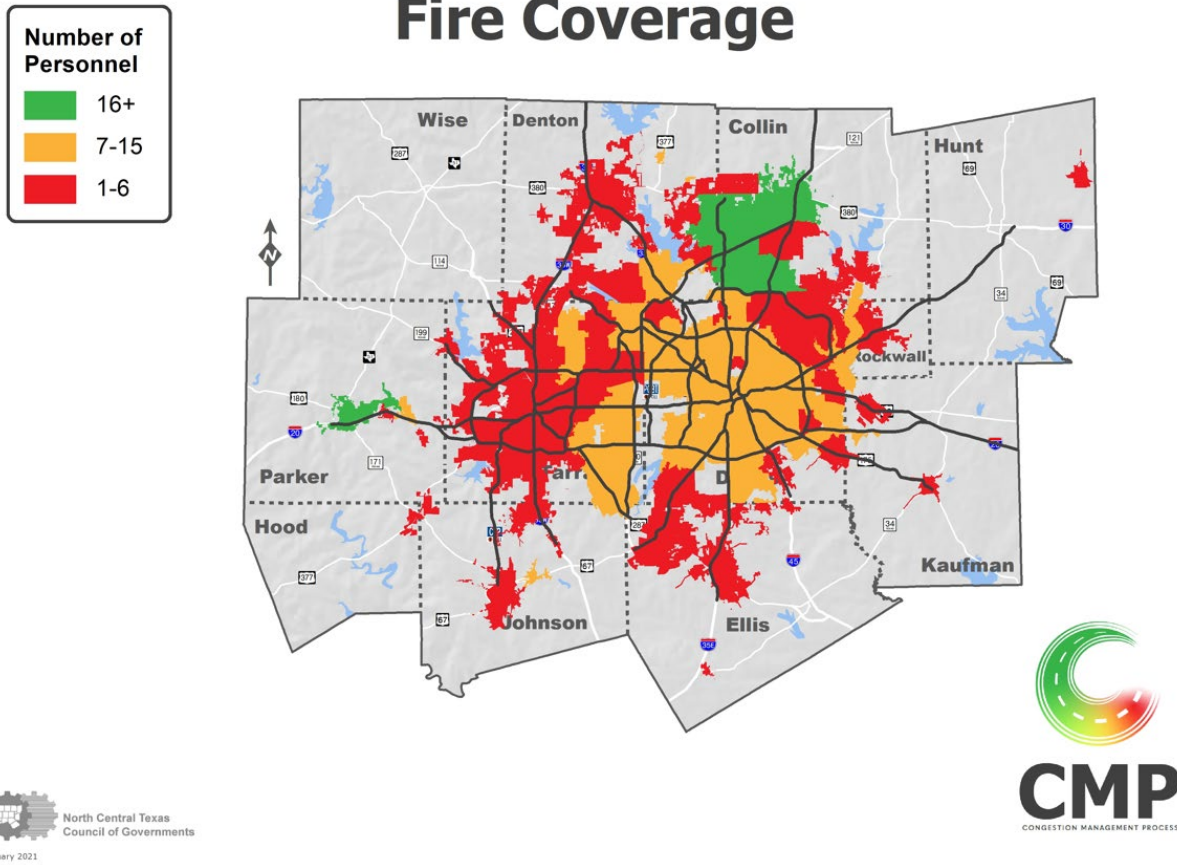
Traffic Incident Management Police Coverage



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Exhibit 3-17: Traffic Incident Management Training, Fire Department Attendance Map
2003 – October 2020

Traffic Incident Management Fire Coverage



North Central Texas
Council of Governments
January 2021



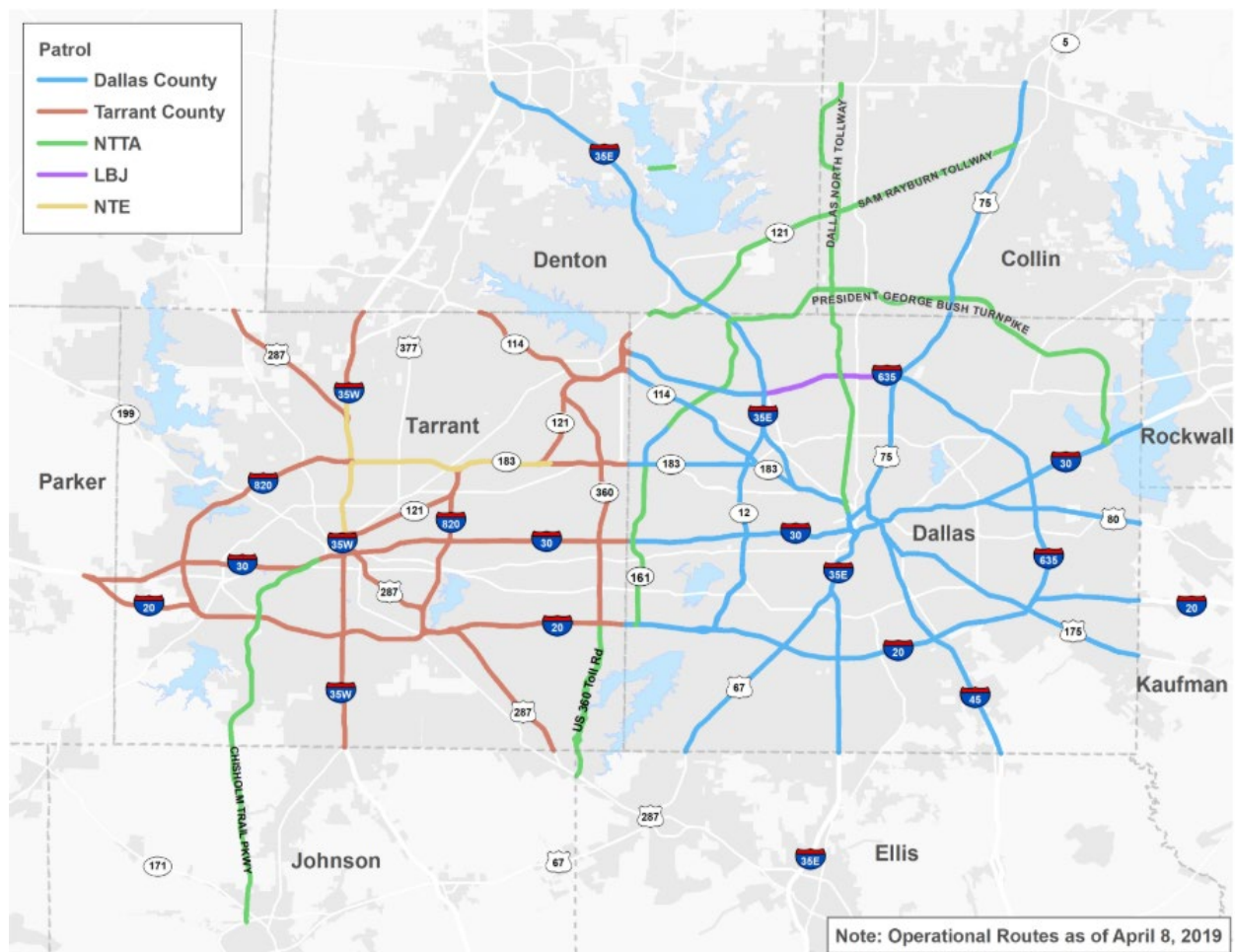
Roadway Assistance Patrols

The goal of the regional Roadway Assistance Patrol (RAP) is to improve roadway safety and help reduce congestion on regional highways, toll roads, and managed lane facilities in Dallas and Tarrant Counties and portions of Collin, Denton, and Johnson Counties. The RAP provides free assistance to stalled and stranded motorists by assisting with flat tires and stalled vehicles, with the ultimate purpose of getting the vehicles operating or off the roadway completely. Vital to the region's Traffic Incident Management operations, the RAP assists first responders by providing traffic control assistance at the scene of traffic crashes on the patrolled roadways.

RAP is currently operated by the Dallas County Sheriff's Office, Tarrant County Sheriff's Office, and the North Texas Tollway Authority (NTTA). RAP services on the LBJ TEXpress and NTE TEXpress corridors are provided by private sector partners. Exhibit 3-18 highlights each agency's coverage area.

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Exhibit 3-18: Coverage Area by Agency



Summary

Evaluating a transportation system’s performance and assets are an integral aspect of the CMP. The mix of data collection, performance measures and asset inventories evaluated through the Congestion Management Process look at multiple elements that effect traffic congestion on our metropolitan transportation system. There are several ways data can be measured, especially when dealing with a multimodal transportation system. It is often measured in terms of how successful the system is in reducing roadway traffic congestion.

If multimodal options, trip reduction programs, system management projects, and other travel policies are effective, the result will be reflected through reduced congestion on the roadway system and improved air quality for the region. In the next Chapter, an overview of the evaluation by corridor will be provided as well as identification of next steps for each corridor.