



Purpose & Need

Denton County Outer Loop

I-35 (Denton County) to the DNT (Collin County)

CSJ 0918-46-341

August 12, 2024

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 USC. 327 and a Memorandum of Understanding dated December 9, 2019, and executed by FHWA and TxDOT.

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Acronyms, Abbreviations, and Definitions

ACRONYM/ABBREVIATION	FULL DEFINITION
ADT	average daily traffic volume (vehicles per day)
CRIS	TxDOT's Crash Records Information System
DEIS	Draft Environmental Impact Statement
DFW	Dallas-Fort Worth
DNT	Dallas North Tollway
Feasibility Study	Denton County Outer Loop Feasibility Study
FHWA	Federal Highway Administration
FM	Farm to Market
LOS	Level of Service
Metroplex	Refers to the Dallas-Forth Worth metroplex which covers 11 counties
mph	miles per hour
Mobility 2045	The defining vision or plan for transportation systems and services in the DFW metropolitan area. Serving as a guide for the expenditure of state and federal funds through the year 2045, the plan addresses regional transportation needs that are identified through forecasting current and future travel demand, developing and evaluating system alternatives, and selecting those options that best meet the mobility needs of the region.
MTP	Metropolitan Transportation Plan
NCTCOG	North Central Texas Council of Governments
TxDOT	Texas Department of Transportation
US	US Highway
vpd	vehicles per day

Study Area Terminology (will be used throughout the EIS)

ACRONYM/ABBREVIATION	FULL DEFINITION
Study Area	The area encompassing the alternatives under consideration as shown in the Feasibility Study and generally bounded by Lake Ray Roberts on the north, the Dallas North Tollway (DNT)/Dallas Parkway (Collin County) on the east, US 380 on the south, and I-35 on the west. The Study Area is used to describe the affected built and natural environments including the existing transportation network and natural ecosystems such as the greenbelt network and watersheds.
Environmental Footprint	An area associated with each Build Alternative that is slightly larger than the proposed right-of-way within which early desktop and field surveys are conducted to identify features that could be potentially affected by construction of the alternative. The Environmental Footprint is intended to provide room for alignment adjustments without requiring additional field surveys. As an example, Section 3.10 in the EIS will include descriptions of the water features (e.g., wetlands, streams, ponds, etc.) within the Environmental Footprint, while impacts will be determined based on the proposed ROW or Project Area.
Project Area or Proposed ROW	The area defined on the Geometric Design Schematic plans needed to construct the alternative. It includes property that would be acquired by TxDOT and/or Denton County in fee title in addition to permanent and temporary easements needed for drainage and utilities. The proposed ROW is used to determine the direct impacts resulting from construction of each Build Alternative.

1.0 Purpose and Need for Action

1.1. Needs

The need for the proposed action is driven by (a) rapid population growth and increasing traffic volumes that are contributing to congestion, (b) higher crash rates compared to the statewide average for roadways across the Study Area, and (c) limited mobility due to the lack of contiguous east-west arterials.

1.2. Supporting Facts

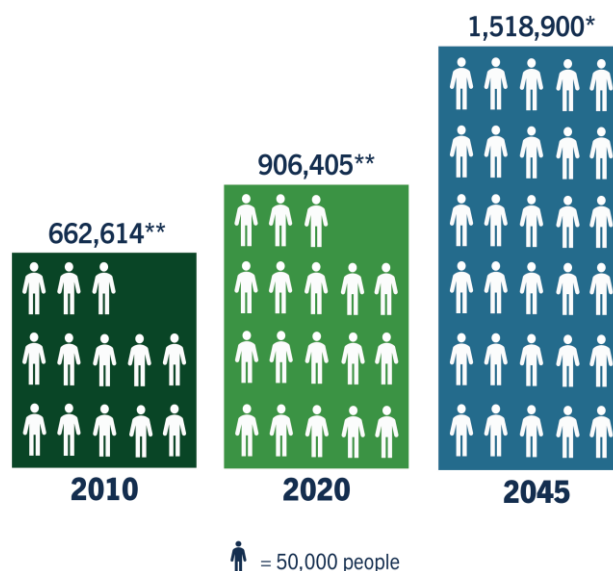
1.2.1. Rapid Current and Projected Population and Traffic Growth

Denton County experienced a 40 percent increase in population between 2010 and 2020 (US Census 2020), making it the seventh most populous county in Texas¹ with a population of 906,405 people. According to the NCTCOG, the population of Denton County in 2023 was over one million people and is forecasted to increase by approximately 68 percent by 2045, resulting in a population of more than 1.5 million people (see **Figure 1**).

In response to population growth, Denton County is being developed rapidly. Between 2015 and 2020, more than 20,000 acres of farm and ranch, timber-covered, and open land have been converted to residential and commercial use. The rapidly dwindling amount of undeveloped and open land limits the areas available for the development of major transportation arterials. By 2045, as illustrated in **Figure 2**, areas of increased population density are forecasted to extend northward from the core of the Metroplex² into eastern Denton County.

The existing roadway network across the Study Area was not designed to handle the growth in traffic and travel demand. Traffic volumes across the Study Area have increased substantially over the last decade. **Figure 3** illustrates locations throughout the Study Area where the 2021 average daily traffic volumes [ADT] expressed in vehicles per day [vpd]) have increased from 9 percent to more than 250 percent over 2011 volumes. Future forecasted growth is shown through 2045.

Figure 1: Population Growth Across Denton County – 2010 - 2045



* NCTCOG 2045 Demographic Forecasts (2022)
 ** US Decennial Census 2010 and 2020 Population

¹ Texas State Directory, <https://www.txdirectory.com/online/county/?pop=1>; accessed May 1, 2024.

² The 11-county area containing the core cities of Dallas and Fort Worth.

Figure 2: Areas of Increasing Population Density in Denton County, 2023 and 2045

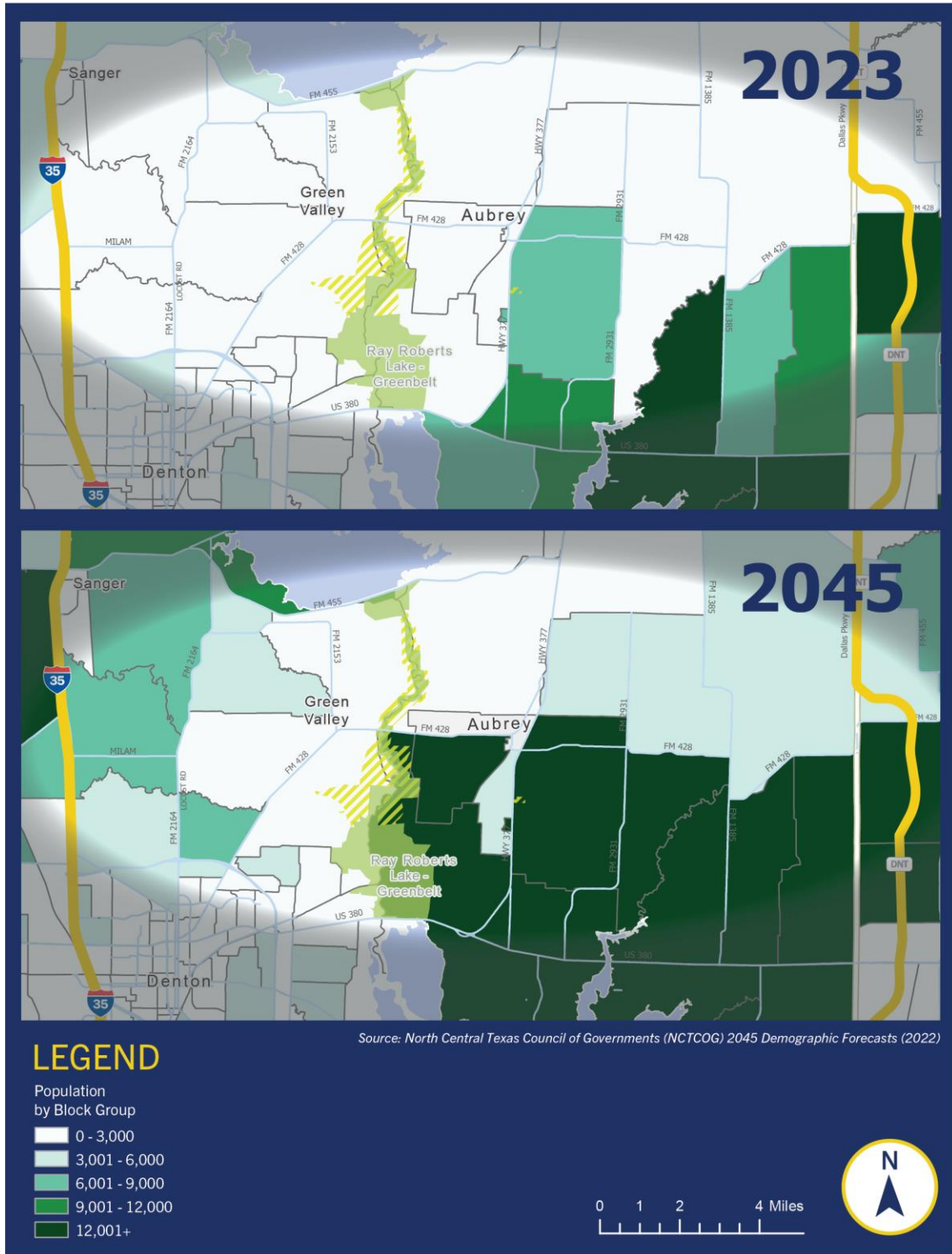
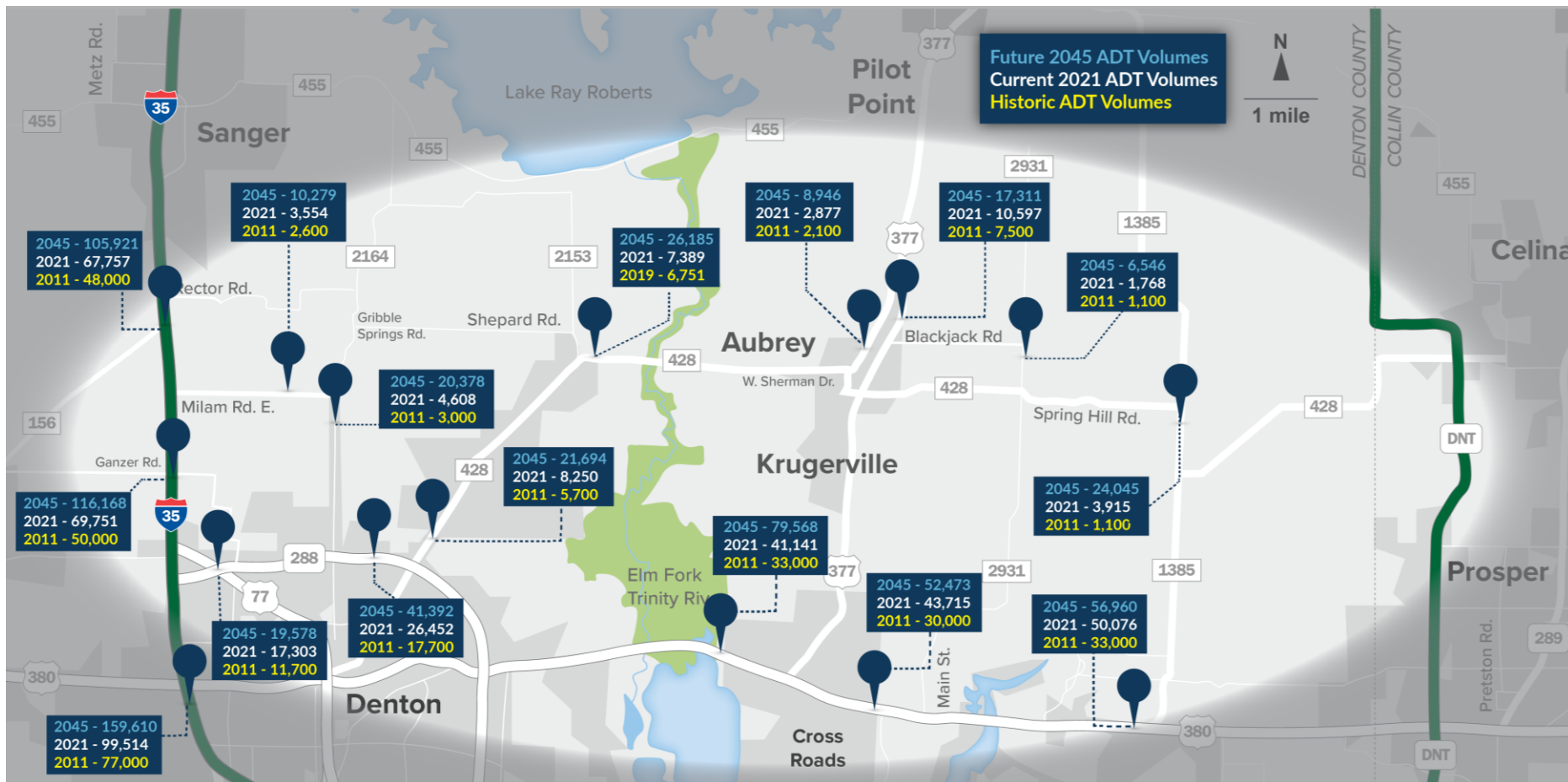


Figure 3: Existing and Forecasted Traffic Volume Growth Across the Study Area, 2011-2045



Increased travel demand has caused congestion along roadways during peak periods, especially at key intersections across the Study Area. As described in **Figure 4**, Level of Service (LOS) is a measure of the number of vehicles on the road and the speed at which they travel along the roadway. Although an LOS analysis has not been completed for all roadways within the Study Area, limited data indicates that locations within the Study Area and along the I-35 corridor operate near or at an unacceptable LOS (LOS E or F) in 2022 (**Figures 5 and 6**). These locations include the I-35 northbound frontage road at US 380 (LOS E or worse) in afternoon (PM) peak hour and the I-35 southbound frontage road at United States (US) 380 in both the morning (AM) and PM peak hours. Near the center of the Study Area, the intersection of US 377 and Blackjack Road operates at LOS D during the AM peak hour.

Figure 4: Level of Service - Defined

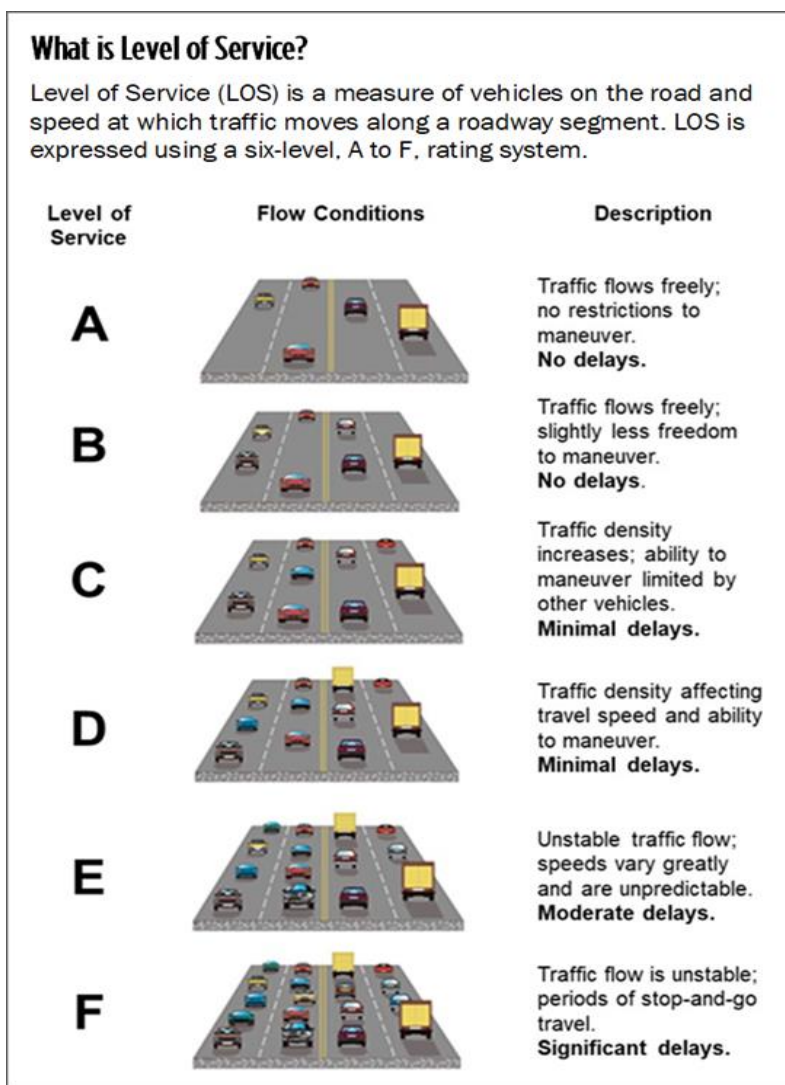


Figure 5: 2045 Forecasted Level of Service Along Study Area Roadways

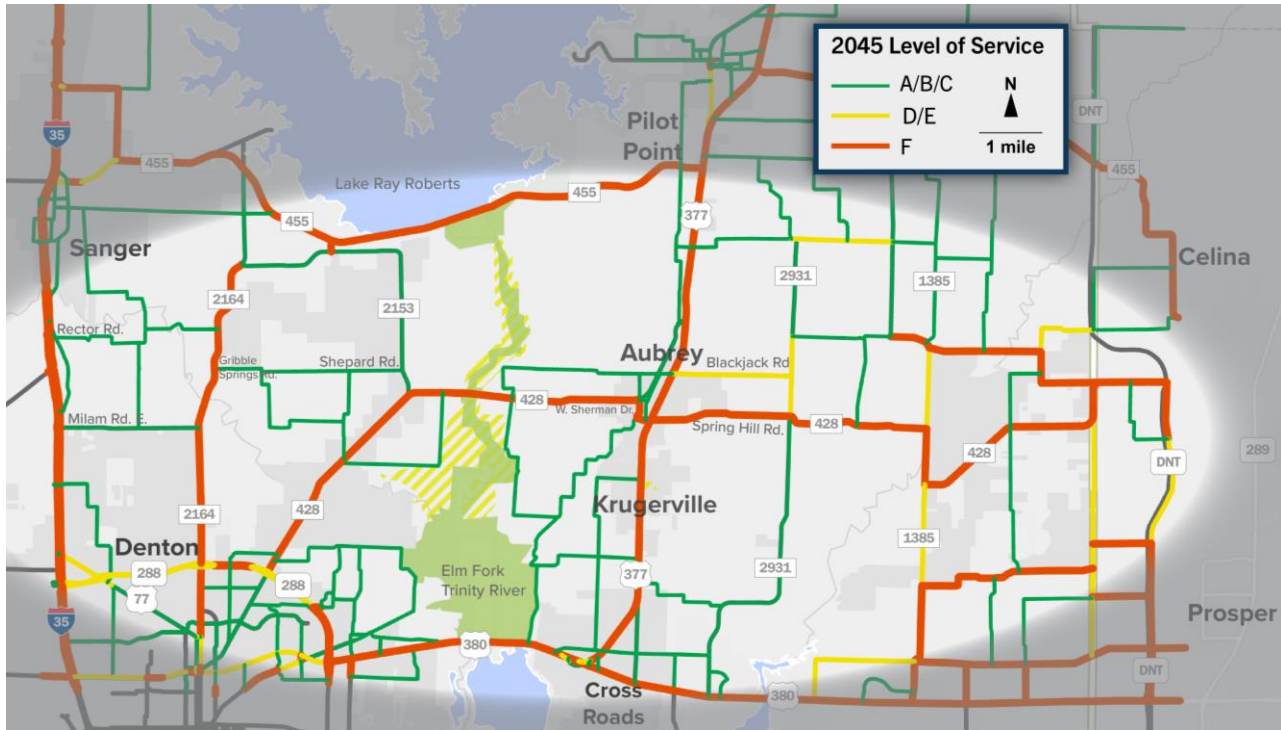
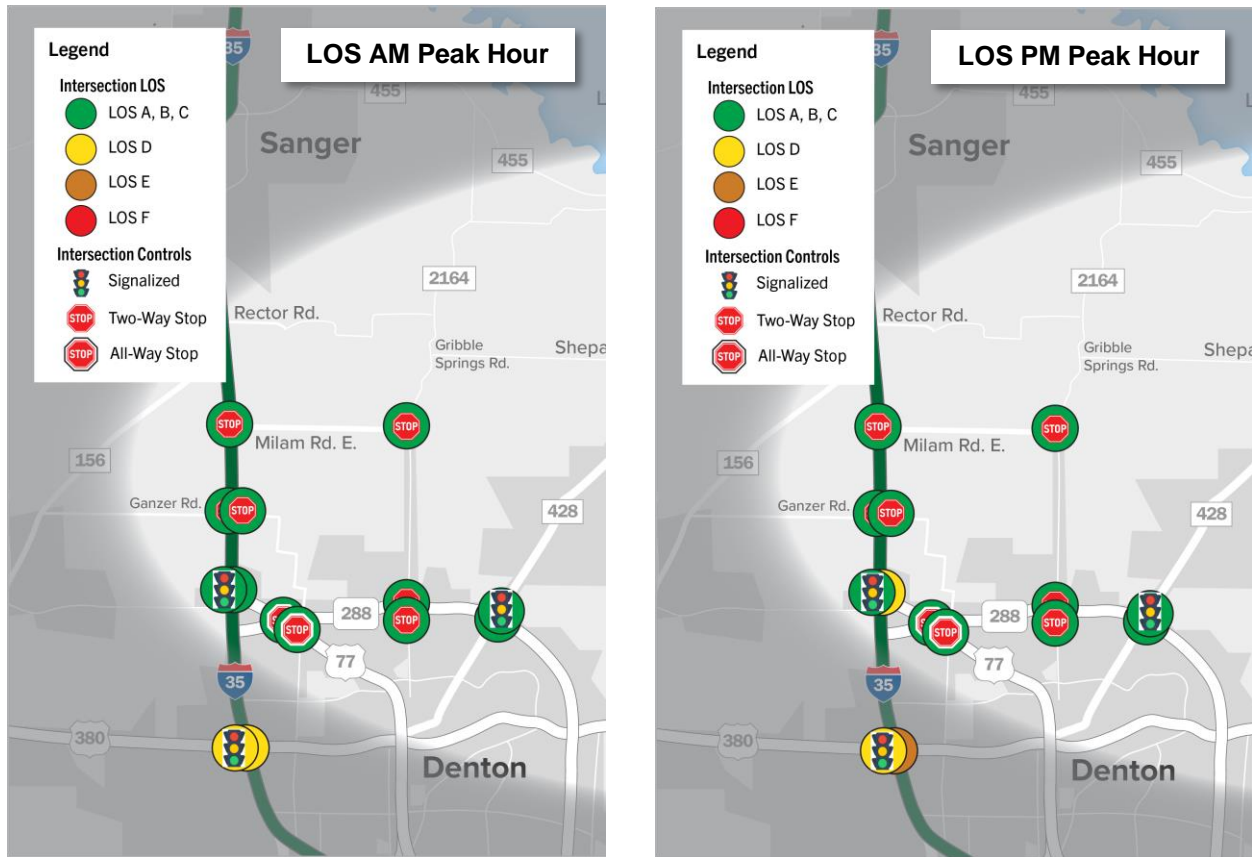


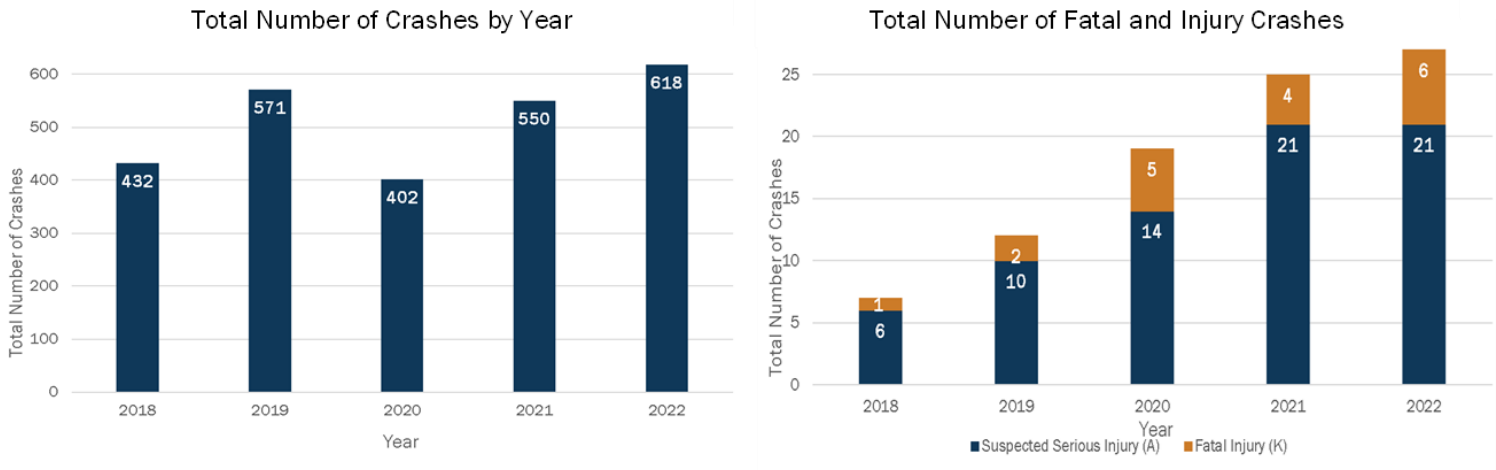
Figure 6: 2045 Forecasted Level of Service Along Study Area Roadways



1.2.2. Higher Crash Rates than the Statewide Average

Between January 2018 and December 2022, a total of 2,573 crashes occurred within the Study Area, with the fewest crashes occurring in 2020 (COVID-19 pandemic year) and the largest³ number of crashes occurring in 2022. **Figure 7** shows the total number of crashes by year and the numbers of fatal and serious injury crashes occurring from 2018 through 2022 within the Study Area.

Figure 7: Total Number of Crashes by Year and by Severity Within the Study Area 2018-2022

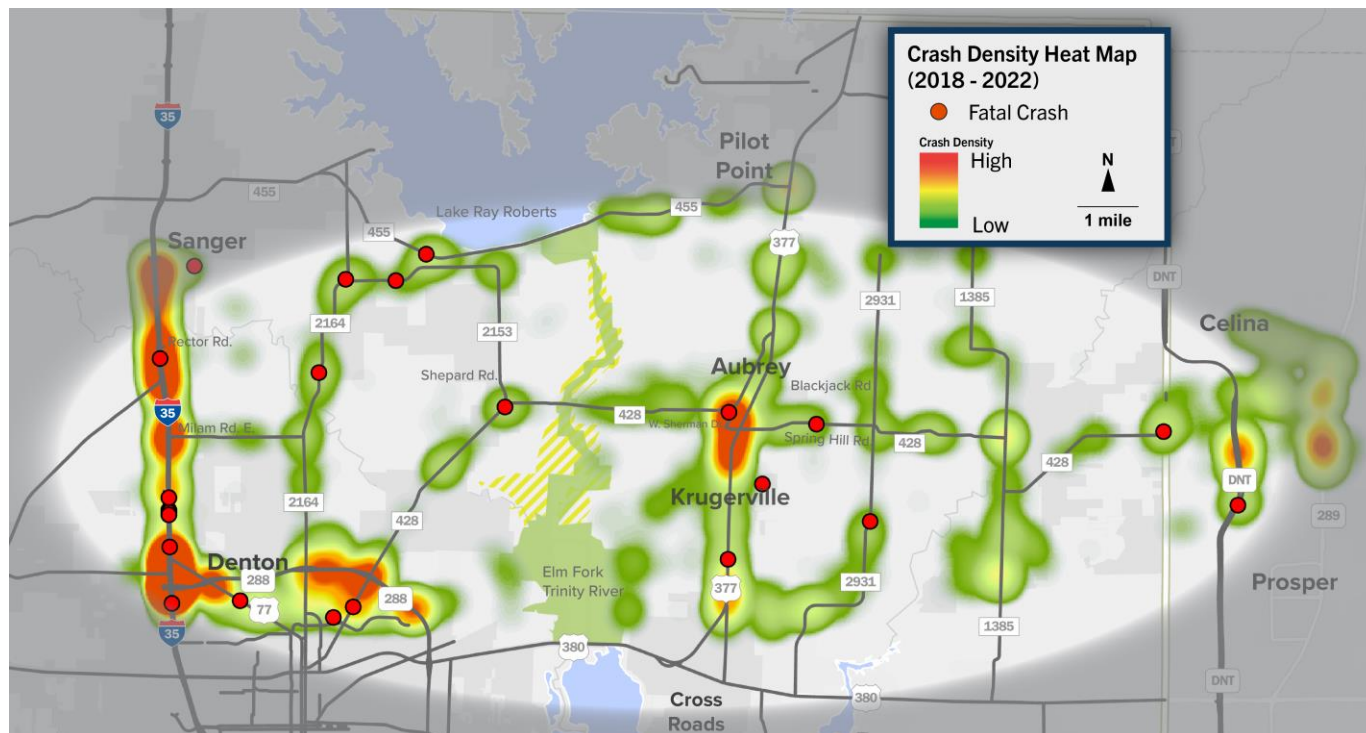


Source: Kimley-Horn, August 2023

Figure 6 shows the locations across the Study Area where crashes have occurred. The color red indicates locations with a high density of crashes with green indicating a low density of crashes. Red dots indicate fatal crash locations.

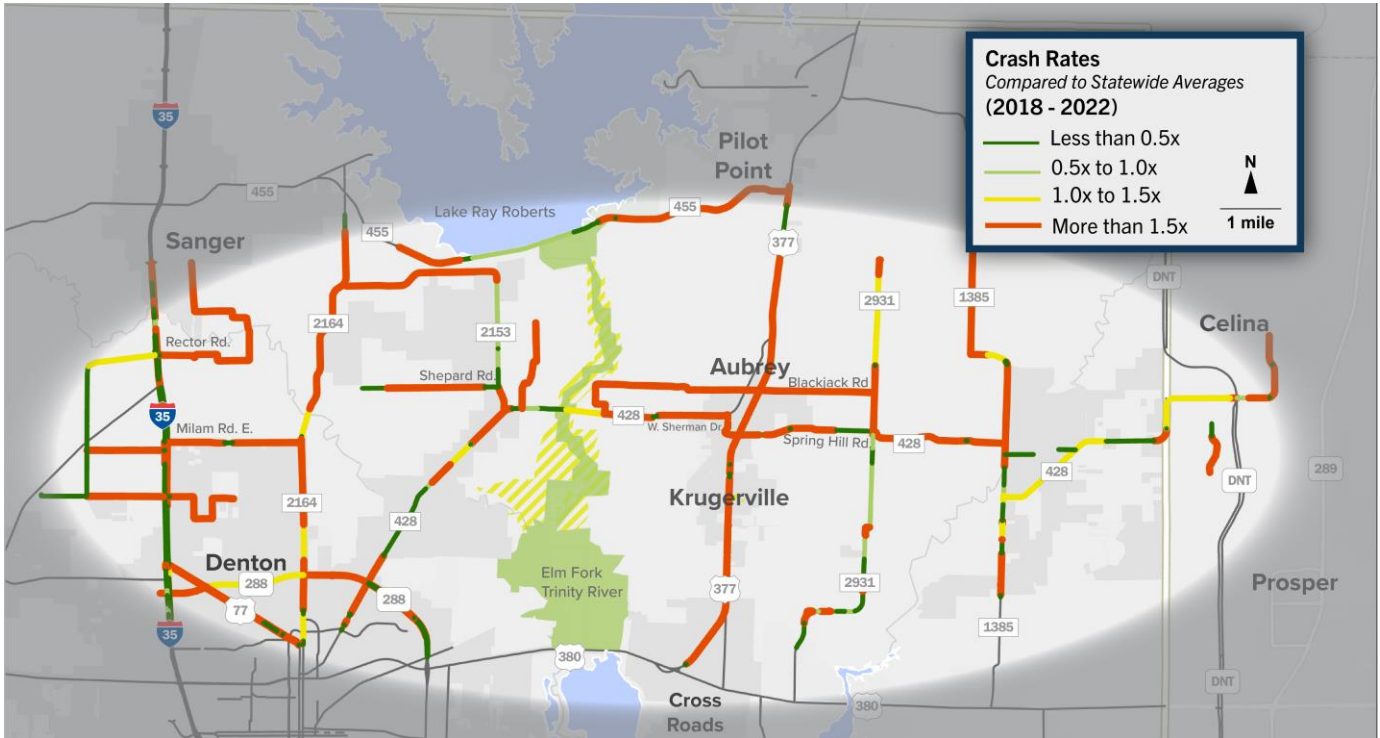
³ TxDOT, CRIS Database, accessed 2023.

Figure 8: Crash Density Within the Study Area, 2018-2022



TxDOT publishes annual statewide crash rates according to highway system and roadway type. Comparing the Study Area's most recent 5-year average crash rate (2018-2022) to the statewide crash rate indicates that most of the primary roadways within the Study Area experience an average crash rate more than 1.5 times the statewide average crash rate for similar roadway types including I-35, US 377, portions of FM 428, FM 3163/Milam Road, FM 2153, and Blackjack Road as shown in red in **Figure 9**.

Figure 9: Study Area Average Crash Rates Compared to Statewide Average Crash Rates, 2018-2022



As illustrated in **Figure 10**, a rural US highway has approximately 22.72 percent more crashes per 100 million vehicle miles traveled than a rural interstate⁴ and an FM Road has approximately 40.8 percent more crashes per million vehicle miles traveled than a rural US highway primarily due to variations in access control such as signalized intersections versus grade-separated intersections or interchanges. Interstates with full access control support continuous traffic flow and generally operate at higher travel speeds.

Figure 10: Comparison of US Highway and Interstate Crash Rates, 2022

Highway System	Traffic Crashes per 100 million vehicle miles	
	Rural	Urban
Interstate	52.88	150.86
US Highway	68.42	192.67
State Highway	86.44	230.67
Farm to Market	115.69	249.93

SOURCE: Statewide Traffic Crash Rates, 2022, TxDOT.gov; accessed May 2024

⁴ The American Association of State Highway and Transportation Officials (AASHTO) designates the following differences between Interstates and US Highways. Interstates and Freeways have full access control, are designed and constructed to strict standards, and typically carry traffic at higher travel speeds (50 to 70 miles per hour). US highways (e.g., US 380) are a broader group of facilities with less restrictive design requirements and that typically carry traffic at lower travel speeds.

1.2.3. Limited Mobility Due to the Lack of Contiguous East-West Arterials

The lack of contiguous arterial travelways across northern Denton County requires travelers to use the existing network of intersecting county and FM roads to access I-35 (western logical termini), the Dallas North Tollway (DNT) (eastern logical termini), the city of Denton, and the core of the Metroplex to the south. The primary existing roadway network is illustrated below (**Figure 11**) and described in **Figure 12**.

Figure 11: Existing Roadway Network Across the Study Area

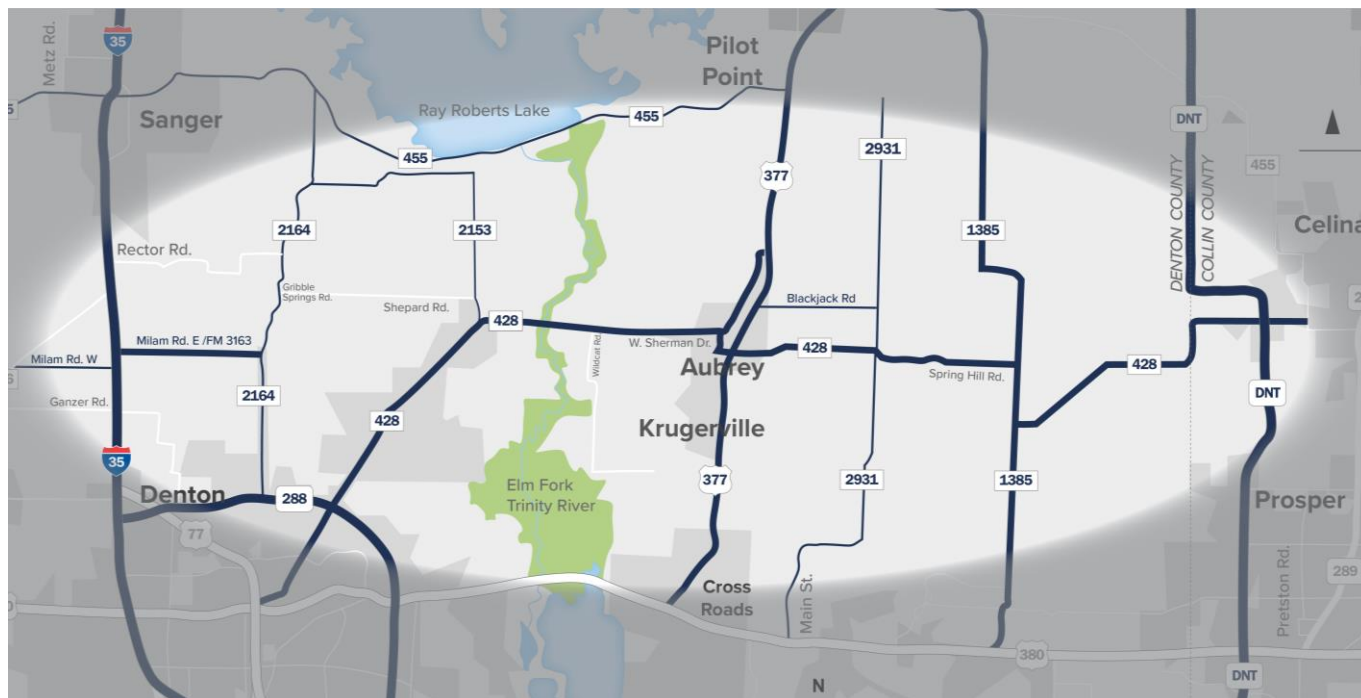


Figure 12: Existing Primary Roadways Across the Study Area

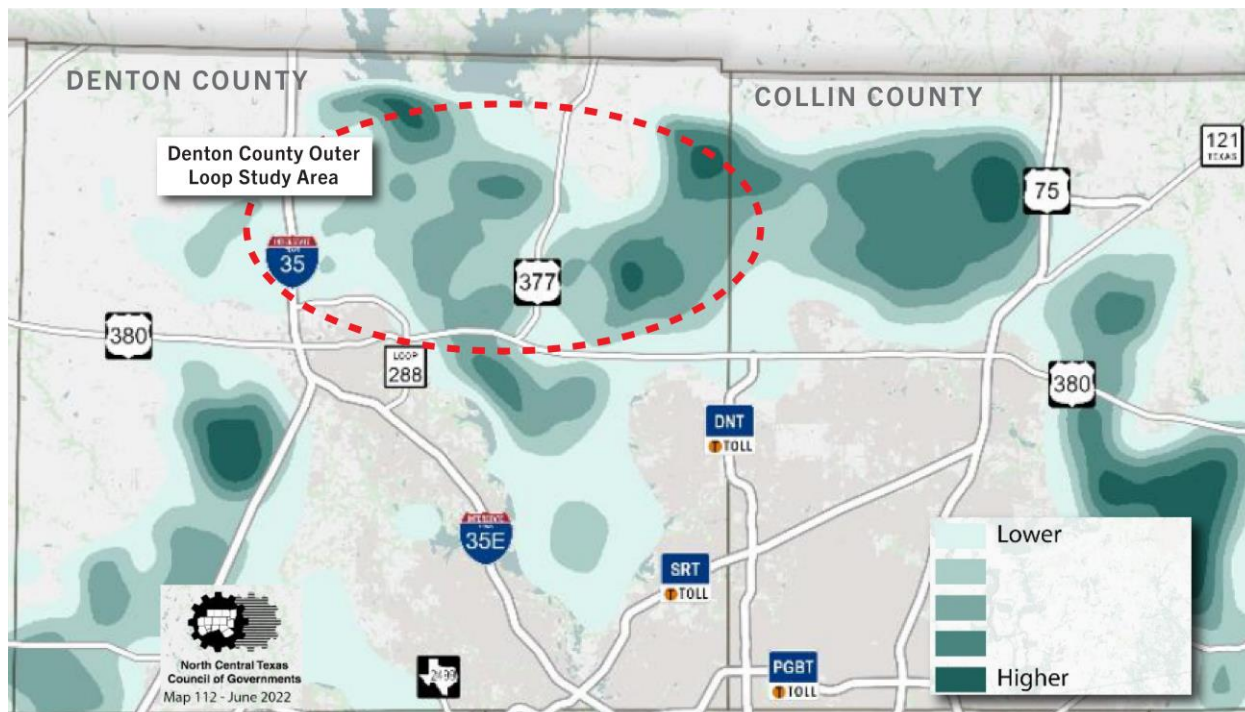
Existing North-South Roadways Across the Study Area	
I-35	The western logical terminus of the proposed action is a 4-lane divided access-controlled interstate with frontage roads and a posted speed limit of 75 miles per hour (mph). I-35 provides access to the western portion of Denton County and the core of the Metroplex and serves as a regional and national travel and freight corridor. I-35 carries 71,527 vpd north of Milam Road and 75,433 vpd south of Milam Road.
US 377	2-lane minor arterial connecting US 380 in Denton on the south to destinations through north Texas and into Oklahoma. Within the Study Area, US 377 carries 11,981 vpd north of Aubrey and 10,507 vpd south of Aubrey.
FM 2931	East of Aubrey, a 2-lane minor collector north of FM 428 and a 2-lane major collector south of FM 428 with a posted speed limit of 55 mph.
FM 1385	Known as Mustang Road is a 2-lane major collector from east of the city of Pilot Point at FM 455 to US 380 in Denton with a posted speed limit of 55 mph.
DNT	The western terminus for the proposed action is a multi-lane principal arterial managed by the North Texas Tollway Authority (NTTA). As a tolled facility it extends northward through the eastern portion of the Metroplex northward currently ending at US 380 in Collin County. Phase 4A of the DNT (US 380 to FM 428) is under construction and anticipated to open to traffic in 2027. Phase 4B (FM 428 to CR 60) is under development and no construction or opening dates have been determined at this time.
Existing East-West Roadways Across the Study Area	
Loop 288	A 4-lane divided, principal arterial serves as a circumferential route around the north, east, and south side of Denton, connecting to I-35 in the northwest corner of Denton and to I-35E in the southeast corner of Denton. Loop 288 has a posted speed limit of 60 mph and carries 15,903 vpd.
FM 3163	Known as Milam Road and classified as a major collector, connects I-35 on the west with FM 2164 on the east within the Study Area. As one of the few existing east-west roads within the Study Area, Milam Road has a posted speed limit of 55 mph, carrying 3,195 vpd.
FM 428	Known as W Sherman Drive west of US 377 and as Spring Hill Road east of US 377) is a 2-lane major collector connecting the city of Denton in the southwest portion of the Study Area to the city of Aubrey at US 377 (near the center of the Study Area) and eventually tying into the DNT east of the Denton/Collin County line. FM 428 is the existing crossing of the Denton County Greenbelt and the Elm Fork Trinity River at the center of the Study Area.
FM 455	2-lane minor arterial at the northern boundary of the Study Area along the Lake Ray Roberts dam, connecting I-35 on the west just north of the city of Sanger with US 377 on the east.
FM 2153	With sections traveling both east-west and north-south, connects FM 2164 to FM 428 east of the Denton County Greenbelt. FM 2153 is a 2-lane minor connector with a posted speed limit of 55 mph.
Blackjack Road	Local roadway with a posted speed limit of 45 mph, connects to FM 428 east of the Elm Fork Trinity River/Denton County Greenbelt and extends east in a discontinuous fashion to tie into FM 2931 in the eastern portion of the Study Area.

SOURCE: Denton County Outer Loop Operational & Safety Analysis Existing Conditions Report; August 31, 2023; TxDOT Statewide Planning Map, accessed May 2024 at: https://www.txdot.gov/apps/statewide_mapping/StatewidePlanningMap.html

As identified by NCTCOG in the *Mobility 2045 Update*⁵, areas of Denton County where population and/or employment growth is occurring are also areas where the existing arterial roadway framework is deficient to handle future travel demand. The NCTCOG analysis considered forecasted growth in population and employment density, arterial spacing and connectivity, congestion on existing arterials, and congestion on any surrounding facilities to identify such areas. The shaded areas on **Figure 13** depict areas of arterial deficiency.

⁵ NCTCOG 2045 Metropolitan Transportation Plan, *Mobility 2045 Update*, adopted June 9, 2022.

Figure 13: Areas with Arterial Deficiencies in Denton County



Shaded areas are not project recommendations. These areas have population/employment growth, congestion, and deficiencies in the existing arterial network that may warrant further study for arterial improvements. Higher arterial needs analysis scores depict areas of greater arterial need.

1.3. Purpose

The purpose of the proposed action is to address population and travel demand growth and support safe and resilient east-west mobility and connectivity across Denton County.