

CHAPTER 5: ESTIMATION OF VEHICLE ACTIVITY

5.1 Dallas-Fort Worth Travel Model for the Expanded Area Overview

The Dallas-Fort Worth Travel Model, Transportation Analytical Forecasting Tool (TAFT), validated in 2019, serves as the source for forecasting vehicle miles of travel (VMT) and other travel characteristics for the North Central Texas nonattainment area. The network-based TAFT is executed in the TransCAD environment, which is a Geographic Information System-based commercial travel demand software package for transportation planning. The North Central Texas Council of Governments Transportation Department is responsible for executing TAFT and conducting various planning studies for the region. The department provides technical support and staff assistance to the Regional Transportation Council and its technical committees, which compose the Metropolitan Planning Organization policy-making body.

5.2 Multimodal Transportation Analysis Process

The forecasting technique of TAFT is based on a four-step sequential process designed to model travel behavior and predict the level of travel demand at regional, sub-area, or small area levels. These four steps are: Trip Generation, Trip Distribution, Mode Choice, and Roadway Assignment. A detailed explanation of TAFT is included in Appendix 12.7.

The roadway networks developed for the analysis years contain over 30,000 unique segments constructed to replicate the transportation system of the coverage area. The transportation networks for this inventory were developed specifically for the years 2023, 2026, 2036, and 2045, as shown in Exhibit 5.2-1.

Exhibit 5.2-1: Transportation Network Development Methodology Summary

Network	Contents
2023	2023 analysis year network
	Transportation system improvements from staging of the Metropolitan Transportation Plan operational in the 2023 ozone season
2026	2026 analysis year network
	Transportation system improvements from staging of the Metropolitan Transportation Plan operational in the 2026 ozone season
2036	2036 analysis year network
	Transportation system improvements from staging of the Metropolitan Transportation Plan operational in the 2036 ozone season
2045	2045 analysis year network
	Transportation system improvements from staging of the Metropolitan Transportation Plan operational in the 2045 ozone season

5.3 Model Adjustments

Several adjustment factors were applied to this conformity determination. A Highway Performance Monitoring System (HPMS) factor and a nonrecurring congestion factor were applied to the network-based travel model, and time-of-day factors were developed to convert the network to August weekday. The HPMS and nonrecurring congestion factors methodologies are consistent with model adjustments applied to the 8-Hour Attainment Demonstration (AD) State Implementation Plan (SIP) used to develop the Motor Vehicle Emission Budgets applicable to this Transportation Conformity analysis. The seasonal, daily, and hourly distribution factors methodologies are consistent with the AD SIP and are based on the Texas Department of Transportation's (TxDOT) Automatic Traffic Recorder (ATR) data.

5.3.1 Model VMT Adjustments (HPMS VS TAFT)

Consistent with previous emission inventory practices, the Dallas-Fort Worth Metropolitan Planning Organization used TxDOT’s HPMS data to adjust modeled VMT to ensure consistent reporting across the state. This adjustment is based on the Environmental Protection Agency’s guidance for emission inventory development. Exhibit 5.3.1-1 shows the calculation performed to develop the new HPMS adjustment factor, 0.9889, based on a comparison of 2014 VMT for HPMS and TAFT.

Exhibit 5.3.1-1: Dallas-Fort Worth and HPMS VMT Analysis

Model VMT Adjustment Factor	
	2014 VMT
HPMS (ASWT ¹⁸)	178,714,289
TAFT (ASWT)	180,721,839
HPMS/TAFT Ratio	0.9889

Source: NCTCOG

The ATR data collected by TxDOT is used to calculate the necessary conversions for seasonal and daily adjustment factors and hourly distribution factors.

5.3.2 Seasonal and Daily Adjustments

ATR data averaged over five years (2015 to 2019) is organized into five day types: Sunday, Monday, Midweek (Tuesday, Wednesday, and Thursday), Friday, and Saturday. To adjust the representative average school season weekday traffic VMT from TAFT to the specified day types in the summer season, ratios are calculated. The summer portion of the ratio uses traffic volumes recorded for the June, July, and August months.

5.3.3 Hourly Adjustments

Daily volumes recorded for midweek, described above, are aggregated by hour to determine the percent of daily traffic occurring during each hour, representing hourly vehicle activity estimates. The TAFT County midweek is further detailed by utilizing a time period volume for aggregation. These time periods correspond to the time periods used in TAFT, where AM Peak is 6:30 AM to 8:59 AM, PM Peak is 3:00 PM to 6:29 PM, and Off-Peak represents all other hours of the day (12:00 AM to 6:29 AM, 9:00 AM to 2:59 PM, and 6:30 PM to 11:59 PM). Periods split by mid-hour times use an equal division of traffic recorded during the hour.

5.3.4 Non-Recurring Congestion

According to a paper published in the January 1987 Institute of Transportation Engineers’ journal by Jeffrey A. Lindley entitled “Urban Freeway Congestion: Quantification of the Problem and Effectiveness of Potential Solutions,” congestion due to traffic incidents accounts for twice as much as congestion from bottleneck situations. Congestion due to incidents, or nonrecurring congestion, causes emissions not represented in the VMT-based calculations of the base emissions. In order to include these effects, the delay caused by nonrecurring congestion is added to the freeway travel times and congestion delay due to bottlenecks to obtain an increased freeway travel time, which translates into reduced speed on freeway facilities. Arterial street emissions are not significantly affected by incidents because alternate routes on the arterial system are generally available; therefore, this factor is not applied to non-freeway type facilities.

¹⁸ Average School Season Weekday Traffic

5.4 Transit Systems

The Dallas-Fort Worth region has three transportation authorities: Dallas Area Rapid Transit (DART) serving the eastern portion of the region, the Denton County Transit Authority (DCTA) serving Denton County, and the Fort Worth Transportation Authority (Trinity Metro) serving the western portion of the region.

Within DART's 700-square-mile service area are a broad range of transportation services, from modern bus and rail services to ridesharing programs, and corporate transportation demand management programs. DART constantly adds and upgrades transit facilities throughout the region by reviewing bus routes to maximize efficiency, especially with regard to the orientation of feeder bus routes to rail station destinations. Local feeder routes improve the potential for increased rail ridership by providing reliable connections from residential areas to rail stations. DART system planners evaluate current routes and design improved cross-town and radial routes to serve current and future rail stations and major destinations. Express routes improve commute time to major destinations by utilizing high-occupancy vehicle lanes and major highways with limited stop time. Express routes serve both transit centers and park-and-ride lots. Improved rail service and ridership are high priorities in DART's attempt to serve the region.

DCTA is a coordinated county transportation authority currently providing express bus service between the cities of Denton, Highland Village, and Lewisville. The service plan includes the A-train, connecting Denton County residents to DART, local fixed-route bus services serving the densest portions of the county, shuttle service for local colleges and universities, a demand-response service to member cities for the elderly and disabled, and a commuter vanpool program.

Trinity Metro provides fixed-route bus service, express bus service, and Rider Request services throughout various cities in the western region. The state-of-the-art Intermodal Transportation Center provides easy access to the Trinity Railway Express (TRE) and Trinity Metro's fixed-route bus service. Trinity Metro operates the TRE jointly with DART to provide regional rail service between Fort Worth and Dallas.

The Rider Request routes offer the choice of having a bus arrive where requested, so long as travel is within the route's designated service area. Trinity Metro's Mobility Impaired Transportation Service (MITS) offers door-to-door transportation anywhere within the cities of Fort Worth, Richland Hills, and Blue Mound. MITS is a transportation service for persons with a verified disability preventing them from riding a fixed-route bus service.

The transit agencies coordinate fare structures to provide riders seamless transfers between service providers and modes.

5.4.1 Transit VMT

Exhibit 5.4.1-1 lists the daily regional transit VMT used in TAFT for the identified transit modes for analysis years 2023, 2026, 2036, and 2045. The slight fluctuation of transit service from year to year is a result of roadway project modifications, implementation of future rail lines, and additional bus services identified to support the rail lines.

Exhibit 5.4.1-1: Transit Vehicle Miles of Travel

Transit Name	2023	2026	2036	2045
DART Bus	71,786	74,853	77,369	90,577
Trinity Metro Bus	18,074	22,943	25,439	34,325
DCTA Bus	5,639	5,639	5,647	5,639
Rail	19,146	21,237	21,984	39,811
Total Daily VMT	114,644	124,671	130,440	170,353

5.5 Roadway VMT

Roadway VMT totals by county and analysis year are in Exhibit 5.5-1. Final VMT estimates are listed in Appendix 12.9.

Exhibit 5.5-1: Roadway Vehicle Miles of Travel

County	2023	2026	2036	2045
Collin	32,253,931	35,010,183	43,573,963	53,415,806
Dallas	92,882,433	99,191,371	110,446,841	122,447,539
Denton	26,727,961	28,845,410	35,417,635	45,243,069
Ellis	9,044,651	9,596,966	11,620,955	13,713,108
Johnson	5,717,034	6,076,868	6,976,306	8,130,319
Kaufman	7,736,090	8,194,899	9,373,918	11,295,787
Parker	6,146,925	6,559,382	7,774,531	9,064,871
Rockwall	3,281,624	3,698,824	4,399,846	5,522,099
Tarrant	61,540,586	66,185,544	77,646,292	87,927,607
Wise	4,115,586	4,326,852	4,901,751	5,596,590
10-County Total Daily VMT	249,446,821	267,686,298	312,132,037	362,356,795

5.5.1 Average Loaded Speeds

Average Loaded Speeds are provided by county by functional class. Final average loaded speeds are listed in Appendix 12.10.

5.5.2 Centerline and Lane Miles

Centerline and Lane Miles are provided by county by functional class. Final mileage estimates are listed in Appendix 12.11.