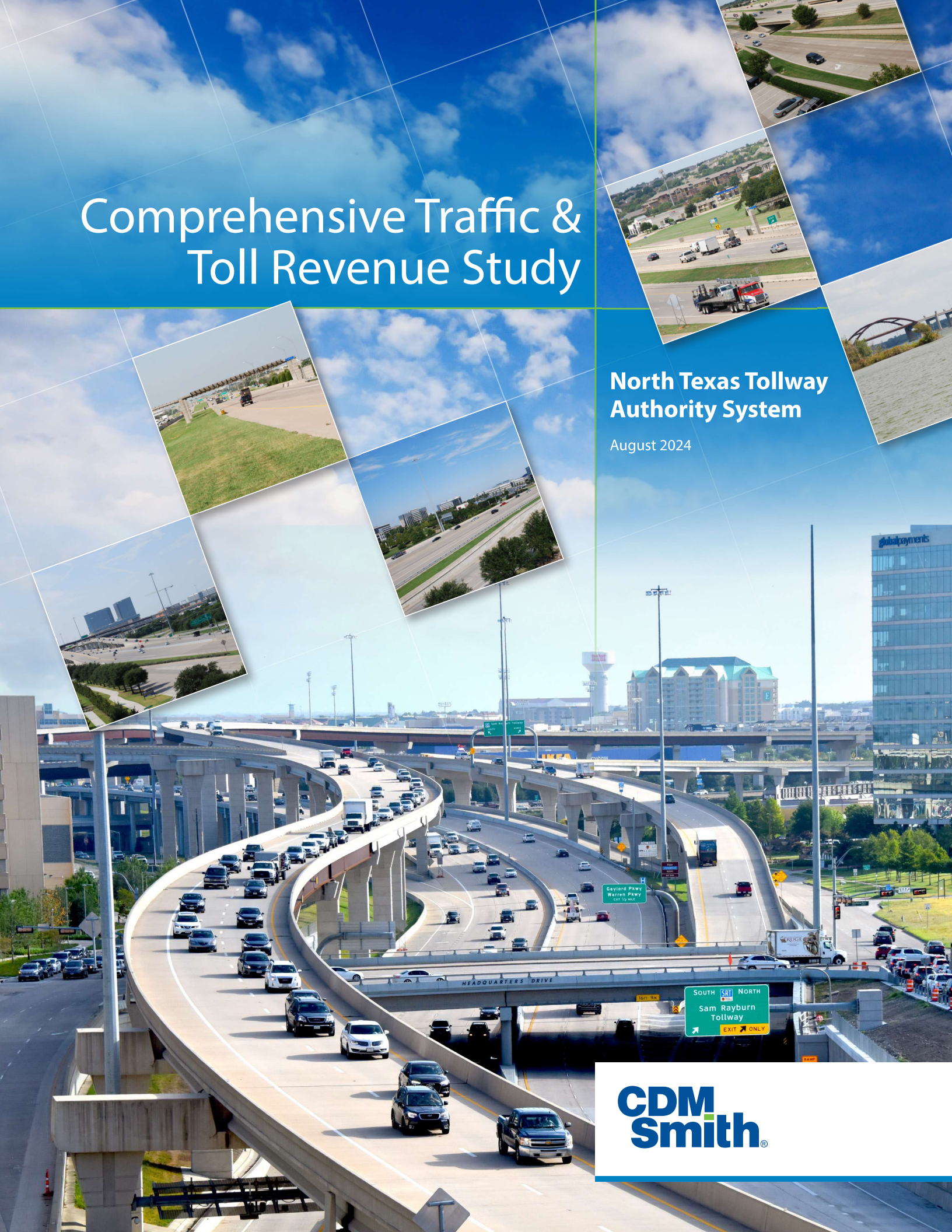


Comprehensive Traffic & Toll Revenue Study

North Texas Tollway Authority System

August 2024



**CDM
Smith**

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Disclaimer

CDM Smith used currently-accepted professional practices and procedures in the development of traffic and revenue estimates. However, as with any forecast, differences between forecasted and actual results may occur, as caused by events and circumstances beyond the control of the forecasters. In formulating the estimates, CDM Smith reasonably relied upon the accuracy and completeness of information provided (both written and oral) by North Texas Tollway Authority (NTTA). CDM Smith also relied upon the reasonable assurances of independent parties and is not aware of any material facts that would make such information misleading.

CDM Smith made qualitative judgments related to several key variables in the development and analysis of the traffic and revenue estimates that must be considered as a whole; therefore, selecting portions of any individual result without consideration of the intent of the whole may create a misleading or incomplete view of the results and the underlying methodologies used to obtain the results. CDM Smith gives no opinion as to the value or merit of partial information extracted from this report.

All estimates and projections reported herein are based on CDM Smith's experience and judgment and on a review of information obtained from multiple agencies, including NTTA. These estimates and projections may not be indicative of actual or future values and are therefore subject to substantial uncertainty. Certain variables such as future developments, economic cycles, global pandemics, and impacts related to advances in automotive technology cannot be predicted with certainty and may affect the estimates or projections expressed in this report, such that CDM Smith does not specifically guarantee or warrant any estimate or projection contained within this report.

While CDM Smith believes that the projections and other forward-looking statements contained within the report are based on reasonable assumptions as of the date of the report, such forward-looking statements involve risks and uncertainties that may cause actual results to differ materially from the results predicted. Therefore, following the date of this report, CDM Smith will take no responsibility or assume any obligation to advise of changes that may affect its assumptions contained within the report, as they pertain to socioeconomic and demographic forecasts, proposed residential or commercial land use development projects and/or potential improvements to the regional transportation network.

CDM Smith is not, and has not been, a municipal advisor as defined in Federal law (the Dodd Frank Bill) to by NTTA and does not owe a fiduciary duty pursuant to Section 15B of the Exchange Act to NTTA with respect to the information and material contained in this report. CDM Smith is not recommending and has not recommended any action to the NTTA. The NTTA should discuss the information and material contained in this report with any and all internal and external advisors that it deems appropriate before acting on this information.

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Executive Summary

At the request of the North Texas Tollway Authority (NTTA), CDM Smith conducted a Comprehensive Traffic and Revenue (T&R) Study of the NTTA System. The study included a system-wide review of transactions and toll revenue, traffic data collection, independent socioeconomic forecasts, review of the latest transportation improvement plan, travel demand model updates, and development of long-term traffic and toll revenue estimates for the NTTA System.

The purpose of this study was to develop T&R forecasts for the NTTA System, which includes the following facilities:

- **Dallas North Tollway (DNT)**
 - Limits: IH 35E in Dallas to US 380 in Frisco
 - Length: Approximately 31 miles
- **President George Bush Turnpike (PGBT), Excluding Eastern and Western Extensions**
 - Limits: Belt Line Road in Irving to SH 78 in Garland
 - Length: Approximately 30 miles
- **President George Bush Turnpike Eastern Extension (PGBT EE)**
 - Limits: SH 78 in Garland to IH 30 in Garland
 - Length: Approximately 10 miles
- **President George Bush Turnpike Western Extension (PGBT WE)**
 - Limits: IH 20 in Grand Prairie to SH 183 in Irving
 - Length: Approximately 10 miles
- **Sam Rayburn Tollway (SRT)**
 - Limits: Business 121 in Coppell to US 75 in McKinney
 - Length: Approximately 26 miles
- **Chisholm Trail Parkway (CTP)**
 - Limits: US 67 in Cleburne to IH 30 in Fort Worth
 - Length: Approximately 28 miles
- **360 Tollway (360T)**
 - Limits: Camp Wisdom Road/Sublett Road to US 287
 - Length: Approximately 10 miles
- **Addison Airport Toll Tunnel (AATT)**
- **Lewisville Lake Toll Bridge (LLTB)**
- **Mountain Creek Lake Bridge (MCLB)**

Based on the traffic forecast at each toll gantry location, annual forecasts for each facility of the NTTA System were prepared through 2070. The projections extend from 2024 through 2070 and include the revenue forecasts for DNT, PGBT, PGBT EE, PGBT WE, SRT, CTP, 360T, AATT, MCLB, and LLTB. In each case, forecasts for each of the facilities are based on modeled traffic estimates at each toll collection location, through the year 2045. These modeled estimates were refined, using post-model adjustments, reflecting validation factors used to match observed 2024 traffic data and the baseline model year at each toll gantry location. The average toll at each location was based on the current mix of passenger car and commercial vehicle traffic and the current average tolls, modified in future years to reflect changing assumptions in the proportion of AVI and ZipCash transaction shares. Further, toll rates for ZipCash transactions are 100 percent higher than the rates for AVI transactions in each case.

Estimates beyond year 2045 are based on nominal assumptions regarding future traffic growth, with assumed toll rate increases. As shown in **Table ES-1**, the estimated annual revenue on the DNT is expected to increase from \$348.6 million in 2024 to \$469.7 million by 2030 and \$675.3 million by 2040. Revenue on the PGBT (excluding PGBT WE and PGBT EE) is expected to be \$301.5 million in 2024, increasing to \$396.5 million by 2030 and \$598.4 million by 2040. PGBT WE is anticipated to generate \$78.5 million in toll revenue in 2024, increasing to \$98.8 million and \$154.1 million by 2030 and 2040, respectively. NTTA's share of the revenue on the PGBT EE is expected to be \$53.6 million in 2024, increasing to \$72.3 million by 2030 and \$120.8 million by 2040. Revenue on the SRT is expected to be \$272.9 million in 2024, increasing to \$355.6 million by 2030 and \$546.8 million by 2040. As fiscal year 2058 is the end of the fifty-year operational agreement of the SRT between NTTA and TxDOT, revenue from SRT is estimated through August 31, 2058, while the other facilities are assumed to generate revenue for NTTA in perpetuity. CTP is anticipated to generate \$86.5 million in toll revenue in 2024, increasing to \$125.1 million and \$203.1 million by 2030 and 2040, respectively. The 360 Tollway is expected to generate \$31.4 million in toll revenue in 2024, increasing to \$46.4 million and \$83.8 million by 2030 and 2040, respectively. Revenue from the AATT, MCLB and LLTB combined is expected to be about \$17.8 million in 2024. By 2030, this is estimated to reach a combined \$23.9 million and increase in 2040 to \$36.9 million, still a very small share of total NTTA System revenue.

Total revenue on the existing NTTA System total revenue on the NTTA System is expected to increase from about \$1.19 billion in 2024 to \$1.59 billion in 2030 and \$2.42 billion in 2040. Driven by nominal traffic growth and continued assumed modest inflationary adjustments in toll rates, annual revenue on the NTTA System is expected to reach more than \$3 billion per year by 2046.

Table ES-1. NTTA System Estimated Annual Toll Revenue (millions)

Year	DNT	PGBT	PGBT EE ⁽¹⁾	PGBT WE	SRT ⁽²⁾	CTP	360T ⁽³⁾	AATT-MCLB-LLTB	NTTA System
2024	\$348.6	\$301.5	\$53.6	\$78.5	\$272.9	\$86.5	\$31.4	\$17.8	\$1,190.8
2025	\$363.3	\$316.2	\$56.4	\$80.9	\$286.4	\$91.4	\$33.9	\$18.6	\$1,247.1
2026	\$379.0	\$332.4	\$59.4	\$83.5	\$299.5	\$97.4	\$36.9	\$19.5	\$1,307.5
2027	\$409.1	\$347.9	\$62.3	\$86.9	\$312.2	\$103.7	\$39.2	\$20.5	\$1,381.9
2028	\$436.0	\$363.6	\$65.5	\$90.7	\$326.0	\$110.6	\$41.5	\$21.6	\$1,455.4
2029	\$452.7	\$379.4	\$68.7	\$94.5	\$340.2	\$118.2	\$43.9	\$22.8	\$1,520.3
2030	\$469.7	\$396.5	\$72.3	\$98.8	\$355.6	\$125.1	\$46.4	\$23.9	\$1,588.3
2031	\$487.2	\$414.0	\$75.8	\$102.8	\$371.6	\$132.0	\$49.1	\$25.0	\$1,657.7
2032	\$506.0	\$433.1	\$79.6	\$108.7	\$388.9	\$139.6	\$53.2	\$26.2	\$1,735.3
2033	\$525.4	\$452.4	\$83.7	\$114.5	\$406.7	\$147.2	\$57.3	\$27.4	\$1,814.4
2034	\$548.2	\$474.2	\$89.7	\$119.6	\$425.7	\$155.5	\$60.9	\$28.7	\$1,902.4
2035	\$569.3	\$495.0	\$95.4	\$124.7	\$445.6	\$163.2	\$64.4	\$30.1	\$1,987.6
2036	\$591.8	\$517.4	\$101.5	\$130.4	\$467.0	\$170.9	\$68.2	\$31.5	\$2,078.6
2037	\$611.2	\$536.1	\$106.1	\$135.7	\$485.8	\$178.3	\$71.8	\$32.7	\$2,157.7
2038	\$631.8	\$555.8	\$110.8	\$141.7	\$505.6	\$186.3	\$75.7	\$34.0	\$2,241.6
2039	\$652.7	\$576.2	\$115.6	\$147.6	\$525.5	\$194.3	\$79.6	\$35.4	\$2,327.0
2040	\$675.3	\$598.4	\$120.8	\$154.1	\$546.8	\$203.1	\$83.8	\$36.9	\$2,419.2
2041	\$697.3	\$619.5	\$126.1	\$160.6	\$568.9	\$212.0	\$88.2	\$38.4	\$2,511.0
2042	\$720.9	\$642.3	\$131.7	\$167.8	\$592.5	\$221.6	\$93.0	\$40.0	\$2,609.8
2043	\$746.1	\$666.4	\$137.7	\$175.1	\$617.4	\$231.4	\$97.8	\$41.6	\$2,713.6
2044	\$773.2	\$692.8	\$144.1	\$183.3	\$644.1	\$242.1	\$103.1	\$43.3	\$2,826.0
2045	\$799.2	\$718.0	\$150.3	\$191.4	\$669.8	\$252.7	\$114.1	\$45.1	\$2,940.6
2046	\$824.3	\$741.9	\$156.0	\$198.7	\$692.9	\$262.6	\$120.0	\$46.6	\$3,043.0
2047	\$850.0	\$765.7	\$161.5	\$205.6	\$716.5	\$272.2	\$125.0	\$48.2	\$3,144.5
2048	\$877.5	\$791.4	\$167.4	\$213.3	\$741.7	\$282.7	\$130.3	\$49.9	\$3,254.1
2049	\$903.6	\$815.7	\$173.2	\$220.4	\$766.7	\$292.8	\$135.4	\$51.6	\$3,359.3
2050	\$931.4	\$842.0	\$179.5	\$228.3	\$793.3	\$303.7	\$70.5	\$53.3	\$3,401.8
2051	\$958.2	\$866.8	\$185.1	\$235.0	\$817.2	\$313.4	\$72.8	\$55.0	\$3,503.5
2052	\$986.7	\$893.5	\$191.2	\$242.5	\$842.5	\$323.9	\$75.3	\$56.7	\$3,612.3
2053	\$1,014.9	\$919.3	\$197.1	\$249.5	\$868.7	\$334.1	\$77.9	\$58.4	\$3,719.8
2054	\$1,045.1	\$947.3	\$203.5	\$257.3	\$896.7	\$345.1	\$80.6	\$60.2	\$3,835.7
2055	\$1,075.7	\$975.2	\$209.9	\$265.0	\$923.5	\$356.1	\$83.3	\$62.1	\$3,950.7
2056	\$1,108.4	\$1,005.6	\$216.8	\$273.6	\$952.0	\$368.2	\$86.2	\$64.1	\$4,074.8
2057	\$1,139.8	\$1,034.4	\$223.3	\$281.6	\$981.2	\$379.9	\$89.1	\$66.0	\$4,195.4
2058	\$1,173.3	\$1,065.6	\$230.4	\$290.5	\$672.8	\$392.6	\$92.3	\$68.0	\$3,985.6
2059	\$1,207.9	\$1,096.9	\$237.7	\$299.1	\$0.0	\$405.0	\$95.3	\$70.1	\$3,412.0
2060	\$1,245.1	\$1,130.8	\$245.5	\$308.7	\$0.0	\$418.4	\$98.6	\$72.4	\$3,519.6
2061	\$1,280.7	\$1,163.6	\$253.1	\$317.8	\$0.0	\$431.6	\$101.8	\$74.5	\$3,623.2
2062	\$1,318.6	\$1,199.1	\$261.3	\$328.0	\$0.0	\$445.9	\$105.4	\$76.8	\$3,735.1
2063	\$1,356.4	\$1,234.0	\$269.5	\$337.6	\$0.0	\$460.0	\$108.9	\$79.1	\$3,845.5
2064	\$1,396.9	\$1,271.7	\$278.2	\$348.4	\$0.0	\$475.4	\$112.7	\$81.6	\$3,965.0
2065	\$1,437.1	\$1,308.8	\$286.7	\$358.6	\$0.0	\$490.5	\$116.5	\$84.1	\$4,082.2
2066	\$1,480.2	\$1,348.9	\$295.9	\$370.0	\$0.0	\$506.8	\$120.6	\$86.7	\$4,209.1
2067	\$1,522.7	\$1,388.5	\$305.1	\$380.8	\$0.0	\$522.9	\$124.6	\$89.4	\$4,334.1
2068	\$1,568.3	\$1,431.5	\$315.1	\$392.8	\$0.0	\$540.4	\$129.0	\$92.2	\$4,469.3
2069	\$1,613.9	\$1,473.3	\$325.0	\$404.2	\$0.0	\$557.5	\$133.3	\$95.0	\$4,602.2
2070	\$1,662.8	\$1,518.7	\$335.6	\$417.0	\$0.0	\$576.0	\$137.9	\$98.0	\$4,746.0

- 1) NTTA's share of the revenue collected from PGBT EE.
- 2) SRT revenue for year 2058 includes revenue from January to August only, because FY 2058 is the end of the fifty-year operational agreement of the SRT between NTTA and TxDOT
- 3) Revenue sharing agreement with TxDOT (50%/50%) is assumed to begin January 1, 2050

Table ES-2 shows the projected annual transaction and revenue growth rates on the NTTA System. Annual transaction and revenue growth rates from 2024 through 2030 are projected to be 2.1 percent and 4.9 percent, respectively. During this period, the growth in transactions is driven mainly by the growth in the demographics along the NTTA System corridors, as well as the opening of the DNT Phase 4A extension. The transaction growth rates progressively decrease to 1.5 percent between 2030 and 2040, and to 0.9 percent between 2040 and 2050. The corresponding growth rates in revenue are 4.3 percent and 3.5 percent, respectively, which incorporate the traffic growth and the assumed toll rate increases.

Table ES-2. NTTA System Transactions and Revenue Annual Growth

Period	Transactions Annual Growth (%)	Revenue Annual Growth (%)
2024-2030	2.1%	4.9%
2030-2040	1.5%	4.3%
2040-2050	0.9%	3.5%

Figure ES-1 graphically displays the annual revenue forecasts shown previously in **Table ES-1** by facility. It is expected that the DNT, PGBT and SRT will continue to generate the vast majority of revenue on the NTTA System throughout the forecast period. The DNT will provide about 29 percent of all NTTA System revenue in 2024; this proportion decreases to 27 percent in 2045 as the SRT and CTP continue to mature. The PGBT (including EE and WE) will provide approximately 36 percent of all NTTA System revenue through 2045. The SRT will provide about 23 percent of all NTTA System revenue through 2045. 360 Tollway is expected to generate three percent of overall revenue in 2024, but this share is projected to increase to four percent by 2045. The AATT, MCLB, and LLTB will contribute less than two percent of revenue through 2045.

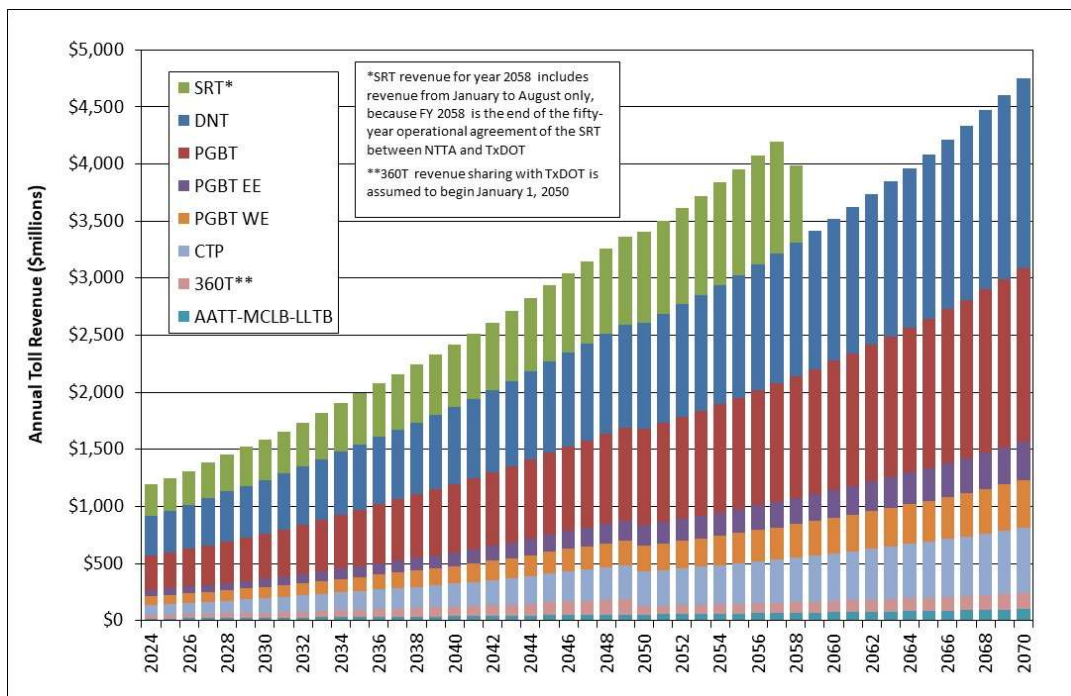


Figure ES-1. NTTA System Estimated Annual Revenue by Facility

Section 1

Introduction

At the request of the North Texas Tollway Authority (NTTA), CDM Smith conducted a Comprehensive Traffic and Revenue (T&R) Study of the NTTA System. The study included a system-wide review of transactions and toll revenue, traffic data collection, independent socioeconomic forecasts, a review of the latest transportation improvement plan, travel demand model updates, and the development of long-term traffic and toll revenue estimates for the NTTA System.

Figure 1-1 illustrates the NTTA System, which includes the following:

- **Dallas North Tollway (DNT)**
 - Limits: IH 35E in Dallas to US 380 in Frisco
 - Length: Approximately 31 miles
- **President George Bush Turnpike (PGBT), Excluding Eastern and Western Extensions**
 - Limits: Belt Line Road in Irving to SH 78 in Garland
 - Length: Approximately 30 miles
- **President George Bush Turnpike Eastern Extension (PGBT EE)**
 - Limits: SH 78 in Garland to IH 30 in Garland
 - Length: Approximately 10 miles
- **President George Bush Turnpike Western Extension (PGBT WE)**
 - Limits: IH 20 in Grand Prairie to SH 183 in Irving
 - Length: Approximately 10 miles
- **Sam Rayburn Tollway (SRT)**
 - Limits: Business 121 in Coppell to US 75 in McKinney
 - Length: Approximately 26 miles
- **Chisholm Trail Parkway (CTP)**
 - Limits: US 67 in Cleburne to IH 30 in Fort Worth
 - Length: Approximately 28 miles
- **360 Tollway (360T)**
 - Limits: Camp Wisdom Road/Sublett Road to US 287
 - Length: Approximately 10 miles
- **Addison Airport Toll Tunnel (AATT)**
- **Lewisville Lake Toll Bridge (LLTB)**
- **Mountain Creek Lake Bridge (MCLB)**

and toll revenue trends since the completion of the August 2022 Study that were also incorporated into this analysis.

Objective and Scope of Study

The purpose of this study was to develop T&R forecasts for the NTTA System shown in **Figure 1-1**. The following outlines the general structure of the report:

Section 2 – NTTA System Traffic Trends and Characteristics

This section provides background information regarding the characteristics of NTTA's roadways and the highway infrastructure near NTTA System corridors. The information in this section provides a historical overview of traffic along and in the vicinity of the NTTA System corridors, which was used as input to the T&R forecasting process. CDM Smith collected traffic data that was used to calibrate the travel demand model. Data summarized in this chapter includes historical traffic and toll revenue data for the system (through June 2024), traffic counts on competing routes and non-tolled ramps along NTTA facilities, travel time data on the NTTA System facilities and other roadways along the NTTA System corridors, and origin-destination data.

Section 3 – Dallas-Fort Worth Area Transportation Characteristics

This section provides a broad overview of the transportation system in the Dallas-Fort Worth (DFW) region and outlines the region-wide characteristics that may impact the NTTA System. It also describes the Mobility 2045 – 2022 Update transportation commitments.

Section 4 – Regional Demographic and Economic Trends

This section provides a description of the NCTCOG forecasting process used to generate the base demographics and details the historical and expected future growth in the DFW region. The historical and expected future growth of the individual counties within the study area is also investigated, followed by a description of the demographic characteristics along NTTA System corridors. Research and Demographic Solutions Group (RDS) performed an independent review of the official demographic datasets from NCTCOG. RDS's demographic review report is included in **Appendix A** to this report. Their findings included the identification of necessary modifications to the regional growth projections within the study focus area. These modified growth projections were incorporated into the NCTCOG travel demand model, resulting in an alternate set of trip tables. This alternate set of trip tables is referred to as the "revised" trip tables which were used in the development of traffic and toll revenue estimates for this study.

Section 5 – Travel Demand Model Development

This section describes the databases utilized in the analysis and highlights the methodologies implemented to calibrate and validate the travel demand model. CDM Smith's proprietary toll diversion model was used to forecast future traffic on toll facilities and was calibrated to ensure it could reasonably replicate current traffic conditions along NTTA System corridors.

Section 6 – Estimated Traffic and Revenue

This section provides the updated traffic forecasts and toll revenue estimates for the NTTA System based on the inputs described in previous sections. The toll sensitivity analyses performed as part of the study are described in detail in this section, including several sensitivity tests to measure the impacts of changes to key input variables to the base T&R forecasts. Also presented are the average weekday transactions and annual toll revenues anticipated on the NTTA System, as well as a description of the various other assumptions used in the forecasting process.

Section 2

NTTA System Traffic Trends and Characteristics

This section provides background information regarding the characteristics of NTTA System facilities and the highway infrastructure near the NTTA System. The information in this section provides a historical overview of traffic in the vicinity of the NTTA System, which was used as input to the travel demand model utilized for the development of traffic and toll revenue forecasts. CDM Smith undertook a comprehensive exercise of collecting traffic data to feed into the travel demand model, discussed in **Section 5**, which also contains a detailed explanation of the methodology employed to develop the long-range T&R forecasts. Data summaries in this section include historical traffic and toll revenue data for the NTTA System (through June 2024), traffic counts on competing routes and non-tolled ramps along NTTA facilities, travel time data on the NTTA System facilities and other roadways along the NTTA System corridors, and origin-destination data.

NTTA System Facilities in Operation

The NTTA System facilities currently in operation are the Dallas North Tollway (DNT), President George Bush Turnpike (PGBT), President George Bush Turnpike Eastern Extension (PGBT EE), President George Bush Turnpike Western Extension (PGBT WE), Sam Rayburn Tollway (SRT), Chisholm Trail Parkway (CTP), 360 Tollway (360T), Addison Airport Toll Tunnel (AATT), Mountain Creek Lake Bridge (MCLB), and Lewisville Lake Toll Bridge (LLTB).

Dallas North Tollway

DNT, shown in **Figure 2-1**, is a limited-access, high-speed toll facility which extends northward from the junction with Stemmons Freeway (IH 35E) north of downtown Dallas through the Dallas suburbs to US 380 in Frisco. The existing DNT corridor covers a distance of approximately 31 miles and includes 41 interchanges. The original DNT segment, which extended from its current southern terminus to IH 635, was constructed and opened to traffic in its entirety in June 1968. It was extended to Frankford Road in June 1987 and to Legacy Road in Plano in September 1994. In April 2004, with the completion of the grade-separated multi-level interchange with SRT, DNT was extended north to just south of Gaylord Parkway in Frisco. Extension Phase 3 extended the DNT corridor from Gaylord Parkway to US 380 and opened to traffic on September 28, 2007. The opening dates for the various DNT segments are shown in **Table 2-1**. The existing DNT facility utilizes a “closed” toll collection system. Each of the four major segments of the facility has one mainlane toll gantry at which tolls are collected in both directions, with toll gantries positioned at selected ramps to prohibit toll-free movements on the facility. The segments of DNT north of IH 635 are flanked by continuous city- or county-maintained frontage roads.

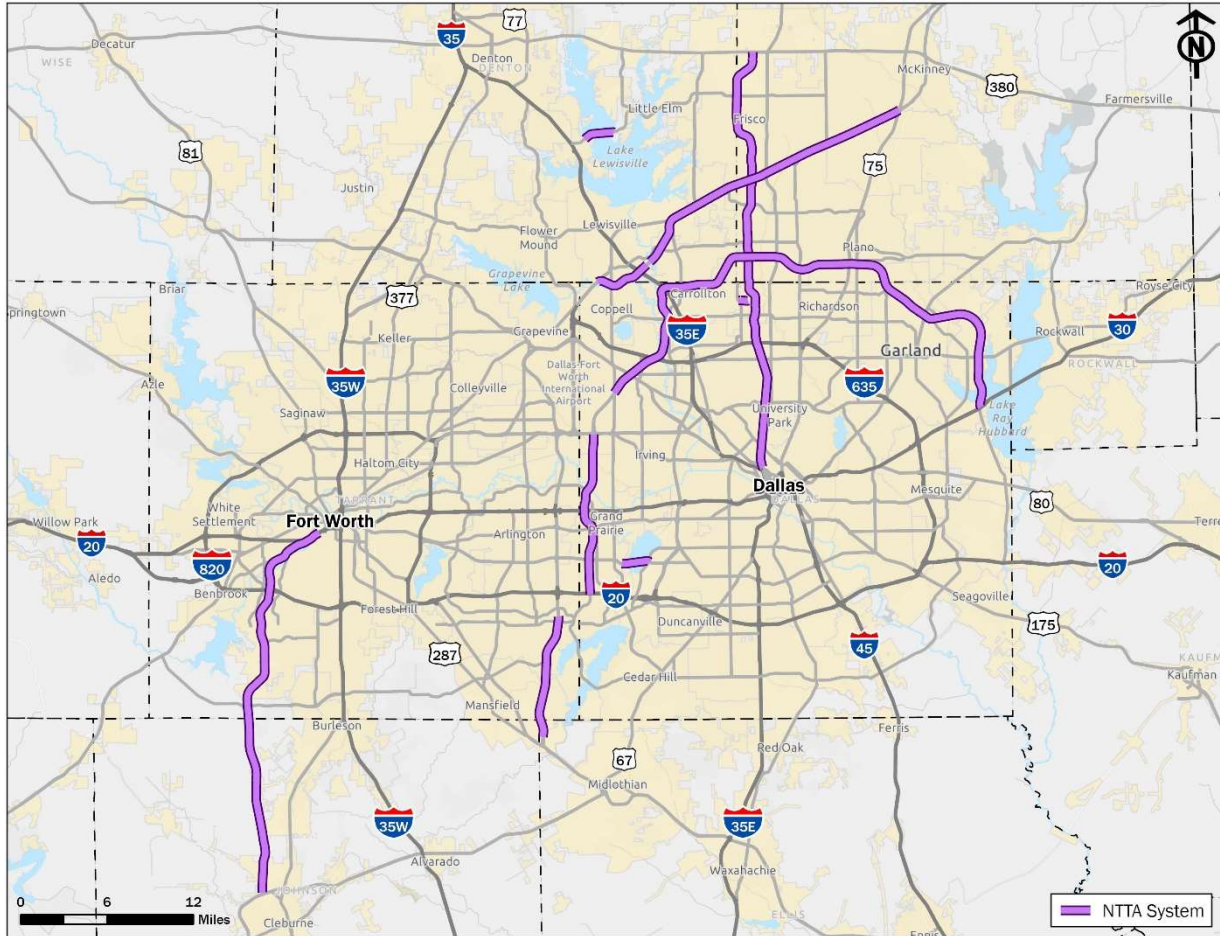


Figure 2-1. The NTTA System

Table 2-1. Opening Dates of DNT Segments

Project Phase	Segment	Opening Date
Phase 1	IH 35E to IH 635	June 1968
Phase 1 Extension	IH 635 to Frankford Road	June 1987
Phase 2	Frankford Road to Legacy Road	September 1994
Phase 2 Extension	Legacy Road to Gaylord Parkway	April 2004
Phase 3 Extension	Gaylord Parkway to US 380	September 2007

President George Bush Turnpike (Including Eastern Extension)

As illustrated in **Figure 2-1**, PGBT (including Eastern Extension) currently extends from the junction with IH 30 at its eastern terminus, traversing the communities of Rowlett, Garland, and Richardson to a junction with US 75. PGBT continues westward through the cities of Plano and Dallas to an interchange with DNT. The facility then continues in a southwesterly direction through Carrollton to the interchange with IH 35E. At this point, it turns due south, along the section referred to as Segment IV, to the interchange with IH 635. From IH 635, the PGBT section referred to as Segment V continues southwesterly through the city of Irving to the northern terminus of the existing SH 161 in the vicinity of Belt Line Road just east of the DFW International Airport. The entire PGBT (excluding PGBT WE), from IH 30 to Belt Line Road, covers a total distance of approximately 40 miles and includes 47 interchanges. The opening dates for the various segments of PGBT are shown in **Table 2-2**.

Table 2-2. Opening Dates of PGBT Segments (Including Eastern Extension)

Project Phase	Segment	Opening Date
Segment I A	Midway Road to Preston Road	November 1998
Segment I B	Preston Road to Coit Road	June 1999
Segment I C	Coit Road to US 75	December 1999
Segment II A	US 75 to Campbell Road	December 1999
Segment II B	Campbell Road to SH 78	April 2000
Segment III	Midway Road to IH 35E	July 2001
Segment IV	IH 35E to IH 635	September 2005
Segment V	IH 635 to Beltline Road	December 2001
Eastern Extension	SH 78 to IH 30	December 2011

PGBT utilizes a “semi-closed” system of toll collection and has six mainlane toll gantries positioned along the entire length of the facility with ramp gantries located on selected ramps along the corridor.

President George Bush Turnpike Western Extension

The PGBT WE toll facility is approximately 12 miles long and runs from IH 20 in Grand Prairie to SH 183 in Irving. The corridor includes 21 interchanges, including IH 20, SH 180 (Main Street), IH 30, and SH 183. Spur 303/Pioneer Parkway, which connects directly to the Mountain Creek Lake Toll Bridge, also crosses the PGBT WE corridor. There are two mainlane toll gantries along PGBT WE, one to the south of Lower Tarrant Parkway and the other to the south of Pioneer Parkway. PGBT WE was opened in phases, and the opening dates of the various segments of the facility are listed in **Table 2-3**.

Table 2-3. Opening Dates of PGBT WE Segments

Project Phase	Segment	Opening Date
Phase 1	SH 183 to Conflans Road	August 2009
Phase 2	Conflans Road to Egyptian Way	August 2009
Phase 3	Conflans Road to Egyptian Way (additional mainlanes)	April 2010
Phase 4	Egyptian Way to IH 20	October 2012

Sam Rayburn Tollway

The SRT corridor is approximately 26 miles in length and runs in a northeast/southwest direction between the interchange of US 75 in McKinney and Denton Tap Road near the bridge over Denton Creek in Coppell. In its 26-mile length, the SRT corridor includes 29 interchanges and has a total of three mainlane toll gantries. The first of the three mainlane gantries is located at the western terminus of the corridor, to the east of Denton Tap Road. The second mainlane gantry is between the Standridge and Josey Lane interchange, and the third mainlane gantry is located between Custer Road and Exchange Parkway. The corridor intersects several major arterials as well as DNT and IH 35E. The opening dates for various segments of SRT are shown in **Table 2-4**. SRT currently utilizes a “semi-closed” system of toll collection. Toll-free sections are currently located near the interchanges with IH 35E and DNT.

Table 2-4. Opening Dates of SRT Segments

Project Phase	Segment	Opening Date
Phase 1	Denton Tap Road to Old Denton Road	July 2006
Phase 2	Old Denton Road to Coit Road	August 2008
Phase 3	Coit Road to Hardin Boulevard	September 2009
Phase 4A	Hardin Boulevard to US 75	December 2010
Phase 4B	Interchange at US 75	March 2011*
Phase 5	Interchange at DNT	December 2011

*Four direct connectors at this interchange opened in December 2010

Chisholm Trail Parkway

CTP is approximately 28 miles long and extends from US 67 in the City of Cleburne to IH 30 in the City of Fort Worth. The corridor intersects FM 1187, SH 183, and IH 20, as well as several east/west arterials, including Vickery Boulevard, Berry Street, Seminary Drive, Altamesa Boulevard, and Sycamore School Road. CTP opened to traffic in May 2014.

360 Tollway

The 360 Tollway is a 9.7-mile toll road between Camp Wisdom Road/Sublett Road in southern Tarrant County and US 287 in northwestern Ellis County and northeastern Johnson County. Built as a public/public partnership between the Texas Department of Transportation and NTTA, 360 Tollway opened to traffic on May 11, 2018.

Addison Airport Toll Tunnel

AATT is located in the town of Addison to the west of DNT between IH 635 and PGBT, as shown in **Figure 2-1**. AATT is a connector for Keller Springs Road and covers a distance of approximately 3,700 feet from Midway Road to Addison Road, with the actual tunnel length being 1,600 feet long traveling under the Addison Airport runway. AATT is a two-lane facility and is served by a single two-way toll gantry located at the western terminus. It opened to traffic in February 1999.

Mountain Creek Lake Bridge

MCLB is located in southwest Dallas crosses Mountain Creek Lake and connects to Spur 303 on either side. The total length of MCLB, including approach roads, is approximately two miles. It is a two-lane facility served by a single two-way toll gantry located at its western terminus. MCLB was opened to traffic on April 30, 1979. The western terminus of the toll bridge connects to the President George Bush Turnpike Western Extension (PGBT WE)

Lewisville Lake Toll Bridge

LLTB is a 1.7-mile four-lane bridge in Denton County that is served by a single two-way toll gantry located at its western terminus. The western and eastern termini of the bridge lie in the cities of Lake Dallas and Little Elm, respectively. LLTB is part of a corridor that runs from IH 35E in Lake Dallas to the Dallas North Tollway in Frisco and was opened to traffic on August 1, 2009.

Toll Collection System and Rates

The following section provides a summary of the existing NTTA System toll collection configuration and toll rates.

TollTag Program

In July 1989, a voluntary subscription electronic toll collection (ETC) system based on automatic vehicle identification (AVI) was installed on DNT. Prior to August 1, 1999, the program, known as TollTag, charged patrons a slightly higher toll and a monthly service fee. After August 1, 1999, TollTag and cash patrons were assessed tolls under the revised cash differential toll rate scenario (\$0.60 for TollTag and \$0.75 for cash). On January 1, 2002, this same \$0.60/\$0.75 toll rate concept was implemented on the PGBT. Since its introduction, the TollTag program has gained

substantial popularity due to the reduction of traffic congestion and delays at toll plazas. Approximately 15,000 TollTags were in circulation in 1989, which more than doubled to approximately 32,000 by the end of 1990 and reached the milestone of one million in November 2005. According to NTTA, there were more than 5.6 million TollTags in circulation by 2020.

ZipCash Program

Between 2007 and 2010, the NTTA replaced its cash toll collection system with an all-electronic toll collection (AET) system that includes the ZipCash program. The ZipCash system allows travelers to use NTTA facilities without a TollTag. When a motorist without a TollTag drives through tolling points, high-speed cameras take digital images of the license plate, and the tolls are billed to the registered owner of the vehicle. ZipCash toll rates are 100 percent higher than TollTag rates, reflecting the higher costs of collection. This surcharge is added to each toll to cover the costs of processing.

NTTA completed the conversion of all its existing toll roads, bridges, and tunnels to AET in December 2010. SRT and LLTB were opened to traffic in 2008 and 2009 with an AET system and never offered a cash option. DNT's mainlane toll gantry near Wycliff Avenue was the first toll collection location that was converted to ZipCash in early 2007, and the first full facility in the NTTA System to be converted from cash to AET was PGBT in July 2009. Conversion of the rest of DNT, AATT, and MCLB followed in December 2010.

NTTA System Toll Rates

On July 1, 2009, a new toll policy went into effect on the NTTA System. Under the new toll rate policy, the base toll rate for AVI users on DNT, PGBT, SRT and PGBT WE was set at \$0.145 per mile (in 2009 dollars). On CTP, the per mile rate (in 2009 dollars) was set at \$0.185 for the segment between IH 30 and Altamesa Boulevard and \$0.145 per mile for the segment between Altamesa Boulevard and US 67. The per mile rates are to be adjusted every two years at an annual growth rate of 2.75 percent on all facilities. This toll policy was amended in late 2011, prior to the opening of the Eastern Extension of PGBT, which includes changes to the toll escalation rate on PGBT EE and toll revenue sharing terms with TxDOT. The most recent toll rate adjustment under this new policy was applied on July 1, 2023. The updated per mile AVI rate on NTTA System facilities for two-axle vehicles is approximately \$0.21 per mile. This rate applies to users with TollTags as well as other tags supported by the NTTA's various interoperability agreements.

NTTA uses an axle-based vehicle classification system to determine the toll that each vehicle pays. For example, tolls charged to vehicles with five axles are four times the toll charged to vehicles with two axles. Currently, all NTTA System facilities operate under a cashless (ZipCash) toll collection system, where the license plates of vehicles using these facilities without valid transponders are photographed and are invoiced at a higher toll than the AVI toll.

Dallas North Tollway

As shown in **Figure 2-2**, the southernmost Mainlane Gantry 1 (MLP 1) is located between Wycliff Avenue and Cedar Springs Road. Ramp toll gantries within the original segment of DNT are located at Mockingbird Lane, Northwest Highway and Royal Lane to and from the north only. On Extension Phase 1, the MLP 2 is located between Keller Springs Road and Trinity Mills Road. Ramp toll gantries within the Extension Phase 1 are located at Spring Valley Road, Belt Line Road, and Keller Springs Road to and from the south and at Frankford Road to and from the north. The MLP 3 on Extension Phase 2 is located between Chapel Hill Boulevard and Parker Road. Ramp toll gantries within Extension Phase 2 are located to and from the south at West Park Boulevard and to and from the north at Parker Road and Spring Creek Parkway. In addition, with the completion of the SRT/DNT interchange ramp toll gantries are located to and from the south on the ramps just north of SRT. On the Extension Phase 3, the MLP 4 is located between Main Street and Eldorado Parkway. Ramp toll gantries within Extension Phase 3 are located at John Hickman, Stonebrook Parkway, Cotton Gin Road, and Eldorado Parkway. With the extension of the DNT north of US 380 in 2023, new ramp gantries were added at Fields Parkway and First Street.

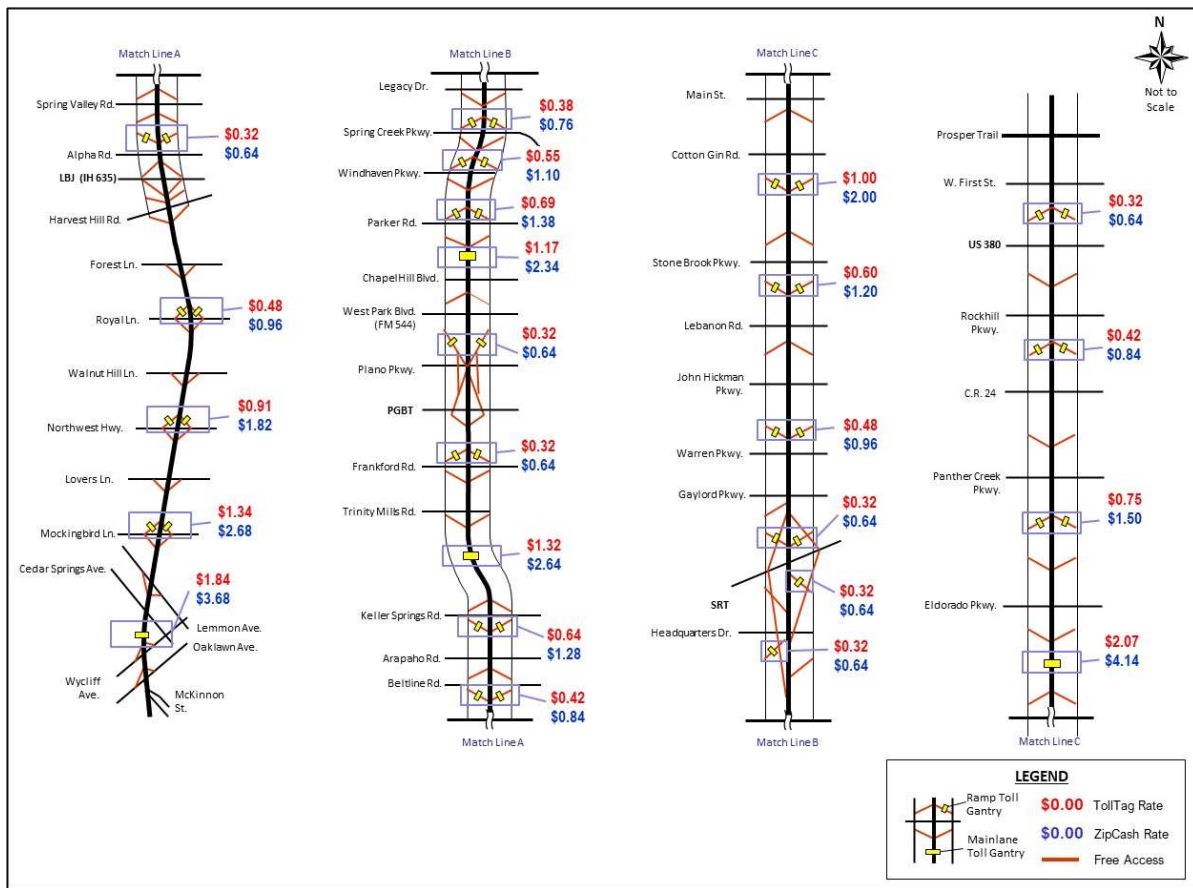


Figure 2-2. Toll Gantry Locations and 2024 Passenger Car Tolls – DNT

President George Bush Turnpike (Including PGBT EE)

The collection system for PGBT (including PGBT EE) is presented in **Figures 2-3** and **2-4**. There are six mainlane toll gantries between IH 30 in the city of Garland and Belt Line Road in the city of Irving. MLP 5 is located near Merritt Road; MLP 6 lies between Shiloh Road and Renner Road; MLP 7 is located between Coit Road and Hillcrest Road; MLP 8 lies between Frankford Road and Kelly Boulevard; MLP 9 is located between Sandy Lake Road and Belt Line Road in Carrollton/Farmers Branch; and MLP 10 is located between Gateway Road and Belt Line Road in Irving.

When traveling eastbound on PGBT, toll gantries are located on the entrance ramps west of Gateway Road, east of Royal Lane, east of Marsh Lane, east of Midway Road, east of Coit Road, west of Custer Drive, east of Shiloh Road, east of Campbell Road, east of Garland Avenue, east of Merritt Road, east of Main Street and east of Miller Road. Toll gantries at exit ramps are located west of Belt Line Road, west of Josey Lane, west of Kelly Boulevard, west of Preston Road, east of Jupiter Road, east of Renner Road, west of Crist Road, west of Firewheel Parkway, and west of Miles Road.

When traveling westbound on PGBT, toll gantries are located on the entrance ramps west of Miles Road, west of Firewheel Parkway, west of Crist Road, east of Renner Road, east of Jupiter Road, west of Preston Road, west of Kelly Boulevard, west of Josey Lane and west of Belt Line Road, while toll gantries are located on exit ramps east of Miller Road, east of Main Street, east of Merritt Road, east of Garland Avenue, east of Campbell Road, east of Shiloh Road, west of Custer Drive, east of Coit Road, east of Midway Road, east of Marsh Lane, east of Royal Lane and west of Gateway Road.

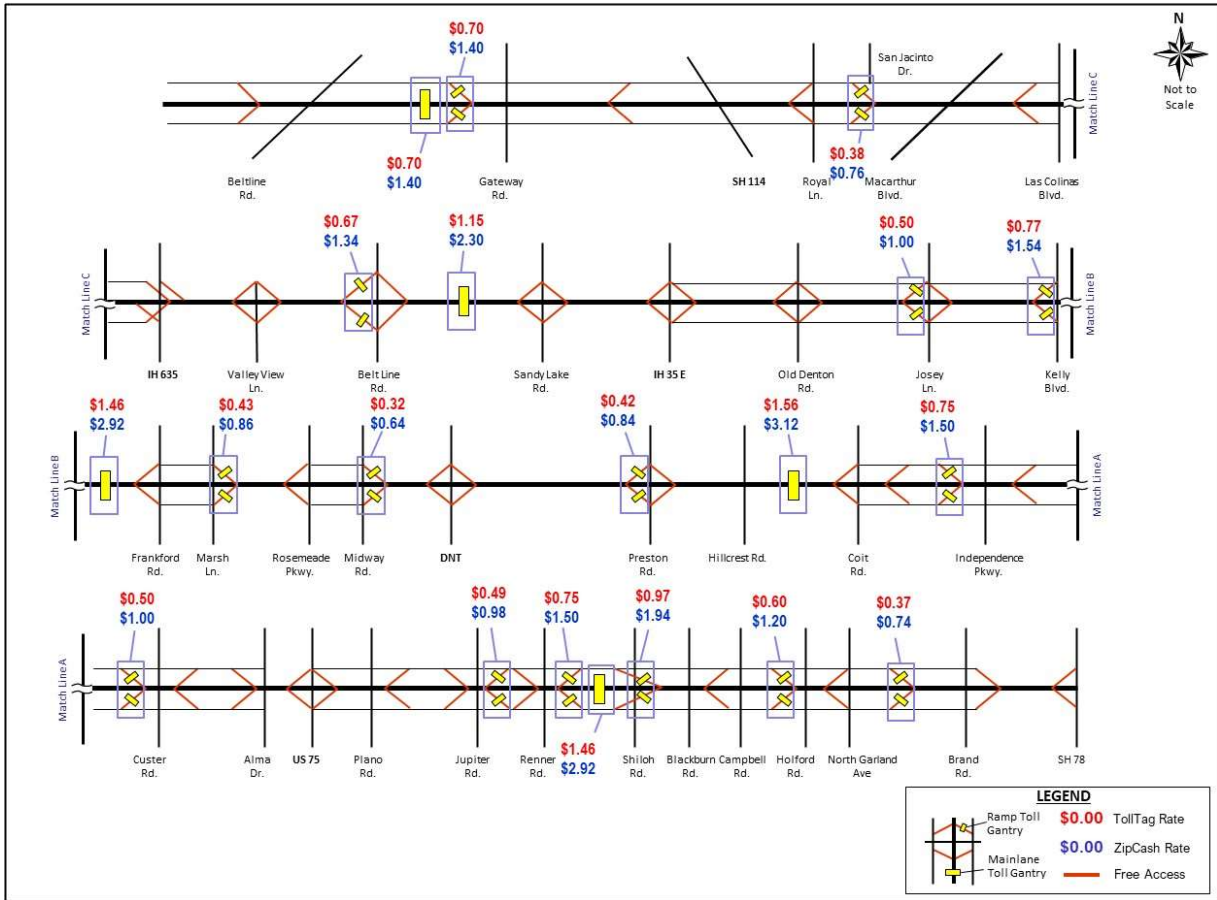


Figure 2-3. Toll Gantry Locations and 2024 Passenger Car Tolls – PGBT (Excluding PGBT EE)

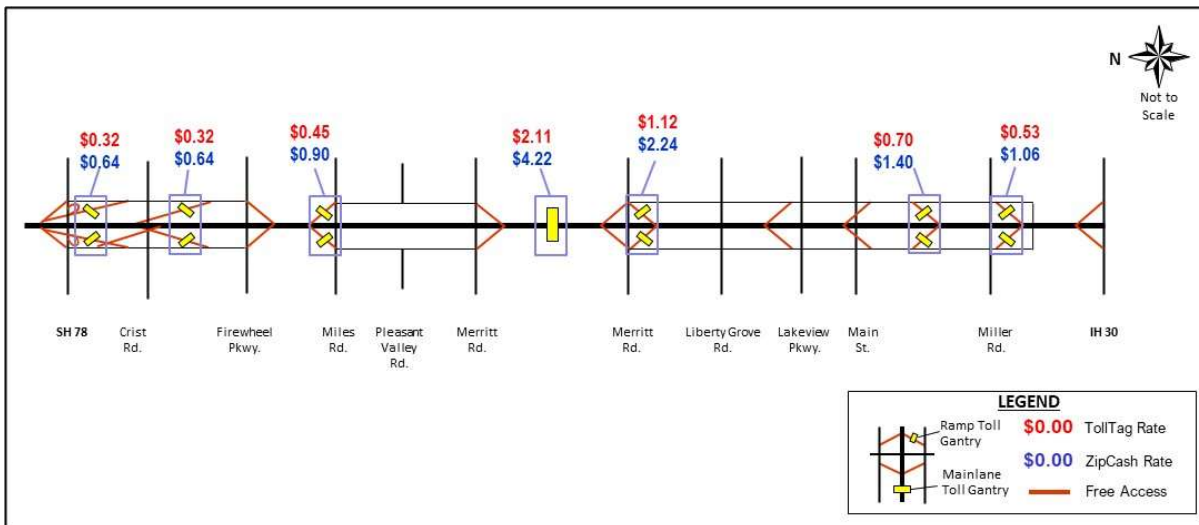


Figure 2-4. Toll Gantry Locations and 2024 Passenger Car Tolls – PGBT EE

President George Bush Turnpike Western Extension

Tolls are currently collected on the PGBT WE at two mainlane gantries and eighteen ramp gantries, as shown in **Figure 2-5**. The mainlane gantries are located near Lower Tarrant Road and Arkansas Lane. The ramp gantries are located at Conflans Road, Shady Grove Road, Lower Tarrant Road, Dalworth Street, Marshall Drive, Pioneer Parkway, Arkansas Lane, and Mayfield Road.

Sam Rayburn Tollway

Tolls are currently collected on the SRT at three mainlane gantries and forty ramp gantries, as shown in **Figure 2-6**. The mainlane gantries are located near Denton Tap Road, Josey Lane and Custer Road. The ramp gantries are located at MacArthur Boulevard, Carrollton Parkway, Parker Road, FM 2281, Standridge Drive, Josey Lane, Plano Parkway, Spring Creek Parkway, Preston Road, Ohio Drive, Coit Road, Independence Parkway, Custer Road, Alma Drive, Stacy Road, Lake Forest Drive and Hardin Boulevard.

Chisholm Trail Parkway

Tolls are currently collected on the CTP at three mainlane gantries and twenty-four ramp gantries, as shown in **Figure 2-7**. The mainlane gantries are located near Hulen Street, FM 1187 and CR 904. The ramp gantries are located at Edwards Ranch Road, Arborlawn Drive, Oakmont Boulevard, Altamesa Boulevard, Sycamore School Road, McPherson Boulevard, FM 1187, CR 920, CR 913, FM 917, CR 904, and Sparks Drive.

360 Tollway

Tolls are currently collected on 360 Tollway at two mainlane gantries and six ramp gantries as shown in **Figure 2-8**. The mainlane gantries are located near New York Avenue and Heritage Parkway. The ramp gantries are located at Holland Road, Debbie Lane, and Southeast Parkway. The current toll rates (effective through June 30, 2023) on various 360 Tollway gantries are shown in **Table 2-5**.

AATT, MCLB and LLTB

As stated previously, the AATT, MCLB and LLTB are each served by a single mainlane toll gantry. The mainlane gantry for the AATT is positioned at the western terminus of the tunnel. The mainlane gantry for the MCLB is located at the bridge's western terminus. The LLTB's mainlane gantry is located at the western end of the bridge in Lake Dallas.

The current toll rates (effective through June 30, 2023) on various NTTA gantries are shown in **Table 2-5**.

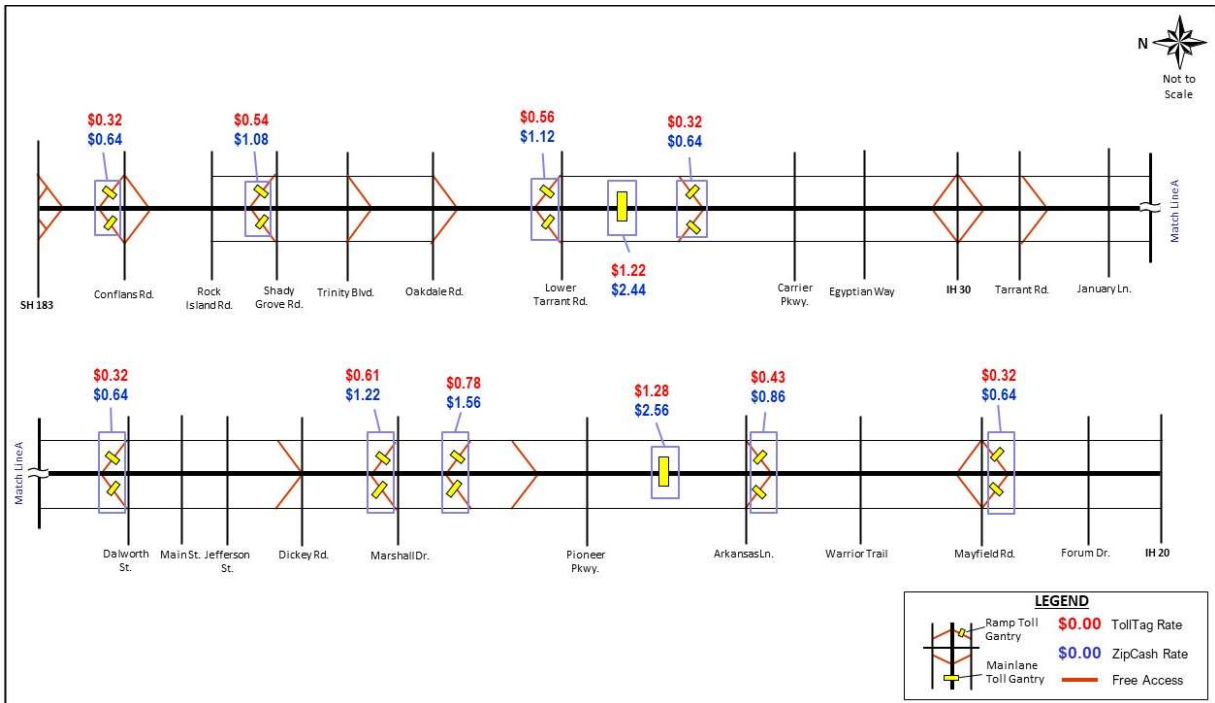


Figure 2-5. Current (2024) PGBT WE Toll Collection System and Passenger Car Toll Rates

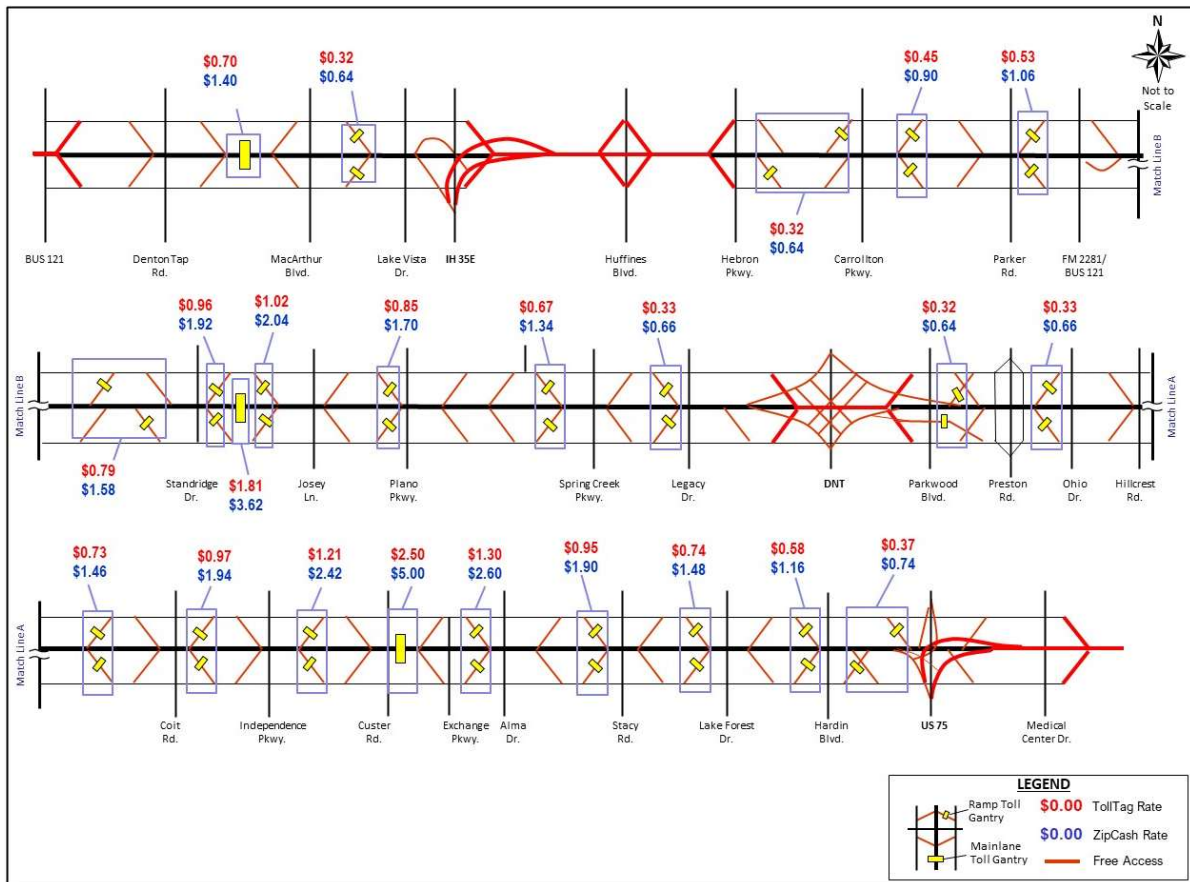


Figure 2-6. Current (2024) SRT Toll Collection System and Passenger Car Toll Rates

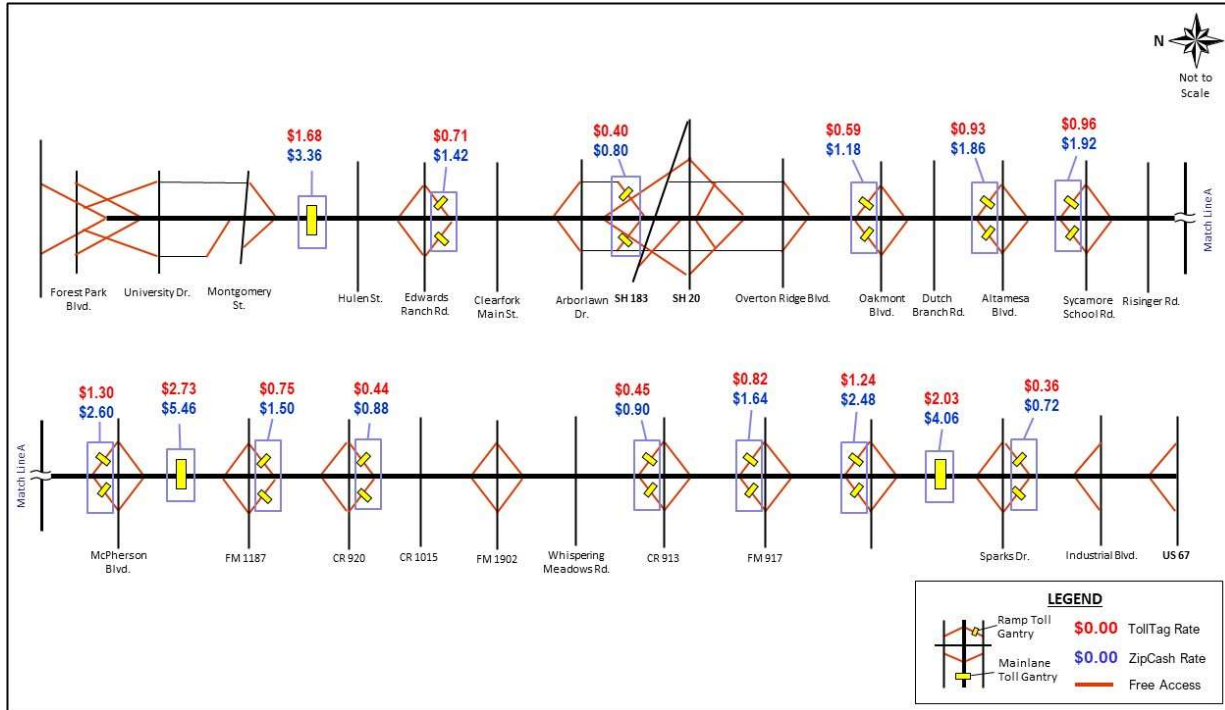


Figure 2-7. Current (2024) CTP Toll Collection System and Passenger Car Toll Rates

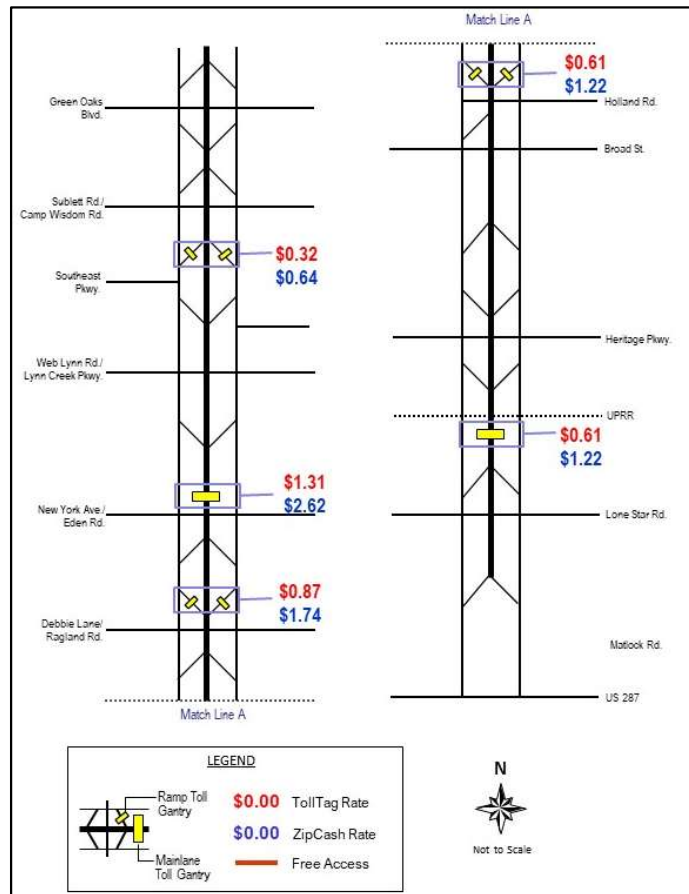


Figure 2-8. Current (2024) 360 Tollway Toll Collection System and Passenger Car Toll Rates

Table 2-5. Existing NTTA System Toll Rates for Two-Axle Vehicles

DNT	TT	ZC	PGBT	TT	ZC	CTP	TT	ZC
MLG 1 (Wycliff)	\$1.84	\$3.68	Miller Road	\$0.53	\$1.06	MLG 1 (Montgomery)	\$1.68	\$3.36
Mockingbird Lane	\$1.34	\$2.68	Main Street	\$0.70	\$1.40	Edwards Ranch Road	\$0.71	\$1.42
Northwest Highway	\$0.91	\$1.82	Merritt Road	\$1.12	\$2.24	Arborlawn Drive	\$0.40	\$0.80
Royal Lane	\$0.48	\$0.96	MLG 5 (Merritt)	\$2.11	\$4.22	Oakmont Boulevard	\$0.59	\$1.18
Spring Valley Road	\$0.32	\$0.64	Miles Road	\$0.45	\$0.90	Altamesa Boulevard	\$0.93	\$1.86
Belt Line Road	\$0.42	\$0.84	Firewheel Parkway	\$0.32	\$0.64	Sycamore School Road	\$0.96	\$1.92
Keller Springs Road	\$0.64	\$1.28	Crist Road	\$0.32	\$0.64	McPherson Boulevard	\$1.30	\$2.60
MLG 2 (Trinity Mills)	\$1.32	\$2.64	North Garland Avenue	\$0.37	\$0.74	MLG 2 (Stewart Feltz)	\$2.73	\$5.46
Frankford Road	\$0.32	\$0.64	Campbell Road	\$0.60	\$1.20	FM 1187	\$0.75	\$1.50
FM 544	\$0.32	\$0.64	East Renner Road	\$0.97	\$1.94	CR 920	\$0.44	\$0.88
MLG 3 (Parker)	\$1.17	\$2.34	MLG 6 (Shiloh)	\$1.46	\$2.92	CR 913	\$0.45	\$0.90
Parker Road	\$0.69	\$1.38	Shiloh Road	\$0.75	\$1.50	FM 917	\$0.82	\$1.64
Windhaven Parkway	\$0.55	\$1.10	West Renner Road	\$0.49	\$0.98	CR 904	\$1.24	\$2.48
Spring Creek Parkway	\$0.38	\$0.76	Independence Parkway	\$0.50	\$1.00	MLG 3 (Sparks)	\$2.03	\$4.06
Gaylord Parkway	\$0.32	\$0.64	Coit Road	\$0.75	\$1.50	Sparks Road	\$0.36	\$0.72
Legacy Drive	\$0.32	\$0.64	MLG 7 (Coit)	\$1.56	\$3.12			
Headquarters Drive	\$0.32	\$0.64	Preston Road	\$0.42	\$0.84	360 Tollway	TT	ZC
Lebanon Road	\$0.48	\$0.96	Midway Road	\$0.32	\$0.64	Webb Lynn Road	\$0.32	\$0.64
Stone Brook Parkway	\$0.60	\$1.20	Marsh Lane	\$0.43	\$0.86	New York Mainlane Gantry	\$1.31	\$2.62
Cotton Gin Rd./Main St.	\$1.00	\$2.00	MLG 8 (Frankford)	\$1.46	\$2.92	New York Avenue	\$0.87	\$1.74
MLG 4 (Eldorado)	\$2.07	\$4.14	Kelly Boulevard	\$0.77	\$1.54	Debbie Lane	\$0.61	\$1.22
Eldorado Parkway	\$0.75	\$1.50	Josey Lane	\$0.50	\$1.00	Lone Star Mainlane Gantry	\$0.61	\$1.22
First Street	\$0.32	\$0.64	MLG 9 (Sandy Lake)	\$1.15	\$2.30			
SRT			Belt Line Road North	\$0.67	\$1.34			
MLG 1 (Denton Tap)	\$0.70	\$1.40	Royal Lane	\$0.38	\$0.76			
MacArthur Boulevard	\$0.32	\$0.64	Belt Line Road South	\$0.70	\$1.40			
Carrollton Parkway	\$0.32	\$0.64	MLG 10 (Belt Line)	\$0.70	\$1.40			
Parker Road	\$0.45	\$0.90	Conflans Road	\$0.32	\$0.64			
Old Denton Road	\$0.53	\$1.06	Shady Grove Road	\$0.54	\$1.08			
Standridge Drive West	\$0.79	\$1.58	Lower Tarrant North	\$0.56	\$1.12			
Josey Lane West	\$0.96	\$1.92	MLG 11 (Lower Tarrant)	\$1.22	\$2.44			
MLG 2 (Josey)	\$1.81	\$3.62	Lower Tarrant South	\$0.32	\$0.64			
Standridge Drive East	\$1.02	\$2.04	Dalworth Street	\$0.32	\$0.64			
Josey Lane East	\$0.85	\$1.70	Marshall Drive	\$0.61	\$1.22			
Plano Parkway	\$0.67	\$1.34	Pioneer Parkway	\$0.78	\$1.56			
Spring Creek Parkway	\$0.33	\$0.66	MLG 12 (Arkansas)	\$1.28	\$2.56			
Preston Road	\$0.32	\$0.64	Arkansas Lane	\$0.43	\$0.86			
Hillcrest Road	\$0.33	\$0.66	Mayfield Road	\$0.32	\$0.64			
Coit Road	\$0.73	\$1.46						
Independence Parkway	\$0.97	\$1.94	Addison Airport Toll Tunne	TT	ZC			
Custer Road	\$1.21	\$2.42	Mainlane Gantry	\$0.74	\$1.48	TollTag Rate		
MLG 3 (Custer)	\$2.50	\$5.00				\$0.212 per mile		
Exchange Parkway	\$1.30	\$2.60	Mountain Creek Lake Bridg	TT	ZC	ZipCash Rate		
Alma Drive	\$0.95	\$1.90	Mainlane Gantry	\$0.74	\$1.48	TollTag rate + 100% surcharge		
Stacy Road	\$0.74	\$1.48						
Lake Forest Drive	\$0.58	\$1.16	Lewisville Lake Toll Bridge	TT	ZC	Minimum Toll:		
Hardin Boulevard	\$0.37	\$0.74	Mainlane Gantry	\$1.47	\$2.94	\$0.32 (TollTag) / \$0.64 (ZipCash)		

Note: Tolls for vehicles with more than two axles are calculated using the (N-1) multiplier.

Comparison of Per-Mile Toll Rates

The average per-mile toll rates for passenger cars on the NTTA System are compared with other representative urban toll facilities throughout the United States in **Figure 2-9**. In general, toll rates on the NTTA System fall within the range of rates on other urban toll facilities. Currently, the average per-mile toll rate for two-axle vehicles is approximately \$0.21 per mile on all NTTA facilities for TollTag/AVI users, while ZipCash users are charged \$0.21 per mile plus a 100 percent surcharge. All NTTA facilities employ an “N-1” factor multiplier method to determine commercial vehicle (CV) toll rates. As per this method, the toll rate for a vehicle is computed as $(N-1) \times (\text{two-axle toll rate})$, where “N” is the number of axles on the vehicle, including any connected trailers. It should be noted that for most of the agencies using this method, a two-axle commercial truck, such as a delivery service or moving truck, is charged the same as a two-axle passenger car.

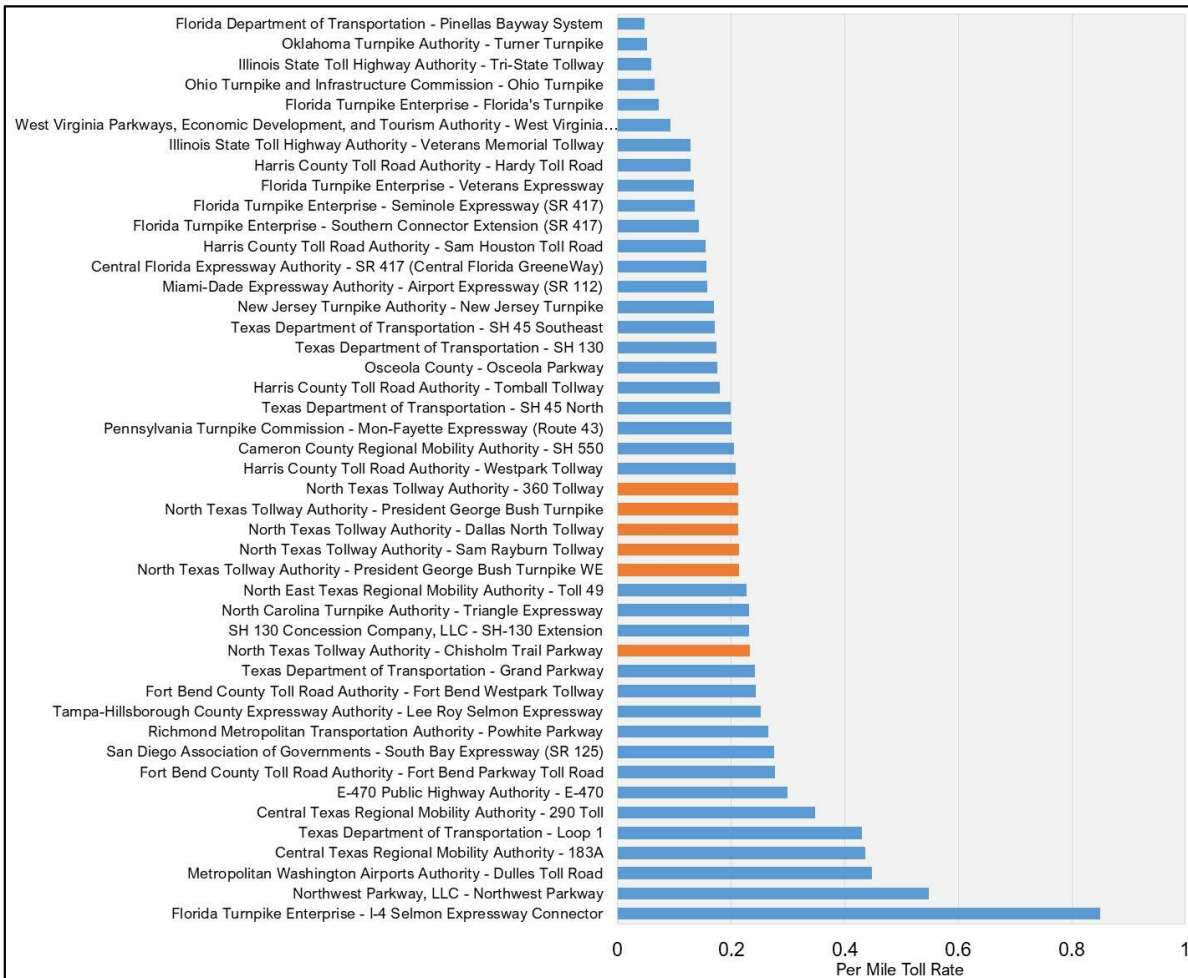


Figure 2-9. Per Mile AVI Toll Rate Comparison to Other Toll Facilities

Annual Transaction Trends

CDM Smith evaluated transaction trends on the NTTA System from January 1, 2014 through June 30, 2024. This evaluation was used to provide a general understanding of the current, as well as historical, performance of the NTTA System facilities. The analysis provided useful insight into the effect that major toll configuration changes, such as the addition of extension projects and toll increases, have had on NTTA System growth trends.

Trends in Average Daily Transactions

Trends in annual average daily transactions from January 2014 to March 2024 for the NTTA System facilities are presented in **Table 2-6** and are based on unaudited transaction data from NTTA. Between 2010 and 2019, the average daily transaction for NTTA System has been growing at an annual rate ranging between 1.5 percent and 6.8 percent. Due to the COVID-19 pandemic, 2020 transactions were significantly lower than 2019 average daily transactions. However, transactions have grown consistently since that time and have been above 2019 levels since 2022.

In 2024 (through June 30), daily transactions averaged approximately 798,300 on the DNT and 1,014,100 on the PGBT. Both facilities saw small decreases from 2023 due in part to weather impacts. However, transactions on both the DNT and the PGBT have experienced relatively consistent overall positive growth over the last ten years. Since 2014, the combined daily transactions on DNT and PGBT have increased from 1.52 million to 1.81 million, an increase of almost 20 percent.

Transaction growth on the SRT has continued to be strong since 2014, with a total growth of 45 percent over a ten-year period. Transaction growth on the CTP has continued to be strong since its opening in 2014 and now generates more than three times as many transactions per day than it did in its first year of operation. Transaction growth on the 360T has continued to be strong since its opening in 2018. Except for 2020, 360T has continued to grow strongly. Moreover, the average daily transactions in 2024 are almost 70 percent higher than the average daily transactions in 2019.

As indicated in **Table 2-6**, both AATT and MCLB continue to generate fewer transactions than they did in 2019. However, transactions on the LLTB have seen consistent positive transaction growth since its opening in 2009, and growth in transactions has jumped noticeably since 2016 following the completion of the Eldorado Parkway corridor through Little Elm and Frisco. The average daily transactions on LLTB have increased by over 25 percent since 2019.

Table 2-6. NTTA System Annual Average Daily Transactions (thousands)

Year	DNT	PGBT	SRT	CTP	AATT	MCLB	LLTB	360T	Total
2014	668.3	850.5	360.5	40.1	6.3	6.6	12.0	--	1,944.2
2015	702.2	892.3	388.2	66.5	6.7	7.0	12.7	--	2,075.6
Change	5.1%	4.9%	7.7%	66.1%	6.4%	5.8%	6.0%	--	6.8%
2016	714.5	935.8	416.4	81.5	6.3	7.4	15.1	--	2,176.9
Change	1.8%	4.9%	7.3%	22.5%	-5.6%	5.8%	18.4%	--	4.9%
2017	707.8	940.1	436.7	94.2	5.9	7.3	17.4	--	2,209.4
Change	-0.9%	0.5%	4.9%	15.6%	-6.8%	-1.2%	15.7%	--	1.5%
2018	733.6	946.9	459.4	104.0	5.5	7.4	19.3	24.1	2,300.3
Change	3.6%	0.7%	5.2%	10.4%	-5.8%	2.2%	10.8%	--	4.1%
2019	763.7	958.4	464.7	110.5	5.2	7.1	21.5	45.5	2,376.6
Change	4.1%	1.2%	1.1%	6.2%	-5.7%	-4.2%	11.0%	11.0%	3.3%
2020	582.6	732.6	352.1	92.2	3.7	5.9	19.1	42.5	1,830.6
Change	-23.7%	-23.6%	-24.2%	-16.6%	-29.3%	-17.5%	-11.0%	-6.4%	-23.0%
2021	722.6	902.5	432.7	115.5	4.3	6.6	21.7	63.1	2,269.1
Change	24.0%	23.2%	22.9%	25.3%	17.3%	12.4%	13.8%	48.3%	24.0%
2022	764.5	960.5	475.8	123.7	4.6	6.4	23.6	69.7	2,428.8
Change	5.8%	6.4%	10.0%	7.1%	6.9%	-3.2%	8.4%	10.4%	7.0%
2023	801.5	1,017.2	515.2	132.0	4.8	6.3	25.9	74.4	2,577.3
Change	4.8%	5.9%	8.3%	6.7%	3.4%	-1.3%	10.2%	6.7%	6.1%
2024*	798.3	1,014.1	521.6	135.2	4.5	6.0	27.0	76.7	2,583.5
Change	-0.4%	-0.3%	1.2%	2.4%	-6.0%	-5.1%	4.1%	3.1%	0.2%

Source: Unaudited NTTA Transaction and Revenue Data

*2024 includes data through June 30

Trends in Monthly Transactions: NTTA System

Tables 2-7 through 2-11 show the monthly transactions for each facility from January 2014 through June 2024. As can be seen from these tables, transactions on NTTA facilities have generally increased consistently, with the exception of COVID-19 impacts in 2020 and 2021. As shown in Table 2-12, the overall NTTA system continues to show strong growth, month over month, in 2023 and 2024.

Average monthly transaction variations on the NTTA System facilities for 2023 are presented as an index of the monthly transactions, as illustrated in Table 2-13. The peak travel months on DNT and PGBT in 2023 were March through October, while the lightest travel months on the DNT were January and February due to the extreme cold weather on travel in the DFW region during the months. The SRT saw its peak month in May, with transactions at six percent higher than the annual average. The CTP experienced its lowest traffic in February and the highest transactions of the year in May. MCLB, AATT, and LLTB experienced the highest traffic volumes in the spring and fall months. Peak travel on the 360T in 2023 occurred from May through October, during which transactions were 2 to 5 percent above the annual average. The lowest traveled month on 360T in 2023 was February.

Table 2-7. Monthly Transaction Trends – Dallas North Tollway (millions)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2014	19.7	18.1	20.2	20.6	21.1	20.4	20.6	20.9	20.3	21.7	19.4	21.0	244.0
2015	20.5	18.0	21.6	21.8	22.0	22.1	22.1	22.1	21.4	22.3	20.4	22.0	256.4
Change	4.2%	-0.1%	6.8%	5.8%	4.3%	8.6%	7.1%	5.9%	5.7%	2.9%	5.0%	4.8%	5.1%
2016	21.4	21.0	22.5	22.1	22.4	21.6	21.6	22.3	21.5	22.2	20.9	21.8	261.5
Change	4.4%	16.7%	4.6%	1.5%	1.5%	-2.4%	-2.4%	1.0%	0.5%	-0.3%	2.4%	-0.8%	2.0%
2017	21.2	20.2	22.8	21.5	22.8	21.7	21.5	21.7	21.0	22.0	21.0	21.0	258.4
Change	-1.0%	-4.0%	1.3%	-3.0%	1.9%	0.5%	-0.3%	-2.8%	-2.5%	-1.3%	0.6%	-3.7%	-1.2%
2018	21.2	19.6	22.8	22.3	23.5	23.0	22.4	23.5	21.5	23.3	22.1	22.4	267.7
Change	0.2%	-2.9%	0.0%	3.9%	2.9%	6.1%	4.2%	8.2%	2.5%	6.0%	5.4%	6.7%	3.6%
2019	22.5	21.1	23.6	23.3	24.1	23.4	23.6	24.2	22.9	24.2	22.6	23.4	278.8
Change	6.2%	7.4%	3.2%	4.4%	2.7%	1.3%	5.1%	2.8%	6.5%	4.2%	1.9%	4.4%	4.1%
2020	23.0	22.3	16.3	9.5	13.9	17.0	17.1	18.2	18.5	19.9	18.3	19.4	213.2
Change	2.1%	6.0%	-30.7%	-59.3%	-42.3%	-27.4%	-27.7%	-24.8%	-19.5%	-17.8%	-18.9%	-17.3%	-23.5%
2021	18.5	14.7	22.3	22.1	22.7	23.2	23.3	23.1	22.8	24.2	23.0	23.8	263.7
Change	-19.4%	-33.9%	36.5%	133.8%	63.2%	36.9%	36.5%	27.0%	23.6%	21.4%	25.5%	22.9%	23.7%
2022	21.2	19.0	24.4	24.3	24.6	23.7	23.1	24.2	23.7	24.5	22.6	23.7	279.0
Change	14.3%	28.6%	9.5%	9.8%	8.6%	2.3%	-0.7%	4.7%	4.0%	1.3%	-1.5%	-0.5%	5.8%
2023	22.3	20.8	25.4	24.8	26.0	25.1	24.4	25.6	24.5	25.3	23.9	24.6	292.5
Change	5.3%	9.7%	3.9%	2.1%	5.4%	5.8%	5.6%	5.8%	3.0%	3.2%	5.7%	3.7%	4.8%
2024	22.8	23.6	24.7	24.8	25.5	24.0							71.3
Change	2.4%	13.6%	-2.7%	0.0%	-1.9%	-4.5%							

Source: Unaudited NTTA Transaction Data

Table 2-8. Monthly Transaction Trends – President George Bush Turnpike (millions)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2014	24.4	22.7	25.6	26.5	27.2	26.4	26.7	26.7	26.0	27.6	24.7	26.1	310.5
2015	25.5	22.5	27.0	27.8	28.0	28.6	28.6	28.1	27.6	28.5	26.1	27.7	325.9
Change	4.7%	-0.9%	5.6%	5.1%	2.6%	8.2%	7.1%	5.2%	6.1%	3.4%	5.5%	6.0%	4.9%
2016	26.9	26.9	29.0	28.8	29.4	29.4	28.7	29.7	28.7	29.4	27.6	28.0	342.4
Change	5.4%	20.0%	7.1%	3.6%	5.1%	2.9%	0.3%	5.7%	4.2%	2.9%	5.8%	1.2%	5.1%
2017	27.1	26.1	30.0	28.6	30.2	29.6	28.6	29.8	28.2	29.7	28.0	27.2	343.1
Change	0.9%	-3.1%	3.5%	-0.8%	2.9%	0.7%	-0.1%	0.3%	-1.8%	1.1%	1.4%	-2.9%	0.2%
2018	27.1	25.6	30.0	29.0	30.7	29.8	29.3	30.7	27.7	29.7	28.4	27.7	345.6
Change	0.0%	-2.1%	-0.1%	1.5%	1.4%	0.8%	2.2%	3.0%	-1.9%	0.1%	1.4%	2.0%	0.7%
2019	27.9	26.6	29.8	29.4	30.4	29.5	29.7	30.5	28.8	30.8	28.0	28.5	349.8
Change	2.9%	3.9%	-0.5%	1.4%	-0.7%	-1.1%	1.5%	-0.8%	4.1%	3.4%	-1.2%	2.8%	1.2%
2020	28.3	27.7	21.3	13.1	17.8	21.4	21.8	23.0	22.9	24.7	22.6	23.4	268.1
Change	1.5%	4.3%	-28.4%	-55.4%	-41.4%	-27.4%	-26.7%	-24.5%	-20.4%	-19.5%	-19.4%	-18.0%	-23.4%
2021	22.5	18.1	28.0	27.5	28.2	29.4	29.4	29.0	28.6	31.4	28.5	28.9	329.4
Change	-20.5%	-34.6%	31.3%	109.3%	57.9%	37.5%	35.0%	26.0%	24.5%	26.9%	26.2%	23.8%	22.9%
2022	25.3	23.3	30.1	30.3	30.8	29.7	28.7	30.9	31.0	31.6	29.2	29.8	350.6
Change	12.4%	28.5%	7.6%	10.1%	9.3%	1.2%	-2.5%	6.6%	8.6%	0.7%	2.3%	2.9%	6.4%
2023	28.2	26.6	32.5	31.3	33.1	31.9	30.6	32.7	31.2	32.4	30.6	30.3	371.3
Change	11.4%	14.5%	8.0%	3.5%	7.4%	7.1%	6.7%	5.7%	0.8%	2.4%	4.8%	1.6%	5.9%
2024	28.0	29.7	32.0	31.7	32.3	31.1							90.0
Change	-0.6%	12.3%	-1.5%	1.2%	-2.3%	-2.4%							

Source: Unaudited NTTA Transaction Data

Table 2-9. Monthly Transaction Trends – Sam Rayburn Tollway (millions)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2014	10.3	9.4	10.7	11.0	11.5	11.3	11.4	11.5	11.0	11.7	10.6	11.3	131.6
2015	10.8	9.5	11.6	11.8	12.2	12.5	12.7	12.5	12.0	12.3	11.5	12.4	141.8
Change	5.6%	0.6%	8.1%	7.9%	5.9%	11.0%	11.1%	8.3%	9.1%	5.7%	9.1%	9.2%	7.7%
2016	11.8	11.7	12.7	12.6	13.1	13.1	13.1	13.2	12.6	13.1	12.4	12.9	152.4
Change	9.1%	23.5%	10.1%	6.6%	7.4%	4.9%	3.3%	5.7%	5.2%	6.2%	7.9%	4.2%	7.5%
2017	12.3	11.7	13.5	13.2	14.1	13.8	13.5	13.9	13.1	13.8	13.2	13.3	159.4
Change	3.8%	0.6%	6.4%	4.4%	7.4%	5.1%	3.1%	5.3%	4.0%	4.9%	6.3%	3.5%	4.6%
2018	13.0	12.0	14.4	13.9	14.8	14.7	14.4	14.9	13.5	14.4	14.0	13.9	167.7
Change	6.1%	2.2%	6.3%	5.3%	5.1%	6.3%	6.6%	7.1%	2.8%	4.6%	5.6%	4.0%	5.2%
2019	13.6	12.7	14.4	14.2	14.9	14.4	14.7	14.7	13.8	14.6	13.6	14.0	169.6
Change	4.2%	5.9%	-0.2%	2.1%	0.9%	-1.7%	2.1%	-1.1%	2.4%	1.6%	-2.5%	1.2%	1.1%
2020	13.4	12.9	9.9	6.1	8.7	10.5	10.7	11.1	11.1	11.8	11.1	11.5	128.9
Change	-1.4%	1.4%	-31.1%	-57.0%	-41.5%	-26.9%	-26.9%	-24.3%	-20.1%	-18.9%	-18.8%	-17.8%	-24.0%
2021	10.9	8.6	13.1	12.9	13.5	14.0	14.5	13.9	13.6	14.5	14.0	14.5	157.9
Change	-18.7%	-33.6%	32.1%	112.3%	54.6%	32.8%	35.1%	24.8%	22.6%	22.4%	26.9%	26.4%	22.6%
2022	12.5	11.3	14.9	14.9	15.4	14.9	14.7	15.2	15.0	15.4	14.5	15.1	173.7
Change	15.3%	31.4%	13.9%	15.1%	14.1%	6.4%	1.2%	8.9%	10.6%	6.1%	3.4%	4.0%	10.0%
2023	14.1	13.2	16.0	15.6	16.7	16.3	16.0	16.5	15.8	16.2	15.7	15.9	188.1
Change	12.9%	17.2%	7.8%	5.1%	8.4%	9.3%	8.9%	8.9%	5.1%	5.4%	8.2%	5.3%	8.3%
2024	14.4	15.0	16.3	16.1	16.8	16.4							45.8
Change	1.9%	13.7%	2.1%	3.0%	0.7%	0.7%							

Source: Unaudited NTTA Transaction Data

Table 2-10. Monthly Transaction Trends – Chisholm Trail Parkway (millions)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2014	--	--	--	--	0.6	0.9	1.0	1.2	1.3	1.4	1.4	1.6	9.5
2015	1.7	1.5	1.8	2.0	2.1	2.1	2.1	2.1	2.2	2.3	2.1	2.3	24.3
Change	--	--	--	--	269.2%	122.9%	102.4%	79.5%	70.3%	60.9%	46.7%	40.9%	154.7%
2016	2.2	2.3	2.4	2.4	2.5	2.4	2.4	2.5	2.6	2.7	2.6	2.7	29.8
Change	34.1%	50.8%	33.7%	23.7%	20.8%	17.3%	13.7%	18.7%	17.6%	16.8%	21.9%	16.2%	22.7%
2017	2.6	2.5	2.9	2.8	3.0	2.9	2.7	3.0	2.9	3.1	2.9	2.9	34.4
Change	17.3%	12.5%	20.7%	16.6%	20.6%	16.6%	14.0%	16.5%	11.8%	14.2%	13.7%	10.0%	15.3%
2018	2.9	2.7	3.2	3.2	3.4	3.2	3.1	3.3	3.1	3.4	3.2	3.2	38.0
Change	12.0%	7.9%	10.0%	11.2%	11.7%	10.7%	12.3%	11.6%	7.2%	9.9%	10.1%	10.2%	10.4%
2019	3.2	3.1	3.4	3.4	3.5	3.2	3.3	3.4	3.3	3.6	3.3	3.4	40.3
Change	9.9%	11.4%	5.1%	8.9%	4.1%	2.7%	6.6%	4.1%	8.2%	6.5%	2.7%	5.9%	6.2%
2020	3.4	3.3	2.6	1.7	2.4	2.8	2.7	2.9	2.9	3.2	2.9	3.1	33.7
Change	5.7%	8.3%	-24.1%	-51.5%	-33.1%	-15.1%	-16.0%	-16.6%	-12.4%	-12.9%	-12.7%	-11.2%	-16.3%
2021	2.9	2.3	3.5	3.6	3.6	3.7	3.6	3.7	3.7	3.9	3.7	3.9	42.2
Change	-14.6%	-29.5%	37.4%	113.1%	54.1%	33.1%	31.9%	27.7%	26.6%	23.9%	28.1%	27.5%	25.0%
2022	3.5	3.1	4.0	4.0	4.0	3.7	3.6	3.8	3.9	4.0	3.8	3.9	45.2
Change	20.2%	30.6%	11.7%	11.6%	10.2%	1.1%	-1.8%	4.7%	4.5%	2.5%	1.9%	0.3%	7.1%
2023	3.7	3.4	4.2	4.0	4.3	4.0	3.9	4.2	4.0	4.2	4.0	4.1	48.2
Change	5.8%	12.8%	5.5%	2.0%	8.0%	8.6%	8.7%	8.7%	3.7%	5.6%	6.7%	5.4%	6.7%
2024	3.8	4.0	4.2	4.3	4.4	4.0							12.1
Change	3.7%	15.4%	1.9%	6.2%	1.8%	-0.7%							

Source: Unaudited NTTA Transaction Data

Table 2-11. Monthly Transaction Trends – 360 Tollway (millions)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2018	--	--	--	--	--	1.2	1.2	1.4	1.3	1.4	1.4	1.4	9.3
2019	1.4	1.3	1.5	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.6	1.6	18.9
Change	--	--	--	--	--	33.3%	30.7%	23.8%	29.5%	20.0%	14.0%	13.8%	103.0%
2020	1.6	1.6	1.3	1.0	1.3	1.5	1.5	1.6	1.5	1.7	1.5	1.6	17.6
Change	14.2%	18.7%	-14.5%	-37.6%	-21.6%	-5.6%	-6.6%	-7.6%	-8.9%	-3.4%	-5.5%	-1.4%	-7.2%
2021	1.5	1.2	1.8	1.9	1.9	2.0	2.1	2.1	2.0	2.2	2.1	2.1	23.0
Change	-3.8%	-20.6%	39.6%	91.8%	51.9%	35.5%	36.6%	31.3%	33.4%	31.6%	40.8%	32.6%	30.9%
2022	1.9	1.7	2.2	2.2	2.3	2.1	2.1	2.2	2.2	2.3	2.1	2.2	25.4
Change	21.6%	37.0%	18.6%	17.5%	16.4%	7.1%	1.8%	7.7%	8.3%	3.8%	-1.4%	2.9%	10.4%
2023	2.0	1.9	2.3	2.3	2.4	2.3	2.3	2.4	2.3	2.4	2.3	2.3	27.1
Change	8.8%	12.7%	6.7%	3.5%	5.1%	8.1%	7.6%	7.4%	4.9%	4.9%	7.7%	5.4%	6.7%
2024	2.1	2.2	2.4	2.4	2.5	2.4							6.7
Change	2.3%	16.0%	4.0%	5.6%	5.5%	3.4%							

Source: Unaudited NTTA Transaction Data

Table 2-12. Monthly Transaction Trends – NTTA System (millions)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2014	55.0	50.8	57.2	58.8	61.3	59.8	60.5	61.1	59.3	63.2	56.9	60.8	704.7
2015	59.2	52.1	62.8	64.2	65.1	66.1	66.3	65.7	64.1	66.4	60.9	65.1	758.0
Change	7.7%	2.6%	9.7%	9.2%	6.2%	10.6%	9.5%	7.5%	7.9%	5.0%	7.0%	7.1%	7.6%
2016	63.1	62.7	67.6	66.9	68.3	67.4	66.6	68.7	66.4	68.4	64.4	66.2	796.7
Change	6.5%	20.4%	7.6%	4.1%	4.9%	2.0%	0.5%	4.6%	3.6%	3.0%	5.7%	1.7%	5.1%
2017	64.0	61.4	70.3	67.0	71.1	68.9	67.3	69.4	66.2	69.5	66.1	65.4	806.5
Change	1.5%	-2.1%	4.0%	0.2%	4.2%	2.1%	1.0%	1.0%	-0.3%	1.7%	2.6%	-1.3%	1.2%
2018	65.2	60.8	71.4	69.3	73.4	72.8	71.4	74.8	68.1	73.3	70.1	69.6	840.2
Change	1.8%	-1.0%	1.7%	3.5%	3.1%	5.7%	6.0%	7.8%	2.9%	5.4%	6.1%	6.5%	4.2%
2019	69.6	65.6	73.7	72.9	75.7	73.1	73.9	75.6	71.7	76.0	70.1	72.0	869.8
Change	6.8%	7.9%	3.1%	5.1%	3.2%	0.3%	3.5%	1.0%	5.3%	3.8%	0.0%	3.4%	3.5%
2020	70.7	68.8	52.3	31.9	44.9	54.0	54.7	57.7	57.8	62.3	57.2	59.8	672.0
Change	1.6%	4.9%	-29.0%	-56.2%	-40.7%	-26.1%	-26.0%	-23.7%	-19.4%	-18.1%	-18.4%	-17.0%	-22.7%
2021	57.2	45.7	69.8	69.0	70.9	73.3	73.9	72.8	71.7	77.3	72.4	74.3	828.2
Change	-19.1%	-33.6%	33.4%	116.0%	57.9%	35.8%	35.1%	26.1%	24.1%	24.1%	26.5%	24.4%	23.2%
2022	65.3	59.1	76.7	76.7	78.2	75.3	73.1	77.4	76.9	78.9	73.2	75.7	886.5
Change	14.2%	29.3%	9.9%	11.2%	10.2%	2.7%	-1.0%	6.3%	7.3%	2.1%	1.1%	1.9%	7.0%
2023	71.4	66.9	81.7	79.2	83.6	80.7	78.2	82.5	78.9	81.7	77.6	78.3	940.7
Change	9.3%	13.3%	6.4%	3.3%	7.0%	7.2%	6.9%	6.6%	2.6%	3.5%	6.0%	3.4%	6.1%
2024	72.2	75.8	80.7	80.5	82.7	79.0							229.1
Change	1.2%	13.3%	-0.7%	1.6%	-1.1%	-2.2%							

Source: Unaudited NTTA Transaction Data

Table 2-13. NTTA System Monthly Transaction Index in 2023

Month	DNT	PGBT	SRT	CTP	AATT	MCLB	LLTB	360T
January	91	91	90	92	92	94	88	90
February	85	86	84	86	91	90	81	84
March	104	105	102	104	113	109	101	103
April	102	101	100	101	99	108	99	100
May	107	107	106	108	102	111	108	105
June	103	103	104	100	99	93	103	103
July	100	99	102	96	96	89	103	100
August	105	106	105	104	106	101	107	105
September	100	101	101	100	104	102	102	102
October	104	105	103	105	108	107	105	105
November	98	99	100	101	94	100	101	100
December	101	98	102	103	95	93	101	102

AVI Utilization Trends

As mentioned previously, the TollTag program has been successful in terms of increased participation since its introduction in July 1989. Recent trends in AVI transaction shares for NTTA System facilities are presented in **Figure 2-10**. The AVI transaction shares shown represent the levels by quarter beginning in 2013 and include VToll transactions with an assumed 90-day lag. As shown in **Figure 2-10**, the average AVI share (including VToll) across all NTTA System facilities has been increasing consistently by 14 to 16 percentage points higher as compared to the AVI share (excluding VToll) percent since 2013. Since the onset of the COVID-19 pandemic, there has been a three to five point decline in overall AVI share on the system. As of June 2022, the AVI share (including VToll) is around 80 percent for the NTTA System. By comparison, AVI share (including VToll) had been over 83 percent in 2019.

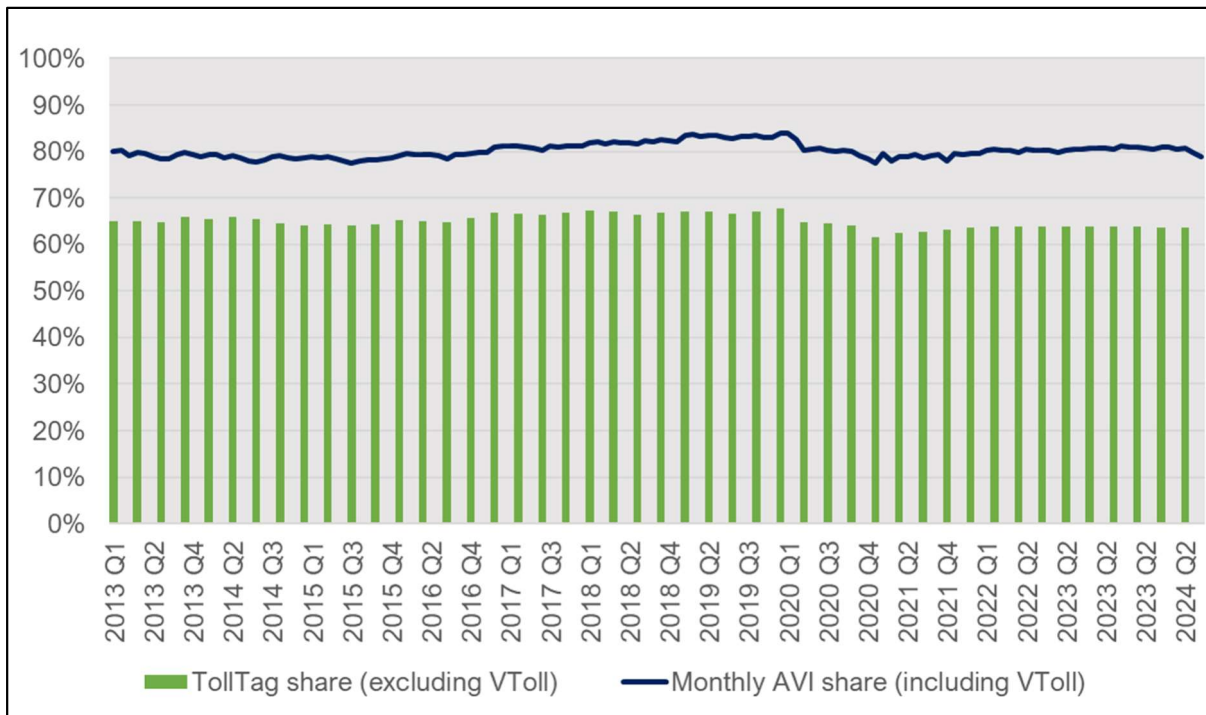


Figure 2-10. Recent NTTA System Average Quarterly AVI Share

Traffic Count Program

CDM Smith embarked on a comprehensive traffic count program in the NTTA System area. This included counts along all NTTA System corridors. In addition, the traffic count program included a series of screenlines. The locations of the traffic count screenlines can be seen in **Figures 2-11** through **2-13**. Traffic counts from the transaction data were obtained from NTTA staff for all the existing mainlane gantries and each of the tolled ramp gantries on all NTTA facilities. In addition, traffic counts were collected at strategic locations along NTTA System corridors, such as the adjacent frontage roads to assist with the base year model calibration.

To collect data for non-NTTA facilities along the screenlines and for the non-tolled ramps on NTTA facilities, CDM Smith engaged GRAM Traffic NTX, a Dallas-based firm. All the counts at non-tolled locations and on the screenlines were conducted for a continuous 48-hour period on interior weekdays only (Tuesday, Wednesday, and Thursday). By combining the ramp transaction data and the counts on the non-tolled ramps, CDM Smith was able to build an average weekday traffic profile for the NTTA System area. The results of the traffic count program were then used to calibrate the travel demand model. A summary of the screenline traffic volumes is presented in **Table 2-14**.

Table 2-14. Screenline Traffic Summary

Screenline ID	2024 Counts	Screenline ID	2024 Counts
Dallas North Tollway		Sam Rayburn Tollway	
Screenline 1	780,700	Screenline S1	296,800
Screenline 2	685,000	Screenline S2	436,200
Screenline 3	680,500	Screenline S3	490,200
Screenline 4	366,200	Chisholm Trail Parkway	
President George Bush Turnpike (including PGBT EE)		Screenline C1	409,300
Screenline 5	221,500	Screenline C2	360,700
Screenline 6	395,500	Screenline C3	85,400
Screenline 7	756,300	Screenline C4	186,100
Screenline 8	337,700	Screenline C5	86,800
Screenline 9	331,800	360 Tollway	
Screenline 10	372,900	Screenline 1	186,900
PGBT Western Extension		Screenline 2	376,200
Screenline W1	512,300	Screenline 3	413,900
Screenline W2	275,200	Screenline 4	92,700
Screenline W3	322,000	Screenline 5	308,100

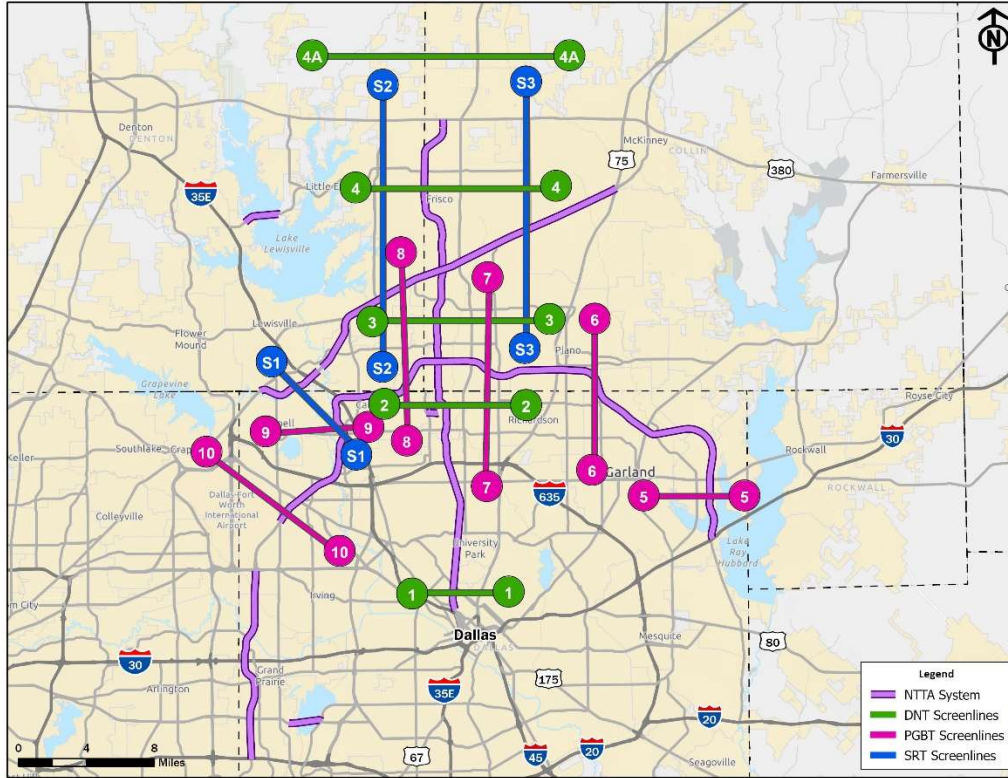


Figure 2-11. DNT/PGBT/SRT Traffic Count Screenlines

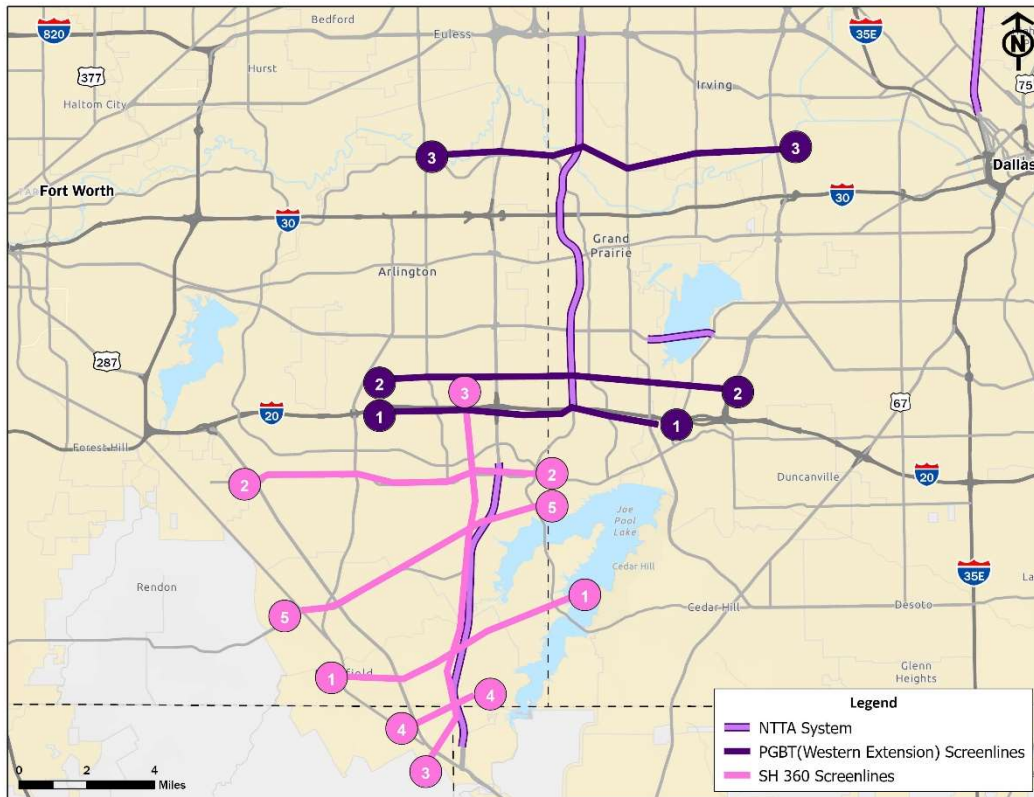


Figure 2-12. PGBT WE and 360T Traffic Count Screenlines

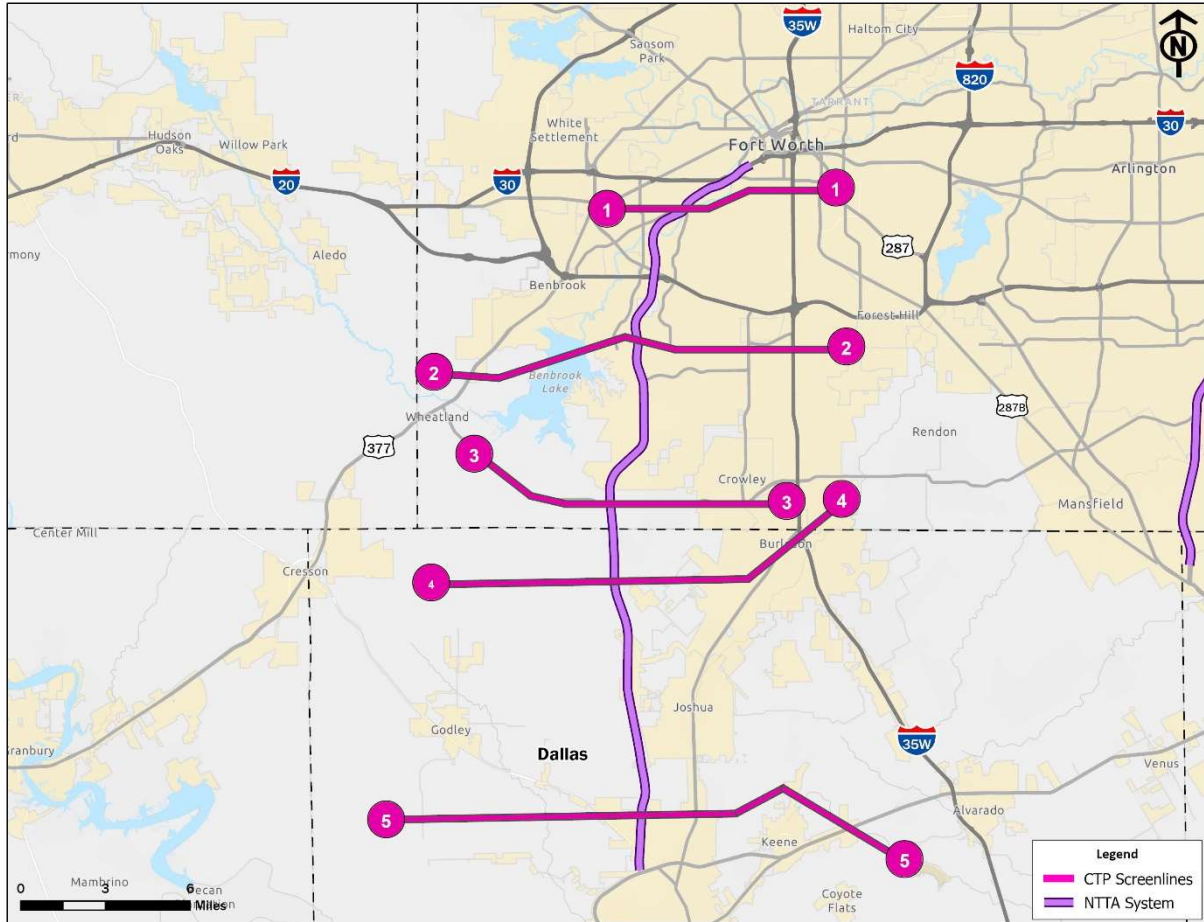


Figure 2-13. CTP Traffic Count Screenlines

Figures 2-14 through 2-19 present the traffic profile for both travel directions on the DNT, PGBT, SRT, PGBT WE, CTP, and 360T for the AM, PM, and off-peak (OP) time periods. The AM peak period is from 6:30 to 9:00 AM (2.5 hours), PM peak period is from 3:00 to 6:30 PM (3.5 hours), and the off-peak (OP) represents the remainder of the day (18 hours).

Dallas North Tollway

The northbound traffic during the PM peak period is higher than that in the AM peak and reflects the movement of traffic from the employment centers located along the southern and central portions of the DNT to the residential suburbs located along the northern segments of the DNT. During the PM peak, the highest traffic volume occurs in the sections between PGBT and Legacy Drive (south of SRT). During the off-peak periods, the highest volumes are seen between MLG 3 and Legacy Drive. In the southbound direction, AM and PM peak traffic volumes are both heaviest in the central portion of the corridor. The highest levels of traffic are experienced between PGBT and SRT.

President George Bush Turnpike (including PGBT EE)

In the eastbound travel direction, the PM peak period is generally higher than the AM peak period for the PGBT. This would also be expected because of the movements between employment centers along the DNT and the growing residential areas of Collin County. As a result, the highest volumes in both directions on the PGBT were recorded between US 75 and the DNT.

President George Bush Turnpike – Western Extension

On the PGBT WE, travel in both the northbound and southbound directions is heavier for the segment north of IH 30. Throughout the day, volumes on PGBT WE north of IH 30 are generally about twenty-five percent higher north of IH 30 than south of IH 30. The highest volumes on PGBT WE occur just north of IH 30.

Sam Rayburn Tollway

The eastbound travel direction indicates the PM peak period is higher than the AM peak period. In the westbound direction, the AM peak period is higher than the PM peak period for the sections north of Exchange Parkway. There are noticeable spikes in both directions for all time periods at DNT/Parkwood and IH 35E.

Chisholm Trail Parkway

Traffic on CTP is much higher in both directions at the northern end of the facility than at the southern end. The highest traffic volumes occur near MLG 1, while the lowest volumes occur at the southern terminus of the roadway. Generally, volumes decline consistently further south on the facility. The highest traffic volumes at the northern end of the facility are approximately five times as high as the lowest at the southern end.

360 Tollway

Traffic on 360 Tollway is much higher in both directions at the northern end of the facility than at the southern end. The highest volumes occur near the northern terminus, followed by the New York Avenue mainlane gantry, while the lowest volumes occur near the southern terminus at US 287. Generally, traffic volumes decline consistently further south on the facility. The highest traffic volumes at the northern end of the facility are approximately three times as high as the lowest at the southern end.

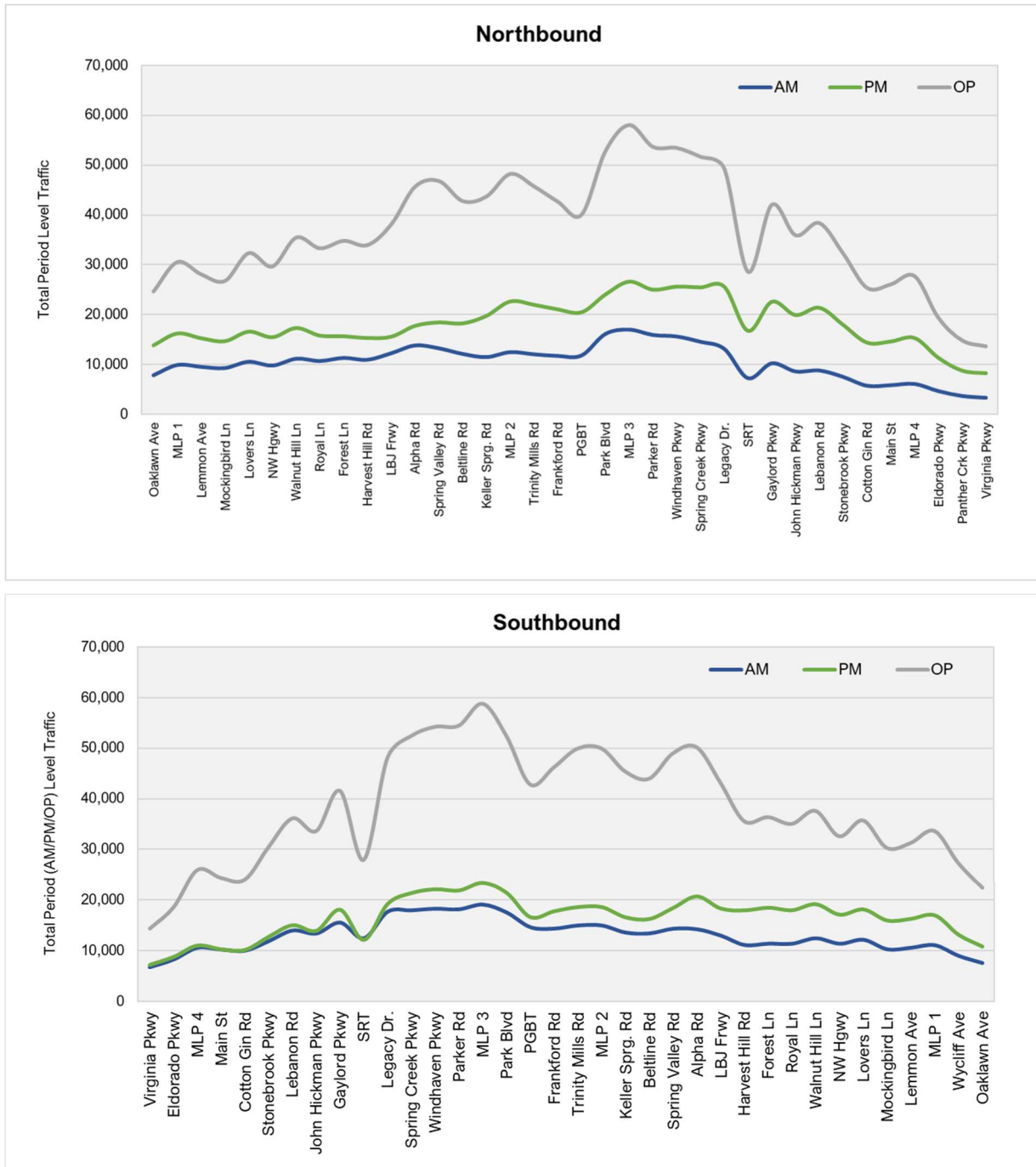


Figure 2-14.
DNT Traffic Volume Profile

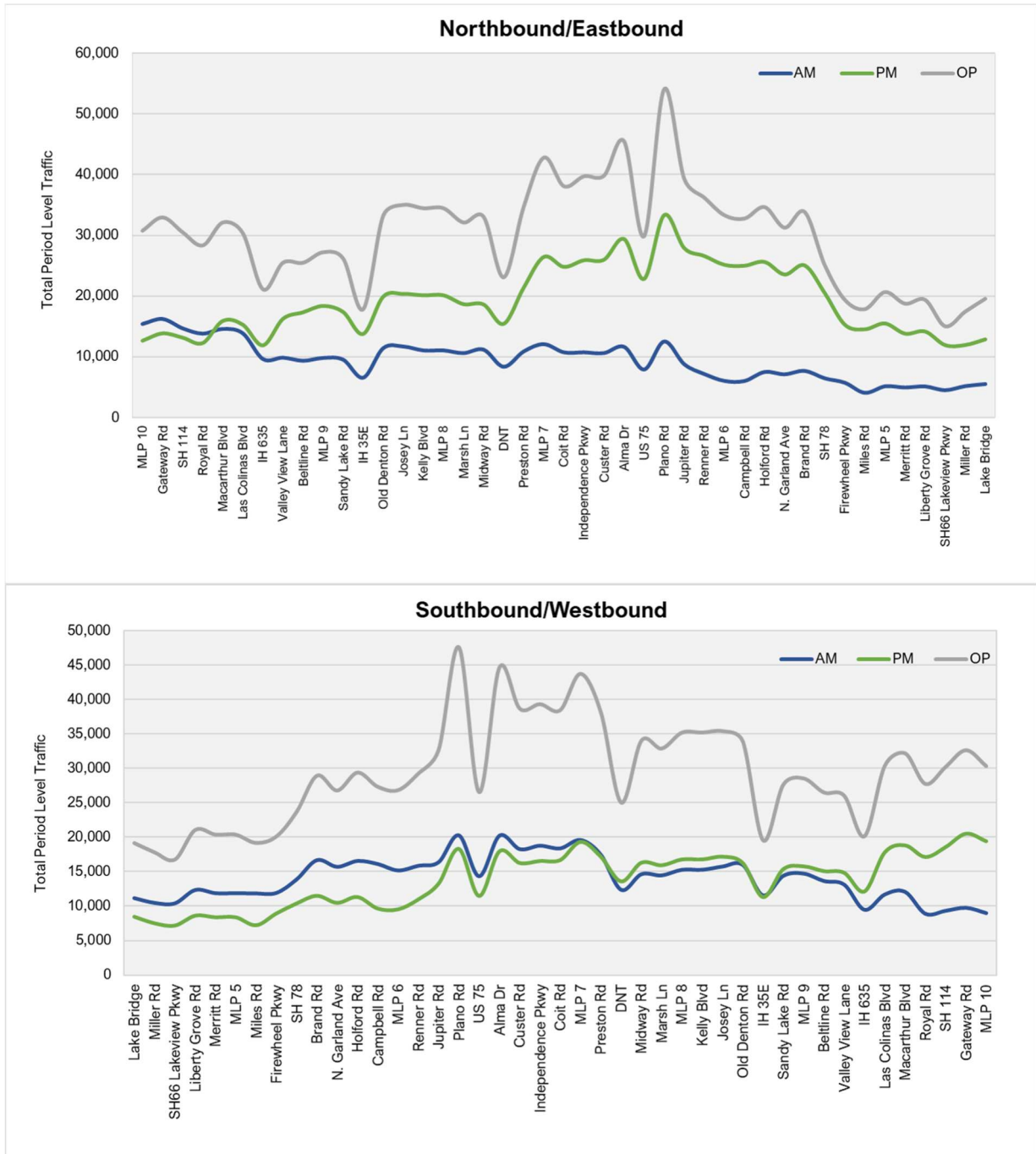


Figure 2-15.
PGBT (Including PGBT-EE) Traffic Volume Profile

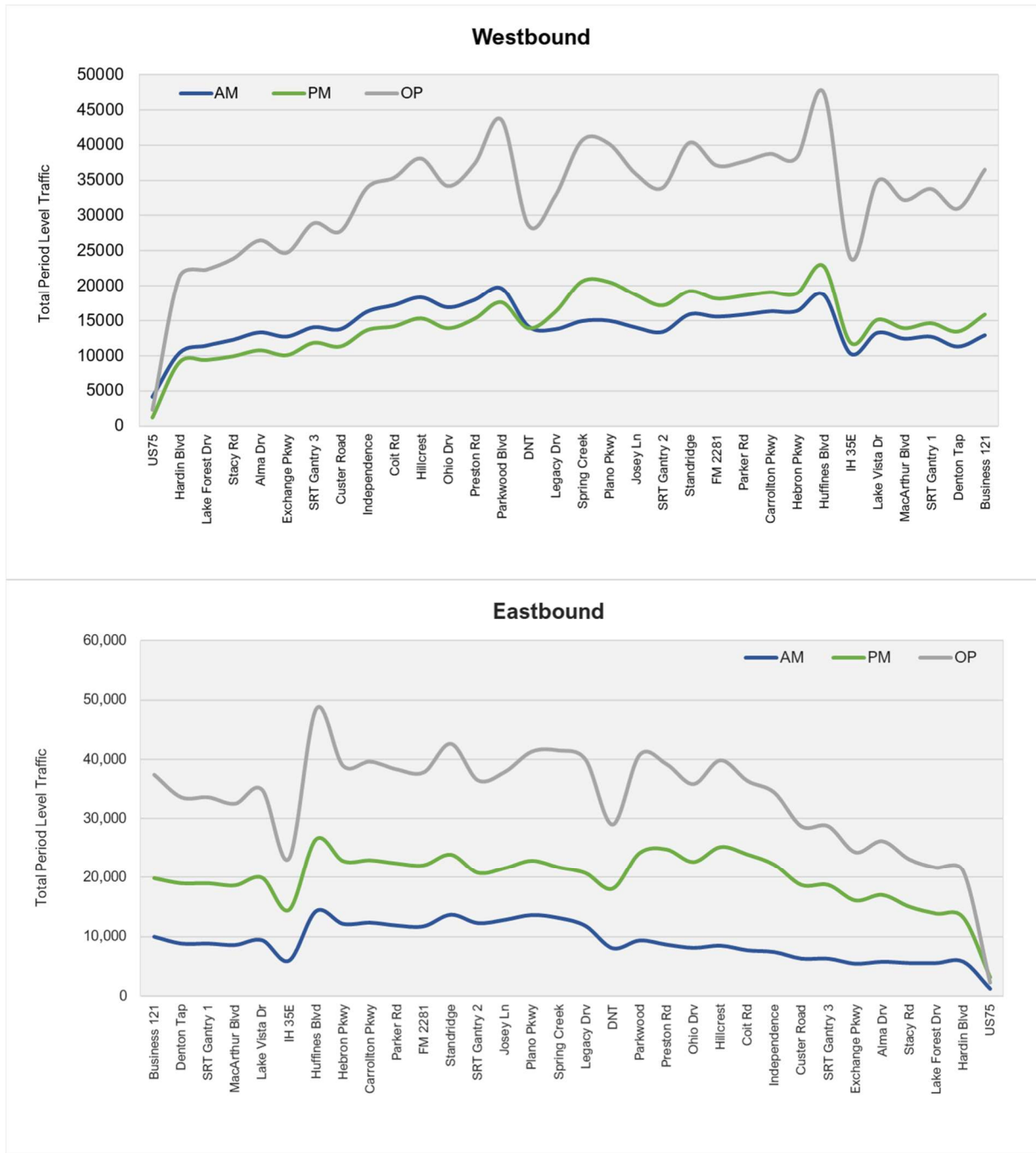


Figure 2-16.
SRT Traffic Volume Profile

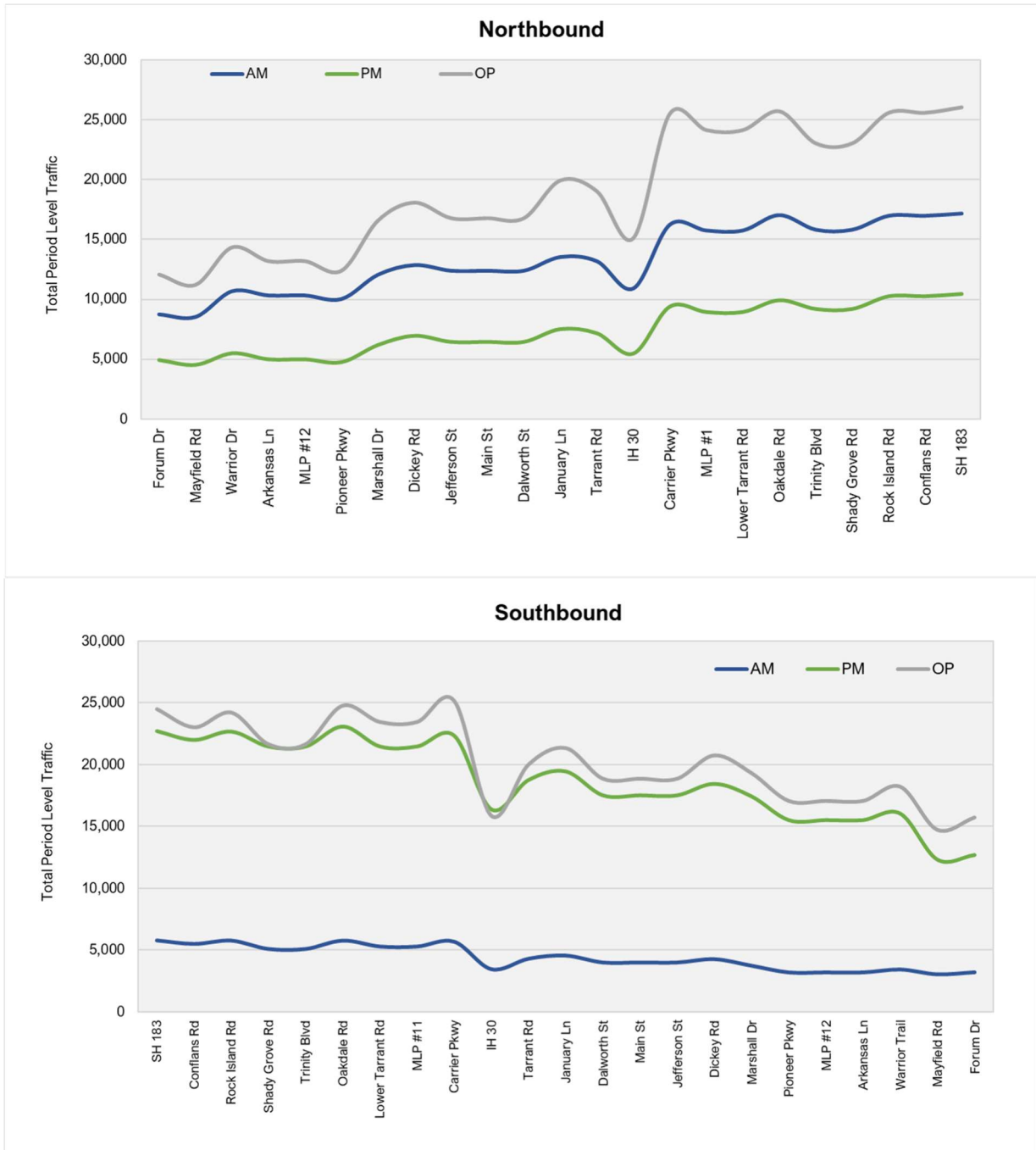


Figure 2-17.
PGBT WE Traffic Volume Profile

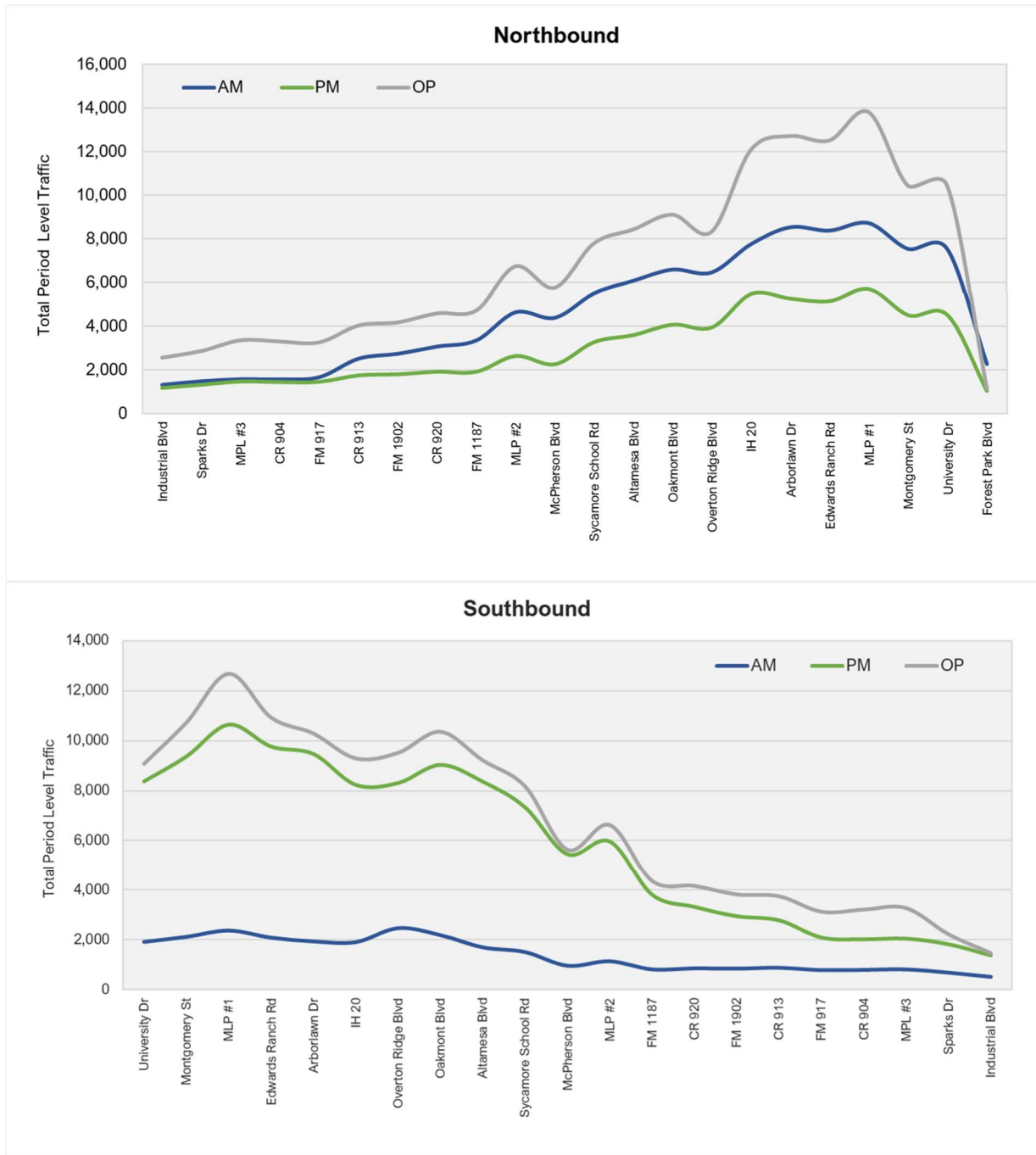


Figure 2-18.
CTP Traffic Volume Profile

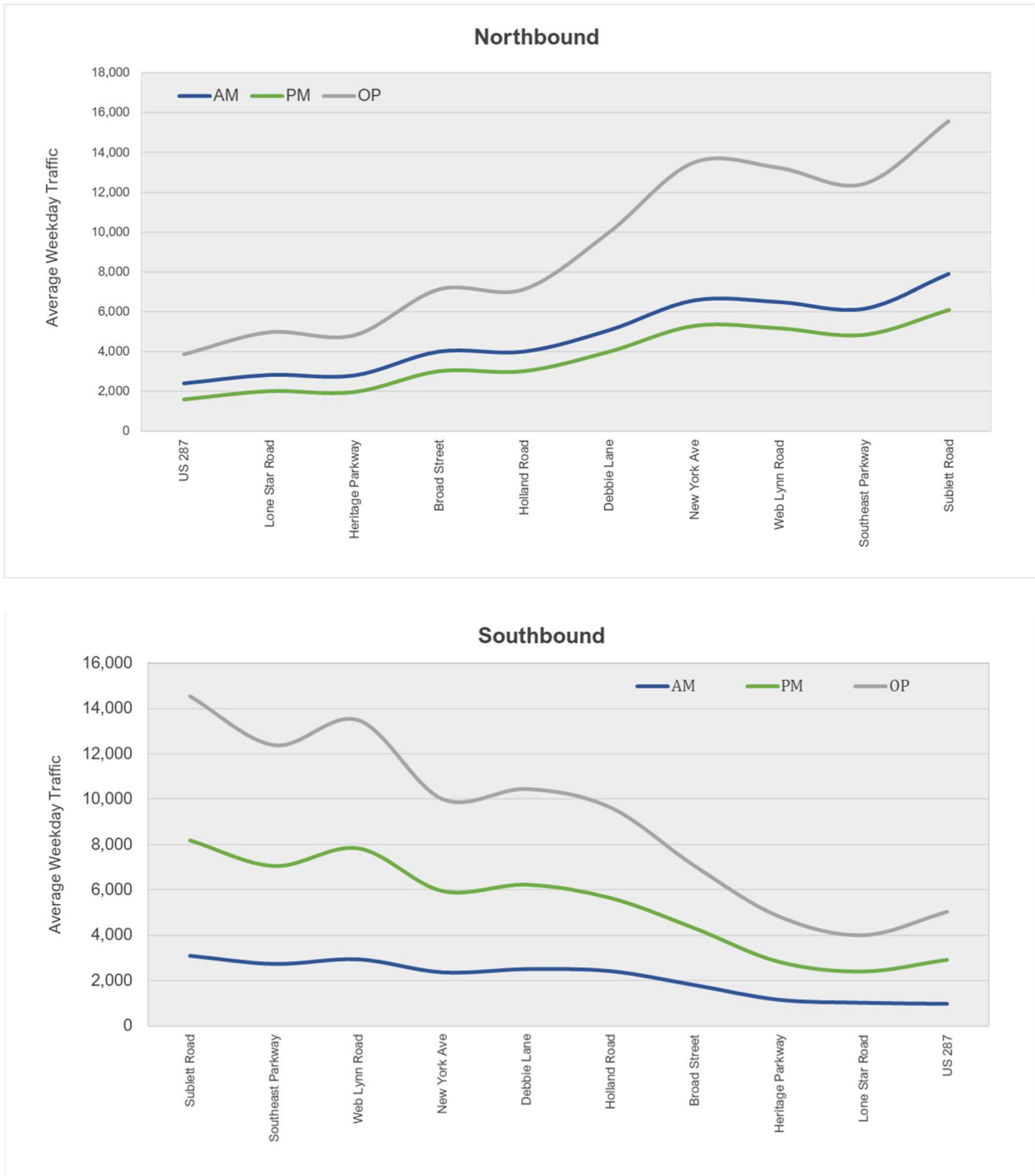


Figure 2-19.
360T Traffic Volume Profile

Average Weekday Transactions by Location

Figures 2-20 through 2-26 show the estimated average weekday transactions in 2024 at each tolling location on the DNT, PGBT, PGBT EE, SRT, AATT, MCLB, LLTB, PGBT WE, CTP, and 360T. As would be expected, the mainlane gantries generated the highest number of transactions on each facility. Among the ramp tolling locations, the Cotton Gin/Main ramps generated the most transactions on the DNT, while the Preston Road, Miles Road, and Pioneer Parkway ramps generated the most transactions on the PGBT, PGBT EE, and PGBT WE, respectively. On the SRT, the highest number of ramp transactions was generated at the Custer Road ramps. On CTP and 360T, the highest number of ramp transactions were generated at Oakmont Boulevard and Webb Lynn Road, respectively.

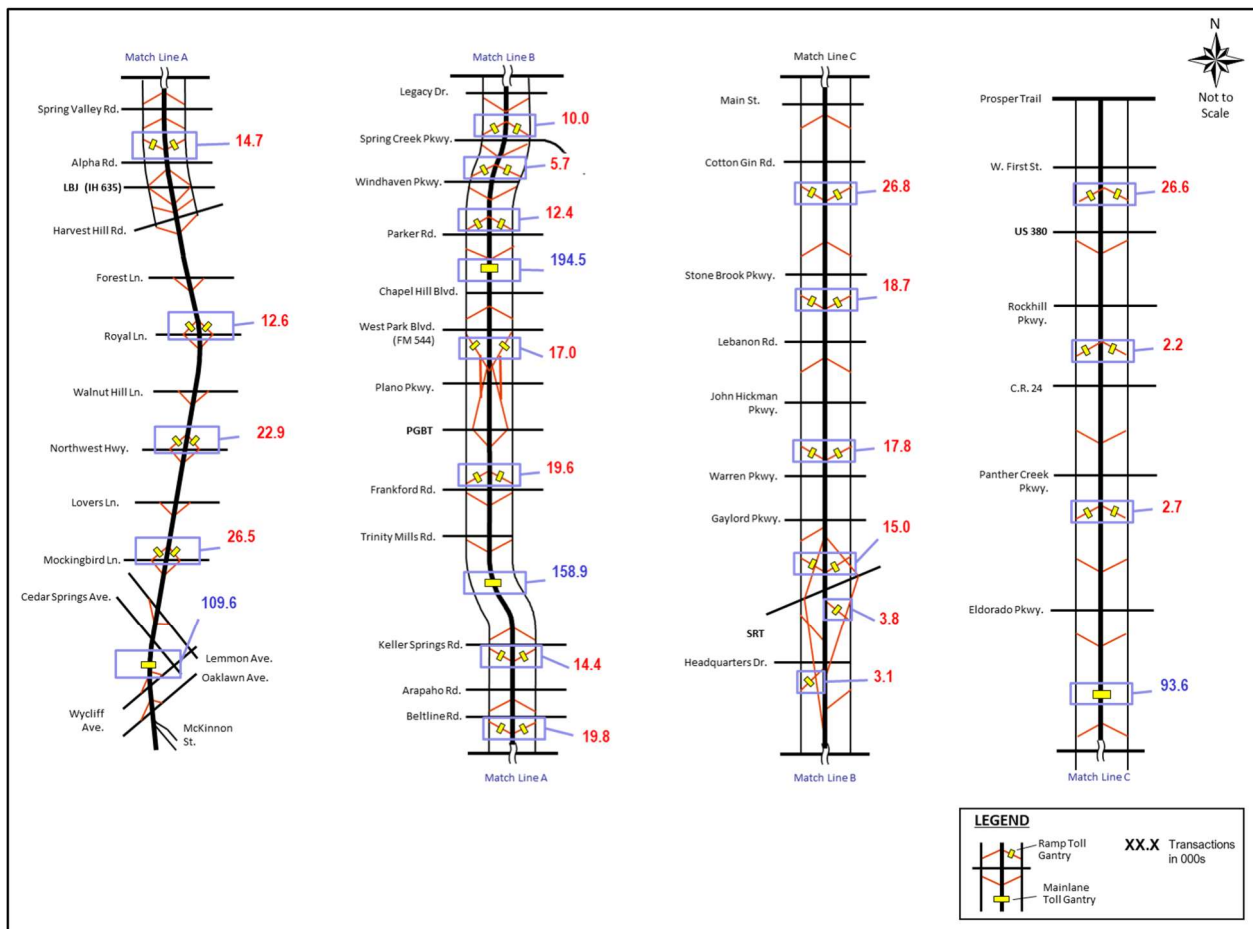


Figure 2-20. DNT 2024 Average Weekday Transactions by Tolling Location

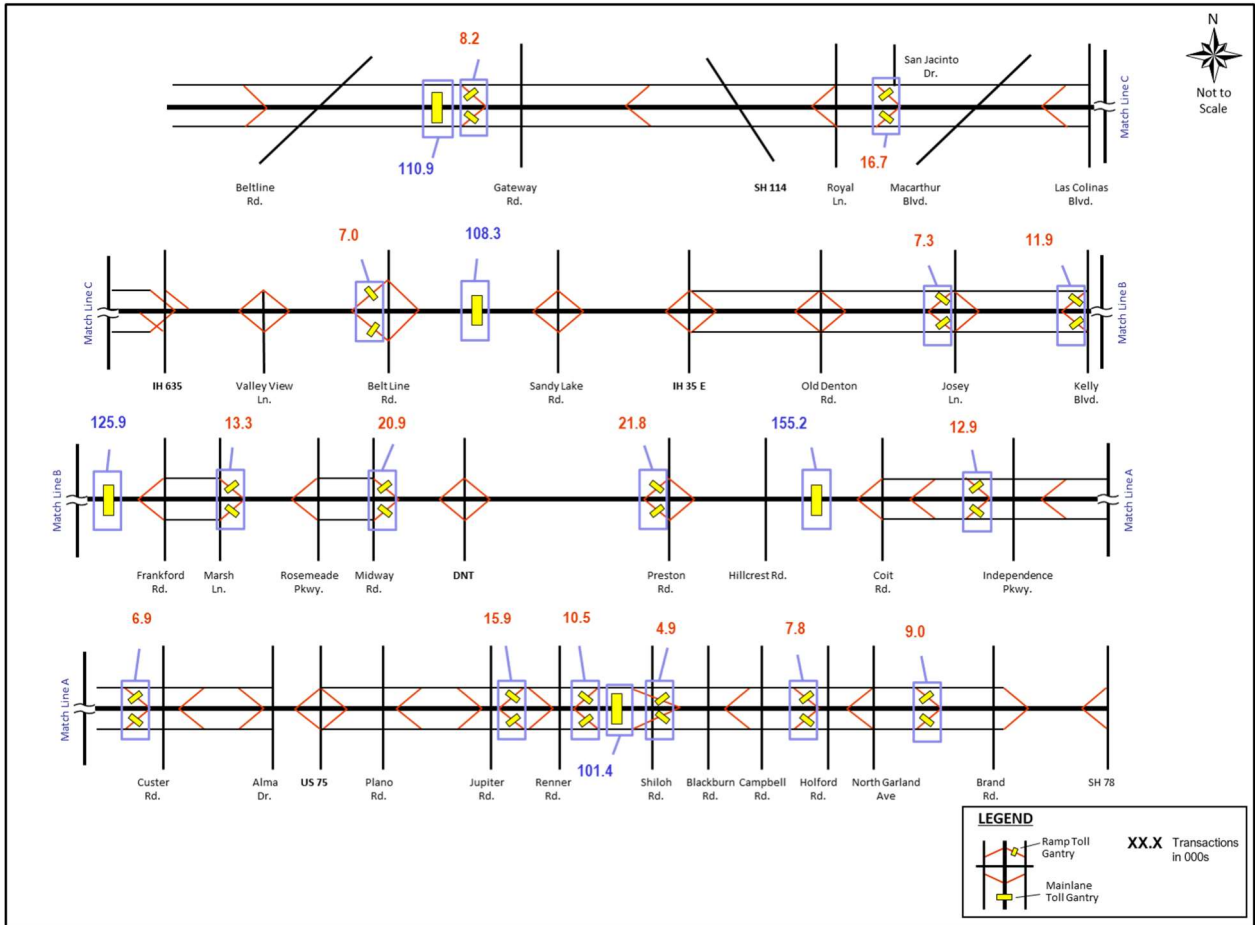


Figure 2-21. PGBT 2024 Average Weekday Transactions by Tolling Location

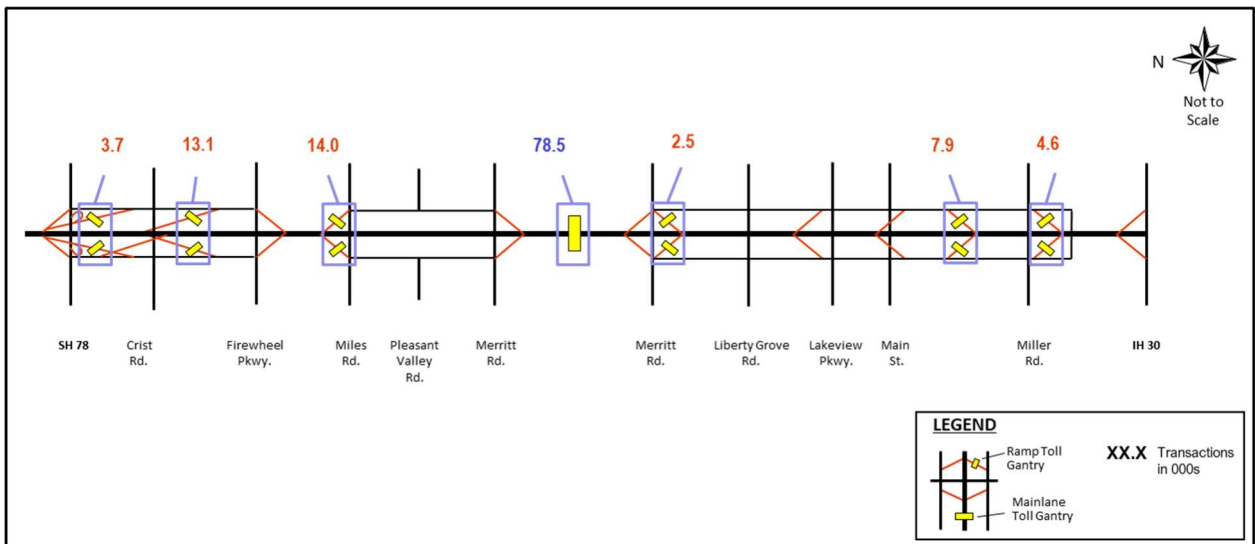


Figure 2-22. PGBT EE 2024 Average Weekday Transactions by Tolling Location

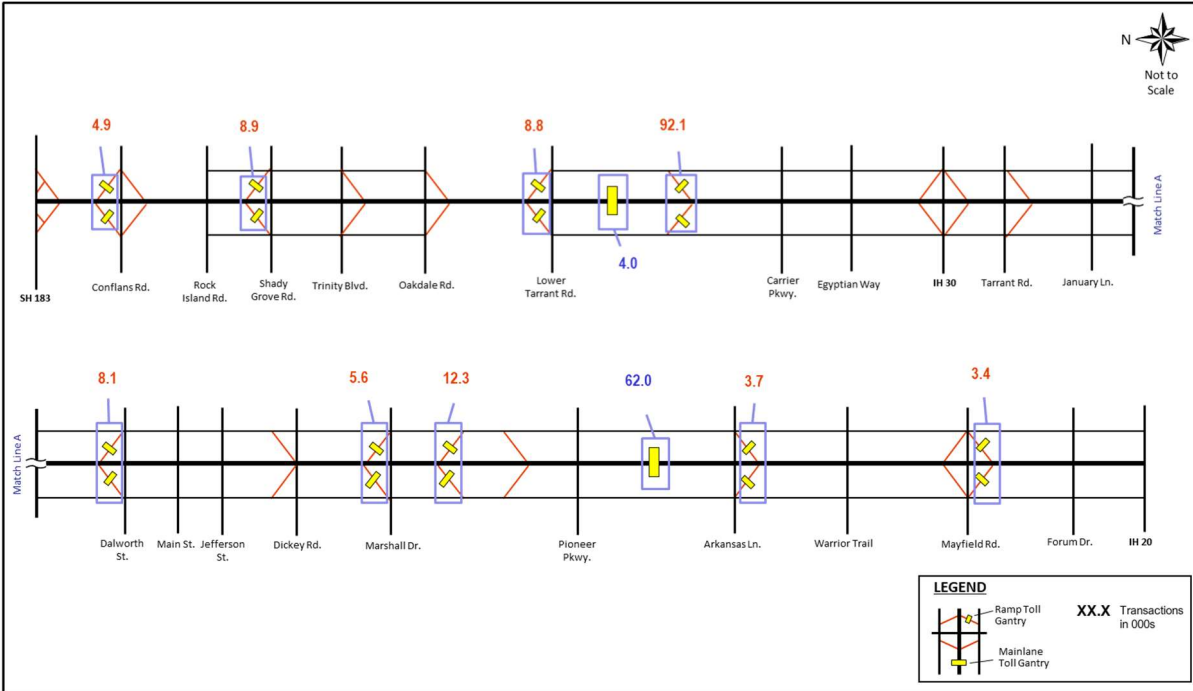


Figure 2-23. PGBT WE 2024 Average Weekday Transactions by Tolling Location

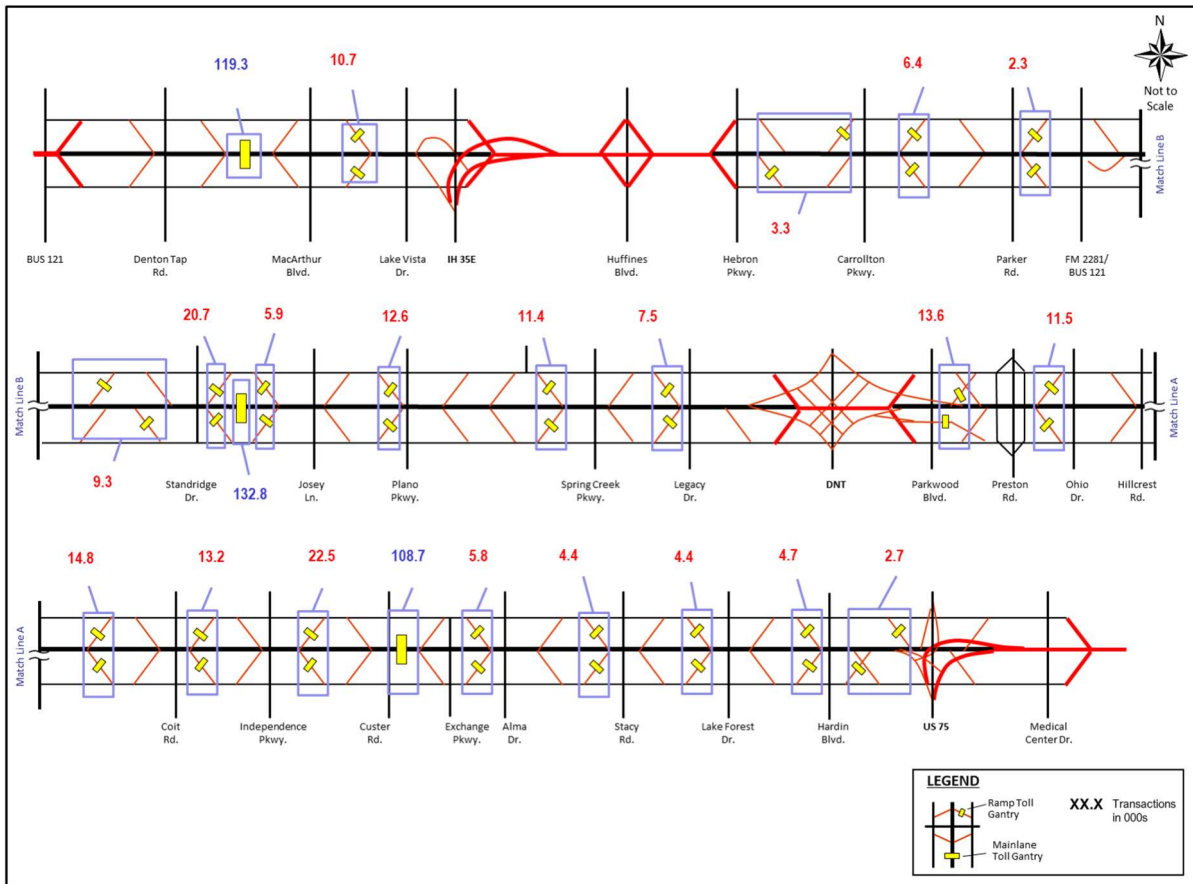


Figure 2-24. SRT 2024 Average Weekday Transactions by Tolling Location

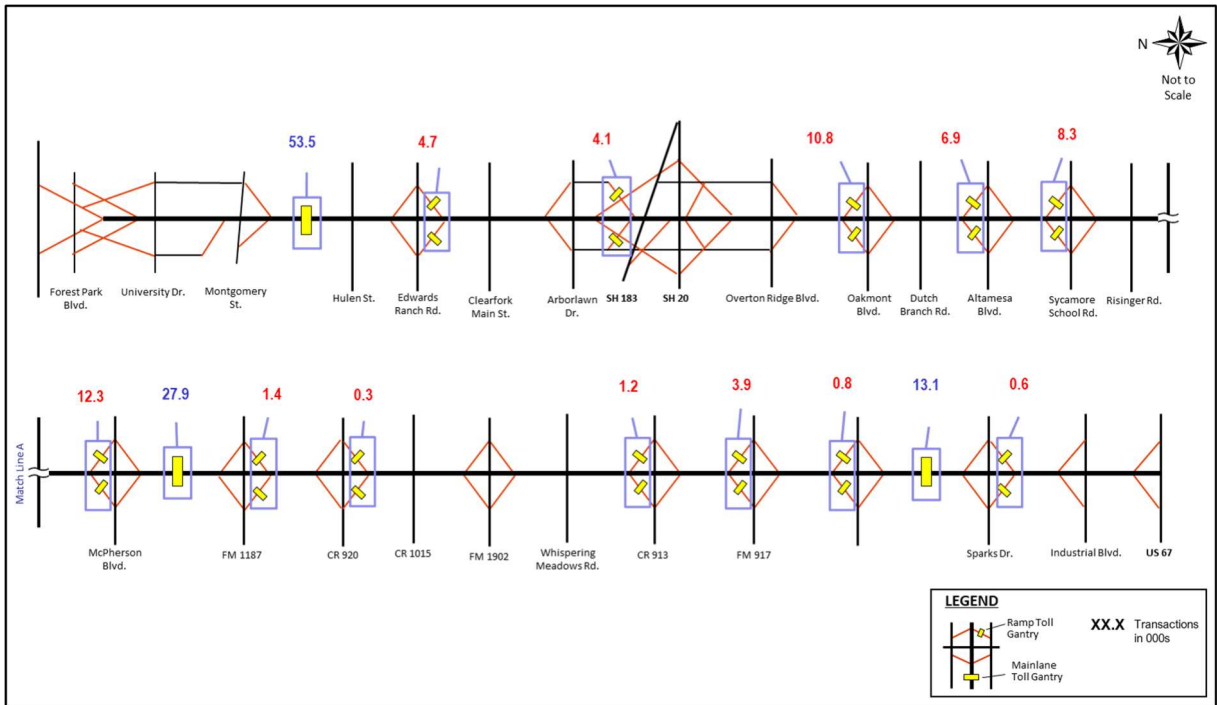


Figure 2-25. CTP 2024 Average Weekday Transactions by Tolling Location

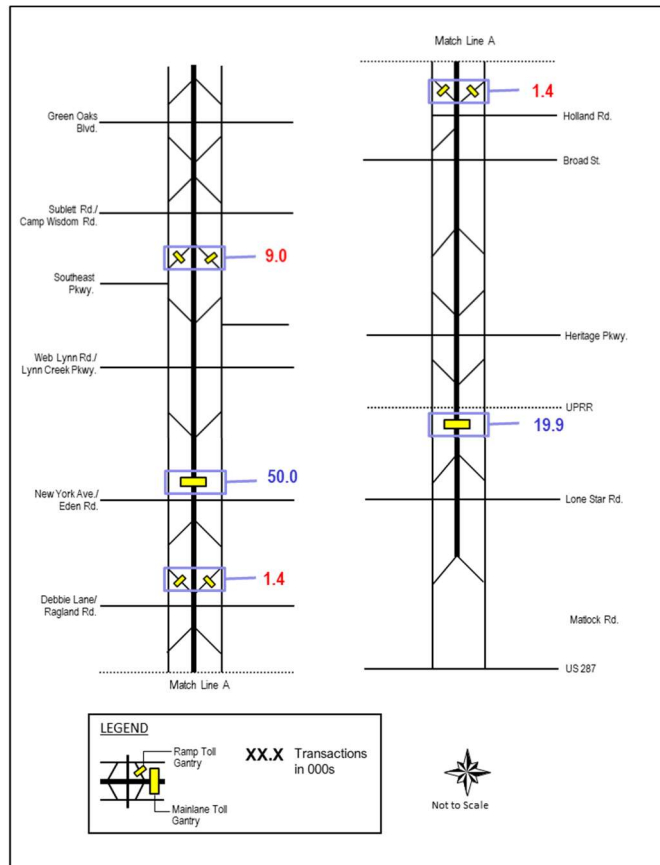


Figure 2-26. 360T 2024 Average Weekday Transactions by Tolling Location

Travel Time Characteristics

The evaluation of a toll facility's future traffic and revenue requires knowledge of the current travel time characteristics of the major roadways in the project area. For the current study, the historical travel time data was collected from INRIX, Inc., a traffic data company based in Washington State that maintains an archive of travel speed data for thousands of roadways across the United States accumulated from GPS-enabled devices along the highway network. INRIX monitors traffic flow along approximately 260,000 miles of major freeways, highways, urban and rural arterials, and side streets in the United States. This data provides historical as well as real-time traffic data seven days a week, 24 hours a day, in as little as one-minute increments for all metro areas with a population of more than one million. They were engaged to provide a series of travel speed data for several roadways within the proposed study area.

INRIX obtains travel speed information from various probes; including anonymous cell phones/smartphones and vehicles equipped with GPS devices (trucks, delivery vans, transit vehicles, etc.). The collected data is then processed in real-time to create travel speed information along most of the major roadways. The real-time travel speed data is normalized to account for parameters that affect traffic flow conditions, such as weather forecasts, school schedules, special events, accidents, seasonal variation, and road construction.

In addition to NTTA's toll facilities, travel time analysis was also conducted on several freeways, local arterials, and frontage roads that compete directly with NTTA System facilities. Several highway and arterial routes were selected for analysis to provide a profile of the fluctuation in operating speed throughout the corridor and the relationship between demand and congestion levels. For all the routes specified in the study area, INRIX data was summarized for Spring 2024. It should be noted that the data summarized includes travel speeds for Tuesday through Thursday. Hence, the summary represents a typical weekday summary by excluding weekends and potentially atypical characteristics of traffic on Mondays and Fridays. **Figures 2-27** through **2-28** show the locations for which travel time data was obtained.

The results are presented graphically in **Figures 2-29** through **2-32**. The figures illustrate the typical peak period speeds in each direction on various facilities. As expected, the DNT routes exhibit their slowest speeds in the southbound AM and northbound PM directions. The PGBT routes generally exhibit higher average speeds than competing routes such as IH 635E. The SRT exhibits its slowest speeds near the western end of the corridor. The 360 Tollway corridor experiences slower speeds in the northbound direction during the AM peak period and in the southbound direction during the PM peak period.

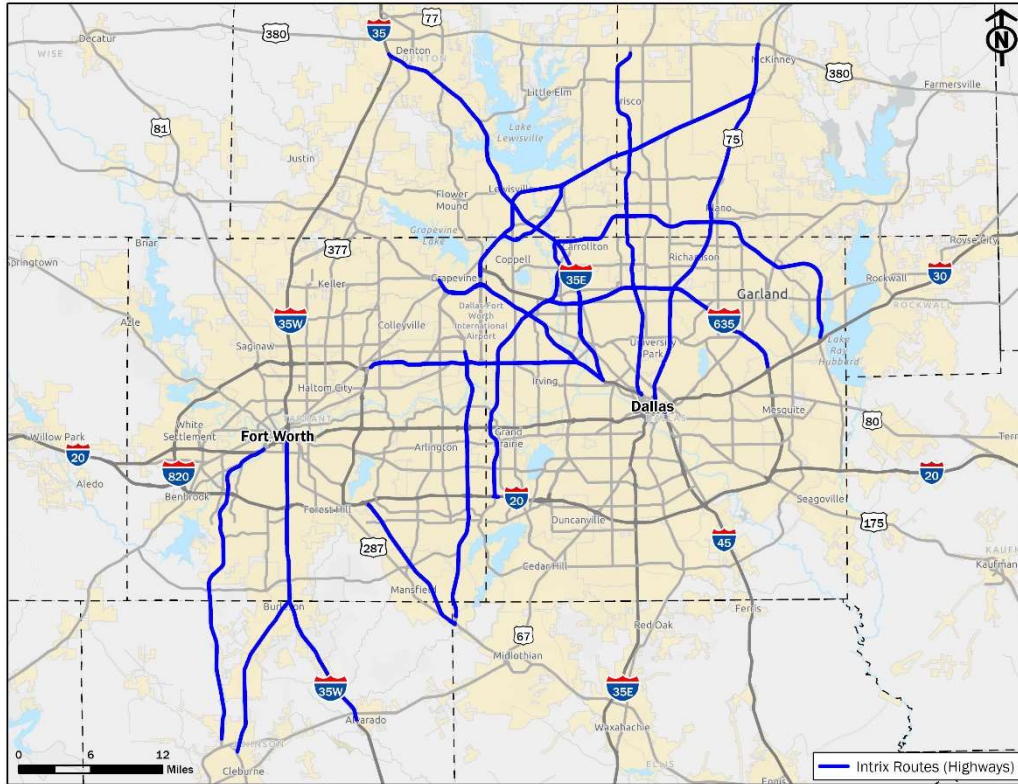


Figure 2-27. Travel Speed Data Collection Locations (Highways)

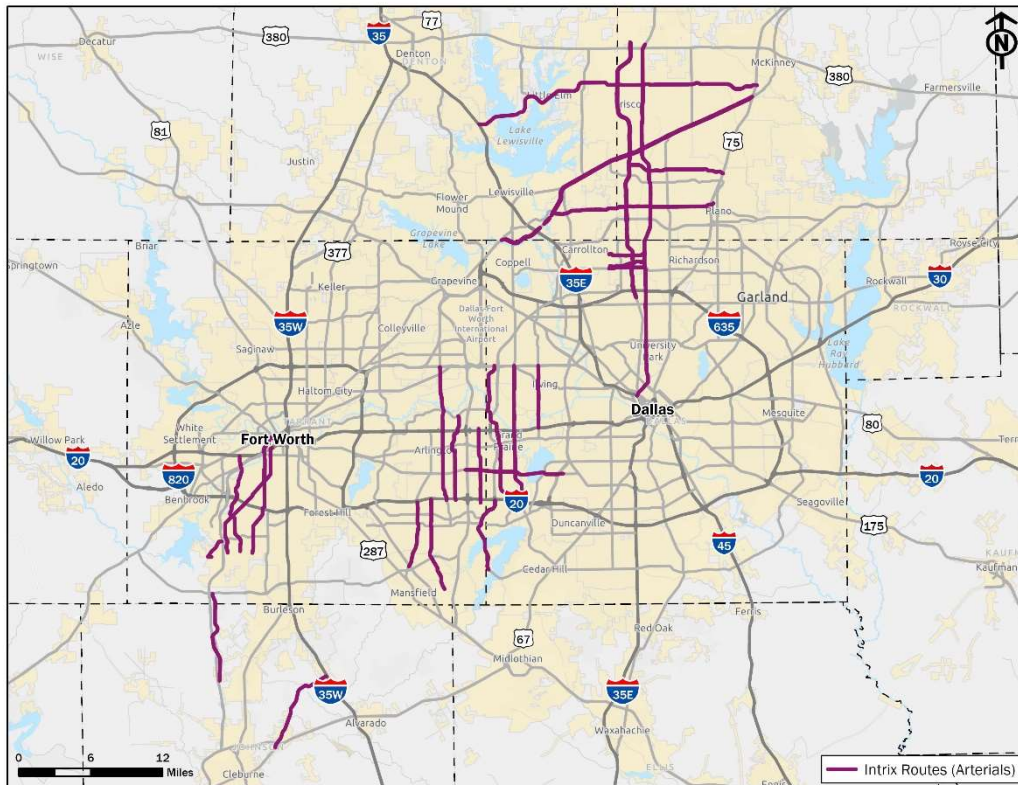


Figure 2-28. Travel Speed Data Collection Locations (Arterials)

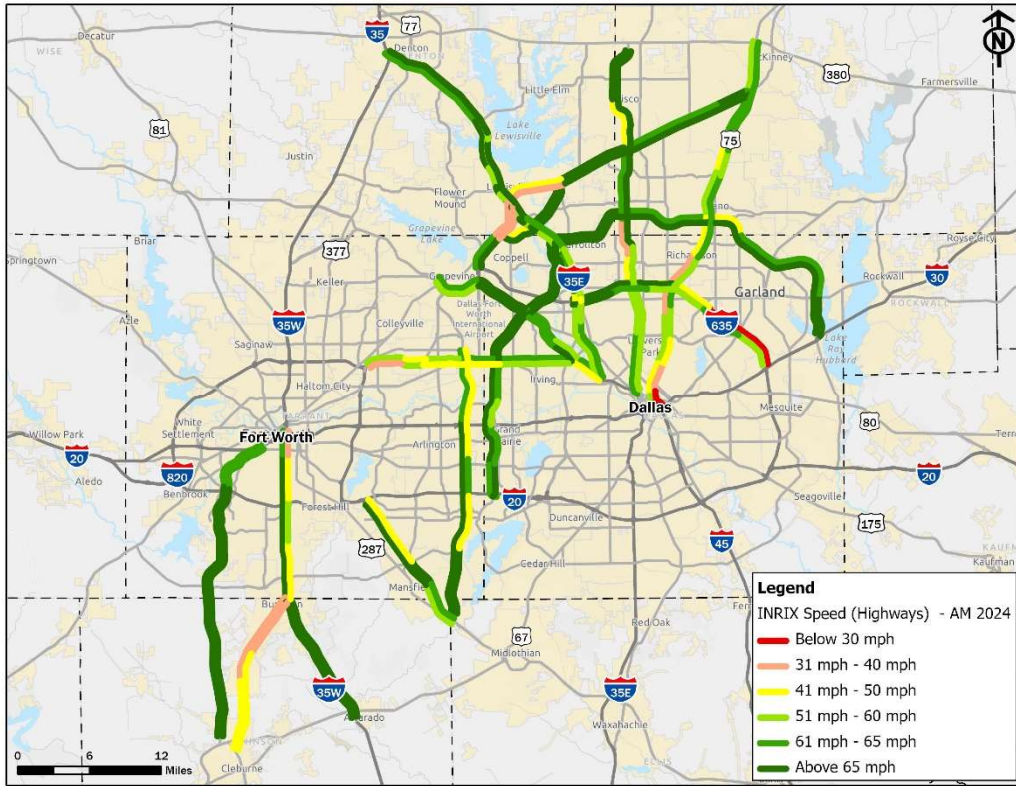


Figure 2-29. Travel Time Results: AM Peak Period (Highways)

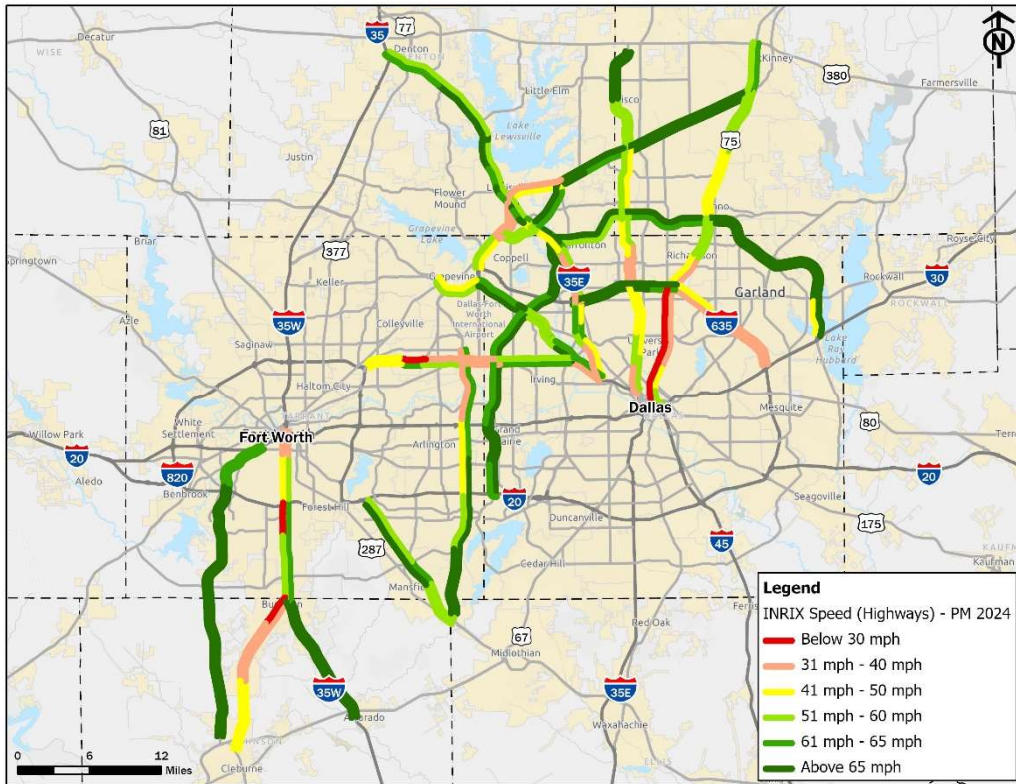


Figure 2-30. Travel Time Results: PM Peak Period (Highways)

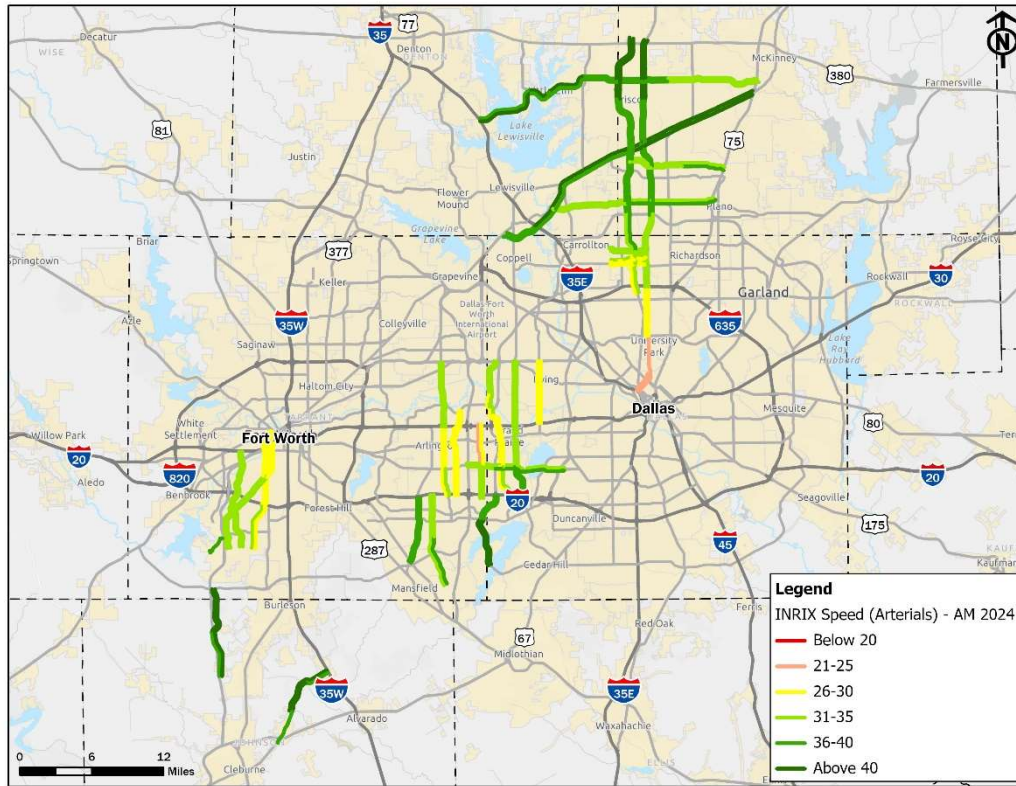


Figure 2-31. Travel Time Results: AM Peak Period (Arterials)

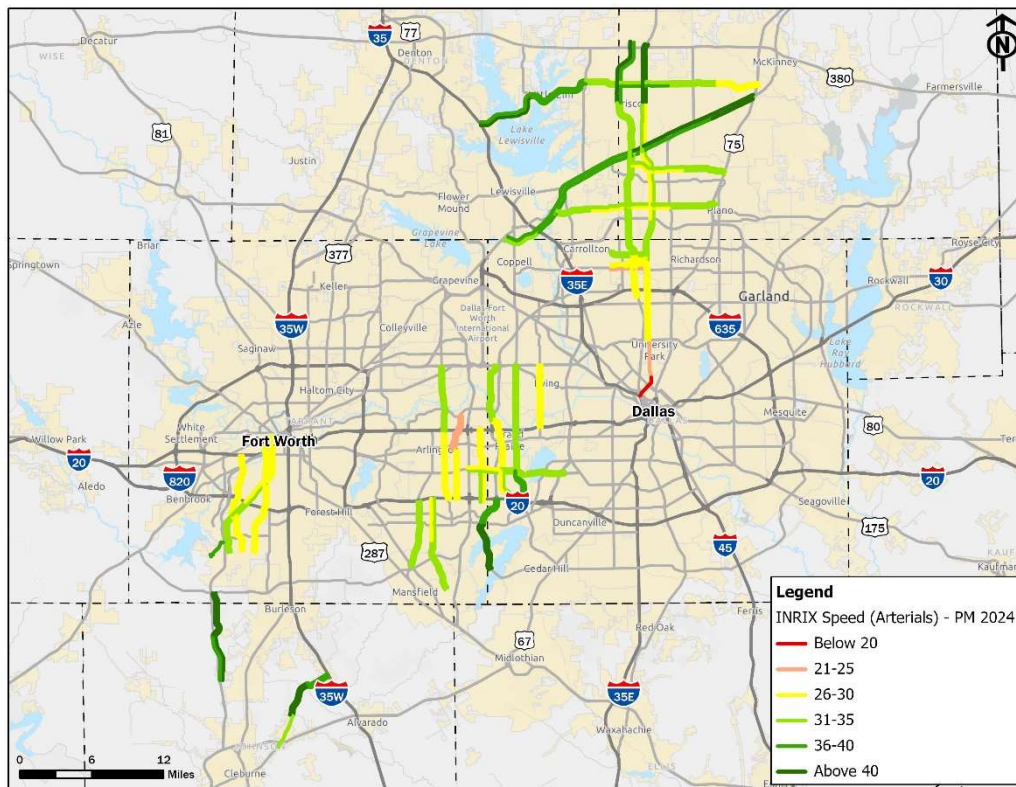


Figure 2-32. Travel Time Results: PM Peak Period (Arterials)

Origin-Destination Data

The origin-destination (O-D) characteristics of the project area were analyzed to understand the travel patterns. The data was obtained from Streetlight Data, Inc, a traffic data company that maintains travel data and delivers unique insights into travel patterns across the country. The O-D data analyzed represents data collected for 2024. **Figure 2-33** shows the locations of O-D zones. A total of 51 zones were identified that were in the area of influence of the NTTA System corridors; the area of influence is defined as the buffer area around a corridor that attracts traffic onto the corridor. The summarized O-D data from Streetlight was then compared with the 2024 trip table matrix received from NCTCOG. A total of 5,352 traffic survey zones (TSZ) in the NCTCOG trip table matrix, out of which 4,037 were in the area of influence, were aggregated into 51 zones, as identified in the Streetlight data. The Streetlight data was then used to adjust the trip table matrix received from NCTCOG. A five percent absolute delta was established as a threshold for updating the trip table matrix; only if the absolute value of delta between the data collected and the O-D data from the trip table varied by more than five percent, then the O-D data was updated. **Figure 2-33** includes arrows that indicate trip adjustments between an O-D trip pair; the arrow-end represents the origin zone, and the arrowhead represents the destination zone. This effort improved the validity of trip patterns in the model to reflect the empirical data.

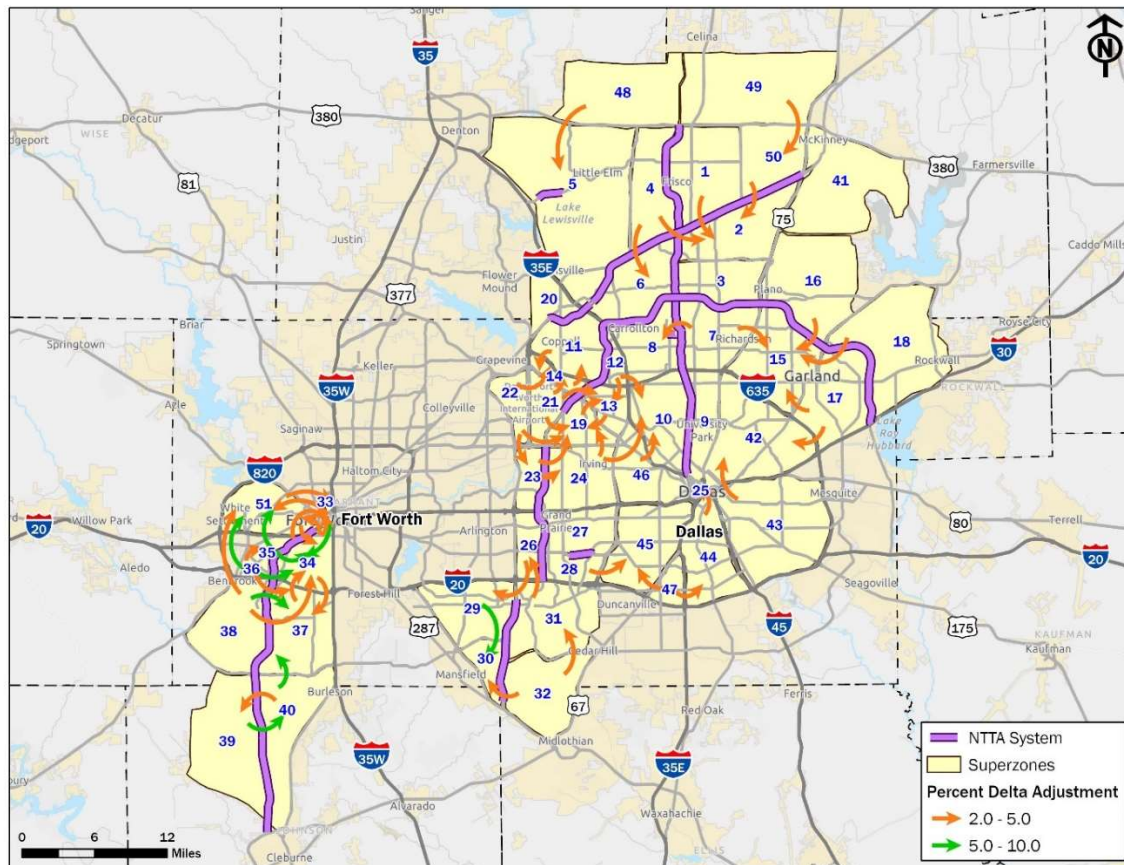


Figure 2-33. Origin-Destination Zones

Stated Preference Survey

In July 2022, CDM Smith conducted a stated preference (SP) survey of NTTA customers who used the NTTA toll network in the Dallas-Fort Worth Metroplex Region. The purpose of the survey was to estimate travelers' willingness to pay for travel time savings via the existing NTTA toll network. The survey collected data from current users of the network by asking respondents about a recent trip made using one of the five regional NTTA tollways and turnpikes and/or one of the three local toll bridges and tunnels. The estimates of toll price sensitivity and willingness to use the toll facilities were then incorporated into the travel demand model to support estimates of traffic and revenue.

The approach employed a dynamic online survey tool developed by CDM Smith. The SP survey was customized for each respondent by presenting questions with wording based on each respondent's previous answers. These dynamic survey features provided an accurate and efficient means of data collection and allowed for the presentation of realistic future conditions in the SP exercises that corresponded with each respondent's reported trip details. Respondents were recruited to the survey by email invitation. The NTTA customer base receives a monthly newsletter via email, and the link to the NTTA Travel Survey was included in the July edition, encouraging customers to participate.

A total of 8,055 completed surveys were collected through this method. Data from the SP survey was analyzed using multinomial logit (MNL) models to estimate a distribution of the value of time of travelers who use the study corridors.

Discrete Choice Model and Value of Time Results

The primary objective of the SP survey was to estimate the value of time (VOT) for passenger vehicle travelers who make trips in the Dallas-Fort Worth Metroplex Region. These value of time estimates are used as inputs to the travel demand models that are used to forecast traffic and toll revenue on the NTTA System.

The eight choice observations for each of the final 8,055 respondents were compiled into a dataset with 64,440 observations to be estimated by a set of multinomial logit (MNL) models. In addition to the model run using the dataset for the full sample, two additional models were run, which segmented the dataset by trip purpose (work and non-work) and trip departure time (peak hour and off-peak). Conventional maximum likelihood procedures were used in the MNL models to estimate travel time and toll cost coefficients, which were then used to calculate VOT.

VOTs for a full distribution of incomes for the full survey sample and the two market segment models are shown in **Table 2-15**. At the median values of household income (\$87,500) for the full survey sample, the MNL model produced a VOT of \$26.10/hour (in 2022 dollars). In the trip purpose market segment model, work and business travelers had VOTs 10% higher than non-

work travelers (\$27.80 per hour compared to \$25.20 per hour). In the trip departure time model, no difference was observed between peak and off-peak travelers, however (\$26.20 per hour for both segments).

Table 2-15. Market Segment VOTs (\$/Hour) at Household Median Income Levels

Household Median Income	Full Sample	Trip Purpose		Trip Departure Time	
		Non-work	Work	Off-peak	Peak
\$20,000	\$17.50	\$16.90	\$18.60	\$17.60	\$17.60
\$60,000	\$23.90	\$23.00	\$25.40	\$24.00	\$24.00
\$87,500	\$26.10	\$25.20	\$27.80	\$26.20	\$26.20
\$100,000	\$26.80	\$25.90	\$28.60	\$27.00	\$27.00
\$150,000	\$29.20	\$28.20	\$31.10	\$29.40	\$29.40
\$200,000	\$30.90	\$29.80	\$32.90	\$31.10	\$31.10
\$250,000	\$32.20	\$31.10	\$34.30	\$32.40	\$32.40

Section 3

Dallas-Fort Worth Area Transportation Characteristics

The purpose of this section is to provide background information on the existing and future transportation characteristics surrounding NTTA roadways in the DFW Metropolitan Area (DFWMA). To maintain consistency with regional transportation planning efforts, planned and programmed transportation improvements contained within *Mobility 2045 – 2022 Update*, the current Metropolitan Transportation Plan (MTP) for the DFWMA, is assumed as the regional foundation. The MTP was developed by the North Central Texas Council of Governments (NCTCOG) and adopted by the Regional Transportation Council (RTC), the metropolitan planning organization (MPO) policy body for the DFWMA. The information described in this section is drawn from the current MTP. As the MPO, NCTCOG is primarily responsible for conducting the multimodal long-range regional transportation planning for the DFWMA. More information about NCTCOG, RTC, and the MTP process is provided in **Section 4**. The MTP for the DFWMA serves as a guideline for the region’s planned investment in transportation infrastructure and services through 2045. It is a federal requirement that the MTP must be financially constrained and balanced to the region’s anticipated revenue streams over a minimum time horizon of twenty years. *Mobility 2045 – 2022 Update* was adopted by the RTC in June 2022. This was an update of the Mobility 2045 plan originally adopted in June 2018. The Mobility 2045 Update plan includes \$136.4 billion in major expenditures on recommended transportation improvement projects and programs expected to be implemented between now and the planning horizon year of 2045. The MTP outlines a \$53.6 billion investment in North Texas roadway infrastructure expansion, system improvements, and new roadway capacity.

According to the US Census, DFWMA is the fourth largest metropolitan area in the nation, with a population of 7.7 million in 2020, and is projected to grow to 11.4 million residents by 2045. This growth represents a 48 percent increase in the population of North Texas over the next 25 years. Total employment is expected to increase 74 percent from 4.03 million in 2019 to 7.02 million by 2045. The DFWMA has one of the largest regional economies in Texas and is more populous than thirty-seven states. **Section 4** provides detailed information regarding the demographic growth characteristics of the region.

Traffic Congestion Trends

Figures 3-1 and 3-2 provide an estimate of the 2045 congestion levels with both the currently planned transportation infrastructure and under a no-build scenario without any transportation improvements. Much of the area surrounding NTTA’s roadways will experience moderate to severe congestion by 2045. The *Mobility 2045 – 2022 Update* estimated that the region-wide annual cost of congestion in 2023 will be \$13.3 billion and could possibly reach about \$30.1 billion by 2045 with planned infrastructure improvements in place and \$60.1 billion with no transportation improvements. In 2023, the region was estimated to experience peak period travel times that are more than 37 percent above free-flow conditions due to congestion, and it is expected that this will increase to over 59 percent in 2045, even after the implementation of all planned improvements.

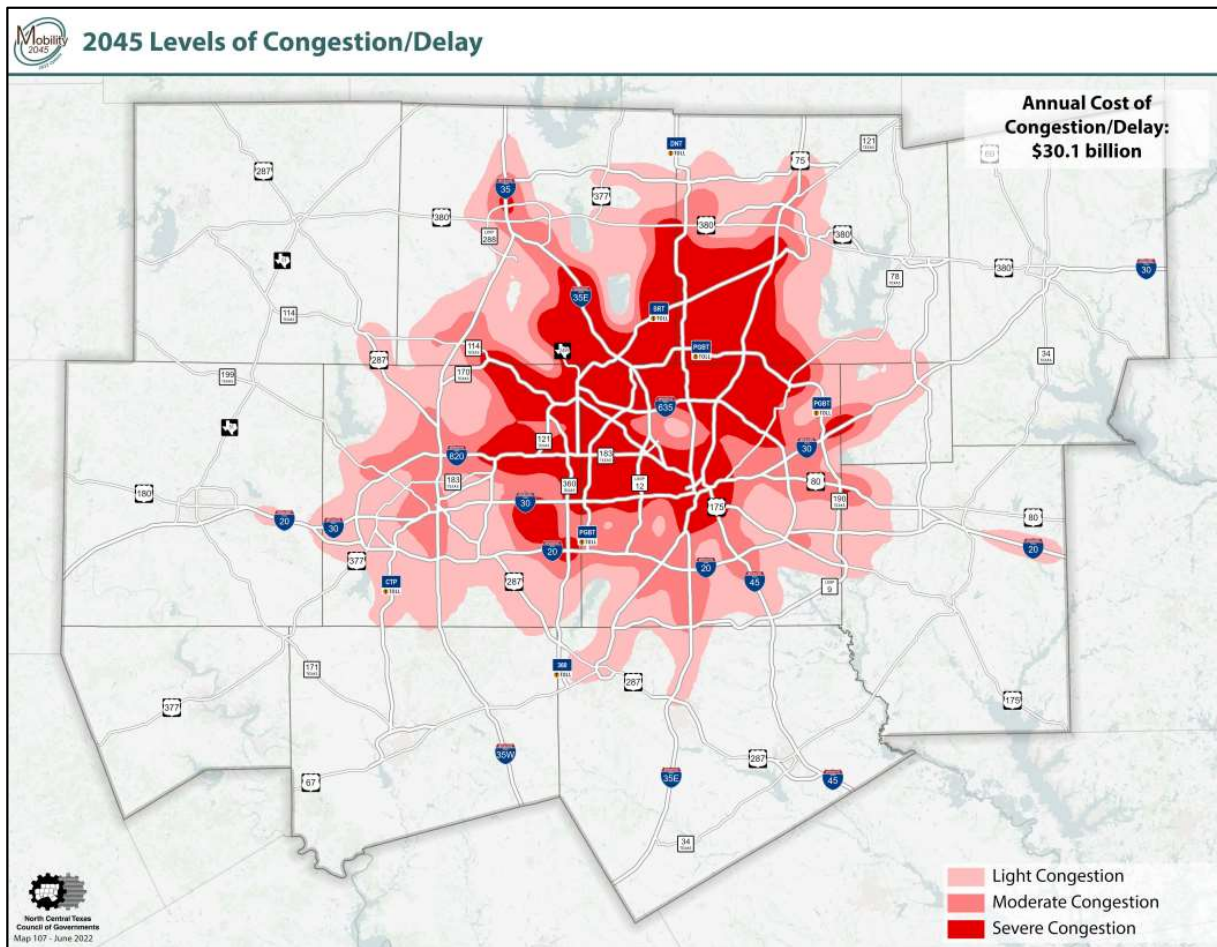


Figure 3-1. 2045 Levels of Congestion/Delay with Planned Improvements

Source: North Central Texas Council of Governments Mobility 2045 – 2022 Update Metropolitan Transportation Plan

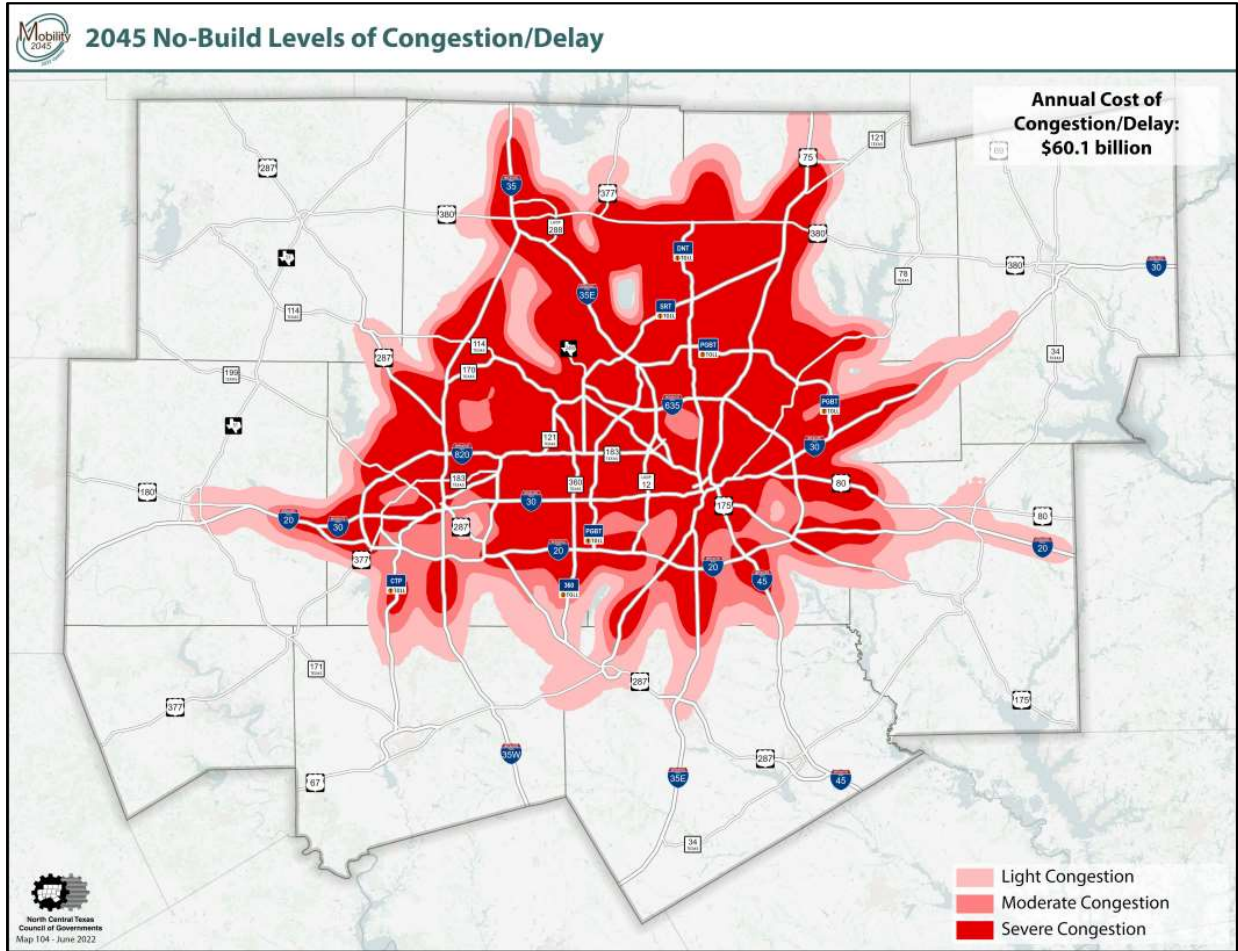


Figure 3-2. 2045 Levels of Congestion/Delay (No-Build Condition)

Source: North Central Texas Council of Governments Mobility 2045 – 2022 Update Metropolitan Transportation Plan

Freeway and Tollway System

Figure 3-3 provides an illustration of the funded roadway improvement recommendations included in the *Mobility 2045 - Update Plan*, focusing on freeways, tollways, HOV/managed lanes, frontage roads, and selected regionally significant arterials. The identification of these facilities is very important to this study because additional freeway and arterial improvements could materially impact NTTA System traffic and toll revenue. Facilities providing improved accessibility to NTTA System facilities could provide positive impacts to the NTTA System while competing/alternate routes could dampen its traffic and revenue potential.

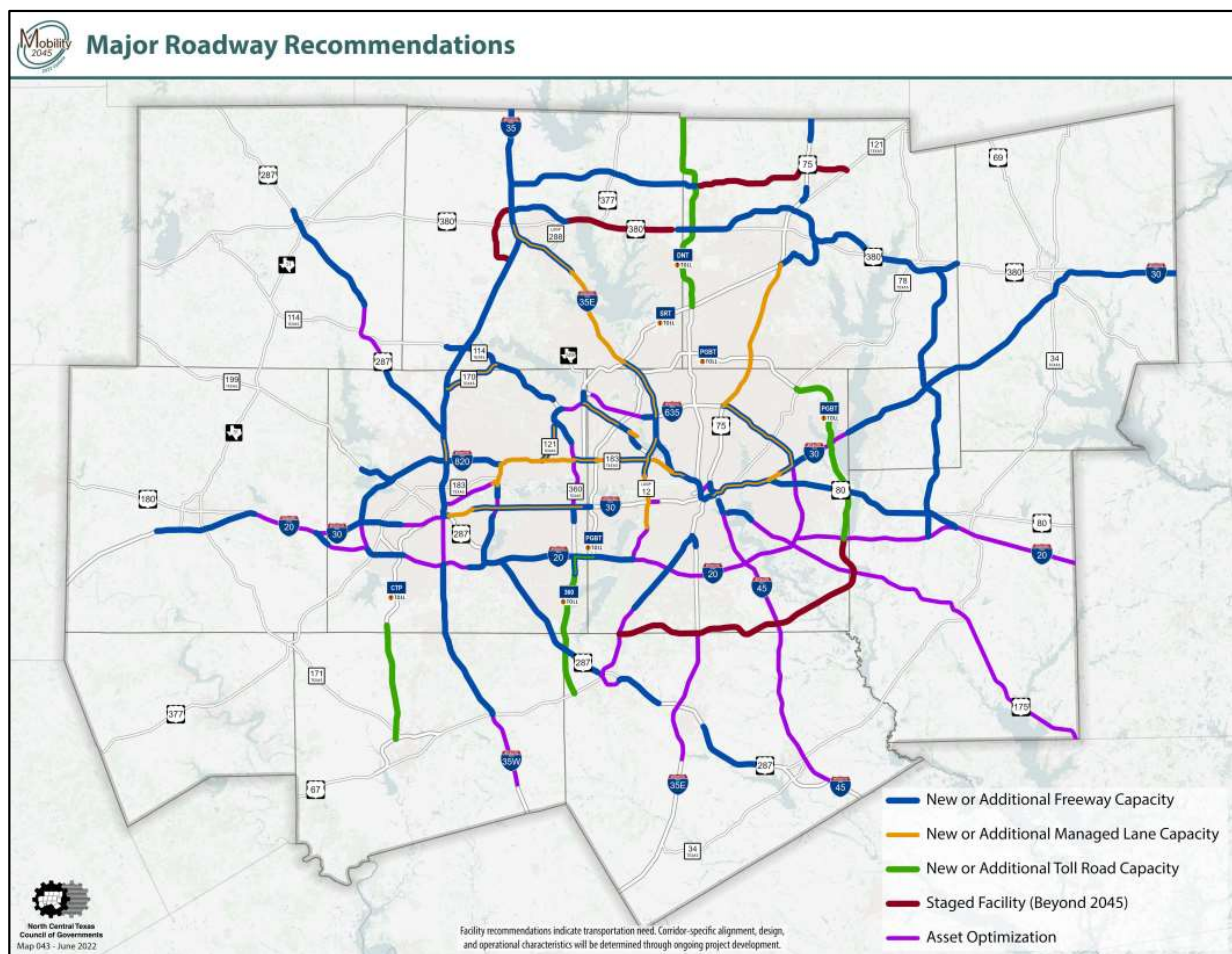


Figure 3-3. 2045 Major Roadway Recommendations

Source: North Central Texas Council of Governments Mobility 2045 – 2022 Update Metropolitan Transportation Plan

The following is a brief description of major freeways and managed lanes in the DFW region and their associated capacity expansions, which are planned through 2045, as shown in **Figure 3-3**:

- **IH 35E** – The ultimate configuration for IH 35E between the IH 35E/IH 35W interchange in Denton and Spur 482/Storey Lane in Dallas will be completed by 2045. The ultimate configuration includes expanding the general-purpose lanes and tolled managed lanes and converting from current reversible managed lanes to concurrent managed lanes. A section between PGBT and IH 635 is already under construction and scheduled to open in January 2026.
- **US 75** – Improvements to US 75 between Grayson County line and CR 370 includes expansion of six lane general-purpose and estimated to complete by 2026. In addition, between Melissa Road and Sam Rayburn Tollway, in northern Collin County, includes the expansion of eight lane general-purpose and is estimated to be completed by 2036.
- **North Tarrant Express (NTE)** – Following projects are planned along NTE:
 - **Segment 1**: General-purpose lanes will expand from four to six lanes by 2026.
 - **Segment 2W**: Tolled managed lanes will expand from four to six lanes by 2026.
 - **Segment 3A**: Expansion from four to eight general-purpose lanes by 2036.
 - **Segment 3B**: Tolled managed lanes between IH 820 and Basswood Boulevard along will expand from four to six lanes by 2036.
 - **Segment 3C**: Expansion from four to six general-purpose lanes by 2036.
- **IH 35W** – Following projects are planned along IH 35W:
 - IH 35W South will expand from ten to eleven lanes general-purpose between IH 20 and SH 174 (Tarrant County line), by 2036.
 - In addition, between SH 174 and Maple Avenue (CR 401) is expected to operate as a six-lane general-purpose, by 2036.
 - IH 35W North will be widened from four lanes to six general purpose lanes between IH 35E/35W and Eagle Parkway by 2036.
- **SH 360** – Following projects are planned along SH 360:
 - SH 360 expansion from four to six general purpose lanes between Stone Myers Parkway and Mid Cities Boulevard, by 2036
 - SH 360 expansion from six to eight general-purpose lanes between IH 30 and IH 20, by 2045.
 - SH 360 expansion from four to six general purpose lanes between IH 20 and Sublett Road, by 2045
 - SH 360 expansion from four to eight general purpose lanes between Sublett Road and Debbie Lane, by 2045

- SH 360 expansion from four to six general purpose lanes between Debbie Lane and US 67, by 2045
- **US 287** – Following projects are planned along US 287:
 - US 287 will be expanded from four to six lane general-purpose freeway between Lone Star Road and Sublett Road, by 2036
 - US 287 expansion from four to six lane general-purpose freeway between IH 35W and South of Ramhorn Hill Road, by 2036
 - US 287 will be reconstructed to full freeway standards between St Paul Road and Lampasas Road by 2036.
- **Midtown Express** –
 - SH 183 will be converted from four to six managed toll lanes between SH 121 and President George Bush Turnpike (PGBT) by 2045
 - SH 183 will be converted from two to four managed toll lanes between SH 114 and Empire Central by 2045
 - Similarly, SH 183 will be converted from two to six managed toll lanes between Empire Central and IH 35E, by 2045

Mobility 2045 includes several changes to planned projects from what was included in prior MTPs. Following is a list of major changes to the previously proposed roadway improvements introduced in the 2045 MTP:

- **360 Tollway** – 360 Tollway between US 67 and US 287 is added in the year 2045.
- **360 Tollway** – Expansion of 360 Tollway between Sublett Road and US 287 from four lanes to six/eight lanes is delayed from 2036 to 2045.
- **DNT Phase 4B** – DNT Phase 4B is added in the year 2033
- **IH 35E** – IH 35E managed lanes expansion between IH 635 and Denton is delayed from 2036 to 2045. A section between PGBT and IH 635 is already under construction and scheduled to open in January 2026.
- **IH 35E** – The following projects are planned along IH 35E:
 - IH 35E expansion from ten to eleven lanes general-purpose between Oak Lawn Avenue and Woodall Rodgers Freeway/Spur 366, by 2036
 - Section between US 380 and IH 35W/IH 35E will be converted from zero to 4 managed toll lanes.
 - IH 35E will operate as eight lane freeway with two to four managed toll lanes between IH35W/IH 35E and Corinth Parkway, by 2045

- Section between Corinth Parkway and IH 635 will be converted from two to four managed lanes, by 2045
- IH 35E expansion from ten to twelve lanes between IH 635 and Loop 12, by 2045
- IH 35E expansion from six to eight lanes between State Loop 12 and Spur 482/Storey Lane, by 2045
- IH 35E expansion from six to eight lanes between Spur 482/Storey Lane to SH 183, by 2036
- IH 35E expansion from ten to eleven lanes between SH 183 and Medical Center Boulevard with two managed toll lanes until Medical District Drive, by 2036 and ultimately section between SH 183 and Inwood Boulevard will have four to six managed toll lanes, by 2045
- IH 35E expansion from ten to twelve lanes between Market Center Boulevard and Oak Lawn Avenue, by 2036

Additional roadway improvements planned for the region that are included in *Mobility 2045 – 2022 Update* are shown in **Figure 3-4**, and they include the following expansions to the NTTA System:

- **SH 190** – SH 190 East Branch, from IH 30 to IH 20 planned to be completed by 2033.
- **360 Tollway and PGBT-WE Connector (the “Elbow”)** – SH 360 to PGBT-WE toll connector is planned to be completed by 2032.
- **DNT Phase 4A:** Construction of the DNT northern extension, from US 380 to FM 428 is planned to be completed by 2027.
- **DNT Phase 4B:** Construction of the DNT northern extension, from FM 428 to the Grayson County is planned to be completed by 2034.

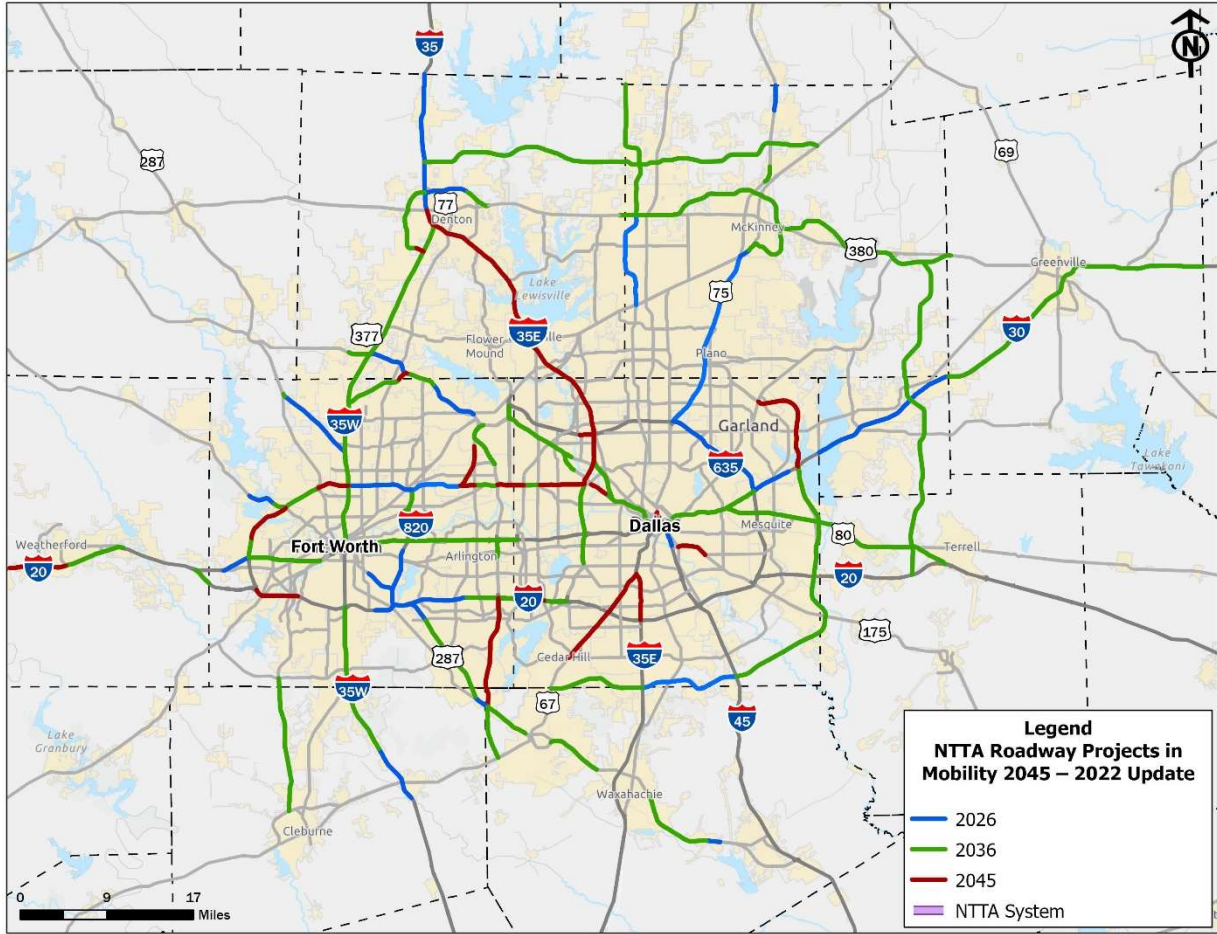


Figure 3-4. Expected Completion Years of Planned Projects in the NTTA System Area

Source: North Central Texas Council of Governments (Mobility 2045 Metropolitan Transportation Plan) and North Texas Tollway Authority

NTTA provided CDM Smith a list of capacity improvement projects, along with the anticipated completion date for each. **Table 3-1** provides a list of future NTTA roadway improvement projects. For some projects, NTTA's planned completion dates differ from those assumed in *Mobility 2045 - 2022 Update*. For those locations, the opening date provided by NTTA was used for traffic and revenue forecast development.

Table 3-1. NTTA Capital Improvement Projects

Project	Opening Date
DNT: Fourth Lane Expansion (SRT to US 380)	August 31, 2025
DNT 4A: Mainlane Extension from US 380 to FM 428	July 30, 2027
DNT 4B: Mainlane Extension from FM 428 to Grayson County Line	July 31, 2034
PGBT/360 "Elbow": Connection from PGBT-WE to SH 360	June 30, 2032
CTP: Expansion to four lanes from FM 1187 to US 67	December 31, 2028
East Branch: Six lane tollway between IH 30/PGBT-EE and IH 20/Loop 9	December 31, 2033

Rail Transit System

Transit service in the DFWMA is provided primarily by Dallas Area Rapid Transit (DART), Trinity Metro (formerly known as the Fort Worth Transportation Authority or The T), and the Denton County Transportation Authority (DCTA). The existing DART light-rail system consists of four lines: the Red, Blue, Green, and Orange lines. The Red Line begins in South Dallas near Westmoreland Avenue and ends at the Parker Road station in Plano; the Blue Line extends from University Hills Boulevard in South Dallas to Downtown Rowlett; the Orange Line runs from Airport Station to Parker Road and the Green Line runs from southeast Dallas to Carrollton. Additionally, during peak periods on weekdays, the Orange Line runs parallel to the Red Line between the Parker Road terminus and downtown Dallas. A map of the current DART rail system is shown in **Figure 3-5**.

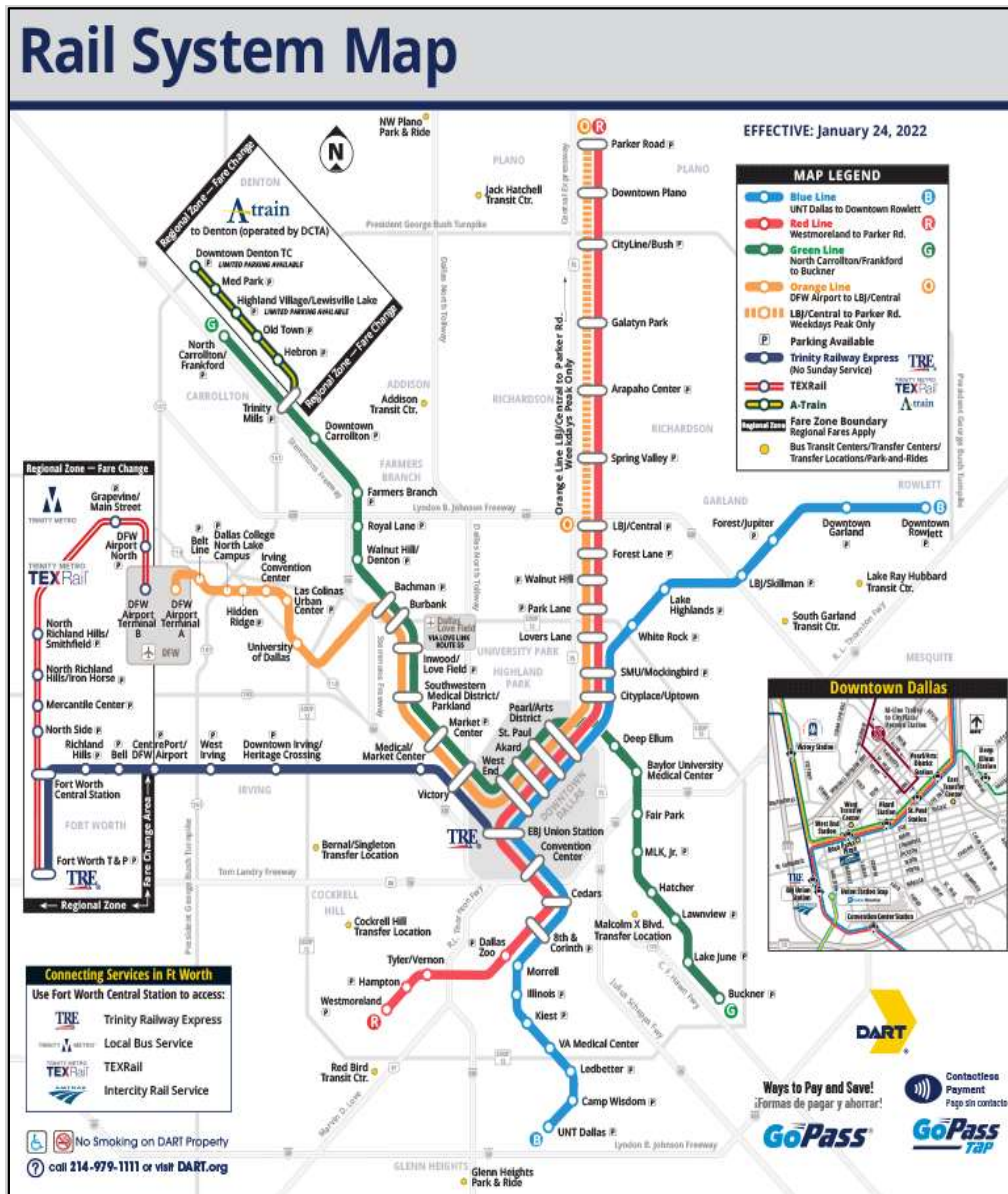


Figure 3-5. Current DART Rail System

Source: Dallas Area Rapid Transit (<http://www.dart.org>)

Trinity Metro is the operator of the bus system for the City of Fort Worth and the TEXRail running from downtown Fort Worth to the DFW Airport. Trinity Metro also partners with DART on the Trinity Railway Express (TRE), which offers commuter rail service between downtown Fort Worth and downtown Dallas with bus connections to DFW Airport.

The Denton County Transportation Authority (DCTA) is the transit authority that operates in Denton County, which is located northwest of Dallas County. Along with operating bus service in three cities within Denton County, DCTA runs the A-Train commuter rail, a regional rail line parallel to IH 35E that connects with the DART system at the Trinity Mills Station in Carrollton.

Figure 3-6 illustrates the proposed rail system as developed by NCTCOG in cooperation with the transit agencies. As can be observed in the figure, there are proposed transit alignments included in *Mobility 2045 - 2022 Update*, which could potentially compete directly with NTTA System facilities.

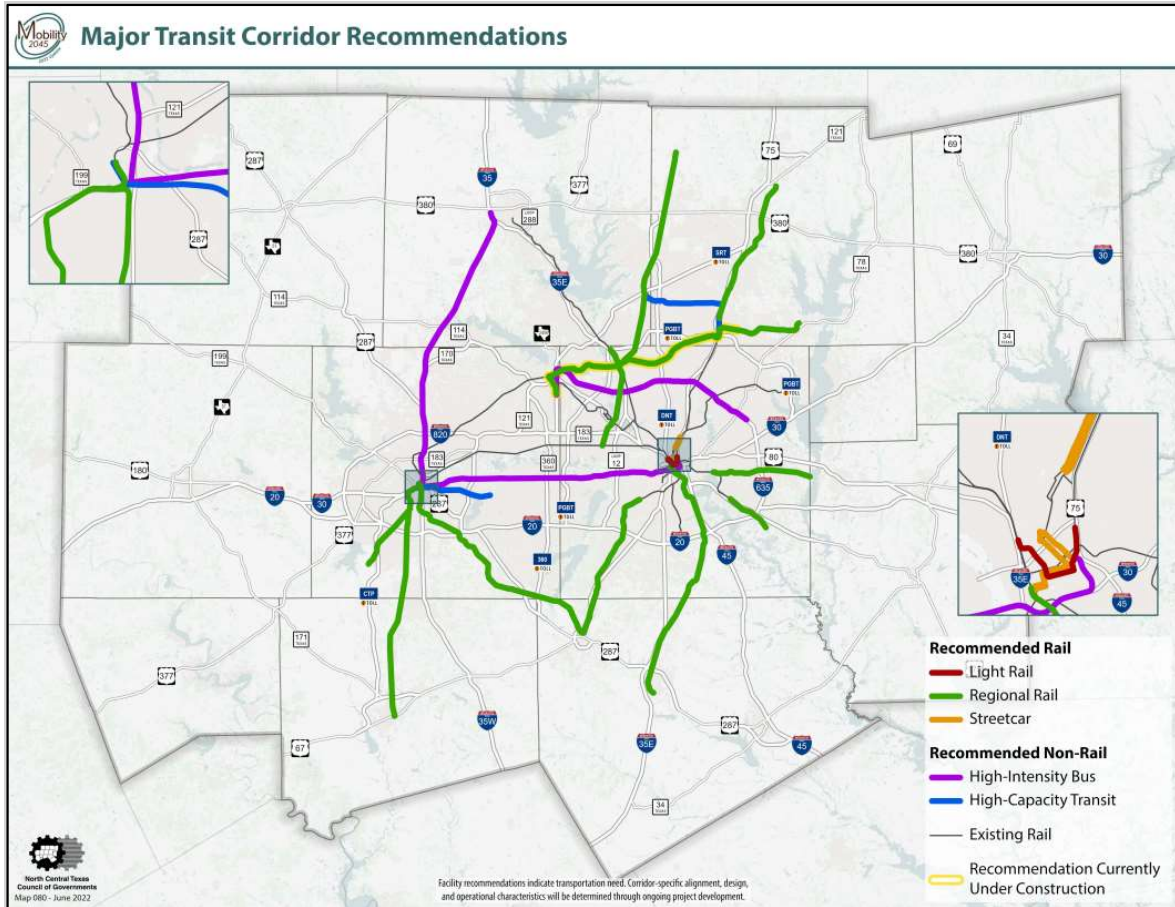


Figure 3-6.

2045 Project Implementation: Passenger Rail

Source: North Central Texas Council of Governments *Mobility 2045* Metropolitan Transportation Plan

To summarize, the transportation system defined in the *Mobility 2045 - 2022 Update* and described above is reflected in the trip tables used to estimate the traffic and toll revenue for the NTTA System. The trip tables and networks were obtained from NCTCOG to reflect all the planned transportation infrastructure development included in the *Mobility 2045 - 2022 Update*.

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Section 4

Regional Demographic and Economic Trends

As part of this NTTA System Comprehensive Traffic and Toll Revenue Study, historical and projected demographic characteristics used by the North Central Texas Council of Governments (NCTCOG) were reviewed to develop travel demand modeling trip tables. This section describes the major socioeconomic characteristics of the Dallas-Fort Worth Metropolitan Area (DFWMA), including both the regional trends and the specific trends near the NTTA System.

In June 2022, the Regional Transportation Council (RTC), the policy body for the DFWMA, adopted *Mobility 2045: The Metropolitan Transportation Plan for North Central Texas – 2022 Update*. The plan included new regional demographic forecasts, developed for the twelve counties that comprise the DFWMA: Collin, Dallas, Denton, Ellis, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise. The demographic datasets from *Mobility 2045 – 2022 Update* were used as the baseline to generate future trip patterns in the DFWMA. The traffic and toll revenue estimates included in this report utilized the databases included in the *Mobility 2045 – 2022 Update*.

This section first provides a description of the NCTCOG forecast process used to generate the base demographics, followed by a discussion of the regional historical and future growth in the twelve-county area. This section also discusses the independent economic review, which was conducted by Research and Demographic Solutions (RDS), an independent economist.

The demographic information presented in this section forms the foundation that was used to develop the potential demand for NTTA System facilities. The demographic information is used as an input to the trip generation model to estimate total trips produced for the Dallas-Fort Worth (DFW) region within the travel demand model.

NCTCOG Demographic Forecast Process

As required by federal legislation, NCTCOG periodically develops future demographics based on county and regional control totals created by the Texas Demographic Center (TDC), formerly known as the Texas State Data Center (TSDC), and other independent sources. The TDC is part of the State Data Center System, a national network of 52 centers (all 50 states, Puerto Rico, and the Virgin Islands) in charge of disseminating demographic information. The demographics adopted by NCTCOG are considered official demographics to support the metropolitan planning process and travel demand modeling within the DFW region.

The demographic forecast and trip table development process implemented by NCTCOG is divided into six steps, as illustrated in **Figure 4-1**. In the first step, regional control totals of population and employment were developed in five-year increments from a base year through

the forecast horizon year (2045). These regional totals were obtained from the TDC and were combined with forecasts developed by independent economists at the Perryman Group. The forecasts were developed in a coordinated effort between NCTCOG’s Research and Information Services and Transportation departments.

The TDC population forecast process is a cohort-component forecast method which involves determination of several elements including fertility, mortality, and migration rates. The migration rate for 2010-2015 was used throughout the projection period.

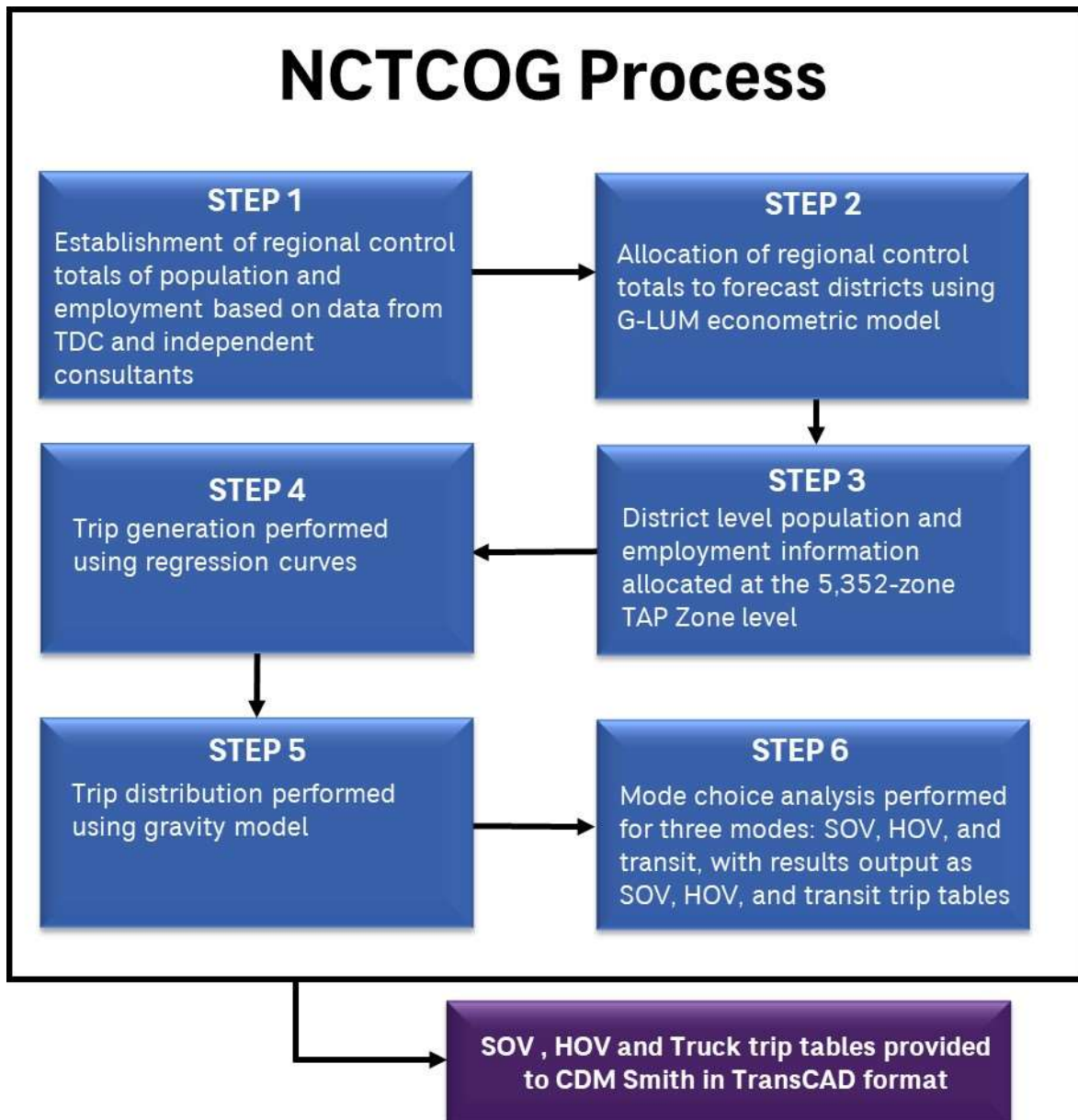


Figure 4-1. NCTCOG Forecast Process

Table 4-1 shows the control totals that were considered during the forecasting process. The population totals adopted by NCTCOG for the region are shown in bold in **Table 4-1**.

Employment control totals were generated by NCTCOG with input from their Employment Estimates program, which monitors non-construction job counts by place of work for municipalities in the DFWMA. The employment totals seen in **Table 4-1** show that the total employment of the DFWMA is anticipated to increase from 5.0 million in 2020 to 8.1 million by 2045.

The second step in the forecasting process involves allocating the DFWMA regional control totals to 242 forecast districts for each five-year interval. The Gravity Land Use Model (G-LUM) was used for this process. In the third step, the district-level information was disaggregated to the Transportation Analysis Process (TAP) zone level using a disaggregation model developed by NCTCOG. There are 5,252 TAP zones in the DFWMA area. The critical variables used in this process are district-level household change, acres of vacant land, the density of future residential development, and proximity to transportation infrastructure. Output from this process was closely reviewed by the member cities and approved by the Regional Demographic Task Force before being presented and approved by the NCTCOG Executive Board.

The fourth step involves performing trip generation using regression curves. This process estimates the total number of trips generated by and attracted to each Traffic Survey Zone (TSZ). In the fifth step, trip distribution is performed using the gravity model. In the sixth and final step, mode choice analysis is performed, and subsequently, trip tables are created for the single occupant vehicle (SOV), high occupancy vehicle (HOV), truck, and transit modes. These final official tables were provided to CDM Smith by NCTCOG.

Table 4-1. Population and Employment Forecast Totals

Forecast	2020	2023	2026	2036	2045
TSDC Population	7,699,000	7,921,000	8,148,000	8,850,000	9,372,000
Mobility 2045 Population	7,610,567	8,153,519	8,683,644	9,901,269	11,411,700
Mobility 2045 Employment	5,037,233	5,712,063	6,038,141	7,140,436	8,111,100
Source: North Central Texas Council of Governments, Texas State Data Center, and 2020 Census					

Historical and Future Regional Growth

The twelve counties served by NCTCOG's planning area include Collin, Dallas, Denton, Ellis, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise. **Figure 4-2** illustrates the spatial relationship of these counties and highlights the DFWMA travel demand model area. NTTA's facilities, which lie in five of the counties, are also represented on the map. The analysis of historical and future demographic growth from a regional perspective is based on information pertaining to population, employment, and income for these twelve counties.

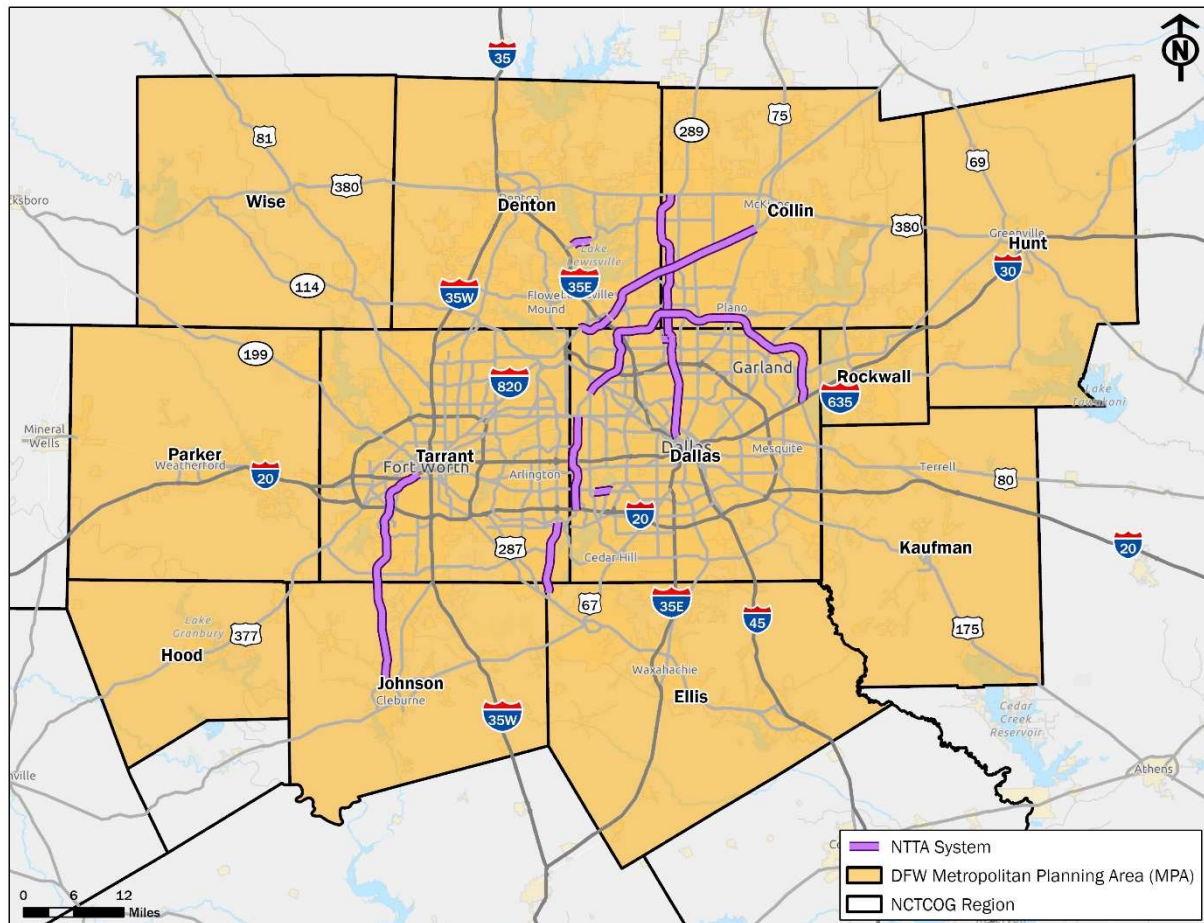


Figure 4-2. DFW Metropolitan Planning Area

Historical Regional Population Trends

Table 4-2 shows the historical population trends for the counties in the DFWMA travel demand model area as well as Texas and the United States. The total population in the twelve-county area has increased at an annual average rate of 2.2 percent from 1990 to 2020, resulting in 3.7 million additional residents. This regional population growth trend exceeded the state and national growth trends between 1990 and 2020, which were 1.8 percent and 1.0 percent per year, respectively.

Dallas County is the largest county in the region in terms of population with approximately 2.6 million residents in 2020. Its population increased at an average annual rate of 1.2 percent between 1990 and 2020, adding a total of about 760,700 people during the same period. Dallas County's population in 2020 represented approximately 33.9 percent of the total population of the twelve-county area.

Rockwall County and Collin County were the fastest-growing counties in the region between 1990 and 2020. Rockwall County's population increased from 25,600 in 1990 to 107,800 in 2020, corresponding to an average annual growth rate of 4.9 percent over the thirty-year period. The Rockwall County population growth rate between 1990 and 2020 has been significantly higher than the population increase experienced by the State of Texas and the United States.

The population in Collin County increased from 264,000 in 1990 to 1,064,500 in 2020, corresponding to an average annual growth rate of 4.8 percent. Tarrant County is the second largest county in the region in terms of population, with approximately 2.1 million people in 2020. Its population increased at an average annual rate of 2.0 percent between 1990 and 2020, adding a total of 940,500 people during the same period. Denton County experienced a significant growth rate of 4.1 percent between 1990 and 2020, gaining 632,900 residents.

The majority of the population in the DFWMA is concentrated within the four core NTTA member counties (Collin, Dallas, Denton, and Tarrant). In 2020, Collin, Dallas, Denton, and Tarrant Counties contained 87 percent of the total population of the twelve-county area, as shown in **Table 4-2**.

An increase in migration to the state beginning in the 1990s has helped to boost the Texas economy. Since 2006, the state has led the nation in domestic migration from states such as California and New York. According to the U.S. Census Bureau, one in six people living in Texas is an immigrant. Approximately 18 percent of the DFW population is foreign-born. The population of the DFW region grew more than any other metropolitan area in the country between 2010 and 2020, according to the U.S. Census Bureau. The DFW region added 1.2 million people during that period.

Future Regional Population Growth

Also included in **Table 4-2** is NCTCOG's population forecast from the Mobility 2045 – 2022 Update. Population in the twelve-county area is expected to increase from 7.7 million in 2020 to approximately 11.4 million by 2045, corresponding to an annual average rate of 1.6 percent. Dallas County's population is expected to grow by an annual average rate of 1.2 percent between 2020 and 2045, from 2.6 million in 2020 to 3.5 million by 2045. The additional 0.92 million residents expected in Dallas County by 2045 would represent the second-highest number of additional residents for any county in the twelve-county area during that period. Only Tarrant County is expected to add more residents by 2045.

Collin County's population is expected to grow between 2020 and 2045 at an annual average rate of 2.1 percent, from about 1.1 million in 2010 to 1.8 million by 2045. Rockwall County population is expected to grow between 2020 and 2045 at an annual average rate of 1.6 percent, from 107,800 in 2020 to 161,600 by 2045. The year 2045 population distributions for each of the counties in the twelve-county area are also presented in **Table 4-2**. As in 2020, Dallas and Tarrant Counties would continue to comprise the largest population centers in the twelve-county area. Most of the growth is expected to be in the core counties of Dallas, Tarrant, Collin, Ellis, and Denton.

Table 4-2. County Population Trends and Projections (US Census Bureau and NCTCOG Forecast)

County	US Census Bureau				NCTCOG Demographic Forecast
	Year 1990	Year 2000	Year 2010	Year 2020	Year 2045
Collin	264,000	491,700	782,300	1,064,500	1,789,000
Dallas	1,852,800	2,218,900	2,368,100	2,613,500	3,533,500
Denton	273,500	433,000	662,600	906,400	1,516,500
Ellis	85,200	111,400	149,600	192,500	318,200
Hood	29,000	41,100	51,200	61,600	95,200
Hunt	64,300	76,600	86,100	100,000	143,600
Johnson	97,200	126,800	150,900	179,900	258,100
Kaufman	52,200	71,300	103,400	145,300	209,400
Parker	64,800	88,500	116,900	148,200	234,700
Rockwall	25,600	43,100	78,300	107,800	161,600
Tarrant	1,170,100	1,446,200	1,809,000	2,110,600	3,047,900
Wise	34,700	48,800	59,100	68,600	104,000
Twelve-County Area	4,013,400	5,197,400	6,417,500	7,698,900	11,411,700
State of Texas	16,986,500	20,851,800	25,145,600	29,145,500	-
United States	248,709,900	281,424,600	308,745,500	331,449,300	-
County	Annual Growth		Percent Population Distribution By County		Share of New Growth (2020-2045)
	1990-2020	2020-2045	2020	2045	
Collin	4.8%	2.1%	13.8%	15.7%	19.5%
Dallas	1.2%	1.2%	33.9%	31.0%	24.8%
Denton	4.1%	2.1%	11.8%	13.3%	16.4%
Ellis	2.8%	2.0%	2.5%	2.8%	3.4%
Hood	2.5%	1.8%	0.8%	0.8%	0.9%
Hunt	1.5%	1.5%	1.3%	1.3%	1.2%
Johnson	2.1%	1.5%	2.3%	2.3%	2.1%
Kaufman	3.5%	1.5%	1.9%	1.8%	1.7%
Parker	2.8%	1.9%	1.9%	2.1%	2.3%
Rockwall	4.9%	1.6%	1.4%	1.4%	1.4%
Tarrant	2.0%	1.5%	27.4%	26.7%	25.2%
Wise	2.3%	1.7%	0.9%	0.9%	1.0%
Twelve-County Area	2.2%	1.1%	100%	100%	100%
State of Texas	1.8%	N/A	N/A	N/A	N/A
United States	1.0%	N/A	N/A	N/A	N/A

Historical Regional Employment Trends

Employment statistics are used as relative indicators of trip attractions to an area. Intense employment growth in an area indicates the potential for an increase in the demand for transportation infrastructure. The countywide historical employment trends in the DFWMA are shown in **Table 4-3**. Between 1990 and 2010, employment in the twelve-county area increased at an annual rate of 3.3 percent, which was higher than the employment growth rate of both the state and the nation. Dallas County is the most prominent employment center in the twelve-county region and is home to many industrial and medical institutions such as AT&T, Bank of America, Southwest Airlines, Texas Instruments, Baylor University Medical Center, and Texas Health Presbyterian Hospital. According to figures presented by NCTCOG, Dallas County added 695,053 new jobs between 1990 and 2010 at an annual average rate of 2.2 percent. In 2010, jobs in Dallas County represented 48.5 percent of the total employment in the twelve-county area.

Approximately 342,261 new jobs were added to Collin County between 1990 and 2010, which corresponds to an annual average rate of 8.0 percent. Fourteen percent of the total jobs produced in the region from 1990 to 2010 were added to Collin County, whose employment growth rate was the highest in the DFWMA during that period. Denton County experienced strong employment growth between 1990 and 2010; employment grew from 75,817 in 1990 to 244,358 in 2010, corresponding to an additional 168,541 jobs at an annual average rate of 5.5 percent. Tarrant County employment increased from 586,058 in 1990 to 1.05 million in 2010, adding 465,469 new jobs. During 2010, the total employment in Tarrant County represented 26 percent of the total employment in the DFWMA.

Employment distributions by county are also shown in **Table 4-3**. Dallas and Tarrant counties incorporate the bulk of the employment centers in the DFWMA, encompassing 74.7 percent of the region's total employment in 2010. **Figures 4-3** and **4-4** show historical unemployment and employment growth rates for DFW and the United States. As can be seen, the DFW area has been consistently tracked closely with or outperformed national trends for both unemployment and overall employment growth. There was a noticeable uptick in the unemployment rate from March 2020 through June 2020 due to the economic slowdown because of the COVID-19 pandemic. However, unemployment rates have since dropped back down to pre-pandemic levels.

Table 4-3. Countywide Employment Trends and Projections (NCTCOG Forecast)

County	Historical Employment			NCTCOG Forecast	
	Year 1990	Year 2000	Year 2010	Year 2045	
Collin	93,700	204,100	436,000	1,068,600	
Dallas	1,255,000	1,745,100	1,950,000	3,578,800	
Denton	75,800	152,800	244,400	694,400	
Ellis	27,800	49,100	60,000	136,200	
Hood	N/A	N/A	18,600	47,300	
Hunt	N/A	N/A	41,800	70,600	
Johnson	26,200	45,100	66,000	120,600	
Kaufman	17,200	31,000	39,900	82,600	
Parker	16,200	29,800	52,100	102,300	
Rockwall	7,500	17,000	30,600	88,700	
Tarrant	586,100	864,400	1,051,500	2,066,700	
Wise	N/A	19,800	29,500	54,300	
Twelve-County Area*	2,105,400	3,138,400	4,020,500	8,111,100	
State of Texas	9,242,900	12,151,400	14,508,200		
United States	138,331,000	165,371,000	174,062,600		
County	Annual Growth		Employment Distribution		Percentage of New Employment (2010-2045)
	1990-2010	2010-2045	2010	2045	
Collin	8.0%	2.6%	10.8%	13.2%	15.5%
Dallas	2.2%	1.7%	48.5%	44.1%	39.8%
Denton	6.0%	3.0%	6.1%	8.6%	11.0%
Ellis	3.9%	2.4%	1.5%	1.7%	1.9%
Hood	N/A	2.7%	0.5%	0.6%	0.7%
Hunt	N/A	1.5%	1.0%	0.9%	0.7%
Johnson	4.7%	1.7%	1.6%	1.5%	1.3%
Kaufman	4.3%	2.1%	1.0%	1.0%	1.0%
Parker	6.0%	1.9%	1.3%	1.3%	1.2%
Rockwall	7.3%	3.1%	0.8%	1.1%	1.4%
Tarrant	3.0%	1.9%	26.2%	25.5%	24.8%
Wise	N/A	1.8%	0.7%	0.7%	0.6%
Twelve-County Area*	3.3%	2.0%	100%	100%	100%
State of Texas	2.3%	N/A	N/A	N/A	N/A
United States	1.2%	N/A	N/A	N/A	N/A

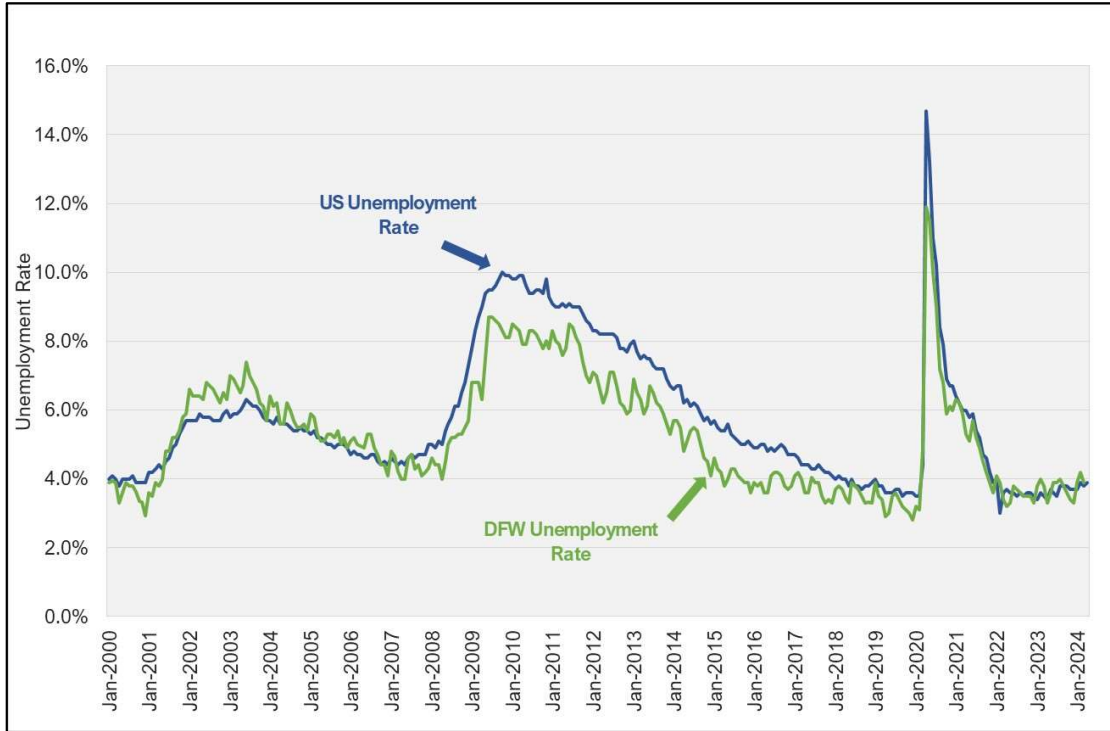


Figure 4-3. Historical Unemployment Rates

Source: Bureau of Labor Statistics

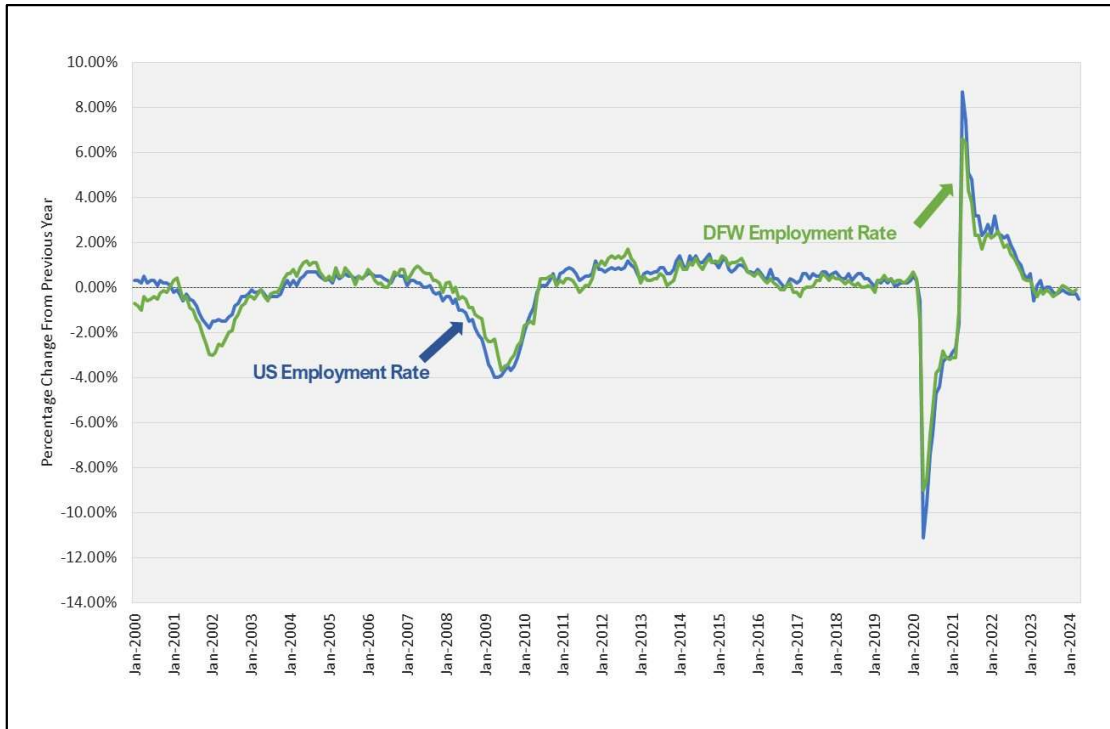


Figure 4-4. Historical Employment Growth

Source: Bureau of Labor Statistics

Future Regional Employment Growth

Table 4-3 also shows the NCTCOG employment estimates for 2010 and forecasts for 2045. Dallas County will continue to be the major employment center in the region and is expected to add an additional 1.63 million jobs by 2045. Dallas County employment is expected to increase from 1.95 million in 2010 to 3.56 million in 2045 at an annual average rate of 1.7 percent. Dallas County is expected to house 39.8 percent of the total additional jobs in the twelve-county region. Collin County's employment is projected to increase from 436,000 in 2010 to 1.07 million in 2045 at an average annual average rate of 2.6 percent. Collin County is expected to gain 15.5 percent of the total regional employment growth. Denton County's employment is projected to increase from 244,400 in 2010 to 694,400 in 2045 at an annual average rate of 3.0 percent. Denton County is expected to gain 11.0 percent of the total regional employment growth.

Employment in Tarrant County is expected to reach 2.07 million in 2045, a 1.01 million increase from the 2010 employment of 1.05 million. This represents an annual average growth rate of 1.9 percent between 2010 and 2045. Tarrant County is expected to account for 24.8 percent of the total additional jobs in the twelve-county region. Between 2010 and 2045, 4.1 million additional jobs are expected to be added in the twelve-county region at an annual average rate of 2.0 percent. **Table 4-3** also presents year 2045 employment distributions for the twelve-county region. The major employment concentrations are expected to continue to be located in Dallas and Tarrant Counties. However, the projections anticipate the migration of jobs from the major city centers to the suburban areas throughout the DFWMA.

Regional Median Household Income Trends

Travel demand, and specifically demand for toll roads, is sensitive to the amount of disposable income available within a household. A reliable indicator of a household's propensity for trip-making, and specifically a motorist's willingness to pay a toll, is median household income. Generally, households with higher incomes have a propensity to make more automobile trips than those with lower incomes due to their greater levels of disposable income. Value of time (VOT), a key factor in motorists' willingness to pay tolls, also tends to be higher in households with higher incomes.

A comparison of median household income for the twelve-county region is provided in **Table 4-4**. The most recent median household income data estimated by the U.S. Census Bureau for 2022 are provided for the twelve-county area, the state, and the nation. The median household income data presented in **Table 4-4** indicates that when reported in real 2023 dollars, income in the region, the state, and the nation grew moderately between 1989 and 2010 but then grew significantly between 2010 and 2020. However, due to inflationary trends, median household income declined slightly between 2020 and 2022. Despite this trend, several of the surrounding

counties continue to have median incomes much higher than statewide and national averages. **Figure 4-5** represents the median household income from the 2022 American Community Survey Five-Year Estimates at the TAP zone level for the NTTA System area presented in constant 2022 dollars. Most of the zones with the highest median household incomes are in Collin and Denton counties near the PGBT, SRT, and north DNT corridors.

Table 4-4. Median Household Income (in Real 2023 Dollars)

County	Year					Average Annual Growth Rate		
	1989	2000	2010	2020	2022	(1989-2010)	(1989-2022)	(2020-2022)
Collin County	\$114,418	\$133,720	\$110,021	\$121,115	\$120,543	-0.2%	0.2%	-0.2%
Dallas County	\$72,882	\$75,333	\$66,284	\$78,434	\$74,976	-0.5%	0.2%	-2.2%
Denton County	\$89,065	\$106,178	\$97,034	\$108,379	\$108,661	0.4%	0.6%	0.1%
Ellis County	\$67,453	\$87,030	\$81,855	\$95,224	\$94,488	0.9%	1.1%	-0.4%
Hood County	\$74,920	\$77,447	\$74,372	\$101,902	\$79,921	0.0%	0.9%	-11.4%
Hunt County	\$58,012	\$63,479	\$59,122	\$64,111	\$71,959	0.1%	0.3%	5.9%
Johnson County	\$70,319	\$76,755	\$73,986	\$80,356	\$81,193	0.2%	0.4%	0.5%
Kaufman County	\$59,965	\$76,269	\$80,400	\$91,054	\$98,191	1.4%	1.3%	3.8%
Parker County	\$72,310	\$80,675	\$80,672	\$105,680	\$100,796	0.5%	1.2%	-2.3%
Rockwall County	\$97,643	\$115,820	\$114,615	\$126,679	\$131,491	0.8%	0.8%	1.9%
Tarrant County	\$76,880	\$83,849	\$74,158	\$85,940	\$80,704	-0.2%	0.3%	-3.1%
Wise County	\$63,665	\$74,743	\$73,643	\$85,429	\$84,736	0.7%	0.9%	-0.4%
State of Texas	\$62,306	\$67,618	\$68,704	\$78,765	\$76,466	0.5%	0.7%	-1.5%
United States	\$68,915	\$72,635	\$70,716	\$80,306	\$79,085	0.1%	0.5%	-0.8%

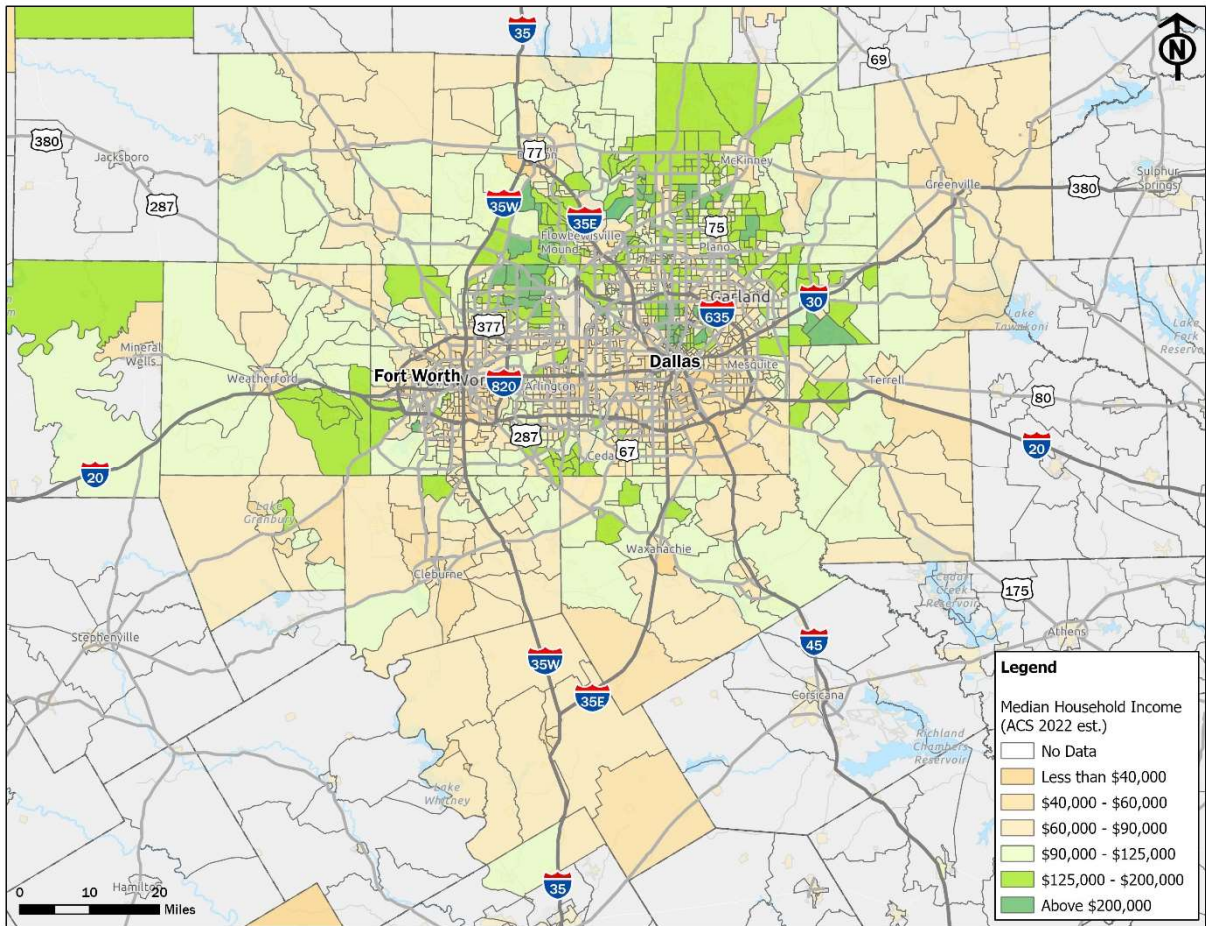


Figure 4-5. NTTA System - Median Household Income

Socioeconomic Indicators

Major Employment Establishments

NCTCOG maintains a comprehensive list of major employment establishments in the DFW region. The locations of those companies are shown in **Figure 4-6**. Additionally, there are several employment locations near NTTA System corridors that have over 2,000 employees, and those locations have significant potential for generating traffic on the NTTA System. Many of these businesses are medical institutions, including Parkland Health and Hospital System, Baylor University Medical Center, Children's Medical Center, UT Southwestern Medical Center, and Texas Health Presbyterian Hospital. Other major companies located near the NTTA System include AT&T, Verizon, American Airlines, Southwest Airlines, Nebraska Furniture Mart, FedEx, JC Penney, Toyota, and Bank of America.

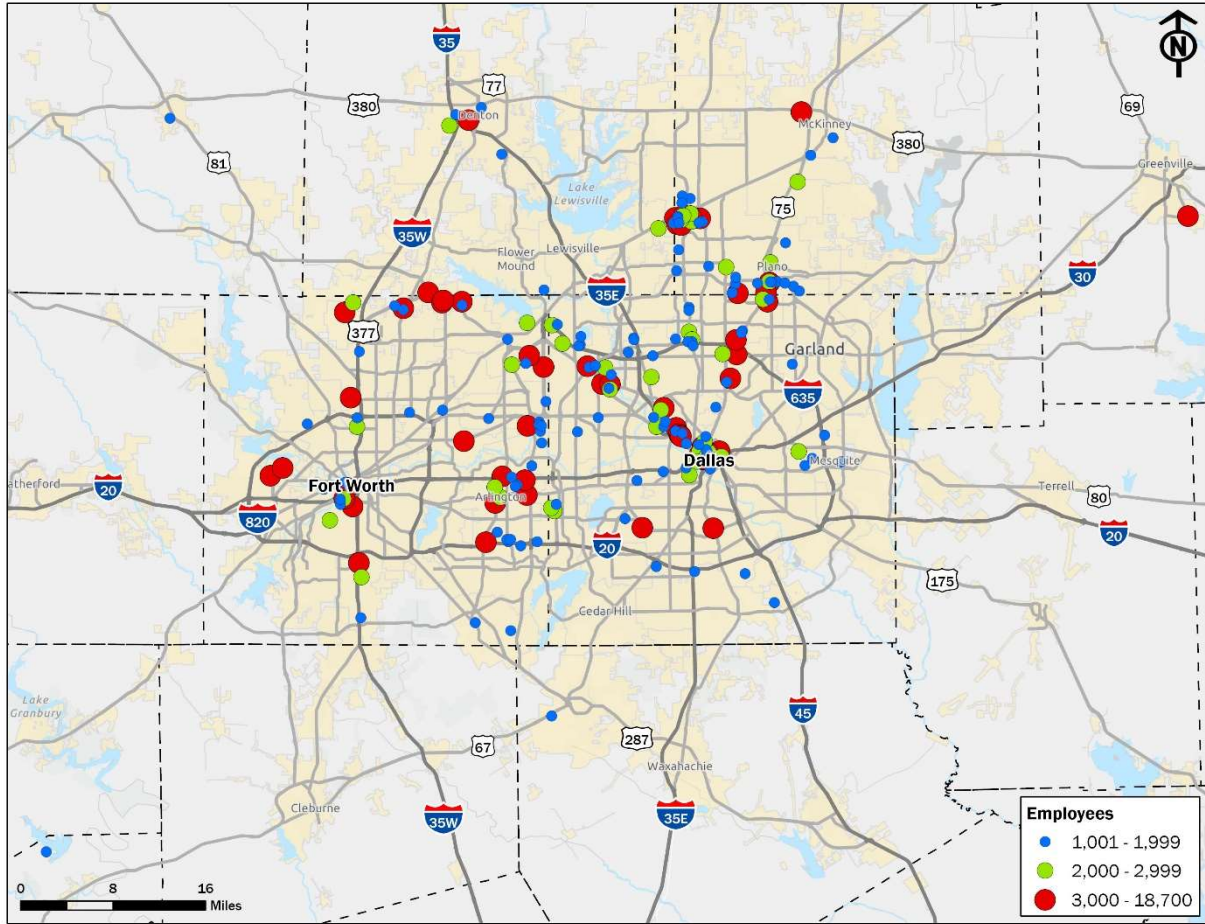


Figure 4-6. Location of Major Employers near NTTA System Facilities

Consumer Price Index

The consumer price index for all urban consumers (CPI-U) is the most widely used measure of inflation and serves as an economic indicator. The CPI-U determines the aggregate price-level of a specific market basket of goods and services that are consumed by typical urban households. This is done by calculating the average going price of each item in the market basket. Food, clothing, housing, transportation (including tolls) and entertainment are all included in the basket. Income taxes and investment items such as stocks and bonds are not included. The Bureau of Labor and Statistics (BLS) of the U.S. Department of Labor calculates the CPI-U every month.

The consumer price index for the base time frame (1982-1984) is 100. Inflation is determined by finding the percentage change in the CPI-U from one year to the next. **Table 4-5** gives the historical trends for CPI-U from 1985-2023 for DFW, the Southern Region (Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, Washington D.C., and West Virginia), and the United States. As indicated in **Table 4-5**, the CPI-U in DFW has continually increased at a similar rate to the CPI-U for both the Southern Region and the United States. This indicates that the inflation rate in DFW is consistent with the rate of inflation seen nationwide. Between 1989 and 2023, the CPI-U in the DFW region grew at an average annual rate of 2.6 percent per year, which is similar to the inflation rate experienced by the Southern Region and the nation during that time. More recently, between 2019 and 2023, CPI-U grew at an annual average rate of 4.8 percent for DFW, 4.7 percent for the Southern Region, and 4.5 percent for the United States.

Table 4-5. Consumer Price Index for All Urban Consumers (CPI-U: 1982-84 = 100)

Year	Dallas-Fort Worth	Growth	Southern Region	Growth	United States City Average	Growth
1984	104.3		103.8		103.9	
1985	108.2	3.7%	107.1	3.2%	107.6	3.5%
1986	109.9	1.6%	108.9	1.7%	109.6	1.9%
1987	112.9	2.7%	112.4	3.2%	113.6	3.7%
1988	116.1	2.8%	116.4	3.6%	118.3	4.1%
1989	119.5	2.9%	121.5	4.4%	124.0	4.8%
1990	125.1	4.7%	127.9	5.3%	130.7	5.4%
1991	130.8	4.6%	132.9	3.9%	136.2	4.2%
1992	133.9	2.4%	136.5	2.7%	140.3	3.0%
1993	137.3	2.5%	140.8	3.2%	144.5	3.0%
1994	141.2	2.8%	144.7	2.8%	148.2	2.6%
1995	144.9	2.6%	149	3.0%	152.4	2.8%
1996	148.8	2.7%	153.6	3.1%	156.9	2.9%
1997	151.4	1.7%	156.9	2.1%	160.5	2.3%
1998	153.6	1.5%	158.9	1.3%	163.0	1.6%
1999	158	2.9%	162	2.0%	166.6	2.2%
2000	164.7	4.2%	167.2	3.2%	172.2	3.4%
2001	170.4	3.5%	171.1	2.3%	177.1	2.8%
2002	172.7	1.3%	173.3	1.3%	179.9	1.6%
2003	176.2	2.0%	177.3	2.3%	184.0	2.3%
2004	178.7	1.4%	181.8	2.5%	188.9	2.7%
2005	184.7	3.4%	188.3	3.6%	195.3	3.4%
2006	190.1	2.9%	194.7	3.4%	201.6	3.2%
2007	193.2	1.7%	200.4	2.9%	207.3	2.9%
2008	201.8	4.4%	208.7	4.2%	215.3	3.8%
2009	200.5	-0.6%	207.8	-0.4%	214.5	-0.4%
2010	201.6	0.5%	211.3	1.7%	218.1	1.6%
2011	207.9	3.1%	218.6	3.4%	224.9	3.2%
2012	212.2	2.1%	223.2	2.1%	229.6	2.1%
2013	216.0	1.8%	226.7	1.6%	233.0	1.5%
2014	218.4	1.1%	230.6	1.7%	236.7	1.6%
2015	217.5	-0.4%	230.1	-0.2%	237.0	0.1%
2016	218.9	0.6%	232.7	1.1%	240.0	1.3%
2017	223.8	2.2%	237.5	2.0%	245.1	2.1%
2018	230.3	2.9%	242.7	2.2%	251.1	2.4%
2019	236.5	2.7%	246.3	1.5%	255.7	1.8%
2020	238.9	1.0%	248.6	1.0%	258.8	1.2%
2021	247.0	3.4%	261.3	5.1%	271.0	4.7%
2022	269.3	9.0%	283.7	8.6%	292.7	8.0%
2023	284.9	5.8%	296.4	4.5%	304.7	4.1%
Compounded Annual Growth						
(1989-2023)	-	2.6%	-	2.7%	-	2.7%
(2009-2023)	-	2.5%	-	2.6%	-	2.5%
(2019-2023)	-	4.8%	-	4.7%	-	4.5%

(CPI-U: 1982-84 = 100)

Trends in Building Permits

The housing industry accounts for a large percentage of investment spending. Building permits are leading economic indicators as they help predict where the economy is headed in the near future. Sustained declines in building permits slow the economy and can be indicative of a potential recession. Likewise, increases in this leading indicator can potentially indicate or trigger economic growth. The trends in single-family residential building permits for the DFW region are presented in **Figure 4-7**. Single-family building permits have generally continued to grow year to year, with some exceptions. Between 1988 and 2006, the total number of single-family building permits increased at an annual average rate of 6.6 percent in the DFW region; however, due to the recession, the number of building permits issued since 2006 dropped significantly. Between 2006 and 2009, the number of single-family building permits decreased at an annual average rate of more than 30 percent. However, there has been a steady increase in building permits since 2011, despite a slight drop in building permit growth in 2020 due to the negative impacts of the COVID-19 pandemic.

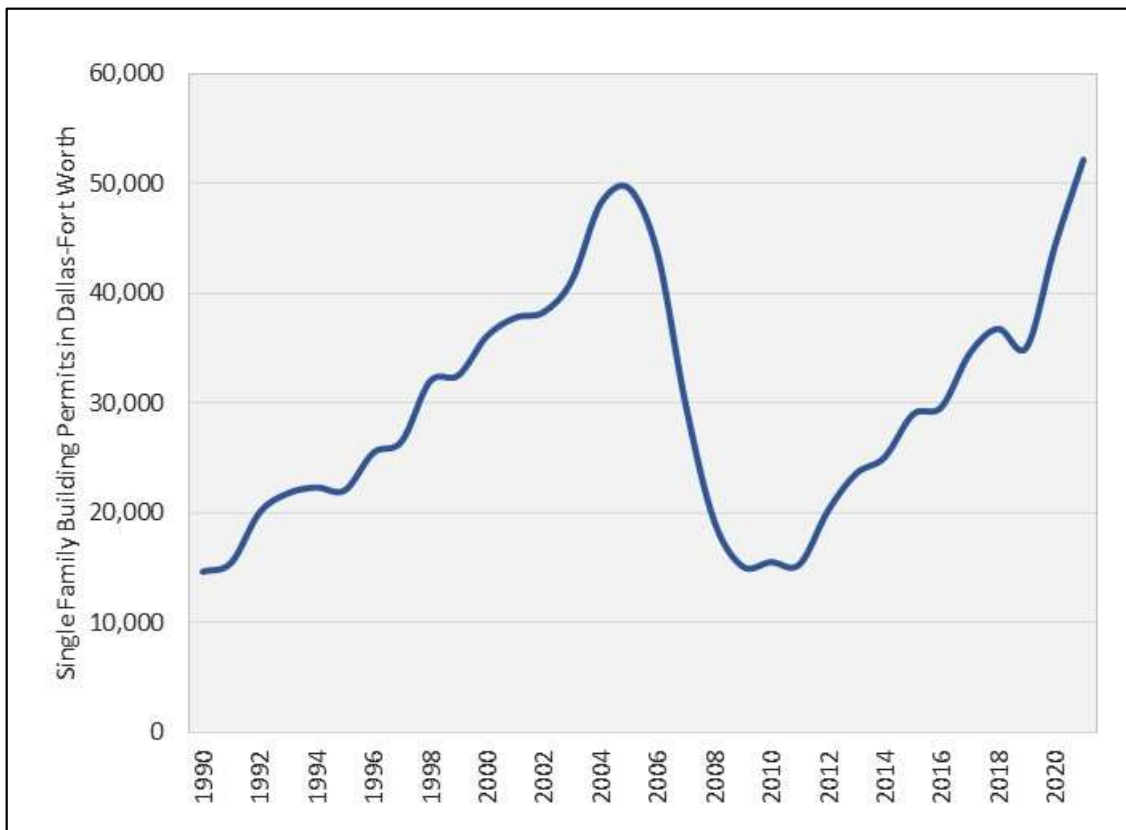


Figure 4-7. Trends in Single Family Building Permits in Dallas-Fort Worth Region

Regional Home Sales

Trends in home prices and the number of sales can serve as a good indicator of the state of a local economy. Growth in the median sale price of area homes is presented for the Dallas multiple listing service (MLS), Collin County MLS, Denton County MLS, and the State of Texas in **Figure 4-8**. The median price of homes sold has been steadily increasing in the DFW region and throughout the state since 2011. Dallas area home prices grew steadily through 2020 but began to sharply increase in 2021, reaching a peak in 2022. As of 2023, the median sale price of area homes for the State of Texas was \$335,000, with Collin County's median sale price at approximately \$507,000. **Figure 4-9** shows the total number of homes sold in the Dallas Fort Worth MSA region annually since 2000. Home sales dropped significantly in 2007 and reached a ten-year low in 2010. However, home sales grew steadily over the next decade, peaking in 2020 and 2021. Home sales have since declined slightly in 2022 and 2023.

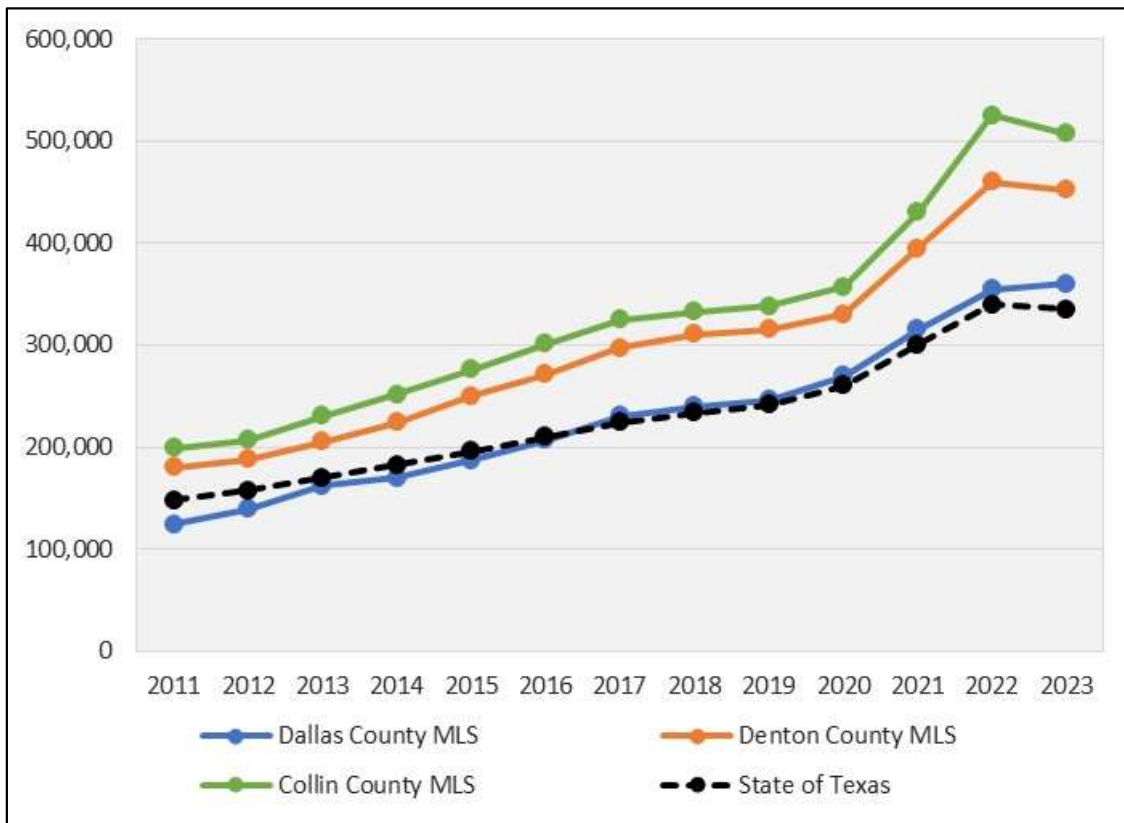


Figure 4-8. Median Home Sale Prices

(Source: Texas A&M Real Estate Center)

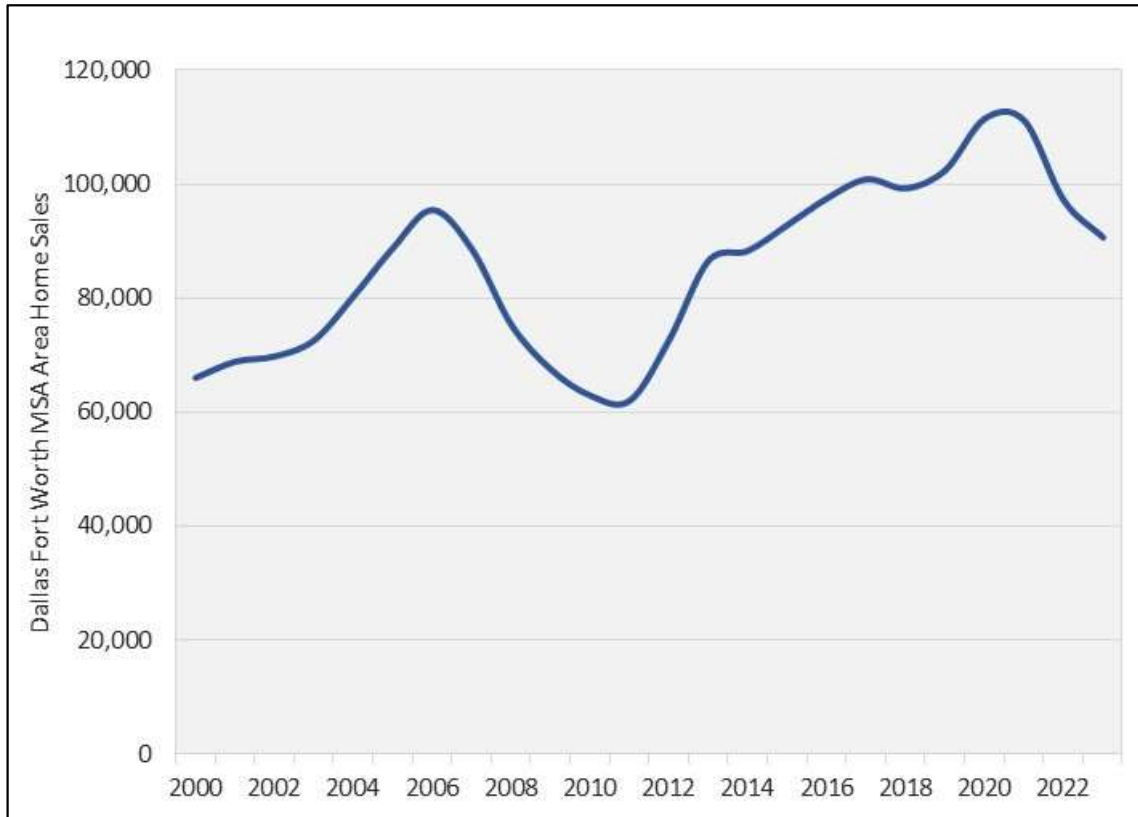


Figure 4-9.

Dallas Fort Worth MSA Area Home Sales

(Source: Texas A&M Real Estate Center)

Gasoline Prices

Figure 4-10 shows the average weekly gasoline price in Texas over the past nine years. Trends in gasoline prices in Texas fell sharply during the second half of 2014 and dropped below \$2.00 per gallon for the first time since early 2012. Prices during the month of April 2020 also depicted a sharp decline as the crude oil futures market briefly turned negative because of the decline in demand for oil due to the enforcement of various travel-related restrictions in several parts of the world to combat the COVID-19 pandemic. Throughout 2021 and 2022, gasoline prices steadily increased, peaking at over \$4.50 per gallon in mid-2022. Prices have since lowered to approximately \$3.00 per gallon over the last two years. However, transactions on the NTTA System have historically been shown to be relatively inelastic to fluctuations in gasoline price.

Future Population and Employment along NTTA System Corridors

The revised population and employment growth between 2024 and 2045 for the NTTA System area of influence disaggregated at the TAP zone level is highlighted in **Figure 4-11** and **Figure 4-12**.

Population Growth Estimates

Figure 4-11 identifies the total population growth in the revised demographic forecasts by zone. Many of the zones in the NTTA System area show anticipated annual population growth rates of more than 1,000 between 2024 and 2045, particularly in Collin and Denton Counties. However, although several zones are expected to generate small population growth by 2045, many of the zones with large, forecasted growth in population are located directly adjacent to NTTA System facilities. As seen in **Figure 4-11**, there are several high-population growth zones along the DNT and SRT corridors.

Employment Growth Estimates

Figure 4-12 identifies the total anticipated employment growth by zone in the NTTA System area. Many of the zones in the central portion of the region show low employment growth through 2045. However, zones with higher projected employment growth are more concentrated in Collin County and Denton County.

Comparison of Official and Revised Demographics

Tables 4-6 and **4-7** show a comparison of the official and revised demographics (population and total employment) projections for years 2024 and 2045. For 2024 and 2045, the revised population estimates are lower than NCTCOG official demographics for Dallas and Tarrant counties but higher for Collin County. The total revised population for the region is slightly lower than the NCTCOG official forecast for both years. The revised regional employment forecasts are slightly lower for 2024 but are three percent higher than the official forecast for 2045. However, the revised employment is higher than official forecasts in both 2024 and 2045 in Collin and Dallas counties.

Figures 4-13 and **4-14** compare NCTCOG's official population and the revised population forecast near the NTTA System for 2024 and 2045. The overall revised population forecast is slightly lower than the NCTCOG forecast, but several zones through the NTTA System area are anticipated to exceed NCTCOG projections. **Figures 4-15** and **4-16** show a comparison of NCTCOG's official employment and the revised employment forecast near the NTTA System for the years 2024 and 2045. As shown in the figures, the revised employment for 2024 is higher at several locations along NTTA System corridors, and projected employment by 2045 exceeds NCTCOG projections throughout the region.

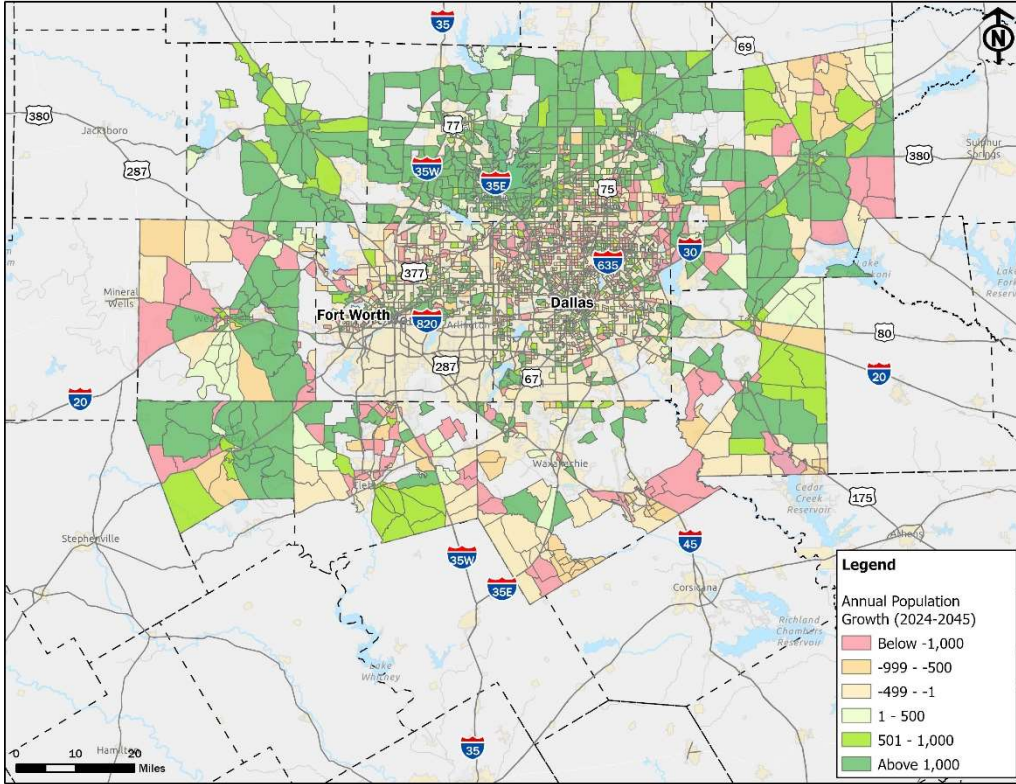


Figure 4-11. Annual Average Population Growth: 2024-2045

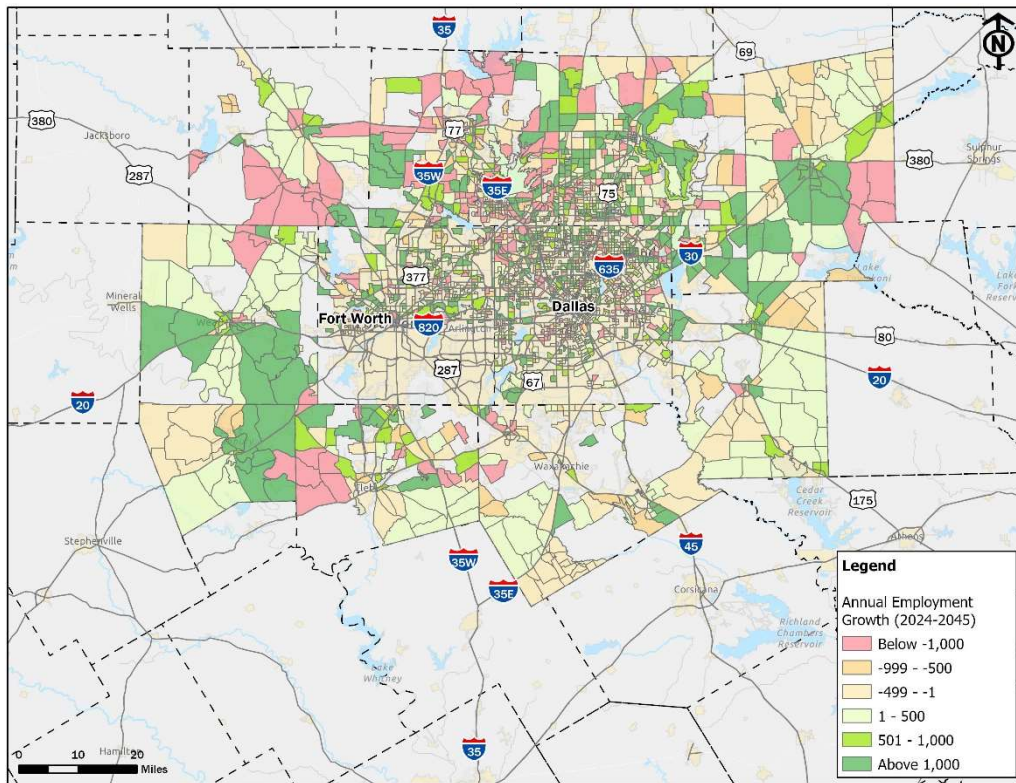


Figure 4-12. Annual Average Employment Growth: 2024-2045

Table 4-6. Population Forecast Comparisons

Population	2024			2025		
	Official (000s)	Revised (000s)	Delta	Official (000s)	Revised (000s)	Delta
Collin	417	418	0%	625	644	3%
Dallas	1,032	1,002	-3%	1,257	1,206	-4%
Denton	359	366	2%	536	520	-3%
Ellis	72	76	5%	105	122	16%
Hill	15	15	-2%	18	18	-1%
Hood	27	26	-2%	37	33	-12%
Hunt	40	40	0%	52	50	-3%
Johnson	68	69	1%	90	90	0%
Kaufman	51	57	11%	66	93	41%
Parker	58	60	3%	80	87	8%
Rockwall	39	41	3%	54	61	13%
Tarrant	814	803	-1%	1,057	993	-6%
Wise	28	27	-2%	36	46	28%
Total	3,021	2,999	-0.7%	4,013	3,962	-1.3%

Table 4-7. Employment Forecast Comparisons

Employment	2024			2025		
	Official (000s)	Revised (000s)	Delta	Official (000s)	Revised (000s)	Delta
Collin	741	758	2%	1,069	1,116	4%
Dallas	2,619	2,635	1%	3,577	3,652	2%
Denton	487	458	-6%	716	715	0%
Ellis	96	87	-9%	136	143	5%
Hill	18	17	-6%	21	21	1%
Hood	35	33	-5%	47	46	-2%
Hunt	52	47	-9%	71	79	12%
Johnson	88	86	-3%	121	133	10%
Kaufman	60	58	-5%	83	91	11%
Parker	75	69	-8%	102	107	5%
Rockwall	62	57	-8%	89	87	-1%
Tarrant	1,469	1,498	2%	2,047	2,133	4%
Wise	41	36	-13%	54	56	2%
Total	5,844	5,838	-0.1%	8,132	8,379	3.0%

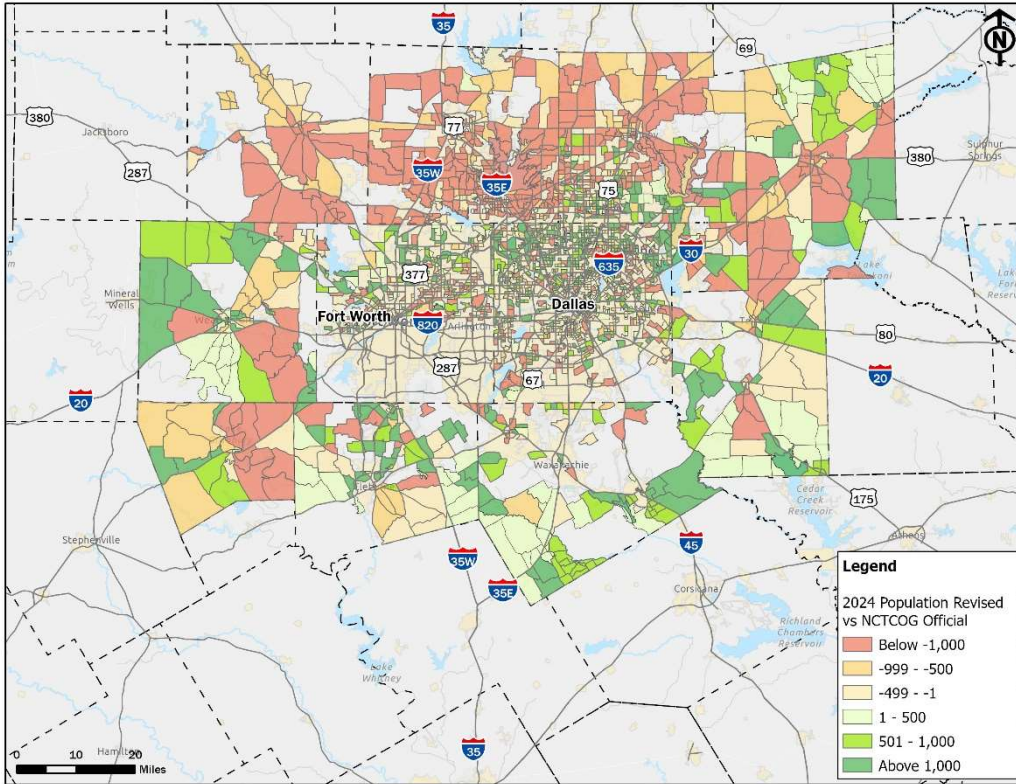


Figure 4-13. 2024 Population Comparison – Revised vs. NCTCOG Official

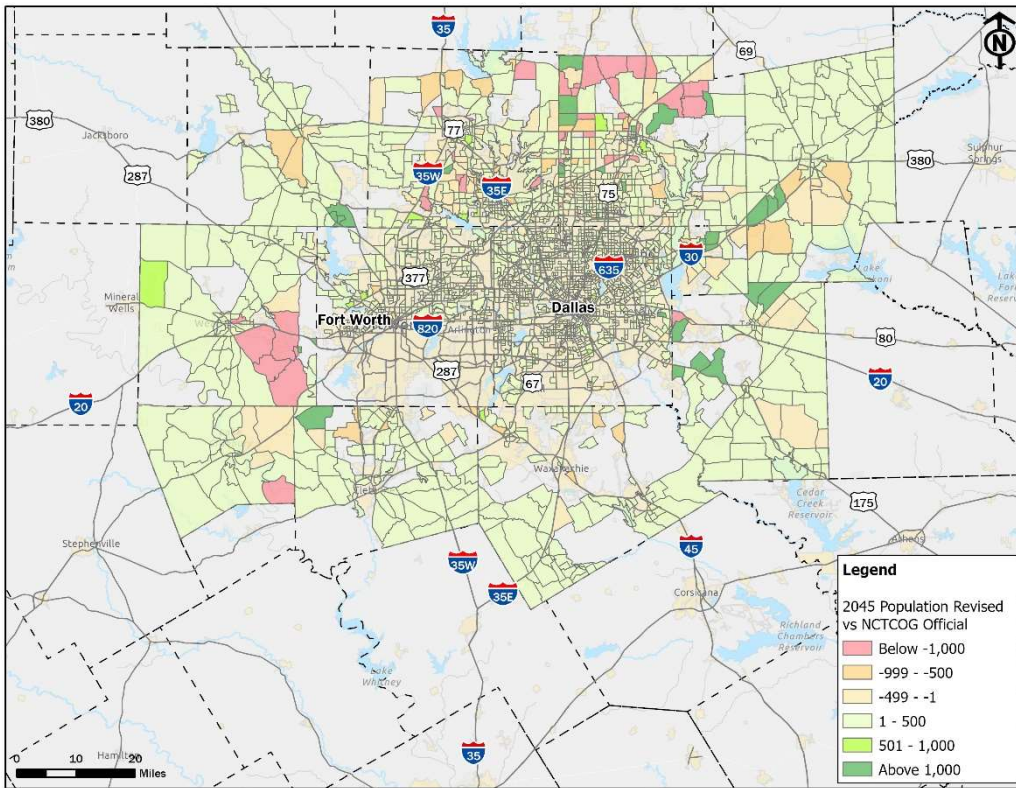


Figure 4-14. 2045 Population Comparison – Revised vs. NCTCOG Official

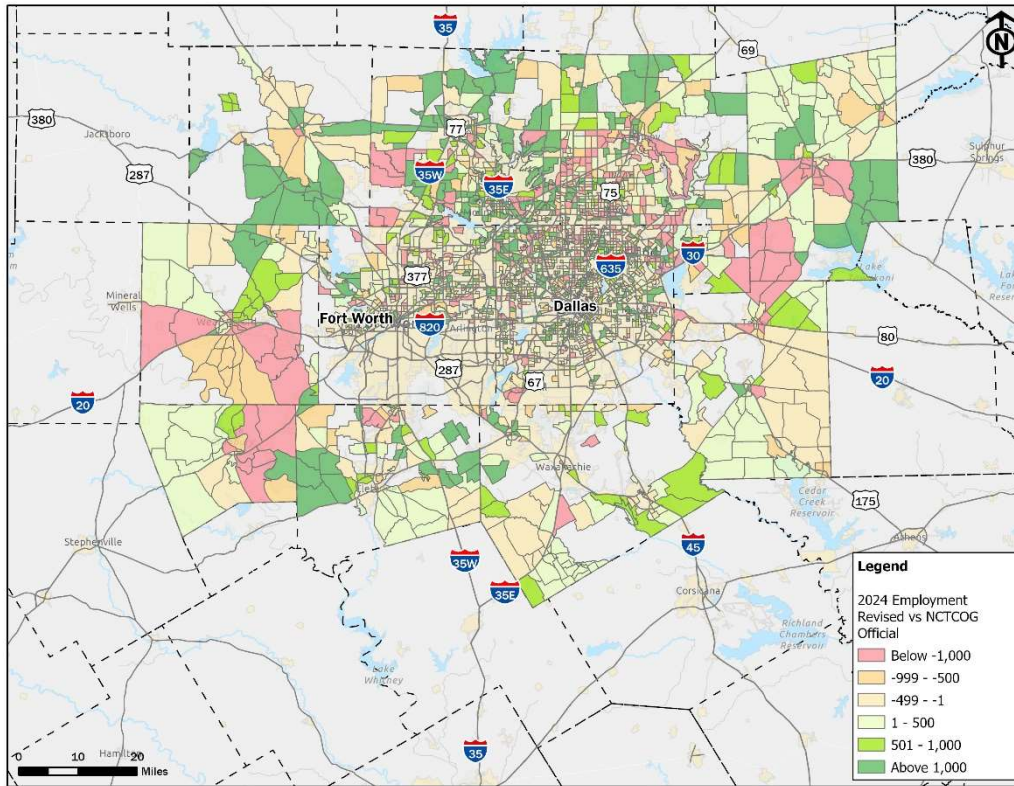


Figure 4-15. 2024 Employment Comparison – Revised vs. NCTCOG Official

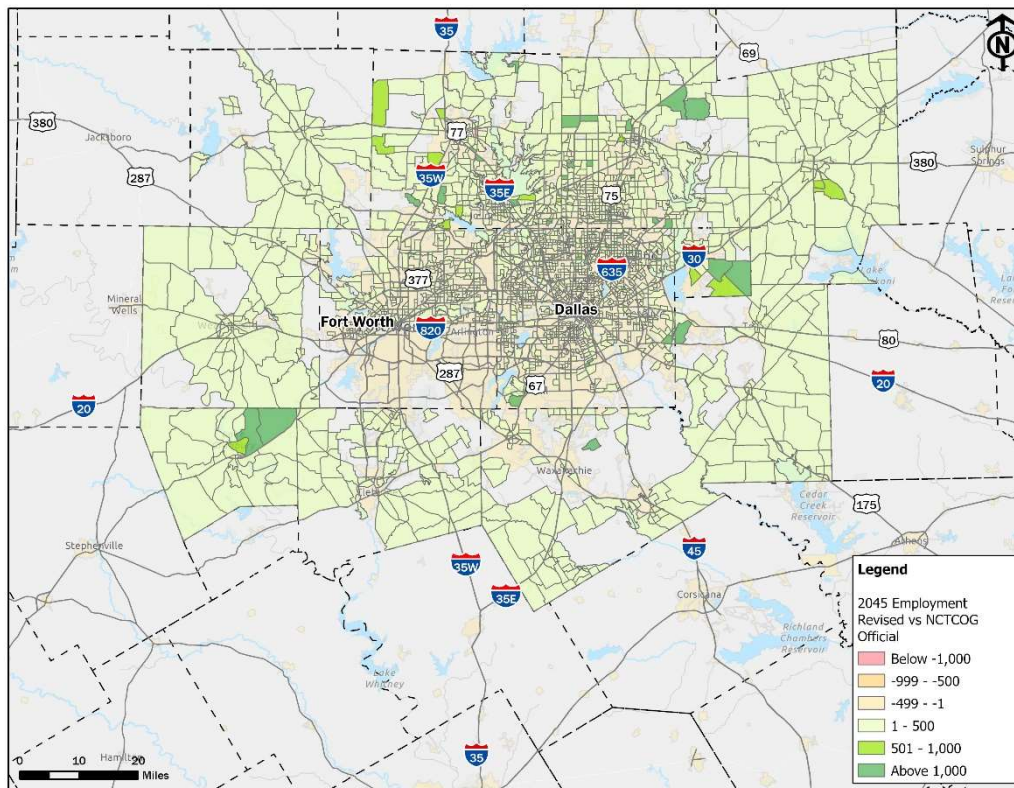


Figure 4-16. 2045 Employment Comparison – Revised vs. NCTCOG Official

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Section 5

Travel Demand Model Development

This section describes the travel demand model calibration process, including database modifications, updates to the TransCAD network, and socio-economic characteristics in the vicinity of NTTA System roadways. **Figure 5-1** illustrates the travel demand process used by CDM Smith for developing the traffic and toll revenue forecasts. This methodology ensures that results are consistent with previous analyses done for NTTA by CDM Smith for toll facilities in the Dallas/Fort Worth (DFW) area.

NCTCOG Information

For this study, the latest travel demand model information was obtained from NCTCOG. This includes the latest official demographics used in the *Mobility 2045 – 2022 Update Plan*. The data included:

- NCTCOG 5,352-zone TransCAD network structure
- Highway network characteristics for the years 2023, 2026, 2036, and 2045 in TransCAD format
- Socioeconomic information at the 5,352 Transportation Analysis Process (TAP) zone level for the years 2023, 2026, 2036, and 2045
- Trip tables (zone-to-zone matrices) for years 2024, 2026, 2036, and 2045. These trip tables were provided for the AM peak (6:30 to 9:00 AM), PM peak (3:00 to 6:30 PM), and off-peak (9:00 AM to 3:00 PM and 6:30 PM to 6:30 AM) periods.

Highway Network Update

NCTCOG's DFW highway model networks reflect the latest regional transportation improvements recommended in *Mobility 2045 – 2022 Update*. The networks incorporate all existing NTTA and TxDOT toll facilities and numerous other planned facilities in the DFWMA. Existing toll facilities were coded to reflect all current ramp and main lane toll charges.

The 2023, 2026, 2036, and 2045 networks provided by NCTCOG were reviewed for consistency and fine-tuned based on the travel time characteristics and traffic counts collected within the NTTA System corridors, described in **Section 2** of this report. This is the model network calibration process. The calibrated networks were then used to develop the forecasted NTTA System traffic and toll revenue streams. A 2024 network developed using NCTCOG's 2023 network was used as the base year for model calibration purposes.

The travel time data collected was used to adjust the free-flow speeds along NTTA System facilities and competing/parallel roadways. These adjustments accounted for geometric and

operational characteristics of the major facilities that are typically not captured or reflected as part of a regional NCTCOG calibration process of travel time attributes. Some typical factors that can influence traffic flow in the corridor are intersection design constraints, traffic signal and stop sign impedances, narrow median design, and multiple entry point characteristics.

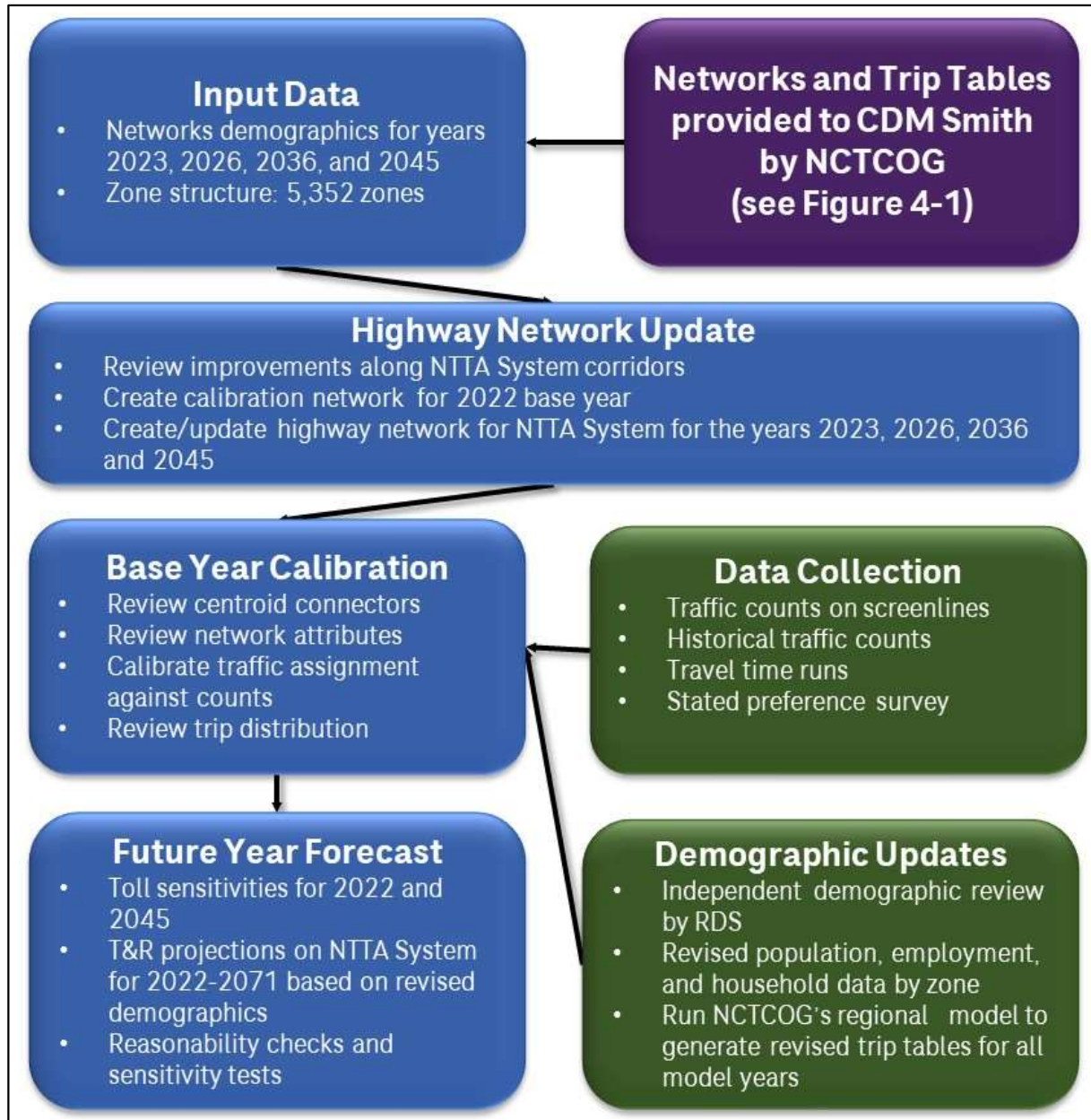


Figure 5-1. NTTA System – Travel Demand Forecasting Process

Model Calibration

The model calibration process involved comparing the 2024 traffic assignment output volumes based on the revised demographics (**Section 4**) against traffic counts obtained for this study and toll transactions at all existing NTTA ramp and mainlane toll gantries (**Section 2**). Output travel times and speeds from the travel demand model were also compared to the actual travel time information. This process was performed for each of the modeled time periods (AM peak, PM peak, and off-peak).

CDM Smith combined traffic count data collected in 2024 alongside the NTTA toll transaction data to calibrate the model and adjust the network characteristics where needed. A total of 28 screenlines were developed along the NTTA System corridors and at several strategic locations to analyze the total corridor traffic distribution and to ensure that the base model outputs reflect current traffic conditions along those corridors. Screenlines 1 through 4 analyzed traffic in the northbound and southbound directions running parallel to the DNT at each of its four mainlane toll gantries and the planned mainlane gantry for the Phase 4A extension. Screenlines 5 through 10 analyzed traffic corresponding to the six mainlane gantries on the PGBT (including PGBT EE). Screenlines S1 through S3 correspond to the three mainlane gantries on the SRT in addition to the two-mile existing toll-free section of SRT northeast of the IH 35E/SRT interchange. On PGBT WE, three screenlines were analyzed (W1, W2 and W3), and five screenlines across the Chisholm Trail Parkway were used for the calibration effort (C1, C2, C3, C4, and C5). Five screenlines were evaluated for the 360 Tollway corridor. The locations of the 26 screenlines are shown in **Figures 5-2, 5-3 and 5-4**.

As part of the calibration process, trips between select origin/destination pairs included in the revised trip tables were adjusted using Streetlight OD data to better reflect observed traffic. **Table 5-1** compares the model output volumes based on the revised demographics and the daily traffic count volumes for each of the screenlines. The model output daily volumes matched the traffic count volumes closely. Additionally, the average speeds from the model output were compared to the observed speeds collected as part of the travel time runs, included in **Section 2**, to ensure that the model accurately reflects existing traffic conditions.

Travel demand modeling practitioners in the United States use “NCHRP 255: Highway Traffic Data for Urbanized Area Project Planning and Design,” published by the Transportation Research Board, to check the reasonableness of model calibration. **Figure 5-5** shows that the percentage difference between the model volumes and traffic is generally within the acceptable range for each of the 28 screenlines according to this widely accepted model calibration standard.

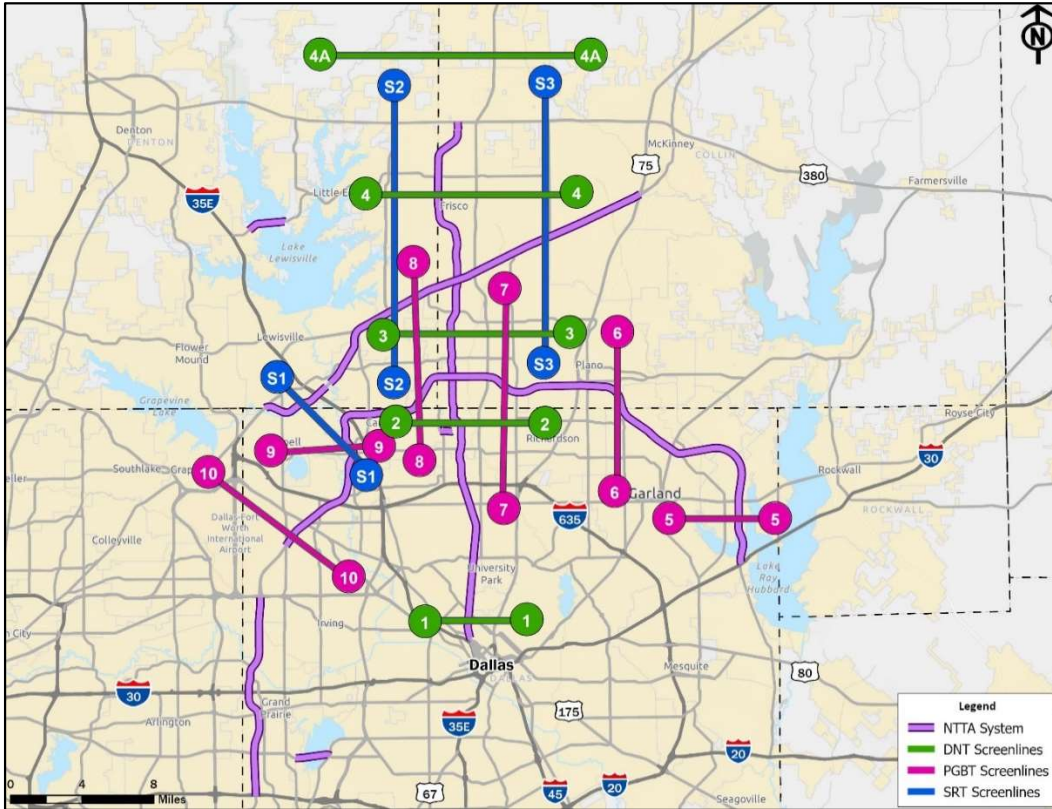


Figure 5-2. NNTA System Screenlines (DNT, PGBT, SRT)

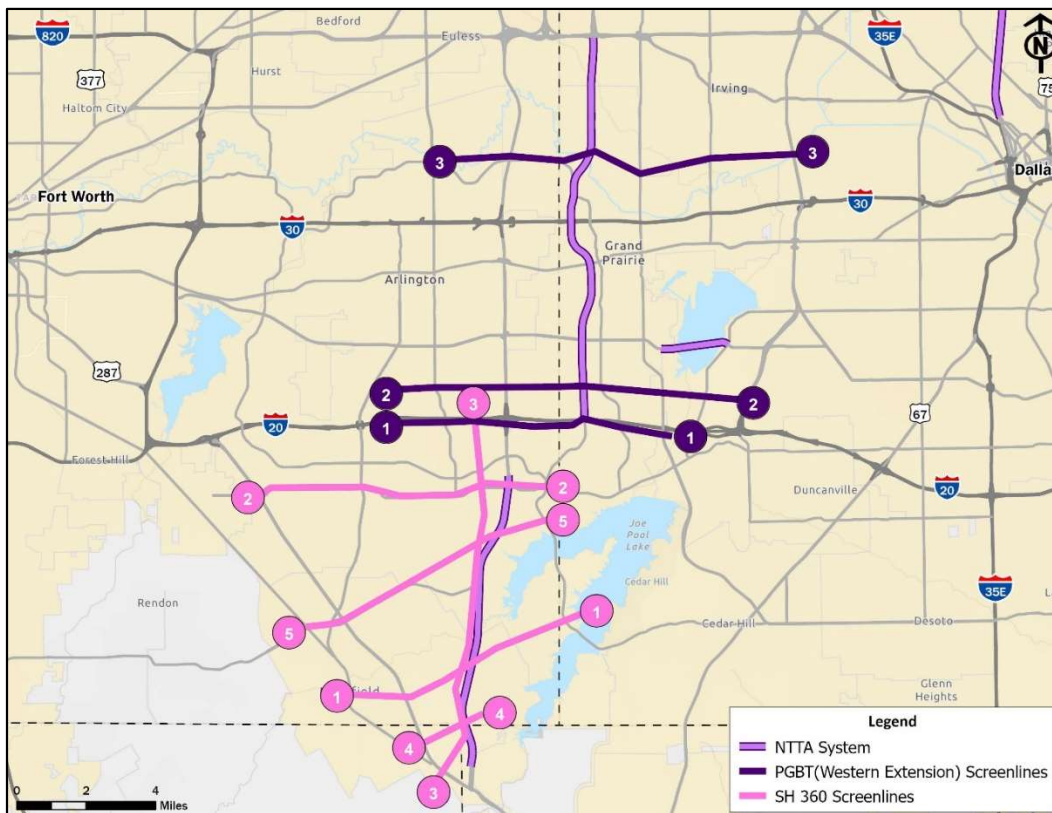


Figure 5-3. NNTA System Screenlines (PGBT WE and 360T)

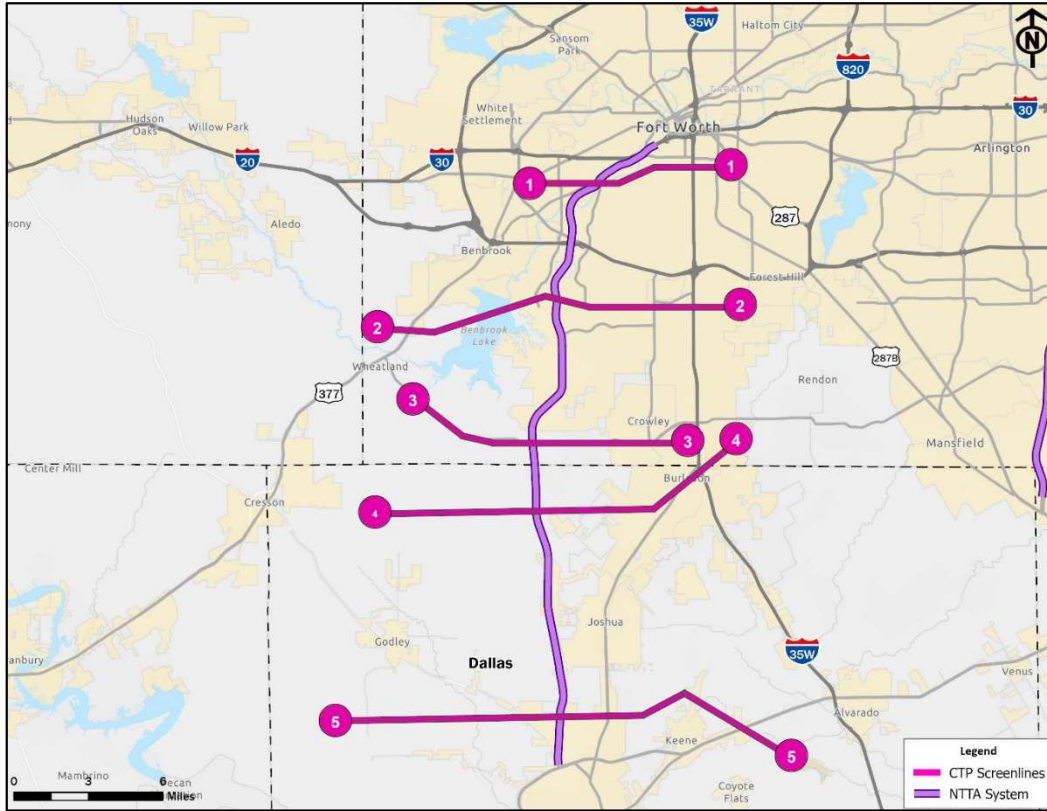


Figure 5-4. NTTA System Screenlines (CTP)

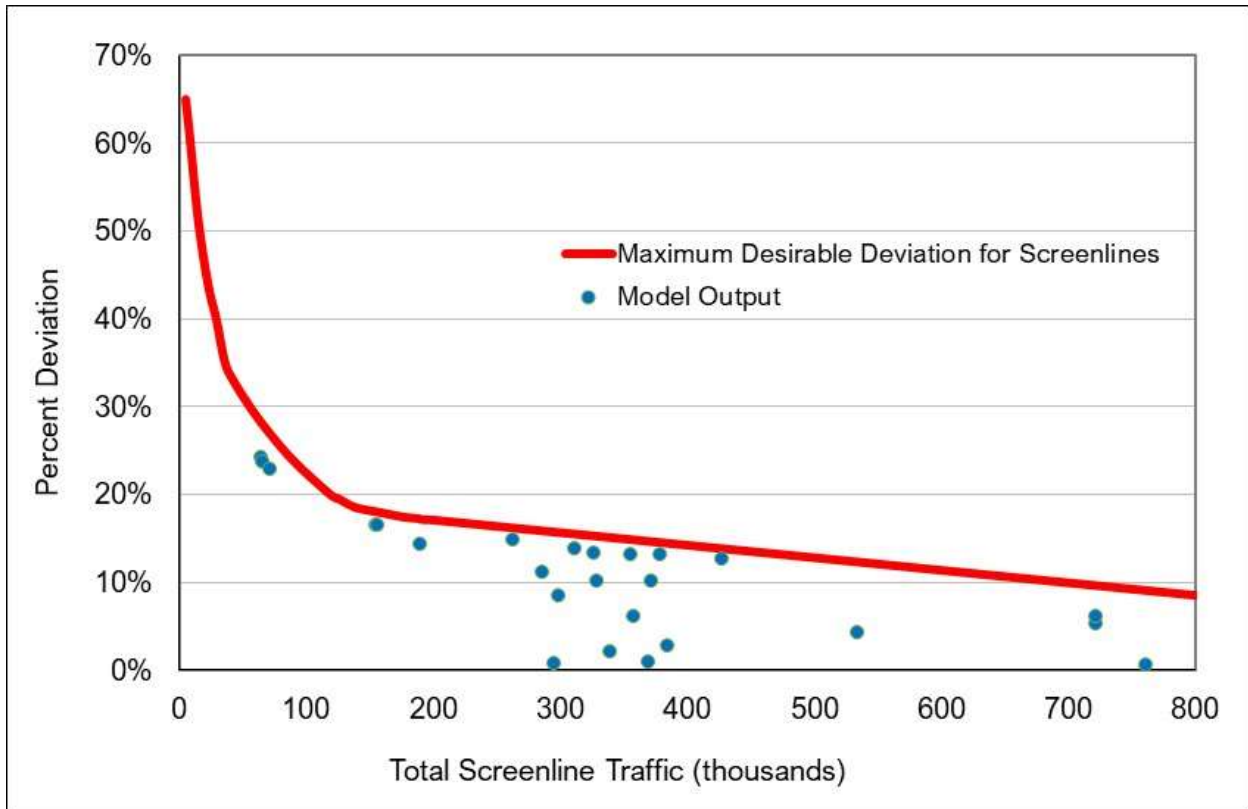


Figure 5-5. NTTA System - Screenline Traffic Validation

Table 5-1. Comparison of Traffic Counts and Model Output: Daily Total

Screenline Location	Screenline Totals		
	2024 Counts	2024 Model Volumes	Diff
Dallas North Tollway			
Screenline 1	780,700	841,500	8%
Screenline 2	685,000	721,400	5%
Screenline 3	680,500	721,900	6%
Screenline 4	366,200	329,000	-10%
President George Bush Turnpike			
Screenline 5	221,500	189,600	-14%
Screenline 6	395,500	384,800	-3%
Screenline 7	756,300	761,000	1%
Screenline 8	337,700	358,300	6%
Screenline 9	331,800	338,700	2%
Screenline 10	372,900	369,300	-1%
Sam Rayburn Tollway			
Screenline S1	296,800	294,800	-1%
Screenline S2	436,200	378,600	-13%
Screenline S3	490,200	427,800	-13%
Chisholm Trail Parkway			
Screenline C1	409,300	355,200	-13%
Screenline C2	360,700	310,900	-14%
Screenline C3	85,400	64,800	-24%
Screenline C4	186,100	155,400	-16%
Screenline C5	86,800	66,200	-24%
President George Bush Turnpike - Western Extension			
Screenline W1	512,300	534,100	4%
Screenline W2	275,200	298,600	9%
Screenline W3	322,000	286,400	-11%
360 Tollway			
Screenline 360-1	186,900	156,100	-16%
Screenline 360-2	376,200	326,100	-13%
Screenline 360-3	413,900	371,700	-10%
Screenline 360-4	92,700	71,500	-23%
Screenline 360-5	308,100	262,600	-15%

Modeling Methodology

State-of-the-practice professional procedures were used in the development of the traffic and revenue forecasts for the NTTA System. The CDM Smith market share diversion routines designed specifically to emulate motorists' willingness to pay tolls at different toll levels and congestion conditions were used to test the toll sensitivities within the corridor for the base year 2024 and future model year 2045.

Traffic assignments using the toll diversion algorithm were performed to evaluate the toll traffic potential of the NTTA System facilities. In the traffic assignment process, the travel model builds two paths between each pair of zones: one that includes toll links and another that excludes toll links. The travel cost associated with using both travel paths is computed, and the volume of trips using the toll facility is then estimated based on travel time savings between the two paths. This technique simulates the driver's decision to use a toll or toll-free route, which depends to a large extent on marginal differences in time and cost between the routes.

In addition to tolls, two other user costs are considered when calculating the total cost of a trip on the NTTA System: time cost and vehicle operating costs. The motorists' time cost is calculated using the value of time estimates that are integrated into the modeling process. How travelers value their travel time helps them determine which route to use for a particular trip. The value of time parameter provides a measure to convert travel time into an equivalent monetary cost for inclusion in the toll diversion process. Vehicle operating costs include a multitude of additional costs to travelers such as wear and tear, maintenance, tires, oil, fuel, and other variable costs.

Value of Time (VOT)

The values of time used for this study were derived from the stated preference (SP) survey completed for the NTTA System area in 2022. The results of the survey were used to calculate values of time in the NTTA System study area and surrounding counties. The average 2024 values of time for the twelve counties in the model area are shown in **Table 5-2**.

Table 5-2. Value of Time by Counties (2024 \$/Hour)

County	VOT	County	VOT
Collin	\$29.61	Johnson	\$26.92
Dallas	\$26.83	Kaufman	\$27.10
Denton	\$28.57	Parker	\$27.22
Ellis	\$27.50	Rockwall	\$29.39
Hood	\$26.48	Tarrant	\$26.91
Hunt	\$25.90	Wise	\$26.66

Vehicle Operating Costs

The vehicle operating cost used in the analysis was calculated by taking into account the average per-mile costs of gasoline and oil and, to a lesser extent, the costs of ongoing maintenance for vehicles in the area. It was also assumed that the fuel efficiency of vehicles will improve in future years. The average fuel efficiency of passenger cars is assumed to increase throughout the forecast period, and future average gasoline prices are assumed to continue to increase as well. The resulting vehicle operating costs adopted for this study are shown in **Table 5-3**.

Table 5-3. Vehicle Operating Costs (\$/mile)

Year	Passenger Cars	Commercial Vehicles
2024	\$0.25	\$0.96
2035	\$0.32	\$1.34
2045	\$0.39	\$1.65

Revised Demographics and Trip Tables

Traffic and revenue estimates along NTTA System corridors that are presented in **Section 6** of this report are based on the revised demographic datasets developed by Research and Demographic Solutions (RDS), as described in **Section 4**. The updated demographic datasets were used as an input to the NCTCOG DFW Regional Travel Model (DFWRM) to generate an alternate set of trip tables and are referred to as the “revised” trip tables. These revised trip tables, with adjustments to trips applied as part of the base year calibration process, were used to estimate the traffic and revenue along the NTTA System corridors.

General Assumptions

The forecasted traffic volumes and estimated toll revenues from this study are based on the following general assumptions, which CDM Smith believes are reasonable for the purposes of this study (a more detailed description of revenue estimation assumptions can be found in **Section 6**):

1. By August 31, 2025, the expansion of DNT from three lanes to four lanes, in both directions, between SRT and US 380 is assumed to be completed.
2. By July 30, 2027, the DNT Extension Phase 4A (US 380 to FM 428) is assumed to open to traffic.
3. By December 31, 2028, the CTP between FM 1187 and US 67 will be expanded from two to four lanes.

4. By June 30, 2032, the PGBT WE/360 Tollway “Elbow” Connector is assumed to be completed and open to traffic.
5. By December 31, 2033, SH 190/East Branch, a proposed six-lane tollway from IH 30/PGBT EE to IH 20/Loop 9, is assumed to open to traffic.
6. By July 31, 2034, DNT 4B mainlanes – six-lane tollway from FM 428 to Grayson County is assumed to open to traffic.
7. It is assumed that construction required as part of the capacity improvements along NTTA facilities over the next several years will cause minimal disruptions to traffic on NTTA facilities (with weekend or overnight closures of lanes/ramps).
8. Alignment of all NTTA System facilities is to be as described in **Section 6** of this report.
9. Improvements to the present highway system in the vicinity of the NTTA System facilities are limited to those currently included in *Mobility 2045 – 2022 Update*. No additional competing limited-access highways will be constructed near the NTTA System corridors at any time during the forecast period. Opening dates of the regional transportation projects are assumed to be consistent with the assumptions in *Mobility 2045 – 2022 Update*, except as noted above.
10. No improvements to the DFW regional passenger rail network are assumed beyond those included in the *Mobility 2045 – 2022 Update*.
11. Fully electronic toll collection system, and toll collection policies and rates for the NTTA System will be adopted as shown in **Section 6** of this report and toll rates are consistent with NTTA’s current toll rate policy.
12. Toll rates on other regional toll roads are consistent with RTC’s current toll policy.
13. In accordance with the existing practice of the NTTA, all NTTA System facilities will be well-maintained, efficiently operated, and effectively signed to encourage maximum usage.
14. Economic growth along NTTA System corridors will follow the forecasts described in **Section 4**.
15. Growth in vehicle operating costs (which include fuel, maintenance, and tires) will not significantly deviate from the assumed inflation rate.
16. No local, regional, or national emergency will arise which would abnormally restrict the use of motor vehicles.

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Section 6

Estimated Traffic and Revenue

This section presents the traffic and revenue (T&R) estimates for the North Texas Tollway Authority System (NTTA System) through 2070. The NTTA System facilities currently in operation are the Dallas North Tollway (DNT), President George Bush Turnpike (PGBT), President George Bush Turnpike Eastern Extension (PGBT EE), President George Bush Turnpike (PGBT WE), Sam Rayburn Tollway (SRT), Chisholm Trail Parkway (CTP), 360 Tollway (360T), Addison Airport Toll Tunnel (AATT), Mountain Creek Lake Bridge (MCLB), and Lewisville Lake Toll Bridge (LLTB). The long-term T&R forecasts are based on the modeling methodologies and background assumptions described in **Section 5** and other assumptions presented in this section. In addition, this section delineates the toll sensitivity analyses that were performed to estimate the revenue maximization toll rates and presents the results of various sensitivity tests to assess impacts on the T&R of key input variables. Finally, this section provides the estimated average weekday traffic for model years 2024 and 2045 and the resulting estimates of transactions and toll revenue through 2070.

Traffic and Toll Revenue Estimation Assumptions

The traffic forecasts and toll revenue estimates for NTTA System facilities are predicated on the following assumptions, which are consistent with observed trends and are considered reasonable for the purposes of this study.

Toll Rate Assumptions

This subsection discusses the assumptions for future toll rate estimation.

DNT, PGBT, and 360 Tollway

- Automatic Vehicle Identification (AVI) toll for two-axle vehicles: \$0.21/mile starting July 1, 2023, with adjustments every two years at 2.75 percent per year, compounded annually.
- Video toll surcharge is the maximum of a) 100 percent of the AVI rate or b) \$0.20 per transaction on July 1, 2009, inflated by 2.75 percent per year.
- Minimum toll charge is based on a trip length of 1.5 miles.
- Tolls charged to users are rounded to the next highest penny.

PGBT EE

- AVI toll for two-axle vehicles: \$0.21/mile on July 1, 2023, with adjustments every two years at 2.75 percent per year. This is the “unified toll,” which is the publicly announced toll, as defined in the PGBT EE Project Agreement between NTTA and the Texas Department

of Transportation (TxDOT). The ratio between the NTTA toll and the unified toll remains constant at 80 percent.

- Video toll surcharge is the maximum of a) 100 percent of the AVI rate or b) \$0.20 per transaction on July 1, 2009, inflated by 2.75 percent per year. This portion of the video toll constitutes the property and revenues of the NTTA only and not of TxDOT.
- Minimum toll charge is based on a trip length of 1.5 miles.
- Tolls charged to users are rounded to the next highest penny.

SRT and PGBT WE

- AVI maximum base toll (MBT) for two-axle vehicles: \$0.21/mile starting July 1, 2023, with adjustments every two years at 2.75 percent per year.
- Video toll surcharge is the maximum of a) 100 percent of the AVI rate or b) \$0.20 per transaction on July 1, 2009, inflated by 2.75 percent per year.
- Minimum toll charge is based on a trip length of 1.5 miles.
- Tolls charged to users are rounded to the next highest penny.
- MBT rounded to \$0.001/mile.

CTP

- Automatic Vehicle Identification (AVI) toll for two-axle vehicles: \$0.27/mile (IH 30 to Altamesa) and \$0.21/mile (Altamesa to US 67) starting July 1, 2023, with adjustments every two years at 2.75 percent per year.
- Video toll surcharge is the maximum of a) 100 percent of the AVI rate or b) \$0.20 per transaction on July 1, 2009, inflated by 2.75 percent per year.
- Minimum toll charge is based on a trip length of 1.5 miles.
- Tolls charged to users are rounded to the next highest penny.

AATT and MCLB

- AVI toll for two-axle vehicles: \$0.74 starting July 1, 2023, with adjustments every two years at 2.75 percent per year.
- Video toll surcharge is 100 percent of the AVI rate.
- Tolls charged to users are rounded to the next highest penny.

LLTB

- AVI toll for two-axle vehicles: \$1.46 starting July 1, 2023, with adjustments every two years at 2.75 percent per year.
- Video toll surcharge is 100 percent of the AVI rate.
- Tolls charged to users are rounded to the next highest penny.

Truck Traffic Shares/Truck Toll Assumptions

Truck Share

Truck traffic (vehicles with greater than two axles) shares are applied on a gantry-by-gantry basis and the averages assumed for each facility are shown in **Table 6-1** below:

Table 6-1. Truck Shares – 2024

Facility	Truck Share	Facility	Truck Share
DNT	1.8%	MCLB	1.5%
PGBT (including EE)	2.4%	LLTB	3.0%
SRT	3.3%	PGBT WE	7.1%
360T	4.3%	CTP	3.7%
AATT	1.1%	NTTA System	3.1%

Truck traffic share rose sharply at the onset of the COVID-19 pandemic and has not yet returned fully to pre-COVID levels. During the course of the pandemic, the number of passenger cars declined on the NTTA system while the number of trucks has remained at the same levels, resulting in increased truck share, as shown in **Figure 6-1**. Truck share has continued to decline as passenger car traffic has grown on the system. Overall, the truck share for the NTTA System is assumed to continue declining over the next three years and ultimately return to pre-COVID levels.

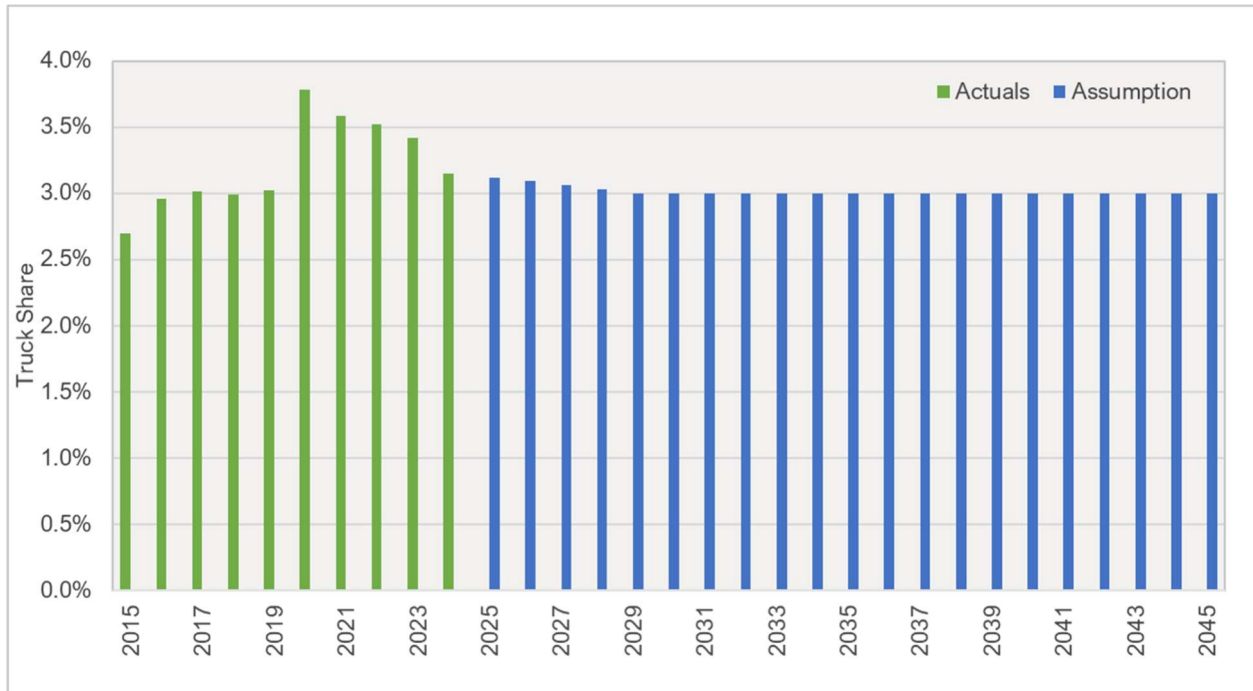


Figure 6-1. NTTA System Truck Share Trend and Assumptions

Truck Toll Factor

Tolls for vehicles with more than two axles are calculated based on “N-1” weighting, where “N” is the number of axles. For example, the toll paid by a five-axle vehicle would be four times that paid by a two-axle vehicle. The average truck toll factor is a ratio of the weighted average of the truck tolls charged to vehicles with greater than two-axles to the tolls charged to two-axle vehicles. For example, a high truck toll factor would mean a higher proportion of multi-axle vehicles on a toll facility. The average truck toll factor assumed for various facilities on the NTTA System is shown in **Table 6-2**. Truck toll factors have varied very little in the last decade across all NTTA System facilities. Therefore, CDM Smith assumed no changes in the truck toll factors, as presented in Table 6-2, throughout its forecast period.

Table 6-2. Truck Toll Factors – 2024

Facility	Truck Toll Factor	Facility	Truck Toll Factor
DNT	2.99	MCLB	3.28
PGBT	3.05	LLTB	2.94
SRT	3.03	PGBT WE	3.35
PGBT EE	3.05	CTP	3.09
AATT	2.89	360 Tollway	3.23

AVI/ZipCash Transaction Shares

AVI transaction shares are applied on a gantry-by-gantry basis and averages assumed in 2024 for each facility are shown below in **Table 6-3**.

Table 6-3. AVI Share – 2024

Facility	AVI Share	Facility	AVI Share
DNT	81.2%	MCLB	69.6%
PGBT	79.4%	LLTB	79.5%
SRT	82.1%	PGBTWE	74.0%
PGBT EE	79.4%	CTP	79.1%
AATT	78.3%	360 Tollway	75.9%

The above AVI transaction shares also include all transactions initially recorded as ZipCash transactions that may be later identified and reclassified as AVI transactions. These transactions are called “VToll” transactions. Over time, the AVI transaction shares are assumed to follow a logistic function, asymptotically increasing to an NTTA System average maximum of 80 percent.

Annual Revenue Days

“Annual revenue days” is a parameter used in the revenue estimation to convert the weekday transactions/revenue to annual transactions/revenue. Observed ratios of the weekend to weekday traffic on NTTA System facilities are used to estimate the annual revenue days. Annual revenue days are applied on a gantry-by-gantry basis and averages for each facility are shown below in **Table 6-4**.

Table 6-4. Annual Revenue Days – 2024

NTTA Facility	Annual Revenue Days	NTTA Facility	Annual Revenue Days
DNT	336	MCLB	342
PGBT	328	LLTB	337
PGBT EE	335	PGBT WE	322
SRT	341	CTP	326
AATT	309	360 Tollway	343

Revenue Recovery Assumptions

The revenue recovery rate for AVI transactions/revenue was assumed to be 99.5 percent for all years. **Table 6-5** describes the assumptions used for ZipCash transactions/revenue recovery. These assumptions are for ZipCash transactions and exclude VTolls, which are transactions captured by the ZipCash system whose license plate numbers are later matched to active transponder accounts. These recovery assumptions have been developed based on guidance from the NTTA staff regarding the NTTA's goals with respect to the non-pursuable and uncollectable ZipCash transactions.

Table 6-5. ZipCash Assumptions

Category	2024
ZipCash Revenue Recovered (After 3 months)	21%
ZipCash Revenue Recovered (After 12 months)	33%
ZipCash Revenue Recovered (After 24 months)	40%

NTTA Toll Collection Concept and Toll Structure

As described in **Section 2**, the NTTA System currently utilizes a mixed toll collection system that includes AVI and video tolling (known as “ZipCash”). Under ZipCash, users without transponders are identified through the license plate number and invoiced for the toll charge incurred. The ZipCash patrons are charged more than AVI customers per transaction. A majority of the VToll transactions, as described earlier, are charged the AVI rate, however, NTTA charges ZipCash rates for certain VToll transactions to recover the additional collection costs of VToll transactions and to discourage customer behavior related causes of VToll transactions. Tolls are collected at fixed tolling points at rates determined generally upon the influence distance using a per-mile toll rate. Toll rates for ZipCash transactions are 100 percent higher than the rates for AVI transactions (with a minimum differential of \$0.29 in 2023 dollars). **Figures 6-2 through 6-8** show the 2024 AVI (TollTag) and ZipCash rates charged at the toll gantries on all NTTA roadways.

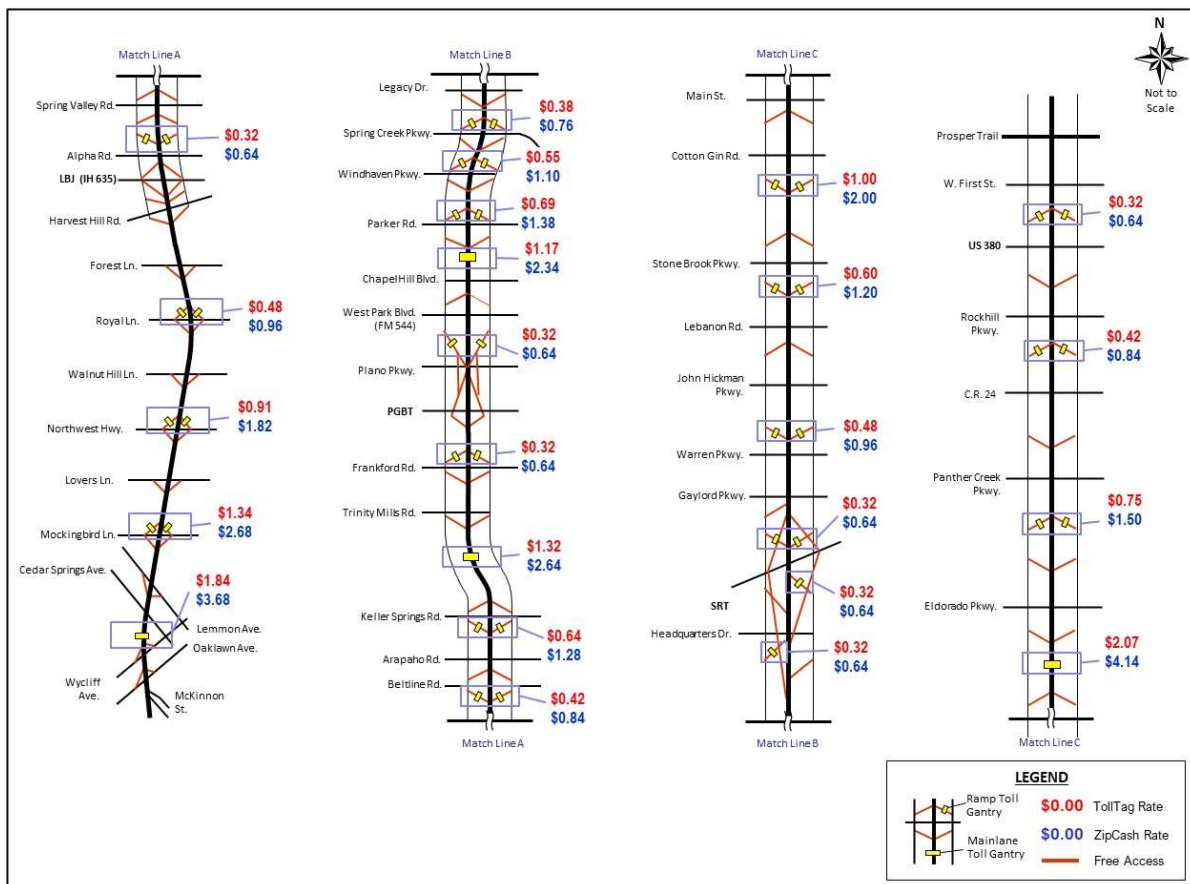


Figure 6-2.
Current (2024) DNT Toll Collection System and Passenger Car Toll Rates

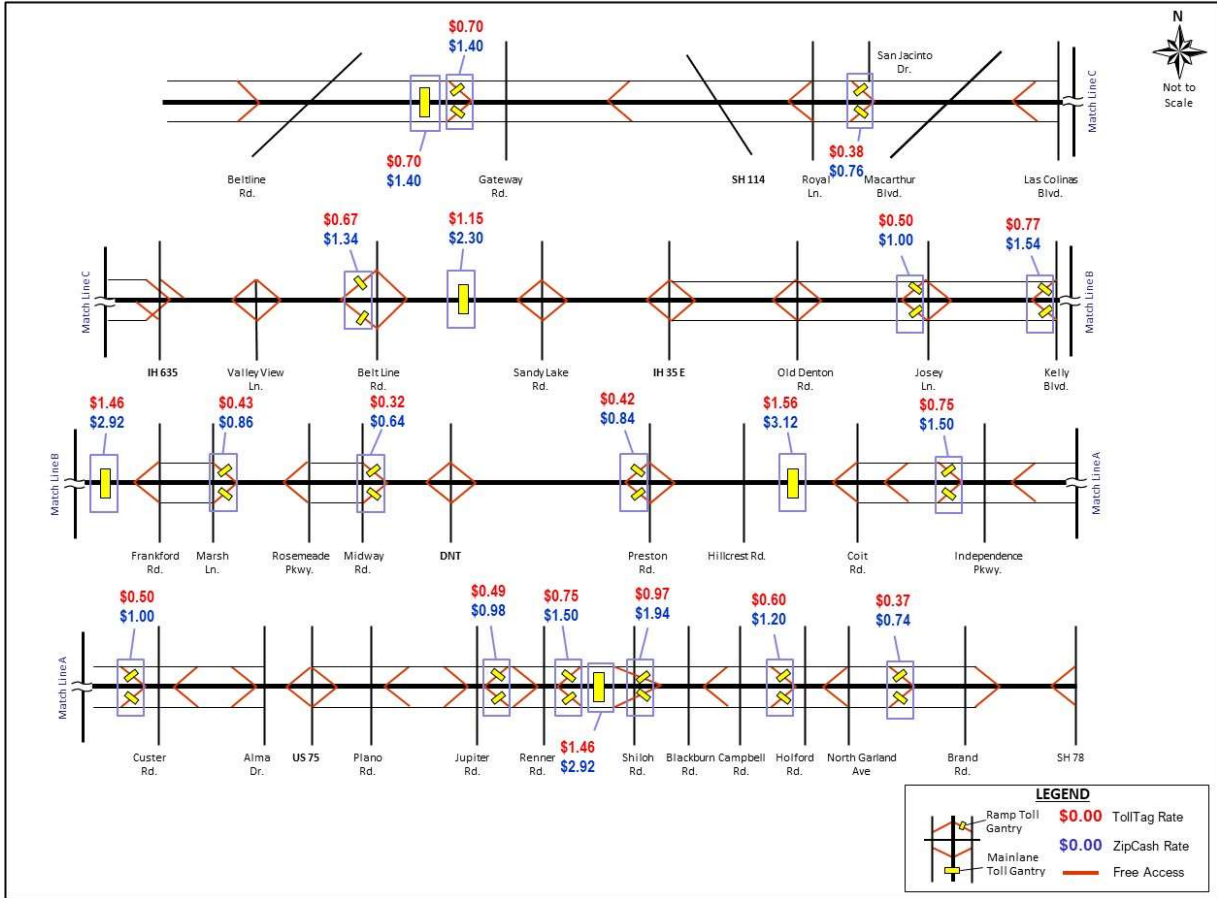


Figure 6-3. Current (2024) PG&T Toll Collection System and Passenger Car Toll Rates

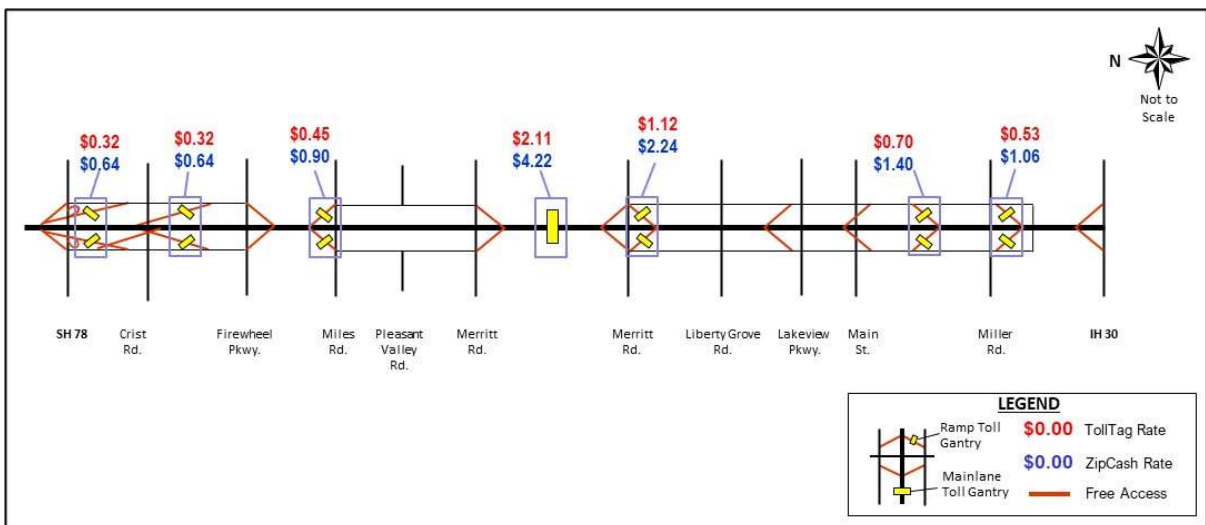


Figure 6-4. Current (2024) PG&T EE Toll Collection System and Passenger Car Toll Rates

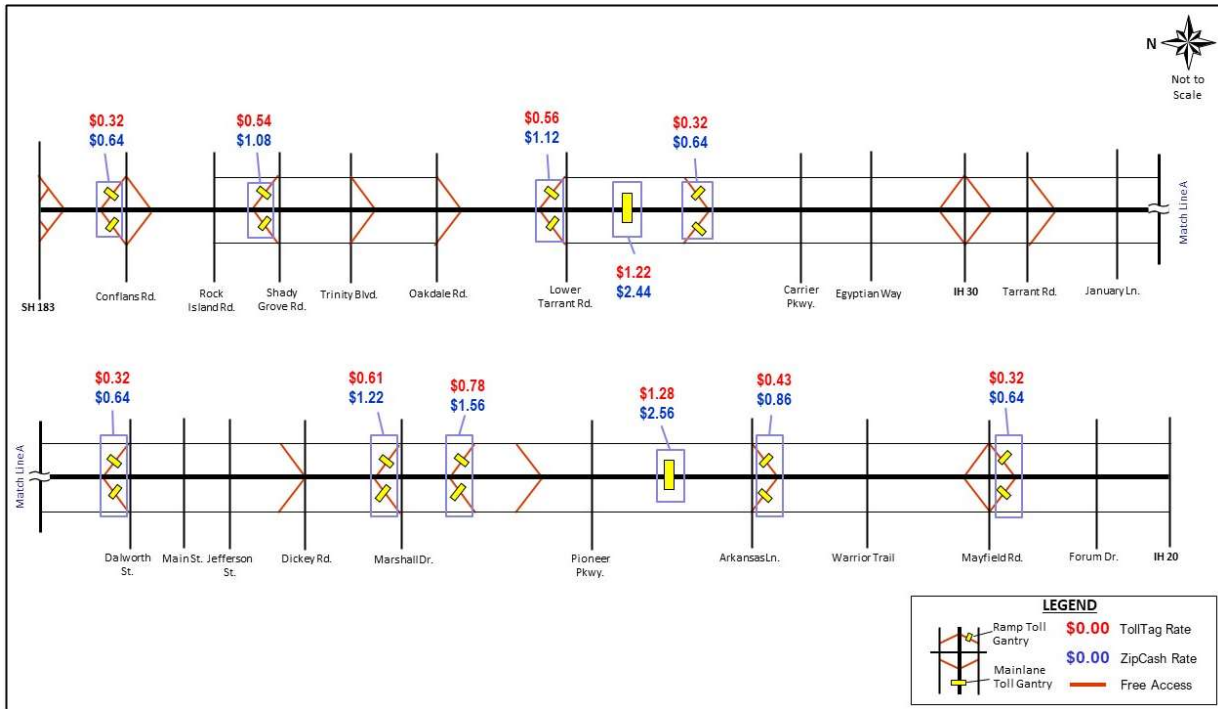


Figure 6-5. Current (2024) PGBT WE Toll Collection System and Passenger Car Toll Rates

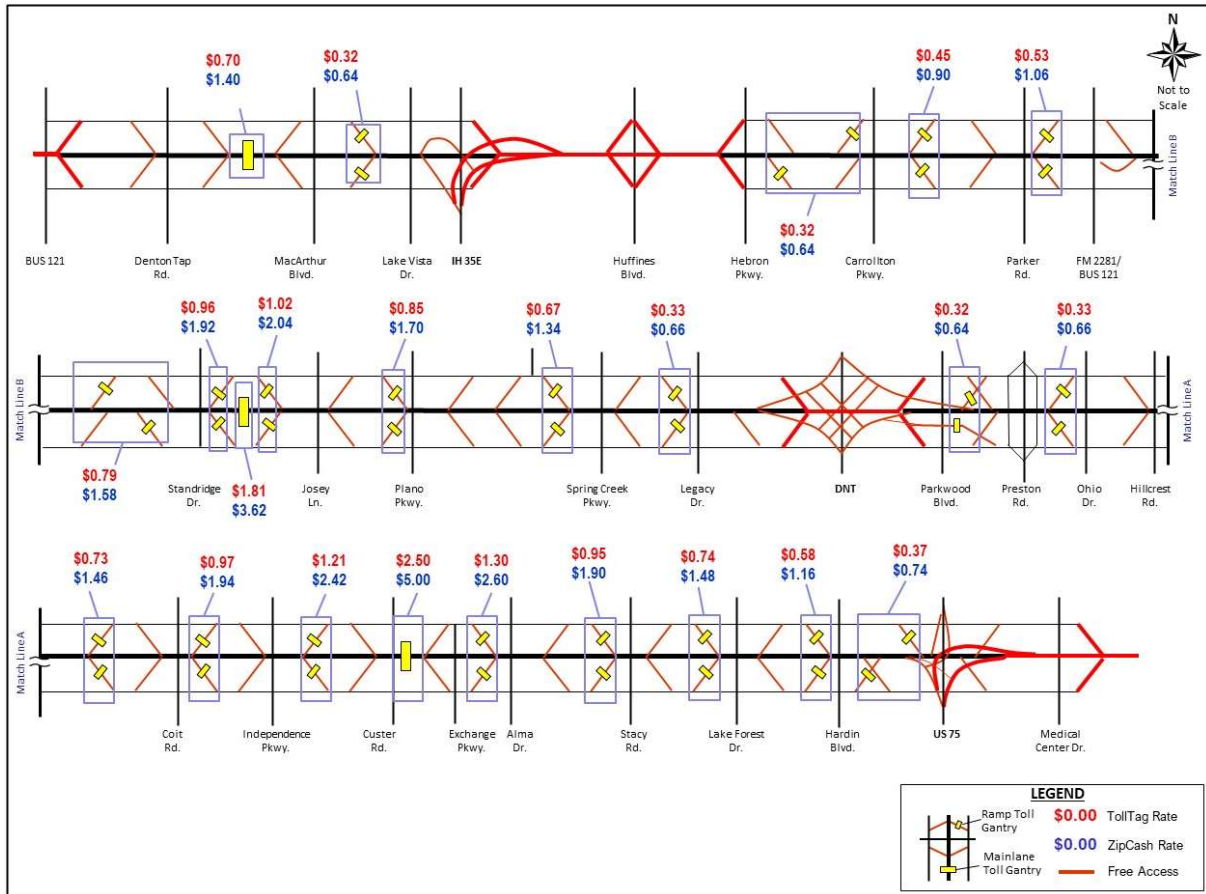


Figure 6-6. Current (2024) SRT Toll Collection System and Passenger Car Toll Rates

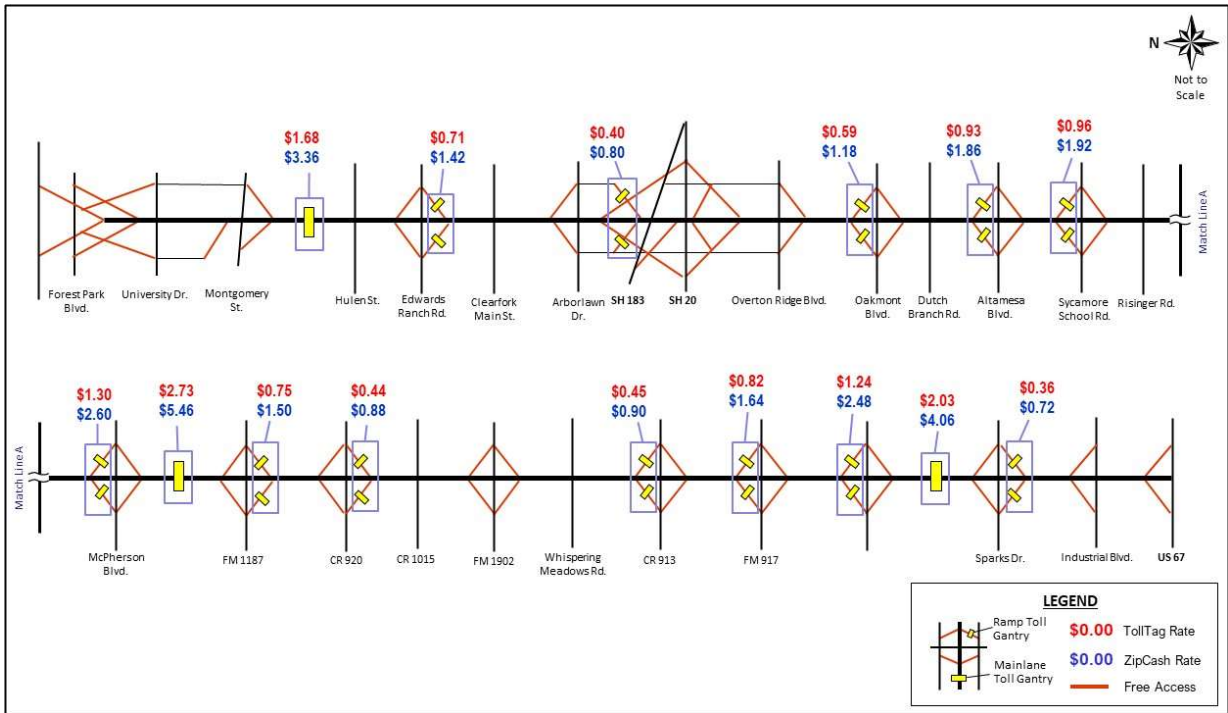


Figure 6-7. Current (2024) CTP Toll Collection System and Passenger Car Toll Rates

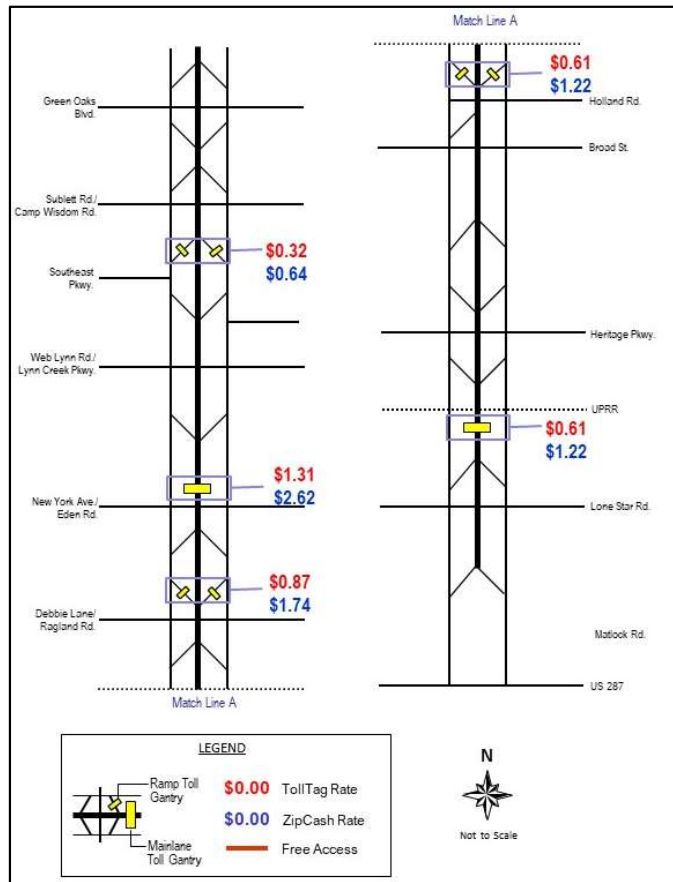


Figure 6-8. Current (2024) 360T Toll Collection System and Passenger Car Toll Rates

Toll Sensitivity Analysis

The toll sensitivity analysis was performed to test the impacts of changes to toll rates on the transactions and revenue from each of the NTTA System facilities and the NTTA System as a whole. It is advisable that the proposed toll rates on the NTTA System facilities be less than that required to maximize revenue as determined by the toll sensitivity analysis. Future flexibility should be maintained to increase tolls, if necessary, to generate additional revenue. Future year toll sensitivity curves are based on changes in traffic characteristics along the NTTA System such as congestion levels, values of time, and attractiveness of competing facilities. These curves are essential in estimating the viability of future toll rate increases. In general, the toll sensitivity curve suggests that when the toll rate increases, a portion of travelers will leave the toll facility and choose other routes. Therefore, as the toll rate increases, transactions decrease. However, as the toll rate increases, the toll revenue increases until it reaches the highest revenue point, where an additional toll rate increment would reduce transactions enough to result in decreased toll revenue. Toll sensitivity analyses were conducted for the NTTA System for the years 2024 and 2025, and **Figure 6-9** illustrates the daily toll sensitivity curves for the NTTA System.

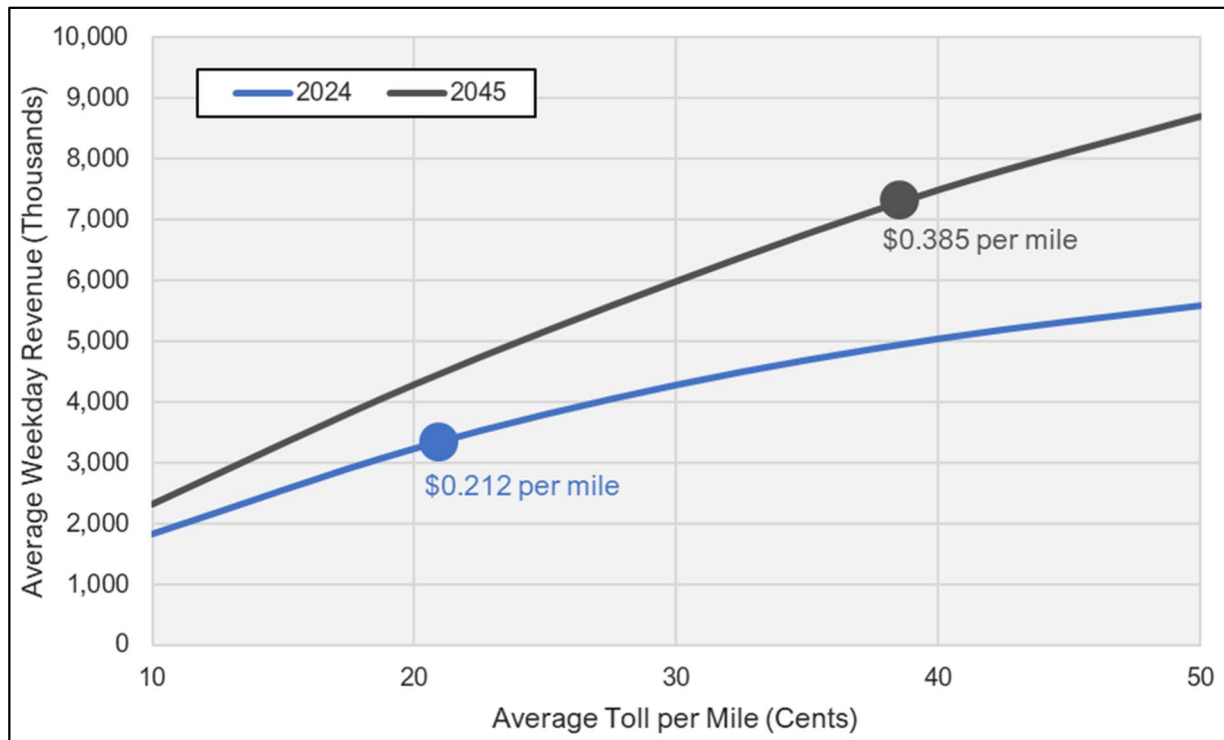


Figure 6-9. Toll Sensitivity Curves – NTTA System

The curves were developed using the revised trip tables that incorporate base year calibration related adjustments, as described in **Section 5**, using toll rates ranging between \$0.10 per mile and \$0.50 per mile. The planned average two-axle vehicle AVI toll rates are included on each of the toll sensitivity curves for reference. The results indicate that the planned toll rates are below the revenue maximization points, demonstrating that, if needed, there is potential for revenue enhancement through toll increases above those assumed for traffic and revenue forecasting purposes.

Estimated Average Weekday Traffic

An equilibrium diversion technique was used to carry out traffic assignment runs for three periods: AM peak, PM peak, and off-peak. The model runs were conducted for the years 2024, 2026, 2036, and 2045. Traffic volumes were estimated by using the revised demographics trip tables, which were adjusted based on the base year model calibration process, as described in **Section 5**.

As the NTTA System currently employs an AVI/ZipCash toll collection system, two separate traffic assignments, one with AVI toll charges and the other with ZipCash charges, were conducted for each model year. The traffic volumes obtained by the AVI toll charge assignment were factored by the assumed AVI transaction shares to get the AVI volumes, and the traffic volumes obtained by the ZipCash toll charge assignment run were factored by the ZipCash transaction shares to get the ZipCash traffic volume. The sum of the AVI and ZipCash volumes provided the total traffic using the NTTA System. In this manner, volume totals for the NTTA System facilities were estimated for each model year. All other years were interpolated or extrapolated between or beyond the modeled years to obtain the yearly traffic and revenue estimates. The traffic assignment results for each of the analysis years were reviewed for reasonableness, and post-model adjustments were made as necessary. This included adjustments to reflect model validation results along the NTTA System corridors. **Figures 6-10** through **6-16** illustrate the average 2024 and 2045 weekday volumes on each of the NTTA System roadways.

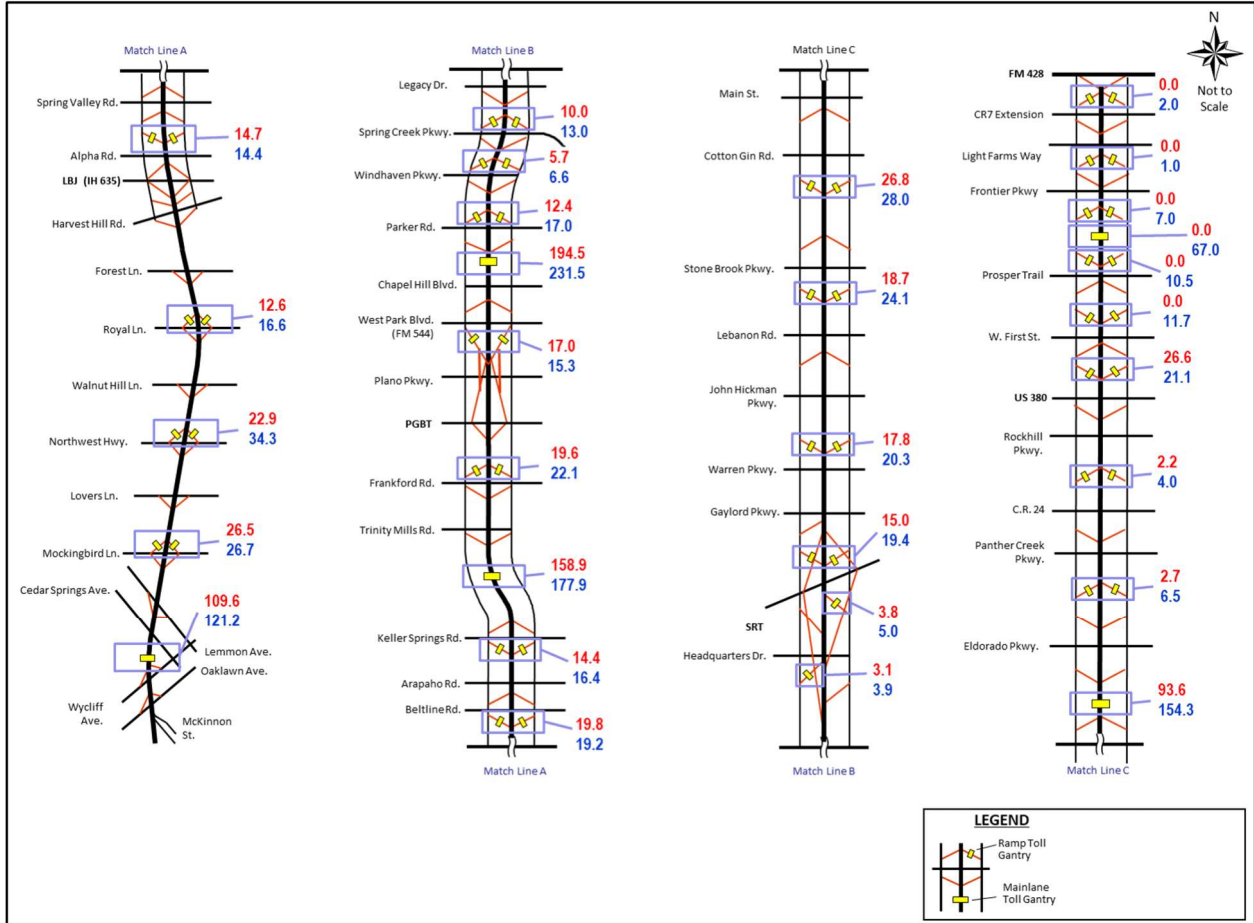


Figure 6-10. Estimated 2024 and 2045 Average Weekday Traffic Volumes (thousands) - DNT

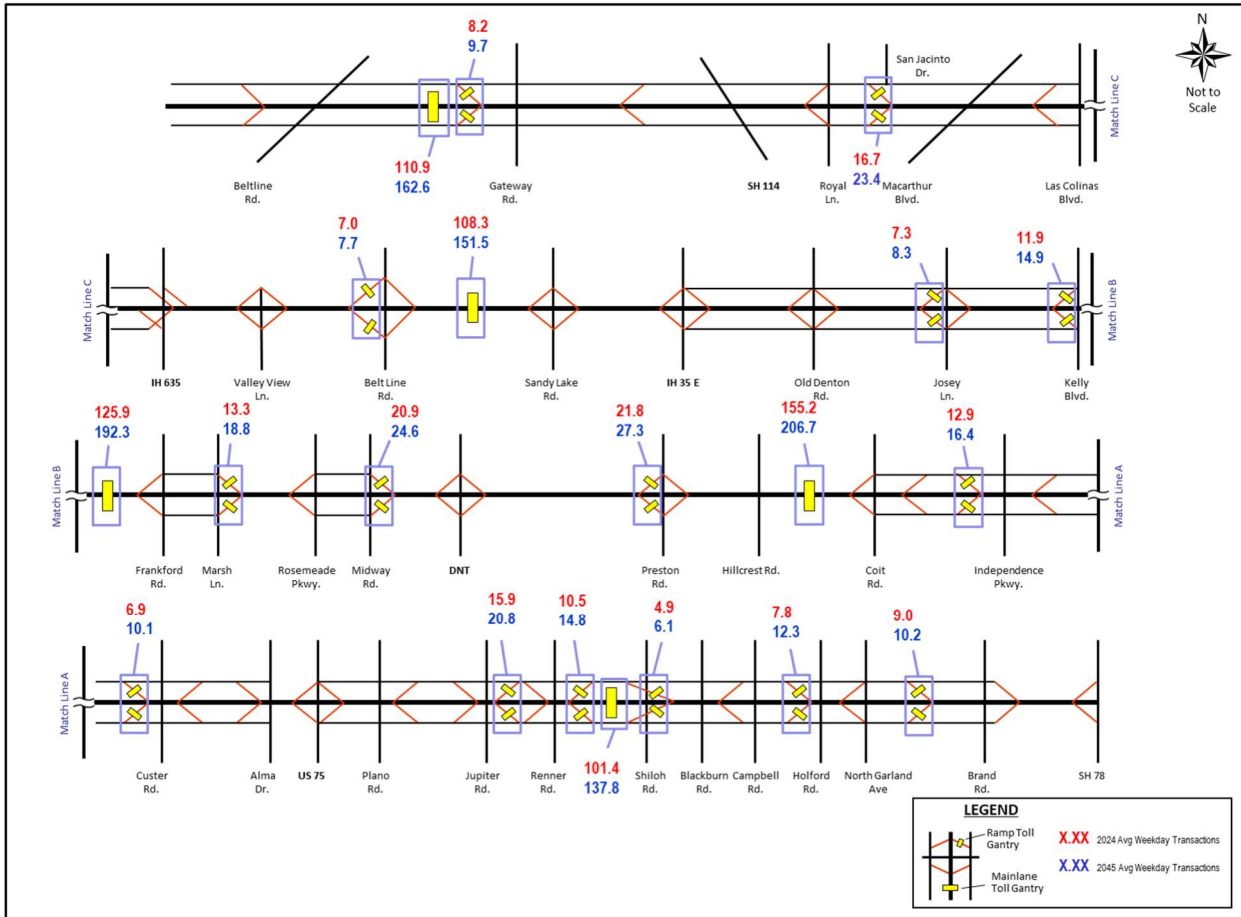


Figure 6-11. Estimated 2024 and 2045 Average Weekday Traffic Volumes (thousands) - PGBT

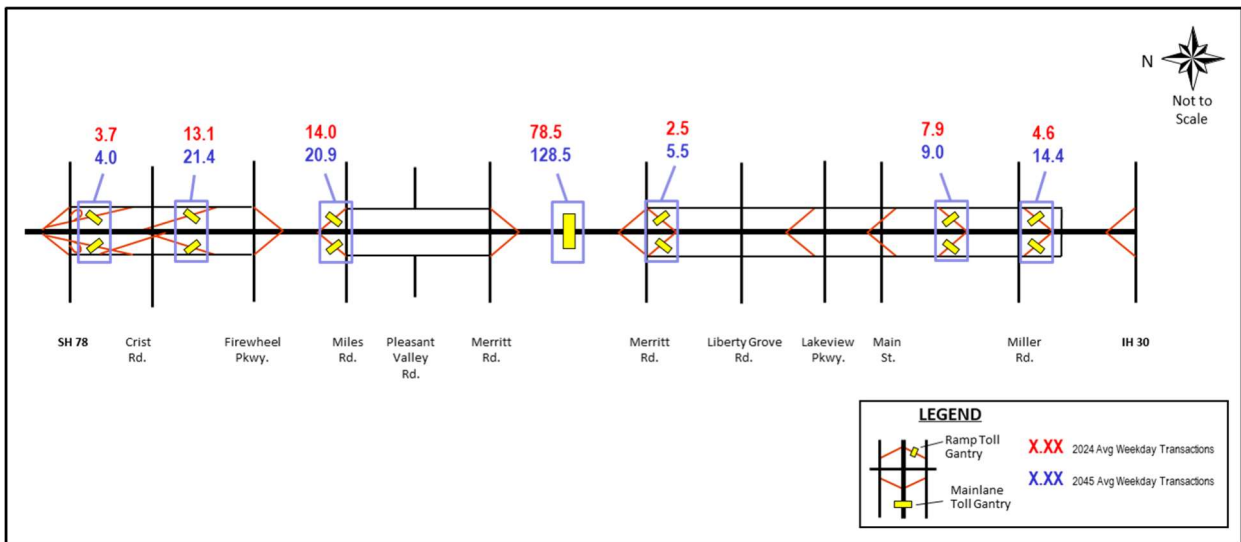


Figure 6-12. Estimated 2024 and 2045 Average Weekday Traffic Volumes (thousands) - PGBT EE

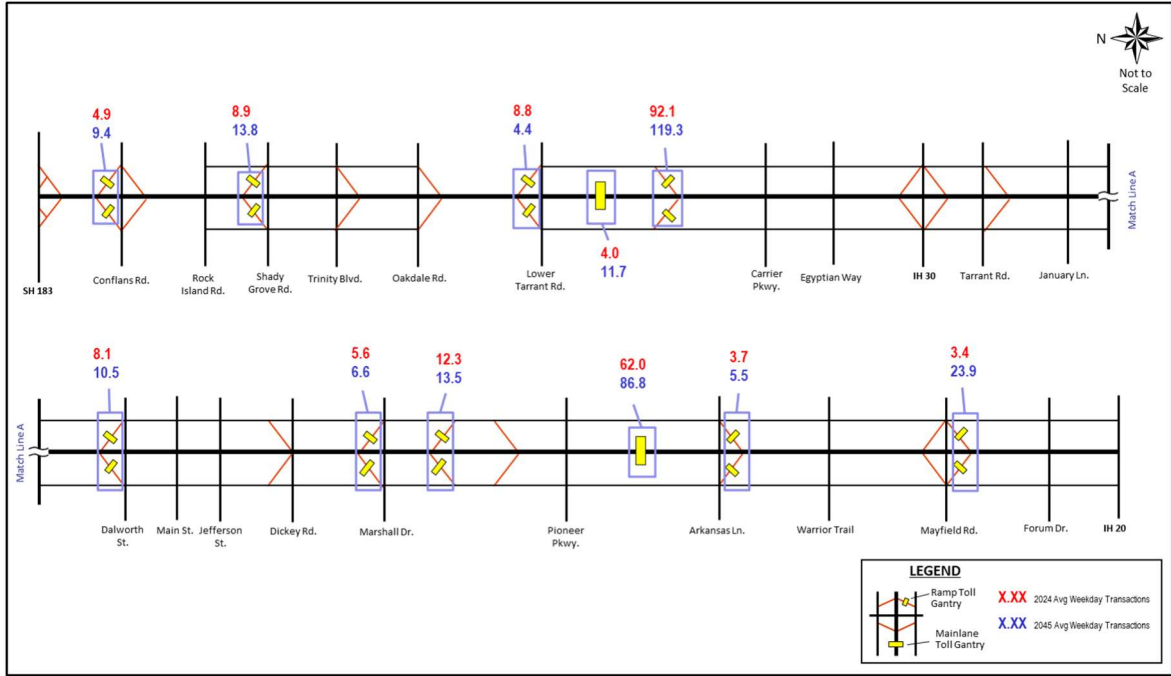


Figure 6-13. Estimated 2024 and 2045 Average Weekday Traffic Volumes (thousands) – PGBT WE

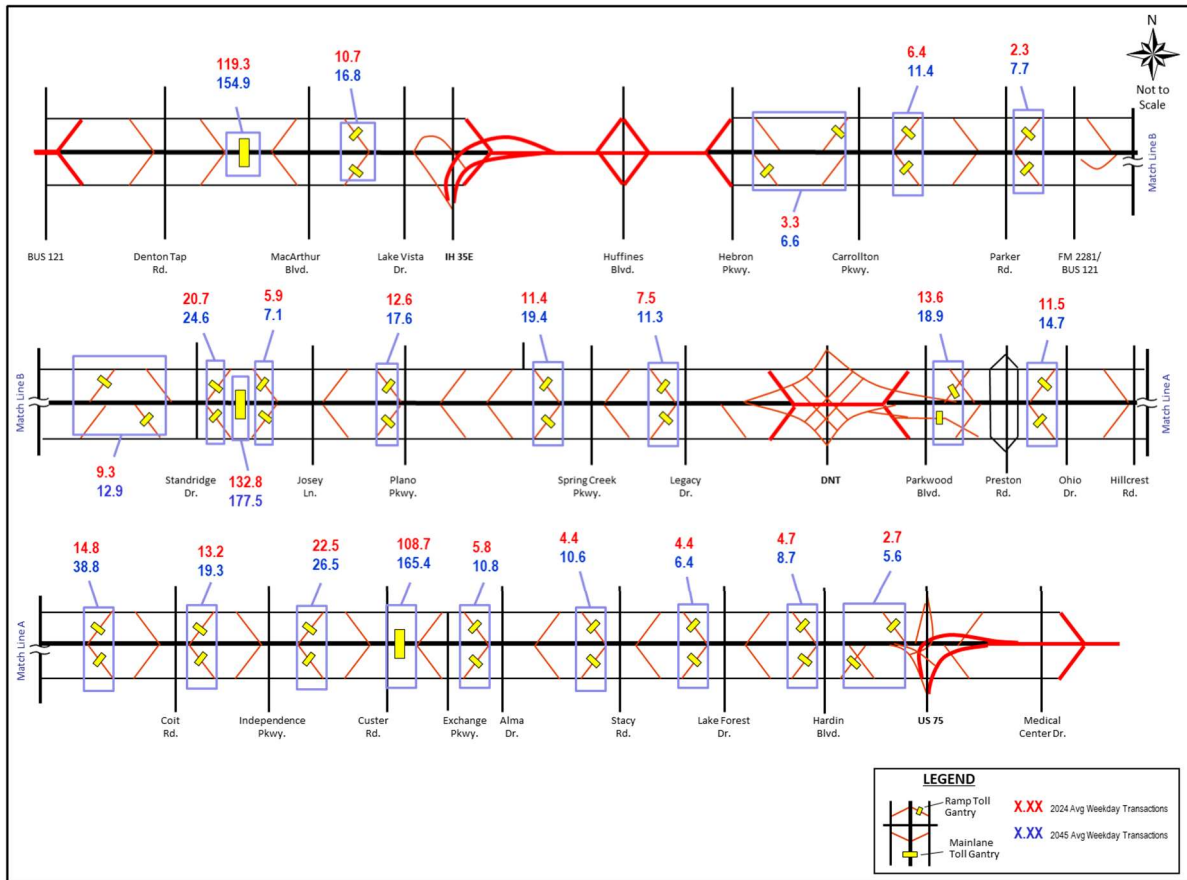


Figure 6-14. Estimated 2024 and 2045 Average Weekday Traffic Volumes (thousands) – SRT

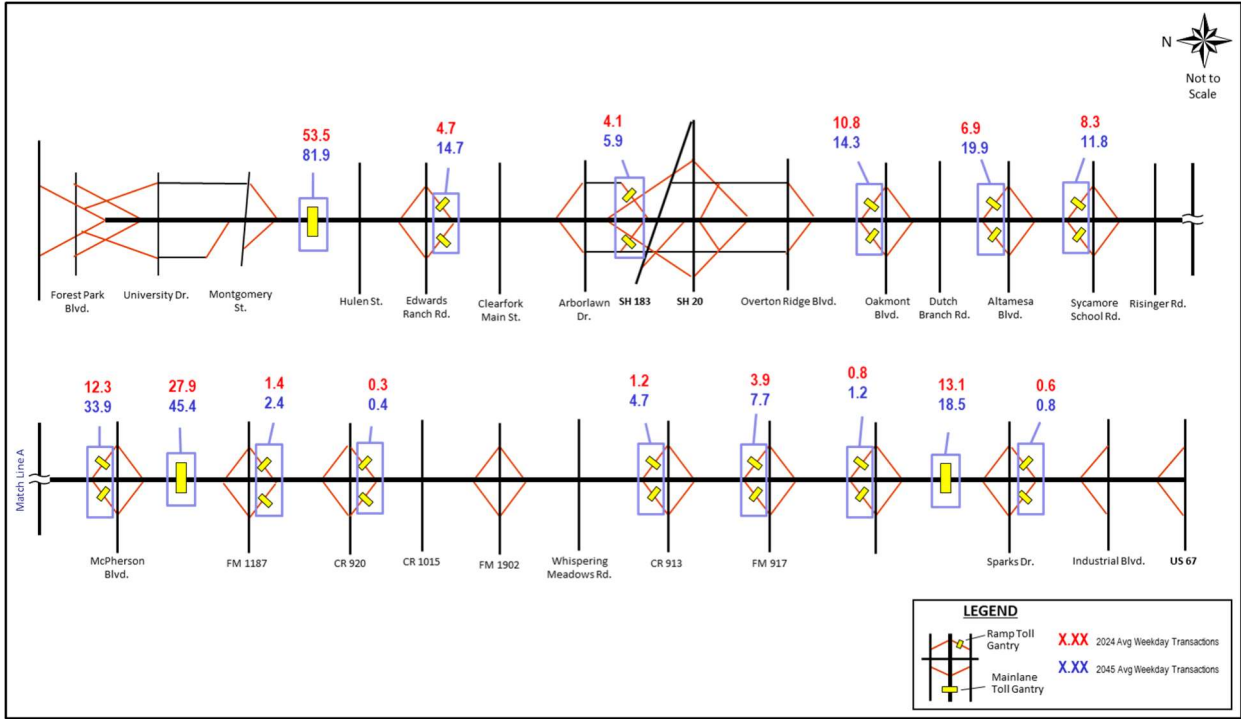


Figure 6-15. Estimated 2024 and 2045 Average Weekday Traffic Volumes (thousands) - CTP

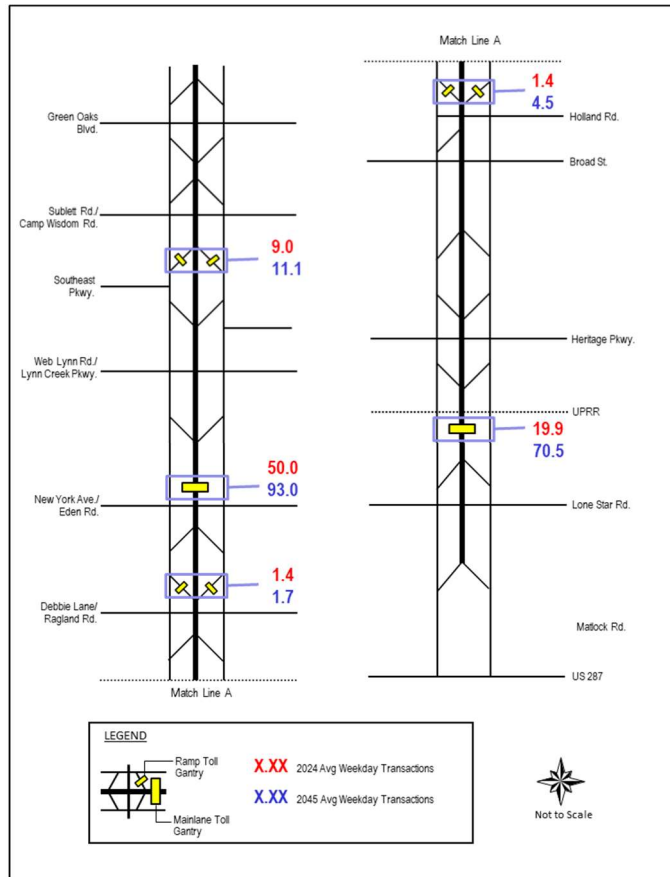


Figure 6-16. Estimated 2024 and 2045 Average Weekday Traffic Volumes (thousands) - 360T

Estimated Annual NTTA System Toll Revenue

Based on the traffic forecast at each toll gantry location, annual forecasts for each facility of the NTTA System were prepared through 2070. The projections extend from 2024 through 2070, including the revenue forecasts for DNT, PGBT, PGBT EE, PGBT WE, SRT, CTP, 360T, AATT, MCLB, and LLTB. In each case, forecasts for each facility are based on modeled traffic estimates at each toll collection location through the year 2045. These modeled estimates were refined using post-model adjustments, reflecting validation factors used to match observed 2024 traffic data and the baseline model year at each toll gantry location. The average toll at each location was based on the current mix of passenger car and commercial vehicle traffic and the current average tolls, modified in future years to reflect changing assumptions in the proportion of AVI and ZipCash transaction shares. Further, toll rates for ZipCash transactions are 100 percent higher than the rates for AVI transactions in each case, as noted previously.

Estimates beyond year 2045 are based on nominal assumptions regarding future traffic growth, with assumed toll rate increases as noted previously. As shown in **Table 6-6**, the estimated annual revenue on the DNT is expected to increase from \$348.6 million in 2024 to \$469.7 million by 2030 and \$675.3 million by 2040. Revenue on the PGBT (excluding PGBT WE and PGBT EE) is expected to be \$301.5 million in 2024, increasing to \$396.5 million by 2030 and \$598.4 million by 2040. PGBT WE is anticipated to generate \$78.5 million in toll revenue in 2024, increasing to \$98.8 million and \$154.1 million by 2030 and 2040, respectively. NTTA's share of the revenue on the PGBT EE is expected to be \$53.6 million in 2024, increasing to \$72.3 million by 2030 and \$120.8 million by 2040. Revenue on the SRT is expected to be \$272.9 million in 2024, increasing to \$355.6 million by 2030 and \$546.8 million by 2040. As fiscal year 2058 is the end of the fifty-year operational agreement of the SRT between NTTA and TxDOT, revenue from SRT is estimated through August 31, 2058, while the other facilities are assumed to generate revenue for NTTA in perpetuity. CTP is anticipated to generate \$86.5 million in toll revenue in 2024, increasing to \$125.1 million and \$203.1 million by 2030 and 2040, respectively. The 360 Tollway is expected to generate \$31.4 million in toll revenue in 2024, increasing to \$46.4 million and \$83.8 million by 2030 and 2040, respectively. Revenue from the AATT, MCLB, and LLTB combined is expected to be about \$17.8 million in 2024. By 2030, this is estimated to reach a combined \$23.9 million and increase in 2040 to \$36.9 million, still a very small share of total NTTA System revenue.

Total revenue on the existing NTTA System is expected to increase from about \$1.19 billion in 2024 to \$1.59 billion in 2030 and \$2.42 billion in 2040. Driven by nominal traffic growth and continued assumed modest inflationary adjustments in toll rates, annual revenue on the NTTA System is expected to reach more than \$3 billion per year by 2046.

Table 6-6. NTTA System Estimated Annual Toll Revenue (millions)

Year	DNT	PGBT	PGBT EE ⁽¹⁾	PGBT WE	SRT ⁽²⁾	CTP	360T ⁽³⁾	AATT-MCLB-LLTB	NTTA System
2024	\$348.6	\$301.5	\$53.6	\$78.5	\$272.9	\$86.5	\$31.4	\$17.8	\$1,190.8
2025	\$363.3	\$316.2	\$56.4	\$80.9	\$286.4	\$91.4	\$33.9	\$18.6	\$1,247.1
2026	\$379.0	\$332.4	\$59.4	\$83.5	\$299.5	\$97.4	\$36.9	\$19.5	\$1,307.5
2027	\$409.1	\$347.9	\$62.3	\$86.9	\$312.2	\$103.7	\$39.2	\$20.5	\$1,381.9
2028	\$436.0	\$363.6	\$65.5	\$90.7	\$326.0	\$110.6	\$41.5	\$21.6	\$1,455.4
2029	\$452.7	\$379.4	\$68.7	\$94.5	\$340.2	\$118.2	\$43.9	\$22.8	\$1,520.3
2030	\$469.7	\$396.5	\$72.3	\$98.8	\$355.6	\$125.1	\$46.4	\$23.9	\$1,588.3
2031	\$487.2	\$414.0	\$75.8	\$102.8	\$371.6	\$132.0	\$49.1	\$25.0	\$1,657.7
2032	\$506.0	\$433.1	\$79.6	\$108.7	\$388.9	\$139.6	\$53.2	\$26.2	\$1,735.3
2033	\$525.4	\$452.4	\$83.7	\$114.5	\$406.7	\$147.2	\$57.3	\$27.4	\$1,814.4
2034	\$548.2	\$474.2	\$89.7	\$119.6	\$425.7	\$155.5	\$60.9	\$28.7	\$1,902.4
2035	\$569.3	\$495.0	\$95.4	\$124.7	\$445.6	\$163.2	\$64.4	\$30.1	\$1,987.6
2036	\$591.8	\$517.4	\$101.5	\$130.4	\$467.0	\$170.9	\$68.2	\$31.5	\$2,078.6
2037	\$611.2	\$536.1	\$106.1	\$135.7	\$485.8	\$178.3	\$71.8	\$32.7	\$2,157.7
2038	\$631.8	\$555.8	\$110.8	\$141.7	\$505.6	\$186.3	\$75.7	\$34.0	\$2,241.6
2039	\$652.7	\$576.2	\$115.6	\$147.6	\$525.5	\$194.3	\$79.6	\$35.4	\$2,327.0
2040	\$675.3	\$598.4	\$120.8	\$154.1	\$546.8	\$203.1	\$83.8	\$36.9	\$2,419.2
2041	\$697.3	\$619.5	\$126.1	\$160.6	\$568.9	\$212.0	\$88.2	\$38.4	\$2,511.0
2042	\$720.9	\$642.3	\$131.7	\$167.8	\$592.5	\$221.6	\$93.0	\$40.0	\$2,609.8
2043	\$746.1	\$666.4	\$137.7	\$175.1	\$617.4	\$231.4	\$97.8	\$41.6	\$2,713.6
2044	\$773.2	\$692.8	\$144.1	\$183.3	\$644.1	\$242.1	\$103.1	\$43.3	\$2,826.0
2045	\$799.2	\$718.0	\$150.3	\$191.4	\$669.8	\$252.7	\$114.1	\$45.1	\$2,940.6
2046	\$824.3	\$741.9	\$156.0	\$198.7	\$692.9	\$262.6	\$120.0	\$46.6	\$3,043.0
2047	\$850.0	\$765.7	\$161.5	\$205.6	\$716.5	\$272.2	\$125.0	\$48.2	\$3,144.5
2048	\$877.5	\$791.4	\$167.4	\$213.3	\$741.7	\$282.7	\$130.3	\$49.9	\$3,254.1
2049	\$903.6	\$815.7	\$173.2	\$220.4	\$766.7	\$292.8	\$135.4	\$51.6	\$3,359.3
2050	\$931.4	\$842.0	\$179.5	\$228.3	\$793.3	\$303.7	\$70.5	\$53.3	\$3,401.8
2051	\$958.2	\$866.8	\$185.1	\$235.0	\$817.2	\$313.4	\$72.8	\$55.0	\$3,503.5
2052	\$986.7	\$893.5	\$191.2	\$242.5	\$842.5	\$323.9	\$75.3	\$56.7	\$3,612.3
2053	\$1,014.9	\$919.3	\$197.1	\$249.5	\$868.7	\$334.1	\$77.9	\$58.4	\$3,719.8
2054	\$1,045.1	\$947.3	\$203.5	\$257.3	\$896.7	\$345.1	\$80.6	\$60.2	\$3,835.7
2055	\$1,075.7	\$975.2	\$209.9	\$265.0	\$923.5	\$356.1	\$83.3	\$62.1	\$3,950.7
2056	\$1,108.4	\$1,005.6	\$216.8	\$273.6	\$952.0	\$368.2	\$86.2	\$64.1	\$4,074.8
2057	\$1,139.8	\$1,034.4	\$223.3	\$281.6	\$981.2	\$379.9	\$89.1	\$66.0	\$4,195.4
2058	\$1,173.3	\$1,065.6	\$230.4	\$290.5	\$672.8	\$392.6	\$92.3	\$68.0	\$3,985.6
2059	\$1,207.9	\$1,096.9	\$237.7	\$299.1	\$0.0	\$405.0	\$95.3	\$70.1	\$3,412.0
2060	\$1,245.1	\$1,130.8	\$245.5	\$308.7	\$0.0	\$418.4	\$98.6	\$72.4	\$3,519.6
2061	\$1,280.7	\$1,163.6	\$253.1	\$317.8	\$0.0	\$431.6	\$101.8	\$74.5	\$3,623.2
2062	\$1,318.6	\$1,199.1	\$261.3	\$328.0	\$0.0	\$445.9	\$105.4	\$76.8	\$3,735.1
2063	\$1,356.4	\$1,234.0	\$269.5	\$337.6	\$0.0	\$460.0	\$108.9	\$79.1	\$3,845.5
2064	\$1,396.9	\$1,271.7	\$278.2	\$348.4	\$0.0	\$475.4	\$112.7	\$81.6	\$3,965.0
2065	\$1,437.1	\$1,308.8	\$286.7	\$358.6	\$0.0	\$490.5	\$116.5	\$84.1	\$4,082.2
2066	\$1,480.2	\$1,348.9	\$295.9	\$370.0	\$0.0	\$506.8	\$120.6	\$86.7	\$4,209.1
2067	\$1,522.7	\$1,388.5	\$305.1	\$380.8	\$0.0	\$522.9	\$124.6	\$89.4	\$4,334.1
2068	\$1,568.3	\$1,431.5	\$315.1	\$392.8	\$0.0	\$540.4	\$129.0	\$92.2	\$4,469.3
2069	\$1,613.9	\$1,473.3	\$325.0	\$404.2	\$0.0	\$557.5	\$133.3	\$95.0	\$4,602.2
2070	\$1,662.8	\$1,518.7	\$335.6	\$417.0	\$0.0	\$576.0	\$137.9	\$98.0	\$4,746.0

- 1) NTTA's share of the revenue collected from PGBT EE.
- 2) SRT revenue for year 2058 includes revenue from January to August only, because FY 2058 is the end of the fifty-year operational agreement of the SRT between NTTA and TxDOT
- 3) Revenue sharing agreement with TxDOT (50%/50%) is assumed to begin January 1, 2050

Table 6-7 shows the projected annual transaction and revenue growth rates on the NTTA System. Annual transaction and revenue growth rates from 2024 through 2030 are projected to be 2.1 percent and 4.9 percent, respectively. During this period, the growth in transactions is driven mainly by the growth in the demographics along the NTTA System corridors, as well as the opening of the DNT Phase 4A extension. The transaction growth rates progressively decrease to 1.5 percent between 2030 and 2040 and to 0.9 percent between 2040 and 2050. The corresponding growth rates in revenue are 4.3 percent and 3.5 percent, respectively, which incorporate the traffic growth and the assumed toll rate increases.

Table 6-7. NTTA System Transactions and Revenue Annual Growth

Period	Transactions Annual Growth (%)	Revenue Annual Growth (%)
2024-2030	2.1%	4.9%
2030-2040	1.5%	4.3%
2040-2050	0.9%	3.5%

Figure 6-17 graphically displays the annual revenue forecasts shown previously in **Table 6-6** by facility. It is expected that the DNT, PGBT and SRT will continue to generate the vast majority of revenue on the NTTA System throughout the forecast period. The DNT will provide about 29 percent of all NTTA System revenue in 2024; this proportion will decrease to 27 percent in 2045 as the SRT and CTP continue to mature. The PGBT (including EE and WE) will provide approximately 36 percent of all NTTA System revenue through 2045. The SRT will provide about 23 percent of all NTTA System revenue through 2045. 360 Tollway is expected to generate three percent of overall revenue in 2024, but this share is projected to increase to four percent by 2045. The AATT, MCLB, and LLTB will contribute less than two percent of revenue through 2045.

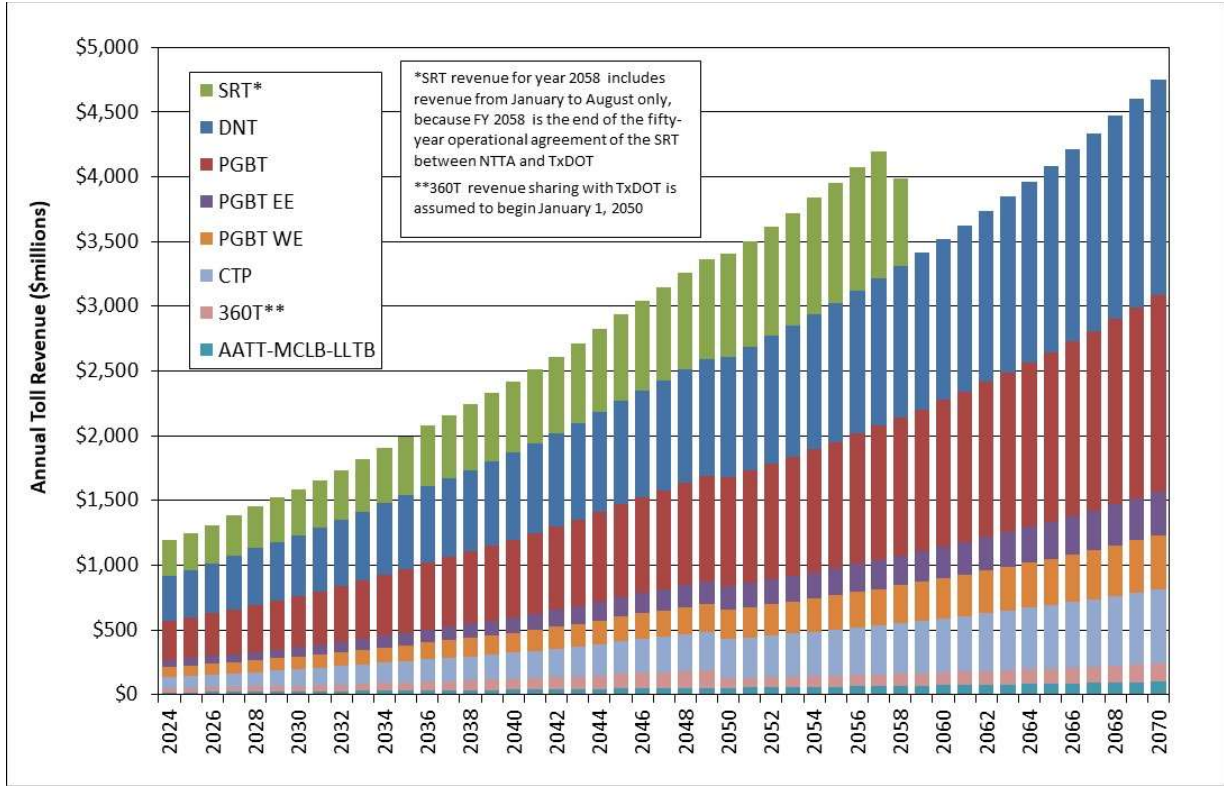


Figure 6-17. NTTA System Estimated Annual Revenue by Facility

Note: PGBT-EE toll revenue shown is the NTTA’s share of the toll revenue

Sensitivity Tests of Key Input Variables

The base case forecasts for the NTTA System shown above are based on several assumptions, as described previously. As any future forecast is subject to considerable uncertainty, most traffic and revenue forecasts to be used in support of project financing typically include sensitivity tests. In general, these are intended to provide a general measure of the potential impact on the revenue forecasts associated with hypothetical changes in certain basic assumptions. These sensitivity tests provide a comparison with the previously presented base case toll revenue forecasts. Each sensitivity test is described in more detail below.

Impacts of Value of Time

Values of time (VOT) assumed to produce the traffic and revenue forecast on the NTTA System are shown in **Table 6-8**. Two alternative scenarios with low VOT and high VOT were created to test the sensitivity of the traffic and revenue forecasts to the VOT. The two alternative VOTs were created by assuming a 15 percent decrease and increase to the average VOT in the region. The scenarios were tested for the years 2024 and 2045, and the traffic forecast and revenue comparison is shown in **Table 6-8**.

As shown in **Table 6-8**, for a 15 percent decrease in VOT in year 2024, revenue is expected to decrease by approximately 6.8 percent, and transactions are expected to drop by 6.7 percent. In 2045, using a 15 percent decrease in VOT, revenue is expected to drop by 6.1 percent, and transactions will decrease by 5.9 percent. In 2024, using a 15 percent increase in VOT, revenue is expected to increase by 2.2 percent, and transactions will increase by 2.3 percent. In 2045, using a 15 percent increase in VOT, transactions and revenue are expected to increase by 4.0 and 3.5 percent, respectively.

Table 6-8. Impacts of Value of Time

Year	Revenue			Revenue Index		
	Base VOT	0.85 VOT	1.15 VOT	Base VOT	0.85 VOT	1.15 VOT
2024	\$1,191,107,800	\$1,110,230,862	\$1,217,777,704	100	94.8	104.2
2045	\$2,934,485,500	\$2,755,084,682	\$3,050,722,658	100	94.9	104.0
Year	Transactions			Transactions Index		
	Base VOT	0.85 VOT	1.15 VOT	Base VOT	0.85 VOT	1.15 VOT
2024	956,133,900	892,415,191	977,685,726	100	95.3	103.3
2045	1,333,662,000	1,254,474,147	1,380,865,922	100	95.1	104.5

Impacts of Severe Demographic Growth Stagnation

Traffic and revenue forecasts were tested under severe demographic growth stagnation scenarios. Demographic growth was assumed to lag by five and ten years behind the revised demographics used in the base forecast. For each alternative, the traffic and revenue estimates were evaluated for the forecast year 2045. As can be seen in **Table 6-9**, the five-year lag demographics/trip tables result in a revenue and transactions decrease of 7.6 and 7.5 percent, respectively. In the case of a ten-year lag in demographic growth, revenue in 2045 would be 14.8 percent lower, and transactions would be 14.2 percent lower.

Table 6-9. Impacts of Severe Demographic Growth Stagnation

Year	2045 Revenue		2045 Revenue Index	
	Base	Alternative	Base	Alternative
Five Year Lag	\$1,191,107,800	\$1,100,144,312	100	92.4
Ten Year Lag	\$2,934,485,500	\$2,500,923,248	100	85.2
Year	2045 Transactions		2045 Transactions Index	
	Base	Alternative	Base	Alternative
Five Year Lag	956,133,900	884,088,619	100	92.5
Ten Year Lag	1,333,662,000	1,144,764,580	100	85.8

Impacts of AVI Share and Revenue Recovery Assumptions

The impacts on the revenue forecasts due to the current AVI share and revenue recovery assumption changes were tested for multiple years. For this test, it was assumed that there would be no change in the total transactions. As can be seen in **Table 6-10**, the estimated revenue would be approximately two percent lower by 2040 if the alternate AVI share assumptions (under which the AVI share drops to 70 percent) are used.

As shown in **Table 6-11**, if the ZipCash revenue recovery is assumed to be 10 percent lower than the base case in all forecast years, the revenue would be 1.7 percent lower in 2024 and 2045. If the ZipCash revenue recovery is assumed to be 10 percent higher than the base case in all forecast years, the revenue would be 1.7 percent higher in both years.

Table 6-10. Impacts of AVI Participation

Year	Revenue				Revenue Index	
	Base TollTag Share	Base Revenue	Alternate Toll Tag Share	Alternate Revenue	Base TollTag Share	Alternate Toll Tag Share
2030	80.0%	\$1,588,343,400	70.0%	\$1,556,966,100	100	98.0
2040	79.9%	\$2,412,888,700	69.9%	\$2,366,531,000	100	98.1
2050	79.9%	\$3,394,970,250	69.9%	\$3,330,277,450	100	98.1
2060	79.3%	\$3,510,558,750	69.4%	\$3,444,782,950	100	98.1
2024-2070		\$139,044,217,600		\$136,410,142,900	100.0	98.6

Table 6-11. Impacts of ZipCash Revenue Recovery

Year	Revenue			Revenue Index		
	Zip Cash Recovery			Zip Cash Recovery		
	Base	0.9	1.1	Base	0.9	1.1
2024	\$1,191,107,800	\$1,170,940,300	\$1,211,274,900	100	98.3	101.7
2045	\$2,934,485,500	\$2,884,950,700	\$2,984,019,900	100	98.3	101.7

Impacts of Truck Traffic Shares

The impacts of lower truck traffic shares on NTTA System revenue are shown in **Table 6-12**. In this test, the total number of the transactions is assumed to remain the same as the base forecast. As shown, NTTA System revenue in both 2024 and 2045 would be 3.4 percent lower when the truck traffic share is reduced by 50 percent at all toll gantries.

Table 6-12. Impacts of Truck Traffic Shares

Year	Revenue		Revenue Index	
	Base	50% Drop in Truck Traffic Shares	Base	50% Drop in Truck Traffic Shares
2024	\$1,191,107,800	\$1,151,198,400	100	96.6
2045	\$2,934,485,500	\$2,833,296,700	100	96.6

Impacts of Revenue Days

The impacts of revenue days on NTTA System revenue are shown in **Table 6-13**. In this test, the number of revenue days is decreased to reflect a reduction of ten percent in the weekend to weekday traffic ratio. As shown in **Table 6-13**, NTTA System revenue would be approximately 2.3 percent lower throughout the forecast period with the weekend to weekday traffic ratio reduced by 10 percent.

Table 6-13. Impacts of Revenue Days

Year	Revenue		Revenue Index	
	Base	10% Drop in Weekend Traffic	Base	10% Drop in Weekend Traffic
2030	\$1,588,343,400	\$1,548,623,700	100	97.50
2040	\$2,412,888,700	\$2,352,514,900	100	97.50
2050	\$3,394,970,250	\$3,310,077,200	100	97.50
2060	\$3,510,558,750	\$3,424,184,250	100	97.54
2070	\$4,734,033,250	\$4,617,558,250	100	97.54

Appendix A

Independent Demographic Review

This appendix contains the documentation of the independent demographic review as provided by the subconsultant, Research and Demographic Solutions. This report was provided to CDM Smith in July 2024.

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NTTA System Demographic Review and Update

July 2024



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INTRODUCTION AND PURPOSE

Research and Demographic Solutions Group (RDS) was commissioned by CDM Smith to perform an independent socioeconomic analysis concerning household, population, and employment forecasts along the North Texas Tollway Authority (NTTA) System roadways. The NTTA System is defined as eight toll roads: the Dallas North Tollway (DNT), the President George Bush Turnpike (PGBT), the Sam Rayburn Tollway (SRT), the Chisholm Trail Parkway (CTP), the Addison Airport Toll Tunnel (AATT), the Mountain Creek Lake Bridge (MCLB), the Lewisville Lake Toll Bridge (LLTB) and the 360 Tollway. This report provides an independent socioeconomic analysis of selected areas in proximity of the NTTA System roadways in light of the current North Central Texas Council of Government's (NCTCOG) Metropolitan Transportation Plan, "Mobility 2045 Update", which was adopted by the Regional Transportation Council on June 9, 2022.

RDS evaluated the latest socioeconomic forecasts prepared by NCTCOG for accuracy and reasonableness, detailed to the level of Traffic Analysis Process (TAP) zones. While review was done for all 5,303 zones, focus was narrowed to 4,039 TAP zones directly affecting portions of the NTTA System. The RDS evaluation was completed for the years of 2024 and 2045.

RDS also identified and calculated major emerging economic trends which directly impact the level and distribution of future socioeconomic growth in the Dallas-Fort Worth Metropolitan Statistical Area (DFW MSA). Such trends include patterns in land use, transportation improvements, and major planned developments. RDS evaluated any factors that will likely change economic growth potential or the overall distribution of economic growth. Examples include, but are not limited to future rail stations and rail line extensions, infrastructure expansions and airport development.

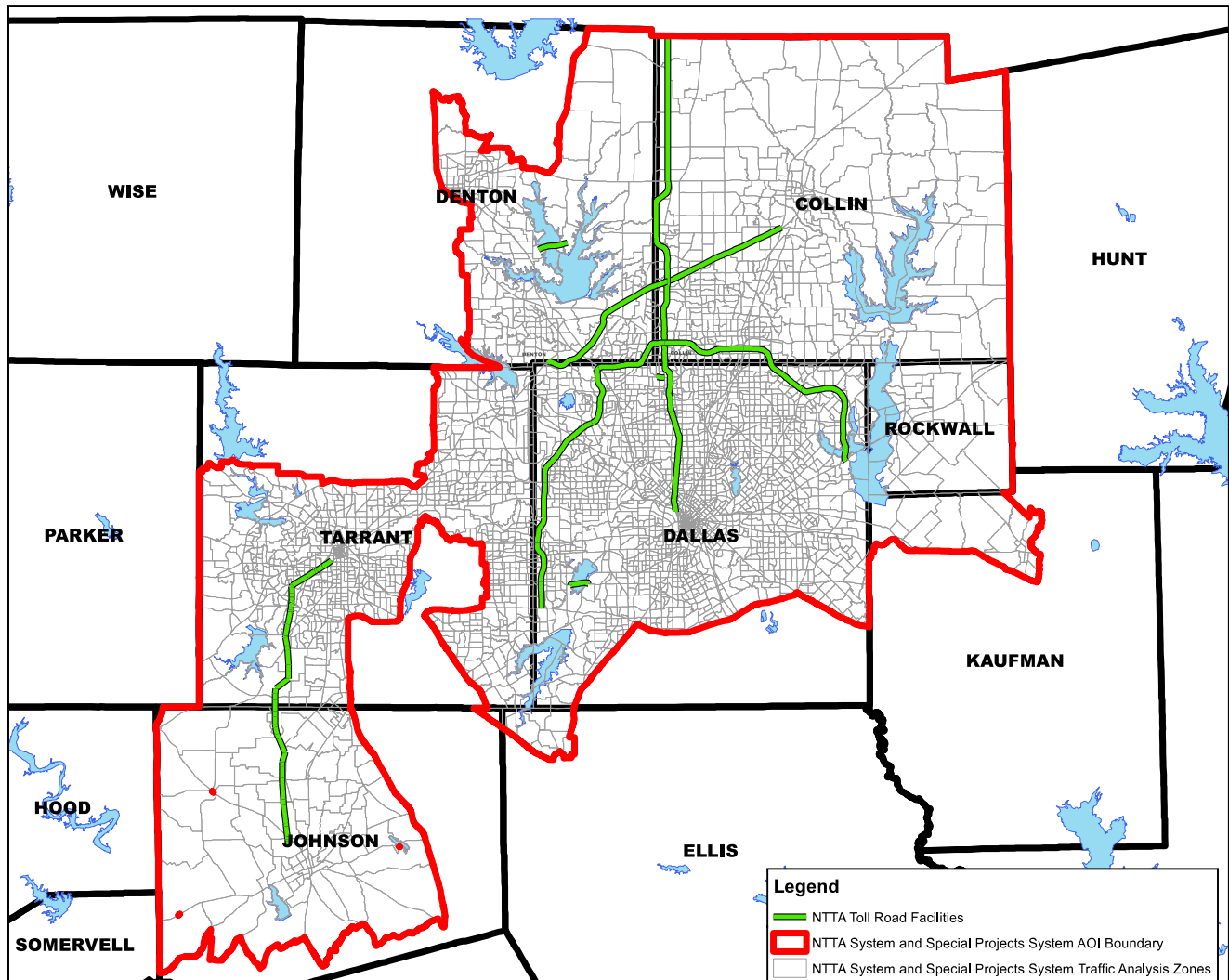
RDS review of the TAP zone-level forecast demographics was completed in June 2024.

Full citations are provided for methodologies, sources of development trends and projections, and narratives defining and detailing important issues affecting future socioeconomic growth in proximity of the NTTA System roadways.

NTTA System Demographic Review Area of Interest Map

The Area of Interest (AOI) for this study includes all of Collin and Rockwall Counties, as well as portions of Dallas, Denton, Johnson, Kaufman and Tarrant Counties in proximity to the NTTA System facilities as shown in Figure 1. CDM Smith and RDS identified 4,039 TAP zones for initial review. Criteria, including residential and commercial construction databases, were established to select the most active TAP zones for review.

Figure 1: Area of Interest Map

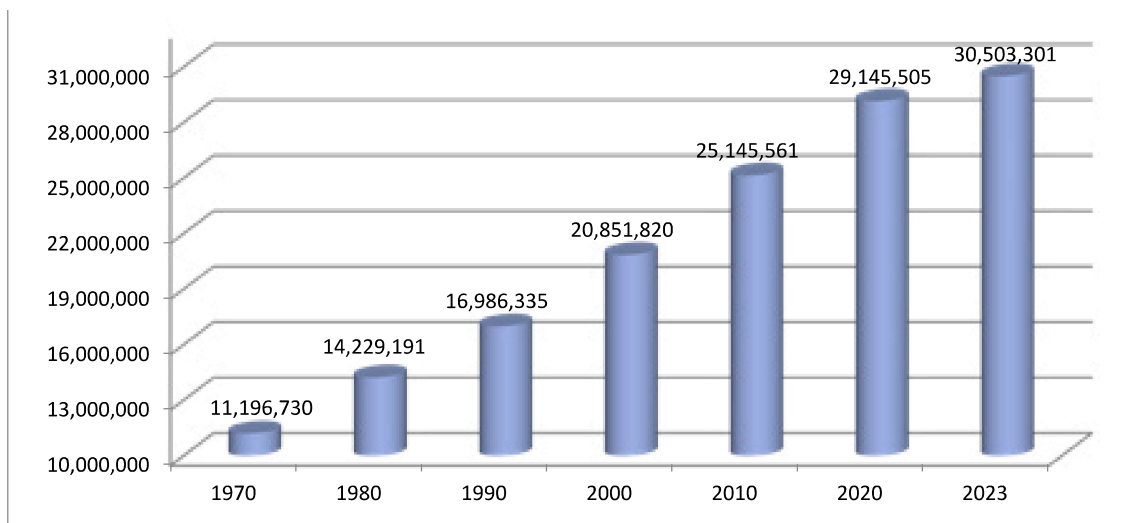


POPULATION TRENDS AND PROJECTIONS

State of Texas

Texas continues to be one of the fastest growing states in the US. After the 2020 census, the Census Bureau reported that Texas added 4 million persons between 2010 and 2020, an almost 16 percent increase in total population. Texas' high growth trend has continued, mainly due to the state's high Hispanic migration and their accompanying birth rates.¹ As of 2023, Hispanic residents made up approximately 39.8 percent, or over 12 million, of Texas' overall population. Figure 2 shows the trend in Texas population from 1970 through 2023.

Figure 2: Texas Total Population 1970 - 2023



Source: US Census Bureau, 2023 Population Estimates

Texas' future population growth is expected to be strong going forward. The state's relatively low cost of living, attractive business climate, low tax rates, and diversified economy all should contribute to sizable future population gains. Utilizing half (0.5) and full (1.0) rates of migration from 2010 to 2020, the Texas Demographic Center (TDC) estimates that between 35.5 and 40.6 million people will live in the state by 2050. Woods and Poole and the Texas Water Development Board forecast a robust 41.2 and 42.3 million 2050 Texas population respectively.

Table 1: Texas Population Projections (in Millions)

Scenarios	2020	2030	2040	2050	2020-2050 Growth	Compound Annual Growth Rate 2020-2050
TDC 0.5 Scenario	29.1	31.6	33.8	35.5	6.4	0.66%
TDC 1.0 Scenario	29.1	34.9	36.8	40.6	11.5	1.12%
Woods & Poole	29.2	33.1	37.0	41.2	12	1.15%
Texas Water Development Board	29.7	33.9	38.1	42.3	12.6	1.19%

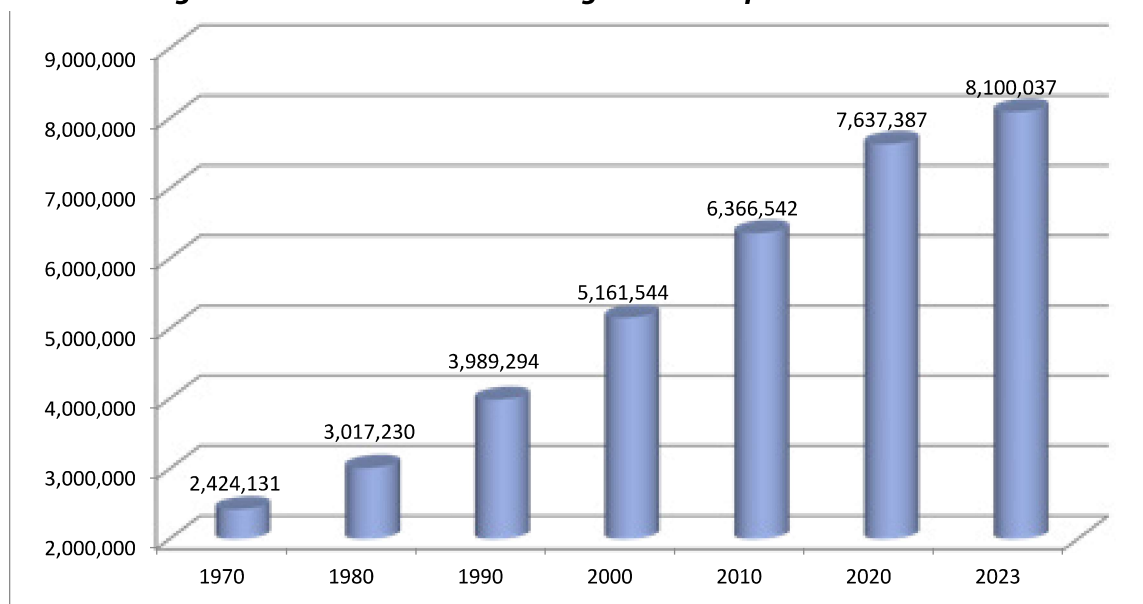
Source: 2022 Texas Demographic Center, 2023 Woods & Poole, 2022 Texas State Water Plan Population Projections

1. "Booming Texas population growth, demographic changes set stage for redistricting battle" Dallas Morning News 12 August, 2021.

DFW Metropolitan Statistical Area

Between 2010 and 2023, the Dallas-Fort Worth-Arlington Metropolitan Statistical Area² experienced the largest MSA population gain in the US and now has 8.1 million residents, as shown in Figure 3. Overall, the MSA has added just under 3 million persons since 2000. To put this in perspective, the DFW MSA has added the total current population of the Denver, CO MSA between 2000 to 2023. Furthermore, DFW MSA growth averaged almost 13,000 more people per year from 2010-2023 than in the 2000-2010 period.

Figure 3: Dallas-Fort Worth-Arlington MSA Population 1970 - 2023



Source: U.S. Census Bureau, Decennial Censuses and 2023 Population Estimates.

Even though residential construction has slowed in many areas of the country, all forecasting agencies including the NCTCOG, the Texas Demographic Center, Woods & Poole, and the Texas Water Development Board agree that the region will continue to see very strong household and population growth through 2050. There are a myriad of attributes that contribute to the overall regional projections. These include a recent history of strong growth, affordable and available land with no limiting geographic boundaries such as an ocean or foreign border, the relatively low cost of doing business in the state and region, central geographic location in the U.S., favorable weather and amenities, etc.

Historical Population Trends

Table 2 shows the historical populations of Dallas, Tarrant, Collin, Denton, Rockwall, Ellis, and Johnson Counties during the past 53 years. Collectively, the population of these seven counties grew by 5.2 million residents, from 2.28 million in 1970 to more than 7.5 million during 2023. Fifty-two percent of that population growth occurred in Dallas and Tarrant Counties. However, Collin County added over 1.1 million residents and experienced the second-most rapid rate of growth with a CAGR of 5.59 percent between 1970 and 2023. The CAGR's of Rockwall and Denton Counties increased to over 5 percent yearly during this same period. The population in the region's southern suburban counties grew more slowly, with Ellis County growing by almost 3 percent and Johnson County by 2.85.

2. The DFWA MSA is comprised of Collin, Dallas, Denton, Ellis, Hunt, Johnson, Kaufman, Parker, Rockwall, Tarrant and Wise Counties.

Table 2: Historical Population for Select Counties in the Dallas-Fort Worth MSA, 1970-2023

Total Population

	Collin County	Dallas County	Denton County	Ellis County	Johnson County	Rockwall County	Tarrant County	Total
1970	66,920	1,327,321	75,633	46,638	45,769	7,046	716,317	2,285,644
1980	144,576	1,556,390	143,126	59,743	67,649	14,528	860,880	2,846,892
1990	264,036	1,852,810	273,525	85,167	97,165	25,604	1,170,103	3,768,410
2000	491,272	2,216,808	433,065	111,415	126,622	43,023	1,449,290	4,871,495
2010	782,341	2,368,139	662,614	149,610	150,934	78,337	1,809,034	6,001,009
2020	1,064,465	2,613,539	906,422	192,455	179,927	107,819	2,110,640	7,175,267
2023	1,195,359	2,606,358	1,007,703	222,829	202,906	131,307	2,182,947	7,549,409

Total Population Change

	Collin County	Dallas County	Denton County	Ellis County	Johnson County	Rockwall County	Tarrant County	Total
1970-1980	77,656	229,069	67,493	13,105	21,880	7,482	144,563	561,248
1980-1990	119,460	296,420	130,399	25,424	29,516	11,076	309,223	921,518
1990-2000	227,236	363,998	159,540	26,248	29,457	17,419	279,187	1,103,085
2000-2010	291,069	151,331	229,549	38,195	24,312	35,314	359,744	1,129,514
2010-2023	413,018	238,219	345,089	73,219	51,972	52,970	373,913	1,548,400
1970-2023	1,128,439	1,279,037	932,070	176,191	157,137	124,261	1,466,630	5,263,765

Compound Annual Growth Rate

	Collin County	Dallas County	Denton County	Ellis County	Johnson County	Rockwall County	Tarrant County	Total
1970-1980	8.01%	1.60%	6.59%	2.51%	3.98%	7.50%	1.86%	2.22%
1980-1990	6.21%	1.76%	6.69%	3.61%	3.69%	5.83%	3.12%	2.84%
1990-2000	6.41%	1.81%	4.70%	2.72%	2.68%	5.33%	2.16%	2.60%
2000-2010	4.76%	0.66%	4.34%	2.99%	1.77%	6.18%	2.24%	2.11%
2010-2023	3.31%	0.74%	3.28%	3.11%	2.30%	4.05%	1.46%	1.78%
1970-2023	5.59%	1.28%	5.01%	2.99%	2.85%	5.67%	2.12%	2.28%

Source: U.S. Census Bureau, Decennial Censuses and 2023 Population Estimates.

Recent Population Trends

Table 3 shows the populations of the ten largest metropolitan statistical areas (MSAs) in the United States. As of the U.S. Census Bureau’s 2023 population estimates, the three largest were the New York-Newark-Jersey City, NY MSA (19.5 million residents), the Los Angeles-Long Beach-Anaheim, CA MSA (12.8 million residents), and the Chicago-Naperville-Elgin, IL MSA (9.2 million residents). In 2023, the DFW MSA was ranked as the fourth largest MSA in the United States followed by the Houston-The Woodlands-Sugar Land MSA in fifth. The Houston MSA’s CAGR was just slightly smaller than DFW’s from 2010 to 2023, but these two MSA’s were the fastest growing in the Top 10.

Table 3: Largest Metropolitan Statistical Areas in the United States, 2010-2023

Rank	MSA	Total Population			Total Change	Average Annual Change	CAGR
		2010	2020	2023	2010 to 2023	2010 to 2023	2010 to 2023
1	New York-Newark-Jersey City, NY-NJ-PA MSA	18,897,109	20,140,470	19,498,249	601,140	46,242	0.24%
2	Los Angeles-Long Beach-Anaheim, CA MSA	12,828,837	13,200,998	12,799,100	-29,737	-2,287	-0.02%
3	Chicago-Naperville-Elgin, IL-IN-WI MSA	9,461,105	9,618,502	9,262,825	-198,280	-15,252	-0.16%
4	Dallas-Fort Worth-Arlington, TX MSA	6,366,542	7,637,387	8,100,037	1,733,495	133,346	1.87%
5	Houston-The Woodlands-Sugar Land, TX MSA	5,920,416	7,122,240	7,510,253	1,589,837	122,295	1.85%
6	Atlanta-Sandy Springs-Roswell, GA MSA	5,286,728	6,089,815	6,307,261	1,020,533	78,503	1.37%
7	Washington-Arlington-Alexandria, DC-VA-MD-WV MSA	5,649,540	6,385,162	6,304,975	655,435	50,418	0.85%
8	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD MSA	5,965,343	6,245,051	6,246,160	280,817	21,601	0.35%
9	Miami-Fort Lauderdale-West Palm Beach, FL MSA	5,564,635	6,138,333	6,183,199	618,564	47,582	0.81%
10	Phoenix-Mesa-Chandler, AZ MSA	4,192,887	4,845,832	5,070,110	877,223	67,479	1.47%

Source: U.S. Census Bureau, Decennial Censuses and 2023 Population Estimates.

Since 2010, Texas has led the way with the population growth of its two largest metropolitan statistical areas. On an average annualized basis, the Dallas-Fort Worth and Houston-The Woodlands-Sugar Land, TX MSAs grew by an average of 133,000 and 122,000 residents each year between 2010 and 2023. When ordered by total population growth between the 2010 decennial Census and the Census Bureau’s 2023 population estimates, the DFW MSA had the largest overall population growth of 1.73 million persons, while the Houston MSA added 1.59 million. Third in 2010 to 2023 growth, the Atlanta-Sandy Springs-Alpharetta, GA MSA gained just over 1 million new residents. Rounding out the top five in total growth, the Phoenix-Mesa-Chandler MSA and the Austin-Round Rock-Georgetown MSA each added over 877,000 and 756,000 new residents from 2010 to 2023.

Table 4: Fastest Growing Metropolitan Statistical Areas in the United States, 2010-2023

RANK	MSA	Total Population			Total Change	Average Annual Change	CAGR
		2010	2020	2023	2010 to 2023	2010 to 2023	2010 to 2023
1	Dallas-Fort Worth-Arlington, TX MSA	6,366,542	7,637,398	8,100,037	1,733,495	133,346	1.87%
2	Houston-The Woodlands-Sugar Land, TX MSA	5,920,416	7,149,604	7,510,253	1,589,837	122,295	1.85%
3	Atlanta-Sandy Springs-Alpharetta, GA MSA	5,286,728	6,106,847	6,307,261	1,020,533	78,503	1.37%
4	Phoenix-Mesa-Chandler, AZ MSA	4,192,887	4,851,102	5,070,110	877,223	67,479	1.47%
5	Austin-Round Rock-Georgetown, TX MSA	1,716,289	2,283,379	2,473,275	756,986	58,230	2.85%
6	Orlando-Kissimmee-Sanford FL MSA	2,134,411	2,673,391	2,817,933	683,522	52,579	2.16%
7	Washington-Arlington-Alexandria, DC-VA-MD-WV MSA	5,649,540	6,278,594	6,304,975	655,435	50,418	0.85%
8	Miami-Fort Lauderdale-West Palm Beach, FL MSA	5,564,635	6,138,356	6,183,199	618,564	47,582	0.81%
9	Seattle-Tacoma-Bellevue, WA MSA	3,439,809	4,018,797	4,044,837	605,028	46,541	1.25%
10	Charlotte-Concord-Gastonia, NC-SC MSA	2,217,012	2,660,348	2,805,115	588,103	45,239	1.83%

Source: U.S. Census Bureau, Decennial Censuses and 2023 Population Estimates.

Population Projections

Table 5 shows four population projection scenarios from the Texas Demographic Center (TDC), Woods and Poole, and the Texas Water Development Board (TWDB) for the Dallas-Fort Worth MSA. These entities project MSA population to be between 9.5 million and almost 11.5 million residents by 2050. The two most conservative scenarios are from Woods and Poole, a firm that specializes in long-term county demographic projections. Their most current projections include two migration scenarios, one assuming half of the 2010-2020 migration rates (0.5 Scenario) and the other assuming full 2010-2020 migration rates (1.0 Scenario) . The Texas Water Development Board’s population projections are created to assist in determining water demand for counties and other user groups throughout Texas. TWDB’s 2050 total of almost 11.5 million is very similar to Woods and Poole and the TDC’s 1.0 Scenario. The historical growth rate of the population for the Dallas-Fort Worth MSA implies that the region’s population will likely grow at a rate similar to these three projections.

Table 5: Population Projections for the Dallas-Fort Worth MSA, 2020-2050

Year	TDC 0.5 Scenario	TDC 1.0 Scenario	Woods and Poole	TWDB
Total Population				
2020	7,637,387	7,637,387	7,665,875	7,551,677
2030	8,377,195	8,806,071	8,873,234	8,788,601
2040	9,030,589	10,048,453	10,069,506	10,105,412
2050	9,538,343	11,271,690	11,351,985	11,496,824
Average Annual Growth				
2020-2030	73,981	116,868	120,736	123,692
2030-2040	65,339	124,238	119,627	131,681
2040-2050	50,775	122,324	128,248	139,141
Compounded Annual Growth Rate				
2020-2030	0.93%	1.43%	1.47%	1.53%
2030-2040	0.75%	1.33%	1.27%	1.41%
2040-2050	0.55%	1.16%	1.21%	1.30%

Source: Texas Demographic Center 2022, Woods and Poole 2023, Texas Water Development Board 2022

Table 6 illustrates population projections for the seven most populous counties in the Dallas-Fort Worth MSA. This local data supports the conclusions that most of the State’s growth from 2020 to 2050 is projected to take place in the large urban core counties coupled with gains in the surrounding suburban ring counties. The urban core of Dallas and Tarrant Counties will see significant continued population growth while the suburban counties of Collin and Denton are projected to grow at the fastest rates during this period.

Table 6: Population Projections for Select Counties in the Dallas-Fort Worth MSA, 2020-2050

Texas Demographic Center 0.5 Migration Scenario							
	Collin County	Dallas County	Denton County	Ellis County	Johnson County	Rockwall County	Tarrant County
2020	1,064,465	2,613,539	906,422	192,455	179,927	107,819	2,110,640
2030	1,213,030	2,790,940	1,047,144	215,095	194,081	122,693	2,281,675
2040	1,366,389	2,904,469	1,183,849	237,287	207,065	138,754	2,430,615
2050	1,508,619	2,960,764	1,299,072	257,336	217,778	154,490	2,530,700
Texas Demographic Center 1.0 Migration Scenario							
	Collin County	Dallas County	Denton County	Ellis County	Johnson County	Rockwall County	Tarrant County
2020	1,064,465	2,613,539	906,422	192,455	179,927	107,819	2,110,640
2030	1,341,877	2,811,320	1,156,452	234,017	205,405	137,756	2,356,541
2040	1,676,287	2,954,449	1,449,394	280,510	231,555	173,604	2,604,655
2050	2,056,270	3,029,940	1,757,793	331,033	257,733	216,829	2,809,558
Woods and Poole Scenario							
	Collin County	Dallas County	Denton County	Ellis County	Johnson County	Rockwall County	Tarrant County
2020	1,075,654	2,609,966	914,324	194,295	180,945	109,136	2,115,682
2030	1,400,540	2,744,303	1,170,534	239,449	213,003	153,636	2,364,644
2040	1,745,423	2,885,879	1,442,241	273,866	233,140	202,447	2,611,945
2050	2,149,197	2,998,433	1,755,745	309,483	252,127	266,764	2,850,575
Texas Water Development Board Scenario							
	Collin County	Dallas County	Denton County	Ellis County	Johnson County	Rockwall County	Tarrant County
2020	1,050,506	2,587,960	891,063	191,638	173,835	119,410	2,004,609
2030	1,239,303	2,871,662	1,115,119	241,778	200,573	160,315	2,279,113
2040	1,497,921	3,180,529	1,329,551	280,745	228,160	213,619	2,580,325
2050	1,807,279	3,429,783	1,584,015	360,584	258,414	246,938	2,799,127

Source: Texas Demographic Center 2022, Woods and Poole 2023, Texas Water Development Board 2022

Note: Table 6 only provides population projections for 7 of the 11 counties in the Dallas-Fort Worth-Arlington MSA.

NTTA System Demographic Review City-Level Population Trends

Many cities within the NTTA System Demographic Review's AOI have seen tremendous growth over the past forty-three years, but the "second ring" suburbs have seen the fastest growth since 2000. Overall, the City of Fort Worth saw the most absolute growth by adding more than 593,000 residents from 1980 to 2023. Dallas' population boom saw it grow by 398,000 persons, though 71 percent of this growth was from 1980 to 2000. In Rockwall County, the city of Fate has been the fastest-growing city since 2000, averaging a CAGR of 18.5 percent. Collin County contains many suburbs that have averaged double-digit CAGR's since 2000, including Anna, Celina, Melissa, and Prosper. Also in Collin County, both Frisco and McKinney now have more than 210,000 persons each, adding over 191 and 159 thousand since 2000 respectively.

Table 7: Historical City Population 1980 - 2023

City	1980	1990	2000	2010	2023	Total Growth 1980-2023	Compound Annual Growth Rate 1980-2000	Compound Annual Growth Rate 2000-2023
Addison	5,553	8,783	14,166	13,056	17,100	11,547	4.79%	0.82%
Allen	8,314	18,309	43,554	84,246	111,620	103,306	8.63%	4.18%
Anna	855	904	1,225	8,249	27,501	26,646	1.81%	14.48%
Arlington	160,113	261,721	332,969	365,438	398,431	238,318	3.73%	0.78%
Balch Springs	13,746	17,406	19,375	23,728	26,711	12,965	1.73%	1.41%
Bedford	20,821	43,762	47,152	46,979	48,370	27,549	4.17%	0.11%
Benbrook	13,579	19,564	20,208	21,234	24,336	10,757	2.01%	0.81%
Burleson	11,734	16,113	20,976	36,690	55,220	43,486	2.95%	4.30%
Carrollton	40,595	82,169	109,576	119,097	132,918	92,323	5.09%	0.84%
Celina	1,520	1,737	1,861	6,028	43,317	41,797	1.02%	14.67%
Cleburne	19,218	22,205	26,005	29,337	36,209	16,991	1.52%	1.45%
Colleyville	6,700	12,724	19,636	22,807	25,736	19,036	5.52%	1.18%
Coppell	3,826	16,881	35,958	38,659	41,404	37,578	11.85%	0.62%
Corinth	1,264	3,944	11,325	19,935	23,707	22,443	11.59%	3.26%
Crowley	5,852	6,974	7,467	12,838	19,932	14,080	1.23%	4.36%
Dallas	904,078	1,006,877	1,188,580	1,197,816	1,302,868	398,790	1.38%	0.40%
Duncanville	27,781	35,748	36,081	38,524	38,883	11,102	1.32%	0.33%
Eules	24,002	38,149	46,005	51,277	59,686	35,684	3.31%	1.14%
Fairview	893	1,554	2,644	7,248	10,790	9,897	5.58%	6.31%
Farmers Branch	24,863	24,250	27,508	28,616	36,917	12,054	0.51%	1.29%
Fate	263	475	497	6,357	24,626	24,363	3.23%	18.49%

POPULATION TRENDS AND PROJECTIONS

City	1980	1990	2000	2010	2023	Total Growth 1980-2023	Compound Annual Growth Rate 1980-2000	Compound Annual Growth Rate 2000-2023
Flower Mound	4,402	15,527	50,702	64,669	79,445	75,043	13.00%	1.97%
Forney	2,483	4,070	5,588	14,661	35,470	32,987	4.14%	8.37%
Fort Worth	385,164	447,619	534,697	741,206	978,468	593,304	1.65%	2.66%
Frisco	3,420	6,138	33,714	116,989	225,007	221,587	12.12%	8.60%
Garland	138,857	180,650	215,768	226,876	243,470	104,613	2.23%	0.53%
Grand Prairie	71,462	99,616	127,427	175,396	202,134	130,672	2.93%	2.03%
Grapevine	11,801	29,202	42,059	46,334	50,928	39,127	6.56%	0.84%
Haltom City	29,014	32,856	39,018	42,409	45,290	16,276	1.49%	0.65%
Hickory Creek	1,422	1,893	2,078	3,247	5,688	4,266	1.91%	4.48%
Highland Park	8,909	8,739	8,842	8,564	8,642	-267	-0.04%	-0.10%
Highland Village	3,246	7,027	12,173	15,056	16,100	12,854	6.83%	1.22%
Hurst	31,420	33,574	36,273	37,337	39,304	7,884	0.72%	0.35%
Irving	109,943	155,037	191,615	216,290	254,373	144,430	2.82%	1.24%
Joshua	1,470	3,821	5,031	6,088	8,901	7,431	6.34%	2.51%
Lake Dallas	3,177	3,656	6,166	7,105	7,917	4,740	3.37%	1.09%
Lewisville	24,273	46,521	77,737	95,290	133,553	109,280	5.99%	2.38%
Little Elm	926	1,255	3,646	25,898	58,496	57,570	7.09%	12.82%
Lucas	1,371	2,205	2,890	5,166	8,642	7,271	3.80%	4.88%
Mansfield	8,102	15,607	28,031	56,368	78,542	70,440	6.40%	4.58%
McKinney	16,249	21,283	54,369	131,117	213,509	197,260	6.22%	6.13%
Melissa	604	557	1,350	4,695	23,571	22,967	4.10%	13.24%
Mesquite	67,053	101,484	124,523	139,824	147,317	80,264	3.14%	0.73%
Murphy	1,150	1,547	3,099	17,708	20,920	19,770	5.08%	8.66%
North Richland Hills	30,592	45,895	55,635	63,343	70,658	40,066	3.04%	1.04%
Plano	72,331	128,713	222,030	259,841	290,190	217,859	5.77%	1.17%
Princeton	3,408	2,321	3,477	6,807	28,027	24,619	0.10%	9.50%
Prosper	675	1,018	2,097	9,423	41,660	40,985	5.83%	13.88%
Richardson	72,496	74,840	91,802	99,223	117,435	44,939	1.19%	1.08%
Richland Hills	7,977	7,978	8,132	7,801	8,323	346	0.10%	0.10%
River Oaks	6,890	6,580	6,985	7,427	7,370	480	0.07%	0.23%

POPULATION TRENDS AND PROJECTIONS

City	1980	1990	2000	2010	2023	Total Growth 1980-2023	Compound Annual Growth Rate 1980-2000	Compound Annual Growth Rate 2000-2023
Rockwall	5,939	10,486	17,976	37,490	52,918	46,979	5.69%	4.81%
Rowlett	7,522	23,260	44,503	56,199	66,813	59,291	9.30%	1.78%
Royse City	1,566	2,206	2,957	9,349	24,138	22,572	3.23%	9.56%
Sachse	1,640	5,346	9,751	20,329	32,294	30,654	9.32%	5.34%
Seagoville	7,304	8,969	10,823	14,835	19,643	12,339	1.99%	2.63%
Southlake	2,808	7,065	21,519	26,575	31,137	28,329	10.72%	1.62%
Sunnyvale	1,404	2,228	2,693	5,130	8,486	7,082	3.31%	5.12%
Terrell	13,169	12,490	13,606	15,816	21,480	8,311	0.16%	2.01%
The Colony	11,586	22,113	26,531	36,328	45,471	33,885	4.23%	2.37%
University Park	22,254	22,259	23,324	23,068	24,954	2,700	0.24%	0.29%
Wylie	3,152	8,716	15,132	41,427	61,078	57,926	8.16%	6.25%

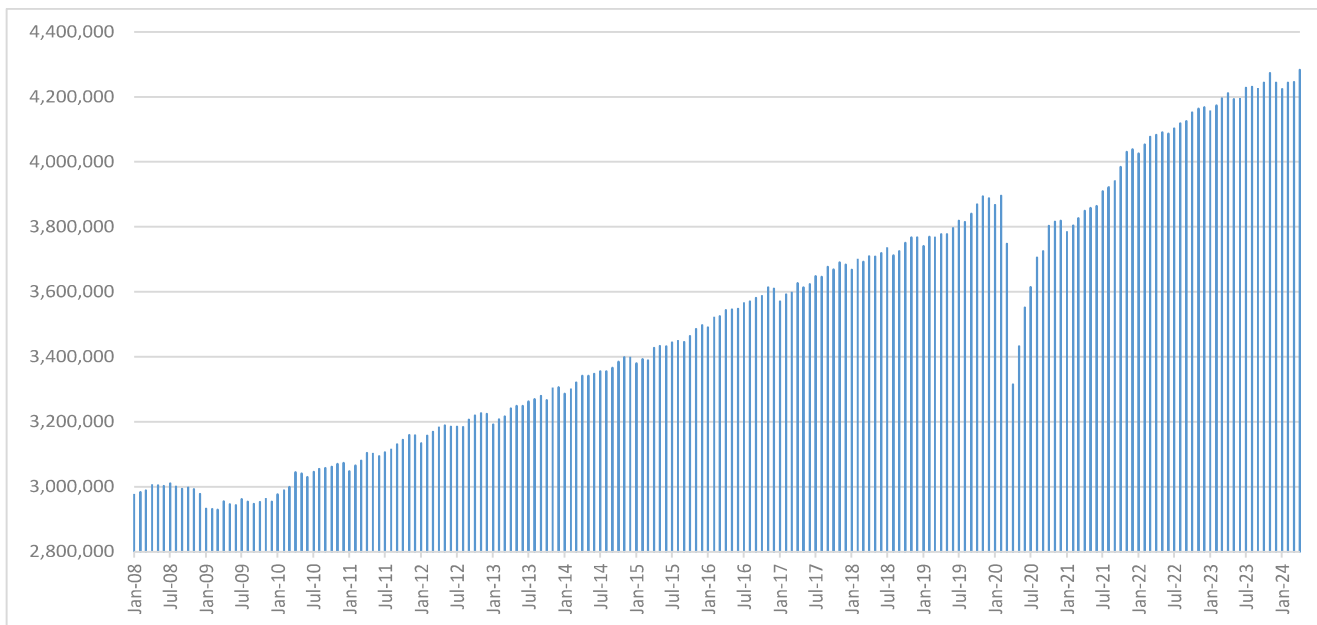
Source: U.S. Census Bureau, Decennial Censuses and 2023 Population Estimates.

EMPLOYMENT TRENDS AND PROJECTIONS

Regional and County

In the past, a downturn in the oil industry meant a downturn in the Dallas-Fort Worth job market. More recently, the diversity of the region’s economy has helped it weather these downturns due to well-represented job strength in the service industries - specifically professional and business services, education and health services and leisure and hospitality. Prior to the region’s steady employment growth, the workforce in the Dallas-Fort Worth MSA fared comparatively well during the 2008-2009 national recession. While there were substantial job losses, over the past decade, those losses have been replaced with new jobs and the local economy had more workers at the end of 2012 than it did before the recession began. This accomplishment eluded the national economy. Figure 4 shows the total employment in the Dallas-Fort Worth MSA between January 2008 and April 2024 based upon the Texas Workforce Commission’s Local Area Unemployment Statistics (LAUS) data. The overall trend for the region has been positive, although not consistently so. The region had approximately 2.98 million jobs in January 2008, growing to a peak of 3.01 million jobs in July later that year. After that point, the region’s employment began to slowly decline with a sharp contraction occurring in December and January 2009. During those months, employment in the Dallas-Fort Worth MSA dropped by almost 60,000 jobs. While a decline in the number of workers between December and January is typical, since it is a period of seasonal employment, the lack of recovery during subsequent months demonstrates that these job cuts were indeed permanent. The region’s total employment fell to its lowest level during March 2009, when it reached 2.93 million jobs. Between then and 2020, barring seasonal fluctuations, total employment had steadily risen in the Dallas-Fort Worth MSA topping out in February 2020 at 3.9 million jobs. The COVID-19 Pandemic and the subsequent loss of 582,000 DFW jobs in March and April 2020 took fifteen months to regain, but the region’s economic resiliency has allowed it to bounce back strongly and see steady employment growth into the present.

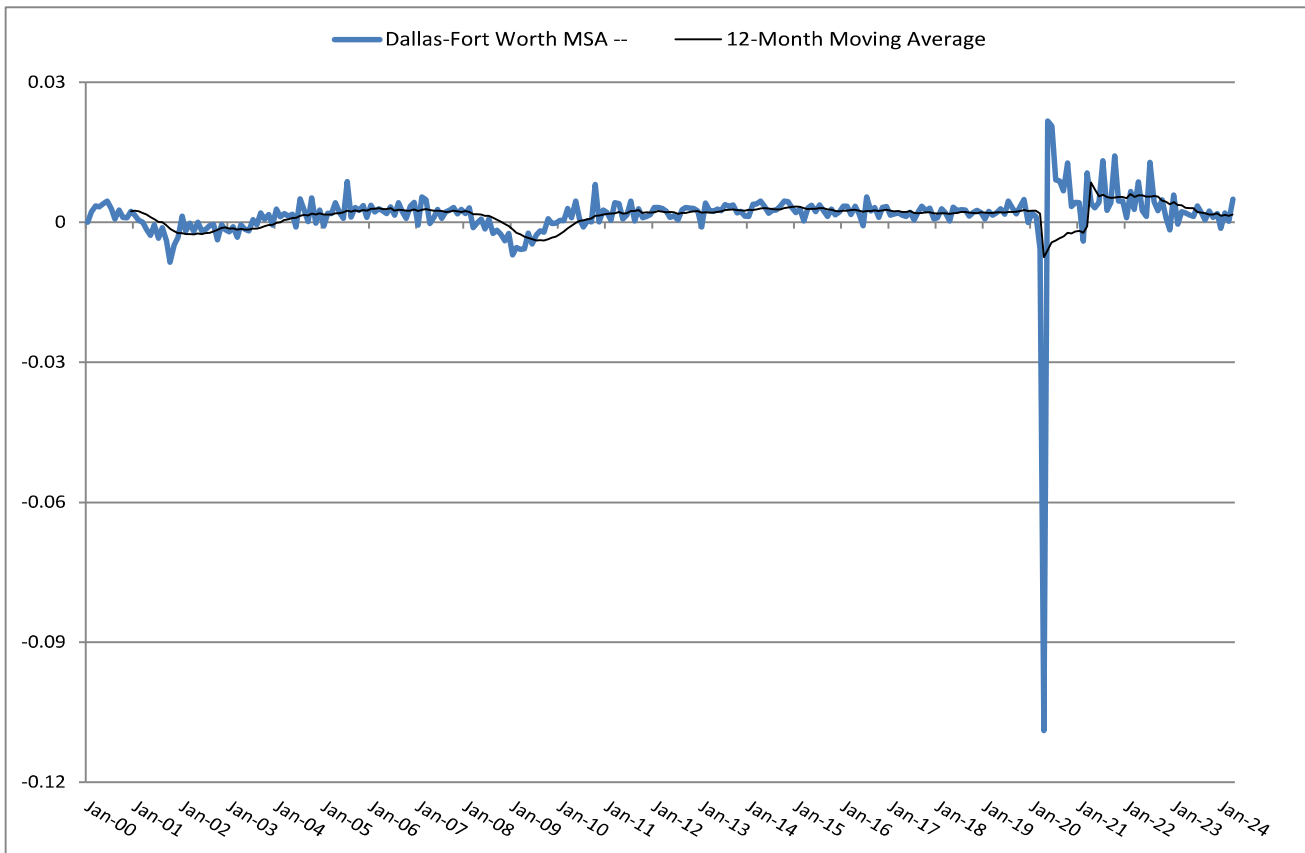
Figure 4: Total Employment in the Dallas-Fort Worth MSA, Jan 2008 - Apr 2024



Source: Texas Workforce Commission - Texas Labor Market Information website. Local Area Unemployment Statistics, June 2024.

Figure 5 shows a longer period of employment data using the Texas Workforce Commission’s Current Employment Estimates (CES) data. The CES data differ from the LAUS data, since they are based upon surveys of employers rather than the actual count of employees. Nonetheless, the discrepancies between the actual and estimated employment numbers tend to be relatively consistent, so the CES data can provide a reasonable resource for understanding employment trends when longer term LAUS data are not available. The data in Figure 5 show the percentage month-on-month employment change between January 2000 and May 2022. The unadjusted employment change shows considerable volatility, due to seasonal and academic employment. However, by adding a trend line showing the 12-month moving average, this volatility can be smoothed and the trends can be discerned. The 12-month moving average trend line shows that the Dallas-Fort Worth region suffered a prolonged period of job loss between 2001 and 2003, due to the downturn in the computer and telecommunications industries, in addition to the recessionary effects of the September 11, 2001 terrorist attacks. The region’s economy recovered by early 2004 and enjoyed a period of sustained employment growth until 2008, when the national recession took hold. Although the job loss of the 2008-2009 Great Recession occurred over a shorter period than the previous recession, the job losses were steeper. Since mid-2010, the Dallas-Fort Worth MSA had experienced another sustained period of employment growth longer than the consistent period seen in the mid-2000s until the shutdowns from the COVID-19 dropped employment by almost 11 percent in April 2020. Over the last 24 months, both the State and the region have averaged .24 percent growth per month.

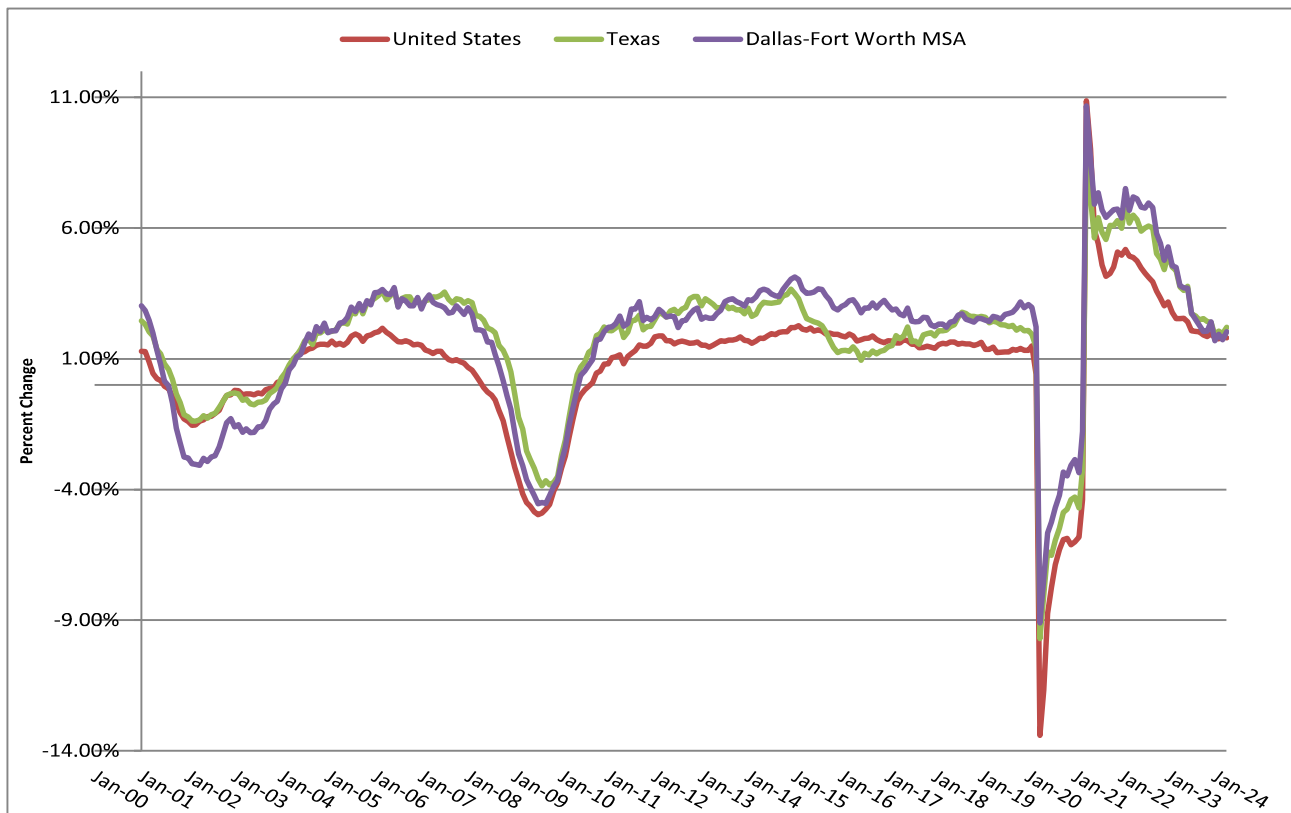
Figure 5: Month-on-Month Employment Change for Dallas-Fort Worth MSA, Jan 2000 to Apr 2024



Source: Texas Workforce Commission - Texas Labor Market Information website. Current Employment Statistics, June 2024.

Figure 6 shows the year-on-year employment change for the United States, Texas, and the Dallas-Fort Worth MSA. These data show that the recession which began in 2001 had a more significant effect on the Dallas-Fort Worth region, than it did on the United States or Texas. After recovering, the region’s employment grew more quickly through the mid-2000s than it did in the nation overall, with a rate of growth that was very similar to Texas’. In fact, employment change in the Dallas-Fort Worth region has outperformed the overall rate for the United States through January 2020, even during periods when total employment was contracting. Although it did not decouple from the Texas economy, the region underperformed against the Texas economy, starting in early 2007, and continued to do so until early 2011. Over the last ten years,, the Dallas-Fort Worth MSA had outperformed the State since November 2012, but in August through November 2018, Texas’ employment grew faster than the MSA. The sharp job losses from COVID-19 and the quick recovery explain the volatility in 2020 -21. The DFW MSA employment market has slowed over the past year, averaging 2.4 percent growth per month while the State of Texas has averaged 2.56 percent.

Figure 6: Year-on-Year Employment Change for the United States, Texas, and Dallas-Fort Worth MSA, Jan 2000 to Apr 2024



Source: Texas Workforce Commission - Texas Labor Market Information website. Current Employment Statistics, June 2024

Table 8 shows more detailed employment data for the four largest MSAs in Texas during the period between 2013 through April 2024. During this time, the Dallas-Fort Worth MSA had a net employment increase of over 1 million jobs, which was the highest overall job growth of the four MSAs and over 466,000 more than the Houston MSA, that added 563,000 new jobs. The Austin MSA had the highest CAGR at 3.68 percent, adding 471,000 new jobs. From Jan 2023 to April 2024, the Dallas-Fort Worth region’s employment growth has been the slowest of the other largest MSA’s.

Table 8: Total Employment in Largest Texas MSAs, 2013-Apr 2024

TOTAL EMPLOYMENT

Year	Austin MSA	Dallas-Fort Worth MSA	Houston MSA	San Antonio MSA
2013	964,166	3,253,995	2,983,316	1,008,086
2014	1,001,470	3,350,325	3,072,718	1,036,291
2015	1,036,980	3,437,008	3,107,962	1,063,931
2016	1,082,392	3,559,384	3,125,997	1,099,891
2017	1,113,688	3,637,295	3,142,202	1,118,736
2018	1,155,965	3,721,911	3,209,947	1,139,853
2019	1,196,050	3,813,443	3,270,640	1,155,580
2020	1,165,020	3,691,503	3,106,692	1,102,179
2021	1,263,839	3,901,793	3,220,354	1,153,500
2022	1,355,836	4,104,644	3,362,820	1,204,936
2023	1,406,681	4,214,999	3,469,061	1,237,067
Apr 2024	1,435,297	4,284,533	3,547,168	1,263,352

TOTAL EMPLOYMENT CHANGE

Year	Austin MSA	Dallas-Fort Worth MSA	Houston MSA	San Antonio MSA
2013-2014	37,304	96,330	89,402	28,205
2014-2015	35,510	86,683	35,244	27,640
2015-2016	45,412	122,376	18,035	35,960
2016-2017	31,296	77,911	16,205	18,845
2017-2018	42,277	84,616	67,745	21,117
2018-2019	40,085	91,532	60,693	15,727
2019-2020	-31,030	-121,940	-163,948	-53,401
2020-2021	98,819	210,290	113,662	51,321
2021-2022	91,997	202,851	142,466	51,436
2022-2023	50,845	110,355	106,241	32,131
2023-Apr 2024	28,616	69,534	78,107	26,285
2013-Apr 2024	471,131	1,030,538	563,852	255,266

COMPOUNDED ANNUAL GROWTH RATE

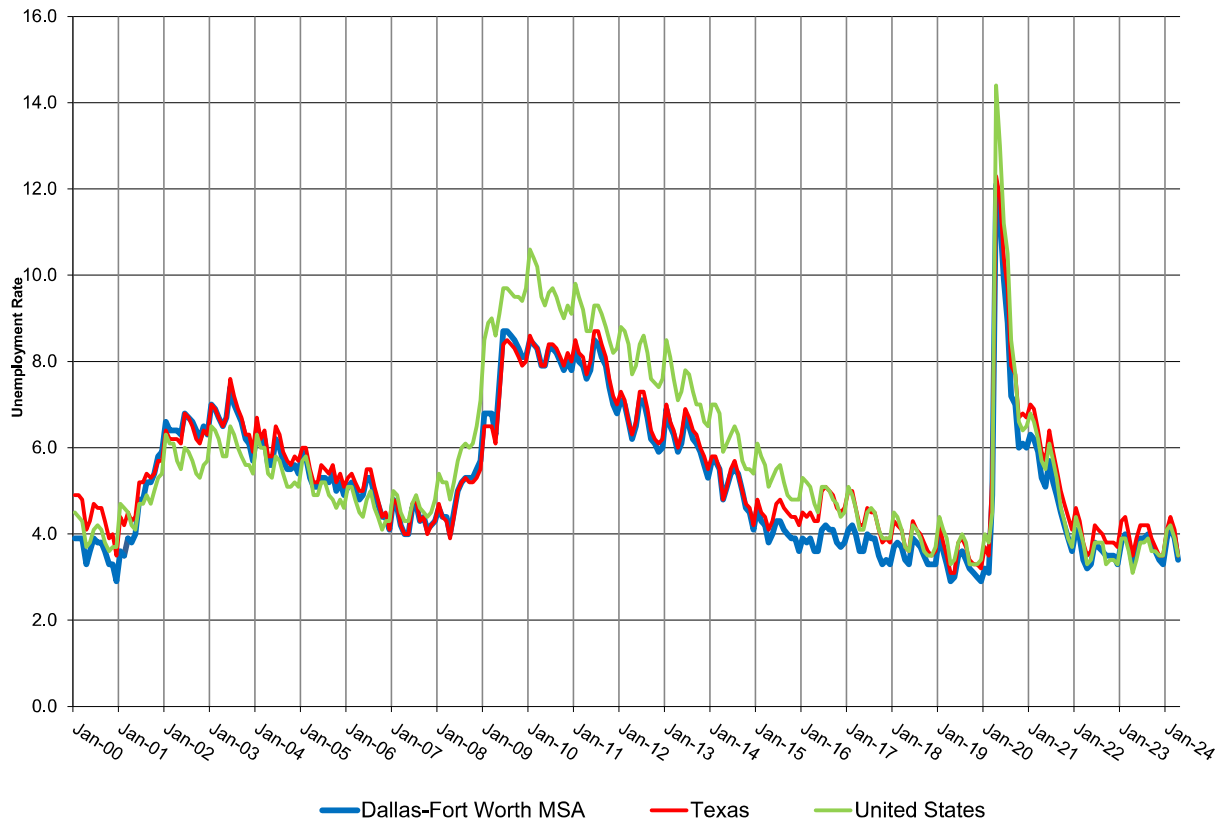
Year	Austin MSA	Dallas-Fort Worth MSA	Houston MSA	San Antonio MSA
2013-2014	3.87%	2.96%	3.00%	2.80%
2014-2015	3.55%	2.59%	1.15%	2.67%
2015-2016	4.38%	3.56%	0.58%	3.38%
2016-2017	2.89%	2.19%	0.52%	1.71%
2017-2018	3.80%	2.33%	2.16%	1.89%
2018-2019	3.47%	2.46%	1.89%	1.38%
2019-2020	-2.59%	-3.20%	-5.01%	-4.62%
2020-2021	8.48%	5.70%	3.66%	4.66%
2021-2022	7.28%	5.20%	4.42%	4.46%
2022-2023	3.75%	2.69%	3.16%	2.67%
2023-Apr 2024	2.03%	1.65%	2.25%	2.12%

Source: US Bureau of Labor Statistics, June 2024.

Unemployment

Figure 7 shows the unemployment rates for the United States, Texas, and the Dallas-Fort Worth MSA. These data show the unemployment rate in the region has closely tracked the overall unemployment rate in Texas during most of the period between January 2000 and May 2024. The Dallas-Fort Worth MSA experienced its lowest unemployment rate during April and December 2019, when it fell to 2.9 percent. During the recession that began in 2001, the regional unemployment rate peaked at 7.5 percent in June 2003. As the regional and national economy recovered and employment expanded during the mid-2000s, the regional unemployment rate fell to approximately 4.0 percent before increasing rapidly during 2008 and 2009. During the 2008-2009 Recession, the regional unemployment rate reached 8.5 percent in June 2009 and sustained that general level for the next two years. From 2011 to 2018, the regional unemployment rate followed a downward trend until January 2015, and until COVID-19-related job losses began in March 2020, it had averaged 3.67 percent. While the national unemployment rate peaked at 14.4 percent in April 2020, Texas and the DFW MSA only reached just over 12 percent. All three unemployment rate trends have continued downward since April 2020 and the most recent data from April 2024 report a sub-3.5 percent unemployment rate for all.

Figure 7: Unemployment Rate: Dallas-Fort Worth MSA, Texas, United States, Jan 2000 to Apr 2024



Note: The unemployment rate data in Figure 7 are based upon seasonally unadjusted unemployment rates. The unadjusted figures were used to maintain consistency between the three geographies of the United States, Texas, and the Dallas Fort-Worth MSA. While seasonally adjusted data are available from the Texas Workforce Commission for the United States and Texas, they are not available for Texas's MSAs.

Source: Texas Workforce Commission - Texas Labor Market Information website. Local Area Unemployment Statistics, June 2024.

REAL ESTATE TRENDS

Relocations of over 80 major corporate headquarters since 2020³ has spurred strong growth in both residential and commercial construction throughout the Dallas-Fort Worth region. Domestic and international investment in DFW remains strong and will likely assure supply increases in almost all facets of the real estate markets for some time to come. Like almost every metropolitan area in the United States, the 2008-2009 Recession had a profound impact on the regional housing market, as well as commercial real estate. The near collapse of the nation's financial system and the severe curtailment of demand due to the subsequent recession led to a sharp reduction in the number of new single-family homes built after 2006. Multifamily construction was also severely impacted by the recession, although it later benefited because fewer households were able to secure the financing to purchase new homes. Similarly, all aspects of commercial real estate were affected by the recession, either due to tight credit markets or financially stressed tenants. Fortunately, the nation's commercial real estate market did not experience the same collapse as the residential market (a real and significant threat at the time) and in spite of the COVID-19 Pandemic, it has steadily become one of the strongest in the U.S. over the past decade.

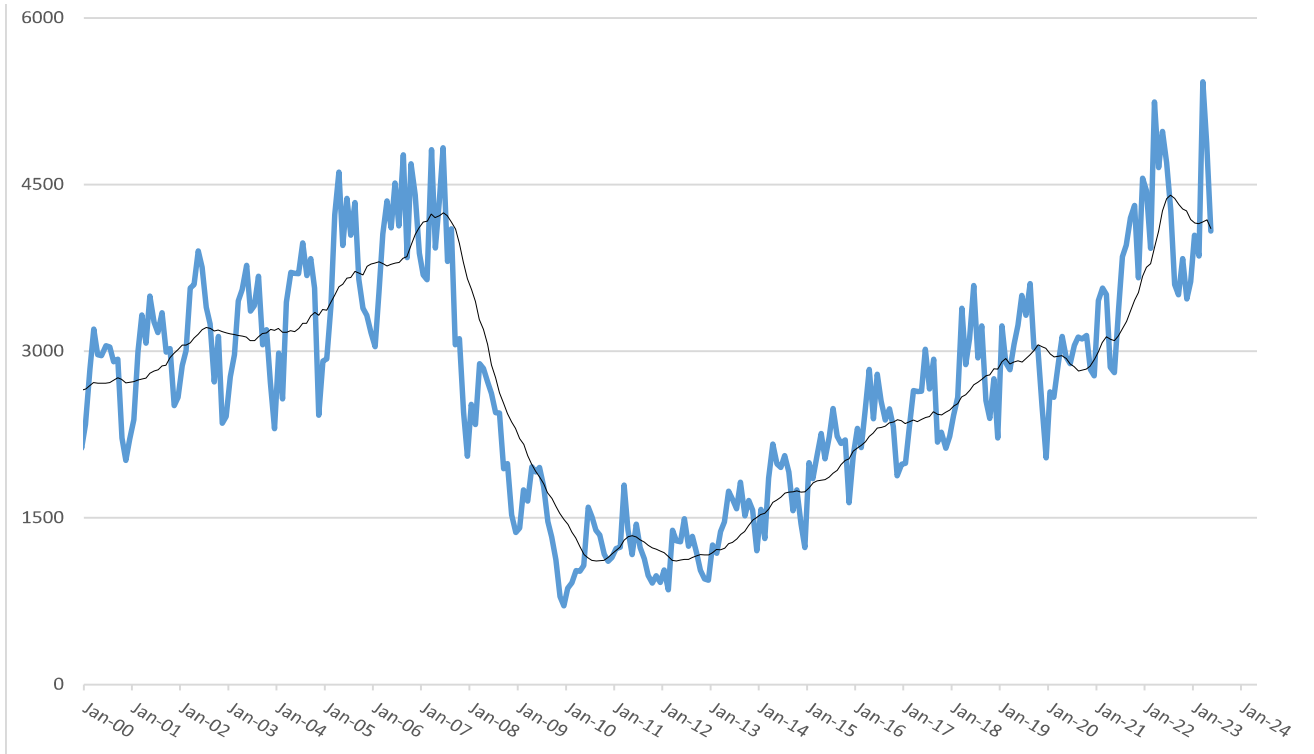
Residential Trends

Figure 8 shows the U.S. Census Bureau's single-family building permit data from Real Estate Center at Texas A&M University, which reports the number of monthly single-family building permits issued in the Dallas-Fort Worth-Arlington MSA. In this 24-year time frame, historical single family building permit activity in the Metroplex showed relatively steady growth until the housing bubble burst in Fall of 2006. After bottoming out in January 2009, the region has seen - barring a few hiccups - steady, sustained single-family growth. From January 2020 to the most current April 2024 figures, the region has, on average, issued 125 single family building permits per day. The first four months of 2024 has started strong with over 16,000 homes permitted. Even with recent interest rate hikes, job growth, pent-up demand and low supply will likely result in the region's single family construction rates to continue to remain substantial in the foreseeable future, but attention to new data will be essential to determine if the market may be leveling off.

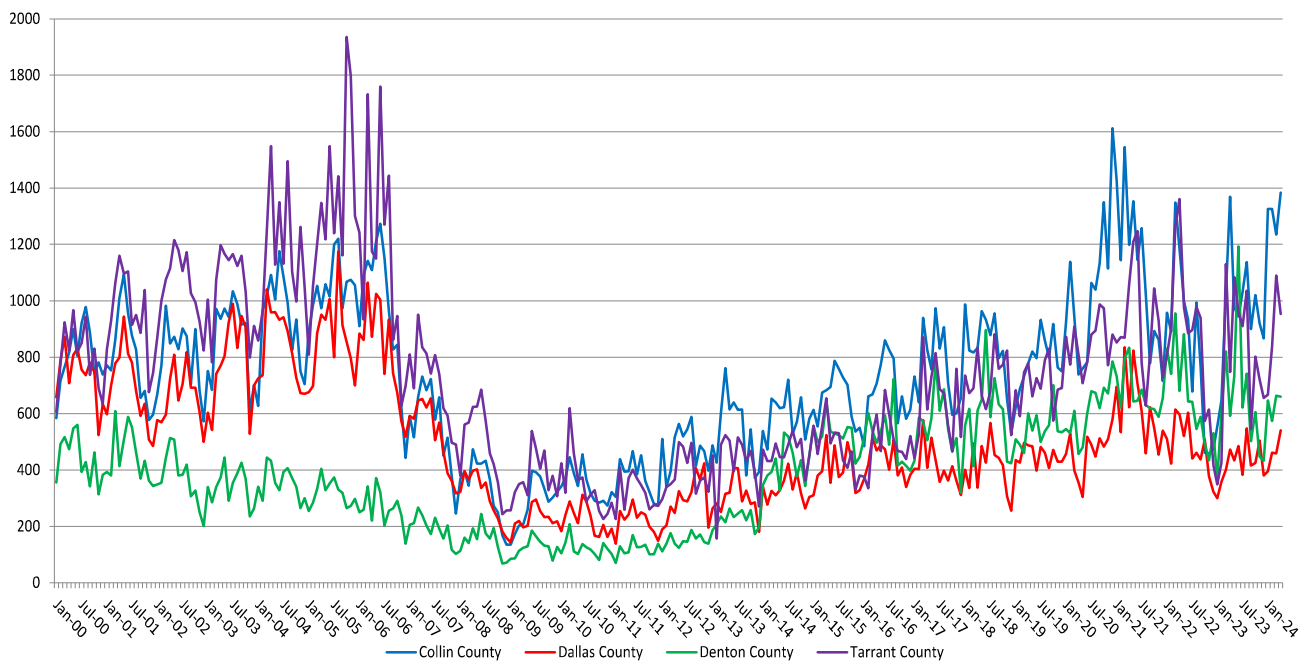
Figure 9 illustrates the number of single-family building permits issued in Collin, Dallas, Denton and Tarrant Counties since 2000. The data show that building permit activity was especially robust in Tarrant County through 2006, reaching almost 2,000 permits during October 2005, then dropped sharply thereafter to less than 500 single-family permits per month through April 2013. Denton County, on the other hand, was a less active market throughout this period and the number of single-family building permits issued actually began declining during 2002. Overall, monthly building permit activity during 2012 and early 2013 was lower than that in early 2000. Since January 2013, all counties have experienced a significant upswing in residential construction. Furthermore, since January 2020, the four core counties have averaged 3,000 permits issued per month. Even during COVID-19 shutdowns, total permits never fell below 2,200 monthly. An increase in total permits issued from January to April 2024 indicate that the single family market may be slightly on the rise in DFW.

3. O' Laughlin, Henry "Every Company Moving to Texas: 2020 to 2024." *Build Remote*, May 14, 2024

**Figure 8: New Private Building Permits: 1-Unit Structures for Dallas-Fort Worth-Arlington, TX MSA
Jan 2000-Apr 2024**



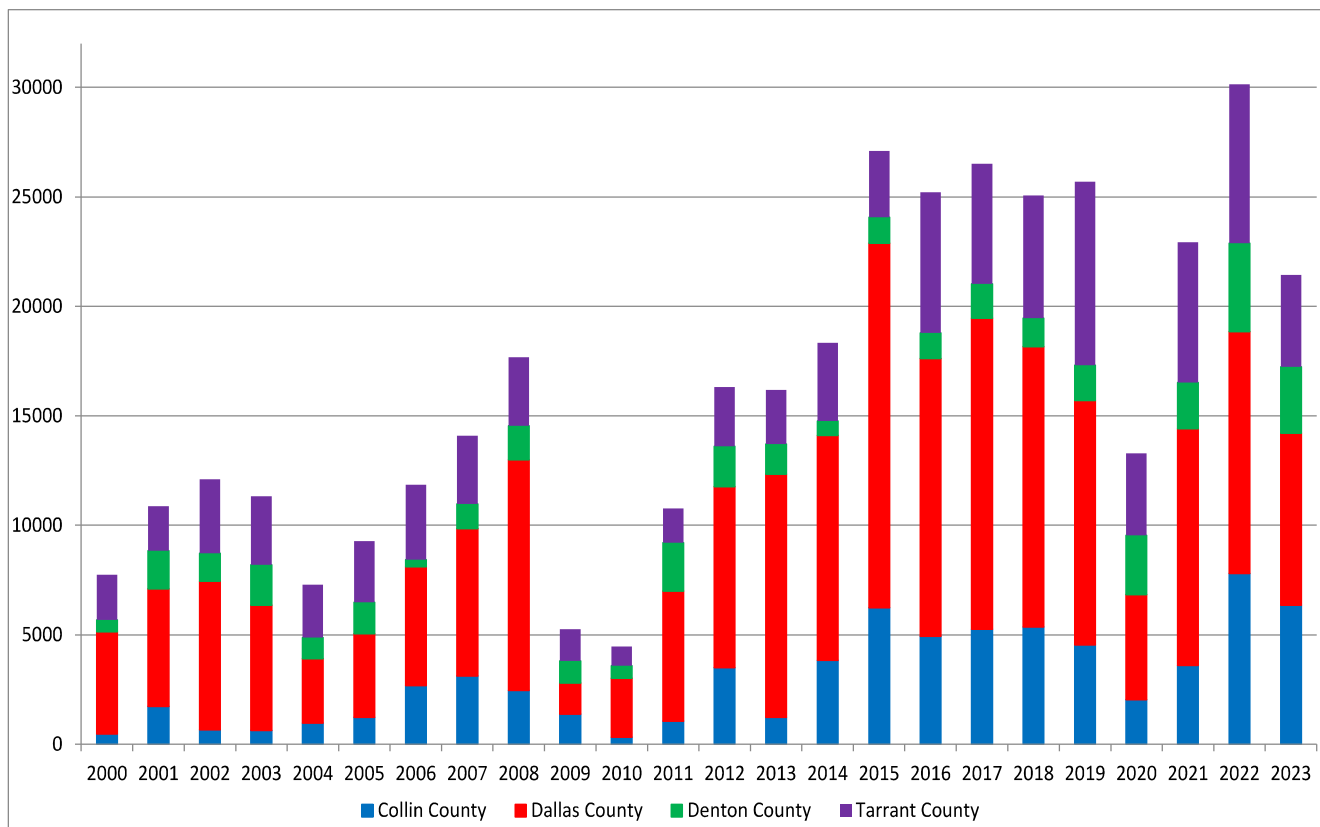
**Figure 9: Single-Family Building Permits Issued in Dallas, Tarrant, Collin and Denton Counties
Jan 2000 to May 2024**



Sources: Texas A&M Real Estate Research Center, Building Permits, July 2022.

As shown in Figure 10, the number of permitted multifamily units in Dallas, Tarrant, Collin, and Denton Counties has varied substantially between 2000 and 2023. The number of permitted units was higher during the region’s downturn from 2001 to 2003. As the single-family housing market began to grow, apartment construction slowed during 2004, before increasing again in 2005 and continuing through 2008. However, during 2009, the number of units permitted fell by roughly two-thirds to 5,250 units and the 2010 total was even lower. However, as the region’s population has continued to grow strongly and single-family homes became difficult for some segments of the population to purchase, the number of permitted multifamily units increased dramatically. 2012 through 2014 saw 16,000 or more permits issued for the four counties, while in 2015 a substantial 27,000 permits were confirmed, over 16,000 of these in Dallas County alone. In the five-year span from 2015 to 2019, the four core counties added 130,000 new units, an average of almost 26,000 per year. In COVID-19-affected 2020, multifamily permits were down more than 50 percent in Collin, Denton and Tarrant Counties, however 2021 saw a quick return to pre-2020 levels. 2022 experienced a record of over 30,000 units permitted while 2023 saw a return to more recent levels.

**Figure 10: Multifamily Units Permitted in Dallas, Tarrant, Collin, and Denton Counties
2000 - 2023**



Source: Texas A&M Real Estate Research Center, Building Permits, June 2024.

Table 9 shows the conditions of multifamily housing market within the various submarkets in the Dallas-Fort Worth region for the first quarter of 2024. According to the real estate research firm CBRE, over 11,000 units were delivered in Q1 2024, the highest quarterly delivery total DFW has recorded in over a decade. The region had an occupancy rate of 92.5 percent during 1Q2024, slightly down from 92.8 in 4Q23. Currently, the highest multifamily occupancy rates are in rural Hunt County and the high-priced Grapevine/Southlake submarkets. The highest effective monthly rents per square foot are in the Oak Lawn/Park Cities and the Intown Dallas submarkets at \$2.41 and \$2.20 respectively. Year-over-year, rents are down by an average of 2.1 percent in 40 of the 48 submarkets. With over 37,500 units currently under construction, the near future will determine if demand can keep up with supply and if rents will continue to dip over the next three quarters of 2024.

Table 9: Overview of the Dallas-Fort Worth Apartment Market during 1Q 2024

Submarket	Inventory	Delivered Units	UC Units	Occupancy Rate	Effective Rent (\$/SF* month)	Weighted Rent Growth YOY Change
Allen/McKinney	25,729	1,336	6,214	93.3%	\$1.70	4.5%
Burleson/Johnson County	4,655	531	416	92.5%	\$1.53	-4.1%
Carrollton/Farmers Branch	17,809	109	300	93.9%	\$1.76	-1.2%
Central Arlington	15,972	156	181	92.1%	\$1.53	-0.8%
Central/East Plano	18,557	834	406	93.8%	\$1.69	-2.1%
Denton	14,329	457	2,367	92.9%	\$1.65	-2.1%
East Dallas	17,799	128	318	93.2%	\$2.14	1.0%
East Fort Worth	7,833	0	0	89.6%	\$1.36	-0.1%
Ellis County	5,153	338	1,170	92.7%	\$1.60	-0.6%
Far East Dallas	12,853	38	0	92.7%	\$1.50	-2.0%
Far North Dallas	27,156	47	850	91.7%	\$1.64	-4.8%
Frisco	28,887	1,415	4,633	93.3%	\$1.79	-3.6%
Garland	17,782	57	704	92.6%	\$1.58	-1.6%
Grand Prairie	18,877	709	773	92.1%	\$1.65	-3.0%
Grapevine/Southlake	9,481	0	0	94.6%	\$1.80	-1.4%
Haltom City/Meacham	6,821	105	527	92.1%	\$1.59	-1.6%
Hunt County	1,043	0	152	95.7%	\$1.35	4.1%
Hurst/Euless/Bedford	28,309	0	93	93.0%	\$1.66	-1.0%
Intown Dallas	33,179	108	2,127	92.7%	\$2.20	-1.5%
Intown Fort Worth/University	17,432	435	1,321	92.0%	\$1.77	-3.5%
Kaufman County	2,480	54	985	93.3%	\$1.63	-1.3%
Las Colinas/Coppell	27,377	340	939	93.2%	\$1.88	-2.8%
Lewisville/Flower Mound	27,610	920	813	93.3%	\$1.70	-2.9%
Love Field/Medical District	7,371	144	785	91.9%	\$1.84	-2.8%
Mesquite	10,530	0	0	92.7%	\$1.53	0.9%
North Arlington	15,223	0	57	91.3%	\$1.61	-1.7%
North Dallas	12,474	0	239	92.7%	\$1.71	-2.6%
North Fort Worth/Keller	12,436	376	1,057	93.2%	\$1.63	-3.6%
North Irving	10,735	0	0	91.1%	\$1.66	-2.9%
North Oak Cliff/West Dallas	9,175	454	1,596	93.7%	\$1.82	-1.0%
Northeast Dallas	28,819	0	825	90.9%	\$1.51	-2.6%
Northeast Fort Worth/NRH	14,323	197	351	92.3%	\$1.56	-2.6%

Overview of the Dallas-Fort Worth Apartment Market during 1Q 2024 (cont'd)

Submarket	Inventory	Delivered Units	UC Units	Occupancy Rate	Effective Rent (\$/SF* month)	Weighted Rent Growth YOY Change
Northwest Dallas	8,088	0	0	93.7%	\$1.68	4.8%
Oak Lawn/Park Cities	13,696	16	136	92.7%	\$2.41	-0.7%
Richardson	16,527	267	444	93.4%	\$1.75	-3.0%
Rockwall/Rowlett/Wylie	7,744	579	919	91.6%	\$1.70	-3.8%
South Arlington/Mansfield	9,739	50	254	92.2%	\$1.70	-2.2%
South Fort Worth	6,274	177	1,848	91.1%	\$1.44	-0.4%
South Irving	15,931	0	0	94.5%	\$1.57	-1.2%
Southeast Dallas	7,981	0	0	94.1%	\$1.45	0.3%
Southern Dallas County	12,086	0	65	91.7%	\$1.55	0.5%
Southwest Dallas	12,086	180	546	90.9%	\$1.41	0.3%
Southwest Fort Worth	16,699	0	0	91.0%	\$1.43	-2.7%
The Colony/Far North Carrollton	17,299	216	1,025	93.3%	\$1.74	-1.8%
West Fort Worth/Parker County	6,662	320	1,103	91.5%	\$1.50	-1.9%
West Plano	17,977	0	264	93.8%	\$1.91	-3.6%
Zang Triangle/Cedars/Fair Park	3,913	71	360	94.1%	\$1.56	-0.3%
Totals	680,911	11,164	37,163	92.5%	\$1.71	-1.7%

Source: CBRE DFW Multifamily Market Report, 1Q2024

Office Trends

Due to the influx of corporate headquarters to the region, the formation of new businesses and the growth of pre-existing ones, the office market in Dallas-Fort Worth continued to remain in flux with over 5.3 million square feet (MSF) under construction during 4Q23. According to the real estate firm Transwestern, the DFW area Class AA/A office market had a stable vacancy rate of 17.4 percent during 4Q23, while Class A-/B rates rose slightly to 20.5 percent. Overall, the Dallas area market contained 244 MSF of rentable space while the Fort Worth area market had 42 MSF. Geographically, the largest concentrations of office space in the DFW region are in the Upper Tollway/West Plano, Dallas Central Business District and the Lower Tollway submarkets, which together account for almost 89.5 MSF, 29 MSF which is available. The Dallas CBD, with a vacancy rate of 25.8 percent, has been recently challenged by the popularity of Uptown/Turtle Creek office properties.

Table 10: Overview of the Dallas Area Office Market during 4Q 2023

Submarket	Inventory	Total SF Available	Total Percentage Available	Class AA/A Percent Available	Class A-/B Percent Available	Vacancy Rate	Under Construction
Uptown/Turtle Creek	15,992,716	5,059,187	27.3%	26.7%	29.2%	18.2%	2,556,505
Dallas CBD	28,993,924	9,801,219	33.8%	32.3%	34.3%	25.8%	0
Design District/Stemmons Freeway	11,119,171	2,493,886	22.4%	32.8%	20.3%	19.3%	0
Preston Center	4,941,698	660,407	13.4%	13.1%	13.5%	9.7%	0
Central Expressway	15,386,461	4,342,612	28.2%	31.2%	27.3%	22.3%	0
Deep Ellum/East Dallas	2,032,648	853,222	42.0%	56.5%	18.5%	20.1%	0

Overview of the Dallas Area Office Market during 4Q 2023 (cont'd)

Submarket	Inventory	Total SF Available	Total Percentage Available	Class AA/A Percent Available	Class A-/B Percent Available	Vacancy Rate	Under Construction
East LBJ Freeway	6,210,909	2,201,845	35.5%	–	35.6%	31.5%	0
Lower Tollway	27,127,446	6,562,441	24.2%	25.4%	23.5%	18.2%	0
Upper Tollway/ West Plano	33,345,166	10,662,808	31.5%	30.4%	33.0%	23.0%	527,945
Upper Tollway/Frisco	6,183,807	1,849,793	25.2%	22.6%	29.6%	10.9%	1,153,889
Richardson	20,056,711	5,563,993	27.7%	26.8%	28.4%	18.1%	0
Plano	6,010,681	1,111,680	18.5%	28.7%	13.8%	11.8%	0
Allen/McKinney	6,367,707	1,155,117	17.9%	22.4%	15.7%	13.0%	102,000
Las Colinas/Urban Center	9,505,596	2,717,385	26.2%	22.3%	30.4%	19.6%	858,024
Las Colinas/Office Center	15,949,233	4,346,604	27.3%	32.6%	22.7%	20.1%	0
Las Colinas/DFW Freeport	16,531,201	5,292,994	32.0%	20.9%	37.0%	20.0%	0
South Irving	1,056,421	99,361	9.4%	–	9.4%	9.0%	0
Lewisville	4,314,014	1,450,908	32.4%	19.5%	33.4%	16.8%	171,000
Denton	1,268,936	42,266	3.3%	–	3.3%	2.9%	0
Garland	676,897	157,314	23.2%	–	23.2%	21.1%	0
Rockwall	367,314	17,158	4.7%	8.6%	0.3%	0.9%	0
Mesquite/Terrell/Forney	396,234	20,798	5.3%	8.5%	5.0%	5.0%	0
Southeast Dallas	599,231	19,312	3.2%	–	3.2%	3.6%	0
Oak Cliff/SW Dallas	2,040,905	417,612	20.5%	42.6%	11.3%	18.8%	0
Grand Prairie	3,578,743	1,617,676	45.2%	92.6%	14.4%	43.6%	0
TOTAL - DALLAS	244,011,515	69,772,402	28.0%	28.8%	27.5%	20.3%	5,369,363

Source: Transwestern DFW Office Market Report, 4Q 2023

Table 11: Overview of the Fort Worth Area Office Market during 4Q 2023

Submarket	Inventory	Total SF Available	Total Percentage Available	Class AA/A Percent Available	Class A-/B Percent Available	Vacancy Rate	Under Construction
Fort Worth CBD	8,533,046	1,077,084	12.6%	12.5%	12.8%	12.0%	0
Southwest Fort Worth	4,649,094	754,786	16.2%	10.5%	18.3%	13.1%	0
West Fort Worth	2,153,334	314,968	14.6%	12.1%	18.1%	12.7%	0
Northwest Fort Worth	282,621	27,683	9.8%	10.5%	8.9%	9.5%	0
Alliance	3,129,102	682,493	21.8%	18.1%	29.2%	10.2%	0
Westlake/Grapevine	8,086,915	1,471,606	18.2%	18.4%	17.6%	15.6%	0
HEB/Mid-Cities	5,497,976	1,028,036	18.7%	3.7%	29.5%	11.8%	0
Northeast Fort Worth	3,059,558	360,526	11.8%	0.0%	13.6%	11.6%	0
Arlington/Mansfield	5,801,072	1,370,045	23.6%	23.9%	23.6%	18.5%	0
Southeast Fort Worth	952,525	105,707	11.1%	–	11.1%	11.1%	0
TOTAL – FORT WORTH	42,145,243	7,192,934	17.1%	13.9%	19.5%	13.5%	0

Source: Transwestern DFW Office Market Report, 4Q 2023

Industrial/Warehousing Trends

As one of the primary distribution centers in the United States and after a record-breaking year in construction in 2023, market conditions in the Dallas-Fort Worth region have tightened recently. However, the DFW MSA is now the 3rd largest industrial/warehouse market in the US, totaling over 1 billion square feet as of the first quarter of 2024. Currently, industrial warehouse distribution accounts for 98 percent of the total industrial market and with 17.9 MSF under construction, accounts for 99 percent of DFW's total. In 1Q2024, 4.6 MSF of net absorption during the quarter pushed the industrial/warehousing vacancy rate up to 8.8 percent. Transwestern anticipates that vacancy rates should top out over the upcoming year, chiefly due to the 12 MSF of new construction deliveries. Strong demand helped generate 29 MSF in net absorption over the past year and drove prices up almost 20 percent from 1Q 2023.

Table 13 illustrates that over 17.9 MSF of industrial properties are under construction in Dallas-Fort Worth at the end of 1Q24. Four submarkets - South Dallas, South and North Fort Worth and Great Southwest - account for two-thirds of the total current construction in the region.

Table 12: Dallas-Fort Worth Industrial Market Trends

	1Q 2024	1Q 2023	Change YOY	Trend	5-Year Average
Yearly Net Absorption (MSF)	29.0	50.0	21.0	↓	33.3
Quarterly Net Absorption (MSF)	4.6	8.5	-3.9	↓	8.4
Vacancy	8.8%	5.3%	3.5%	↑	5.2%
Availability	12.8%	12.7%	0.1%	↔	11.3%
Asking Rents (NNN) per sf	\$8.06	\$6.46	19.8%	↑	+10.7%
Total Construction (MSF)	17.9	68.2	-50.3	↓	46.5
Speculative Construction (MSF)	15.4	58.9	-43.5	↓	38.3

Source: Transwestern 1Q DFW Industrial Market Report, 2024

Table 13: Overview of the Dallas-Fort Worth Industrial Market during 1Q 2024

Submarket	Inventory	Vacant SF	Total Vacancy Rate 1Q2024	Available SF (includes construction)	Available Percent	Under Construction	12-Month Total Net Absorption
Flex/High-Tech	98,703,490	4,794,043	4.9%	6,982,556	7.0%	113,550	-351,664
Industrial	906,823,159	80,095,518	8.8%	119,425,905	12.9%	17,873,195	29,050,467

Source: Transwestern 1Q DFW Industrial Market Report, 2024

Table 14: Industrial Submarkets Under Construction Dallas-Fort Worth Metro 1Q2024

SUBMARKET	SQFT
South Dallas	3,552,400
South Fort Worth	3,034,905
Great Southwest	2,672,167
North Fort Worth	2,511,152
East Dallas	1,992,359
Northeast Dallas	1,603,536
Northwest Dallas	1,248,849
DFW Airport	1,032,088
South Stemmons	225,739
Total DFW	17,873,195

Source: Transwestern 1Q DFW Industrial Market Report, 2024

Retail Trends

The Dallas-Fort Worth retail market leads the US in construction and occupancy rates remained near all-time high levels in the Dallas-Fort Worth retail market in 1Q 2024. According to CBRE's 1Q24 Marketview report, the DFW retail market now contains over 312 million square feet. Regionally, total absorption remains strong with 269,000 SF through the first quarter. The top two submarkets in construction, North Central and Far North Dallas, have almost 3 MSF building now. Occupancy rates for retail were slightly higher in the Fort Worth area (95.4 percent) than in Dallas (95.2 percent). Overall, occupancy rates are down by .9 percent from 2023.

Table 15: Overview of the Dallas-Fort Worth Retail Market 2020 - 1Q2024

MARKET		2020	2021	2022	2023	Q1 2024
Dallas Total	Absorption	-1,191,039	2,626,123	2,303,235	1,748,900	347,000
	Delivered Construction	1,599,521	1,327,655	1,341,252	756,499	902,535
	Rentable Building Area	197,560,139	201,036,290	202,700,700	204,041,952	204,798,451
	Occupancy Rate	93.1%	93.8%	95.2%	95.0%	95.2%
Fort Worth Total	Absorption	-177,590	941,882	1,243,658	17,800	-78,000
	Delivered Construction	782,502	613,852	253,612	90,500	54,000
	Rentable Building Area	104,774,824	106,782,008	106,936,560	107,190,172	107,280,672
	Occupancy Rate	92.4%	92.5%	94.0%	95.5%	95.4%
DFW Market Total	Absorption	-1,368,629	3,568,005	3,546,893	1,766,700	269,000
	Delivered Construction	2,382,023	1,941,507	1,594,864	846,999	956,535
	Rentable Building Area	302,334,963	307,818,298	309,637,260	311,232,124	312,079,123
	Occupancy Rate	92.8%	93.4%	94.8%	95.2%	95.2%

Source: CBRE Marketview DFW Retail , 1Q2024

RDS FORECAST REVIEW AND RESULTS

RDS was retained to review the latest socioeconomic forecasts for the NTTA System Demographic Review AOI for accuracy and reasonableness. For the purpose of this study, CDM Smith provided RDS with households, population, and employment data from the demographic data that were used to develop the Mobility 2045 Update at the TAP zone level. The data was provided by NCTCOG in four intervals, 2023, 2026, 2036 and 2045. It was determined that for the purposes of this study, RDS would create a 2024 baseline data file using recent Census data and the 2023 NCTCOG data as guidance, which was then reviewed for accuracy at the zonal level.

Passed in June 2022 by the Regional Transportation Council, the NCTCOG 2045 Demographic Forecast Update stands as the official demographic projection for the current mobility plan, the Mobility 2045 Update.

In 2020, NCTCOG began using a new regional travel demand model to create their most recent projections called the Transportation Analytical Forecasting Tool, or TAFT. According to NCTCOG's staff, the projection processes started with preparation of a temporally dense time series of "built" footprints based on LANDSAT and other remote sensing data. Staff then use a more categorically detailed "ground truth" land use set to further categorize the binary footprints from step one and count the pixels in each category and year in the time series. They then used linear regression to relate the time series of pixel quantities of various land uses to estimates of households, population, and employment. After that, NCTCOG establishes regional household and employment control totals for the forecast years. These control totals were based on projections purchased from Dr. Ray Perryman, who has developed models for forecasting economic and demographic factors. After small-area demographic allocations, densities are calculated and comparisons are made to the control totals. After numerous model runs, recalculations and allocations, TAP zone demographics were then sent to the respective cities for review and comment.

GIS Review: RDS relied heavily on geographic information system (GIS) technology during the comprehensive review process. RDS gathered multiple years of aerial photography, zoning and future land use maps, parcel boundaries and development databases for GIS analysis. Using GIS, RDS determined TAP zones where new development was likely to occur. RDS also acquired current housing data information from Zonda, one of the nation's leading new home research consultants. This data was also converted to a GIS dataset and mapped during the review process. Through the use of GIS, multiple datasets were displayed side-by-side. This allowed staff to review all model years of the NCTCOG Forecast simultaneously.

Households/Population: Original data from NCTCOG was provided to RDS by CDM Smith for the years 2023, 2026, 2036 and 2045. After accounting for growth discrepancies between 2023 and 2045 in the original data, specific attention was given to areas that were projected to see significant household growth. The housing data was plotted and future and vacant lot inventories were reviewed for inclusion. The development dataset also included residential projects and was mapped and reviewed along with Zonda data (See Figure 11 for a sample map). Specific attention was also given to areas with the greatest potential of redevelopment. For example, the City of Plano provided RDS a future land use shapefile that included their "Transit Village" designation. These villages are small geographic areas zoned for dense, multi-use development that is mass-transit and pedestrian friendly. Specific attention was given to areas like these, as well as future potential commuter rail stations or other land use or zoning areas that cities place focus on future development.

Figure 11: Sample Development Monitoring Map

Employment: RDS staff reviewed the data with specific attention to zones that showed significant growth during the forecast years. The development database was very important, as many of the points of interest included building square footages and future projects. RDS also used consistent employees per square footage data (see Appendix B) for estimating job potential. The future year review also used data and information gathered from many of the cities within the AOI, as well as NCTCOG’s Development Monitoring database that contains information concerning commercial developments that were under construction, future, or conceptual. Employment clusters around current and future rail stations and highway frontage were also reviewed for potential growth or redevelopment.

Initial NCTCOG Data Adjustments: During preliminary analysis of NCTCOG’s 2045 demographic data, RDS discovered that 952 of the 5,303 TAP zones showed decreases in households from 2023 to 2045. Similarly, NCTCOG’s data showed decreases in employment in 1,624 zones during the same time period. RDS reached out to NCTCOG’s modeling team and was told that their 2023 data was derived using a different methodology than their future iteration totals. The team explained that 2023 zonal totals are based on observed data and will be naturally jagged in small

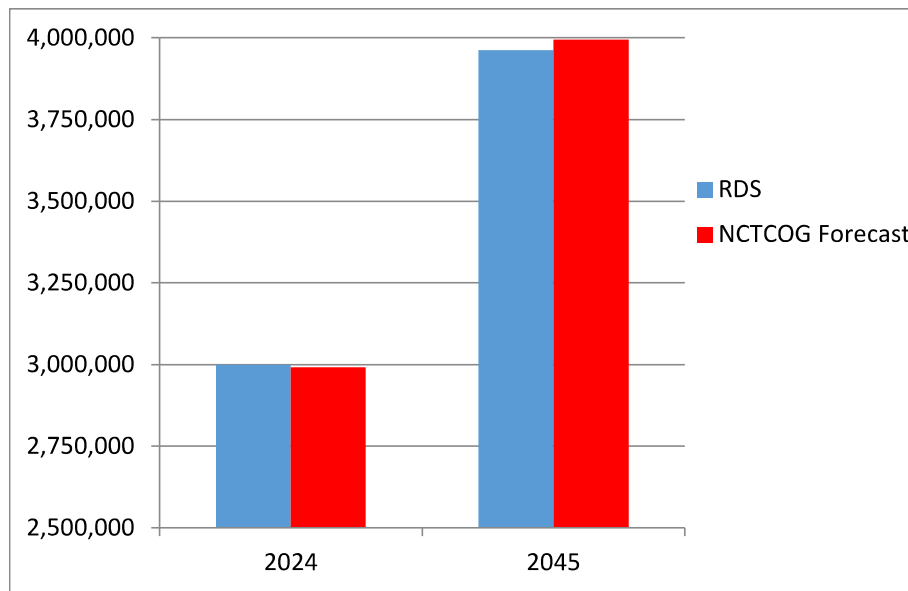
geographies while the later data assume a smooth transition from one iteration to another.

In order for RDS to derive baseline 2024 TAP zone household data that was, in most cases, more than NCTCOG’s 2023 totals, RDS used 2010 Census data and NCTCOG’s 2023 households to interpolate new 2024 household figures. Each TAP zone was then reviewed for accuracy.

Establishing 2024 zonal totals where NCTCOG’s employment figures decreased between 2023 and 2045 was more problematic because of the lack of an independent “official” count, especially at a small geography. Therefore, RDS used the most recent data from previous reviews and Longitudinal Employer-Household Dynamics (LEHD) TAP zone totals as a guide during review as well. As with households, all TAP zones in the AOI were reviewed by RDS staff for accuracy to establish 2024 employment totals needed for this project.

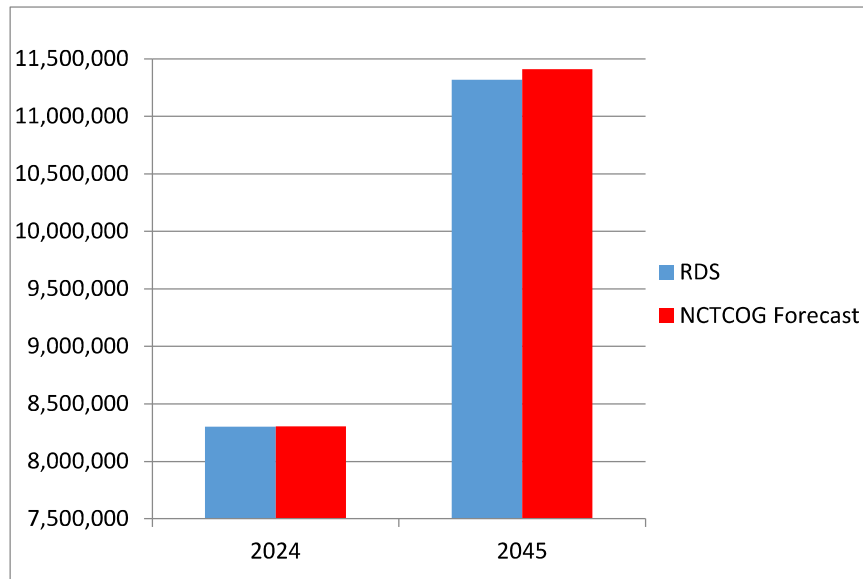
RDS 2024-2045 Review: Using GIS, Census data, new home reports, commercial development datasets and current year Appraisal District data for each individual TAP zone, 2024 and 2045 were reviewed for growth and reasonableness. RDS staff established totals for each. Household sizes were calculated using sizes established by the NCTCOG data to calculate population. In order for proper comparison for this report, RDS interpolated 2024 totals for the following charts. Figures 12, 13, and 14 illustrate this growth from 2024 to 2045 and compare them by absolute, percentage and the compound annual growth rate (CAGR) seen in RDS’ and NCTCOG’s forecasts.

Figure 12: RDS vs. NCTCOG Forecast Households



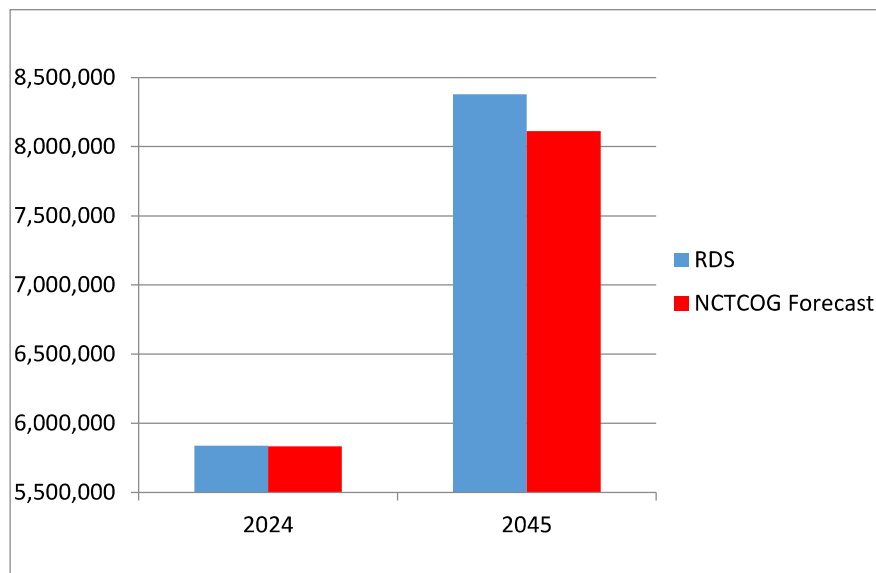
	2024-2045 Absolute Change	2024-2045 Percentage Change	2024-2045 CAGR
RDS Forecast	962,796	32.1%	1.33%
NCTCOG Forecast	1,002,337	33.5%	1.39%

Figure 13: RDS vs. NCTCOG Forecast Population



	2024-2045 Absolute Change	2024-2045 Percentage Change	2024-2045 CAGR
RDS Forecast	3,019,380	36.4%	1.49%
NCTCOG Forecast	3,109,937	37.5%	1.53%

Figure 14: RDS vs. NCTCOG Forecast Employment



	2024-2045 Absolute Change	2024-2045 Percentage Change	2024-2045 CAGR
RDS Forecast	2,540,708	43.5%	1.74%
NCTCOG Forecast	2,278,541	39.1%	1.58%

Table 16 illustrates NCTCOG’s adopted and RDS’ post-review AOI totals for households, population and employment for 2024 and 2045. In order for proper year-to-year comparison, NCTCOG’s 2024 total was interpolated after review was completed for the purposes of this study.

Table 16: RDS and NCTCOG AOI Statistics

	2024			2045		
	HH	POP	EMP	HH	POP	EMP
RDS	2,308,352	6,312,616	4,933,541	2,976,065	8,400,622	6,894,851
NCTCOG	2,327,071	6,381,774	4,905,185	2,974,558	8,397,300	6,629,904

For review of each model year’s basic, service, and retail employment breakdowns, RDS used each iteration’s shares provided by NCTCOG. RDS staff then reviewed these totals and adjusted the data over time using quantitative theory and individual review. Overall, RDS’ recommended shares are very close to the shares proposed by NCTCOG, as shown in Table 17. Looking forward, the service sector is expected to gain in overall share of total employment, while the basic and retail sectors will likely see a small decline.

**Table 17: NCTCOG System AOI Basic, Service and Retail Employment Shares
NCTCOG and RDS (2024 - 2045)**

Percentage of Employment by Sector in AOI						
	RDS			NCTCOG		
Year	Basic	Retail	Service	Basic	Retail	Service
2024	24.2%	9.1%	66.7%	24.0%	8.9%	67.1%
2045	23.2%	8.6%	68.1%	22.6%	8.4%	69.0%

Figures 15 and 16 illustrate RDS' total household and employment growth by TAP zone in the 13-county region from 2024 to 2045.

Figure 15: RDS Household Growth 2024-2045

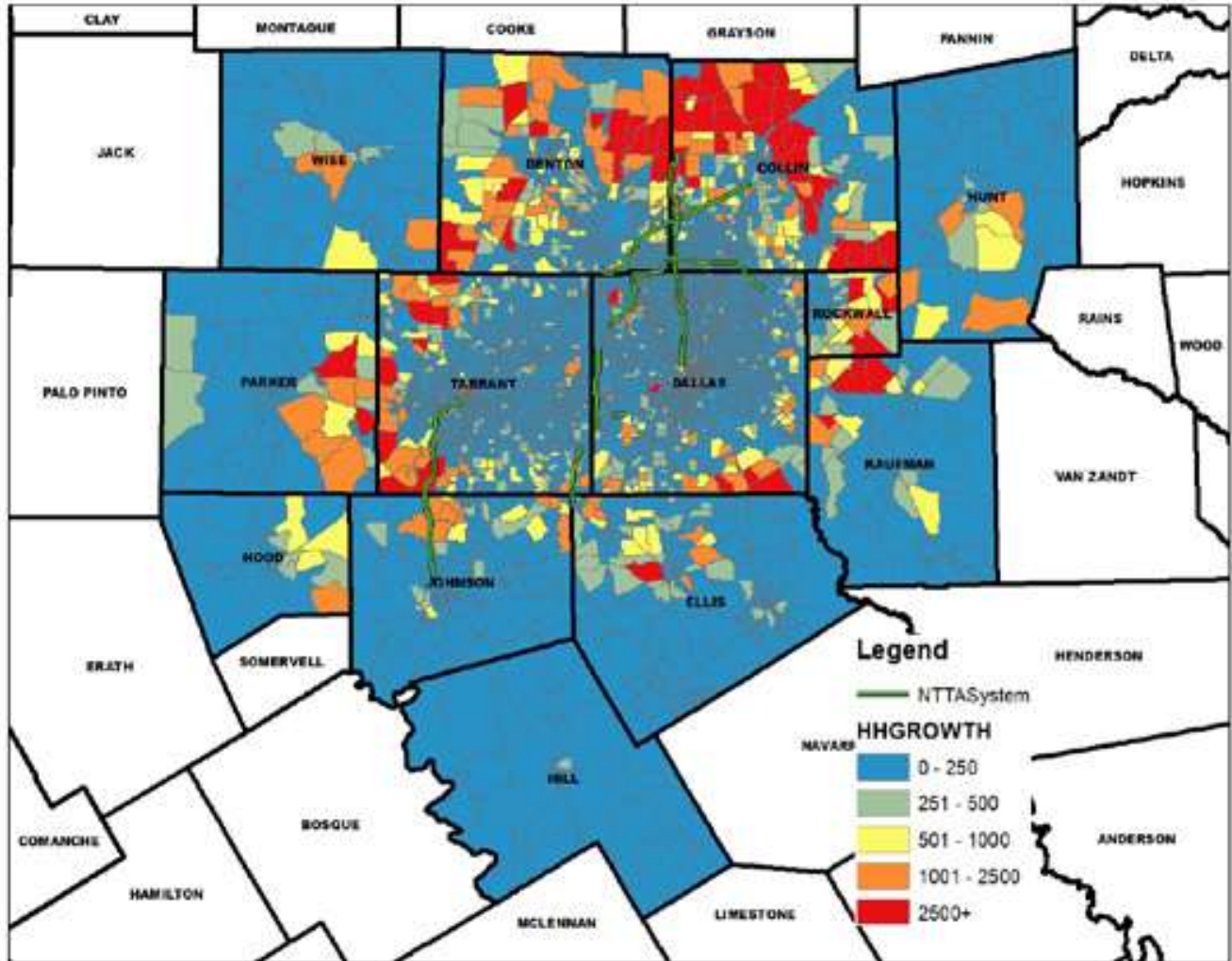
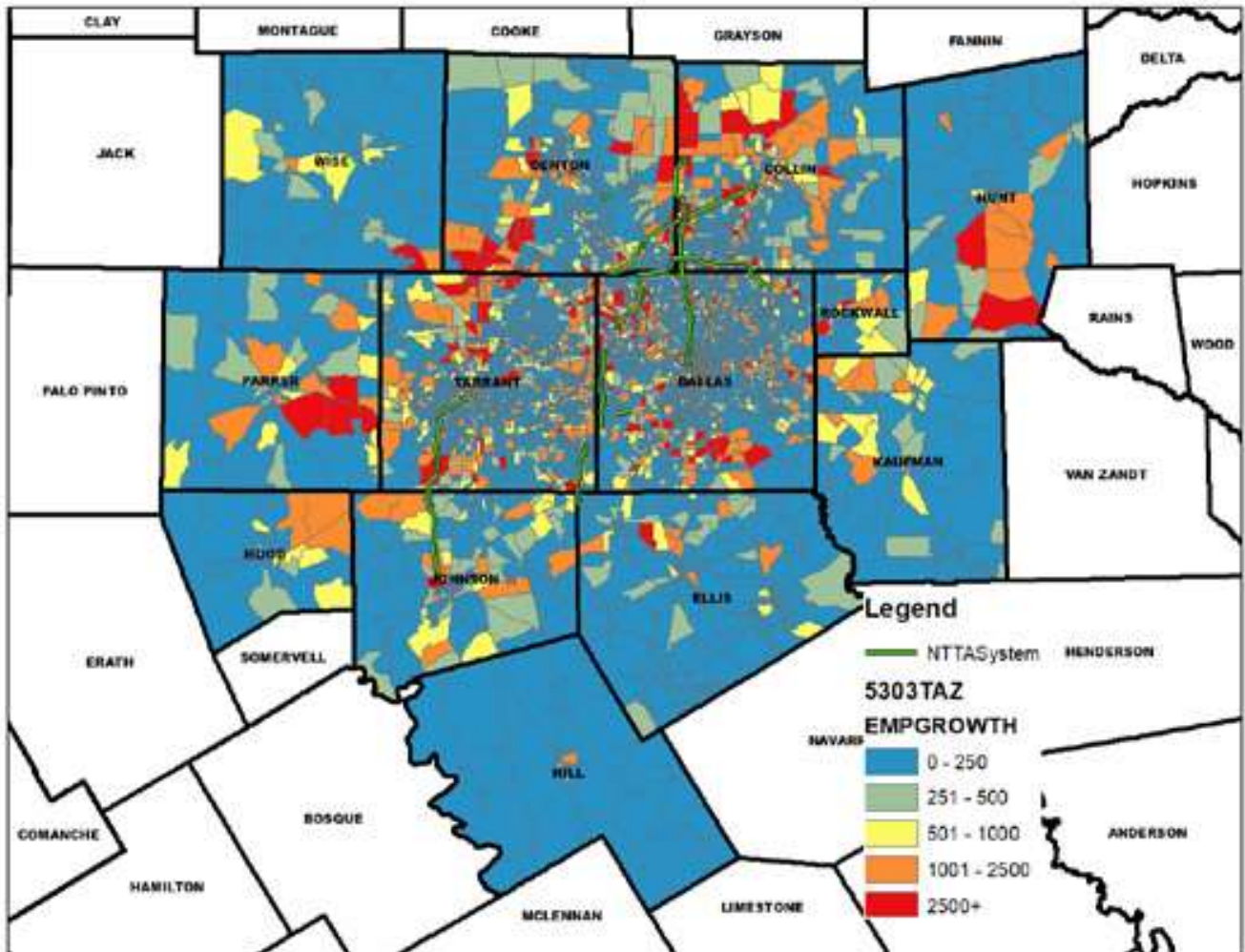


Figure 16: RDS Employment Growth 2024-2045



APPENDIX A - SPECIAL GENERATORS

Special generators are employers with unique traffic patterns that generate high traffic volumes on a consistent or event-driven basis. Most of these special generators are universities, hospitals, and malls. NCTCOG examines each of these to ensure correct geographical location and then assigns each an accurate employment total. Here is a list of special generators located within the region. Each of these was taken into account when TAP zone totals were calculated to ensure proper traffic volumes.

Special Generator	Type
DFW Airport	Airport
Love Field Airport	Airport
Walls Regional Hospital	Hospital
Medical Center of Lewisville	Hospital
Trinity Medical Center	Hospital
Presbyterian Hospital of Plano	Hospital
Baylor Regional Medical Center at Plano	Hospital
Medical Center of Plano	Hospital
Kindred Hospital Fort Worth (Southwest)	Hospital
Harris Methodist Southwest Hospital	Hospital
John Peter Smith Hospital	Hospital
UNT Health Science Center	Hospital
Osteopathic Med. Ctr. Of Texas	Hospital
Plaza Medical Center	Hospital
Baylor All Saints Episcopal Hospital	Hospital
Harris Methodist Fort Worth & Cook Children's	Hospital
D/FW Medical Center	Hospital
Northeast Community Hospital	Hospital
Harris Methodist HEB Hospital	Hospital
North Hills Hospital	Hospital
Baylor University Medical Center at Grapevine	Hospital
Denton Community Hospital	Hospital
Doctors Hospital	Hospital
Richardson Regional Medical Center	Hospital
Plano Rehabilitation Hospital	Hospital
Veterans Admin. Medical Center	Hospital
Methodist Medical Center	Hospital
Las Colinas Medical Center	Hospital
RHD Memorial Medical Center	Hospital
Healthsouth Medical Center	Hospital
St. Paul Medical Center	Hospital
Baylor Health Center at Irving	Hospital
UT SW MedCtr & Children's MedCtr of Dal	Hospital
Texas Scottish Rite Hospital	Hospital
Texas A&M HSC/Baylor Collg Dent	Hospital
Baylor Institute for Rehabilitation	Hospital
Baylor University Medical Center	Hospital
Presbyterian Hospital (in Dallas)	Hospital
Medical City Dallas Hospital	Hospital
Garland Community Hospital	Hospital

Special Generator	Type
The Medical Center of Mesquite	Hospital
Lake Pointe Medical Center	Hospital
Mesquite Community Hospital	Hospital
Baylor Medical Center of Garland	Hospital
Medical Center of McKinney	Hospital
Columbia Medical Center of McKinney	Hospital
Vista Ridge Mall	Regional Shopping Mall
Irving Mall	Regional Shopping Mall
The Shops at Willowbend	Regional Shopping Mall
Hulen Mall	Regional Shopping Mall
Ridgmar Mall	Regional Shopping Mall
La Gran Plaza De Fort Worth	Regional Shopping Mall
Northeast Mall	Regional Shopping Mall
Grapevine Mills Mall	Regional Shopping Mall
Golden Triangle Mall	Regional Shopping Mall
Collin Creek Mall	Regional Shopping Mall
Southwest Center	Regional Shopping Mall
Northpark Center	Regional Shopping Mall
Galleria Mall	Regional Shopping Mall
Fire Wheel Mall	Regional Shopping Mall
Town East Mall	Regional Shopping Mall
Richardson Square Mall	Regional Shopping Mall
Stonebriar Mall	Regional Shopping Mall
Texas Christian University	University/College
Texas Woman's University	University/College
University Of North Texas	University/College
Southern Methodist University	University/College
Spring Creek Campus	University/College
Southwest Baptist Theological Seminary	University/College
TCC--South Campus	University/College
Texas Wesleyan University	University/College
TCC--Northwest Campus	University/College
TCC--Southeast Campus	University/College
TCC--Northeast Campus	University/College
Univ. of Texas at Dallas	University/College
Richland College	University/College
Dallas Baptist University	University/College
Mountain View College	University/College
University of Dallas	University/College
North Lake Junior College	University/College
El Centro College	University/College
Brookhaven Junior College	University/College
Eastfield College	University/College
The Mesquite Metroplex Center	University/College
CCCC - Preston Ridge Campus	University/College
CCCC - Central Park Campus	University/College

APPENDIX B - ESTIMATED SQUARE FEET PER EMPLOYEE

The following chart represents employee coefficients that were used as a guide when reviewing and estimating employment in commercial properties.

Land Use Category	Estimated Square Feet per Employee
Office	275
Retail	300
Hotel/Motel	.75 Emp per Room
Institutional	800
Industrial	1250



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