



# Appendix C

## Traffic Projections Methodology & Results

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FM 76 (North Loop Drive) Feasibility Study

September 2022

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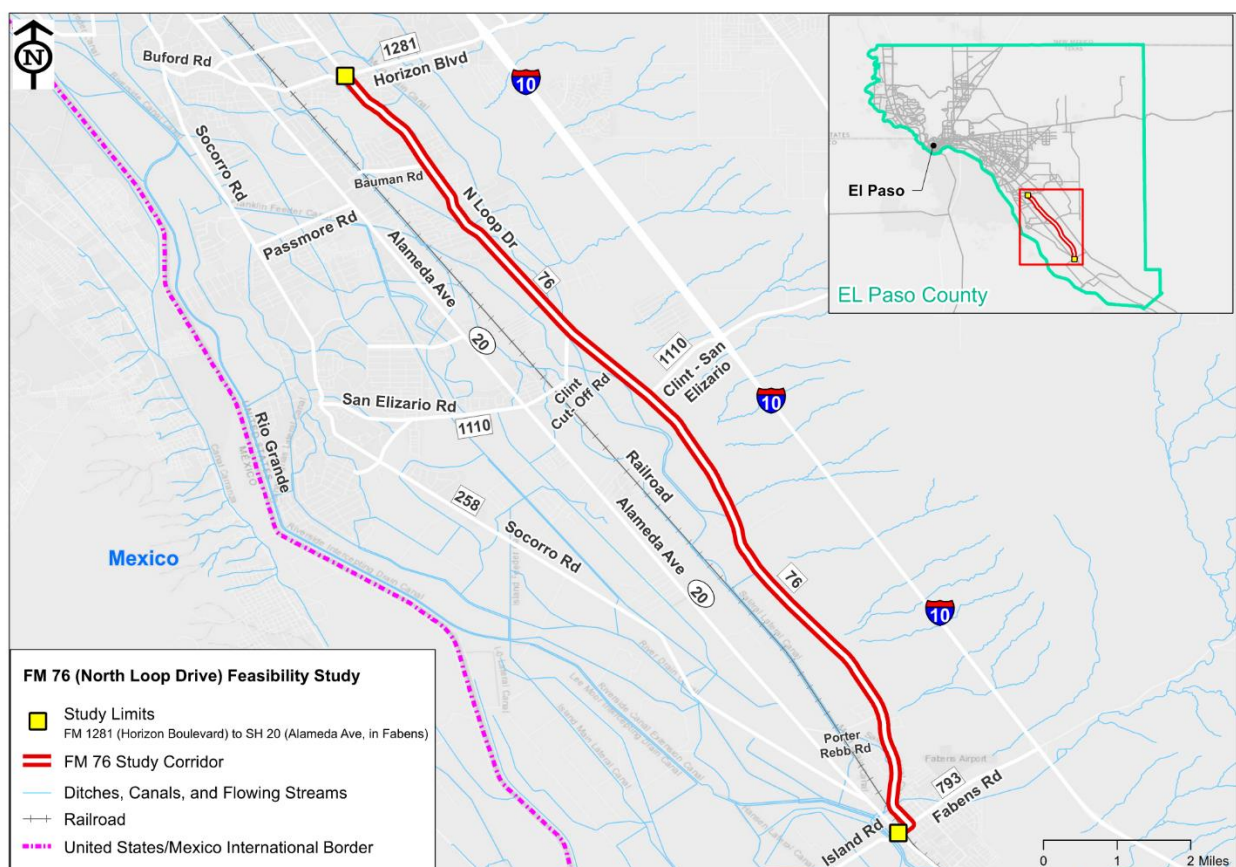
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Appendix C.1 – Typical Traffic Volume Regression Worksheet

## 1. Introduction

The Farm to Market (FM) 76 Corridor Feasibility Study is focused on improving mobility and safety along FM 76 (North Loop Drive) between Horizon Boulevard (FM 1281) and Alameda Avenue in Fabens. The study corridor is approximately 12.6 miles long.

The Traffic Projections Methodology described in this report will support the scoped Subtask 110.A.4 “Traffic Projection Studies,” which will help to estimate the Existing (2019) and Forecast (2045) horizon year volumes for No Build and Build scenarios within the FM 76 corridor limits which are shown in **Figure 1**.



**Figure 1: FM 76 Study Corridor Limits**

The traffic projections will also be used to develop straight line diagrams (traffic volume diagrams) as part of the same scoped Subtask.

## 1.1 Purpose

Existing and projected volumes for the FM 76 corridor in the study area are required for the alternative analysis for short-, mid-, and long-term improvements. The purpose of this memorandum is to present the methodology to estimate the existing 2019 traffic volumes, the traffic growth rate, and forecast 2045 traffic volumes including turning movements. The traffic projections methodology will include application and use of traffic data from various data sources.

## 1.2 Corridor Description

The FM 76 corridor is a minor arterial following a north-south alignment located outside the El Paso urban core. The corridor runs through the residential area of Socorro, farming land of around Clint, and the more urbanized areas of Fabens in El Paso County. FM 76 corridor in the study limits is predominantly two-lane two-way road up to Horizon Boulevard and turns into 4 lanes from Horizon Boulevard to north of the study area. The corridor is connected with I-10 and Alameda Avenue through Horizon Boulevard, Clint Cut-off Road, Clint-San Elizario Road, and Fabens Road. Traffic generators such as churches, schools, retail shops are located along the study corridor.

## 2. Traffic Data Sources

### 2.1 Historic TxDOT Counts

The primary source of historical traffic count data from the Texas Department of Transportation (TxDOT) is the Statewide Traffic Analysis and Reporting System (STARS II)<sup>1</sup>. The STARS II system can be accessed online and contains a Traffic Count Database System (TCDS) of historical traffic data, including mid-block volume counts, classification counts, and speed. The data contained in STARS II are of varying resolution and detail ranging from annual average daily traffic (AADT) estimates of two-way traffic to 15-minute Federal Highway Administration (FHWA) 13 vehicle classification directional volumes.

### 2.2 Third-Party Probe Data

The third-party probe data is used to complement the 2019 counts whenever counts are not available and include travel patterns from StreetLight data. Each data source is based on probe data collected from cell-phone location-based services and Global Positioning System device data processed by the vendor into anonymized traffic data estimates.

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<sup>1</sup> "Statewide Traffic Analysis and Reporting System," Statewide Traffic Analysis and Reporting System (Texas Department of Transportation), accessed June 17, 2021, <https://www.txdot.gov/inside-txdot/division/transportation-planning/stars.html>

StreetLight data provides various travel metrics that stem from trip estimations from passively collected vehicle probe data. Trip data can be acquired through the StreetLight InSight platform maintained by StreetLight through various analysis types, which can be used to estimate traffic volumes and travel times. The finest level of detail available is 15-minute intervals for traffic volumes. The data are acquired by specifying zones or segments that reflect locations (e.g., a single intersection leg), by type of data (volume, speeds), and by any analysis period. StreetLight InSight only provides an estimate of total traffic.

### **2.3 Travel Demand Models**

The El Paso Metropolitan Planning Organization (MPO) Travel Demand Model (TDM), the Amended Horizon 2045 TDM, will be used to acquire Average Daily Traffic (ADT) volume projections (assignments) for the study area. The TDM consists primarily of the regional network and demographic input files. The El Paso MPO provides six distinct model network configurations (2012, 2017, 2020, 2030, 2040 and 2045) to simulate various planning years.

### **2.4 TxDOT Transportation Planning and Programming Division (TPP) Data Packet**

The scope of work for the FM 76 (North Loop Drive) Feasibility study indicates that TxDOT will provide the study team with a TxDOT TP&P Consultant Corridor Packet for purposes of developing a Traffic Projections Methodology. The study team will review the packet and traffic forecast related information from the TxDOT TPP data packet.

## **3. Study Area**

StreetLight InSight was used to conduct a “top routes” analysis, which indicates the other roadways used as part of paths that pass through the existing FM 76 corridor traveling to common regional origins and destinations. This analysis is depicted in **Figure 2**.

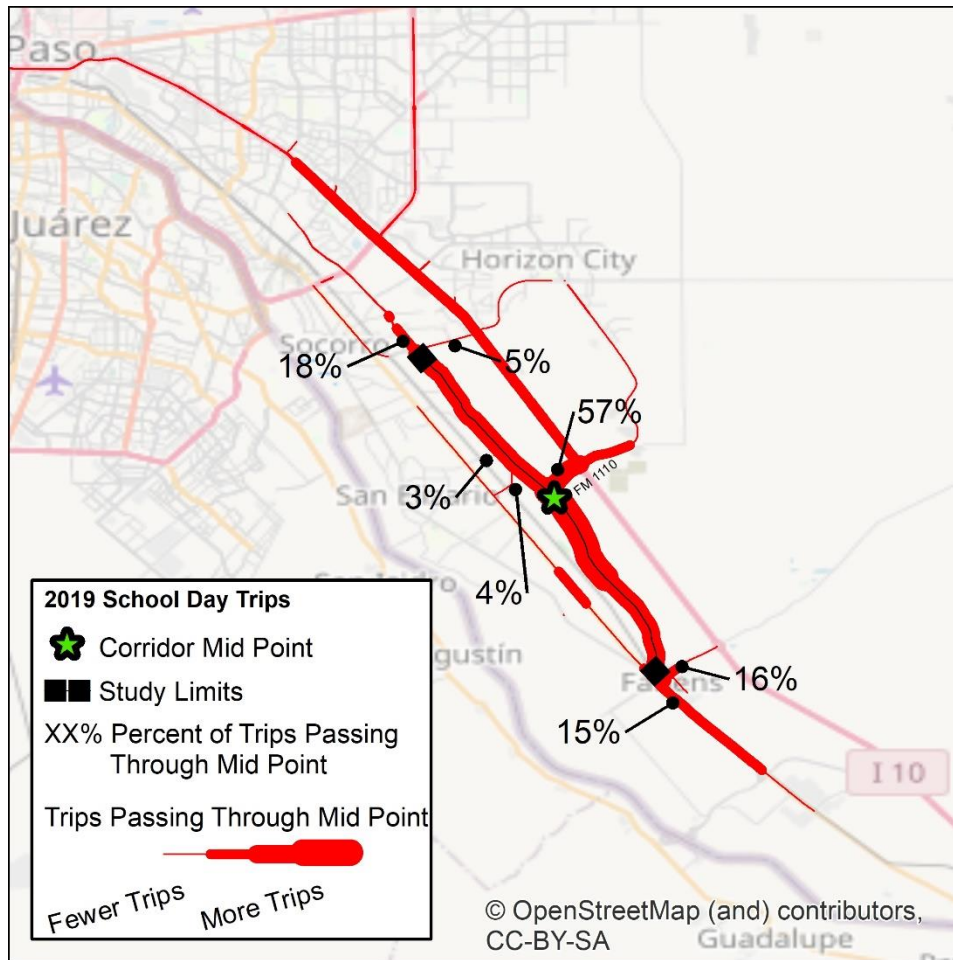


Figure 2: Top Routes Analysis for FM 76 for Average of Working Days in 2019

Trips are mostly concentrated near FM 1110 as it serves as the primary connector to I-10 in the FM 76 corridor limits. Considering the top route analysis, the selected area for data collection and the data collected are presented in **Figure 3**. Traffic, turning movement, classification are included in the data collected.

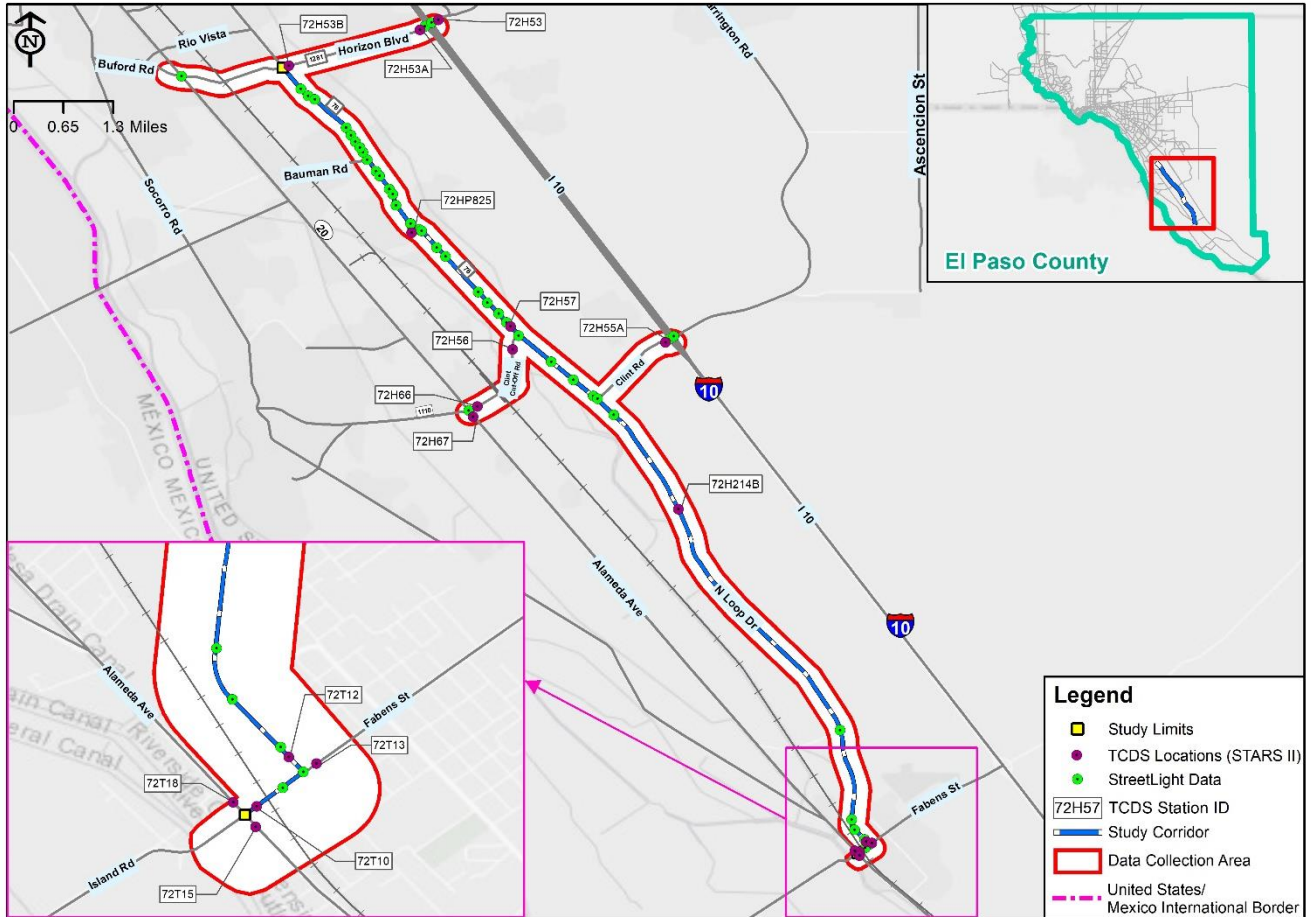


Figure 3: FM 76 Corridor Traffic Data Collection

#### 4. Traffic Forecasting Methodology

There are typically three approaches to the traffic forecast followed by TxDOT:

1. Pivot/Trend Line/Growth procedures
2. Travel Demand Model application
3. Hybrid approach

This forecast methodology follows procedures used by TPP for a hybrid approach considering historical AADT growth as well as regional travel demand model growth.

The following steps will be employed by the study team to determine the existing and future year growth factors and associated traffic volumes.

**Step 1: Baseline 2019 peak hour turning movements** – will be developed from synthesized traffic counts from the StreetLight InSight platform. Peak hour turning movements from StreetLight platform will be collected along the study corridor for an average traffic condition that represent a workday when schools are in session in 2019. The process would be performed as follows:

- AM and PM peak hours will be determined from available 24-hour counts along the corridor.
- Hourly turning movement (during the AM and PM peak hours determined above) will be extracted from StreetLight. If available counts are prior to 2019, the study team will apply an annual growth rate (AGR) to bring volumes up to 2019. These processes will be performed using the pre-pivot year formulae described in Step 2.
- For locations for which actual counts are not available, Streetlight data will be extracted. These turning movement information will be used as actual counts.
- Traffic counts will be compared with TxDOT counts for consistency and factored where required.
- The previous steps will result in an unbalanced traffic volume profile. Next, the traffic volumes will be balanced keeping the signalized intersections and other major intersections as control points and using Streetlight and driveways to balance the network. The resulting 2019 volumes will be depicted on a line diagram of the corridor.
- Commercial Vehicle percentages will be determined at corridor level (not by turning movement) by direction along FM-76.

**Step 2: Historical Growth Factors** – will be developed using the TxDOT’s Regressions and Projections Worksheet. The Worksheet uses the standard TPP Division Pivot Method for projected AADTs. A typical format of the Worksheet is shown in **Appendix C.1**. The AADT for Pre- and Post- Pivot years is generally based on the following relationships:

Pre-Pivot Year:
$\text{Analysis Year AADT} = [\text{Count Year AADT}] * [1 + (\text{Analysis Year} - \text{Count Year}) * \text{Pre Pivot growth\%/yr}]$
Post-Pivot Year:
$\text{Analysis Year AADT} = [\text{Count Year AADT}] * [1 + (\text{Pivot Year} - \text{Count Year}) * \text{Pre Pivot growth\%/yr}] + [\text{Count Year AADT}] * [1 + (\text{Analysis Year} - \text{Pivot Year}) * \text{Pre Pivot growth\%/yr}]$

*Note: Pivot Year is Count Year plus 20yr*

TxDOT El Paso District Automatic Traffic Recorder (ATR) station data within the study data collection area for the years 2000 to 2019 will be used as primary source of the data to determine the growth

rates. Regression analysis will be performed for the study area to determine the average linear growth rate based on the historical data. The worksheet produces average forecasted linear annual growth rates for the selected locations. Projections of the traffic volume data using the pre- and post- pivot year growth will be developed for the following conditions:

- Existing Year (2019)
- Future Year (2045)

**Step 3: Future Growth Factors** – will be developed from the El Paso MPO TDM that will be acquired by the study team. The TDM consists of both network and demographic input files which can show network and demographic changes in the study area. The growth rates will be determined from the Base Year and Future Year model networks for consideration as potential source of traffic growth trends.

## 5. Adjusted Growth Factors

Developments such as Eastwind are planned along FM 76 in the study area. Traffic generated from these developments in the study area likely to significantly impact the FM 76 traffic projection estimates. Traffic data and traffic due to the Eastwind Development in future years were obtained from Eastwind Traffic Impact Assessment prepared by CEA Group. In coordination with TxDOT El Paso District, the growth rates obtained in **Step 3** will be adjusted for use in the corridor traffic projections for various segments on FM 76.

The adjusted annual growth rates will be compared with the historic population growth rate for El Paso County as provided by the U.S Census of Bureau to check if the adopted growth rates are reasonable. The recommended growth rate will align with the typical 2-5 percent range guideline according to the Corridor Analysis Standard Operating Procedures (SOP), Basic Corridor Analysis, H – Linear Regression Analysis.

## 6. Corridor Traffic Volumes

No Build or baseline future traffic volumes will be developed by applying the growth rates determined in **Step 3** to the existing balanced 2019 volumes developed in **Step 1**. The future volumes will then rounded to the nearest multiple of 25 and balanced.

The Build future Volumes will be developed based on the annual growth rates from the El Paso MPO TDM also determined on **Step 3**. Under some alternative conditions the growth rate for the Build may be lower than the No Build conditions due to reduced demand which should be reflected in the TDM models.

## 7. Final Quality Control

A final round of quality control checks on the results from all the analyses will be conducted on both the balanced existing year (2019) and future year (2045) No Build and Build straight line diagrams.

Quality management practices outlined in the FM 76 Feasibility study Quality Management Plan will be used to ensure quality and consistency. This ensures that the resulting line diagrams provide a reliable representation of the existing traffic conditions as well as a reasonable future traffic forecast along the study corridor.

## **8. Conclusion**

This memorandum summarizes the traffic projection methodology to develop traffic volumes for existing year 2019 and future year 2045. The study team will follow this methodology to project traffic volumes for the No Build condition and three conceptual alternatives for the FM 76 corridor. The projected volumes will be submitted for review and approval by TxDOT. The approved traffic volumes will be used as part of the alternatives analysis.



## APPENDIX C.1

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### Typical Traffic Volume Regression Worksheet

TRAFFIC VOLUME REGRESSION WORKSHEET													May 31, 2022
PROJECT: LIMITS:								District: County: CSJ:					
ROUTE													
LOCATION													
1999													
2000													
2001													
2002													
2003													
2004													
2005													
2006													
2007													
2008													
2009													
2010													
2011													
2012													
2013													
2014													
2015													
2016													
2017													
2018													
2019													
	Regr01	Regr02	Regr03	Regr04	Regr05	Regr06	Regr07	Regr08	Regr09	Regr10	Regr11	Regr12	
Low Linear Annual Growth Rate	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Forecast Lnr. An. Grwth Rate													
High Linear Annual Growth Rate													
Estimated Standard Deviation													
B (Slope)													
A (Intercept)													
R=													
Confidence Interval													
	Avg. of selected Forecast Linear Annual Growth Rates:						Avg. of all Forecast Linear Annual Growth Rates:						
GR's for Non-Regression vol's only													
PROJECTIONS OF ABOVE TRAFFIC VOLUME DATA TO FORECASTED YEARS													
<input type="checkbox"/> Use last Count Year from above. <input type="checkbox"/> Do not use last Count Year from above. Enter any one of previous count years from above: <input type="text"/> <input type="text"/> Enter Base Year						<b>Pre-20/Pivot Yr Growth Rates Selection</b> <input type="radio"/> Use Relative Low & Non-Regression GR's <input type="radio"/> Use Relative Frctst & Non-Regression GR's <input type="radio"/> Use Relative High & Non-Regression GR's <input type="radio"/> Use Avg. of Selected Low Growth Rates <input checked="" type="radio"/> Use Avg. of Selected Forecast Growth Rates <input type="radio"/> Use Avg. of Selected High Growth Rates <input type="radio"/> Use Avg. of All Low Growth Rates <input type="radio"/> Use Avg. of All Forecast Growth Rates <input type="radio"/> Use Avg. of All High Growth Rates <input type="radio"/> Use Highest Forecast Growth Rate <input type="radio"/> Use Lowest Forecast Growth Rate <input type="radio"/> Use Manually Selected Growth Rate <input type="text" value="2.0%"/>							
<input type="checkbox"/> Pivot Growth Rate at 20 Years from Count Year (most commonly used). <input type="checkbox"/> Pivot Growth Rate (GR) at other than 20 Years from Count Year. Enter years from Count Year for pivoting Growth Rate (e.g. for pivoting growth ten years from Count Year, enter 10) <input type="text"/> Enter Model Year						<b>Post-20/Pivot Year Growth Rate</b> Note: If Pre-20/Pivot Yr GR is 2.0% or less, that rate is used in the projections, not the rate below. Enter Growth Rate (2.0% most common) <input type="text" value="2.0%"/>							
Optional input: SPR Station, Yr	<input type="text"/>	Optional input: K-Factor		Enter Earliest Variable Year		Optional input: Dir. Dist.		Enter Latest Variable Year					
ROUTE													
LOCATION													
20/PIVOT YR AN. GROWTH RATE													
Count Year - 2019													
Base Year -													
Ten Year Forecast - 10													
Twenty Year Forecast - 20													
Thirty Year Forecast - 30													
Forty Year Forecast - 40													
Error - no selections made.													
Earliest Var Yr Frctst -													
Latest Var Yr Frctst -													
Model Year Forecast -													
Model Traffic Assignment													
Difference of Model Yr Forecast from Model Traffic Assignment													
Above Difference in DDHV													
% Difference of Model Yr Forecast from Model Traffic Assignment													