Carbon Monoxide (CO) Traffic Air Quality Analysis (TAQA) Technical Report

Interstate Highway 10 (I-10)
From State Highway (SH) 46 to Farm-to-Market Road (FM) 3351
Bexar and Kendall Counties, Texas

CSJs: 0072-06-082 & 0072-07-075

June 2019

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 16, 2014, and executed by FHWA and TxDOT.

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1.0 Project Description

1.1 Introduction

The Texas Department of Transportation (TxDOT) San Antonio District is proposing improvements to Interstate Highway 10 (I-10) from State Highway (SH) 46 to Farm-to-Market Road (FM) 3351 (Ralph Fair Road) in Bexar and Kendall counties, Texas. The project is located within the cities of Boerne, Fair Oaks Ranch, and San Antonio, as well as the census-designated area of Scenic Oaks. This technical report identifies and assesses the air quality impacts associated with carbon monoxide emissions on the proposed project. The project location is shown in **Appendix A.**

1.2 Existing Facility

Within the area of the proposed improvements, I-10 is currently a northwest-to-southeast, controlled-access, four-lane divided freeway. The existing typical section for the eastbound and westbound I-10 lanes consists of two 12' mainlanes with 5' inside shoulders and 10' outside shoulders. A grass median divides the eastbound and westbound traffic lanes. The right-of-way (ROW) width of the existing corridor is 300'.

1.3 Proposed Facility

The proposed project would expand the current facility to an eight-lane divided freeway with the addition of one general-purpose lane and one high-occupancy vehicle (HOV) lane in each direction (eight travel lanes total). The total distance of the proposed improvements is about 10.07 miles, and the estimated time of completion (ETC) is year 2024 with a design year of 2044. No additional ROW acquisition is anticipated for the proposed project.

1.4 Objectives of this Report

The purpose of this technical report is to present the findings of the carbon monoxide (CO) analysis that was performed for the proposed project. This analysis follows "TxDOT's Standard Operating Procedure for Complying with CO TAQA Requirements" (TxDOT 2015).

2.0 Background Information

The primary pollutants from motor vehicles are volatile organic compounds (VOCs), carbon monoxide (CO), and nitrogen oxides (NOx). VOCs and NOx can combine under the right conditions in a series of photochemical reactions to form ozone. Because these reactions take place over a period of several hours, maximum concentrations of ozone are often found far downwind of the precursor sources. Thus, ozone is a regional problem and not a localized condition.

Accordingly, concentrations of ozone, for the purpose of comparing the results of the National Ambient Air Quality Standards (NAAQS), are modeled by the regional air quality planning agency for the state implementation plan (SIP). However, concentrations for CO are readily modeled for highway projects and are required by federal regulations.

Added capacity projects that have an annual average daily traffic (AADT) volume over 140,000 vehicles per day (VPD) for the ETC or design year are required to complete a project-level CO traffic air quality analysis (TAQA). The projected AADT in the area of the I-10 proposed improvements (including frontage roads) for the ETC year of 2024 and for the design year of 2044 is estimated to be 105,300 vehicles per day and 159,000 vehicles per day, respectively, therefore triggering the need for a CO TAQA. The traffic data used in the analysis were submitted by HDR in the *Traffic Projections Methodology Memo* approved by TxDOT's Transportation Planning and Programming (TPP) Division on April 30, 2019, and are included in **Appendix B**.

3.0 Analysis Methodology

On March 11, 2019, TxDOT and the air quality analysis consultant held a conference call to discuss the air quality analysis methodology for the proposed project. During this call, TxDOT decided that CO concentrations for the proposed project would be modeled for the ETC year of 2024 and the design year of 2044. TxDOT also concurred that the analysis area should focus on the area where I-10 travels under FM 3351 (Ralph Fair Road), since this would be the location with the highest overall traffic levels in the project area. The analysis area includes the I-10 mainlines as well as FM 3351 and the frontage roads within a 500' buffer around the intersection of I-10 and Ralph Fair Road. See **Appendix A** for a project overview map.

A total of 39 free-flow links (road segments on which traffic is assumed to be moving at a constant speed) were established for the analysis. The links represent various traffic speeds along the I-10 mainlines, the adjacent frontage roads, and FM 3351 within the 500' buffer. A total of 26 receptors (geographical points in the model) were placed at least 3 meters (10') from the outside travel lanes, at points such as sidewalks that could be continuously accessed by the public. Because the number of links and receptors exceeded those recommended for the CALINE-3 dispersion model, the CAL3QHC dispersion model was used for this CO TAQA. The modeling factored in adverse meteorological conditions and receptors in accordance with TxDOT's Standard Operating Procedure (SOP) for Complying with CO TAQA Requirements (TxDOT 2015). The topography and meteorology of the analysis area would not seriously restrict the dispersion of air pollutants.

On April 30, 2019, TxDOT's TPP Division approved the traffic data for years 2024 and 2044 for the proposed project. The traffic data for each link for 2024 (the ETC year) and 2044 (the design

year) are shown in **Table 1** (see **Appendix B** for traffic data). The estimated speeds for the links included in the analysis are based on estimates for a PM peak hour. (The PM peak hour is the 1-hour period of the afternoon during which there is the greatest number of vehicles in the analysis area.)

Table 1. Projected AADT, Design Hour Volume (DHV), Speed, and CO Emission Factor for Each Link in the Analysis Area

Link	2024 (ETC Year)				2044 (Design Year)			
	AADT	DHV[1]	Speed (mph)	CO Emission Factor[2]	AADT	DHV[1]	Speed (mph)	CO Emission Factor[2]
EB RF	8,100	697	30	1.7904	12,500	1,075	30	0.6897
EB RF accel	3,000	258	15	2.5381	4,800	413	15	0.9767
EB RF accel 1	2,200	189	25	1.8637	3,300	284	25	0.6918
EB RF accel 2	1,600	138	15	2.5381	2,400	206	15	0.9767
EB RF decel	2,200	189	5	3.8872	3,300	284	5	1.3857
EB RF OP	7,800	671	20	2.2599	11,800	1,015	20	0.8712
EB RF OP decel	7,800	671	5	3.8872	11,800	1,015	5	1.3857
EB RF–FR right accel	600	52	15	2.5381	900	77	15	0.9767
EB RF–NB FR left	4,800	413	15	2.5381	7,000	602	15	0.9767
NB FR 1	18,300	1,574	38	1.5289	27,500	2,365	38	0.6042
NB FR 2	17,000	1,462	38	1.5289	25,300	2,176	38	0.6042
NB FR decel	13,200	1,135	5	3.8872	19,800	1,703	5	1.3857
NB FR right decel	5,100	439	5	3.8872	7,700	662	5	1.3857
NB FR straight accel	8,500	731	15	2.5381	12,800	1,101	15	0.9767
NB FR–RF left accel	4,700	404	15	2.5381	7,000	602	15	0.9767
NB FR–RF right accel	5,100	439	15	2.5381	7,700	662	15	0.9767
NB IH 10 ML	27,700	2,382	61	1.3275	42,300	3,638	61	0.5660
NB ML turn 1	200	17	30	1.7904	300	26	30	0.6897
NB ML turn 2	200	17	20	2.2599	300	26	20	0.8712
NB ML turn 3	200	17	20	2.2599	300	26	20	0.8712
NB ML turn 4	200	17	25	1.8637	300	26	25	0.6918
NB ML turn 5	200	17	20	2.2599	300	26	20	0.8712
NB ML turn 6	200	17	20	2.2599	300	26	20	0.8712
SB FR 1	16,600	1,428	38	1.5289	25,500	2,193	38	0.6042
SB FR 2	17,300	1,488	38	1.5289	26,600	2,288	38	0.6042
SB FR accel	9,600	826	15	2.5381	1,500	129	15	0.9767
SB FR decel	16,600	1,428	5	3.8872	25,500	2,193	5	1.3857
SB FR–RF left accel	6,200	533	15	2.5381	9,400	808	15	0.9767
SB FR–RF right accel	800	69	15	2.5381	1,100	95	15	0.9767
SB IH 10 ML	27,800	2,391	68	1.6100	42,500	3,655	68	0.7240
WB R accel	1,100	95	15	2.5381	1,600	138	15	0.9767

Link	2024 (ETC Year)				2044 (Design Year)			
	AADT	DHV[1]	Speed (mph)	CO Emission Factor[2]	AADT	DHV[1]	Speed (mph)	CO Emission Factor[2]
WB RF	7,000	602	30	1.7904	10,500	903	30	0.6897
WB RF accel 1	3,300	284	15	2.5381	5,000	430	15	0.9767
WB RF accel 2	1,900	163	25	1.8637	2,700	232	25	0.6918
WB RF decel	7,000	602	5	3.8872	10,500	903	5	1.3857
WB RF OP 1	8,000	688	20	2.2599	12,000	1,032	20	0.8712
WB RF OP 2	8,000	688	5	3.8872	12,000	1,032	5	1.3857
WB RF–FR left accel	6,900	593	15	2.5381	10,400	894	15	0.9767
WB RF–NB FR turn	3,700	318	15	2.5381	5,500	473	15	0.9767

AADT = annual average daily traffic; accel = acceleration lane; decel = deceleration lane; EB = eastbound; FR = frontage road; ML = mainline; mph = miles per hour; NB = northbound; OP = overpass; R = right; RF = Ralph Fair Road; SB = southbound; WB = westbound

[1] DHV, or design hour volume, was calculated by multiplying each segment's AADT by the project-specific K-factor (0.086).

[2] CO emission factors are in units of grams per vehicle-mile. These factors were taken from the TxDOT CO TAQA Emission Rate Lookup Table, which is a spreadsheet with emission rates for CO in Texas (TxDOT 2016).

The following assumptions and input parameters were used in the analysis:

- **1-hour CO background concentration:** 6.1 parts per million (ppm);
- **8-hour CO background concentration:** 1.9 ppm;
- Background concentrations were obtained from the CO TAQA SOP (Appendix B Background CO Concentrations and CO NAAQS, 2015);
- CO emission factors were obtained from TxDOT's Emission Rate Lookup Table for CO TAQA (TxDOT 2016), which was developed from the U.S. Environmental Protection Agency's (EPA) Motor Vehicle Emissions Simulator (MOVES) model (2014). Emission rates for the San Antonio area for urban freeways and urban arterials were used. Only emission factors from years 2010 to 2040 are available in the Emission Rate Lookup Table for CO TAQA; however, since the CO TAQA for the I-10 Project requires evaluating CO concentrations for the design year 2044, emission factors for year 2040 were used for the analysis based on the discussion that follows. As a result of EPA's implementation of more-stringent environmental regulations and exhaust emission standards for new vehicles in future years, the emission factors tend to decrease over time, although the incremental rate of the decrease in emission rates becomes smaller after 2030. For example, the emission factors for the years 2038, 2039, and 2040 for urban freeways

for an average speed of 60 miles per hour in the San Antonio area are 0.5746 gram/mile (g/m), 0.5618 g/m, and 0.5516 g/m, respectively. The emission factor for the year 2044 is expected to be slightly less than the emission factor for the year 2040 under the same conditions. Accordingly, if the 2040 CO emission factors are used to evaluate the proposed project's CO concentrations for the year 2044, it will result in slightly higher CO concentrations. This methodology results in conservative estimates of CO. The CO emission rates used in this analysis (along with the projected AADT, design hour volume, and speed for each link) are included above in **Table 1, Projected AADT, DHV, Speed, and CO Emission Factor for Each Link in the Analysis Area.**

- **Stable Atmospheric Conditions:** Stability Class of F or Stability Class 6 (for a worst-case analysis)
- **Mixing Height:** 1,000 meters
- **Wind Speed:** 1 meter per second
- **Wind Directions Modeled:** Every 10 degrees of wind direction from 0 to 350 degrees were evaluated as recommended by the CAL3QHC User's Guide.
- **Projected Vehicle Speeds:** The projected vehicle speeds in the future years were obtained from the traffic team (see **Table 1** for the speeds assigned to each link).

The input and output files of the CO CAL3QHC model analyses for the years 2024 and 2044 have been submitted to the District for inclusion in the project files.

4.0 Receptor Locations

The CO TAQA SOP recommends placing CO receptors where the maximum total project CO concentrations are likely to occur, where the general public is likely to have access, and at an assumed breathing height of 1.8 meters (5.9 feet) above the ground. Accordingly, 26 receptors were placed at least 3 meters (10 feet) beyond the outside edge of the travel lanes along the frontage roads and FM 3351. The general locations of the modeled CO receptors are shown in the context of the proposed project's design features in the **Carbon Monoxide Receptors on Plan View Map** in **Appendix C. Table 2** below shows the AADT and DHV for the link closest to each CO receptor.

Table 2. CO Receptors and AADT and DHV for the Closest Link

Receptor ID	Distance from Road (m)	Nearest Link Speed	ROW Width (m)	2024 (ETC Year)		2044 (Design Year)	
				AADT	DHV	AADT	DHV
R1	5.9	5	85.5	5,100	439	7,700	662
R2	1.0	5	156.8	5,100	439	7,700	662
R3*	0.3	5	156.8	18,300	1,574	27,500	2,365
R4	5.1	15	85.5	3,700	318	5,500	473
R5	2.7	38	156.8	17,000	1,462	25,300	2,176
R6*	2.4	38	156.8	18,300	1,574	27,500	2,365
R7	0.5	30	60	8,100	697	12,500	1,075
R8	0.8	30	23.6	8,100	697	12,500	1,075
R9	0.2	30	23.6	8,100	697	12,500	1,075
R10	2.2	5	60	7,000	602	10,500	903
R11	1.7	30	23.6	7,000	602	10,500	903
R12	1.7	30	23.6	7,000	602	10,500	903
R13	3.5	38	156.8	17,000	1,462	25,300	2,176
R14	1.0	38	156.8	17,000	1,462	25,300	2,176
R15	4.0	15	23.7	1,900	163	2,700	232
R16	1.6	5	23.7	2,200	189	3,300	284
R17	9.2	38	156.8	17,300	1,488	26,600	2,288
R18	9.2	38	156.8	17,300	1,488	26,600	2,288
R19	6.1	5	156.8	16,600	1,428	25,500	2,193
R20	5.6	38	156.8	16,600	1,428	25,500	2,193
R21	9.0	38	156.8	17,300	1,488	26,600	2,288
R22	7.4	38	156.8	16,600	1,428	25,500	2,193
R23	0	25	23.7	2,200	189	3,300	284
R24	0.6	25	23.7	2,200	189	3,300	284
R25	4.3	25	23.7	1,900	163	2,700	232
R26	4.3	25	23.7	1,900	163	2,700	232

*Denotes receptors with the highest AADT
AADT = average annual daily traffic; DHV = design hour volume; ETC = estimated time of completion; ID = identifier

5.0 Analysis Results

Using the foregoing model input data, CO concentrations for the proposed project were estimated for the 1-hour CO concentrations for both the ETC year (2024) and the design year (2044) at the location of each modeled air quality receptor. The results are shown in **Table 3,** along with the 8-hour CO concentrations that were calculated from the 1-hour results according to the conversion formula prescribed in Appendix C of the CO TAQA SOP. Background concentrations provided in Appendix B of the CO TAQA SOP were added to the modeled values.

For the ETC year, receptors 2 and 3 are projected to have the highest 1-hour CO concentration of 6.6 ppm and the highest 8-hour CO concentration of 2.20 ppm. The CO modeling also predicted that, for the design year, receptors 2, 3, 6, 20, and 21 would have the highest 1-hour CO concentration of 6.3 ppm and 8-hour CO concentration of 2.02 ppm.

The projected levels for CO concentrations for the design year are generally slightly less than for the ETC year, despite an expected substantial increase in AADT. These results are strongly influenced by the expected decrease in CO emission factors resulting from increasingly stringent environmental regulations and exhaust emission standards for new vehicles in future years, and because older vehicles with comparatively greater CO emissions are expected to be taken out of service.

The input and output files of the CO CAL3QHC model analyses for the years 2024 and 2044 are provided in **Appendices D** and **E,** respectively.

Table 3. Estimated CO Concentrations at Each Receptor (parts per million (ppm))

Receptor ID	2024 (ETC Year)					2044 (Design Year)				
	1-Hour CO Derived from CAL3QHC	1-Hour Background Concentration	Total 1-Hour Concentration[1]	8-Hour Background Concentration	Total 8-Hour Concentration[2]	1-Hour CO Derived from CAL3QHC	1-Hour Background Concentration	Total 1-Hour Concentration[1]	8-Hour Background Concentration	Total 8-Hour Concentration[2]
1	0.4	6.1	6.5	1.9	2.14	0.1	6.1	6.2	1.9	1.96
2	0.5	6.1	6.6	1.9	2.20	0.2	6.1	6.3	1.9	2.02
3	0.5	6.1	6.6	1.9	2.20	0.2	6.1	6.3	1.9	2.02
4	0.3	6.1	6.4	1.9	2.08	0.1	6.1	6.2	1.9	1.96
5	0.3	6.1	6.4	1.9	2.08	0.1	6.1	6.2	1.9	1.96
6	0.3	6.1	6.4	1.9	2.08	0.2	6.1	6.3	1.9	2.02
7	0.2	6.1	6.3	1.9	2.02	0.1	6.1	6.2	1.9	1.96
8	0.2	6.1	6.3	1.9	2.02	0.0	6.1	6.1	1.9	1.90
9	0.1	6.1	6.2	1.9	1.96	0.1	6.1	6.2	1.9	1.96
10	0.2	6.1	6.3	1.9	2.02	0.1	6.1	6.2	1.9	1.96
11	0.1	6.1	6.2	1.9	1.96	0.0	6.1	6.1	1.9	1.90
12	0.1	6.1	6.2	1.9	1.96	0.0	6.1	6.1	1.9	1.90
13	0.3	6.1	6.4	1.9	2.08	0.1	6.1	6.2	1.9	1.96
14	0.3	6.1	6.4	1.9	2.08	0.1	6.1	6.2	1.9	1.96
15	0.3	6.1	6.4	1.9	2.08	0.1	6.1	6.2	1.9	1.96
16	0.2	6.1	6.3	1.9	2.02	0.1	6.1	6.2	1.9	1.96
17	0.3	6.1	6.4	1.9	2.08	0.1	6.1	6.2	1.9	1.96
18	0.2	6.1	6.3	1.9	2.02	0.1	6.1	6.2	1.9	1.96
19	0.3	6.1	6.4	1.9	2.08	0.1	6.1	6.2	1.9	1.96
20	0.3	6.1	6.4	1.9	2.08	0.2	6.1	6.3	1.9	2.02
21	0.2	6.1	6.3	1.9	2.02	0.2	6.1	6.3	1.9	2.02
22	0.3	6.1	6.4	1.9	2.08	0.1	6.1	6.2	1.9	1.96
23	0.2	6.1	6.3	1.9	2.02	0.0	6.1	6.1	1.9	1.90
24	0.1	6.1	6.2	1.9	1.96	0.0	6.1	6.1	1.9	1.90
25	0.1	6.1	6.2	1.9	1.96	0.0	6.1	6.1	1.9	1.90
26	0.1	6.1	6.2	1.9	1.96	0.0	6.1	6.1	1.9	1.90

ETC = estimated time of completion; ID = Receptor Identifier

[1] Total 1-hour concentration = 1-hour CO derived from CAL3QHC plus the 1-hour background concentration

[2] Total 8-hour concentration = 1-hour CO derived from CAL3QHC multiplied by 0.6 plus the 8-hour background concentration (conversion formula prescribed in Appendix C of the CO TAQA SOP)

The CO modeling results meet TxDOT's expectations, and TxDOT does not expect the local concentrations of CO to exceed the NAAQS at any time. The results of the air quality analysis are summarized in **Table 4.**

Table 4. Estimated Maximum CO Concentrations (ppm)

Year	1-Hour CO (Standard 35 ppm[1])	1-Hour % of NAAQS	8-Hour CO (Standard 9 ppm[1])	8-Hour % of NAAQS
2024 (ETC year)	6.6	18.9%	2.20	24.0%
2044 (design year)	6.3	18.0%	2.02	22.4%

ETC = estimated time of completion; NAAQS = National Ambient Air Quality Standards; ppm = parts per million

[1] Note that both the 1-hour and 8-hour NAAQS allow for one exceedance per year at a given receptor.

6.0 References

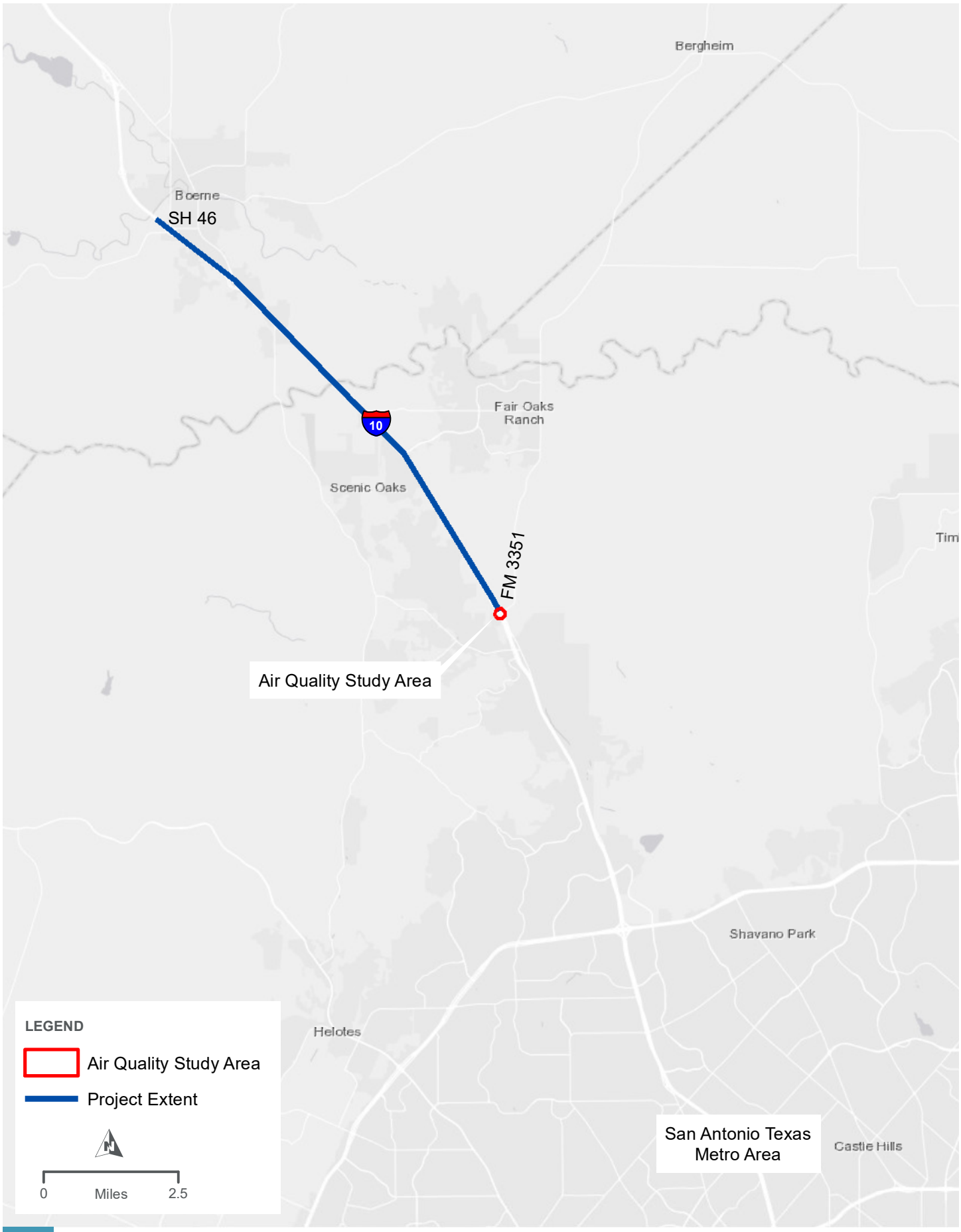
[TxDOT] Texas Department of Transportation

2015 Standard Operating Procedure for Complying with CO TAQA Requirements (Version 1). http://ftp.dot.state.tx.us/pub/txdot-info/env/toolkit/220-01-sop.pdf. Effective date September 1, 2015.

2016 Emission Rate Lookup Table for General Conformity [Microsoft Excel spreadsheet with tabular emission rates for criteria pollutants]. http://ftp.dot.state.tx.us/pub/txdot-info/env/toolkit/205-01-fig.xlsx. Data from June 2016; accessed April 2019.

APPENDIX A

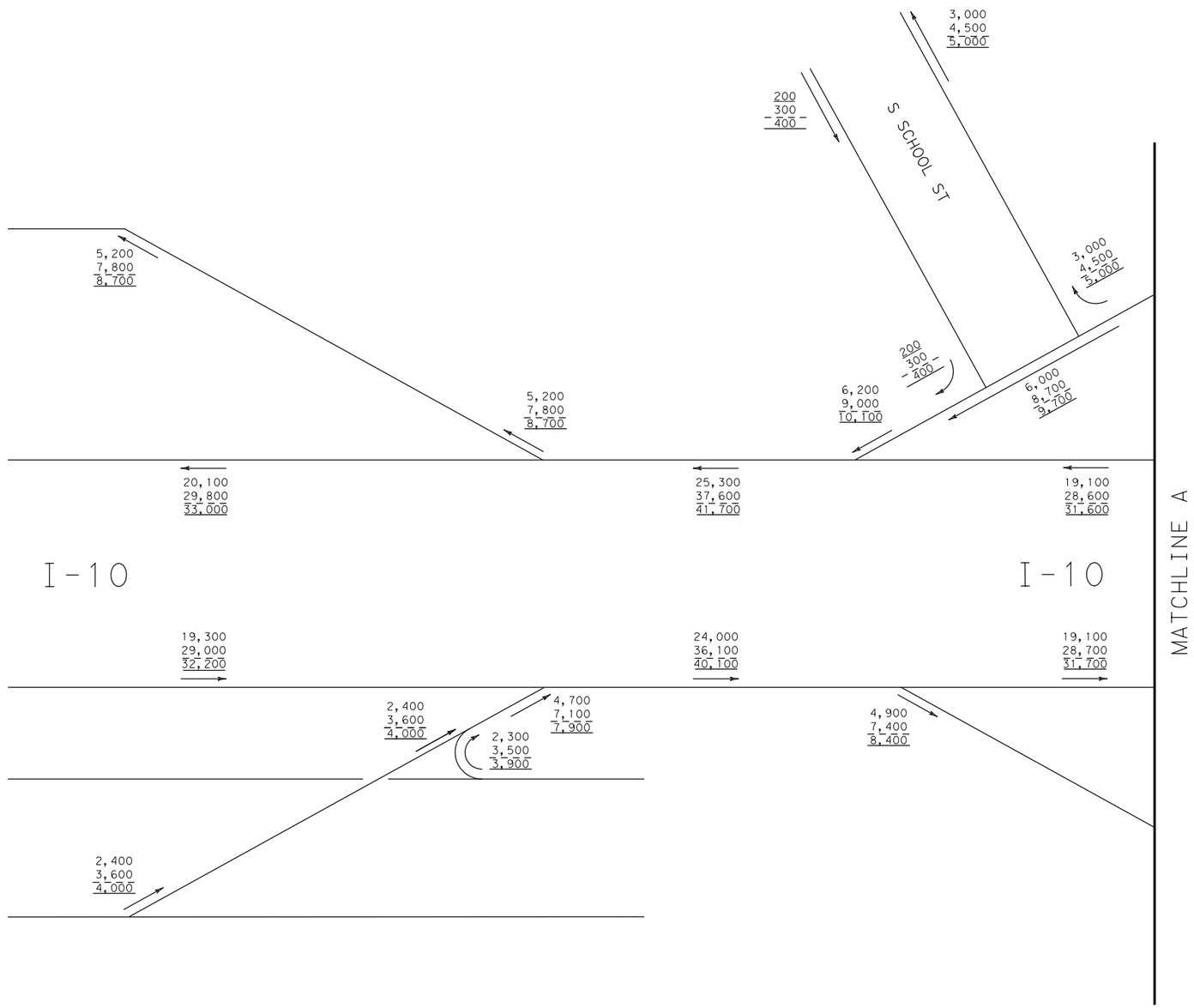
Project Overview Map



AIR QUALITY STUDY AREA OVERVIEW MAP

APPENDIX B

Traffic Data



LEGEND

1,000 - 2024 ADT
1,000 - 2044 ADT
1,000 - 2054 ADT

NOT TO SCALE

NOTE: PRELIMINARY TRAFFIC, AWAITING TP&P APPROVAL

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Texas Department of Transportation

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IH 10 TRAFFIC DIAGRAM FROM SH 46 TO FM 3351 2024, 2044, AND 2054 BUILD ADT

SHEET 01 OF 09

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6			IH 10
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TEXAS	SAT	BEXAR/KENDALL	B1
CONTROL	SECTION	JOB	
0072	06	082	

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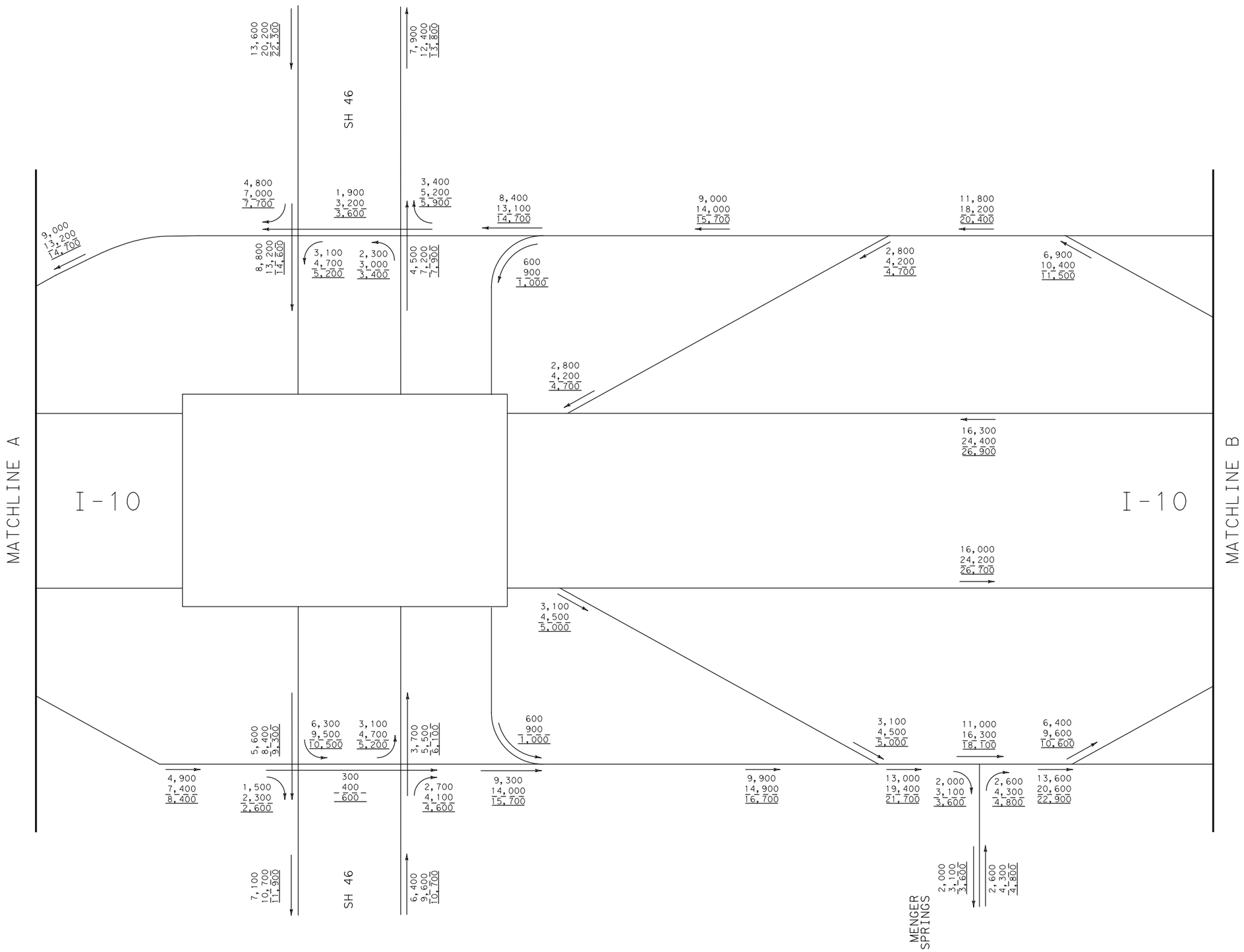

LEGEND

1,000 - 2024 ADT
1,000 - 2044 ADT
1,000 - 2054 ADT

NOT TO SCALE

NOTE: PRELIMINARY TRAFFIC, AWAITING TP&P APPROVAL

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SHEET 02 OF 09

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6			IH 10
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR/KENDALL	B2
CONTROL	SECTION	JOB	
0072	06	082	

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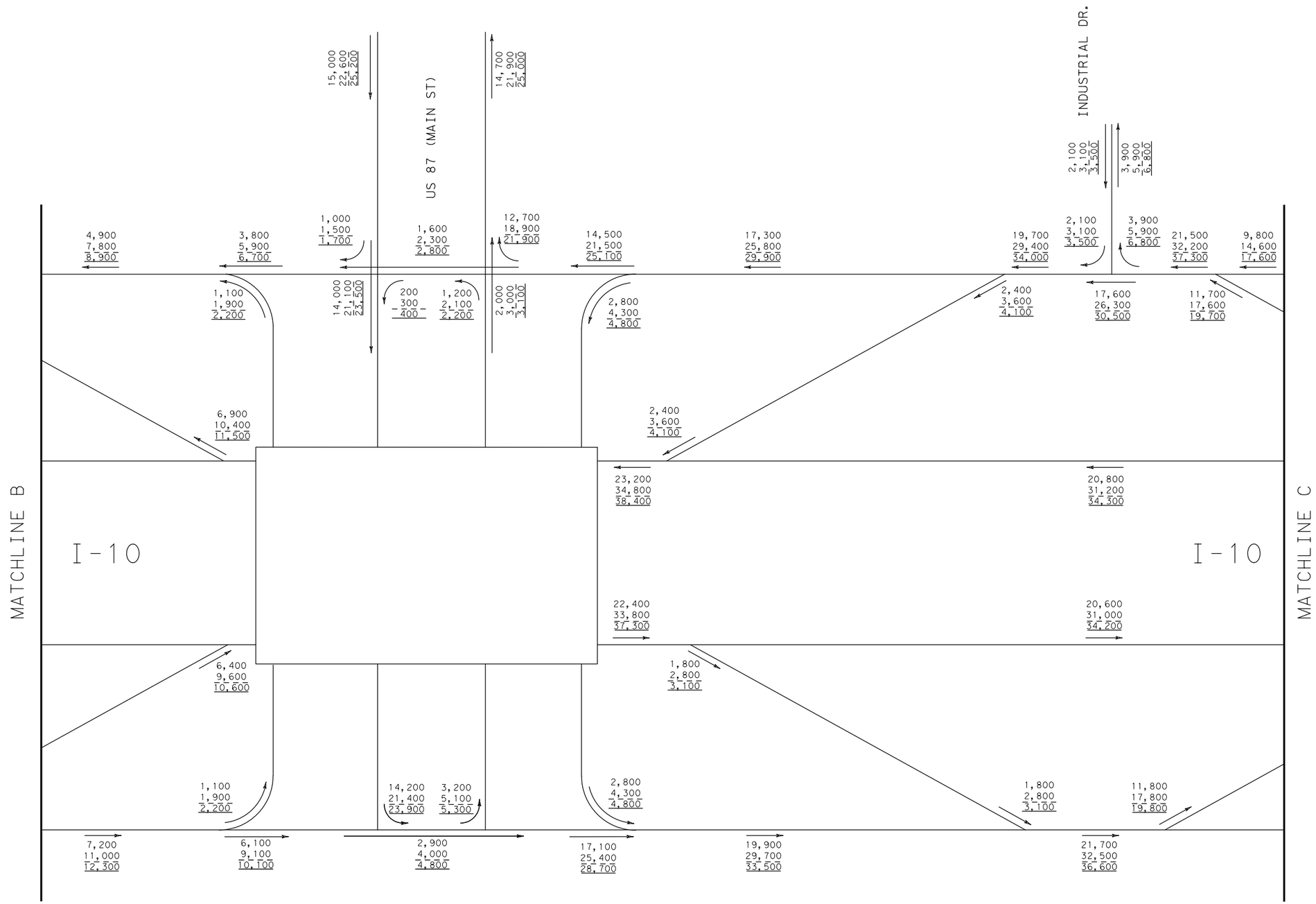

LEGEND
1,000 - 2024 ADT
1,000 - 2044 ADT
1,000 - 2054 ADT

NOT TO SCALE

NOTE: PRELIMINARY TRAFFIC, AWAITING TP&P APPROVAL

HDR
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972.960.4400

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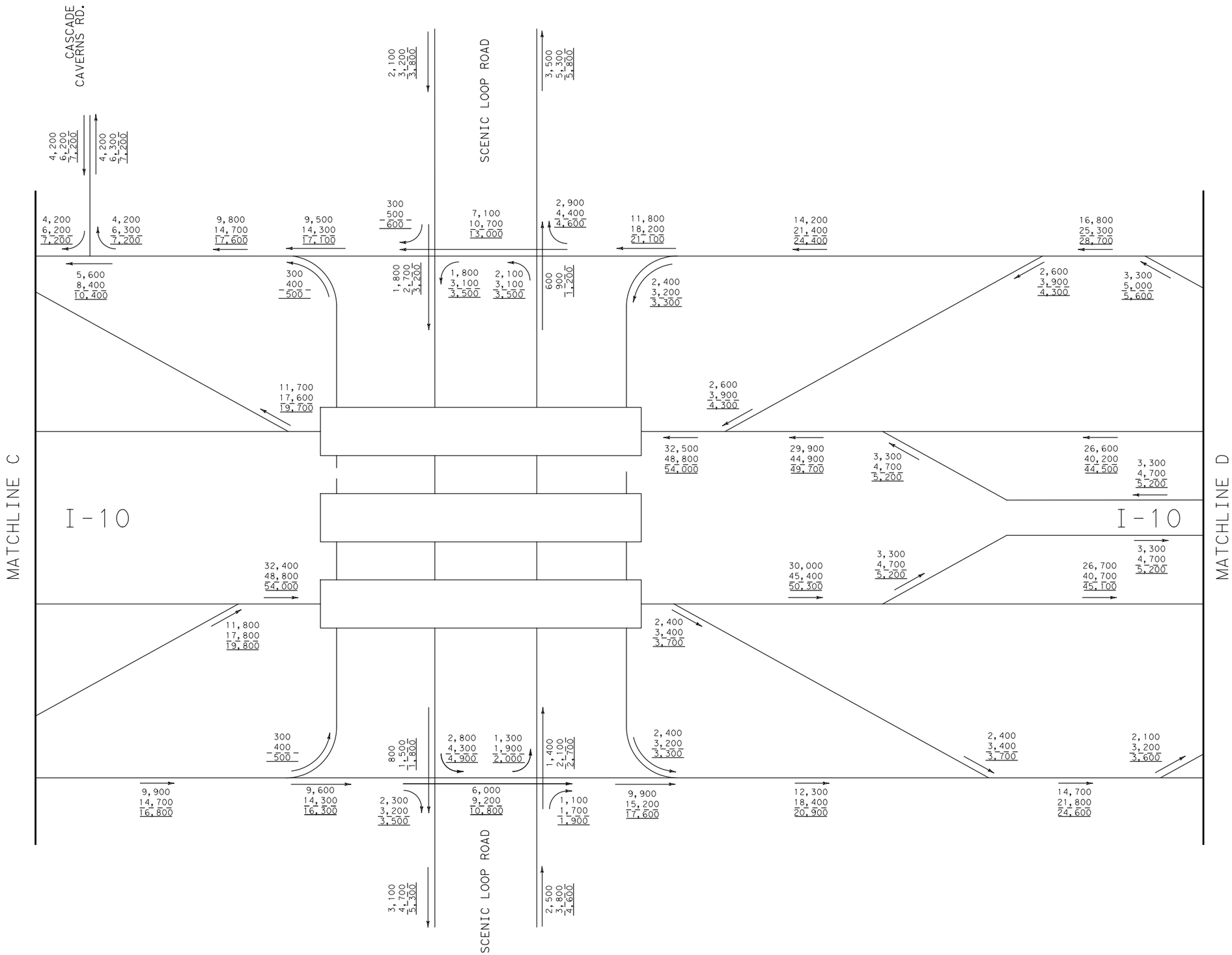
IH 10 TRAFFIC DIAGRAM FROM SH 46 TO FM 3351 2024, 2044, AND 2054 BUILD ADT

SHEET 03 OF 09

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6			IH 10
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR/KENDALL	B3
CONTROL	SECTION	JOB	
0072	06	082	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: VCHANG DATE: 9/27/2018
FILE: $PWVARVAULTPATHDESC$
TIME: 2:31:21 PM PENTABLE: I0104955.tbl
SCALE: 1:400.004



LEGEND
1,000 - 2024 ADT
1,000 - 2044 ADT
1,000 - 2054 ADT

NOT TO SCALE

NOTE: PRELIMINARY TRAFFIC, AWAITING TP&P APPROVAL

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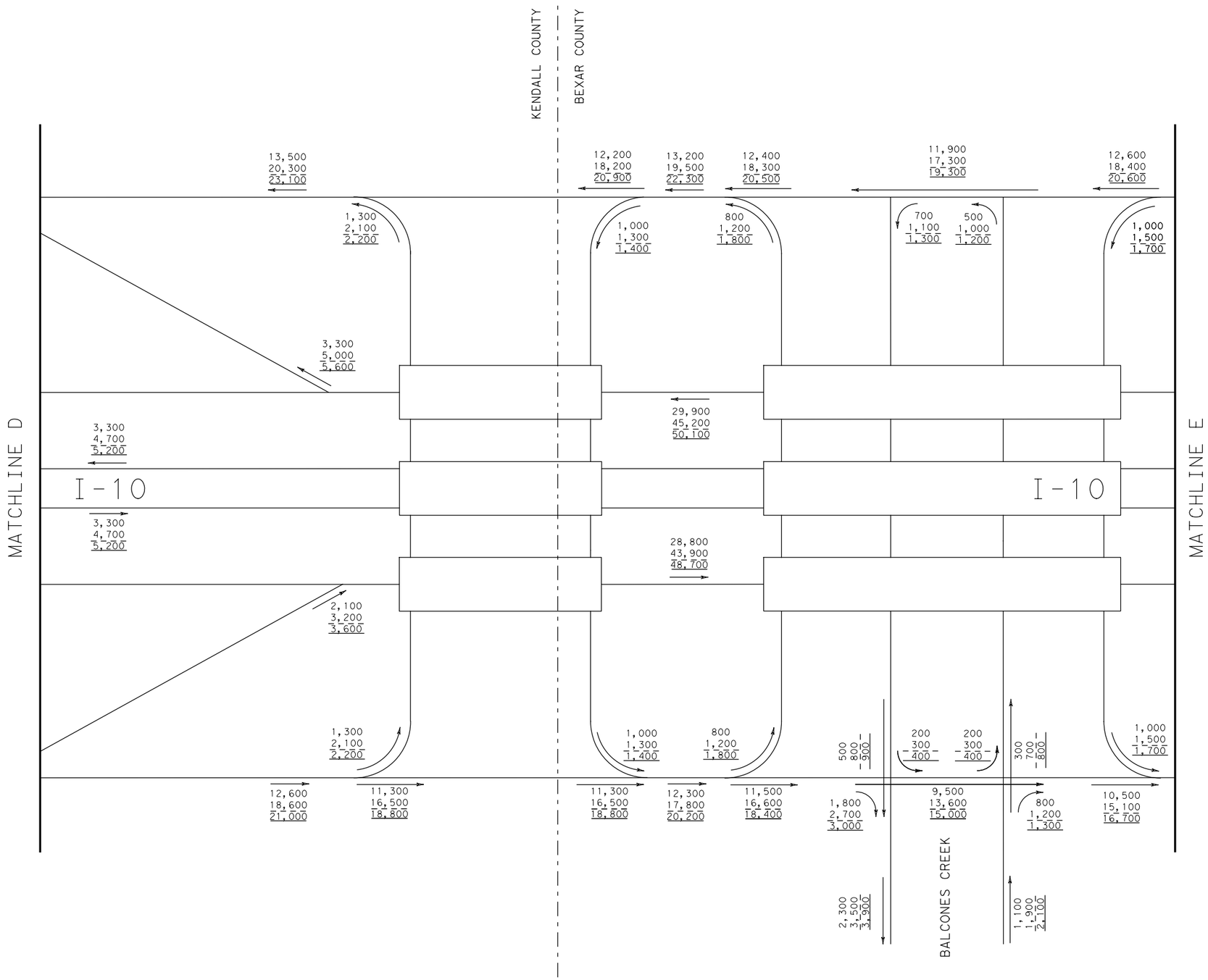
IH 10 TRAFFIC DIAGRAM FROM SH 46 TO FM 3351 2024, 2044, AND 2054 BUILD ADT

SHEET 04 OF 09

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6			IH 10
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR/KENDALL	B4
CONTROL	SECTION	JOB	
0072	06	082	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: VCHANG DATE: 9/27/2018 TIME: 2:31:33 PM PENTABLE: IOI04955.tbl
FILE: $PWVARVAULTPATHDESC$ SCALE: 1:400.004



LEGEND

1,000 - 2024 ADT
1,000 - 2044 ADT
1,000 - 2054 ADT

NOT TO SCALE

NOTE: PRELIMINARY TRAFFIC, AWAITING TP&P APPROVAL

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SHEET 05 OF 09

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6			IH 10
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR/KENDALL	B5
CONTROL	SECTION	JOB	
0072	06	082	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: VCHANG DATE: 9/27/2018 TIME: 2:31:44 PM PENTABLE: IOI04955.tbl
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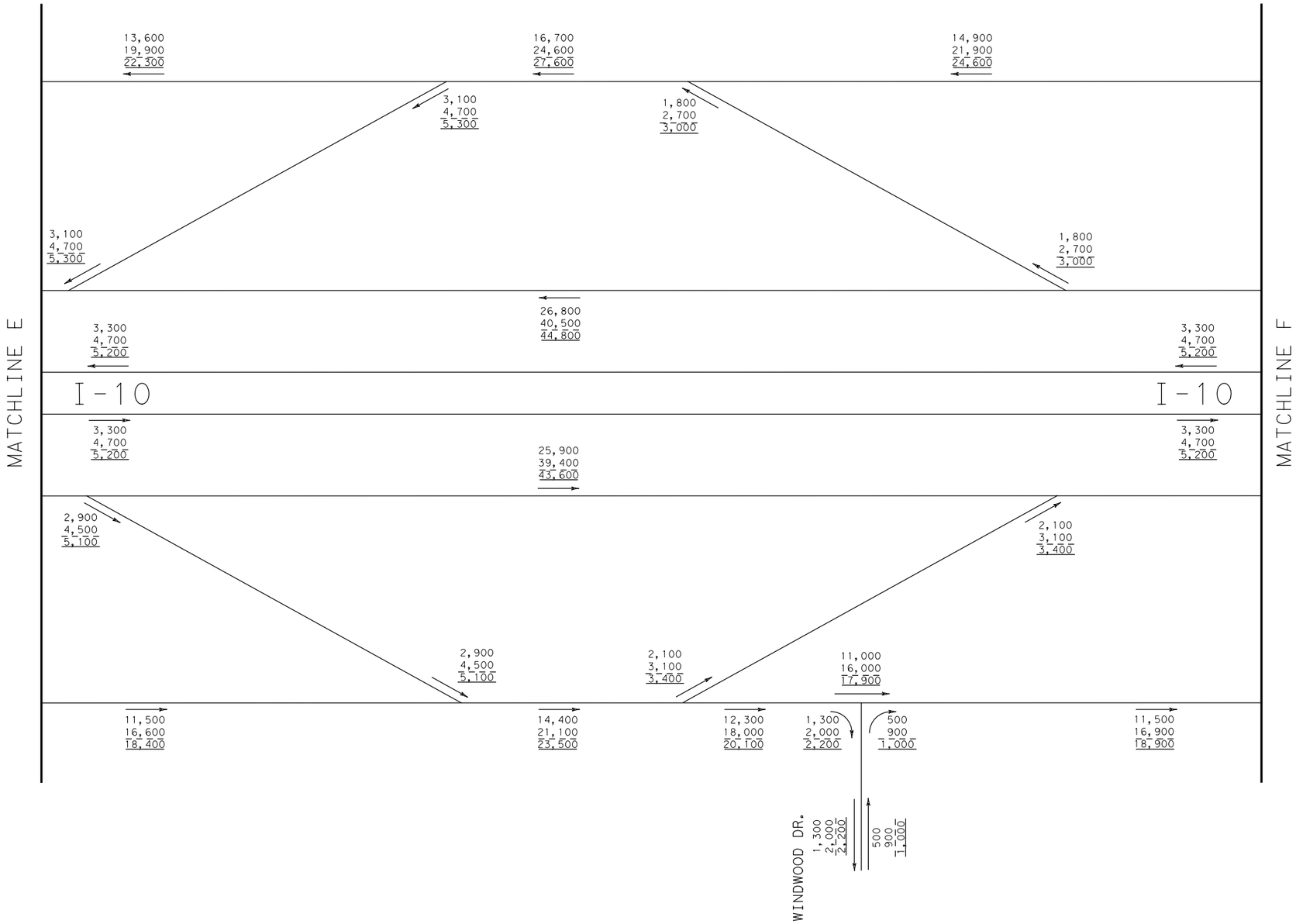

LEGEND
1,000 - 2024 ADT
1,000 - 2044 ADT
1,000 - 2054 ADT

NOT TO SCALE

NOTE: PRELIMINARY TRAFFIC, AWAITING TP&P APPROVAL

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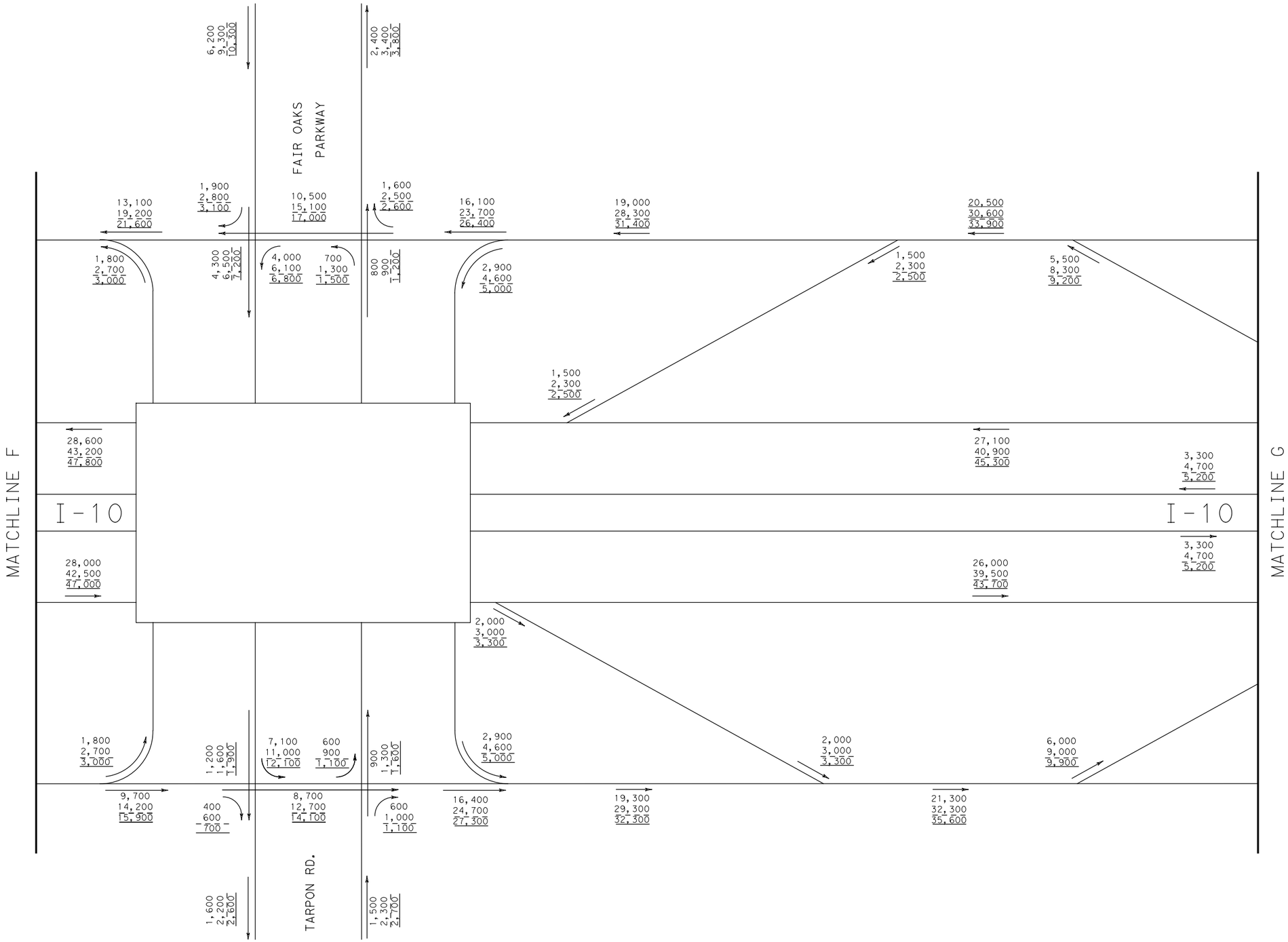
SHEET 06 OF 09

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6			IH 10
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR/KENDALL	B6
CONTROL	SECTION	JOB	
0072	06	082	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: VCHANG DATE: 9/27/2018
FILE: $PWVARV/ULTPATHDESC$
PENTABLE: 10104955.tbl
TIME: 2:31:56 PM SCALE:1:400.004



LEGEND
1,000 - 2024 ADT
1,000 - 2044 ADT
1,000 - 2054 ADT

NOT TO SCALE

NOTE: PRELIMINARY TRAFFIC, AWAITING TP&P APPROVAL

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SHEET 07 OF 09

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6			IH 10
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR/KENDALL	B7
CONTROL	SECTION	JOB	
0072	06	082	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
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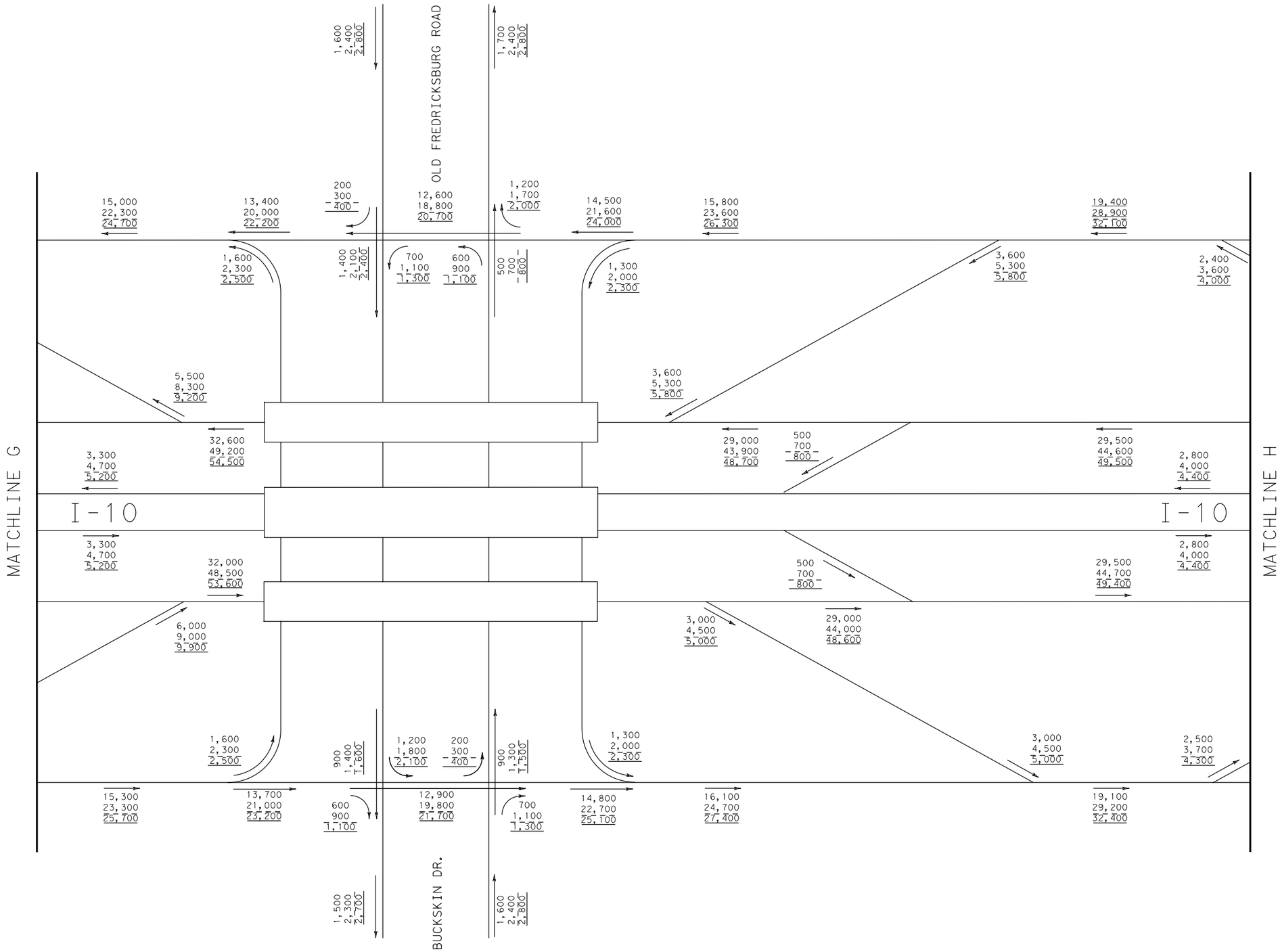
FILE: $PWVARVAULTPATHDESC$ SCALE: 1:400.004



LEGEND
1,000 - 2024 ADT
1,000 - 2044 ADT
1,000 - 2054 ADT

NOT TO SCALE

NOTE: PRELIMINARY TRAFFIC, AWAITING TP&P APPROVAL

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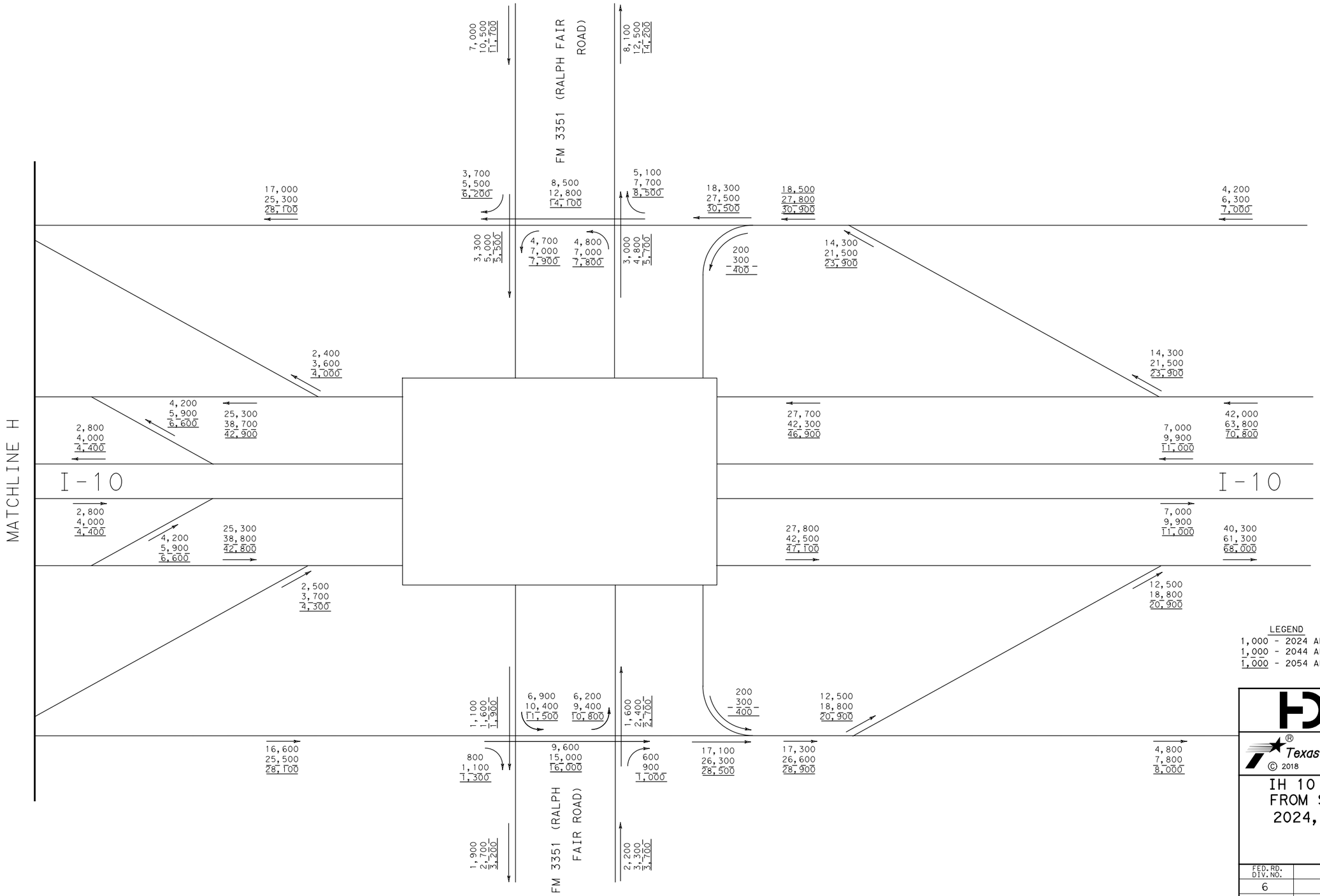
SHEET 08 OF 09

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6			IH 10
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR/KENDALL	B8
CONTROL	SECTION	JOB	
0072	06	082	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: VCHANG DATE: 9/27/2018
FILE: $PWVARVAULTPATHDESC$
PENTABLE: 10104955.tbl
TIME: 2:32:20 PM SCALE: 1:400.004



LEGEND
1,000 - 2024 ADT
1,000 - 2044 ADT
1,000 - 2054 ADT

NOT TO SCALE

NOTE: PRELIMINARY TRAFFIC, AWAITING TP&P APPROVAL

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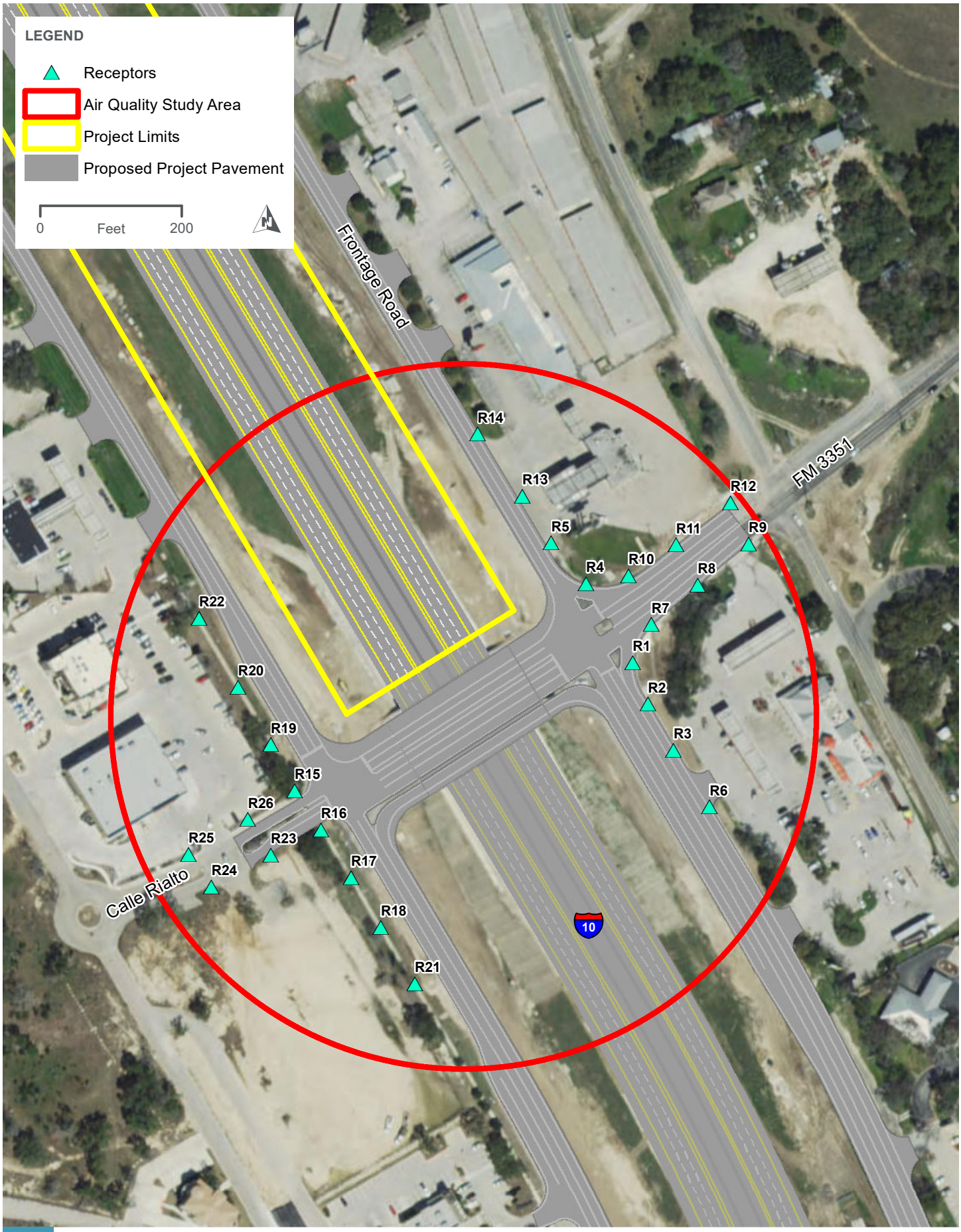
SHEET 09 OF 09

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6			IH 10
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	SAT	BEXAR/KENDALL	B9
CONTROL	SECTION	JOB	
0072	06	082	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: VCHANG DATE: 9/27/2018 TIME: 2:32:32 PM PENTABLE: IOI04955.tbl
FILE: $PWVARVAULTPATHDESC$ SCALE: 1:400.004

APPENDIX C

Carbon Monoxide Receptors Plan View Map



CARBON MONOXIDE RECEPTORS PLAN VIEW MAP

APPENDIX D

CAL3QHC Modeling Files for 2024

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: TXI-10RalphFairCO RUN: TXI-10 Ralph Fair 2024

DATE : 4/25/19
TIME : 8:50:46

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 175. CM
U = 1.0 M/S CLAS = 6 (F) ATIM = 60. MINUTES
MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH (M)	BRG (DEG)	TYPE	VPH (G/MI)	EF	H (M)	W (M)	V/C	QUEUE (VEH)
	*	X1	Y1	X2	Y2	*									
1. EB RF	*	535273.2	********	535339.4	********	*	79.	57.	AG	697.	1.8	0.0	13.4		
2. EB RF accel	*	535246.8	********	535273.2	********	*	31.	58.	AG	258.	2.5	0.0	13.4		
3. EB RF accel 1	*	535087.7	********	535131.6	********	*	51.	60.	AG	189.	1.9	0.0	9.8		
4. EB RF accel 2	*	535148.6	********	535167.1	********	*	25.	49.	AG	138.	2.5	0.0	9.8		
5. EB RF decel	*	535131.6	********	535148.6	********	*	20.	59.	AG	189.	3.9	0.0	9.8		
6. EB RF OP	*	535167.1	********	535230.6	********	*	74.	58.	AG	671.	2.3	0.0	13.4		
7. EB RF OP decel	*	535230.6	********	535246.8	********	*	19.	58.	AG	671.	3.9	0.0	13.4		
8. EB RF-FR right accel	*	535148.6	********	535163.6	********	*	15.	91.	AG	52.	2.5	0.0	9.8		
9. EB RF-NB FR left	*	535246.8	********	535254.4	********	*	30.	15.	AG	413.	2.5	0.0	9.8		
10. NB FR 1	*	535336.9	********	535293.6	********	*	84.	329.	AG	1574.	1.5	0.0	16.2		
11. NB FR 2	*	535254.4	********	535192.7	********	*	117.	328.	AG	1462.	1.5	0.0	13.4		
12. NB FR decel	*	535293.6	********	535269.3	********	*	46.	328.	AG	1135.	3.9	0.0	16.2		
13. NB FR right decel	*	535296.6	********	535272.8	********	*	46.	329.	AG	439.	3.9	0.0	9.4		
14. NB FR straight acc	*	535269.3	********	535254.4	********	*	30.	331.	AG	731.	2.5	0.0	13.4		

```
      15. NB FR-RF left accel * 535269.3  ********  535243.3  ******** *
27.   282. AG    404.   2.5   0.0  9.4
      16. NB FR-RF right acc  * 535272.8  ********  535273.2  ******** *
13.     2. AG    439.   2.5   0.0  9.4
      17. NB I-10 ML          * 535302.1  ********  535146.8  ******** *
304.   329. AG   2382.   1.3   0.0 21.9
      18. NB ML turn 1        * 535331.6  ********  535273.4  ******** *
110.   328. AG     17.   1.8   0.0 12.8
      19. NB ML turn 2        * 535273.4  ********  535259.9  ******** *
15.   298. AG     17.   2.3   0.0 12.8
      20. NB ML turn 3        * 535259.9  ********  535246.4  ******** *
14.   258. AG     17.   2.3   0.0 12.8
      21. NB ML turn 4        * 535246.4  ********  535180.1  ******** *
79.   237. AG     17.   1.9   0.0 12.8
      22. NB ML turn 5        * 535180.1  ********  535175.0  ******** *
10.   211. AG     17.   2.3   0.0  9.8
      23. NB ML turn 6        * 535175.0  ********  535178.8  ******** *
23.   170. AG     17.   2.3   0.0 12.8
      24. SB FR 1             * 535086.1  ********  535131.9  ******** *
89.   149. AG   1428.   1.5   0.0 13.4
      25. SB FR 2             * 535163.6  ********  535227.4  ******** *
126.   150. AG   1488.   1.5   0.0 13.4
      26. SB FR accel         * 535149.6  ********  535163.6  ******** *
28.   149. AG    826.   2.5   0.0 13.4
      27. SB FR decel         * 535131.9  ********  535149.6  ******** *
34.   149. AG   1428.   3.9   0.0 13.4
      28. SB FR-RF left accel * 535149.6  ********  535167.1  ******** *
19.   112. AG    533.   2.5   0.0  9.4
      29. SB FR-RF right accel* 535149.6  ********  535145.4  ******** *
13.   199. AG     69.   2.5   0.0  9.4
      30. SB I-10 ML          * 535120.1  ********  535274.8  ******** *
302.   149. AG   2391.   1.6   0.0 21.9
      31. WB R accel          * 535166.8  ********  535137.6  ******** *
35.   238. AG     95.   2.5   0.0  9.8
      32. WB RF               * 535334.0  ********  535289.4  ******** *
54.   236. AG    602.   1.8   0.0 13.4
      33. WB RF accel 1       * 535269.6  ********  535243.3  ******** *
32.   236. AG    284.   2.5   0.0 13.4
      34. WB RF accel 2       * 535137.6  ********  535077.1  ******** *
70.   239. AG    163.   1.9   0.0  9.8
      35. WB RF decel         * 535289.4  ********  535269.6  ******** *
23.   238. AG    602.   3.9   0.0 13.4
      36. WB RF OP 1          * 535243.3  ********  535179.6  ******** *
75.   238. AG    688.   2.3   0.0 13.4
      37. WB RF OP 2          * 535179.6  ********  535166.8  ******** *
15.   238. AG    688.   3.9   0.0 13.4
      38. WB RF-FR left accel * 535166.8  ********  535163.6  ******** *
25.   187. AG    593.   2.5   0.0  9.8
      39. WB RF-NB FR turn    * 535269.6  ********  535254.4  ******** *
16.   281. AG    318.   2.5   0.0  9.8
```

JOB: TXI-10RalphFairCO RUN: TX I-10 Ralph Fair 2024

DATE : 4/25/19
TIME : 8:50:46

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. R1	535284.6	********	1.8
2. R2	535291.0	********	1.8
3. R3	535302.1	********	1.8
4. R4	535264.4	********	1.8
5. R5	535249.3	********	1.8
6. R6	535317.8	********	1.8
7. R7	535292.7	********	1.8
8. R8	535312.5	********	1.8
9. R9	535334.7	********	1.8
10. R10	535282.8	********	1.8
11. R11	535303.2	********	1.8
12. R12	535326.8	********	1.8
13. R13	535236.8	********	1.8
14. R14	535217.6	********	1.8
15. R15	535138.6	********	1.8
16. R16	535149.8	********	1.8
17. R17	535162.9	********	1.8
18. R18	535175.7	********	1.8
19. R19	535128.3	********	1.8
20. R20	535114.1	********	1.8
21. R21	535190.4	********	1.8
22. R22	535097.2	********	1.8
23. R23	535128.2	********	1.8
24. R24	535102.6	********	1.8
25. R25	535092.6	********	1.8
26. R26	535118.2	********	1.8

JOB: TXI-10RalphFairCO RUN: TX I-10 Ralph Fair 2024

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.2	0.3	0.1	
10.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.2	0.2	0.2	0.2	
20.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	
30.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.3	0.2	
40.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	
50.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.2
60.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.3	0.1	0.2	0.2	0.2	0.2
70.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.3	0.1	0.2	0.2	0.2	0.2
80.	*	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2
90.	*	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.3	0.1
100.	*	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2
110.	*	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.2
120.	*	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.2	0.3
130.	*	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.3
140.	*	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
150.	*	0.1	0.3	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0

```
 160.  *   0.3   0.3   0.2   0.2   0.3   0.1   0.0   0.0   0.0   0.1
0.0   0.0   0.1   0.2   0.0   0.0   0.0   0.0   0.0   0.0
 170.  *   0.3   0.3   0.2   0.1   0.2   0.1   0.1   0.0   0.0   0.2
0.0   0.0   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.0
 180.  *   0.4   0.4   0.1   0.2   0.3   0.1   0.1   0.0   0.0   0.2
0.0   0.0   0.3   0.3   0.0   0.0   0.0   0.0   0.0   0.0
 190.  *   0.4   0.4   0.2   0.3   0.3   0.1   0.1   0.0   0.0   0.2
0.1   0.0   0.3   0.3   0.0   0.0   0.0   0.0   0.0   0.0
 200.  *   0.3   0.4   0.2   0.2   0.2   0.1   0.1   0.1   0.0   0.1
0.1   0.1   0.2   0.2   0.0   0.0   0.0   0.0   0.0   0.0
 210.  *   0.2   0.2   0.1   0.1   0.1   0.1   0.1   0.1   0.0   0.1
0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 220.  *   0.1   0.2   0.1   0.0   0.1   0.1   0.1   0.1   0.0   0.1
0.0   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 230.  *   0.1   0.2   0.1   0.1   0.1   0.1   0.1   0.0   0.1   0.1
0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 240.  *   0.2   0.2   0.1   0.0   0.1   0.1   0.0   0.1   0.1   0.1
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 250.  *   0.1   0.2   0.1   0.1   0.1   0.1   0.0   0.1   0.1   0.1
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 260.  *   0.2   0.2   0.1   0.1   0.1   0.1   0.0   0.2   0.1   0.0
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 270.  *   0.1   0.2   0.1   0.1   0.1   0.1   0.0   0.2   0.1   0.0
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 280.  *   0.2   0.5   0.3   0.2   0.2   0.3   0.0   0.1   0.0   0.0
0.0   0.0   0.2   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 290.  *   0.2   0.5   0.3   0.2   0.2   0.3   0.0   0.0   0.0   0.1
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 300.  *   0.2   0.4   0.5   0.1   0.1   0.3   0.2   0.0   0.0   0.1
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 310.  *   0.1   0.4   0.4   0.1   0.2   0.3   0.2   0.0   0.0   0.1
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 320.  *   0.1   0.4   0.3   0.1   0.2   0.2   0.1   0.0   0.0   0.0
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 330.  *   0.0   0.3   0.3   0.0   0.1   0.2   0.1   0.0   0.0   0.0
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 340.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
0.0   0.0   0.0   0.0   0.1   0.2   0.1   0.1   0.1   0.1
 350.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
0.0   0.0   0.0   0.0   0.1   0.1   0.3   0.2   0.1   0.1
 360.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
0.0   0.0   0.0   0.0   0.3   0.2   0.1   0.2   0.3   0.1
 ------*-------------------------------------------------------------------
-------------------------------------------------------
 MAX   *   0.4   0.5   0.5   0.3   0.3   0.3   0.2   0.2   0.1   0.2
0.1   0.1   0.3   0.3   0.3   0.2   0.3   0.2   0.3   0.3
 DEGR. *  180   280   300   190   160   280   300   260   230   170    50
200   180   180     0     0   350     0     0   120
```

JOB: TXI-10RalphFairCO RUN: TX I-10 Ralph Fair 2024

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC21	REC22	REC23	REC24	REC25	REC26
0.	0.2	0.1	0.0	0.0	0.0	0.0
10.	0.2	0.1	0.2	0.0	0.0	0.1
20.	0.2	0.1	0.1	0.0	0.0	0.1
30.	0.2	0.2	0.0	0.1	0.0	0.1
40.	0.2	0.2	0.0	0.0	0.1	0.1
50.	0.2	0.2	0.0	0.0	0.1	0.1
60.	0.2	0.2	0.0	0.0	0.0	0.0
70.	0.2	0.2	0.0	0.0	0.0	0.0
80.	0.2	0.2	0.0	0.0	0.0	0.0
90.	0.2	0.2	0.1	0.0	0.0	0.0
100.	0.1	0.2	0.1	0.0	0.0	0.1
110.	0.1	0.2	0.1	0.0	0.0	0.1
120.	0.1	0.2	0.1	0.0	0.0	0.1
130.	0.1	0.3	0.0	0.0	0.0	0.0
140.	0.0	0.1	0.0	0.0	0.0	0.0
150.	0.0	0.0	0.0	0.0	0.0	0.0
160.	0.0	0.0	0.0	0.0	0.0	0.0
170.	0.0	0.0	0.0	0.0	0.0	0.0
180.	0.0	0.0	0.0	0.0	0.0	0.0
190.	0.0	0.0	0.0	0.0	0.0	0.0
200.	0.0	0.0	0.0	0.0	0.0	0.0
210.	0.0	0.0	0.0	0.0	0.0	0.0
220.	0.0	0.0	0.0	0.0	0.0	0.0
230.	0.0	0.0	0.0	0.0	0.0	0.0
240.	0.0	0.0	0.0	0.0	0.0	0.0
250.	0.0	0.0	0.0	0.0	0.0	0.0
260.	0.0	0.0	0.0	0.0	0.0	0.0
270.	0.0	0.0	0.0	0.0	0.0	0.0
280.	0.0	0.0	0.0	0.0	0.0	0.0
290.	0.0	0.0	0.0	0.0	0.0	0.0
300.	0.0	0.0	0.0	0.0	0.0	0.0
310.	0.0	0.0	0.0	0.0	0.0	0.0
320.	0.0	0.0	0.0	0.0	0.0	0.0
330.	0.0	0.0	0.0	0.0	0.0	0.0
340.	0.1	0.0	0.0	0.0	0.0	0.0

```
350.  *   0.2   0.1   0.0   0.0   0.0   0.0
360.  *   0.2   0.1   0.0   0.0   0.0   0.0
------*-------------------------------------
MAX   *   0.2   0.3   0.2   0.1   0.1   0.1
DEGR. *    0   130    10    30    40    10
```

THE HIGHEST CONCENTRATION OF 0.50 PPM OCCURRED AT RECEPTOR REC2 .

APPENDIX E

CAL3QHC Modeling Files for 2044

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: TXI-10RalphFairCO RUN: TXI-10 Ralph Fair 2044

DATE : 4/25/19
TIME : 8:57:25

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 175. CM
U = 1.0 M/S CLAS = 6 (F) ATIM = 60. MINUTES
MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE	VPH	EF	H	W	V/C	QUEUE
	*	X1	Y1	X2	Y2	*	(M)	(DEG)		(G/MI)		(M)	(M)		(VEH)
1. EB RF	*	535273.2	********	535339.4	********	*	79.	57.	AG	1075.	0.7	0.0	13.4		
2. EB RF accel	*	535246.8	********	535273.2	********	*	31.	58.	AG	413.	1.0	0.0	13.4		
3. EB RF accel 1	*	535087.7	********	535131.6	********	*	51.	60.	AG	284.	0.7	0.0	9.8		
4. EB RF accel 2	*	535148.6	********	535167.1	********	*	25.	49.	AG	206.	1.0	0.0	9.8		
5. EB RF decel	*	535131.6	********	535148.6	********	*	20.	59.	AG	284.	1.4	0.0	9.8		
6. EB RF OP	*	535167.1	********	535230.6	********	*	74.	58.	AG	1015.	0.9	0.0	13.4		
7. EB RF OP decel	*	535230.6	********	535246.8	********	*	19.	58.	AG	1015.	1.4	0.0	13.4		
8. EB RF-FR right accel	*	535148.6	********	535163.6	********	*	15.	91.	AG	77.	1.0	0.0	9.8		
9. EB RF-NB FR left	*	535246.8	********	535254.4	********	*	30.	15.	AG	602.	1.0	0.0	9.8		
10. NB FR 1	*	535336.9	********	535293.6	********	*	84.	329.	AG	2365.	0.6	0.0	16.2		
11. NB FR 2	*	535254.4	********	535192.7	********	*	117.	328.	AG	2176.	0.6	0.0	13.4		
12. NB FR decel	*	535293.6	********	535269.3	********	*	46.	328.	AG	1703.	1.4	0.0	16.2		
13. NB FR right decel	*	535296.6	********	535272.8	********	*	46.	329.	AG	662.	1.4	0.0	9.4		
14. NB FR straight acc	*	535269.3	********	535254.4	********	*	30.	331.	AG	1101.	1.0	0.0	13.4		

```
      15. NB FR-RF left accel * 535269.3  ********  535243.3  ******** *
27.   282. AG    602.   1.0   0.0  9.4
      16. NB FR-RF right acc  * 535272.8  ********  535273.2  ******** *
13.     2. AG    662.   1.0   0.0  9.4
      17. NB I-10 ML          * 535302.1  ********  535146.8  ******** *
304.   329. AG   3638.   0.6   0.0 21.9
      18. NB ML turn 1        * 535331.6  ********  535273.4  ******** *
110.   328. AG     26.   0.7   0.0 12.8
      19. NB ML turn 2        * 535273.4  ********  535259.9  ******** *
15.   298. AG     26.   0.9   0.0 12.8
      20. NB ML turn 3        * 535259.9  ********  535246.4  ******** *
14.   258. AG     26.   0.9   0.0 12.8
      21. NB ML turn 4        * 535246.4  ********  535180.1  ******** *
79.   237. AG     26.   0.7   0.0 12.8
      22. NB ML turn 5        * 535180.1  ********  535175.0  ******** *
10.   211. AG     26.   0.9   0.0  9.8
      23. NB ML turn 6        * 535175.0  ********  535178.8  ******** *
23.   170. AG     26.   0.9   0.0 12.8
      24. SB FR 1             * 535086.1  ********  535131.9  ******** *
89.   149. AG   2193.   0.6   0.0 13.4
      25. SB FR 2             * 535163.6  ********  535227.4  ******** *
126.   150. AG   2288.   0.6   0.0 13.4
      26. SB FR accel         * 535149.6  ********  535163.6  ******** *
28.   149. AG    129.   1.0   0.0 13.4
      27. SB FR decel         * 535131.9  ********  535149.6  ******** *
34.   149. AG   2193.   1.4   0.0 13.4
      28. SB FR-RF left accel * 535149.6  ********  535167.1  ******** *
19.   112. AG    808.   1.0   0.0  9.4
      29. SB FR-RF right accel* 535149.6  ********  535145.4  ******** *
13.   199. AG     95.   1.0   0.0  9.4
      30. SB I-10 ML          * 535120.1  ********  535274.8  ******** *
302.   149. AG   3655.   0.7   0.0 21.9
      31. WB R accel          * 535166.8  ********  535137.6  ******** *
35.   238. AG    138.   1.0   0.0  9.8
      32. WB RF               * 535334.0  ********  535289.4  ******** *
54.   236. AG    903.   0.7   0.0 13.4
      33. WB RF accel 1       * 535269.6  ********  535243.3  ******** *
32.   236. AG    430.   1.0   0.0 13.4
      34. WB RF accel 2       * 535137.6  ********  535077.1  ******** *
70.   239. AG    232.   0.7   0.0  9.8
      35. WB RF decel         * 535289.4  ********  535269.6  ******** *
23.   238. AG    903.   1.4   0.0 13.4
      36. WB RF OP 1          * 535243.3  ********  535179.6  ******** *
75.   238. AG   1032.   0.9   0.0 13.4
      37. WB RF OP 2          * 535179.6  ********  535166.8  ******** *
15.   238. AG   1032.   1.4   0.0 13.4
      38. WB RF-FR left accel * 535166.8  ********  535163.6  ******** *
25.   187. AG    894.   1.0   0.0  9.8
      39. WB RF-NB FR turn    * 535269.6  ********  535254.4  ******** *
16.   281. AG    473.   1.0   0.0  9.8
```

JOB: TXI-10RalphFairCO RUN: TX I-10 Ralph Fair 2044

DATE : 4/25/19
TIME : 8:57:25

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. R1	535284.6	********	1.8
2. R2	535291.0	********	1.8
3. R3	535302.1	********	1.8
4. R4	535264.4	********	1.8
5. R5	535249.3	********	1.8
6. R6	535317.8	********	1.8
7. R7	535292.7	********	1.8
8. R8	535312.5	********	1.8
9. R9	535334.7	********	1.8
10. R10	535282.8	********	1.8
11. R11	535303.2	********	1.8
12. R12	535326.8	********	1.8
13. R13	535236.8	********	1.8
14. R14	535217.6	********	1.8
15. R15	535138.6	********	1.8
16. R16	535149.8	********	1.8
17. R17	535162.9	********	1.8
18. R18	535175.7	********	1.8
19. R19	535128.3	********	1.8
20. R20	535114.1	********	1.8
21. R21	535190.4	********	1.8
22. R22	535097.2	********	1.8
23. R23	535128.2	********	1.8
24. R24	535102.6	********	1.8
25. R25	535092.6	********	1.8
26. R26	535118.2	********	1.8

JOB: TXI-10RalphFairCO RUN: TX I-10 Ralph Fair 2044

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	
10.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	
20.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	
30.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	
40.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	
50.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	
60.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	
70.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	
80.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	
90.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	
100.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	
110.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
120.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.2	
130.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	
140.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0	
150.	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	

```
 160.  *   0.1   0.2   0.1   0.1   0.0   0.1   0.0   0.0   0.0   0.0
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 170.  *   0.1   0.1   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 180.  *   0.1   0.1   0.1   0.0   0.1   0.1   0.0   0.0   0.0   0.1
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 190.  *   0.1   0.1   0.1   0.0   0.1   0.1   0.1   0.0   0.0   0.0
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 200.  *   0.1   0.1   0.1   0.0   0.0   0.1   0.0   0.0   0.0   0.1
0.0   0.0   0.0   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 210.  *   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1
0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 220.  *   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1
0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 230.  *   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.1
0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 240.  *   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.1
0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 250.  *   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.1   0.0
0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 260.  *   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 270.  *   0.0   0.1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
 280.  *   0.0   0.1   0.1   0.0   0.0   0.1   0.0   0.0   0.0   0.0
0.0   0.0   0.0   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 290.  *   0.0   0.1   0.1   0.0   0.1   0.1   0.0   0.0   0.0   0.0
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 300.  *   0.0   0.2   0.1   0.1   0.1   0.1   0.0   0.0   0.0   0.0
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 310.  *   0.0   0.2   0.2   0.1   0.1   0.1   0.0   0.0   0.0   0.0
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 320.  *   0.1   0.2   0.2   0.1   0.1   0.2   0.0   0.0   0.0   0.0
0.0   0.0   0.1   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 330.  *   0.0   0.0   0.2   0.0   0.0   0.0   0.0   0.0   0.0   0.0
0.0   0.0   0.0   0.1   0.0   0.0   0.0   0.0   0.0   0.0
 340.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
0.0   0.0   0.0   0.0   0.0   0.1   0.1   0.0   0.1   0.0
 350.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
0.0   0.0   0.0   0.0   0.1   0.1   0.0   0.0   0.1   0.1
 360.  *   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
0.0   0.0   0.0   0.0   0.1   0.1   0.0   0.1   0.0   0.0
 ------*-------------------------------------------------------------------
-------------------------------------------------------
 MAX   *   0.1   0.2   0.2   0.1   0.1   0.2   0.1   0.0   0.1   0.1
0.0   0.0   0.1   0.1   0.1   0.1   0.1   0.1   0.1   0.2
 DEGR. *  160   160   310   160   170   320   190     0   240   180     0
0   160   150     0     0   120     0    10   120
```

JOB: TXI-10RalphFairCO RUN: TX
I-10 Ralph Fair 2044

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC21	REC22	REC23	REC24	REC25	REC26
0.	0.2	0.0	0.0	0.0	0.0	0.0
10.	0.0	0.0	0.0	0.0	0.0	0.0
20.	0.0	0.0	0.0	0.0	0.0	0.0
30.	0.0	0.0	0.0	0.0	0.0	0.0
40.	0.0	0.0	0.0	0.0	0.0	0.0
50.	0.0	0.0	0.0	0.0	0.0	0.0
60.	0.0	0.0	0.0	0.0	0.0	0.0
70.	0.0	0.0	0.0	0.0	0.0	0.0
80.	0.0	0.0	0.0	0.0	0.0	0.0
90.	0.0	0.0	0.0	0.0	0.0	0.0
100.	0.0	0.0	0.0	0.0	0.0	0.0
110.	0.0	0.0	0.0	0.0	0.0	0.0
120.	0.1	0.1	0.0	0.0	0.0	0.0
130.	0.0	0.1	0.0	0.0	0.0	0.0
140.	0.0	0.1	0.0	0.0	0.0	0.0
150.	0.0	0.0	0.0	0.0	0.0	0.0
160.	0.0	0.0	0.0	0.0	0.0	0.0
170.	0.0	0.0	0.0	0.0	0.0	0.0
180.	0.0	0.0	0.0	0.0	0.0	0.0
190.	0.0	0.0	0.0	0.0	0.0	0.0
200.	0.0	0.0	0.0	0.0	0.0	0.0
210.	0.0	0.0	0.0	0.0	0.0	0.0
220.	0.0	0.0	0.0	0.0	0.0	0.0
230.	0.0	0.0	0.0	0.0	0.0	0.0
240.	0.0	0.0	0.0	0.0	0.0	0.0
250.	0.0	0.0	0.0	0.0	0.0	0.0
260.	0.0	0.0	0.0	0.0	0.0	0.0
270.	0.0	0.0	0.0	0.0	0.0	0.0
280.	0.0	0.0	0.0	0.0	0.0	0.0
290.	0.0	0.0	0.0	0.0	0.0	0.0
300.	0.0	0.0	0.0	0.0	0.0	0.0
310.	0.0	0.0	0.0	0.0	0.0	0.0
320.	0.0	0.0	0.0	0.0	0.0	0.0
330.	0.0	0.0	0.0	0.0	0.0	0.0
340.	0.0	0.0	0.0	0.0	0.0	0.0

```
350.  *   0.2   0.0   0.0   0.0   0.0   0.0
360.  *   0.2   0.0   0.0   0.0   0.0   0.0
------*-------------------------------------
MAX   *   0.2   0.1   0.0   0.0   0.0   0.0
DEGR. *    0   120     0     0     0     0
```

THE HIGHEST CONCENTRATION OF 0.20 PPM OCCURRED AT RECEPTOR REC21.