



CITY OF DENTON TRAVEL DEMAND MODEL UPDATE FOR

Craver Ranch

Denton, Texas

OCTOBER 28, 2025 (UPDATED)

SUPPLEMENTAL STUDY

PREPARED BY:

Westwood

PROJECT 0059397.00

City of Denton Travel Demand Model Update For:

Craver Ranch

Denton, Denton County, Texas

SUPPLEMENTAL STUDY

Commissioned By: KFM Engineering & Design

For Submittal To: City of Denton

Reference: _____

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EXECUTIVE SUMMARY

This memorandum contains the findings of an alternative Travel Demand Model (TDM) analysis scenario requested by the City of Denton to evaluate traffic conditions without the proposed Denton County Outer Loop. This study supplements the prior study prepared by Westwood, dated September 8, 2025, and updated by a previous supplemental study dated October 7, 2025. The alternative scenario (October 7th edition) differs from the original study in that it uses the 2016 roadway network and demographic conditions as the baseline year and excludes the proposed Denton County Outer Loop from the roadway network in the vicinity of the Craver Ranch project. To better represent the existing and planned roadway conditions, this analysis retains the modified analytical approach employed in the original study, including redefining the study area into 11 discrete Traffic Analysis Zones (TAZs), relocating zonal centroids, and modifying and adding centroid connectors accordingly. The current update (this study) utilizes the previous analysis results but recalculates the link capacity results using alternative roadway capacity values provided by the City staff. A section containing a description of the study area roadways was also added. The model results are presented in this memo that correspond in content and sequence to those in the original study for convenience.

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The services of **Westwood Professional Services** (“Westwood”) were retained by **KFM Engineering & Design** on behalf of the Applicant to prepare the supplemental update of the City of Denton Travel Demand Model for a proposed residential and commercial development located in the City of Denton, Denton County, Texas. The Project is referred to herein as *Craver Ranch* (the “Project”). The proposed Craver Ranch development contains approximately 2,500 acres located in the City of Denton and will be developed in several phases. An adjacent, 225-acre parcel consisting of approximately 115 proposed single-family lots is also included in this analysis, which is referred to herein as *Estates at Craver Ranch*. The supplemental study provides the findings of an alternative TDM analysis scenario requested by the City of Denton to evaluate traffic conditions without the proposed Denton County Outer Loop.

The study was conducted in accordance with the submitted City of Denton Travel Demand Model Update Report for Craver Ranch, dated September 8, 2025. The alternative scenario differs from the prior study in two ways: 1) it uses the 2016 roadway network and demographic conditions as the baseline year, and 2) it excludes the proposed Denton County Outer Loop from the roadway network in the vicinity of the Craver Ranch project. To better represent the existing and planned roadway conditions, this analysis retains the modified analytical approach employed in the original study, including redefining the study area into 11 discrete Traffic Analysis Zones (TAZs), relocating zonal centroids, and modifying and adding centroid connectors accordingly. Any other assumptions or methodologies that have been introduced for this supplemental update are described in this memo.

Table 1. Development Program Summary (APPROXIMATE)

	LAND USE	Full Buildout
Craver Ranch	Single-Family Lots	
	Detached (ITE LUC #210)	7,091
	Attached (ITE LUC #215)	584
	Multifamily Dwelling Units (ITE LUC #220)	1,515
	Commercial* (ITE LUC #820)	1,243,097 SF
	Elementary School (ITE LUC #520) 1 School @ 600 Students/School	3
	Middle School (ITE LUC #522) 1 School @ 1,200 Students/School	1
Estates at Craver Ranch	Single-Family Lots	
	Detached (ITE LUC #210)	115

NOTE: The development program provided above is based upon the most current and complete information available at the time of this memo publication. Final development numbers may change.

* Commercial use is assumed to consist of a mix of retail and related uses.

Land Use Update

The City's original TDM was outlined by a single TAZ (TAZ ID#1500) for the study area, and its land use category is summarized in Table 2 below.

Table 2. Summary of Land Use Updates in Study Area TAZs

LAND USE CATEGORY	Baseline Condition (Acres)	With Project (Acres)
Agriculture	3780.1	1055.19
Commercial	0	163.49
Residential	0	2561.41
Rural Areas	1420.3	1402.3
Undeveloped	264	264
Total	5446.4	5446.4

In coordination with City staff, the study area zoning was redefined from the original configuration into eleven discrete TAZs. This refinement involved subdividing the original TAZ into smaller zones, with socioeconomic data (households, population, and employment) proportionately allocated to each new TAZ based on land area, and adding new socioeconomic data per the developments, which is shown in Tables 3, 4, and 5. Exhibit 1 shows the boundaries of the 11 TAZs within the study area in relation to the Craver Ranch and Estates at Craver Ranch development limits, and Exhibit 2 shows how the updated TAZs align with the conceptual site plan for the proposed developments.

Table 3. Land Use Updates in Study Area TAZs

LAND USE CATEGORY	#4145	#4146	#4147	#4148	#4149	#4150	#4151	#4152	#4153	#4154	#4155	Total
Baseline Condition Redistributed												
Agriculture	-	-	27.4	121.7	-	-	21.82	467.8	323	-	93.47	1055.19
Rural Areas	542.4	185.9	-	-	233	118.7	-	-	193	129.3	-	1402.3
Undeveloped	264	-	-	-	-	-	-	-	-	-	-	264
Craver Ranch and Estates at Craver Ranch Developments												
Commercial	-	28.75	10.05	26.82	11.9	11.55	45.97	11.2	17.25	-	-	163.49
Residential – Single Family	-	101.8	353.35	-	197.6	466.2	410.28	156.2	332.7	273.9	117.73	2409.75
Residential – Townhomes	-	10.75	5	-	11.9	11.55	9.85	11.2	17.25	-	-	77.5
Residential – Multi-Family	-	12	20.2	17.88	-	-	24.08	-	-	-	-	74.16
Total	806.4	339.2	416	166.4	454.4	608	512	646.4	883.2	403.2	211.2	5446.4

Table 4. Socio-Economic Data Distributed in Study Area TAZs – Baseline Conditions

SOCIOECONOMIC DATA	#1500 (2016 Base)	#4145	#4146	#4147	#4148	#4149	#4150	#4151	#4152	#4153	#4154	#4155
Total Households	329	49	20	25	10	27	37	31	39	53	24	13
Total Population	894	132	56	68	27	75	100	84	106	145	66	35
School Enrollment	0	0	0	0	0	0	0	0	0	0	0	0
Retail	0	0	0	0	0	0	0	0	0	0	0	0
Office	16	2	1	1	0	1	2	2	2	3	1	1
Service	3	0	0	1	0	0	0	1	0	1	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Total Employment	19	2	1	2	0	1	2	3	2	4	1	1

Table 5. Updated Socio-Economic Data in Study Area TAZs – With Project

SOCIOECONOMIC DATA	#4145	#4146	#4147	#4148	#4149	#4150	#4151	#4152	#4153	#4154	#4155	Total
Total Households	49	726	1,764	272	922	978	1,634	715	1,220	773	416	9,469
Total Population	132	2,176	5,290	815	2,762	2,932	4,902	2,138	3,652	2,316	1,246	28,362
School Enrollment	0	0	600	0	0	1,800	0	0	600	0	0	3,000
Retail	0	142	53	79	60	63	197	76	100	0	0	771
Office	2	1	0	0	1	0	0	1	2	0	0	7
Service	0	0	0	0	0	0	0	0	1	0	0	1
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Total Employment	2	143	53	79	61	63	197	77	103	0	0	779

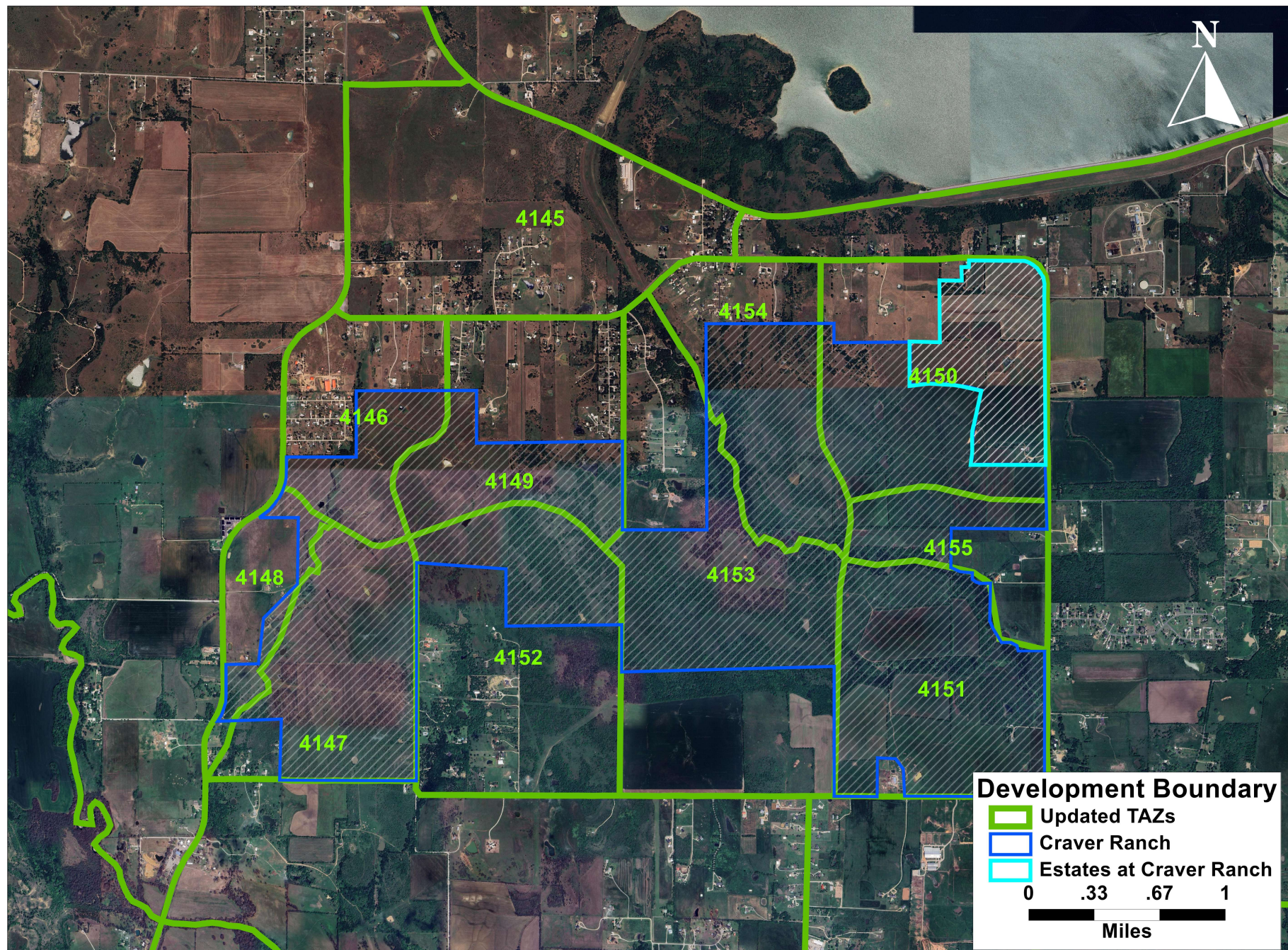


Exhibit 1 - Craver Ranch Development Study Limits and Updated Traffic Analysis Zones

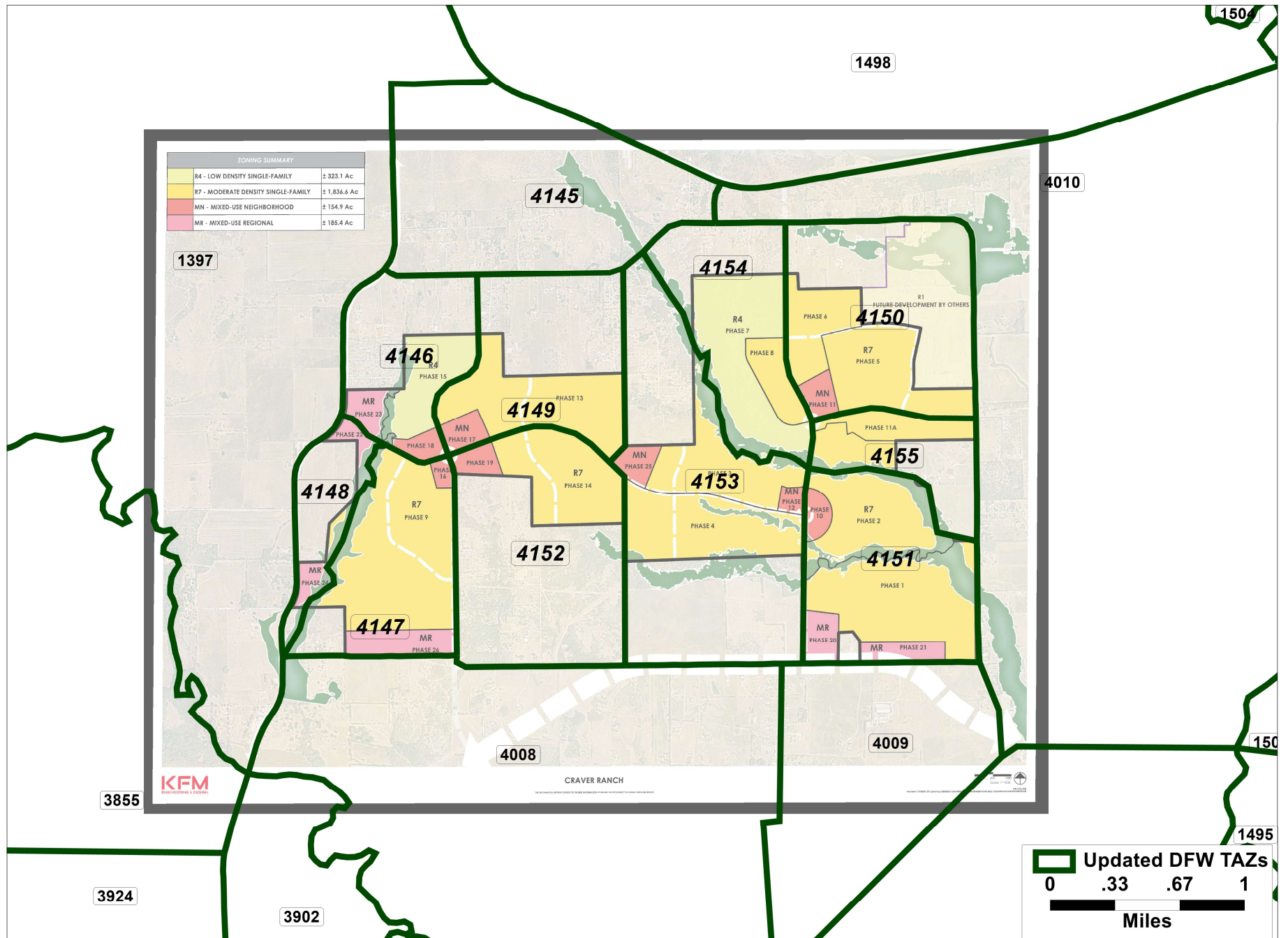


Exhibit 2 - Updated Traffic Analysis Zones and Craver Ranch Concept Plan

Study Area Roadways

The study site is located north of Shepherd Road/Gribble Springs Road, east of FM 2164, and south and west of FM 2153. In the Base model, FM 2164 and FM 2153 are both designated as Minor Arterials. Shepherd/Gribble Springs Roads are designated as Collector. The alignments of two future north-south Secondary Arterials and one future east-west Secondary Arterial are located within the site, which are coded as Minor Arterials, along with Collectors, as shown in Exhibit 3. Roadway network features, including functional classification, number of lanes, and posted speed limit, are shown in Table 6. A description of the characteristics of all roadways, both on-site and off-site, that were evaluated in the model are listed below:

- 1) FM 2164, north of Gribble Springs Road
 - a) 2016 TDM:
 - i) Cross-section:
 - (1) Two-way, two lanes (one per direction) without median
 - ii) City of Denton Thoroughfare Plan Classification: Minor Arterial
 - iii) Posted Speed Limit: 60 MPH
- 2) FM 2153
 - a) 2016 TDM:
 - i) Cross-section:
 - (1) Two-way, two lanes (one per direction) without median
 - ii) City of Denton Thoroughfare Plan Classification: Minor Arterial
 - iii) Posted Speed Limit: 55 MPH
- 3) Gribble Springs Road
 - a) 2016 TDM:
 - i) Cross-section:
 - (1) Two-way, two lanes (one per direction) without median
 - ii) City of Denton Thoroughfare Plan Classification: Collector
 - iii) Posted Speed Limit: 35 MPH
- 4) FM 428
 - a) 2016 TDM:
 - i) Cross-section:
 - (1) Two-way, two lanes (one per direction) without median
 - ii) City of Denton Thoroughfare Plan Classification: Minor Arterial
 - iii) Posted Speed Limit: 60 MPH

The City of Denton 2022 Thoroughfare plan includes three additional proposed Secondary Arterials within the site: two North/South secondary arterials located between FM 2146 and FM 2153, and one East/West secondary arterial located between Gribble Springs Road/Shepard Road and FM 2153. The proposed arterials are coded as two-way, two lanes (one per direction) without median in minor arterials with the posted speed limit of 55 MPH. Proposed on-site collectors within the developments are also coded as two-way, two lanes (one per direction) without median with the posted speed limit of 35 MPH.

Analysis Results

For this analysis, the City of Denton's 2016 TDM was used as the base model. The locations of the centroid and centroid connectors for each TAZ have been carefully determined, considering the center of gravity of a zone's major trip-generating locations based on the Craver Ranch site plan and existing residential areas to provide fair trip distribution.

For this supplemental study, the following scenarios were analyzed:

- I. Year 2016 Baseline Conditions with proposed Craver Ranch roadway network
- II. Year 2016 Craver Ranch Development (i.e., includes socio-economic data in accordance with proposed Craver Ranch land uses) with proposed Craver Ranch roadway network

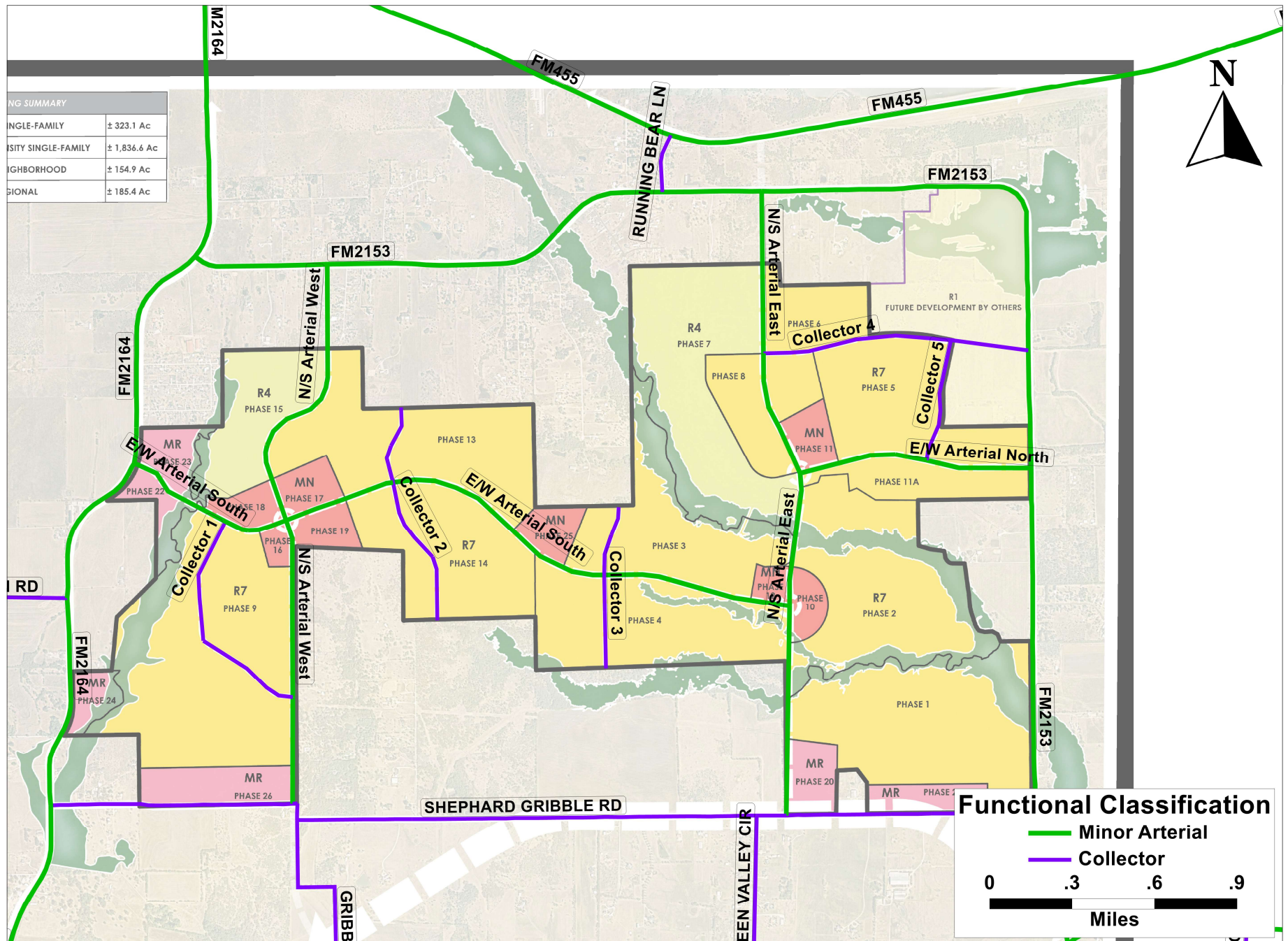
This analysis also utilizes alternative roadway capacity guidelines provided by the City staff in lieu of the original TDM calculations. The guidelines were applied as follows:

- Minor arterial: 900 vehicles per hour per lane (for median divided cross-sections) and 875 vehicles per hour per lane (for undivided cross-sections)
- Collector roadway: 575 vehicles per hour per lane (for median divided cross-sections) and 525 vehicles per hour per lane (for undivided cross-sections)
- Daily roadway link capacity calculated assuming a K-factor of 10%
- Level of Service Definitions:
 - LOS C+ = V:C ratio < 65%
 - LOS D = V:C ratio between 65%-80%
 - LOS E = V:C ratio between 80%-100%
 - LOS F = V:C ration > 100%

Locations of each link ID can be found in Exhibit 4. The results of the analysis are presented in Table 6 and graphically summarized in Exhibit 5 and Exhibit 6. As shown in the results summary, all roadways within the Craver Ranch site are projected to operate at Level of Service C or better, for all analysis scenarios under the conditions described herein when constructed to the City's Thoroughfare-Plan-designated cross-sections. Some roadway segments within the beyond the site boundary are projected to operate at Levels of Service D or E.

NOTE: For reference, the link capacity calculations using the direct values obtained from the TDM model are provided in Table 6A.

END OF MEMO



LAND USE SUMMARY	
SINGLE-FAMILY	± 323.1 Ac
MULTI-FAMILY	± 1,836.6 Ac
NEIGHBORHOOD	± 154.9 Ac
REGIONAL	± 185.4 Ac

Exhibit 3 - Existing Roadway Functional Classification

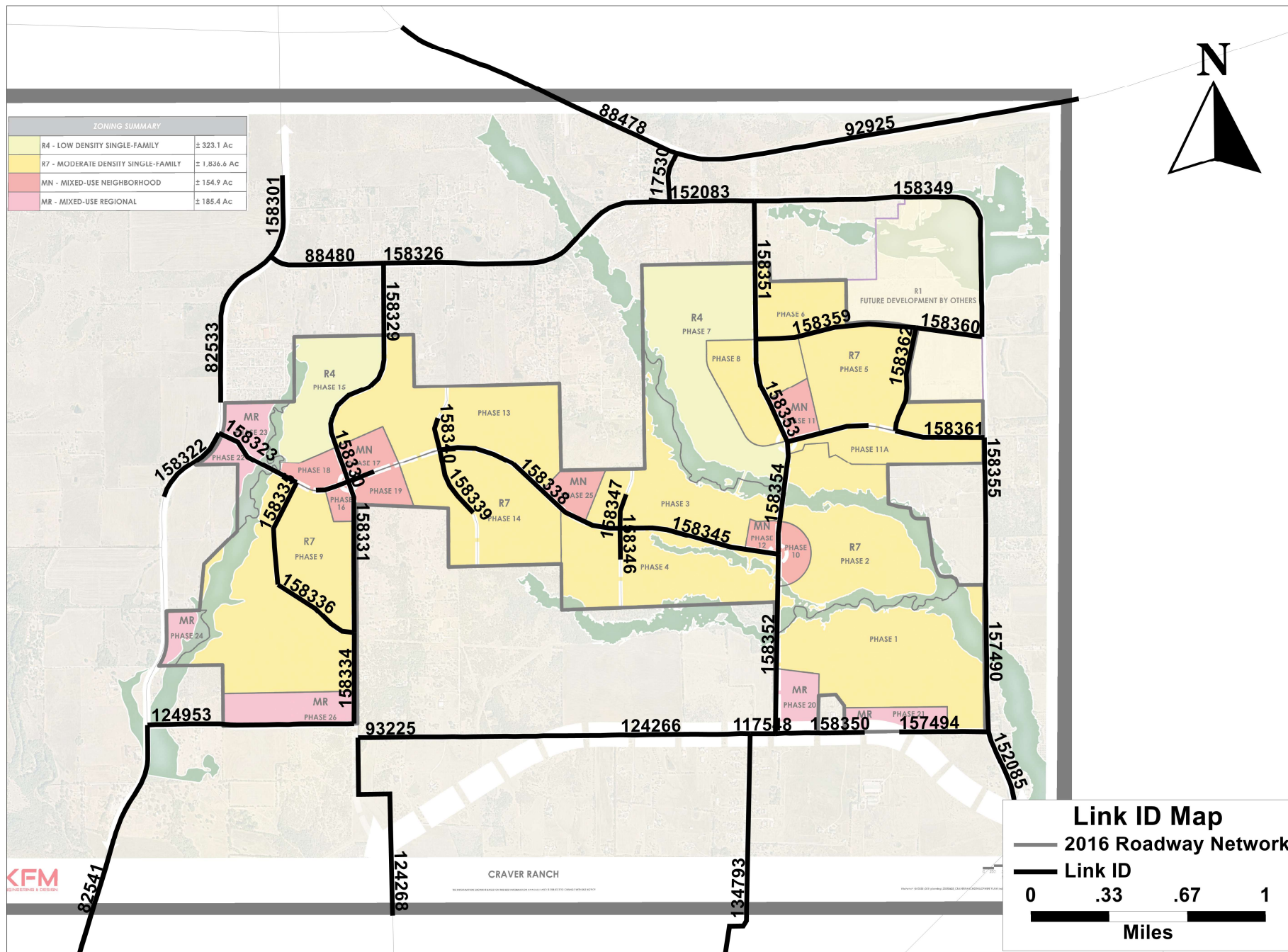


Table 6. Summary of Planning Level Infrastructure Development (Year 2016-NCTCOG Capacities)

Development	TDM Link ID	System Roadways	Location	TDM Configuration				Baseline Conditions				Build With Development				Development Utilization (%)	City Utilization (%)
				Facility Type	# of Lanes	Median	Speed (mph)	Volumes (vpd)	Capacity	LOS	V/C	Volumes (vpd)	Capacity	LOS	V/C		
On-Site	158329	Western N/S Arterial	South of FM 2153	Minor Arterial	2	Undivided	55	85	16,500	C+	0.01	1,994	16,500	C+	0.12	95.7%	4.3%
	158330	Western N/S Arterial	North of E/W Arterial South	Minor Arterial	2	Undivided	55	83	16,500	C+	0.01	2,365	16,500	C+	0.14	96.5%	3.5%
	158331	Western N/S Arterial	South of E/W Arterial South	Minor Arterial	2	Undivided	55	222	16,500	C+	0.01	286	16,500	C+	0.02	22.4%	77.6%
	158334	Western N/S Arterial	North of Shepard Gribble Rd	Minor Arterial	2	Undivided	55	235	16,500	C+	0.01	1,926	16,500	C+	0.12	87.8%	12.2%
	158351	Eastern N/S Arterial	South of FM 2153	Minor Arterial	2	Undivided	55	3,779	16,500	C+	0.23	5,147	16,500	C+	0.31	26.6%	73.4%
	158353	Eastern N/S Arterial	North of E/W Arterial North	Minor Arterial	2	Undivided	55	3,771	16,500	C+	0.23	4,527	16,500	C+	0.27	16.7%	83.3%
	158354	Eastern N/S Arterial	South of E/W Arterial North	Minor Arterial	2	Undivided	55	285	16,500	C+	0.02	2,880	16,500	C+	0.17	90.1%	9.9%
	158352	Eastern N/S Arterial	North of Shepard Gribble Rd	Minor Arterial	2	Undivided	55	843	16,500	C+	0.05	4,462	16,500	C+	0.27	81.1%	18.9%
	158323	E/W Arterial South	East of FM 2164	Minor Arterial	2	Undivided	55	1,070	16,500	C+	0.06	7,243	16,500	C+	0.44	85.2%	14.8%
	158324	E/W Arterial South	West of Western N/S Arterial	Minor Arterial	2	Undivided	55	1,044	16,500	C+	0.06	6,609	16,500	C+	0.40	84.2%	15.8%
	158332	E/W Arterial South	East of Western N/S Arterial	Minor Arterial	2	Undivided	55	896	16,500	C+	0.05	8,201	16,500	C+	0.50	89.1%	10.9%
	158338	E/W Arterial South	Between Collector 2 and Collector 3	Minor Arterial	2	Undivided	55	807	16,500	C+	0.05	6,187	16,500	C+	0.37	87.0%	13.0%
	158345	E/W Arterial South	West of Eastern N/S Arterial	Minor Arterial	2	Undivided	55	812	16,500	C+	0.05	6,377	16,500	C+	0.39	87.3%	12.7%
	158356	E/W Arterial North	East of Eastern N/S Arterial	Minor Arterial	2	Undivided	55	3,700	16,500	C+	0.22	4,007	16,500	C+	0.24	7.7%	92.3%
	158361	E/W Arterial North	West of FM 2153	Minor Arterial	2	Undivided	55	3,699	16,500	C+	0.22	3,436	16,500	C+	0.21	-	-
	158335	Collector 1	South of E/W Arterial South	Collector	2	Undivided	35	53	10,500	C+	0.01	3,094	10,500	C+	0.29	98.3%	1.7%
	158336	Collector 1	West of Western N/S Arterial	Collector	2	Undivided	35	13	10,500	C+	0.00	1,639	10,500	C+	0.16	99.2%	0.8%
	158339	Collector 2	South of E/W Arterial South	Collector	2	Undivided	35	21	10,500	C+	0.00	620	10,500	C+	0.06	96.6%	3.4%
	158340	Collector 2	North of E/W Arterial South	Collector	2	Undivided	35	65	10,500	C+	0.01	2,521	10,500	C+	0.24	97.4%	2.6%
	158346	Collector 3	South of E/W Arterial South	Collector	2	Undivided	35	140	10,500	C+	0.01	3,164	10,500	C+	0.30	95.6%	4.4%
	158347	Collector 3	North of E/W Arterial South	Collector	2	Undivided	35	-	10,500	C+	0.00	923	10,500	C+	0.09	100.0%	0.0%
	158359	Collector 4	East of Eastern N/S Arterial	Collector	2	Undivided	35	23	10,500	C+	0.00	1,019	10,500	C+	0.10	97.7%	2.3%
	158362	Collector 5	North of E/W Arterial North	Collector	2	Undivided	35	10	10,500	C+	0.00	732	10,500	C+	0.07	98.6%	1.4%
	158322	FM 2164	South of E/W Arterial South	Minor Arterial	2	Undivided	60	10,086	16,500	C+	0.61	14,274	16,500	E	0.87	29.3%	70.7%
	158349	FM 2153	North of Collector 4	Minor Arterial	2	Undivided	55	1,829	16,500	C+	0.11	1,580	16,500	C+	0.10	-	-
	158355	FM 2153	South of E/W Arterial North	Minor Arterial	2	Undivided	55	5,589	16,500	C+	0.34	7,636	16,500	C+	0.46	26.8%	73.2%
	157490	FM 2153	North of Shepard Gribble Rd	Minor Arterial	2	Undivided	55	6,364	16,500	C+	0.39	7,887	16,500	C+	0.48	19.3%	80.7%
	124953	Shepard Gribble Rd	East of FM 2164	Collector	2	Undivided	35	125	10,500	C+	0.01	1,762	10,500	C+	0.17	92.9%	7.1%
	158350	Shepard Gribble Rd	East of Eastern N/S Arterial	Collector	2	Undivided	35	647	10,500	C+	0.06	2,622	10,500	C+	0.25	75.3%	24.7%
	157494	Shepard Gribble Rd	West of FM 2153	Collector	2	Undivided	35	660	10,500	C+	0.06	5,559	10,500	C+	0.53	88.1%	11.9%
Off-Site	82533	FM 2164	South of FM 2153	Minor Arterial	2	Undivided	60	7,636	16,500	C+	0.46	8,105	16,500	C+	0.49	5.8%	94.2%
	158301	FM 2164	North of FM 2153	Minor Arterial	2	Undivided	60	6,030	16,500	C+	0.37	7,472	16,500	C+	0.45	19.3%	80.7%
	82541	FM 2164	South of Shepard Gribble Rd	Minor Arterial	2	Undivided	60	9,589	16,500	C+	0.58	13,956	16,500	E	0.85	31.3%	68.7%
	88480	FM 2153	East of FM 2164	Minor Arterial	2	Undivided	55	2,483	16,500	C+	0.15	3,323	16,500	C+	0.20	25.3%	74.7%
	158326	FM 2153	East of Western N/S Arterial	Minor Arterial	2	Undivided	55	2,545	16,500	C+	0.15	3,149	16,500	C+	0.19	19.2%	80.8%
	152083	FM 2153	West of Eastern N/S Arterial	Minor Arterial	2	Undivided	55	5,608	16,500	C+	0.34	6,727	16,500	C+	0.41	16.6%	83.4%
	152085	Shepard Rd	South of FM 2153	Minor Arterial	2	Undivided	55	7,024	16,500	C+	0.43	13,431	16,500	E	0.81	47.7%	52.3%
	158360*	Collector 4	West of FM 2153	Collector	2	Undivided	35	60	10,500	C+	0.01	2,620	10,500	C+	0.25	97.7%	2.3%
	88478	FM 455	West of Running Bear Ln	Minor Arterial	2	Undivided	60	10,475	16,500	C+	0.63	10,863	16,500	D	0.66	3.6%	96.4%
	92925	FM 455	East of Running Bear Ln	Minor Arterial	2	Undivided	60	8,627	16,500	C+	0.52	10,244	16,500	C+	0.62	15.8%	84.2%
	117530	Running Bear Ln	North of FM 2153	Collector	2	Undivided	20	7,299	10,500	D	0.70	8,946	10,500	E	0.85	18.4%	81.6%
	93225	Shepard Gribble Rd	East of Western N/S Arterial	Collector	2	Undivided	35	1	10,500	C+	0.00	63	10,500	C+	0.01	98.4%	1.6%
	124266	Shepard Gribble Rd	West of Green Valley Cir	Collector	2	Undivided	35	11	10,500	C+	0.00	138	10,500	C+	0.01	92.0%	8.0%
	117548	Shepard Gribble Rd	East of Green Valley Cir	Collector	2	Undivided	35	199	10,500	C+	0.02	1,973	10,500	C+	0.19	89.9%	10.1%
	134793	Green Valley Circle	South of Shepard Rd	Collector	2	Undivided	35	188	10,500	C+	0.02	1,835	10,500	C+	0.17	89.8%	10.2%
	124268	Gribble Springs Rd	South of Shepard Rd	Collector	2	Undivided	35	325	10,500	C+	0.03	421	10,500	C+	0.04	22.8%	77.2%
	157496	FM 428	West of FM 2153	Minor Arterial	2	Undivided	60	8,627	16,500	C+	0.52	10,489	16,500	C+	0.64	17.8%	82.2%
	92915	FM 428	East of FM 2153	Minor Arterial	2	Undivided	60	12,813	16,500	D	0.78	14,633	16,500	E	0.89	12.4%	87.6%

[NOTE: *Within the Estates at Craver Ranch development]

Table 6A. Summary of Planning Level Infrastructure Development (Year 2016-TDM Capacities)

Development	TDM Link ID	System Roadways	Location	TDM Configuration				Baseline Conditions (TDM)				Build With Development (TDM)				Development Utilization (%)	City Utilization (%)
				Facility Type	# of Lanes	Median	Speed (mph)	Volumes (vpd)	Capacity	LOS	V/C	Volumes (vpd)	Capacity	LOS	V/C		
On-Site	158329	Western N/S Arterial	South of FM 2153	Minor Arterial	2	Undivided	55	85	21,433	C+	0.00	1,994	21,433	C+	0.09	95.7%	4.3%
	158330	Western N/S Arterial	North of E/W Arterial South	Minor Arterial	2	Undivided	55	83	21,433	C+	0.00	2,365	21,433	C+	0.11	96.5%	3.5%
	158331	Western N/S Arterial	South of E/W Arterial South	Minor Arterial	2	Undivided	55	222	21,433	C+	0.01	286	21,433	C+	0.01	22.4%	77.6%
	158334	Western N/S Arterial	North of Shepard Gribble Rd	Minor Arterial	2	Undivided	55	235	21,433	C+	0.01	1,926	21,433	C+	0.09	87.8%	12.2%
	158351	Eastern N/S Arterial	South of FM 2153	Minor Arterial	2	Undivided	55	3,779	21,433	C+	0.18	5,147	21,433	C+	0.24	26.6%	73.4%
	158353	Eastern N/S Arterial	North of E/W Arterial North	Minor Arterial	2	Undivided	55	3,771	21,433	C+	0.18	4,527	21,433	C+	0.21	16.7%	83.3%
	158354	Eastern N/S Arterial	South of E/W Arterial North	Minor Arterial	2	Undivided	55	285	21,433	C+	0.01	2,880	21,433	C+	0.13	90.1%	9.9%
	158352	Eastern N/S Arterial	North of Shepard Gribble Rd	Minor Arterial	2	Undivided	55	843	21,433	C+	0.04	4,462	21,433	C+	0.21	81.1%	18.9%
	158323	E/W Arterial South	East of FM 2164	Minor Arterial	2	Undivided	55	1,070	21,433	C+	0.05	7,243	21,433	C+	0.34	85.2%	14.8%
	158324	E/W Arterial South	West of Western N/S Arterial	Minor Arterial	2	Undivided	55	1,044	21,433	C+	0.05	6,609	21,433	C+	0.31	84.2%	15.8%
	158332	E/W Arterial South	East of Western N/S Arterial	Minor Arterial	2	Undivided	55	896	21,433	C+	0.04	8,201	21,433	C+	0.38	89.1%	10.9%
	158338	E/W Arterial South	Between Collector 2 and Collector 3	Minor Arterial	2	Undivided	55	807	21,433	C+	0.04	6,187	21,433	C+	0.29	87.0%	13.0%
	158345	E/W Arterial South	West of Eastern N/S Arterial	Minor Arterial	2	Undivided	55	812	21,433	C+	0.04	6,377	21,433	C+	0.30	87.3%	12.7%
	158356	E/W Arterial North	East of Eastern N/S Arterial	Minor Arterial	2	Undivided	55	3,700	21,433	C+	0.17	4,007	21,433	C+	0.19	7.7%	92.3%
	158361	E/W Arterial North	West of FM 2153	Minor Arterial	2	Undivided	55	3,699	21,433	C+	0.17	3,436	21,433	C+	0.16	-	-
	158335	Collector 1	South of E/W Arterial South	Collector	2	Undivided	35	53	17,388	C+	0.00	3,094	17,388	C+	0.18	98.3%	1.7%
	158336	Collector 1	West of Western N/S Arterial	Collector	2	Undivided	35	13	17,388	C+	0.00	1,639	17,388	C+	0.09	99.2%	0.8%
	158339	Collector 2	South of E/W Arterial South	Collector	2	Undivided	35	21	17,388	C+	0.00	620	17,388	C+	0.04	96.6%	3.4%
	158340	Collector 2	North of E/W Arterial South	Collector	2	Undivided	35	65	17,388	C+	0.00	2,521	17,388	C+	0.14	97.4%	2.6%
	158346	Collector 3	South of E/W Arterial South	Collector	2	Undivided	35	140	17,388	C+	0.01	3,164	17,388	C+	0.18	95.6%	4.4%
	158347	Collector 3	North of E/W Arterial South	Collector	2	Undivided	35	-	17,388	C+	0.00	923	17,388	C+	0.05	100.0%	0.0%
	158359	Collector 4	East of Eastern N/S Arterial	Collector	2	Undivided	35	23	17,388	C+	0.00	1,019	17,388	C+	0.06	97.7%	2.3%
	158362	Collector 5	North of E/W Arterial North	Collector	2	Undivided	35	10	17,388	C+	0.00	732	17,388	C+	0.04	98.6%	1.4%
	158322	FM 2164	South of E/W Arterial South	Minor Arterial	2	Undivided	60	10,086	21,433	C+	0.47	14,274	21,433	C+	0.67	29.3%	70.7%
	158349	FM 2153	North of Collector 4	Minor Arterial	2	Undivided	55	1,829	21,433	C+	0.09	1,580	21,433	C+	0.07	-	-
	158355	FM 2153	South of E/W Arterial North	Minor Arterial	2	Undivided	55	5,589	21,433	C+	0.26	7,636	21,433	C+	0.36	26.8%	73.2%
	157490	FM 2153	North of Shepard Gribble Rd	Minor Arterial	2	Undivided	55	6,364	21,433	C+	0.30	7,887	21,433	C+	0.37	19.3%	80.7%
	124953	Shepard Gribble Rd	East of FM 2164	Collector	2	Undivided	35	125	17,388	C+	0.01	1,762	17,388	C+	0.10	92.9%	7.1%
	158350	Shepard Gribble Rd	East of Eastern N/S Arterial	Collector	2	Undivided	35	647	17,388	C+	0.04	2,622	17,388	C+	0.15	75.3%	24.7%
	157494	Shepard Gribble Rd	West of FM 2153	Collector	2	Undivided	35	660	17,388	C+	0.04	5,559	17,388	C+	0.32	88.1%	11.9%
Off-Site	82533	FM 2164	South of FM 2153	Minor Arterial	2	Undivided	60	7,636	21,433	C+	0.36	8,105	21,433	C+	0.38	5.8%	94.2%
	158301	FM 2164	North of FM 2153	Minor Arterial	2	Undivided	60	6,030	21,433	C+	0.28	7,472	21,433	C+	0.35	19.3%	80.7%
	82541	FM 2164	South of Shepard Gribble Rd	Minor Arterial	2	Undivided	60	9,589	21,433	C+	0.45	13,956	21,433	C+	0.65	31.3%	68.7%
	88480	FM 2153	East of FM 2164	Minor Arterial	2	Undivided	55	2,483	21,433	C+	0.12	3,323	21,433	C+	0.16	25.3%	74.7%
	158326	FM 2153	East of Western N/S Arterial	Minor Arterial	2	Undivided	55	2,545	21,433	C+	0.12	3,149	21,433	C+	0.15	19.2%	80.8%
	152083	FM 2153	West of Eastern N/S Arterial	Minor Arterial	2	Undivided	55	5,608	21,433	C+	0.26	6,727	21,433	C+	0.31	16.6%	83.4%
	152085	Shepard Rd	South of FM 2153	Minor Arterial	2	Undivided	55	7,024	21,433	C+	0.33	13,431	21,433	C+	0.63	47.7%	52.3%
	158360*	Collector 4	West of FM 2153	Collector	2	Undivided	35	60	17,388	C+	0.00	2,620	17,388	C+	0.15	97.7%	2.3%
	88478	FM 455	West of Running Bear Ln	Minor Arterial	2	Undivided	60	10,475	21,433	C+	0.49	10,863	21,433	C+	0.51	3.6%	96.4%
	92925	FM 455	East of Running Bear Ln	Minor Arterial	2	Undivided	60	8,627	21,433	C+	0.40	10,244	21,433	C+	0.48	15.8%	84.2%
	117530	Running Bear Ln	North of FM 2153	Collector	2	Undivided	20	7,299	17,388	C+	0.42	8,946	17,388	C+	0.51	18.4%	81.6%
	93225	Shepard Gribble Rd	East of Western N/S Arterial	Collector	2	Undivided	35	1	17,388	C+	0.00	63	17,388	C+	0.00	98.4%	1.6%
	124266	Shepard Gribble Rd	West of Green Valley Cir	Collector	2	Undivided	35	11	17,388	C+	0.00	138	17,388	C+	0.01	92.0%	8.0%
	117548	Shepard Gribble Rd	East of Green Valley Cir	Collector	2	Undivided	35	199	17,388	C+	0.01	1,973	17,388	C+	0.11	89.9%	10.1%
	134793	Green Valley Circle	South of Shepard Rd	Collector	2	Undivided	35	188	17,388	C+	0.01	1,835	17,388	C+	0.11	89.8%	10.2%
	124268	Gribble Springs Rd	South of Shepard Rd	Collector	2	Undivided	35	325	17,388	C+	0.02	421	17,388	C+	0.02	22.8%	77.2%
	157496	FM 428	West of FM 2153	Minor Arterial	2	Undivided	60	8,627	21,433	C+	0.40	10,489	21,433	C+	0.49	17.8%	82.2%
	92915	FM 428	East of FM 2153	Minor Arterial	2	Undivided	60	12,813	21,433	C+	0.60	14,633	21,433	C+	0.68	12.4%	87.6%

[NOTE: *Within the Estates at Craver Ranch development]

APPENDIX

City of Denton Travel Demand Model Update - Supplement

Scenario	TAZ	Acreage (Not Occupied by Craver Ranch)	Acreage Pct Dist	Total HH	Total Pop	School Enrollment	Industrial	Retail	Office	Service	Total Employment
Base 2016 Redistributed	4145	806	14.8%	49	132	-	-	-	2	-	2
	4146	186	3.4%	11	31	-	-	-	1	-	1
	4147	27	0.5%	2	4	-	-	-	-	-	-
	4148	122	2.2%	7	20	-	-	-	-	-	-
	4149	233	4.3%	14	38	-	-	-	1	-	1
	4150	119	2.2%	7	19	-	-	-	-	-	-
	4151	22	0.4%	1	4	-	-	-	-	-	-
	4152	468	8.6%	28	77	-	-	-	1	-	1
	4153	516	9.5%	31	85	-	-	-	2	1	3
	4154	129	2.4%	8	21	-	-	-	-	-	-
	4155	93	1.7%	6	15	-	-	-	-	-	-
SubTotal		2,721	50.0%	164	447	-	-	-	7	1	8
Craver Ranch + Estates at Craver Ranch (Exact Lots)	4145	-	0.0%	-	-	-	-	-	-	-	-
	4146	153	2.8%	715	2,145	-	-	142	-	-	142
	4147	389	7.1%	1,762	5,286	600	-	53	-	-	53
	4148	45	0.8%	265	795	-	-	79	-	-	79
	4149	221	4.1%	908	2,724	-	-	60	-	-	60
	4150	489	9.0%	971	2,913	1,800	-	63	-	-	63
	4151	490	9.0%	1,633	4,898	-	-	197	-	-	197
	4152	179	3.3%	687	2,061	-	-	76	-	-	76
	4153	367	6.7%	1,189	3,567	600	-	100	-	-	100
	4154	274	5.0%	765	2,295	-	-	-	-	-	-
	4155	118	2.2%	410	1,231	-	-	-	-	-	-
SubTotal		2,725	50.0%	9,305	27,915	3,000	-	771	-	-	771
11-TAZ 2016 Build	4145	806	14.8%	49	132	-	-	-	2	-	2
	4146	339	6.2%	726	2,176	-	-	142	1	-	143
	4147	416	7.6%	1,764	5,290	600	-	53	-	-	53
	4148	166	3.1%	272	815	-	-	79	-	-	79
	4149	454	8.3%	922	2,762	-	-	60	1	-	61
	4150	608	11.2%	978	2,932	1,800	-	63	-	-	63
	4151	512	9.4%	1,634	4,902	-	-	197	-	-	197
	4152	646	11.9%	715	2,138	-	-	76	1	-	77
	4153	883	16.2%	1,220	3,652	600	-	100	2	1	103
	4154	403	7.4%	773	2,316	-	-	-	-	-	-
	4155	211	3.9%	416	1,246	-	-	-	-	-	-
SubTotal		5,446	100.0%	9,469	28,362	3,000	-	771	7	1	779

City of Denton Travel Demand Model Update - Supplement

Scenario	TAZ	Acerage	Acreage Pct Dist	Total HH	Total Pop	School Enrollment	Industrial	Retail	Office	Service	Total Employment
Base 2016	1500	5,446.4	100%	329	894	-	-	-	16	3	19
11-TAZ 2016 No Build	4145	806.4	14.8%	49	132	-	-	-	2	-	2
	4146	339.2	6.2%	20	56	-	-	-	1	-	1
	4147	416	7.6%	25	68	-	-	-	1	1	2
	4148	166.4	3.1%	10	27	-	-	-	-	-	-
	4149	454.4	8.3%	27	75	-	-	-	1	-	1
	4150	608	11.2%	37	100	-	-	-	2	-	2
	4151	512	9.4%	31	84	-	-	-	2	1	3
	4152	646.4	11.9%	39	106	-	-	-	2	-	2
	4153	883.2	16.2%	53	145	-	-	-	3	1	4
	4154	403.2	7.4%	24	66	-	-	-	1	-	1
	4155	211.2	3.9%	13	35	-	-	-	1	-	1
SubTotal		5446.4	100%	329	894	-	-	-	16	3	19

RE: Craver Ranch TDM - Methodology clarification

From Rakibul Alam <Rakibul.Alam@cityofdenton.com>

Date Wed 10/22/2025 12:08 PM

To Dahye Lee <Dahye.Lee@westwoodps.com>

Cc Jennifer Butcher <Jennifer.Butcher@westwoodps.com>; Steve Stoner <Steve.Stoner@westwoodps.com>; Mitch Hesse <mhesse@kfm-llc.com>

CAUTION: External Sender. Please do not click on links or open attachments from senders you do not trust.

Hi Dahye,

Good morning. The City recommends not using Exhibit 2-5 that you mentioned, as it was not applied in HDR's Hunter and Cole Study. Instead, the City suggests the following approach to define roadway daily capacity and LOS standards:

1. Hourly Capacity per Lane

Use Exhibit 2-4 and 2-4 considering the "Suburban Residential" area type.



Exhibit 2-3. Arterial Hourly Capacities per Lane (Divided)

Area Type	Functional Class						
	Freeway	Principal Arterial	Minor Arterial	Collector	Freeway Ramp	Frontage Road	HOV
CBD	N/A	725	725	475	1250	725	1600
Outer Business District	N/A	775	775	500	1375	775	1600
Urban Residential	N/A	850	825	525	1425	850	1600
Suburban Residential	N/A	925	900	575	1600	900	1600
Rural	N/A	1025	975	600	1725	975	1600

Exhibit 2-4. Arterial Hourly Capacities per Lane (Undivided) (vehicle per lane per hour)

Area Type	Functional Class						
	Freeway	Principal Arterial	Minor Arterial	Collector	Freeway Ramp	Frontage Road	HOV
CBD	N/A	650	650	425	1250	650	N/A
Outer Business District	N/A	725	725	450	1375	725	N/A
Urban Residential	N/A	775	750	475	1425	750	N/A
Suburban Residential	N/A	875	825	525	1600	825	N/A
Rural	N/A	925	875	550	1725	875	N/A

2. Convert Hourly Capacity to Daily Capacity

Convert the hourly lane capacity to daily road capacity by multiplying the hourly capacity per lane by the number of lanes and dividing by the K factor.

- In the Hunter and Cole study, a 10% K factor was used.
- For example, for an undivided two-lane collector roadway in a suburban residential area, the hourly lane capacity from Exhibit 2-4 is 525 vphpl.
- Therefore, the daily capacity would be:
 $525 \times 2 \times (1 / 0.10) = 10,500 \text{ vpd}$

3. LOS Thresholds

- LOS E: 10,500 vpd (full capacity)
- LOS D: 80% of capacity → 8,400 vpd
- LOS C: 65% of capacity → 6,825 vpd

All of the above methodology recommendations are consistent with HDR's Hunter and Cole 2040 Travel Demand Model (TDM) Study.

Please let me know if you have any questions.

Best regards,
Rakib

Md Rakibul Alam, Ph.D.

Principal Transportation Planner, Transportation Services Division
Department of Development Services

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From: Dahye Lee <Dahye.Lee@westwoodps.com>

Sent: Tuesday, October 21, 2025 10:36 AM

To: Rakibul Alam <Rakibul.Alam@cityofdenton.com>

Cc: Jennifer Butcher <Jennifer.Butcher@westwoodps.com>; Steve Stoner <Steve.Stoner@westwoodps.com>; Mitch Hesse <mhesse@kfm-llc.com>

Subject: Craver Ranch TDM - Methodology clarification

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Good morning, Rakib

I would like to clarify the methodology for converting NCTCOG's hourly capacities into a daily capacity. According to Exhibits 2-4 and 2-5 from the NCTCOG, it appears the hourly capacity per lane (in Exhibit 2-4) can be multiplied by the sum of the conversion factors for the three time periods (in Exhibit 2-5) to get the daily capacity per lane. So, for example, for urban residential minor arterial, my understanding of the calculation is $750 \times (2.1 + 2.9 + 9.2) = 10,650$. Considering both directions, the daily capacity would be 21,300 (FYI - the TDM calculated capacity is 21,433). Do you concur with this methodology, or are there specific guidelines the city recommends for using the NCTCOG's capacity table to get the daily capacity?

Also, if you have guidelines on the LOS threshold, please let me know!

Thank you!
Dahye

Dahye Lee, Ph.D., P.E.

Project Engineer, Traffic

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