



CAPITAL AREA METROPOLITAN  
PLANNING ORGANIZATION

Freight Plan  
**Forecast and  
Trends Report**



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## Acronyms

ABIA - Austin Bergstrom International Airport

ADAS - Advanced Driver Assistance Systems

ADS - Automated Driving System

AI - Artificial Intelligence

AV - Automated Vehicle

BVLOS - Beyond Visual Line of Sight

CAPCOG - Capital Area Council of Governments

CAMPO - Capital Area Metropolitan Planning Organization

CAGR - Compound Annual Growth Rate

CAVs - Connected and Automated Vehicles

CO2 - Carbon Dioxide

FAA - Federal Aviation Administration

FHWA - Federal Highway Administration

FMCSA - Federal Motor Carrier Safety Administration

FSP - Freight Signal Priority

GAO - Government Accountability Office

HOS - Federal Hours of Service

HVAC - Heating, Ventilation, and Air Conditioning

I2I - Infrastructure-to-Infrastructure

IIJA - Infrastructure Investment and Jobs Act

MPO - Metropolitan Planning Organization

NAICS - North American Industry Classification System

NAS - National Airspace System

NEVI - National Electric Vehicle Implementation



PSR - Precision Scheduled Railroading

PTC - Positive Train Control

RTP - Regional Transportation Plan

SAE - Society of Automotive Engineers

SH - State Highway

TCFC - Texas Connected Freight Corridors

THFN - Texas Highway Freight Network

TIP - Transportation Improvement Program

TPAS - Truck Parking Availability System

TxDMV - Texas Department of Motor Vehicles

TxDOT - Texas Department of Transportation

UAS - Unmanned Aircraft Systems

UAVs - Unmanned Aerial Vehicles

V2I or I2V - Vehicle-To-Infrastructure

V2V - Vehicle-To-Vehicle

WIM - Weigh-In-Motion

## Introduction

The Capital Area region, a six-county metropolitan area centered on Austin in Central Texas, has experienced rapid growth and economic development in recent years. A key aspect of this growth is an increase in freight and the movement of goods by truck, rail, pipeline, and air. Efficient freight movement is crucial to the competitiveness of the region's businesses and industries, and the overall way of life for its residents. Recognizing this importance, the Capital Area Metropolitan Planning Organization (CAMPO) is developing a Regional Freight Plan that will highlight the importance of freight to the region and inform the Regional Transportation Plan (RTP) by identifying policies, strategies, and investments to enhance the performance and safety of the multimodal freight network.

## Project Background and Purpose

CAMPO's six-county region is comprised of Bastrop, Burnet, Caldwell, Hays, Travis, and Williamson counties. The total land area for the region is 5,215 square miles or roughly the size of Connecticut. The region is traversed by IH 35, a national corridor for trade, commerce, and passenger travel that connects major cities in Texas, spanning 21 counties from the border with Mexico to Oklahoma. The CAMPO region itself is diverse geographically, with the population concentrated in the urban metropolitan core in Travis County and a variety of established and emerging suburbs, historic towns, and rural areas in the surrounding counties. These areas generate and attract freight, each providing a unique set of industries and challenges.

Since the region's last regional freight plan was developed in 2008, several forces have contributed to the increasing demand for freight transportation in the CAMPO region. First, the region has experienced tremendous population growth, resulting in an overall higher demand for goods and services. Second, the growth of e-commerce carried over from the COVID-19 pandemic has significantly increased the demand for last-mile delivery services, which has increased the demand for truck transportation and warehousing. Finally, growing key freight-intensive industries in the region, such as automobile and semiconductor production, have increased the need to transport raw materials, finished goods, and equipment. These factors underscore the importance of efficient and reliable freight transportation in the CAMPO region.

The purpose of this forecast and trends report is to describe the current and future drivers of goods movement in the CAMPO region, identify key commodities and trading partners, determine locations with freight-intensive land use, and describe trends in the freight industry that will impact the CAMPO region.

## Key Findings

The following bullets summarize key findings in the report with respect to the trends that are expected to impact freight demand and commodity flow movements in the CAMPO region:

### Population and Employment

- The total population for the region is anticipated to increase by 2.4 million between 2020 and 2050. Travis County and Williamson County exhibit the highest population concentrations, collectively representing over 80 percent of the total regional population as of 2020.

- Total employment in the region is projected to increase by 1.2 million between 2020 and 2050. Similar to population, regional employment is concentrated in Travis County, which had nearly 70 percent of the total in 2020.
- Between 2020 and 2050, Williamson County is forecasted to add 1.1 million new residents and 377,000 jobs, which is the most in terms of total growth among the counties in the region.

### Commodity Flow Analysis

- In 2019, the CAMPO region transported 113 million tons of commodities valued at \$86 billion, which is forecasted to increase by 92 percent in tonnage and 138 percent in value to 218 million tons and \$205 billion, respectively, by 2050.
- The majority of the 2019 flows were intrastate (69 percent), with 18 percent circulating within the CAMPO region, and international flows making up 2.4 percent. By 2050, the share remaining within the CAMPO region is expected to decline to 13 percent.
- The majority of commodity flows occurred between the CAMPO region and other Texas counties, notably Harris, Bexar, and Dallas counties, all of which are strategically located within the Texas Triangle and linked by key interstates and freight rail. These counties accounted for most of the intrastate commodity flows in terms of tonnage and value, a trend that is expected to persist through 2050.
- Nonmetallic minerals led the 2019 commodity types and are forecasted to rise 40 percent by 2050, followed by manufactured construction materials. In terms of value, chemicals topped the list, expected to grow by 159 percent. Secondary traffic flows, tied to warehouse and retail distribution, are predicted to grow by 250 percent to \$36 billion by 2050. The leading growth of these commodity types underline the growing freight activity linked to construction materials production and e-commerce, which are clustered along the IH 35 corridor and nearby warehouses and logistics centers.
- Regarding transportation modes, trucks were dominant in 2019, accounting for 96 percent of the tonnage and 84 percent of the value. Rail handled 4 percent of the tonnage, and air, albeit costlier, accounted for a considerable value proportion (15 percent) compared to rail (1 percent). The truck mode is expected to retain a similar share by 2050, but its value share is predicted to rise to 85 percent. Rail is projected to double its value share to 2 percent, while air transport is expected to decrease from 15 percent to 12 percent, pointing to potential opportunities for rail to serve the regional manufacturing industry.
- The projected growth in rail flows highlights opportunities to serve manufacturing industries in the region. Commodity flows by rail destined for the CAMPO region are routed to major hubs in Dallas-Fort Worth and San Antonio.
- The growth in expected air traffic serves the need for expedited delivery for high-valued commodities and goods. The value of the commodity transported by air is expected to increase by 96 percent according to the 2050 forecast.

### Freight Intensive Development and Land Use

- Freight growth areas are expected to be located on major interstate, US, and state highway corridors. Ensuring access to the corridors from local roadways will be essential to providing safe, efficient access to higher capacity roadways.



- Land use policies put in place by municipalities are critical to managing and directing freight-intensive development. Development zones can incentivize growth in optimal locations, and coordination between economic development efforts and transportation planning is needed to plan effectively for growth in the larger region.
- Land use planning should be coordinated with the development of the necessary infrastructure to accommodate the volume of truck traffic and their loads. Upgrading local roadways and ensuring seamless connectivity with the THFN can significantly enhance the mobility and safety of trucks, thereby reducing congestion impacts in residential areas.

### Freight Transportation Trends

- Business and consumer practices and economic forces – accelerated by the COVID-19 pandemic – have shifted consumer distribution patterns to more dispersed distribution models, increasing the impact of goods movement throughout urbanized areas rather than in concentrated industrial zones. Shifting demands have also placed increased demand on airports for cargo space, and similar market conditions have pushed railroads to change commodity mix to more profitable goods.
- Market factors and public incentives are driving changes in freight vehicle technology, and the industry is expected to continue to transform over the coming decades. Efficiencies and safety gained from connected and autonomous vehicles are encouraging adoption, while Texas’ permissive regulatory environment attracts pilot programs. Public agencies can invest in connected infrastructure that responds to real-time conditions, using the data provided by increasingly “smart” vehicles.
- CAMPO can play a role in advancing fueling infrastructure to accelerate adoption within the region. For example, Texas’ National Electric Vehicle Infrastructure (NEVI) grant program presents an opportunity for MPOs to apply for funding to construct and operate charging infrastructure, which could potentially expand to commercial vehicles in future rounds.

### Report Organization

This document is one of the deliverables as defined under Task 4 – Forecast and Trends Report from the scope of work for Cambridge Systematics, Inc.’s project number 220134. The remainder of this document is organized into the following sections:

- Population and Employment Forecasts
- Commodity Flow and Forecasts Analysis
- Freight Intensive Development and Land Use
- Freight Transportation Trends
- Conclusion and Next Steps

### Population and Employment Forecasts

The CAMPO region has experienced tremendous population and employment growth just in the past decade alone. This growth is expected to continue as the region’s economy continues to expand, which will increase demand for freight. This section looks at the projected population and employment growth in the region, which are key drivers of freight demand.

## Population

In 2020, the CAMPO region had a population of approximately 2.3 million. Projections show an increasing trend in total population with the region expected to add 2.4 million new residents between 2020 and 2050. Table 1 summarizes the population trends by county. Over half the population lives in Travis County, which is expected to reach nearly 2 million in 2050. In terms of total population growth, Williamson County is expected to gain 1 million new residents, increasing its share of the region's total to 36 percent while Travis County's share is expected to decline to less than half (42 percent) by 2050.

Table 1: Regional Population Projections by County

County	2020	2025	2030	2050	2020-2050 CAGR
Bastrop	97,216	117,175	167,704	184,520	2.2%
Burnet	49,130	51,990	54,494	62,658	0.8%
Caldwell	45,883	49,772	58,412	69,133	1.4%
Hays	241,067	292,867	356,239	765,751	3.9%
Travis	1,290,188	1,416,887	1,539,244	1,978,903	1.4%
Williamson	609,017	720,688	857,312	1,699,283	3.5%
<b>Total</b>	<b>2,332,501</b>	<b>2,649,379</b>	<b>3,033,405</b>	<b>4,760,248</b>	<b>2.4%</b>

Note: CAGR = Compound Annual Growth Rate. Source: CAMPO Projections. August 2023.

## Employment

Table 2 shows 2020 and projected 2050 employment for the CAMPO region. Between 2020 and 2050, total employment in the region is expected to increase by 1.2 million. Regional employment is highly concentrated in Travis County, which had nearly 70 percent of the total in 2020. Between 2020 and 2050, Hays and Williamson counties are forecasted to outpace Travis County and the region overall in terms of annual job growth.

Both sets of projections show Williamson County capturing most of the region's total population and employment growth. Between 2020 and 2050, it is expected to add 1.1 million residents and 377,000 jobs. The forecasts point to Williamson County as a focus for growth as industries and builders seek areas outside of Travis County where open space and easier access to transportation corridors are attractive to development.

Table 2: Regional Employment Projections by County

County	2020	2025	2030	2050	2020-2050 CAGR
Bastrop	18,801	22,010	24,887	39,315	2.5%
Burnet	17,595	18,000	18,900	22,600	0.8%
Caldwell	10,154	10,300	11,700	15,200	1.4%
Hays	66,985	98,242	120,498	264,376	4.7%
Travis	677,874	882,864	971,263	1,287,276	2.2%
Williamson	195,312	233,179	280,727	572,743	3.7%
<b>Total</b>	<b>986,721</b>	<b>1,264,595</b>	<b>1,427,975</b>	<b>2,201,510</b>	<b>2.7%</b>

Note: CAGR = Compound Annual Growth Rate. Source: CAMPO Projections. August 2023.

## Commodity Flow and Forecasts Analysis

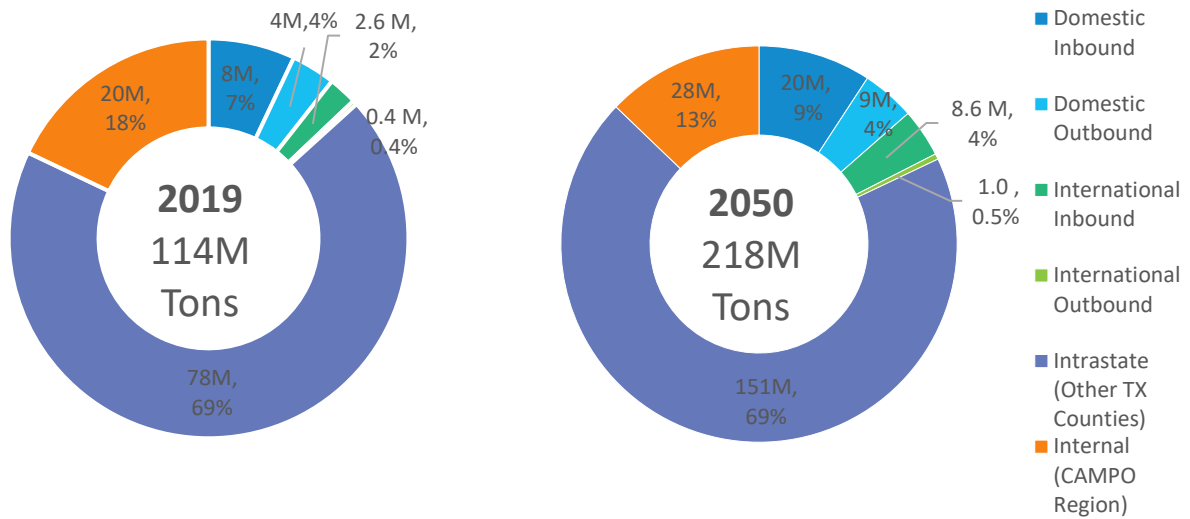
The following sections reference the analysis of regional commodity flows using the Transearch database from IHS Markit (now S&P Global) for Texas. Transearch data is consistent with the forecasts developed for Texas Delivers 2050, the new statewide freight plan. This database has 2019 as the base year and was enhanced to improve how some important flows in Texas are captured, including cross-border trade, maritime trade, and energy-related commodities.

According to the Transearch data, more than 113 million tons of commodities valued at \$86 billion were transported to, from, or within the CAMPO region in 2019. By 2050, the commodity flow in the CAMPO region is estimated to increase sharply to 218 million tons valued at \$205 billion, representing an overall 92 percent increase in tonnage and 138 percent increase in value. The following sections describe the commodity flow related to the CAMPO region by direction, commodity, mode, and trading partners.

### Direction

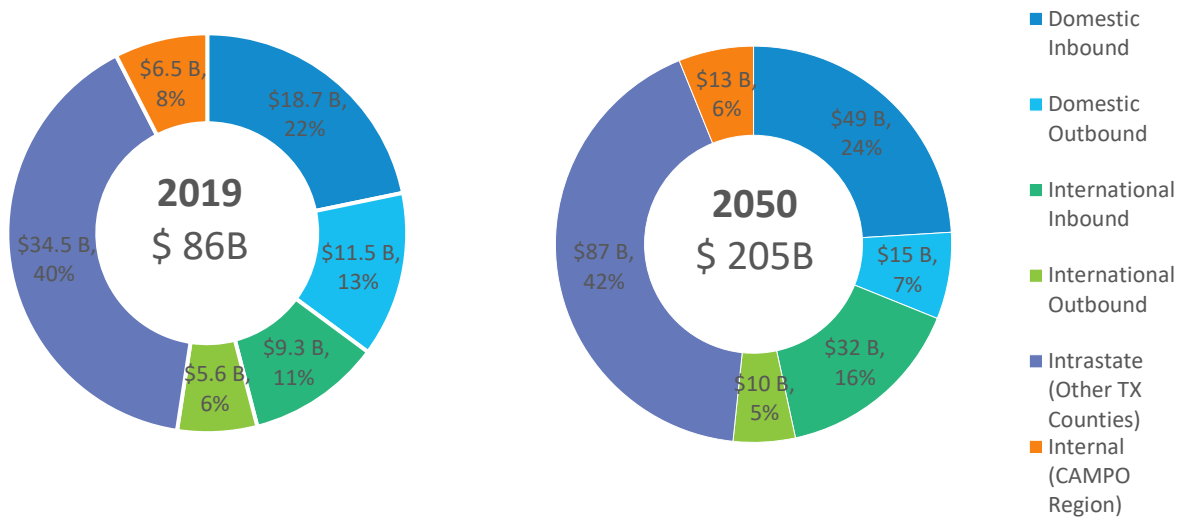
As shown in Figure 1, in 2019 and 2050, 69 percent of freight flow tonnage consists of intrastate freight - commodities transported to or from the CAMPO region to other Texas destinations. Intrastate freight movements account for around 40 percent of total values in 2019 and 2050, as shown in Figure 2. Intrastate freight flow constitutes over two-thirds of the total freight tonnage but contributes only 40 percent of the overall freight value, suggesting that intrastate flows consist of lower-valued commodities. In 2019, each ton of goods was worth \$440, and it is anticipated that by 2050, the per-ton value will increase to \$570, signifying a 30 percent increase.

Figure 1: Commodity Tonnage by Direction, 2019 and 2050



Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

Figure 2: Commodity Value by Direction, 2019 and 2050



Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

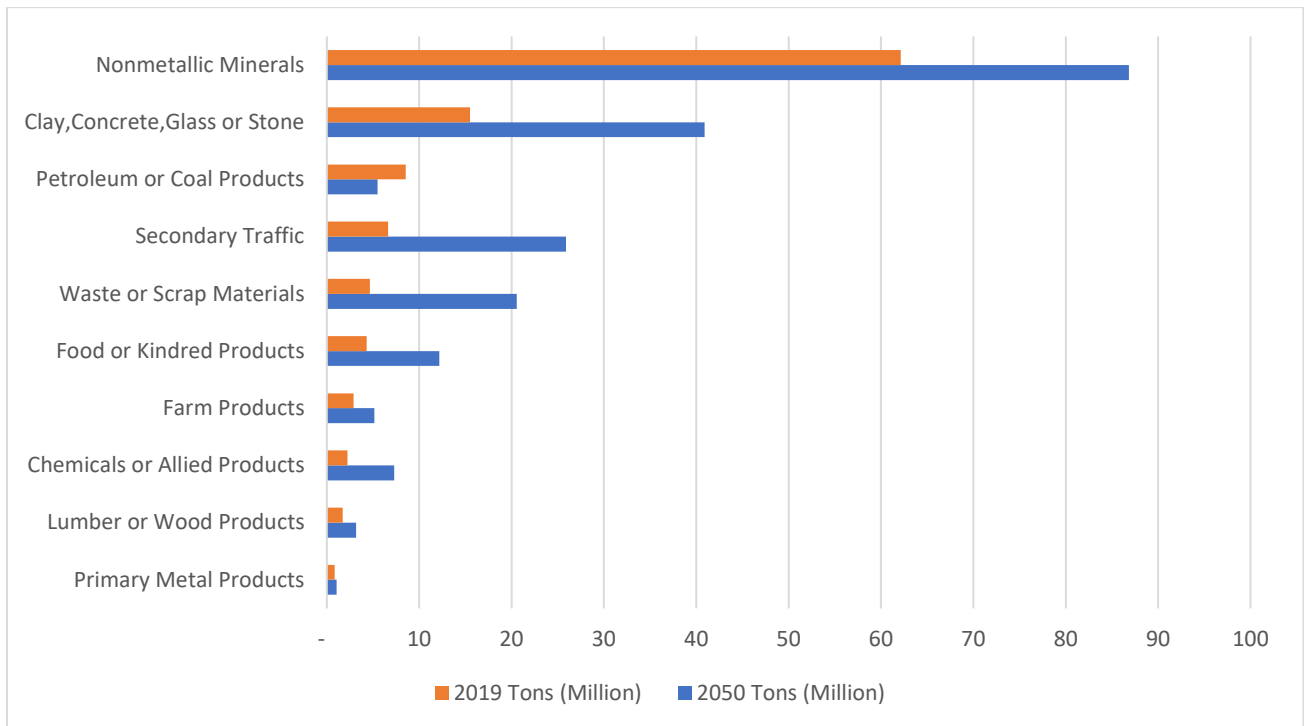
### Commodity Types

Commodity patterns provide valuable insights into the economic activity and industries within the CAMPO region. In 2019, the average price per ton of commodity flows to, from, or within the CAMPO region was \$756 per ton, and this number is estimated to increase to \$941 per ton in 2050. The following section will delve into the commodities in terms of tonnage and value.

Figure 3 illustrates the top 10 commodities by 2019 tonnage and the projected tonnage in 2050. The leading commodities by tonnage in 2019 include nonmetallic minerals (62 million tons); clay,

concrete, glass, or stone (15 million tons); petroleum or coal products (8 million tons);<sup>1</sup> secondary traffic (7 million tons);<sup>2</sup> and waste or scrap materials (5 million tons). For future trends, petroleum or coal products are projected to decrease to 5 million tons in 2050, representing a 36 percent decrease, and will rank as the seventh leading commodity. Overall, the top 10 commodities made up 96 percent of the total 2019 tonnage.

Figure 3: Top Commodities by Tonnage, 2019 and 2050



Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo. Note: Secondary traffic refers to the transportation of goods between interim locations, such as warehouses or distribution centers.

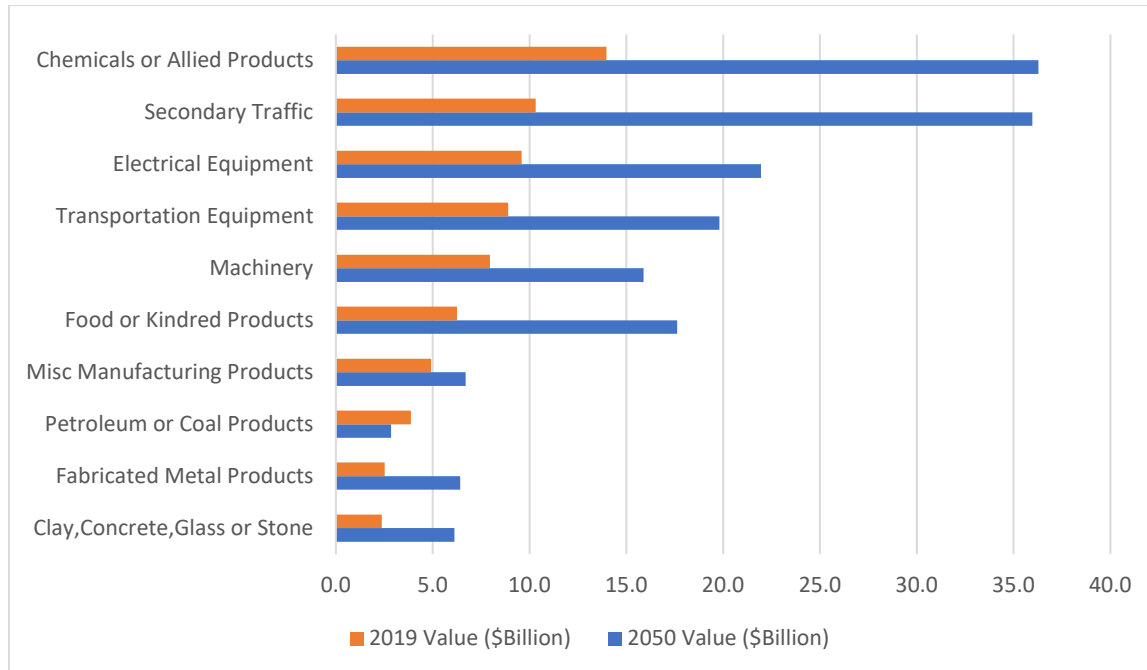
Figure 4 summarizes the top 10 commodities by value. The top commodities in 2019 include chemicals or allied products (\$14 billion), secondary traffic (\$10 billion), electrical equipment (\$10 billion), transportation equipment, (\$9 billion), and machinery (\$8 billion). The top 10 commodities in 2019 made up more than 82 percent of the total commodity value in 2019.

In terms of projected 2050 value, the top four commodities remain the same as in 2019. Food or kindred products are projected to increase by 182 percent, from \$6 billion in 2019 to \$18 billion in 2050, and become the fifth leading commodity by value.

<sup>1</sup> Petroleum or coal products: the STCC code for this commodity is 29, which does not include raw coal.

<sup>2</sup> Secondary traffic refers to the transportation of goods between interim locations, such as warehouses or distribution centers.

Figure 4: Top Commodities by Value, 2019 and 2050



Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo. Note: Secondary traffic refers to the transportation of goods between interim locations, such as warehouses or distribution centers.

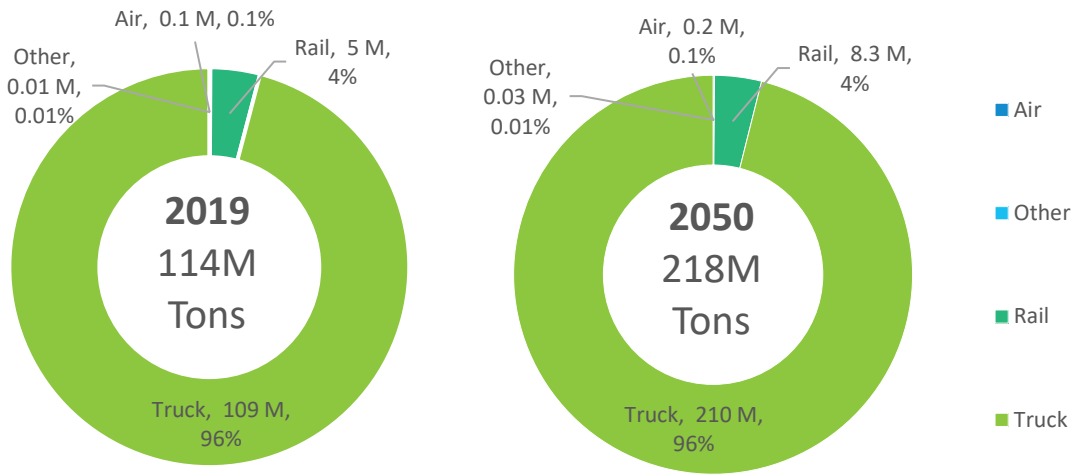
### Mode

Transearch data divides modal information into sixteen detailed modes, which are further grouped into six broad groups: Air, Other, Pipeline, Rail, Truck, and Water; Other refers to flows with unclassified modes. The Water mode is not applicable to the CAMPO region. No information is reported for the Pipeline mode as Transearch does not include intrastate flows of crude or refined petroleum products.

Truck is the predominant mode for freight movement in the CAMPO region. Figure 5 and Figure 6 provide insights into the tonnage and value for each mode. Trucks accounted for 96 percent of the total 2019 weight (109 million tons) and 2050 projected weight (210 million tons). Rail movement ranks as the second most significant mode, representing 4 percent of both the total freight tonnage in 2019 (5 million tons) and the projected figure for 2050 (8 million tons). Air and Other modes contribute less than 1 percent of the overall freight tonnage within the CAMPO region.

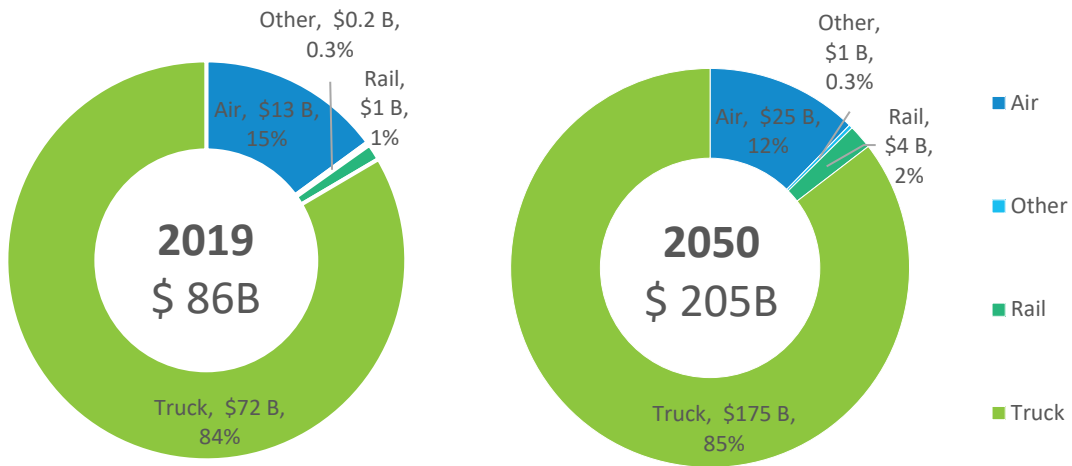
In terms of value, trucks are the leading mode in the CAMPO region. Truck-carried commodities were valued at \$72 billion in 2019, accounting for 84 percent of total freight value. By 2050, this value is expected to increase to \$175 billion, accounting for 85 percent of the total projected value in the future.

Figure 5: Commodity Tonnage by Mode, 2019 and 2050



Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

Figure 6: Commodity Value by Mode, 2019 and 2050



Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

### Trading Partners

Freight flows provide insight into a location’s transportation activities and infrastructure usage. This section specifically focuses on inbound and outbound flows to identify the primary trading partners based on tonnage and value.

Table 3 illustrates the top 10 trading partners CAMPO imported commodities from in 2019. The leading inbound origins were Louisiana, Iowa, Oklahoma, Arkansas, and Nebraska. The top 10 partners collectively accounted for 43 percent of the total inbound weight to the CAMPO region. Among them, Mexico stood out as the primary international inbound origin for CAMPO,

with three locations within Mexico included in the top 10. In 2019, 21 percent of the total inbound tonnage originated from Mexico.

Table 3: Inbound Trading Partners (U.S. Domestic and International) by Tonnage, 2019 and 2050

Inbound Partner	2019 Tonnage (Thousand)	Percent	2050 Tonnage (Thousand)	Percent	Percent Change 2019- 2050
Louisiana	948	9%	2,109	7%	123%
Iowa	650	6%	2,379	8%	266%
Oklahoma	523	5%	1,237	4%	136%
Arkansas	506	5%	1,199	4%	137%
Nebraska	354	3%	1,326	5%	275%
Unknown Mexican State, Mexico*	348	3%	956	3%	175%
Alabama	327	3%	643	2%	97%
California	317	3%	921	3%	190%
Mexico, Mexico	306	3%	1,097	4%	259%
Coahuila De Zaragoza, Mexico	296	3%	1,125	4%	280%
<b>All Others</b>	<b>6,064</b>	<b>57%</b>	<b>15,705</b>	<b>55%</b>	<b>159%</b>
Rest of Mexico	1,337	13%	4,785	18%	227%
Canada	353	3%	623	2%	77%
Other Domestic Partners	4,371	41%	10,287	34%	140%
Other International partners	4	0.04%	11	0.04%	156%
<b>Total</b>	<b>10,639</b>	<b>100%</b>	<b>28,698</b>	<b>100%</b>	<b>170%</b>

Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo. Note: Asterisk (\*) denotes a location that was identified as unknown in the Transearch database.

Table 4 lists the top 10 states or countries based on the value of freight imports. In 2019, the leading inbound partners in terms of value were Chihuahua, Mexico; California; Louisiana; Oklahoma; and Tennessee. These top 10 partners collectively accounted for approximately 44 percent of the total inbound freight value. Mexico held the position of the primary international inbound country, contributing 27 percent of the total freight value.

In terms of value trends, more than half of the top 10 origins are projected to experience a growth rate faster than the overall growth rate for all inbound partners (170 percent), and origins in Mexico are expected to witness a higher percentage increase compared to other states and countries.



Table 4: Inbound Trading Partners (U.S. Domestic and International) by Value, 2019 and 2050

Inbound Partner	2019 Value (\$Millions)	Percent	2050 Value (\$Millions)	Percent	Percent Change 2019-2050
Chihuahua, Mexico	2,113	8%	6,432	8%	204%
California	1,833	7%	5,770	7%	215%
Louisiana	1,220	4%	2,806	3%	130%
Oklahoma	1,193	4%	4,039	5%	238%
Tennessee	1,135	4%	3,248	4%	186%
Nuevo Leon, Mexico	1,060	4%	3,956	5%	273%
Georgia	1,003	4%	2,166	3%	116%
Estado de México (State of Mexico)	993	4%	3,634	4%	266%
Coahuila De Zaragoza, Mexico	927	3%	3,564	4%	284%
Arkansas	801	3%	2,072	3%	159%
<b>All Others</b>	<b>15,773</b>	<b>56%</b>	<b>43,449</b>	<b>54%</b>	<b>175%</b>
Rest of Mexico	3,445	12%	12,257	15%	256%
Canada	514	2%	1,230	2%	139%
Other Domestic Partners	11,495	41%	29,042	36%	153%
Other International partners	318	1%	920	1%	189%
<b>Total</b>	<b>28,052</b>	<b>100%</b>	<b>81,136</b>	<b>100%</b>	<b>189%</b>

Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

In 2019, outbound commodities accounted for the lowest portion of commodity tonnage, amounting to 4.5 million tons or 4 percent of the total. The major outbound partners outside of Texas were California, Louisiana, Oklahoma, and Florida. Table 5 summarizes the top outbound trading partners by tonnage in 2019 and 2050. The top 10 partners collectively received 62 percent of the total outbound tonnage. Clay, concrete, glass, or stone are the predominant commodities exported to California and Oklahoma, which accounted for 54 percent and 36 percent of total outbound tonnage to California and Oklahoma, respectively. Approximately 49 percent of goods shipped from the CAMPO region to Louisiana were nonmetallic minerals. Unlike inbound flows, only 10 percent of outbound flows were transported to international destinations.

For future projections, nearly all of the top 10 outbound partners are expected to receive more than double the amount of freight tonnage in 2050, with the exception of Florida and Arizona.

Table 5: Outbound Trading Partners (U.S. Domestic and International) by Tonnage, 2019 and 2050

Inbound Partner	2019 Value (\$Millions)	Percent	2050 Value (\$Millions)	Percent	Percent Change 2019-2050
California	777	17%	1,821	17%	134%
Louisiana	770	17%	1,990	19%	158%
Oklahoma	380	8%	847	8%	123%
Florida	147	3%	275	3%	86%
Arizona	137	3%	225	2%	64%
Ohio	129	3%	424	4%	228%
Colorado	120	3%	263	3%	119%
New Mexico	117	3%	280	3%	140%
Utah	102	2%	230	2%	127%
Michigan	97	2%	270	3%	179%
<b>All Others</b>	<b>1,703</b>	<b>38%</b>	<b>3,823</b>	<b>37%</b>	<b>124%</b>
Rest of Mexico	274	6%	788	8%	187%
Canada	132	3%	203	2%	54%
Other Domestic Partners	1,295	29%	2,826	27%	118%
Other International partners	2	0.1%	6	0.1%	147%
<b>Total</b>	<b>4,479</b>	<b>100%</b>	<b>10,447</b>	<b>100%</b>	<b>133%</b>

Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

Despite outbound tonnage accounting for only 4 percent of the total tonnage, its value was substantial, amounting to \$17 billion, which represented 20 percent of the total value in 2019. Table 6 lists the leading outbound trading partners by value. The top major outbound trading partners were Chihuahua, Mexico; Oklahoma; California; Ontario, Canada; and Tamaulipas, Mexico. The top 10 outbound partners received nearly 56 percent of the total value of exported goods. Of the freight value exported to Chihuahua, Mexico, 51 percent was attributed to machinery commodities. In 2050, the total outbound commodity value is estimated to reach nearly \$25 billion, indicating a 46 percent increase from 2019.

Table 6: Outbound Trading Partners (U.S. Domestic and International) by Value, 2019 and 2050

Outbound Partner	2019 Value (\$Millions)	Percent	2050 Value (\$Millions)	Percent	Percent Change 2019-2050
Chihuahua, Mexico	2,316	14%	4,261	17%	84%
Oklahoma	1,590	9%	1,786	7%	12%
California	1,321	8%	1,680	7%	27%
Ontario, Canada	900	5%	934	4%	4%
Tamaulipas, Mexico	780	5%	1,601	6%	105%
Florida	766	4%	994	4%	30%
Louisiana	632	4%	1,122	5%	78%
Tennessee	476	3%	504	2%	6%
New Jersey	444	3%	465	2%	5%
Georgia	387	2%	467	2%	21%
<b>All Others</b>	<b>7,452</b>	<b>44%</b>	<b>11,075</b>	<b>44%</b>	<b>49%</b>
Rest of Mexico	1,327	8%	2,993	12%	126%
Rest of Canada	161	1%	184	1%	15%
Other Domestic Partners	5,697	33%	7,234	29%	27%
Other International partners	267	2%	664	3%	148%
<b>Total</b>	<b>17,063</b>	<b>100%</b>	<b>24,889</b>	<b>100%</b>	<b>46%</b>

Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

### Commodity Flow Origins and Destinations in Texas

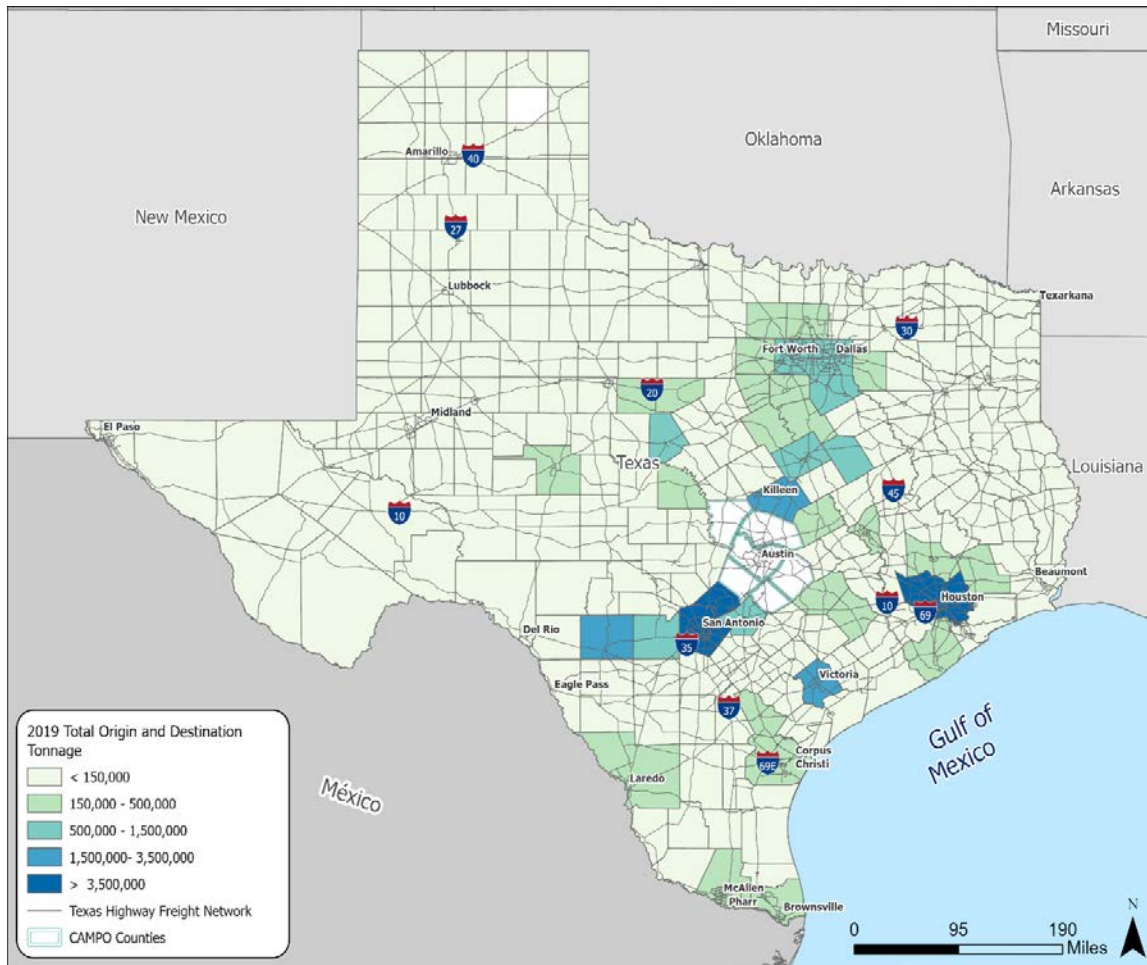
Nearly 69 percent of commodities transported to or from the CAMPO region started or ended within Texas. These intrastate flows reference movements between counties in the CAMPO region and the counties outside the region in the rest of the state.

Figure 7 displays the amount of tonnage that originated in and was destined for each county. In 2019, Bexar County, Harris County, and Comal County were the top three intrastate trading partners for the CAMPO region, each associated with 12 million, 10 million, and 9 million tons of commodities, respectively. These counties are served by major corridors such as IH 10 and IH 35.

Figure 8 shows the intrastate trading partners by value. Counties with higher commodity tonnage are likely to have a higher value. The top intrastate partners were Harris, Bexar, and Dallas counties. Each had commodities valued at \$10 billion, \$5 billion, and \$2 billion in 2019, respectively. Besides the leading counties, those adjacent to the Mexico border, such as Webb, Hidalgo, and Cameron counties also showed a relatively high commodity value. Each of these

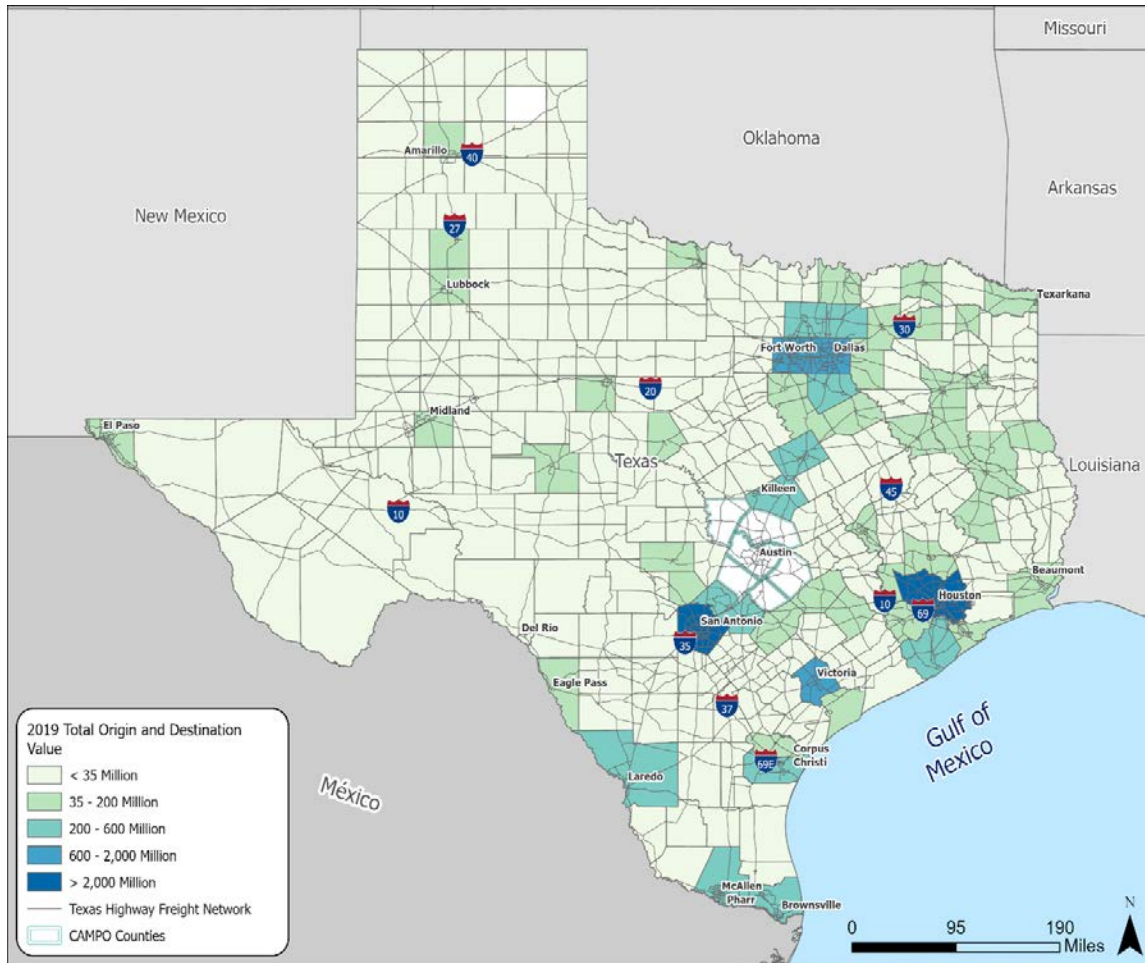
counties ranked the sixth, eighteenth, and nineteenth as intrastate trading partners for the CAMPO region in terms of value, respectively.

Figure 7: Total Origin and Destination Tonnage by County outside of the CAMPO Region, 2019



Source: Cambridge Systematics analysis of 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

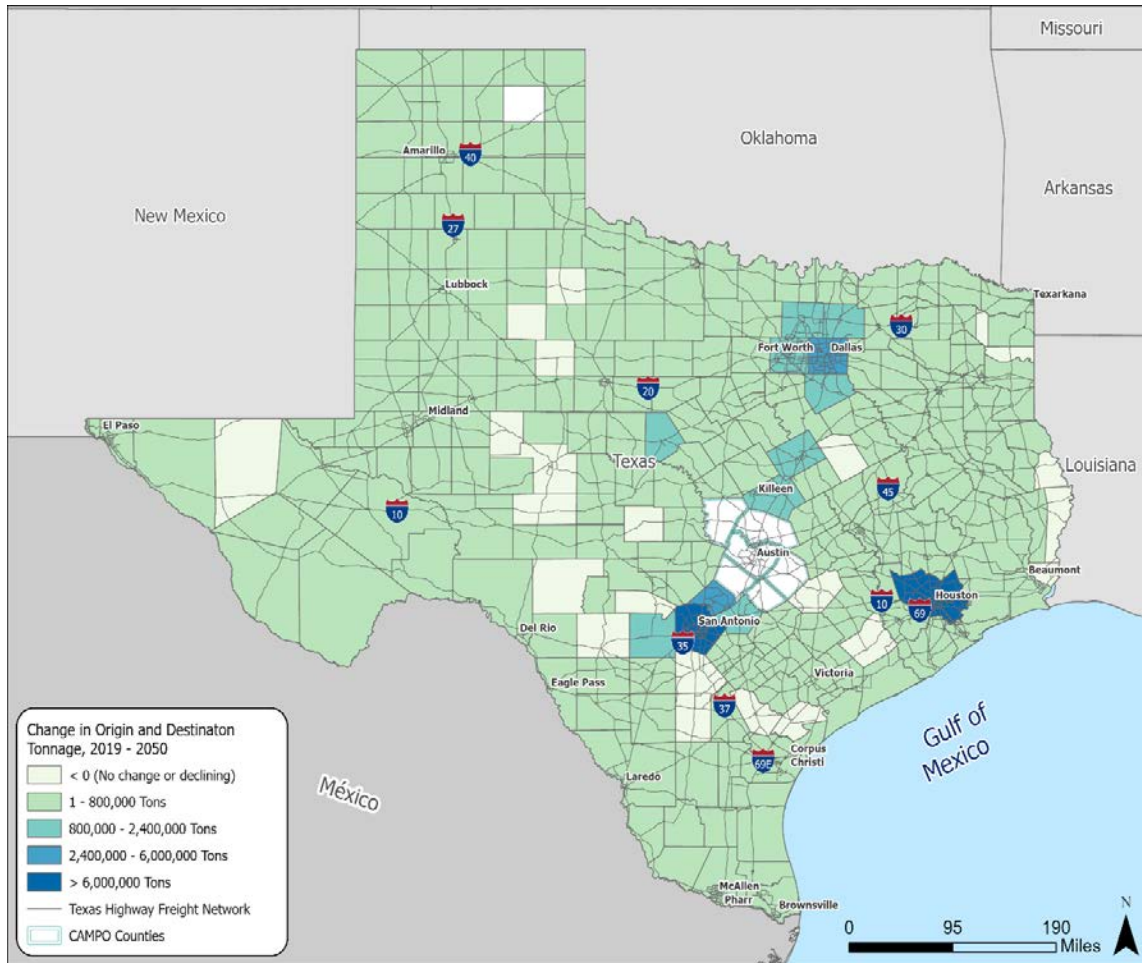
Figure 8: Total Origin and Destination Value by County outside of the CAMPO Region



Source: Cambridge Systematics analysis of 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

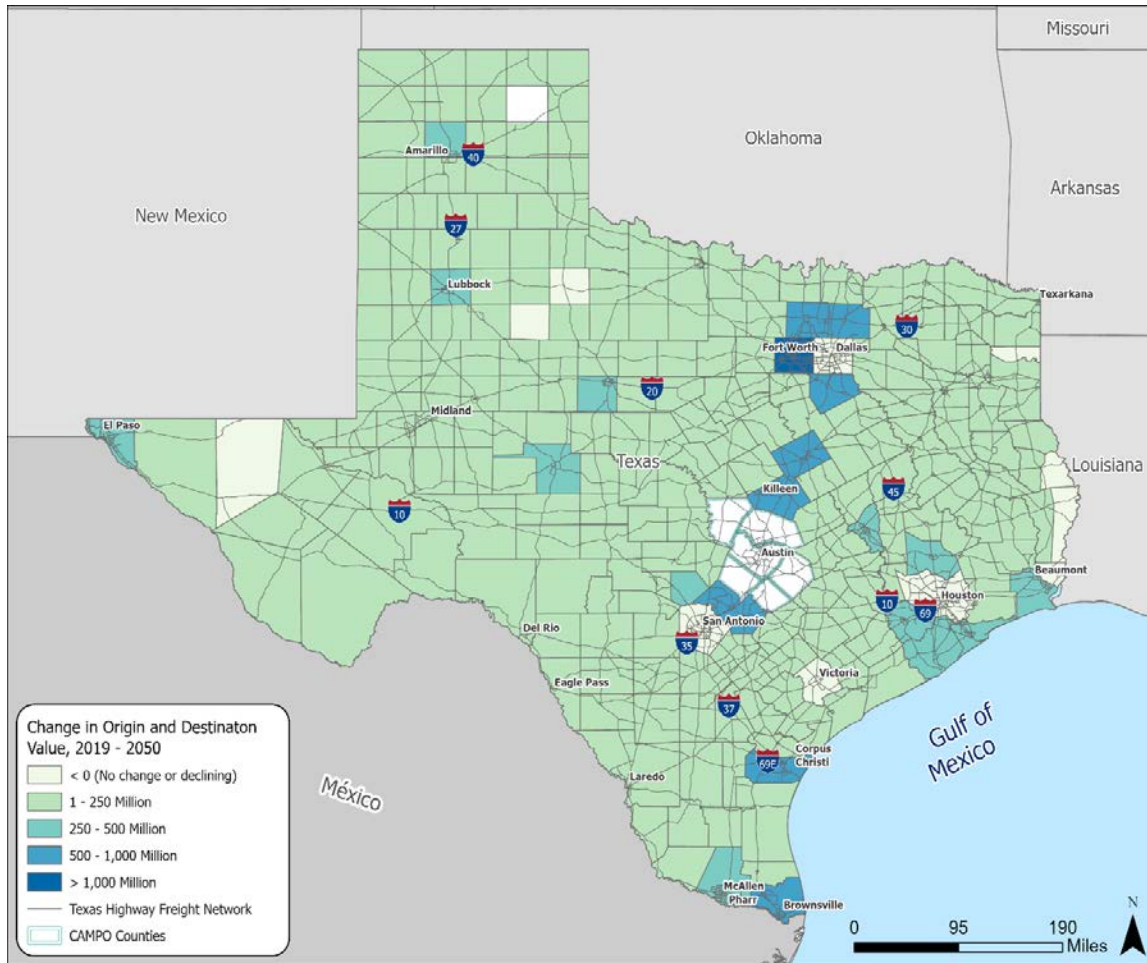
Figure 9 and Figure 10 display the absolute change in commodity tonnage and value associated with each intrastate trading partner based on the Transearch 2019 to 2050 forecasts.

Figure 9: Total Change in Tonnage by County Outside of the CAMPO Region, 2019 to 2050



Source: Cambridge Systematics analysis of 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

Figure 10: Total Change in Value by County Outside of the CAMPO Region, 2019 to 2050



Source: Cambridge Systematics analysis of 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

### Commodity Flow by Mode

This section identifies the top commodities by total tonnage and value in 2019 and 2050 by mode. Over 95 percent of the commodity flow tonnage in the CAMPO region was transported by truck in 2019 and the remainder by rail and air. Trucks are expected to continue to be the key mode for moving freight in the region in 2050 according to Transearch projections.

### Top Truck Commodities

The CAMPO roadway network transported approximately 109 million tons of commodities, valued at \$72 billion in 2019. By 2050, tonnage is projected to reach 210 million tons, representing a 92 percent increase from 2019, with an estimated value of \$175 billion, representing a 144 percent increase from 2019. Table 7 and Table 8 summarize the top Truck commodities by tonnage and value in 2019 and 2050.

Table 7: Top Five Truck Commodities by Tonnage and Value in 2019

Top Five Truck Commodities by 2019 Tonnage	Tons (Thousands)	Top Five Truck Commodities by 2019 Value	Value (\$Millions)
Nonmetallic Minerals	59,700	Chemicals or Allied Products	\$12,724
Clay, concrete, glass or Stone	15,109	Secondary Traffic	\$10,323
Petroleum or Coal Products	8,402	Machinery	\$7,324
Secondary Traffic	6,651	Electrical Equipment	\$6,810
Waste or Scrap Materials	4,629	Transportation Equipment	\$6,510
<b>Sum of Top 5</b>	<b>94,491</b>	<b>Sum of Top 5</b>	<b>\$43,691</b>
<b>Total Tonnage</b>	<b>109,194</b>	<b>Total Value</b>	<b>\$71,831</b>

Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

Table 8: Top Five Truck Commodities by Tonnage and Value in 2050

Top Five Truck Commodities by 2050 Tonnage	Tons (Thousands)	Top Five Truck Commodities by 2050 Value	Value (\$Millions)
Nonmetallic Minerals	84,015	Secondary Traffic	\$35,977
Clay, concrete, glass or Stone	40,090	Chemicals or Allied Products	\$30,172
Secondary Traffic	25,911	Food or Kindred Products	\$17,505
Waste or Scrap Materials	20,445	Electrical Equipment	\$17,212
Food or Kindred Products	12,031	Transportation Equipment	\$14,724
<b>Sum of Top 5</b>	<b>182,492</b>	<b>Sum of Top 5</b>	<b>\$115,590</b>
<b>Total Tonnage</b>	<b>209,577</b>	<b>Total Value</b>	<b>\$175,322</b>

Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

### Top Rail Commodities

The freight rail network in the CAMPO region carried approximately 5 million tons of commodities valued at \$1 billion, resulting in an average price of \$253 per ton. By 2050, rail flow is projected to increase to 8 million tons valued at \$4 billion, with an average value of \$488 per ton. This trend suggests a shift in rail freight movement towards higher-value commodities.

Table 9 and Table 10 summarize the top five rail-transported commodities by tonnage and value in 2019 and 2050.



Table 9: Top Five Rail Commodities by Tonnage and Value in 2019

Top Five Rail Commodities by 2019 Tonnage	Tons (Thousands)	Top Five Rail Commodities by 2019 Value	Value (\$Millions)
Nonmetallic Minerals	2,437	Transportation Equipment	\$464
Chemicals or Allied Products	857	Chemicals or Allied Products	\$345
Lumber or Wood Products	405	Lumber or Wood Products	\$107
Clay, concrete, glass or Stone	385	Petroleum or Coal Products	\$ 94
Coal	178	Clay, concrete, glass or Stone	\$54
<b>Sum of Top 5</b>	<b>4,262</b>	<b>Sum of Top 5</b>	<b>\$1,063</b>
<b>Total Tonnage</b>	<b>4,567</b>	<b>Total Value</b>	<b>\$1,156</b>

Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

Table 10: Top Five Rail Commodities by Tonnage and Value in 2050

Top Five Rail Commodities by 2050 Tonnage	Tons (Thousands)	Top Five Rail Commodities by 2050 Value	Value (\$Millions)
Chemicals or Allied Products	3,444	Transportation Equipment	\$2,130
Nonmetallic Minerals	2,816	Chemicals or Allied Products	\$1,373
Clay, concrete, glass or Stone	810	Lumber or Wood Products	\$175
Lumber or Wood Products	595	Clay, concrete, glass or Stone	\$118
Transportation Equipment	235	Food or Kindred Products	\$80
<b>Sum of Top 5</b>	<b>7,900</b>	<b>Sum of Top 5</b>	<b>\$3,876</b>
<b>Total Tonnage</b>	<b>8,281</b>	<b>Total Value</b>	<b>\$4,040</b>

Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

### Top Air Cargo Commodities

Air cargo represents a small fraction - less than one percent - of the total freight flows originating or destined in the CAMPO region. This mode is commonly used for high-value commodities due to its higher cost. Air cargo transported 88,000 tons of goods with a total value of \$13 billion in 2019 and by 2050, the figures are expected to increase to 226,000 tons, with a value of \$25 billion. Table 11 and Table 12 summarize the top air commodities by weight and value.

Table 11: Top Five Air Commodities by Value and Tonnage in 2019

Top Five Air Commodities by 2019 Tonnage	Tons (Thousands)	Top Five Air Commodities by 2019 Value	Value (\$Millions)
Small Packaged Freight Shipments	32	Misc. Manufacturing Products	\$4,304
Electrical Equipment	11	Electrical Equipment	\$2,738
Misc. Mixed Shipments	8	Transportation Equipment	\$1,927
Misc. Manufacturing Products	6	Misc. Mixed Shipments	\$1,166
Mail or Contract Traffic	5	Chemicals or Allied Products	\$902
<b>Sum of Top 5</b>	<b>61</b>	<b>Sum of Top 5</b>	<b>\$11,036</b>
<b>Total Tonnage</b>	<b>88</b>	<b>Total Value</b>	<b>\$12,858</b>

Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

Table 12: Top Five Air commodities by Value and Tonnage in 2050

Top Five Air Commodities by 2050 Tonnage	Tons (Thousands)	Top Five Air Commodities by 2050 Value	Value (\$Millions)
Small Packaged Freight Shipments	100	Misc. Manufacturing Products	5,336
Misc. Mixed Shipments	29	Chemicals or Allied Products	4,741
Electrical Equipment	17	Electrical Equipment	4,581
Chemicals or Allied Products	14	Misc. Mixed Shipments	4,169
Mail or Contract Traffic	12	Transportation Equipment	2,949
<b>Sum of Top 5</b>	<b>172</b>	<b>Sum of Top 5</b>	<b>21,776</b>
<b>Total Tonnage</b>	<b>226</b>	<b>Total Value</b>	<b>25,264</b>

Source: 2019 Transearch updated to reflect energy-related commodities (sand, brine, and water), and international water and air cargo.

## Freight Intensive Development and Land Use

The CAMPO region is a prime location for new freight-intensive users seeking to locate and/or expand. Industries and businesses have been focusing on the region, looking for large buildings with immediate occupancy, cities with light and heavy industrial land uses available for new construction, and proximity to the freight network system. Companies are also attracted by state and local programs designed to spur economic development and job creation. The Texas Enterprise Fund for example, offers incentives and financing for businesses expanding or relocating to Texas.

According to the Capital Area Council of Government's (CAPCOG) 2020-2025 Comprehensive Economic Development Strategy, the fastest job growth in the region occurred in the transportation and warehousing, information, professional, scientific, and technical services, and construction sectors.<sup>3</sup> The report indicates the need for more multimodal facilities to support business development, including attracting and serving the needs of manufacturing.<sup>4</sup> It considers this achievable in recognizing the potential for CAPCOG jurisdictions to support expanded freight infrastructure across the region.<sup>5</sup>

Understanding freight trends from the context of land use and economic development supplies essential context to the factors that are driving demand for freight. The future freight-growth potential of the region and where growth will concentrate provides insights for improvements to freight access and mobility and policies to preserve the most compatible parcels for freight-intensive uses. At the local level, cities that coordinate land use planning and economic development incentives can direct industrial development towards compatible areas and thus, reduce potential impacts of freight movement and optimize connectivity with the rest of the system.

### Approach

Several methods were used to gather information and identify areas with potential freight-intensive growth, including:

- Freight-intensive industry interviews.
- Research into Economic Development Corporation priorities.
- Evaluation of comprehensive planning policies supporting freight-intensive uses.
- Future Land Use maps.
- Digital news articles for information on future industrial parks and developments.

**Appendix A** provides a detailed assessment of land use policies, examines economic development priorities, and identifies major planned projects, where available. The information was used to create a conceptual map of freight-growth areas, which is shown in Figure 11, highlighting cities in the region that are poised to attract major freight-related developments and expansion of industrial uses. Many of these high-growth locations are found in exurban and peripheral areas where land is readily available, and in proximity to the multimodal freight network. For these cities, the future land use assessment in **Appendix A** includes a detailed profile of their land use policies and economic development priorities that support freight-intensive uses in each county. **Appendix B** includes available future land use maps used to inform the assessment.

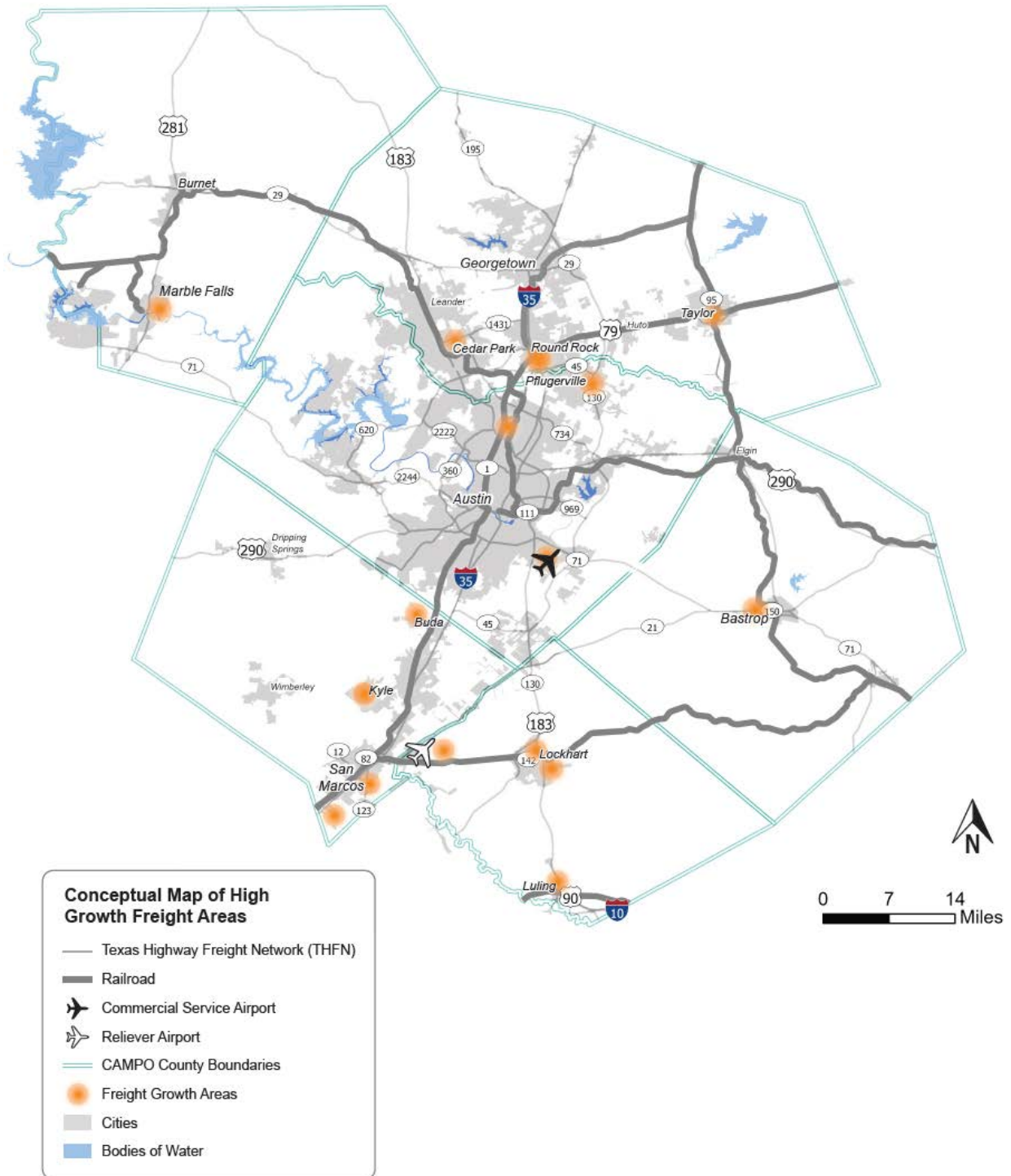
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<sup>3</sup> Voights, Betty. "Comprehensive Economic Development Strategy" (p. 5). Capital Area Council of Governments, 2020 Accessed from: <https://www.capcog.org/wp-content/uploads/2021/11/CEDS-2020-2025-Updated-Final.pdf>

<sup>4</sup> Ibid p. 17

<sup>5</sup> Ibid p. 17

Figure 11: Conceptual Map of High Growth Freight Areas



Note: San Marcos Regional Airport is the FAA designated reliever airport for both the Austin-Bergstrom and San Antonio International Airports (<https://flysanmarcos.com/>).

### Land Use Assessment Summary

In the CAMPO region, the cities have local control over land use policies and zoning, which influences the development and siting of industrial uses and freight generators in incorporated and unincorporated areas. Land use policies play a vital role in regional freight planning, especially when accommodating freight-intensive industries like manufacturing and warehousing. These policies, typically articulated in city comprehensive plans, aim to strategically situate such industries in the CAMPO region. Land use considerations for freight balances several key factors, including accessibility to the roadway network, minimizing impact on residential and environmentally sensitive areas, and ensuring efficient access and local circulation, particularly for truck traffic.

Efficient first and last-mile connectivity for trucks is essential for the overall efficacy of the freight network. Thus, land use planning should be coordinated with the development of the necessary infrastructure to accommodate the volume of truck traffic and their loads. Upgrading local roadways and ensuring seamless connectivity with the THFN can significantly enhance the mobility and safety of trucks, thereby reducing congestion impacts in residential areas.

Moreover, the strategic importance of land use policy extends to regional economic development strategies. City and county governments in the CAMPO region often strive to attract freight-intensive industries due to their potential for job creation, local workforce training, and tax revenue generation. The effective use of land use policies can facilitate such economic growth by ensuring the region remains an attractive choice for industries and corporations considering relocation or expansion. To this end, many cities in the region offer tax incentives and grants as part of a comprehensive benefits package aimed at enticing investment. At the local level, the creation of reinvestment zones or districts can provide further tax advantages, making the region even more appealing for companies planning to build manufacturing facilities or warehouses in certain areas.

Furthermore, land use planning can identify and prepare locations optimal for heavy freight activity. Developing infrastructure in these areas to accommodate truck movements and oversized/overweight loads is crucial. It is essential that these locations not only accommodate the needs of freight-intensive industries but also minimize impact on surrounding areas.

Overall, strategic land use planning, when aligned with regional and local economic development strategies, can accommodate the needs of freight intensive industries while minimizing potential negative impacts. At the county level, the development of long-range transportation and thoroughfare planning plays an important and complementary role. These efforts contribute to policies, project improvements, and investment decisions that provide essential roadway infrastructure in areas where freight intensive uses will be concentrated. By ensuring the necessary infrastructure for optimal freight mobility, safety, and connectivity, the CAMPO region positions itself as an ideal location for these industries.

## Freight Transportation Trends

Freight movement in the CAMPO region and throughout the world, has changed significantly over the last several years due to consumer demand, business practices, and supply chain upheaval from the COVID-19 pandemic. The industry is poised to further transform as a result of vehicle automation, fuel alternatives, intelligent infrastructure, and continued adaptation to consumer and business practices. This section discusses freight trends by mode, with a focus on technologies that are shaping the industry, including potential disruptors. The developments discussed in this section highlight both private and public sector advancements in freight operations and applications that have the capacity to increase transportation system performance, safety, and efficiency.

### Roadway Industry Trends and Developments

Development of the roadway system is central to the mission of CAMPO, and trucks carry over 95 percent of tonnage in the CAMPO region. Responding to truck trends will be essential to making informed investments in the roadway network that enhance safety, mobility, and economic competitiveness for the general public as well as the freight community.

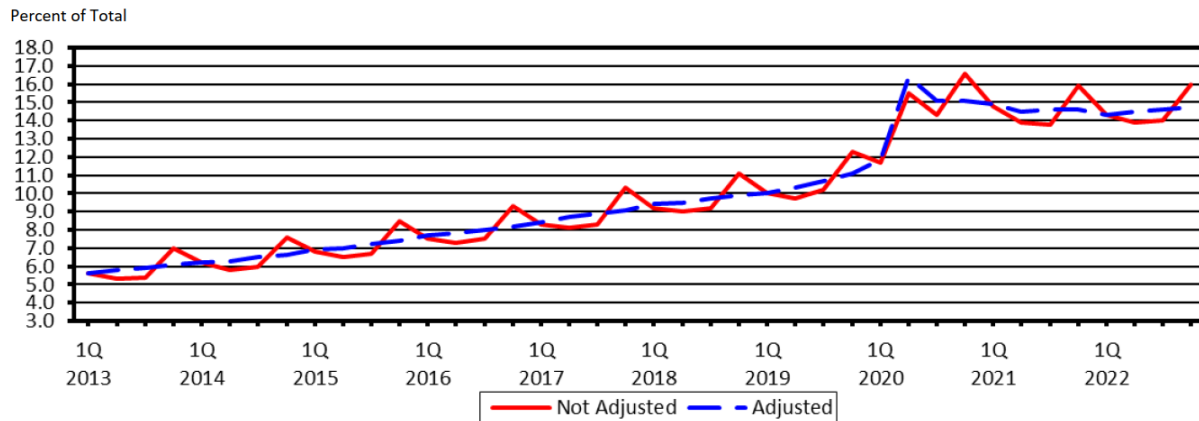
#### Smart Highway Infrastructure

Smart infrastructure uses technology to monitor, communicate, and adapt to conditions on the roadway network. Smart highway infrastructure applications can include infrastructure-to-infrastructure (I2I) applications in which assets communicate with other assets, as well as vehicle-to-infrastructure (V2I or I2V) applications in which infrastructure assets communicate with vehicles. Specific applications and technologies are described throughout this section. Notably, TxDOT has recently invested in smart highway infrastructure through its Texas Connected Freight Corridors (TCFC) program, a 36-month testbed of technology applications on IH 35 from Laredo to Dallas, IH 45 from Houston to Dallas, and IH 10 from Houston to San Antonio. The TCFC pilot included deployment of connected vehicle technologies to over 1,000 commercial vehicles to share information about traffic conditions, wrong-way driving, crash and queuing notifications, and truck parking availability. V2I/I2V technology will also enable freight signal prioritization near large freight generators.

#### E-commerce, Warehousing, and Distribution

While the trend toward e-commerce delivery to homes and businesses has been growing steadily for two decades, the COVID-19 pandemic significantly accelerated this trend. Post pandemic, this growth is slowing and returning to the prior trend. According to the U.S. Census Bureau, total e-commerce sales in dollars for 2022 increased 7.7 percent over 2021, while e-commerce as a percentage of all retail sales remained steady at 14.6 percent (Figure 12). One of the key impacts of e-commerce on truck transportation is the geographic dispersion of deliveries. Large, consolidated truck deliveries to stores have been replaced with more less-than-truckload deliveries to stores, more movement in between warehouses and distribution centers (i.e., secondary traffic) and frequent deliveries directly to individual residences and businesses. The commodity flow analysis also highlighted this growth in e-commerce and warehousing according to the 2050 Transearch projections. In 2019, nearly 7 million tons of secondary traffic moved on the CAMPO region's roadway network, and in 2050, the tonnage is estimated to reach 26 million tons, representing a 271 percent increase.

Figure 12: Estimated Quarterly U.S. Retail E-commerce Sales as a Percentage of Total Quarterly Retail Sales



Source: U.S. Census Bureau. (Note that the blue line has been adjusted for seasonal variation).

The rise of e-commerce has led to the astounding growth of warehouses and distribution centers, with annual development of new sites across the country more than tripling in the past five years. The growth in secondary traffic as a key commodity directly reflects this trend as well. Supply chains require faster times to market, leading to growing demand for warehouses, distribution centers, and fulfillment centers to support e-commerce and next-day delivery activities. Faster times to market require warehousing locations closer to markets as well, leading some analysts to estimate that e-commerce requires three times more warehousing space per product than traditional retail stores.<sup>6</sup>

In the CAMPO region and other Texas metropolitan areas, these development patterns have led to a network of fulfillment centers near centers of activity, especially on the edges of existing development where large tracts are available, land is more affordable, and consumers are nearby. Decentralization of warehousing and distribution centers results in more widespread impacts to the roadway system: rather than a single warehouse on a major highway, transportation infrastructure now must accommodate movements to and from distribution and fulfillment centers directly to customers. Many of these require travel in residential neighborhoods and on roadways of various functional classifications.

As truck volumes grow to serve this demand, traffic and congestion can become an issue for residents and businesses. Delivery delays and their causes will be more visible to residents. This could lead to a higher incidence of complaints but could also make the challenges of freight delivery more tangible and meaningful to citizens. Concern for the safety and environmental qualities of delivery trucks is likely to increase, putting pressure on the adoption of emerging and new technologies—including use of more electric vans and natural gas and hybrid electric trucks—and safety advances associated with connected and automated/autonomous vehicles.

#### Automation at Ports, Intermodal Terminals, and Warehouses

There have been many developments to automate various goods movement functions such as receiving, stocking, and picking at both warehouses and ports. This type of automation relies on robotics and advanced sensing. As an example, the British online-only supermarket Ocado has

<sup>6</sup> Prologis (June 17, 2020), COVID-19 special report #6: “Accelerated Retail Evolution Could Bolster Demand for Well-Located Logistics Space.” <https://www.prologis.com/news-research/globalinsights/covid-19-special-report-6-accelerated-retail-evolution-could-bolster>

built fully automated warehouses that can run 24-hours a day without having to hire late-night shift workers. The warehouse is populated with over a thousand robots that lift, move, or sort groceries day and night, processing 3.5 million items every week. Their actions are coordinated by a central computer, which ensures that the robots are used as efficiently as possible. All robots are interchangeable, which makes it easy to replace them if they break down or to add more if Ocado wants to scale up operations. Ocado has partnered with Kroger in the U.S., including at a site in Dallas.<sup>7</sup> Similarly, Amazon employs automated technology within certain fulfillment centers.<sup>8</sup> In addition, Amazon employs automated gate technology, including app-based software that allows drivers to efficiently proceed in and out of facilities. BNSF Railway encourages truck drivers accessing intermodal terminals to use their proprietary RailPass application to minimize gate time and proceed efficiently through an intermodal facility.<sup>9</sup> The primary benefits from automating intermodal terminals, fulfillment centers, and facilities functioning as inland ports and warehouses are efficiency and cost savings.

### Drayage Optimization

Drayage is the transportation of freight for short distances by trucks. It may include trucking between terminals, or trucking from terminals to warehouses, distribution centers, or directly to the final destination. Drayage operators often take many short trips in a day, often between only a few origins and destinations. Software solutions exist that provide insight into supply chain analytics and support and optimize drayage operations through better coordination and monitoring of the process. There are also mathematical models to match drayage truck capacity and trailer/container availability and appointment scheduling at intermodal (rail and port) terminals. As an example, Amazon Relay, a technology platform hosting over 55,000 trucking companies ranging in size from single-cab owner-operators to large fleets, connects freight loads with available capacity, and moves hundreds of thousands of loads per week. Amazon uses Relay to enable drivers and fleets to book drayage jobs, servicing domestic and international container customers.<sup>10</sup> In addition, new data are becoming available from emerging technologies such as telematics and connected and automated vehicles (CAVs) that open opportunities to understand freight movements in more granular detail and determine ways to better optimize drayage operations.

### Smart Trailers

Smart trailers can include any type of trailer, from flatbed to refrigerated trucks, which provides insights into the status of the trailer and its cargo using sensors that measure a wide array of features, including mileage, location, temperature, humidity, shock, and vibration. Smart trailers are typically equipped with telematics technology (described in the following Telematics and Freight Traveler Information section) that can provide real-time data visibility and reporting to fleet owners. This technology helps fleet owners optimize their operations and protect their assets.

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<sup>7</sup> Supermarket News. 2021. <https://www.supermarketnews.com/technology/inside-look-kroger-s-first-ocado-robotic-warehouse>

<sup>8</sup> About Amazon. 2022. <https://www.aboutamazon.com/news/operations/10-years-of-amazon-robotics-how-robots-help-sort-packages-move-product-and-improve-safety>

<sup>9</sup> BNSF Railway. 2023. <https://www.bnsf.com/ship-with-bnsf/intermodal/railpass.page>

<sup>10</sup> Amazon. 2023. <https://relay.amazon.com/amazon-relay-spot-work-to-keep-fleets-moving>



### Telematics and Freight Traveler Information

Telematics is the integrated use of communications and information technology to transmit, store, and receive information from telecommunications devices to remote objects over a network. In the trucking industry, this often involves having an aftermarket device installed in the cab that can send and receive tailored information from a third-party service provider.

Telematics systems can also be used for fleet management purposes such as to monitor remote assets and drivers. Leading telematics service providers include Trimble, GeoTab, Solera, and Verizon Connect.

Telematics traveler information typically includes freight-specific information such as dynamic route guidance, route restrictions, low bridge heights, parking availability information, weather information, work zone status, rail crossing information, and border/port wait times. Some basic freight traveler information is also available through state departments of transportation and third-party data integrators such as INRIX and Waze.

### Smart Truck Parking

The parking of trucks is a critical step in the operation of both short- and long-haul freight carriers. Trucks require space to park while loading and unloading as well as to comply with federal Hours of Service (HOS) regulations established by the Federal Motor Carrier Safety Administration (FMCSA), which require frequent rests for all property carrying drivers. The recent requirement that trucks be equipped with electronic logging devices has enhanced enforcement of HOS.

The inability to find safe parking has become one of the top issues for truck drivers around the country. Texas possesses multiple long-haul trucking corridors, which are used by drivers who need to rest and adhere to HOS regulations. Urbanized areas such as Austin also have a high concentration of truck origination and termination trips, and truck drivers prefer to park overnight close to where they have to make a delivery or pick up a load. Undesignated parking, which occurs when drivers are unable to find parking at designated facilities, can pose a safety risk to drivers and other vehicles, and is typically illegal. Difficulty in finding places to rest, either at establishments or along major truck routes, combined with increased pressures to maximize revenues, can lead truck drivers to undertake risky behavior by driving while fatigued.<sup>11 12</sup>

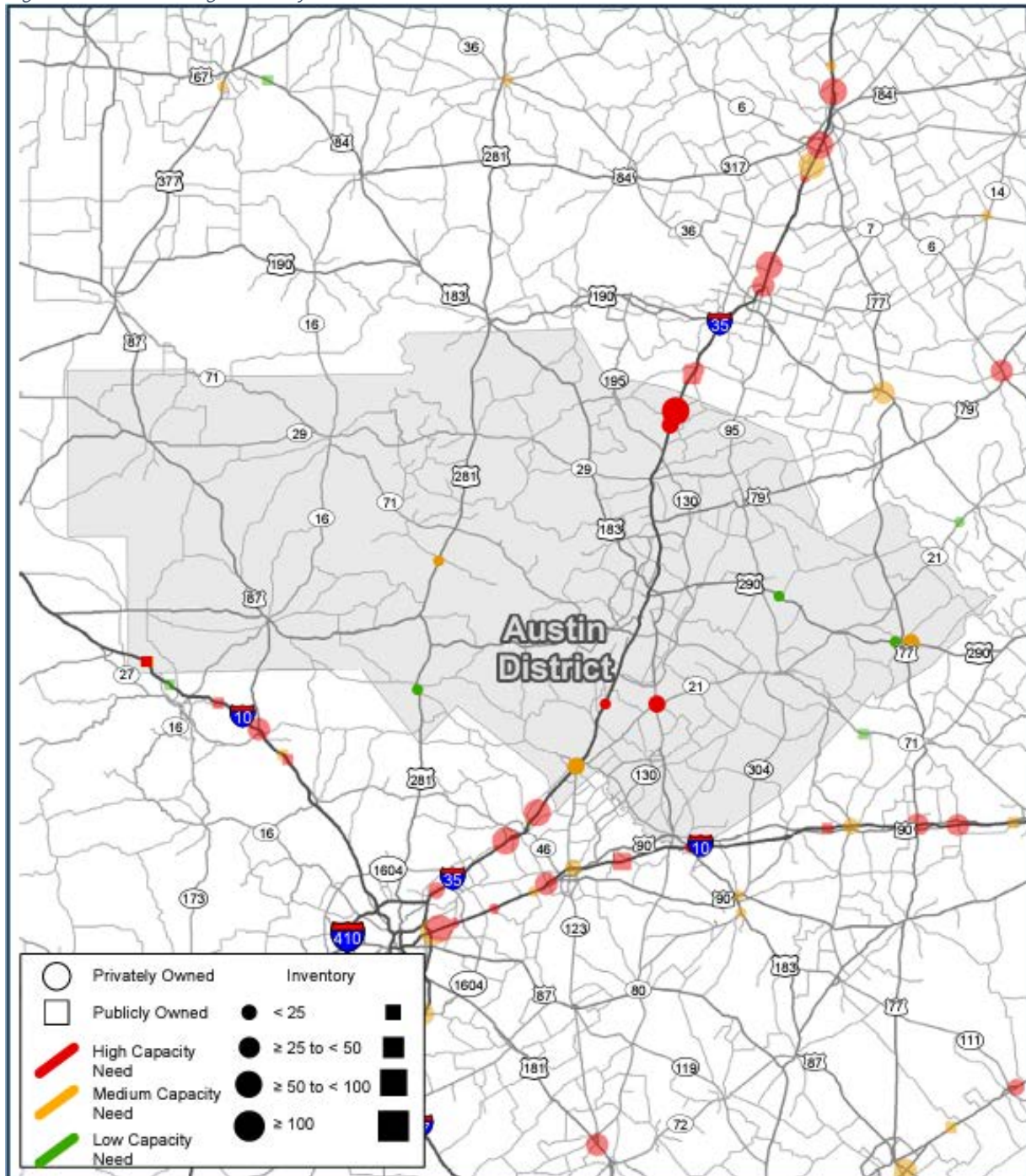
The Texas Statewide Truck Parking Study found that parking availability is particularly scarce in the TxDOT Austin District despite significant truck traffic on IH 35 and other corridors (Figure 13). As of the 2020 study, there were no truck parking locations in the majority of the Austin District, very few locations not located on IH 35, and high utilization (low excess capacity) at most locations. Since the study, CAMPO's planning partners have made strides to increase

<sup>11</sup> Thompson, J., Newnam, S., Stevenson, M. 2015. A model for exploring the relationship between payment structures, fatigue, crash risk, and regulatory response in a heavy-vehicle transport system. *Transportation Research Part A*, 82, 204-215.

<sup>12</sup> National Academies of Sciences, Engineering, and Medicine. 2016. *Commercial Motor Vehicle Driver Fatigue, Long-Term Health, and Highway Safety: Research Needs*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/21921>

parking supply, including a \$22 million RAISE grant award for a parking plaza on SH 130 submitted by Caldwell County.<sup>13</sup>

Figure 13: Truck Parking Inventory and Utilization in the TxDOT Austin District



Source: TxDOT, Texas Statewide Truck Parking Study, 2020. <https://www.txdot.gov/projects/planning/freight-planning/truck-parking-study.html>

<sup>13</sup> US Department of Transportation. 2023. RAISE 2023 Fact Sheets. [https://www.transportation.gov/sites/dot.gov/files/2023-06/RAISE%202023%20Fact%20Sheets\\_2.pdf](https://www.transportation.gov/sites/dot.gov/files/2023-06/RAISE%202023%20Fact%20Sheets_2.pdf)

Smart truck parking leverages data collection and data dissemination technologies to monitor, report and recommend truck parking options for commercial truckers. One recent example is the IH 10 Corridor Coalition Truck Parking Availability System (TPAS).<sup>14</sup> This system will make real-time truck parking information at 37 public truck parking locations along the IH 10 corridor from Texas to California available to truck drivers and dispatchers to assist them in making informed parking decisions. The system is expected to "go live" in 2024 and will include ongoing operations and maintenance. Lessons learned from the TPAS can be applied to the CAMPO region, and the Capital Area will benefit from decisions regarding selection and procurement of sensing and reporting equipment.

#### Advanced Driver Assistance Systems

Advanced Driver Assistance Systems (ADAS) are technologies that make vehicles safer by automating, improving, or adapting tasks involved in operating a vehicle.<sup>15</sup> ADAS rely on a variety of vehicle-based sensors including radar, lidar, ultrasound, and video cameras. Examples of ADAS applications include forward collision warning, automated braking, lane departure warning, and blind spot warning (Figure 14). These safety-focused systems have been appearing in new automobiles and trucks for many years and their use is expected to continue to grow.

Figure 14: ADAS Concept for Trucks



Source: Fleet Equipment Magazine 2021. <https://www.fleetequipmentmag.com/advanced-truck-driver-assistance-systems/>

ADAS are in the early stage of adoption and are emerging as a mature new technology. They have the advantage of providing immediate benefits while being part of the suite of technologies that lead, in time, to CAVs, and therefore are both practical and forward-looking. The primary benefit of ADAS is safety, which is a top concern of motor carriers and their drivers. Beyond their innate value in protecting human life, safety improvements reduce accident and insurance costs

<sup>14</sup> IH 10 Corridor Coalition. <https://i10connects.com/overview-tpas>

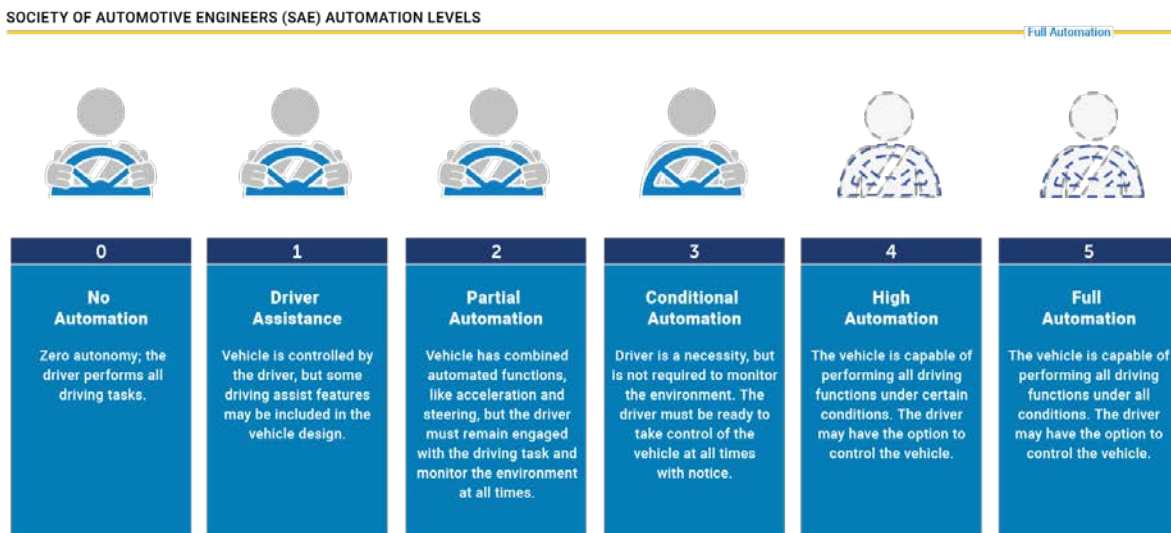
<sup>15</sup> National Highway Traffic Safety Administration. <https://www.nhtsa.gov/equipment/driver-assistance-technologies>

in trucking, as well as risks of expensive litigation. In addition, ADAS technology is often combined with telematics to help monitor the condition of vehicles and reduce operating costs.

### Connected and Autonomous Freight Vehicles

In recent years, there have been many advancements in truck automation or “self-driving trucks.” These advancements have coincided with the progression of the broader automated vehicle (AV) industry. AVs are complex systems of hardware and software that perform the primary driving functions of vehicles (i.e., steering, acceleration, and braking) with varying degrees of decreased human intervention. The automated driving system (ADS) includes sensing, communicating, monitoring, navigating, and decision-making, depending on the level of automation. Vehicles can be categorized into six levels of automation, from no automation to full automation, as defined by the Society of Automotive Engineers (SAE) in the illustration below (Figure 15).

Figure 15: Society of Automotive Engineers (SAE) Levels of Vehicle Automation



Source: Federal Highway Administration 2018

<https://ops.fhwa.dot.gov/automationdialogue/presentations/azwksp102418/index.htm>

Most of the ADAS systems described above would fit into the SAE level 1 or 2 descriptions and have already been adopted by the trucking industry. There are several companies currently testing SAE level 3 and 4 trucks on roads today, but these systems are still not mature enough for widespread deployment. Examples of these companies include Aurora Innovation, Embark Technologies, and TuSimple. These companies are focusing on testing truck automation in specific operational design domains such as only on divided highways until the technology becomes mature enough to operate in all environments. Most industry experts believe that freight movement is likely to be one of the first AV use cases to come to market but that it will be initially limited to specific operational design domains. Level 5 trucks that can operate anywhere in all conditions are still many years away from being ready for full deployment.

There are many enabling technologies that could improve AV safety and reliability and lead to a faster deployment timeline. Enabling technologies for AVs include a combination of vehicle-to-vehicle (V2V) communication, radar and cameras, in-vehicle sensor and control systems, and V2I communications. AVs that are supported by V2I or V2V communications are referred to as

connected and automated vehicles or CAVs. Some of the benefits of CAVs include improved safety, efficiency, mobility, and cost reductions.

#### Freight Platooning and V2V Technology

Freight platooning uses V2V technology to enable trucks to communicate with each other and automatically control their speeds to allow them to travel at short headways, saving fuel and reducing driver workload. This technology is typically a SAE level 1 or 2 system and not as advanced as the SAE level 3 through level 5 CAVs described above. Freight platooning connects one or two following trucks to a lead truck that is manually driven, allowing the following trucks to mimic the actions of the leader. Some of the key benefits include safety and fuel reduction due to improved aerodynamics.

Platooning is potentially a key first step towards full automation. Freight platooning of three trucks using V2V technology has been successfully tested by the Federal Highway Administration (FHWA) and Volvo Trucks (Figure 16) and initial tests demonstrated potential fuel savings of nearly 10 percent.<sup>16</sup> However, the future market for freight platooning is somewhat uncertain. Daimler, a major truck manufacturer, discontinued platooning efforts in 2019, and Volvo Trucks has shifted their focus from platooning to fleet electrification and fully automated trucks.<sup>17</sup> Nevertheless, freight platooning may be effective in certain niches such as on dense freight corridors where the length of haul is deemed cost-effective for freight platooning.

*Figure 16: Federal Highway Administration/Volvo Truck Platooning Demonstration*



Source: Federal Highway Administration

Texas, Arizona, New Mexico, and California have also collaborated, as members of the IH 10 Corridor Coalition, to advance the IH 10 Western Connected Freight Corridor Pooled Fund

<sup>16</sup> Federal Highway Administration. 2019.

<https://www.fhwa.dot.gov/publications/research/ear/19028/19028.pdf>

<sup>17</sup> Truck News. 2019. <https://www.trucknews.com/technology/daimler-abandons-platooning-to-focus-on-automation/1003089387/>

Study, funded by the FHWA.<sup>18</sup> The goal of this program is to implement a planning framework for operations and technologies to enable freight CAV activities, such as truck platooning, truck parking and reservation systems, and corridor-wide information systems. In general, Texas has a permissive regulatory environment that enables utilization of automation technologies including platooning.

#### Freight Signal Priority

Freight signal priority (FSP) is a V2I application that has been tested and evaluated in some locations but has not been widely deployed. FSP leverages V2I technology installed in trucks and at the roadside. The roadside V2I technology is connected to a traffic signal and provides wireless connectivity between the connected truck and the traffic signal. The truck can transmit its location and a request for a green light to the traffic signal, and the signal can be programmed to either extend the green time to allow the truck to make it through the intersection without stopping or reduce the red time to decrease the delay encountered by trucks.

FSP can minimize the travel time, stops and total delay for trucks, which can result in reduced fuel usage and reduced vehicle emissions. FSP is one of many specific technologies being deployed as part of the TCFC program being implemented by TxDOT.<sup>19</sup> Past improvements to signals and their control systems to implement adaptive signal timing, transit signal priority, transit queue jumps, and other connected applications may accelerate deployment in the Capital Area where freight needs coincide with these passenger-focused applications.

#### In-motion Size and Weight Inspection and Electronic Screening

The Texas Department of Motor Vehicles (TxDMV) enforces vehicle size and weight regulations. While there are many specifications that vary by vehicle type, generally commercial vehicles up to 14 feet tall and 8.5 feet wide, trailers up to 59 feet long, and a gross weight of 80,000 pounds may operate without a permit.<sup>20</sup> Permits are available for recurring activity or one-time trips for indivisible loads (that is, loads that cannot be broken into smaller components) or for industry-specific exemptions. Additionally, some agencies have been given legislative authority to issue oversize/overweight permits near sea or land ports (Texas Transportation Code, Title 7, Subtitle E, Chapter 623).

There are many commercially-available technologies that monitor vehicle compliance with traffic safety laws without stopping for manual inspection. Some of the key technologies include weigh-in-motion (WIM) and electronic screening for driver safety and credential compliance. The primary benefit of these technologies is in improved safety, but these technologies also have labor productivity benefits associated with their use in reducing enforcement and inspection work.

WIM technology can be deployed on the highway main lane or on the entrance ramp to a site. In either scenario, trucks are weighed as they pass over the WIM at speed. Although this measurement is not accurate enough to issue a weight citation directly, it can screen out trucks with empty loads or that are obviously over the allowed weight. TxDOT initiated a Weigh-in-

<sup>18</sup> Texas A&M Transportation Institute.

<https://static.tti.tamu.edu/conferences/ttc19/presentations/general-session-3/rutter.pdf>

<sup>19</sup> TxDOT. <https://www.txdot.gov/about/programs/innovative-transportation/texas-connected-freight-corridors.html>

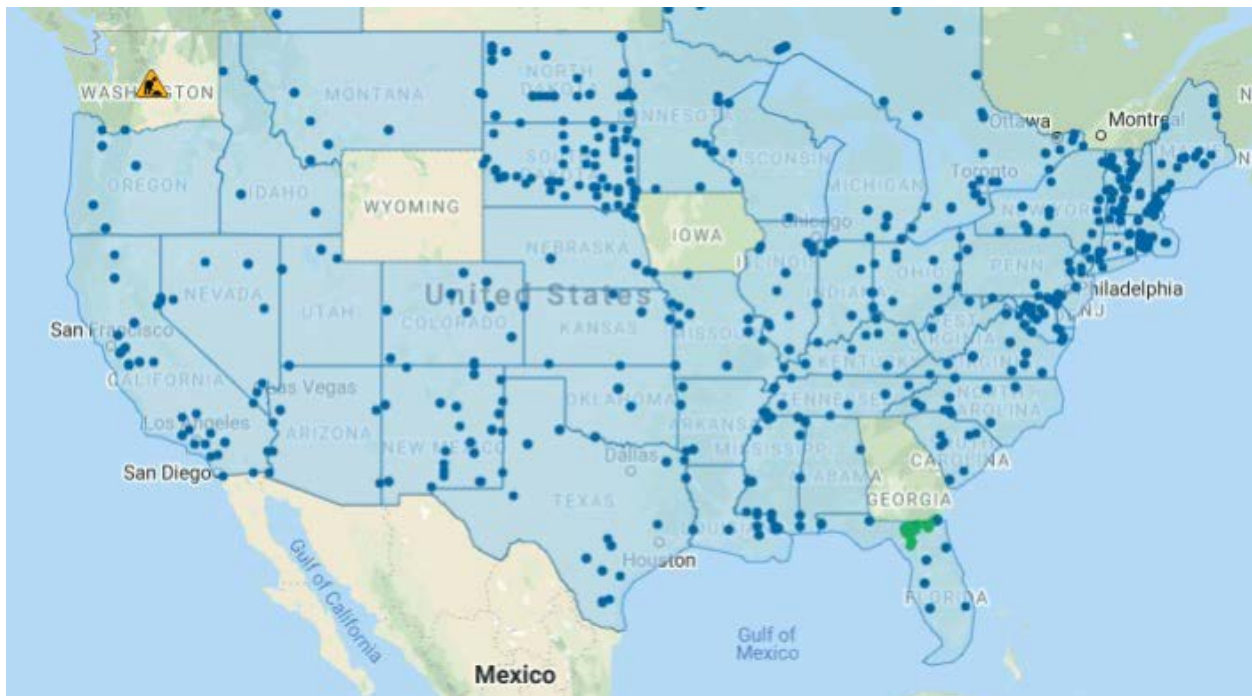
<sup>20</sup> Texas Department of Motor Vehicles. Texas Size/Weight Limits, 2023. <https://www.txdmv.gov/motor-carriers/oversize-overweight-permits/texas-size-weight-limits>

Motion and Vehicle Classification Strategic Plan in 2020 to determine optimal locations throughout the state and establish a deployment strategy.

Prescreening is typically done using transponders or smart phones. Under the transponder approach, trucks enroll in a program such as PrePass and are assigned a small wireless transponder designed to be mounted on the windshield. When one of these trucks approaches an equipped inspection site, an electronic reader mounted over the roadway automatically scans the transponder and identifies the vehicle and checks for compliance. Trucks not meeting compliance are required to pull over.

The smart phone approach is based on services provided by mobile application providers such as Drivewyze and, more recently, PrePass from Help Inc. In this approach, the enrollment process starts with the driver downloading and installing an application on their mobile phone. When the driver starts their trip, they turn on the application and start driving. The application will alert the driver when they cross a boundary drawn in a mapping program (a practice called geo-fencing) and are approaching an inspection location. Like the transponder approach, the vehicle is identified and compared against a list of criteria. Once a decision has been made, the driver is notified to continue driving or to pull into the inspection site via an alert on their cell phone. Figure 17 shows how widespread the Drivewyze application is deployed in the United States.

Figure 17: Drivewyze Bypass Service Locations



Source: Drivewyze Coverage Map 2022

#### Data Analytics / Artificial Intelligence

Another recent development in trucking technology is the use of data analytics and artificial intelligence (AI) to improve transportation operations. Data analytics and AI use a wide variety of statistical and mathematical tools to gain insights from data to support human-like decision making. Traffic data is generated from different sources, such as from traditional agency-owned road sensors and from private sector probe-based data aggregators like Google Maps and Waze. The integration of data from multiple sources, and the analysis and sharing of large

datasets or “big data” is crucial to understand travel patterns, and to help understand traffic conditions and operate transportation systems more efficiently. TxDOT has procured data subscriptions that include truck GPS data and other in-cab unit data to support planning and decision-making. Some subscriptions include access for MPOs to expand capacity for freight planning throughout the state.

### Vehicle Electrification

Commercial-vehicle electrification has reached the point of being viable and cost effective in several applications. As the costs have decreased and governments increase incentives for electrification and raise standards for diesel-powered trucks, the electrification of truck fleets has become more of a practical possibility than ever. Truck electrification includes a wide range of technologies, each with different advantages. Truck electrification using batteries is the most common type, encompassing battery-only electric, hybrid electric, and plug-in hybrid electric.

Americas Commercial Transportation Research Company projects that by 2035, battery-electric trucks will comprise half of Classes 4 through 8 vehicles sold in the United States.<sup>21</sup> The company’s cost analysis found that battery-electric, medium-duty trucks have cheaper total cost of ownership than comparable diesel trucks, and this advantage is expected to increase as battery technology continues to improve and new regulations are introduced to curtail diesel emissions. The highest adoption rates are forecast for Classes 6 through 7 trucks (60 percent in 10 years), while Classes 4 through 5 trucks are more likely to switch to gasoline engines. Class 8 trucks are likely to favor diesel engines until emission regulations are tightened. The transition to electric is well underway at Amazon, which committed to purchasing 100,000 new Rivian Electric vans. As of March 2023, Amazon has 3,000 Rivian Electric vans operating across the United States that have delivered 75 million packages since entering service (Figure 18).<sup>22</sup>

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<sup>21</sup> <https://www.truckinginfo.com/10161524/act-half-of-class-4-8-sales-to-be-bev-by-2035>

<sup>22</sup> <https://www.aboutamazon.com/news/transportation/everything-you-need-to-know-about-amazons-electric-delivery-vans-from-rivian>



Figure 18: Amazon Rivian Electric Van



Source: Rivian Van – Amazon

In addition to traditional plug-in charging, electromagnetic induction, or wireless, charging technologies have been piloted for transit systems and show promise for freight use along local delivery routes. Induction charging involves in-pavement coils that transmit electricity to a vehicle outfitted with corresponding coils. The vehicles can park on top of the induction charging infrastructure for short intervals to receive partial charge. In 2021, Tesla partnered with WAVE, owned by Ideanomics, to pilot induction charging for its electric semi-truck. WAVE estimates charging power of 500 kilowatts to 1 megawatt.<sup>23</sup>

#### *Texas National Electric Vehicle Implementation (NEVI) Plan*

The Infrastructure Investment and Jobs Act (IIJA) authorizes a new formula funding program for NEVI, which allocates money to states specifically for vehicle electrification projects. Texas is set to receive approximately \$408 million between FY2022 and FY2026 under this new program.<sup>24</sup> To meet program requirements, each state must submit a NEVI Plan. In 2022, Texas submitted its NEVI Plan, which documents the existing conditions regarding statewide vehicle electrification infrastructure and outlines planned infrastructure investments.

As of August 2023, TxDOT opened Phase 1 of the Texas Electric Vehicle Infrastructure program for applications. Within MPOs, grants are issued via the following steps:<sup>25</sup>

- TxDOT provides resources to MPOs through an Inter-Agency Contract to write regional EV charging plans using the Texas EV Plan as a template
- TxDOT drafts request for grant application based on regional EV charging plans

<sup>23</sup> <https://www.vehiclesuggest.com/tesla-move-to-wireless-charging/>

<sup>24</sup> USDOT, 5-year National Electric Vehicle Infrastructure Funding by State, 2022. [https://www.fhwa.dot.gov/bipartisan-infrastructure-law/evs\\_5year\\_nevi\\_funding\\_by\\_state.cfm](https://www.fhwa.dot.gov/bipartisan-infrastructure-law/evs_5year_nevi_funding_by_state.cfm)

<sup>25</sup> TxDOT, Texas Electric Vehicle Charging Plan, 2023. <https://ftp.txdot.gov/pub/txdot/get-involved/statewide/EV%20Charging%20Plan/TexasElectricVehicleChargingPlan.pdf>

- TxDOT scores responses
- TxDOT selects grant recipients
- MPO updates Transportation Improvement Program (TIP)
- Awardees construct and operate stations for 5 years
- TxDOT collects station usage reports from awardees and reports to FHWA.

### Alternative Truck Fueling

Hydrogen fuel-cell engines run on stored hydrogen gas (similar to how gasoline is stored in a tank). The hydrogen is then piped to the fuel-cell stack, where chemical processes create electricity. This electricity, combined with electricity from a lithium-ion battery and from regenerative braking, then powers the vehicle. Hydrogen gas is refueled similarly to gasoline and diesel, making it relatively straightforward to integrate with existing truck fueling infrastructure.

Hydrogen trucks are currently being used in limited applications, and hydrogen cell equipment development has recently focused on reducing vehicle weight and the retrofitting of existing vehicles to make the technology more accessible and affordable. Range, power, investment in charging or fueling locations, and technology advances will all influence the future market share of battery and hydrogen fuel cell freight vehicles. Limited deployments exist in the US today, including drayage operations near the Ports of Los Angeles and Long Beach.<sup>26,27</sup>

### Cargo Bikes

A cargo bike is a human-powered vehicle designed and constructed specifically for transporting freight. Cargo bike designs include a cargo area consisting of an open or enclosed box, a flat platform, or a wire basket, usually mounted over one or both wheels, low behind the front wheel, or between parallel wheels at either the front or rear of the vehicle. The frame, drivetrain, and wheels must be constructed to handle loads larger than those on an ordinary bicycle. An electric cargo bike adds an electric motor and battery to a cargo bike. This provides extra power and assistance up to a speed limit governed by electric bike laws.

Cargo bikes are increasingly being used for last-mile delivery, especially in dense urban areas. Cargo bikes and trailers can use bike lanes and travel where trucks and vans cannot and often carry smaller standardized mini-containers that can travel on vessels, trucks, or vans. Their width is typically about 3 feet, allowing them to travel in most bike lanes. However, some regions have prohibited cargo bikes of a certain size, speed, or number of wheels to use bike lanes. For example, the Code of Ordinances in the City of Austin prohibits use of motorized vehicles in bicycle lanes, excepting motorized bicycles, scooters, and similar vehicles traveling at speeds up to 20 miles per hour.<sup>28</sup> A typical cargo bike travels at speeds of 12 to 25 miles per hour and can carry a maximum load of about 400 pounds. Some cargo bikes are equipped with various sensors and displays to show location, engine power, wear, and weather.

<sup>26</sup> FreightWaves, 2022. <https://www.freightwaves.com/news/act-expo-exclusive-first-ride-in-hyzon-hydrogen-powered-fuel-cell-truck>

<sup>27</sup> Telios, Toyota Port of Long Beach Fuel Cell, 2022. <https://teliospc.com/projects/toyota-port-of-long-beach-fuel-cell/>

<sup>28</sup> City of Austin, Code of Ordinances, Title 12, § 12-1-21 - DRIVING IN BICYCLE LANE. [https://library.municode.com/tx/austin/codes/code\\_of\\_ordinances?nodeId=TIT12TRRE\\_CH12-1TRREAD\\_ART1DEAP\\_S12-1-1DE](https://library.municode.com/tx/austin/codes/code_of_ordinances?nodeId=TIT12TRRE_CH12-1TRREAD_ART1DEAP_S12-1-1DE)

Figure 19: UPS Quad Cargo Bike



Source: UPS

Cargo bikes have been successfully introduced in various markets across the world and for different types of deliveries. FedEx and UPS have conducted several large-scale field trials with cargo bikes and are ramping up their use. Some cargo bike products are being developed to meet the requirements for specific markets such as grocery delivery.

### Delivery Robots

A delivery robot is an autonomous, electric-powered robot that provides last-mile delivery services via local streets and sidewalks. An operator may remotely monitor and take control of the robot in certain situations that it cannot resolve by itself, such as when it is stuck in an obstacle. Delivery robots can be used in various settings, including food delivery, package delivery, hospital delivery, and room service.

Delivery robots can reduce transportation costs for consumers while delivering small to medium sized loads in a sustainable, safe, and efficient way. Testing and pilot projects are ongoing throughout the world, with fully autonomous robots delivering goods in a variety of use cases, both on roads and in campus environments. Delivery robots can deliver anything from convenience goods and e-commerce packages to groceries and electronics. Robots developed by Nuro have full HVAC systems and are designed with grocery delivery in mind. Sodexo has procured “Kiwibots” for food delivery at 50 college campuses across the United States. While delivery robots typically travel at slower speeds and off the main roadway, the Nuro robot can travel on neighborhood streets at up to 25 miles per hour (Figure 20). The Capital Area has been home to operations of small food delivery vehicles, such as the Refraction AI pilot delivering food from two Austin Chick-fil-A locations (2021) and the COCO Delivery vehicles serving various restaurants and vendors (2022).<sup>29</sup>

<sup>29</sup> KVUE, Remotely-piloted robot deliveries rolling out in Austin, 2022.

<https://www.kvue.com/article/news/local/remotely-piloted-robot-deliveries-rolling-out-in-austin/269-b4567d88-a85b-4001-a837-b1fc28d8a666>

Figure 20. Nuro Delivery Robot on Shared Roadway



Source: Nuro

Given the low travel speeds and small vehicle size compared to conventional vehicles, some delivery robots may operate best outside of main travel lanes on busy roadways and operate instead in bicycle lanes or on sidewalks. Although Texas’s permissive regulatory environment is less restrictive than other states, possibly spurring adoption, large urban areas may be hesitant to embrace small delivery vehicles occupying sidewalk space due to concerns about pedestrian safety, accessibility, or operation of a motorized vehicle on sidewalks. The Texas Transportation Code permits personal delivery vehicles to operate on sidewalks traveling up to 10 miles per hour.<sup>30</sup>

### Rail Industry Trends and Developments

While CAMPO does not have control over the freight rail system and its operation, the rail system directly influences CAMPO by providing alternatives to highway travel, interacting with other modes at at-grade crossings, and requiring coordination during project development.

#### Operational Practices and Precision Scheduled Railroading

Over the last decade, Class I railroads have prioritized lowering operating costs over expanding service, an operational practice frequently referred to as Precision Scheduled Railroading (PSR).<sup>31</sup> Not all railroads use the term PSR, and specific implementation methods vary. In general, this strategy results in railroads serving fewer, larger customers, foregoing stops at smaller yards or customers that may have been served under prior operational practices.

These trends have several impacts to the roadway network and land use planning:

- Truck traffic to or from rail-served facilities are destined for fewer, larger rail yards or customers, resulting in fewer locations generating this type of demand. As CAMPO plans for freight-generating land uses, access to these facilities is important.

<sup>30</sup> Texas Transportation Code. Title 7. Subtitle C. Chapter 552A. Subchapter A. Sec. 552A.0006. <https://statutes.capitol.texas.gov/Docs/TN/htm/TN.552A.htm>

<sup>31</sup> Class I railroads are the nation’s largest rail companies which operate vast, multistate networks. There are three Class I railroads in Texas: BNSF Railway, CPKC (formerly Kansas City Southern), and Union Pacific.

- Smaller businesses are more dependent on trucks to ship goods, and shifting to rail to avoid congestion or seek a lower transportation cost is less likely to be feasible. While businesses may have the option to truck goods to a rail yard, moving goods between modes adds additional cost and potential for disruption. Instead, businesses may choose to rely on trucks for the entire shipment, increasing truck travel on the roadway system.
- PSR has also resulted in longer trains to increase revenue generated by each train. Longer trains require additional time to travel through at-grade crossings with the roadway system, resulting in additional delay on the roadway system to allow trains to pass. When planning grade separation projects or new corridors, CAMPO can consider options that reduce the impact of delay at at-grade crossings.
- Development or encouragement of new rail-served facilities requires significant coordination with railroad companies to determine whether future service is possible within the context of the larger system. Prioritization of the existing network was recently demonstrated in Texas when Union Pacific stopped construction of the Brazos Yard in Southeast Texas, choosing instead to focus on existing facilities.<sup>32</sup>

### Rail Safety

Transportation safety is a shared core goal of CAMPO and railroads, and safety projects are good candidates for collaboration between CAMPO and railroad operators. This section discusses safety trends at at-grade crossings and within the rail system.

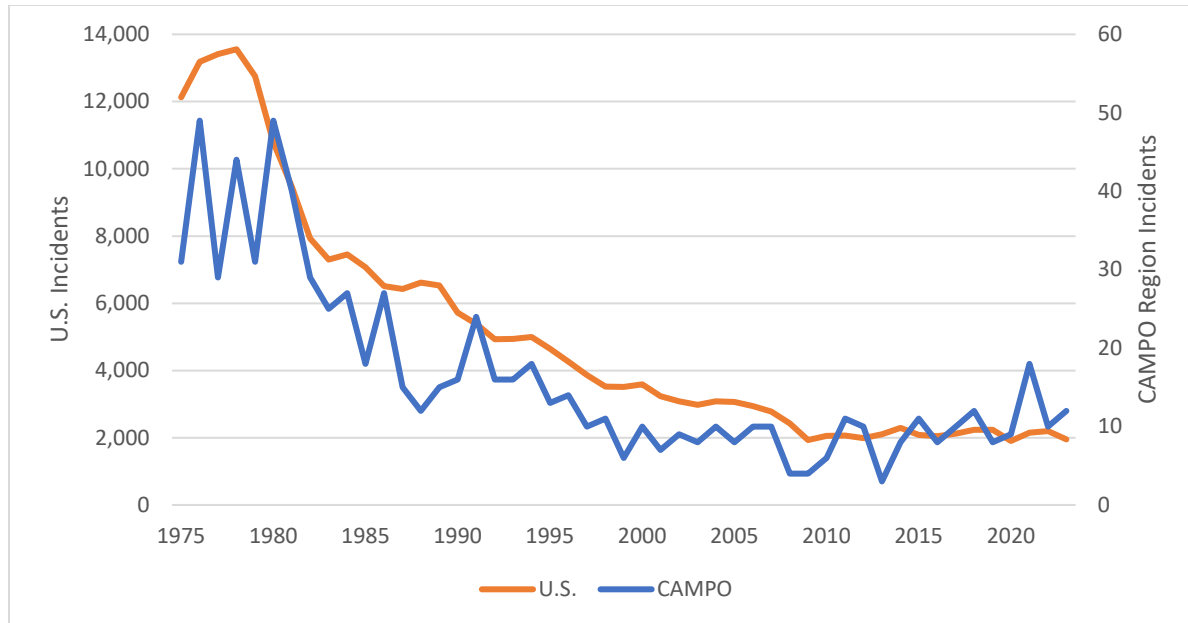
#### *At-Grade Crossings*

At-grade crossings, or locations where the roadway and rail systems intersect, have potential for collisions between trains, vehicles of any kind, bicycles, and pedestrians. Grade crossing incidents were reduced significantly between 1975 and 2010 both nationally and within the CAMPO region due to measures such as signals and crossing arms to alert travelers and prevent crossings as trains approach (Figure 21). Since 2010, the number of incidents per year has remained steady nationwide. However, incidents in the CAMPO region trended up in the past 15 years.

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<sup>32</sup> Trains. January 2021. <https://www.trains.com/trn/news-reviews/news-wire/union-pacific-writes-down-brazos-yard-investment/>

Figure 21: U.S. and CAMPO Region At-Grade Crossing Incidents Since 1975



Source: Federal Railroad Administration, Highway/Rail Grade Crossing Incidents, railroads.dot.gov

The U.S. Department of Transportation has recently encouraged investment in highway-rail safety projects through its requirement that states update their Grade Crossing Action Plans,<sup>33</sup> provision of dedicated funding to address at-grade crossings (Section 130),<sup>34</sup> and discretionary funding from the Railroad Crossing Elimination Grant Program authorized by the IIJA. TxDOT funding for these projects can be programed through its Railroad Grade Separation Program which dedicates \$25 million per year.<sup>35</sup>

*Rail System Safety*

Safety trends within the rail system follow a similar pattern as at-grade crossing incidents. The total number of incidents on U.S. railroads peaked in 1979 and dropped significantly throughout the 1980s and 1990s (Figure 22). Over the past 20 years, approximately 10,000 railroad incidents were reported in each year.

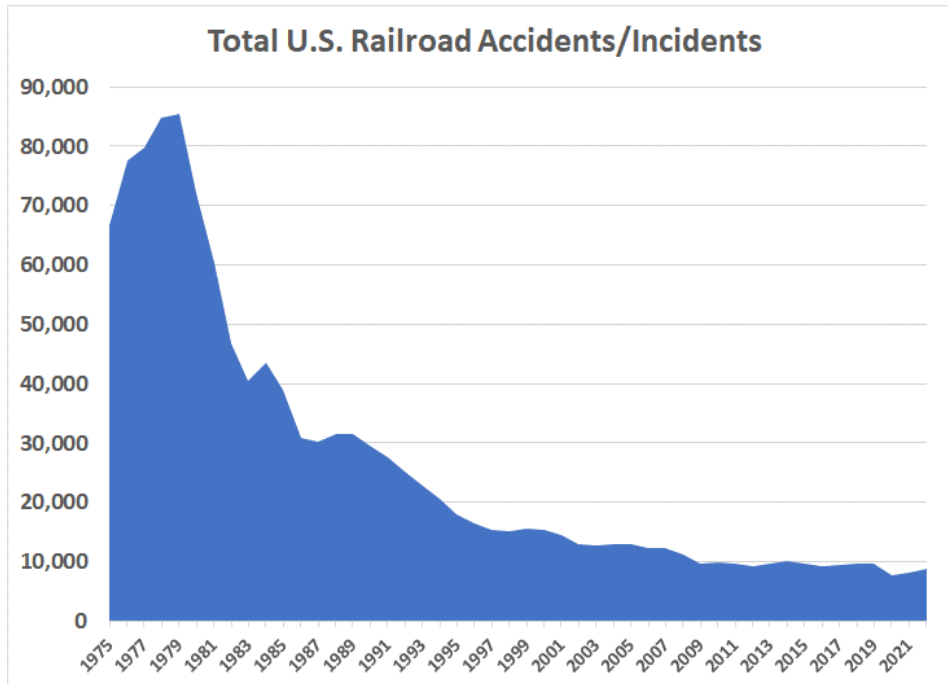
<sup>33</sup> Federal Rail Administration. <https://railroads.dot.gov/sap>

<sup>34</sup> Texas Rail Plan, Section 2.1.5. <https://ftp.dot.state.tx.us/pub/txdot-info/rail/texas-rail-plan-chapters.pdf>

<sup>35</sup> TxDOT.

[http://onlinemanuals.txdot.gov/TxDOTOnlineManuals/TxDOTManuals/rho/railroad\\_grade\\_separation\\_program\\_rgs.htm](http://onlinemanuals.txdot.gov/TxDOTOnlineManuals/TxDOTManuals/rho/railroad_grade_separation_program_rgs.htm)

Figure 22: Total U.S. Rail Accidents and Incidents Since 1975



Source: Federal Railroad Administration, Accident / Incident Overview, [railroads.dot.gov](https://railroads.dot.gov)

Though rail incidents have generally remained at historic lows, safety improvements remain a priority for governments and railroads. A central focus of railroad safety in recent years is Positive Train Control (PTC). PTC prevents train-to-train collisions, speeding, and unauthorized train movement. The federal government required implementation of PTC by the end of 2020 following a 2009 collision between a freight train and passenger train in California.<sup>36</sup> The Federal Railroad Administration (FRA) reported full implementation of PTC prior to the deadline.<sup>37</sup>

Notably, implementation required technology that is interoperable across all railroads, laying the groundwork for future use of the communication infrastructure put in place for PTC. For example, the advancement of mobile technology, smart vehicles, and the implementation of PTC by railroads could provide in-vehicle warnings of oncoming trains.<sup>38,39</sup>

Derailments have been another on-going safety focus within the rail industry. On February 3, 2023, a Norfolk Southern train carrying 150 cars derailed near East Palestine, Ohio, a town just west of the Pennsylvania border with a population of 4,800. Five of the derailed cars were carrying the hazardous material vinyl chloride, a cancer-causing substance that is a key ingredient to hard plastic resins used in construction and health care. Officials ordered a 2-mile

<sup>36</sup> Association of American Railroads

<sup>37</sup> FRA, <https://railroads.dot.gov/research-development/program-areas/train-control/ptc/positive-train-control-ptc>

<sup>38</sup> [https://railroads.dot.gov/sites/fra.dot.gov/files/fra\\_net/2784/Highway-Rail%20Intersection%20ITS%20GPS%20Based%20In-Vehicle%20Warning%20Systems\\_20121231\\_FINAL.pdf](https://railroads.dot.gov/sites/fra.dot.gov/files/fra_net/2784/Highway-Rail%20Intersection%20ITS%20GPS%20Based%20In-Vehicle%20Warning%20Systems_20121231_FINAL.pdf)

<sup>39</sup> <https://railroads.dot.gov/sites/fra.dot.gov/files/2022-02/RCVW%20Phase%20I%20Project%20Report.pdf>

radius evacuation, and in consultation with Norfolk Southern, released the contents of one car into a trench where it was burned off, releasing a plume of toxic smoke (Figure 23). The Ohio Department of Natural Resources estimated that the release caused the death of 3,500 fish,<sup>40</sup> and as of August 2023 Norfolk Southern estimates the total cost from the derailment to have exceeded \$800 million.<sup>41</sup> This event illustrates the importance of transportation safety and cascading impacts of freight incidents to surrounding land uses. Several bills were proposed in the 2023-2024 U.S. Congress to address railroad safety following the event, though none have become law as of February 2024.<sup>42</sup> If a new rail safety bill is passed, railroads and their public agency partners may have additional requirements resulting in new safety projects.

*Figure 23: Norfolk Southern East Palestine, Ohio, Derailment in February 2023*



Source: The Morning Journal. [www.morningjournal.com](http://www.morningjournal.com)

### Fuel Sources and Carbon Emissions

Like the transportation industry at large, the U.S. rail industry is advancing vehicles powered by alternative fuels and implementing strategies to lower fuel consumption and emissions. One application involved integrating battery-electric locomotives with traditional diesel-fueled

<sup>40</sup> The Columbus Dispatch, Thousands of fish found dead days after Ohio train derailment, toxic spill in East Palestine, 2023. <https://www.dispatch.com/story/news/environment/2023/02/14/thousands-of-fish-found-dead-after-train-derailment-in-east-palestine/69902454007/>

<sup>41</sup> CNBC, Norfolk Southern CEO on Ohio derailment: 'We're making promises, and we're keeping promises', 2023. <https://www.cnbc.com/2023/08/15/norfolk-southern-ceo-on-ohio-derailment.html>

<sup>42</sup> Bills proposed in 2023-2024 Congress include: (1) Railway Safety Act (S.576), (2) Assistance for Local Heroes During train Crises Act (S.844), (3) Railway Accountability Act (S.1044), (4) Decreasing Emergency Railroad Accident Instances Locally (DERAIL) Act (H.R. 1238), (5) Reducing Accidents in Locomotives Act (H.R. 1633), and (6) Railway Safety Act of 2023 (H.R. 1674).



locomotives to reduce emissions while providing the necessary power for a freight train.<sup>43,44</sup> Freight rail manufacturers are also offering locomotives that can run on alternative fuels such as liquified natural gas and compressed natural gas. Manufacturers are producing conversion kits for existing locomotives, locomotives that rely on natural gas, as well as dynamic gas blending and injection capabilities that significantly reduce diesel usage.<sup>45 46</sup> Hydrogen fuel-cell locomotives are also being tested in the rail industry.<sup>47</sup> As CAMPO and its partners advance infrastructure for alternative fuels for roadway transportation, adoption and demand from the rail industry should be considered in system capacity planning.

Figure 24: Wabtec FLXdrive Battery-Electric Locomotive



Source: Wabtec

### Air Cargo Industry Trends and Developments

There have been a number of structural changes that have occurred in the air cargo industry over the past several years, most notably e-commerce growth and advancement of drone testing and use. These trends most directly impact how freight moves and are the focus of this section. Additionally, the industry must be responsive to security regulations, customer requirements and preferences, and an increased focus on emissions and sustainability from the public and policymakers.

#### e-Commerce

E-commerce, in particular, is resulting in significant changes to supply chain management and movement of commodities by air. The dominance of e-commerce platforms has accelerated the need for speed and flexibility, including in international cargo flows. This situation is leading to more decentralized trade flows that require superior tracking, logistics, and warehouse design.

<sup>43</sup> Wabtec. 2022. <https://www.wabteccorp.com/newsroom/press-releases/union-pacific-railroad-makes-largest-investment-in-wabtec-s-flxdrive-battery-electric-locomotive>

<sup>44</sup> Progress Rail. 2022. <https://www.railfreight.com/technology/2022/02/07/union-pacific-to-have-largest-electric-locomotive-fleet-in-the-world/>

<sup>45</sup> Progress Rail. 2023. [https://www.progressrail.com/en/Segments/Engines/Natural\\_Gas\\_Solutions.html](https://www.progressrail.com/en/Segments/Engines/Natural_Gas_Solutions.html)

<sup>46</sup> International Railway Journal. 2017. <https://www.railjournal.com/regions/north-america/florida-east-coast-railway-converts-locomotive-fleet-to-lng/>

<sup>47</sup> Trains. 2023. <https://www.trains.com/trn/news-reviews/news-wire/can-cpkcs-hydrogen-fuel-cell-locomotives-doom-the-diesel/>

Aviation is well suited to absorb much of this demand due to its speed and reliability across long distances, especially when compared to marine transportation for transcontinental shipments. Related air-cargo trends include the following:

- Development of products and services that provide end-to-end solutions with specialized handling and full tracking and tracing, on a retail basis.
- Changing customer expectations about delivery speed, reliability, and transparency.
- The growth of the freight integrators such as FedEx and DHL who can provide end-to-end, express delivery service.
- Retail internet platform providers' owner-controlled logistics networks such as Amazon, Walmart, and Target.
- The growth of very large freight forwarders that want to control their own airlift capacity.

As shown earlier in Figure 12, e-Commerce grew at an accelerated pace during the COVID-19 pandemic and has maintained nearly 15 percent of the retail market.

International e-commerce is causing significant changes to the movement of commodities throughout the supply chain. In order to accommodate these requirements, airports need a simplified clearance process for shipments, larger on-apron facilities to accommodate air cargo transfers, and specialized facilities to handle temperature controlled, hazardous, and bonded goods. They also need better connectivity to off-airport support facilities. Austin Bergstrom International Airport (AUS) has undertaken a \$33 million cargo expansion to include flexible cargo space, trailer staging, and employee parking. As the airport increases its airside cargo capacity and on-site cargo-handling capabilities, CAMPO can facilitate growth by monitoring and planning for roadside capacity and efficiency accessing the airport.

### Drones and Unmanned Aerial Vehicles (UAVs)

A delivery drone is a type of UAV used for distributing packages to consumers during the last-mile delivery process. Drone delivery is an intermodal technology likely to expand in the next five years. Offering a wide range of benefits, the major focus is on increased connectivity and reliability. As e-commerce direct-to-customer shipping grows, this intermodal technology allows for more efficient goods movement to the final consumer, especially in urban areas. Drone delivery also has applications in remote, less densely populated rural areas where customers are dispersed and the cost to deliver is high. Drones are likely to fill a niche in inspection roles, in local delivery of certain goods such as pharmaceuticals and other medical supplies, or in delivery to remote areas with few roads.

Most drones are fully autonomous and can take off and land vertically, making their use in dense urban areas practical. Their main infrastructure requirement is enough space to take off and land safely, resulting in the use of building rooftops as a common staging area for delivery drones. Their delivery range and load can vary based on battery capacity and other limitations. Delivery range can be up to 300 miles and maximum loads range from 300 to 500 pounds. However, most drones carry packages that weigh under 5 pounds.

### Regulation

One of the main barriers to accelerated adoption of drones for last-mile delivery is compliance with various regulations and standards that govern the use of airspace, privacy, security, and noise, and these regulations continue to evolve as use cases and the regulatory environment

mature. For example, night operation under certain conditions were permitted in April 2021.<sup>48</sup> These changes to the FAA’s Small Unmanned Aircraft Systems (UAS) Rule, Part 107 also allowed for drones under 0.55 pounds to fly over people and moving vehicles. While this weight requirement is prohibitive for freight applications, the changes can allow for remote traffic monitoring and surveying to enhance traffic information. For flight operations over vehicles, restrictions include either:

- The UAV must remain within a closed or restricted-access site, and all individuals inside any moving vehicle within the designated area must be on notice of the operation; or
- The UAV does not maintain sustained flight over moving vehicles.

Additional guidance is given by the State of Texas’s Government Code, Chapter 423 which details what is permissible (423.002) and what is considered an offense (423.003, 423.004, 423.0045, 423.0046). This includes restrictions on use near critical infrastructure facilities such as ports, petroleum refineries, steelmaking facilities, among other contexts.<sup>49</sup> Drones also have to avoid collisions with other drones, birds, or buildings and ensure safe landing and delivery of goods.

### Testing

UAV use cases are being tested and validated, including hub-to-hub, hub-to-van, rooftop deliveries, and direct-to-customer applications. The FAA is authorizing expanded testing conditions, beyond what is currently permitted by law, on a case-by-case basis to facilitate the safe evolution of UAS use. For example, in August 2023, the FAA authorized three companies (Phoenix Air Unmanned, UPS Flight Forward, and uAvionix) to operate drones beyond visual line of sight (BVLOS).<sup>50</sup>

Texas is home to many test programs for UAS. Texas A&M University in Corpus Christi has been one of seven test sites for the FAA since 2014. The objective of this testing is to provide verification of the safety of the public, operations, and related navigational procedures before drones are integrated into the National Airspace System (NAS).<sup>51</sup> In 2022, Walgreens launched its first drone delivery in a major U.S. market in suburbs north of Dallas.<sup>52</sup> The service is being offered in partnership with Alphabet’s Wing drone which can carry three pounds and is flown autonomously but monitored by pilots.<sup>53</sup> In October 2023, Amazon announced the expansion of Prime Air, its drone delivery program, to include College Station, Texas, in addition to its existing

<sup>48</sup> Code of Federal Regulations. Title 14, Chapter I, Subchapter F, Part 107—Small Unmanned Aircraft Systems. <https://www.ecfr.gov/current/title-14/chapter-I/subchapter-F/part-107>.

<sup>49</sup> State of Texas’s Government Code, Chapter 423. <https://statutes.capitol.texas.gov/Docs/GV/htm/GV.423.htm>.

<sup>50</sup> FAA. 2023. <https://www.faa.gov/newsroom/faa-authorizes-ups-uavionix>

<sup>51</sup> Federal Aviation Administration. UAS Test Site Program. [https://www.faa.gov/uas/programs\\_partnerships/test\\_sites/](https://www.faa.gov/uas/programs_partnerships/test_sites/).

<sup>52</sup> Walgreens. 2022. <https://news.walgreens.com/our-stories/walgreens-and-wing-launch-drone-delivery-in-first-major-us-metropolitan-area.htm>

<sup>53</sup> *Alphabet’s Wing project unveils new drone delivery model in Texas*. Reuters. October 20, 2021. <https://www.reuters.com/technology/alphabets-wing-project-will-unveil-new-drone-delivery-model-texas-2021-10-20/>.

service in Lockeford, California.<sup>54</sup> Prime Air offers delivery of thousands of products under five pounds as well as pharmaceutical delivery.

Figure 25: *Delivery Drone Taking Off from Rooftop*



Source: ZF

## Conclusion and Next Steps

This memorandum described the current drivers of freight generation, commodity flows and forecasts, land use and development patterns, and freight trends impacting the CAMPO region. The Capital Area has experienced rapid population growth alongside increased industrial investment, resulting in new freight demands on the transportation system. CAMPO can expect freight volumes on the highway, rail, and air systems to continue to increase. However, evolving transportation and infrastructure technology, shipping patterns and market demands present many opportunities to shape the future of goods movement in Central Texas.

The findings of this memorandum, as summarized in the introduction and detailed throughout, provide essential context behind the trends and developments transforming supply chain operations, logistics, and last-mile delivery. Many of these trends are driven by the private sector and fall outside CAMPO's direct purview. Nonetheless, they significantly influence how businesses, industries, and households in the region are served by freight logistics. Developments such as the use of drones and advanced delivery vehicle technologies, some which are operating in public rights-of-way, highlight the need for enhanced coordination between the public and private sectors. This coordination is vital to ensure that there are appropriate policies, regulations, and supporting infrastructure to safely accommodate these new operators.

This can be achieved through regular dialogue with the private sector, including outreach to freight industries and the technology sector. Opportunities for pilot demonstrations and working group discussions could foster collaboration and innovation. While these findings do not directly inform the recommendations of the final Regional Freight Plan, they offer a critical framework for understanding the dynamic landscape of freight movement. This understanding is imperative for developing a plan that is both responsive to current trends and adaptable to future changes in the freight industry.

<sup>54</sup> KXAN. 2023. <https://www.kxan.com/news/texas/amazon-expands-drone-delivery-service-in-college-station-reveals-new-plans/>



CAPITAL AREA METROPOLITAN  
PLANNING ORGANIZATION

Trends and Forecasts  
Report

# Appendix A: Future Land Use Assessment



Final 1: March 6, 2024

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## Acronyms

CAMPO – Capital Area Metropolitan Planning Organization

EDA – Economic Development Administration

EDC – Economic Development Corporation

ETJ – Extra-Territorial Jurisdiction

GSMP – Greater San Marcos Greater Partnership

IH – Interstate Highway

LEDC – Lockhart Economic Development Corporation

SH – State Highway

SMART – San Marcos Air, Rail, and Transportation Terminal

THFN – Texas Highway Freight Network

TIF – Tax Increment Financing

US – United States Highway

## Summary Overview

Numerous cities have future land use policies and vacant land available to welcome freight-intensive uses, as well as economic development policies supporting them. Vacant land with future industrial land use will be critical for freight growth areas located near major highways. Additional factors to consider are land values and environmental constraints.

The analysis of freight development and land use trends has identified cities to the north and east of Austin with direct access to the multimodal freight network and meeting the criteria for freight intensive users. These cities have the greatest potential as freight growth areas and will benefit from regional manufacturing and distribution development projects. They include:

- Bastrop (Industrial Park only)
- Marble Falls
- Caldwell County (Luling and Lockhart)
- Hays County (Buda, Kyle, and San Marcos)
- Austin (North Burnet/Gateway area; Metric and Highway 183)
- Williamson County (Pflugerville, Round Rock, Taylor, and Cedar Park)

Austin-Bergstrom International Airport and the IH 35 corridor are integral to the movement of freight for the cities above, along with other modes of transportation that are part of the Texas Highway Freight Network. Manufacturers and distributors will find these cities well-suited to their needs.

However, the roadway networks may not be currently designed to handle frequent truck traffic and oversized/overweight loads. Therefore, considerations for integrating freight-intensive land uses with the multimodal freight network are necessary, such as access management, rural highway safety, bridge and pavement asset management, and connectivity with the Texas Highway Freight Network (THFN).

## County/City Analysis

In the CAMPO region, the cities have local control over land use policies and zoning, which influences the development and siting of industrial uses and freight generators. The following subsections are organized by county and focus on cities with land use policies and economic development priorities supporting freight-intensive users. Information on planned major projects is included where available. Numerous CAMPO municipalities are currently undergoing comprehensive plan updates to address growth and infrastructure needs.

### Bastrop County

- 888 square miles (land only)
- Cities: Bastrop (county seat), Mustang Ridge, Elgin, Smithville
- Major highways: US 290, SH 21, SH 71, SH 95, SH 304



## Bastrop

### *Comprehensive Plan Land Use Policies*

Bastrop’s comprehensive plan indicates that of the 3,500 acres of vacant land within the Bastrop municipal limits, approximately 1,500 acres are zoned for office, general retail, commercial, and industrial uses.<sup>1</sup> The plan lists several parameters related to industrial development, both within and outside the city limits. Several are specific to industrial land use and intended to minimize impacts to adjacent properties:<sup>2</sup>

- Industrial land uses should be located on and take vehicular access from arterial roads, or from industrial streets which lead directly to arterial streets.
- Heavy manufacturing or similar uses should not be located adjacent to existing residential land uses, areas targeted for residential use, or sensitive environmental areas, in addition to other performance measures contained in the Bastrop Code of Ordinances.
- In development involving loading docks and bays, arrange loading areas so they do not face the front property line or public right-of-way.

Furthermore, the plan envisions that industrial growth will remain centered in and around the current Bastrop Industrial Park.<sup>3</sup> The plan also notes that there is a lack of industrial street standards in Bastrop, which include sturdier road bases and surfacing, as well as greater dimensional standards for large vehicles, and that the Subdivision Code should be amended to incorporate industrial street standards.<sup>4</sup>

### *Economic Development Priorities*

The Bastrop Economic Development Corporation (EDC) commissioned a study in 2010 to guide the creation of an economic development strategy for the community. The study, “Elevating Bastrop: An Economic Development Action Plan to Attract Talent and Investment,” listed transportation and warehousing as one of six industry sectors with state and national growth.<sup>5</sup>

The plan suggests that businesses planning to expand or relocate within Bastrop Business and Industrial Park may be eligible for reduced property purchases, or even free land. The program is based on the amount of capital investment and the number of primary jobs created. The

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<sup>1</sup> City of Bastrop, “Bastrop Comprehensive Plan (2016-2026) Chapter 5 Land Use & Community Image” (pp. 5-3). (2016). Accessed from: <https://www.zotero.org/foresightcitations/trash/items/U3PTIL5S/item-list>

[https://www.cityofbastrop.org/upload/page/0267/docs/Chap%205%20Land%20Use\\_Community%20Image.pdf](https://www.cityofbastrop.org/upload/page/0267/docs/Chap%205%20Land%20Use_Community%20Image.pdf)

<sup>2</sup> Ibid pp. 5-30

<sup>3</sup> Ibid pp. 5-31

<sup>4</sup> Ibid pp. 5-43

<sup>5</sup> Golden Shovel Agency “Elevating Bastrop: An Economic Development Action Plan to Attract Talent and Investment” (p. 16) (2020). Accessed from: <https://www.bastropedc.org/about/strategic-plan/p/item/11143/strategic-plan>

business may receive a portion of the purchase price after a certain time, based upon reaching certain milestones. In addition, a project may also qualify for a Texas Department of Agriculture Capital Fund grant for up to \$750,000 in infrastructure improvements.<sup>6</sup> The website notes that the city could apply for this grant on behalf of the project.

In addition, the City of Bastrop may provide tax abatements on value added to the real property or new business property to encourage business investment and/or expansion in the city, subject to city council approval.<sup>7</sup>

### *Major Planned Projects*

In 2021, The Boring Company purchased 73 acres in Bastrop County to build an 80,000-square-foot warehouse and manufacturing facility at 130 Walker Watson Road north of the SH 71 and SH 21 westbound split.<sup>8</sup> Bastrop County Commissioner's Court tabled the conditional use permit in February 2022. As of July 2023, it is unknown if the project has been approved.

### Burnet County

- 994 square miles (land only)
- Cities: Bertram, Burnet (county seat), Cottonwood Shores, Double Horn, Granite Shoals, Highland Haven, Horseshoe Bay (mostly in Llano County), Marble Falls, and Meadowlakes
- Major highways: US 183, US 281, SH 29

### Burnet

#### *Comprehensive Plan Land Use Policies*

In December 2021, the Burnet City Council hired Freese & Nichols to update their comprehensive plan. As of July 2023, the status of the plan is pending, and future land use policies are currently not available.<sup>9</sup>

The EDC's website indicates the highest zoning category available within the city limits is commercial.<sup>10</sup> Permitted uses in that category include cafés, restaurants, taverns, food sales, food and beverage sales, convenience stores, hotels, banks, offices, service shops, and shopping

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<sup>6</sup> Ibid

<sup>7</sup> Bastrop Economic Development Corporation. "Bastrop, Tx Incentives." Accessed from: <https://www.bastropedc.org/business/incentives/>.

<sup>8</sup> Ashbrook, Maeve "Elon Musk's The Boring Company purchases land in Bastrop outside Austin" KVUE News. July 9, 2021. Accessed from: <https://www.kvue.com/article/money/economy/boomtown-2040/elon-musk-the-boring-company-purchases-land-bastrop/269-1d1490d8-2595-4939-b914-289bcda43d2b>

<sup>9</sup> Cooley, Brigid. "Burnet Council Approves Contract for City Comprehensive Plan." DailyTrib.Com (blog), December 16, 2021. Accessed from: <https://www.dailytrib.com/2021/12/16/burnet-council-approves-contract-for-city-comprehensive-plan/>.

<sup>10</sup> Burnet Economic Development Corporation. "Available Properties | Burnet Texas." Accessed from: <https://www.burnetedc.com/ed/properties>.

centers. Therefore, it is not likely for freight-intensive industries to pursue locating in Burnet without a zone change request.

### *Economic Development Priorities*

The Burnet Economic Development Corporation notes that the city and county offer various incentives for qualifying businesses.<sup>11</sup> Some of these include:

- Tax abatements
- Utility incentives
- Reinvestment Zones
- Electric Utility Incentives
- Freeport Tax Exemptions

### Marble Falls

#### *Comprehensive Plan Land Use Policies*

Marble Falls is currently updating their comprehensive plan, which may result in an increase or decrease of land designated for industrial use. The plan will address physical development, redevelopment, and the future direction of growth within the Marble Falls planning area.<sup>12</sup> Future land use policies are currently not available. The plan is expected to be complete in the fall of 2023.

#### *Economic Development Priorities*

The Marble Falls EDC has identified target industries.<sup>13</sup> They include freight-intensive uses, such as:

- E-ship and technical services
- Specialty Distribution
- Light Manufacturing
- Sustainable agriculture and ranching

Furthermore, the EDC completed a strategic plan process with an update in 2013.<sup>14</sup> Several of the goals support industrial-type development, such as:

- Develop a strong, goal-oriented business attraction program.
- Support the success of existing businesses.
- Strategically develop and recruit at the business park.

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<sup>11</sup> Burnet Economic Development Corporation. "Economic Incentives | Burnet Texas." Accessed from: <https://www.burnetedc.com/ed/page/economic-incentives>.

<sup>12</sup> Marble Falls Comprehensive Plan Update. May 2023. Accessed from: <https://storymaps.arcgis.com/stories/34f6b1eb930b46578e0694eadd68af42>

<sup>13</sup> Marble Falls Economic Development Corporation. "Marble Falls Target Industry Analysis | Marble Falls EDC," June 24, 2017. Accessed from: <https://www.marblefallseconomy.com/target-industry-analysis/>.

<sup>14</sup> Marble Falls Economic Development Corporation. "Marble Falls 2012-2013 Strategic Plan | Marble Falls EDC," April 25, 2017. Accessed from: <https://www.marblefallseconomy.com/2012-2013-strategic-plan/>.

- Create a competitive incentive program.

They also offer several grants supporting businesses, such as the business improvement grant program, a sign replacement grant, and a community leverage grant.<sup>15</sup>

### *Major Planned Projects*

There are several planned business and industrial parks available for new businesses and industries in Marble Falls. The EDC's website says "manufacturing, distribution, regional service companies, regional corporate headquarters, and professional service firms will find a wide range of existing buildings and property for sale" and their locations.<sup>16</sup>

### Caldwell County

- 545 square miles (land only)
- Cities: Lockhart (county seat), Niederwald, Martindale, Luling, San Marcos (mainly in Hays County)
- Major highways: IH-10, US 90, US 183, SH 80, SH 130

### Caldwell County

#### *Economic Development Priorities*

Both Luling and Lockhart are well-positioned for future freight industry growth due to land use policies and economic development priorities, as well as a few environmental constraints.

The county's EDC boasts its prime location in the heart of the Texas Innovation Corridor, with quick and easy access to Austin and San Antonio as well as access to SH 130, which connects to IH 10 and Houston.<sup>17</sup>

The website also notes that Caldwell County is the site of the country's first and largest Job Corps program, Gary Job Corps, located adjacent to the San Marcos Regional Airport. The program provides free career training and on-the-job experience to low-income young adults, so they are ready for the workforce.<sup>18</sup>

### Lockhart

#### *Comprehensive Plan Land Use Policies*

Lockhart's comprehensive plan lists a land use goal to "establish adequate acreage for industrial parks to facilitate expanded employment opportunities and enhance the community's tax

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<sup>15</sup>Marble Falls Economic Development Corporation. "Available Business Programs Offered by the Marble Falls EDC. | Marble Falls EDC," April 25, 2017. Accessed from: <https://www.marblefallseconomy.com/available-programs-0/>.

<sup>16</sup>Marble Falls Economic Development Corporation. "Marble Falls Business Industrial Parks | Marble Falls EDC," April 25, 2017. Accessed from: <https://www.marblefallseconomy.com/business-industrial-parks/>.

<sup>17</sup>Caldwell County Texas. "Caldwell County, Texas." Accessed July 14, 2023. Accessed from: <https://www.co.caldwell.tx.us/page/caldwell.Economic%20Development>.

<sup>18</sup>Gary Jobs Corps "Job Corps | Gary." Accessed July 14, 2023. <http://gary.jobcorps.gov/>.

base.”<sup>19</sup> The goal validates Lockhart’s plan to bring industrial users to their community.

The comprehensive plan also references numerous policy considerations related to the placement of industrial land uses and incompatible uses. These include:

- The compatibility of existing uses should be maintained with consideration given to the long-term transition of land use and opportunities for redevelopment.
- There should be sufficient buffering between incompatible land uses to minimize harmful effects on the value and enjoyment of land.
- Transportation access and circulation should be provided for uses that generate large numbers of trips.
- Land use decisions should be made to ensure adequate transportation facilities are existing or planned to support access and circulation needs.

### *Major Planned Projects*

The Walton International Group has several master plans in Caldwell County, mostly with residential and commercial opportunities. However, the I-Zone Texas project in San Marcos has 1,744 acres in the Cotton Center Master Plan available for commercial and industrial uses. The project is located immediately south of the San Marcos Regional Airport and the Gary Job Corps Center. The plan has potential freight growth with direct access to SH 80 and SH 142, which provide direct access to IH 35 and the SH 130 Tollway.

### *Economic Development Priorities*

The Lockhart Economic Development Corporation (LEDC) is seeking businesses to locate in Lockhart, as well as to retain and grow existing businesses.<sup>20</sup> The corporation assists in finding resources to help growing businesses, such as locating a larger building or land, financial incentives or assistance, or helping to train employees.

The LEDC targets several industries, such as auto parts, metal, and electronic manufacturing, food and beverage processing, logistics and distribution, pharmaceutical and medical supplies, and medical device manufacturing.<sup>21</sup>

In the report, “A Competitive Realities Report and Target Industry Strategy for Lockhart, Texas,” Garner Economics, LLC advises Lockhart to be more proactive in building the assets and

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<sup>19</sup> City of Lockhart. “Lockhart 2020 Comprehensive Plan.” (p.3) Accessed from: <https://www.lockhart-tx.org/page/open/1554/0/2020%20Comprehensive%20Plan>.

<sup>20</sup> City of Lockhart Economic Development. “Retention & Expansion.” Accessed from: <https://lockhartedc.com/business-growth/retention-and-expansion>.

<sup>21</sup> City of Lockhart Economic Development. “Target Industries.” Accessed from: <https://lockhartedc.com/site-selectors/target-industries>.

infrastructure needed to attract higher-quality targets and companies.<sup>22</sup> To be considered by targeted industries, Garner Economics advises Lockhart to seek resources to build and provide sites and buildings for interested industries.

The report also includes several recommendations for Lockhart to support the target industry strategy:<sup>23</sup>

- Develop an inventory of existing sites and buildings.
- Create a culture of “yes” within the City’s permitting and regulatory processes.
- Develop and sustain a coordinated effort for workforce training.

### Luling

As a small municipality of less than 6,000 residents, there is limited information available online on Luling’s comprehensive plan and economic development priorities. However, the location is ripe for freight-intensive growth and the city is poised to attract manufacturing and other industrial users as highlighted in recent economic development announcements.

#### *Major Planned Projects*

Earlier in 2023, the X-Bow rocket motor manufacturing company announced it would build a \$25 million facility in Luling. The new campus will be built on the land that previously served as the Caldwell County Carter Memorial Airport, which closed in 2022.<sup>24</sup>

In June 2023, the U.S. Department of Commerce’s Economic Development Administration (EDA) awarded \$1 million to Luling for business growth. The KVUE article quotes Governor Abbott saying, “This grant to help support growth in aerospace manufacturing and other important industries will bring hundreds of good-paying jobs to Texans and the City of Luling.”<sup>25</sup> The article also explains the \$1 million will be invested in Luling’s industrial park to spur business growth and development in the region.

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<sup>22</sup> Garner Economics LLC. “A Competitive Realities Report and Target Industry Strategy for Lockhart, Texas.” (p. 72) Lockhart Texas Economic Development Corporation. Accessed from <https://lockhart.nyc3.digitaloceanspaces.com/downloads/Final-Garner-Report-for-printing.pdf>.

<sup>23</sup> Ibid p. 69

<sup>24</sup> kvue.com. “X-Bow Systems Planning Rocket Motor Manufacturing Facility in Luling,” February 12, 2023. Accessed from: <https://www.kvue.com/article/money/economy/boomtown-2040/x-bow-systems-rocket-manufacturing-facility-luling/269-d09fcb31-ab46-45fe-8ff9-15010c599a84>.

<sup>25</sup> kvue.com. “City of Luling Receives \$1M Federal Grant to Support Business Growth,” June 12, 2023. Accessed from: <https://www.kvue.com/article/money/economy/boomtown-2040/luling-grant-manufacturing-business-growth/269-d36f0820-efca-4ef4-8560-0c714f0f5dd1>.

### Buda

#### *Comprehensive Plan Land Use Policies*

Buda is also undertaking a comprehensive plan update.<sup>26</sup> A draft future land use plan was released in June 2023 for public comment. The plan shows large tracts of industrial land use along the Union Pacific railroad, between FM 1626 and IH 35. Two land use categories are included in the plan that would allow freight-intensive uses. The interstate land use category would permit light industrial and manufacturing uses, but not fronting service roads; industrial users also require heavy buffering from residential areas.<sup>27</sup> The industrial land use category is in Buda's primary industrial area, southwest of town. It would be available for target industries and provide an opportunity to expand the tax base with large users, as well as small businesses in the local supply chain. This area includes "legacy industrial users," but is also available for new industrial development. The area offers advantageous access to major thoroughfares and IH 35.

Although the comprehensive plan is being updated, the current plan supports industrial uses.<sup>28</sup> The goal of the industrial employment district is to provide the needed services and facilities to enable major industrial activity in Buda while being sensitive to future land uses. Heavy industrial is the dominant use in this district. The industrial employment district was created for the mining industry, which contributes heavily to the local economy but is incompatible with many other uses. The industrial companies own much of the land in this district, so this activity is expected to continue well into the future. The proximity to IH 35 permits direct access for the heavy truck traffic generated by industrial activities.

However, much of this district is located over the Edwards Aquifer, which requires additional protection measures for natural features and water quality of this area. This may be limiting for potential freight-intensive businesses wanting to locate in this area.

#### *Economic Development Priorities*

The City of Buda's Incentive Policy identifies advanced manufacturing/industrial as a target industry and indicates additional incentives may be offered to industries interested in locating in Buda.<sup>29</sup> In addition, a task force is established to streamline the process of evaluating these projects through the city's development process.

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<sup>26</sup> Our Buda. "Our Buda | Downtown Plan, Corridor Study, Etc. for Buda, TX." Accessed from: <https://ourbuda.com/>.

<sup>27</sup> Our Buda. "Draft Future Land Use Categories," June 21, 2023. [https://ourbuda.com/wp-content/uploads/2023/07/DRAFT\\_Land-Use-Categories.pdf](https://ourbuda.com/wp-content/uploads/2023/07/DRAFT_Land-Use-Categories.pdf).

<sup>28</sup> City of Buda. "Buda 20030 Comprehensive Plan - Future Land Development Plan For Buda." (pp. 199-200) Accessed from: [https://legistarweb-production.s3.amazonaws.com/uploads/attachment/pdf/250539/E\\_Comprehensive\\_Plan\\_Future\\_Land\\_Development\\_Excerpt\\_including\\_Map.pdf](https://legistarweb-production.s3.amazonaws.com/uploads/attachment/pdf/250539/E_Comprehensive_Plan_Future_Land_Development_Excerpt_including_Map.pdf)

<sup>29</sup> City of Buda. "City of Buda Incentive Policy 2018." Accessed from: [https://legistarweb-production.s3.amazonaws.com/uploads/attachment/pdf/1245992/Buda\\_Incentive\\_Policy\\_-\\_2018\\_1\\_.pdf](https://legistarweb-production.s3.amazonaws.com/uploads/attachment/pdf/1245992/Buda_Incentive_Policy_-_2018_1_.pdf)

The Buda EDC and the city can provide incentives to businesses locating in or expanding in Buda. Advanced manufacturing and industrial businesses are desired.<sup>30</sup> Many local and state incentives are available to assist with business development.

### Hays County

- 680 square miles (land only)
- Cities: San Marcos (county seat), Niederwald, Uhland, Buda, Dripping Springs, Hays, Kyle, Mountain City, Wimberley, Woodcreek
- Major highways: IH 35, US 290, SH 21, SH 80

Hays County is another area well suited for growth. Several cities along IH 35 have available land, industrial land uses, and supportive economic development policies. Hays County is also part of the Greater San Marcos Greater Partnership (GSMP), a nonprofit public-private partnership serving as the regional economic development organization for San Marcos, Hays, and Caldwell counties.<sup>31</sup> The GSMP promotes and markets on behalf of the region, drawing new companies and supporting expansion of existing companies.

### Kyle

#### *Comprehensive Plan Land Use Policies*

Kyle is another city currently updating its comprehensive plan. They recently had an open house in May 2023 to gather community input on two growth scenarios. The consultant presented both scenarios to the City Council, and the plan adoption is expected in late 2023.<sup>32</sup>

#### *Economic Development Priorities*

The City of Kyle is willing to offer a range of incentives to attract businesses based on a variety of factors, such as capital investment, tax revenue potential, and job creation.<sup>33</sup> The Economic Development Corporation website lists many local incentives to enhance economic development and streamline the development process.<sup>34</sup> Some of these include:

- Chapter 380 Economic Development Agreements
- First year tax rebates up to \$10,000
- Freeport tax exemptions
- Infrastructure Projects
- Public Improvement District

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<sup>30</sup> Buda TX Economic Development Corporation. "Incentives | Buda EDC." Accessed from: <https://budaedc.com/incentives>.

<sup>31</sup> Great San Marcus Partnership. "Our Services | Greater San Marcos Partnership." Accessed from: <https://greatersanmarcostx.com/about/our-services>.

<sup>32</sup> City of Kyle, Texas – Official Website. "Comprehensive Plan Open House." Accessed from: <https://www.cityofkyle.com/communications/comprehensive-plan-open-house>.

<sup>33</sup> City of Kyle Economic Development. "Incentives | Kyle, TX Economic Development." Accessed from: <https://kyleed.com/choose-kyle/incentives>.

<sup>34</sup> Ibid



- Tax abatement

### Dripping Springs

#### *Comprehensive Plan Land Use Policies*

Due to its recent rapid growth, the City of Dripping Springs initiated a comprehensive plan update in April 2022. The city also placed a moratorium on development until September 2022.<sup>35</sup> The growth has impacted the city's infrastructure, including wastewater capacity. The comprehensive plan update will establish future land use priorities, as well as guide infrastructure investments and economic development.<sup>36</sup>

It is important to note that the current future land use map does not have an industrial land use category.<sup>37</sup> Therefore, it is unknown if there will be an opportunity for freight-intensive uses in the plan update. The public input process will continue through 2023.

#### *Economic Development Priorities*

Although Dripping Springs seeks business growth, it is concerned with sustainability. They have an economic development program created by the Economic Development Committee to develop and expand the local economy, and they are willing to provide incentives on a case-by-case basis.<sup>38</sup> The committee's mission is to facilitate business growth and attract clean and sustainable businesses to Dripping Springs while providing employment opportunities.

The Chapter 380 Economic Development Program promotes commercial and manufacturing businesses to locate, remain, and expand in Dripping Springs. The purpose of the Chapter 380 program is to expand the local economy by enhancing its economic development efforts to attract and retain high quality development and jobs.<sup>39</sup>

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<sup>35</sup> kvue.com. "City of Dripping Springs Extends Development Moratorium yet Again | Kvue.Com." February 16, 2022. Accessed from: <https://www.kvue.com/article/money/economy/boomtown-2040/dripping-springs-extends-development-moratorium-until-may-kvue/269-d3ac1d61-5fc1-4b18-9481-aba3922021f2>.

<sup>36</sup> City of Dripping Springs. "Dripping Springs Launches Comprehensive Plan Initiative | Dripping Springs, TX," April 18, 2022. <https://www.cityofdrippingsprings.com/site-home/news/dripping-springs-launches-comprehensive-plan-initiative>.

<sup>37</sup> City of Dripping Springs. "City of Dripping Springs Comprehensive Plan 2016," November 15, 2016.

Accessed from:

[https://www.cityofdrippingsprings.com/sites/g/files/vyhliif6956/f/uploads/final\\_comprehensive\\_plan\\_11.15.16\\_1.pdf](https://www.cityofdrippingsprings.com/sites/g/files/vyhliif6956/f/uploads/final_comprehensive_plan_11.15.16_1.pdf).

<sup>38</sup> Dripping Springs Chamber. "Economic Development." Accessed from:

<https://drippingspringstx.org/economic-development/>.

<sup>39</sup> City of Dripping Springs. "CHAPTER 380 ECONOMIC DEVELOPMENT PROGRAM POLICIES & PROCEDURES," November 15, 2016. Accessed from:

[https://www.cityofdrippingsprings.com/sites/g/files/vyhliif6956/f/uploads/380\\_guidelines\\_adopted\\_10-16-07.pdf](https://www.cityofdrippingsprings.com/sites/g/files/vyhliif6956/f/uploads/380_guidelines_adopted_10-16-07.pdf)

## San Marcos

### *Comprehensive Plan Land Use Policies*

San Marcos is another city in the process of a comprehensive plan update. A draft was released in January 2023. The commercial/employment census category indicates light to heavy industrial and warehousing and distribution as primary land uses.<sup>40</sup> New commercial/employment areas should be focused on designated areas along or near highways. The land use is primarily distinguished by light to heavy industrial, warehouse and distribution, lower density office, and general commercial uses.

The draft plan includes several economic development goals supporting target industries, which include aerospace, aviation, security and defense, regional distribution, materials science, and life science. Specific economic development goals in the draft plan include:<sup>41</sup>

- ECD-3.1 Regularly assess and update target industries and collaborate with all educational institutions to support workforce development for specific industry needs.
- ECD-3.2 Leverage the Greater San Marcos Partnership “Texas Innovation Corridor” identity to attract investment and new employment opportunities.
- ECD-3.3 Plan for commercial land and employment centers consistent with the Preferred Scenario Map, including Class A office, industrial, and other uses to attract target industries.
- ECD-3.5 Develop partnerships to create transit connections between the community and major airports in nearby cities; and improve connections between the community and the San Marcos Regional Airport through enhanced transit, road, and utility infrastructure.

The city has a strong infrastructure network and a ready workforce to support business growth, so it does not offer financial incentives. However, it will consider incentives when filling gaps and when supporting business developments that would not locate in San Marcos or choose not to expand their operation.<sup>42</sup>

### *Major Planned Projects*

Forty acres of land in the San Marcos Extra-Territorial Jurisdiction (ETJ) were annexed in 2022 and have freight-intensive growth potential.<sup>43</sup> It is on Posey Road between Transportation Way

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<sup>40</sup> Vision SMTX. “Revised Draft San Marcos Comprehensive Plan,” (pp. 108-111) January 2023. Accessed from: [https://www.visionsmtx.com/wp-content/uploads/2023/02/VisionSMTX\\_FinalDraft\\_02.16.23\\_.pdf](https://www.visionsmtx.com/wp-content/uploads/2023/02/VisionSMTX_FinalDraft_02.16.23_.pdf).

<sup>41</sup> Ibid p.50

<sup>42</sup> City of San Marcos. “Incentives | City of San Marcos, TX.” Accessed from: <https://sanmarcostx.gov/3561/Incentives>.

<sup>43</sup> Weilbacher, Eric. “San Marcos City Council approves annexation, rezoning for two industrial, heavy commercial areas,” May 6, 2022. Community Impact Newspaper. Accessed from [San Marcos City Council approves annexation](#)

and IH 35. The zoning allows for a significant increase in commercial and industrial development on the fringes of San Marcos.

Hill Country Studios was set to begin construction in April 2023, and the expected completion is in August 2025.<sup>44</sup> The film production studio is located near Wonder World Drive and West Center Point Road in the La Cima development. The 820,000-square foot facility will include stages, workshops, offices, and support spaces. The project will include additional retail space for public use. It is expected that the development will support local businesses and industries.

The area of the newly constructed one million square foot Amazon Delivery Station on Fortuna Road in San Marcos has a large freight-growth potential due to its proximity to IH 35 and planned road improvements.

The Gas Lamp District Master Plan development by the Walton International Group in San Marcos has lots available for commercial and industrial uses. The master plan has direct access to Centerpoint Road and Old Bastrop Road, as well as IH 35.

The CAMPO Existing Conditions report included information on a pending annexation and zoning request for the SMART (San Marcos Air, Rail, and Transportation) Terminal. As of June 2023, the owner withdrew the annexation and zoning request for the Axis Logistics Park. The land was east of FM 110, between SH 80 and the Union Pacific railroad tracks. The site is east of the alignment for the new FM 110 loop.

### Travis County

- 990 square miles (land only)
- Cities: Austin (county seat with small parts in Hays and Williamson Counties), Cedar Park (mainly in Williamson County), Elgin (mostly in Bastrop County), Leander (mainly in Williamson County), Mustang Ridge (small parts in Caldwell and Bastrop Counties), Pflugerville (small part in Williamson County), Round Rock (mainly in Williamson County), Bee Cave, Creedmoor, Jonestown, Lago Vista, Lakeway, Manor, Rollingwood, Sunset Valley, West Lake Hills
- Major highways: IH 35, US 183, US 290, SH 71, TX Loop 1 (MoPac Expressway), SH 45, SH 130

### Austin

Austin is competing with numerous, adjacent smaller cities with available land, industrial zoning, access to the freight network, and very few environmental constraints. In addition, these cities are offering economic incentives to attract new industries. Most of Austin's future industrial land uses are on the city's eastern edge, near the airport. Without redevelopment efforts, zone

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<sup>44</sup> <https://storymaps.arcgis.com/stories/c7056df1cc3742a68e6e59fc26a83aea>

changes, or the acquisition of new land, it is not likely for large scale industries to pursue locating in Austin.

### *Comprehensive Plan Land Use Policies*

Austin's 2035 North Burnet/Gateway Master Plan is a redevelopment vision to transform the area from an "aging, auto-oriented commercial and industrial uses" into a mixed-use, pedestrian and transit-friendly neighborhood.<sup>45</sup> The plan's objective is to increase residential dwelling units, commercial space, hotels, and industrial warehouse and service center space. The plan targets increasing industrial warehouse and service center space to five to six million square feet over the next 25 to 30 years.

The plan recognizes trucking as the most utilized mode for freight transportation in the North Burnet/Gateway area. Most parcels in the southeast side of the study area are zoned industrial and include warehousing or distribution uses.<sup>46</sup> It is one of the largest distribution centers within the city, and most of the loading/unloading occurs in this area.

However, the plan proposes reducing the number of parcels with industrial zoning. There is a regional need to provide for industrial land uses and trucking activity, however, the desire is to concentrate industrial land uses in the southeast portion of the plan area, where there is convenient roadway access to MoPac and Highway 183.<sup>47</sup>

### *Economic Development Priorities*

The Austin Area EDC has several objectives and priorities supporting development and increasing the tax base. The objectives and priorities in the Interlocal Agreement include 6.5(d) and (e) which directly encourage freight-intensive development:<sup>48</sup>

- 6.5(d) The proactive and innovative development and expansion of infrastructure, communities, public facilities, and other socially beneficial real estate projects.
- 6.5(e) Increasing the tax base within the City of Austin and generating revenues and other resources for the City through the promotion of job growth and business growth.

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<sup>45</sup> City of Austin Texas "North Burnet Gateway 2035 Master Plan." November 2007. Accessed from: [https://www.austintexas.gov/sites/default/files/files/Housing\\_%26\\_Planning/Adopted%20Neighborhood%20Planning%20Areas/19\\_NorthBurnetGateway/nbg-np.pdf](https://www.austintexas.gov/sites/default/files/files/Housing_%26_Planning/Adopted%20Neighborhood%20Planning%20Areas/19_NorthBurnetGateway/nbg-np.pdf)

<sup>46</sup> Ibid pp.2-14

<sup>47</sup> Ibid pp.4-19

<sup>48</sup> City of Austin. "COA and AEDC Interlocal Agreement 20230308.Pdf," (p.8) June 10, 2021. [https://drive.google.com/file/d/1CUHRohnqvKtXT15hbSVIOSfxuOYauRV/view?usp=embed\\_facebook](https://drive.google.com/file/d/1CUHRohnqvKtXT15hbSVIOSfxuOYauRV/view?usp=embed_facebook).

## Major Planned Projects

The South Central Waterfront Project is a 118-acre redevelopment project with a vision of accessible economic and community benefits over the next 20 years.<sup>49</sup> The project may be an opportunity for freight-intensive users.

## Williamson County

- 1,118 square miles (land only)
- Cities: Georgetown (county seat), Austin (mostly in Travis County and a small part in Hays County), Bartlett (partly in Bell County), Cedar Park (a small part in Travis County), Leander (small part in Travis County), Pflugerville (mostly in Travis County), Round Rock (small part in Travis County), Thorndale (mostly in Milam County), Coupland, Florence, Granger, Hutto, Jarrell, Leander, Liberty Hill, Taylor, Thrall, Weir
- Major highways: IH 35, US 79, US 183, SH 29, SH 45, SH 95, SH 130, TX Hwy Loop 1, SH 195, 183A Toll Road

## Pflugerville

### Comprehensive Plan Land Use Policies

Pflugerville's 2040 Comprehensive Plan was adopted in April 2022. The plan has reserved 180 acres for industrial future land use, reduced from 593 acres in the city's existing land use and 59 acres in ETJ.<sup>50</sup>

The plan's "Employment" future land use category applies to the industrial flex space opportunities along SH 45 and SH 130. Employment centers are primarily used for office, industrial, and flex space development. Industrial flex space development includes a range of manufacturing and storage uses with varying appearances and intensities.<sup>51</sup> The plan recommends industrial areas be located along arterial thoroughfares, in proximity to freeways, rail lines, and areas with access to airports and other transportation links.<sup>52</sup>

Pflugerville recognizes the importance of diversifying commercial and industrial businesses, and the plan has included an action item to support the Employment and Commercial Centers Goal and Policy Statement: 3.30.3, which is to "promote diversification of the commercial/industrial base."<sup>53</sup>

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<sup>49</sup>AEDC Austin Economic Development Corporation. "AEDC 2023 Annual Report 20230215.Pdf," (p.3) February 15, 2023. [https://drive.google.com/file/d/12FXIQrGBh6Nk0UCyGv6SUS3M\\_yEAZi-m/view?usp=embed\\_facebook](https://drive.google.com/file/d/12FXIQrGBh6Nk0UCyGv6SUS3M_yEAZi-m/view?usp=embed_facebook).

<sup>50</sup>City of Pflugerville. "Aspire Pflugerville 2040 Comprehensive Plan | Chapter 3: Land Use, Growth & Development." (p.66) Accessed from: <https://www.pflugervilletx.gov/home/showpublisheddocument/9910/637866437201130000>.

<sup>51</sup>Ibid p.82

<sup>52</sup>Ibid p.83

<sup>53</sup>Ibid p.101

### *Economic Development Priorities*

Pflugerville offers incentives to attract businesses, including individual tax abatement. The Pflugerville Community Development Corporation offers incentives enticing businesses to locate there, which could be beneficial to freight-intensive uses. The website list includes:<sup>54</sup>

- Tax Abatement – individual basis
- Triple Freeport Exemption
- Chapter 380 financing
- Tax Increment Financing
- Eligible for Foreign Trade Zone
- Industrial foundation
- Public utility incentives
- Low property tax rates
- Workforce development and training grants
- Relocation assistance
- Low-cost land
- Tenant finish-out assistance
- EB-5 financing
- Low-cost reuse of water for irrigation or chilling

### *Major Planned Projects*

Electronic Vision Systems Inc. (EVS) purchased 14.5 acres in the One Thirty Business Park at 15825 Impact Way. In August 2023, the New Jersey-based company will begin building a 175,000-square-foot warehouse and manufacturing facility.<sup>55</sup> EVS does welding, laser cutting, powder coating, and assembly for various industries, including aerospace and semiconductors.

### Round Rock

#### *Comprehensive Plan Land Use Policies*

Round Rock's Future Land Use Map indicates industrial land use along IH 35.<sup>56</sup> The comprehensive plan has specific criteria regarding the location of industrial land uses:

- New industrial development shall not be permitted within 500 feet of single-family or two-family uses or within 500 feet of designated arterial roadways or future arterial roadways.
- Little or no visibility from public view, other than from the adjacent roadway.

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<sup>54</sup> Pflugerville Chamber of Commerce. "Economic Development – Pflugerville Chamber of Commerce, TX." Accessed from: <https://www.pfchamber.com/economic-development>.

<sup>55</sup> Pflugerville Chamber of Commerce. "Economic Development – Pflugerville Chamber of Commerce, TX." Accessed from: <https://www.pfchamber.com/economic-development>.

<sup>56</sup> City of Round Rock Texas. "ROUND ROCK 2030 – ROUND ROCK 2030," (pp.135-136). June 25, 2020. Accessed from: <https://www.roundrocktexas.gov/wp-content/uploads/2020/09/Round-Rock-2030-Adopted-Web.pdf>.

- No adjacent residential or commercial development.

The plan's criteria for the light industrial land use category include:

- Direct access to a collector street or arterial roadway
- No adjacent residential development

The Land Use Inventory table in the comprehensive plan indicates that, as of 2020, only two percent of the city's 663 acres reserved for industrial land uses have been developed.<sup>57</sup> Between 2000 and 2010, significant portions of land intended for industrial land use were developed instead for commercial and office uses.<sup>58</sup> If Round Rock continues the trend, there will be less industrial land available for freight-intensive uses.

### *Economic Development Priorities*

Round Rock is also actively attracting businesses and willing to offer tax breaks. The Round Rock Economic Development Partnership website states that Round Rock avoids burdening industrial development with high taxes. Instead, they offer tax breaks, and they claim to have the lowest property taxes in the region.<sup>59</sup>

Furthermore, the partnership's website indicates they have the proper infrastructure to work with local industries and will develop the best package for a project. Round Rock can also offer various incentives case-by-case, which may include tax abatement, foreign trade zone, reinvestment zone, and Freeport exemptions.

The economic development section of the comprehensive plan has policies and implementation strategies that support new and existing freight-intensive businesses.<sup>60</sup> One strategy is to provide a navigable regulatory and development review process that is efficient, streamlined, and meets or exceeds established performance measures. Another is supporting zoning and annexation decisions that attract desirable employment centers and consider appropriate incentives. The city also prioritizes infrastructure projects associated with major employers. Lastly, economic development projects encounter an expedited development review process.

### *Major Planned Projects*

Link Logistics has two industrial projects that will bring one million square feet of industrial space to Round Rock.<sup>61</sup> Settlers Grove, a 631,000-square-foot industrial and warehouse development,

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<sup>57</sup> Ibid p.111

<sup>58</sup> Ibid p.110

<sup>59</sup> Round Rock Texas. "Economic Development - City of Round Rock." Accessed from: <https://www.roundrocktexas.gov/city-businesses/economic-development/>.

<sup>60</sup> Round Rock 2030. "POLICIES AND IMPLEMENTATION - ROUND ROCK 2030." Accessed from: <https://roundrock2030.com/policies-and-implementation/>.

<sup>61</sup> Sjoberg, Brooke. "Industrial Projects in Round Rock to Bring Nearly 1M Square Feet of Industrial Space." Community Impact, January 20, 2023. Accessed from: <https://communityimpact.com/austin/round-rock/development/2023/01/20/industrial-projects-in-round-rock-to-bring-nearly-1m-square-feet-of-industrial-space/>.

was expected to be complete in June 2023. The other project, Round Rock 45, will have three Leadership in Energy and Environmental Design-certified structures. The project broke ground in October 2022 and the three structures will be sized at 139,000 square feet, 127,240 square feet, and 102,000 square feet.

### Taylor

#### *Comprehensive Plan Land Use Policies*

The Envision Taylor Comprehensive Plan provides big ideas and policies to accommodate projected growth. The plan also has land uses that would permit freight-intensive uses. The Employment Centers land use is a mixed-use area centered around office or industrial uses that can support significant employment. There are 2,407 acres designated as Employment Centers in the future land use plan, of which 60% are designated as industrial.<sup>62</sup>

Samsung's location in Taylor led to the creation of the Special Employment District, which provides a location for large-scale employment that is associated with Samsung or other high-tech businesses in the region. The city prioritizes keeping these areas for industrial use. The total land use area for this district is 5,203 acres.<sup>63</sup>

During public and stakeholder meetings, it was discussed that reserving land around the rail line for manufacturing is an opportunity for transporting materials and supplies. It is beneficial for industrial uses to locate near rail lines.<sup>64</sup>

The city also created a new sector within the restricted growth sector called Controlled Growth Tier II. These areas are prime for future industrial development due to their proximity to major transportation infrastructure and potential expansions of the City's sewer system. The city can add areas to the Controlled Growth Sector where they want to encourage industrial growth.<sup>65</sup> The Controlled Growth Sector was expanded with the primary goal of providing more space to assist in the development of other industrial and manufacturing uses that can support the Samsung facility.<sup>66</sup>

#### *Economic Development Priorities*

The City of Taylor is attracting new businesses by offering incentive packages, tax abatements, and tax rebate opportunities. The city has also streamlined the plan review, permitting, and inspection processes, combined with a City Council willing to partner with developers.<sup>67</sup> They

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<sup>62</sup> City of Taylor Texas. "Envision Taylor Comprehensive Plan," (p.75) November 18, 2021. Accessed from: <https://www.ci.taylor.tx.us/DocumentCenter/View/13206/Envision-Taylor-Comprehensive-Plan-Second-Amendment-Final?bidId=>.

<sup>63</sup> Ibid p.81

<sup>64</sup> Ibid p.82

<sup>65</sup> Ibid p.85

<sup>66</sup> Ibid p.86

<sup>67</sup> City of Taylor Texas. "Economic Development | Taylor, TX - Official Website." Accessed from: <https://www.ci.taylor.tx.us/644/Economic-Development>.



offer many incentives to encourage businesses to locate in Taylor, which include cash grants, land grants, forgivable loans, property tax rebates and/or sales tax rebates, Tax Increment Financing (TIF) grants, and downtown rental assistance.

### *Major Planned Projects*

Samsung is building a 6-million square-foot semiconductor manufacturing facility, and the plant is expected to be fully operational by the end of 2025. The plant will be located near US 79 and CR 401, on more than 1,000 acres of land.<sup>68</sup>

### *Cedar Park*

#### *Comprehensive Plan Land Use Policies*

Planning areas are established in Cedar Park's future land use map to support unique developments. Industrial uses are permitted in several planning areas of the comprehensive plan. A portion of planning area "A" includes Lime Creek Quarry, which is approximately 350 acres in size.<sup>69</sup> RM 1431 and Lakeline Boulevard provide convenient access to Planning Area "A."

Planning area "C" is located along Brushy Creek Road between 183A and Parmer Lane and is approximately 100 acres. The area is near several schools; therefore, future development should be compatible and have minimal impacts, such as a corporate headquarters.<sup>70</sup>

The planning area "G" is mostly undeveloped and at the eastern edge of the city limits. It is approximately 105 acres and located south of E. Whitestone Boulevard, southeast of Toro Grande Boulevard.<sup>71</sup>

The city's heavy commercial land use designation is suitable for manufacturing, processing, assembling, packaging, and fabricating previously prepared materials, as well as warehousing. The comprehensive plan recognizes that it is difficult for the industrial business community to find large parcels of land with easy access to the freight network system. The city considers freight-intensive businesses a beneficial source of employment and an increased tax base.<sup>72</sup>

#### *Economic Development Priorities*

Cedar Park is home to a diverse mix of businesses, including regional or national headquarters, defense and aerospace, healthcare and biotechnology, software development, clean

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<sup>68</sup> Ortiz, Monica "Samsung development leaves residents questioning Taylor's infrastructure plans" December 12, 2021. Spectrum News 1. Accessed from: <https://spectrumlocalnews.com/tx/south-texas-el-paso/news/2021/12/10/samsung-development-leaves-130-year-church-questioning-taylor-s-infrastructure-plans>

<sup>69</sup> Cedar Park Texas. "Comprehensive Plan City of Cedar Park, Texas," (p.23) March 10, 2022. Accessed from: <https://www.cedarparktexas.gov/DocumentCenter/View/1848/Adopted-Comprehensive-Plan-PDF>.

<sup>70</sup> Ibid p.25

<sup>71</sup> Ibid p.29

<sup>72</sup> Ibid p.18

technology, and advanced manufacturing. They offer incentives case-by-case. The Triple Freeport exemption is one of the incentives offered on property taxes on inventory for employers that manufacture or distribute goods shipped outside of Texas.

The city assists businesses with many free services to locate and/or expand in Cedar Park. The city's Economic Development Department works directly with regional partners such as the Governor's Office of Economic Development, the Cedar Park Chamber of Commerce, the Capital Certified Development Corporation, the Opportunity Austin program of the Austin Chamber of Commerce, the Pedernales Electric Cooperative, and the Texas Workforce Commission to assist with the needs of businesses.<sup>73</sup>

### *Major Planned Projects*

Shop LC is relocating its headquarters from Austin to Cedar Park.<sup>74</sup> The home shopping network's headquarter office has an anticipated completion date in mid-2024. The 200,000-square-foot facility will be constructed near East New Hope Drive and North Bell Boulevard (US 183).

Another business set to open in Cedar Park is NFM, a home store previously known as Nebraska Furniture Mart.<sup>75</sup> It will build a 117-acre project located near the H-E-B Center. The NFM development will also include a 250-room hotel, a 30,000-square-foot convention center, and additional commercial space.

Indigo Ridge is a 155-acre mixed-use major project located a few miles to the east of Cedar Park's downtown, located at the intersection of Whitestone Boulevard and County Road 175.<sup>76</sup> The mixed-use development includes office, living, retail/dining, hotel, and recreational uses. The headquarters for the United States Tennis Association (USTA Texas) will also be housed at Indigo Ridge.

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<sup>73</sup> Cedar Park Texas Economic Development Corporation. "City of Cedar Park, Texas Economic Development Corporation." Accessed from: <https://cedarparktexasedc.com/>.

<sup>74</sup> kvue.com. "Shop LC to Move Headquarters from Austin to Cedar Park | Kvue.Com," November 19, 2021. Accessed from: <https://www.kvue.com/article/money/economy/boomtown-2040/shop-lc-moving-headquarters-austin-to-cedar-park/269-acf37e4a-2ad0-46be-8f9a-e4aaed2eb780>.

<sup>75</sup> Washington, Zacharia. "8 Large Projects Underway as Cedar Park, Leander Prioritize Commercial Development." Community Impact, January 14, 2023. Accessed from <https://communityimpact.com/austin/cedar-park-leander/development/2023/01/14/8-large-projects-underway-as-cedar-park-leander-prioritize-commercial-development/>.

<sup>76</sup> Indigo Ridge. "Indigo Ridge - Mixed-Use Development in Cedar Park, Texas." Accessed from: <https://www.indigoridgeatx.com/>.

## Georgetown

### *Comprehensive Plan Land Use Policies*

Georgetown recently updated its comprehensive plan, and several land use policies encourage and protect industrial uses while buffering from non-compatible uses.<sup>77</sup>

- Land Use Policy 1 calls for placement of more intense uses where services and transportation networks are more established. It is expected that more intense uses will generate more traffic.
- Land Use Policy 4 encourages redevelopment, which is described as the clearing of land and construction of new buildings and/or the conversion of existing buildings to a different use. The city encourages redevelopment in target areas through small area planning, intentional infrastructure investment, and/or specialized development standards. Identified target areas include Williams Drive, South and North Austin Avenue, and Downtown.
- Land Use Policy 8 is to protect and promote land uses that support Georgetown’s target industries, support diversification of the City’s tax base, and enhance economic development through intentional infrastructure planning, recruitment, and the land use entitlement process. Georgetown’s target industries include advanced manufacturing, life sciences, and professional services.

### *Economic Development Priorities*

Georgetown wants to keep existing businesses and attract new ones, particularly in the identified industries of advanced manufacturing, life sciences, professional development, and destination retail. Georgetown’s Economic Development Strategic Plan has identified several goals and priorities related to supporting businesses and attracting industries.<sup>78</sup>

- Strategic Goal 1: Support existing businesses and industries.
- Strategic Goal 2: Enhance targeted recruitment of identified industries.
- Strategic Goal 4: Encourage speculative development.

### *Major Planned Projects*

Georgetown Logistics Park is a new industrial park with 625,000 square feet of industrial space development for larger tenant warehouse space driven by e-commerce, last-mile delivery, and manufacturing tenants.<sup>79</sup> The development is at the southwest corner of IH 35 and Tx Hwy 130

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<sup>77</sup> Georgetown 2030 Plan Update. “Land Use.” Accessed from: <https://2030-comprehensive-plan-georgetowntx.hub.arcgis.com/pages/land-use>.

<sup>78</sup> City of Georgetown. “Economic Development Strategic Plan – Georgetown Economic Development.” Accessed from: <https://invest.georgetown.org/economic-development-strategic-plan/>.

<sup>79</sup> Widner, Cindy. “Stonelake breaks ground on massive Georgetown logistics park,” August 1, 2022. Urbanize Austin. Accessed from: <https://austin.urbanize.city/post/austin-suburb-georgetown-industrial-park>

along Aviation Drive, just east of Georgetown Municipal Airport. It is suited to larger warehousing, distribution, and manufacturing tenants in the greater Central Texas region.



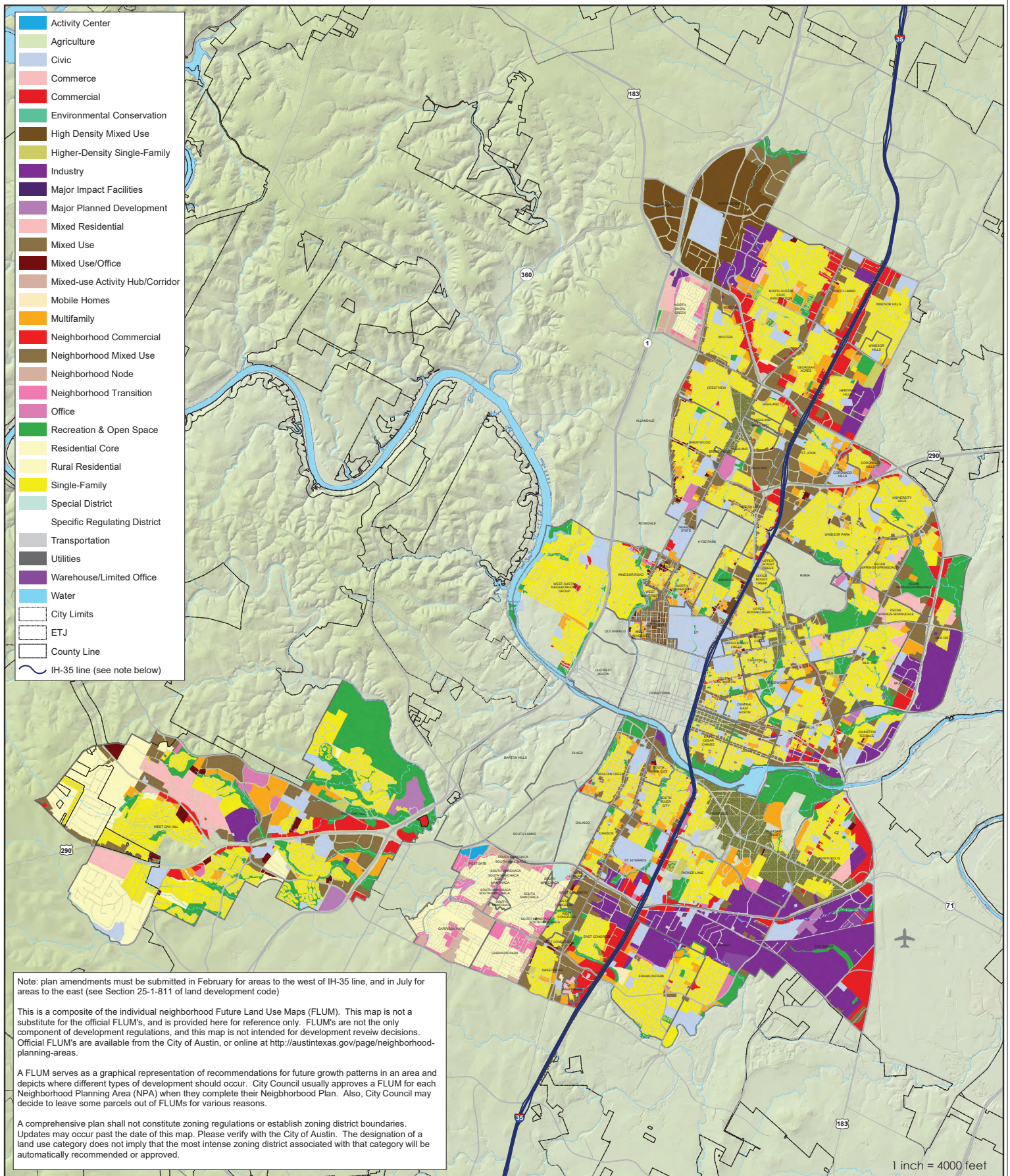
CAPITAL AREA METROPOLITAN  
PLANNING ORGANIZATION

Trends and Forecasts  
Report

# Appendix B: Future Land Use Maps



Final 1: March 6, 2024



# Future Land Use Map Composite

## CITY OF AUSTIN

Created: Thursday, August 29, 2019  
 File: future\_land\_use\_map\_composite.mxd



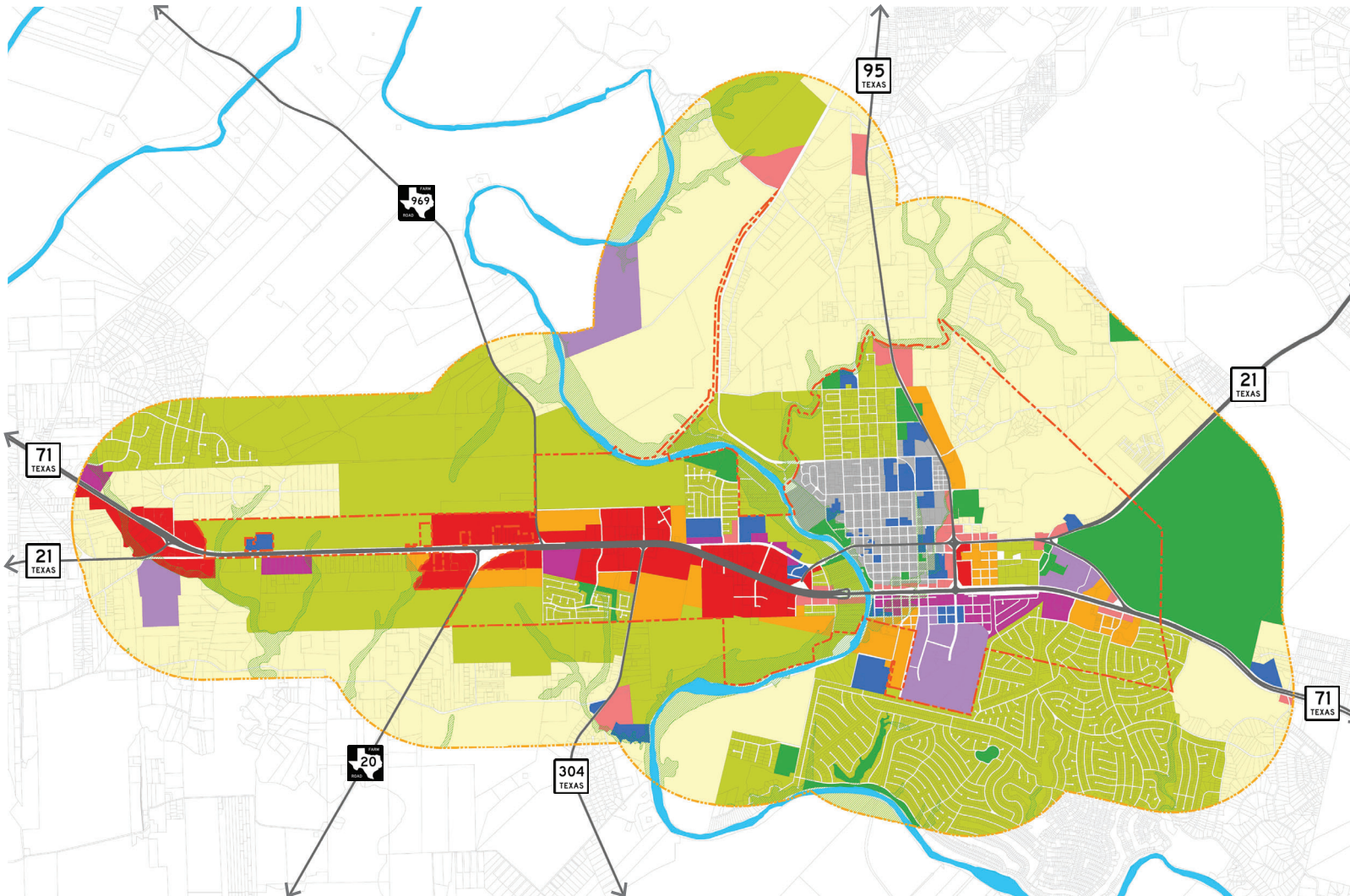
PLANNING AND ZONING DEPARTMENT

This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries.

This product has been produced by the Planning and Zoning Department for the sole purpose of geographic reference. No warranty is made by the City of Austin regarding specific accuracy or completeness.

# FUTURE LAND USE MAP - BASTROP

## MAP 5-B:

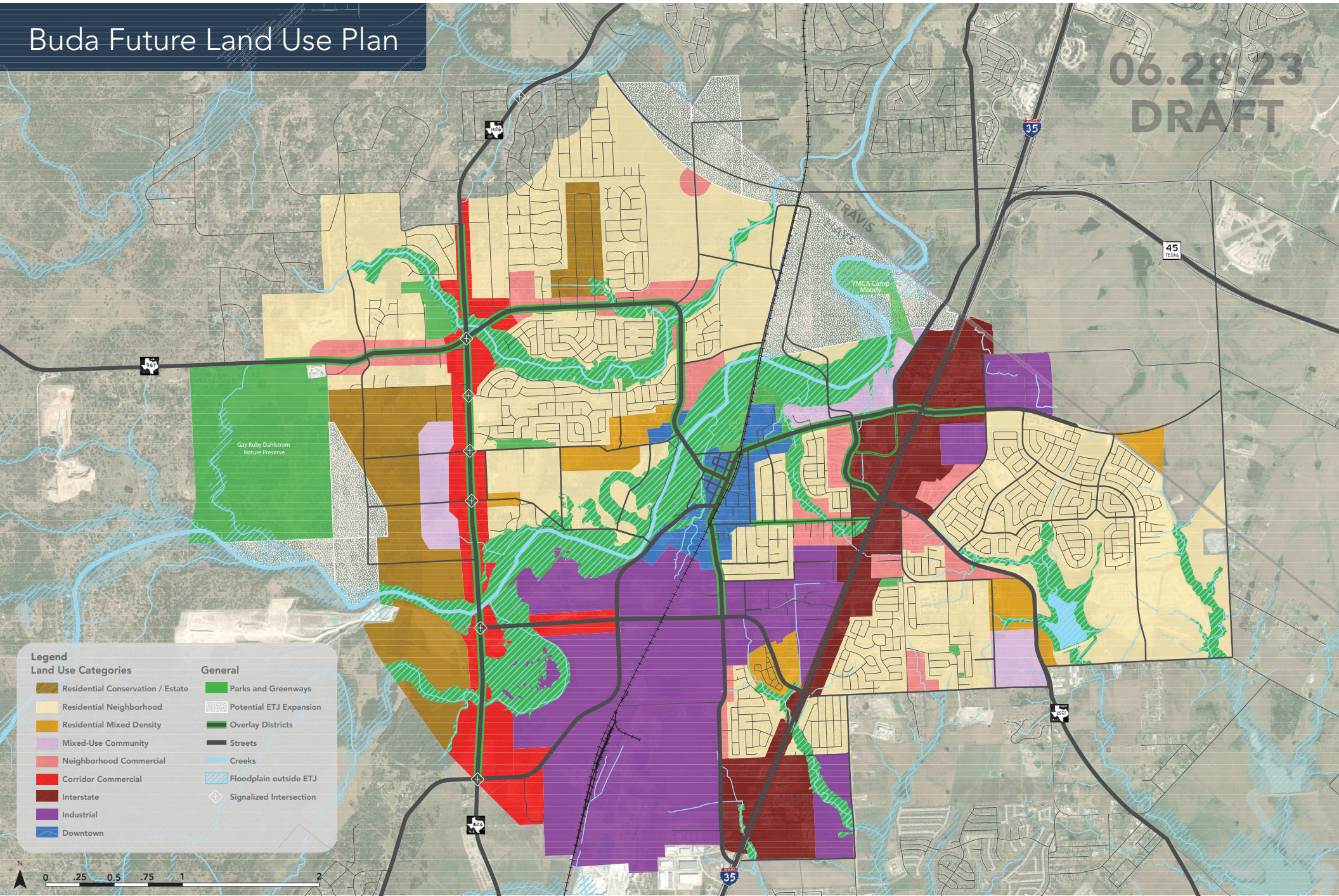


- LEGEND:**
- CITY LIMITS
  - STATUTORY ETJ
  - PARKS & OPEN SPACE
  - RURAL RESIDENTIAL
  - NEIGHBORHOOD RESIDENTIAL
  - TRANSITIONAL RESIDENTIAL
  - NEIGHBORHOOD COMMERCIAL
  - GENERAL COMMERCIAL
  - PROFESSIONAL SERVICES
  - DOWNTOWN BASTROP<sup>1</sup>
  - PUBLIC & INSTITUTIONAL
  - INDUSTRY
  - FLOODPLAIN OVERLAY<sup>2</sup>

Notes: <sup>1</sup>Boundary is similar to the DB-FBC. <sup>2</sup>The Floodplain Overlay denotes environmentally sensitive land where development impacts should be minimized, and land could be preserved or dedicated as public parkland or open space.

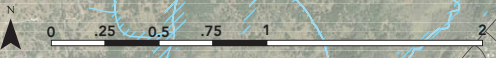
# Buda Future Land Use Plan

06.28.23  
DRAFT

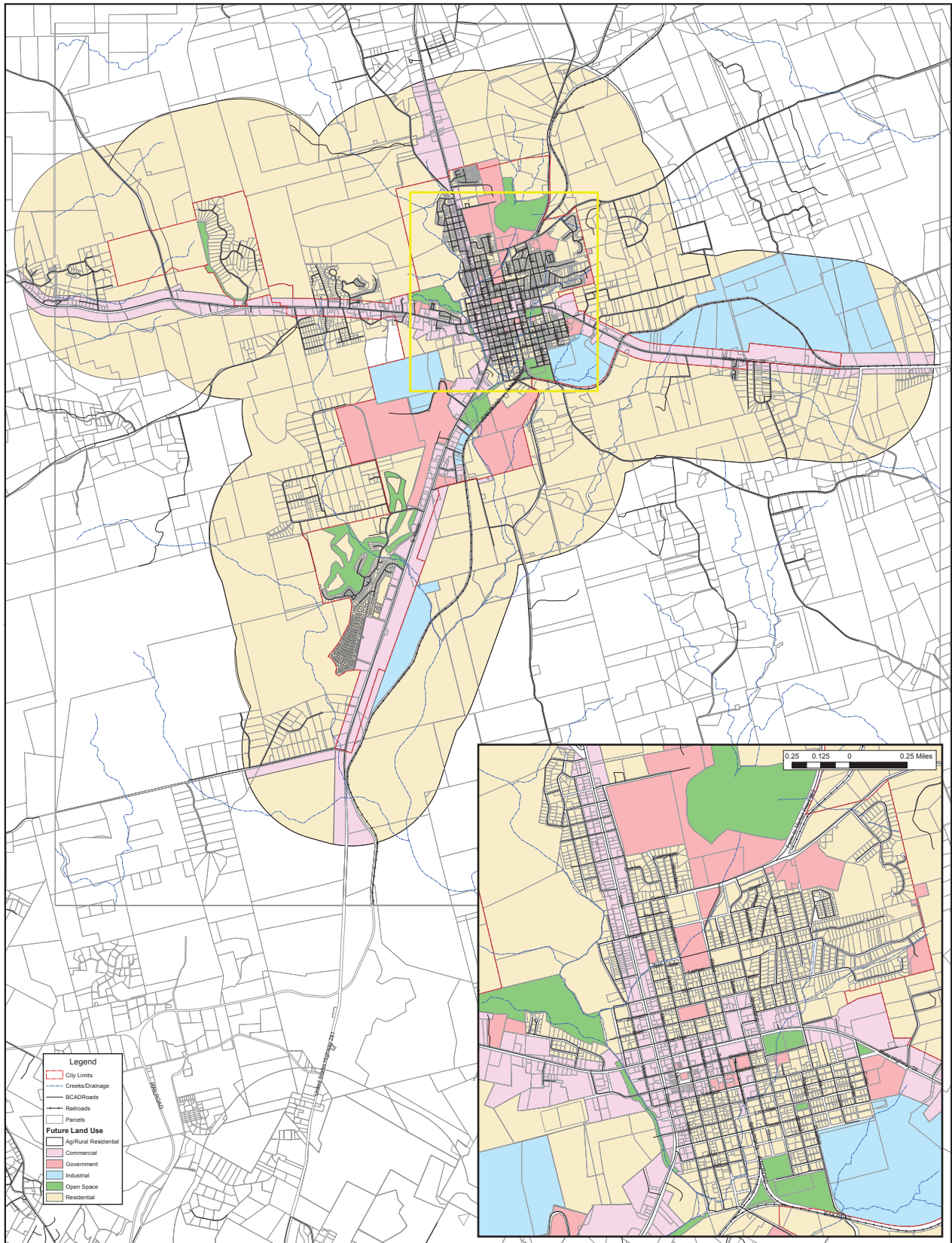


**Legend**  
Land Use Categories

Residential Conservation / Estate	Parks and Greenways
Residential Neighborhood	Potential ETJ Expansion
Residential Mixed Density	Overlay Districts
Mixed-Use Community	Streets
Neighborhood Commercial	Creeks
Corridor Commercial	Floodplain outside ETJ
Interstate	Signalized Intersection
Industrial	
Downtown	







- Legend**
- City Limits
  - Creeks/Drainage
  - BCADRoads
  - Railroads
  - Parcels
- Future Land Use**
- Ag/Rural Residential
  - Commercial
  - Government
  - Industrial
  - Open Space
  - Residential



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 (512) 756-6093  
 Fax (512) 756-8560  
 www.cityofburnet.com

# CITY OF BURNET

Adopted Future Land Use  
 March 13, 2012



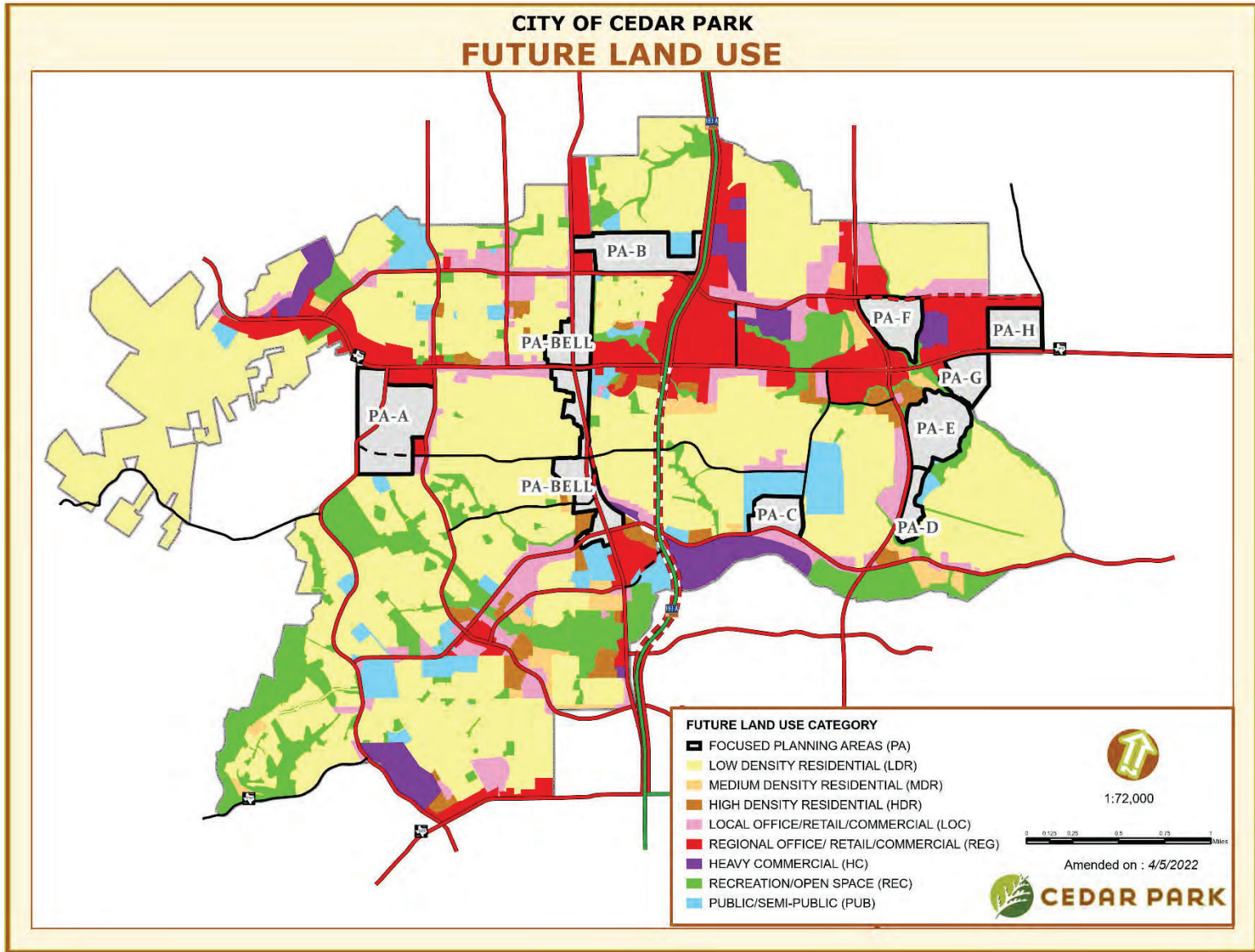
Pursuant to Chapter 213.005 of the Local Government Code,  
 "A comprehensive plan shall not constitute zoning regulations or establish zoning district boundaries."

\*This Product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries.



Printing Date: 3/21/2012  
 Map by: Jakob Hageman

Figure 10. Future Land Use Map



# Dripping Springs

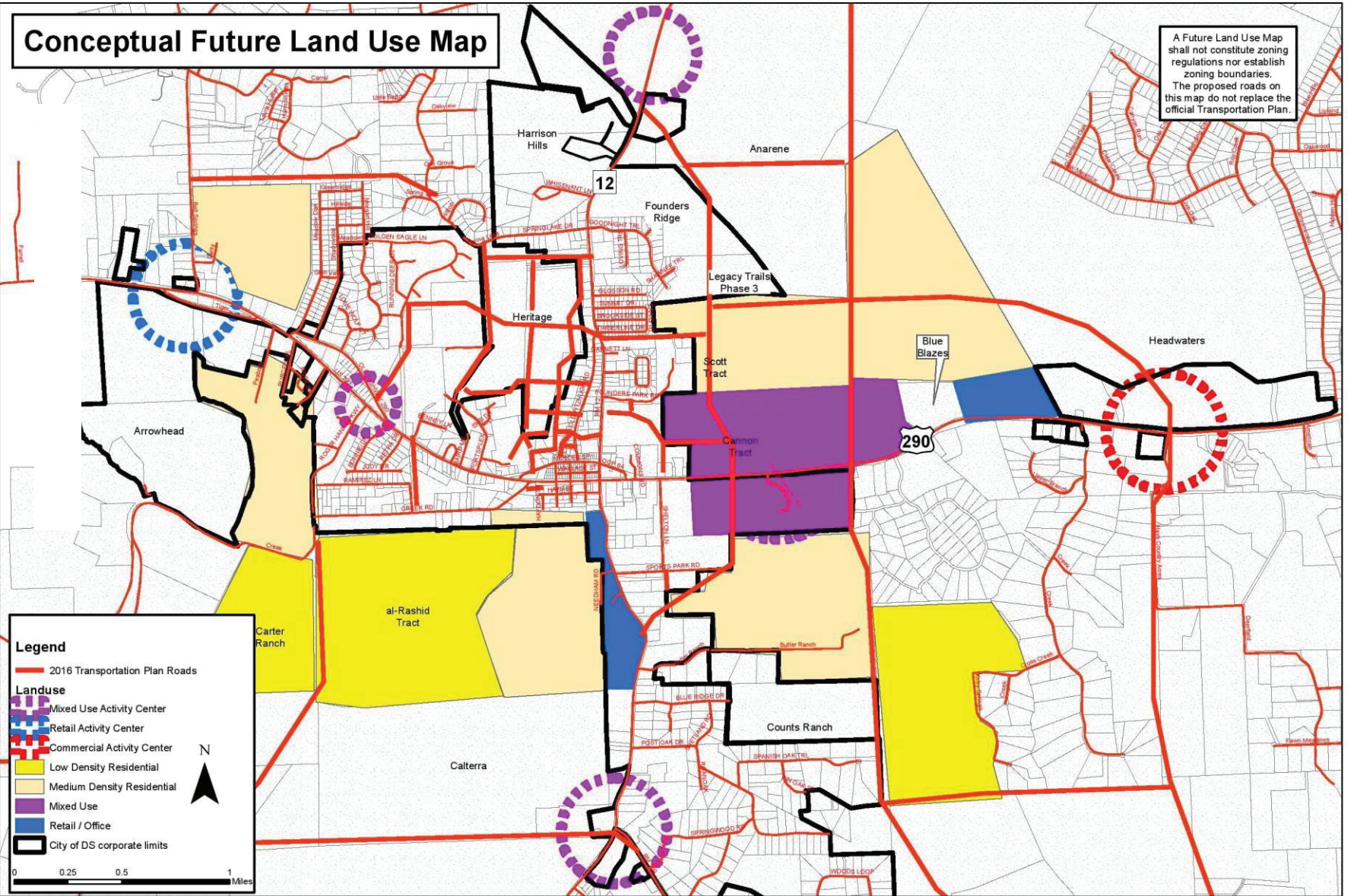
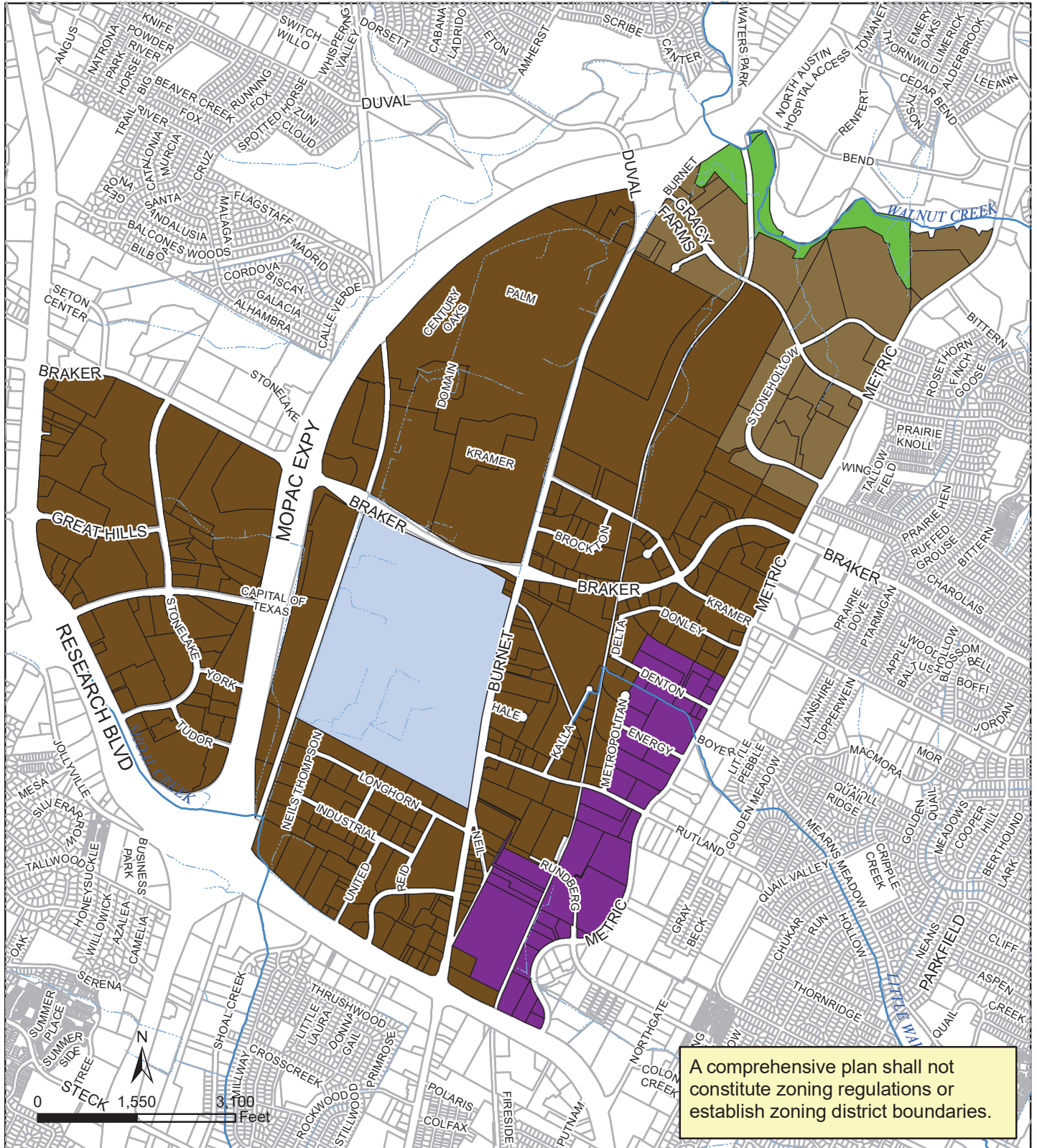


Figure 1: Conceptual Future Land Use Map



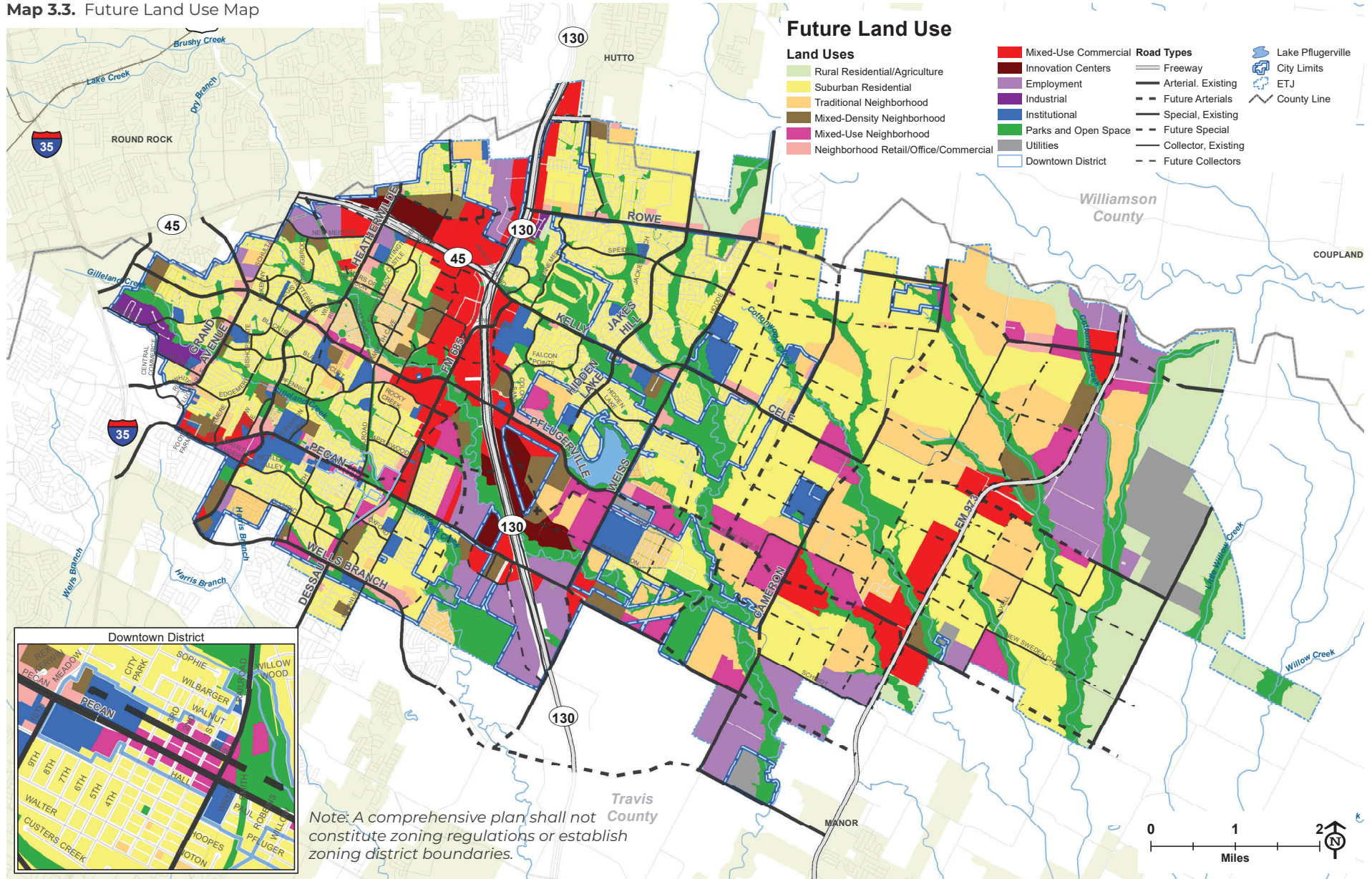
North Burnet-Gateway  
 Combined Neighborhood Planning Area  
 Future Land Use Map (FLUM)

**Future Land Use Categories**

- Mixed Use
- High Density Mixed Use
- Industry
- Civic
- Recreation & Open Space

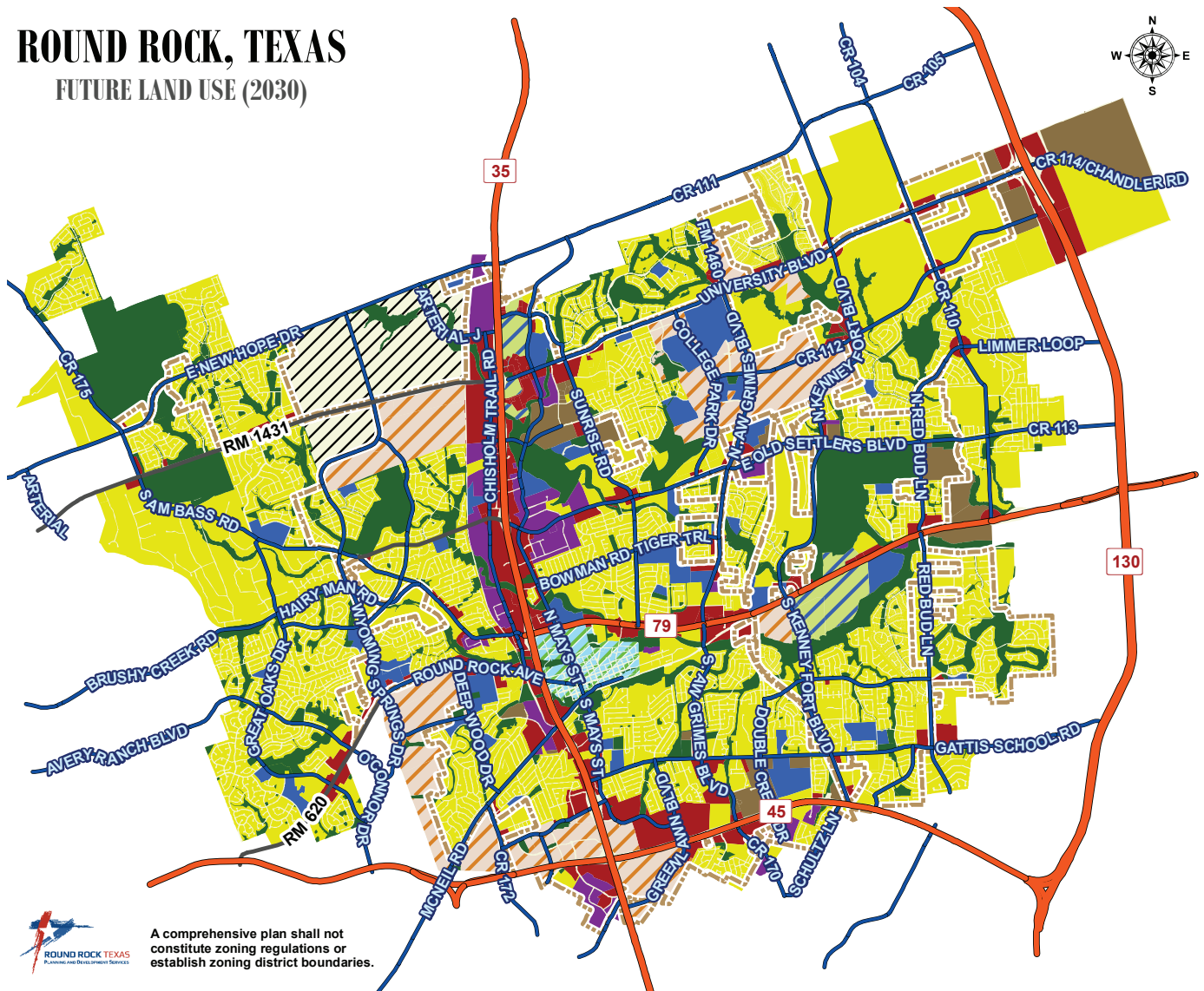
# Pflugerville

Map 3.3. Future Land Use Map



# ROUND ROCK, TEXAS

## FUTURE LAND USE (2030)



A comprehensive plan shall not constitute zoning regulations or establish zoning district boundaries.

FUTURE LAND USE		TRANSPORTATION (2017)	
	OPEN SPACE		FREEWAY/TOLLWAY
	RESIDENTIAL		FM/RM/STATE
	COMMERCIAL		ARTERIAL
	MIXED-USE		CITY LIMITS
	DOWNTOWN MIXED-USE		
	EMPLOYMENT CENTER		
	INDUSTRIAL		
	PUBLIC FACILITIES		
	REGIONAL ATTRACTION		

changes to map categories associated with new zoning districts and changing land use trends. To consider adjustments on the FLUM, staff conducted a preliminary review of the existing FLUM and identified potential revisions to create a new draft map. Staff then offered individual meetings between staff and stakeholders owning 100-plus acres of land in the city limits and/or ETJ to discuss potential changes to their land envisioned in the next ten years. Once a new draft FLUM was created, staff held an open house on July 22, 2019 to solicit public input. Staff identified 402 parcels of land in the city limits and ETJ consisting of five acres or more with a single owner and sent a letter inviting those owners to attend the Open House. The Open House was open to the public as well. The public and stakeholders provided input on how they saw the city and their parcels being developed or redeveloped in the future. Staff then revised the FLUM based on the input received.