This page intentionally left blank

CHAPTER 4

SUMMARY OF EXISTING CONDITIONS

4. SUMMARY OF EXISTING CONDITIONS

The review of existing conditions for the Temple MMP ensures that the investments recommended by the plan are based on a quantitative evaluation of the needs specific to the City of Temple. As described in Chapter 3, public and stakeholder input helped draft a vision statement for the City supported by broad goals, each with specific objectives. These objectives are a framework to identify areas of transportation needs within the City. Additionally, the data analyzed in this chapter is supplemented by what was learned through the public engagement process to also capture what the data may not be providing, such as near misses.

An important step in identifying transportation needs in the Temple MMP study area is to capture, as much as possible, an understanding of the existing population and employment trends occurring in the area. Land use patterns and demographic trends directly influence which modes of travel people use. People use the system to travel to and from work, access services, leisure activities, and for many other reasons. In areas where development is spread out and land uses are separated, people are more likely to use personal automobiles and travel further distances throughout the day.

Over the past decade, Temple has seen significant growth, both within the City and in the rural areas contained in the Extra-Territorial Jurisdiction (ETJ). According to the Decennial Census, the City of Temple grew from 66,102 people in 2010 to 82,073 in 2020. In the past five years, the population increased by nearly 10%. When the ETJ is included, the population is estimated at roughly 134,000 people. (Insert footnote - 2019 ACS). Employment is strong within the study area, with nearly 60,000 jobs in 2018.

Analysis of the existing conditions provides a baseline for the transportation system performance assessment. The following sections summarize the mobility analysis completed in the CSA, which examined the existing transportation network for the study area. By examining each mode of transportation and its impact on the network, City leaders can understand which investments will help the greatest number of people. Additional details on the elements included in this chapter can be found in Appendix B: Comprehensive System Assessment (CSA) Technical Memorandum.

4.1 Roadway Network Configuration and Condition

When looking at the entire transportation system, analyzing the need for new roadways and additional capacity is important to understand the functionality and existing conditions of the network. Roadway networks are examined within the context of different mode choices and factors that impact safety and efficiency (e.g., quality and availability of transit services and active transportation infrastructure, the resiliency of the transportation system in the case of a natural disaster or security threat). The transportation network may be generally categorized as a grid of major corridors, with recent development resulting in more varied roadway patterns.

Temple is situated along Interstate 35, the single most important north-south corridor in Texas, linking the city with major metropolitan areas, tourism, and international trade. The interstate and expressways in the City continue to be improved to add capacity and accommodate freight movement, local traffic, and longer trips. H. K. Dodgen Loop provides a bypass loop around the City and connects to several major corridors, such as US 190, SH 36 (Airport Road), SH 317, Adams/Central Ave, 31st Street, 3rd Street, 1st Street, and Avenue H. Typically, travelers in the City will encounter the most traffic on these facilities, especially during the peak travel periods. Preliminary analysis and public feedback highlighted areas of known traffic concerns in the City of Temple:

- Intersection of Avenue H and 31st Street
- West Temple commuters - congestion along FM 2305 and connecting corridors
- Underdeveloped roads (e.g., North Pea Ridge, South Pea Ridge, Hartrick Bluff)
- Congestion along 31st Street
- Downtown Temple one-way streets
- Potentially underutilized roadway capacity (e.g., Industrial Blvd Cut-Off, Martin Luther King Jr. Blvd)

4.1.1 Current Thoroughfare Plan

A Thoroughfare Plan is a long-range plan/map that identifies the location and type of roadway facilities needed to meet projected long-term growth. It is not a list of construction projects but rather serves as a tool to enable the City to preserve necessary right-of-way for the development of the transportation system as the needs arise. The primary consideration in planning and designing streets has historically been the roadway's vehicle capacity, represented by roadway width and number of traffic lanes. Multiple documents guide how streets in Temple are currently classified, including the City of Temple Master Thoroughfare Plan (approved with the 2020 Comprehensive Plan on October 15th, 2020), and the KTMPO Metropolitan Transportation Plan (MTP), which categorizes roads into classifications and plans for future expansions for the region. Temple currently uses six road classifications:

- **Highway –** Mobility Between Cities
- **Major Arterial –** Mobility Within City
- **Minor Arterial –** Moderate Length Trips
- **Community Collector –** Connect to Arterials
- **Neighborhood Collector –** Connect to Arterials and Collectors, Property Access
- **Local Roads –** Connects to Collectors, Property Access

4.1.2 Traffic Delay and Level of Service (LOS)

Two modeling systems analyzed the existing traffic levels of service (LOS) in the study area, 1) a travel demand model from KTMPO, and 2) TransModeler, a mesoscopic traffic modeling tool. The models used data inputs including roadway characteristics, speed limits, roadway capacity, traffic volume counts, signal timing, and origin and destination data. The data was sourced from KTMPO, the City of Temple, and the TxDOT Statewide Traffic Analysis and Reporting System (STARS) to evaluate the existing interaction between supply and demand on the transportation system.

Level of Service Analysis

One of the pertinent outputs of both models is the Level of Service (LOS). LOS is an indicator of congestion on a scale from A to F, where A represents free flow traffic and F represents severe congestion. LOS is derived from comparing traffic volume to the traffic capacity on a given corridor or segment, also known as “volume-to-capacity” (V/C) ratios.

TABLE 1 provides the ranges used to generate roadway segment LOS values and are based on TxDOT’s Transportation Planning and Programming (TPP) division resources:

Level of Service (LOS) is an indicator of congestion on a scale from A to F, where A represents free flow traffic and F represents severe congestion.

TABLE 1: LOS GRADE DEFINED BY V/C RATIO

LOS GRADE	V/C RATIO
A	Less than 0.33
B	0.33 to 0.55
C	0.55 to 0.75
D	0.75 to 0.90
E	0.90 to 1.00
F	Greater than 1.00

Roadway segments in the study area were analyzed using the KTMPO Travel Demand Model. As displayed in TABLE 2, LOS measures show that out of 511 roadway miles, 464 roadway miles (91%) are categorized as having an adequate LOS (LOS A-D), and 47 roadway miles (9%) are categorized as having a deficient LOS (LOS E-F).

TABLE 2: TEMPLE SUBAREA EXISTING LEVEL OF SERVICE (LOS)

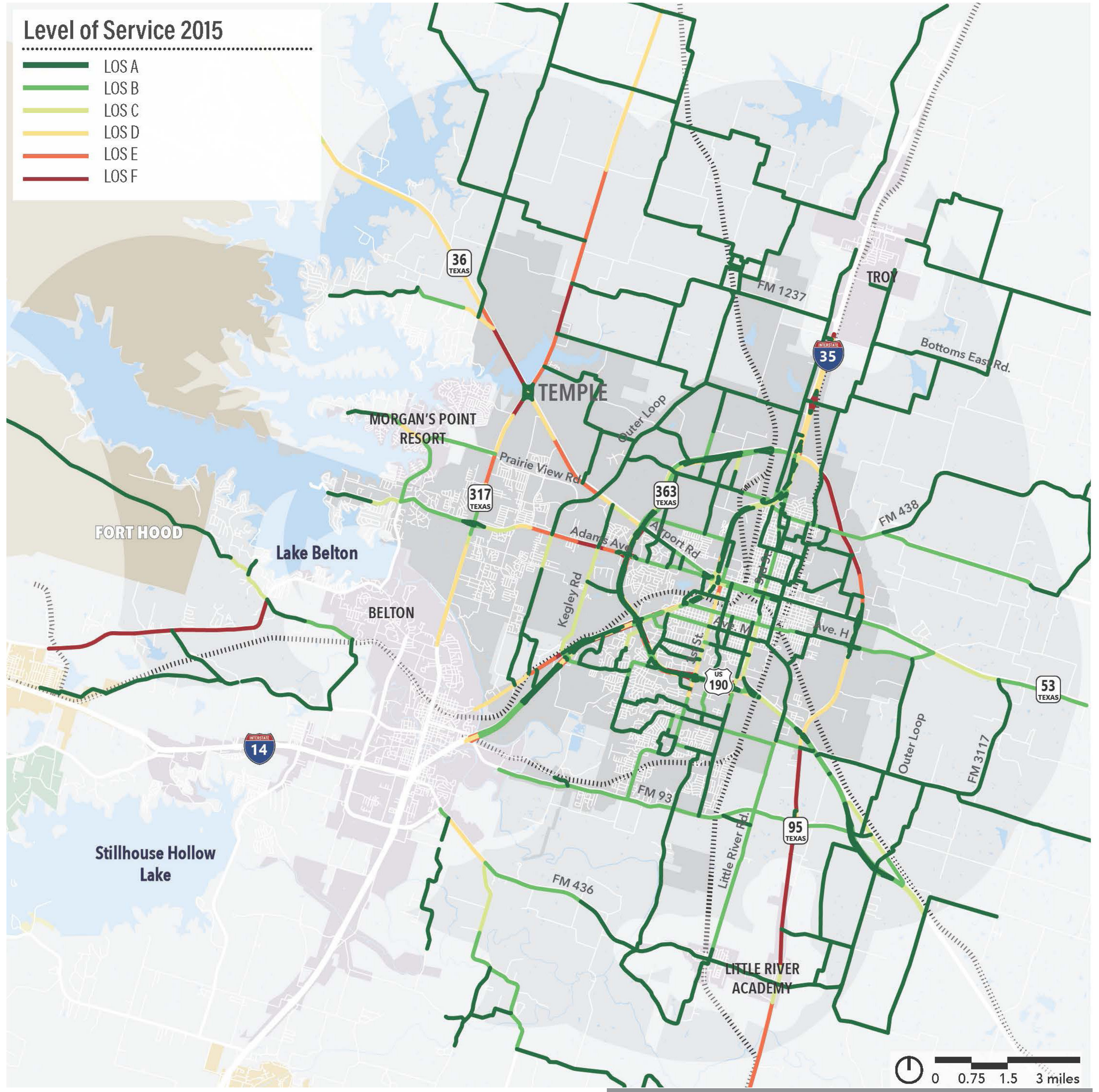
MEASURE	2015 - EXISTING CONDITIONS*	
	Roadway Miles	% of Total
LOS A-D	464	91%
LOS E-F	47	9%
Total	511	100%

*2015 was used to evaluate current conditions because it is the most recent year available in the KTMPO Model.

Figure 8 shows that the existing LOS was strained along highways around major urban areas. Contiguous LOS scores of E and F, suggesting heavy congestion, are seen on the following roadways of the study area:

- Highway 36 west of the City of Temple
- Highway 317
- I-35 from north of the City of Temple to the City of Belton
- Highway 363 west of the City of Temple
- US 190 south of the City of Temple
- Highway 95 south of the City of Temple

Figure 8: Temple Subarea Level-of-Service – 2015 Existing Conditions



Source: KTMPO Model

Existing Operational Performance Results

Measures of effectiveness (MOEs) were output from the TransModeler simulation runs to evaluate operational performance of the AM and PM peak hours in the baseline conditions. These MOEs include intersection level of service (LOS), total network delay, total vehicle-miles traveled (VMT), segment delay, and segment volume.

81 intersections in the study area were analyzed using TransModeler. Approximately 15 percent received a deficient LOS (LOS E-F) during peak commute times (TABLE 3).

TABLE 3: TOTAL NUMBER OF INTERSECTIONS WITH DEFICIENT LOS

SCENARIO	2015 - NO. OF FAILING INTERSECTIONS
AM Baseline Conditions	12
PM Baseline COnditions	14

Source: TransModeler V6

Total Network Delay – Baseline Conditions

Using TransModeler, total network delay was compared for the AM and PM peak hours. The comparison showed PM peak hour experiences higher total network delay than the AM peak hour. This is consistent with the typical traffic patterns in most urban areas, as trips between home and work—as well as trips between home, work, and commercial developments—tend to occur more in the PM peak hour.

31st street experienced the highest average delay in the PM peak hour, followed closely by the couplet formed by Adams and Central Aves.

TABLE 4 highlights the top 5 intersections in the AM period with high/failing LOS based on delay. TABLE 5 highlights the top 5 intersections in the PM period with high/failing LOS based on delay.

Delay is a measure of additional travel time experienced by travelers at speeds less than the free flow speed.

Total network delay sums the delay for all vehicles within the simulation and all vehicles which could not enter the network during the analysis period.

TABLE 4: EXISTING CONDITIONS – TOP INTERSECTIONS 5 WITH HIGH/FAILING LOS FOR AM PEAK PERIOD

INTERSECTION	LOS	DELAY (SEC/VEH)
31st St & Ave M	F	224
Adams Ave & Central Ave	F	196
Adams Ave & I-35 Frontage	F	151
31st St & Scott Blvd	F	121
31st St & Ave H	F	112

TABLE 5: EXISTING CONDITIONS – TOP 5 INTERSECTIONS WITH HIGH/FAILING LOS FOR PM PEAK PERIOD

INTERSECTION	LOS	DELAY (SEC/VEH)
31st St & Ave M	F	262
Adams Ave & Central Ave	F	241
Adams Ave & 25th St	F	231
FM 2305, Hilliard Rd & Old Waco Rd	F	192
Adams Ave & I-35 Frontage	F	177

Figure 9 shows network delay in AM period by node (intersection) and link (roadway).

Figure 10 shows network delay in PM period by node (intersection) and link (roadway).

Figure 9: 2021 AM Peak Delay

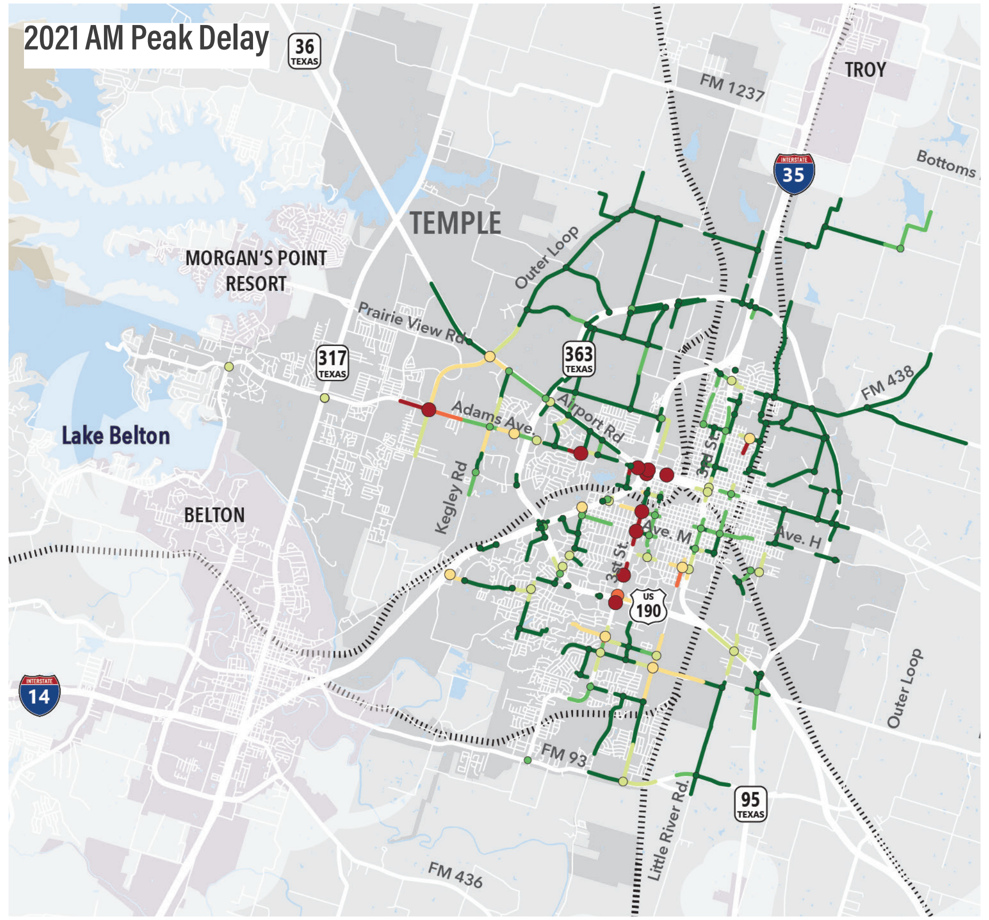
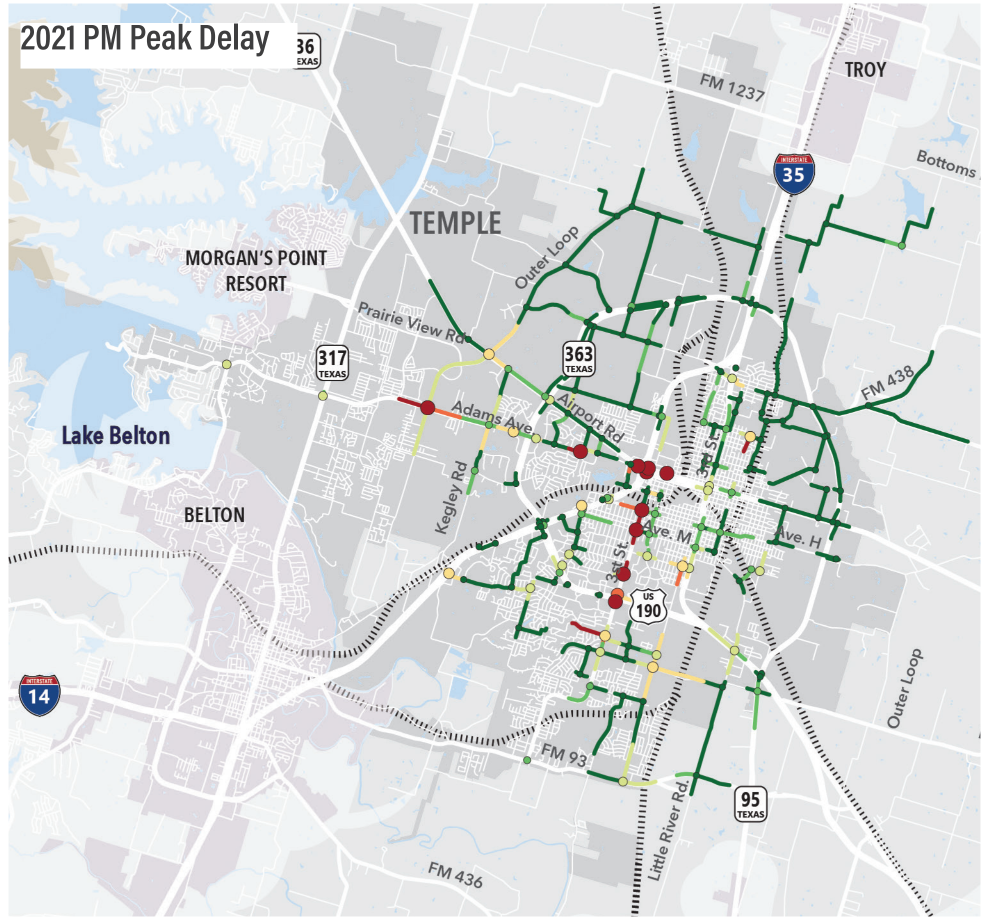
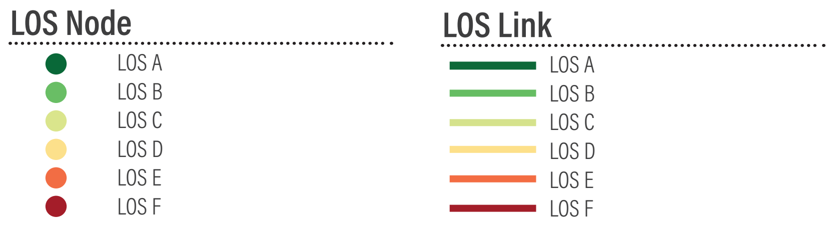


Figure 10: 2021 PM Peak Delay





4.1.3 Key Findings

The following summarizes key findings from the roadway needs analysis:

- As expected, major roadways such as interstates and state highways are expected to see high levels of congestion and delay in the future.
- Intersections along 31st Street, Adams Ave, and Central Ave experience high levels of delay.
- Many connections on the west side of town, near Loop 363 are forecasted as failing in 2045.
- Educational facilities within the City of Temple are expected to continue to be one of the largest activity generators in the community. Level of service around these institutions is typically congested, especially during peak hours.
- Industrial traffic will likely continue to expand in Temple, especially to the north. Evaluating impacts of current delay and the freight network on future LOS will help identify potential routing recommendations.

A hub and spoke model of transit refers to the design of a route network. Typically, this type of network design centers around one or two central transit locations, from which all other routes disperse as "spokes" from the hub.

4.2 Multimodal Transportation System Performance Statistics

Each mode of transportation analyzed (including transit, active transportation, freight, and aviation) informed the mobility, accessibility, connectivity, and other performance factors of the comprehensive multimodal transportation system in Temple.

4.2.1 Transit

Because transit in the study area is part of an interconnected regional system, both the breadth of transit service from the regional system level as well as the individual transit stop characteristics and performance were evaluated. This included an evaluation of the ridership of each transit route of the existing fixed route bus transit system in the study area by stop and by how much of the underlying transit market it served.

System Overview

Operating under the Hill Country Transit District, "The HOP" provides all fixed route services in the study area. The HOP is a regional public transit system that started in the 1960s as a volunteer transit service and evolved to serve a nine-county area. Serving multiple cities through the largely rural service area, the HOP is a coverage-based, hub-and-spoke system.

Currently, there are two transfer stations in Killeen and Temple that serve as the major 'hubs' and are connected in a linear pattern by two main routes. The HOP runs nine different fixed bus routes in the communities of Temple, Belton, Harker Heights, Killeen, and Copperas Cove. Two routes serve the City of Temple.

- Route 510 – VA Hospital/Temple College/Temple Mall/ Walmart
- Route 530 – Adams Ave/Temple HS/Social Security Office

Figure 11 shows the existing fixed routes operating within the study area. Figure 12 highlights the HOP's service categories.

Figure 11: The HOP Existing Fixed Routes

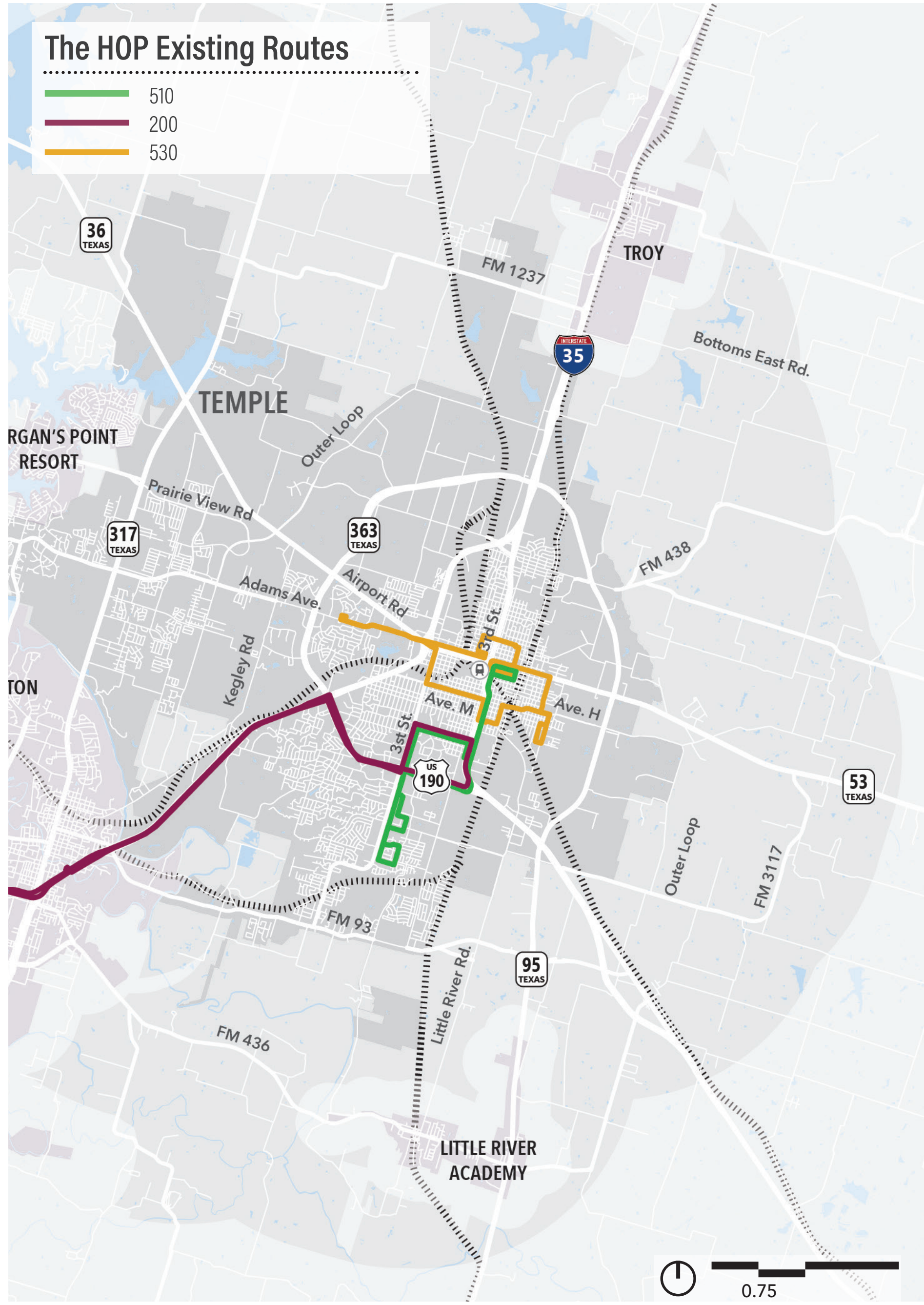
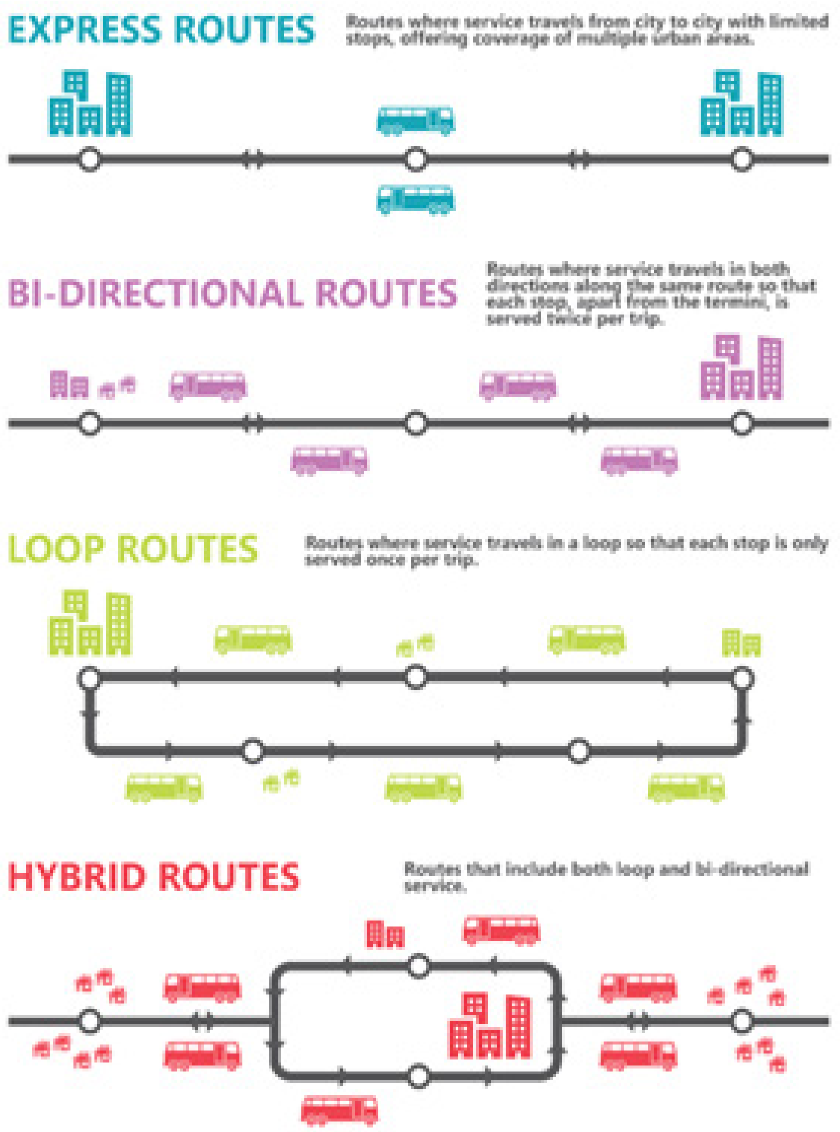


Figure 12: HOP Service Categories



Operations

All of the HOP routes, apart from the 200 Express route, operate with 60-minute headways. The 200 Express operates service with trips every two hours. While service span varies by route, most routes run from approximately 6:00 a.m. to 6:00 p.m. Within Temple, Route 200 Express Route Connector operates as an Express Service, and Routes, 510 South and 530 East/ West Crosstown are Hybrid Routes (both loop and bi-directional service).

“Boardings” are the number of people getting on a bus.

“Alightings” are the number of people getting off a bus.

Total ridership activity is the sum of all boardings and alightings at a given location.

Ridership Analysis

COVID-19 Impacts on Transit Ridership

Transit ridership across the nation took a large hit during the initial onset of the COVID-19 pandemic. Ridership declined drastically across the country. For example, Houston Metro reported its total ridership was 53.6% lower in December 2020 than compared to the same month 2019[1]. Dallas Area Rapid Transit (DART) saw a 55% decrease[2] in overall ridership from March to June in 2020 alone. The HOP faced similar hardship, with ridership declining by similar percentages. Although transit is expected to recover, the length of time it will take to reach pre-COVID ridership numbers is unknown.

Ridership Analysis Results

Using ridership counts from The HOP that reflected ridership activity across the fixed route transit system spanning one week in spring of 2019, the project team mapped the existing transit ridership by bus stop. The total ridership activity (the sum of boardings and alightings) for each stop revealed which stops along each route had the highest and lowest ridership activity. The majority of stops that experienced high ridership activity were transfer stations and other major destinations such as medical facilities, supermarkets, and higher education facilities. Specifically, stops with the highest ridership activity included:

- The Baylor Scott & White Clinic on Scott & White Drive between Harker Heights and Belton
- Avenue U at 3rd Street by the VA hospital
- Confederate/Liberty Park in Belton
- The Baylor Scott & White Medical Center
- Temple Transfer Station
- Walmart on Private Drive

1 Source: TTI, April 2021, https://comptroller.texas.gov/economy/fiscal-notes/2021/apr/transit.php

2 Source: Community Impact, July 2020, https://communityimpact.com/dallas-fort-worth/richardson/coronavirus/2020/07/08/dart-officials-report-55-hit-to-ridership-since-march/

Transit Market Analysis

The project team identified how much of the potential transit market in the Temple area is currently served by fixed route transit. The transit market analysis included a number of factors such as total population, total employment, and Targeted Transit Riders (TTR) currently within the service area. TTR are a portion of the population with demographic[3] indicators that would suggest a greater likelihood of their using transit, including:

- Population with disabilities
- Population with limited English proficiency
- Population of minorities
- Population aged 65 and older
- Population aged 17 or younger
- Population in poverty

Target Transit Riders (TTR) are a portion of the population with demographic indicators that would suggest a greater likelihood of their using transit.

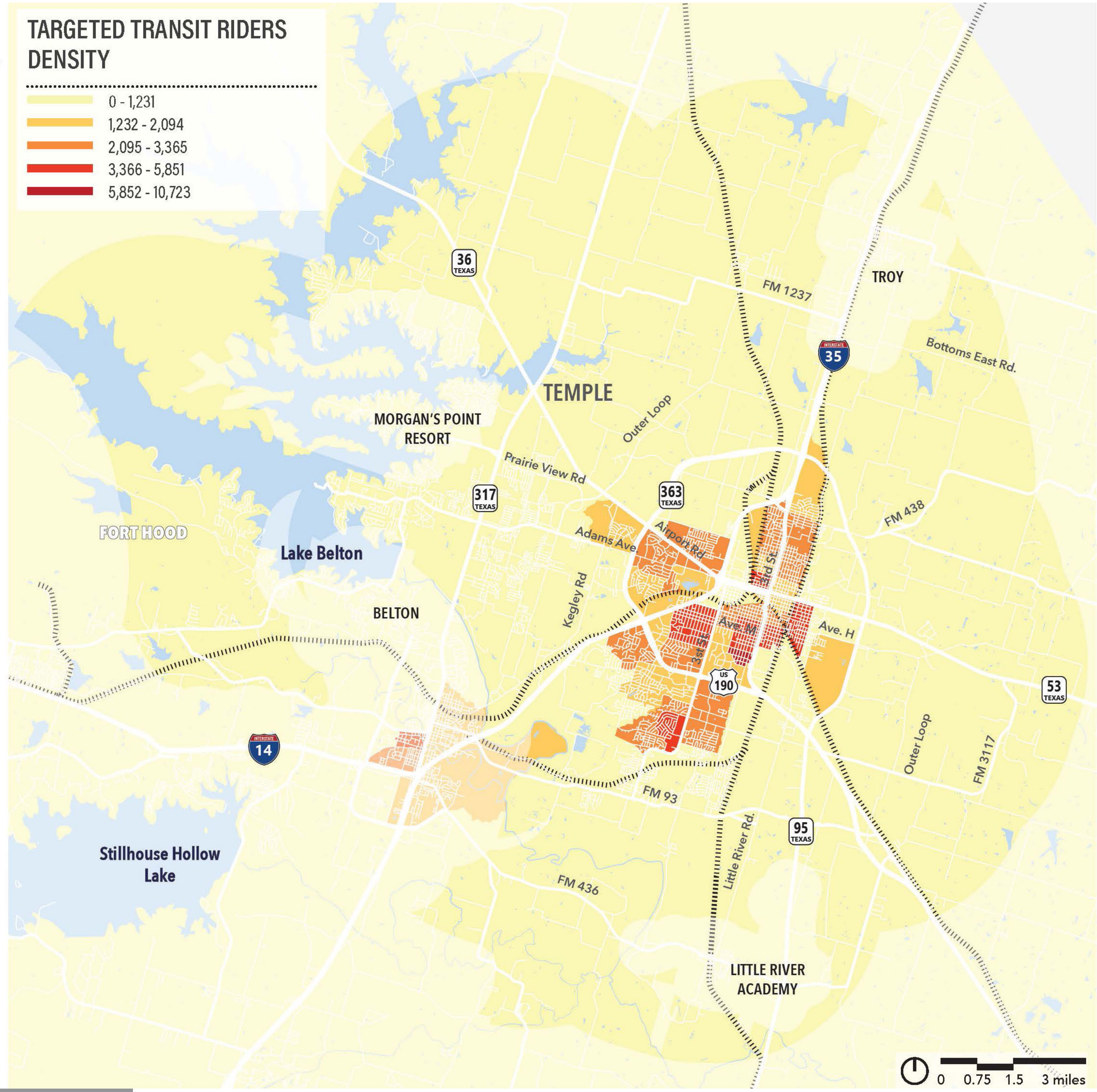
With the TTR population per US Census block group in the study area established, existing bus stops and demographic/employment data were used to conduct a buffer analysis with Geographic Information Systems (GIS) mapping software. The analysis identified populations that fell within or outside of a quarter-mile buffer, which is the distance assumed most people will walk to access transit.

To estimate the number of TTR served by the existing fixed route transit system, the percentage of each block group that fell within the buffer was calculated. This same process to calculate the total population served and total employment served.

3 Demographic data for each block group in the study area was sourced from the US Census Bureau’s 2019 American Community Survey (ACS) and 2018 Longitudinal Employer-Household Dynamics program (LEHD).

Figure 13 compares the levels of TTR in each block group to the quarter-mile buffer generated around the existing transit stops. The map illustrates that there are block groups with high levels of TTR around Temple and west-central Bell County south and east of Killeen/Harker Heights that fall outside of the existing system's service area.

Figure 13: Targeted Transit Riders and Market Served



Source: The HOP

Figure 14: Population and Employment Served by Transit

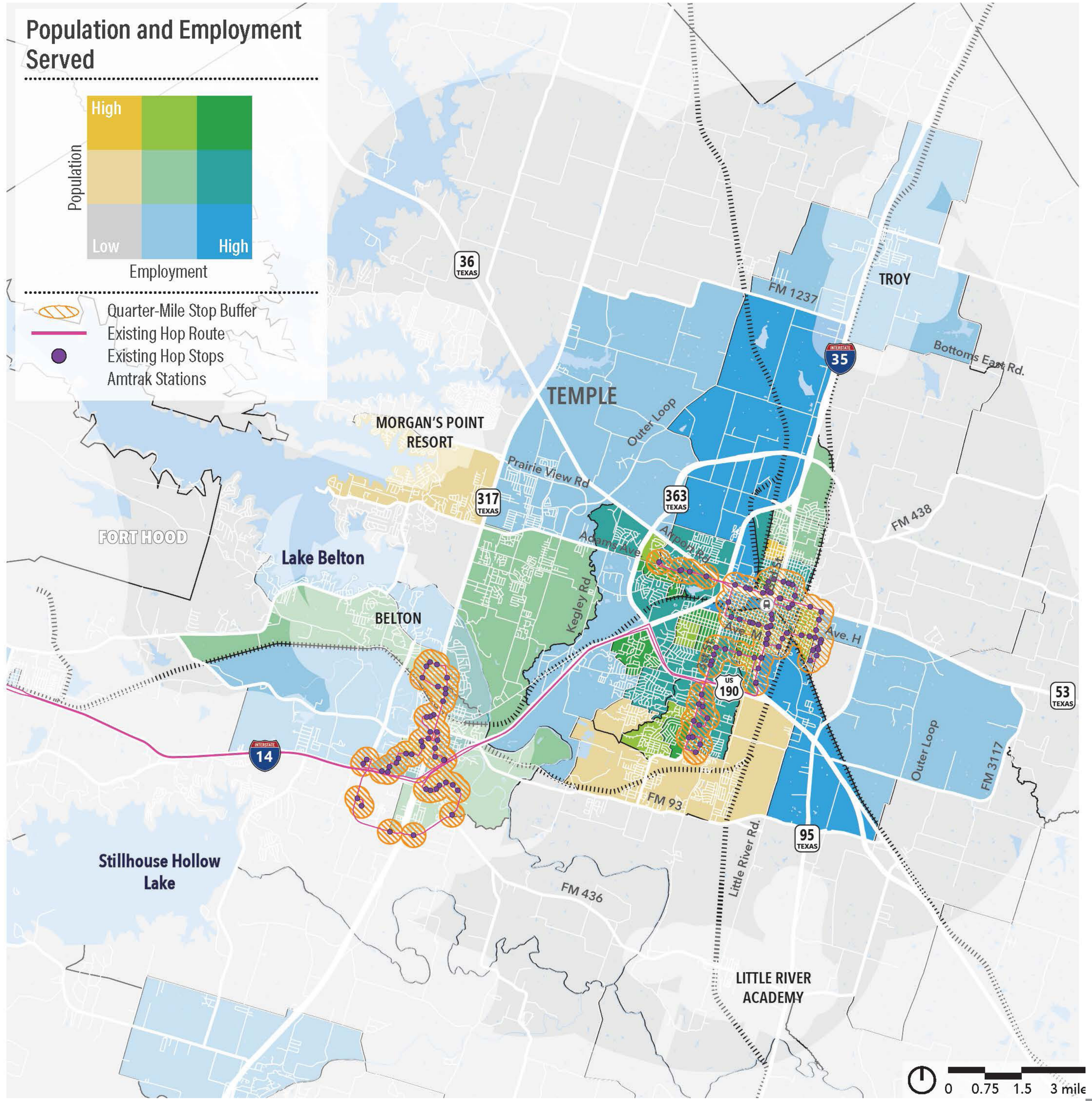


Figure 14 illustrates the levels of total population and employment in the study area in comparison to the quarter-mile buffer generated around the existing transit stops. The map shows that areas of both high population and employment are being served in Temple, Belton, Harker Heights, and south Killeen. However, there are still many block groups with medium-to-high levels of population and employment that are not currently served by the fixed route transit system.

Key Findings

Key Findings from the overview of the existing transit network and available ridership data include:

- The existing fixed route transit system in the study area is estimated to serve just over a third of the total population and just under half of all employment.
- The highest levels of ridership activity tend to occur at major destinations such as transfer stations, medical facilities, supermarkets, and higher education facilities.
- All of the HOP routes apart from the 200 Express route operate with 60-minute headways.
- There are block groups with high levels of TTR around Temple and west-central Bell County south and east of Killeen/Harker Heights that fall outside of the existing system's service area.
- The data analysis and feedback garnered through this study indicated that there is a transit service gap between central/east Temple and employment opportunities in the Industrial Park.

4.2.2 Active Transportation

Active transportation infrastructure is an important component of a balanced transportation system that supports mobility for non-motorized modes of travel such as walking, biking, and wheeling. Pedestrian and bicycle-supportive infrastructure help provide facilities that enable travelers to choose non-motorized travel throughout the study area and provide key accessibility connections to people with mobility challenges. Accessibility and connectivity for people who walk and bike or use other active transportation modes is a primary goal of the Temple Comprehensive Plan 2020 and the Temple MMP.

Existing Facilities

Sidewalks

Within the City of Temple, there are 173 miles of existing sidewalk. This means that over 84% of roadways that should typically have sidewalks currently lack this transportation resource. An analysis of the sidewalk data from the City's GIS database and Google Street View imagery determined the proportion of sidewalks in each of the six sidewalk condition rankings. Results are summarized below:

- 40% of existing sidewalk is in good condition or better
- 6% of sidewalk is in Fair condition
- 40% of sidewalk is in Poor or Very Poor condition
- Fair, Poor, and Very Poor sidewalks are concentrated in the gridded central portion of Temple
- 14% of existing sidewalk did not have a reported condition ranking

Hike & Bike Trails

Within the project study area, there are nearly 40 miles of off-street hike & bike trails, including both paved and non-paved trails. Currently, there are minimal designated on-street bicycle facilities, such as bike lanes or protected bike lanes, within the City of Temple. Figure 4 9 provides a snapshot of existing active transportation facilities in the study area.

Bicycling Comfort

Using a bicycle is a healthy, efficient, and affordable way to reach daily activities. However, safe, and comfortable facilities are needed for most people to choose cycling as a way of getting to their destination. A commonly used typology[4] within active transportation planning separates potential active transportation users into four categories of bicycle user types:

- Strong and Fearless ~3%: These riders are a small portion of the population and are comfortable riding on roadways with limited or no bicycle-specific facilities.
- Enthused and Confident ~13%: These riders may feel comfortable riding where there is a designated lane for bicycles and on low-volume roadways without bicycle facilities.
- Interested but Concerned ~54%: While in a park or on a hike & bike trail these riders may feel safe and comfortable, but they have significant safety concerns while riding with traffic on the roadway. They would be interested in riding to accomplish daily needs more often if they felt safe and comfortable. This is generally the largest part of the population.
- Not Interested ~30%: This portion of the population doesn't have interest in riding to accomplish daily activities, but they may use hike & bike trails or ride for recreation on occasion.

The takeaway from the average bicycle user type classification is that a large portion of the population (Interested but Concerned) may be able to use bicycles more often should safe and comfortable facilities be present along their route.

To better understand how cycling feels within the study area, a Bicycle Level of Traffic Stress (LTS) analysis was conducted to determine how each street is likely to feel to a person while cycling. The LTS produces a score ranging from 1 to 4, with 1 being the most comfortable and 4 being the least. The LTS score also correlates to the bicycle user types that feel comfortable using a given street (TABLE 7). As seen below, LTS scores of 1 and 2 can accommodate 70-100% of the potential riding population.

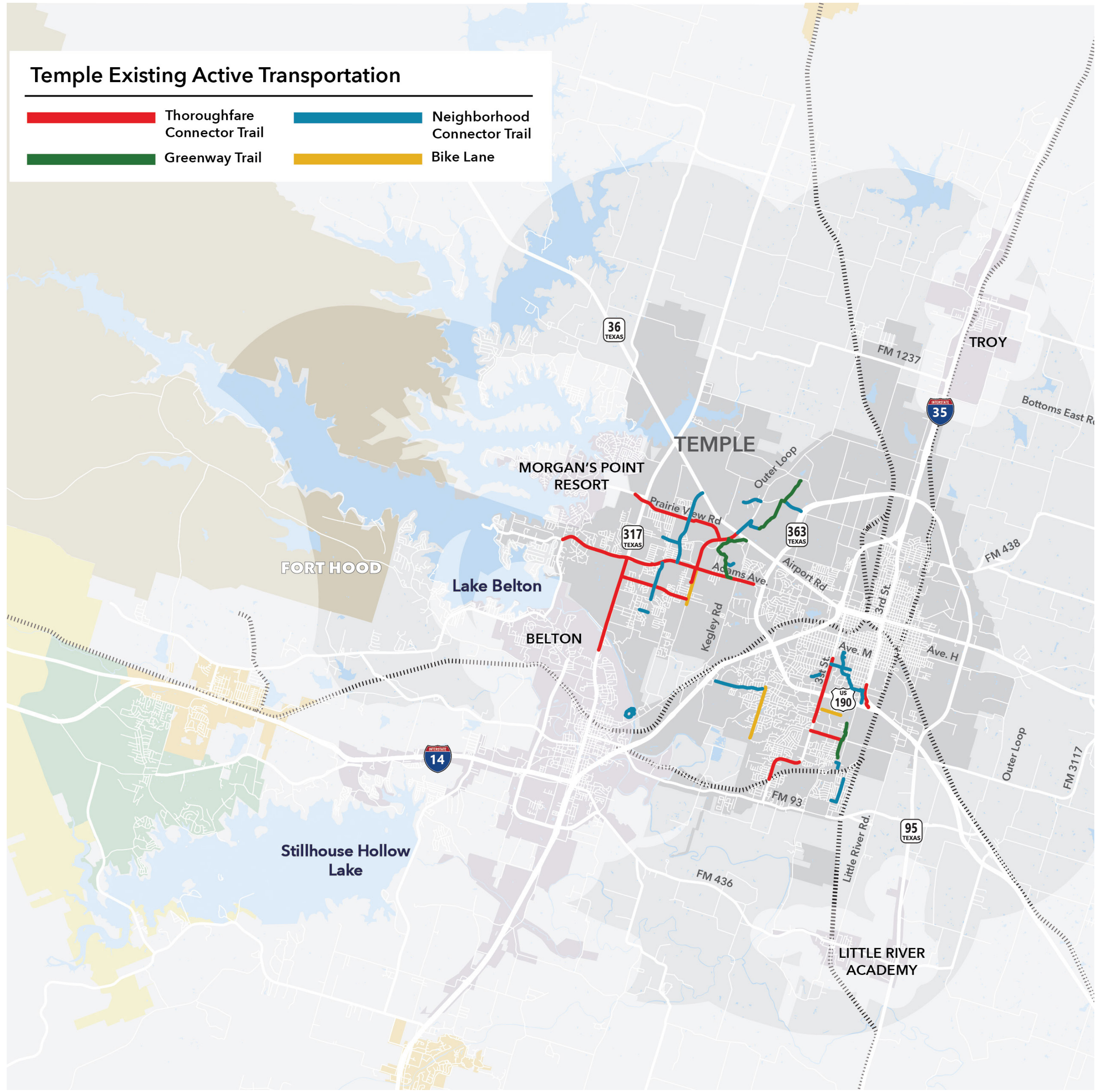
4 Geller, Roger. Four Types of Cyclists

TABLE 7: LTS SCORE AND USER ACCOMMODATION

LTS Score	Users Accommodated	Potential Riding Population Served	Typical Bicycle Facility Types
1 (Low Stress)	All Users	100%	Protected and Separated Bike Lanes, Off-Street Trails, or Low-Volume Local Roadways
2	Strong and fearless Enthused and Confident Interested but Concerned	70%	Buffered Bike Lanes on a Calm Street
3	Strong and fearless Enthused and Confident	16%	Narrow Bike Lane on a Busy Street
4 (High Stress)	Strong and fearless	3%	No Bike Lane on a Busy Street or Using a Shared Lane

The LTS analysis found that a little over 40% of centerline roadway miles in the study area have LTS scores of 1 and 2, with the majority of that being LTS 1. This is fed by the system of local streets with low speeds and volumes, particularly concentrated in the neighborhoods to the north and south of downtown Temple. The remaining 55% of roadways are ranked with LTS scores of 3 and 4, meaning that only up to about 16% of the potential riding population may feel comfortable accessing them in their current form. Outside of the Temple municipal boundary, there are many rural roadways with LTS 3 scores, and although volumes may be relatively low, potential speeds are not conducive to LTS 1 or 2 scores. Low-stress streets in neighborhoods to the far south and west of the City of Temple are also fairly isolated and have limited connections to the greater street network.

Figure 15: Existing Active Transportation Facilities



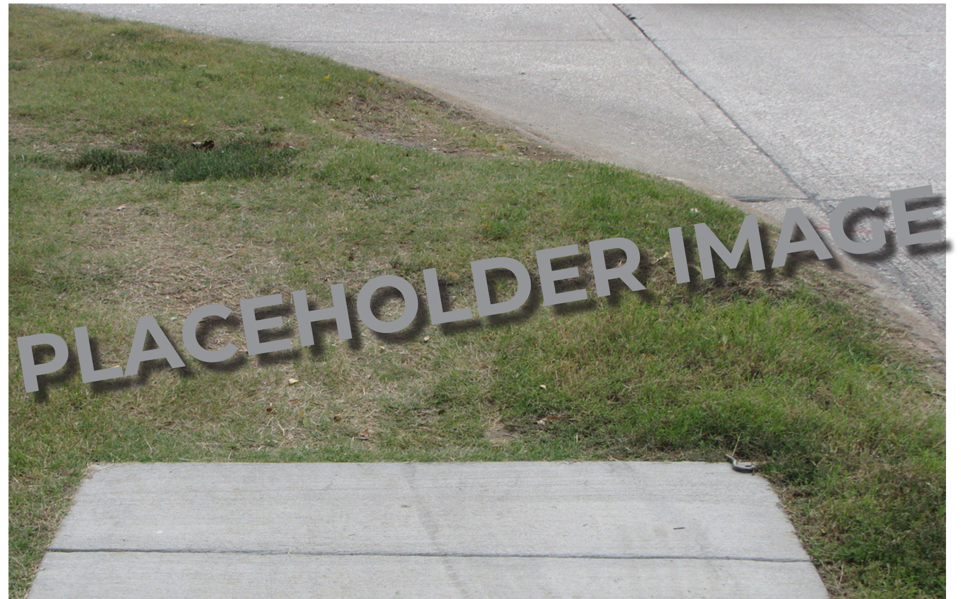
Gaps Analysis

The next phase identified gaps in the network. Generally, bicycle and pedestrian facilities end at the public right-of-way, making the last hundred-foot connection to the 'front door' less comfortable for access.

Critical Roadway Network Gaps

As shown in the Active Transportation Demand Analysis, there are few continuous North/South and East/West connections across the grid. The railroad is a significant barrier in this area and is likely forcing additional traffic to the few through cross-streets. This reinforces the need for a balanced roadway approach to make sure active transportation modes are accommodated on the through streets. Locations of critical gaps are identified below:

- S. 24th St., from Adams Avenue to MLK Jr. Dr.
- S. MLK Jr. Dr., from E. Avenue E to King Circle of Trail Crossings
- W Avenue F, from S. MLK Jr. Dr. to S. 25th St.
- S. 25th St., from W. H. Ave. to W. Avenue E
- Stratford Dr, from Hickory Rd to Waterford Park
- S. 5th St, from Friars Creek Trail to Temple College
- W. Adams Ave (EB), from Hilliard Rd to N. Kegley Rd
- W. Adams Ave, from Morgan's Point Rd to 317



Key Findings

Key Findings from the overview of the existing transit network and available ridership data include:

- 84% of roadways in Temple that would typically be expected to have a sidewalk do not.
- A large portion of sidewalks (40%) are in poor condition.
- The City of Temple's central neighborhoods have a network of connected low-stress streets that provide a good foundation for walking or cycling.
- Many of the outlying residential areas to the west and south also contain low-stress local streets well suited for active transportation.
- Major regional thoroughfares such as I-35 and Loop 363 limit crossing to only a handful of streets to access central Temple;
    - For example, between the north and south interchanges of I-35 and Loop 363, there are five opportunities to cross I-35 from east to west, all of which are high-stress roadways. The same may be true for those walking, as the presence of sidewalks are spotty approaching those crossings.
- Adams Avenue and Central Avenue separate Temple from north to south and signalized crossings are primarily on higher-stress roadways.
- The railroad line running through Temple limits roadway crossings to stressful streets shared with motor vehicles.
- Comparing high areas of demand and existing walking and biking facilities, there are gaps in areas that are also identified Environmental Justice Communities (areas where more than half of the population is low to moderate income, more than half minority, or where a quarter or more of the population is of Hispanic or Latino descent).

4.2.3 Freight and Aviation

Existing Freight Network

Freight transportation continues to increase throughout Temple and is essential to the economy. The location of Temple along Interstate 35, uniquely situated between five major metropolitan cities in Central Texas, makes it an important part of the truck freight movement on the National Highway Freight Network (NHFN).

The City's central proximity allows for north-south and east-west rail corridors. Burlington Northern and Santa Fe (BNSF) and Union Pacific (UP) are the main railroad carriers in the City. Temple was originally founded based on railroad activity to provide services for railroad equipment and passengers at a major junction point.

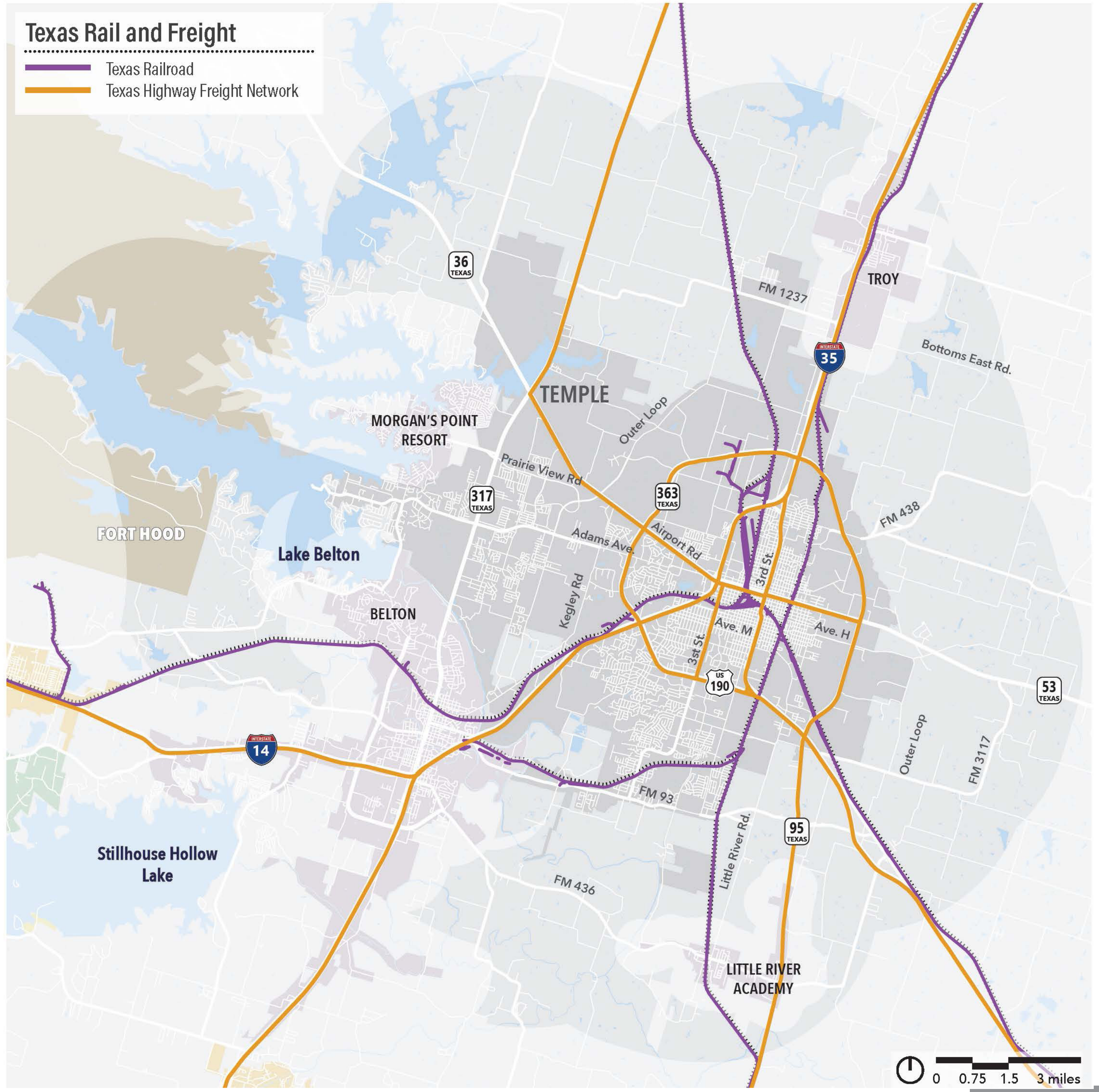
Figure 16 displays the Texas rail and freight network and how it relates to the City. As shown, there is a high level of connectivity between the Texas Highway Freight Network in orange and the railroads in purple. One outcome of the strength and diversity of the region's freight-dependent industries is a substantial flow of commodities moving into and out of Temple and the surrounding area. Commodities moving into and out of Temple and the surrounding area are composed of a broad range of commodity types including items consumed within the region and industrial products and agricultural goods produced in the area for consumption elsewhere.

Current Commodity Flows

Based on the commodity flow information obtained from the Texas Statewide Analysis Model (SAM-V4), the City of Temple and its surrounding area were estimated to have transported over 12.7 million tons of cargo to trading partners throughout North America in 2015. Top outbound commodities include non-metallic minerals (8.67 million tons); secondary and miscellaneous cargo (1.2 million tons); clay, concrete, and glass (0.7 million tons); petroleum products (0.41 million tons); and durable manufacturing (0.33 million tons).

During that same period, the area received over 9 million tons of cargo. Top inbound commodities include non-metallic minerals (3.93 million tons); petroleum products (1.75 million tons); clay, concrete, and glass (0.85 million tons); agriculture products (0.64 million tons); and food (0.57 million tons).

Figure 16: Texas Rail and Freight Network



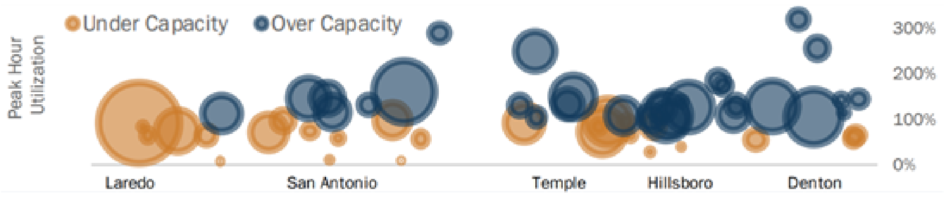
Truck Movements

Existing freight movements were explored to provide a depiction of truck travel on roadways for the Temple region. The analysis found that I-35 is the dominant corridor for truck travel, though other roadways— FM 93, SH 36, SH 53, SH 317, SL363, US 190, and Sparta Rd show notable truck flows.

Truck Parking

The demand for truck parking in Temple has increased as the movement of goods continue to flow into the city and through to areas such as Dallas, Austin, and Houston. Where there is a need for truck parking is based on factors such as convenience, comfort, and shipper/receiver demand. According to the Texas Statewide Truck Parking Study completed in 2020 by TxDOT and the KTMPO 2021 Parking Study, I-35 experiences high demand for truck parking that operates over capacity near the Temple area Figure 6.

Figure 6: Truck Parking Demand and Utilization at Publicly Owned and Privately Owned Truck Parking Locations



Source: TxDOT

The lack of parking options can lead to unauthorized truck parking. Unauthorized truck parking will cause additional congestion, safety and reliability concerns if not addressed. Several existing locations serve as the main parking options for trucks along these routes including Loves Truck Stop, Southwest Travel Center, and Texstar Travel Center.

Airport

The Draughon-Miller Central Texas Regional Airport (TPL) is located in the northwest corner of the City, near the interchange of TX 36 and TX 317. Access to the airport is solely from Airport Rd/ TX 36. Historically a US Army Air Forces Airfield, TPL now services general aviation and corporate aircraft operators. Its role is to connect Temple to regional and national markets to support the local economy. "The total operations breakdown includes 79.0 percent itinerant general aviation (GA); 14.1 percent military; and 6.9 percent local GA."[5] In addition to the runway, and multiple hangers, landside facilities at the airport include the terminal building and paved parking lots.

Movement to and from the airport becomes increasingly important as the City continues to grow. Nearby development has resulted in additional regional and local trips. These trips are generally served by single occupancy vehicle pick up and drop off. However, the airport has begun to experience additional trips using ride share options such as Uber and Lyft.

Key Findings

Key Findings from the overview of the existing freight network and airport include:

- Interstate 35 provides the city with the opportunity to connect between five major metropolitan cities in Central Texas.
- Notable truck flows include I-35, SH 36, SH 53, US 190, SH 317, SL 336, Sparta Rd, and FM 93.
- Demand for truck parking is increasing in Temple, and along I-35.
- Trips to and from the Draughon-Miller Central Texas Regional Airport (TPL) will continue to increase as the area grows. Accessibility to and from the airport will be key to the success of its growth.

5 Source: Author, "Airport Master Plan", 2020, Page 17, https://issuu.com/playbyplay/docs/airportmasterplan

4.3 Safety Performance

Transportation safety data analysis provides planners, policymakers, and the public with a better understanding of where critical safety issues exist in the transportation system and what factors may be contributing to study area crashes and crash rates. As such, safety data analysis is a critical component of regional transportation planning.

4.3.1 Vision Zero

The 2017 update to the Texas Strategic Highway Safety Plan (SHSP) acknowledged a steady increase in roadway fatalities, particularly in urban areas, since 2012, despite efforts to improve roadway user behavior and upgrade roadway conditions. The SHSP maintains a vision of moving toward zero deaths on roadways, commonly called "Vision Zero." The vision represents a multidiscipline collaboration aspiring to make Texas travel safer by reducing crashes, fatalities, and injuries by focusing on seven key emphasis areas, including distracted driving, impaired driving, intersection safety, older road users, pedestrian safety, roadway and lane departures, and speeding.

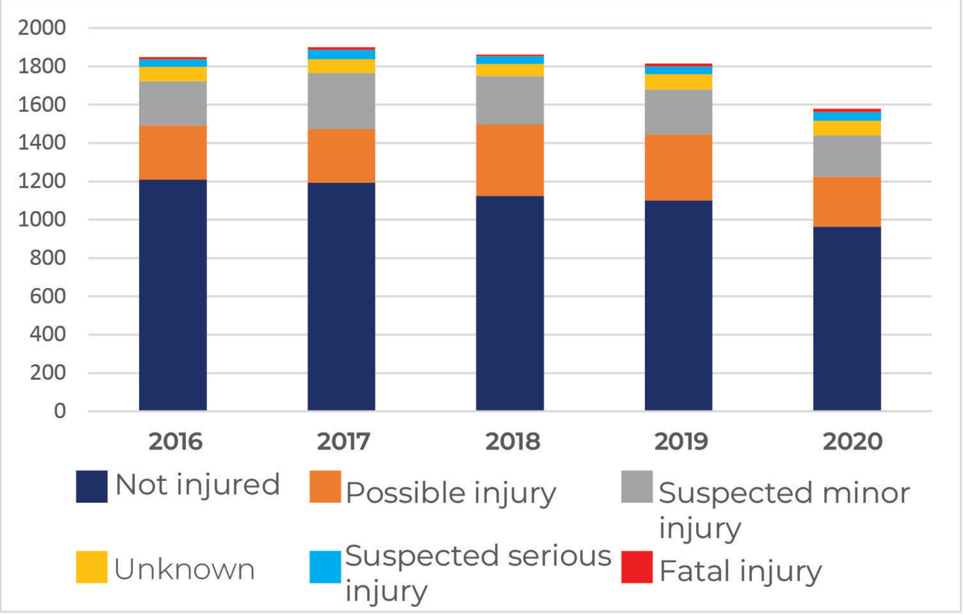
Temple is using the tools and metrics outlined in the Highway Safety Improvement Plan (HSIP) and included Vision Zero as a goal in the MMP. That goal makes it a priority to significantly reduce and eventually eliminate vehicle related fatalities in the study area, supporting the Texas SHSP goals.

4.3.2 Analysis of Crashes in Temple

Mapping the historical crash data from the Texas Crash Record Information System (CRIS) within the City of Temple and surrounding ETJ over a five-year period (2016-2020) for both motorized and non-motorized users provides an understanding of where crashes were occurring and their level of severity.

The overall number of crashes and total severe crashes has stayed consistent over the last five years, with a slight decrease in 2020. Figure 7 shows a summary of the crash counts and their severity in Temple over the last five years.

Figure 7: Crash Summary by Severity, 2016-2020

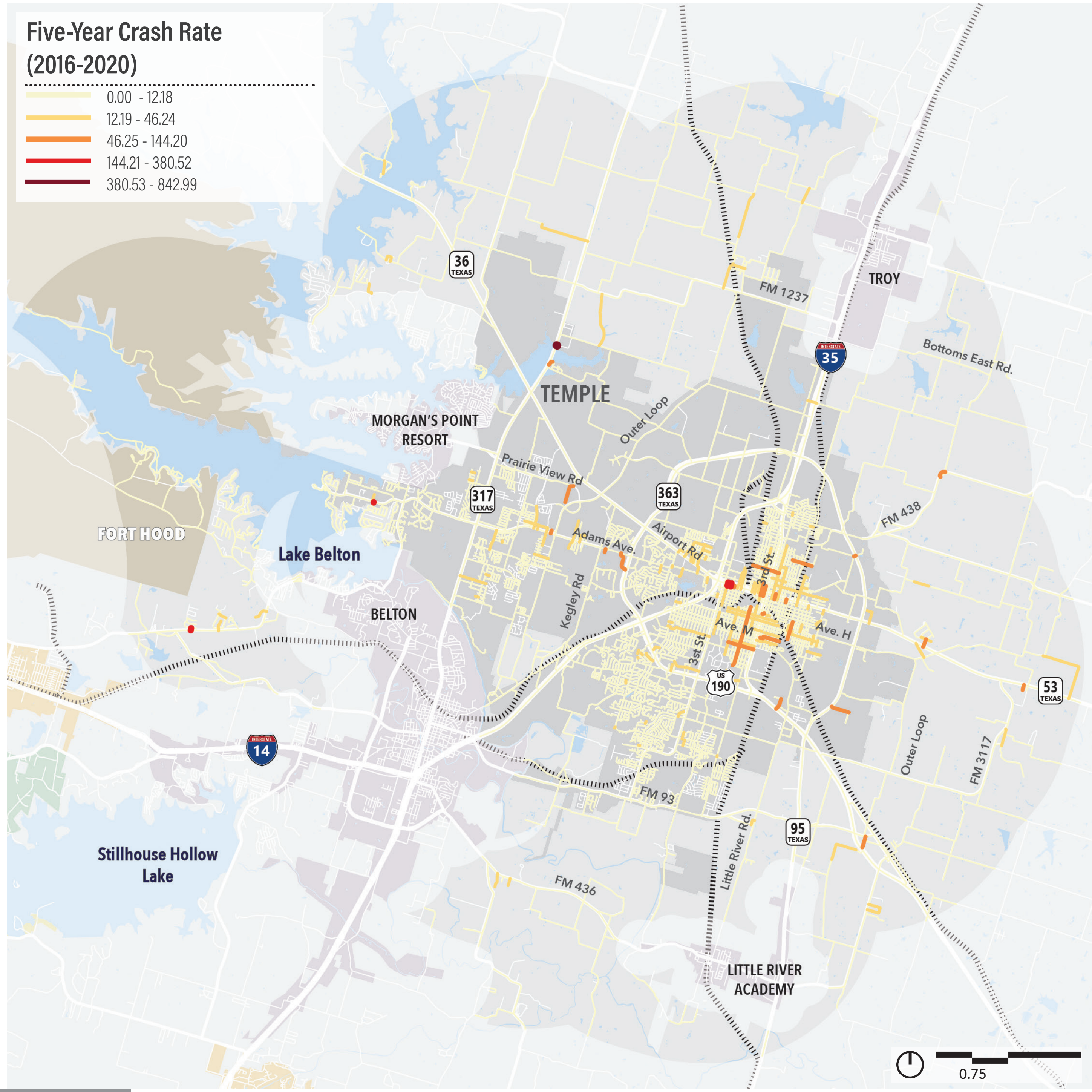


Total crash counts, especially where interstates are present, can yield somewhat misleading results as traffic volumes and the statistical likelihood of crashes are interlinked. For example, 100 crashes a year, while undesirable on an interstate with an average daily traffic count of around 19,000 vehicles, is proportionally less alarming than a local road with 100 crashes and a smaller volume of traffic. Normalizing the crash counts by volume of traffic helps refine the crash analysis to a point where locations experiencing disproportionate crash rates and severe outcomes are highlighted. To perform this analysis, vehicle miles traveled by segment were used to generate crash rates, rate of fatalities, and rate of injuries. The rates used in this analysis are expressed in terms of million vehicle miles (MVM) traveled.

High Crash Rates

Figure 17 shows the crash rates by segment and highlights a few key locations with the highest rate of crashes. A few locations, due to segment length and low volume of traffic, are shown to have a disproportionate rate of crashes. A small segment of Old Cedar Creek Road near the intersection with 317 has two crashes over the 5-year period and a low volume of approximately 100 average daily traffic (ADT) count, which in turn yields a high crash rate. Similar results are seen with a small segment of Woodland Trail just south of FM 2305, and High Crest Drive to the west off of FM 439. Two segments between W. Adams Avenue and W. Central Avenue in central Temple are shown as well. In these cases, N. 29th St. had 42 crashes and 27th St had 16 crashes.

Figure 17: 5 Year Crash Rates by Segment



Highest Rates of Severe Crashes

Segments with high rates of fatalities combined with high rates of serious injury rates provide a better understanding of where localized rates of severe outcomes were occurring. The person-level data, rather than the crash level data, informed both fatal and serious injury rates.

The following are identified as "fatal segments" of the roadway:

- Nolan Loop, which connects FM 439 to FM 93
- S. Cedar Road, off of FM 2305
- Reads Lake Road
- S. 57th Street, just north of I-35
- S. 49th Street to the south of I-35
- N. 25th Street, between W. Adams Avenue and W. Central Avenue

Additionally, nine are identified as "serious injury" segments of the roadway:

- West of I-35, Executive Drive, just north of W. Adams Avenue
- Draper Drive, just off of Airport Road
- Hart Road
- N. 21st Street
- S. 7th Street
- N. 7th Street
- E. Jackson Street, just south of Jackson Park

Contributing Factors

Understanding factors that contribute to crashes, especially those resulting in serious injuries or fatalities, adds depth to a comprehensive crash analysis and informs the development of strategic solutions. Of the top ten contributing factors identified, the top factors (in terms of total crashes) were speeding, failing to yield the right-of-way, and erratic driving. A portion of data entries was noted as having "No Data" or "Other" in the contributing factors fields, though the crash data did note other factors including distracted or inattentive, swerving or veering, or improper changing of lanes. This data highlights the propensity of certain types of crashes on the system and provides for a more systemic approach to developing solutions that address risk and severity reduction.

4.3.3 Active Transportation Crashes

Walking and bicycling are the two most basic forms of transportation, referred to as active transportation. While people traveling in a vehicle that has been engineered with crumple zones, seatbelts, and airbags are inherently buffered from more severe outcomes in the event of a crash, persons traveling by various means outside a motorized vehicle are inherently more susceptible or vulnerable to severe outcomes. Evaluating the safety of active transportation users on the network follows a process similar to that used to analyze vehicular crashes. Over the five years, there were 197 active transportation users affected by 186 crashes. Of those, there were 12 fatalities, 30 serious injuries, and 62 minor injuries. Figure 18 shows the locations of active transportation crashes and their severity.

Several segments in the study area are identified as having high active transportation severe crash rates, including:

- S. 31st Street, two fatalities just north of US 190
- 31st Street, several severe injuries south of Canyon Creek Drive and near the intersection of W. Avenue J
- S. 31st Street, two serious injuries occurred on W. Avenue R and W. Avenue T
- US 190 near and at I-35 had several severe crashes, including 3 fatalities
- S. 1st Street between W. Avenue J and W. Avenue F had a few crashes with one fatality and two serious injuries
- SH 53, 3 fatalities and 1 serious injury

Active Transportation Contributing Factors

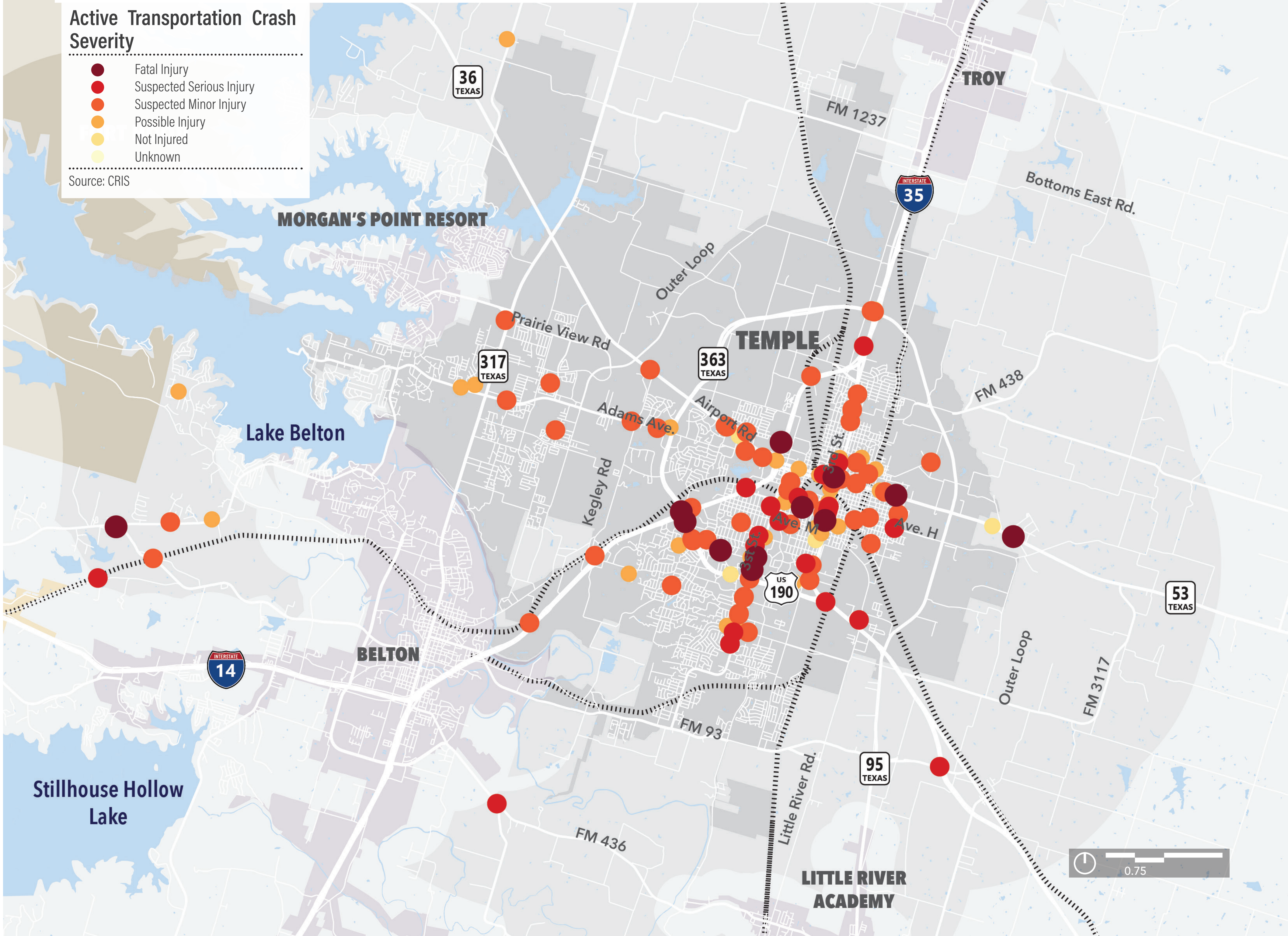
Active transportation crashes were reviewed for contributing factors. Other than crashes with no data or "other" noted for contributing factors, the top four contributing factors noted were distracted driving, failure to yield, erratic driving, and speeding.

4.3.4 Key Findings

Key findings from this analysis include:

- Speeding is the top contributing factor for all crashes and for those that result in a fatality or serious injury.
- Distracted Driving is the highest contributing factor for crashes involving active transportation.
- Vulnerable users, i.e., pedestrians and bicyclists are at a higher risk of fatality or serious injury in a crash.
- Single vehicle or same direction collisions were the top collision type for speed-related contributing factors.

Figure 18: Active Transportation Crashes by Severity



4.4 Travel Demand Management

A review of current and past efforts to pursue Transportation Demand Management (TDM) strategies in Temple provided an understanding of the current knowledge of and support for Transportation Demand Management by the City's elected officials, staff, and the leaders of other partner agencies.

The review produced examples of interest in TDM on the part of the City and KTMPO, but there was no evidence of past efforts to establish formal TDM programs or current efforts underway. However, interest in TDM was expressed in several local and regional plans such as the City of Temple's Comprehensive Plan and KTMPO's 2045 MTP.

4.4.1 Existing Mode Share

The current level of mode use for commuting assembled in TABLE 6 shows the shares for 2018 and 2015. The results indicate that commuting in Temple is highly car-oriented with 82.9% driving alone and 10.9% carpooling. A comparison with the 2015 results suggests a small shift from driving alone to carpooling has occurred but the overall share using a car has remained about the same. Bicycling and walking to work have decreased, and working at home has increased.

4.4.2 Key Findings

Key findings from this analysis include:

- No current City or regional TDM program in place.
- Interest expressed in previous plans.
- The majority of the residents drive alone (82%).

TABLE 6: COMMUTE MODE SHARE FOR TEMPLE

USUAL COMMUTE MODE	2015 SHARE	2018 SHARE
Drove Alone	83.5%	82.9%
Carpooled	9.9%	10.9%
Public Transit	0.5%	0.5%
Taxi	0.0%	0.0%
Motorcycle	0.2%	0.2%
Bicycle	0.5%	0.3%
Walked	1.7%	1.3%
Worked at Home	3.2%	3.4%
Other	0.5%	0.5%
Total	100.0%	100.0%

This page intentionally left blank