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CHAPTER 10

MOBILITY RECOMMENDATIONS

10. MOBILITY RECOMMENDATIONS

The City of Temple is a diverse place that is growing rapidly. The city's vision for a multimodal transportation system requires plans that will balance the needs of different people to move efficiently about the community. While it may not be necessary for every roadway to carry all modes of travel, the goal is for the transportation network to provide meaningful choices for all travelers. Access to a range of mobility options enables people to live where they wish and provides access to employment, education, and healthcare. This results in greater quality of life for residents and greater economic vitality for the City.

This chapter discusses mobility options for the City of Temple within the MMP planning horizon. The MMP mobility recommendations described in the following sections were developed based on the Goals and Objectives (Chapter 2) the public and stakeholder feedback (Chapter 3), the findings of the comprehensive system assessment (Chapters 4 and 5), the scenario analysis and testing of alternative solutions (Chapter 6), the Active Transportation Plan (Chapter 7), the Transit Vision plan (Chapter 8) and the review of the current Thoroughfare Plan and existing street network (Chapter 9).

A critical part of the MMP development was analyzing the output from these various technical analyses and the feedback from the stakeholders to develop multimodal mobility recommendations. The recommendations described in the following sections describe desirable components of an enhanced multimodal transportation network. Proposed elements include intersection operational and infrastructure improvements, roadway infrastructure improvements, multimodal facilities, safety improvements, transportation demand management strategies, and revisions and updates to city programs and policies.to make them consistent with the MMP recommendations and to prepare the city for dealing with emerging smart city and smart transportation technologies. Figure 10 1 shows the mobility areas addressed in the recommendations.

Figure 10 1: The Outer Loop project demonstrates Temple's expanding transportation network

The mobility recommendations serve as a blueprint for the city's transportation system that responds to community goals and guides future project implementation.

Recommendations include physical projects, policies to improve transportation system operations, or programs to improve project delivery identified throughout the planning process that would benefit the multimodal network. The MMP development process took a comprehensive view of the transportation system, but for clarity, the following recommendations are categorized by mode.

Figure 10 2: Modal Categories

Intersection Improvements | **Roadway Recommendations** | **Multimodal Recommendations** | **Transportation Demand Management Strategies** | **Freight Transportation** | **Safety**

10.1 INTERSECTION RECOMMENDATIONS

The following intersection recommendations are products of the key findings of the comprehensive system analysis, scenario analysis, Active Transportation Plan development, Thoroughfare Plan review, and a comprehensive network connectivity evaluation.

TABLE 10.1: Proposed Intersection Project Recommendations

Project Name	From Limit	To Limit	Work Description
FM 2305 & Hilliard Rd/Old Waco Rd	FM 2305	Hilliard Rd/Old Waco Rd	Add right-turn lane eastbound and southbound and keep shared thru/right lane northbound
Old Howard Rd, SH 36 & Hilliard Rd	Old Howard Rd, SH 36	Hilliard Rd	Add dual left-turn southbound
FM 2305 & Pea Ridge Rd	FM 2305	Pea Ridge Rd	Add right-turn lane eastbound and westbound
FM 2305 & Kegley Rd	FM 2305	Kegley Rd	Add right-turn lane northbound and westbound
Charter Oaks Dr & Midway Dr/Kegley Rd	Charter Oaks Dr	Midway Dr/ Kegley Rd	Add right-turn lane northeast bound and remove stop sign for northwest bound and southbound approaches; Extend two-way left-turn lane on Kegley Rd from FM 2305 to Charter Oaks Drive and update functional class to minor arterial. Add traffic signal and change northbound lane assignment to left-turn lane and shared thru/right-turn lane

Project Name	From Limit	To Limit	Work Description
IH 35 SB Frontage & Midway Dr	IH 35 SB Frontage	Midway Dr	Add left-turn and right-turn lane southwest bound
IH 35 NB Frontage & Berger/Hart Rd	IH 35 NB Frontage	Berger/Hart Rd	Add traffic signal (part of North Outer Loop project)
IH 35 SB Frontage & Hart Rd	IH 35 SB Frontage	Hart Rd	Add traffic signal (part of North Outer Loop project)
Loop 363 WBFR & Wendland Rd	Loop 363 WBFR	Wendland Rd	Add left-turn lane northbound and add traffic signal
Loop 363 EBFR & Wendland Rd	Loop 363 EBFR	Wendland Rd	Add left-turn lane southbound and add traffic signal
Loop 363 NB Frontage & Industrial Blvd	Loop 363 NB Frontage	Industrial Blvd	Add left-turn lane southeast bound and add traffic signal
Loop 363 SB Frontage & Industrial Blvd	Loop 363 SB Frontage	Industrial Blvd	Add left-turn lane northwest bound and add traffic signal
Cearley Rd/Twin Oaks Dr & SH 53	Cearley Rd/Twin Oaks Dr	SH 53	Add right-turn lane northbound and add signal

Project Name	From Limit	To Limit	Work Description
IH 35 NB Frontage & 31st St/Nugent Ave	IH 35 NB Frontage	31st St/Nugent Ave	Add traffic signal
IH 35 SB Frontage & Nugent Ave	IH 35 SB Frontage	Nugent Ave	Add traffic signal
57th St & IH 35 SB Frontage	57th St	IH 35 SB Frontage	Add shared left/thru lane southwest bound
Central Ave & 31st St	Central Ave	31st St	Add right-turn lane northbound and convert thru to shared thru/right lane eastbound and provide for accommodation NPD AAA network
31st & Ave D	31st	Ave D	Add traffic signal and provide accommodation for NPD AAA network
31st St & Ave H	31st St	Ave H	Add right-turn lane northbound and add right-turn lane westbound; Add right-turn lane southbound and extended left-turn lane westbound. Provide accommodation for NPD AAA network
31st St & Ave M	31st St	Ave M	Add right-turn lane northbound and provide for NPD AAA network
Adams Ave & 31st St	Adams Ave	31st St	Add left-turn lane northbound and right-turn lane southwest bound. Provide accommodation for NPD AAA network

Project Name	From Limit	To Limit	Work Description
FM 93 & Hatrick Bluff Rd	FM 93	Hatrick Bluff Rd	Add right-turn lane northbound and left-turn lane westbound
Old Hwy 95 & FM 93	Old Hwy 95	FM 93	Widen FM 93 from 2 to 4 lanes from FM 1741 to SH 95
Loop 363/Young Ave & FM 438	Loop 363/Young Ave	FM 438	Add left-turn lane northwest bound, add left-turn lane southbound, and add traffic signal
Young Ave & Shell Ave	Young Ave	Shell Ave	Add right-turn lane southwest bound
3rd St, Industrial Blvd & Young Ave	3rd St, Industrial Blvd	Young Ave	Add left-turn lane westbound
3rd St/1st St & Adams Ave	3rd St/1st St	Adams Ave	Add right-turn lane southbound
1st St & Ave H	1st St	Ave H	Add left-turn lane southbound and right-turn lane westbound
FM93 & S 31st St	FM 93	S 31st Street	Upgrade and redesign intersection in conjunction with the proposed expansion and redesign of FM 93.
190 & MLK	US-190	S MLK Jr Dr	Future grade separation
Hilliard Rd & Research Loop	Hilliard Rd	Research Loop	Potential roundabout

10.1.1 INTERSECTION PROGRAM AND POLICY RECOMMENDATIONS

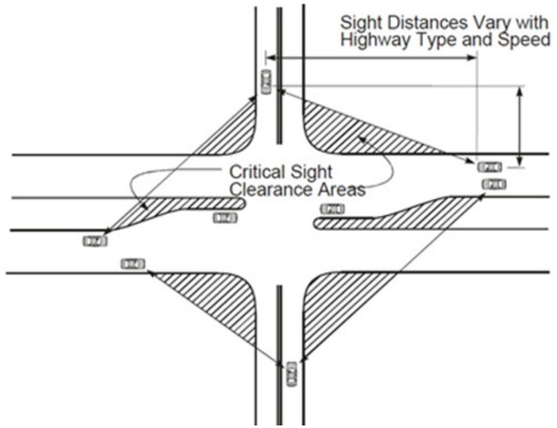
10.1.1.1 Sight Distance Recommendations

Drivers approaching or departing an intersection should have an unobstructed view of traffic control devices and sufficient length along the crossing road to safely navigate the intersection. According to the Texas Transportation institute "Appropriate intersection sight distance (ISD) reduces the potential for conflicts at intersections. Sight distance is also provided at intersections to allow the drivers of stopped vehicles a sufficient view of the intersecting road." Sight distances can be limited by terrain, walls, railings, or landscaping.

The MMP recommends appropriate considerations to allow for intersection sight distance in exceedance of requirements set forth by AASHTO and TXDOT. TXDOT recommends the following factors should be taken into consideration when designing an intersection:

- Adequate sight distance should be provided along both highway approaches and across corners.
- Gradients of intersecting highways should be as flat as practical on sections that are to be used for storage of stopped vehicles.
- Combination of vertical and horizontal curvature should allow adequate sight distance of the intersection.
- Traffic lanes and marked pedestrian walks should be clearly visible at all times.
- Lane markings and signs should be clearly visible and understandable from a desired distance.
- Intersections should eliminate, relocate, or modify conflict points to the extent allowable in order to improve safety.
- Intersections should be evaluated for the effects of barriers, rails, and retaining walls on sight distance.

Figure 10 3: Critical Sight Distance Clearance Areas



Source: TTI Urban Intersection Design Guide: Volume 1 – Guidelines

For selecting intersection sight distance, refer to AASHTO's A Policy on Geometric Design for Highways and Streets. Sight distance criteria are provided for the following types of intersection controls:

- Intersections with no control
- Intersections with stop control on the minor road
- Intersections with yield control on the minor road
- Intersections with traffic signal control
- Intersections with all-way stop control
- Left turns from the major road

10.1.1.2 Roundabouts

As a part of its intersection and signal program, the City should consider and continue the judicious use of roundabouts in the design of relevant functional classes of roadways, particularly at locations with high crash rates. Roundabouts are a specialized intersection treatment that provide proven safety countermeasures because they can substantially reduce crashes that result in serious injury or death. Roundabouts can:

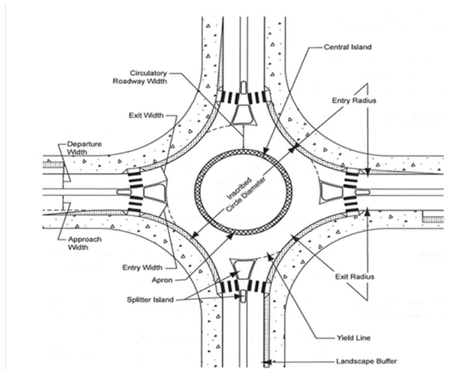
- Improve safety
- Promote lower speeds and traffic calming
- Reduce conflict points
- Lead to improved operational performance
- Can be part of an effective corridor access management plan.
- Meet a wide range of traffic conditions because they are versatile in size, shape, and design

Roundabouts | Intersection Safety - Safety | Federal Highway Administration (dot.gov)

The benefits of roundabouts include lowering vehicular speeds to consistent average operating speeds. Lower vehicular speeds using roundabouts allow safer pedestrian and bicycle crossings. This also allows merging traffic to enter conflicting traffic streams in a manageable manner as they are generally more predictive speeds for judging traffic spacing.

Roundabout basic geometric elements include an inscribed circle, a central island, a dashed entrance line at each entry, and a circulatory roadway (one or more lanes). Where applicable, sidewalks with accessible ramps and crosswalks can be included. In addition, landscape buffers between the back of curb, sidewalk and traffic splitter islands can enhance the aesthetic and function of each entry/exit point. Truck aprons, mountable curbs or laydown curbs are recommended at curb lines to accommodate truck tractor-semitrailer WB-50 design vehicles.

Figure 10 4: Roundabout Geometric Elements



Source: NCHRP 672

Table 10 2 presents typical design elements, and their range of appropriate values as described by the AASHTO Policy on Geometric Design of Highways and Streets. The MMP recommends these specifications as the basis for roundabout design.

Table 10 2: Comparison of Roundabout Types

Design Element	Mini-Roundabout	Single-Lane Roundabout	Multilane Roundabout
Desirable maximum entry design speed	15 to 20 mph	20 to 25 mph	25 to 30 mph
Maximum number of entering lanes per approach	1	1	2+
Typical inscribed circle diameter	45 to 90 ft.	90 to 180 ft.	150 to 300 ft.
Central Island Treatment	Mountable	Raised	Raised
Typical Daily Service Volumes	0 to 15,000	0 to 20,000	0 to 45,000 (2 lanes)

Source: AASHTO Policy on Geometric Design of Highways and Streets

Local examples of successful roundabout projects completed on Avenue U and on North 31st in Temple are shown in Figure 10 5 and Figure 10 6 .

Figure 10 5: Single Lane Roundabout - Avenue U

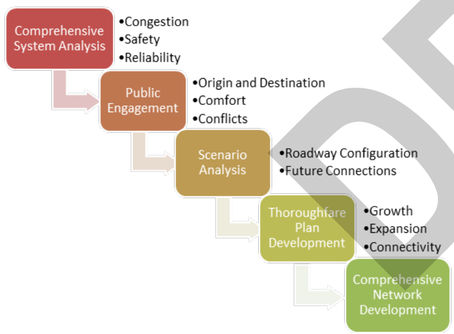
Figure 10 6: Single Lane Roundabout - North 31st Street

10.2 ROADWAY RECOMMENDATIONS

Temple MMP roadway recommendations were evaluated and selected using a technical and analytical process. The process began with the key findings of the comprehensive system analysis, public engagement activities, the scenario analysis, Thoroughfare Plan development, and a comprehensive network evaluation. Figure 10 7 shows the steps in the development of the roadway recommendations.

Roadway cross-section recommendations for each facility type were described in Chapter 9 Thoroughfare Plan. These cross-sections included specifications for included components such as sidewalks, bicycle facilities and landscape features. These cross-sections, combined with the multimodal recommendations from the Active Transportation Plan and the Transit Vision Plan, support a Complete-Streets strategy for the MMP.

Figure 10 7: Roadway Recommendation Development



Complete Streets is a set of policies and design standards that provide users of all ages and abilities with transportation infrastructure to move safely and comfortably through the space, regardless of mode. “Complete streets” principles encourage planners and engineers to consider all transportation modes and users of a roadway when designing streets, including bicyclists, transit riders, pedestrians, motorists, youth, elderly, differently abled, and the able-bodied.

Complete Streets concepts incorporating and accommodating companion recommendations for the respective roadways from the Active Transportation Plan and Transit Vision Plan should be taken into consideration when planning, designing, and implementing the recommended roadway improvement projects presented in Table 10 3.

Figure 10 8: Complete Streets Concept – Pedestrian Safety Island

Table 10 3: Proposed Roadway Improvement Projects

Project Name	From Limit	To Limit	Work Description
Highway 36 (Airport Road)	Moffat Road	Loop 363	Widen to 4 lanes from Moffat Road to Loop 363
Highway 317	Adams Road	Bell/McLennan County Line	Widen to 4 lanes with median from Adams Road to Bell/ McLennan County Line
Highway 95	US 190	FM 436	Widen to 4 lanes from US 190 to FM 436
Hickory Road	Stratford Dr	FM 93	New roadway parallel to FM 1741 / 31st St from Stratford Dr to FM 93
1st Street	US 190	Marlandwood Rd	New roadway parallel to FM 1741 / 31st St from US 190 to Marlandwood Road, recommended alignment shown in TMED Neighborhood Plan

Project Name	From Limit	To Limit	Work Description
FM 2305 (West Adams)	HWY 317	Loop 363	Increase capacity
South Pea Ridge	Adams Ave	Hogan Rd	Enhance standards/improve
Hartrick Bluff	Tanglewood Rd	Allen Way	Enhance standards/improve
S 31st Street	Azalea Dr	Canyon Creek Dr	Increase capacity and Provide accommodation for TMED NPD AAA network connections.
Industrial Blvd	N. 3rd	I-35	Decrease capacity
Martin Luther King	French Ave	Loop 363	Decrease capacity
Western Outer Loop	South of Adams Ave	I-35	New continuous 4-lane divided principal arterial
Eastern Outer Loop	I-35	Heidenheimer	New continuous 4-lane divided principal arterial
I-35	US 190 / I-14	Loop 363	widen to eight lanes as part of future 1-14 project.
US 190	1st Street	Highway 95	Upgrade to 4 lane freeway with continuous frontage roads and grade separation at MLK Blvd Widen from two to four lanes from two miles south of FM 436 in Heidenheimer to Milam County Line (Future 1-14 corridor)
FM 93	FM 1741 / S 31st St	SH 95	Widen from 2 to 4 lanes, provide for a raised median, and construct grade-separation at UP RR (TxDOT project)

Project Name	From Limit	To Limit	Work Description
Kegley Rd	Kegley Ln (End of Phase II)	The intersection of Charter Oak Drive	Improvements include expanded pavement sections with a continuous left-turn lane and an elevated bridge structure over Pepper Creek; Improvements will take this rural road and turn it into a minor arterial providing an alternate route for traffic from IH-35 to the west side of town.
Young Ave	E Shell Ave	E Young Ave	Realign Shell/Young into T intersection. Proposed Shell Rd Re-alignment in Bellaire NPD, concept only, $11.9M, may not reach to this intersection
Loop 363 Frontage	Lucius McClevey Dr	Industrial Blvd	Reconstruct main lanes and overpass, Construct interchange and expand 2 to 4 lanes with frontage roads TBD, $50M, (KTMPO W35-07)
W Nugent Ave	Dodgen Loop	N 31st St	current ROW looks to be around 60-70; acquire ROW to Minor Arterial 80-100 and expand to 4 lanes
Pegasus	Dodgen Loop	FM 1273	acquire ROW to CC 65-75 and expand to 4 lanes. Evaluate connection with Loop 363
Midway Dr	Charter oak Dr	Battle Dr	widen at and leading up to intersections
FM 1123	FM 436	south boundary	widen to four lanes
FM436	FM1123	East of Dice Grove Rd	widen to four lanes
Hartrick Bluff	FM 93	South Future Minor Arterial	widen to four lanes

Project Name	From Limit	To Limit	Work Description
SH 36 Airport Rd	Moffat Rd	North bridge	widen to four lanes
1st St	S 1st ST	South of W Blackland Rd	J type connection - avoid last parcel
Little River/Old 95 Rd	W Blackland Rd	South ETJ	Reconstruct two lane arterial roadway with a center-turn lane, bike lanes, and 6 ft sidewalks.

10.2.1 ROADWAY PROGRAM AND POLICY RECOMMENDATIONS

Along with the Complete Streets approach described in the introduction to the roadway recommendations, the MMP recommends that the City revise and strengthen some of its other policies and programs. The following subsections provide specific criteria for these programs.

10.2.1.1 Access Management Criteria

Access management is an approach to roadway design and operations that helps to maintain smooth traffic flows and reduce turning movement conflicts particularly at adjacent land use ingress and egress points. Access management is based on the strategic use of roadway elements such as median treatments, signalization, and innovative intersection design combined with driveway spacing, median opening and turn-lane applications. The MMP recommends that the City refine its access management program by applying revised standards for driveway spacing and median openings as discussed in the following sections.

10.2.1.2 Driveway Spacing

In general municipalities in Texas follow the TxDOT Access Management Manual. The MMP recommendation is that driveway spacing for commercial and residential sites adhere to the recommendations in Table 10 4 where applicable. In functional roles or cases not specifically identified by this memo and its attachments the City should defer to the TxDOT Access Management Manual. Table 10 4 presents a summary of the MMP recommendations for driveway spacing.

Table 10 4: Minimum Driveway Spacing

Functional Role	Commercial Spacing	Residential Spacing
Rural Local	100’	40’
Rural Collector	200’	200’
Suburban Local	50’	20’
Suburban Neighborhood Collector	150’	50’
Suburban Community Collector	150’	Prohibited
Suburban Minor Arterial	200’	Prohibited
Suburban Major Arterial	400’	Prohibited
Urban Local	40’	40’
Urban Avenue	100’	100’

10.2.1.3 Median Opening Recommendations

As part of the City’s access management policy the MMP recommends medians at appropriate locations on the relevant functional class of roadway. Table 10 5 presents specifications derived from NCHRP guidance, which recommends median opening criteria for varying roadway operating speeds. The MMP recommends the application of these criteria for new or redesigned roadways with median treatments.

Table 10 5: Minimum Spacing for Median Openings

Design Speed (MPH)	Minimum Spacing with 100’ Minimum Storage Requirement	Minimum Spacing with 150’ Minimum Storage Requirement
30	350’	500’
35	425’	575’
40	500’	650’
45	600’	750’
50	750’	900’
Sources NCHRP No. 93, 1970; NCHRP No. 929, 2020		

10.2.1.4 Operation and Maintenance Policies

The 2020 Pavement Management Report (PMR) is a quantitative study which investigates the pavement condition of City’s entire road network. The report recommends preservation, rehabilitation, or reconstruction of Temple roads, based on a pavement section’s Pavement Condition Index, which at the time of the report was a system wide average of seventy-five (75).

The MMP recommends that the City continue to conduct, and budget for, the PMR asset management strategy of rejuvenation and global preventive maintenance to maintain a state of good repair, which in this case is defined by the City as a pavement condition index (PCI) of eighty (80). The MMP further recommends that the City use a performance-based planning approach to this effort by periodically conducting a review of the program. The review should include how well the program is achieving the target PCI, and whether the PCI achieved results in the envisioned transportation system condition outcomes. Based on this review, the City could then adjust the frequency of its interventions and the associated budget to achieve the intended outcomes.

10.3 MULTIMODAL RECOMMENDATIONS

The multimodal recommendations were developed as part of the Active Transportation Plan (Chapter 7) and Transit Vision Plan (Chapter 8). Recommendations for the active network include pedestrian and bicycle facilities to help implement the All Ages and Abilities network. Recommendations for transit include the phased implementation of the proposed alternatives. Combined with the intersection and roadway improvement recommendations, the multimodal recommendations described in the following subsections represent an integral part of the City of Temple’s Complete-Streets program.

10.3.1 ACTIVE TRANSPORTATION RECOMMENDATIONS

These active transportation recommendations present proposed facilities and infrastructure that benefit access, character, quality of place, and the health and well-being of the community. The recommended improvements address the key findings of the active transportation demand analysis, level of stress analysis, and the public input gathered from stakeholder interviews and the public. These active transportation projects, many of which can and should be implemented in conjunction with proposed or programmed roadway work, provide the basis for implementing the Complete Streets concept of an All Ages and Abilities active transportation network.

10.3.1.1 Bicycle Facilities

Table 10 6 presents the bicycle facility recommendations developed from the safety, network connectivity, and bicycle level-of-stress analysis. These recommendations are conceptual in nature. Specific design elements for each facility should be developed based on appropriate corridor cross-section, functional class and engineering opportunities and constraints encountered during project development.

Figure 10 9: Pepper Creek Hike and Bike Trail

Source: KPA Engineering

Table 10 6: Proposed Bicycle Facility Project Recommendations

Project Name	From Limit	To Limit	Work Description	Length (ft.)
FM 2305 (Adams Ave)	N. 50th	Belton Lake	Bicycle Facility, Striping, and/or Signage	70,000
Old Waco Rd	FM 2305	North of S. Pea Ridge Road	Bicycle Facility, Striping, and/or Signage	21,000
Hilliard Rd	FM 2305	Wendlands Farm Lake	Bicycle Facility, Striping, and/or Signage	25,000
SH 36	SH 317	I-35	Bicycle Facility, Striping, and/or Signage	35,000
Hog Pen Creek Trail	FM 2305	Poison Oak	Bicycle Facility, Striping, and/or Signage	12,000
S. Kegley Rd	SH 36	I-35	Bicycle Facility, Striping, and/or Signage	20,000
Midway Dr	I-35	S. 57th St.	Bicycle Facility, Striping, and/or Signage	10,000
Hickory Rd	Midway Dr	Stratford Dr	Bicycle Facility, Striping, and/or Signage	7,600
S. 57th St	West Avenue L	Forest Trail	Bicycle Facility, Striping, and/or Signage	2,500
Georgetown RR Trail 1, 2, 3	Stonehaven Dr	Leon River	Bicycle Facility, Striping, and/or Signage	26,500
S. 5th St	South of W Avenue U	Canyon Creek Dr	Bicycle Facility, Striping, and/or Signage	7,500
W. Avenue L	S. 57th	S. 8th St	Bicycle Facility, Striping, and/or Signage	13,500
Teague PL	S. Martin Luther King Jr. Dr	E. Marvin R Felder Dr	Bicycle Facility, Striping, and/or Signage	3,700
S. 2nd St	E. Avenue L	E. Avenue K	Bicycle Facility, Striping, and/or Signage	1,100
South 25th St	Adams Ave	West Avenue T	Bicycle Facility, Striping, and/or Signage	9,200
SH 53	SH 290	I-35	Bicycle Facility, Striping, and/or Signage	6,500
3rd St	Adams Ave	W. Avenue E	Bicycle Facility, Striping, and/or Signage	2,200
N. 7th St	Mayborn Dr	Adams Ave	Bicycle Facility, Striping, and/or Signage	8,000
Mayborn Dr	N. 15th St	N. 7th St	Bicycle Facility, Striping, and/or Signage	1,500
N. 15th St	Industrial Boulevard	Mayborn Dr	Bicycle Facility, Striping, and/or Signage	2,500
Martin Luther King Jr. Dr	E. Nugent Ave	Road 5	Bicycle Facility, Striping, and/or Signage	13,000

Project Name	From Limit	To Limit	Work Description	Length (ft.)
Martin Luther King Jr. Dr	S. Martin Luther King Jr. Dr	S. 24th St	Bicycle Facility, Striping, and/or Signage	3,500
East Avenue H	S. Martin Luther King Jr. Dr	Dodgen Loop	Bicycle Facility, Striping, and/or Signage	12,000
Lake Terrace Trail	Prairie View Rd	Connecticut Ave	Bicycle Facility, Striping, and/or Signage	6,000
31st St	W. Houston Ave	Georgetown Trail	Bicycle Facility, Striping, and/or Signage	40,000
Prairie View Rd	Starlight Dr	Hilliard Rd	Bicycle Facility, Striping, and/or Signage	15,000
Canyon Creek Dr	S. 31st St	Old 95 Rd	Bicycle Facility, Striping, and/or Signage	12,900
Tarver Dr	Old Waco Rd	SH 317	Bicycle Striping and/or Signage	10,000
Hogan Rd	Old Waco Rd	SH 317	Bicycle Striping and/or Signage	10,000
Poison Oak Rd	Old Waco Rd	SH 317	Bicycle Striping and/or Signage	11,000
Pepper Creek Trail Ext	FM 2305	S. Kegley Rd	Bicycle Striping and/or Signage	5,500
Bird Creek Interceptor Trail	Midway Dr	Shallow Ford Rd	Bicycle Striping and/or Signage	5,000
Stratford Dr	Hickory Rd	Waterbury Dr	Bicycle Striping and/or Signage	3,000
Waterbury Dr	Stratford Dr	Winchester Dr	Bicycle Striping and/or Signage	1,100
Winchester Dr	Waterbury Dr	S. 31st St	Bicycle Striping and/or Signage	1,700
S. 31st St	Winchester Dr	Waters Dairy Rd	Bicycle Striping and/or Signage	900
Waters Dairy Rd	S. 31st St	S. 5th S.	Bicycle Striping and/or Signage	5,500
Cottonwood Ln	Oakdale Ln	Oakview Dr	Bicycle Striping and/or Signage	1,800
Oakview Dr	Cottonwood Ln	Azalea Dr	Bicycle Striping and/or Signage	1,000
Azalea Dr	Oakview Dr	East of Lowes Dr	Bicycle Striping and/or Signage	8,000
N. 23rd St	Adams Ave	W. Houston Ave	Bicycle Striping and/or Signage	900
W. Houston Ave	N. 23rd St	N. 31st	Bicycle Striping and/or Signage	500
W. Downs Ave	N. 15th St	N. 1st St	Bicycle Striping and/or Signage	780
N. 1st St	W. Downs Ave	E. Downs Ave	Bicycle Striping and/or Signage	50

Project Name	From Limit	To Limit	Work Description	Length (ft.)
W. Barton Ave	N. 1st St	Mid-block N. 1st and N. Main St	Bicycle Striping and/or Signage	200
Mid-block N. 1st and N. Main St	W. Barton Ave	W. Calhoun Ave	Bicycle Striping and/or Signage	500
W. Calhoun Ave	Mid-block N. 1st and N. Main St	N. 1st St	Bicycle Striping and/or Signage	200
N. 1st St	W. Calhoun Ave	W. Upshaw Ave	Bicycle Striping and/or Signage	10,000
E. Nugent Ave	N. 15th St	N. 8th St	Bicycle Striping and/or Signage	1,500
S. 24th St	SH 53	Martin Luther King Jr. Dr	Bicycle Striping and/or Signage	11,000
S. 30th St	E. H Avenue	Avenue N	Bicycle Striping and/or Signage	3,000
Avenue N	S. 30th St	S. 24th St	Bicycle Striping and/or Signage	900
S. 34th St	E. H Avenue	SH 53	Bicycle Striping and/or Signage	3,400
Avenue Z	57th St	S. 55th St	Bicycle Striping and/or Signage	150
S. 55th	W. Avenue Z	Skyline Dr	Bicycle Striping and/or Signage	120
Skyline Dr/Everton Dr	S. 55th St	S. 31st St	Bicycle Striping and/or Signage	2,100
East Loop	Scott and White Blvd	North Loop	Bicycle Striping and/or Signage	350
North Loop	East Loop	Inner Loop	Bicycle Striping and/or Signage	100
Inner Loop	North Loop	Utility Dr	Bicycle Striping and/or Signage	250
Utility Dr	Inner Loop	Emergency Dr	Bicycle Striping and/or Signage	100
Emergency Dr	Utility Dr	S. 31st St	Bicycle Striping and/or Signage	600
S. 1st St	SH 190	Fryers Creek	Bicycle Striping and/or Signage	5,000
W. Avenue F	S. 25th	S. Martin Luther King Jr Dr	Bicycle Striping and/or Signage	2,000
S. 1st St	W. Avenue D	W. Avenue V	Bicycle Striping and/or Signage	9,300

10.3.1.2 Safe Routes to Schools

A key element of the Active Transportation Plan is support for and integration with the Safe Routes to Schools initiative. Recommendations in this category were developed based on the findings of the safety analysis and the sidewalk density and connectivity analysis conducted during development of the Active Transportation Plan. Table 10 7 presents the proposed sidewalk projects to support the Safe Routes to Schools initiative.

10.3.1.3 Key Sidewalk and Trail Gaps

The key sidewalk and trail gap project recommendations presented in Table 10 8 were developed based on the findings of the CSA and the outcomes of the gap assessment performed during the scenario analysis. The proposed key sidewalk and trail projects are designed to address gaps in the overall network and to support continuity and safer transitions between the Parks and Trails Master Plan facilities and the active transportation facilities of the primary transportation system network.

Table 10 7: Proposed Safe Routes to School Sidewalk Projects

Project Name	Work Description	Density
Cater Elementary School	New Sidewalk Construction	0.00
Charter Oak Elementary	New Sidewalk Construction	0.11
Bonham Middle School	New Sidewalk Construction	0.21
North Belton Middle School	New Sidewalk Construction	0.24
Lamar Middle School	New Sidewalk Construction	0.24
Tarver Elementary School	New Sidewalk Construction	0.27
Raye Allen Elementary	New Sidewalk Construction	0.28
Jefferson Elementary	New Sidewalk Construction	0.30
Hector P Garcia Elementary	New Sidewalk Construction	0.40
Pirtle Elementary School	New Sidewalk Construction	0.40
Lake Belton High School	New Sidewalk Construction	0.49
High Point Elementary	New Sidewalk Construction	0.58
Edwards Academy Temple High School	New Sidewalk Construction	0.63
Scott Elementary School	New Sidewalk Construction	0.68
Lakewood Ranch Elementary	New Sidewalk Construction	0.83
Travis Middle School	New Sidewalk Construction	0.86
Meredith-Dunbar Elementary	New Sidewalk Construction	1.00
Lake Belton Middle School	New Sidewalk Construction	1.04
Kennedy-Powell Elementary School	New Sidewalk Construction	1.12

Table 10 8: Proposed Key Sidewalk and Trail Gap Projects

Project Name	From Limit	To Limit	Work Description
S 24th St	Adams Ave/53	E Avenue N / MLK	Railroad overpass to MLK/North 8th St.
S MLK Jr Dr / N. 8th Street	E Avenue E	King Circle or Trail Crossing	Upgraded sidewalk / Install new side path
W Avenue F	S MLK Jr Dr	S 25th St	Upgraded sidewalk / Install new side path
S 25th St	W H Ave	W Avenue E	Install new / rehabilitate existing sidewalk. Include pedestrian amenities at RR crossing
W Avenue E	S 25th St	S 31 St	Tie into trail or side path on S 31 St
Stratford Dr	Hickory Rd	Waterford Park	Sidewalk installation
S 5th St	Friars Creek Trail	Temple College	Pedestrian and bicycle bridge over LP 363/US 190
W Adams Ave	Hillard Rd	N Kegley Rd	Safety Improvements to upgrade from sidewalk to trail - with signage and crossings
W Adams Ave	Morgan's Point Rd	317	Safety Improvements to upgrade from sidewalk to trail - with signage and crossings
E. Avenue H	MLK	Henderson Rd	Expand southwest and add bike lanes at the overpass to HB trail
Trail crossing across 1st Street at Temple College			Signalized, but could benefit from high visibility features, traffic calming or other safety improvements.
Friar's Creek Trail crossing across Canyon Creek Dr			Marked, but could benefit from high visibility features.
Hickory Rd and Midway Dr			Signalized, but could benefit from high visibility features.

10.3.2 ACTIVE TRANSPORTATION POLICY AND PROGRAM RECOMMENDATIONS

10.3.2.1 Critical Site Connectivity Gaps

There is often a gap in site connectivity between the onsite roadway network and the planned sidewalk or trail network during the transitioning from City infrastructure to onsite infrastructure at key employment centers and community facilities like the VA, Temple College and Baylor Scott and White Medical Center. The primary bicycle and pedestrian facilities stop at the edge of the site, making the last hundred-foot connection to the 'front door' less comfortable for access. These final transition facilities are often private roadways. Nonetheless, multimodal connections are critical for successful connectivity. Coordination and collaboration between the City and these stakeholders will be necessary to reach the MMP active transportation goals.

10.3.2.2 Downtown Multimodal Circulation

To aid implementation of the All Ages and Abilities network, the MMP recommends that the City conduct a traffic operations analysis of the W. Central and W. Adams one-way pair in downtown to determine if it is feasible, from a traffic operations standpoint, to restore the two-way traffic patterns on these roadways. During the scenario analysis of roadway system deficiencies, the simulation of a return to two-way traffic on these streets, revealed that the change produced only a minimal improvement in traffic.

The finding that a return to two-way operations does not significantly hamper traffic, leaves open the option to make the change for other purposes. Those purposes include facilitating the implementation of the All Ages and Abilities network, enhancing the walkability and quality of place in downtown temple, and, in addition, providing some traffic calming benefits. A more detailed study of traffic operations is needed to confirm the conceptual findings of the MMP scenario analysis.

10.3.2.3 Continuity between Park Trails and Planned On-Road Network

The planned trails and on-street bicycle facility connections do an excellent job of connecting a network of logical connections turning a set of park trails into part of the active transportation network (where it is feasible). Because these are planning level connections, there are yet to be precise plans for location and intersection crossings. The gaps listed above in Table 10 8 are either areas where existing trail crossings could use further engineering and safety analysis, or future crossings should be considered carefully for optimal location and design that balances safety with usability.

10.3.2.4 Signage and Wayfinding

While not a physical gap, providing information is also important to avoid a knowledge gap of the network and how travelers can connect to their destination. To achieve seamless integration, it is important that Temple coordinate between the Transportation department and Parks and Recreation to create a signage and wayfinding system to clearly sign, mark and map the linkages between these two components of the active transportation system.

10.3.3 TRANSIT ACTION PLAN RECOMMENDATIONS

The MMP Transit Vision Plan (Chapter 8) outlined a conceptual version of what an expanded and enhanced transit system might look like using a combination of traditional and innovative advanced practice approaches to improved service delivery. The MMP recommendation focuses on the most important near-term aspect of the transit vision, which is an active strategic planning initiative to understand the benefits and costs of the various alternatives, and to develop and refine an operational delivery and system governance structure that meet the City's service delivery goals and budget tolerances. Table 10 9.summarizes the strategic planning components of the transit action plan from Chapter 8.

Table 10 9: Transit Strategic Planning Initiative

Project Name	Work Description
Evaluation of the benefits and costs of the long-term service models presented in Chapter 8 Transit Vision Plan.	Undertake a benefit cost analysis (BCA) of the alternative service models presented in this MMP plus additional service elements that may be feasible with participation of private sector partners, such as subscription service.
Transition to new or revised operational model.	If the tradeoffs of costs versus benefits are positive, select a preferred operational model for provision of service within Temple, and work with HCTD to determine how that local operational model fits within the overall regional transit governance structure.

10.4 ADOPTED TRANSPORTATION-10.4 ADOPTED TRANSPORTATION-RELATED DESIGN STANDARDS

The MMP recommended roadway cross-sections and design elements are presented at a conceptual level to provide guidance on achieving a Complete-Streets based mobility network. To see these design standards implemented during project engineering and construction, the City must adjust its engineering design manuals and codes. The City plans to undertake a major update to its Uniform Development Code during late 2022 or early 2023. The MMP recommendation is that the City, during this process, revise the UDC street design standards and subdivision regulations to incorporate the MMP cross-section and design elements described in this plan.

10.5 TRANSPORTATION DEMAND MANAGEMENT

The City is interested in promoting the use of Transportation Demand Management (TDM) strategies and programs as part of an overall program of mobility and traveler safety. Although the City does not have any current TDM programs or policies adopted, there are local and regional tools in place that promote these efforts. Through an evaluation of these existing efforts and a comprehensive review of the other recommendations brought forward as part of the MMP, the following TDM recommendations were developed. The following three-step process guided the evaluation effort:

1. Gauge the level of support for TDM measures and develop a prioritized list of measures to consider
2. Assess the potential trip-reduction benefits of the highest-priority measures
3. Formulate a process for developing a TDM program over time

Recent changes in the number of people working at home as well as the availability of ride-hailing services can impact how receptive workers and employers are to TDM programs.

Local municipalities and transit authorities can contract with private ridesharing and carpooling companies to provide rides in particular service areas or to target segments of the population needing additional ride assistance. This method can be more efficient and affordable than providing a fixed route or on-demand service.

KTMPO's Congestion Management Process[1] also identifies a set of "Non-Infrastructure Improvements" that can be part of a toolbox for management of congestion as indicated below:

- Initiating and Managing a Rideshare Program - Ridesharing

1 *KTMPO, Congestion Management Process I 2016 Update, Pages 4-5 to 4-7.*

programs, which match employees that live near one another to facilitate carpooling, can result in fewer cars on roads and less congestion, while also encouraging travelers to utilize an alternative mode of transportation.

- Flexible Work Hours - Flexible work hours relieve stress on the transportation network during peak travel times by allowing people to commute to and from work at off-peak travel times.
- Telecommuting - Telecommuting allows for people to work from home and reduces the number of trips between work and home during peak travel times.
- Satellite Offices - Satellite offices can disperse jobs throughout a larger area, rather than in one office. This prevents concentrated congestion in one area.
- Land Use Management - Controlling and regulating land uses can help control which types and how many trips are being made in specific areas. Managing growth and development can directly impact the transportation system as well as influence how commuters select their travel mode. Implementing land uses that contain a mix of residential, retail, and employment can improve the feasibility of conducting trips by walking or biking, therefore reducing automobile demand on congested corridors.
- Commuter Choice Tax Benefits - Employers can provide incentives and discounted transit passes to encourage transit use in exchange for tax benefits.
- HOV Toll Savings - Preferential pricing for multi-occupant vehicles on toll roads incentivizes ridesharing, which can again reduce the number of cars on the road at a particular time.
- Parking Management - Preferential parking for vehicles that carry more than a single occupant can encourage ridesharing.
- Driver Education - Driver education programs can inform drivers about choices that are available to avoid and reduce congestion.

The City of Temple has the option to use any of the aforementioned non-infrastructure improvements laid out in the KTMPO CMP as well as partner with the KTMPO and other KTMPO partner agencies in a united campaign to encourage Transportation Demand Management including: Flexible Work Hours, Compressed Work Weeks, and Telecommuting. The campaign could start with the development of promotional material for TDM that identifies potential strategies and their potential benefits. It could also include development of a TDM Toolbox that includes more information about each potential strategy and case studies as examples. In addition to the MPO the cities and the county, partners in the programs could include the chambers of commerce and possibly Transportation Management Associations (groups of employers).

10.6 EMERGING TECHNOLOGIES

Rapid development of a broad range of technologies in vehicle guidance, monitoring systems, automated data collection systems, artificial intelligence, traffic management software, communication systems, micro mobility services (car, bike or scooter sharing programs) and data management tools is creating new and exciting opportunities for how transportation services are supplied and managed. By examining the emerging technologies and advanced data collection and management methods that are on the horizon, the city can make decisions now that can help maximize the value of these technologies as they become available.

The MMP recommendations on emerging technology are designed to support Temple's Comprehensive Plan stated principles, which include evaluating opportunities to invest in TDM and smart city technologies to improve transportation efficiency, and to actively monitor predicted changes to the transportation system stemming from emerging technology such as deployment of prototype autonomous vehicles.

10.6.1 TECHNOLOGY INFRASTRUCTURE

Innovative technologies emerge quickly and can have a major impact of the transportation network. Although the City can't plan specifically for new technologies that have yet to be developed or infiltrate the network, they can plan for the space they will potentially inhabit. Table 10 10 presents a list of emerging technologies, mobility solutions and advanced data management methods that the City should monitor and consider for future application.

Manufacturers and vendors are already deploying new and emerging technologies such as prototype autonomous interconnected vehicles in pilot programs across the US. These technologies require advanced digital communications infrastructure to support operations and management. Cities are beginning to find themselves in a debate with vendors, who stand to make billions of dollars from deployment of these technologies, over who pays for and maintains the required digital and communications infrastructure. The simple act of allowing vendors to attach transponders, routers, or other technology to City infrastructure such as lampposts or traffic signals can have fiscal impacts on the City if control and financial responsibility for

Table 10 10: Best Practices Tools by Category for Emerging Technologies, Mobility Solutions, and Data Management

Category	Tool
Coordinated Traffic Management and Adaptive Signal Control	Demand-Responsive Signal System
	Adaptive Signal Timing
Vehicle Technologies	Signal Infrastructure-to-Vehicle Communications
	Roadway Design, Infrastructure, and Maintenance to Support Safe Automated and Autonomous Vehicle Operations
	Autonomous Shuttles
Mobility Innovations	Ridesharing and Carpooling
	Shared Micromobility
	Curbside Management and ADA Accessibility
Advanced Data Collection and Data Management Methods	Use of "Big Data"
	Real-time Traffic Data Capture by Signal System Equipment
	Advanced Video-based Data Collection
	Automated Traffic Signal Performance Monitoring (ATSPM)
	Asset Management and ITS Performance Monitoring Systems
	Unmanned Aerial Vehicles (Drones) for Data Collection

maintenance or replacement are not clearly worked out in the contractual relationship. The MMP recommends that the City review and revise its policies regarding shared infrastructure to consider the expanding pool of utility types and entities.

The recommended design cross-sections allotted private infrastructure to separate easements requiring additional ROW. As technologies advance, an increasing number of private sector entities will require use of this valuable space. The MMP recommends consideration of public utility easements (PUE) along major facilities (such as arterials) when constructing facilities in new or lightly developed areas where future roadway expansion is likely and private infrastructure deployment for expected growth is not already established.

Although the City would pay for this additional ROW at project implementation, there are several benefits to this approach. One benefit is not having to purchase additional ROW containing developed private utilities, as well as ROW to relocate those utilities during roadway expansion. A second benefit, is that the space can become a valuable resource, needed by companies to deploy their emerging technologies.

10.6.1.1 Visual Interpretation Improvements

While there may be uncertainty around the exact technologies and timing of when new transportation technologies will emerge on area roadways, there are ways to prepare that also have immediate benefits to community safety. Most autonomous vehicle technologies use sensors and cameras to interpret the roadway, its boundaries and characteristics like speed and hierarchy within the transportation network. This information is primarily communicated through signage and pavement markings. The City can adopt standards and maintenance practices today that improve the legibility of these markings for roadway users today and for the AV technologies of the future. Identified strategies include pavement-marking standardization updates, improving signage standards, and reflectivity and legibility improvements.

10.6.1.2 Curbside Management

With the introduction of micromobility along with private ride sharing services, suddenly the curbside has become a critically important interface for arrivals, departures, and parking of many different modes all while maintaining ADA accessibility. With this potentially conflict riddled space, careful planning and delineation can go a long way. Many cities are moving towards keeping this space as flexible as possible, changing rules and uses over the course of a day and the week. This is possible through new technology and digital signage.

10.6.1.3 Data Assets and Resource

New technologies bring new resources and assets to consider, discuss, and manage. One of these assets is a wealth of new data about the community and area travel patterns. The City must examine the challenges of identifying and documenting the rights and responsibilities of all parties. Responsible control and management of this data results in more complex relationships with technology vendors and a duty to the public for responsible stewardship of data by the City and by the vendor to protect personal information.

The City has the potential to utilize this data to make a big difference in managing infrastructure, modelling travel patterns, and understanding the movement of people within the City in a way that has never been done before. The MMP recommends that the City follow national best practice standards for managing and negotiating this rich resource. The MMP recommends that the City dedicate budget for internal or consultative services for making sense of the City's data in a way that can drive policy, contract terms, program, and project decisions. This resource can help to translate data into helpful datasets of roadway usage or conditions for planning and maintenance purposes.

10.6.2 TECHNOLOGY AND REGIONAL PLANNING PARTNERS

In the area of emerging technologies, the MMP recommends that the City continue its strong working relationship with regional partners such as KTMPO and TxDOT, as many of the new mobility and intelligent transportation strategies may require regional implementation. Consideration of Emerging Technologies and TSMO by KTMPO was evident in their Congestion Management Process (CMP) that states:

Technological efficiency improvement strategies utilize modern technology and computing capabilities to improve efficiency and operations in the existing transportation system. These strategies typically involve using sensors to collect and process data about traffic conditions. Information about traffic conditions can be directly presented to commuters in the form of electronic signage so that they can make travel decisions based on current conditions. The information can also be used to manipulate traffic operations based on current demands. Technological efficiency improvement strategies can effectively increase a transportation system's capacity without requiring costly and time-consuming construction.

TxDOT also has a TSMO program that supports regional pilot studies across the state. Working with TxDOT and KTMPO, there may be opportunities to request, or to join, regional studies that look at advanced practice intelligent transportation and transportation management solutions to City operational or safety issues.

10.7 FREIGHT TRANSPORTATION RECOMMENDATIONS

The intersection and roadway improvements recommended in the MMP have benefit for freight transportation. Specific freight recommendations fall into two categories. Truck routing and safety.

10.7.1.1 Downtown Truck Routing

On the truck routing front, the CSA and feedback from stakeholders indicated that truck routing in the downtown area may not be optimal. The MMP recommends that the City undertake a truck routing study of the downtown with the goal of reducing unnecessary through trips and improving freight circulation patterns.

The process of establishing a truck route is as follows:

1. City conducts study to identify recommended route(s)
2. City submits proposal for the truck route to TxDOT district.
3. District reviews proposal and forwards it to TxDOT Traffic Division (TRF) for review and comment.
4. TRF reviews and comments on the proposal from an engineering standpoint (obtaining FHWA approval if necessary) and notifies the district.
5. District notifies city of comments.
6. City passes ordinance establishing the truck route.
7. Appropriate signs are installed to accommodate the truck route.
8. District provides TRF with map clearly defining the truck route.

10.7.1.2 Truck Safety Parking

Federal regulations on hours of service (HOS) for commercial truck drivers (49 C.F.R. §395), often referred to as the "11-14-10 rule", require that drivers can drive no more than 11 hours in a single day (with up to 3 additional hours of non-driving on-duty time) after which a period of 10 hours of rest is then required before going back on-duty to operate their vehicle again. Complying with these regulations can require that the driver find a legal parking spot to obtain the required rest during long haul trips.

Finding legal parking is often difficult, as there is often both a shortage of legal parking spots available as well as a lack of a system that indicates the location of available legal parking spots on a real time basis. A lack of rest areas for truck drivers can also

lead to tired drivers staying on the road longer or parking in unsafe locations (e.g., shoulders or exit ramps) that are not designed to handle heavy cargo traffic.

Review of area planning studies and feedback from stakeholders indicates that Temple is not immune to this national challenge. Truck parking on shoulders or ramps and in other areas not designated for truck parking is common and presents a safety risk for both the truck drivers and other motorists. The MMP recommends that the City work with its regional planning partners KTMPO and TxDOT to begin to address this issue. In 2021 KTMPO conducted a Regional Freight Transportation and Parking Study, a process in which the city was a stakeholder. This study is available for viewing on the KTMPO website, and references the problems, and possible impacts, as stated above, as well as provides some alternative parking solutions.

In its Statewide Freight Mobility Plan, TxDOT has a strategic goal of deploying a Safety Roadside Rest Areas (SRRA) throughout the state and is currently doing pilot projects in selected areas. Temple, with its strategic location on the I-35 corridor could be a likely candidate for such a pilot project.

TxDOT is also working with private businesses and the vendors of navigation apps to help improve the information technology resources for real time identification of available truck safety parking spots. Temple should with work with KTMPO and the TxDOT district to monitor this program and keep local businesses that provide parking to take steps to get their real time parking availability information out to drivers in need of a safety parking space.

10.8 SAFETY

10.8.1 SAFETY PROGRAM AND POLICY RECOMMENDATIONS

As Temple and the surrounding area continue to grow, balancing the enhancement of safety and efficiently maintaining mobility will become more complex. With growth comes higher traffic volumes, a more complex mix of modes on the transportation system, more points of conflict, and a need for more sophisticated methods of evaluating and managing transportation safety needs. This section of the MMP recommendations focuses on specific elements of the transportation system that provide safety benefits.

10.8.1.1 Crash Modification Factors

In addition to the mobility improvements they provide, most of the mobility recommendations described thus far in the chapter also provide safety benefits. The process used to identify and scope the needed mobility improvements included consideration of crash rate, severity and type. As a result, each of the proposed intersection, roadway, and active transportation improvements have components that FHWA has defined as proven safety countermeasures (Figure 10 10). For example, installing walkways to increase safety for pedestrians on segments where pedestrian-related crashes were higher than others or a commercial corridor that implements access management would be expected to achieve a greater reduction in crashes than a roadway that allows any number of driveways because it directly addresses the top contributing factor of failure to yield.

Therefore, the first safety program recommendation is for the City to ensure that its future design efforts recognize and incorporate the recommended design cross-section components that serve as safety countermeasures or crash modification factors. This approach is important because without consideration of the safety benefits in the benefit cost analysis, safety elements are often discarded or reduced in effectiveness during the value-engineering phase of a project. In particular, attention must be paid to pedestrians, cyclists, and other vulnerable roadway users.

Figure 10 10: FHWA Proven Safety Countermeasures

10.8.1.2 Medians and Pedestrian Islands

Medians play a variety of roles within the transportation system including traffic calming and access management. One of the most important roles played by medians and their lesser cousin, pedestrian safety islands, is to provide safe havens for individuals attempting to safely cross major roadways. As traffic grows and facilities are upgraded, these features will become more important to pedestrian safety and the ability to implement an All Ages and Abilities network. The MMP recommends that the City be assertive in the consideration and deployment of median treatments on all major roadways with two-way traffic on four or more total travel lanes. In cases where medians are not feasible for facilities of this type, then the use of pedestrian safety islands becomes an imperative to facilitate safe pedestrian movement.

10.8.1.3 Driver Awareness

Distracted Driving is the highest contributing factor for crashes in Temple; It is also a difficult factor to mitigate given the variety of distractions faced by drivers. One countermeasure that has shown to help in mitigating this factor is education. Education is a key strategy of safety improvements, targeted through a safe systems approach to reach out to the public directly through awareness campaigns and educational events.

Another recommended best practice strategy of raising driver awareness is the use of signage and signals to provide a stronger visual profile for the facility. Items of this type include:

- Enhanced delineation and friction for horizontal curves.
- Weather and Flood Warning Systems
- End-of-Queue Warning Systems
- Speed Warning Systems
- Pedestrian and Bicyclist Detection, Notification, and Warnings

10.8.1.4 Roadway and Intersection Realignment

Alignment recommendations address roadway geometry issues on existing roadways that create safety issues or affect operational continuity. Examples include:

- Locations where roadways intersect at oblique angles rather than at 90-degrees diminishing sight lines and making it harder to judge the spacing and speed of crossing traffic.
- Locations where incremental development of a minor arterial or collector along section lines or property boundaries results in offset intersections that require left turns across oncoming traffic.
- Roadways that have unnecessary sharp turns such as pairs of sharp 90-degree turns that can startle motorists and cause challenges in controlling the vehicle.

Two examples of projects of this type include: a) Completion of a project that eliminated an offset intersection at Prairie View Road/SH317 and FM2483, and b) A current project to realign two 90-degree turns on Poison Oak Road.

Table 10 11 presents locations identified as having alignment discontinuity issues during the transportation network field review. These locations are a sample of the system, and the City should continue to identify additional locations that exhibit similar alignment discontinuity.

This chapter has presented a broad range of project recommendations for consideration by the City. But identifying candidate projects is only the first step in providing on-the-ground improvements that provide value to the City. Chapter 11 provides a discussion on steps that the City should take and processes that the City should institute In order to fund and implement the projects. Chapter 12 provides a proposed program of priority projects selected from among the MMP recommendations for inclusion in the City's Capital Improvement Program.

Table 10 11: Safety Realignment Projects

Project Name	Character of Work
Young Avenue at Shell Avenue	Intersection with sight distance issues due to curves on both roadways. Realign/Straighten Young Avenue (a Community Collector) to provide a continuous roadway. Realign Shell Avenue (a Minor Arterial) to implement a conventional T intersection with the improved Young Avenue.
Hickory Rd at Stratford Drive Intersection	Hickory Road at Stratford Drive currently terminates at a stub out with a traffic barrier, resulting in a dramatic 90 degree turn. The intent appears to be to continue the roadway along this alignment in future phases. However, substantial floodplain and environmental features constrain the ability to extend the alignment. The MMP recommendation is to consider a near-term realignment of Hickory to soften the curve to connect directly into Stratford Drive while investigating the feasibility of longer-term solutions for avoiding or addressing the floodplain issues.
Rabbit Rd South of Stringtown Rd to FM3117	Future Minor Arterial planned in TP to veer NE to connect to FM3117. Consider realignment of Rabbit Rd to connect at the intersection of Stringtown Spur and Trader Rd, which connects to FM 3117. Complex area with curves and sight distance issues. May require traffic study to identify preferred alignment.
Knob Creek Road from Dirt Road to North of Dirt Road	Realign to eliminate pair of 90 degree turns.
Knob Creek Intersection with FM 3117	Realign Knob Creek to connect to FM 3117 at intersection with Bob White Road.
Pecan Rd from Bottoms East Rd to Berger Rd	Straighten out 90-degree to 90-degree turn pair by extending Pecan directly south to Berger Road through the existing parcel to form a T intersection. Upgrade realigned Pecan to a Community Collector.
N. Mockingbird Rd from 53 to Little Flock Rd	Community Collector with 90-degree turn east and 90-degree turn north. Consider realignment to match the proposed Field Rd alignment to connect to Peach Orchard.
Bottoms Rd at FM 438 Connection	Future Minor Arterial planned through parcel to connect to proposed outer loop. Consider not veering off and use the existing connection at 438 as access to outer loop and close connection to 438. Another option is to follow the northern parcel line where it begins SE veer to connect to outer loop.

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