Thoroughfare Plan

February 2022 – FINAL

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Contents

Introduction

A community's thoroughfare system is vital to its ability to grow in a positive manner as transportation is linked to land use. The Brenham Comprehensive Plan, Historic Past, Bold Future: Plan 2040 (Plan 2040), was adopted by the City of Brenham (City) City Council on September 19, 2019. This Brenham Thoroughfare Plan (T-Plan) updates the 2014 Thoroughfare Plan and serves as a second step and implementation tool for Plan 2040 by providing information, analysis, and recommendations that supplement Plan 2040.

Plan 2040 "serves as a framework for thoughtful community discussion on the real and perceived challenges facing Brenham currently and in the future. Through long-range planning efforts, the community can accommodate its projected growth and revitalization in a manner that preserves its history, culture, and overall quality of life for current and future residents." Plan 2040 includes five focus areas consisting of:

- Land Use and Development
- Growth Capacity
- Economic Opportunity
- Transportation
- Parks and Recreation

The transportation focus area of Plan 2040 describes near-term and long-range transportation needs and priorities in and around the City. It notes that top focus areas include improving safety and connectivity and relieving congestion.

Highlights:

Plan 2040 provides the following Guiding Principles (GP) related to transportation:

- GP1: Brenham will be ACTIVE by enabling healthy living through offering quality and safe City parks and recreational opportunities, by prioritizing the ability to walk and bicycle safely, and by committing to maintain high levels of public safety services.
- GP2: Brenham will be COLLABORATIVE by pursuing and maintaining partnerships in all arenas, including housing, transportation, infrastructure, economic development, emergency response, and arts and culture.

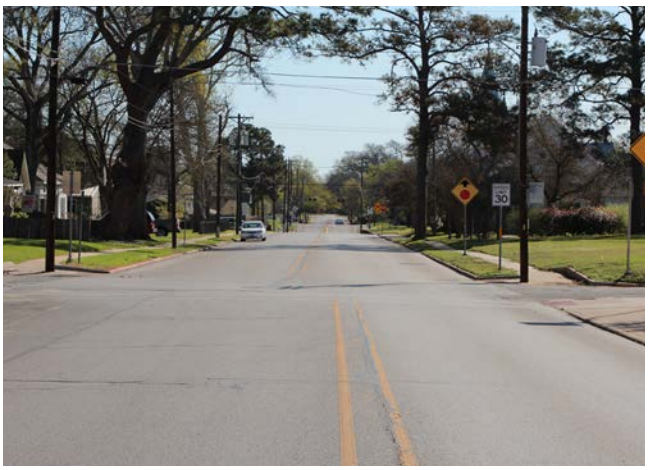
Plan 2040 provides the following Transportation Goals:

- Goal T1: Improved traffic flow, safety, and cross-town connectivity.
- Goal T2: Increased opportunities for Brenham's residents and visitors to safely walk and bike within the City, whether for work, shopping, or recreation.
- Goal T3: A street system that is in good repair and is safe and inviting for all users (vehicles, bicyclists, and pedestrians), using the "Complete Streets" concept whenever feasible.
- Goal T4: Enhanced partnerships and collaborative relationships with the Texas Department of Transportation (TxDOT), Union Pacific Railroad, and other transportation partners.

It is with these multimodal Guiding Principles and Transportation Goals in mind that this report discusses, creates, or refines the Brenham Thoroughfare Plan Map, provides Typical Sections for New Development, highlights Priority Transportation Projects, Truck Routes Map, Bicycle and Pedestrian Priority Routes Map, and Traffic Impact Analysis Guidelines discussion.

The T-Plan is divided and detailed into four sections:

- Section 1 The Motor Vehicle Network.
- Section 2 The Bicycle and Pedestrian Network.
- Section 3 Traffic Impact Analysis Guidelines.
- Section 4 Summary of the report recommendations.



College Avenue

Austin Street, Business 36

Tom Green & Market Street

Section 1
Motor Vehicle Network

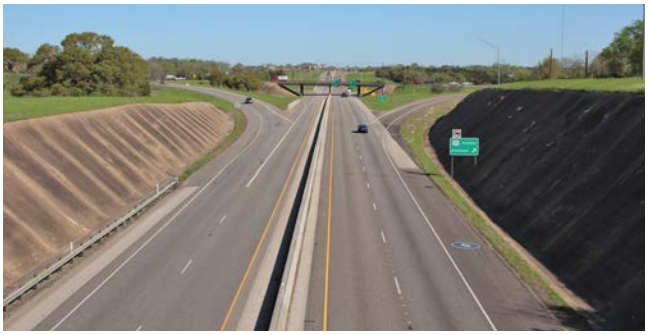
1.01 Thoroughfare Plan Map and Discussion

An essential element of the Transportation Plan is a street network that establishes a long-range vision for a highly connected, multimodal street system throughout the City of Brenham. The first listed transportation goal in Plan 2040 is to improve traffic flow, safety, and cross-town connectivity. The Brenham Thoroughfare Plan Map identifies the street network as a hierarchy of highways and streets that serve motor vehicles within and surrounding the City of Brenham (City) by utilizing the concept of **Functional Classification**. Functional classification refers to road categories according to the character of service they provide in relation to the total road network. Brenham's functional classifications include arterial and collector roads that are further categorized into principal, major, minor levels. All roadways serve a mix of two functions: mobility and access. **Mobility** refers to traveling from one place to another or from a trip's beginning point (origin) to its ending point (destination), whether to serve a neighborhood or to move traffic from one side of the community to the other in a short amount of time. **Access** refers to the ability to reach the land uses that lie along a route. Other factors to consider are the number of driving lanes, speed limits, and the number of access points along the roadway.

The functional classification of roads in Brenham ranges from local roads to interstates. Roadways with the highest mobility have the lowest access. Roads such as interstate highways and other controlled access freeways maximize mobility by eliminating direct access (driveways or other cross streets). Roadways with the highest access have the lowest mobility. These include local or neighborhood streets where frequent driveways provide excellent access but impede mobility. For example, a neighborhood cul-de-sac provides access only and no mobility for through traffic.

The Brenham Thoroughfare Plan Map is shown in Figures 1.01-1 and 1.01-2 and identifies the following functional classifications, listed from highest mobility and lower access to lower mobility and highest access:

Texas Department of Transportation (TxDOT) Principal Arterial (Brown): A state-maintained roadway which carries a high volume of vehicular traffic (range of 20,000 Vehicles Per Day (VPD) to 60,000 VPD) and which is intended to move traffic in, out, or around the City. Principal Arterials typically have six lanes of traffic and do not allow bicycle lanes.



Example: US 290 and TX Hwy 36)

Figure 1.01-1 Thoroughfare Plan Map

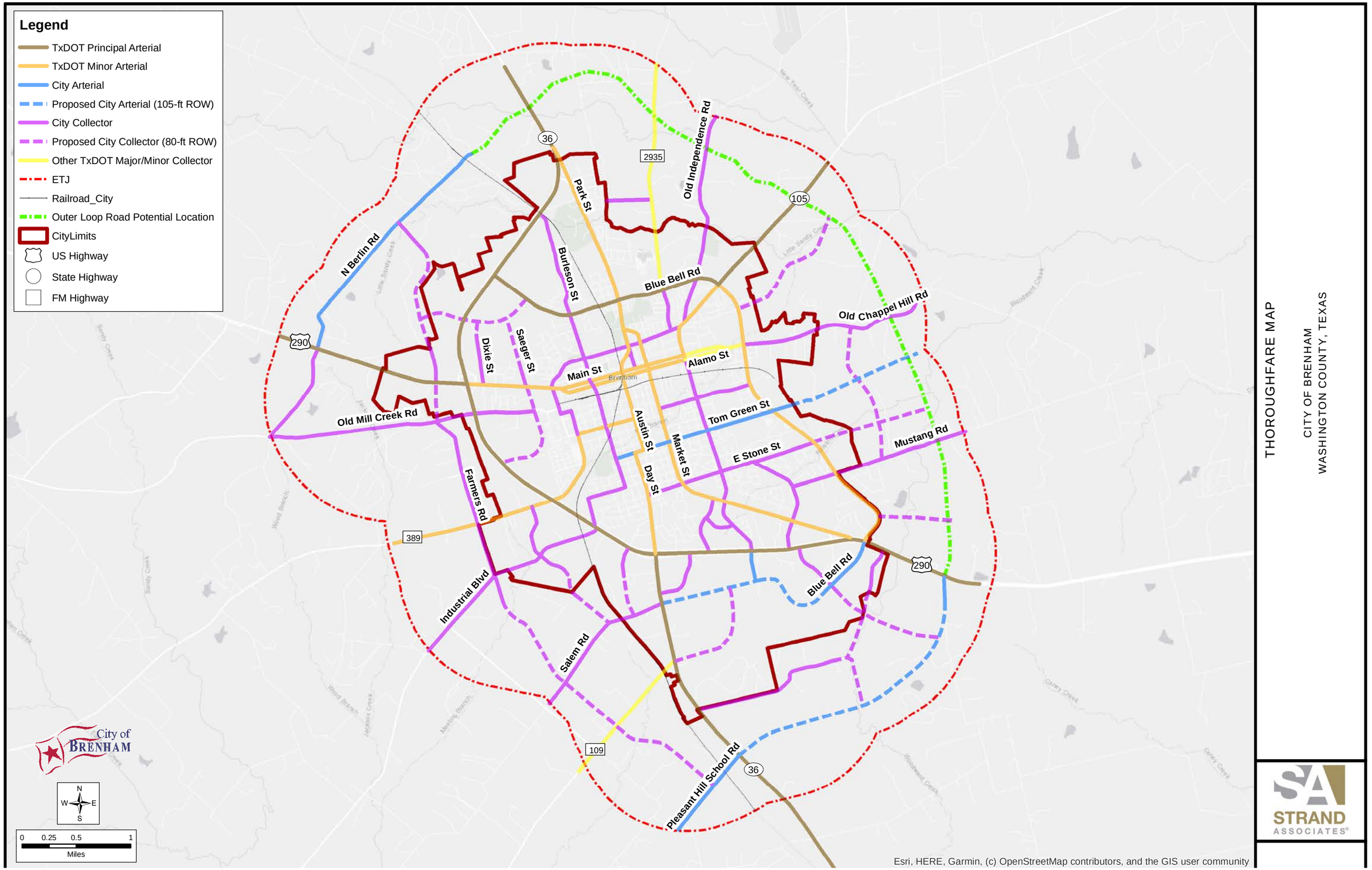
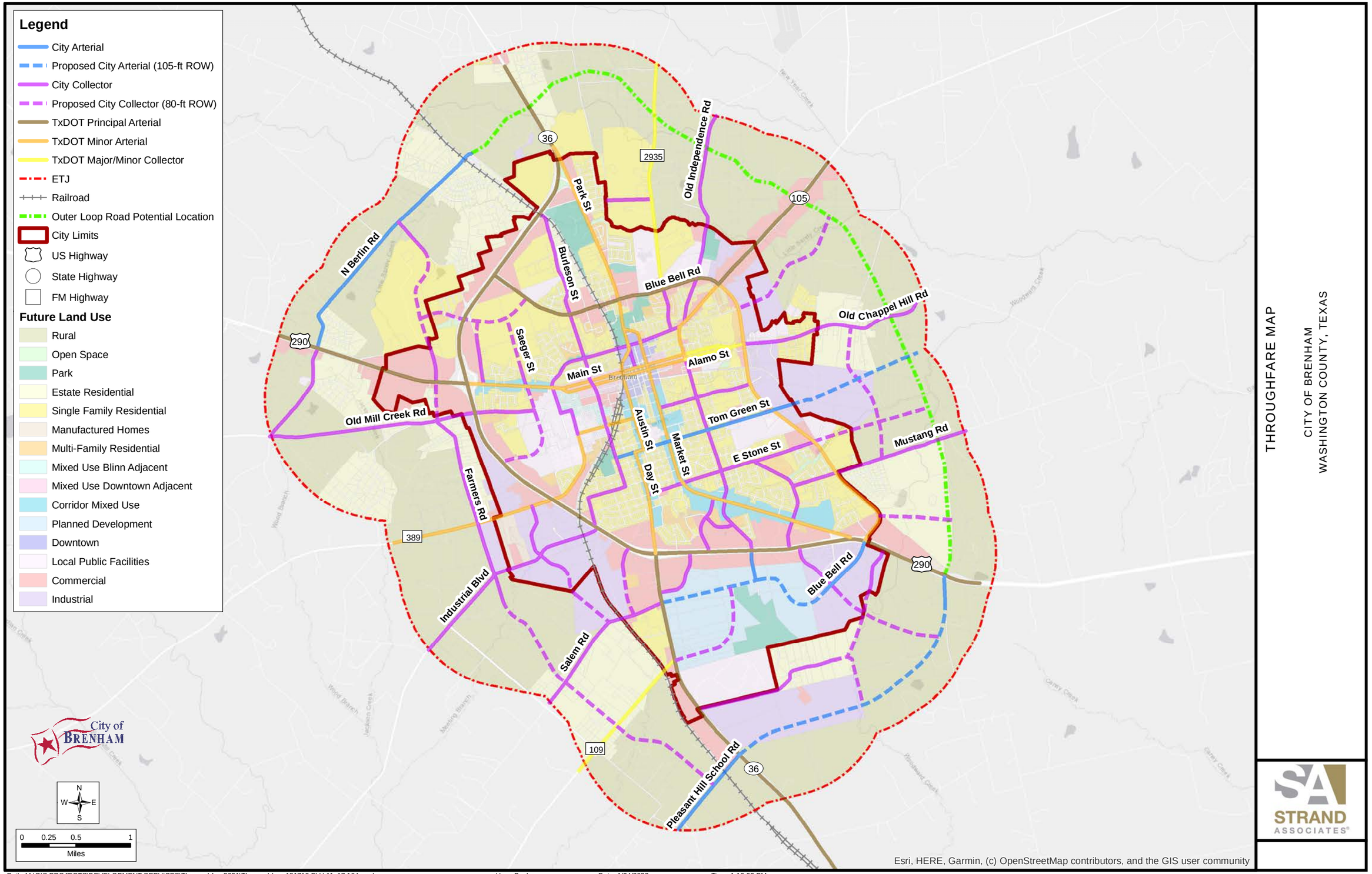


Figure 1.01-2 Thoroughfare Plan Map



THOROUGHFARE MAP

CITY OF BRENHAM
WASHINGTON COUNTY, TEXAS

STRAND ASSOCIATES®

Path: M:\GIS PROJECTS\DEVELOPMENT SERVICES\Thoroughfare2021\Thoroughfare 121719 FLU 11x17 104.mxd User: Becky Date: 1/24/2022 Time: 1:10:03 PM

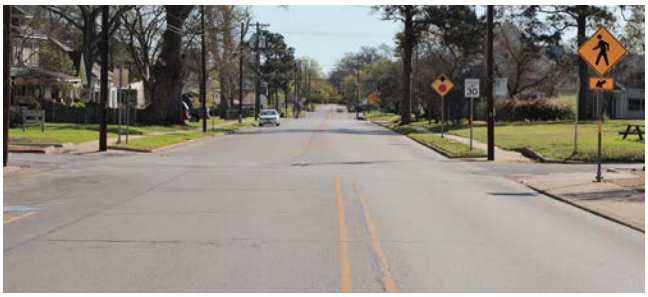
TxDOT Minor Arterial (Orange): A state-maintained roadway that carries moderate volumes of vehicular traffic (range of 5,000 VPD to 30,000 VPD) and which is intended to move traffic around the City. Minor arterials are typically four lanes wide and may be divided or undivided. Minor arterials may also include bicycle lanes.

Example: FM 577, Blue Bell Road

City Arterial (Blue): A City of Brenham maintained roadway similar to a minor arterial that carries a moderate volume of vehicular traffic and is intended to move traffic around the City. Minor arterials are typically four lanes wide and may be divided or undivided. Minor arterials may also include bicycle lanes. *(Example: E. Tom Green Street, Old Chappel Hill, N. Berlin Road)*

TxDOT Major and Minor Collector (Yellow): A state-maintained roadway that primarily carries vehicular traffic from residential streets and other collectors to arterials (range of 5,000 VPD to 10,000 VPD). A collector is typically three or four lanes wide and may also include bicycle lanes. (Example: Austin Street, South Day Street)

City Collector (Purple): A city-maintained roadway that primarily carries vehicular traffic from residential streets and other collectors to arterials. Typically, three or four lanes and may include bicycle lanes.



Example: East Academy Street, South Jackson Street

Local Street (not identified): Streets that are not identified as one of the classifications listed above are considered Local Streets, which provide the lowest mobility and highest access levels. For example, streets that service a neighborhood are local streets. (Example: Gun n Rod Road) While local streets are not specified on the T-Plan, subdivision design is of utmost importance and dictates local street layout. To help reduce speeds and give high levels of access, the City of Brenham's subdivision ordinance institutes traffic calming measures. These measures include limiting extra-long roadways by restricting block lengths to a maximum of twelve hundred (1200) feet, suggesting pinch-points and pedestrian crossings at high pedestrian traffic areas, and limiting the street width. In addition to helping with traffic calming, limiting block lengths also increases the number of access points and lowers mobility. Another way that the subdivision ordinance encourages higher access is by limiting the maximum cul-de-sac length to six hundred (600) feet.

Example: Muscadine Trail

A. Application of Thoroughfare Plan

The primary goal of the Thoroughfare Plan is to establish a mechanism for growth and development and to be a long-range declaration of public policy. As discussed in Section 1.01, the City of Brenham's transportation system consists of a street network made of several different functional classifications.

The Thoroughfare Plan Map (Figure 1.01-1), shown on page 5, identifies by color existing arterials and collectors with solid lines and proposed extensions, new streets, and a potential outer loop by dashed lines. It is imperative to identify major streets that will likely need an extension and proposed streets for future connections to facilitate positive future growth and connectivity. It is also important to identify existing streets that need widening, multimodal additions or other improvements to accommodate current growth. Early and planned identification of these roadways is crucial as once the alignment and right-of-way of major streets are established and adjacent properties developed, it is difficult to retroactively acquire additional right-of-way without significant costs.

Having new connections on the officially adopted Thoroughfare Plan Map will facilitate and give City Staff a basis to require developers to dedicate right-of-way for these roadways on platting documents before development occurs. At the time a Preliminary or Final Plat is submitted to the Development Services Department, a review of the subdivision is conducted to identify if any additional right-of-way dedication is needed per the adopted Thoroughfare Plan map (Figure 1.01-1). In the case of existing streets, the developer is typically required to dedicate additional right-of-way width for eventual road widening by the City or TxDOT. In the case of new roadways on larger undeveloped tracts of land the developer would be required to dedicate the right-of-way and construct the street network in accordance with applicable City design standards.

One exception to the right-of-way dedication requirement exists on the proposed Thoroughfare Plan. Shown in Figure 1.01-1 (Page 5) is a large green "outer-loop" around the east side of the City limits and located in the City's Extraterritorial Jurisdiction. This outer loop represents a long-term vision to dedicate a freeway or arterial roadway that would open the eastern side of the community for development as well as provide a connection with minimal to no stops along the route. Currently, SH 36/US 290 serves as the City's western loop and FM 577 serves as the eastern loop. Both thoroughfares are already developed with multiple traffic signals and controlled intersections. It is anticipated that in the next 10-20 years additional traffic signals will be installed along these roadways to account for the increased vehicle traffic and congestion which stems from the rapidly growing community. An additional loop will need to be considered as the City grows out from the core of the Downtown area, east to the currently more rural or underdeveloped areas. The green outer loop, as shown in Figure 1.01-1, represents a conceptual location of the eventual thoroughfare and additional analysis and studies are needed to determine the finalized location and alignment based on topography, property lines, existing roadways, and waterways. Therefore, no right-of-way dedication will be required at the time of platting properties located along the green outer loop. Following a more detailed and thorough study of the proposed road alignment, the City and County should work together with TxDOT to advocate for the right-of-way acquisition to develop the proposed thoroughfare.

The Thoroughfare Plan also includes maps for City of Brenham priority projects, truck routes, and for bicycle and pedestrian routes. As development proposals arise, each of the adopted maps within the Thoroughfare Plan will be consulted to find opportunities for both the developer and City to make improvements and/or dedications at the initial stages of the process before construction occurs.

B. TxDOT Programmed Projects

TxDOT is currently developing design concepts to improve the interchange at US 290/SH 36 (the cloverleaf interchange). The cloverleaf interchange has been funded and will serve as an vital local, regional, and statewide roadway connection. The goals of TxDOT's redesign project are to improve safety, reduce congestion, improve mobility, maintain connectivity, and provide a viable major evacuation route. The primary focus of the project is to construct a new interchange that will provide a continuous US 290 route, maintain two lanes in each direction, and maintain access to local roads. At the time of this report, specific alternatives have not been finalized. TxDOT has narrowed down the list of design concepts to three primary choices. All the design concepts include expanding the US 290/SH 36 connection from one to two lanes, completing the conversion to one-way frontage roads, updating entrance and exit ramps, and accommodating bicyclists and pedestrians within urban settings. The proposed interchange would, subject to the concept selected and final design considerations, require additional right-of-way and potential displacements.

On November 19, 2020, TxDOT held a virtual public meeting at the Barnhill Center to discuss the proposed US 290/SH 36 interchange project options. TxDOT detailed five different options and received feedback from Councilmembers, County Commissioners, potentially affected business owners and homeowners, and the public. These five preliminary design concepts are shown in Figure (TxDOT map with all concepts). The presentation, both audio and visual components, was available online to the public from November 19, 2020, to December 4, 2020. TxDOT received comments from the local officials and attendees of the meeting as well as written comments from the public submitted by mail on or before December 4, 2020.

To help evaluate each concept, a scoring matrix was utilized by TxDOT (Figure 1.01-5), that gave a relative concept score for each of the six primary goals: Provide continuous flow on US 290, Minimize property impacts, Preserve local access, Improve safety, Reduce congestion, and Improve statewide and local mobility.

Based on the scoring matrix and public comment, Concept B was shown to be the preferred concept, with Concepts A and C ruled completely out. The remaining concepts (B, D, & E) will now undergo a further environmental review of constraints within the study area. Typical environmental constraints are community facilities, residential/ commercial structures, hazardous materials sites, historical markers and structures, oil and gas wells, archaeological sites, parkland, streams, wetlands, floodplains, and protected species.

An additional public hearing is anticipated in between 2021 to 2023, followed by environmental clearance. Right-of-way acquisition will start in 2022, with utility relocations and construction plans completed by 2025. Depending on approval and available funding, construction is estimated to begin in 2026, with completion in 2 to 3 years.

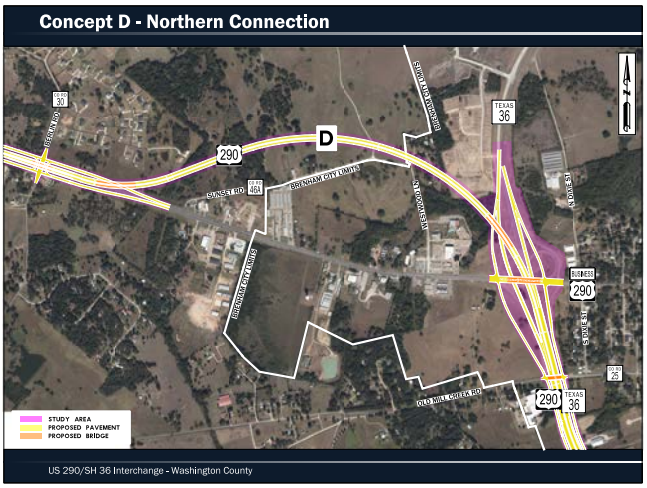
Concept B

Concept B provides a direct, free flow connection for US 290 through traffic while maintaining the existing freeway/free flow connection for traffic traveling northbound US 290 to northbound SH 36 and southbound SH 36 to southbound US 290. Concept B has more substantial impacts, primarily southwest of the existing cloverleaf interchange. See figure 1.01-4.

Concept D

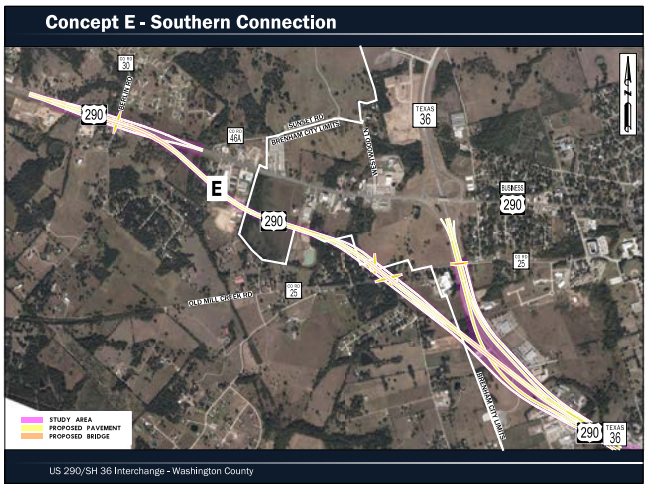
Concept D is termed the Northern Connection and reroutes both the westbound and eastbound travel lanes to the north. The purple shading identifies the study area, the yellow shading identifies the proposed pavement, and the orange shading identifies proposed bridges/overpasses. This concept constructs a new two-lane roadway alignment in each direction north of the existing US 290/SH 36 Intersection, includes an uninterrupted direct

connection providing continuous flow along US 290, provides a direct connect tie-in near Berlin Road, and features an overpass at Berlin Road with U-turns for improved safety and connectivity, and includes a frontage road connection between Business 290 and Old Mill Creek Road to accommodate local access. This concept would necessitate acquiring right-of-way.



Concept E

Concept E is an additional concept that was presented at the public meeting in November 2020. This concept is referred to as the Southern Connection. Concept E constructs a new two-lane roadway alignment in each direction south of the existing US 290/SH 36 Intersection. This concept also includes an uninterrupted direct connection providing continuous flow along US 290 and provides a direct connect tie-in near Berlin Road that consists of an overpass with U-turns for improved safety and connectivity, as well as an overpass at Old Mill Creek Road with U-turns, as needed. In addition, it maintains the existing US 290/SH 36 intersection to accommodate local traffic. Regional main lane traffic will continue on US 290 through the direct connect, thereby reducing the traffic on the existing US 290/SH 36 intersection and improving its operation. Concept E will also require the acquiring of a large amount of right-of-way.



Conclusion

The project team recommends that the City be proactive in working with TxDOT as the US 290/SH 36 interchange (the cloverleaf) improvement concepts are refined, and the impacts come into sharper focus. The City should advocate for the concept that best advances Plan 2040's Guiding Principle 2 by considering impacts to housing, transportation, infrastructure, economic development, emergency response, and arts and culture.

Figure 1.01-4 US 290/SH 36 TxDOT Concept B - Southern Direct Connect Source: Txdot.gov

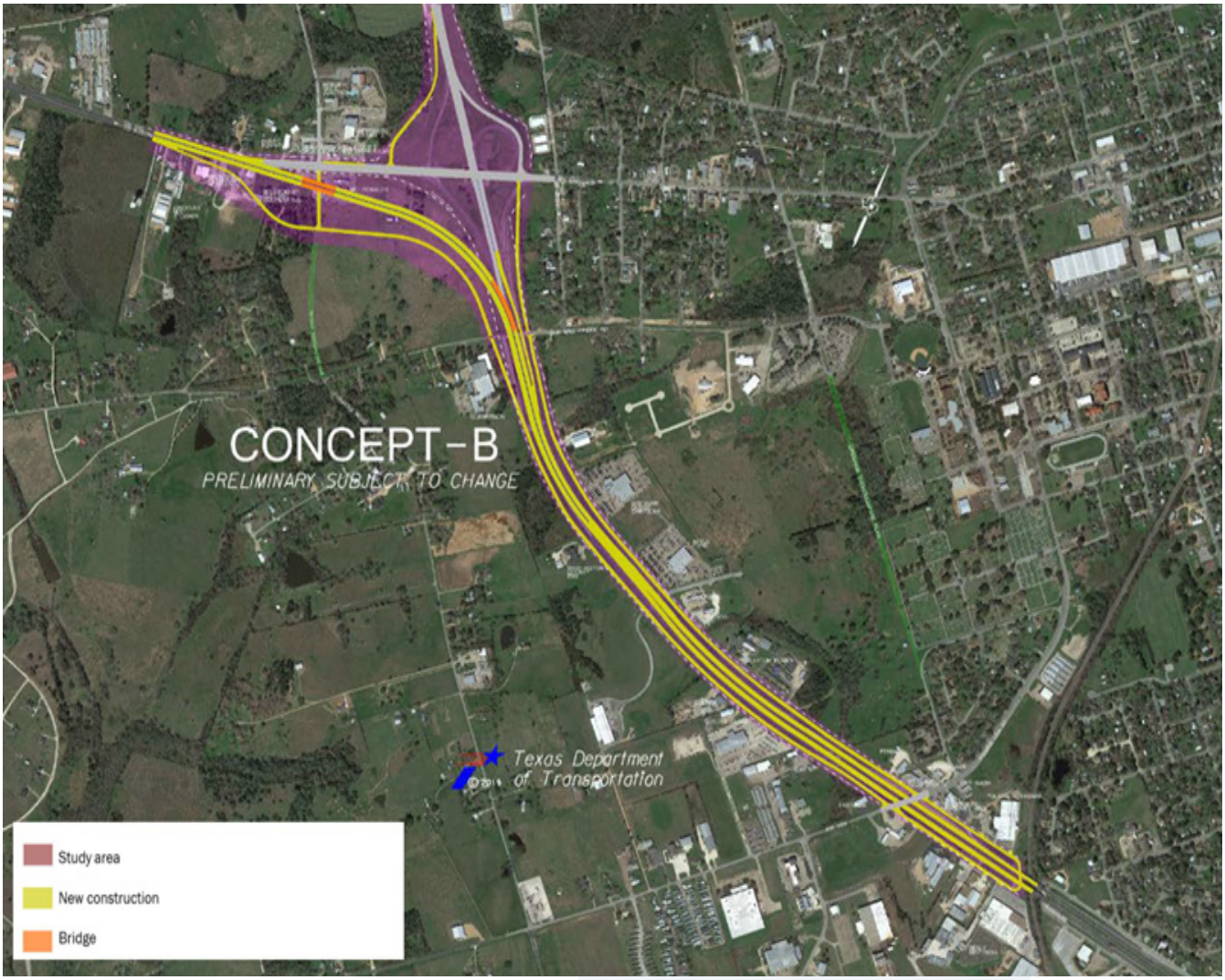


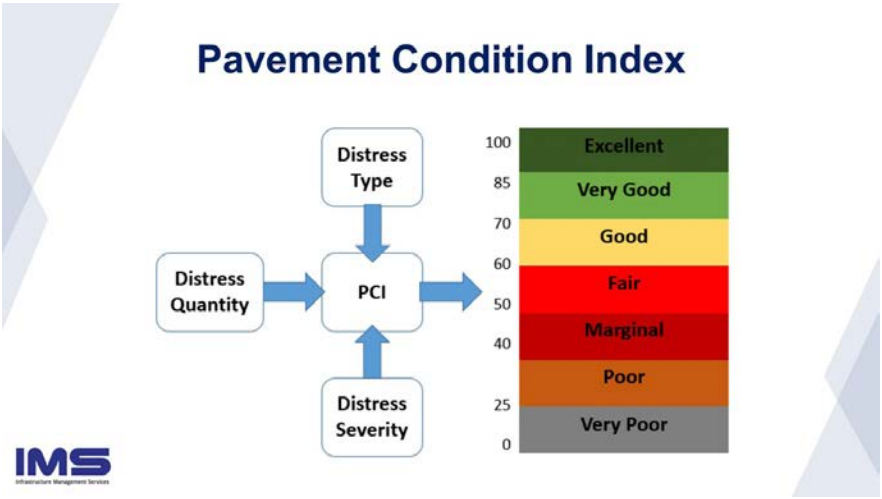
Figure 1.01-5 Concept Scoring Matrix

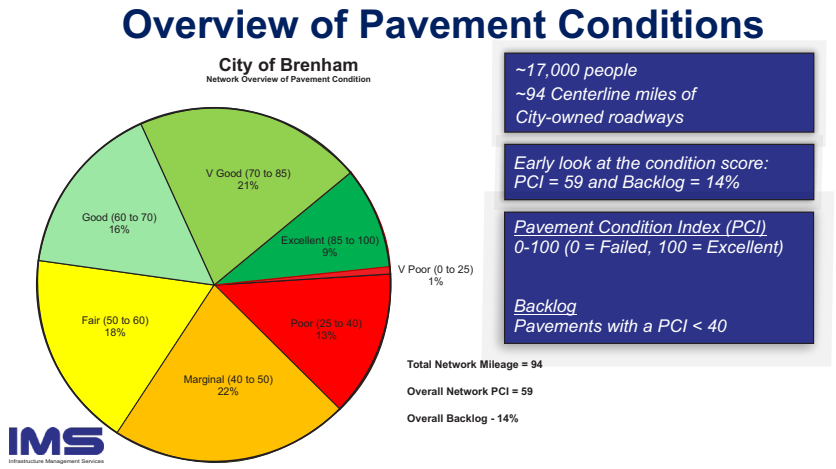
	Concept A Diverging Diamond Interchange	**Concept B** Central Direct Connect	**Concept C** Split northern Connection	**Concept D** Northern Connection	**Concept E** Souther Connection
Provide Continuous Flow on US 290	🔴	🟢	🟢	🟢	🟢
Minimize Property Impacts	🟢	🟡	🔴	🔴	🔴
Preserve Local Access	🟢	🟢	🟡	🟢	🟢
Improve Safety	🟡	🟢	🟢	🟢	🟢
Reduce Congestion	🟡	🟢	🟡	🟢	🟢
Improve Statewide and Local Mobility	🔴	🟢	🟡	🟢	🟢

Relative Concept Score: Poor 🔴 Good 🟡 Best 🟢

C. City Planned Projects

In late 2020 the City of Brenham partnered with Infrastructure Management Services (IMS), a full-service consulting firm that performs pavement condition surveys, right-of-way asset surveys, and creates pavement rehabilitation plans, to conduct an in-depth street condition inventory survey utilizing state of the art scientific equipment to evaluate the City's street network. Based on the resulting survey and report, that consisted of gathering data and analyzing over 94 centerline miles of the street network, it was found that the City's streets had an overall Pavement Condition Index (PCI) of 59. This is slightly below average, with a goal of reaching a PCI of 70. With the results of the in-depth inventory data, the City of Brenham is now able to plan, budget, and react efficiently to our street network needs.





The resulting data enables the City of Brenham to properly identify its needs related to each street and react accordingly. The City may now efficiently and effectively conduct a great deal of work in-house to include crack sealing, performing overlays on "good" and "fair" streets, and dedicating additional funds for mill and overlay projects, sealant additions, and total reconstruction based on each street's characteristics.

To this end, over the next five years, the City of Brenham has dedicated over $2.5 million dollars toward street projects. These projects include specifically dedicating $250,000 to seal coat projects that will extend the life of GOOD and FAIR streets in our system and dedicating over $600,000 to in-house street projects that will concentrate on residential streets for mill and overlay improvements as well as reconstruction of streets that fall below 40 PCI. Another $1.7 million is dedicated towards contractor projects that will help tackle larger sections of streets that fall below a PCI of 50. With these three tactics and dedicated funding, the City of Brenham will improve the overall PCI rating of the street network.

The City of Brenham has also identified several large Capital Improvement Projects that pertain to street widening and drainage improvements. The following identified streets are listed below:

Burleson St (FM 577-Benton Dr.) $3,915,000
Gun and Rod Road (East).....$1,873,000
Gun and Rod Road (West)..... $1,929,500
Jake Pickle Drive Extension (South) $894,000
Old Chappell Hill Rd.....$2,052,500
Old Mill Creek Rd.....$2,351,000
South Blue Bell Rd Extension $7,987,000
Total.....$21,002,000

A. The Burleson Street project

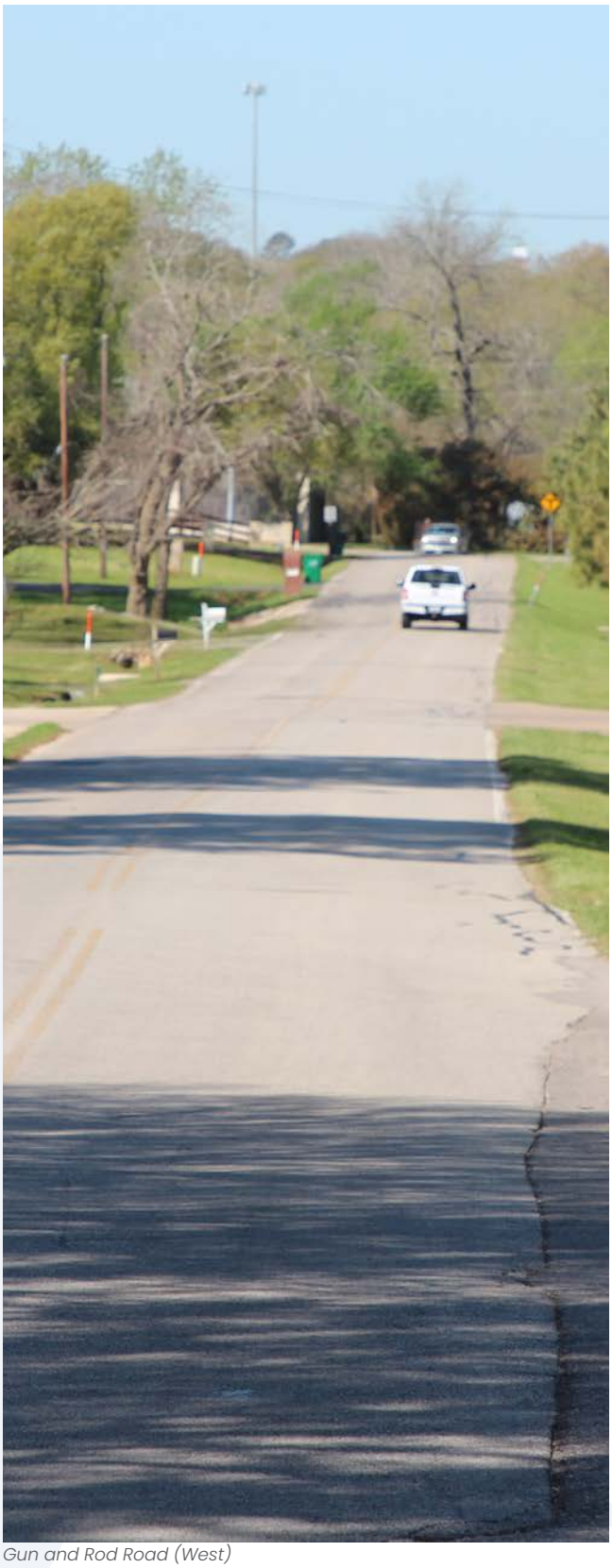
Located at FM 577 and Benton Drive, includes a pavement section with concrete curb and gutter with storm sewer and three lanes that total 40-foot wide from back-of-curb to back-of-curb with two driving lanes and a center turn lane. The project also includes a sidewalk on one side and street lighting. Special considerations to note is that the area may require detention, resulting in the need for the City to purchase additional land.

B. The Gun and Rod Road (East) project

Includes a pavement section with concrete curb and gutter with storm sewer and three lanes that total 40-foot wide from back-of-curb to back-of-curb with two driving lanes and a center turn lane. The project also includes a 12-foot multi-use sidewalk path and lighting. Special considerations to note are landscaping in the right-of-way on the north side will likely be impacted, and the City may want to upgrade the downstream storm sewer lines with both east and west improvements for Gun and Rod Estates.

C. The Gun and Rod Road (West) project

Includes a pavement section with concrete curb and gutter with storm sewer and three lanes that total 40-foot wide from back-of-curb to back-of-curb with two driving lanes and a center turn lane. The project also includes a multi-use sidewalk path and lighting. Special considerations include that the City may need additional right-of-way for the multi-use path, the City may want to upgrade the downstream storm sewer lines with both east and west improvements for Gun and Rod Estates, and possible replacement of all corrugated metal pipe (CMP) that currently exists underneath the pavement section.



Gun and Rod Road (West)

D. The Jake Pickle Drive extension project

Includes a pavement section with concrete curb and gutter with storm sewer and three lanes that total 40-foot wide from back-of-curb to back-of-curb with two driving lanes and a center turn lane and lighting on one side. Special considerations for this project are the extension may require modifications to the existing drainage channel and the construction of a bridge.

E. The Old Chappell Hill Road project

Consists of a pavement section with a concrete curb and gutter with storm sewer and three lanes that total 40-foot wide from back-of-curb to back-of-curb with two driving lanes and a center turn lane and verifying spacing of existing lighting and adding or modifying as needed. The special considerations for this project include the removal of the existing bridge and the construction of either a new bridge or a culvert crossing.

F. The Old Mill Creek Road project

Includes a pavement section with concrete curb and gutter with storm sewer and three lanes that total 40-foot wide from back-of-curb to back-of-curb with two driving lanes and a center turn lane, a sidewalk on the north side, and lighting.

G. South Blue Bell Road extension (Salem Road tie-in) project

Includes a pavement section with concrete curb and gutter with storm-sewer; a four-lane boulevard with a grass median and left-turn bays, where needed. The total pavement section is 70-foot-wide back-of-curb to back-of-curb. In addition, decorative lighting on both sides and two sidewalks are included, with a 10-foot multi-use path on one side and a 4-foot sidewalk on the other. This project does include approximately 140-feet of additional right-of-way acquisition along the length of the street. Several special considerations for this project comprise of the extension, that may require detention if the park ponds do not have adequate capacity, a bridge, or two smaller bridges, will also need to be constructed, and the extension will cross under overhead transmission lines. Lastly, a signal at the intersection of Highway 36 will be necessary.

1.02 Priority Projects Map

To move forward, it is important to include an assessment of existing transportation conditions to see areas of concern and of opportunity. In this vein, the development of Plan 2040 included documentation of existing transportation conditions and needs within the Existing City Report portion of the Plan. One tool utilized to gather input during a community engagement process was a mapping exercise conducted in January 2019. Participants marked areas in need of improvement of connectivity and/or traffic flow on maps of Brenham's road network. The areas of consensus from multiple maps included:

- Areas needing improved connectivity:
  - SH 36 north of the cloverleaf interchange with US 290
  - The area west of Blinn College approaching US 290
  - US 290 at the BNSF Railroad crossing
  - The US 290/SH 36 intersection (shopping area with HEB and Wal-Mart)
  - The SH 36 at intersection with the BNSF Railroad, near Hohlt Park
  - The area south of US 290 near Brenham Family Park where the Chappell Hill Street extension is planned

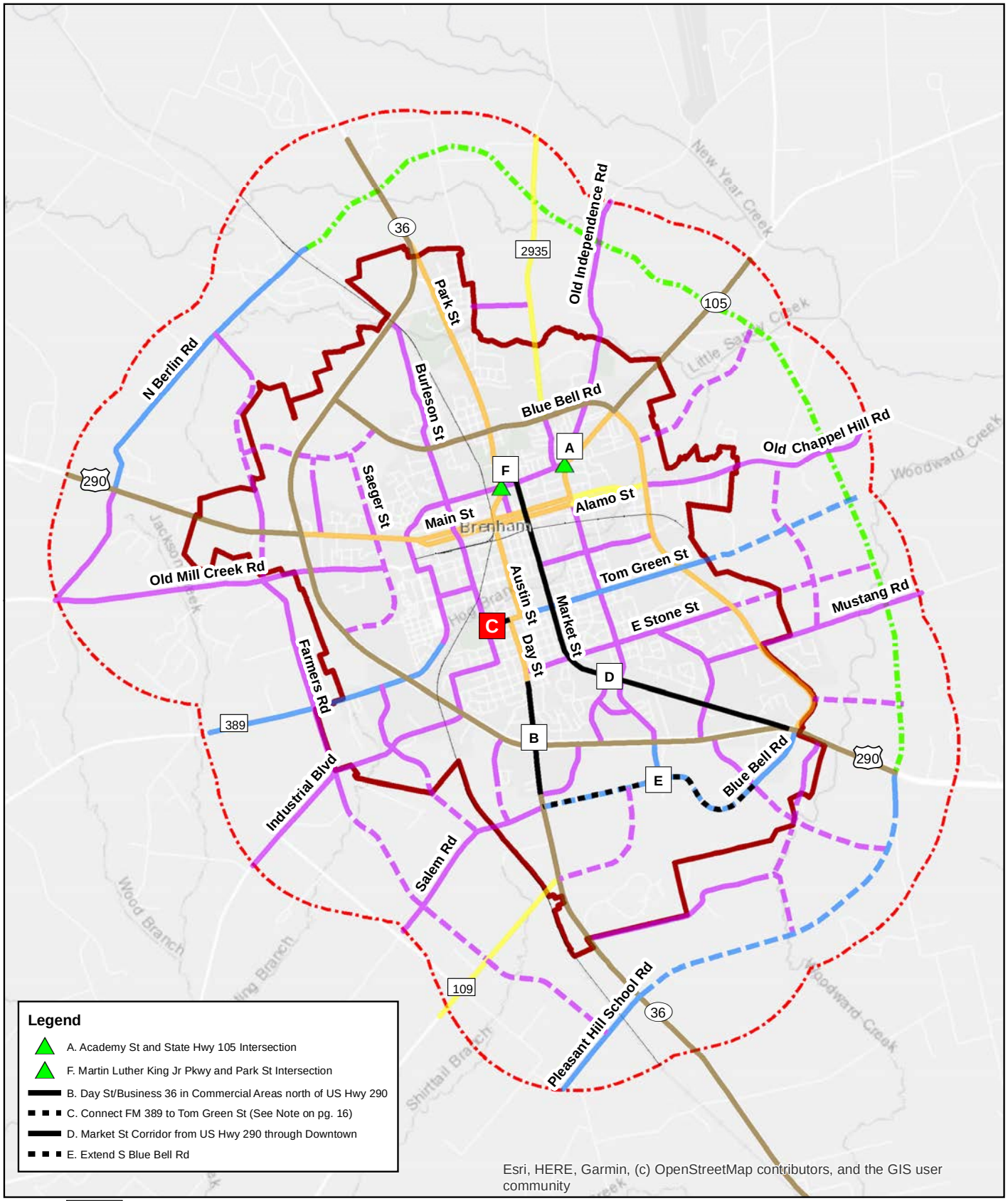
- Areas needing improved traffic flow:
  - The US 290/SH36 cloverleaf interchange
  - Day Street, in commercial areas both north and south of the US-290 interchange
  - US 290 west of the SH 36 intersection, at the Westwood Shopping Center area
  - The area around Brenham High School
  - The area around Brenham Post Office
  - Downtown
  - Crossing Streets near the BNSF Railroad line when trains are present; particularly Main Street
  - The intersection of Blue Bell Road and SH 105

Plan 2040 indicates on page 66 that "Overall, there are no significant traffic concerns based on projected population growth and development." While existing congestion is modest compared to larger metropolitan areas, there are several current and future trip generators that will increase traffic volumes on the streets and highways that serve them, including:

- New commercial developments along US 290, which is expected to remain the highest volume traffic facility
- New commercial developments along SH 36
- Brenham Family Park, which, when developed, may serve as a regional trip attractor, especially as a mix of complementary uses develop around it
- Market Street, Day and Austin Streets, and West Main Street, identified as corridor mixed use on the Future Land Use Map
- Downtown
- Blinn College
- Blue Bell Creameries
- Industrial business parks (particularly for truck traffic)

Based on the needs identified in the Existing City Report, the locations of current and future trip generators, discussion with City staff and other stakeholders, local knowledge, and professional judgment, the team identified and prioritized six future projects in Plan 2040. Figure 1.02-1 (page 16)shows the priority projects. These future projects include: the Academy Street and SH 105 intersection, Day Street/ BUS 36 in commercial areas north of US 290 through downtown, connecting FM 389 to Tom Green Street, Market Street corridor from US 290 through downtown, extending South Blue Bell Road, and the Martin Luther King Jr. Parkway and Park Street intersection.

Figure 1.01-2 Priority Projects



City Of Brenham Priority Projects

Each of these future projects was identified in Plan 2040 as a strategic action and capital investment priority with focused implementation in the short to mid-term, and to be incorporated into the Capital Improvements Program (CIP). These future projects, why they are needed, and possibilities for improvements are detailed following Figure 1.02-1.

A. Intersection of Academy Street and SH 105

This "Y" intersection is near a curve in the Academy Street roadway and is complicated by the nearby Thiel Street tee intersection to the east. The project should reconfigure the intersection to improve safety, reduce driver confusion, and mitigate congestion.

Possible improvements to be investigated could include removing the Thiel Street connection to SH 105 or converting the street to one-way eastbound to eliminate conflicts created by westbound Theil Street traffic; conversion to all-way stop control; and/or geometric modifications and land acquisition to construct a roundabout.

Academy Street & Chappell Hill Street

B. Day Street/BUS 36 in Commercial Areas North and South of US 290

The commercial area along SH 36/Day Street north and south of US 290 experiences congestion and vehicle queuing concerns. This area was noted within the Existing City portion of Plan 2040 as an area that was in need of improved traffic flow. The high number of closely spaced driveways on both sides of the street results in conflicting movements and often unsafe driving behavior. Safety improvements and access management to improve safety, reduce congestion, and provide more orderly movement of vehicles are recommended.

Possible improvements to be investigated include eliminating driveway access points on Day Street for properties that currently have more than one; extending the raised median on Day Street north of US 290 to the north to eliminate left-out movements near the Frontage Road/interchange signal; and/or providing cross access between businesses fronting Day Street/BUS 36, possibly with the addition of a consolidated, signalized access point.

Day Street, Business 36

C. Connect FM 389 to Tom Green Street

Providing a connection between FM 389/Prairie Lea Street and Tom Green Street would significantly improve connectivity and mobility on the south side of the City by creating a continuous east-west City Arterial corridor. This was initially determined to be a priority as there is currently only one way to cross the railroad tracks, which is detrimental to Fire and EMS as well as if an evacuation ever needs to take place. However, with the proposed development of Fire Station Number 2 and multiple EMS stations, emergency personnel will be capable of serving all areas of town efficiently without this connection. After additional consideration and research, this project has been deemed cost-prohibitive. Furthermore, the new US Hwy 290 and SH 36 interchange concepts all incorporate one-way frontage roads that will likely alleviate the necessity for this connection.

D. Market Street Corridor from US 290 Through Downtown

The Market Street corridor is a TxDOT Minor Arterial

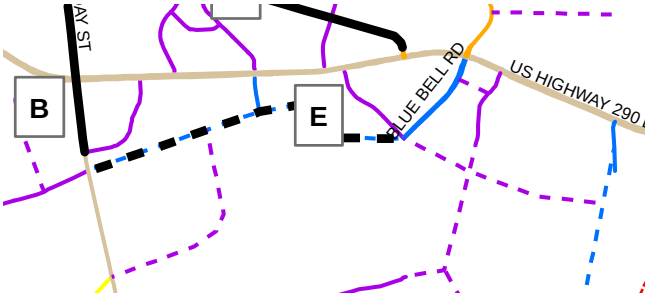
that is a primary north-south connection for the City, particularly for travelers coming from or going to the east on US 290. Currently, the corridor varies in character along its length. The street section along the corridor consists of a three-lane section (one travel lane in each direction with a center-turn lane) on the southern portion and a traditional two-lane section closer to Downtown. Development and implementation of a Corridor Improvement Plan are recommended to create a more cohesive and welcoming transportation corridor.

Market Street

Possible improvements to be investigated could include installation of a raised median within the three-lane portions of the corridor where there is a lack of driveways or side streets and, therefore, no need for a left-turn refuge area; enhanced crosswalks and/or sidewalks; investigation of on-street bike accommodations; and/or streetscaping elements such as decorative lighting, landscaping, wayfinding signage, etc.

E. Extend South Blue Bell Road South of SH 36

Blue Bell Road is an important arterial route providing a high level of mobility throughout the City. Continuing South Blue Bell Road from its current terminus south of US 290 to connect with SH 36 is a high priority. The vital need for this connection was also highlighted in Plan 2040 as it would further improve connectivity on the south side of the City. A variety of land uses could be developed with an extension. The Future Land Use Map shows this area as a Planned Development where an additional study is needed for proposed realignment and adjacent land uses. This connection is shown as a dashed line on the Thoroughfare Plan map running north of the proposed Brenham Family Park area.



excerpt of Figure 1.02-1

F. Intersection of Martin Luther King Jr. Parkway and Park Street (by the Library)

The intersection of Martin Luther King Jr. Parkway, Academy Street, BUS 36, and Park Street has a traffic signal and marked turn lanes on the northbound and southbound approaches. However, no lane designations are marked on the eastbound or westbound approaches. This often results in vehicle operations resembling a single lane functioning for left-turn, through, and right-turn movements. Intersection improvements are recommended to reduce congestion at this location.

Possible improvements to be investigated include providing separate left-turn and shared through/right-turn lanes on the eastbound (Martin Luther King Jr. Parkway), and westbound (Academy Street) approaches; updating the traffic signal phasing and/or timings; and/or providing improved pedestrian crosswalks.

Academy Street to Dr. MLK Jr. & North Park Street

1.03 Typical Sections

Plan 2040 recommends that the City integrate "Complete Streets" concepts into local projects. Complete Streets concepts seek to better accommodate all road users, including pedestrians, bicyclists, transit users, and motorists. The recommended typical sections have been developed with this concept in mind.

The typical sections are intended to guide City decisions when new or retrofit street projects are undertaken. Adjustments to the dimensions and/or amenities can be made based on project specific considerations.

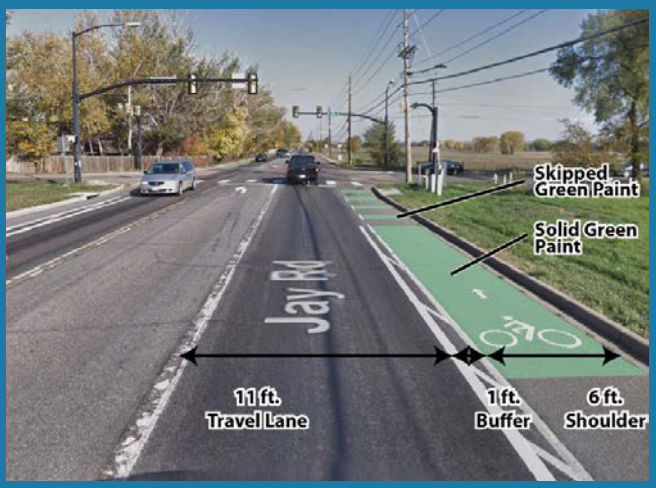
Lane Widths:

The 13-foot wide travel lanes shown in the Local Alternatives L1 and L2 sections match the City's current standards. Narrower lanes are being used by many communities to help calm traffic and reduce travel speeds. 11-foot lanes have become commonplace for local streets, with some communities going even narrower. This is another item the City should monitor, and if appropriate, sometime in the future, consider revising the Local Alternatives L1 and L2 typical sections to provide narrower motor vehicle travel lanes.

Bike Accommodations:

The project team discussed the pros and cons of providing a wider on-street bike area. The industry trend is toward wider accommodations, sometimes with a painted buffer area. This is something the City should monitor, and if appropriate, sometime in the future consider revising the Collector Alternative C2 typical section to provide wider on-street bicycle space, similar to the Arterial Alternative A2 section.

Source: Active Transport Alliance - activetrans.org



Source: Boulder County - bouldercounty.org

A. City Arterial Streets

Arterial streets provide a high level of mobility. These streets are intended to move 5,000 to 30,000 vehicles per day through and around the City efficiently, with access points generally being from collector streets. Arterial streets typically have speeds of 40 to 50 mph, with greater driveway spacing and fewer driveways allowed per lot. The recommended typical sections depict a four-lane street. If traffic volumes on an arterial corridor do not warrant a four-lane street section, the City could select a typical section from the City Collector category.

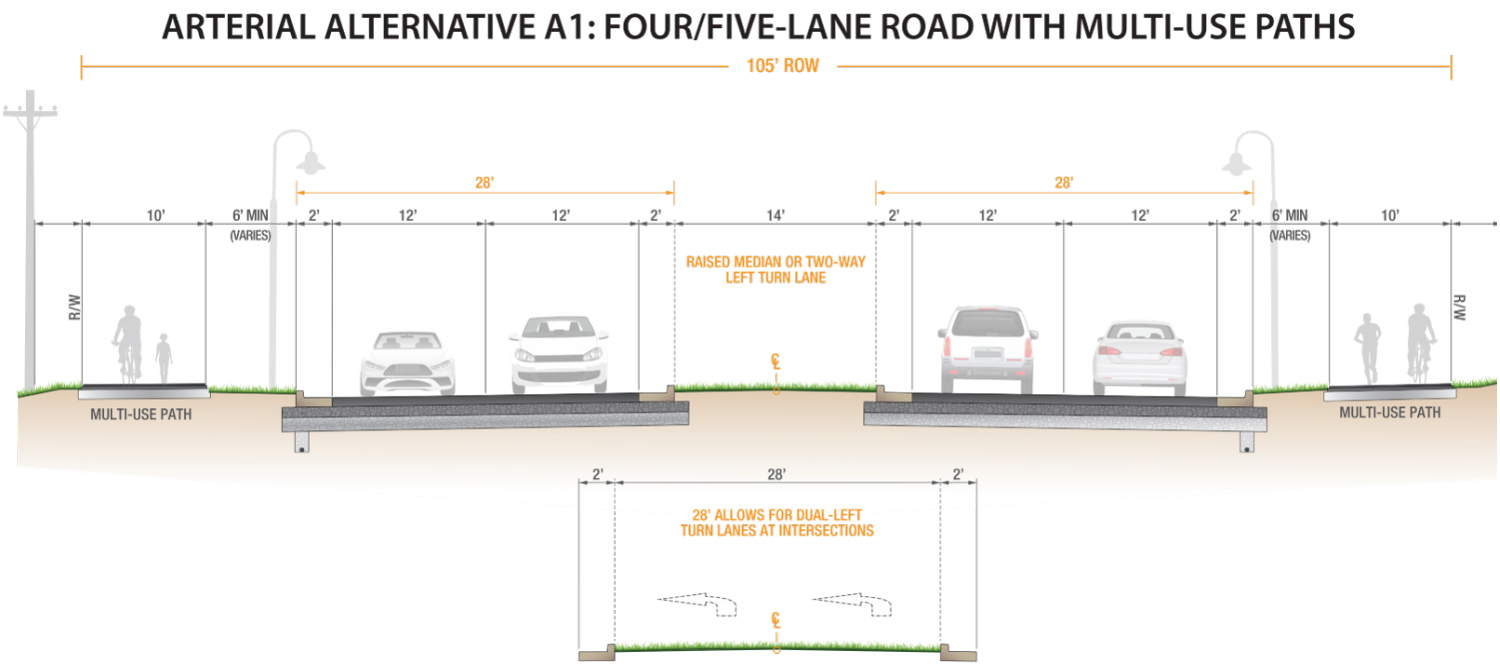
Prairie Lee Street

1. Arterial Alternative A1: Four- or Five-Lane Road with Multi-use Paths

Typical section Arterial Alternative A1 provides two travel lanes in each direction. Between intersections, a Two-Way Left-Turn Lane (TWLTL) or a raised center median could be provided, depending on the presence or absence of driveways. A multi-use path is provided on each side of the road to accommodate bicyclists and pedestrians. The total right-of-way (ROW) width between the major intersections is 105 feet. At some busier intersections, additional ROW may be needed to accommodate dual left-turn lanes.

This section is suitable along City Arterial streets that are also designated as Higher or Medium/Lower Priority Bicycle/Pedestrian Routes (see report Section 2). The Arterial Alternative A1 section is shown in Figure 1.03-1.

Figure 1.03-1 Arterial Alternative A1



2. Arterial Alternative A2: Four- or Five-Lane Road with Buffered Bike Lanes

Typical section Arterial Alternative A2 provides two travel lanes in each direction. Between intersections, a Two-Way Left-Turn Lane or a raised center median can be provided, depending on the presence or absence of driveways. Sidewalks are provided on each side of the road to accommodate pedestrians. In addition, on-street, buffered bicycle lanes are also provided in each direction. The total ROW width between major intersections is 105 feet. At some busier intersections, additional ROW may be needed to accommodate dual left-turn lanes.

This section is suitable along City Arterial streets that are also designated as Higher or Medium/Lower Priority Bicycle/Pedestrian Routes (see report Section 2). The Arterial Alternative A2 section is shown in Figure 1.03-2.

B. City Collector Streets

Collector streets provide a moderate level of mobility while allowing more frequent direct access than arterial streets. Collector streets typically allow speeds of 30-40 mph and provide travel through corridors and provide a connection to arterial streets. The recommended typical sections depict both two- or three-lane streets and two-lane only streets.

1. Collector Alternative C1: Two- or Three-Lane Road with Path and Sidewalk

Typical section Collector Alternative C1 provides one travel lane in each direction. Between intersections, a Two-Way Left-Turn Lane or a raised center median can be provided, depending on the presence or absence of driveways. A sidewalk is provided on one side, with a multi-use path provided on the other. The total ROW width is 80 feet.

Figure 1.03-2 Arterial Alternative A2

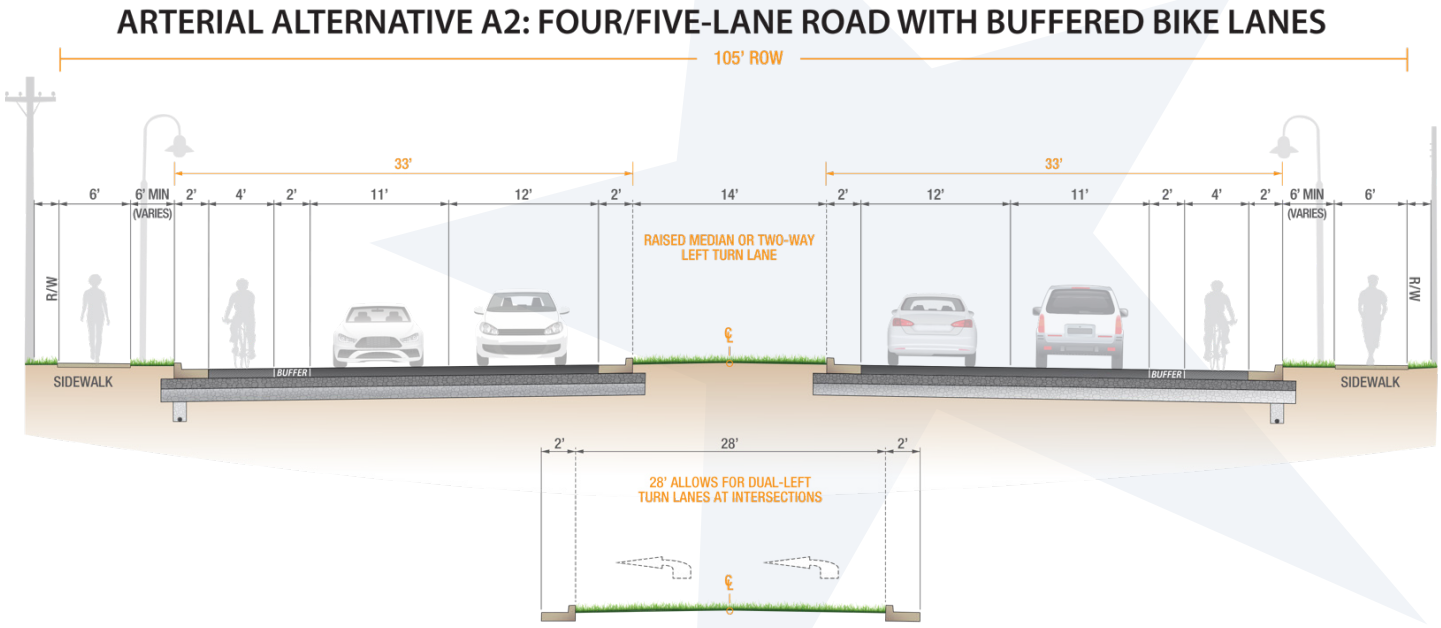


Figure 1.03-3 Collector Alternative C1

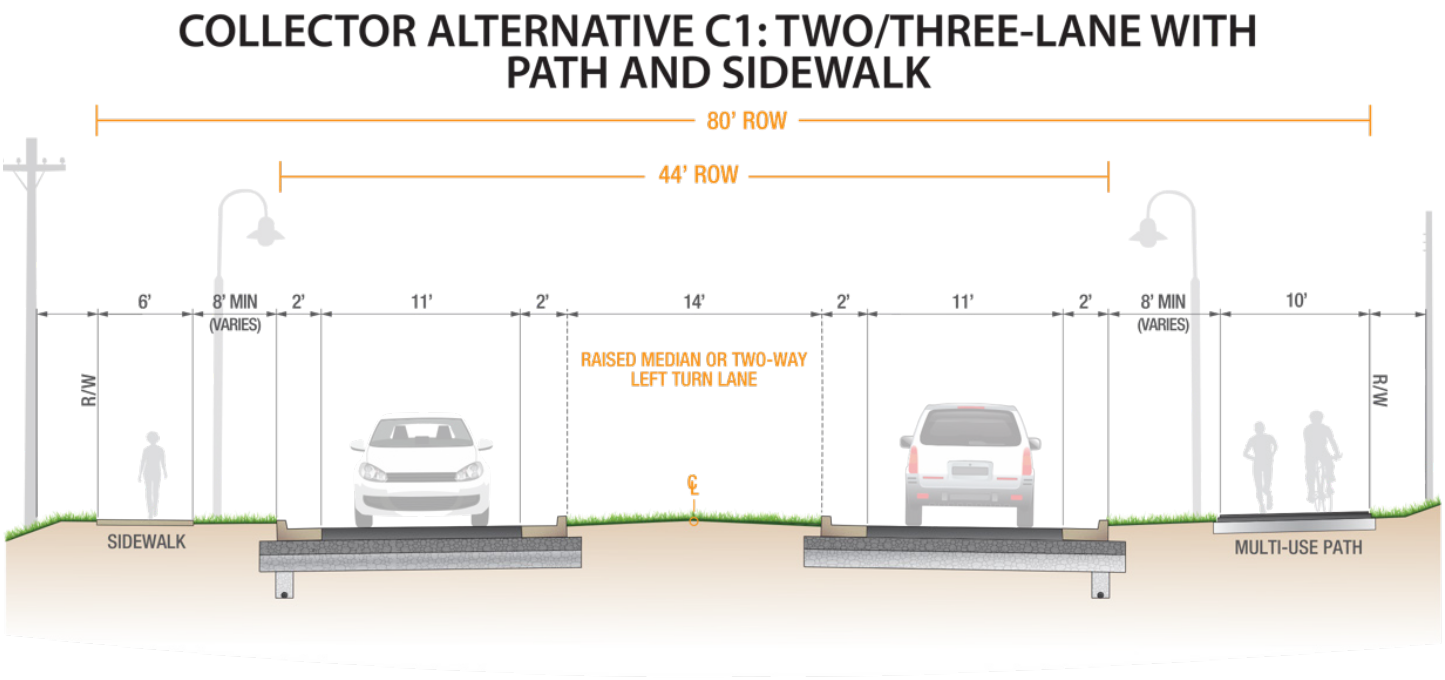
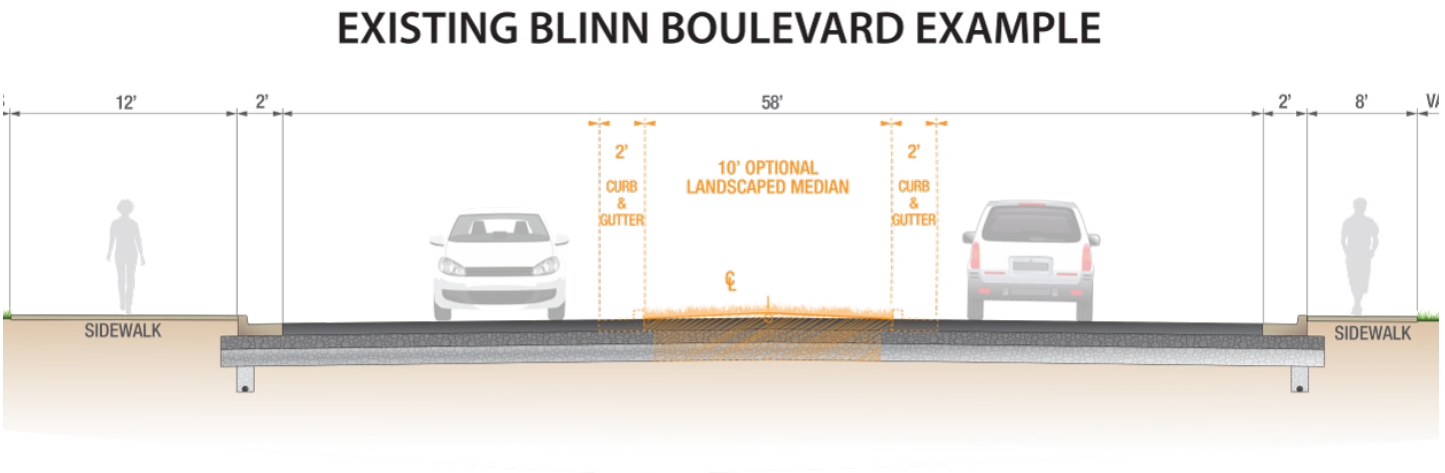


Figure 1.03-4 Existing Blinn Boulevard Example



This section is designed such that it accommodates a variety of City Collector street segments as well as Bicycle/Pedestrian Routes (see report Section 2). The Collector Alternative C1 section is shown in Figure 1.03-3. This section features a sidewalk or multi-use path on each side of the street for pedestrians and bicyclists, as well as a raised median or Two-Way Left-Turn Lane. The right-of-way for this section is 60-80 feet. The existing Blinn Boulevard section is also shown for reference in figure 1.03-4.

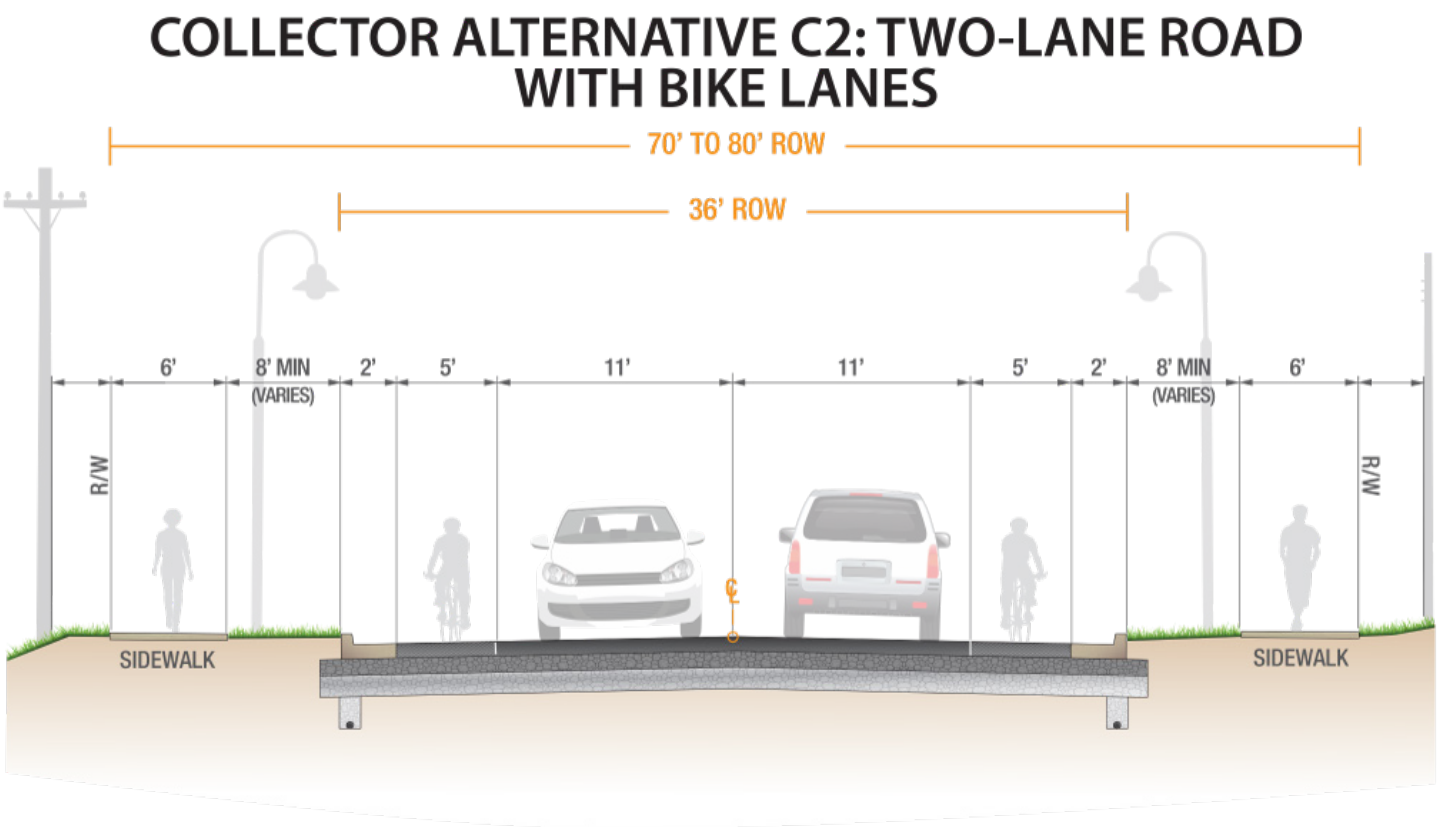
Blinn Boulevard

2. Collector Alternative C2: Two-Lane Road with Bike Lanes

Typical section Collector Alternative C2 provides one travel lane in each direction and no area for a raised median or a Two-Way Left-Turn Lane. The benefits of this cross-section are that a sidewalk is provided on both sides in addition to on-street bike lanes. The total ROW width is 70 to 80 feet.

This section is suitable along City Collector streets that are also designated as Medium/Lower Priority Bicycle/Pedestrian Routes (see report Section 2). The Collector Alternative C2 section is shown in Figure 1.03-5.

Figure 1.03-5 Collector Alternative C2



C. City Local Streets

All streets that are not functionally classified by TxDOT or as a City Arterial or City Collector can be considered local streets. Local streets provide a lower level of mobility with a very high level of access. These streets typically have speeds of 15-30 mph. The recommended typical sections depict two-lane streets.

1. Local Alternative L1: Two-lane Urban Section with Path

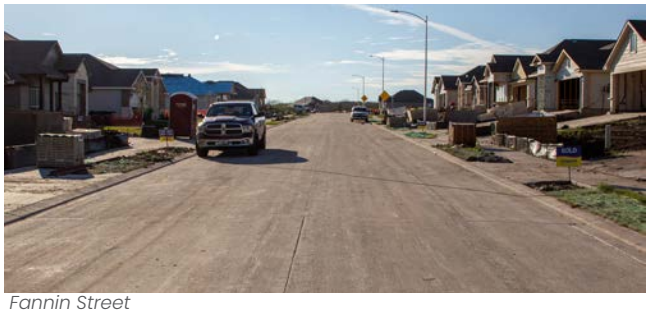
Typical section Local Alternative L1 provides one travel lane in each direction. A multi-use path is provided on one side. The total ROW width is 55 feet.

This section is suitable along local streets that are also designated as High or Medium/Lower Priority Bicycle/Pedestrian Routes (see report Section 2). The Local Alternative L1 section is shown in *Figure 1.03-6.*

2. Local Alternative L2: Two-Lane Urban Section with Sidewalks

Typical section Local Alternative L2 provides one travel lane in each direction. A sidewalk is provided on both sides. The total ROW width is 55 feet.

This section is suitable along local streets that are not designated as High or Medium/Lower Priority Bicycle/Pedestrian Routes (see report Section 2). The Local Alternative L2 section is shown in Figure 1.03-7.



Fannin Street

Figure 1.03-6 Local Alternative L1

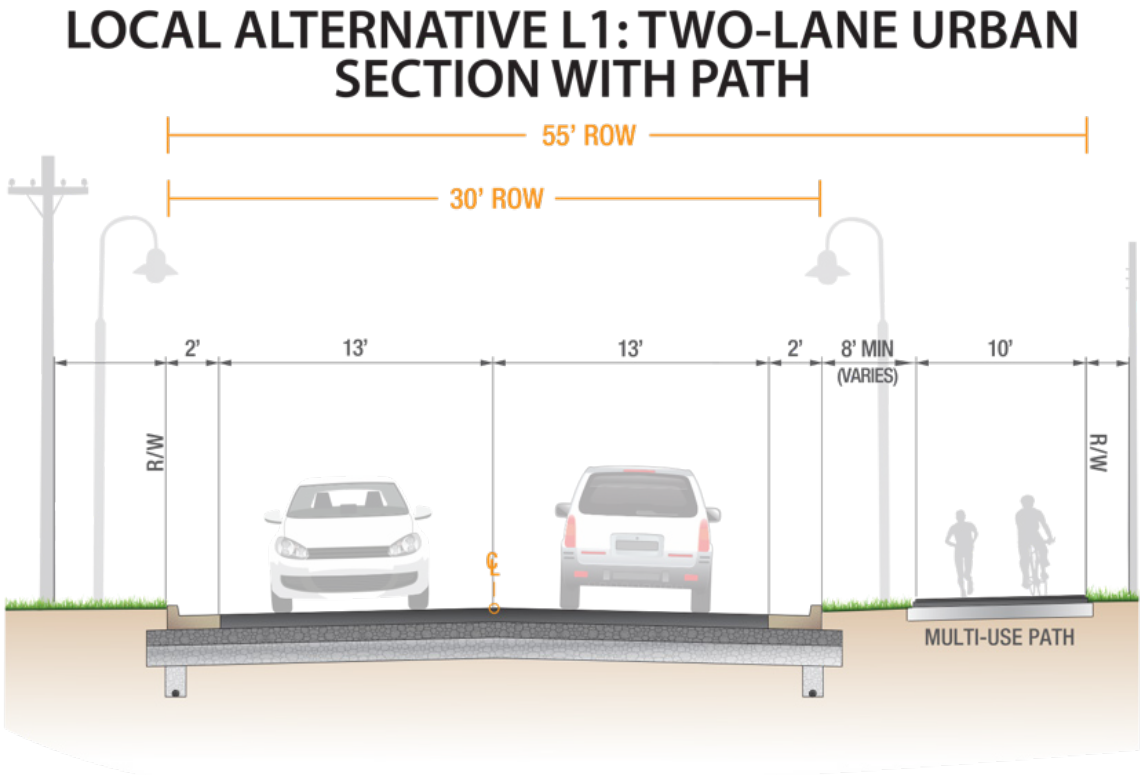
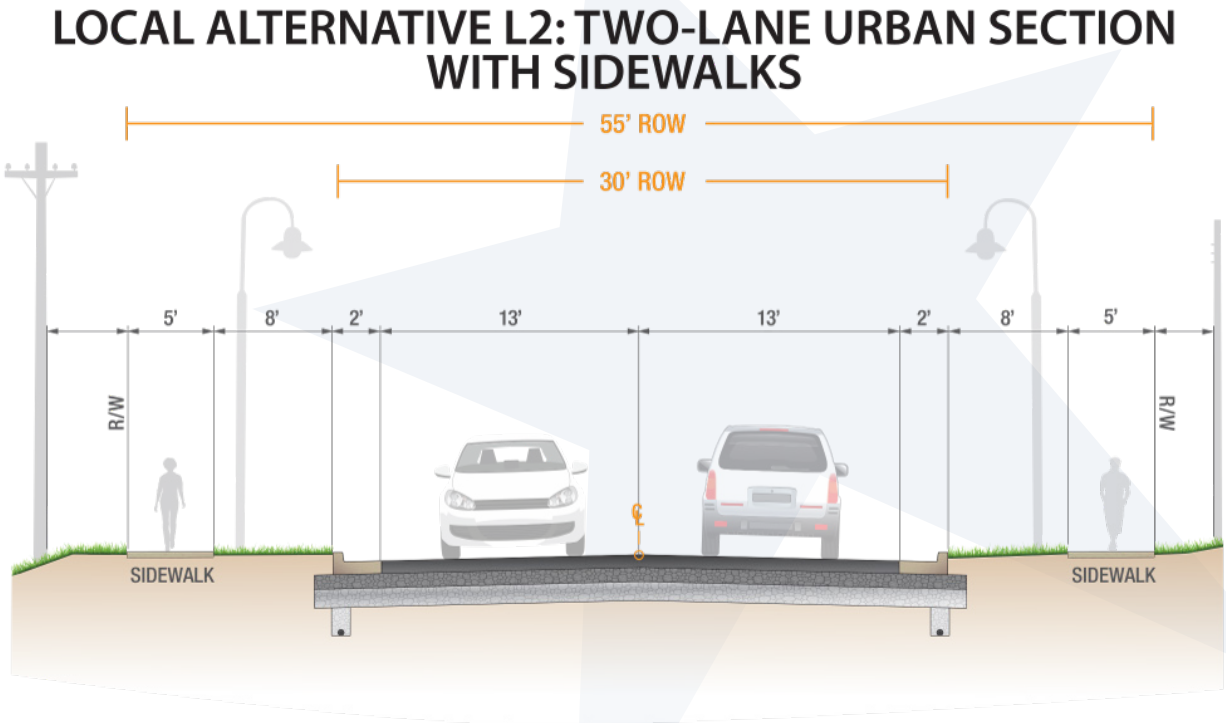


Figure 1.03-7 Local Alternative L1



1.04 Truck Routes Map and Discussion

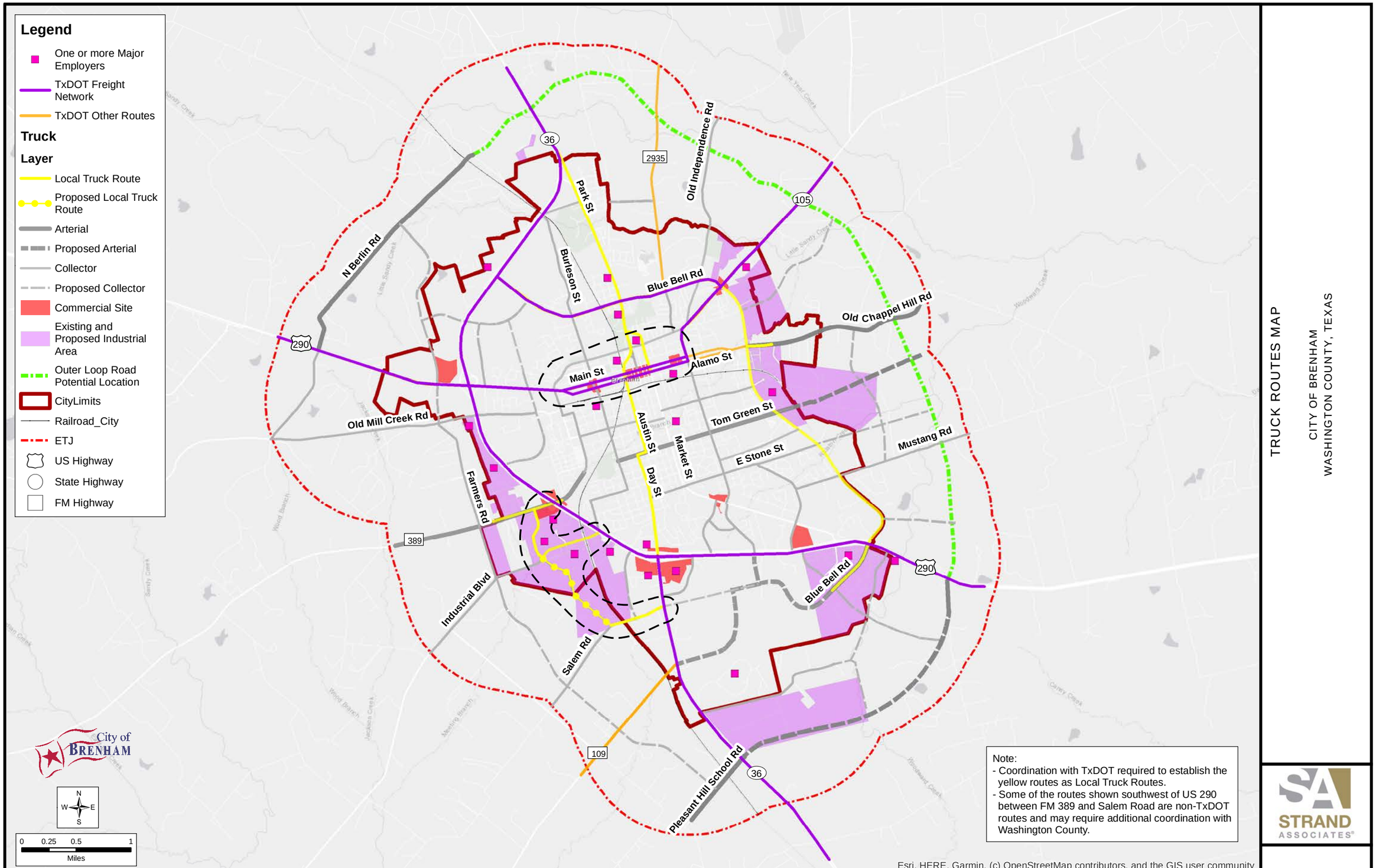
The City of Brenham's Code of Ordinances outlines Traffic Regulations in Chapter 25 to include Truck and Hazardous Materials Routes in Article IV, Sections 25-90 through 25-95. Article IV establishes and creates certain truck and hazardous materials routes in, through, and around the City of Brenham for all trucks, semitrailers, road tractors, and truck tractors or any vehicle or conveyance carrying hazardous materials entering or exiting the city. These routes are shown on the Truck Routes Map in Figure 1.04-1. The primary purpose of the Truck Routes Map is to easily identify the preferred routes for trucks with business in the City to use between their destinations and the TxDOT Freight Network.

The Truck Routes Map identifies some of the larger employers in the City that are likely to receive truck deliveries and/or service. It also highlights some of the commercial land use areas where truck traffic is more frequent. The TxDOT Freight Network is shown in purple, while the recommended Local Truck Routes are shown in yellow.

Additional coordination with TxDOT and Washington County regarding the establishment of local truck routes is warranted. The City should also consider coordinating with TxDOT to investigate eliminating or relocating the portion of the TxDOT Freight Network that uses the Main Street and Alamo Street one-way pair through downtown. Regional trucks that do not have a downtown destination should be encouraged to use SR 36/Blue Bell Road/SR 105 instead. Another option would be to relocate the TxDOT Freight Network route from Main Street and Alamo Street to Martin Luther King Jr. Parkway and Academy Street. Due to residential land uses along that route as well as the Park Street intersection (a priority project location), potential adverse impacts would need to be further evaluated.

US 290 - Truck Route

Figure 1.04-1 Truck Routes Map



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Section 2 Bicycle and Pedestrian Network

2.01 Bicycle and Pedestrian Routes Map and Discussion

The Brenham Bicycle and Pedestrian Routes Map identifies the streets that best connect a number of community features. To promote an active lifestyle and increase overall community accessibility, it is desirable to make it easier to walk and bike to destinations such as churches, parks, and schools. Currently, the only designated bike route in the City is located on FM 389/Prairie Lea Street. The routes identified on the map should be prioritized for future bicycle and pedestrian improvement projects.

The Brenham Bicycle and Pedestrian Routes Map identifies bike and pedestrian routes in the following categories:

1. Recommended Higher Priority Bicycle and Pedestrian Routes on Existing Streets
2. Recommended Higher Priority Bicycle and Pedestrian Routes on Future Streets
3. Recommended Medium to Lower Priority Bicycle and Pedestrian Routes on Existing Streets
4. Recommended Medium to Lower Priority Bicycle and Pedestrian Routes on Future Streets

The Bicycle and Pedestrian Routes Map is shown in Figure 2.01

Discussion among the project team during the development of the bike/pedestrian map identified a few areas worth noting where the City should further investigate opportunities for improvements. First, there are no pedestrian or bicycle accommodations along or across Park Street/BUS 36 at Brenham High School. This is something that the City should consider improving.

Another challenging area occurs north of US 290 on Day Street/BUS 36. Bicyclists choosing to use the recommended Higher Priority route along Austin Street east of Day Street will need to use Hillcrest Lane to connect to Day Street where Austin Street ends. TxDOT is planning sidewalk improvements on portions of Austin Street and Day Street in 2022. The City should consider planning for or advocating for a multi-use path along the east side of Day Street from Hillcrest Lane traveling to the south, ideally through the US 290 interchange and beyond.

Adequately accommodating bicycles along the crossing streets at many of the US 290 interchanges will be particularly challenging. The City will need to coordinate with TxDOT on any desired improvements.

Bicyclist on Tom Green Street

Sidewalk Improvements:

As noted in Plan 2040, the City should develop a sidewalk improvement program to repair, replace, or install new sidewalks, crosswalks, and curb cuts, in high pedestrian use areas adjacent to, and leading to and from schools, near and adjacent to public buildings and spaces (including parks), and other areas with the potential for high sidewalk usage. It is encouraging that new subdivisions such as Vintage Farms and Liberty Village, both Planned Development Districts, have provided sidewalks and pedestrian trails for their residents. For example, Davy Street located within the under-construction Liberty Village Subdivision, provides sidewalks, a crosswalk, and a pinch point to calm traffic and increase pedestrian safety

2.02 Bicycle and Pedestrian Routes Map and Discussion

The following is a list of federal, state, and other grant and low-interest loan options to help fund Bicycle and Pedestrian projects in the City. This information is from a variety of sources, including the Houston Galveston Area Council. Grants for which the City does not meet eligibility requirements are not listed. Additional information under the Local Programs subsection can be found here:

https://link.cityofbrenham.org/hgac-2040-ped

A. Federal Programs

1. **Surface Transportation Block Grant Program (STBGP)**

Offered By:	Federal Highway Administration (FHA), via TxDOT and local Metropolitan Planning Organizations(MPO) (where applicable).
Eligible Entities:	Municipal government entities. Generally, it may not be used to improve roads classified as local roads.
Total Program Funding:	$1.01 billion.

Min-Max Award per Project:	None specified.
Local Match:	State or Local 20 percent.
Application Due Date:	February of each year.

2. Transportation Alternatives Set-Aside (TA)

Offered By:	FHWA, via TxDOT and local MPO (where applicable). The TA program is part of the STBG program.
Eligible Entities:	Municipal government entities, among others.
Total Program Funding:	$10.6 million FY 2019 to 2020.
Min-Max Award per Project:	None specified.
Local Match:	20 percent.
Application Due Date:	Preliminary application in April of odd numbered years.

3. Safe Routes to School (SRTS)

Offered By:	FHWA, via TxDOT and local MPO (where applicable). The TA program is part of the STBG program.
Eligible Entities:	Municipal government entities, amongst others
Total Program Funding:	$8.7 million FY 2019 to 2020
Min-Max Award per Project:	None specified.
Local Match:	0 percent.
Application Due Date:	Preliminary application in April of odd numbered years.

4. Recreational Trails Program

Offered By:	HWA, via the Texas Parks and Wildlife Department.
Eligible Entities:	Municipal government entities, among others.
Total Program Funding:	Varies year to year approximately $4 million.
Min-Max Award per Project:	From $4,000 up to $200,000 for non-motorized trails and $400,000 for motorized (off highway vehicle) trails.
Local Match:	20 percent.
Application Due Date:	February 1 each year.

5. Highway Safety Improvements Program (HSIP)

Offered By:	FHWA, via TxDOT and local MPO (where applicable).
Eligible Entities:	Municipal government entities, among others.
Total Program Funding:	$216 million.
Min-Max Award per Project:	None specified.
Local Match:	10 percent state or local.
Application Due Date:	Last call for projects concluded in August 2018. according to HSIP's Website, TxDOT is currently developing process improvements to the HSIP program in lieu of a 2019 program call.

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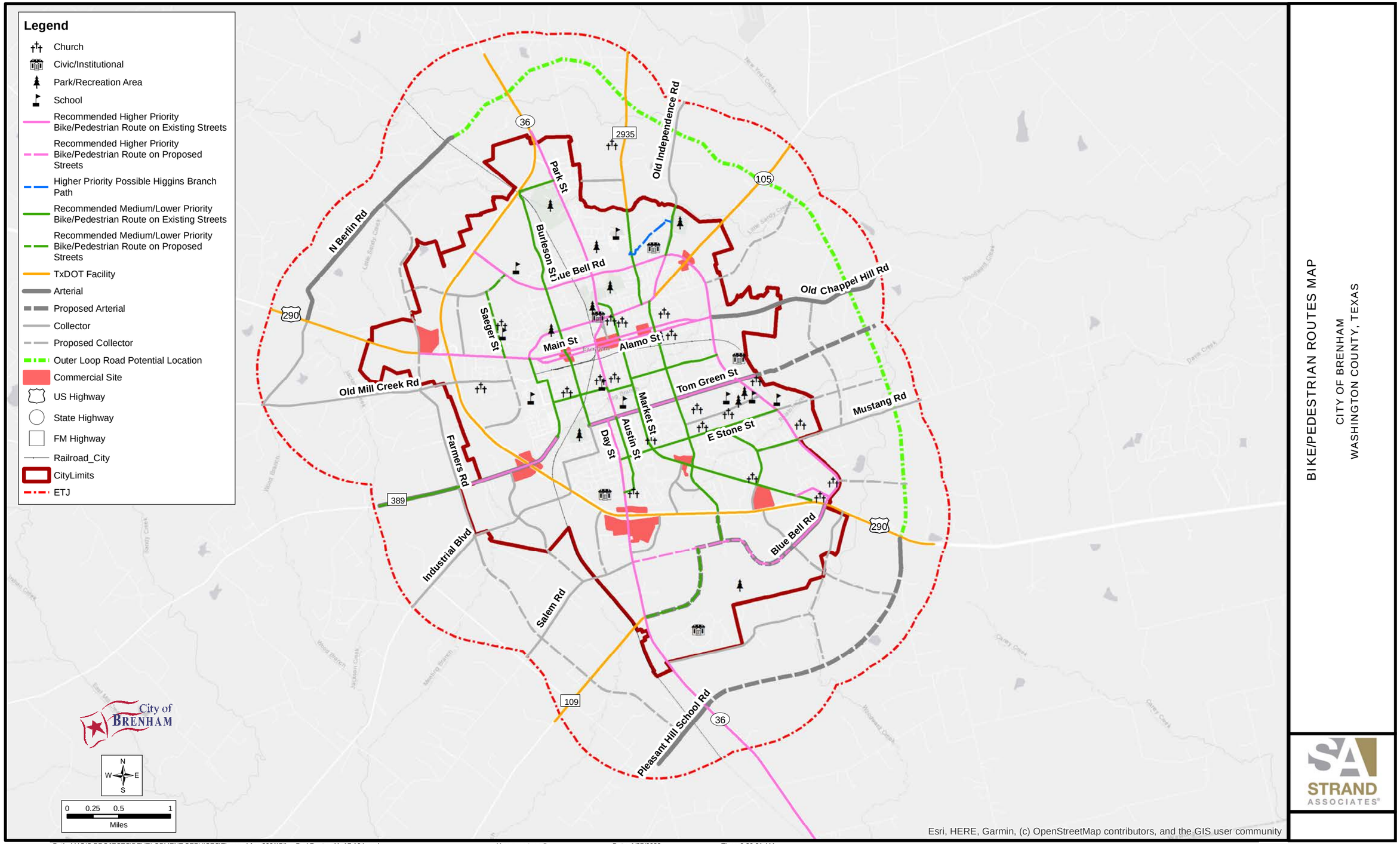
Figure 2.01-1 Bike and Pedestrian Routes Map



BIKE/PEDESTRIAN ROUTES MAP

CITY OF BRENHAM

WASHINGTON COUNTY, TEXAS

STRAND ASSOCIATES®

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6. **Better Utilizing Investments to Leverage Development (BUILD), formerly known as Transportation Investment Generating Economic Recovery (TIGER).**

Offered By:	United States Department of Transportation (DOT).
Eligible Entities:	Municipal government entities, among others.
Total Program Funding:	Varies year to year approximately $4 million.
Min-Max Award per Project:	From $1 million in rural areas and $5 million in urban areas up to $25 million maximum. No more than $100 million to a single state.
Local Match:	20 percent in urban areas, 0 percent in rural areas.
Application Due Date:	May 18, 2020.

B. Local Programs

1. **Capital Improvement Programs**

   To the extent possible, the City should coordinate the implementation of pedestrian and bicycle improvements as part of larger roadway projects, particularly along the routes identified as Higher and Medium/Lower priority corridors on the Bike/Pedestrian Routes Map.

2. **Bond Initiatives**

   Voters may authorize local governments to sell bonds to fund capital improvements, including bicycle and pedestrian facilities. In November 2012, Houston voters approved a major bond referendum supporting the Bayou Greenways Initiative. The City agreed to provide up to $100 million to build shared use paths along its waterways.

3. **Developer-funded Facilities**

   The City could consider adopting policies that encourage or require developers to construct bicycle and pedestrian accommodations. This could be included in any Traffic Impact Analysis guidelines that the City chooses to implement (see Section 3 of this report).

4. **Volunteers**

   Volunteers can help maintain pedestrian and bicyclist facilities, reducing localities' upkeep costs. These volunteers can help pick up trash, remove debris, maintain plantings, and partake in other activities to keep shared use paths, bicycle lanes, and other infrastructure safe, attractive, and in good repair. The Woodlands Township near Houston has an adopt-a-path program where interested residents volunteer to clean a path or park at least once per quarter.

5. **Businesses**

   Businesses may be interested in providing financial support to help construct or maintain pedestrian and bicyclist infrastructure. For example, Blue Cross and Blue Shield of Texas provided $750,000 to support Houston B-Cycle, the City's bike-share program. In New York City, Citigroup paid $41 million to be the lead sponsor of New York City's bike-share program for five years.

6. **Private Foundations**

   - Several non-profit organizations and private foundations provide funding to support the planning and construction of pedestrian and bicycle facilities:
   - The American Hiking Society: National Trails Fund offers grants ($500 to $5,000) to member organizations for projects that improve hiking trails.
   - The PeopleForBikes: Community Grant Program provides grants to help construct bicycle infrastructure and support large-scale bicycle advocacy initiatives.
   - Advocacy Advance: Rapid Response Grants provide funding to organizations that are part of the League of American Bicyclists and the Alliance for Biking & Walking to support campaigns aimed at increasing or preserving funding for active transportation infrastructure.

Section 3
Traffic Impact Analysis Guidelines

3.01 Introduction

This section outlines examples of existing Traffic Impact Analysis (TIA) guidance for ten (10) Texas communities to aid the City in creating TIA guidelines. The following list summarizes each of the researched communities' TIA guidelines to include when a TIA is required and, in some instances, the content to be provided. Note that there are certainly additional communities in Texas with some form of guidance for a TIA that is not listed here. This section concludes with a discussion of TIA guidelines considerations and potential policies.

A. TIA Guidelines Discussion

Many of the TIA guidelines the team reviewed not only provide a list of recommended methodology and content to include in the TIA report, but they also typically include recommendations for determining whether a TIA is required to be completed as part of the approval process. Many of the guidelines directly state a development-generated trip threshold (whether for peak hour trips, daily trips, or both). For generated peak hour trips, this threshold was typically approximately **100 vehicle trips per hour.** Not as many of the guidelines provide a threshold for daily generated trips, and the range of values varies more than for generated peak-hour trips. A typical range of **1,000 to 5,000 trips per day** was seen in the reviewed TIA guidelines. For the trip generation methodology to calculate the number of generated trips for the development, most of the TIA guidelines recommend the use of the latest ITE Trip Generation Manual trip generation tables. Some municipalities or government entities have their own trip generation worksheet for the development team to fill out and require the submittal of this worksheet for their own review to determine whether a TIA will be required during the approvals process.

If a TIA is required, most guidelines outline some items that are expected to be included in the analysis/ report. There are some minor differences between different TIA guidelines, but the following list shows a typical TIA outline.

1. **Introduction**
    a. Study Purpose
    b. Study Objectives
2. **Study Area and Proposed Development**
    a. Overview of Study Area
    b. Description of the Proposed Development Including Site Plan, Land Uses, and Lot Sizes
    c. Description of Existing Land Uses
    d. Nearby Anticipated Development
3. **Existing Conditions**
    a. Current Thoroughfare System
    b. Existing Geometrics
    c. Existing Traffic Volumes
    d. Projected Traffic Volumes without the Development
4. **Trip Generation**
    a. Trip Generation

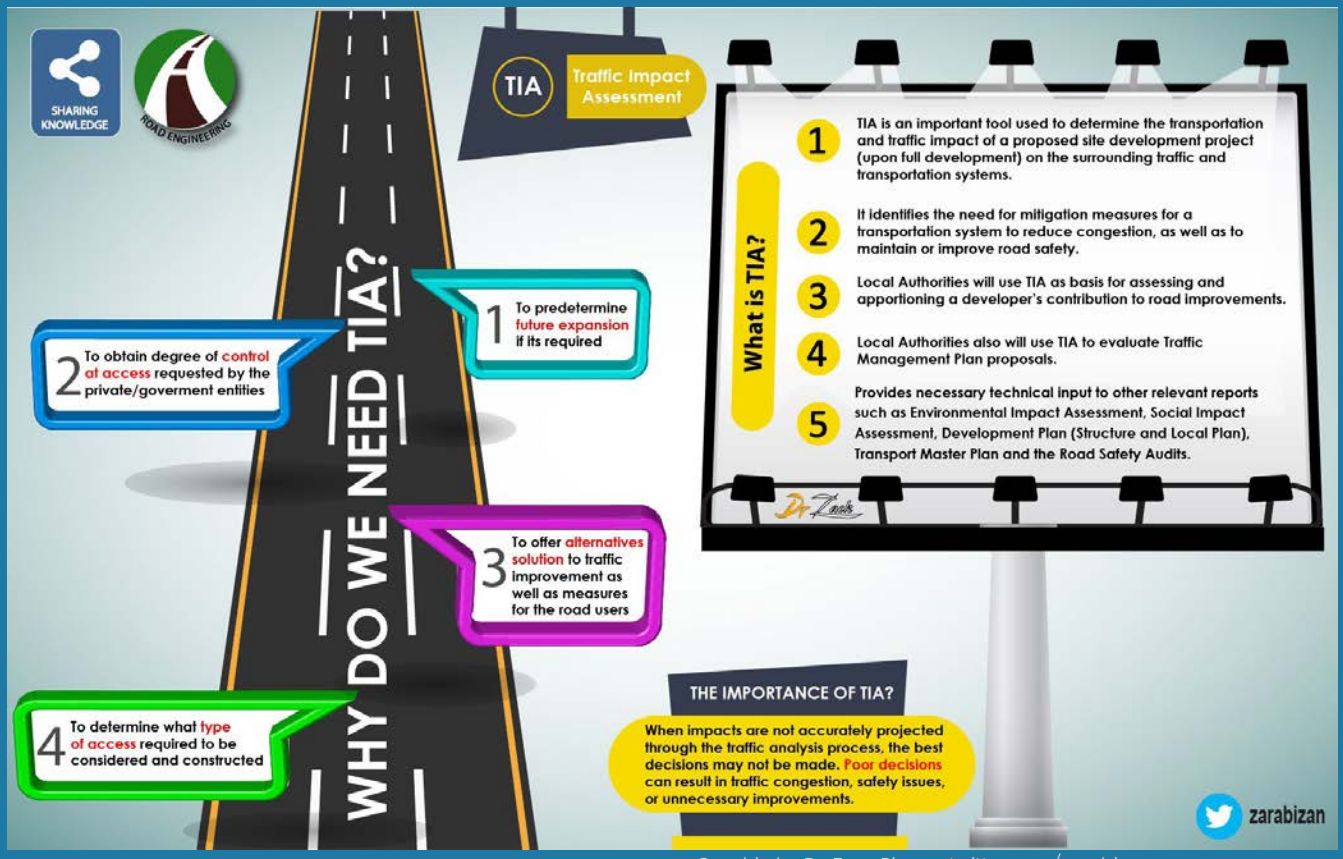
b. Trip Distribution and Assignment
c. Development Traffic Volumes

5. Traffic Analysis (LOS and Queuing)

a. Existing Operations
b. Projected Operations with the Existing System and without the Development
c. Existing System with the Development Traffic Operations, Signal Warrants
d. Improved System with the Development Traffic Operations

6. Conclusions and Recommendations

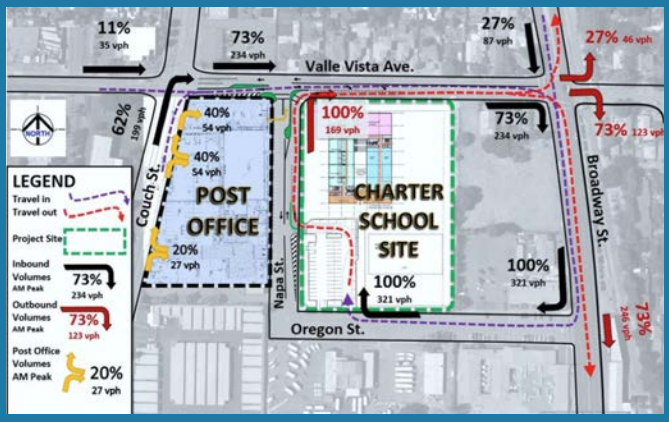
a. Summarize the Analysis and Results
b. Recommend Needed Improvements to Maintain the Desired LOS/Operations



Graphic by Dr. Zara Bizan - twitter.com/zarabizan

TIA Benefits:

Effectively written and enforced TIA guidelines allow a community to understand the transportation and traffic impacts of a proposed development as it moves through the approvals process. An effective TIA clearly identifies the existing conditions, the number of trips that a proposed site will generate and the modes of travel, and identifies the improvements needed to mitigate the transportation impacts. The TIA can also be used to allocate the cost of prudent improvements between the City, developer, and other managing agencies or interests.



PRISM Engineering Traffic Engineering

c. Calculate the Developer's Share of the Cost for the Needed Improvements (sometimes this is a standalone effort and not included in the TIA)

In Summary

The ability of cities within Texas to establish guidelines for the use of TIA as a condition of project approvals is well established. The project team recommends the City develop official TIA guidelines to ensure the traffic impacts associated with proposed development and redevelopment projects are identified, and the responsibilities of the interested parties regarding necessary improvements to accommodate the generated traffic are clearly defined. The TIA guidelines should include a requirement that Planned Development Districts (PDD) complete a TIA.

B. Examples of TIA Guidelines

This section provides a summary of TIA guidelines from the following sample of ten Texas communities.

1. Boerne, Texas (Population [Pop.]: 17,106)
2. Sugar Land, Texas (Pop: 88,485)
3. Seagoville, Texas (Pop: 16,878)
4. Fort Bend County, Texas (County Pop: 585,375)
5. Buda, Texas (Pop: 16,449)
6. Plano, Texas (Pop: 286,143)
7. Addison, Texas (Pop: 15,458)
8. College Station, Texas (Pop: 124,710)
9. Kerrville, Texas (Pop: 23,370)
10. Melissa, Texas (Pop: 9,212)

1. Boerne, Texas (Pop: 17,106)

a. TIA requirements:
   i. 75 or less trips per peak hour require a Peak Hour Trip (PHT) Generation Form. Only 101 to 250 trips per peak hour requires a Level 1 TIA.
   ii. **251 to 1,000 trips per peak** hour requires a Level 2 TIA.
   iii. **1,001 trips per peak hour** or more requires a Level 3 TIA.

b. TIA Level 2 and Level 3 Content
   i. Traffic Analysis Map (land uses, proposed site, etc.)
   ii. Trip Generation and Design Hour Volumes
   iii. Trip Distribution
   iv. Trip Assignment
   v. Existing and Projected Traffic Volumes
   vi. Capacity Analysis
   vii. Conclusions and Requirements
   viii. Administrative Requirements

2. Sugar Land, Texas (Pop: 88,485)

a. TIA required if:
   i. Site generates **approximately 100 trips per peak hour** or **approximately 1,000 trips per day** *The city has a trip generation worksheet pre-made to fill out and submit for review.
   ii. Site involves **100 acres or more of development**
   iii. Planned Development (PD) requests
   iv. Zoning or Rezoning requests
   v. Conditional Use (CUP) requests
   vi. Proposed Amendments to the City's Major Roadway Plan

b. TIA Content:
   i. Executive Summary (Key Findings, Recommendations)
   ii. Introduction (Proposed Development, Study Purpose and Methodology, Traffic Operations Analysis, Anticipated Hours of Operation)
   iii. Existing Conditions (Existing Network, Existing Land Use, Existing Volumes, Existing Conditions Analysis, Project Specific Conditions)
   iv. Trip Generation and Distribution (Proposed Development, Trip Generation, Adjusted Trips, Trip Distribution)
   v. Pre- and Post-Development Comparative

Analysis (Background Traffic Operations, No-Build Traffic Operations, and Total Traffic with Improvements Operations)

vi. Conclusions (Key Findings, Recommendations, Map Exhibit with Proposed Improvements)

3. Seagoville, Texas (Pop: 16,878)

a. TIA Required if:
   i. Site generates more than **500 trips per day**

b. TIA Content:
   i. General Site Description
   ii. Proposed Capital Improvements
   iii. Roadway Impact Analysis
   iv. Trip Generation
   v. Trip Distribution
   vi. Adequacy Determination (Maintain Level of Service [LOS] C or better operations)
   vii. Intersection Analysis (LOS analysis, adequacy determination)
   viii. Effect of Adequacy Determinations (developer agrees to pay for improvements needed, reduces density, etc.)

4. Fort Bend County, Texas (County Pop: 585,375)

a. TIA Required if:
   i. Site generates **5,000 trips per day** or **100 trips per peak hour**

b. TIA Content:
   i. Introduction (Proposed Development, Land Use & Access Points, Adjacent Roadway Network and Nearby Development, Study Area, Data Sources, Design Standards Used)
   ii. Analysis and Background Traffic (Describes analyses used to determine existing and future traffic conditions, outlines background and horizon years for each phase and final build-out)
   iii. Trip Generation (Trip Rates, Trip Reductions)
   iv. Trip Distribution/Assignment (Described distribution methodology and defines directional distribution percentages for trip assignment)
   v. Capacity Analysis (Capacity and LOS analysis for existing and forecasted conditions (with and without development)
   vi. Recommendations (Improvements needed to achieve LOS D or a LOS that matches existing no-development conditions)

5. Buda, Texas (Pop: 16,449)

a. TIA Required if:
   i. Site Generates **100 trips per peak hour** or **2,000 trips per day**

b. TIA Content:
   i. Existing Condition Survey
   ii. Traffic Volumes
   iii. Capacity Analysis
   iv. Future without development
   v. Future with development
   vi. Mitigation Plan

6. Plano, Texas (Pop: 286,143)

a. TIA Required if:
   i. Site generates **8,000 trips/day**

b. TIA Content (Rezoning):
   i. Study Area Maps
   ii. Existing Traffic Volumes
   iii. Proposed Trip Generation
   iv. Existing Zoning
   v. Net Increase Trip Generation and Distribution
   vi. Proposed Zoning
   vii. LOS Analysis
   viii. Thoroughfare Network
   ix. Conclusions

c. TIA Content (Site Plan):
   i. Study Area Maps
   ii. Trip Distribution and Assignment
   iii. Existing Zoning and Development

iv. LOS Analysis
v. Proposed Development Zoning
vi. Thoroughfare Network
vii. Mitigation
viii. Conclusions

7. Addison, Texas (Pop: 15,458)

a. TIA Required if:
   i. Site Generates **150 trips per peak hour** or **1,000 trips per day**
   ii. The following land uses are present: **school, restaurant with drive-through, movie theater**
   iii. The following roads are involved: Belt Line Road, Dallas Parkway service roads, Marsh Lane, Midway Road

b. TIA Content (Methodology Required):
   i. Site Location and Characteristics
   ii. Study Area Boundaries
   iii. Existing Zoning
   iv. Existing Development
   v. Proposed Zoning
   vi. Proposed Development
   vii. Existing Transportation System
   viii. City's Master Transportation Plan
   ix. Planned Transportation Improvements and Timing
   x. Existing Traffic Volumes
   xi. Projected Traffic Volumes
   xii. Existing Site Trip Generation
   xiii. Proposed Site Trip Generation
   xiv. Net Change In Trip Generation
   xv. Trip Distribution and Traffic Assignment
   xvi. Intersection/Turn Lane Analysis
   xvii. Driveway and Turn Lane Analysis
   xviii. Queuing Analysis, if Appropriate
   xix. Level Of Service Evaluation
   xx. Traffic Signal Evaluation
   xxi. Proposed Mitigation Measures
   xxii. Conclusions
   xxiii. Recommendations

c. TIA Content (Report Format):
   i. Introduction
   ii. Executive Summary
   iii. Existing and Proposed Land Use
   iv. Existing and Proposed Transportation System
   v. Site Traffic Characteristics
   vi. Traffic Analysis
   vii. Proposed Mitigation Measures
   viii. Conclusions
   ix. Recommendations
   x. Appendices

8. College Station (Pop: 124,710)

a. TIA Required if:
   i. Zoning request, Preliminary Plan, or Site Plan generates **150 trips per peak hour.**
   ii. Peaking characteristics could have a detrimental impact on the transportation system as determined by the Administrator.

b. TIA Content:
   i. Study Area
   ii. Existing Zoning description
   iii. Proposed Zoning
   iv. Roadway Network
   v. Impact Determination
      a. Proposed Trip Generation
      b. Existing Trip Generation
      c. Net increased Trip Distribution and Assignment
      d. Level of Service Analysis
      e. Neighborhood Traffic Analysis
      f. Conclusions
   vi. Mitigation
   vii. Cost of Mitigation

c. Criteria for Approval
   i. Design Requirement
   ii. Level of Service
   iii. Determination of Adequate Mitigation

9. Kerrville, Texas (Pop: 23,370)

a. TIA Required if:
   i. On-street parking is requested in a commercial area.
   ii. A traffic light is desired.
   iii. Access onto an arterial or collector
   iv. Proposed development would generate **1,000 or more net new vehicle trips per day.**
   v. Development would generate **150 or more trips** during the AM or PM peak hour.

b. TIA Content:
   i. Not yet determined. Subdivision Ordinance is currently under 2021 update.

10. Melissa, Texas (Pop: 9,212)

Analysis Category	Site Trips Generated at Full Build-Out	TIA Analysis Periods[1]	Design Considerations Appendices
I	**>50 peak hour driveway trips; or 100-500 total peak hour trips**	**Existing year Opening[2] Five years after opening**	**All site access drives All signalized interactions and/or major un-signalized interactions within 0.5 miles to 1 mile of site boundary**
II	**>500 total peak hourtrips**	1. Existing year 2. Opening year of each phase 3. Five years after initial opening 4. Ten years after final opening with full build-out	1. All site access drives 2. All signalized intersections and/or major un-signalized intersections within 1.5 miles of site boundary

1. Analysis periods shall include build and no-build scenarios. Assume full occupancy when each phase opens.
2. Assume full build-out.

a. TIA Required if:

b. TIA Requirements (Report Outline):
   i. Executive Summary
   ii. Introduction (Purpose, Methodology)
   iii. Existing and Proposed Land Use (Site Location and Study Area, Existing Zoning, Existing Development, Proposed Zoning)
   iv. Existing and Proposed Transportation System (Thoroughfare System, Existing Traffic Volumes, Projected Traffic Volumes)
   v. Site Traffic Characteristics (Trip Generation, Trip Distribution, Trip Assignment)
   vi. Traffic Analysis (LOS Evaluations, Traffic Signal Evaluations)
   vii. Mitigation
   viii. Conclusions
   ix. Recommendations
   x. Appendices

Section 4

Summary and Recommendations

4.01 Summary

This Brenham Thoroughfare Plan Report provides information, analysis, and recommendations that supplement Plan 2040, the Brenham Comprehensive Plan. This report uses Plan 2040's multimodal Guiding Principles and Transportation Goals as guidance to create or refine the Brenham Thoroughfare Plan Map, Typical Sections for New Development, Priority Transportation Projects, Truck Routes Map, Bicycle and Pedestrian Priority Routes Map, and Traffic Impact Analysis Guidelines discussion. The following is a summary of the recommendations from Sections 1, 2, and 3 of this report.

4.02 Recommendations

A. Motor Vehicle Network

1. The City should be proactive in working with TxDOT as the US 290/SH 36 Interchange (the cloverleaf) improvement concept is refined, and the impacts come into sharper focus. The City should advocate that the chosen concept will best utilize Plan 2040's Guiding Principle 2 by considering impacts to housing, transportation, infrastructure, economic development, emergency response, and arts and culture.
2. Seek to advance improvements and new street connections to the City Arterial and City Collector streets shown in the Thoroughfare Plan Map by adequately providing funding through the Capital Improvements Program (CIP). In particular, seek to advance the following priority projects:
    a. Intersection of Academy Street and SH 105
    b. Day Street/BUS 36 in commercial areas north and south of US 290
    c. Extend South Blue Bell Road south of SH 36
    d. Intersection of Martin Luther King Jr. Parkway and Park Street (by the Library)
3. Use this Report's Typical Sections as guidance for all new streets and street retrofit or reconstruction projects.
    a. Arterial Alternative A1: Four- or Five-Lane Road with Multi-Use Paths
    b. Arterial Alternative A2: Four- or Five-Lane Road with Buffered Bike Lanes
    c. Collector Alternative C1: Two- or Three-Lane Road with Path and Sidewalk
    d. Collector Alternative C2: Two-Lane Road with Bike Lanes
    e. Local Alternative L1: Two-Lane Urban Section with Path
    f. Local Alternative L2: Two-Lane Urban Section with Sidewalks
4. Local Truck Routes
    a. Coordinate with TxDOT and Washington County regarding the establishment of local truck routes to identify and communicate the preferred routes for trucks with business in the City to use between their destinations and the TxDOT Freight Network.
    b. Consider coordinating with TxDOT to investigate eliminating or relocating the

portion of the TxDOT Freight Network that uses the Main Street and Alamo Street one-way pair through downtown.

B. Pedestrian and Bicycle Network

1. Seek to advance improvements to bicycle and pedestrian infrastructure on the streets shown in the Bike/Pedestrian Routes Map. In particular, seek to advance the following priority projects:
    a. Consider improving pedestrian and bicycle accommodations along and/or across Park Street/BUS 36 at Brenham High School.
    b. Consider providing a multi-use path along the east side of Day Street from Hillcrest Lane traveling to the south, ideally through the US 290 interchange and beyond.
    c. Coordinate with TxDOT to improve bicycle and pedestrian crossings of US 290 and SH 36.
    d. Coordinate with TxDOT to establish bicycle lanes when possible as state street improvements are designed.
    e. Promote community volunteer opportunities to build and maintain walking paths.
    f. Seek funding opportunities for bike lanes and pedestrian trails through local, state, and federal grants programs.

C. TIA Guidelines

a. The City should develop official TIA guidelines to ensure the traffic impacts associated with proposed development and redevelopment projects are identified, and the responsibilities of the interested parties regarding necessary improvements to accommodate the generated traffic are clearly defined.
b. The TIA guidelines should include a requirement that PDD complete a TIA.

Appendix
Plan 2040 Reference

This reference is from page 114-116 in the City's Plan 2040 - The Future City Comprehensive Plan.

Implementation Action Agena

Transportation

Plan SAP List Number	Item Priority High – 1 Medium – 2 Low – 3	TRANSPORTATION Strategic Action Priorities	Years 1-2 Years	Years 3-9 Years	Years 10+ Years	Involved Entities
		Capital Investments				
1	1	Focused implementation of short to mid-term projects identified in the 2019 Thoroughfare Plan, and incorporated into a formalized Capital Improvements Program (CIP).				City Public Works Department
2	1	Conduct pro-active preventative maintenance on streets and sidewalks and schedule targeted reconstruction in locations with deteriorated street conditions.				City Public Works Department
3	2	Develop a sidewalk improvement program to repair, replace, or install new sidewalks, crosswalks, and curb cuts, in high pedestrian use areas adjacent to, and leading to and from schools, near and adjacent to public buildings and spaces (including parks) and other areas with the potential for high sidewalk usage.				City Public Works Department, City Development Services Department

Plan SAP List Number	Item Priority High – 1 Medium – 2 Low – 3	TRANSPORTATION Strategic Action Priorities	Years 1-2 Years	3-9 Years	10+ Years	Involved Entities
		Programs and Initiatives				
4	2	Encourage traffic demand management strategies to anticipate and mitigate traffic congestion.		✓	✓	City Public Works Department, local employers
5	3	Preserve traffic capacity by implementing access management and other Transportation Systems Management (TSM) provisions in the city.			✓	City Public Works Department
6	3	Emphasize resiliency in future transportation network planning, including both redundancy in systems as well as protection from potential hazards and threats.			✓	City Public Works Department
7	2	Implement temporary, low-cost, tactical transportation improvements to demonstrate the need and/or effectiveness of transportation projects.		✓		City Public Works Department, City Development Services Department
8	3	Integrate the "Complete Streets" concept into local transportation planning and projects.		✓		City Public Works Department
9	3	Continue to plan for future transportation technology advancements such as more widespread use of electric vehicles, automated vehicles, and ride sharing.			✓	City Public Works Department
		Regulations and Standards				
10	1	Update design and construction standards to reflect changes in street classification system included in 2019 Thoroughfare Plan.	✓			City Public Works Department
		Partnerships and Coordination				
11	1	Continue active partnership and dialogue with Texas Department of Transportation (TxDOT) to ensure that TxDOT projects and roadways reflect the City's desires and needs.	✓	✓	✓	City Public Works Department, TxDOT

Legend Programs & Initiatives; Regulations & Standards; Partnerships & Coordination; Targeted Planning/Studies; Capital Investments

Plan SAP List Number	Item Priority High – 1 Medium – 2 Low – 3	TRANSPORTATION Strategic Action Priorities	Years			Involved Entities
			1-2 Years	3-9 Years	10+ Years	
12	1	Establish uniform street construction standards in partnership with Washington County and potential cooperation for cost-share in construction projects that are mutually beneficial, particularly in the City's ETJ.				City Public Works Department, Washington County
13	1	Work with BNSF Railroad to identify railroad crossings that need safety improvements, including those associated with industrial facilities for worker and visitor safety.				City Public Works Department, Union Pacific Railroad
14	3	Consider establishing and hosting a formal quarterly meeting of key transportation related officials in Brenham to facilitate better coordination of transportation planning goals and projects.				City Public Works Department, BISD, BVCOG, BTD, TxDOT
15	2	Explore public transportation needs and potential means to address them in coordination with Brazos Transit District and BVCOG.				City Development Services Department, BTD, BVCOG
16	1	Actively participate during regional transportation planning and funding processes to secure transportation funding and advance projects of regional significance.				City Public Works Department, TxDOT, BVCOG
		Targeted Planning/Studies				
17	3	Keep pedestrian and bicycle components of Thoroughfare Plan up to date.				City Development Services Department, City Public Works Department
18	1	Keep newly created Thoroughfare Plan up to date, following a similar update schedule to that of the Comprehensive Plan.				City Development Services Department, City Public Works Department

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City of BRENHAM

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February 2022 - FINAL