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BACKGROUND

The Waller County Transportation Plan (WCTP) is a comprehensive transportation study conducted to determine existing and future transportation needs in Waller County. Land use and transportation coordination will become increasingly critical as the County continues to grow and develop. Coordinating planning efforts allows local decision-makers to define common goals, balance competing interests, and coordinate efforts to maximize cost-effectiveness and efficiency. The Plan consists of a Mobility Plan and a Thoroughfare Plan. The Mobility Plan examined existing and future mobility needs that were identified through public outreach and data collection and created a list of short- and long-term recommendations based on the identified issues. The Thoroughfare Plan is a long-range plan (50+ years) that creates a system of major roadways intended to facilitate travel and preserves the needed roadway right-of-way (ROW) so that the county has the ability to develop appropriate transportation facilities as development occurs or as traffic increases. It should be noted that the proposed SH36A was not included in this study. TxDOT is performing a separate study on the proposed location of that corridor.

H-GAC and Waller County led the development of the WCTP. Funding for the study included a combination of funds from TxDOT and Waller County, in conjunction with Brookshire, City of Waller, Hempstead, Katy, Pattison, and Prairie View.

VISION AND GOALS

The WCTP is a county-wide transportation plan that accommodates current and future mobility needs of all people and goods traveling within and through the area. The Steering Committee established a vision for the region and accompanying goals to steer plan development.

“The vision of the WCTP is to enhance safety and mobility for all users while preserving the county’s heritage and protecting environmentally sensitive areas.”

Table ES-1 : Study Goals, Objectives, and Performance Measures

Goals	Objectives	Performance Measures
ENHANCE MOBILITY Develop innovative approaches to manage and improve transportation facilities, minimize delays, and selectively increase roadway capacity on the transportation network.	▪ Improve safety ▪ Improve connectivity ▪ Improve access ▪ Preserve right-of-way ▪ Mitigate barriers	▪ Reduction in the number of fatal and serious crashes ▪ Number of roadway lane miles built to increase connectivity ▪ Number of transit lines or stations expanded into Waller County ▪ Number of changes or amendments to the thoroughfare plan ▪ Bridge condition
ECONOMIC DEVELOPMENT Support continued economic development by managing congestion and improving travel reliability and safety.	▪ Mitigate congestion ▪ Improve reliability ▪ Revise development policies	▪ Travel time reliability (Planning Time Index, Average Weekday Motorist Delay at Highway Rail Grade Crossings) ▪ Level of service ▪ On-time performance of existing transit service
QUALITY OF LIFE Reflect the County's priorities on protecting quality of life and the natural environment through appropriate use of design concepts and mitigation techniques.	▪ Preserve county heritage ▪ Balance between transportation network and natural environment ▪ Incorporate all modes of transportation	▪ Acreage of farm land or natural areas preserved ▪ Number of additional miles of bike facilities and sidewalk facilities
PROJECT CONSENSUS Strengthen partnerships between local governments by identifying projects with significant consensus in Waller County.	▪ Community support ▪ Fiscal soundness ▪ Strengthen partnerships	▪ Number of public meetings held on transportation-related projects ▪ Number of projects funded in the transportation plan ▪ Number of interagency coordination meetings on transportation projects

PUBLIC INVOLVEMENT

H-GAC and the consultant team collaborated with local communities on a public involvement process to engage residents, businesses, institutions, and elected officials in decision-making. Over the yearlong study, seven steering committee meetings, nine stakeholder meetings, and six public meetings were held.



Figure ES-2 Public Meeting, Round 1 - Brookshire

ANALYSIS RESULTS

Understanding existing and future land use and traffic operations is essential to identifying intersection and/or roadway operational deficiencies that must be addressed as part of this plan. Key findings from the analysis include the following:

- There is a significant increase in traffic on football game days compared to non-game days on State Highway (SH) 6 and Farm to Market (FM) 1488 (20% increase), US 290 (60% increase), and roads adjacent to Prairie View A&M University (200% increase).
- The percentage of heavy trucks on US 90 (16-18%) is about the same as IH 10 (14-18%).
- The non-freeway roads with the highest percentage of heavy truck traffic is FM 1489 (13-24%), US 90 (16-18%), SH 6 (14-15%), FM 529 (7-16%), and FM 362 (6-15%).
- Brookshire, Pattison, and Hempstead have several roads in poor condition that need repair.
- Most crashes occur on FM roads with 36% of total crashes and crash hotspots are along IH-10, US 90, and US 290.
- The only transit service in the county is on-demand service provided by Colorado Valley Transit.
- Waller County had a 159% increase in population and 154% increase in jobs between 1980-2017.
- 66% percent of the land is classified as vacant developable.
- The population is forecasted to increase by 169% to approximately 134,000 by 2045. Employment is expected to increase by 86% during that same time period.
- Vehicle miles traveled is expected to increase 5% annually by 2040. The average annual growth in traffic volume along major roadways ranges from 2.5% (FM 359) to 42% (FM 362). See Figure ES-3.

Figure ES-3: Issues Identified by the Steering Committee, Stakeholder Groups and Public

Major Issues	Steering Committee	Stakeholders	Public
Traffic Congestion	●	●	●
Transit Needs	●	●	●
Increased Truck Traffic	●	●	●
Cyclist/Vehicle Conflicts	●	●	●
Dangerous Road Curves	●	●	●
Road Flooding		●	●
Roads without Shoulders	●	●	●
Road Conditions			●
North/South Connectivity	●	●	●
East/West Connectivity	●	●	●
Coordinate Ordinances/Policies		●	●
Widen IH 10	●	●	●
Widen US 290	●	●	●

ADDITIONAL ISSUES

MAJOR BARRIERS

The Brazos River, Katy Prairie Conservancy, and numerous creeks and streams are natural barriers, along with their floodways and floodplains, that present a significant challenge to roadway connectivity and directly obstruct north-south and west-east travel. (Figure E-?). Building roads through floodplains and floodways is difficult and expensive. Proactive planning is of critical importance.

Identifying gaps where roads end or do not exist is critical in mitigating congestion and improving connectivity and safety. Improving connectivity by eliminating the dead-end roads redistributes traffic, improves safety, and mitigates congestion on existing neighboring roads. Because Waller County is mostly rural, there are large gaps in the transportation network. Currently there are no corridors that completely traverse the county from north to south. IH 10 and US 290 are the only routes that traverse the county from east to west. Additional regional routes are needed to provide alternative routes, disperse traffic, and improve connectivity. Failing to address this issue will result in lost opportunities and will have a direct effect on future mobility, congestion, and safety.

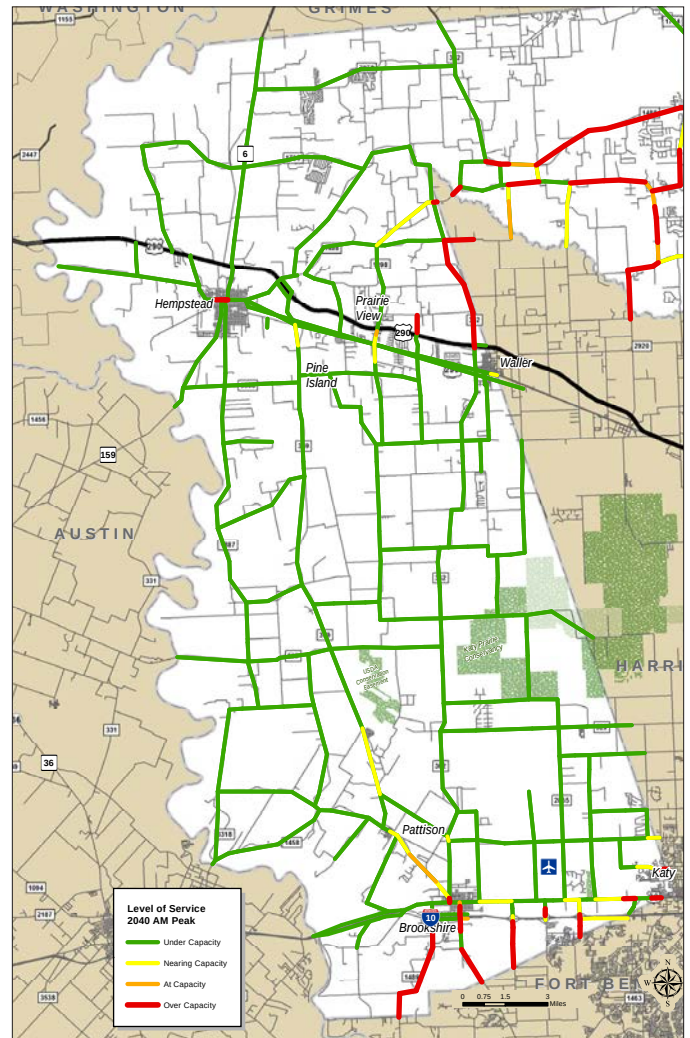


Figure E-4: 2040 Projected AM level of service



Figure ES-5: Owens Road - one of many dead-end roads in Waller County.

MOBILITY PLAN

The 2019 WCTP offers short- and long-term transportation strategies through a combination of physical, operational, and regulatory measures. These recommendations are intended to help local governments and policy makers guide transportation investments to improve mobility and increase access to jobs, homes, and services in the area.

Based on the needs identified, the 2019 WCTP developed short- and long-term recommendations to address mobility issues. The list below summarizes the improvements by type.

- 8 grade separations at railroad facilities
- 42 intersection improvements (geometric design and signal installations)
- 5 Brazos River bridges
- 234 miles roadway modifications including widening/straightening
- 22 miles access management treatment (raised medians)
- 42 miles new roads

SHORT-TERM RECOMMENDATIONS

ROADWAY

Short-term roadway recommendations are improvements intended to be implemented relatively quickly, within a 0-5-year timeframe, and require no or minimal right-of-way. See Figure E-6 and Figure E-7 for short-term improvements in the northern and southern area of the County.

The proposed short-term projects include:

- 20 intersection improvements (geometric design).
- 8 traffic signal installations.
- 56 miles roadway modifications including widening/straightening.
- 22 miles access management treatment (raised medians).
- 6 miles of new roads.

ACTIVE TRANSPORTATION

- A more detailed Waller County Hike and Bike Study to determine the exact location and design standards for a bicycle network in Waller County.
- Paved shoulders, sidewalks, or bike lanes are recommended as part of all short-term and long-term roadway projects, where possible.

Figure ES-6: Short-Term Roadway Recommendations – Northern County

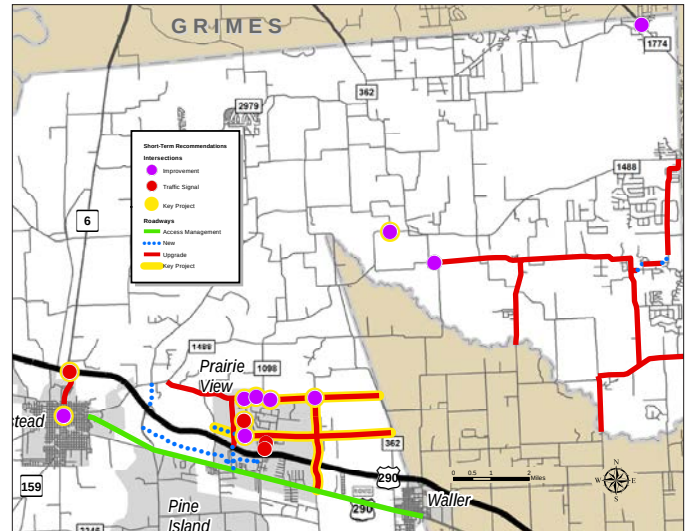
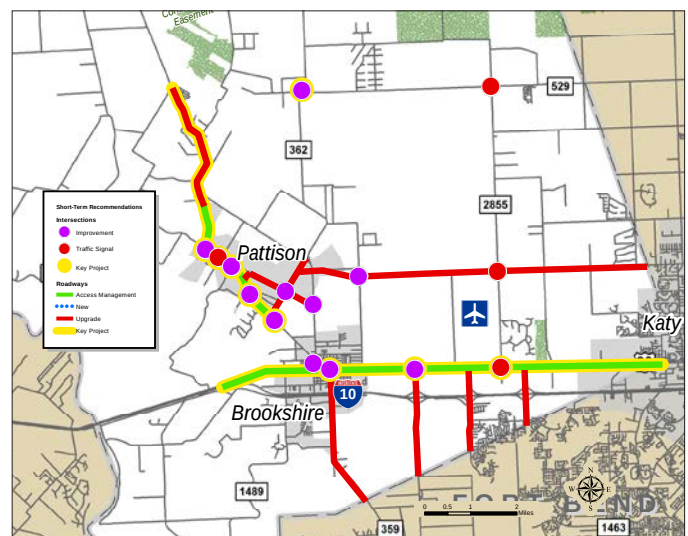


Figure ES-7: Short-Term Roadway Recommendations – Southern County



TRANSIT

- A short-term transit study is recommended to address significant transit issues including local and commuter transportation challenges. Existing recommendations based on the current study are:
 1. Initiate year-round weekday circulator service for Hempstead, Prairie View, Waller, and Brookshire.
 2. Develop intra-county service linking Hempstead, Prairie View, Waller, and Brookshire.
 3. Secure a location in western Katy and initiate Park and Ride service into Houston in 2022 or 2023.

LONG-TERM RECOMMENDATIONS

ROADWAY

Long-term roadway recommendations are improvements intended to be implemented within a 6-20-year time-frame and require additional right-of-way; see Figure E-8. The proposed long-term projects include:

- 5 bridge crossings across the Brazos River (including directional frontage roads for I-10 and US290).
- 8 grade separation at railroad facilities along Business 290 and US 90.
- 15 intersection modifications (geometric design improvements).
- 178 miles of roadway upgrades (widen/straighten).
- 36 miles of new roads.

ACTIVE TRANSPORTATION

Long-term pedestrian/bicycle recommendations include on-road and off-road facilities and are shown in Figure E-9. Specific recommendations include six separated shared use paths.

TRANSIT

Transit recommendations include the following and are outlined in Figure E-10:

- Commuter rail service connecting Hempstead, Prairie View and Waller with Houston Downtown.
- Park and ride commuter bus service from Brookshire and expansion of Western Katy service to Houston.
- Intra-County feeder transit service between Hempstead, Prairie View, Waller, and Cypress.

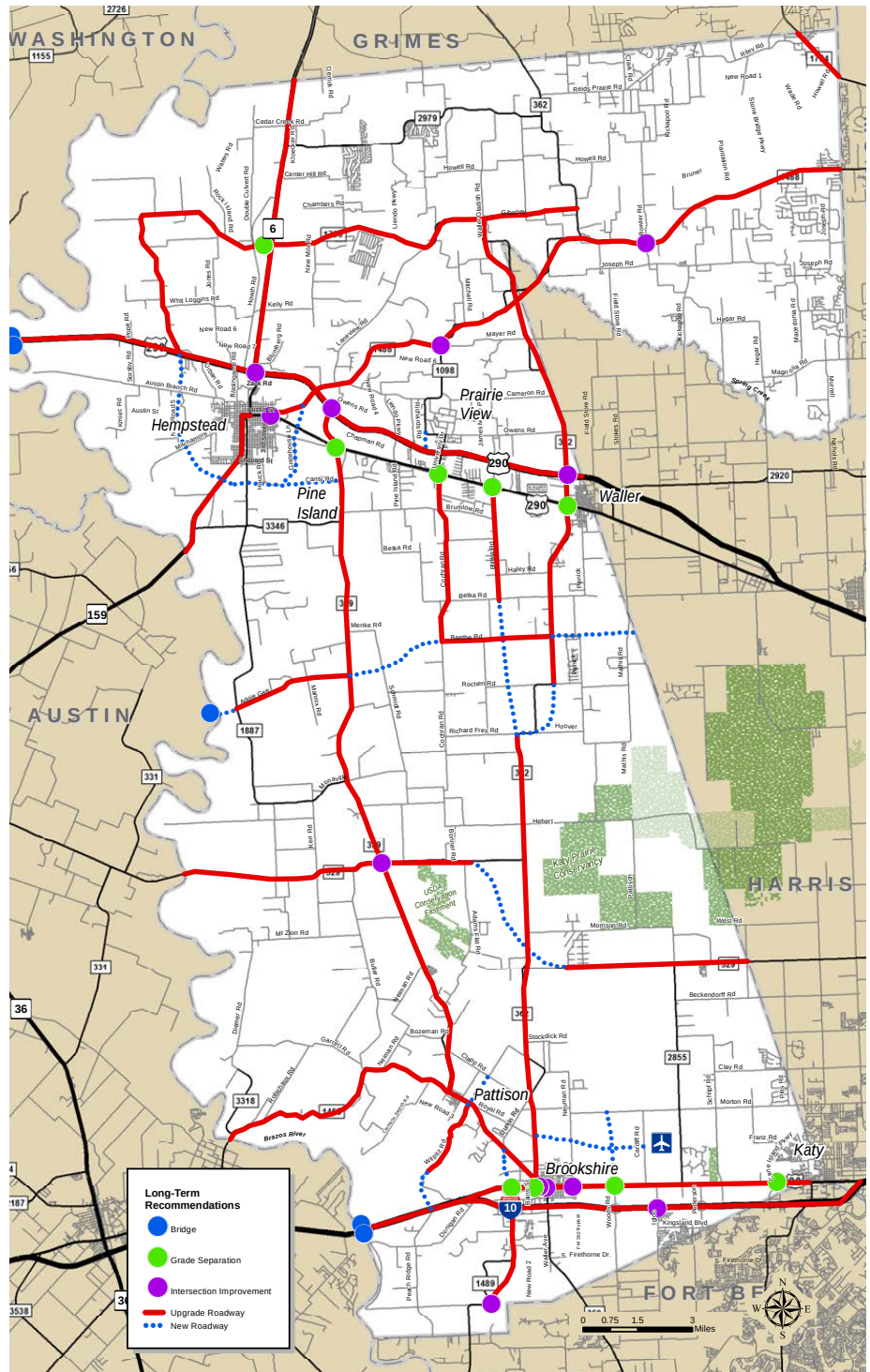


Figure ES-8: Long-Term Roadway Recommendations

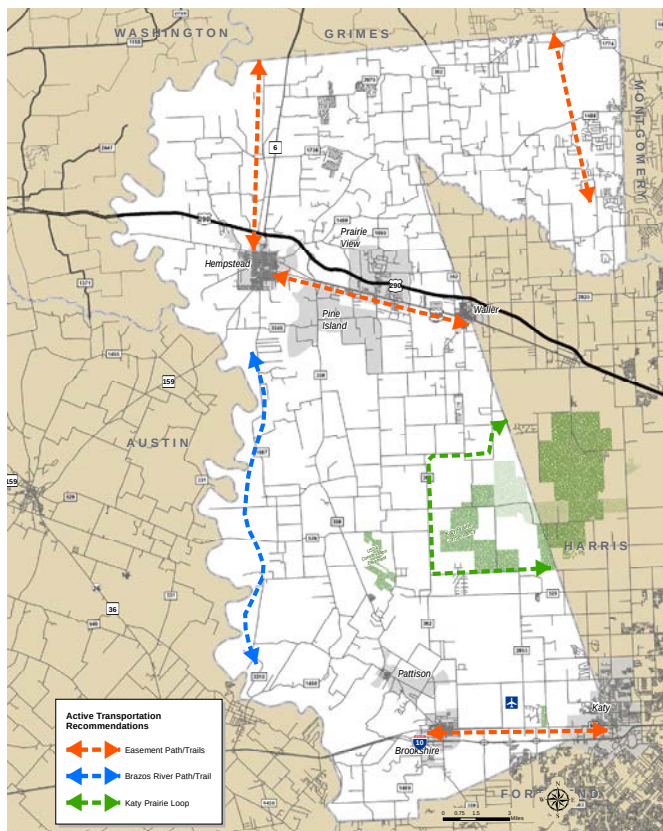


Figure ES-9: Long Term Active Transportation Recommendations

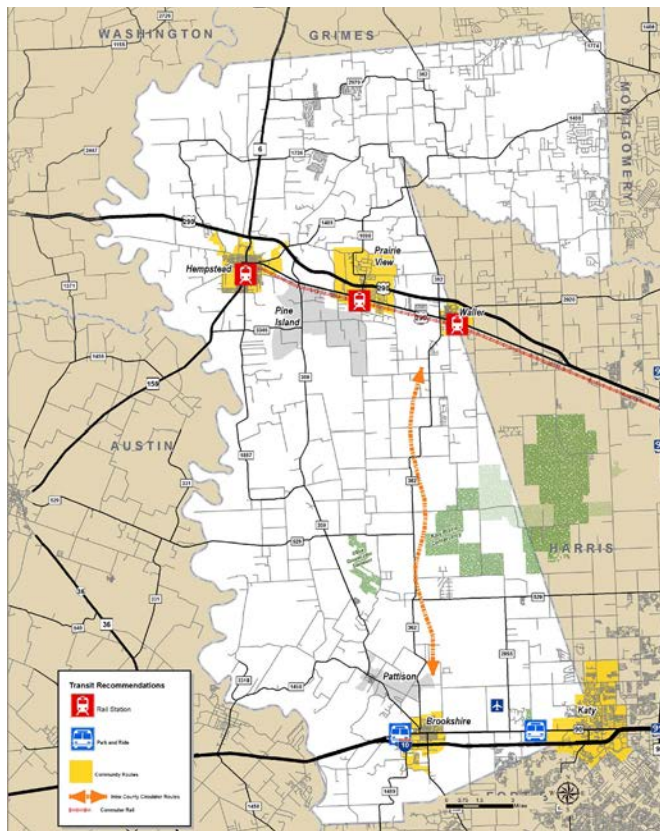


Figure ES-10: Transit Recommendations

COSTS AND BENEFITS

Draft planning level cost estimates were developed for the roadway improvements. In addition to short- and long-term projects, the WCTP identified pavement repair improvements for roadways in fair to poor condition. The estimated total cost to implement the WCTP has been divided into short-term and long-term projects, as shown in Figure ES-11

The benefits include:

- Improved travel time by developing a network of E/W and N/S roads that improve connectivity.
- Distributing traffic across various roadways by providing alternative travel routes.
- Congestion mitigation by increasing connectivity and reducing mobility barriers by constructing roadway and intersection improvements
- Implementing transit services.
- Improved safety by implementing access management strategies.
- Improved safety for bikes and pedestrians by adding shoulders to new and widened roadways and creating off-road active transportation paths.
- Communities working together for better mobility in Waller County.

Figure ES-11: Cost Estimates for Roadway Projects

Recommendation Type	Length (Miles)	Estimated Cost (Millions)
Road Repair	46.31	\$39.2
Poor Roads	8.59	\$6.6
Fair Roads	37.72	\$32.6
Short-Term	83.40	\$276.0
Short-Term Key	25.90	\$68.2
Short-Term Other	57.51	\$207.8
Long-Term	216.35	\$1,244.0
TOTAL	377.02	\$1,559.2

THOROUGHFARE PLAN

The WCTP also includes an update to the 2012 Waller County Thoroughfare Plan. The 2019 Waller County Thoroughfare Plan provides the County with an updated planning tool that can be used to manage, guide, and design a transportation network that improves connectivity, mitigates congestion, and accommodates new development and growth. The strategies for the 2019 Thoroughfare Plan are to:

- Improve N/S and E/W connectivity
- Promote orderly development
- Standardize road design standards
- Update subdivision regulations

PURPOSE

The Thoroughfare Plan designs a system of major roadways intended to provide adequate access and travel mobility. It includes freeways, major and secondary arterials (high-capacity urban roads), and major collectors. Figure E-12 outlines what a Thoroughfare Plan is and is not.

PROCESS

The Thoroughfare Plan was developed using the existing conditions analysis completed in the mobility plan, documenting new corridors and missing roadway links, and soliciting input from the Steering Committee, stakeholders, and the public. This resulted in the 2019 Waller County Thoroughfare Plan is shown in Figure E-13.

SUMMARY

- 9 thoroughfares removed from Katy Prairie Conservancy
- 5 thoroughfares recommended to be removed from City of Houston Thoroughfare Plan
- 3 Brazos River crossings added
- 1 new E/W thoroughfare added to traverse the County
- 1 new limited access facility along FM 362
- Improved N/S and E/W connectivity

IMPLEMENTATION

There are still steps that need to be completed by the County for the Thoroughfare Plan to be successfully implemented.

This includes:

- Updating existing subdivision regulations;
- Instituting policies and procedures to coordinate and optimize transportation investments in the county;
- Collaborating with the development community to ensure that roadway investments satisfy existing and future growth needs;
- Coordinating with Hempstead, Prairie View, Waller, Pattison, Brookshire, Katy, Houston, Fort Bend County and Montgomery County to ensure their Thoroughfare Plan complements the WCTP;
- Developing a process to amend the thoroughfare plan; and
- Updating the thoroughfare plan every 5 years.

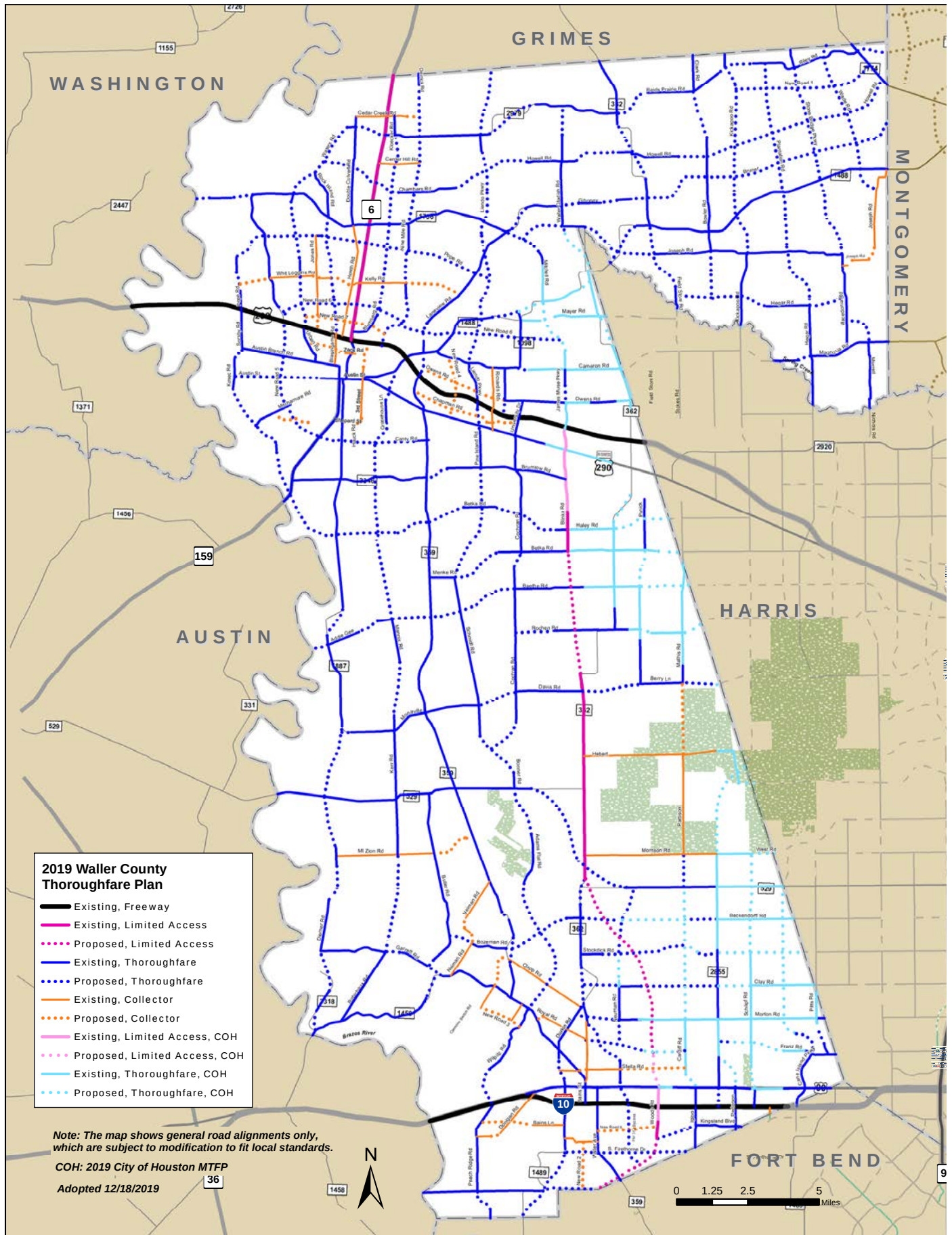


Figure ES-13: 2019 Waller County Thoroughfare Plan



The Waller County Transportation Plan (WCTP) is the result of the Houston-Galveston Area Council's (H-GAC) Sub-Regional Planning Initiative (SPI) program. H-GAC's SPI process assists members of the H-GAC Metropolitan Planning Organization (MPO) in achieving local and regional goals by facilitating project identification and implementation strategies driven by the needs of cities and counties. As the federally designated MPO for the eight-county Houston-Galveston region, H-GAC is responsible for working with its member jurisdictions to identify projects to include in the federally required long-range plan, the RTP.

This SPI provided local communities and regional partners the opportunity to work together to create a Transportation-Land Use Vision for Waller County. To coordinate transportation planning efforts, Waller County elected officials asked H-GAC to establish a partnership with Waller County, Hempstead, Prairie View, City of Waller, Pattison, Brookshire, Katy, and the Texas Department of Transportation (TxDOT) to collectively examine current and future mobility needs and develop the WCTP (the Plan). The planning process identified consensus-driven transportation priorities for possible inclusion in the H-GAC Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP).

The WCTP is a comprehensive transportation study conducted to determine existing and future transportation needs in Waller County. Land use and transportation coordination will become increasingly critical as the County continues to grow and develop. Coordinating planning efforts allows local decision-makers to define common goals, balance competing interests, and coordinate efforts to maximize cost-effectiveness and efficiency.

PURPOSE

The Waller County Transportation Plan includes a Mobility Plan and a Thoroughfare Plan. The Mobility Plan examined existing and future mobility needs that were identified through public outreach and data collection and created a list of short- and long-term recommendations based on the identified issues. The Thoroughfare Plan is a long-range plan (50+ years) that identifies the general location and type of transportation corridor needed to meet projected long-term growth in the County. A thoroughfare plan is not a list of construction projects but is a tool that allows the County to preserve right-of-way (ROW) for the development of a transportation system as the need arises.

PLAN LEADERSHIP AND GUIDANCE

H-GAC and Waller County led the development of the WCTP. Funding for the study included a combination of funds from TxDOT (80%) and Waller County, in conjunction with Brookshire, City of Waller, Hempstead, Katy, Pattison, and Prairie View (20%).

A Steering Committee was created to guide plan development and provide input throughout the planning process. Members of the WCTP's partner agencies served on the Steering Committee facilitated by the consultant team and H-GAC staff. The members included non-elected representatives from:

- Waller County*
- City of Brookshire*
- City of Hempstead*
- City of Katy*
- City of Pattison*
- City of Pine Island
- City of Prairie View*
- City of Waller*
- City of Houston
- Colorado Valley Transit
- Harris County
- Katy Prairie Conservancy
- Prairie View A&M University
- Texas Department of Transportation*
- Waller County Economic Development Corporation
- Waller County Transportation Authority

*Project funding partner

The Steering Committee met regularly during the plan's development, formulated the vision and guiding principles, and provided input at key decision points in the study.

The stakeholders consisted of multiple agencies including local governments, municipalities, school districts, and emergency personnel provided input to the Plan as project partners. These groups provided input for their local jurisdiction/agency through focus groups, outreach activities, and direct meetings. The stakeholder members included:

- Waller County
- Cities, communities and towns: Brookshire, City of Waller Hempstead, Katy, Pattison, Prairie View, and Pine Island.

- County Commissioners for Precinct 1, 2, 3 and 4
- Hempstead, Katy, Royal, and Waller Independent School Districts and Prairie View A&M University
- Emergency Services from Brookshire, City of Waller, Hempstead, Katy, Pattison, and Waller County
- Hempstead Chamber of Commerce, Katy Area Chamber of Commerce, Waller Area Chamber of Commerce, West IH-10 Chamber of Commerce, and Waller-Harris Emergency Services District
- Houston Executive Airport
- United Way

VISION AND GUIDING PRINCIPLES

The WCTP is a county-wide transportation plan that accommodates current and future mobility needs of all people and goods traveling within and through the area. The Steering Committee established a vision for the region and accompanying goals to steer plan development.

The vision of the WCTP is to enhance safety and mobility for all users while preserving the county's heritage and protecting environmentally sensitive areas.

The vision is supported by the following goals:

- Develop innovative approaches to manage and improve transportation facilities, minimize delays, and selectively increase roadway capacity on the transportation network,
- Support continued economic development by managing congestion and improving travel reliability and safety,
- Reflect the County's priorities on protecting quality of life and the natural environment through appropriate use of design concepts and mitigation techniques, and
- Strengthen partnerships between local governments by identifying projects with significant consensus in Waller County.

Performance measures are used to track performance of the Plan and allow entities to directly determine the effectiveness of the recommendations. These metrics are

targets the entities will strive to meet or exceed, and represent how each of the entities are succeeding individually, as well as Waller County as a whole (Table 1-1).

Table 1-1: Study Goals, Objectives, and Performance Measures

Goals	Objectives	Performance Measures
ENHANCE MOBILITY Develop innovative approaches to manage and improve transportation facilities, minimize delays, and selectively increase roadway capacity on the transportation network.	▪ Improve safety ▪ Improve connectivity ▪ Improve access ▪ Preserve right-of-way ▪ Mitigate barriers	▪ Reduction in the number of fatal and serious crashes ▪ Number of roadway lane miles built to increase connectivity ▪ Number of transit lines or stations expanded into Waller County ▪ Number of changes or amendments to the thoroughfare plan ▪ Bridge condition
ECONOMIC DEVELOPMENT Support continued economic development by managing congestion and improving travel reliability and safety.	▪ Mitigate congestion ▪ Improve reliability ▪ Revise development policies	▪ Travel time reliability (Planning Time Index, Average Weekday Motorist Delay at Highway Rail Grade Crossings) ▪ Level of service ▪ On-time performance of existing transit service
QUALITY OF LIFE Reflect the County's priorities on protecting quality of life and the natural environment through appropriate use of design concepts and mitigation techniques.	▪ Preserve county heritage ▪ Balance between transportation network and natural environment ▪ Incorporate all modes of transportation	▪ Acreage of farm land or natural areas preserved ▪ Number of additional miles of bike facilities and sidewalk facilities
PROJECT CONSENSUS Strengthen partnerships between local governments by identifying projects with significant consensus in Waller County.	▪ Community support ▪ Fiscal soundness ▪ Strengthen partnerships	▪ Number of public meetings held on transportation-related projects ▪ Number of projects funded in the transportation plan ▪ Number of interagency coordination meetings on transportation projects

ENVIRONMENTAL JUSTICE

Federal law requires an assessment of the social, economic, and environmental impacts that planning policies and activities may have on vulnerable communities. These obligations are expressed in Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d et seq.) and in the Presidential Executive Orders 12898: "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" and 13166: "Improving Access to Services for Persons with Limited English Proficiency." The goal of non-discrimination laws is to ensure equitable treatment and meaningful involvement for all people, including the traditionally underserved population.

The classes of persons protected by environmental justice are the minority population, the low-income population, and residents who have Limited English Proficiency (LEP). Although Waller County is one of the least populated counties in the H-GAC Transportation Management Area, the county has the third highest percentage of minority residents (31.0%) and the highest percentage of residents who live in poverty (18.2%). Furthermore, Waller County is behind only Harris and Fort Bend Counties in the percentage of the population that is unable to communicate proficiently in English (10.5%). These demographic characteristics made equity considerations pertinent to the process of developing a county-wide transportation plan.



Steering Committee Meeting

Neighborhoods sensitive for environmental justice were identified by mapping demographic information from the U.S. Census Bureau 2011-2015 American Community Survey 5-year Estimates. The results show a concentration of low-income and/or minority communities around the cities of Prairie View, Pine Island, and Hempstead to the north, and around Brookshire to the south (Figure 1-1). Residents with limited proficiency in the English Language are concentrated south of I-10, around Pine Island, and within County Commissioner Precinct 2 to the northeast. The language predominantly spoken by the LEP population is Spanish.

Public involvement was paramount in gaining meaningful participation and input from the County's environmental justice communities to ensure their needs were met in the Plan. To bolster the public involvement efforts aimed toward environment justice communities, H-GAC developed partnerships with a multitude of community groups.

PUBLIC INVOLVEMENT

H-GAC and the consultant team collaborated with local communities on a public involvement process to engage residents, businesses, institutions, and elected officials in decision-making. These efforts reflect H-GAC's Public Participation Plan.

A Public Involvement Plan (PIP) detailing the activities and outreach methods used in the plan development process was developed. Letters to elected officials, legal advertisements, email campaigns, flyers and posters, mailings to area businesses and churches, social media postings, electronic sign messages, and press releases were all used to increase participation. The PIP can be read in full in Appendix A.



Stakeholder Meeting

STEERING COMMITTEE

The Steering Committee was created to provide guidance and technical expertise and to gather input from local agencies. Committee members met seven times during the study, developed the vision statement and goals, identified stakeholders, received, reviewed, and provided input on plan drafts, and assisted with notifying local communities about public meetings.

STAKEHOLDER MEETINGS

Community members provided input about the County's current transportation needs and anticipated future growth as an essential aspect of the Plan's public involvement process. Three rounds of stakeholder meetings were conducted. The first round was held in July 2017. Participants provided feedback about existing conditions, major transportation concerns, and proposed/anticipated new developments. The second and third round of meetings were held to receive feedback on proposed recommendations and took place prior to public meetings in March 2018 and July 2018.

PUBLIC MEETINGS

Several outreach efforts and best practices were directed towards the County's environmental justice population to ensure their needs were known and addressed in this Plan. Strategies included scheduling public meetings at accessible venues within their communities, expanding publicity pathways to include media releases in the local newspapers, public service announcements on the local radio station (KPVU), placing custom invitation posters and flyers on local transit vehicles, and notices on highway changeable message signs. The print and broadcast messaging were in both

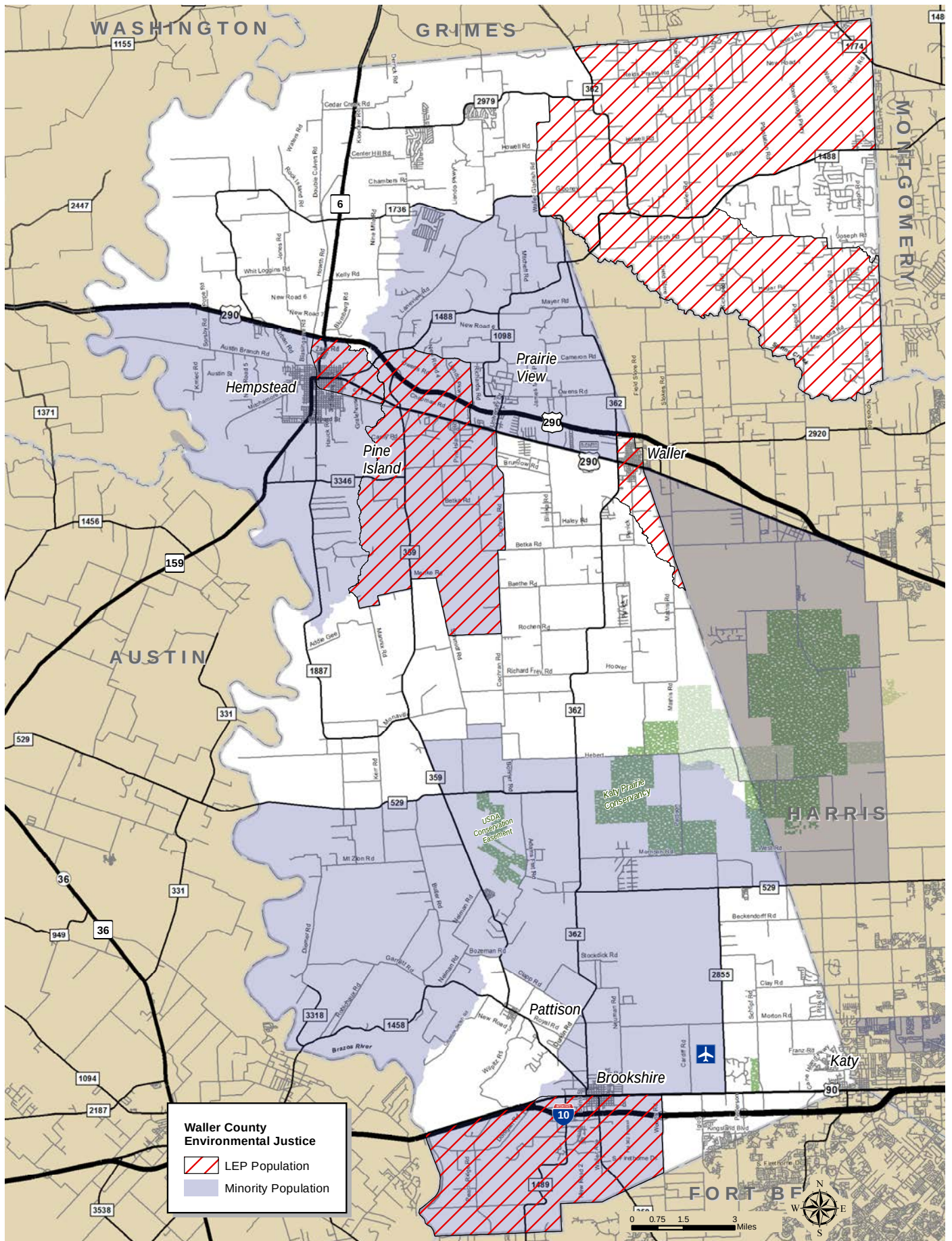


Figure 1-1

English and Spanish to ensure that language was not a barrier to accessing information. Additionally, bi-lingual staff were available to provide translation services at the public meetings.

Community partnerships were an important gateway to engaging the environmental justice communities. H-GAC partnered with local elected officials, police officers, leaders of faith-based organizations, the public library, community advocates, educational institutions, the chambers of commerce, and homeowner's associations. Outreach was also made in neighborhood grocery stores, post offices, and barber shops.

Three rounds of public meetings were held consisting of two meetings on separate evenings at two different venues: one located in the northern part of the county and the other in the southern part.

Public meeting participants were asked to identify the transportation related problems and concerns they felt strongly about, and to indicate their preferred solutions. Written comments were taken at the live events and interested persons could submit comments online or by phone.

Meeting summaries, including comments for all meetings, are included in Appendix A.

Public Meeting 1

The first round of public meetings occurred on October 10th and 12th of 2017. Attendees were given an overview of the study and the preliminary findings from the existing condition analysis.

The top five most serious transportation problems issues identified in comment forms were:

1. Roadway flooding
2. Roadway pavement conditions
3. Traffic congestion
4. Truck conflicts
5. Bike and auto conflicts.



Public Meeting, Round 1 - Brookshire



Public Meeting, Round 2 - Pattison



Public Meeting, Round 3 - Prairie View

The top five desired transportation improvements were:

1. Roadway drainage
2. Intersections
3. Roadway pavement condition
4. Park and ride service
5. Commuter rail service

Public Meeting 2

The second round of public meetings occurred on April 24th and 26th of 2018. The purpose of these meetings was to receive comments on the Draft 2019 Thoroughfare Plan and the proposed short-and long-term recommendations.

Major comments received at this round of meetings included: improving streets around Royal ISD schools to improve safety; concerns regarding the environmental impacts of the proposed recommendations on the Katy Prairie Conservancy (KPC); needs of a limited access facility in thoroughfare plan across the county to preserve right of way; maintenance needs of existing roadway facilities; and needs of new bike facilities connecting Old Katy and KPC.

Public Meeting 3

The third round of public meetings occurred on August 14th and 16th of 2018. The purpose of these meetings was to present and receive feedback on the final study recommendations.

Major comments and concerns received from the third round of public meetings included: Pederson Road extension through the Remington Trails subdivision; need for alternative route to relieve traffic congestion on FM 2855; FM 529 re-alignment crossing USDA conservation easements; bicyclist safety on major roads; and thoroughfare connectivity with adjacent counties.

Public Meeting Advertisements



LET YOUR VOICE BE HEARD!

Attend a public meeting to provide input on the proposed transportation recommendations intended to enhance mobility in Waller County now and in the future.

The meeting will be an Open House with a brief presentation at 6:30 p.m.

For more information visit: hgacmpo.com/Waller

PUBLIC MEETINGS

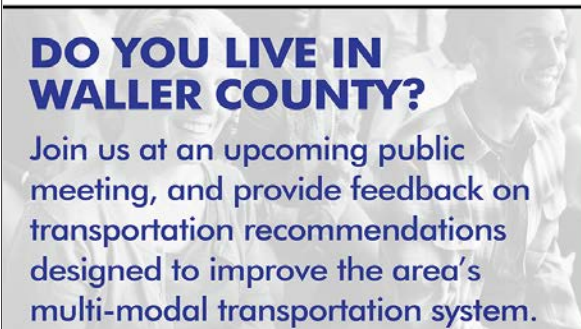
TUESDAY, APRIL 24, 2018
6:00 – 8:00 p.m.
Pattison Fire Station
2950 FM 359
Pattison, TX 77423

THURSDAY, APRIL 26, 2018
6:00 – 8:00 p.m.
Waller County Community Center
21274 FM 1098
Prairie View, TX 77445

PublicComments@h-gac.com
HGACmpo.com
facebook.com/HGACmpo
twitter.com/HGACmpo



H-GAC will provide for reasonable accommodations for persons attending H-GAC functions. Requests from persons needing special accommodations should be received by H-GAC staff 24 hours prior to a function. The public meeting will be conducted in English and requests for language interpreters or other special communication needs should be made at least two working days prior to a function. Please call 713-993-2471 for assistance.



DO YOU LIVE IN WALLER COUNTY?

Join us at an upcoming public meeting, and provide feedback on transportation recommendations designed to improve the area's multi-modal transportation system.

PUBLIC MEETINGS

TUESDAY, AUGUST 14, 2018
5:00 p.m. – 7:00 p.m.
Royal High School, Cafeteria
34499 Royal Road
Brookshire, TX 77423

THURSDAY, AUGUST 16, 2018
5:00 p.m. – 7:00 p.m.
Waller County Community Center
21212 FM 1098 Loop
Prairie View, TX 77446

PublicComments@h-gac.com
HGACmpo.com/Waller
facebook.com/HGACmpo
twitter.com/HGACmpo



It is important to understand population and development histories as well as anticipated growth in order to develop transportation recommendations that are appropriately tailored to the needs of area residents.

Background data was collected and analyzed from numerous sources. Analysis of this data provides the foundation for developing a complete and connected roadway network and, ultimately, a thoroughfare plan that will serve the entire county. Included in the area profile are analyses of the following:

Area Overview: Overview of study area demographics and economic characteristics.

Population: Analysis about existing population characteristics and predicted future population patterns.

Employment: Analysis about existing employment characteristics and predicted future employment patterns.

Roadway Network: A look at the transportation network and identifying major roads.

Roadway Network Demand: Details about existing traffic congestion.

Trip Generators: Examination of the existing, known, and forecasted major trip generators.

Barriers: A look at the study area's natural and man-made barriers.

Gap Analysis: Overview of gaps in the roadway network.

Previous Thoroughfare Plans: Reviewing existing and previous plans provides insight on previous and future needs.

COUNTY OVERVIEW

Waller County is located approximately 40 miles west of downtown Houston, Texas. At 518 square miles of land, the County's household population is approximately 50,000 people. Hempstead is the largest city and serves as the county seat of government. The County has a diverse mix of communities and is home to Prairie View A&M University (PVAMU), Goya, Amazon, Igloo, and other major developments which share common mobility needs. It is also home to Katy Prairie Conservancy and a United States Department of Agriculture (USDA) Conservation Easement.

Cities are located along two major roadway corridors: United States Highway 290 (US 290) and Interstate Highway 10 (IH 10). The cities of Hempstead, Pine Island, Prairie View, and Waller are in the northern part of the County along US 290. The cities of Pattison, Brookshire, and Katy are in the southern portion of the County along IH 10. A map of Waller County is presented in Figure 2-1.

DEMOGRAPHICS

POPULATION

The H-GAC regional growth forecast model provided data on population and employment growth. According to the 2017 American Community Survey, Waller County had a 159% increase in population and 154% increase in jobs between 1980-2017 (Table 2-1). This growth is expected to continue over the next couple of decades. Population growth is a combined result of natural increase (births) and migration. The County had a net migration of 72% (H-GAC Current County Data Viewer). More residents will seek housing opportunities in the suburbs as the Houston metropolitan area continues to grow. If the existing trend continues, development will push west making rural Waller County prime for the next development boom.

EMPLOYMENT

Employment centers and opportunities have grown as the county population has increased. In 2015, Waller County had a total of 19,871 jobs, which is an increase of 11,871 jobs since 1990 (Table 2-2). The major industries, making up 50% of the jobs, are education, manufacturing, and retail (H-GAC Current County Data Viewer).

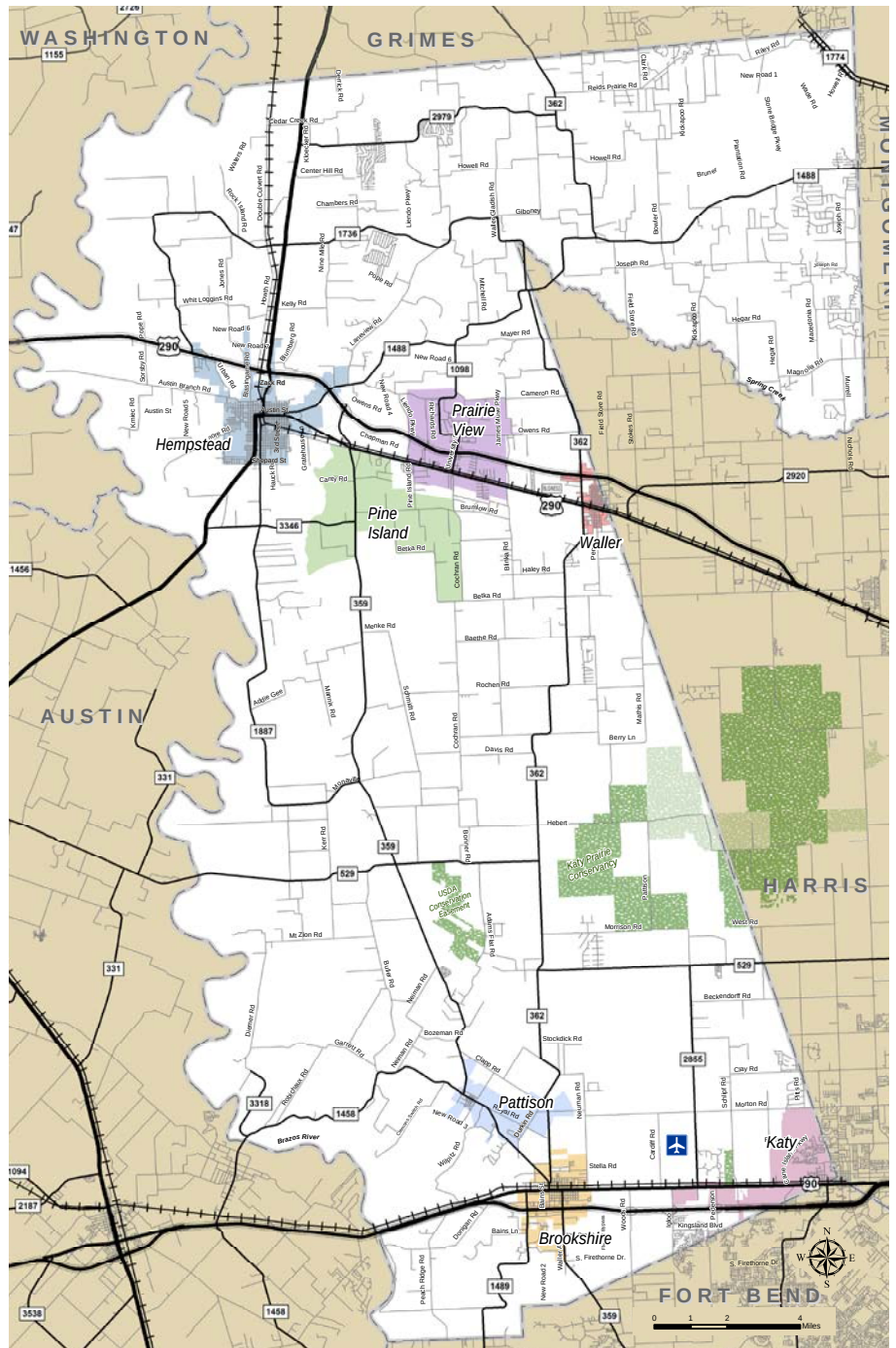


Figure 2-1: Waller County

Table 2-1: Population Growth

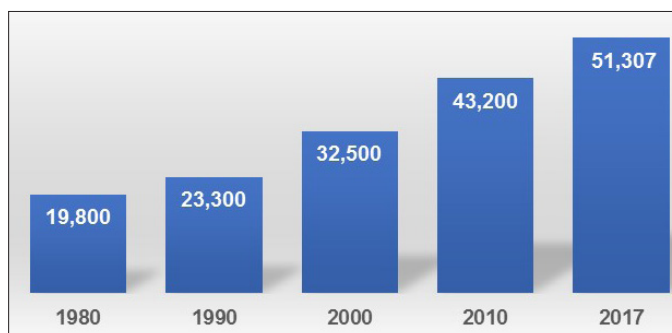
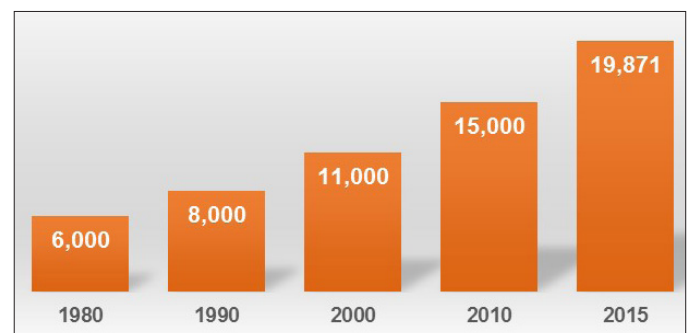


Table 2-2: Job Growth



NETWORK

ROADWAY NETWORK

The County is served primarily by IH 10, US 290, and a number of regional and county roadways. The existing primary roadway network within the study area is shown in Figure 2-2. Most of the roads in the County are maintained by the State. TxDOT maintains over 1,950 total lane miles of roadways in Waller County.

The roadway network is comprised of the following roadway types:

Interstate Highway (IH)

Interstate Highways are high-speed, limited access highways that provide mobility to and from other counties and major destinations. IH 10 is the only interstate freeway facility in the County.

This major corridor connects Waller County to Houston to the east and San Antonio to the west. It also serves as a hurricane evacuation route.

IH 10 is four to six main lanes with shoulders and a posted speed limit of 65 miles per hour (mph). Access to and from IH 10 is provided with two-lane frontage roads and grade-separated interchanges at Peach Ridge Road, US 90, FM 1489, FM 359, Woods Road, Igloo Road, Pederson Road, and Cane Island Parkway. Land use along IH 10 is mostly undeveloped except for concentrated commercial and residential land uses within the cities.

United States Highway (US)

US Highways are non-freeway facilities that carry large volumes of traffic at relatively higher speeds. US 290 is the exception to this definition, operating more like an interstate rather than a US Highway. US 290, Business 290, and US 90 are the three US highways serving the County.

US 290 is a major east-west highway traversing the northern portion of the County. This major corridor connects the County to the City of Houston to the east and the City of Austin to the west. US 290 has four to six main lanes with shoulders and a posted speed limit of 60 miles per hour (mph) and serves as a hurricane evacuation route. Land along US 290 is mostly undeveloped except within the cities, where commercial, school, and residential uses were observed.

Business 290 (BU 290) is the original route of US 290 through the Cities of Hempstead and Waller. This route parallels US 290 and is used by local traffic. Land along this facility is mostly undeveloped except the segments in Hempstead and Waller where residential and commercial developments are located. From Hempstead to University Drive, BU 290 is a

four-lane divided roadway with a two-way left-turn lane. From University Drive to the Harris County line, BU 290 is a four-lane undivided facility. BU 290 has a maximum speed limit of 55 mph. For the segments within the Cities of Waller and Hempstead, the posted speed limit is reduced to 35 mph.

US 90 parallels IH 10 from Katy to Brookshire. This four-lane undivided facility provides access to residential, industrial, and commercial areas. US 90 has a high number of commercial truck usage due to the number of industrial warehouses located between US 90 and IH 10. US 90 also parallels the Union Pacific Railroad and experiences delays due to trains blocking intersections.

State Highways (SH)

State highways are a mixture of various types of major arterials including limited access facilities such as freeways. These roads are funded and maintained by the State of Texas. SH 6 and SH 159 are the two state highways serving the County.

SH 6 functions as a major north-south connection between Hempstead and College Station, home of Texas A&M University, and Waco, home of Baylor University. This roadway is a four-lane divided facility with a posted speed limit of 60 mph. Traffic increases on this road by 20% during football season.

SH 159 is one of the few roads that crosses the Brazos River. It connects Hempstead to La Grange. SH 159 is a two-lane facility with a posted speed limit of 60 mph.

Farm-to-Market Roads (FM)

FM roads are state-maintained roads common throughout the County that serve as rural arterials. They provide regional access, connectivity, and mobility in the County and to adjacent counties. There are 12 FM roads in Waller County: FM 1458, FM 1488, FM 1489, FM 1736, FM 1887, FM 2855, FM 2979, FM 3318, FM 3346, FM 359, FM 362, and FM 529. These roadways carry a significant amount of both local and regional traffic. Land along FM routes is primarily vacant, undeveloped with a mix of land uses, mostly residential and commercial, along FM routes in the cities.

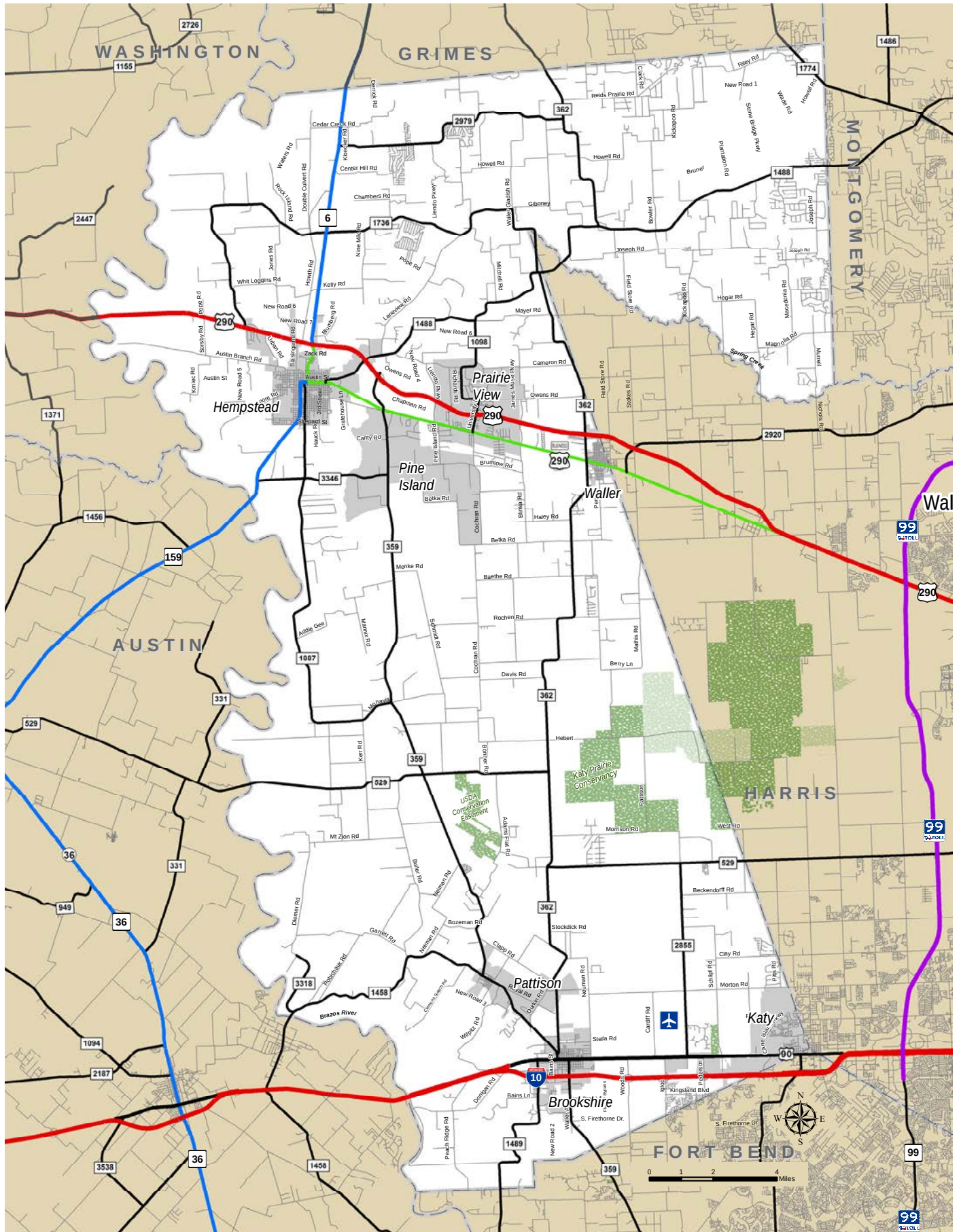


Figure 2-2: Existing Road Network

MULTIMODAL TRANSPORTATION FACILITIES

TRANSIT NETWORK

Demand response, or dial-a-ride, is the primary type of transit service available. This service is provided by Colorado Valley Transit and operates countywide on weekdays from 7:00 AM to 6:00 PM.

Prairie View A&M University (PVAMU) provides shuttle service to their students, faculty, and staff. PVAMU Transportation Services provides on- and off-campus shuttle service to designated off-campus housing locations Monday through Thursday, 7:00 AM - 6:45 PM during the academic year. Additionally, through a Student Special Run Request Form, shuttle service is provided to Houston area airports, two Greyhound bus stations, and three Mega Bus stops.

BICYCLE AND PEDESTRIAN NETWORK

The existing bicycle and pedestrian facilities include a 1.12-mile bike lane on University Drive and a 2.7-mile shared use path along Cypress Creek. Participants in Steering Committee meetings and Stakeholder Meetings were asked to identify bikeway needs. Feedback from the public involvement effort indicated there are about 100 miles of on-road bikeway needs that have been identified. The facility locations and types are illustrated in Figure 2-3.

AVIATION

Waller County has numerous small airports, most of which are airstrips. The largest airport is Houston Executive Airport with a 6,610-foot runway located in the southern portion of the County at Morton Road and FM 2855.

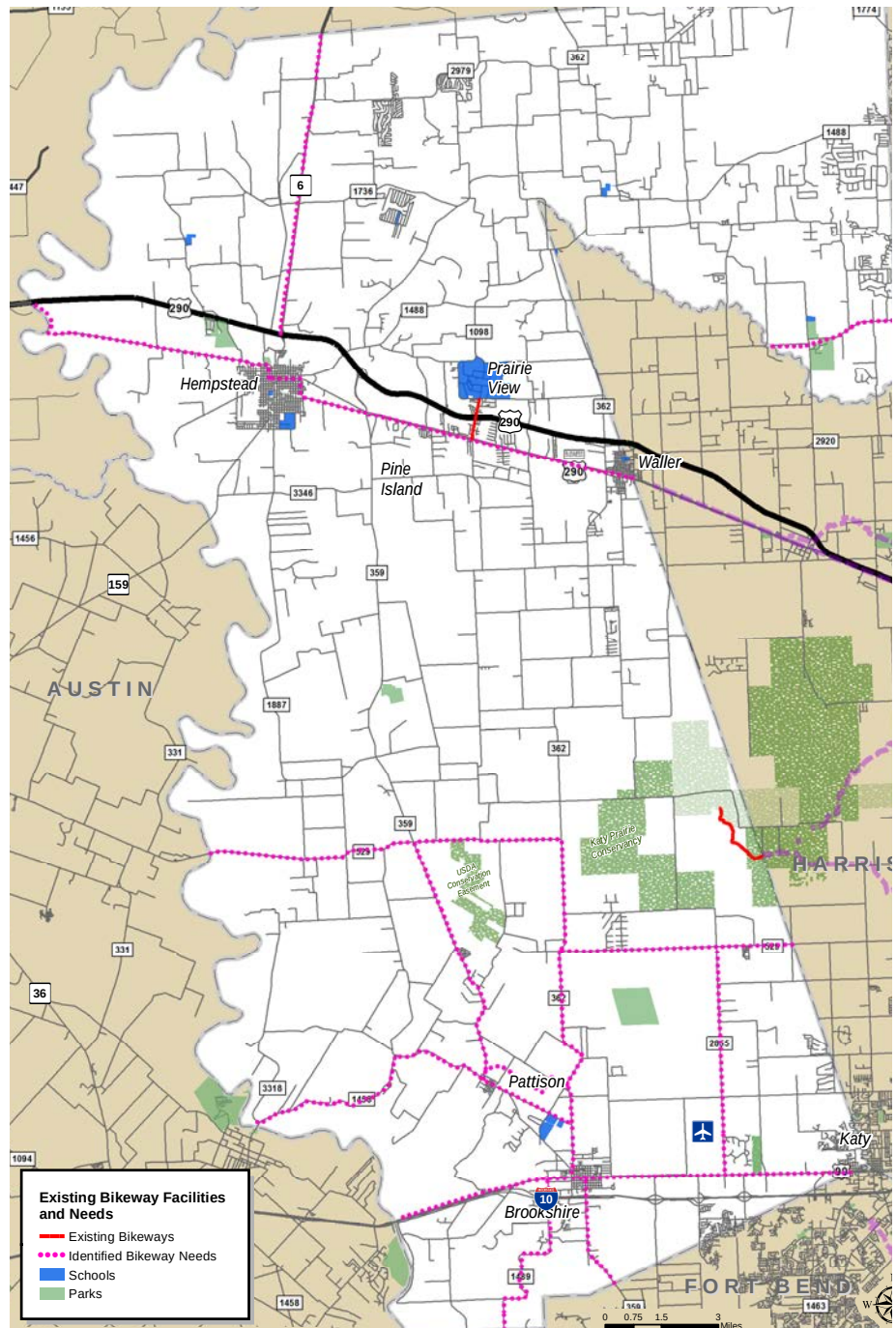


Figure 2-3: Bikeway Facilities and Needs



Houston Executive Airport, Waller County

IDENTIFIED ISSUES

A review of existing conditions and public involvement comments revealed the following issues that most impact the County roadway network.

ROADWAY CAPACITY

Overall the County has very few roadway capacity issues. Minor congestion does occur during the morning (6:00-9:00am) and evening (4:00-6:00pm) peak periods due to typical work-related travel patterns. Many of the roadway segments that operate over, at, or near capacity for the morning peak hour are located near a school (Table 2-3).

Table 2-3: Over capacity road segments during morning peak hour.

Road	Segment
Hegar Rd	Harris County to Magnolia Road
Fields Store Rd	Joseph Road to Harris County
FM 1488	Bowler Road to Montgomery County
FM 359	FM 1458 to 1 mile south of IH 10
IH 10	Woods Road to Fort Bend County
Joseph Rd	Macedonia Road to Montgomery County
Joseph Rd	Hegar Road to Kickapoo Road
Kickapoo Rd	Joseph Road to Harris County
Macedonia Rd	Magnolia Road to Joseph Road
Magnolia Rd	Hegar Road to Montgomery County
SH 159	BU 290 to 13th Street
Woods Rd	IH 10 to Fort Bend County

Input from the steering committee members and stakeholders indicated there was severe congestion along US 290 during college football weekends with traffic backed up at least five miles along US 290.

Roads Without Shoulders

Due to the rural nature of the county, many of the major roads do not have shoulders. On the roads that do have shoulders, cyclists often use these as bike lanes and vehicles use them as stopping lanes in the event of a breakdown or emergency.

Curves

Waller County is like many other rural counties and has sharp curves along many of the major roads. There are numerous sharp curves on FM 1488, FM 529, FM 362, and FM 1489. These curves raised safety concerns including loss of vehicle control and collisions with other vehicles. Straightening the curves,

adding proper warning signage, and reducing speed limits could mitigate this type of safety concern.

Intersections

Most major intersections within the County are four-way or T-junction intersections. However, there are numerous Y-intersections that have irregular angles and cause safety issues. The existing intersection geometric design cannot accommodate the turning movement of large trucks. By improving geometric design and signal controls, the County can mitigate the number crashes.

Access Management

Access management is the proactive management of vehicular access points to land parcels adjacent to a road. Access management improves safety by reducing the number of conflict points along a roadway and by limiting the number of driveways and medians and restricting certain movements of other median openings.

Road Conditions

Poor roadway condition can cause safety issues and wear and tear on vehicles. Most of the roads inventoried are located within a city limits, which hinders funding assistance from the County. Addressing these issues is needed to improve roadway efficiency.

Flooding Issues

Roadway flooding causes mobility issues and is a major concern of the public after recent flooding events such as Hurricane Harvey in August 2017. Steering Committee input indicated that major flooding is a concern on US 290 at University Drive and that improved drainage treatments could mitigate this issue.

Cyclist/Vehicle Conflicts

This was a commonly identified issue with every stakeholder group. Roads are frequently used by the bicycling community for pleasure and training rides due to the lack of heavy traffic. Bicyclists often share the drive lane with vehicles due to a lack of dedicated bikeways on most roadway segments. Numerous organized bike rides do require road closures.

TRANSIT

Demand response service results in less community mobility and reduced operational efficiency. Lack of local or other funding sources precludes services besides demand response, according to the Colorado Valley Transit District. H-GAC's 2016-2017 Regionally Coordinated Transportation Plan (RCTP) identified Prairie View and Hempstead as communities of high transit need and Brookshire as a city of medium-high transit need. The RCTP indicates a substantially higher

number than the regional average of vulnerable individuals in the identified communities.

FREIGHT TRAFFIC

Increasing heavy truck traffic along major roads raised safety concerns. US 290 and IH 10 are both classified by TxDOT as major freight corridors, however, SH 6, SH 159 in downtown Hempstead, FM 529, FM 2855, US 90, and FM 1489 all have high percentages of truck traffic. Warehouse development along IH 10/US 90 spurred a large increase in heavy trucks. There are three railroads in the County, all owned by UPRR. The routes parallel BU 290, SH 6, and US 90 and all crossings are at-grade. At-grade crossings will become a barrier to traffic as population, development, and freight traffic increase.

BARRIERS

There are numerous barriers that obstruct the path of needed roads for maximum connectivity of the roadway network. Some of these barriers can be overcome with infrastructure, such as bridges, but the increased construction costs may make these projects cost-prohibitive. Other barriers can be overcome by simply rerouting roadways.

Waller County has both natural and manmade barriers. Examples of natural barriers include the Brazos River, Spring Creek, Cypress Creek, Katy Prairie Conservancy, USDA Conservation Easement, and numerous creeks and streams. These natural barriers, along with their floodways and floodplains, present a significant challenge to roadway connectivity as they directly obstruct north-south and west-east travel (Figure 2-4). The lack of bridges crossing the Brazos River affects mobility between Waller and Austin Counties. Currently, there are 5 bridges: IH 10, US 290, SH 159, FM 529, and FM 1459.

Established in 1992, the Katy Prairie Conservancy (KPC), is a non-profit land trust created to protect a sustainable portion of the Katy Prairie for conservation and recreational benefits. As of 2017, KPC has protected approximately 24,000 acres in Harris and Waller Counties and is home to hundreds of species of wildlife, native grasses, and wildflowers. Approximately 8,600 acres are in Waller County.

Table 2-4: Issues Identified by the Steering Committee, Stakeholder Groups and Public

Major Issues	Steering Committee	Stakeholders	Public
Traffic Congestion	●	●	●
Transit Needs	●	●	●
Increased Truck Traffic	●	●	●
Cyclist/Vehicle Conflicts	●	●	●
Dangerous Road Curves	●	●	●
Road Flooding		●	●
Roads without Shoulders	●	●	●
Road Conditions			●
North/South Connectivity	●	●	●
East/West Connectivity	●	●	●
Coordinate Ordinances/Policies		●	●
Widen IH 10	●	●	●
Widen US 290	●	●	●

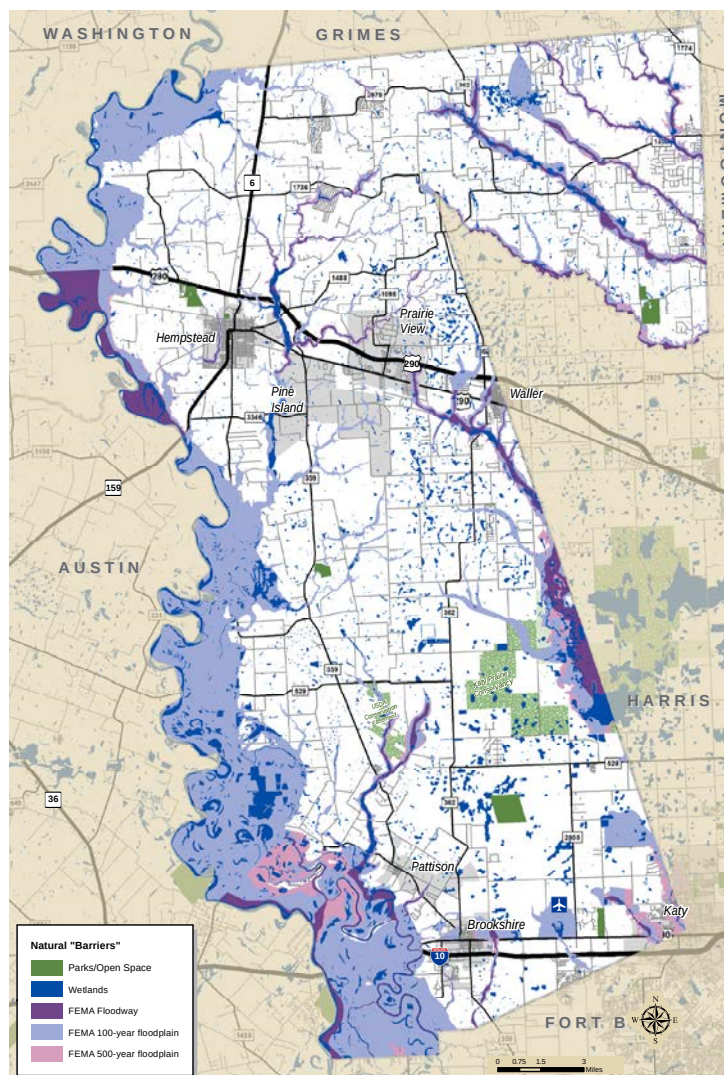


Figure 2-4: Natural Barriers

Major manmade barriers include railroads, airports, golf courses, historical properties, cemeteries, and superfund sites. (Figure 2-5). Major highways can also serve as a barrier to other modes of transportation. These barriers can have negative impacts on vehicular travel times, intersection and corridor levels-of-service, and overall community-to-community access.

GAP ANALYSIS

Identifying gaps where roads either end or do not exist play a critical role in improving congestion, connectivity, and safety throughout the County. "T" roads can be described as roads that end at a cross road and force drivers to detour. These detours add additional congestion to cross roads that may already be over capacity. Because Waller County is mostly rural, there are large gaps in the transportation network.

NON-CONTINUOUS REGIONAL ROUTES

Providing for long trips over continuous routes that link multiple city or county population and employment centers is important for mobility and orderly development. Currently, there are no corridors that completely traverse the county from north to south. IH 10 and US 290 are the only routes that provide a continuous east-west route. Public comments made it clear that a limited access facility is needed between the northern and southern parts of the county.

LAND USE

Land use information is important to understand origin-destination patterns and roadway usage. This information can be used to determine the future needs of a roadway to accommodate the trips it will generate.

As part of the efforts of this study, the current land use maps for each precinct in the County were reviewed and, if necessary, updated to reflect the county's current development patterns. Currently, over 60% of Waller County's land is vacant.

MAJOR TRIP GENERATORS

Major traffic generators were identified by collecting data from newspapers, magazine articles, websites, public outreach meetings, and internet searches. Major traffic generators, defined as any employer with 100 or more employees, are presented in Figure 2-6. These include:

- Amazon
- Buc-ee's (2)
- Daikin Industries, Ltd. (Harris County)
- Goya Foods

- Grundfos CBS Inc.
- Igloo Products Corp.
- Prairie View A&M University (PVAMU)
- Rooms to Go Outlet and Distribution Center
- Texas Renaissance Festival (Grimes County)

Several major trip generators are located outside the County lines, Texas Renaissance Festival, Daikin Industries, Inc., University of Texas, and Texas A&M University, but they have a major impact on Waller County roads.

According to the H-GAC Planned and Announced Land Use Changes database, most of the major projected commercial and residential developments in the study area will occur along US 290, IH 10, and in the northeast corner of the County.

THOROUGHFARE PLANS

Reviewing existing and previous thoroughfare plans provides insight on previous and future needs. The 2012 Waller County Thoroughfare Plan was used as a starting point for the development of this document. Adjacent county thoroughfare plans, such as Montgomery, Harris (City of Houston MTFP), and Fort Bend were also used in the development of the WCTP. This ensured that existing and future roadways in Waller County were connected to the adjacent county's roadways.



Goya Foods

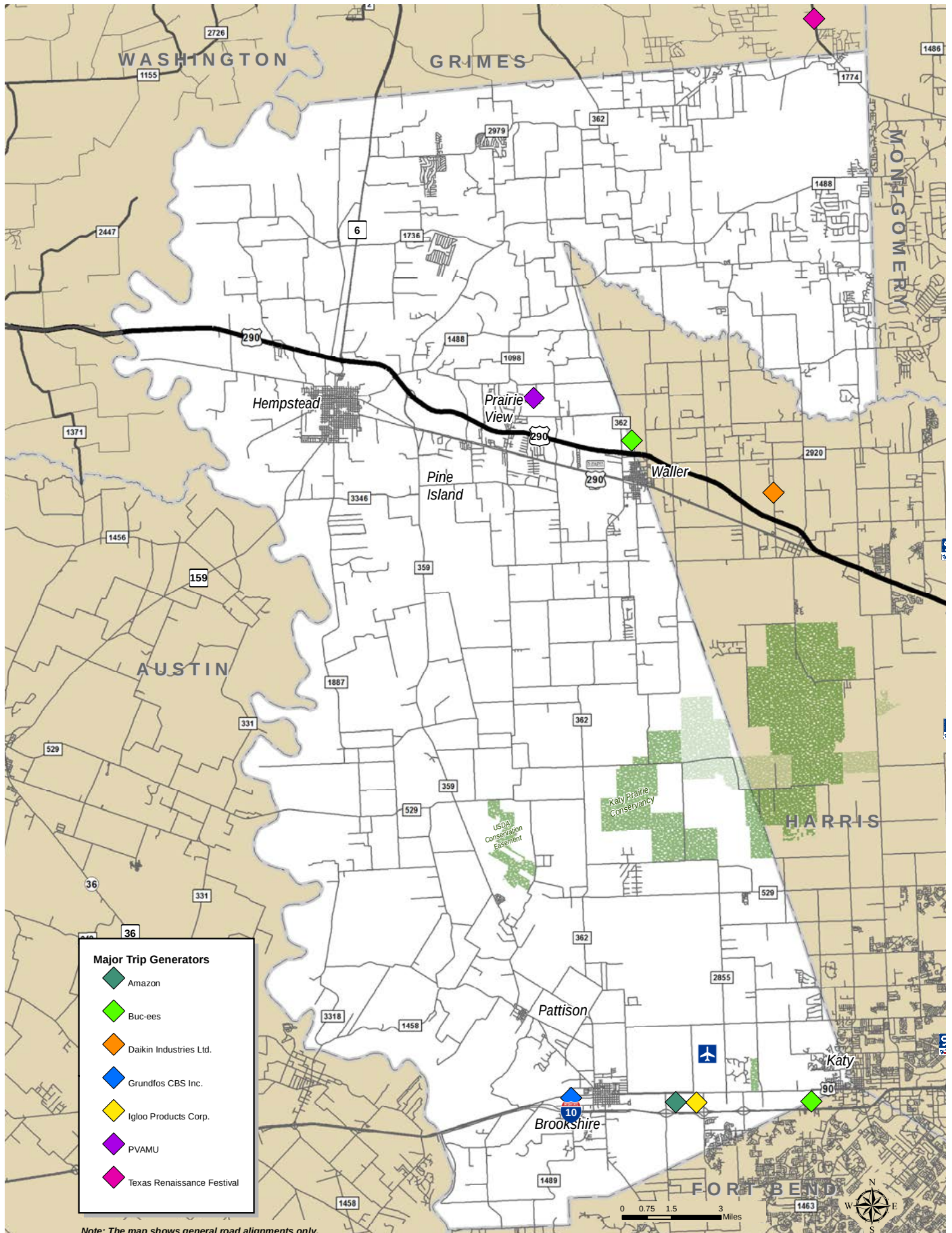


Figure 2-6: Major Trip Generators



DATA COLLECTION

Data collection is crucial for developing a baseline of the mobility conditions within Waller County. A variety of data was collected and reviewed for this study. Comprehensive plans, thoroughfare plans, site development plans, and more were collected and reviewed. Data on traffic and roadway characteristics were gathered including twenty-four-hour traffic counts, pavement conditions, crash data, and socioeconomic data. Key traffic and roadway characteristics were studied and inventoried including roadway geometries, traffic counts, and traffic signal locations. All of these are necessary to accurately understand the current roadway network conditions and to provide input into the transportation model. Extensive traffic data collection was performed for this study. More than 90 twenty-four-hour traffic counts were taken including 30 classification counts to identify heavy truck traffic. A roadway inventory was performed in the major cities and a traffic study was done to determine the increase of traffic volumes on the roadway network during fall football weekends.

EXISTING ROADWAYS

Understanding existing traffic conditions is essential to identifying intersection and/or roadway operational deficiencies that must be addressed as part of this plan.

Traffic counts were collected along major roadways to determine the daily traffic volumes. The data is needed to determine the existing congestion levels and freight truck volumes.

Weekday bidirectional twenty-four-hour traffic volume count data was collected at 99 locations in April 2017 on a variety of roadway types (Figure 3-1). The traffic counts provided updated information on the status of traffic conditions and served as a baseline assessment of the impacts of recent developments on traffic conditions. Figure 3-1 shows the locations of these counts and the reported vehicles per day. Of the 99 count locations, 30 were classification counts which provided data on truck volumes. Traffic count analysis showed that the County has very few roads over capacity. The roads with the highest average daily traffic (ADT) are US 290, SH 6, IH 10, FM 1774 and the southern portion of FM 359 in Pattison. More traffic count information can be found in Appendix B.

ROADWAY CAPACITY

Overall, there are very few capacity issues in the county. Congestion does occur due to typical work-related trips. Morning Peak period (6:00-9:00 am) traffic capacity was analyzed on the major roadways using H-GAC's 2015 Travel Demand Forecast. The morning peak period was slightly worse than the evening peak

period, therefore results from the morning peak were utilized for analysis to ensure recommendations improve both peak periods. The results of this analysis were reported in four levels of service: (1) Under capacity, (2) Near capacity, (3) At capacity, and (4) Over capacity. The criteria are based on the generalized capacity analysis tables and average speeds located in the 2010 Highway Capacity Manual.

The results of this analysis show that most roadway facilities currently operate Under Capacity. Many of the roadway segments that operate over, at, or near capacity for the morning peak hour were located near a school (Table 3-1).

Prairie View A&M University (PVAMU) is located north of US 290 on University Drive in Prairie View. Roadways near and adjacent to PVAMU experience extreme congestion during football game days. The roads adjacent to PVAMU roads experienced a 200-600% increase in traffic, US 290 experienced an increase over 60%, and SH 6 and FM 1488 experienced a 20% increase in traffic (Figure 3-2). This analysis indicates that there are significant increases in traffic within Prairie View and along US 290, primarily within the two-hour window before and after games.

This issue in Prairie View is caused by the lack of access to the football stadium and University as there is only one road that provides access to the football stadium. Currently, this level of congestion only occurs during football weekends, but as the University grows, the issue will occur more often. It is recommended that PVAMU conduct a traffic study to determine the best way to accommodate the congestion due to special events and future growth.

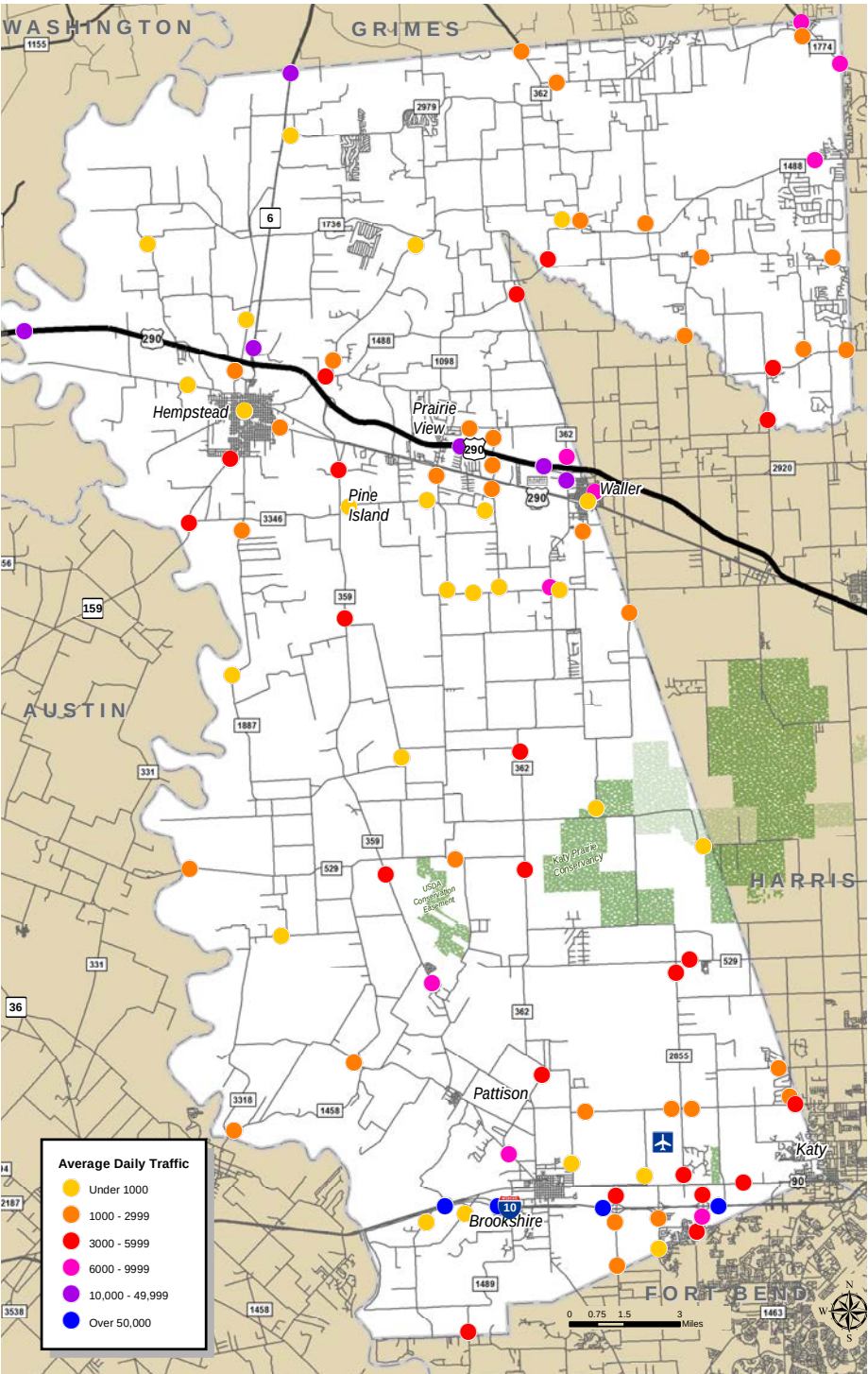


Figure 3-1: April 2017 Traffic Volumes

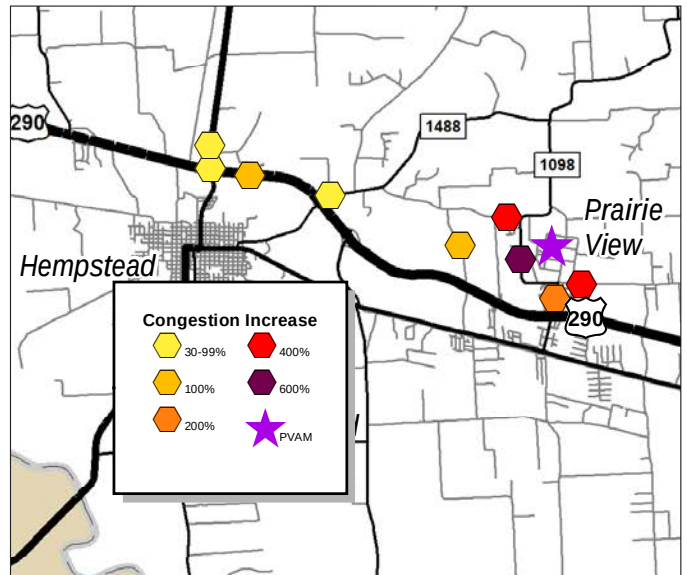
Traffic headed through Waller County to The University of Texas, Texas A&M University, and Baylor University also adds to the congestion on football weekends. US 290 is the primary route in and out of

Houston for all three universities so even though these universities are not located in the County, the through traffic is increasing traffic on county roadways.

Table 3-1: 2017 Roadways Over/At/Near Capacity (AM Peak Hour)

Road	Segment
Hegar Rd	Harris County to Magnolia Road
Fields Store Rd	Joseph Road to Harris County
FM 1488	Bowler Road to Montgomery County
FM 359	FM 1458 to 1 mile south of IH 10
IH 10	Woods Road to Fort Bend County
Joseph Rd	Macedonia Road to Montgomery County
Joseph Rd	Hegar Road to Kickapoo Road
Kickapoo Rd	Joseph Road to Harris County
Macedonia Rd	Magnolia Road to Joseph Road
Magnolia Rd	Hegar Road to Montgomery County
SH 159	BU 290 to 13th Street
Woods Rd	IH 10 to Fort Bend County

Figure 3-2: Traffic Increase on College Football Weekends



ROAD CONDITIONS

Participants in the first round of public meetings indicated that roadway condition was a big concern. A windshield survey of roadway pavement, striping, and presence of shoulders and medians was performed to evaluate the existing conditions for 53 roadway segments (77 roadway miles) within seven communities in the County. Roadway inventory was performed on select locations in Brookshire, City of Waller, Hemp-

stead, Katy, Pattison, Pine Island and Prairie View.

The 53 roadway segments were assessed as either Good, Fair, or Poor condition (Table 3-2). The roadway inventory resulted in approximately 9 linear miles of roadway in poor condition requiring asphalt repair, 19 linear miles of roadway with road markings requiring restriping, 50 linear miles of roadway with no presence of shoulders, and 74 linear miles of

roadway with no median treatment. To prevent vehicle accidents, these issues should be addressed.

The cities of Prairie View, Pine Island, Waller, Pattison, and Katy have pavement in Good and Fair Condition. Hempstead, Pattison, and Brookshire have pavement segments in poor condition. The City of Brookshire has the highest number of roadway segments with pavement in poor condition (Figure 3-3 and Table 3-3).

Table 3-2: Road Condition Rating

GOOD	FAIR	POOR
New construction, recent overlay, occasional cracks that are sealed, shows some traffic wear	Longitudinal and traverse cracks, occasional patching in good conditions, slight distortions	Severe Distortions, Alligator Cracking, Extensive Patching, Potholes

Table 3-3: Road Condition Rating

CITY	ROAD	LENGTH (Miles)	FROM	TO	NUMBER OF LANES	ROAD CONDITION	SHOULDER	MEDIAN	ROAD MARKING / STRIPING CONDITION
Brookshire	Cooper Street /South Street	1.52	End of Cooper (W)	Waller Avenue	2	Fair	No	No	No
	FM 1489	1.80	Gassner Road	Rheman Cutoff Road	2	Poor	No	No	No
	FM 359/Bain Road	1.34	IH 10	Hubbard Road	2	Poor	No	No	No
	FM 362	0.59	Garvie Road	FM 359	2	Fair	Yes	No	Good
	Gassner St./2 1/2 Street	1.07	FM 359	Waller Street	2	Poor	No	No	No
	South Street	0.71	Waller Ave	Hereford Drive	2	Poor	No	No	No
	US 90	2.60	Donign Road	Stalknecht Road	2	Fair	No	No	No
	Waller Street	1.16	2 1/2 Street	13th Street	2	Fair	Yes	No	Fair
Hempstead	Austin Branch Road	0.58	Urban Road	Country View Lane	4	Good	No	No	Fair
	BU 290 /Austin Street	1.54	SH 159	Diiorio Farmers Market	4	Fair	No	Yes	Good
	Blasingame Road	0.90	US 290	St. Marys street	3	Good	No	No	Fair
	Blasingame Road	0.38	St. Marys Street	Austin Street / BU 290	3	Fair	No	No	No
	BU 290	1.03	US 290	Austin Street	4	Good	Yes	No	Good
	FM 1488	1.52	Austin Street	SH 6	3	Good	Yes	No	Good
	FM 1887	1.35	Austin Street	Shepard Street	4	Good	Yes	No	Good
	SH 159	1.46	Wilkins Street	Shepard Street	4	Good	Yes	No	Good
	Urban Street	1.79	US 290	Austin Street	2	Poor	No	No	Good
Katy	Ave D	2.15	US 90	Morton	4	Good	No	No	Good
	First Street	1.78	Avenue D	Tubular Street	2	Fair	No	No	No
	FM 1463	0.63	US 90	IH 10W	4	Good	No	Yes	Good
	Frantz Road	2.34	Katy Fort Bend Road	Bartlett Road	4	Good	No	Yes	Good
	Morton	1.00	Pitts	Katy Hockley Cutoff	4	Good	No	No	Good
	US 90	2.57	Avenue D	Commerce Drive	2	Fair	Yes	No	Good
Pattison	Clapp Road	3.04	FM 359	FM 362	2	Good	No	No	Fair
	Durkin Road	0.70	FM 359	Royal Road	2	Fair	No	No	Fair
	Durkin Road	0.80	Royal Road	Clapp Road	2	Poor	No	No	No
	FM 1458	0.25	FM 359	Hidden Country Trailer Park	2	Good	Yes	No	Good
	FM 359	3.86	Clapp Road	Kellner Road	2	Good	Yes	No	Good
	FM 362	1.59	Royal Road	Clapp Road	2	Fair	Yes	No	Good
	Royal Road	1.21	FM 359	FM 362	2	Fair	No	No	Good
	Sterling St./1st Street	1.08	Avenue H Street	Clapp Road	2	Poor	No	No	No
	Wilpitz Road	0.67	FM 359	Stenzel Road	2	Good	No	No	No

CITY	ROAD	LENGTH (Miles)	FROM	TO	NUMBER OF LANES	ROAD CONDITION	SHOULDER	MEDIAN	ROAD MARKING / STRIPING CONDITION
Pine Island	Betka Road	4.24	Brumlow Road	Cochran Road	2	Fair	No	No	No
	Brumlow Road	2.71	FM 359	Cochran Road	2	Good	No	No	Fair
	Cochran Road	2.52	Brumlow Road	Betka Road	2	Good	No	No	Good
	FM 3346	1.96	FM 359	Clear Creek Road	2	Good	No	No	Good
	FM 359	2.97	Pierceall Road	Old Houston Road	2	Fair	Yes	No	Good
	Old Houston Road	1.60	Clear Creek Road	Laura Road	2	Fair	No	No	Good
Prairie View	Blinka Rd. / James Muse Pkwy	1.97	Pine Ridge Road	Owens Road	2	Fair	No	No	Good
	BU 290	1.25	Liendo Parkway	James Muse Parkway	4	Fair	No	No	Good
	Cochran Road	1.21	BU 290	Pine Ridge	4	Good	Yes	No	Good
	FM 1098	3.10	Joe Loggins Road	US 290	2	Good	Yes	No	Good
	Liendo Parkway	1.92	Wyatt Chapel Road	BU 290	2	Fair	No	No	Fair
	Owens Road	1.28	University Drive	James Muse Parkway	2	Fair	No	No	Fair
	Richards Road	1.87	Wyatt Chapel Road	BU 290	2	Good	No	No	Fair
	Wyatt Chapel Road	1.14	Liendo Parkway	FM 1098	2	Fair	No	No	Fair
Waller	BU 290	1.60	Stokes	FM 362	4	Fair	No	No	Good
	Fieldstore	1.66	Waller Spring Creek Rd	Mills	2	Good	No	No	Fair
	FM 362	2.84	Owens	Quail Hollow Park	2	Fair	Yes	No	Good
	Mary Waller Road	0.46	FM 362	Field Store Road	2	Good	No	No	Good
	Penick Road	0.42	Washington Street	Myrtle Avenue	2	Good	No	No	No
	Waller Street	0.75	FM 362	Field Store Road	2	Good	No	No	No
	Washington Street	1.30	Waller-Tomball Road	FM 362	2	Fair	No	No	Fair

Figure 3-3: Roadway Inventory

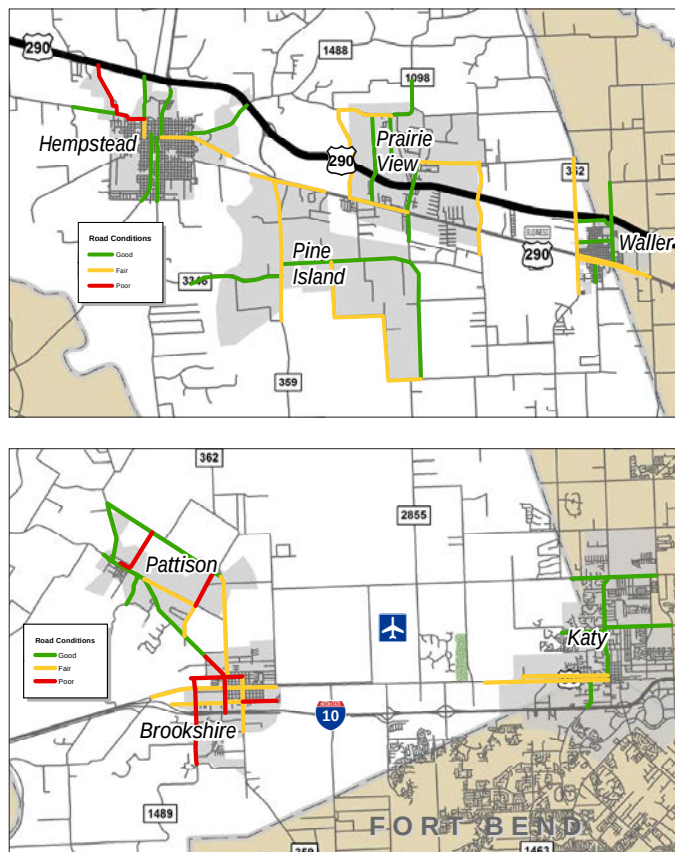


Table 3-4 2017 vs 2040 Percent of Trucks on Major Roadways in Waller County

Roadway	2017 Percent Trucks*	2040 Percent Trucks**
FM 1458	8-9%	13-14%
FM 359	8-12%	11-15%
FM 362	6-15%	12-26%
FM 529	7-16%	15-18%
FM 1458	8-9%	13-14%
FM 1488	5-6%	6-9%
FM 1489	13-24%	12-15%
FM 1887	8-9%	14-27%
FM 2855	3-15%	17-18%
IH 10	14-18%	18-20%
Peach Ridge	10%	3%
SH 6	14-15%	19-21%
SH 159	7-13%	10-12%
US 90	16-18%	3-4%
US 290	10-14%	10-14%

Note: Range is over the span of the corridor

* Classification counts performed 2017

**Source: TxDOT Statewide Planning Maps, Future Traffic and Percent Truck overlay (txdot.gov)

FREIGHT TRAFFIC

Heavy truck volumes were collected for specific roadways. Currently, IH 10, US 290, and SH 6 are designated as TxDOT freight routes and should have a higher percentage of truck volume in comparison to other county roadways. However, as is seen in Table 3-4, FM 1489 and US 90 both have a higher percentage of truck traffic than US 290 and SH 6. There is also a high percentage of heavy truck traffic on FM 2855, FM 359, and FM 362.

After comparing the 2017 and 2040 truck percentages, it is apparent that there are more trucks on US 90 than previously understood. The new industrial warehouses located along US 90 have a major impact on the traffic patterns. The analysis also revealed that more heavy trucks are using Peach Ridge to access FM 1489 to avoid the sharp curves on FM 1489.

SAFETY

A key function of any transportation system is to not only move vehicles efficiently, but also to provide safety for all travelers. Roadway design standards help maximize the safety of the traveling public, but they cannot anticipate the complex variables with which travelers are confronted. Therefore, it is necessary to regularly review crash data to understand safety issues that may arise on existing roadways.

Examination of 2012-2016 crash reports from TxDOT's Crash Record Information System (CRIS) identified locations throughout the county with high crash rates. The top 20 Waller County intersections for crash

Table 3-5 Top 10 Intersections with the Highest Crashes (2012-2016)

Intersection	Number of Crashes
US 90 at FM 359	37
BU 290 at FM 362	34
US 290 at FM 362	30
FM 362 at FM 529	26
FM 362 at FM 1488	23
US 290 at FM 1488	23
IH 10 at FM 359	23
US 90 at FM 2855	20
FM 359 at BU 290	19
SH 6 at BU 290	18

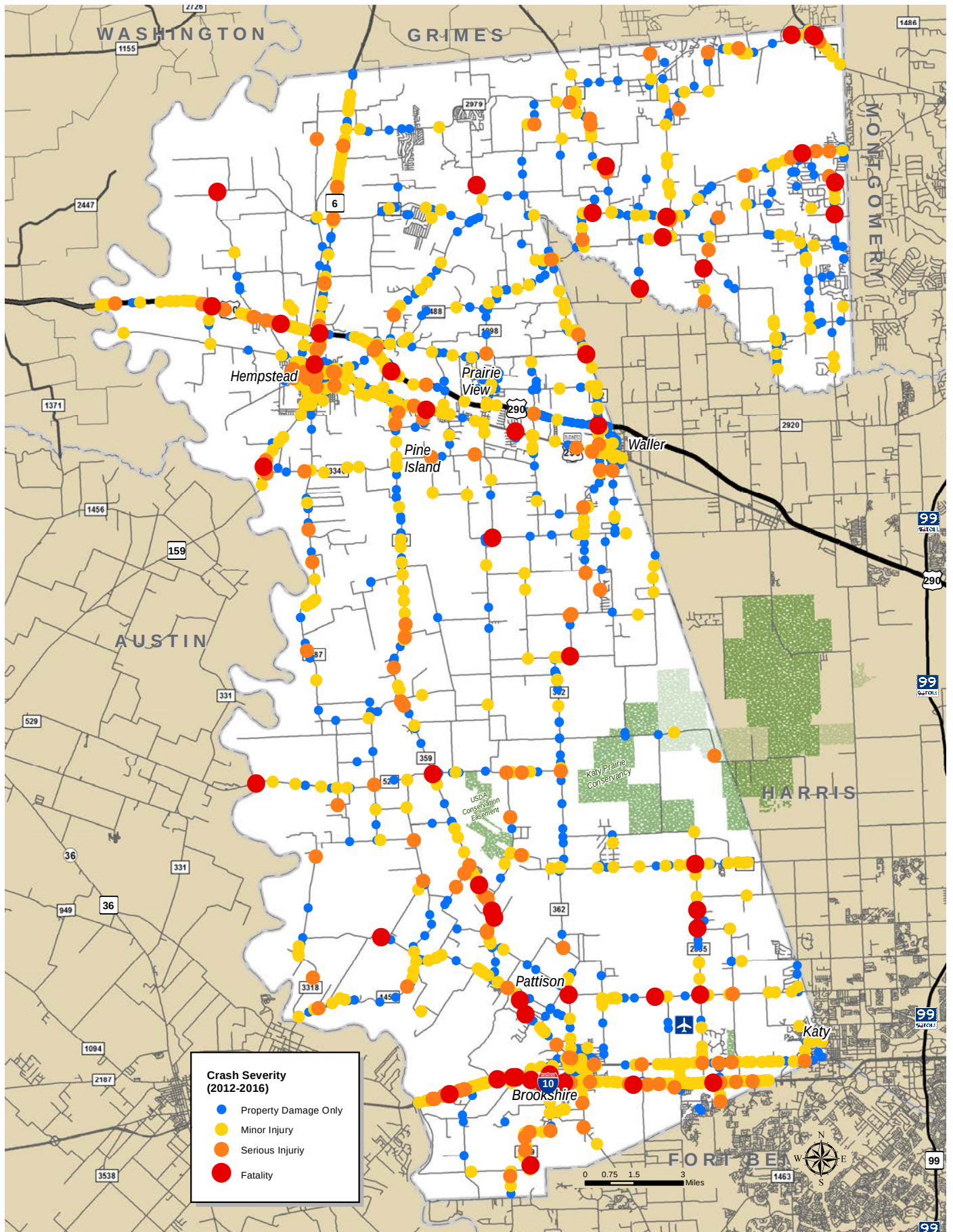


Figure 3-6: Crash Severity

locations are summarized in Table 3-5. Detailed examination of crash reports can reveal a high frequency of a particular type of crash that may be corrected through engineering measures, such as signing, pavement markings, illumination, law enforcement, education, and emergency management.

During the 5-year period examined, there were 3,366 crashes. Figure 3-4 shows crashes by roadway type. At 36%, the largest percentage of crashes occurred on FM roads. Figure 3-5 depicts the split of crashes by severity and Figure 3-6 shows the location of crashes and their severity. Most of the crashes resulted in a ‘non-injury’, indicating a less severe crash (63%).

The team conducted a crash hot spot analysis to identify areas with a greater amount of crashes (Figure 3-7). The results show four crash hot spot regions:

- US 290 and SH 6
- IH 10 (Brookshire)
- US 290 and FM 362
- US 90 and Pederson Rd.

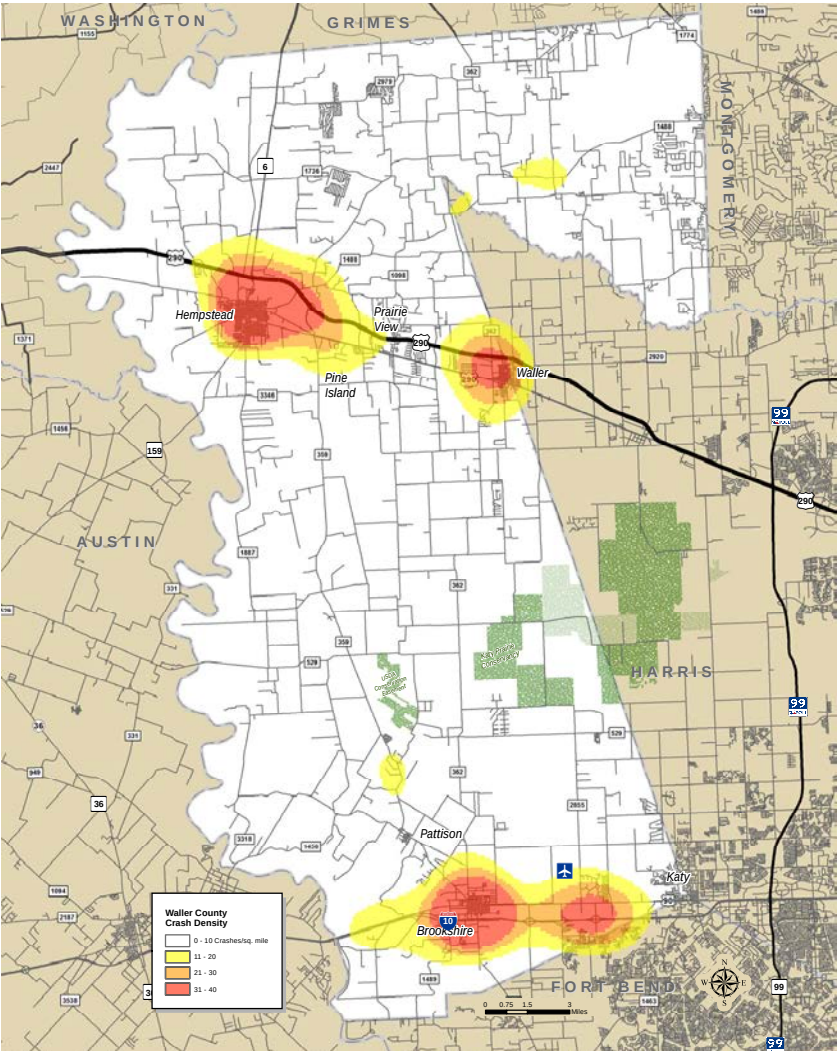


Figure 3-7: Crash Hot Spots

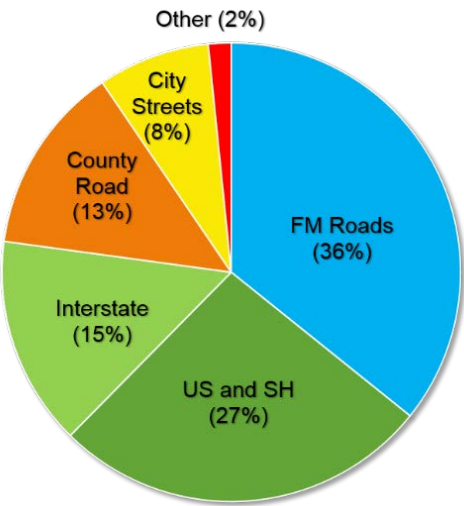


Figure 3-4: Crashes by Roadway Types

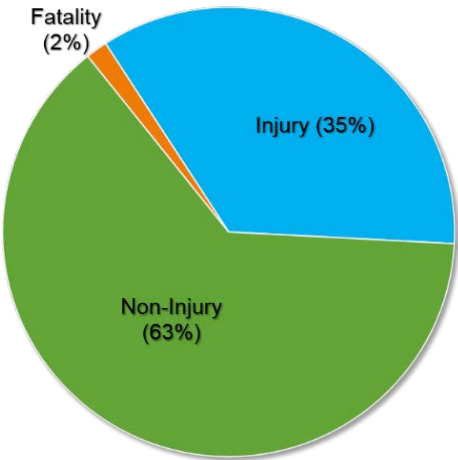


Figure 3-5: Crashes by Severity

FORECAST ANALYSIS

This section contains the methodology used to analyze the collected data and to develop the 2040 traffic forecast. The traffic projections consist of projected average daily traffic (ADT) and projected peak-hour traffic volumes for the weekday morning peak hour.

The Forecast Analysis describes the demographic and traffic forecast results for the 2040 scenarios using the H-GAC regional travel demand model. The demographic projections include population, household, and employment projections, while the traffic projections include projected ADT and projected peak-hour traffic conditions for the morning peak hour for roadways in the H-GAC regional travel demand model.

DEMOGRAPHIC

Existing and future land use data and projected population, households, and employment data were collected from the H-GAC regional growth forecast model (2017 Q4 estimates) to understand the potential impact on mobility. Table 3-6 shows the projected population growth in the County between 2015 and 2045. In 2015, the County’s population was 49,941. This number is projected to increase by approximately 85,000 people (169%) by 2045. Job growth, Table 3-7, is also expected to continue. In 2015, there were 19,871 jobs in the County. This number is expected to increase by 86% (37,000 jobs) by 2045.

REVISING GROWTH ESTIMATES

As part of the analysis, a “2040 what if” scenario was developed. This scenario looked at the impact that doubling the announced proposed developments (Figure 3-9) had on the future transportation network.

This information was incorporated into the demographic forecasts. These developments resulted in higher population (34% higher) and employment (66% higher) estimates than were initially forecast by the 2045 H-GAC regional growth forecast model (2017 Q4 estimates).

REVISED POPULATION FORECAST

Although Waller County is currently a rural county, the revised population forecast estimates that the population will increase 261% by 2040, from approximately 48,800 residents in 2017 to nearly 175,900. This population growth is projected to occur across all municipalities in the County, therefore, investments in the transportation system will need to be geographically dispersed to accommodate the growth.

EMPLOYMENT FORECAST

The revised employment forecast estimates that employment will increase from 20,500 jobs in 2017 to 41,500 jobs in 2040, amounting to 102% growth in employment (Table 3-5).

Table 3-6: Population Growth

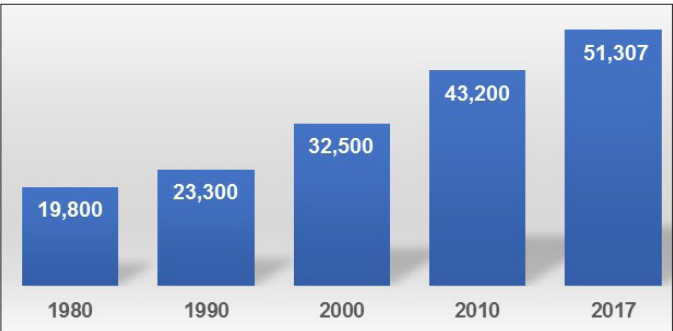


Table 3-7: Job Growth

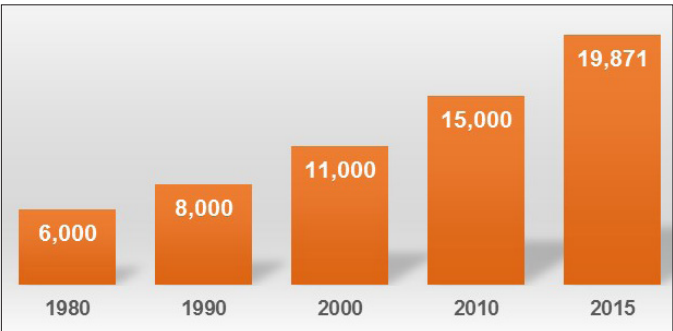


Table 3-8: Revised Population and Employment Forecasts for Waller County

Demographics	2017 Estimate*	2040 Revised Projection**	Percent Growth
Population	48,800	175,900	261%
Employment	20,500	41,500	102%

**H-GAC regional growth forecasts (2017 Q4 estimates) updated by traffic analysis zone with input from steering committee, project stakeholders, and the public for this study.

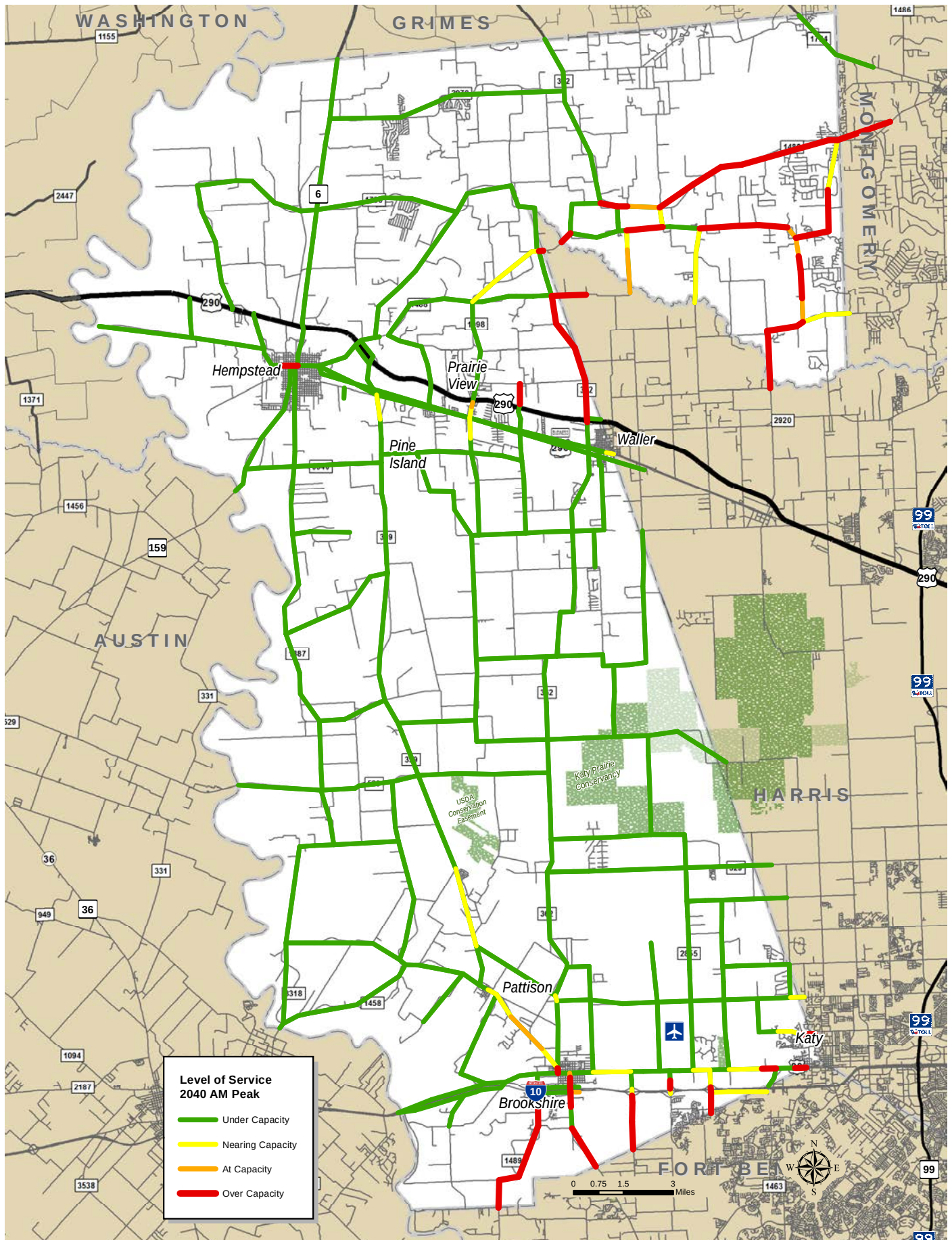


Figure 3-8: 2040 AM Level

FUTURE DEVELOPMENT

Waller County continues to grow with new single-family housing, multi-family housing, office buildings, hotels, shopping centers, dining, and entertainment venues.

Data on locations of future developments was researched and collected. Most of the major projected commercial and residential developments in the study area are shown in Figure 3-9.

Growth Metrics

Population and economic growth bring increased tax revenue, economic prosperity, social diversity, and increased services and amenities to communities. The challenges that come with growth, like traffic congestion, housing shortages, and strains on local services and schools, can be minimized or eliminated with proper planning.

Community growth typically happens incrementally making it hard to anticipate the demand it will create on existing facilities and services. Similarly, local governments deal with land development projects on a case-by-case basis making it difficult to see the cumulative impact these projects have on the local transportation network.

The growth metrics detailed in Appendix C are intended to help Waller County officials better comprehend the magnitude of future population growth. These metrics are rough estimates of the potential impact of population growth and should not be considered definitive expectations of future growth or demand. Rather, the metrics are ideas meant to facilitate discussion of policies needed to accommodate such growth should it occur.

The metrics include projections for water demand, housing, education facilities, and businesses. Housing projections include projections for single-family, multi-family, and manufactured housing. Methodology and assumptions for each topic are explained in Appendix C.

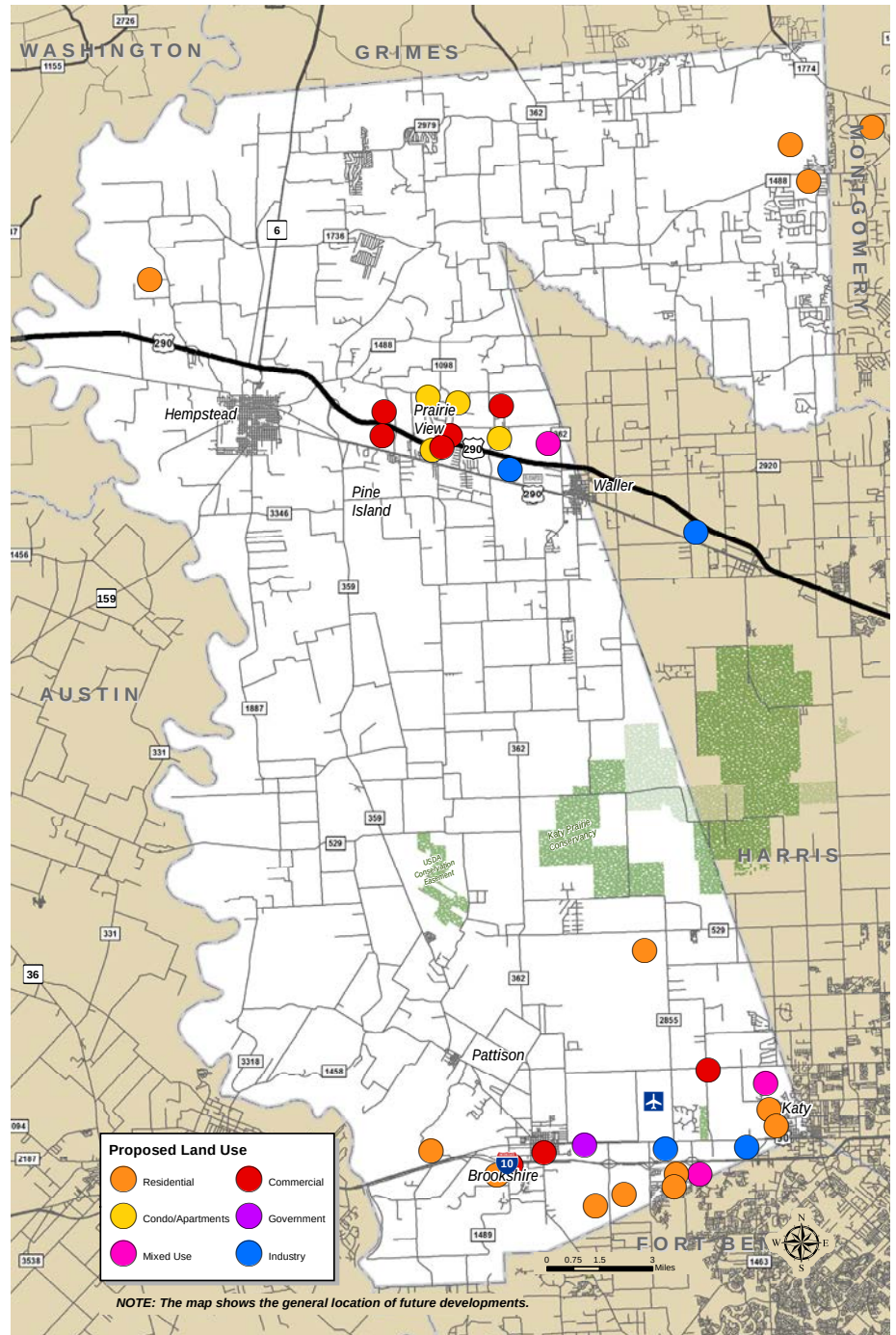


Figure 3-9: Future Developments



IDENTIFIED NEEDS

The following needs were identified by addressing the issues specified during public outreach, data collection and analysis, and forecast analysis. It should be noted that the proposed SH36A was not included in this study. TxDOT is performing a separate study on the proposed location of that corridor.

ROADWAY NEEDS

New Road Connections

Gap analysis and connectivity analysis show that new connectivity is needed in several locations throughout the county, shown by purple dotted lines in Figure 4-2.

- There is no direct connectivity between Pattison and IH 10. To access IH 10 from Pattison, drivers must travel on FM 359 and pass through Brookshire. FM 359 at IH 10 is projected to operate over capacity with a traffic volume of more than 15,000 vehicles per day during peak periods. New connectivity between Pattison and IH 10 is needed to provide alternative access and reduce the traffic demand on FM 359. This can be done by extending Durkin Road south to connect with FM 1489 and extending Wilpitz Road south to connect with IH 10.



Figure 4-1: FM 359 Extension North

- FM 529 is the only east-west road serving central Waller County. A new east-west facility is needed to reduce traffic demand on FM 529 and to improve connectivity.
- A bypass around Hempstead, Prairie View, and US 290 is needed to improve traffic circulation and support current and future developments. The loop is also needed to reduce truck traffic through downtown Hempstead. The inner loop can be built by extending FM 1736 south and east to connect with FM 359.
- A new four lane road spur from FM 1488 south to new FM 1736/Hempstead loop is needed to avoid truck traffic through downtown Hempstead.
- The extension of Wood Road as a two-lane facility from US 90 to Morton Road is needed as an additional north-south facility to alleviate traffic demand on FM 2855.
- The extension of Royal Road east to Cardiff Road is needed as an additional east-west facility to provide alternate connectivity to Royal ISD schools and the Houston Executive Airport.
- FM 359 should be extended from US 290 north to FM 1488. This important link is needed to provide an alternate route between FM 1488 and US 290. (Figure 4-1).

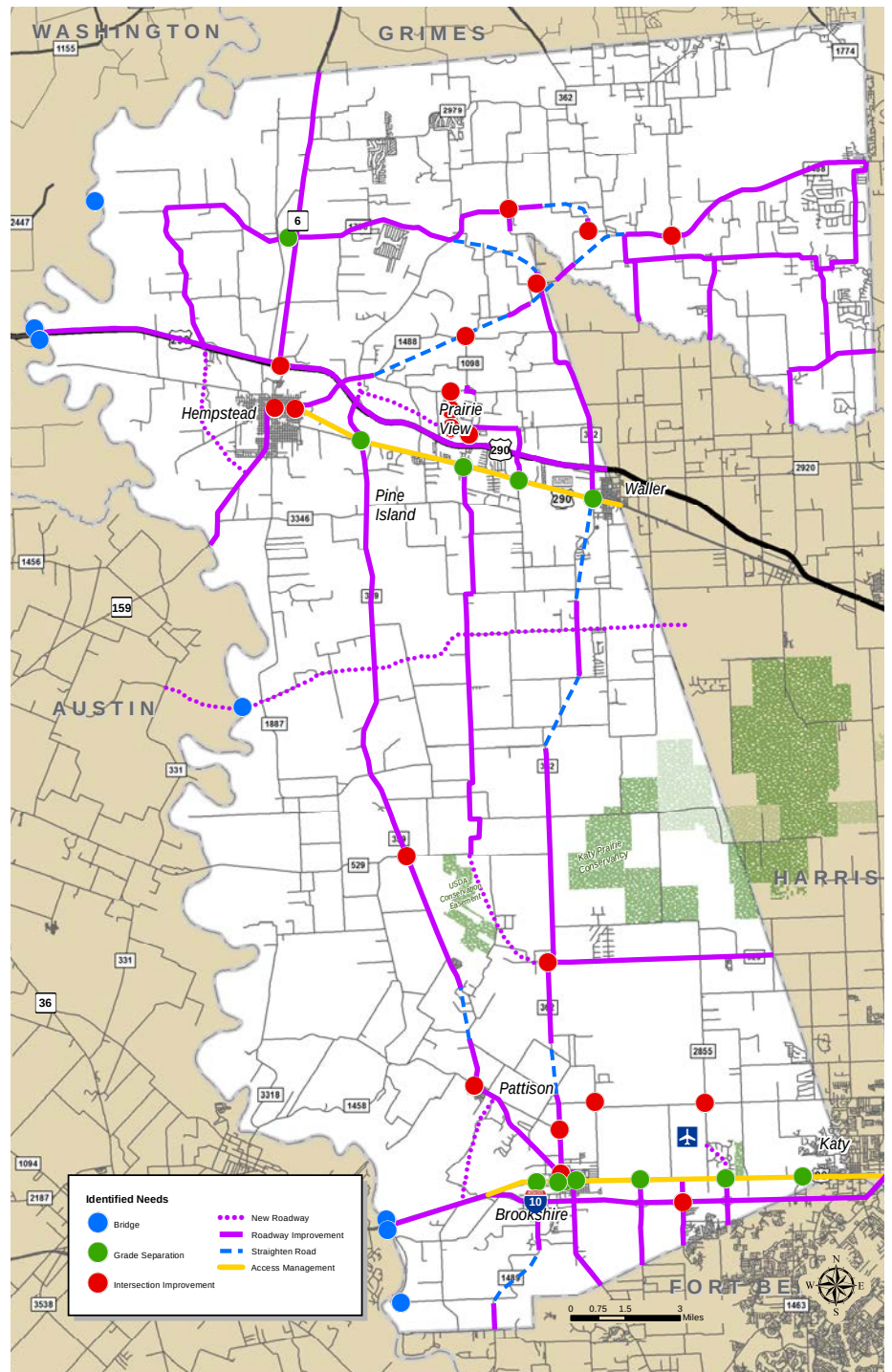


Figure 4-2: Identified Needs

Road Widening

Almost every major road needs to be widened to accommodate future traffic as shown by the solid purple lines in Figure 4-2. The County needs to include shoulders to accommodate the cyclist community when the widenings are constructed.

Road Straightening

Numerous roads need to be straightened to improve safety (Figure 4-3). These facilities are shown by dashed blue lines in Figure 4-2. Right-of-way should be preserved as development occurs to increase the safety of the drivers.

Access Management Treatments

Access management treatments, the solid yellow line in Figure 4-2, are needed along BU 290 and US 90. The treatments will improve capacity, access, safety, and mobility along those roads.

It is important to develop access management standards that balance property access with the functional integrity of the road system. Limiting the number of conflict points, reduces the chances for a crash (Figure 4-4). Studies show that installing a raised median treatment reduces crashes by 40% in urban areas and 60% in rural areas. (Access Management, Balancing Access and Mobility, Florida Department of Transportation, 2013)

Good access management practices can delay the need to widen a road for several years. In cases where roadways cannot be widened, access management will increase roadway capacity, reduce crashes, and shorten travel time. (FHWA Document Number FHWA-OP-03-066)

US 90 and BU 290 need access management improvements to improve safety. FM 359 through Pattison, FM 1488 in Hempstead, and FM 2920 in the City of Waller are other roads that could benefit from this type of treatment.

INTERSECTION NEEDS

Intersection modifications, shown with red dots in Figure 4-2, are needed where there is a safety issue, excessive delay, or expected future delays. Turn lanes, signal timing, and other capacity or safety improvements can be implemented to alleviate these issues.

Prairie View A&M University (PVAMU) is expected to experience significant growth within the next five years. In addition to the University's expansion, multi-family and commercial developments are planned near the campus. Improvements to all major roadways and intersections near and adjacent to the PVAMU campus are needed to improve safety, access, connectivity, and mobility.

Railroad grade separations, shown with green dots, are needed to

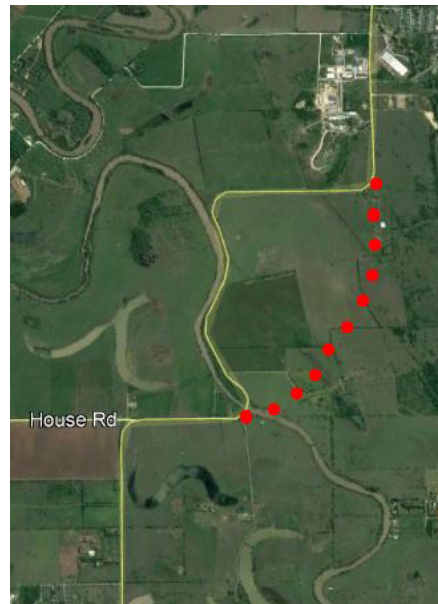


Figure 4-3: Example of Road Straightening

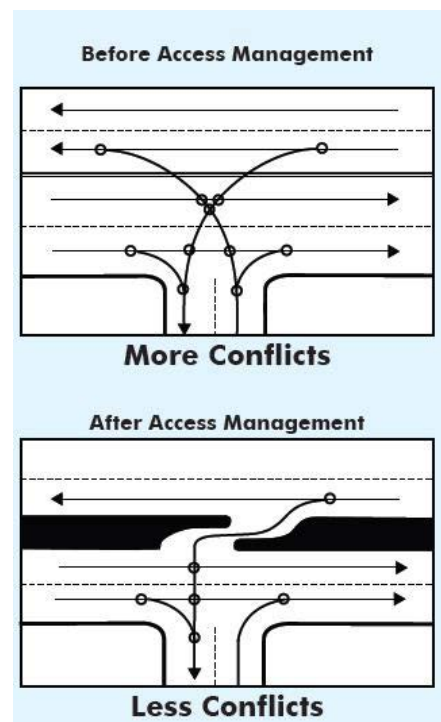


Figure 4-4: Limiting conflict points.

Source: Access Management, Balancing Access and Mobility, Florida Department of Transportation, 2013

improve safety and reduce delay. At-grade railroad crossings create safety and operational issues. Ten railroad grade separations are needed throughout the County.

Additional river crossings, shown with blue dots, are needed across the Brazos River. Currently, there are five bridges crossing the river. Three additional bridges, one north of US 290, one mid-county, and one south of IH 10, are needed to accommodate future traffic.

MULTI-MODAL NEEDS

Active Transportation

Pedestrian and bicycle facilities were also identified as a need countywide. As a result of the safety, gap, and connectivity analysis, in addition to public input, the following improvements are recommended to meet active transportation needs:

- Conduct a Waller County Active Transportation study to identify the locations for future on- and off-road facilities.
- Require sidewalks, crosswalks, and Americans with Disabilities Act (ADA) compliant ramps as part of all intersection improvements.

Transit

Population and employment growth will increase the demand for both local and commuter services. The County should consider providing opportunities for transit services in the short- and long-term for both local and commuter services. Currently, there is a high demand for public transportation in Prairie View, Hempstead, and Brookshire. Input from the public meetings identified the desire for services between cities and between northern and southern Waller County. The following improvements are needed to meet the County's future transit needs:

- Conduct a detailed County needs assessment for local and commuter services to identify deficiencies. The analysis should address the growing need for reverse commuting.

- Commuter bus service is needed to add capacity in the IH 10 corridor. Expansion of the West Katy Park and Ride and implementation of a park and ride near Brookshire would enhance capacity into Houston.
- Hempstead, Prairie View, and the City of Waller will need commuter service in the future.
- Conduct a Short-Range Transit Study to provide the County a means to address and potentially resolve significant transportation issues. Additional benefits of a Short-Range Transit Study include analysis of options for capital and operational funding for Park and Ride service in the southern part of the county. While relatively limited in scope, a Short-Range Transit Study could provide a focused approach to existing transit concerns.

The Mobility Plan presents short- and long-term recommendations designed to address the mobility needs in Waller County. These recommended improvements to the transportation network have been identified as necessary to accommodate the existing and anticipated future traffic demand on the transportation network and to address safety concerns.

As a result, the proposed recommendations listed below are expected to address the needs of this fast-growing county and allow for reasonable access to homes, jobs, shopping, and entertainment. It will be the responsibility of the Cities, County, and TxDOT to implement the suggested solutions. Appendix D lists the recommendations including a brief description of the project and estimated construction cost (in 2018 dollars, exclusive of potential right-of-way acquisition).

PREVIOUSLY FUNDED PROJECTS

The funded roadway improvement projects are included in Appendix B. The Regional Transportation Plan (RTP) includes the widening of James Muse Parkway and the widening of Woods Road totaling \$19.8 million (in 2019 dollars). The H-GAC Transportation Improvement Program (TIP) identifies the following projects:

- Clemson Switch Road bridge replacement at Bessie's Creek (underway)
- IH 10 widening one lane in each direction from Brazos River to FM 359 (underway)

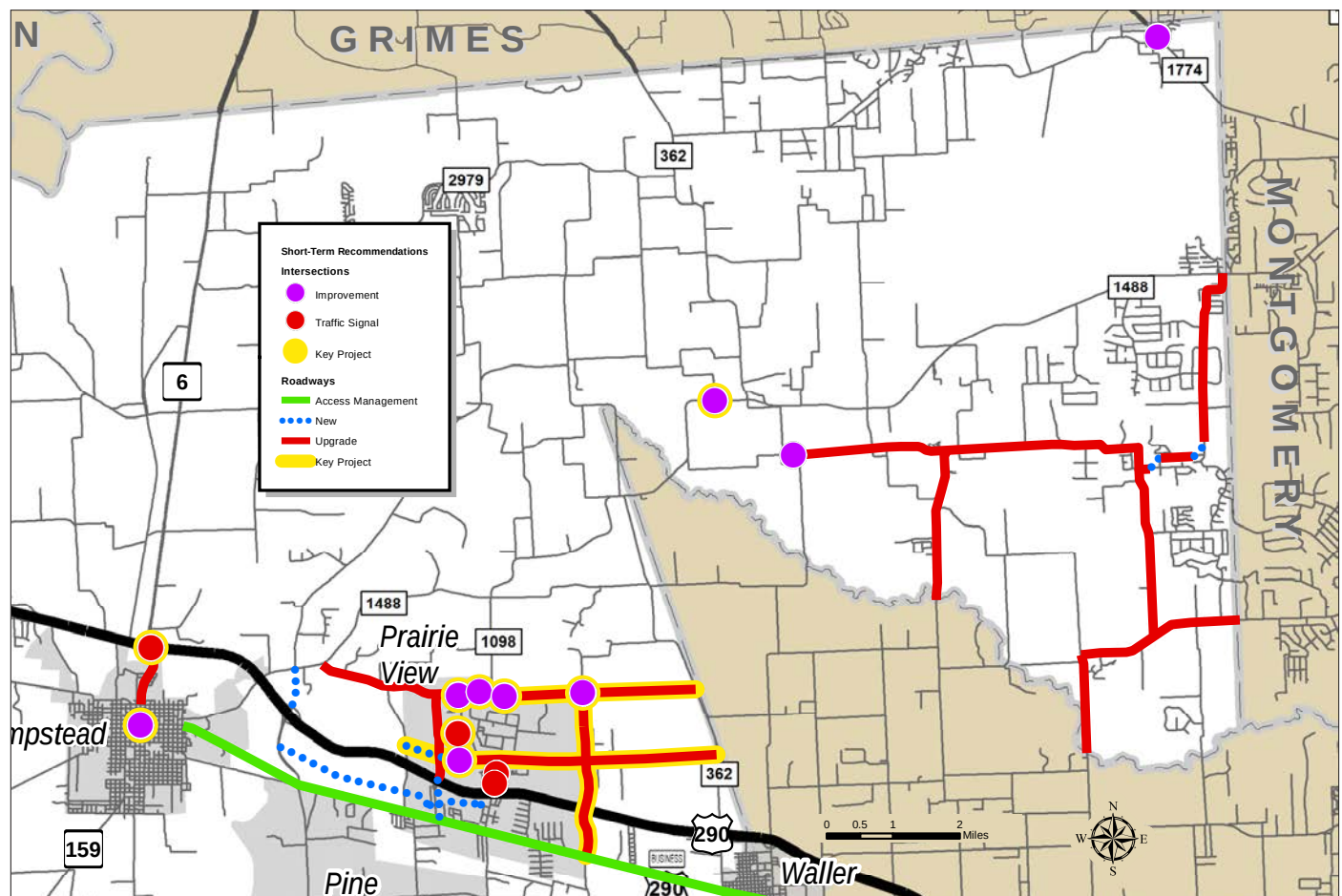


Figure 4-5: Short -Term Roadway Recommendations – Northern County

- City of Waller, downtown intersection improvements, sidewalks, pedestrian/bicycle amenities, and curb and gutter drainage improvements

RECOMMENDATIONS

SHORT-TERM ROADWAY RECOMMENDATIONS (0-5 YEARS)

The short-term recommendations consist of intersection improvements, access management, roadway improvements, pavement repair, street widening, construction of new roadways, and extensions. These recommendations have been identified as necessary to address existing mobility issues and handle the anticipated future traffic demand within the next 5 years.

Further, the short-term recommendations include key projects which are recommended to be completed as soon as possible. Figure 4-51 and Figure 4-62 depict the short-term recommendations with key projects highlighted.

BU 290

- Install advanced warning signals and signs (curve) from US 290 south 0.85 miles.
- Implement access management (median treatment) from FM 1488 to Harris County line.

Durkin Road

- Widen to four lanes from FM 359 to FM 362 with shoulder/bike lanes on both sides.

Coruthers Street

- Extend as a two-lane road parallel to US 290/BU 290 from Richards Road to FM 1098 with median/turn lane and shoulder/bike lanes.

Chapman Lane Extension

- Extend as a two-lane road parallel to US 290/BU 290 from FM 359 to Richards Road with median/turn lane and shoulder/bike lanes.

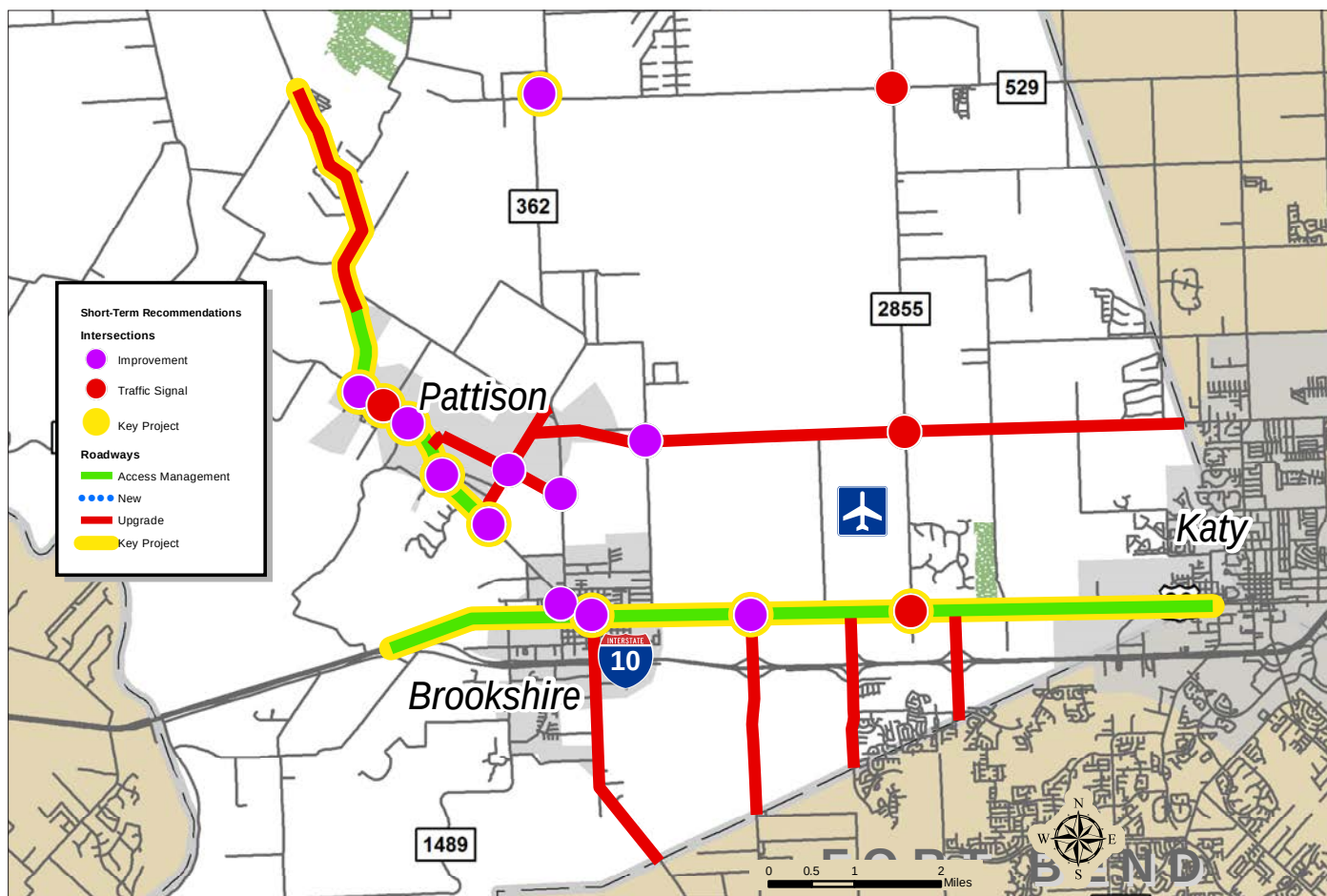


Figure 4-6: Short -Term Roadway Recommendations – Southern County

Cameron Road

- Remove intersection jog and convert to T-intersection at Flukinger Road.
- Extend as a two-lane road from O'Bannion Street to FM 1098 with median/turn lane and shoulder/bike lanes.
- Widen to four lanes from O'Bannion Street to FM 362 with median/turn lane and shoulder/bike lanes.

Flukinger Road

- Realign to connect to James Muse Pkwy and widen to four lanes from Cameron Road to Owens Road with median/turn lane and shoulder/bike lanes.

FM 359

- Conduct a safety study from Neiman Road to Bozeman Road for safety improvements.
- Implement access management treatments from Durkin Road to Clapp Road.
- Add Fire Station signage at Pattison Fire Station, install flashing traffic light, and widen intersection for improved turning movements.
- Convert skewed intersection at Wilpitz Road to T-intersection.
- Convert skewed intersection at Senzel Road to T-intersection.
- Replace flashing light with traffic signal at FM 1458.
- Convert skewed intersection at Durkin Road to a T-intersection and install traffic signal.
- Extend as a two-lane road from US 290 to FM 1488
- Widen to four-lanes from US 90 south to Fort Bend County line with median/turn lane and shoulder/bike lanes.

FM 362

- Replace flashing light with traffic signal, reduce speed limit on FM 529 (e at curve and clear vegetation to improve visibility and intersection safety at FM 359.
- Install traffic signal and add exclusive right-turn and left-turn lanes at Royal Road.

FM 1098

- Install traffic signal, convert to T-intersection, and add/widen exclusive right-turn and left-turn lanes for truck movements at Wyatt Chapel Road.

- Install traffic signal and add/widen exclusive right-turn and left-turn lanes for truck movements at Owens Road.
- Install traffic signal and add exclusive right-turn and left-turn lanes at L.W. Minor Street.
- Convert skewed intersection at FM 1098 and FM 1098 extension to a T-intersection and install traffic signal.
- Convert skewed intersection at FM 1098 and Cameron Road to a T-intersection and install traffic signal.
- Extend FM 1098 as a two-lane road from existing FM 1098 to Liendo Parkway with median/turn lane and shoulder/bike lanes.
- Add exclusive right-turn and left-turn lanes at Hawkins Street.
- Install traffic signal and add exclusive right-turn and left-turn lanes at Echols Street.
- Widen to four lanes from Wyatt Chapel Road to new Cameron Road Extension with median/turn lane and shoulder/bike lanes.

FM 1488

- Install flashing traffic signals and safety signage and add exclusive right-turn and left-turn lanes at Giboney Road (Fields Store Elementary School).

FM 1774

- Remove intersection jog and convert to T-intersection at Riley Road/E. Hollyhill Drive.

FM 2855

- Install traffic signal at US 90.
- Install traffic signal at FM 529.

Fields Store Road

- Install traffic signal and add exclusive right-turn and left-turn lanes to improve access at Joseph Road.

Hegar Road

- Widen to four lanes from Spring Creek to Magnolia Road with median/turn lane and shoulder/bike lanes.

Igloo Road

- Widen to four lanes from US 90 to Fort Bend County line with median/turn lane and shoulder/bike lanes.

James Muse Parkway

- Widen to four lanes from Owens Road to BU 290 with median/turn lane and shoulder/bike lanes.

Joseph Road

- Widen to four lanes from Fields Store Road to Montgomery County line with median/turn lane and shoulder/bike lanes.

Kickapoo Road

- Widen to four lanes from Joseph Road to Spring Creek with median/turn lane and shoulder/bike lanes.

Macedonia Road

- Realign and widen to four lanes from Joseph Road to Magnolia Road with median/turn lane and shoulder/bike lanes.

Magnolia Road

- Widen to four lanes from Hegar Road to Montgomery County line with median/turn lane and shoulder/bike lanes.

Morton Road

- Realign and widen to four-lanes from Durkin Road to Harris County line with median/turn lane and shoulder/bike lanes.
- Improve intersection geometric design to remove disjointed intersection at Neuman Road.
- Install traffic signal controller at FM 2855.

Owens Road

- Widen to four lanes from FM 362 to University Drive and improve access to Herman T. Jones Elementary School with median/turn lane and shoulder/bike lanes.

Pederson Road

- Widen to four lanes from US 90 south to Fort Bend County line with median/turn lane and shoulder/bike lanes.

Richards Road

- Widen to four lanes from US 290 to BU 290 and realign to connect with Springdale Road with median/turn lane and shoulder/bike lanes.
- Widen to four lanes from Wyatt Chapel Road to US 290 with median/turn lane and shoulder/bike lanes.

Royal Road

- Install traffic signal controller at Durkin Road.
- Widen to four lanes from FM 359 to Clapp Road with median/turn lane and shoulder/bike lanes.

SH 6

- Replace flashing red light at US 290 with a traffic signal.
- Conduct a traffic study to identify long term solution to US 290 interchange to accommodate football weekend traffic in the fall.

SH 159

- Install traffic signal, add truck signage and add/widen exclusive right-turn and left-turn lanes for truck movements at Austin Street.

US 90

- Install traffic signal, add truck signage, and add/widen exclusive right-turn and left-turn lanes for truck movements at Waller Avenue.
- Remove intersection jog at Woods Road and realign with crossing of railroad track to Goya Road/McAllister.
- Implement access management treatments from Donigan Road to Harris County line.

Woods Road

- Widen to four lanes from US 90 to Fort Bend County line with median/turn lane and shoulder/bike lanes.
- Begin acquiring ROW for Woods Parkway (Limited Access Facility)

Wyatt Chapel Road

- Widen to four lanes from FM 1488 to FM 1098 with median/turn lane and shoulder/bike lanes.

SHORT-TERM PAVEMENT REPAIR (0-5 YEARS)

The pavement repair recommendations are a result of the roadway inventory that was conducted in Brookshire, Hempstead, Katy, Pattison, Pine Island, and the City of Waller. Information regarding the inventoried roads can be found in Chapter 2. Table 4-1 lists the number of road miles and the estimated construction cost for pavement repair by community. A table detailing the individual roadway segments recommended for pavement repair, estimated cost, and the responsible entity is presented in Table 4-4, Roadway Inventory Summary.

SHORT-TERM TRANSIT RECOMMENDATIONS

It is recommended that an in-depth study be conducted to address the local and commuter transit issues. The study should perform a detailed look at the feasibility, service plan, cost, and implementation plan for the following:

- Year-round weekday circulator service for Hempstead, Prairie View, City of Waller, and Brookshire.
- Intra-county service linking Hempstead, Prairie View, City of Waller, and Brookshire.
- Secure a location in western Katy and initiate Park and Ride service into Houston by 2022 or 2023.

Table 4-1: Estimated Cost of Pavement Repair

City	Road Condition	Lane Miles	Estimated Cost (Millions)
Brookshire	Fair	5.68	\$4.5
	Poor	4.92	\$3.8
Hempstead	Fair	1.92	\$2.8
	Poor	1.79	\$1.4
Katy	Fair	4.35	\$3.4
	Poor	0.0	\$0.0
Pattison	Fair	3.49	\$2.7
	Poor	1.88	\$1.4
Pine Island	Fair	8.80	\$6.8
	Poor	0.00	\$0.0
Prairie View	Fair	7.56	\$6.8
	Poor	0.00	\$0.0
Waller	Fair	5.74	\$5.7
	Poor	0.00	\$0.0
TOTAL		46.31	\$39.2

SHORT-TERM ACTIVE TRANSPORTATION RECOMMENDATIONS

There were numerous locations where stakeholders and the public identified additional bicycle infrastructure needs. While not the focus of this study, the location of these needs was recorded and mapped (see Chapter 2). It is recommended that Waller County develop a bicycle plan that will further refine the location of bike needs, identify the specific type of bike infrastructure needed (i.e. a bike lane on shoulder, separated on-road bike lane, off-road bike trail, etc.), and a plan to implement bicycle project recommendations.



LONG-TERM ROADWAY RECOMMENDATIONS (6-25 YEARS)

The long-term roadway recommendations consist of roadway widening and extension, construction of new roadway facilities, intersection modification, bridges over the Brazos River, and railroad grade separations. These recommendations have been identified as necessary to handle the anticipated future traffic demand on the area's transportation network. Figure 4-6 depicts the long-term recommendations.

IH 10

- Coordination with TxDOT regarding the on-going project of adding one additional main lane and frontage road to each direction throughout Waller County.
- Complete diamond interchange for full access to IH 10 at Igloo Road.
- Construct two IH 10 frontage road bridges at the Brazos River.

US 290

- Add U-turn lane at FM 362.
- Construct two US 290 frontage road bridges at the Brazos River.
- Add direct connectors from US 290 eastbound to SH 6 northbound and from SH 6 southbound to US 290 westbound and U-turn lanes.
- Add one additional main lane and frontage road per direction, improve drainage, install advanced truck signage, and add U-turn lanes.

US 90

- Add exclusive right-turn and left-turn lanes at Cooper Street.
- Install traffic signal and add exclusive right-turn and left-turn lanes at FM 1489/Koomey Road.
- Install traffic signal and add exclusive right-turn and left-turn lanes at Otto Road.
- Widen to four lanes for segments within Waller County.

SH 6

- Widen to three lanes per direction as limited access facility from US 290 to Grimes County line and install advanced truck signage.

SH 159

- Widen to four lanes from 13th Street to 10th Street with median/turn lane and shoulder/bike lanes.
- Widen to four lanes from Austin Street to Austin

County line with median/turn lane and shoulder/bike lanes.

FM 1098 Extension

- Extend as a two-lane facility with shoulders from Penick Road to the Harris County line.

FM 1458

- Realign and widen to four lanes from FM 359 to Austin County line with median/turn lane and shoulder/bike lanes.

FM 1736

- Realign and widen to four lanes from US 290 to Waller Gladish Road with median/turn lane and shoulder/bike lanes.
- New FM 1736/Hempstead loop by extending FM 1736 as a four-lane facility from US 290 to FM 359 at Cauty Road with median/turn lane and shoulder/bike lanes.

FM 1488

- Replace flashing light with traffic signal and add exclusive right-turn and left-turn lanes at FM 1098.
- Add/widen exclusive right-turn and left-turn lanes at Austin Street.
- Remove intersection jog and align with Hegar Road at Bowler Road.
- Realign and widen to four lanes from BU 290 to Montgomery County line with median/turn lane and shoulder/bike lanes; drainage improvements.
- Construct a new four-lane road spur from FM 1488, south to New FM 1736/Hempstead loop.

FM 1489

- Install traffic signal and add exclusive right-turn and left-turn lanes at House Road.
- Install traffic signal and add exclusive right-turn and left-turn lanes at IH 10 frontage road.
- Widen to four lanes from IH 10 to US 90 with median/turn lane and shoulder/bike lanes.
- Extend as a two-lane facility with shoulders from US 90 to FM 359 at Durkin Road.
- Grade separation at UPRR.
- Realign and widen to four lanes from House Road to IH 10 with median/turn lane and shoulder/bike lanes.

FM 359

- Replace flashing light with traffic signal and add exclusive right-turn and left-turn lanes at FM 529.

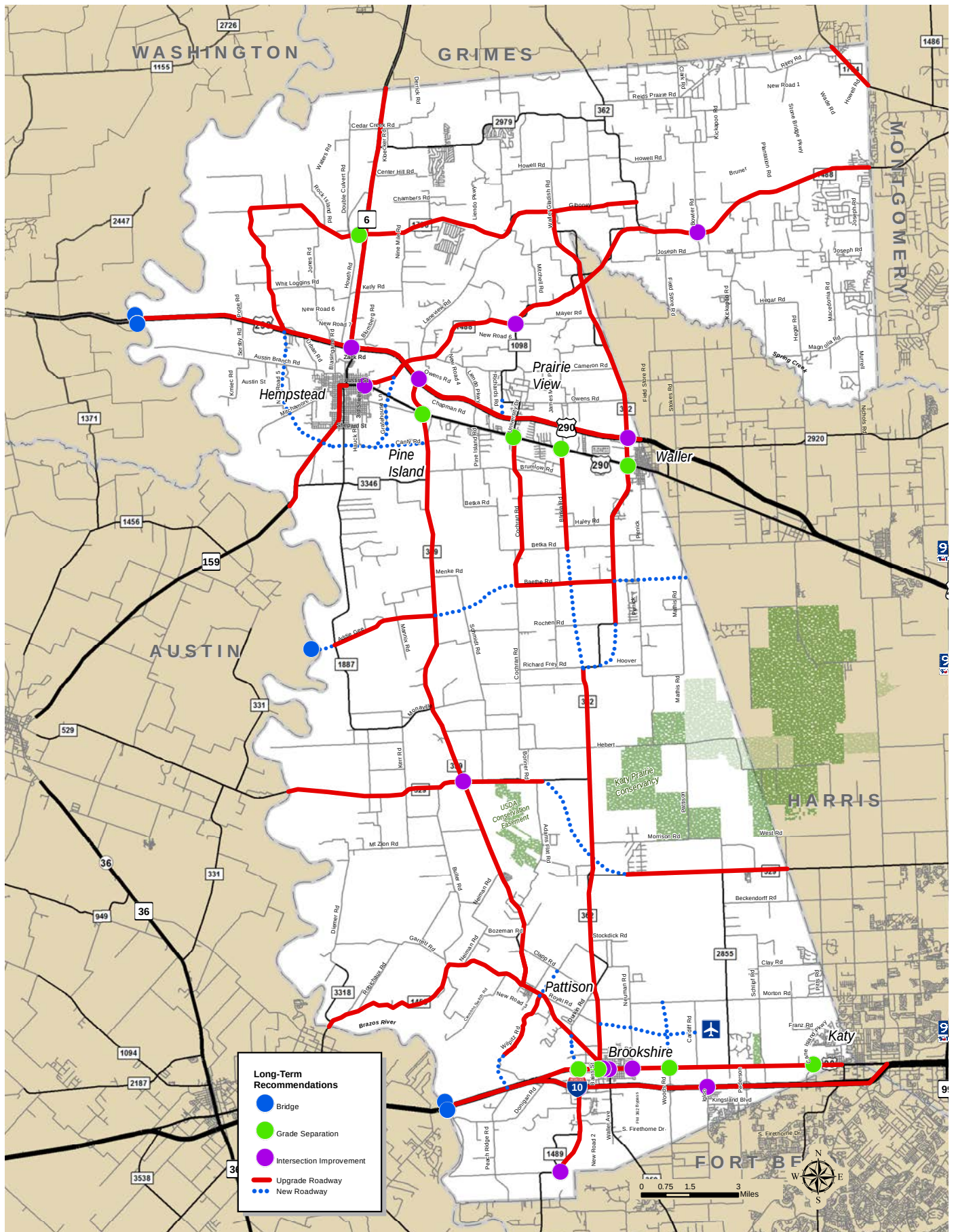


Figure 4-7: Long-Term Recommendations

- Install traffic signals at ramps at US 290.
- Grade separation at UPRR north of BU 290.
- Realign and widen to four lanes from US 290 to US 90 with median/turn lane and shoulder/bike lanes.
- Grade separation at UPRR north of US 90.

FM 362

- Realign and widen to four lanes from FM 1736 to Rothen Road with median/turn lane and shoulder/bike.
- Construct a new four-lane road from Rothen Road to Richard Frey Road to eliminate sharp curves.
- Realign and convert skewed intersection to T-intersection to improve intersection safety at FM 529.
- Realign and widen to four lanes from Richard Frey Road to FM 359 with median/turn lane and shoulder/bike lanes and improve drainage.
- Grade separation at UPRR.

FM 529

- Construct a new four-lane road from Wilson Road/FM 362 to Adams Flat Road with median / turn lane and shoulder/bike lanes.
- Widen to four lanes from Adams Flat Road to Austin County line with median/turn lane and shoulder/bike lanes.
- Widen to four lanes from Wilson Road/FM 362 to Harris County line with median/turn lane and shoulder/bike lanes.

Addie Gee Road

- Realign and improve two-lane road with shoulders from FM 1887 to FM 359.
- Extend as a two-lane road with shoulders east to Baethe Road.
- Extend as a two-lane road with shoulders west to the Brazos River (intended to connect to Oil Field Road at Lake Road in Austin County).
- Construct a new bridge over Brazos River.

Baethe Road

- Improve existing two-lane road with shoulders from Cochran Road to Penick Road.
- Extend as a two-lane road with shoulders from Penick Road to the Harris County line.

Blinka Road

- Widen to four lanes from BU 290 to Betka Road with median/turn lane and shoulder/bike lanes.
- Extend as a two-lane road from Betka Road to Richard Frey Road at FM 362 with shoulder/bike lanes.
- Grade separation at UPRR.

Bruner Road

- Realign and widen to four lanes from Giboney Road to FM 362 with median/turn lane and shoulder/bike lanes.

Cane Island Parkway

- Grade separation at UPRR.

Cochran Road

- Grade separation at UPRR.
- Realign and widen to four lanes from BU 290 to Baethe Road with median/turn lane and shoulder/bike lanes.

Giboney Road

- Realign and widen to four lanes from Waller Gladish Road to Bruner Road with median/turn lane and shoulder/bike lanes.

Royal Road Extension

- Extend as a two-lane road with shoulders east to connect to Cardiff Road.

Stalknecht Road at UPRR

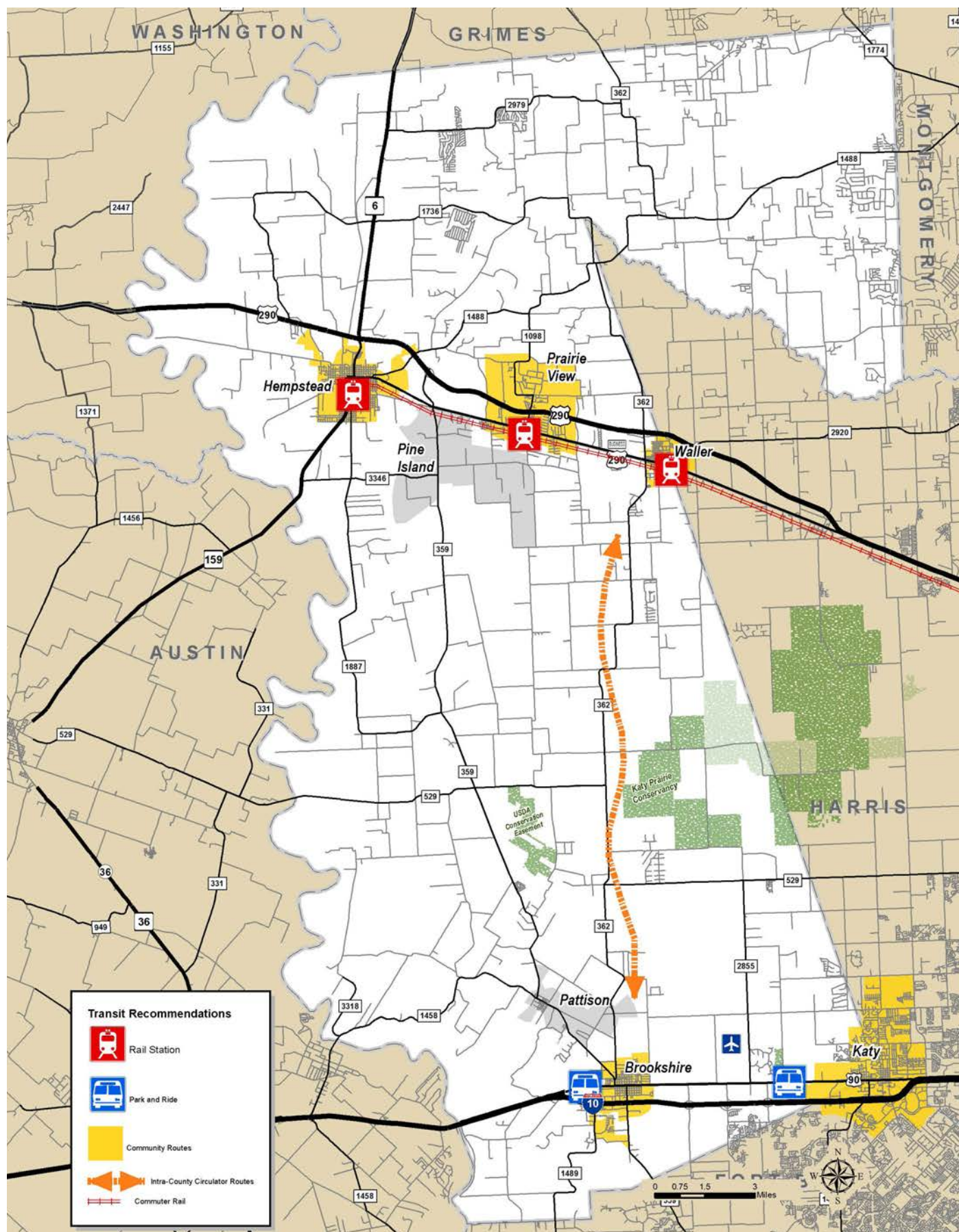
- Install traffic signal and add exclusive right-turn and left-turn lanes and improve at-grade crossing at UPRR.

Wilpitz Road

- Extend as a two-lane road with shoulders north to Clapp Road / McGregor Lane.
- Widen to four-lanes from FM 359 to Bessie's Bayou with median/turn lane and shoulder/bike lanes.
- Extend as a four-lane road south from Bessie's Bayou to IH 10 and Peach Ridge Road with median/turn lane and shoulder/bike lanes, including a bridge at Bessie's Bayou.

Woods Road

- Extend as a two-lane facility with shoulders from US 90 to Morton Road.



LONG-TERM TRANSIT RECOMMENDATIONS

Long-term transit recommendations include park and ride commuter bus service and commuter rail service.

Park and Ride Commuter Bus Service

Park and ride commuter bus service from Brookshire and expansion of Western Katy service to Houston. Feeder transit service between Hempstead, Prairie View, City of Waller, and Cypress.

Commuter Rail Service

Commuter rail service connecting Hempstead, Prairie View, and City of Waller with Houston Downtown.

Figure 4-9 depicts the long-term transit recommendations. Table 4-7 details the recommended transit projects?

LONG-TERM ACTIVE TRANSPORTATION RECOMMENDATIONS

Long-term pedestrian/bicycle recommendations include on-road and off-road facilities. Figure 4-8 depicts the long-term pedestrian/bike recommendations. A table of the recommended shared use paths and the responsible entity is presented in Table 4-6.

On-Road Facilities

Paved shoulders, sidewalks, or bike lanes are recommended as parts of all short-term and long-term roadway projects, where possible.

Off-Road Facilities

Six separated shared use paths are recommended as a building block for a regional active transportation network:

1. SH 6 Path - Separated shared use path along easement between SH 6 and Grimes County line.
2. US 90 Path - Separated shared use path along easement between FM 362 and Harris County line.
3. Houston Ave/BU290 Path - Separated shared use path along an easement between Downtown Hempstead, east to Harris County line.
4. CenterPoint Path - Separated shared use path along the CenterPoint easement from Grimes County line south to Magnolia Road.
5. Brazos River Path - Separated shared use path along the Brazos River from FM 3346, south to FM 1458.
6. Katy Prairie Loop - Separated shared use path loop starting at Harris County line using Richard Frey Road to FM 362 to Morrison Road ending at Harris County line.

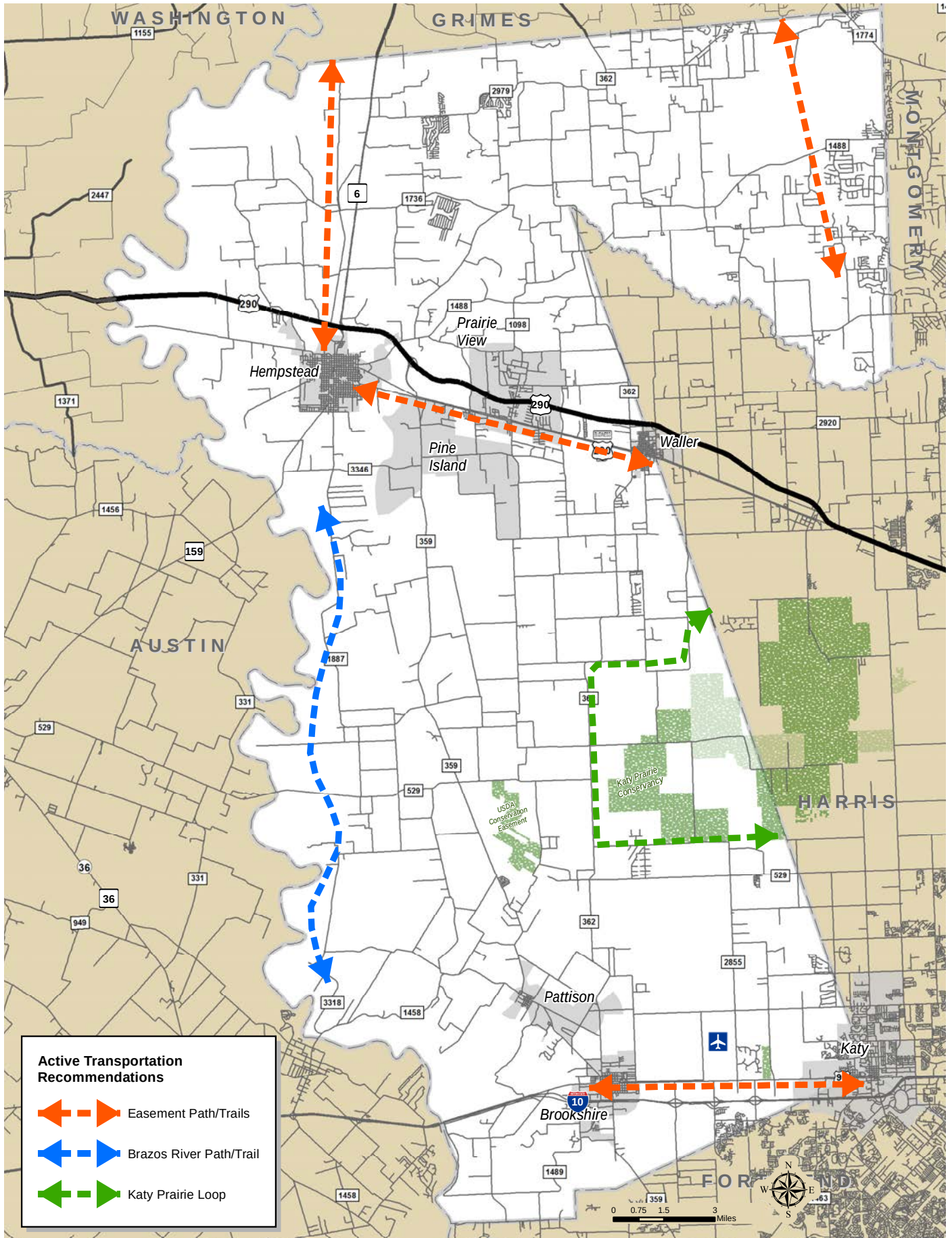


Figure 4-9: Long Term Active Transportation Recommendations

POLICY RECOMMENDATIONS

In addition to the project recommendations, there are several policy recommendations to consider that were proposed through the stakeholder and public engagement process. These policy recommendations are intended to be considered by the County to address future transportation needs and operational improvements.

Jurisdictional Coordination

The County should update its comprehensive plan in coordination with adjacent cities. Doing so will ensure coordination and alignment between jurisdictions and increase collaboration to implement plan objectives and recommendations. The cities of Hempstead and Waller have both developed Livable Centers Planning studies. Livable Centers is an H-GAC program that works with local communities to identify specific recommendations, such as pedestrian and bicycle facilities, that can help facilitate the creation of Livable Centers. Through the study process the local community identifies a vision for the study area. The studies contain an implementation plan to realize this vision.

It is recommended that Pattison, Brookshire, Prairie View, and Pine Island initiate Livable Centers studies that expand upon the efforts of Hempstead and City of Waller.

Managing New Growth

The County is undergoing rapid development and the County character is shifting from a rural County, to a more developed County with new subdivisions and employment centers. This new growth will result in increased traffic and wear and tear on the existing roadways. To plan and manage this new growth, the County should request Traffic Impact Assessments (TIA) for new developments. A TIA is used to understand the traffic impacts a new development will have on the existing transportation network. Understanding these impacts will help the County prioritize roadway projects to minimize congestion impacts that may result from new development.

COSTS AND BENEFITS

Costs

The estimated total cost to implement the WCTP has been divided into short-term and long-term projects, as shown in Table 4-2 and Table 4-3 by recommendation type. Detailed project costs and project descriptions are presented in Table 4-4 (road repair), Table 4-5 (short-term key roadway), Table 4-6 (short-term other roadway), Table 4-7 (long term roadway), Table 4-8 (long-term hike/bike), and Table 4-9 (long-term transit).

Table 4-2: Short and Long-Term Cost Summary

Recommendation Type	Length (Miles)	Estimated Cost (Millions)
Road Repair	46.31	\$39.2
Poor Roads	8.59	\$6.6
Fair Roads	37.72	\$32.6
Short-Term	83.40	\$276.0
Short-Term Key	25.90	\$68.2
Short-Term Other	57.51	\$207.8
Long-Term	216.35	\$1,244.0
TOTAL	377.02	\$1,559.2

Table 4-3: Short and Long-Term Improvements by Project Type

Recommended Improvement Type	Length (Miles)	Estimated Cost (Millions)
Short-Term	83.18	\$276.0
New Facility	5.62	\$17.8
Widen and Improve	52.53	\$224.5
Access Management	22.12	\$11.7
Safety Study	3.13	\$1.2
Intersection Improvement	n/a	\$20.8
Long-Term	137.53	\$1,244.0
New Facility	36.70	\$156.5
Bridge	1.05	\$120.0
Widen and Improve	171.00	\$750.3
Improve	7.00	\$12.3
Intersection Improvements	n/a	\$45.0
Grade Separation	n/a	\$160.0
TOTAL	220.71	\$1,520.0

Benefits

- Improved travel time by developing a network of E/W and N/S roads that improve connectivity.
- Distributing traffic across various roadways by providing alternative travel routes.
- Congestion mitigation by increasing connectivity and reducing mobility barriers by constructing roadway and intersection improvements.
- Implementing transit services.
- Improved safety by implementing access management strategies.
- Improved safety for bikes and pedestrians by adding shoulders to new and widened roadways and creating off-road active transportation paths.
- Communities working together for better mobility in Waller County.

- b. Support Entity – the partnering entity or entities who will assist with the implementation of the project or take over the lead role in implementation in the case where the lead entity is unable to implement it. The support entity's role includes participating in the funding of the project and might also be responsible for a specific phase of the project implementation; such as conceptual design, right-of-way acquisition, preliminary design, final design, or construction.

The success of any planning document ultimately comes down to implementation. The WCTP sets several Goals, Objectives, and Performance Measures (see Table 1-1 in Chapter 1) to guide the plan through implementation and to measure the plan's performance.

IMPLEMENTATION

The WCTP includes recommended projects to be implemented by the partner agencies. Three implementation periods were determined: short-term key projects (0-5 years), other short-term projects (0-5 years), and long-term projects (6+ years). The implementation period for short-term key projects is similar to that for other short-term projects; however, the short-term key projects are those deemed most critical to immediate mobility improvement and their implementation should be prioritized by the entity responsible for implementing each project.

The list of recommended projects is identified in the Tables 4-4, 4-5, 4-6, 4-7, 4-8 and 4-9. The recommended projects have been categorized in five areas:

1. Road/Improvement/Length – identifies the recommended location of the projects for implementation.
2. Segment Description – describes the specific task to be completed.
3. Segment Cost Estimate – estimated construction cost of the segment/study. Note that Segment Cost Estimates are for construction only and do not include related costs such as right-of-way acquisition, utility relocation, etc.
4. Responsible Entity – identifies all groups responsible for the implementation of the project; this category is further broken into lead and supporting entity.
 - a. Lead Entity – constitutes the project “Champion” for the project, who is primarily responsible for the implementation of the project.

Table 4-4: Roadway Inventory Summary

CITY	ROAD	LENGTH (Miles)	FROM	TO	NUMBER OF LANES	ROAD CONDITION	SHOULDER	MEDIAN	ROAD MARKING / STRIPING CONDITION	EST. COST (MILLIONS)
Brookshire	Cooper Street /South Street	1.52	End of Cooper (W)	Waller Avenue	2	Fair	No	No	No	1.2
	FM 1489	1.80	Gassner Road	Rheman Cutoff Road	2	Poor	No	No	No	1.4
	FM 359/Bain Rd	1.34	IH 10	Hubbard Road	2	Poor	No	No	No	1.0
	FM 362	0.59	Garvie Road	FM 359	2	Fair	Yes	No	Good	0.5
	Gassner St./2 1/2 Street	1.07	FM 359	Waller Street	2	Poor	No	No	No	0.8
	South Street	0.71	Waller Ave	Hereford Drive	2	Poor	No	No	No	0.6
Hempstead	US 90	2.60	Donign Road	Stalknecht Road	2	Fair	No	No	No	2.0
	Waller Street	1.16	2 1/2 Street	13th Street	2	Fair	Yes	No	Fair	0.9
	Austin Branch Rd	0.58	Urban Road	Country View Lane	4	Good	No	No	Fair	--
	BU 290 /Austin Street	1.54	SH 159	Diurio Farmers Market	4	Fair	No	Yes	Good	2.4
	Blasingame Rd	0.90	US 290	St. Marys Street	3	Good	No	No	Fair	--
	Blasingame Rd	0.38	St. Marys Street	Austin Street/BU 290	3	Fair	No	No	No	--
Katy	BU 290	1.03	US 290	Austin Street	4	Good	Yes	No	Good	1.0
	FM 1488	1.52	Austin Street	SH 6	3	Good	Yes	No	Good	--
	FM 1887	1.35	Austin Street	Shepard Street	4	Good	Yes	No	Good	--
	SH 159	1.46	Wilkins Street	Shepard Street	4	Good	Yes	No	Good	--
	Urban Street	1.79	US 290	Austin Street	2	Poor	No	No	Good	1.4
	Ave D	2.15	US 90	Morton	4	Good	No	No	Good	--
	First Street	1.78	Avenue D	Tubular Street	2	Fair	No	No	No	1.4
	FM 1463	0.63	US 90	IH 10W	4	Good	No	Yes	Good	--
	Frantz Road	2.34	Katy Fort Bend Road	Bartlett Road	4	Good	No	Yes	Good	--
	Morton	1.00	Pitts	Katy Hockley Cutoff	4	Good	No	No	Good	--
	US 90	2.57	Avenue D	Commerce Drive	2	Fair	Yes	No	Good	2.0
	Clapp Road	3.04	FM 359	FM 362	2	Good	No	No	Fair	--
Pattison	Durkin Road	0.70	FM 359	Royal Road	2	Fair	No	No	Fair	0.5
	Durkin Road	0.80	Royal Road	Clapp Road	2	Poor	No	No	No	0.6
	FM 1458	0.25	FM 359	Hidden Country Trailer Park	2	Good	Yes	No	Good	--

Table 4-4: Roadway Inventory Summary

CITY	ROAD	LENGTH (Miles)	FROM	TO	NUMBER OF LANES	ROAD CONDITION	SHOULDER	MEDIAN	ROAD MARKING / STRIPING CONDITION	EST. COST (MILLIONS)
Pattison	FM 359	3.86	Clapp Road	Kellner Road	2	Good	Yes	No	Good	--
	FM 362	1.59	Royal Road	Clapp Road	2	Fair	Yes	No	Good	1.2
	Royal Road	1.21	FM 359	FM 362	2	Fair	No	No	Good	0.9
	Sterling St./1st Street	1.08	Avenue H Street	Clapp Road	2	Poor	No	No	No	0.8
Pine Island	Wilpitz Road	0.67	FM 359	Stenzel Road	2	Good	No	No	No	--
	Betka Road	4.24	Brumlow Road	Cochran Road	2	Fair	No	No	No	3.3
	Brumlow Road	2.71	FM 359	Cochran Road	2	Good	No	No	Fair	--
	Cochran Road	2.52	Brumlow Road	Betka Road	2	Good	No	No	Good	--
	FM 3346	1.96	FM 359	Clear Creek Road	2	Good	No	No	Good	--
	FM 359	2.97	Pierceall Road	Old Houston Road	2	Fair	Yes	No	Good	2.3
Prairie View	Old Houston Rd	1.60	Clear Creek Road	Laura Road	2	Fair	No	No	Good	1.2
	Blinka Rd. / James Muse Pkwy	1.97	Pine Ridge Road	Owens Road	2	Fair	No	No	Good	1.5
	BU 290	1.25	Liendo Parkway	James Muse Pkwy	4	Fair	No	No	Good	1.9
	Cochran Road	1.21	BU 290	Pine Ridge	4	Good	Yes	No	Good	--
	FM 1098	3.10	Joe Loggins Road	US 290	2	Good	Yes	No	Good	--
	Liendo Pkwy	1.92	Wyatt Chapel Road	BU 290	2	Fair	No	No	Fair	1.5
	Owens Road	1.28	University Drive	James Muse Pkwy	2	Fair	No	No	Fair	1.0
	Richards Road	1.87	Wyatt Chapel Road	BU 290	2	Good	No	No	Fair	0.9
	Wyatt Chapel Rd	1.14	Liendo Parkway	FM 1098	2	Fair	No	No	Fair	--
Waller	BU 290	1.60	Stokes	FM 362	4	Fair	No	No	Good	2.5
	Fieldstore	1.66	Waller Spring Creek Rd	Mills	2	Good	No	No	Fair	--
	FM 362	2.84	Owens	Quail Hollow Park	2	Fair	Yes	No	Good	2.2
	Mary Waller Road	0.46	FM 362	Field Store Road	2	Good	No	No	Good	--
	Penick Road	0.42	Washington Street	Myrtle Avenue	2	Good	No	No	No	--
	Waller Street	0.75	FM 362	Field Store Road	2	Good	No	No	No	--
	Washington St.	1.30	Waller-Tomball Road	FM 362	2	Fair	No	No	Fair	1.0

Table 4-5: Waller County Mobility Plan Recommendations - Short-Term KEY Projects

Project ID	Road	Improvement	Length (Miles)	Description	Estimated Cost (Millions)	Lead Agency	Support Agency
1	Cameron Road	Widen and Improve	2.8	Widen to four lanes from O'Bannon Street to FM 362 with median/turn lane and shoulder/bike lanes	12.0	PV	WC
2	Cameron Road at Flukinger Road	Intersection Improvement	-	Remove intersection jog and convert to T-intersection	1.0	PV	WC
3	Cameron Road Extension	New Facility	0.7	Extend as a two-lane road from O'Bannon Street to FM 1098 with median/turn lane and shoulder/bike lanes	2.2	PV	--
4	Flukinger Road	Widen and Improve	1	Realign to connect to James Muse Pkwy and widen to four lanes from Cameron Road to Owens Road with median/turn lane and shoulder/bike lanes	6.0	PV	--
5	FM 1098 at Cameron/FM 1098	Intersection Improvement	-	Convert skewed intersection to a T-intersection and install traffic signal	1.0	TxDOT	PV
6	FM 1098/Cameron at O'Bannon Street	Intersection Improvement	-	Convert skewed intersection to a T-intersection and install traffic signal	1.0	TxDOT	PV
7	FM 1098 at L.W. Minor Street	Intersection Improvement	-	Install traffic signal and add exclusive right-turn and left-turn lanes	0.2	TxDOT	PV
8	FM 1098 at Owens Road	Intersection Improvement	-	Install traffic signal and add/widen exclusive right-turn and left-turn lanes for truck movements	1.0	TxDOT	PV
9	FM 1098 at Wyatt Chapel Road	Intersection Improvement	-	Install traffic signal and convert to T-intersection and add/widen exclusive right-turn and left-turn lanes for truck movements	1.0	TxDOT	PV
10	FM 1098 Extension	New Facility	1	Extend as a two-lane road from FM 1098 to Liendo Parkway with median/turn lane and shoulder/bike lanes	3.2	TxDOT	PV
11	FM 1488 at Giboney Road**	Intersection Improvement	-	Install flashing traffic signals and safety signage at Fields Store Elementary School and add exclusive right-turn and left-turn lanes	1.0	TxDOT	WC
12	FM 2855 at US 90	Intersection Improvement	-	Install traffic signal	0.2	TxDOT	WC
13	FM 359 (A)	Access Management	3.2	Implement access management (median treatment) from Dirkin Road to Clapp Road	1.9	TxDOT	P
14	FM 359 (B)	Safety Study	2.3	Conduct a safety study from Neiman Road to Bozeman Road for safety improvements	0.9	TxDOT	P
15	FM 359 at Durkin Road	Intersection Improvement	-	Convert skewed intersection to a T-intersection and install traffic signal	1.0	TxDOT	P
16	FM 359 at FM 1458	Intersection Improvement	-	Replace flashing light with traffic signal	1.0	TxDOT	P
17	FM 359 at Pattison Fire Station	Intersection Improvement	-	Add Fire Station signage and install flashing traffic light and widen intersection for improved turning movements	0.1	TxDOT	P

Table 4-5: Waller County Mobility Plan Recommendations - Short-Term KEY Projects

Project ID	Road	Improvement	Length (Miles)	Description	Estimated Cost (Millions)	Lead Agency	Support Agency
18	FM 359 at Stenzel Road	Intersection Improvement	-	Convert skewed intersection to T intersection	1.0	TxDOT	P
19	FM 359 at Wilpitz Road	Intersection Improvement	-	Convert skewed intersection to T intersection	1.0	TxDOT	P
20	James Muse Parkway**	Widen and Improve	1.5	Widen to four lanes from Owens Road to BU 290 with median/turn lane and shoulder/bike lanes	6.4	PV	--
21	Owens Road	Widen and Improve	3.8	Widen to four lanes from FM 342 to University Drive and improve access to Herman T Jones Elementary School with median/turn lane and shoulder/bike lanes	15.9	PV	WC
22	SH 159 at Austin Street	Intersection Improvement	-	Install traffic signal, add truck signage and add/widen exclusive right-turn and left-turn lanes for truck movements	1.0	H	TxDOT
23	SH 6 at US 290	Intersection Improvement	-	Replace flashing red light with a traffic signal	0.5	TxDOT	--
24	US 90	Access Management	9.6	Implement access management (median treatment) from Donigan Road to Harris County line	5.7	TxDOT	B, K, WC
25	US 90 at Waller Ave	Intersection Improvement	-	Install traffic signal, add truck signage and add/widen exclusive right-turn and left-turn lanes for truck movements	1.0	TxDOT	B
26	US 90 at Woods Road	Intersection Improvement	-	Remove intersection jog and realign with crossing of railroad track to Goya Road/McAllister Road	1.0	TxDOT	WC
	County Wide	Policy	-	Waller County should develop and adopt access management standards.	-	WC	
	FM 1098	Study	-	Perform a speed study from Wyatt Chapel to University Drive	0.2	TxDOT	PV
	Prairie View A&M University	Study	-	Perform a traffic study to determine the traffic impact on adjacent roads due to special events and University growth.	0.5	PVAM	PV
	Transit Study	Study	-	Waller County should conduct a short range transit study to address the transit needs in the County.	0.5	WC	W, PV, PVAM, H, PI, K, B, P
	Active Transportation Study	Study	-	Waller County should conduct an Active Transportation study to develop a detailed plan to address hike/bike needs of the County.	0.5	WC	W, PV, PVAM, H, PI, K, B, P
Total Key Short-Term Projects				25.9 Miles	68.2	Million	
*Projected also listed in TxDOT Project Tracker							
**Project also listed in TxDOT Regional Transportation Plan or Transportation Improvement Plan							
B - Brookshire	PI - Pine Island			TxDOT - Texas Department of Transportation			
K - Katy	PV - Prairie View			W - City of Waller			
P - Pattison	PVAM - Prairie View A&M Univ			WC - Waller County			

Table 4-6: Waller County Mobility Plan Recommendations - Short-Term Other Recommendations

Project ID	Road	Improvement	Length (Miles)	Description	Estimated Cost (Millions)	Lead Agency	Support Agency
27	BU 290 (A)	Access Management	9.3	Implement access management (median treatment) from FM 1488 to Harris County line	\$4.1	TxDOT	WC
28	BU 290* (B)	Safety Improvements	0.9	Install advanced warning signals and signs (curve) from US 290 south 0.85 miles	\$0.3	TxDOT	WC
29	Chapman Lane Extension	New Facility	0.8	Extend as a two-lane road parallel to US 290/BU 290 from FM 359 to Richards Road with median/turn lane and shoulder/bike lanes	\$2.6	PV	--
30	Coruthers Street Extension	New Facility	2.5	Extend as a two-lane road parallel to US 290/BU 290 from Richards Road to FM 1098 with median/turn lane and shoulder/bike lanes	\$8.0	PV	WC
31	Durkin Road	Widen and Improve	1.6	Widen to four lanes from FM 359 to FM 362 with shoulder/bike lanes on both sides	\$6.7	P	--
32	Fields Store Rd at Joseph Rd	Intersection Improvement	-	Install traffic signal and add exclusive right-turn and left-turn lanes to improve access	\$1.0	WC	--
33	FM 1098	Widen and Improve	0.6	Widen to four lanes from Wyatt Chapel Road to new Cameron Road Extension with median/turn lane and shoulder/bike lanes	\$2.5	TxDOT	PV
34	FM 1098 at Echols Street	Intersection Improvement	-	Install traffic signal and add exclusive right-turn and left-turn lanes	\$0.2	TxDOT	PV
35	FM 1098 at Hawkins Street	Intersection Improvement	-	Add exclusive right-turn and left-turn lanes	\$0.2	TxDOT	PV
36	FM 1774 at Riley Rd/E Hollyhill Dr**	Intersection Improvement	-	Remove intersection jog and convert to T-intersection	\$1.0	TxDOT	WC
37	FM 2855 and FM 529	Intersection Improvement	-	Install traffic signal	\$0.2	TxDOT	WC
38	FM 359*/Waller Avenue	Widen and Improve	3.1	Widen to four lanes from US 90 south to Fort Bend County line with median/turn lane and shoulder/bike lanes	\$13.1	TxDOT	B
39	FM 359 Extension**	New Facility	0.6	Extend as a two-lane road from US 290 north to FM 1488	\$1.8	TxDOT	WC
40	FM 362 at FM 359	Intersection Improvement	-	Replace flashing light with traffic signal and reduce speed on FM 529 at curve and clear vegetation to improve visibility and intersection safety	\$1.0	TxDOT	B, P
41	FM 362 at Royal Road	Intersection Improvement	-	Install traffic signal and add exclusive right-turn and left-turn lanes	\$1.0	TxDOT	P
42	Hegar Road**	Widen and Improve	1.5	Widen to four lanes from Spring Creek to Magnolia Road with median/turn lane and shoulder/bike lanes	\$6.3	WC	--
43	Igloo Road	Widen and Improve	1.8	Widen to four lanes from US 90 to Fort Bend County line with median/turn lane and shoulder/bike lanes	\$7.7	K	WC

Project ID	Road	Improvement	Length (Miles)	Description	Estimated Cost (Millions)	Lead Agency	Support Agency
44	Joseph Road**	Widen and Improve	9.4	Widen to four lanes from Fields Store Road to Montgomery County line with median/turn lane and shoulder/bike lanes	\$39.8	WC	--
45	Kickapoo Road**	Widen and Improve	2.3	Widen to four lanes from Joseph Road to Spring Creek with median/turn lane and shoulder/bike lanes	\$9.6	WC	--
46	Macedonia Road	Widen and Improve	2.5	Realign and widen to four lanes from Joseph Road to Magnolia Road with median/turn lane and shoulder/bike lanes	\$10.8	WC	--
47	Magnolia Road**	Widen and Improve	2.5	Widen to four lanes from Hegar road to Montgomery County line with median/turn lane and shoulder/bike lanes	\$10.7	WC	--
48	Morton Road	Widen and Improve	7.6	Realign and widen to four lanes from Durkin Road to Harris County line with median/turn lane and shoulder/bike lanes	\$32.2	WC	--
49	Morton Road at FM 2855	Intersection Improvement	-	Install traffic signal	\$0.2	TxDOT	WC
50	Morton Road at Neuman Road	Intersection Improvement	-	Remove intersection jog and convert to T-intersection	\$1.0	WC	--
51	Pederson Road	Widen and Improve	2.4	Widen to four lanes from US 90 south to Fort Bend County line with median/turn lane and shoulder/bike lanes	\$10.3	K	--
52	Richards Road (A)	Widen and Improve	1.3	Widen to four lanes from Wyatt Chapel Road to US 290 with median/turn lane and shoulder/bike lanes	\$5.5	PV	--
53	Richards Road (B)	Widen and Improve	0.6	Widen to four lanes from US 290 to BU 290 and realign to connect with Springdale Road with median/turn lane and shoulder/bike lanes	\$2.7	PV	--
54	Royal Road	Widen and Improve	1.7	Widen to four lanes from FM 359 to Clapp Road with median/turn lane and shoulder/bike lanes	\$7.2	P	--
55	Royal Road at Durkin Road	Intersection Improvement	-	Install traffic signal to improve safety and mobility near Royal High School	\$1.0	P	--
56	Woods Road**	Widen and Improve	2.3	Widen to four lanes from US 90 to Fort Bend County line with median/turn lane and shoulder/bike lanes	\$9.9	WC	--
57	Wyatt Chapel Road	Widen and Improve	2.18	Widen to four lanes from FM 1488 to FM 1098 with median/turn lane and shoulder/bike lanes	\$9.2	PV	WC
Total Other Short-Term Projects			57.5	Miles	\$207.8	Million	
*Projected also listed in TxDOT Project Tracker							
**Project also listed in TxDOT Regional Transportation Plan or Transportation Improvement Plan							
B - Brookshire K - Katy P - Pattison PI - Pine Island PV - Prairie View TxDOT - Texas Department of Transportation W - City of Waller WC - Waller County							

Table 4-7: Waller County Mobility Plan Recommendations - Long-Term Other Recommendations

Project ID	Road	Improvement	Length (Miles)	Description	Estimated Cost (Millions)	Lead Agency	Support Agency
58	Addie Gee Road	Widen and Improve	3.3	Realign and improve two lane road with shoulders from FM 1887 to FM 359	\$8.3	WC	--
59	Addie Gee Road at Brazos River	New Facility	0.25	Construct a new two-lane bridge	\$60.0	WC	--
60	Addie Gee Road Extension (east)	New Facility	2.7	Extend as a two-lane facility with shoulders east to Baethe Road	\$8.7	WC	--
61	Addie Gee Road Extension (west)	New Facility	0.7	Extend as a two-lane facility with shoulders west to the Brazos River (intended to connect to Oil Field Road at Lake Road in Austin County)	\$2.5	WC	--
62	Baethe Road	Improve	3.7	Improve two lane road with shoulders from Cochran Road to Penick Road	\$4.0	WC	--
63	Baethe Road Extension	New Facility	1.5	Extend as a two-lane facility with shoulders from Penick Road to the Harris County line (intended to align with proposed Baethe Road in Harris County)	\$4.9	WC	--
64	Blinka Road	Widen and Improve	3.7	Widen to four lanes from BU 290 to Betka Road with median/turn lane and shoulder/bike lanes	\$15.8	WC	--
65	Blinka Road Extension	New Facility	6.9	Extend as a two-lane facility from Betka Road to Richard Frey Road at FM 362 with shoulder/bike lanes	\$16.9	WC	--
66	Bruner Road	Widen and Improve	1.4	Realign and widen to four lanes from Giboney Road to FM 362 with median/turn lane and shoulder/bike lanes	\$6.1	WC	--
67	Cane Island at UPRR	New Facility	-	Grade Separation	\$20.0	K	--
68	Cochran Road	Widen and Improve	4.7	Realign and widen to four lanes from BU 290 to Baethe Road with median/turn lane and shoulder/bike lanes	\$19.7	PI	PV, WC
69	Cochran Road at UPRR	New Facility	-	Grade Separation	\$20.0	PV	--
70	FM 1098 Extension	New Facility	0.5	Extend as a two-lane facility south to connect to US 290 with shoulder/bike lanes	\$1.6	TxDOT	PV
71	FM 1458	Widen and Improve	7.4	Realign and widen to four lanes from FM 359 to Austin County line with median/turn lane and shoulder/bike lanes	\$31.2	TxDOT	P
72	FM 1488 *	Widen and Improve	18.6	Realign and widen to four lanes from BU 290 to Montgomery County line with median/turn lane and shoulder/bike lanes; Drainage improvements	\$78.6	TxDOT	WC, H
73	FM 1488 at Austin Street	Widen and Improve	-	Add/widen exclusive right-turn and left-turn lanes	\$1.5	TxDOT	H
74	FM 1488 at Bowler Road	Improve	-	Remove intersection jog and align with Hegar Road	\$1.5	TxDOT	WC

Table 4-7: Waller County Mobility Plan Recommendations - Long-Term Other Recommendations

Project ID	Road	Improvement	Length (Miles)	Description	Estimated Cost (Millions)	Lead Agency	Support Agency
75	FM 1488 at FM 1098	Intersection Improvement	-	Replace flashing light with traffic signal and add exclusive right-turn and left-turn lanes	\$1.5	TxDOT	WC
76	FM 1488 Spur	New Facility	2.4	Construct a new four lane road spur from FM 1488, continue south to New FM 1736/Hempstead loop	\$18.5	TxDOT	H
77	FM 1489	Widen and Improve	2.6	Realign and widen to four lanes from House Road to IH 10 with median/turn lane and shoulder/bike lanes	\$14.8	TxDOT	B
78	FM 1489 at House Road	Intersection Improvement	-	Install traffic signal and add exclusive right-turn and left-turn lanes	\$1.5	TxDOT	WC
79	FM 1489 at IH 10 Frontage Rd	Intersection Improvement	-	Install traffic signal and add exclusive right-turn and left-turn lanes	\$1.5	TxDOT	B
80	FM 1489 at UPRR	New Facility	-	Grade Separation	\$20.0	TxDOT	B
81	FM 1489 Extension	New Facility	1.2	Extend as a two-lane facility with shoulders from US 90 to FM 359 at Durkin Road	\$3.6	TxDOT	WC
82	FM 1489/Koomey Road	Widen and Improve	0.5	Widen to four lanes from IH 10 to US 90 with median/turn lane and shoulder/bike lanes	\$2.0	TxDOT	B
83	FM 1736	Widen and Improve	17	Realign and widen to four lanes from US 290 to Waller Gladish Road with median/turn lane and shoulder/bike lanes	\$71.9	TxDOT	WC
84	FM 1736/Hempstead loop	New Facility	7.1	Extend as a four-lane facility from US 290 to FM 359 at Canty Road with median/turn lane and shoulder/bike lanes	\$30.1	TxDOT	PI, WC, H
85	FM 359** (D)	Widen and Improve	25.2	Realign and widen to four lanes from US 290 to US 90 with median/turn lane and shoulder/bike lanes	\$106.8	TxDOT	P, PI
86	FM 359 at FM 529	Intersection Improvement	-	Replace flashing light with traffic signal and add exclusive right-turn and left-turn lanes	\$1.5	TxDOT	WC
87	FM 359 at UPRR	New Facility	-	Grade Separation	\$20.0	TxDOT	PI
88	FM 359 at US 290	Intersection Improvement	-	Install traffic signals at ramps	\$5.0	TxDOT	WC
89	FM 359/Bains at UPRR	New Facility	-	Grade Separation	\$20.0	TxDOT	B
90	FM 362 (A)	New Facility	4.4	Construct a new four lane road from Roehen Road to Richard Frey Road to eliminate sharp curves with median/turn lane and shoulder/bike lanes	\$33.9	TxDOT	WC
91	FM 362 (B)	Widen and Improve	13.1	Realign and widen to four lanes from FM 1736 to Roehen Road with median/turn lane and shoulder/bike lanes and improve drainage	\$55.6	TxDOT	WC, W

Table 4-7: Waller County Mobility Plan Recommendations - Long-Term Other Recommendations

Project ID	Road	Improvement	Length (Miles)	Description	Estimated Cost (Millions)	Lead Agency	Support Agency
92	FM 362 (C)	Widen and Improve	13.2	Realign and widen to four lanes from Richard Frey Road to FM 359 with median/turn lane and shoulder/bike lanes and improve drainage	\$55.9	TxDOT	P
93	FM 362 at FM 529	Intersection Improvement	-	Realign and convert to T-intersection to improve intersection safety	\$1.5	TxDOT	WC
94	FM 362 at UPRR	New Facility	-	Grade Separation	\$20.0	TxDOT	W
95	FM 529**	New Facility	1.2	Construct a new four lane road from Wilson Road / FM 362 to Adams Flat Road with median/turn lane and shoulder/bike lanes	\$9.6	TxDOT	WC
96	FM 529**	Widen and Improve	10.2	Widen to four lanes from Adams Flat Road to Austin County line with median/turn lane and shoulder/bike lanes	\$43.0	TxDOT	WC
97	FM 529 *	Widen and Improve	6.7	Widen to four lanes from Wilson Road/FM 362 to Harris County line with median/turn lane and shoulder/bike lanes	\$28.5	TxDOT	WC
98	Giboney Road	Widen and Improve	1.7	Realign and widen to four lanes from Waller Gladish Road to Bruner Road with median/turn lane and shoulder/bike lanes	\$7.3	WC	--
99	IH 10 ***	Widen and Improve	-	Add one additional main lane to each direction throughout Waller County	\$0.0	TxDOT	B, K
121	IH 10	New Facility	11	Add two frontage roads to each direction throughout Waller County	\$84.7	TxDOT	B, K
100	IH 10 at Brazos River	New Facility	0.3	Construct two IH 10 frontage road bridges	\$25.0	TxDOT	WC
101	IH 10 at Igloo	Intersection Improvement	-	Complete diamond interchange for full access to IH 10	\$5.0	TxDOT	WC
102	Blinka at UPRR	New Facility	-	Grade Separation	\$20.0	PV	--
103	Royal Road Extension	New Facility	3.1	Extend as a two-lane facility with shoulders east to connect to Cardiff Road	\$8.3	WC	--
104	SH 159	Widen and Improve	4.3	Widen to four lanes from Austin Street to Austin County line with median/turn lane and shoulder/bike lanes	\$33.2	TxDOT	H
105	SH 159 / Austin Street	Widen and Improve	0.2	Widen to four lanes from 13th Street to 10th Street with median/turn lane and shoulder/bike lanes	\$1.7	TxDOT	H
106	SH 6**	Widen and Improve	8.4	Widen from four to six lane limited access facility from US 290 to Grimes County line and install advanced truck signage	\$14.0	TxDOT	WC
107	Stalknecht at UPRR	Intersection Improvement	-	At-grade crossing of UPRR connecting US 90 and Stalknecht Road	\$3.0	B	--

Table 4-7: Waller County Mobility Plan Recommendations - Long-Term Other Recommendations

Project ID	Road	Improvement	Length (Miles)	Description	Estimated Cost (Millions)	Lead Agency	Support Agency
108	US 290 *	Widen and Improve	20.9	Add one main lane and frontage road per direction; Drainage improvements; Install advanced truck signage; Add U-turn lanes	\$120.3	TxDOT	H, PV
109	US 290 at Brazos River	New Facility	0.5	Construct two frontage road bridges	35.0	TxDOT	WC
110	US 290 at FM 362	New Facility	-	Add U-turn lane for mobility and safety	\$5.0	TxDOT	--
111	US 290 at SH 6	New Facility	-	Add direct connector from US 290 EB to SH 6 NB and from SH 6 SB to US 290 WB and U-turn lanes	\$12.0	TxDOT	WC
112	US 90 *	Widen and Improve	9.6	Widen to four lanes with medians for segments within WC	\$34.5	TxDOT	B, K
113	US 90 at Cooper street	Intersection Improvement	-	Add exclusive right-turn and left-turn lanes	\$1.5	TxDOT	B
114	US 90 at FM 1489/Koomey Rd	Intersection Improvement	-	Install traffic signal and add exclusive right-turn and left-turn lanes	\$1.5	TxDOT	B
115	US 90 at Otto	Intersection Improvement	-	Install traffic signal and add exclusive right-turn and left-turn lanes	\$1.5	TxDOT	B
116	Wilpitz Road	Widen and Improve	2.2	Widen to a four lanes FM 359 to new Wilpitz Road Extension (south) with median/turn lane and shoulder/bike lanes	\$9.4	P	WC
117	Wilpitz Road Extension (north)	New Facility	0.9	Extend as a two-lane facility with shoulders north to Clapp Road / McGregor Lane	\$2.9	P	--
118	Wilpitz Road Extension (south)	New Facility	1.5	Extend as a four-lane facility south to IH 10 and Peach Ridge Road with median/turn lane and shoulder/bike lanes, including bridge at Bessies Bayou	\$6.6	WC	--
119	Woods Road at UPRR	New Facility	-	Grade Separation	\$20.0	WC	--
120	Woods Road Extension	New Facility	2.6	Extend as a two-lane facility with shoulders from US 90 to Morton Road	\$8.40	WC	--
Total Long-Term Projects			227.35	Miles	\$1.30	Billion	

*Projected also listed in TxDOT Project Tracker
**Project also listed in TxDOT Regional Transportation Plan or Transportation Improvement Plan
*** Project currently under construction

B - Brookshire
K - Katy
P - Pattison
PI - Pine Island
PV - Prairie View
TxDOT - Texas Department of Transportation
W - City of Waller
WC - Waller County

Table 4-8: Long-Term Active Transportation

Project Name	Type	Adjacent Facility	Limits	Facility Type	Lead Agency
SH 6 Path	Easement Path	SH 6	Grimes County line south to Hempstead	Separated Shared Use Path	WC
Houston Ave/BU290 Path	Easement Path	Houston Ave/ BU 290	Downtown Hempstead, east to Harris County line	Separated Shared Use Path	WC
US 90 Path	Easement Path	US 90	FM 362, east to Harris County line	Separated Shared Use Path	WC
CenterPoint Path	Easement Path	CenterPoint Easement	Grimes County line south to Magnolia Road	Separated Shared Use Path	WC
Brazos River Path	Brazos River Greenway	Brazos River	FM 3346, south to FM 1458	Separated Shared Use Path	WC
Katy Prairie Loop	Hike/Bike Path	Katy Prairie Conservancy	Loop starting at Harris County line using Richard Frey Road to FM 362 to Morrison Road ending at Harris County line	Separated Shared Use Path	WC

Table 4-9: Long-Term Transit Recommendations

Project Name	Type	Location/Description
Brookshire Park and Ride Facility	Park & Ride	I-10 at Brookshire
Katy Park and Ride Facility	Park & Ride	I-10 west of Katy
Hempstead Rail Station	BRT/Rail Station	UPRR in Hempstead
Prairie View Rail Station	BRT/Rail Station	UPRR in Prairie View
Waller Rail Station	BRT/Rail Station	UPRR in the City of Waller
Katy Park and Ride Service	Commuter Service	Park and Ride Service from Katy to Houston
Brookshire Park and Ride Service	Commuter Service	Park and Ride Service from Brookshire to Houston
Commuter Rail/BRT Service	Commuter Service	Commuter Rail/BRT Service from Hempstead, Prairie View and Waller to Houston
Community Circulators	Local Bus Routes	Fixed and/or flexible route service within Hempstead, Prairie View, Waller, Brookshire and Katy
Intra-County Circulators	County Bus Routes	Intra-county bus service connecting cities within Waller County

B - Brookshire
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FUNDING THE PLAN

This plan outlines numerous roadway infrastructure needs throughout Waller the County. Finding funding for these projects will be the critical component to implementing the recommendations in the plan. The State of Texas as well as the Federal Government provides an array of funding tools to help local and county governments encourage and maintain the economic vitality of their jurisdictions. Funding tools applicable to the implementing the WCTP are described below.

STATE

Texas provides three ways for cities and counties to implement physical improvements or changes for their jurisdictions:

- Regulatory
- Financing
- Economic development

These strategies should be incorporated into a Comprehensive Plans and used for transportation, flood mitigation, parks, housing, etc. Each strategy is unique and most effective if combined with other economic strategies.

REGULATORY

The first strategy includes regulating the requirements through ordinances or regulations which, over time, require property owners to make necessary improvements to meet the imposed standards under provisions of the Texas Constitution and State Laws of Texas. These tools take time and may not be the fastest way to effectuate improvements. Screening, signage, signalization, or landscape ordinances or other development standards that fall within the cities', their ETJ, or counties' regulatory program should be adopted. The development standards between Waller and adjacent counties and cities within the study area should apply complementary development standards so a developer can't play one jurisdiction against another. Complementary standards will also ensure uniformity in safety standards and prepare the area for the continued forecasted growth the area is facing.

FINANCING

There are basically three ways to finance capital improvements for cities and counties:

- Tax revenues
- Capital Improvement Programming (CIP) with the sale of bonds backed by either General Obligation (GO) Debt or Revenue Bonds

- Other revenues such as sales or hotel occupancy taxes (HOT), impact fees, fines, and grants such as funding through H-GAC/MPO or other State grants, could be used as a part of a capital stack of funds. NOTE: Counties are more limited in sales tax due to legislative limitations that should be addressed given the urban nature of the H-GAC Region.

These financial tools are more efficient in terms of time but require financial capacity to pay for or service the debt on the bond for the improvements. Cities and counties often set up a five-year CIP for long-term or higher cost improvements and sell bonds based on a GO basis paid for by revenues from the City. GO bond issues generally require an election of the jurisdiction. Typically, a discretionary budget for ongoing maintenance is established in the annual budget process to pay for improvements involving transportation.

Impact fees are also allowed in Texas for transportation improvements, but that requires a separate ordinance and a study to determine the cost of any impact fee imposed for the new development. Impact fees can be considered a deterrent to economic development if the developers can simply move out of the jurisdiction to avoid the fee. Therefore, impact fees should be evaluated in the context of the region. In addition, impact fees should also be similar between the counties and cities to again ensure continuity.

ECONOMIC DEVELOPMENT

Economic development agreements or incentives between the private sector and public sector have been perfected in Texas to allow the private sector to advance funding for on-site and off-site improvements to accelerate the implementation of transportation improvements. Economic development tools offer great flexibility in that they can be created based on either a broad geographic basis or project site specific bases. The use of these economic development tools is based on the performance of the reimbursement and scale of the project and can be applied to both existing and new developments. The agreements must outline expectations and schedules of projected new value. The tax revenues gained from that new real property value are then used to reimburse the private sector for the advanced funding of public improvements, including any lawful mobility improvements. Economic development agreements can be leveraged with other grant programs that are offered throughout the region, State, or Federal government and can apply to public-to-public, as well as public-to-private sector partnerships.

ECONOMIC DEVELOPMENT TOOLBOX

These three implementation tools (regulatory, financing, and economic development) were established under the Texas Constitution, and later allowed through various pieces of enabling legislation. The Economic Development Toolbox outlines how they may generally be applied to the study area. Page one of the Economic Development Toolbox is shown as Table 4-10 and the entire toolbox is available as an Appendix. The use of these three tools should be linked to the recognized or adopted Comprehensive Plans of cities, or in the case of a county, through recognition or passage of minute orders by the Commissioner's Court and/or through the Major Thoroughfare Plan for the unincorporated portions of the county.

The use of economic development tools can be the key of success in revitalization and redevelopment of an area, regardless of the land use. The use of economic development strategies must take into consideration existing communities, residents, and businesses, as well as projected growth. Home-rule cities can apply these tools for mobility, land use, beautification, public service, etc. Waller County can also use the tools in partnership with the home-rule cities to create more powerful partnerships with private sector industries within the County.

Economic development is not a one-size-fits-all solution. Each economic development tool provides specific opportunities for application and requires a detailed analysis of the community. However, the private sector can join forces with the cities and counties to use a combination of the tools to implement the transportation improvements.

MANAGEMENT DISTRICTS

Article III, Section 52, Article XVI, Section 59, and Article III, Section 52-a, of the Texas Constitution authorizes the creation of certain special districts for limited purposes. These districts are areas of the state, county, municipality, or other political subdivision that have been divided for judicial, political, electoral, or administrative purposes. These districts may acquire, purchase, sell, or lease real or personal property; litigate legal matters; impose and collect taxes; issue bonds; borrow money; and contract with other entities. Some types of districts are granted the power of eminent domain.

Municipal Management Districts

Municipal Management Districts (MMD) are one of several types of special districts authorized by State law. The Texas Local Government Code governs the creation and operation of MMDs. MMDs are empowered to "promote, develop, encourage, and maintain employment, commerce, economic development,

and the public welfare in the commercial areas of municipalities and metropolitan areas of this state" (Sec 375.001(b)). MMDs have the power to finance their operations by issuing bonds or other obligations, payable in whole or in part from ad valorem taxes, assessments, impact fees, or other funds of the MMD to provide improvements and services. MMDs may levy a tax only after holding an election within the district. MMDs are intended to supplement, not supplant, existing public services.

Tax Increment Reinvestment Zones

Chapter 311 of the Texas Tax Code enables counties and cities to create Tax Increment Reinvestment Zones (TIRZs). TIRZs help finance the cost of redevelopment and encourage development within the designated area that would otherwise not attract sufficient market development in a timely manner. Taxes attributable to new improvements (tax increments) are set aside in a fund to finance public improvements within the boundaries of the zone.

These improvements are usually undertaken to promote existing businesses and/or to attract new business to the area.

County Assistance Districts

In recognition that it is often difficult for Counties to fund public projects, services, and projects, Texas authorizes Counties to create County Assistance Districts (CAD) by adopting a local sales tax to fund these initiatives. The Local Government Code, Chapter 387, allows any County in Texas to initiate a CAD, provided that the total combined rate of all local sales taxes within a proposed district does not exceed 2 percent. To initiate a CAD, voters in the County must approve the tax in an election before it is levied. A county may create up to four county assistance districts, but not more than one district may be created in a commissioner's precinct.

According to the Texas Comptroller, County Assistance District funds can be used for construction, maintenance or improvement of roads or highways; provision of law enforcement and detention services; maintenance or improvement of libraries, museums, parks, or other recreational facilities; promotion of economic development and tourism; firefighting and fire prevention services and provision of services that benefit the public welfare.

Public Improvement Districts

A Public Improvement District (PID) delineates a geography where specific improvements are financed by assessments against property owners within the geography. PIDs offer cities and counties a means for improving their infrastructure to promote economic growth in an area. They function as a development

Table 4-10: Funding Table

ECONOMIC FUNDING TOOLBOX	PROGRAM FUNCTION	STATUTORY AUTHORITY	APPLICABLE JURISDICTION	PROJECT TYPE	USES FOR LAWFUL PURPOSES	PROs	CONS
Housing Initiatives	Created under Chapter 380/381 Powers under Local Government Code	This initiative allows cities or counties to incentivize are development of Housing which can include a requirement for on-site and off-site transportation improvements.	Created by City or County	Reimbursement can be tailored to the economics of the development including off-site transportation related improvements needed to make area improvements. Increment is generated by new housing within the area 380/381 district created. Can be used for housing codes.	The incentive is paid from new increment generated by the new real property housing revenues; term in determined by creating entity	This tool can be used to provide needed housing for the area due to resin boom construction and influx of employees.	This program has not been used in the area, but can be created by the cities or counties based on their future housing plans or needs.
Local Government Corporation (LGC)	An entity that provides an alter ego of the city & county that allows a separate board to be created to administer the approval of public improvements. Typically used in Gulf Coast Region to complement TIRZ/TIF operations.	Subchapter D of Chapter 431 Transportation Code	City or Counties	The LGC acts as the Board to implement a Plan which can include public works implementation, transportation improvements, acquisition; improvements are not subject to public bidding requirements; Board appointed entity; city council or county	Powers, as granted by the city or county and can be used for any lawful purpose including all transportation improvements. Can be created over large areas.	Flexible within the scope of the City Charter or within County Statutes	Does not provide additional sources of revenue unless created with other overlapping economic development entities. Most powerful when coupled with TIRZ, or PID, or MMD districts.
Community Development Block Grant (CDBG)	Funds can be used for public improvements for Low Mod Income Areas; should be part of the City or County CDBG Program	Housing and Community Development (HCD) Act of 1974, Part 570	Municipality / County	Infrastructure, ROW, road improvements as well as social programs, affordable housing and economic development programs	Compete with other small cities for available \$ to benefit low-mod Census tracts	Properly structured application may provide wide benefits	Must meet Federal oversight requirements, project specific and not all cities or counties have CDBG entitlement funding. Therefore, grants may be competitive.
Municipal Management Districts (MMD)	Public Improvements include intersection, mobility improvements as well as water, sewer, drainage, landscape architecture, and monuments. Again, an area approach that imposes overlapping tax or assessment depending on the type of creation.	CH 375 Local Government Code	City, County or ETJ or In City	Public improvements in a specifically designated district	Created by Legislature and can be done by special legislative, (most common) or follow TCEQ process; provides for overlapping taxing authority; appointment of a Board	Districts ordinarily can do any lawful purpose within its geographic boundaries	Districts are used extensively throughout the Gulf Coast. The use has region wide success
Tax Increment Reinvestment Zone (TIRZ)	Tax Increment Reimbursement Zones (TIRZ or TIF) allows a portion of city or county tax revenue increment to be applied to an area or project improvement	CH 311 Tax Code	Municipalities create and counties can participate through interlocal agreements	Public improvements to promote new or re-development of specifically designated zones or projects including transportation.	An ordinance, a Project & Financing Plan, appointment of a Board, increment only available city or counties. If created with sales tax powers other revenue streams can be applied to the eligible project funding.	Works best with an active developer and catalyst project, County may participate or as an incentive for creating new development.	Limited to the increment, works best with an active developer and catalyst project
Municipal Utility District (MUD)	Public Improvement Finance which can include transportation if RUD, Road Utility District Powers are also created	Chapters, 47, 49, 51, 53, 54 of Water Code	Within Cities, County or ETJ including In City	TCEQ or Legislature created taxing authority for water, sewer, drainage and park improvements; if Road Utility District Powers are granted can be used for transportation improvements	TCEQ or special legislation, Minimum acreage is necessary to realistically use MUD tools. Not as effective for developed areas but very good for greenfield.	Eligible costs fully reimbursed; typically advanced by the developer subject to an overlapping tax and reimbursed by bond issues of the MUD	Overlapping tax rate and typically requires legislative creation to be most effective versus TCEQ administrative process of approval

tool that allocates costs according to the benefits received. Chapter 372 of the Texas Local Government Code authorized the creation of PIDs by local governments. A PID can help improve infrastructure to accommodate increased development in an area to provide adequate infrastructure resulting from growth in an area.

FEDERAL

At the federal level, funding for transportation projects is generally provided for capital projects, including highway and rail construction, and specific projects designated by Congress. Federal government funding is distributed to serve a range of distinct purposes.

Better Utilizing Investments to Leverage Development (BUILD) grants (formerly TIGER grants) from the US Department of Transportation are focused on transportation projects. The Transportation Alternatives Program (TAP) was a new feature in MAP-21 which combines several programs, including the old Recreational Trails, Safe Routes to School, and Transportation Enhancements programs.

In addition to the federal and state funding available through the H-GAC RTP/TIP process, local jurisdictions and stakeholders can utilize existing funding mechanisms or collaborate to create new ones where appropriate.

PROACTIVE

Proactive approaches could help to move projects forward in H-GAC's Transportation Improvement Program. Examples include:

- County and/or local jurisdictions acquiring ROW in advance
- Encourage landowners and developers to donate ROW
- County and/or local governments can fund feasibility and traffic studies, environmental studies, and preliminary engineering and design
- County and/or local governments could pay the full cost of relocating utilities and pipelines and constructing drainage improvements

TRANSIT

Federal_ Transit services have been provided in Waller County by the Colorado Valley Transit District (CVTD) since 1986. The CVTD serves four rural counties west of Houston by delivering demand response or shared dial a ride service throughout Waller County with four dedicated accessible vans Federal operating funding for CVTD is provided from the Formula Grants for Rural Areas, also known as 5311 funding. State formula funding is also provided along with local match reve-

nues from the United Way of Waller County. Although exact ridership numbers for Waller County, individually are not available it is estimated that approximately 21,500 trips were provided in 2016 by CVTD.

Recently, the rapid growth of Prairie View A&M University has led the school to institute and subsequently expand its transit system through its Transportation Department. Productive coordination since 2016 between CVTD and Prairie View A&M has resulted in limited scheduled local bus service in Prairie View. Revenues provided through the university and student fees are used to underwrite the academic year transit services.

The 2020 Census will likely incorporate most or all of Katy in the Houston Urbanized Area (UZA). As Waller County grows more urbanized in percentage of population in the coming decades, 5307 revenues could become more important in the funding of services.

There are many grants sources of funding available within Federal Transit Administration (FTA) and other agencies and departments of the federal government. However, the sources indicated below are primary sources that Waller County could utilize.

5307 Urban

This is officially known as the Urbanized Area Formula Grant Program (5307). As the name indicates, funds are allocated based on a designated formula. It is designed for urban areas with a population above 50,000 or below 200,000. Normally in urban areas above 200,000 population, operating funding is not permitted. However, there is what is known as the "100 bus rule" in urban areas over 200,000. An urban transit system in an urban area over 200,000 (such as Harris County Transit) with fewer than 100 buses in revenue service is eligible to receive operating funding at 50% of total expenses, passed through the designated recipient (METRO).

5311 Rural

This is officially known as the Formula Grants for Rural Areas (5311). To receive 5307 or 5311 funds, Waller County will need to match funding in the following manner (Table 4-11).

Table 4-11: Local Funding Match Requirements for Rural Formula Grants

Funding Type	Federal Contribution	Local Contribution
Operating Funding	50%	50%
Capital Funds	80%	20%
Planning	80%	20%
Administrative	80%	20%

Congestion Mitigation Air Quality Funds for Commuter and Transit Programs (CMAQ)

Provided as a pilot program under the Federal Highways Administration (FHWA) is designed to reduce air pollution and vehicle miles travelled. In H-GAC MPO region it can fund qualified programs up to \$2 million federal over 3 years. The ability to fund the program after funds expire is essential.

5310 Enhanced Mobility of Seniors and Individuals with Disabilities

Funded as both a discretionary pilot program and a successor to the New Freedom and Reverse Commute Program, 5310 provides services in Waller County.

State Assistance

Thirty-eight (38) rural operators receive funding from TxDOT for state operation and capital assistance. Requirements are similar to federal rural 5311 funding in that the county or entity must be part of a multi-county or county agency (such as the Colorado Valley Transit). State funding is similar to local funding in that it can be used to offset federal funds for capital, operating, administrative or planning expenses.

General Fund

Federal funding must be matched to be used. Using municipal or local funding is a common means of matching federal funding.

Targeted Local Fees (ex. Hotel, Car Rental) – Local or County

Less common but also used, this is the designation of various local or county fees to fund the local match of service..

Vehicle Advertising

Transit vehicles using outside advertising can be mobile billboards. Revenues received from advertising can be used as local match.

In-Kind Match

Contributions in terms of non-allocated administrative services or contribution of facility space can be deemed local match. Their designated value can be counted toward the local match.

PUBLIC LOANS AND GRANTS

Chapters 380 (cities) and 381 (counties) of the Local Government Code grant cities and counties broad discretion to make loans and grants of public funds or the provision of public services, at little or no cost, to promote all types of business development including industrial, commercial and retail projects. Each agree-

ment can be uniquely tailored to address the specific needs of both the local government entity and the business prospect.

IMPACT FEES

Impact fees impose a charge on new development to pay for the construction or expansion of off-site capital improvements that are necessitated by and benefit the new development. Impact fees are authorized through the police power, not the taxing power. They are part of the development approval process. Requiring an impact fee to provide adequate public facilities is similar to meeting site planning and zoning requirements.

NEXT STEPS

1. Consider creating region-wide 380/381 districts that tee up the use of economic development solutions for the recommendations in this study.
2. Require a meeting with all plat applicants during submission to inquire about project, financing, traffic generation, values, and timing. This meeting should determine the impact the proposed plat will have on the corridors and surrounding area. These meetings should include both county and city representatives and their consultants. Create a database in GIS that allows cities and counties to track growth and proposed development/plats/permits; use a common platform for the design of the GIS architecture of the database and shape files. Incorporate the CIP in GIS and share amongst your public partners.
3. Make sure the plat and permit information are shared among the county and cities to allow power in collaboration for the necessary improvements. Set up plat sharing with each submission of plats related to the industrial growth and make sure the plat sharing reaches the correct and appropriate division of the cities and counties.
4. Ordinance amendments for local regulations should be shared with the county and cities to insure complementary standards.
5. Hold at least two meetings per year with public partners and the private industry to discuss the private sector plans. It is critical to stay informed. Invite the H-GAC transportation and planning group to these meetings – H-GAC is the major funding source.



THOROUGHFARE PLAN

The 2019 Waller County Thoroughfare Plan (2019 WCTP) provides the County with an updated planning tool that can be used to manage, guide, and design a transportation network that improves connectivity, mitigates congestion, and accommodates new development and growth. The primary objective of the Thoroughfare Plan is to ensure the preservation of adequate rights-of-way that:

- Are appropriately aligned
- Have sufficient width
- Follow county-wide design standards
- Allow for the orderly and efficient expansion of the transportation network
- Serve existing and future transportation needs

Right-of-way (ROW) is property granted or reserved for transportation purposes. The ROW width is not the same as the width of a road. ROW contains road pavement, shoulders, utilities(lights), drainage, and may contain sidewalks, pedestrian elements, curbs, gutters, clear zones, and medians.

The first Waller County Thoroughfare Plan was adopted in 1985, updated in 2007 and 2012. These plans have aided in the growth of the County by preserving

rights-of-way for critical future roadways and ensuring private sector participation. The 2012 update was essentially an extension of The City of Houston Major Thoroughfare and Freeway Plan (MTFP) to preserve the one-mile grid throughout the entire county and identified the proposed location of Prairie Parkway that traverses the Katy Prairie Conservancy. The City of Houston Extraterritorial Jurisdiction (ETJ) extends into Waller County. The Waller County Thoroughfare Plan aligns with the thoroughfare classifications in the City of Houston MTFP.

The 2012 plan was used as a starting point for the development of this document. Adjacent county thoroughfare plans, such as Montgomery, Harris (City of Houston MTFP), and Fort Bend were also used in the development of the WCTP. This chapter of the Waller County Transportation Plan can also be used as a stand alone 2019 Waller County Thoroughfare Plan document.

The 2019 Plan is a culmination of analyzing existing conditions, assessing environmental constraints, identifying future needs, and input from the Steering Committee, stakeholders, and public.

PURPOSE

The 2019 WCTP designs a system of major roadways intended to provide adequate access and travel mobil-

ity. It includes freeways, major and secondary arterials (high-capacity urban roads), and major collectors.

A THOROUGHFARE PLAN IS:

- Long range (50+ years)
- Identifies type and general location of future roadways
- Preserves transportation corridors (i.e. right-of-way)
- Guides future development
- Promotes connectivity and design uniformity
- Requires, through the platting approval process of cities and counties, appropriate dedication of rights of way, and construction of identified thoroughfares by private land owners/developers

A thoroughfare plan benefits the County by indicating where needed roadway right-of-way should be preserved so that, as development occurs or as traffic increases, the County will have the ability to develop appropriate transportation facilities. The Plan also supports orderly development as private development occurs and minimizes disruption and displacement of people and businesses by providing a long-range, predictable plan. A plan is a statement of intention, not a guarantee of action.

A THOROUGHFARE PLAN IS NOT:

- A list of construction projects
- A commitment by local governments to build specific roads
- A survey, design or engineering study showing the exact alignments or cost estimates for specific roadways
- A ranking or prioritization of roadway improvements
- A set time frame for when a project should be complete
- A financial plan or funding mechanism

PLAN CONSIDERATIONS

A Thoroughfare Plan displays the proposed general alignments for the extensions of existing arterial and collectors and planned new roadways. It is important to note that the actual alignments of these roadways will likely vary somewhat from this plan and will be determined through the subdivision development process and the preliminary engineering phase of design. Slight modifications to facility locations, such as a shift of an alignment several hundred feet one way or another or changes in roadway curvature, are warranted

and accepted as long as the intent of the Thoroughfare Plan to provide system connectivity and appropriate types of facilities is not compromised. As development occurs, alignment studies will probably be needed to determine the exact location of some roadways, keeping in mind the overall purpose and intent of the Thoroughfare Plan and the alignments shown on it.

BACKGROUND DATA

In conjunction with the Mobility Plan, background data was collected and analyzed from numerous sources. The analysis of this data provides the foundation for developing a comprehensive and connected roadway network and, ultimately, a thoroughfare plan that will serve the entire County. Data that was analyzed for this plan includes (see Chapter 2):

- Area Overview: Overview of study area demographics, social, and economic characteristics.
- Roadway Network: A look at the transportation network and identifying the major roads.
- Roadway Network Demand: Details about existing traffic congestion.
- Population: Analysis about existing population characteristics and predicted future population patterns.
- Employment: Analysis about existing employment characteristics and predicted future employment patterns.
- Trip Generators: Examination of the existing, known, and forecasted major trip generators.
- Barriers: A look at the study area's natural and man-made barriers.
- Gap Analysis: Overview of gaps and connectivity in the roadway network.
- Previous Thoroughfare Plans: Review of previous and current plans by the County and constituent municipalities.

2012 WALLER COUNTY THOROUGHFARE PLAN

The preceding Thoroughfare Plan for Waller County was adopted by the Waller County Commissioners Court on April 18, 2012 (shown in Figure 6-1). The 2012 Thoroughfare Plan requires an update to reflect growth, changing development patterns, and community input.

The 2012 Plan illustrates sufficient thoroughfares, thoroughfares to be widened, and proposed thoroughfares. The Plan also highlights a potential alignment of the future Prairie Parkway extension. It proposed several additional east-west routes that provide connectivity to establish a transportation grid.

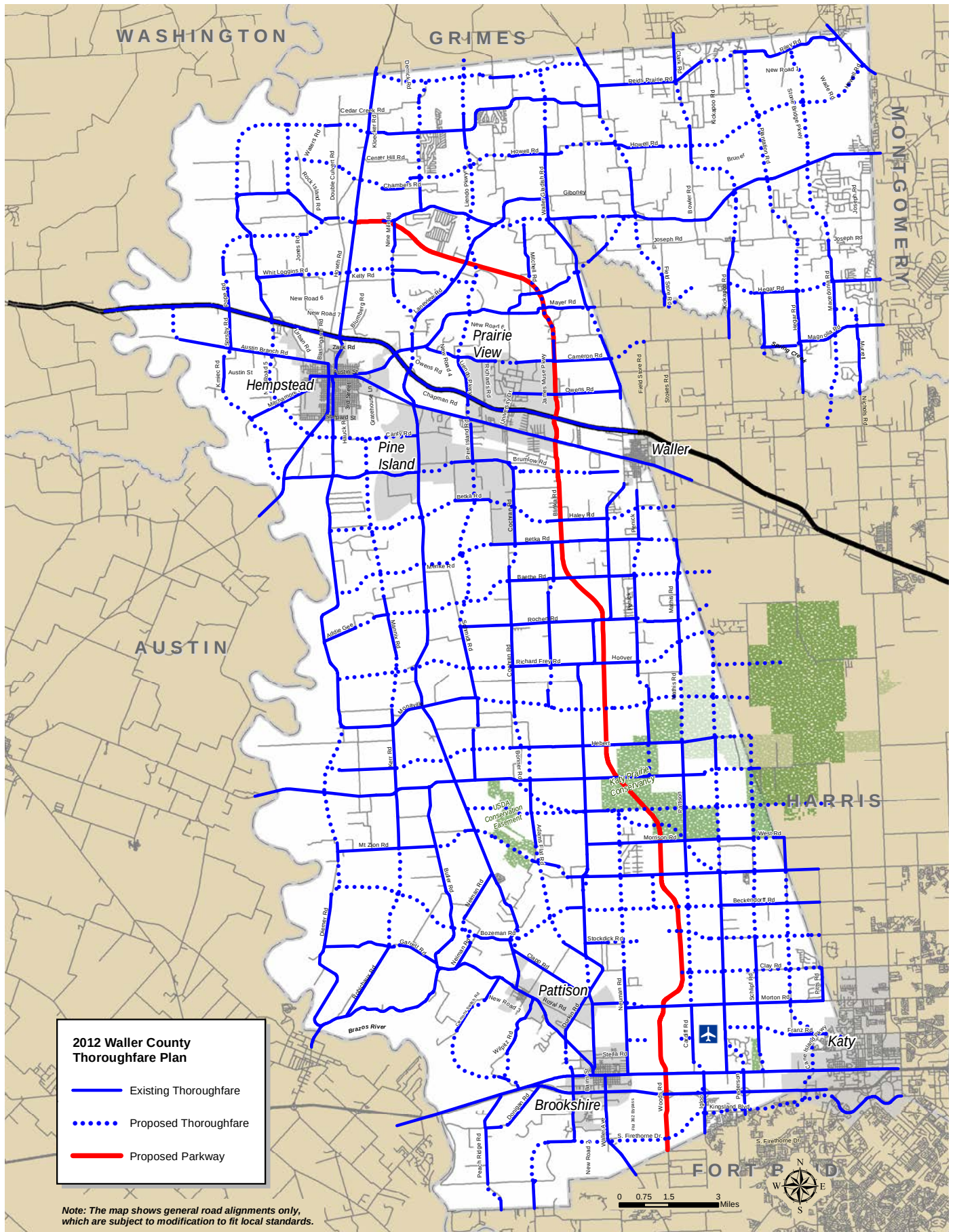


Figure 5-1: 2012 Waller County Thoroughfare Plan

PLAN DEVELOPMENT

The purpose of a Major Thoroughfare Plan is to provide the county with a blueprint for an adequate and maintainable transportation network that can be developed as the county grows. Ideally the network should reduce congestion, improve travel times, and promote public safety. The plan must address the need for connectivity, identify where traffic volumes are placing a burden on the transportation system today and in the future, identify where right-of-way will be required to address the identified need, and identify potential issues such as man-made barriers or floodplain issues that could impact the feasibility of a future connection. This The Thoroughfare Plan will ultimately assist the county in positioning the necessary infrastructure before or as development is occurring occurs to meet the travel needs of the region, by:

- Identifying roadway needs throughout the county
- Identifying future right of way needs
- Identifying new roadway corridors that improve connectivity
- Establishing road design guidelines that result in consistency throughout the county, and
- Establishing roadway functional classifications.

PROCESS

The first step in the development of the WCTP was to review existing conditions and existing and previous thoroughfare plans. The next step in the process was to determine what Waller County wanted to “look” like in 50 years. Steering Committee and stakeholder input explained that Waller County wanted to encourage higher density development along US 290 and IH 10 and preserve its rural, low density character in the middle of the county (Figure 65-2).

This information guided the development of the 2019 Plan by creating a higher density thoroughfare grid in the more urbanized locations (US 290 and IH 10 corridors) with thoroughfares spaced about one mile apart. In more rural and environmentally sensitive areas, like central Waller County, a lower density thoroughfare grid was developed with thoroughfares spaced from one to five miles or more apart.

The next step was to document the new corridors and “missing roadway links” that were identified during the Steering Committee and stakeholder meetings.

The fourth step involved using the Waller County FEMA flood plain map to identify corridors in the floodway, 100-year flood plain, or 500-year flood plain. This information was used to modify and sometimes remove corridors due to their location in the floodway/floodplain.

The fifth step involved a gap and connectivity analysis of the existing roadway network. Identifying the network gaps (i.e. where roads do not exist) and where major roads end revealed where new thoroughfares should be planned.

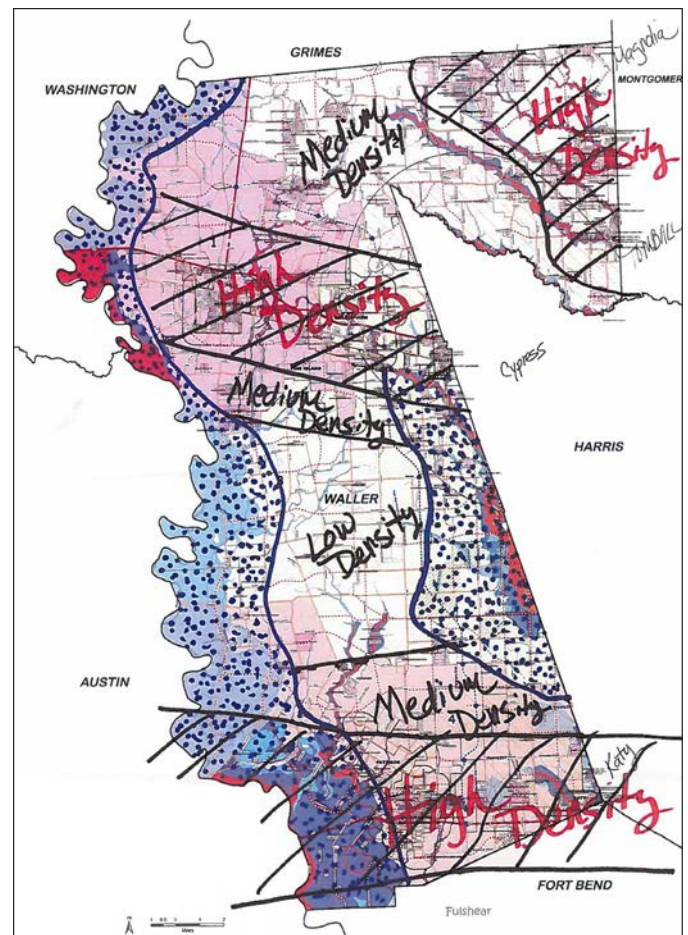
The sixth step solicited input from the Steering Committee, local municipalities, and communities through stakeholder groups and the public via six public meetings. Comments were reviewed, and the Plan adjusted when necessary.

The last step was County adoption of the Thoroughfare Plan. The map and design criteria were adopted at the July 25, 2018 Commissioners Court meeting. The County is now responsible for implementing, maintaining and updating the Thoroughfare Plan on a regular basis. It is recommended that the plan be reviewed every 5 years and that the County’s subdivision regulations be updated to reflect the design standards and/or policies presented in this Plan.

GAP ANALYSIS

Identifying gaps where roads end or do not exist plays a critical role in improving congestion mitigation, connectivity, and safety throughout the County. Figure

Figure 5-2: Thoroughfare Density Concept



2-5 in Chapter 2 County Profile illustrates where major thoroughfares and collector streets end. “T” roads are described as roads that end at a cross road and force drivers to detour to get where they want to go. These detours add additional congestion to crossroads that may be already over capacity. Improving connectivity by eliminating the “T” roads redistributes traffic, improves safety, and mitigates congestion on existing neighboring roads.

Because Waller County is mostly rural, there are large gaps in the transportation network. It is important that the County “follow” the thoroughfare plan to preserve future corridors or the opportunity is lost. Failing to close these gaps or connect existing roads will result in lost opportunities and will have a direct effect on future mobility, congestion, and safety. An example of a lost opportunity is in the Magnolia area of Montgomery County just east of Waller. The opportunity to connect FM 1774 and FM 149 has been lost due to the residential development that has occurred over the years. This not only affects the routing of emergency vehicles and school buses, but also creates a safety issue for citizens by not having alternative routes in case of an emergency.

THOROUGHFARE SPACING

Desirable thoroughfare spacing is a function of the capacity of the system, transportation facilities, and local development. The “ideal” spacing is usually one mile, however this can vary depending on the density of development.

The spacing was reviewed to ensure roadway layout was consistent with standard transportation planning practices. In general, the ideal standard for sufficient coverage of “Major Thoroughfares” is a network grid spaced from one to five miles apart, whereas “Thoroughfares” are approximately one mile apart. The majority of the County’s roadway network is currently deficient in this spacing.

NON-CONTINUOUS REGIONAL ROUTES

Providing continuous routes that link multiple city or county population and employment centers is important for mobility and orderly development. Identifying corridors where anticipated traffic demand exceeds the operational capacity of the facility is essential for financially responsible planning and programming of transportation improvement funds. “Regional Thoroughfares” will play an increasingly important part as alternate routes to relieve congested freeway corridors. Currently there are no corridors that completely traverse the county from north to south. IH 10 and US 290 are the only routes that traverse the county from east to west. Additional regional routes are needed to provide alternative routes, disperse traffic, and improve connectivity throughout the County.

During public outreach, there were comments regarding the need for a new north-south. The public did not want a “Freeway” type facility but wanted a road that would decrease the travel time between the northern and southern portions of the County. The study ran a stress test using the 2040 roadway network, population and employment to see what the impact a limited access facility would have on the adjacent roads. The test showed that there was a definite impact on the adjacent roads. Some of the volumes were reduced by the traffic on the local roads by 50% (Figure 4-6: Stress Test Results). Keep in mind that this test was a forecast, the actual results might vary.

ROAD CONNECTIVITY

Providing continuous routes that link multiple city and county population and employment centers is important for mobility and orderly development. Identifying corridors where anticipated traffic demand exceeds the operational capacity of the facility is essential for financially responsible planning and programming of transportation improvement funds. “Regional Thoroughfares” will play an increasingly important part as alternate routes to relieve congested freeway corridors.

Currently, there are no corridors that completely traverse the county from north to south. From public outreach, it was clear that a limited access facility is needed between the northern and southern parts of the county. To determine the impact a limited access facility would have on adjacent roads, H-GAC ran a stress test using the 2040 travel demand model with and without a limited access facility. The model results indicate that there is a need for a limited access facility with up to 50% of traffic being diverted from local streets to the limited access facility. This facility would not only reduce the north-south travel time, mitigate crashes, and provide an additional evacuation route, but also, it would remove through traffic from FM 359 and FM 362, leaving these facilities for the local traffic (Figure 5-3).

IH 10 and US 290 are the only routes that traverse the county from east to west. FM 529 and FM 1488 are two major east-west facilities, but they do not provide a continuous route across the County. Additional regional routes are needed to provide alternative routes to local roads, disperse traffic, and improve connectivity throughout the County.

New north-south and east-west facilities and extension of existing roadway facilities would improve connectivity and help meet future growth.

Another connectivity issue that affects mobility between Waller County and Austin County is the lack of bridges crossing the Brazos River. Currently, there are 5 bridges, IH 10, US 290, SH 159, FM 529, and FM 1459. Additional bridges are needed north of US 290,

mid-county, and south of IH 10. Frontage road bridges are also needed at US 290 and IH 10 to provide increased mobility across the Brazos River.

CROSSINGS OVER NATURAL BARRIERS

The Brazos River, Katy Prairie Conservancy, and numerous creeks and streams are present in the County (Figure 5-4 on the next page). These natural barriers, along with their floodways and floodplains, present a significant challenge to roadway connectivity and directly obstruct north-south and west-east travel.

Building roads through floodplains and floodways is difficult and expensive. The 2019 WCTP was designed to minimize roadway connections through floodplains as much as possible, however, any comprehensive roadway network will require connections through floodplains and floodways given the County's geographic characteristics. Environmental analysis, potential mitigation, and applying for and obtaining permits from the US Army Corps of Engineers can be lengthy and costly, but this deficiency must be addressed to ensure that the future roadway network can support population and employment growth over the next 50 years.

Proactive planning is of critical importance where roadways through floodplains are required. Early identification of environmental issues, close collaboration between participating federal, state, and local entities as well as developers, and identification of funding sources well in advance of engineering and construction are all steps that should be taken to lessen the burden of building roadways through floodplains and floodways.

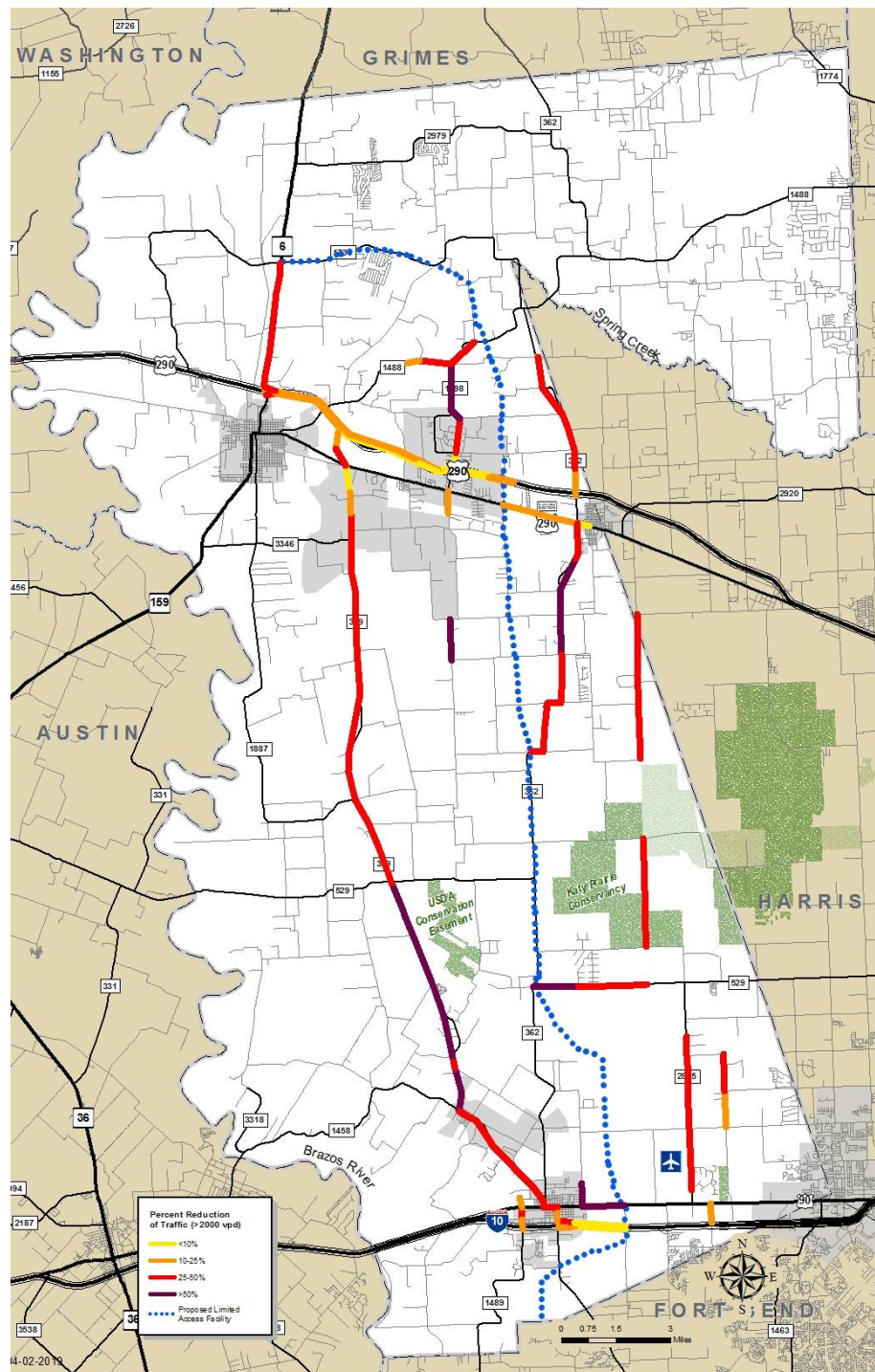


Figure 5-3: Stress Test

PUBLIC INPUT

As mentioned in Chapter 1, an extensive public involvement plan was implemented. The six public meetings resulted in numerous comments that influenced the development of the 2019 WCTP. The following key issues were identified:

- Realignment of proposed thoroughfares – Although the Thoroughfare Plan does not represent exact roadway alignments, some were modified to avoid existing developments and make use of existing roadway facilities as much as possible.
- FM 529 realignment – The proposed alignment for FM 529 was modified to avoid USDA Conservation Easement.
- Limited Access facility – A limited access north/south facility was added to remove thru traffic from local roads and preserve the rural Waller County character.
- Oppose all thoroughfares in The Katy Prairie Conservancy (KPC) – KPC advocates for the protection and conservation of the Katy Prairie and opposes all roads through the KPC. Nine thoroughfares were removed from the 2019 Plan to accommodate this request. However, to ensure connectivity and school and emergency response access, the Thoroughfare Plan includes one north-south road through the Katy Prairie conservation area. Currently, there is a connectivity gap of 10 miles between the two-existing north-south facilities, a distance considered insufficient to accommodate emergency response needs and the development occurring along the outer edges of the conservation area. The demand for this north-south facility may not be immediate, but the facility will be necessary if development trends continue as they do today.

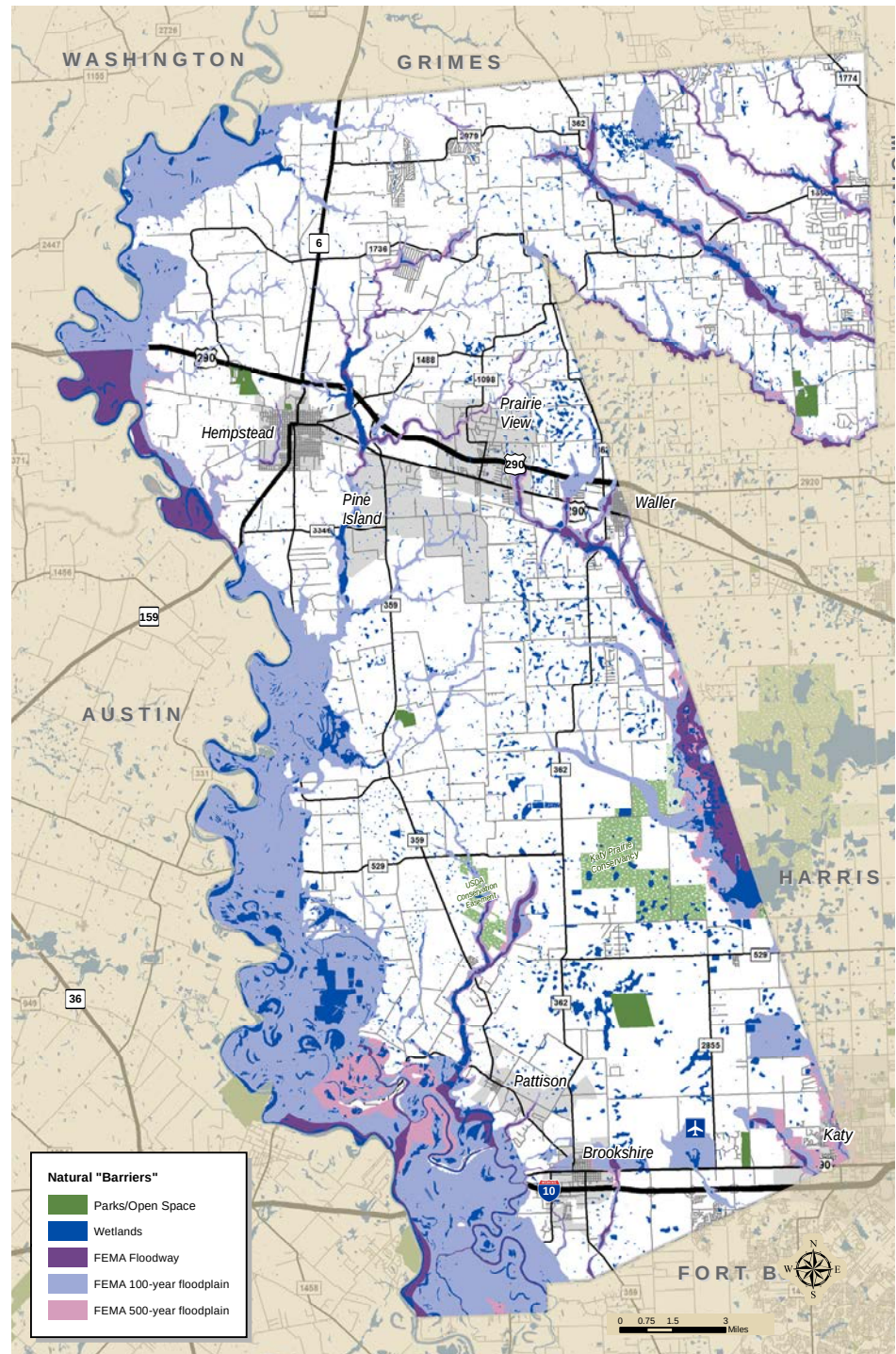


Figure 5-4: Natural Barriers

- Oppose Pederson Road extension – Over 75 comments were received opposing the extension of Pederson Road through Remington Trails to FM 2855. ROW was preserved for the extension of Pederson Road when the subdivision was platted in the early 1990s (Figure 65-5). Today, imagery

maps clearly show that the ROW exists for the proposed road (Figure 65-6). Waller County acknowledges the opposition to the extension but has no ability to remove it from City of Houston's MTFP.

Figure 5-5: Remington Farms Plat (1992)

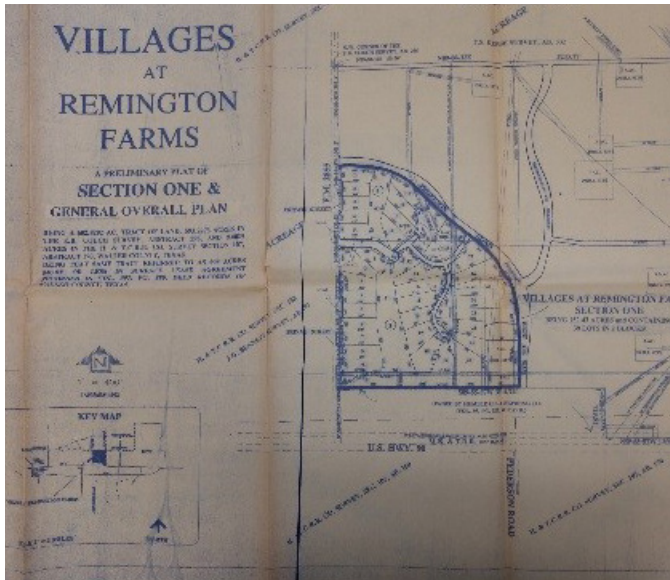
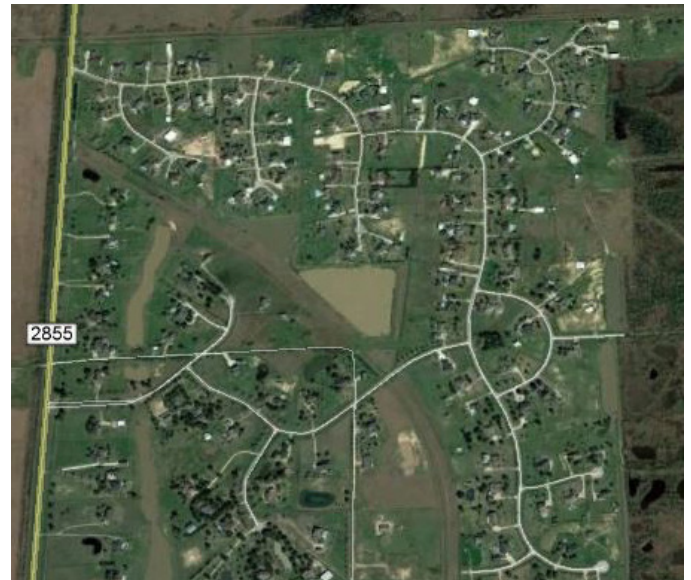


Figure 5-6: Remington Trails (Feb. 2017)



2019 THOROUGHFARE PLAN

The 2019 Waller County Thoroughfare Plan (2019 WCTP) is shown in Figure 5-7. The map also identifies the functional classifications, interstate, limited access facility, major thoroughfare, or major collector, and if the facility is existing or proposed. These maps are the most essential elements of the 2019 WCTP.

The roadway analysis was performed at a high level, so it is critical that more detailed studies to refine alignments, investigate potential environmental impacts, and determine the ultimate design of the roadway (i.e. cross sections, bridges, intersection geometries, and the like) be conducted as the need for a given roadway becomes apparent.

Subdivision plats that include thoroughfares should be developed in collaboration with, and under the review of the County and, where appropriate, municipal agencies.

DESIGN CRITERIA

Functional Classification

In addition to defining a thoroughfare network, a classification was assigned to each of the roadways. Functional classification is the process by which local and regional roadways are grouped into hierarchal categories according to the transportation objectives they are intended to provide. This process identifies the role each roadway serves in the context of the larger transportation system. Functional classifications for the plan were based on a variety of considerations, including whether the roadway is on the state system and the amount of traffic it currently or is expected to carry.

Transportation systems are designed to serve a diverse range of travel needs, from long-distance travel between cities to local trips between home and retail areas, schools, employment, and other service locations. Assigning a functional class to each roadway in the system helps ensure that the transportation system can serve the diverse travel needs of users in a logical and efficient manner.

Functional classifications provide a basis for selecting appropriate speed and geometric design criteria for a given roadway. However, this does not mean that the functional classification for a given roadway prescribes specific design criteria. Instead, the actual configuration of roadways is subject to review and adjustment to ensure facility design is coordinated with adjacent development, considers the development character of the area which the roadway serves (urban, suburban or rural), and meets other community goals and objectives.

MOBILITY VS. ACCESS

The two primary travel needs served by roadways are mobility, which is the ability to move people or goods efficiently between locations, and access, which is the ability to reach numerous desired destinations. While all roadways serve these two needs to some degree, certain types of roadways serve one need better than the other. Highways, for example, provide a high degree of mobility, facilitating higher-speed, longer-distance travel between destinations by providing minimal traffic conflicts and few opportunities to enter/exit the roadway. Such roadways are classified as Interstate/ Freeway/Toll Roads under the functional classification system specified in the WCTP. Neighborhood streets, on the other hand, provide a high de-

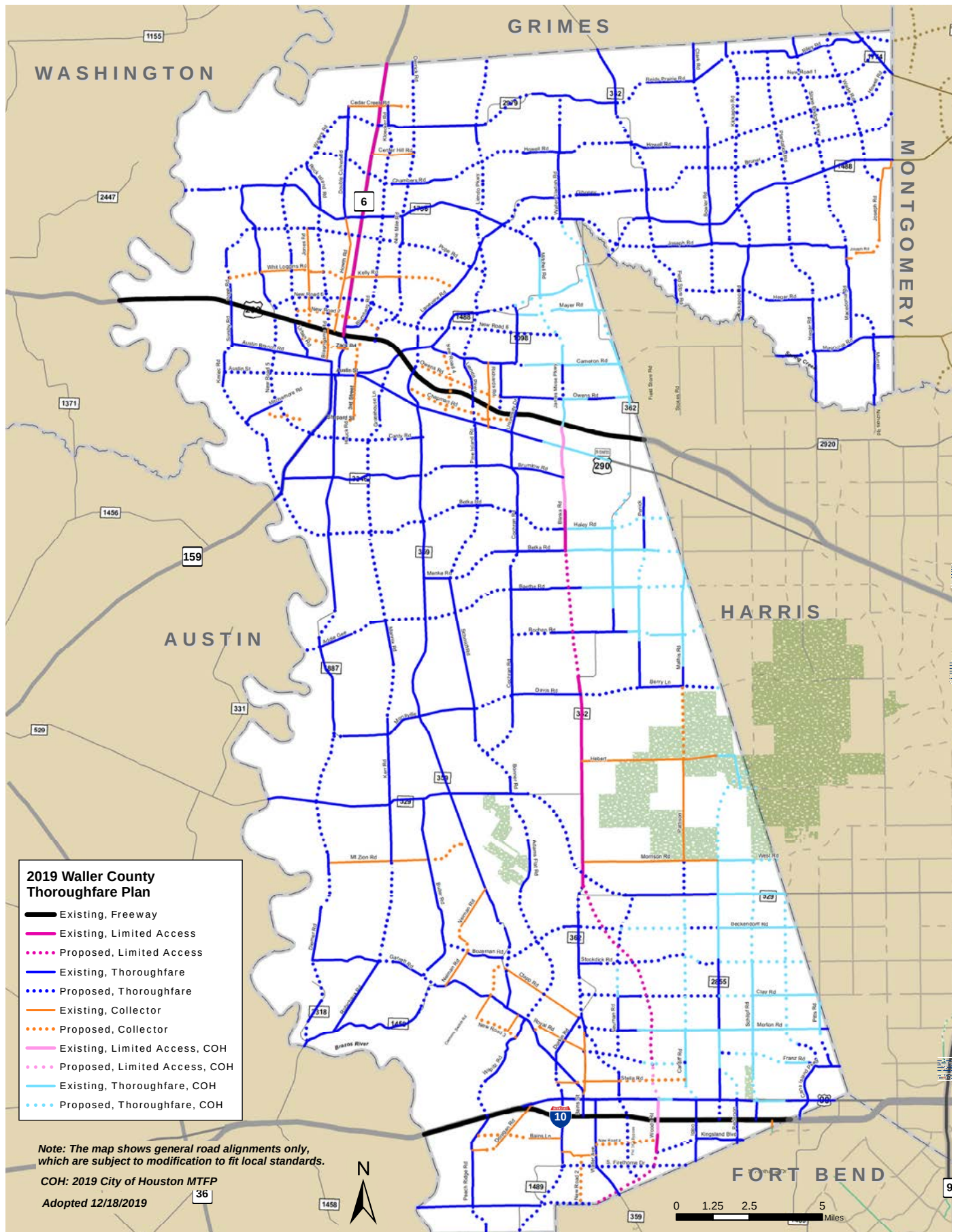
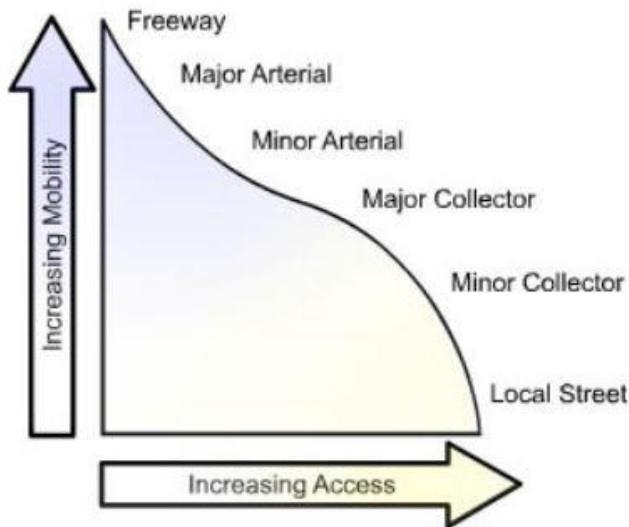


Figure 5-7: 2019 Waller County Thoroughfare Plan

Figure 5-8: Mobility vs Access



gree of access (to homes, shopping centers, etc.), but offer lower mobility due to the presence of driveways, traffic signals, lower speeds, and other design characteristics. These roadways are classified as Local Streets under this functional classification system (Figure 5-8, Source: FHWA).

If an entire roadway network was built as Interstate/Freeway, there would be wasted roadway capacity and excessive amounts of land dedicated to roadway while providing limited access to activities and homes. On the other hand, if the network was purely Local Streets, it would be grid locked without enough capacity and experience high volumes and slower traffic speeds. Varieties of roadway types are needed to build a functional network and create different roadway and intersection traffic densities.

The Waller County Functional Classification System, Figure 5-9, has five primary functional classes which are listed below. The Thoroughfare Plan focuses mainly on the Major Thoroughfares, Thoroughfares (known in some jurisdictions as “Arterials”), and Major Collectors within the County. Table 5-1 presents the functional classification design criteria and describes basic design characteristics including design speeds, number of lanes, traffic volume, and intersection spacing. The design criteria were developed to achieve a safe, efficient, and connected thoroughfare network. Figure 5-10: 2019 WCTP ROW Widths, depicts the right-of-way (ROW) to be preserved for an existing or future roadway facility and Figure 5-11: 2019 WCTP Number of Lanes, illustrates the ultimate number of lanes the facility will have.

INTERSTATE / FREEWAY / TOLL ROAD (F)

Interstate/Freeway/Toll Road (F) roadways provide a high degree of mobility by serving travel between

major destinations, as well as long-distance traffic that goes through or bypasses an area. They are designed to minimize travel time by providing high posted speed limits, offering physical separation from other roadways and modes (e.g. no at-grade intersections, sidewalks, or bicycle lanes) and providing a limited number of access/egress points (e.g. entrance and exit ramps). These high-volume thoroughfares often have more than two lanes in each direction, no medians, and at least 400 feet of right-of-way. Roadways of this type usually have both inside and outside shoulders.

LIMITED ACCESS FACILITY (LF)

Limited access facilities (LF) are similar to Interstates/Freeways in that they provide a high degree of mobility by primarily serving long-distance travel with limited access points. However, the intersections are signalized and not grade separated. An example of a limited access facility in Waller is SH 6, signalized intersections and minimal driveways are used to control the traffic flow, with the limited access facility given most of the green time.

Limited access facilities are typically designed to minimize travel time by posting high speed limits and offering physical separation from other modes of transportation. Roadways are typically high-volume roads with more than two lanes in each direction and at least 120 feet of right-of-way. Inside and outside shoulders are typically present along limited access facilities.

MAJOR THOROUGHFARES (MT)

Major Thoroughfares (MT) (also known as principal arterials) provide a high degree of regional mobility by serving travel between major destinations and activity centers. They also serve long-distance traffic that goes through or bypasses an area and connect traffic into and between interstate and freeway thoroughfares. The number of lanes can vary between four and eight lanes in each direction. Medians are typically present, may contain left turn lanes, and usually have infrequent openings. There are limited driveway and street intersections, and no on-street parking. There is no grade separation between Major Thoroughfares and smaller intersecting roadways, however, grade separations between Major Thoroughfares can occur depending on intersection volumes. Major Thoroughfares have a minimum right-of-way of 120 feet. Wide (greater than 6 feet) sidewalks and bicycle lanes can be found along Major Thoroughfares, especially in urban areas, and shoulders may be present in rural areas.

THOROUGHFARES (T)

Thoroughfares (T) (also known as Arterials) are intended to connect traffic into and between the principal arterial systems. They can serve trips of moderate

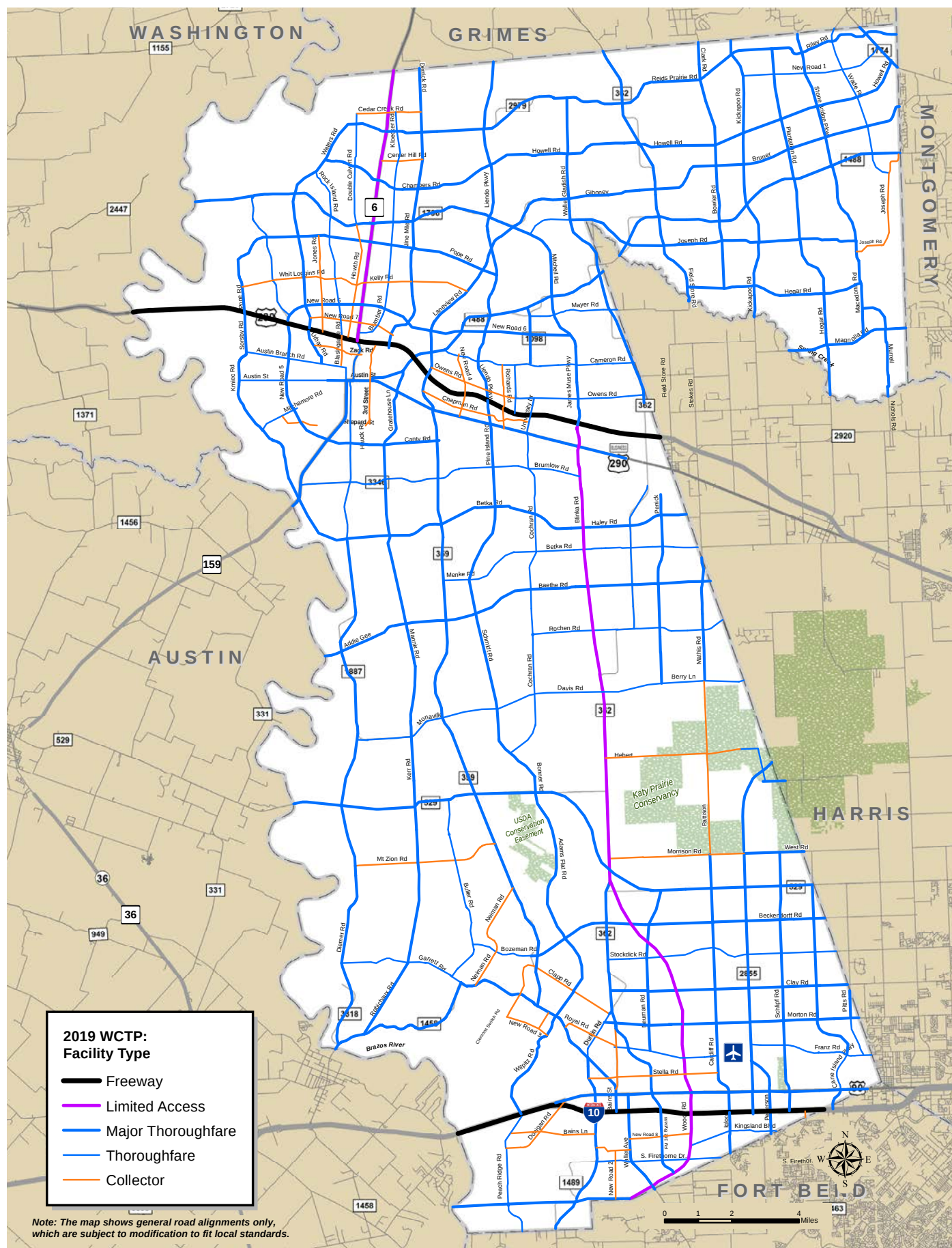


Table 5-1: Functional Classification Design Criteria

Thoroughfare Type	Number of Lanes	Minimum Right of Way	Design Speed (mph)	Vehicles per Day (vpd)	Minimum Intersection Spacing	Minimum Shoulder Width	Typical Characteristics
Interstate/ Freeway (F)	4 or more	400 feet	> 50 mph	> 40,000	No at-grade intersections	8 - 12 feet	- Includes Interstate Highways, Freeways, Expressways and Tollways - High degree of access control - All interchanges are grade separated - No sidewalks - No median openings - No bicycle lanes
Limited Access Facility (LF)	4 or more	180 feet	> 50 mph	> 40,000	Some at-grade intersections	8 - 12 feet	- Higher speeds and regional mobility - High degree of access control - Some interchanges are grade separated - No sidewalks - Limited median openings - No bicycle lanes
Major Thoroughfare (MT)	2 to 8	120 feet	40-50 mph	20,000 - 60,000	400 - 500 feet	2 - 8 feet	- Higher speeds and regional mobility - Infrequent median openings - Limited driveway and street intersections - No on-street parking - Sidewalks (min. 6 ft) encouraged, esp. in urban areas - Bicycle lanes permitted
Thoroughfare (T)	2 to 6	100 feet	35-45 mph	10,000 - 30,000	300 - 400 feet	2 - 8 feet	- Greater local accessibility - Infrequent median openings - Limited driveway and street intersections - Permitted street parking - Sidewalks (min. 6 ft) encouraged, esp. in urban areas - Bicycle lanes permitted
Major Collector (C)	2 to 4	80 feet	35-40 mph	5,000 - 30,000	250 - 300 feet	2 - 8 feet	- Accessibility to and from local communities and activity - Frequent median openings, driveway and street - Permitted street parking - Sidewalks may not be present, especially in rural areas - Bicycle lanes permitted

length by connecting smaller geographic areas. While they provide slightly less mobility benefit than Major Thoroughfares, they are still characterized by relatively high travel speeds, low interference from cross traffic, and provide greater local accessibility. Typically, there is no grade separation between Minor Thoroughfares and intersecting roadways of similar classification. Medians are oftentimes present in urban areas and may contain turn lanes. On-street parking, wide (6- foot) sidewalks, and bicycle lanes can be found on Thoroughfares, especially in urban areas. Thoroughfares have a minimum right-of-way of 100 feet. The presence and width of shoulders varies based upon space available and the character (urban, suburban, or rural) of the area served.

MAJOR COLLECTORS (C)

Major collectors (C) provide a balance between mobility and access primarily collecting traffic from local streets and providing connections to arterials. In urban areas, collectors provide traffic circulation in residential areas or commercial districts, while in rural areas they primarily serve travel within the county (i.e. trips shorter than those served by thoroughfares). Major Collectors specifically provide access to and from local communities and activity centers. They are characterized by more frequent median openings and more driveway and street intersections. The minimum right-of-way for Major Collectors is 80 feet. Sidewalks and bicycle lanes can be provided along Major Collectors, especially in urban areas. Availability and width of shoulders varies.

To allow for greater flexibility in subdivision design and to encourage local governments to develop minimum and maximum street intersection spacing standards that meet the needs of their communities, the MCTP does not classify or specify the alignment of minor collectors or local roads, which are generally local or residential in nature.

TYPICAL ROADWAY CROSS-SECTIONS

Design criteria recommendations for the roadway classifications listed above are described and illustrated in the following sections. The design criteria are based on the goal of achieving a safe, efficient, and connected thoroughfare network.

As Figure 5-9 indicates, these functional classifications prescribe the same basic design characteristics – right-of-way (Figure 5-10), design speeds, number of lanes (Figure 5-11), traffic volume, and intersection spacing – regardless of whether the roadway serves an urban, suburban, or rural area. However, as the standard cross-sections (Figures 5-12 and 5-13) on the following pages indicate, there may be some difference in the design details of a given roadway depending on the character area the roadway serves. For example, urban and suburban roadways might have sidewalks, curb-and-gutter, no shoulders, and raised landscaped medians, whereas rural roadways might have open trenches, shoulders, and continuous two way left turn lanes or no medians.

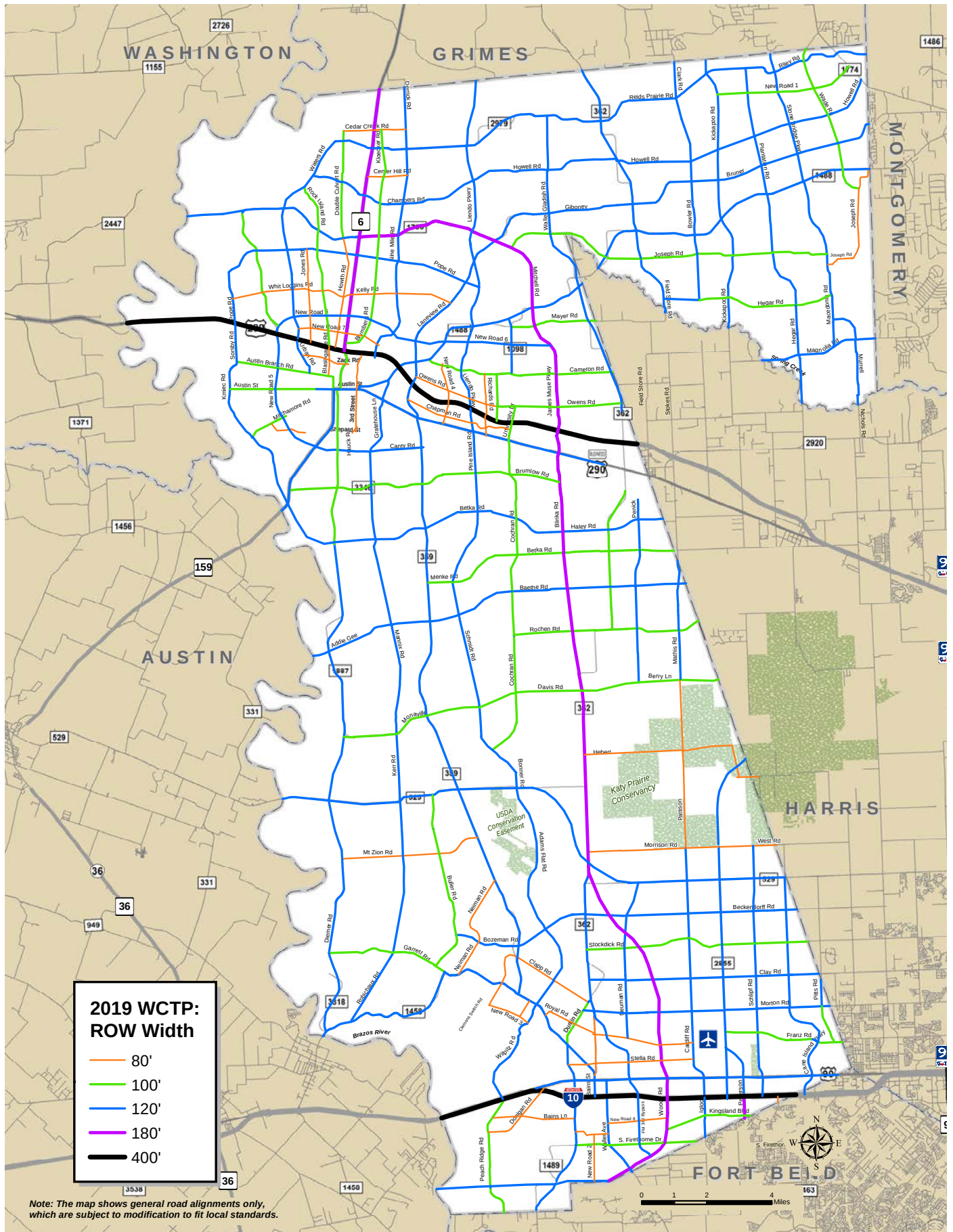


Figure 5-10: 2019 Waller County Thoroughfare Plan: Right-of-Way Widths

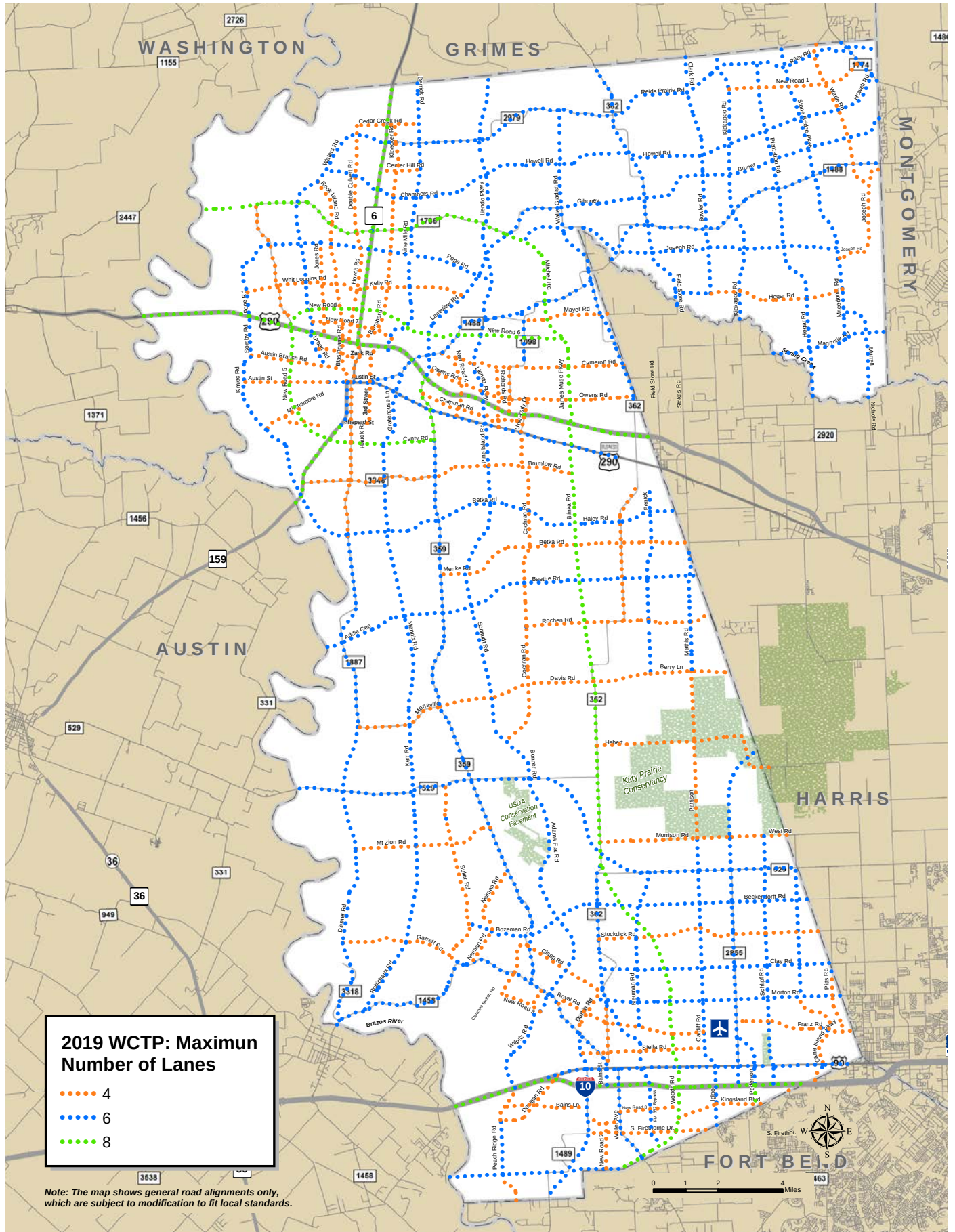
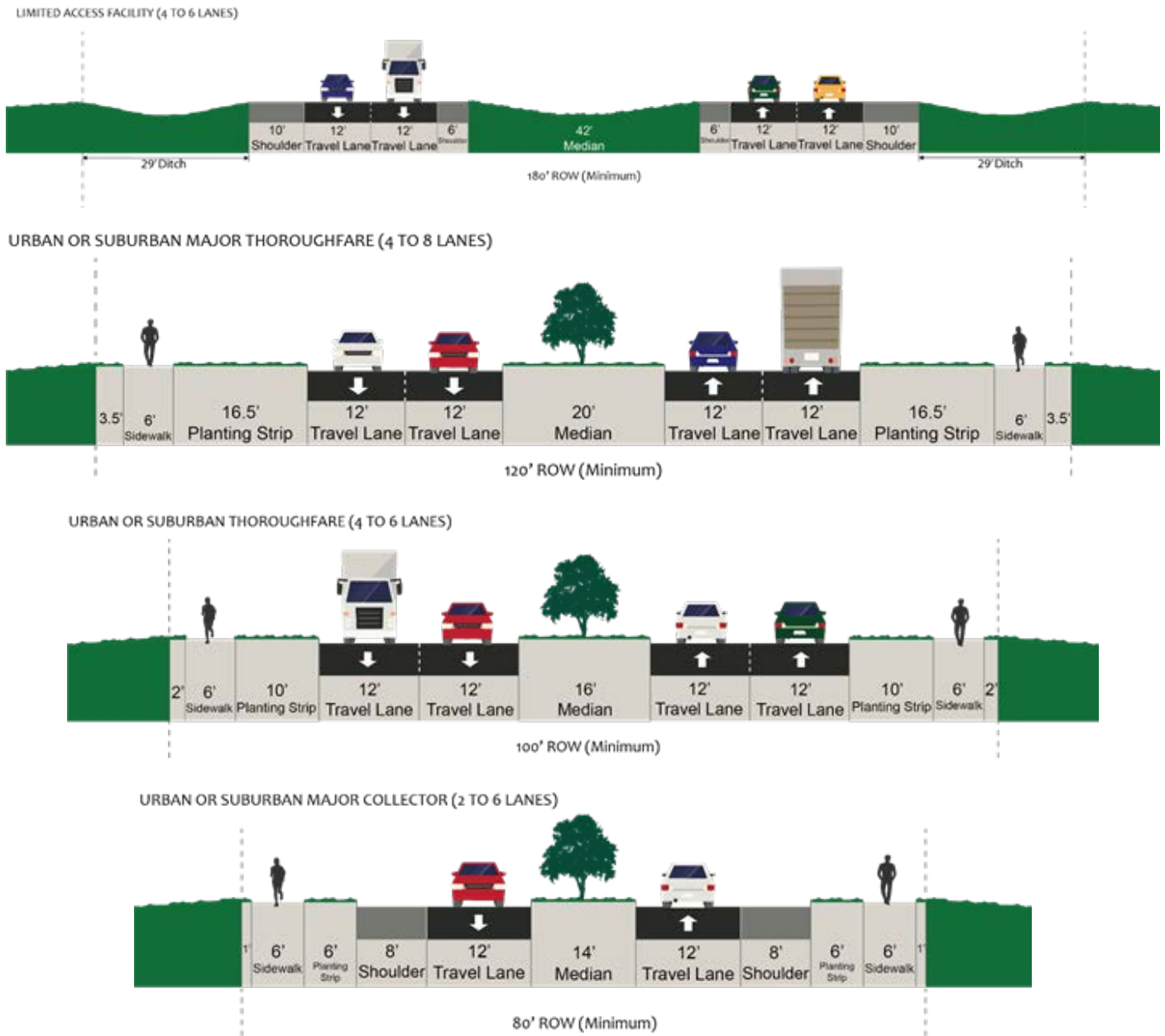


Figure 5-11: 2019 Waller County Thoroughfare Plan: Number of Lanes

Figure 5-12: Standard Cross-section Recommendations by Functional Classification and Area Type



Standard lane widths are 12 feet, except where shared use lanes (for bicycles) are provided. Raised, landscaped medians are recommended for all roadways carrying more than 20,000 vehicles per day.

The Plan includes a cross-section recommendation for the optional bicycle facility integration. This concept could be incorporated along thoroughfares and collectors with shoulders and posted speed limits less than 50 miles per hour. The rumble strip, or another type of lane protection along the outside travel lane, provides separation and protection for the bicyclist on roads with speed limits greater than 50 mph.

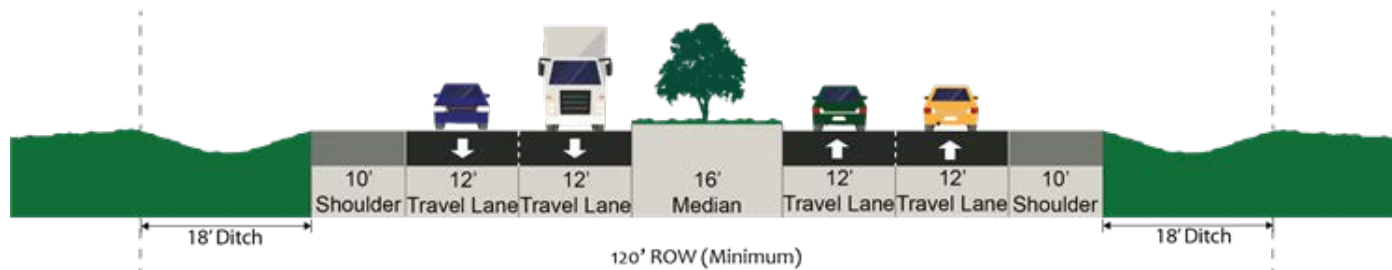
The standard sections illustrated on the previous pages are conceptual in nature and do not consider local factors such as land use character, available right-of-way, environmental conditions, or local situations that could alter the design of a roadway. Detailed engineering studies and design will be required for all roadways as they are implemented.

NEW THOROUGHFARES

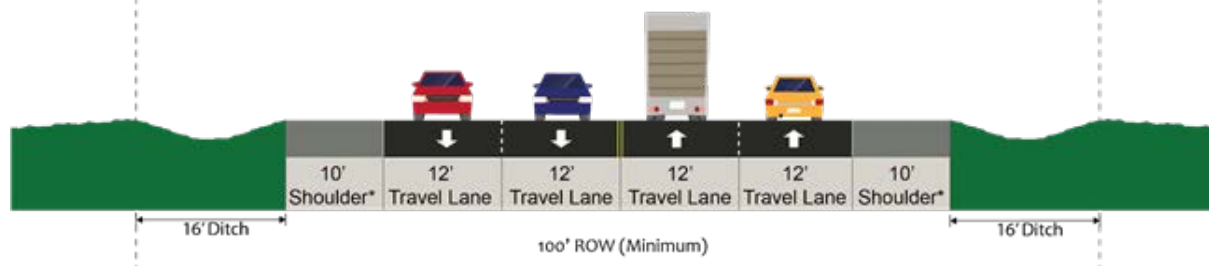
The results of detailed analysis and public input new thoroughfares were considered throughout the County. Although many of the corridors in the 2019 plan were

Figure 5-13: Standard Cross-section Recommendations by Functional Classification and Area Type (continued)

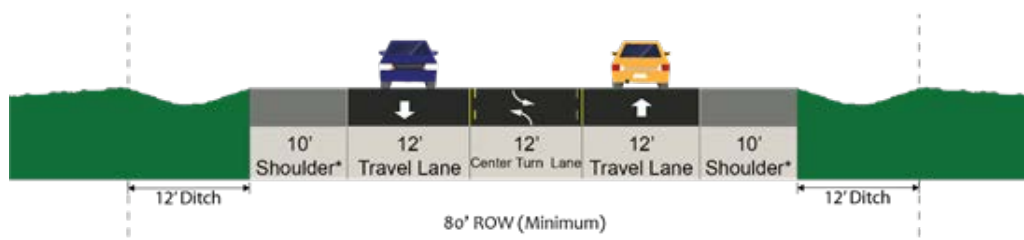
RURAL MAJOR THOROUGHFARE (4 TO 6 LANES)



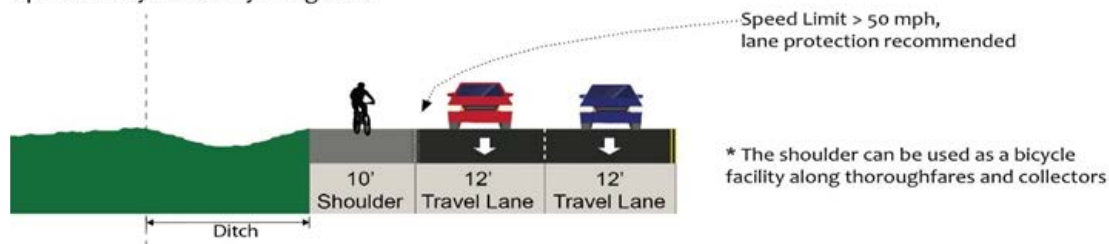
RURAL THOROUGHFARE (4 TO 6 LANES)



RURAL MAJOR COLLECTOR (2 TO 4 LANES)



Optional Bicycle Facility Integration



in the 2012 thoroughfare plan, there were numerous corridors that were not. New thoroughfares were added where connectivity was needed.

INTERSECTION SPACING

The opportunity for vehicular crashes increases as the number of intersections per mile increases. The existence of too many intersections per mile also has the potential to increase delay and congestion. However, too few intersections can limit access as motorists need intersections to reach activities and destinations. Internal cross-access between parcels is highly encouraged to facilitate adequate access to multiple destinations while minimizing vehicle conflicts on thoroughfares.

SUBDIVISION REGULATIONS

The Waller County Transportation Plan recommends that subdivision regulations are updated consistent with the Thoroughfare Plan. The Waller County Subdivision and Development Regulations defines land subdivision as the division of a tract of land into two or more parts with any of the tracts being 10 acres or less in area (Waller County Subdivision and Development Regulations, 2013). Subdivision regulations provide the procedures and standards for subdividing land into smaller parcels for sale and development. Subdivision regulations require land developers to comply with certain conditions to record a plat, final drawing, or plat of a proposed land subdivision. Generally, at the point of land subdivision, the land owner may be required

to dedicate land to the construction of roadways from the Thoroughfare Plan. The purpose of this section is to highlight that County and municipal subdivision regulations will reference the adopted Thoroughfare Plan described in this chapter.

Land subdivision regulations are important to ensure that quality development occurs across the county. Waller County, and many municipalities within Waller County, have subdivision regulations with specific clauses that require developments (land subdivisions) to dedicate land to the addition of thoroughfares. Relevant excerpts from the regulations and ordinances that address thoroughfares and streets are shown below.

Waller County

Subdivision and Development Regulations states the following in Appendix A: Engineering Design Standards:

"Streets shall be laid out so as to align with existing streets in adjoining or nearby subdivisions, leaving the possibility of connecting the subdivisions with a minimum of street construction. No voids shall be left within the subdivision with the intent of avoiding responsibility for constructing streets or bridges, nor along the subdivision boundary to avoid connecting with adjacent subdivisions or streets. Arterials shall be placed and designed in accordance with the plan of the County Thoroughfare Plan and the County Engineer. Collectors will be placed in accordance with any collector street plan that contains the subdivision."

Hempstead

Subdivision Ordinance states the following in Article 4B – Subdivision Design Requirements:

"All industrial and commercial streets shall have a minimum right-of-way width of eighty feet (80'). All residential streets shall have a minimum right-of-way width of sixty feet (60'), where the plat is inside the City limits and where only single-family residential lots abut such street."

Katy

Chapter 10- Subdivision Regulation Ordinances states the following:

"Sec. 10.04.003 Streets (I): Right-of-way widths (1) Major streets shall have a minimum right-of-way width of at least eighty feet (80') or preferably one hundred feet (100'). (2) collector or secondary streets shall have a right-of-way of at least sixty feet (60') or preferably seventy feet (70'). (4) Residential streets shall have a right-of-way of at least sixty feet (60')."

"Sec. 10.04.006 Sidewalks: Sidewalks of minimum four-foot (4') width (ADA compliant) (1) on the sub-

division side, or sides, of all major thoroughfares, or arterial streets. (2) On the subdivision side, or sides, of all secondary or collector streets. (3) On the residence side, or sides, of all marginal service streets where such service streets parallel major thoroughfares, or arterial streets, adjacent to or within a subdivision. (4) As deemed necessary by the planning commission in commercial, industrial, public grounds, and multifamily dwelling areas."

"Sec. 10.05.002 Street paving (2) Pavement width (A) Major streets: Forty-four feet (44') to sixty-four feet (64') between back of curbs. (B) Secondary streets: Thirty-eight feet (38') to forty-four feet (44') between back of curbs. (C) Residential streets: Twenty-eight feet (28') to thirty-two feet (32') between back of curbs."

Pattison

Subdivision Regulations includes requirements on street design and right-of-way within Appendix A-Engineering Design Standards:

"A3. Street Alignments. 3.1 Streets shall be laid out so as to align with existing streets in adjoining or nearby subdivisions, leaving the possibility of connecting the subdivisions with a minimum of street construction. No voids shall be left within the subdivision with the intent of avoiding responsibility for constructing streets or bridges, nor along the subdivision boundary to avoid connecting with adjacent subdivisions or streets. Arterials shall be placed and designed in accordance with any arterial street plan that contains the subdivision. Collectors will be placed in accordance with the plan of the City Thoroughfare Plan and the City Engineer."

"A4. Minimum Street Requirements. 4.1.1 If the arterial is included in the transportation plan, the right of way and pavement shall be as required in the plan. 4.1.2 The minimum right of way for an arterial shall be 100 feet. 4.2.1 If the collector is included in a transportation plan, the right of way and pavement cross section shall be as required in the plan. 4.2.2 The minimum right of way for a collector shall be 80 feet."

"4.5 Additional Right of Way for Existing Streets. 4.5.2 Where the subdivision affects only one side of a city street, adequate right of way shall be provided to obtain one-half the total proposed width to provide right of way as prescribed by City Council. 4.5.3 Where the development is on both sides of the existing county street, right of way for the total prescribed width shall be provided."

Prairie View

Reviews sidewalk construction under certain conditions as described in the Code of Ordinances Chapter 3 – Building Regulations:

“Article 3.9 Division 6 Sec. 3.981 Permits; Permit Fees (b) Sidewalks Required. Sidewalks shall be required to be constructed along an existing curb-type major thoroughfare abutting the property in all residential and commercial areas being developed.”

City of Waller

Requires the sufficient dedication of right-of-way during the subdivision process to accommodate transportation according to the Code of Ordinances Appendix A – Subdivisions:

“Appendix A. Part III. Sec. 3.04.02 Right-of-way width, widening. The width of the right-of-way for any street shall be at least 60 feet. In those instances where a subdivision plat is located adjacent to an existing public street with right-of-way width less than 60 feet, sufficient additional right-of-way shall be dedicated within the subdivision plat boundary to accommodate the development of the street to a total right-of-way width of not less than 60 feet.”

It is recommended that subdivision regulations are updated to represent the recommendations within this document. Subdivision regulations must be integrated with other local plans, policies, and ordinances to effectively shape development and growth within the county.

Moving forward, the Waller County Transportation Plan recommends the following changes to subdivision regulations to be consistent with the 2019

- All municipalities are recommended to include subdivision regulations that require the dedication of ROW for the future addition of roadways as recommended by the 2019 Thoroughfare Plan
- Minimum ROW requirements for roadways of varying functional classifications should be consistent with recommendations for roadway functional classifications made in the 2019 Thoroughfare Plan
- Sidewalk requirements should align with the standard cross-section recommendations by functional classification and type in the 2019 Thoroughfare Plan.

“A thoroughfare plan is a statement of intention, not a guarantee of action.”

IMPLEMENTATION

The 2019 WCTP will result in a well-connected transportation system for the residents and businesses of Waller County to travel to, from, and within local communities by accomplishing the following:

- Preserve adequate rights-of-way for future expansion and connectivity.
- Establish county-wide design standards that enhance the safety and movement of all County roadway users and aid the transition from rural to urban land uses.
- Institute policies and procedures to coordinate and optimize transportation investments in the County.
- Require collaboration with the development community to ensure that roadway investments satisfy existing and future growth needs.

The 2019 WCTP represents a build-out of the County’s ultimate thoroughfare system and does not attempt to represent the need for or the timing of specific construction projects. This is a true long-range plan based on currently existing plans approved by local elected officials. Constant input from the local government planning process is necessary to maintain a current inventory of thoroughfares. This Plan provides a logical scenario of arterial development based on current trends as well as expectations of the future.

This Plan should be used as a guide for local planning to support and promote orderly and planned growth. It should also be a starting point for needs-based arterial studies. This plan may be used as a basis for city or county bond programs, regional land-use plans, economic development initiatives, and regional transportation plans.

The development of effective implementation policies will enable government officials, engineers, planners, and local stakeholders to ensure that the vision and guiding principles of this plan are put into practice as development occurs within the county.

POLICY

The following 2019 WCTP policies are intended to be complimentary to and coordinated with the WCTP map. Both the policies and the map are to be considered and interpreted within the context of the guiding principles described in Chapter 1 of this document.

COMPLETE STREETS

Waller County recognizes that each street is a system of inter-related components serving a wide variety of users. Complete Streets are meant to provide safe, accessible, and convenient use by a variety of users including motorists, transit riders, pedestrians, and cyclist. These street system components may include, but are not limited to, vehicle travel lanes, bicycle travel lanes, drainage facilities, utilities, sidewalks, street trees, transit infrastructure, on-street parking, street signs, and lighting.

CONTEXT SENSITIVE SOLUTIONS

As Waller County continues the transition from a mostly rural area to one defined by increasing urbanization, the interaction between transportation system users, communities, and the surrounding land uses should play a significant role in how transportation system projects are designed and implemented. The thoroughfare plan considers the significance of the role and encourages the use of Context Sensitive Design policies to better merge individual and community needs, while maintaining system mobility, and the community's aesthetic quality.

Context sensitive solutions involves a collaborative approach that involves all stakeholders in developing a transportation facility that complements its physical setting and preserves scenic, aesthetic, historic and environmental resources while maintaining safety and mobility. (Source: Federal Highway Administration website)

Waller County may use context sensitive solutions to effectively merge the past aesthetics of the community with the new development patterns in ways that maintain the local rural character but does not sacrifice efficiency or impede accessibility to new area destinations.

ACCESS MANAGEMENT

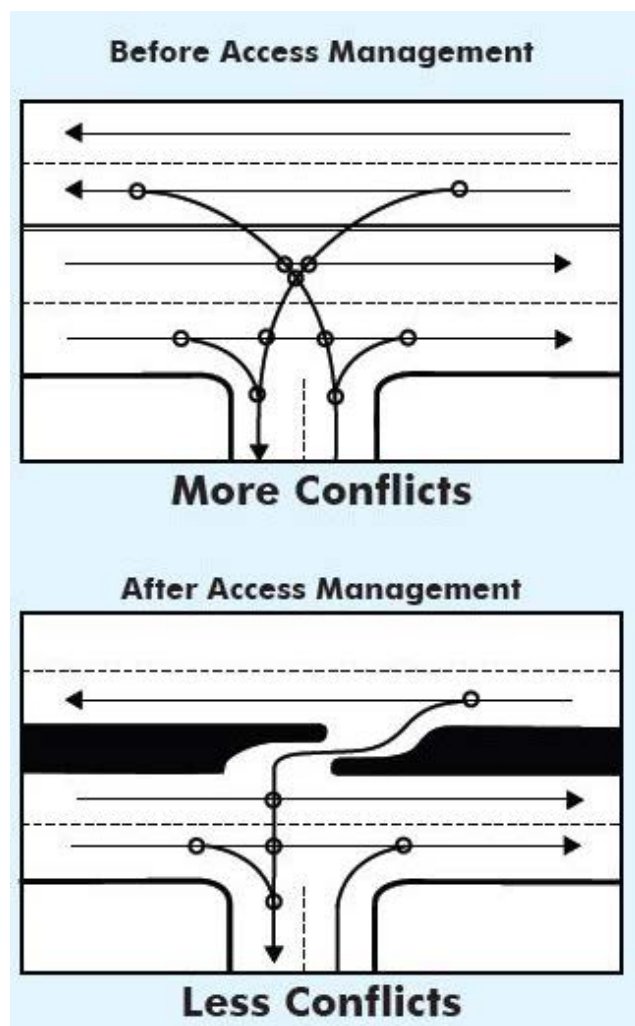
To improve traffic safety and protect the functional integrity of the street system in Waller County, this WCTP recognizes the importance of access management. Access management is the careful planning of the location, design, and operation of driveways, median openings, interchanges, and street connections. The purpose of access management is to provide access to land development in a manner that preserves the safety and efficiency of the transportation system.

Access Management improves safety by limiting the number of conflict points along a roadway by limiting the number of driveways and median openings and restricting certain movements of some median openings (Figure 5-14). The following list is a set of techniques that state and local governments can use to control access to highways, major arterials, and other roadways.

- **ACCESS SPACING:** Increasing the distance between traffic signals improves the flow of traffic on major arterials, reduces congestion, and improves air quality for heavily traveled corridors.
- **CROSSING ACCESS EASEMENTS:** Internal cross-access between parcels can be provided to facilitate adequate access to multiple destinations while minimizing vehicle conflicts on thoroughfares.

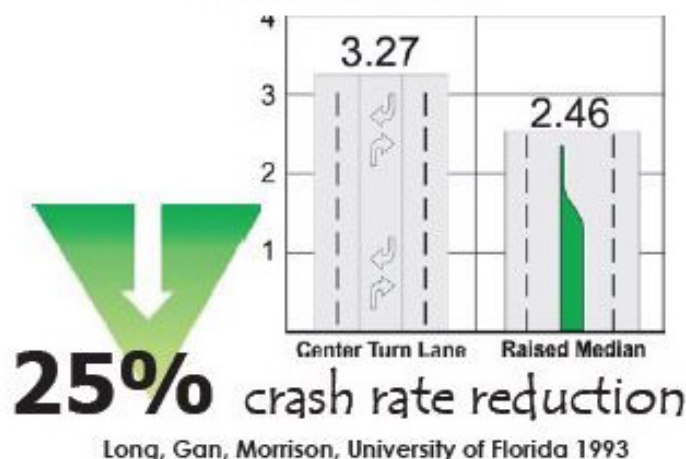
Figure 5-14: Limiting conflict points.

(Source: Access Management, Balancing Access and Mobility, Florida Department of Transportation, 2013)



- **DRIVEWAY SPACING:** Fewer driveways spaced further apart allow for more orderly merging of traffic and presents fewer challenges to drivers.
- **SAFE TURNING LANES:** Dedicated left- and right-turn, indirect left-turns and U-turns, and roundabouts keep through-traffic flowing. Roundabouts represent an opportunity to reduce an intersection with many conflict points or a severe crash history (T-bone crashes) to one that operates with fewer conflict points and less severe crashes (sideswipes) if they occur.
- **MEDIAN TREATMENTS:** Two-way left-turn lanes (TWLTL) and raised, landscaped medians are examples of some of the most effective means to regulate access and reduce crashes. Raised, landscaped medians are more restrictive in terms of access as they are non-traversable, but they

Figure 5-15: Crash Reduction Rates for Median Treatments Florida Crash Study



also provide a degree of safety that continuous TWLTLs do not. Raised, landscaped medians with openings are recommended for all roadways carrying more than 20,000 vehicles per day.

- **RIGHT-OF-WAY MANAGEMENT:** As it pertains to ROW reservation for future widening, good sight distance, access location, and other access-related issues.

It is important for Waller County to develop access management standards to achieve a balance between property access and functional integrity of the road systems. Studies show that implementing access standards increases roadway capacity, reduces crashes (Figure 5-14), and reduces travel time for motorists. (Source: Federal Highway Administration website) Although a roadway may eventually need to be widened, good access management practices can delay the need to widen the road for several years. In cases where roadways cannot be widened, good access management will help reduce congestion. (Source: Access Management, Balancing Access and Mobility, Florida Department of Transportation, 2013).

POTENTIAL FUNDING OPTIONS

The WCTP designates a system of major roadways throughout the county intended to provide adequate access and travel mobility. Since the Plan is not a list of construction projects, this section is for guidance only in the event funding is needed. There are many development tools and strategies available to local jurisdictions to implement the thoroughfare plan. These items will be discussed with an emphasis on encouraging greater coordination of effort among local jurisdictions, private land developers, and other area stakeholders. In addition to the federal and state funding available through the H-GAC RTP/ TIP pro-

cess, local jurisdictions and stakeholders can utilize existing funding mechanisms or collaborate to create new ones where appropriate.

The State of Texas provides an array of tools to help local and county governments encourage and maintain the economic vitality of their jurisdictions. Tools applicable to the County are described below.

TAX INCREMENT FINANCING (TAX CODE, CHAPTER 311)

Tax Increment Financing is a tool that local governments can use to publicly finance needed structural improvements and enhanced infrastructure within a reinvestment zone. These improvements are usually undertaken to promote existing businesses and/or to attract new business to the area.

LOCAL GOVERNMENT CODE CHAPTER 387

Local Government Code Chapter 387 allows counties to create County Assistance Districts that are funded by a portion of sales taxes. Any county may adopt this sales tax, in all or part of the county, if the new combined local sales tax rate would not exceed 2 percent at any location within the district. A county may create up to four county assistance districts, but not more than one district may be created in a commissioner's precinct. The commissioners' court may serve as the governing body of the district; or alternatively, the commissioners' court, by order, may appoint a board of directors to administer the district. A county assistance district may fund construction, maintenance or improvement of roads or highways; provision of law enforcement and detention services; maintenance or improvement of libraries museums, parks or other recreational facilities; promotion of economic development and tourism; firefighting and fire prevention services and provision of services that benefit the public welfare.

CHAPTERS 380 (CITIES) AND 381 (COUNTIES) OF THE LOCAL GOVERNMENT CODE

Chapters 380 (cities) and 381 (counties) of the Local Government Code grant cities and counties broad discretion to make loans and grants of public funds or the provision of public services, at little or no cost, to promote all types of business development including industrial, commercial and retail projects. Each agreement can be uniquely tailored to address the specific needs of both the local government entity and the business prospect.

PUBLIC IMPROVEMENT DISTRICTS (PID) (LOCAL GOVERNMENT CODE, CHAPTER 372)

Public Improvement Districts (PID) (Local Government Code, Chapter 372) offer cities and counties a

means for improving their infrastructure to promote economic growth in an area. The Public Improvement District Assessment Act allows cities and counties to levy and collect special assessments on properties that are within the city or its extraterritorial jurisdiction. Additional financing options are available to certain large counties. PIDs may be formed to create water, wastewater, health and sanitation, or drainage improvements; street and sidewalk improvements; mass transit improvements; parking improvements; library improvements; park, recreation and cultural improvements; landscaping and other aesthetic improvements; art installation; creation of pedestrian malls or similar improvements; supplemental safety services for the improvement of the district, including public safety and security services; or supplemental business-related services for the improvement of the district, including advertising and business recruitment and development.

Other possible methods to fund future roadway projects include the following.

Impact Fees

Impact Fees impose a charge on new development to pay for the construction or expansion of off-site capital improvements that are necessitated by and benefit the new development. Impact fees are authorized through the police power; not the taxing power. They are part of the development approval process. Requiring an impact fee to provide adequate public facilities is like meeting site planning and zoning requirements. Many builders and developers are impact fee proponents because they know that impact fees add predictability to the development approval process and create a “level playing field” between them and their competitors. They also know impact fees replace less fair negotiated exactions. (Source: ImpactFees.com)

Thoroughfare Fund

Thoroughfare Fund is a designated funding source, created by a city or county, would be used to fund all elements of a major or minor thoroughfare, including construction (travel lanes, sidewalks, bicycle lanes etc.), Right-of-way acquisition and engineering costs. (Source: City of Columbus Thoroughfare Plan, Columbus, IN, www.columbus.in.gov)

Parking Tax

Parking Tax at perhaps \$5 per space, could be dedicated exclusively for roadway projects.

PRO-ACTIVE

Pro-active approaches could help to move projects forward in H-GAC’s Transportation Improvement Program. Examples include:

- County and/or local jurisdictions acquiring right-of-way in advance.
- Encourage landowners and developers to donate right-of-way
- County and/or local governments can fund feasibility and traffic studies, environmental studies and preliminary engineering and design
- County and/or local governments could pay the full cost of relocating utilities and pipelines and constructing drainage improvements

INTERPRETATION OF THE 2019 WCTP MAP

The 2019 WCTP Map shows several new street connections to be made at an undefined point in the future. Many of these new connections are likely to be constructed in segments, when development occurs in those areas. In no instance should any of these connections on the 2019 WCTP Map be interpreted as showing exact alignments for new streets, they are instead intended to represent conceptual connections from one location to another.

It is recognized by this document that the actual implementation of the new connections shown will be highly dependent on numerous unknowns, such as future traffic demand, timing and location of future development, environmental findings, and engineering and financial feasibility. These unknowns do not invalidate the need for or content of this Plan, but rather reinforce the appropriateness of viewing the new connections as conceptual. As such these new connections should in no way be interpreted as or used to limit the current use of the areas in which they are located. These conceptual connections should, however, be incorporated into new subdivisions and other developments in these areas.

Further, in no way should any future connection shown on the 2019 WCTP map be interpreted as establishing an easement or right-of-way for that connection or in any way claiming private property for public use.

NEXT STEPS

There are steps that need to be completed by the County for this adopted Thoroughfare Plan to be successfully implemented.

This includes:

- Updating existing subdivision regulations;
- Instituting policies and procedures to coordinate and optimize transportation investments in the county;

- Collaborating with the development community to ensure that roadway investments satisfy existing and future growth needs;
- Coordinating with Hempstead, Prairie View, Waller, Pattison, Brookshire, Katy, Houston, Fort Bend County and Montgomery County to ensure their Thoroughfare Plan complements the 2019 WCTP;
- Developing a process to amend the thoroughfare plan; and
- Updating the thoroughfare plan every 5 years.

SUMMARY

The 2019 Waller County Thoroughfare Plan is a long range (50+ years) plan that identifies the type and general location of future roadways; preserves transportation corridors (i.e. right-of-way); and guides future development. It is not a list of construction projects; a survey, design or engineering study showing the exact alignments of roadways; a time frame for when a project should be complete; a funding mechanism; or a promise to build roads.

The 2019 WCTP will promote connectivity and design uniformity throughout Waller County. Local and county wide planning efforts will greatly benefit from the WCTP through its description of the intended major transportation network and its provision of a single source of information for the review of the key roadway infrastructure currently existing or being planned in the future. Local governmental agencies are encouraged to use this information to help in the development, modification, and implementation of their local plans.

Changes will be made to the thoroughfare plan over time; however, the County should make all reasonable efforts to maintain the original integrity of the plan and its basic theory and keep changes and revisions to a minimum. It will be necessary to maintain the plan's continuity and ensure confidence in the plan's long – range implementation by private land owners.

The 2019 WCTP is intended to represent the intentions and expectations of individual cities and Waller County in developing an ultimate thoroughfare system while maintaining a regional perspective. The County is responsible for maintaining the 2019 WCTP for the guidance of development of the street and highway network which will provide a high level of mobility and accessibility for most of the citizens, present and future, of this County.