Missouri City PEDESTRIAN AND BICYCLE PLAN

Final Report
December 2009

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EXECUTIVE SUMMARY

STUDY OVERVIEW

The Houston-Galveston Area Council (H-GAC) is a voluntary association of local governments and local elected officials in the 13-county Gulf Coast Planning Region, an area of 12,500 square miles with more than 5.7 million people. H-GAC's mission is to serve as the instrument of local government cooperation, promoting the region's orderly development and the safety and welfare of its citizens. H-GAC currently has 131 local government members, including all major general-purpose local governments in the 13-county region: 13 counties, 105 cities, and 13 school districts. H-GAC also serves as the Metropolitan Planning Organization (MPO) for transportation planning in the eight-county Houston-Galveston area. This area includes Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties, an area of 7,700 square miles with more than 5.0 million people. H-GAC's Transportation Policy Council approves the Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP). H-GAC anticipates that more than one million residents will relocate to the region in the next decade and 3.5 million new residents are expected by 2035.

An important component of both community livability and transportation planning is ensuring that pedestrians and bicyclists are properly accommodated now and into the future. Communities nationwide are finding it challenging to strike a harmonious balance between differing transportation modes. As a result, pedestrian and bicycle facilities have become increasingly important. In 2004, H-GAC conducted a Pedestrian and Bicyclist Special Districts Study to identify districts where there were high levels of existing or potential pedestrian and bicyclist activity, where there were opportunities to replace vehicle trips with pedestrian or bicycle trips, and to improve pedestrian and bicyclist safety. Five districts were identified throughout Fort Bend County; one of these was Missouri City. In order to address the need and opportunity for such facilities, Missouri City in partnership with H-GAC performed a Pedestrian and Bicycle Study in "The Show Me City." The study was performed under H-GAC's Pedestrian and Bicyclist Special Districts Program, which develops investment zones within their eight-county transportation planning area. Michael Baker Jr., Inc. (Baker), along with subconsultant Community Awareness Services (CAS), was contracted for this study.

The Study Area includes segments of Farm-to-Market Road (FM) 2234 (Texas Parkway), FM 3345 (Cartwright Road), FM 1092 (Murphy Road), and State Highway (SH) 6 that were identified in a preliminary study conducted by H-GAC in 2004 as having a particularly high concentration of pedestrian and bicycle trip generators (e.g., schools, parks, or stores). These roadway segments include:

- **Texas Parkway from Buffalo Run to Cartwright Road;**
- **Cartwright Road from Texas Parkway to Murphy Road;**
- **Murphy Road from Lexington Boulevard to SH 6; and**
- **SH 6 from Dulles Avenue to Lake Olympia Parkway.**

Prior to the initial meeting, data such as aerial photography, GIS spatial data layers, land use maps, demographic data, pedestrian and bicycle count data, traffic and crash data, roadway improvements, proposed pedestrian and bicycle facilities and existing and proposed plans, were reviewed to identify deficiencies and potential improvements.

This study concludes with a list of conceptual recommendations for facility improvements, as well as a list of recommendations for changes that can be made to policies and programs to further the study's goals. Specific improvement recommendations will have to be evaluated through coordination with the Texas Department of Transportation (TxDOT) and Missouri City.

SCOPE OF SERVICES

The Missouri City Pedestrian and Bicycle Study was completed through a series of tasks that included:

- **Developing Sponsors, Stakeholders, and a Vision**: An Initial Meeting with Missouri City and H-GAC was held on April 7, 2009 to confirm the primary goals and objectives of the study and to review the vision of the project. Through formal and informal discussions, strategic sponsors and stakeholders were identified to support the study.
- **Needs Assessment:** Data were obtained to evaluate existing conditions in the Study Area. A field inventory was performed in April 2009 to confirm the physical conditions. Data and inventory findings were analyzed for potential deficiencies and opportunities.
- **Local Officials Coordination and Public Outreach:** A stakeholder database was assembled and utilized to identify potential charrette invitees. An online survey was administered to measure walking and biking habits, and gather feedback from the general public. A public meeting (held June 25, 2009) and charrette (held July 22, 2009) solicited additional input from stakeholders and residents regarding existing deficiencies and potential improvements.
- **Conceptual Improvements:** A matrix of recommended improvements for the pedestrian and bicycle network, along with policy and programmatic recommendations, were developed. Existing design and construction projects were reviewed for opportunities to incorporate pedestrian and bicycle facilities. Concept level schematics were developed to illustrate the improvements.

- **Implementation Plan:** Improvements identified in the conceptual improvements were evaluated for potential funding sources, time to implement, and facility demand. The FHWA's Overlapping Priorities Method (FHWA, 1999) was used to identify what potential pedestrian and bicycle demands will be produced, relative to trip generators.

MISSOURI CITY PEDESTRIAN AND BICYCLE NETWORK

Field reconnaissance was performed including a sidewalk inventory and intersection inventory and assessment, to identify the presence and condition of pedestrian facilities (e.g., curb ramps, crosswalks, warning signs, pedestrian signals, and push buttons). Data was also collected for the Study Area roadways including, but not limited to, posted speed limit and pavement width (lane and shoulder width). Roadway attribute data was used to evaluate Study Area roadways for bicycle compatibility.

Eleven (11) intersections were studied and three (3) were selected for pedestrian and bicycle counts. The Intersection Inventory and Assessment led to further analyses of pedestrian and bicycle facilities in the form of a(n):

- **Origin and Destination Survey:** The intersection of Cartwright Road and Quail Valley East Drive was selected as it had the highest volume of pedestrians and bicyclists (46 between 3:00 PM and 7:00 PM). The pedestrian and bicycle Peak Hour was identified between 5:15 PM and 6:15 PM.
- **Traffic Signal Analysis:** Traffic signal timing can hinder pedestrian and bicycle safety if crossing times do not allow enough time for all pedestrians to cross a roadway. There are twenty-two (22) traffic signals in the Study Area and fifteen (15) have pedestrian phases and/or timing. Timings were collected for specific intersections and compared to guidelines proposed in future amendments to the 2003 Manual of Uniform Traffic Control Devises (MUTCD); Federal Highway Administration [FHWA], 2008).
- **Pedestrian and Bicycle Crash Analysis:** Pedestrian and bicycle crash data were requested from H-GAC for the most recent three (3) years available (2005 – 2007). The data, which was selected from the Texas Department of Transportation (TxDOT) crash database, were requested to determine the crash history for pedestrians and bicyclists in the Study Area as well as in the entire city. There were 32 reported crashes involving pedestrians and bicyclists (33 individuals in total) between 2005 and 2007 in Missouri City. However, four (4) pedestrian crashes were excluded from the data due to contributing circumstances (e.g. result of criminal activity, crashes into buildings/houses from the roadway and suicide). Of the remaining crashes, eight (8) crashes involved bicyclists and twenty (20) involved pedestrians.

PUBLIC INPUT

To solicit public feedback, an online survey was designed and administered to Missouri City residents to measure habits, opinions and attitudes regarding bicycling and walking in the Study Area and Missouri City in general. The survey was accessible online for 46 days, starting on April 21, 2009 and ending on June 5, 2009. A public meeting was also held on June 25, 2009 to obtain additional input from the general public. Potential sponsors and stakeholders were identified for participation in a charrette, which was held on July 22, 2009. In order to gather feedback from attendees for the charrette, two groups were formed to discuss pedestrian and bicycle issues in the Study Area. At the end of the group session, the group moderator reported to the larger audience on the identified issues and potential improvements.

Residents commented on the need for sidewalk connections from the residential neighborhoods to educational and recreational destinations, connections to the existing park network and trail system, and connections to other communities.

RECOMMENDATIONS

Because of data collection, field reconnaissance, stakeholder and public inputs, recommended improvements were drafted to address identified pedestrian and bicycle deficiencies in the Study Area. Existing plans and projects were reviewed for planning consistency. A Recommendations Matrix and Map was prepared to summarize the recommended improvements and their potential cost and time to implement.

Public input and various methods of research, coordination, and efforts helped outline the desired goals and constraints for the area. They are listed below:

Desired Goals

- **Connect sidewalk network to trail network;**
- **Connect trail network to bicycle compatible roadways;**
- **Establish bicycle routes;**
- **Increase commuting using bikeways and walkways;**
- **Relieve traffic congestion; and**
- **Improve quality of life.**

Constraints

- **Sidewalk network gaps on Texas Parkway, Murphy Road and SH 6;**
- **Texas Parkway and Cartwright Road are not bicycle compatible;**
- **Some curb ramps are not Americans with Disabilities Act (ADA) compliant;**

- **Pedestrians would benefit from countdown signals at signalized intersections; and**
- **Pedestrian phase timing could be modified to meet new FHWA MUTCD guidelines.**

Any modification to occur within the roadway right-of-way (ROW) itself would require additional coordination and/or authorization. Therefore, recommended improvements are referred to as "concepts" in this document to reflect further coordination with TxDOT and the City is needed.

In addition to intersection improvements already planned by TxDOT, the following conceptual improvements are recommended in this Study:

- **Sidewalk Improvements along SH 6;**
- **Sidewalk Improvements along Murphy Road;**
- **Intersection Improvements at Murphy Road and El Dorado;**
- **Bikeway Improvements along Cartwright Road;**
- **Intersection Improvements at Cartwright Road and Quail Valley East Drive; and**
- **Intersection Improvements at Texas Parkway and Buffalo Run, and at Texas Parkway and Independence Boulevard.**

This Missouri City Pedestrian and Bicycle Study provides a detailed review of these concepts along with schematics, anticipated benefits and/or constraints, the potential implementation times, and estimated costs.

This Pedestrian and Bicycle Plan for the Study Area should be utilized by Missouri City as a planning resource to fund and construct pedestrian and bicycle facilities in the future. In addition to these conceptual improvements, recommendations of the Study include policy and programmatic initiatives to help achieve the City's goal of "Creating a safe and more comfortable pedestrian and bicycle-friendly environment in Missouri City that encourages people of all ages to walk and bike for everyday transportation and enjoyment" (Missouri City, 2009a).

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I. STUDY OVERVIEW

A. INTRODUCTION

Missouri City in partnership with the Houston-Galveston Area Council (H-GAC) performed a Pedestrian and Bicycle Study in "The Show Me City." The study was performed under H-GAC's Pedestrian and Bicyclist Special Districts Program, which develops investment zones within their eight (8) county jurisdiction to improve safety and mobility for pedestrians and bicyclists. Michael Baker Jr., Inc. (Baker), along with subconsultant Community Awareness Services (CAS), was contracted for the study.

The purpose of the Missouri City Pedestrian and Bicycle Study was to develop a conceptual plan to promote enhanced pedestrian and bicycle access and mobility in Missouri City. The study assessed existing pedestrian and bicycle facilities, identified physical deficiencies and potential opportunities, and proposed treatments to improve pedestrian and bicycle access and mobility.

This report documents the activities, findings, and recommendations of the Missouri City Pedestrian and Bicycle Study including the data collection process, assumptions, needs assessment results and concept development efforts. This information is organized into the following sections:

- **Section I** provides a study overview;
- **Section II** provides a detailed profile of Missouri City;
- **Section III** provides a detailed analysis of the existing pedestrian and bicycle network in Missouri City;

- **Section IV**, reviews the procedures and information gathered from the public outreach efforts for this study; and
- **Section V**, presents the recommended improvements as well as estimated cost and potential funding sources.

B. WHY PLAN FOR PEDESTRIANS AND BICYCLISTS?

Communities nationwide are finding it challenging to strike a harmonious balance between transportation modes. As a result, pedestrian and bicycle facilities have become increasingly important. When streets are designed only for motorists, modal choices are limited, which leads to decreasing health, higher transportation costs, and a lower quality of life. For these reasons, places that allow you to leave your front door on foot or on a bicycle to grab a cup of coffee, go to work, or to play in a park have become more attractive. Pedestrian and bicycle planning evaluates opportunities to replace motor vehicle trips with bicycling and walking trips.

Pedestrian walking east on Cartwright Road

C. VISION AND COMMUNITY GOALS

Missouri City has identified a vision, as well as several goals, for the transportation network and the overall community *(Missouri City, 2009a)*. The vision statement is below:

> *"Creating a safe and comfortable pedestrian and bicycle-friendly environment in Missouri City that encourages people of all ages to walk and bike for everyday transportation and enjoyment."*

This vision served as the foundation for this study. The proposed recommendations will support and help achieve the community's goals and vision:

- **Improve pedestrian and bicycle safety** by recommending actions which reduce pedestrian and bicycle related collisions;
- **Increase the level of commuting** via pedestrian walkways and bikeways as a cost-effective and efficient transportation alternative by providing coordinated pedestrian and bicycle facilities, enforcement of traffic laws, and promotional campaigns for walking and bicycling;
- **Fund, create, and maintain** a functional pedestrian and bicycle transportation system on and off-street pedestrian walkways/trail and bicycle routes that will enable safe

transportation until overall roadways improvements are made that allow travel on roadways;

- **Establish and maintain safe standards and guidelines** for pedestrian and bicycle facilities, programs, and projects; and
- **Integrate and coordinate pedestrian, bicycle, and transit modes** of transportation with city buses and bike and ride facilities at transit stations, so that walking and bicycling can maintain an important role in congestion management.

D. SCOPE OF SERVICES

The Missouri City Pedestrian and Bicycle Study was completed through a series of tasks that included:

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E. STUDY AREA

H-GAC has identified districts throughout the region where there are significant opportunities to replace vehicle trips with pedestrian or bicycle trips. The results of this program are utilized in the Regional Transportation Plan (RTP) to locate future pedestrian and bicycle facility improvement districts and to prioritize future investments. Districts were ranked on their potential for success through a scoring system, along with a conceptual plan that was developed for a pilot project to focus on pedestrian and bicycle improvements. Missouri City was chosen as a special district for improvement. Through this program, Missouri City partnered with H-GAC to create this Pedestrian and Bicycle Plan.

Pedestrian push buttons at El Dorado Boulevard and Murphy Road

The Study Area includes segments of Farm-to-Market Road (FM) 2234 (Texas Parkway), FM 3345 (Cartwright Road), FM 1092 (Murphy Road), and State Highway (SH) 6. Specific limits include:

- **Texas Parkway from Buffalo Run to Cartwright Road;**
- **Cartwright Road from Texas Parkway to Murphy Road;**
- **Murphy Road from Lexington Boulevard to SH 6; and**
- **SH 6 from Dulles Avenue to Lake Olympia Parkway.**

Bicyclist riding along Murphy Road at El Dorado Boulevard

Missouri City generally maintains the traffic signals and sidewalks on the Study Area roadways; however, the Texas Department of Transportation (TxDOT) maintains the roadways themselves. Any modifications within the roadway ROW would require coordination and/or authorization with TxDOT. For this reason, specific facility improvements proposed in this document are referred to as "concepts." Figure 1 illustrates the Study Area in a regional context, while Figure 2 illustrates a local context.

Figure 1: Study Area (Regional Context)

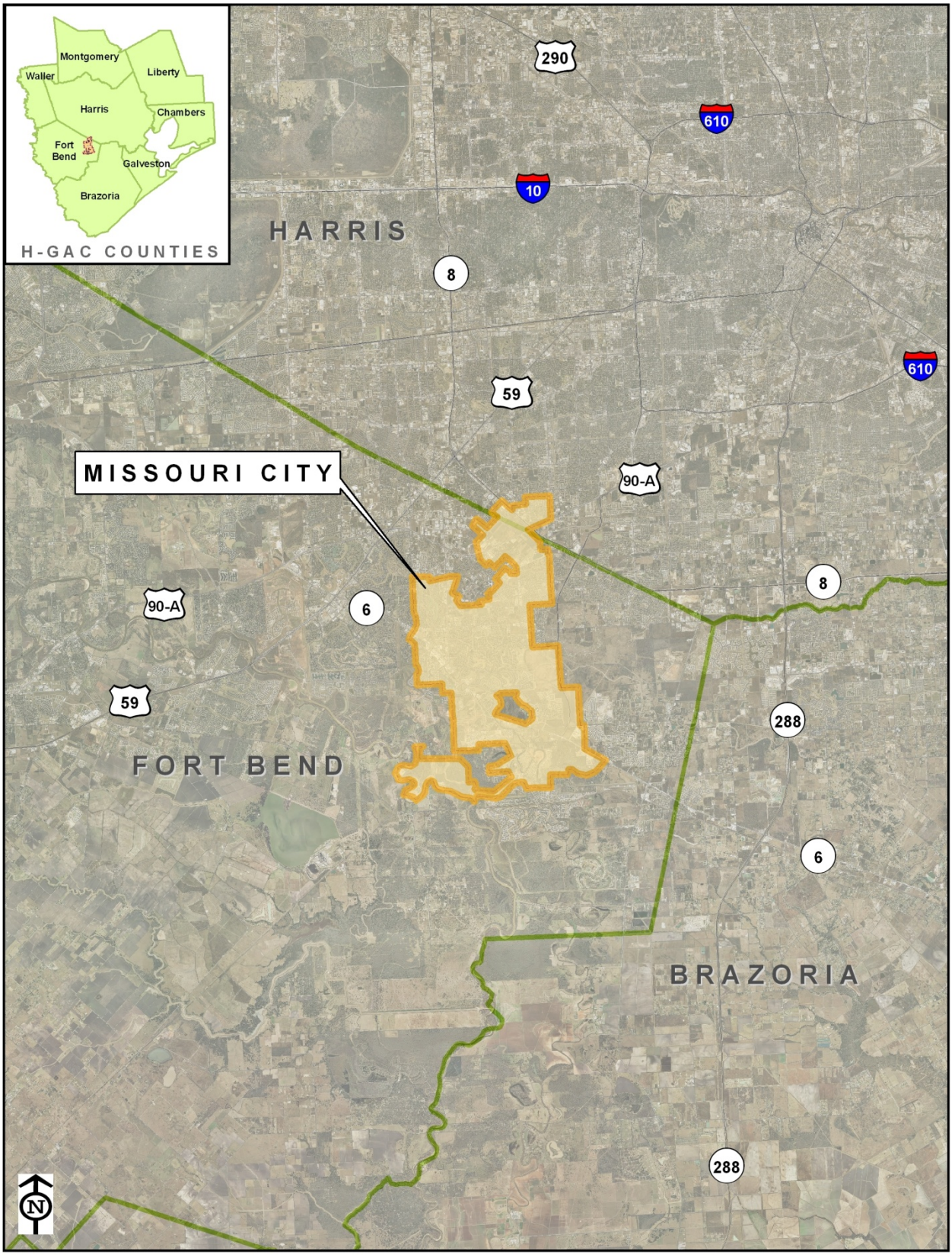
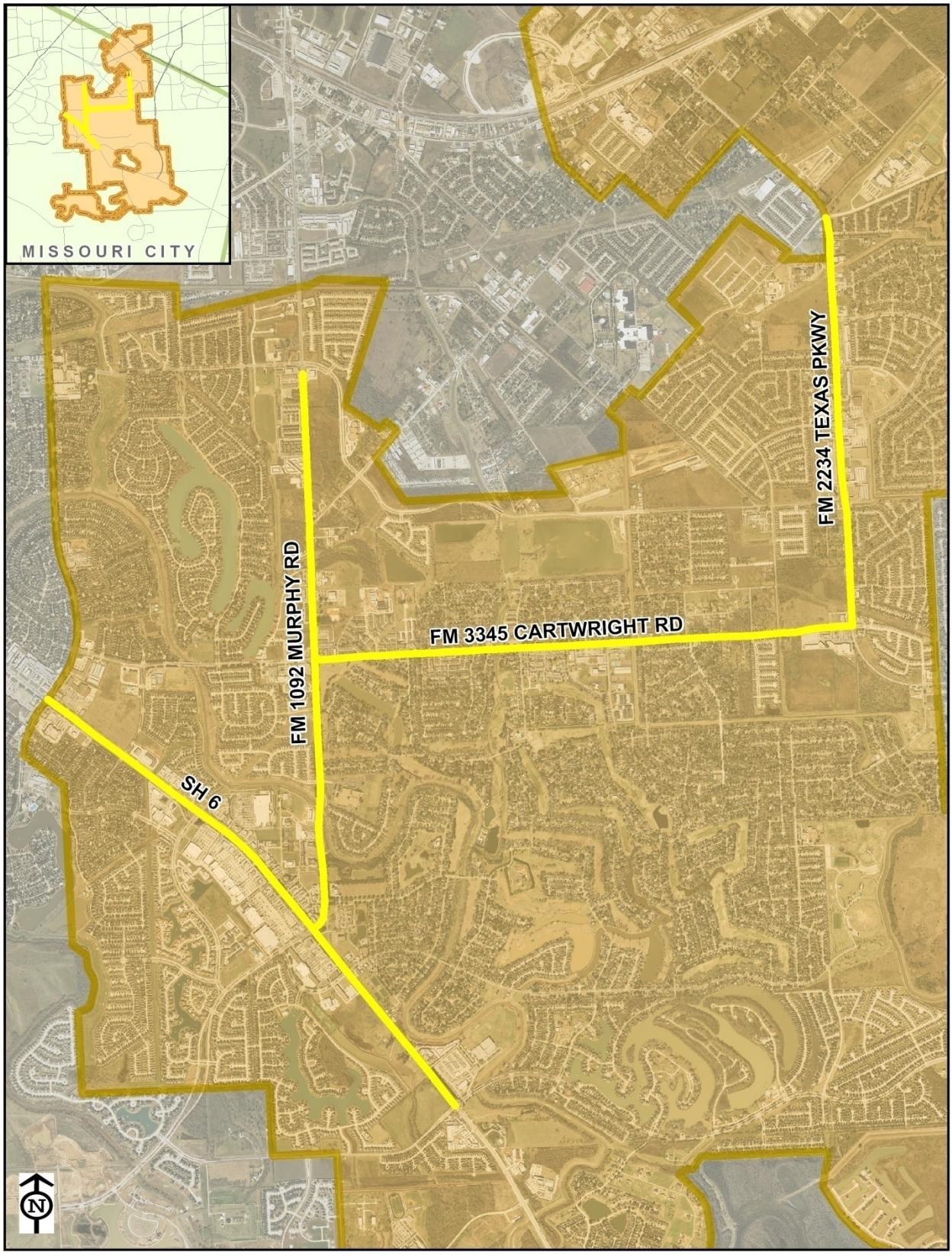


Figure 2: Study Area (Local Context)



II. MISSOURI CITY PROFILE

To supplement data on existing conditions gathered in the field, the Baker team collected additional resources (e.g., existing plans, census data) to assist in the pedestrian and bicycle network analysis. Existing resources were utilized to gain an understanding of land use, travel mode choice, and potential network users. Existing plans and documents, demographic data (population and employment data), and land use information are detailed in this section.

A. EXISTING PLANS AND DOCUMENTS

Existing and proposed development plans for Missouri City were collected as part of this study. These plans were reviewed to identify potential improvements, current planning initiatives, and proposed private development throughout the city. The following plans were collected:

- **SH 6 Corridor Access Management Plan (Adopted in 2007):** for short, medium and long term improvements for SH 6 from FM 521 in Fort Bend County to IH 10 in Houston;
- **Missouri City's Comprehensive Plan (September 2009):** for future Comprehensive Plan vision and elements such as mobility, parks and recreation, growth capacity, community image, and appearance;
- **Missouri City Parks Master Plan (March 2007):** for evaluating future development of parks within the Study Area;
- **Missouri City Trails Master Plan (September 2009):** for assessment of the future trail system plans as a subset of the Parks Master Plan; and
- **TxDOT Right-of-Way (ROW) Plans, As-Builts, and Construction Plans:** to assist in Conceptual Development.

TxDOT additionally provided several plans for the Study Area roadways. They are listed below:

- **SH 6** – Fiber As-Builts and ROW;
- **FM 3345, Cartwright Road** – ROW; Typical Section, P & P, and Details; Retaining Walls and Details; Signing, Striping, & Signals; Storm Sewer P & P; Storm Sewer Details; and, Utilities;
- **FM 1092 and Cartwright Road** – State Highway Improvement Project Number CM 2009 (377), CSJ 1257-01-044;
- **FM 1092 and Lexington Boulevard** – State Highway Improvement Project Number CM 2009 (377), CSJ 1257-01-045;

- **SH 6 and Glenn Lakes Drives** – State Highway Improvement Project Number CM 2009 (377), CSJ 1257-01-085;
- **SH 6 and FM 1092** – State Highway Improvement Project Number CM 2009 (377), CSJ 1257-01-086;
- **Texas Parkway** – As-Builts; ROW; Title Sheet and Typical Section; P & P; and, Proposed Roadway Widening; and
- **FM 1092, Murphy Road** – Typical Section, P & P; Base Repair and Overlay Plans; Landscape Improvements (CSJ 1257-01-037); ROW Acquisition (CSJ 1257-01-016).

B. DEMOGRAPHIC PROFILE

This section includes population and employment data for Missouri City. The demographic data in this section also includes a comparison to Fort Bend County and statewide data. It should be noted that a small section of Missouri City is located within adjacent Harris County, but will not be used for demographic calculations, since the Study Area is located entirely within Fort Bend County. Population and employment data were obtained through the U.S. Census Bureau. This information can be used simultaneously with information presented later in this document (i.e., land use information presented in Section II.C and the pedestrian and and bicyclist network presented in Section III) to assist in determining travel mode choice.

1. Population

As of 2000, Missouri City had a total population of 52,913 (Table 1). Population estimates obtained from the American Community Survey (ACS) show a 20% increase in the population of the city between 2005 and 2007, while Fort Bend County and the State of Texas are estimated to have grown by 37% and 12% respectively (Table 2).

2. Employment and Commuting to Work

Similar to Fort Bend County and the State of Texas, the majority of people who commute to work drive alone in Missouri City. Those who carpool account for a smaller percentage, while public transportation, walking, and other means of transportation make up relatively insignificant portions of the working community. The average commute time for workers within Missouri City is 32.4 minutes, which is higher than the national average of 25.4 minutes, and Houston's average of 23.9 minutes. Employment and commuting data are summarized in Table 3.

Table 1: Population in 2000 (U.S. Census Bureau)

	Missouri City		Fort Bend County		Texas	
Total Population	52,913		354,452		20,851,820	
Race	**Number**	**%**	**Number**	**%**	**Number**	**%**
White	23,435	39.9%	201,896	47.0%	14,799,505	53.8%
African-American	20,290	34.6%	70,356	16.4%	2,404,566	8.7%
American Indian/Alaskan Native	107	0.2%	1,046	0.2%	118,362	0.4%
Asian	5,610	9.6%	39,706	9.2%	562,319	2.0%
Native Hawaiian/Pacific Islander	21	0.0%	130	0.0%	14,434	0.1%
Some Other Race	2,360	4.0%	32,240	7.5%	2,438,001	8.9%
Two or More Races	1,090	1.9%	9,078	2.1%	514,633	1.9%
Hispanic or Latino or Any Race	5,755	9.8%	74,871	17.4%	6,669,666	24.2%

Source: U.S. Census Bureau, Census 2000 Fact Sheet.

Table 2: 2008 Population Estimates (U.S. Census Bureau)

	Missouri City	Fort Bend County	Texas
Total Population	74,723	532,141	24,326,974

Source: U.S. Census Bureau, Census 2000 Fact Sheet.

Table 3: Employment and Commuting to Work in 2000

	Missouri City		Fort Bend County		Texas	
Workers 16 Years and Over	26,500		163,614		9,157,875	
Commuting to Work	**Number**	**%**	**Number**	**%**	**Number**	**%**
Drove Alone	22,196	83.8%	133,482	81.6%	7,115,590	74.7%
Carpooled	3,019	11.4%	20,565	12.6%	1,326,012	13.9%
Public Transportation (Bus, Train & Taxi)	446	1.7%	2,718	1.7%	170,268	1.8%

Table 3: Employment and Commuting to Work in 2000 (Cont.)

	Missouri City		Fort Bend County		Texas	
Walked	69	0.3%	800	0.5%	173,670	1.3%
Other Means	156	0.6%	1,318	0.8%	120,311	2.6%
Worked at Home	614	2.3%	4,731	2.9%	252,024	3.8%
Mean Travel Time to Work (mins.)	32.4	---	32.3	---	25.4	---

--- equals zero or it rounds to zero
Source: U.S. Census Bureau, Census 2000.

C. LAND USE

Land use in the Study Area varies, with Single-Family Residential (R-2) being predominant. These neighborhoods feature cul-de-sacs contained by circuitous roadways, which connect to major roadways. Community facilities are distributed throughout the Study Area, and include city parks and recreational areas, schools, and government facilities. The majority of these uses are in close proximity to the residential areas.

The following activity centers were identified as having the potential to generate pedestrian and bicycle trips in the Study Area:

- **SH 6 Commercial Corridor:** Lake Olympia Parkway to Dulles Avenue;
- **Murphy Road Commercial Corridor:** North of Cartwright Road;
- **Schools:**
  - **Elementary Schools:** E.A. Jones, Glover, Quail Valley, Lexington Creek, Lantern Lane, Palmer, Hunters Glen, and Edward Glover Jr.;
  - **Middle Schools:** Lake Olympia, Quail Valley;
  - **High Schools:** Thurgood Marshall, Progressive;
- **Parks:** Independence, Community, Kitty Hollow, and numerous pocket parks;
- **City Facilities:** Missouri City Hall and Library, located on Texas Parkway, Hunters Glen Community Center; and
- **Community Facilities:** YMCA, Boys and Girls Club and Quail Valley Golf Course.

Commercial land is concentrated along most major thoroughfares in Missouri City, with the highest concentration of commercial uses in the Study Area are located on SH 6 and the northern portion of Murphy Road. The SH 6 Commercial Corridor is the more prominent of the two (2) commercial zones, stretching the entire length of the study limits along SH 6.

Commercial centers are located along SH 6

Figure 3 illustrates land use and trip generators in the city as identified through background research, field investigations, and information provided by the city.

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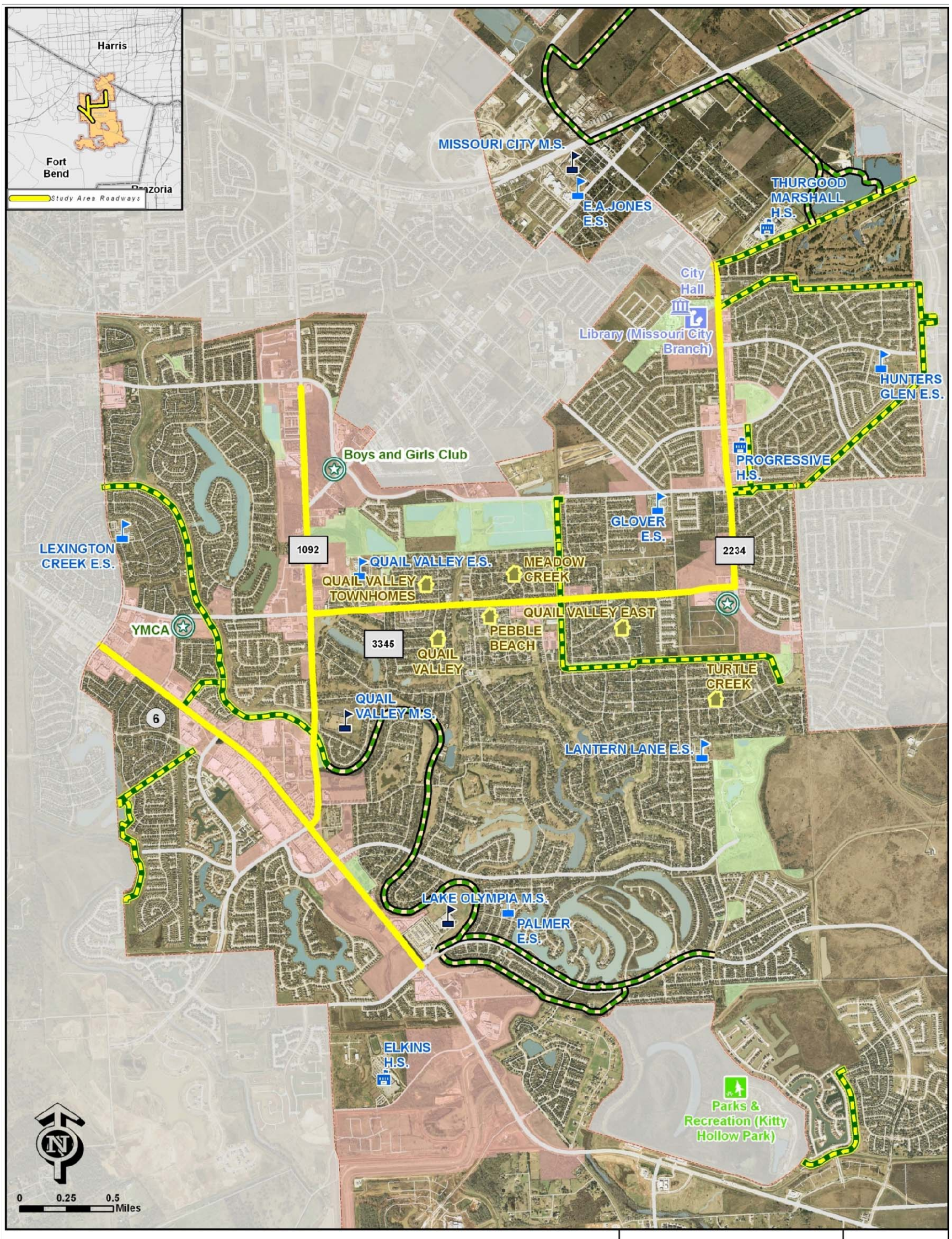

Figure 3: Missouri City Land Use and Trip Generators

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III. MISSOURI CITY PEDESTRIAN AND BICYCLE NETWORK

Through the course of this study, several deficiencies and opportunities relating to Missouri City's pedestrian and bicycle network were identified. The online survey results, comments from the public meeting, and the charrette offered feedback relating to desired pedestrian and bicycle connections and improvements. The comments were collected and used to develop improvements and policy recommendations. Residents commented on the need for sidewalk connections from residential neighborhoods to educational and recreational destinations, connections to the existing park network and trail system, and connections to other communities.

A. OVERALL NETWORK

Existing pedestrian and bicycle facilities were inventoried as part of this study. Missouri City's Comprehensive Plan Update, H-GAC's Regional Bikeway Plan, and the SH 6 Corridor Access Management Plan were referenced to supplement field-collected data. Table 4, the Pedestrian and Bicycle Network Analysis Matrix, summarizes the existing pedestrian and bicycle facilities in the Study Area. Bicycle compatibility was determined based on H-GAC and AASHTO guidelines for bicycle facilities. If a roadway was determined not to be bicycle compatible, the recommended widths for compatibility were provided ("Bicycle Compatible" column of Table 4).

B. TRAIL NETWORK

Information on existing and proposed trails and parks was collected from the Missouri City Parks Master Plan and Draft Trails Master Plan. The Missouri City Trails Master Plan was adopted in 2007 to create a citywide system of trails to connect land uses. Several trails run throughout Missouri City, but only two trails pass through the Study Area roadways: the Oyster Creek Trail and the GWCA Trail. The Oyster Creek Trail passes through Murphy Road south of the Plantation Ridge Drive/ El Dorado intersection, and the GWCA Trail is proposed in Missouri City's Draft Master Plan to extend across Cartwright Road, west of the Quail Valley East intersection.

Component of the Trails Network, Mosley Park

C. PEDESTRIAN NETWORK

Site visits to Missouri City were performed to observe pedestrian travel patterns and inventory the presence of sidewalks, curb ramps, crosswalks, push buttons, and pedestrian signals. Pedestrian amenities such as benches, trashcans, etc. were also inventoried, but not observed along the Study Area roadways.

1. Sidewalk Inventory

Sidewalks were inventoried in Missouri City along SH 6, Murphy Road, Cartwright Road, and along Texas Parkway to determine the extent and condition of the sidewalk network on these corridors. The results of the inventory are detailed in Figure 4, Missouri City Pedestrian and Bicycle Network Map.

Sidewalk condition was rated based on the following criteria:

Excellent Condition:	*Well-maintained or new sidewalk with no cracks, overgrowth (encroaching landscape) or obstacles.*
Good Condition:	*Nearly new sidewalk with very little distress.*
Fair Condition:	*Sidewalk with minor cracking, some overgrowth and/or a few obstacles.*

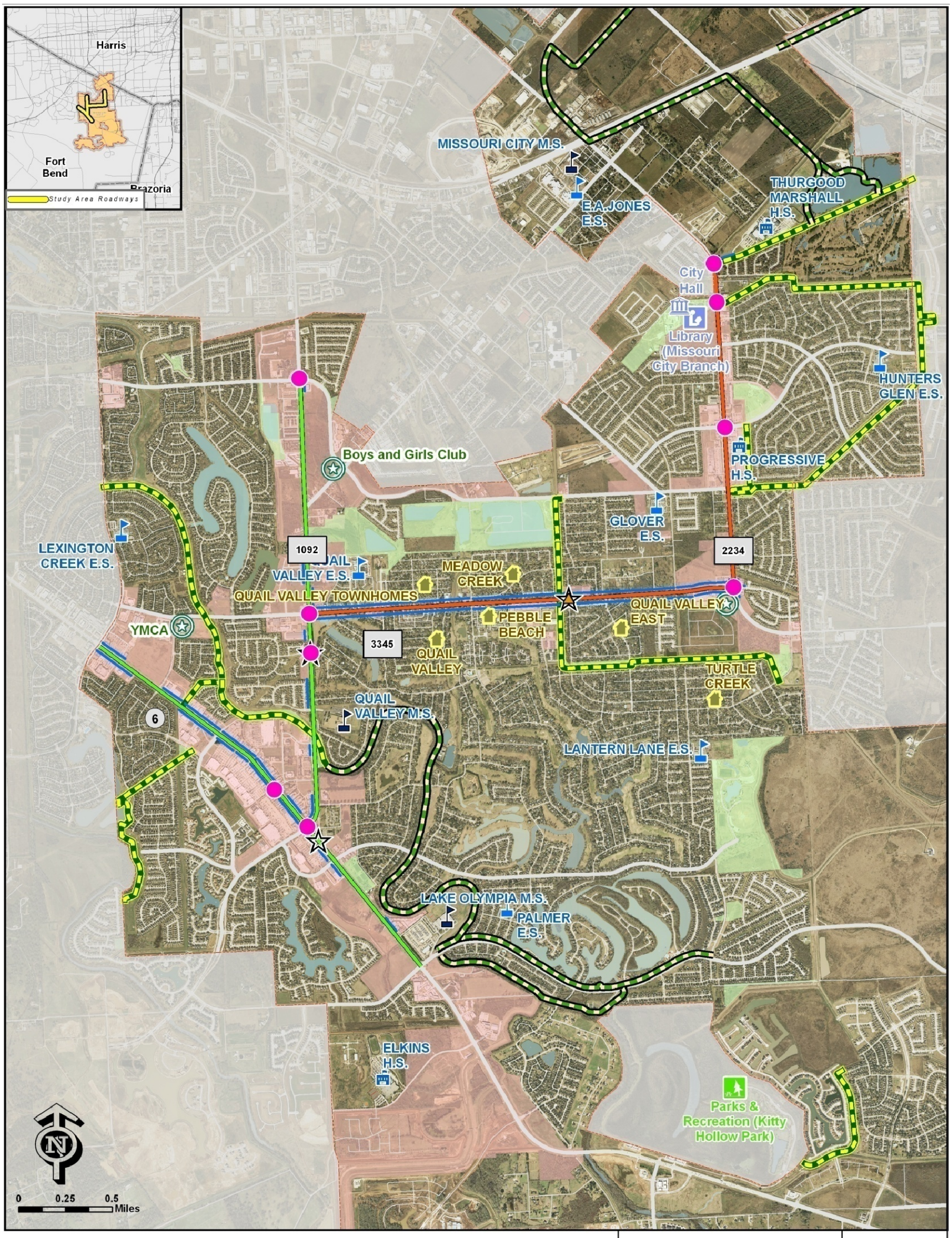
- **Sidewalk on SH 6 from Austin/Dulles Avenue to Lake Olympia Parkway is limited to areas adjacent to new development;**
- **Sidewalk on Murphy Road from Lexington Boulevard to SH 6 is intermittent and concentrated at signalized intersections;**
- **Sidewalk on Cartwright Road from Murphy Road to Texas Parkway is continuous; and**
- **Sidewalk on Texas Parkway from Cartwright Road to Buffalo Run is limited.**

Cracked sidewalk along Cartwright Road

Table 4: Pedestrian and Bicycle Network Analysis Matrix

Street	From	To	AADT	Speed Limit	Total Pavement Width	Direction Lane NB//SB	Shoulder Width[1] NB//SB	Direction Lane EB//WB	Shoulder Width[2] EB//WB	Bicycle Compatible[3]	Sidewalks and Width	Curb	Sidewalk Condition	Buffer Type and Width	Curb Ramps
SH 6	Austin/Dulles	Lake Olympia	51,901 (2008) Avg. 3 Int.	50 MPH	107 ft.	6 Lanes @ 12 ft. CLT @ 16.5 ft.	9.5 ft.			*Yes 9.5 ft. Shoulder*	Partial, 6 ft.	No	Excellent	Grass, 40 ft. – 43 ft.	Textured Sidewalk @ driveways
Murphy Road (FM 1092)	Lexington	SH 6	32,652 (2008) Avg. 2 Int.	50 MPH	77 ft.	4 Lanes @ 12 ft. CLT @ 12 ft.	8 ft.			*Yes 8 ft. Shoulder*	Partial, 5 ft. – 6 ft.	No	Excellent	Grass, 10 ft. – 20 ft.	Yes
Cartwright Road (FM 3345)	Murphy	Quail Village		40 MPH	74 ft.			4 Lanes @ 12.5 ft. Median @ 20 ft. or 4 Lanes @ 12.5 ft. Reduced Width Median with LTO lane	0 ft.	*No 15 ft. Lane or 6 ft. Shoulder Needed*	Yes, 4 ft.	Yes	Fair	Grass, 4 ft. WB 5 ft. – 7 ft. EB	Textured Sidewalk
	Quail Village	La Quinta	24,122 (2008)											Grass, 0 ft. – 4 ft.	Textured Sidewalk (old) and ADA Compliant (new)
	La Quinta	Quail Valley East												Grass, 4 ft.	
	Quail Valley East	Valley Forest												Grass, 6 ft.	Textured Sidewalk
	Valley Forest	The Woods	21,938 (2008)											No Buffer	Textured Sidewalk (old) and ADA Compliant (new)
	The Woods	Texas Parkway									Yes, 4 ft. EB/4 ft. WB where buffer exists, 5 ft. WB where no buffer exists		Good – EB Fair – WB	Partial, Grass, 4 ft.	Textured Sidewalk
Texas Parkway (FM 2234)	Cartwright Road	Buffalo Run	30,864 (2008) Avg. 2 Int.	45 MPH	64.5 ft.	4 Lanes @ 12 ft. CLT @ 11.5 ft.	2.5 ft./2 ft.			*No 15 ft. Lane or 6 ft. Shoulder Needed*	No	No	Not Applicable	Not Applicable	No

[1] *Compatibility was determined based on the H-GAC Pedestrian and Bicycle Design Guidelines (rev. 9/2/03).*
[2] *On roadways with an Average Annual Daily Traffic (AADT) greater than 10,000, a shoulder width of 8 ft. should be provided wherever possible (AASHTO).*
[3] *If parking occurs intermittently, then bicyclists could share the roadway as few conflicts with vehicles would potentially exist. However, if parking occurs frequently, then the likelihood for potential conflicts increase and sharing the roadways is not recommended.*



Legend

- Inventoried Intersections
- Bicycle and Pedestrian Count Locations
- Bicycle and Pedestrian Origin and Destination Survey Locations
- City Hall
- Library
- Parks & Recreation Center
- Residential Development
- High School
- Middle School
- Elementary School
- Community Destinations
- Bicycle Compatible Roadway
- Non-Bicycle Compatible Roadway
- Existing Sidewalk
- Existing Shared Use Path or Trail
- Proposed Shared Use Path or Trail
- Missouri City Boundary
- Parks and Open Space
- Commercial Services

Data Sources: Houston-Galveston Area Council, Fort Bend County, and field observations **December 2009**

Figure 4: Missouri City Pedestrian and Bicycle Network Map

PEDESTRIAN AND Missouri City BICYCLE PLAN

missouri CITY TEXAS the show me city

H-GAC

Baker

D. BICYCLE NETWORK

The Study Area roadways were evaluated for bicycle compatibility using H-GAC's *Revised Draft Pedestrian/Bicycle Design Guidelines* (H-GAC, 2003) and the American Association of State Highway and Transportation Official's (AASHTO) *Guide for the Development of Bicycle Facilities, 3rd Edition* (AASHTO, 1999).

Data collected for the Study Area roadways included posted speed limit, pavement width (lane and shoulder width), ROW width, on-street parking, location of traffic signals, roadway geometry, potential horizontal and vertical sight distance issues, and traffic volumes. Bicycle compatibility was determined based on H-GAC and AASHTO guidelines for bicycle facilities (H-GAC, 2003 and AASHTO, 1999). According to AASHTO, a roadway must provide sufficient width, speed and traffic volumes for a bicycle and motor vehicle to share safely. For example, on roadways with traffic volumes over 10,000 AADT, an 8-foot shoulder should be provided. On roadways with traffic volumes less than 10,000 AADT, a 14 or 15-foot travel lane would be sufficient to be shared by bicycles. Table 4, Pedestrian and Bicycle Network Analysis Matrix, and Figure 4: Missouri City Pedestrian and Bicycle Network Map, the Missouri City Pedestrian and Bicycle Network Map, illustrates the results of the bicycle compatibility assessment.

Bicyclist traveling south on Murphy Road

E. INTERSECTION INVENTORY AND ASSESSMENT

Major intersections, and those with observed pedestrian activity, were inventoried for the presence and condition of pedestrian facilities, including curb ramps, crosswalks, warning signs, and pedestrian signals and push buttons. Eleven (11) intersections were inventoried and assessed in the Study Area:

- **Texas Parkway and Buffalo Run;**
- **Texas Parkway and Missouri City Drive;**
- **Texas Parkway and Independence Boulevard;**
- **Texas Parkway and Cartwright Road;**
- **Cartwright Road and Quail Valley East Drive;**

- **Cartwright Road and Murphy Road;**
- **Murphy Road and Lexington Boulevard;**
- **Murphy Road and El Dorado Boulevard;**
- **Murphy Road and SH 6;**
- **SH 6 and Township Lane; and**
- **SH 6 and Glenn Lakes Lane.**

Pedestrian and bicycle count data, vehicle level of service (LOS) data, and signal timing and phasing data were received from Missouri City to determine potential impacts to signal timing adjustments at signalized intersections. Missouri City selected three (3) intersections for pedestrian and bicycle counts based on observed activity and proximity to trip generators: SH 6 and Murphy Road, Murphy Road and El Dorado Boulevard, and Cartwright Road and Quail Valley East Drive. These data are presented in Appendix A, Intersection Inventory and Assessment.

El Dorado Boulevard/Plantation Drive intersection was inventoried

AASHTO has specific regulations for the amount of crossing time pedestrian and bicyclists need to cross an intersection. This number is calculated by using the existing pavement width and the rate (feet per second) at which the average person can walk across the intersection. Pavement widths that were not sufficient for crossing time are noted in Table 6, the Recommendations Matrix.

F. MISSOURI CITY TRAFFIC SIGNAL ANALYSIS

The timing and phasing of traffic signals can hinder pedestrian and bicycle safety if the time allowed for crossing the street (pedestrian clearance phase) is not sufficient. New FHWA

MUTCD[1] guidelines (anticipated for release in 2009/2010) have increased the pedestrian clearance phase from 4 feet per second to 3.5 feet per second, with a seven (7) second steady walk minimum (FHWA, 2008).

There are twenty-two (22) traffic signals in the study area. Fifteen (15) of these traffic signals have pedestrian phases and/ or timing. For the purpose of the study, seven (7) intersections were selected for a pedestrian phasing and timing analysis. Current traffic signal timing and phasing plans were obtained for these intersections and compared to the new FHWA MUTCD guidelines. Results of the analysis are presented below:

- **Texas Parkway and Independence Boulevard:** No pedestrian phasing and no pedestrian crosswalks currently exist;
- **Texas Parkway and Cartwright Road:** No pedestrian phasing and no pedestrian crosswalks currently exist;
- **Cartwright Road and Quail Valley East Road:** There are four (4) pedestrian crosswalks and phases at this traffic signal and they are programmed to be activated only by pushing pedestrian buttons (as per provided signal timing sheets). The existing and recommended pedestrian timing (according to the 2009 MUTCD) are as follows:
  - **Phase 2:** Crossing Quail Valley East Road on the north side;
    - Existing "Walk" phase timing is 4 seconds; **5 seconds is recommended**;
    - Existing "Flashing Don't Walk" phase timing is 14 seconds; **20 seconds is recommended;**
  - **Phase 6:** Crossing Quail Valley East Road on the south side
    - Existing "Walk" phase timing is 4 seconds; **5 seconds is recommended**;
    - Existing "Flashing Don't Walk" phase timing is 14 seconds; **20 seconds is recommended;**
  - **Phase 4:** Crossing Cartwright Road on the east side
    - Existing "Walk" phase timing is 4 seconds; **5 seconds is recommended**;
    - Existing "Flashing Don't Walk" phase timing is 17 seconds; **22 seconds is recommended;**
  - **Phase 8:** Crossing Cartwright Road on the west side
    - Existing "Walk" phase timing is 4 seconds; **5 seconds is recommended**;

[1] Federal Highway Administration (FHWA) publishes an MUTCD under 23 Code of Federal Regulations (CFR), Part 655, Subpart F. The latest version was published in 2003; however, proposed amendments for the next edition of the MUTCD have been made available on the FHWA website (FHWA, 2008).

  - Existing "Flashing Don't Walk" phase timing is 17 seconds; **22 seconds is recommended;**

- **Cartwright Road and Murphy Road:** There are four (4) pedestrian crosswalks and phases at this traffic signal and they are programmed to be activated only by pushing pedestrian buttons (as per provided signal timing sheets). The existing and recommended pedestrian timing (according to the 2009 MUTCD) are as follows:
  - **Phase 2:** Crossing Cartwright Road on the east side;
    - Existing "Walk" phase timing is 4 seconds; **5 seconds is recommended;**
    - Existing "Flashing Don't Walk" phase timing is 20 seconds; **24 seconds is recommended;**
  - **Phase 6:** Crossing Cartwright Road on the west side;
    - Existing "Walk" phase timing is 4 seconds; **5 seconds is recommended;**
    - Existing "Flashing Don't Walk" phase timing is 20 seconds; **24 seconds is recommended;**
  - **Phase 7:** Crossing Murphy Road on the south side;
    - Existing "Walk" phase timing is 4 seconds; **5 seconds is recommended;**
    - Existing "Flashing Don't Walk" phase timing is 20 seconds; **27 seconds is recommended;**
  - **Phase 8:** Crossing Murphy Road on the north side;
    - Existing "Walk" phase timing is 4 seconds; **5 seconds is recommended;**
    - Existing "Flashing Don't Walk" phase timing is 20 seconds; **27 seconds is recommended;**
- **Murphy Road and SH 6:** No pedestrian phasing and no pedestrian crosswalks currently exist;
- **SH 6 and Township Lane:** No pedestrian phasing and no pedestrian crosswalks currently exist; and
- **SH 6 and Glenn Lakes Lane:** No pedestrian phasing and no pedestrian crosswalks currently exist.

G. PEDESTRIAN AND BICYCLE ORIGIN AND DESTINATION SURVEY

Pedestrian and bicycle counts were performed at three (3) intersections in the Study Area: Cartwright Road and Quail Valley East Drive; Murphy Road and El Dorado Boulevard; and Murphy Road and SH 6. Following the counts, the intersection of Cartwright Road and Quail

Valley East Drive was selected for an Origin and Destination Survey, as it had the highest volume of pedestrians and bicyclists (46 between 3:00 PM and 7:00 PM). Utilizing the count data, a pedestrian and bicycle Peak Hour was developed. The Origin and Destination survey was performed during the identified Peak Hour, which was 5:15 PM to 6:15 PM.

Cartwright Road is an east-west corridor that divides the Quail Valley East neighborhood into two (2) residential districts, located on the northern and southern portion of Quail Valley East Drive. The intersection accommodates a Chevron gas station on the northeastern corner and a dry cleaner on the northwest. In order to document pedestrian and bicycle activities for the intersection, the origin and destination of each pedestrian and/or bicyclist was noted and assigned a number. The number designates the actions of each person. There were a total of fifteen (15) pedestrians making twenty (20) separate trips. Table 5 details the Origin and Destination Survey Findings.

Table 5: Origin and Destination Survey Findings

Pedestrian or Bicyclist #	Time	Pedestrian or Bicyclist	Origin	Destination
1	5:15 PM	Pedestrian	N. Quail Valley Trail	S. Quail Valley Trail
2	5:16 PM	Bicyclist	S. Quail Valley East Drive	Chevron Gas Station
3	5:16 PM	Pedestrian	S. Quail Valley East Drive	Chevron Gas Station
4	5:17 PM	Bicyclist	S. Quail Valley East Drive	Chevron Gas Station
5	5:17 PM	Pedestrian	S. Quail Valley East Drive	Chevron Gas Station
2	5:20 PM	Bicyclist	Chevron Gas Station	S. Quail Valley East Drive
3	5:20 PM	Pedestrian	Chevron Gas Station	S. Quail Valley East Drive
4	5:20 PM	Bicyclist	Chevron Gas Station	S. Quail Valley East Drive
5	5:20 PM	Pedestrian	Chevron Gas Station	S. Quail Valley East Drive
6	5:25 PM	Pedestrian	E. Cartwright Road	W. Cartwright Road
7	5:30 PM	Pedestrian	W. Cartwright Road	N. Quail Valley East Drive
8	5:31 PM	Pedestrian	W. Cartwright Road	E. Cartwright Road
9	5:33 PM	Pedestrian	Chevron Gas Station	S. Quail Valley East Drive
10	5:34 PM	Bicyclist	S. Quail Valley East Drive	N. Quail Valley East Drive
11	5:41 PM	Pedestrian	W. Cartwright Road	N. Quail Valley East Drive
12	5:45 PM	Pedestrian	W. Cartwright Road	E. Cartwright Road
13	5:50 PM	Pedestrian	S. Quail Valley East Drive	W. Cartwright Road

Table 5: Origin and Destination Survey Findings (Cont.)

Pedestrian or Bicyclist #	Time	Pedestrian or Bicyclist	Origin	Destination
14	5:50 PM	Pedestrian	S. Quail Valley East Drive	W. Cartwright Road
15	6:04 PM	Pedestrian	S. Quail Valley East Drive	Chevron Gas Station
15	6:10 PM	Pedestrian	Chevron Gas Station	S. Quail Valley East Drive
LEGEND:				
		Illegal Pedestrian Crossing		
		No Intersection Crossing		
		Gas Station Trip		
		Neighborhood Trip		

Bicyclist crossing the Quail Valley intersection

H. SUMMARY OF EXISTING CONDITIONS ON ROADWAYS IN THE STUDY AREA

A sidewalk inventory and an intersection inventory and assessment, were used to identify the presence and condition of pedestrian facilities, including curb ramps, crosswalks, warning signs, pedestrian signals and push buttons. The Study Area roadways were evaluated for bicycle compatibility based on a field inventory of existing roadway characteristics and were compared to H-GAC and AASHTO guidelines for bicycle facilities. The field inventory included posted speed limit, pavement width (lane and shoulder width), ROW width, on-street parking, and the location of traffic signals. Photographs of the existing conditions are located in Appendix B, the Study Area Photograph Log.

1. State Highway (SH) 6

In the Study Area, SH 6 runs west to east from Dulles Avenue to Lake Olympia Parkway. In this section, the posted speed limit is 50 mph. Pavement width was measured at 106 feet, with six (6) 12-foot wide travel lanes, 9-foot shoulders, and a 16-foot center left turn lane. The Annual Average Daily Traffic (AADT) in 2008 was 51,901 vehicles per day. According to TxDOT, SH 6 is a principal arterial with an AADT estimated to exceed 80,000 in 2029. The roadway is currently bicycle compatible since a 9-foot shoulder exists for bicycle travel, as compared to the required shoulder width for bicycle compatibility (6 to 8 feet), which is documented in H-GAC's Pedestrian and Bicycle Design Guidelines. According to ROW plans received from TxDOT, the public ROW in this section varies between 90 and 100 feet with an additional 90 feet proposed on the western side of the roadway east of Murphy Road.

In this section of SH 6, there are partial sidewalks at 6 feet wide with a 40 to 43 foot wide grass buffer (drainage swale). There are several sidewalk network gaps in the Study Area, most notably between Lake Olympia Parkway and Murphy Road. Curb ramps exist at driveways and intersections where sidewalks are available to facilitate intersection movements.

SH 6 is a high volume, high traffic roadway

2. FM 1092 (Murphy Road)

In the Study Area, Murphy Road runs north to south from Lexington Boulevard to SH 6. In this section, the posted speed limit is 50 mph. Pavement width was measured at 77 feet, with four (4) 12-foot wide travel lanes, 8-foot shoulders, and a 12-foot center left turn lane. The AADT in 2008 was 32,652 vehicles per day.

According to TxDOT, Murphy Road is a minor arterial with an AADT estimated to be 33,000 in 2009. In 2029, the AADT is estimated to exceed 51,500. The roadway is

currently bicycle compatible since an 8-foot shoulder exists for bicycle travel, meeting the required shoulder width for bicycle compatibility (6 to 8 feet), which is documented in H-GAC's Pedestrian and Bicycle Design Guidelines. According to ROW plans received from TxDOT, the public ROW in this section is approximately 80 feet wide with an additional 60 feet proposed in the Study Area.

In this section of Murphy Road, there are partial sidewalks at 5 to 6 feet wide with a 10 to 20 foot grass buffer (drainage swale). There are several sidewalk network gaps in the Study Area, most notably between Lexington Boulevard and 5th Street.

3. FM 3345 (Cartwright Road)

In the Study Area, Cartwright Road runs east to west from Texas Parkway to Murphy Road. In this section, the posted speed limit is 40 mph. Pavement width was measured at 74 feet, with four (4) 12.5-foot wide travel lanes and a 20-foot center median that reduces in width at subdivisions to provide a left turn only lane. The AADT in 2008 in the Study Area was 23,030 vehicles per day. The roadway is currently not bicycle compatible since there are no shoulders. A 15 foot outside lane, 6 to 8 foot shoulder or 5 to 6 foot bicycle lane would be needed for compatibility as per H-GAC guidelines. This is consistent with AASHTO guidelines. According to ROW plans received from TxDOT, the public ROW in this section is 90 to 100 feet wide, with proposed ROW at 180 to 200 feet wide.

New sidewalk along Murphy Road does not connect with Oyster Creek Trail

4. FM 2234 (Texas Parkway)

In the Study Area, Texas Parkway runs north to south from Buffalo Run to Cartwright Road. In this section, the posted speed limit is 45 mph. Pavement width was measured at 64 feet, with four (4) 12-foot wide travel lanes and an 11.5-foot center left turn lane. The AADT in 2008 in the Study Area was 30,864 vehicles per day. According to TxDOT, the Texas Parkway is a principal arterial with an AADT estimated to exceed 42,200 in 2029. The roadway is currently not bicycle compatible since there are no shoulders. A 15 foot outside lane, 6 to 8 foot shoulder or 5 to 6 foot bicycle lane would be needed for compatibility as per

Continuous sidewalks are on Cartwright Road but there are no bicycle facilities

H-GAC guidelines. This is consistent with AASHTO guidelines. According to ROW plans received from TxDOT, the public ROW in this section is 64 to 80 feet wide.

View of open drainage ditch along the east side of Texas Parkway

5. Intersection Improvements for Murphy Road and El Dorado Boulevard

This signalized intersection has four (4) standard-striped crosswalks, one (1) across each approach. There is sidewalk at the intersection flush with the roadway in place of curb ramps. Pedestrian signals and push buttons are provided for each approach. A pedestrian count was performed at the intersection on May 7, 2009 between 3:00 PM and 7:00 PM. One (1) bicyclist crossed the intersection in the four (4)-hour count period.

6. Intersection Improvements for Cartwright Road and Quail Valley East Drive

This signalized intersection has four (4) standard-striped crosswalks, one (1) across each approach. However, the existing crosswalk striping is faded. ADA compliant curb ramps exist eastbound, but westbound the sidewalk is textured flush with the curb. Pedestrian signals and push buttons are provided for each approach. A pedestrian count and origin and destination survey was performed for the intersection. A signal timing and phasing evaluation and analysis was also performed to determine if sufficient time exists, per MUTCD 2009 guidelines, for a pedestrian to cross each leg of the intersection (see Section III-F above).

7. Intersection Improvements for Texas Parkway and Buffalo Run

This signalized intersection has two (2) standard striped crosswalks (one across the north approach of Texas Parkway and one across the west approach of Scanlin Road). Crosswalks do not exist on east or south intersection approaches. Several trip generators are located nearby, including residential neighborhoods, Thurgood Marshall High School, City Hall, the library and a fitness center. ADA compliant curb ramps do not exist; however, the sidewalk is flush with the roadway. There are three (3) school

warning signs (MUTCD S1-1). Pedestrian signals and push buttons are available for the crosswalk approaches.

8. Intersection Improvements for Texas Parkway and Independence Boulevard

This signalized intersection does not have existing pedestrian facilities (e.g., crosswalks, curb ramps, pedestrian signals).

I. PEDESTRIAN AND BICYCLE CRASH ANALYSIS SUMMARY

Pedestrian and bicycle crash data were requested from the Houston-Galveston Area Council (H-GAC) for the most recent three (3) years available (2005 – 2007). The data, which selected from a Texas Department of Transportation (TxDOT) crash database, were requested to determine the crash history for pedestrians and bicyclists in the Study Area as well as in the entire city.

There were 32 reported crashes involving pedestrians or bicyclists (33 individuals in total) between 2005 and 2007 in Missouri City. However, four (4) pedestrian crashes were excluded from the data due to contributing circumstances (e.g. result of criminal activity, crashes into buildings/houses from the roadway and suicide).

As Table 7 shows, eight (8) crashes involved bicyclists and 20 involved pedestrians. The crash data received did not contain the necessary data to perform analysis using the FHWA Pedestrian and Bicycle Crash Analysis Tool (PBCAT). However, the crashes were detailed by crash type and location using the data available.

The results are listed below:

- **More than half of the reported pedestrian and bicycle crashes** (15) were not at an intersection or intersection-related.
- **Fourteen (14) of the reported crashes** occurred during the day, and eleven (11) occurred at night.
- **Among the pedestrians and bicyclists involved in the reported crashes**, more than half (17) were 18 years old and under.
- **Seven (7) of the eight (8) bicyclists** were not wearing a helmet during the time of the crash.
- **There were six (6) crashes that occurred on Study Area roadways:** four (4) were pedestrian crashes and two (2) were bicyclist crashes; of these crashes, two (2)

pedestrian crashes resulted in fatalities. Eleven (11) crashes were within one-half mile of a school.

- **There were nine (9) neighborhood crashes** with pedestrians or bicyclists; seven (7) of these involved pedestrians and two (2) involved bicyclists. All involved pedestrians and bicyclists were between the ages of 19 and 65. Neighborhood crashes are those that occurred away from a major roadway within residential developments.
- **A review of the crash types** was performed to investigate the conditions, travel behavior, and characteristics involved in the pedestrian and bicycle crashes. Crash type data can assist in determining appropriate countermeasures and educational approaches to address the conditions under which the crashes are occurring. A summary and analysis of the received crash data, including crash locations, is illustrated in Appendix C.

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IV. PUBLIC INPUT

A. SUMMARY OF PUBLIC PROCESS

To engage the public, the Baker Team tailored the public outreach process to include neighborhood groups, potential project sponsors, and public agencies, in coordination with Missouri City and H-GAC. An online survey, a public meeting, and a charrette were held to gather comments from interested parties.

Input was gathered from the initial meeting with H-GAC and Missouri City on April 7, 2009 to discuss the project vision, and identify potential stakeholders. A draft online survey was also presented at this meeting for input. Following the meeting, a database was developed of potential stakeholders to include in the public outreach process and the survey was revised based on comments.

Prior to the public meeting, held on June 25, 2009, a press release, and advertisement were distributed. The purpose of the public meeting was to share the study findings and recommendations with residents, business owners and other parties interested in the study. The meeting served as an opportunity to initiate discussion with the community at-large regarding existing deficiencies, potential improvements, and funding opportunities. Attendees were provided with feedback forms to record their comments.

Feedback forms were placed in the comment box at the public meeting

The charrette was held on July 22, 2009 to gather additional information on potential improvements in a round table format. Attendees were divided into two groups and asked to list locations of concern and the reason for the concern. Groups then reported out to the meeting and common locations were listed for inclusion in the Draft Report.

B. ONLINE SURVEY SUMMARY

An online survey was designed and administered to the community to assist in identifying and confirming issues related to pedestrian and bicycle access and mobility in Missouri City. The goal of the survey was to measure habits, opinions and attitudes regarding bicycling and walking in the Study Area. The survey addressed the following primary issues:

- **The availability and condition of bicycle facilities;**
- **The availability and condition of pedestrian facilities; and**

- **The availability of crosswalks and pedestrian signals at signalized intersections.**

A link to the survey was posted on Missouri City's website and a press release was used to promote the survey to a wider audience. The survey was accessible online for 46 days, starting on April 21, 2009 and ending on June 5, 2009, and during that time 210 responses were received. Over three-quarters (77%) of the respondents were residents of Missouri City. Addresses of Missouri City residents were requested in the survey and compared to the Study Area roadway network to determine what percentage resided within the Study Area. Approximately 85% of respondents from Missouri City lived within the Study Area.

Over half of the survey respondents travel by motor vehicle on the Study Area roadways on a frequent basis. Among the respondents, SH 6 is the most frequently traveled by motor vehicle (92%), followed by Murphy Road (83%), Cartwright Road (68%), and Texas Parkway (58%). The majority of respondents feel that bicycle facilities, in terms of their presence and condition in Missouri City, are not satisfactory. Conversely, the majority of respondents felt that pedestrian facilities were satisfactory. Several comments regarding bicycling and walking arose repeatedly in the open comment section:

- **Sidewalks are not connected, or do not exist, along portions of the Study Area roadways and in adjacent neighborhoods. Survey respondents would like to see sidewalks installed and the sidewalk network improved;**
- **Survey respondents feel that an education campaign regarding state laws and road safety would benefit motorists, pedestrians and bicyclists;**
- **Several respondents have a desire for their children to walk or bike to school, but feel facilities are not adequate;**
- **Several respondents desire additional off road paths and trails;**
- **Trails connecting to adjacent communities are desired; and**
- **Designated, signed bicycle routes and lanes are desired.**

For more information on the online survey, refer to Appendix D.

C. SUMMARY OF PUBLIC MEETING AND CHARRETTE

At the public meeting, residents commented on the need for sidewalk connections from the residential neighborhoods to educational and recreational destinations, connections to the existing park network and trail system, and connections to other communities. Comments from the public meeting were compiled and areas of concern are listed below:

- **The entire Texas Parkway corridor lacks sidewalks and this causes people to walk on the shoulder.**

- The intersection of Dulles Avenue and Cartwright Road and the area north of the intersection has many pedestrians and bicyclists. Facilities should connect to Sugar Land.
- Walking along Texas Parkway to the post office is very unsafe.
- There should be sidewalks, paths, etc. away from traffic to allow riding/walking in quieter areas.
- Room to walk and bike on Texas Parkway would make the neighborhoods safer.
- Quail Valley Elementary students cross at the intersection of Cartwright Road and Quail Valley Drive.
- Commenter noted a woman pushing a stroller along Quail Valley without a sidewalk.
- Paths through the park at Quail Valley would be nice.
- Bridge SH 6 at Murphy Road intersection was suggested.
- Install sidewalks and bicycle paths along SH 90 to Fort Bend Toll Way along Texas Parkway.
- The Colonies, Quail Valley, and Lake Olympia do not connect to SH 6.
- Trails stop at Quail Valley.
- Quail Valley has intermittent sidewalks that only cover 1/3 of neighborhood.
- Students from Quail Valley Elementary walk down El Dorado and they are narrow and unsafe.
- Senior citizens ride scooters along shoulders on Murphy Road and SH 6 to Dulles Avenue.
- Texas Parkway and Cartwright Road is not pedestrian friendly.
- South of Cartwright Road, there are no school cross walks, sidewalks, or bicycle paths.
- Missouri City roads need designated lanes for cyclists.

Formal presentation at the public meeting

Many of the above concerns were also noted by charrette attendees. Appendix E contains the comments received at the public meeting and charrette.

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V. RECOMMENDATIONS

A. SUMMARY

The corridors and intersections detailed in this section were identified as having potential opportunities and/or constraints related to pedestrian and bicycle travel. Locations were selected based on feedback from Missouri City officials and the public, pedestrian and bicycle crash data, existing conditions, and proximity to major destinations, such as parks, schools, commercial districts and villages.

Below is a listing of desired goals and constraints for Missouri City:

1. *Desired Goals*

- **Connect sidewalk network to trail network**
- **Connect trail network to bicycle compatible roadways**
- **Establish bicycle routes**
- **Increased commuting using bikeways and walkways**
- **Relieve traffic congestion**
- **Improve quality of life**

2. *Constraints*

- **Sidewalk network gaps on Texas Parkway, Murphy Road and SH 6**
- **Texas Parkway and Cartwright Road are not bicycle compatible**
- **Some curb ramps are not ADA compliant**
- **Pedestrians would benefit from countdown signals at signalized intersections**
- **Pedestrian phase timing could be modified to meet new FHWA MUTCD guidelines**

B. CONCEPTUAL IMPROVEMENTS

Recommendations to upgrade and enhance pedestrian and bicycle facilities in the Study Area were determined based on findings from data collection, the sidewalk inventory, bicycle compatibility assessment, trail network review, and public outreach.

Sidewalk ending at brick wall on Texas Parkway

Any modification to occur within the roadway ROW itself would require additional coordination and/or authorization with TxDOT. Therefore, recommended improvements are referred to as "concepts" in this document to reflect the fact that they still require coordination between TxDOT and the City, as well as further analysis.

Conceptual improvements are summarized in the Recommendations Matrix (Table 6), and illustrated in the Recommended Improvements for Pedestrian and Bicycle Facilities Map (Figure 5). Table 6 also has a column titled "Figure 5 Symbol" which shows the text of the recommendation (Table 6) to the location of it in the map (Figure 5). This section is also detailed with the following elements:

- **Improvement Concept:** The application of the improvement concept is described, as are applicable standards used to develop the concept.
- **Anticipated Benefits:** Community, congestion relief, air quality and access/mobility benefits were calculated both qualitatively and quantitatively.
- **Potential Time to Implement:** The potential time frame for implementation is included and noted as short-term (2012-2017), or long–term (2018-2035) based on H-GAC's Transportation Improvement Plan (TIP), and Regional Transportation Plan (RTP) schedule.

Table 6: Recommendations Matrix

Figure 5 Symbol	Deficiency/Opportunity	Recommendation	Length	Implementation Timeline	Cost[1]
SH 6					
Sidewalk Improvements – SH 6					
1	Sidewalk network gaps, most notably between Lake Olympia Parkway and Murphy Road.	Construct approximately 4,000 ft. of 6 ft. wide sidewalk westbound between Lake Olympia Parkway and Murphy Road. Note: New sidewalk needs to be designed and constructed to meet ADA and TDLR requirements.	4,000 LF	Short Term	$80,100
Intersection Improvements – SH 6					
2	SH 6 and Murphy Road: No pedestrian phasing or crosswalks currently exist.	TxDOT has completed the plans, specifications, and estimates (CSJ 1257-01-044) to reconfigure and upgrade traffic signal systems and improve traffic capacity at the intersections of Murphy Road and Glenn Lakes Lane. The improvements include crosswalk, curb ramps, push buttons, and pedestrian signals with countdown displays. The project is scheduled for letting in October 2009. It is recommended that the City work with TxDOT to implement phasing and timing in accordance with the guidelines proposed in the Draft MUTCD 2009 Edition.	N/A	Letting October 2009	N/A
3	SH 6 and Glenn Lakes Lane: No pedestrian phasing or crosswalks currently exist.				
FM 1092 (Murphy Road)					
Sidewalk Improvements – Murphy Road					
4	Sidewalk network gaps, most notably between Lexington Boulevard and 5th Street.	Construct approximately 18,250 ft. of 5 ft. wide sidewalk northbound and southbound between Lexington Boulevard and SH 6. Note: New sidewalk needs to be designed and constructed to meet ADA and TDLR requirements.			
	Northbound	SH 6 to Raoul Wallenburg Lane	1,900 LF	Included Below	Included Below
		Raoul Wallenburg Lane to Plantation Settlement	650 LF	Included Below	Included Below
		Plantation Settlement to El Dorado Boulevard	700 LF	Included Below	Included Below
		El Dorado Boulevard to Cartwright Road	950 LF	Included Below	Included Below
		Cartwright Road to Bridgewater Center	750 LF	Included Below	Included Below
		Bridgewater Center to S. Granada Street	2,500 LF	Included Below	Included Below
		S. Granada Street to Lexington Boulevard	1,500 LF	Included Below	Included Below
	Southbound	Lexington Boulevard to 5th Street	2,900 LF	Included Below	Included Below
		5th Street to Cartwright Road	1,900 LF	Included Below	Included Below
		Cartwright Road to El Dorado Boulevard	1,000 LF	Included Below	Included Below
		El Dorado Boulevard to Plantation Settlement	1,300 LF	Included Below	Included Below
		Plantation Settlement to Hampton	1,600 LF	Included Below	Included Below
		Hampton to SH 6	600 LF	Included Below	Included Below
	TOTAL	Sidewalk Total	18,250 LF	Long Term (2018-2035)	$606,000
Intersection Improvements – Murphy Road					
2	Murphy Road and SH 6: No pedestrian phasing or crosswalks currently exist.	TxDOT has completed the plans, specifications, and estimates (CSJ 1257-01-044) to reconfigure and upgrade traffic signal systems and improve traffic capacity at the intersections of Lexington Boulevard, Cartwright Road, and Glenn Lakes. The improvements include crosswalk, curb ramps, push buttons, and pedestrian signals with countdown displays. The project is scheduled for letting in October 2009. It is recommended that the City work with TxDOT to implement phasing and timing in accordance with the guidelines proposed in the Draft MUTCD 2009 Edition.	N/A	Letting October 2009	N/A
5	Murphy Road and Cartwright Road: Pedestrian activity and demand exists between retail and residential neighborhoods.				

Table 6: Recommendations Matrix (Cont.)

Figure 5 Symbol	Deficiency/Opportunity	Recommendation	Length	Implementation Timeline	Cost[1]
6	Murphy Road and El Dorado Boulevard: Pedestrian activity and demand from neighborhoods east and west. Pedestrian signals are not countdown display and curb ramps do not have a detectable surface.	Install new curb ramps with detectable surface and update pedestrian signals to countdown display in accordance with the Draft MUTCD 2009 Edition.	N/A	Short Term (2012-2017)	$39,700
FM 3345 (Cartwright Road)					
Bikeway Improvements – Cartwright Road					
7	Cartwright Road is not bicycle compatible.	Utilize up to 6 ft. of ROW to increase buffer width to 5 ft., remove existing 4 ft. sidewalk, and install a minimum 6 ft. one directional asphalt paved shared use path adjacent to eastbound and westbound Cartwright Road in accordance with the Draft MUTCD 2009 Edition.	N/A	Long Term (2018-2035)	$651,190
Intersection Improvements– Cartwright Road					
8	Cartwright Road and Texas Parkway: Foodarama is a pedestrian and bicycle activity generator. Pedestrian and bicycle enhanced access desired to recreation, retail and residential land uses.	TxDOT project CSJ 2105-01-020 includes the reconstruction and widening of Texas Parkway from a two-lane roadway to a four lane divided rural section with raised median and intersection improvements at Texas Parkway and Cartwright Road. The plans, specifications, and estimates are 90% complete. The project is scheduled for letting in August 2011. In addition to widening the roadway, the project will reconfigure and upgrade traffic signal systems and improve traffic capacity at the intersections. The improvements include crosswalks, curb ramps, push buttons, and pedestrian signals with countdown displays. It is recommended that the City work with TxDOT to implement phasing and timing in accordance with the guidelines proposed in the Draft MUTCD 2009 Edition.	N/A	Letting August 2011	N/A
9	Cartwright Road and Quail Valley East Drive: in a 4-hour count period, 46 pedestrians and bicyclists passed through the intersection. Existing crosswalks are faded. New ADA compliant curb ramps with detectable surface do not exist westbound.	Restripe existing crosswalks and install ADA compliant curb ramps with detectable warning strips westbound. Upgrade pedestrian signals to countdown display(s). Evaluate pedestrian signal timing and phasing against the Draft MUTCD 2009 Edition. It is further recommended that "Use Crosswalk" signs with supplemental arrows directing pedestrians to use the crosswalks at Quail Valley East Drive (R9-3a and R9-3b) be installed at the GWCA trail crossing at Cartwright Road, 225 ft. west of the intersection.	N/A	Short Term (2012-2017)	$48,150
FM 2234 (Texas Parkway)					
Bikeway Improvements – Texas Parkway					
11	There is very little existing sidewalk between Buffalo Run and Cartwright Road to support the existing pedestrian demand and activity. Texas Parkway is not bicycle compatible.	Texas Parkway does not currently have sufficient pavement width to restripe for bicycle lanes, or the minimum required shoulder width based on H-GAC and AASHTO Guidelines. According to As-Built Plans, Existing ROW Plans, and Proposed ROW Plans provided by TxDOT, sufficient ROW does not exist to install sidewalks, or a shared use path at the minimum recommended widths per H-GAC and AASHTO Guidelines. There are several long range projects proposed to widen Texas Parkway identified in H-GAC's Regional Transportation Plan (MPO ID Numbers 980 and 13637). Baker supports TxDOT's recommendation to add 6 ft. designated bicycle lanes both northbound and southbound to the scope of the LRP projects #980 and #13637 identified in the RTP. It is further recommended that as part of those projects, a 5 ft. sidewalk and/or a 6 ft. asphalt paved path be installed.	N/A	N/A	N/A

Table 6: Recommendations Matrix (Cont.)

Figure 5 Symbol	Deficiency/Opportunity	Recommendation	Length	Implementation Timeline	Cost[1]
Intersection Improvements– Texas Parkway					
8	Texas Parkway and Cartwright Road: Foodarama is a pedestrian and bicycle activity generator. Pedestrian and bicycle enhanced access desired to recreation, residential and retail land uses.	TxDOT project CSJ 2105-01-020 includes the reconstruction and widening of Texas Parkway from Cartwright Road to FM 521, which is south of the city limits. A two-lane roadway to a four lane divided rural section with raised median and intersection improvements at Texas Parkway and Cartwright Road. The plans, specifications, and estimates are 90% complete. The project is scheduled for letting in August 2011. In addition to widening the roadway, the project will reconfigure and upgrade traffic signal systems and improve traffic capacity at the intersections. The improvements include crosswalks, curb ramps, push buttons, and pedestrian signals with countdown displays. It is recommended that the City work with TxDOT to implement phasing and timing in accordance with the guidelines proposed in the Draft MUTCD 2009 Edition.	N/A	Letting August 2011	N/A
11	Texas Parkway and Buffalo Run: Crosswalks do not exist on east or south approaches of intersection. Several trip generators located nearby, including residential neighborhoods, Thurgood Marshall H.S., City Hall, the library, and fitness center.	Install crosswalks on east and south approaches to intersection. Install ADA compliant curb ramps at intersection. Install and upgrade existing pedestrian signals with countdown display in accordance with the Draft MUTCD 2009 Edition.	N/A	Short Term (2012-2017)	$39,150
12	Texas Parkway and Independence Boulevard: No pedestrian phasing. No existing crosswalks or pedestrian facilities. Pedestrian access to residential and retail.	Install ADA compliant highly visible crosswalks, curb ramps, push buttons, and pedestrian signals with countdown display in accordance with the Draft MUTCD 2009 Edition.	N/A	Short Term (2012-2017)	$50,650

[1] *Detailed breakdowns of the cost estimates are provided in Tables 7-13.*
N/A = Not Applicable

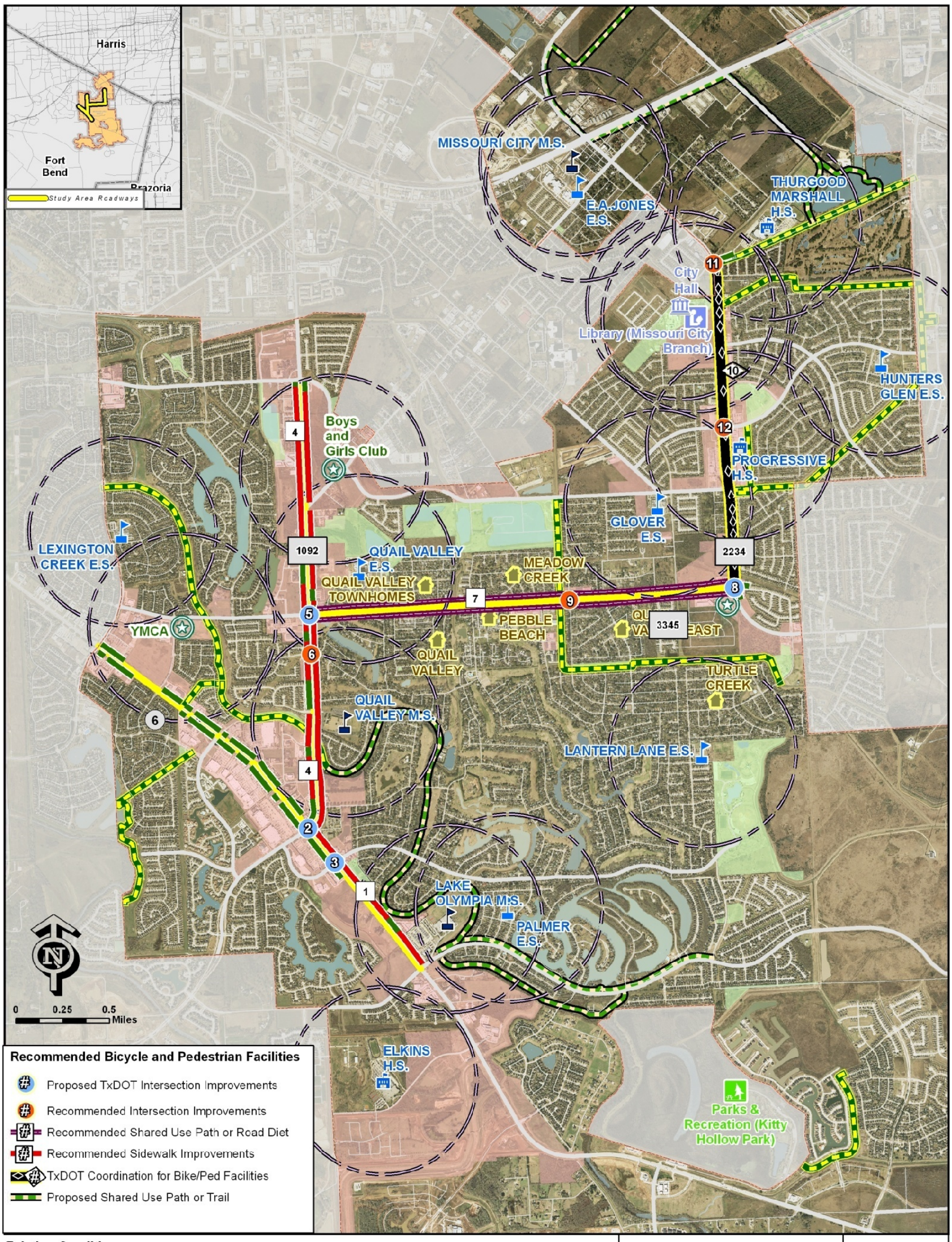


Figure 5: Recommended Improvements for Pedestrian and Bicycle Facilities

1. State Highway (SH) 6

a) Improvement Concept

Based on discussions with TxDOT, it is recommended that roadway modifications be made, specifically at intersections, to accommodate bicycle traffic prior to designating the roadway as a bicycle compatible route (Share the Road or signed bicycle route).

For pedestrians, it is recommended that approximately 4,000 feet of 6-foot wide sidewalk be installed adjacent to westbound SH 6 between Lake Olympia and Murphy Road. Five feet is the minimum recommended width for new sidewalk installation based on H-GAC and AASHTO guidelines; however, existing sidewalk on SH 6 is 6 feet wide. It is further recommended that a 10-foot grass buffer be maintained between the shoulder and sidewalk. This improvement would utilize 6 feet of existing ROW (not including the grass buffer to remain undisturbed). Figure 5 illustrates the location of the recommended improvement.

New sidewalks along SH 6 allow pedestrians to walk to nearby stores

b) Anticipated Benefits and/or Constraints

Benefits: Access to Ridgeview Park; access to over four (4) dozen retail establishments and several residential communities including Lake Olympia; access to existing sidewalk network; access to Lake Olympia Parkway Shared Use Path; and improved access that should result in a modest decrease in automobile trips, vehicle miles traveled, and associated vehicle emissions if roadways are constructed with pedestrian and bicycle facilities. To view net air quality benefits, refer to Appendix F.

Constraints: Sidewalk installation on SH 6 assumes that the 90 feet of ROW on the westbound side of the roadway can be utilized for construction. This concept would require a minimum of five feet of width for implementation. Coordination with TxDOT is needed during planning and design as the roadway is within the state's jurisdiction. Other potential constraints include time to construct, drainage impacts, and impacts to ROW. Other utility impacts (e.g., gas and water lines) need to be evaluated during the design phase.

c) Potential Time to Implement

Sidewalk installation on SH 6 is classified as a long-term improvement.

TxDOT Intersection Improvements: Several intersections were inventoried on SH 6, for which signal timings were obtained and analysis performed. TxDOT has completed the plans, specifications and estimates (CJS 1257-01-044) to reconfigure and upgrade traffic signal systems and improve traffic capacity at the intersections of Murphy Road and Glenn Lakes. The improvements include crosswalks, curb ramps, push buttons, and pedestrian signals with countdown displays. The project is scheduled for letting in October 2009. It is recommended that the City work with TxDOT to implement phasing and timing in accordance with the guidelines proposed in the Draft Manual on (Uniform) Traffic Control Devices 2009.

2. FM 1092 (Murphy Road)

a) Improvement Concept

It is recommended that approximately 18,250 feet of 5 foot wide sidewalk be installed adjacent to Murphy Road. Table 5 details the linear feet between cross streets. Five feet is the recommended width for sidewalk installation based on TxDOT and AASHTO guidelines. It is further recommended that a 3 – 10 foot grass buffer be maintained between the shoulder and sidewalk for drainage and motor vehicle separation. This improvement would utilize five feet of existing ROW (not including the grass buffer and undisturbed). Figure 5 illustrates the location of the recommended improvement.

Sidewalk along SH 6 ends near Lexington Boulevard

b) Anticipated Benefits and/or Constraints

Benefits: Access to YMCA; access to dozens of retail establishments and several residential communities; access to Oyster Creek Trail; access to Mosley Park, Independence Park, Lexington Square and American Legion Park; access to Quail Valley schools; and improved access that should result in a modest decrease in automobile trips, vehicle miles traveled, and associated vehicle

emissions if roadways are constructed with pedestrian and bicycle facilities. To view net air quality benefits, refer to Appendix F.

Constraints: Sidewalk installation on Murphy Road assumes that the ROW is distributed equally from the roadway centerline, providing 31.5 feet of available ROW in each direction. This concept would require a minimum of five feet of width for implementation, not including ten feet for the grass buffer. Coordination with TxDOT is needed during the planning and design phase as the roadway is within the state's jurisdiction. Other potential constraints include time to construct, potential drainage impacts, and impacts to ROW. Utility impacts are not anticipated but need to be evaluated during the design phase.

c) Potential Time to Implement

Sidewalk installation on Murphy Road is classified as a long-term improvement.

3. FM 3345 (Cartwright Road)

View of center median on Cartwright Road

a) Improvement Concept – Shared Use Path

It is recommended that the buffer and sidewalk widths on Cartwright Road be widened to provide a 5 foot buffer and a 6 foot asphalt paved shared use path both eastbound and westbound as illustrated in Figure 6. This concept utilizes up to 6 feet of ROW to widen the buffer and pedestrian pathway as per AASHTO guidelines for a shared use path adjacent to the roadway.

b) Anticipated Benefits and/or Constraints – Shared use Path

Benefits: Enhanced access and mobility between residential neighborhoods and commercial land uses for bicyclists, and improved access that should result in a modest decrease in automobile trips, vehicle miles traveled, and associated vehicle

emissions if roadways are constructed with pedestrian and bicycle facilities. To view net air quality benefits, refer to Appendix F.

Constraints: Installation of a shared use path assumes that the ROW is distributed equally from the roadway centerline, providing 45 to 50 feet of available ROW in each direction. This concept would require a minimum of 6 feet of width for implementation. Coordination with TxDOT is needed during the design phase as the roadway is within the state's jurisdiction. Other potential constraints include time to construct, potential drainage impacts, and impacts to ROW. Utility impacts are not anticipated but need to be evaluated during the design phase.

c) Potential Time to Implement – Shared use Path

A shared use path on Cartwright Road is classified as a long-term improvement.

d) Improvement Concept – Road Diet

As an alternative to the recommended shared use path, a road diet could potentially be implemented on Cartwright Road. A road diet reduces the number of travel lanes in order to achieve enhanced mobility and access for pedestrians and bicyclists. One of the most common applications is reducing a four-lane typical section (two travel lanes in each direction) to two lanes (one travel lane in each direction) to provide sufficient width for bicycle lanes and a center median. This is the application recommended for Cartwright Road. The improvement is illustrated in Figure 7.

7. This concept would not require additional right of way; however, traffic demand analysis needs to be performed prior to preliminary design to determine traffic impacts and the effect on vehicle level-of-service.

e) Anticipated Benefits and/or Constraints – Road Diet

Benefits: Lower vehicular speeds, sensitive to surrounding neighborhoods, improves motorist awareness, and provides a separated facility for bicyclists. Cartwright Road could be considered a "Complete Street" if the road diet was successful serving many modes of transportation along the corridor.

Constraints: Increased delay for vehicles (level-of-service delay) and other potential traffic impacts to be determined prior to preliminary design.

f) Potential Time to Implement – Road Diet

A road diet for Cartwright Road would be a long-term improvement.

Figure 6: Recommended Improvements for a Shared Use Path on Cartwright Road

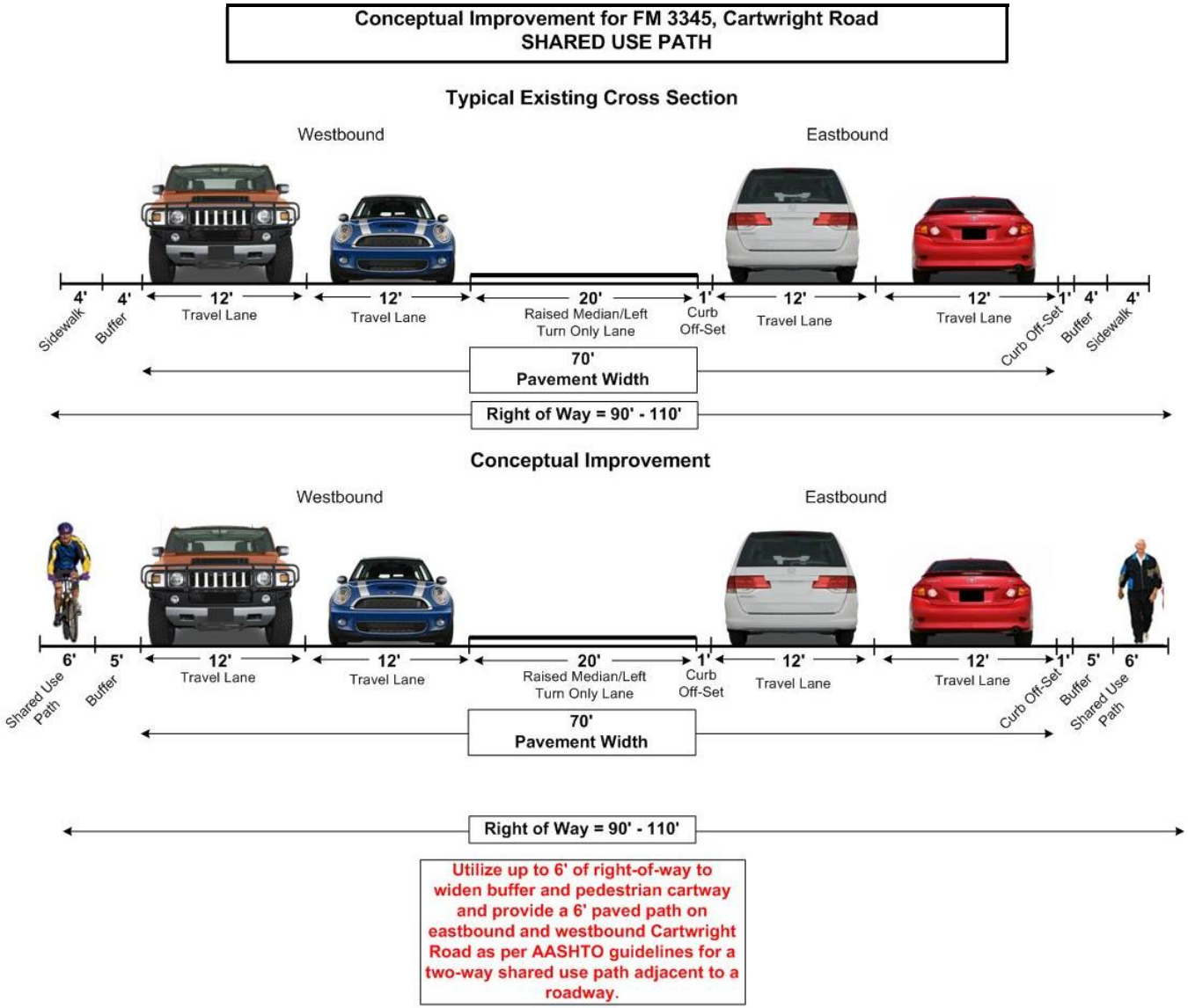
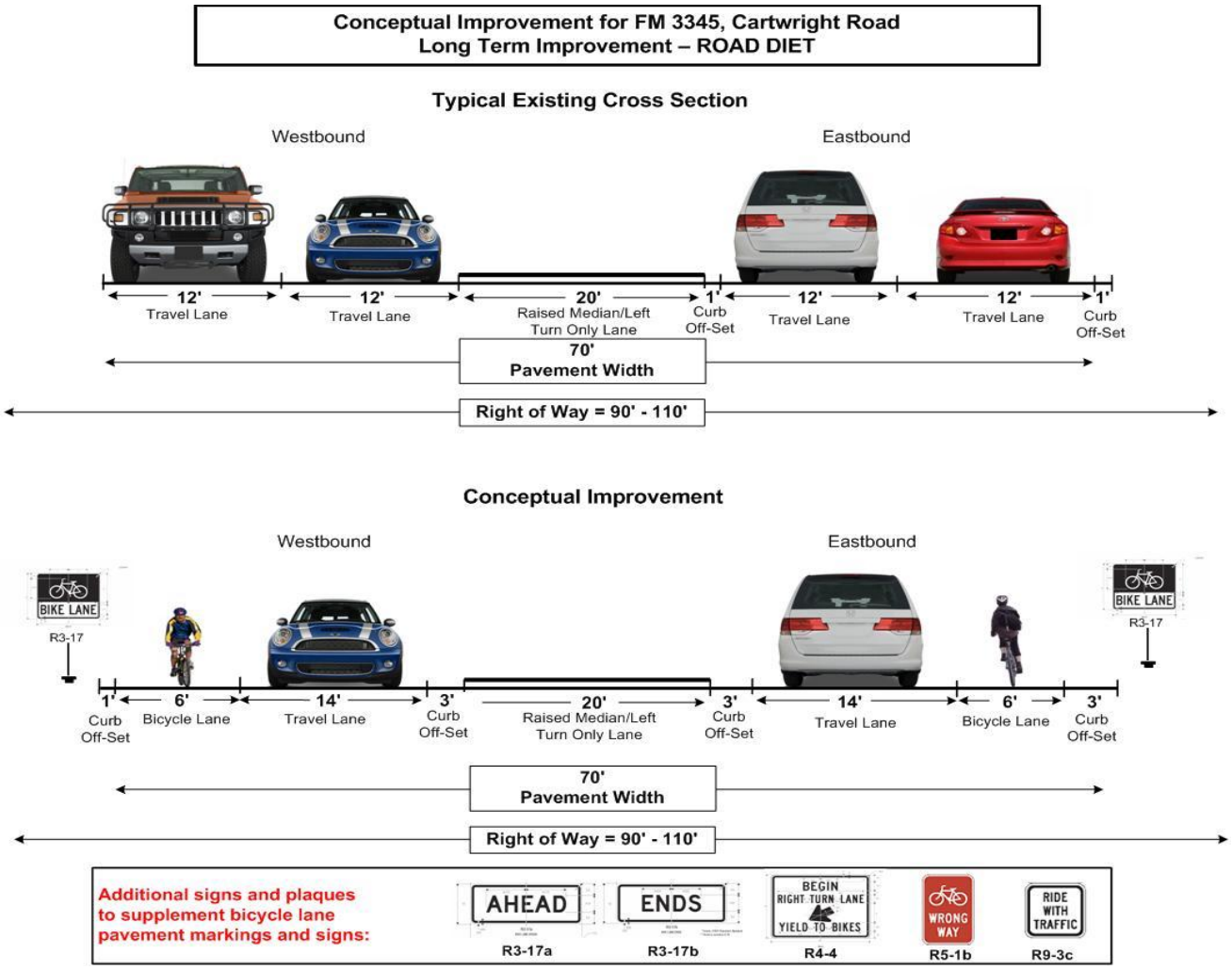


Figure 7: Recommended Improvements for a Road Diet on Cartwright Road



4. FM 2234 (Texas Parkway)

a) Improvement Concept

Texas Parkway does not currently have sufficient pavement width to restripe for bicycle lanes, or the minimum required shoulder width based on H-GAC and AASHTO Guidelines. According to as-built plans, existing ROW plans, and proposed ROW plans provided by TxDOT, sufficient ROW does not exist to install sidewalks, or a shared use path at the minimum recommended width per H-GAC and AASHTO Guidelines. There is several long range projects proposed to widen portions of Texas Parkway identified in H-GAC's Regional Transportation Plan. Specific TxDOT projects such as #980 and #13637 start at Cartwright Road and end south of the city limits, at FM 521, Baker supports TxDOT's recommendation to add 6 foot designated bicycle lanes both northbound and southbound to the scope of the LRP projects #980 and #13637 identified in the RTP. It is further recommended that as part of those projects, a 5 foot sidewalk and/or a 6 foot asphalt paved path be installed northbound and southbound). Figure 5 illustrates the location of the recommended improvement.

Pedestrian walking southbound on Texas Parkway

b) Anticipated Benefits and/or Constraints

Benefits: Enhancing access and mobility between residential neighborhoods and civic land uses for pedestrians and bicyclists. Improved access could result in a modest decrease in automobile trips; vehicle miles traveled, and associated vehicle emissions if roadways are constructed with pedestrian and bicycle facilities.

Constraints: Scope and limits associated with TxDOT projects #980 and #13637.

c) Potential Time to Implement

Pedestrian and bicycle facilities on Texas Parkway is a long term concept. The City is in the process of designing interim improvements to the intersection crossings, as well as sidewalk connections between existing segments.

5. *Intersection Improvements for Murphy Road and El Dorado Boulevard*

a) Improvement Concept

It is recommended that the existing pedestrian signals be replaced with countdown signals to enhance pedestrian and bicycle mobility and safety at the intersection. Figure 8 illustrates the recommended improvement.

b) Anticipated Benefits and/or Constraints

Benefits: Enhanced access between residential neighborhoods and commercial land uses, enhanced pedestrian expectation to cross the street.

Constraints: None anticipated.

c) Potential time to implement

Since significant impacts are not anticipated, this concept is a short-term improvement.

6. *Intersection Improvements for Cartwright Road and Quail Valley East Drive*

a) Improvement Concept

It is recommended that existing crosswalks be restriped, and ADA compliant curb ramps with detectable warning surface be installed eastbound. It is further recommended that pedestrian signals be upgraded to countdown display(s) and pedestrian signal timing and phasing is evaluated against the MUTCD 2009 Edition. Lastly, it is recommended that "Use Crosswalk" signs with supplemental arrows directing pedestrians to use the crosswalks at Quail Valley East Drive (R9-3a and R9-3b) be installed at the GWCA trail crossing at Cartwright Road. Figure 9 illustrates the recommended improvements.

b) Anticipated Benefits and/or Constraints

Benefits: Pedestrian expectation to cross the street, crosswalk visibility, ADA access and mobility, access to intersection for trail users and enhanced pedestrian mobility.

Constraints: None anticipated.

c) Potential Time to Implement

Since significant impacts are not anticipated, potential time to implement this concept is short-term.

7. *Intersection Improvements for Texas Parkway and Buffalo Run*

a) Improvement Concept

It is recommended that crosswalks be installed on east and south approaches to the intersection. It is further recommended that ADA compliant curb ramps be installed, as well as pedestrian signals with countdown display. Figure 10 illustrates the recommended improvement.

b) Anticipated Benefits and/or Constraints

Benefits: Pedestrian expectation to cross the street, crosswalk visibility, ADA access and mobility, and enhanced pedestrian mobility and access to Thurgood Marshall High School, City Hall, the library, community center, and fitness center.

Constraints: None anticipated.

c) Potential Time to Implement

Since significant impacts are not anticipated, potential time to implement this concept is short-term.

8. *Intersection Improvements for Texas Parkway and Independence Boulevard*

a) Improvement Concept

It is recommended that crosswalks, curb ramps, push buttons, and pedestrian signals with countdown display be installed at the intersection. Nearby pedestrian and bicycle trip generators include residential neighborhoods, Progressive High School and Hunters Glen Park. Figure 11 illustrates the recommended improvement.

b) Anticipated Benefits and/or Constraints

Benefits: Pedestrian expectation to cross the street, ADA access and mobility, and enhanced pedestrian mobility and access to trip generators on Texas Parkway including Progressive High School and Hunter Glen Park.

Constraints: None anticipated.

c) Potential Time to Implement

Since significant impacts are not anticipated, potential time to implement this concept is short-term.

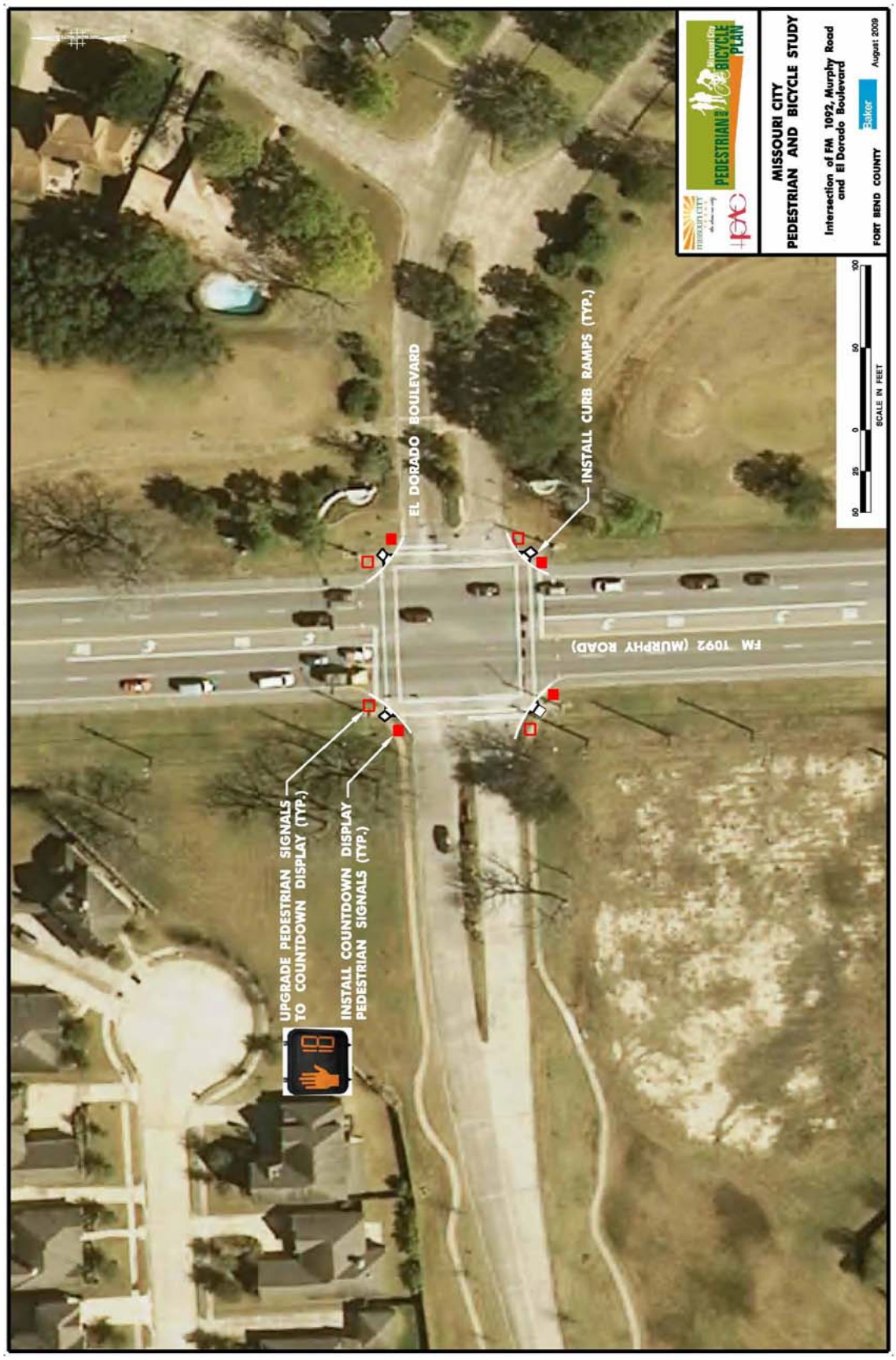
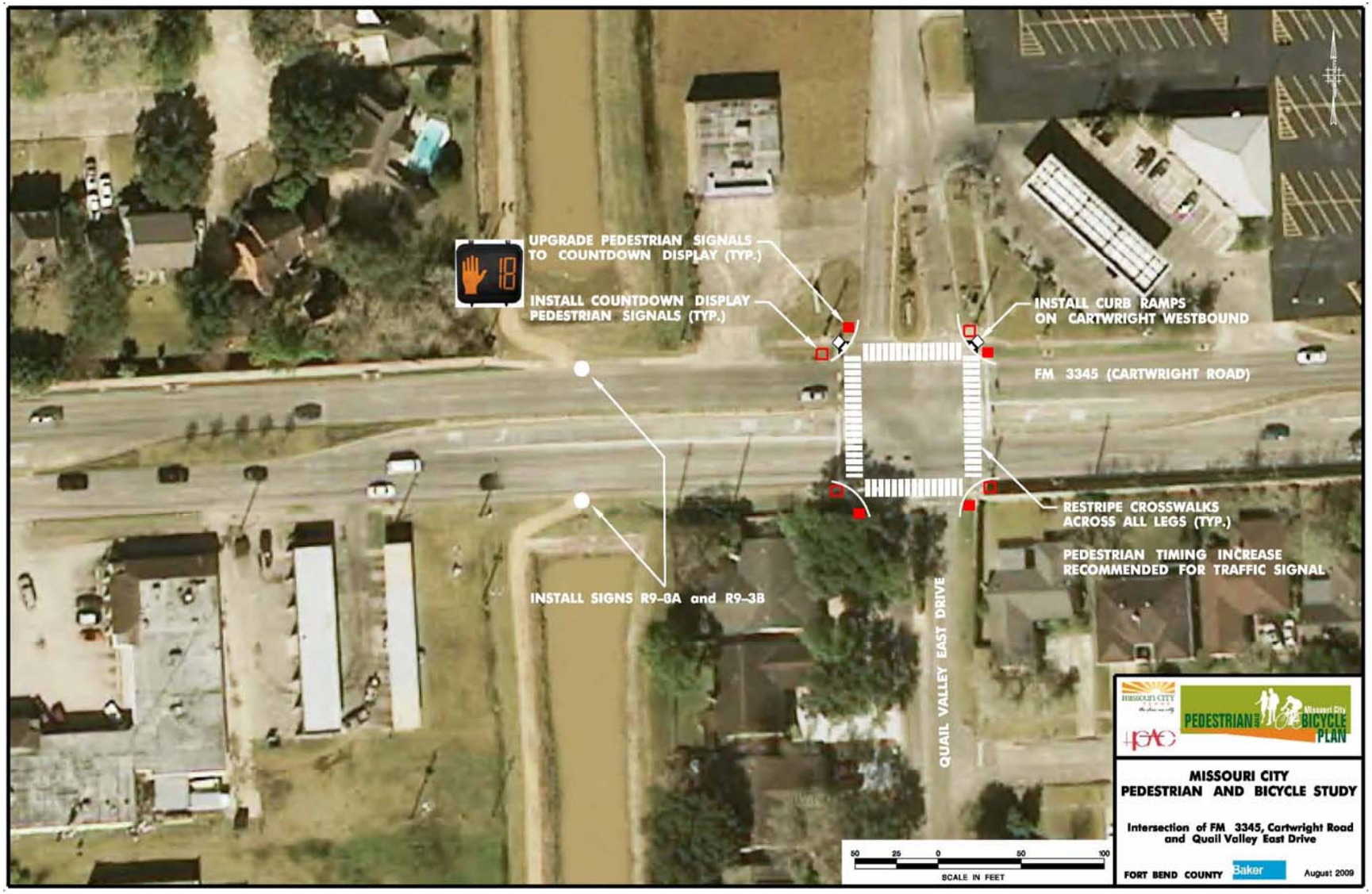


Figure 8: Intersection Improvements for Murphy Road and El Dorado Boulevard

Figure 9: Intersection Improvements for Cartwright Road and Quail Valley East Drive



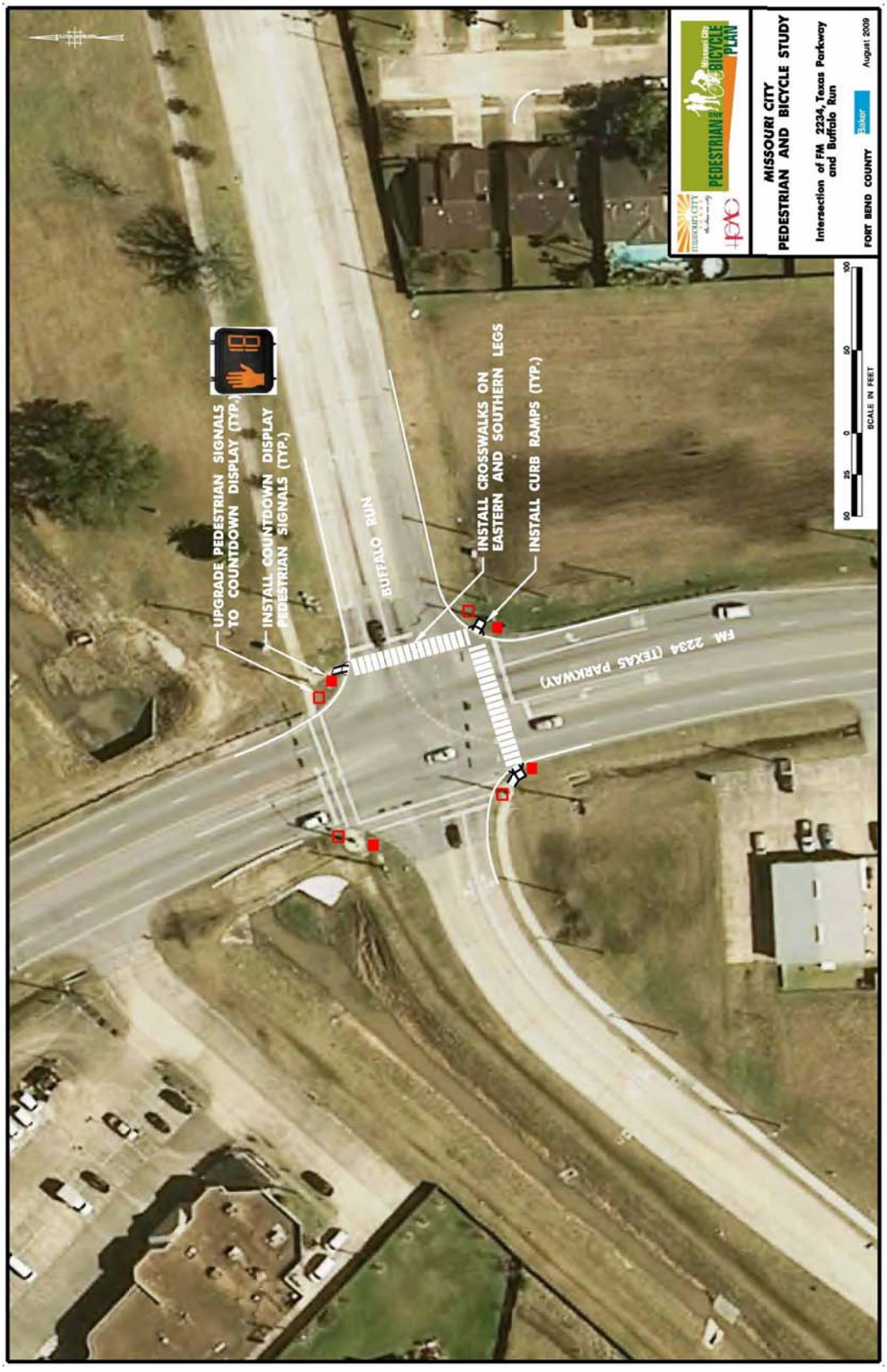


Figure 10: Intersection Improvements for Texas Parkway and Buffalo Run

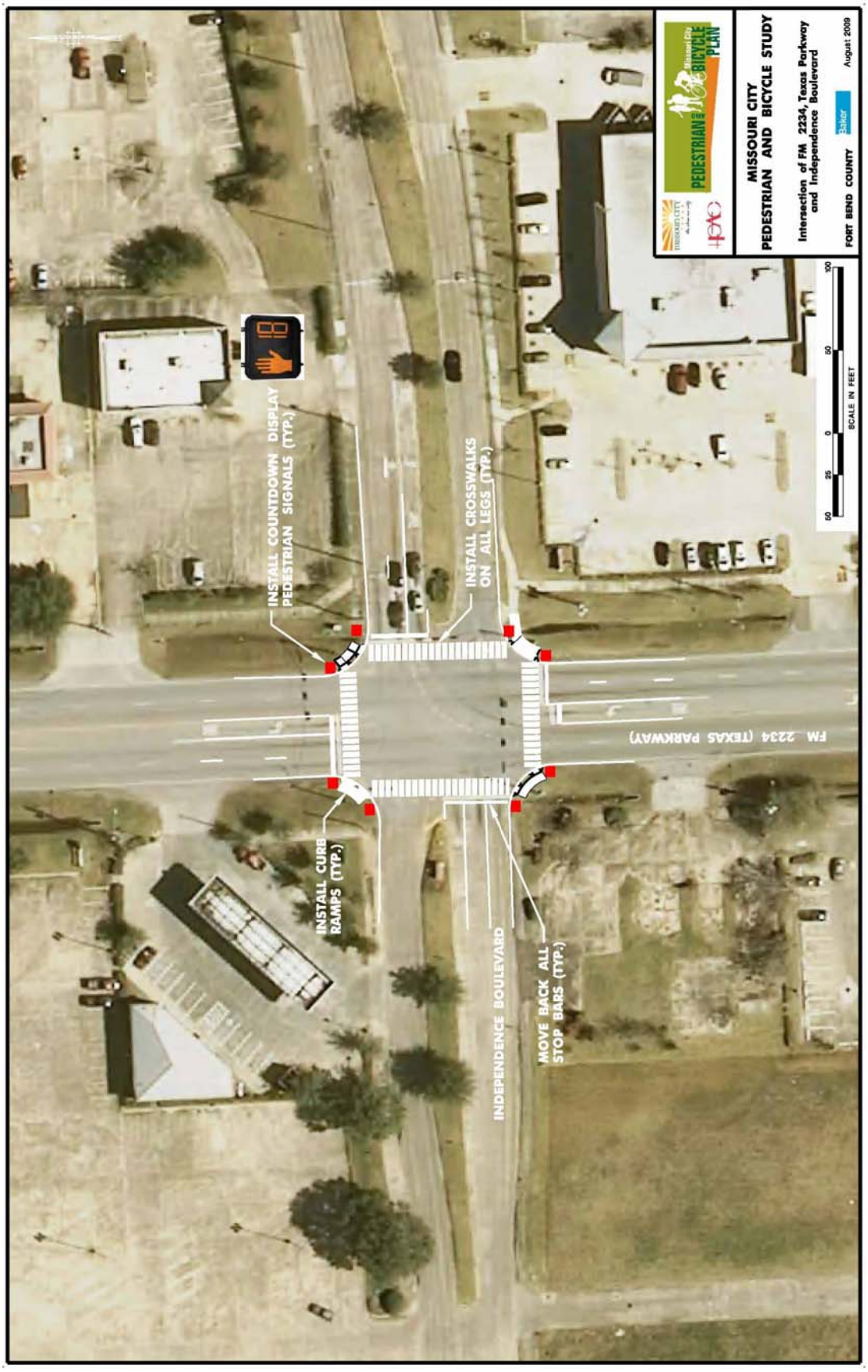


Figure 11: Intersection Improvements for Texas Parkway and Independence Boulevard

C. POLICY, EDUCATION & ENFORCEMENT RECOMMENDATIONS

Missouri City local officials have demonstrated their dedication and support for pedestrian and bicycle access and mobility improvements in their community. The following section provides recommendations to assist in implementing community goals.

1. Policy/Programmatic Recommendations

Missouri City requires new development to install sidewalks and new commercial properties to install bicycle racks as a contribution to a community trying to achieve a pedestrian and bicycle friendly environment. Additional policy and/or programmatic recommendations follow:

- Create a Pedestrian and Bicycle Task Force to advocate for improvements and monitor progress;
- Incorporate pedestrian and bicycle designs, and best practices regionally, into local design manuals and specifications;
- Adopt a policy or ordinance that requires the consideration of pedestrians and bicyclists as part of transportation improvement projects (new roadways, added capacity roadways and overlay construction projects);
- Develop and/or update local standards for the construction of sidewalks, crosswalks, on-street bikeways and off-road shared use paths;
- Adopt an ordinance to require developers to install sidewalk not only adjacent to their property, but to connect with the nearest existing sidewalk and/or trail;
- Adopt an ordinance to maintain shoulder widths when development creates the need to add a turning lane;
- Create a database inventory of the sidewalks within the city limits, including direction, width, condition, limits and obstructions/conflicts that may affect the wheelchair bound and the blind, identify projects for implementation, prioritize, and include in CIP and/or H-GAC's RTP;
- Designate a City department responsible for bikeway planning, design and maintenance;
- Adopt bikeway nomenclature used by H-GAC and TxDOT;
- Develop a and adopt Bikeway Plan with coordination among the city departments, the general public and H-GAC;
- Coordinate with Schools on pedestrian and bicycle connections to schools;

- Develop a city pedestrian and bicycle web page providing information on compatible roadways, the trail network, and safety information;
- Create a map of existing trails and compatible roadways for residents;
- Perform neighborhood walkability/bikeability audits with homeowner's associations;
- Implement a walking school bus and/or walk-bike to school day;
- Continue and extend the Pedestrian and Bicycle Study;
- Extend the proposed treatments/improvements on the Study Area roadways beyond the Study Area limits as conditions allow and resources become available;
- Coordinate with TxDOT when improvements are proposed for Study Area roadways and intersections so that pedestrian and bicycle accommodations are considered and implemented; and
- Explore opportunities to accommodate cyclists and pedestrians on roadways not specifically identified in the study to serve as additional (or alternate) routes for pedestrians and bicyclists, specifically east/west routes.

2. Education

To properly plan for future growth of pedestrian and bicycle use in a community, it is important to implement educational programs that encourage proper safety techniques among pedestrians, bicyclists, and motorists. When educating a community it is important to dispel myths, encourage courteous and lawful behavior, and enhance awareness. By utilizing the resources of the local police, school and library, education programs have the potential of reaching a broader audience and cross section of the community.

The following four (4) primary groups should be educated about bicycle safety and awareness:

- **Young bicyclists;**
- **Parents of young bicyclists;**
- **Adult bicyclists; and**
- **Motorists.**

It is important to educate each group on the most frequent causes of crashes and injuries, laws pertaining to cyclists and pedestrians, and safe riding techniques.

The National Highway Traffic Safety Administration (NHTSA) distributes a packet called "Getting to School Safely Community Action Kit." Within the packet there are fact sheets about pedestrian and bicycle safety. Another organization that distributes a guide about how to properly walk to school is the Department of Health and Human Services, Center for Disease Control and Prevention (CDC). The CDC gives parents fun tips for teaching their children the proper way to walk to school.

TxDOT has Safety Tips on their website for Pedestrians, Bicyclists, and Drivers: http://www.txdot.gov/safety/tips/default.htm.

3. Enforcement

The key to encouraging a safe and well traveled transportation system is an enforcement program for traffic regulations, as they apply to roadway users: motorists, pedestrians, and bicyclists. Missouri City can act to both reduce poor travel behavior and encourage beneficial travel habits through enforcement. This process should include reviewing current ordinances and regulations related to travel to identify elements that may unnecessarily affect users, especially in terms of pedestrians and bicyclists. In addition, this review may assist in identifying opportunities to partner with community, county, or state organizations to inform users about safe travel behavior, such as yielding to pedestrians in crosswalks and use of bicycle helmets by bicyclists.

Yielding to a Pedestrian in a Crosswalk: According to Texas Transportation Code, Section 552.003, a motorist shall yield the ROW to a pedestrian crossing the roadway in a crosswalk if, among other things, no traffic control signal is in place.

Bicycle Helmets: The most common cause of death for a bicyclist is a head injury. Nationally, laws have been implemented requiring children to wear bicycle helmets while riding bicycles. For example, Houston law requires all bicyclists under the age of 18 years to wear a safety helmet.

http://www.missouricitytx.gov/

D. COST ESTIMATES FOR THE IMPROVEMENTS

Cost estimates were calculated with the notion that the recommended improvements in Table 6, Recommendations Matrix, would be implemented. Tables 7 through 13 include cost estimates for the conceptual bike and intersection improvements. Also, refer to Table 6, Recommendations Matrix.

Table 7: Pedestrian Improvement for SH 6

Item No.	Description	Unit	Quantity	Est. Price	Total
531.2024 Concrete Sidewalks (5 ft.)	--	SY	2,670	$30	$80,100
	--		**Total**		$80,100

Note: Cost estimates included the following assumptions: 1. The construction length/road work is 4,000 ft.; 2. Installing 6 ft. wide 5" deep sidewalk on one side; 3. All prices are adjusted for future inflation and difference in quantities.

Table 8: Pedestrian Improvement for Murphy Road

Item No.	Description	Unit	Quantity	Est. Price	Total
531.2024 Concrete Sidewalks (5 ft.)	--	SY	20,200	$30	$606,000
	--		**Total**		$606,000

Note: Cost estimates included the following assumptions: 1. The construction length/road work is 18,250 ft.; 2. Installing 56 ft. wide 5" deep sidewalk on one side; 3. All prices are adjusted for future inflation and difference in quantities.

Table 9: Pedestrian Improvement for Intersection of Murphy Road and El Dorado Boulevard

Item No.	Description	Unit	Quantity	Est. Price	Total
XXXX	Traffic Signal Cabinet modification	Intersection	1	$2,000	$2,000
XXXX	Conduits, excavation and backfill	LF	50	$85	$4,250
XXXX	5 Conductor signal cable	LF	550	$7	$3,850
687.2001 Ped Pole Assembly & foundation	Ped pole assembly and foundation	EA	4	$1,750	$7,000
688.2001 Ped Push Button	Ped push button	EA	4	$200	$800
XXXX	LED countdown ped. signal head, module & bracket	EA	8	$1,000	$8,000
XXXX	Wheelchair ramp	EA	4	$2,500	$10,000
666.2006 reflective pavement Marking 4 thick (x-walls)	Reflective pavement marking 4 ft. thick (x-walls, stop lines, etc)	LF	400	$2	$800
XXXX	Signage on U-channel posts (price incl.)	SF	40	$75	$3,000
			Total		$39,700

Table 10: Bike Improvement for Cartwright Road

Item No.	Description	Unit	Quantity	Est. Price	Total
104.2015	Removing sidewalk concrete	SY	15,200	$3	$45,600
164.20XX	6" Gravel Base	Ton	3800	$35	$133,000
340.21XX	D-GR HMA ------ PG70-22	SY	5,100	$80	$408,000
160.2003 Seeding	Seeding	SF	840	$1	$840
XXXX	Signage on U-channel posts (price incl.)	SF	850	$75	$63,750
			Total		$651,190

Note: Cost estimates included the following assumptions: 1. The construction length/ road work is 17,000 ft.; 2. Removing 4 ft. wide 4'' deep sidewalk on both sides; 3. Installing 6 ft. wide 4" deep asphalt paved "Shared Use Path;" 4. 6 ft. of Gravel Base is installed under the paved path; 5. All Prices are adjusted for future inflation and difference in quantities.

Table 11: Pedestrian Improvement for Intersection of Cartwright Road and Quail Valley East Drive

Item No.	Description	Unit	Quantity	Est. Price	Total
XXXX	Traffic signal cabinet modification	Intersection	1	$2,000	$2,000
XXXX	Conduits, excavation and backfill	LF	100	$85	$8,500
XXXX	5 Conductor signal cable	LF	750	$7	$5,250
687.2001 Ped pole assembly & foundation	Ped pole assembly and foundation	EA	4	$1,750	$7,000
688.2001 Ped push button	Ped push button	EA	4	$200	$800
XXXX	LED countdown ped. signal head, module & bracket	EA	8	$1,000	$8,000
XXXX	Wheelchair ramp	EA	4	$2,500	$10,000
666.2006 Reflective pavement marking 4 thick (x-walls)	Reflective pavement marking 4 ft. thick (x-walls, stop lines, etc)	LF	1,800	$2	$3,600
XXXX	Signage on U-channel posts (price incl.)	SF	40	$75	$3,000
			Total		$48,150

Table 12: Pedestrian Improvement for Intersection of Texas Parkway and Buffalo Run

Item No.	Description	Unit	Quantity	Est. Price	Total
XXXX	Traffic Signal Cabinet modification	Intersection	1	$2,000	$2,000
XXXX	Conduits, excavation and backfill	LF	50	$85	$4,250
XXXX	5 Conductor signal cable	LF	600	$7	$4,200
687.2001 Ped Pole Assembly & foundation	Ped pole assembly and foundation	EA	4	$1,750	$7,000
688.2001 Ped Push Button	Ped push button	EA	4	$200	$800

Table 12: Pedestrian Improvement for Intersection of Texas Parkway and Buffalo Run (Cont.)

Item No.	Description	Unit	Quantity	Est. Price	Total
XXXX	Wheelchair ramp	EA	3	$2,500	$7,500
666.2006 Reflective pavement marking 4 thick (x-walls)	Reflective pavement marking 4 ft. thick (x-walls, stop lines, etc)	LF	1,200	$2	$2,400
XXXX	Signage on U-channel posts (price incl.)	SF	40	$75	$3,000
			Total		$39,150

Table 13: Pedestrian Improvement for Intersection of Texas Parkway and Independence Boulevard

Item No.	Description	Unit	Quantity	Est. Price	Total
XXXX	Traffic signal cabinet modification	Intersection	1	$2,000	$2,000
XXXX	Conduits, excavation and backfill	LF	100	$85	$8,500
XXXX	5 Conductor signal cable	LF	1,050	$7	$7,350
687.2001 Ped Pole Assembly & foundation	Ped pole assembly and foundation	EA	4	$1,750	$7,000
688.2001 Ped Push Button	Ped push button	EA	4	$200	$800
XXXX	LED countdown ped. signal head, module & bracket	EA	8	$1,000	$8,000
XXXX	Wheelchair ramp	EA	4	$2,500	$10,000
666.2006 Reflective pavement marking 4 thick (x-walls)	Reflective pavement, marking 4 ft. thick (X-walls, stop lines, etc)	LF	2,000	$2	$4000
XXXX	Signage on U-channel posts (price incl.)	SF	40	$75	$3,000
			Total		$50,650

E. FUNDING SOURCES

Costs associated with implementing the improvements will vary. Short-term improvements (e.g., crosswalk striping) will have less design requirements and will therefore be lower in cost than an improvement that would need to go through feasibility assessment and design before obtaining funding for construction (e.g., sidewalk installation on Murphy Road. A list of funding possibilities for several intersection and facility improvements in Missouri City is shown below:

1. Transportation Enhancements (TE)

A notable federal resource is Transportation Enhancements (TE). TE funding supports multi-modal transportation systems among other activities. To be eligible, a project must: (1) have a relationship to surface transportation; and (2) be one of twelve qualifying activities:

- **Provision of pedestrian and bicycle facilities**
- **Provision of pedestrian and bicycle safety and education activities**
- **Acquisition of scenic or historic easements and sites**
- **Scenic or historic highway programs including tourist and welcome centers**
- **Landscaping and scenic beautification Rehabilitation and operation of historic transportation buildings, structures, or facilities**
- **Historic preservation**
- **Conversion of abandoned railway corridors to trails**
- **Control and removal of outdoor advertising**
- **Archaeological planning and research**
- **Environmental mitigation of highway runoff pollution, reduce vehicle-caused wildlife mortality, maintain habitat connectivity**
- **Establishment of transportation museums.**

TE funds are apportioned to the states by formula, based on amounts made available from the Surface Transportation Program (STP) under 23 U.S.C. 104(b)(3), which includes several adjustments, such as adjustments for metropolitan planning, open container and driving while intoxicated laws, highway safety, and safety belt and motorcycle helmet laws (FHWA, 2009).

2. National Highway System (NHS)

The NHS is comprised of the 42,000-mile Interstate system and another 113,000 miles of roads identified by the states based on their importance to the national and regional economy, and their connectivity. NHS funding for projects on NHS roadways can be used for pedestrian and bicycle improvements on NHS systems highways, or on land adjacent to any NHS system highway, including interstate highways. This includes incidental improvements within larger projects which enable bicycle compatibility such as paved shoulders and bicycle safe drainage grates, designated bicycle facilities such as bikeways, signed routes, bike lanes and paths, and pedestrian accommodations such as sidewalks, signals, overpasses and crosswalks. It also includes funding of independent pedestrian and bicycle projects (projects that are initiated primarily to benefit pedestrian and bicycle travel) along or in the vicinity of NHS roadways. Projects could include shoulder paving, bicycle safe drainage grates, construction of sidewalks or bikeways, installation of pedestrian signals, crosswalks or overpasses.

3. Surface Transportation Program (STP) Funds

The program is broadly defined and gives states flexibility to invest in a wide variety of transportation activities. Pedestrian and bicycle facilities and walkways are specifically listed as eligible activities under this program. As with NHS, pedestrian and bicycle improvements maybe incidental improvements within larger projects which establish bicycle compatibility are designated pedestrian and bicycle accommodations. The funds can also be used for independent pedestrian and bicycle projects along or in the vicinity of roadways. Projects could include installation of pedestrian signals, crosswalks or overpasses, shoulder paving, bicycle safe drainage grates, or construction of sidewalks or bikeways. Under the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU), it is specified that these funds may be used for the modification of sidewalks to comply with the ADA.

4. Safe Routes to School

Safe Routes to School (SRTS) is a Federal-Aid program created in SAFETEA-LU and administered by State Departments of Transportation. The program provides funds to the states to improve the ability of primary and middle school students, to walk and bicycle safely to school (Safe Routes to School National Partnership, 2009). The Safe Routes to School Program aims to address issues for any school striving to solve active transportation problems. Individual schools, multiple schools in close proximity (2 miles or less), and school districts can apply for funding under this program during a call for projects. For application guidelines and eligibility requirements, this link is provided: http://www.txdot.gov/safety/safe_routes/information.htm.

5. The Congestion Mitigation and Air Quality Improvement Program (CMAQ)

Authorized by SAFETEA-LU, the Congestion Mitigation and Air Quality Improvement Program provide funds for surface transportation and other projects that help to reduce congestion and improve air quality. The funds are mainly used to help communities in nonattainment areas and maintenance areas to reduce emissions. Non-attainment areas are those areas designated by the Environmental Protection Agency as not meeting the National Ambient Air Quality Standards (NAAQS). A maintenance area was once a non-attainment area but has now reached NAAQS. The SAFETEA-LU CMAQ program provides more than $8.6 billion in funds to State Departments of Transportation (DOT), Metropolitan Planning Organizations (MPO), and transit agencies to invest in emissions-reducing projects. Pedestrian and Bicycle Programs are two kinds of many programs that can be funded using CMAQ funds. Pedestrian and bicycle programs that can be funded under this program can come in one of many forms. Some include creating trails or storage facilities or marketing efforts designed to encourage bike riding and walking as forms of transportation. Education and outreach programs are also eligible for CMAQ funds and could be used to increase public knowledge about the benefits of biking and walking. The funds are made available through the MPOs and TxDOT to local governments and nonprofit organizations, as well as to private organizations as part of a public-private partnership CMAQ funds are only released as reimbursement payments for completed work. CMAQ funds require a state or local match. Usually, the breakdown is 80% federal funding and 20% state or local funding.

6. National Recreational Trails Fund (Symms Trails System Act)

An annual sum is apportioned to the states for use in developing trails related projects, many of which benefit pedestrians and bicyclists. Funding is from federal motor fuels taxes collected on sale of fuel for motorized recreational vehicles (ATVs, off road motorcycles, snowmobiles) and is administered through FHWA.

7. Scenic Byways

The program recognizes roads having outstanding scenic, historic, cultural, natural, recreational, and archaeological qualities and provides for designation of these roads as National Scenic Byways, All-American Roads, or America's Byways. Funds for this program can also be used in the development and provision of tourist implementation; and construction of pedestrian and bicycle facilities, interpretive facilities, overlooks and other enhancements for byway travelers. Designation of the scenic byway must be in accordance with a Scenic Byways program developed and adopted by the state.

8. Section 402 Safety Funds

These funds are administered by the National Highway Traffic Safety Administration (NHTSA) to be spent on non-construction activities to improve the safety of the traveling public. Pedestrian and bicycle projects are on the NHTSA priority list. In each state, the program is administered by a designated Highway Safety representative.

9. Federal Transit Administration Funds

Title 49 U.S.C. (as amended by the Transportation Equity Act for the 21st Century [TEA-21]) allows the Urbanized Area Formula Grants, Capital Investment Grants and Loans, and Formula Program for Other than Urbanized Area transit funds to be used for improving pedestrian and bicycle access to transit facilities and vehicles. SAFETEA-LU continues the Transit Enhancement Activity program with a 1% set-aside of Urbanized Area Formula Grant funds designated for, among other things, pedestrian access and walkways and bicycle access, including storage equipment and installing equipment for transporting bicycles on mass transit vehicles.

10. Federal Community Development Block Grant (CDBG) Program

Community Development Block Grants (CDBG) are for the use of local communities serving low- to moderate-income people. The grants are most often used for projects such as rehabilitating or constructing affordable housing or for job-creating economic development, but they can also be used for projects that would benefit low- and moderate- income pedestrians and bicyclists. Several of the types of projects that can be funded with these grants could be used for pedestrian and bicycle activities. These include acquisition of land for some public purpose, building public improvements or facilities, including sidewalks and recreational facilities, and also the costs associated with administrating or planning these projects. Not all local governments are eligible to apply for CDBG. The local government must have at least 50,000 residents or be designated a central city of a metropolitan area. Urban counties with at least 200,000 residents may also apply (these local governments are called entitlement communities). The local governments can spend the money themselves or distribute it to local non-profit or for-profit organizations or entities. Additionally, a portion of the funds is distributed to states, which can then distribute the funds as they see fit, including to no entitlement communities. The most central restriction on the use of CDBG funds is that at least 70% of the money must be used for activities that primarily benefit low to moderate-income people. In the case of building sidewalks or other pedestrian facilities, this usually means that these funds can only be used in areas where at least 70% of the residents have low to moderate incomes. Importantly, a community must also prepare a Consolidated Plan in order to be eligible for the funds. This plan contains an action plan, which specifies how the community will use the

funds, as well as fulfills the reporting and application requirements for entitlement communities. These grants are funded through the U.S. Department of Housing and Urban Development and administered by the Office of Block Grant Assistance in HUD's Office of Community Planning and Development (CPD).

11. Bicycles Belong

The Bicycles Belong Coalition is sponsored by member companies of the American Bicycle Industry. The Coalition has stated goal is to put more people on bikes more often through the implementation of TEA-21. One of the Coalition's primary activities is the funding of local bicycle advocacy organizations. Grants are awarded for up to $10,000 on a rolling basis. By June 2000, almost $200,000 has been awarded to advocacy organizations in the District of Columbia, Marin County, CA, Milwaukee, WI, Dallas, TX, Los Angeles, New York City, Portland, Maine, and others. Information about the Coalition, including grant applications and related information, is on the web at www.bikesbelong.org. They can also be contacted at:

12. The National Institutes of Health

The National Institutes of Health funds projects that "study primary and secondary prevention approaches targeting environmental factors that contribute to inappropriate weight gain in children, adolescents, and adults." Applications may be submitted by for-profit and nonprofit organizations (e.g., universities, colleges, hospitals, laboratories, units of state and local governments, and eligible agencies of the federal government).

Approximately $4,000,000 is committed to fund successful applications and NIH anticipates making 5 to 12 awards. The application guidelines that apply to pedestrian and bicycle programs are listed below:

- **Promoting walking or bicycling to school or to worksites**
- **Increasing physical activity during before and after school care**
- **Decreasing sedentary behaviors in children and adolescents**
- **Promoting physical activity at worksites**
- **Increasing family participation in physical activity**

For more information, visit: http://www.grants.nih.gov/grants/guide/rfa-files/RFA-DK-02-021.html.

13. General Mills Foundation

The foundation provides grants through the Champions Youth Nutrition and Fitness program. In 2003, the foundation will award 50 grants, each for up to $10,000. Applicants must be a nonprofit organization. The American Dietetic Association will assist in evaluating the proposals. The application is available at: http://www.generalmills.com/corporate/commitment/2006ChampionsApplicationOverview.pdf.

14. American Recovery and Reinvestment Act of 2009 (ARRA)

The ARRA, commonly referred to as the federal economic stimulus bill, was signed into law by President Barack Obama on February 17, 2009. The ARRA provides $789 billion in tax cuts and spending to stimulate the national economy. The law provides an opportunity for states, counties, municipalities, and schools to enhance their communities through available funding for sidewalk construction, bicycle lanes, paths, and complete streets (Safe Routes to School National Partnership, 2009).

F. PILOT PROJECT

The majority of recommendations from this study are intended for long-term implementation since funding needs to be secured and coordination with TxDOT will is needed. However, it is important that the City select several study recommendations to implement as a starting point to build momentum toward achieving the long-term vision. The study team identified several short-term recommendations that could serve as pilot projects to implement within two (2) years of completing the study. The pilot projects include infrastructure upgrades that are low-cost and based on As-Built plans would not require ROW purchase. Policy and programmatic recommendations that could be adopted within a two year time frame are also included.

Recommendation	Implementing Agency	Cost Estimate
Infrastructure Improvements		
Intersection Improvements at Murphy Road and El Dorado Boulevard	City of Missouri City in coordination with TxDOT	$39,700
Intersection Improvements at Cartwright Road and Quail Valley East Drive	City of Missouri City in coordination with TxDOT	$48,150
Intersection Improvements at Texas Parkway and Buffalo Run	City of Missouri City in coordination with TxDOT	$39,150
Intersection Improvements at Texas Parkway and Independence Boulevard	City of Missouri City in coordination with TxDOT	$50,650

Policies and Programs		
Create a Pedestrian and Bicycle Task force to monitor progress and provide recommendations	City of Missouri City	N/A
Recommendation	**Implementing Agency**	**Cost Estimate**
Infrastructure Improvements		
Develop a City Pedestrian and Bicycle web page with information about the City's trail network, sidewalk system, and bicycle-compatible roadways.	City of Missouri City	N/A
Provide information about pedestrian and bicyclist safety on the city's web site including educational videos for cyclists, pedestrians, and motorists.	City of Missouri City	N/A
Explore opportunities to accommodate cyclists and pedestrians on roadways not specifically identified in the study to serve as additional (or alternate) routes.	City of Missouri City	N/A
Encourage City police officers to enforce local traffic laws such as yielding to pedestrians in a crosswalk, speeding, and jaywalking.	City of Missouri City	N/A

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VII. CREDITS

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D. COMMUNITY AWARENESS SERVICES

Jeri Anderson – Public Involvement Director

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APPENDIX A: Intersection, Inventory, & Assessment

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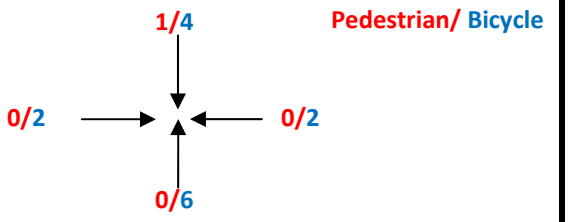
Intersection: Texas Parkway (FM 2234) and Buffalo Run

Intersection Control:	Signalized
Crosswalks:	There are 2 standard striped crosswalks (1 across the north approach of Texas Parkway and 1 across the west approach of Scanlin Road).
Curb Ramps:	ADA compliant curb ramps do not exist; however, the sidewalk is flush with the roadway.
Warning Signs:	There are 3 school warning signs (MUTCD S1-1).
Pedestrian Signals or Push Buttons:	There are pedestrian signals (symbol) and push buttons for each crosswalk approach.
Traffic Data:	Pedestrian: Not available Bicycle: Not available Vehicle LOS (Year 2005): D
Signal Timing:	Not obtained
Notes:	On Buffalo Run, 9 feet of sidewalk exists westbound approaching the intersection. Thurgood Marshall High School is located approximately 1,500 feet east of the intersection on westbound Buffalo Run.

Intersection: Texas Parkway (FM 2234) and Missouri City Drive

Intersection Control:	Signalized	
Crosswalks:	There are 4 standard-striped crosswalks, 1 across each approach.	
Curb Ramps:	ADA compliant curb ramps do not exist; however, the sidewalk is flush with the roadway.	
Warning Signs:	Not applicable	
Pedestrian Signals or Push Buttons:	There are pedestrian signals (countdown) and push buttons for each crosswalk approach.	
Traffic Data:	Date: 6/5/2007 Count period: 6:30-8:30 (AM), 11:00-1:00 (Mid-day), 4:30-6:30 (PM) Bicycle/Pedestrian: 14/1 Vehicle LOS (Year 2005): C	
Signal Timing:	Not obtained	
Notes:	Pedestrian observed walking on shoulder during field investigation.	

Intersection: Texas Parkway (FM 2234) and Independence Boulevard

Intersection Control:	Signalized	
Crosswalks:	There are no existing crosswalks.	
Curb Ramps:	Not inventoried	
Warning Signs:	Not inventoried	
Pedestrian Signals or Push Buttons:	Not inventoried	
Traffic Data:	Date: 6/5/2007 Count period: 6:30-8:30 (AM), 11:00-1:00 (Mid-day), 4:30-6:30 (PM) Bicycle/Pedestrian: 1/12 Vehicle LOS (Year 2005): C	Pedestrian/Bicycle 2/0 5/1 2/0 3/0
Signal Timing:	No pedestrian phasing currently exists.	
Notes:	Not applicable	

Intersection: Texas Parkway (FM 2234) and Cartwright Road (FM 3345)

Intersection Control:	Signalized	
Crosswalks:	There are no existing crosswalks.	
Curb Ramps:	There are no existing curb ramps.	
Warning Signs:	There are no existing warning signs.	
Pedestrian Signals or Push Buttons:	There are no existing pedestrian signals and/or push buttons.	
Traffic Data:	Date: 6/5/2007 Count period: 6:30-8:30 (AM), 11:00-1:00 (Mid-day), 4:30-6:30 (PM) Bicycle/Pedestrian: 2/0 Vehicle LOS (Year 2005): D	0/0 Pedestrian/Bicycle 0/1 0/0 0/1
Signal Timing:	Not obtained	
Notes:	Turning movements could potentially conflict with a pedestrians crossing.	

Intersection: Murphy Road (FM 1092) and Lexington Boulevard

Intersection Control:	Signalized
Crosswalks:	There are 4 standard-striped crosswalks, 1 across each approach.
Curb Ramps:	ADA compliant curb ramps do not exist; however, the sidewalk is flush with the roadway.
Warning Signs:	There are no warning signs at the intersection.
Pedestrian Signals or Push Buttons:	There are pedestrian signals (countdown) and push buttons for each crosswalk approach.
Traffic Data:	Pedestrian: Not available Bike: Not available Vehicle LOS (Year 2005): C
Signal Timing:	Not obtained
Notes:	Not applicable

Intersection: Murphy Road (FM 1092) and Cartwright Road (FM 3345)

Intersection Control:	Signalized
Crosswalks:	There are 4 standard-striped crosswalks, 1 across each approach.
Curb Ramps:	ADA compliant curb ramps do not exist; however, the sidewalk is flush with the roadway.
Warning Signs:	There is no warning sign at the intersection.
Pedestrian Signals or Push Buttons:	There are pedestrian signals (symbol) and push buttons for each crosswalk approach.
Traffic Data:	Pedestrian: Not available Bike: Not available Vehicle LOS (Year 2005): D
Signal Timing:	There are 4 pedestrian crosswalks and phases at this traffic signal and they are programmed for activation by pedestrian push button. The existing and recommended timing (as per MUTCD 2009) are:

Intersection: Murphy Road (FM 1092) and Cartwright Road (FM 3345) (Continued)

Signal Timing (Continued):	*Phases 2 and 6 – Crossing Cartwright Road* *Existing "Walk" phase timing is 4 seconds. 5 seconds is recommended. *Existing "Flashing Don't Walk" phase timing is 20 seconds. 27 seconds is recommended. *Phases 7 and 8 – Crossing Murphy Road* *Existing "Walk" phase timing is 4 seconds. 5 seconds is recommended. *Existing "Flashing Don't Walk" phase timing is 20 seconds. 27 seconds is recommended.
Notes:	Wide intersection, new crosswalks. Two (2) seconds of "walk" symbol on pedestrian signal is potentially confusing to pedestrians. Countdown pedestrian signals would enhance pedestrian predictability at the intersection. There is no sidewalk to the shopping center on the southwest corner. Curb ramps should be upgraded for detectable surfaces.

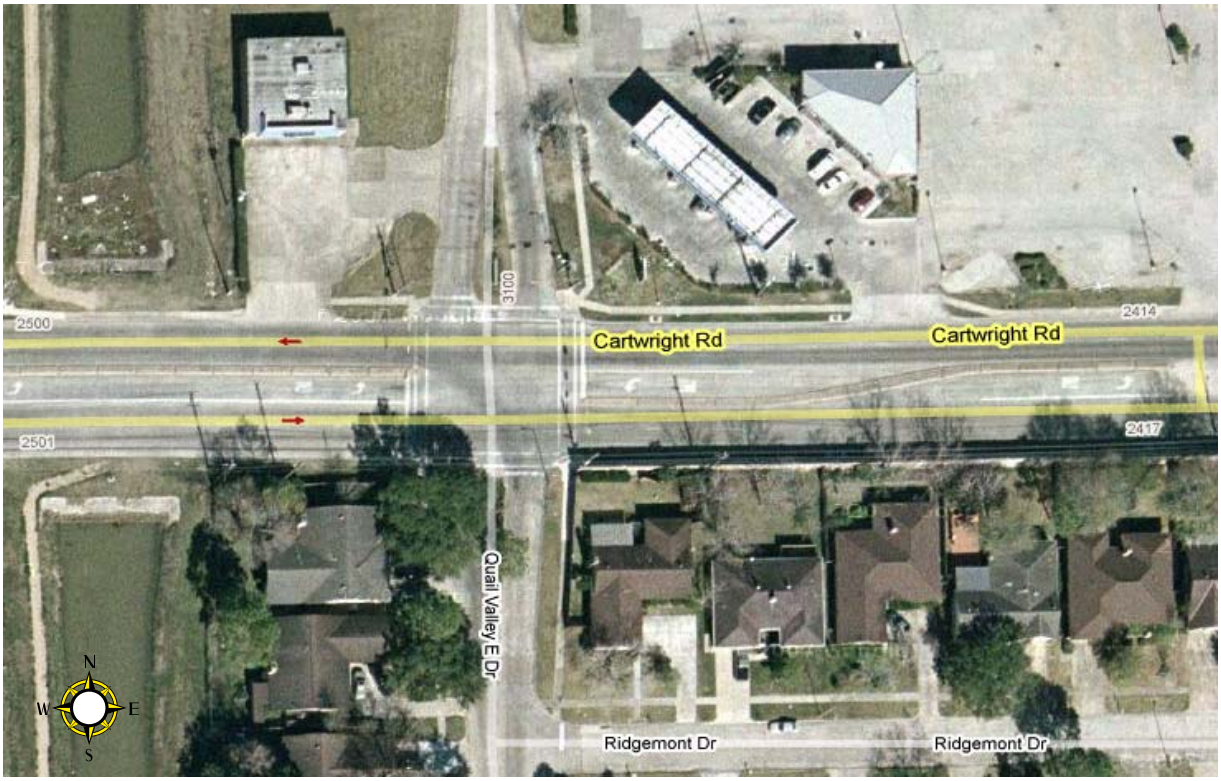
Intersection: Murphy Road (FM 1092) and El Dorado Boulevard

Intersection Control:	Signalized	
Crosswalks:	There are 4 standard-striped crosswalks, 1 across each approach.	
Curb Ramps:	ADA compliant curb ramps do not exist; however, the sidewalk is flush with the roadway.	
Warning Signs:	There are no warning signs	
Pedestrian Signals or Push Buttons:	There are pedestrian signals (symbol) and push buttons for each crosswalk approach.	
Traffic Data:	Date: 5/7/2009 Count period: 3:00 PM - 7:00 PM Bicycle/Pedestrian: 1/0 Vehicle LOS (Year 2005): C	0/0 Pedestrian/Bicycle 0/0 0/0 0/1
Signal Timing:	Not obtained	
Notes:	No pedestrian activity observed on day of count.	

Intersection: Murphy Road (FM 1092) and State Highway (SH) 6

Intersection Control:	Signalized	
Crosswalks:	There are no existing crosswalks	
Curb Ramps:	Curb ramps exist or approaching sidewalk is flush with the curb.	
Warning Signs:	There are no warning signs	
Pedestrian Signals or Push Buttons:	There are no existing pedestrian signals or push buttons.	
Traffic Data:	Date: 5/7/2009 Count period: 3:00 PM – 7:00 PM Bicycle/Pedestrian: 1/0 Vehicle LOS (Year 2005): D	0/0 Pedestrian/ Bicycle 0/0 0/0 0/1
Signal Timing:	No pedestrian phasing exists.	
Notes:	Not applicable	

Intersection: Cartwright Road (FM 3345) and Quail Valley East Drive



Intersection Control:	Signalized	
Crosswalks:	There are 4 standard striped crosswalks, 1 across each approach (faded).	
Curb Ramps:	ADA compliant curb ramps exist on westbound Cartwright Road. Eastbound, the sidewalk is textured and ramps down to the street.	
Warning Signs:	There are no warning signs at the intersection.	
Pedestrian Signals or Push Buttons:	There are pedestrian signals (symbol) and push buttons for each crosswalk approach.	
Traffic Data:	Date: 5/7/2009 Count period: 3:00 PM – 7:00 PM Bicycle/Pedestrian: 36/10 Vehicle LOS (Year 2005): B	7/1 Pedestrian/Bicycle 9/2 12/4 8/3
Signal Timing:	There are 4 pedestrian crosswalks and phases at this traffic signal and they are programmed for activation by pedestrian push button. The existing and recommended timing (as per MUTCD 2009) are:	

Intersection: Cartwright Road (FM 3345) and Quail Valley East Drive (Continued)

Signal Timing (Continued):	*Phases 2 and 6 – Crossing Quail Valley East Drive* *Existing "Walk" phase timing is 4 seconds. 5 seconds is recommended. *Existing "Flashing Don't Walk" phase timing is 14 seconds. 20 seconds is recommended. *Phases 4 and 8 – Crossing Cartwright Road* *Existing "Walk" phase timing is 4 seconds. 5 seconds is recommended. *Existing "Flashing Don't Walk" phase timing is 17 seconds. 22 seconds is recommended.
Notes:	Eastbound at intersection, new ADA compliant curb ramps with detectable surface for the blind. Sidewalks exist along Cartwright Road from Murphy Road to Texas Parkway.

Intersection: SH 6 and Township Lane

Intersection Control:	Signalized
Crosswalks:	There are no existing crosswalks.
Curb Ramps:	Not inventoried
Warning Signs:	Not inventoried
Pedestrian Signals or Push Buttons:	Not inventoried
Traffic Data:	Pedestrian: Not available Bike: Not available Vehicle LOS (Year 2005): B
Signal Timing:	No pedestrian phasing exists.
Notes:	Land use observed at the intersection is not comprised of pedestrian or bicycle trip generators (Sonic Drive-Thru, Home Depot, Chili's, no residential development).

Intersection: SH 6 and Glenn Lakes Lane

Intersection Control:	Signalized
Crosswalks:	There are no existing crosswalks.
Curb Ramps:	Not inventoried
Warning Signs:	Not inventoried
Pedestrian Signals or Push Buttons:	Not inventoried
Traffic Data:	Pedestrian: Not available Bike: Not available Vehicle LOS (Year 2005): C
Signal Timing:	No pedestrian phasing exists.
Notes:	Despite the mixed land use, comprised of residential developments (Quail Valley and Colony Lakes) and commercial development (Midtown Shopping Center, Domino's Pizza, donut shop, etc.), no pedestrian facilities were observed at the intersection (crosswalks, curb ramps, pedestrian signals, push buttons, etc.). Since new development is being constructed and there is potential for pedestrian and bicycle trips, this intersection is recommended as a candidate for improvements.

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APPENDIX B: Study Area Photograph Log

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I. STUDY AREA PHOTOGRAPH LOG

The following photographs represent the existing conditions on roadways in the study area (see Section H of the Missouri City Pedestrian and Bicycle Plan).

A. STATE HIGHWAY (SH) 6

Crosswalks along Murphy Road and SH 6. Provides opportunity for safe bike/ped crossings.

View of open drainage ditch along the west side of SH 6. Currently designed does not accommodate bicycling.

Pedestrian signals at Colonial Lakes Drive and SH 6. Provides opportunity for safe bike/ped crossings.

Sidewalk along SH 6 ends near Colonial Lakes Drive. Provides opportunity to review sidewalk ordinances.

A. STATE HIGHWAY (SH) 6 (CONT)

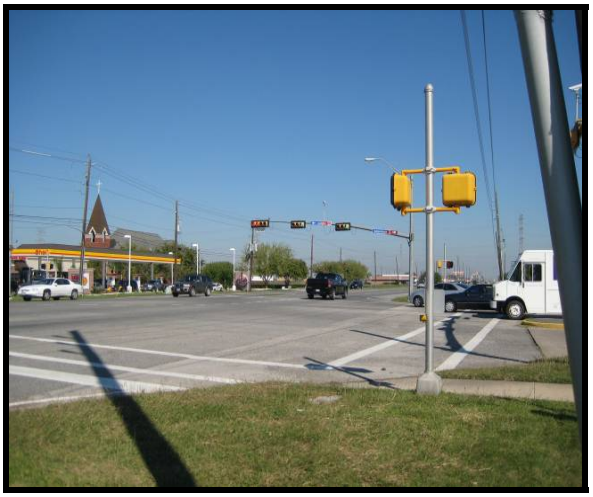
SH 6 is a high volume, high traffic roadway. SH 6 as currently designed does not accommodate bicycling.

SH 6 is a commercial corridor. Pedestrians can walk to nearby stores.

View of SH 6 cross section between Glenn Lakes Lane and Murphy Road.

New sidewalks along SH 6 are currently 6 feet wide. Connectivity allows pedestrians to walk to nearby stores.

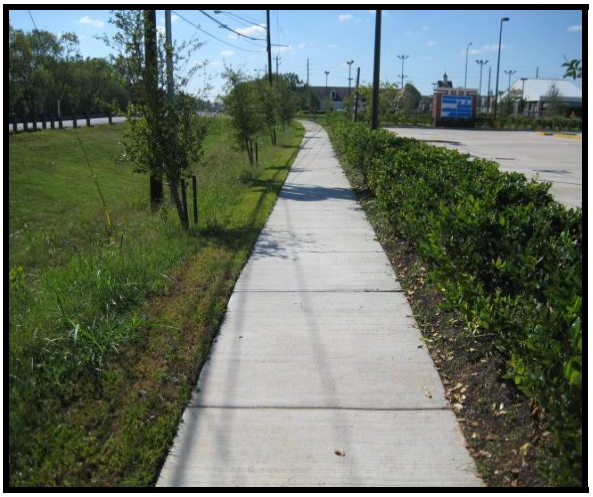
B. FM 1092 (MURPHY ROAD)



Crosswalks along Murphy Road and Lexington Boulevard. Provides opportunity for safe bike/ped crossings.

Discontinuous sidewalk along Murphy Road near Cartwright Road. Limited shoulder for bike path adjacent to travel lane.

Sidewalk along the east side of Murphy Road. Provides opportunity for future connectivity.



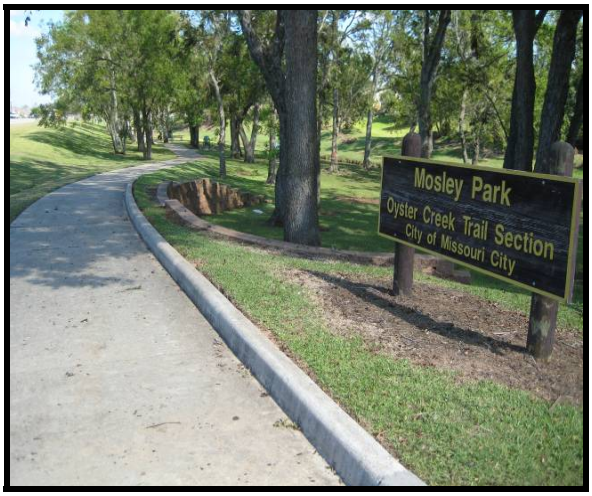
New sidewalk along Murphy Road.

B. FM 1092 (MURPHY ROAD) (CONT)

New sidewalk along Murphy Road does not connect with Oyster Creek Trail. Simple improvements can easily increase the conectivity of exisiting trails and sidewalks.

Oyster Creek Trail is 1.21 miles long and allows pedestrians and bicyclists to cross under Murphy Road. Proposed Phase II of the Oyster Creek Trail will connect existing sections of the trail system.

Oyster Creek Trail east of Murphy Road connects to Mosley Park.



Mosley Park is part of the Oyster Creek Trail System. It crosses Murphy Road, south of El Dorado Blvd.

C. FM 3345 (CARTWRIGHT ROAD)

Sidewalk along Cartwright Road near Texas Parkway. Sidewalks along Cartwright Road are continuous from Texas Parkway to Murphy Road.

Curb ramps and striping on Cartwright Road.

Continuous sidewalk along the south side of Cartwright Road accommodates pedestrians.

Utilities located along Cartwright Road, west of Valley Forest Drive.

C. FM 3345 (CARTWRIGHT ROAD) (CONT)

Current sidewalk near Valley Forest Drive intersection.

Pedestrian crossing Quail Valley East Drive.

Bicyclist crossing Quail Valley East Drive.

View of center median on Cartwright Road.

D. FM 2234 (TEXAS PARKWAY)

View of open drainage ditch along the east side of Texas Parkway. As currently designed, does not accommodate bicycling.

Entrance to Missouri City Civic Center and Municipal Buildings on Texas Parkway. Opportunity to connect community assets to pedestrian/bicycle infrastructure.

Missouri City Hall on Texas Parkway. Opportunity to connect community assets to pedestrian/bicycle infrastructure.

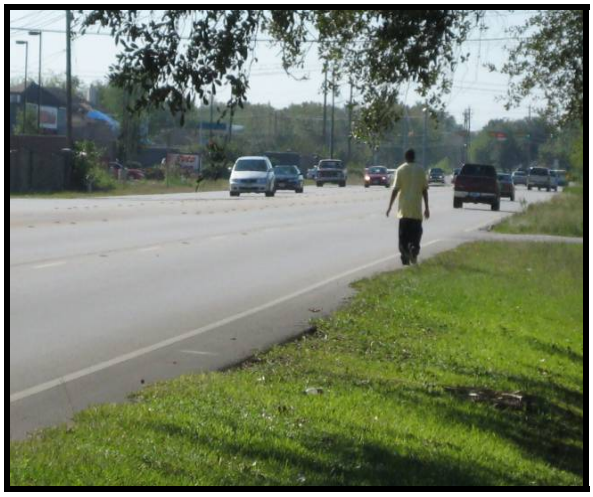
Existing sidewalk along Texas Parkway near Independence Boulevard. Texas Parkway as currently designed does not accommodate bicycling.

D. FM 2234 (TEXAS PARKWAY) (CONT)

Hunters Glen Park trail runs parallel to Texas Parkway between Independence Boulevard and Court Road. Opportunity to connect community assets to pedestrian/bicycle infrastructure.

Bicyclist using the sidewalk near Hunters Glen Park.

Sidewalk along Texas Parkway ends near Quail Trace. Provides opportunity to review sidewalk ordinances.



Pedestrian walking along Texas Parkway shoulder. Current design does not accommodate pedestrian/bicycle usage.

APPENDIX C: Pedestrian & Bicycle Crash Analysis

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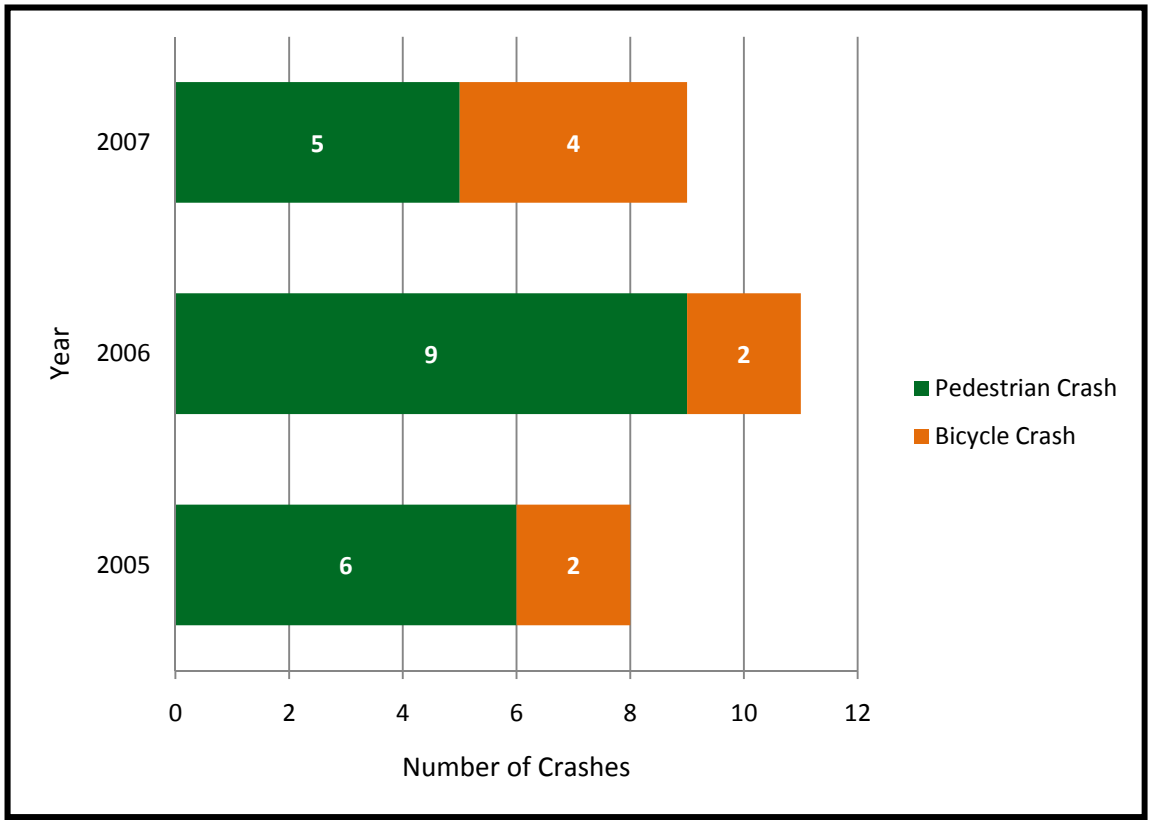
I. PEDESTRIAN AND BICYCLE CRASH ANALYSIS

A. INTRODUCTION

The Houston-Galveston Area Council (H-GAC) requested pedestrian and bicyclists crash data for the most recent three consecutive years available (2005-2007). Summaries of the information obtained from the H-GAC crash data and crash locations are illustrated here.

There were 32 reported crashes involving bicyclists or pedestrians (33 individuals in total) between 2005 and 2007 in Missouri City (**Figure 1**). However, four (4) pedestrian crashes were excluded from the data due to contributing circumstances (e.g., result of criminal activity, crashes into buildings/houses from the roadway, and suicide). Of the remaining crashes, eight (8) crashes involved bicyclists and 20 involved pedestrians.

Figure 1: Pedestrian and Bicycle Crashes by Year



The crash data received did not contain the necessary data to perform analysis using the Federal Highway Administration (FHWA) Pedestrian and Bicycle Crash Analysis Tool (PBCAT). However, the crashes are detailed in this summary by crash type and location using the data available.

II. DATA COLLECTED

A. CRASH TYPE

A review of the crash types was performed to investigate the conditions, travel behavior, and characteristics involved in the pedestrian and bicycle crashes. Crash type data can assist in determining appropriate countermeasures and educational approaches to address the conditions under which the crashes are occurring.

Pedestrian crossing at FM 3345 and Quail Valley East Dr.

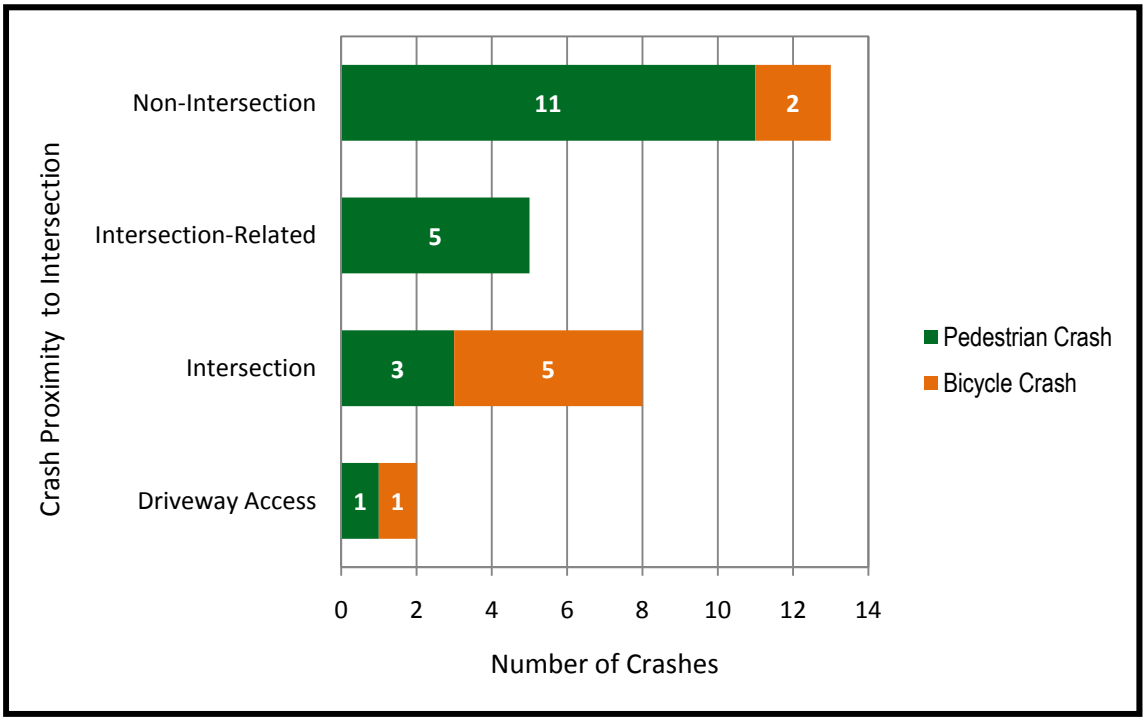
B. CRASH PROXIMITY TO AN INTERSECTION

More than half of the reported pedestrian and bicycle crashes (15) were not at an intersection or intersection-related[1] (**Figure 2**). However, five (5) of the eight (8) reported bicycle crashes occurred at an intersection.

Bicyclist traveling south on Murphy Road

[1] Crash data definitions are based on Texas Department of Transportation Annual Motor Vehicle Crash Data Report Definitions: http://www.txdot.gov/txdot_library/publications/citizen/drivers_vehicles/crash_statistics/default.htm

Figure 2: Crash Proximity to an Intersection, 2005 – 2007



The table below details crash proximity to an intersection by year:

Proximity to Intersection	Year		
	2005	2006	2007
Driveway Access	1	1	1
Intersection	2	4	2
Intersection-Related	2	2	1
Non-Intersection	4	6	6

C. CRASH SEVERITY OVER THE 3-YEAR PERIOD

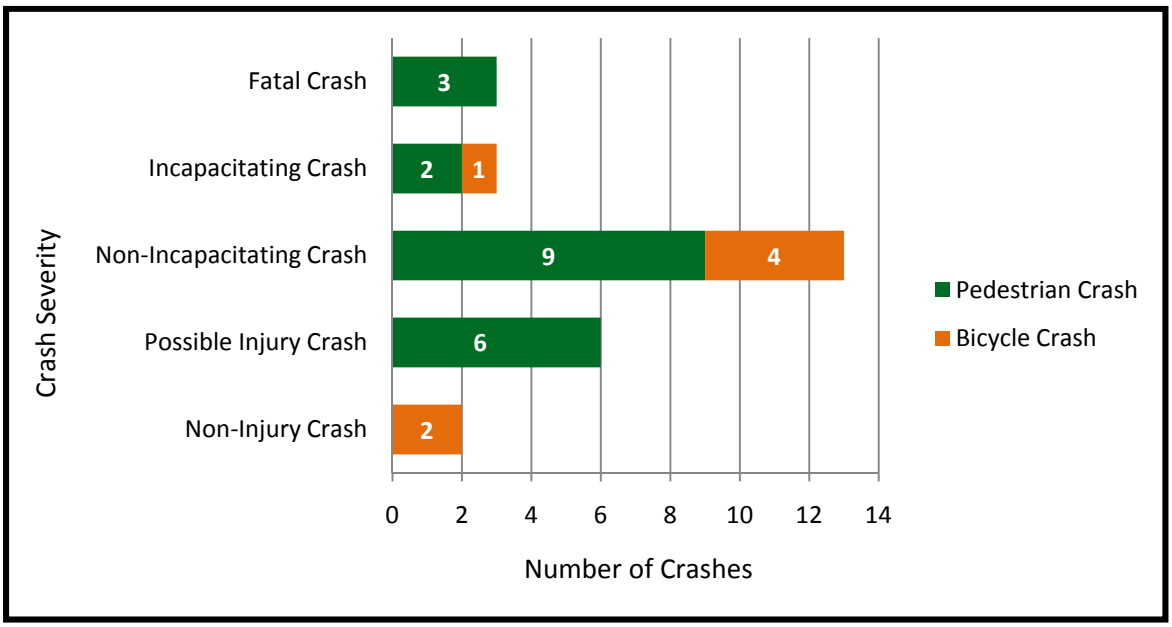
Crash severity describes the most severe injury sustained by a victim of a reported crash. There are five (5) categories of severity, per the Texas Department of Transportation (TxDOT) crash report definitions, represented in the crash data for Missouri City, which are as follows:

- **Fatal Crash/Injury** - Any injury crash that results in one or more fatal injuries;
- **Incapacitating Crash** - A crash in which the most severe injury sustained was an incapacitating injury (i.e., injury which prevents a person from walking, driving, or continuing normal activities);

- **Non-Incapacitating** - A crash in which the most severe injury sustained was a non-incapacitating injury;
- **Possible injury** - A crash in which the most severe injury sustained was a possible injury; and
- **Non Injury** - Any motor vehicle crash other than an injury crash.

There were three (3) fatalities resulting from the reported pedestrian and bicycle crashes (**Figure 3**). All of the fatal crashes involved pedestrians. Reported bicycle crashes most often resulted in non-incapacitating injuries.

Figure 3: Crash Severities, 2005 - 2007



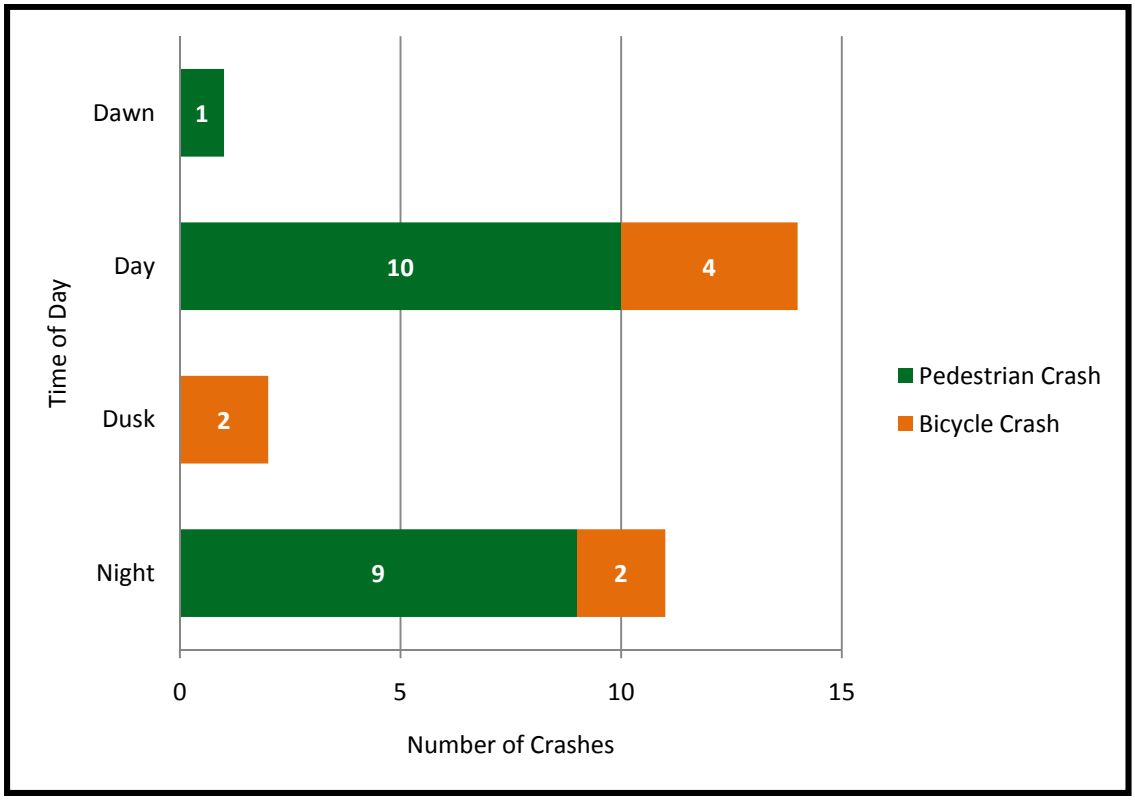
The table below details crash severity for reported crashes by year.

Crash Severity	Year		
	2005	2006	2007
Fatal Crash	0	3	0
Incapacitating Crash	2	1	1
Non-Incapacitating Crash	4	4	5
Possible Injury Crash	3	3	0
Non-Injury Crash	0	0	1

D. TIME OF DAY

Fourteen (14) of the reported crashes occurred during the day, and 11 crashes occurred at night (**Figure 4**). Among crashes occurring at night, data indicate that eight (8) of the crashes occurred where lighting was present.

Figure 4: Crash Occurrence Time of Day, 2005 - 2007



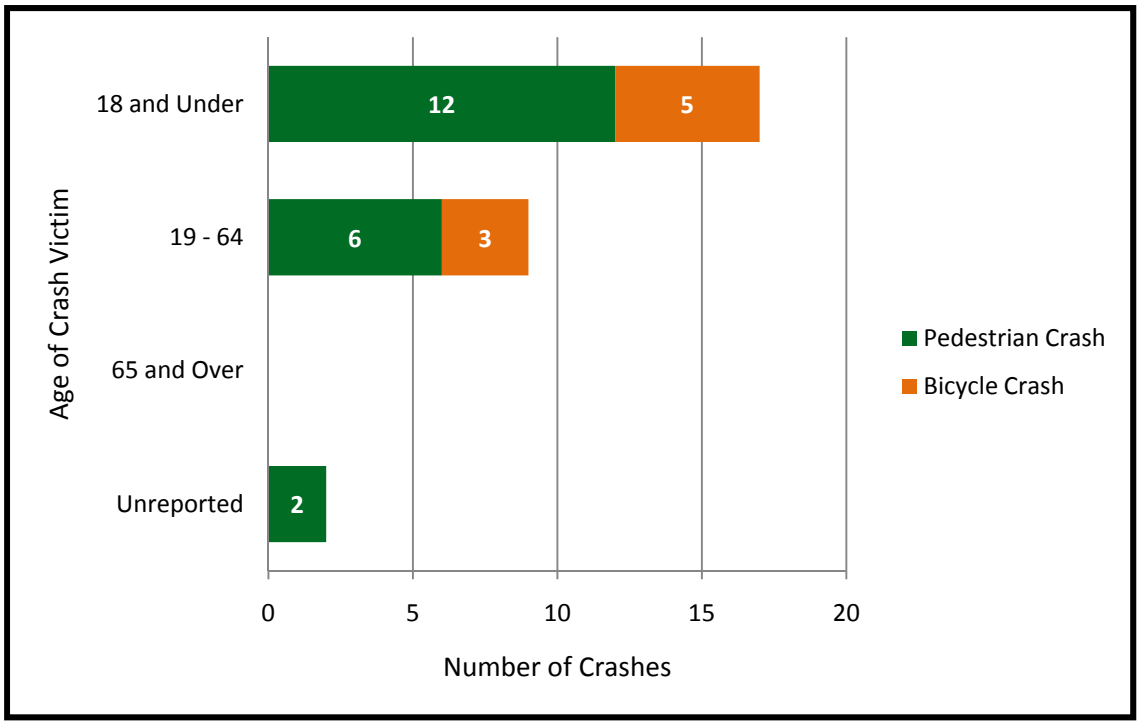
There was an increase of crashes that occurred at night in 2006 as compared to 2005 and 2007, as detailed in the table below.

Crash Occurrence Time of Day	Year		
	2005	2006	2007
Dawn	1	0	0
Day	5	5	4
Dusk	0	0	2
Night	2	6	3

E. AGE OF CRASH VICTIM

Among the pedestrians and bicyclists involved in the reported crashes, more than half (17) were 18 years old and under (**Figure 5**).

Figure 5: Age of Pedestrian and Bicycle Crash Victims, 2005 - 2007

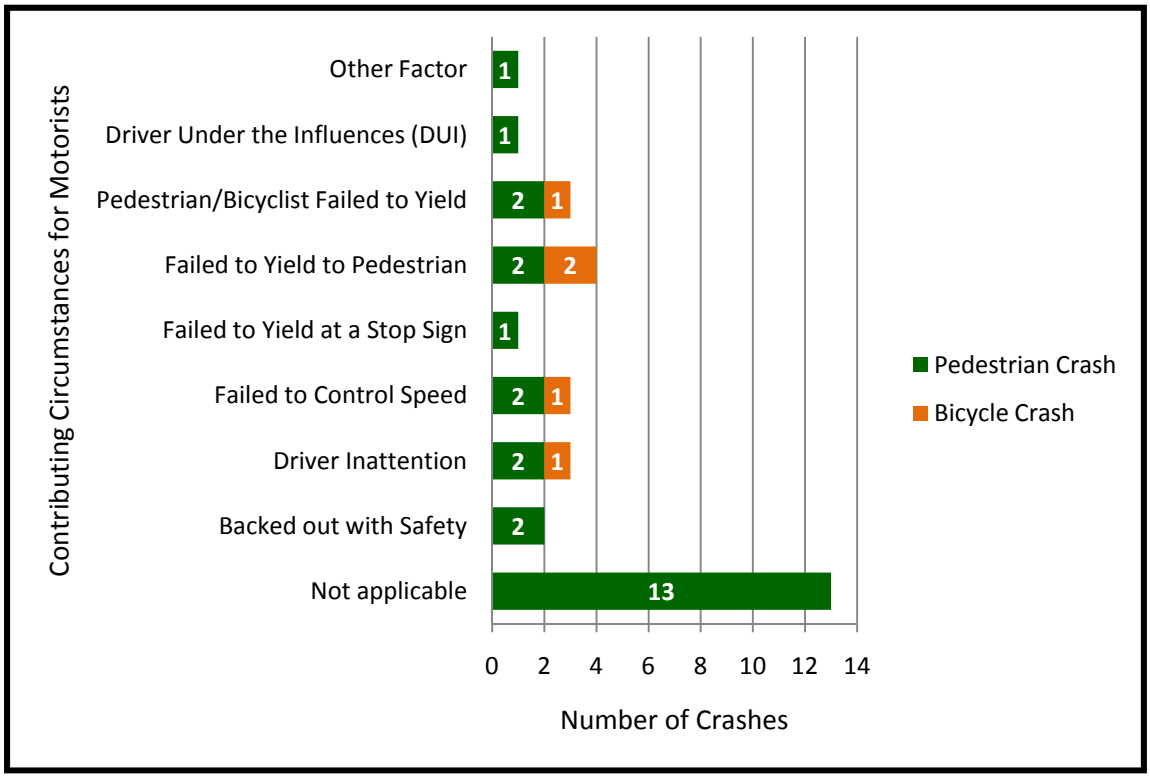


Age of Pedestrian and Bicycle Crash Victims	Year		
	2005	2006	2007
18 and Under	7	5	5
19 - 64	2	4	3
65 and Over	0	0	0
Unreported	0	1	1

F. CONTRIBUTING CIRCUMSTANCES

Information on contributing factors for the motorists involved in the crashes was reported in the crash data. The data indicate that the crashes occurred under multiple circumstances; although in nearly 13 of the crashes, contributing factors were reported as not applicable (**Figure 6**).

Figure 6: Contributing Circumstances for Motorists in the Crashes, 2005 - 2007



As a final note on crash circumstances, it was reported that seven (7) of the eight (8) bicyclists were not wearing a helmet during the time of the crash.

G. CRASH LOCATION

Reported pedestrian and bicycle crashes were mapped based on data provided. One (1) of the 28 reported crashes could not be mapped due to georeferencing limitations in the crash data. The unmapped crash occurred on State Highway 6 (SH 6). Additionally, the following two (2) crashes occurred outside of the Crash Map area:

Roadway	Date	Crash Type	Severity
Sienna Parkway	06/14/2005	Bicycle Crash	Possible Injury
Ruppstock Road	08/22/2006	Bicycle Crash	Possible Injury

Crash locations are illustrated in **Figure 7**, Missouri City Pedestrian and Bicycle Crash Map.

H. STUDY AREA ROADWAY CRASHES

There were six (6) crashes that occurred on either SH 6, FM 1092 (Murphy Road), FM 3345 (Cartwright Road) or FM 2234 (Texas Parkway). One (1) reported pedestrian crash occurred

along SH 6. There were two (2) pedestrian crashes along Murphy Road and with both resulting in fatalities. Along Cartwright Road, there was only one (1) reported crash, which resulted in an incapacitating injury to a bicyclist. For Texas Parkway, there were two (2) crashes reported: one (1) involving a pedestrian and the other involving a bicyclist. The pedestrian crash resulted in an incapacitating injury while the bicycle crash resulted in a non-incapacitating injury.

I. SCHOOL AREA CRASHES

Crashes were reviewed for their relative proximity to schools in the Study Area. There were a total of 11 crashes within a ½ mile of a school, four (4) of which occurred along study roadways: two (2) on Murphy Road and two (2) on Texas Parkway. Eight (8) of these crashes involved victims who were 18 years or younger.

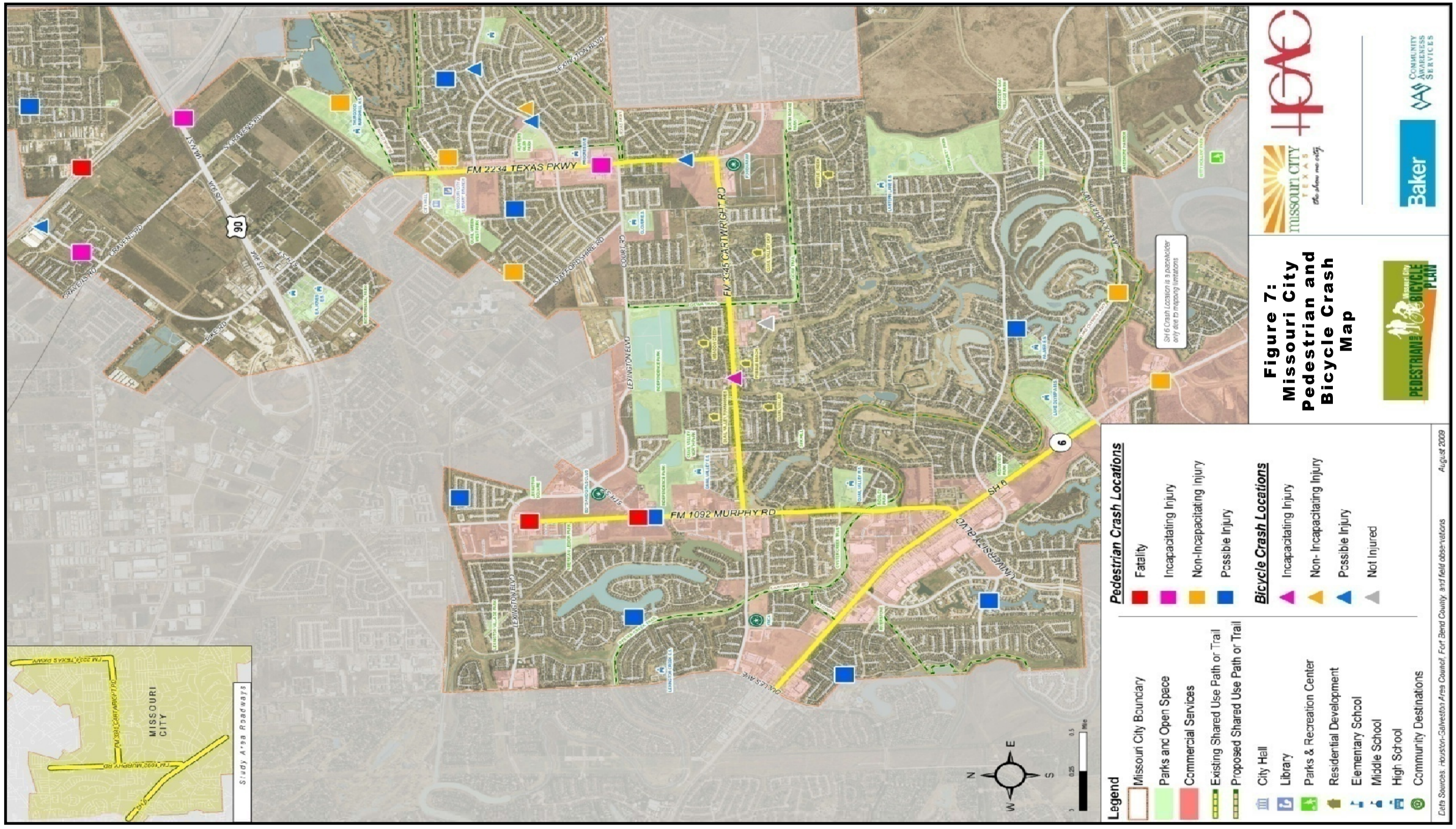
The crashes in the vicinity of the schools involved seven (7) pedestrians and five (5) bicyclists. One (1) crash resulted in a pedestrian fatality.

J. NEIGHBORHOOD AND CORRIDOR CRASHES

The remaining crashes were categorized as neighborhood or corridor crashes. Neighborhood crashes involve crashes that occurred away from a major roadway within residential developments. There were nine (9) neighborhood crashes, which included seven (7) pedestrians and two (2) bicyclists. There were no fatal crashes among the neighborhood crashes; however, there was one (1) incapacitating injury. The remaining crashes were either possible injury or non-injury incidents. All neighborhood crashes involved pedestrians and bicyclists between the ages of 19 and 65.

There was one (1) corridor crash, which occurred along the Sam Houston Tollway (Beltway 8). This crash involved a motorist and a pedestrian, and resulted in a pedestrian fatality.

Crash location and type can be viewed in **Figure 7** below.


FM 2234 TEXAS PKWY
FM 1092 MURPHY RD
FM 2351 CASTLEWRIGHT RD
SH 6
LEXINGTON BLVD
COURTLAND DR
STAFFORDSHIRE RD
GRAVES RD
KEGANS RD
OAKLESS AVE
CANTERBURY HILL DR
Study Area Roadways
MISSOURI CITY
Legend
Missouri City Boundary
Parks and Open Space
Commercial Services
Existing Shared Use Path or Trail
Proposed Shared Use Path or Trail
City Hall
Library
Parks & Recreation Center
Residential Development
Elementary School
Middle School
High School
Community Destinations
Pedestrian Crash Locations
Fatality
Incapacitating Injury
Non-Incapacitating Injury
Possible Injury
Bicycle Crash Locations
Incapacitating Injury
Non- Incapacitating Injury
Possible Injury
Not Injured
Data Sources: Houston-Galveston Area Council, Fort Bend County, and field observations
August 2009
SH 6 Crash Location is a potential error due to mapping limitations
Figure 7:
Missouri City
Pedestrian and
Bicycle Crash
Map
missouri city
TEXAS
the show me city
Community
Awareness
Services
Baker

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APPENDIX D: Online Survey Results Summary

Online Survey: April 21, 2009 to June 5, 2009

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I. EXECUTIVE SUMMARY

To assist in identifying and confirming issues relating to pedestrian and bicycle access, mobility and safety in Missouri City, as part of the Pedestrian and Bicycle Plan, an online survey was designed and administered to the community. The goal of the survey was to measure habits, opinions, and attitudes regarding bicycling and walking in the Study Area[1], Missouri City, and region. The survey addressed the following primary issues:

- **The availability and condition of bicycle facilities;**
- **The availability and condition of pedestrian facilities; and**
- **The availability of crosswalks and pedestrian signals at signalized intersections.**

A link to the survey was posted on Missouri City's website and a press release was used to promote the survey to a wider audience. The survey was accessible online from April 21, 2009 through June 5, 2009, and during that time, 210 responses were received. Over three-quarters (77%) of the respondents were residents of Missouri City. Addresses of Missouri City residents were requested in the survey and compared to the Study Area roadway network to determine what percentage resides within the Study Area. Approximately eighty-five percent (85%) live within the Study Area.

Over half of the survey respondents travel by motor vehicle on the Study Area roadways on a frequent basis. SH 6 is the most frequently traveled by motor vehicle by respondents (92%), followed by Murphy Road (83%), Cartwright Road (68%), and Texas Parkway (58%).

The majority of respondents feel that bicycle facilities in terms of their presence and condition in Missouri City are not satisfactory. Conversely, the majority of respondents felt that pedestrian facilities were satisfactory.

Several comments regarding bicycling and walking arose repeatedly in the open comment section.

- **Sidewalks** are not connected, or do not exist, along portions of the Study Area roadways and in adjacent neighborhoods. Survey respondents would like to see sidewalks installed and the sidewalk network improved.
- **Survey respondents** feel that an education campaign regarding state laws and road safety would benefit motorists, bicyclists, and pedestrians.

[1] The Study Area includes SH 6, FM 1092 (Murphy Road), FM 3345 (Cartwright Road), and FM 2234 (Texas Parkway).

- **Several respondents** have a desire for their children to walk or bike to school, but feel facilities are not adequate.
- **Several respondents** desire additional off road paths and trails for walking and biking.
- **Trails** connecting to adjacent communities are desired.
- **Designated, signed** bicycle routes and lanes are desired.

II. INTRODUCTION

Online surveys offer several advantages over traditional survey methods (e.g., paper, telephone). They are quick and easy to design, administer, complete, and monitor. The survey administrator has the ability to view the survey results on a daily basis, and if a specific question or set of questions causes confusion to participants, the survey can be easily manipulated to clarify the question. Online surveys are also cost effective when compared to traditional survey methods.

The Missouri City online survey was designed to take approximately 10 to 15 minutes to complete. The majority of questions were designed in multiple-choice format to maximize the responses. Respondents were provided an opportunity at the end of the survey to provide general comments in an open-end format. A link to the survey was posted on the Missouri City website and was accessible online for approximately a month through www.surveymonkey.com. The survey was administered to obtain the following information:

- **The extent to which survey respondents travel the Study Area roadways;**
- **Presence and condition of pedestrian and bicycle facilities;**
- **Perceived safety regarding pedestrian and bicycle travel;**
- **The extent to which survey respondents travel by biking or walking; and**
- **Improvements that might encourage respondents to bike or walk more often.**

To manage the data and process the results, the raw survey data were downloaded from www.surveymonkey.com and imported into Microsoft Excel for analysis. Data were then analyzed using two different reporting methods: frequency tables and cross tabulations. Frequency tables provide statistics on cumulative percents. Cross tabulations analyze the data by comparing variables in one pre-defined set to variables in another. For example, one could cross tabulate the rating assigned by a respondent for the condition of shoulders, by the community in which the respondent resides to obtain facility information for that specific community, in this case Missouri City.

III. SURVEY RESULTS

A total of 210 responses were received from the online survey. Over three-quarters (77%) of the respondents are residents of Missouri City, while thirteen percent (13%) live in an adjacent community. Approximately eighty-five percent (85%) of Missouri City residents live within the Study Area, based on addresses received from survey respondents.

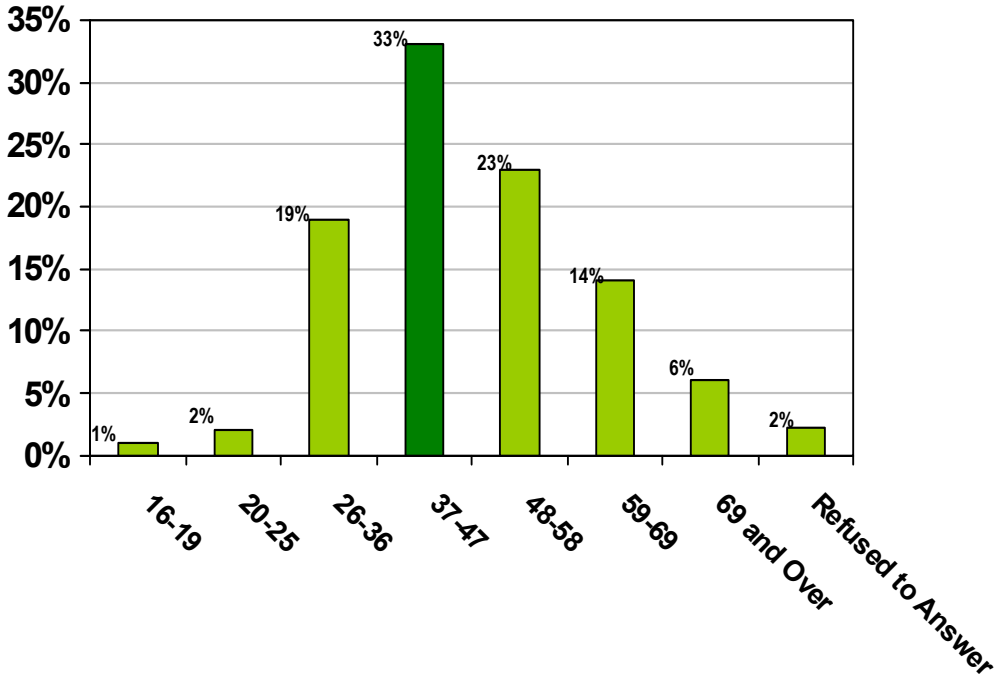
A. TRAVEL CHARACTERISTICS

The survey asked how many times in the past month a respondent has traveled to, or through, Missouri City. Fifty-one percent (51%) of those who answered the question (25 out of 49), traveled to, or through, Missouri City on a daily basis. The primary purpose of trips to, or through, Missouri City was work or work-related (66%).

B. DEMOGRAPHICS

Fifty-five percent (55%) of respondents were male. Respondents' ages ranged from 16 to 69 and older, with the "37-47" age category accounting for over 30% of respondents (see **Figure 1**).

Figure 1: Age



C. VEHICLE/BICYCLE OWNERSHIP

Over half (56%) of respondents have two (2) motor vehicles residing at their household, while seventy-seven percent (77%) own a bicycle in working condition.

D. BICYCLE CLUBS/ORGANIZATIONS

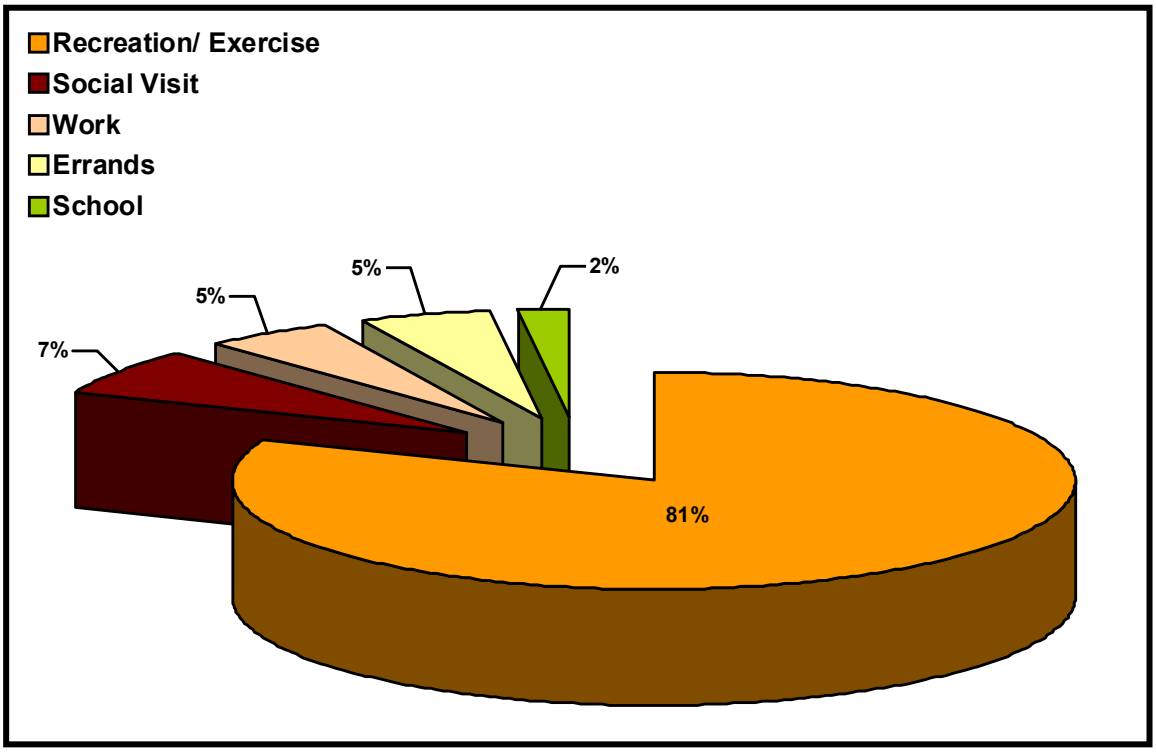
Respondents were asked early in the survey if they are a member of a bicycle club or organization. Seventeen percent (17%) of respondents (number = 32) are currently members of bicycle clubs, while eighty-three percent (83%) are not members. Ten of the 32 respondents are members of the Southwest Cycling Club, and five of the 32 respondents are members of Sugar Cycles.

E. BICYCLE TRIPS

Sixty-one percent (61%) of respondents made a trip by bicycle in the month prior to answering the survey. Of those respondents who made a trip by bike in the past month, seventy-six percent (76%) also made a bicycle trip in the week prior to answering the survey.

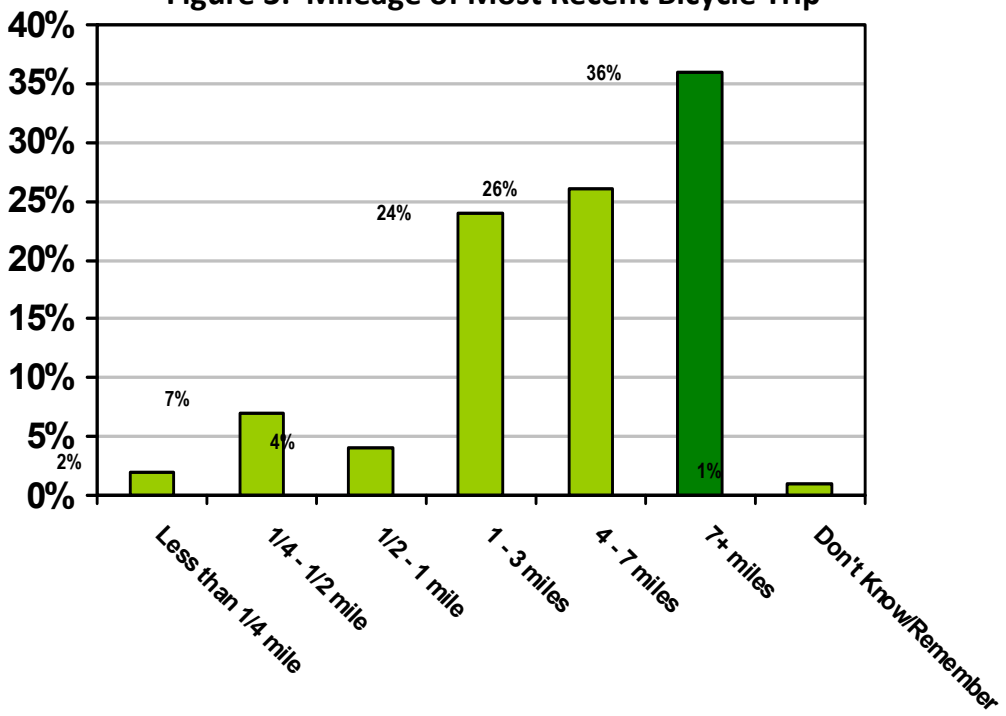
Bicyclists were asked the primary purpose of their most recent bicycle trip. Eighty-one percent (81%) stated that recreation and/or exercise was the primary purpose, while seven percent (7%) were on a social visit, five percent (5%) commuted to work, five percent (5%) traveled for errands, and two percent (2%) commuted to school. **Figure 2** illustrates the results.

Figure 2: Bicycle Trip Purpose



When asked if their most recent bicycle trip involved travel to a transit stop and/or transit station, a mere three percent (3%) responded "Yes." Respondents were also asked about the mileage of their most recent bicycle trip (roundtrip). Thirty-six percent (36%) traveled seven (7) miles or more for their most recent bicycle trip, while twenty-six percent (26%) traveled four (4) to seven (7) miles, twenty-four percent (24%) traveled one (1) to three (3) miles, seven percent (7%) traveled ¼ mile to a ½ mile, four percent (4%) traveled ½ mile to one (1) mile, and two percent (2%) traveled less than ¼ mile. **Figure 3** illustrates the results.

Figure 3: Mileage of Most Recent Bicycle Trip



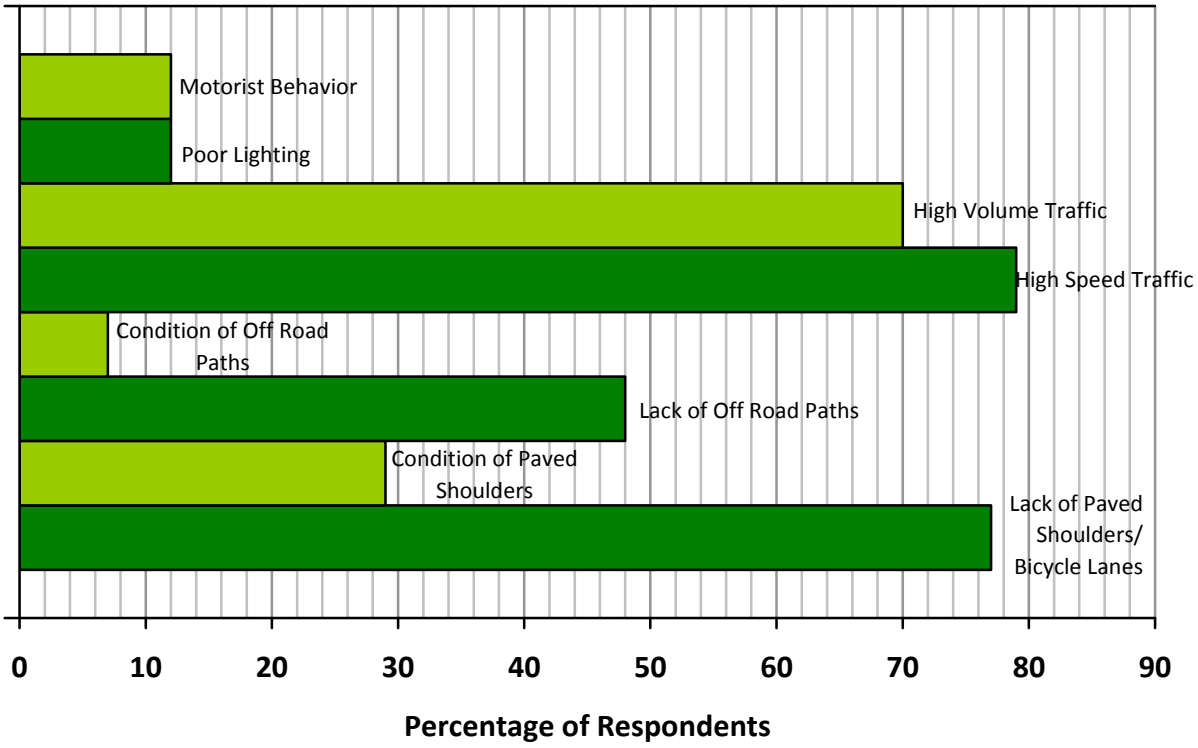
The majority of bicyclists surveyed (92%), traveled on road for at least a portion of their trip, most sharing a travel lane with motor vehicles (82%).

Bicyclists were asked if their most recent bicycle trip was entirely within, or consisted of traveling through a portion of, Missouri City. Seventy-eight percent (78%) traveled through Missouri City for their most recent trip by bicycle. Of those who traveled through Missouri City, forty-nine percent (49%) traveled on Cartwright Road for at least a portion of their trip, while forty-two percent (42%) traveled on SH 6, twenty-seven (27%) traveled on Texas Parkway, and twenty-six percent (26%) traveled on Murphy Road.

Bicyclists were asked if they felt safe making their most recent bicycle trip and if they did not feel safe, what contributed to this feeling. Sixteen percent (16%) of the bicyclists surveyed felt "completely safe" making their most recent bicycle trip, while thirty-six percent (36%) felt "somewhat safe," twenty-eight percent (28%) felt "somewhat unsafe" and twenty percent

(20%) did not feel safe at all. Contributing to the unsafe feeling was high speed motor vehicle traffic (79%), a lack of paved shoulders/bicycle lanes (77%), high volume motor vehicle traffic (70%), lack of off road paths (48%), condition of paved shoulders (29%), poor lighting (12%), motorist behavior and/or disregard (specified in "Other" category at 12%) and the condition of off road paths (7%). **Figure 4** illustrates the results.

Figure 4: Reasons for Feeling "Unsafe" on Recent Bicycle Trip



When asked what would encourage respondents to ride a bike, or ride more often, the top three answers were:

1) **More bicycle lanes;**
2) **More recreational trails and paths; and**
3) **Wide paved shoulders.**

Open-ended responses revealed that many respondents believe that bicycle signage (e.g., Share the Road), safer crossings at intersections, and driver education would encourage people to ride a bicycle more often.

F. WALKING TRIPS

To obtain information on the frequency of pedestrian trips, survey respondents were asked how many trips they had made by walking in the past week. Survey results show that three-

quarters of the respondents (75%) had traveled by walking the previous week. Of those who walked over the past week (i.e., pedestrians), nearly three-quarters (71%) had made a trip by walking in the past 24 hours.

Pedestrians were asked if their most recent trip was entirely within, or consisted of traveling through a portion of, Missouri City. Seventy-nine percent (79%) traveled through Missouri City for their most recent walking trip. Of those who traveled through Missouri City, fourteen percent (14%) traveled on Texas Parkway for at least a portion of their trip, while twelve percent (12%) traveled on SH 6, twelve percent (12%) traveled on Cartwright Road, and nine percent (9%) traveled on Murphy Road.

Pedestrians were then asked a series of questions regarding the frequency and adequacy of sidewalks and paved paths. Those results are illustrated in **Figures 5 through 8**.

Figure 5:
Was there sidewalk or a paved path available?

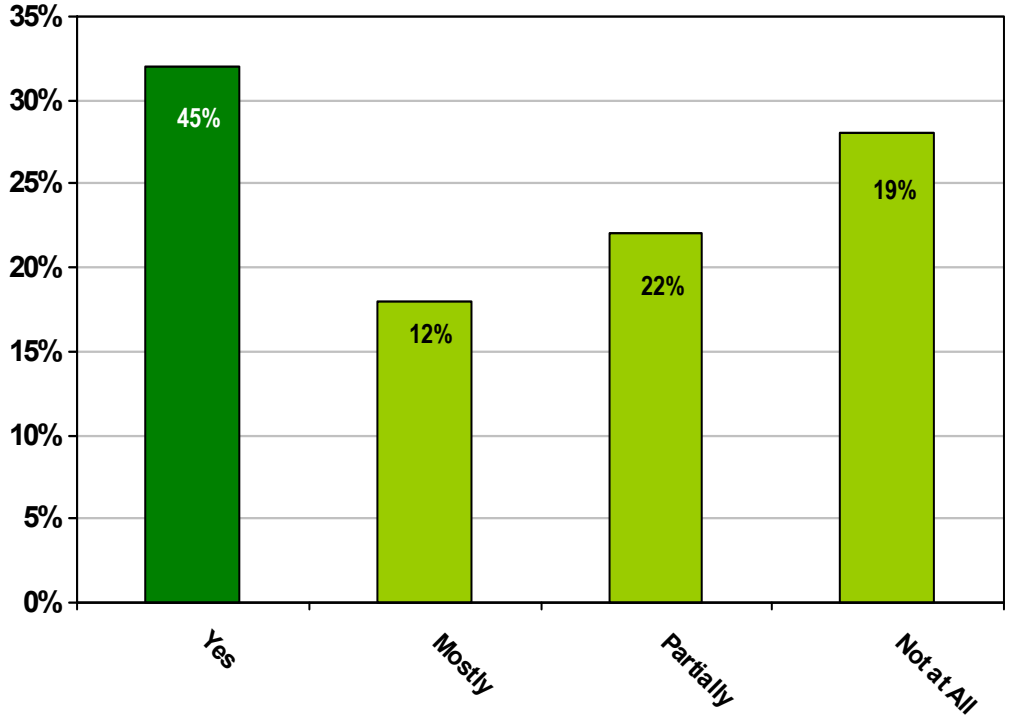


Figure 6:
If there was no sidewalk or path, did you…

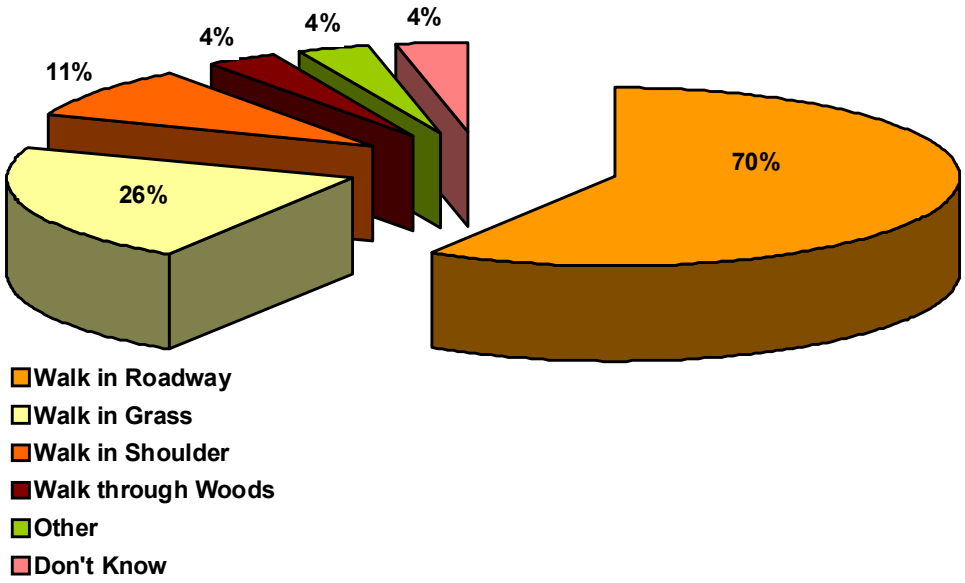


Figure 7:
What was the condition of the sidewalk/path?

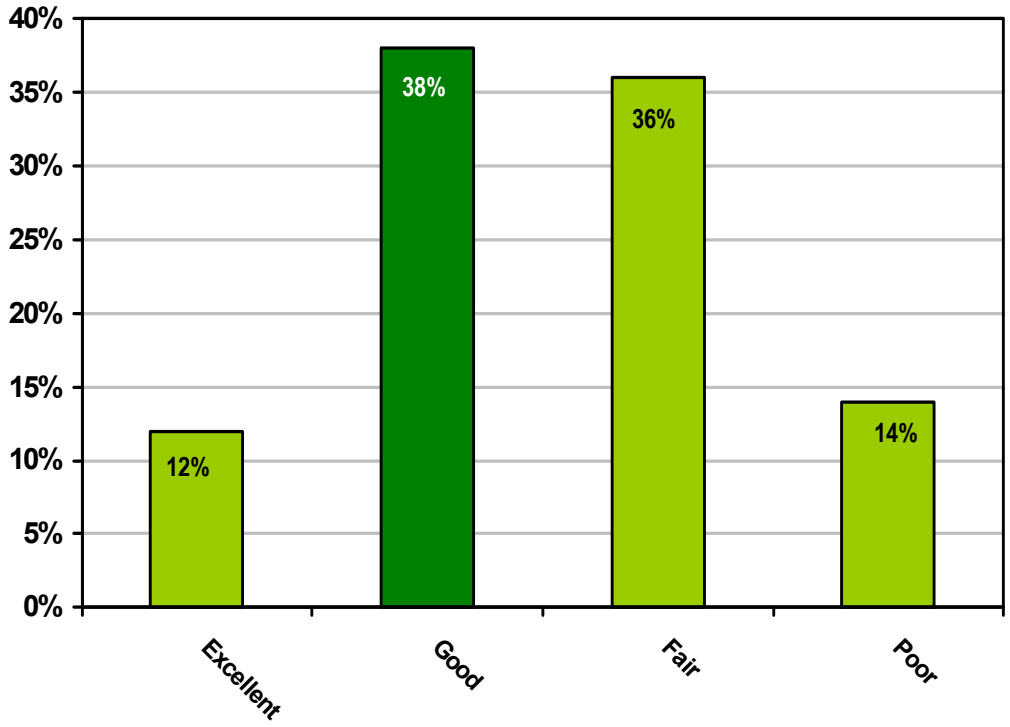
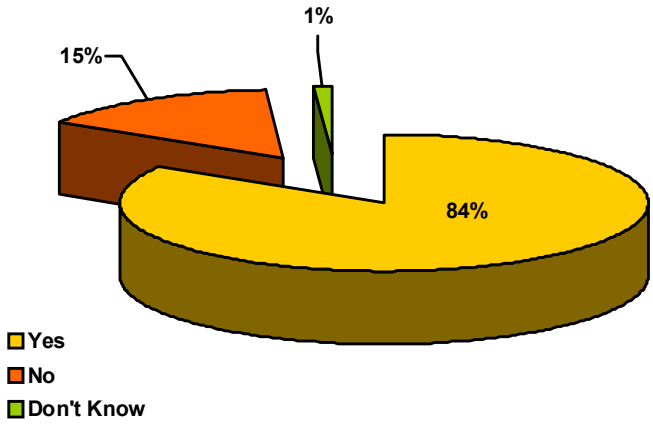


Figure 8:
Was the sidewalk/path of adequate width?



Pedestrians were asked if they felt safe making their most recent walking trip, and if they did not feel safe, what contributed to this feeling. Forty-two percent (42%) of the pedestrians surveyed felt "completely safe" making their most recent trip by walking, while thirty-five percent (35%) felt "somewhat safe," thirteen percent (13%) felt "somewhat unsafe," and nine percent (9%) did not feel safe at all. Contributing to the unsafe feeling was a lack of sidewalks/paved paths (77%), high-speed motor vehicle traffic (60%), high volume motor vehicle traffic (57%), poor lighting (33%), and personal safety and security (30%).

When asked what would encourage respondents to walk more often, the top three answers were:

1) **More or improved recreational trails and paths;**
2) **More or improved sidewalks; and**
3) **Improved pedestrian accommodation at intersections.**

G. COMMUNITY FACILITIES

Respondents were asked to rate the presence and condition of pedestrian and bicycle facilities in Missouri City. The rating scale included the following categories: Excellent, Good, Satisfactory, Not Satisfactory, Poor, Don't Exist, and Don't Know. **Table 1** summarizes the results of the bicycle facility ratings, while **Table 2** summarizes the results of the pedestrian facility ratings.

Table 1: Missouri City Bicycle Facility Ratings

	Excellent	Good	Satisfactory	Not Satisfactory	Poor	Don't Exist	Don't Know
Presence of Shoulders	2%	12%	21%	**28%**	15%	10%	12%
Condition of Shoulders	2%	16%	18%	**25%**	18%	7%	14%
Presence of Off Road Paths	1%	1%	19%	**25%**	20%	14%	20%
Condition of Off Road Paths	2%	8%	18%	16%	15%	17%	**24%**
Presence of Bicycle Signage	1%	1%	4%	19%	15%	**40%**	20%
Presence of Bicycle Racks	1%	1%	3%	15%	18%	**34%**	28%
Capacity of Bicycle Racks	1%	2%	4%	11%	14%	32%	**36%**

Table 2: Missouri City Pedestrian Facility Ratings

	Excellent	Good	Satisfactory	Not Satisfactory	Poor	Don't Exist	Don't Know
Presence of Sidewalks	4%	19%	**28%**	22%	13%	7%	7%
Condition of Sidewalks	1%	17%	**39%**	18%	11%	7%	7%
Presence of Curb Ramps	3%	21%	**35%**	16%	3%	6%	16%
Condition of Curb Ramps	3%	21%	**37%**	12%	4%	6%	17%
Presence of Crosswalks at Signalized Intersections	5%	18%	**32%**	19%	9%	4%	13%
Presence of Pedestrian Signals at Signalized Intersections	4%	15%	**28%**	21%	8%	8%	16%
Presence of Warning Signs/Crosswalks near Schools	10%	21%	**36%**	10%	5%	5%	13%
Presence of Pathways	1%	9%	24%	**30%**	14%	7%	15%
Condition of Pathways	3%	17%	**27%**	15%	11%	7%	20%

To supplement the data obtained from **Tables 1 and 2**, respondents were asked if there are locations in the Study Area, where it is "difficult or uncomfortable to cross the road." Seventy-two percent (72%) of respondents stated that there are locations in the Study Area where it is difficult to cross the roadway. Of those who responded, sixty-seven percent (67%) identified specific locations. The top three intersections identified as being difficult or uncomfortable to cross were:

1) **SH 6 and Murphy Road;**
2) **Murphy Road and Cartwright Road; and**
3) **SH 6 and Glenn Lakes Lane.**

Respondents were asked as a final question, "are there locations where you live (any roadway), where it is difficult or uncomfortable to cross?" Approximately sixty-five percent (65%) of respondents state that there are locations where they live where it is difficult or uncomfortable to cross the roadway. Of those who responded "Yes," fifty-nine percent (59%) provided a location. The top three identified locations were along the following roadways:

1) **Turtle Creek Drive;**
2) **Hampton Drive; and**
3) **Grand Parkway.**

H. ADDITIONAL COMMENTS

At the end of the survey, respondents were given the opportunity to provide additional comments regarding walking and bicycling in Missouri City. Over 100 comments were received providing great detail about issues and improvements needed. Comments were sorted into the following four (4) categories: Bicycle Facilities, Pedestrian Facilities, Trail Network, and General Comments. The following is a summary of comments and a selection of quotes by category:

- **Bicycle Facilities:** Approximately eighteen (18) comments referenced the need for additional and/or improved bicycle facilities specifically, including designated bicycle lanes, signed bicycle routes, bicycle paths, and bicycle racks.
  - "There needs to be more bike lanes in the Sugar Land/ Missouri City area. With as developed as it is, and as much traffic as it has, it would benefit to have alternate modes of transportation available."
  - "Please do not focus bicycling issues solely on mountain bikes and off road trails. Many people ride road bicycles for pleasure/recreation and commuting. The quality of existing roads is very important to road bicyclers. What is a small pot-hole or bump to cars can be very bad on bicycles."

- **Pedestrian Facilities:** Thirteen (13) comments specifically referenced the need for improved pedestrian facilities, including sidewalk installation and repair.
  - "Need to put sidewalks on Texas Parkway."
  - "Adding and maintaining sidewalks along FM 2234 and Murphy Rd. would improve the quality of life and increase property values for residents."
- **Trail Network:** Twenty-two (22) comments were related to the installation of new pedestrian and bicycle trails and pathways.
  - "Bike/walking path from YMCA to near Hampton is great. Need to expand and connect paths within City and possibility connect up with City of Sugarland."
  - "Walk/bike paths with green spaces would add to the appeal of the neighborhood and attract young families."
  - "How much trouble would it be to build an off-road paved trail to Kitty Hollow Park?"
- **General Comments:** Several comments were received requesting that government officials encourage walking and bicycling, educate the motorist, increase personal safety, and improve overall conditions for pedestrian and bicycle travel.
  - "Looking forward to seeing more resident-friendly walk ways and bicycle lanes."
  - "Glad you are working on it!"
  - "It would be wonderful to be able to walk out in the open I would feel safer than I do in the parks."
  - "Missouri City could be a great place for walking and bicycling if these modes were taken into consideration and accommodated in all projects."
  - "The biggest problem I had riding my bicycle in and around Missouri City on the roadways was uneducated motorist who felt bicycles do not belong on the road. These motorists intentionally scare the bicyclist by honking at them or driving to close to them. An awareness program would be nice and strict laws against endangering a bicyclist are needed."
  - "I was riding on the El Dorado course before it was closed for re-building. I really enjoyed it and hope we will be allowed to do so again in the future."
  - "I feel that more of FM 2234 should be included in the project. We pay Fort Bend taxes but do not get the improved pathway you are describing."

APPENDIX E: Feedback from Public Meeting & Charette

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Public Meeting

June 25, 2009

5:00 PM to 8:00 PM City of Missouri City,

City Hall Old Municipal Court Room

Comments from Feedback Form:

- "We live right off 2234 Road and witness constantly the need for sidewalks. This is so unsafe; we literally cringe when we encounter someone on the shoulder walking in either direction. The grocery store, Foodarama, is just around the corner, but walking to it is completely out of the question for us. We are seniors, not too slow, but not ready to run across the road to the other side. Another point is that we would rather walk a sidewalk on 2234 than in the neighborhood because of (wife's') fear of dogs. The neighborhood kids tend to have Pit bulls and some people just don't keep their dogs in their own yard."
- "I do appreciate this opportunity to participate in this. I am pleased to see that some attention is being given to the needs of the residents concerning mobility and availability to have safer walkways and streets for pedestrian safety. I am hopeful to further participate with the planning input and have the opportunity to express my views and concerns in an open meeting again. Lauretta on Hill 2314 River Valley Drive, Mo. City, TX. 281-499-0461."
- "Parts of Missouri City have been excluded. I feel we should include Dulles @ Cartwright and North of that! There is a YMCA and a school in the area. Furthermore, there is a HUGE population of walkers and bikers in this area, which include fire and police, Brightwater residents. If this area is managed by Sugarland, then lets figure out how to partner. Our trails should connect to their trails. No Silos."
- "I am very excited about the prospective plans. My concern is that a decision won't be made without the input of all Missouri City citizens. For me specifically, I want to see sidewalks on Texas Parkway in the identified areas. Most of Texas Parkway seems to have been overlooked, and I believe it should now be a priority. Please feel free to contact me! Leronia Boughton 2331 Quail Pl. Drive Missouri City, TX 77489 281-499-3732 LBoughton@earthlink.net (E-mail Address)."
- "I live in Quail Green West-to walk along 2234 to go to the Post Office feels very unsafe-please provide a wider shoulder – sidewalk there. Monika Burau 1651 Meadow Green Drive 281-499-6065."
- "As part of this bicycle/pedestrian network of three roads, the sidewalks, paths, etc. to the parks, green areas need to be included. Pedestrians/bicyclists want to ride in areas away from traffic and improving access to these areas will encourage usage, etc. I would expect you will have way higher traffic away from these three roads because of the desire to ride/walk in quieter areas. The park areas can then become shorter routes for those individuals who also want to use these paths for work or access to schools or retail establishments. Dennis Olheiser 281-499-7009."

- "It would be a safer neighborhood if there was room to walk and ride our bikes on the streets of Texas Parkway. Please consider. The presentation was a good "heads-up." I pray it goes through. Other cities around us are family friendly, so please make Missouri City the same."
- "Question #1-What is the status of walking and biking trails that were proposed through the Quail Valley Park? There are many residents and non-residents who enjoy the large tress and varied topography for biking who are currently endangering themselves by riding and walking on the streets. I also cringed when I saw a woman pushing a baby in a stroller on the side of the road in Quail Valley the other Day! No sidewalk there. Question #2- Please address safety issues for students who attend Quail Valley Elementary and wish to ride bikes to school and cross Cartwright at Quail Village Drive. Many kids live in Quail Valley. Can you have bike paths (off busy streets) through the Park so kids can exercise and maintain good health as well as get to school safely while crossing Cartwright Road? Question #3-Is it possible to safety ride a bike across Highway 6 at the target intersection of Murphy Road in your proposal so as to give bikers and pedestrians' access to business across Highway from Quail Valley? (A bridge across Highway 6)."
- "1. Share the road signs.
  2. Bike lanes.
  3. Community education and promotion.
  4. Keeping the roads/bike lanes free from hazardous objects (rocks, glass, metal, water).
  5. Law enforcement. I'm a member, past Vice President, past Treasurer, and currently assisting in a CPA capacity Southwest Cycling Club. I use many roads for cycling within Missouri City and Sugarland each day. I and my club would like to provide input regarding routes not included in your study, safety matters, etc. My contact information is above, please contact me so we can get together to participate. Some limited funding may be available as well. Cy Sanders, CPA 12705 S. Kirkwood, Suite 209 Stafford, Texas 77477 (281) 491-9100 Fax (281) 491-9119."
- "Install sidewalks and bicycle paths from Highway 90 to Fort Bend toll way along 2234. Nathan Lyles 1535 Autumn Dawn Ct. Missouri City 77489 281-438-0743."
- "1. Sidewalks exist on Highway 6 that do NOT connect to North of Highway 6 that includes the Colonies, Quail Valley, and Lake Olympia.
  2. I hope you make your recommendations strong, because MC Council has a history of ignoring this issue, especially on 2234.
  3. Aesthetics need to be part of this-or people will not use them. This is a low expense often neglected."
- "1. Missouri City residents have been asked and asked about these issues. The only reason I bothered to attend was because H-GAC was involved. What happens is city staff listens, reports what we say, and then the council and Mayor table it or find another way to drag us out for another study.
  2. The trails stop at Quail Valley except for one token trail. There are intermittent sidewalks that cover only 1/3 of Quail Valley. Children from Quail Valley Middle School walk down the middle of El Dorado Blvd. to get home. There are narrow, dangerous sidewalks down Murphy Road.

Even though there is a county trail, there is no way to use it from West of 1092 except to go to Mosley Park by motor vehicle.

3. The city is redeveloping the golf course at Murphy Road to Cartwright yet did not follow its own sidewalk development ordinances or set up barriers for safety from stray golf balls.

4. Please provide % of sidewalks that exist to those needed on each road.

5. The Cartwright Texas Parkway study spent some recommendations on this. Are you aware of and have you read those recommendations?"

- "1. Quail Valley Elementary has a major population South of Cartwright but no real cross walks, sidewalks, or bicycle paths. To provide an example of how bad that is, the Quail Valley Dolphins lost their swimming pool that served 242 families in a summer swimming program. They are swimming at Meadowcreek, which is across Cartwright @ La Quinta. The Dolphins lost 50% of the kids 9-14 because parents were afraid for the kids to walk or ride bikes so they go south to Lake Olympia Pool – so you have split up friendships and a group that has been teaching kids to swim and compete for 37 years. 2. Senior citizens ride 4-wheel and 3-wheel scooters along the shoulders of Murphy Road and Highway 6. I see one gentleman at least once per week on Murphy Road and then West of sidewalks on Highway 6 going to Dulles."
- "On Texas Parkway, the need for sidewalks is great to make streets safer for bikes and pedestrian traffic. Missouri City is a great community in many ways, but the Texas Parkway, Cartwright Corridor is not pedestrian-friendly. Fewer park walks close to the back of safe walkways."
- "This is what I think we need: Extra wide, striped asphalt trials. Bike lanes along roadways need to be swept; otherwise, they are useless for bikes. An example is Highway 59 and University Blvd. Get more input from bike commuters (people that actually have to ride). Find a solution to the "sidewalks to nowhere" on FM 2234" (Gregg Vaupel, gvaupel@sbcglobal.net).
- "As a resident, cyclist, and walker, I think it is imperative that every road in Missouri City has a designated lane for cyclists."
- "Good presentation on findings. Sidewalks would provide safer walks to businesses. Provide safe pedestrian/motor sharing where feasible. Interested in Texas Parkway improvements, which is what I travel most."

Charrette

July 22, 2009

1:00 PM to 4:00 PM Missouri City

22nd Floor Conference Room, City Hall

Group Assessment Results

Group #	Locations	Reason
1	Texas Pkwy at Buffalo Run	Need to take into account mobility issues for ~2000 homes; People walking to the school, park, community center, library, fitness center
1	Texas Pkwy at Cartwright Rd	Intersection improvements; Foodarama is an activity center and mobility; Access to tennis center on Cypress Point Dr and new recreation facility (south side)
2	Texas Pkwy (FM 2234) Between Independence Blvd and Buffalo Run	No shoulders, bike lanes or crossing movements
2	Texas Pkwy from Buffalo Run to Cartwright Rd (FM 3345)	Bicycle and pedestrian concerns; Could promote economic development; Place for people to park and walk; Needs sidewalks
1	Texas Pkwy at Independence Blvd	Intersection improvements off access to Texas Pkwy and retail
2	Texas Pkwy at City Hall	Pedestrian access, connection to Hunters Glen Trail
1	Texas Pkwy from City Hall to 5th St	Need to access public facilities; Sidewalk and shoulders for bikers
1	Texas Pkwy from Cartwright Rd to Turtle Creek	Access to neighborhoods and the trail
1, 2	Texas Pkwy from Turtle Creek to Foodarama	People are walking with groceries with no sidewalks; Glenn lakes has striping for cars but no place for bikes; Community Park nearby; Need crosswalks at every intersection
2	Texas Pkwy between Buffalo Run and Hwy. 90	Non-bicycle compatible
1	Cartwright Rd at Colonial Lakes Dr and general study area	YMCA; Connect Brightwater Dr, Oyster Creek Trail, and Enclave neighborhood to Cartwright Rd; Pedestrian Bridge?
1	Cartwright Rd to Murphy Rd (FM 1092) to SH 6	Connectivity and access to retail and SH 6

Group #	Locations	Reason
1	Cartwright Rd	Widen sidewalks, ADA ramps, bikes on sidewalks, utility pole on sidewalks, fill in gaps
1	Cartwright Rd and Cypress Point Dr	City bought tennis center; Need connection to new recreation facility
1	Murphy Rd at Hampton Dr	Widen shoulder and bike through movements
1	Murphy Rd at 5th St	Maintenance for shoulder and bike through movements needed
1	Murphy Rd and Cartwright Rd	Roadway improvements scheduled for intersection moving south/east: Review ROW and capacity
2	Murphy Rd @ El Dorado	Work on signal timing for cyclists; Cross timing runs out of time
1, 2	Murphy Rd @ Oyster Creek Trail	Intersection issues; Pedestrian bridge?
1	SH6 to Dulles Ave	Retail and neighborhoods; Provide bicycle through movements
1	SH 6 to Lexington Blvd to Murphy Rd	Access/mobility needs; Churches, businesses and activity
2	SH 6@ Murphy Rd (FM 1092)	Intersection improvements needed; Have cross light but no crosswalks
2	SH 6 @ Lake Olympia Pkwy	No cross light
1, 2	SH 6 @ Glenn Lakes	Minor intersection compared to Murphy Rd; Needs pedestrian crossing
2	SH 6 to Cartwright Rd	Pedestrians walk in grass; Needs connection to Wal-Mart
2	SH 6 from Lake Olympia Pkwy to Murphy Rd	Need sidewalk connection and bicycle signage
2	SH 6 at Lake Olympia Pkwy	No cross light
1	Water Park @ Hunters Glen Park	Business center causes mobility concerns
1, 2	Alternative to Cartwright Rd: Court Rd btw. Columbia Blue to Waterfall Dr and entire portion of Lexington Blvd/ Court Rd	Pedestrian and bicyclists avoid roadway entirely or get through as quick as possible; possible E/W connector
2	Court Rd From Texas Pkwy to the Canal	Insufficient shoulder issue
2	Dulles Ave & Lake Olympia Pkwy; Cartwright Rd to Dulles Ave	Study area needs to be extended
1, 2	Entire study area	Make sidewalks wider than they currently are within the study area with ability to

Group #	Locations	Reason
		accommodate pedestrians, bicyclists and wheelchairs; “Share the Road” signs, MC website to show recommended bike routes; Bicycle and Pedestrian routes off main road routes and/or parallel roadway use for lower volumes/speeds; parking for residents to access trails; System (trails to sidewalks, bike paths to trails, etc) needs to connect overall
2	Off Road and/or parallel roadways	Lower volume/speeds to serve as bike/ped routes rather than study area roads with parking for trail access
2	Independence Blvd	Possible bike/ped corridor alternative

City of Missouri City
Pedestrian and Bicycle Study

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Question #1 - What is the status of walking & biking trails that were proposed through the Quail Valley Park? There are many residents and non-residents who enjoy the large trees and varied topography for biking who are currently endangering themselves by riding & walking on the streets. I ~~saw~~ cringed when I saw a women pushing a baby in stroller on the side of the road in Quail Valley the other day. No sidewalk there.

Question #2 - Please address safety issues for students who attend Quail Valley Elementary and wish to ride bikes to school and cross Cartwright at Quail Village Drive. Many kids live in Quail Valley. Can You have bike paths (off busy streets) through the Park so kids can exercise and maintain good [redacted] as well as get to school safely while crossing Cartwright Road.

(over)

missouri CITY TEXAS the show me city

H-GAC

Baker

Community Awareness Services

Question #3 Is it possible to safely ride a bike across Hwy 6 at the target intersection of Murphy raad in your proposal so as to give bikers and pedestrians access to business across Hwy from Quail Valley. (a bridge across Hwy 6)

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Olympia Pool - so you have split up friendships and a group that has been teaching kid to ~~Swim~~ swim and compete for 37 years.

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Lauretta Mc Hill 2314 River Valley Dr.
Mo. City, Tx 281-499-0461

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PARTS OF MISSOURI CITY have been excluded. I feel we should include Dulles & Cartwright. and North of that! There is a YMCA. and a School in the area. Furthermore, there is a HUGE population of walkers and bikers in this area, which include FIRE + Police, BRIGHTWATER Residents. IF THIS AREA IS MANAGED BY SUGARLAND THEN LETS FIGURE OUT HOW TO PARTNER. OUR TRAILS SHOULD CONNECT to their trails. No Sicos

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Leronia Boughton
2331 Quail Ridge Drive
Missouri City, TX 77489
281-499-3732 LBoughton@earthlink.net
email addres

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Pedestrian and Bicycle Study

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Monika Burau
1651 Meadow Green Dr.
281-499-6065

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AS PART OF THIS BICYCLE/PEDESTRIAN NETWORK OF THREE ROADS, THE SIDEWALKS PATHWAYS, ETC TO THE PARKS, GREEN [redacted] NEED TO BE INCLUDED. PEDESTRIANS/BICYCLISTS WANT TO RIDE IN AREAS AWAY FROM TRAFFIC AND IMPROVING ACCESS TO THESE AREAS WILL ENCOURAGE USAGE, ETC. I WOULD EXPECT YOU WILL HAVE WAY HIGHER TRAFFIC AWAY FROM THESE THREE ROADS BECAUSE OF THE DESIRE TO RIDE/WALK IN QUIETER AREAS. THE PARK AREAS CAN THEN BECOME SHORTER ROUTES FOR THOSE INDIVIDUALS WHO ALSO WANT TO USE THESE PATHS FOR WORK OR ACCESS TO SCHOOLS OR RETAIL ESTABLISHMENTS

DENNIS OLHEISER
281 499 7009

City of Missouri City
Pedestrian and Bicycle Study

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It would be a safer neighborhood if there was room to walk & ride our bikes on the Streets of Texas Parkway. Pls consider. The presentation was a great "Readup". I pray it goes through other Cities around us our family friendly so pls make Missouri City The Same

CY SANDERS, CPA

12705 S. Kirkwood, Suite 209 • Stafford, Texas 77477 • (281) 491-9100 • Fax (281) 491-9119

(1) Share the Road Signs

(2) Bike Lanes

(3) Community Education & Promotion

(4) Keeping the roads / bike lanes free from hazardous objects
- Rocks
- Glass
- metal
- water

(5) Law enforcement

I'm a member, past Vice President, past Treasurer & currently assisting in a CPA capacity Southwest Cycling Club. I use many roads for cycling within Mo. City & Sugar Land each day. I & my club would like to provide input regarding routes not included in your study, safety matters, etc.

My contact information is above, please contact me so we can get together to participate. Some limited funding may be available as well.

City of Missouri City
Pedestrian and Bicycle Study

FEEDBACK FORM

Public Information Open House
June 25, 2009
5:00 PM to 8:00 PM
City of Missouri City,
City Hall Old Municipal Court Room

FEEDBACK FORM

The following form is to record written comments by you the attendee regarding items presented and discussed at the Public Information Open House for the City of Missouri City Pedestrian and Bicycle Study. We would also your comments regarding bicycling and walking in Missouri City to assist us in identifying deficiencies and opportunities. Any and all comments provided on this form will be shared with H-GAC, Missouri City and the Baker Team (Baker and Community Awareness Services), and will be incorporated into future planning efforts for the study.

Install sidewalks and Bicycle Paths from HWY 90 to Fort Bend Tollway along 2234.

Nathan Eyles
1535 Autumn Breeze Ct
Mo City 77489
281-438-0743

City of Missouri City
Pedestrian and Bicycle Study

Missouri City PLAN

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1. Sidewalks exist on Hiway 6 that do Not connect to North of Hiway 6 that include the Colonies & Q Valley, & Lake Olympia.

2. I hope you make your recommendations strong, because ~~out~~ MC Council has a history of ignoring this issue espcially on 2234.

3. Aesthetics need to be part of this – or people will not use them. This is a low expense often neglected.

missouri CITY TEXAS the show me city

H-GAC

Baker | Community Awareness Services

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On TX Pkwy the need for sidewalks is great. To make streets safer for bikes and pedestrian traffic. Missouri City is a great Community in many ways but the TX Pkwy, Cartwright Corridor is not pedestrian-friendly. Fewer park walk due to the lack of safe walkways.

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This is what I think we need:

1. extra wide, striped asphalt trails
2. bike lanes along roadways need to be swept, otherwise they are useless for bikes. An example is Hwy 59 + University Blvd.
3. get more input from bike commuters (people that actually have to ride)
4. find a solution to the "sidewalk to nowhere" on FM 2234

Gregg Vaupel
gvaupel@sbcglobal.net

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AS A RESIDENT, CYCLIST & WALKER I THINK IT IS IMPERATIVE THAT EVERY ROAD IN MISSOURI CITY HAS A DESIGNATED LANE FOR CYCLISTS.

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Good Presentation on findings
- Sidewalks would Provide safer walks to businesses
- Provide ~~save~~ Ped/motor Sharing where feasible
- Interest in TX Parkway Improvements which is what I travel most.

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City of Missouri City
Pedestrian and Bicycle Study

missouri CITY TEXAS

FEEDBACK FORM

Initial Meeting with Missouri City & H-GAC
April 7, 2009
1:30 PM
City of Missouri City,
City Hall Council Conference Room

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Write/note "hot spots" on trails map and city map
- no connections
- safety issues/conflict points

Goals - last one: Consider deleting "light rail" since non-existent in city

on fact sheet - missing period(.) after 1st photo on 2nd page
"sidewalk ending at a brick wall on Cartwright Road"

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- link goals & objectives to previous work such as Comp Plan, Parks Master Plan, Trail Master Plan & Throughfare Plan.
- FTP site is good way to get data
- County Parks Master Plan –
- S.H. 6
- Missouri City addresses but not in MO City – Sienna (change Not sure going to NO to Yes)
- images of signage on bike route
- add Origin & Destination

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- "not sure" on residence to go to 'yes' questions
- we do not have 'rail trails'

Thanks!

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- I'd suggest using different color other than green to highlight Study area (green blends in w/ the golf course community). For handout as well as online survey.

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Green study area color blends well with green features on map.

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Map of Study area - Can you change from green to a different color that will stand out better?

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Pedestrian and Bicycle Study

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April 20- May 20-

17th

FEEDBACK FORM

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Survey — Bicycle Signs Image

Take out Bike Lanes - MC questions

Ride on bike to Metro Pkwy

- Add question to Metro / Transit Stops + Stations including P&R

→ Zip Code (Demographic)

→ O&D Info after Study Area Roads

APPENDIX F: Air Quality Analysis

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I. AIR QUALITY ANALYSIS

A. PREMISE OF BENEFITS

The objective of the overall Pedestrian and Bicyclist Special Districts Program is to fund strategic investments in pedestrian and bicycle facilities that enhance safety and mobility. Several of the project recommendations are to provide attractive and continuous sidewalks in the areas in which they are most needed, including locations where sidewalks do not exist or are deteriorated. Improvements in the pedestrian environment will improve the potential for this travel mode. It will also increase the ability to connect to transit as a travel mode, if in the future the study area is served by a transit services. Additionally, the recognition of bicycle travel through the network of trails, and installation of bicycle rack at visible locations near destinations, will make this travel mode more viable and attractive. The net result anticipated is a modest decrease in automobile trips, vehicle miles traveled (VMT), and associated vehicle emissions.

B. STATEMENT OF BENEFIT

1. *Key Data and Assumptions*

- Traffic Analysis Zones (TAZs) within the Study Area (**Table 1**);
- 14,077 person-trips in TAZs (**Table 2**);
- 1.14 regional intrazonal average vehicle occupancy provided by H-GAC (person trips per vehicle trip);
- 12,348 number of vehicle trips within TAZs (calculated B/C);
- 0.84% reduction in vehicle trips due to projects (Baker calculated based on H-GAC estimates);
- 1.51 mile average trip distance (**Table 3**); and
- Regional vehicle type mix (from H-GAC Conformity Determination Appendix, Table 44).

2. *Results*

- VOC reduced: 25.4 kg/year; and
- NOx reduced: 27.3 kg/year.

Table 1: Traffic Analysis Zones (TAZ) Included in or adjacent to the Study Area

TAZ Numbers			
2131	**2140**	**2150**	**2173**
2137	**2141**	**2151**	**2190**
2138	**2148**	**2163**	**2191**
2139	**2149**	**2172**	**2195**

Table 2: Daily Total Person-Trips by TAZ (2009)

TAZ	Home-Based Work	Home-Based Non-Work	Not Home-Based	TOTAL
2131	7	120	26	153
2137	43	886	149	1078
2138	6	81	16	103
2139	2	12	3	17
2140	7	62	15	84
2141	1	16	4	21
2148	291	4,202	1,094	5,587
2149	5	55	26	86
2150	27	468	207	702
2151	16	276	94	386
2163	39	792	257	1,088
2172	6	68	18	92
2173	16	205	41	262
2190	137	1,627	460	2,224
2191	21	178	46	245
2195	90	1430	429	1949
TOTAL	714	10,478	2,885	14,077

C. CALCULATIONS

There are very few studies on the effect of microscale pedestrian improvements on travel patterns. The “Making the Land Use, Transportation, Air Quality Connection" (LUTRAQ) demonstration project is one study that attempted to quantify potential effects (1,000 Friends of Oregon, 1993). Making the Land Use Transportation Air Quality Connection -- The Pedestrian Environment -- Volume 4A. Available at: http://ntl.bts.gov/DOCS/tped.html) Special attention was given to the quality of the pedestrian environment as gauged by the Pedestrian Environment Factor (PEF), a composite measure of pedestrian accessibility within a given area. The four variables included in the PEF are: ease of street crossings, sidewalk continuity, local street connectivity (grid vs. cul-de-sac), and topography. Each of the variables is given a score of 1-3, resulting in a maximum PEF score of 12. Most significant to the LUTRAQ study was the finding that a higher PEF score for a zone was accompanied by a lower automobile mode share for that zone. A one-point increase in PEF was accompanied by a decrease in automobile mode share of 1.8 percent.

Proposed sidewalk improvements in the study area will increase and enhance sidewalk continuity along approximately 15,000 linear feet of roadway. In addition, enhanced pedestrian intersection accommodations will be installed at nine (9) intersections in the study area through a combination of improvements proposed by this study and TxDOT. By a comparison to the PEF for existing pedestrian facilities, the proposed improvements are expected to increase the PEF score by 0.94 based on sidewalk continuity and ease of crossing benefits.

While the Portland study suggested a 1.8 percent decrease in automobile mode share, H-GAC estimates a more conservative 0.9 percent decrease. The number of daily automobile trips within these zones is estimated at 12,348 per day based on 14,077-person trips/day divided by the regional intrazonal average vehicle occupancy of 1.14. The average intrazonal vehicle trip distance of 1.51 miles is based on data provided by H-GAC and displayed in **Table 3**. Trips used for this calculation began and ended within the same TAZ.

The average trip within the TAZs adjacent to or within the study area is shown below in **Table 3**. Trips originating and ending within the same TAZ are representative of the distance of trips that are likely to be converted from vehicles to bicycle or pedestrian trips. According to the H-GAC's Pedestrian and Bicyclist Special Districts Program (2004, p7), successful bicycle and pedestrian study areas would range from one-quarter miles for walking to two miles for biking.

Table 3: Average Trip within or adjacent to the TAZs or within Study Area

TAZ	Average Intrazonal TAZ Trip length
2131	1.751
2137	1.69
2138	1.138
2139	1.422
2140	1.917
2141	1.354
2148	2.54
2149	1.41
2150	0.874
2151	1.33
2163	1.695

Table 3: Average Trip within or adjacent to the TAZs or within Study Area (Cont.)

TAZ	Average Intrazonal TAZ Trip length
2172	1.21
2173	1.457
2190	1.254
2191	1.586
2195	1.487
Average	**1.51**

VMT reduced are calculated to be 8,266 per day based on multiplication of the average trip distance (1.51), number of vehicle trips in adjacent TAZs (12,348), and the percentage of trips reduced by the project (0.84%):

1.51 x 12,348 = 18,645

18,645 x 0.0084 = 157 mi/day

Vehicle emissions are calculated by multiplying VMT by the weighted average emission rates by vehicle type (average average emission rates for the daylight hours (6 am to 9 pm) found in the H-GAC 2009 Conformity Determination, by vehicle type multiplied by the percent of such vehicles measured regionally (H-GAC, 2009) most likely to be removed from the road by the recommended improvements as shown in **Table 4** below).

Table 4: Vehicle Mix and Average Emission Rates

Vehicle Type	LDGV	LDGT1	LDGT2	LDDV	LDDT12	MC	All Vehicles
Regional Fleet Mix	68.73%	7.20%	23.96%	0.06%	0.00%	0.13%	1.00
VOC (g/mile)	0.2757	0.0364	0.1289	0.0001	0.0000	0.0026	**0.4436**
NOx (g/mile)	0.2693	0.0346	0.1712	0.0002	0.0000	0.0014	**0.4768**

Notes:
VOC = 157 mi/day x 0.4436 g/mi = 69.65 g/day = 25.4 kg/year
NOx = 157 mi/day x 0.4768 g/mi = 74.86 g/day = 27.3 kg/year