Prepared for:
Houston-Galveston Area Council
Texas Department of Transportation
City of Stafford

Prepared by:
Traffic Engineers, Inc.

In partnership with:
Asakura Robinson
Marsh Darcy Partners
Progressive Consulting Engineers
TranSystems

FM 1092
ACCESS MANAGEMENT STUDY

December 2013

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ACKNOWLEDGMENTS

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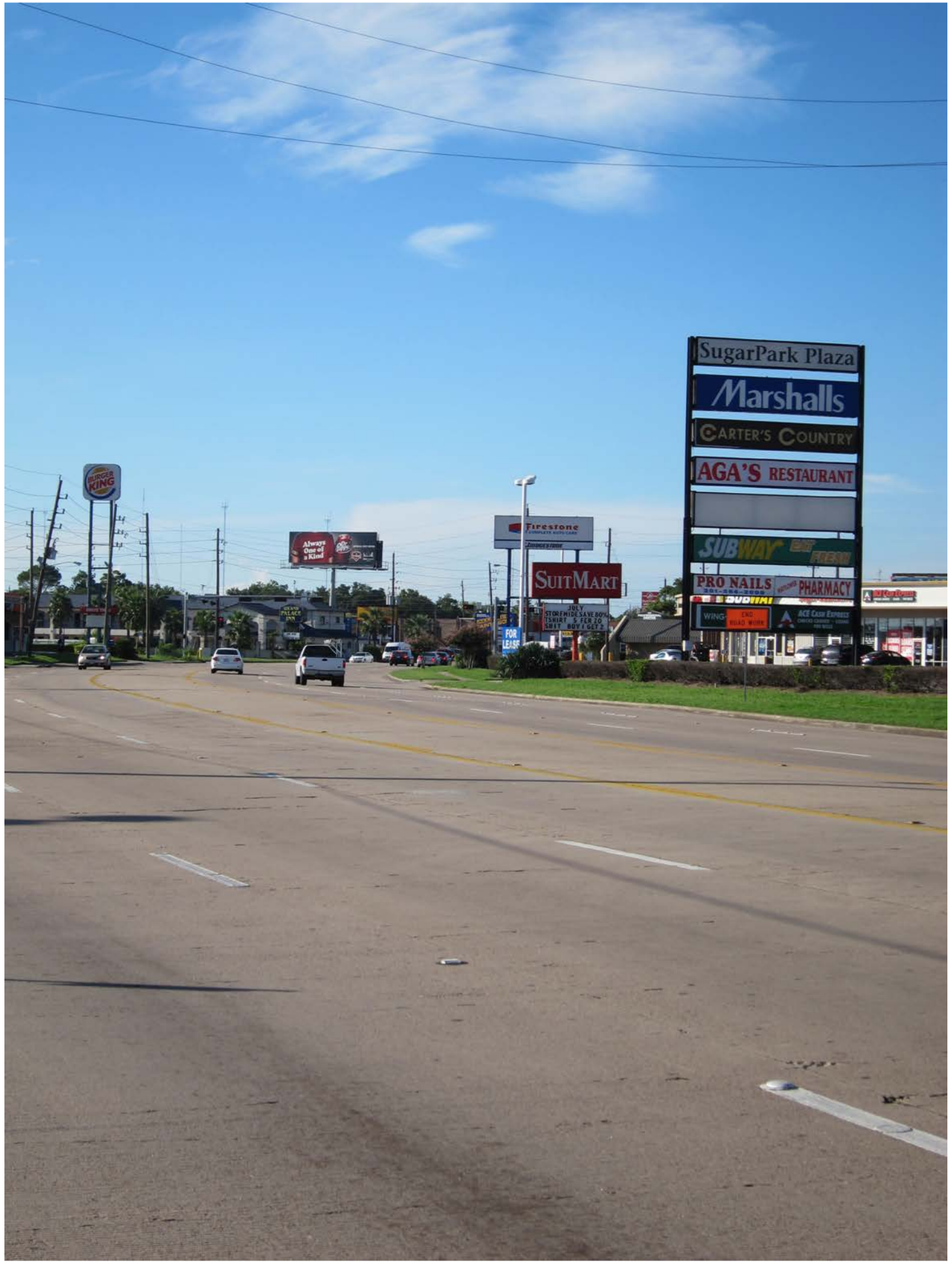

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Executive Summary

FM 1092 ACCESS MANAGEMENT STUDY

FM 1092 is the main north-south corridor through the City of Stafford connecting US 59 (recently designated I-69) and the City of Houston on the north to the City of Missouri City to the south. The study area corridor, also known to many people in the region as Murphy Road, can be seen in Figure ES.1. The study area includes the right-of-way for FM 1092, major intersections, and also considers access to major facilities and destinations along the corridor

The FM 1092 corridor plays two primary roles in the City of Stafford and the region. First, it is the primary connection for many north-south trips through Stafford connecting SH 6 and Missouri City on the south with major regional roadways such as US 90A and US 59. Its role is particularly important as there are limited alternative north-south corridors in eastern Fort Bend County. Safety along the corridor is a concern as, currently, the corridors experiences a high rate of crashes versus similar corridors across the State of Texas. To the north of the corridor is the West Bellfort Park & Ride which provides strong commuter and local bus connections as well as access to the HOV/HOT lane system on US 59.

Secondly, the FM 1092 corridor also represents the economic core of the City of Stafford. Travelling the full length of the city, the corridor is home to many businesses and potential development sites and a significant share of the city's tax base. Key destinations along the corridor include the Stafford Centre, the nearby Houston Community College campus, the Island District along US 90A, and the Texas Instruments campus site.

The FM 1092 Access Management Study has been developed to help define a vision for the corridor to support and balance these two objectives as traffic volumes grow and the corridor continues to redevelop.

STAKEHOLDERS AND STUDY GOALS

The FM 1092 Access Management Study was sponsored by the City of Stafford and the Houston-Galveston Area Council (H-GAC). The study team developed the recommendations outlined in the study through extensive input from the public and business owners along the corridor. Input was gathered through a series of outreach events and public meetings (Chapter 2 of this report). A steering committee guided the study development and was made up of constituents who have an interest in the long term success of the corridor. The steering committee included representatives from:

- Houston - Galveston Area Council
- City of Stafford Public Works
- City of Stafford Fire Department
- City of Stafford Police Department
- Stafford Municipal School District
- Stafford Economic Development Council
- Texas Department of Transportation
- City of Houston
- City of Missouri City
- METRO
- Fort Bend Chamber of Commerce
- Houston Community College System

The Steering Committee developed three major goals for the study as a framework for the recommendations for the corridor.

- Improve FM 1092 Corridor Mobility
- Address Safety Issues
- Enhance Economic Development Opportunities

These goals were developed to balance the objectives for the corridor to move people traveling in all modes efficiently and safely while enhancing FM 1092 as the economic "Main Street" for the City of Stafford.

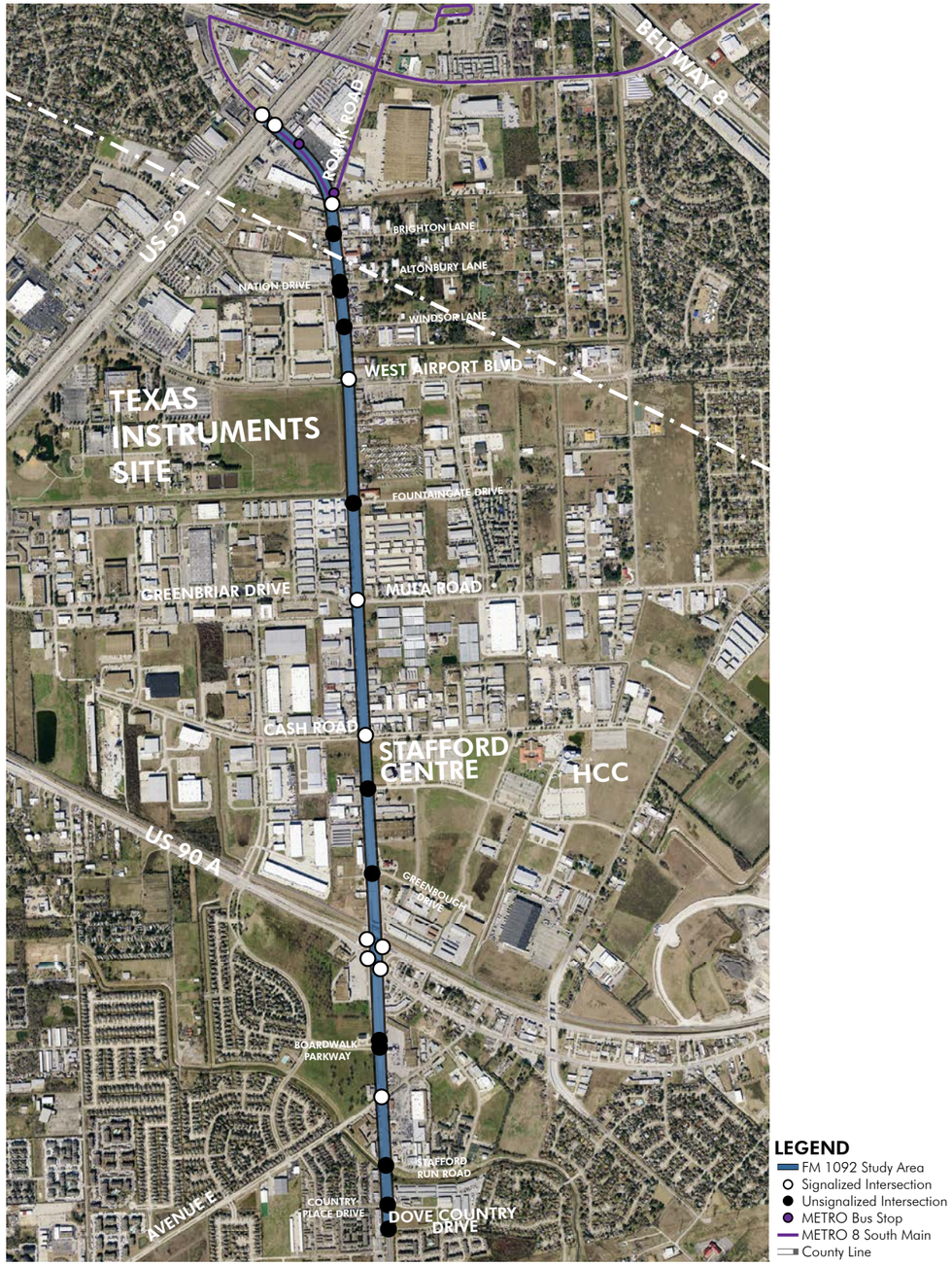


Figure ES.1 - *FM 1092 Study Corridor*

STUDY RECOMMENDATIONS

Based on an analysis of existing conditions along the corridor and comparing with the goals established by the Steering Committee, a set of recommendations were developed. The existing conditions assessment looked at critical issues including traffic operations and delay, pedestrian and cyclist mobility, safety metrics including crash rates and causes, and overall economic performance data such as land values and sales tax rates.

Based on this detailed assessment, which is detailed in Chapter 3 of this report, recommendations were developed that address the overall corridor, key intersections, streetscape elements and economic development opportunities focused around key opportunity nodes.

The current cross-section for most of the FM 1092 corridor is shown in Figure ES.2. The roadway is seven lanes with three travel lanes in each direction and a center turn lane. No sidewalks exist along the majority of the corridor. The proposed cross-section for the corridor, shown in Figure ES.3, was developed to utilize the existing right-of-way and pavement section as efficiently possible to achieve the desired benefits and minimize implementation costs. The proposed cross-section maintains three travel lanes in each direction but also provides a center median with turn lanes at major roadways and driveways to provide access to adjacent developments. 11′ travel lanes allow the inclusion of a bike lane in each direction of travel. Sidewalks were proposed for the length of the project, a top concern of area residents.

A more detailed set of recommendations with associated planning level cost estimates are shown in Table ES.1 on the following page. Each of these recommendations is detailed in Chapter 5 of this report.

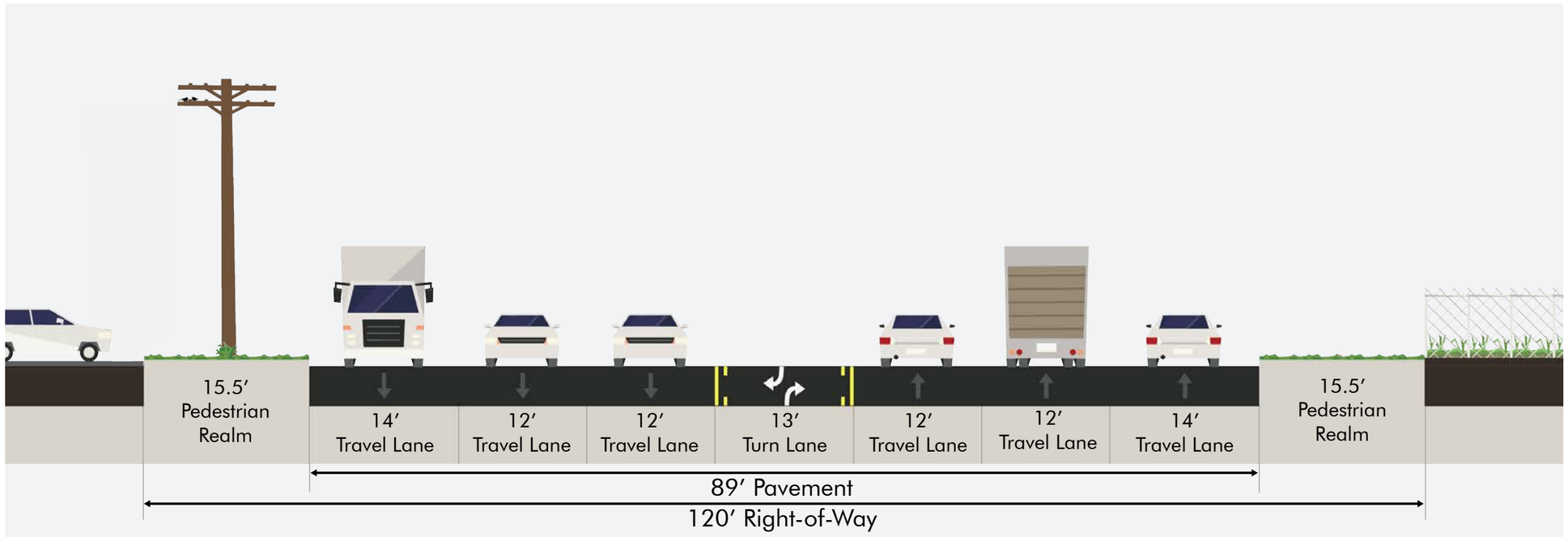


Figure ES.2 *FM 1092 Study Corridor Typical Cross Section*

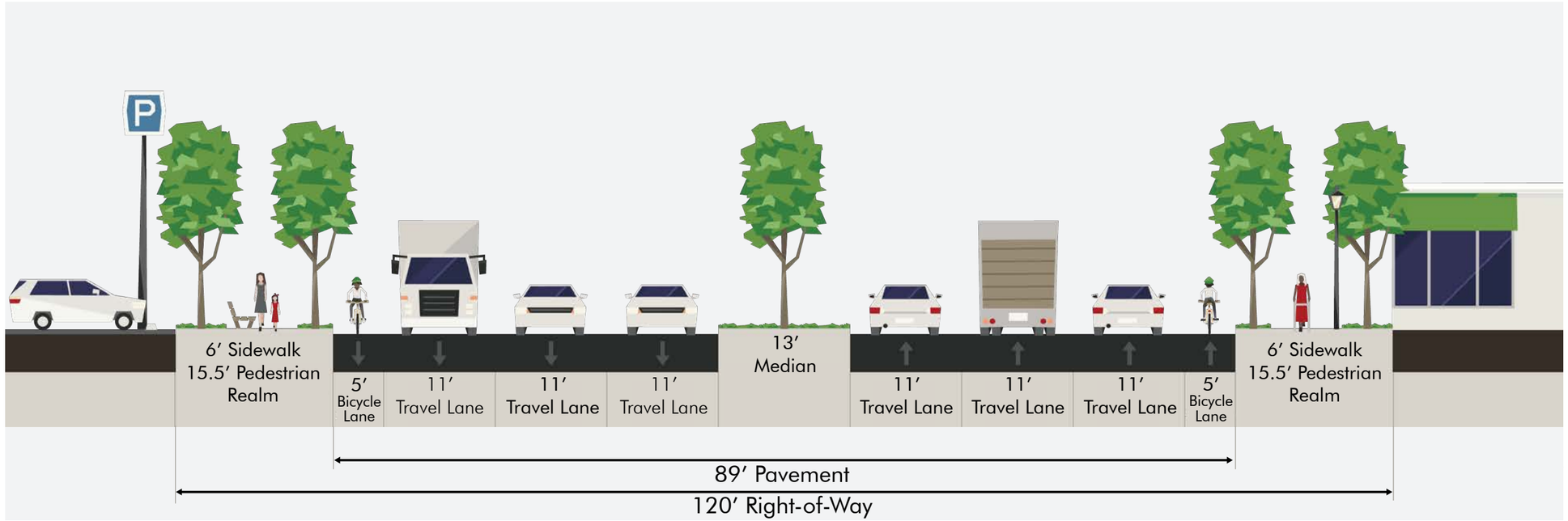


Figure ES.3 *Proposed Typical Cross-section - Roark Road to Dove Country Drive*

Table ES.1 *Summary of Roadway Corridor, Intersection and Streetscape Recommendations*

PROJECT NUMBER	PROJECT TITLE	TYPE	TxDOT COST	CITY OF STAFFORD COST [1]	OTHER ENTITIES [2]	COST
			SHORT			
1	Install Signal Interconnect	Corridor	$ 510,400	$0	$0	$ 510,400
2A	FM 1092 at US 59 West Frontage Rd - Short	Intersection	$ 46,200	$0	$0	$ 46,200
5A	FM 1092 at West Airport Blvd - Short	Intersection	$ 33,400	$0	$0	$ 33,400
7	FM 1092 at Greenbriar Dr/Mula Rd	Intersection	$ 22,920	$ 34,380	$0	$ 57,300
8	FM 1092 at Cash Rd	Intersection	$ 48,800	$ 12,200	$0	$ 61,000
9	FM 1092 at US 90A Underpass	Intersection	$ 30,500	$0	$0	$ 30,500
11A	FM 1092 at Dove Country Dr - Short	Intersection	$ 28,800	$0	$0	$ 28,800
12	US 90A at Promenade Blvd	Intersection	$ 33,800	$0	$0	$ 33,800
13	Restripe Corridor	Corridor	$ 471,100	$0	$0	$ 471,100
14	Construct 13' Median	Corridor	$ 485,400	$0	$0	$ 485,400
			MEDIUM			
4	Mid-block Crossing	Intersection	$ 147,500	$0	$0	$ 147,500
11B	FM 1092 at Dove Country Dr - Medium	Intersection	$ 186,000	$0	$0	$ 186,000
16	Landscape Medians	Landscape	$0	$ 425,000 - $ 595,000 [3]	$ 75,000 - $ 105,000 [3]	$ 500,000 - $700,000 [3]
17	Driveway Consolidation	Corridor	$ 120,800	$0	$0	$ 120,800
18A	Construct Sidewalks	Corridor	$ 1,444,700	$0	$0	$ 1,444,700
18B	Construct Side Paths	Corridor	$ 321,900	$0	$0	$ 321,900
19	Plants Street Trees	Landscape	$0	$127,500 - $ 255,000 [4]	$ 22,500 - $ 45,000 [4]	$ 150,000 - $ 300,000 [4]
20	Pedestrian Lighting	Streetscape	$0	$ 850,000 - $ 2,550,000 [5]	$ 150,000 - $ 450,000 [5]	$ 1,000,000 - $ 3,000,000 [5]
21	Roadway Lighting	Corridor	$ 400,000 - $ 500,000 [4]	$0	$0	$ 400,000 - $ 500,000 [6]
22	City of Stafford Monuments	Streetscape	$0	Cost similar to existing monuments	$0	Cost similar to existing monuments
			LONG			
2B	FM 1092 at US 59 West Frontage Rd - Long	Intersection	$ 297,600	$0	$0	$ 297,600
3	FM 1092 at Roark Rd	Intersection	Future Cost [7]			
5B	FM 1092 at West Airport Blvd - Long	Intersection	$ 1,225,500	$0	$0	$ 1,225,500
6	FM 1092 at Fountaingate Dr	Intersection	$1,006,160	$ 251,540	$0	$ 1,257,700
10	FM 1092 at Avenue E	Intersection	$ 1,774,000	$0	$0	$ 1,774,000
15	RTP Project 13641	Corridor	City of Missouri City listed as lead agency in the 2035 RTP Update			$ 10,100,000
23	Stafford Centre Park	Streetscape	$0	$ 145,000 [8]	$0	$ 145,000 [8]
24	Pedestrian and Bicycle Trail	Streetscape	$0	$ 135,000 [9]	$0	$ 135,000 [9]
			TOTAL COST			
		LOW	**$ 8,635,480**	**$ 1,980,620**	**$ 357,500**	**$ 10,863,600** [10]
		HIGH	**$ 8,735,480**	**$ 3,978,120**	**$ 600,000**	**$ 13,313,600** [10]

[1] Includes other entities within the City of Stafford not yet determined, e.g.: improvement districts, local businesses, other management entities
[2] Other entities outside the City of Stafford, e.g.: Brays Oaks Management District, International Management District
[3] For trees, depending on size, at a 25 to 100 foot spacing. Special pavers are an alternative to vegetation landscaping that can reduce maintenance costs.
[4] For trees, depending on size, at a spacing of 25 to 100 feet
[5] Dependent on phasing of implementation prioritized by activity centers and fixture type and spacing
[6] Dependent on fixture type and a spacing of 120 to 150 feet
[7] Cost to be based on final design of future long term project
[8] Cost is estimated based on a 9,000 square foot plaza on the southeast corner of FM 1092 at Cash Rd
[6] Cost estimate considers the addition of a trail, irrigation and street trees along the drainage corridor at the Texas Instruments Site
[10] Does not include Project 15 - 2035 RTP Updated Project 13641

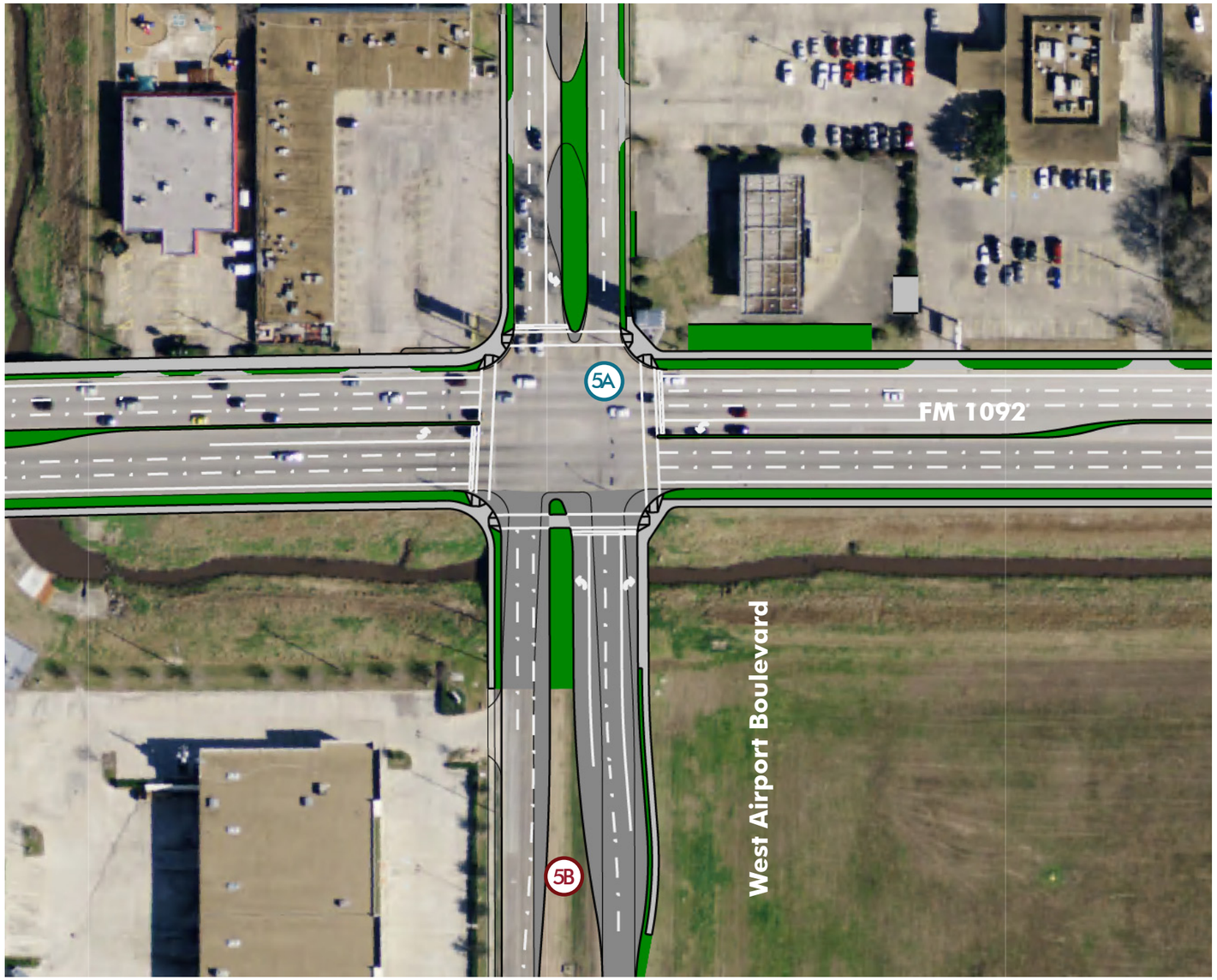


Figure ES.4: *Recommendations for FM 1092 at West Airport Boulevard*

Recommendations were developed to a schematic design level, to assess the feasibility and identify any potential challenges or opportunities that would arise form the proposed recommendations. An example of this is shown in Figure ES.4 which shows the proposed conditions for the intersection of FM 1092 at West Airport Boulevard. The addition of left turns at the intersection were recommended to improve the signal operations and improve the overall level of service for vehicles. Improved pedestrian and bicycle facilities are also recommended.

The recommendations outlined in Table ES.1 summarize an implementation approach that defines a clear path forward in terms of project phasing based on a prioritized timeline. The timeline was established based on 1) project cost, 2) likely ease of implementation and 3) ability to satisfy project goals. The timeline is an estimate and individual projects may be accelerated by increased focus and availability of funding.

In addition to the recommendations outlined for the corridor, the report also identifies regional improvements, such as improvements in regional roadway connectivity, potential bicycle opportunities, and stronger transit connections that round out the toolbox of transportation choices to improve mobility for travellers along the corridor and in the study area.

The implementation of the recommendations outlined in this report will require strong partnership among the various stakeholders, both public and private, with interests along the corridor. While the infrastructure improvements outlined here may be accomplished through partnerships of public agencies such as the City of Stafford, the City of Houston, TxDOT and H-GAC, to fully achieve the vision for the corridor outlined by the goals set forth by the project steering committee, a more holistic approach will be required. The redevelopment adjacent to the corridor should be coordinated with the investments in infrastructure that these recommendations outline to maximize the potential benefits to the community and the region.

Chapter 6 of this report outlines implementation strategies including economic development tools, potential partnerships, and approaches to redefine key development nodes along the corridor. By coordinating the recommendation with planning efforts such as the development of an updated Comprehensive Plan for the City of Stafford, supporting a regulatory environment aligned with the communities goals, and working with property owners and developers along the corridor, FM 1092 can continue to be the true “Main Street” for the City of Stafford while providing safer, more efficient connectivity and mobility for the region.

Introduction

FM 1092 is the main north-south corridor through the City of Stafford connecting US 59 (recently designated I-69) and the City of Houston on the north to the City of Missouri City to the south (Figure 1.1). The corridor is known to many people in the region as Murphy Road though for consistency will be referred to as FM 1092 in this report.

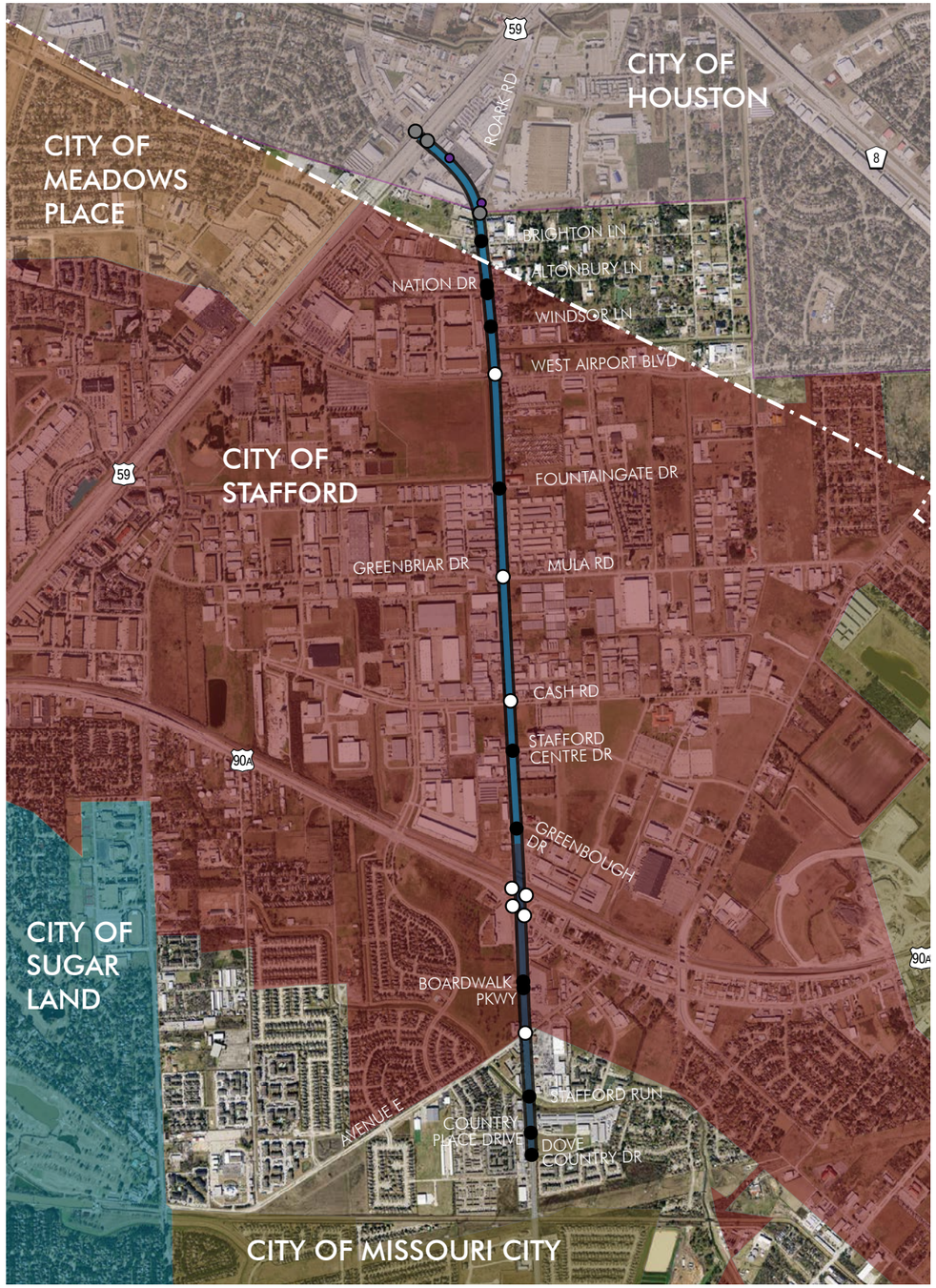
The FM 1092 corridor plays two primary roles in the City of Stafford and the region. First, it is the primary connection for many trips through the City to regional destinations, including a large percentage of commute trips. As Fort Bend County has experienced significant development and population growth for the past several decades, traffic volumes have increased along segments of the corridor. FM 1092 serves as a key connection for regional trips with direct access to two of the major east-west freeways in Fort Bend County, US 59 and US 90A. Mobility on the corridor was improved when the roadway was grade separated from the Union Pacific railroad tracks just north of US 90A. The corridor also provides connections to major east-west arterials such as West Airport Boulevard, and West Bellfort Avenue. As the existing roadway network provides limited alternative routes, FM 1092 will continue to play a key role in mobility for the City of Stafford and the region for the foreseeable future.

The FM 1092 corridor also represents the economic core of the City of Stafford. Travelling the full length of the city, the corridor is home to many businesses and potential development sites and a significant share of the city's tax base. Key destination in the city along the corridor include the Stafford Centre, the nearby Houston Community College campus, the Island District along US 90A, and the Texas Instruments campus site. There are many local jobs along the corridor, with concentrations of light industrial and distribution sites. There is also local retail, neighborhood services, and entertainment options, primarily restaurants. Stakeholders have identified a desire for more neighborhood services to serve the local community. Figure 1.2 shows the typical cross-section of FM 1092 through the study area.

ACCESS MANAGEMENT

Given the critical nature the corridor plays in the mobility and economic future of the City of Stafford and the region, the Houston-Galveston Area Council (H-GAC), the Metropolitan Planning Organization (MPO) for the Houston-Galveston 8-County region, has collaborated with the City of Stafford and the Texas Department of Transportation (TxDOT) to develop the FM 1092 Access Management Study. H-GAC has previously developed an access management study for the segment of FM 1092 in Missouri City, south of the City of Stafford, and this plan has been developed to coordinate with the vision developed in that study.

By definition, access management is a strategy to reduce and consolidate access points along a corridor to reduce the number of conflict points between drivers, pedestrians, and bicyclists. Improving the visibility and operations of driveways as well as creating clear channels for turning movements and cross movements along a corridor, will not only improve safety along a



LEGEND

- Bus Stop
- Unsignalized Intersection
- TxDOT Operated Signalized Intersection
- City of Houston Operated Signliazed Intersection
- FM 1092 - 7 Lane Typical Section
- FM 1092 - 5 Lane Typical Section
- Fort Bend / Harris County Line
- Stafford City Limit
- Meadows Place City Limit
- Missouri City City Limit
- Houston City Limit
- Sugar Land City Limit

Figure 1.1 *Surrounding Jurisdictions*

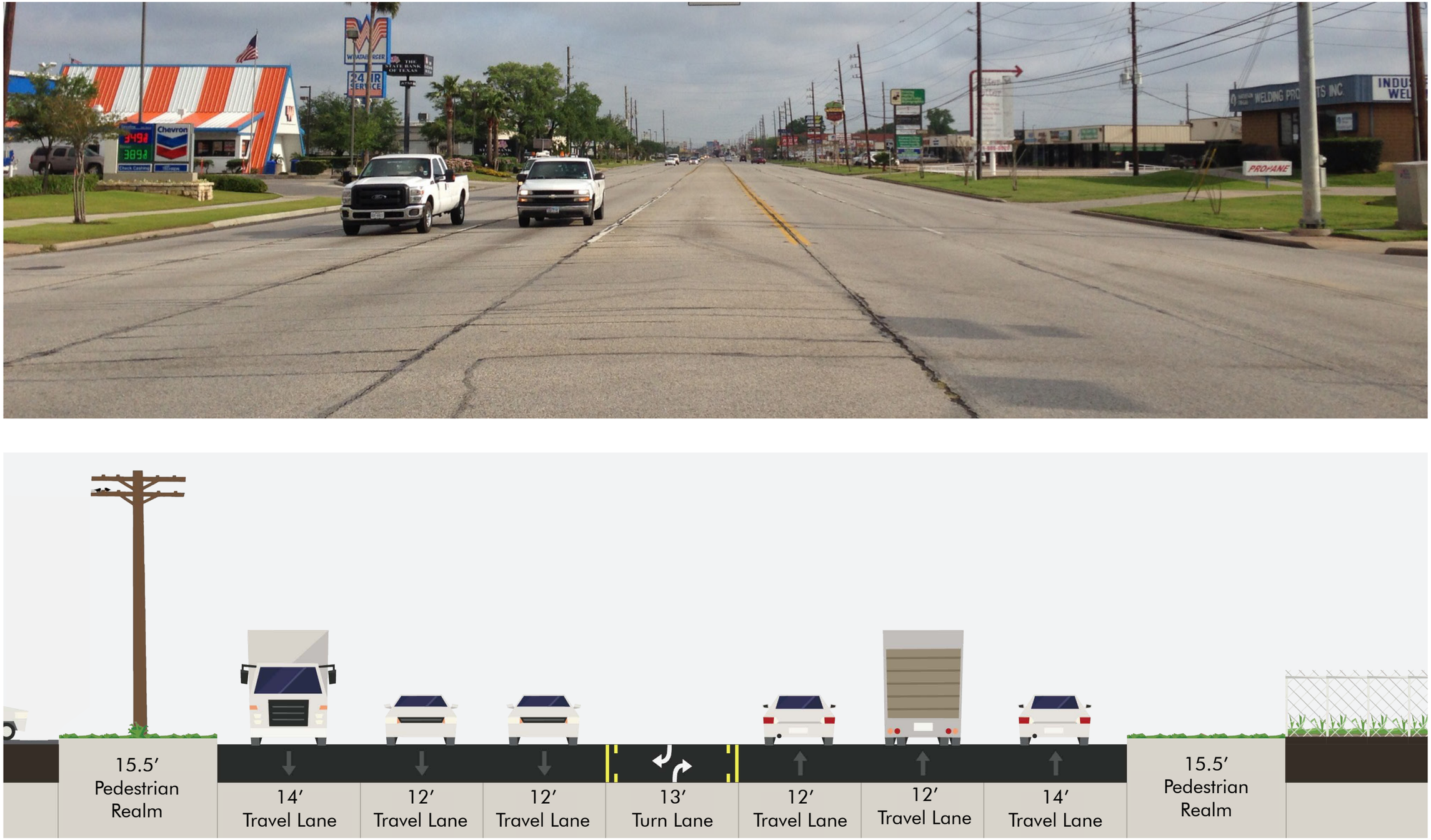


Figure 1.2 *FM 1092 Study Corridor Typical Cross Section*

corridor, due to reduced conflict points, it will also increase mobility and traffic flow. This will improve traffic delays, lowering emissions and improving air quality along the corridor. Access management also focuses on improving the overall attractiveness of the corridor by creating a sense of place which benefits both users and business owners alike.

An access management study encompasses a large toolbox of strategies that can be implemented to improve the mobility, safety, and attractiveness of a corridor. This toolbox includes:

- Raised medians
- Dedicated left- and right-turn lanes
- Driveway improvements and consolidation
- Joint and cross access between adjacent properties
- Improvements to the pedestrian realm, including sidewalks and pedestrian amenities
- Bicycle facilities and amenities
- Traffic signal operation improvements
- Intelligent Transpiration Systems
- Thoroughfare planning to improve surrounding roadway network
- Landscaping
- Branding and Wayfinding
- Policy Improvements

This study will address the current operations of FM 1092 and determine ways to improve mobility of the corridor and present a future plan for the study area that will improve safety, plan for projected growth in the region, and define a path to meet the goals of the project stakeholder to transform the corridor into a multi-modal, economically vibrant, activity center for the City of Stafford.

STUDY AREA

The 3.1 mile FM 1092 study corridor is a TxDOT roadway that travels though four jurisdictions. The 0.31 mile section between US 59 and Roark Road is within the City of Houston. The 0.15 mile section between Roark Road and the county line (approximately half way between Brighton Lane and Altonbury Lane) is within Stafford ETJ and Harris County. The 2.25 mile section between the county line and Avenue E is within the City of Stafford. The southernmost 0.35 miles between Avenue E and Dove Country Drive is within Stafford ETJ and Fort Bend County. Members of each jurisdiction were part of the project Steering Committee to define goals for the corridor.

The majority of the corridor travels through the City of Stafford, a city which does not levy non-school property taxes and is known for a strong commercial sales tax base. The City of Stafford became the home to a large Texas Instruments (TI) manufacturing site in the 1960s and since then, the city has been a hub of high tech and specialized manufacturing. Due to the large commercial and retail base within the City of Stafford the city sales tax revenue was $767 per capita in 2010, a much higher value than surrounding communities and the city of Houston. One

Buffer	Land Area	Population	Population Density	Employment	Employment Density
0.25 Mile	1.6 sq. miles	3,254	2,007	4,761	2,936
0.5 Mile	3.5 sq. miles	7,277	2,076	10,974	3,131
1.0 Mile	8.2 sq. miles	22,691	2,760	27,289	3,318
1.5 Mile	14.2 sq. miles	50,033	3,528	38,443	2,711

Table 1.1 *2010 Employment and Population within the Study Area*
Source: US Census 2010, Longitudinal Employer - Household Dynamics, 2010

Statistics	Study Area	Stafford	Houston	Fort Bend County	Harris County	Texas
Total Population: Total	50,033	17,693	2,099,451	585,375	4,092,459	25,145,561
Households: Total	17,415	6,750	782,643	187,384	1,435,155	8,922,933
Households: Average household size	2.86	2.62	2.64	3.09	2.82	2.75
Median Household income	$59,549	$61,084	$42,962	$79,845	$51,444	$49,646
Unemployed	15.90%	3.70%	8.00%	5.10%	7.30%	7.00%
Below Poverty Level	16%	9%	21.00%	8.00%	16.80%	16.80%
% Own	44%	44%	45%	80%	54%	64%
% Rent	56%	56%	55%	20%	43%	36%
Vacancy	8%	5%	12%	5%	10%	11%
Single Family Detached	51%	50%	46%	84%	57%	66%
Single Family Attached	3%	2%	5%	2%	4%	3%
Apt 2-9	7%	8%	13%	3%	10%	10%
Apt 10-49	31%	29%	24%	5%	18%	10%
Apt 50+	6%	8%	11%	2%	7%	4%
Other	1%	3%	1%	4%	3%	8%
% Hispanic	35.8%	25.9%	43.8%	23.7%	40.8%	37.6%
% White (non Hispanic)	17.9%	22.4%	25.6%	36.2%	33.0%	45.3%
% Black (non Hispanic)	24.7%	26.8%	23.1%	21.1%	18.4%	11.5%
% Asian (non Hispanic)	19.4%	22.6%	5.9%	16.9%	6.1%	3.8%
% Other (non Hispanic)	2.2%	2.3%	1.6%	2.3%	1.7%	1.8%
% 17 or Under	28%	25%	26%	30%	28%	27%
% 18-34	28%	30%	29%	20%	26%	24%
% 35-64	37%	38%	36%	43%	38%	38%
% 65+	7%	7%	9%	7%	8%	10%
% No High School	10%	6%	14%	6%	12%	10%
% Some High School	8%	6%	12%	6%	10%	10%
% High School Graduate	22%	20%	23%	20%	24%	26%
% Some College	22%	24%	18%	21%	20%	22%
% Assoc. Degree	5%	8%	4%	7%	6%	6%
% College Degree	22%	22%	18%	27%	18%	17%
% Grad School	11%	13%	11%	14%	10%	9%
% Drive Alone	77%	83%	74.2%	82%	77%	79%
% Carpool	17%	11%	13.5%	11%	13%	12%
%Transit	2%	2%	4.8%	2%	3%	2%
%Bike	0%	0%	0.4%	0%	0%	0%
%Walk	1%	1%	2.2.%	1%	2%	2%
%Other	4%	3%	4.9%	5%	5%	5%
% No Vehicle Available	6%	3%	5%	1%	7%	6%
% 1 Vehicle Available	37%	36%	32%	14%	37%	35%
% 2 Vehicles Available	42%	43%	41%	50%	39%	41%
% 3 or more Vehicles Available	15%	17%	21%	35%	16%	19%

☐ *Source: US Census, 2010* ☐ *Source: American Community Survey 5 year Estimates, 2011*
Table 1.2 *Study Area Demographics*

third of the cities sales tax revenue is collected within 0.5 miles of the study corridor, showing the economic importance of FM 1092 to the City of Stafford.

Table 1.1 summarizes the population as well as the jobs within the study area emphasizing that the corridor is a major employment destination with higher numbers of jobs than local population. Demographics were collected and summarized in Table 1.2, which includes all persons who reside within 1.5 miles of the study corridor. Over 50,000 people live within 1.5 miles of the corridor. The study area population is young and racially diverse. The median income for the study area is similar to the City of Stafford and higher than both Houston and Harris County but less than Fort Bend County, which is one of the highest incomes counties in the state. The majority of residents commute by car, either by driving alone or carpooling. The majority of the single family residential homes are near the edges of study area, with the exception of two residential developments along the south segment of the corridor, the Promenade at Stafford Run and Dove Country.

GOAL DEVELOPMENT

The following summarized the goals developed for the FM 1092 corridor. Working with the project steering committee, which is detailed in Chapter 2, three overarching goals - Safety, Mobility, and Economic Development - were developed for FM 1092.

Safety

The first goal for the study is to improve the safety along the corridor. The overall crash rate for FM 1092 is double the statewide average calculated by TxDOT for peer roadways. The crash rate is 426 crashes per 100 million vehicle miles travelled (VMT); approximately 150 crashes occur along the corridor each year. A high number of crashes are concentrated at key intersection along the corridor. These locations are:

- Greenbough Drive and the US 90A underpass
- West Airport Boulevard
- Greenbriar Drive/Mula Road
- Avenue E
- US 59 Frontage Roads
- Cash Road

Crash data were analyzed to better understand the contributing factors and dynamics of crashes at these hotspots and to develop recommendations to address major safety issues along the corridor.

Research has also shown the number of access points along a corridor is strongly correlated to crash rates. The current driveway density along FM 1092 exceeds typical standards, with some segments of the corridor having driveway densities over 70 driveways per mile. Introducing standards to decrease driveway density through driveway spacing minimums and encouraging joint-access will allow for improvement of safety along the corridor as redevelopment occurs and standards are enforced.

Figure 1.3 *Traffic and Signage along FM 1092*

Mobility

Currently, the corridor experiences acceptable travel times but significant delays occur during peak periods. Delays are focused at the intersections of FM 1092 at Avenue E, FM 1092 at West Airport Boulevard, and FM 1092 at both US 59 frontage roads. Intersection operations at these critical intersections were evaluated to determine both short and long term improvements that can decrease intersection delay. These improvement were also linked to improvements in safety along the corridor as well.

Continued development within Fort Bend County has led to increased traffic volumes along FM 1092 south of West Airport Boulevard and in particular south of US 90A. Traffic is expected to continue to increase as development continues; there are currently plans to widen the section of FM 1092 south of US 90A. Currently, FM 1092 south of US 90A is four through lanes with one two-way left-turn lane. This section is proposed to be widened to six travel lanes with a raised median to provide the same number of through lanes as FM 1092 north of US 90A which has six through travel lanes and one two-way left-turn lane.

Another reason for the growth in traffic volumes along FM 1092 is a the limited connectivity of the regional roadway network. The roadway network provides few continuous north-south corridors parallel to FM 1092. Opportunities to develop alternative routes that can serve short trips within the corridor as well as disperse the current and projected traffic along FM 1092 have been assessed.

This lack of roadway connectivity also affects pedestrian and bicycle mobility, decreasing opportunities for alternative routes and increasing travel distances. Despite the lack of active transportation facilities, pedestrians and bicyclists are often seen along the corridor to the point where pedestrians have worn paths along FM 1092 where no sidewalks are present. The corridor lacks continuous sidewalks and pedestrian signals at many locations. No bicycle facilities are currently located either along or near the corridor. Improving mobility includes developing an improvement plan to address the lack of active transportation facilities.

The northern most section of the study corridor, within the City of Houston is served by the Metropolitan Transit Agency of Harris County (METRO). METRO Route 8 South Main serves two bus stops on the corridor. The 8 South Main also serves the West Bellfort Park & Ride, which is located northeast of the corridor along Roark Road, which provides a strong anchor for the north part of the FM 1092 as well as access to the HOV/HOT lanes for passenger vehicles. The West Bellfort Park & Ride serves six METRO routes and one Fort Bend County Transit route. The West Bellfort Park & Ride exceeds 2,000 boardings on an average weekday which surpasses the number of boarding at any other park & ride within the METRO system. Continuing to support transit along the corridor as well as strengthening the connection between the West Bellfort Park & Ride and the FM 1092 corridor will continue to improve mobility along the corridor.

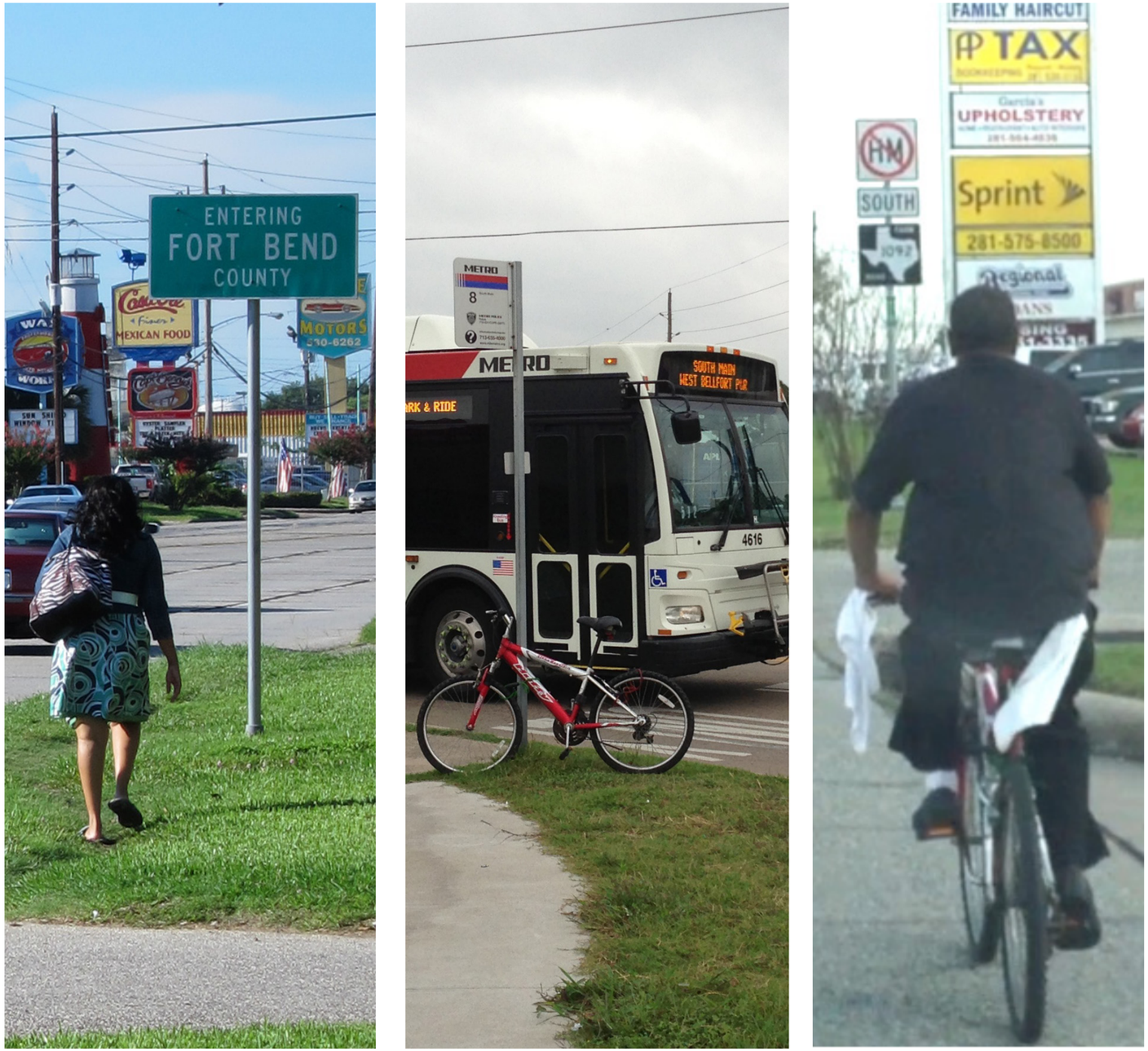


Figure 1.4 *Active Transportation Along FM 1092*

Economic Development

While the corridor serves as a major concentration for employment and provides a large percentage of the sales tax revenue for the City of Stafford, many of the retail locations were observed to have multiple vacancies and rental turnover rate was reported as high along the corridor. Many of the properties have begun to show their age and limited reinvestment has gone into property redevelopment. This has led to in a limited sense of place along the corridor. Improving streetscape elements and developing a cohesive and attractive aesthetic for the corridor will help solidify the corridor as a "Main Street" for the City of Stafford and support economic development and redevelopment to ensure the corridor continues to be a major driver of the Stafford economy.

There is also an opportunity to define and prioritize the role that local jurisdiction can play to support economic development along the corridor. This includes improved corridor planning, greater investment in the corridor, creating partnerships with other jurisdictions and private investments, and defining a policy and regulatory environment that will support the long term change along the corridor.

Figure 1.5 *Current City of Stafford Branding*

GOALS and PERFORMANCE METRICS

1 Address Safety Issues

- Reduce the high crash rate at crash hotspots
- Develop access standards to reduce conflict points along the corridor

2 Improve Corridor Mobility

- Improve intersection level of service
- Reduce travel times and delay
- Improve access to and for transit, pedestrians and bicyclists

3 Enhance Economic Development Opportunities

- Increasing sales tax revenue
- Increase property values
- Developing cohesive and appealing streetscape and corridor aesthetic.
- Define tools for implementation

Public Involvement

Engaging the public and key stakeholders in every step of the FM 1092 Access Management Study ensured the development of a successful set of recommendations for the corridor. Engagement the public was accomplished on three levels:

1 Steering Committee Meetings and Workshops

2 Stakeholder Meetings & Business Open Houses

3 Public Meetings

A majority of meetings conducted as part of the study were held at the Stafford Centre, which is centrally located at the intersection of FM 1092 and Cash Road.

STEERING COMMITTEE

The Steering Committee was comprised of individuals who represent 11 organizations, and were chosen to serve as a sounding board and to advise on the project direction. Steering Committee members, who are listed in Figure 2.1, will be the driving force to ensure the recommendations within this plan are implemented. The Steering Committee met five times though the study to review materials, develop design alternatives, offer input, monitor the planning process, and reach a consensus on the study's conclusions and recommendations.

The first and second Steering Committee meetings resulted in the establishment of the framework of three project goals that drove the development of recommendations and implementation strategies:

1 **Improve Corridor Mobility**

2 **Address Safety Issues**

3 **Enhance Economic Development Opportunities**

The third steering committee included a workshop where members were able to design proposed cross-sections for the corridor and provide input on key economic development objectives. This meeting also included real time surveys where steering committee members were able to provide opinions on different access management and economic development strategies to help steer the project team during the development of recommendations.

The fourth steering committee meetings allowed the project team to review the recommendations for FM 1092 with the steering committee in detail. The final steering committee meeting was dedicated to the presentation and discussion of the economic development and implementation strategies for the corridor.

City of Houston	
Khang Nguyen	
City of Missouri City	
Valerie Ruda Marvin	Cristin Emshoff
City of Stafford	
Council Member Felecia Evans-Smith	Charles Russell, PE
Council Member Wen Guerra	Jamie Hendrixson
City of Stafford Fire Department	
Larry DiCamillo	
City of Stafford Police Department	
Bonny Krahn	
Fort Bend Chamber of Commerce	
Harish Jajoo	
Houston Community College System	
Dr. Julian Fisher	
Houston-Galveston Area Council (H-GAC)	
Stephan Gage	
Metropolitan Transit Organization of Harris County Texas (METRO)	
Edmund Petry	
Stafford Municipal School District	
Dr. Lance Hindt	
Texas Department of Transportation (TxDOT)	
Ijeoma Ejezie	Sanjay G Upadhyay, PE
Dee Rader, PE	Jeff Volk, PE

Figure 2.1 *Steering Committee Members (Alphabetical by Organization)*

STAKEHOLDER MEETINGS AND BUSINESS OPEN HOUSES

Stakeholder meetings were conducted with smaller groups of Stafford residents and business owners as well as public officials. Members of the consultant team met with the two major residential communities within the City of Stafford: Promenade Residents Association and Dove Country Homeowners Association. Meetings were also held with the Stafford Police Department and Stafford Fire Department to discuss safety, emergency response and access issues along the corridor.

Two business open houses were held concurrent with the two public meetings for the project to target business owners and property owners directly effected by the study effort. The open houses allowed local business owners to review the project recommendations during business hours. The goal of the open houses were to help educate concerned people who may not fully understand the study effort or may need additional information to understate how the study impacts their business or property.

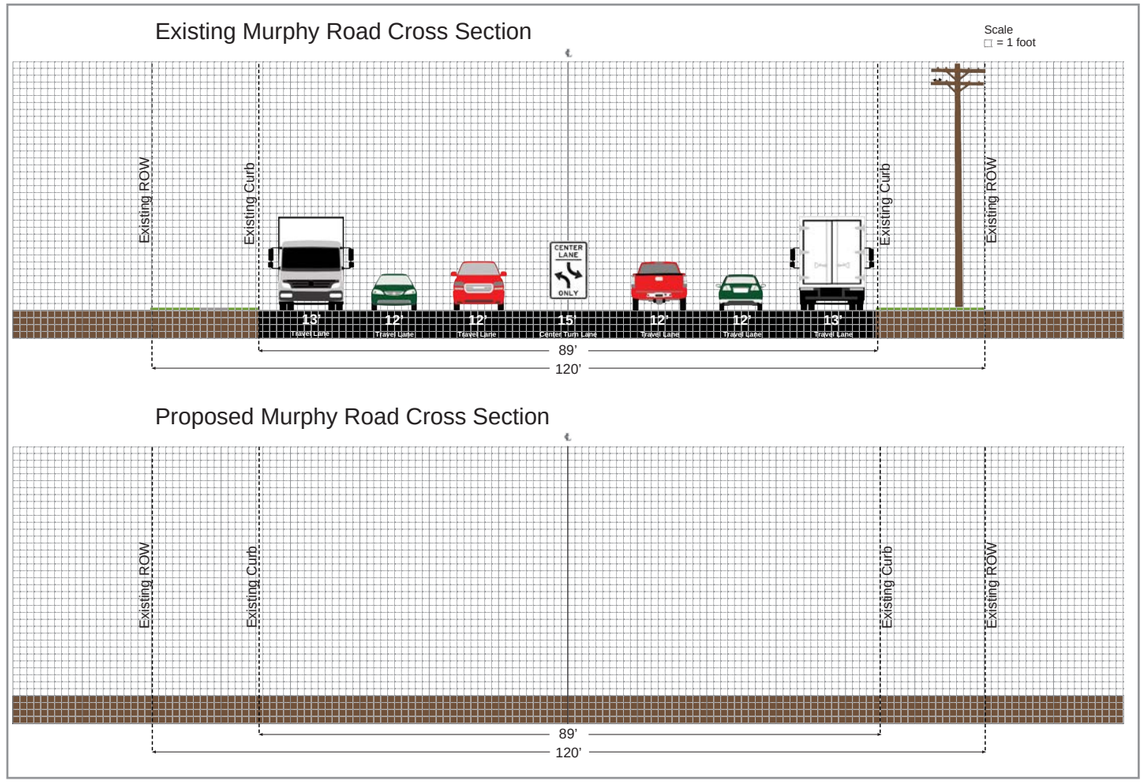


Figure 2.2 *Steering Committee Cross-section Development Workshop Board*

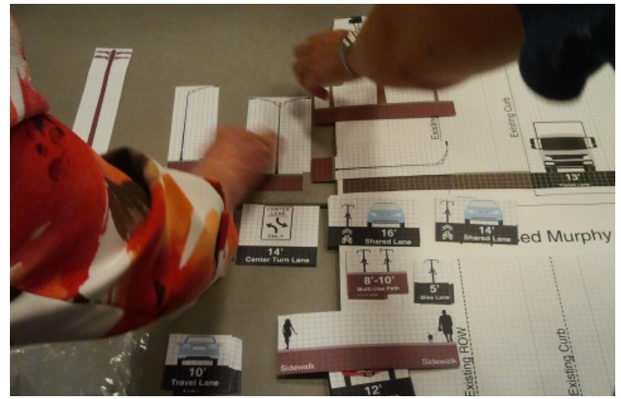


Figure 2.3 *Steering Committee Member Workshop*

PUBLIC MEETINGS

There were two public meetings as part of the study. Both meetings coincided with the business open houses, the business open house occurred during the day and the public meeting occurring during the early evening. Attendees of the public meetings provided valuable support and input to help steer the study and ensure successful recommendations. During the first public meeting, attendees were asked to provide input on what their priorities for the project were. The top issues included reducing the risk of accidents and improving mobility for both vehicles and pedestrians. Figure 2.4 summarizes the votes cast by attendees. A project time line shown the dates for the meetings related to the project is shown on the following page.

PUBLIC ENGAGEMENT STRATEGIES

The following is a summary of the multiple approaches for public engagement used for the FM 1092 Access Management Study.

- Project website – a project website was established by H-GAC (http://www.h-gac.com/go/am). The website provided information on the status of the project, as well as relevant presentations and other resources. An e-mail address specifically tied to the FM 1092 Access Management Study was also created to allow for specific queries about the project to be answered by the study team.
- Stakeholder websites – The study team worked with stakeholders to provide a link to the project website and meeting notices on stakeholder websites, (e.g., City of Stafford and Missouri City).
- Area newsletters and newspapers – The study team coordinated with the stakeholders to include project information in local newspapers.
- E-mail blasts from the Stakeholders and H-GAC – stakeholders and H-GAC sent out project information to their e-mail distribution lists. These e-mails informed the public of upcoming public meetings and provided project updates
- Flyers/posters - Flyers and postcards, in both English and Spanish were mailed to all businesses along FM 1092 within the study area. The postcards issued for the second public meeting and business open house are shown in Figure 2.5. A poster was also printed to advertise the second public meeting and business open house at the West Bellfort Park & Ride (Figure 2.6). Flyers were also distributed to local homeowners associations to share with there members.

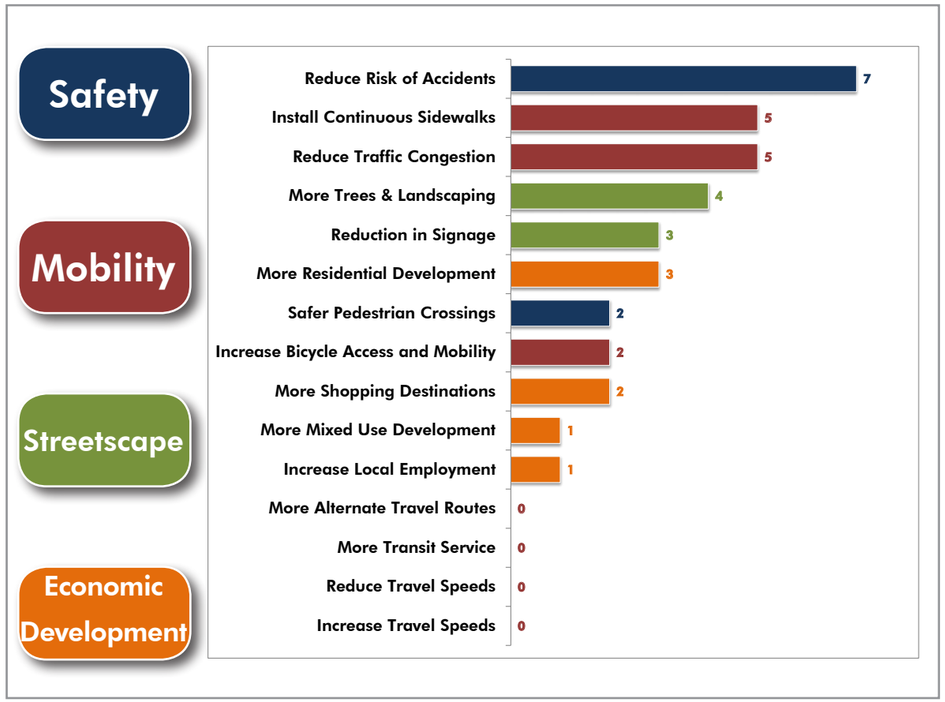


Figure 2.4 *Public Survey or Priorities from Public Meeting #1*

Figure 2.5 *Postcards in English and Spanish Used to Advertise for Public Meeting and Business Open House #2*

Figure 2.6 *Poster Installed at West Bellfort Park & Ride Advertises Public Meeting and Business Open House*

Figure 2.7 *TxDOT ITS Dynamic Message Sign Used to Publicize Public Meeting and Business Open House*

Project Timeline

FEBRUARY

1. Kickoff - February 12, 2013

MARCH

APRIL

2. Stakeholder Meeting #2 - April 16, 2013
3. Public Meeting and Business Open House #1 - April 22, 2013

MAY

JUNE

JULY

4. Stakeholder Meeting #3 - July 2, 2013

AUGUST

5. Stakeholder Meeting #4 - August 26, 2013

SEPTEMBER

6. Public Meeting and Business Open House #2 - September 23, 2013

OCTOBER

7. Stakeholder Meeting #5 - October 8, 2013
8. Public Meeting and Business Open House #2 - October 17, 2013

NOVEMBER

Existing Conditions

To better understand the current performance of the FM 1092 study corridor, an in-depth analysis of the existing conditions was conducted. The existing conditions analysis was divided into the three overarching goals of the study – Safety, Mobility, and Economic Development. The existing performance of the corridor and key intersections was determined by measures of Level of Service (LOS) as well as travel time and delays experienced by vehicles traveling along the corridor. The existing forms of alternative transportation and infrastructure were also evaluated. Historical crash records from 2009 to 2011 were obtained from TxDOT and the City of Stafford to better understand the safety hotspots along the corridor as well as determine any crash trends that can be addressed through this study. To understand the current economic climate of the corridor, the surrounding land use and economic performance was assessed and evaluated. All of these existing conditions analyses supported the recommendations developed in this study.

ROADWAY CHARACTERISTICS

FM 1092 is a TxDOT Farm-to-Market Road (FM) in southwest Harris County and northeast Fort Bend County. Typical cross sections for the corridor were documented at key points (Figure 3.1) The 3.1 mile section of FM 1092 analyzed for this access management study stretches from US 59 in the City of Houston to Dove County Road south of the City of Stafford in the City of Stafford Extraterritorial Jurisdiction (Figure 3.2).

FM 1092 is classified as a Major Thoroughfare in the City of Houston. The entire FM 1092 corridor is included as a Major Thoroughfare on the H-GAC 2012 Regional Thoroughfare Plan Update. On the Fort Bend County Major Thoroughfare Plan, the section of FM 1092 with Fort Bend County is classified as a Farm-to-Market (FM) road.

Figure 3.1 *Southbound FM 1092 at Greenbriar Drive/Mula Road*

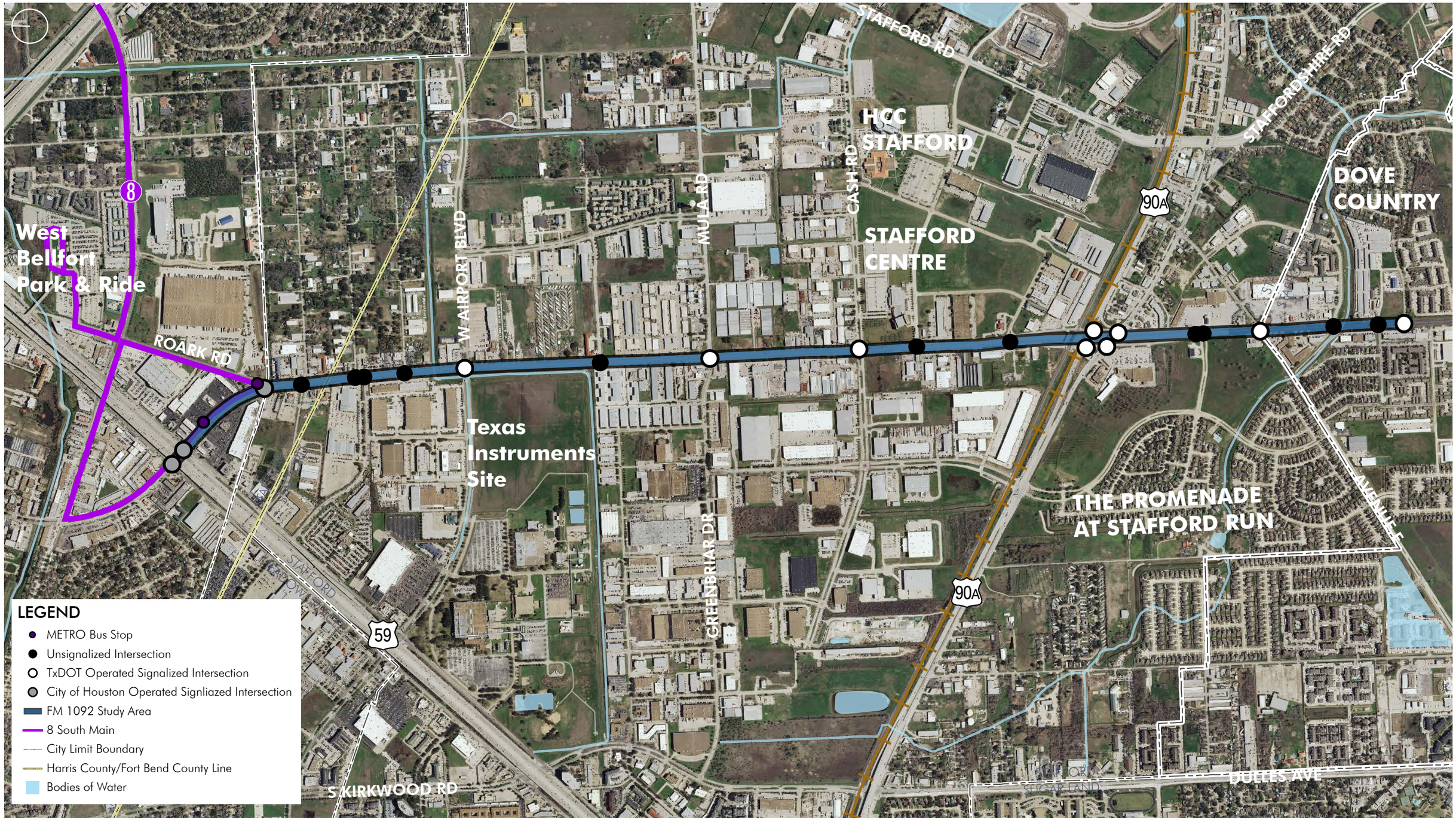


Figure 3.2 *Study Area*

The northern section of FM 1092, between US 59 and Greenbough Drive, is a seven lane roadway with six travel lanes and one two-way left-turn lane. Typical pavement width is 89' from curb to curb and the roadway right-of-way (ROW) is 120 feet. The sidewalks are discontinuous along this section. Figure 3.3 depicts the typical cross-section of the seven-lane section of FM 1092.

A drainage channel runs parallel to FM 1092 from north of the West Airport Boulevard intersection south to Fountaingate Drive adjacent to the Texas Instruments Site. This drainage channel is wide enough to require a bridge crossing instead of a culvert. The drainage canal currently limits the width of the West Airport Boulevard at FM 1092 intersection as well as future access points from FM 1092 to the Texas Instruments site.

South of Greenbough Drive, the main lanes of FM 1092 are grade separated under the Union Pacific (UP) Glidden Subdivision and US 90A. The FM 1092 underpass was constructed in 2008 and striped as four lanes with a median and shoulders on both the left and right. One northbound and one southbound FM 1092 frontage road crosses the UP Glidden Subdivision and US 90A at grade. The UP Glidden Sub experiences 50 to 60 daily trains and is currently being double tracked to improve rail operations. While there are crosswalks and wheelchair ramps at the FM 1092 at US 90A intersections, the at-grade rail crossing is a barrier for pedestrians and bicycles.

South of the underpass, FM 1092 is a five lane roadway with four travels lanes and one two-way left-turn lane. Between the underpass and Stafford Run, FM 1092 is a curb and gutter roadway. South of Stafford Run, FM 1092 is an open ditch roadway with shoulders that average 8 feet wide. The typical pavement width (excluding shoulders) is 60 feet. Figure 3.4 depicts the typical cross-section of the five-lane section of FM 1092. The speed limit for the entire corridor is 45 miles per hour (mph).

The land uses along the corridor are primarily commercial and light industrial including distribution facilities and some retail concentrated along the northern section. Because of this, truck traffic makes up 4 to 12% of trips on the corridor. South of US 90A, two residential communities have access on FM 1092. The Promenade at Stafford Run is southwest of the US 90A at FM 1092 intersection; Broadway Parkway, which intersects FM 1092, is a major access point to the development. The Promenade is expanding with new homes currently under construction adjacent to the west side of FM 1092. The Dove Country residential community is between FM 1092 and Staffordshire Road south of US 90A. Dove Country Drive, the southern terminus of the study area, is a major access point to the Dove County development. The City of Missouri City, south of the study area, is home to more residential developments adjacent to FM 1092. A more detailed discussion of surrounding land uses is included later in this chapter.

CURRENT TRAFFIC VOLUMES

Twenty-four hour traffic volumes were collected in January 2013 at three locations along FM 1092. The locations are shown in Figure 3.5 and the traffic volumes, including the percent of heavy vehicles, the D Factor, and the K Factor are included in Table 3.1. The D factor represents the directionality of the traffic during the peak periods. The K value is the ratio of peak hour traffic to the total daily traffic volume.

FM 1092, north of West Airport Boulevard, receives a number of heavy vehicles. The percentage of heavy vehicles is likely due

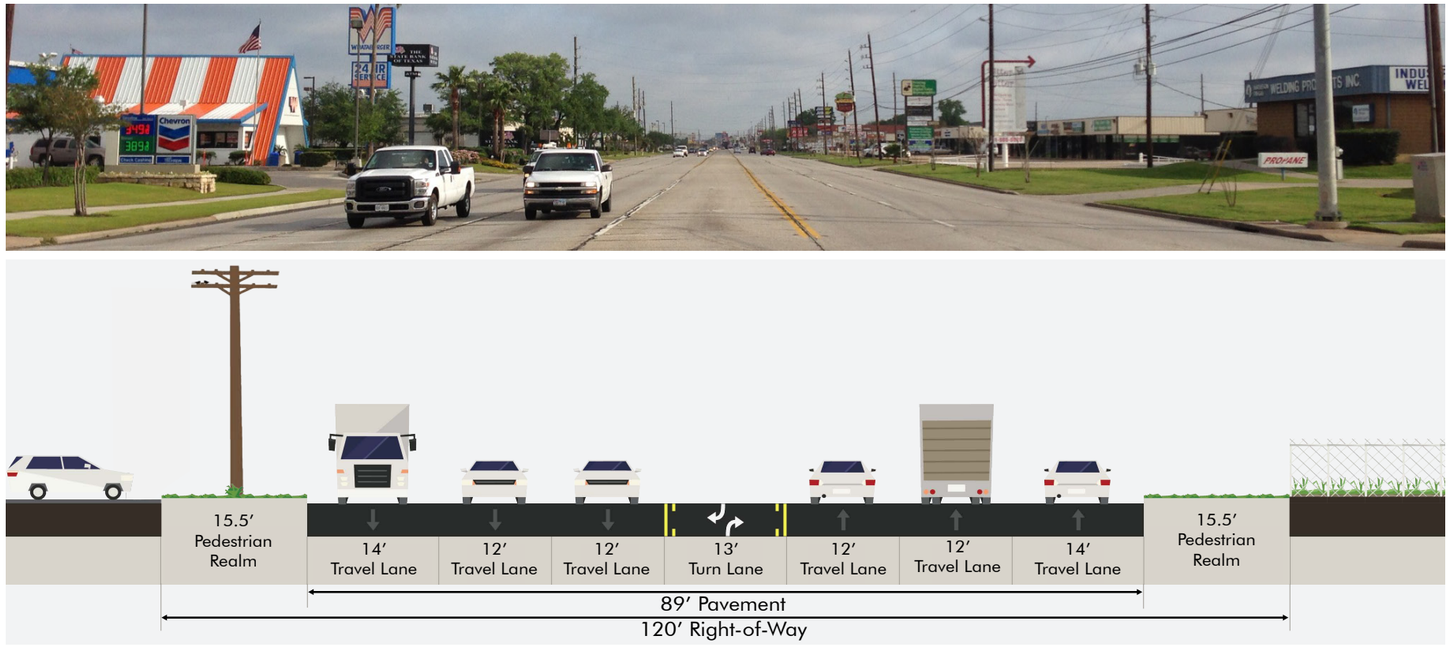


Figure 3.3 *Typical 7 Lane Cross-section - Northbound FM 1092 at Greenbriar Drive/Mula Road*

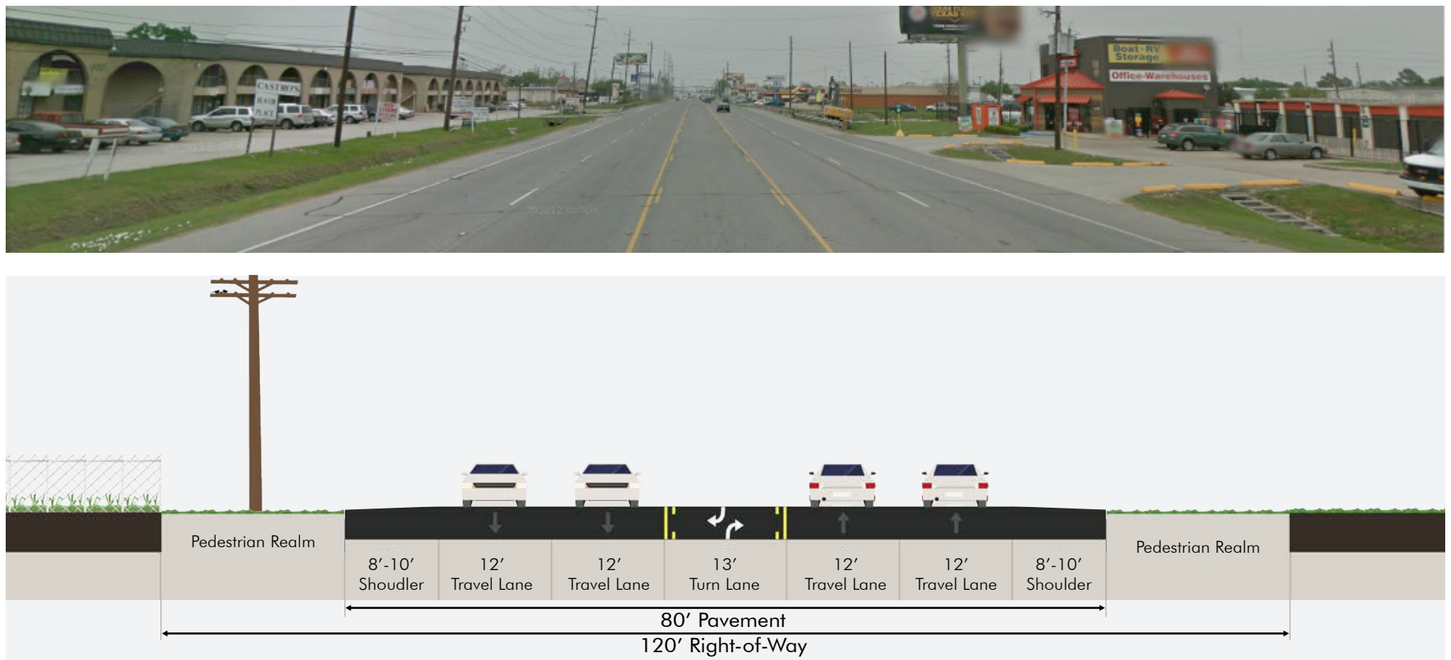


Figure 3.4 *Typical 5 Lane Cross-section - Northbound FM 1092 at Country Place Drive/Commerce Business Drive*

to the land uses along this section of FM 1092; there are many distribution facilities, including the Men's Wearhouse distribution facility along Roark Road, along this section that contribute to the percentage of heavy vehicles.

The traffic volumes south of West Airport Boulevard are higher than the volumes north of West Airport. West Airport Boulevard is a major connector for drivers traveling to and from US 59 as well as Beltway 8. The turning movement counts collected at the intersection of FM 1092 at West Airport Boulevard supports the assumption that traffic to and from FM 1092 south of West Airport Boulevard use West Airport Boulevard as a connection to US 59 and other roadways.

The variation of D values along FM 1092 represents to the varying land uses along the corridor. The traffic volumes south of US 90A have a higher D value, a result of higher peak hour directionality, than the northern sections of the corridor. South of US 90A, the land uses adjacent to FM 1092 are primarily single family residential with some retail. FM 1092 north of US 90A primarily passes commercial and industrial land uses which appear to generate more balanced all-day traffic instead of peak hour only traffic.

HISTORICAL TRAFFIC VOLUMES

Historical traffic volumes were also evaluated. TxDOT Annual Average Daily Traffic (AADT) Volume Estimates were obtained for three locations along the corridor. Figure 3.5 shows the locations of each of the count locations. The bar charts in Figure 3.6 show the yearly change in AADT from 2009 to 2011. Traffic volumes north of West Airport have declined slightly with a compound annual growth rate (CAGR) of -1.6%, the most recent period for which AADT data are available.

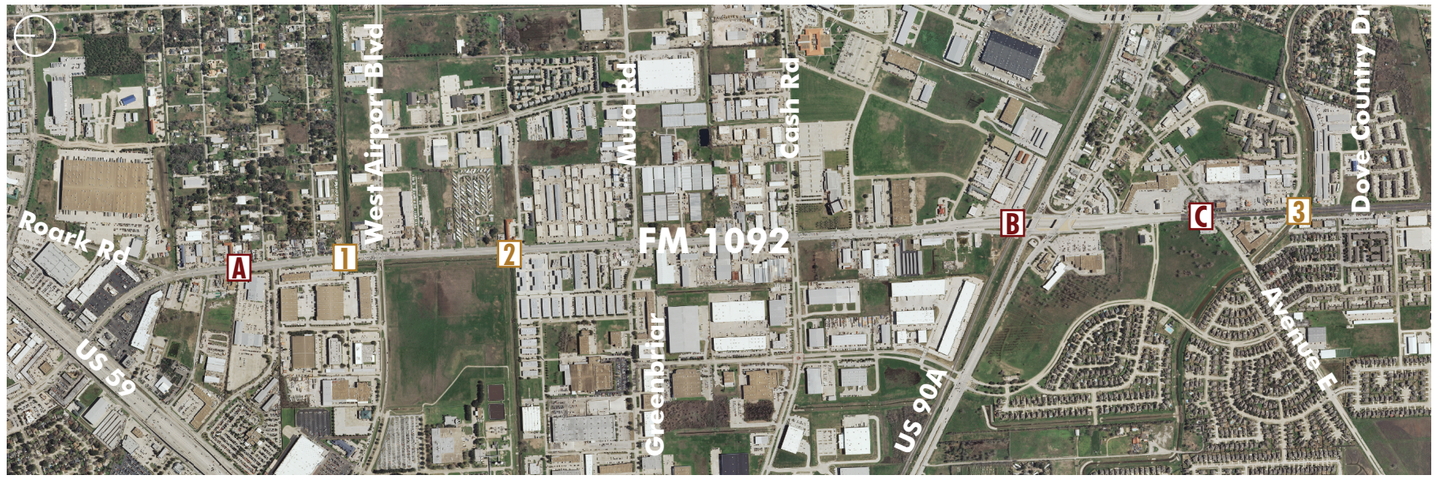
South of West Airport Boulevard has seen traffic volume increases. Traffic volumes between West Airport and US 90A have grown at an average annual rate of 12.7%. Traffic volumes south of US 90A have experienced the highest annual growth at 14.2%. There has been continued development south of the study area in Missouri City and surrounding Fort Bend County that has contributed to the increase in traffic volumes south of West Airport Boulevard along the corridor. While there has been considerable increase in traffic along the study corridor since 2009, the AADT is less than 33,000, resulting in a manageable amount of daily traffic for the seven lane section of FM 1092. The reason AADT is lower that current weekday counts is that they include adjustment factors for weekend and seasonal variations.

CORRIDOR OPERATIONS

The 3.1 mile long FM 1092 Study Area includes 12 signalized intersections and 11 unsignalized intersections, stop-controlled on the minor street. The signalized intersections are marked in Figure 3.2. The intersections at US 59 and Roark Road are maintained by the City of Houston. All of the other intersections are maintained by the TxDOT Houston District.

The intersection of FM 1092 at the US 59 frontage roads is a diamond intersection with cycle lengths varying between 90 and 120 seconds, depending on the time of day. The intersections at the US 59 frontage roads are coordinated with the intersection of the US 59 frontage roads at West Bellfort Avenue. The intersection of FM 1092 at Roark Road runs at a 120 second cycle length during the peak periods and a 90 second cycling length during the off peak.

All of the signals controlled by TxDOT, with the exception of the frontage road intersections at US 90A, were retimed in September of 2011. With the new timing



LEGEND

1 2013 Count Location

A TxDOT AADT Location

Figure 3.5 *Count Locations*

Location	24 Hour Total Vehicles	Percent Heavy Vehicles*	D Factor AM Peak 7:30-8:30	D Factor PM Peak 5:00- 6:00	K
1 North of West Airport Boulevard	37,700	12%	58%	55%	8.4%
2 South of West Airport Boulevard	43,100	4%	59%	55%	8.1%
3 South of US 90A	40,300	8%	70%	63%	8.6%

* Heavy Vehicle classified as vehicle with length of 25 feet or more

Table 3.1 *2013 Traffic Count Volumes and Characteristics (Not AADT Adjusted)*

Source: TEI

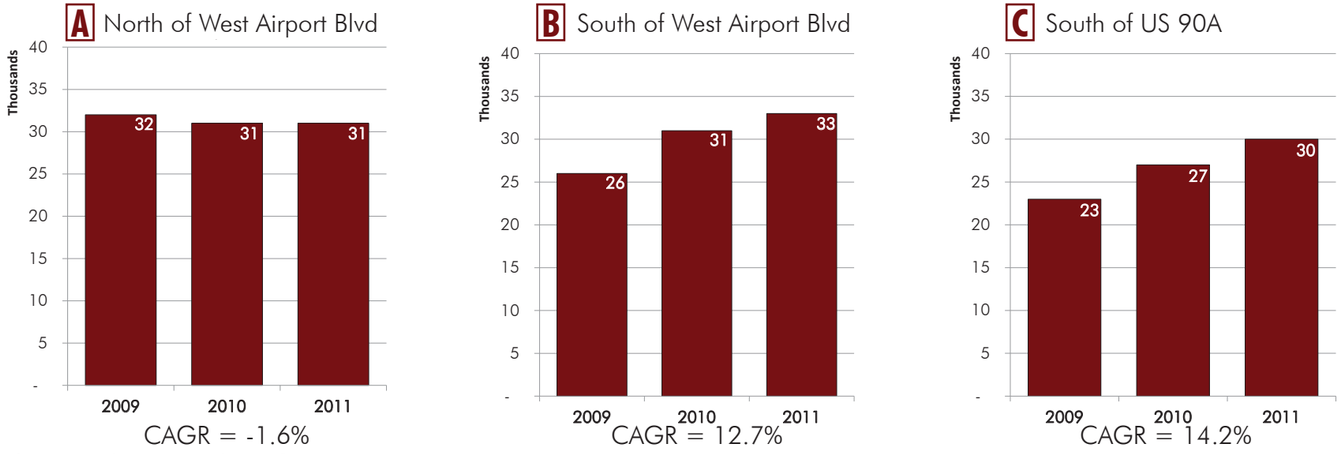


Figure 3.6 *Historical TxDOT AADT*

Source: TxDOT, 2009, 2010, 2011

implementation, all signalized intersections from West Airport Boulevard south to SH 6 are coordinated, except for Avenue E. Due to high traffic volumes and oversaturation, Avenue E runs free during the AM (6:45 to 8:00 AM) and PM (4:00 to 7:00 PM) peak periods. Cycle lengths range from 126 to 130 seconds depending on the time of day. Currently the corridor operates with Time Based Coordination for its traffic signal as their is not signal interconnect for the TxDOT signals along the corridor. Due to issues such a clock drift, signals can easily fall out of coordination, lowering overall corridor performance. An inventory of all the signalized intersections was developed and is included in Appendix A. An example of what the inventory includes is depicted in Figure 3.7.

CORRIDOR LEVEL OF SERVICE

While FM 1092 is classified as a farm-to-marked road, the roadway operates as an urban street. The 2010 Highway Capacity Manual contains a methodology to generalize daily service volumes along a corridor to determine a corridor's Level of Service (LOS). The LOS of a corridor is a measure of the volume to capacity ratio of that corridor and the corridors overall performance. Exhibit 16-14 from the Highway Capacity Manual was used for general planning purpose to determine a roadway's LOS. Table 3.2 shows the elements of Exhibit 16-14 that apply to the FM 1092 study corridor. The complete table is included in Appendix B.

The 24-hour traffic volumes, presented in Table 3.1, result in a LOS between C and D for the seven lane section of the FM 1092 study corridor. South of 90A, where FM 1092 has four travel lanes and one two-way left-turn lane, the 24 hour traffic volumes were determined to be over 40,000 veh/day, resulting in a corridor LOS of F for the five lane section of FM 1092. There are currently

LEVEL OF SERVICE

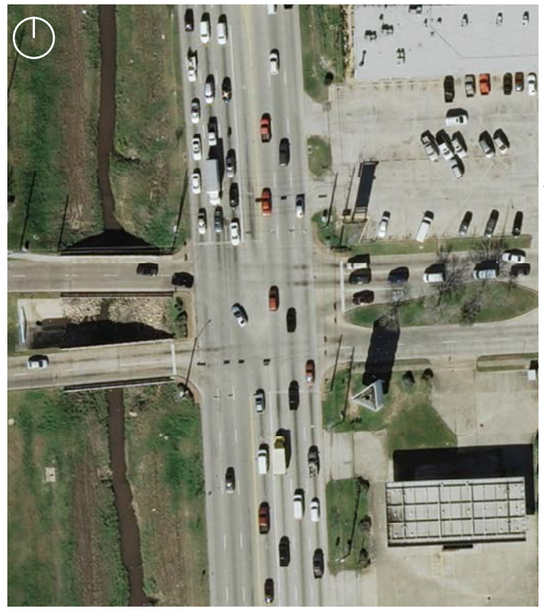
Level of service (LOS) describes the quality of traffic operating conditions and is rated from LOS A to LOS F. LOS A represents the most desirable condition with free-flow movement of traffic with minimal delays. LOS F generally indicates severely congested conditions with excessive delays to motorists. Intermediate grades of LOS B, LOS C, LOS D, and LOS E reflect incremental increases in congestion and delay.

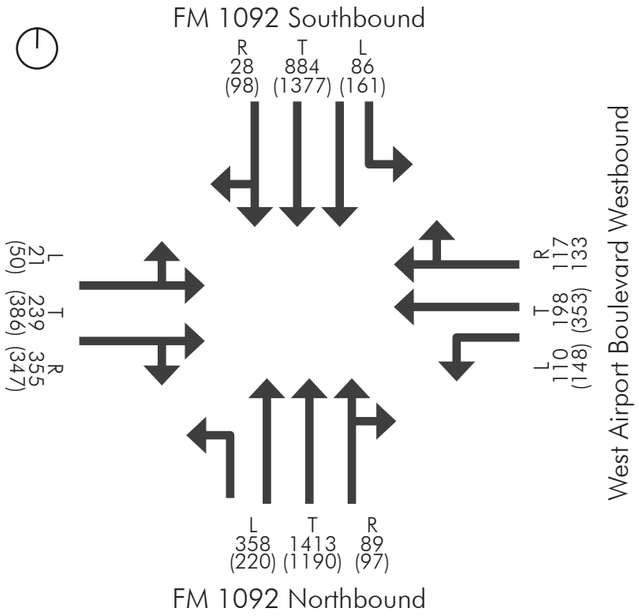
LOS can be measures along a corridor as measure of volume to capacity or at an intersection as measure of average delay per stopped vehicle. The 2010 *Highway Capacity Manuel* outline guides for both assessments.

			Four Lane Roads			Six Lane Roads		
Posted Speed	K factor	D factor	LOS C or Better	LOS D	LOS E	LOS C or Better	LOS D	LOS E
45 MPH	0.09	0.55	21.4	37.2	37.9	31.9	54	54.3
		0.60	19.6	34.1	34.8	29.2	49.5	49.8
	0.10	0.55	19.3	33.5	34.1	28.7	48.6	48.9
		0.60	17.7	30.7	31.3	26.3	44.5	44.8
	0.11	0.55	17.5	30.5	31	26.1	44.2	44.4
		0.60	16.1	27.9	28.4	23.9	40.5	40.7
General Assumptions include: No Roundabouts or all-way stop controlled intersections along the facility; coordinated, semi-actuated traffic signals; arrival type 4; 120-s cycle time; protected left turn phases; 0.45 weighted average g/C ratio; exclusive left turn bays with adequate storage provided at traffic signals; no exclusive right turn lanes provided; no restrictive median; 2-mile facility length; 10% traffic turns left, 10% turns right at each traffic signal; peak hour factor=0.92; and base saturation flow rate - 1900pc/hr/ln								
30-mph assumes signal spacing = 1050 ft and 20 access points/mi								
45-mph assumes signal spacing = 1500 ft and 10 access points/mi								
* Values interpolated from data for 30 mph and 45 mph								

Table 3.2 *2010 Highway Capacity Model Level of Service Planning Tool for Urban Street Facilities*
Source: 2010 Highway Capacity Manual - Exhibit 16-14

FM 1092 @ WEST AIRPORT BOULEVARD





AM Peak Hour | 7:15 - 8:15
(PM) Peak Hour | 5:00 - 6:00

SIGNAL INFORMATION

PHASING	Split
SIGNAL TYPE	Span Wire
DETECTION TYPE	Inductive Loops
CROSSWALKS	No
WHEELCHAIR RAMPS	No
PEDESTRIAN BUTTONS	No
OTHER NOTES	• Bridge across drainage ditch west of intersection has limited the ability to widen the westbound approach to accommodated more through-lanes or turn-lanes. • Southbound turning radius is very tight and can be limiting for a truck with a long wheel base.

Figure 3.7 *Example of Intersection Geometry Summary Sheets included in Appendix B*

plans to expand FM 1092 to six travel lanes south of US 90A. With the expansion of FM 1092, current traffic volumes south of US 90A will result in a corridor LOS of D with room for additional traffic volume growth. Therefore, it can be generalized that the corridor level of service is at an acceptable level along FM 1092 and the major mobility issues and resultant delay are a result of intersection LOS.

INTERSECTION LEVEL OF SERVICE

The intersections along the FM 1092 study corridor were evaluated using the Synchro traffic analysis software package based on the methodologies outlined in the Highway Capacity Manual (HCM), which is published by the Transportation Research Board. The operating conditions at an intersection are graded by the LOS experienced by drivers. LOS for signalized intersections reflects the operation of the intersection as a whole. LOS is determined by the overall delay at an intersection that is measured in seconds per vehicle. Table 3.3 shows the upper limit of delay associated with each level of service for signalized intersections.

Level of Service (LOS)	Signalized Intersection
A	< 10 seconds
B	< 20 seconds
C	< 35 seconds
D	< 55 seconds
E	< 80 seconds
F	≥ 80 seconds

Table 3.3 *Intersection Level of Service Delay Thresholds in Seconds*
Source: Highway Capacity Manual, 2010

Table 3.4 summarizes the existing conditions LOS for all signalized intersections along the FM 1092 corridor. The intersections were evaluated with the existing lane configurations, traffic volumes, and traffic control devices. The calculations for the signals were based on turning movement counts collected in April 2011 and January 2013.

In addition to delay and the corresponding Level of Service, a secondary means of evaluation is often utilized to assess the overall capacity of the intersection. This evaluation is a ratio of volume to capacity (v/c) that reflects, regardless of delay, the ability to

	FM 1092 Signalized Intersection	AM Peak Hour LOS	AM Peak Hour Delay (Seconds per Vehicle)	AM Peak Hour Volume/ Capacity	PM Peak Hour LOS	PM Peak Hour Delay (Seconds per Vehicle)	PM Peak Hour Volume/ Capacity
1	West US 59 Frontage Rd[1]	C	26.9	0.48	D	39.8	**0.94**
2	East US 59 Frontage Rd[1]	C	20.0	0.53	D	36.9	0.63
3	Roark Rd[1]	A	5.2	0.52	B	18.3	0.70
4	West Airport Blvd[2]	C	31.6	0.82	D	51.1	**0.95**
5	Greenbriar Dr / Mula Rd[2]	B	18.7	0.69	C	24.1	0.73
6	Cash Rd[2]	C	24.9	0.69	C	22.8	0.57
7	Westbound US 90 & Northbound FM 1092[1]	C	26.4	0.49	B	18.7	0.48
8	Eastbound US 90 & Northbound FM 1092[1]	B	14.6	0.60	B	11.4	0.44
9	Westbound US 90 & Southbound FM 1092[1]	A	7.5	0.49	B	14.0	0.63
10	Eastbound US 90 & Southbound FM 1092[1]	C	21.2	0.46	B	19.6	0.40
11	Avenue E[2]	**E**	**58.8**	**1.01**	**E**	**62.6**	**1.04**
12	Dove County Dr[2]	A	5.3	0.75	A	5.1	0.74

[1] Turning movement counts collected in January 2013
[2] Turning movement counts collected in April 2013

Table 3.4 *Existing Intersection Level of Service Delay*

Figure 3.8 *Signalized Intersections*

accommodate the existing or projected traffic volumes over the course of a peak hour. A v/c ratio of 1.00 reflects the capacity of the intersection or movement. The LOS rating deemed acceptable varies by community, facility type, and traffic control device. For this study area, LOS D has been assumed to be the minimum desirable standard for signalized intersections. However, worse levels of service of E and F may be considered acceptable for some situations due to limited available mitigation measures.

The analyses indicate that all of the existing intersections operate with acceptable levels of service with the exception of FM 1092 at Avenue E, which operates at a LOS E in both the AM and PM Peak Periods. Other intersections are nearing capacity with a v/c ratio over 0.90, specifically at the Southbound US 59 Frontage Road and at West Airport Boulevard. Avenue E experiences a high number of left-turning movements during the peak periods which increases the overall delay of the intersection. The highest left-turning movements are from Avenue E to both northbound and southbound FM 1092. FM 1092 intersects Avenue E at an skewed angle, due to the alignment of Avenue E. Many vehicles use Avenue E as a bypass to and from US 90A from development south of the study corridor.

AVERAGE SPEED AND TRAVEL TIME

Travel time runs were conducted to determine the average speed of each link along the study corridor as well as the total travel time of the corridor during both the AM and PM peak periods. Three runs were conducted for northbound and southbound travel in both the AM and PM peak periods; the average travel times are depicted in Figures 3.9 through 3.12 as distance versus time plots. Below each plot is the corresponding intersection LOS for that intersection during that time periods and corresponds to Traffic Operation Assessment calculations in Table 3.4. Travel time along the corridor in the peak periods ranges from 6 minutes to 11 minutes.

The distance versus time plots show the progression of the corridor during the peak periods and are a way to mimic what a driver experience while traveling down FM 1092. During the AM peak, travel times along the 3.1 mile corridor are between six and seven minutes. During the PM peak period, the northbound travel time is seven minutes. The highest amount of delay is experienced while traveling southbound during the PM peak period, the total travel time during this time is almost double the expected travel time during the AM peak period. The cause of the increase in delay during the PM peak is primarily the southbound approach at the intersection of FM 1092 at Avenue E. The Avenue E intersection operates at a LOS of E, which causes excessive delay and decreases the travel time along the corridor substantially.

As the distance versus time plots suggest, the number of intersections along a corridor as well as the performance of those intersections can greatly affect the mobility of the corridor. Figures 3.13 and 3.14 show the average travel speeds between each signalized intersection along the corridor.

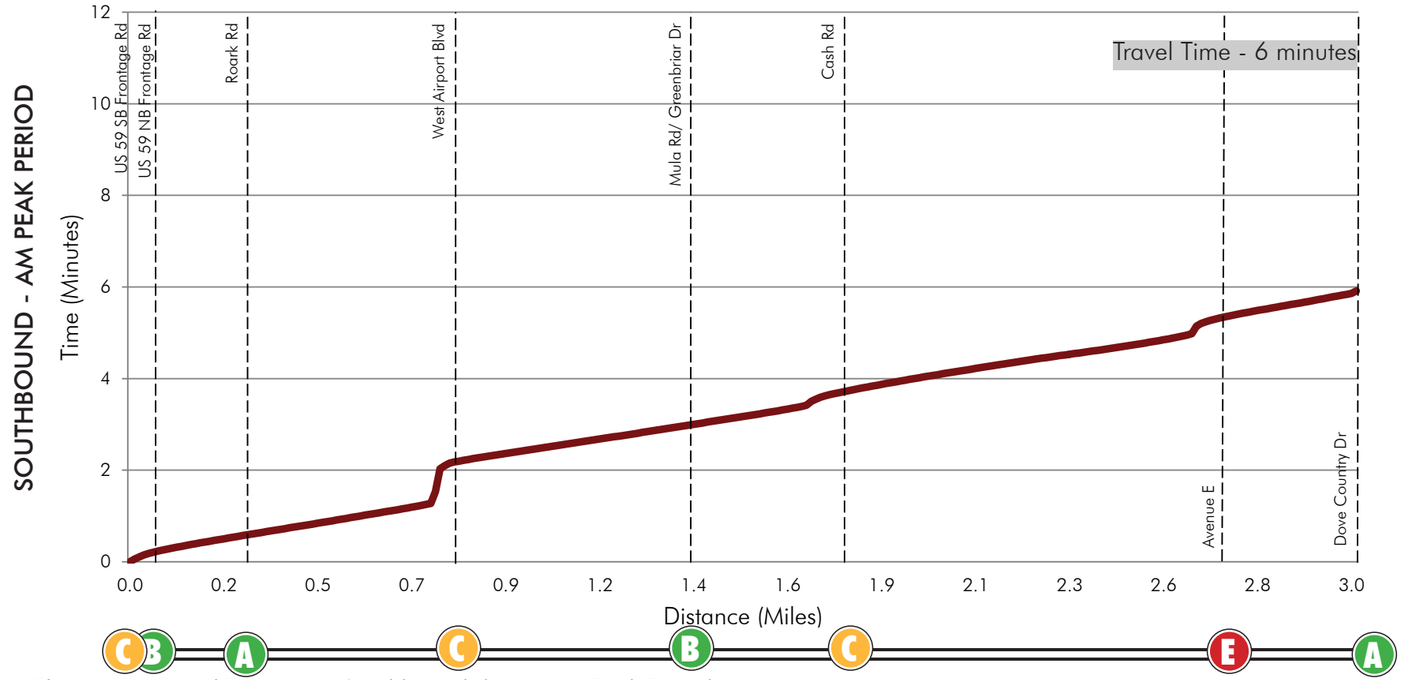


Figure 3.9 *Travel Time Run - Southbound during AM Peak Period*

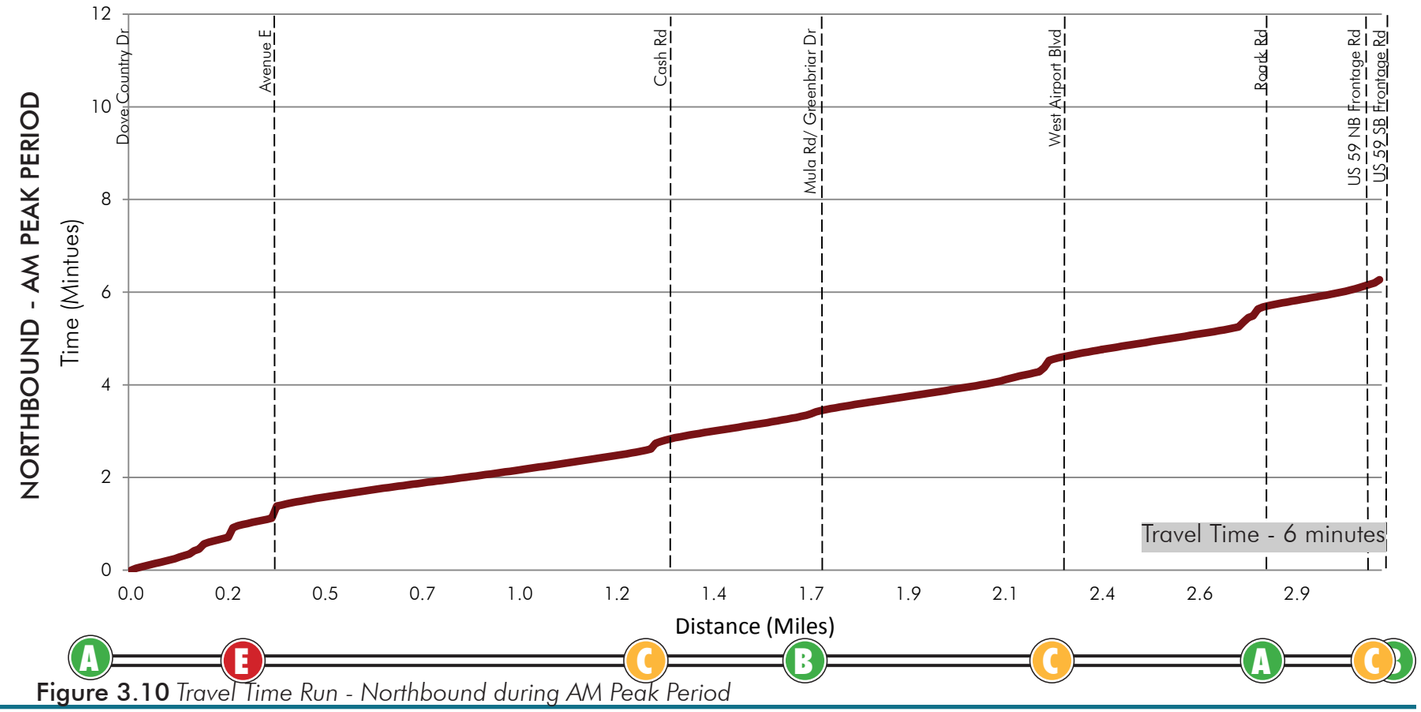


Figure 3.10 *Travel Time Run - Northbound during AM Peak Period*

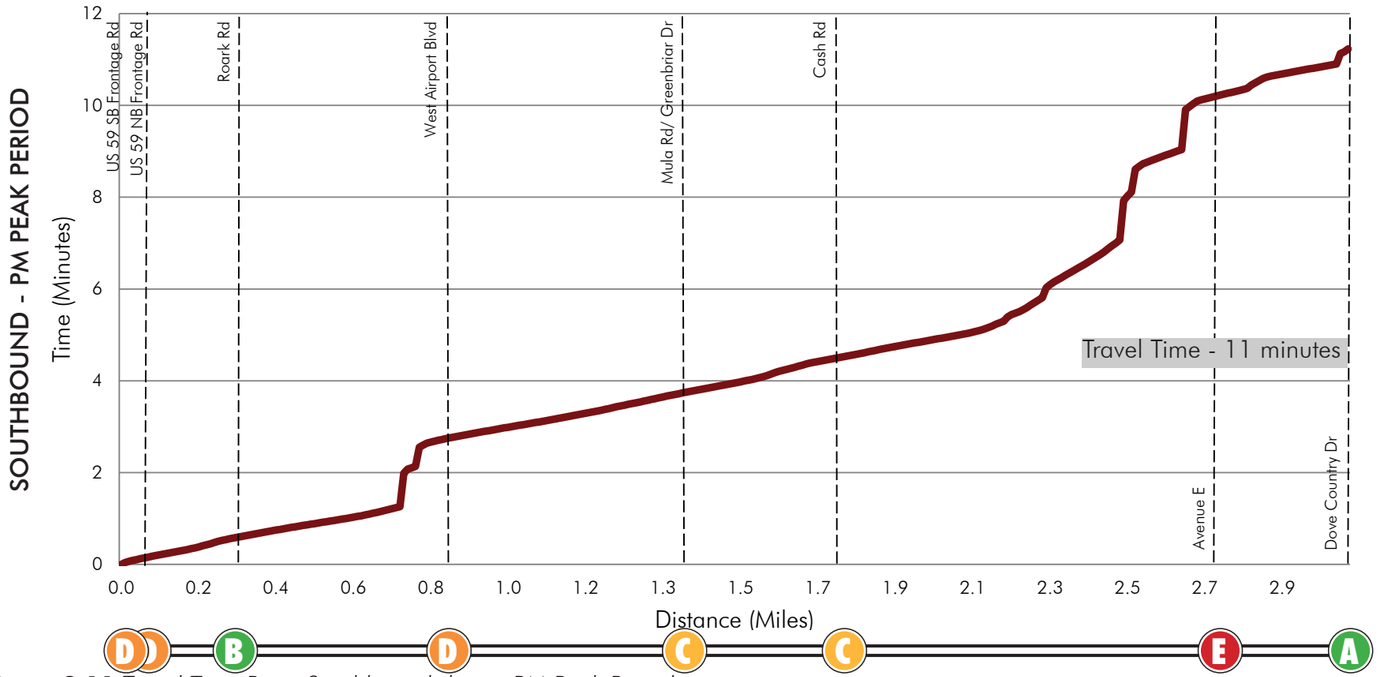


Figure 3.11 *Travel Time Run - Southbound during PM Peak Period*

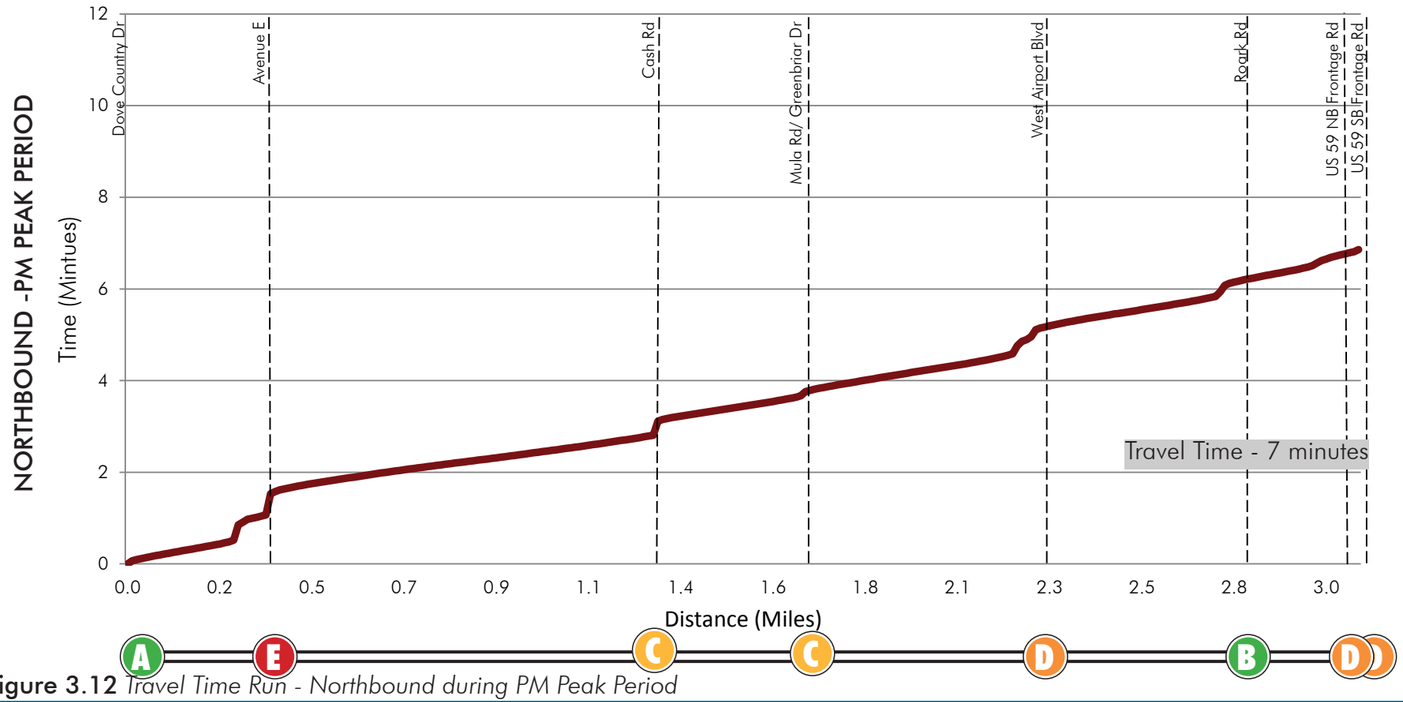


Figure 3.12 *Travel Time Run - Northbound during PM Peak Period*

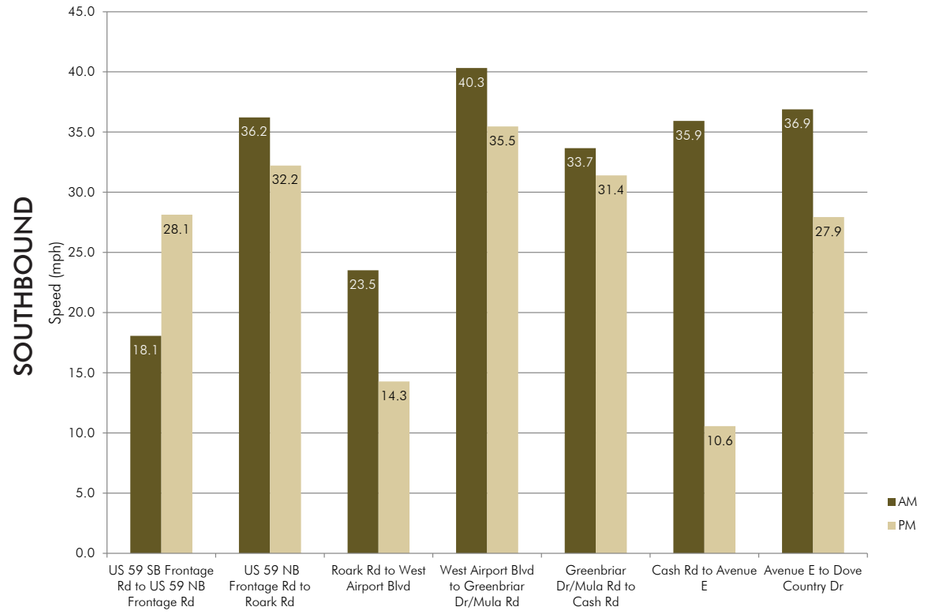


Figure 3.13 *Average Travel Speed by Segment for Southbound Travel*

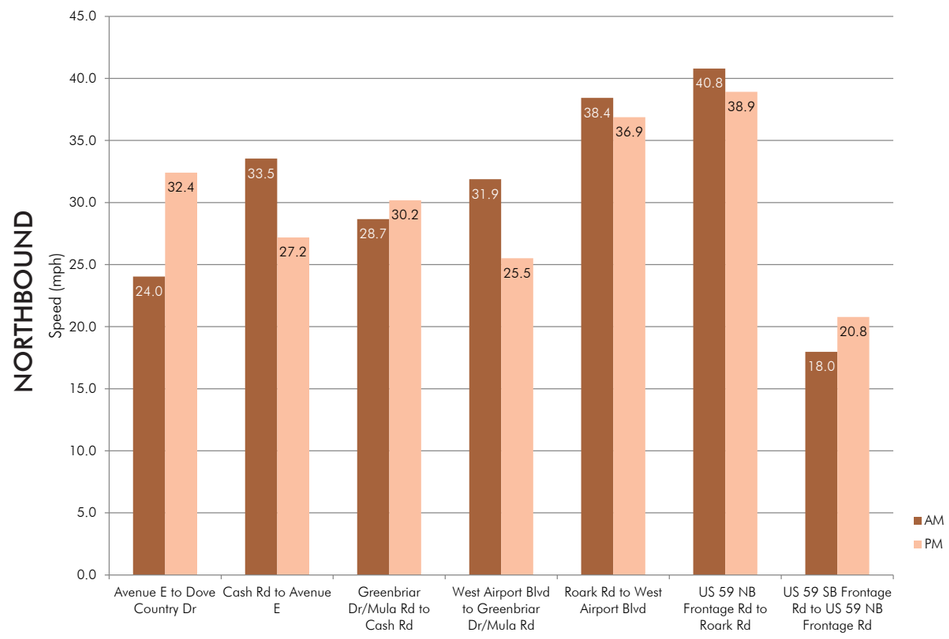


Figure 3.14 *Average Travel Speed by Segment for Northbound Travel*

CORRIDOR MOBILITY

FM 1092 plays a dual role as both a main economic corridor for the City of Stafford as well as a regional connector for the surrounding municipalities. One of the reasons for the dual roles of FM 1092 is because the corridor is located in an area with limited roadway network connectivity. While the area has strong regional connections due to US 59, US 90A, SH 6, and Beltway 8, the connections between these major regional connectors is limited. Figure 3.15 shows the surrounding roadway network near the FM 1092 study area.

The roadway network in Figure 3.15 is on top of a map background which shows the connectivity of the surrounding area as a measure of intersections per square mile. Intersections per square mile are a common measure of roadway connectivity. More intersections per square mile typically results in a more connected roadway network and more alternate paths to disperse vehicular traffic; stronger connectivity also improves the pedestrian and bicycle environment by providing more direct travel options.

The low connectivity values indicate the need for alternative roadways within the region. FM 1092 is one of only three roadways that connect SH 6 to US 59 or Beltway 8. The other two roadways are Dulles Avenue/ Kirkwood Road and the Fort Bend Parkway Toll Road. Between US 59 and Beltway 8, south of the US 59 and Beltway 8 intersection, there are only three East-West connections: West Bellfort Street, West Airport Boulevard, and US 90A.

Overall, in an area of roughly 37 square miles, a major roadway grid of only eight roads is present. This limited connectivity result in a few roadways carrying a high percentage of area traffic. With the continued development of Fort Bend County, the need for and value of alternate traffic routes is likely to increase.

RTP PROJECTS

The current H-GAC 2035 RTP Update includes 10 capacity enhancing roadway projects near the FM 1092 study area which will begin to address some capacity and connectivity issues. They are listed below with a corresponding number in Figure 3.15 where applicable. In depth descriptions of each project are included in Appendix C.

1. FM 1092*
   Access Management medians between Missouri City City Limit and Hampton Drive
2a. FM 1092
   Widen from 4-lanes to 6-lanes between US 90A and Lexington Boulevard
2b. FM 1092
   Widen from 4-lanes to 6-lanes between Lexington Boulevard and Cartwright Road
2c. FM 1092
   Widen from 4-lanes to 6-lanes between Cartwright Road and SH 6
3. FM 1092 @ 5th Street
   Intersection improvements including one additional northbound and one additional southbound through lane
4. FM 1092 @ El Dorado Blvd
   Intersection improvements including one additional northbound and one additional southbound through lane
5. Cash Road
   New 4-lane roadway from current terminus of Cash Road, west of FM 1092, to Kirkwood Road
6. West Bellfort Street
   Widen to 6-lane divided roadway from FM 1876/ Eldridge Road to the Fort Bend/Harris County Line
7. Beltway 8
   Widen from 4-lanes to 8-lanes from US 59 to SH 288
8. Brand Lane
   Widen from 2-lanes to 4-lanes from US 90A to Avenue E.

* Recommendation from FM 1092 - Missouri City Access Managements Study

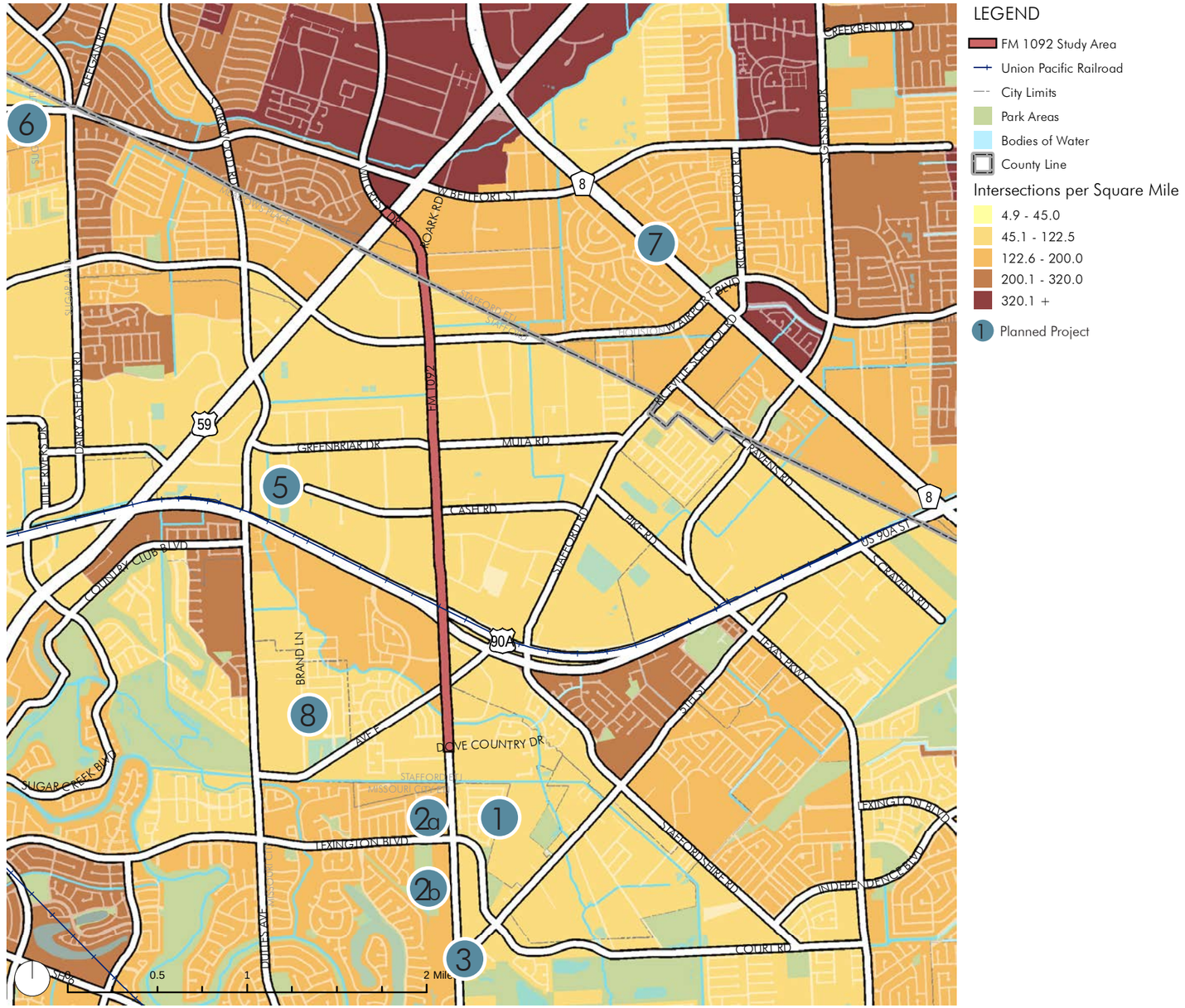


Figure 3.15 *Roadway Connectivity and locations of RTP projects.*
Source: US Census TIGER Shapefiles, 2011 and Houston-Galveston Area Council 2035 RTP Update

TRANSIT

There are six bus routes that operate along or near the FM 1092 study area that also serve the West Bellfort Park & Ride (P&R). The West Bellfort P&R is a facility operated by the Metropolitan Transit Authority of Harris County (METRO) located north of the study area along Roark Road. The West Bellfort P&R serves two local METRO Routes, three METRO P&R routes, and one Fort Bend County Transit route. Fort Bend County Transit operates three Park & Ride routes along US 59 from Fort Bend County to major employment centers in Harris County; the Greenway Plaza route stops at the West Bellfort P&R. Figure 3.16 depicts the transit network near the study area. Table 3.5 summarizes the six routes that serve the West Bellfort Park & Ride.

The majority of the FM 1092 corridor, including the segment south of Roark Road in the City of Stafford, is outside of the METRO service area, which ends at the Harris/Fort Bend County line. Two METRO bus stops directly serve the FM 1092 study corridor. The two stops are along northbound FM 1092 between Roark Road and US 59 and are served by the 8 South Main southbound route only prior to the routes terminus at the West Bellfort P&R. The approximate daily boarding between both stops is 10 riders and the approximate daily alightings at both stops is over 55 riders.

The West Bellfort P&R produces the highest boarding activity amongst all park & ride facilities within the entire METRO system. The total number of boarding's onto METRO bus routes at the West Bellfort P&R is over 2,040 on an average weekday. Based on this level of usage West Bellfort also has one of the highest parking utilizations in the system (97.7% of the site 2,040 parking spaces were utilized during METRO's October 2013 vehicle count)

The route that is the primary driver of the high number of boardings at the West Bellfort P&R is the 265 West Bellfort which serves Downtown Houston. Due to high demand, route 265 operates at 3 to 7 minute headways during the morning and afternoon peak periods and the existing parking lot is near capacity on most days.

In addition to the fixed route service at West Bellfort, there are a number of STAR Vanpools that operate out of the West Bellfort Park & Ride lot.

Demand Response

While the City of Stafford, which makes up a majority of the study corridor, is not served by fixed route transit service, the City is served by demand response service through the Fort Bend County Public Transportation Department. Fort Bend country provides dial-a-ride service to anyone within the county who wishes to travel within the county and requests a ride with a 24-hour notice for a small fee (typically $1). In 2011, 9,400 demand response transit trips were provided to residence of the city of Stafford, resulting in one of the highest per capita rates for cities within Fort Bend County.

HOT/HOV LANE

The West Bellfort Park & Ride also provides direct access to the US 59 South (Southwest Freeway) HOV/HOT Lane via a T-Ramp. METRO High Occupancy Vehicle (HOV) lanes have been operation along US 59 since 1993, but starting in June 2012, the HOV were converted to HOV/HOT lanes which allows single occupancy drivers to use the lanes by paying a toll through their toll tag. HOV/HOT lanes still allow carpools, vanpools, and motorcycles to travel for free. The HOV/HOT lane along US 59 South extends from the Fort Bend/Harris County Line to Spur 527 near downtown Houston.

Currently, the HOV/HOT toll pricing varies between $1.00 and $4.50 based on the time of day. To ensure high levels of service for buses and other approved HOV vehicles, the lanes are closed to tolling during peak times. Therefore, inbound single occupancy drivers can use the HOT lane from 5:00am to 7:00am and 8:00 to 11:00am; outbound drivers can only use the HOT lane on US 59 from 1:00pm to 5:00pm and 6:00pm to 8:00pm.

The quarterly report produced by METRO to summarize HOV/HOT operations for the quarter ending in June 2013, stated a total corridor utilization for the US 59 South HOV lane, not including tolled vehicles, was 7,117 daily vehicles and 23,820 passenger trips. For this quarter, an additional 766 tolled vehicles used the HOV/HOT lanes. During the AM peak period, 13% of vehicles are single occupant vehicles. During the PM peak period, 16% of vehicles are single occupant vehicles.

Travel speeds within the HOV/HOT lane average between 50 and 60 mph, resulting in an advantage over the US 59 main lanes during peak travel times.

Route	8 South Main	19 Wilcrest Crosstown	265 West Bellfort	269 Westwood/ West Bellfort	292 West Bellfort/ Westwood	FB Greenway
Weekday Ridership (Entire Route)	2,866 (10 boardings, 55 alightings on FM 1092)	1,201	2,308	16	498	343
Daily Southbound/ Outbound Trips	46	30	70	2	20	10
Daily Northbound/ Inbound Trips	42	30	56	1	23	9
Peak Hour Headways	15-20 minutes	20 minutes	3 to 7 Minutes	Off Peak Service Only (Late Evening)	15 Minutes	15 Minutes
Major Destinations	Herman Park, MFAH, Rice, Texas Medical Center, TMC Transit Center, Wheeler Station	Wilcrest from West Bellfort Park & Ride to North of IH 10	Downtown Houston	Downtown Houston	Texas Medical Center	Greenway Plaza

Source: Metropolitan Transit Authority of Harris County (METRO)

Table 3.5 *Summary of Transit Routes serving Study Area*

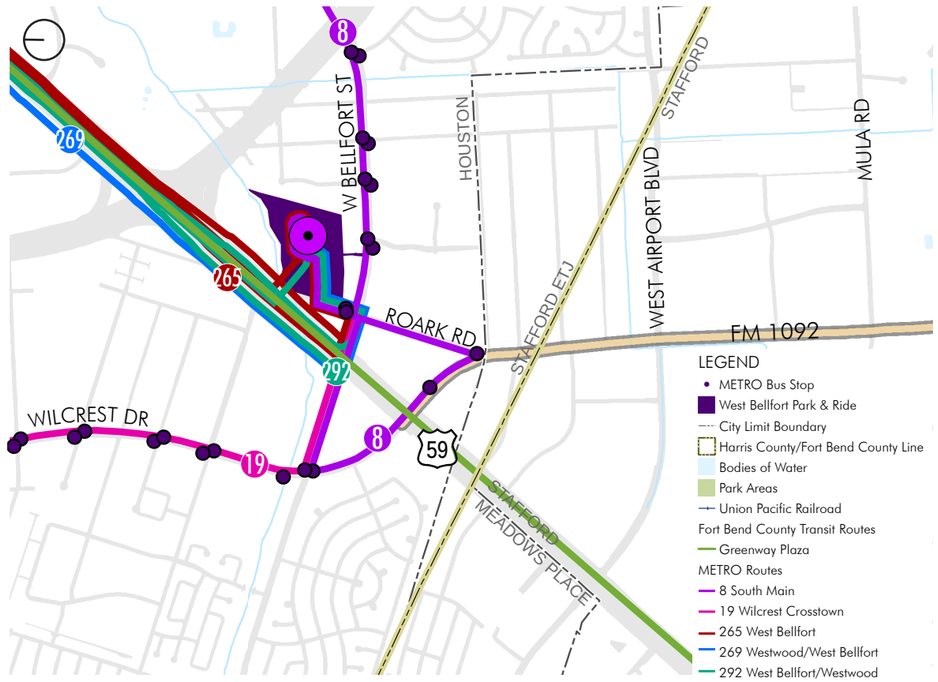


Figure 3.16 *Transit Network near FM 1092 Study Area*

SIDEWALKS

There are limited pedestrian facilities along FM 1092 making walking along the corridor a challenge. Sidewalks are discontinuous and typically are only located in front of retail development. Figure 3.17 shows the locations with existing sidewalks along FM 1092. Pedestrians use the corridor despite the absence of sidewalks. Many areas without sidewalks have visible walking paths worn in the grass, as shown by the photograph in Figure 3.18. Pedestrians walking in areas without sidewalks as well as crossing the street were often seen during site visits to the corridor.

Crosswalks with wheelchair ramps are only present at the signalized intersections of Roark Road, Avenue E, US 59 North and South Frontage Road, and the FM 1092 frontage road intersections with US 90A. The lack of Americans with Disabilities Act (ADA) compliant pedestrian infrastructure creates an environment that is inaccessible to mobility challenged people, people in wheelchairs and others such as individuals pushing strollers.

The two-mile stretch between Roark Road and US 90A provides no ADA compliant pedestrian crossings. While the intersections at US 90A do provide crosswalks and wheel chair ramps, the intersections are south of the UP Glidden Subdivision which is a major pedestrian barrier. Therefore, pedestrians closer to US 90A than Roark Road wanting to legally cross FM 1092 would need cross the railroad to reach the ADA compliant crossing at the US 90A intersection.

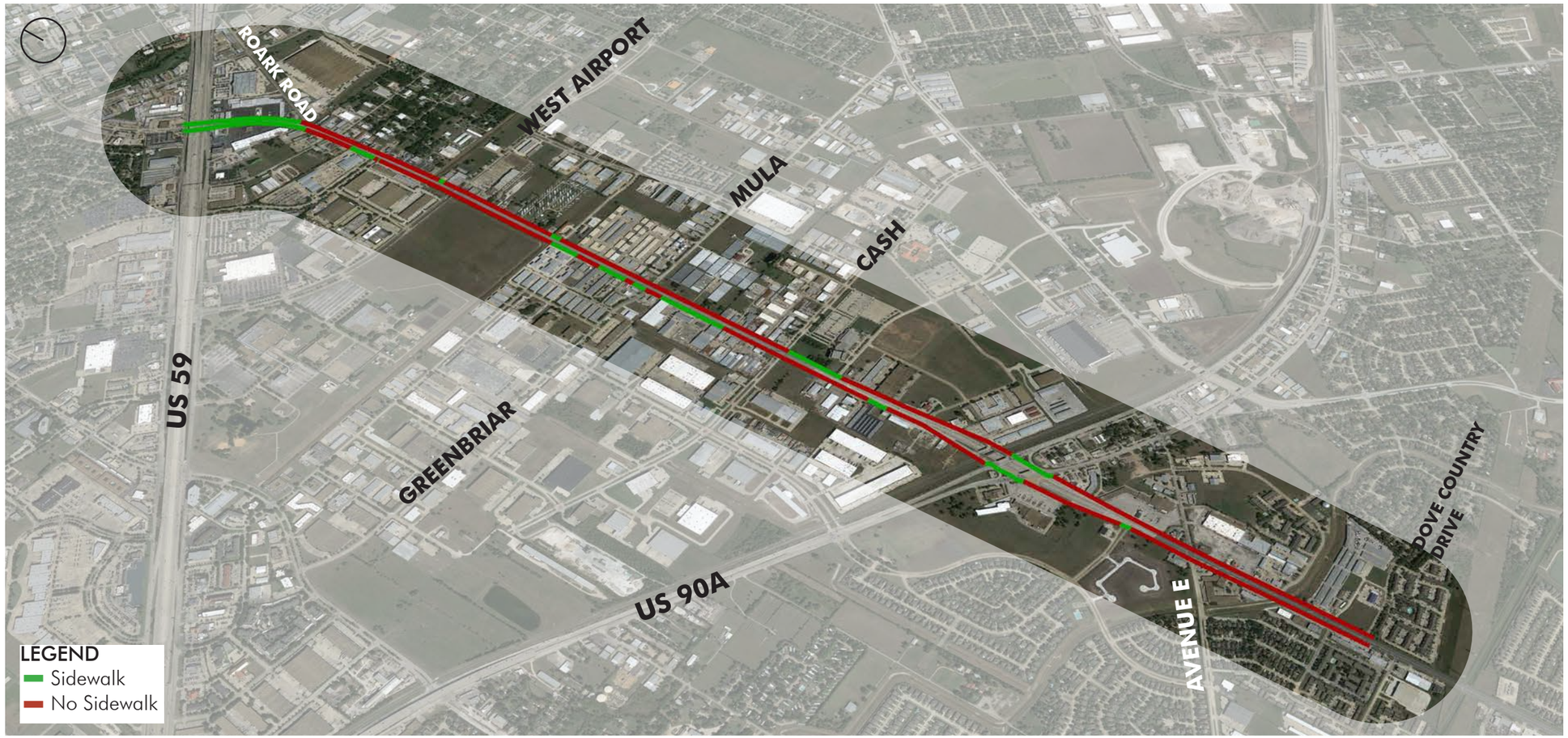


Figure 3.17 *Sidewalks*

Figure 3.18 *Discontinuous Sidewalk Network*

Figure 3.19 *Large Block Size*

Figure 3.20 *ADA Accessibility*

DRIVEWAY SPACING

FM 1092 is a major hub for businesses in the area. The number of businesses, parcels, and an inconsistent driveway policy has led to a large number of driveways along the corridor. Figure 3.21 and Table 3.6 show the number of driveways per mile along the corridor between each signalized intersection.

The highest driveway density is between Roark Road and West Airport Boulevard with a density of 72 driveways per mile. A close second is between Mula Road/Greenbriar Drive and Cash Road. Along both these stretches of FM 1092, most parcels, even small parcels, have two or more access points.

As the number of driveways along a corridor increases, the number of crashes is likely to as well. There is a direct correlation between driveways per mile and crashes along a corridor as stated in the TxDOT *Access Management Manual, 2011*. Each driveway is a potential conflict point for both vehicle-to-vehicle and vehicle-to-pedestrian interactions, and consequently a high number of closely spaced driveways increases the chance for collision.

The high number of driveways also effect the free flow speed. The Highway Capacity Manual states that free flow speed decrease by 0.15 mph per access point. Therefore areas with a high number of access points not only decrease safety along a corridor, they also decrease mobility.

Figure 3.21 *Average Driveway Spacing Between Major Intersections*

Section	Northbound Driveways	Southbound Driveways	Total Driveways	Driveway Density (per mile)
US 59 to Roark Rd	9	6	15	50
Roark Rd to West Airport Blvd	26	9	35	72
West Airport Blvd to Greenbriar Dr/Mula Rd	15	10	25	42
Greenbriar Dr/Mula Rd to Cash Rd	9	16	25	70
Cash Rd to FM 1092 Frontage Roads	7	5	12	40
West FM 1092 Frontage Road	-	5	5	8
East FM 1092 Frontage Road	10	-	10	17
FM 1092 Frontage Roads to Avenue E	2	1	3	38
Avenue E to Dove Country Dr	6	7	13	37

Table 3.6 *Driveway Density*

CURRENT ACCESS MANAGEMENT PRACTICES/STANDARDS

The 3.1 mile FM 1092 study corridor is a TxDOT roadway that travel though four jurisdictions. This means that different access management standards currently apply to the corridor. The two sections that travel through Stafford ETJ default to TxDOT access management standards due to the roadway being a TxDOT roadway. Within the City of Houston and City of Stafford, City of Houston and City of Stafford standards apply with approval by TxDOT.

Table 3.7 highlights current Access Management practices across these jurisdictions. As recommendations for future safety and mobility on the corridor are developed, the criteria will be assessed to support driveway design and consolidation strategies.

All jurisdictions encourage joint-access among multiple parcels where possible. Also, all jurisdictions encourage the alignment of driveways to match adjacent driveways or median openings if applicable.

	City of Stafford[1]	City of Houston[2]	City of Missouri City[3]	TxDOT[4]
Minimum Driveway Spacing	165′	20′	400′	360′
Minimum driveway offset from an intersection	100′	• Primary streets/thoroughfares - 100′ • Minor streets - 60′	100′ or 90 % of Frontage Length, which ever is greater	n/a
Driveways per Parcel Limits	n/a	Depended on Parcel's frontage length • Frontage up to 170′ - allowed 1 driveway • Frontage between 170′ and 250′ - allowed 2 driveways • Frontage between 250′ and 450′ allowed 3 driveways • One additional driveway allowed for each 250′ of frontage over 450′	n/a	n/a
Median Width	n/a	See Agency Engineer for ROW over 120′	24′	• Minimum - 2′ • Minimum for Pedestrian Refuge - 5′ • Recommended -16′ • Dual left-turns present - 24′
Median Length	n/a	• Divided Thoroughfare or Collector - 500′ • Divided by Local Street - 350′ • Divided by private street or driveway - 300′	• 6-Lane Thoroughfare - Minimum of 380′ to 425′ depending on intersection roadway/driveway classification • 4-Lane Thoroughfare - Minimum of 380′ to 480′ depending on intersection roadway/driveway classification	Dependent upon roadway geometry, minimum spacing requirements, and left-turn storage requirements
Median Opening	n/a	Depended upon type of driveway/street median opening is for, as well as the presence of a left turn bay • No Left - Turn Bay - 45′ to 50′ • One Left - Turn Bay - 52.5′ - 55′ • Two Left - Turn Bays - 60′	Width of driveway or street + 10′	Dependent upon roadway geometry, minimum spacing requirements, and left-turn storage requirements
Minimum Driveway offset from median nose	50′	75′	n/a	n/a

[1] *Source: City of Stafford Code of Ordinances, Chapter 78, Article IX - Location and Construction of Non-residential Driveways and Joint Access Requirements*
[2] *Source: City of Houston Department of Public Works and Engineering Infrastructure Design Manual, July 2012*
[3] *Source: City of Missouri City Public Infrastructure Design Manual, 2004*
[4] *Source: Texas Department of Transportation Roadway Design Manual, 2010 and Texas Department of Transportation Access Management Manual, 2011*

Table 3.7 *Access Management Standards for Surrounding Jurisdictions*

CRASH RATES

Crash data were obtained for the FM 1092 study area to better understand the safety issues along the corridor. Historical crash data were collect and analyzed for the years 2009 to 2011, the period after the US 90A underpass was completed. The collection of data includes all police reported crashes that resulted in more than $1,000 of property damage and/or personal injury or death. The data was obtained from TxDOT's Crash Records Information System (CRIS). The City of Stafford Police Department was also consulted to help identify safety issues along the corridor.

Between 2009 and 2011, there were 449 reported crashes along the FM 1092 study corridor resulting in a yearly crash rate of 426 crashes per 100 million vehicle miles traveled (VMT). The statewide average for crashes along an urban FM road in 2012, as recorded by TxDOT, is 204 crashes per 100 million VMT; the crash rate along the study area is more than double the statewide average. TxDOT also calculated the average for urban, undivided, roadways with 4 or more lanes to be 274 crashes per 100 million VMT.

To better understand the crash rate along the FM 1092 study corridor, the corridor was separated into three segments, as shown in Figure 3.22. Segment 1, from US 59 to West Airport Boulevard, has a crash rate of 372.3 crashes per 100 million VMT. Segment 2, from Fountaingate Drive to Cash Road, has a crash rate of 336 crashes per 100 million VMT. Segment 3, from Stafford Center Drive to Dove County Drive, has the highest crash rate at 524.5 crashes per 100 million VMT. Segment 3 is over 2.5 times greater than the state wide average for urban FM roads. The crash rate along Segment 3 does include crashes that occurred along the FM 1092 Frontage Roads that intersect with US 90A as well as at the underpass.

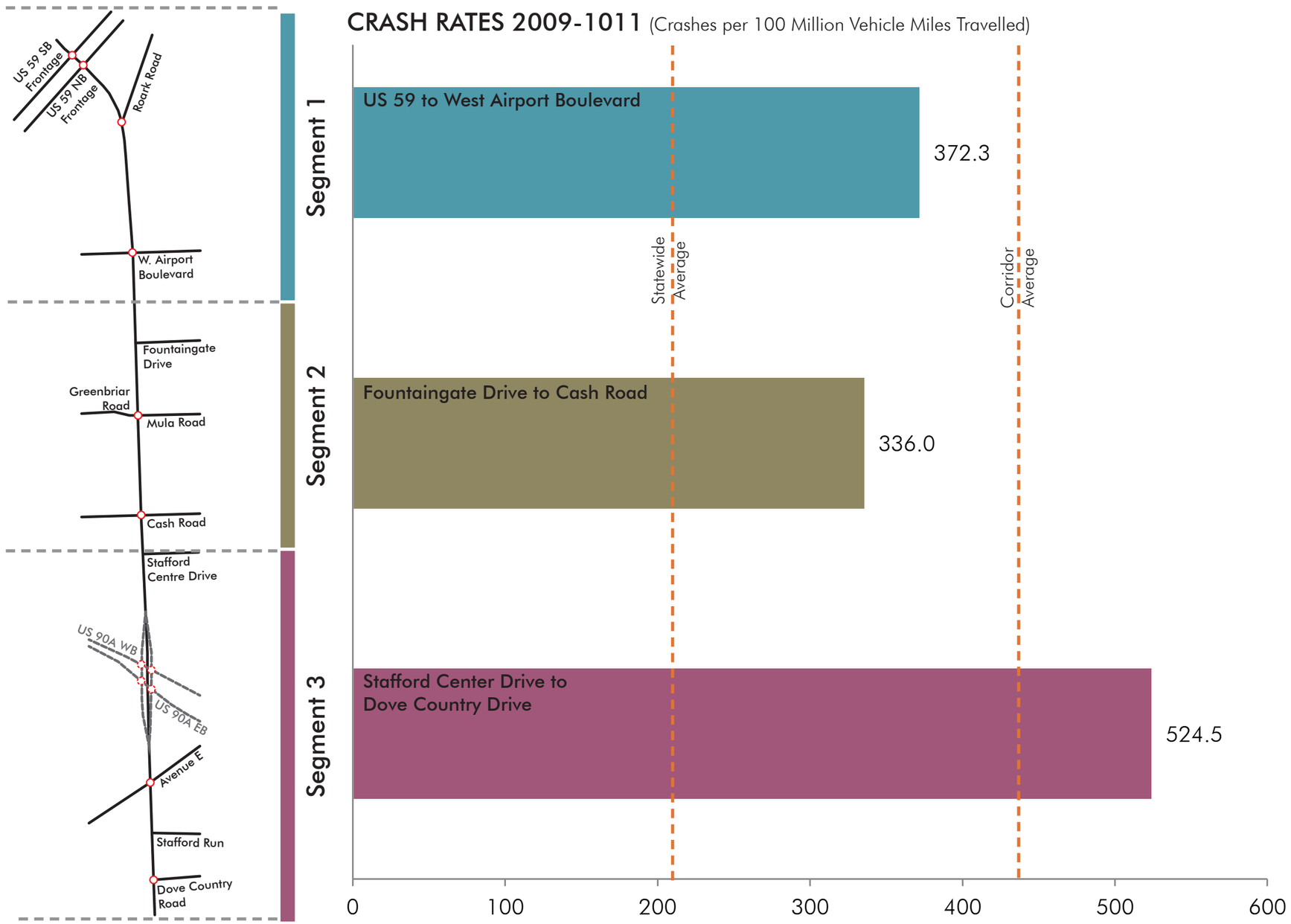


Figure 3.22 *Crash Rate by Segment*
Source: TxDOT Crash Records Information System (CRIS), 2009, 2010, 2011

SAFETY HOTSPOTS

All recorded crashes obtained for 2009 to 2011 were mapped to identify the crash hotspots along the corridor. The majority of hotspots occur at intersections, both signalized and unsignalized. Figure 3.23 depicts the density of crashes along the FM 1092 study corridor. Areas with darker reds have a higher concentration of crashes then areas with blue. A summary of the number of crashes at all signalized intersection and key unsignalized intersection is shown in Table 3.8.

The highest concentration of crashes at an intersection is at the FM 1092 at West Airport Boulevard intersection, with 65 crashes at the intersection between 2009 and 2011. Over 50% of crashes at the West Airport Boulevard intersection were rear end collisions.

The second most visible safety hotspot is an elongated area in Figure 3.23 that stretches from Greenbough Drive to south of US 90A and includes the high crash volumes recorded for Segment 3 in Figure 3.22. This safety hotspot includes the unsignalized intersection of Greenbough Drive, where 49 accidents occurred from 2009 to 2011. The accidents that are recorded at Greenbough Drive area appear to be a combination of two main safety issues that were reinforced by comments from the study steering committee and the public. The first is that FM 1092

	Intersection	Total	Rear - End		Sideswipe		Left - Turn		Right - Turn		Pedestrian		Bicycle		Fixed Object		Other	
			Crashes	Percent of Total	Crashes	Percent of Total	Crashes	Percent of Total	Crashes	Percent of Total	Crashes	Percent of Total	Crashes	Percent of Total	Crashes	Percent of Total	Crashes	Percent of Total
1	US 59	36	4	11%	8	22%	13	36%	1	3%	-	-	-	-	2	6%	8	22%
2	Roark Road	11	3	27%	1	9%	4	36%	-	-	-	-	-	-	-	-	3	27%
3	Brighton Lane	4	1	25%	-	-	2	50%	-	-	-	-	-	-	-	-	1	25%
4	Altonbury Lane	3	1	33%	-	-	1	33%	-	-	-	-	-	-	-	-	1	33%
5	Nations Blvd	7	-	-	1	14%	4	57%	-	-	-	-	-	-	-	-	2	29%
6	West Airport Boulevard	65	35	54%	5	8%	6	9%	2	3%	1	2%	-	-	4	6%	12	18%
7	Fountaingate Drive	12	2	17%	-	-	2	17%	1	8%	1	8%	-	-	-	-	6	50%
8	Greenbriar Drive/Mula Road	46	17	37%	9	20%	7	15%	5	11%	-	-	-	-	-	-	8	17%
9	Scarpinato Road	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	100%
10	Cash Road	32	15	47%	6	19%	4	13%	2	6%	-	-	-	-	-	-	5	16%
11	Stafford Centre Drive	17	3	18%	1	6%	5	29%	2	12%	-	-	-	-	-	-	6	35%
12	Greenbough Drive	49	3	6%	24	49%	13	27%	2	4%	-	-	1	0%	3	6%	3	6%
13	US 90A	54	11	20%	7	13%	8	15%	4	7%	-	-	-	-	2	4%	22	41%
14	Boardwalk Parkway	10	4	40%	4	40%	1	10%	1	10%	-	-	-	-	-	-	-	-
15	Avenue E	42	16	38%	6	14%	8	19%	2	5%	-	-	-	-	-	-	10	24%
16	Stafford Run Road	7	1	14%	1	14%	1	14%	-	-	-	-	-	-	1	14%	3	43%
17	Country Place/ Commerce Business Drive	14	3	21%	2	14%	4	29%	-	-	-	-	-	-	-	-	5	36%
18	Dove Country Drive	13	10	77%	-	-		0%	1	8%	-	-	-	-	1	8%	1	8%

Table 3.8 *Crashes by Location and Type*
Source: TxDOT Crash Records Information System (CRIS), 2009, 2010, 2011

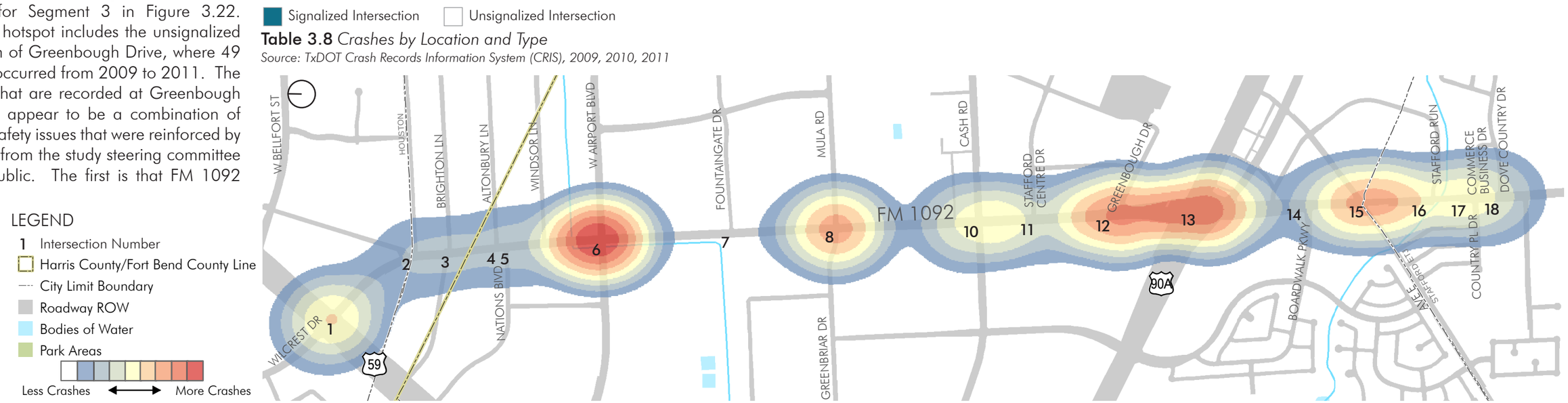


Figure 3.23 *Crash Hotspots*
Source: TxDOT Crash Records Information System (CRIS), 2009, 2010, 2011

drops a lane about 1/10 a mile north of Greenbough Drive prior to Stafford Center Drive. The required merge may be the cause of the high number of sideswipe crashes near Greenbough Drive. The unsignalized intersection of FM 1092 and Greenbough Drive is also a location of a number of left-turn crashes that are most likely a result of illegal/unsafe U-turns at or near the intersection. According to members of the stakeholder team, motorists will make a U-Turn from FM 1092 northbound on ramp from US 90A to FM 1092 southbound after the raised median ends, north of the underpass and north of the Greenbough Drive intersection. This unsafe driving maneuver also occurs south of the underpass by drivers traveling north/east on US 90A who wish to travel north on FM 1092.

Within the three years of crash data that was analyzed, two crashes involved pedestrians and one involved a bicyclist. The two pedestrian crashes occurred at West Airport Boulevard and Fountaingate Drive. The one bicyclist involve crash occurred at Greenbough Drive.

CRASH SEVERITY AND COST

Fortunately, the 449 crashes that occurred along FM 1092 between 2009 and 2011 did not result in any fatalities. There were six crashes that resulted in incapacitating injuries and at least 61 injuries sustained from crashes along FM 1092. A summary of crash severity based on injury sustained is shown in Table 3.9. The table summarizes the total number of crashes that resulted in an incapacitating injury, a non-incapacitating injury, a possible injury, and crashes that resulted in only property damage. Because a crash can result in more than one type of injury, the Number of Crashes column sums to more than the total 449 crashes along the corridor. The table also includes the number of people who sustained each type of injury.

The National Safety Council (NSC) makes estimates of the average costs of fatal and nonfatal unintentional injuries to illustrate their impact on the nation's economy. The costs are a measure of the dollars spent and income not received due to accidents, injuries, and fatalities. The NSC crash cost estimates are comprehensive and also include the economic cost of crashes (i.e., those associated with wage and productivity losses, medical expenses, administrative expenses, motor vehicle damage, and uninsured employer cost) as well as a measure of the value of quality of life lost due to crash-related deaths and injuries.

The cost of crashes for the study corridor based on severity was determined using 2011 annual crash cost estimates from NSC. The NSC Average Comprehensive Costs in 2011 Dollars for all accidents between 2009 and 2011 along the corridor are shown in Table 3.9. The 449 crashes along the 3.1 mile stretch of FM 1092 between 2009 and 2011 resulted in a total economic cost of over $8,000,000.

Severity	Number of Crashes With	Number of Persons Injured	Average Cost (2011 Dollars)	Total Cost of Crashes 2009-2011
Fatality	0	0	$4,459,000	$0.00
Incapacitating Injury	6	6	$225,100	$1,350,600
Non-incapacitating Injury	42	55	$57,400	$3,157,000
Possible Injury	64	104	$27,200	$2,828,800
Property Damage Only	343	-	$2,400	$823,200
All Crashes	**449***			**$8,159,600**

Table 3.9 *Crash Severity and Cost*

Source: TxDOT Crash Records Information System (CRIS), 2009, 2010, 2011

* Total crashes value is less then the sum of all injuries due to some crashes resulted in more then one injury

CURRENT ECONOMIC ENVIRONMENT

The land uses along the FM 1092 study corridor are primarily commercial and light industrial. The majority of the study corridor is within the City of Stafford, a city where employees who work in the city limits outnumber residents. In 2010, there were approximately 11,000 employees within a ½ mile of the study corridor. Within the same area, the residential population was 7,277 residents as calculated by the 2010 US Census.

The northern section of the study corridor is within the City of Houston, which does not have zoning regulations. The parcels within the City of Houston are retail strip centers as well as the Men's Wearhouse Distribution Facility along Roark Road. Within the City of Stafford, FM 1092 as well as the adjacent parcels are classified as a Primary Corridor. The corridor was recently rezoned to support future redevelopment. Figure 3.24 is the current zoning plan for the City of Stafford; the pink-purple parcels show the Primary Corridor zone. This zoning code permits light industrial, office, general retail, and restaurants within the corridor, but all other uses would require a Special Use Permit. Examples of uses that would require a Special Use Permit are big box retail, overnight accommodations, light vehicle service, or institutional development. The zoning code also encourages "clustered buildings to create pedestrian connections" but does not require property owners to build to this standard. The zoning code also includes building design standards, parking minimums, sign restrictions, and landscaping guidelines for all new development. A summary of all requirements in the zoning code is included in Appendix D.

Figure 3.25 shows the land use within a 1.5 mile buffer of the study area. Within the 1.5 mile buffer, 41% of the land area is commercial or industrial. The second largest share of land area is single-family residential. Most of the single-family residential land area within the 1.5 mile buffer are residences in the City of Sugar Land, the City of Houston, the City of Meadows Place, the City of Missouri City and the Stafford ETJ. The main single-family residential developments that feed into FM 1092 are The Promenade at Stafford Run and Dove Country. The Promenade at Stafford Run is southwest of the US 90A at FM 1092 intersection. The major access point to the development from FM 1092 is Broadway Parkway. The Promenade is still expanding with new homes currently under construction adjacent to the west side of FM 1092. The Dove Country residential community is between FM 1092 and Staffordshire Road south of US 90A. Dove Country Drive, the southern terminus of the study area, is a major access point to the Dove County development.

FM 1092 also provides access to the Stafford Centre and the Houston Community College Stafford Campus, both along Cash Road east of FM 1092. The Stafford Centre is a 90,000 square foot performing arts theatre and convention complex that opened in 2004 and has become a hub of activity for not only the city but for the entire region.

While the pie chart in Figure 3.25 shows 10% of the nearby land area to be parks and open space, the majority of parks and open space is located outside of the City of Stafford.

Figure 3.26 depicts the land value of the surrounding parcels. Almost half of land area within 1.5 miles of the study area has a land value less than $5.00 per square foot. The highest value parcels are primarily located within the City of Sugar Land as well as along US 59 near the Fountains on the Lake development.

The motto of the City of Stafford, which is

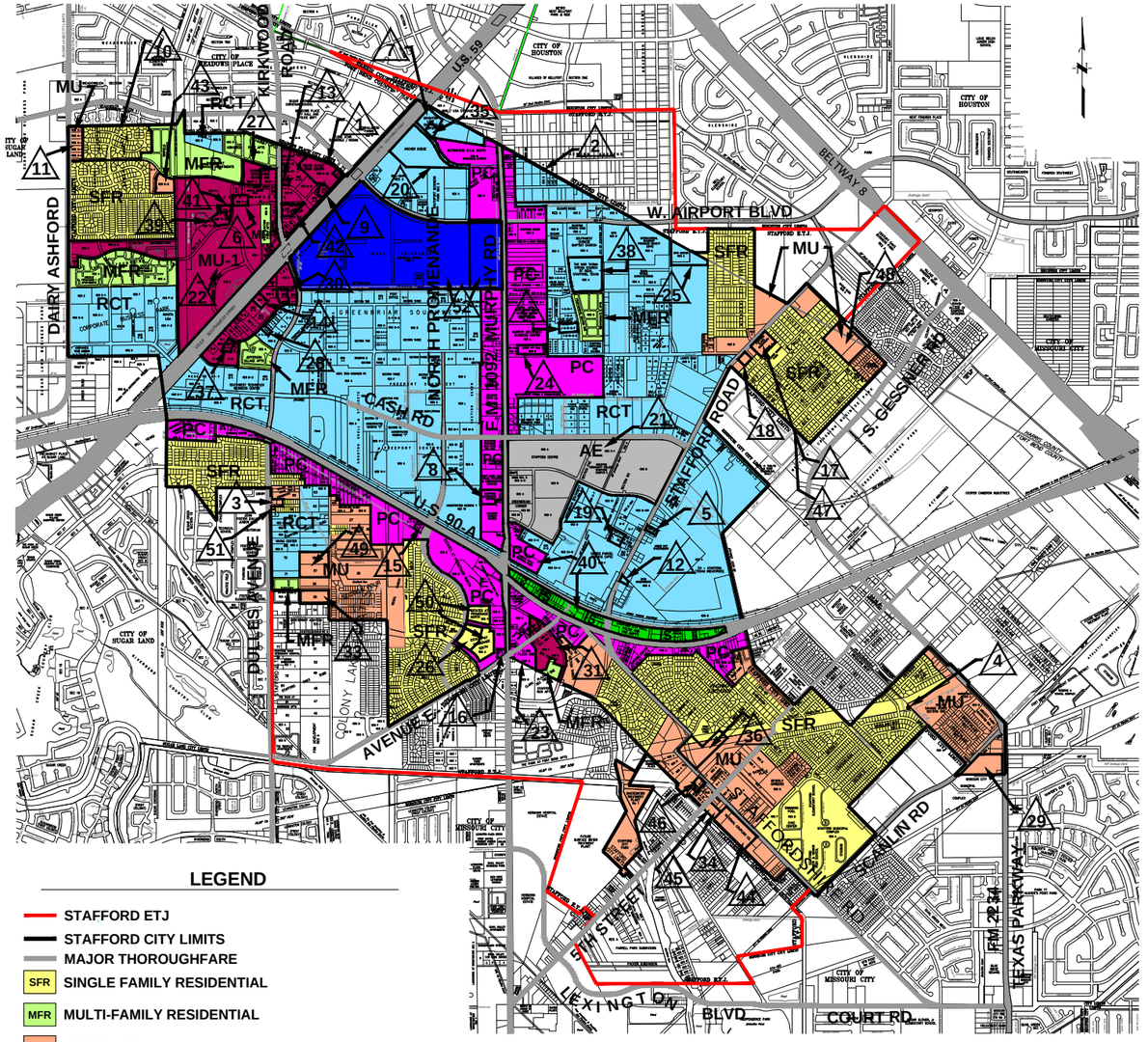
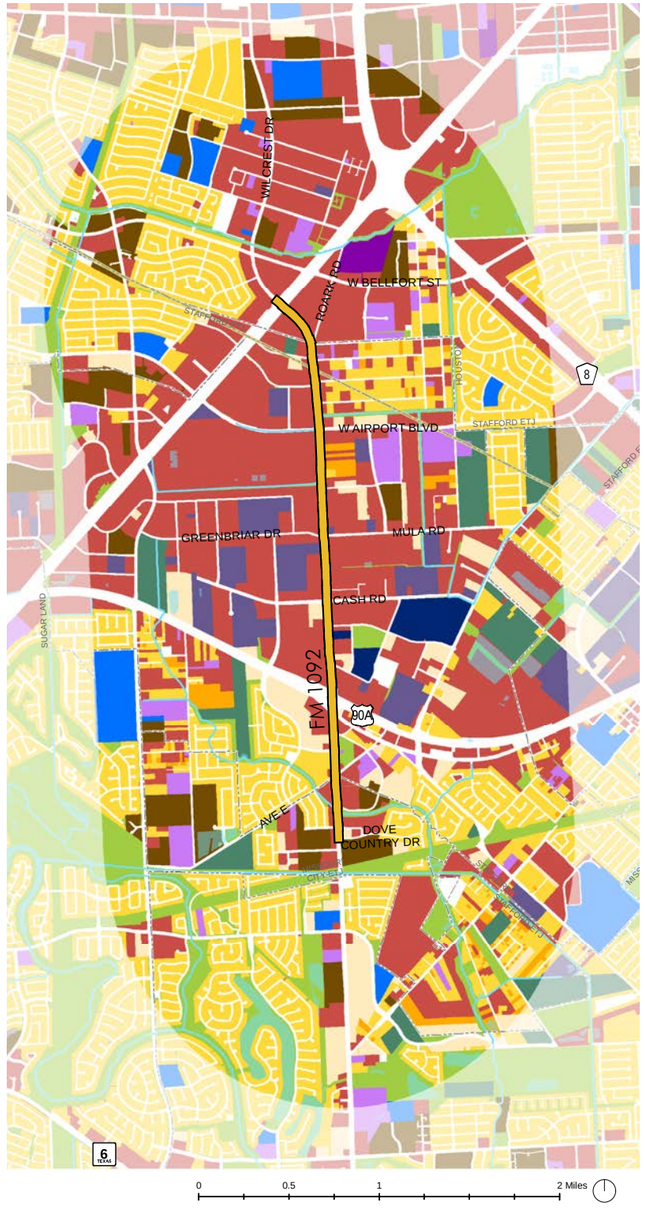
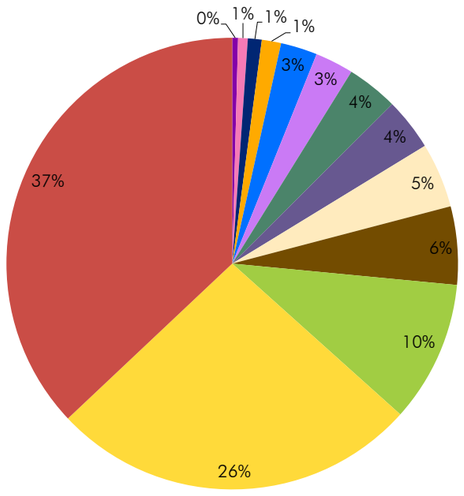


Figure 3.24 *City of Stafford Zoning District Map*
Source: Zoning District Map for the City of Stafford, January 2013



LAND USE

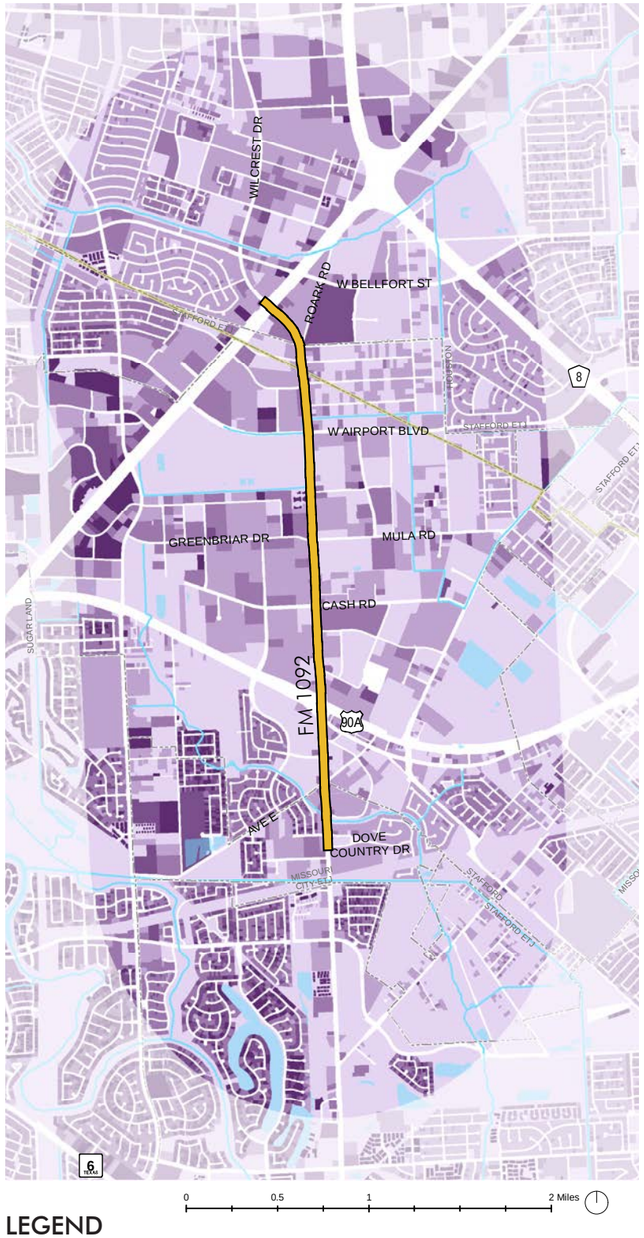
- Civic/Community
- HCC - Stafford
- Commercial
- Farm/Ranch
- Industrial
- Mobile Home
- Multi-Family Residential
- Parks, Open Space, Easement
- Public & Institutional
- Schools
- Single-Family Residential
- Vacant
- West Bellfort Park&Ride
- ROW/Easement/Undetermined



LEGEND

- FM 1092
- Fort Bend/Harris County Line
- City Limit Boundary
- Bodies of Water

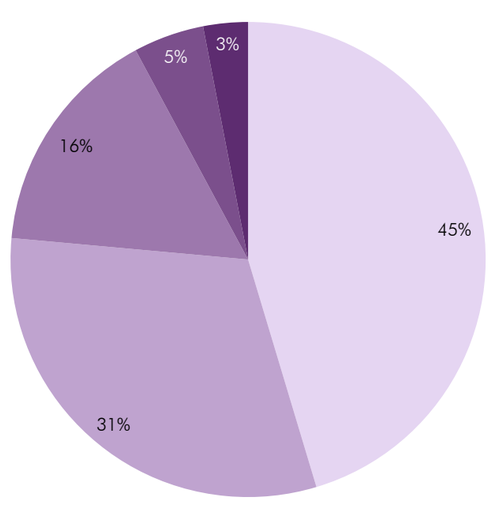
Figure 3.25 *Land Use Within a 1.5 Mile of Study Corridor*
Source: Houston-Galveston Area Council, 2010



LAND VALUE (+ IMPROVEMENTS)

Dollars per Square Foot

- $0 .00 - $5.00
- $5.01 - $15.00
- $15.01 - $25.00
- $25.01 - $30.00
- $30.01 +



LEGEND

- FM 1092
- Fort Bend/Harris County Line
- City Limit Boundary
- Bodies of Water

Figure 3.26 *Land Value with Improvements Within a 1.5 Mile of Study Corridor*
Source: Houston-Galveston Area Council, 2010

proudly displayed on the city website and public banners around the city, is the "City with no property taxes." In 1995, the City of Stafford stopped levying non-school municipal property taxes. This was a result of the city's strong commercial base. In 1990, the sales tax revenue per capita for the City of Stafford was $261 per person. By 2000, the sales tax per capita within the City was $767 per capita. In 2010, the City of Stafford sales tax revenue per capita was $728. The decision to stop levying non-school municipal property taxes seems to have coincided with the large increase in sales tax per revenue from 1990 to 2000, but since 2000 the values have been relatively flat. The growth was driven primarily by the increase in development along US 59 in locations like the Fountains. Figure 3.27 summarizes the change in sales tax revenue per capita for the City of Stafford and the City of Houston. The City of Houston contributes one cent of a potential of two cents of sales tax is allocated to the Metropolitan Transit Agency of Harris County (METRO).

Figure 3.28 show the sales tax collection from the City of Stafford between 2008 and 2012 and the proportion of sales tax collected from the FM 1092 corridor. Between 2008 and 2012, a time of economic uncertainty nationally, the City of Stafford was able to maintain its sales tax revenue. The annual sales tax growth rate between 2008 to 2012 for the city was essentially flat (-0.03%). During that same time period, the sales tax collection of businesses within 0.5 miles of the study area grew by an annual rate of 3.21%. While the sales tax data show that sales tax collection is growing near the FM 1092 corridor and business are doing well, there has still been an increase in vacancies, a lack of owner investment in property redevelopment and upgrades, as well a high tenant turnovers. High tenant turnover, vacancies, and poor property upkeep can potentially start to affect the businesses near the corridor and that effect will result in lower sales tax collection from surrounding businesses. The corridor has lost business to surrounding communities and the incentive of no non-school municipal taxes may not be the only benefit businesses are looking for in site selection.

Some of the largest employers within Fort Bend County are located in Stafford near FM 1092. These employers include Puffer-Sweiven, Tyco Valves and Controls, Fiserv Outputs Solutions, UPS, and Texas Instruments.

Texas Instruments (TI) has had a large manufacturing site based in Stafford since the 1960's. TI has closed the plant and will be moving the remaining employees to Sugar Land by 2014. The TI site is approximately 175 acres and presents a rarely experienced opportunity for any city. The chance for infill development on such a large tract of land has the potential to transform and alter the fabric of the city. When TI first opened the manufacturing plant, it helped place the City of Stafford as a premier location for high tech and specialized manufacturing. The 175 acre site has the chance to again contribute greatly to the future of the City of Stafford. Currently the City of Stafford zoning plan, shown in Figure 3.24, classifies the TI site as Mixed Use-2, which would represent a new development typology for the City and has the potential to bring more residential development that may support increased neighborhood services opening in the area.

* One cent of potential of two cents of sales tax is allocated to the Houston MTA (METRO) so total sales tax generated in the City of Houston is actually double that shown in Figure 3.27.
Source: US Census Bureau; Texas Comptroller's Office

Figure 3.27 *Sales Tax per Capita for Stafford and Houston*
Source: State of Texas Comptroller, 1990, 2000, and 2010

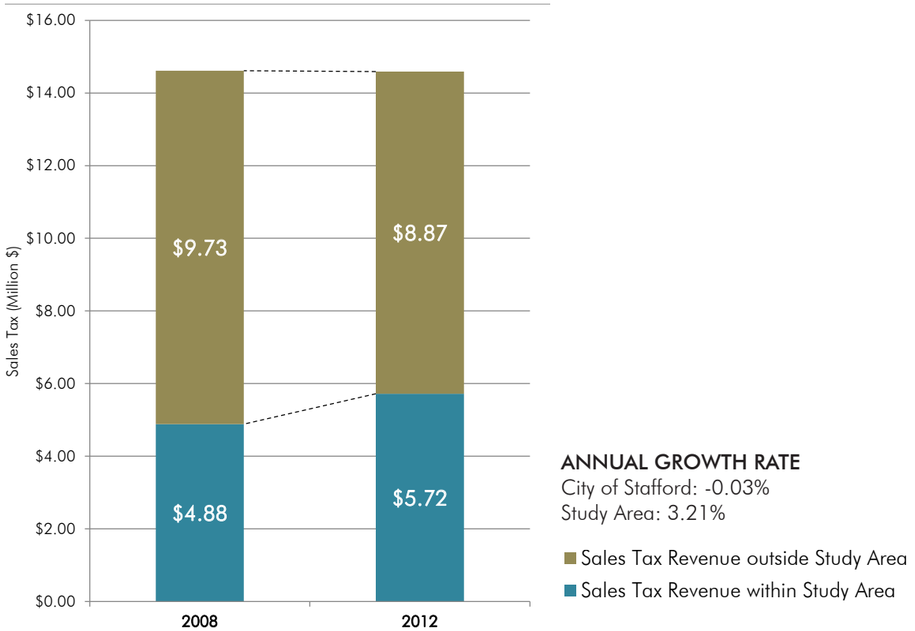


Figure 3.28 *Changes in Sales Tax in the City of Stafford*
Source: State of Texas Comptroller, 2008 and 2012

EXISTING STREETSCAPE

Existing streetscape design on FM 1092 incorporates minimal standards based on the City of Stafford's Code of Ordinances, which has resulted in an environment that is focused on moving automobiles, and facilitating advertisement for corridor businesses. Aesthetically, this is translated into an asphalt corridor accentuated by signage competing for the attention of drivers passing-by. The current roadway environment was not viewed by the public and stakeholders to entice motorists to stop at local businesses and to walk along business storefronts.

Both the design of the roadway and the aesthetics of the streetscape suggest that the corridor is one to move through, and not a destination to go to. The corridor generally lacks the spaces and places that would encourage slower travel, alternative modes of transportation, or lingering and gathering. Figure 3.30 depicts the automobile-centric streetscape. Figure 3.31 shows an example of the demand for bicycle infrastructure observed on the corridor.

AESTHETICS

Lack of Visual Cohesion

The numerous signs along the corridor lack cohesive aesthetic such as scale, placement, or other visual elements that ties them together. Instead, signs compete with one another for the attention of drivers speeding by. Stakeholder identified this as creating a clutter of signs along the roadway.

Lack of Tree Cover and Other Landscape Elements

Significant stretches of the FM 1092 streetscape currently lack landscaping that can provide tree cover for pedestrians and provide an more visually appealing streetscape. They would also serve to soften features along FM 1092, such as utility and light poles. Tree cover would also soften the view of large and often underutilized parking lots. In addition to tree cover, there lacks a diversity of other landscape elements, aside from strips of lawn and low shrubs.

Lack of Sense of "Place" or "Arrival"

From an urban design standpoint, FM 1092 lacks a hierarchy of strong, or vivid images to facilitate the legibility of the corridor as an entity, or a place and to feel as if you are moving from one jurisdiction to another as you travel the corridor. The adjacent industrial and retail development has parking in front and low shrubs or small tree coverage, if any. The ensuing repetitiveness of the streetscape does not invite visitors to pay greater attention to the businesses, nor participate in the community along the corridor. Moreover, there are few indicators or distinct elements that signify to visitors that they have reached an important destination or area along the corridor. Figure 3.32 depicts the general aesthetic of the corridor and the lack of a sense of "place".

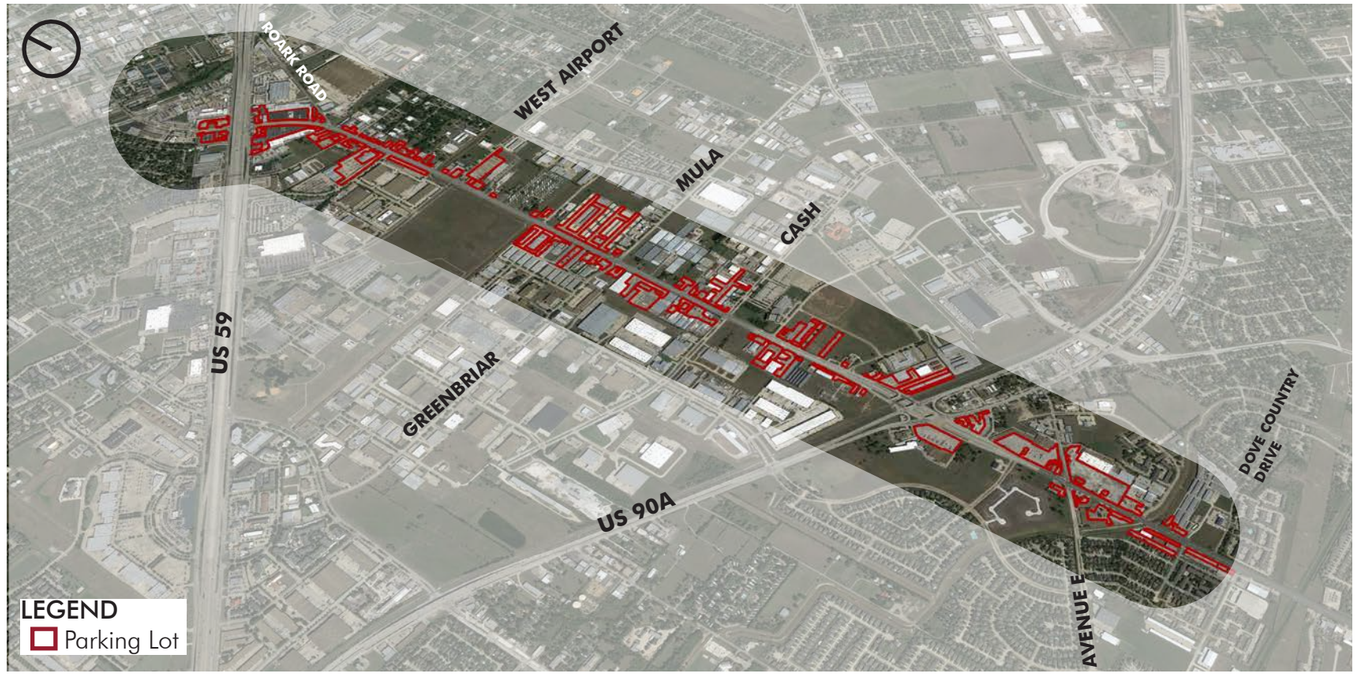


Figure 3.29 *Parking Lots along Study Corridor*

Figure 3.30 *Automobile-Centric Streetscape*

Figure 3.31 *Demand for Bicycle Infrastructure Despite Lack of Facilities*

Underutilized Parking Lots

A significant share of the roadway frontage along FM 1092 is parking lots. Figure 3.29 shows the location of all parking lots that have access to the corridor. An abundance of large lots disrupt the ability to foster an appealing and comfortable environment, thereby potentially compromising the corridor's development potential. Moreover, they deter pedestrians and bicyclists from patronizing the businesses, as they would have to traverse the parking lots to reach the building entrances. In addition to the aesthetic and mobility consequences, the vast impervious surface coverage negatively impacts groundwater and surface water resources, inhibiting water to recharge into the soil. Further, the areas of pavement can contribute to the 'heat island effect,' as the concrete absorbs and retains heat from the sun's rays, raising the surrounding temperatures. Examples of an underutilized parking lots are shown in Figure 3.33 and Figure 3.34. While clearly a challenge, the parking lots also represent an opportunity to rethink some of the adjacent development along the corridor.

Figure 3.33 *Underutilized Parking Lots*

Figure 3.34 *Signage and Parking Lots*

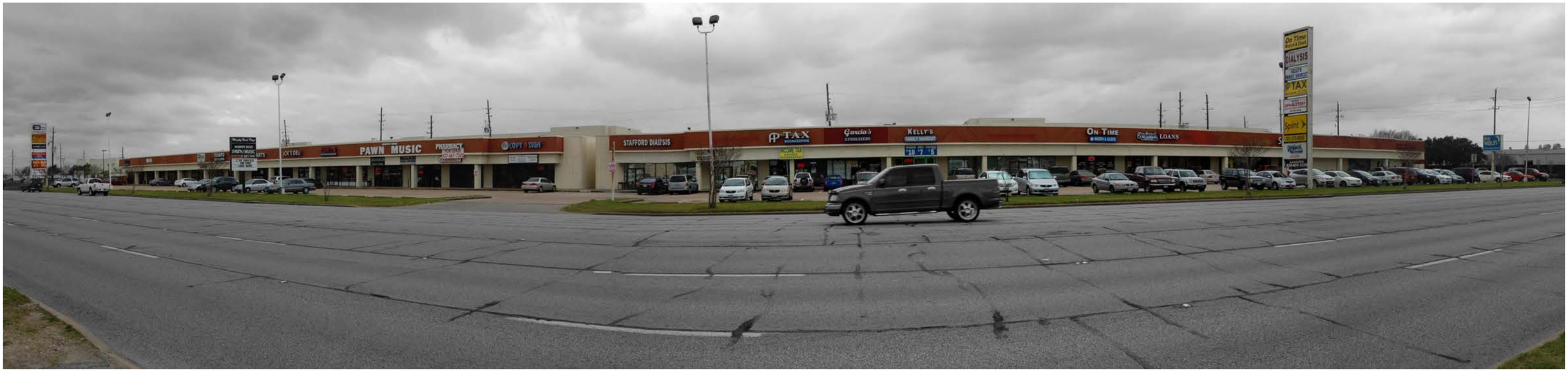


Figure 3.32 *Lacking Visual Hierarchy or Sense of "Place"*

Right-of-Way

Block Size

The disconnected street grid reduces the opportunity to use alternate routes to make trips off of the corridor. The distance between intersections are acceptable for automobile travel but translates into few opportunities for pedestrians to cross the street, with distances ranging from 0.3 to 2 miles between crossings. This presents a potential safety hazard as pedestrians jaywalk, attempting to cross the street in the areas between signalized crossings. Additionally, this can affect the potential success of retail, as potential patrons are unable to easily reach storefronts on the other side of the street. This was mentioned by several stakeholders as a challenge including residents on the south end of the study area where residents in the apartments at Dove Country Drive had difficulty reaching the retail on the west side of FM 1092.

Safety and ADA Accessibility

Crossing the street can be challenging, given current conditions. As noted, many intersections lack crosswalks and pedestrian crossing signals. Moreover, the existing center turn lane does not provide a pedestrian refuge when traversing the roadway. Many areas also fail to meet Americans with Disabilities Act (ADA) Guidelines, lacking pedestrian ramps. In some instances, despite the presence of a ramp, there is no connecting sidewalk, or physical obstructions on the ramps and sidewalks prevent the accessibility of people with disabilities, as shown in Figure 3.35 and Figure 3.36.

Figure 3.35 *Physical Obstructions*

Figure 3.36 *Busy Intersections with No Pedestrian Infrastructure*

Figure 3.37 *Numerous Driveways per Block*

Existing Stafford Branding and Placemaking Practices

Lighting

The distinct street lighting featured along Main Street/US 90A within the City of Stafford Island District serves to add character to the streetscape, in line with the traditional "Main Street" feel of this stretch of the corridor.

Street Banners

Street banners attached to the lighting on Main Street/US 90A are an effective way to send messages to visitors about Stafford, such as "Best place to live & launch a small business". Figure 3.40 shows and exiting street banner along Main Street/US 90A that helps give the area a distinct place.

Monuments

The Stafford pyramids, Figure 3.38, are a bold branding effort informing commuters and visitors that they are entering the City of Stafford on Main Street/US 90A and along US 59. The large scale is appropriate to attract the attention of drivers traveling at high speeds, and to stand out on the wide planted median.

Wayfinding

The red street signs along Main Street/US 90A are cohesive with the other design efforts to establish a brand and affiliation with the City of Stafford. There is limited wayfinding signage that directs visitors to destinations, which would not only assist with navigation, but also feature the assets available.

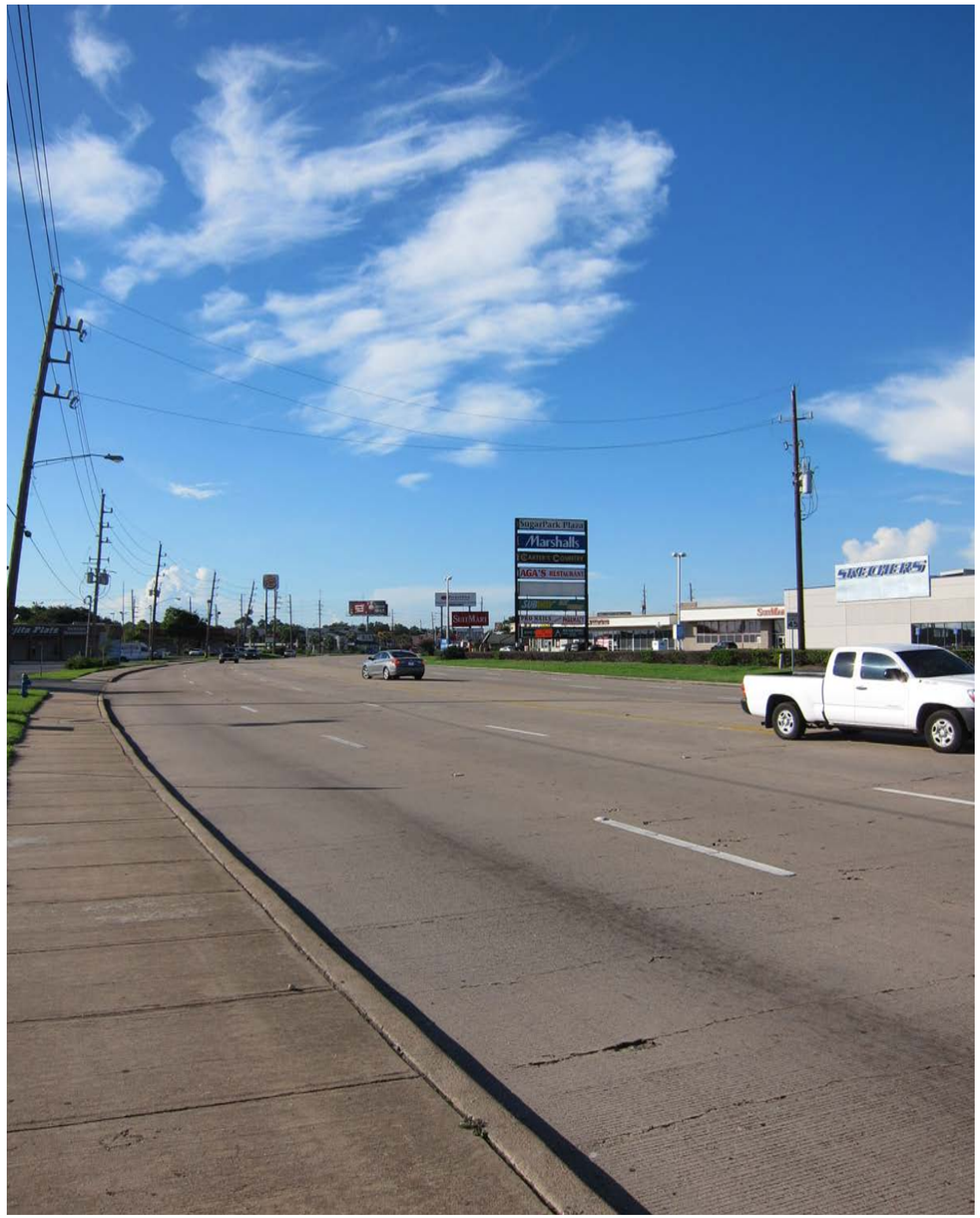
Median and Streetscape Planting

Median and streetscape planting along Main Street/US 90A adds an attractive element to the streetscape. The planting composes a presentation that serves to mark the corridor as a traditional "Main Street," and introduces visitors to one of Stafford's main civic nodes, including the City Hall and Municipal Court.

Figure 3.38 *Existing Branding Efforts: Stafford Pyramid*

Figure 3.39 *Existing Branding Efforts: Street Signs*

Figure 3.40 *Existing Branding Efforts: Street Banners*



SUMMARY

Safety

1. The overall corridor crash rate is double the statewide average
2. A majority of crashes are clustered around several crash hotspots near major intersections
3. Significant driveway density along the corridor exceeds typical standards and there is potential for consolidation

Mobility

1. The corridor is viewed as providing strong mobility through the region; local development and connections to development are an opportunity for growth
2. While the overall travel times are acceptable, significant traffic delays in peak hours focused primarily at Avenue E and West Airport Boulevard
3. Traffic growth is likely to increase due to development as well as the proposed widening of FM 1092 south of US 90A
4. Active transportation facilities for walking and biking are limited or missing but there is significant pedestrian and bicyclist activity observed along the corridor

Economic Development

1. The corridor has a strong location relative to major regional destinations and access to regional freeway corridors
2. Sales tax is increasing along the corridor, but there is desire to enhance and redevelop corridor as an economic and job engine for Stafford as shown in the recently adopted Stafford Zoning District Plan
3. No property tax represents a strong development incentive for Stafford; opportunity exists to outline a vision for the corridor and play more proactive role in shaping outcomes.
4. Several major local destinations as well as future TI redevelopment represents potential catalytic projects
5. Limited local population makes attracting neighborhood services challenging; there is a need for a residential strategy for the corridor
6. There is a desire to improve corridor identity and aesthetics to make the corridor more welcoming and provide a greater sense of place and arrival

ACCESS MANAGEMENT BENEFITS

Access Management, when applied effectively, can have multiple benefits for a corridor as well as surrounding roadways and adjacent properties. First and foremost, access management practices can increase the safety along a corridor. Figure 4.1 shows the direct relationship between access points on a corridor and crash rates. Table 4.1 shows the relationship between median types and accident rates. These two figures show how reducing access points along a corridor and installing a median can significantly reduce crashes on a corridor. Chapter 3 presented the crash rates along FM 1092 showing the crash rates are almost double similar roadways in the state of Texas.

Access management can also positively impact the operations of a corridor by improving travel times and reducing delays. Reductions in delay and congestion not only make drivers happy but also have a positive economic effect on surrounding land uses. Reductions in congestion also have positive effects on air quality.

Access management practices can also improve appearances and help establish a sense of place on the corridor. Improving the appearance of corridor with landscaping and amenities will help attract investment into the corridor and increase the value of adjacent properties.

Access management also allows for improvements in pedestrian and bicycle amenities which results in a safer environment for pedestrians and bicyclists and encourages more multi-modal travel along the corridor.

Taken together these provide a set of tools to improve and enhance to corridor.

ACCESS MANAGEMENT TOOLS

The access management toolbox can be divided into to four main categories listed below.

1 Medians, Streetscape Improvements and Driveway Consolidations.

Medians increase safety for motorists and provide potential pedestrian refuges when crossing the street. Medians also allow for the transformation of a corridor's streetscape and improves the opportunities for landscaping, lighting and wayfinding elements. Driveway consolidation reduces the access points along corridor increasing safety and mobility for all users of the corridor.

2 Intersection and Signal Improvements

Intersection and signal improvements improve mobility and safety along a corridor. Intelligent transportation systems, signal interconnect to support better synchronization, and improved signal timings reduce congestion and improve traffic flow. Intersection improvements can address safety and travel delay. This can include striping, pedestrian crosswalks and the installation of dedicated turning lanes where warranted to improve capacity and address safety issues.

3 Walking, Biking, and Transit Improvements

Improving active modes of transportation along a corridor can help reduce vehicle congestion and delay but also improve the vitality of a corridor by encourage alternative modes. On a corridor like FM 1092 which currently has limited sidewalks and crosswalks and no bicycle infrastructure, despite an

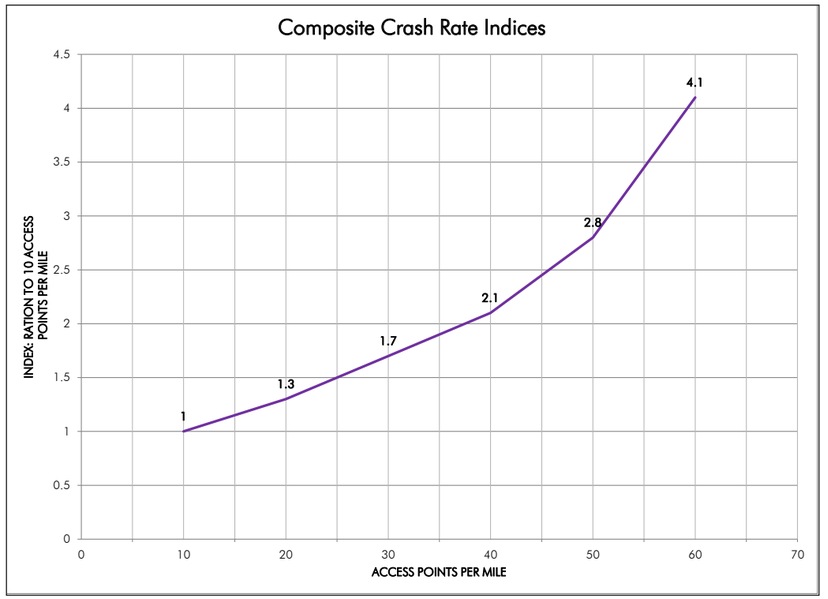


Figure 4.1 *Composite Crash Rate Indices*
Source: TxDOT Access Management Manual, 2011 - Figure 1-2

	Median Type		
Total Access Points per Mile*	Undivided	Two-Way Left-Turn Lane	Non- Traversable Median
<20	3.8	3.4	2.9
20.01 - 40	7.3	5.9	5.1
40.01 - 60	9.4	7.9	6.8
> 60	10.6	9.2	8.2
Average Rate	9.0	6.9	5.6

* Includes both signalized and unsignalized access points

Table 4.1 *Representative Accident Rates (Crashes per Million VMT) by Type of Median-Urban and Suburban Areas*
Source: TxDOT Access Management Manual, 2011 - Table 1-1

apparent demand, improvements to multi-modal infrastructure and amenities will improve safety for all travel modes.

4 Economic Development

While transportation and economic development are often though of separately, they are closely linked. Reductions in congestion and delay along a corridor has a positive effect on the value of surrounding properties and increasing the economic vitality of an area. Economic value can also increase with a corridors beautification and branding which helps establish a sense of place along a corridor.

Economic development planning should be closely linked with the long term vision for a corridor to ensure that the transportation systems are supportive of the development objectives.

Access Management Toolbox

1 Medians, Driveway Access, and Streetscapes

2 Intersection and Signal Improvements

3 Walking, Biking, and Transit Improvements

4 Economic Development

Recommendations

This chapter presents the recommendations for the FM 1092 Access Management study between US 59 and Dove Country Drive. The recommendations were made utilizing the access management toolbox to address the project goals and the needs for the corridor.

Recommendations were coordinated with the recommendations from the FM 1092 Access Management Project - Missouri City as well as planned projects along the corridor, such as the 2035 RTP Update project MPOID 13641 which includes the widening of FM 1092 south of US 90A to Lexington Boulevard in Missouri City from a four-lane divided roadway to a six-lane divided roadway. The MPOID 13641 listed project cost is $10,100,000 and the current letting date is 2020.

Project specific recommendations were classified as either short, medium, or long term and categorized as either intersection improvements, corridor improvements, or landscape and streetscape improvements. A summary of project classifications is included in Figure 5.1.

The driveway consolidation plan within this chapter can be used to assist with ongoing access management policies along the corridor. A driveway consolidation plan will reduce conflict points along the corridor and improve safety and traffic operations.

Regional recommendations are also included in this chapter, expanding on the intersection and corridor specific access management and placemaking improvements. These recommendations include:

- Regional roadway connectivity to support the existing City of Stafford and Fort Bend County Major Thoroughfare Plans and to assist with developing alternative routes to FM 1092
- Regional bicycle opportunities to improve bicycle connections within the region;
- Improvements and placemaking for existing and future activity nodes along the corridor;
- Improvements to existing transit connections.

These regional recommendations are guidelines to support improvements for the corridor and the area surrounding FM 1092. These recommendations are intended to support further planning efforts and enhancements within the region and support economic development opportunities which are presented in the next chapter, Implementation.

TERM CLASSIFICATIONS

Short Term: 0-5 Years

- Focused on improvements to safety and traffic operations
- Lower cost, easier to implementation projects e.g., signage, striping, smaller scale infrastructure
- Includes projects that are generally within the State's right-of-way, and require little to no coordination or purchase of additional ROW.

Medium Term: 5-15 Years

- Relatively low-cost, simple treatments, but may require small amounts of right-of-way and coordination with other government agencies or private sector
- Additional safety and traffic flow improvements
- Includes streetscape improvement related to the implementation of infrastructure projects such as medians

Long Term: 15+ Years

- Higher cost, complex projects that require additional study and extensive coordination with other government agencies and private sector.
- Project that will require a large investments and likely right-of-way acquisitions
- Projects to address future demand

PROJECT CATEGORIES

Intersection

- Improvements to improve intersection operations and improve safety including the installation or improvements to crosswalks and ADA complaint wheelchair ramps;

Corridor

- Improvements to optimize traffic operations, increase safety, and to create a sense of place along the corridor including the recommended cross-section with medians as well as bicycle and pedestrian facilities

Landscaping/Streetscape

- Improvements to the pedestrian environment including trees and lighting as well as place making elements to enhance the aesthetics of the corridor.

Figure 5.1: *Corridor Specific Projects Term Classification and Project Categories*

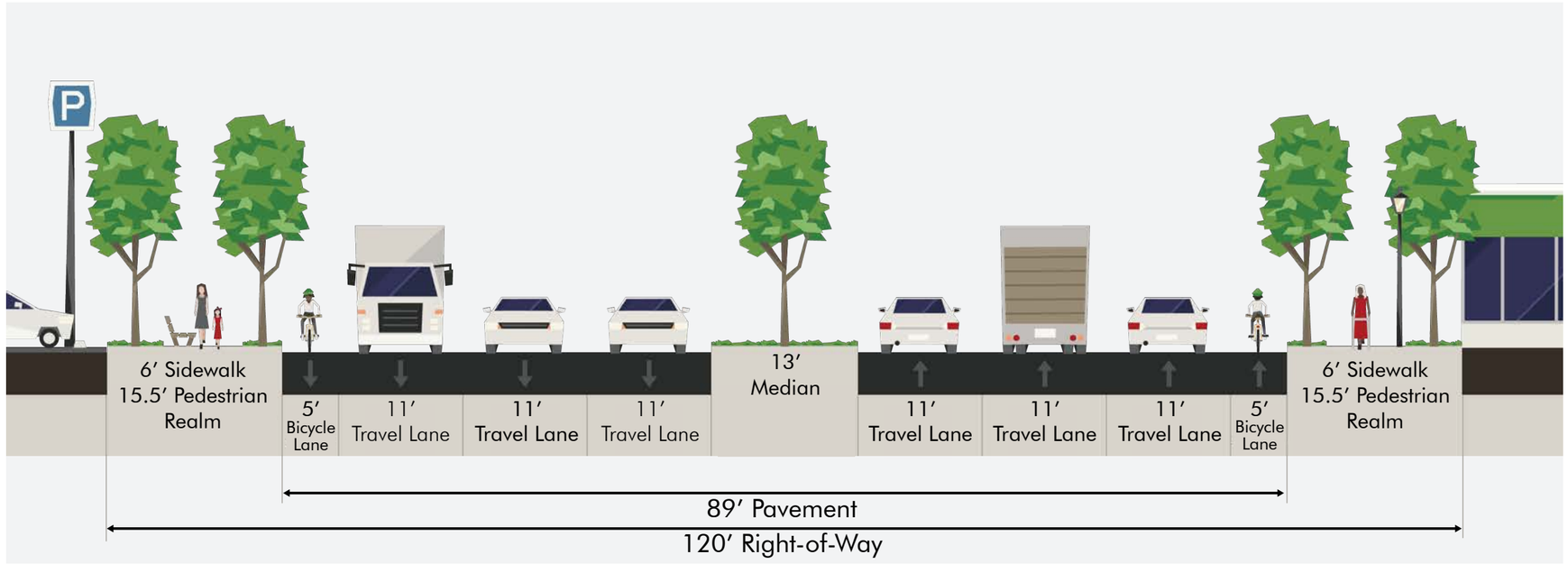


Figure 5.2 *Proposed Typical Cross-section - Roark Road to Dove Country Drive*

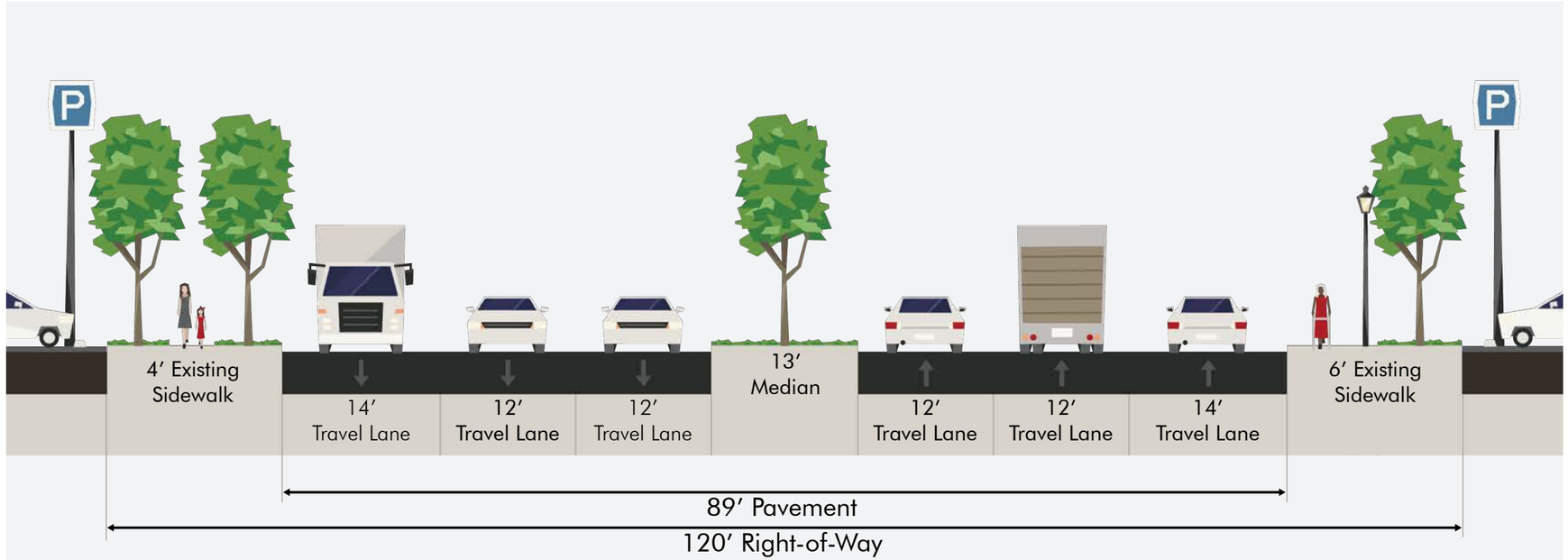


Figure 5.3 *Proposed Alternative Cross-section - US 59 to Roark Road*

RECOMMENDED ROADWAY CROSS-SECTION

The existing cross-section of FM 1092 north of Avenue E is a seven-lane roadway with six travel lanes and a two-way center left-turn lane. South of Avenue E, FM 1092 is reduced to a five-lane roadway with four travel lanes and a two-way center left-turn lane. Traffic analyses determined that the existing six travel lanes are acceptable for existing and future traffic along the corridor. Expanding FM 1092 south of Avenue E was recommended by the FM 1092 Access Management - Missouri City study as well as MPOID 13641 included in the 2035 RTP Update; this report supports and reaffirms these existing plans.

In addition to six travel lanes, bicycle lanes and continuous sidewalks are also recommended for the corridor to accommodate pedestrians and bicyclists and to align with TxDOT policy of providing multi-modal infrastructure along improved roadway corridors. To improve the safety and operations of the corridor, it is recommended that a median be installed with slip left-turn lanes to channelize turning movements. Currently, the roadway pavement width is 89 feet. The proposed cross-section, shown in Figure 5.2, includes six 11-foot travel lanes, two 5-foot bicycle lanes, and a 13-foot median, which can be constructed within the existing pavement. Being able to construct within the limits of the exiting pavement will minimize cost and support a timely implementation of the upgrades. The recommended cross-section addresses stakeholder feedback and the project goals to improve safety and mobility. Additionally, it allows for the opportunity to implement sidewalk and streetscape improvements to beautify, brand, and create a sense of place along the corridor. A 6′ sidewalk is proposed though opportunities to provide a wider facility may be explored adjacent to major land uses. Specific streetscape improvements are discussed later in this chapter.

Figure 5.3 shows an alternative cross-section for the corridor between US 59 and Roark Road. The bicycle lanes recommended for the corridor south of Roark Road are not currently shown to continue north of Roark Road due to that lack of bicycle connections near the intersection of FM 1092 at US 59. A bicycle facility is recommended to continue along Roark Road to the West Bellfort Park & Ride and the future Keegans Bayou Trail at the point that Roark Road is improved.

INTERSECTION RECOMMENDATIONS

Recommendations for each of the major intersections along the corridor are focused on improving operations and improving multi-modal safety. The intersection recommendations include before and after LOS calculations to demonstrate how traffic operations-focused recommendations improve signal performance and reduce delays. These intersection analyses results in all signalized intersections operating with a LOS of D or better and v/c ratios less than 0.85. The intersection analyses for all signalized intersections are included in Appendix E. The detailed cost estimates for the intersection recommendations are included in Appendix F.

FM 1092 at US 59 SB Frontage Road	A.M. Peak Hour			P.M. Peak Hour		
	LOS	Delay (seconds/vehicle)	v/c	LOS	Delay (seconds/vehicle)	v/c
Before	C	26.9	0.48	D	39.8	0.94
After	C	26.9	0.45	D	36.1	0.82

FM 1092 AT US 59 FRONTAGE ROAD (SOUTHBOUND)

Case for Action

Operations

The intersection of FM 1092 at US 59 has two signalized intersections that operate as a single diamond interchange. Both signalized intersections operate at a LOS of D during the PM peak hour. During the PM peak period, the FM 1092 at US 59 West Frontage Road intersection operates with a volume to capacity (v/c) ratio of 0.94 with a delay of 39.5 seconds per vehicle. This is a very high v/c ratio and warns that the intersection is operating close to capacity.

The poor LOS in the PM peak period is due to a high number of left turns traveling southbound on the US 59 West Frontage Road to southbound FM 1092. Currently there is one dedicated left-turn lane, one shared left-through lane, and one shared through-right lane at the US 59 West Frontage Road approach. Expanding the approach capacity will improve the overall operations of the intersection.

Safety

There are a number of crashes at the intersection of FM 1092 at US 59 West Frontage Road. Between 2009 and 2011, 36 crashes occurred at the intersection. By reviewing the crash data at the intersection in greater depth, it was determined that a majority of accidents are due to confusion about the current intersection alignment. While the left-most lane on the US 59 SB Frontage Road approach is a left-turn only, there is a receiving lane on the opposite end of the intersection with a small painted island to discourage vehicles from driving straight. The crash records show that drivers appear to travel straight from the left-turn only lane, resulting in side swipe collisions with left turning vehicles from the center left-through lane.

Top Manner of Crash classifications:

- Left Turns - 36%
- Sideswipe - 22%

Top contributing factors for collisions:

- Driver Inattention - 25%
- Failed to Control Speed - 18%
- Failed to Drive in Single Lane - 18%

Recommended Improvements

Short Term

PROJECT #2A - Eliminate southbound through movement from left-turn lane by extending curb island and extending signage and striping of Left Turn Only Lane for southbound approach.

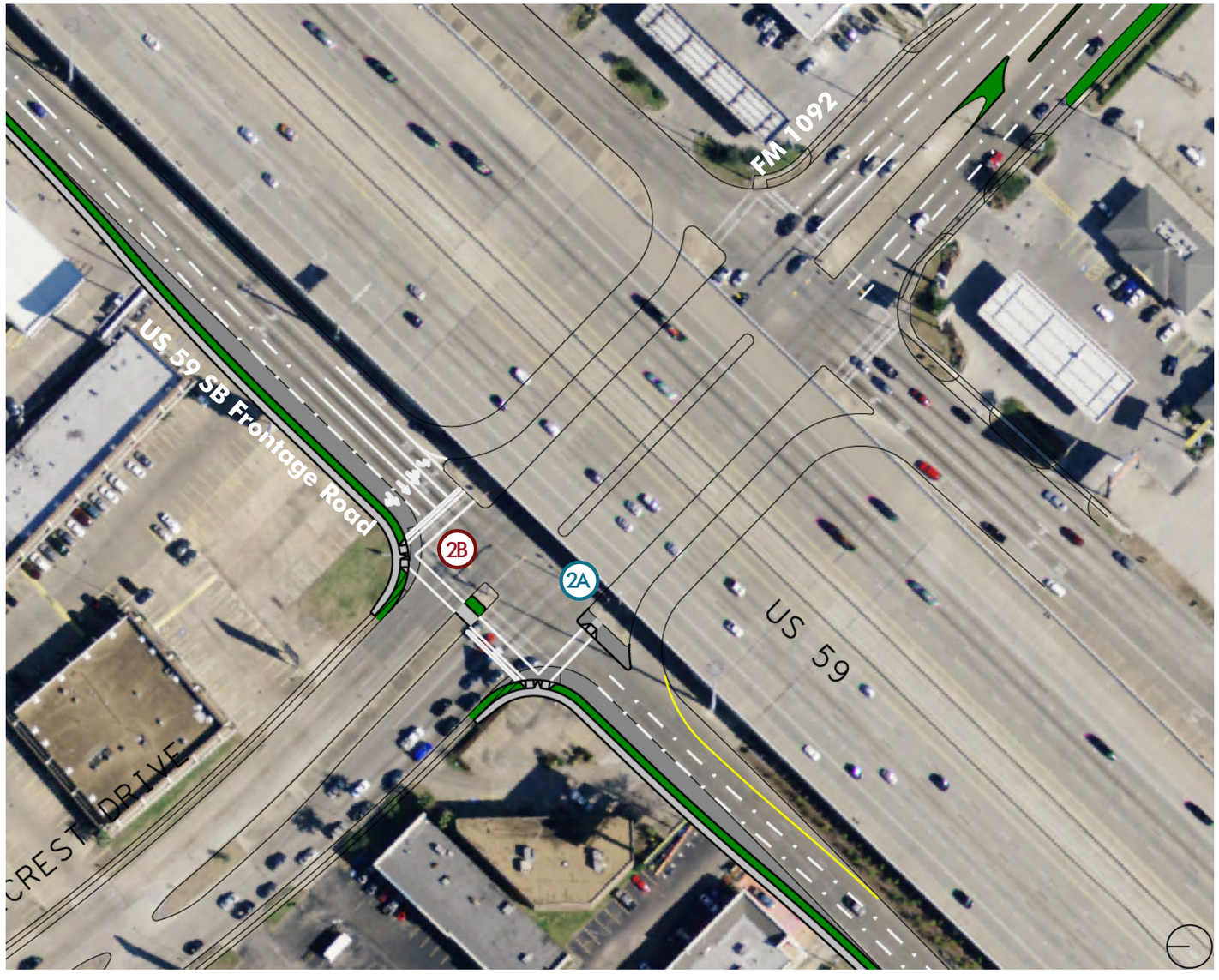


Figure 5.4: *Recommendations for FM 1092 at US 59*

Estimated Cost: $46,200

Long Term

PROJECT #2B - Right-of-way acquisition and widening to add an additional southbound through lane and realign intersection with three receiving lanes.

Estimated Cost: $ 297,600

FM 1092 AT ROARK ROAD

Case for Action

Operations

The intersection of FM 1092 at Roark Road operates well at LOS A during the AM peak period and a LOS of B during the PM peak period. Roark Road experiences a heavy number of northbound right turns as drivers use Roark Road as a cut-through street to access the US 59 Northbound Frontage Road. Roark Road also provides access to the West Bellfort Park & Ride and the US 59 South HOV/HOT lane. As presented in the Existing Conditions Chapter, the US 59 South HOV/HOT lane has been successful and ridership is projected to increase, which will likely result in increased travel to the West Bellfort Park & Ride along Roark Road.

Roark Road is also a potential major corridor for active transportation, with pedestrians and bicyclists traveling to and from the West Bellfort Park & Ride. Roark Road will also provide connections from FM 1092 and the surrounding area to the future Keegans Bayou Trail. With the completion of the Keegans Bayou Trail, the trail connection will be made all the way to the Port of Houston along Brays Bayou with pedestrian and bicycle infrastructure.

Safety

The intersection of FM 1092 at Roark Road has had few crashes over the three years of recorded data for this report. Between 2009 and 2011, 11 reported crashes occurred.

Top Manner of Crash classifications:

- Left-Turns - 36%
- Rear-End - 27%

Top contributing factors for collisions:

- Failed to Control Speed - 25%
- Failed to Yield ROW - Turning Left - 25%

Recommended Improvements

Long Term

PROJECT #3 - Widen and realign the intersection to square the intersection and include a northbound right-turn only lane. Improve Roark Road from FM 1092 to West Bellfort Boulevard to incorporate improved pedestrian and bicycle facilities. This will recommendation will require further study by the City of Houston to determine the appropriate cross-section at the time that Roark Road were to be considered for improvements. Alternate cross-section may include a side path or on-street bicycle lanes to improve the connection to the north.

Project cost to be based on final design to be developed with further study.

	A.M. Peak Hour			P.M. Peak Hour		
	LOS	Delay (seconds/vehicle)	v/c	LOS	Delay (seconds/vehicle)	v/c
Before	A	5.2	0.52	B	18.3	0.70
After	A	8.3	0.44	B	16.2	0.60

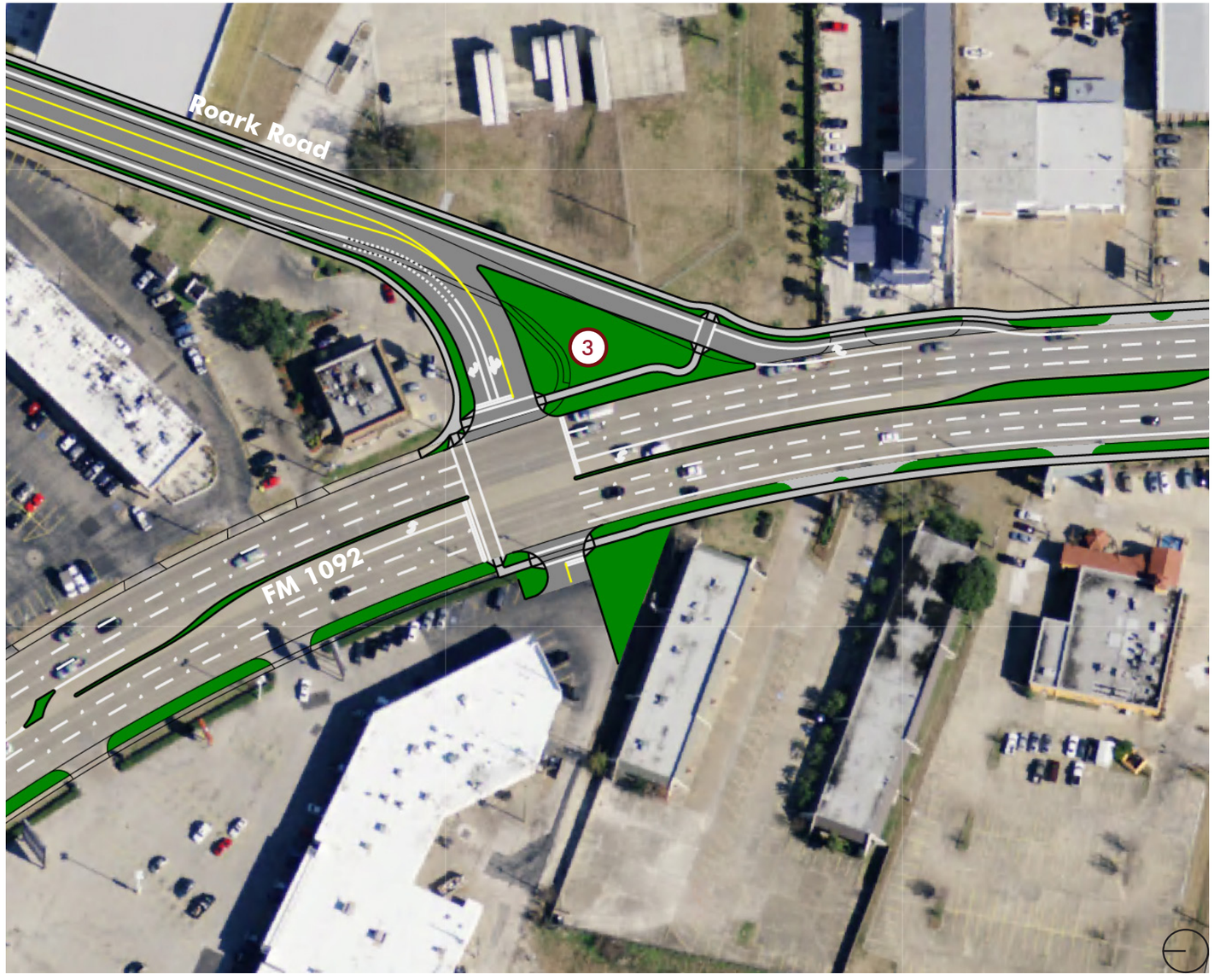


Figure 5.5: *Recommendations for FM 1092 at Roark Road*

FM 1092 AT WEST AIRPORT BOULEVARD

Case for Action

Operations
The intersection of FM 1092 at West Airport Boulevard operates at a LOS of C during the AM Peak and LOS D during the PM peak period. While the LOS values are classified as acceptable, the intersection could operate more efficiently if the existing split phase operations on West Airport Boulevard were removed. Currently, the West Airport Boulevard approaches operate as a split phase as the approach lane geometry is limited by the bridge over the drainage canal.

The existing bridges on the eastbound approach also limit the turning radius for large trucks with a long wheel base wishing to turn from southbound FM 1092 to westbound West Airport Boulevard. Widening the intersection will help reduce issues with large trucks turning at the intersection.

Safety
The intersection of FM 1092 at West Airport Boulevard has the highest crash rate along the study corridor with 63 crashes occurring at or near the intersection between 2009 and 2011. The addition of turn lanes can reduce the read-end crashes at the intersection.

The intersection has no pedestrian infrastructure, making the intersection difficult to traverse for pedestrians.

Top Manner of Crash classifications:

- Rear-End - 54%
- Other - 18%

Top contributing factors for collisions:

- Failed to Control Speed - 57%
- Driver Inattention - 11%
- Disregard stop sign or light - 11%

Recommended Improvements

Short Term

PROJECT #5A - Install crosswalks on all four approaches as well as wheelchair ramps and pedestrian signals.

Estimated Cost: $33,400

Long Term

PROJECT #5B - Intersection upgrades including the installation of eastbound left-turn lane and right-turn lane, additional downstream lane from the westbound approach, extension of westbound left-turn lane, and signal timings to remove split phasing for West Airport Boulevard approaches. Includes the widening of West Airport Boulevard bridge with bridge culverts.

Estimated Cost: $1,225,500

	A.M. Peak Hour			P.M. Peak Hour		
	LOS	Delay (seconds/vehicle)	v/c	LOS	Delay (seconds/vehicle)	v/c
Before	C	31.6	0.82	D	51.5	0.95
After	C	25.3	0.67	C	31.4	0.77

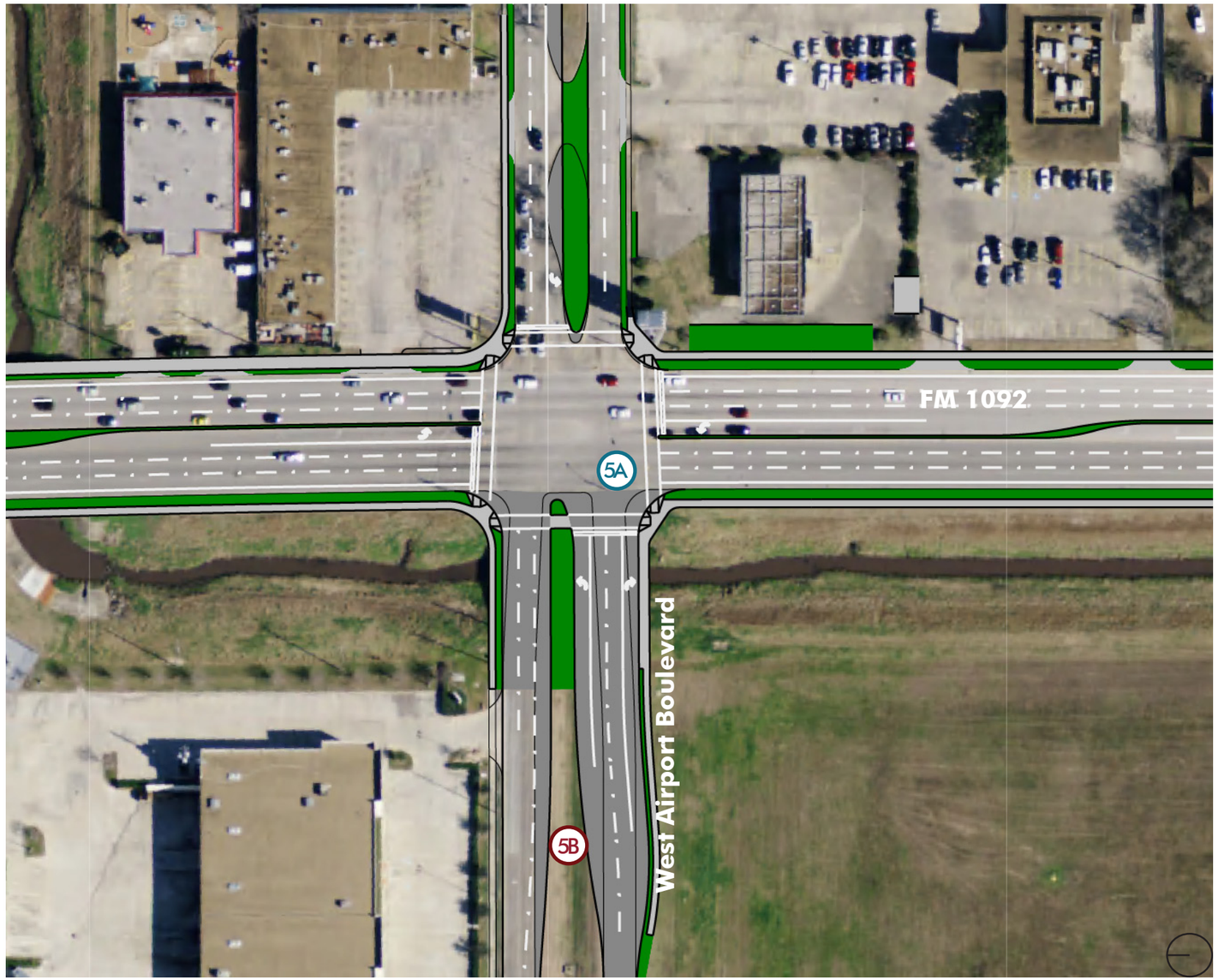


Figure 5.6: *Recommendations for FM 1092 at West Airport Boulevard*

FM 1092 AT GREENBRIAR DRIVE/MULA ROAD

Case for Action

Operations

The intersection of FM 1092 at Greenbriar Drive and Mula Road operates with a LOS of B during the morning peak period and a LOS C during the evening peak period; operating with acceptable LOS values with its current alignment. Intersection operations would improve if the existing split phase for Greenbriar Drive/Mula Road was converted to leading/lagging left. To allow for a change from split phase operations on the minor approach, the eastbound approach would require a dedicated left-turn lane.

Greenbriar Drive and Mula Road experience relatively low traffic volumes and the roadway lane striping could be revised without greatly effecting the operations of the roadway. Converting Greenbriar Drive and Mula Road (currently 4-lane roadways) to 3-lane roadways with two travel lanes and one two-way left-turn lane would allow for a dedicated left turn lane for the eastbound approach, including the removal of the exiting split phase signal operations, and the installation of bidirectional 5-foot bicycle lanes. Bicycle lanes along Greenbriar Drive and Mula Road would connect FM 1092 to The Fountains shopping center and other retail destinations along US 59. The Before and After LOS calculations show that reducing the travel lanes along Greenbriar Drive and Mula Road while installing a dedicated left-turn lane for the eastbound reduces delay and improves the v/c ratio for the intersection.

Safety

A total of 46 of crashes occurred at the intersection of FM 1092 at Cash Road between 2009 and 2011 including a high percentage of rear-end crashes.

The intersection has no crosswalks or pedestrian signals, making the intersection difficult for pedestrians to traverse.

Top Manner of Crash classifications:

- Rear-End - 37%
- Sideswipe - 20%

Top three contributing factors for collisions:

- Failed to Control Speed - 46%
- Driver Inattention - 22%
- Failed to Yield ROW – Private Drive - 17%

Recommended Improvements

Short Term

PROJECT #7 - Restripe Mula Road and Greenbriar Drive as 3-lane roadway (two travel lanes and one continuous left-turn lane) with two - 5' foot bicycle lanes to allow for dedicated left turns at FM 1092. Revise signal operations and timings to support lane geometry and remove split phase operations. Install crosswalks and pedestrian signals. (Note: Bicycle lanes are proposed from Stafford Road to South Kirkwood Road.)

Estimated Cost: $57,300

	A.M. Peak Hour			P.M. Peak Hour		
	LOS	Delay (seconds/vehicle)	v/c	LOS	Delay (seconds/vehicle)	v/c
Before	B	18.7	0.67	C	24.1	0.73
After	B	16.4	0.69	C	23.8	0.74

Figure 5.7: *Recommendations for FM 1092 at Greenbriar Drive/Mula Road*

FM 1092 AT CASH ROAD

Case for Action

Operations
Currently the intersection of FM 1092 at Cash Road operates at LOS C during the morning and evening peak periods. Like most of the other signalized intersections along the corridor, there are no crosswalks at the intersection and only one wheelchair ramp, adjacent to the Stafford Centre.

Safety
A total of 32 of crashes occurred at the intersection of FM 1092 at Cash Road between 2009 and 2011.

Top Manner of Crash classifications:

- Rear-End - 37%
- Sideswipe - 20%
- Other - 17%

Top contributing factors for collisions:

- Failed to Control Speed - 46%
- Driver Inattention - 22%
- Failed to Yield ROW – Private Drive - 17%

Recommended Improvements

Short Term

PROJECT #8 - Pedestrian improvements including crosswalk installation, three ADA wheelchair ramps, and pedestrian signals as well as restriping and adding appropriate signage to designate Cash Road between FM 1092 and Stafford Road as a bicycle route with sharrows connecting to Houston Community College.

Estimated Cost: $61,000

	A.M. Peak Hour			P.M. Peak Hour		
	LOS	Delay (seconds/vehicle)	v/c	LOS	Delay (seconds/vehicle)	v/c
Before	C	24.9	0.69	C	22.8	0.57
After	C	21.5	0.71	B	18.0	0.57

Figure 5.8: *Recommendations for FM 1092 at Cash Road*

FM 1092 AT GREENBOUGH DRIVE

Case for Action

Safety
Between 2009 and 2011, 49 crashes occurred at or near the intersection of FM 1092 at Greenbough Drive. Greenbough Drive is a local street that is stop controlled at FM 1092 and located at the north terminus of the US 90A underpass where the FM 1092 frontage lanes and the FM 1092 main lanes start to merge and realign with the seven-lane cross-section of FM 1092 to the north.

Driving behaviors contribute to the high number of crashes at or near the FM 1092 at Greenbough Drive intersection. Accidents reports show that many drivers from the frontage lanes attempt to cross the two main lanes to either make a left turn or to U-turn at the earliest convenience. Drivers also try to cross multiple lanes of traffic from Greenbough Drive to the southbound lanes on FM 1092. Similar driving behavior is also present south of the US 90A overpass near Broadway Parkway.

Top Manner of Crash classifications:

- Sideswipe - 49%
- Left Turn - 27%

Top contributing factors for collisions:

- Failed to Control Speed - 46%
- Driver Inattention - 22%
- Failed to Yield ROW – Private Drive - 17%

Recommended Improvements

Short Term

PROJECT #9 - Install raised delineators in the gore areas between the FM 1092 frontage roads and the FM 1092 main travels lanes as well as improve signage and striping. Specifically for southbound traffic south of the underpass and northbound traffic north of the underpass to address drivers making unsafe driving maneuvers at these locations.

Estimated Cost: $30,500

Figure 5.9 *Recommendations for FM 1092 at Greenbough Drive*

FM 1092 AT AVENUE E

Case for Action

Operations
The intersection of FM 1092 at Avenue E is currently running with a LOS E during both the AM and PM peak periods. Due to a heavy number of turning movements, the intersection is at capacity during the peak periods. Due to the over saturation of the intersection during the peak period, the intersection currently runs free and out of coordination with other signals. This reduces the operations of not only the intersection but the corridor as well. Significant travel time delays along the corridor affect drivers traveling southbound during the PM peak as shown in Figure 3.11. The high number of turning vehicles is a result of the surrounding roadway network as well as the surrounding roadway alignment; many drivers use Avenue E as their primary connection between FM 1092 and US 90A, bypassing the split diamond intersection of FM 1092 and US 90A.

Safety
Between 2009 and 2011, 45 intersection related crashes occurred at the intersection of FM 1092 at Avenue E. Rear-end collisions appear to be driven by the stop-and-go traffic that results from the poor operations of the traffic signal as well as the proximity of the US 90A underpass just north of the intersection, which can obstruct sight-distance for drivers .

Another cause of collisions at the intersection is the lane reduction on the southbound approach, from 3 to 2 lanes at the intersection with Avenue E. The right most lane becomes a right-turn only that acts as an entrapment lane and results in many unsafe last minute lane changing or difficult weaving maneuvers by drivers.

Top Manner of Crash classifications:

- Rear End - 38%
- Other - 24%
- Left-Turn - 19%

Top contributing factors for collisions:

- Failed to Control Speed - 31%
- Failed to Yield ROW – Private Drive - 27%
- Changed Lane When Unsafe - 19%

Recommended Improvements

Long Term

PROJECT #10 - Realign and reconstruct Avenue E to remove intersection skew and to include dual westbound left-turn lanes. Revise signal operations and timings to support lane geometry and protected left-turn movements (remove split phase).

Estimated Cost: $1,774,000

	A.M. Peak Hour			P.M. Peak Hour		
	LOS	Delay (seconds/vehicle)	v/c	LOS	Delay (seconds/vehicle)	v/c
Before	E	58.8	1.01	E	62.6	1.04
After	C	28.2	0.79	C	30.3	0.83

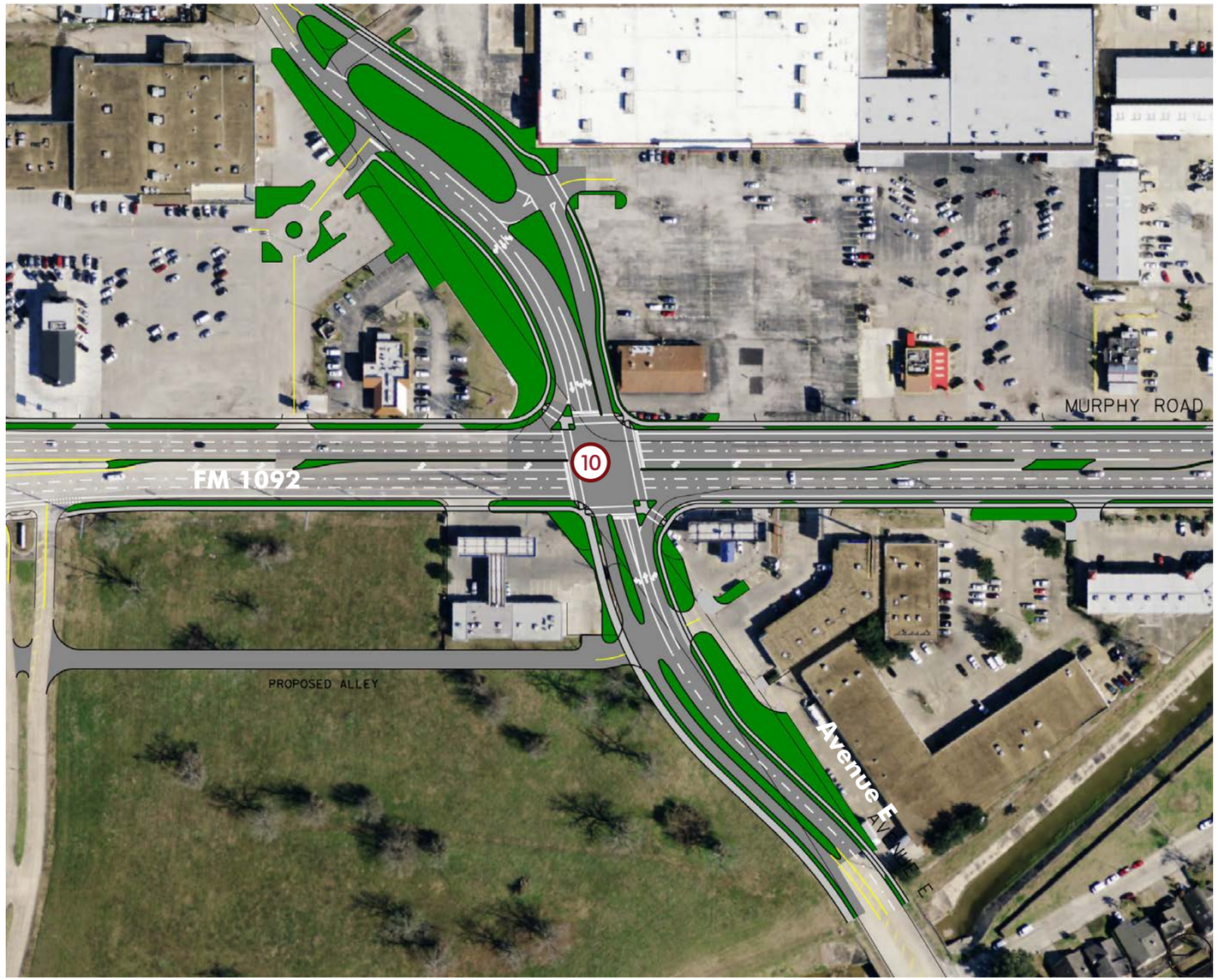


Figure 5.10: *Recommendations for FM 1092 at Avenue E*

FM 1092 AT DOVE COUNTRY DRIVE

Case for Action

Operations
The intersection currently operates with good LOS due to low volumes along Dove Country Drive. The Dove Country residential community is mostly built out and traffic volumes are not projected to increase to a level that could significantly effect the intersection operations.

Safety
Between 2009 and 2011, only 13 collisions occurred at the intersection of FM 1092 at Dove Country Drive. A review of the crash data, listed below, did not show any specific safety problems associated with the intersection.

Top Manner of Crash classification:

- Rear-End - 77%

Top three contributing factors for collusions:

- Failed to Control Speed - 77%
- Driver Inattention - 23%

Recommended Improvements

The intersection is located adjacent to a retail strip center which currently has three driveways located along FM 1092. As part of the proposed driveway consolidation plan presented later in this chapter, consolidating driveways at this retail center will be advantageous if a new driveway is constructed to align with the existing FM 1092 at Dove Country Drive intersection.

Short Term

PROJECT #11A - Install crosswalks, wheel chair ramps, and pedestrian signals.

Estimated Cost: $28,800

Long Term

PROJECT #11B - Convert to four-way intersection by adding driveway to the adjacent strip retail center located at 720 FM 1092. With the construction of new driveway at the retail center, close the two northern most driveways as part of driveway consolidation strategy. A new traffic signal at the intersection of FM 1092 at Country Place Drive/Commerce Business Drive should also be considered to allow left-turns on to FM 1092. This would operate with a common signal controller to the signal at Dove Country Drive.

Estimated Cost: $186,000

	A.M. Peak Hour			P.M. Peak Hour		
	LOS	Delay (seconds/vehicle)	v/c	LOS	Delay (seconds/vehicle)	v/c
Before	A	5.3	0.75	A	5.1	0.74
After	A	5.0	0.57	A	5.0	0.55

Figure 5.11: *Recommendations for FM 1092 at Dove Country Drive*

US 90A AT PROMENADE BOULEVARD

Case for Action

Operations
The intersection of US 90A at Promenade Boulevard, shown in Figure 5.12, is a major access point to the Promenade residential neighborhood. Currently, the traffic signal at the intersection prevents northbound traffic from Promenade Boulevard to enter the intersection if a train is traveling along the Union Pacific Railroad, blocking promenade north of US 90A. While restricting through movements prevents unwanted back up into the intersection, the prevention of turning movements is unnecessary. Allowing left-turns even when a train is present will reduce congestion along Promenade Boulevard and improve traffic operations at the intersection.

The expansion of the Union Pacific Railroad to double tracks in the future will likely increase train traffic and result in more vehicle delay at the intersection. The crossing currently averages roughly 60 trains per day.

Recommended Improvements

Short Term

PROJECT #12 - Improve signal operations to allow northbound left-turns when a train is present along the Union Pacific Railroad.

Estimated Cost: $33,800

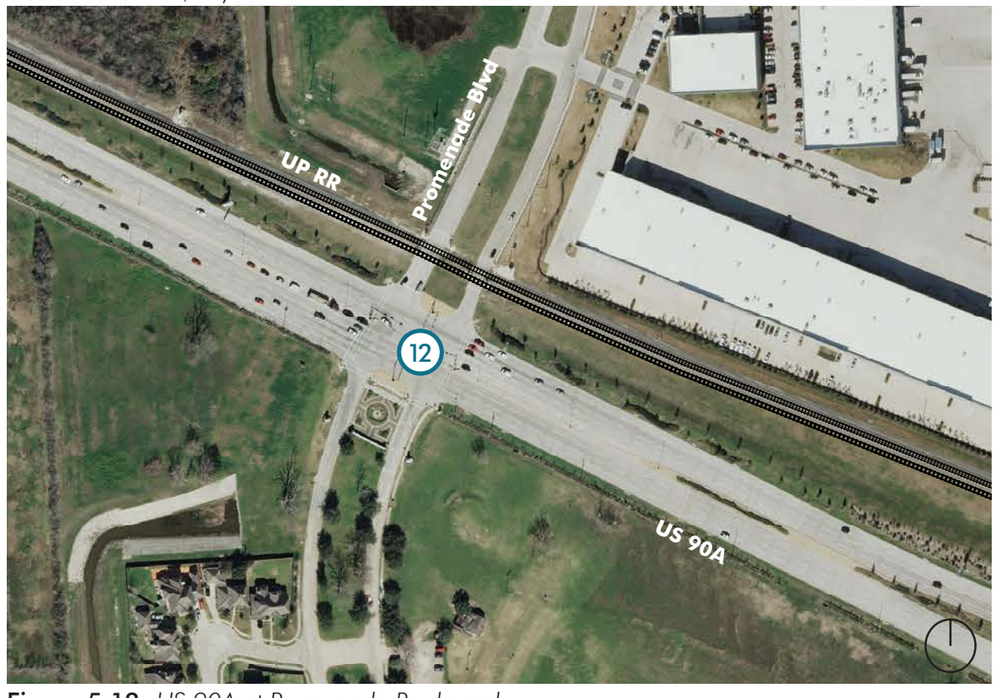


Figure 5.12: *US 90A at Promenade Boulevard*

POSSIBLE FUTURE DEMAND FOR TURN LANES

Traffic volumes are expected to increase along FM 1092 due to average yearly growth and future development south of the study area within Fort Bend County. Despite the traffic increase, the proposed six-lane cross-section, shown in Figure 5.2, is expected to operate at acceptable levels with projected traffic volumes. Dedicated turn lanes may need to be added to mitigate congestion as a consequence of the projected growth. Therefore, locations along the corridor were identified that may require additional dedicated turn-lanes in the future. TxDOT criteria states that a dedicated right-turn lane should be considered on a roadway with a 45 mph design speed when turning volumes exceed 60 vehicles per hour (vph).

Using the TxDOT criteria, there are four intersections that would potentially require additional turn-lanes in the future based on traffic volume growth. These four intersections are highlighted in Figure 5.13. FM 1092 at West Airport may require an additional dedicated right-turn lane for the northbound approach. FM 1092 at Greenbriar Drive and Mula Road may require an additional dedicated right-turn lane for both the northbound and southbound approaches. FM 1092 at Cash Road may require an additional dedicated right-turn lane for both the northbound and southbound approaches. FM 1092 at Avenue E may require an additional dedicated turn lane for the northbound approach.

While the current TxDOT standard for roadways with a speed limit of 45 mph warrants right-turn only lanes at the intersections shown in Figure 5.13, the decision to construct dedicated right-turn only lanes should also address the following issues:

- *Pedestrian Safety* - The addition of a travel lane to an intersection creates longer, more challenging pedestrian crossings. Additionally, right-turn only lanes that allow right turns during the red phase of a signal can result in drivers making unsafe right-turns without coming to a complete stop and not addressing pedestrian who may be nearby or attempting to cross the intersection.
- *Bicycle Safety* - Right-turn only lanes can also cause increase conflict with bicyclists, resulting in reduced safety and a higher chance of collisions between bicyclist and drivers.
- *Right-of-way Acquisition* - Additional turn-lanes may require right-of-way (ROW) acquisitions if the existing 120 foot of ROW is not sufficient for all travel lanes and adequate sidewalks. Therefore ROW may need to be purchased at additional cost.
- *Roadway Aesthetics* - future corridor planning may developed an enhanced streetscape design that improves to overall visual appeal of the corridor and creates a strong sense of place. The addition of right turn lanes can cut into this space and reduce the benefits of the streetscape improvements to the corridor.

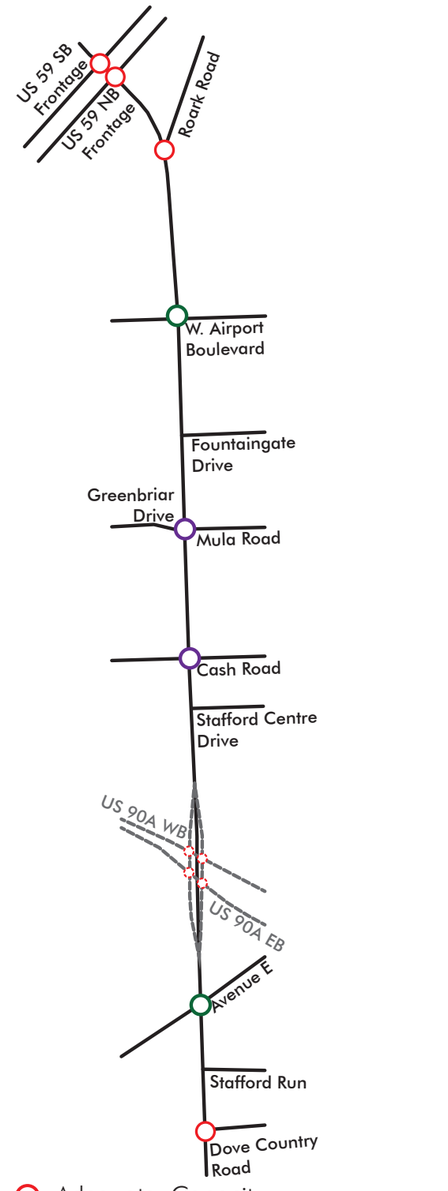


Figure 5.13: *Possible Locations for Dedicated Right-turn Lanes Due to Future Traffic Growth*

DRIVEWAY CONSOLIDATION STRATEGY

As the number of driveways along a corridor increases, so does the probability of a collision, as shown in Figure 5.14. The existing conditions analysis summarizes the correlation between high crash rates and the high volume of driveways along the corridor. Some sections of FM 1092 have driveway spacing as high as 72 driveways per mile, shown in Figure 3.21. A Driveway Consolidation Strategy is recommended to address the approach for consolidating driveways, increasing driveway spacing, and improving overall access and operations along the corridor.

Corridor recommendation #17 highlights a few areas along FM 1092 where driveways should be consolidated to allow parcels along the corridor to have better access, considering the location of the proposed medians. Figure 5.15 summarizes Recommendation #17, and driveway consolidation location recommendations are shown in the schematic drawing of the corridor presented in Figure 5.17 to Figure 5.20.

While driveway consolidation is proposed at several locations as part of project #17, the development of a Driveway Consolidation Strategy will ensure the continued reduction of access points along the corridor as property owners change. Driveway consolidation or removal should occur when a driveway is located close to an intersection, a driveway provides redundant parcel access, or a driveway is too close to other driveways.

The table in Figure 3.7 summarizes access management practices, including driveway spacing requirements, for both the City of Houston and the City of Stafford. Both cities currently have restrictions on driveway placement near an intersection and minimum driveway spacing, though there are many examples along FM 1092 where these restrictions were not applied. The City of Stafford mandates a minimum driveway offset from an intersection of 100 feet, compared to the City of Houston with a minium driveway offset ranging from 60 feet to 100 feet depending on the intersection type. The City of Stafford minium driveway spacing is 165 feet and the City of Houston minimum driveway spacing is 20 feet. TxDOT also recommends a minium driveway spacing of 200 feet. The City of Houston has restrictions to help reduce redundant parcel driveways by limiting the number driveways for a parcel based on parcel frontage length. A driveway consolidation strategy should enforce the existing restrictions and/or develop a set of restrictions specific to FM 1092 and ensure they are enforced when a property changes ownership or redevelops.

Driveway consolidation can also be practiced without a change in property ownership by receiving the current property owners consent, possibly by leveraging incentives. Incentives can include alternative access routes and cross-access between parcels and/or alignment with a median opening or a traffic signal.

To continue the reduction of access points along the corridor recommended in project #17, jurisdictions should enforce more stringent access management criteria to drive consolidation over time as parcels redevelop. A Driveway Consolidation Strategy is unlikely to be a quick fix, but will benefit the corridor over time.

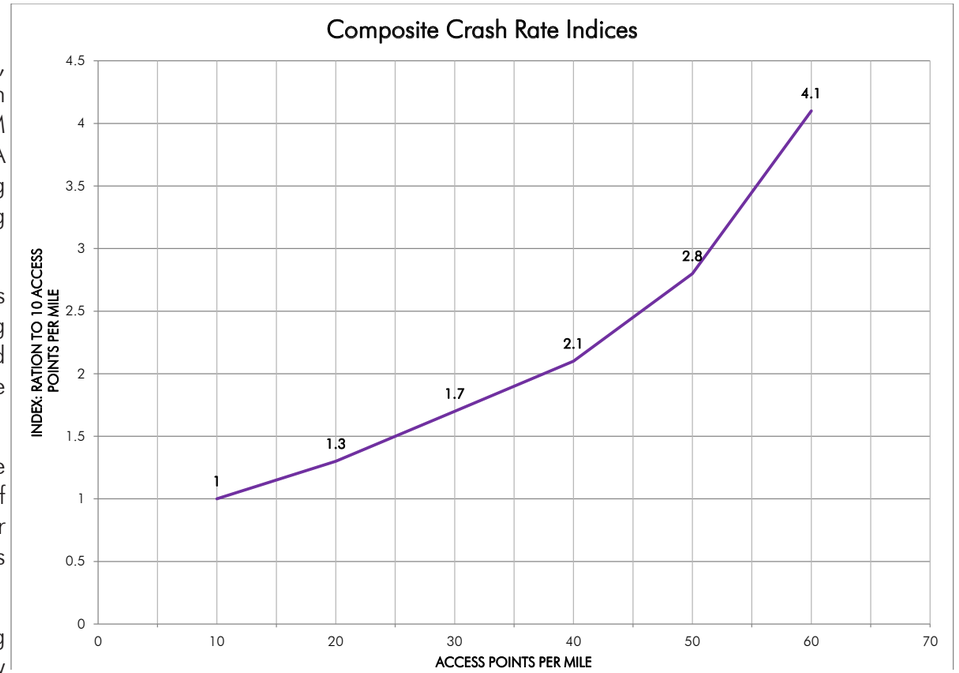


Figure 5.14: *Composite Crash Rate Indices*

Medium Term

PROJECT #17 - Driveway consolidation for the following areas:

- Southport Business Park (12220 Murphy Rd)- Close northern most and central driveway and install driveway adjacent with future median opening with access to Nations Boulevard (shown in Figure 5.16)
- Car mechanics and storage (south of West Airport Boulevard at 12439 Murphy Rd and 12503 Murphy Rd) - Consolidate driveways and provide cross access
- ReStore Home Improvement and Retail store (13570 Murphy Rd) - add additional driveway to line up with median opening and improve cross access
- Houston Community Bank and adjacent property (13570 Murphy Rd and 13715 Murphy Rd) - Provide cross access
- Cross access between retail centers along the west side of FM 1092 and north of the canal at 504 FM 1092 and 508 Murphy Rd.

Figure 5.15: *Recommendation #17*

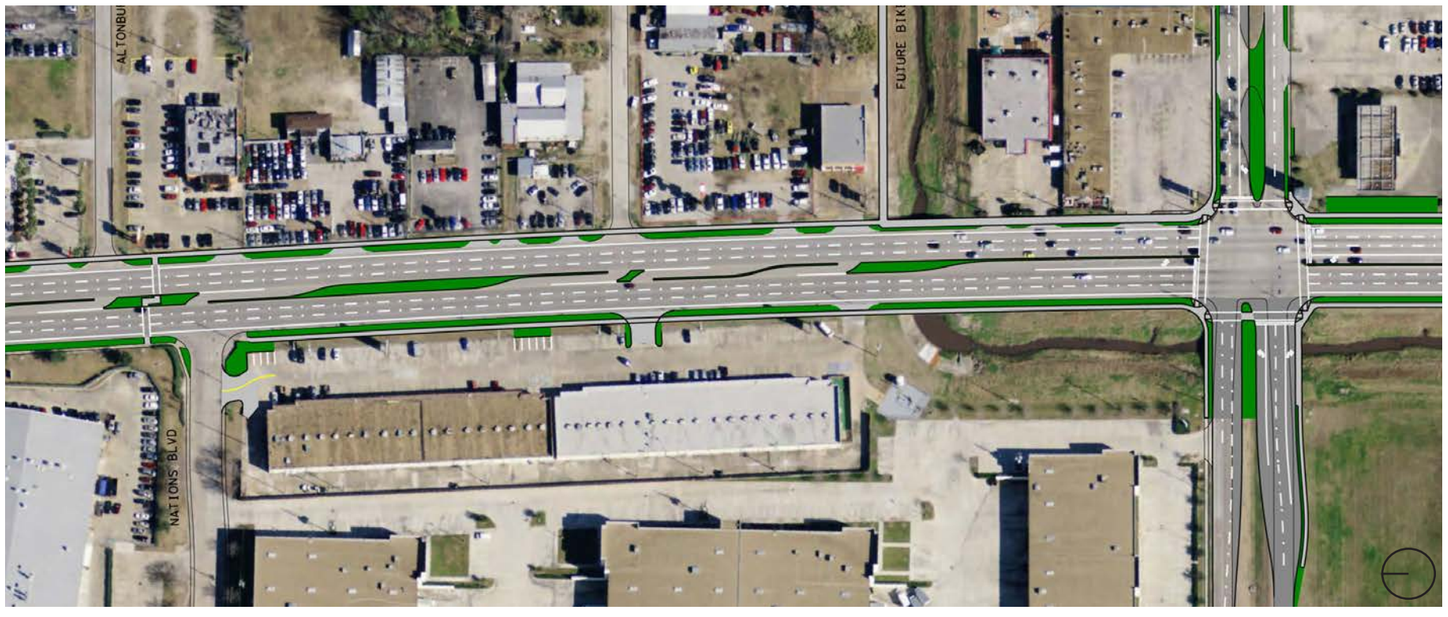


Figure 5.16: *Example of Recommend Driveway Consolidation at 12220 Murphy Road Retail Center*

CORRIDOR RECOMMENDATIONS

The following four Figures, 5.17 through 5.20, present all of the corridor specific improvements, driveway consolidations, pedestrian and streetscape improvements. Previously presented intersection improvements are also included in the following figures with abbreviated descriptions and combined costs for all recommendations associated with a signalized intersection. Detailed cost estimates for all intersection and corridor improvements are included in Appendix F.

As with the intersection projects, projects for the corridor are classified by implementation timing priorities. There are three implementation timing categories for projects: short term, medium term, and long term.

LEGEND

- Short Term Project (0-5 years)
- Medium Term Project (5-15 years)
- Long Term Project (15+ years)
- Multi Phased Intersection Improvements
- New Curb
- Median/Pedestrian Realm (Potential Streetscape Improvements)
- Sidewalk/Side Path
- Driveway Removal

Recommendation		Term	Cost
1	Install Signal Interconnect	Short	$ 510,400
2	FM 1092 at US 59 Southbound Frontage Road intersection improvements presented in Figure 5.4	Short & Long	$ 343,800
3	FM 1092 at Roark Road intersection improvements presented in Figure 5.5	Long	FUTURE
4	Two-stage mid-block pedestrian crossing with HAWK beacon signal and median	Medium	$ 147,500
13	Restripe with proposed cross-section	Short	$ 471,100
14	Construct 13' median along the corridor with channelized left-turns lanes	Short	$ 485,400
16	Landscape roadway medians	Medium	$ 500,000 - $ 700,000[2]
17	Driveway consolidation at 12220 Murphy Road - close northern most and central driveway and install driveway adjacent with future median opening, and install driveway with access to Nations Boulevard	Medium	$ 120,800
18A	Construct 6' sidewalks	Medium	$ 1,444,700
19	Landscape pedestrian realm to provide shade and buffer	Medium	$ 150,000 - $ 300,000[2]
20	Install pedestrian lighting and install City of Stafford banners on lighting poles within Stafford city limits	Medium	$ 1,000,000 - $ 3,000,000[2]
21	Install double-headed roadway lighting	Medium	$ 400,000 - $ 500,000
22	Install City of Stafford monument/gateway signage	Medium	Similar to Previous Monument Cost

Figure 5.17: *FM 1092 Corridor Recommendations - US 59 to Windsor Lane*

[1] Cost to be based on final design of future long term project
[2] Dependent on type and spacing

Recommendation		Term	Cost
1	Install Signal Interconnect	Short	$ 510,400
5	FM 1092 at West Airport Boulevard intersection improvements presented in Figure 5.6	Short & Long	$1,258,900
6	Realign Fountaingate Drive with potential signalized access point to future development on former TI Site	Long	$1,257,700
7	FM 1092 at Greenbriar Drive/Mula Road intersection improvements presented in Figure 5.7	Short	$ 57,300
13	Restripe with proposed cross-section	Short	$ 471,100
14	Construct 13′ median along the corridor with channelized left-turns lanes	Short	$ 485,400
16	Landscape roadway medians	Medium	$ 500,000 - $ 700,000 [1]
17	Driveway consolidation and cross access between 12439 Murphy Road and 12503 Murphy Road	Medium	$ 120,800
18A	Construct 6′ sidewalks	Medium	$ 1,444,700
19	Landscape pedestrian realm to provide shade and buffer	Medium	$ 150,000 - $ 300,000[1]
20	Install pedestrian lighting and install City of Stafford banners on lighting poles within Stafford city limits	Medium	$ 1,000,000 - $ 3,000,000[1]
21	Install double-headed roadway lighting	Medium	$ 400,000 - $ 500,000
24	Develop landscape/beautification plan for drainage corridor, create pedestrian and bicyclist trails	Long	$ 135,000

[1] Dependent on type and spacing

LEGEND

- (#) Short Term Project (0-5 years)
- (#) Medium Term Project (5-15 years)
- (#) Long Term Project (15+ years)
- (#) Multi Phased Intersection Improvements
- New Curb
- Median/Pedestrian Realm (Potential Streetscapes Improvements)
- Sidewalk/Side Path
- Driveway Removal

Figure 5.18: *FM 1092 Corridor Recommendations - Windsor Lane to Scarpinato Road*

Recommendation		Term	Cost
1	Install Signal Interconnect	Short	$ 510,400
8	FM 1092 at Cash Road intersection improvements presented in Figure 5.8	Short	$ 61,000
9	Install raised delineators in the gore areas and improve signage and striping	Short	$ 30,500
13	Restripe with proposed cross-section	Short	$ 471,100
14	Construct 13' median along the corridor with channelized left-turns lanes	Short	$ 485,400
16	Landscape roadway medians	Medium	$ 500,000 - $ 700,000 [1]
17	Driveway consolidation - provide cross access Add additional driveway to align with median opening and improve cross access	Medium	$ 120,800
18A	Construct 6' sidewalks	Medium	$ 1,444,700
18B	Construct side paths and ramp connections between bicycle lanes and side paths	Medium	$ 321,900
19	Landscape pedestrian realm to provide shade and buffer	Medium	$ 150,000 - $ 300,000[1]
20	Install pedestrian lighting and install City of Stafford banners on lighting poles within Stafford city limits	Medium	$ 1,000,000 - $ 3,000,000[1]
21	Install double-headed roadway lighting	Medium	$ 400,000 - $ 500,000
23	Develop a community park plaza space at Stafford Centre for public use to include shade trees, benches, and other amenities	Long	$ 145,000

[1] Dependent on type and spacing

LEGEND

- (#) Short Term Project (0-5 years)
- (#) Medium Term Project (5-15 years)
- (#) Long Term Project (15+ years)
- (#) Multi Phased Intersection Improvements
- New Curb
- Median/Pedestrian Realm (Potential Streetscape Improvements)
- Sidewalk/Side Path
- Driveway Removal

Figure 5.19: *FM 1092 Corridor Recommendations - Scarpinato Road to US 90A*

Recommendation		Term	Cost
1	Install Signal Interconnect	Short	$ 510,400
9	Install raised delineators in the gore areas and improve signage and striping	Short	$ 30,500
10	FM 1092 at Avenue E intersection improvements presented in Figure 5.10	Long	$ 1,774,000
11	FM 1092 at Dove Country Drive intersection improvements presented in Figure 5.11	Short & Medium	$ 215,400
13	Restripe with proposed cross-section	Short	$ 471,100
14	Construct 13' median along the corridor with channelized left-turns lanes	Short	$ 485,400
15	Widen FM 1092 as included in RTP project 13641 and the FM 1092 Access Management Plan - Missouri City	Medium	$ 10,100,000
16	Landscape roadway medians	Medium	$ 500,000 - $ 700,000*
17	Driveway consolidation and cross access between 504 Murphy Road and 508 Murphy Road	Medium	$ 120,800
18A	Construct 6' sidewalks	Medium	$ 1,444,700
18B	Construct side paths and ramp connections between bicycle lanes and side paths	Medium	$ 321,900
19	Landscape pedestrian realm to provide shade and buffer	Medium	$ 150,000 - $ 300,000*
20	Install pedestrian lighting and install City of Stafford banners on lighting poles within Stafford city limits	Medium	$ 1,000,000 - $ 3,000,000*
21	Install double-headed roadway lighting	Medium	$ 400,000 - $ 500,000
22	Install City of Stafford monument/gateway signage	Medium	Similar to Previous Monument Cost

* Dependent on type and spacing

LEGEND

- (#) Short Term Project (0-5 years)
- (#) Medium Term Project (5-15 years)
- (#) Long Term Project (15+ years)
- (#) Multi Phased Intersection Improvements
- New Curb
- Median/Pedestrian Realm (Potential Streetscape Improvements)
- Sidewalk/Side Path
- Driveway Removal

Figure 5.20: *FM 1092 Corridor Recommendations - US 90A to Dove Country Drive*

RECOMMENDATIONS | 57

STREETSCAPE IMPROVEMENTS

Sidewalks

Along FM 1092, there are some basic recommended streetscape elements that should be applied across the length of the corridor. A top priority is the construction of continuous sidewalks, filling existing gaps in the network. This proposed improvement received strong public support during the study. The provision of improved infrastructure will allow pedestrians to safely travel along the corridor without being forced to walk in the roadway or grass and dirt; not only improving their experience and safety, but also the predictability of their actions from the automobile drivers' perspective. It is recommended that the City of Stafford consider including sidewalk regulations in its Streets Code of Ordinances to establish a 5-foot minimum for sidewalk width, with opportunities to provide wider facilities where conditions warrant, and ensure that poles, distribution boxes and other utility structures do not obstruct the width requirements and comply with the Americans with Disabilities Act (ADA) and Texas Accessibility Standards (TAS). It is recommended that sidewalks be constructed when new developments or major redevelopment take place along FM 1092 or through specific projects to connect the infrastructure gaps through Capital Improvement Plans and other projects such as grants.

Figure 5.21: *Bioswale and sidewalk*

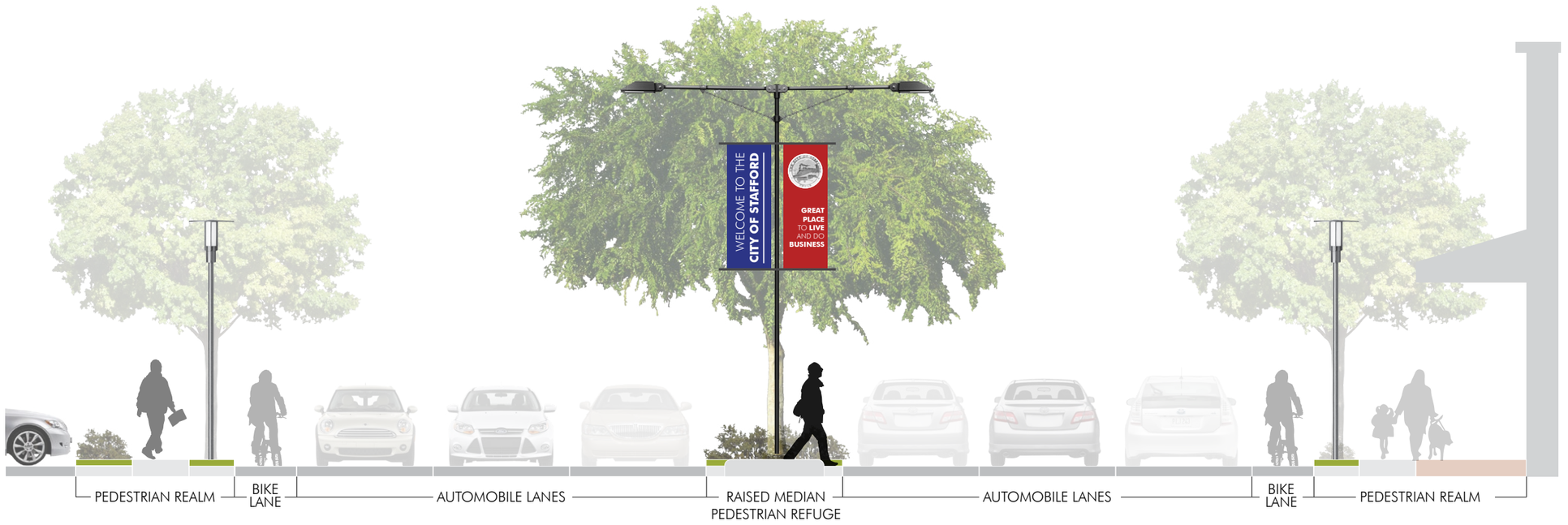


Figure 5.22: *Streetscape design addresses the pedestrian realm, bicycle and automobile travel, and the right-of-way edges*

Landscape

Once continuous sidewalk infrastructure is in place, other streetscape elements can be added to improve the pedestrian experience. Landscaping options along the corridor vary in aesthetic improvement, installation and maintenance cost. There is turf and sporadic tree placement along the corridor, which require regular irrigation and mowing. Street trees can be planted consistently along sidewalks to provide shade coverage for pedestrians. This tree coverage creates a more enjoyable walking experience, especially in Texas summers, and creates a buffer from automobile traffic. Street trees should be planted every 25 to 55 feet on center of landscaping strip depending on tree size, per existing City of Stafford Ordinance (Section 98-26. Street trees required). The City of Stafford has a list of street trees, listed in its Vegetation Code of Ordinances (Section 98-42. – Appendix G. Department of parks and recreation street trees). Property owners can be required to plant and maintain street trees, and may require that City of Stafford staff, arborist or permit review, ensure that street trees are properly maintained. Enforcement of street tree standards may require that property owners properly irrigate and maintain the trees, or replace them if necessary.

In addition to turf and trees, plants and flowers can be added at commercial entrances and intersections. These improvements will involve maintenance costs for weeding and exchanging seasonal plants. Bioswales are landscape elements that offer a greater functional purpose, collecting surface water run off from impervious surfaces, such as roadways and parking lots, and filtering pollutants before reaching natural waterways. Bioswale plants are chosen based on their ability to handle excess water. While the cost of construction is greater than improving the existing turf, bioswales alleviate irrigation costs by collecting runoff. TxDOT does not fund these types of improvements directly in their projects, typically major streetscape improvements are funding by other local sources including cities, management districts or other corridor groups.

Urban Form

Surface parking lots currently line much of the length of FM 1092, which is buffered by a landscape zone. Definition of the corridor's edge and the pedestrian experience can be improved through site design that considers an alternative building form to the existing strip retail development with front parking lots. By building towards the street, and placing parking lots to the rear and sides of buildings, the quality of the streetscape is greatly improved. Businesses receive greater visibility, and access from the sidewalk becomes safer and easier by eliminating the need to walk through vast parking lots. Additionally, these street front developments can contribute other streetscape amenities, such as wider sidewalks, plazas, landscaping and site furnishings that benefit their customer experience. Some communities have been successful in developing pad sites that begin to fill some of the unused parking areas and better engage

the street and pedestrian realms.

Lighting

Currently there is street lighting on both sides of the right-of-way to illuminate the roadway. The installation of pedestrian lighting can impact both the safety and aesthetics of the pedestrian realm at night. Separate light poles may be installed for pedestrian lighting; however, there are also dual fixtures that incorporate both pedestrian and roadway lighting. Pedestrian lighting levels should target one foot candle (fc) coverage, the distance that is illuminated from the light source. However, 0.5 fc is the minimum illumination for sidewalks, which would still allow pedestrians to detect obstacles in front of them. Pedestrian lighting should be prioritized in areas with high pedestrian activity, such as civic spaces, and areas with concern for pedestrian safety, such as freeway underpasses and roadway intersections. Roadway lighting primarily serves motorists. According to the American National Standard Practice for Roadway Lighting by the Illuminating Engineering Society of North America (IESNA), commercial throughways with a major/collector classification should have a horizontal light level range of 0.6 to 1.7 fc.

Light pole fixtures may be chosen to build on existing branding efforts by the City of Stafford. For example, Upper Kirby Management District in Houston replaced poles to create an appealing aesthetic along the corridor that is agreeable to the business community. In addition to the poles, hanging devices can be included in order to display city banners, which may be targeted at key nodes for visibility, such as major intersections and areas with high activity.

Figure 5.23: *Pedestrian lighting and street trees along wide sidewalks*

Intersections

FM 1092 is a wide corridor designed to allow automobile traffic to flow through at 45 miles per hour. This roadway design and speed limit are challenging for pedestrians who need to cross the roadway to reach destinations. Intersection crosswalks are recommended at key intersections along the corridor. The availability of curb ramps is inconsistent, and should be built in compliance to the Americans with Disability Act (ADA) and Texas Accessibility Standards (TAS). Contrasting surface materials on ramps, such as detectable warning surfaces with grooves (often called rumble strips), are a required safety feature to aid people in wheelchairs or with vision impairments.

Because traffic signals are geared towards the flow of automobile traffic, pedestrian crossing signals can help reduce wait-time. There are several common marked crosswalk patterns that should be considered to delineate the pedestrian crossings, including many creative, artistic ideas as shown in Figure 5.24. The pedestrian refuge is a design element that helps pedestrians cross such wide corridors. This refuge creates a protected zone to wait for automobile traffic, as many people may not be able to cross all lanes of traffic before the signal changes. Pedestrians may also benefit from signal timing changes, including a "pedestrian leading interval" during which pedestrians are given several seconds before automobiles to begin crossing.

Figure 5.24: *Pedestrian intersection crossings may address safety, while creating a unique quality to the streetscape.*

BASIC STREETSCAPE ELEMENTS:

- Continuous sidewalks (minimum of 5 feet in width) within right-of-way
- ADA- compliant ramps (built to TAS) to provide full accessibility along the corridor
- Marked crosswalks
- Pedestrian crossing signals
- Street trees within right-of-way
- Pedestrian lighting (1 foot candle coverage)
- Branding elements (banners, directional signage, pavement markings at crosswalks, etc) at points of high visibility
- Bike lanes
- Pedestrian refuge at median crossings

Medians

With the addition of anticipated turning lanes along FM 1092, there are opportunities to improve the condition of curbed medians for aesthetics and pedestrian safety purposes. Recommended landscaping improvements will require irrigation (to TxDOT standards) and maintenance, and may be best focused in areas where other improvements are being made, including private development, or where the City of Stafford is able to coordinate with other management or maintenance entities. Medians may include ground cover (turf, mulch, low shrubs, etc.) and a single row of street trees on center, while maintaining visibility for drivers at the median ends. An attractive alternative to median landscaping is special pavers, which reduces long-term maintenance costs by comparison. Bright colors or ornate patterns may be chosen in an effort to create a distinctive identity along the corridor that is cohesive with the City of Stafford's existing branding, as well as a distinction between pervious and impervious surfaces.

Monument signage is currently placed throughout the City of Stafford, which effectively communicates the city boundaries, locations include the arterials of US 59 and US 90A. There are opportunities to include similar public art, banners, or monumental/ gateway signage in the medians along FM 1092. People can use these as visual cues as landmarks that help them navigate through an area, which can be used by the City of Stafford to alert travelers that they are approaching an important destination, such as the Stafford Centre.

MEDIAN TREATMENTS:

- Street trees
- Ground cover
- Special paving
- Street lighting
- Branding elements (banners, monumental signage, public art, etc)

Figure 5.25: *Medians can have treatments that vary in material and maintenance costs, while still improving streetscape conditions.*

Signage

FM 1092 is a prominent corridor that may be utilized for City of Stafford's branding efforts. Decorative or informative signage can be designed according to the City's brand, similar to the examples shown in Figure 5.27. Aside from City branding, signage along FM 1092 is inconsistent, as it is also called to as Murphy Road. FM 1092 and Murphy Road are street names that are used interchangeably by individuals. This distinction should be decided upon in preparation for future development, in an effort to develop a unified identity and sense of place along the corridor. It is recommended that the length of the corridor be referred to as Murphy Road, with consistent street signage throughout, as shown in Figure 5.26. This example mimics some of the existing streets signs within the City of Stafford with red sign panels.

Improvements should also be made to develop more consistent commercial signage along the corridor. There are strip retail developments along FM 1092 that lack cohesion and inhibit the character of the corridor as a shopping destination. Instead of advertising the corridor as a destination, each establishment strives to feature its logo and business signage to be visible from the roadway. This creates visual clutter along the corridor, which can be alleviated if the City of Stafford's Sign Ordinance was revised to establish height restrictions and design guidelines for commercial signage. This effort will likely be contentious with business owners. They should be engaged in the process in order to gain their input and support. Business owners should be reassured that signage improvements will lead to a more desirable business environment. Such an effort would be initiated by City Planning staff and advised by a committee that may include business owners, sign manufacturers, architects and designers. For future developments, business advertising can be established through a more comprehensive sign branding, similar to other shopping mall or mixed-use developments, such as Market Street in The Woodlands or The Domain in Austin.

Figure 5.26: *Develop Consistent Corridor Identity*

Figure 5.27: *City branding efforts*

Figure 5.28: *Market Street (The Woodlands, Texas) branding through signage*

CATALYST NODES

There are multiple parcels of vacant and undeveloped land along FM 1092 that are located near one another and well situated along important roads and intersections. Under the right circumstances, these development opportunities can serve as catalysts for economic growth and future development. There are several key tracts where civic and private initiatives can have a significant impact on proximate real estate and business activity.

Four locations emerge as possible sites for catalyst redevelopment that can have an anchoring effect to create nodes of activity along FM 1092. In each instance investments by key corridor stakeholders can be enhanced through the leverage of recommended transportation improvements, regulatory changes, and strengthening of partnerships. This will be discussed in greater detail in the Implementation Chapter. Figure 5.29 presents an overview the subject area's key opportunity nodes, and important development and redevelopment locations:

1. Roark Road - *Connection to METRO's West Bellfort Park & Ride*

   Roark Road connects FM 1092 to the West Bellfort Park & Ride, where thousands of riders access job centers in Houston through METRO services for their weekday commutes. There is an opportunity for partnerships between City of Houston, TxDOT, METRO, Brays MD, private businesses, and landowners to create destination amenities, community space, and enhanced site access with linkages to Keegans Bayou Trail and the bicycle network within FM 1092 corridor.

2. West Airport Boulevard - *Texas Instruments Site*

   The Texas Instruments site is a large tract with limited access to the surrounding roadway network and is currently in negotiations for new ownership as TI has closed or relocated it facilities. Increasing access with the creation of increased roadway connection for future development, where building density, appropriate land use considerations, parks and open spaces could enhance the site for commercial activity. Additionally, there may be opportunities to combine the site drainage requirements with park space allocation.

3. Cash Road - *Stafford Centre and Houston Community College*

   There are opportunities to capitalize on synergies around the Cash Road node between community amenities such as the City of Stafford facilities (e.g., Stafford Centre) and Houston Community College by enhancing the node with plazas, parks, and festival spaces in the existing green spaces that are currently underutilized.

4. Avenue E - *Island District and Adjacent Commercial*

   Currently, the existing commercial around the FM 1092 and Avenue E intersection is underdeveloped. With the proposed realignment of the intersection, Recommendation # 10, would improve traffic flow around and into adjacent commercial and act as a catalyst for new development.

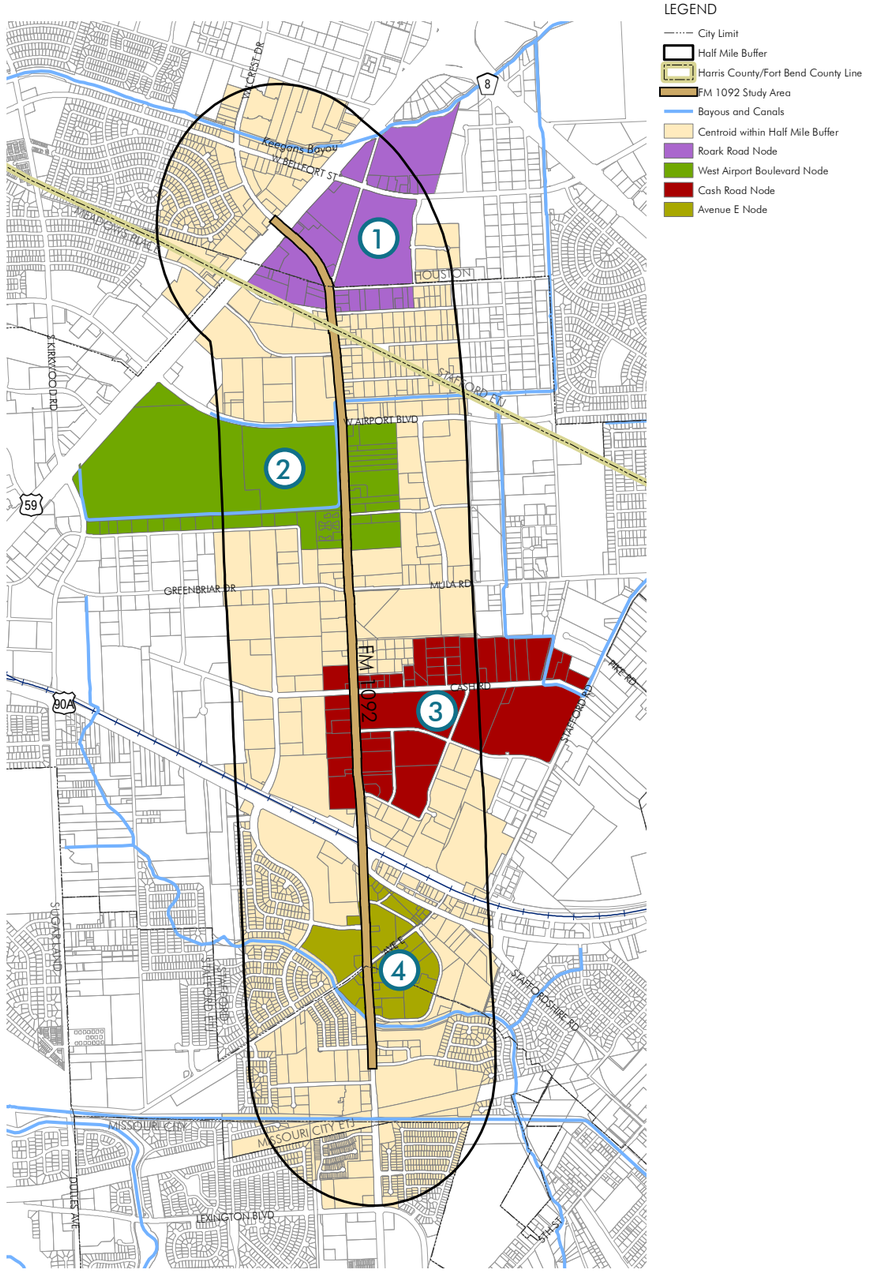


Figure 5.29 *Opportunity Nodes*

IMPROVE ROADWAY CONNECTIVITY

FM 1092 is one of a few major corridors that provides access between southwest Houston and residential areas within the City of Stafford Missouri City and Sugar Land. Growth in the region and immediate surroundings has contributed to congestion along the corridor. The low level of connectivity of the area roadways limits the possible dispersion of the existing and projected traffic in the area. Therefore, providing alternative routes is essential to ensure continued mobility along FM 1092 as well as strengthening connections between destinations along the corridor and with regional destination.

Figure 5.30 presents potential connections for the area between US 59, Beltway 8, and US 90A. The map also shows connections that are part of the City of Stafford's current Major Thoroughfare Plan. The current Thoroughfare Plan was adopted in 2007 and last updated in February 2012. The connections shown in the map in Figure 5.30 is not intended to depict the precise location of future roadway right-of-way, but to show areas where future connections and possible additions to the Major Thoroughfare Plan could be targeted to allow alternate routes to FM 1092.

The City of Stafford should continue to maintain and enforce the Major Thoroughfare Plan and coordinate with the City of Houston, the City of Missouri City, the City of Sugar Land, and Fort Bend County, which all maintain Major Thoroughfare Plans. This coordination will allow overall regional mobility to be maintained as development and roadway infrastructure is developed. The plan should also align with the Houston-Galveston Area Council Major Thoroughfare Plan development process.

Connections within existing Stafford Major Thoroughfare Plan

1. Cash Road - Connect Royal Drive and Kirkwood Road
2. Jebbia Lane - Connect Mula Road and Cash Road
3. Fountaingate Drive - Extension to Flaxseed Way
4. Cash Road - Extension southeast from Stafford Road *

Proposed Connections to be added to Stafford Major Thoroughfare Plan

5. Royal Drive - Extension to Cash Road
6. Trinity Drive/Stafford Centre Drive Connection
7. Bellfort Village Drive/Sugar Ridge Boulevard Connection
8. Greenland Drive - Connect Cash Road and West Airport Boulevard
9. Connection from Mula Road to Flaxseed Way

Proposed Connections to be coordinated with the City of Missouri City

10. Stafford Centre Boulevard - Extension to South Gessner Road
11. Connection from Cash Road to South Gessner Road

Proposed Connections through former TI Site

12. Texas Instruments Site - Provide East/ West and North/South connections to maximize access to future development

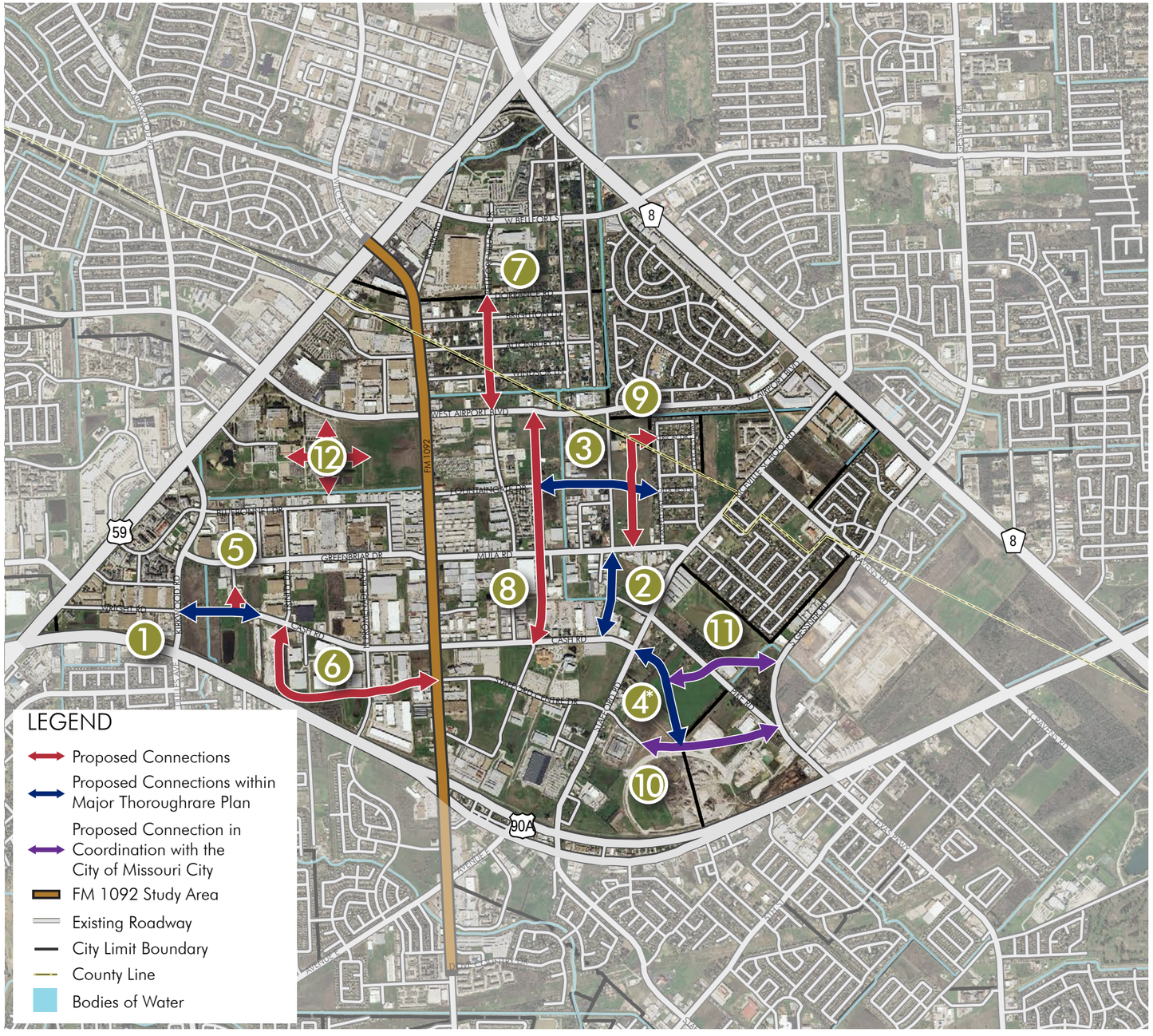


Figure 5.30 *Proposed Regional Connections*

*The major thoroughfare plan has this connection to continue to US 90A and Present Street dependent on the Union Pacific Railroad. With the official closing of the railroad crossing at Present Street this year, Figure 5.30 shows a proposed alternate for this connection that differs from the existing major thoroughfare plan.

BICYCLE NETWORK

Currently there are no bicycle facilities along FM 1092 or the surrounding area despite an existing demand for bicycle infrastructure. Bicyclists currently travel along the existing roadway or utilize the sidewalks. The proposed cross-section for FM 1092 includes a 5′ bicycle lane for each travel direction. While FM 1092 is a high speed roadway that could cause discomfort to some bicyclists, there are few alternative roadways to create a sufficient bicycle network that would allow bicyclist to access destination along FM 1092 from other routes. The recommended 5-foot bicycle lane should provide an improved comfort level for bicyclists along FM 1092 versus existing conditions.

To support the proposed bicycle lanes along FM 1092, a set of regional bicycle opportunities were developed to provide cyclists along FM 1092 with access to regional destinations. Figure 5.31 presents the regional bicycle network which focuses on connecting different activity centers within the area. The plan features the future Keegans Bayou trail, which will provide a direct bicycle connection to the Texas Medical Center and Downtown Houston along Brays Bayou once the trail is complete.

Project Recommendations

Bicycle Lanes

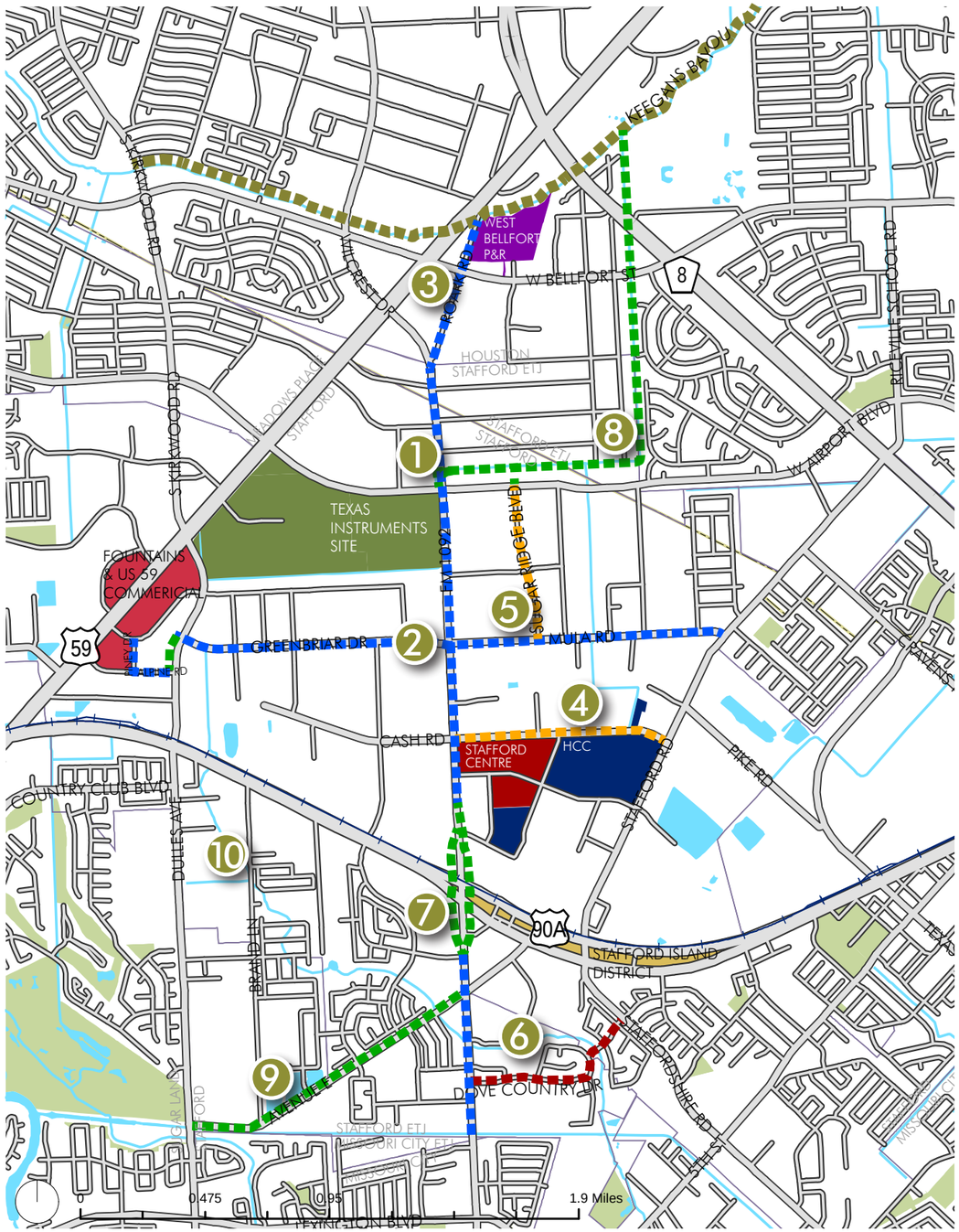
1. FM 1092 - Bidirectional 5′ Bicycle Lanes from Roark Road to Stafford Centre Drive and Boardwalk Parkway to Stafford ETJ Boundary
2. Mula Road and Greenbriar Drive - Bidirectional 5′ Bicycle Lanes from Stafford Road to South Kirkwood Road. To connect to The Fountains and US 59, construct share-use path along South Kirkwood Road and bicycle lanes along Alpine Road and Piney Drive.
3. Roark Road - Bidirectional 5′ Bicycle Lanes from FM 1092 to Future Keegans Bayou Trail

Signed/Shared Lanes

4. Cash Road - Shared route marked with sharrows from FM 1092 to Stafford Road
5. Sugar Ridge Boulevard - Share route marked with sharrows from Mula Road to West Airport Boulevard
6. Dove Country - Signed route from FM 1092 to Staffordshire Road

Shared-use Path

7. FM 1092 - Shared-use Path to provide bicycle connections across UP railroad and US 90A underpass
8. Drainage easement trail - Shared Use Path from Texas Instruments Site and FM 1092 to Future Keegans Bayou Trail
9. Avenue E - Shared Use Path from FM 1092 to Dulles Avenue to connect with regional bicycle connections with the City of Sugar Land
10. Possible connection along Drainage Corridor - A stakeholder recommended connection to create a share-use path along a drainage corridor between Dove Country and The Fountains that is contingent on safe crossings of FM 1092 and US 90A



LEGEND

- Union Pacific Railroad
- City Limits
- Harris County/Fort Bend County Line
- Stafford Island District
- Texas Instruments Site
- The Fountains and Stafford US 59 Commerical
- Houston Community College Campus
- Stafford Centre
- West Bellfort Park & Ride
- Park Areas
- Bodies of Water

Proposed Bicycle Connections

- Bicycle Lane
- Bicycle Route with Sharrows
- Bicycle Route
- Shared-use Path
- Planned Keegans Bayou Trail

Figure 5.31 *Regional Bicycle Opportunities*

TRANSIT CONNECTIONS

The entire study area is within a reasonable distance to the West Bellfort Park & Ride, as shown in Figure 5.34. The northern segment of the study area, as well as all of Roark Road are within a 1/2 mile walking distance to the Park & Ride. These short connections to the Park & Ride provide area residents more travel options. The West Bellfort Park & Ride, located along Roark Road, is the busiest Park & Ride within the METRO system with over 2,040 boardings on an average weekdays. The Park & Ride is also a major connection to the recently added HOV/HOT lanes along US 59 South. The conversion of the HOV lane to HOV/HOT lane will result in added traffic to and through the West Bellfort Park & Ride.

It is recommended that improved corridor connections to and from West Bellfort Park & Ride be considered. Recommendation #3, previously presented in the intersection recommendation summary page for FM 1092 at Roark Road, addresses the necessary improvements proposed along Roark Road; specifically the installation of sidewalks along the south side of Roark Road, the addition of bicycle facilities and the widening of Roark Road. Figure 5.32 shows a potential cross-section for Roark Road, though the addition of a shared use path on the south side of the street should also be considered at the time of implementation, in lieu of bike lanes. Recommendation #3 also improves the bicycle and pedestrian connections to the future Keegans Bayou Trail.

The recently completed Fort Bend Subregional Plan proposed an expanded regional transit system for Fort Bend County as the county continues to grow. The plan identified FM 1092 as a potential corridor for future local transit service based on development density and connections to Missouri City. Therefore the corridor, as well as future projects should be designed with future transit stops and pedestrian access in mind. This would require coordination between Fort Bend County Transit and METRO as the City of Stafford is not in the METRO service area.

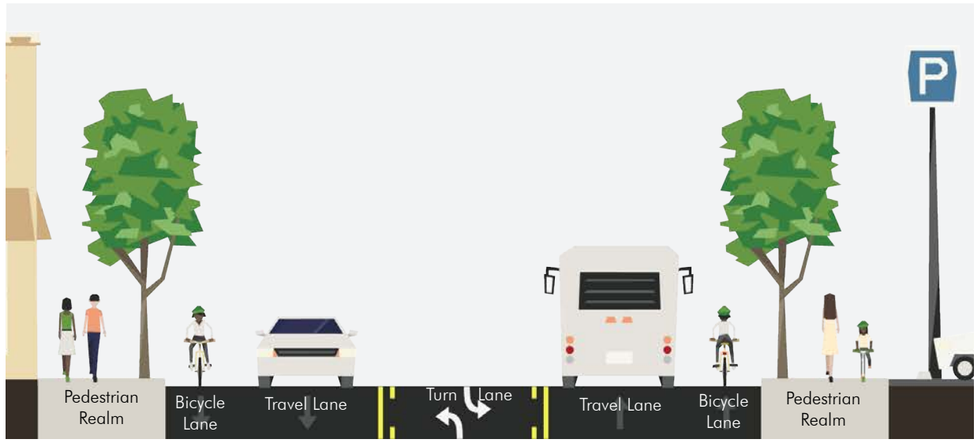


Figure 5.32 *Potential Roark Road Cross-section*

Figure 5.33 *West Bellfort Park & Ride Connections*

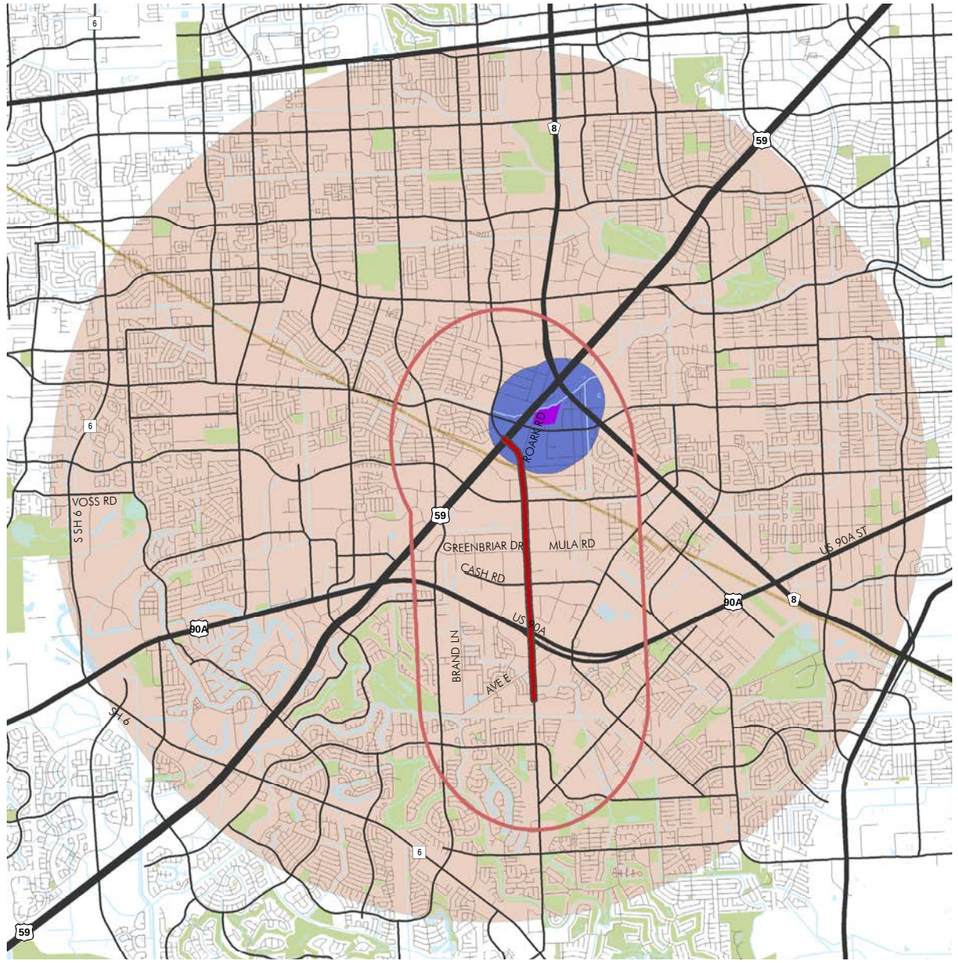


Figure 5.34 *West Bellfort Park & Ride Catchment Area*

The H-GAC Updated 2035 RTP includes the proposed commuter rail line along US 90A from Houston to Rosenberg. To benefit from the proposed commuter rail it is recommended that locations where stations and TOD developments could occur should be identified along the corridor.


A

D

B

E

C

F

Figure 5.35 *Possible Progression of Improvements to the FM 1092 Corridor*

SUMMARY

The FM 1092 Access Management Study recommendations include:

1. Intersection Improvements for all signalized intersections to improve safety and mobility
2. Corridor improvements including: medians, sidewalks, bicycle lanes
3. A driveway consolidation plan
4. Streetscape improvement suggestions to improve corridor aesthetic and create a sense of place
5. Improvements and placemaking for existing and future activity nodes along the corridor
6. Improved regional roadway connectivity to support the existing City of Stafford and Fort Bend County Major Thoroughfare Plans and to develop alternative routes
7. Regional bicycle opportunities to improve bicycle connections within the region
8. Improvements to existing transit connections

Implementation, Economic Development, and the Regulatory Environment

Chapter 5 presents a broad set of recommendations to improve FM 1092 and achieve the safety and mobility goals defined by the Steering Committee for the Access Management Study. These recommendations are primarily focused on infrastructure projects within the public right-of-way targeted at roadway and streetscape improvements. The recommendations address specific high-crash locations and intersections operating at suboptimal levels of service. The recommendations also define a set of streetscape enhancements that address the overall visual appeal of the corridor and support the City of Stafford's goal's for linked to FM 1092 as a Primary Corridor for the City.

These recommendations are summarized in Table 6.1 on the following page. Detailed cost estimates are included in Appendix F. Table 6.1 summarizes an implementation approach to define a clear path forward in terms of project phasing based on a timeline for implementation. The timeline was established based on 1) project cost, 2) likely ease of implementation and 3) ability to satisfy project goals. The priorities identified for each project are tentative and are based on existing conditions. The timeline is an estimate and individual projects may be accelerated by increased focus and availability of funding. Three priority categories have been utilized:

Short Term: 0-5 Years

- Focused on improvements to safety and traffic operations
- Lower cost, easier to implementation projects e.g., signage, striping, smaller scale infrastructure

Medium Term: 5-15 Years

- Additional safety and traffic flow improvements
- Larger scale infrastructure and enhancements: Construction of medians and sidewalks as well as some additional storage and/or turning lanes
- Includes streetscape improvement related to the implementation of infrastructure projects such as medians

Long Term: 15+ Years

- Project that will require a large investments and likely right-of-way acquisitions
- Projects to address future demand

Implementation of the projects will require attention and prioritization from the participating jurisdictions and the development of partnerships to allocate funding to move the projects from a plan to on the ground reality. Key stakeholder including TxDOT, the City of Stafford, Houston and Missouri City and Fort Bend County can begin to program some of the recommendation into Capital Improvement Plans (CIP). Management districts and other improvement districts can support the implementation of projects, particularly those such as streetscape elements that may not be readily fundable through CIP programs. H-GAC can also plan an important role in implementation through coordination with the Regional Transportation Plan and the allocation of future grant dollars that may be available to support project implementation.

Importantly, the recommendations outlined in this report will have the greatest benefit to the local community on all three dimensions of the goals outlined for the project, Safety, Mobility and Economic Development if the infrastructure and streetscape projects are developed in coordination with broader planning efforts and potential regulatory changes along the corridor.

While Access Management policies and safety improvements can improve the operations of the corridor, targeted efforts to support the type and level of economic activity desired by stakeholders, particularly the City of Stafford, will require a broader set of strategies and approaches. This Chapter of the FM 1092 Access Management Report outlines many of the key development strengths the City has to build on and outlines potential partnerships, regulatory tools and strategies to achieve the goals.

Table 6.1 *Summary of Roadway Corridor, Intersection and Streetscape Recommendations*

PROJECT NUMBER	PROJECT TITLE	TYPE	TxDOT COST	CITY OF STAFFORD COST [1]	OTHER ENTITIES [2]	COST
			SHORT			
1	Install Signal Interconnect	Corridor	$ 510,400	$0	$0	$ 510,400
2A	FM 1092 at US 59 West Frontage Rd - Short	Intersection	$ 46,200	$0	$0	$ 46,200
5A	FM 1092 at West Airport Blvd - Short	Intersection	$ 33,400	$0	$0	$ 33,400
7	FM 1092 at Greenbriar Dr/Mula Rd	Intersection	$ 22,920	$ 34,380	$0	$ 57,300
8	FM 1092 at Cash Rd	Intersection	$ 48,800	$ 12,200	$0	$ 61,000
9	FM 1092 at US 90A Underpass	Intersection	$ 30,500	$0	$0	$ 30,500
11A	FM 1092 at Dove Country Dr - Short	Intersection	$ 28,800	$0	$0	$ 28,800
12	US 90A at Promenade Blvd	Intersection	$ 33,800	$0	$0	$ 33,800
13	Restripe Corridor	Corridor	$ 471,100	$0	$0	$ 471,100
14	Construct 13' Median	Corridor	$ 485,400	$0	$0	$ 485,400
			MEDIUM			
4	Mid-block Crossing	Intersection	$ 147,500	$0	$0	$ 147,500
11B	FM 1092 at Dove Country Dr - Medium	Intersection	$ 186,000	$0	$0	$ 186,000
16	Landscape Medians	Landscape	$0	$ 425,000 - $ 595,000 [3]	$ 75,000 - $ 105,000 [3]	$ 500,000 - $700,000 [3]
17	Driveway Consolidation	Corridor	$ 120,800	$0	$0	$ 120,800
18A	Construct Sidewalks	Corridor	$ 1,444,700	$0	$0	$ 1,444,700
18B	Construct Side Paths	Corridor	$ 321,900	$0	$0	$ 321,900
19	Plants Street Trees	Landscape	$0	$127,500 - $ 255,000 [4]	$ 22,500 - $ 45,000 [4]	$ 150,000 - $ 300,000 [4]
20	Pedestrian Lighting	Streetscape	$0	$ 850,000 - $ 2,550,000 [5]	$ 150,000 - $ 450,000 [5]	$ 1,000,000 - $ 3,000,000 [5]
21	Roadway Lighting	Corridor	$ 400,000 - $ 500,000 [4]	$0	$0	$ 400,000 - $ 500,000 [6]
22	City of Stafford Monuments	Streetscape	$0	Cost similar to existing monuments	$0	Cost similar to existing monuments
			LONG			
2B	FM 1092 at US 59 West Frontage Rd - Long	Intersection	$ 297,600	$0	$0	$ 297,600
3	FM 1092 at Roark Rd	Intersection	Future Cost [7]			
5B	FM 1092 at West Airport Blvd - Long	Intersection	$ 1,225,500	$0	$0	$ 1,225,500
6	FM 1092 at Fountaingate Dr	Intersection	$1,006,160	$ 251,540	$0	$ 1,257,700
10	FM 1092 at Avenue E	Intersection	$ 1,774,000	$0	$0	$ 1,774,000
15	RTP Project 13641	Corridor	City of Missouri City listed as lead agency in the 2035 RTP Update			$ 10,100,000
23	Stafford Centre Park	Streetscape	$0	$ 145,000 [8]	$0	$ 145,000 [8]
24	Pedestrian and Bicycle Trail	Streetscape	$0	$ 135,000 [9]	$0	$ 135,000 [9]
			TOTAL COST			
		LOW	**$ 8,635,480**	**$ 1,980,620**	**$ 357,500**	**$ 10,863,600** [10]
		HIGH	**$ 8,735,480**	**$ 3,978,120**	**$ 600,000**	**$ 13,313,600** [10]

[1] Includes other entities within the City of Stafford not yet determined, e.g.: improvement districts, local businesses, other management entities
[2] Other entities outside the City of Stafford, e.g.: Brays Oaks Management District, International Management District
[3] For trees, depending on size, at a 25 to 100 foot spacing. Special pavers are an alternative to vegetation landscaping that can reduce maintenance costs.
[4] For trees, depending on size, at a spacing of 25 to 100 feet
[5] Dependent on phasing of implementation prioritized by activity centers and fixture type and spacing
[6] Dependent on fixture type and a spacing of 120 to 150 feet
[7] Cost to be based on final design of future long term project
[8] Cost is estimated based on a 9,000 square foot plaza on the southeast corner of FM 1092 at Cash Rd
[6] Cost estimate considers the addition of a trail, irrigation and street trees along the drainage corridor at the Texas Instruments Site
[10] Does not include Project 15 - 2035 RTP Updated Project 13641

Many of the strengths of the FM 1092 corridor can be linked directly to features of the surrounding landscape and land use contexts within which it resides. The planning, development, and promotion of these strengths can lead to implementable solutions for economic development along FM 1092, which serves as a basis for the recommendations outlined in this report.

CORRIDOR STRENGTHS

Location, Access, and Existing Traffic Volumes

FM 1092 offers great access to important highways and thoroughfares, and connects to other high volume roads. These connections provide the study area with access between Southwest Houston, with its quickly growing commercial amenities, and desirable residential areas within the City of Stafford, Missouri City, and Sugar Land. Growth in the region and immediate surroundings has contributed to congestion within the area's road network as it captures both commercial and residential traffic. FM 1092 is essential to people's commute, but also provides access to area destinations, as there are a number of businesses locations within the study area that attract employees and customers. The 2010 Census estimates the City of Stafford's population to be approximately 18,000, and the more than 38,00 people work within 1.5 miles of the corridor.

The network is well positioned to capitalize on the subject area's location and access, and enhance commercial, industrial, retail, and restaurant business opportunity. Figure 6.1 provides an overview of important roads, connections, and intersections as well as potential development parcels:

Available Land for Development and Redevelopment

1. Important network roads:
   - US 59
   - West Airport Boulevard
   - Greenbriar Drive/Mula Road
   - Avenue E
   - US 90A

2. Important regional connections:
   - West Bellfort Street
   - South Kirkwood Road
   - Stafford Road

3. Important Nodes:
   - FM 1092 at Roark
   - FM 1092 at West Airport
   - FM 1092 at Cash
   - FM 1092 at Avenue E

4. Other important features:
   - West Keegans Bayou Trail
   - Drainage easements and rights-of-way

There are multiple parcels of vacant and undeveloped land along FM 1092 that are located near one another and well situated along important roads and intersections. Under the right circumstances, these development opportunities can serve as catalysts for economic growth and future development. There are several key tracts where civic and private initiatives can have a significant impact on proximate real estate and business activity. Perhaps the most important of these is the Texas Instruments tract located strategically between Highway 59 and FM 1092 with frontage on West Airport. This parcel is currently being marketed by the existing landowner, and may be sold in whole or in part in the near term. The future development patterns within this site will certainly affect the future of the entire corridor. Figure 6.1 presents an overview of the study area's vacant parcels and redevelopment locations.

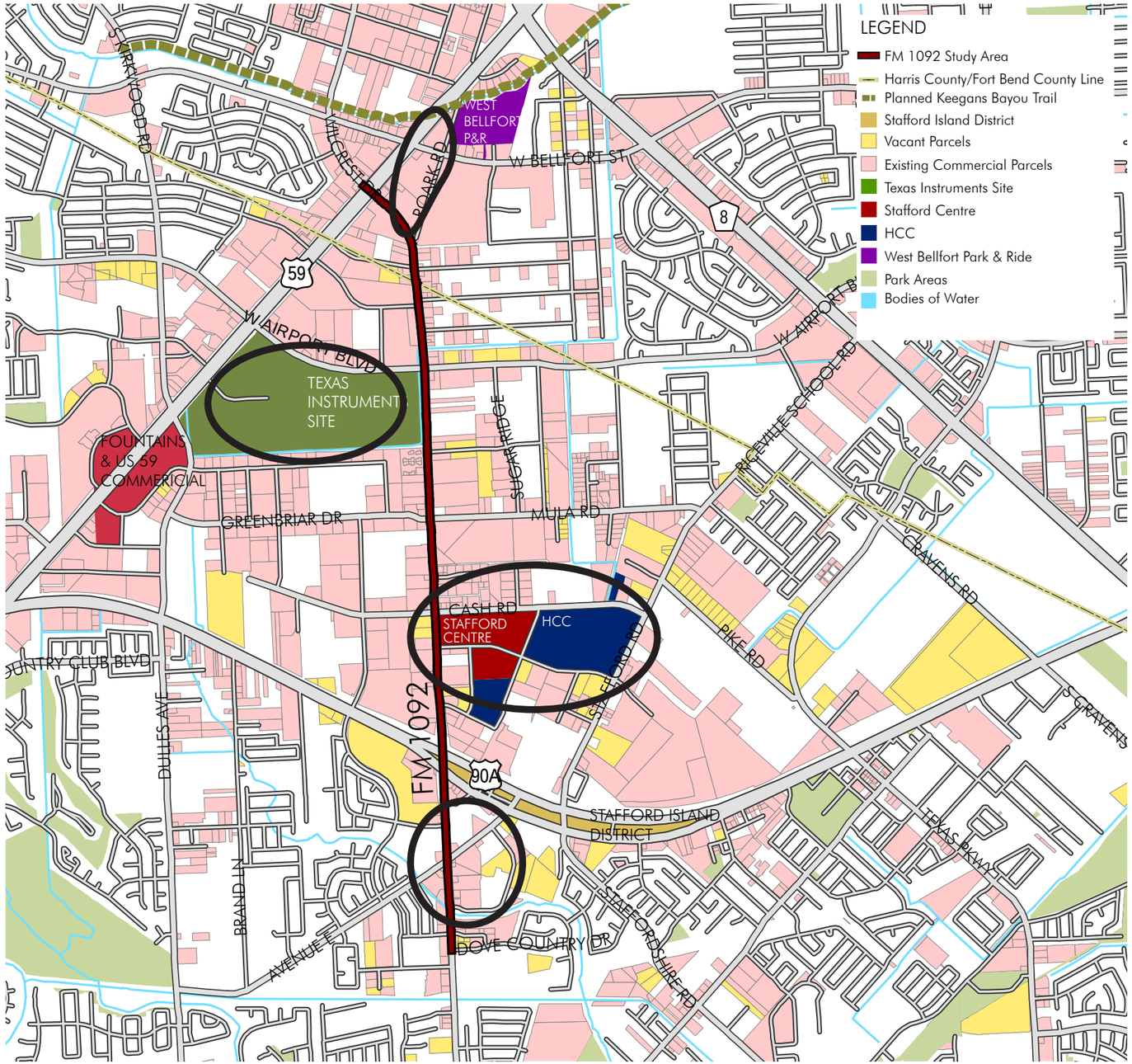


Figure 6.1 *Opportunity Nodes and Vacant Parcels*

Catalyst Nodes

When viewing the corridor's physical strengths as a whole, four locations emerge as possible sites for catalyst redevelopment that can have an anchoring effect to create nodes of activity along FM 1092 as described in Chapter 5. These include Roark Road/West Bellfort Park & Ride, the Texas Instruments site, Stafford Centre / Houston Community College,and Avenue E, the Island District and Adjacent Commercial. These sites sit at important intersections, along important roads with regional connections, and each is proximate to tracts that are either vacant or prime for redevelopment.

In each instance investments by key corridor stakeholders can be enhanced through the leverage of recommended transportation improvements, regulatory changes, and strengthening of partnerships.

- Roark Road Corridor
  - *West Bellfort Park & Ride*
  - *Future Keegans Bayou Trail*
- West Airport Boulevard
  - *Texas Instruments*
- Cash Road
  - *Stafford Centre*
  - *Houston Community College*
- Avenue E
  - *Residential / Retail*

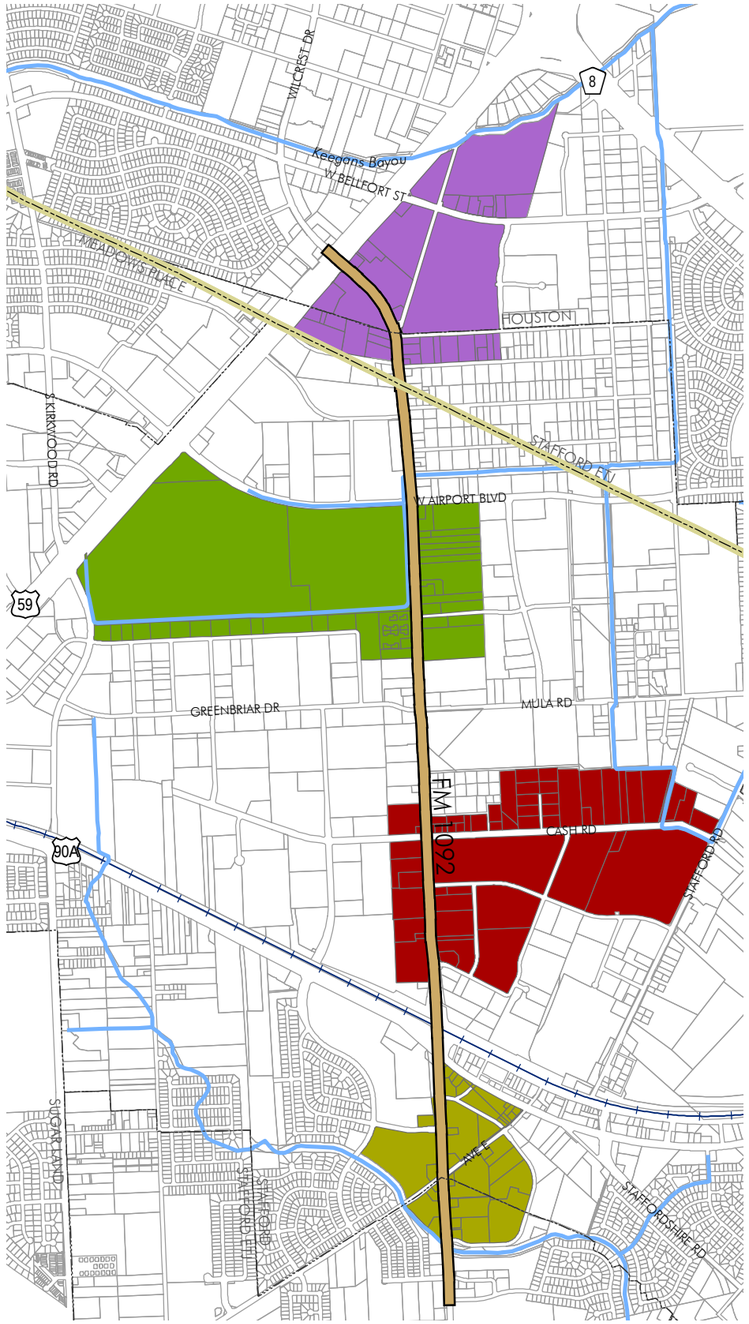


Figure 6.2 *Opportunity Nodes and Parcel Boundaries*

Business Friendly Environment

The City of Stafford has long prided itself on its business friendly environment. It has been described alternatively as "an island of business opportunity," "a Shangri-La for property owners," and "one of the best places in the nation to live and launch a small business." The City has reinforced its pro-business orientation with regulations that offer commercial property owners with a great deal of flexibility. As a result, the FM 1092 corridor and study area have historically offered commercial and industrial real estate investors and their tenants a welcome business environment. Examples of this flexibility for business activity can easily be seen in the City's sign and parking ordinances and cluster building requirements. Each regulation is permissive, offering the business community considerable freedom to design, build and manage their sites.

No Property Tax

Unquestionably, the most enticing feature of the City of Stafford's pro-business environment as been the lack of property tax collection since 1995, with Stafford being the largest such city in Texas to maintain this policy. Most of the City's annual operating revenue comes from sales tax derived from the City's 2% sales tax. Stafford is in the position to pay off all of its outstanding debt in 2014. If it chooses, by eliminating debt, the City will be able to devote more resources toward infrastructure and amenities that enhance the quality of life for its citizens and business partners.

CORRIDOR CHALLENGES

Existing Uses

Among the challenges facing the City and revitalization advocates are the existing land use patterns. In some instances the issue is as simple as property maintenance. However the issue is generally broader. The business community has largely been permitted to develop sites to suit their perceived needs. Architecture, landscaping, signage, and land use patterns, and the linkages between sites reflect the individual nature of development. As a result, the corridor lacks a cohesive aesthetic, and some sections appear blighted.

Planning

While it is true that the City has many of the planning tools it needs to guide public and private conversations about the corridor's redevelopment, many of these documents are out of date. As a consequence, they no longer meet the challenges or contain aspirations of the community. As an example, the City's Comprehensive Plan dates from the 1970's, and the city is undertaking a plan update in 2014. The City lacks a Comprehensive Parks Master Plan, and the City's Major Thoroughfare Plan does not have the level of connectivity of parallel road networks which could greatly enhance redevelopment within the corridor.

Regulatory

The City of Stafford's business friendly approach had created markets and opportunities that would not have otherwise existed, to be sure. Within the corridor, however, the market has delivered a pattern of development that appears to inhibit FM 1092's highest and best uses.

As an example, permissive sign ordinances allow businesses a great deal of latitude. Signs can be large, of varying design, and multiple signs can be deployed. Consequently, the number and variety of signs along the corridor contributes to the visual clutter, thus diminishing the value of a sign, the effectiveness of its message, and the return on that investment to the business owner.

BUILDING ON STRENGTHS

Public safety and traffic management are understood to be municipal services that are part of any community's most basic assessment. They are services targeting core needs, and are basic standard of living assessments. Quality of life considerations, on the other hand, are services that address greater community desires for social and cultural amenities. For an entity to compete successfully for desirable businesses job creators, productive workers, and stable communities for thriving families, it must provide more than the basic services; it must also provide amenities desired by communities; it must be compelling compared to available alternatives.

The City cannot be expected to revitalize the corridor on its own, or provide all the desired amenities to retain and attract businesses and residents. Table 6.2 outlines areas that can influence future development in the City of Stafford, and what sectors have control in realizing these elements. The City of Stafford's strengths can provide a platform upon which the City can continue to grow, and compete more effectively. Those opportunities include infrastructure upgrades, planning and regulatory tools, partnerships, and roadway improvements.

CITIES CONTROL: REGULATORY ENVIRONMENT	CITIES DON'T CONTROL: PRIVATE SECTOR ACTIVITY	CITIES DON'T CONTROL: PRIVATE SECTOR ACTIVITY
▪ Zoning - Land Uses ▪ Zoning - Form Based ▪ Zoning - Overlay Districts ▪ Platting, Lot Size, Setbacks ▪ Right Of Way Widths ▪ Access Management ▪ Roadway Alignments ▪ Parking ▪ Sidewalk Widths ▪ Public Realm - Lighting - Landscaping - Signage - Art ▪ Health & Safety Code Compliance	▪ Ownership ▪ Parcel Size ▪ Third Party Transactions ▪ Building Architectural Appeal ▪ Edge Conditions in Abutting Cities ▪ "The Market" - Competition - Demographics - Demand - Risk Assessment	▪ Visual Aesthetics ▪ Urban Design ▪ Enhancements to Public Realm Improvements ▪ Branding and Marketing ▪ Infrastructure Upgrades ▪ Commercial Renovations ▪ Range of Housing ▪ Risk Mitigation ▪ Land Acquisition / Swaps ▪ Support of Commercial Property Owners ▪ Resident Support

Table 6.2 *Sector Control on Future Development*

Infrastructure that supports desired goals

The road network within the study area, and FM 1092 specifically, are host to thousands of daily commuters, residents, and the corridor's employees. Those roads are generally wide, high speed, high capacity throughways. There are a number of alternative approaches to managing traffic and safety concerns within the corridor as defined in this report. Each solution presents opportunities to address and enhance elements of the corridor that have more direct impact on the business climate. Effective roadway design that manages volumes and speeds within the corridor will enhance basic performance measurements, but they will also create an opportunity for a new functional aesthetic that can open more investment opportunities within the area.

As examples, corridor enhancements have been used to revitalize commercial and residential in Harris County along Cypress Creek Parkway, in Missouri City along Highway 6, and in the City of Houston surrounding Intercontinental Airport. In each of the aforementioned locations, investments in traditional and non-traditional infrastructure have made streetscapes more vibrant, more inviting to pedestrians, more complimentary to private investments, and have helped create a sense of continuity that previously did not exist. Enhancements include the following:

- Update the major thoroughfare plan to address right-of-way issues, and disconnected roadway networks
- Develop corridor master plans to coordinate sidewalks, signage, and landscape improvements
- Install raised green medians with seasonal plantings and trees
- Install trees and seasonal landscape installations in parallel right-of-way
- Install hardscape installations at transit facilities and other strategic locations within investment area
- Install visible, attractive, ADA compliant pedestrian crosswalks
- Construct trails and bike dedicated bike paths
- Enhance public plazas
- Enhance public parks
- Enhance festival spaces

New planning and regulatory tools to compel specifically desired outcomes

As the City reexamines FM 1092, and evaluates options to enhance investment in the area, it may want to consider more articulate and current planning documents, as well as stricter, rather than less strict regulations. Such new guidelines and rules, produced in concert with the development community and other stakeholders, could enhance roadway and right-of-way investments, and provide greater corridor continuity. In this way, private and public investments are leveraged in pursuit of the common goal of corridor enhancement.

The following areas are recommended for review and updating by the City of Stafford:

- The City's Comprehensive Plan (Underway)
- Master Plans for each Node within the City's boundaries
- The City's Capital Improvements Plan
- The City's Major Thoroughfare Plan
- A Parks Master Plan
- Regulatory code reviews

With respect to the regulatory codes, the following may be warranted:

- Requiring deed restrictions defining design and aesthetic of properties at platting, working with the development community on standards
- Requirement for, rather than 'encouragement of' cluster buildings to create pedestrian connections, reduced parking, and creation of more developable opportunities for the private sector
- Shared parking ordinance to consolidate curb cuts, reduce expansive parking lots, and create more developable opportunity for the private sector, and improve circulation between parcels
- Review setback requirements
- A more uniform sign ordinance to limit visual clutter
- More robust landscape ordinance to provide for development and maintenance of green infrastructure

Leveraging Partnerships

Economic development has been defined by stakeholders as a community priority as it affects the lives and opportunity of everyone. As such, economic development is best pursued when its goals are well defined and the pursuit of those goals leverages the resources of all of a community's stakeholders.

Said another way, the economic potential of the FM 1092 corridor cannot be achieved without a plan and without partnerships: public-private, public-public, and private-private. The nature of the partnership depends on the area and the issue.

The following are examples of ways partnerships can work to pursue the shared goal of economic development within the FM 1092 corridor:

1. Public-Public Partnerships:

Several entities have an interest in the study area mobility issues. It should be noted that some stakeholders have greater interest in specific issues along in the corridor than others, but by defining the goals for both transportation and economic development, a plan can be developed that allows for strategic partnerships that advance specific goals related to the revitalization of FM 1092. The partnership should be actively pursued to move project objectives forward. For example, the Cities of Stafford, Houston and Missouri City, Fort Bend County, and TxDOT work to define, prioritize, install, and maintain roadway improvements along FM 1092 in their jurisdictions. Those improvements may be to intersections, medians, rights-of-way, signals, sidewalks, alternative transportation corridors, and access.

The following is a review of stakeholders who share an interest in the development patterns and revitalization opportunities within the corridor. Figure 6.3 outlines jurisdictional stakeholder boundaries with the entities listed below:

- TxDOT
- City of Stafford
- City of Stafford EDC
- City of Houston
- METRO
- Fort Bend County
- Harris County
- Harris County Community College
- Brays Oaks MD
- International MD
- Fort Bend WCID No. 2
- Stafford MSD

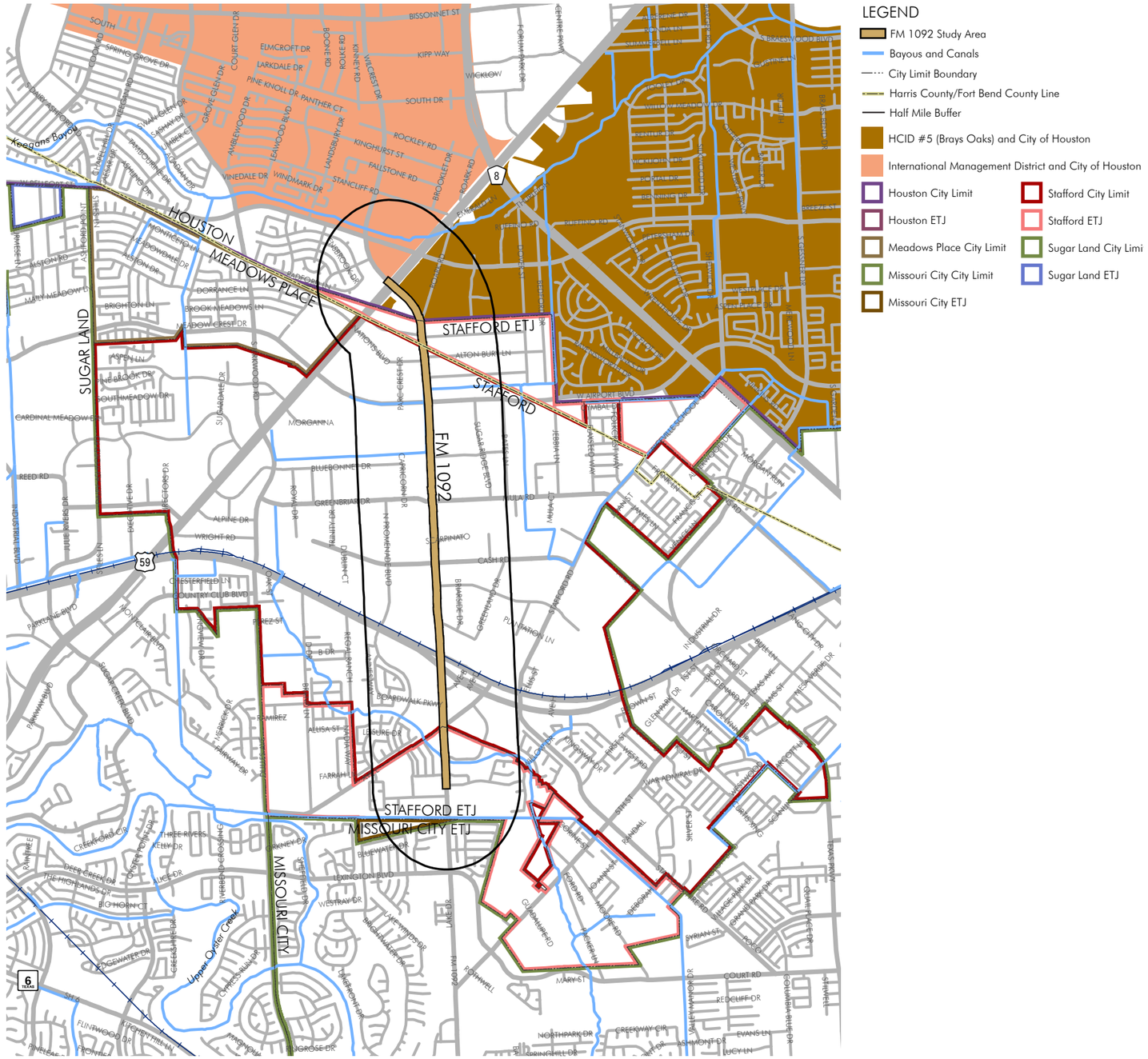


Figure 6.3: *Jurisdictional Stakeholder Boundaries*

2. Public-Private Partnerships:

Figure 6.4 shows current land use patterns within the corridor. Land ownership and land use patterns are varied and often incompatibly juxtaposed. Coordinated planning and community engagement can, over time, help the corridor develop in a more cohesive manner to be aesthetically consistent, and provide a more stable business environment for investors, property owners, businesses, their customers, and the City.

The City of Stafford should continue to work with private property owners to develop design guidelines for the identified nodes within the City. These design guidelines should, to the extent possible, be incorporated into deed restrictions, Area or Corridor Master Plans, and the City's regulatory framework. In this way, as properties transition over time redevelopment will follow a consistent pattern that furthers the City's goals and enhances the business climate throughout the corridor.

The following is a list of community stakeholders who share an interest in the development patterns revitalization opportunities within the corridor, and who can help the City develop corridor planning and visioning documents:

- Real Estate Investors
- Business Owners
- Customers
- Residents
- Students
- Commuters and Transit Agencies

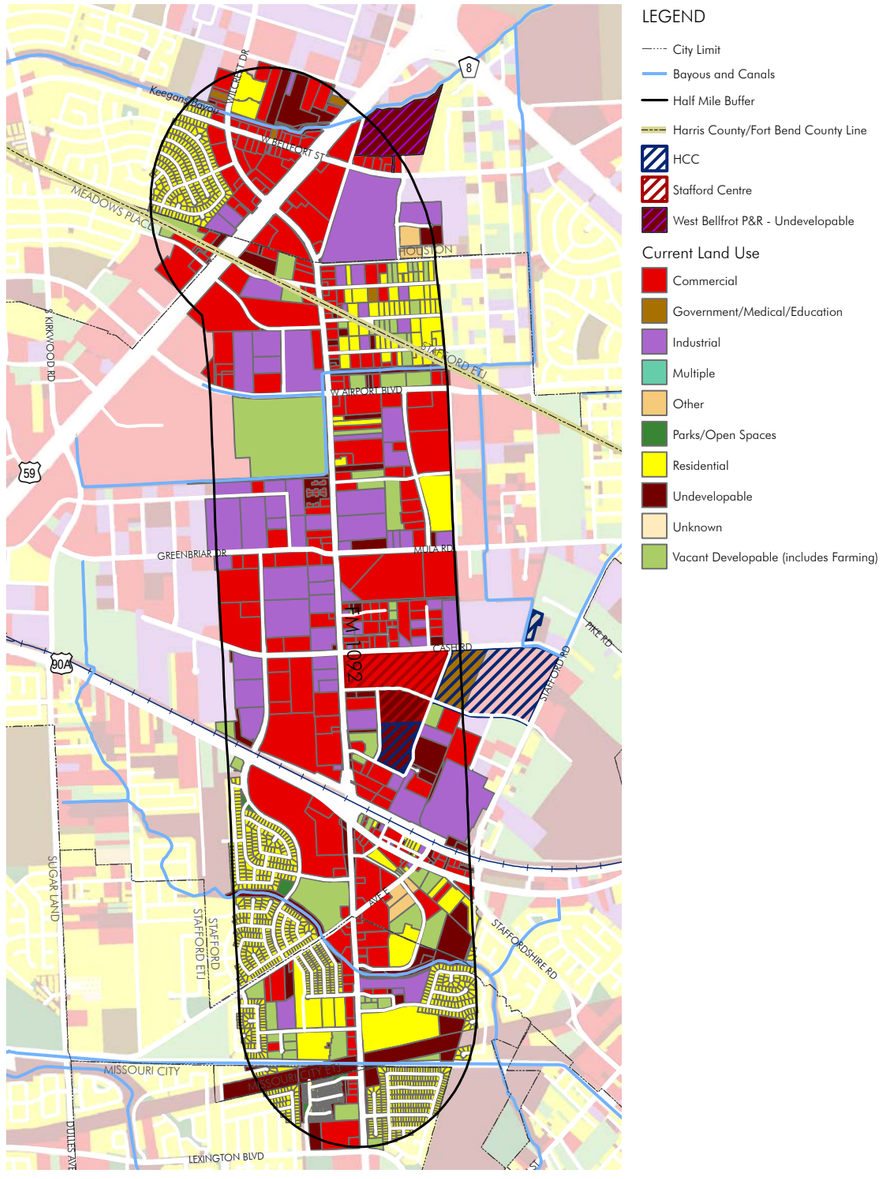


Figure 6.4 *Existing Land Use along the FM 1092 Study Area*

The core of FM 1092's revitalization rests on leveraging the interests of the varied jurisdictional and community stakeholders, and supporting those efforts with planning and regulatory tools that reflect their shared aspirations. While some stakeholders have interest in issues related to the corridor as a whole, others have a more narrow focus, thus developing strategies that mirror and marry the interests of stakeholders is essential.

ECONOMIC DEVELOPMENT GOAL

In many communities, economic development goals are defined in terms of property value, sales tax, and employment. The FM 1092 corridor, however, offers some challenges to those paradigms. While most of the jurisdictional partners are dependent on property tax, the City of Stafford's budget is funded exclusively by sales tax and user fees. Thus ad valorem growth is not an appropriate benchmark for economic development goals. In fact, the corridor's property tax base is robust and growing. In recent years, the base has grown by more than 132%, and many parcels have grown at a rate more than 10 times that average. Further complicating the discussion is the fact that neither property tax, nor sales tax discussions motivate community stakeholders. However, there is a nexus.

Land use appears to be an area where each group of stakeholders has a vested interest. Land uses are more valuable if they mirror the vision and aspirations of the stakeholders. Stakeholders, however, hold different sets of interests for defining property value, which may consider sales tax, or the quality of life bundle of goods, services, and opportunities that meet the aspirations of the corridor's residents, commuters, and the workforce. The economic development goal for FM 1092 is Placemaking, a strategy in pursuit of these broad livability goals that delivers growth, stability, value, and opportunity to each stakeholder group.

Placemaking as a public policy goal is echoed by some of the most forward thinking planners. Richard Florida, for example, argues that these amenities are a decisive source of competitive advantage among communities. Michael Bloomberg argues more pragmatically, "when people can find inspiration in a community that also offers great parks, safe streets and extensive mass transit, they vote with their feet."

THE DEVELOPMENT TOOL BOX

Each stakeholder only controls and influences a portion of the corridor, which can be extended with planning and engagement, encouraging fellow stakeholders to embrace and advance toward a common vision. The following tables address how corridor-related issues can be addressed through a Comprehensive Plan, Master Planning process, and Capital Improvements Plan. Each provides a summary of issues, as well as broad benefits, and partners that will need to be engaged to build the vision and implement the Plan. Each will then be discussed in the context of the corridor's four Catalyst Nodes in the next section.

COMPREHENSIVE PLAN		
ISSUES ADDRESSED	**BROAD BENEFITS**	**POTENTIAL RESOURCE PARTNERS**
Vision for City's Future Land Use Transportation Infrastructure Parks & Recreation Economic Development Community Engagement	Provides guidance to council on issues of importance to community Identifies action steps for implementation of desired outcomes Provides opportunities for robust engagement of community, bot residents and property owners, on issues and funding priorities	City Council EDC City Staff Residents Business Owners Consulting Team

Table 6.3 *Comprehensive Plan*

CAPITAL IMPROVEMENTS PLAN		
ISSUES ADDRESSED	**BROAD BENEFITS**	**POTENTIAL RESOURCE PARTNERS**
Identifies infrastructure improvements and Timing / Schedule for funding	Provides council with priorities by which to make funding decisions Provides community with prospective schedule for improvements	City Council City Staff County METRO TxDOT Management Districts Residents Business Owners

Table 6.4 *Capital Improvements Plan*

MASTER PLANS: CORRIDOR AND NODES		
ISSUES ADDRESSED	**BROAD BENEFITS**	**POTENTIAL RESOURCE PARTNERS**
Engineering and Design of Transportation Improvements ▪ Roadway ▪ Visual and Aesthetic ▪ Alternative Modes Identifies Funding Options ▪ Grants ▪ Partnerships Prioritizes Action Steps	Provides opportunity to engage private property owners in revitalization discussions and options Establishes priority for future action Provides council with input for funding decisions Provides template for regulatory change	City Council EDC City Staff TxDOT METRO Consultant Management Districts County Residents Business Owners

Table 6.5 *Master Plans*

CODE REVIEW AND REVISIONS		
ISSUES ADDRESSED	**BROAD BENEFITS**	**POTENTIAL RESOURCE PARTNERS**
Zoning in General Overlay Districts Setbacks Parking Landscape Signage	Provides regulatory framework to support desired outcomes Requires certain private sector actions and investments to improve look, character, and property values Puts private sector on notice that City has high standards for future development	City Staff Consulting Team Residents Business Owners

Table 6.6 *Code Review and Revisions*

NODE ISSUES, OPPORTUNITIES AND RECOMMENDATIONS

The Houston-Galveston Area Council (H-GAC) land use projections consider the demographic trends in the region, and existing and past land use patterns within the corridor study area. Reviewing H-GAC's land use projections suggests that without a cooperative effort to influence current trends, the corridor will continue to evolve in an inconsistent manner, inhibiting the ability to promote economic development. The following offers a discussion of how the economic development tools, and the respective strengths of the stakeholder groups, can meet the challenges posed currently, and in the future for each of the four priority nodes in the study area.

Roark Road

Connection to METRO's West Bellfort Park & Ride

Issues:

This node presents a unique challenge, as most of the node is outside of City of Stafford and covered by multiple jurisdictions. The boundaries fall within the City of Houston, Harris County, and Brays Oaks Management District. The area is currently failing to capture the synergies offered by the METRO Park & Ride facility, or its proximity to Keegans Bayou. There is currently little reason for commuters to arrive early, linger, or visit the area on weekends. Figure 6.5 illustrates H-GAC's 2040 land use projections for the area.

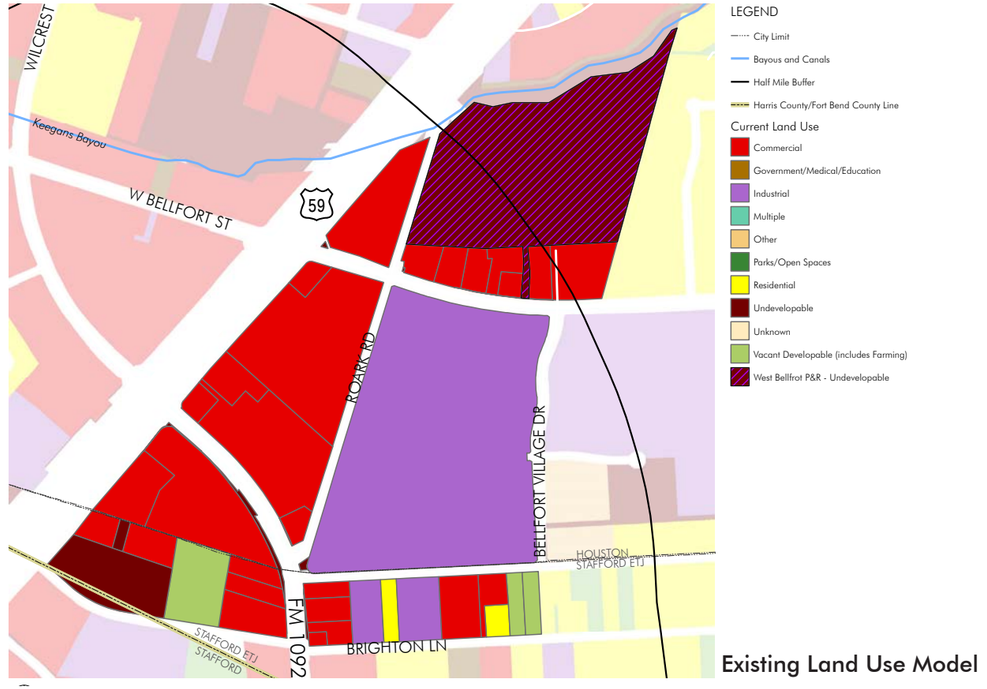
Potential Opportunity:

Fortunately the node has a number of potential revitalization partners: City of Houston, TxDOT, METRO, Brays Oaks Management District (MD), private businesses, and land owners. Each of these has an interest and could play a role in creating a business- and visitor-friendly environment for those who frequent the corridor. Proximity to Keegans Bayou Trail, the proposed bicycle network and Brays Oaks MD's parks and economic development plans provide the node with opportunities that could lead to revitalization efforts. It will be important to understand each stakeholders goals in the areas to support any investments. For example, given that the City of Stafford is not in the METRO Service Area, METRO may want to prioritize any of its investments in a way that benefits resident that are within the service area.

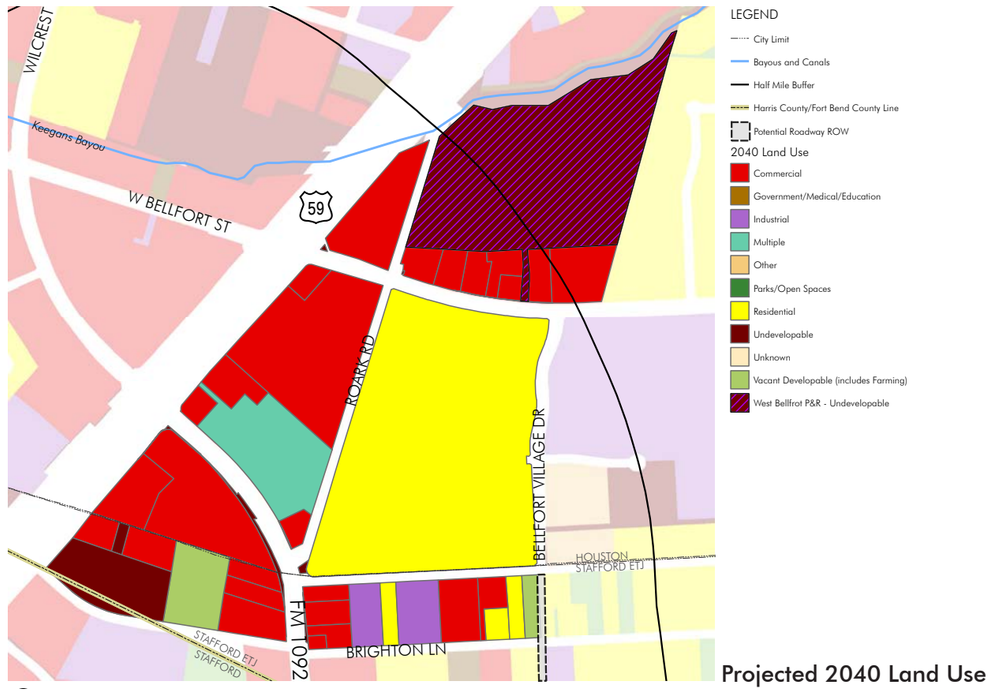
Recommendations:

The corridor will require multiple stakeholders to play a role in facilitating these efforts due to the multiple jurisdictions that would be involved. While not in the City of Stafford or Fort Bend County, these agencies should have a leading role because of the relationship the node has to FM 1092, and overall corridor mobility. Focus should be on developing the following:

- Capital Improvement Plan: Pursue road widening and alternative transportation linkages
- Master Plan: Work with Brays Oaks MD to create a Master Plan that incorporates reduced setbacks, offers shared parking, reduces curb-cuts, enhances landscaping requirements, and establishes stricter signage rules, and incorporates walkable features that support Master Planning efforts in other areas of the corridor.

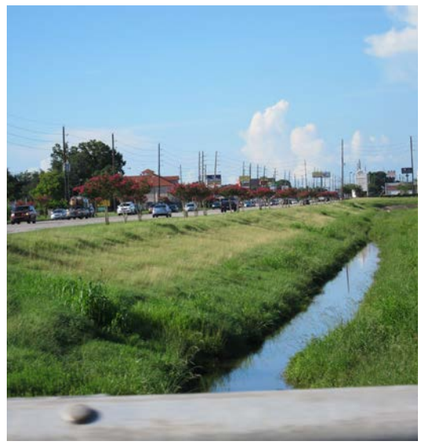


Existing Land Use Model



Projected 2040 Land Use

Figure 6.5 *Existing and Future Land Use for Roark Road Node*
Source: Houston-Galveston Area Council 2040 Land Use Projections



West Airport Boulevard

Texas Instruments Site

Issues:

The Texas Instruments site is large and the surrounding road network inhibits access to the tract, as well as adjacent properties. The pending sale of the TI property brings a new opportunity for development along the FM 1092 corridor that may change the context of the area dramatically. Figure 6.6 illustrates H-GAC's 2040 land use projections for the area.

Potential Opportunities:

The TI site represents a location where increased connectivity may be possible through the redevelopment of the site, though this would require the city to work with the developer and adjacent land owners to implement a plan for new roadways. There is potential to provide the site with access streets from the south and encourage an internal street grid within the site. The existing drainage channel also represents a potential a green destination in conjunction with site drainage facilities, and link the site to the FM 1092 corridor bicycle networks and the proposed Brays Oaks MD trail system. Pursue partnerships with the County to construct the alternative transportation system within drainage rights of way. Pursue partnership with FB WCID No. 2 and future land owner(s) to create and maintain community spaces within the site. One potential approach to create this type of connectivity while making more of the site accessible is shown in Figure 6.6 but there are other potential configurations to achieve similar goals. This future owner of the site will have significant say in how the site is ultimately developed and this represents an opportunity for the City of Stafford to partner with the developer to achieve its goals.

Recommendations:

This is perhaps the most important site in the corridor. Its redevelopment pattern will significantly influence adjacent properties and transportation issues along FM 1092. The City should use the tools at its disposal and engage in constructive partnerships with all of the nodes stakeholders to ensure that the site develops in a manner that reflects the vision and aspirations of each.

- Capital Improvement Plan: Construct (or cause to be constructed) new cross streets, and connectors, as well as integration of alternative transportation linkages.
- Master Plan: Review and develop specific density and land use goals for the site. Encourage the integration of parks and open space, features that promote walkability, hardscape and softscape elements that create community spaces.
- Code Review and Revisions: Reduce setbacks, curb cuts, and offer shared parking opportunities; enhance landscaping requirements and stricter signage rules.
- Other: Encourage standardized deed restrictions and design standards that reinforce other efforts along the corridor.

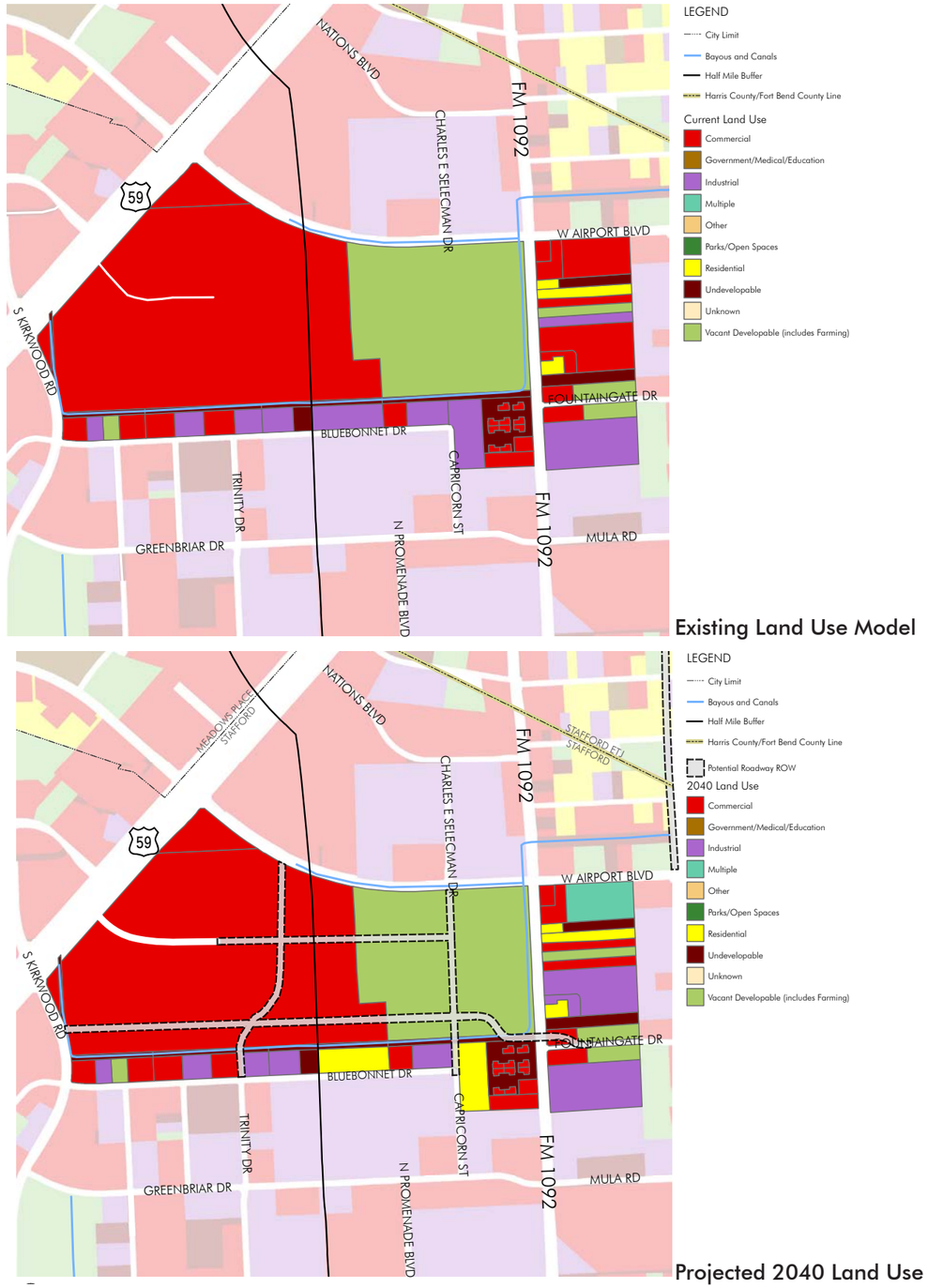
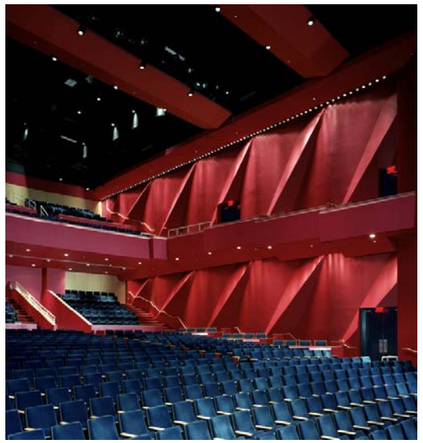


Figure 6.6 *Existing and Future Land Use for West Airport Boulevard Node*
Source: Houston-Galveston Area Council 2040 Land Use Projections



Cash Road

Stafford Centre and Houston Community College

Issues:

The site represents an underutilized asset, considering the adjacent land uses and their potential for complimentary activities between Stafford Centre and Houston Community College (HCC). The site lacks alternative access routes for local trips, and fails to fully capitalize on the inherent opportunity to create a compelling destination amenity with available green space and features that attract the community outside of events and education. Figure 6.7 illustrates H-GAC's 2040 land use projections for the area.

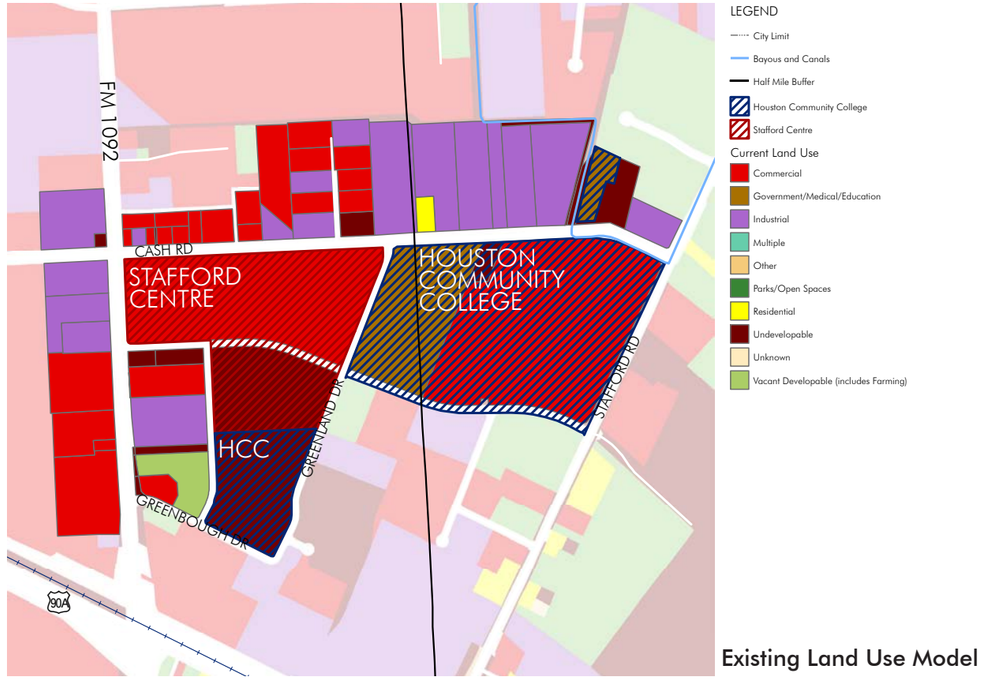
Potential Opportunities:

Capitalize on synergies between the City of Stafford and Houston Community College (HCC) through combined investments in enhanced destination activity centers like plazas, parks, and festival spaces. Create circulation alternatives by linking Cash Road to other FM 1092 laterals. Link sites to FM 1092 bicycle network. Pursue partnerships with private businesses, FB WCID No. 2, HCC and the County to maintain and further enhance the area.

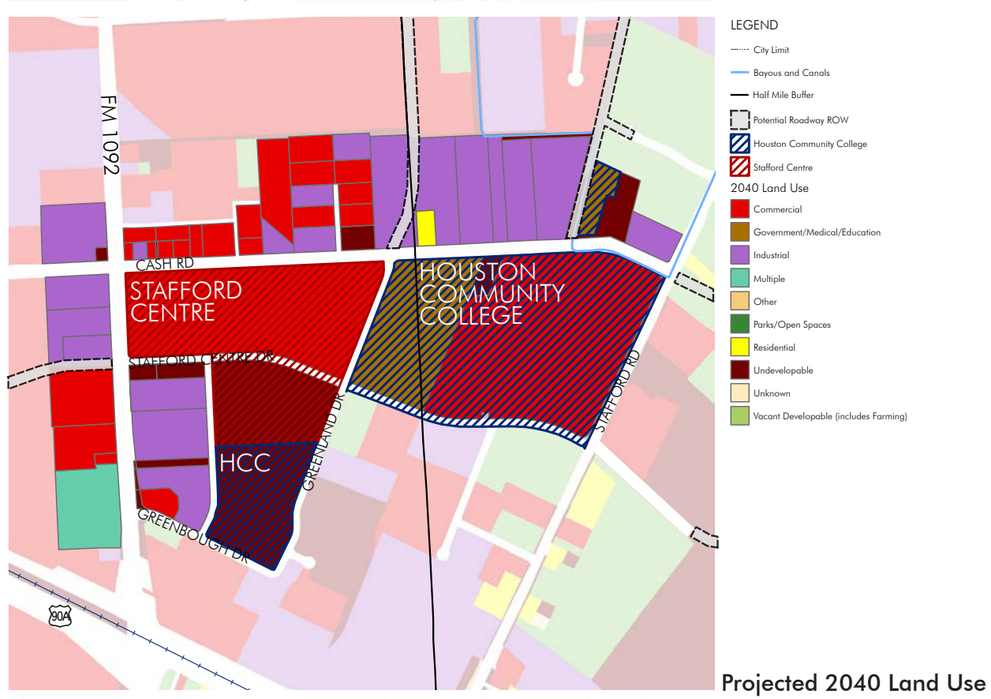
Recommendations:

This site represents a significant opportunity to build on the City's park system and create a place for people to spend time outside of business hours along the corridor. Both the Stafford Centre and HCC sites have available land to provide weekend and off-hour attractions. Development of such amenities would provide a boost to adjacent property owners and business and could significantly expand the City's parks system.

- Capital Improvements Plan: Provide or cause to be provided alternative transportation linkages and integration. Provide or cause to be provided FM 1092 parallel circulation to enhance the value and productivity of adjacent properties as well as access to the propose amenities.
- Master Plan: Develop a Master Plan incorporating formal parks and open space amenities, walkable features, hardscape and softscape improvements, as well as possible linkages to the West Airport node.
- Code Review and Revision: Consider revisions providing reduced setbacks, shared parking opportunities, enhanced landscape requirements, and stricter signage rules.
- Other: Encourage standardized deed restrictions and design standards that reinforce other efforts along the corridor.

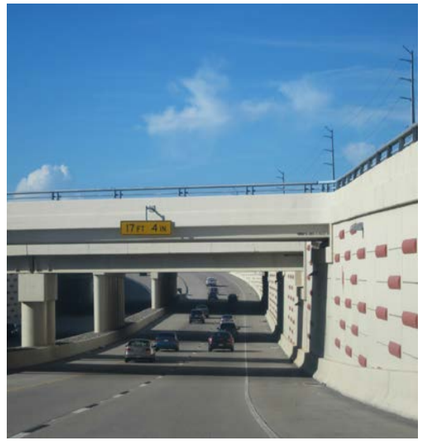


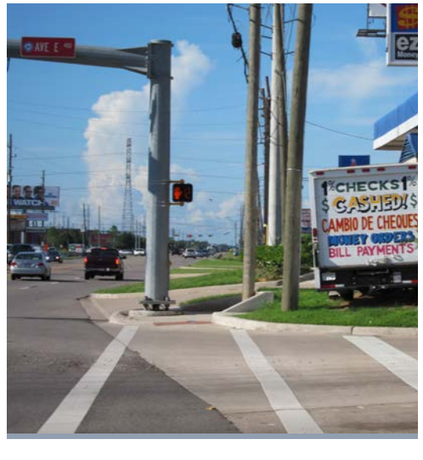
Existing Land Use Model



Projected 2040 Land Use

Figure 6.7 *Existing and Future Land Use for Cash Road Node*
Source: Houston-Galveston Area Council 2040 Land Use Projections





Avenue E

Island District and Adjacent Commercial

Issues:

The node is the site of the most congested intersections in the study area and circulation is difficult due to the disconnected road network. This combination depresses highest and best use calculations for some of the adjacent properties though new development had been proposed for the west side of FM 1092. As a consequence, area commercial is underdeveloped and fails to offer compelling retail opportunities to the growing proximate residential neighborhoods. A portion of the node is within the City of Stafford's ETJ. Figure 6.8 illustrates H-GAC's 2040 land use projections for the area.

Potential Opportunities:

This site has a great deal of near term redevelopment potential. Residential neighborhoods border the node, and new homes are being constructed in the region. Additionally, the site is near the Missouri City boundary line where continued development provides population further enhancing the sites retail potential.

Because of the level of disruption the proposed roadway realignments pose to the node, there exists a unique opportunity to redevelop the sites in a pattern that is more productive and than currently exists. Figure 6.9, on the following page, illustrates a node plan that incorporates more connectivity and a more walkable development scenario for the node. Figure 6.10 provides a more detailed view of potential streetscape design elements that could be incorporated into any redevelopment. The following recommendations provide a means toward these ends.

Recommendations:

Shared parking could provide greater density and more private sector synergies. Correcting misaligned roads will enhance access. Linking the site to the FM 1092 bicycle improvements and neighborhood trail networks further enhances the sites access. Creating green space within the site will serve to attract and hold community engagement. Pursuing partnership opportunities with landowners will encourage that the site's redevelopment patterns reflect the aspirations of the area's stakeholders.

- Capital Improvements Plan: Pursue roadway realignments, cross street connections, as well as alternative transportation linkages.
- Master Plan: Pursue walkable features, hardscape and soft scape instillations, community spaces, and higher density development rules.
- Code Revision and Review: Consider specific setback requirements, shared parking, enhanced landscaping, and stricter signage rules.
- Other: Consider annexation of commercial tracts within the node, but also within City of Stafford ETJ. Encourage standardized deed restrictions and design standards for node.

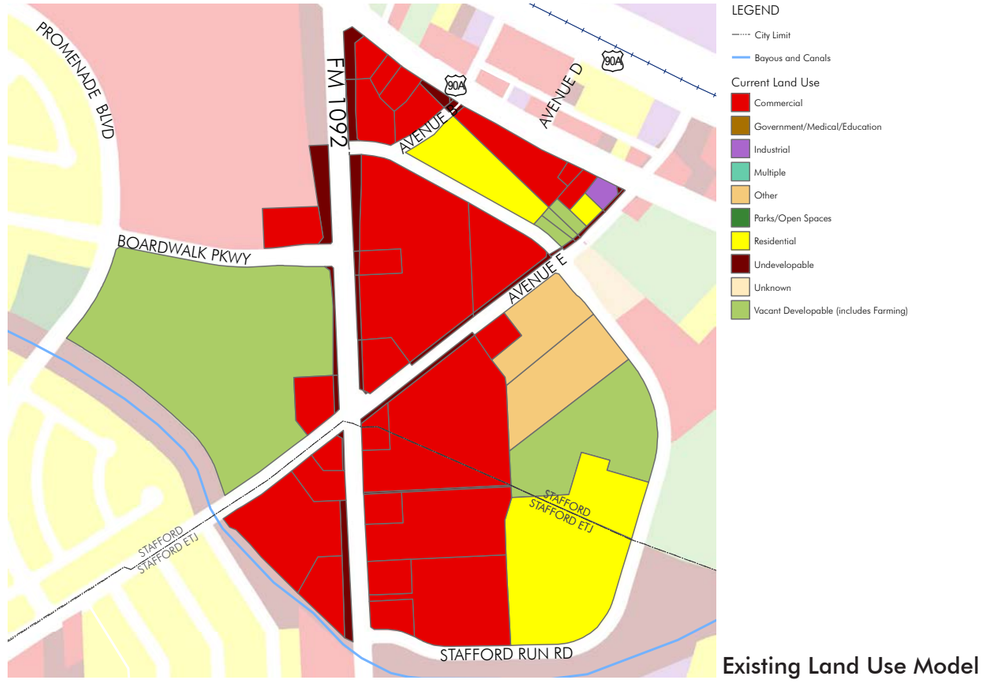


Figure 6.8 *Existing and Future Land Use for Avenue E Node*
Source: Houston-Galveston Area Council 2040 Land Use Projections

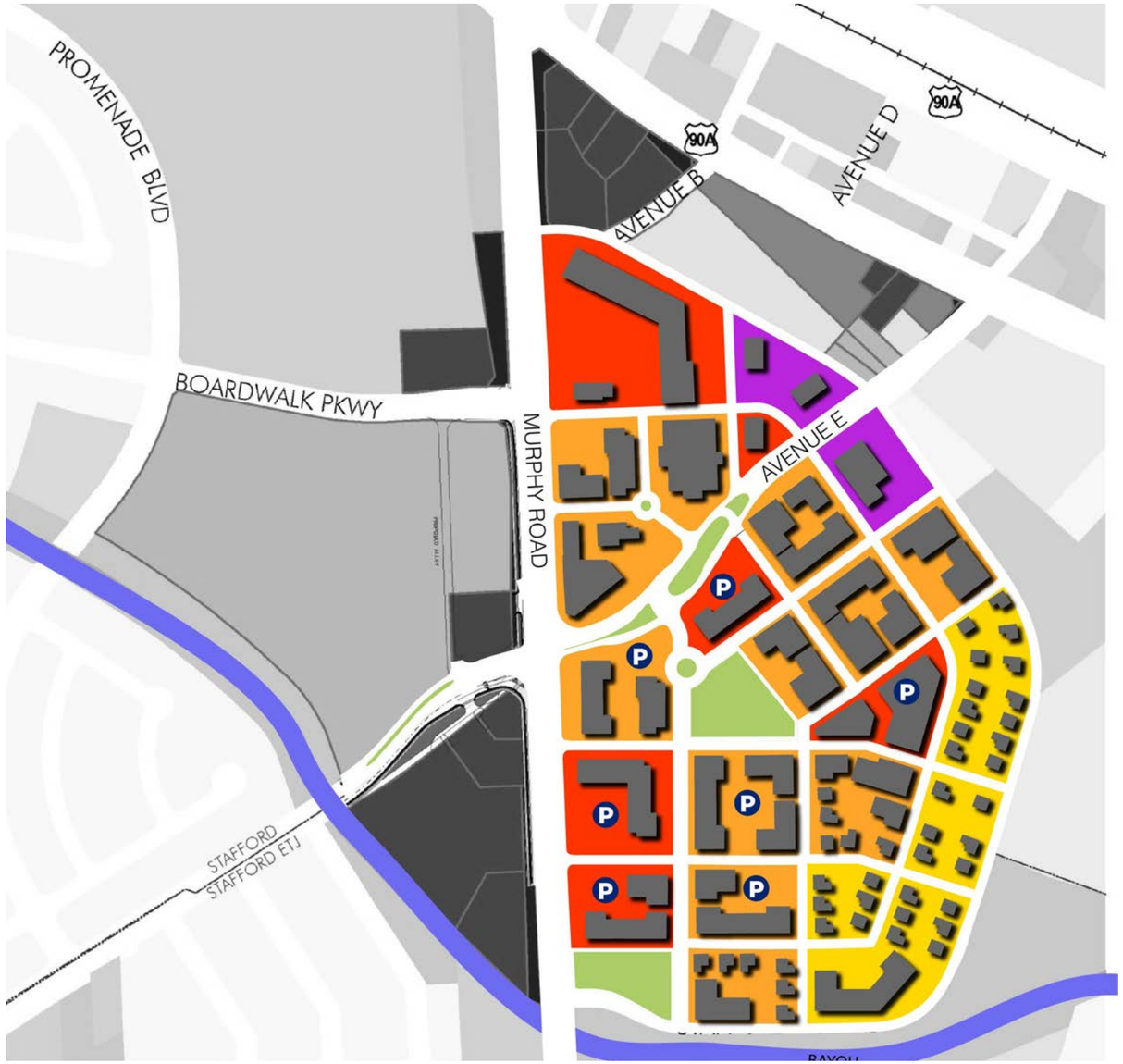


Figure 6.9 *Reimagining Development Opportunities at Avenue E and FM 1092*

Site development and streetscape design for these four nodes capitalize on opportunities to create destinations along FM 1092. A comprehensive development approach can ensure that land use, site access and parking consider the City of Stafford vision for residents' quality of life, visitor attraction, economic development, future growth, and site access locally and regionally. These are items that can be refined through the City's Comprehensive Planning process.

Site design of the opportunity nodes and future developments should encourage the creation of environments where people have more balanced transportation options along the corridor and can utilize the interior street networks for their shorter trips. The following elements should be considered for creating vibrant storefront activity:

- Interior sidewalk network along building frontage
- Shared parking, parking garages, and on-street parking
- Bulb-outs, or curb extensions to reduce pedestrian crossing distances at intersections
- Marked crosswalks
- Site furnishings (benches, bike racks, signage, trash receptacles, etc.)
- Parking lot trees and landscaping
- Awnings and shade coverage at building facades

Figure 6.10 *Example of streetscape design within a development adjacent to FM 1092, which encourages pedestrian activity*

1. Site Furnishings
2. Public plaza, gathering/performance space
3. Street trees
4. Bulb-outs, or curb extensions at intersections
5. ADA-compliant ramps at curb cuts
6. Marked pedestrian crossing
7. On-street parking defined by bulb-outs

OPEN SPACE

Public parks, plazas and open spaces play an important role in creating vibrant urban centers, which can be enhanced with programming, such as festivals, musical performances, exercise classes, organized sports, and movie nights. It is recommended that opportunities to develop or enhance public spaces be established through the development of these nodes, and other sites along FM 1092. Parks and plazas have the potential to increase business activity, improve surrounding property values, public health, residents' quality of life and sense of community. Programming these spaces with events gives people a reason to enjoy the space, and encourages them to patron surrounding businesses. Site features that should be considered are sports fields, playgrounds, green spaces, tree coverage, public gathering and seating space, flexible event space, and water features.

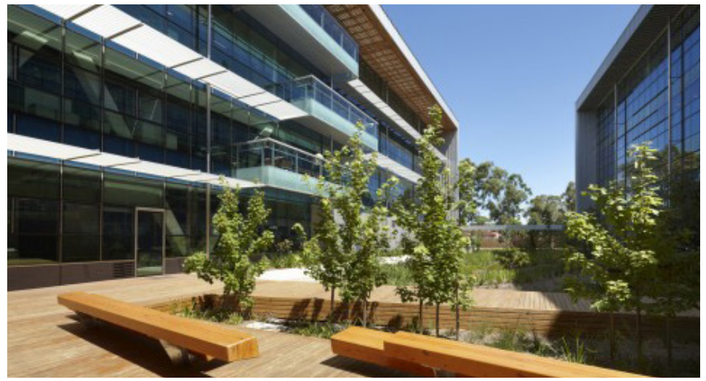


Figure 6.11 *Public parks and plazas help create destinations around commercial land uses that may benefit from community and management programming, such as events and festivals.*

CONCLUSION

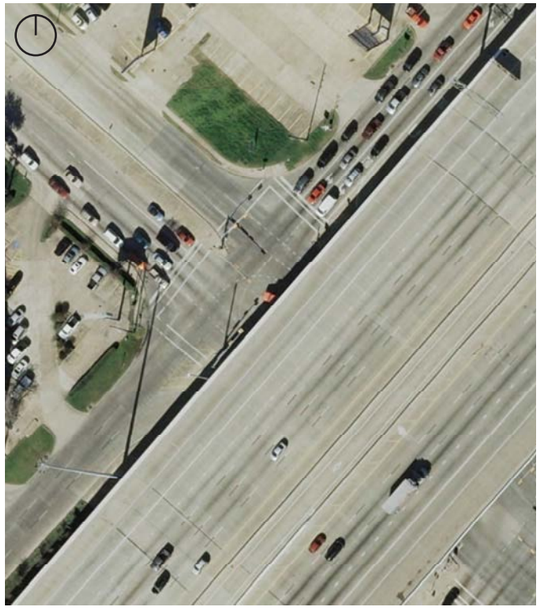
The FM 1092 corridor represents the main economic corridor for the City of Stafford and has significant potential for revitalization. However, the City of Stafford or the private sector cannot do it alone. But together, with their jurisdictional and community partners they can reimagine and remake the corridor to capture to potential.

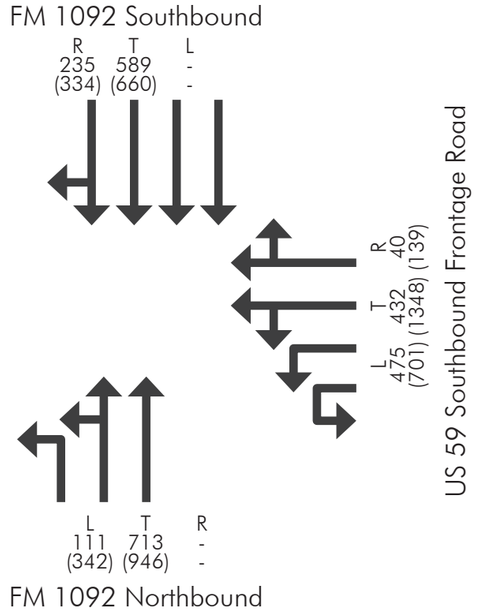
The corridor has intrinsic strengths that flow from its location and traffic patterns and key nodes focused around development opportunities and transportation infrastructure. The corridor also has stakeholders that share vested interests in the region, and provide the leverage needed to capitalize on intrinsic strengths. Combined there is the potential to remake FM 1092 in a manner that delivers stability and economic vitality for all while delivering the safety and mobility improvements that are a priority for the community.

Placemaking takes time. But with time, deliberate planning, and a thoughtful regulatory environment, FM 1092 can evolve as a destination for investors, businesses, employees, residents, students, and commuters to visit, revisit, and enjoy.

APPENDIX A | Intersection Inventory

FM 1092 @ US 59 SOUTHBOUND FRONTAGE ROAD



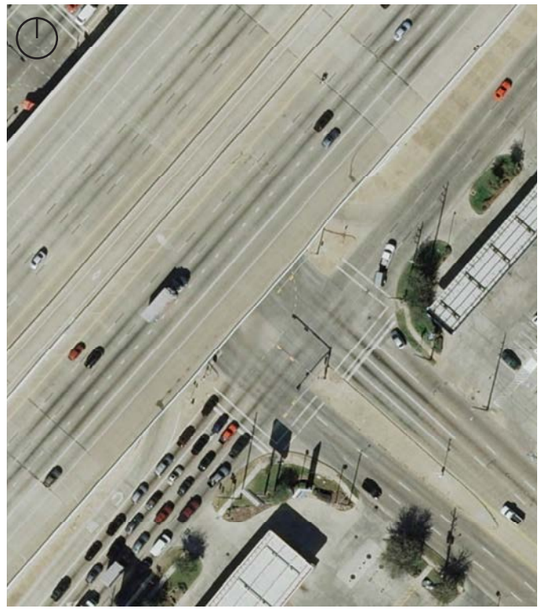


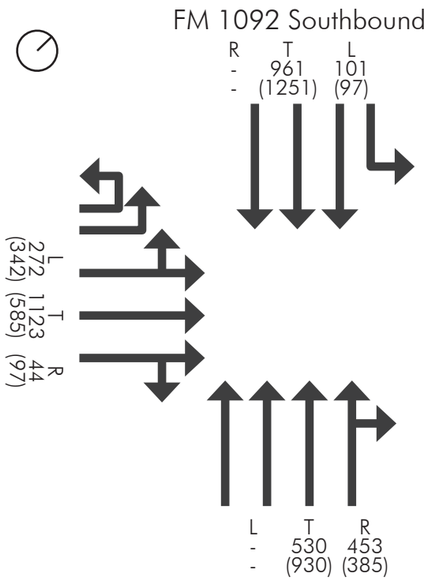
AM Peak Hour | 7:30 - 8:30
(PM) Peak Hour | 4:45 - 5:45

SIGNAL INFORMATION

PHASING	Diamond
SIGNAL TYPE	Mast Arm
DETECTION TYPE	Induction Loops
CROSSWALKS	Yes
WHEELCHAIR RAMPS	Yes
PEDESTRIAN BUTTONS	Yes
OWNERSHIP	City of Houston
OTHER NOTES	• Left most westbound lane is an entrapment left-turn lane • There is only a painted median across from the left-turn only lane, which may cause confusion for vehicle who are caught in the entrapment lane

FM 1092 @ US 59 NORTHBOUND FRONTAGE ROAD





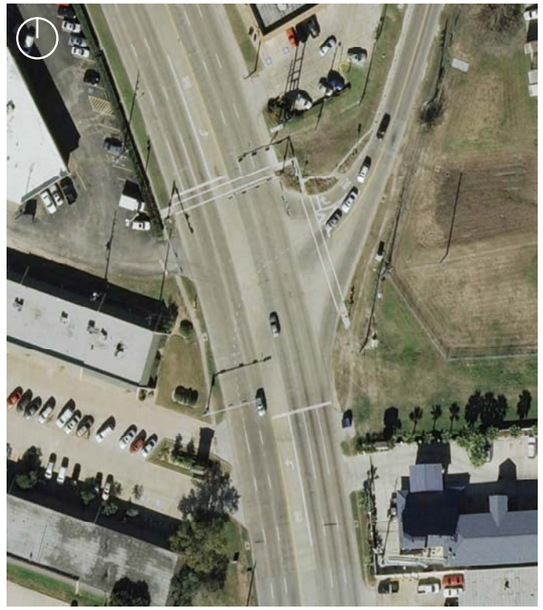
AM Peak Hour|7:15 - 8:15

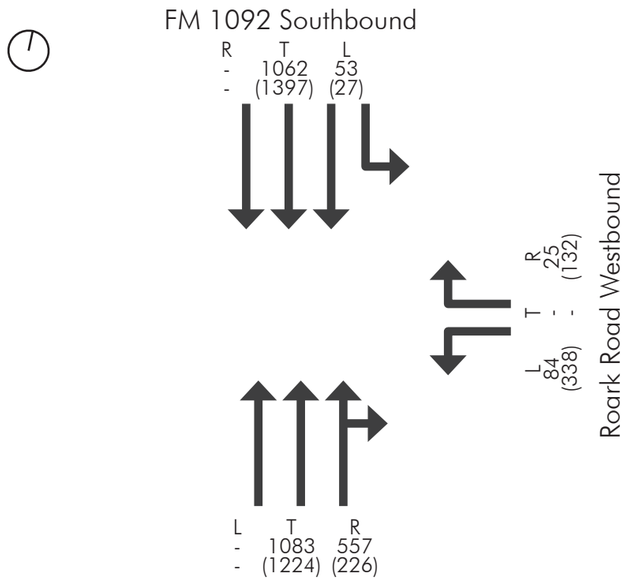
(PM) Peak Hour|4:45 - 5:45

SIGNAL INFORMATION

PHASING	Diamond
SIGNAL TYPE	Mast Arm
DETECTION TYPE	Induction Loops
CROSSWALKS	Yes
WHEELCHAIR RAMPS	Yes
PEDESTRIAN BUTTONS	Yes
OWNERSHIP	City of Houston
OTHER NOTES	

FM 1092 @ ROARK ROAD





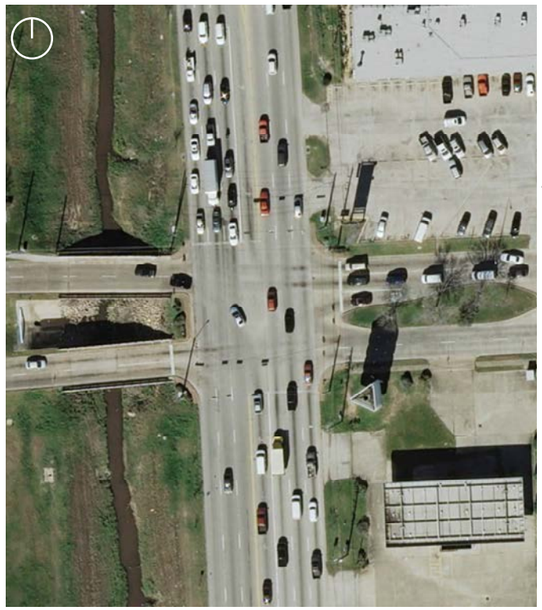
AM Peak Hour |7:15 - 8:15

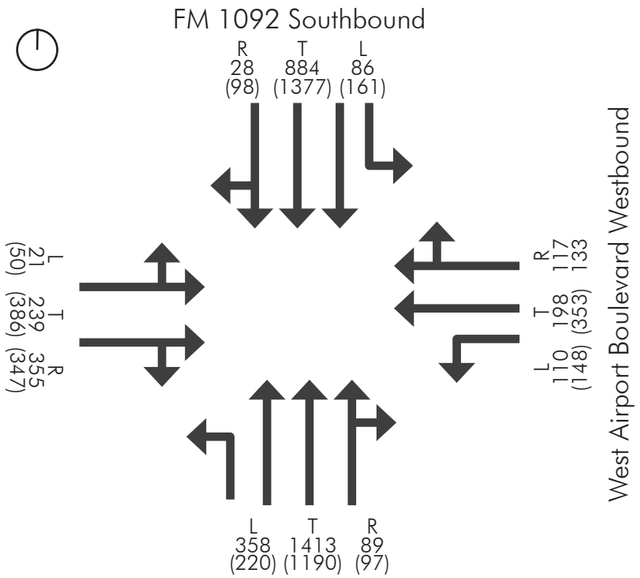
(PM) Peak Hour|4:45 - 5:45

SIGNAL INFORMATION

PHASING	Lead-Lag
SIGNAL TYPE	Mast Arm
DETECTION TYPE	Induction Loops
CROSSWALKS	Yes, across southbound and westbound approaches
WHEELCHAIR RAMPS	Yes, for crosswalk across southbound and westbound approaches
PEDESTRIAN BUTTONS	Yes
OWNERSHIP	City of Houston
OTHER NOTES	• Skewed intersection • Eastbound approach is from a private driveway

FM 1092 @ WEST AIRPORT BOULEVARD





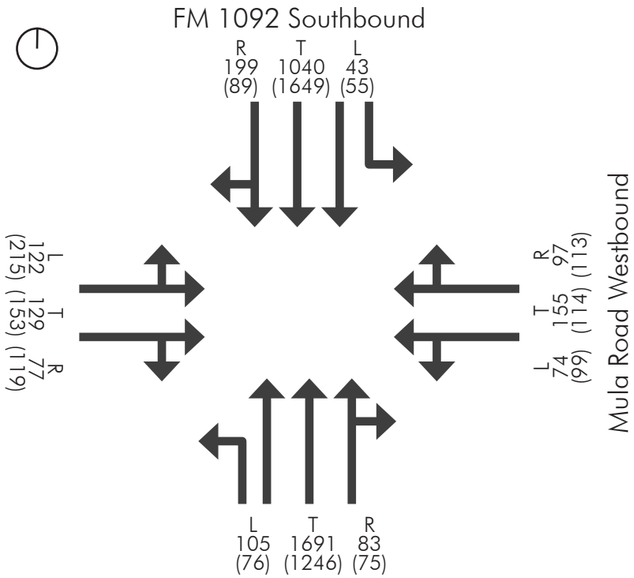
AM Peak Hour |7:15 - 8:15

(PM) Peak Hour | 5:00 - 6:00

SIGNAL INFORMATION

PHASING	Split
SIGNAL TYPE	Span Wire
DETECTION TYPE	Induction Loops
CROSSWALKS	No
WHEELCHAIR RAMPS	No
PEDESTRIAN BUTTONS	No
OWNERSHIP	TxDOT
OTHER NOTES	• Bridge across drainage ditch west of intersection has limited the ability to widen the westbound approach to accommodated more through-lanes or turn-lanes. • Southbound turning radius is very tight and can be limiting for a truck with a long wheel base. • Westbound left-turn bay provides limited storage

FM 1092 @ GREENBRIAR DRIVE/MULA ROAD



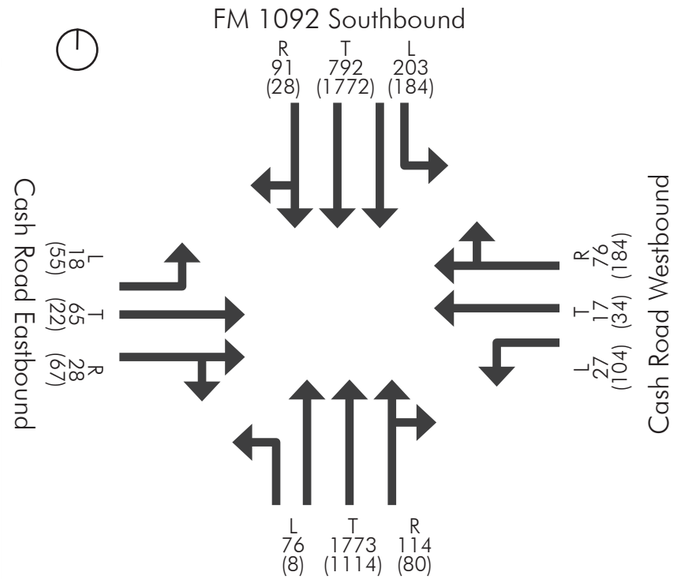
AM Peak Hour|7:15 - 8:15

(PM) Peak Hour:|4:30 - 4:30

SIGNAL INFORMATION

PHASING	Split
SIGNAL TYPE	Span Wire
DETECTION TYPE	Induction Loops
CROSSWALKS	Stripped across eastbound and westbound approach
WHEELCHAIR RAMPS	Yes
PEDESTRIAN BUTTONS	No
OWNERSHIP	TxDOT
OTHER NOTES	

FM 1092 @ CASH ROAD



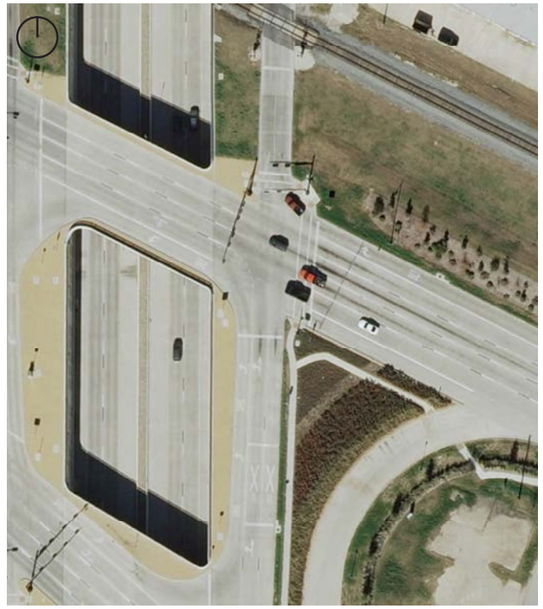
AM Peak Hour|7:15 - 8:15

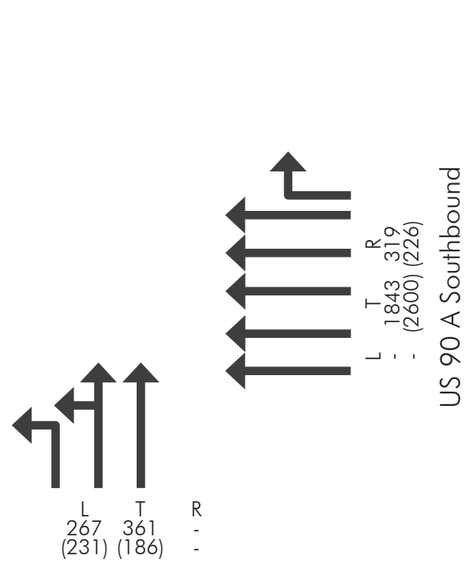
(PM) Peak Hour:|4:30 - 5:30

SIGNAL INFORMATION

PHASING	Lead-Lag
SIGNAL TYPE	Span Wire
DETECTION TYPE	Induction Loop
CROSSWALKS	No
WHEELCHAIR RAMPS	Only at southeast corner, adjacent to Stafford Centre
PEDESTRIAN BUTTONS	No
OWNERSHIP	TxDOT
OTHER NOTES	

SOUTHBOUND FM 1092 @ SOUTHBOUND US 90 A





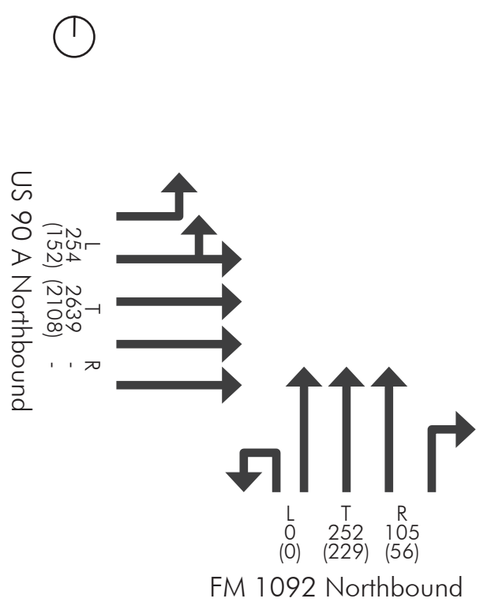
AM Peak Hour|7:30 - 8:30

(PM) Peak Hour|7:15 - 8:15

SIGNAL INFORMATION

PHASING	Split Diamond
SIGNAL TYPE	Mast Arm
DETECTION TYPE	Vehicle detection system (Vivds)
CROSSWALKS	Yes
WHEELCHAIR RAMPS	Yes
PEDESTRIAN BUTTONS	Yes
OWNERSHIP	TxDOT
OTHER NOTES	

SOUTHBOUND FM 1092 @ NORTHBOUND US 90A



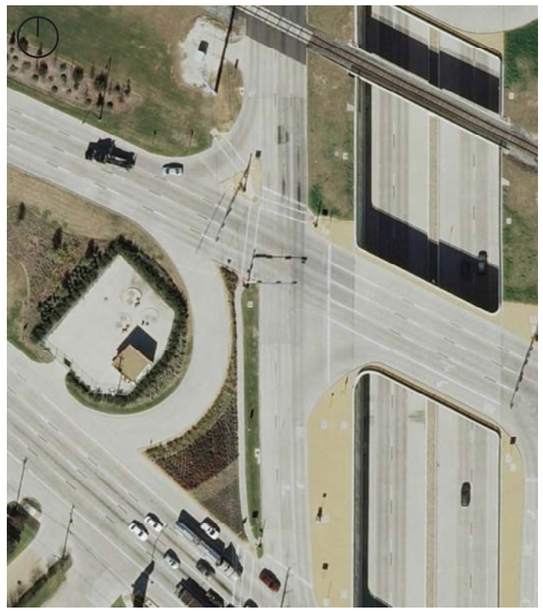
AM Peak Hour|7:00 - 8:00

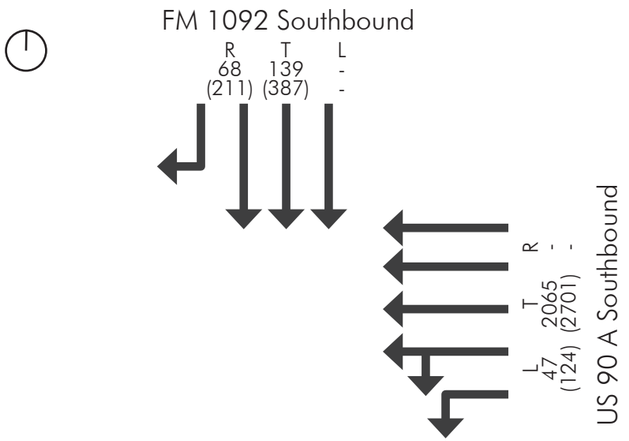
(PM) Peak Hour:|5:00 - 8:00

SIGNAL INFORMATION

PHASING	Split Diamond
SIGNAL TYPE	Mast Arm
DETECTION TYPE	Vehicle detection system (Vivds)
CROSSWALKS	Yes
WHEELCHAIR RAMPS	Yes
PEDESTRIAN BUTTONS	Yes
OWNERSHIP	TxDOT
OTHER NOTES	

NORTHBOUND FM 1092 @ SOUTHBOUND US 90A





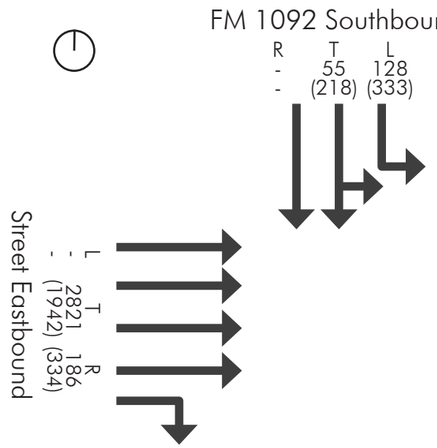
AM Peak Hour|7:15 - 8:15

(PM) Peak Hour|4:45 - 5:45

SIGNAL INFORMATION

PHASING	Split Diamond
SIGNAL TYPE	Mast Arm
DETECTION TYPE	Vehicle detection system (Vivds)
CROSSWALKS	Yes
WHEELCHAIR RAMPS	Yes
PEDESTRIAN BUTTONS	Yes
OWNERSHIP	TxDOT
OTHER NOTES	

NORTHBOUND FM 1092 @ NORTHBOUND US 90A



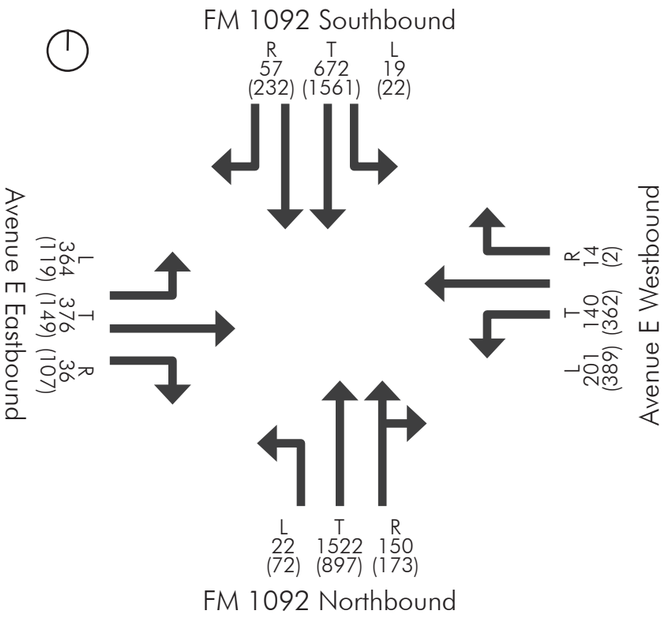
AM Peak Hour|7:00 - 8:00

(PM) Peak Hour:|7:15 - 8:15

SIGNAL INFORMATION

PHASING	Split Diamond
SIGNAL TYPE	Mast Arm
DETECTION TYPE	Vehicle detection system (Vivds)
CROSSWALKS	Yes
WHEELCHAIR RAMPS	Yes
PEDESTRIAN BUTTONS	Yes
OWNERSHIP	TxDOT
OTHER NOTES	

FM 1092 @ AVENUE E



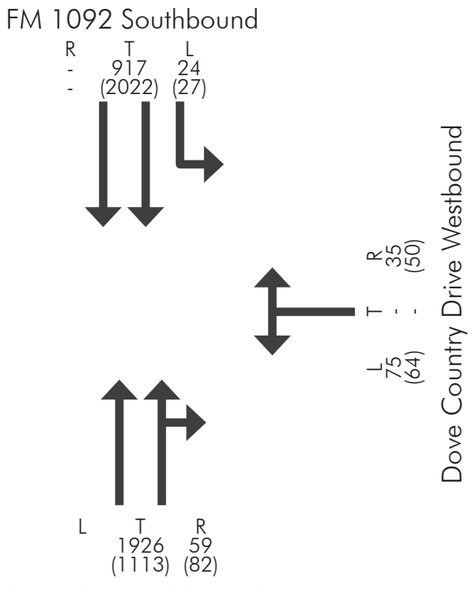
AM Peak Hour|7:15 - 8:15

(PM) Peak Hour|4:45 - 4:45

SIGNAL INFORMATION

PHASING	Lead-Lag*
SIGNAL TYPE	Mast Arm
DETECTION TYPE	Vehicle detection system (Vivds)
CROSSWALKS	Yes, Across westbound, northbound, and eastbound approaches.
WHEELCHAIR RAMPS	Yes, for crosswalks across westbound, northbound, and eastbound approaches.
PEDESTRIAN BUTTONS	Yes
OWNERSHIP	TxDOT
OTHER NOTES	• Runs free (non-coordinating) from 6:00 am to 6:45 am and from 4:00 pm to 7:00 pm dues to FM 1092 saturation issue

FM 1092 @ DOVE COUNTRY DRIVE



AM Peak Hour|7:15 - 8:15
(PM) Peak Hour|5:15 - 6:15

SIGNAL INFORMATION

PHASING	T Intersection
SIGNAL TYPE	Span Wire
DETECTION TYPE	None
CROSSWALKS	No
WHEELCHAIR RAMPS	No
PEDESTRIAN BUTTONS	No
OWNERSHIP	TxDOT
OTHER NOTES	

APPENDIX B | EXHIBIT 16-14, 2010 HIGHWAY CAPACITY MANUAL

			Two Lane Roads			Four Lane Roads			Six Lane Roads		
Posted Speed	K-factor	D-factor	LOS C or Better	LOS D	LOS E	LOS C or Better	LOS D	LOS E	LOS C or Better	LOS D	LOS E
30 MPH	0.09	0.55	5.9	15.4	19.9	11.4	31.4	37.9	16.3	46.4	54.3
		0.60	5.4	14.1	18.3	10.3	28.8	34.8	15.0	42.5	49.8
	0.10	0.55	5.3	13.8	17.9	10.1	28.2	34.1	14.7	41.8	48.9
		0.60	4.8	12.7	16.4	9.3	25.9	31.3	13.5	38.3	44.8
	0.11	0.55	4.8	12.6	16.3	9.2	25.7	31.0	13.4	38.0	44.5
		0.60	4.4	11.5	14.9	8.4	23.5	28.4	12.2	34.8	40.8
45 MPH	0.09	0.55	10.3	18.6	19.9	21.4	37.2	37.9	31.9	54	54.3
		0.60	9.4	17.1	18.3	19.6	34.1	34.8	29.2	49.5	49.8
	0.10	0.55	9.3	16.8	17.9	19.3	33.5	34.1	28.7	48.6	48.9
		0.60	8.5	15.4	16.4	17.7	30.7	31.3	26.3	44.5	44.8
	0.11	0.55	8.4	15.3	16.3	17.5	30.5	31	26.1	44.2	44.4
		0.60	7.7	14.0	14.9	16.1	27.9	28.4	23.9	40.5	40.7
Source: 2010 Highway Capacity Manual - Exhibit 16-14											
General Assumptions include: No Roundabouts or all-way stop controlled intersections along the facility; coordinated, semi-actuated traffic signals; arrival type 4; 120-s cycle time; protected left turn phases; 0.45 weighted average g/C ratio; exclusive left turn bays with adequate storage provided at traffic signals; no exclusive right turn lanes provided; no restrictive median; 2-mile facility length; 10% traffic turns left, 10% turns right at each traffic signal; peak hour factor=0.92; and base saturation flow rate - 1900pc/hr/ln											
30-mph assumes signal spacing = 1050 ft and 20 access points/mi											
45-mph assumes signal spacing = 1500 ft and 10 access points/mi											
* Values interpolated from data for 30 mph and 45 mph											

APPENDIX C | PLANNED PROJECTS FROM THE 2035 RTP UPDATE WITHIN THE STUDY AREA

H-GAC RTP UPDATE:
Capacity enhancing roadway projects

1. **FM 1092***
Access Management medians between Missouri City City Limit and Hampton Drive

2a **FM 1092**
Widen from 4-lanes to 6-lanes between US 90A and Lexington Boulevard

2b **FM 1092**
Widen from 4-lanes to 6-lanes between Lexington Boulevard and Cartwright Road

2c **FM 1092**
Widen from 4-lanes to 6-lanes between Cartwright Road and SH 6

3 **FM 1092 @ 5th Street**
Intersection improvements including one additional northbound and one additional southbound through lane

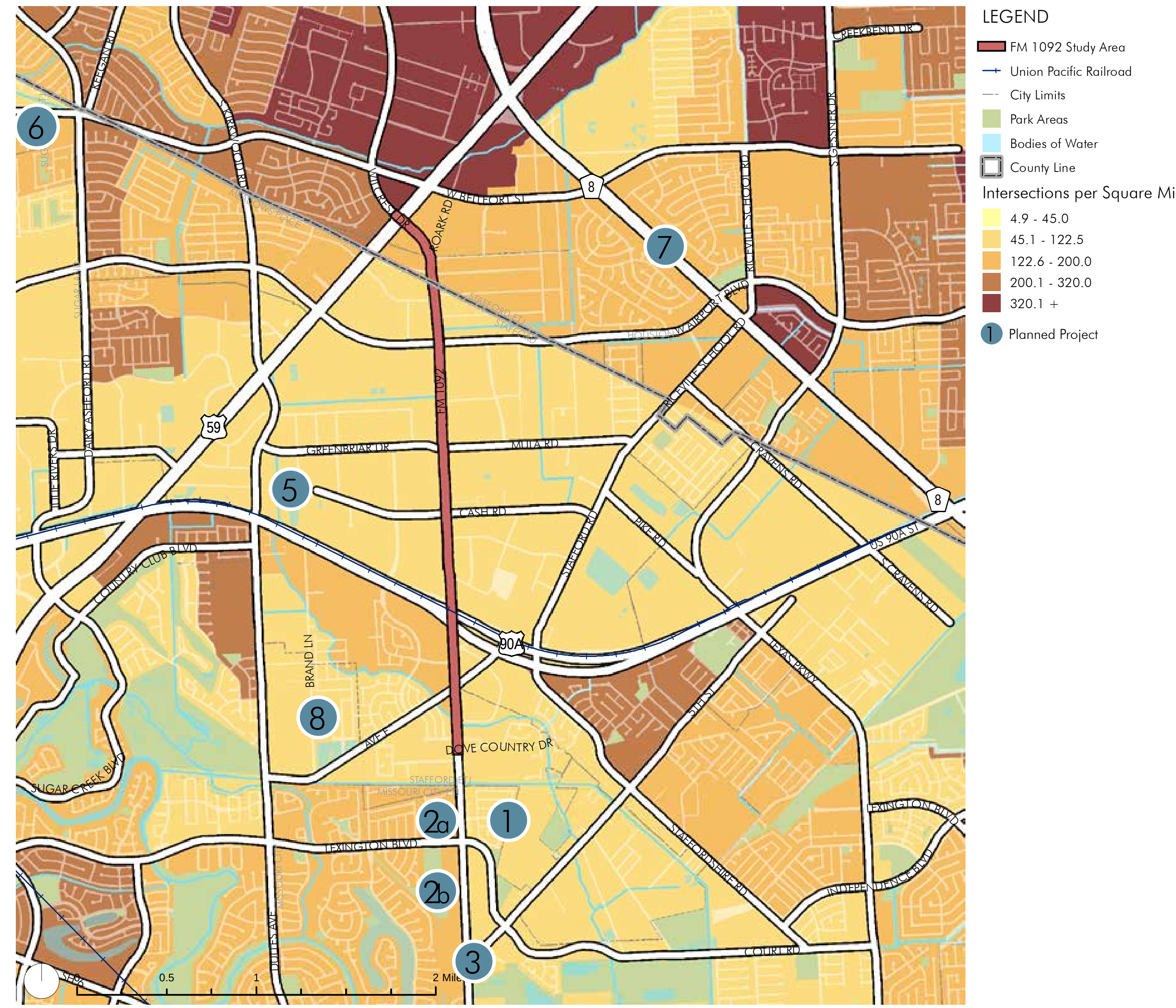
4 **FM 1092 @ El Dorado Blvd**
Intersection improvements including one additional northbound and one additional southbound through lane

5 **Cash Road**
New 4-lane roadway from current terminus of Cash Road, west of FM 1092, to Kirkwood Road

6 **West Bellfort Street**
Widen to 6-lane divided roadway from FM 1876/Eldridge Road to the Fort Bend/Harris County Line

7 **Beltway 8**
Widen from 4-lanes to 8-lanes from US 59 to SH 288

8 **Brand Lane**
Widen from 2-lanes to 4-lanes from US 90A to Avenue E.



* *Recommendation from FM 1092 - Missouri City Access Managements Study*

MPOID	TOTAL COST	PROJECT CODE	PROJECT STATUS	DESCRIPTION	STREET	COUNTY	FROM LOCATION	TO LOCATION	LEAD AGENCY
15418	$1,859,949	TSM	TIP	Construction of access management (medians) consisting of grading, signage, and pavement markings	FM 1092	FORT BEND	CITY LIMIT	HAMPTON DR	CITY OF MISSOURI CITY
13641	$10,100,000	SOV	SHORT	Reconstruct 4-lane divided roadway to 6-lane divided curb and gutter roadway with closed storm drains and cross-drainage culverts and bridge widening	FM 1092 / MURPHY RD	FORT BEND	US 90A	LEXINGTON BLVD	CITY OF MISSOURI CITY
13586	$1,076,411	SOV	TIP	Construct new 4-lane concrete boulevard from existing termini at Trinity Rd to Kirkwood (includes intersection modifications on Kirkwood)	CASH RD	FORT BEND	TRINITY RD	KIRKWOOD RD AT WRIGHT RD	CITY OF STAFFORD
977	$7,700,455	SOV	SHORT	Widen to 6-lane divided Roadway	BELLFORT ST W	FORT BEND	FM 1876	HARRIS C/L	FORT BEND COUNTY
13642	$10,100,000	SOV	SHORT	Reconstruct 4-lane divided roadway to 6-lane divided curb and gutter roadway with closed storm drains and cross-drainage culverts	FM 1092 / MURPHY RD	FORT BEND	LEXINGTON BLVD	CARTWRIGHT RD	CITY OF MISSOURI CITY
13643	$9,914,231	SOV	SHORT	Reconstruct 4-lane divided roadway to 6-lane divided curb and gutter roadway with closed storm drains and cross-drainage culverts and bridge widening	FM 1092 / MURPHY RD	FORT BEND	CARTWRIGHT RD	SH 6	CITY OF MISSOURI CITY
13657	$132,612,687	SOV	LET	Widen existing 4-lane tollway to 8-lanes	BELTWAY 8	HARRIS	US 59	SH 288	HCTRA
13585	$3,500,000	SOV	TIP	Widen 2-lane asphalt roadway to a 4-lane concrete undivided roadway with underground storm sewer	BRAND LN	FORT BEND	US 90A	AVENUE E	FORT BEND COUNTY
10056	$5,151,076	REHAB	LET	Engineering, right-of-way acquisition and reconstruction of existing divided roadway with concrete paving curbs, sidewalks, street lighting and underground utilities as needed	BELLFORT ST W	HARRIS	KIRKWOOD	WILCREST	CITY OF HOUSTON
13721	$403,015	TSM	SHORT	Addition of one NB and one SB through lane	MURPHY RD / FM 1092	FORT BEND	AT 5TH ST		CITY OF MISSOURI CITY
13724	$393,070	TSM	SHORT	Addition of one NB and one SB through lane	MURPHY ROAD / FM 1092	FORT BEND	AT EL DORADO BLVD		CITY OF MISSOURI CITY

APPENDIX D | ZONING CODES

THE CITY OF STAFFORD ZONING ORDINANCE

Section 102-1. Short title.

This chapter shall be known and may be cited as "The City of Stafford Zoning Ordinance."

Section 102-2. Authority and purpose.

This chapter is adopted for the purpose of promoting and protecting the health, safety and general welfare of the residents, citizens and inhabitants of the city. This chapter is further adopted to foster orderly and healthful development, good government, peace and order, and trade and commerce within the city.

Section 102-3. Newly annexed areas.

A. Zoning annexed areas. Within 60 days following the annexation of territory into the city, the city council shall initiate proceedings to establish permanent zoning classifications for all such newly annexed territory. Pending completion of such proceedings, such territory shall be classified as District "MU," Mixed Use. Such temporary zoning classification shall remain in effect only until such time as the city council establishes the permanent zoning classification, following procedures required by V.T.C.A., Local Government Code ch. 211 and article VIII of this chapter.

B. Permits in temporarily zoned areas. In newly annexed areas temporarily classified as District "MU," Mixed Use, no permit for the construction of a building, or certificate for the use of land, other than for a building or use allowed in said district shall be issued by the zoning administrator.

C. Unplatted property. The city's planning and zoning commission and the city council shall not approve plats for the subdivision of land within newly annexed areas until the area within the proposed subdivision shall have received a permanent zoning classification by the city council.

Section 102-4. Land use policies.

A. *Purpose*. The land use policy statements set forth in this section have been developed as part of the city's ongoing comprehensive planning process and were designed to provide guidance in developing the original zoning regulations contained in this chapter. Said policies are hereby adopted as a part of this chapter to provide guidelines for considering future amendments to these zoning regulations.

B. *Land use goals citywide*.

1. Provide for orderly growth, development and redevelopment by adopting a comprehensive zoning ordinance for the city.

2. Accommodate a mixture of new commercial and residential development that will strengthen the city's existing dynamic urban character of diverse land uses, but restrictive enough to eliminate, over time, incompatible uses that destabilize adjoining and area property values.

3. Promote a healthy balance between residential and nonresidential land uses designed to maintain and enhance property values and revenue streams by providing a zoning plan that accommodates unforeseen future markets for quality residential and/or commercial development.

4. Provide for the elimination of buildings and/or uses which are visually or functionally incompatible with adjacent or area buildings and/or uses, by implementation of zoning which, while fair in relation to existing uses at the time of its adoption, will result in greater integrity of the city's longterm development.

5. Support private and public initiatives which encourage investment in beautification programs, and stimulate such programs by providing for adequate open space through zoning.

6. Develop and maintain a zoning ordinance that is organized, fair, straight forward, and easy to interpret by citizens, property owners, developers, city officials, and other interested parties.

C. *Specific geographic areas*. Within the city limits, three distinct geographic areas exist. These geographic areas are as follows:

1. Single-family residential subdivisions traversed by quiet, local streets, and which are relatively well-insulated from commercial encroachment;

2. The central mixed use area, which includes the area surrounded by the north and south lanes of U.S. Highway 90A known as the "Island," and other strip development, most of which is located along the major transportation corridors of U.S. Highway 90A, FM 1092, and Dulles Avenue; and

3. The relatively large tracts of land lying north of U.S. Highway 90A, traversed by Highway 59 and FM 1092, with good access to regional markets.

C. *Objectives*. Objectives sought to be implemented through adoption of zoning regulations applicable to the specific geographic areas of the city are as follows:

1. Single-family residential areas. Zoning regulations applicable to single-family residential areas are intended to protect the integrity, safety, and aesthetic characteristics of existing and future neighborhoods throughout the city, and shall be implemented by:

a. Providing a purely residential zoning district that limits uses to single-family residential purposes, having maximum densities compatible with densities currently found in the city's existing single-family residential subdivisions; and

b. Imposing performance standards and requiring substantial buffer yards, screening, and landscaping for uses adjacent to and surrounding the residential district.

2. *Mixed use areas.*

a. There exists within the city certain areas which, due to their unique character and diversity of land uses, require an approach to zoning that permits mixed use development in a compact, urban form. This type of development typically integrates a variety of complimentary uses, including, but not limited to, residential, office, manufacturing, retail, public, and entertainment.

b. The primary areas of the city where this type of development would be appropriate include the "Island," as well as lands which abut or are in close proximity to the south side or US Highway 90A. These locations enjoy good access to and visibility from major thoroughfares, but are in need of revitalization and economic development.

c. Other areas of the city where this type of development would be appropriate include those which lie along the perimeter of residential neighborhoods. These locations may be better suited for transitional types of uses and/or neighborhood service uses.

d. Although the above-described areas may have significant differences in character and, thus, varied land use opportunities and development possibilities, the goal of mixed use zoning would serve each of the situations well. The following regulations applicable to the mixed use areas, and the special provisions applicable to the "Island" area only, are intended to:

1. Encourage economic development through the redevelopment and revitalization of the "Island" to preserve, protect, and reinforce its historical significance and its role in distinguishing the city's identity from surrounding communities;

2. Provide a review procedure for "Island" developments which, while ensuring compliance with the general purpose and intent of this chapter, will allow some deviation from the general standards otherwise applicable to District MU, will promote and permit innovation and flexibility in land use and site design, and support relatively small scale and economically viable mixed use development; and

3. Provide performance standards that place emphasis on buffer yards, screening, and landscaping that are specifically designed to stabilize and enhance commercial and residential property values within such a mixed use district by limiting or prohibiting the continuation of incompatible land uses that negatively impact adjoining properties and detract from the visual image of the city.

3. *Multiple use areas.* Zoning regulations applicable to the multiple use areas are intended to attract new retail/office/hotel/mixed commercial uses and light/"high tech" industrial uses which are dependent upon convenient access to highways, major arterials, and/or rail service, and which serve regional, national, and international markets, by:

a. Perpetuating the city's leadership role in the economic development in Fort Bend County and the region by providing an open and flexible multiple use zoning district designed to maintain existing, and attract new, quality, well-planned high tech industries and other developments that benefit from good access to regional markets; and

b. Providing the flexibility of "cumulative" zoning to accommodate, encourage, and protect new single-family residential development on currently undeveloped tracts north of U.S. Highway 90A by applying performance standards and requiring buffer yards, screening, and landscaping to protect single-family residential uses from adverse impacts of surrounding nonsingle-family residential uses.

4. *Multifamily residential dwelling areas.* Zoning regulations applicable to the multifamily residential dwelling areas are intended to:

a. Protect existing multifamily residential developments by requiring buffer yards between multifamily and new nonresidential development;

b. Ensure that a reasonable balance is maintained between multifamily residential development and other housing options; and

c. Ensure that multifamily residential development does not occupy a disproportionate amount of land within the city, with due regard and consideration being given to the amount of land devoted to single-family residential development.

CHARACTERISTIC	STAFFORD PRIMARY CORRIDOR ZONING (PC)	MISSOURI CITY WITH CORRIDOR OVERLAY	OBSERVATIONS
GENERAL INTENT	The purpose of this district is to enhance the aesthetic character along this primary corridor as a means to preserve and enhance property values, business opportunities, and community identity.	The most permissive of the retail districts with a city-wide or regional service area.	
REPRESENTATIVE PERMITTED USES	Office, mixed use, restaurant, retail, tavern, indoor recreation, government facilities, light industrial By Specific Use Permit: Overnight accommodations, big box retail, light vehicle service, institutional, townhomes (in limited areas)	Retail, neighborhood commercial, offices, banks, car wash, grocery store, liquor sales, restaurant, vet clinic (indoor), lounges, hotel, automobile accessory sales and service, gas station	Stafford is generally more restrictive by requiring specific use permit for more uses, but the PC zoning allows light industrial uses, whereas LC-3 is more retail/service oriented.
BUILDING DESIGN STANDARDS	80% of exterior front walls (70% side and rear) must be glass, brick veneer, face brick, clay brick, stucco/Dry-Vit, cement (tinted), textured concrete block (split-face, fluted, etc.), concrete tilt walls or pre-cast concrete panels (with relief), stone, rock, exposed aggregate panels, or other comparable masonry or other materials of equal characteristics in acceptable colors. Architectural composition and articulation: Architectural composition is the art of designing parts of a building to seamlessly fit together into a larger whole. Symmetry is when wings of a building are matched in size and character about a central point (often the primary entrance). Commercial buildings that face arterial streets and other public areas shall be articulated to reduce the apparent mass of the structure. They shall also be articulated to be sensitive to the pedestrian realm at the ground level. Building entry identity: The primary building entry shall be easily identifiable for building visitors arriving by car or on foot. The architecture of the building shall reinforce the visual importance of the entry. The entry shall be pedestrian-scale, transparent, and inviting. Architectural detailing: Use of interesting architectural detailing that supports the quality and character expressed by these building design guidelines is required. Acceptable color palette available at the city.	The front building lines shall be interrupted at least every 300 feet in one or more of the following manners: a. A minimum ten-foot building offset; b. A canopy facade; c. Landscaping Exterior geometric forms should general of a traditional suburban nature. 100% of exterior walls must be masonry. 33% of exterior walls visible from a roadway or driveway must be architectural masonry unit or stone consisting of approved colors. Roofs must have minimum 4:1 pitch and visible roofing must be standing seam metal, slate, or concrete tile of approved colors. Awnings and bollards have prescribed dimensions, scale, and color Acceptable color palette available at the city. Corporate logo colors are allowed with limitations.	Stafford appears to have more descriptive/intent requirements, while Missouri city appears to have more precise requirements. Actual ease of implementation will depend on staff interpretation and administration.
PARKING	Sample parking ratios with significant difference from Missouri City: General Office: 4:1,000 sf Restaurant: 22:1,000 sf Parking ratio for other uses generally consistent between the two cities Shared parking allowed based on a study. 98-27 Parking lot and shrub requirements depend on size of parking lot.	General Office: 2.8:1,000 sf Restaurant: 8-15:1,000 sf (depending on use) Shared parking allowed based on criteria and formulas Significant parking lot screening and internal landscaping required	

CHARACTERISTIC	STAFFORD PRIMARY CORRIDOR ZONING (PC)	MISSOURI CITY WITH CORRIDOR OVERLAY	OBSERVATIONS
SIGNS	70-8 (m) Spectacular Signs Changeable message signs appear to be prohibited; this is a limiting provision. See 70-44 below. 70-9 On-Premise Signs Up to three signs per property. Wall signs limited to no more than 50% of the wall area 70-11 Pennants and streamers prohibited. 70-43 Height Limitation Ground signs are limited to 42-1/2 feet high, except in an integrated business development, height may be 45 feet. 70-44 Size Limitation On-premise ground signs can not exceed 15′ x 30′ or maximum of 300 square feet. 70-44 (a) (5) Spectacular signs in Integrated business developments Spectacular signs, which appear to include changeable message signs, appear to be allowed within integrated business developments. Spectacular sign limited to 30% of the display surface and message may not change more frequently than once every two minutes.	Wall Signs: Maximum 2 square feet per linear foot of building frontage; all lettering must be white, except for corporate logos Monument Signs: Allowable height and size depends on speed limit on the roadway. For FM 1092 with speed limit of 50 mph, a "medium profile" monument sign is allowed consisting of maximum height of 15′ and maximum area of 160 sf; of which up to 24 sf may be a changeable message sign. Sign area may be distributed on no more than three monument signs per street frontage. Sign base and encasement must be constructed of masonry materials matching the primary building materials. Sign landscaping is required in addition to general landscaping requirements. Additional restrictions for banners, window signs, canopy/awning signs, temporary signs, and prohibited signs. "A-frame" signs allowed without permit during normal business hours; size limitations apply. Off-premise signs prohibited.	Stafford code generally more permissive. Missouri City recently overhauled sign code, so existing signs may not match requirements of this code.
LANDSCAPING	98-26 Street trees required at 1 tree per 30′ of frontage. Tree requirement can be met by a combination of planting minimum size trees, oversized trees, preserving trees, or paying an in lieu of fee.	Greater of 20% of site area not covered by buildings or 6% of gross site area must be landscaped.	
TRANSITIONAL BUFFERS (between residential and non-residential uses)	98-28 six-foot minimum fence (wood or masonry), or opaque evergreen hedge	Minimum 20-foot buffer yard with either: a. eight-foot masonry fence and 1 tree per 30 feet. b. eight-foot wood fence with opaque evergreen hedge with minimum 20-foot height at maturity.	

APPENDIX E | EXISTING AND FUTURE INTERSECTION ANALYSIS

	AM Peak Hour						PM Peak Hour					
	Existing			Proposed			Existing			Proposed		
	LOS	Delay Seconds per Vehicle	Volume/ Capacity	LOS	Delay Seconds per Vehicle	Volume/ Capacity	LOS	Delay Seconds per Vehicle	Volume/ Capacity	LOS	Delay Seconds per Vehicle	Volume/ Capacity
US 59 Frontage Rd (Southbound)[1]	C	26.9	0.48	C	26.9	0.45	D	39.8	0.94	D	36.1	0.82
East US 59 Frontage Rd (Northbound)[1]	C	20.0	0.53	C	25.4	0.55	D	36.9	0.63	C	31.0	0.63
Roark Rd[1]	A	5.2	0.52	A	8.3	0.44	B	18.3	0.70	B	16.2	0.60
West Airport Blvd[2]	C	31.6	0.82	C	25.3	0.67	D	51.1	0.95	C	31.4	0.77
Greenbriar Dr / Mula Rd[2]	B	18.7	0.67	B	16.4	0.69	C	24.1	0.73	C	23.8	0.74
Cash Rd[2]	C	24.9	0.69	C	21.5	0.71	C	22.8	0.57	B	18.0	0.57
Westbound US 90 & Northbound FM 1092[1]	C	26.4	0.49	C	25.4	0.49	B	18.7	0.48	C	23.8	0.49
Eastbound US 90 & Northbound FM 1092[1]	B	14.6	0.60	B	15.1	0.61	B	11.4	0.44	B	11.4	0.45
Westbound US 90 & Southbound FM 1092[1]	A	7.5	0.49	A	8.9	0.49	B	14.0	0.63	B	15.4	0.63
Eastbound US 90 & Southbound FM 1092[1]	C	21.2	0.46	C	23.6	0.47	B	19.6	0.40	C	25.1	0.40
Avenue E[2]	E	58.8	1.01	C	28.2	0.79	E	62.6	1.04	C	30.3	0.83
Dove County Dr[2]	A	5.3	0.75	A	5.0	0.57	A	5.1	0.74	A	5.0	0.55

[1] Turning movement counts collected in January 2013

[2] Turning movement counts collected in April 2013

FM 1092 @ US 59 SOUTHBOUND FRONTAGE ROAD | **EXISTING - AM**

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	589	235	111	713	0	0	0	0	475	432	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0	4.0	
Lane Util. Factor		0.86		0.86	0.86					0.91	0.91	
Frt		0.96		1.00	1.00					1.00	0.99	
Flt Protected		1.00		0.95	1.00					0.95	0.99	
Satd. Flow (prot)		6134		1522	4802					1610	3315	
Flt Permitted		1.00		0.95	0.94					0.95	0.99	
Satd. Flow (perm)		6134		1522	4504					1610	3315	
Peak-hour factor, PHF	0.92	0.88	0.88	0.88	0.88	0.92	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	0	669	267	126	810	0	0	0	0	540	491	45
RTOR Reduction (vph)	0	56	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	880	0	113	823	0	0	0	0	351	722	0
Turn Type		NA		Prot	NA					Perm	NA	
Protected Phases		3		2	2 3						4	
Permitted Phases										4		
Actuated Green, G (s)		36.3		26.8	63.1					54.9	54.9	
Effective Green, g (s)		36.3		26.8	63.1					54.9	54.9	
Actuated g/C Ratio		0.28		0.21	0.49					0.42	0.42	
Clearance Time (s)		4.0		4.0						4.0	4.0	
Vehicle Extension (s)		3.0		3.0						3.0	3.0	
Lane Grp Cap (vph)		1712		313	2247					679	1399	
v/s Ratio Prot		c0.14		0.07	c0.08							
v/s Ratio Perm					0.10					c0.22	0.22	
v/c Ratio		0.51		0.36	0.37					0.52	0.52	
Uniform Delay, d1		39.4		44.3	20.9					27.8	27.7	
Progression Factor		1.00		0.72	0.45					1.00	1.00	
Incremental Delay, d2		0.3		2.9	0.1					0.7	0.3	
Delay (s)		39.7		34.7	9.5					28.4	28.1	
Level of Service		D		C	A					C	C	
Approach Delay (s)		39.7			12.5		0.0				28.2	
Approach LOS		D			B		A				C	

Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ US 59 SOUTHBOUND FRONTAGE ROAD | **PROPOSED CONCEPT - AM**

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	589	235	111	713	0	0	0	0	475	432	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Util. Factor		0.86		0.86	0.86					0.86	0.86	
Frt		0.96		1.00	1.00					1.00	0.99	
Flt Protected		1.00		0.95	1.00					0.95	0.98	
Satd. Flow (prot)		6134		1522	4802					1522	4687	
Flt Permitted		1.00		0.95	0.94					0.95	0.98	
Satd. Flow (perm)		6134		1522	4506					1522	4687	
Peak-hour factor, PHF	0.92	0.88	0.88	0.88	0.88	0.92	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	0	669	267	126	810	0	0	0	0	540	491	45
RTOR Reduction (vph)	0	56	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	880	0	113	823	0	0	0	0	270	801	0
Turn Type		NA		Prot	NA					Perm	NA	
Protected Phases		3		2	2 3						4	
Permitted Phases										4		
Actuated Green, G (s)		35.4		28.6	64.0					51.0	51.0	
Effective Green, g (s)		35.4		28.6	64.0					51.0	51.0	
Actuated g/C Ratio		0.27		0.22	0.49					0.39	0.39	
Clearance Time (s)		5.0		5.0						5.0	5.0	
Vehicle Extension (s)		3.0		3.0						3.0	3.0	
Lane Grp Cap (vph)		1670		334	2283					597	1838	
v/s Ratio Prot		c0.14		0.07	c0.08							
v/s Ratio Perm					0.10					c0.18	0.17	
v/c Ratio		0.53		0.34	0.36					0.45	0.44	
Uniform Delay, d1		40.2		42.7	20.4					29.2	29.0	
Progression Factor		1.00		0.72	0.37					1.00	1.00	
Incremental Delay, d2		0.3		2.6	0.1					0.5	0.2	
Delay (s)		40.5		33.5	7.6					29.7	29.1	
Level of Service		D		C	A					C	C	
Approach Delay (s)		40.5			10.7		0.0				29.3	
Approach LOS		D			B		A				C	

Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ US 59 SOUTHBOUND FRONTAGE ROAD | **EXISTING - PM**

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	660	334	342	946	0	0	0	0	701	1348	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0	4.0	
Lane Util. Factor		0.86		0.86	0.86					0.91	0.91	
Frt		0.95		1.00	1.00					1.00	0.99	
Flt Protected		1.00		0.95	1.00					0.95	1.00	
Satd. Flow (prot)		6085		1522	4798					1610	3337	
Flt Permitted		1.00		0.95	0.89					0.95	1.00	
Satd. Flow (perm)		6085		1522	4272					1610	3337	
Peak-hour factor, PHF	0.92	0.97	0.97	0.97	0.97	0.92	0.92	0.92	0.92	0.97	0.97	0.97
Adj. Flow (vph)	0	680	344	353	975	0	0	0	0	723	1390	143
RTOR Reduction (vph)	0	46	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	978	0	318	1010	0	0	0	0	651	1600	0
Turn Type		NA		Prot	NA					Perm	NA	
Protected Phases		3		2	2 3						4	
Permitted Phases										4		
Actuated Green, G (s)		27.0		28.0	55.0					63.0	63.0	
Effective Green, g (s)		27.0		28.0	55.0					63.0	63.0	
Actuated g/C Ratio		0.21		0.22	0.42					0.48	0.48	
Clearance Time (s)		4.0		4.0						4.0	4.0	
Vehicle Extension (s)		3.0		3.0						3.0	3.0	
Lane Grp Cap (vph)		1263		327	1920					780	1617	
v/s Ratio Prot		c0.16		c0.21	0.11							
v/s Ratio Perm					0.11					0.40	0.48	
v/c Ratio		0.91dr		0.97	0.53					0.83	0.99	
Uniform Delay, d1		48.6		50.6	27.8					29.0	33.2	
Progression Factor		1.00		0.46	0.25					1.00	1.00	
Incremental Delay, d2		3.0		22.3	0.1					7.7	19.6	
Delay (s)		51.7		45.6	7.1					36.7	52.8	
Level of Service		D		D	A					D	D	
Approach Delay (s)		51.7			16.3		0.0				48.2	
Approach LOS		D			B		A				D	

Intersection Summary			
HCM 2000 Control Delay	39.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.1%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

FM 1092 @ US 59 SOUTHBOUND FRONTAGE ROAD | **PROPOSED CONCEPT - PM**

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	660	334	342	946	0	0	0	0	701	1348	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Util. Factor		0.86		0.86	0.86					0.86	0.86	
Frt		0.95		1.00	1.00					1.00	0.99	
Flt Protected		1.00		0.95	1.00					0.95	0.99	
Satd. Flow (prot)		6085		1522	4798					1522	4721	
Flt Permitted		1.00		0.95	0.90					0.95	0.99	
Satd. Flow (perm)		6085		1522	4328					1522	4721	
Peak-hour factor, PHF	0.92	0.97	0.97	0.97	0.97	0.92	0.92	0.92	0.92	0.97	0.97	0.97
Adj. Flow (vph)	0	680	344	353	975	0	0	0	0	723	1390	143
RTOR Reduction (vph)	0	68	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	956	0	318	1010	0	0	0	0	549	1699	0
Turn Type		NA		Prot	NA					Perm	NA	
Protected Phases		3		2	2 3						4	
Permitted Phases										4		
Actuated Green, G (s)		29.0		34.0	63.0					52.0	52.0	
Effective Green, g (s)		29.0		34.0	63.0					52.0	52.0	
Actuated g/C Ratio		0.22		0.26	0.48					0.40	0.40	
Clearance Time (s)		5.0		5.0						5.0	5.0	
Vehicle Extension (s)		3.0		3.0						3.0	3.0	
Lane Grp Cap (vph)		1357		398	2220					608	1888	
v/s Ratio Prot		c0.16		c0.21	0.12							
v/s Ratio Perm					0.10					c0.36	0.36	
v/c Ratio		0.70		0.80	0.45					0.90	0.90	
Uniform Delay, d1		46.6		44.8	22.1					36.6	36.6	
Progression Factor		1.00		0.62	0.18					1.00	1.00	
Incremental Delay, d2		1.7		4.3	0.1					16.7	6.3	
Delay (s)		48.2		32.0	4.1					53.4	42.9	
Level of Service		D		C	A					D	D	
Approach Delay (s)		48.2			10.8		0.0				45.4	
Approach LOS		D			B		A				D	

Intersection Summary			
HCM 2000 Control Delay	36.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

FM 1092 @ EAST US 59 NORTHBOUND FRONTAGE ROAD | **EXISTING - AM**

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	101	961	0	0	530	453	272	1123	44	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0				
Lane Util. Factor	1.00	0.91			0.86		0.86	0.86				
Frt	1.00	1.00			0.93		1.00	0.99				
Flt Protected	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (prot)	1770	5085			5965		1522	4774				
Flt Permitted	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (perm)	1770	5085			5965		1522	4774				
Peak-hour factor, PHF	0.97	0.97	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.92	0.92	0.92
Adj. Flow (vph)	104	991	0	0	546	467	280	1158	45	0	0	0
RTOR Reduction (vph)	0	0	0	0	120	0	0	3	0	0	0	0
Lane Group Flow (vph)	104	991	0	0	893	0	252	1228	0	0	0	0
Turn Type	Prot	NA			NA		Perm	NA				
Protected Phases	8	5 8			5			6				
Permitted Phases							6					
Actuated Green, G (s)	21.9	62.2			36.3		59.8	59.8				
Effective Green, g (s)	21.9	62.2			36.3		59.8	59.8				
Actuated g/C Ratio	0.17	0.48			0.28		0.46	0.46				
Clearance Time (s)	4.0				4.0		4.0	4.0				
Vehicle Extension (s)	3.0				3.0		3.0	3.0				
Lane Grp Cap (vph)	298	2432			1665		700	2196				
v/s Ratio Prot	0.06	c0.19			c0.15							
v/s Ratio Perm							0.17	0.26				
v/c Ratio	0.35	0.41			0.54		0.36	0.56				
Uniform Delay, d1	47.8	22.0			39.7		22.7	25.5				
Progression Factor	1.18	0.45			0.42		1.00	1.00				
Incremental Delay, d2	0.6	0.1			0.3		1.4	1.0				
Delay (s)	57.0	9.9			17.1		24.2	26.6				
Level of Service	E	A			B		C	C				
Approach Delay (s)		14.4			17.1			26.1			0.0	
Approach LOS		B			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ EAST US 59 NORTHBOUND FRONTAGE ROAD | **PROPOSED CONCEPT - AM**

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	101	961	0	0	530	453	272	1123	44	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0		5.0	5.0				
Lane Util. Factor	1.00	0.91			0.86		0.86	0.86				
Frt	1.00	1.00			0.93		1.00	0.99				
Flt Protected	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (prot)	1770	5085			5965		1522	4774				
Flt Permitted	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (perm)	1770	5085			5965		1522	4774				
Peak-hour factor, PHF	0.97	0.97	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.92	0.92	0.92
Adj. Flow (vph)	104	991	0	0	546	467	280	1158	45	0	0	0
RTOR Reduction (vph)	0	0	0	0	115	0	0	3	0	0	0	0
Lane Group Flow (vph)	104	991	0	0	898	0	252	1228	0	0	0	0
Turn Type	Prot	NA			NA		Perm	NA				
Protected Phases	8	5 8			5			6				
Permitted Phases							6					
Actuated Green, G (s)	21.0	61.4			35.4		58.6	58.6				
Effective Green, g (s)	21.0	61.4			35.4		58.6	58.6				
Actuated g/C Ratio	0.16	0.47			0.27		0.45	0.45				
Clearance Time (s)	5.0				5.0		5.0	5.0				
Vehicle Extension (s)	3.0				3.0		3.0	3.0				
Lane Grp Cap (vph)	285	2401			1624		686	2151				
v/s Ratio Prot	0.06	c0.19			c0.15							
v/s Ratio Perm							0.17	0.26				
v/c Ratio	0.36	0.41			0.55		0.37	0.57				
Uniform Delay, d1	48.6	22.5			40.5		23.5	26.4				
Progression Factor	1.74	0.46			0.77		1.00	1.00				
Incremental Delay, d2	0.7	0.1			0.4		1.5	1.1				
Delay (s)	85.1	10.3			31.5		25.0	27.5				
Level of Service	F	B			C		C	C				
Approach Delay (s)		17.4			31.5			27.1			0.0	
Approach LOS		B			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ EAST US 59 NORTHBOUND FRONTAGE ROAD | **EXISTING - PM**

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	97	1251	0	0	930	385	342	585	97	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0				
Lane Util. Factor	1.00	0.91			0.86		0.86	0.86				
Frt	1.00	1.00			0.96		1.00	0.98				
Flt Protected	0.95	1.00			1.00		0.95	0.99				
Satd. Flow (prot)	1770	5085			6126		1522	4688				
Flt Permitted	0.95	1.00			1.00		0.95	0.99				
Satd. Flow (perm)	1770	5085			6126		1522	4688				
Peak-hour factor, PHF	0.93	0.93	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	104	1345	0	0	1000	414	368	629	104	0	0	0
RTOR Reduction (vph)	0	0	0	0	57	0	0	13	0	0	0	0
Lane Group Flow (vph)	104	1345	0	0	1357	0	272	816	0	0	0	0
Turn Type	Prot	NA			NA		Perm	NA				
Protected Phases	8	5 8			5			6				
Permitted Phases							6					
Actuated Green, G (s)	55.0	86.0			27.0		36.0	36.0				
Effective Green, g (s)	55.0	86.0			27.0		36.0	36.0				
Actuated g/C Ratio	0.42	0.66			0.21		0.28	0.28				
Clearance Time (s)	4.0				4.0		4.0	4.0				
Vehicle Extension (s)	3.0				3.0		3.0	3.0				
Lane Grp Cap (vph)	748	3363			1272		421	1298				
v/s Ratio Prot	0.06	c0.26			c0.22							
v/s Ratio Perm							c0.18	0.17				
v/c Ratio	0.14	0.40			1.07		0.65	0.63				
Uniform Delay, d1	23.0	10.1			51.5		41.4	41.1				
Progression Factor	1.24	0.26			0.41		1.00	1.00				
Incremental Delay, d2	0.1	0.0			42.7		7.5	2.3				
Delay (s)	28.5	2.7			63.9		48.8	43.5				
Level of Service	C	A			E		D	D				
Approach Delay (s)		4.5			63.9			44.8			0.0	
Approach LOS		A			E			D			A	

Intersection Summary			
HCM 2000 Control Delay	36.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ EAST US 59 NORTHBOUND FRONTAGE ROAD | **PROPOSED CONCEPT - PM**

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	97	1251	0	0	930	385	342	585	97	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0		5.0	5.0				
Lane Util. Factor	1.00	0.91			0.86		0.86	0.86				
Frt	1.00	1.00			0.96		1.00	0.98				
Flt Protected	0.95	1.00			1.00		0.95	0.99				
Satd. Flow (prot)	1770	5085			6126		1522	4688				
Flt Permitted	0.95	1.00			1.00		0.95	0.99				
Satd. Flow (perm)	1770	5085			6126		1522	4688				
Peak-hour factor, PHF	0.93	0.93	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	104	1345	0	0	1000	414	368	629	104	0	0	0
RTOR Reduction (vph)	0	0	0	0	57	0	0	13	0	0	0	0
Lane Group Flow (vph)	104	1345	0	0	1357	0	272	816	0	0	0	0
Turn Type	Prot	NA			NA		Perm	NA				
Protected Phases	8	5 8			5			6				
Permitted Phases							6					
Actuated Green, G (s)	48.0	82.0			29.0		38.0	38.0				
Effective Green, g (s)	48.0	82.0			29.0		38.0	38.0				
Actuated g/C Ratio	0.37	0.63			0.22		0.29	0.29				
Clearance Time (s)	5.0				5.0		5.0	5.0				
Vehicle Extension (s)	3.0				3.0		3.0	3.0				
Lane Grp Cap (vph)	653	3207			1366		444	1370				
v/s Ratio Prot	0.06	c0.26			c0.22							
v/s Ratio Perm							c0.18	0.17				
v/c Ratio	0.16	0.42			0.99		0.61	0.60				
Uniform Delay, d1	27.5	12.0			50.4		39.7	39.4				
Progression Factor	1.98	0.16			0.53		1.00	1.00				
Incremental Delay, d2	0.1	0.1			21.3		6.2	1.9				
Delay (s)	54.5	2.0			47.8		45.8	41.3				
Level of Service	D	A			D		D	D				
Approach Delay (s)		5.8			47.8			42.4			0.0	
Approach LOS		A			D			D			A	

Intersection Summary			
HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ ROARK ROAD | **EXISTING - AM**

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	1083	557	53	1062	84	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frt	0.95		1.00	1.00	0.97	
Flt Protected	1.00		0.95	1.00	0.96	
Satd. Flow (prot)	4826		1770	5085	1738	
Flt Permitted	1.00		0.95	1.00	0.96	
Satd. Flow (perm)	4826		1770	5085	1738	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	1231	633	60	1207	95	28
RTOR Reduction (vph)	52	0	0	0	9	0
Lane Group Flow (vph)	1812	0	60	1207	114	0
Turn Type	NA		Prot	NA	NA	
Protected Phases	2		1	6	8	
Permitted Phases						
Actuated Green, G (s)	95.6		8.6	108.2	13.8	
Effective Green, g (s)	95.6		8.6	108.2	13.8	
Actuated g/C Ratio	0.74		0.07	0.83	0.11	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3548		117	4232	184	
v/s Ratio Prot	c0.38		c0.03	0.24	c0.07	
v/s Ratio Perm						
v/c Ratio	0.51		0.51	0.29	0.62	
Uniform Delay, d1	7.3		58.7	2.4	55.6	
Progression Factor	0.15		0.60	1.32	1.00	
Incremental Delay, d2	0.4		3.6	0.2	6.1	
Delay (s)	1.5		38.7	3.3	61.7	
Level of Service	A		D	A	E	
Approach Delay (s)	1.5			5.0	61.7	
Approach LOS	A			A	E	

Intersection Summary			
HCM 2000 Control Delay	5.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ ROARK ROAD | **PROPOSED CONCEPT - AM**

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	1083	557	53	1062	84	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.91	1.00	1.00	0.91	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	4916	1531	1711	4916	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	4916	1531	1711	4916	1770	1583
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	1231	633	60	1207	95	28
RTOR Reduction (vph)	0	175	0	0	0	25
Lane Group Flow (vph)	1231	458	60	1207	95	3
Turn Type	NA	Perm	Prot	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	94.0	94.0	8.7	107.7	12.3	12.3
Effective Green, g (s)	94.0	94.0	8.7	107.7	12.3	12.3
Actuated g/C Ratio	0.72	0.72	0.07	0.83	0.09	0.09
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	3554	1107	114	4072	167	149
v/s Ratio Prot	0.25		c0.04	0.25	c0.05	
v/s Ratio Perm		c0.30				0.00
v/c Ratio	0.35	0.41	0.53	0.30	0.57	0.02
Uniform Delay, d1	6.7	7.1	58.7	2.5	56.3	53.4
Progression Factor	0.25	2.30	0.66	1.23	1.00	1.00
Incremental Delay, d2	0.2	1.0	4.1	0.2	4.4	0.0
Delay (s)	1.9	17.3	43.1	3.3	60.7	53.4
Level of Service	A	B	D	A	E	D
Approach Delay (s)	7.1			5.2	59.0	
Approach LOS	A			A	E	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ ROARK ROAD | **EXISTING - PM**

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	1224	226	27	1397	338	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frt	0.98		1.00	1.00	0.96	
Flt Protected	1.00		0.95	1.00	0.97	
Satd. Flow (prot)	4966		1770	5085	1730	
Flt Permitted	1.00		0.95	1.00	0.97	
Satd. Flow (perm)	4966		1770	5085	1730	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1360	251	30	1552	376	147
RTOR Reduction (vph)	17	0	0	0	13	0
Lane Group Flow (vph)	1594	0	30	1552	510	0
Turn Type	NA		Prot	NA	NA	
Protected Phases	2		1	6	8	
Permitted Phases						
Actuated Green, G (s)	69.1		4.5	77.6	44.4	
Effective Green, g (s)	69.1		4.5	77.6	44.4	
Actuated g/C Ratio	0.53		0.03	0.60	0.34	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	2639		61	3035	590	
v/s Ratio Prot	c0.32		0.02	c0.31	c0.30	
v/s Ratio Perm						
v/c Ratio	0.60		0.49	0.51	0.87	
Uniform Delay, d1	21.0		61.6	15.2	40.0	
Progression Factor	0.31		0.81	1.13	1.00	
Incremental Delay, d2	0.6		5.8	0.6	12.6	
Delay (s)	7.1		55.4	17.7	52.6	
Level of Service	A		E	B	D	
Approach Delay (s)	7.1			18.4	52.6	
Approach LOS	A			B	D	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ ROARK ROAD | **PROPOSED CONCEPT - PM**

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	1224	226	27	1397	338	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.91	1.00	1.00	0.91	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	4916	1531	1711	4916	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	4916	1531	1711	4916	1770	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1360	251	30	1552	376	147
RTOR Reduction (vph)	0	98	0	0	0	12
Lane Group Flow (vph)	1360	153	30	1552	376	135
Turn Type	NA	Perm	Prot	NA	NA	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2				8
Actuated Green, G (s)	73.7	73.7	7.8	86.5	33.5	41.3
Effective Green, g (s)	73.7	73.7	7.8	86.5	33.5	41.3
Actuated g/C Ratio	0.57	0.57	0.06	0.67	0.26	0.32
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2786	867	102	3271	456	563
v/s Ratio Prot	0.28		0.02	c0.32	c0.21	0.01
v/s Ratio Perm		0.10				0.07
v/c Ratio	0.49	0.18	0.29	0.47	0.82	0.24
Uniform Delay, d1	16.9	13.5	58.5	10.6	45.5	32.8
Progression Factor	0.30	0.08	0.75	1.46	1.00	1.00
Incremental Delay, d2	0.5	0.3	1.5	0.5	11.5	0.2
Delay (s)	5.6	1.4	45.5	16.0	57.0	33.0
Level of Service	A	A	D	B	E	C
Approach Delay (s)	4.9			16.5	50.3	
Approach LOS	A			B	D	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ WEST AIRPORT BOULEVARD | **EXISTING - AM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	239	355	110	198	117	358	1413	89	86	884	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		0.95		1.00	0.95		1.00	0.91		1.00	0.91	
Frt		0.91		1.00	0.94		1.00	0.99		1.00	1.00	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3228		1770	3342		1770	5040		1770	5062	
Flt Permitted		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3228		1770	3342		1770	5040		1770	5062	
Peak-hour factor, PHF	0.79	0.79	0.79	0.89	0.89	0.89	0.97	0.97	0.97	0.74	0.74	0.74
Adj. Flow (vph)	27	303	449	124	222	131	369	1457	92	116	1195	38
RTOR Reduction (vph)	0	191	0	0	67	0	0	5	0	0	3	0
Lane Group Flow (vph)	0	588	0	124	286	0	369	1544	0	116	1230	0
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		24.6		12.5	12.5		28.7	54.3		13.8	39.8	
Effective Green, g (s)		26.8		14.7	14.7		30.9	56.5		16.0	41.6	
Actuated g/C Ratio		0.21		0.11	0.11		0.24	0.43		0.12	0.32	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	5.8	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		665		200	377		420	2190		217	1619	
v/s Ratio Prot		c0.18		0.07	c0.09		c0.21	0.31		0.07	c0.24	
v/s Ratio Perm												
v/c Ratio		0.88		0.62	0.76		0.88	0.70		0.53	0.76	
Uniform Delay, d1		50.1		55.0	55.9		47.7	30.0		53.5	39.7	
Progression Factor		1.00		1.00	1.00		0.60	0.33		0.58	0.46	
Incremental Delay, d2		13.0		4.0	7.6		14.3	1.5		1.2	3.3	
Delay (s)		63.1		59.0	63.6		43.2	11.4		32.3	21.5	
Level of Service		E		E	E		D	B		C	C	
Approach Delay (s)		63.1			62.4			17.5			22.4	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	31.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ WEST AIRPORT BOULEVARD| **PROPOSED CONCEPT - AM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	239	355	110	198	117	358	1413	89	86	884	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	12	11	11	12
Total Lost time (s)	2.8	4.0	5.0	2.8	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3342		1711	4872		1711	4893	
Flt Permitted	0.25	1.00	1.00	0.43	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	472	3539	1583	797	3342		1711	4872		1711	4893	
Peak-hour factor, PHF	0.79	0.79	0.79	0.89	0.89	0.89	0.97	0.97	0.97	0.74	0.74	0.74
Adj. Flow (vph)	27	303	449	124	222	131	369	1457	92	116	1195	38
RTOR Reduction (vph)	0	0	419	0	71	0	0	4	0	0	2	0
Lane Group Flow (vph)	27	303	30	124	282	0	369	1545	0	116	1231	0
Turn Type	pm+pt	NA	custom	pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		3	4								
Actuated Green, G (s)	27.1	18.4	8.7	22.9	16.3		32.1	68.6		12.8	49.7	
Effective Green, g (s)	31.5	20.6	8.7	27.3	18.5		34.3	70.8		15.0	51.5	
Actuated g/C Ratio	0.24	0.16	0.07	0.21	0.14		0.26	0.54		0.12	0.40	
Clearance Time (s)	5.0	6.2	5.0	5.0	6.2		6.2	6.2		6.2	5.8	
Vehicle Extension (s)	2.0	2.0	2.0	3.0	2.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	223	560	105	233	475		451	2653		197	1938	
v/s Ratio Prot	c0.01	c0.09		c0.04	0.08		c0.22	0.32		0.07	c0.25	
v/s Ratio Perm	0.02		0.02	0.08								
v/c Ratio	0.12	0.54	0.29	0.53	0.59		0.82	0.58		0.59	0.63	
Uniform Delay, d1	38.4	50.3	57.7	43.7	52.2		44.9	19.7		54.6	31.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.50	0.46		0.58	0.37	
Incremental Delay, d2	0.1	0.6	0.5	2.3	1.3		8.4	0.7		2.8	1.6	
Delay (s)	38.5	50.9	58.2	46.0	53.6		31.0	9.9		34.6	13.4	
Level of Service	D	D	E	D	D		C	A		C	B	
Approach Delay (s)		54.7			51.6			13.9			15.2	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	25.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ WEST AIRPORT BOULEVARD | **EXISTING - PM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	386	347	148	353	133	220	1190	97	161	1377	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		0.95		1.00	0.95		1.00	0.91		1.00	0.91	
Frt		0.93		1.00	0.96		1.00	0.99		1.00	0.99	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3294		1770	3394		1770	5028		1770	5035	
Flt Permitted		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3294		1770	3394		1770	5028		1770	5035	
Peak-hour factor, PHF	0.92	0.92	0.92	0.87	0.87	0.87	0.88	0.88	0.88	0.94	0.94	0.94
Adj. Flow (vph)	54	420	377	170	406	153	250	1352	110	171	1465	104
RTOR Reduction (vph)	0	111	0	0	30	0	0	7	0	0	6	0
Lane Group Flow (vph)	0	740	0	170	529	0	250	1455	0	171	1563	0
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		26.8		18.8	18.8		16.8	45.8		13.8	42.8	
Effective Green, g (s)		29.0		21.0	21.0		19.0	48.0		16.0	45.0	
Actuated g/C Ratio		0.22		0.16	0.16		0.15	0.37		0.12	0.35	
Clearance Time (s)		6.2		6.2	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		734		285	548		258	1856		217	1742	
v/s Ratio Prot		c0.22		0.10	c0.16		c0.14	0.29		0.10	c0.31	
v/s Ratio Perm												
v/c Ratio		1.01		0.60	0.96		0.97	0.78		0.79	0.90	
Uniform Delay, d1		50.5		50.6	54.1		55.2	36.4		55.4	40.3	
Progression Factor		1.00		1.00	1.00		1.00	0.54		0.86	0.79	
Incremental Delay, d2		35.2		2.2	29.3		43.7	3.0		13.7	6.7	
Delay (s)		85.7		52.8	83.5		98.7	22.7		61.4	38.4	
Level of Service		F		D	F		F	C		E	D	
Approach Delay (s)		85.7			76.3			33.8			40.6	
Approach LOS		F			E			C			D	

Intersection Summary			
HCM 2000 Control Delay	51.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ WEST AIRPORT BOULEVARD| **PROPOSED CONCEPT - PM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	386	347	148	353	133	220	1190	97	161	1377	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	12	11	11	12
Total Lost time (s)	2.8	4.0	6.2	2.8	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3394		1711	4860		1711	4867	
Flt Permitted	0.24	1.00	1.00	0.24	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	442	3539	1583	449	3394		1711	4860		1711	4867	
Peak-hour factor, PHF	0.92	0.92	0.92	0.87	0.87	0.87	0.88	0.88	0.88	0.94	0.94	0.94
Adj. Flow (vph)	54	420	377	170	406	153	250	1352	110	171	1465	104
RTOR Reduction (vph)	0	0	81	0	31	0	0	7	0	0	6	0
Lane Group Flow (vph)	54	420	296	170	528	0	250	1455	0	171	1563	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8	5	7	4		5	2		1	6	
Permitted Phases	8		8	4								
Actuated Green, G (s)	25.2	21.2	43.0	35.2	26.2		21.8	56.4		19.8	54.4	
Effective Green, g (s)	29.6	23.4	43.0	37.4	28.4		24.0	58.6		22.0	56.6	
Actuated g/C Ratio	0.23	0.18	0.33	0.29	0.22		0.18	0.45		0.17	0.44	
Clearance Time (s)	5.0	6.2	6.2	5.0	6.2		6.2	6.2		6.2	6.2	
Vehicle Extension (s)	3.0	2.0	2.0	3.0	2.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	163	637	599	242	741		315	2190		289	2119	
v/s Ratio Prot	0.02	0.12	0.08	c0.06	c0.16		c0.15	0.30		0.10	c0.32	
v/s Ratio Perm	0.06		0.10	0.14								
v/c Ratio	0.33	0.66	0.49	0.70	0.71		0.79	0.66		0.59	0.74	
Uniform Delay, d1	40.5	49.6	34.8	37.4	47.0		50.6	28.0		49.9	30.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.74	0.87		0.71	0.53	
Incremental Delay, d2	1.2	1.9	0.2	8.9	2.7		11.1	1.5		1.9	2.1	
Delay (s)	41.7	51.5	35.0	46.3	49.7		48.6	25.8		37.3	18.4	
Level of Service	D	D	D	D	D		D	C		D	B	
Approach Delay (s)		43.6			48.9			29.1			20.2	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ GREENBRIAR DRIVE / MULA ROAD | **EXISTING - AM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	122	129	77	74	155	97	105	1691	83	43	1040	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		0.95			0.95	1.00	1.00	0.91		1.00	0.91	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3352			3483	1583	1770	5050		1770	4963	
Flt Permitted		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3352			3483	1583	1770	5050		1770	4963	
Peak-hour factor, PHF	0.92	0.92	0.92	0.80	0.80	0.80	0.94	0.94	0.94	0.74	0.74	0.74
Adj. Flow (vph)	133	140	84	92	194	121	112	1799	88	58	1405	269
RTOR Reduction (vph)	0	23	0	0	0	106	0	4	0	0	20	0
Lane Group Flow (vph)	0	334	0	0	286	15	112	1883	0	58	1654	0
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4						
Actuated Green, G (s)		16.4			14.1	14.1	11.3	69.4		5.6	63.7	
Effective Green, g (s)	18.7			16.3	16.3	13.3	71.4			7.6	65.7	
Actuated g/C Ratio	0.14			0.13	0.13	0.10	0.55			0.06	0.51	
Clearance Time (s)	6.3			6.2	6.2	6.0	6.0			6.0	6.0	
Vehicle Extension (s)	2.0			2.0	2.0	2.0	3.0			2.0	3.0	
Lane Grp Cap (vph)	482			436	198	181	2773			103	2508	
v/s Ratio Prot	c0.10			c0.08		0.06	c0.37			0.03	c0.33	
v/s Ratio Perm					0.01							
v/c Ratio	0.69			0.66	0.08	0.62	0.68			0.56	0.66	
Uniform Delay, d1	52.9			54.2	50.2	55.9	21.1			59.6	23.9	
Progression Factor	1.00			1.00	1.00	1.22	0.20			0.78	0.49	
Incremental Delay, d2	3.5			2.7	0.1	3.2	1.0			2.5	0.8	
Delay (s)	56.4			56.9	50.3	71.5	5.2			48.8	12.6	
Level of Service	E			E	D	E	A			D	B	
Approach Delay (s)	56.4			54.9			8.9				13.8	
Approach LOS	E			D			A				B	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ GREENBRIAR DRIVE / MULA ROAD | **PROPOSED CONCEPT - AM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	122	129	77	74	155	97	105	1691	83	43	1040	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	12	11	11	12
Total Lost time (s)	2.7	4.0		2.8	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1758		1770	1863	1583	1711	4881		1711	4797	
Flt Permitted	0.64	1.00		0.37	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1184	1758		684	1863	1583	1711	4881		1711	4797	
Peak-hour factor, PHF	0.92	0.92	0.92	0.80	0.80	0.80	0.94	0.94	0.94	0.74	0.74	0.74
Adj. Flow (vph)	133	140	84	92	194	121	112	1799	88	58	1405	269
RTOR Reduction (vph)	0	17	0	0	0	102	0	3	0	0	19	0
Lane Group Flow (vph)	133	207	0	92	194	19	112	1884	0	58	1655	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4		4						
Actuated Green, G (s)	20.8	19.5		17.9	17.9	17.9	12.0	73.8		6.4	68.2	
Effective Green, g (s)	23.1	21.8		20.1	20.1	20.1	14.0	75.8		8.4	70.2	
Actuated g/C Ratio	0.18	0.17		0.15	0.15	0.15	0.11	0.58		0.06	0.54	
Clearance Time (s)	5.0	6.3		5.0	6.2	6.2	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	2.0		3.0	2.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	259	294		182	288	244	184	2845		110	2590	
v/s Ratio Prot	0.04	c0.12		0.04	c0.10		0.07	c0.39		0.03	c0.35	
v/s Ratio Perm	0.05			0.04		0.01						
v/c Ratio	0.51	0.70		0.51	0.67	0.08	0.61	0.66		0.53	0.64	
Uniform Delay, d1	49.0	51.0		49.2	51.9	47.0	55.4	18.4		58.9	21.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.26	0.14		0.76	0.40	
Incremental Delay, d2	1.7	6.1		2.2	4.8	0.0	2.6	0.8		1.6	0.9	
Delay (s)	50.7	57.1		51.4	56.7	47.1	72.1	3.4		46.3	9.3	
Level of Service	D	E		D	E	D	E	A		D	A	
Approach Delay (s)		54.7			52.6			7.3			10.6	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ GREENBRIAR DRIVE / MULA ROAD | **EXISTING - PM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	168	161	122	89	108	114	60	1131	63	54	1741	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		0.95			0.95	1.00	1.00	0.91		1.00	0.91	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3334			3461	1583	1770	5045		1770	5038	
Flt Permitted		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3334			3461	1583	1770	5045		1770	5038	
Peak-hour factor, PHF	0.78	0.78	0.78	0.88	0.88	0.88	0.92	0.92	0.92	0.98	0.98	0.98
Adj. Flow (vph)	215	206	156	101	123	130	65	1229	68	55	1777	117
RTOR Reduction (vph)	0	30	0	0	0	117	0	4	0	0	5	0
Lane Group Flow (vph)	0	547	0	0	224	14	65	1293	0	55	1889	0
Turn Type	Split	NA		Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4						
Actuated Green, G (s)		24.2			11.3	11.3	6.4	64.4		5.6	63.6	
Effective Green, g (s)	26.5				13.5	13.5	8.4	66.4		7.6	65.6	
Actuated g/C Ratio	0.20				0.10	0.10	0.06	0.51		0.06	0.50	
Clearance Time (s)	6.3				6.2	6.2	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	2.0				2.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	679				359	164	114	2576		103	2542	
v/s Ratio Prot	c0.16				c0.06		0.04	c0.26		0.03	c0.37	
v/s Ratio Perm						0.01						
v/c Ratio	0.81				0.62	0.08	0.57	0.50		0.53	0.74	
Uniform Delay, d1	49.3				55.8	52.7	59.0	20.9		59.5	25.5	
Progression Factor	1.00				1.00	1.00	1.36	0.43		0.81	0.58	
Incremental Delay, d2	6.5				2.4	0.1	3.7	0.6		1.1	0.9	
Delay (s)	55.8				58.2	52.7	84.1	9.6		49.5	15.6	
Level of Service	E				E	D	F	A		D	B	
Approach Delay (s)	55.8				56.2			13.1			16.6	
Approach LOS	E				E			B			B	

Intersection Summary			
HCM 2000 Control Delay	24.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ GREENBRIAR DRIVE / MULA ROAD | **PROPOSED CONCEPT - PM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	168	161	122	89	108	114	60	1131	63	54	1741	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	12	11	11	12
Total Lost time (s)	3.7	4.0		3.8	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1742		1770	1863	1583	1711	4877		1711	4870	
Flt Permitted	0.49	1.00		0.24	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	906	1742		445	1863	1583	1711	4877		1711	4870	
Peak-hour factor, PHF	0.78	0.78	0.78	0.88	0.88	0.88	0.92	0.92	0.92	0.98	0.98	0.98
Adj. Flow (vph)	215	206	156	101	123	130	65	1229	68	55	1777	117
RTOR Reduction (vph)	0	22	0	0	0	107	0	4	0	0	5	0
Lane Group Flow (vph)	215	340	0	101	123	23	65	1293	0	55	1889	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4		4						
Actuated Green, G (s)	38.7	28.7		24.8	20.8	20.8	6.2	66.6		6.4	66.8	
Effective Green, g (s)	41.0	31.0		29.2	23.0	23.0	8.2	68.6		8.4	68.8	
Actuated g/C Ratio	0.32	0.24		0.22	0.18	0.18	0.06	0.53		0.06	0.53	
Clearance Time (s)	6.0	6.3		6.0	6.2	6.2	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	2.0		3.0	2.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	380	415		163	329	280	107	2573		110	2577	
v/s Ratio Prot	c0.06	c0.20		0.03	0.07		c0.04	0.27		0.03	c0.39	
v/s Ratio Perm	0.12			0.11		0.01						
v/c Ratio	0.57	0.82		0.62	0.37	0.08	0.61	0.50		0.50	0.73	
Uniform Delay, d1	34.9	46.8		42.2	47.2	44.7	59.3	19.7		58.8	23.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.09	1.02		0.71	0.42	
Incremental Delay, d2	1.9	11.3		6.8	0.3	0.0	5.9	0.6		0.9	1.4	
Delay (s)	36.9	58.2		49.0	47.4	44.7	70.6	20.7		42.7	11.3	
Level of Service	D	E		D	D	D	E	C		D	B	
Approach Delay (s)		50.2			46.9			23.1			12.2	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	15.8
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ CASH ROAD | **EXISTING - AM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	65	28	27	17	76	76	1773	114	203	792	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.91		1.00	0.91	
Frt	1.00	0.95		1.00	0.88		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3380		1770	3105		1770	5039		1770	5006	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3380		1770	3105		1770	5039		1770	5006	
Peak-hour factor, PHF	0.62	0.62	0.62	0.67	0.67	0.67	0.96	0.96	0.96	0.73	0.73	0.73
Adj. Flow (vph)	29	105	45	40	25	113	79	1847	119	278	1085	125
RTOR Reduction (vph)	0	36	0	0	102	0	0	5	0	0	10	0
Lane Group Flow (vph)	29	114	0	40	36	0	79	1961	0	278	1200	0
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	3.7	9.6		4.6	10.5		7.9	67.1		23.9	83.1	
Effective Green, g (s)	6.0	11.9		6.9	12.8		10.0	69.2		26.0	85.2	
Actuated g/C Ratio	0.05	0.09		0.05	0.10		0.08	0.53		0.20	0.66	
Clearance Time (s)	6.3	6.3		6.3	6.3		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	81	309		93	305		136	2682		354	3280	
v/s Ratio Prot	0.02	c0.03		c0.02	0.01		0.04	c0.39		c0.16	0.24	
v/s Ratio Perm												
v/c Ratio	0.36	0.37		0.43	0.12		0.58	0.73		0.79	0.37	
Uniform Delay, d1	60.1	55.5		59.6	53.5		58.0	23.3		49.4	10.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.57	1.03	
Incremental Delay, d2	1.0	0.3		1.2	0.1		4.0	1.8		7.7	0.2	
Delay (s)	61.1	55.8		60.8	53.5		62.0	25.1		35.7	10.6	
Level of Service	E	E		E	D		E	C		D	B	
Approach Delay (s)		56.6			55.2			26.5			15.3	
Approach LOS		E			E			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ CASH ROAD | **PROPOSED CONCEPT - AM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	65	28	27	17	76	76	1773	114	203	792	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	12	11	11	12
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.91		1.00	0.91	
Frt	1.00	0.95		1.00	0.88		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3380		1770	3105		1711	4871		1711	4840	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3380		1770	3105		1711	4871		1711	4840	
Peak-hour factor, PHF	0.62	0.62	0.62	0.67	0.67	0.67	0.96	0.96	0.96	0.73	0.73	0.73
Adj. Flow (vph)	29	105	45	40	25	113	79	1847	119	278	1085	125
RTOR Reduction (vph)	0	41	0	0	102	0	0	5	0	0	8	0
Lane Group Flow (vph)	29	109	0	40	36	0	79	1961	0	278	1202	0
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	4.6	10.6		4.6	10.6		7.9	62.8		27.2	82.1	
Effective Green, g (s)	6.9	12.9		6.9	12.9		10.0	64.9		29.3	84.2	
Actuated g/C Ratio	0.05	0.10		0.05	0.10		0.08	0.50		0.23	0.65	
Clearance Time (s)	6.3	6.3		6.3	6.3		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	93	335		93	308		131	2431		385	3134	
v/s Ratio Prot	0.02	c0.03		c0.02	0.01		0.05	c0.40		c0.16	0.25	
v/s Ratio Perm												
v/c Ratio	0.31	0.33		0.43	0.12		0.60	0.81		0.72	0.38	
Uniform Delay, d1	59.3	54.5		59.6	53.4		58.1	27.3		46.6	10.7	
Progression Factor	1.00	1.00		1.00	1.00		0.82	0.66		0.53	0.79	
Incremental Delay, d2	0.7	0.2		1.2	0.1		4.7	2.7		4.4	0.3	
Delay (s)	60.0	54.7		60.8	53.4		52.2	20.8		29.3	8.7	
Level of Service	E	D		E	D		D	C		C	A	
Approach Delay (s)		55.6			55.1			22.0			12.6	
Approach LOS		E			E			C			B	

Intersection Summary			
HCM 2000 Control Delay	21.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ CASH ROAD | **EXISTING - PM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	20	52	94	35	154	17	989	72	184	1780	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.91		1.00	0.91	
Frt	1.00	0.89		1.00	0.88		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3155		1770	3107		1770	5033		1770	5078	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3155		1770	3107		1770	5033		1770	5078	
Peak-hour factor, PHF	0.52	0.52	0.52	0.82	0.82	0.82	0.85	0.85	0.85	0.99	0.99	0.99
Adj. Flow (vph)	65	38	100	115	43	188	20	1164	85	186	1798	18
RTOR Reduction (vph)	0	91	0	0	168	0	0	6	0	0	1	0
Lane Group Flow (vph)	65	47	0	115	63	0	20	1243	0	186	1815	0
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	10.9	9.6		12.7	11.4		4.2	53.5		29.4	78.7	
Effective Green, g (s)	13.2	11.9		15.0	13.7		6.3	55.6		31.5	80.8	
Actuated g/C Ratio	0.10	0.09		0.12	0.11		0.05	0.43		0.24	0.62	
Clearance Time (s)	6.3	6.3		6.3	6.3		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	179	288		204	327		85	2152		428	3156	
v/s Ratio Prot	c0.04	0.01		c0.06	0.02		0.01	c0.25		0.11	c0.36	
v/s Ratio Perm												
v/c Ratio	0.36	0.16		0.56	0.19		0.24	0.58		0.43	0.58	
Uniform Delay, d1	54.5	54.5		54.4	53.1		59.5	28.3		41.7	14.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.58	0.53	
Incremental Delay, d2	0.5	0.1		2.1	0.1		0.5	1.1		0.2	0.5	
Delay (s)	54.9	54.6		56.5	53.2		60.1	29.4		24.3	8.2	
Level of Service	D	D		E	D		E	C		C	A	
Approach Delay (s)		54.7			54.3			29.9			9.7	
Approach LOS		D			D			C			A	

Intersection Summary			
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ CASH ROAD | **PROPOSED CONCEPT - PM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	20	52	94	35	154	17	989	72	184	1780	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	12	11	11	12
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.91		1.00	0.91	
Frt	1.00	0.89		1.00	0.88		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3155		1770	3107		1711	4866		1711	4908	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3155		1770	3107		1711	4866		1711	4908	
Peak-hour factor, PHF	0.52	0.52	0.52	0.82	0.82	0.82	0.85	0.85	0.85	0.99	0.99	0.99
Adj. Flow (vph)	65	38	100	115	43	188	20	1164	85	186	1798	18
RTOR Reduction (vph)	0	91	0	0	168	0	0	5	0	0	0	0
Lane Group Flow (vph)	65	47	0	115	63	0	20	1244	0	186	1816	0
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	10.0	9.7		11.7	11.4		4.2	59.5		24.3	79.6	
Effective Green, g (s)	12.3	12.0		14.0	13.7		6.3	61.6		26.4	81.7	
Actuated g/C Ratio	0.09	0.09		0.11	0.11		0.05	0.47		0.20	0.63	
Clearance Time (s)	6.3	6.3		6.3	6.3		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	167	291		190	327		82	2305		347	3084	
v/s Ratio Prot	c0.04	0.01		c0.06	0.02		0.01	c0.26		0.11	c0.37	
v/s Ratio Perm												
v/c Ratio	0.39	0.16		0.61	0.19		0.24	0.54		0.54	0.59	
Uniform Delay, d1	55.3	54.4		55.4	53.1		59.6	24.2		46.3	14.2	
Progression Factor	1.00	1.00		1.00	1.00		1.15	0.76		0.61	0.26	
Incremental Delay, d2	0.5	0.1		3.7	0.1		0.6	0.9		0.5	0.6	
Delay (s)	55.9	54.5		59.1	53.2		69.1	19.3		28.7	4.3	
Level of Service	E	D		E	D		E	B		C	A	
Approach Delay (s)		54.9			55.1			20.1			6.6	
Approach LOS		D			E			C			A	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

NORTHBOUND FM 1092 @ WESTBOUND US 90 | **EXISTING - AM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1843	319	267	361	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0				
Lane Util. Factor					0.81	1.00	0.91	0.91				
Frt					1.00	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.99				
Satd. Flow (prot)					7544	1583	1610	3365				
Flt Permitted					1.00	1.00	0.95	0.99				
Satd. Flow (perm)					7544	1583	1610	3365				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.82	0.82	0.82	0.82	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2248	389	326	440	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	135	145	56	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2248	254	103	462	0	0	0	0
Turn Type					NA	Perm	Perm	NA				
Protected Phases					8			2 7				
Permitted Phases						8	2 7					
Actuated Green, G (s)					98.0	98.0	20.0	20.0				
Effective Green, g (s)					98.0	98.0	20.0	20.0				
Actuated g/C Ratio					0.65	0.65	0.13	0.13				
Clearance Time (s)					4.0	4.0						
Vehicle Extension (s)					3.0	3.0						
Lane Grp Cap (vph)					4928	1034	214	448				
v/s Ratio Prot					c0.30							
v/s Ratio Perm						0.16	0.06	0.14				
v/c Ratio					0.46	0.25	0.48	1.03				
Uniform Delay, d1					12.8	10.7	60.2	65.0				
Progression Factor					1.00	1.00	0.70	0.61				
Incremental Delay, d2					0.1	0.1	1.5	48.3				
Delay (s)					12.9	10.9	44.0	88.1				
Level of Service					B	B	D	F				
Approach Delay (s)	0.0				12.6			73.8			0.0	
Approach LOS	A				B			E			A	

Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

NORTHBOUND FM 1092 @ WESTBOUND US 90 | **PROPOSED CONCEPT - AM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1843	319	267	361	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.81	1.00	0.91	0.91				
Frt					1.00	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.99				
Satd. Flow (prot)					7544	1583	1610	3365				
Flt Permitted					1.00	1.00	0.95	0.99				
Satd. Flow (perm)					7544	1583	1610	3365				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.82	0.82	0.82	0.82	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2248	389	326	440	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	148	139	68	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2248	241	109	450	0	0	0	0
Turn Type					NA	Perm	Perm	NA				
Protected Phases					8			2 7				
Permitted Phases						8	2 7					
Actuated Green, G (s)					93.0	93.0	23.0	23.0				
Effective Green, g (s)					93.0	93.0	23.0	23.0				
Actuated g/C Ratio					0.62	0.62	0.15	0.15				
Clearance Time (s)					5.0	5.0						
Vehicle Extension (s)					3.0	3.0						
Lane Grp Cap (vph)					4677	981	246	515				
v/s Ratio Prot					c0.30							
v/s Ratio Perm						0.15	0.07	0.13				
v/c Ratio					0.48	0.25	0.44	0.87				
Uniform Delay, d1					15.4	12.8	57.7	62.1				
Progression Factor					1.00	1.00	0.84	0.84				
Incremental Delay, d2					0.1	0.1	1.1	14.5				
Delay (s)					15.5	12.9	49.4	66.5				
Level of Service					B	B	D	E				
Approach Delay (s)	0.0				15.1			61.0			0.0	
Approach LOS	A				B			E			A	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

NORTHBOUND FM 1092 @ WESTBOUND US 90 | **EXISTING - PM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑↑↑↑	↱	↰	↑↑				
Volume (vph)	0	0	0	0	2600	226	231	186	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0	4.0	4.0				
Lane Util. Factor					0.81	1.00	0.91	0.91				
Frt					1.00	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					7544	1583	1610	3334				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					7544	1583	1610	3334				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2737	238	243	196	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	93	119	54	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2737	145	24	242	0	0	0	0
Turn Type					NA	Perm	Perm	NA				
Protected Phases					8			2 7				
Permitted Phases						8	2 7					
Actuated Green, G (s)					91.0	91.0	25.0	25.0				
Effective Green, g (s)					91.0	91.0	25.0	25.0				
Actuated g/C Ratio					0.61	0.61	0.17	0.17				
Clearance Time (s)					4.0	4.0						
Vehicle Extension (s)					3.0	3.0						
Lane Grp Cap (vph)					4576	960	268	555				
v/s Ratio Prot					c0.36							
v/s Ratio Perm						0.09	0.01	0.07				
v/c Ratio					0.60	0.15	0.09	0.44				
Uniform Delay, d1					18.2	12.8	52.9	56.2				
Progression Factor					1.00	1.00	0.39	0.43				
Incremental Delay, d2					0.2	0.1	0.1	0.5				
Delay (s)					18.4	12.8	20.6	24.7				
Level of Service					B	B	C	C				
Approach Delay (s)	0.0				18.0			23.4			0.0	
Approach LOS	A				B			C			A	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

NORTHBOUND FM 1092 @ WESTBOUND US 90 | **PROPOSED CONCEPT - PM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑↑↑↑	↱	↰	↑↑				
Volume (vph)	0	0	0	0	2600	226	231	186	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.81	1.00	0.91	0.91				
Frt					1.00	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					7544	1583	1610	3334				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					7544	1583	1610	3334				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2737	238	243	196	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	101	117	65	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2737	137	26	231	0	0	0	0
Turn Type					NA	Perm	Perm	NA				
Protected Phases					8			2 7				
Permitted Phases						8	2 7					
Actuated Green, G (s)					86.6	86.6	27.4	27.4				
Effective Green, g (s)					86.6	86.6	27.4	27.4				
Actuated g/C Ratio					0.58	0.58	0.18	0.18				
Clearance Time (s)					5.0	5.0						
Vehicle Extension (s)					3.0	3.0						
Lane Grp Cap (vph)					4355	913	294	609				
v/s Ratio Prot					c0.36							
v/s Ratio Perm						0.09	0.02	0.07				
v/c Ratio					0.63	0.15	0.09	0.38				
Uniform Delay, d1					21.0	14.7	50.9	53.8				
Progression Factor					1.00	1.00	0.24	1.09				
Incremental Delay, d2					0.3	0.1	0.1	0.4				
Delay (s)					21.3	14.8	12.5	59.0				
Level of Service					C	B	B	E				
Approach Delay (s)	0.0				20.8			43.9			0.0	
Approach LOS	A				C			D			A	

Intersection Summary			
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

NORTHBOUND FM 1092 @ EASTBOUND US 90 | **EXISTING - AM**

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	374	105	0	0	0	254	2639	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0				4.0	4.0				
Lane Util. Factor		0.91	1.00				0.81	0.81				
Frt		1.00	0.85				1.00	1.00				
Flt Protected		1.00	1.00				0.95	1.00				
Satd. Flow (prot)		5085	1583				1433	6032				
Flt Permitted		1.00	1.00				0.95	1.00				
Satd. Flow (perm)		5085	1583				1433	6032				
Peak-hour factor, PHF	0.92	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	394	111	0	0	0	267	2778	0	0	0	0
RTOR Reduction (vph)	0	0	99	0	0	0	76	21	0	0	0	0
Lane Group Flow (vph)	0	394	12	0	0	0	164	2784	0	0	0	0
Turn Type		NA	Perm				Perm	NA				
Protected Phases		2						1 4				
Permitted Phases			2				1 4					
Actuated Green, G (s)		16.0	16.0				102.0	102.0				
Effective Green, g (s)		16.0	16.0				102.0	102.0				
Actuated g/C Ratio		0.11	0.11				0.68	0.68				
Clearance Time (s)		4.0	4.0									
Vehicle Extension (s)		3.0	3.0									
Lane Grp Cap (vph)		542	168				974	4101				
v/s Ratio Prot		c0.08										
v/s Ratio Perm			0.01				0.11	0.46				
v/c Ratio		0.73	0.07				0.17	0.68				
Uniform Delay, d1		64.9	60.3				8.7	14.3				
Progression Factor		1.00	1.00				0.03	0.38				
Incremental Delay, d2		8.3	0.8				0.1	0.3				
Delay (s)		73.2	61.1				0.3	5.8				
Level of Service		E	E				A	A				
Approach Delay (s)		70.5		0.0				5.3		0.0		
Approach LOS		E		A				A		A		

Intersection Summary					
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.60				
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0		
Intersection Capacity Utilization	47.6%	ICU Level of Service	A		
Analysis Period (min)	15				
c Critical Lane Group					

NORTHBOUND FM 1092 @ EASTBOUND US 90 | **PROPOSED CONCEPT - AM**

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	374	105	0	0	0	254	2639	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0				4.0	4.0				
Lane Util. Factor		0.91	1.00				0.81	0.81				
Frt		1.00	0.85				1.00	1.00				
Flt Protected		1.00	1.00				0.95	1.00				
Satd. Flow (prot)		5085	1583				1433	6032				
Flt Permitted		1.00	1.00				0.95	1.00				
Satd. Flow (perm)		5085	1583				1433	6032				
Peak-hour factor, PHF	0.92	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	394	111	0	0	0	267	2778	0	0	0	0
RTOR Reduction (vph)	0	0	100	0	0	0	77	24	0	0	0	0
Lane Group Flow (vph)	0	394	11	0	0	0	163	2781	0	0	0	0
Turn Type		NA	Perm				Perm	NA				
Protected Phases		2						1 4				
Permitted Phases			2				1 4					
Actuated Green, G (s)		15.0	15.0				101.0	101.0				
Effective Green, g (s)		15.0	15.0				101.0	101.0				
Actuated g/C Ratio		0.10	0.10				0.67	0.67				
Clearance Time (s)		5.0	5.0									
Vehicle Extension (s)		3.0	3.0									
Lane Grp Cap (vph)		508	158				964	4061				
v/s Ratio Prot		c0.08										
v/s Ratio Perm			0.01				0.11	0.46				
v/c Ratio		0.78	0.07				0.17	0.68				
Uniform Delay, d1		65.9	61.2				9.0	14.9				
Progression Factor		1.00	1.00				0.02	0.37				
Incremental Delay, d2		11.0	0.9				0.1	0.4				
Delay (s)		76.9	62.0				0.3	5.8				
Level of Service		E	E				A	A				
Approach Delay (s)		73.6		0.0				5.4		0.0		
Approach LOS		E		A				A		A		

Intersection Summary					
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.61				
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0		
Intersection Capacity Utilization	48.4%	ICU Level of Service	A		
Analysis Period (min)	15				
c Critical Lane Group					

NORTHBOUND FM 1092 @ EASTBOUND US 90 | **EXISTING - PM**

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	229	56	0	0	0	152	2108	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0				4.0	4.0				
Lane Util. Factor		0.91	1.00				0.81	0.81				
Frt		1.00	0.85				1.00	1.00				
Flt Protected		1.00	1.00				0.95	1.00				
Satd. Flow (prot)		5085	1583				1433	6033				
Flt Permitted		1.00	1.00				0.95	1.00				
Satd. Flow (perm)		5085	1583				1433	6033				
Peak-hour factor, PHF	0.92	0.98	0.98	0.92	0.92	0.92	0.98	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	234	57	0	0	0	155	2151	0	0	0	0
RTOR Reduction (vph)	0	0	49	0	0	0	49	23	0	0	0	0
Lane Group Flow (vph)	0	234	8	0	0	0	90	2144	0	0	0	0
Turn Type		NA	Perm				Perm	NA				
Protected Phases		2						1 4				
Permitted Phases			2				1 4					
Actuated Green, G (s)		21.0	21.0				97.0	97.0				
Effective Green, g (s)		21.0	21.0				97.0	97.0				
Actuated g/C Ratio		0.14	0.14				0.65	0.65				
Clearance Time (s)		4.0	4.0									
Vehicle Extension (s)		3.0	3.0									
Lane Grp Cap (vph)		711	221				926	3901				
v/s Ratio Prot		c0.05										
v/s Ratio Perm			0.01				0.06	0.36				
v/c Ratio		0.33	0.04				0.10	0.55				
Uniform Delay, d1		58.1	55.8				10.0	14.5				
Progression Factor		1.00	1.00				0.05	0.39				
Incremental Delay, d2		1.2	0.3				0.0	0.1				
Delay (s)		59.4	56.1				0.6	5.8				
Level of Service		E	E				A	A				
Approach Delay (s)		58.7		0.0				5.5		0.0		
Approach LOS		E		A				A		A		

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

NORTHBOUND FM 1092 @ EASTBOUND US 90 | **PROPOSED CONCEPT - PM**

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	229	56	0	0	0	152	2108	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0				4.0	4.0				
Lane Util. Factor		0.91	1.00				0.81	0.81				
Frt		1.00	0.85				1.00	1.00				
Flt Protected		1.00	1.00				0.95	1.00				
Satd. Flow (prot)		5085	1583				1433	6033				
Flt Permitted		1.00	1.00				0.95	1.00				
Satd. Flow (perm)		5085	1583				1433	6033				
Peak-hour factor, PHF	0.92	0.98	0.98	0.92	0.92	0.92	0.98	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	234	57	0	0	0	155	2151	0	0	0	0
RTOR Reduction (vph)	0	0	49	0	0	0	50	23	0	0	0	0
Lane Group Flow (vph)	0	234	8	0	0	0	89	2144	0	0	0	0
Turn Type		NA	Perm				Perm	NA				
Protected Phases		2						1 4				
Permitted Phases			2				1 4					
Actuated Green, G (s)		20.0	20.0				96.0	96.0				
Effective Green, g (s)		20.0	20.0				96.0	96.0				
Actuated g/C Ratio		0.13	0.13				0.64	0.64				
Clearance Time (s)		5.0	5.0									
Vehicle Extension (s)		3.0	3.0									
Lane Grp Cap (vph)		678	211				917	3861				
v/s Ratio Prot		c0.05										
v/s Ratio Perm			0.00				0.06	0.36				
v/c Ratio		0.35	0.04				0.10	0.56				
Uniform Delay, d1		59.1	56.6				10.4	15.1				
Progression Factor		1.00	1.00				0.02	0.36				
Incremental Delay, d2		1.4	0.3				0.0	0.2				
Delay (s)		60.4	56.9				0.2	5.6				
Level of Service		E	E				A	A				
Approach Delay (s)		59.8		0.0				5.3		0.0		
Approach LOS		E		A				A		A		

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

SOUTHBOUND FM 1092 @ WESTBOUND US 90 | **EXISTING - AM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	47	2065	0	0	0	0	0	139	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	4.0
Lane Util. Factor				0.81	0.81						0.91	1.00
Frt				1.00	1.00						1.00	0.85
Flt Protected				0.95	1.00						1.00	1.00
Satd. Flow (prot)				1433	6035						5085	1583
Flt Permitted				0.95	1.00						1.00	1.00
Satd. Flow (perm)				1433	6035						5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.85	0.85	0.92	0.92	0.92	0.92	0.92	0.85	0.85
Adj. Flow (vph)	0	0	0	55	2429	0	0	0	0	0	164	80
RTOR Reduction (vph)	0	0	0	10	8	0	0	0	0	0	0	71
Lane Group Flow (vph)	0	0	0	39	2427	0	0	0	0	0	164	9
Turn Type				Perm	NA						NA	Perm
Protected Phases					5 8						6	
Permitted Phases				5 8								6
Actuated Green, G (s)				118.0	118.0						16.0	16.0
Effective Green, g (s)				118.0	118.0						16.0	16.0
Actuated g/C Ratio				0.79	0.79						0.11	0.11
Clearance Time (s)											4.0	4.0
Vehicle Extension (s)											3.0	3.0
Lane Grp Cap (vph)				1127	4747						542	168
v/s Ratio Prot											c0.03	
v/s Ratio Perm				0.03	0.40							0.01
v/c Ratio				0.03	0.51						0.30	0.05
Uniform Delay, d1				3.5	5.7						61.8	60.2
Progression Factor				0.01	0.37						1.00	1.00
Incremental Delay, d2				0.0	0.1						1.4	0.6
Delay (s)				0.0	2.2						63.3	60.8
Level of Service				A	A						E	E
Approach Delay (s)	0.0				2.1		0.0				62.5	
Approach LOS	A				A		A				E	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

SOUTHBOUND FM 1092 @ WESTBOUND US 90 | **PROPOSED CONCEPT - AM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	47	2065	0	0	0	0	0	139	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						5.0	5.0
Lane Util. Factor				0.81	0.81						0.91	1.00
Frt				1.00	1.00						1.00	0.85
Flt Protected				0.95	1.00						1.00	1.00
Satd. Flow (prot)				1433	6035						5085	1583
Flt Permitted				0.95	1.00						1.00	1.00
Satd. Flow (perm)				1433	6035						5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.85	0.85	0.92	0.92	0.92	0.92	0.92	0.85	0.85
Adj. Flow (vph)	0	0	0	55	2429	0	0	0	0	0	164	80
RTOR Reduction (vph)	0	0	0	13	12	0	0	0	0	0	0	72
Lane Group Flow (vph)	0	0	0	36	2423	0	0	0	0	0	164	8
Turn Type				Perm	NA						NA	Perm
Protected Phases					5 8						6	
Permitted Phases				5 8								6
Actuated Green, G (s)				114.0	114.0						15.0	15.0
Effective Green, g (s)				109.0	109.0						15.0	15.0
Actuated g/C Ratio				0.73	0.73						0.10	0.10
Clearance Time (s)											5.0	5.0
Vehicle Extension (s)											3.0	3.0
Lane Grp Cap (vph)				1041	4385						508	158
v/s Ratio Prot											c0.03	
v/s Ratio Perm				0.02	0.40							0.01
v/c Ratio				0.03	0.55						0.32	0.05
Uniform Delay, d1				5.7	9.4						62.8	61.1
Progression Factor				0.00	0.37						1.00	1.00
Incremental Delay, d2				0.0	0.1						1.7	0.6
Delay (s)				0.0	3.6						64.5	61.7
Level of Service				A	A						E	E
Approach Delay (s)	0.0				3.5		0.0				63.5	
Approach LOS	A				A		A				E	

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

SOUTHBOUND FM 1092 @ WESTBOUND US 90 | **EXISTING - PM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	124	2701	0	0	0	0	0	387	211
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	4.0
Lane Util. Factor				0.81	0.81						0.91	1.00
Frt				1.00	1.00						1.00	0.85
Flt Protected				0.95	1.00						1.00	1.00
Satd. Flow (prot)				1433	6034						5085	1583
Flt Permitted				0.95	1.00						1.00	1.00
Satd. Flow (perm)				1433	6034						5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.95	0.95
Adj. Flow (vph)	0	0	0	131	2843	0	0	0	0	0	407	222
RTOR Reduction (vph)	0	0	0	30	9	0	0	0	0	0	0	81
Lane Group Flow (vph)	0	0	0	88	2847	0	0	0	0	0	407	141
Turn Type				Perm	NA						NA	Perm
Protected Phases					5 8						6	
Permitted Phases				5 8								6
Actuated Green, G (s)				112.0	112.0						22.0	22.0
Effective Green, g (s)				112.0	112.0						22.0	22.0
Actuated g/C Ratio				0.75	0.75						0.15	0.15
Clearance Time (s)											4.0	4.0
Vehicle Extension (s)											3.0	3.0
Lane Grp Cap (vph)				1069	4505						745	232
v/s Ratio Prot											0.08	
v/s Ratio Perm				0.06	0.47							c0.09
v/c Ratio				0.08	0.63						0.55	0.61
Uniform Delay, d1				5.1	9.1						59.4	60.0
Progression Factor				0.00	0.33						1.00	1.00
Incremental Delay, d2				0.0	0.2						2.9	11.3
Delay (s)				0.0	3.3						62.2	71.2
Level of Service				A	A						E	E
Approach Delay (s)	0.0				3.2		0.0				65.4	
Approach LOS	A				A		A				E	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

SOUTHBOUND FM 1092 @ WESTBOUND US 90 | **PROPOSED CONCEPT - PM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	124	2701	0	0	0	0	0	387	211
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						5.0	5.0
Lane Util. Factor				0.81	0.81						0.91	1.00
Frt				1.00	1.00						1.00	0.85
Flt Protected				0.95	1.00						1.00	1.00
Satd. Flow (prot)				1433	6034						5085	1583
Flt Permitted				0.95	1.00						1.00	1.00
Satd. Flow (perm)				1433	6034						5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.95	0.95
Adj. Flow (vph)	0	0	0	131	2843	0	0	0	0	0	407	222
RTOR Reduction (vph)	0	0	0	37	14	0	0	0	0	0	0	88
Lane Group Flow (vph)	0	0	0	81	2842	0	0	0	0	0	407	134
Turn Type				Perm	NA						NA	Perm
Protected Phases					5 8						6	
Permitted Phases				5 8								6
Actuated Green, G (s)				108.6	108.6						21.0	21.0
Effective Green, g (s)				103.6	103.6						21.0	21.0
Actuated g/C Ratio				0.69	0.69						0.14	0.14
Clearance Time (s)											5.0	5.0
Vehicle Extension (s)											3.0	3.0
Lane Grp Cap (vph)				989	4167						711	221
v/s Ratio Prot											0.08	
v/s Ratio Perm				0.06	0.47							c0.08
v/c Ratio				0.08	0.68						0.57	0.61
Uniform Delay, d1				7.6	13.6						60.3	60.6
Progression Factor				0.00	0.32						1.00	1.00
Incremental Delay, d2				0.0	0.4						3.3	11.8
Delay (s)				0.0	4.8						63.6	72.4
Level of Service				A	A						E	E
Approach Delay (s)	0.0				4.6		0.0				66.7	
Approach LOS	A				A		A				E	

Intersection Summary			
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

SOUTHBOUND FM 1092 @ EASTBOUND US 90 | **EXISTING - AM**

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	0	0	128	55	0	0	2821	186	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0			4.0	4.0			
Lane Util. Factor				0.91	0.91			0.81	1.00			
Frt				1.00	1.00			1.00	0.85			
Flt Protected				0.95	0.97			1.00	1.00			
Satd. Flow (prot)				1610	3301			7544	1583			
Flt Permitted				0.95	0.97			1.00	1.00			
Satd. Flow (perm)				1610	3301			7544	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.92	0.92	0.96	0.96	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	133	57	0	0	2939	194	0	0	0
RTOR Reduction (vph)	0	0	0	50	51	0	0	0	70	0	0	0
Lane Group Flow (vph)	0	0	0	16	73	0	0	2939	124	0	0	0
Turn Type				Perm	NA			NA	Perm			
Protected Phases					3 6			4				
Permitted Phases				3 6					4			
Actuated Green, G (s)				36.0	36.0			86.0	86.0			
Effective Green, g (s)				36.0	36.0			86.0	86.0			
Actuated g/C Ratio				0.24	0.24			0.57	0.57			
Clearance Time (s)								4.0	4.0			
Vehicle Extension (s)								3.0	3.0			
Lane Grp Cap (vph)				386	792			4325	907			
v/s Ratio Prot								c0.39				
v/s Ratio Perm				0.01	0.02				0.08			
v/c Ratio				0.04	0.09			0.68	0.14			
Uniform Delay, d1				43.8	44.3			22.4	14.8			
Progression Factor				0.03	0.06			1.00	1.00			
Incremental Delay, d2				0.2	0.2			0.4	0.1			
Delay (s)				1.3	3.0			22.8	14.9			
Level of Service				A	A			C	B			
Approach Delay (s)	0.0				2.4			22.3			0.0	
Approach LOS	A				A			C			A	

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

SOUTHBOUND FM 1092 @ EASTBOUND US 90 | **PROPOSED CONCEPT - AM**

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	0	0	128	55	0	0	2821	186	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0			5.0	5.0			
Lane Util. Factor				0.91	0.91			0.81	1.00			
Frt				1.00	1.00			1.00	0.85			
Flt Protected				0.95	0.97			1.00	1.00			
Satd. Flow (prot)				1610	3301			7544	1583			
Flt Permitted				0.95	0.97			1.00	1.00			
Satd. Flow (perm)				1610	3301			7544	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.92	0.92	0.96	0.96	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	133	57	0	0	2939	194	0	0	0
RTOR Reduction (vph)	0	0	0	52	53	0	0	0	83	0	0	0
Lane Group Flow (vph)	0	0	0	14	71	0	0	2939	111	0	0	0
Turn Type				Perm	NA			NA	Perm			
Protected Phases					3 6			4				
Permitted Phases				3 6					4			
Actuated Green, G (s)				36.0	36.0			85.0	85.0			
Effective Green, g (s)				31.0	31.0			85.0	85.0			
Actuated g/C Ratio				0.21	0.21			0.57	0.57			
Clearance Time (s)								5.0	5.0			
Vehicle Extension (s)								3.0	3.0			
Lane Grp Cap (vph)				332	682			4274	897			
v/s Ratio Prot								c0.39				
v/s Ratio Perm				0.01	0.02				0.07			
v/c Ratio				0.04	0.10			0.69	0.12			
Uniform Delay, d1				47.6	48.2			23.1	15.1			
Progression Factor				0.09	0.99			1.00	1.00			
Incremental Delay, d2				0.2	0.3			0.5	0.1			
Delay (s)				4.4	48.0			23.5	15.2			
Level of Service				A	D			C	B			
Approach Delay (s)	0.0				32.9			23.0			0.0	
Approach LOS	A				C			C			A	

Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

SOUTHBOUND FM 1092 @ EASTBOUND US 90 | **EXISTING - PM**

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	0	0	333	218	0	0	1942	334	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0			4.0	4.0			
Lane Util. Factor				0.91	0.91			0.81	1.00			
Frt				1.00	1.00			1.00	0.85			
Flt Protected				0.95	0.98			1.00	1.00			
Satd. Flow (prot)				1610	3322			7544	1583			
Flt Permitted				0.95	0.98			1.00	1.00			
Satd. Flow (perm)				1610	3322			7544	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.98	0.92	0.92	0.98	0.98	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	340	222	0	0	1982	341	0	0	0
RTOR Reduction (vph)	0	0	0	132	72	0	0	0	161	0	0	0
Lane Group Flow (vph)	0	0	0	52	306	0	0	1982	180	0	0	0
Turn Type				Perm	NA			NA	Perm			
Protected Phases					3 6			4				
Permitted Phases				3 6					4			
Actuated Green, G (s)				42.0	42.0			79.0	79.0			
Effective Green, g (s)				42.0	42.0			79.0	79.0			
Actuated g/C Ratio				0.28	0.28			0.53	0.53			
Clearance Time (s)								4.0	4.0			
Vehicle Extension (s)								3.0	3.0			
Lane Grp Cap (vph)				450	930			3973	833			
v/s Ratio Prot								c0.26				
v/s Ratio Perm				0.03	0.09				0.11			
v/c Ratio				0.11	0.33			0.50	0.22			
Uniform Delay, d1				40.2	42.8			22.8	19.0			
Progression Factor				0.08	0.24			1.00	1.00			
Incremental Delay, d2				0.5	0.9			0.1	0.1			
Delay (s)				3.5	10.9			22.9	19.1			
Level of Service				A	B			C	B			
Approach Delay (s)	0.0				8.5			22.3			0.0	
Approach LOS	A				A			C			A	

Intersection Summary			
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

SOUTHBOUND FM 1092 @ EASTBOUND US 90 | **PROPOSED CONCEPT - PM**

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	0	0	333	218	0	0	1942	334	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0			5.0	5.0			
Lane Util. Factor				0.91	0.91			0.81	1.00			
Frt				1.00	1.00			1.00	0.85			
Flt Protected				0.95	0.98			1.00	1.00			
Satd. Flow (prot)				1610	3322			7544	1583			
Flt Permitted				0.95	0.98			1.00	1.00			
Satd. Flow (perm)				1610	3322			7544	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.98	0.92	0.92	0.98	0.98	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	340	222	0	0	1982	341	0	0	0
RTOR Reduction (vph)	0	0	0	139	75	0	0	0	164	0	0	0
Lane Group Flow (vph)	0	0	0	45	303	0	0	1982	177	0	0	0
Turn Type				Perm	NA			NA	Perm			
Protected Phases					3 6			4				
Permitted Phases				3 6					4			
Actuated Green, G (s)				42.0	42.0			78.0	78.0			
Effective Green, g (s)				37.0	37.0			78.0	78.0			
Actuated g/C Ratio				0.25	0.25			0.52	0.52			
Clearance Time (s)								5.0	5.0			
Vehicle Extension (s)								3.0	3.0			
Lane Grp Cap (vph)				397	819			3922	823			
v/s Ratio Prot								c0.26				
v/s Ratio Perm				0.03	0.09				0.11			
v/c Ratio				0.11	0.37			0.51	0.22			
Uniform Delay, d1				43.8	46.8			23.4	19.5			
Progression Factor				0.29	0.92			1.00	1.00			
Incremental Delay, d2				0.5	1.2			0.1	0.1			
Delay (s)				13.1	44.1			23.5	19.6			
Level of Service				B	D			C	B			
Approach Delay (s)	0.0				33.9			23.0			0.0	
Approach LOS	A				C			C			A	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ AVENUE E | **EXISTING - AM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	364	376	36	201	140	14	22	1522	150	19	672	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1838		1770	1837		1770	3491		1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1838		1770	1837		1770	3491		1770	3539	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.79	0.79	0.79	0.97	0.97	0.97	0.82	0.82	0.82
Adj. Flow (vph)	391	404	39	254	177	18	23	1569	155	23	820	70
RTOR Reduction (vph)	0	2	0	0	3	0	0	6	0	0	0	36
Lane Group Flow (vph)	391	441	0	254	192	0	23	1718	0	23	820	34
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	26.5	25.5		14.5	13.5		3.5	61.3		3.5	61.3	61.3
Effective Green, g (s)	29.0	28.0		17.0	16.0		5.6	63.4		5.6	63.4	63.4
Actuated g/C Ratio	0.22	0.22		0.13	0.12		0.04	0.49		0.04	0.49	0.49
Clearance Time (s)	6.5	6.5		6.5	6.5		6.1	6.1		6.1	6.1	6.1
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	1.5		2.0	1.5	1.5
Lane Grp Cap (vph)	394	395		231	226		76	1702		76	1725	772
v/s Ratio Prot	0.22	c0.24		c0.14	0.10		c0.01	c0.49		0.01	0.23	
v/s Ratio Perm												0.02
v/c Ratio	0.99	1.12		1.10	0.85		0.30	1.01		0.30	0.48	0.04
Uniform Delay, d1	50.4	51.0		56.5	55.8		60.3	33.3		60.3	22.2	17.4
Progression Factor	1.00	1.00		1.00	1.00		1.15	0.47		1.00	1.00	1.00
Incremental Delay, d2	43.1	80.4		88.4	24.4		0.5	19.8		0.8	0.9	0.1
Delay (s)	93.5	131.4		144.9	80.2		69.9	35.6		61.1	23.2	17.5
Level of Service	F	F		F	F		E	D		E	C	B
Approach Delay (s)		113.6			116.8			36.0			23.7	
Approach LOS		F			F			D			C	

Intersection Summary			
HCM 2000 Control Delay	58.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ AVENUE E | **PROPOSED CONCEPT - AM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	364	376	36	201	140	14	22	1522	150	19	672	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	12	11	11	12
Total Lost time (s)	4.0	4.0	6.5	4.0	4.0	6.5	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1711	4849		1711	4858	
Flt Permitted	0.38	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	717	1863	1583	3433	1863	1583	1711	4849		1711	4858	
Peak-hour factor, PHF	0.93	0.93	0.93	0.79	0.79	0.79	0.97	0.97	0.97	0.82	0.82	0.82
Adj. Flow (vph)	391	404	39	254	177	18	23	1569	155	23	820	70
RTOR Reduction (vph)	0	0	30	0	0	15	0	8	0	0	7	0
Lane Group Flow (vph)	391	404	9	254	177	3	23	1716	0	23	883	0
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4			8						
Actuated Green, G (s)	48.0	31.1	31.1	10.4	22.0	22.0	3.6	59.7		3.6	59.7	
Effective Green, g (s)	50.5	33.6	31.1	12.9	24.5	22.0	5.7	61.8		5.7	61.8	
Actuated g/C Ratio	0.39	0.26	0.24	0.10	0.19	0.17	0.04	0.48		0.04	0.48	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.1	6.1		6.1	6.1	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5		2.0	1.5	
Lane Grp Cap (vph)	456	481	378	340	351	267	75	2305		75	2309	
v/s Ratio Prot	c0.14	0.22		0.07	0.10		c0.01	c0.35		0.01	0.18	
v/s Ratio Perm	c0.19		0.01			0.00						
v/c Ratio	0.86	0.84	0.02	0.75	0.50	0.01	0.31	0.74		0.31	0.38	
Uniform Delay, d1	32.2	45.7	37.8	57.0	47.3	44.9	60.2	27.7		60.2	21.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.17	0.47		1.11	0.71	
Incremental Delay, d2	14.2	11.7	0.0	7.6	0.4	0.0	0.7	1.9		0.8	0.5	
Delay (s)	46.4	57.4	37.9	64.6	47.7	45.0	71.3	14.8		67.9	15.9	
Level of Service	D	E	D	E	D	D	E	B		E	B	
Approach Delay (s)		51.3			57.1			15.5			17.2	
Approach LOS		D			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ AVENUE E | **EXISTING - PM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	128	164	106	384	373	5	70	858	170	24	1548	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.94		1.00	1.00		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1753		1770	1859		1770	3451		1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1753		1770	1859		1770	3451		1770	3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.94	0.94	0.94	0.89	0.89	0.89	0.92	0.92	0.92
Adj. Flow (vph)	133	171	110	409	397	5	79	964	191	26	1683	260
RTOR Reduction (vph)	0	18	0	0	0	0	0	12	0	0	0	104
Lane Group Flow (vph)	133	263	0	409	402	0	79	1143	0	26	1683	156
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	9.5	15.5		26.5	32.5		5.9	59.3		3.5	56.9	56.9
Effective Green, g (s)	12.0	18.0		29.0	35.0		8.0	61.4		5.6	59.0	59.0
Actuated g/C Ratio	0.09	0.14		0.22	0.27		0.06	0.47		0.04	0.45	0.45
Clearance Time (s)	6.5	6.5		6.5	6.5		6.1	6.1		6.1	6.1	6.1
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	1.5		2.0	1.5	1.5
Lane Grp Cap (vph)	163	242		394	500		108	1629		76	1606	718
v/s Ratio Prot	0.08	c0.15		c0.23	0.22		0.04	c0.33		0.01	c0.48	
v/s Ratio Perm												0.10
v/c Ratio	0.82	1.09		1.04	0.80		0.73	0.70		0.34	1.05	0.22
Uniform Delay, d1	57.9	56.0		50.5	44.3		59.9	27.1		60.4	35.5	21.5
Progression Factor	1.00	1.00		1.00	1.00		0.97	0.83		1.00	1.00	1.00
Incremental Delay, d2	24.8	82.8		55.5	8.6		17.8	2.3		1.0	36.2	0.7
Delay (s)	82.7	138.8		106.0	52.9		75.8	24.7		61.4	71.7	22.2
Level of Service	F	F		F	D		E	C		E	E	C
Approach Delay (s)		120.8			79.7			28.0			65.0	
Approach LOS		F			E			C			E	

Intersection Summary			
HCM 2000 Control Delay	62.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ AVENUE E | **PROPOSED CONCEPT - PM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	128	164	106	384	373	5	70	858	170	24	1548	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	12	11	11	12
Total Lost time (s)	4.0	4.0	6.5	4.0	4.0	6.5	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.91		1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	3433	1863	1583	1711	4794		1711	4817	
Flt Permitted	0.24	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	443	1863	1583	3433	1863	1583	1711	4794		1711	4817	
Peak-hour factor, PHF	0.96	0.96	0.96	0.94	0.94	0.94	0.89	0.89	0.89	0.92	0.92	0.92
Adj. Flow (vph)	133	171	110	409	397	5	79	964	191	26	1683	260
RTOR Reduction (vph)	0	0	93	0	0	4	0	20	0	0	15	0
Lane Group Flow (vph)	133	171	17	409	397	1	79	1135	0	26	1928	0
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4			8						
Actuated Green, G (s)	25.9	20.4	20.4	16.2	31.1	31.1	8.1	64.7		3.5	60.1	
Effective Green, g (s)	30.9	22.9	20.4	18.7	33.6	31.1	10.2	66.8		5.6	62.2	
Actuated g/C Ratio	0.24	0.18	0.16	0.14	0.26	0.24	0.08	0.51		0.04	0.48	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.1	6.1		6.1	6.1	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5		2.0	1.5	
Lane Grp Cap (vph)	186	328	248	493	481	378	134	2463		73	2304	
v/s Ratio Prot	0.04	0.09		c0.12	c0.21		c0.05	0.24		0.02	c0.40	
v/s Ratio Perm	0.13		0.01			0.00						
v/c Ratio	0.72	0.52	0.07	0.83	0.83	0.00	0.59	0.46		0.36	0.84	
Uniform Delay, d1	41.6	48.6	46.7	54.1	45.4	37.6	57.9	20.1		60.4	29.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.66		0.80	0.63	
Incremental Delay, d2	10.3	0.7	0.0	10.6	10.5	0.0	4.1	0.6		1.0	3.6	
Delay (s)	52.0	49.3	46.8	64.7	56.0	37.6	60.1	13.8		49.2	22.2	
Level of Service	D	D	D	E	E	D	E	B		D	C	
Approach Delay (s)		49.5			60.2			16.8			22.5	
Approach LOS		D			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ DOVE COUNTRY DRIVE | **EXISTING - AM**

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	75	35	1926	59	24	917
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.96		1.00		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1724		3524		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	1724		3524		1770	3539
Peak-hour factor, PHF	0.76	0.76	0.96	0.96	0.89	0.89
Adj. Flow (vph)	99	46	2006	61	27	1030
RTOR Reduction (vph)	13	0	1	0	0	0
Lane Group Flow (vph)	132	0	2066	0	27	1030
Turn Type	NA		NA		Prot	NA
Protected Phases	4		2		1	6
Permitted Phases						
Actuated Green, G (s)	13.4		96.8		3.3	105.6
Effective Green, g (s)	14.9		98.3		4.8	107.1
Actuated g/C Ratio	0.11		0.76		0.04	0.82
Clearance Time (s)	5.5		5.5		5.5	5.5
Vehicle Extension (s)	2.0		1.5		2.0	1.5
Lane Grp Cap (vph)	197		2664		65	2915
v/s Ratio Prot	c0.08		c0.59		0.02	c0.29
v/s Ratio Perm						
v/c Ratio	0.67		0.78		0.42	0.35
Uniform Delay, d1	55.2		9.3		61.2	2.8
Progression Factor	1.00		0.13		0.79	0.66
Incremental Delay, d2	6.5		1.1		1.2	0.3
Delay (s)	61.7		2.3		49.4	2.1
Level of Service	E		A		D	A
Approach Delay (s)	61.7		2.3			3.3
Approach LOS	E		A			A

Intersection Summary			
HCM 2000 Control Delay	5.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ DOVE COUNTRY DRIVE | **PROPOSED CONCEPT - AM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	10	75	10	35	10	1926	59	24	917	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	12	11	11	12
Total Lost time (s)	5.5	5.5		4.0	5.5		5.5	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	0.93		1.00	0.88		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1723		1770	1642		1711	4894		1711	4908	
Flt Permitted	0.72	1.00		0.74	1.00		0.27	1.00		0.95	1.00	
Satd. Flow (perm)	1347	1723		1384	1642		491	4894		1711	4908	
Peak-hour factor, PHF	0.92	0.92	0.92	0.85	0.92	0.85	0.92	0.93	0.93	0.94	0.94	0.92
Adj. Flow (vph)	11	11	11	88	11	41	11	2071	63	26	976	11
RTOR Reduction (vph)	0	10	0	0	37	0	0	2	0	0	1	0
Lane Group Flow (vph)	11	12	0	88	15	0	11	2132	0	26	986	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Prot	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2					
Actuated Green, G (s)	13.6	13.6		13.6	13.6		96.6	96.6		3.3	105.4	
Effective Green, g (s)	13.6	13.6		15.1	13.6		96.6	98.1		4.8	106.9	
Actuated g/C Ratio	0.10	0.10		0.12	0.10		0.74	0.75		0.04	0.82	
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		3.0	3.0		1.5	1.5		2.0	1.5	
Lane Grp Cap (vph)	140	180		160	171		364	3693		63	4035	
v/s Ratio Prot		0.01			0.01			c0.44		c0.02	0.20	
v/s Ratio Perm	0.01			c0.06			0.02					
v/c Ratio	0.08	0.07		0.55	0.09		0.03	0.58		0.41	0.24	
Uniform Delay, d1	52.5	52.5		54.2	52.6		4.4	6.9		61.2	2.6	
Progression Factor	1.00	1.00		1.00	1.00		0.26	0.24		0.68	0.48	
Incremental Delay, d2	0.1	0.1		4.0	0.2		0.1	0.4		1.5	0.1	
Delay (s)	52.6	52.5		58.3	52.8		1.2	2.1		43.1	1.4	
Level of Service	D	D		E	D		A	A		D	A	
Approach Delay (s)		52.6			56.3			2.1			2.4	
Approach LOS		D			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

FM 1092 @ DOVE COUNTRY DRIVE | **EXISTING - PM**

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	66	36	1113	75	23	2022
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.95		0.99		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1719		3506		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	1719		3506		1770	3539
Peak-hour factor, PHF	0.85	0.85	0.93	0.93	0.94	0.94
Adj. Flow (vph)	78	42	1197	81	24	2151
RTOR Reduction (vph)	15	0	3	0	0	0
Lane Group Flow (vph)	105	0	1275	0	24	2151
Turn Type	NA		NA		Prot	NA
Protected Phases	4		2		1	6
Permitted Phases						
Actuated Green, G (s)	11.7		98.2		3.6	107.3
Effective Green, g (s)	13.2		99.7		5.1	108.8
Actuated g/C Ratio	0.10		0.77		0.04	0.84
Clearance Time (s)	5.5		5.5		5.5	5.5
Vehicle Extension (s)	2.0		1.5		2.0	1.5
Lane Grp Cap (vph)	174		2688		69	2961
v/s Ratio Prot	c0.06		0.36		0.01	c0.61
v/s Ratio Perm						
v/c Ratio	0.60		0.47		0.35	0.73
Uniform Delay, d1	55.9		5.5		60.8	4.4
Progression Factor	1.00		0.41		1.34	0.55
Incremental Delay, d2	4.0		0.5		0.1	0.1
Delay (s)	59.9		2.8		81.8	2.6
Level of Service	E		A		F	A
Approach Delay (s)	59.9		2.8			3.4
Approach LOS	E		A			A

Intersection Summary			
HCM 2000 Control Delay	5.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

FM 1092 @ DOVE COUNTRY DRIVE | **PROPOSED CONCEPT - PM**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	10	66	10	36	10	1113	75	23	2022	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	12	11	11	12
Total Lost time (s)	5.5	5.5		4.0	5.5		5.5	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.91		1.00	0.91	
Frt	1.00	0.93		1.00	0.88		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1723		1770	1641		1711	4869		1711	4912	
Flt Permitted	0.72	1.00		0.74	1.00		0.08	1.00		0.95	1.00	
Satd. Flow (perm)	1346	1723		1384	1641		138	4869		1711	4912	
Peak-hour factor, PHF	0.92	0.92	0.92	0.85	0.92	0.85	0.92	0.93	0.93	0.94	0.94	0.92
Adj. Flow (vph)	11	11	11	78	11	42	11	1197	81	24	2151	11
RTOR Reduction (vph)	0	10	0	0	38	0	0	3	0	0	0	0
Lane Group Flow (vph)	11	12	0	78	15	0	11	1275	0	24	2162	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Prot	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2					
Actuated Green, G (s)	12.7	12.7		12.7	12.7		96.4	96.4		4.4	106.3	
Effective Green, g (s)	12.7	12.7		14.2	12.7		96.4	97.9		5.9	107.8	
Actuated g/C Ratio	0.10	0.10		0.11	0.10		0.74	0.75		0.05	0.83	
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		3.0	3.0		1.5	1.5		2.0	1.5	
Lane Grp Cap (vph)	131	168		151	160		102	3666		77	4073	
v/s Ratio Prot		0.01			0.01			0.26		0.01	c0.44	
v/s Ratio Perm	0.01			c0.06			0.08					
v/c Ratio	0.08	0.07		0.52	0.09		0.11	0.35		0.31	0.53	
Uniform Delay, d1	53.4	53.3		54.7	53.4		4.7	5.4		60.1	3.4	
Progression Factor	1.00	1.00		1.00	1.00		0.49	0.45		1.31	0.43	
Incremental Delay, d2	0.1	0.1		3.0	0.3		1.9	0.2		0.5	0.3	
Delay (s)	53.5	53.4		57.6	53.7		4.2	2.6		79.3	1.7	
Level of Service	D	D		E	D		A	A		E	A	
Approach Delay (s)		53.4			56.0			2.6			2.6	
Approach LOS		D			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX F | DETAILED COST ESTIMATES

1. Figure AF.1 - Summary of Roadway Corridor, Intersection, Landscape and Streetscape Recommendations

2. Figure AF.2 - Summary of Recommendations with Cost Breakdown by Agency

3. Detailed construction cost estimates for intersection and corridor recommendations

Table AF.1 *Summary of Roadway Corridor, Intersection, Landscape and Streetscape Recommendations*

PROJECT NUMBER	PROJECT TITLE	TYPE	LOCATION	TERM	PROJECT	COST
1	**Install Signal Interconnect**	Corridor	Corridor	SHORT	Install Signal Interconnect system from US 59 to Dove Country Road - Fiber Optic Cable System	$ 510,400
2A	**FM 1092 at US 59 West Frontage Rd - Short**	Intersection	FM 1092 at US 59 West Frontage Rd	SHORT	Intersection upgrades to address safety issues: curb extension and extending signage & striping	$ 46,200
2B	**FM 1092 at US 59 West Frontage Rd - Long**	Intersection	FM 1092 at US 59 West Frontage Rd	LONG	ROW acquisition and widening to add an additional westbound through lane and realign intersection with three receiving lanes	$ 297,600
3	**FM 1092 at Roark Rd**	Intersection	FM 1092 at Roark Rd	LONG	Widen and realign intersection, include a northbound right-turn only lane. Widen Roark Road from FM 1092 to West Bellfort Boulevard and restripe from FM 1092 to US 59 East Frontage Road as a three-lane roadway with 2 5' Bicycle lanes	FUTURE [1]
4	**Mid-block Crossing**	Intersection	FM 1092 between Nations Blvd and Altonbury Ln	MEDIUM	Two-stage mid-block pedestrian crossing with HAWK beacon signal and median	$ 147,500
5A	**FM 1092 at West Airport Blvd - Short**	Intersection	FM 1092 at West Airport Blvd	SHORT	Install crosswalks on all four approaches as well as wheel chair ramps and pedestrian signals	$ 33,400
5B	**FM 1092 at West Airport Blvd - Long**	Intersection	FM 1092 at West Airport Blvd	LONG	Intersection upgrades including the installation of eastbound left-turn lane and right-turn lane, additional downstream lane from the westbound approach, extension of westbound left-turn lane, and signal timings to remove split phasing for West Airport Boulevard approaches. Includes the widening of West Airport Boulevard bridge with bridge culverts.	$ 1,225,500
6	**FM 1092 at Fountaingate Dr**	Intersection	FM 1092 at Fountaingate Dr	LONG	Realignment to match schematic; requires ROW acquisition	$ 1,257,700
7	**FM 1092 at Greenbriar Dr/Mula Rd**	Intersection	FM 1092 at Greenbriar Dr/ Mula Rd	SHORT	Restripe Mula Road and Greenbriar Drive as 3-lane roadway (2 travel lanes and one continues left-turn lane) with 2 5' foot bicycle lanes to allow for dedicated left turns at FM 1092. Revise signal operations and timings to support lane geometry and remove split phase operations. Install crosswalks and pedestrian signals.	$ 57,300
8	**FM 1092 at Cash Rd**	Intersection	FM 1092 at Cash Rd	SHORT	1. Pedestrian improvements: Install crosswalks, wheelchair ramps (3), and pedestrian signals 2. Restripe and add appropriate signage to designate Cash Road between FM 1092 and Stafford Road as a bicycle route with sharrows	$ 61,000
9	**FM 1092 at US 90A Underpass**	Intersection	FM 1092 at US 90A Underpass	SHORT	Install raised delineators in the four gore areas between the FM 1092 frontage roads and the FM 1092 main travels lanes as well as improve signage and striping. Specifically for southbound traffic south of the underpass and northbound traffic north of the underpass to address drivers making unsafe driving maneuvers at these locations.	$ 30,500
10	**FM 1092 at Avenue E**	Intersection	FM 1092 at Avenue E	LONG	Realignment to match schematic	$ 1,774,000
11A	**FM 1092 at Dove Country Dr - Short**	Intersection	FM 1092 at Dove Country Dr	SHORT	Install crosswalks, wheel chair ramps, and pedestrian signals	$ 28,800
11B	**FM 1092 at Dove Country Dr - Medium**	Intersection	FM 1092 at Dove Country Dr	MEDIUM	Convert to four-way intersection by adding driveway to the adjacent strip retail center located at 720 FM 1092. With the construction of new driveway at the retail center, close the two northern most driveways as part of driveway consolidation strategy	$ 186,000
12	**US 90A at Promenade Blvd**	Intersection	US 90A at Promenade Blvd	SHORT	Improve signal timing at the intersection to allow northbound left turns when a train is present along the UP railroad.	$ 33,800
13	**Restripe Corridor**	Corridor	Corridor from US 59 to Avenue E	SHORT	Restripe corridor with proposed cross-section: US 59 to Roark Road: 4 12' inside travel lanes, 2 14' outside travel lanes, 13' two-way left-turn lane Roark Road to US 59 Underpass: 6 11' travel lanes, 2 5' bicycle lanes, 13' two-way left-turn lane.	$ 471,100
14	**Construct 13' Median**	Corridor	Corridor from US 59 to Avenue E	SHORT	Construct 13' median along the entire corridor with channelized left turns lanes (Note the possible inclusion in cost estimates of 20' of mountable curb for each left turn lane)	$ 485,400
15	**RTP Project 13641**	Corridor	Corridor (South of Avenue E)	LONG	Widen FM 1092 as included in RTP project 13641 and the FM 1092 Access Management Plan - Missouri City; including proposed medians and stripping with proposed cross-section	$ 10,100,000
16	**Landscape Medians**	Landscape	Corridor	MEDIUM	Landscape roadway medians with turf, ground cover, shrubs and a single row of street trees on center, while maintaining visibility for drivers at the median ends	$ 500,000 - $700,000 [2]
17	**Driveway Consolidation**	Corridor	Driveway Consolidation	MEDIUM	Driveway consolidation for the following areas: 1. Southport Business Park located at 12220 Murphy Road - Close northern most and central driveway and install driveway adjacent with future median opening; install driveway with access to Nations Boulevard 2. Car mechanics and storage located south of West Airport Boulevard at 12439 Murphy RD and 12503 Murphy RD - Consolidate driveways and provide cross access 3. ReStore Home Improvement and Retail store located at 13570 Murphy RD - add additional driveway to line up with median opening and improve cross access 4. Houston Community Bank and adjacent property located at 13570 Murphy RD and 13715 Murphy RD - Provide cross access 5. Cross access between retail centers along the west side of FM 1092 and north of the canal at 504 FM 1092 and 508 Murphy RD	$ 120,800
18A	**Construct Sidewalks**	Corridor	Corridor (excluding Greenbough Dr to Boardwalk Pkwy)	MEDIUM	Construct 20,300 feet of 6' sidewalks along corridor with landscaped buffer where sidewalks are currently not present; includes wheelchair ramps at unsignalized intersections where necessary.	$ 1,444,700
18B	**Construct Side Paths**	Corridor	Between Greenbough Dr and Boardwalk Pkwy	MEDIUM	Construct 4500 feet of side paths with landscaped buffer and ramp connections between bicycle lanes and side paths	$ 321,900
19	**Plants Street Trees**	Landscape	Corridor	MEDIUM	Plant street trees on center of landscaping strip, per existing City of Stafford Ordinance (Section 98-26), to provide shade for pedestrians and improve overall aesthetic	$ 150,000 - $ 300,000 [3]
20	**Pedestrian Lighting**	Streetscape	Corridor	MEDIUM	Install pedestrian lighting along sidewalks to target a foot candle (fc) coverage, the distance that is illuminated from the light source. Lighting fixtures may be chosen to fit within the City of Stafford branding efforts.	$ 1,000,000 - $ 3,000,000 [4]
21	**Roadway Lighting**	Corridor	FM 1092 between US 59 and Roark Rd	MEDIUM	Install double-headed roadway lighting with a 0.6 to 0.7 foot candle (fc) coverage along the center of the median. Lighting fixtures may be chosen to fit within the City of Stafford branding efforts.	$ 400,000 - $ 500,000 [5]
22	**City of Stafford Monuments**	Streetscape	FM 1092 median at north and south city limit	MEDIUM	Install City of Stafford monument/gateway marker in medians to serve as landmarks or visual cues for navigation	Cost similar to existing monuments
23	**Stafford Centre Park**	Streetscape	West end of Stafford Centre, adjacent to FM 1092	LONG	Develop park and plaza space along FM 1092 at Stafford Centre for public use to include hardscape and softscape elements, shade trees, event space, lighting, and site furnishings, such as benches, trash receptacles bike racks, etc.)	$ 145,000 [6]
24	**Pedestrian and Bicycle Trail**	Streetscape	Drainage corridor along FM 1092	LONG	Develop landscape/beautification plan for drainage corridor along FM 1092 to create pedestrian and bicyclist trails	$ 135,000 [7]

[1] Cost to be based on final design of future long term project
[2] For trees, depending on size, at a 25 to 100 foot spacing. Special pavers are an alternative to vegetation landscaping that can reduce maintenance costs.
[3] For trees, depending on size, at a spacing of 25 to 100 feet
[4] Dependent on phasing of implementation prioritized by activity centers and fixture type and spacing
[5] Dependent on fixture type and a spacing of 120 to 150 feet
[6] Cost is estimated based on a 9,000 square foot plaza on the southeast corner of FM 1092 at Cash Rd
[7] Cost estimate considers the addition of a trail, irrigation and street trees along the drainage corridor at the Texas Instruments Site

Table AF.2 *Summary of Recommendations with Cost Breakdown by Agency*

PROJECT NUMBER	PROJECT TITLE	TYPE	TXDOT COST	CITY OF STAFFORD COST [1]	OTHER ENTITIES [2]	COST
			SHORT			
1	Install Signal Interconnect	Corridor	$ 510,400	$0	$0	$ 510,400
2A	FM 1092 at US 59 West Frontage Rd - Short	Intersection	$ 46,200	$0	$0	$ 46,200
5A	FM 1092 at West Airport Blvd - Short	Intersection	$ 33,400	$0	$0	$ 33,400
7	FM 1092 at Greenbriar Dr/Mula Rd	Intersection	$ 22,920	$ 34,380	$0	$ 57,300
8	FM 1092 at Cash Rd	Intersection	$ 48,800	$ 12,200	$0	$ 61,000
9	FM 1092 at US 90A Underpass	Intersection	$ 30,500	$0	$0	$ 30,500
11A	FM 1092 at Dove Country Dr - Short	Intersection	$ 28,800	$0	$0	$ 28,800
12	US 90A at Promenade Blvd	Intersection	$ 33,800	$0	$0	$ 33,800
13	Restripe Corridor	Corridor	$ 471,100	$0	$0	$ 471,100
14	Construct 13' Median	Corridor	$ 485,400	$0	$0	$ 485,400
			MEDIUM			
4	Mid-block Crossing	Intersection	$ 147,500	$0	$0	$ 147,500
11B	FM 1092 at Dove Country Dr - Medium	Intersection	$ 186,000	$0	$0	$ 186,000
16	Landscape Medians	Landscape	$0	$ 425,000 - $ 595,000 [3]	$ 75,000 - $ 105,000 [3]	$ 500,000 - $700,000 [3]
17	Driveway Consolidation	Corridor	$ 120,800	$0	$0	$ 120,800
18A	Construct Sidewalks	Corridor	$ 1,444,700	$0	$0	$ 1,444,700
18B	Construct Side Paths	Corridor	$ 321,900	$0	$0	$ 321,900
19	Plants Street Trees	Landscape	$0	$127,500 - $ 255,000 [4]	$ 22,500 - $ 45,000 [4]	$ 150,000 - $ 300,000 [4]
20	Pedestrian Lighting	Streetscape	$0	$ 850,000 - $ 2,550,000 [5]	$ 150,000 - $ 450,000 [5]	$ 1,000,000 - $ 3,000,000 [5]
21	Roadway Lighting	Corridor	$ 400,000 - $ 500,000 [4]	$0	$0	$ 400,000 - $ 500,000 [6]
22	City of Stafford Monuments	Streetscape	$0	Cost similar to existing monuments	$0	Cost similar to existing monuments
			LONG			
2B	FM 1092 at US 59 West Frontage Rd - Long	Intersection	$ 297,600	$0	$0	$ 297,600
3	FM 1092 at Roark Rd	Intersection	Future Cost [7]			
5B	FM 1092 at West Airport Blvd - Long	Intersection	$ 1,225,500	$0	$0	$ 1,225,500
6	FM 1092 at Fountaingate Dr	Intersection	$ 1,006,160	$ 251,540	$0	$ 1,257,700
10	FM 1092 at Avenue E	Intersection	$ 1,774,000	$0	$0	$ 1,774,000
15	RTP Project 13641	Corridor	City of Missouri City listed as lead agency in the 2035 RTP Update			$ 10,100,000
23	Stafford Centre Park	Streetscape	$0	$ 145,000 [8]	$0	$ 145,000 [8]
24	Pedestrian and Bicycle Trail	Streetscape	$0	$ 135,000 [9]	$0	$ 135,000 [9]
			TOTAL COST			
		LOW	**$ 8,635,480**	**$ 1,980,620**	**$ 357,500**	**$ 10,863,600** [10]
		HIGH	**$ 8,735,480**	**$ 3,978,120**	**$ 600,000**	**$ 13,313,600** [10]

[1] Includes other entities within the City of Stafford not yet determined, e.g.: improvement districts, local businesses, other management entities
[2] Other entities outside the City of Stafford, e.g.: Brays Oaks Management District, International Management District
[3] For trees, depending on size, at a 25 to 100 foot spacing. Special pavers are an alternative to vegetation landscaping that can reduce maintenance costs.
[4] For trees, depending on size, at a spacing of 25 to 100 feet
[5] Dependent on phasing of implementation prioritized by activity centers and fixture type and spacing
[6] Dependent on fixture type and a spacing of 120 to 150 feet
[7] Cost to be based on final design of future long term project
[8] Cost is estimated based on a 9,000 square foot plaza on the southeast corner of FM 1092 at Cash Rd
[6] Cost estimate considers the addition of a trail, irrigation and street trees along the drainage corridor at the Texas Instruments Site
[10] Does not include Project 15 - 2035 RTP Updated Project 13641

PROJECT #1 - Install Signal Interconnect

From US 59 to Dove Country Road - Fiber Optic Cable System

SHORT

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0618 2100	CONDT(PVC)(SCH 40)(3")(CONC ENCSE)(RDWY	LF	18.25	16368.00	$298,716.00
6014 2017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	4.02	16368.00	$65,799.36
CONSTRUCTION SUBTOTAL					**$364,515.36**
MOBILIZATION (5%)					$18,225.77
DESIGN AND ENGINEERING (15%)					$54,677.30
CONTINGENCIES (20%)					$72,903.07
TOTAL					**$510,400.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013
[2] Total cost rounded up to the nearest $100

PROJECT #2A - FM 1092 at US 59 West Frontage Road

Eliminate southbound through movement from left-turn lane by extending curb island and extending signage and striping of Left Turn Only Lane for southbound approach.

SHORT

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0536 2002	CONC MEDIAN	SY	53.25	570.00	$30,352.50
0529 2001	CONC CURB (TY I)	LF	13.97	87.00	$1,215.39
0531 2005	CURB RAMPS (TY 1)	EA	1388.26	1.00	$1,388.26
CONSTRUCTION SUBTOTAL					**$32,956.15**
MOBILIZATION (5%)					$1,647.81
DESIGN AND ENGINEERING (15%)					$4,943.42
CONTINGENCIES (20%)					$6,591.23
TOTAL					**$46,200.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013
[2] Total cost rounded up to the nearest $100

PROJECT #2B - FM 1092 at US 59 West Frontage Road

Right-of-way acquisition and widening to add an additional southbound through lane and realign intersection with three receiving lanes.

LONG

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0104 2001	REMOVING CONC (PAV)	SY	10.50	814.77	$8,555.09
0104 2011	REMOVING CONC (MEDIANS)	SY	13.57	23.33	$316.59
0104 2015	REMOVING CONC (SIDEWALKS)	SY	9.15	118.44	$1,083.73
0104 2022	REMOVING CONC (CURB AND GUTTER)	LF	7.67	1126.95	$8,643.71
0260 2006	LIME TRT (EXST MATL) (6")	SY	1.97	894.34	$1,761.85
0292 2008	ASPHALT STAB BASE (GR 2)(PG 70)	TON	74.57	295.13	$22,008.01
0360 2003	CONC PVMT (CONT REINF-CRCP)(10")	SY	43.92	894.34	$39,279.41
0502 2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	4965.82	1.00	$4,965.82
0529 2001	CONC CURB (TY I)	LF	13.97	1029.45	$14,381.42
0531 2016	CONC SIDEWALKS (6')(6")	LF	45.91	978.76	$44,934.87
0531 2005	CURB RAMPS (TY 1)	EA	1388.26	4.00	$5,553.04
0666 2027	REFL PAV MRK TY I (W) 8" (BRK)(100MIL)	LF	1.42	1532.62	$2,176.32
0666 2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	0.91	822.93	$748.87
0666 2048	REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	5.66	108.16	$612.19
0666 2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	80.45	2.00	$160.90
0666 2069	REFL PAV MRK TY I(W)(DBL ARROW)(100MIL)	EA	171.12	2.00	$342.24
0666 2123	REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)	LF	0.95	233.19	$221.53
0666 2191	PAVEMENT SEALER 8"	LF	0.42	2588.74	$1,087.27
0666 2195	PAVEMENT SEALER 24"	LF	1.49	108.16	$161.16
0666 2219	PAVEMENT SEALER (ARROW)	EA	28.25	2.00	$56.50
0666 2224	PAVEMENT SEALER (DBL ARROW)	EA	74.21	2.00	$148.42
0677 2003	ELIM EXT PAV MRK & MRKS (8")	LF	0.85	1479.00	$1,257.15
0678 2003	PAV SURF PREP FOR MRK (8")	LF	0.20	2588.74	$517.75
0678 2006	PAV SURF PREP FOR MRK (24")	LF	0.43	108.16	$46.51
0678 2007	PAV SURF PREP FOR MRK (ARROW)	EA	11.78	2.00	$23.56
0678 2008	PAV SURF PREP FOR MRK (DBL ARROW)	EA	28.05	2.00	$56.10
CONSTRUCTION SUBTOTAL					**$159,099.98**
MOBILIZATION (5%)					$7,955.00
DESIGN AND ENGINEERING (15%)					$23,865.00
CONTINGENCIES (20%)					$31,820.00
LAND ACQUISITION [3]					$74,765.00
TOTAL					**$297,600.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013
[2] Total cost rounded up to the nearest $100
[3] Based on HCAD 2013 Land Values

PROJECT #4 - Mid-block Crossing

Two-stage mid-block pedestrian crossing with HAWK beacon signal on FM 1092 between Nations Boulevard and Altonbury Lane

MEDIUM

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0104 2011	REMOVING CONC (MEDIANS)	SY	13.57	8.00	$108.56
0104 2022	REMOVING CONC (CURB AND GUTTER)	LF	7.67	16.00	$122.72
0531 2010	CURB RAMPS (TY 7)	EA	1218.60	4.00	$4,874.40
0666 2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	0.91	144.00	$131.04
0666 2191	PAVEMENT SEALER 8"	LF	0.42	144.00	$60.48
0678 2003	PAV SURF PREP FOR MRK (8")	LF	0.20	144.00	$28.80
XXXX XXXX	HAWK BEACON INSTALLATION	EA	120000	1.00	$100,000.00
CONSTRUCTION SUBTOTAL					**$105,326.00**
MOBILIZATION (5%)					$5,266.30
DESIGN AND ENGINEERING (15%)					$15,798.90
CONTINGENCIES (20%)					$21,065.20
TOTAL					**$147,500.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013
[2] Total Costs rounded to the nearest $100

PROJECT #5A - FM 1092 at West Airport Boulevard

Install crosswalks on all four approaches as well as wheelchair ramps and pedestrian signals.

SHORT

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0104 2011	REMOVING CONC (MEDIANS)	SY	13.57	22.667	$307.59
0104 2022	REMOVING CONC (CURB AND GUTTER)	LF	7.67	116.32	$892.17
0531 2005	CURB RAMPS (TY 1)	EA	1388.26	8	$11,106.08
0531 2017	CURB RAMPS (TY 21)	EA	1507.5	1	$1,507.50
0666 2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	0.91	729.97	$664.27
0666 2048	REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	5.66	183.12	$1,036.46
0666 2191	PAVEMENT SEALER 8"	LF	0.42	729.97	$306.59
0666 2195	PAVEMENT SEALER 24"	LF	1.49	183.12	$272.85
0678 2003	PAV SURF PREP FOR MRK (8")	LF	0.2	729.97	$145.99
0678 2006	PAV SURF PREP FOR MRK (24")	LF	0.43	183.12	$78.74
0682 2014	PED SIG SEC (12 IN) LED (2 INDICATIONS W/9 IN	EA	361.37	8	$2,890.96
0684 2007	TRAF SIG CBL (TY A) (12 AWG) (2 CONDR) (P BTN)	LF	1.23	1150	$1,414.50
0684 2009	TRAF SIG CBL (TY A) (12 AWG) (4 CONDR) (P HD)	LF	1.42	1250	$1,775.00
0688 2001	PED DETECT (2 INCH PUSH BTN)	EA	148	8	$1,184.00
XXXX XXXX	PED WALK SIGN (R10-3ER, 9" X 12")	EA	30	4	$120.00
XXXX XXXX	PED WALK SIGN (R10-3EL, 9" X 12")	EA	30	4	$120.00
CONSTRUCTION SUBTOTAL					**$23,822.71**
MOBILIZATION (5%)					$1,191.14
DESIGN AND ENGINEERING (15%)					$3,573.41
CONTINGENCIES (20%)					$4,764.54
TOTAL					**$33,400.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013
[2] Total Costs rounded to the nearest $100

PROJECT #5B - FM 1092 at West Airport Boulevard

LONG

Intersection upgrades including the installation of eastbound left-turn lane and right-turn lane, additional downstream lane from the westbound approach, extension of westbound left-turn lane, and signal timings to remove split phasing for West Airport Boulevard approaches.

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0104 2011	REMOVING CONC (MEDIANS)	SY	13.57	896.44	$12,164.75
0104 2022	REMOVING CONC (CURB AND GUTTER)	LF	7.67	1087.33	$8,339.82
0260 2006	LIME TRT (EXST MATL) (6")	SY	1.97	896.44	$1,766.00
0292 2008	ASPHALT STAB BASE (GR 2)(PG 70)	TON	74.57	295.83	$22,059.79
0360 2003	CONC PVMT (CONT REINF-CRCP)(10")	SY	43.92	741.31	$32,558.48
0502 2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	4965.82	3.00	$14,897.46
0529 2001	CONC CURB (TY I)	LF	13.97	1797.83	$25,115.69
0666 2027	REFL PAV MRK TY I (W) 8" (BRK)(100MIL)	LF	1.42	1567.78	$2,226.25
0666 2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	0.91	511.08	$465.08
0666 2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	80.45	3.00	$241.35
0666 2191	PAVEMENT SEALER 8"	LF	0.42	1979.86	$831.54
0666 2219	PAVEMENT SEALER (ARROW)	EA	28.25	102.00	$2,881.50
0677 2003	ELIM EXT PAV MRK & MRKS (8")	LF	0.85	1567.78	$1,332.61
0678 2003	PAV SURF PREP FOR MRK (8")	LF	0.20	2078.86	$415.77
0678 2007	PAV SURF PREP FOR MRK (ARROW)	EA	11.78	3.00	$35.34
XXXX XXXX	BRIDGE WIDENING WITH BRIDGE CLASS CULVERTS	EA	750000	1.00	$750,000.00
CONSTRUCTION SUBTOTAL					**$875,331.44**
MOBILIZATION (5%)					$43,766.57
DESIGN AND ENGINEERING (15%)					$131,299.72
CONTINGENCIES (20%)					$175,066.29
TOTAL					**$1,225,500.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013
[2] Total Costs rounded to the nearest $100

PROJECT #6 - FM 1092 AT FOUNTAINGATE DRIVE

LONG

Realignment to match schematic; requires ROW acquisition

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0104 2001	REMOVING CONC (PAV)	SY	10.5	1544.275556	$16,214.89
0104 2022	REMOVING CONC (CURB AND GUTTER)	LF	7.67	800.82	$6,142.29
0260 2006	LIME TRT (EXST MATL) (6")	SY	1.97	7647.883333	$15,066.33
0292 2008	ASPHALT STAB BASE (GR 2)(PG 70)	TON	74.57	2523.8015	$188,199.88
0360 2003	CONC PVMT (CONT REINF-CRCP)(10")	SY	43.92	7647.883333	$335,895.04
0502 2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	4965.82	1	$4,965.82
0529 2001	CONC CURB (TY I)	LF	13.97	3423.36	$47,824.34
0530 2037	DRIVEWAYS (CONC)(TYPE 1)	SY	45	491.9677778	$22,138.55
0531 2016	CONC SIDEWALKS (6')(6")	LF	45.91	3711.3	$170,385.78
0531 2005	CURB RAMPS (TY 1)	EA	1388.26	8	$11,106.08
0536 2002	CONC MEDIAN	SY	53.25	62.54	$3,330.26
0666 2027	REFL PAV MRK TY I (W) 8" (BRK)(100MIL)	LF	1.42	1017.09	$1,444.27
0666 2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	0.91	1204.52	$1,096.11
0666 2048	REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	5.66	148.49	$840.45
0666 2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	80.45	4	$321.80
0666 2123	REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)	LF	0.95	1997.68	$1,897.80
0666 2191	PAVEMENT SEALER 8"	LF	0.42	4219.29	$1,772.10
0666 2195	PAVEMENT SEALER 24"	LF	1.49	148.49	$221.25
0666 2219	PAVEMENT SEALER (ARROW)	EA	28.25	4	$113.00
0677 2003	ELIM EXT PAV MRK & MRKS (8")	LF	0.85	1523.14	$1,294.67
0678 2003	PAV SURF PREP FOR MRK (8")	LF	0.2	4219.29	$843.86
0678 2006	PAV SURF PREP FOR MRK (24")	LF	0.43	148.49	$63.85
0678 2007	PAV SURF PREP FOR MRK (ARROW)	EA	11.78	4	$47.12
XXXX XXXX	TRAFFIC SIGNAL INSTALATION	EA	200000	1	$200,000.00
CONSTRUCTION SUBTOTAL					**$831,225.53**
MOBILIZATION (5%)					$41,561.28
DESIGN AND ENGINEERING (15%)					$124,683.83
CONTINGENCIES (20%)					$166,245.11
LAND ACQUISITION [3]					$93,950.00
TOTAL					**$1,257,700.00**
TXDOT TOTAL (80%)					$1,006,160.00
CITY OF STAFFORD TOTAL (20%)					$251,540.00

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013
[2] Total costs rounded up to the nearest $100
[3] Based on Fort Bend County Appraisal District 2013 Land Values

PROJECT #7 - FM 1092 AT MULA ROAD/GREENBRIAR DRIVE

SHORT

Restripe Mula Road and Greenbriar Drive as 3-lane roadway (two travel lanes and one continuous left-turn lane) with two-5' foot bicycle lanes to allow for dedicated left turns at FM 1092. Revise signal operations and timings to support lane geometry and remove split phase operations. Install crosswalks and pedestrian signals.

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0666 2006	REFL PAV MRK TY I (W) (4") (DOT) (100 ML)	LF	0.72	277	$199.44
0666 2012	REFL PAV MRK TY I (W) (4") (SLD) (100 ML)	LF	0.38	6171	$2,344.98
0666 2036	REFL PAV MRK TY I (W) (8") (SLD) (100 ML)	LF	0.91	501	$455.91
0666 2054	REFL PAV MRK TY I (W) (ARROW) (100 ML)	EA	80.45	4	$321.80
0666 2057	REFL PAV MRK TY I (W) (BIKE ARROW) (100 ML)	EA	55.73	12	$668.76
0666 2063	REFL PAV MRK TY I (W) (BIKE SYMBOL) (100 ML)	EA	55.3	12	$663.60
0666 2069	REFL PAV MRK TY I (W) (DBL ARROW) (100 ML)	EA	171.12	1	$171.12
0666 2096	REFL PAV MRK TY I (W) (WORD) (100 ML)	EA	125.65	4	$502.60
0666 2105	REFL PAV MRK TY I (Y) (4") (BRK) (100 ML)	LF	0.37	5378	$1,989.86
0666 2111	REFL PAV MRK TY I (Y) (4") (SLD) (100 ML)	LF	0.4	6411	$2,564.40
0666 2145	REFL PAV MRK TY II (W) (4") (SLD) (100 ML)	LF	0.17	6411	$1,089.87
0666 2147	REFL PAV MRK TY II (W) (4") (DOT) (100 ML)	LF	0.22	277	$60.94
0666 2153	REFL PAV MRK TY II (W) (8") (SLD) (100 ML)	LF	0.36	501	$180.36
0666 2160	REFL PAV MRK TY II (W) (ARROW) (100 ML)	EA	41.38	4	$165.52
0666 2161	REFL PAV MRK TY II (W) (BIKE ARROW) (100 ML)	EA	28.55	12	$342.60
0666 2163	REFL PAV MRK TY II (W) (BIKE SYMBOL) (100 ML)	EA	29.4	12	$352.80
0666 2165	REFL PAV MRK TY II (W) (DBL ARROW) (100 ML)	EA	56.75	1	$56.75
0666 2173	REFL PAV MRK TY II (W) (WORD) (100 ML)	EA	46.98	4	$187.92
0666 2178	REFL PAV MRK TY II (Y) (4") (SLD) (100 ML)	LF	0.17	6411	$1,089.87
0666 2189	PAVEMENT SEALER (4")	LF	0.29	18237	$5,288.73
0666 2191	PAVEMENT SEALER (8")	LF	0.42	501	$210.42
0666 2219	PAVEMENT SEALER (ARROW)	EA	28.25	4	$113.00
0666 2220	PAVEMENT SEALER (WORD)	EA	31.58	4	$126.32
0666 2224	PAVEMENT SEALER (DBL ARROW)	EA	74.21	1	$74.21
0666 2251	PAVEMENT SEALER (BIKE ARROW)	EA	44	12	$528.00
0666 2252	PAVEMENT SEALER (BIKE SYMBOL)	EA	72.6	12	$871.20
0672 2015	REFL PAV MRK TY II-A-A	EA	3.2	568	$1,817.60
0672 2017	REFL PAV MRK TY II-C-R	EA	3.56	44	$156.64
0682 2014	PED SIG SEC (12 IN) LED (2 INDICATIONS W/9 IN	EA	361.37	8	$2,890.96
0684 2007	TRAF SIG CBL (TY A) (12 AWG) (2 CONDR) (P BTN)	LF	1.23	1150	$1,414.50
0684 2009	TRAF SIG CBL (TY A) (12 AWG) (4 CONDR) (P HD)	LF	1.42	1250	$1,775.00
0688 2001	PED DETECT (2 INCH PUSH BTN)	EA	148	8	$1,184.00
XXXX XXXX	PED WALK SIGN (R10-3ER, 9" X 12")	EA	30	4	$120.00
XXXX XXXX	PED WALK SIGN (R10-3EL, 9" X 12")	EA	30	4	$120.00
XXXX XXXX	BIKE LANE SIGNAGE	EA	400	12	$4,800.00
XXXX XXXX	REVISING TIMING TO SPLIT PHASING, SIG HEADS	LS	6000	1	$6,000.00

CONSTRUCTION SUBTOTAL	$40,899.68
MOBILIZATION (5%)	$2,044.98
DESIGN AND ENGINEERING (15%)	$6,134.95
CONTINGENCIES (20%)	$8,179.94
TOTAL	**$57,300.00**
TXDOT TOTAL (40%)	$22,920.00
CITY OF STAFFORD TOTAL (60%)	$34,380.00

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013

[2] Total cost rounded up to the nearest $100

PROJECT #8 - FM 1092 at Cash Road

SHORT

Pedestrian improvements including crosswalk installation, three ADA wheelchair ramps, and pedestrian signals as well as restriping and adding appropriate signage to designate Cash Road between FM 1092 and Stafford Road as a bicycle route with sharrows connecting to Houston Community College.

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0104 2011	REMOVING CONC (MEDIANS)	SY	13.57	20.78	$281.92
0104 2022	REMOVING CONC (CURB AND GUTTER)	LF	7.67	130.01	$997.18
0260 2006	LIME TRT (EXST MATL) (6")	SY	1.97	20.78	$40.94
0292 2008	ASPHALT STAB BASE (GR 2)(PG 70)	TON	74.57	6.86	$511.36
0360 2003	CONC PVMT (CONT REINF-CRCP)(10")	SY	43.92	20.78	$912.66
0502 2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	4965.82	1.00	$4,965.82
0529 2001	CONC CURB (TY I)	LF	13.97	119.07	$1,663.41
0531 2005	CURB RAMPS (TY 1)	EA	1388.26	6.00	$8,329.56
0666 2027	REFL PAV MRK TY I (W) 8" (BRK)(100MIL)	LF	1.42	3125.73	$4,438.54
0666 2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	0.91	1137.52	$1,035.14
0666 2048	REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	5.66	172.05	$973.80
0666 2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	80.45	4.00	$321.80
0666 2191	PAVEMENT SEALER 8"	LF	0.42	4263.25	$1,790.57
0666 2195	PAVEMENT SEALER 24"	LF	1.49	172.05	$256.35
0666 2219	PAVEMENT SEALER (ARROW)	EA	28.25	4.00	$113.00
0677 2003	ELIM EXT PAV MRK & MRKS (8")	LF	0.85	4263.25	$3,623.76
0678 2003	PAV SURF PREP FOR MRK (8")	LF	0.20	4263.25	$852.65
0678 2006	PAV SURF PREP FOR MRK (24")	LF	0.43	172.05	$73.98
0678 2007	PAV SURF PREP FOR MRK (ARROW)	EA	11.78	4.00	$47.12
0682 2014	PED SIG SEC (12 IN) LED (2 INDICATIONS W/9 IN	EA	361.37	8.00	$2,890.96
0684 2007	TRAF SIG CBL (TY A) (12 AWG) (2 CONDR) (P BTN)	LF	1.23	1150.00	$1,414.50
0684 2009	TRAF SIG CBL (TY A) (12 AWG) (4 CONDR) (P HD)	LF	1.42	1250.00	$1,775.00
0668 2001	PED DETECT (2 INCH PUSH BTN)	EA	148.00	8.00	$1,184.00
XXXX XXXX	PED WALK SIGN (R10-3ER, 9" X 12")	EA	30.00	4.00	$120.00
XXXX XXXX	PED WALK SIGN (R10-3EL, 9" X 12")	EA	30.00	4.00	$120.00
XXXX XXXX	BIKE LANE SIGNAGE	EA	400.00	12.00	$4,800.00
CONSTRUCTION SUBTOTAL					**$43,534.02**
MOBILIZATION (5%)					$2,176.70
DESIGN AND ENGINEERING (15%)					$6,530.10
CONTINGENCIES (20%)					$8,706.80
TOTAL					**$61,000.00**
TXDOT TOTAL (80%)					$48,800.00
CITY OF STAFFORD TOTAL (20%)					$12,200.00

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013
[2] Total cost rounded up to the nearest $100

PROJECT #9 - FM 1092 at US 90A Underpass

SHORT

Install raised delineators in the four gore areas between the FM 1092 frontage roads and the FM 1092 main travels lanes as well as improve signage and striping. Specifically for southbound traffic south of the underpass and northbound traffic north of the underpass to address drivers making unsafe driving maneuvers at these locations.

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0658 2237	INSTL DEL ASSM (D-SW)SZ 1(FLX)SRF	EA	91.72	150.00	$13,758.00
XXXX XXXX	INCREASED SIGNAGE	EA	400.00	20.00	$8,000.00
CONSTRUCTION SUBTOTAL					**$21,758.00**
MOBILIZATION (5%)					$1,087.90
DESIGN AND ENGINEERING (15%)					$3,263.70
CONTINGENCIES (20%)					$4,351.60
TOTAL					**$30,500.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013
[2] Total cost rounded up to the nearest $100

PROJECT #10 - FM 1092 AT AVENUE E

LONG

Realign Avenue E to remove intersection skew and to include dual westbound left-turn lanes. Revise signal operations and timings to support lane geometry and protected left-turn movements (remove split phase)

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0104 2001	REMOVING CONC (PAV)	SY	10.50	3461.80	$36,348.94
0104 2011	REMOVING CONC (MEDIANS)	SY	13.57	114.16	$1,549.11
0104 2022	REMOVING CONC (CURB AND GUTTER)	LF	7.67	4202.21	$32,230.95
0260 2006	LIME TRT (EXST MATL) (6")	SY	1.97	8568.05	$16,879.05
0292 2008	ASPHALT STAB BASE (GR 2)(PG 70)	TON	74.57	2827.46	$210,843.32
0360 2003	CONC PVMT (CONT REINF-CRCP)(10")	SY	43.92	8568.05	$376,308.56
0502 2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	4965.82	1.00	$4,965.82
0529 2001	CONC CURB (TY I)	LF	13.97	8820.00	$123,215.40
0530 2010	DRIVEWAYS (CONC)	SY	59.24	2375.12	$140,702.37
0531 2016	CONC SIDEWALKS (6')(6")	LF	45.91	2536.80	$116,464.49
0531 2005	CURB RAMPS (TY 1)	EA	1388.26	6.00	$8,329.56
0666 2027	REFL PAV MRK TY I (W) 8" (BRK)(100MIL)	LF	1.42	975.96	$1,385.86
0666 2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	0.91	2432.07	$2,213.18
0666 2048	REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	5.66	183.19	$1,036.86
0666 2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	80.45	9.00	$724.05
0666 2123	REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)	LF	0.95	1167.13	$1,108.77
0666 2191	PAVEMENT SEALER 8"	LF	0.42	4575.16	$1,921.57
0666 2195	PAVEMENT SEALER 24"	LF	1.49	183.19	$272.95
0666 2219	PAVEMENT SEALER (ARROW)	EA	28.25	9.00	$254.25
0677 2003	ELIM EXT PAV MRK & MRKS (8")	LF	0.85	4178.27	$3,551.53
0678 2003	PAV SURF PREP FOR MRK (8")	LF	0.20	4575.16	$915.03
0678 2006	PAV SURF PREP FOR MRK (24")	LF	0.43	183.19	$78.77
0678 2007	PAV SURF PREP FOR MRK (ARROW)	EA	11.78	9.00	$106.02
XXXX XXXX	SIGNAL MODIFICATIONS	EA	100000	1.00	$100,000.00
CONSTRUCTION SUBTOTAL					**$1,181,406.41**
MOBILIZATION (5%)					$59,070.32
DESIGN AND ENGINEERING (15%)					$177,210.96
CONTINGENCIES (20%)					$236,281.28
LAND ACQUISITION [3]					$120,000.00
TOTAL					**$1,774,000.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013
[2] Total cost rounded up to the nearest $100
[3] Based on Fort Bend County Appraisal District 2013 Land Values

PROJECT #11A - FM 1092 at Dove Country Drive

SHORT

Install crosswalks, wheel chair ramps, and pedestrian signals.

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0531 2005	CURB RAMPS (TY 1)	EA	1388.26	8.00	$11,106.08
0666 2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	0.91	554.11	$504.24
0666 2048	REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	5.66	138.81	$785.66
0666 2191	PAVEMENT SEALER 8"	LF	0.42	554.11	$232.73
0666 2195	PAVEMENT SEALER 24"	LF	1.49	138.81	$206.83
0678 2003	PAV SURF PREP FOR MRK (8")	LF	0.20	554.11	$110.82
0678 2006	PAV SURF PREP FOR MRK (24")	LF	0.43	138.81	$59.69
0682 2014	PED SIG SEC (12 IN) LED (2 INDICATIONS W/9 IN	EA	361.37	8.00	$2,890.96
0684 2007	TRAF SIG CBL (TY A) (12 AWG) (2 CONDR) (P BTN)	LF	1.23	1150.00	$1,414.50
0684 2009	TRAF SIG CBL (TY A) (12 AWG) (4 CONDR) (P HD)	LF	1.42	1250.00	$1,775.00
0688 2001	PED DETECT (2 INCH PUSH BTN)	EA	148.00	8.00	$1,184.00
XXXX XXXX	PED WALK SIGN (R10-3ER, 9" X 12")	EA	30.00	4.00	$120.00
XXXX XXXX	PED WALK SIGN (R10-3EL, 9" X 12")	EA	30.00	4.00	$120.00
CONSTRUCTION SUBTOTAL					**$20,510.51**
MOBILIZATION (5%)					$1,025.53
DESIGN AND ENGINEERING (15%)					$3,076.58
CONTINGENCIES (20%)					$4,102.10
TOTAL					**$28,800.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013
[2] Total cost rounded up to the nearest $100

PROJECT #11B - FM 1092 at Dove Country Drive

MEDIUM

Convert to four-way intersection by adding driveway to the adjacent strip retail center located at 720 FM 1092. With the construction of new driveway at the retail center, close the two northern most driveways as part of driveway consolidation strategy.

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0104 2017	REMOVING CONC (DRIVEWAYS)	SY	12.39	600.00	$7,434.00
0104 2022	REMOVING CONC (CURB AND GUTTER)	LF	7.67	739.25	$5,670.05
0260 2006	LIME TRT (EXST MATL) (6")	SY	1.97	721.41	$1,421.18
0292 2008	ASPHALT STAB BASE (GR 2)(PG 70)	TON	74.57	238.07	$17,752.58
0360 2003	CONC PVMT (CONT REINF-CRCP)(10")	SY	43.92	721.41	$31,684.42
0502 2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	4965.82	1.00	$4,965.82
0529 2001	CONC CURB (TY I)	LF	13.97	909.99	$12,712.56
0531 2016	CONC SIDEWALKS (6')(6")	LF	45.91	1020.90	$46,869.52
0666 2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	0.91	223.62	$203.49
0666 2048	REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	5.66	21.55	$121.97
0666 2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	80.45	2.00	$160.90
0666 2069	REFL PAV MRK TY I(W)(DBL ARROW)(100MIL)	EA	171.12	2.00	$342.24
0666 2123	REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)	LF	0.95	1632.84	$1,551.20
0666 2191	PAVEMENT SEALER 8"	LF	0.42	1856.46	$779.71
0666 2195	PAVEMENT SEALER 24"	LF	1.49	21.55	$32.11
0666 2219	PAVEMENT SEALER (ARROW)	EA	28.25	2.00	$56.50
0666 2224	PAVEMENT SEALER (DBL ARROW)	EA	74.21	2.00	$148.42
0677 2003	ELIM EXT PAV MRK & MRKS (8")	LF	0.85	540.00	$459.00
0678 2003	PAV SURF PREP FOR MRK (8")	LF	0.20	1856.46	$371.29
0678 2006	PAV SURF PREP FOR MRK (24")	LF	0.43	21.55	$9.27
0678 2007	PAV SURF PREP FOR MRK (ARROW)	EA	11.78	2.00	$23.56
0678 2008	PAV SURF PREP FOR MRK (DBL ARROW)	EA	28.05	2.00	$56.10
CONSTRUCTION SUBTOTAL					**$132,825.90**
MOBILIZATION (5%)					$6,641.30
DESIGN AND ENGINEERING (15%)					$19,923.89
CONTINGENCIES (20%)					$26,565.18
TOTAL					**$186,000.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013
[2] Total cost rounded up to the nearest $100

PROJECT #13 - Restripe Corridor

SHORT

Restripe corridor with proposed cross-section:
US 59 to Roark Road: 4 12' inside travel lanes, 2 14' outside travel lanes, 13' two-way left-turn lane
Roark Road to US 59 Underpass: 6 11' travel lanes, 2 5' bicycle lanes, 13' two-way left-turn lane

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0666 2015	REFL PAV MRK TY I (W) (6") (BRK) (100 ML)	LF	0.6	16500	$9,900.00
0666 2018	REFL PAV MRK TY I (W) (6") (DOT) (100 ML)	LF	1.1	420	$462.00
0666 2024	REFL PAV MRK TY I (W) (6") (SLD) (100 ML)	LF	0.5	32000	$16,000.00
0666 2036	REFL PAV MRK TY I (W) (8") (SLD) (100 ML)	LF	0.8	8000	$6,400.00
0666 2042	REFL PAV MRK TY I (W) (12") (SLD) (100 ML)	LF	2.5	9700	$24,250.00
0666 2048	REFL PAV MRK TY I (W) (24") (SLD) (100 ML)	LF	5	2200	$11,000.00
0666 2054	REFL PAV MRK TY I (W) (ARROW) (100 ML)	EA	110	75	$8,250.00
0666 2057	REFL PAV MRK TY I (W) (BIKE ARROW) (100 ML)	EA	100	26	$2,600.00
0666 2060	REFL PAV MRK TY I (W) (BIKE RR XING) (100 ML)	EA	100	2	$200.00
0666 2063	REFL PAV MRK TY I (W) (BIKE SYMBOL) (100 ML)	EA	150	26	$3,900.00
0666 2069	REFL PAV MRK TY I (W) (DBL ARROW) (100 ML)	EA	180	10	$1,800.00
0666 2072	REFL PAV MRK TY I (W) (ENTR GORE) (100 ML)	EA	700	2	$1,400.00
0666 2075	REFL PAV MRK TY I (W) (EXIT GORE) (100 ML)	EA	500	2	$1,000.00
0666 2084	REFL PAV MRK TY I (W) (RR XING) (100 ML)	EA	350	6	$2,100.00
0666 2087	REFL PAV MRK TY I (W) (SYMBOL) (100 ML)	EA	200	6	$1,200.00
0666 2093	REFL PAV MRK TY I (W) (UTURN ARW) (100 ML)	EA	180	2	$360.00
0666 2096	REFL PAV MRK TY I (W) (WORD) (100 ML)	EA	125	70	$8,750.00
0666 2099	REFL PAV MRK TY I (W) (18") (YLD TRI) (100 ML)	EA	50	120	$6,000.00
0666 2120	REFL PAV MRK TY I (Y) (6") (SLD) (100 ML)	LF	0.5	5500	$2,750.00
0666 2126	REFL PAV MRK TY I (Y) (12") (SLD) (100 ML)	LF	3	18000	$54,000.00
0666 2146	REFL PAV MRK TY II (W) (6") (BRK) (100 ML)	LF	0.4	16500	$6,600.00
0666 2147	REFL PAV MRK TY II (W) (6") (DOT) (100 ML)	LF	0.6	420	$252.00
0666 2149	REFL PAV MRK TY II (W) (6") (SLD) (100 ML)	LF	0.5	32000	$16,000.00
0666 2153	REFL PAV MRK TY II (W) (8") (SLD) (100 ML)	LF	0.6	8000	$4,800.00
0666 2155	REFL PAV MRK TY II (W) (12") (SLD) (100 ML)	LF	1.1	9700	$10,670.00
0666 2157	REFL PAV MRK TY II (W) (24") (SLD) (100 ML)	LF	2.5	2200	$5,500.00
0666 2160	REFL PAV MRK TY II (W) (ARROW) (100 ML)	EA	50	75	$3,750.00
0666 2161	REFL PAV MRK TY II (W) (BIKE ARROW) (100 ML)	EA	50	26	$1,300.00
0666 2160	REFL PAV MRK TY II (W) (BIKE RR XING) (100 ML)	EA	50	2	$100.00
0666 2163	REFL PAV MRK TY II (W) (BIKE SYMBOL) (100 ML)	EA	60	26	$1,560.00
0666 2165	REFL PAV MRK TY II (W) (DBL ARROW) (100 ML)	EA	70	10	$700.00
0666 2166	REFL PAV MRK TY II (W) (ENTR GORE) (100 ML)	EA	200	2	$400.00
0666 2167	REFL PAV MRK TY II (W) (EXIT GORE) (100 ML)	EA	200	2	$400.00
0666 2169	REFL PAV MRK TY II (W) (RR XING) (100 ML)	EA	150	6	$900.00
0666 2171	REFL PAV MRK TY II (W) (SYMBOL) (100 ML)	EA	200	6	$1,200.00
0666 2172	REFL PAV MRK TY II (W) (UTURN ARW) (100 ML)	EA	60	2	$120.00
0666 2173	REFL PAV MRK TY II (W) (WORD) (100 ML)	EA	50	70	$3,500.00
0666 2174	REFL PAV MRK TY II (W) (18") (YLD TRI) (100 ML)	EA	25	120	$3,000.00
0666 2181	REFL PAV MRK TY II (Y) (6") (SLD) (100 ML)	LF	1.06	5500	$5,830.00

0666 2183	REFL PAV MRK TY II (Y) (12") (SLD) (100 ML)	LF	0.70692	18000	$12,724.56
0666 2190	PAVEMENT SEALER (6")	LF	0.11	54420	$5,986.20
0666 2191	PAVEMENT SEALER (8")	LF	0.13643	8000	$1,091.44
0666 2193	PAVEMENT SEALER (12")	LF	0.20257	27700	$5,611.19
0666 2195	PAVEMENT SEALER (24")	LF	0.45466	2200	$1,000.25
0666 2216	REFL PAV MRK TY I (BLACK) (6") (BRK) (100 ML)	LF	0.6	16500	$9,900.00
0666 2218	REFL PAV MRK TY II (BLACK) (6") (BRK) (100 ML)	LF	0.6	16500	$9,900.00
0666 2219	PAVEMENT SEALER (ARROW)	EA	35	75	$2,625.00
0666 2220	PAVEMENT SEALER (WORD)	EA	35	70	$2,450.00
0666 2224	PAVEMENT SEALER (DBL ARROW)	EA	40	10	$400.00
0666 2225	PAVEMENT SEALER (ENTR GORE)	EA	120	2	$240.00
0666 2226	PAVEMENT SEALER (EXIT GORE)	EA	200	2	$400.00
0666 2228	PAVEMENT SEALER (RR XING)	EA	60	6	$360.00
0666 2230	PAVEMENT SEALER (UTURN ARW)	EA	60	2	$120.00
0666 2250	REF PAV MRK TY I (BLACK) (6") (BRK) (100 ML)	LF	0.8	16500	$13,200.00
0666 2251	PAVEMENT SEALER (BIKE ARROW)	EA	60	26	$1,560.00
0666 2252	PAVEMENT SEALER (BIKE SYMBOL)	EA	75	26	$1,950.00
0666 2257	PAVEMENT SEALER (YLD TRI)	EA	1.3	120	$156.00
0672 2017	REFL PAV MRK TY II-C-R	EA	3.34807	200	$669.61
0678 2002	PAV SURF PREP FOR MRK (6")	LF	0.14192	54420	$7,723.29
0678 2003	PAV SURF PREP FOR MRK (8")	LF	0.2	8000	$1,600.00
0678 2004	PAV SURF PREP FOR MRK (12")	LF	0.23867	27700	$6,611.16
0678 2006	PAV SURF PREP FOR MRK (24")	LF	0.7	2200	$1,540.00
0678 2007	PAV SURF PREP FOR MRK (ARROW)	EA	15	75	$1,125.00
0678 2008	PAV SURF PREP FOR MRK (DBL ARROW)	EA	17	10	$170.00
0678 2009	PAV SURF PREP FOR MRK (ENTR GORE)	EA	80	2	$160.00
0678 2010	PAV SURF PREP FOR MRK (EXIT GORE)	EA	90	2	$180.00
0678 2013	PAV SURF PREP FOR MRK (RPM)	EA	0.5	200	$100.00
0678 2014	PAV SURF PREP FOR MRK (RR XING)	EA	35	6	$210.00
0678 2016	PAV SURF PREP FOR MRK (UTURN ARR)	EA	20	2	$40.00
0678 2018	PAV SURF PREP FOR MRK (WORD)	EA	15	70	$1,050.00
0678 2019	PAV SURF PREP FOR MRK (YIELD TRI)	EA	6	120	$720.00
XXXX XXXX	BIKE LANE SIGNAGE ALONG FM 1092	EA	400	40	$16,000.00
CONSTRUCTION SUBTOTAL					**$336,477.70**
MOBILIZATION (5%)					$16,823.89
DESIGN AND ENGINEERING (15%)					$50,471.66
CONTINGENCIES (20%)					$67,295.54
TOTAL					**$471,100.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013

[2] Total cost rounded up to the nearest $100

PROJECT #14 - Construct 13' Median

SHORT

Construct along the entire corridor with channelized left turns lanes (Note the possible inclusion in cost estimates of 20' of mountable curb for each left turn lane)

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0536 2002	CONC MEDIAN	SY	53.25	6293.15	335110.18
0529 2024	CONC CURB (MOUNTABLE)	LF	9.00	500.00	4500.00
0666 2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	0.91	3770.30	3430.97
0666 2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	80.45	11.00	884.95
0666 2191	PAVEMENT SEALER 8"	LF	0.42	3770.30	1583.53
0666 2219	PAVEMENT SEALER (ARROW)	EA	28.25	11.00	310.75
0678 2003	PAV SURF PREP FOR MRK (8")	LF	0.20	3770.30	754.06
0678 2007	PAV SURF PREP FOR MRK (ARROW)	EA	11.78	11.00	129.58
CONSTRUCTION SUBTOTAL					**$346,704.02**
MOBILIZATION (5%)					$17,335.20
DESIGN AND ENGINEERING (15%)					$52,005.60
CONTINGENCIES (20%)					$69,340.80
TOTAL					**$485,400.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013

[2] Total cost rounded up to the nearest $100

PROJECT #17 - Driveway Consolidation

MEDIUM

For the following locations:
1. Southport Business Park located at 12220 Murphy Road - Close northern most and central driveway and install driveway adjacent with future median opening; install driveway with access to Nations Boulevard
2. Car mechanics and storage located south of West Airport Boulevard at 12439 Murphy RD and 12503 Murphy RD - Consolidate driveways and provide cross access
3. ReStore Home Improvement and Retail store located at 13570 Murphy RD - add additional driveway to line up with median opening and improve cross access
4. Houston Community Bank and adjacent property located at 13570 Murphy RD and 13715 Murphy RD - Provide cross access
5. Cross access between retail centers along the west side of FM 1092 and north of the canal at 504 FM 1092 and 508 Murphy RD

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0104 2022	REMOVING CONC (CURB AND GUTTER)	LF	7.67	65.24	$500.39
0104 2017	REMOVING CONC (DRIVEWAYS)	SY	12.39	105.29	$1,304.57
0529 2001	CONC CURB (TY I)	LF	13.97	144.82	$2,023.14
0530 2010	DRIVEWAYS (CONC)	SY	59.24	1389.30	$82,301.93
0666 2123	REFL PAV MRK TY I (Y) 8" (SLD)(100MIL)	LF	0.95	89.38	$84.91
0666 2191	PAVEMENT SEALER 8"	LF	0.42	89.38	$37.54
0678 2003	PAV SURF PREP FOR MRK (8")	LF	0.20	89.38	$17.88
CONSTRUCTION SUBTOTAL					**$86,270.36**
MOBILIZATION (5%)					$4,313.52
DESIGN AND ENGINEERING (15%)					$12,940.55
CONTINGENCIES (20%)					$17,254.07
TOTAL					**$120,800.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013

[2] Total cost rounded up to the nearest $100

PROJECT #18A - Construct Sidewalk

Construct 20,300 feet of 6' sidewalks along corridor with landscaped buffer where sidewalks are currently not present; includes wheelchair ramps at unsignalized intersections where necessary.

MEDIUM

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0531 2016	CONC SIDEWALKS (6')(6")	LF	45.91	20300.00	$ 931,973.00
0531 2005	CURB RAMPS (TY 1)	EA	1388.26	72.00	$ 99,954.72
CONSTRUCTION SUBTOTAL					**$1,031,927.72**
MOBILIZATION (5%)					$51,596.39
DESIGN AND ENGINEERING (15%)					$154,789.16
CONTINGENCIES (20%)					$206,385.54
TOTAL					**$1,444,700.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013

[2] Total cost rounded up to the nearest $100

PROJECT #18B - Construct Side Path

Construct 4500 feet of side paths and ramp connections between bicycle lanes and side paths

MEDIUM

ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST [1]	QUANTITY	COST [2]
0531 2119	CONC SIDEWALKS (SHARED USE)(10'X6")	SY	52.00	4100.00	$ 213,200.00
0531 2005	CURB RAMPS (TY 1)	EA	1388.26	12.00	$ 16,659.12
CONSTRUCTION SUBTOTAL					**$229,859.12**
MOBILIZATION (5%)					$11,492.96
DESIGN AND ENGINEERING (15%)					$34,478.87
CONTINGENCIES (20%)					$45,971.82
TOTAL					**$321,900.00**

[1] Based on TxDOT Bid Estimates - July 2013 - September 2013

[2] Total cost rounded up to the nearest $100

APPENDIX G | CITY OF STAFFORD CODE: 98.42. DEPARTMENT OF PARKS AND RECREATION STREET TREES

(a) Generally.

Common Name	Botanical Name
D Texas Sugar Maple	Aver barbatum
D Pecan	Carya illinoensis
D Anacua	Ehretia anacua
D Ginkgo	Ginkgo biloba
D Black Gum	Nyssa sylvatica var sylvatica
D Sawtooth Oak	Quercus acutissima
D Southern Red Oak	Quercus falcata
D Overcup Oak	Quercus lyrata
D Bur Oak	Quercus macrocarpa
D Chinkapin Oak	Quercus muehlenbergii
D Nuttal Oak	Quercus nutallii
D Montgomery Oak	Quercus polymorpha
D Shumard Oak	Quercus shumardii
D Post Oak	Quercus stellata
D Live Oak	Quercus virginiana
D Bald Cypress	Taxodium distichum var distichum
D Montezuma Bald Cypress	Taxodium distichum mucronatum
D Winged Elm	Ulmus alata
D Ceder Elm	Ulmus crassifolia
E American Holly	Ilex opaca
D Swamp Chestnut Oak	Quercus michauxii
D Drake Elm	Ulmus parvifolia var drakii
Bradford Pear	Pyrus calleryana
Crepe Myrtle	Lagerstroemia indica

(b) Under power lines.

Common Name	Botanical Name
D Gum Bumelia	Bumelia lanuginosa
D Black Hickory	Carya texana
D Eastern Persimmon	Diospyros virginiana
D Anaqua	Ehretia anacua
D Ginkgo-Male only	Ginkgo biloba
D Sweetbay	Magnolia virginiana
D Black Cherry	Acer rubrum var drummondii
D Shining Sumac	Rhus copallina
D Live Oak	Quercus virginiana
D Caroline Basswood	Tilia caroliniana
D Winged Elm	Ulmus alata
D Ceder Elm	Ulmus crassifolia
D Drake Elm	Ulmus parvifolia var drakii
E American Holly	Ilex opaca
D Chinese Pistachio	Pistacia chinensis

*D means deciduous and E means evergreen. See appendices A-1 and A-2, sections 98-40 and 98-41, for comments.