

FM 1092/Murphy Road Access Management Study

Final Report - January 2012



FM 1092

ACCESS MANAGEMENT STUDY



Access Management Tool Box

BICYCLE & PEDESTRIAN

- Bicycle Lanes
- Bicycle Trails
- Sidewalk Connectivity
- Pedestrian Crossings

SIGNAL TIMING

- Execute Patterns
- Evaluate Coordination

TRANSIT OPPORTUNITIES

- Park & Ride Lots
- Funding Opportunities
- Car Pools & Van Pools

RAISED MEDIANS

- Planned Openings
- Left-Turn Lanes

DRIVEWAY CONSOLIDATION

- Shared Access
- Cross Access

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The steering committee and consultant team would like to thank all the citizens, staff and elected officials along the FM 1092/Murphy Road corridor for their assistance with the development of this plan.

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Introduction

The Houston-Galveston Area Council (H-GAC) is the Metropolitan Planning Organization (MPO) for the Houston-Galveston 8-County Transportation Management Area (TMA), including Fort Bend County. Over the past decade, the H-GAC region has grown by 1.2 million residents to equal a population near 5.9 million. It is anticipated that population growth will continue and an additional three million people will reside in the region within the next 25 years. This growth has and will impact day-to-day activities including general mobility, access to jobs and homes, availability of amenities, impacts on the environment, and overall quality of life. Transportation infrastructure has to be either expanded or measures should be taken to increase efficiency of existing infrastructure to accommodate this growth. Access management studies are conducted to study existing and future conditions and recommend feasible improvements to accommodate the growth.

FM 1092/Murphy Road Access Management Study was undertaken by H-GAC, in association with Texas Department of Transportation (TxDOT) and the City of Missouri City. FM 1092 is a major north-south roadway in Missouri City. Crash rates have increased along FM 1092 from 2008 to 2010, and traffic volumes continue to increase. H-GAC has initiated this access management study to reduce crashes and improve traffic flow.

Access Management

Access management is defined by TxDOT as a means to:

- Reduce traffic delay and congestion
- Promote properly designed access and circulation systems for development
- Provide property owners and customers with safe access to roadways
- Make pedestrian and bicycle travel safer

Research has been conducted to identify and document the benefits of access management study. Based on National Highway Institute Course No. 133078, April 2000, following are some of the benefits of access management:

- Improves Safety - reduces the number of crashes by up to 50%
- Reduces Congestion - increases roadway capacity by 23% to 43%
- Improves Mobility - reduces travel time and delay as much as 40% to 60%
- Preserves Public and Private Investments - maintains current land use

Purpose of the Study

The purpose of this access management study is to identify transportation improvements that reduce crashes, improve traffic flow, reduce motorist delay, and to address multi-modal/land use context.

Study Goals

Following are the study goals:

- a. Safety for all modes of transportation that reduce crashes and conflicts
- b. Improve traffic flow

- c. Explore bicycle accommodation opportunities
- d. Reduce motorist delay
- e. Improve quality of life

Study Area

The corridor study area is approximately three miles in length and is defined as the southern section of FM 1092 from SH 6 South to Dove Country Road just north of the Missouri City city limit.

FM 1092 is a major north-south arterial, which provides connections between US Highway 90A and US 59 to the north and SH 6 to the south. In the study area, FM 1092 is a four-lane divided roadway with two-way turn lane in the center, except at the Cartwright intersection. At the Cartwright intersection, FM 1092 is a six-lane roadway. The right of way (ROW) along the study corridor varies from 125 to 140 feet. TxDOT is owner of FM 1092 and is maintained by TxDOT and by Missouri City in the City limits.

Study Process

The study process included collection and analysis of existing data, identification and analysis of future corridor specific needs, and recommending improvements. To accomplish these tasks, three Steering Committee meetings were conducted to gather technical guidance. Stakeholders and Public Meetings were also conducted to identify specific needs along the corridor and to fine-tune the recommendations in a way that best serves the residents and business owners along the corridor. Figure ES -1 illustrates the study process.

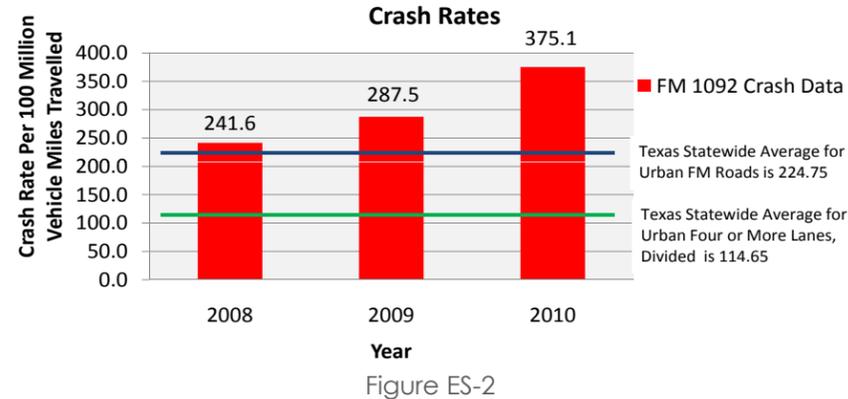
Existing Conditions

Transportation agencies typically use crash rates to compare crash severity along a roadway with similar type of roadways in the State. FM 1092 crash data was analyzed to estimate crash rates. Crash rate is defined as the number of crashes per 100 million vehicle miles travelled. Figure ES -2 illustrates that crash rates along FM 1092 have increased from 2008 to 2010. TxDOT estimates average crash rates on State roads each year. In the year 2009, the average crash rate for all urban FM roads is 224.75 and all divided urban roadways with four or more lanes is 114.65. Crash rates along FM 1092 corridor not only increased from 2008 to 2010, but are also higher than State average crash rates. This shows that safety measures to reduce crashes are necessary along FM 1092.



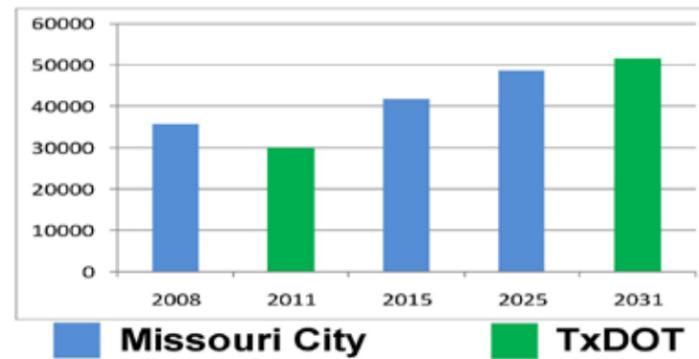
Figure ES-1

TxDOT and Missouri City provided traffic data. Figure ES-3 illustrates existing and future daily traffic volumes. Average daily two-way traffic volumes along FM 1092 range from 35,550 in year 2008 to 51,500 in year 2031. This increase in traffic volumes suggest that capacity improvements are necessary along FM 1092 to accommodate the future growth. There is a slight decrease in traffic volumes between years 2008 and 2011 in line with national trends.



Analysis

Traffic simulation analysis was conducted to study the existing conditions and future conditions along the corridor. Based on the analysis, the following conceptual short term, medium term, and long term improvements are recommended. Short term improvements can be implemented within four years and do not require purchase of additional right of way, such as traffic signal timing. Medium term improvements can be implemented in five to seven years and may require purchase of additional right of way, such as driveway consolidation and center raised median. Long term improvements can be implemented in greater than 10 years time and can require policy changes and additional right of way, such as roadway widening.



Short Term Improvements

1. Signalized Intersections
 - a. Supplemental signal head and sign at Hampton Drive intersection
 - b. Pedestrian signals at Hampton Drive and Dove Country Drive intersections
 - c. Traffic signal timing optimization along FM 1092 corridor

Medium Term Improvements

1. Pedestrian and Bicycle
 - a. Sidewalks and Oyster Creek connection at Plantation Settlement Lane
 - b. Bicycle Paths along the corridor
2. Shared driveway and adjacent property cross-access along the corridor at feasible locations
3. Raised median with planned openings and turn lanes along the corridor

One of the challenging aspects of constructing raised median along FM 1092 corridor was to balance spacing of median openings and providing access to properties that do not have

alternative access. There are five such locations along FM 1092 corridor at Wells Fargo driveway, Palm Grove Drive, Shell Gas Station driveway at Cartwright Road intersection, Heritage Baptist Church driveway, and Church of Christ driveway. These locations are too close to a public street with median opening and difficult to provide a median opening that meet design standards. However, a design variance can be requested from TxDOT and if approved an alternative median opening can be constructed at these five locations. Conceptual alternative median opening options at these five locations are also presented in the report.

Long Term Improvements

Long term recommendation for FM 1092 corridor is to construct a multi-modal facility to include:

1. Six-lane roadway with curb and gutter
2. Bike lanes
3. Sidewalks
4. Raised median with planned openings and turn lanes
5. Palm Grove Drive re-alignment
6. Cartwright Road intersection improvements
7. 5th Street re-alignment
8. Lexington Road intersection improvements

Implementation and Cost Summary

Implementation cost is estimated based on average cost summaries, prepared by TxDOT for previous similar projects, and adjusted for quantity. Please note that this cost do not include the cost of additional right of way, if needed.

Short Term Improvements

- Supplemental traffic signal head and sign at Hampton Drive intersection, and Pedestrian Facilities at Hampton Drive and Dove Country Drive intersections = \$40,000 (TxDOT)
- Traffic Signal Timing improvements along the corridor and right-turn overlap traffic signal heads at Cartwright Road and Lexington Boulevard intersections = \$55,000 (TxDOT)

Medium Term Improvements

- Median and Pedestrian Improvements (includes planned median openings with turn lanes and bike paths along the FM 1092 corridor) = \$900,000 (TxDOT = \$750,000 and City of Missouri City = \$150,000)
- Palm Grove Drive Access - Option A = \$250,000 (City of Missouri City)
- Palm Grove Drive Access - Option B = \$450,000 (City of Missouri City)

Long Term Improvements

- Palm Grove Drive Access - Option C = \$1,100,000 (City of Missouri City)
- 5th Street Re-alignment = \$700,000 (City of Missouri City)
- Six-lane Multimodal Facility (includes bike lanes, sidewalks, and drainage improvements along the FM 1092 corridor; and turn lane improvements at Cartwright Road and Lexington Boulevard intersections) = \$21,000,000 (TxDOT = \$20,300,00 and City of Missouri City = \$700,000)

CHAPTER 1: INTRODUCTION

- Purpose of the Study
- Study Goals
- Study Area
- Study Process



The Houston-Galveston Area Council (H-GAC) is the Metropolitan Planning Organization (MPO) for the Houston-Galveston 8-County Transportation Management Area (TMA). The TMA includes Chambers, Brazoria, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties. Over the past decade, the H-GAC region has grown by 1.2 million residents to equal a population near 5.9 million. It is anticipated that population growth will continue and an additional three million people will reside in the region within the next 25 years. This growth has and will impact day-to-day activities including general mobility, access to jobs and homes, availability of amenities, impacts on the environment, and overall quality of life. Transportation infrastructure has to be either expanded or measures should be taken to increase efficiency of existing infrastructure to accommodate this growth.

FM 1092/Murphy Road Access Management Study was undertaken by Houston-Galveston Area Council (H-GAC), in association with Texas Department of Transportation (TxDOT) and the City of Missouri City. These agencies selected the consulting team comprising of Gunda Corporation, LLC (GUNDA) as lead and CJ Hensch & Associates, Inc. (CJH), Kendig Keast Collaborative (KKC), Parsons Brinckerhoff Americas, Inc. (PB), and The Lentz Group (TLG) as sub-consultants to perform the study.

FM 1092 is a major north-south roadway in Missouri City. Crash rates have increased along FM 1092 from 2008 to 2010, and traffic volumes continue to increase. H-GAC has initiated this access management study to reduce crashes and improve traffic flow.

Access management is defined by TxDOT as a means to:

- Reduce traffic delay and congestion
- Promote properly designed access and circulation systems for development
- Provide property owners and customers with safe access to roadways
- Make pedestrian and bicycle travel safer

Research has been conducted to identify and document the benefits of access management study. Based on National Highway Institute Course No. 133078, April 2000, following are some of the benefits of access management:

- Improves Safety – reduces the number of crashes by up to 50%
- Reduces Congestion – increases roadway capacity by 23% to 43%
- Improves Mobility – reduces travel time and delay as much as 40% to 60%
- Preserves Public and Private Investments – maintains current land use

This report is organized in to six parts. Part one provides introduction, and describes the specific purpose, goals, study area, and process of this study in detail. Part two describes the public involvement process. Part three describes the analysis of existing conditions. Part four describes analysis of future conditions. Part five describes the recommended improvements and implementation strategies. Part six describes long term strategies for the corridor development.

Purpose of the Study

The purpose of FM 1092 access management study is to identify transportation improvements that reduce crashes, improve traffic flow, reduce motorist delay, and to address multi-model/land use context.

The study includes collection of sufficient information to measure and evaluate a range of viable short and long-term improvement concepts. This study will address cost-benefit and cost-effectiveness of various solutions. The study shall conclude with the identification of recommended improvements along with an implementation schedule.

Study Goals

The following goals were discussed and defined during the first Steering Committee meeting for this study.

- a. Safety for all modes of transportation that reduce crashes and conflicts
- b. Improve traffic flow
- c. Explore bicycle accommodation opportunities
- d. Reduce motorist delay
- e. Improve quality of life

Study Area

The corridor study area (Figure 1-1) is approximately three miles in length and is defined as the southern section of FM 1092 from SH 6 South to Dove Country Road just north of the Missouri City city limit.



Figure 1-1



FM 1092 is a major north-south arterial, which provides connections between US Highway 90A and US 59 to the north and SH 6 to the south. In the study area, FM 1092 is a four-lane divided roadway with two-way turn lane in the center, except at the Cartwright intersection. At the Cartwright intersection, FM 1092 is a six-lane roadway. The right of way (ROW) along the study corridor varies from 125 to 140 feet. TxDOT is owner of FM 1092 and is maintained by TxDOT and by Missouri City in the City limits.

Study Process

The study process included collection and analysis of existing data, identification and analysis of future corridor specific needs, and recommending improvements. To accomplish these tasks, three Steering Committee meetings were conducted to gather technical guidance. Stakeholders and Public Meetings were also conducted to identify specific needs along the corridor and to fine-tune the recommendations in a way that best serves the residents and business owners along the corridor. Figure 1-2 illustrates the study process.

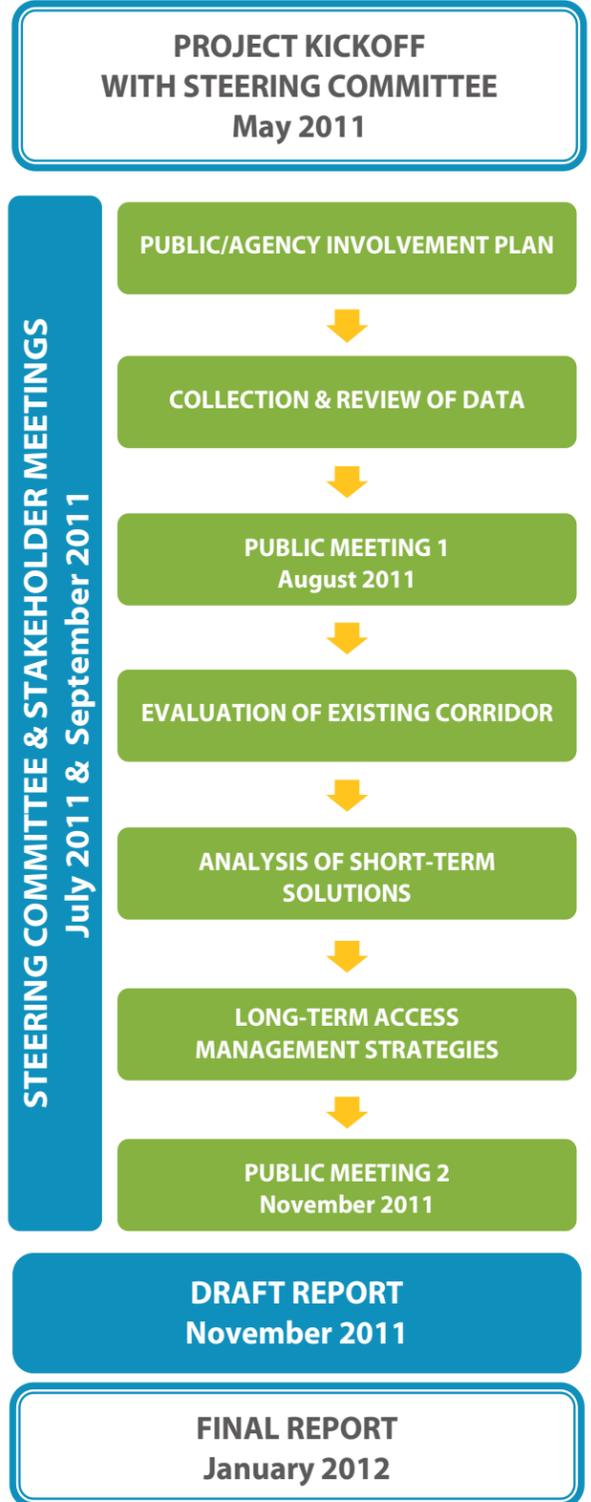


Figure 1-2

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CHAPTER 2: PUBLIC INVOLVEMENT

- Goals of Public Involvement
- Public Involvement Plan
- Steering Committee
- Stakeholder Meetings
- Public Meetings

Goals of Public Involvement

An important aspect of every access management study is public involvement. Establishing a detailed plan from the beginning is crucial to the success of the study. The goals of the public involvement efforts were to create an open process that encouraged idea exchange, allow for serious consideration of all suggestions, and provide an objective presentation of options.

Public Involvement Initiatives

H-GAC actively engages the public in the decision-making process, in keeping with the Federal Highway Administration's five key initiatives for a successful public participation process:

1. **Public involvement is more than simply following legislation and regulations.** In a democratic society, people have opportunities to debate issues, frame alternative solutions and affect final decisions. Knowledge is the basis of such participation. The public needs to know details about a plan or action in order to evaluate the relative importance and anticipated costs and benefits. Through continued interaction with the entire community, agencies and project sponsors can build support and assure that the public has the opportunity to help shape the substance of plans and actions.
2. **Agency and non-agency partners need to be in continuous contact during transportation decision-making,** from early problem identification to definition of purpose and need, and from alternatives development to implementation of a particular solution.
3. **Agencies and project sponsors should use a variety of public involvement techniques to target different groups or individuals** in different ways, according to their varying agendas. A single, one-size-fits-all approach usually leaves people out of the process.
4. **Agencies and project sponsors should search out the public and work hard to elicit comments.** It is true that resources are limited, and agencies cannot make anyone participate. However, transportation agencies have repeatedly found that actively engaging the public and changing unsuccessful approaches bring greater results.
5. **Agencies and project sponsors should focus on increasing public participation in decisions** rather than focus on conducting participation activities because they are required. Decision-making should include both the continuous stream of informal decisions made by agency staff and the less frequent formal decisions made by higher-level management. Timely agency response to ideas from the public and the integration of those ideas into decisions shows the public that participation is worthwhile. A focus on the wide range of possible decision points gets agencies past simply offering the public passive opportunities to comment on proposals just before formal decision-making.

H-GAC outlined a public involvement process that achieved these initiatives and provided the team with invaluable guidance for future improvements within the FM 1092 study corridor.

Public Participation Objectives

The public involvement process was driven by these primary objectives:

- Initiation of citizen participation at onset of the study and continued throughout the process
- Intensified efforts to solicit community views prior to major project decision points
- Public access to all relevant information
- Regular reports of study findings to the public
- Provision of orientation materials to accommodate new participants entering the process
- Two-way communication between the study team and community participants to freely exchange information, ideas and values
- Presentation of transportation options in an objective manner
- Use of a variety of techniques and approaches to reach a diverse group of persons potentially affected by the proposed project
- Serious consideration of all suggestions from the community
- Timely response with answers and information to citizen inquiries
- Complete documentation of public involvement activities
- Incorporation of small discussion groups to encourage a casual environment for discussions during public meetings
- Evaluation of the public involvement plan's effectiveness

Public Involvement Plan

Targeted Groups

Three primary groups (Steering Committee, Stakeholders and General Public) were targeted as part of this plan, with each group providing unique perspectives in relation to the project. Following is a description of the role, activities, scheduled meetings and meeting purpose for each target group.

Steering Committee

A group of local technical and policy decision makers was identified for the FM 1092 Access Management Study Steering Committee. The committee met at key milestones in the process to receive and assess reports on progress, comment on the schedule, coordinate with their respective agencies and provide oversight of major activities associated with the study. This group provided details on current and future plans, policies and standards to be used in the process. The committee extended technical guidance related to project goals, determining measures of effectiveness and project tools to be employed in the corridor. It was composed of representatives from TxDOT, H-GAC, the City of Missouri City and Fort Bend Independent School District.

The Steering Committee met at the Missouri City EOC Training Room the following dates:

- May 18, 2011
- July 26, 2011
- September 29, 2011



Stakeholder Meetings

The FM 1092 corridor has many stakeholder groups who are affected by transportation issues in the corridor, including:

- Civic and homeowner organizations
- Businesses and chamber of commerce
- Schools and churches
- Police, fire and ambulance service providers
- Landowners, developers and real estate agents
- Environmental groups

The study team held several meetings to educate the stakeholders on access management and the study process in general. The main function of these meetings was to serve as a method to gather issues and concerns from groups that represent a larger collection of the affected populous and possibly incorporate those issues into the study recommendations. The stakeholder meetings focused on the citizenry affected daily by the corridor — the people that live and work in the corridor and have an intimate knowledge of the issues affecting the region. To broaden interest in the project and increase attendance, representatives of businesses that attended the first public meeting were also invited to the second Stakeholder meeting.

The Stakeholders met at the Missouri City EOC Training Room the following dates:

- July 26, 2011
- September 29, 2011



Public Meetings

The intent of public meetings was to promote honest, active, two-way communication with the public — actively listening to their concerns and keeping them informed about the study's progress — so that all community groups felt as if their concerns were being addressed and they had the opportunity to participate. It was important to reach out to members of the public that actively use the study corridor as a connecting transportation route, including residents of nearby

Stafford and Sugar Land. Advertising in publications distributed throughout Fort Bend County, such as The Fort Bend Herald and The Fort Bend Star provided some outreach. Meeting notices were also provided for neighboring cities to post on their websites.

Public meetings were a major component of this two-way communication effort and were scheduled during key stages of the project. The first public meeting relayed the purpose, process and progress of the study; engaged the public in providing specific input on corridor activities and characteristics; and presented initial recommendations. Short-, medium- and long-term recommendations were presented at the second public meeting. A summary of public comments are included in the Appendices.

The first public meeting was held at Quail Valley Middle School on August 31, 2011.



The second public meeting was held at Missouri City Community Center on November 3, 2011.



Public Meetings Comments Summary is included in Appendix A.

Outreach Approach

H-GAC employs a variety of methods, from high-tech tools to high-touch meetings, to reach people of all ethnic and socioeconomic backgrounds in providing education and awareness of the project as well as to maximize public input to direct future implementation.

Dynamic Communications Tools

Presentation materials

At steering committee, stakeholder and public meetings, presentation materials with clear, strong graphics are used to assist the public in understanding technical concepts. These include presentation boards, PowerPoint presentations, handouts and other communications tools. The materials explain overall access management concepts plus corridor-specific topics such as the study process and goals, project schedule and funding partners. Materials also convey the technical results at each stage of the study. Team members knowledgeable of the project are available at meetings so that attendees who have questions may have them addressed and provide direct input regarding the project.

Project maps

Another important technique in engaging the public is using detailed aerial maps to present study recommendations and to gather specific comments on the public's knowledge of the corridor (locations of developments, high crash locations, problem intersections, etc.) and suggested improvements. These maps are documented as part of the public participation process and become a formal portion of the project record.

Fact sheets

To help better communicate the principles of access management, fact sheets will be created that can be distributed electronically, using Missouri City's email subscription service and adding contacts gathered from stakeholder and public meetings. These sheets will also be printed in small quantities as elected officials briefing sheets. One fact sheet will explain overall principles of access management and one or more fact sheets will describe how these principles are being applied to the FM 1092/Murphy Road corridor.

Online Survey

An online version of the questionnaire distributed at the first public meeting has been posted and forwarded to attendees of the meeting. This online survey tool is a resource that can be forwarded to additional interest groups allowing the study team to gather more feedback by residents and businesses affected by the study who were not able to attend the public meeting.

Comprehensive Meeting Notification

As part of their goal to make diligent efforts to involve the public, the federal government has set forth in the Code of Federal Regulations the National Environmental Protection Act (NEPA) public involvement requirements (40CFR1506.6). This study's outreach approach complied with the NEPA directives for publication and notification of public meetings. It also complied with TxDOT Houston's guidelines for the sequence and types of notices. The specific outreach components included:

- Elected officials notification letter from Alan Clark, H-GAC's Director of Transportation as the first publicity item, in keeping with TxDOT Houston's preference for notifying elected officials about public meeting opportunities prior to any other advertisements or mailings.
- Legal ad in The Houston Chronicle, the area's largest distribution daily newspaper, 30 days prior to the public meetings in accordance with TxDOT Houston's preferred timeline.
- Display ads in English and Spanish placed in La Voz and The Fort Bend Herald and The Fort Bend Star, two weeks prior to the meetings.
- Postcard in English and Spanish text mailed to property owners and stakeholder groups two weeks prior to the meetings. Extra postcards will be available at Missouri City, City Hall and Fort Bend Chamber of Commerce reception desks.
- Website posting on H-GAC's Transportation Public Information page, FortBendNow.com, Missouri City's website and on the Fort Bend Chamber of Commerce's website. We will also provide meeting notices for the adjacent cities of Stafford and Sugar Land to post on their websites.
- Facebook posting on H-GAC's public profile.
- Limited English Proficiency outreach recognizing the Spanish-speaking households in the corridor with a Spanish display ad placed in La Voz, the weekly Spanish newspaper distributed by The Houston Chronicle, in addition to the Spanish text on postcards mailed to households and businesses.
- E-vites sent to the Fort Bend Chamber of Commerce members who are business owners and residents along the corridor.
- Dynamic messaging signs posted by TranStar on northbound and southbound lanes of US 59 the day of the meeting and northbound and southbound lanes on FM 1092, three days to a week before the meeting.
- Portable Construction Signs posted by the City of Missouri City three days to a week before the meeting.



CHAPTER 3: ANALYSIS OF EXISTING CONDITIONS

- Land Use and Zoning
- Roadway Characteristics
- Crash Data
- Bicycle and Pedestrians
- Transit
- Traffic Characteristics
- Traffic Simulation Analysis
- Existing Policies and Practices
- Planned Projects in the Area

Analysis of existing conditions is important to identify existing issues, how these issues relate to future needs, and then assess what can be done in the short term to help existing and future conditions along the corridor. The following sections describe existing land use and zoning, roadway characteristics, crash data, bicycle/pedestrian/transit facilities, traffic characteristics, traffic analysis, existing policies and practices, and planned projects in the study area.

Land Use and Zoning

Missouri City's zoning along the FM 1092 corridor is for non-residential (Local Commercial) or higher-density residential (Multi-Family) uses, or for Planned Developments or Specific Use Permit (SUP) uses, or Community Facilities (CF). City's zoning districts are shown in Figure 3-1. Existing developments along the corridor reflect City's zoning and are predominantly residential (apartments, townhomes, and single-family units), commercial, and worship facilities. In addition, there is a school (Quail Valley Middle School) at Plantation Settlement Lane and a park (Mosley Park) with Oyster Creek Trail between Williamsburg Lane and Plantation Settlement Lane. There are some open tracts of land on the west side of FM 1092 at 5th Street and on the east side of FM 1092 between 5th Street and Independence Boulevard.



Figure 3-1

Roadway Characteristics

FM 1092 study corridor is in Missouri City and Fort Bend County, and is approximately 20 miles southwest of Downtown Houston. The study limits of FM 1092 corridor are from SH 6 to Dove Country Road, approximately three miles in length. SH 6 is in Missouri City and Dove Country Road is just north of the Missouri City limits. Therefore, the section of FM 1092 from SH 6 to Missouri City limits is in Missouri City and from Missouri City limits to Dove Country Road is in Fort Bend County (City of Stafford ETJ). FM 1092 is a TxDOT facility and is a major north-south arterial, which provides connections between US Highway 90A and US 59 to the north and SH 6 to the south.

In the study area, FM 1092 is a four-lane divided roadway with two-way turn lane in the center, except at the Cartwright intersection. At the Cartwright intersection, FM 1092 is a six-lane roadway with acceleration lanes for northbound and southbound directions. Shoulders are provided on both sides of the roadway with open ditch drainage system. Existing right of way along the corridor is 125 to 140 feet. Existing roadway cross-section is illustrated in Figure 3-2. The speed limit along FM 1092 from SH 6 to Missouri City limits is 50 miles per hour and from Missouri City limits to Dove Country Road is 45 miles per hour.

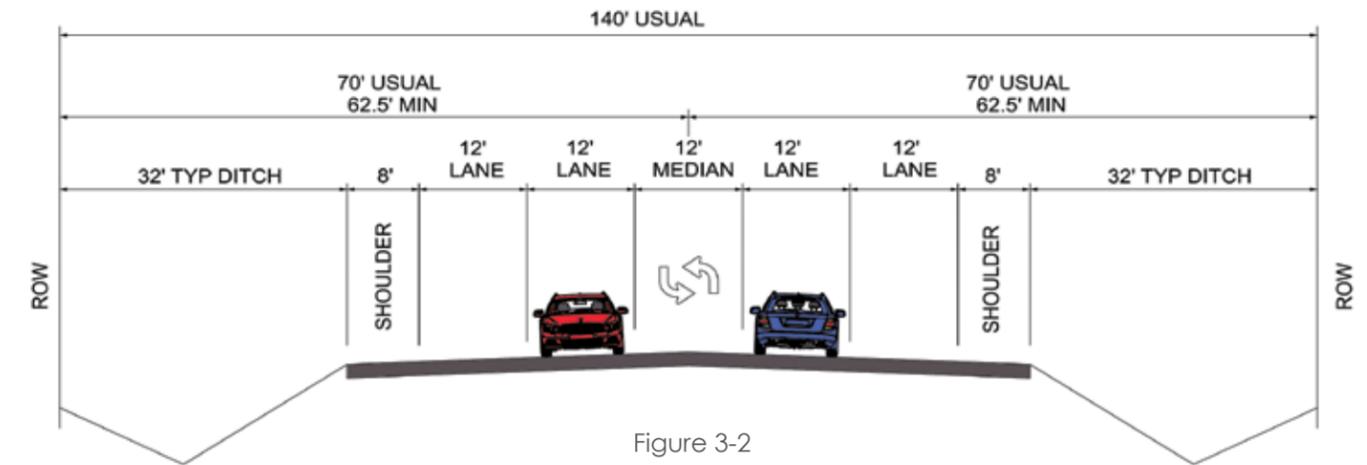


Figure 3-2

There are eight existing signalized intersections along the study corridor and are listed below. In addition, a new traffic signal is under construction at the intersection of Township Lane.

1. SH 6
2. Hampton Drive
3. Plantation Settlement Lane
4. El Dorado Boulevard/Plantation Ridge Drive
5. FM Road 3345/Cartwright Road
6. 5th Street
7. Lexington Boulevard/Independence Boulevard
8. Dove Country Drive

All the traffic signals are currently maintained by Missouri City except Dove Country Drive. Dove Country Drive traffic signal is maintained by TxDOT. All the traffic signals along FM 1092 corridor are coordinated and operate as a system.

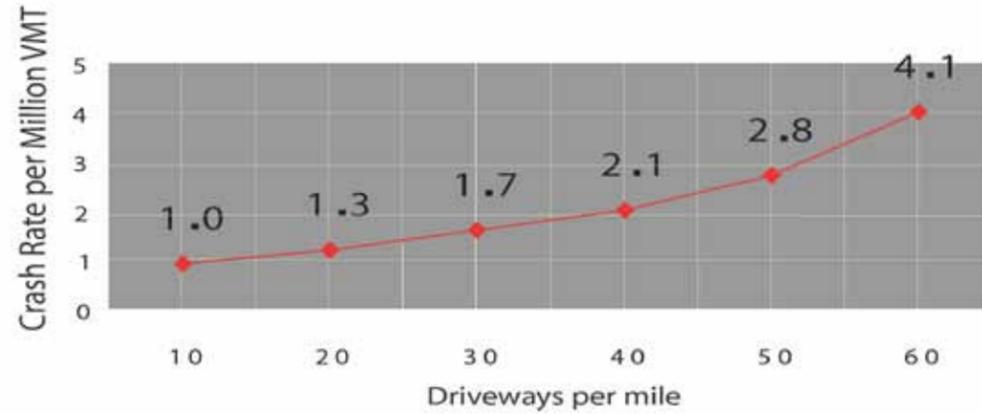
Number of driveways along the corridor were identified and driveway density was calculated. Driveway density is defined as number of driveways per mile. Figure 3-3 illustrates the driveway density along the corridor.



- | | | | |
|---------|--------------------------------------|---------|---------------------------------------|
| 0 - 10 | █ | 21 - 30 | █ |
| 11 - 20 | █ | >30 | █ |

Figure 3-3

Typically, number of crashes are related to number of driveways along the corridor. Figure 3-4 illustrates that as the number of driveways increase number of crashes also increase.



Source: NCHRP Report 420: Impacts of Access Management Techniques

Figure 3-4

Consolidating the number of driveways along the corridor by providing shared access or cross access can help reduce the crashes and improve safety. In addition, cross access between commercial properties increase the number of customers to the businesses.

Crash Data

Crash data was collected from H-GAC and Missouri City. Missouri City crash data was organized for years 2008 to 2010 separately and this data was analyzed. The following table provides number of crashes, injuries, and fatalities along the corridor.

Year	Number of Crashes	Crashes per 100 Million Vehicle Miles Travelled	Total Injuries	Total Fatalities
2008	82	241.6	31	0
2009	85	287.5	21	1
2010	115	375.1	33	0

Source: City of Missouri City

Table 3-1

Transportation agencies typically use crash rates to compare crash severity along a roadway with similar type of roadways in the State. FM 1092 crash data was analyzed to estimate crash rates. Crash rate is defined as the number of crashes per 100 million vehicle miles travelled. Figure 3-5 illustrates that crash rates along FM 1092 have increased from 2008 to 2010. TxDOT estimates average crash rates on State roads each year. In the year 2009, the average crash rate for all urban FM roads is 224.75 and all divided urban roadways with four or more lanes is 114.65. Crash rates along FM 1092 corridor not only increased from 2008 to 2010, but are also higher than State average crash rates. This shows that safety measures to reduce crashes are necessary along FM 1092.

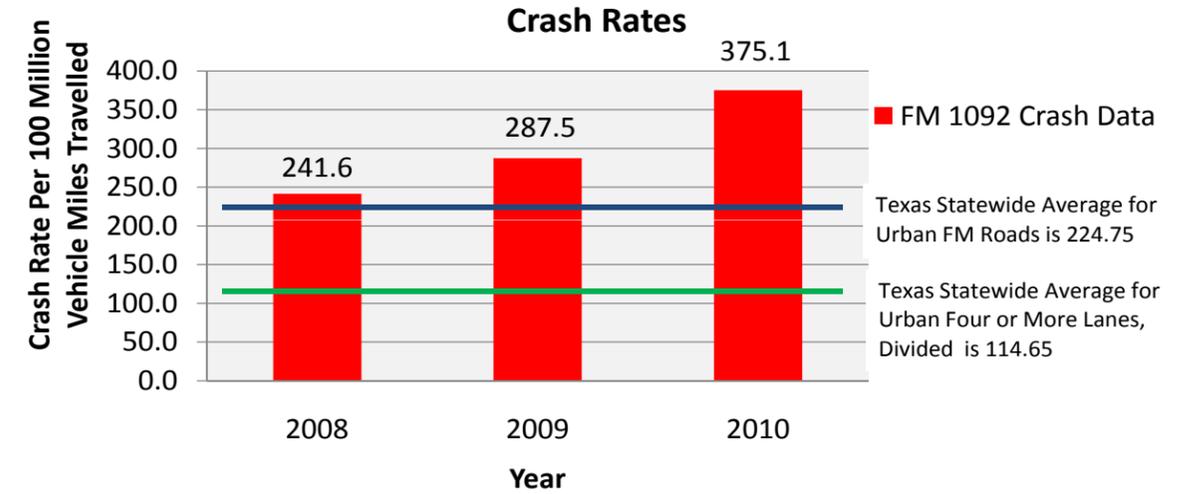


Figure 3-5

Latest year 2010 crashes were analyzed in detail to identify hot spots. Hot spots are locations along the corridor which have relatively more number of crashes than other locations. Figure 3-6 illustrates 2010 crash hot spots along the corridor. Table 3-2 (on the following page) shows type of crashes at these hot spots. Crashes shown at one location generally happened within a block distance on both sides. Table 3-2 shows that the majority of the crashes are either right angle or rear end type crashes. Research has shown that implementing access management techniques can reduce right angle, rear end, and left-turn type crashes. Therefore, access management improvements will help reduce crashes on the FM 1092 corridor.

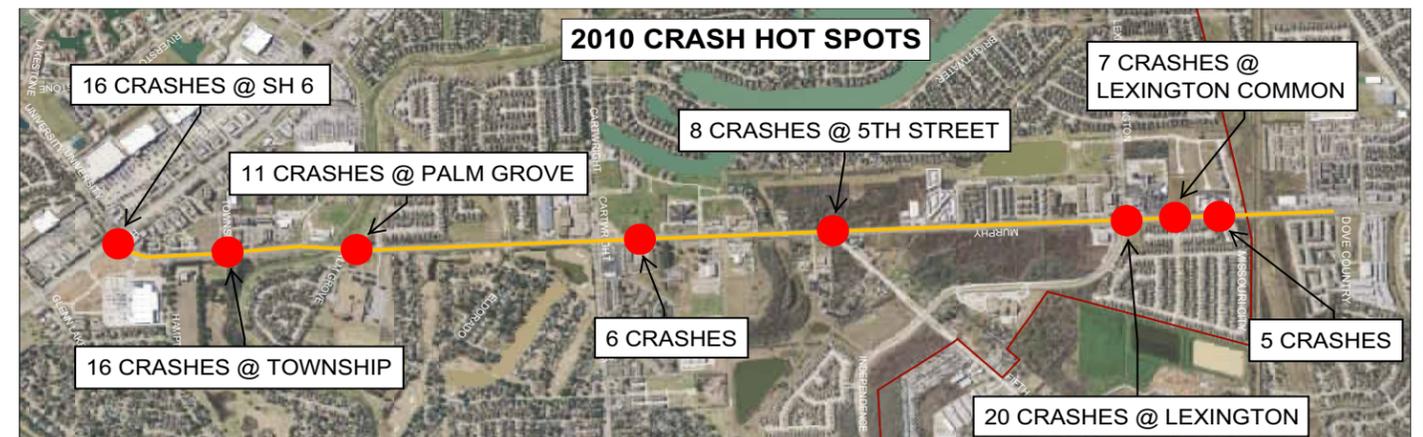


Figure 3-6

Location	Total	Right Angle	Rear End	Left Turn	Sideswipe	Other
Murphy Road at SH 6	16	6	7	0	3	0
Murphy Road at Township	16	3	9	2	1	1
Murphy Road at Palm Grove	11	5	3	2	1	0
Murphy Road north of Cartwright	6	3	1	0	1	1
Murphy Road at 5th Street	8	2	3	1	1	1
Murphy Road at Lexington	20	6	12	0	1	1
Murphy Road at Lexington Common	7	2	2	1	1	1
Murphy Road south of Calgary	5	1	2	1	0	1

Table 3-2

Bicycle and Pedestrians

Currently the FM 1092 corridor has limited pedestrian facilities. The sidewalks are not continuous and lie mainly outside of the FM 1092 ROW on private property. Currently at five of the seven signal intersection there are pedestrian ramps and signals. However at Dove Country Rd. and Hampton Dr. there are no pedestrian facilities.

Pedestrian and bicycle traffic peaks near the Quail Valley Middle School. Currently there are pedestrian signals for the intersection of Plantation Settlement and Murphy Road (FM 1092) but due to the heavy turning traffic volumes children have to wait through several cycles before they can cross the intersection. The main cause of this is the majority of traffic coming out of the school is taking a right or left on the same green light the pedestrians are using.

There are no current bike facilities along the corridor nor is there a proposed plan in place for bicycle routes. However there is a federal mandate that all new and modified corridors consider and attempt to accommodate pedestrian and bicycle facilities. The corridor has been identified in the "Missouri City Pedestrian and Bicycle Plan" completed in December 2009 as a bicycle compatible roadway.

Transit

There are no current transit plans for this corridor. Residential densities would not support regular bus route service. There are several park and rides in the vicinity but no METRO or other bus service have been proposed for this corridor.

Traffic Characteristics

TxDOT and Missouri City provided traffic data. Figure 3-7 illustrates existing and future daily traffic volumes. Average daily two-way traffic volumes along FM 1092 range from 35,550 in year 2008 to 51,500 in year 2031. There is a slight decrease in traffic volumes between years 2008 and 2011 in line with national trends.

Signalized intersections turning movement counts were also provided by Missouri City. These counts were adjusted to year 2011 and are included in Appendix B.

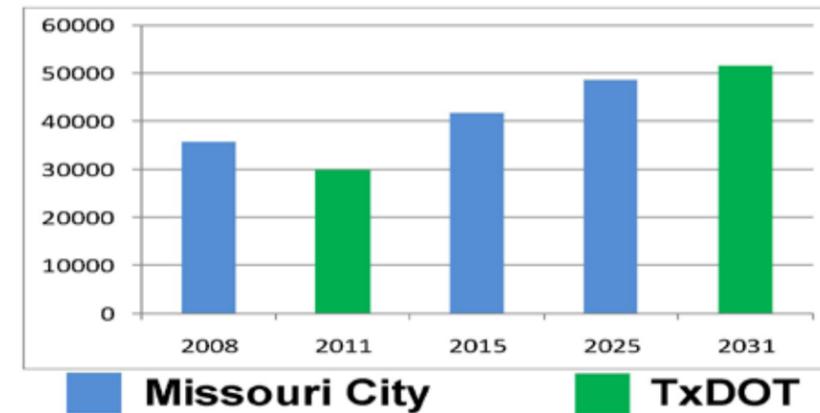


Figure 3-7

Traffic Simulation Analysis

Traffic simulation analysis was conducted by using SYNCHRO software for the AM and PM peak hours. Intersection performance is measured with level of service. Level of service is represented as "A" to "F". "A" being the best free-flowing condition and "F" being failing condition. Level of service "D" is considered as acceptable by most agencies. Figure 3-8 illustrates different level of service conditions.

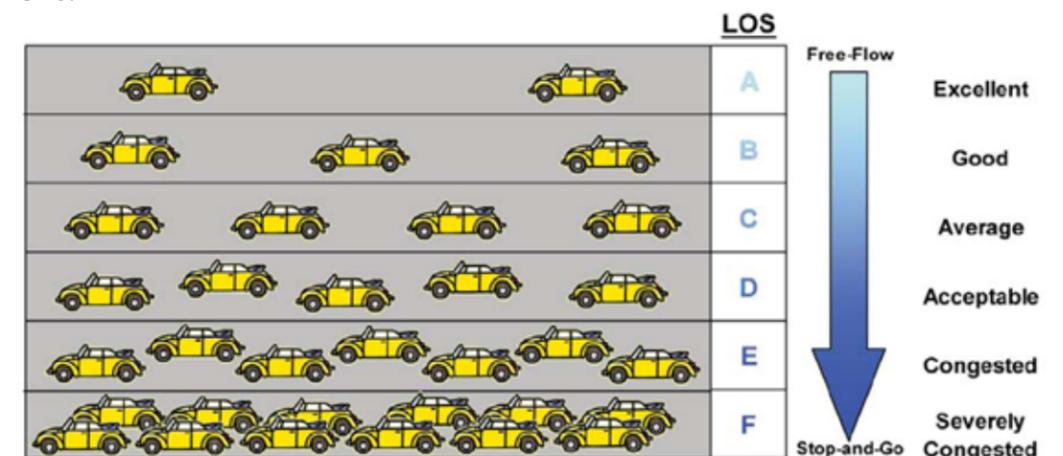


Figure 3-8

Field visits were conducted to gather existing intersection lane configuration and traffic signals information. Existing traffic signal timing information was provided by Missouri City. The lane configuration, traffic signals information, and signal timing information and turning movement counts provided by Missouri City were coded in the SYNCHRO software to estimate signalized intersections level of service. SYNCHRO is a traffic analysis software that uses Highway Capacity Manual procedures to estimate level of service. Both AM and PM peak hour level of service analysis was performed, however, PM peak hour was the worst case scenario and this report provides results for PM peak hour analysis. Figure 3-9 (on the next page) provides existing level of service for all the signalized intersections. Most of the intersections operate at acceptable level of service "D" or better except SH 6 and Cartwright Road. SH 6 operate at failing level of service "F" and Cartwright Road operate with excessive delays during the PM peak hour.



Figure 3-9

Based on several trials, the following set of signal timing optimization recommendations was made to improve the level of service at Cartwright Road and Lexington Boulevard intersections.

- Cartwright Road: Add right-turn overlap phase for westbound, northbound, and southbound approaches.
- Lexington Boulevard: Remove split phase for eastbound and westbound approaches and operate intersection as an eight-phase intersection; add right-turn overlap phase for eastbound and southbound approaches.

In addition to the above improvements signal timing optimization is recommended along the entire corridor. Also, Missouri City has already programmed to install southbound triple left-turn lanes at the intersection of SH 6. Therefore, this improvement is considered in the improvements analysis. Figure 3-10 provides level of service with recommended short-term improvements. Intersection level of service has improved at Cartwright Road but SH 6 continues to operate at failing level of service “F”. Detail level of service information is included in Appendix C.



Figure 3-10

Existing Policies and Practices

FM 1092 is a TxDOT facility, however, the FM 1092 study corridor is in Missouri City and Fort Bend County. New driveway permit applications or driveway modifications along the section of FM 1092 corridor that is in Missouri City are reviewed and approved by both Missouri City and TxDOT. Driveway permit applications or driveway modifications along the section of FM 1092 corridor that is in Fort Bend County are reviewed and approved by TxDOT. Land use and platting applications in the City are reviewed by Missouri City and in the County are approved by Fort Bend County. Following are some useful manuals that provide information related to access and procedures.

1. TxDOT Access Management Manual, December 2009
2. City of Missouri City Public Infrastructure Design Manual, 2004

Planned Projects in the Area

Recently, Missouri City has completed intersection improvements at SH 6, Cartwright Road, and Lexington Boulevard. Missouri City also added a new temporary METRO Park and Ride facility along SH 6. Projects that are under construction are traffic signal at Township Lane, City wide Intelligent Transportation Systems (ITS) improvements, City wide traffic signal equipment improvements, and traffic management center. Missouri City has also scheduled to construction triple left-turn lanes for southbound approach at the intersection of SH 6.

There are several other planned improvements along the study corridor (TIP and RTP). However, please note that funding is not committed for these projects at this time.

1. From US 90A to SH 6 (Year 2015): reconstruct to six-lane divided curb and gutter roadway with closed storm drains, cross-drainage culverts, and bridge widening
2. From Cartwright Road to SH 6: widening to eight lanes
3. From Lexington Boulevard to Cartwright Road (Year 2017): widening to eight-lanes

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CHAPTER 4: ANALYSIS OF FUTURE CONDITIONS

Traffic Simulation Analysis

An analysis of future traffic conditions is important to determine the geometric improvements that will be necessary along the corridor. Existing and future traffic volumes from H-GAC model and TxDOT historical traffic counts were reviewed to estimate annual traffic volumes growth rate. Based on the review it was determined that a two percent annual traffic growth rate is appropriate for FM 1092. Existing intersection turning movement counts provided by Missouri City were then projected to years 2025 and 2035 based on the estimated two percent annual growth rate. Using these projected volumes, traffic simulation analysis was conducted for future years 2025 and 2035. Traffic simulation analysis was first conducted for No Build scenario to see how the intersections would operate without constructing any improvements and to identify intersections that need improvements. Later, several alternatives were analyzed for intersections that would operate at an unacceptable level of service in the future years. Based on several trials, recommendations were made to improve the level of service. The following sections provide future years No Build and Build scenarios level of service.

Traffic Simulation Analysis

Figure 4-1 shows results of No Build scenario traffic simulation analysis for the year 2025. As shown in the figure, all the signalized intersections operate at acceptable level of service except SH 6, Cartwright Road, and Lexington Boulevard intersections.



Figure 4-1

Figure 4-2 shows results of No Build scenario traffic simulation analysis for the year 2035. As shown in the figure only Plantation Settlement operate at acceptable level of service and all the other intersections operate at unacceptable level of service.



Figure 4-2

Based on several trials, a set of recommendations was made to improve the level of service. Recommended improvements are to widen FM 1092 from SH 6 to Dove Country Drive from four-lanes to six-lanes. In addition, the following improvements are recommended at Cartwright Road and Lexington Boulevard intersections. The recommendations are made based on the assumption that the short-term recommendations are already constructed.

- Cartwright Road: Remove split phase for eastbound and westbound approaches and operate as an eight-phase intersection; add a left-turn lane for westbound and southbound approaches; convert westbound and northbound approaches right-turn to a free turn by constructing acceleration lanes; add a right-turn lane to the eastbound approach.
- Lexington Boulevard: Add a left-turn lane to the eastbound approach.

Figure 4-3 shows results of Build scenario traffic simulation analysis for the year 2025. By constructing the recommended improvements, Cartwright Road and Lexington Boulevard intersections improved to acceptable level of service. In addition, El Dorado Boulevard, 5th Street, and Dove Country Drive intersections are improved by more than a letter grade level of service. SH 6 continue to operate at failing level of service because of excessive traffic volumes.



Figure 4-3

Figure 4-4 shows results of Build scenario traffic simulation analysis for the year 2035. By constructing the recommended improvements, all the intersections operate at acceptable level of service or better except SH 6 and Cartwright Road intersections. Cartwright Road intersection will operate at excessive delays, and SH 6 continues to operate at failing level of service due to excessive traffic volumes. Detail level of service information is included in Appendix D.



Figure 4-4

Traffic analysis and recommended improvements are based on the assumption that the traffic growth along the FM 1092 corridor would be an average of two percent per year. However, it is recommended to monitor the traffic volumes in the future years and if a traffic growth of more than two percentage is observed then the corridor should be reanalyzed and recommendations for the long-term should be revised to better serve the traffic growth.

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CHAPTER 5: RECOMMENDED IMPROVEMENTS & IMPLEMENTATION STRATEGIES

Short Term Improvements

Medium Term Improvements

Long Term Improvements

Transit

Implementation and Cost Summary

Next Steps

Access management improvements along FM 1092 corridor are classified as short term, medium term, and long term improvements. Short term improvements can be implemented within four years and do not require purchase of additional right of way, such as traffic signal timing. Medium term improvements can be implemented in five to seven years and may require purchase of additional right of way, such as driveway consolidation and center raised median. Long term improvements can be implemented in greater than 10 years time and can require policy changes and additional right of way, such as roadway widening.

The improvements presented in this report are conceptual in nature and are based on the analysis, feedback from steering committee, and comments received from stakeholders and general public. Based on the availability of funding, Missouri City will further analyze these conceptual improvements in coordination with TxDOT to finalize, design, and construct the improvements.

Short Term Improvements

Short term improvements are recommended along the FM 1092 corridor to improve safety and traffic flow. The recommended improvements are listed below and a clear graphical representation is shown in Appendix E from pages E1 to E4.

1. Signalized Intersections
 - a. Supplemental signal head and sign at Hampton Drive intersection
 - b. Pedestrian signals at Hampton Drive and Dove Country Drive intersections
 - c. Traffic signal timing optimization along FM 1092 corridor

Based on public meeting feedback, supplemental traffic signal head and signal ahead sign are recommended for the northbound traffic at Hampton Drive intersection to improve sight distance and safety. Pedestrian facilities are not installed at the intersections of Hampton Drive and Dove Country Drive under existing conditions, therefore crosswalks and countdown pedestrian signals are recommended at these two intersections. Traffic signal timing optimization typically has a significant positive impact on safety and mobility with less cost. Therefore, timing optimization is recommended along FM 1092 to improve coordination between signalized intersections and improve traffic flow and safety along the corridor. Timing optimization improvements at Cartwright Road intersection include, adding right-turn overlap phase for westbound, northbound, and southbound approaches. Timing optimization improvements at Lexington Boulevard intersection include: removing split phase for eastbound and westbound approaches and operate intersection as an eight-phase intersection; and adding right-turn overlap phase for eastbound and southbound approaches.

Medium Term Improvements

Recommended medium term improvements are listed below and a clear graphical representation is shown in Appendix E from pages E5 to E13.

1. Pedestrian and Bicycle
 - a. Sidewalks and Oyster Creek connection at Plantation Settlement Lane
 - b. Bicycle Paths along the corridor
2. Shared driveway and adjacent property cross-access along the corridor at feasible locations
3. Raised median with planned openings and turn lanes along the corridor

Pedestrian and Bicycle Infrastructure

For the medium term, it is recommended that the existing shoulder throughout the corridor be changed to a proposed bike lane/shoulder. The existing shoulder is typically eight feet wide which would provide ample room for the bike lane/shoulder. This would require some restriping at the intersections and the addition of a rumble strip, but would allow bicyclist to use the corridor while not affecting the automobile traffic. In order for a bike lane to attract the most use, it would need to be in both directions and for the length of the corridor.



Along with the addition of the bike lane, it is also recommended that the shared use path along the south side of the Oyster Creek be connected to the north side via a shared path bridge which would need to connect to a new at grade path connecting to Quail Valley Middle School driveway. In addition to the at grade path going to the school it is also recommended that a path go under the FM 1092 bridge on the north side of Oyster Creek and connect to sidewalk along Plantation Settlement Lane. Addition of this bridge and two paths would allow students from the neighborhoods along the creek, to access the school without the

danger of crossing FM 1092. A pedestrian signal at the Plantation Settlement intersection is also recommended with a dedicated cycle for pedestrians and bicyclists. In the existing condition children have to share the green signal cycle with vehicular traffic, which quite often fails to yield to pedestrians waiting to cross which requires the children to sit through more than one cycle.

Shared Access

Typically, number of crashes is related to number of driveways along the corridor. Consolidating the number of driveways along the corridor by providing shared access and/or cross access can help reduce the crashes and improve safety. In addition, cross access between commercial properties increase the number of customers to the businesses. Therefore, shared access and/or cross access are recommended along the corridor at feasible points to share a median opening.

Raised Median

Research has shown that raised medians improve safety. According to Transportation Research Board Access Management Manual (2003), replacing a two-way center left-turn lane with a raised median will significantly reduce crashes by 15 to 57 percentage on a four-lane roadway. Since crash rate has increased along FM 1092 corridor form year 2008 to 2010, raised median with planned openings is recommended along the corridor to reduce crashes and improve safety. A typical cross-section of recommended median improvement is shown in Figure 5-1.

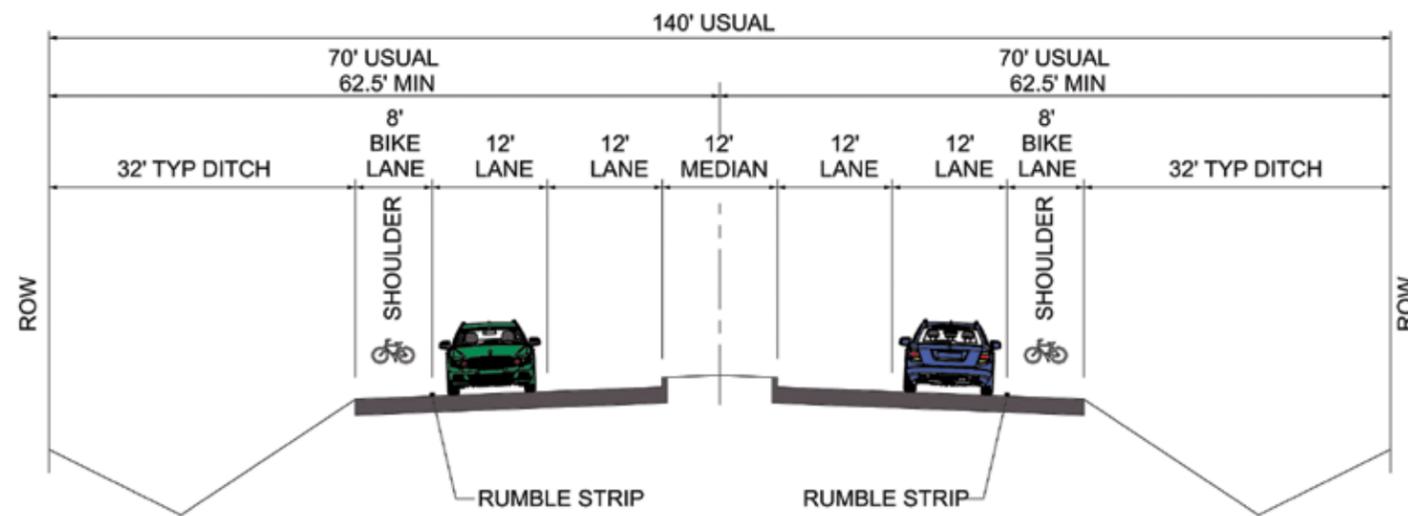


Figure 5-1

One of the challenging aspects of constructing raised median along FM 1092 corridor was to balance spacing of median openings and providing access to properties that do not have alternative access. There are five such locations along FM 1092 corridor at Wells Fargo driveway, Palm Grove Drive, Shell Gas Station driveway at Cartwright Road intersection, Heritage Baptist Church driveway, and Church of Christ driveway. These locations are too close to a public street with median opening and difficult to provide a median opening that meet design standards. However, a design variance can be requested from TxDOT and if approved an alternative median opening can be constructed at these five locations. Alternative median opening options at these five locations are explained below and graphical representation is shown in Appendix E from pages E14 to E19.

Wells Fargo Driveway Alternative

Wells Fargo bank is in the northeast quadrant of FM 1092 and Hampton Drive intersection. It's driveway on FM 1092 is approximately 375 feet from Hampton Drive to the south and approximately 330 feet from Township Lane to the north. Because of the close proximity from both the signalized intersections (Hampton Drive and Township Lane) it is difficult to provide a median opening with southbound left turn-lane on FM 1092 that meets design standards at Wells Fargo driveway. However, TxDOT has allowed left-turn lanes with shorter taper length than design standard at Hampton Drive in the past. Therefore, a design variance can be requested from TxDOT and if approved an alternative median opening with 50 feet storage and 100 feet taper can be constructed at this location. A limitation of this alternative is that southbound left-turn lane length at Hampton Drive and northbound left-turn lane length at Township Lane will be restricted and cannot be extended in the future.

Palm Grove Drive Alternative

Palm Grove Drive is approximately 270 feet from Plantation Settlement Lane to the north. A short southbound left-turn lane is provided at Palm Grove Drive in existing conditions. When the medians are installed, constructing an opening with southbound left-turn lane on FM 1092 that meets design standard is not possible. Without a median opening Palm Grove Drive will be limited to right-in and right-out access only. Motorists going south from Palm Grove Drive have to make a right turn, then quickly merge in a short distance to enter the northbound left-turn lane at Plantation Settlement Lane, and then make a u-turn to go south. In addition, Palm Grove Drive connects to FM 1092 at an elevation, resulting in challenges to the motorists going south without a median opening. Therefore, several options were discussed during the steering committee meetings and two medium-term alternatives are recommended to improve Palm Grove Drive. Option A is to align Palm Grove Drive to Quail Valley Middle school driveway that connects to Plantation Settlement Lane traffic signal. This option will require coordination with the school and provides a safe access to residents. Option B is to relocate Palm Grove Drive further south on FM 1092 such that a median opening and a southbound left-turn lane can be provided with a design variance approval. This option will require TxDOT approval of design variance and provides a safe access to residents.

Shell Gas Station Driveway Alternative

Shell gas station is in the northeast quadrant of FM 1092 and Cartwright Road intersection. It's driveway on FM 1092 is only 170 feet from Cartwright Road intersection and aligns to the southbound left-turn lane at Cartwright Road intersection. Currently, gas tanker trucks and vendor trucks access the property from the driveway on FM 1092. If a median is constructed, gas tanker trucks coming from the north cannot access the property. Therefore, based on discussion with the steering committee it is recommended to open the median on FM 1092 at the gas station driveway so that gas tanker trucks coming from the north can access the property without making a u-turn at Cartwright Road intersection. To provide a safer median opening, it is recommended to post no left-turn sign at the gas station driveway to discourage motorists from making a left-turn from the driveway into the southbound left-turn lane at the Cartwright Road intersection.

Heritage Baptist Church Driveway Alternative

Heritage Baptist Church driveway is on the east side of FM 1092 and is only 220 feet from Waterford Village Boulevard to the north, making it difficult to provide a median opening and southbound left-turn lane on FM 1092 that meets design standards. In the base option it is recommended to connect Heritage Baptist Church parking lot to Quail Valley Church parking lot to the south to share Quail Valley Church driveway median opening. However, an alternative median opening and a southbound left-turn lane can be provided on FM 1092 at Heritage Baptist Church driveway with a design variance approval. This alternative will require TxDOT approval of design variance.

Church of Christ Driveway Alternative

Church of Christ driveway is in the southeast quadrant of FM 1092 and 5th Street intersection. It's driveway is only 260 feet from 5th Street intersection and has similar challenges like Palm Grove Drive for motorists to go south from the driveway. An alternative median opening and a southbound left-turn lane on FM 1092 can be provided with a design variance approval. This alternative will require TxDOT approval of design variance.

Long Term Improvements

Long term recommendation for FM 1092 corridor is to construct a multi-modal facility to include the following. A typical cross-section of recommended multi-modal facility improvement is shown in Figure 5-2.

1. Six-lane roadway with curb and gutter
2. Bike lanes
3. Sidewalks
4. Raised median with planned openings and turn lanes
5. Palm Grove Drive re-alignment
6. Cartwright Road intersection improvements
7. 5th Street re-alignment
8. Lexington Road intersection improvements

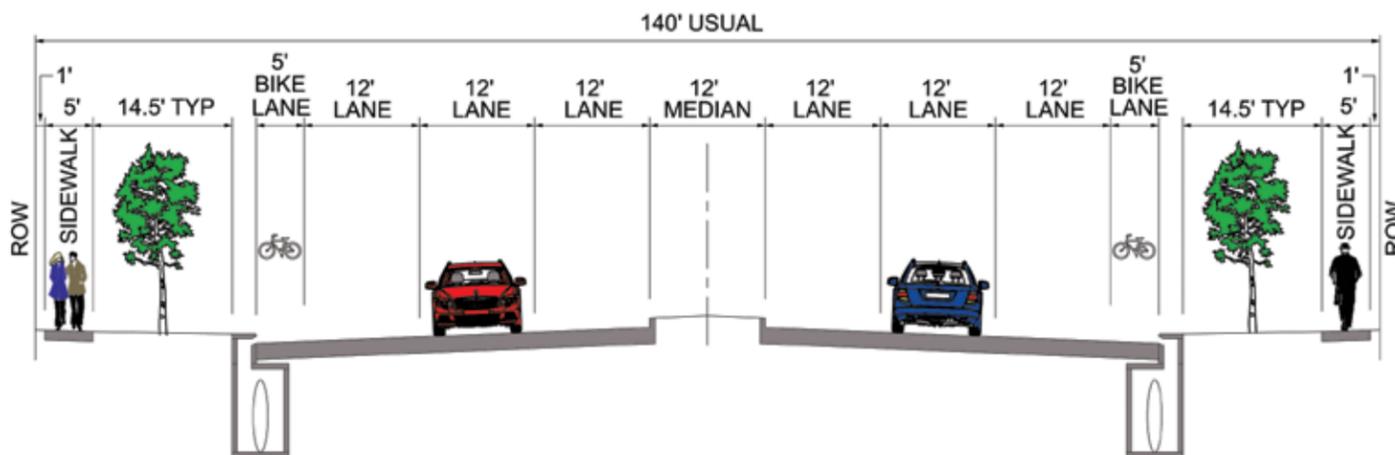


Figure 5-2

FM 1092 ultimate configuration would require a total reconstruction to become a six-lane curb and gutter facility with a median/turn bay in the center. During this reconstruction the corridor should be designed with bicycle lanes and sidewalks throughout the corridor.

Several options were considered as to the design of bicycle facilities to be chosen. Looking at the current and future use of this corridor it was assumed that the majority of the bicyclists would be students and basic riders. Per American Association of State Highway and Transportation Officials standard, shared automobile/bicycle lanes are not recommended for basic riders. Most basic riders don't have the confidence to share a lane with a car. Another alternative is to have a bicycle/pedestrian shared path but that is also not recommended when traveling near and parallel to a roadway. Therefore, the best section recommended for a curbed roadway would be a striped five foot bike lane next to the 12 foot vehicle lane.

Pedestrian facilities are also recommended for the length of the corridor. Currently there are only a few places where sidewalk exists along the corridor. Those sidewalks should continue to be used. Proposed new sidewalks will tie into those existing sections as to avoid two parallel sidewalks on the same side of the road. The new sidewalks should be placed near the outer limits of the right of way in order to give pedestrians ample distance between the vehicle and bike traffic and themselves. Also placing the five feet sidewalk near the right of way would allow easier access for the pedestrians to the businesses.

These recommended improvements will make the corridor more pedestrian and bike friendly, which in turn could reduce local automobile trips, especially in the morning commute and school day end. Continuous bicycle and pedestrian facilities allows the pedestrian to walk or bike the entire corridor which will increase pedestrian use.

Palm Grove Drive re-alignment option to connect to Williamsburg Lane and Mosley Park is included to make the intersection a four-legged intersection and improve Oyster Creek Trail connectivity. Intersection improvements are recommended at Cartwright Road intersection to improve capacity. The improvements include removing split phase for eastbound and westbound approaches and operating intersection as an eight-phase intersection; adding a left-turn lane for westbound and southbound approaches; converting westbound and northbound approaches right-turn to a free turn by constructing acceleration lanes; and adding a right-turn lane to the eastbound approach.

5th Street re-alignment option is included to eliminate the intersection skew and improve safety. A left-turn lane is recommended for the eastbound approach to improve capacity of Lexington Boulevard intersection. The improvements recommended in this report would improve the overall safety and efficiency of FM 1092 corridor. Graphical representation of the recommended improvements is shown in Appendix E from pages E20 to E24.

Transit

Currently there is not a huge transit demand along the FM 1092 Corridor, due to the minimal residential development and lack of connectivity to other routes. Therefore, it is recommended that transit through this corridor not be considered at this time.

Implementation and Cost Summary

Preliminary implementation cost is estimated based on average cost summaries, prepared by TxDOT for previous similar projects, and adjustment for quantity. Please note that this cost do not include the cost of additional right of way, if needed. Detail preliminary cost estimates are included in Appendix F.

Short Term Improvements

- Supplemental traffic signal head and sign at Hampton Drive intersection, and Pedestrian Facilities at Hampton Drive and Dove Country Drive intersections = \$40,000 (TxDOT)
- Traffic Signal Timing improvements along the corridor and right-turn overlap traffic signal heads at Cartwright Road and Lexington Boulevard intersections = \$55,000 (TxDOT)

Medium Term Improvements

- Median and Pedestrian Improvements (includes planned median openings with turn lanes and bike paths along the FM 1092 corridor) = \$900,000 (TxDOT = \$750,000 and City of Missouri City = \$150,000)
- Palm Grove Drive Access - Option A = \$250,000 (City of Missouri City)
- Palm Grove Drive Access - Option B = \$450,000 (City of Missouri City)

Long Term Improvements

- Palm Grove Drive Access - Option C = \$1,100,000 (City of Missouri City)
- 5th Street Re-alignment = \$700,000 (City of Missouri City)
- Six-lane Multimodal Facility (includes bike lanes, sidewalks, and drainage improvements along the FM 1092 corridor; and turn lane improvements at Cartwright Road and Lexington Boulevard intersections) = \$21,000,000 (TxDOT = \$20,300,00 and City of Missouri City = \$700,000)

Next Steps

A series of steps are involved before the conceptual improvements recommended in this report are finalized and constructed. The steps are illustrated in Figure 5-3.



Figure 5-3

Future updated information related to improvements along FM 1092 can be found on the following websites:

- www.h-gac.com/taq, click on Access Management, then FM 1092
- www.missouricitytx.gov

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CHAPTER 6: LONG TERM STRATEGIES

- Planning Opportunities
- Northern Gateway
- Cartwright/Murphy: Neighborhood Center
- Bike-Ped Network
- Regulatory Approaches

Planning Opportunities

Transportation planning and land use planning are tightly intertwined. Transportation decisions drive development decisions and vice versa. Proposed roadway design modifications intended to smooth traffic flow and reduce the occurrence of accidents along Murphy Road will result in a safer travel experience. They will also affect how development along the corridor is physically organized and accessed.

Typical transportation planning tools such as the installation of medians, traffic signals, transit/pedestrian/bike improvements, and the consolidation of driveways help to create “ordered” patterns of land use along corridors, with areas near main intersections having the highest development intensity. This is followed by main entrances to larger master-planned developments between signalized intersections, and finally by single-use developments punctuated with open spaces—a pattern commonly seen along emerging commercial strips. This land use hierarchy, typically reinforced through zoning (and often by significant differences in land values), helps to modulate the look and functionality of a corridor by breaking it into a series of nodes where activity is concentrated at specific points. These points, if planned and designed well, provide opportunities to accentuate a community’s identity and image among both drivers and residents.

The Murphy Road Site Analysis shown in Figure 6-1 illustrates how a handful of discrete planning interventions can add physical dimension, visual interest, and pedestrian functionality to the FM 1092 corridor. These improvements can provide opportunities for new mixed-use development and design features that could greatly enhance an otherwise nondescript section of thoroughfare, and further distinguish Missouri City from other communities along the corridor.

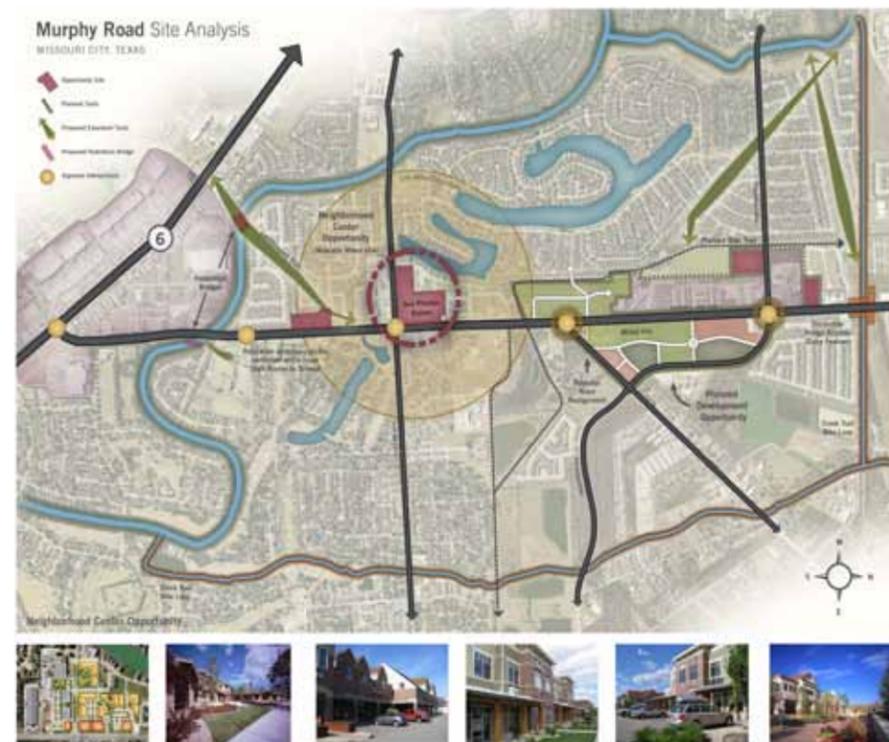


Figure 6-1

Northern Gateway

Starting at Missouri City’s northern boundary along FM 1092, there is an opportunity to create a sense of entry and arrival by establishing a proper community gateway at the drainage way crossing. If properly accented in a manner similar to the brick monuments that frame the Highway 6/Murphy Road intersection, a bridge feature could be created that accentuates the sense of crossing over into Missouri City. This could help formally “announce” the City and instill a sense of anticipation of what lies ahead.

The intersection of Murphy Road and Independence Boulevard is the first main intersection that one passes through when entering the City from the north. This intersection exhibits a layering of both old and newer commercial development interspersed with pieces of vacant land, multi-family housing and quasi-industrial uses. It is the closest that the corridor comes to a mixed-use zone although without the interconnection and interplay characteristic of master-planned developments.

Over time, the City should encourage the redevelopment of much of the aging industrial uses along the western edge of the corridor, and aim for more master-planned development in its place. New sidewalks, bike path connections and cross easements among frontage uses should be implemented to create easier cross-flow and reduce unnecessary vehicle incursions onto FM 1092. Redevelopment and infill of underused and vacant sites should strive for a more urban feel with side/rear parking, parking lot greenery, internal crosswalks, and buildings that are grouped into discrete spaces with stronger presence along the street. Intersection improvements should include decorative mast arms, stylized street signs and well-marked crosswalks.

The open tracts of land in the middle section of the corridor should be reserved for mixed-use, master-planned development organized along an internal, interconnected street system. Access into the area should be restricted to a handful of openings along FM 1092, Fifth Street and Independence Avenue. The internal streets, as well as FM 1092 (and the other major streets framing this opportunity area), should be outfitted with sidewalks and/or dedicated multi-use trails and street trees.

This plan contemplates the potential realignment of several hundred feet of Fifth Street where it meets FM 1092. The eventual realignment, if feasible, would cause Fifth Street to meet the corridor at a 90-degree angle just north of the current intersection. Any new entrance drive for possible new development fronting the western edge of FM 1092 should align with the new Fifth Street intersection.

Cartwright/Murphy: Neighborhood Center

The intersection of Cartwright and Murphy Roads is positioned to serve as a compact, walkable commercial center for the residential neighborhoods that surround it. The western edge of the intersection is bracketed by an aging commercial center anchored by City functions (Municipal Court, Fire Department, Police Department) and an open tract of land on the north side of Cartwright Road. Re-conceiving the area as a unified mixed-commercial district, that would include infill and corner-lot development as well as some structured parking and an enlarged

public square, would take advantage of the significant public investment already made in the area and position it as a hub of commercial and public activity for the City's west side. It would also serve to repurpose and instill new life into an older strip center that still has many years of useful life left in it.

The Cartwright Road Concept shown as Figure 6-2 illustrates how the entire western side of this key intersection could be "notched together" into a single master development. Much of the deadening surface parking lots are replaced by a low parking structure (south side) or enclosed by new street-hugging buildings that frame the intersection. The grassy outlot along the south side of Cartwright Road is moved from the parking garage footprint and expanded into a green "public square" fronting directly onto the aforementioned public buildings. The repurposed center, with multiple pedestrian and bike connections to the surrounding neighborhoods, school, creek trail and Highway 6 commercial district, becomes the active hub of the corridor.



Figure 6-2

Initiating this small-area redevelopment plan will involve engaging very directly with affected landowners; assisting the assemblage of land; recruiting developers and equity investors; installing infrastructure and offering financial incentives to offset any extraordinary public improvement costs. Such efforts are usually managed and organized under the purview of a non-profit, public-private development corporation. Other tools include applying appropriate zoning and design standards, and the use of tax increment financing.

Bike-Ped Network

The pedestrian system along and around the immediate FM 1092 corridor is anchored by the Oyster Creek Trail. This trail provides a strong opportunity for other bike/ped segments, including neighborhood sidewalks, to connect to it. However, the trail currently has a limited number of access points and creek crossings along its length, which limits its usefulness as a day-to-day, multi-use pedestrian link. The City should attempt to maximize use of the trail by increasing the number of these connections and by constructing pedestrian bridges and underpasses in key locations to provide access to the Highway 6 commercial district and Quail Valley Middle School.

In other areas in the vicinity of FM 1092, there are opportunities to create or extend trail spurs along utility and drainage easements that could tie into the main trail. In this way, the Oyster Creek Trail should be positioned as the primary pedestrian spine for this part of the City including for residents of the immediate area who could use it to safely cross FM 1092 (via existing and new underpasses) and to access shopping opportunities along Highway 6 and/or the smaller commercial center at Cartwright Road.

Extending the trail further to the east along existing drainage features, as part of implementing the City's Trails Master Plan, would create a closed loop allowing users to completely circumnavigate this segment of the Murphy Road corridor. Besides offering a major added recreational amenity to the neighborhood, this will expand the number of safe routes for neighborhood children.

Regulatory Approaches

As a Home Rule municipality, Missouri City may use its local "police power" authority to protect and enhance public health, safety and welfare by adopting reasonable regulations to manage access to and from private properties along busy roadways such as FM 1092. Items which cities typically regulate through the adoption of local access management ordinances (or as part of their overall development regulations) include:

- The number of access points to a site. Reducing the number of curb cuts results in fewer conflict points along the roadway as illustrated in Figure 6-3 where a unified access and circulation plan (b) functions much more effectively than a site plan that creates numerous conflicts (a). The number of access points can be regulated based on a given number per site, or the length of frontage. (For example, parcels may be permitted one curb cut by right, with one additional curb cut permitted for lots with more than 100 feet of frontage on the primary street.) Internal access and circulation can be maximized through more deliberate parking design, cross-access easements, shared driveways, and access from side streets or alleys. Fewer access points along street frontages also reduces the number of places where vehicles potentially cross paths with pedestrians and bicyclists traveling along a corridor.
- The location of access points. Where an access point is located relative to nearby intersections, side streets, other access points,

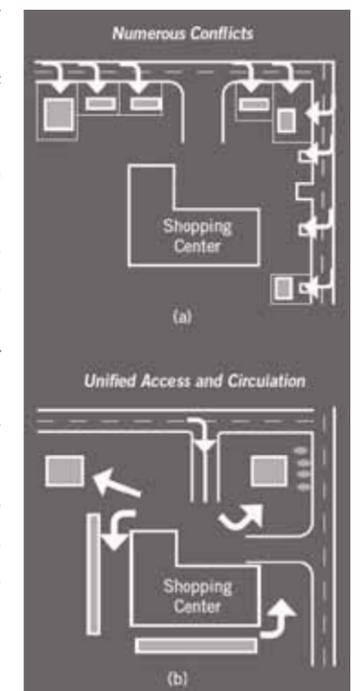


Figure 6-3

and structures has a significant impact on site safety and functionality. Location can be regulated by providing minimum clearance from these and other site elements in order to create a safer street environment and preserve critical sight lines on the development lot. It is also common to focus access points away from the primary corridor and onto less traveled streets. For example, corner lots (or “double frontage” through lots) may be required to provide access from the side or back street, or, where applicable, alleys can provide access in lieu of the primary roadway. [Appendix A, Zoning, in the Missouri City Code of Ordinances already includes restrictions, in some zoning districts, on direct driveway access to a thoroughfare from corner lots that front on a side street.]

When regulating the location of access points, it is important to consider other site requirements, such as building location and required yards, landscaping and pedestrian access.

- Requirement to consider shared driveways. Many times, adjacent lots establish their own curb cuts from the primary street. Cumulatively, this can result in many points of conflict along a corridor. Some local regulations require owners to consider shared driveway access to adjoining parking areas. In addition to the benefits to the public street, property owners benefit from this arrangement. On-site circulation is enhanced by eliminating the need to re-enter the primary street to move between neighboring retail and office sites. Further, the site area that would have been dedicated for a curb cut and driveway can be used to provide parking or additional building space, further optimizing the development potential of the property. This option can be incentivized through other regulations (i.e., a reduction in the required on-site parking supply). [Chapter 82, Subdivisions, in the Missouri City Code of Ordinances already requires that all plats for commercial and/or industrial development indicate provision for shared access (Section 82-159). Further, much of the FM 1092 corridor frontage is zoned for such uses.]
- Requirement to consider cross-access between sites. Providing cross-access is a highly effective means of minimizing conflicts with the public street and optimizing on-site circulation. The basic concept is to connect the parking areas of adjacent parcels with circulation aisles, thereby eliminating the need to re-enter the public street to move between lots. This offers significant benefit to developers and businesses since it results in a more efficient site layout. It can also provide an easily accessible location for overflow parking when neighboring uses experience their peak parking demands at different times (e.g., an office building with peak weekday activity next to a restaurant and cinema complex with peak activity on nights and weekends).
- Requirements related to on-site stacking and loading. A very targeted aspect of some local development regulations involves managing vehicle queuing on drive-thru business sites, especially for typical “fast food” establishments in auto-oriented areas. Regulations addressing vehicle “stacking” lanes can include standards for the location and capacity of such queuing lanes relative to the location of menu boards, ordering stations, and payment and order pick-up windows as illustrated in Figure 6-4. Loading activity and service vehicle operations on commercial sites are also regulated for similar reasons, particularly to prohibit on-site maneuvering of large truck and delivery vehicles from interfering with traffic on the public roadway or disrupting regular on-site circulation and customer access to parking spaces. In essence, vehicles which visit a site temporarily but never actually park can have

a major impact on overall site functionality, and these impacts can overflow into and affect safe and efficient traffic operation on the adjacent public street.

- Requirements to enhance multi-modal access and safety. Access management typically focuses on automobiles. However, bicyclists and pedestrians should also be considered. Local site development regulations can require a continuous and consistent pedestrian network that provides safe and direct access from the public sidewalk to the building entrance. Such standards

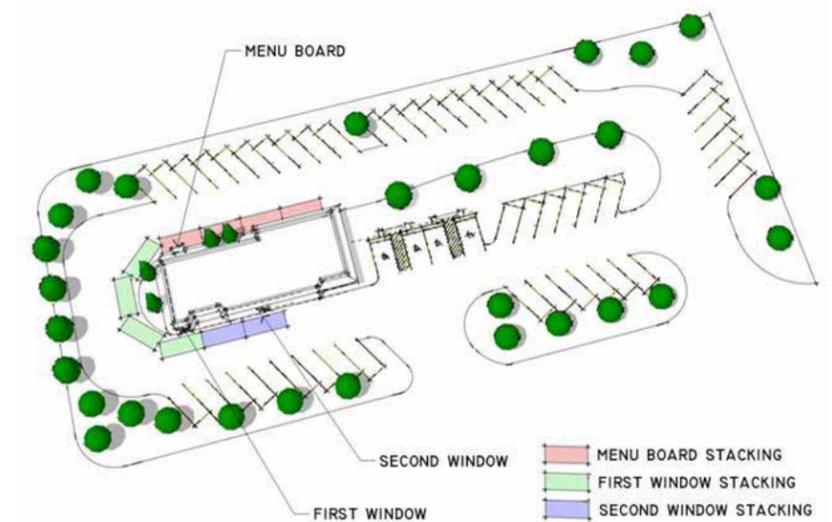


Figure 6-4

can also require specific design treatments (e.g., unique pavers, crosswalk markers, signage, etc.) that optimize safety at unavoidable on-site pedestrian/vehicle conflict points. Bicycle storage facilities can also be required. Regulations can specify the minimum on-site bicycle storage capacity (typically as a percentage of the on-site vehicular parking requirement), the location of bicycle storage infrastructure relative to the primary structure and other site elements, and the pedestrian linkages between the bicycle storage area and the primary building or public sidewalk. Bicycle parking and related amenities can also be incentivized by linking it to a corresponding reduction in the minimum required vehicular parking supply. Photographs in Figure 6-5 offer examples of successful site development practices that balance the access and circulation needs of vehicles, pedestrians and bicyclists. [Within Appendix A, Zoning, of the Missouri City Code of Ordinances, Section 8, PD Planned Development District, requires that a PD applicant submit a concept plan that, among other things, indicates “pedestrian and vehicular circulation within the entire area and access to outside the PD district.” Likewise, Section 15, Specific Use Permits, requires the Planning and Zoning Commission to make findings regarding “ingress and egress to property and proposed structures thereon with particular reference to automotive and pedestrian safety and convenience, [and] traffic flow and control.”]



Figure 6-5

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APPENDIX A: PUBLIC MEETINGS COMMENTS SUMMARY



**Comments Summary
Public Meeting #1
August 31, 2011**

A questionnaire was distributed at the public meeting. Below is a summary of the 40 questionnaires received (as of October 10, 2011):

Which category best describes your interest?

Local resident	28
Service business owner.....	4
Retail business owner.....	3
Worship facility.....	3
Public official	2
School.....	1

Of the tools presented here tonight, which would you like to see used in the corridor?

Sidewalks.....	14
Improve traffic signal timing	10
Center two-way left-turn lane	9
Six-lane roadway section.....	9
Left- and right-turn lanes	7
Bike paths.....	7
Raised median	5
New traffic signal installation	4
Driveway reconfiguration	4
Limit driveway access to FM 1092.....	4
Transit opportunities	3
Four-lane roadway section.....	2
No medians	1
Align turn lanes with businesses and residential entrances	1
FM 1092 should be a highway with no traffic signals.....	1
Soft surface running/walking path along the bike path	1

Which locations in the corridor present safety problems?

Cartwright and FM 1092.....	7
Lexington and FM 1092	6
Entire Corridor.....	5
SH 6 and FM 1092.....	5
Entrance to Quail Valley Middle School	3
5th Street and FM 1092.....	2
Waterford Village Blvd and FM 1092	2
Palm Grove Drive and FM 1092.....	2
FM 1092 and Ave. E	2
90A and FM 1092.....	2

Turning into Lowe's.....	1
Dove Country Road and FM 1092	1
Williamson Lane and FM 1092	1
Mula/Greenbriar	1

Which transportation related issues along the corridor concern you the most?

Traffic lights not synchronized.....	7
Turning in and out of subdivisions.....	6
Being able to access destinations without making a U-turn	4
Heavy traffic	3
Increasing FM 1092's capacity.....	2
Misaligned U-turns impacting businesses	1
Reduced speed	1
Do not create METRO bus stops.....	1
Raised medians affecting left turns into school with 250 plus students being picked up and dropped off everyday	1
Sidewalks for safety.....	1
Street Lights.....	1
People driving down the middle turn lane	1
Throughput.....	1

Do you walk along this corridor?

No	25
Yes.....	7

What sections of FM 1092 do you walk along or across?

5th Street to Cartwright	2
5th Street to Lexington.....	1
Waterford Village to Brightwater Ctr	1
Lexington to Independence	1
Quail Valley Middle School to Cartwright.....	1
Access to bike trail leading to Oyster Creek Park.....	1

What is your destination?

Church.....	1
YMCA	1
Quail Valley Middle School.....	1
Oyster Creek Park	1

Do you or your employees/students bicycle along this corridor?

No	28
Yes.....	3



Would you want the ability to bicycle along the corridor?

No	15
Yes.....	4

Where do you start and end your bike ride?

Palm Grove to Hwy 6.....	1
Palm Grove to Cartwright.....	1
FM 1092 and Hwy 6.....	1

Do you have any other general comments?

No change on FM 1092 (because of SH 6, concern about U-turns or other various reasons)	9
Synchronize traffic lights	2
Information on traffic counts was informative.....	1
Traffic light at Lexington Common.....	1
Transit to get to Park & Ride.....	1
Plans should accommodate local residents' non-business access.....	1
Need more high-speed evacuation routes.....	1
Missouri City needs another road from Beltway 8 between FM 1092 and Fort Bend Tollway to get to SH 6.....	1
Long turn lanes to unclog traffic	1
Do better establishing construction times than SH 6	1
Must address the problem intersections around Quail Valley Middle School.....	1
Wheel Chair access should be a must.....	1
If you end up with grass medians which will require perpetual maintenance (like the recent Hwy 6 "improvements"), then I think that would be a total waste of our tax dollar.....	1
You did an awesome job presenting the matter and I really liked how you handled the questions	1

Questions

1. Accidents on FM 1092 – have there been more accidents from behind and/or change of lane accidents or t-bone type crashes?
2. Can red lights change time spans during an emergency when cars need to get to US 59?
3. Getting in and out of any subdivision and having to then make a U-turn to get access will be/can cause more problems and accidents than what is already occurring. The number of businesses along FM 1092 in comparison to SH 6 is way less, so why create medians on FM 1092?

**Comments Summary
Public Meeting #2
November 3, 2011**

A questionnaire was distributed at the public meeting. Below is a summary of the 21 questionnaires received (as of November 17, 2011):

Which category best describes your interest?

Local resident	16
Worship facility.....	2
Retail business owner.....	1
Service business owner.....	1
Homeowner	1
Business driver	1
Investment property owner	1
HOA director.....	1
First United Methodist.....	1

Of the recommendations presented here tonight, which would you like to see used in the corridor?

Improve traffic signal timing/progression	17
Left-and right-turn lanes	13
Raised median	10
Consolidated driveways along FM 1092	8
Bike paths.....	8
Pedestrian facilities	6
Six-lane roadway section.....	3
Sidewalks.....	2
None of the above	1

What modifications or additional improvements would you like to see and where? (Please provide detailed comments)

- Double left turn to Cartwright Westbound
- No entrance for Cover Trail – north to south will cause u-turns @ Plantation Settlement. Acceleration lane Northbound from Covey.
- Option B at school
- Leave median open
- I generally support use of raised medians and consolidation of driveways to reduce conflicts with turning traffic and improve both safety and traffic flow.
- "Yield on green" instead of "left turn arrow only" lights. These work fine in other areas of Texas (Dallas, Austin). We do NOT need to waste money and aggravate residents on raised medians.
- Red light a Murphy Road at Williamsburg Lane. Traffic light needed for shoppers exiting/ entering Wal-mart.
- More study and stats to determine where lights are needed.

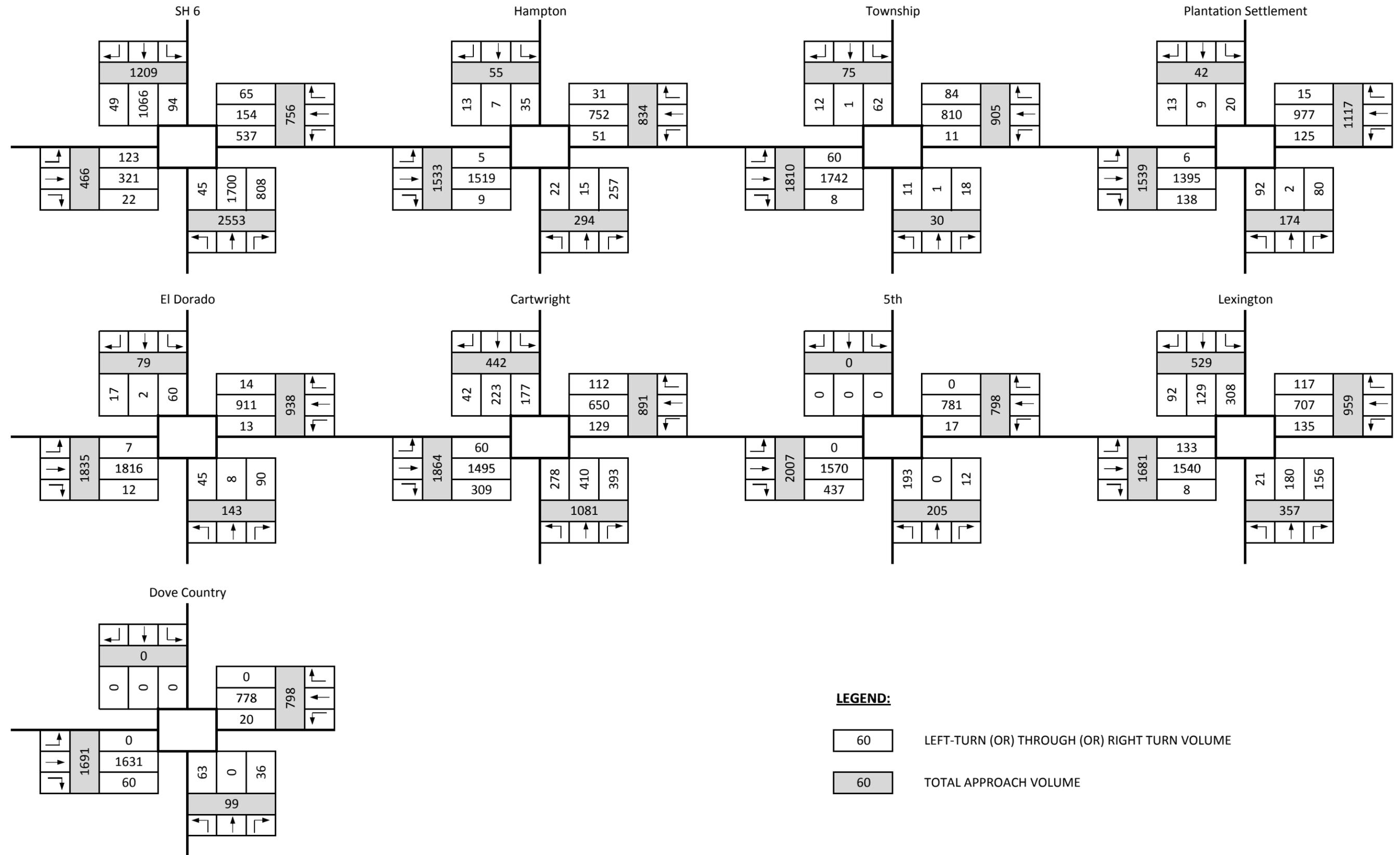
- I have difficulty entering/exiting my sub-division all day long (Lexington Common).
- Right turn signal from Independence (Lexington) onto FM 1092. Improve timing at Lexington/FM 1092 so I can exit/enter my subdivision in Lexington Common. Reduce accidents!
- Easier access to Quail Valley near the school would be great.
- An exit/entrance median opening for the church at the North side of the Lexington light – we have a heavy traffic volume leaving the church day school from 1-2 weekdays and entrance/exit traffic to and from worship services on Sundays.
- There's a great need for an alternate median opening for First United Methodist Church. No of the Lexington Blvd light – weekdays +weekends heavy use after church and church day school.
- Please consider double left-turn lane (northbound on FM 1092) onto Lexington to allow more people to turn and enter First United Methodist Church for church/day school and others to go on Lexington.
- Would love to see a light added at Raul Wahlenburg and 1092
- Is not necessary!!!
- Is not cost effective!!!
- Potential for causing more accidents!!!
- The current proposed plan is a huge improvement over the originally proposed plan, but still is going to cause many U-turn points that will increase the conflict points along the corridor. Specifically:
 1. Township – the open median area is not the natural driveway/entrance.
 2. No east access to Quail Cleaners, Fitness Zone & EOC. from the South. Folks will U-turn at the Cartwright Light causing more conflict points.
 3. No access to Covey Trail from the South.
 4. Closing Palm Grove and re-routing seems plausible.
 5. No Northbound access to the Subway shopping center.
 6. No Northbound access to the Soccer 4 All and Budget Bands. This will cause U-turns at Lexington and cause more conflict points. If you want to see how the area's traffic patterns have changed with raised medians, spend a Saturday at the corner of Glenn Lakes & Hwy 6 and see how many people U-turn at Glenn Lakes traveling South to get to Lowes.
- Not needed at this point – not cost effective – too much tax payer \$
- Stop medians
- Our property is New Hope Lutheran Church at 1424 FM 1092. We would like the curb cut currently shown aligning with the South entrance to our property to be relocated to the North entrance to our property as previously shown on the preliminary plan dated July 26, 2011. See attached sketch.
- Ten Reasons to stop City Council installing Medians messing up Missouri City roads.
 1. Medians cost money and will increase the debt. The argument that the city pays 20% and the Texas Transportation pays 80% is nuts. It is all your money that they will collect somehow along with the fees for collecting money. Missouri City says they will increase the rate of taxes next year because they have to. Well I guess so, if they keep spending.
 2. Medians make the road more dangerous. Pilling up to turn left and make u-turns to get to a business a block back down the road creates road hazards and impatience.
 3. Medians discourage commerce. People skip shopping if the left turn includes a drive to the end of the block and make a u-turn in heavy traffic.
 4. Medians impede the emergency vehicles that may need to use the center lane in rush hour traffic. Hope it is not your heart attack that has delayed response.
 5. Medians discourage business growth. I would think twice about building a business where the access is limited. The extension of medians on Hwy 6 out to Arcola past all the green fields only discourages businesses from starting there.
 6. Medians will make an evacuation a worse headache. We all remember Rita. Many of us took a left turn into the empty oncoming lanes to go back home or take a less traveled road.
 7. Medians have brought blight to areas. Example: Westheimer. Will Hwy 6 in Missouri city meet that fate? Murphy Road need help to revitalize not hindrance to businesses and churches.
 8. Medians are a waste of money. They had to widen the roads to make room for the medians. Was that part of the cost presented to the citizens? I doubt it.
 9. Medians with grass have to be maintained forever until the grass and plantings die but some city contracts call for constant replanting. More spending by the city not figured into the cost.
 10. Medians make people mad at the agency that implemented them. Missouri City City Council will blame Houston Galveston Area Council and vice a versa. www.h-gac.com/taq HGAC covers many counties and lots of money. Looking at their agendas gives a scope of their reach and intent. Missouri City started the ball rolling requesting the median study and going forward. Spending like drunken sailors.
- Turning left from Palm Grove onto FM 1092 is extremely difficult for residents of this neighborhood. Timing of the intersection lights at Quail Valley Middle School and the new lights going in at Township Ln should be set as to allow periodic moments to exit our neighborhood in a safe way. Also, drivers currently block our neighborhood's only exit road when stopping at the school's light on 1092, which gives even less chance of accessing FM 1092 safely. Could something be done about that?
- The traffic congestion on 1092 in the am and pm is horrid. I just recently starting this route due to a job change. Individuals actually use the middle turn lane to drive past stopped traffic and then jump back in the main traffic. This is enough to p*#@ someone who has patiently waited off! Where are the police near my home across from QVMS? Cars zoom thru the school zone with no consequence. Why is the light at my subdivision (Plantation Settlement) so short to get out and so long before it changes? Whose idea was it to put that merge lane (so on 1092 and Cartwright) that ends near the storage center? That is a terrible idea and causes a backup. What really is causing the traffic back up going towards 59 and returning on 1092?
- Township Square: North driveway is not the natural entrance for the Township - very restricted entry+exit. South driveway is better opening for median break turning lane.
- Limiting access to Palais Royal shopping center will cause u-turns @ Cartwright.

- Need double left-turn from Murphy (southbound) onto Cartwright (same as current). Back-up w/double left-turn is to Shipley/Baytown driveway.
- Quail Valley Church and Heritage Baptist Church cross access: One large driveway to be shared by both churches. One crossover one access point w/access to both parking lots.
- Open tract on the west side of 5th Street intersection: Need to add openings for future development.
- Non-residents cut thru on Americana, speeding and discarding trash (Lexington Common). I have witnessed a child almost get hit by a car speeding trying to pass a slower vehicle.
- Right-turn lane (Lexington westbound) needed – have to stop cut-thru traffic (Lexington Common).
- Access blocked to budget blinds+soccer for all. You would have to turn left on Lexington, u-turn, come back to 1092 + turn right.

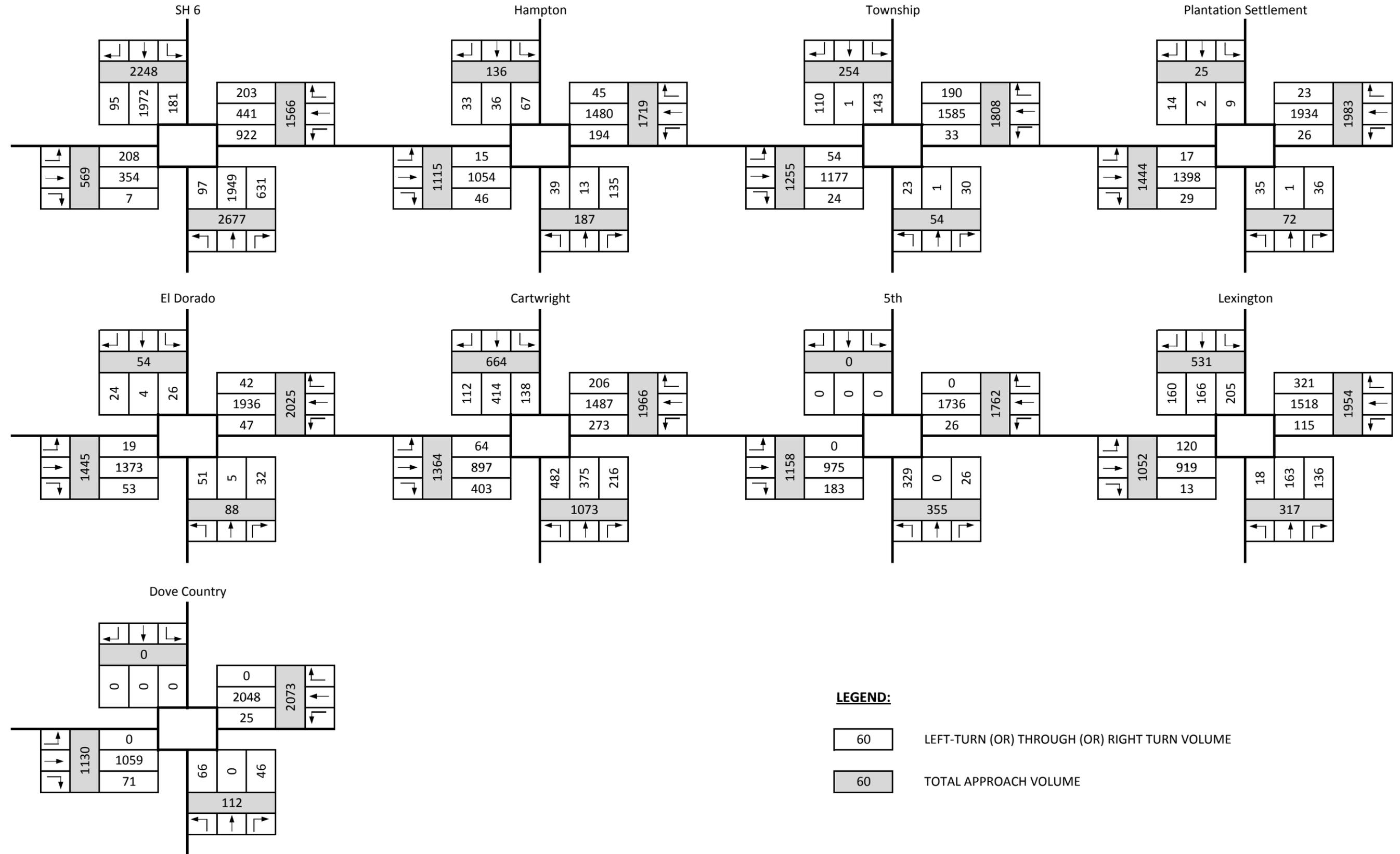
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APPENDIX B: TURNING MOVEMENT COUNTS

Year 2011 - AM Peak Hour Traffic Counts



Year 2011 - PM Peak Hour Traffic Counts



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APPENDIX C: 2011 LEVEL OF SERVICE

Year 2011

AM Peak Hour Level of Service

	FM 1092 @	SH 6	Hampton	Township	Plantation Settlement	El Dorado	Carwright	5th	Lexington	Dove Country
Without Improvement (No Build Scenario)	Eastbound	F	D	E	E	E	F	-	E	-
	Westbound	E	E	C	F	C	F	E	D	D
	Northbound	C	B	A	B	A	B	A	C	A
	Southbound	C	A	A	C	A	C	A	C	A
	Intersection	D	B	A	C	A	D	A	D	A
With Improvement (Build Scenario)	Eastbound	E	D	E	E	E	E	-	D	-
	Westbound	E	E	C	F	C	F	E	E	D
	Northbound	C	B	A	B	A	C	A	C	A
	Southbound	C	B	A	B	A	D	A	C	A
	Intersection	D	C	A	B	A	D	B	D	A

PM Peak Hour Level of Service

	FM 1092 @	SH 6	Hampton	Township	Plantation Settlement	El Dorado	Carwright	5th	Lexington	Dove Country
Without Improvement (No Build Scenario)	Eastbound	F	E	D	D	D	F	-	D	-
	Westbound	F	C	C	D	D	F	E	D	E
	Northbound	F	C	B	B	A	D	A	D	A
	Southbound	F	B	B	A	B	D	B	D	A
	Intersection	F	C	C	A	B	E	C	D	A
With Improvement (Build Scenario)	Eastbound	F	E	D	D	D	F	-	D	-
	Westbound	F	C	C	D	D	E	E	D	E
	Northbound	F	C	B	B	A	D	A	D	A
	Southbound	F	B	B	A	B	D	B	D	A
	Intersection	F	C	B	A	B	D	C	D	A

APPENDIX D: 2025 & 2035 LEVEL OF SERVICE

Year 2025

AM Peak Hour Level of Service

	FM 1092 @	SH 6	Hampton	Township	Plantation Settlement	El Dorado	Carwright	5th	Lexington	Dove Country
Without Improvement (No Build Scenario)	Eastbound	F	D	E	E	F	F	-	F	-
	Westbound	F	F	C	F	C	F	F	E	E
	Northbound	E	E	D	B	B	C	A	F	C
	Southbound	E	A	A	C	A	D	A	D	A
	Intersection	E	D	C	C	B	E	B	F	B
With Improvement (Build Scenario)	Eastbound	E	D	E	E	F	F	-	E	-
	Westbound	E	F	C	F	C	D	F	E	E
	Northbound	C	B	A	A	A	C	A	C	A
	Southbound	E	B	B	D	B	D	A	D	A
	Intersection	D	C	A	C	B	D	A	D	B

PM Peak Hour Level of Service

	FM 1092 @	SH 6	Hampton	Township	Plantation Settlement	El Dorado	Carwright	5th	Lexington	Dove Country
Without Improvement (No Build Scenario)	Eastbound	F	F	E	D	D	F	-	D	-
	Westbound	F	D	C	D	D	F	F	E	E
	Northbound	F	D	C	B	B	D	B	E	B
	Southbound	F	C	C	A	C	D	C	F	C
	Intersection	F	C	C	B	C	F	D	F	C
With Improvement (Build Scenario)	Eastbound	F	F	D	D	D	F	-	D	-
	Westbound	F	D	C	D	D	D	F	E	E
	Northbound	F	B	C	B	A	D	A	C	A
	Southbound	F	C	C	A	A	D	A	D	A
	Intersection	F	C	C	B	A	D	B	D	A



Year 2035

AM Peak Hour Level of Service

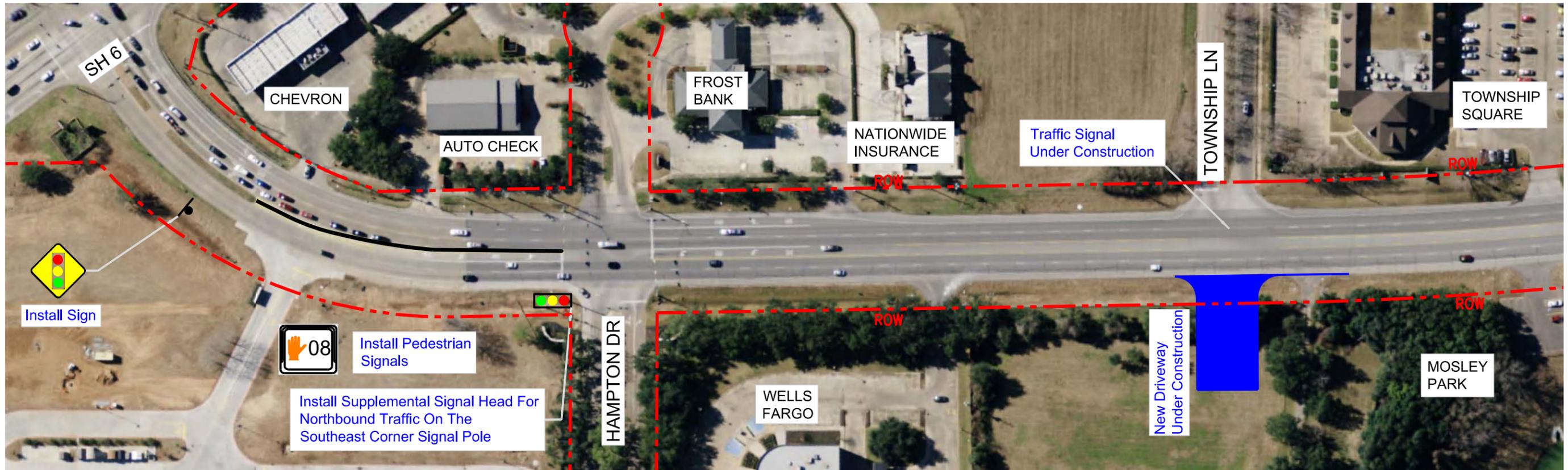
	FM 1092 @	SH 6	Hampton	Township	Plantation Settlement	El Dorado	Carwright	5th	Lexington	Dove Country
Without Improvement (No Build Scenario)	Eastbound	F	D	E	F	F	F	-	F	-
	Westbound	F	F	C	F	C	F	F	F	F
	Northbound	F	F	F	B	E	D	C	F	E
	Southbound	F	A	A	D	A	D	A	D	A
	Intersection	F	F	F	E	D	F	C	F	D
With Improvement (Build Scenario)	Eastbound	F	D	E	F	F	F	-	F	-
	Westbound	F	F	C	F	C	D	F	F	F
	Northbound	C	B	A	A	A	E	A	D	B
	Southbound	F	B	B	D	B	D	A	E	A
	Intersection	F	D	A	C	B	E	B	E	B

PM Peak Hour Level of Service

	FM 1092 @	SH 6	Hampton	Township	Plantation Settlement	El Dorado	Carwright	5th	Lexington	Dove Country
Without Improvement (No Build Scenario)	Eastbound	F	F	F	D	D	F	-	E	-
	Westbound	F	E	F	D	D	F	F	F	F
	Northbound	F	F	D	B	B	D	B	E	B
	Southbound	F	D	F	D	F	F	F	F	F
	Intersection	F	E	F	D	E	F	E	F	E
With Improvement (Build Scenario)	Eastbound	F	F	E	D	D	F	-	D	-
	Westbound	F	E	C	D	D	E	F	E	F
	Northbound	F	B	C	B	A	D	B	D	A
	Southbound	F	D	C	A	A	E	A	E	A
	Intersection	F	D	C	B	A	E	C	D	B

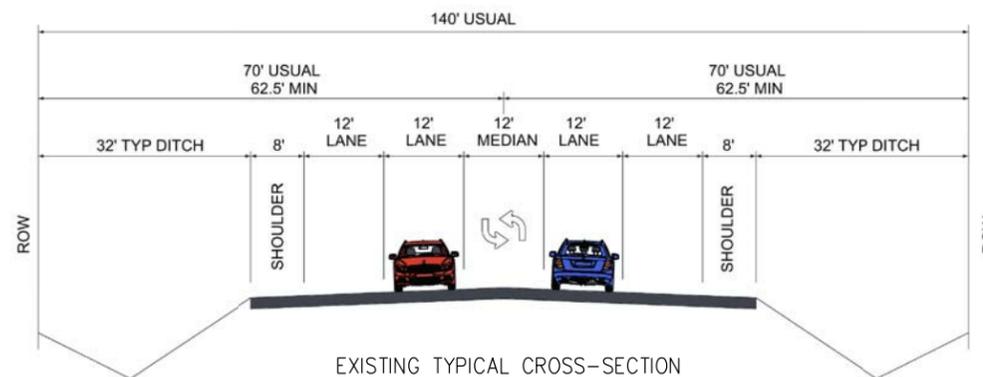
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APPENDIX E: RECOMMENDED IMPROVEMENTS



LEGEND:

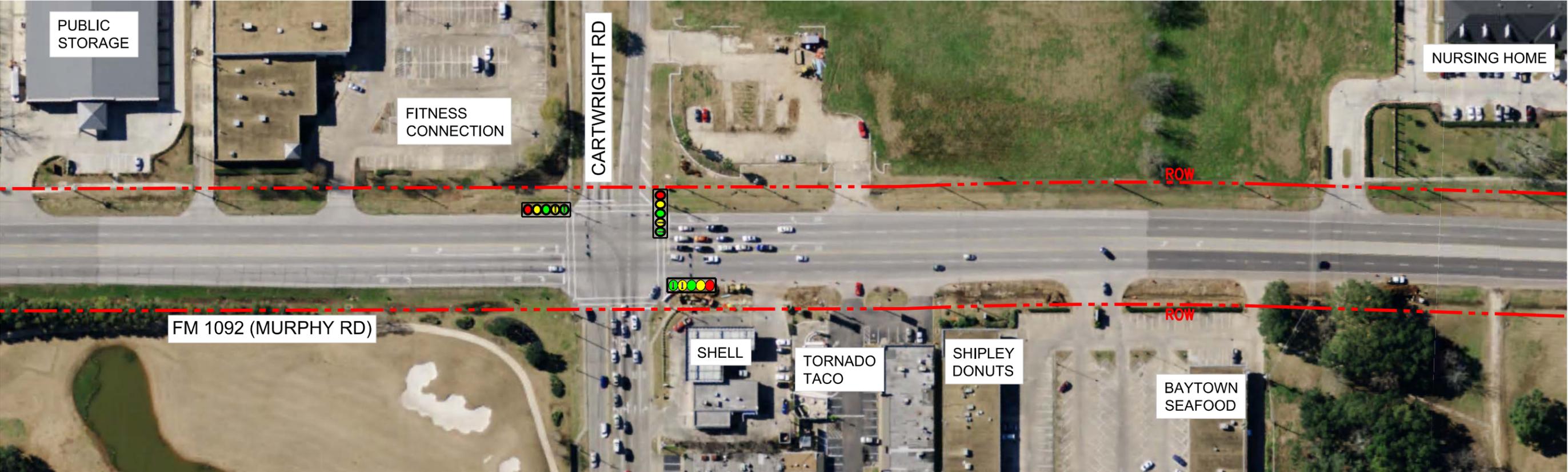
- EXISTING RAISED MEDIAN
- EXISTING RIGHT OF WAY
- NEW DRIVEWAY
- SIGNALIZED INTERSECTION
- PROPOSED SIGN
- PROPOSED COUNTDOWN PEDESTRIAN SIGNAL HEAD
- PROPOSED SUPPLEMENTAL TRAFFIC SIGNAL HEAD
- RIGHT-TURN OVERLAP SIGNAL HEAD



LIST OF IMPROVEMENTS:

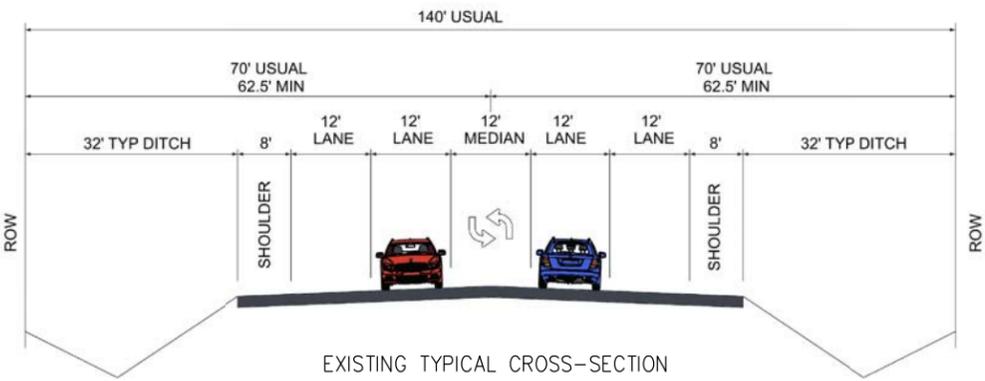
1. ADVANCE WARNING SIGN (SIGNAL AHEAD [W3-3]) FOR NORTHBOUND TRAFFIC AT HAMPTON DRIVE INTERSECTION.
2. COUNTDOWN PEDESTRIAN SIGNALS AND CROSSWALKS AT HAMPTON DRIVE INTERSECTION.
3. SUPPLEMENTAL TRAFFIC SIGNAL HEAD AT HAMPTON DRIVE INTERSECTION.
4. TRAFFIC SIGNAL TIMING IMPROVEMENTS ALONG FM 1092.



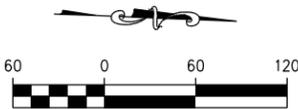


LEGEND:

- EXISTING RAISED MEDIAN
- EXISTING RIGHT OF WAY
- SIGNALIZED INTERSECTION
- PROPOSED SIGN
- PROPOSED COUNTDOWN PEDESTRIAN SIGNAL HEAD
- PROPOSED SUPPLEMENTAL TRAFFIC SIGNAL HEAD
- RIGHT-TURN OVERLAP SIGNAL HEAD



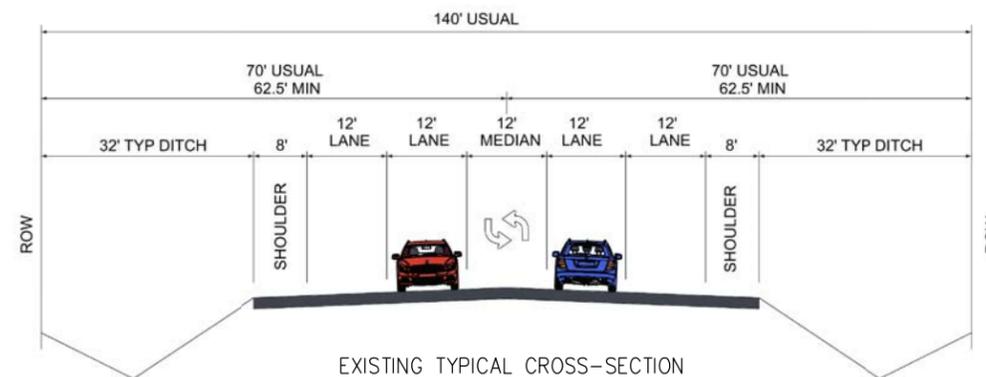
- LIST OF IMPROVEMENTS:
1. TRAFFIC SIGNAL TIMING IMPROVEMENTS ALONG FM 1092, INCLUDING RIGHT-TURN OVERLAP PHASE FOR WESTBOUND, NORTHBOUND, AND SOUTHBOUND APPROACHES AT CARTWRIGHT ROAD INTERSECTION.





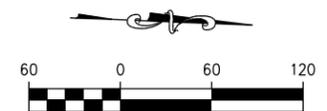
LEGEND:

-  EXISTING RAISED MEDIAN
-  EXISTING RIGHT OF WAY
-  SIGNALIZED INTERSECTION
-  PROPOSED SIGN
-  PROPOSED COUNTDOWN PEDESTRIAN SIGNAL HEAD
-  PROPOSED SUPPLEMENTAL TRAFFIC SIGNAL HEAD
-  RIGHT-TURN OVERLAP SIGNAL HEAD



LIST OF IMPROVEMENTS:

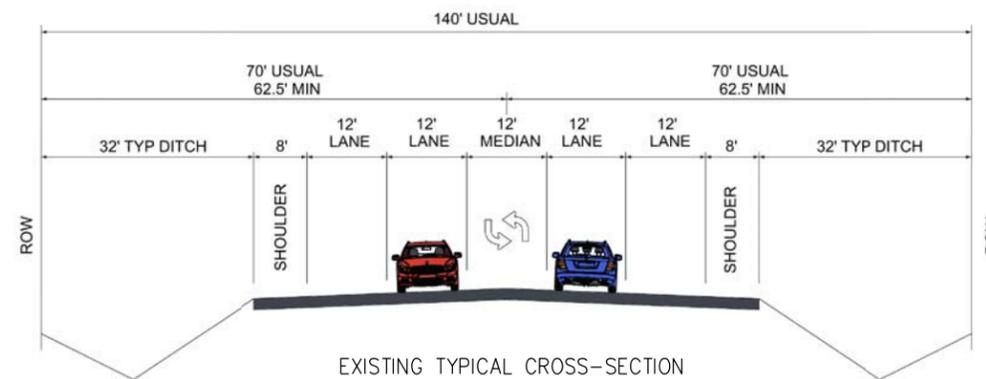
1. TRAFFIC SIGNAL TIMING IMPROVEMENTS ALONG FM 1092, INCLUDING REMOVING SPLIT PHASE FOR EASTBOUND AND WESTBOUND APPROACHES (OPERATE INTERSECTION AS AN EIGHT PHASE INTERSECTION) AND ADDING RIGHT-TURN OVERLAP PHASE FOR SOUTHBOUND AND EASTBOUND APPROACHES.





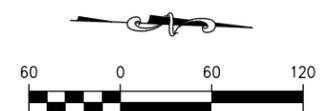
LEGEND:

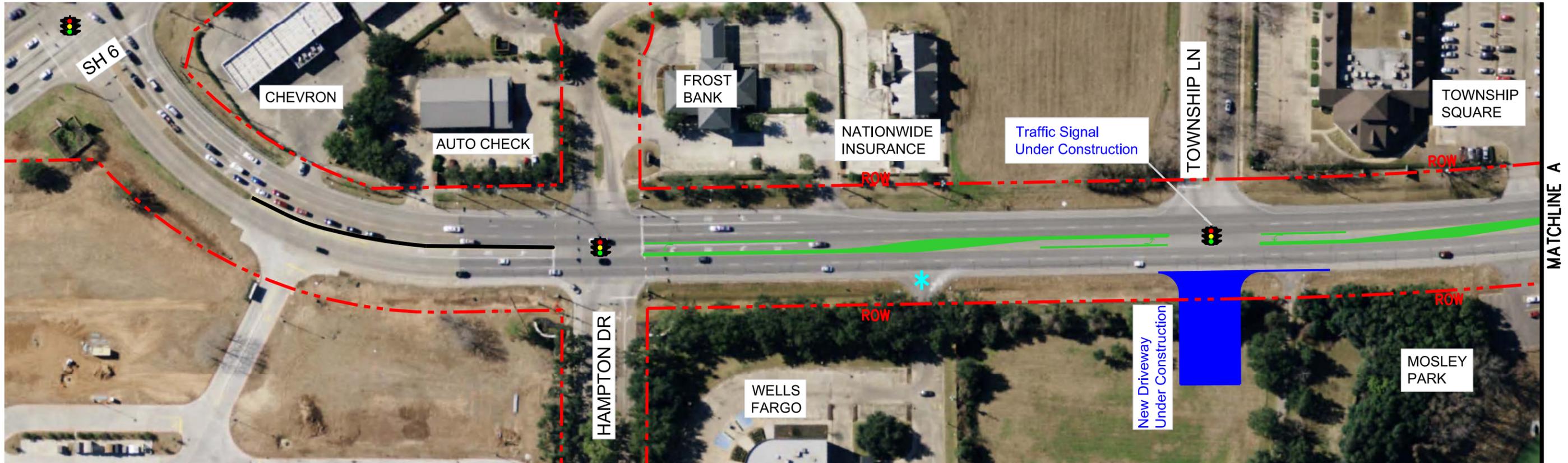
-  EXISTING RAISED MEDIAN
-  EXISTING RIGHT OF WAY
-  SIGNALIZED INTERSECTION
-  PROPOSED SIGN
-  PROPOSED COUNTDOWN PEDESTRIAN SIGNAL HEAD
-  PROPOSED SUPPLEMENTAL TRAFFIC SIGNAL HEAD
-  RIGHT-TURN OVERLAP SIGNAL HEAD



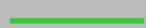
LIST OF IMPROVEMENTS:

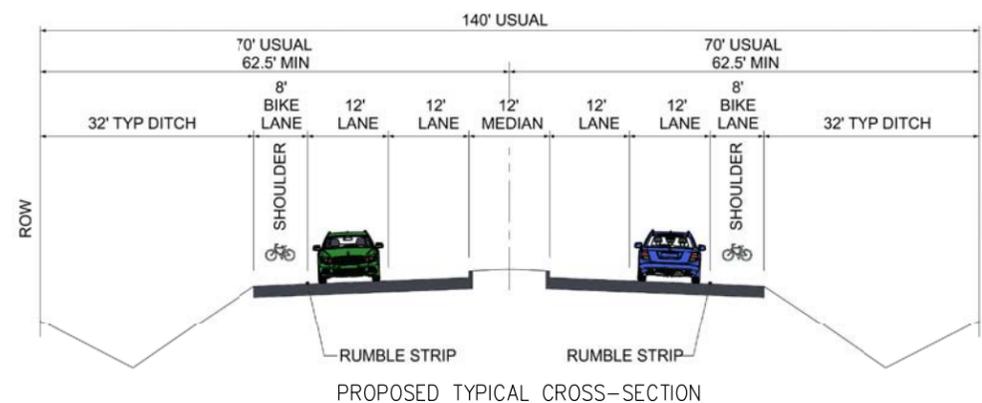
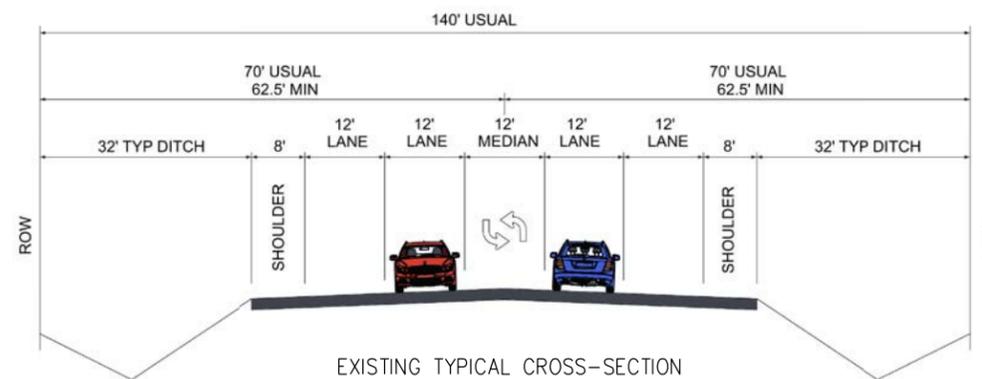
1. COUNTDOWN PEDESTRIAN SIGNALS AND CROSSWALKS AT DOVE COUNTRY DRIVE INTERSECTION.
2. TRAFFIC SIGNAL TIMING IMPROVEMENTS ALONG FM 1092.





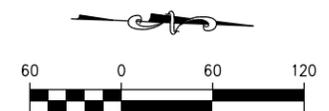
LEGEND:

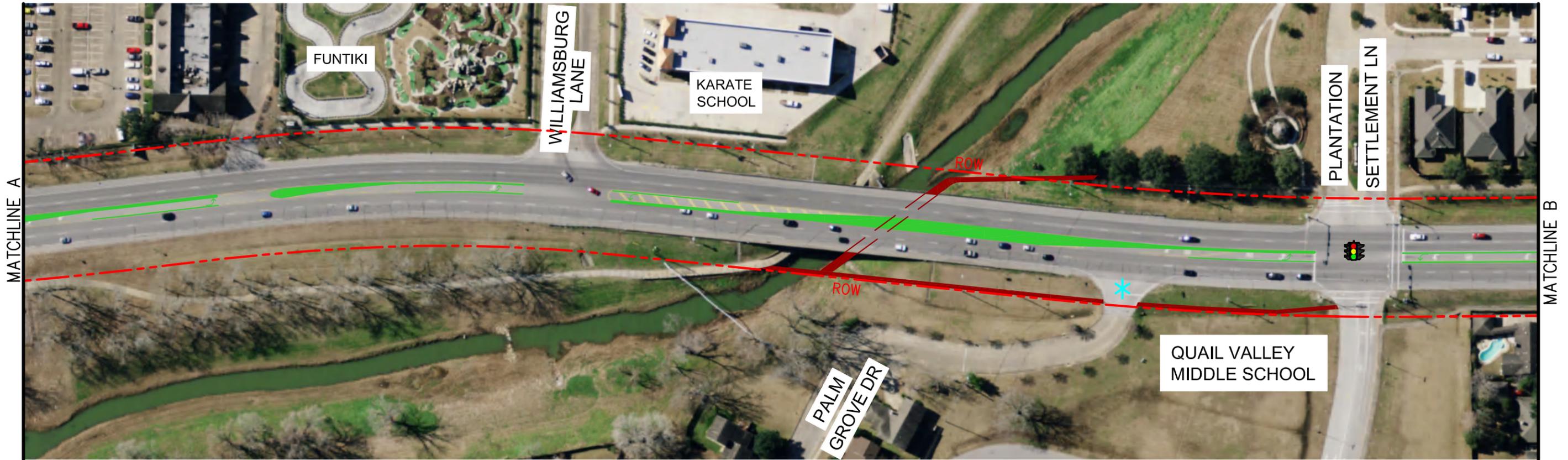
-  EXISTING RAISED MEDIAN
-  PROPOSED RAISED MEDIAN
-  EXISTING RIGHT OF WAY
-  PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
-  SIGNALIZED INTERSECTION
-  NOTE



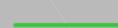
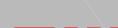
LIST OF IMPROVEMENTS:

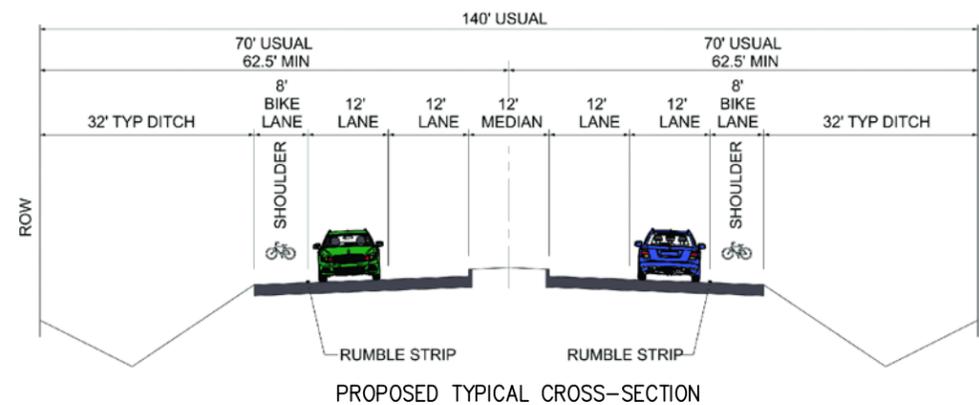
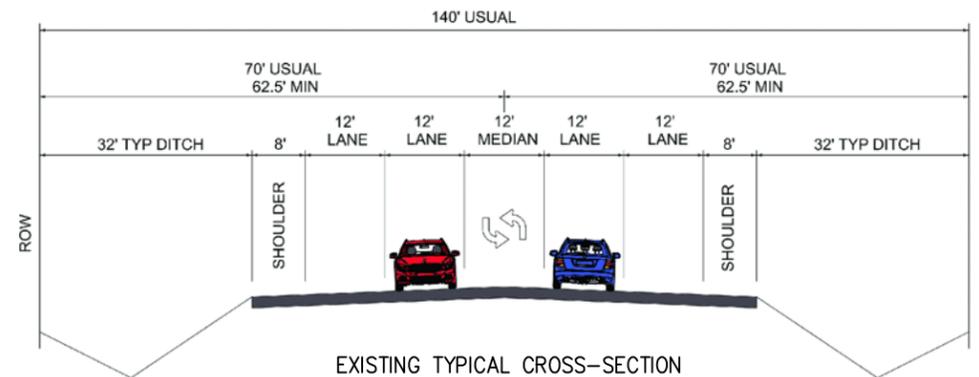
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
 2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.
-  ALTERNATIVE MEDIAN OPTION IS AVAILABLE. SEE PAGE 37.





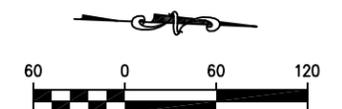
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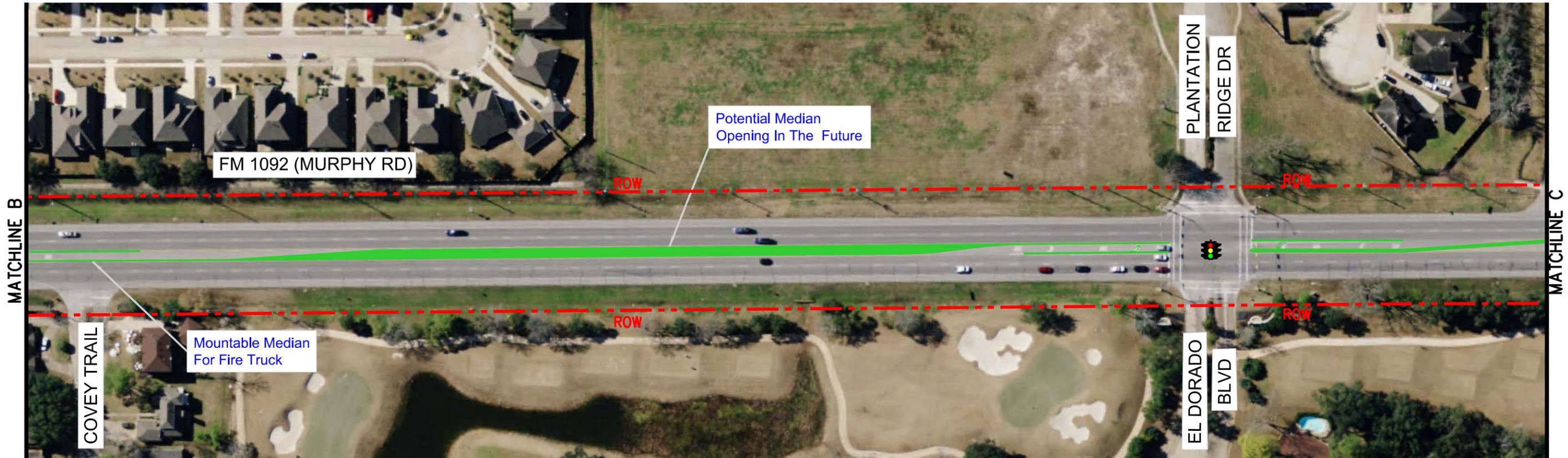
-  EXISTING RAISED MEDIAN
-  PROPOSED RAISED MEDIAN
-  EXISTING RIGHT OF WAY
-  PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
-  PROPOSED SIDEWALK
-  SIGNALIZED INTERSECTION
-  NOTE



LIST OF IMPROVEMENTS:

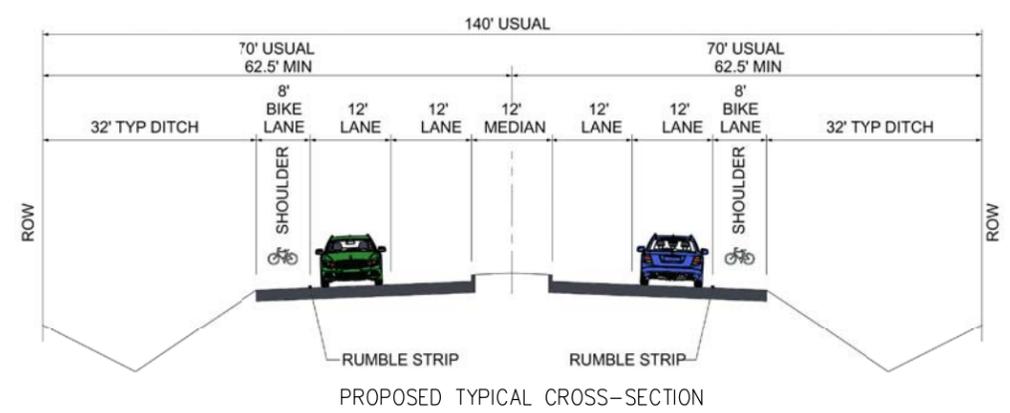
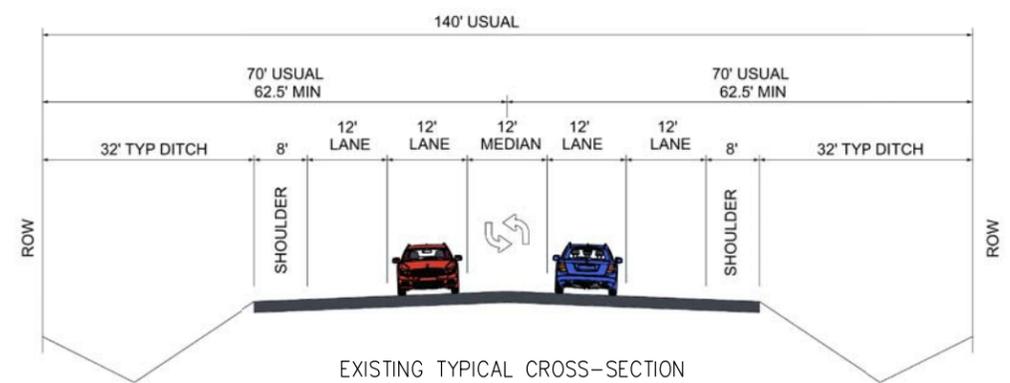
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
 2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.
 3. PROPOSED SIDEWALK AND OYSTER CREEK TRAIL CONNECTION.
-  ALTERNATIVE MEDIAN OPTIONS ARE AVAILABLE. SEE PAGE A11 AND A12.



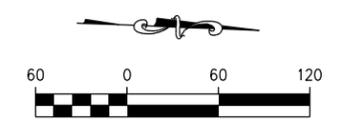


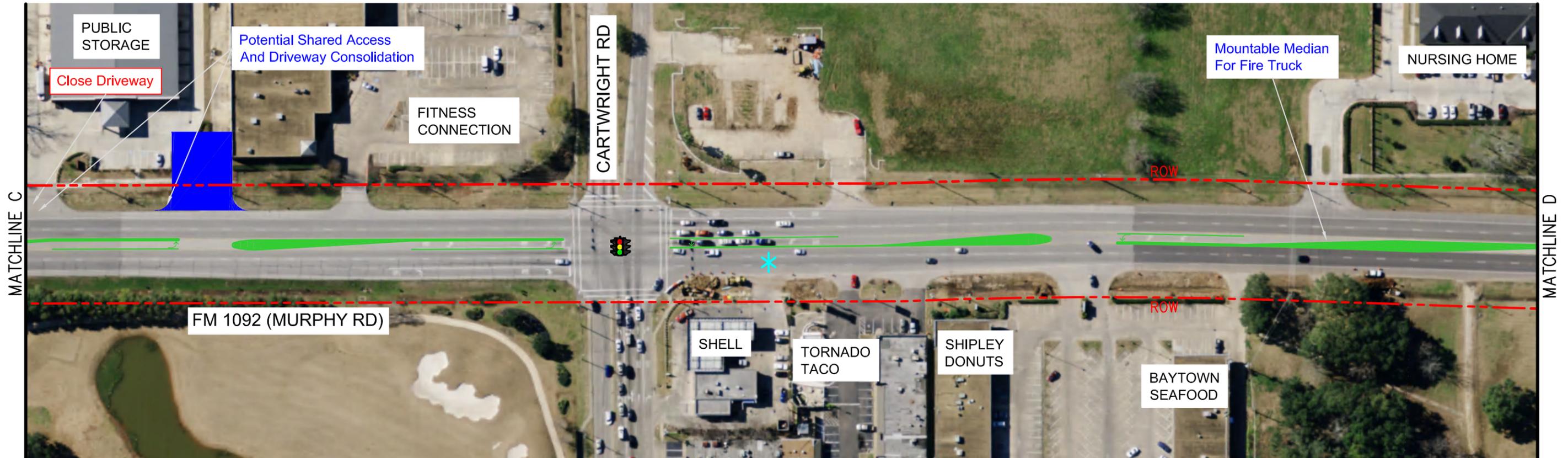
LEGEND:

- EXISTING RAISED MEDIAN
- PROPOSED RAISED MEDIAN
- EXISTING RIGHT OF WAY
- PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
- SIGNALIZED INTERSECTION
- NOTE

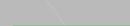


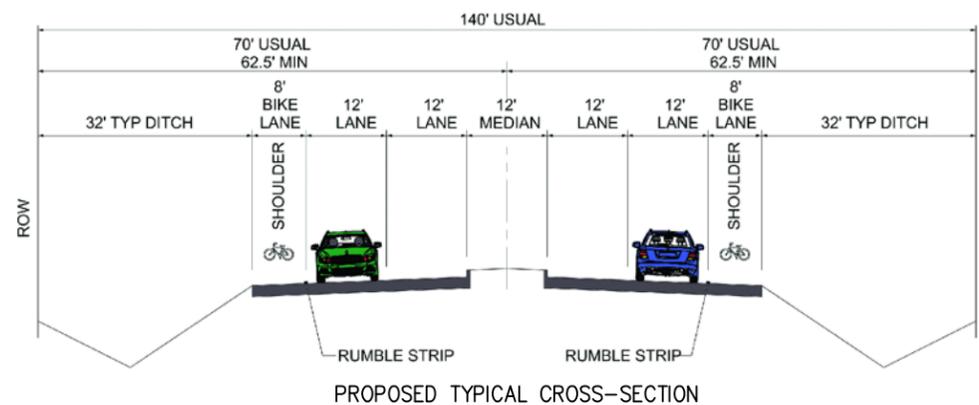
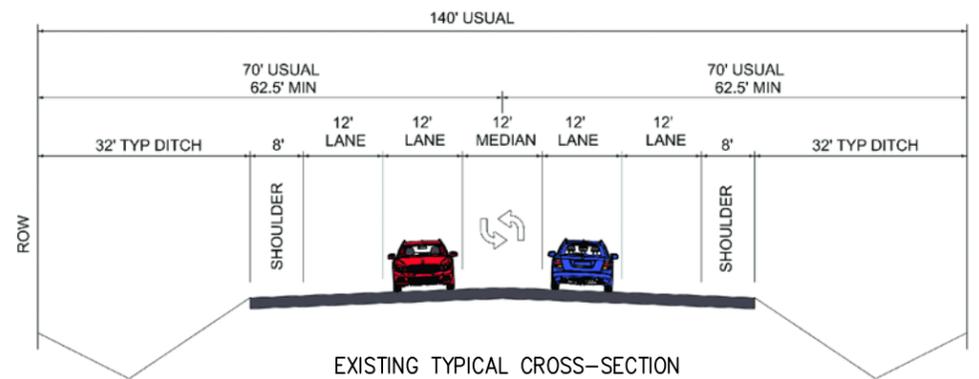
- LIST OF IMPROVEMENTS:
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
 2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.
 3. MOUNTABLE MEDIAN FOR FIRE TRUCK AT COVEY TRAIL.
 4. POTENTIAL MEDIAN OPENING IN THE FUTURE BETWEEN PLANTATION SETTLEMENT LANE AND EL DORADO BOULEVARD.





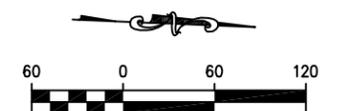
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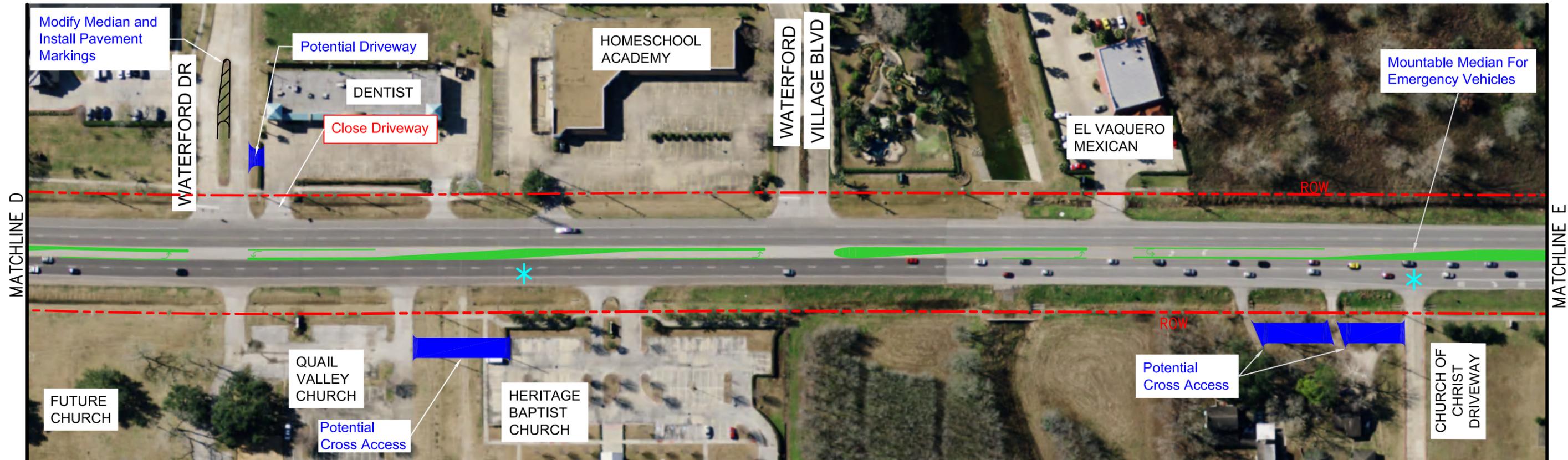
-  EXISTING RAISED MEDIAN
-  PROPOSED RAISED MEDIAN
-  EXISTING RIGHT OF WAY
-  PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
-  SIGNALIZED INTERSECTION
-  NOTE



LIST OF IMPROVEMENTS:

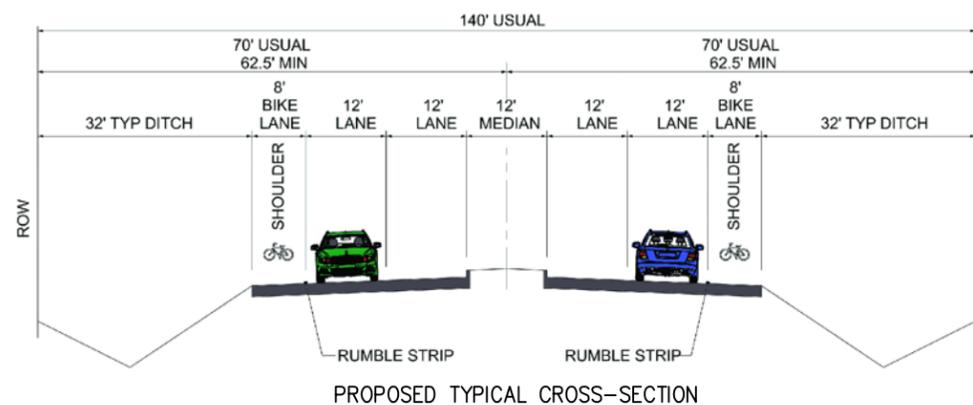
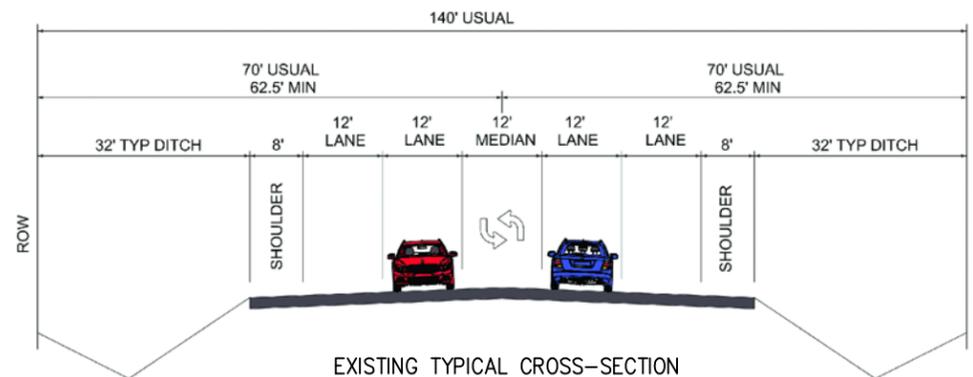
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
 2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.
 3. POTENTIAL SHARED ACCESS AND DRIVEWAY CONSOLIDATION AT PUBLIC STORAGE AND FITNESS CONNECTION.
 4. MOUNTABLE MEDIAN FOR FIRE TRUCK AT NURSING HOME.
- * ALTERNATIVE MEDIAN OPTION IS AVAILABLE. SEE PAGE A13.





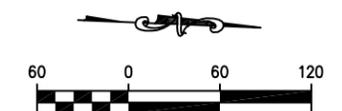
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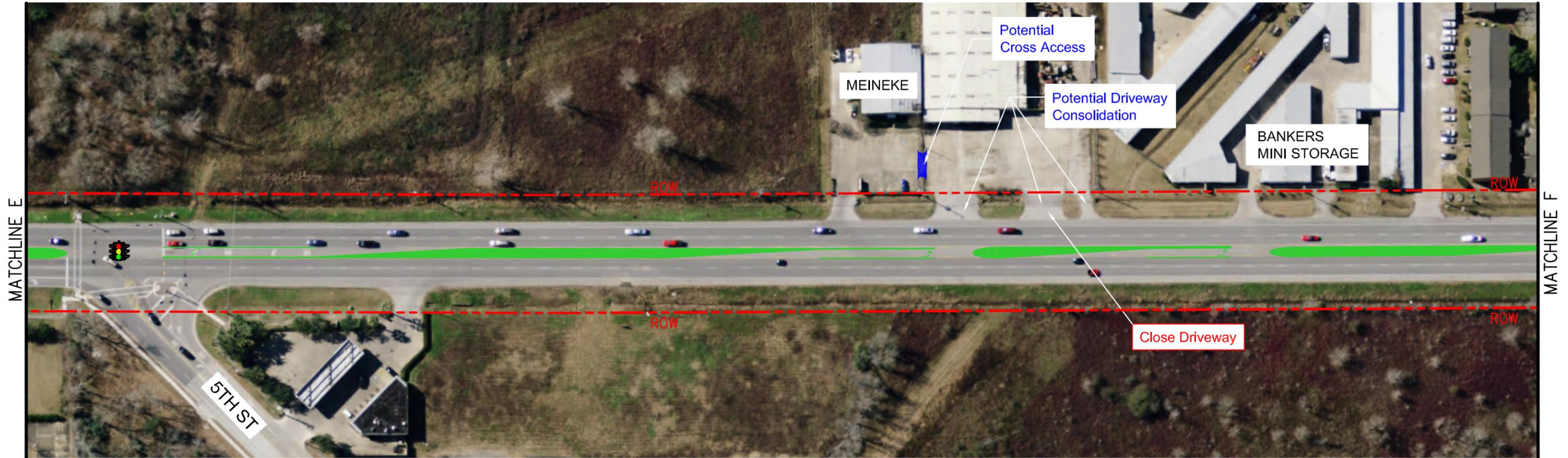
- EXISTING RAISED MEDIAN
- PROPOSED RAISED MEDIAN
- EXISTING RIGHT OF WAY
- PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
- SIGNALIZED INTERSECTION
- NOTE



LIST OF IMPROVEMENTS:

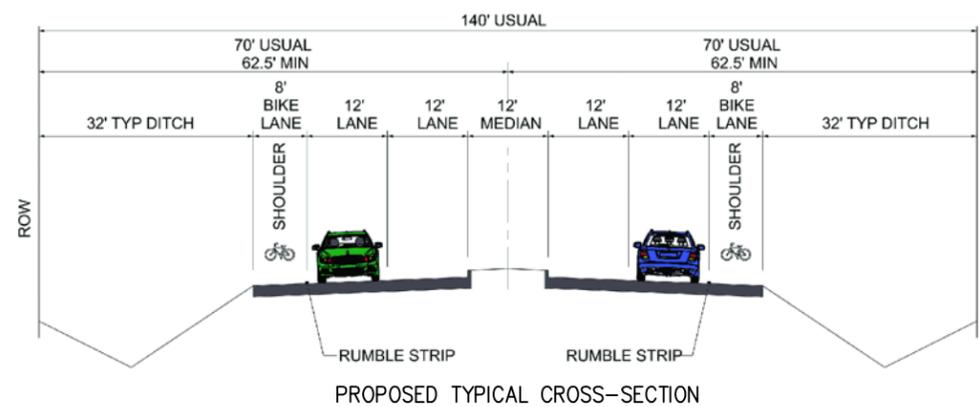
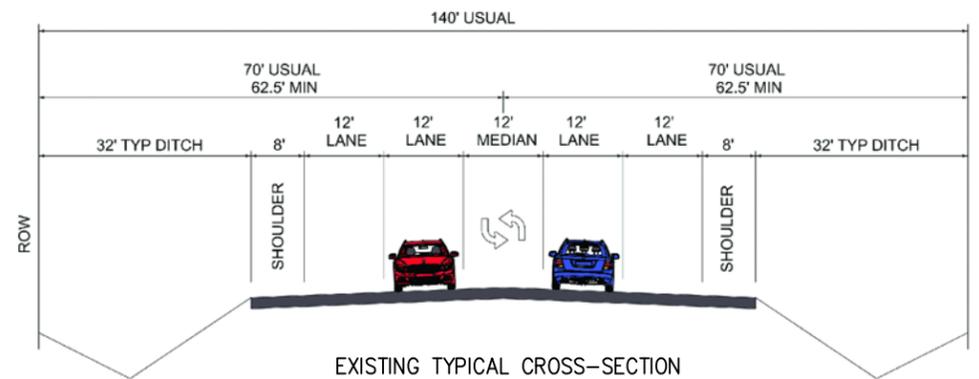
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
 2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.
 3. MEDIAN MODIFICATION AND PAVEMENT MARKINGS ON WATERFORD DRIVE.
 4. POTENTIAL CROSS ACCESS BETWEEN QUAIL VALLEY CHURCH AND HERITAGE BAPTIST CHURCH.
 5. POTENTIAL DRIVEWAY AND DRIVEWAY CONSOLIDATION FOR DENTIST OFFICE.
 6. MOUNTABLE MEDIAN FOR EMERGENCY VEHICLES AT CHURCH OF CHRIST DRIVEWAY.
- * ALTERNATIVE MEDIAN OPTIONS ARE AVAILABLE. SEE PAGE A14 AND A15.





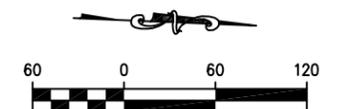
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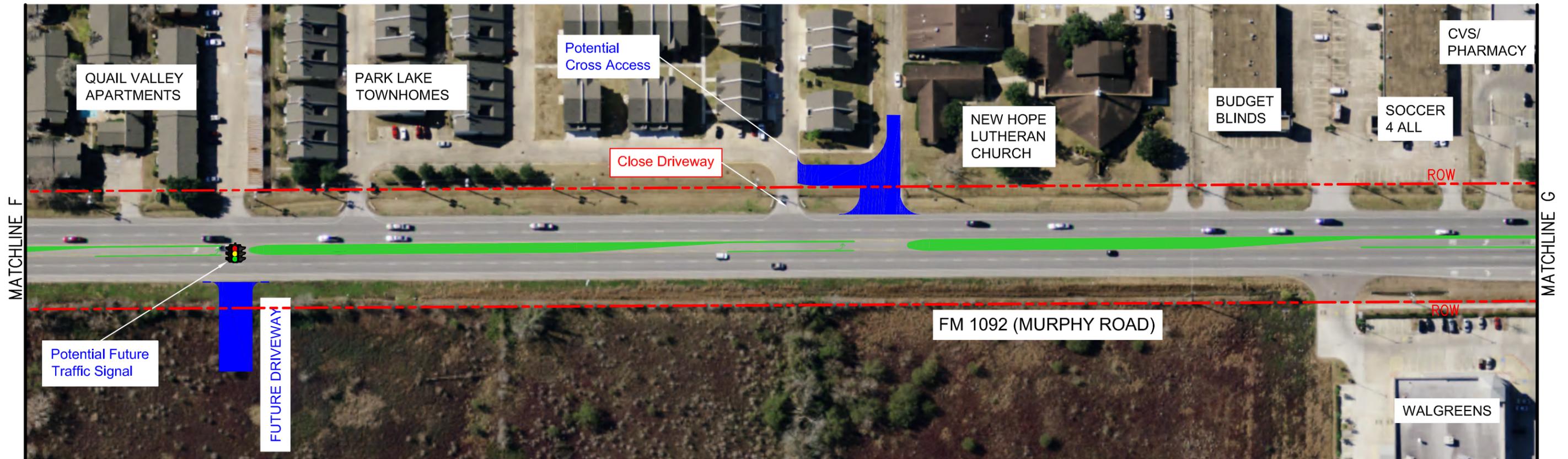
-  EXISTING RAISED MEDIAN
-  PROPOSED RAISED MEDIAN
-  EXISTING RIGHT OF WAY
-  PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
-  SIGNALIZED INTERSECTION
-  NOTE



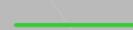
LIST OF IMPROVEMENTS:

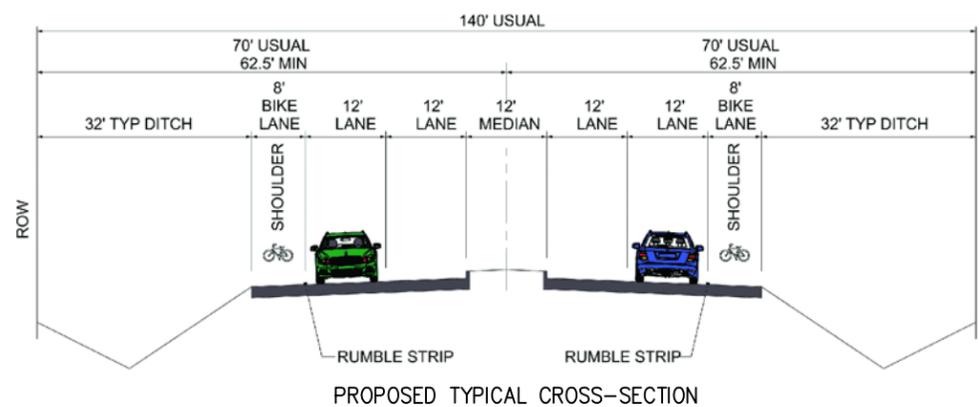
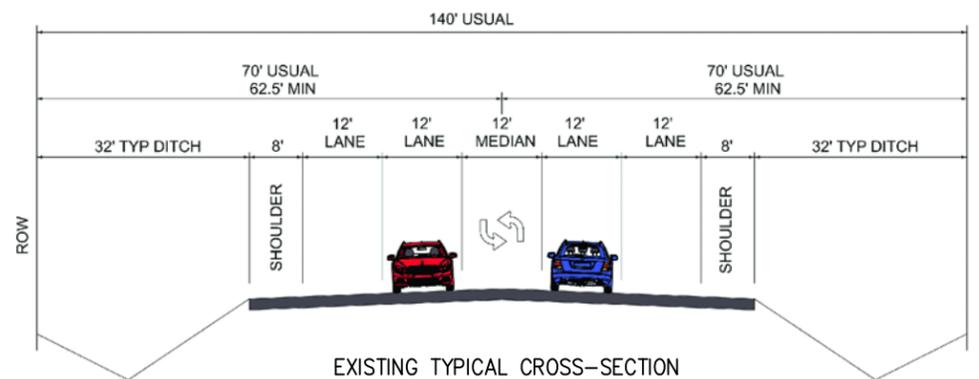
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.
3. POTENTIAL CROSS ACCESS BETWEEN MEINEKE AND AUTO CARE.
4. POTENTIAL DRIVEWAY CONSOLIDATION FOR AUTOCARE.





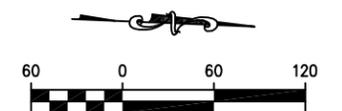
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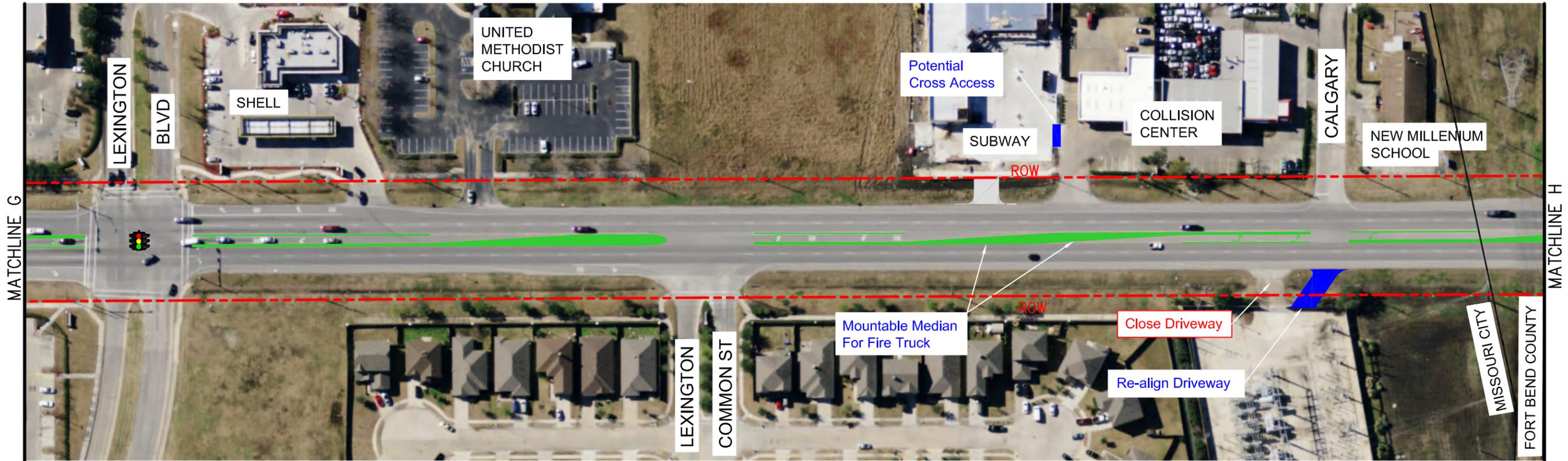
-  EXISTING RAISED MEDIAN
-  PROPOSED RAISED MEDIAN
-  EXISTING RIGHT OF WAY
-  PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
-  SIGNALIZED INTERSECTION
-  NOTE



LIST OF IMPROVEMENTS:

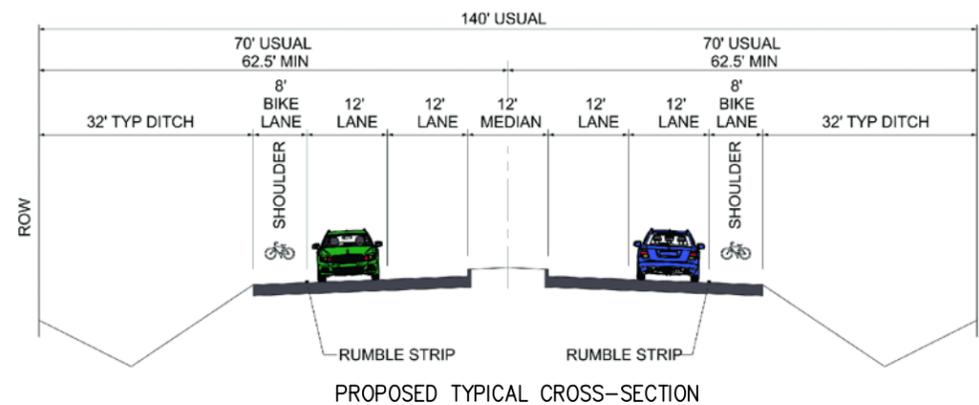
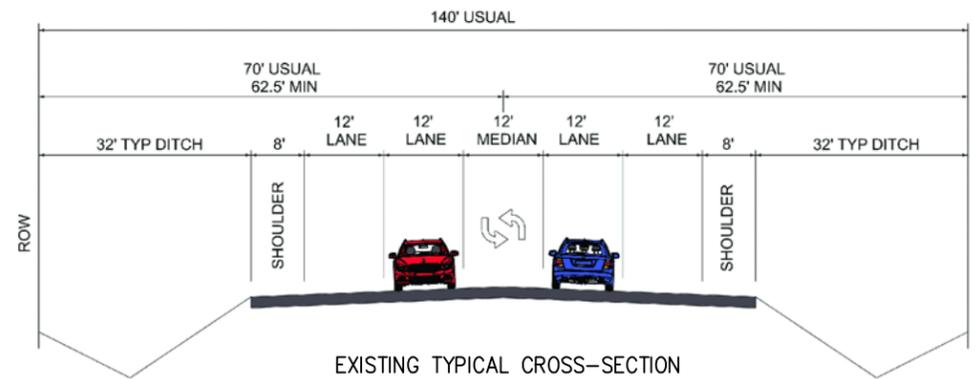
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.
3. POTENTIAL FUTURE TRAFFIC SIGNAL AT QUAIL VALLEY APARTMENTS DRIVEWAY.
4. POTENTIAL FUTURE DRIVEWAY ACROSS QUAIL VALLEY APARTMENTS DRIVEWAY.
5. POTENTIAL CROSS ACCESS BETWEEN PARK LAKE TOWNHOMES AND NEW HOPE LUTHERAN CHURCH.





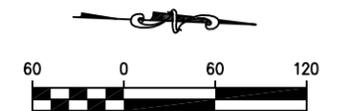
LEGEND:

- EXISTING RAISED MEDIAN
- PROPOSED RAISED MEDIAN
- EXISTING RIGHT OF WAY
- PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
- SIGNALIZED INTERSECTION
- NOTE



LIST OF IMPROVEMENTS:

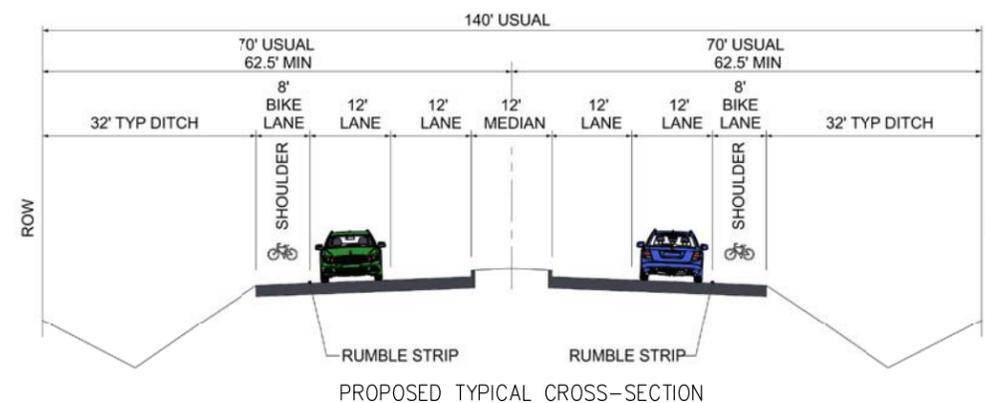
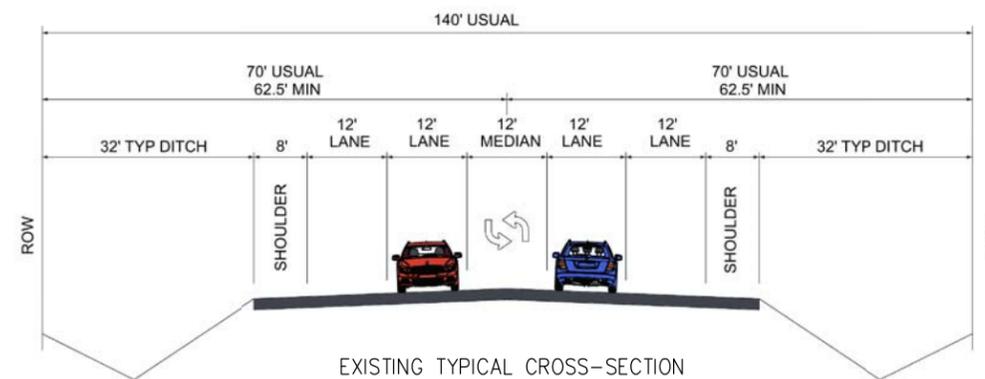
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.
3. MOUNTABLE MEDIAN FOR FIRE TRUCK AT SUBWAY AND COLLISION CENTER DRIVEWAYS.
4. POTENTIAL CROSS ACCESS BETWEEN SUBWAY AND COLLISION CENTER.
5. POTENTIAL DRIVEWAY RE-ALIGNMENT AT ELECTRIC STATION ACROSS CALGARY.





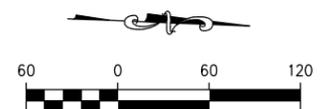
LEGEND:

-  EXISTING RAISED MEDIAN
-  PROPOSED RAISED MEDIAN
-  EXISTING RIGHT OF WAY
-  PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
-  SIGNALIZED INTERSECTION
-  NOTE

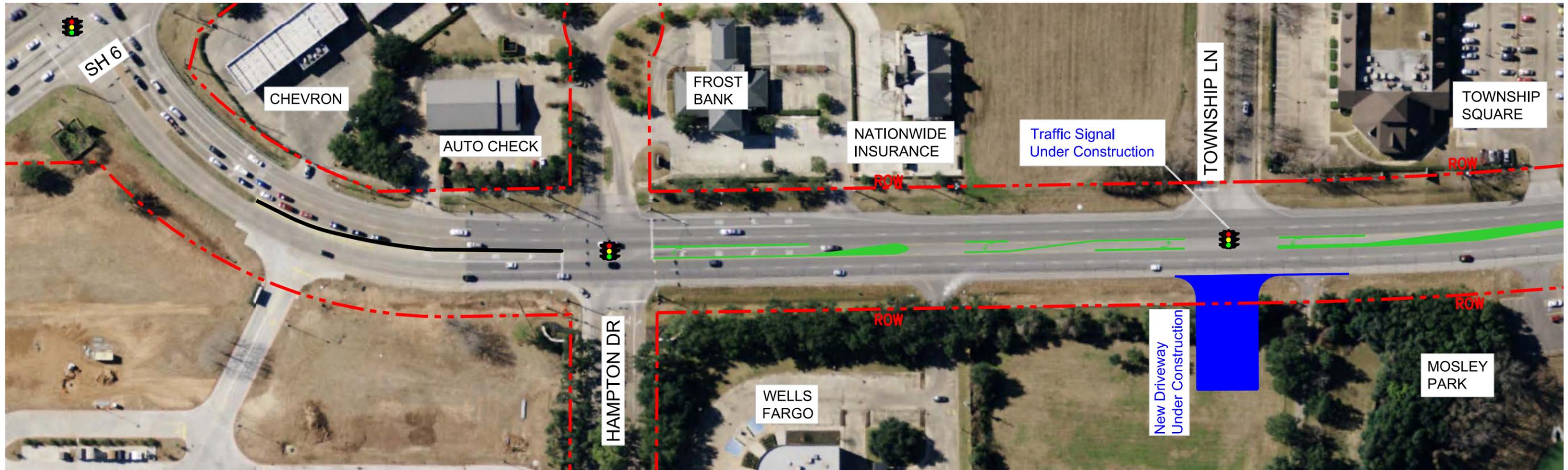


LIST OF IMPROVEMENTS:

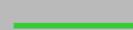
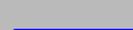
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.

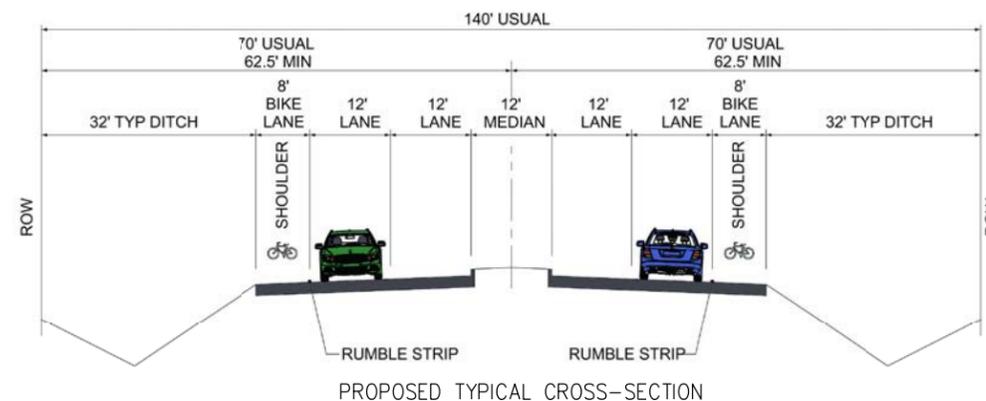
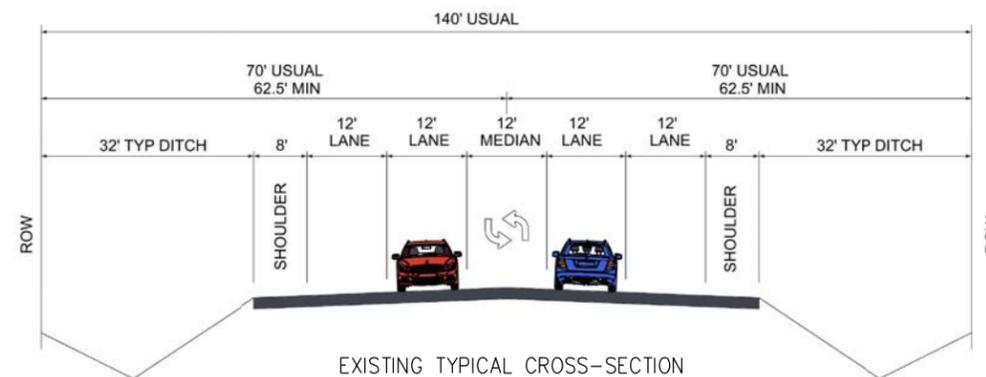


MEDIUM TERM RECOMMENDATIONS - WELLS FARGO ALTERNATIVE



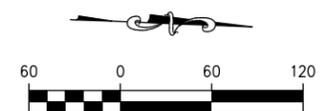
LEGEND:

-  EXISTING RAISED MEDIAN
-  PROPOSED RAISED MEDIAN
-  EXISTING RIGHT OF WAY
-  PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
-  SIGNALIZED INTERSECTION
-  NOTE

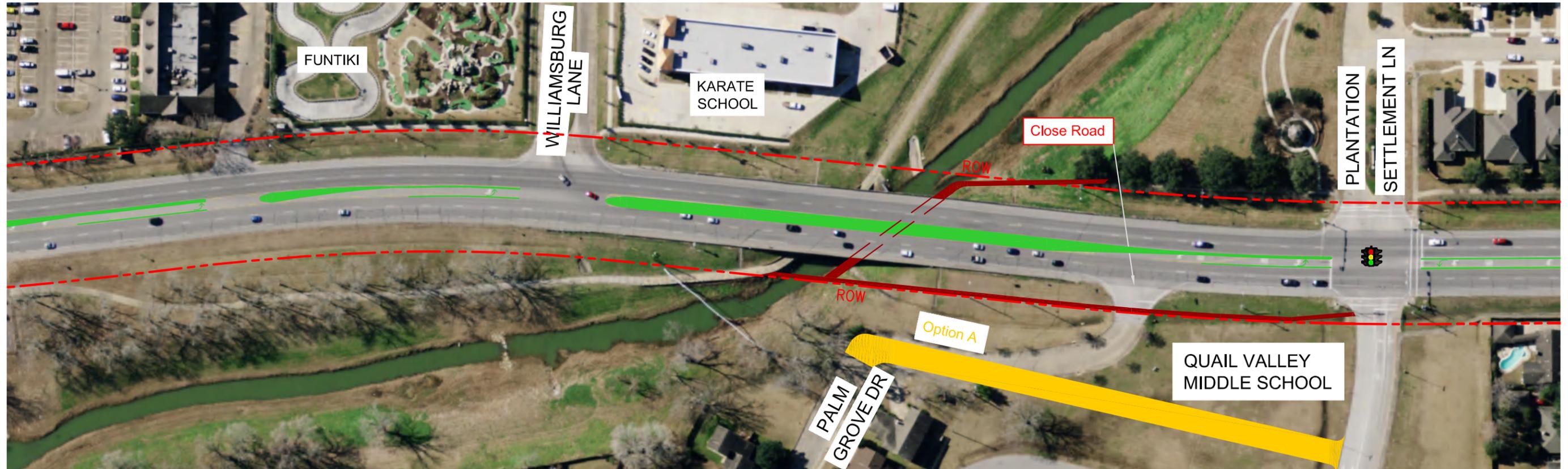


LIST OF IMPROVEMENTS:

1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.

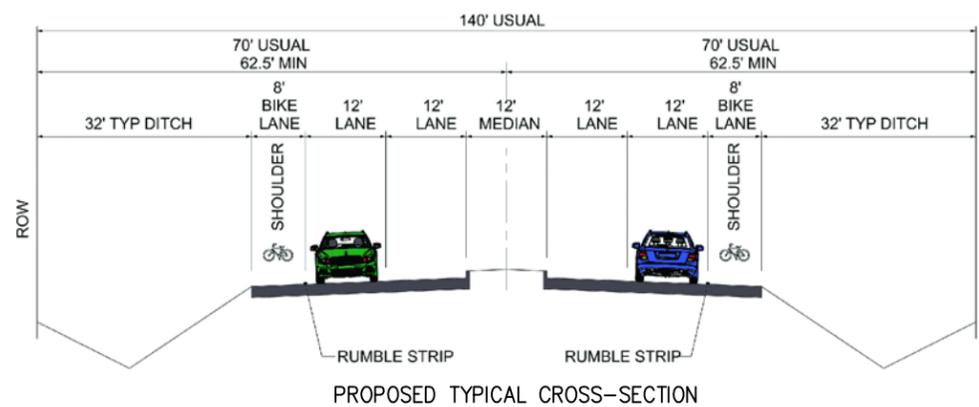
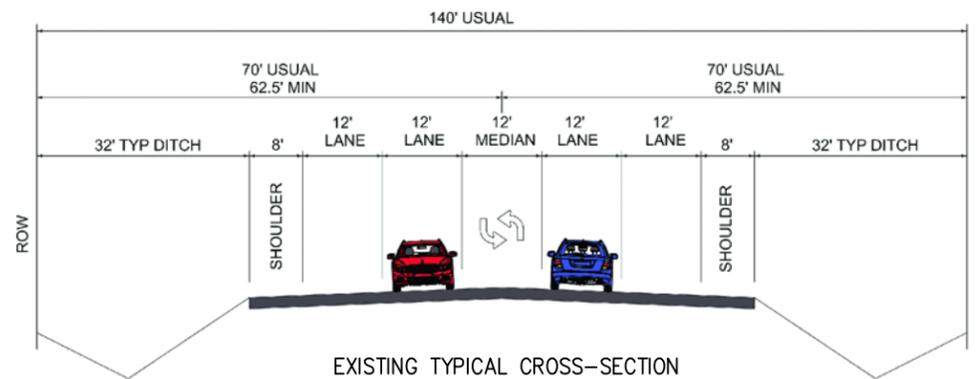


MEDIUM TERM RECOMMENDATIONS - PALM GROVE ALTERNATIVE OPTION A



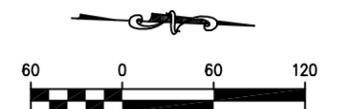
LEGEND:

- EXISTING RAISED MEDIAN
- PROPOSED RAISED MEDIAN
- EXISTING RIGHT OF WAY
- PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
- PAM GROVE DRIVE CONNECTION TO SCHOOL DRIVEWAY
- PROPOSED SIDEWALK
- SIGNALIZED INTERSECTION
- NOTE

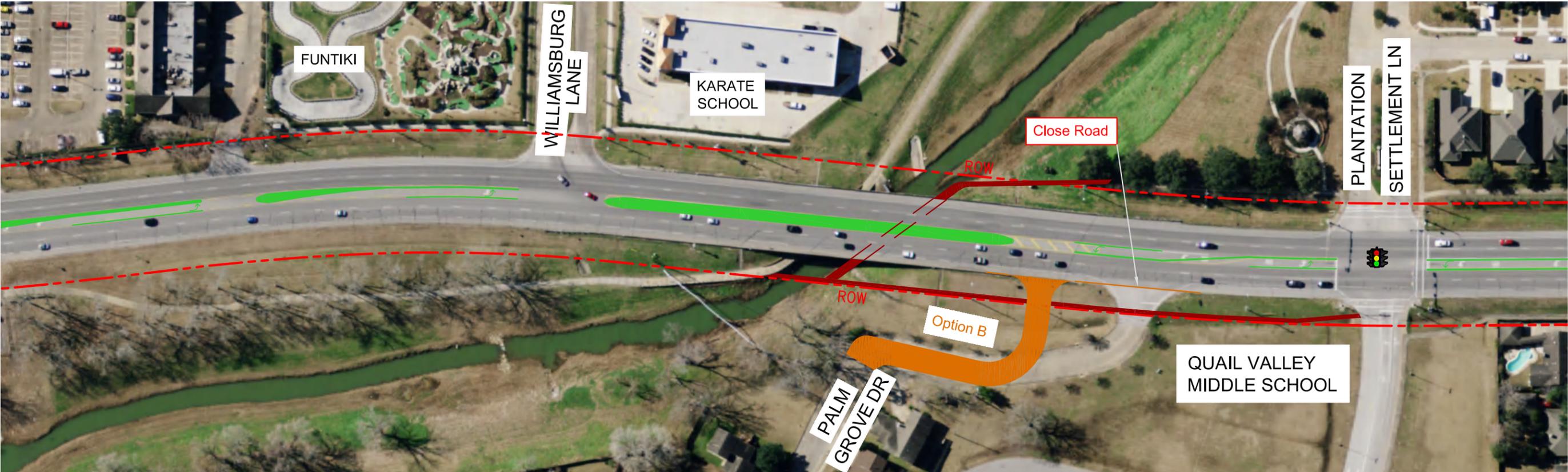


LIST OF IMPROVEMENTS:

1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.
3. PALM GROVE DRIVE CONNECTION TO FM 1092 VIA QUAIL VALLEY MIDDLE SCHOOL DRIVEWAY.
4. PROPOSED SIDEWALK AND OYSTER CREEK TRAIL CONNECTION.

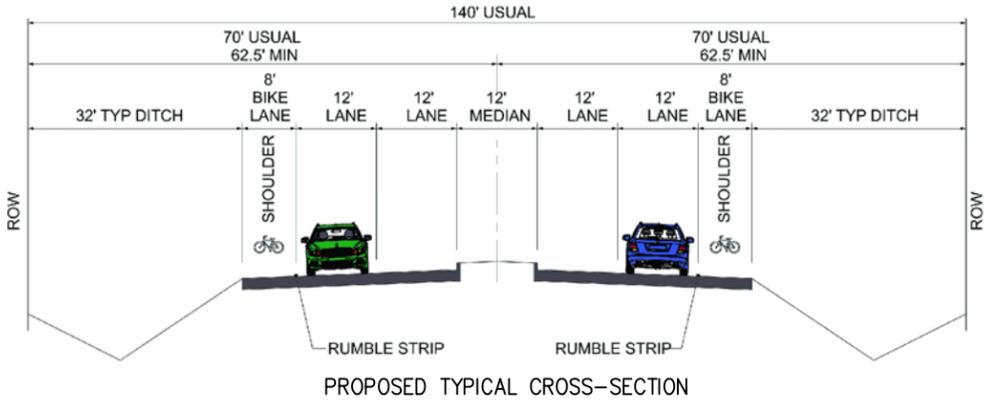
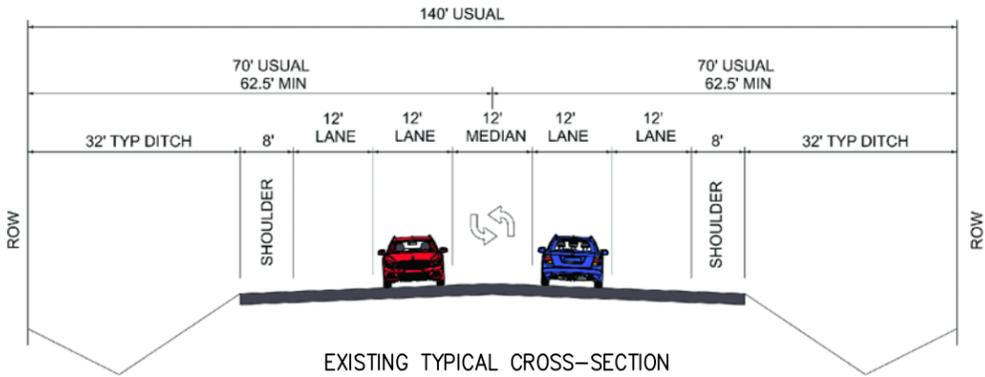


MEDIUM TERM RECOMMENDATIONS - PALM GROVE ALTERNATIVE OPTION B



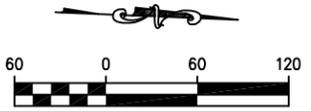
LEGEND:

- EXISTING RAISED MEDIAN
- PROPOSED RAISED MEDIAN
- EXISTING RIGHT OF WAY
- PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
- PALM GROVE DRIVE RE-ALIGNMENT
- PROPOSED SIDEWALK
- SIGNALIZED INTERSECTION
- NOTE

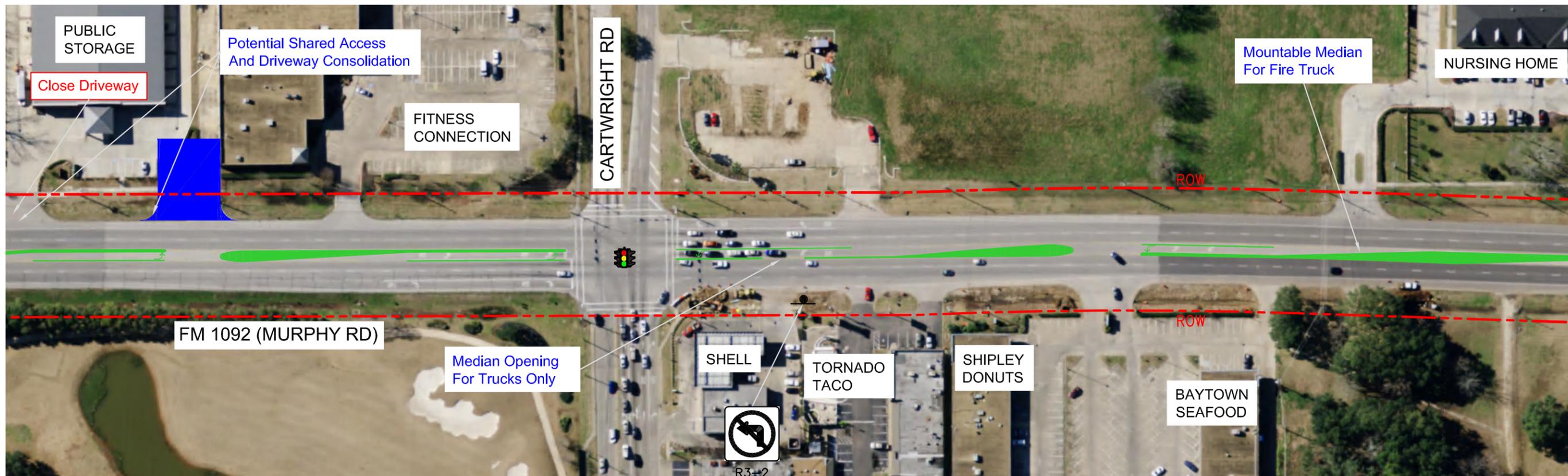


LIST OF IMPROVEMENTS:

1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.
3. PALM GROVE DRIVE RE-ALIGNMENT.
4. PROPOSED SIDEWALK AND OYSTER CREEK TRAIL CONNECTION.

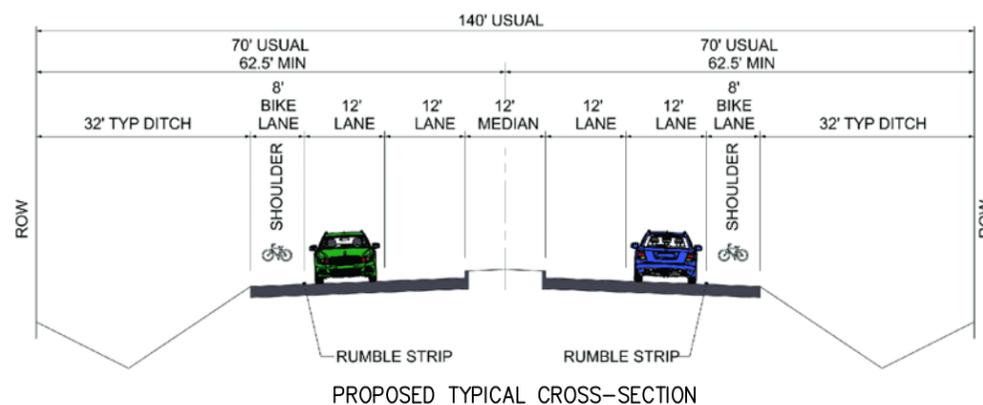
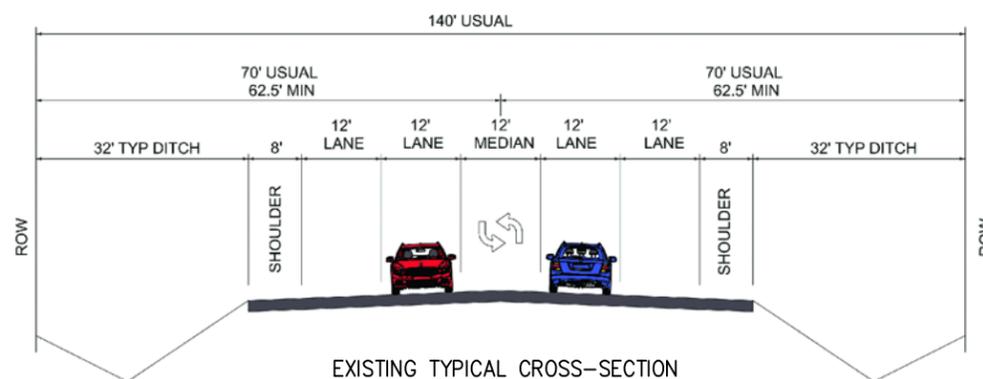


MEDIUM TERM RECOMMENDATIONS - CARTWRIGHT SHELL STATION ALTERNATIVE



LEGEND:

-  EXISTING RAISED MEDIAN
-  PROPOSED RAISED MEDIAN
-  EXISTING RIGHT OF WAY
-  PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
-  SIGNALIZED INTERSECTION
-  PROPOSED SIGN
-  NOTE

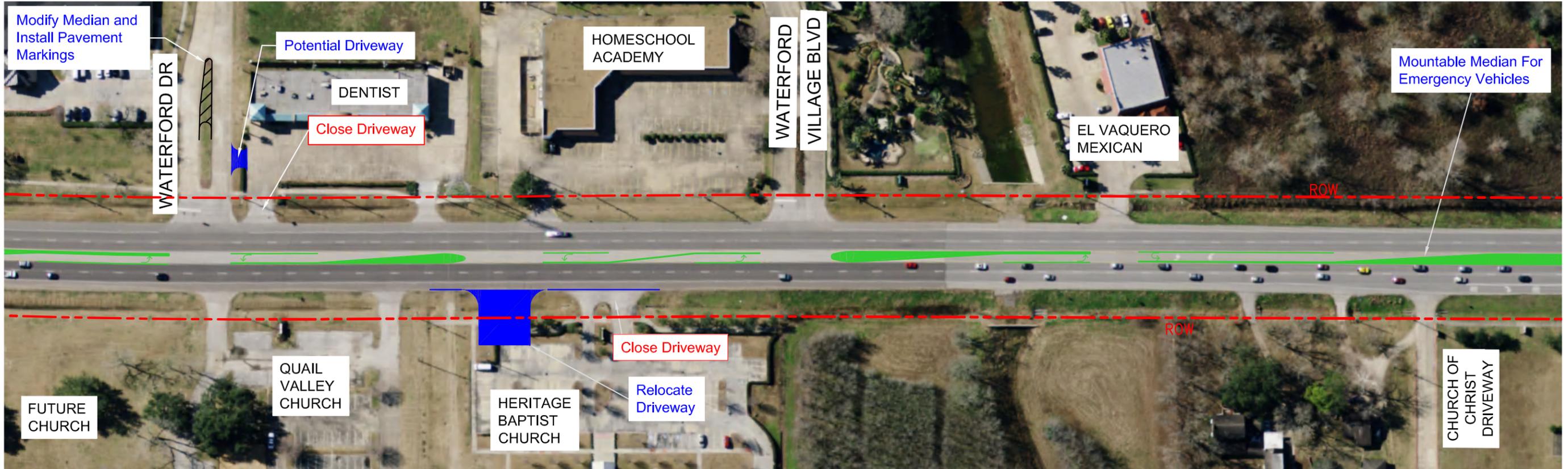


LIST OF IMPROVEMENTS:

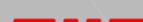
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.
3. POTENTIAL SHARED ACCESS AND DRIVEWAY CONSOLIDATION AT PUBLIC STORAGE AND FITNESS CONNECTION.
4. MOUNTABLE MEDIAN FOR FIRE TRUCK AT NURSING HOME.
5. NO LEFT TURN SIGN (R3-2) AT SHELL GAS STATION DRIVEWAY.

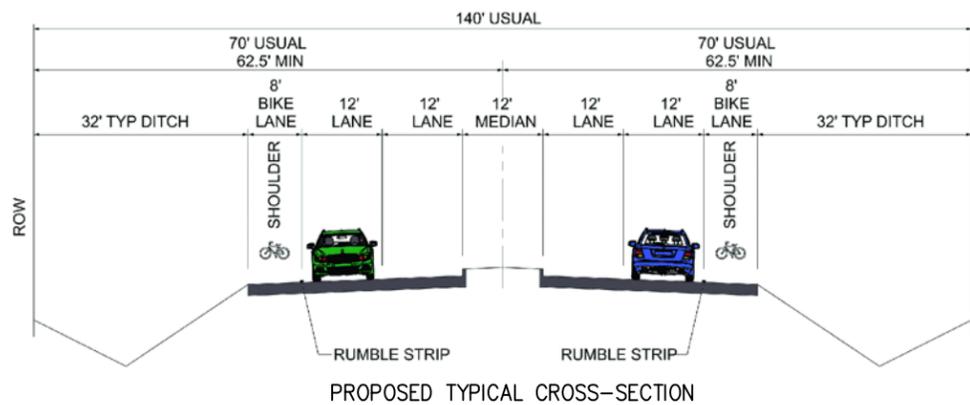
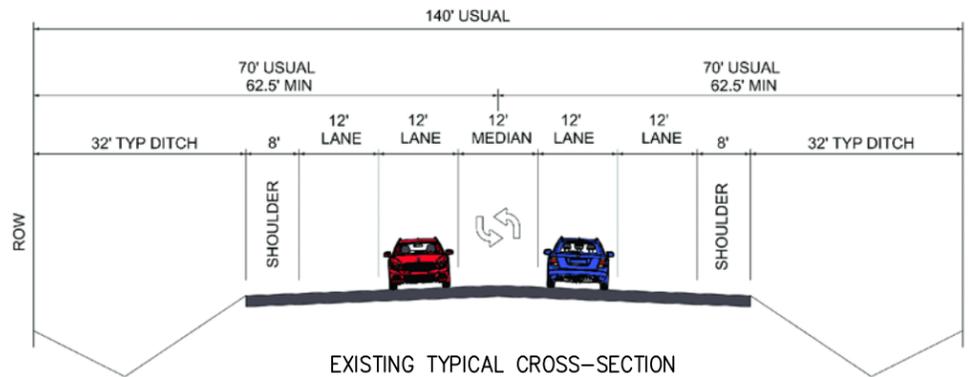


MEDIUM TERM RECOMMENDATIONS - HERITAGE BAPTIST CHURCH ALTERNATIVE



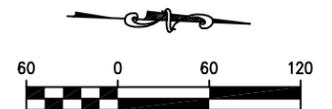
LEGEND:

-  EXISTING RAISED MEDIAN
-  PROPOSED RAISED MEDIAN
-  EXISTING RIGHT OF WAY
-  PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
-  SIGNALIZED INTERSECTION
-  NOTE

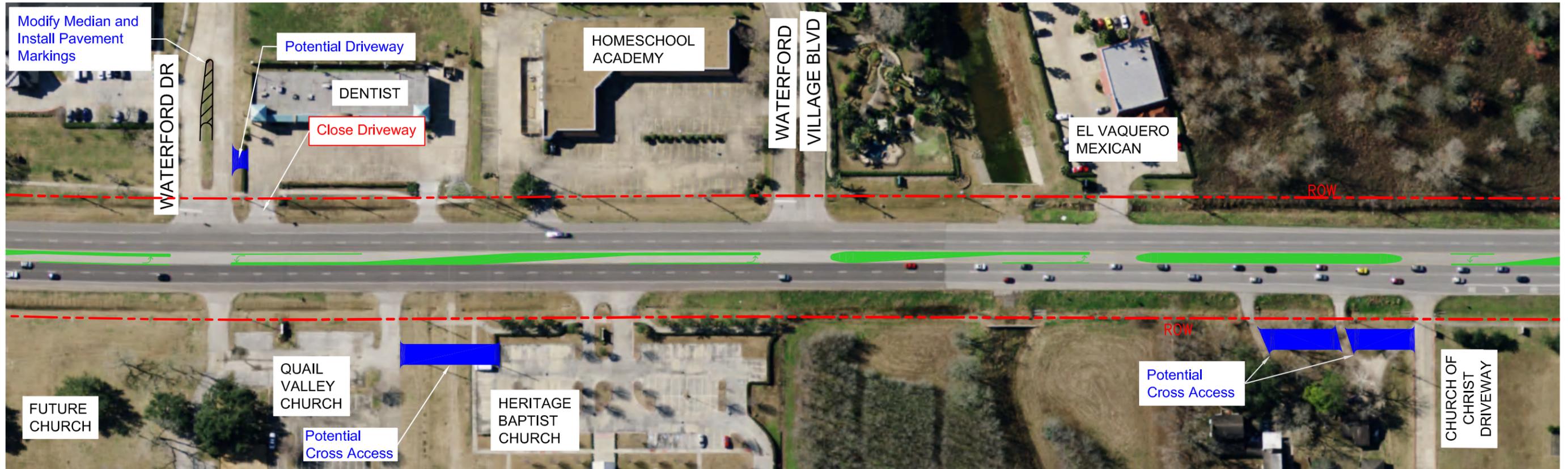


LIST OF IMPROVEMENTS:

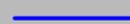
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.
3. MEDIAN MODIFICATION AND PAVEMENT MARKINGS ON WATERFORD DRIVE.
4. POTENTIAL DRIVEWAY AND DRIVEWAY CONSOLIDATION FOR DENTIST OFFICE.
5. MOUNTABLE MEDIAN FOR EMERGENCY VEHICLES AT CHURCH OF CHRIST DRIVEWAY.
6. POTENTIAL HERITAGE BAPTIST CHURCH DRIVEWAY RELOCATION.

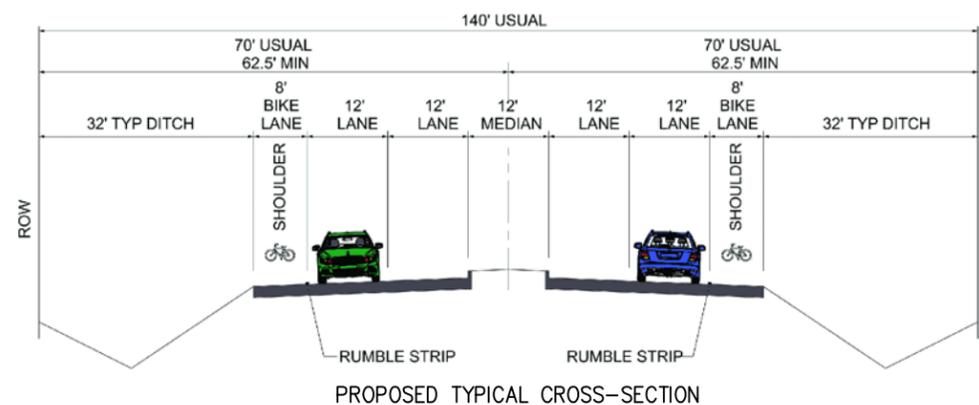
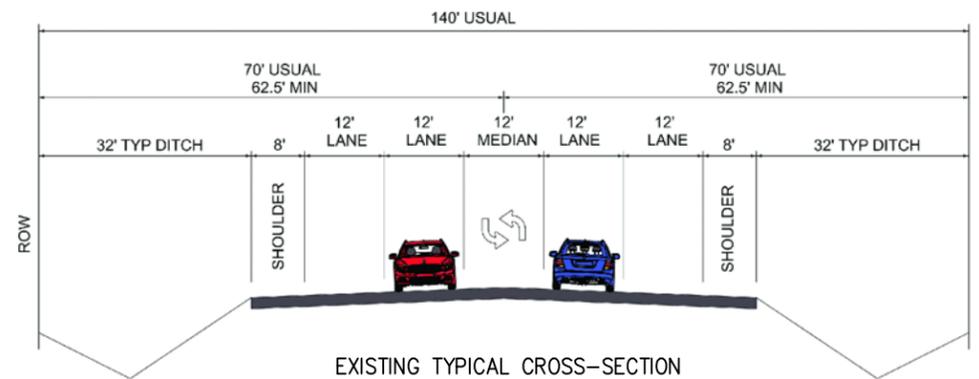


MEDIUM TERM RECOMMENDATIONS - CHURCH OF CHRIST ALTERNATIVE



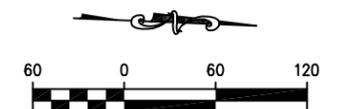
LEGEND:

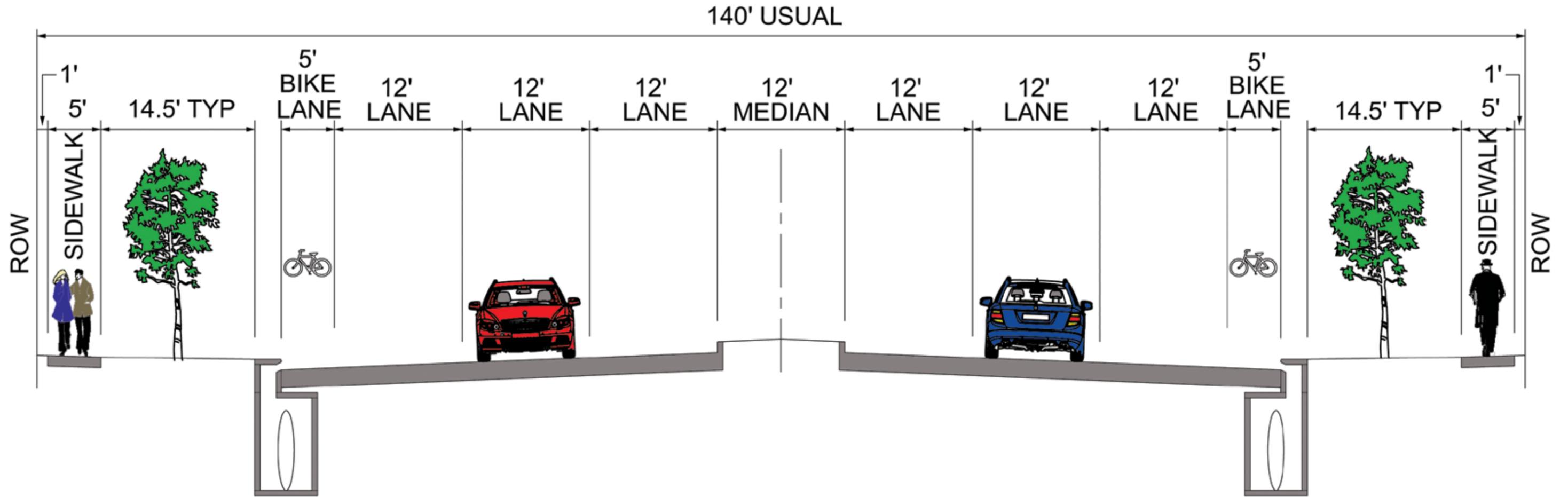
-  EXISTING RAISED MEDIAN
-  PROPOSED RAISED MEDIAN
-  EXISTING RIGHT OF WAY
-  PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
-  SIGNALIZED INTERSECTION
-  NOTE



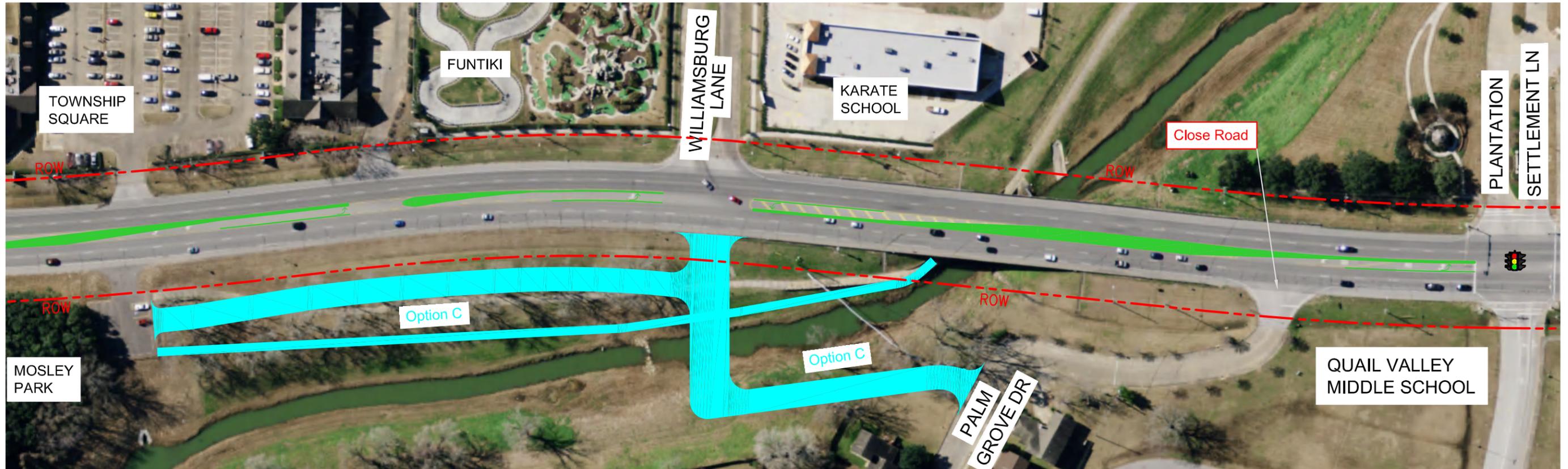
LIST OF IMPROVEMENTS:

1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
2. SHOULDERS UPGRADATION FOR USE AS BIKE LANES.
3. MEDIAN MODIFICATION AND PAVEMENT MARKINGS ON WATERFORD DRIVE.
4. POTENTIAL CROSS ACCESS BETWEEN QUAIL VALLEY CHURCH AND HERITAGE BAPTIST CHURCH.
5. POTENTIAL DRIVEWAY AND DRIVEWAY CONSOLIDATION FOR DENTIST OFFICE.
6. POTENTIAL CROSS ACCESS BETWEEN RESIDENTIAL PROPERTIES AT CHURCH OF CHRIST DRIVEWAY.



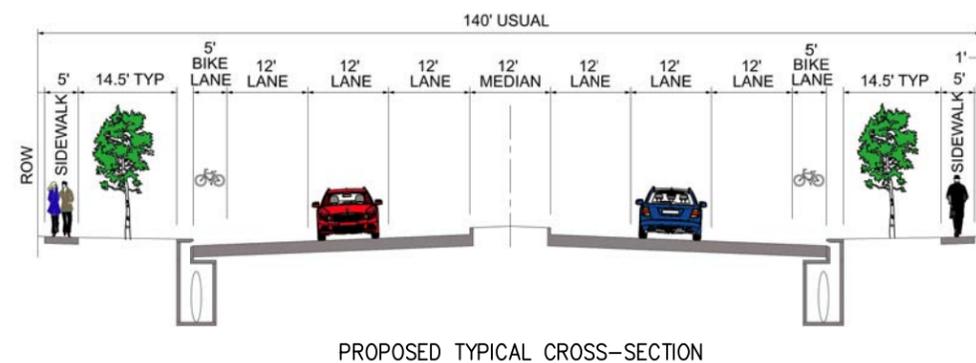
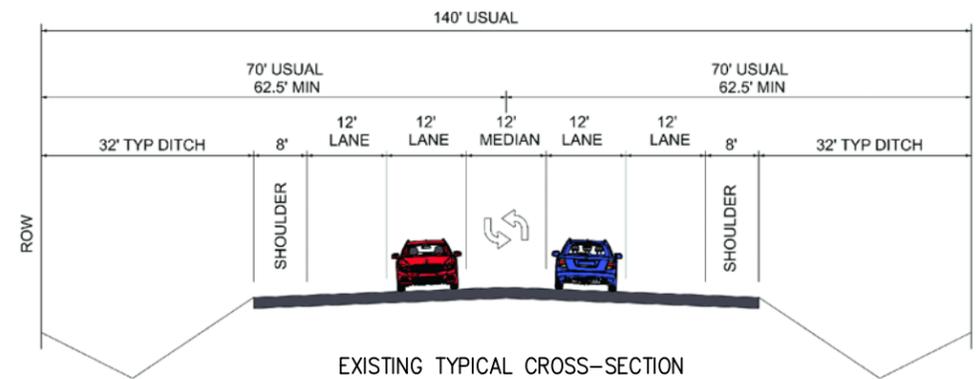


LONG TERM RECOMMENDATIONS - PALM GROVE ALTERNATIVE



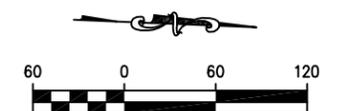
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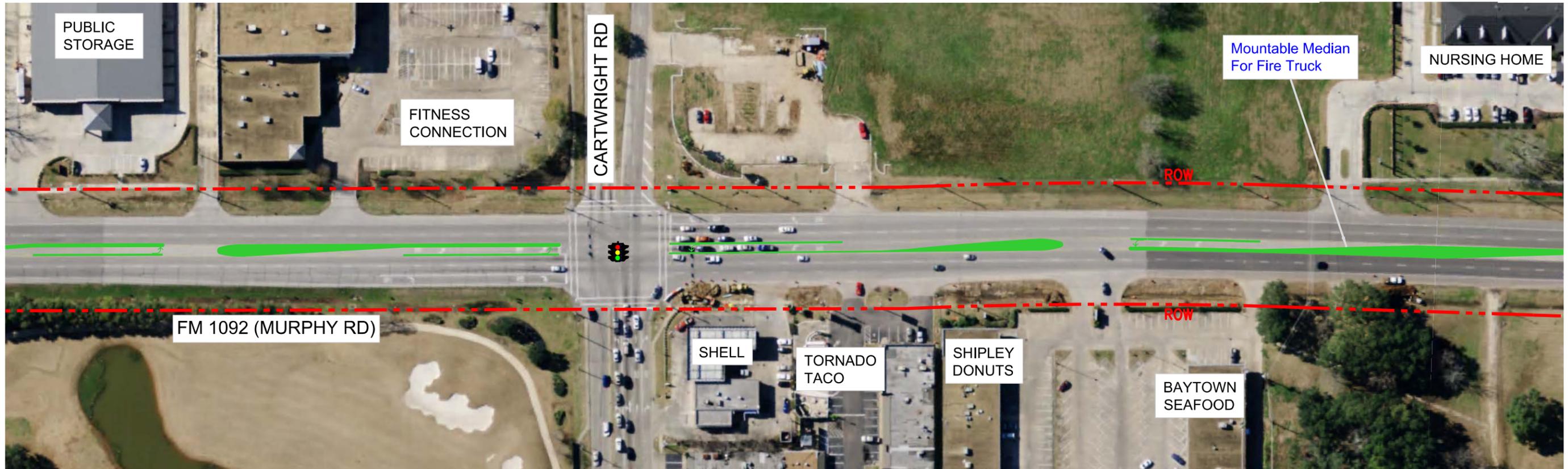
- PROPOSED RAISED MEDIAN
- - - EXISTING RIGHT OF WAY
- PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
- PALM GROVE DRIVE RE-ALIGNMENT
- SIGNALIZED INTERSECTION



LIST OF IMPROVEMENTS:

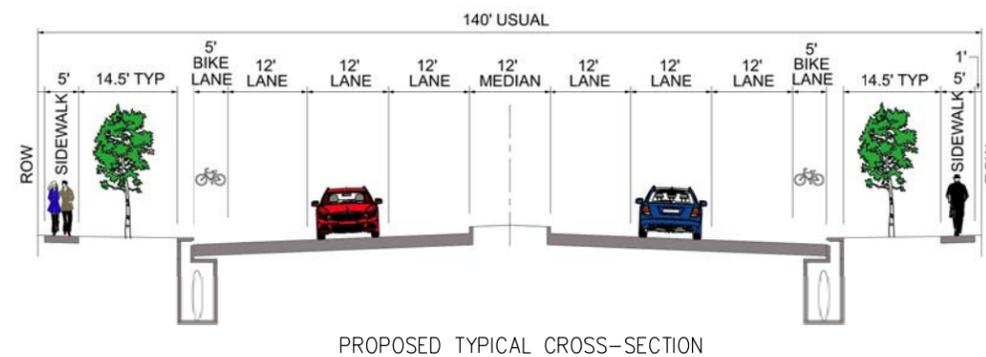
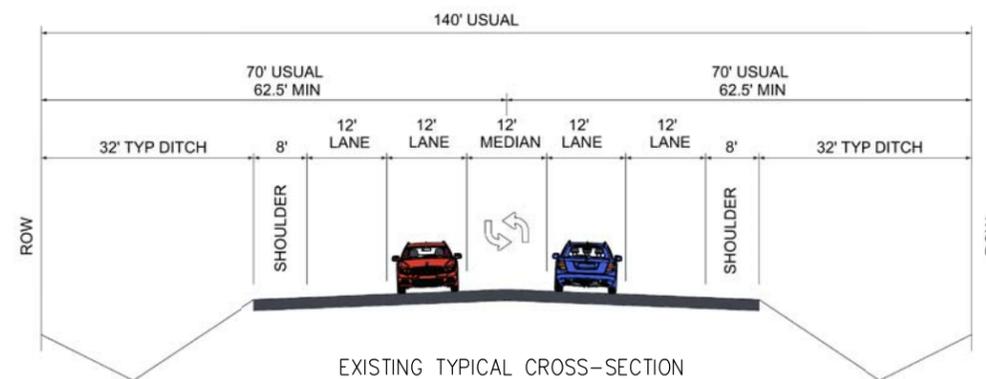
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
2. SIX-LANE MULTI-MODAL FACILITY WITH BIKE LANES, SIDEWALKS, AND CLOSED DRAINAGE.
3. PALM GROVE DRIVE RE-ALIGNMENT TO WILLIAMSBURG LANE, CONNECTION TO MOSLEY PARK, AND OYSTER CREEK TRAIL RE-ALIGNMENT.





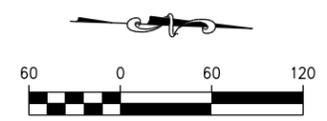
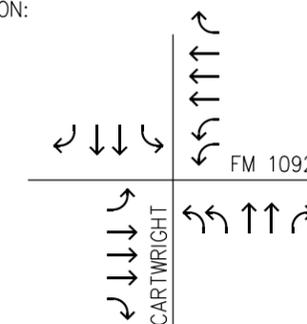
LEGEND:

- PROPOSED RAISED MEDIAN
- - - EXISTING RIGHT OF WAY
- PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
- SIGNALIZED INTERSECTION

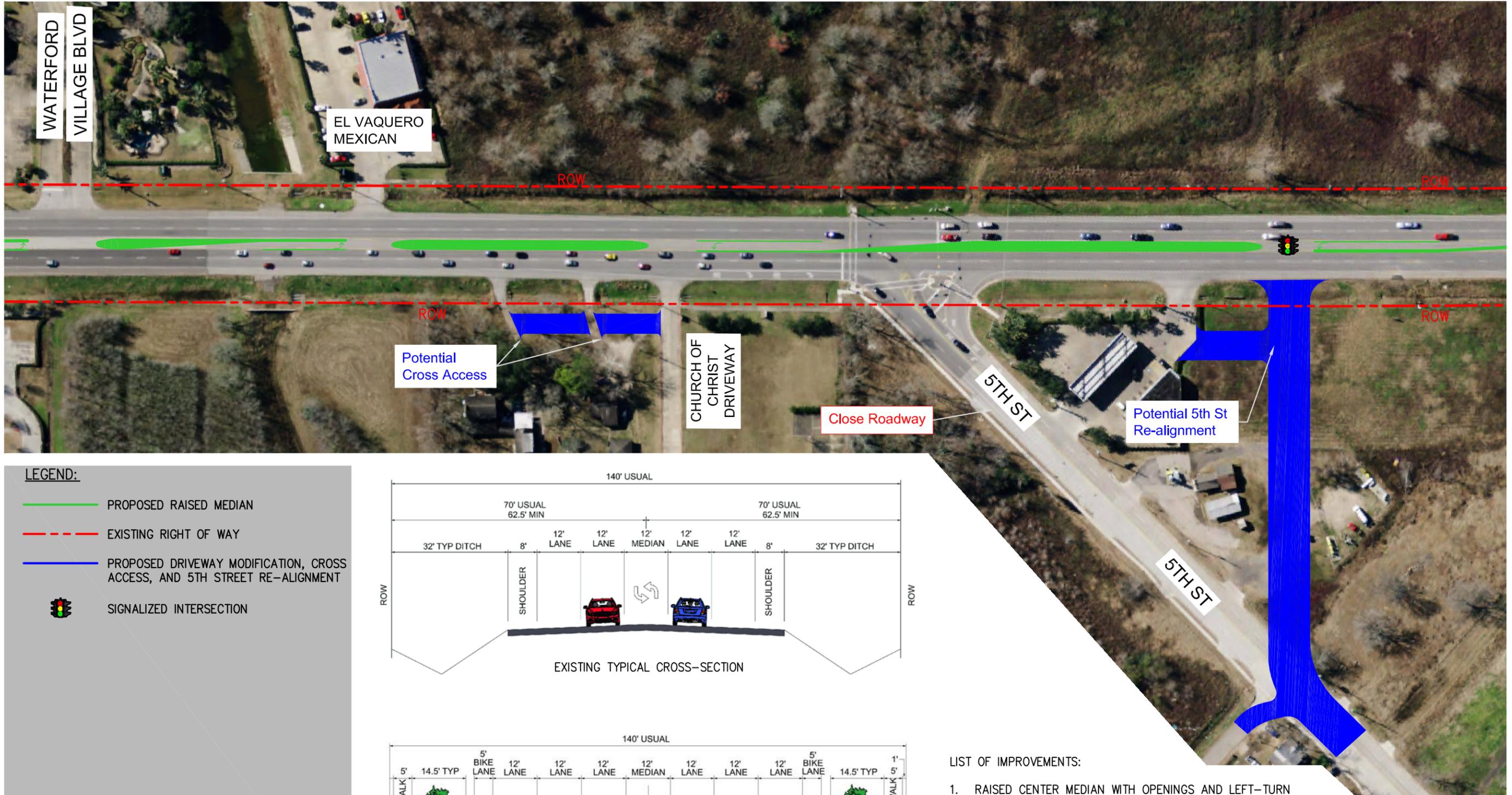


LIST OF IMPROVEMENTS:

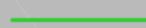
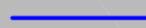
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
2. SIX-LANE MULTI-MODAL FACILITY WITH BIKE LANES, SIDEWALKS, AND CLOSED DRAINAGE.
3. MOUNTABLE MEDIAN FOR FIRE TRUCK AT NURSING HOME.
4. PROPOSED LANE CONFIGURATION AT CARTWRIGHT ROAD INTERSECTION:

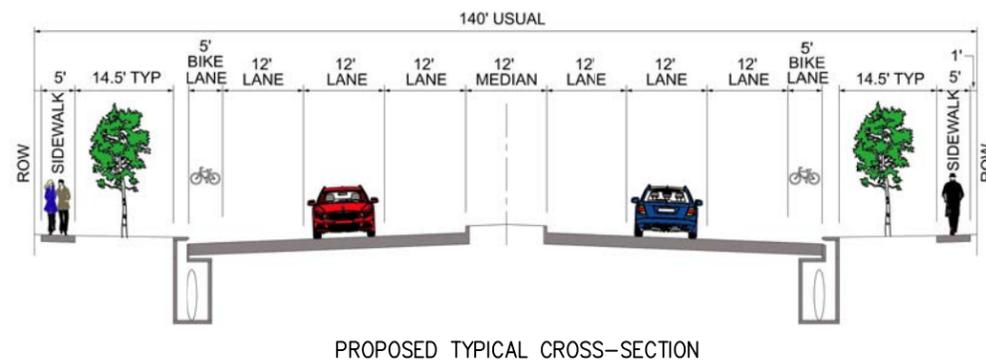
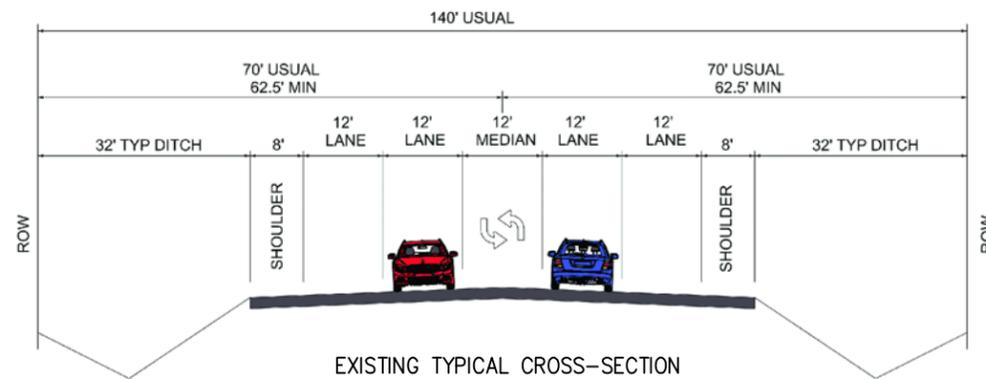


LONG TERM RECOMMENDATIONS - 5TH STREET RE-ALIGNMENT



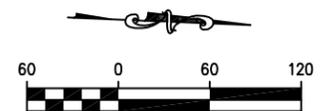
LEGEND:

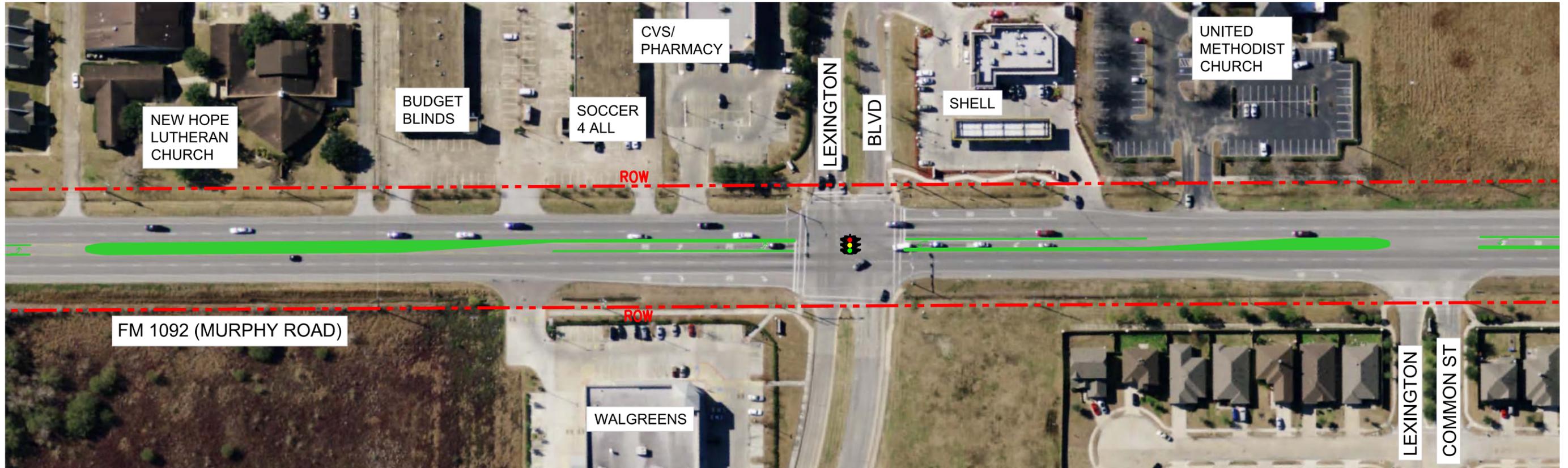
-  PROPOSED RAISED MEDIAN
-  EXISTING RIGHT OF WAY
-  PROPOSED DRIVEWAY MODIFICATION, CROSS ACCESS, AND 5TH STREET RE-ALIGNMENT
-  SIGNALIZED INTERSECTION



LIST OF IMPROVEMENTS:

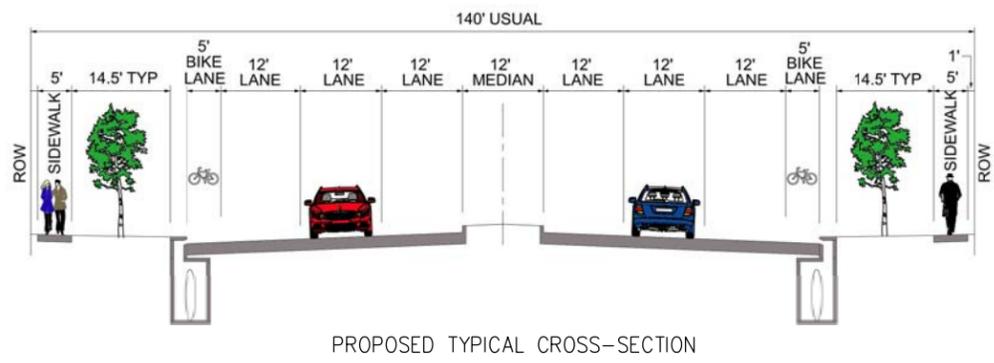
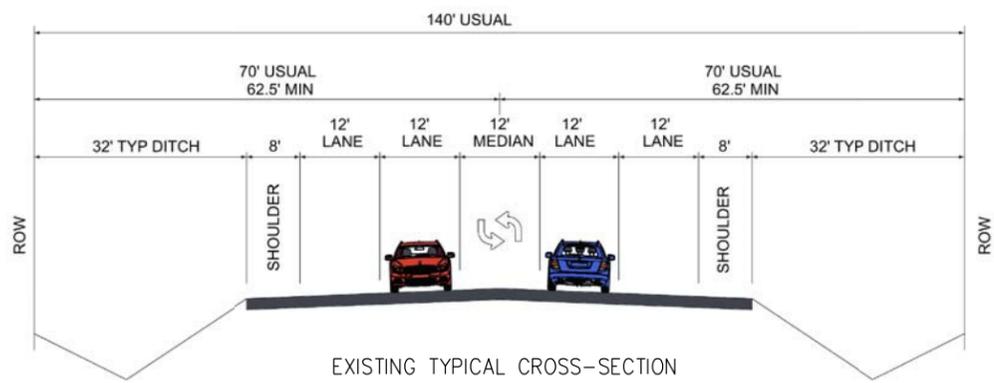
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
2. SIX-LANE MULTI-MODAL FACILITY WITH BIKE LANES, SIDEWALKS, AND CLOSED DRAINAGE.
3. POTENTIAL CROSS ACCESS BETWEEN RESIDENTIAL PROPERTIES AT CHURCH OF CHRIST DRIVEWAY.
4. 5TH STREET RE-ALIGNMENT INCLUDING TRAFFIC SIGNAL RELOCATION AND CONNECTION TO GAS STATION.



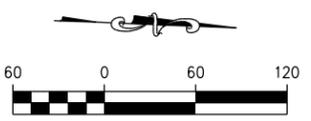
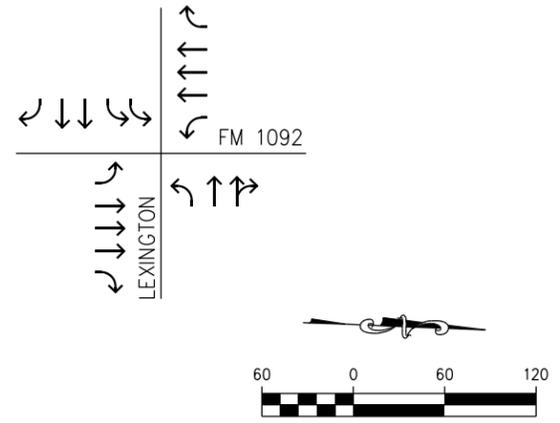


LEGEND:

- PROPOSED RAISED MEDIAN
- EXISTING RIGHT OF WAY
- PROPOSED DRIVEWAY MODIFICATION AND CROSS ACCESS
- SIGNALIZED INTERSECTION



- LIST OF IMPROVEMENTS:
1. RAISED CENTER MEDIAN WITH OPENINGS AND LEFT-TURN LANES ALONG THE FM 1092 CORRIDOR.
 2. SIX-LANE MULTI-MODAL FACILITY WITH BIKE LANES, SIDEWALKS, AND CLOSED DRAINAGE.
 3. PROPOSED LANE CONFIGURATION AT LEXINGTON BOULEVARD INTERSECTION:



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APPENDIX F: PRELIMINARY COST ESTIMATES



PRELIMINARY COST ESTIMATE
SHORT TERM IMPROVEMENTS - SIGNALS AND PEDESTRIANS

Estimate Date:	January 20, 2012
TxDOT Sub Totals:	82,438
Contingency: 15%	12,366
TxDOT Total:	94,803
Missouri City Sub Totals:	
Contingency:	
Missouri City Total:	
Grand Total:	94,803

PRELIMINARY COST ESTIMATE
MEDIUM TERM IMPROVEMENTS - MEDIAN AND PEDESTRIAN

Estimate Date:	January 20, 2012
TxDOT Sub Totals:	538,324
Contingency: 30%	161,497
TxDOT Total:	699,821
Missouri City Sub Totals:	110,320
Contingency: 30%	33,096
Missouri City Total:	143,416
Grand Total:	843,237

ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
SUPPLEMENTAL SIGNALS AND PEDESTRIAN FACILITIES				
SIGN, "SIGNAL AHEAD", W3-3	EA	1.00	\$200.00	\$200.00
CONDT (RM) 3"	LF	600.00	\$15.00	\$9,000.00
GROUND BOX TY 1 (122422)	EA	6.00	\$600.00	\$3,600.00
BACK PLATE (12 IN) (3 SEC)	EA	1.00	\$100.00	\$100.00
PED SIG SEC (12 IN) LED (2 INDICATIONS)	EA	16.00	\$100.00	\$1,600.00
VEH SIG SEC (12 IN) LED (GRN)	EA	1.00	\$200.00	\$200.00
VEH SIG SEC (12 IN) LED (YEL)	EA	1.00	\$200.00	\$200.00
VEH SIG SEC (12 IN) LED (RED)	EA	1.00	\$200.00	\$200.00
TRF SIG CBL (TY A) (12 AWG) (2 CONDR)	LF	1,200.00	\$0.75	\$900.00
TRF SIG CBL (TY A) (12 AWG) (4 CONDR)	LF	1,200.00	\$1.00	\$1,200.00
TRF SIG CBL (TY A) (12 AWG) (7 CONDR)	LF	200.00	\$1.25	\$250.00
PED POLE ASSEMBLY	EA	8.00	\$1,150.00	\$9,200.00
PED DETECT (2 INCH PUSH BTN)	EA	16.00	\$200.00	\$3,200.00
LED COUNTDOWN PEDESTRIAN MODULE	EA	16.00	\$300.00	\$4,800.00
Sub-Total				\$34,650.00

ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
SIGNAL TIMING IMPROVEMENTS AND RIGHT-TURN OVERLAP SIGNAL HEADS				
CONDT (RM) 3"	LF	600.00	\$15.00	\$9,000.00
GROUND BOX TY 1 (122422)	EA	4.00	\$600.00	\$2,400.00
BACK PLATE (12 IN) (5 SEC)	EA	5.00	\$150.00	\$750.00
VEH SIG SEC (12 IN) LED (GRN ARW)	EA	5.00	\$200.00	\$1,000.00
VEH SIG SEC (12 IN) LED (GRN)	EA	5.00	\$200.00	\$1,000.00
VEH SIG SEC (12 IN) LED (YEL ARW)	EA	5.00	\$200.00	\$1,000.00
VEH SIG SEC (12 IN) LED (YEL)	EA	5.00	\$200.00	\$1,000.00
VEH SIG SEC (12 IN) LED (RED)	EA	5.00	\$200.00	\$1,000.00
TRF SIG CBL (TY A) (12 AWG) (7 CONDR)	LF	750.00	\$1.25	\$937.50
SIGNAL TIMING	EA	9.00	\$3,300.00	\$29,700.00
Sub-Total				\$47,787.50

LEGEND:
EA EACH
LF LINEAR FEET
SY SQUARE YARD
SF SQUARE FEET
MO MONTH
MI MILES
STA STATION
CY CUBIC YARD

Note: Preliminary cost is estimated based on average cost summaries, prepared by TxDOT for previous similar projects, and adjusted for quantity.

ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
ROADWAY				
CONC MEDIAN	SY	10,092.00	\$40.00	\$403,680.00
MOUNTABLE MEDIAN CURB	LF	5,253.00	\$10.00	\$52,530.00
Sub-Total				\$456,210.00
PED BRIDGE AND SIDEWALK ASSOCIATED WITH IT				
PEDESTRIAN BRIDGE	SF	1,272.00	\$60.00	\$76,320.00
CONC SIDEWALK (5') (5")	LF	1,000.00	\$34.00	\$34,000.00
Sub-Total				\$110,320.00
TRAFFIC CONTROL				
ASSUME 9 MONTH CONSTRUCTION	MO	9.00	\$8,000.00	\$72,000.00
Sub-Total				\$72,000.00
SIGNING AND STRIPING				
SHOULDER TEXTURING	LF	29,824.00	\$0.15	\$4,473.60
PAVEMENT MARKINGS, ALL	MI	2.82	\$2,000.00	\$5,640.00
Sub-Total				\$10,113.60

LEGEND:
EA EACH
LF LINEAR FEET
SY SQUARE YARD
SF SQUARE FEET
MO MONTH
MI MILES
STA STATION
CY CUBIC YARD

Note: Preliminary cost is estimated based on average cost summaries, prepared by TxDOT for previous similar projects, and adjusted for quantity.



PRELIMINARY COST ESTIMATE
MEDIUM TERM IMPROVEMENTS - PALM GROVE DRIVE OPTION A

Estimate Date:	January 20, 2012
TxDOT Sub Totals:	
Contingency:	30%
TxDOT Total:	
Missouri City Sub Totals:	187,400
Contingency:	30% 56,220
Missouri City Total: 243,620	
Grand Total: 243,620	

ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
ROADWAY				
PREPARE R.O.W.	STA	6	\$2,200.00	\$13,200.00
EXCAVATION WORK	CY	5,600	\$5.00	\$28,000.00
SURFACE (CRCP)(10")	SY	1,867	\$30.00	\$56,010.00
BASE COURSES	SY	2,000	\$16.00	\$32,000.00
CONC CURB	LF	1,200.00	\$2.50	\$3,000.00
CONC SIDEWALK (5') (5")	LF		\$34.00	\$0.00
PED RAMPS	EA		\$1,500.00	\$0.00
DRIVEWAYS	EA		\$3,050.00	\$0.00
Sub-Total				\$132,210.00

BRIDGE				
BRIDGE	SF	0.00	\$65.00	\$0.00
Sub-Total				\$0.00

TRAFFIC CONTROL				
ASSUME 4 MONTHS CONSTRUCTION	MO	4.00	\$2,000.00	\$8,000.00
Sub-Total				\$8,000.00

DRAINAGE				
STORM SEWER, UNDERDRAIN, & DETENTION	MI	0.11	\$400,000.00	\$44,000.00
STORMWATER POLLUTION PREVENTION PLAN	MI	0.11	\$15,000.00	\$1,650.00
Sub-Total				\$45,650.00

SIGNING AND STRIPING				
SIGNING	MI	0.11	\$8,000.00	\$880.00
PAVEMENT MARKINGS, ALL	MI	0.11	\$6,000.00	\$660.00
Sub-Total				\$1,540.00

LEGEND:

- EA EACH
- LF LINEAR FEET
- SY SQUARE YARD
- SF SQUARE FEET
- MO MONTH
- MI MILES
- STA STATION
- CY CUBIC YARD

Note: Preliminary cost is estimated based on average cost summaries, prepared by TxDOT for previous similar projects, and adjusted for quantity.

PRELIMINARY COST ESTIMATE
MEDIUM TERM IMPROVEMENTS - PALM GROVE DRIVE OPTION B

Estimate Date:	January 20, 2012
TxDOT Sub Totals:	
Contingency:	30%
TxDOT Total:	
Missouri City Sub Totals:	325,987
Contingency:	30% 97,796
Missouri City Total: 423,783	
Grand Total: 423,783	

ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
ROADWAY				
PREPARE R.O.W.	STA	3	\$2,200.00	\$7,040.00
EXCAVATION WORK	CY	2,987	\$5.00	\$14,935.00
SURFACE (CRCP)(10")	SY	996	\$30.00	\$29,880.00
BASE COURSES	SY	1,067	\$16.00	\$17,072.00
CONC CURB	LF	640.00	\$2.50	\$1,600.00
CONC SIDEWALK (5') (5")	LF		\$34.00	\$0.00
PED RAMPS	EA		\$1,500.00	\$0.00
DRIVEWAYS	EA		\$3,050.00	\$0.00
Sub-Total				\$70,527.00

BRIDGE				
BRIDGE	SF	0.00	\$65.00	\$0.00
GUARDRAIL	EA	1.00	\$175,000.00	\$175,000.00
Sub-Total				\$175,000.00

TRAFFIC CONTROL				
ASSUME 6 MONTHS CONSTRUCTION	MO	6.00	\$5,000.00	\$30,000.00
Sub-Total				\$30,000.00

DRAINAGE				
STORM SEWER, UNDERDRAIN, & DETENTION	MI	0.06	\$800,000.00	\$48,000.00
STORMWATER POLLUTION PREVENTION PLAN	MI	0.06	\$15,000.00	\$900.00
Sub-Total				\$48,900.00

SIGNING AND STRIPING				
SIGNING	MI	0.06	\$20,000.00	\$1,200.00
PAVEMENT MARKINGS, ALL	MI	0.06	\$6,000.00	\$360.00
Sub-Total				\$1,560.00

LEGEND:

- EA EACH
- LF LINEAR FEET
- SY SQUARE YARD
- SF SQUARE FEET
- MO MONTH
- MI MILES
- STA STATION
- CY CUBIC YARD

Note: Preliminary cost is estimated based on average cost summaries, prepared by TxDOT for previous similar projects, and adjusted for quantity.



PRELIMINARY COST ESTIMATE
LONG TERM - SIX LANE MULTIMODAL FACILITY

Estimate Date:	January 20, 2012
TxDOT Sub Totals:	15,580,739
Contingency: 30%	4,674,222
TxDOT Total:	20,254,961
Missouri City Sub Totals:	520,000
Contingency: 30%	156,000
Missouri City Total:	676,000
Grand Total:	20,930,961

ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
ROADWAY				
PREPARE R.O.W.	STA	149	\$2,200.00	\$327,800.00
REMOVING ASPHALT (PAVEMENT)	SY	125,924	\$4.00	\$503,696.00
EXCAVATION WORK	CY	464,607	\$5.00	\$2,323,035.00
SURFACE (CRCP)(10")	SY	154,869	\$30.00	\$4,646,070.00
BASE COURSES	SY	158,130.00	\$16.00	\$2,530,080.00
CONC CURB	LF	29,344.00	\$2.50	\$73,360.00
CONC SIDEWALK (5') (5")	LF	21,557.00	\$34.00	\$732,938.00
PED RAMPS	EA	104.00	\$1,500.00	\$156,000.00
DRIVEWAYS	EA	65.00	\$3,050.00	\$198,250.00
CONC MEDIAN	SY	10,092.00	\$40.00	\$403,680.00
MOUNTABLE MEDIAN CURB	LF	5,253.00	\$10.00	\$52,530.00
Sub-Total				\$11,947,439.00
BRIDGE				
BRIDGE WIDENING	SF	4,080.00	\$65.00	\$265,200.00
Sub-Total				\$265,200.00
TRAFFIC CONTROL				
ASSUME 1.5-YEAR CONSTRUCTION	MO	18.00	\$12,500.00	\$225,000.00
Sub-Total				\$225,000.00
TRAFFIC SIGNALS				
MODIFY EXISTING SIGNALS	EA	9.00	\$50,000.00	\$450,000.00
LEFT/RIGHT TURN LANES	EA	4.00	\$130,000.00	\$520,000.00
Sub-Total				\$970,000.00
DRAINAGE				
STORM SEWER, UNDERDRAIN, & DETENTION	MI	2.82	\$800,000.00	\$2,256,000.00
STORMWATER POLLUTION PREVENTION PLAN	MI	2.82	\$15,000.00	\$42,300.00
Sub-Total				\$2,298,300.00
SIGNING AND STRIPING				
SIGNING	MI	2.82	\$20,000.00	\$56,400.00
PAVEMENT MARKINGS, ALL	MI	2.82	\$120,000.00	\$338,400.00
Sub-Total				\$394,800.00

LEGEND:

- EA EACH
- LF LINEAR FEET
- SY SQUARE YARD
- SF SQUARE FEET
- MO MONTH
- MI MILES
- STA STATION
- CY CUBIC YARD

Note: Preliminary cost is estimated based on average cost summaries, prepared by TxDOT for previous similar projects, and adjusted for quantity.

PRELIMINARY COST ESTIMATE
LONG TERM IMPROVEMENTS - PALM GROVE DRIVE OPTION C

Estimate Date:	January 20, 2012
TxDOT Sub Totals:	
Contingency: 30%	
TxDOT Total:	
Missouri City Sub Totals:	824,514
Contingency: 30%	247,354
Missouri City Total:	1,071,868
Grand Total:	1,071,868

ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
ROADWAY				
PREPARE R.O.W.	STA	11	\$2,200.00	\$24,860.00
EXCAVATION WORK	CY	10,240	\$5.00	\$51,200.00
SURFACE (CRCP)(10")	SY	3,413	\$30.00	\$102,390.00
BASE COURSES	SY	3,664	\$16.00	\$58,624.00
CONC CURB	LF	2,260.00	\$2.50	\$5,650.00
CONC SIDEWALK (5') (5")	LF	920.00	\$34.00	\$31,280.00
PED RAMPS	EA		\$1,500.00	\$0.00
DRIVEWAYS	EA		\$3,050.00	\$0.00
Sub-Total				\$274,004.00
BRIDGE				
BRIDGE	SF	5,060.00	\$65.00	\$328,900.00
Sub-Total				\$328,900.00
TRAFFIC CONTROL				
ASSUME 9 MONTHS CONSTRUCTION	MO	9.00	\$5,000.00	\$45,000.00
Sub-Total				\$45,000.00
DRAINAGE				
STORM SEWER, UNDERDRAIN, & DETENTION	MI	0.21	\$800,000.00	\$168,000.00
STORMWATER POLLUTION PREVENTION PLAN	MI	0.21	\$15,000.00	\$3,150.00
Sub-Total				\$171,150.00
SIGNING AND STRIPING				
SIGNING	MI	0.21	\$20,000.00	\$4,200.00
PAVEMENT MARKINGS, ALL	MI	0.21	\$6,000.00	\$1,260.00
Sub-Total				\$5,460.00

LEGEND:

- EA EACH
- LF LINEAR FEET
- SY SQUARE YARD
- SF SQUARE FEET
- MO MONTH
- MI MILES
- STA STATION
- CY CUBIC YARD

Note: Preliminary cost is estimated based on average cost summaries, prepared by TxDOT for previous similar projects, and adjusted for quantity.



PRELIMINARY COST ESTIMATE
LONG TERM IMPROVEMENTS - 5TH STREET RE-ALIGNMENT

Estimate Date:	January 20, 2012
TxDOT Sub Totals:	
Contingency:	30%
TxDOT Total:	
Missouri City Sub Totals:	
Contingency:	30%
Missouri City Total:	696,654
Grand Total:	696,654

ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
ROADWAY				
PREPARE R.O.W.	STA	6	\$2,200.00	\$13,200.00
EXCAVATION WORK	CY	9,600	\$5.00	\$48,000.00
SURFACE (CRCP)(10")	SY	3,200	\$30.00	\$96,000.00
BASE COURSES	SY	3,333	\$16.00	\$53,328.00
CONC CURB	LF	1,200.00	\$2.50	\$3,000.00
CONC SIDEWALK (5') (5")	LF	1,200.00	\$34.00	\$40,800.00
PED RAMPS	EA	4.00	\$1,500.00	\$6,000.00
DRIVEWAYS	EA	1.00	\$3,050.00	\$3,050.00
Sub-Total				\$263,378.00

TRAFFIC SIGNAL				
INSTALL TRAFFIC SIGNAL	EA	1.00	\$120,000.00	\$120,000.00
REMOVE EXISTING TRAFFIC SIGNAL	EA	1.00	\$20,000.00	\$20,000.00
Sub-Total				\$140,000.00

TRAFFIC CONTROL				
ASSUME 8 MONTHS CONSTRUCTION	MO	8.00	\$5,000.00	\$40,000.00
Sub-Total				\$40,000.00

DRAINAGE				
STORM SEWER, UNDERDRAIN, & DETENTION	MI	0.11	\$800,000.00	\$88,000.00
STORMWATER POLLUTION PREVENTION PLAN	MI	0.11	\$15,000.00	\$1,650.00
Sub-Total				\$89,650.00

SIGNING AND STRIPING				
SIGNING	MI	0.11	\$20,000.00	\$2,200.00
PAVEMENT MARKINGS, ALL	MI	0.11	\$6,000.00	\$660.00
Sub-Total				\$2,860.00

LEGEND:

- EA EACH
- LF LINEAR FEET
- SY SQUARE YARD
- SF SQUARE FEET
- MO MONTH
- MI MILES
- STA STATION
- CY CUBIC YARD

Note: Preliminary cost is estimated based on average cost summaries, prepared by TxDOT for previous similar projects, and adjusted for quantity.