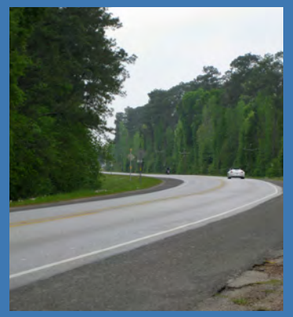
FINAL REPORT

SH105
ACCESS MANAGEMENT STUDY

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CHAPTER 1: INTRODUCTION

The purpose of this access management study is to develop a set of recommendations to improve safety, mobility, and quality of life along SH 105 between Loop 336 in Conroe to US 59 in Cleveland. Recommendations are being developed to address mobility and safety for all road users, including pedestrians and bicycles.

Recommendations have been depicted conceptually; prioritized as short-term, medium-term, or long-term; and evaluated to determine projected benefits and estimated costs for construction.

STUDY BACKGROUND

SH 105 is the primary east-west arterial roadway between Conroe and Cleveland. This is a section of roadway that has long been identified as congested and in need of transportation improvements. A preliminary engineering study was completed by the Texas Department of Transportation in 2004 for SH 105 from FM 1484 (10th Street) in Conroe to 1.1 miles west of Pin Oak Road in Cleveland. The study recommended widening this stretch of roadway to five lanes in the urban areas and four lanes in the rural areas. Three rounds of public meetings (a total of six meetings) were held between June 2003 and May 2004. The public feedback and input received as part of that process was generally positive and in favor of the proposed improvements. The estimated cost for improvements identified in that study was $142 million. Due to funding shortfalls, it is now uncertain when that project would be implemented.

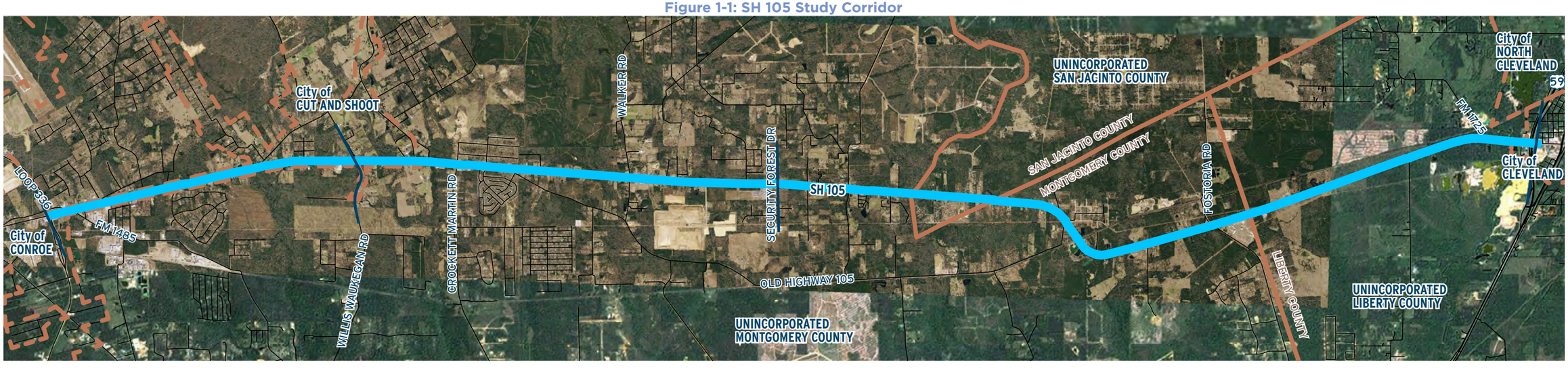
In addition to vehicular congestion experienced by drivers, this roadway has also had many crashes due to the current capacity constraints, traffic volumes, and high travel speeds. The Houston-Galveston Area Council therefore initiated this access management study to identify short-term improvements to enhance safety and mobility, while also identifying long-term recommendations to facilitate continued economic development and quality of life.

STUDY AREA

The study corridor is the 18.7-mile section of SH 105 from Loop 336 in Conroe to US 59 in Cleveland, as shown in **Figure 1-1**. The study corridor traverses the counties of Montgomery, San Jacinto, and Liberty. Approximately 13.7 miles (or 73 percent) of the corridor is located in Montgomery County, and approximately 3.7 miles (or 20 percent) of the corridor is located in Liberty County. A small portion of the corridor (1.3 miles, or 7 percent) falls within San Jacinto County. The cities of Conroe, Cut and Shoot, and Cleveland each have jurisdiction over portions of the SH 105 corridor. Approximately 14 miles (or 75 percent) of the corridor is situated within unincorporated portions of all three counties.

There are a variety of land uses along the corridor, including residential, commercial, light industrial, institutional, and undeveloped land. Unique to this corridor are the various flea markets that operate primarily on weekends and attract patrons from as far away as Louisiana. The corridor also includes municipal facilities,

Figure 1-1: SH 105 Study Corridor



Congestion on SH 105

churches, and the Austin Elementary School, which is in the Conroe Independent School District. Western Wastes owns a Class I landfill located east of Walker Road. A new Class IV landfill owned by Montgomery Landfill Solutions is being constructed west of Walker Road and will have direct access to SH 105. Developments such as these landfills and the fact that SH 105 is the major east-west route through the area contribute to the high truck traffic on this corridor. Combined with the two-lane roadway cross-section, the result is congestion and negative impacts on mobility and safety.

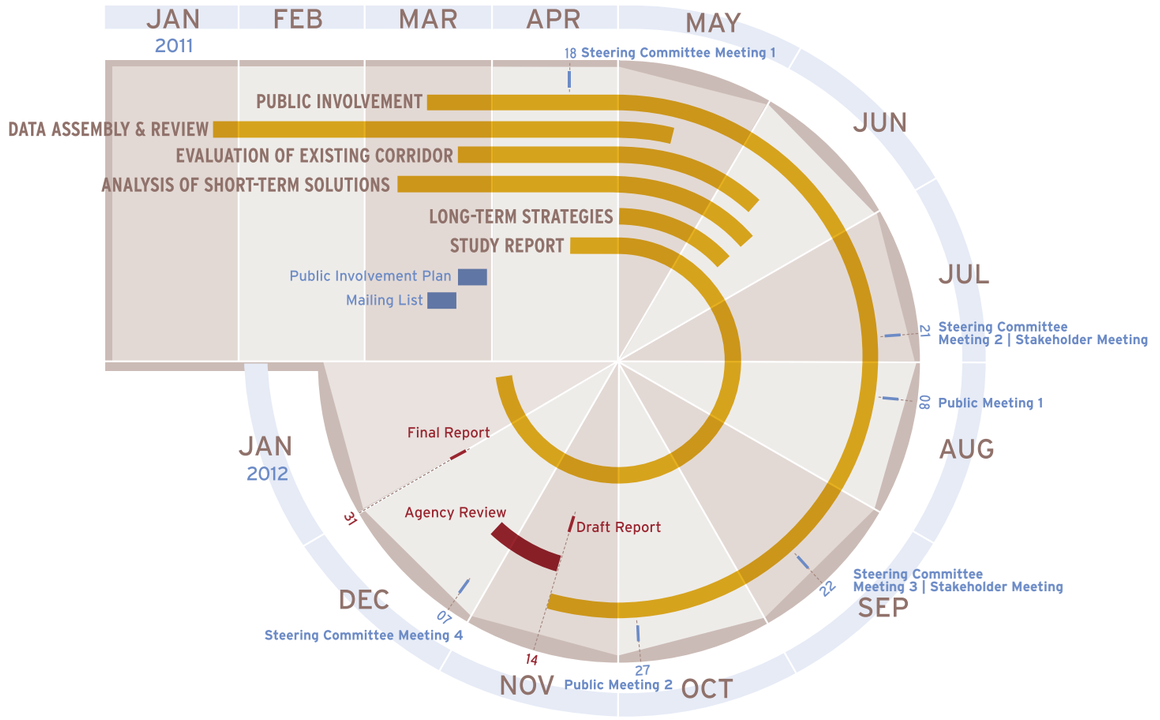
Existing (2011) traffic volumes along the study corridor range from a high of 25,200 vehicles per day (vpd) west of FM 1485 near Cut and Shoot to 10,300 vpd just west of FM 1725 in Cleveland. Based on the H-GAC regional travel demand model, traffic volumes along this corridor are projected to increase to approximately 40,500 vpd and 13,100 vpd at these locations by 2035. These traffic volumes represent a compounded growth of between one percent and two percent per year. The current 2035 Regional Transportation Plan Update does not include any capacity improvements for SH 105, so these projected high future volumes would result in a significant deterioration in mobility and safety, much worse than is currently the case.

Due to the current congestion along the SH 105 corridor, the general perception of members of the public is that there is a significant amount of traffic that uses alternate routes. Using the H-GAC regional travel demand model, it was confirmed that there is some latent travel demand for the SH 105 study corridor. The evaluation showed for example, that if SH 105 is widened in the future, the section between Loop 336 and FM 1485 would attract more traffic volumes than if it were not widened, and would continue to be congested. This demonstrates the need for multimodal improvements as well as the need for improvements to the surrounding roadway network to provide alternate east-west access in the area.

STUDY PROCESS

This access management study was initiated in March 2011, as illustrated in **Figure 1-2**. The first public meeting was held in August 2011 and the second in October 2011. Stakeholder meetings were held in July 2011 and September 2011 to obtain input from smaller groups of corridor users. The Steering Committee met four times during the course of the study.

Figure 1-2: Project Schedule



CHAPTER 2: PUBLIC INVOLVEMENT

To assure a transportation planning process that supports early and continued participation, a project-specific public involvement plan was developed in accordance with H-GAC's overall public involvement commitment to provide complete information, timely public notice, and full public access to key decisions.

This is consistent with initiatives identified in the Transportation Public Participation Plan adopted by the Transportation Policy Council on July 27, 2007.

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.** Knowledge is the basis of constructive participation. The public needs to know details about a plan or action in order to evaluate the relative importance and anticipated costs and benefits.

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.** 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 on conducting participation activities because they are required.** Timely agency response to ideas from the public and the integration of those ideas into decisions shows the public that participation is worthwhile.

STEERING COMMITTEE

A Steering Committee was established to provide guidance during the study and to facilitate the appropriate incorporation of public feedback obtained during the course of the project. The Steering Committee was comprised of staff from area agencies, counties, and cities. This group of local technical and policy decision makers met at key milestones during the project to provide comment and input on data, findings, recommendations, and the study report. The group met four times, in April, July, September, and November.

STAKEHOLDER MEETINGS

There are a number of stakeholder groups that are affected by transportation issues in the corridor, including:

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

The targeted groups represent people who live and work along the corridor and have an intimate knowledge of the issues affecting the area. Two stakeholder meetings were

Public Participation Objectives

- Initiation of citizen participation at the 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.
- 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.

Steering Committee Membership

- Houston-Galveston Area Council
- Texas Department of Transportation (Houston District, Montgomery Area, Beaumont District)
- City of Cut and Shoot
- City of Conroe
- City of Cleveland
- Montgomery County
- Liberty County
- US Congressional Districts 2 and 8
- Texas State Senator, District 4
- Texas State Representatives, Districts 16 and 18
- Greater Conroe/Lake Conroe Area Chamber of Commerce
- Greater Conroe Economic Development Council
- Cleveland Chamber of Commerce

held, the first in July and the second in September. Both meetings were held at the Security Community Center.

PUBLIC MEETINGS

Two public meetings were held as part of this study. The first meeting was held in August 2011. The purpose of that meeting was to introduce the access management study, present an overview of existing corridor conditions, and obtain feedback and input on a set of preliminary corridor recommendations. The second meeting was held in October 2011 to present proposed recommendations for the corridor and obtain additional public input and comment. Both meetings were held at the Austin Elementary School, providing a convenient location for members of the general public along the corridor.

First Public Meeting

The first public meeting was attended by 61 people, comprising local residents, retail and service owners, and public officials, some of whom attended in multiple capacities. Meeting attendees were given a questionnaire designed to obtain input on corridor issues and needs. A total of 28 completed questionnaires were received from those who attended the meeting. After the meeting, additional questionnaires were distributed to patrons at the weekend flea markets. An additional 22 responses were received as a result of that effort, bringing the total to 50 completed questionnaires. Of the improvements presented at the first public meeting, those with the highest support were widening to four lanes from Willis Waukegan Road to US 59, left- and right-turn lanes at intersections, signal improvements, and two-way left-turn lanes for some sections.

Respondents to the First Public Meeting Questionnaire identified themselves as:

- Local Residents - 46
- Public Officials - 3
- Retail Owners - 3
- Service Owners - 3
- Developers - 3
- School Official - 1

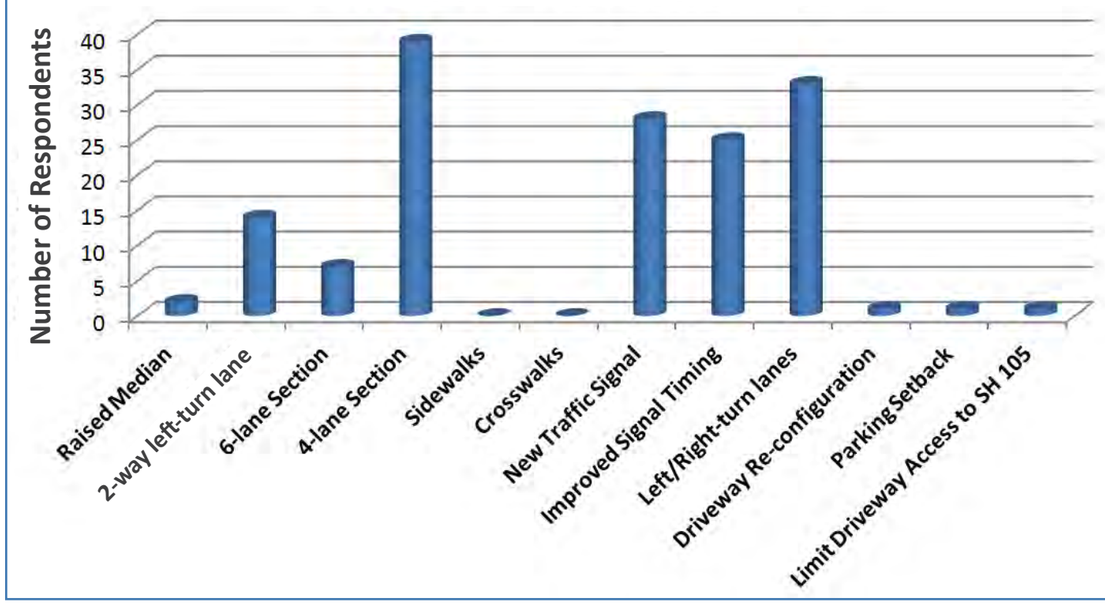
Second Public Meeting

The second public meeting was attended by 53 people, comprising members of the general public and elected officials or their representatives. Meeting attendees were again given a questionnaire, this time designed to obtain input on proposed improvements. A total of 19 completed questionnaires were received. Of the improvements presented at the second public meeting, those with the highest support were improvements to signal timing, left- and right-turn lanes, and proposed roadway widening.

Respondents to the Second Public Meeting Questionnaire identified themselves as:

- Local Residents - 13
- Public Officials - 5
- School Official - 1
- Retail Owners - 3

Public Support for Improvements



CHAPTER 3:
EXISTING CORRIDOR CONDITIONS

This chapter describes existing land use and transportation conditions along the SH 105 study corridor, as well as existing access management policies and practices.

This includes an evaluation of the roadway, nature of adjacent development, interaction between the roadway and development, and resulting traffic operating conditions. An assessment of corridor growth and development conditions is useful input for access control and land use decision making in a manner that facilitates both corridor safety and long-term economic feasibility along of SH 105. An overall evaluation of existing conditions helps identify and quantify deficiencies, constraints, and issues, thereby laying the ground work for the development of appropriate improvement measures.

LAND USE AND DEVELOPMENT

In the western portion of the corridor, development consists primarily of mixed commercial and residential development that mostly relies on exclusive access directly to SH 105. Frontage parcels vary greatly in depth and width, but structures are primarily located close to and along the SH 105 right-of-way. A few subdivisions have residential lots which access other local streets connected to SH 105. Cut and Shoot municipal facilities are clustered near Woodridge Drive. In many cases, curb cuts in this segment are not well defined and the SH 105 right-of-way is not clearly delineated.

In the central portion of the corridor, from Willis Waukegan Road to Security Forest Drive, development and access is less intensive and interspersed with larger undeveloped tracts. A few churches and subdivisions are located in this section, with small clusters of commercial uses located at the SH 105 intersections with Crockett Martin Road and Walker Road. At the eastern end of this section, the Olde Security Square flea market is a significant commercial use located on the south side of SH 105. Others such as Frontier Flea Market, Four Seasons Flea Market, and Outback Flea Market are closed.

Extending east of Security Forest Drive, the corridor becomes more rural in character with a few isolated ranches and residential properties visible from the corridor. Significant overhead utility and pipeline easements, along with a grade-separated railroad crossing, also contribute to the open rural character of this section. The corridor includes a variety of woodlands and open spaces. Natural features include Caney Creek, Duck Creek, Peach Creek, Jayhawker Creek, and the San Jacinto River. Overall, natural areas are smaller in scale and scattered in the western portion of the corridor, whereas larger and more contiguous wooded areas are found in the eastern portion.

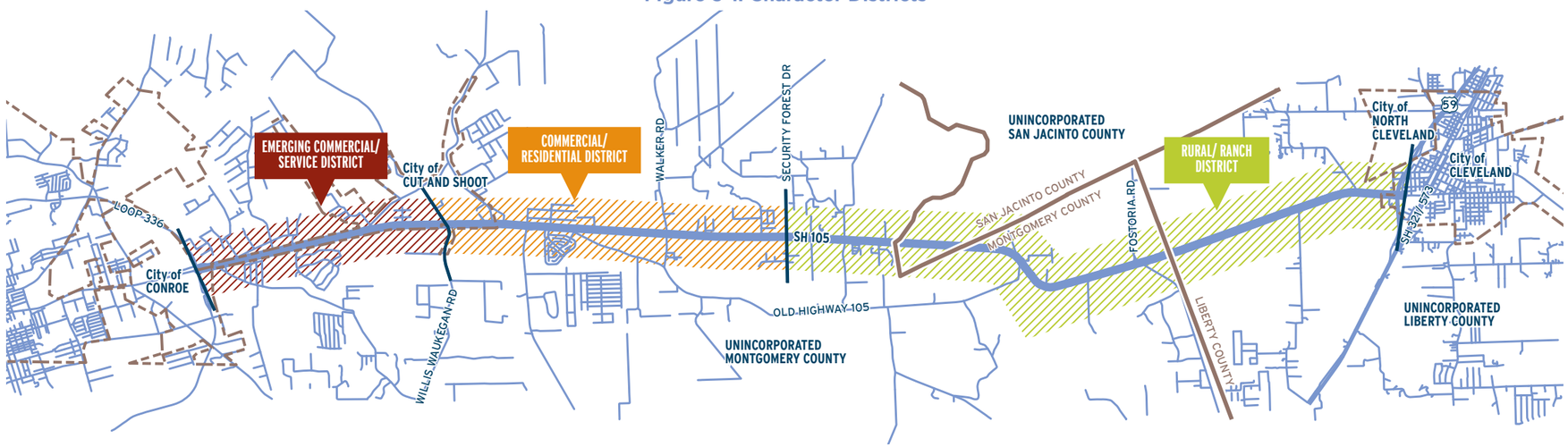
Character Districts

Three "character districts" were defined for the study area, as illustrated in **Figure 3-1**. The district approach provides a basis for understanding generalized land use patterns and provides a framework for developing principles and guidelines as part of this study.

From west to east, the three character districts for the SH 105 study corridor are as follows:

1. **Emerging Mixed Commercial/Service District**
   - **Location:** Loop 336 to Willis Waukegan Road
   - **Length:** 3.8 miles
   - **Jurisdictions:** Montgomery County, cities of Conroe and Cut and Shoot, and TxDOT
   - **Character:** This predominantly urbanized district consists of a relatively high intensity mix of commercial, residential, and other uses with some peak activity uses, such as the Austin Elementary School and flea markets. Utility extensions are planned, which will accelerate the development of remaining vacant sites. Due to the intensity of uses and the anticipated future configuration of the roadway, shared access to SH 105 is key to improving access, efficiency, and safety along the corridor, all of which will positively impact the success of businesses. Due to the anticipated increase in commercial development in this district, pedestrian accessibility and safety should be carefully considered in any infrastructure and land use planning.
   - **Observations:**
     - Curb cuts for various uses are not defined, and many properties have very wide driveway access
     - Multiple interferences within the right-of-way (e.g. mailboxes, signage, parking)
     - Lot depths vary, buildings are situated close to the right-of-way, and parking areas conflict with traffic movements in the right-of-way

Figure 3-1: Character Districts



- Predominant uses in this corridor segment are automotive and vehicular sales and service; other uses include convenience retail, light industrial, salon and beauty services, government services, as well as some single family residential uses

2. **Mixed Commercial and Residential District**
   - **Location:** Willis Waukegan Road east to Security Forest Drive
   - **Length:** 5.1 miles
   - **Jurisdictions:** Montgomery County, the City of Cut and Shoot, and TxDOT
   - **Character:** This mixed character district includes a lower intensity mix of residential and open spaces, with some commercial uses and a few community uses, such as religious institutions. Pedestrian mobility and access within this district is most important at commercial and other activity nodes.
   - **Observations:**
     - Non-residential uses within the district include an RV park, ranches, convenience stores, commercial, entertainment, gas stations, automotive and motorcycle service and supply, institutional, flea markets, a machine shop, storage, and farm supply
     - Commercial uses are concentrated at Walker Road and Crockett Martin Road
     - Much of the district is made up of large undeveloped tracts with a few institutional uses and residential subdivisions
     - Curb cuts for some uses are not defined and others have wide driveways

3. **Rural and Ranch District**
   - **Location:** Security Forest Drive to US 59
   - **Length:** 9.8 miles
   - **Jurisdictions:** Montgomery, San Jacinto, and Liberty Counties, City of Cleveland, and TxDOT
   - **Character:** This predominantly rural district is made up of large-lot residential uses and undeveloped land and SH 105 has a more open and highway-scale character with minimal corridor access points that are widely spaced. As the character of the corridor is rural, the need for pedestrian mobility and connectivity is not significant.
   - **Observations:**
     - Within this district, the corridor is more rural and wooded
     - Residential uses tend to be isolated large lot, single family properties
     - The few non-residential uses along the corridor in this area include a grocery store, institutional uses (including two churches), computer service, landscape nursery, and automotive and truck service, hotels, fast food, and gas stations
     - Overhead utility easements and pipeline easements cross the corridor near Old Highway 105 and east of the Montgomery and Liberty county lines
     - This district is the longest in the study area

Development Growth and Access Control

Development along the SH 105 corridor has the potential to be influenced by the plans of the City of Cut and Shoot to extend wastewater treatment service along the corridor east of FM 1485. This could have a significant effect on development and land use intensification in the western segment of the corridor. This further emphasizes the need for greater consistency in standards for access control in order to minimize conflicts. More uniformity in corridor access control and development access design produces more consistent driver expectation and would improve safety along the corridor. This would ultimately result in long-term economic benefits for the corridor.

Subdivision Regulations

Montgomery, San Jacinto, and Liberty counties have development regulations that are applicable to SH 105. In the absence of zoning controls, these subdivision regulations most directly influence development pattern along the corridor. Standards for minimum lot sizes for well and septic - served properties affect the amount of development that can occur along the SH 105 corridor. Established by the State of Texas and reflected in these subdivision regulations, the standards essentially determine the build-out potential along the SH 105 corridor. A summary and comparison of these regulations is provided in **Appendix B**.

With the exception of State-mandated minimum lot area requirements for septic service, there is little consistency between the counties on standards for development controls. For example, San Jacinto County sets a minimum driveway spacing of 50 feet to 150 feet, whereas Liberty and Montgomery counties do not. Conversely, San Jacinto County provides no minimum threshold for lot width, while Liberty County allows for 50-foot spacing and Montgomery County allows as little as 20 feet for townhouses and 50 feet for single-family residential developments.

Driveway spacing and lot width requirements have a similar impact on development patterns as they directly influence the alignment and separation of property adjacent to the right-of-way. In turn, this directly impacts the number of driveways needed to serve these properties. The impact of this can be seen along SH 105 where driveways are clustered in close proximity to each other. Similarly, minimum block lengths help to limit the number of streets intersecting SH 105. While Montgomery County sets a minimum block length of 2,000 feet along major thoroughfares, including SH 105, Liberty County allows for a 1,400-foot separation and San Jacinto County provides no minimum standard.

It should be noted that a portion of the eastern section of SH 105 lies within the City of Cleveland's extraterritorial jurisdiction (ETJ) area. However, it is unclear whether Cleveland's subdivision regulations are applicable in this area, as noted in a 2009 ETJ Study commissioned by the City of Cleveland.

Adopted Plans and Regulations

Current plans and development regulations pertaining to the SH 105 study corridor include:

- Montgomery County Subdivision Regulations and Design Guidelines
- San Jacinto County Subdivision Regulations
- Liberty County Subdivision Regulations
- City of Conroe Comprehensive Plan
- Access Management Manual, TxDOT
- Guidelines Emphasizing Bicycle and Pedestrian Accommodations, TxDOT

TxDOT Access Management Standards

In addition to the access limits imposed by the subdivision regulations, TxDOT regulates access to state highways such as SH 105 by establishing minimum connection spacing requirements that vary according to the posted speed along the corridor. Speed limits for SH 105 vary along its length, from 45 miles per hour (mph) nearing Cleveland to 60 mph at the Montgomery County line. Based on TxDOT standards, the minimum connection or access point spacing should be 360 feet, a far greater distance than the driveway spacing and lot width allowances currently imposed by the subdivision regulations in the three counties. Based on the TxDOT requirements, there are many non-conforming access points along the SH 105 corridor, particularly in the western segment.

Other Documents

Other plans that influence development in the area include the City of Conroe's Comprehensive Plan, the H-GAC's Regional Transportation Plan, and TxDOT's recently established policy to consider pedestrians and bicyclists in roadway development. In its Comprehensive Plan, the City of Conroe identifies the Loop 336 and SH 105 area as a community gateway and area that is in need of revitalization. The H-GAC Regional Transportation Plan for Montgomery County calls for widening SH 105 to a four lane divided rural highway.

In March 2011, TxDOT issued a policy memorandum calling for the consideration of pedestrian and bicycle facilities in the construction and renovation of new roadways. For rural corridors such as SH 105, wider shoulders should be provided when bridges or bridge decks are being reconstructed or replaced. While currently limited in scope to bridge projects and shoulder widths, the broader emphasis of accommodating pedestrians and bicyclists represents a shift in policy direction.

ROADWAY

SH 105 is a principal arterial with a length of 18.7 miles within the study limits from Loop 336 to US 59. The posted speed limit varies from 45 mph just west of US 59 to 65 mph between Old Highway 105 E and FM 1725, as shown in **Figure 3-2**. The predominant posted speed limit is 55 mph. There is a small segment of roadway west of Lee Turner Road which has a posted speed limit of 60 mph.

Existing Cross-Sections and Right-of-Way

Within the study corridor, SH 105 is primarily a two-lane roadway with shoulders. There is a three-lane section between FM 1485 and Whipporwill Road, and a five-lane section between Loop 336 and FM 1485, as shown in **Figure 3-3**.

Right-of-way along the corridor varies from 120 feet to 150 feet in urban and suburban areas of the corridor, and is up to 280 feet wide in rural areas, as shown in **Table 3-1**.

Table 3-1: Existing Right-of-Way Summary

SH 105 Segment	ROW Width
Loop 336 to Crystal Forest Drive	120'-150'
Crystal Forest Drive to Millmac Road	120'-200'
Millmac Road to Willis Waukegan Road	150'-200'
Willis Waukegan Road to Crockett Martin Road	150'-200'
Crockett Martin Road to Old SH 105	150'
Old SH 105 to Pioneer Lane	120'-150'
Pioneer Lane to Security Forest Drive	150'
Security Forest Drive to Duck Creek Road	150'-200'
Duck Creek Road to Montgomery County Line	150'-280'
Montgomery County Line to Lee Turner Road	150'-200'
Lee Turner Road to Fostoria Road	150'-250'
Fostoria Road to US 59	150'

Bicycle and Pedestrian Facilities

The SH 105 study corridor is not a designated bike route. However, where shoulders are 10 feet in width, "share the road" signs are posted along the roadway. There are no sidewalks on either side of SH 105 and most of the signalized intersections do not have crosswalks. For most of the corridor the lack of sidewalks and crosswalks is due in large part to the rural context. However, segments of the corridor with heavy commercial and school activity would be better served with improved pedestrian facilities.

Figure 3-3: Cross-Sections

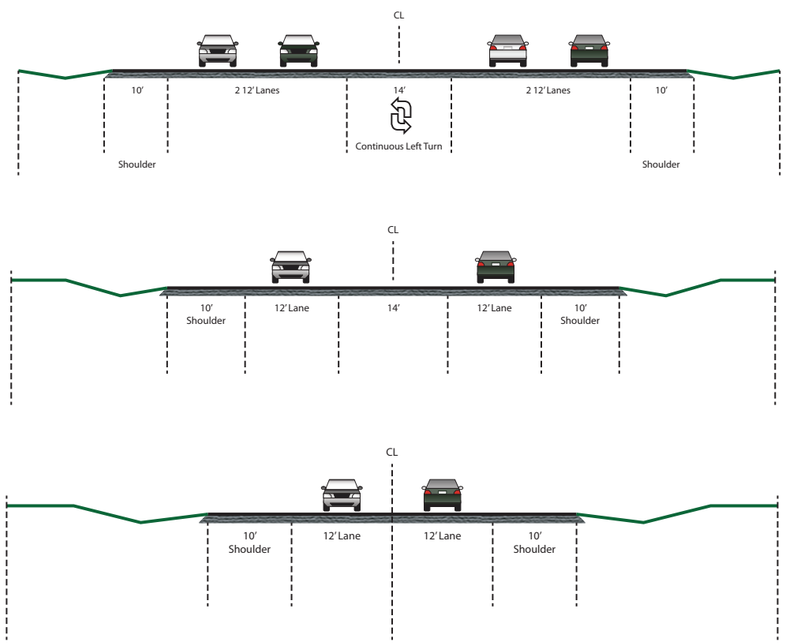
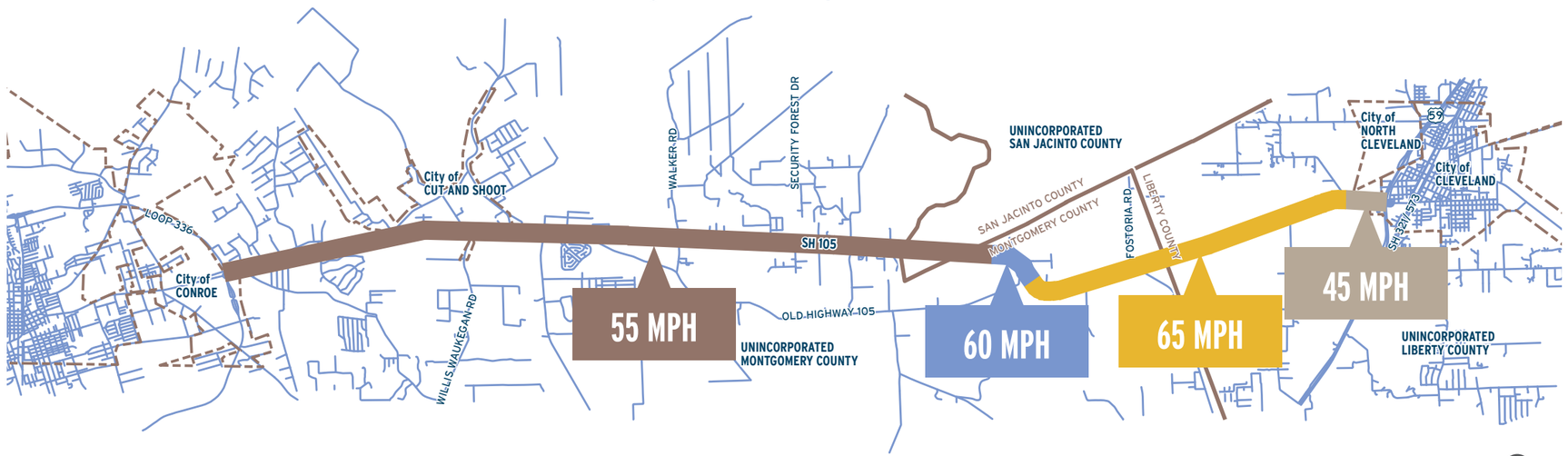


Figure 3-2: Posted Speed Limits



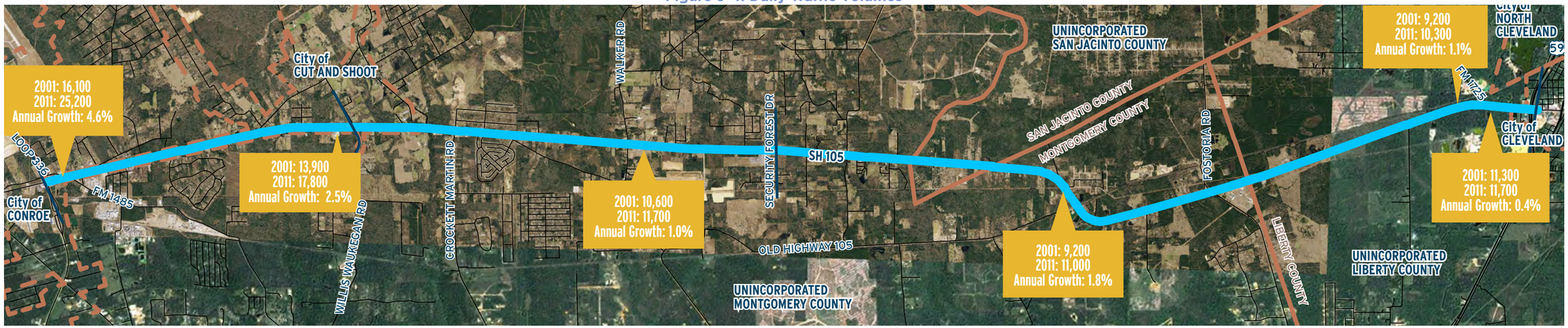
Traffic Control

There are nine traffic signals along the SH 105 study corridor – Loop 336, FM 1485, Whipporwill Road, Millmac Road, Willis Waukegan Road, FM 1484, Crockett Martin Road, Walker Road, and US 59. These signals are traffic actuated but are not coordinated as part of a signal system. All other intersections along SH 105 have stop signs on cross-streets. There are flashing signals at the intersections of SH 105 at Walker Road and Fostoria Road.

Traffic Volumes

Daily traffic and peak hour intersection turning movement counts were conducted along SH 105 in April 2011 as part of this study. Detailed traffic count data is provided in **Appendix C**. Daily traffic volumes along SH 105 range from a low of 10,300 vpd near FM 1725 to a high of 25,200 vpd between Loop 336 and FM 1485, as shown in **Figure**

Figure 3-4: Daily Traffic Volumes



3-4. A review of historical traffic volumes at these locations shows that year 2001 volumes on the corridor ranged from 9,200 vpd to 16,100 vpd. Over the last 10 years, traffic volumes have grown at a compounded rate of approximately one percent per year on the east near Cleveland, approximately five percent on the west, and between one and two percent per year in the central portion.

Classified traffic counts were also conducted along the SH 105 study corridor. As a percentage of total daily traffic volumes, heavy truck traffic ranges from eight percent to 10 percent, as shown in **Figure 3-5**.

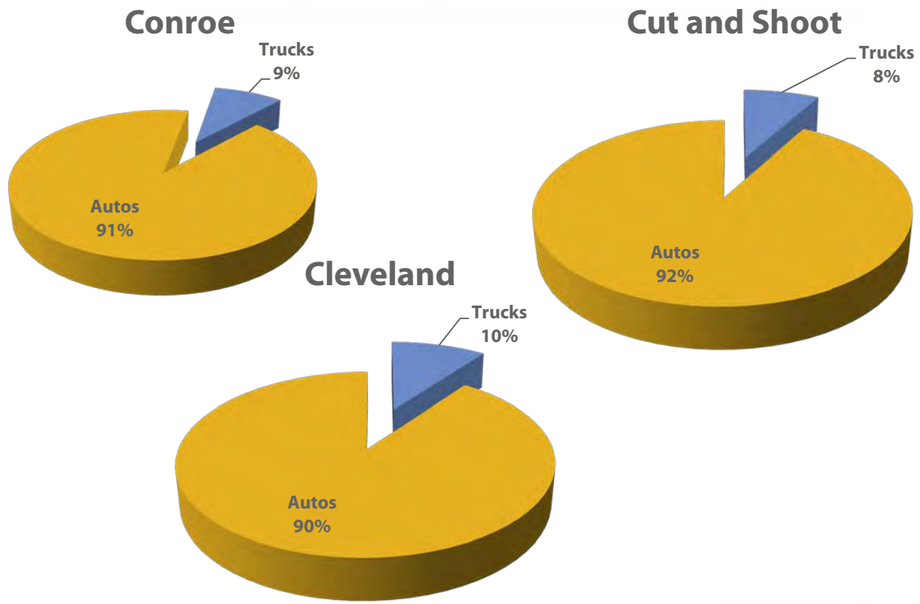
Future Roadways

The Cleveland Bypass is under construction. It is anticipated that this bypass would reduce traffic along SH 105 on the east end near Cleveland. Conroe has recommended an arterial extending north at Circle Six Drive as part of their 2035 Thoroughfare Plan.

TRAFFIC OPERATIONS ANALYSIS

A model using Synchro/SimTraffic, a traffic analysis/simulation software tool, was developed to assist in the evaluation of the impacts of identified transportation improvements. Model inputs included vehicle speed profiles, vehicle types and characteristics,

Figure 3-5: Traffic Composition



traffic composition, lane geometries, traffic volumes, and signal control timing plans. The model was calibrated to better replicate real world conditions and validated to ensure the output matched field data (such as travel time and traffic volume). Detailed information regarding model development is included in **Appendix D**.

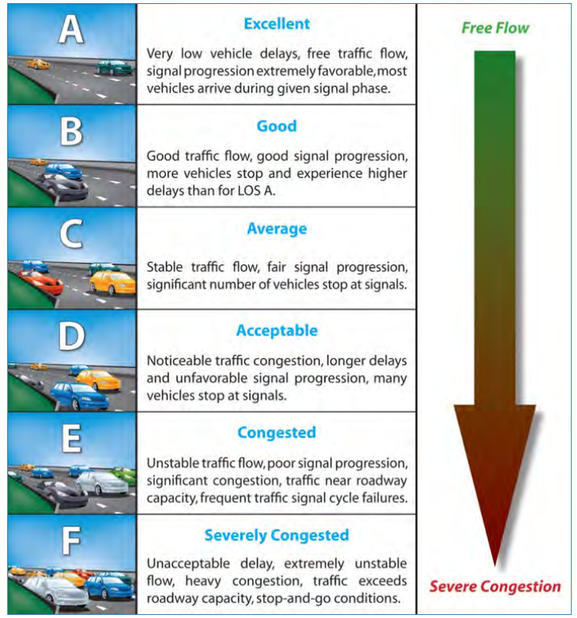
Measures of Effectiveness

Measures of effectiveness utilized in evaluating traffic operating conditions along SH 105 include travel time, average control delay, and level-of-service.

Level-of-Service - LOS is a qualitative measure of operating conditions based on control delay for intersections. From a generalized corridor perspective, LOS can also be related to the ratio of traffic volume to available capacity for a roadway segment. LOS is given a letter designation from A to F, where LOS A represents free-flow conditions and LOS F represents heavy congestion. LOS D represents the limit of acceptable operating conditions in urban areas. In rural area, LOS C is generally regarded as the limit of acceptable operating conditions. LOS classifications are illustrated in **Figure 3-6**.

Travel Time - This represents the average travel time, in seconds, for vehicles to traverse a section of roadway under the given roadway geometric and traffic conditions.

Figure 3-6: LOS Illustration



Corridor Level-of-Service

Using the ratio of daily traffic volume to roadway capacity, LOS was calculated for the SH 105 study corridor and is illustrated in **Figure 3-7**. This LOS is representative of the combination of operating conditions during the AM and PM peak periods along the corridor as a whole. The figure shows that overall, the SH 105 study corridor operates at LOS D or worse. The western section of the corridor operates overall at LOS F.

Intersection Level-of-Service

Existing LOS is summarized in **Tables 3-2** and **3-3** for major intersections along the SH 105 study corridor. The intersection with the worst traffic operations is Loop 336, which operates at LOS E during the weekday PM peak hour and LOS D during the weekend peak hour. With the exception of the westbound approach, all approaches operate at LOS E during the weekday PM peak hour. SH 105 at FM 1485 operates at LOS D during the PM peak hour. During this peak period, the northbound approach at this intersection operates at LOS E.

Figure 3-7: Corridor LOS

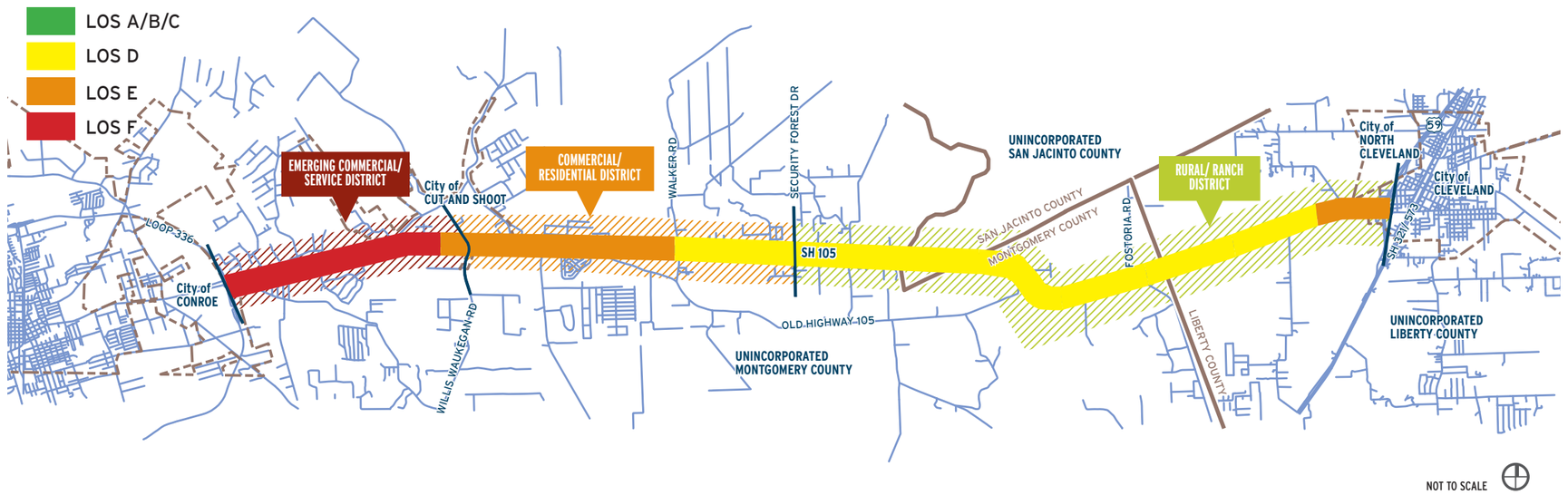


Table 3-2: Weekday PM Peak Hour Intersection Level-of-Service

Intersection	Total	Eastbound	Westbound	Northbound	Southbound
SH 105 at Loop 336	E	E	D	E	E
SH 105 at FM 1485	D	D	B	E	-
SH 105 at Whipporwill Road	B	B	B	-	C
SH 105 at Crystal Forest Drive	*	A	A	E	-
SH 105 at Millmac Road	B	B	B	-	B
SH 105 at Willis Waukegan Road	*	A	A	F	F
SH 105 at FM 1484	C	B	C	-	C
SH 105 at Crockett Martin Road	C	C	C	D	C
SH 105 at Walker Road	*	A	A	C	C
SH 105 at Security Forest Drive	*	A	A	B	-
SH 105 at Olde Security Flea Market Entrance	*	A	A	A	A
SH 105 at Fostoria Road	*	A	A	C	C
SH 105 at FM 1725	A	A	A	-	B
SH 105 at US 59 SB Frontage Road	B	C	A	-	C
SH 105 at US 59 NB Frontage Road	C	A	C	C	-

**Highway Capacity Manual* does not define overall intersection LOS for a one- or two-way stop controlled intersection.

Table 3-3: Weekend Peak Hour Intersection Level-of-Service

INTERSECTION	TOTAL	EASTBOUND	WESTBOUND	NORTHBOUND	SOUTHBOUND
SH 105 at Loop 336	D	D	C	C	D
SH 105 at FM 1485	C	C	B	D	-
SH 105 at Whipporwill Road	B	A	B	-	C
SH 105 at Crystal Forest Drive	*	A	A	D	-
SH 105 at Millmac Road	B	A	B	-	B
SH 105 at Willis Waukegan Road	*	A	A	D	F
SH 105 at FM 1484	B	A	B	-	C
SH 105 at Crockett Martin Road	C	C	B	D	C
SH 105 at Walker Road	*	A	A	D	D
SH 105 at Olde Security Flea Market Entrance	*	A	A	F	C
SH 105 at Security Forest Drive	*	A	A	B	-
SH 105 at Fostoria Road	*	A	A	C	C
SH 105 at FM 1725	A	A	A	-	C
SH 105 at US 59 SB Frontage Road	B	C	A	-	C
SH 105 at US 59 NB Frontage Road	C	B	C	C	-

**Highway Capacity Manual* does not define overall intersection LOS for a one- or two-way stop controlled intersection.

The northbound and southbound approaches at Willis Waukegan operate at failing conditions during the PM peak hour. It should be noted that at the time of this study, a traffic signal was being installed at this intersection. The failing LOS represents the two-way stop control configuration. Traffic operations reflecting the new traffic signal will be presented as part of the discussion of short-term improvements. Another intersection with worse than LOS D operations is Crystal Forest Drive (located 1.5 miles east of Loop 336), where the northbound approach at SH 105 operates at LOS E during the PM peak hour. A traffic signal warrant study was recently completed by TxDOT for this intersection. Based on that study, a traffic signal is warranted and will be designed and installed very soon.

SH 105 at Walker Road operates at LOS C on the northbound and southbound Walker Road approaches during the PM peak hour and at LOS D on those same approaches during the weekend peak hour. This is reflective of the impact of the flea markets which operate on the weekend and the majority of which are in the vicinity of this intersection. A traffic signal warrant study was recently completed by TxDOT for this intersection. However, that study concluded that a traffic signal is not warranted at this location. Traffic signal warrant analyses are performed according to the methodology outlined in Part 4 of the Texas Manual on Uniform Traffic Control Devices (Texas MUTCD), 2011 Edition. That manual identifies volume, operating, and crash history criteria and thresholds for warranting a traffic signal. Satisfaction of those warrants does not automatically trigger the installation of a traffic signal; however, the warrants have to be met for a signal to be justified.

Traffic operations were also analyzed for the entrance to the Olde Security Flea Market which is located near Security Forest Drive and is the largest and busiest flea market on the corridor. During the weekend peak hour, the northbound approach at this intersection operates at LOS F.

Travel Time

Current times within the SH 105 character districts are summarized in **Figures 3-8** and **3-9** for the weekday and weekend peak hours. Travel time between the study termini is approximately 22 minutes to 23 minutes in either direction during both peak periods that were analyzed. Travel time along the corridor does not exhibit strong peaking characteristics and is comparable on a weekday as it is on the weekend. Field travel time runs were conducted as part of this study and are consistent with the 22- to 23-minute range of travel times obtained as a result of the traffic analysis. Details of comparison between field data and traffic analysis results for corridor sections are included in the discussion of the traffic analysis model in **Appendix D**.

Figure 3-8: Existing PM Peak Hour Travel Times (Minutes)

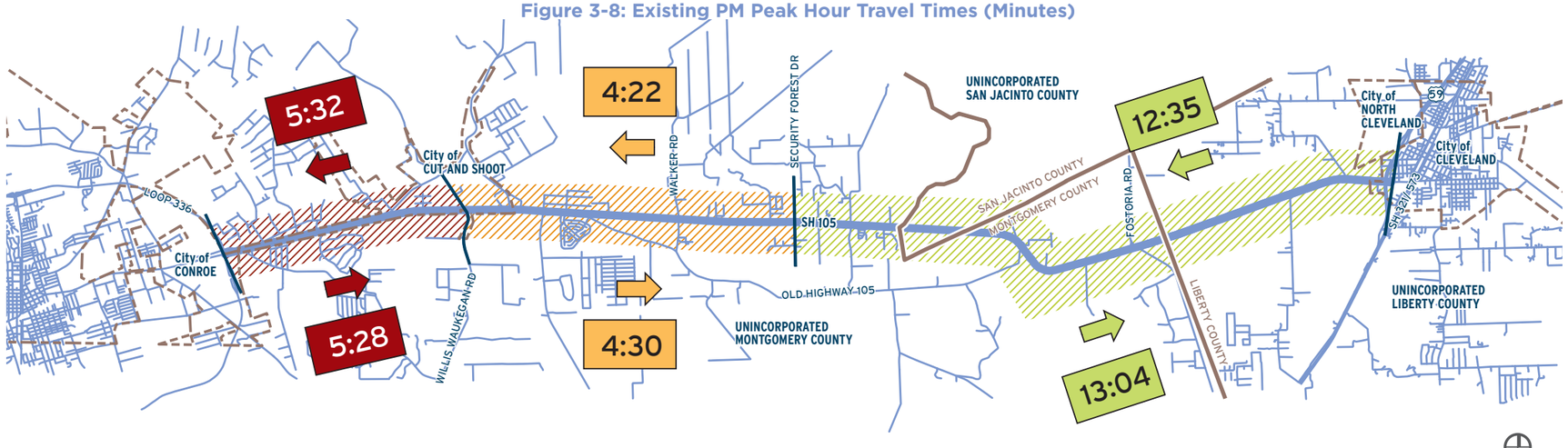
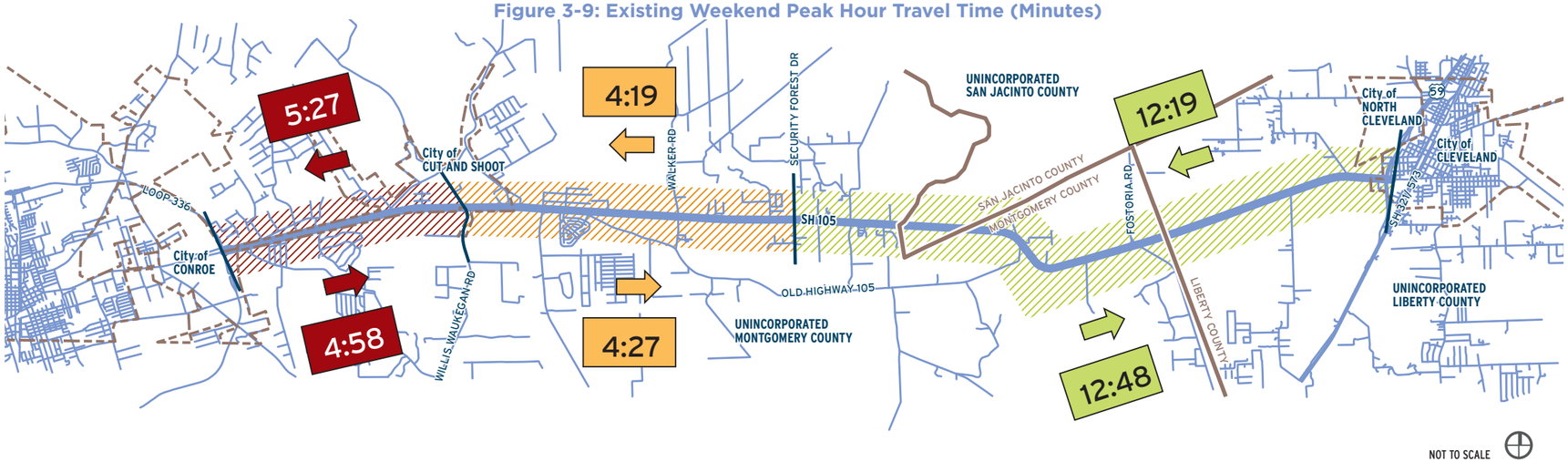


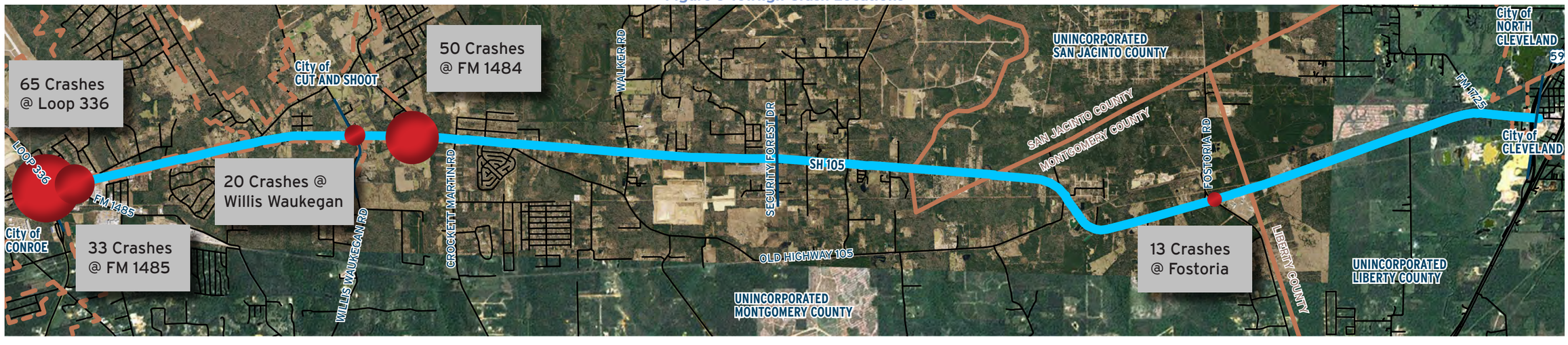
Figure 3-9: Existing Weekend Peak Hour Travel Time (Minutes)



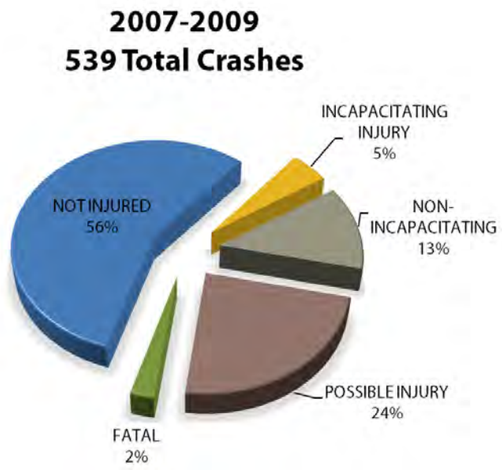
CRASH ANALYSIS

The main purpose of a crash analysis is to identify crash patterns and severity to facilitate the adoption of suitable countermeasures. This study analyzed annual corridor crash data along SH 105 for the three-year period from 2007 to 2009 provided by TxDOT. There were a total of 539 crashes during the three-year analysis period spread out over the corridor and at intersections. High crash locations are shown in **Figure 3-10** and include Loop 336 which had 65 crashes over that period and FM 1484 which had 50. FM 1485 had 33 crashes and Willis Waukegan had 20 crashes. High crash locations are concentrated in the western and central portions of the study area which are more developed and have more commercial activity.

Figure 3-10:High Crash Locations



Almost half of the 539 total crashes on the corridor over the three-year period resulted in some type of injury or death. In all, 378 road users suffered some type of injury ranging from minor to severe incapacitating injuries. Additionally, there were 16 deaths as a result of 13 fatal crashes. The location with the most fatal crashes was FM 1485 which had two such crashes resulting in the loss of three lives.



A summary of total number of crashes for various sections of SH 105 is shown in **Table 3-4** for each of the three years in the analysis period. The total number of crashes on the corridor increased in each year, from 158 in 2007 to 178 in 2008 and finally to 202 in 2009. Over the three-year period, the section between Duck Creek Road and Lee Turner Road saw an increase from three crashes in a year to seven in a year, an increase of 133 percent. Likewise, the segment between Whipporwill Road and Willis Waukegan Road had an increase in crashes from 13 to 22 (69 percent), and the segment between Willis Waukegan Road and Duck Creek Road went from 49 crashes to 69 crashes (41 percent). The majority of crashes on the corridor were rear-end and left-turn collisions.

Table 3-4: Summary of Total Crashes

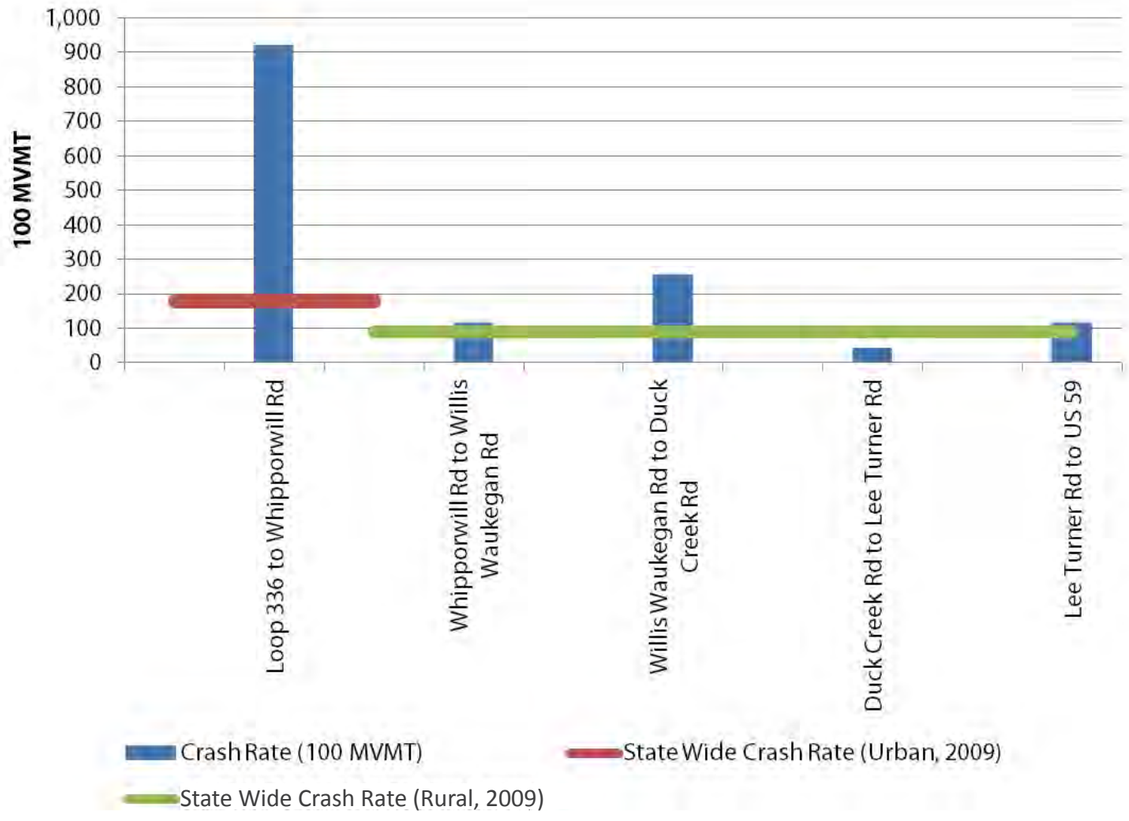
Year	Section		Total Crashes
	From	To	
2007	Loop 336	Whipporwill Road	76
	Whipporwill Road	Willis Waukegan Rd	13
	Willis Waukegan Rd	Duck Creek Road	49
	Duck Creek Road	Lee Turner Road	3
	Lee Turner Road	US 59	17
	Loop 336	**US 59**	**158**
2008	Loop 336	Whipporwill Road	79
	Whipporwill Road	Willis Waukegan Rd	21
	Willis Waukegan Rd	Duck Creek Road	47
	Duck Creek Road	Lee Turner Road	3
	Lee Turner Road	US 59	28
	Loop 336	**US 59**	**178**
2009	Loop 336	Whipporwill Road	81
	Whipporwill Road	Willis Waukegan Rd	22
	Willis Waukegan Rd	Duck Creek Road	69
	Duck Creek Rd	Lee Turner Road	7
	Lee Turner Rd	US 59	23
	Loop 336	**US 59**	**202**

The number of crashes along a given segment of roadway correlates to a number of factors, including traffic volume and length of the roadway section. In other words, a relatively high number of crashes is not of itself indicative of a crash problem since traffic volume could be a major factor. The crash rate for a facility provides a good indication of traffic safety and allows for better comparison of similar facilities by taking into account the length of the roadway segments and daily traffic volumes. Crash rates are influenced by roadway type, conditions, travel speed, and accessibility. Crash rates were calculated for the study corridor based on the number of crashes per 100 million vehicle miles traveled (100 MVMT) and compared to statewide averages, as shown in **Figure 3-11**. Typically, a roadway is considered to have a significant crash problem when the crash rate is at least double the statewide average for that particular facility type. The SH 105 segment between Willis Waukegan Road and Duck Creek Road has a crash rate more than double the statewide average for comparable roads. The segment between Loop 336 and Whipporwill Road has a crash rate that is more than four times the statewide average. The trends in crash rates, injuries, and fatalities indicate that there is a significant safety issue on SH 105 that needs to be improved.

SH 105 Crash Rates

- Loop 336 to Whipporwill has a crash rate more than four times the statewide average.
- Willis Waukegan to Duck Creek has a crash rate more than double the statewide average.

Figure 3-11: Crash Rates



CHAPTER 4:
ACCESS MANAGEMENT TOOLS

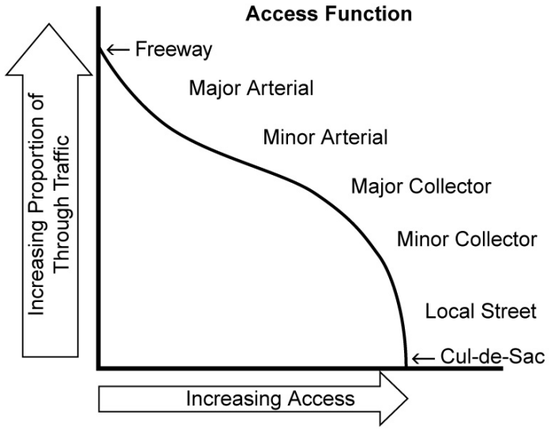
As mentioned previously, the SH 105 study corridor has and will continue to experience vehicular congestion and crashes due to the current capacity constraints, traffic volumes, and high travel speeds.

Funding is not currently available for a full widening of the corridor from Loop 336 to US 59. Access management techniques provide a cost effective means of extending the useful life of a roadway. The purpose of an access management plan is to provide access to corridor development in a manner that maintains the safety and mobility of the existing transportation system[1].

ROADWAY HIERARCHY

Roadways provide mobility and access to varying degrees depending on their place within the roadway hierarchy. Mobility refers to ability and ease with which traffic moves along the roadway whereas access refers to the ability and ease for traffic to get to a destination. Roadway functional hierarchy is illustrated in **Figure 4-1** and demonstrates how various roadway types accommodate mobility and access. Freeways are on one end of the spectrum and primarily provide mobility with no direct access for residential, commercial, or other developments. One step below is arterials (such as SH 105) which are designed to primarily provide mobility but also have some access to abutting development. Local streets are at the other end of the spectrum and exist primarily to provide access to development.

Figure 4-1: Roadway Functional Hierarchy[2]



TOOLBOX

There are a variety of tools that can be used as part of an access management plan including the following:

- Two-way left-turn lanes
- Raised median treatments
- Installation or extension of left- and right-turn lanes
- Traffic signal operation enhancement
- Multimodal improvements
- Driveway modifications
- Increased intersection/driveway spacing
- Cross-street widening
- Improved supporting street network
- Regional and local policies

Two-Way Left-turn Lanes

Most of the SH 105 study corridor has two travel lanes with a double yellow line in the middle and no median. While this is adequate on low-volume roadways, as traffic volumes and left-turn maneuvers increase, this type of roadway cross-section has limitations in safely accommodating vehicles, pedestrians, and bicyclists.

Benefits that have been realized in communities with effective access management policies include the following[3]:

- Delaying or preventing costly highway improvements
- Improving roadway safety conditions (reduced crash rates)
- Reducing traffic delay and congestion which has a positive economic effect
- Improving the appearance of transportation corridors
- Promoting properly designed access and circulation systems for development
- Increasing the area available for landscaping, which can help attract investment
- Providing property owners and customers with safe access to roadways
- Reducing air pollution
- Making pedestrian and bicycle travel safer

With an increase in traffic volumes in general, and left-turn volumes in particular, a median provides refuge for turning vehicles and also frees up through traffic. Two-way left-turn lanes allow turns in both directions and can increase capacity on an undivided roadway by as much as 30 percent[4]. In addition to improving mobility, they also improve safety. Studies have shown that roadways with two-way left-turn lanes have crash rates as much as 35[5] percent lower than roadways without a median. TxDOT recommends two-way left-turn lanes where there are 10-20 or more driveways per mile and traffic volumes are in excess of 3,000 vpd for two-lane roadways, and 6,000 vpd for 4-lane roadways[6].

Raised Median Treatments

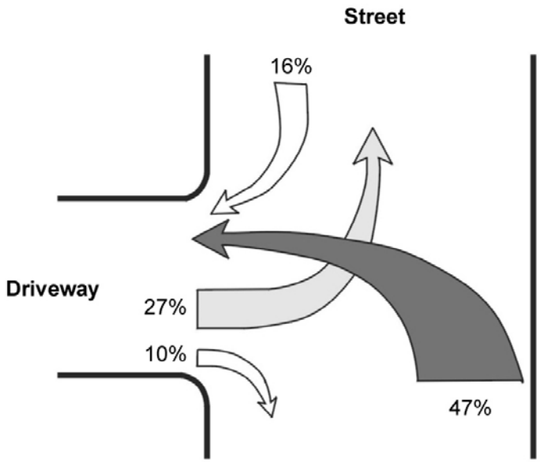
The portion of the SH 105 study corridor between Loop 336 and FM 1485 currently has a flush two-way left-turn lane which allows for left-turn ingress and egress along the entire length of the roadway. While this is convenient for

Vehicular Turns without a Median

Fewer Conflict Points with Median

[1] *Access Management Manual,* Transportation Research Board, 2003, p3
[2] *Access Management Manual,* Transportation Research Board, 2003, p4
[3] *Access Management Manual,* Transportation Research Board, 2003, p1-4
[4] *Access Management Manual,* Transportation Research Board, 2003, p19
[5] *Access Management Manual,* Transportation Research Board, 2003, p200
[6] *Roadway Design Manual,* Texas Department of Transportation, 2010, p3-7, 3-8, 3-25

Figure 4-2: Percentage of Driveway Crashes by Movement



access to and from adjacent development, the high traffic volumes and speed make this an unsafe situation. Existing daily traffic volumes are approximately 25,200 vehicles per day along this segment of roadway. According to the TxDOT Roadway Design Manual, raised medians should be considered when daily traffic volumes exceed 20,000 vpd[7]. Raised medians offer the opportunity for improvements in safety, traffic operations, and aesthetics.

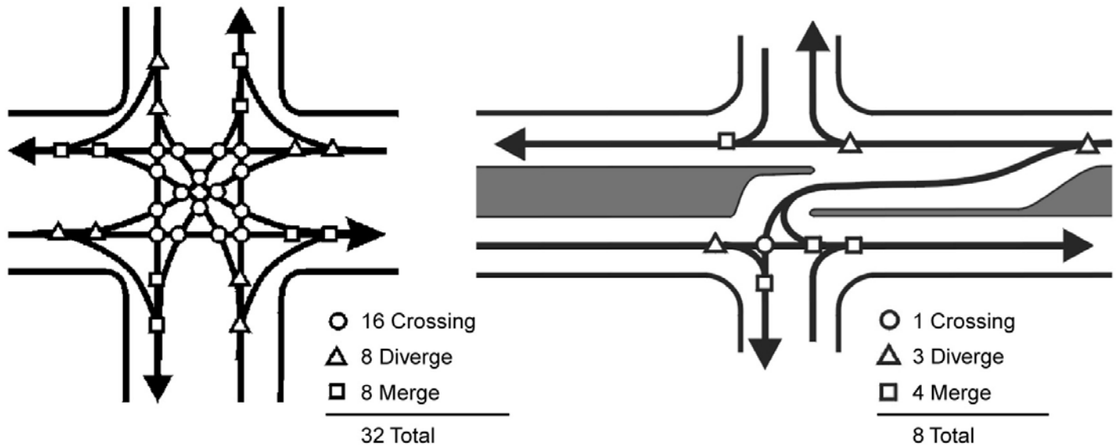
Safety - The increase in adjacent development has a direct correlation to increased traffic volume. A two-way left-turn lane allows unfettered access to all driveways and as traffic volumes and access density increase, so does the crash risk. Studies have shown that more than 70 percent of crashes at driveways involve left turns, as shown in **Figure 4-2**.

The implementation of a raised median also significantly reduces the number of conflict points. A conflict point represents an area of the roadway at an intersection where vehicle paths cross. Increasing the number of conflict points increases driving complexity and subsequently increases crash risk. As shown in **Figure 4-3**, an intersection with no access control has a total of 32 conflict points. With the installation of a directional median the number of conflict points is reduced to 8. Studies have shown that replacing a two-way left-turn lane on a 4-lane roadway with a raised median can reduce crashes by as much as 15-57 percent. A median also provides an additional refuge area for both pedestrians and bicyclists. Implementation of raised medians results in more u-turn maneuvers due to the reduction in direct left-turn access. Studies have shown that right turns followed by u-turns are safer than direct left-turns[9].

Traffic Operation - Studies have shown that implementation of a raised median can reduce delay by up to 30 percent and increase capacity of the roadway by up to 30 percent[10]. A raised median therefore offers a roadway system that is operationally more efficient.

Aesthetics - The installation of a raised median offers opportunities to enhance the aesthetics of a corridor through landscaping or other improvements, thereby increasing the corridor's appeal and potentially attracting additional economic development.

Figure 4-3[8]: Conflict Points: Typical Four-Way Intersection versus Directional Median Opening



Exclusive Turn Lanes

Exclusive left-turn and right-turn lanes allow turning vehicles to leave the roadway with less disruption to traffic in the through travel lanes. This minimizes the speed differentials along a facility and improves traffic flow and safety. Studies have shown that right-turn lanes can reduce crashes by up to 20 percent and left-turn lanes can reduce total crashes at unsignalized locations by up to 75 percent[11].

Traffic Signal Operations Improvements

Traffic signal optimization and synchronization promotes optimal traffic flow. Closely spaced intersections such as Loop 336 and FM 1485 operate better when interconnected and coordinated. Properly spacing signals is crucial for efficient traffic operation at local intersections as well as along the corridor. Studies have shown that one half-mile is the optimum spacing for traffic signals along a corridor. In urban settings it is not always possible to allow a half-mile between traffic signals, however, they should not be placed less than one quarter-mile apart.

Adjustments to signal timing can also be made at individual traffic signals to improve traffic flow. This includes adjustments to green time and actuation parameters. At actuated signal locations, in-pavement loop detectors or video detectors are used to place calls for service for intersection approaches. A call is placed when a vehicle arrives at the intersection during the red signal indication. However, the recall feature of the traffic signal controller can be modified so that calls for side street service aren't placed after vehicles have turned right on red and are no longer waiting for the green indication on that approach. There are locations along the SH 105 corridor, such as Millmac, where such adjustments would improve traffic flow.

Multimodal Improvements

Establishment or improvement of multimodal alternatives along a corridor has the potential to reduce auto demand and the reduced traffic volume results in improvements in traffic flow and safety. Accommodation of modes such as transit and bicycles, and improvements in conditions for pedestrian traffic, enhance a corridor's appeal, traffic operation, and safety. This includes a safe, secure area for patrons at a transit stop, sidewalks of sufficient width and in good condition on both sides of the roadway, and bicycle facilities.

[7] *Roadway Design Manual,* Texas Department of Transportation, 2010, p3-6, 3-22
[8] *Access Management Manual,* Transportation Research Board, 2003, p18
[9] *Access Management Manual,* Transportation Research Board, 2003, p8
[10] *Access Management Manual,* Transportation Research Board, 2003, p19
[11] *Access Management Manual,* Transportation Research Board, 2003, p19

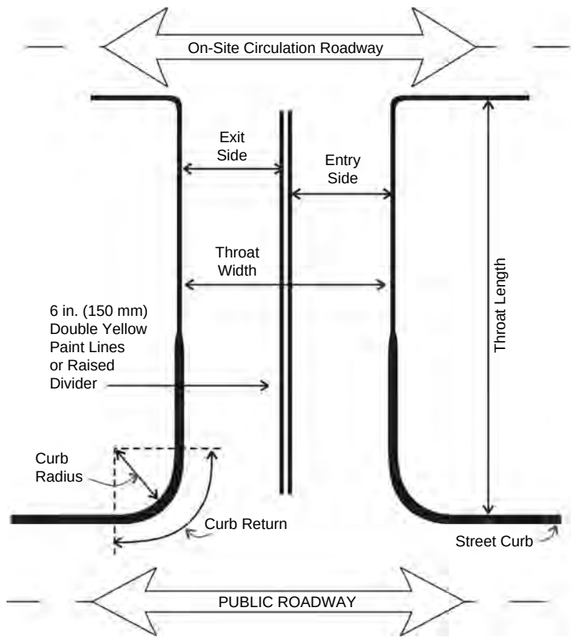
Driveway Modifications

Like typical intersections, driveways have numerous conflict points. Right-turn and left-turn lanes can allow turning vehicles to get out of through lanes prior to the execution of the turn maneuver. However, the design of the driveway is also important in maintaining good traffic flow. Small curb radii cause drivers turning right into a driveway to do so more slowly, and result in a greater negative impact to drivers who are following them. There is also an increase in the potential for drivers to turn into the path of exiting traffic. It is also important the driveway throat length and width are appropriately sized to facilitate efficient access and egress. **Figure 4-4** illustrates the different elements of a driveway.

Increased Intersection/Driveway Spacing

Access density is directly correlated to crash risk. Crash risk increases as access density increases. For example, studies have shown that increasing access density from 10 access points per mile to 20 access points per mile can increase crash rates by an estimated 30 percent[12]. Therefore access spacing should be given careful consideration when reviewing permit applications for new driveways. Driveway consolidation requires agreement between the property owner and the responsible agency and can therefore be problematic. However, where possible, consideration should be given to consolidating existing driveways to reduce conflicts and improve traffic operation.

Figure 4-4[12]: Driveway Elements



Wide Undefined Driveways Should be Better Delineated

Cross-Street Widening and Improved Supporting Street Network

Widening cross-streets that intersect a major roadway can improve traffic flow along the corridor by making it easier for drivers to turn into the roadway as well as providing better access via the cross-street and reducing dependence on the major street. A supporting street network is crucial to the mobility and safety of a community. Alternative routes reduce the burden on other facilities. A roadway network that incorporates roadway hierarchy provides better traffic operation and safety.

Regional and Local Policies

Policy frameworks can be established on a regional or local level to provide standards that enforce access management principles. Such policies should be an integral part of the development and permitting review process. Having such policies not only helps maintain optimum levels of traffic operation and safety, but also provides developers a clear understanding of expectations. It is typical for roadways such as SH 105 to go through various jurisdictions so it's important for there to be coordination between the various agencies to ensure uniformity.

A better supporting street network is needed.

[12] *Access Management Manual,* Transportation Research Board, 2003, p16

CHAPTER 5:
TRANSPORTATION IMPROVEMENT RECOMMENDATIONS

Existing issues and concerns were identified through the public involvement process as well as a technical evaluation of existing transportation conditions. Concerns expressed by members of the public included congestion, safety, and the negative impact of heavy truck traffic on both mobility and safety.

Although the corridor as a whole was cited as having mobility issues, areas of particular concern to the public included the western part of the study corridor, and specific intersections such as Loop 336, FM 1485, Crystal Forest Drive, Millmac Road, Willis Waukegan Road, Walker Road, and Fostoria Road. Recommendations were developed to address corridor mobility and safety deficiencies identified through technical evaluation and public input.

PRIORITIZATION

Recommended improvements were classified as short-, medium-, or long-term depending on implementation timeframe. Short-term recommendations are designed for implementation within a five-year timeframe. Short-term improvements are generally confined to the existing right-of-way and include projects which can be constructed relatively quickly. Medium-term and long-term improvements require more implementation time with more extensive engineering, acquisition of right-of-way, negotiation with property owners, funding, and investment from other entities. Recommended improvements are described in this chapter of the report based on their prioritization. Conceptual layouts of the short and medium-term improvements are provided as Sheets 1 through 16 in **Appendix E**.

SHORT-TERM TRANSPORTATION IMPROVEMENTS

The anticipated timeframe for short-term improvements is five years. There are two categories of short-term improvements for the SH 105 corridor. The first category is the set of improvements that have been identified and funded by the Texas Department of Transportation for implementation by 2012. These include two-way left-turn lanes and passing lanes. The second category includes new projects identified as part of this SH 105 Access Management Study. These new recommendations include the following:

- Traffic signal improvements
- Raised median
- Additional travel lanes
- Roadway realignment
- Intersection improvements
- Two-way left-turn lane
- Bicycle/pedestrian enhancements

Funded TxDOT Improvements

Funded TxDOT improvements for the corridor include two-way left-turn lanes and passing lanes at the following locations:

- Two-way left-turn lane from Whipporwill Road to FM 1484
- Eastbound passing lane from west of Crockett Martin Road to west of Walker Road
- Eastbound from Walker Road to Duck Creek Road
- Westbound from Lee Turner Road to Duck Creek Road

Traffic Signal Improvements

There are a number of traffic signal improvements that can be implemented to benefit the SH 105 corridor. These include the following:

- Optimize traffic signal timing for signalized intersections along the corridor
- Install a new traffic signal at Crystal Forest Drive
- Interconnect traffic signals at Loop 336, FM 1485, Whipporwill, and Crystal Forest

Traffic signal timing parameters are dependent on factors such as traffic volume and speed. As traffic volumes change due to traffic growth and redistribution, it is important for those parameters to be adjusted accordingly. In addition to optimizing green time for various traffic movements, it is also recommended that traffic signal actuation parameters be adjusted to better serve traffic. For example, based on field investigations at the intersection of SH 105 at Millmac Road, traffic actuation parameters for the Millmac Road approach are currently configured to remember calls for service even after vehicles have turned right during the red signal display of the signal phase and are no longer waiting for a green light. This results in a green signal phase on Millmac Road when there are no vehicles waiting to be served. This causes avoidable queuing on SH 105 which can be mitigated by modifying actuation parameters so that green time is given only when a car is still waiting for service on the side street.

Crystal Forest Intersection

A new traffic signal is recommended along SH 105 at Crystal Forest Drive. This is the primary access for the Crystal Forest subdivision and drivers often have difficulty finding gaps to turn onto SH 105. Residents have expressed this problem previously as well as during the public involvement process for this access management study. A traffic engineering study was completed by TxDOT in March 2010 for this intersection. This detailed study recommended a traffic signal at this location.

Traffic signals that are in close proximity to each other benefit from being interconnected so they work together as a coordinated system. Traffic signals along SH 105 at Loop 336, FM 1485, Whipporwill, and Crystal Forest should be interconnected to facilitate the flow of traffic. The traffic signals at Loop 336 and FM 1485 are one-third of a mile apart. Whipporwill Road is a little less than one mile further east. The new signal at Crystal Forest would be a little less than one half-mile east of the signal at Whipporwill Road.

Comments were received during the public involvement process about installing a traffic signal at the intersection of SH 105 at Walker Road. Comments pertained to traffic

Walker Road Intersection

volumes, congestion, and safety for this intersection that currently has stop signs on Walker Road and flashing beacons. TxDOT previously conducted a traffic signal warrant study for this intersection and conducted another one after the first public meeting. Based on both studies, a traffic signal at this location is not warranted at this time. A traffic signal must be warranted for an intersection before one can be considered for installation. Warrants are identified in the Texas MUTCD and include consideration of vehicular volumes, vehicular delay, crash experience, pedestrian volumes, signal system coordination, and roadway networks. The Walker Road intersection does not currently meet the thresholds established for these warrants but should be monitored and re-evaluated in the future.

Raised Median

A raised median is recommended along SH 105, from Loop 336 to east of Douget Road, to improve safety and traffic operations. A raised median is also recommended east of Douget Road but that section has been identified as a medium-term improvement and will be discussed in a subsequent section of this report. Full median openings were limited to signalized intersections such as Loop 336 and FM 1485, and public streets such as Old Highway 105 and the reconfigured Douget Road approach. This is due to safety implications of the numerous conflict points at a full median opening. Directional openings allowing left-turns but not cross-traffic are recommended at various locations.

Installation of a raised median will require some drivers to execute u-turn maneuvers for access and egress. U-turns will be accommodated at all median openings. Where necessary, loons (additional roadway pavement) are recommended at median openings to accommodate u-turns.

At Walker Road, a raised curb is recommended along SH 105 eastbound and westbound left-turn lane storage and taper to eliminate unsafe maneuvers made by some drivers to access and egress the commercial development at this intersection.

Additional Travel Lanes

Additional travel lanes on SH 105 in each direction from FM 1485 to east of Douget are recommended to reduce the congestion in this section. In the eastbound direction, the right-most lane terminates at FM 1485 as a right-turn lane, creating a bottleneck. Due to limited capacity east of Douget Road, some drivers traveling westbound on SH 105 use Douget Road as a bypass via Whipporwill Road. However, when they merge back to SH 105 just east of FM 1485, they add to the congestion along the corridor. The proposed additional capacity in both directions would improve traffic flow in this area.

Skewed Douget Road Intersection

Roadway Realignment

Based on input received from the Steering Committee, it was identified that the skewed angle at which Douget Road intersects SH 105 causes visibility concerns, particularly for traffic turning left from Douget Road onto SH 105 during peak hours when there is heavy queuing on SH 105. It is recommended that the Douget approach be reconfigured to tie into SH 105 at a right angle with a full median opening to accommodate all turning movements. There will be no median opening at the existing Douget Road intersection, thereby eliminating all turning movements with the exception of the right-turn from the existing Douget Road approach. There will be a short acceleration lane to allow right-turning traffic to merge smoothly with traffic on SH 105.

Intersection Improvements

Various intersection improvements have been developed for intersections along SH 105 to reduce queuing, particularly during peak hours, and to minimize the impact of turning vehicles on through traffic flow. A dual left-turn lane is recommended for the westbound SH 105 approach at Loop 336.

Left-turn lanes are recommended for the following locations along SH 105:

- Westbound at Crystal Forest
- Northbound at Crockett Martin
- Northbound and eastbound at Carmen/Crockett Trace
- Westbound at Old Highway 105
- Northbound and southbound at Walker
- Eastbound at FM 1725
- Eastbound and westbound at CR 381
- Eastbound at Lee Turner

Right-turn lanes are recommended for the following locations along SH 105:

- Northbound Loop 336 (with acceleration lane)
- Northbound FM 1485
- Eastbound and northbound at Crystal Forest
- Westbound at Millmac
- Westbound at Woodridge
- Eastbound at Austin Elementary School entrances
- Southbound and westbound at FM 1484
- Northbound Old Highway 105
- Eastbound and westbound at Walker
- Eastbound at Duck Creek
- Westbound and southbound at Lee Turner
- Westbound at FM 1725

Two-Way Left-Turn Lane

To maximize the available capacity of the roadway and improve traffic flow by allowing for left-turn ingress and egress, two-way left-turn lanes were recommended along SH 105 at the following locations:

- Between Crockett Martin Road and Carmen Boulevard – This section consists of mixed residential and commercial developments that generate a lot of turning movements.
- Between Pioneer and Security Forest – This section serves the flea markets which have heavy turning movements.
- From Wells Avenue to approximately 300 feet west – This section is located near US 59 and primarily serves commercial development.

Bicycle/Pedestrian Considerations

Various recommendations were developed to accommodate bicycles and improve conditions for pedestrian traffic. In the short-term time frame, a 10-foot shoulder is recommended from 300 feet west of Wells Avenue to US 59. A 5-foot shoulder is recommended at the following locations:

- From Loop 336 to east of Douget Road
- From Woodridge Drive to Willis Waukegan Road
- Crockett Martin Road to Carmen Boulevard
- Pioneer Road to Security Forest Drive

Absence of Pedestrian Crosswalk

Sidewalks are recommended at the following locations to improve pedestrian safety and enhance corridor appeal:

- From Loop 336 to east of Douget Road
- Woodridge Drive to Willis Waukegan Road
- Crockett Martin Road to Carmen Boulevard
- Pioneer Road to Security Forest Drive

Addition of pedestrian crosswalks and crossing signals where appropriate are recommended at the following intersections along SH 105:

- Loop 336
- FM 1485
- Crystal Forest Drive (with installation of the new traffic signal)
- Millmac Road
- Crockett Martin Road
- Carmen Boulevard/Crockett Trace Road
- FM 1725

MEDIUM-TERM TRANSPORTATION IMPROVEMENTS

Medium-term improvements are those that could be implemented in a six- to 15-year timeframe. Medium-term improvements recommended for the SH 105 corridor include the following:

- Raised median
- Additional travel lanes
- Roadway realignment
- Bicycle/pedestrian considerations
- Driveway consolidation

Raised Median

A raised median is recommended along SH 105, from east of Douget Road to Whipporwill Road to improve safety and traffic operations. The only full median opening between Douget Road and Whipporwill Road would be at Jefferson Chemical Road. Other turns would be accommodated with directional median openings. Loons are provided where necessary to accommodate u-turns.

Additional Travel Lanes

Additional travel lanes on SH 105 in each direction east of Douget Road to Crystal Forest are recommended to improve traffic flow. In the short-term the additional lane from the FM 1485 intersection would be tapered off east of Douget Road. However, in the medium-term the lane would be carried through to Crystal Forest and terminated as a right-turn lane.

Roadway Realignment

It is recommended that the skewed angle at which Old SH 105 intersects SH 105 be eliminated by realigning the approach to create a conventional right-angled intersection. This would improve sight distance and safety at this intersection.

Driveway Consolidation

Studies have shown that higher driveway density correlates to reduced mobility and increased crash risk. For example, an increase in number of access points from 10 per mile to 20 per mile could increase crash rates by approximately 30 percent[13]. Driveways along the SH 105 corridor were reviewed and locations identified where multiple access points could be consolidated. Implementation of this recommendation will require TxDOT to negotiate with property owners to partner in improving operations and safety for the corridor as a whole.

Bicycle/Pedestrian Considerations

Various recommendations were developed to accommodate bicycles and improve conditions for pedestrian traffic in the medium-term. A 5-foot shoulder is recommended from east of Douget Road to Crystal Forest Drive.

LONG-TERM TRANSPORTATION IMPROVEMENTS

SH 105 improvements that would likely require more than 15 years for implementation were classified as long-term. These include:

- SH 105 reconstruction
- Bicycle/pedestrian considerations
- Roadway extension

SH 105 Reconstruction

In order to better accommodate future development and traffic volume growth it is recommended that in the long-term, SH 105 be reconstructed and widened to provide a 6-lane divided curb-and-gutter cross-section from Loop 336 to Willis Waukegan Road and a 4-lane open ditch cross-section from Willis Waukegan Road to US 59.

Bicycle/Pedestrian Considerations

As development increases and the corridor becomes more urbanized than rural, travel speeds will reduce, making it possible to enhance bicycle and pedestrian facilities along the corridor. Sidewalks on both sides of SH 105 are recommended in the long-term within the 6-lane curb-and-gutter section. In this section from Loop 336 and Willis Waukegan Road, it is also recommended that bicycle lanes be provided along SH 105. East of Willis Waukegan Road, it is anticipated that the corridor will maintain most of its rural character. Therefore, in this section of SH 105 from Willis Waukegan Road to US 59, it is recommended that a 10-foot shoulder be provided to accommodate bicycle and pedestrian travel demand.

Extension of Jefferson Chemical Road

Enhancements to the study area roadway network would be beneficial in providing alternatives to the traveling public, thereby reducing some travel demand on SH 105. One such improvement is the extension of Butler Road from east of Loop 336 to Jefferson Chemical Road. The highest traffic volumes on the study corridor both under existing and projected conditions occur in the section of SH 105 between Loop 336 and FM 1485. The extension of Butler Road would provide a parallel east-west facility to serve the high travel demand in this area.

[13] *Access Management Manual,* Texas Department of Transportation, p1-4

CHAPTER 6:
EVALUATION AND IMPLEMENTATION OF RECOMMENDATIONS

This chapter describes the evaluation of the transportation improvements identified in the previous chapter and discusses how they could be implemented. The evaluation includes a traffic analysis of improvements, determination of benefits, and development of cost estimates.

TRAFFIC ANALYSIS OF SHORT-TERM IMPROVEMENTS

The recommended improvements for the SH 105 study corridor were evaluated using the existing conditions traffic operations model. The results for average travel time/delay and level-of-service are summarized in this section.

Average Travel Time and Delay

The recommended improvements are designed to reduce travel time and delay along the SH 105 study corridor. **Figures 6-1** and **6-2** summarize the projected change in delay as a result of the recommended improvements. It is projected that vehicular delay would reduce in both directions along the corridor in all three character districts by up to 30 percent during both the weekday PM peak hour and up to 56 percent during the weekend peak hour. The exception is the eastbound direction in the Emerging Mixed Commercial/Service District which is projected to increase in delay by 19 percent during the weekday PM peak hour and by eight percent during the weekend peak hour. The additional through lanes for this area will improve travel time, however, the projected increase in delay for this section is due in large part to the installation of the new traffic signal at Crystal Forest. While this signal improves operation and safety for the Crystal Forest approach, it would result in cars on SH 105 stopping at

Figure 6-1: Weekday PM Peak Hour Change in Delay

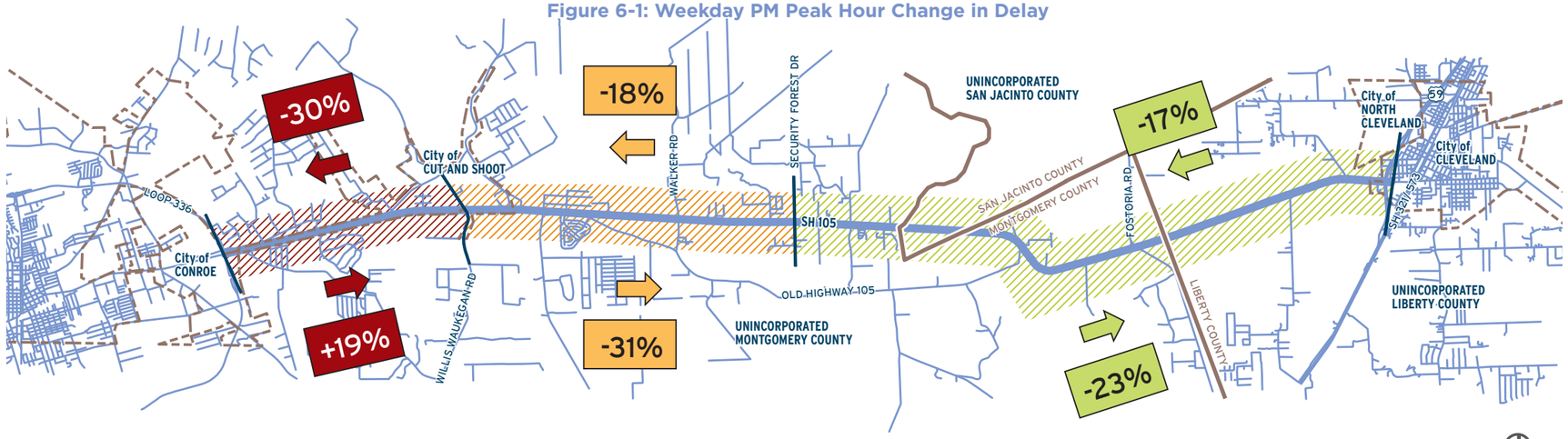


Figure 6-2: Weekend Peak Hour Change in Delay

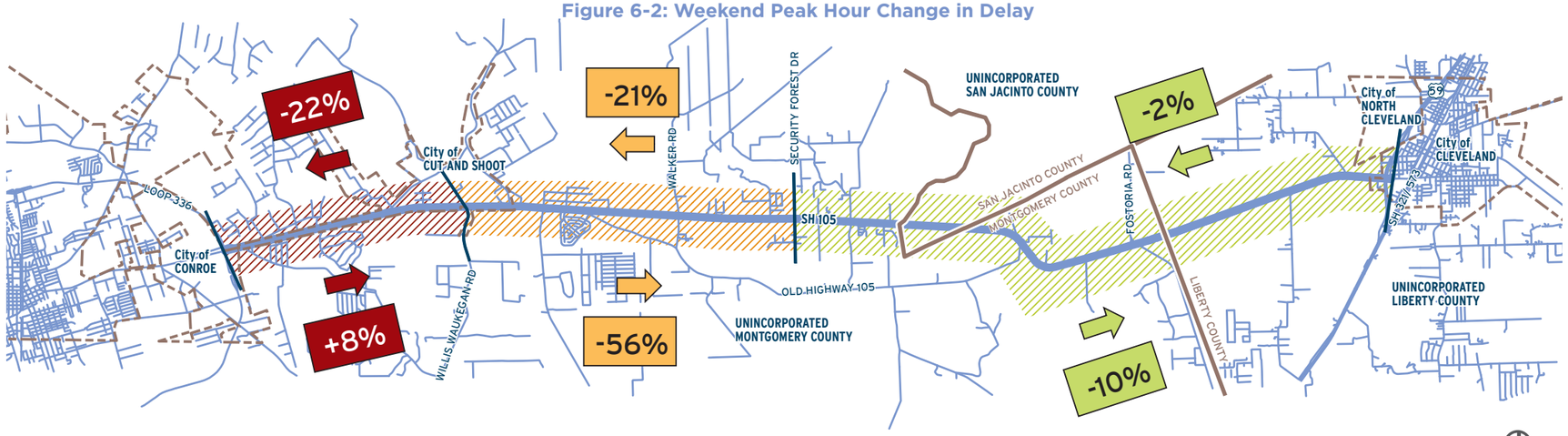


Table 6-1: Weekday PM Peak Hour Intersection Level-of-Service with Improvements

Intersection	Total	Eastbound	Westbound	Northbound	Southbound
SH 105 at Loop 336	D	D	C	D	D
SH 105 at FM 1485	C	C	B	D	-
SH 105 at Whipporwill Road	A	B	A	-	D
SH 105 at Crystal Forest Drive	A	A	A	D	-
SH 105 at Millmac Road	B	B	A	-	D
SH 105 at Willis Waukegan Road	B	A	A	D	D
SH 105 at FM 1484	B	B	B	-	D
SH 105 at Crockett Martin Road	B	A	B	D	C
SH 105 at Walker Road	*	A	A	C	C
SH 105 at Olde Security Flea Market Entrance	*	A	A	A	A
SH 105 at Security Forest Drive	*	A	A	B	-
SH 105 at Fostoria Road	*	A	A	C	C
SH 105 at FM 1725	A	A	A	-	C
SH 105 at US 59 SB Frontage Road	B	B	A	-	D
SH 105 at US 59 NB Frontage Road	C	B	D	D	-

Table 6-2: Weekend Peak Hour Intersection Level-of-Service with Improvements

INTERSECTION	TOTAL	EASTBOUND	WESTBOUND	NORTHBOUND	SOUTHBOUND
SH 105 at Loop 336	C	C	B	C	D
SH 105 at FM 1485	B	B	A	D	-
SH 105 at Whipporwill Road	B	B	B	-	C
SH 105 at Crystal Forest Drive	A	A	A	C	-
SH 105 at Millmac Road	A	A	A	-	C
SH 105 at Willis Waukegan Road	B	A	A	C	D
SH 105 at FM 1484	B	A	B	-	D
SH 105 at Crockett Martin Road	B	A	B	D	C
SH 105 at Walker Road	*	A	A	D	C
SH 105 at Olde Security Flea Market Entrance	*	A	A	C	B
SH 105 at Security Forest Drive	*	A	A	B	-
SH 105 at Fostoria Road	*	A	A	C	C
SH 105 at FM 1725	A	A	A	-	C
SH 105 at US 59 SB Frontage Road	B	B	A	-	D
SH 105 at US 59 NB Frontage Road	C	B	D	D	-

**Highway Capacity Manual* does not define overall intersection LOS for a one- or two-way stop controlled intersection.

this intersection, which is not currently the case. These stops would contribute to slightly increased delay for this roadway segment.

Intersection Level-of-Service

The impacts of recommended improvements on intersection delay and level-of-service along the SH 105 study corridor are summarized in **Table 6-1**.

Traffic operations for the intersections of SH 105 at Loop 336 and FM 1485 are projected to improve from LOS E and LOS D respectively to LOS D and LOS C during the weekday PM peak hour. Weekday PM peak hour operations at Whipporwill, FM 1484, and Crockett Martin Road are also projected to improve by one LOS letter grade. During the weekend peak hour, Loop 336 and FM 1475 are projected to again improve by a letter grade from LOS D and LOS C respectively to LOS C and LOS B with the recommended improvements. Weekend peak hour traffic operations at Millmac and Crockett Martin are also projected to improve by a letter grade.

BENEFITS OF TRANSPORTATION IMPROVEMENTS

Benefits of the short-term recommendations identified for the SH 105 study corridor include both qualitative and quantitative benefits. Qualitative benefits include improved safety for drivers, pedestrians, and bicyclists due to the reduction in conflict points and other geometric improvements. Quantitative benefits are quantifiable parameters such as travel efficiency benefits which include travel time savings and reduction in crash cost and vehicle emissions.

Travel Time Savings

Travel time is an integral component of transportation cost, and therefore an assessment of potential savings in travel time is useful in the evaluation of transportation improvements. The value of travel time includes costs to consumers of personal (unpaid) time spent on travel, and costs to businesses of paid employee time spent in travel. In order to estimate potential travel time savings for transportation improvements, a monetary value is placed on the amount of time saved. The value of time for the

Houston area is $16.30 per person hour and $88.12 per truck-hour (commercial).[14] Assuming an average vehicle occupancy of 1.2 persons, the value of time per vehicle is equivalent to $19.56 per hour for non-commercial travel.

Based on the peak hour traffic simulation model developed for the SH 105 study corridor, the total travel time for all vehicles on SH 105 was calculated for the existing and improved scenarios. It is projected that the recommended improvements would result in approximately 18 hours in total travel time savings during the weekday PM peak hour, and 16 hours of travel time savings during the weekend peak hour.

The H-GAC regional travel demand model was utilized to develop an approximate relationship between total travel time on the SH 105 study corridor during the peak hour and on a daily basis. Based on that relationship, it is estimated that the recommended improvements would result in a savings of 249 hours on a typical weekday. Assuming 260 weekdays a year the annual daily travel time savings due to the recommended improvements are estimated to be approximately $1.7 million.

Crash Cost Savings

Crash costs refer to the economic value of damages or losses caused by collisions. The National Safety Council publishes monetary costs per crash type (fatal, injury, and non-injury) as summarized in **Table 6-3**. These costs include wage and productivity losses, medical expenses, administrative expenses, motor vehicle damage, employers' uninsured costs, and a measure of the value of lost quality of life. The access management measures recommended for SH 105 have been shown to improve safety on roadways. The primary SH 105 measures for which research has been conducted to document benefits include two-way left-turn lanes, raised medians, right-turn lanes, and left-turn lanes.

Studies[15] have shown that installing a two-way left-turn can reduce the number of crashes by 35 percent. As mentioned previously, two-way left-turn lanes are not appropriate for high volumes roadway segments. Studies have shown that where two-way left-turn lanes have been replaced with raised medians, total crashes have been reduced by up to 57 percent on 4-lane roadways. Studies have also shown that where no two-way left-turn lanes previously exist, adding a raised median can reduce total crashes by 35 percent. For turn lanes, studies have demonstrated crash reductions of 20 percent for right-turn lanes and 25 percent for left-turn lanes.

Table 6-3: Crash Cost by Severity

Crash Type	Cost
Death	$4,540,678
Incapacitating Injury	$228,935
Non-incapacitating Evident Injury	$58,395
Possible Injury	$27,772
No Injury	$2,534

Source: Estimating the Costs of Unintentional Injuries, National Safety Council, 2009, adjusted to 2011 Dollars

Crash savings were calculated based on the monetary values of crashes identified in **Table 6-3**, the SH 105 crash history for the three-year period 2007–2009, and the estimated reductions in crashes due to the recommended improvements. Based on short to medium-term improvements, the estimated annual crash savings for the SH 105 study corridor are estimated as $6.7 million. Over the long-term, recommended improvements represent an estimated annual crash savings of $12 million.

Vehicle Emissions

The term "emissions" generally refers to gases and particles introduced into the air as pollutants. The United States Environmental Protection Agency describes air pollution as the contamination of air by the discharge of harmful substances. These harmful substances include hydrocarbons (HC), carbon monoxide (CO), and nitrogen oxides (NOx). Ozone is not directly emitted, but is rather formed from other emissions including HC and CO. The concentration of these air pollutants is related to traffic congestion. Lower speeds associated with traffic congestion tend to result in higher levels of pollutants.

The recommended improvements for SH 105 are designed to improve traffic operations and reduce congestion along the corridor. It is projected that implementing the recommendations for the SH 105 corridor would result in a reduction in emissions of up to three percent.

COST ESTIMATES

A summary of estimated costs associated with the short, medium, and long-term improvements identified in the preceding sections is provided in **Table 6-4**, along with an indication of the responsible implementing agency. Within the short-term category, those identified ad funded projects are those for which TxDOT has already dedicated funds and is in the process of preparing detailed designs for anticipated construction in Spring 2012. Cost estimate details are provided in **Appendix F**.

FUNDING SOURCES

A number of funding sources may be explored to secure the finances necessary to implement the improvements identified in this study. These include state funds, sales tax, bond issue, and the creation of a special improvement district, among others.

State Funding

Since SH 105 is a state highway, TxDOT can utilize state funds for implementation of improvements. TxDOT has developed two high-level funding programs to assist in financial planning and program administration. The first, the Statewide Preservation Program (Maintain It) comprised of three funding categories, and the second program is the Statewide Mobility Program (Build It) which is comprised of nine funding categories related to system expansion.

It is important to note, however, that federal and state transportation revenue streams are rapidly losing pace with needed investments. State and federal gas taxes have not changed since the early 1990s and recent increases in oil prices have resulted in an increased trend toward green technology, caused people to adjust their driving habits and buy more fuel-efficient cars. As gas tax revenues, a major source of highway funding, continued to decline, it will be necessary to identify additional funding sources to address the access, safety and mobility needs of the SH 105 corridor.

Local Option Sales Taxes for Transportation

The use of local option sales tax revenues to fund transportation needs in the study area represents a significant opportunity. In general, the State of Texas Tax Code authorizes cities and counties to adopt local sales and use taxes for any purpose other than repaying bonds. Provided the sum of all local option taxes in a given area does not exceed two percent, and the local option tax is approved by referendum, each city and county in the southeast Texas region could adopt up to one-half percent sales tax that could be earmarked to address transportation system needs.

State Infrastructure Bank

This is a banking system set up by TxDOT with federal and state funds and is designed to encourage local entities to pay a larger share of the cost for highway projects. Local entities may apply for loans, lines of credit, letters of credit, bond insurance, and capital reserves for roadway improvement projects.

Traffic Impact Fees on New Development

Traffic impact fees ensure that new development pays its fair share of the cost to improve the transportation system so as not to exacerbate existing transportation problems.

Bond Issues

Funds for roadway and other capital improvements could be generated through the issue of "Certificates of Obligation", commonly known as bonds. Issuing bonds to fund city improvements largely depends on a favorable bond rating and low interest rates. Funding transportation improvements by issuing bonds remains an attractive option for many cities and counties.

Special Improvement District

This is a defined area within which residents and businesses pay an additional tax or fee in order to fund improvements within the district's boundaries. The funds could be used to provide services, such as cleaning streets, providing security, making capital improvements, construction of pedestrian and streetscape enhancements, and marketing the area.

[14] *Annual Urban Mobility Report,* Texas Transportation Institute, 2011
[15] *Access Management Manual,* Transportation Research Board, 2003

Table 6-4: Cost Estimate Summary
Loop 336 to US 59 (Length = 18.7 Miles)

Primary Funding Source		TxDOT				City/County				TOTALS (In Millions)
	Improvement	Number	Unit	Unit Cost	Cost	Number	Unit	Unit Cost	Cost	
Short Term (less than 5 years)	***NEW PROJECTS:***									
	New Traffic Signal (Crystal Forest Intersection)	1	EA	$ 200,000.00	$ 200,000					
	Upgrade Signal Equipment (Loop 336 to FM 1485)	2	INT	$ 20,500.00	$ 41,000					
	Optimize Traffic Signal Timing	9	INT	$ 5,000.00	$ 45,000					
	Add Right Turn Lane - SH 105 (Average Length = 225')	2	EA	$ 72,800.00	$ 145,600					
	Add Right Turn Lane - SH 105 (Average Length = 400')	4	EA	$ 113,100.00	$ 452,400					
	Add Right Turn Lane - SH 105 (Average Length = 640')	3	EA	$ 173,700.00	$ 521,100					
	Widen SH 105 - From Loop 336 to East of Douget	2.1	MI	$ 1,651,519.00	$ 3,468,190					
	Bridge Widening - Lawrence Creek	3,200	SF	$ 75.00	$ 240,000					
	Bridge Culvert Widening - West Fork Crystal Creek	190	SF	$ 120.00	$ 22,800					
	Add Raised Median / Channelization (Concrete)	24,274	SF	$ 10.00	$ 242,740	1,350	SF	$ 10.00	$ 13,500	
	Driveway Closure	1	EA	$ 1,353.00	$ 1,353					
	Add Pedestrian Crosswalks	8	EA	$ 4,143.00	$ 33,144					
	Standardize Driveway Width	14	EA	$ 3,179.00	$ 44,506					
	Concrete Sidewalks (Loop 336 to east of Douget Rd)	30,020	SF	$ 9.00	$ 270,180					
	Concrete Sidewalks (Woodridge Dr to Willis Waukegan Rd)	34,000	SF	$ 9.00	$ 306,000					
	Concrete Sidewalks (Crockett Martin Rd to Carmen Blvd)	19,000	SF	$ 9.00	$ 171,000					
	Concrete Sidewalks (Pioneer Rd to Security Forest Dr)	20,000	SF	$ 9.00	$ 180,000					
	Add NB Right Turn Lane - Crystal Forest					1	EA	$ 42,800.00	$ 42,800	
	Add SB Right Turn Lane - FM 1484					1	EA	$ 80,200.00	$ 80,200	
	Add NB Left Turn Lane - Crockett Martin					1	EA	$ 56,200.00	$ 56,200	
	Add NB Left Turn Lane - Crockett Trace					1	EA	$ 61,500.00	$ 61,500	
	Add NB Right Turn Lane - Old Highway 105					1	EA	$ 84,400.00	$ 84,400	
	Add NB & SB Left Turn Lanes - Walker					1	EA	$ 157,200.00	$ 157,200	
	Add SB Right Turn Lane - Lee Turner					1	EA	$ 45,200.00	$ 45,200	
	Widening (Douget Road)					0.1	MI	$ 1,651,519.00	$ 165,152	
	FUNDED PROJECTS:									
	TxDOT Improvements (Montgomery County) – Super 2 Passing Lanes, Center Left Turn Lane and Asphalt Overlay	1	LS	$ 5,130,000	$ 5,130,000					
	TxDOT Improvements (San Jacinto County) – Super 2 Passing Lanes and Asphalt Overlay	1	LS	$ 700,000	$ 700,000					
	TxDOT Improvements (Liberty County) – Super 2 Passing Lanes and Asphalt Overlay	1	LS	$ 1,170,000	$ 1,170,000					
										$ 14.09
	TOTAL FOR SHORT TERM IMPROVEMENTS (less than 5 years)				$ 13,385,013				$ 706,152	
Medium Term (5 – 15 years)	Upgrade Signal Equipment (Whipporwill to Crystal Forest)	1	INT	$ 20,500.00	$ 20,500					
	Widen SH 105 - From East of Douget to Crystal Forest	1.0	MI	$ 1,651,519.00	$ 1,651,519					
	Bridge Culvert Widening - Unnamed Creek near Jefferson Chemical Rd	1,012	SF	$ 80.00	$ 80,960					
	Add Raised Median / Channelization (Concrete)	24,385	SF	$ 10.00	$ 243,850					
	Driveway Closure	17	EA	$ 1,353.00	$ 23,001					
	Add NB Left Turn Lane - Jefferson					1	EA	$ 157,000.00	$ 157,000	
	Realign Old SH 105					1	EA	$ 148,200.00	$ 148,200	
										$ 2.33
	TOTAL FOR MEDIUM TERM IMPROVEMENTS (5 – 15 years)				$ 2,019,830				$ 305,200	
Long Term (15 years +)	Widen SH 105 from 4-Lane to 6-Lane - From Loop 336 to Willis Waukegan (Full Reconstruction)	4.0	MI	$ 4,477,572.00	$ 17,910,288					
	Widen SH 105 from 2-Lane to 4-Lane - From Willis Waukegan to US 59 (Full Reconstruction)	14.5	MI	$ 3,805,227.00	$ 55,175,792					
	Bridge Reconstruction - East Fork Crystal Creek, Hurricane Creek, Caney Creek, Cagle Branch Creek, Spring Branch Creek, Lawrence Creek, Peach Creek, Jayhawker Creek and East Fork San Jacinto River	243,040	SF	$ 60.00	$ 14,582,400					
	Bridge Culvert Reconstruction - West Fork Crystal Creek, Unnamed Creek near Jefferson Chemical Rd and Bee Branch Creek	7,900	SF	$ 75.00	$ 592,500					
	Add Raised Median / Channelization (Concrete)	1,449,952	SF	$ 10.00	$ 14,499,520					
	Concrete Sidewalks (Loop 336 to Willis Waukegan Rd)	210,870	SF	$ 9.00	$ 1,897,830					
	Butler Street Extension (From Loop 336 to Jefferson Chemical Rd)					1	EA	$ 1,044,400.00	$ 1,044,400	
										$ 105.70
	TOTAL FOR LONG TERM IMPROVEMENTS (15 years +)				$ 104,658,330				$ 1,044,400	
GRAND TOTAL				$	120,063,172			$	2,055,752	$ 122.12

Units: EA = Each INT = Intersection MI = Miles SF = Square Feet LS = Lump Sum

CHAPTER 7:
LAND USE MANAGEMENT STRATEGIES

The way land development projects are conceived and executed strongly influences how frequently and in what manner the right-of-way is accessed. The purpose of this section is to provide a basis upon which further activities may be developed by the entities along the SH 105 corridor, including potential planning and regulatory approaches that can be used to effectively supplement recommendations for the SH 105 corridor.

Land use management strategies can be combined with access management measures to positively impact the SH 105 corridor. Greater uniformity and coordination in access control and site design for the SH 105 corridor would help reduce congestion, improve safety, create a more predictable and user-friendly environment for both motorized and non-motorized travel, and help provide a more organized and stable environment for economic development.

CHARACTER DISTRICTS

As mentioned previously in this report, the intensity and physical character of development varies along SH 105 study corridor. Three Character Districts were identified for the SH 105 corridor - the *Emerging Mixed Commercial/Service District*, the *Mixed Commercial/Residential District*, and the *Rural and Ranch District*. These districts were identified for the purpose of dividing the corridor into segments within which the nature and character of development is similar, in order to facilitate the development of land use managements strategies that are uniquely suited to the different character of each area. These character districts were described in Chapter 3 and are illustrated again in **Figure 7-1**.

The Emerging Mixed Commercial/Service District is located in the western portion of the corridor and has a relatively high intensity mix of retail, commercial, and residential land uses. The Mixed Commercial/Residential District is in the central portion of the study area and has a lower intensity mix of residential and commercial land uses. The Rural/Ranch District is located in the eastern portion of the study corridor and is comprised primarily of ranches and large lot residential land uses.

CORRIDOR DEVELOPMENT PRINCIPLES

A set of development principles has been developed to support a safe and economically vibrant SH 105 corridor in the future. It is recommended that these principles be applied by the various jurisdictions along the corridor.

Corridor-Wide Principles

While specific principles for the three character districts will be outlined later in this section, there are several general principles that may be applied to all of the districts to achieve coordinated and effective access management along the corridor. These general principles include:

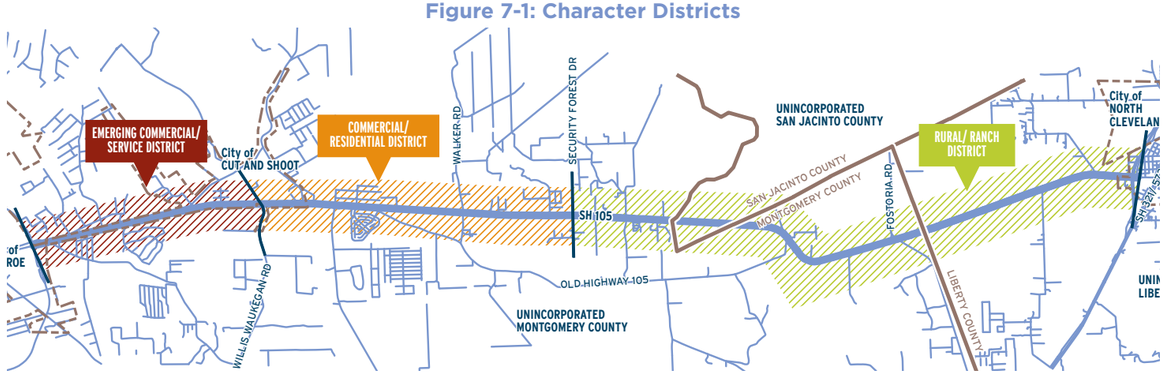
- Locate driveways away from intersections so that the functional area of the intersection is preserved.
- Clearly delineate driveway entry points.
- Driveway spacing should reflect TxDOT standards, which are related to the speed limit on the corridor (Current TxDOT spacing standards require a minimum of 425 feet in areas with posted speed limits of 50 mph or greater, and 360 feet for areas with posted speed limits of 45 mph or less.)
- Promote "visual continuity" along the corridor especially with respect to access, setbacks and right-of-way treatments, while allowing commercial nodes and residential neighborhoods to develop or maintain a unique identity.
- Promote access between commercial nodes and residential neighborhoods.
- Encourage an inter-connected street system along the corridor, with limited cul-de-sacs and dead-end streets that rely solely on SH 105 for access.
- Access to SH 105 for major subdivisions should be managed carefully subject to driveway spacing requirements. Secondary access from a side street should be encouraged.
- Provide for pedestrian and bicycle mobility and safety, both along and across the SH 105 corridor, particularly in areas of commercial and institutional activity.
- Consider opportunities for multi-use trails and paths to supplement pedestrian and bicycle mobility in the area, such as along utility easements.
- Include adequate provisions for access to public transportation for residents and employees along the corridor.
- Protect public uses and their access points, and emphasize their locations through appropriate right-of-way treatments, including turn lane channelization, signage and pedestrian facilities where appropriate.
- Incorporate natural, sustainable storm water management practices where feasible.

Emerging Mixed Commercial/Service District Principles

This portion of the corridor is expected to become more intensively developed with commercial uses. Improvements in this section of the corridor should support this anticipated change. Principles for this character district are as follows:

- Expect and plan for additional and more intensive commercial uses to develop within the district.
- Focus on developing a mix of uses that will be compatible with each other and create a market synergy and mutual benefit.
- Seek to limit access by individual residential uses along the SH 105 frontage.
- For larger developments, encourage an adequate internal road network for site circulation.
- Promote shared signage and coordinated aesthetic treatments at adjacent commercial properties, to reduce visual clutter and aid in orientation of drivers.
- Encourage cross-access easements at the time of redevelopment and promote shared access, including allowances for driveways to be located at or straddling lot lanes.
- Consider limiting access driveways near SH 336 to right-in, right-out movements.
- Establish and clearly delineate pedestrian crossing locations at commercial and other activity nodes.

Figure 7-1: Character Districts



- Where pedestrian traffic is more likely (e.g. near Loop 336), delineate pedestrian zones along SH 105 with sidewalks and take advantage of medians to provide pedestrian refuge at crossings.
- As redevelopment occurs, implement deeper front setbacks for all uses (non-residential and residential). Parking should not be allowed within this setback. This will allow for a landscape and signage buffer at commercial and institutional properties. Having parking spaces set back further will also help limit conflicts between vehicles parking and through traffic.
- Establish consistent parking standards and incorporate provisions for parking relief for projects implementing shared parking use agreements with adjacent properties.
- Minimum lot frontage standards should correspond to the TxDOT driveway spacing standards mentioned previously, with a minimum frontage for a lot with a dedicated driveway access of 425 or 360 feet, and a minimum frontage for a parcel with shared drive way access of 212.5 feet or 180 feet, respectively.
- Narrow lots should be discouraged, as they create significant potential for traffic conflicts.

Mixed Commercial and Residential District Principles

This portion of the corridor is expected to remain primarily residential in character with non-residential activity at limited nodes. Principles for this character district are as follows:

- Cluster commercial uses at select nodes and promote development with service-oriented, retail, and neighborhood commercial uses.
- Residential development should be accommodated between commercial nodes, while seeking to limit individual residential driveway access to SH 105.
- Encourage integrated/shared parking between flea markets and adjacent commercial uses.
- Establish and clearly delineate pedestrian crossing locations at commercial and other activity nodes, and provide sidewalks within nodes.
- As redevelopment occurs, implement deeper front setbacks for all uses (non-residential and residential). Parking should also be prohibited within this setback.
- Minimum lot frontage standards should correspond to the TxDOT driveway spacing standards mentioned previously, with a minimum frontage for a lot with a dedicated driveway access of 425 or 360 feet, and a minimum frontage for a parcel with shared drive way access of 212.5 feet or 180 feet, respectively.
- Narrow lots should be discouraged, as they create significant potential for traffic conflicts.
- Establish consistent parking standards and incorporate provisions for parking relief for projects implementing shared parking use agreements with adjacent properties.

Rural and Ranch District Principles

This portion of the corridor is expected to remain rural in character and as such improvements in this area should support this rural character. Principles for this character district are as follows:

- Preserve the character of large lot residential properties by encouraging large driveway separations and minimum lot frontages (approximately 2,000 feet or more) and large building setbacks (approximately 200 feet or more).
- Promote the protection of the rural landscape via the conservation and promotion of agricultural uses.
- Encourage nature preserves and protect wooded areas and mature trees stands.
- At creek crossings, utilize rustic design elements to emphasize water features and crossings.
- Ensure that future commercial/non-residential development occurs in a contiguous node, particularly if such development is located near the US 59 bypass. The same standards applied to the commercial nodes in the other districts along the corridor should also be incorporated here should such development occur.

ILLUSTRATED CORRIDOR DEVELOPMENT GUIDELINES

Examples of potential outcomes derived from the preceding development guidelines and principles were developed for illustration purposes using three areas along the SH 105 corridor. These prototypes illustrate the benefits of effective coordination of private development patterns with appropriate enhancements to the SH 105 corridor. The prototypes are centered on:

1. A reorganized mid-block commercial node at a smaller scale on the north side of SH 105 at FM 1485 (**Figure 7-2**).

2. A major commercial node at Crockett Martin Road extending along both sides of SH 105, including a combination of multi-tenant retail center and individual commercial properties (**Figure 7-3**).

3. A commercial node at the intersection of Walker Road, consisting primarily of single tenant properties and including a gas station (**Figure 7-4**).

Although these prototypes illustrate the application of the corridor development principles; more specific design solutions will need to be developed to address the unique conditions of particular development or redevelopment sites along the corridor in the future.

IMPLEMENTING THE PRINCIPLES AND GUIDELINES

Application of the Corridor Development Principles and Guidelines can be undertaken in various ways by all jurisdictions to promote long term safety and stability along the corridor. It is anticipated that implementation of the principles and guidelines for the character districts will occur incrementally over time. For effective implementation, supportive plans and controls at the local and county levels will need to be developed that encourage the appropriate land use patterns, minimize the potential for undesirable conflicts, and control access in a manner that enhances the safety and functioning of the corridor.

To aid in pursuing mutually beneficial strategies along the corridor, a "tool box" of implementation strategies has been developed. Potential county and community actions include developing a corridor improvement plan, applying key tools and techniques, and enforcement.

Figure 7-2: Development Prototype near FM 1485

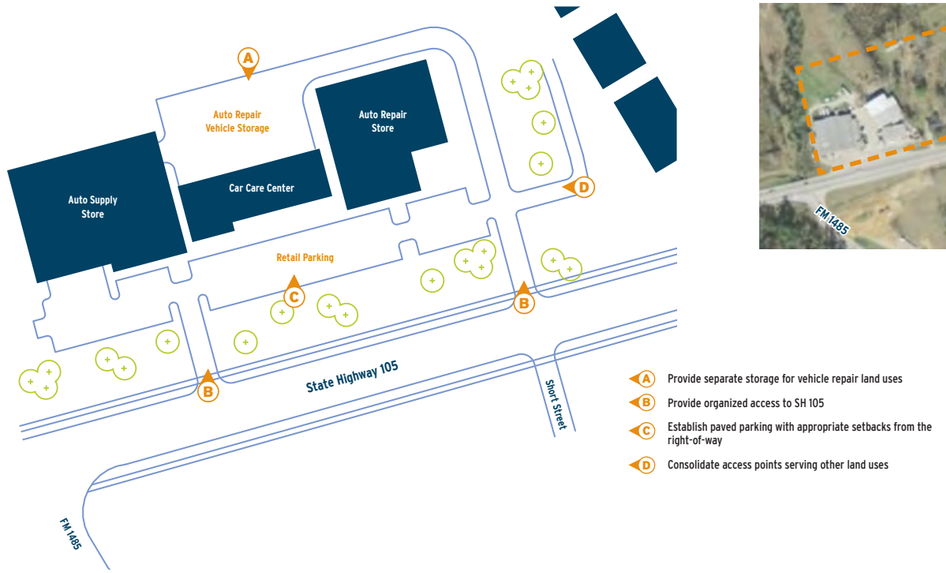
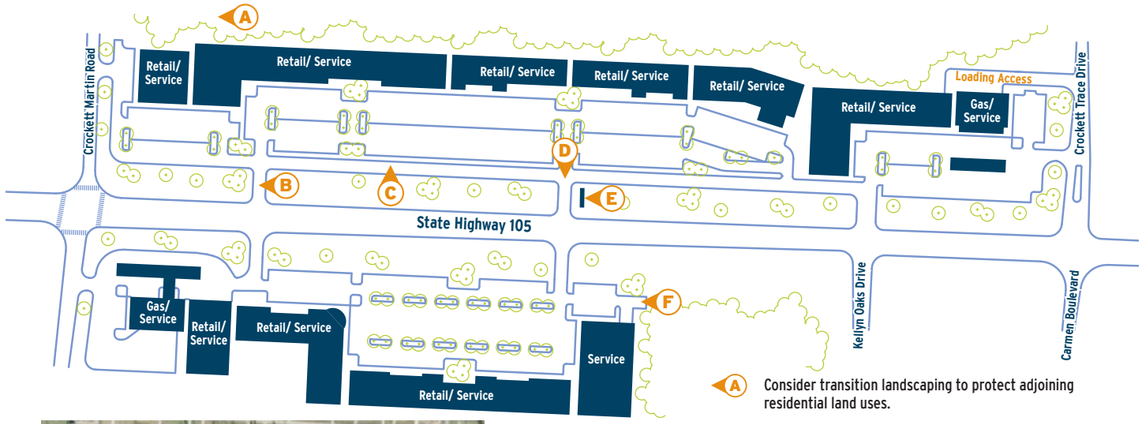


Figure 7-3: Development Prototype for Crockett Martin - Crockett Trace



- A Consider transition landscaping to protect adjoining residential land uses.
- B Consolidate access points to provide for safety
- C Potentially continue access road
- D Plan for completion of development access through determining consolidated access locations. Secure approval through the County development review process.
- E Consider unified shopping center signage providing multiple business listings at a few select locations.
- F Alternatively design parking aisle access to provide cross-access with adjoining properties.

Figure 7-4: Development Prototype at Walker

- A Establishes approved building setbacks associated with future right-of-way needs. Allows for landscaping, appropriate signage, and improved visibility along the corridor.
- B Potential easement for cross-access to adjoining property in the future.
- C Offstreet parking and circulation provided outside of the right-of-way.
- D Provide opportunity to connect parking access to adjoining property through cross-access easements.
- E Landscape buffer for parking area - enhances safety and visibility while improving aesthetics.
- F Coordinate access at both arterial and side streets.

SH 105 Corridor Improvement Plan

The purpose of a SH 105 Corridor Improvement Plan would be to address land use and transportation in order to manage growth in ways that will best meet local needs without compromising roadway safety. The plan would provide a means to reach agreement among stakeholders on which tools and techniques would be most appropriate for implementation and how these tools might be applied (independently by each municipality).

Application of Key Tools and Techniques

While a corridor improvement plan would provide a complete coordinated strategy, there are a number of implementation actions pertaining to development that could be undertaken regardless of the completion of a complete corridor plan.

Commercial Nodes –Location of such nodes along with specific types of land uses should be identified for the SH 105 corridor to serve both the traveling public and adjoining neighborhood areas.

Uniform Building Setback- As noted earlier in this report, the future SH 105 right-of-way width may be subject to change due to possible roadway widening and other improvements. As a result, it is possible that existing land uses may be removed due to new right-of way requirements. In the future when new right-of-way limits are established for SH 105, local jurisdictions can should consider establishing new building and parking setback line in anticipation of roadway widening in order to minimize land use impacts.

Lot Frontage – This is the land between a building and the road. Requirements for lot frontage currently vary by local agency. To the greatest degree practical, consideration should be given to making revisions for consistency with TxDOT driveway separation requirements (i.e. shared access for multiple uses, etc.)

Development Plan Review Process – it is often desirable to establish a compliance review process for the issuance of driveway permits that includes access management and land use design review in a single step. Options for implementing such a process could be explored by local permitting agencies.

Other Design Standards – Consideration should be given to updating or adopting other design standards including the following:

- Landscape and/or site design guidelines
  - Parking lot standards
  - Drainage swales and/or other on-site detention solutions
- Street design standards
- Minimum curb cut widths
- Minimum standards for collector and local streets that intersect SH 105
- Updated access controls
  - Driveway spacing
  - Shared access
  - Shared parking
  - Subdivision access requirements

Enforcement

TxDOT requires approval of driveway permits on state highways. Several local agencies, such as Conroe and Montgomery County also review permits for local compliance. To be effective, compliance monitoring and enforcement will be essential.

APPENDIX A
PUBLIC INVOLVEMENT REPORT

PUBLIC MEETING #1 SUMMARY

About the Study

The Houston-Galveston Area Council conducted an access management study for SH 105 to identify transportation improvements that will reduce crashes, improve traffic flow, reduce motorist delay and address multi-modal/ land-use context. The study area extends from SH 105 between Loop 336 in Conroe to US 59 in Cleveland, and crosses Montgomery, San Jacinto and Liberty Counties.

Meeting Purpose and Activities

H-GAC hosted a public meeting regarding proposed safety and mobility improvements. The open house meeting was held to introduce the study, show initial recommendations and improvements, and receive public feedback. The meeting date, location and time:

Wednesday, August 10, 2011
Austin Elementary School
14796 Highway 105 East
Conroe, Texas 77306
6:00-8:00 p.m.

At the meeting, informative boards were staffed by project team members. Attendees were able to speak with team members and have questions answered. Two sets of large table maps of the study area were displayed and attendees were invited to review the short-, medium- and long-term recommendations. Smaller maps of proposed pedestrian improvements and livable center plans were also available for review. Questionnaires were provided to collect comments from attendees. Some attendees took extra copies of the questionnaires to distribute to people who were not able to attend the meeting.

The project boards, presentation, sign-in sheets and completed questionnaires are included as attachments to the Public Involvement Report, which is a separate document.

Attendance

A total of 72 people attended the public meetings. The following breakdown categorizes the attendees:

General Public	57
Elected Officials/Steering Committee	4
Project Team	11

PUBLICITY SUMMARY

A variety of methods were used to publicize the meetings. The following is a breakdown of the publicity summary. Copies of all publicity items are included in Attachment A.

Direct Mail

Letters were sent to local elected officials 30 days in advance. Two rounds of postcards were mailed to local community groups, the Steering Committee, the Stakeholder Committee, schools, churches, emergency services and property owners within the SH 105 study area. Extra postcards were distributed at Austin Elementary School, Security Community Center, Cut and Shoot Town Hall, and other local area businesses. The map on the following page shows the distribution area of the property owners who received the postcard. The complete mailing lists are included on the enclosed CD.

Newspapers

A public meeting notice was printed in the legal section of The Houston Chronicle, 30 days prior to the meeting. Display ads were printed in English and Spanish in the Conroe Courier and Cleveland Advocate and in Spanish in La Voz, The Houston Chronicle's Spanish language publication. A media release was e-mailed approximately two weeks in advance. An article appeared in Your Houston News.

Newsletters
Notices appeared in H-GAC's Vision and Regional Focus electronic newsletters.

E-Notices
An e-notice was e-mailed to elected officials, the Steering Committee, and individuals from a database of previous meetings.

Social Media
A notice was posted on the H-GAC's website, www.h-gac.com, in the Transportation and Air Quality section and on H-GAC's face book page.

Signs
TxDOT's portable orange construction signs displayed the meeting information on the day of the meetings at two separate locations, near either end of the study corridor.

QUESTIONNAIRE COMMENTS SUMMARY

Questionnaires were distributed to attendees at the meeting. Some attendees took extra questionnaires and distributed them after the meeting. After the meeting, an abbreviated version of the questionnaire (with questions related to walking and bicycling deleted) was provided in electronic file for e-mail distribution; 20 of these abbreviated questionnaires were completed.

A total of 50 completed questionnaires were received, with these summary responses:

Which category best describes your interest?
Local resident....46
Public official....6
Retail business owner....3
Service business owner....3
Developer....2
School official....1
Future retail owner....1

Of the tools presented here tonight, which would you like to see used in the corridor?
Four-lane roadway section....39
Left- and right-turn lanes....33
New traffic signal installation....28
(2 specified Walker Road)
Improve traffic signal timing/progression....25
Center two-way, left turn lane....14
Raised median....2
Six-lane roadway section....7
Driveway reconfiguration....1
Locate parking to be set back further....1
(Austin Elementary)
Limit driveway access to SH 105....1
Center turn lane....1

Which locations along the corridor have the most safety issues?
SH 105 at
Crystal Forest....12
North Walker Road....8
Fostoria....8
Loop 336....7
Willis Waukegan....6
Millmac....4
Loop 1485....4
Austin Elementary School....2
Crockett Trace/Emerson Estates....2
Crystal Trail....2
Flea markets....2
Crockett Martin Road....1
Duck Creek....1
Peach Creek....1
Sonic....1
Trails End....1

The whole highway....2
From Loop 336 to Security-Foster Drive....2

What transportation-related issues along the SH 105 corridor concern you the most?
Congestion....21
Truck traffic....10
Access to businesses....6
Wrecks and safety concerns....6
Speed limits....5
Turn lanes....3
Not enough lanes....2
Access to residences....1
All of it....1
Elementary school does not need raised median....1
Emergency vehicle access....1
Intersection or roadway designs....1
Mix of slow and fast traffic creates passing hazards....1
Mobility....1
Road narrowing....1
Traffic signal warning lights....1

Do you or your employees/students walk along this corridor?
No....26
Yes....2
2 say they would walk if it were safe

What sections of SH 105 do you walk along or across?
Walker Rd.....1
Crystal Forest....1
Cross N. Walker; Fostoria; Waukegan; Duck Cr.....1

What is your destination?
S. Walker....1
Loop 336....1

Do you or your employees/students bicycle along this corridor?
No....26
Yes....3

Where do you start and end your bike ride?
Willis....1
Waukegan to Loop 336....1

Do you have any other general comments on the information presented tonight?
Raised medians will negatively impact businesses....5
Need lights, crosswalk, 4 lanes plus turn lane....3
Community discouraged by promises and no results....2
Trucks/cars from Louisiana and East Texas use SH 105....1
More lights....1
Glad to see improvements....1
ROW required?....1
Expand SH 105 like Airport Road....1
Widen SH 105 between Cleveland and Conroe....1
Band-aid approach at Crystal Forest proposed....1
Informative presentation....1
SH 105 is dangerous....1
Need 5-foot shoulder bike lanes....1

PUBLIC MEETING #2 SUMMARY

About the Study
The Houston-Galveston Area Council conducted an access management study for SH 105 to identify transportation improvements that will reduce crashes, improve traffic flow, reduce motorist delay and address multi-modal/land-use context. The study area extends from SH 105 between Loop 336 in Conroe to US 59 in Cleveland, and crosses Montgomery, San Jacinto and Liberty Counties.

Meeting Purpose and Activities
H-GAC hosted a public meeting regarding proposed safety and mobility improvements. The open house meeting was held to introduce the study, show final recommendations and improvements, and receive public feedback. The meeting date, location and time:

Thursday, October 27, 2011
Austin Elementary School
14796 Highway 105 East
Conroe, Texas 77306
6:00-8:00 p.m.

At the meeting, informative boards were staffed by project team members. Attendees were able to speak with team members and have questions answered. Two sets of large table maps of the study area were displayed and attendees were invited to review the short-, medium- and long-term recommendations. Smaller maps of proposed pedestrian improvements and livable center plans were also available for review. Two display monitors were set up to continuously play a short movie on access management. Questionnaires were provided to collect comments from attendees. Some attendees took extra copies of the questionnaires to distribute to people who were not able to attend the meeting.

The project boards, presentation, sign-in sheets and completed questionnaires are included as attachments to the Public Involvement Report, which is a separate document.

Attendance
A total of 61 people attended the public meeting. The following breakdown categorizes the attendees:

General Public	45
Elected Officials/Steering Committee	8
Project Team	8

PUBLICITY SUMMARY

A variety of methods were used to publicize the meetings. The following is a breakdown of the publicity summary. Copies of all publicity items are included in Attachment A.

Direct Mail

Letters were sent to local elected officials 30 days in advance. Postcards were mailed to local community groups, the Steering Committee, the Stakeholder Committee, schools, churches, emergency services and property owners within the SH 105 study area. Extra postcards were distributed at Austin Elementary School, Security Community Center, Cut and Shoot Town Hall, and other local area businesses. The map on the following page shows the distribution area of the property owners who received the postcard. The complete mailing lists are included on the enclosed CD.

Newspapers

A public meeting notice was printed in the legal section of The Houston Chronicle, 30 days prior to the meeting. Display ads were printed in English and Spanish in the Conroe Courier, Cleveland Advocate, The Greensheet. The display ad was only printed in Spanish in La Voz, the Houston Chronicle's Spanish language publication. A media release was emailed approximately two weeks in advance. An article was published in both Guidry News and Your Houston News.

Newsletters

Notices appeared in H-GAC's Vision and Regional Focus electronic newsletters.

E-notices

An e-notice was emailed to elected officials, the Steering Committee, and individuals from a database of previous meetings.

Social Media

A notice was posted on the H-GAC's website, www.h-gac.com, in the Transportation and Air Quality section and on H-GAC's facebook page.

Signs

TxDOT's portable orange construction signs displayed the meeting information on the day of the meetings at two separate locations, near either end of the study corridor.

QUESTIONNAIRE COMMENTS SUMMARY

Questionnaires were distributed to attendees at the meeting. Some attendees took extra questionnaires for distribution to others who were not at the meeting. A summary of the 19 completed questionnaires received is provided below:

Which category best describes your interest?

Local resident	13
Public official	5
School official	1
Retail business owner	1

Of the access management tools presented, which would you like to see used along the corridor?

Improve traffic signal timing/progression	10
Left- and right-turn lanes	9
Center two-way, left-turn lane	8
Four-lane roadway section	7
No raised median	3
Six-lane roadway section	3
New traffic signal installation	3
Locate parking to set back further	2
Four-lane with a center turn lane	2
Center turn lane in Cut and Shoot	1
Raised median	1

What do you think about the set of short-term recommendations?

No raised median	8
No bicycle/pedestrian enhancements	6
No raised median accept at churches, schools, and major turns	2
Douget Road needs traffic-triggered signal	1
Traffic signal at Crystal Forest	1
Widen lanes	1

What do you think about the set of medium-term recommendations?

No raised median	7
No bicycle/pedestrian enhancements	5
No driveway consolidation	1
Some of the medium-term should be short-term	1
No raised median, need center turn lane	1
You will acquire land from property owners who do not desire to lose their property	1

What do you think about the set of long-term recommendations?

No bicycle/pedestrian enhancements	2
More concerned with traffic problems	1
Only sidewalks near schools	1
It's a consideration	1
No sidewalks	1
OK	1

Do you support these recommendations for pedestrian/bicycle traffic along SH 105?

No	11
Yes	1

What modifications or additions would you like to see?

Widen SH 105
Wait for the bicycle/pedestrian enhancements when more businesses are along SH 105
Place sidewalks only near schools
Four lanes with center-turn lane only

Do you have any other general comments on the information presented tonight?

Rethink raised medians with a center-turn only
Why can't East of Conroe (Hwy 105) be done as West of Conroe?
No raised medians
The zero crashes at Walker Road is not true, please recheck sources
Lower the speed limits
Add more police patrol

APPENDIX B
SUMMARY OF SH 105 CORRIDOR SUBDIVISION REGULATIONS

SUMMARY OF SH 105 CORRIDOR

Subdivision regulations for Montgomery, San Jacinto, and Liberty counties are applicable to SH 105 and were reviewed as part of this study. In the absence of zoning controls, these subdivision regulations most directly influence development pattern along the corridor. A summary and comparison of these regulations is provided in the table.

Regulatory Element	San Jacinto	Citation
Extra Territorial Jurisdiction (ETJ)	If parcel is within ETJ of an incorporated city, then it is subject to the regulations of both the city and County.	Part I, Sec. 2.8
Exemptions from Subdivision Regulations	1. The land is used primarily for ag, farm, ranch, timber or wildlife management. 2. The land is being divided among family for family and results in no more than 4 lots. 3. All lots are more than 10 acres and no new streets or public dedications. 4. All lots are being sold to Veterans through the Veterans Land Board Assoc. 5. The land is owned by the state or any of its agencies or school funds unless there are public dedications or if land is subdivided for sale to adjacent private owners. 6. The land is owned by a political jurisdiction of the state, is in a floodplain and is being sold to adjacent owners. 7. Two tracts are created - one for the owner and to be sold for development that would be subject to plat requirements. 8. No public dedications are being made and the lot is being transferred to a previous owner with a plat being required before further development. *Items 2, 3 and 4 require lot frontage of at least 50'.*	Part I, Sec. 3.1
Water/Wastewater/Sewage	No On-Site Sewage Facility permits will be issued for land subdivided after June 19, 2000, unless it has been subdivided according to the Subdivision Regulations and the San Jacinto County On-Site Sewage Facility Rules or is exempt from subdivision under state law. Subdivision Regulations include a reference to Texas Administrative Code [Title 30, Part I, Ch. 285, Subchapter A, Rule §285.4 (a)] : Subdivisions served by a public water supply and an OSSF must have a minimum lot size of 1/2 acre. Subdivisions with individual water systems (not served by public water supply) must have a minimum lot size of 1 acre.	Part I, Sec. 2.10 Appendix 6, Sec. 8 Texas Administrative Code [Title 30, Part I, Ch. 285, Subchapter A, Rule §285.4 (a)
Streets		
General provisions	Must be paved and dedicated. Private streets permitted only by variance. Neighborhood Subdivision Streets (those serving 100 lots or less) must connect to a State or Federal Highway or a County Feeder Road.	Part I, Sec. 6.1 Part I, Sec. 6.5
R.O.W. width	Neighborhood: 50' Local: 60' Collector: 70'	Part II, Sec. 2.5
Number of lanes	Neighborhood: 2 Local: 2 Collector: 2	Part II, Sec. 2.5
Min. lot frontage	Cul-de-sac bulbs: 25' Neighborhood: 50' Local: 50' Collector: 150' County Feeder Roads: 150'	Part I, Sec.6.5.1 Part I, Sec.6.5.2 Part II, Sec. 2.5
Min. driveway spacing	Neighborhood: 50' Local: 50' Collector: 150'	Part II, Sec. 2.5
Pavement width	NONE NOTED	

Regulatory Element	San Jacinto	Citation
Lots		
Flag lots	Generally not permitted, unless Commissioners Court approves the lot after review and consideration.	Part I, Sec. 6.4
Min. lot width	NONE NOTED	
Min. lot depth	NONE NOTED	
Min. setback	NONE NOTED	
Min. lot area	Subdivisions served by a public water supply and an OSSF: 1/2 acre Subdivisions with individual water systems: 1 acre This reflects the Texas Administrative Code [Title 30, Part I, Ch. 285, Subchapter A, Rule §285.4 (a) regarding On-Site Sewage Facilities.	Appendix 6, Sec. 8
Exemptions to bulk regulations	NONE NOTED	
Interior Roads - Manufactured Rental Home Parks	Must provide direct access to 60' wide public road Parks with more than 80 spaces must have two points of access. Minimum pavement width of 24'.	Appendix 5, Site Design and Development Standards
Max. block length	NONE NOTED	
Floodplain development	Development in the floodplain requires a permit and compliance with standards for floodplain construction.	Appendix 3, Article 3B
Other Applicable Development Regulations	No.	Ashley, Permit Dept., San Jacinto County 5/19/11, 9:55 a.m. CST

Regulatory Element	Liberty	Citation
Extra Territorial Jurisdiction (ETJ)	If parcel is within ETJ of an incorporated city, then it is subject to the regulations of both the city and County.	Sec. 2.9
Exemptions from Subdivision Regulations	1. The land is used primarily for ag, farm, ranch, timber or wildlife management. 2. The land is being divided among family for family and results in no more than 4 lots. 3. All lots are more than 10 acres and no new streets or public dedications. 4. All lots are being sold to Veterans through the Veterans Land Board Assoc. Lots are subject to driveway spacing requirements. 5. The land is owned by the state or any of its agencies or school funds unless there are public dedications or if land is subdivided for sale to adjacent private owners. 6. The land is owned by a political jurisdiction of the state, is in a floodplain and is being sold to adjacent owners. 7. Two tracts are created - one for the owner and to be sold for development that would be subject to plat requirements. 8. No public dedications are being made and the lot is being transferred to a previous owner with a plat being required before further development. *Items 2 and 3 require lot frontage of at least 50'.*	Sec. 3.1
Water/Wastewater/Sewage	No On-Site Sewage Facility permits will be issued for land subdivided after February 10, 2000, unless it has been subdivided according to the Subdivision Regulations and the Liberty County On-Site Sewage Facility Rules or is exempt from subdivision under state law. Subdivision Regulations include a reference to Texas Administrative Code [Title 30, Part I, Ch. 285, Subchapter A, Rule §285.4 (a)] : Subdivisions served by a public water supply and an OSSF must have a minimum lot size of 1/2 acre. Subdivisions with individual water systems (not served by public water supply) must have a minimum lot size of 1 acre.	Sec. 2.10 Texas Administrative Code [Title 30, Part I, Ch. 285, Subchapter A, Rule §285.4 (a)
Streets		
General provisions	Must be paved and dedicated. Private streets permitted only by variance. Neighborhood Subdivision Streets (those serving 100 lots or less) must connect to a State or Federal Highway or a County Feeder Road.	Sec. 6.1 Sec. 6.5
R.O.W. width	Open Ditches: Main or Arterials: 75' Collector or Laterals: 60' Single-family residential streets: 60' with 50' radius cul-de-sac and 600' length Curb and Gutter Arterials: 75' Collectors: 60' Single-family residential streets: 60' with 50' radius cul-de-sac and 600' length Alleys: 20'	Sec. 4.1.3(a) Sec. 4.1.1
Number of lanes	NONE NOTED	
Min. lot frontage	Cul-de-sac bulbs: 25' Neighborhood: 50' County Feeder Roads: 150'	Sec.6.5.1 Sec.6.5.2
Min. driveway spacing	NONE NOTED	
Pavement width	NONE NOTED	

Regulatory Element	Liberty	Citation
Lots		
Flag lots	Generally not permitted, unless Commissioners Court approves the lot after review and consideration.	Sec. 6.4
Min. lot width	50'	Sec. 4.1.1
Min. lot depth	130'	Sec. 4.1.1
Min. setback	25'	Sec. 4.1.1
Min. lot area	NONE NOTED However, per the Texas Administrative Code [Title 30, Part I, Ch. 285, Subchapter A, Rule §285.4 (a) regarding On-Site Sewage Facilities: 1 acre for lots served by well and septic and 1/2 acre central water and septic.	
Exemptions to bulk regulations	Subdivisions with curb and gutter can have a zero lot line design, minimum lot width of 45' and 110' depth	Sec. 4.1.1
Interior Roads - Manufactured Rental Home Parks	NONE NOTED	
Max. block length	1,400'	Sec. 4.1.1
Floodplain development	Development and construction in special flood hazard areas requires a permit and compliance with standards for floodplain construction.	Appendix 4, Secs. A, C and D
Other Applicable Development Regulations	No.	Leslie, Engineering Dept. Liberty County 5/20/11, 10:21 a.m. CST

SUBDIVISION REGULATIONS (CONTINUED)

Regulatory Element	Montgomery	Citation
Extra Territorial Jurisdiction (ETJ)	NONE NOTED	
Exemptions from Subdivision Regulations	NONE NOTED	
Water/Wastewater/Sewage	Cluster developments, residential condominiums, multi-family residential, apartments and mobile home parks should be served by sanitary sewer. Mobile home parks should be served by a community water supply. While not referenced in Subdivision Regulations, Texas Administrative Code [Title 30, Part I, Ch. 285, Subchapter A, Rule §285.4 (a)] applies : Subdivisions served by a public water supply and an OSSF must have a minimum lot size of 1/2 acre. Subdivisions with individual water systems (not served by public water supply) must have a minimum lot size of 1 acre.	Subdivision Guidelines and Recommendations: Sec. 2-II-J-4 Texas Administrative Code [Title 30, Part I, Ch. 285, Subchapter A, Rule §285.4 (a)
Streets		
General provisions	NONE NOTED	
R.O.W. width	Commercial/industrial subdivisions: 70', 60' if concrete curb and gutter Minor streets, loop roads and cul-de-sacs less than 800' length: 50' Collector streets: 60', 50' if concrete curb and gutter Major thoroughfares: 100'-120' according to typical section in Major Thoroughfare Plan Alleys: 20' Cul-de-sac bulbs: 50' single-family and 60' other uses	Subdivision Guidelines and Recommendations: Sec. 2-II-B Sec. 2-II-F
Number of lanes	NONE NOTED	
Min. lot frontage	NONE NOTED	
Min. driveway spacing	NONE NOTED	
Pavement width	Residential streets, major thoroughfares, ranchettes 10 acres or more and mobile homes 10 acres or more: Minimum pavement width = 18' Commercial and heavy industrial streets: Minimum pavement width = 22'	Sec. 3-II-B-1

Regulatory Element	Montgomery	Citation
Lots		
Flag lots	NONE NOTED	
Min. lot width	Single-family residential: 50', 30' for pie-shaped lots, 60' corner lots, 75' corner lots on major thoroughfare Townhouses: 20', 30' for end or corner units Cluster developments: 25' Mobile home park lots: 40' for double-wide mobile homes; 25' for single-wide mobile homes	Subdivision Guidelines and Recommendations: Sec. 2-II-J-4
Min. lot depth	Single-family residential: 100', 110' for lots on major thoroughfare	Subdivision Guidelines and Recommendations: Sec. 2-II-J-4
Min. setback	Single-family and two-family dwellings: 20' front, 10' exterior side; 5' interior side for main building, 3' for secondary buildings Apartments or multi-family developments: 20' from any street Townhouse: 20' front	Subdivision Guidelines and Recommendations: Sec. 2-II-J-4
Min. lot area	Cluster developments and townhouses: 1,400 s.f. Multi-family and Apartments: 6,000 s.f., plus 1,500 s.f. for each dwelling unit in excess of two None other noted; however, per the Texas Administrative Code [Title 30, Part I, Ch. 285, Subchapter A, Rule §285.4 (a) regarding On-Site Sewage Facilities: 1 acre for lots served by well and septic and 1/2 acre central water and septic.	Subdivision Guidelines and Recommendations: Sec. 2-II-J-4
Exemptions to bulk regulations	NONE NOTED	
Interior Roads - Manufactured Rental Home Parks	NONE NOTED	
Max. block length	Single-family detached lots less than 5,000 s.f.: 1,400' Single-family detached lots greater than 5,000 s.f.: 2,000' Along major thoroughfares: 2,000'	Subdivision Guidelines and Recommendations: Sec. 2-II-I
Floodplain development	Lots shall only be permitted in the floodplain after all other viable options are exhausted. For those lots platted in the floodplain the lowest habitable floor elevation must be 1' above 100 -year floodplain elevation. No structures are permitted in the 100-year floodway.	Subdivision Guidelines and Recommendations: Sec. 2-II-B
Other Applicable Development Regulations	Subdivision Guidelines and Recommendations: S.O.P. / Required Drainage Criteria Manual: If requirements are stricter than Sub. Regs, it supercedes the Sub. Regs.	Cristy Weldon Engineer, Montgomery County 5/24/11, 1:50 pm CST

SUBDIVISION REGULATIONS (CONTINUED)

Regulatory Element	Cleveland	Citation
Extra Territorial Jurisdiction (ETJ)	NONE NOTED	
Exemptions from Subdivision Regulations	NONE NOTED	
Water/Wastewater/Sewage	Permits for septic systemswill only be issued when a final plat for the lot has been approved and recorded or when an existing lot complies with the subdivision regulations. The city will not supply water or sewer service to any subdivision until a final plat for has been approved and recorded or until the subdivision regulations have been fully complied with. While not referenced in Subdivision Regulations, Texas Administrative Code [Title 30, Part I, Ch. 285, Subchapter A, Rule §285.4 (a)] applies : Subdivisions served by a public water supply and an OSSF must have a minimum lot size of 1/2 acre. Subdivisions with individual water systems (not served by public water supply) must have a minimum lot size of 1 acre.	Municipal Code, Subdivision Regulations: Sec.106-4(a) and 106-4(d) Texas Administrative Code [Title 30, Part I, Ch. 285, Subchapter A, Rule §285.4 (a)
Streets		
General provisions	Street intersections shall be as near to 90 dgrees as practical, Cul-de-sacs shall be no longer than 500'. Subdivisions with frontage onto an arterial require a marginal-access street (i.e. frontage road). Sidewalks are not required.	Municipal Code, Subdivision Regulations: Sec.106-10(2), 106-(5)
R.O.W. width	Cul-de-sac bulbs: 100' in residential areas; 200' in commercial/industrial Alleys: 20'	Municipal Code, Subdivision Regulations: Sec.106-10(2), 106-(3)
Number of lanes	NONE NOTED	
Min. lot frontage	Lots must front onto a public street. Irregular shaped lots must have at least 50' of frontage.	Municipal Code, Subdivision Regulations: Sec.106-(13)
Min. driveway spacing	NONE NOTED	
Pavement width	Alleys: 20' in commercial / industrial; 14' in residential areas	Municipal Code, Subdivision Regulations: Sec.106-(3)

Regulatory Element	Cleveland	Citation
Lots		
Flag lots	NONE NOTED	
Min. lot width	50' if served by sewer 75' if not served by sewer 100' corner lots	Municipal Code, Subdivision Regulations: Sec.106-(13)
Min. lot depth	120' if served by sewer 200' if not served by sewer	Municipal Code, Subdivision Regulations: Sec.106-(13)
Min. setback	Front yard: 25'; corner lots: must have a 15' sideyard setback unless it is a "key" lot, in which case 25' is required; rear yard: 25% of lot depth or 40' maximum; sideyard: the greater of 10' or 10% of lot width.	Municipal Code, Subdivision Regulations: Sec.106-(13)
Min. lot area	6,000 s.f. if served by sewer 15,000 s.f. if not served by sewer [This appears to conflict with the Texas Administrative Code [Title 30, Part I, Ch. 285, Subchapter A, Rule §285.4 (a) regarding On-Site Sewage Facilities, which requires a mininum lot area of 1/2 acre (21,780 s.f.) if a parcel is served by central water and septic.]	Municipal Code, Subdivision Regulations: Sec.106-(13)
Exemptions to bulk regulations	NONE NOTED	
Interior Roads - Manufactured Rental Home Parks	NONE NOTED	
Max. block length	1200' maximum; 200' minimum	Municipal Code, Subdivision Regulations: Sec.106-(11)
Floodplain development	NONE NOTED	
Other Applicable Development Regulations	NONE NOTED	

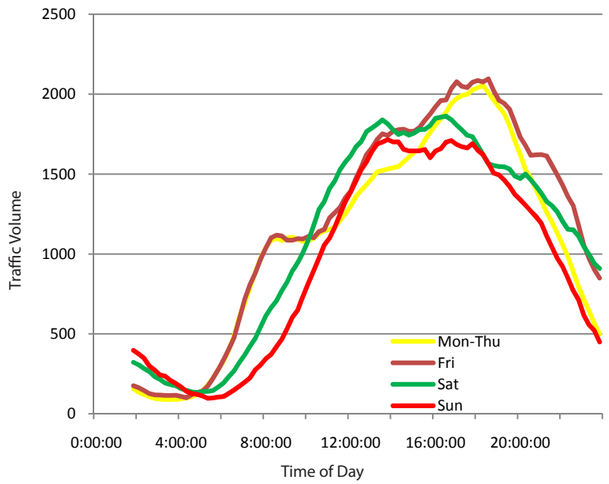
APPENDIX C
EXISTING (2011) TRAFFIC COUNT DATA

SEVEN-DAY TRAFFIC COUNTS SUMMARY

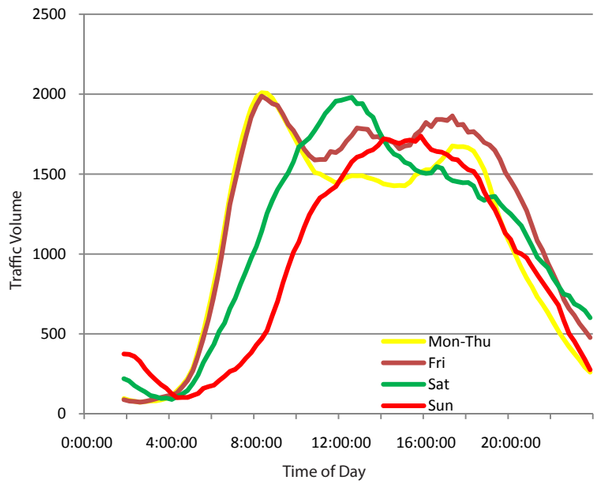
EB - Eastbound, WB - Westbound

24-hour traffic counts were conducted for seven consecutive days at various locations along SH 105. This data is summarized in the following charts for each location by day of the week and time of day. For each location, traffic volumes are summarized by direction and then totaled for both directions.

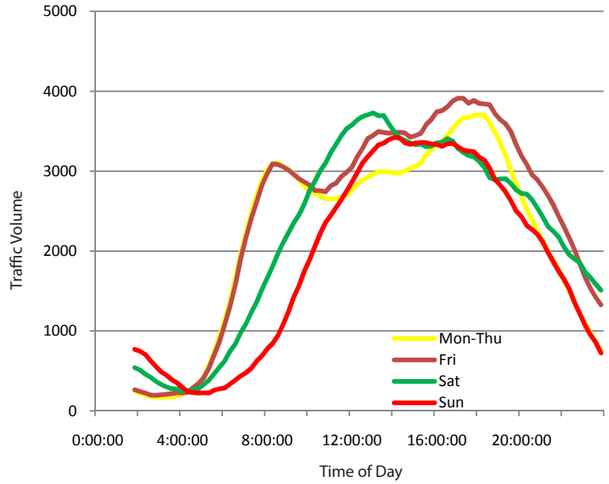
SH 105 - EB East of Loop 336



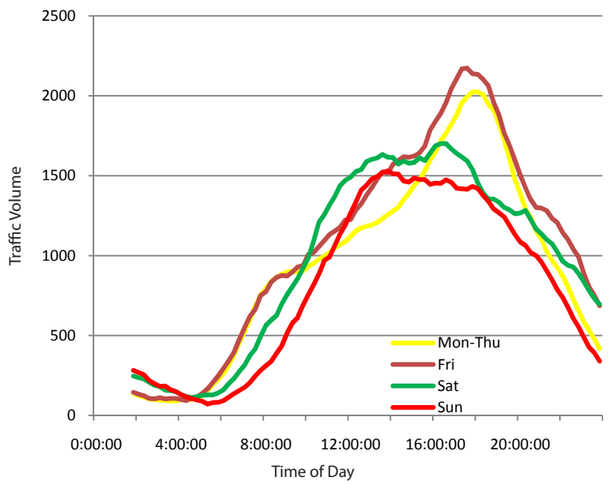
SH 105 - WB East of Loop 336



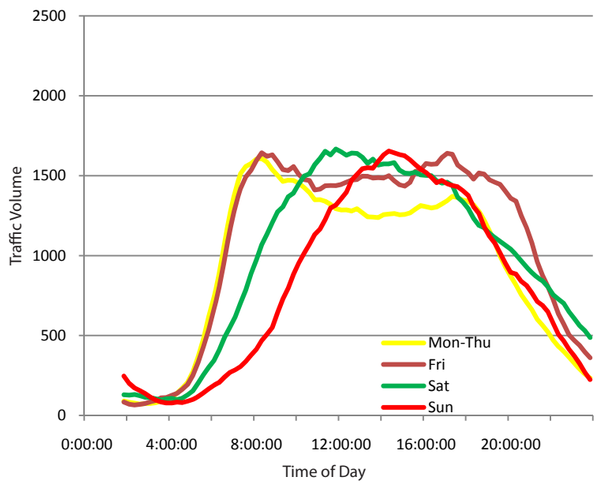
Total SH 105 East of Loop 336



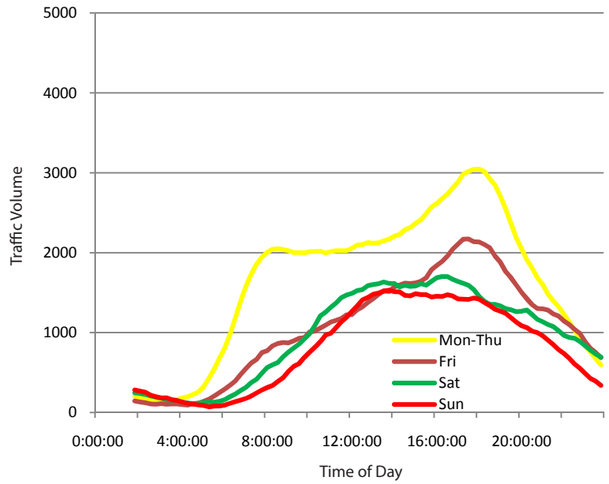
SH 105 - EB East of FM 1485



SH 105 - WB East of FM 1485



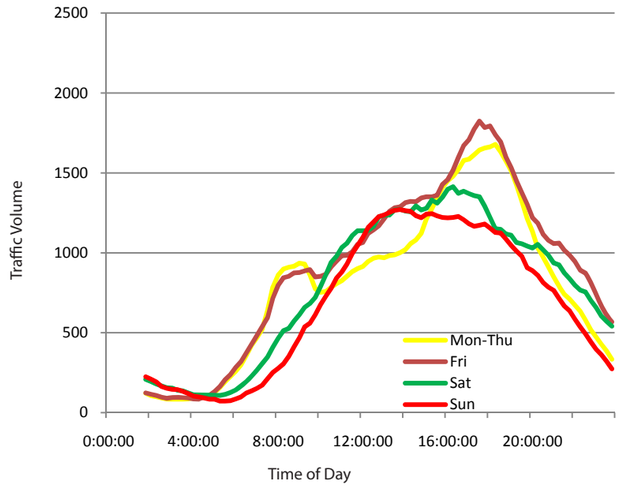
Total SH 105 East of FM 1485



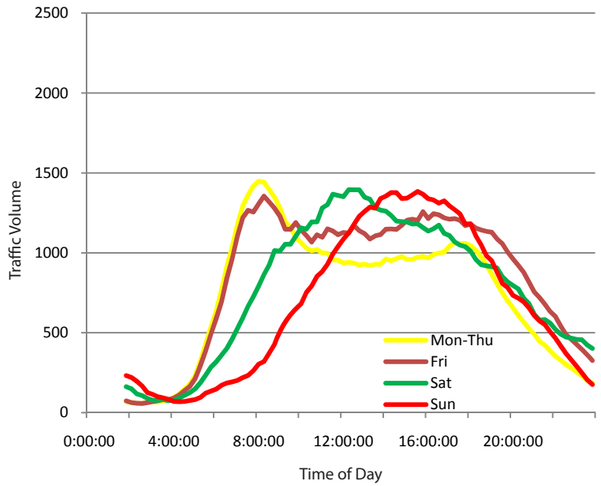
SEVEN-DAY TRAFFIC COUNTS SUMMARY (CONTINUED)

EB - Eastbound, WB - Westbound

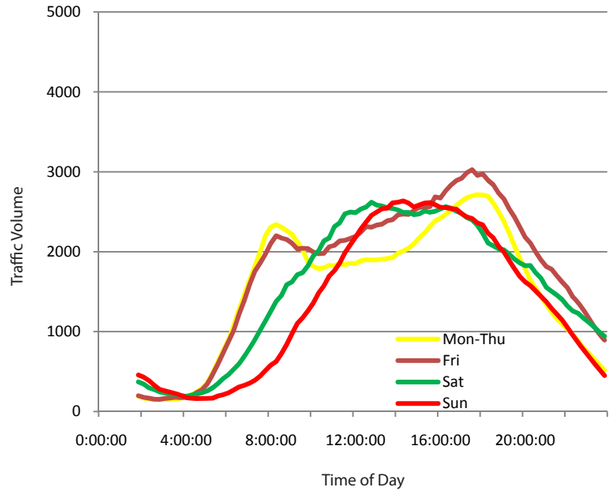
SH 105 - EB between Austin Elementary School Entrance and Exit Driveways



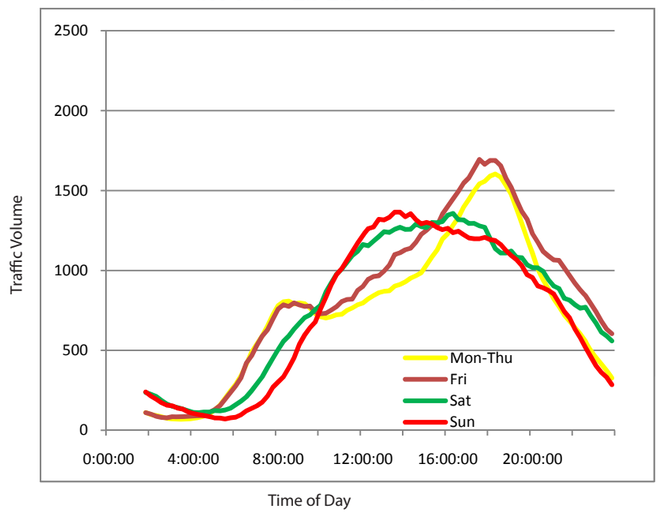
SH 105 - WB between Austin Elementary School Entrance and Exit Driveways



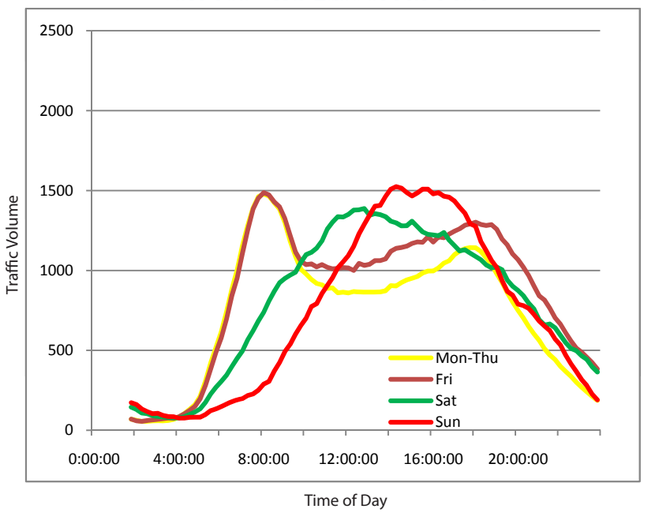
Total SH 105 between Austin Elementary School Entrance and Exit Driveways



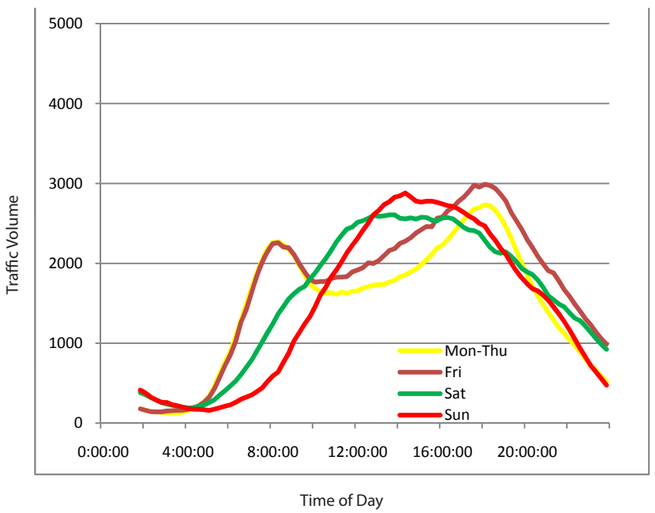
SH 105 - EB East of FM 1484



SH 105 - WB East of FM 1484



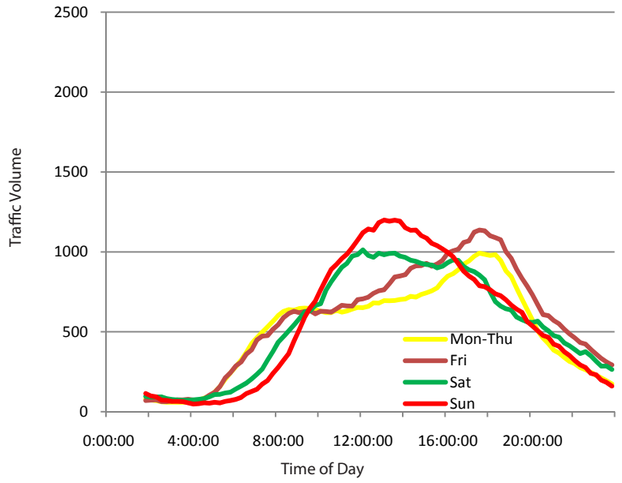
Total SH 105 East of FM 1484



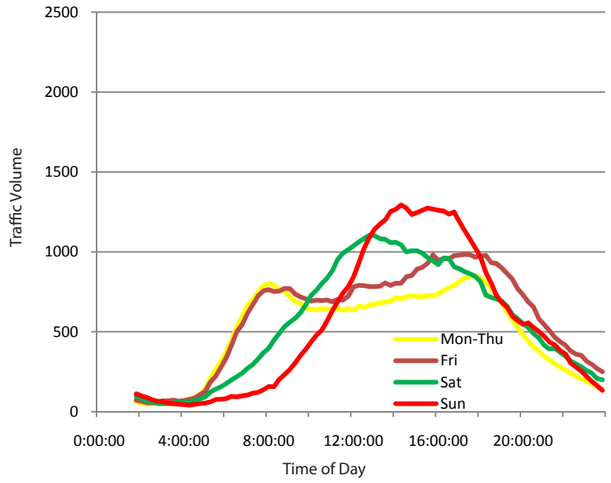
SEVEN-DAY TRAFFIC COUNTS SUMMARY (CONTINUED)

EB - Eastbound, WB - Westbound

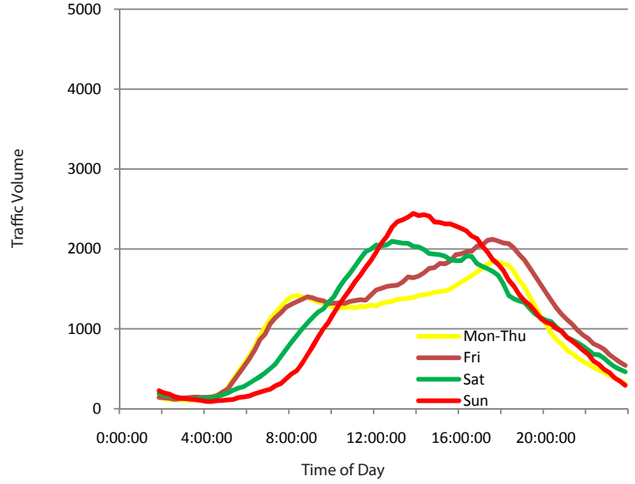
SH 105 - EB East of Walker Road



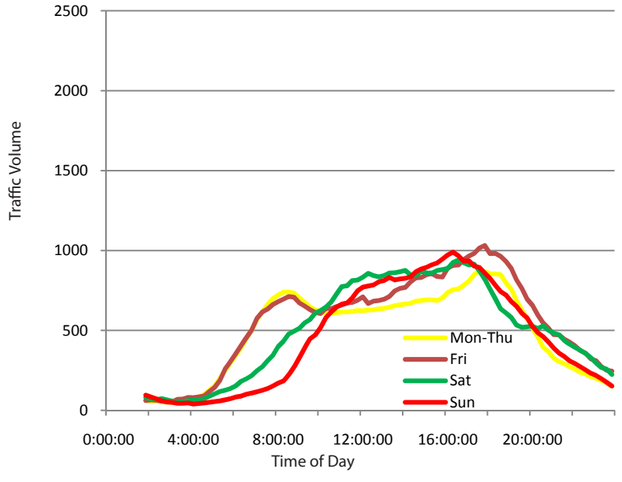
SH 105 - WB East of Walker Road



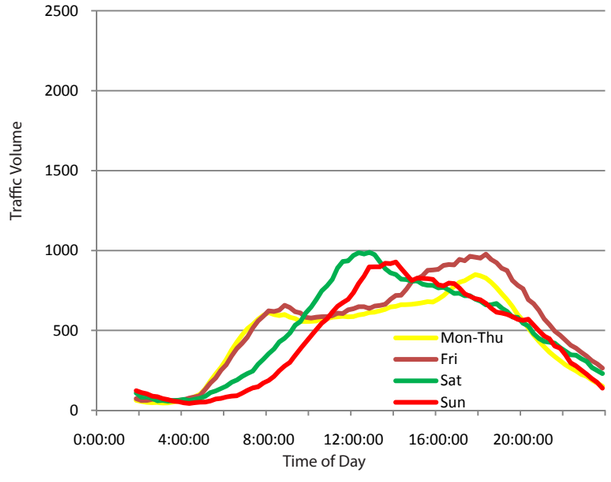
Total SH 105 East of Walker Road



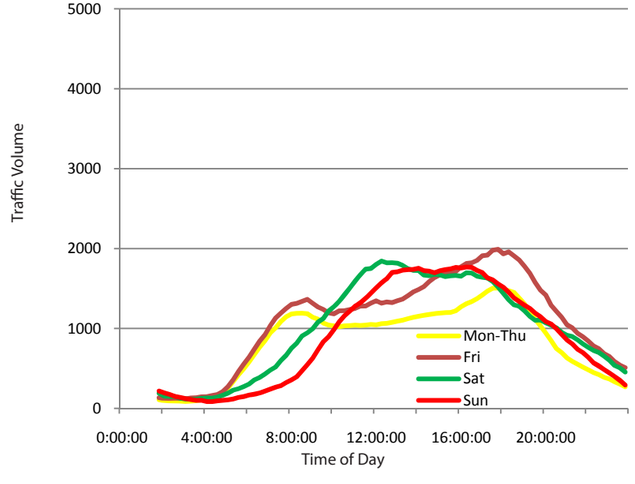
SH 105 - EB East of Lee Turner Road



SH 105 - WB East of Lee Turner Road



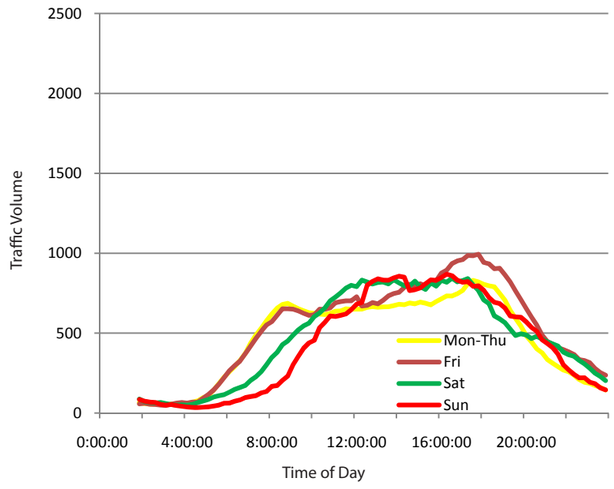
Total SH 105 East of Lee Turner Road



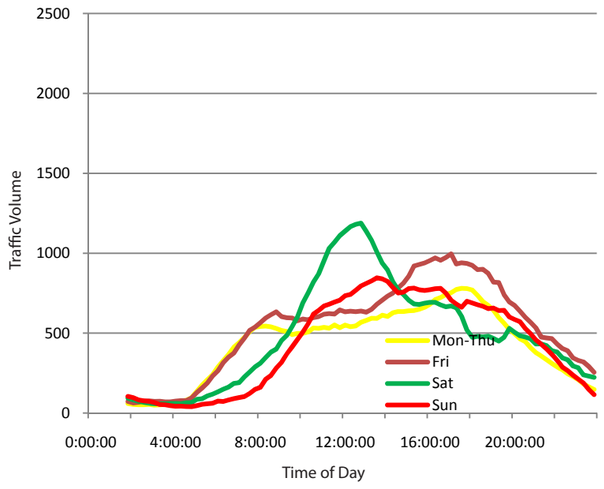
SEVEN-DAY TRAFFIC COUNTS SUMMARY (CONTINUED)

EB - Eastbound, WB - Westbound

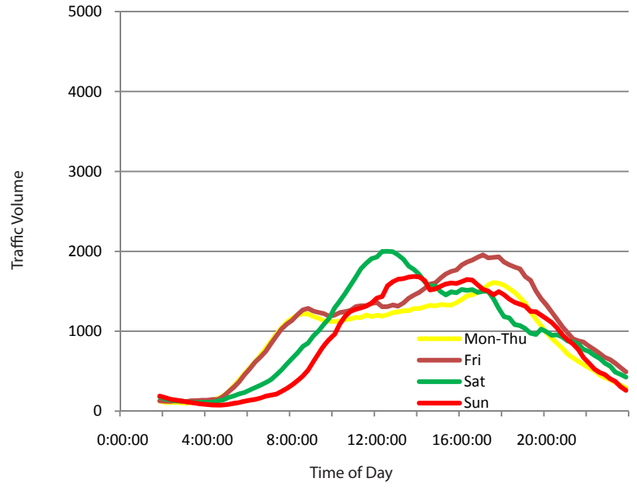
SH 105 - EB West of FM 1725



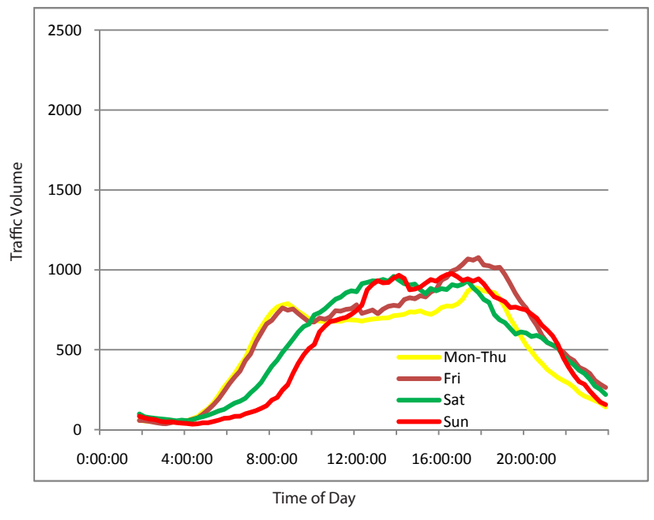
SH 105 - WB West of FM 1725



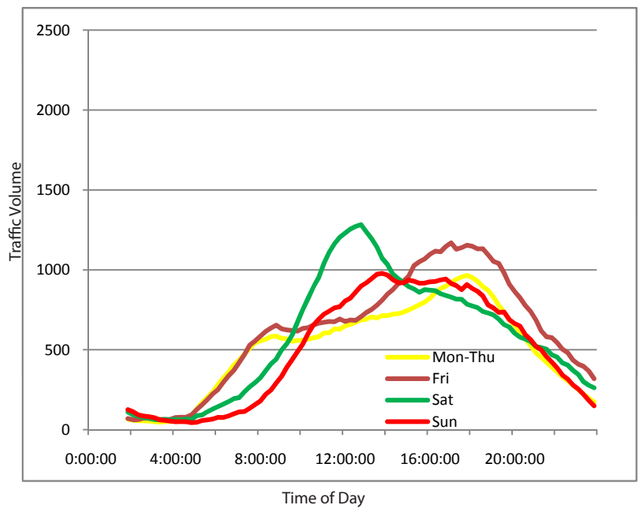
Total SH 105 West of FM 1725



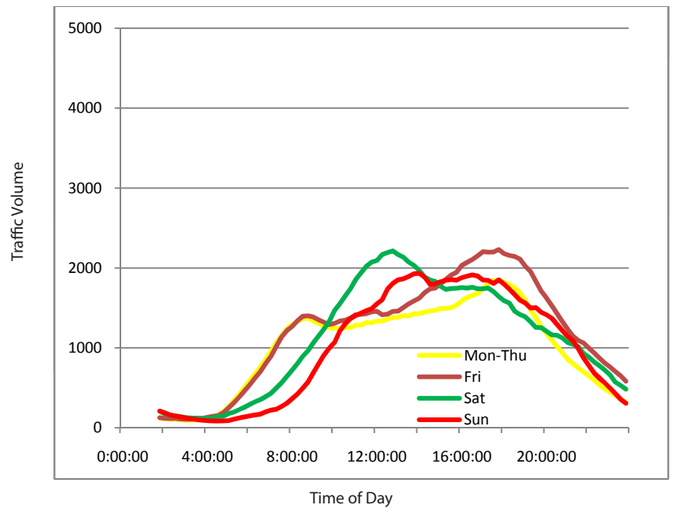
SH 105 - EB West of US 59



SH 105 - WB West of West of US 59



Total SH 105 West of US 59



APPENDIX D
SYNCHRO/SIMTRAFFIC MODEL DEVELOPMENT

The development of an access management plan for SH 105 involves the evaluation and analysis of the existing transportation system and the proposed recommendations. The analysis methodology and analytical tools used to evaluate the transportation system are described in this section.

ANALYSIS METHODOLOGY

The study area was modeled using Synchro/SimTraffic. Synchro is a macroscopic simulation software developed by Trafficware® for capacity analysis of intersections that are either isolated or part of a network, and includes an evaluation of delay and queues. Synchro also has the capability of optimizing traffic signals, thereby allowing the development of traffic signal timing to accommodate roadway and intersection reconfigurations evaluated as part of this traffic study. SimTraffic, the companion visualization software, enables microscopic simulation of the roadway network developed in SYNCHRO.

Capacity analyses were conducted for study area intersections to evaluate existing and projected traffic operating conditions. The Highway Capacity Manual defines capacity at an intersection as the maximum hourly rate at which vehicles can reasonably be expected to pass through the intersection under prevailing traffic roadway and signalization conditions. The primary Measures of Effectiveness (MOEs) used in evaluating the traffic impacts for the proposed hotel development were peak hour intersection control delay (measured in units of seconds per vehicle) and level-of-service (LOS).

Control delay is defined as that component of total delay caused by decelerating and accelerating at a traffic signal or stop sign. Level-of-Service (LOS) is a qualitative measure of operating conditions at an intersection based on control delay. LOS is given a letter designation from A to F, where LOS A represents free-flow conditions and LOS F represents heavy congestion.

DATA SOURCES

Data for simulation model input were obtained as follows:

- Background aerials used in building the scaled network were obtained from Houston-Galveston Area Council's (H-GAC) digital aerial imagery files.
- Traffic signal timings for study area intersections were obtained from Texas Department of Transportation (TxDOT).
- Traffic counts in the study area were conducted by CJ Hensch and CDM Smith.

MODEL INPUTS

To simulate real-life traffic conditions, the model requires very detailed data inputs. This section describes the various inputs that were utilized to develop the Synchro/SimTraffic model for the current project.

LANE AND GEOMETRIC INFORMATION

Several field trips were conducted to document the roadway geometric and operational details such as speed limits, number of lanes, left-turn and right-turn lanes. Aerial imagery obtained from HGAC was scaled and used as a template to develop the existing study area roadway network. Lane and geometric information that was input in the software includes roadway speed limit, number of lanes, lane widths, turn bay storage lengths and number of storage lanes.

Traffic Volumes and Composition

Traffic volume information input in the simulation software includes peak hour intersection turning movement counts, and truck percentages. Peak hour intersection turning movement counts and 24-hour counts for the study area were used as the basis for developing traffic volumes that were coded in the simulation model. During the typical weekday, it was estimated that heavy vehicle percentage on SH 105 ranges between eight percent and 10 percent.

Intersection Traffic Control

All the signalized intersections along SH 105 in the study area along with critical minor un-signalized intersections and driveways were modeled in the simulation software. As mentioned previously, traffic signal timings for study area intersections were obtained from TxDOT.

Model Calibration and Validation

Calibration is a necessary process to ensure that traffic conditions in the real world are sufficiently replicated by the simulation model. Synchro/SimTraffic is a complex mathematical model with several parameters that can be adjusted to match behavior in the real world. Model parameters in Synchro/SimTraffic can be classified as following:

- Vehicle parameters
- Driver parameters

Driver parameters directly affect driving behavior for vehicles in the model. Vehicle parameters describe attributes associated with each vehicle type modeled such as vehicle dimensions, occupancy, acceleration and deceleration profiles. Some of the parameters affect the models' performance on a global scale while others have a local effect.

Vehicle parameters that can be modified in Synchro/SimTraffic include length and width of vehicles, acceleration rate and maximum speed of vehicles. The default parameters provided in Synchro/SimTraffic are acceptable for the study area simulation and are not modified during the calibration process.

Driver parameters can be used to adjust the driving behavior of the vehicles in the simulation model from being most conservative to most aggressive. The driver parameters that can be modified in Synchro/SimTraffic include Yellow Deceleration Rate (maximum deceleration rate a driver is willing to use when faced with a yellow light), Speed Factor (maximum speed of a driver), Headways (amount of time between vehicles drivers try to maintain), etc. The driver parameters were modified from the default values provided in Synchro/SimTraffic till a realistic driver behavior was observed for the SH 105 study area.

After the calibration process was completed, the model was run multiple times and inspected visually to ensure expected operation of network elements. Analysis output from the Synchro/SimTraffic model was obtained after running the model for one hour representing the peak hour. Average travel time along SH 105 in the study area was calibrated to ensure real world travel behavior.

Travel time data were collected on SH 105 in the study area during the peak analysis periods. This data was used to assess the accuracy of the Synchro/SimTraffic model. Travel time output provided by the model was compared to real-world travel times and, if necessary, data input parameters were adjusted to reflect more real-world conditions. Finally, field observations were conducted and the model was calibrated based on field observations of queue lengths.

Table 1 and **Table 2** compare the travel time results from Synchro/SimTraffic model and the field observations for a typical weekday PM and weekend peak hour. The results show that the travel time along SH 105 in the study area is comparable to the output from the simulation model.

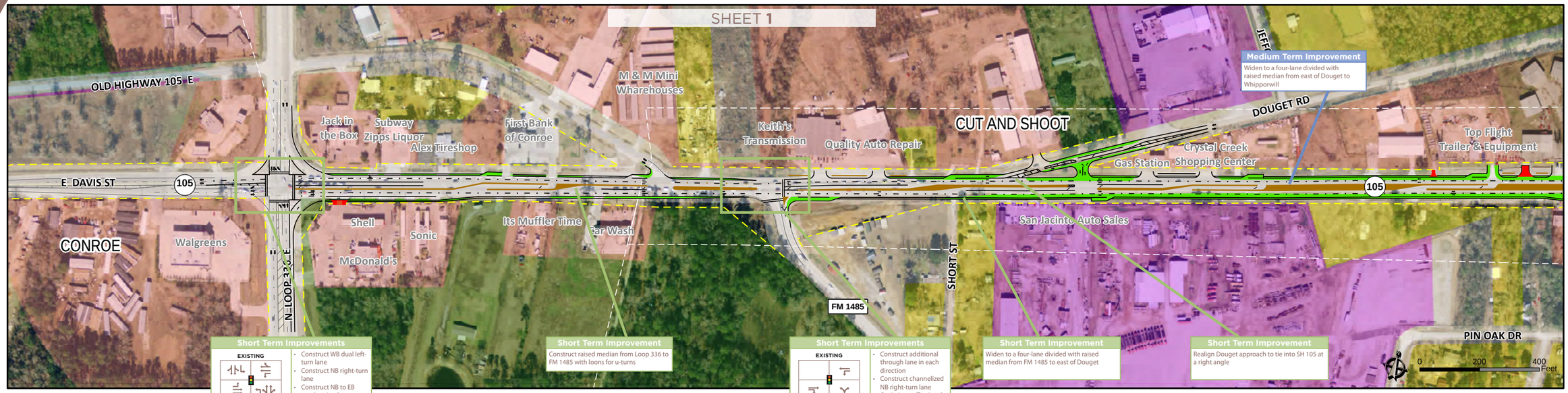
Table 1: Travel Time Results - Existing Weekday PM Peak Hour

Direction	SH 105 From	SH 105 To	Travel Time Field Observation	Travel Time Synchro/SimTraffic
Eastbound	Loop 336	FM 1485	0:01:05	0:00:57
	FM 1485	Whipporwill Road	0:01:18	0:01:16
	Whipporwill Road	Crystal Forest Drive	0:00:28	0:00:33
	Crystal Forest Drive	Millmac Road	0:01:17	0:01:16
	Millmac Road	Willis Waukegan Road	0:01:32	0:01:27
	Willis Waukegan Road	FM 1484	0:01:05	0:00:56
	FM 1484	Crockett Martin Road	0:00:44	0:01:02
	Crockett Martin Road	Walker Road	0:02:32	0:02:32
	Walker Road	Fostoria Road	0:07:53	0:08:17
	Fostoria Road	FM 1725	0:03:31	0:03:17
	FM 1725	US 59 NBFR	0:01:37	0:01:30
	Total		**0:23:02**	**0:23:03**
Westbound	US 59 NBFR	FM 1725	0:01:15	0:01:08
	FM 1725	Fostoria Road	0:03:28	0:03:17
	Fostoria Road	Walker Road	0:07:56	0:08:10
	Walker Road	Crockett Martin Road	0:02:29	0:02:33
	Crockett Martin Road	FM 1484	0:01:00	0:00:56
	FM 1484	Willis Waukegan Road	0:00:55	0:00:53
	Willis Waukegan Road	Millmac Road	0:01:32	0:01:30
	Millmac Road	Crystal Forest Drive	0:01:11	0:01:14
	Crystal Forest Drive	Whipporwill Road	0:00:34	0:00:31
	Whipporwill Road	FM 1485	0:01:27	0:01:13
	FM 1485	Loop 336	0:01:01	0:01:05
	Total		**0:22:47**	**0:22:29**

Table 2: Travel Time Results - Existing Weekend Peak Hour

Direction	SH 105 From	SH 105 To	Travel Time Field Observation	Travel Time Synchro/SimTraffic
Eastbound	Loop 336	FM 1485	0:00:39	0:00:40
	FM 1485	Whipporwill Road	0:00:59	0:01:11
	Whipporwill Road	Crystal Forest Drive	0:00:25	0:00:29
	Crystal Forest Drive	Millmac Road	0:01:11	0:01:13
	Millmac Road	Willis Waukegan Road	0:01:42	0:01:25
	Willis Waukegan Road	FM 1484	0:00:57	0:00:54
	FM 1484	Crockett Martin Road	0:00:38	0:00:57
	Crockett Martin Road	Walker Road	0:02:30	0:02:36
	Walker Road	Fostoria Road	0:07:54	0:08:09
	Fostoria Road	FM 1725	0:03:40	0:03:16
	FM 1725	US 59 NBFR	0:01:34	0:01:22
	Total		**0:22:10**	**0:22:13**
Westbound	US 59 NBFR	FM 1725	0:00:57	0:01:04
	FM 1725	Fostoria Road	0:03:45	0:03:17
	Fostoria Road	Walker Road	0:07:55	0:07:57
	Walker Road	Crockett Martin Road	0:02:51	0:02:38
	Crockett Martin Road	FM 1484	0:00:44	0:00:49
	FM 1484	Willis Waukegan Road	0:00:56	0:00:52
	Willis Waukegan Road	Millmac Road	0:01:28	0:01:31
	Millmac Road	Crystal Forest Drive	0:01:12	0:01:14
	Crystal Forest Drive	Whipporwill Road	0:00:30	0:00:35
	Whipporwill Road	FM 1485	0:01:12	0:01:14
	FM 1485	Loop 336	0:00:29	0:00:53
	Total		**0:22:00**	**0:22:05**

APPENDIX E
CONCEPTUAL LAYOUTS FOR RECOMMENDED IMPROVEMENTS



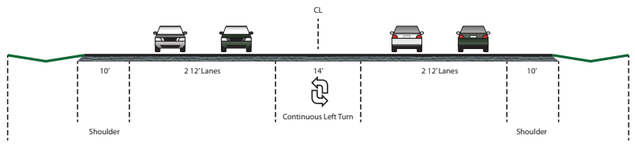
Typical Cross Sections

SHORT TERM IMPROVEMENTS
- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

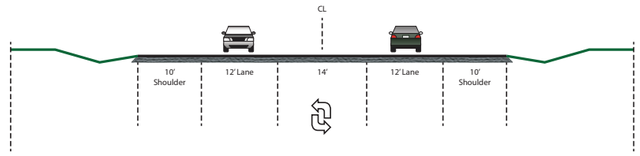
MEDIUM TERM IMPROVEMENTS
- Driveway Closure
- Reconfigure Driveway

LEGEND
- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

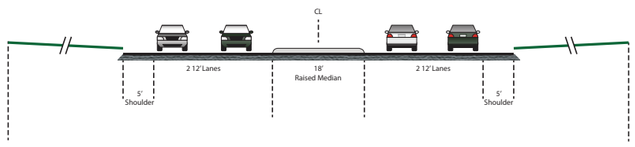
Existing Section (Loop 336 - FM 1485)



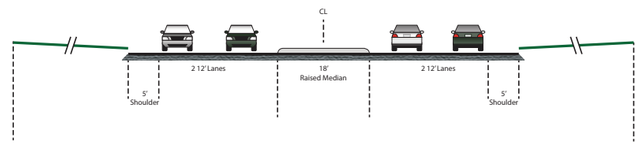
Existing Section (FM 1485 - Whipporwill)



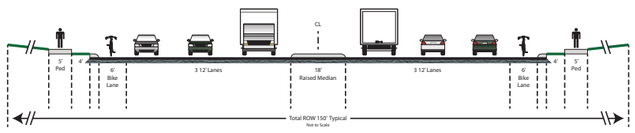
Proposed Short Term (Loop 336 - East of Douget)



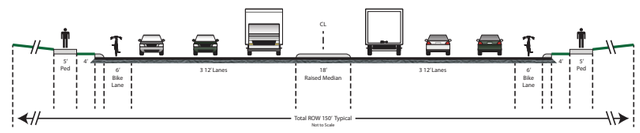
Proposed Medium Term (East of Douget - Whipporwill)

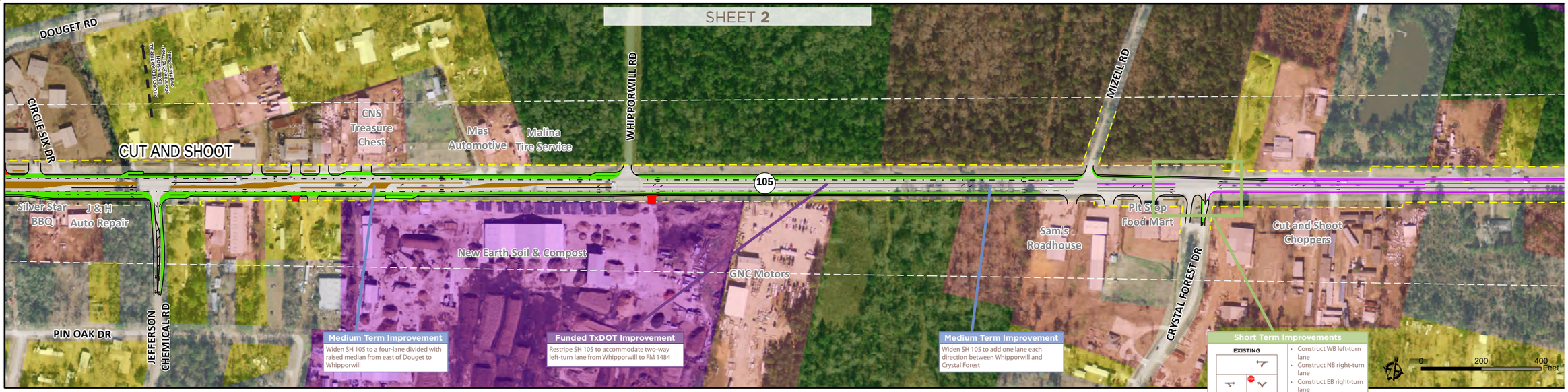


Proposed Long Term (Loop 336 - Willis Waukegan)



Proposed Long Term (Loop 336 - Willis Waukegan)





Long Term Improvement
Widen SH 105 to a six-lane divided curb and gutter (with raised median) from Loop 336 to Willis Waukegan

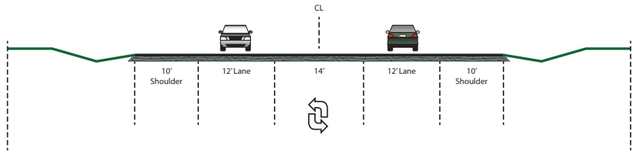
Typical Cross Sections

SHORT TERM IMPROVEMENTS
- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

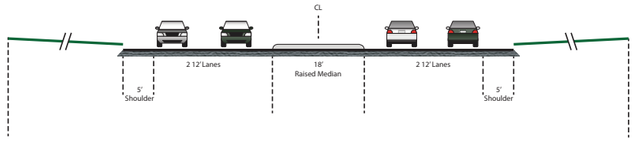
MEDIUM TERM IMPROVEMENTS
- Driveway Closure
- Reconfigure Driveway

LEGEND
- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

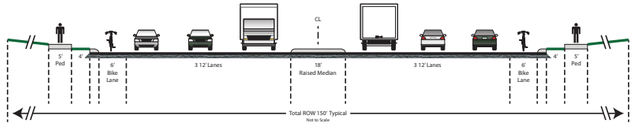
Existing Section
(FM 1485 - Whipporwill)



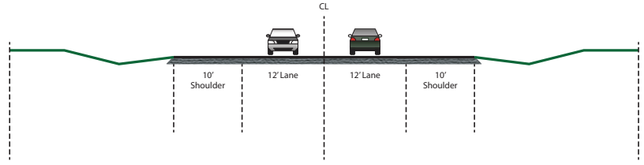
Proposed Medium Term
(East of Douget - Whipporwill)



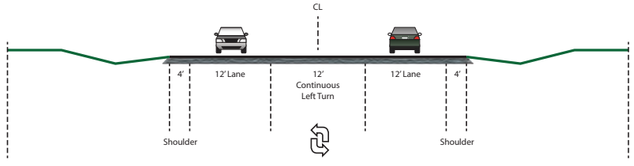
Proposed Long Term
(Loop 336 - Willis Waukegan)



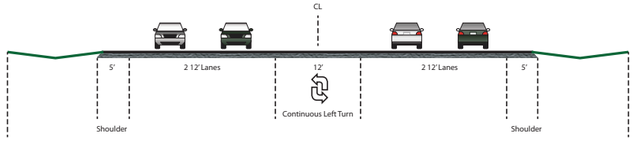
Existing
(Whipporwill - US 59)



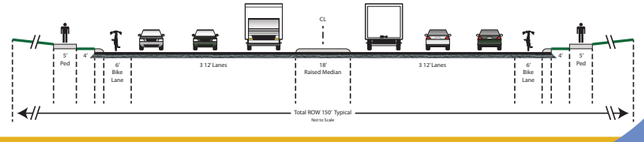
Funded TxDOT Improvement
(Whipporwill - FM 1484)

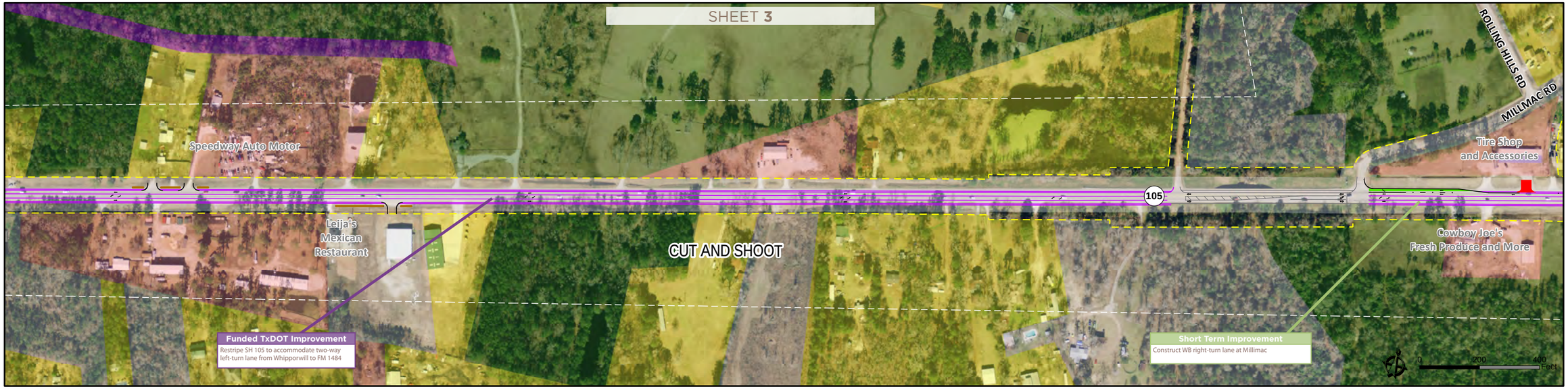


Proposed Medium Term
(Whipporwill - Crystal Forest)



Proposed Long Term
(Loop 336 - Willis Waukegan)





Long Term Improvement
Widen SH 105 to a six-lane divided curb and gutter (with raised median) from Loop 336 to Willis Waukegan

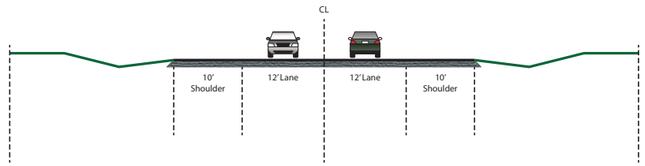
Typical Cross Sections

SHORT TERM IMPROVEMENTS
- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

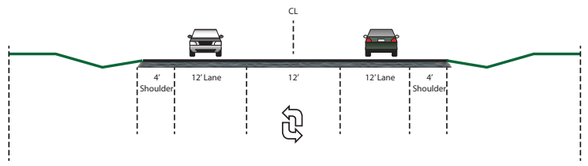
MEDIUM TERM IMPROVEMENTS
- Driveway Closure
- Reconfigure Driveway

LEGEND
- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

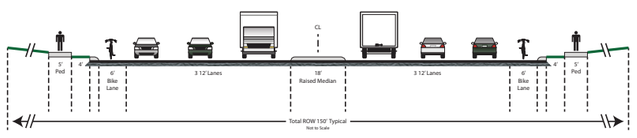
Existing Section
(Whipporwill - US 59)

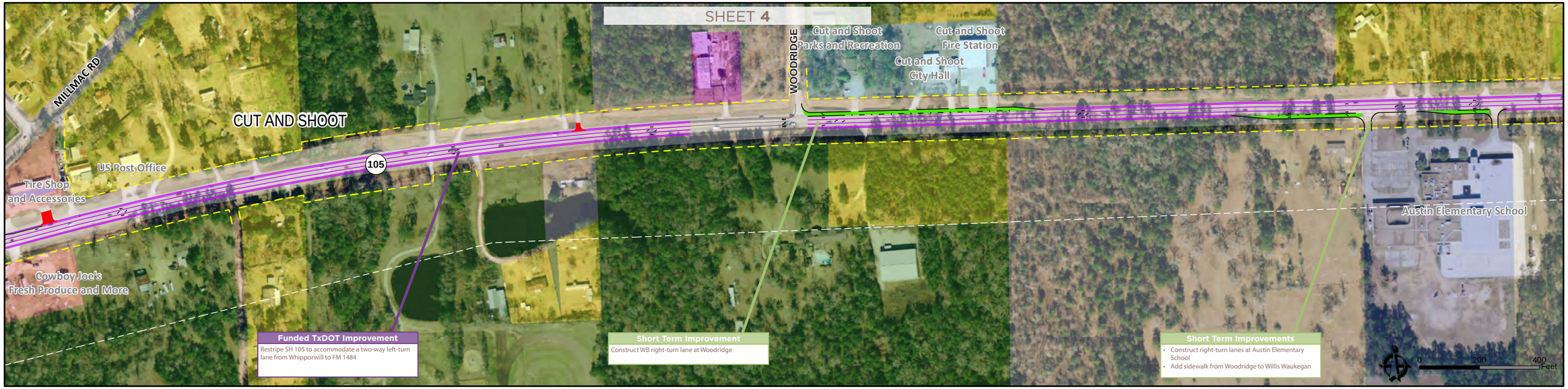


Funded TxDOT Improvement
(Whipporwill - FM 1484)



Proposed Long Term
(Loop 336 - Willis Waukegan)





Long Term Improvement

Widen SH 105 to a six-lane divided curb and gutter (with raised median) from Loop 336 to Willis Waukegan

Typical Cross Sections

SHORT TERM IMPROVEMENTS

- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

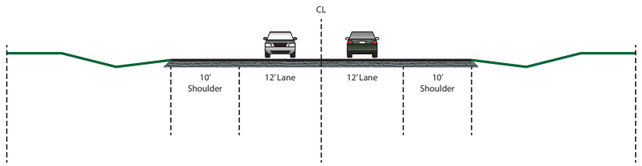
MEDIUM TERM IMPROVEMENTS

- Driveway Closure
- Reconfigure Driveway

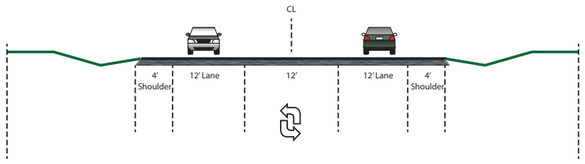
LEGEND

- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

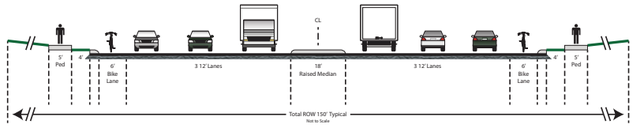
Existing Section (Whipporwill - US 59)



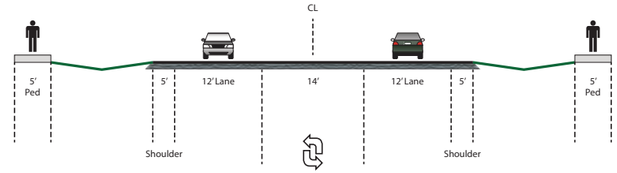
Funded TxDOT Improvement (Whipporwill - FM 1484)



Proposed Long Term (Loop 336 - Willis Waukegan)



Proposed Short Term (Woodridge - Willis Waukegan)



Long Term Improvement
Widen SH 105 to a six-lane divided curb and gutter (with raised median) from Loop 336 to Willis Waukegan

Long Term Improvement
Widen SH 105 to a four-lane divided with raised median and shoulders from Willis Waukegan to US 59

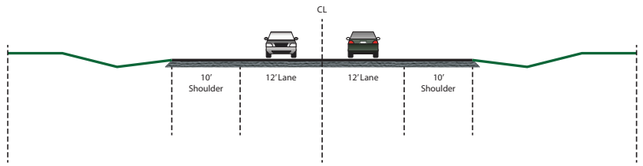
Typical Cross Sections

SHORT TERM IMPROVEMENTS
- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

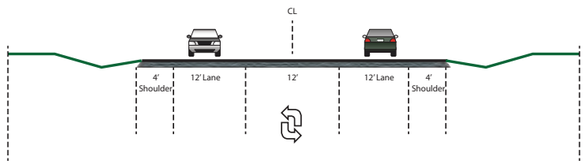
MEDIUM TERM IMPROVEMENTS
- Driveway Closure
- Reconfigure Driveway

LEGEND
- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

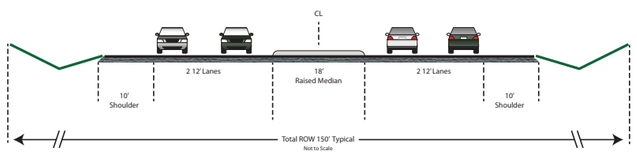
Existing Section
(Whipporwill - US 59)



Funded TxDOT Improvement
(Whipporwill - FM 1484)



Proposed Long Term
(Willis Waukegan - US 59)



Typical Cross Sections

SHORT TERM IMPROVEMENTS

- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

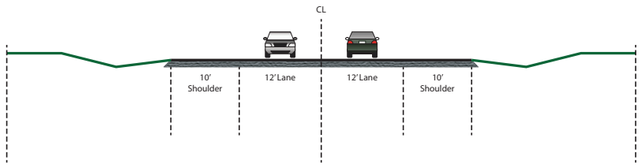
MEDIUM TERM IMPROVEMENTS

- Driveway Closure
- Reconfigure Driveway

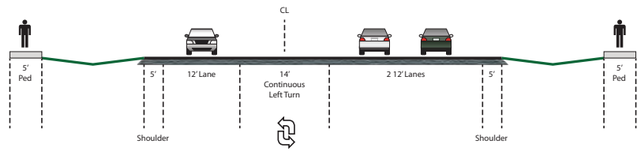
LEGEND

- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

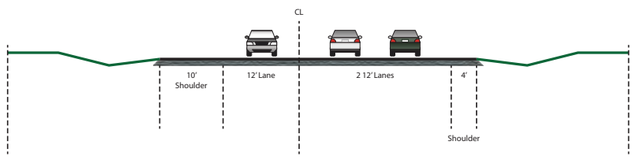
Existing Section
(Whipporwill - US 59)



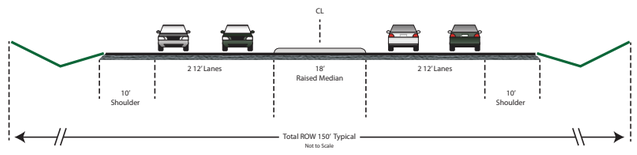
Proposed Short Term
(Crockett Martin - Carmen)

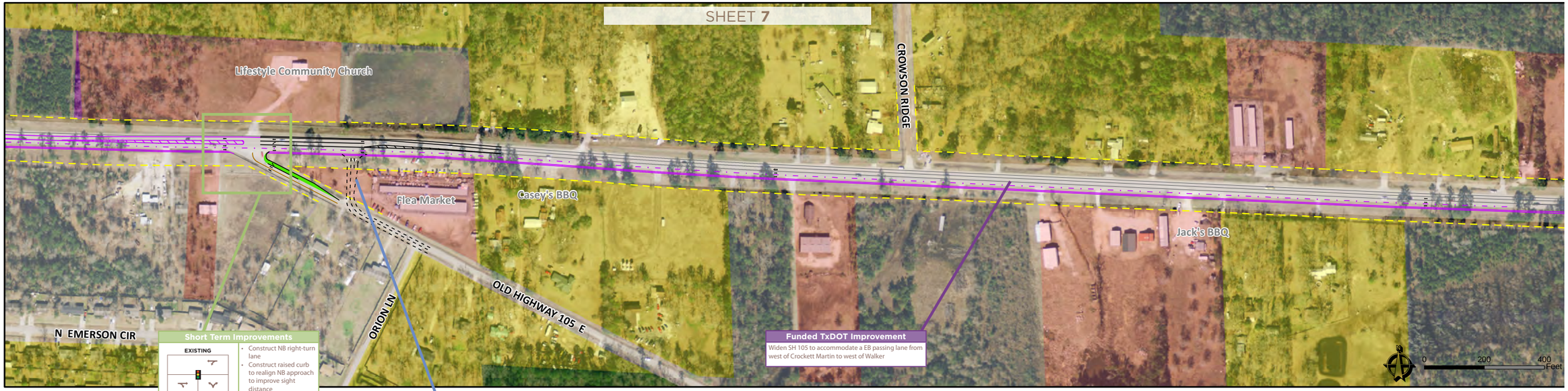


Funded TxDOT Improvement
(West of Crockett Martin - West of Walker)



Proposed Long Term
(Willis Waukegan - US 59)

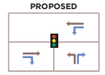




Short Term Improvements

EXISTING

PROPOSED



- Construct NB right-turn lane
- Construct raised curb to realign NB approach to improve sight distance
- Construct WB left-turn lane

Medium Term Improvement

Realign Old Highway 105 approach to tie into SH 105 at a right angle

Funded TxDOT Improvement

Widen SH 105 to accommodate a EB passing lane from west of Crockett Martin to west of Walker

Long Term Improvement

Widen SH 105 to a four-lane divided with raised median and shoulders from Willis Waukegan to US 59

Typical Cross Sections

SHORT TERM IMPROVEMENTS

- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

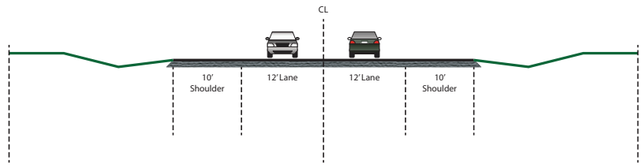
MEDIUM TERM IMPROVEMENTS

- Driveway Closure
- Reconfigure Driveway

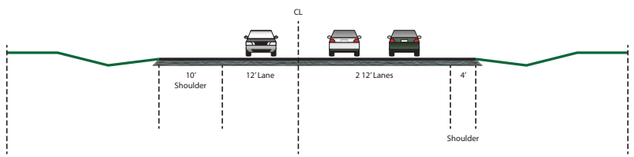
LEGEND

- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

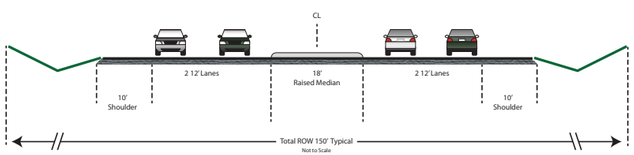
Existing Section
(Whipporwill - US 59)

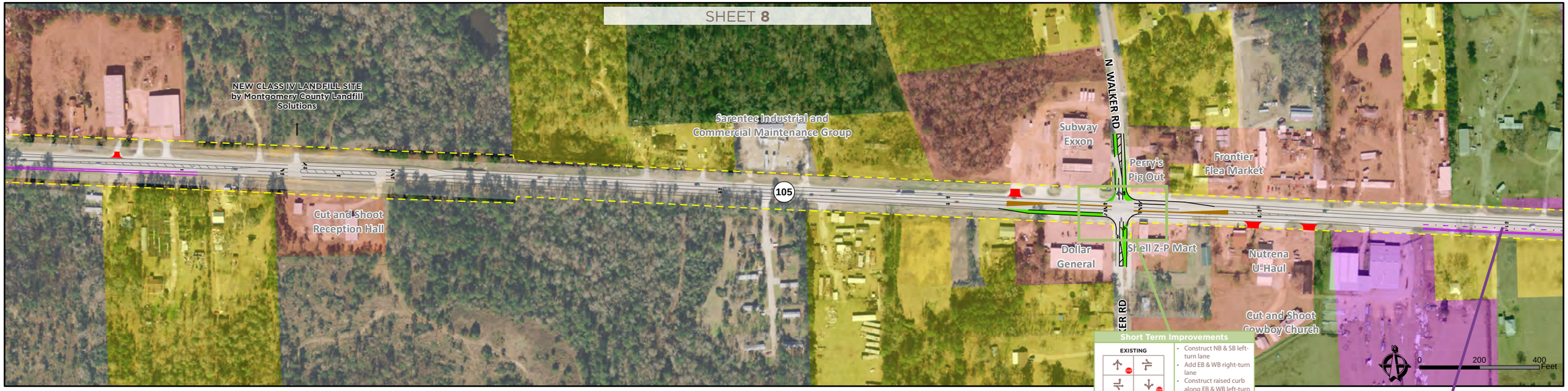


Funded TxDOT Improvement
(West of Crockett Martin - West of Walker)



Proposed Long Term
(Willis Waukegan - US 59)





Long Term Improvement

Widen SH 105 to a four-lane divided with raised median and shoulders from Willis Waukegan to US 59

Short Term Improvements

EXISTING

PROPOSED

- Construct NB & SB left-turn lane
- Add EB & WB right-turn lane
- Construct raised curb along EB & WB left-turn lane storage and taper

Funded TxDOT Improvement

Widen SH 105 to accommodate a EB passing lane from east of Walker to Duck Creek

Typical Cross Sections

SHORT TERM IMPROVEMENTS

- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

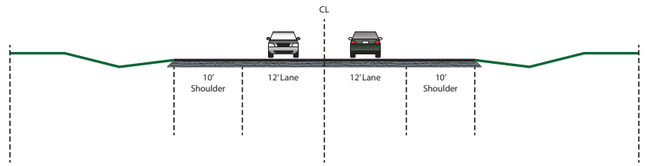
MEDIUM TERM IMPROVEMENTS

- Driveway Closure
- Reconfigure Driveway

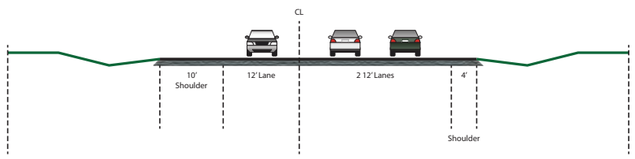
LEGEND

- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

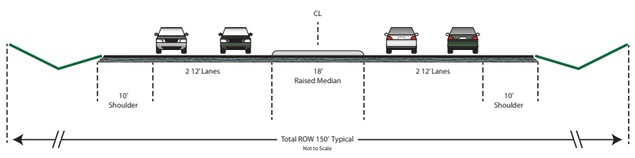
Existing Section
(Whipporwill - US 59)



Funded TxDOT Improvement
(East of Walker - Duck Creek)



Proposed Long Term
(Willis Waukegan - US 59)



Typical Cross Sections

SHORT TERM IMPROVEMENTS

- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

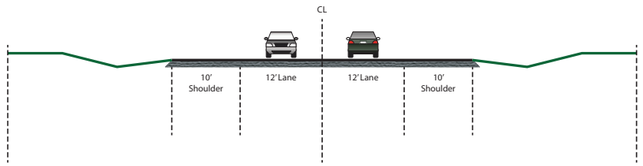
MEDIUM TERM IMPROVEMENTS

- Driveway Closure
- Reconfigure Driveway

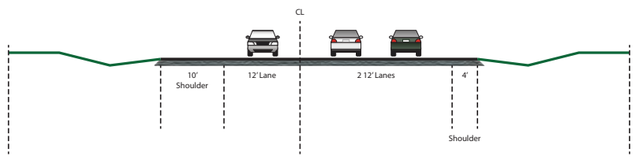
LEGEND

- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

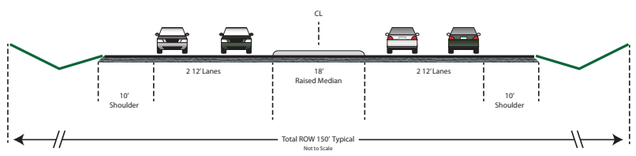
Existing Section
(Whipporwill - US 59)

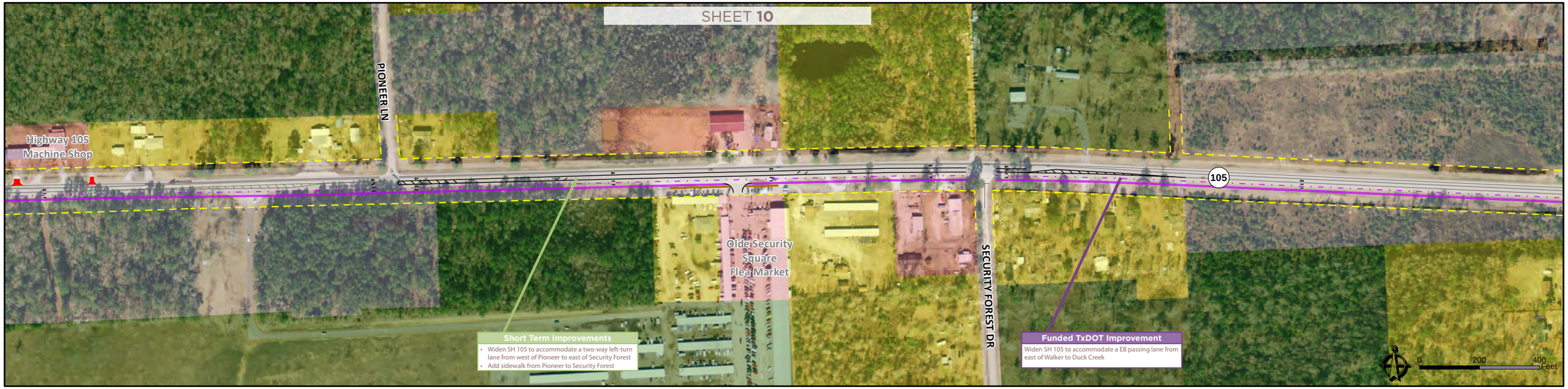


Planned TxDOT Improvement
(East of Walker - Duck Creek)



Proposed Long Term
(Willis Waukegan - US 59)





Long Term Improvement
Widen SH 105 to a four-lane divided with raised median and shoulders from Willis Waukegan to US 59

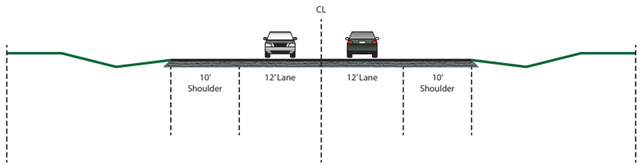
Typical Cross Sections

SHORT TERM IMPROVEMENTS
- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

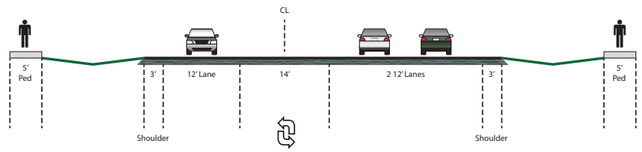
MEDIUM TERM IMPROVEMENTS
- Driveway Closure
- Reconfigure Driveway

LEGEND
- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

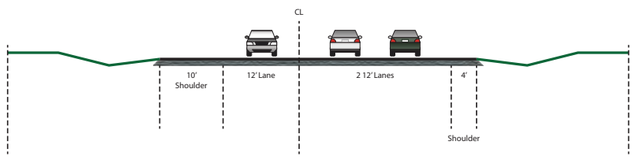
Existing Section
(Whipporwill - US 59)



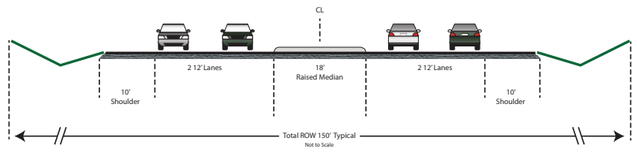
Proposed Short Term
(Pioneer - Security Forest)

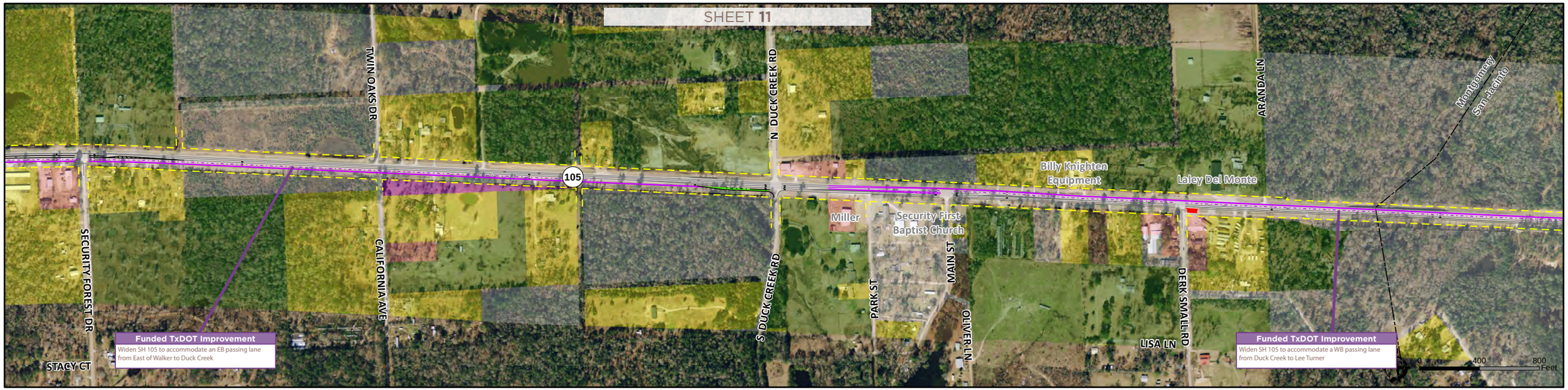


Funded TxDOT Improvement
(East of Walker - Duck Creek)



Proposed Long Term
(Willis Waukegan - US 59)





Short Term Improvement

Construct EB right-turn lane at Duck Creek

Long Term Improvement

Widen SH 105 to a four-lane divided with raised median and shoulders from Willis Waukegan to US 59

Typical Cross Sections

SHORT TERM IMPROVEMENTS

- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

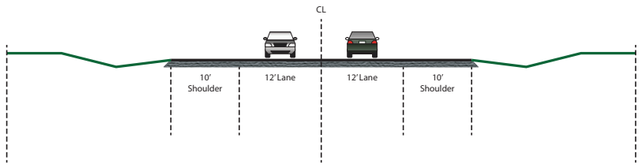
MEDIUM TERM IMPROVEMENTS

- Driveway Closure
- Reconfigure Driveway

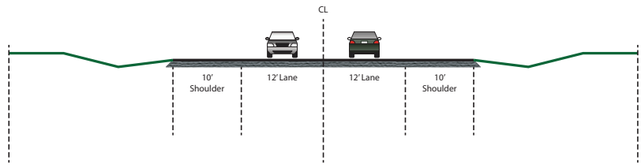
LEGEND

- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

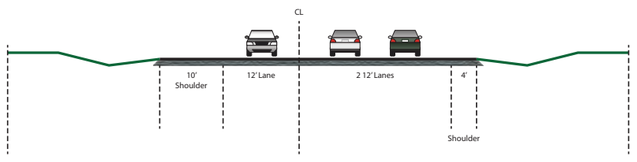
Existing Section
(Whipporwill - US 59)



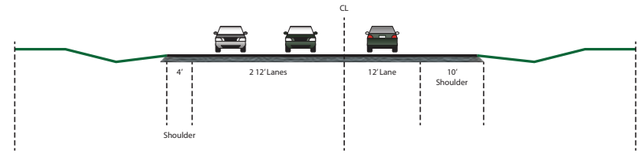
Existing Section
(Whipporwill - US 59)



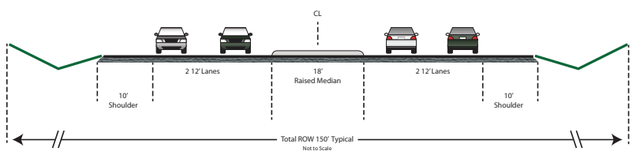
Funded TxDOT Improvement
(East of Walker to Duck Creek)



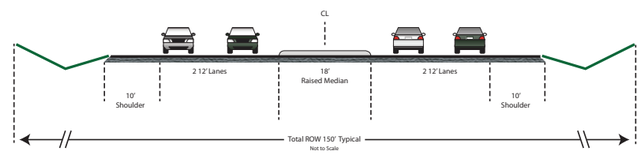
Funded TxDOT Improvement
(Duck Creek - Lee Turner)

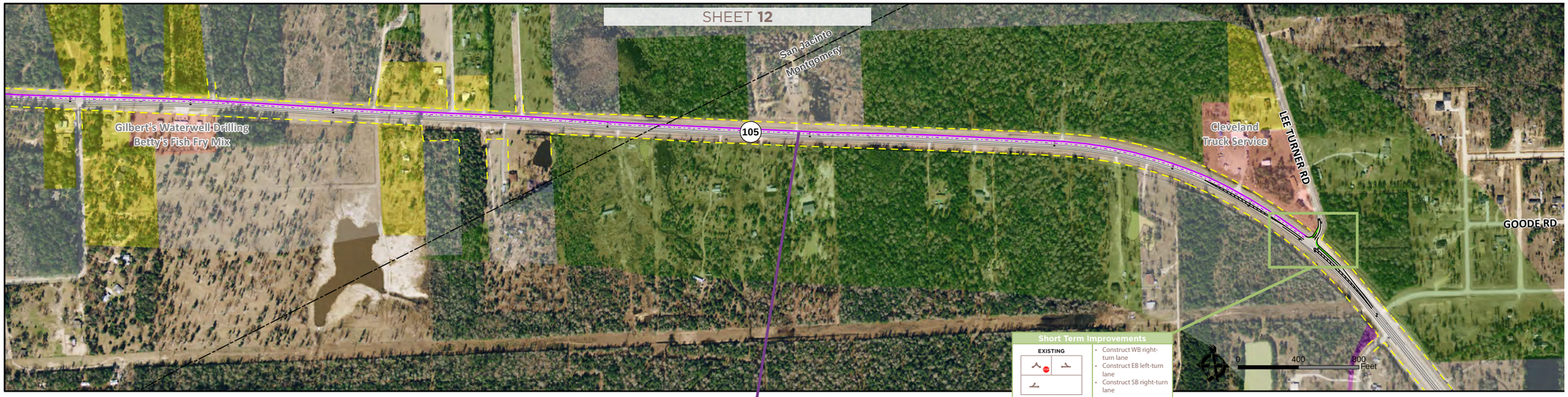


Proposed Long Term
(Willis Waukegan - US 59)



Proposed Long Term
(Willis Waukegan - US 59)





Long Term Improvement

Widen SH 105 to a four-lane divided with raised median and shoulders from Willis Waukegan to US 59

Funded TxDOT Improvement

Restripe SH 105 to accommodate a WB passing lane from Duck Creek to Lee Turner

Short Term Improvements

EXISTING

PROPOSED

- Construct WB right-turn lane
- Construct EB left-turn lane
- Construct SB right-turn lane

Typical Cross Sections

SHORT TERM IMPROVEMENTS

- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

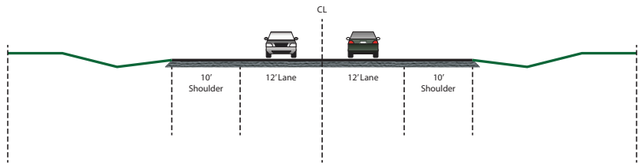
MEDIUM TERM IMPROVEMENTS

- Driveway Closure
- Reconfigure Driveway

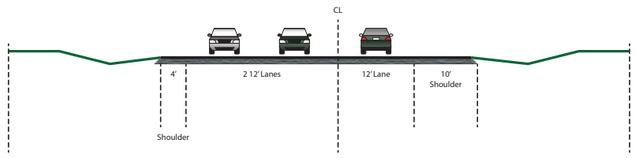
LEGEND

- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

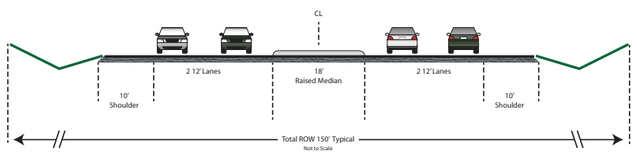
Existing Section
(Whipporwill - US 59)



Planned TxDOT Improvement
(Duck Creek - Lee Turner)



Proposed Long Term
(Willis Waukegan - US 59)



Long Term Improvement

Widen SH 105 to a four-lane divided with raised median and shoulders from Willis Waukegan to US 59

Typical Cross Sections

SHORT TERM IMPROVEMENTS

- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

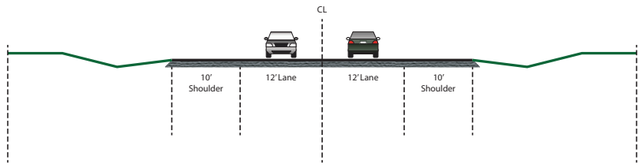
MEDIUM TERM IMPROVEMENTS

- Driveway Closure
- Reconfigure Driveway

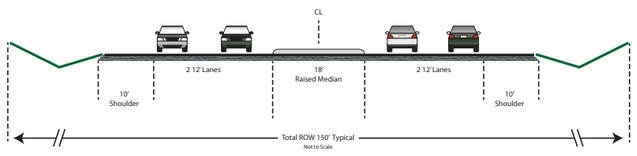
LEGEND

- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

Existing Section
(Whipporwill - US 59)



Proposed Long Term
(Willis Waukegan - US 59)



Long Term Improvement

Widen SH 105 to a four-lane divided with raised median and shoulders from Willis Waukegan to US 59

Typical Cross Sections

SHORT TERM IMPROVEMENTS

- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

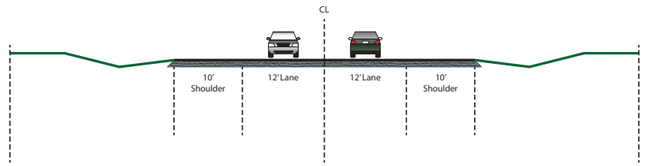
MEDIUM TERM IMPROVEMENTS

- Driveway Closure
- Reconfigure Driveway

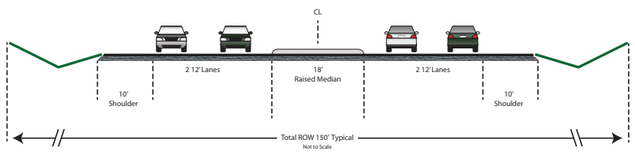
LEGEND

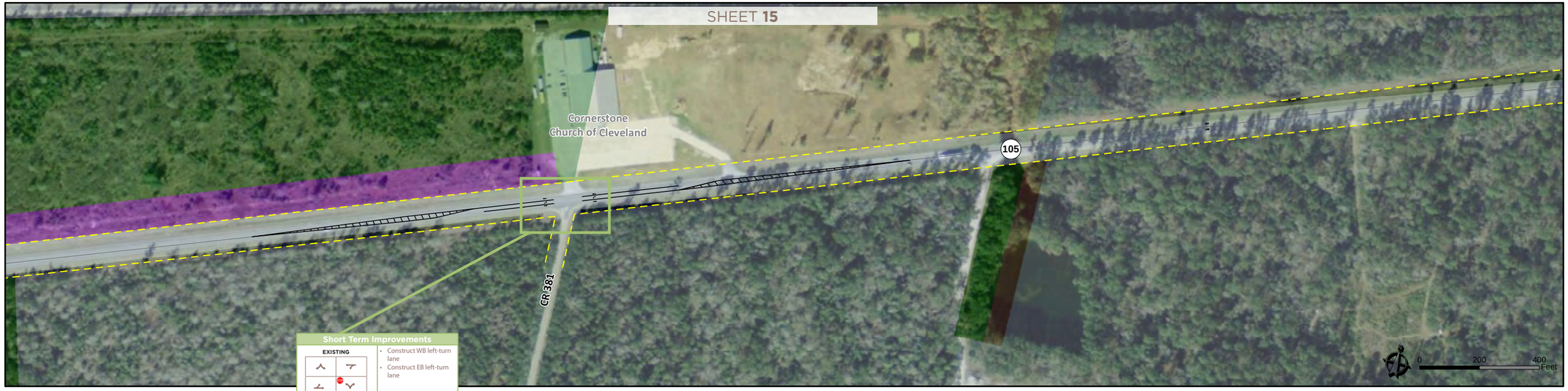
- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

Existing Section
(Whipporwill - US 59)



Proposed Long Term
(Willis Waukegan - US 59)





Short Term Improvements

EXISTING

PROPOSED

- Construct WB left-turn lane
- Construct EB left-turn lane

Long Term Improvement

Widen SH 105 to a four-lane divided with raised median and shoulders from Willis Waukegan to US 59

Typical Cross Sections

SHORT TERM IMPROVEMENTS

- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

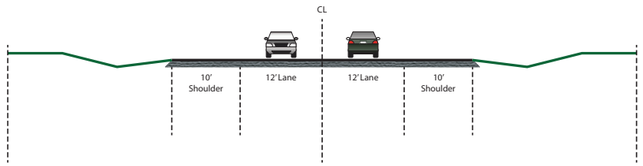
MEDIUM TERM IMPROVEMENTS

- Driveway Closure
- Reconfigure Driveway

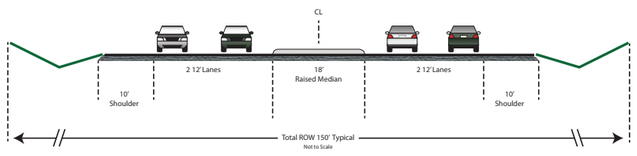
LEGEND

- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

Existing Section
(Whipporwill - US 59)



Proposed Long Term
(Willis Waukegan - US 59)



Typical Cross Sections

SHORT TERM IMPROVEMENTS

- Traffic Signal (Proposed)
- Raised Median/Curb
- Loon

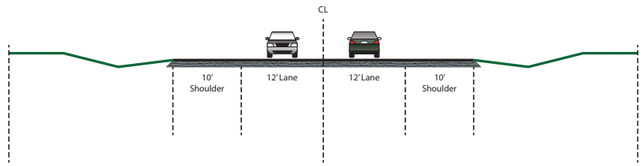
MEDIUM TERM IMPROVEMENTS

- Driveway Closure
- Reconfigure Driveway

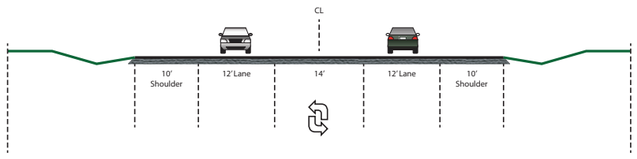
LEGEND

- Civic
- Commercial
- Farm Ranch
- Residential
- Undetermined
- Vacant
- Traffic Signal (Existing)
- Existing Lane Marking
- Proposed Lane Marking
- Existing Right-of-Way
- Existing Lane Configuration
- Proposed Lane Configuration
- New Pavement
- Funded TxDOT Improvement

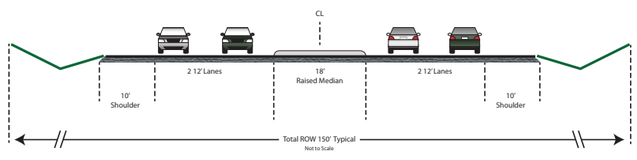
Existing Section
(Whipporwill - US 59)



Proposed Short Term
(Wells Avenue to Driveway 330' West)



Proposed Long Term
(Willis Waukegan - US 59)



APPENDIX F
COST ESTIMATE DETAILS

This appendix provides cost estimates for prioritized improvement projects. Included are a summary of estimated costs, and details of quantities and bid prices. Assumptions upon which the cost estimates were developed are also provided.

Cost Summary and Responsible Agency
Loop 336 to US 59 (Length = 18.7 Miles)

	Primary Funding Source	TxDOT				City/County				TOTALS (In Millions)
	Improvement	Number	Unit	Unit Cost	Cost	Number	Unit	Unit Cost	Cost	
Short Term (less than 5 years)	***NEW PROJECTS:***									
	New Traffic Signal (Crystal Forest Intersection)	1	EA	$ 200,000.00	$ 200,000					
	Upgrade Signal Equipment (Loop 336 to FM 1485)	2	INT	$ 20,500.00	$ 41,000					
	Optimize Traffic Signal Timing	9	INT	$ 5,000.00	$ 45,000					
	Add Right Turn Lane - SH 105 (Average Length = 225')	2	EA	$ 72,800.00	$ 145,600					
	Add Right Turn Lane - SH 105 (Average Length = 400')	4	EA	$ 113,100.00	$ 452,400					
	Add Right Turn Lane - SH 105 (Average Length = 640')	3	EA	$ 173,700.00	$ 521,100					
	Widen SH 105 - From Loop 336 to East of Douget	2.1	MI	$ 1,651,519.00	$ 3,468,190					
	Bridge Widening - Lawrence Creek	3,200	SF	$ 75.00	$ 240,000					
	Bridge Culvert Widening - West Fork Crystal Creek	190	SF	$ 120.00	$ 22,800					
	Add Raised Median / Channelization (Concrete)	24,274	SF	$ 10.00	$ 242,740	1,350	SF	$ 10.00	$ 13,500	
	Driveway Closure	1	EA	$ 1,353.00	$ 1,353					
	Add Pedestrian Crosswalks	8	EA	$ 4,143.00	$ 33,144					
	Standardize Driveway Width	14	EA	$ 3,179.00	$ 44,506					
	Concrete Sidewalks (Loop 336 to east of Douget Rd)	30,020	SF	$ 9.00	$ 270,180					
	Concrete Sidewalks (Woodridge Dr to Willis Waukegan Rd)	34,000	SF	$ 9.00	$ 306,000					
	Concrete Sidewalks (Crockett Martin Rd to Carmen Blvd)	19,000	SF	$ 9.00	$ 171,000					
	Concrete Sidewalks (Pioneer Rd to Security Forest Dr)	20,000	SF	$ 9.00	$ 180,000					
	Add NB Right Turn Lane - Crystal Forest					1	EA	$ 42,800.00	$ 42,800	
	Add SB Right Turn Lane - FM 1484					1	EA	$ 80,200.00	$ 80,200	
	Add NB Left Turn Lane - Crockett Martin					1	EA	$ 56,200.00	$ 56,200	
	Add NB Left Turn Lane - Crockett Trace					1	EA	$ 61,500.00	$ 61,500	
	Add NB Right Turn Lane - Old Highway 105					1	EA	$ 84,400.00	$ 84,400	
	Add NB & SB Left Turn Lanes - Walker					1	EA	$ 157,200.00	$ 157,200	
	Add SB Right Turn Lane - Lee Turner					1	EA	$ 45,200.00	$ 45,200	
	Widening (Douget Road)					0.1	MI	$ 1,651,519.00	$ 165,152	
	FUNDED PROJECTS:									
	TxDOT Improvements (Montgomery County) – Super 2 Passing Lanes, Center Left Turn Lane and Asphalt Overlay	1	LS	$ 5,130,000	$ 5,130,000					
	TxDOT Improvements (San Jacinto County) – Super 2 Passing Lanes and Asphalt Overlay	1	LS	$ 700,000	$ 700,000					
	TxDOT Improvements (Liberty County) – Super 2 Passing Lanes and Asphalt Overlay	1	LS	$ 1,170,000	$ 1,170,000					
	TOTAL FOR SHORT TERM IMPROVEMENTS (less than 5 years)				$ 13,385,013				$ 706,152	$ 14.09
Medium Term (5 – 15 years)	Upgrade Signal Equipment (Whipporwill to Crystal Forest)	1	INT	$ 20,500.00	$ 20,500					
	Widen SH 105 - From East of Douget to Crystal Forest	1.0	MI	$ 1,651,519.00	$ 1,651,519					
	Bridge Culvert Widening - Unnamed Creek near Jefferson Chemical Rd	1,012	SF	$ 80.00	$ 80,960					
	Add Raised Median / Channelization (Concrete)	24,385	SF	$ 10.00	$ 243,850					
	Driveway Closure	17	EA	$ 1,353.00	$ 23,001					
	Add NB Left Turn Lane - Jefferson					1	EA	$ 157,000.00	$ 157,000	
	Realign Old SH 105					1	EA	$ 148,200.00	$ 148,200	
	TOTAL FOR MEDIUM TERM IMPROVEMENTS (5 – 15 years)				$ 2,019,830				$ 305,200	$ 2.33
Long Term (15 years +)	Widen SH 105 from 4-Lane to 6-Lane - From Loop 336 to Willis Waukegan (Full Reconstruction)	4.0	MI	$ 4,477,572.00	$ 17,910,288					
	Widen SH 105 from 2-Lane to 4-Lane - From Willis Waukegan to US 59 (Full Reconstruction)	14.5	MI	$ 3,805,227.00	$ 55,175,792					
	Bridge Reconstruction - East Fork Crystal Creek, Hurricane Creek, Caney Creek, Cagle Branch Creek, Spring Branch Creek, Lawrence Creek, Peach Creek, Jayhawker Creek and East Fork San Jacinto River	243,040	SF	$ 60.00	$ 14,582,400					
	Bridge Culvert Reconstruction - West Fork Crystal Creek, Unnamed Creek near Jefferson Chemical Rd and Bee Branch Creek	7,900	SF	$ 75.00	$ 592,500					
	Add Raised Median / Channelization (Concrete)	1,449,952	SF	$ 10.00	$ 14,499,520					
	Concrete Sidewalks (Loop 336 to Willis Waukegan Rd)	210,870	SF	$ 9.00	$ 1,897,830					
	Butler Street Extension (From Loop 336 to Jefferson Chemical Rd)					1	EA	$ 1,044,400.00	$ 1,044,400	
	TOTAL FOR LONG TERM IMPROVEMENTS (15 years +)				$ 104,658,330				$ 1,044,400	$ 105.70
	GRAND TOTAL				$ 120,063,172				$ 2,055,752	$ 122.12

Units: EA = Each INT = Intersection MI = Miles SF = Square Feet LS = Lump Sum

Cost Estimate Assumptions

	Improvement	Assumptions
Short Term (less than 5 years)	New Traffic Signal (Crystal Forest Intersection)	Costs include vehicle detection, signal heads, street lighting, cabling and conduit. The costs also include pedestrian pads, curb ramps, proposed pavement markings and roadside signs. Traffic signal interconnection, as per TxDOT standards, will also be a part of the new traffic signal.
	Upgrade Signal Equipment (Loop 336 to FM 1485)	Costs for upgrading existing traffic signal controller and cabinet, and installing wireless traffic signal interconnect.
	Optimize Traffic Signal Timing	Cost to obtain traffic count data, develop signal timing inputs, field implement/fine tune and provide documentation.
	Add Right Turn Lane - SH 105 (Average Length = 225')	Costs for adding right turn lanes (RTL's) are based on an average length of 225 LF construction area per RTL. Costs include all the materials required for the widening of existing SH 105 to accommodate the RTL at the intersection.
	Add Right Turn Lane - SH 105 (Average Length = 400')	Costs for adding right turn lanes (RTL's) are based on an average length of 400 LF construction area per RTL. Costs include all the materials required for the widening of existing SH 105 to accommodate the RTL at the intersection.
	Add Right Turn Lane - SH 105 (Average Length = 640')	Costs for adding right turn lanes (RTL's) are based on an average length of 640 LF construction area per RTL. Costs include all the materials required for the widening of existing SH 105 to accommodate the RTL at the intersection.
	Widen SH 105 - From Loop 336 to East of Douget	Costs for widening SH 105 were calculated on a per mile basis. Costs include all the materials required for the widening of existing SH 105 to accommodate the addition of a raised median with left turn bays for access to businesses. Drainage improvements were also included in the costs since existing ditches would have to be relocated due to the roadway widening.
	Add Raised Median / Channelization (Concrete)	Costs for adding raised medians/channelizations include all materials such as curb, conc riprap and striping. The cost was calculated on a square foot basis.
	Add Pedestrian Crosswalks	Costs included adding pavement markings to identify the new crosswalks at the selected intersections.
	Standardize Driveway Width	Costs for standardizing driveway widths include adding a narrow raised median to minimize the excessive width of some driveways. This work includes all materials such as curb and conc riprap. The cost was calculated on a square foot basis.
	Concrete Sidewalks (Loop 336 to east of Douget Rd, Woodridge Dr to Willis Waukegan Rd, Crockett Martin Rd to Carmen Blvd and Pioneer Rd to Security Forest Dr)	Costs for concrete sidewalks include installation of a sidewalk with new curb ramps located at each cross street intersection. The costs was calculated on a square foot basis.
	Add NB Right Turn Lane - Crystal Forest	Costs for adding right turn lane at the Crystal Forest intersection. Costs include all the materials required for the widening cross street to accommodate the RTL at the intersection.
	Add SB Right Turn Lane - FM 1484	Costs for adding right turn lane at the FM 1484 intersection. Costs include all the materials required for the widening cross street to accommodate the RTL at the intersection.
	Add NB Left Turn Lane - Crockett Martin	Costs for adding left turn lane at the Crockett Martin intersection. Costs include all the materials required for the widening cross street to accommodate the LTL at the intersection.
	Add NB Left Turn Lane - Crockett Trace	Costs for adding left turn lane at the Crockett Trace intersection. Costs include all the materials required for the widening cross street to accommodate the LTL at the intersection.
	Add NB Right Turn Lane - Old Highway 105	Costs for adding right turn lane at the Old Hwy 105 intersection. Costs include all the materials required for the widening cross street to accommodate the RTL at the intersection.
	Add NB & SB Left Turn Lanes - Walker	Costs for adding left turn lanes at the Walker intersection. Costs include all the materials required for the widening cross street to accommodate the LTL's at the intersection.
	Add SB Right Turn Lane - Lee Turner	Costs for adding right turn lane at the Lee Turner intersection. Costs include all the materials required for the widening cross street to accommodate the RTL at the intersection.
	Widening (Douget Road)	Costs for widening Douget Road were calculated on a per mile basis. Costs include all the materials required for the widening of existing Douget Road to accommodate a left turn lane at the SH 105 intersection. Drainage improvements were also included in the costs since exisitng ditches would have to be relocated due to the roadway widening.
Medium Term (5-15 years)	Upgrade Signal Equipment (Whipporwill to Crystal Forest)	Costs for upgrading existing traffic signal controller and cabinet, and installing wireless traffic signal interconnect.
	Widen SH 105 - From East of Douget to Crystal Forest	Costs for widening SH 105 were calculated on a per mile basis. Costs include all the materials required for the widening of existing SH 105 to accommodate the addition of a raised median with left turn bays for access to businesses. Drainage improvements were also included in the costs since exisitng ditches would have to be relocated due to the roadway widening.
	Add Raised Median / Channelization (Concrete)	Costs for adding raised medians/channelizations include all materials such as curb, conc riprap and striping. The cost was calculated on a square foot basis.
	Driveway Closure	Costs for driveway closures include demolition of existing driveway and placement of curb, embankment and topsoil.
	Add NB Left Turn Lane - Jefferson	Costs for adding left turn lane at the Jefferson intersection. Costs include all the materials required for the widening cross street to accommodate the LTL at the intersection.
	Realign Old SH 105	Costs for realigning of cross street are based on a 250 LF construction area. Costs include demolition of existing cross street and all the materials required for the relocation of the new cross street. Drainage improvements were also included in the costs since exisitng ditches would have to be relocated due to the roadway widening. Costs for acquiring ROW required for the realignment are not included in the estimate.

Cost Estimate Assumptions (Continued)

	Improvement	Assumptions
Long Term (15 years +)	Widen SH 105 from 4-Lane to 6-Lane (Widen Only)	Costs for widening SH 105 from 4-lanes to 6-lanes were calculated on a per mile basis. Costs include all the materials required for the widening of existing SH 105 to accommodate the additional 2 lanes and a center raised median. Drainage improvements were also included in the costs since exisitng ditches would have to be relocated due to the roadway widening.
	Widen SH 105 from 4-Lane to 6-Lane (Full Reconstruction)	Costs for widening and reconstructing SH 105 from 4-lanes to 6-lanes were calculated on a per mile basis. Costs include all the materials required for the full reconstruction of SH 105 and addition of 2 lanes and a center raised median. Drainage improvements were also included in the costs since exisitng ditches would have to be relocated due to the roadway widening.
	Widen SH 105 from 2-Lane to 4-Lane (Widen Only)	Costs for widening SH 105 from 2-lanes to 4-lanes were calculated on a per mile basis. Costs include all the materials required for the widening of existing SH 105 to accommodate the additional 2 lanes and a center raised median. Drainage improvements were also included in the costs since exisitng ditches would have to be relocated due to the roadway widening.
	Widen SH 105 from 2-Lane to 4-Lane (Full Reconstruction)	Costs for widening and reconstructing SH 105 from 2-lanes to 4-lanes were calculated on a per mile basis. Costs include all the materials required for the full reconstruction of SH 105 and addition of 2 lanes and a center raised median. Drainage improvements were also included in the costs since exisitng ditches would have to be relocated due to the roadway widening.
	Add Raised Median / Channelization (Concrete)	Costs for adding raised medians/channelizations include all materials such as curb, conc riprap and striping. The cost was calculated on a square foot basis.
	Concrete Sidewalks	Costs for concrete sidewalks include installation of a sidewalk with new curb ramps located at each cross street intersection. The costs was calculated on a square foot basis.

Summary of Quantities for Short Term Improvements

	Segment	Short Term Improvements Along SH 105 by TxDOT												
		New Traffic Signal	Upgrade Signal	Optimize Traffic Signal Timing	Add Right Turn Lane - SH 105 (Average Length = 225')	Add Right Turn Lane - SH 105 (Average Length = 400')	Add Right Turn Lane - SH 105 (Average Length = 640')	Widen SH 105	Bridge Widening	Bridge Widening (Concrete)	Add Raised Median / Chan. (Concrete)	Driveway Closure	Add Pedestrian Crosswalks	Standardize Driveway Width	Concrete Sidewalks
		EA	INT	INT	EA	EA	EA	MI	SF	SF	SF	EA	EA	EA	SF
1	From Loop 336 to East of Douget		2					0.7		190	20,265	1	2	3	30,020
2	Douget Intersection Improvements							0.1							
3	From East of Douget to Whipporwill														
4	From Whipporwill to Crystal Forest	1											1	8	
5	From Crystal Forest to Willis Waukegan				1	2	1						1		34,000
6	From Willis Waukegan to Walker					2					2,100		3	3	19,000
7	From Walker to US 59				1		2	1.3			1,909		1		20,000
Total	From Loop 336 to US 59	1	2	9	2	4	3	2.1	3,200	190	24,274	1	8	14	103,020
		EA	INT	INT	EA	EA	EA	MI	SF	SF	SF	EA	EA	EA	SF

Summary of Quantities for Short Term Improvements (Continued)

	Segment	Short Term Improvements by City/County								
		Add NB Right Turn Lane - Crystal Forest	Add SB Right Turn Lane - FM 1484	Add NB Left Turn Lane - Crockett Martin	Add NB Left Turn Lane - Crockett Trace	Add NB Right Turn Lane - Old Highway 105	Add NB & SB Left Turn Lanes - Walker	Add SB Right Turn Lane - Lee Turner	Widening (Douget Road)	Add Raised Median / Channelization (Concrete)
		EA	EA	EA	EA	EA	EA	EA	MI	SF
1	From Loop 336 to East of Douget									
2	Douget Intersection Improvements								0.1	
3	From East of Douget to Whipporwill									
4	From Whipporwill to Crystal Forest	1								
5	From Crystal Forest to Willis Waukegan									
6	From Willis Waukegan to Walker		1	1	1	1	1			1,350
7	From Walker to US 59							1		
Total	From Loop 336 to US 59	1	1	1	1	1	1	1	0.1	1,350
		EA	EA	EA	EA	EA	EA	EA	MI	SF

Units: EA = Each INT = Intersection MI = Miles SF = Square Feet LS = Lump Sum

Summary of Quantities for Medium Term Improvements

		Medium Term						
		Improvements Along SH 105 by TxDOT					Improvements by City/County	
Segment		Upgrade Signal Equipment	Widen SH 105	Bridge Widening (Culvert)	Add Raised Median / Channelization (Concrete)	Driveway Closure	Add NB Left Turn Lane - Jefferson	Realign Old SH 105
		INT	MI	SF	SF	EA	EA	EA
1	From Loop 336 to East of Douget							
2	Douget Intersection Improvements							
3	From East of Douget to Whipporwill		0.6	1,012	24,385	4	1	
4	From Whipporwill to Crystal Forest	1	0.4					
5	From Crystal Forest to Willis Waukegan							
6	From Willis Waukegan to Walker					7		1
7	From Walker to US 59					6		
Total	From Loop 336 to US 59	1	1.0	1,012	24,385	17	1	1
		INT	MI	SF	SF	EA	EA	EA

Summary of Quantities for Long Term Improvements

		Long Term						
		Improvements Along SH 105 by TxDOT						
Segment		Widen SH 105 from 4-lane to 6-lane (Full Reconstruction)	Widen SH 105 from 2-lane to 4-lane (Full Reconstruction)	Bridge Reconstruction	Bridge Reconstruction (Culvert)	Butler Street Extension	Add Raised Median / Channelization (Concrete)	Concrete Sidewalks
		MI	MI	Sf	SF	EA	SF	SF
1	From Loop 336 to Willis Waukegan	4.0		24,926	6,180	1	234,315	210,870
2	From Willis Waukegan to US 59		14.5	218,114	1,720		1,215,637	
Total	From Loop 336 to US 59	4.0	14.5	243,040	7,900	1	1,449,952	210,870
		MI	MI	SF	SF	EA	SF	SF

Units: EA = Each INT = Intersection MI = Miles SF = Square Feet LS = Lump Sum

Cost Estimate Details for Short Term Improvements

					New Traffic Signal		Upgrade Signal Equipment		Optimize Traffic Signal Timing		Add Right Turn Lane - SH 105 (Average Length = 225')		Add Right Turn Lane - SH 105 (Average Length = 400')		Add Right Turn Lane - SH 105 (Average Length = 640')		Add NB Right Turn Lane - Crystal Forest		Add SB Right Turn Lane - FM 1484		Add NB Left Turn Lane - Crockett Martin		Add NB Left Turn Lane - Crockett Trace		Add NB Right Turn Lane - Old Highway 105	
					Per Each		Per Each		Per Each		Per Each		Per Each		Per Each		Per Each		Per Each		Per Each		Per Each		Per Each	
ITEM	CODE	DESCRIPTION	UNIT	PRICE	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST
100	2002	PREPARING ROW	STA	$ 2,500.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
104	2001	REMOVING CONC (PAV)	SY	$ 6.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
104	2009	REMOVING CONC (RIPRAP)	SY	$ 5.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
104	2021	REMOVING CONC (CURB)	LF	$ 4.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
104	2036	REMOVING CONC (SIDEWALK OR RAMP)	SY	$ 11.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
105	2014	REMOVING STAB BASE & ASPH PAV (7"-12")	SY	$ 5.00		$ -		$ -		$ -	50	$ 250.00	91	$ 455.00	142	$ 710.00	38	$ 190.00	63	$ 315.00	48	$ 240.00	44	$ 220.00	67	$ 335.00
110	2001	EXCAVATION (ROADWAY)	CY	$ 8.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
112	2002	SUBGRADE WIDENING (DENS CONT)	STA	$ 1,000.00		$ -		$ -		$ -	2.5	$ 2,500.00	4	$ 4,000.00	6.5	$ 6,500.00	2	$ 2,000.00	3	$ 3,000.00	2	$ 2,000.00	2	$ 2,000.00	3	$ 3,000.00
132	2005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	$ 20.00		$ -		$ -		$ -	215	$ 4,300.00	387	$ 7,740.00	607	$ 12,140.00	161	$ 3,220.00	270	$ 5,400.00	204	$ 4,080.00	189	$ 3,780.00	284	$ 5,680.00
150	2001	BLADING	STA	$ 130.00		$ -		$ -		$ -	2.5	$ 325.00	4	$ 520.00	6.5	$ 845.00	2	$ 260.00	3	$ 390.00	2	$ 260.00	2	$ 260.00	3	$ 390.00
160	2003	FURNISHING AND PLACING TOPSOIL (4")	SY	$ 1.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
162	2002	BLOCK SODDING	SY	$ 4.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
164	2045	STRAW OR HAY MULCHING	SY	$ 0.20		$ -		$ -		$ -	378	$ 75.60	681	$ 136.20	1068	$ 213.60	567	$ 113.40	475	$ 95.00	358	$ 71.60	333	$ 66.60	500	$ 100.00
168	2001	VEGETATIVE WATERING	MG	$ 14.00		$ -		$ -		$ -	5	$ 70.00	8	$ 112.00	13	$ 182.00	7	$ 98.00	6	$ 84.00	4	$ 56.00	4	$ 56.00	6	$ 84.00
170	2001	IRRIGATION SYSTEM	LS	$ 25,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
247	2041	FL BS (CMP IN PLC)(TY A GR 1)(FNAL POS	CY	$ 62.00		$ -		$ -		$ -	68	$ 4,216.00	114	$ 7,068.00	202	$ 12,524.00	18	$ 1,116.00	106	$ 6,572.00	45	$ 2,790.00	76	$ 4,712.00	87	$ 5,394.00
260	2012	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY)	TON	$ 145.00		$ -		$ -		$ -	6	$ 870.00	9	$ 1,305.00	16	$ 2,320.00	1	$ 145.00	9	$ 1,305.00	4	$ 580.00	6	$ 870.00	7	$ 1,015.00
260	2014	LIME TRT (SUBGR)(DC)(6")	SY	$ 2.50		$ -		$ -		$ -	306	$ 765.00	511	$ 1,277.50	910	$ 2,275.00	81	$ 202.50	476	$ 1,190.00	202	$ 505.00	340	$ 850.00	393	$ 982.50
316	2006	ASPH (AC-20-5TR)	GAL	$ 3.50		$ -		$ -		$ -	111	$ 388.50	186	$ 651.00	331	$ 1,158.50	29	$ 101.50	173	$ 605.50	73	$ 255.50	124	$ 434.00	143	$ 500.50
316	2222	AGGR(TY-PB GR-4S SAC-B)	CY	$ 110.00		$ -		$ -		$ -	3	$ 330.00	4	$ 440.00	8	$ 880.00	1	$ 110.00	4	$ 440.00	2	$ 220.00	3	$ 330.00	3	$ 330.00
341	2122	D-GR HMA(QCQA) TY-D PG70-22	TON	$ 80.00		$ -		$ -		$ -	31	$ 2,480.00	51	$ 4,080.00	91	$ 7,280.00	8	$ 640.00	48	$ 3,840.00	20	$ 1,600.00	34	$ 2,720.00	39	$ 3,120.00
354	2023	PLANE ASPH CONC PAV(0" TO 4")	SY	$ 3.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
360	2018	CURB (TYPE II)	LF	$ 4.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
360	2023	CONC PAV (JOINT REINF) (6")	SY	$ 38.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
432	2066	RIPRAP (CONC)(CL B)	CY	$ 300.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	$ 5,000.00		$ -		$ -		$ -	1	$ 5,000.00	1	$ 5,000.00	1	$ 5,000.00	0.5	$ 2,500.00	0.5	$ 2,500.00	0.5	$ 2,500.00	0.5	$ 2,500.00	0.5	$ 2,500.00
506	2034	TEMPORARY SEDIMENT CONTROL FENCE	LF	$ 3.00		$ -		$ -		$ -	250	$ 750.00	400	$ 1,200.00	650	$ 1,950.00	340	$ 1,020.00	285	$ 855.00	215	$ 645.00	200	$ 600.00	300	$ 900.00
506	2040	TEMP SEDIMENT CONTROL FENCE (REMOVE)	LF	$ 1.00		$ -		$ -		$ -	250	$ 250.00	400	$ 400.00	650	$ 650.00	340	$ 340.00	285	$ 285.00	215	$ 215.00	200	$ 200.00	300	$ 300.00
531	2005	CURB RAMPS (TY 1)	EA	$ 1,600.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
531	2024	CONC SIDEWALK (5")	SY	$ 44.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
533	2001	SHOULDER TEXTURING (MILLED)	STA	$ 50.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
636	2001	ALUMINUM SIGNS (TY A)	SF	$ 26.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
644	2001	INS SM RD SN SUP&AM TY 10BWG(1) SA(P)	EA	$ 400.00		$ -		$ -		$ -	1	$ 400.00	1	$ 400.00	1	$ 400.00	1	$ 400.00	1	$ 400.00	1	$ 400.00	1	$ 400.00	1	$ 400.00
662	2004	WK ZN PAV MRK NON-REMOV (W) 4" (SLD)	LF	$ 0.30		$ -		$ -		$ -		$ -		$ -		$ -	340	$ 102.00	285	$ 85.50	215	$ 64.50	200	$ 60.00	300	$ 90.00
662	2032	WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)	LF	$ 0.30		$ -		$ -		$ -		$ -		$ -		$ -	340	$ 102.00	285	$ 85.50	215	$ 64.50	200	$ 60.00	300	$ 90.00
662	2050	WK ZN PAV MRK REMOV (REFL) TY I-A	EA	$ 3.00		$ -		$ -		$ -		$ -		$ -		$ -	9	$ 27.00	7	$ 21.00	6	$ 18.00	5	$ 15.00	8	$ 24.00
666	2003	REFL PAV MRK TY I (W) 4" (BRK)(100MIL)	LF	$ 0.50		$ -		$ -		$ -		$ -		$ -		$ -	85	$ 42.50	143	$ 71.50	108	$ 54.00	100	$ 50.00	150	$ 75.00
666	2006	REFL PAV MRK TY I (W) 4" (DOT)(100MIL)	LF	$ 1.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
666	2012	REFL PAV MRK TY I (W) 4" (SLD)(100MIL)	LF	$ 0.50		$ -		$ -		$ -	250	$ 125.00	400	$ 200.00	650	$ 325.00	340	$ 170.00	570	$ 285.00	430	$ 215.00	400	$ 200.00	600	$ 300.00
666	2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	$ 1.00		$ -		$ -		$ -	100	$ 100.00	100	$ 100.00	100	$ 100.00		$ -		$ -		$ -		$ -		$ -
666	2042	REFL PAV MRK TY I (W) 12"(SLD)(100MIL)	LF	$ 3.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
666	2048	REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	$ 6.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	$ 140.00		$ -		$ -		$ -	1	$ 140.00	1	$ 140.00	1	$ 140.00	2	$ 280.00	2	$ 280.00	2	$ 280.00	2	$ 280.00	2	$ 280.00
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	$ 145.00		$ -		$ -		$ -	1	$ 145.00	1	$ 145.00	1	$ 145.00	2	$ 290.00	2	$ 290.00	2	$ 290.00	2	$ 290.00	2	$ 290.00
666	2105	REFL PAV MRK TY I (Y) 4" (BRK)(100MIL)	LF	$ 0.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
666	2111	REFL PAV MRK TY I (Y) 4" (SLD)(100MIL)	LF	$ 0.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
666	2132	REFL PAV MRK TY I (Y) 24"(SLD)(100MIL)	LF	$ 6.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
672	2012	REFL PAV MRKR TY I-C	EA	$ 3.00		$ -		$ -		$ -	10	$ 30.00	10	$ 30.00	10	$ 30.00	4	$ 12.00	7	$ 21.00	5	$ 15.00	5	$ 15.00	8	$ 24.00
672	2015	REFL PAV MRKR TY II-A-A	EA	$ 3.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
677	2001	ELIM EXT PAV MRK & MRKS (4")	LF	$ 0.45		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
677	2003	ELIM EXT PAV MRK & MRKS (8")	LF	$ 0.60		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
677	2008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	$ 60.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
677	2018	ELIM EXT PAV MRK & MRKS (WORD)	EA	$ 60.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
678	2001	PAV SURF PREP FOR MRK (4")	LF	$ 0.05		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
678	2003	PAV SURF PREP FOR MRK (8")	LF	$ 0.10		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	$ 10.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	$ 10.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
6055	2001	IN - LANE OR TRANSVERSE RUMBLE STRIP	LF	$ 18.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	DRAINAGE IMPROVEMENTS	MI	$ 500,000.00		$ -		$ -		$ -	0.05	$ 25,000.00	0.08	$ 40,000.00	0.12	$ 60,000.00	0.03	$ 15,000.00	0.05	$ 25,000.00	0.04	$ 20,000.00	0.04	$ 20,000.00	0.06	$ 30,000.00
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (RECONSTRUCTION)	EA	$ 150,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (TS2 CABINET)	EA	$ 25,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (DETECTION)	EA	$ 24,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (PEDESTRIAN)	EA	$ 1,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (SIGNAL HEADS)	EA	$ 1,100.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (BACK PLATES)	EA	$ 100.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (POLES)	EA	$ 8,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (REMOVE SIGNAL)	EA	$ 10,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	SIGNAL SYNCHRONIZATION	LS	$ 150,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
		SUB TOTAL 1				$ -		$ -		$ -		$ 48,510.10		$ 75,399.70		$ 115,768.10		$ 28,481.90		$ 53,416.00		$ 37,419.10		$ 40,968.60		$ 56,204.00
					MISC 20%	$ -																				
XXX	XXX	BONDS	LS	5%		$ -		$ -		$ -		$ 2,425.51		$ 3,769.99		$ 5,788.41		$ 1,424.10		$ 2,670.80		$ 1,870.96		$ 2,048.43		$ 2,810.20
500	2001	MOBILIZATION	LS	20%	10%	$ -		$ -		$ -		$ 9,702.02		$ 15,079.94		$ 23,153.62		$ 5,696.38		$ 10,683.20		$ 7,483.82		$ 8,193.72		$ 11,240.80
		SUB TOTAL 2				$ -		$ -		$ -		$ 60,637.63		$ 94,249.63		$ 144,710.13		$ 35,602.38		$ 66,770.00		$ 46,773.88		$ 51,210.75		$ 70,255.00
XXX	XXX	MISCELLANEOUS & CONTINGENCY	LS	20%		$ -		$ -		$ -		$ 12,127.53		$ 18,849.93		$ 28,942.03		$ 7,120.48		$ 13,354.00		$ 9,354.78		$ 10,242.15		$ 14,051.00
		GRAND TOTAL				$ -		$ -		$ -		$ 72,765.15		$ 113,099.55		$ 173,652.15		$ 42,722.85		$ 80,124.00		$ 56,128.65		$ 61,452.90		$ 84,306.00
		CALLED				**$ -**		**$ -**		**$ -**		**$ 72,800.00**		**$ 113,100.00**		**$ 173,700.00**		**$ 42,800.00**		**$ 80,200.00**		**$ 56,200.00**		**$ 61,500.00**		**$ 84,400.00**
		AVERAGE UNIT COST (ROUNDED TO NEAREST $100)			PRICE/EACH	$ 200,000.00	PRICE/EACH	$ 20,500.00	PRICE/EACH	$ 5,000.00	PRICE/EACH	$ 72,800.00	PRICE/EACH	$ 113,100.00	PRICE/EACH	$ 173,700.00	PRICE/EACH	$ 42,800.00	PRICE/EACH	$ 80,200.00	PRICE/EACH	$ 56,200.00	PRICE/EACH	$ 61,500.00	PRICE/EACH	$ 84,400.00

Cost Estimate Details for Short Term Improvements (Continued)

					Add NB & SB Left Turn Lanes - Walker		Add SB Right Turn Lane - Lee Turner		Widen SH 105		Add Raised Median / Channelization (Concrete)		Add Pedestrian Crosswalks		Driveway Closure		Standardize Driveway Width		Concrete Sidewalks	
					Per Each		Per Each		Per Mile		Per Square Foot		Per Each		Per Each		Per Each		Per Square Foot	
ITEM	CODE	DESCRIPTION	UNIT	PRICE	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST
100	2002	PREPARING ROW	STA	$ 2,500.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
104	2001	REMOVING CONC (PAV)	SY	$ 6.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
104	2009	REMOVING CONC (RIPRAP)	SY	$ 5.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
104	2021	REMOVING CONC (CURB)	LF	$ 4.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
104	2036	REMOVING CONC (SIDEWALK OR RAMP)	SY	$ 11.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
105	2014	REMOVING STAB BASE & ASPH PAV (7"-12")	SY	$ 5.00	133	$ 665.00	36	$ 180.00	2588	$ 12,940.00		$ -		$ -	1544	$ 7,720.00		$ -		$ -
110	2001	EXCAVATION (ROADWAY)	CY	$ 8.00		$ -		$ -		$ -		$ -		$ -	255	$ 2,040.00		$ -		$ -
112	2002	SUBGRADE WIDENING (DENS CONT)	STA	$ 1,000.00	6	$ 6,000.00	2	$ 2,000.00	152	$ 152,000.00		$ -		$ -		$ -		$ -		$ -
132	2005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	$ 20.00	568	$ 11,360.00	152	$ 3,040.00	14403	$ 288,060.00		$ -		$ -	100	$ 2,000.00		$ -		$ -
150	2001	BLADING	STA	$ 130.00	6	$ 780.00	2	$ 260.00	152	$ 19,760.00		$ -		$ -		$ -		$ -		$ -
160	2003	FURNISHING AND PLACING TOPSOIL (4")	SY	$ 1.50		$ -		$ -		$ -		$ -		$ -	1544	$ 2,316.00		$ -		$ -
162	2002	BLOCK SODDING	SY	$ 4.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
164	2045	STRAW OR HAY MULCHING	SY	$ 0.20	1000	$ 200.00	267	$ 53.40	38825	$ 7,765.00		$ -		$ -		$ -		$ -		$ -
168	2001	VEGETATIVE WATERING	MG	$ 14.00	12	$ 168.00	3	$ 42.00	466	$ 6,524.00		$ -		$ -		$ -		$ -		$ -
170	2001	IRRIGATION SYSTEM	LS	$ 25,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
247	2041	FL BS (CMP IN PLC)(TY A GR 1)(FNAL POS	CY	$ 62.00	154	$ 9,548.00	39	$ 2,418.00	7528	$ 466,736.00		$ -		$ -		$ -		$ -		$ -
260	2012	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY)	TON	$ 145.00	12	$ 1,740.00	3	$ 435.00	610	$ 88,450.00		$ -		$ -		$ -		$ -		$ -
260	2014	LIME TRT (SUBGR)(DC)(6")	SY	$ 2.50	693	$ 1,732.50	177	$ 442.50	33878	$ 84,695.00		$ -		$ -		$ -		$ -		$ -
316	2006	ASPH (AC-20-5TR)	GAL	$ 3.50	252	$ 882.00	64	$ 224.00	12319	$ 43,116.50		$ -		$ -		$ -		$ -		$ -
316	2222	AGGR(TY-PB GR-4S SAC-B)	CY	$ 110.00	6	$ 660.00	1	$ 110.00	280	$ 30,800.00		$ -		$ -		$ -		$ -		$ -
341	2122	D-GR HMA(QCQA) TY-D PG70-22	TON	$ 80.00	69	$ 5,520.00	18	$ 1,440.00	3388	$ 271,040.00		$ -		$ -		$ -		$ -		$ -
354	2023	PLANE ASPH CONC PAV(0" TO 4")	SY	$ 3.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
360	2018	CURB (TYPE II)	LF	$ 4.00		$ -		$ -		$ -	176945	$ 707,780.00		$ -		$ -	2187	$ 8,748.00		$ -
360	2023	CONC PAV (JOINT REINF) (6")	SY	$ 38.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
432	2066	RIPRAP (CONC)(CL B)	CY	$ 300.00		$ -		$ -		$ -	26182	$ 7,854,600.00		$ -		$ -	53	$ 15,900.00		$ -
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	$ 5,000.00	1	$ 5,000.00	0.5	$ 2,500.00	24	$ 120,000.00	24	$ 120,000.00	0.25	$ 1,250.00	0.25	$ 1,250.00	1	$ 5,000.00		$ -
506	2034	TEMPORARY SEDIMENT CONTROL FENCE	LF	$ 3.00	600	$ 1,800.00	160	$ 480.00	23295	$ 69,885.00		$ -		$ -		$ -		$ -		$ -
506	2040	TEMP SEDIMENT CONTROL FENCE (REMOVE)	LF	$ 1.00	600	$ 600.00	160	$ 160.00	23295	$ 23,295.00		$ -		$ -		$ -		$ -		$ -
531	2005	CURB RAMPS (TY 1)	EA	$ 1,600.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -	112	$ 179,200.00
531	2024	CONC SIDEWALK (5")	SY	$ 44.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -	34877	$ 1,534,588.00
533	2001	SHOULDER TEXTURING (MILLED)	STA	$ 50.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
636	2001	ALUMINUM SIGNS (TY A)	SF	$ 26.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
644	2001	INS SM RD SN SUP&AM TY 10BWG(1) SA(P)	EA	$ 400.00	2	$ 800.00	1	$ 400.00	30	$ 12,000.00		$ -		$ -		$ -		$ -		$ -
662	2004	WK ZN PAV MRK NON-REMOV (W) 4" (SLD)	LF	$ 0.30	600	$ 180.00	160	$ 48.00	23295	$ 6,988.50		$ -		$ -		$ -		$ -		$ -
662	2032	WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)	LF	$ 0.30	600	$ 180.00	160	$ 48.00	23295	$ 6,988.50		$ -		$ -		$ -		$ -		$ -
662	2050	WK ZN PAV MRK REMOV (REFL) TY I-A	EA	$ 3.00	15	$ 45.00	4	$ 12.00	582	$ 1,746.00		$ -		$ -		$ -		$ -		$ -
666	2003	REFL PAV MRK TY I (W) 4" (BRK)(100MIL)	LF	$ 0.50	300	$ 150.00	80	$ 40.00	5824	$ 2,912.00		$ -		$ -		$ -		$ -		$ -
666	2006	REFL PAV MRK TY I (W) 4" (DOT)(100MIL)	LF	$ 1.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
666	2012	REFL PAV MRK TY I (W) 4" (SLD)(100MIL)	LF	$ 0.50	1200	$ 600.00	320	$ 160.00	23295	$ 11,647.50		$ -		$ -		$ -		$ -		$ -
666	2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	$ 1.00		$ -		$ -		$ -	5600	$ 5,600.00		$ -		$ -		$ -		$ -
666	2042	REFL PAV MRK TY I (W) 12"(SLD)(100MIL)	LF	$ 3.00		$ -		$ -		$ -		$ -	360	$ 1,080.00		$ -		$ -		$ -
666	2048	REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	$ 6.00		$ -		$ -		$ -		$ -	72	$ 432.00		$ -		$ -		$ -
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	$ 140.00	4	$ 560.00	2	$ 280.00	12	$ 1,680.00	56	$ 7,840.00		$ -		$ -		$ -		$ -
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	$ 145.00	4	$ 580.00	2	$ 290.00	12	$ 1,740.00	56	$ 8,120.00		$ -		$ -		$ -		$ -
666	2105	REFL PAV MRK TY I (Y) 4" (BRK)(100MIL)	LF	$ 0.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
666	2111	REFL PAV MRK TY I (Y) 4" (SLD)(100MIL)	LF	$ 0.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
666	2132	REFL PAV MRK TY I (Y) 24"(SLD)(100MIL)	LF	$ 6.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
672	2012	REFL PAV MRKR TY I-C	EA	$ 3.00	15	$ 45.00	4	$ 12.00	291	$ 873.00	560	$ 1,680.00		$ -		$ -		$ -		$ -
672	2015	REFL PAV MRKR TY II-A-A	EA	$ 3.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
677	2001	ELIM EXT PAV MRK & MRKS (4")	LF	$ 0.45		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
677	2003	ELIM EXT PAV MRK & MRKS (8")	LF	$ 0.60		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
677	2008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	$ 60.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
677	2018	ELIM EXT PAV MRK & MRKS (WORD)	EA	$ 60.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
678	2001	PAV SURF PREP FOR MRK (4")	LF	$ 0.05		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
678	2003	PAV SURF PREP FOR MRK (8")	LF	$ 0.10		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	$ 10.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	$ 10.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
6055	2001	IN - LANE OR TRANSVERSE RUMBLE STRIP	LF	$ 18.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	DRAINAGE IMPROVEMENTS	MI	$ 500,000.00	0.11	$ 55,000.00	0.03	$ 15,000.00	2.88	$ 1,440,000.00		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (RECONSTRUCTION)	EA	$ 150,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (TS2 CABINET)	EA	$ 25,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (DETECTION)	EA	$ 24,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (PEDESTRIAN)	EA	$ 1,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (SIGNAL HEADS)	EA	$ 1,100.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (BACK PLATES)	EA	$ 100.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (POLES)	EA	$ 8,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (REMOVE SIGNAL)	EA	$ 10,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	SIGNAL SYNCHRONIZATION	LS	$ 150,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -		$ -
		SUB TOTAL 1				$ 104,795.50		$ 30,074.90		$ 3,171,642.00		$ 8,705,620.00		$ 2,762.00		$ 15,326.00		$ 29,648.00		$ 1,713,788.00
XXX	XXX	BONDS	LS	5%		$ 5,239.78		$ 1,503.75		$ 158,582.10		$ 435,281.00		$ 138.10		$ 766.30		$ 1,482.40		$ 85,689.40
500	2001	MOBILIZATION	LS	20%		$ 20,959.10		$ 6,014.98		$ 634,328.40		$ 1,741,124.00		$ 552.40		$ 3,065.20		$ 5,929.60		$ 342,757.60
		SUB TOTAL 2				$ 130,994.38		$ 37,593.63		$ 3,964,552.50		$ 10,882,025.00		$ 3,452.50		$ 19,157.50		$ 37,060.00		$ 2,142,235.00
XXX	XXX	MISCELLANEOUS & CONTINGENCY	LS	20%		$ 26,198.88		$ 7,518.73		$ 792,910.50		$ 2,176,405.00		$ 690.50		$ 3,831.50		$ 7,412.00		$ 428,447.00
		GRAND TOTAL				$ 157,193.25		$ 45,112.35		$ 4,757,463.00		$ 13,058,430.00		$ 4,143.00		$ 22,989.00		$ 44,472.00		$ 2,570,682.00

Units: EA = Each INT = Intersection MI = Miles SF = Square Feet LS = Lump Sum STA = Station SY = Square Yards CY = Cubic Yards LF = Linear Feet

Cost Estimate Details for Medium Term Improvements

					Add NB Left Turn Lane - Jefferson		Widen SH 105		Add Raised Median / Channelization (Concrete)		Driveway Closure		Realign Old SH 105	
					Per Each		Per Mile		Per Square Foot		Per Each		Per Each	
ITEM	CODE	DESCRIPTION	UNIT	PRICE	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST
100	2002	PREPARING ROW	STA	$ 2,500.00		$ -		$ -		$ -		$ -	2	$ 5,000.00
104	2001	REMOVING CONC (PAV)	SY	$ 6.00		$ -		$ -		$ -		$ -		$ -
104	2009	REMOVING CONC (RIPRAP)	SY	$ 5.00		$ -		$ -		$ -		$ -		$ -
104	2021	REMOVING CONC (CURB)	LF	$ 4.00		$ -		$ -		$ -		$ -		$ -
104	2036	REMOVING CONC (SIDEWALK OR RAMP)	SY	$ 11.00		$ -		$ -		$ -		$ -		$ -
105	2014	REMOVING STAB BASE & ASPH PAV (7"-12")	SY	$ 5.00	139	$ 695.00	2588	$ 12,940.00		$ -	1544	$ 7,720.00	978	$ 4,890.00
110	2001	EXCAVATION (ROADWAY)	CY	$ 8.00		$ -		$ -		$ -	255	$ 2,040.00	500	$ 4,000.00
112	2002	SUBGRADE WIDENING (DENS CONT)	STA	$ 1,000.00	6	$ 6,000.00	152	$ 152,000.00		$ -		$ -		$ -
132	2005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	$ 20.00	592	$ 11,840.00	14403	$ 288,060.00		$ -	100	$ 2,000.00	100	$ 2,000.00
150	2001	BLADING	STA	$ 130.00	6	$ 780.00	152	$ 19,760.00		$ -		$ -	2	$ 260.00
160	2003	FURNISHING AND PLACING TOPSOIL (4")	SY	$ 1.50		$ -		$ -		$ -	1544	$ 2,316.00		$ -
162	2002	BLOCK SODDING	SY	$ 4.00		$ -		$ -		$ -		$ -		$ -
164	2045	STRAW OR HAY MULCHING	SY	$ 0.20	1042	$ 208.40	38825	$ 7,765.00		$ -		$ -	1000	$ 200.00
168	2001	VEGETATIVE WATERING	MG	$ 14.00	13	$ 182.00	466	$ 6,524.00		$ -		$ -	5	$ 70.00
170	2001	IRRIGATION SYSTEM	LS	$ 25,000.00		$ -		$ -		$ -		$ -		$ -
247	2041	FL BS (CMP IN PLC)(TY A GR 1)(FNAL POS	CY	$ 62.00	114	$ 7,068.00	7528	$ 466,736.00		$ -		$ -	190	$ 11,780.00
260	2012	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY)	TON	$ 145.00	9	$ 1,305.00	610	$ 88,450.00		$ -		$ -	15	$ 2,175.00
260	2014	LIME TRT (SUBGR)(DC)(6")	SY	$ 2.50	512	$ 1,280.00	33878	$ 84,695.00		$ -		$ -	856	$ 2,140.00
316	2006	ASPH (AC-20-5TR)	GAL	$ 3.50	186	$ 651.00	12319	$ 43,116.50		$ -		$ -	311	$ 1,088.50
316	2222	AGGR(TY-PB GR-4S SAC-B)	CY	$ 110.00	4	$ 440.00	280	$ 30,800.00		$ -		$ -	7	$ 770.00
341	2122	D-GR HMA(QCQA) TY-D PG70-22	TON	$ 80.00	51	$ 4,080.00	3388	$ 271,040.00		$ -		$ -	86	$ 6,880.00
354	2023	PLANE ASPH CONC PAV(0" TO 4")	SY	$ 3.50		$ -		$ -		$ -		$ -		$ -
360	2018	CURB (TYPE II)	LF	$ 4.00		$ -		$ -	176945	$ 707,780.00		$ -		$ -
360	2023	CONC PAV (JOINT REINF) (6")	SY	$ 38.00		$ -		$ -		$ -		$ -		$ -
432	2066	RIPRAP (CONC)(CL B)	CY	$ 300.00		$ -		$ -	26182	$ 7,854,600.00		$ -		$ -
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	$ 5,000.00	1	$ 5,000.00	24	$ 120,000.00	24	$ 120,000.00	0.25	$ 1,250.00	6	$ 30,000.00
506	2034	TEMPORARY SEDIMENT CONTROL FENCE	LF	$ 3.00	625	$ 1,875.00	23295	$ 69,885.00		$ -		$ -	500	$ 1,500.00
506	2040	TEMP SEDIMENT CONTROL FENCE (REMOVE)	LF	$ 1.00	625	$ 625.00	23295	$ 23,295.00		$ -		$ -	500	$ 500.00
531	2005	CURB RAMPS (TY 1)	EA	$ 1,600.00		$ -		$ -		$ -		$ -		$ -
531	2024	CONC SIDEWALK (5")	SY	$ 44.00		$ -		$ -		$ -		$ -		$ -
533	2001	SHOULDER TEXTURING (MILLED)	STA	$ 50.00		$ -		$ -		$ -		$ -		$ -
636	2001	ALUMINUM SIGNS (TY A)	SF	$ 26.00		$ -		$ -		$ -		$ -		$ -
644	2001	INS SM RD SN SUP&AM TY 10BWG(1) SA(P)	EA	$ 400.00	2	$ 800.00	30	$ 12,000.00		$ -		$ -		$ -
662	2004	WK ZN PAV MRK NON-REMOV (W) 4" (SLD)	LF	$ 0.30	625	$ 187.50	23295	$ 6,988.50		$ -		$ -		$ -
662	2032	WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)	LF	$ 0.30	625	$ 187.50	23295	$ 6,988.50		$ -		$ -		$ -
662	2050	WK ZN PAV MRK REMOV (REFL) TY I-A	EA	$ 3.00	15	$ 45.00	582	$ 1,746.00		$ -		$ -		$ -
666	2003	REFL PAV MRK TY I (W) 4" (BRK)(100MIL)	LF	$ 0.50	313	$ 156.50	5824	$ 2,912.00		$ -		$ -		$ -
666	2006	REFL PAV MRK TY I (W) 4" (DOT)(100MIL)	LF	$ 1.50		$ -		$ -		$ -		$ -		$ -
666	2012	REFL PAV MRK TY I (W) 4" (SLD)(100MIL)	LF	$ 0.50	1250	$ 625.00	23295	$ 11,647.50		$ -		$ -	500	$ 250.00
666	2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	$ 1.00		$ -		$ -	5600	$ 5,600.00		$ -		$ -
666	2042	REFL PAV MRK TY I (W) 12"(SLD)(100MIL)	LF	$ 3.00		$ -		$ -		$ -		$ -		$ -
666	2048	REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	$ 6.00		$ -		$ -		$ -		$ -		$ -
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	$ 140.00	2	$ 280.00	12	$ 1,680.00	56	$ 7,840.00		$ -		$ -
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	$ 145.00	2	$ 290.00	12	$ 1,740.00	56	$ 8,120.00		$ -		$ -
666	2105	REFL PAV MRK TY I (Y) 4" (BRK)(100MIL)	LF	$ 0.50		$ -		$ -		$ -		$ -		$ -
666	2111	REFL PAV MRK TY I (Y) 4" (SLD)(100MIL)	LF	$ 0.50		$ -		$ -		$ -		$ -	500	$ 250.00
666	2132	REFL PAV MRK TY I (Y) 24"(SLD)(100MIL)	LF	$ 6.00		$ -		$ -		$ -		$ -		$ -
672	2012	REFL PAV MRKR TY I-C	EA	$ 3.00	16	$ 48.00	291	$ 873.00	560	$ 1,680.00		$ -		$ -
672	2015	REFL PAV MRKR TY II-A-A	EA	$ 3.00		$ -		$ -		$ -		$ -	15	$ 45.00
677	2001	ELIM EXT PAV MRK & MRKS (4")	LF	$ 0.45		$ -		$ -		$ -		$ -		$ -
677	2003	ELIM EXT PAV MRK & MRKS (8")	LF	$ 0.60		$ -		$ -		$ -		$ -		$ -
677	2008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	$ 60.00		$ -		$ -		$ -		$ -		$ -
677	2018	ELIM EXT PAV MRK & MRKS (WORD)	EA	$ 60.00		$ -		$ -		$ -		$ -		$ -
678	2001	PAV SURF PREP FOR MRK (4")	LF	$ 0.05		$ -		$ -		$ -		$ -		$ -
678	2003	PAV SURF PREP FOR MRK (8")	LF	$ 0.10		$ -		$ -		$ -		$ -		$ -
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	$ 10.00		$ -		$ -		$ -		$ -		$ -
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	$ 10.00		$ -		$ -		$ -		$ -		$ -
6055	2001	IN - LANE OR TRANSVERSE RUMBLE STRIP	LF	$ 18.00		$ -		$ -		$ -		$ -		$ -
XXX	XXX	DRAINAGE IMPROVEMENTS	MI	$ 500,000.00	0.12	$ 60,000.00	2.88	$ 1,440,000.00		$ -		$ -	0.05	$ 25,000.00
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (RECONSTRUCTION)	EA	$ 150,000.00		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (TS2 CABINET)	EA	$ 25,000.00		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (DETECTION)	EA	$ 24,000.00		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (PEDESTRIAN)	EA	$ 1,000.00		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (SIGNAL HEADS)	EA	$ 1,100.00		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (BACK PLATES)	EA	$ 100.00		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (POLES)	EA	$ 8,000.00		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (REMOVE SIGNAL)	EA	$ 10,000.00		$ -		$ -		$ -		$ -		$ -
XXX	XXX	SIGNAL SYNCHRONIZATION	LS	$ 150,000.00		$ -		$ -		$ -		$ -		$ -
		SUB TOTAL 1				$ 104,648.90		$ 3,171,642.00		$ 8,705,620.00		$ 15,326.00		$ 98,798.50
XXX	XXX	BONDS	LS	5%		$ 5,232.45		$ 158,582.10		$ 435,281.00		$ 766.30		$ 4,939.93
500	2001	MOBILIZATION	LS	20%		$ 20,929.78		$ 634,328.40		$ 1,741,124.00		$ 3,065.20		$ 19,759.70
		SUB TOTAL 2				$ 130,811.13		$ 3,964,552.50		$ 10,882,025.00		$ 19,157.50		$ 123,498.13
XXX	XXX	MISCELLANEOUS & CONTINGENCY	LS	20%		$ 26,162.23		$ 792,910.50		$ 2,176,405.00		$ 3,831.50		$ 24,699.63
		GRAND TOTAL				$ 156,973.35		$ 4,757,463.00		$ 13,058,430.00		$ 22,989.00		$ 148,197.75
		CALLED				**$ 157,000.00**		**$ 4,757,500.00**		**$ 13,058,430.00**		**$ 23,000.00**		**$ 148,200.00**

Units: EA = Each INT = Intersection MI = Miles SF = Square Feet LS = Lump Sum STA = Station SY = Square Yards CY = Cubic Yards LF = Linear Feet

Cost Estimate Details for Long Term Improvements

					Widen SH 105 from 4-Lane to 6-Lane (Widen Only)		Widen SH 105 from 4-Lane to 6-Lane (Full Reconstruction)		Widen SH 105 from 2-Lane to 4-Lane (Widen Only)		Widen SH 105 from 2-Lane to 4-Lane (Full Reconstruction)		Add Raised Median / Channelization (Concrete)		Butler Street Extension		Concrete Sidewalks	
					Per Mile		Per Mile		Per Mile		Per Mile		Per Square Foot		Per Each		Per Square Foot	
ITEM	CODE	DESCRIPTION	UNIT	PRICE	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST	QTY.	COST
100	2002	PREPARING ROW	STA	$ 2,500.00		$ -		$ -		$ -		$ -		$ -	28	$ 70,000.00		$ -
104	2001	REMOVING CONC (PAV)	SY	$ 6.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
104	2009	REMOVING CONC (RIPRAP)	SY	$ 5.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
104	2021	REMOVING CONC (CURB)	LF	$ 4.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
104	2036	REMOVING CONC (SIDEWALK OR RAMP)	SY	$ 11.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
105	2014	REMOVING STAB BASE & ASPH PAV (7"-12")	SY	$ 5.00	4686	$ 23,430.00	141830	$ 709,150.00	17020	$ 85,100.00	412784	$ 2,063,920.00		$ -		$ -		$ -
110	2001	EXCAVATION (ROADWAY)	CY	$ 8.00		$ -		$ -		$ -		$ -		$ -	530	$ 4,240.00		$ -
112	2002	SUBGRADE WIDENING (DENS CONT)	STA	$ 1,000.00	211	$ 211,000.00	211	$ 211,000.00	766	$ 766,000.00	766	$ 766,000.00		$ -		$ -		$ -
132	2005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	$ 20.00	19969	$ 399,380.00	19969	$ 399,380.00	72528	$ 1,450,560.00	72528	$ 1,450,560.00		$ -	2652	$ 53,040.00		$ -
150	2001	BLADING	STA	$ 130.00	211	$ 27,430.00	211	$ 27,430.00	766	$ 99,580.00	766	$ 99,580.00		$ -	28	$ 3,640.00		$ -
160	2003	FURNISHING AND PLACING TOPSOIL (4")	SY	$ 1.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -
162	2002	BLOCK SODDING	SY	$ 4.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
164	2045	STRAW OR HAY MULCHING	SY	$ 0.20	70290	$ 14,058.00	70290	$ 14,058.00	255300	$ 51,060.00	255300	$ 51,060.00		$ -	9333	$ 1,866.60		$ -
168	2001	VEGETATIVE WATERING	MG	$ 14.00	843	$ 11,802.00	843	$ 11,802.00	3064	$ 42,896.00	3064	$ 42,896.00		$ -	112	$ 1,568.00		$ -
170	2001	IRRIGATION SYSTEM	LS	$ 25,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
247	2041	FL BS (CMP IN PLC)(TY A GR 1)(FNAL POS	CY	$ 62.00	25229	$ 1,564,198.00	59898	$ 3,713,676.00	76939	$ 4,770,218.00	177841	$ 11,026,142.00		$ -	1824	$ 113,088.00		$ -
260	2012	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY)	TON	$ 145.00	2044	$ 296,380.00	4852	$ 703,540.00	6232	$ 903,640.00	14405	$ 2,088,725.00		$ -	148	$ 21,460.00		$ -
260	2014	LIME TRT (SUBGR)(DC)(6")	SY	$ 2.50	113529	$ 283,822.50	269541	$ 673,852.50	346224	$ 865,560.00	800287	$ 2,000,717.50		$ -	8207	$ 20,517.50		$ -
316	2006	ASPH (AC-20-5TR)	GAL	$ 3.50	41283	$ 144,490.50	98015	$ 343,052.50	125900	$ 440,650.00	291013	$ 1,018,545.50		$ -	2984	$ 10,444.00		$ -
316	2222	AGGR(TY-PB GR-4S SAC-B)	CY	$ 110.00	938	$ 103,180.00	2228	$ 245,080.00	2861	$ 314,710.00	6614	$ 727,540.00		$ -	68	$ 7,480.00		$ -
341	2122	D-GR HMA(QCQA) TY-D PG70-22	TON	$ 80.00	11353	$ 908,240.00	26954	$ 2,156,320.00	34622	$ 2,769,760.00	80029	$ 6,402,320.00		$ -	821	$ 65,680.00		$ -
354	2023	PLANE ASPH CONC PAV(0" TO 4")	SY	$ 3.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -
360	2018	CURB (TYPE II)	LF	$ 4.00	42174	$ 168,696.00	42174	$ 168,696.00	153180	$ 612,720.00	153180	$ 612,720.00	176945	$ 707,780.00		$ -		$ -
360	2023	CONC PAV (JOINT REINF) (6")	SY	$ 38.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
432	2066	RIPRAP (CONC)(CL B)	CY	$ 300.00		$ -		$ -		$ -		$ -	26182	$ 7,854,600.00		$ -		$ -
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	$ 5,000.00	48	$ 240,000.00	60	$ 300,000.00	60	$ 300,000.00	60	$ 300,000.00	24	$ 120,000.00	6	$ 30,000.00		$ -
506	2034	TEMPORARY SEDIMENT CONTROL FENCE	LF	$ 3.00	42174	$ 126,522.00	42174	$ 126,522.00	153180	$ 459,540.00	153180	$ 459,540.00		$ -	5600	$ 16,800.00		$ -
506	2040	TEMP SEDIMENT CONTROL FENCE (REMOVE)	LF	$ 1.00	42174	$ 42,174.00	42174	$ 42,174.00	153180	$ 153,180.00	153180	$ 153,180.00		$ -	5600	$ 5,600.00		$ -
531	2005	CURB RAMPS (TY 1)	EA	$ 1,600.00		$ -		$ -		$ -		$ -		$ -		$ -	112	$ 179,200.00
531	2024	CONC SIDEWALK (5")	SY	$ 44.00		$ -		$ -		$ -		$ -		$ -		$ -	34877	$ 1,534,588.00
533	2001	SHOULDER TEXTURING (MILLED)	STA	$ 50.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
636	2001	ALUMINUM SIGNS (TY A)	SF	$ 26.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
644	2001	INS SM RD SN SUP&AM TY 10BWG(1) SA(P)	EA	$ 400.00	42	$ 16,800.00	42	$ 16,800.00	153	$ 61,200.00	153	$ 61,200.00		$ -		$ -		$ -
662	2004	WK ZN PAV MRK NON-REMOV (W) 4" (SLD)	LF	$ 0.30	42174	$ 12,652.20	42174	$ 12,652.20	153180	$ 45,954.00	153180	$ 45,954.00		$ -		$ -		$ -
662	2032	WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)	LF	$ 0.30	42174	$ 12,652.20	42174	$ 12,652.20	153180	$ 45,954.00	153180	$ 45,954.00		$ -		$ -		$ -
662	2050	WK ZN PAV MRK REMOV (REFL) TY I-A	EA	$ 3.00	1055	$ 3,165.00	1055	$ 3,165.00	3830	$ 11,490.00	3830	$ 11,490.00		$ -		$ -		$ -
666	2003	REFL PAV MRK TY I (W) 4" (BRK)(100MIL)	LF	$ 0.50	10544	$ 5,272.00	21087	$ 10,543.50	38295	$ 19,147.50	38295	$ 19,147.50		$ -		$ -		$ -
666	2006	REFL PAV MRK TY I (W) 4" (DOT)(100MIL)	LF	$ 1.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -
666	2012	REFL PAV MRK TY I (W) 4" (SLD)(100MIL)	LF	$ 0.50	42174	$ 21,087.00	42174	$ 21,087.00	153180	$ 76,590.00	153180	$ 76,590.00		$ -	5600	$ 2,800.00		$ -
666	2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	$ 1.00		$ -		$ -		$ -		$ -	5600	$ 5,600.00		$ -		$ -
666	2042	REFL PAV MRK TY I (W) 12"(SLD)(100MIL)	LF	$ 3.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
666	2048	REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	$ 6.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	$ 140.00	8	$ 1,120.00	8	$ 1,120.00	48	$ 6,720.00	48	$ 6,720.00	56	$ 7,840.00		$ -		$ -
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	$ 145.00	8	$ 1,160.00	8	$ 1,160.00	48	$ 6,960.00	48	$ 6,960.00	56	$ 8,120.00		$ -		$ -
666	2105	REFL PAV MRK TY I (Y) 4" (BRK)(100MIL)	LF	$ 0.50		$ -		$ -		$ -		$ -		$ -		$ -		$ -
666	2111	REFL PAV MRK TY I (Y) 4" (SLD)(100MIL)	LF	$ 0.50		$ -		$ -		$ -		$ -		$ -	5600	$ 2,800.00		$ -
666	2132	REFL PAV MRK TY I (Y) 24"(SLD)(100MIL)	LF	$ 6.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
672	2012	REFL PAV MRKR TY I-C	EA	$ 3.00	527	$ 1,581.00	527	$ 1,581.00	1915	$ 5,745.00	1915	$ 5,745.00	560	$ 1,680.00		$ -		$ -
672	2015	REFL PAV MRKR TY II-A-A	EA	$ 3.00		$ -		$ -		$ -		$ -		$ -	70	$ 210.00		$ -
677	2001	ELIM EXT PAV MRK & MRKS (4")	LF	$ 0.45		$ -		$ -		$ -		$ -		$ -		$ -		$ -
677	2003	ELIM EXT PAV MRK & MRKS (8")	LF	$ 0.60		$ -		$ -		$ -		$ -		$ -		$ -		$ -
677	2008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	$ 60.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
677	2018	ELIM EXT PAV MRK & MRKS (WORD)	EA	$ 60.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
678	2001	PAV SURF PREP FOR MRK (4")	LF	$ 0.05		$ -		$ -		$ -		$ -		$ -		$ -		$ -
678	2003	PAV SURF PREP FOR MRK (8")	LF	$ 0.10		$ -		$ -		$ -		$ -		$ -		$ -		$ -
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	$ 10.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	$ 10.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
6055	2001	IN - LANE OR TRANSVERSE RUMBLE STRIP	LF	$ 18.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	DRAINAGE IMPROVEMENTS	MI	$ 500,000.00	3.99	$ 1,995,000.00	3.99	$ 1,995,000.00	14.51	$ 7,255,000.00	14.51	$ 7,255,000.00		$ -	0.53	$ 265,000.00		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (RECONSTRUCTION)	EA	$ 150,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (TS2 CABINET)	EA	$ 25,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (DETECTION)	EA	$ 24,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (PEDESTRIAN)	EA	$ 1,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (SIGNAL HEADS)	EA	$ 1,100.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (BACK PLATES)	EA	$ 100.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (POLES)	EA	$ 8,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	TRAFFIC SIGNAL IMPROVEMENTS (REMOVE SIGNAL)	EA	$ 10,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
XXX	XXX	SIGNAL SYNCHRONIZATION	LS	$ 150,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
		SUB TOTAL 1				$ 6,635,292.40		$ 11,921,493.90		$ 21,619,934.50		$ 36,798,206.50		$ 8,705,620.00		$ 696,234.10		$ 1,713,788.00
XXX	XXX	BONDS	LS	5%		$ 331,764.62		$ 596,074.70		$ 1,080,996.73		$ 1,839,910.33		$ 435,281.00		$ 34,811.71		$ 85,689.40
500	2001	MOBILIZATION	LS	20%		$ 1,327,058.48		$ 2,384,298.78		$ 4,323,986.90		$ 7,359,641.30		$ 1,741,124.00		$ 139,246.82		$ 342,757.60
		SUB TOTAL 2				$ 8,294,115.50		$ 14,901,867.38		$ 27,024,918.13		$ 45,997,758.13		$ 10,882,025.00		$ 870,292.63		$ 2,142,235.00
XXX	XXX	MISCELLANEOUS & CONTINGENCY	LS	20%		$ 1,658,823.10		$ 2,980,373.48		$ 5,404,983.63		$ 9,199,551.63		$ 2,176,405.00		$ 174,058.53		$ 428,447.00
		GRAND TOTAL				$ 9,952,938.60		$ 17,882,240.85		$ 32,429,901.75		$ 55,197,309.75		$ 13,058,430.00		$ 1,044,351.15		$ 2,570,682.00
		CALLED				**$ 9,953,000.00**		**$ 17,882,300.00**		**$ 32,430,000.00**		**$ 55,197,400.00**		**$ 13,058,430.00**		**$ 1,044,400.00**		**$ 2,570,700.00**
		AVERAGE UNIT COST (ROUNDED TO NEAREST $100)			PRICE/MILE	$ 2,492,144.00	PRICE/MILE	$ 4,477,572.00	PRICE/MILE	$ 2,235,676.00	PRICE/MILE	$ 3,805,227.00	PRICE/SQ. FT.	$ 10.00	PRICE/EACH	$ 1,044,400.00	PRICE/SQ. FT.	$ 9.00

Units: EA = Each INT = Intersection MI = Miles SF = Square Feet LS = Lump Sum STA = Station SY = Square Yards CY = Cubic Yards LF = Linear Feet

SH 105 COST BRIDGE WIDENING/RECONSTRUCTION

Structure Number	Water/Roadway Crossing	Type	Existing Bridge Length	Existing Bridge Width	Bridge Widening/Reconstruction Needed					
					Short Term Widening		Medium Term Widening		Long Term New Bridge	
			LF	LF	LF	SF	LF	SF	LF	SF
3	West Fork Crystal Creek	Culvert	38	86	5	190	0	0	103	3,914
4	Unnamed Creek	Culvert	22	45	0	0	46	1,012	103	2,266
5	East Fork Crystal Creek	Bridge	182	49.7	0	0	0	0	103	18,746
6	Hurricane Creek	Bridge	60	48.5	0	0	0	0	103	6,180
7	Caney Creek	Bridge	645	46	0	0	0	0	86	55,470
8	Cagle Branch Creek	Bridge	120	46	0	0	0	0	86	10,320
9	Spring Branch Creek	Bridge	120	46	0	0	0	0	86	10,320
10	Lawrence Creek	Bridge	200	46	16	3,200	0	0	86	17,200
11	Peach Creek	Bridge	664	46	0	0	0	0	86	57,104
12	BNSF Railroad	Bridge	250	88.9	0	0	0	0	0	0
13	Jayhawker Creek	Bridge	250	47	0	0	0	0	86	21,500
14	Bee Branch Creek	Culvert	20	45	0	0	0	0	86	1,720
15	East Fork San Jacinto River	Bridge	1,100	44	0	0	0	0	42	46,200
TOTALS						3,390		1,012		250,940
						SF		SF		SF

Calcluations for Bridge Culvert Costs

Structure Number	Water/Roadway Crossing	Calculations for Bridge Culvert Costs – Short Term					
		Price per LF	Box Culvert	Head Wall	Total	Calc Price per SF	Price per SF Used
3	West Fork Crystal Creek	$650	$13,000	$9,000	$22,000	$115.79	$120

Structure Number	Water/Roadway Crossing	Calculations for Bridge Culvert Costs – Medium Term					
		Price per LF	Box Culvert	Head Wall	Total	Calc Price per SF	Price per SF Used
4	Unnamed Creek	$650	$59,800	$18,000	$77,800	$76.88	$80

Structure Number	Water/Roadway Crossing	Calculations for Bridge Culvert Costs – Long Term						
		Price per LF	Box Culvert	Head Wall	Removal of Existing Culvert	Total	Calc Price per SF	Price per SF Used
3	West Fork Crystal Creek	$650	$268,800	$18,000	$5,460	$291,260	$74.71	
4	Unnamed Creek	$650	$133,900	$18,000	$2,730	$154,630	$68.24	
14	Bee Branch Creek	$650	$11,800	$18,000	$1,350	$131,150	$76.24	
LONG TERM TOTALS						$577,040	$73.04	$75