SH 249 ACCESS MANAGEMENT STUDY

AUGUST 2015

Houston-Galveston Area Council

CDM Smith

IN ASSOCIATION WITH

HNTB
THE LENTZ GROUP
CJ HENSCH

SH 249

Acknowledgments

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Introduction

CHAPTER 1

This chapter provides an overview of the study purpose and participants, background, goals, study area, and process and schedule.

STUDY PURPOSE AND PARTICIPANTS

The purpose of this access management study is to develop short, medium, and long-term transportation improvements to enhance corridor mobility, safety, and quality of life, as well as economic growth along SH 249 between the Sam Houston Tollway/Beltway 8 and Interstate 45 (I-45) in Harris County. This study will also consider long-term multimodal transportation strategies along the SH 249 corridor and other major study area roadways to improve mobility and enhance connectivity in the Houston metropolitan area. The purpose of these recommendations being developed is to address mobility and safety for all road users, including pedestrians and bicyclists.

> Proper access management assists in protecting the substantial public investment in transportation by preserving roadway efficiency and enhancing traffic safety, thus reducing the need for expensive improvements. Also, access management can significantly reduce traffic accidents, personal injury, and property damage.
>
> *Source: Access Management Manual, TxDOT, July 2011*

Participants in this study include:

- Houston-Galveston Council (H-GAC): Lead Agency and Funding Partner
- Texas Department of Transportation (TxDOT): Funding Agency
- Steering Committee Members
- Stakeholders: Private Sector
- Public

STUDY BACKGROUND

The Houston metropolitan area is among the fastest-growing metropolitan areas in the United States with the eight-county region's population projected to grow from 6.2 million today to 9.6 million by 2040. It is critical to have an efficient transportation system to sustain the mobility needs of the growing population and continue to foster economic growth in the area.

SH 249 is an important local and regional corridor for existing and future movement of people and goods in northwest Houston. SH 249 extends from I-45 North to the intersection of FM 1774 and FM 149 in Pinehurst. It is classified as a principal arterial and has a variety of cross sections as well as types of access control. It serves major traffic generators and points of interest such as the Sam Houston Race Track, Willowbrook Mall, and two campuses of Lone Star College. The Hewlett-Packard Houston Campus (formerly Compaq Headquarters) is based at the Louetta Road intersection and FMC Technologies, a global leader for the energy industry, has an office building located at the SH 249 and BW 8 interchange. Daily traffic volumes are approximately 146,000 near the intersection of SH 249 and FM 1960.

Funding has been approved to construct three toll lanes in each direction along SH 249. The SH 249 or Tomball Tollway project is proposed to be constructed in up to three phases from beginning north of Spring Cypress Road to FM 1488 extending further from FM 149. The section of Tomball Tollway between just south of Brown Road to Cypress Spring Road recently opened in April 2015. The tollway will intersect with the planned Segment F of the Grand Parkway and the future Woodlands Parkway extension. Ultimately, there are plans to extend SH 249 to College Station, home of Texas A&M University.

The focus of this study is to evaluate existing and future traffic conditions on SH 249 between Sam Houston Tollway/Beltway 8 and I-45. With the construction of the toll lanes immediately north of this area, more traffic is anticipated to use this section of SH 249.

STUDY GOALS

The following goals were developed for the SH 249 Access Management Study in collaboration with the Steering Committee members during meetings held throughout the project:

- **Improve** safety and mobility for all transportation modes (i.e., vehicular, pedestrian, transit, bicyclist, and other users).
- **Develop** a uniform access management strategy for the corridor.
- **Identify** low-cost solutions that can be implemented in the short-term.
- **Develop** innovative long-term transportation strategies that enhance the corridor and promote regional connectivity.

STUDY AREA

SH 249 between the Sam Houston Tollway/Beltway 8 and I-45 is approximately 7.2 miles in length and traverses in a north-south direction from Beltway 8 to Breen Drive, and in a west-east direction from Breen Drive to I-45. SH 249 is considered primarily a major north-south thoroughfare in northwest Houston.

The SH 249 intersection with the Sam Houston Tollway is grade separated with access to Beltway 8 frontage roads. SH 249 connects to I-45 with an at-grade diamond interchange at the I-45 frontage roads. Other major thoroughfares connecting to the study corridor include Hollister Street, Fallbrook Drive, North Houston Rosslyn Road, Antoine Drive, West Montgomery Road, Breen Drive, Ella Boulevard, and Veterans Memorial Drive. **Figure 1.1** shows the study corridor and the major intersecting roadways.

Another component of this study is to evaluate the regional connectivity along SH 249. For this purpose, the study area shown in Figure 1.1 is established to identify recommendations to improve mobility along SH 249 and enhance the street network connectivity within this area.

STUDY PROCESS AND SCHEDULE

The study process for this access management study has four major components:

- Evaluate Existing Conditions
- Develop Traffic Analysis Model
- Develop and Evaluate Short and Medium-Term Recommendations
- Identify Long-Term Strategies

Public involvement is very important in an access management study and served as a critical and ongoing component throughout this study. The details of public involvement activities are described in Chapter 2.

This study was conducted over an approximate one-year period which began in June 2014 and concluded in July 2015. The project schedule showing major tasks, meetings, and deliverables is shown in **Figure 1.2**.

Figure 1.1 Study Area

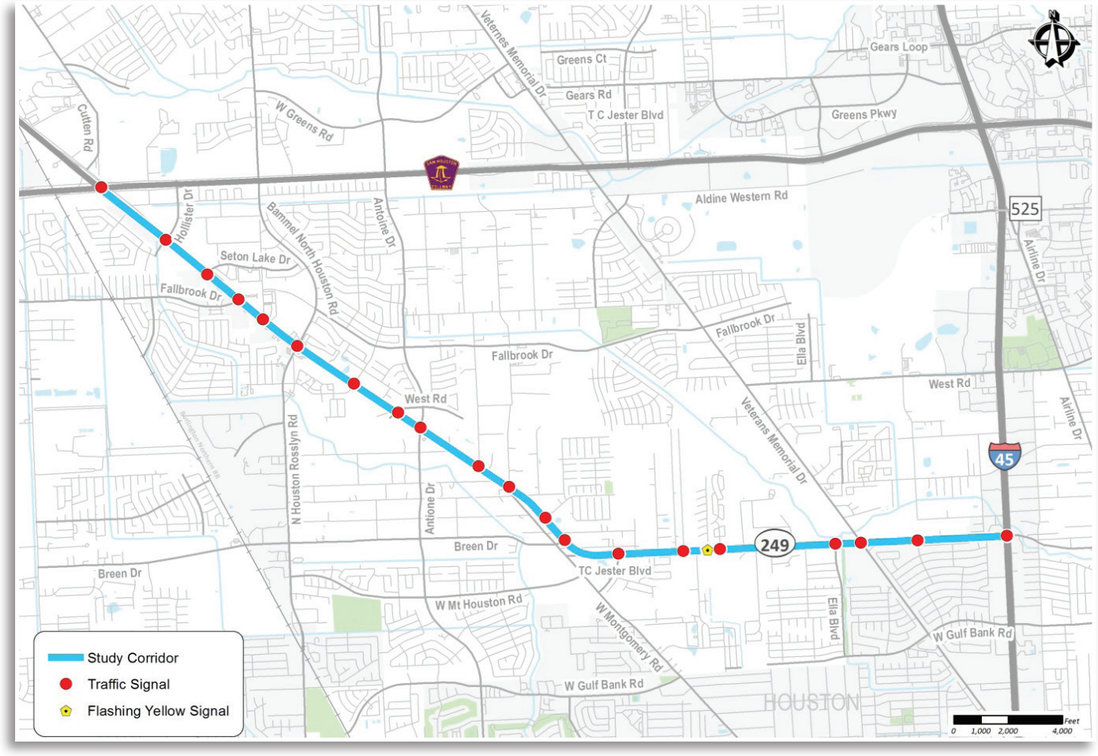
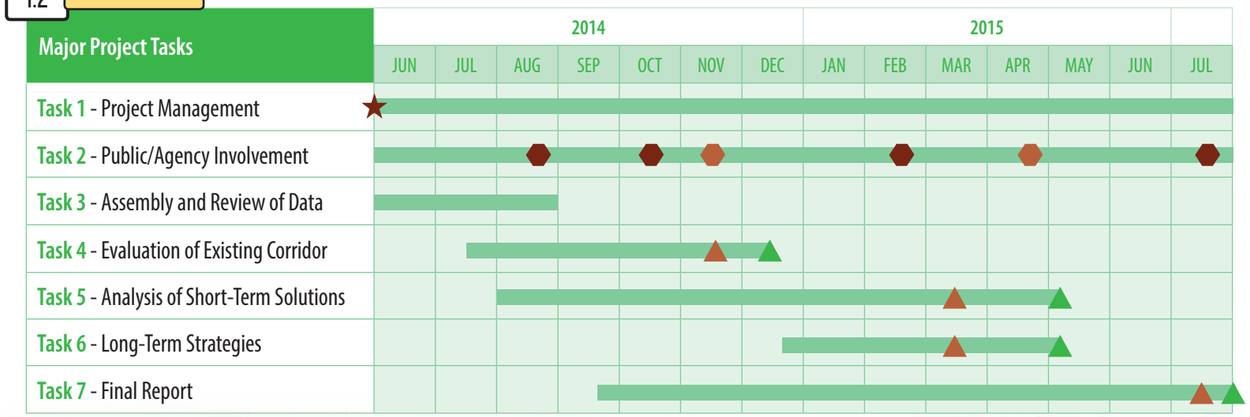


Figure 1.2 Schedule



Public/Agency Involvement

CHAPTER 2

Public involvement is very important to an access management study. To ensure that the specific needs of the community were incorporated, the SH 249 Access Management Study developed public and stakeholder engagement strategies to obtain community input on critical issues and needs along the corridor, and to obtain feedback on the proposed recommendations. 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.**

PUBLIC INVOLVEMENT PLAN

To ensure 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. The following three engagement strategies were identified as part of this plan:

- Steering Committee Meetings
- Stakeholder Meetings
- Public Meetings

STEERING COMMITTEE MEETINGS

A Steering Committee was established comprised of public and agency representatives determined by H-GAC to guide the technical development of the study, monitor the study progress, and coordinate with their respective agencies to help reach a consensus on the study's findings and recommendations. **Table 2.1** includes the list of members in this committee.

Table 2.1 Steering Committee Representatives

Organization	Representative (s)
Houston-Galveston Area Council (H-GAC)	Stephen Gage and Marco Bracamontes
Texas Department of Transportation (TxDOT)	Charles Airiohuodion, Patrick Gant, Catherine McCreight, and Maurice Johnson
Harris County Precinct 1	Nick Harris
Harris County Precinct 4	Marco Montes, Michael James - Constable, and Captain Ronnie Glaze - Constable
Harris County Public Infrastructure	Charles Dean
City of Houston	Amar Mohite, Anita Hollmann, and Khang Nguyen
METRO	Armon Irones
Northwest Houston Fire District	Fire Chief Wesley Cole
Houston Intercontinental Chamber of Commerce	Reggie Gray
Klein Independent School District	Anthony Shields
Near Northwest Management District	Wayne Norden

This group consisted of 11 organizations and met 4 times at key milestones during the project to provide guidance and input on data, findings, recommendations, and the study report. They will continue to be the driving force to ensure that the recommendations within this plan are implemented.

STAKEHOLDERS

Stakeholders were identified and included:

- Business owners
- Chambers of Commerce, etc.
- Civic and homeowners organization
- Schools and churches
- Police and fire departments
- Landowners and developers

A stakeholder meeting was held on January 21, 2015 at the Church of Christ located at 11709 SH 249. The purpose of this meeting was to discuss and develop proposed recommendations for the section along SH 249 between West Montgomery Road and Mount Houston Road. This section of roadway has been an area with safety concerns and has experienced fatal crashes, congestion, and hazardous driving speeds. Design concepts and recommendations were developed for this area to improve safety and mobility.

PUBLIC MEETINGS

Local residents are very familiar with the issues (safety, delays, conflicting movements, etc.) along the SH 249 corridor and adjacent roadways as they experience them on a frequent, if not daily, basis. They also have insight on how conditions have evolved and with their experience can provide valuable information on potential solutions for these problems. Two public meetings were held as part of the SH 249 Access Management Study.

First Public Meeting

The first meeting, held on November 13, 2014 at Hill Intermediate School, presented the goals and objectives of the study, what access management entails, and existing conditions within the study area. One of the primary purposes of this meeting was to receive firsthand information on the issues/concerns along the corridor. Input from the public was obtained by a comment form, one-on-one discussions with team members, and a 1"=200' aerial of the study corridor was available. Members of the public marked areas on the aerials identifying where and what they felt the most significant issues and concerns were. The input received from this first meeting assisted the study team to validate existing conditions evaluation and identify the areas of most concern from a public perspective. A total of 15 people attended this meeting and 8 comment forms were received.

Photos from the First Public Meeting.

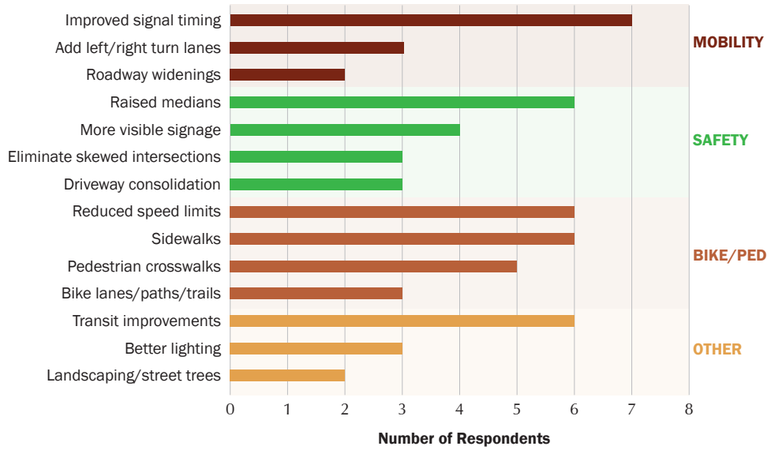
Variable Message Sign along I-45 Advertising Public Meeting No. 1

The following provides a summary of comments received:

- The intersections perceived as being highly congested are: North Houston Rosslyn Road (six responses), Fallbrook Drive, Breen Drive, Antoine Drive, and I-45 (four responses each), and Beltway 8, Old Foltin Road, Ella Boulevard, and Veterans Memorial (two responses each).
- Areas that experience speeding are from Antoine Drive to North Houston Rosslyn Road, North Houston Rosslyn Road to BW 8, I-45 to north SH 249, and Antoine Drive to Breen Drive. It was mentioned that there was no speeding during rush hour. Spot locations for excessive speeding include Breen Drive, North Houston Rosslyn Road, and Veterans Memorial Drive.
- Sections were mentioned that needed improvements to make walking safer. The central section was mentioned six times, eastern section was mentioned five times, and the western section was mentioned four times.
- Also, sections were mentioned that needed improvements to make biking safer. The central section was mentioned three times, western section two times, and the eastern section mentioned once.

During the first public meeting, attendees were asked to provide their support for potential transportation improvements encompassing mobility, safety, multimodal, and aesthetics along the corridor. Of the improvements presented at the first public meeting, those with the highest support were improved signal timing, raised medians, sidewalks, and transit improvements. **Figure 2-1** shows the types of improvements and the responses received from the public.

Figure 2.1 Public Survey on Transportation Improvements



Second Public Meeting

The second and final public meeting, held on April 21, 2015 at the White Oak Conference Center, presented the findings and preliminary recommendations that the study team evaluated during the course of the study. The input received from this meeting was used to refine draft recommendations as needed. A total of 64 people attended this meeting and 12 comment forms were received.

Aerial maps showing recommended improvements at a 1"=100' scale were available for review and comments. Citizens were encouraged to provide comments on these aerials indicating any areas of concern or comments on the recommendations. Also, a regional connectivity map was available for review and comment as well.

Portions of the comment form requested how the respondent felt about the short, medium, and long-term recommendations. Overall, there were 27 responses to these questions and 15 stated they were very satisfied/satisfied, 9 were not satisfied, and 3 had no comments. Also, other comments received from the forms included:

Specific Location Comments:

- Don't add another lane for left turns from Hollister onto SH 249 N – we have good traffic flow with the current lanes. Problem is the other side from BW 8.
- Blue Creek Ranch subdivision is against extending Hollister through Fallbrook. Traffic does not warrant it and will create noise and security issues. Consider conserving the area as green space.
- Insurance Auto Auction Business – 2535 W. Mount Houston Road – it creates driving hazardous at Mobile Home Estates and endangers safety of those attending Hill Intermediate School. 18 wheelers park in middle of 249 turn lane and unload vehicles there. Hard to see around these vehicles. Business has 3 driveway exits which can cause many problems.
- Hill Intermediate School - access road to the school from SH 249 creates problems. Parents are backing up in middle turn lane all the way to Moonglow light.
- W. Montgomery must feed to SH 249 better – especially when making left turn from W. Montgomery to SH 249.
- SH 249 and Antoine (Kroger exit) – very dangerous; curve between SH 249 and Breen has poor lighting.
- Look at Brownie Campbell and Antoine intersection when considering Ann Louise Bridge – there is no access to our land.
- Don't expand TC Jester at Star Peak. Would create additional noise and traffic.
- Don't have the raised median to the entrance of our street (Lynda Drive). Need to change entrance to Hill Elementary.

General Comments:

- Create a light rail system on SH 249. Existing railroad ROW would provide a light rail system to downtown.
- Use noise abatement, improve air quality, connect horse trails to current parks.
- Think outside the box.
- Have high speed rail to get to downtown.
- Preserve and use wetlands or areas that flood in neighborhoods.
- Worried about the median – not having a way to turn or return.
- Don't completely understand road closures; optimize signal timing ASAP.
- Bike lanes should be studied; don't reduce the speed.
- Put rail in middle of SH 249 to downtown.
- Barrier for bike and ped facilities rather than a sharrow.

One of the comments heard frequently during the question and answer session at the public meeting was that the attendees wanted a bike lane that was separated from the vehicular travel lane. Subsequent to this public meeting, this recommendation was modified and now includes a shared use path for both pedestrians and bicycles and is separated from the travel lane.

PUBLIC/STAKEHOLDER ENGAGEMENT STRATEGIES

The following is a summary of the public and stakeholder engagement strategies implemented for the SH 249 Access Management Study:

- **Project Website** – A website was developed and is located at http://www.h-gac.com/taq/access-management/current-studies/sh249.aspx. The site provides a description of the study, public involvement activities, study area map, and various documents associated with the study.
- **H-GAC** outreach tools, including monthly Vision e-newsletter and Fact Sheets.
- **Legal Ads** – Houston Chronicle, La Vox, and Neighborhood News.
- **Email Blast** – email notifications to area stakeholders, Steering Committee members, and elected officials asking them to post information on websites and Facebook pages and send to their email distribution lists.
- **Postcards** – sent to property owners and businesses and to a number of schools in the Aldine ISD.
- **Flyers** – posted at Acres Home Community Center and Houston Public Library Acres Homes Branch.
- **TxDOT** Dynamic Messaging Sign on I-45 the day of the first public meeting.
- **Billboard** advertising second public meeting placed on SH 249 south of Washington Drive near the 249 Church of Christ.
- **News release** sent to Houston Chronicle and Guidry News.
- **Agency Survey** – In the fall of 2014, a survey was distributed to Metropolitan Transit Authority of Harris County (METRO) bus drivers who drove along or near the SH 249 corridor. The purpose of this survey was to gain insight on the issues that the drivers witnessed for both vehicular traffic and pedestrian/bicycle movements. Their input provided an array of issues they witnessed along the corridor and adjacent streets.

AGENCY MEETINGS

At the conclusion of this study, the recommendations developed for the SH 249 study corridor were presented to the Technical Advisory Council (TAC) on May 13, 2015 for their input and at the Transportation Policy Council (TPC) meeting on May 22, 2015 for their input as well. The TPC provides policy guidance and overall coordination of the transportation planning activities within the region. The TAC reviews and evaluates H-GAC's Regional Transportation Plan (RTP) and provides its recommendations to the TPC. Once approved by these committees, the recommendations from the SH 249 Access Management Study will be incorporated into the RTP for funding and implementation.

Existing Conditions

CHAPTER 3

To properly assess the improvements needed along the SH 249 study corridor, it is critical to understand and evaluate the current performance of the roadway. This chapter describes existing land use and transportation conditions along the study corridor. It includes a thorough evaluation of the physical and operational characteristics of the roadway. The physical characteristics of the corridor include adjacent land use, number of travel lanes, cross streets, intersection geometry, driveways, and multimodal facilities along the corridor. The operational characteristics encompass an evaluation on how the facility is functioning under existing traffic conditions, analyzing vehicular delays, and identifying high-crash locations and roadway segments with high crash rates.

An overall evaluation of existing conditions helps identify and quantify deficiencies, constraints, and issues, thereby laying the ground work for the development of appropriate recommendations to improve mobility and safety, and ensure the long-term sustainability of the corridor.

STUDY SECTIONS

The overall character of the SH 249 corridor has changed over time as development occurred in the northwest region of Houston. The existing land use and major roadways that intersect SH 249 have created distinct character sections along the study corridor. To address these unique characteristics, the SH 249 corridor has been divided into three sections based on land use and traffic characteristics that will help to provide context sensitive solutions to the corridor. Context sensitive implies that recommended solutions and concepts will be appropriate to the unique characteristics of each section to improve overall quality of life in the communities they serve. The corridor sections are shown in Figure 3.1.

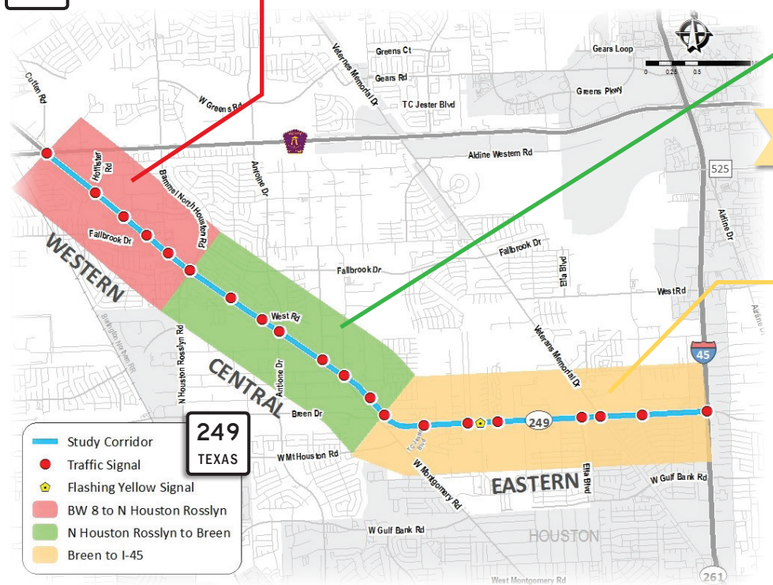
Western Section

The western section extends from Sam Houston Tollway/ Beltway 8 to North Houston Rosslyn Road/Bammel North Houston Road for a distance of 1.8 miles. Major intersecting roadways include:

- Sam Houston Tollway/Beltway 8
- Hollister Drive
- Fallbrook Drive
- North Houston Rosslyn Road/Bammel North Houston Road

Major subdivisions on or near the corridor of this section include Blur Creek Park, Blue Creek Ranch, and Rampur Estates. Businesses/retail that are located in this general area are Northwest Green Business Park, Prairie Green Business Park, and Park Northwest.

FIGURE 3.1 Study Sections



Central Section

The central section extends North Houston Rosslyn Road/ Bammel North Houston Road to Breen Drive for a distance of 2.3 miles. Major intersecting roadways include:

- North Houston Rosslyn Road/Bammel North Houston Road
- Antoine Drive
- Mosielee Street
- Old Foltin Road
- Breen Road

Major subdivisions on or near the corridor in this section include Meadows of Northwest Park and North Lane Place, and major businesses/retail include the Walmart Supercenter, ALDI Supermarket, and Willow Plaza.

Eastern Section

The eastern section extends from Breen Road to I-45 for a distance of 3.1 miles. Major intersecting roadways include:

- Breen Road
- Moonglow Drive
- Veterans Memorial Drive
- Ella Boulevard
- I-45/North Freeway

Major subdivisions on or near the corridor in this section include Woodglen Village, Yale Street Gardens, Mount Royal Village, Granada, Pine Valley Meadows, Heather Glen, and Hidden Valley. Major businesses/retail include Go Kart Raceway and All American Auto & Truck Salvage.

LAND USE CHARACTERISTICS

An analysis of current land use along the SH 249 corridor is provided in this section. For the land use analysis, the study area consists of all parcels within one quarter mile of the SH 249 corridor between Beltway 8 and I-45. Over one quarter (27 percent) of the land within the SH 249 study area is currently vacant but with development potential. Another seven percent of the land in the local study area is currently vacant and considered undevelopable. The predominant land use of the developed land surrounding SH 249 is residential, which accounts for 23 percent of the study area. Commercial/retail development and mixed-use development each account for approximately 15 percent of the study area. A mix of institutional, industrial, and other land uses comprise approximately 12 percent of the study area and the remaining 1 percent of the land surrounding the SH 249 corridor is made up of parks and open space.

Large office complexes are clustered around the intersection of Beltway 8 and SH 249. Major retail developments along the corridor include superstores such as Walmart and Kroger and several strip center shopping plazas. Residential development along the corridor largely consists of single-family home subdivisions such as Blue Creek Ranch, Willowood, Willow Springs and others. **Figure 3.2** shows the variety of land uses with their respective percentages in the local study area.

The following provides details of land uses within each section of the corridor.

Western Section

Most of the parcels adjacent to SH 249 in the western section of the study area are within the City of Houston's limited service area. Farther off the corridor, the land in this segment lies within unincorporated Harris County included within the Houston extraterritorial jurisdiction (ETJ). The western segment of SH 249 is the most densely developed of the three sections and contains a variety of mixed uses. A majority of this development is commercial, including a number of fast food restaurants in the eastern end of the section and a cluster of office complexes in the western end near the SH 249 intersection with Beltway 8. Residential development adjacent to the corridor in this segment is limited to a multi-family development at the SH 249 intersection with Old Bammel North Houston Road intersection. The remaining residential development in the area is primarily single-family housing and is separated from SH 249 by other land uses. **Figure 3.3** illustrates the percentages of different land uses within the western section.

Central Segment

The land surrounding SH 249 between North Houston Rosslyn Road and Breen Drive is located in unincorporated Harris County within the City of Houston's ETJ. This section contains a variety of mixed uses and one-fifth of it is classified as vacant developable property. A majority of the developed parcels in this segment are commercial facilities. Commercial developments in the area include several used car lots, auto parts stores, and grocers. Small pockets of residential, industrial, and multiple-use developments are also located in the central segment of SH 249. The character of SH 249 begins to transition around the intersection with Antoine Drive from an underutilized corridor with large amounts of vacant land to a more intensively developed commercial corridor. A Kroger supermarket anchors a small retail strip on the northeast corner of the SH 249 intersection with Antoine Drive. A Walmart Supercenter and an ALDI grocery are located approximately half a mile down the road, near the SH 249 intersection with Smiling Wood Lane. Strip commercial developments along SH 249 between Smiling Wood Lane and North Houston Rosslyn Road contain a variety of food and retail businesses, including a number of Vietnamese restaurants and the Hung Dong Food Market, a large Vietnamese grocery. **Figure 3.4** illustrates the percentages of different land uses within the central section.

FIGURE 3.2 Current Land Use in the SH 249 Local Study Area

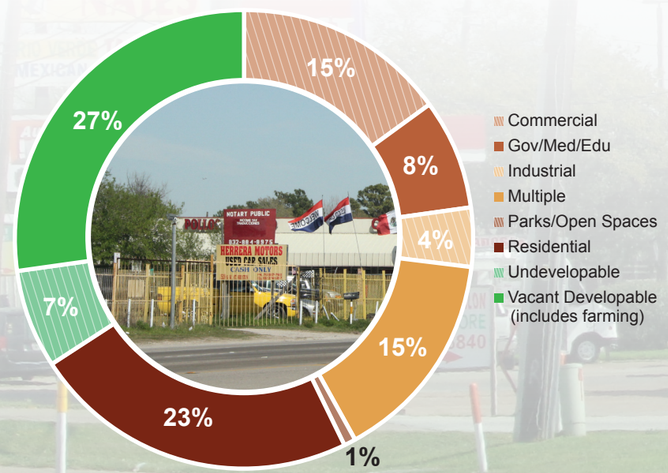


FIGURE 3.3 Land Uses in Western Section

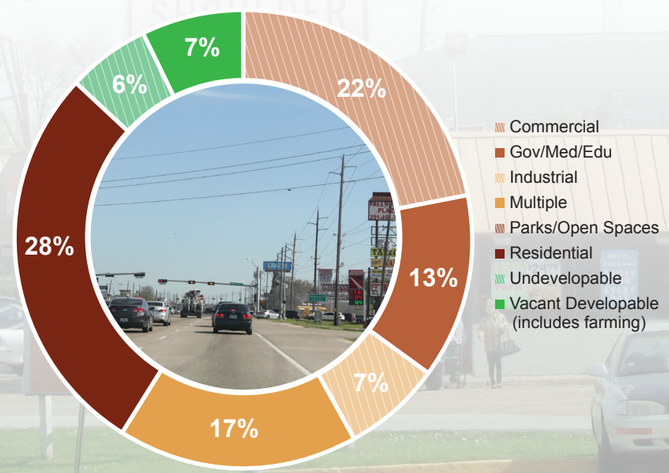
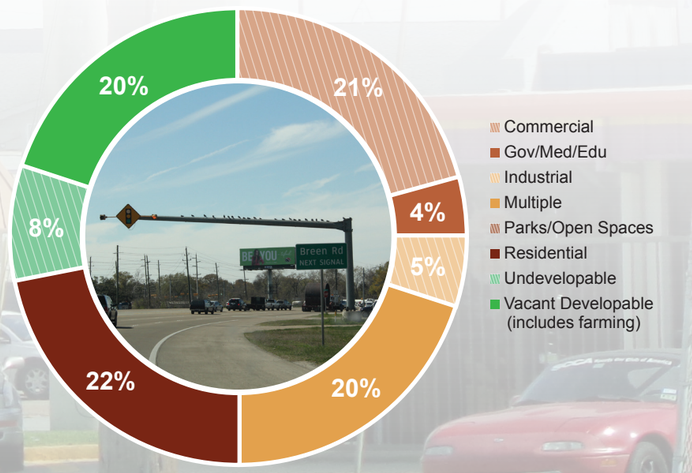


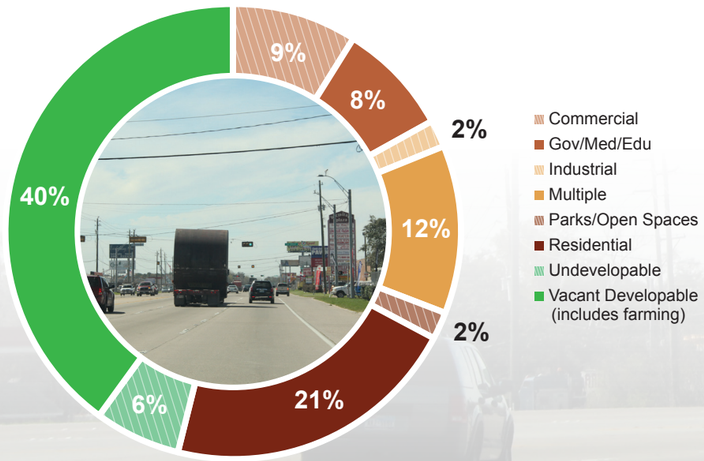
Figure 3.4 Land Uses in Central Section



Eastern Segment

The eastern portion of the SH 249 study corridor near the intersection with I-45 consists of large tracts of vacant land and a mix of low-intensity commercial, residential, and light industrial development. This section has 40 percent developable vacant land and is over 20 percent residential. Land to the south of SH 249 in the easternmost portion of this segment, between I-45 and Ella Boulevard, is within the City of Houston's full service boundary. The remaining land in the eastern segment of the study area is in unincorporated Harris County, but within the City of Houston's ETJ. Mobility in this segment is impaired by a number of staggered intersections. Veterans Memorial Drive forms a major intersection with SH 249. A Fiesta Mart grocery store anchors a small strip retail development at the northeast corner of this intersection and the southwest corner contains a Walgreen's and several fast food outlets. At the eastern end of the corridor, single-family residential subdivisions run along both sides of SH 249 and are separated from the roadway by noise barriers and a narrow grassy strip. Farther west, commercial uses in this segment include salvage yards and building suppliers. **Figure 3.5** shows the percentages of different land uses in the eastern section.

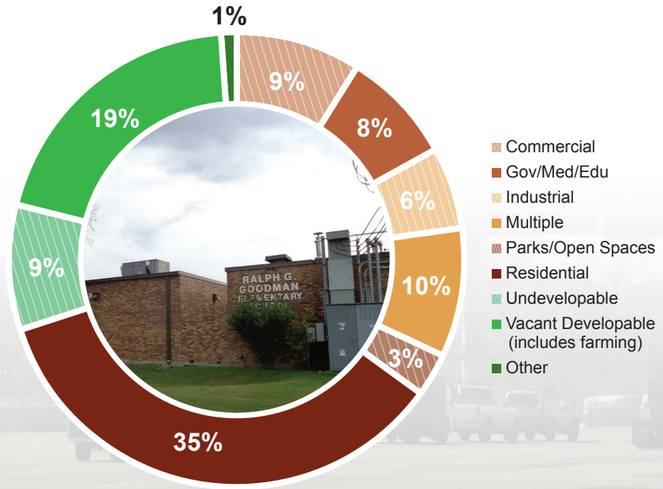
FIGURE 3.5 Land Uses in Eastern Section



Land Use in the Surrounding Community

Land use around SH 249 has also been analyzed at the larger community level in order to provide a context for considering influences on development and traffic from outside of the local study area. The community study area includes all parcels within the three zip codes that intersect the study area corridor (77038, 77086, and 77088). The predominant land use of the area surrounding SH 249 is residential, which accounts for approximately 35 percent of the community study area. Nearly one-fifth of the land within the three zip codes surrounding SH 249 study area is currently vacant but with development potential. Commercial/retail development and mixed-use development account for approximately nine and eight percent of the study area, respectively. A mix of institutional, industrial, and other land uses comprise approximately 15 percent of the study area and the remaining land surrounding the SH 249 corridor is made up of parks and open space.

FIGURE 3.6 Current Land Use in the SH 249 Community Study Area



Major developments just outside of the study area include the Sam Houston Race Park located about one mile east of the SH 249 intersection with Beltway 8, Willowbrook Mall located approximately two miles northeast of the SH 249/ Beltway 8 intersection, two campuses of Lone Star College and the Hewlett-Packard Houston Campus (formerly Compaq Headquarters). **Figure 3.6** provides a graphical breakdown of current land use in the SH 249 community study area and **Table 3.1** provides acreages of current land use immediately surrounding SH 249 and in the larger community.

Table 3.1 SH 249 Current Land Use

Current Land Use	Local Study Area Land Use (in acres)	Community Area Land Use (in acres)
Commercial	391	1,427
Government/Medical/Educational	200	1,334
Industrial	146	967
Multiple	355	1,492
Other	4	36
Parks/Open Spaces	27	424
Residential	580	5,622
Undevelopable	168	1,367
Unknown	0	3
Vacant Developable	675	3,212
Water	0	93
Total	**2,546**	**15,977**

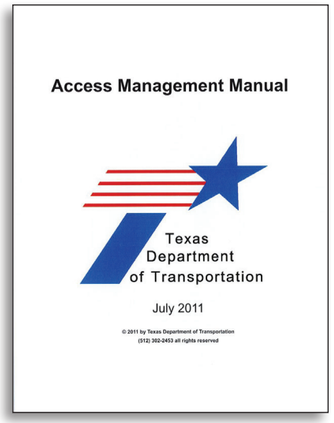
EXISTING POLICIES AND PRACTICES

The following sections discuss the existing policies and practices that pertain to the SH 249 corridor.

Development Regulations

The entire study area for the SH 249 corridor is located within the City of Houston or Houston's ETJ. The City of Houston's subdivision regulations apply to all land within the Houston city limits and the Houston ETJ. Chapter 42 of the Houston municipal code establishes subdivision regulations that influence land use development patterns within the City of Houston and its ETJ. Standards for minimum lot sizes and setbacks determine the amount of development that can occur along the SH 249 corridor. The driveways for proposed developments have to comply with TxDOT standards with regards to location and spacing.

TxDOT Access Management Standards



TxDOT has access management standards in place to ensure the safe and efficient functioning of state highways under its jurisdiction while still maintaining access to adjacent development. These standards provide minimum connection spacing criteria for access to state highways that vary according to the posted speed limit. Speed limits for SH 249 range from 45 miles per hour (mph) at the eastern end of the corridor from the intersection with I-45 to Veterans Memorial Drive to 50 mph west of Veterans Memorial Drive. TxDOT standards recommend a minimum connection spacing of 360 feet for a highway with a posted speed of 45 mph and 425 feet for a posted speed of 50 mph and above. Based on TxDOT requirements, there are many non-conforming access points along the SH 249 corridor.

Other Documents

Other plans that could influence development in the area include the City of Houston's Northwest Sub-regional Study, H-GAC's 2040 Mobility NOW Regional Transportation Plan (RTP), and TxDOT's pedestrian and bicyclist policy and guidance. The Northwest Mobility Study is part of Phase II of Houston's City Mobility Plan (CMP) which will provide recommendations for improving mobility along individual corridors and the greater transportation network. Released in January 2014, the draft Northwest Mobility Study identifies the following mobility needs within the SH 249 study area: improvements to the SH 249 intersection with Antoine Drive; realignment of Breen Drive with SH 249; full build out of Fallbrook Drive between Beltway 8 and I-45; and provide pedestrian facilities along SH 249 and West Road. H-GAC's 2040 Mobility NOW RTP calls for roadway capacity improvements to West Road and Veterans Memorial Drive within the SH 249 Access Management Study area.

ROADWAY CHARACTERISTICS

Originally a part of Farm-to-Market (FM) 149, the highway was given the revised classification of State Highway (SH) 249 in 1988. The highway grew in stature after Compaq Computer Corporation (now called Hewlett-Packard) moved its headquarters near to the intersection of SH 249 and Louetta Road. SH 249 is owned and maintained by Texas Department of Transportation (TxDOT).

Number of Lanes/Speeds/Classification

The roadway's characteristics are summarized in **Table 3.2**. As shown in the table, the corridor has a total of six travel lanes with a center two-way left-turn lane (TWLT). The speed limit along the corridor varies from 45 mph to 50 mph. The most right-of-way width (~290 feet) is in the western section of the corridor near Beltway 8/Sam Houston Tollway and the least right-of-way width (130 feet) is in the eastern section near Veterans Memorial Drive.

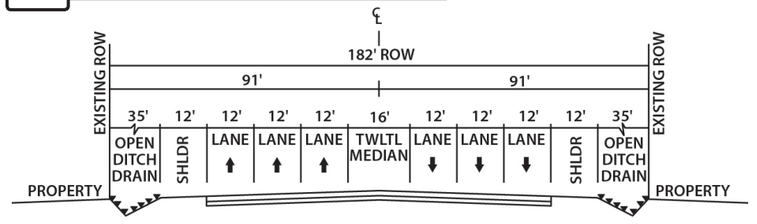
Table 3.2 Roadway Characteristics by Section

Current Land Use	Length (miles)	Travel Lanes	Median Type	Speed Limit (mph)	Right of-Way (feet)
Western Section (Beltway 8 to North Houston Rosslyn Road)	1.8	6	TWLT	50	180' to 290'
Central Section (North Houston Rosslyn Road to Breen Drive)	2.3	6	TWLT	50	180'
Eastern Section (Breen Drive to I-45)	3.1	6	TWLT	45-50	130' to 180'

Existing Typical Sections

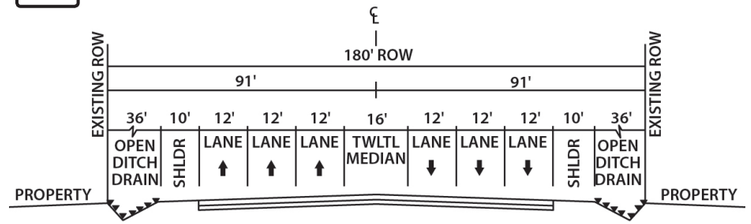
The typical section for the western section has a right-of-way that varies between 180 feet to 290 feet. The wider sections are near Beltway 8 where it expands to make the connections to the BW 8 corridor as well as the Sam Houston Tollway. The section depicted in **Figure 3.7** is at the intersection of SH 249 and Fallbrook Drive. As shown, there are six 12-foot through lanes, one 16-foot two-way left-turn lane in the center, 12-foot shoulders, and an open ditch on both sides of the facility.

Figure 3.7 Typical Section – Western Section



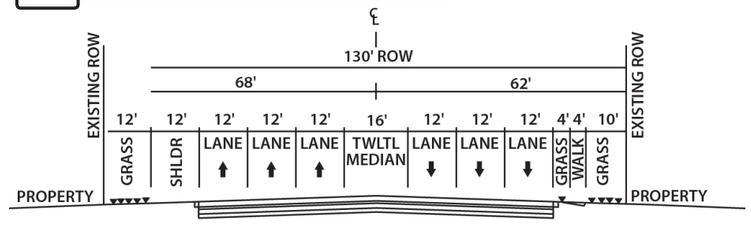
The central section has a right-of-way that is approximately 180 feet. The configuration is basically the same as the typical section at Fallbrook, but has an open ditch on both sides of 36 feet and a shoulder of 10 feet on both sides. **Figure 3.8** shows the section at the intersection at SH 249 just east of Smiling Wood Lane.

Figure 3.8 Typical Section – Central Section



The eastern section has the narrowest typical sections which range from 130 feet to 180 feet. **Figure 3.9** shows the typical section at the intersection of SH 249 just west of Veterans Memorial Drive. This has the same typical section as the first two sections in regards to the width of the center two-way left-turn lane and the travel lanes; however, there is a shoulder on the northern side of the facility but not one on the southern side of the corridor.

Figure 3.9 Typical Section – Eastern Section



Cross Streets and Signalization

There are numerous streets that intersect the SH 249 corridor. **Table 3.3** summarizes the cross streets by the three sections. As part of the descriptions of the cross streets, the number of travel lanes, median type, intersection type, and speed limit are shown. The following provides a brief summary of the cross street characteristics by section.

- **Western Section** – there are eight intersecting roadways and of these six are signalized. The speed limit varies between 30 mph and 50 mph and two of these roadways have a raised median.
- **Central Section** – there are 11 intersecting roadways and of these 8 are signalized. The speed limit varies between 30 mph and 45 mph and five of these roadways have a raised median.
- **Eastern Section** – there are 21 intersecting roadways and of these 9 are signalized. The speed limit varies between 20 mph and 45 mph and four of these roadways have a raised median.

There are 20 signalized intersections along the SH 249 corridor which are shown in Figure 3.1. A key to success in signal coordination is the appropriate spacing of the signals. The desirable spacing between signals is approximately a half-mile (2,640 feet) according to the Federal Highway Administration (FHWA) Access Management guidelines. **Table 3.4** shows the intersection spacing for each of the three study sections. As shown in this table, all three sections along SH 249 have closely spaced signals. The eastern section has the most closely spaced signals—the distance between the signals from Cordoba Drive to Old Hickory Lane is approximately 470 feet. Therefore, it is critical to maintain good signal timing coordination to improve mobility and reduce delays along the corridor.

Table 3.3 Cross Streets by Section

Section	Cross Street	Lanes	Median Type	Intersection Control Type	Speed Limit (mph)
Western Section (Beltway 8 to North Houston Rosslyn Road)	Beltway 8 EBFR	3	N/A	Signalized	50
	Beltway 8 WBFR	3	N/A	Signalized	50
	Galena Creek Drive	2	None	Unsignalized	30
	Hollister Street	4	Raised	Signalized	40
	Seton Lake Drive	2	None	Signalized	30
	Old Fairbanks North Houston Road	2	None	Unsignalized	45
	Fallbrook Drive	4	Raised	Signalized	30
	Old Bammel North Houston Road	2	None	Signalized	35
Central Section (North Houston Rosslyn Road to Breen Drive)	North Houston Rosslyn Road/Bammel North Houston Road	4	Raised	Signalized	35
	Smiling Wood Lane/NW Park Drive	4/2	Raised	Signalized	30
	West Road	4	Raised	Signalized	45
	Antoine Drive	4	Raised	Signalized	40
	Romona Boulevard	2	None	Signalized	35
	Mosielee Street	2	None	Signalized	35
	Chippewa Boulevard/West Montgomery Road	2	None	Unsignalized	35/30
	Old Foltin Road	2	None	Signalized	30
	Killough Street	2	None	Unsignalized	30
	Upland Willow Avenue	4	Raised	Signalized	30
	Washington Drive	2	None	Unsignalized	30
Eastern Section (Breen Drive to I-45)	Breen Drive	2	None	Signalized	35
	Lincoln Drive	2	None	Unsignalized	30
	Mt Houston Road	1	None	Unsignalized	30
	TC Jester Boulevard	4	Raised	Signalized	35
	McKinley Street	2	None	Unsignalized	30
	Royal Village Road	2	None	Unsignalized	30
	Big John Street	2	None	Unsignalized	30
	Lynda Drive	2	None	Unsignalized	20
	Moonglow Drive	2	None	Signalized	20
	Cordoba Drive (north of SH 249)	2	Raised	Unsignalized	20
	Cordoba Drive (south of SH 249)	2	None	Unsignalized	30
	Old Hickory	2	None	Signalized	30
	Cora Street	2	None	Unsignalized	30
	Ella Boulevard	4	Raised	Signalized	40
	Veterans Memorial Drive	4	Raised	Signalized	45
	Deer Trail Drive	2	None	Signalized	30
	Bunny Run Drive	2	None	Unsignalized	30
	Sunnywood Drive	2	None	Unsignalized	30
	I-45 NBFR	3	N/A	Signalized	45
	I-45 SBFR	3	N/A	Signalized	45
	Valley Stream Street	2	None	Unsignalized	30

Table 3.4 Distance Between Signalized Intersections

Study Sections	Distance Between Signalized Intersections
Western Section (Beltway 8 to North Houston Rosslyn Road)	1,200 feet to 3,100 feet
Central Section (North Houston Rosslyn Road to Breen Drive)	1,100 feet to 2,600 feet
Eastern Section (Breen Drive to I-45)	470 feet to 4,200 feet

TRAFFIC OPERATIONS

The following provides a description of the volumes and level-of-service along the SH 249 corridor and its intersections.

Traffic Volumes

Twenty-four hour traffic volume counts and peak hour intersection turning movement counts were conducted along SH 249 for both directions of travel in September 2014. An intersection inventory is provided in **Appendix A**. Daily traffic volumes on SH 249 ranged from a low of 50,000 vehicles per day (vpd) south of Antoine Drive to a high of 62,000 vpd south of Hollister Road. Vehicle classification traffic counts were also conducted along the corridor. Heavy vehicles (FHWA Classes 4 through 13) comprise 12 percent of the daily traffic in both the western and central sections of corridor and 6 percent in the eastern section. **Figure 3.10** summarizes the daily traffic volumes and the truck percentages along the corridor. **Appendix B** provides details of the traffic counts.

Corridor Level-of-Service

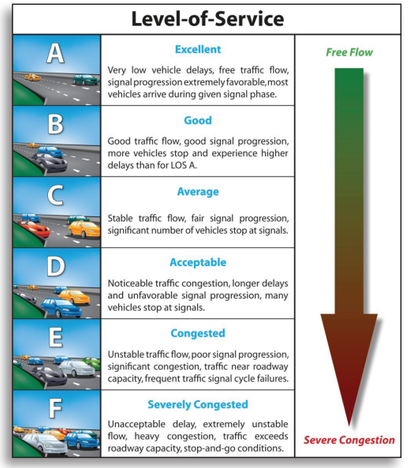
Level-of-service (LOS) measures the quality of traffic flow. It is a qualitative measure ranging from A to F, which characterizes both operational conditions within a traffic stream and highway users' perception. LOS A represents free-flow conditions and LOS F represents heavy congestion. LOS D represents the limit of acceptable operating conditions in urban areas. **Figure 3.11** illustrates the LOS classification. The corridor LOS for SH 249 was evaluated based on 2010 Highway Capacity Manual (HCM) methodology prescribed in Exhibit 16-4 for urban street facilities. Daily traffic volume thresholds based on HCM that were utilized for general planning purpose to determine the LOS for the SH 249 corridor are >54,300 vpd for LOS F, 54,000 - 54,300 vpd for LOS E, 31,900 - 54,000 vpd for LOS D and <31,900 vpd for LOS A-C.

Using these daily service volume thresholds, the western section was found to operate at LOS F while the central and eastern sections operate at LOS D. **Figure 3.12** shows the level-of-service along the study area corridor. As shown in this figure. the central section and particularly the eastern section are close to LOS E.

Figure 3.10 Daily Traffic Volume and Truck Percentages

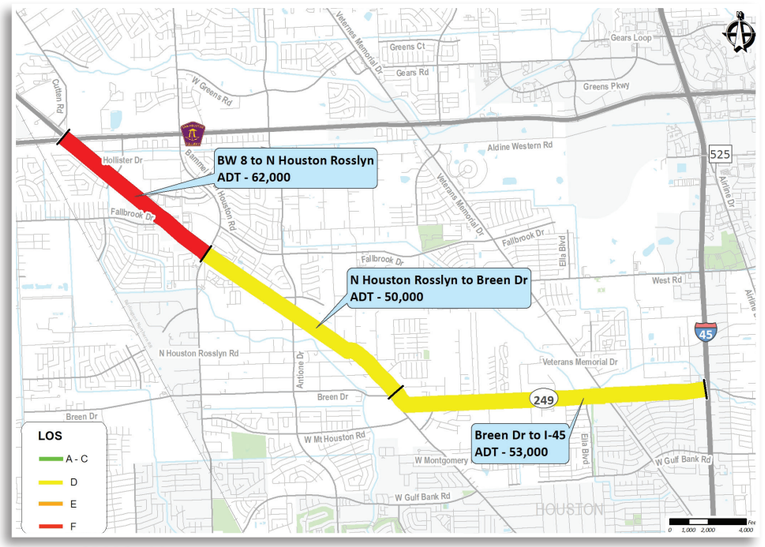
Source: CDM Smith, 2014

Figure 3.11 Level-of-Service Classification



Source: CDM Smith

Figure 3.12 Corridor Level-of-Service



Source: CDM Smith

Intersection Level-of-Service

Capacity analyses were conducted for all intersections along the study corridor to evaluate traffic operating conditions. The Highway Capacity Manual (2010) 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 were peak hour intersection control delay (measured in units of seconds per vehicle) and LOS.

Control delay is defined as that component of total delay caused by decelerating and accelerating at a traffic signal or stop sign. LOS is a qualitative measure of operating conditions at an intersection based on control delay. The relationship between the various LOS classifications and control delay is summarized in **Table 3.5.**

Table 3.5 Level-of-Service Criteria for Signalized Intersections

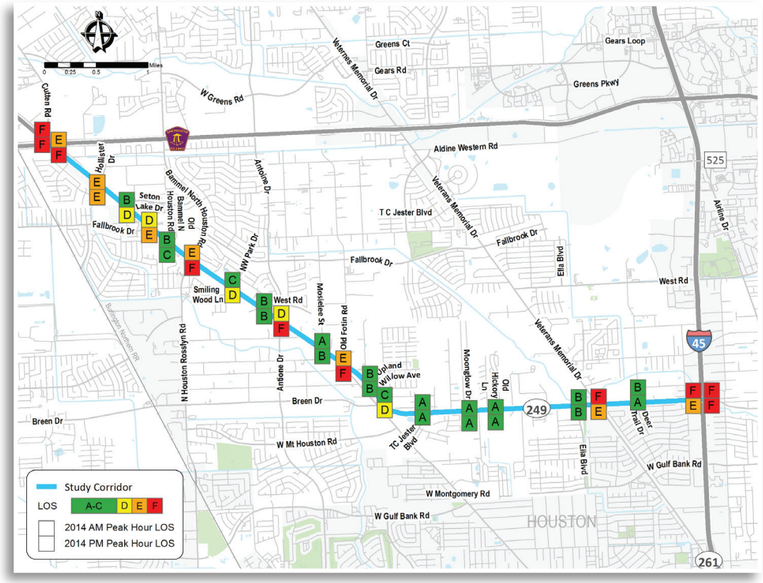
Level of Service	Average Control Delay (sec/veh)	Description
A	0 - 10	Very low vehicle delays, free traffic flow, signal progression extremely favorable, most vehicles arrive during given signal phase.
B	> 10 - 20	Good traffic flow, good signal progression, more vehicles stop and experience higher delays than for LOS A.
C	> 20 - 35	Stable traffic flow, fair signal progression, significant number of vehicles stop at signals.
D	>35 - 55	Noticeable traffic congestion, longer delays and unfavorable signal progression, many vehicles stop at signals.
E	> 55 - 80	Unstable traffic flow, poor signal progression, significant congestion, traffic near roadway capacity, frequent traffic signal cycle failures.
F	> 80	Unacceptable delay, extremely unstable flow, heavy congestion, traffic exceeds roadway capacity, stop-and-go conditions.

Source: 2010 Highway Capacity Manual

A traffic operations model of the corridor was created using Synchro/SimTraffic software, macroscopic simulation tool developed by Trafficware® for intersection capacity analysis. 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 study.

Using the traffic analysis methodology previously discussed, existing traffic operating conditions were evaluated for all the intersections. A summary of the AM and PM peak hour LOS of all signalized intersections is provided in **Figure 3.13**. Detailed results for all intersections (both signalized and unsignalized) from Synchro is included in **Appendix C**. The intersections with the worst LOS are Beltway 8, Bammel North Houston Road, Antoine Drive, Old Foltin Road, Veterans Memorial Drive, and I-45.

Figure 3.13 Existing Intersection Level-of-Service



CRASH DATA ANALYSIS

An in-depth crash analysis was conducted along the SH 249 study corridor to evaluate the safety issues. As part of this, the crash rate between 2010 and 2012 was determined and is shown in **Figure 3.14**. Based on the data, all three sections along SH 249 had crash rates higher than the statewide average of 121.8 crashes per 100 million vehicle miles traveled (MVMT) for the period 2010-2012 based on urban roadways. The western section had the highest crash rate of 202 crashes per 100 MVMT and the central section had the lowest crash rate at 150 crashes per 100 MVMT.

Figure 3.14 Crash Rate (2010-2012)

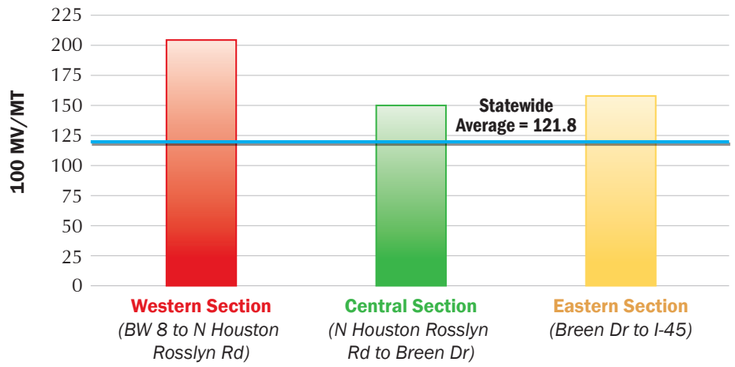


Figure 3.15 Number of Crashes (2010-2012)

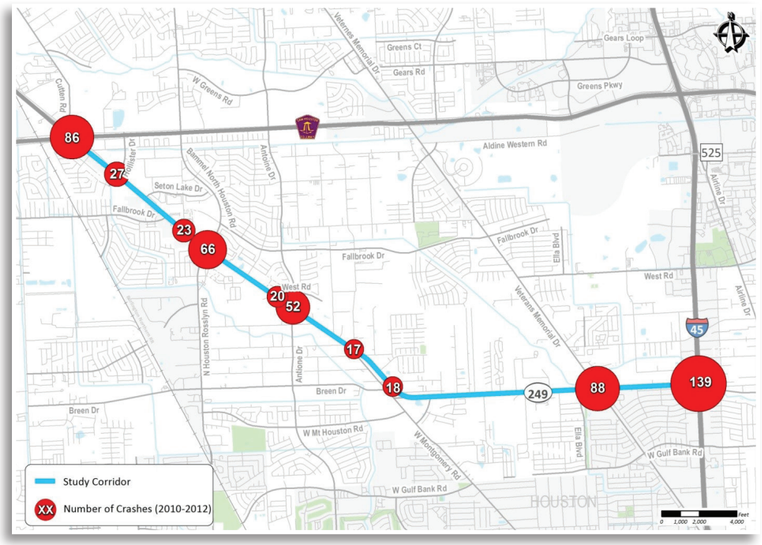
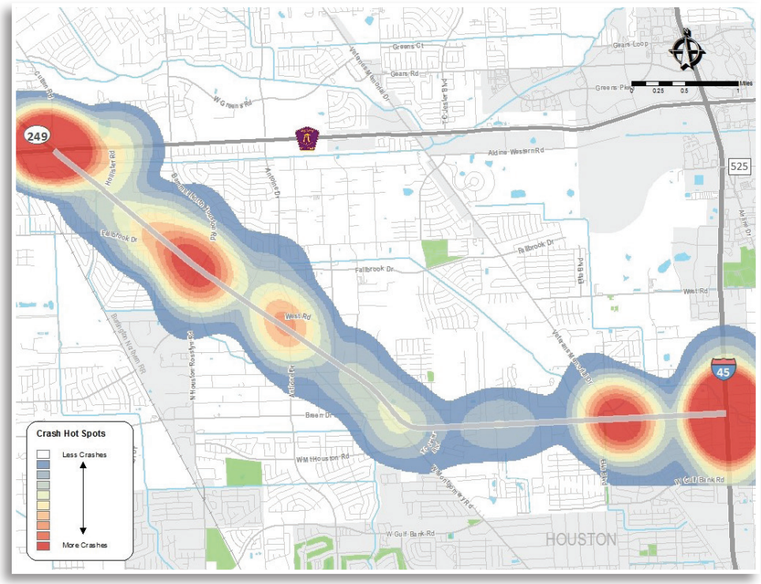


Figure 3.15 shows the top ten intersections with the highest number of crashes between 2010 and 2012 along the study corridor. Intersections with the highest crashes by far are I-45 (139), Veterans Memorial Drive (88), followed by the intersection at BW 8 (86). The next two highest locations fall primarily in the central section of the corridor at Bammel North Houston Road (66) and Antoine Drive (52). These high crash locations are also the intersections experiencing congestion and operating at an unacceptable level-of-service.

Another way to depict the number of crashes is shown in **Figure 3.16** which shows the crash hot spots. This graphic shows the areas of crashes along the study corridor and mirrors the data in Figure 3.15.

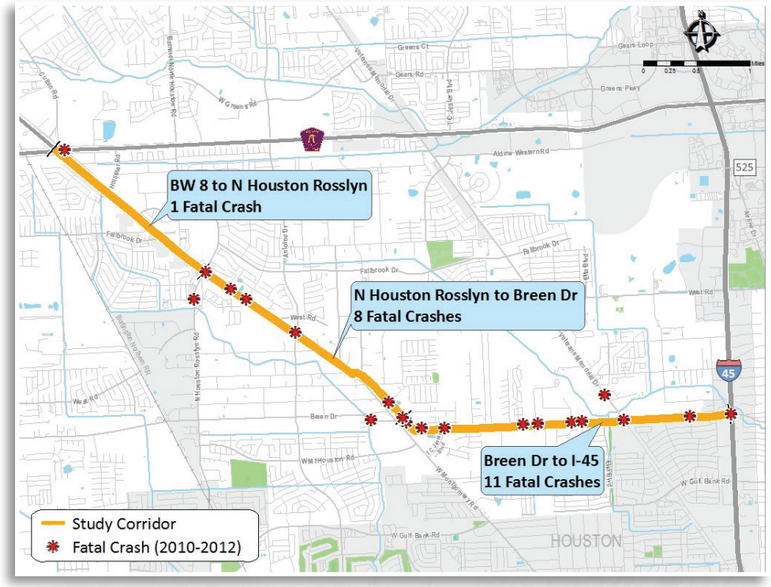
Figure 3.16 Crash Hot Spots



Source: TxDOT Crash Records Information System (CRIS), 2010-2012

As shown in **Figure 3.17**, there were 20 fatal crashes reported along the study corridor between 2010 and 2012. The eastern section of the corridor had the most with 11 fatal crashes, followed by the central section with 8 fatal crashes, and 1 fatal crash in the western section. The number of crashes also includes fatalities at locations of intersecting roadways near the SH 249 corridor in the study area. The higher number of fatal crashes near Breen Drive and in the eastern section could mainly be contributed to speeding and inadequate sight distance.

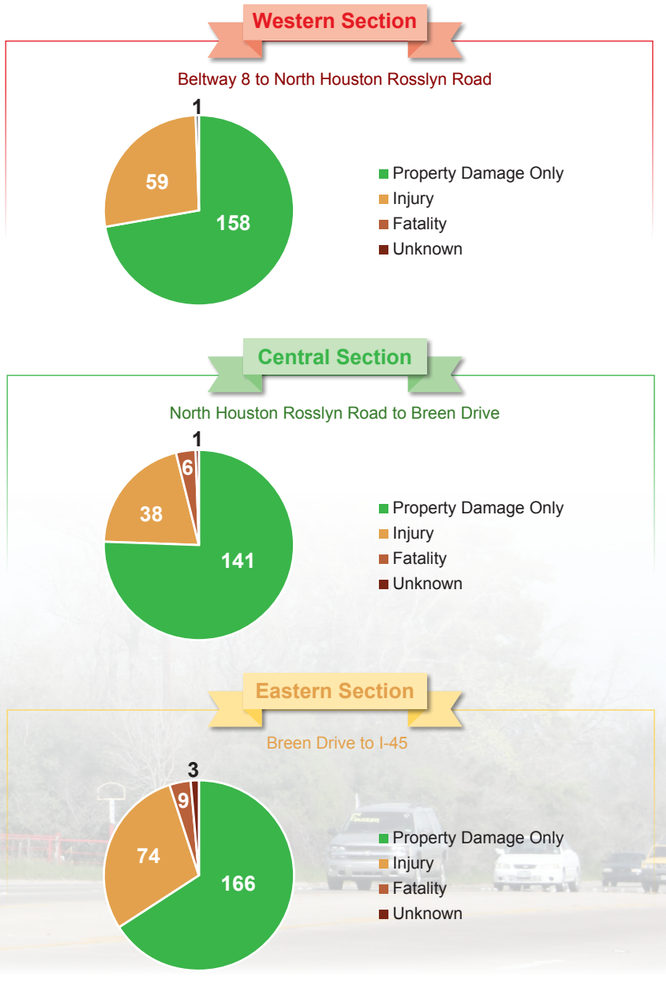
Figure 3.17 Fatal Crashes (2010-2012)



Source: TxDOT Crash Records Information System (CRIS), 2010-2012

Figure 3.18 illustrates the severity of crashes by section between 2010 and 2012 on the SH 249 corridor. As can be seen from this figure, the eastern section has the highest incidents of crashes with 166 with property damage only, 74 injuries, 9 fatalities, and 3 crashes of unknown circumstances. The number of fatal crashes differs between Figures 3.17 and 3.18 due to a 2,500 foot buffer used for fatal crashes around SH 249 compared to a 100 foot buffer used for the crash severity by section. **Appendix D** provides details of the crash data.

Figure 3.18 Crash Severity by Section



TRANSIT SERVICE AND AMENITIES

The SH 249 corridor within the study area and adjacent roadways are served by a number of Metropolitan Transit Authority of Harris County (METRO) bus routes. The routes include:

- Route 44
- Route 64
- Route 66
- Route 85
- Route 108
- Route 212

The routes and their alignments in the SH 249 study area are shown in **Figure 3.19**.

Figure 3.19 METRO Routes in Study Area

Source: Metropolitan Transit Authority of Harris County (METRO)

There are a total of 32 bus stops within the corridor. The busiest transit stops along the SH 249 corridor are located at Antoine Drive in both the northbound and southbound directions. According to data received from METRO in October 2014, there were 107 boardings and alightings in the northbound direction, and 106 boardings and alightings in the southbound direction from April to June 2014 at the Antoine Drive bus stops. **Table 3.6** provides a description of the amenities of the bus stops by section. **Appendix E** provides additional details of the bus stops along the SH 249 corridor within the study area.

Table 3.6 Amenities of Bus Stops by Section

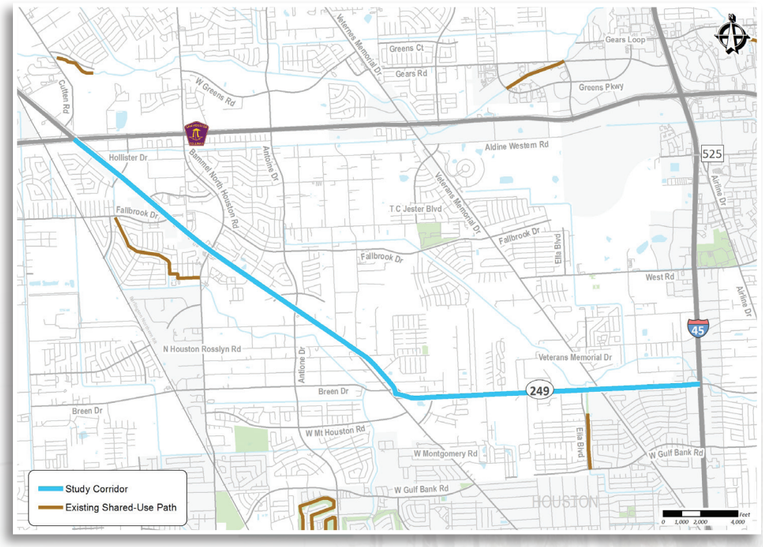
Section	Routes	Eastbound Bus Stops	Westbound Bus Stops
Western Section (Beltway 8 to North Houston Rosslyn Road)	44 - Acres Home Limited 108 - Veterans Memorial 212 - Seton Lake	3 total stops; 0 on side street	12 total stops; 7 on side streets
		All unsheltered; 2 with sidewalk and flag pole; 1 without sidewalk	1 park and ride, 1 sheltered; all with flag poles and 6 with sidewalk
Central Section (North Houston Rosslyn Road to Breen Drive)	44 - Acres Home Limited 85 - Antoine Limited 108 - Veterans Memorial 212 - Seton Lake	9 total stops; 5 on side streets	5 total stops; 1 on side street
		1 sheltered; all with flag poles; 2 with sidewalk	All unsheltered; all with flagpoles; 1 with sidewalk
Eastern Section (Breen Drive to I-45)	66 - Yale 108 - Veterans Memorial 212 - Seton Lake	1 stop; 1 on side street	2 total stops; 1 on side street
		Unsheltered, with flagpole and sidewalk	Both unsheltered; both with flag poles; 1 with trash receptacle; 1 with sidewalk

Source: Metropolitan Transit Authority of Harris County (METRO)

BICYCLE AMENITIES

SH 249 is a high-speed/high-volume roadway with no bicycle infrastructure. The City of Houston does not currently have a Bike Master Plan (the last one was done in 1993) but the City, as well as the County, has maps to show where future bike lanes or trails will be located. Existing bike lanes, trails, shared-use paths in the study area are illustrated in **Figure 3.20**. As shown in this figure, the existing biking facilities (shared-use paths) are along a stream in the northwestern part of the study area from Fallbrook Drive to North Houston Rosslyn Road, in the southern portion along Antoine Drive, and on portions of Ella Boulevard, West Green Road, and Greens Bayou.

Figure 3.20 Bicycle Amenities



Sources: H-GAC's 2040 Regional Pedestrian and Bicycle Plan, City of Houston's Bikeways Map Viewer, and City of Houston's Northwest Mobility Study

To contribute to Houston's citywide bicycle network expansion, and to make SH 249 accessible to cyclists, cohesive, safe, and comfortable bicycle facilities should be implemented. Providing designated rights-of-way to bike, bicycle facilities not only give cyclists more confidence in choosing to bike but also make cyclists more visible and their movements more predictable to vehicle drivers.

Research conducted by Portland State University, the Portland Bureau of Transportation, and others led to the categorization of bicyclist comfort levels currently used in the City of Portland (Oregon) Bicycle Master Plan. According to this criterion, the general population is divided into four categories based on their propensity to use a bicycle as a mode of transportation. Those categories are:

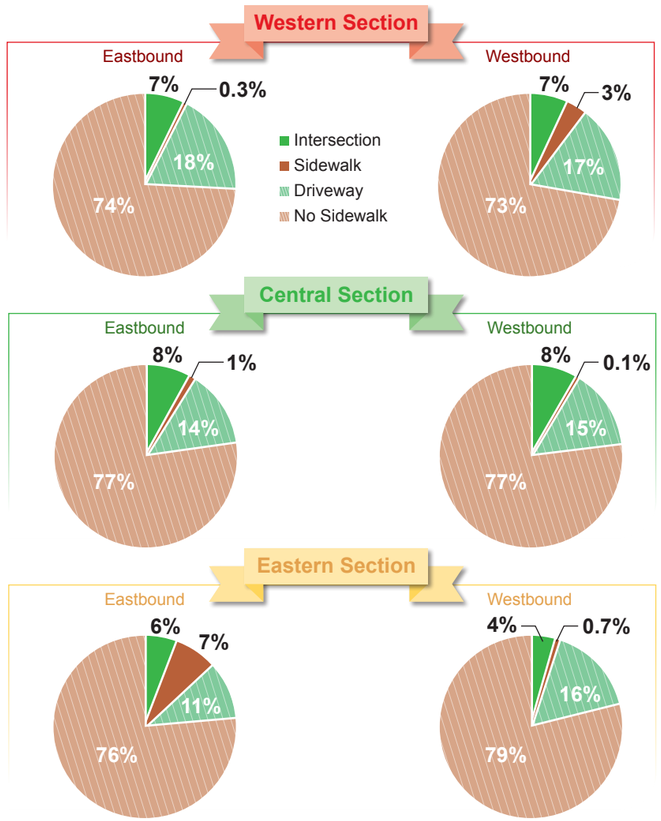
- **Strong and Fearless** — less than 1 percent of people
- **Enthused and Confident** — 7 percent of people
- **Interested but Concerned** — 60 percent of people
- **No Way No How** — 32 percent of people

Based on these criteria and current conditions along SH 249, less than one percent of users (Strong and Fearless) would ride a bicycle. To capture the largest potential group (Interested but Concerned), bicycle facilities with physical separation will be necessary.

PEDESTRIAN AMENITIES

A significant number of households along the corridor do not own a vehicle, leaving residents dependent on transit, walking, and bicycling for transportation. The average percent of households along the SH 249 corridor without a car is five percent. **Figure 3.21** summarizes the pedestrian and vehicular access located on each side of the study corridor. As shown in this figure, there are very few sidewalks in the corridor. In the western section, the eastbound direction has sidewalks of less than one percent of the distance, while in the westbound direction the percent of sidewalks is around three percent. In the central section, there is one percent or less that contains sidewalks in both directions. The eastbound direction in the eastern section has slightly over seven percent sidewalks, while the westbound direction has less than one percent.

Figure 3.21 Pedestrian and Vehicular Access Along the Study Corridor



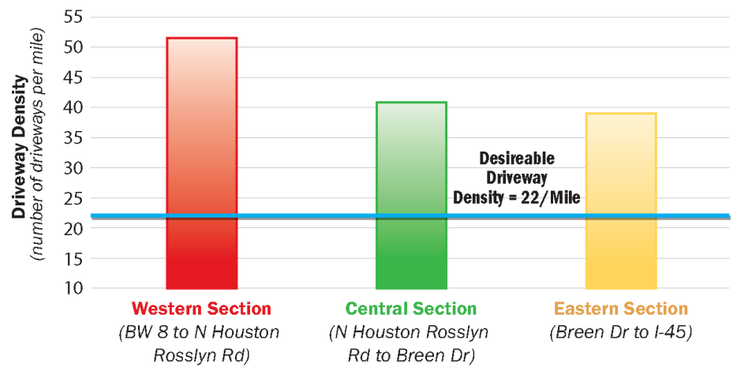
DRIVEWAYS AND ACCESS

Along the study corridor, there are approximately 330 driveways on both sides of the roadway. The highest density of driveways occurs between Bammel North Houston Road and Fallbrook Drive, and the lowest between Veteran's Memorial Drive and Breen Drive, where most of the land is currently undeveloped. Driveways provided the most access but also result in increased conflict points, which impacts safety and mobility along the corridor. **Table 3.7** also shows by section and by direction the number of driveways that comprise each section. **Figure 3.22** shows the number of driveways by section in relation to the desirable number of driveways. According to the Transportation Research Board, the desirable spacing is 22 driveways per mile and each section is more than double that.

Table 3.7 Number of Driveways Along SH 249

Study Sections	Length (mi)	Eastbound Driveways	Westbound Driveways	Total Driveways
Western Section (Beltway 8 to North Houston Rosslyn Road)	1.8	55	35	90
Central Section (North Houston Rosslyn Road to Breen Drive)	2.3	50	55	105
Eastern Section (Breen Drive to I-45)	3.1	64	74	138
SH 249 Corridor Total (Beltway 8 to I-45)	**7.2**	**169**	**164**	**333**

Figure 3.22 Driveway Density



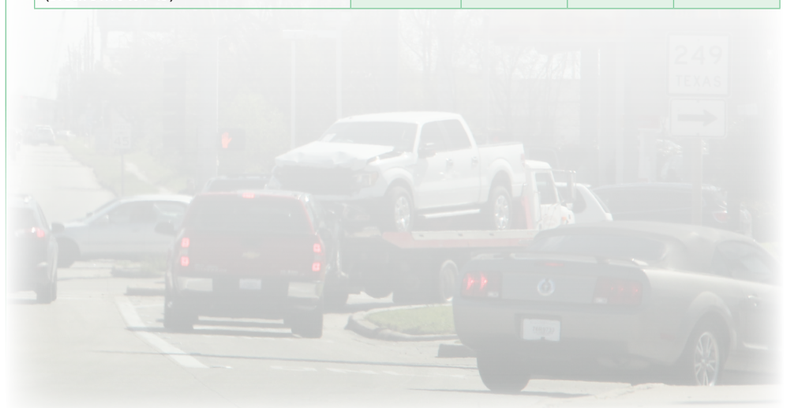
DRAINAGE CHARACTERISTICS

The drainage characteristics along the SH 249 study corridor are summarized in **Table 3.8** and are described as follows:

- **Western Section** *(Beltway 8 to North Houston Rosslyn Road)*: This section has a considerable amount of open ditch along the corridor. In the eastbound direction, close to 90 percent is open ditch and in the westbound direction close to 75 percent is open ditch. The curb and gutter is located in the northern part of the western section between Galena Creek Drive to Beltway 8 in the eastbound direction, and from west of Hollister Street to Beltway 8 in the westbound direction.
- **Central Section** *(North Houston Rosslyn Road to Breen Drive)*: There is no curb and gutter present in either direction in the central section; it is completely open ditch.
- **Eastern Section** *(Breen Drive to I-45)*: This section has close to 65 percent of open ditch along both the eastbound and westbound directions. The curb and gutter is located on the eastern side of this section east of Ella Boulevard to I-45.

Table 3.8 Drainage Inventory

Study Sections	Eastbound		Westbound	
	Open Ditch (ft)	Curb and Gutter (ft)	Open Ditch (ft)	Curb and Gutter (ft)
Western Section (Beltway 8 to North Houston Rosslyn Road)	8,200	1,200	6,900	2,500
Central Section (North Houston Rosslyn Road to Breen Drive)	12,300	0	12.300	0
Eastern Section (Breen Drive to I-45)	10,700	6,200	10,700	6,200



Planned Projects and Land Use Development

CHAPTER 4

This chapter discusses the planned roadway projects by agency within the study area, planned commercial and residential developments, bicycle plans, and the recently approved METRO Reimagining plan.

PLANNED ROADWAY PROJECTS

A number of resources were used to determine the planned/committed roadway projects in the study area including:

- H-GAC 2040 Regional Transportation Plan (RTP)
- City of Houston Capital Improvement Plan (CIP)
- Harris County Capital Improvement Program (CIP)

The *2040 Regional Transportation Plan* (RTP) was reviewed to determine fiscally constrained roadway capacity improvement projects within the local and expanded SH 249 study area. **Table 4-1** provides a description, project identifier, cost, and approximate let date of the project. The projects include only added capacity projects such as new roadways or existing roadway widening and do not include projects such as restriping, signal timing improvements, et cetera due to the numerous project listings.

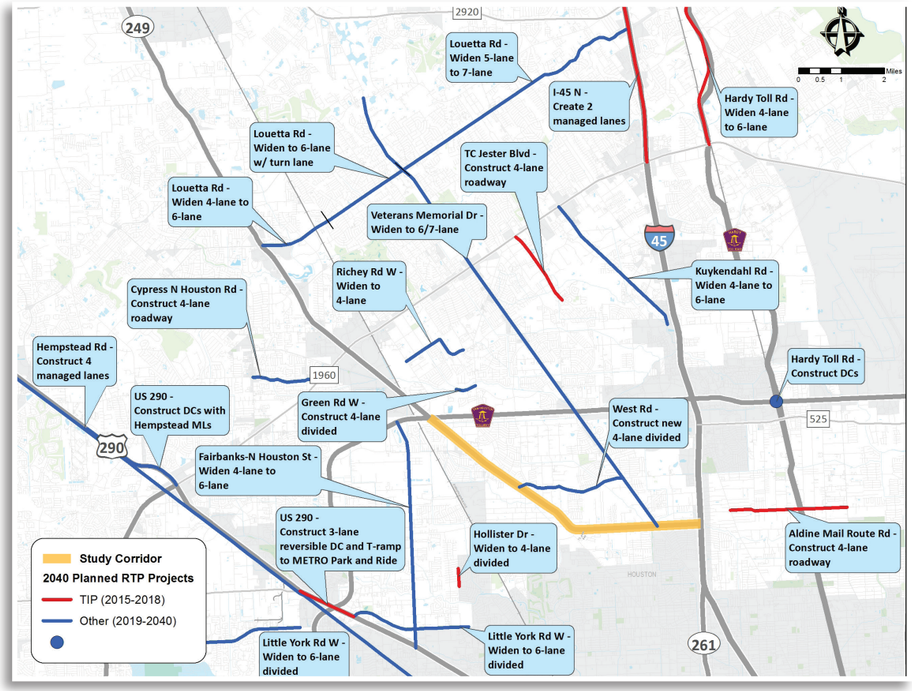
Figure 4-1 illustrates the locations of these planned roadway projects from the 2040 RTP. If there are multiple projects with the same project description on one roadway, these are combined within the figure. The first two projects (MPO ID 8077 and 8006) in the table are listed within the localized SH 249 study area while the others are in the expanded study area.

Table 4.1 Planned Major Capacity Projects in 2040 RTP

MPO ID	Roadway	From	To	Description	Total Cost (M$)	Date
8077	Veterans Memorial Dr	Beltway 8	SH 249	Widen to 6/7-lane roadway with storm sewer system	$13.42	2023
8006	West Rd	SH 249	Veterans Memorial Dr	Construct 4-lane divided roadway	$13.42	2023
12725	I-45 N	Montgomery/Harris CL	FM 1960	Reconfigure to create 2 managed lanes	$0.97	2015
15587	Hardy Toll Road	SH 99	FM 1960	Widen from 4-lane to 6-lane roadway	$60.00	2015
16076	Hardy Toll Road	At Beltway 8	-	Construct EB-SB and NB-WB direct connectors	$71.00	2019
11374	US 290	S of Telge Rd	S of SH 6	Construct DCs with Hempstead managed lanes	$64.87	2033
16016	US 290	W of FM 529	W of Little York W	Construct 1-lane reversible managed lane connector and T-ramp to METRO Park and Ride	$26.00	2015
11372	Hempstead Rd	43rd St/Clay Rd	Gessner Dr	Construct 4 managed lanes with two 2-lane frontage roads (Toll)	$347.14	2032
11547	Hempstead Rd	Gessner Dr	Jones Rd	Construct 4 managed lanes with two 2-lane frontage roads and DC to BW 8 (Toll)	$446.33	2032
11373	Hempstead Rd	Jones Rd	W of Huffmeister	Construct 4 managed lanes (Toll)	$428.80	2032
13829	Hempstead Rd	W of Huffmeister Rd	SH 99	Construct 4 managed lanes	$798.69	2032
8061	Louetta Rd	SH 249	Memorial Chase	Widen from 4-lane to 6-lane roadway	$5.97	2023
8003	Louetta Rd	Old Louetta Rd	Champion Forest Dr	Widen to 6-lane roadway with center turn lane	$3.73	2023
8004	Louetta Rd	Champion Forest Dr	Stuebner Airline Rd	Widen to 6-lane roadway with center turn lane	$3.73	2023
8037	Louetta Rd	Stuebner Airline Rd	TC Jester Blvd	Widen from 5-lane to 7-lane roadway	$4.47	2023
8049	Louetta Rd	TC Jester Blvd	Kuykendahl Rd	Widen from 5-lane to 7-lane roadway	$3.73	2023
8051	Louetta Rd	E of Kuykendahl Rd	I-45	Widen from 5-lane to 7-lane roadway	$11.93	2023
8078	Veterans Memorial Dr	FM 1960	W Greens Rd	Widen to 6/7-lane roadway with storm sewers	$9.69	2023
8002	Stuebner Airline Rd	Spring Cypress Rd	Louetta Rd	Widen to 6-lane roadway with storm sewers	$5.13	2023
8038	Stuebner Airline Rd	Louetta Rd	Cypresswood Dr	Widen to 6-lane roadway with storm sewers	$4.47	2023
8073	Stuebner Airline Rd	Cypresswood Dr	FM 1960	Widen to 6-lane roadway with storm sewers	$11.93	2023
8067	Richey Rd W	Cutten Rd	Champion Forest Dr	Widen to 4-lane roadway with curbs, storm sewers, and turn lanes	$13.50	2023
78	Greens Rd W	Hollister Dr	Bammel N Houston Rd	Construct 4-lane divided roadway with curb and gutter and storm sewers	$4.72	2023
8052	Kuykendahl Rd	FM 1960	Rankin Rd	Widen from 4-lane to 6-lane roadway	$10.44	2023
11879	Hollister Dr	W. Gulf Bank Rd	White Oak Bayou	Widen to 4-lane divided roadway, with curbs, sidewalks, and necessary underground utilities	$4.23	2016
111	Little York Rd W	US 290	Houston City Limits	Widen to 6-lane roadway	$7.34	2023
7792	Little York Rd W	Eldridge Pkwy N	Brittmore Rd	Widen from 4-lane to 6-lane roadway	$11.76	2023
7898	Fairbanks-N Houston St	Beltway 8	US 290	Widen from 4-lane to 6-lane roadway	$14.17	2023
942	Cypress N Houston Rd	Jones Rd	Perry Rd	Construct 4-lane roadway	$7.93	2023
8011	Cypress N Houston Rd	Perry Rd	FM 1960	Construct 4-lane roadway	$2.98	2023
13665	TC Jester Blvd	FM 1960	N of Spears Rd	Construct 4-lane roadway with off-site detention	$7.44	2015
10097	Aldine Mail Route Rd	Airline Dr	Sweeney Rd	Construct 4-lane concrete roadway with curb and gutter and storm sewers	$10.40	2015

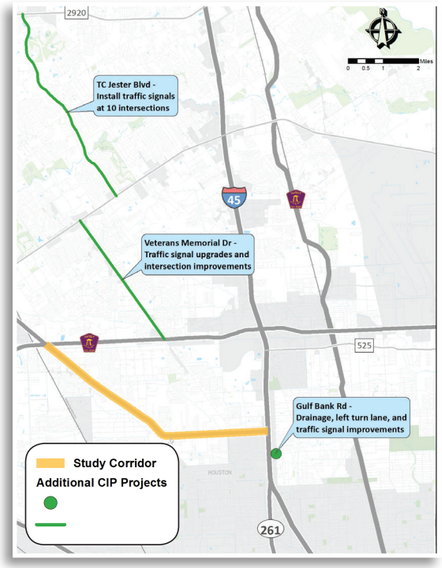
Source: H-GAC 2040 RTP

Figure 4.1 Planned Projects in 2040 RTP



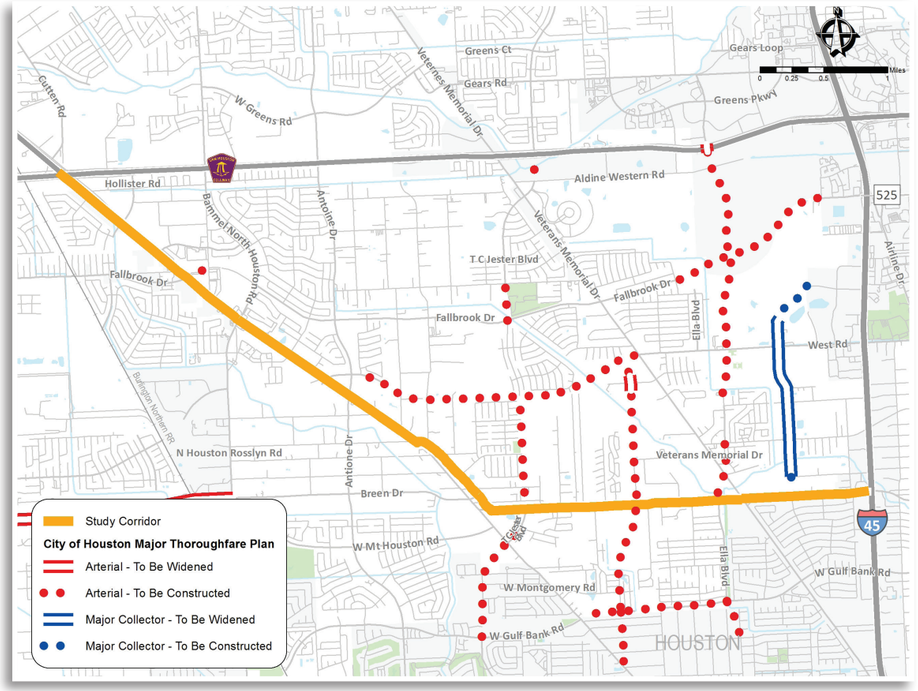
Source: H-GAC 2040 RTP

Figure 4.2 Planned Projects in Capital Improvement Programs



Source: Harris County Precincts 1 and 4 and City of Houston

Figure 4.3 Planned Improvements in the *City of Houston Thoroughfare Plan*



Source: City of Houston 2013-2014 MTFP

The only project in the study area found in the *City of Houston CIP* is the design and construction of a two-lane roadway, which is an extension of Hollister Road from White Oak Bayou to West Gulf Bank Road. It was also identified as one of the RTP projects.

Three future projects are located in Harris County Precinct 1. The roadway widenings of Aldine Mail Route and TC Jester Boulevard have been identified as RTP projects. The third project is to provide drainage, left turn lane, and traffic signal improvements on Gulf Bank Road at Sweetwater Lane. This project is in the design phase and the estimated completion date is 2015. Precinct 4 has two roadway projects in the study area. The first one is to install traffic signals on TC Jester Boulevard at 10 intersections between FM 1960 and FM 2920. The project is in the construction phase and is expected to be complete in late 2015. The second one is to construct missing segments of the continuous turn lane between West Green Road and FM 1960 with traffic signal upgrades and intersection improvements on Veterans Memorial Drive from Beltway 8 to FM 1960. The project is currently in the study phase. **Figure 4-2** identifies the locations of the projects.

The *City of Houston Major Thoroughfare Plan* (MTFP) classifies major city streets into three categories - major thoroughfare, major collector, and minor collector in a hierarchical system. Furthermore, the City evaluated the roadways within each category to determine whether they have sufficient width, need to be widened (expansion), or need to be acquired (extension or construction of a new roadway). **Figure 4-3** illustrates the roadways in the study area identified in the 2013-2014 MTFP that need to be widened or constructed.

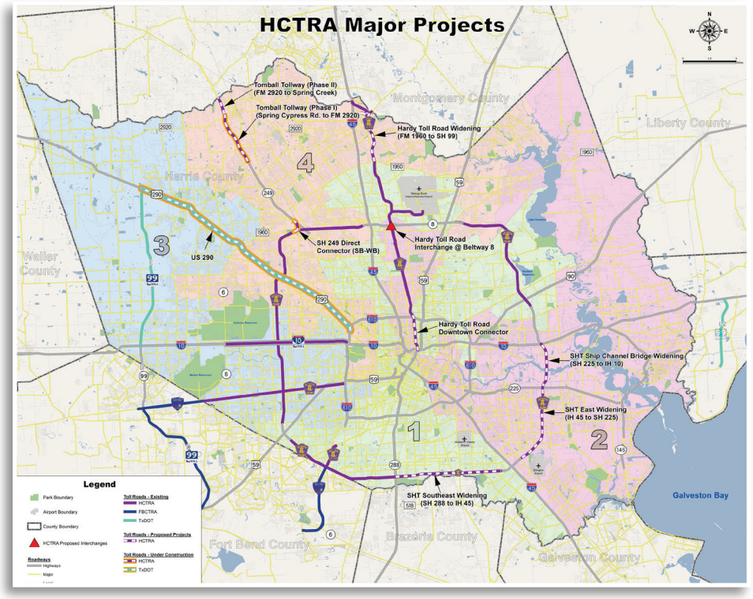
SH 249 TOLL LANES AND DIRECT CONNECTOR PROJECT

The Harris County Toll Road Authority (HCTRA) is responsible for the construction and operation of urban toll highways in the Greater Houston area. The SH 249 (Tomball Tollway) project will provide three toll lanes in each direction within the existing SH 249 corridor. The current frontage roads will remain the same and will not be tolled. The Tomball Tollway project has two phases – the limits of Phase I are from just south of Spring Cypress Road to just north of FM 2920. Construction of Phase 1 was completed in April 2015 and the estimated cost is $170 million.

Phase II of the Tomball Tollway project will extend the Phase I toll lanes north of FM 2920 to the Harris/Montgomery County line and some points beyond into Montgomery County. The project is currently in the planning stage, and the estimated cost of Harris County's portion is $175 million.

Another HCTRA project related to the study corridor is the direct connector linking SH 249 southbound to Sam Houston Tollway westbound. The cost for this direct connector is approximately $25 million. Construction for this project began in April 2014 and is planned to be complete in December 2015. These three projects are illustrated in **Figure 4-4**.

Figure 4.4 SH 249 Toll Lanes and Direct Connector Projects



Source: HCTRA website

PLANNED COMMERCIAL AND RESIDENTIAL DEVELOPMENTS

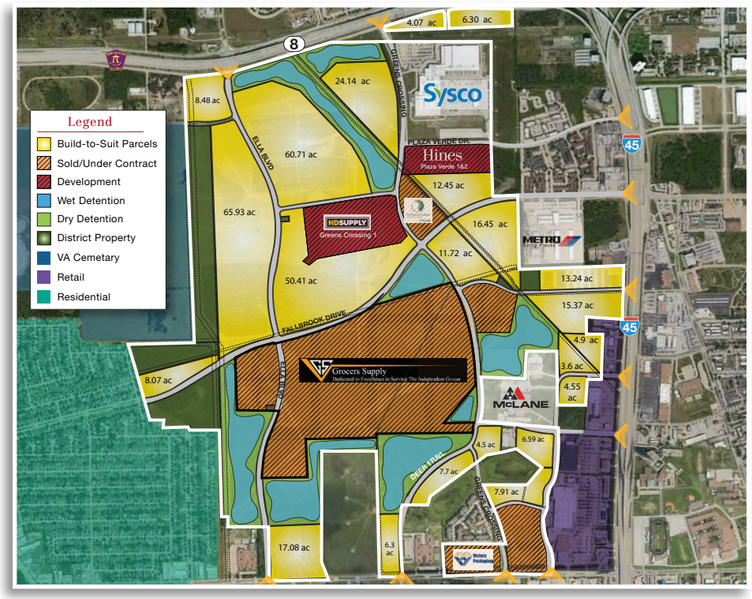
Information about planned developments was collected from various sources including members of the SH 249 Access Management Study Steering Committee and the City of Houston's online *Plat Tracker* system. Approximately 1,265 acres of development is planned in the community surrounding the SH 249 study corridor. Over three quarters (76 percent) of the planned development acreage is represented by a single development, the Pinto Business Park. Pinto Business Park is a master-planned business park that is under construction in the southwest corner of the I-45/Beltway 8 interchange. The area is generally bounded by Beltway 8 to the north, I-45 to the east, West Road to the south, and just west of Ella Boulevard to the west. The southernmost edge of this planned development of over 950 acres will be located a little over one mile from the SH 249 corridor and is therefore likely to impact traffic on SH 249 and the surrounding roadway network. As part of the Pinto Business Park Master Plan[1], the developer is currently enhancing the roadway network within the plat by extending existing roadways and improving connectivity. Roadway improvements within the plat include:

- Extension of Ella Boulevard from SH 249 to Beltway 8;
- Extension of Fallbrook Drive from the western terminus near Sweetbrook Drive to the eastern terminus near I-45 (a portion of this roadway extension has been completed from Greens Crossing east to the eastern terminus near I-45); and
- Extension of Greens Crossing Boulevard/Deer Trail Drive from Plaza Verde Drive to the southern terminus of Deer Trail Drive just north of West Road (a portion of this roadway extension has been completed from Plaza Verde Drive to the just north of Greens Landing Drive).

The Pinto Business Park Master Plan, shown in **Figure 4-5**, also identifies 11 entrances to the Business Park from Beltway 8, I-45, and West Road.

Other major planned developments in the area include the Fallbrook RV Resort which will provide a recreational amenity in the area and the Blue Bell Place residential subdivision. A few large commercial developments, the Four Seasons Business Park Beltway and the Commercial Reserves at Blue Creek, are planned near the SH 249 intersection with Beltway 8, where a cluster of similar commercial developments are already located. **Table 4-2** summarizes all planned developments in the area surrounding SH 249.

Figure 4.5 Pinto Business Park Master Plan



Source: http://www.pintobusinesspark.com/BUILD-TO-SUIT_MASTER_PARCEL_PLAN.pdf, June 2014

[1] http://www.pintobusinesspark.com/BUILD-TO-SUIT_MASTER_PARCEL_PLAN.pdf, June 2014

BICYCLE PLANS

Similar to the planned roadway projects, a number of resources were used to determine the planned bicycle projects in the study area and include:

- H-GAC's 2040 Regional Pedestrian and Bicycle Plan
- City of Houston's Bikeways Map Viewer
- City of Houston's Northwest Mobility Study

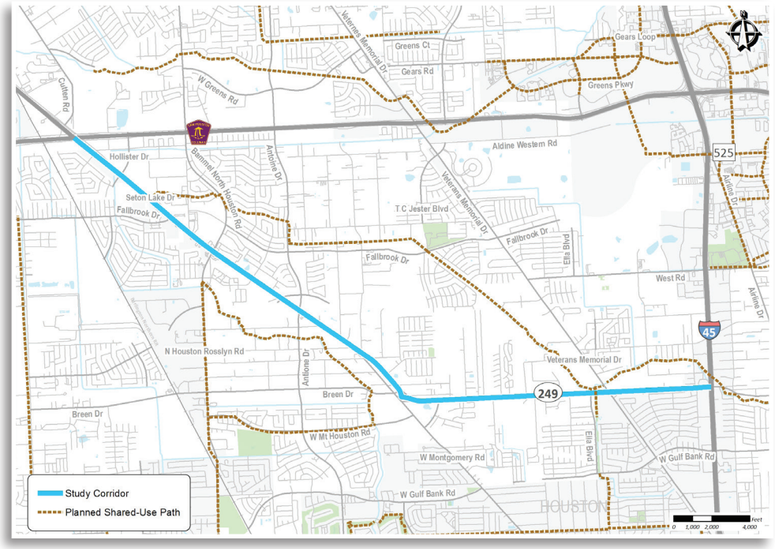
The 2040 Regional Pedestrian and Bicycle Plan is a long range planning document that describes the vision of H-GAC's eight-county region for enhancing pedestrian and bicycle infrastructure, and supports the 2040 RTP. The City of Houston's Bicycle Master Plan is currently being updated to replace the 1993 Comprehensive Bikeway Plan and will develop vision and goals for bicycling in Houston while identifying future projects to create a citywide bicycle network. Meanwhile the online Bikeways Map Viewer shows the existing and future planned bike facilities. The City of Houston's Northwest Mobility Study is a sub-regional study and part of the greater City Mobility Plan to assess the localized corridor network with multimodal considerations.

The planned bicycle facilities also include shared use paths. Two of these facilities are along Greens Bayou and Halls Bayou, and are part of the Bayou Greenways 2020 project which aims to expand and enhance Houston's parks system by creating a continuous 150-mile system of parks and trails along Houston's bayous. Other planned paths include segments on Ella Boulevard, West Mount Houston Road, North Houston Rosslyn Road, along a stream from North Houston Rosslyn Road to West Mount Houston Road, and a path in residential neighborhoods southeast of the intersection of West Gulf Bank Road and Antoine Drive. These are illustrated in **Figure 4-6**.

Table 4.2 Planned Developments in SH 249 Community Study Area

Subdivision/Development Name	Location	Acres
COMMERCIAL PLANNED DEVELOPMENTS		
Commercial Reserves at Blue Creek	Southwest side of SH 249 just south of Beltway 8	13.8
Fallbrook Commercial Center	Northwest corner of Veterans Memorial Dr and Fallbrook Dr	5.1
Four Seasons Business Park Beltway	Southwest Corner SH 249 and Beltway 8	15.1
KME Development	East side of North Houston Rosslyn Rd between Romona Blvd and Chippewa Blvd	1.4
La Plazita	West side of Veterans Memorial Dr between Woodsdale Blvd and Morewood Dr	1.0
Northwest Orion Terrace	North side of SH 249 east of Big Johnson Rd	2.4
Northwest Park Plaza	Northeast side of SH 249 just south of Upland Willow Ave	6.0
PFL	South side of Fallbrook Dr between Tomball Pkwy and Willowwood Pkwy	1.0
Victory Store	West side of Wheatley St between Victory Dr and Charles St	1.2
Gilbert Commercial Estates	Northwest corner of SH 249 and SH Veterans Memorial Dr	2.4
Peachtree Plaza Phase I	West side of Veterans Memorial Dr between Woodsdale Blvd and Morewood Dr	2.5
SGR at West Mount Houston	Westbound SH 249 just west of TC Jester Blvd	0.6
Commercial Planned Development Total		**52.5**
GOVERNMENT/MEDICAL/EDUCATION PLANNED DEVELOPMENTS		
Aldine ISD Drew Academy	North side of Little York Rd between Carver Rd and Montgomery Rd	17.0
Greater Commission	South side of Victory Dr between Montgomery Rd and Bradmar St	2.2
M Park	West side of Houston Rosslyn Rd between Smiling Wood Ln and West Rd	3.0
Pine Valley Development GP	South side of SH 249 between Cordoba Dr and Cora St	38.9
Government/Medical/Education Planned Development Total		**61.1**
INDUSTRIAL PLANNED DEVELOPMENTS		
Bajio Industrial	West side of Veterans Memorial Dr just north of West Rd	4.0
Future Pipe Industries	Northeast side of SH 249 between Old Foltin Rd and Killough Dr	21.5
Northside Industrial Park	Between Beltway 8 and Aldine Western Rd east of TC Jester Blvd	10.8
Pinto Business Park Light Industrial	Southwest corner of I-45 and Beltway 8 interchange	961.8
Bammell N Houston Industrial Park	Northbound Bammell North Houston Rd just north of SH 249	4.9
KEYA Control	Westbound Beltway 8 west of Sharmon Rd	6.4
Industrial Planned Development Total		**1,009.4**
MULTIPLE USE PLANNED DEVELOPMENTS		
DPS North	Northeast side of intersection of Veterans Memorial Dr and Dewalt St	10.9
Multiple Use Planned Development Total		**10.9**
RESIDENTIAL PLANNED DEVELOPMENTS		
Blue Bell Place	South side of Blue Bell Rd east of Veterans Memorial Dr	32.8
Lincoln City Partial Replat	North side of Victory Dr between Banjo St and Lawn St	0.6
Maple Ridge Place	West of TC Jester Blvd and just north of Magnolia Hill Trl	14.4
Replat of Oliver	East side of Sealey St between Esther Dr and Victory Dr	0.1
Tex Mex One Property	South side of SH 249 between Cordoba Dr and Cora St	20.0
Forestwood Enclave	West side of Highmanor Dr just south of Fallbrook Dr	9.7
Forestwood Section 6	East side of TC Jester Blvd south of Fallbrook Dr	6.4
Forestwood Section 8	West side of TC Jester Blvd south of Fallbrook Dr	11.0
Dyer Vistas	South of Victory Dr between Charlie St and Dyer St	11.0
Residential Planned Development Total		**106.0**
OTHER PLANNED DEVELOPMENTS		
Fallbrook RV Resort	North of Fallbrook Dr and east of Ann Louise Rd	25.2
Other Planned Development Total		**25.2**

Figure 4.6 Planned Bicycle Facilities



Sources: H-GAC's 2040 Regional Pedestrian and Bicycle Plan, City of Houston's Bikeways Map Viewer, and City of Houston's Northwest Mobility Study

METRO REIMAGINING

Houston METRO adopted their System Reimagining Plan in February 2015. The objective of this Plan is to improve the existing bus network and integrate it with the expanding rail service. This Plan includes revisions to routes, frequency of service, and new connections. Implementation of this Plan is anticipated for August 2015. Within the SH 249 study area, the only changes would be to the headways or frequencies on how often the buses comes to each stop on a route. Changes from the existing transit network to the Reimagining network include:

- Route 66 would be replaced on Veterans Memorial by Route 59.
- Route 85 would have more frequent service changing existing headways from 16 to 30 minutes to 15 minutes or less south of SH 249.

Short and Medium-Term Recommendations

CHAPTER 5

Existing issues and concerns were identified through the public involvement process as well as a technical evaluation of existing transportation conditions. Primary concerns expressed included mobility and safety, as well as the lack of suitable pedestrian and bicycle infrastructure. Recommendations were developed to address these concerns and this chapter focuses on short-term and medium-term recommendations.

SHORT-TERM IMPROVEMENTS

Short-term recommendations are typically designed for implementation within a five-year time frame. They are generally, though not always, confined to the existing right-of-way and include projects which can be constructed relatively quickly. In some instances, however, minor right-of-way corner clips may be required to implement short-term recommendations. There are three different types of short-term improvements developed and include corridor wide improvements, intersection improvements, and connectivity improvements.

Corridor Wide Improvements

The following section discusses short-term recommendations which are corridor wide along SH 249 between BW 8 and I-45.

Raised Medians

The SH 249 corridor currently has six travel lanes and a continuous two-way left-turn lane (TWLTL). While this is convenient for access to and from adjacent development, the high traffic volumes and speed can make this an unsafe traveling environment. Existing (September 2014) traffic volumes ranged from a low of 50,000 vehicles per day (vpd) south of Antoine Drive to a high of 62,000 vpd south of Hollister Road. According to the TxDOT Access Management Manual, raised medians should be considered where the average daily traffic exceeds 20,000 vehicles and the demand for mid-block turns is high[2]. It is recommended that the existing two-way left-turn lane should be replaced with a 16-foot raised median. Full median openings will be limited to signalized intersections. Directional openings allowing left-turns but not cross-traffic are recommended at various locations along the corridor. Left-turn bays (with raised curb) are recommended where left-turn lanes are currently striped and at all intersections. Installation of a raised median will cause some drivers to execute U-turns for access and egress. U-turns will be accommodated at most median openings. Passenger cars will be able to make all U-turns but longer vehicles will need loons (openings at edge of roadway) to be able to safely execute a U-turn.

Signal Timing and Optimization

There are 20 signalized intersections along the corridor and as mentioned in the Existing Conditions chapter, the desirable spacing between signals is approximately a half-mile (2,640 feet). Within the study corridor, all three sections have closely spaced signals with six being closer than 1,320 feet apart. Of these six signals, three are less than 1,000 feet apart and include Cordoba Drive to Old Hickory Lane (467 feet apart), Moonglow Drive to Cordoba Drive (891 feet), and Ella Boulevard to Veterans Memorial Drive (999 feet). Traffic signals should be re-timed and re-optimized to provide the optimum traffic flow along the corridor and should be reevaluated every two years. It is also recommended that pedestrian signal parameters be re-evaluated during project implementation to ensure that there is adequate time for pedestrians, particularly the elderly and those in wheelchairs, to cross at the signals.

Crosswalks

The placement of additional crosswalks should be studied along the corridor to ensure the safety of pedestrians crossing the roadway and that the signal timing at these intersections provides ample time to cross the street. It is also recommended to look at the existing crosswalks to determine if they are located at the proper locations. Based on the evaluation, the study recommends crosswalks be added or improved at 12 intersections.

Shared Use Path

The implementation of sidewalks and bicycle facilities was mentioned often during the public involvement process. Currently, there are very few sidewalks within the corridor with the western section having less than three percent, central section one percent or less, and the eastern section with seven percent or less. It is recommended that an the existing ten-foot shoulder on either side of the corridor in the western and central sections, and in a portion of the eastern section be converted to accommodate eight-foot shared use path, which will be separated by a slotted curb from the travel lane. The other portion of the eastern section currently has curb and gutter sidewalk on the sides of the corridor so it was not proposed to convert shoulder into shared use path in that portion. Near the intersection of SH 249 and Veterans Memorial Drive continuing eastward, a five-foot sidewalk is recommended on both sides of the corridor. This part of the eastern section does not have enough right-of-way to accommodate a shared use path.

[2] *Access Management Manual*, Texas Department of Transportation, 2011, p.1-5

Street Lighting

Poor lighting within a corridor contributes to safety concerns of residents along the corridor. This condition particularly affects non-motorized transportation users in a negative way. Pedestrians and bicyclists feel less safe traveling on the roadway, and transit users feel less safe walking to and from bus stops, as well as waiting at bus stops. It is recommended that street lighting for the corridor be evaluated in detail and upgraded to current safety standards where deficiencies exist.

Landscaping

It is recommended that landscaping treatments be implemented along the SH 249 corridor. Treatments include trees, bushes, and flowers and during the implementation phase of both the medians and sidewalks this should be examined in detail to see where these should be installed. The landscaping has the ability to become very visual and ornate within a wide median. Also, it is recommended that shade trees be planted along the sidewalks. In the same way that motorists are protected from the sun, heat, etc. pedestrians need to be protected from the hot and humid conditions in Houston. In addition, landscaping provides a "Parkway" feel and visual cues that encourage drivers to drive more slowly.

Advanced Signage Reevaluation

It is recommended that the existing advance signage for intersections be reevaluated to ensure that they are at a proper distance from the signal and are the appropriate size to provide adequate time for drivers to place themselves into the proper lane before reaching the intersection. This in turn will enhance safety and minimize the disruption of traffic flow near the intersection.

Transit

There are currently 32 bus stops within the corridor. Amenities at bus stops are based on the number of boardings and alightings. These can vary from a simple bus stop sign with no additional amenities, to a bus stop with a bench, shelter, garbage can, etc. A recommendation for transit is to evaluate the bus stops with their boardings and alightings and determine where improvements should be made. At a minimum, it is recommended that a concrete pad be provided to stand on while waiting for the bus. Some of the bus stop signs are very close to the roadway with a ditch on the other side which creates an unsafe environment for people waiting for the bus. Additionally, far side stops should be considered along SH 249 especially in the other side of dedicated right turn lanes, so that buses stopping at bus stops would not conflict with right turn traffic.

Speed Limit Study

Within the western and central sections, the speed limit is 50 mph and in the eastern section it varies between 45 mph and 50 mph. With the implementation of the aforementioned short-term improvements, it is recommended that a study be conducted to determine if the speed limit needs to be reduced along the corridor. Most of the recommendations suggest reducing the speed limit, particularly with the implementation of a shared use path. The reduction in speed will improve safety and, with the addition of the other short-term recommendations, will transform the existing corridor into a more pleasant and safer driving, walking, and bicycling experience.

Road Closures

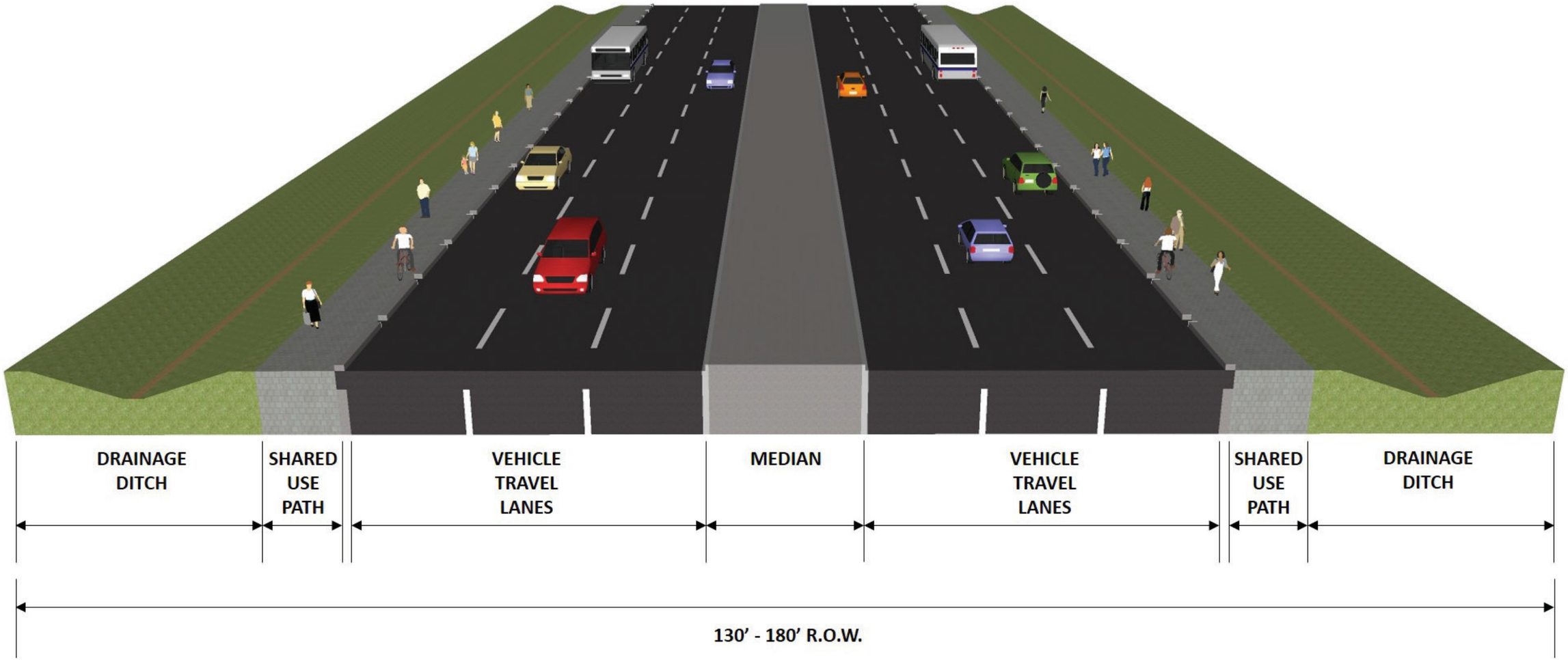
It is recommended that three small sections of roadway be closed and include:

- Mount Houston Road between West Montgomery Road and SH 249. It currently is a one-way roadway entering onto eastbound SH 249 which creates and unsafe driving situation—traffic merges with other high-speed vehicles. Also, some drivers decide to complete U-turns at this location going westbound along SH 249 which creates a very hazardous driving situation.
- Washington Drive between West Montgomery Road and SH 249. This two-way roadway is recommended to be closed due to the proximity of other intersecting roadways along SH 249.
- Killough Drive between West Montgomery Road and SH 249. Killough Drive is just south of the split of SH 249 and West Montgomery Road, and the elimination of this short piece of roadway between these two streets will reduce the traffic turning onto West Montgomery Road and SH 249.

The recommended road closures are not stand-alone actions, but must be paired with nearby intersection and roadway improvements providing comparable circulation. For instance, West Mount Houston Road should be be closed unless alternative access is provided via extending TC Jester Boulevard to West Montgomery Road.

Figure 5-1 shows the proposed typical section along SH 249 with the implementation of these various corridor wide improvements.

Figure 5.1 Short Term Typical Section



Intersection Improvements

The following section discusses the recommended short and medium-term improvements at 20 intersections along SH 249 between BW 8 and I-45. **Table 5-1** shows the improvements by location and the type of improvements at each. The following is a brief description of types of recommendations at these intersections:

- Deceleration lanes, turn bays, and left and right-turn lanes have been recommended to be implemented in the short-term throughout the SH 249 corridor. These improvements will provide capacity for vehicles turning left which will not impact vehicular movement on the through lanes. Right-turn bays will provide an area for cars turning which also, in turn, will not affect vehicular movement on the through lanes. If right-of-way is needed at certain locations then these recommendations will need to go into the medium-term time period. Dual left-turn lanes have also been recommended at various intersections along the corridor.
- Driveway Modifications - It is recommended that the driveways on the north side of SH 249 across from Fallbrook Drive be reconfigured. The driveways for the Self Storage and the adjacent Dairy Queen need to be realigned. Currently, both driveways have two different traffic signals. It is recommended that the driveway for the Self Storage be an entrance only from SH 249 and the driveway for the Dairy Queen be an exit driveway onto SH 249. This, in turn, will create the need for only one traffic signal at that location. This driveway modification is recommended in the short term. In the medium term, if the driveway modification has not been complete, the extension of Fallbrook Street recommended as a connectivity improvement will solve the issues altogether.

Table 5.1 Intersection Recommendations

Term	Intersection	Improvement
SHORT	SH 249 at Hollister St	EB SH 249 - Extend left turn storage lane to 300 ft WB SH 249 - Extend left turn storage lane to 300 ft; add exclusive right turn lane (300 ft storage) NB Hollister Dr - Add dual left turn lanes (120 ft storage); thru lane and shared thru and right turn lane SB Hollister Dr - Add dual left turn lanes (100 ft storage); thru lane and shared thru and right turn lane
	SH 249 at Seton Lake Dr	EB SH 249 - Extend left turn storage lane to 300 ft WB SH 249 - Add left turn lane (150 ft storage)
	SH 249 at Fallbrook Dr	EB SH 249 - Add right turn lane (150 ft storage) WB SH 249 - Add dual left turn lanes (200 ft storage) SB Driveways - Combine driveways into one; exclusive left turn lane and shared thru and right turn lane
	SH 249 at Old Bammel N Houston Rd	EB SH 249 - Extend left turn storage lane to 300 ft WB SH 249 - Extend left turn storage lane to 200 ft
	SH 249 at N Houston Rosslyn Rd/Bammel N Houston Rd	EB SH 249 - Extend left turn storage lane to 300 ft; extend right turn storage lane to 300 ft WB SH 249 - Extend left turn storage lane to 300 ft; add right turn lane (300 ft storage) NB N Houston Rosslyn - Add dual left turn lanes (150 ft storage); thru lane and shared thru and right turn lane SB Bammel N Houston - Add dual left turn lanes (150 ft storage); thru lane and shared thru and right turn lane
	SH 249 at Smiling Wood Ln/ NW Park Dr	EB SH 249 - Extend left turn storage lane to 250 ft WB SH 249 - Extend left turn storage lane to 250 ft SB NW Park Dr - Add exclusive thru lane
	SH 249 at West Rd	EB SH 249 - Extend left turn storage lane to 250 ft WB SH 249 - Extend left turn storage lane to 250 ft
	SH 249 at Antoine Dr	EB SH 249 - Extend left turn storage lane to 300 ft; extend right turn storage lane to 300 ft WB SH 249 - Extend left turn storage lane to 300 ft storage; add right turn lane (400 ft storage) NB Antoine Dr - Add dual left turn lanes (200 ft storage) SB Antoine Dr - Add dual left turn lanes (150 ft storage)
SHORT	SH 249 at Mosielee St	EB SH 249 - Extend left turn storage lane to 200 ft WB SH 249 - Add left turn lane (150 ft storage)
	SH 249 at Old Foltin Rd	EB SH 249 - Extend left turn storage lane to 250 ft WB SH 249 - Extend left turn storage lane to 200 ft; add right turn lane (200 ft storage) NB Old Foltin - Modify lane usage to allow separate left turn lane and a shared thru, left and right lane SB Old Foltin - Add additional left turn lane
	SH 249 at Upland Willow Ave	EB SH 249 - Extend left turn storage lane to 200 ft storage WB SH 249 - Add left turn lane (150 ft storage)
	SH 249 at Breen Dr	EB SH 249 - Extend left turn storage lane to 100 ft; add right turn lane (200 ft storage) WB SH 249 - Extend left turn storage lane to 300 ft NB Breen Dr - Add right turn lane; make shared left and right turn lane shared thru and left turn lane
	SH 249 at TC Jester Blvd	EB SH 249 - Extend left turn storage lane to 150 ft WB SH 249 - Extend left-turn lane to 200 ft
	SH 249 at Moonglow Dr	WB SH 249 - Extend left turn storage lane to 200 ft
	SH 249 at Old Hickory Ln	WB SH 249 - Add left turn lane (100 ft storage)
	SH 249 at Ella Blvd	EB SH 249 - Add left turn lane (100 ft storage) WB SH 249 - Extend left turn storage lane to 250 ft
	SH 249 at Veterans Memorial Dr	EB SH 249 - Extend left turn storage lane to 350 ft; extend right turn storage lane to 350 ft WB SH 249 - Extend left turn storage lane to 300 ft; add right turn lane (300 ft storage) SB Veterans Memorial Dr - Add right turn lane (250 ft storage)
	SH 249 at Deer Trail Dr	EB SH 249 - Add u-turn lane (150 ft storage) WB SH 249 - Extend left turn storage lane to 300 ft
MEDIUM	SH 249 at Veterans Memorial Dr	NB Veterans Memorial Dr - Add right turn lane
	SH 249 at Old Bammel N Houston Rd	SB Old Bammel N Houston Rd - Add right turn lane

Note: SH 249 is regarded as an east-west arterial in this table. All cross streets are regarded as north-south streets

Connectivity Improvements

Connectivity improvements were developed to enhance the mobility of traffic flow within the study area. Widening of existing roadways, and constructing sections of roadways to provide a longer roadway, improve mobility within the area and relieve vehicular pressure on SH 249. This is particularly true for parallel facilities near SH 249. These recommendations were based on the City of Houston Thoroughfare Plan (2013-2014) and the Study Team recommendations. The types of improvements recommended in the short-term along five study area roadways include:

- Breen Drive from SH 249 to ~ Vogel Creek – widen to four-lane divided facility
- Ella Boulevard from BW 8 to Northville Street – construct four-lane divided facility
- Deer Trail Drive from Greens Landing Drive to ~1,250′ north of West Road – construct four-lane divided facility
- Fallbrook Drive from Sweetbrook Drive to Greens Crossing Boulevard – construct four-lane divided roadway
- TC Jester Boulevard from Star Peak Drive to West Montgomery Road – construct four-lane divided facility.

MEDIUM-TERM RECOMMENDATIONS

Medium-term recommendations are designed for implementation within five to ten years and typically require some additional right-of-way and could require coordination with property owners. There are no corridor wide designated improvements recommended in the medium term. There are two intersection improvements in the medium term due to identified additional right-of-way needs as following:

- SH 249 at Veterans Memorial – add a right-turn lane on NB Veterans Memorial Drive
- SH 249 at Old Bammel North Houston Road – add a right turn lane on SB Old Bammel North Houston Road

Connectivity improvements in the medium-term include:

- Ann Louise Road – construct a bridge 600′ south of BW 8
- Breen Drive from North Houston Rosslyn Road to ~ Vogel Creek – widen to four-lane divided facility
- Fallbrook Drive from SH 249 to Old Bammel North Houston – construct four-lane divided facility
- Hollister Drive from Blue Creek Drive to Fallbrook Drive – construct four-lane divided facility
- Old Foltin Road from Essie Road to SH 249 – widen to three-lane roadway with center turn lane
- West Road from North Houston Rosslyn Road to Walmart entrance – construct four-lane divided roadway

Figures 5-2 through **5-15**, starting on the next page, illustrate the short and medium-term corridor wide, intersection, and connectivity recommendations.

POTENTIAL LAND USE IMPLICATIONS OF SHORT AND MEDIUM-TERM RECOMMENDATIONS

Based on preliminary design, a majority of the recommended short-term improvements would typically occur within the existing SH 249 right-of-way; therefore, impacts to adjacent land uses would generally be limited to changes in access. Changes in access to properties along the SH 249 corridor would result from the construction of raised medians along the SH 249 corridor from Beltway 8 to I-45 which would restrict left-turning movements in all areas where access is not provided. All businesses on both sides of SH 249 will have unrestricted right-in and right-out throughout the corridor. A short-term recommendation to reconfigure driveways on the north side of SH 249 across from Fallbrook Drive would slightly alter but generally maintain access to and from both businesses at this site, a Dairy Queen and a self-storage facility.[3] Another short term recommendation is to close Killough Drive between West Montgomery Road and SH 249. One commercial facility currently has direct access from this short segment of Killough Drive; however, multiple other access points to that business would still be available via West Montgomery Road and SH 249.

Some of the short and medium-term roadway recommendations highlight locations where overall mobility and connectivity would be improved by widening existing facilities or constructing new facilities. Potential impacts to existing development in the area surrounding the recommended short and medium-term roadway improvements would vary depending on surrounding land uses and additional right-of-way needs.

[3] The City of Houston, identified in the MTFP, has a new construction project that would connect Fallbrook at SH 249, east to Old Bammel North Houston Road. The Study Team has identified this as a potential medium-term project and may impact the businesses in this immediate vicinity.

Figure 5.2 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations

RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

City of Houston

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

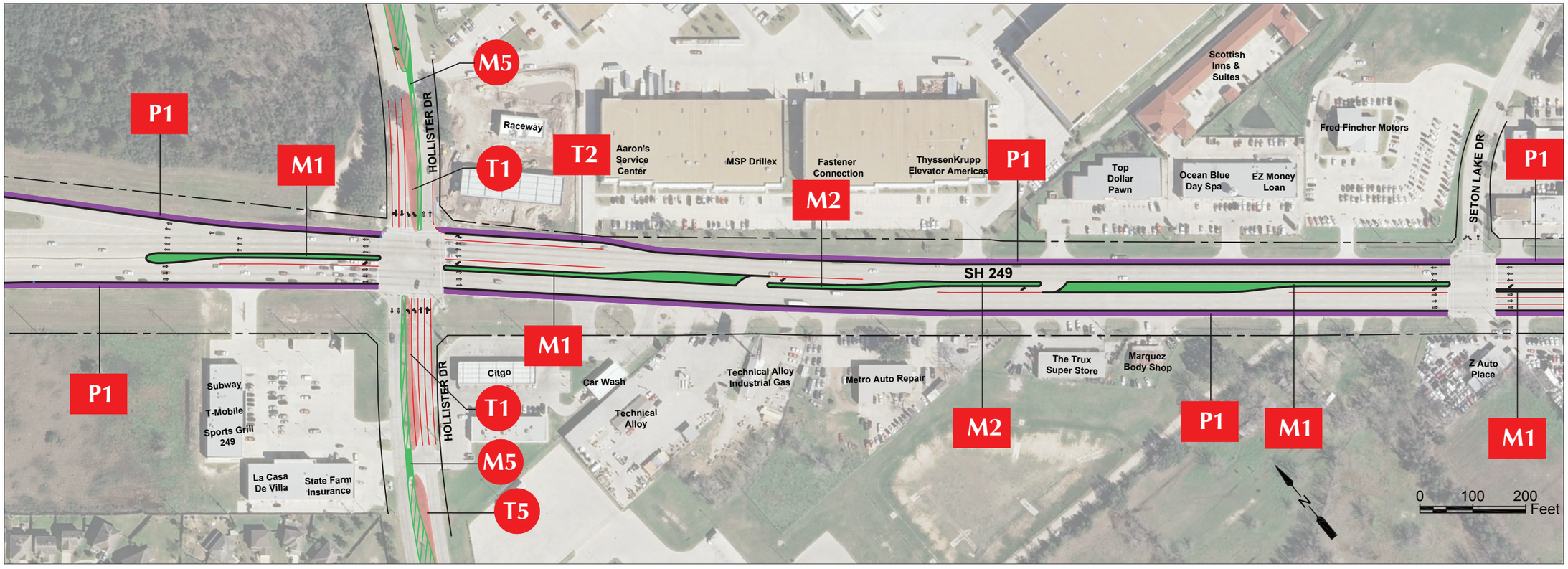
IMPROVEMENT LEGEND

- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

PEDESTRIAN IMPROVEMENTS

- P1 Add Shared Use Path

Figure 5.3 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations



RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

City of Houston

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

IMPROVEMENT LEGEND

- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

MEDIAN IMPROVEMENTS

- **M1** Add Raised Median with Left-Turn Lane
- **M2** Add Median with Directional Opening
- **M5** Add Raised Median Closure

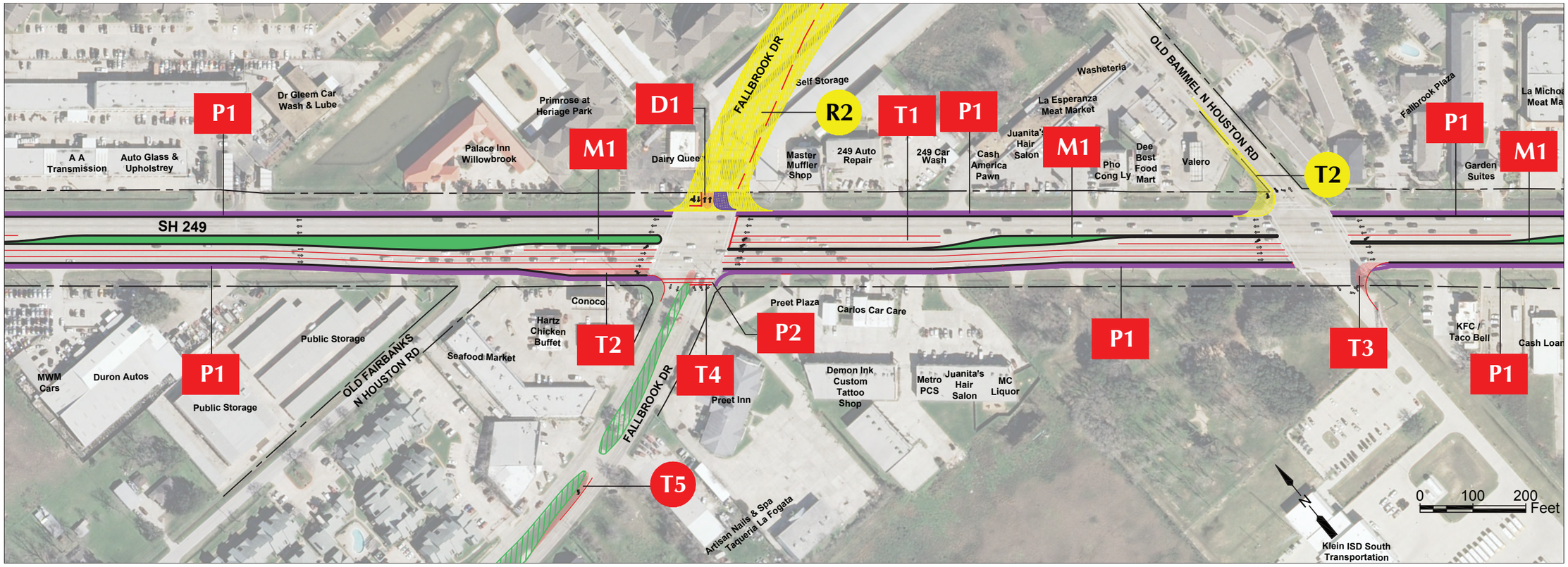
INTERSECTION IMPROVEMENTS

- **T1** Add Additional Left-Turn Lane
- **T2** Add Right-Turn Lane
- **T5** Add Left-Turn Lane

PEDESTRIAN IMPROVEMENTS

- **P1** Add Shared Use Path

Figure 5.4 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations



RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

City of Houston

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

IMPROVEMENT LEGEND

- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

MEDIAN IMPROVEMENTS

M1 Add Raised Median with Left-Turn Lane

PEDESTRIAN IMPROVEMENTS

P1 Add Shared Use Path

P2 Add Crosswalk

DRIVEWAY IMPROVEMENTS

D1 Consolidate Driveways

ROADWAY IMPROVEMENTS

R2 Extend Roadway

INTERSECTION IMPROVEMENTS

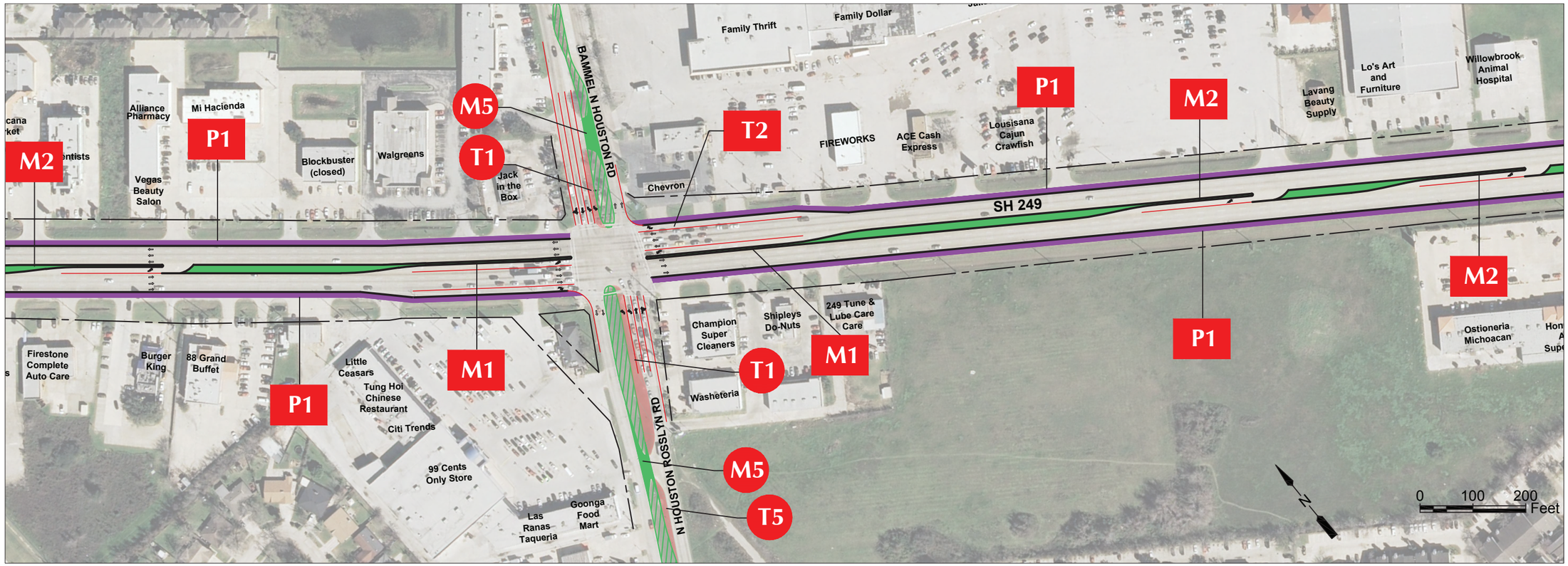
T1 / **T5** Add Additional Left-Turn Lane / Add Left-Turn Lane

T2 / **T2** Add Right-Turn Lane

T3 Re-Align Curve

T4 Add Stop Bar

Figure 5.5 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations



RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

City of Houston

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

IMPROVEMENT LEGEND

- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

MEDIAN IMPROVEMENTS

- **M1** Add Raised Median with Left-Turn Lane
- **M2** Add Median with Directional Opening
- **M5** Add Raised Median Closure

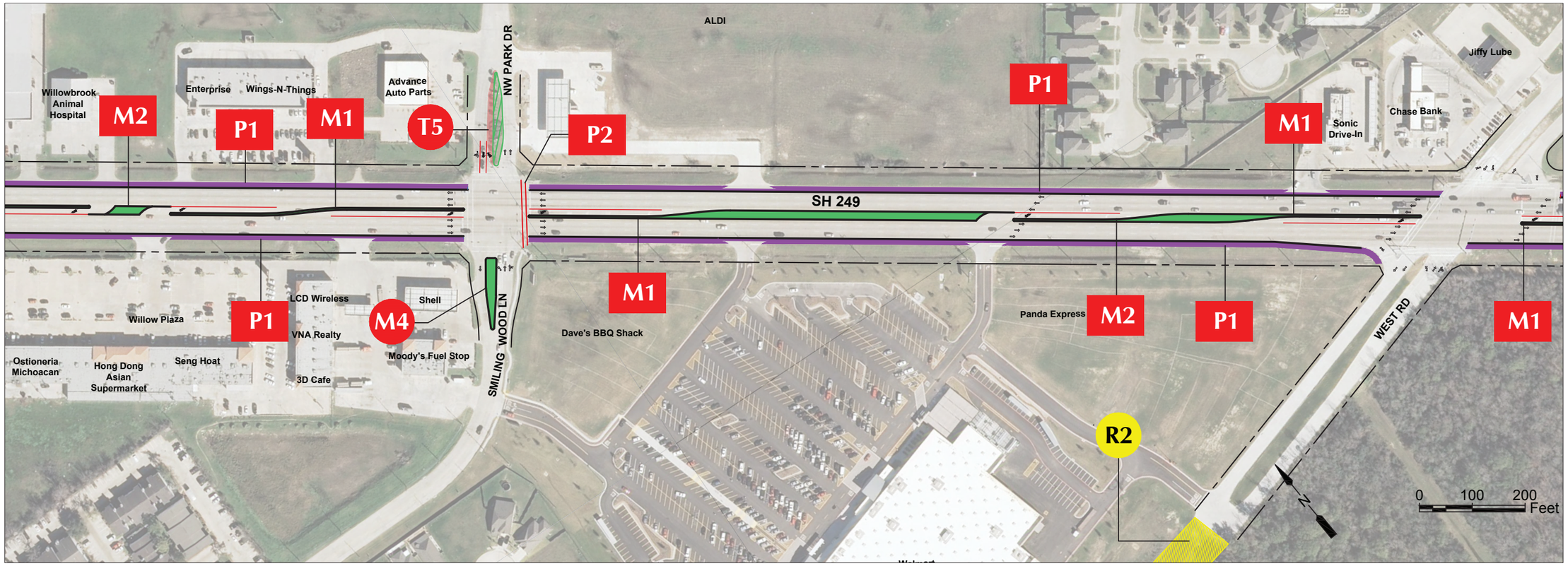
PEDESTRIAN IMPROVEMENTS

- **P1** Add Shared Use Path

INTERSECTION IMPROVEMENTS

- **T1** Add Additional Left-Turn Lane
- **T2** Add Right-Turn Lane
- **T5** Add Left-Turn Lane

Figure 5.6 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations



RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

City of Houston
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

IMPROVEMENT LEGEND

- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

MEDIAN IMPROVEMENTS

- **M1** Add Raised Median with Left-Turn Lane
- **M2** Add Median with Directional Opening
- **M4** Add Raised Median

PEDESTRIAN IMPROVEMENTS

- **P1** Add Shared Use Path
- **P2** Add Crosswalk

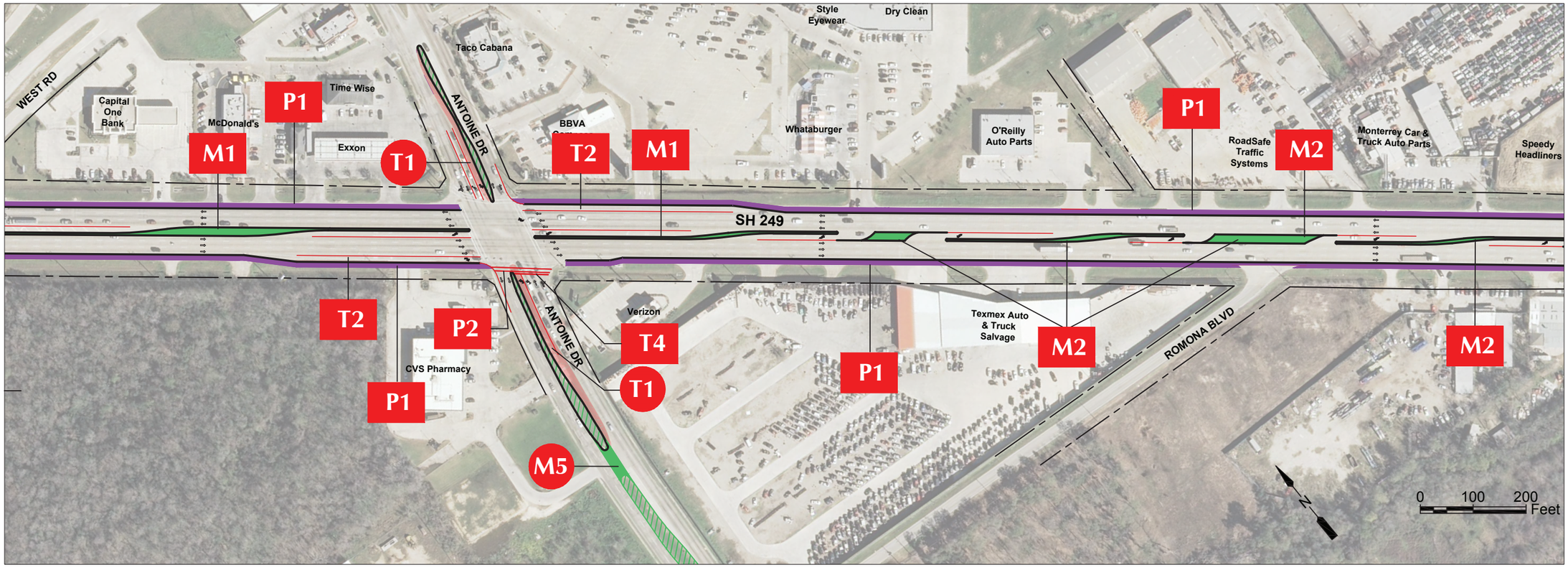
ROADWAY IMPROVEMENTS

- **R2** Extend Roadway

INTERSECTION IMPROVEMENTS

- **T5** Add Left-Turn Lane

Figure 5.7 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations



RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

City of Houston
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

IMPROVEMENT LEGEND

- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

MEDIAN IMPROVEMENTS

- **M1** Add Raised Median with Left-Turn Lane
- **M2** Add Median with Directional Opening
- **M5** Add Raised Median Closure

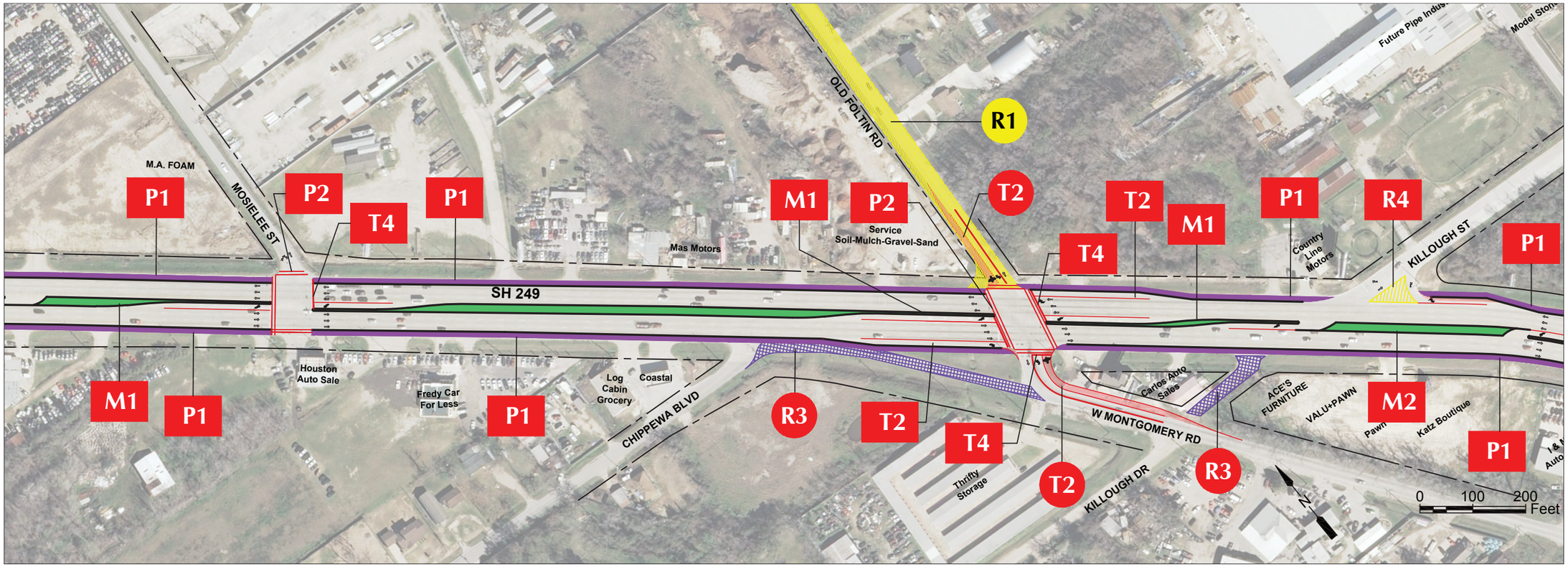
PEDESTRIAN IMPROVEMENTS

- **P1** Add Shared Use Path
- **P2** Add Crosswalk

INTERSECTION IMPROVEMENTS

- **T1** Add Additional Left-Turn Lane
- **T2** Add Right-Turn Lane
- **T4** Add Stop Bar

Figure 5.8 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations



RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

City of Houston
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

IMPROVEMENT LEGEND
- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

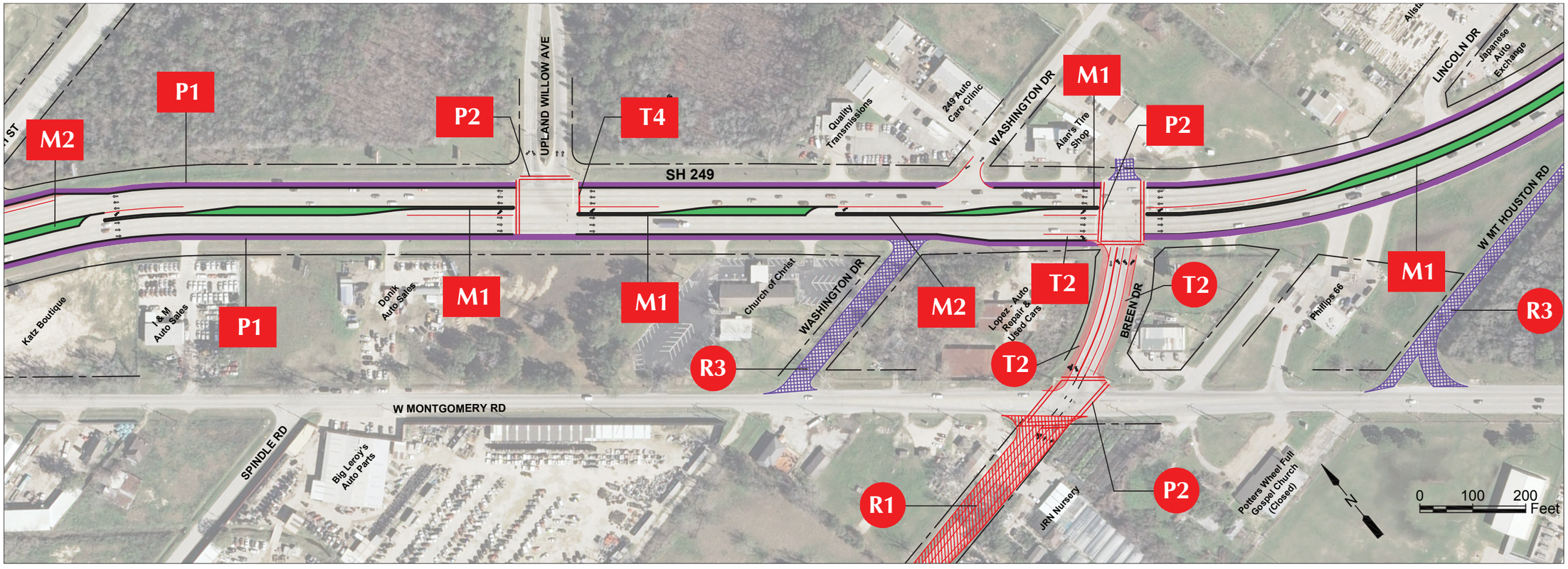
MEDIAN IMPROVEMENTS
- **M1** Add Raised Median with Left-Turn Lane
- **M2** Add Median with Directional Opening

PEDESTRIAN IMPROVEMENTS
- **P1** Add Shared Use Path
- **P2** Add Crosswalk

ROADWAY IMPROVEMENTS
- **R1** Widen Roadway
- **R3** Close Roadway
- **R4** Provide painted island

INTERSECTION IMPROVEMENTS
- **T2** / **T2** Add Right-Turn Lane
- **T4** Add Stop Bar

Figure 5.9 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations



RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

City of Houston

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

IMPROVEMENT LEGEND

- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

MEDIAN IMPROVEMENTS

- M1 Add Raised Median with Left-Turn Lane
- M2 Add Median with Directional Opening

PEDESTRIAN IMPROVEMENTS

- P1 Add Shared Use Path
- P2 / P2 Add Crosswalk

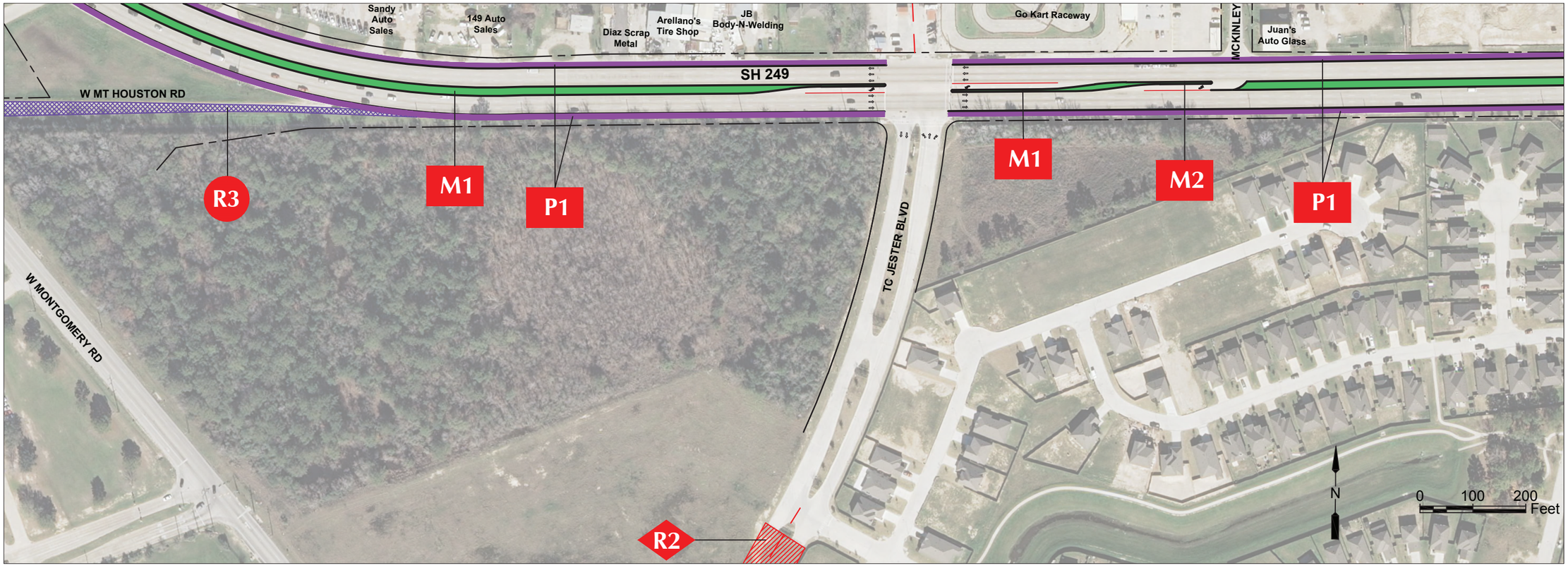
ROADWAY IMPROVEMENTS

- R1 Widen Roadway
- R3 Close Roadway

INTERSECTION IMPROVEMENTS

- T2 / T2 Add Right-Turn Lane
- T4 Add Stop Bar

Figure 5.10 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations



RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

City of Houston
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

IMPROVEMENT LEGEND

- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

MEDIAN IMPROVEMENTS

- **M1** Add Raised Median with Left-Turn Lane
- **M2** Add Median with Directional Opening

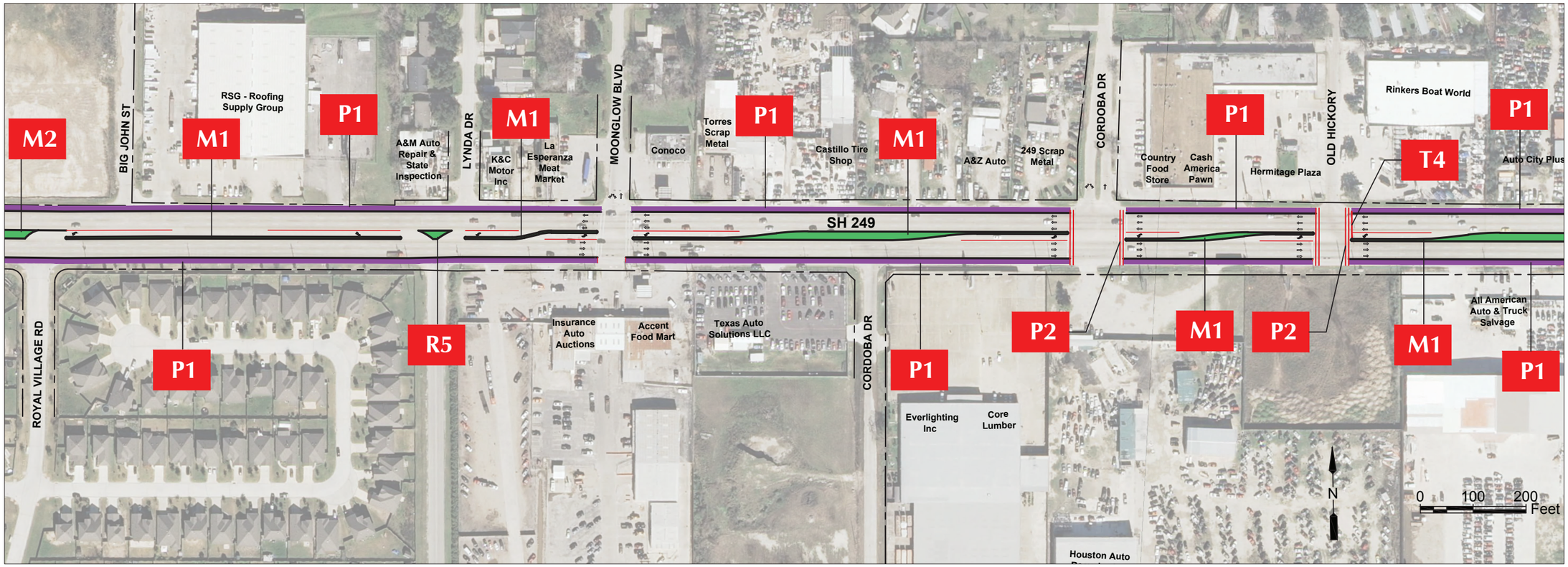
PEDESTRIAN IMPROVEMENTS

- **P1** Add Shared Use Path
- **P2** Add Crosswalk

ROADWAY IMPROVEMENTS

- **R2** Extend Roadway
- **R3** Close Roadway

Figure 5.11 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations



RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

City of Houston

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

IMPROVEMENT LEGEND

- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

MEDIAN IMPROVEMENTS

M1 Add Raised Median with Left-Turn Lane

M2 Add Median with Directional Opening

PEDESTRIAN IMPROVEMENTS

P1 Add Shared Use Path

P2 Add Crosswalk

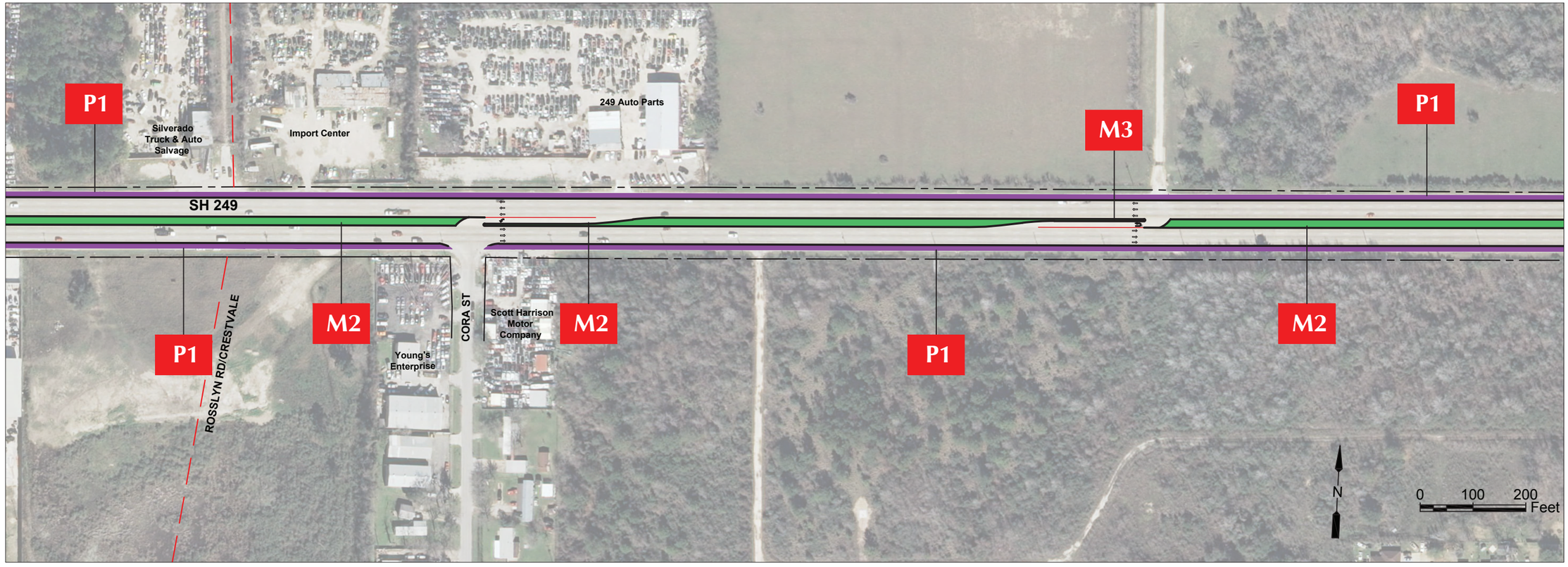
ROADWAY IMPROVEMENTS

R5 Provide raised island

INTERSECTION IMPROVEMENTS

T4 Add Stop Bar

Figure 5.12 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations



RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

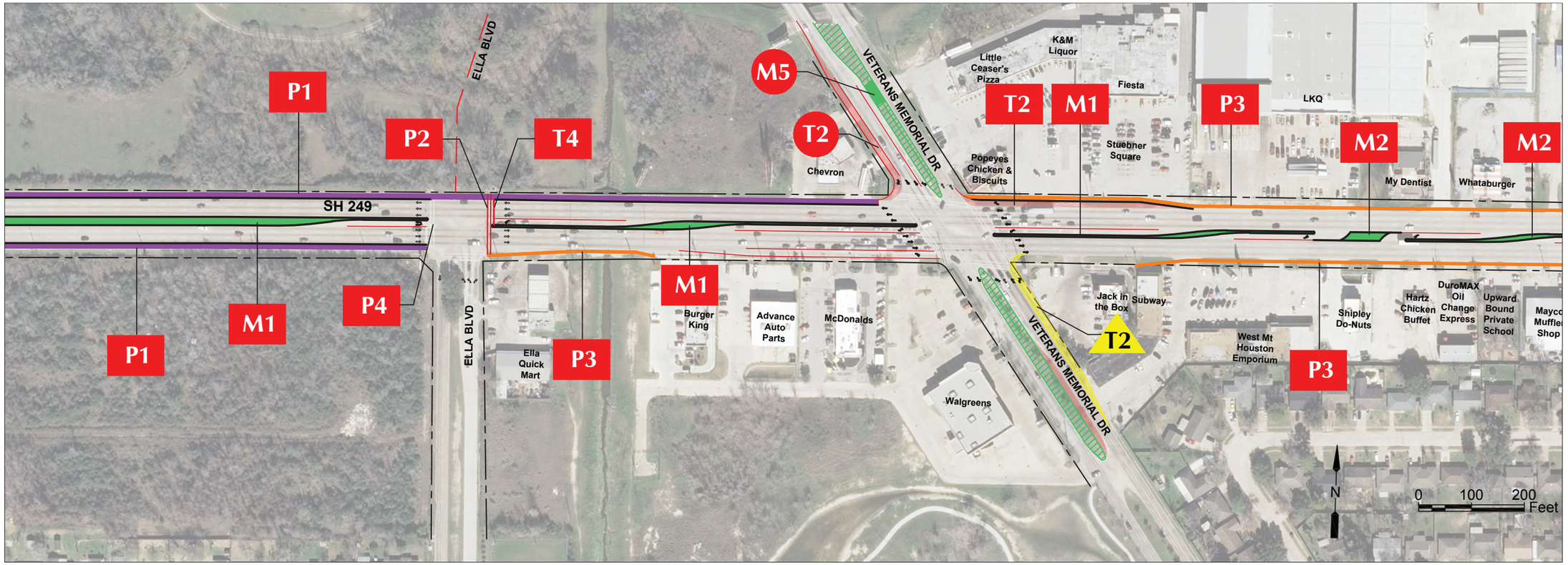
City of Houston
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

IMPROVEMENT LEGEND
- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

MEDIAN IMPROVEMENTS
- **M1** Add Raised Median with Left-Turn Lane
- **M2** Add Median with Directional Opening
- **M3** Add Median with U-Turn Lane

PEDESTRIAN IMPROVEMENTS
- **P1** Add Shared Use Path
- **P2** Add Crosswalk

Figure 5.13 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations



RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

City of Houston

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

IMPROVEMENT LEGEND

- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

MEDIAN IMPROVEMENTS

- **M1** Add Raised Median with Left-Turn Lane
- **M2** Add Median with Directional Opening
- **M5** Add Raised Median Closure

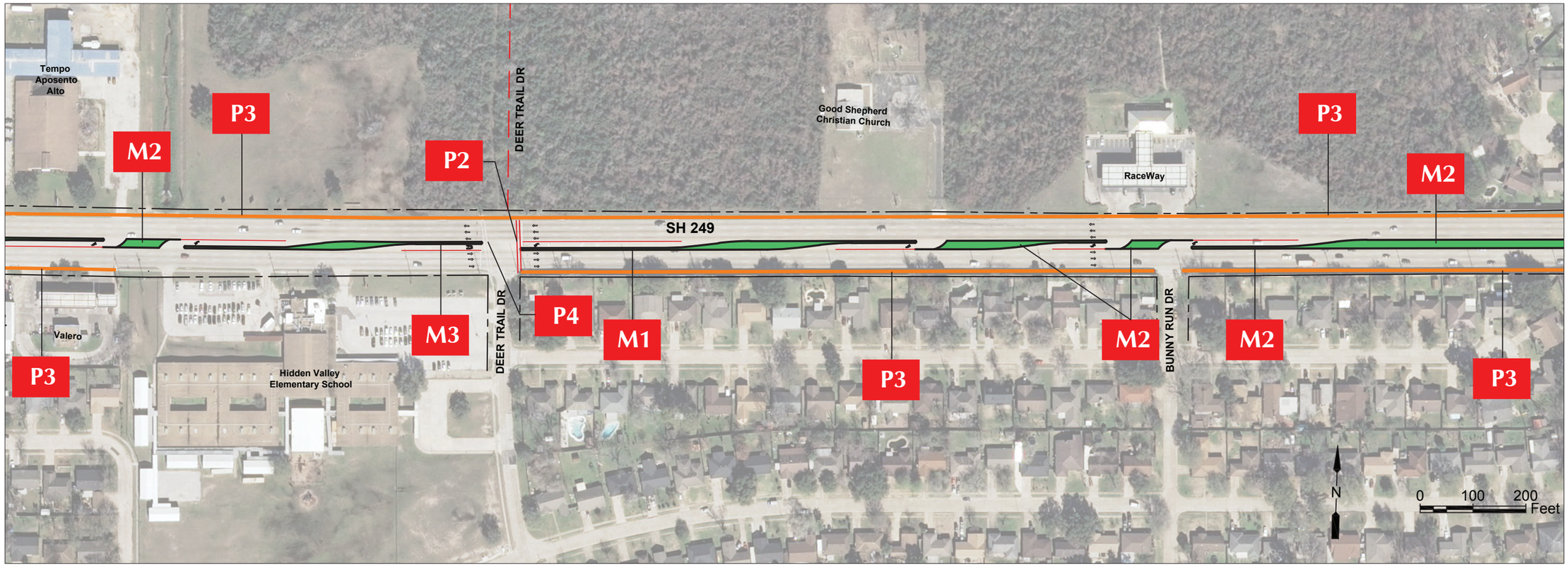
INTERSECTION IMPROVEMENTS

- **T2** / **T2** / **T2** Add Right-Turn Lane
- **T4** Add Stop Bar

PEDESTRIAN IMPROVEMENTS

- **P1** Add Shared Use Path
- **P2** Add Crosswalk
- **P3** Add Sidewalk
- **P4** Remove Crosswalk

Figure 5.14 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations



RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

City of Houston
- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

IMPROVEMENT LEGEND

- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

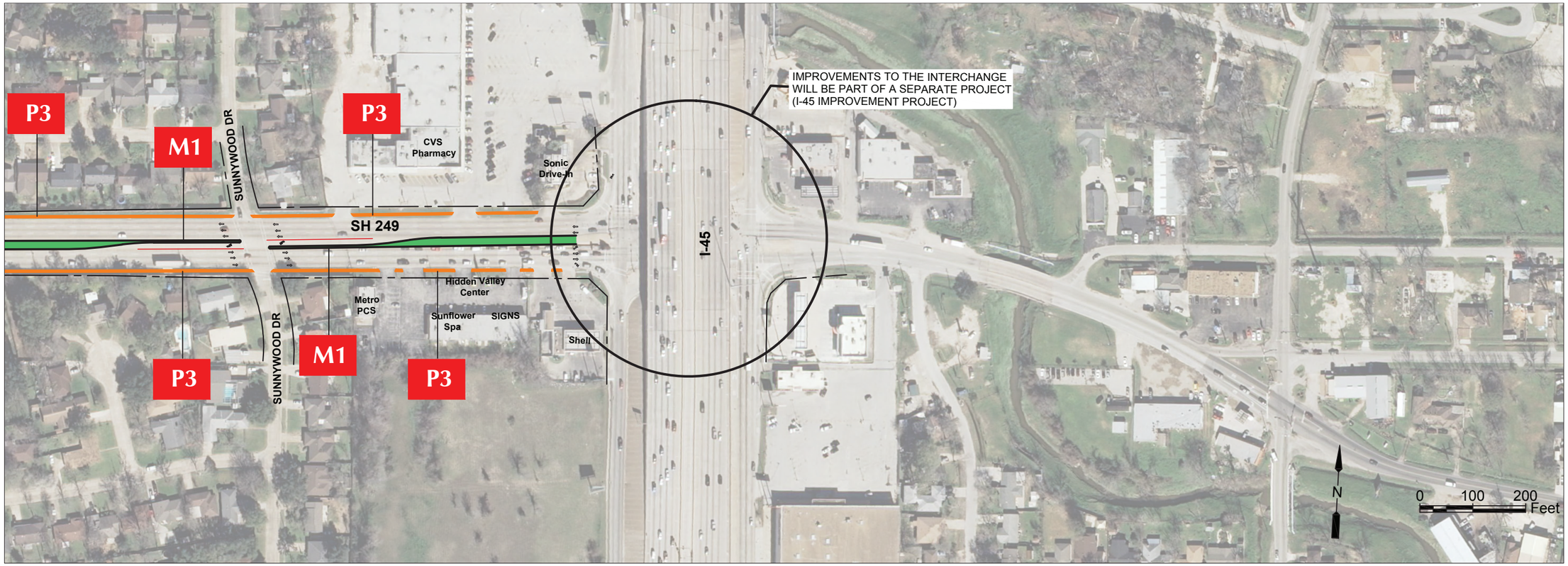
MEDIAN IMPROVEMENTS

- **M1** Add Raised Median with Left-Turn Lane
- **M2** Add Median with Directional Opening
- **M3** Add Median with U-Turn Lane

PEDESTRIAN IMPROVEMENTS

- **P2** Add Crosswalk
- **P3** Add Sidewalk
- **P3** Remove Crosswalk

Figure 5.15 Short and Medium-Term Corridor Wide, Intersection, and Connectivity Recommendations



RESPONSIBLE AGENCY/TIME PERIOD

Harris County Precinct 1

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

TxDOT

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

Harris County Precinct 4

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

City of Houston

- Short-Term Improvement
- Medium-Term Improvement
- Long-Term Improvement

IMPROVEMENT LEGEND

- Existing Right-of-Way
- Proposed Raised Median
- Existing Raised Median
- Proposed Raised Curb
- New Pavement
- Remove Pavement
- Roadway Widening/Extension
- Proposed Shared Use Path
- Proposed Striping
- Proposed Sidewalk
- Proposed Stop Bar
- Proposed Crosswalk
- Existing Lane Configuration
- Proposed Lane Configuration
- City of Houston 2014 Major Thoroughfare Plan

MEDIAN IMPROVEMENTS

M1 Add Raised Median with Left-Turn Lane

PEDESTRIAN IMPROVEMENTS

P3 Add Sidewalk

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Long-Term Recommendations

CHAPTER 6

The long-term recommendations and strategies proposed in this plan go beyond traditional roadway improvements to address land development and access management considerations along the SH 249 corridor, as there is a strong connection between land use and transportation. This document is a versatile planning tool that can serve as a guide to prevent future access problems and provide a vision for the corridor. The purpose is to encourage new development and redevelopment in the study area. The recommendations should be implemented through a combination of regulations, interagency or public-private agreements, and roadway improvement projects.

This chapter focuses on long-term recommendations, and it includes projects that take approximately 10 to 20 years to implement due to the need to conduct extensive studies related to engineering and environmental issues in the area, and prepare necessary documents as required by TxDOT and FHWA (if federal funding is involved) due to potential right-of-way impacts, as well as impacts to the surrounding area. Additionally, these projects can be considered major investments and the overall cost of such proposed improvements takes time to evaluate, fund, and implement. The recommended long-term recommendations for the SH 249 can be evaluated for three areas:

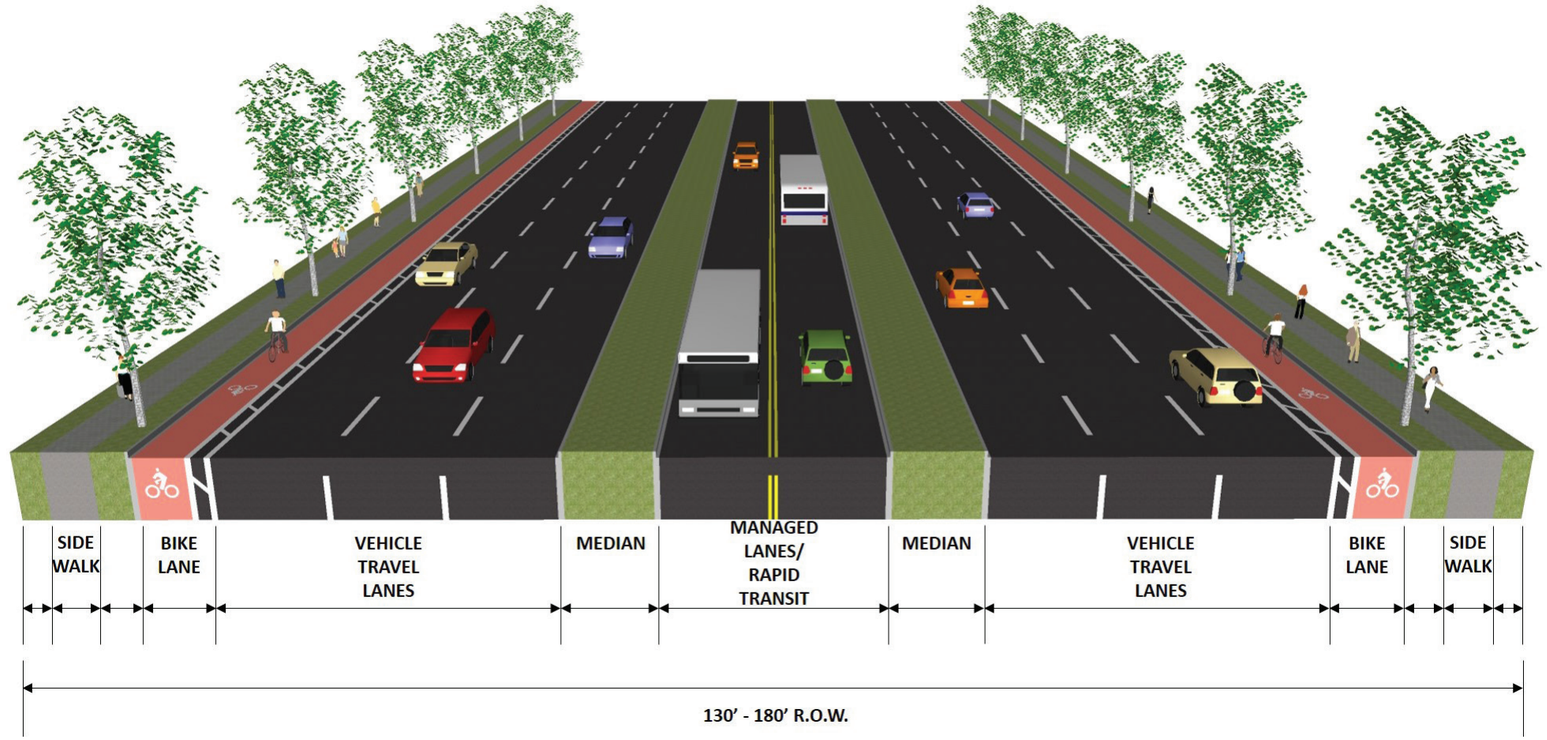
1. **Corridor Improvements:** Improvements in the vicinity and along the corridor
2. **Sub-regional Improvements:** Improvements that result in better connectivity to the corridor, circulation and distribution of traffic, multimodal options along the corridor, and implementation of complete street concepts
3. **Regional Improvements:** Connectivity and mobility as it relates to corridor improvements that serve the Greater Houston area and the region

CORRIDOR IMPROVEMENTS

Three options for the long-term vision of the SH 249 corridor were evaluated. These options were developed to maintain local access along SH 249 while efficiently moving traffic through the corridor. Two of the three options were eliminated due to either the negative impacts to the adjacent property and land use, or that it did not provide a thorough multimodal corridor.

The preferred option, shown in **Figure 6-1**, would includes a special use lane such as one managed lane or rapid transit lane in each direction located in the center of the roadway, two medians separating the special use lanes and the vehicle travel lanes, three travel lanes in each direction, a lane with a buffer in each direction, and a sidewalk separated from the bike lane. Managed/rapid transit lanes would be grade separated at major intersections to provide efficient movements through the corridor. This option provides enhanced mobility for transit and toll users through the implementation of these special lanes; for bicyclists and pedestrians through the construction of bike lanes and sidewalks; along with enhanced safety for all users with the removal of the center two-way left-turn lane.

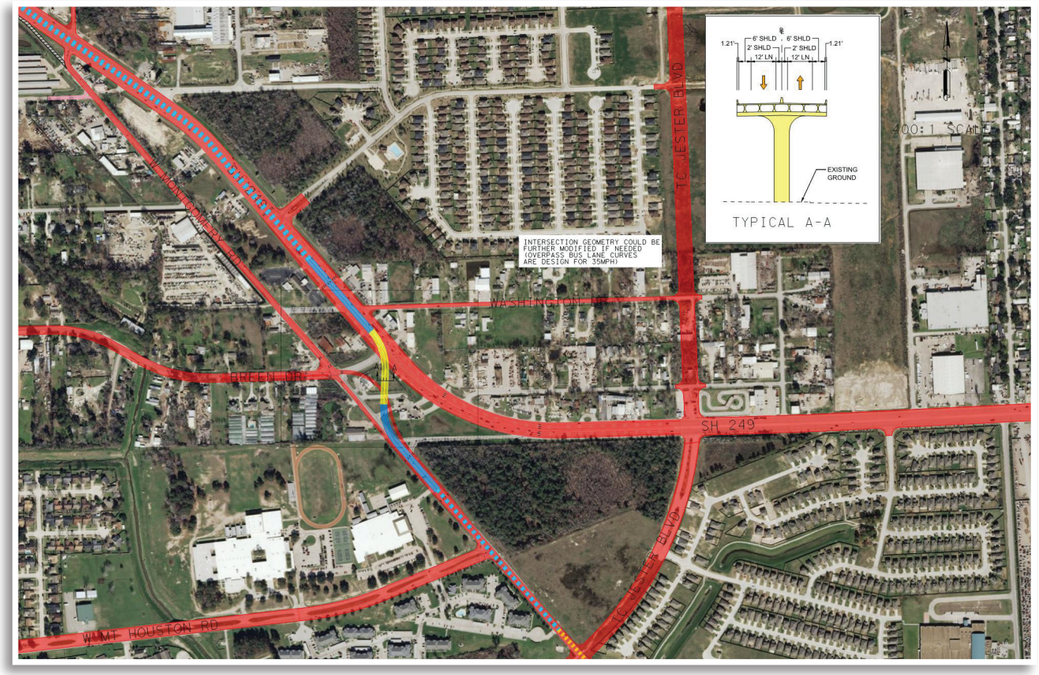
Figure 6.1 Managed Lanes/Rapid Transit Median Option



In addition to the overall corridor, improvements to SH 249 at Mount Houston Road were also evaluated. Issues on West Mount Houston Road include sight distance heading eastbound on SH 249 and vehicles making U-turn onto northbound/westbound SH 249. Other issues in the curve area include skewed intersections, speeding, and sight distance. As mentioned in Chapter 2, a stakeholder meeting was held with area residents and businesses on January 21, 2015 at the SH 249 Church of Christ. Comments and ideas were received for this area and are reflected in **Figure 6-2**. Improvements include realigning Breen Drive to connect to the eastern section of SH 249 at a safer angle. Intersection geometry should consider grade separations between heavy movements and should be evaluated as part of a future study. The three dimensional rendering of the realignment improvements in the Breen Drive area is illustrated in **Figure 6.3.**

Looking at the proposed long-term improvements to SH 249, and in particular the option calling for two special use lanes in the center will lead to a complete reconfiguration of the intersection at SH 249 and West Montgomery Road. The improvements include constructing a two-lane, grade-separated overpass from SH 249 to West Montgomery Road for the use of transit only. This overpass would be designed to minimum standards for the use of transit which would include two travel lanes and outside shoulders. The slope would be designed for six percent. The overpass would clear the SH 249 southbound to eastbound movement and the West Montgomery Road northbound movement. Currently, West Montgomery Road has heavy transit use, and with the future opening of the direct connector from I-45 southbound to Shepherd Drive in conjunction with the opening of the Shepherd transit center, transit use will only increase on this facility. These improvements are also aligned with comments received from the final public meeting in April 2015 which indicated a need for increased transit frequency, improved connection to Seton Lake Park and Ride, and enhanced transit facilities and functionality. This connection would facilitate the already heavy transit movement by providing a free flowing movement between SH 249 and West Montgomery Road.

Figure 6.2 Breen Area Realignment



Traffic on SH 249 would be able to free flow without any incoming traffic, via the three lanes in each direction, through the curve at Breen Road. At the Breen Road and West Montgomery intersection, Breen Road would be maintained as a minor arterial with improvements proposed only at the intersection. Breen Road would be improved from the bayou crossing east to West Montgomery Road with two travel lanes in each direction. Breen Road would dead end at West Montgomery Road; eastbound traffic on Breen Road would be forced to make a left or a right onto West Montgomery Road and northbound traffic on West Montgomery Road would be able to enter Breen Road westbound. West Montgomery Road, north of Breen Road, would be three lanes: one travel lane in each direction with a center left-turn lane. South of Breen Road, West Montgomery Road would split to include one travel lane in each direction to accommodate the transit overpass, until it ties into the transit overpass where it would become two travel lanes in each direction. This section of West Montgomery Road, between Breen Road and TC Jester Boulevard, could be improved to six lanes in each direction depending on projected traffic demand.

These proposed improvements would remove the existing connections between Breen Road, West Montgomery Road, and SH 249; therefore, changing traffic patterns and as a result decrease the need to improve and upgrade Breen Road. The following movements would not be accommodated with these proposed intersection improvements: eastbound/westbound Breen Road to/from SH 249, northbound to eastbound from West Montgomery Road to SH 249, and westbound to southbound from SH 249 to West Montgomery Road. These movements would need to occur via SH 249 at West Montgomery Road north of Breen Road or between SH 249 and West Montgomery Road via TC Jester Boulevard south of Breen Road. Using TC Jester Boulevard between SH 249 and West Montgomery Road is contingent on the extension of the TC Jester Boulevard south of SH 249.

Access Management Policies and Strategies

Access management policies and strategies have progressed since the first H-GAC access management study conducted in April 2002. Additional strategies could be applied to the SH 249 corridor to further enhance and promote mobility, safety, and corridor vitality. Some issues related to access management of the SH 249 corridor and possible future polices and strategies to address those issues are further described in **Table 6-1**. The access management policies developed for the corridor and possibly for the region should be straight forward, coordinated, and consistently applied. Furthermore, the access management policies and guidelines for new development should address the following:

1. Functional Area of an Intersection
2. Driveway Spacing and Geometry
3. Traffic Impact Study

TxDOT, Harris County, and the City of Houston should work together to identify barriers related to implementing access management strategies in the region. These agencies should establish uniform guidelines for future development and redevelopment based on the TxDOT Access Management Manual and Transportation Research Board (TRB) Access Management Manual. The guidelines should be consistently applied by the various agencies when reviewing permit application for platting, access, development, and redevelopment. Collaboration on these guidelines can also help guide the aesthetics along the corridor.

Figure 6.3 Breen Area Realignment Sketch

Table 6.1 Access Management Policies & Strategies

Access Management Issue	Description of Issue	Future Solution, Policy, or Strategy
Property Owner/ Developer Needs Versus Public Needs	The need to provide a safe roadway often conflicts with developer's desire to have unlimited and convenient access. Based on field observations along the corridor, development in the corridor has not adequately maintained the balance between the needs of the owner/developer and those of the general public. While convenient to some, current development patterns are detrimental to drivers and pedestrians because of the safety hazards they present.	The driveway permitting and design requirements of the various agencies should be examined and modified to address the requirements for a wider range of site uses or redevelopment. Monitoring these permits could ensure that the original permit conditions and previous agreements with developers and property owners are applicable. Driveway design and specifications should be reviewed periodically to proactively avoid additional access issues. Additionally, Chapter 42 - Subdivisions, Developments and Platting of the City of Houston municipal code should be revised to recommend the use of shared driveways and to include discussions on access management. Coordination between TxDOT and the City of Houston should be encouraged to promote the use of shared driveways along the corridor; through the promotion of shared driveways in Chapter 42. **e.g.** As adopted by in the City of Fredericksburg, Texas in March 2014, the ordinance is intended to: 1. Prohibit the indiscriminate location and spacing of driveways while maintaining reasonable vehicular access to and from the public street system; 2. Reduce conflicting turning movements and congestion and thereby reducing vehicular accidents; and 3. Maintain and enhance a positive image for the attraction of new, high-quality developments in the City. The ordinance also notes that driveway design for state maintained highways must meet requirements of TxDOT Access Management Manual.
Traffic Impact Analysis (TIA)	The completion of access management forms are required by the City of Houston for commercial development greater than 10,000 square feet and residential developments greater than one single family home. In addition to the access management forms, the developer may be required to conduct a TIA on the proposed development. Typically, TIAs are conducted for a single development or redevelopment with little regard to other proposed development in the vicinity. This causes mitigation measures to be short sighted and usually only beneficial to those utilizing the development.	A more comprehensive approach to traffic impacts associated with proposed developments and redevelopments should be encouraged. This would help facilitate the identification of mitigation measures that are beneficial to a large population of vehicles and provide opportunities for implementing access management strategies. Additionally, the City of Houston should encourage the use of shared driveways as described above.
Agency Obligation to Provide Access	Agencies are required to provide access to any platted parcel of land. Typically the land use and platting power to control the configuration and the intensity of the development are vetted with either the city or county.	The State needs strong support and cooperation from the city and county to ensure that access management is an integral part of the platting and design process. **e.g.** The Wichita Falls MPO's 2010-2035 MTP provides recommended access management ordinances for use by local jurisdictions. Two of the example ordinances include provisions for the unified access and circulation: *Development sites under the same ownership considered unified parcels (also applies to phased development). Limits number of connections permitted to overall site/promotes cooperation between multiple owners when abutting properties are in different ownership.* *Adjacent commercial or office properties and major traffic generators (i.e. shopping plazas, office parks) shall provide a cross access drive and pedestrian access way to allow circulation between sites. This requirement shall also apply to a building site that abuts an existing developed property unless the decision making body finds that this would be impractical.*
Interagency Coordination and Support	Interagency support and improved communication are critical in carrying out a successful access management program. TxDOT, Harris County, and the City of Houston must work together to establish a unified vision to preserve and maintain the integrity of the corridor.	Interagency coordination and support can be achieved through collaboration with the City of Houston and Harris County, who have defined development regulations, and TxDOT since TxDOT has jurisdiction over SH 249 and has defined access management standards in their manual. **e.g.** A handout outlining the procedures for plat reviews that includes a point of contact could become an effective tool for distributing access management requirements and related information.
Corridor Management District	The SH 249 corridor currently lacks a cohesive and organized voice to identify, define and develop solutions to issues facing the corridor. A coordinated effort is needed to in maintaining the vision and goals of the corridor.	Establishment of a corridor management district (District) that works closely with property owners and developers to coordinate access management and corridor issues with various agencies, helping prevent further degradation of safety and capacity along the corridor. The District becomes the focal group that creates a link between the community along the corridor and the various agencies. The District also will help identify public private partnership initiatives, apply for grants, and create opportunities to support the economic development / redevelopment along the corridor. The District, in coordination with the City and TxDOT, may designate segments of the corridor for the purpose of developing access management plans that apply special access management requirements to the corridor. The purpose of this designation is to develop a specific plan for the roadway system, including, but not limited to, median openings, signal location, access connections, and cross access and joint access requirements for adjacent developments that may reduce access problems on major thoroughfares and advances sustainable development patterns in conformance with the desired character of the area. Corridor access management overlay zones do not supersede underlying land use and zoning provisions, but provide additional requirements for designated areas. **e.g.** The Wichita Falls MPO identified recommendations for local governments to accomplish access management. One of the recommendations encourages local governments to establish a corridor overlay district for high priority arterial roadways that establishes a high degree of access control and supporting land development regulations.

Sources: City of Houston Municipal Code, Chapter 42 Subdivisions, Developments and Platting, https://library.municode.com/index.aspx?clientId=10123
City of Houston Department of Public Works and Engineering, Infrastructure Design Manual, December 2014, Chapter 15 on Traffic Impact Analysis
City of Fredericksburg, Texas Municipal Codes adopted March 2014. http://www.fbgtx.org/DocumentCenter/View/500
Wichita Falls Metropolitan Planning Organization, 2010-2035 Metropolitan Transportation Plan Update (January 2010)

Sub-regional Improvements

Sub-regional long-term recommendations are focused on enhancing connectivity to and from the corridor and within the area of influence which includes roadways and connections to Beltway 8 on the north, I-45 on the east, West Gulf Bank Road on the south side and Fairbanks North Houston Road on the west in order to facilitate multimodal options and connections to major corridors in the area. The primary purpose of these connectivity improvements is to preserve existing capacity on SH 249.

SH 249 is a unique diagonal corridor, it traverses north to south at the western end and east to west at the eastern end while connecting to Beltway 8 and to I-45. The corridor is heavily utilized and congested since there are many disjointed arterials that do not provide adequate connectivity or capacity within the sub-region, and as a result, many users are forced to use SH 249. As identified in the *Northwest Sub-regional Mobility Study* (January 2015), the prevalent issue in the region is lack of continuity and connectivity of existing roadways. This sub-regional study cites three issues related to connectivity:

1. Many of the Major Thoroughfares are not yet built and therefore create a gap within the existing system of roadways.
2. The White Oak Bayou presents an obstacle to street connectivity especially where it intersects with roadways.
3. Given the presence of industrial and manufacturing facilities within the sub-region, heavy trucks are prevalent, but are more evident along corridors such as Fairbanks North Houston, Fallbrook Drive, Breen and Bingle/ North Houston Rosslyn Road.

Creating a connected supporting street system can improve connectivity and/or capacity of side streets, parallel roads, inter-parcel circulation systems to support planned development, and help alleviate congestion along SH 249. The City of Houston Planning Commission's *Major Thoroughfare and Freeway Plan* (MTFP) is an effective instrument in guiding development, as well as providing mobility and accessibility to the users of the corridor.

The MTFP identifies all major corridors within the City of Houston and its surrounding ETJ. It recognizes corridors that need to be constructed and also those roadways that need to be widened. As part of this access management study, the Study Team reviewed the improvements identified in the MTFP and identified additional improvements.

Figure 6-4 shows all the connectivity recommendations for the short-term, medium-term, and long-term time periods from both the MTFP and Study Team. The vast majority of these projects are long-term since they require more project development time and higher level of funding. **Table 6-2** lists the sub-regional connectivity projects in the long-term.

Figure 6.4 Connectivity Recommendations

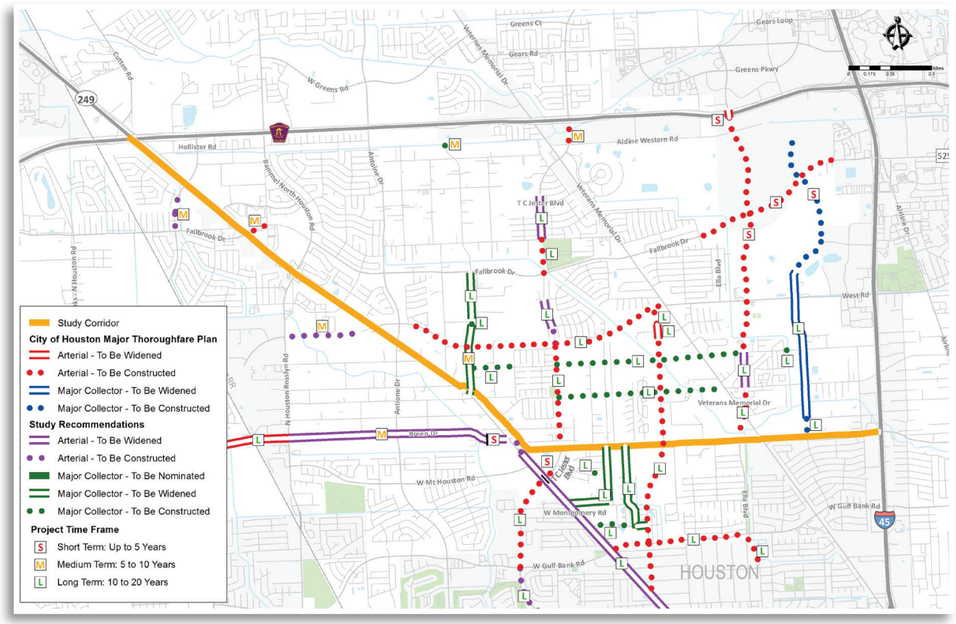


Table 6.2 Long-Term Sub-Regional Connectivity Recommendations

Ann Louise Rd	Fallbrook Dr	Essie Rd	Widen from 2-lane undivided roadway to 3-lane roadway with center turn lane
Blue Bell Rd	TC Jester Blvd	Veterans Memorial Dr	Construct 2-lane undivided roadway
Breen Dr	Gessner Rd	Fairbanks N Houston Rd	Construct 4-lane divided roadway
Breen Dr	Fairbanks N Houston Rd	N Houston Rosslyn Rd	Widen from 2-lane undivided roadway to 4-lane divided roadway
Cordoba Dr	SH 249	Crestvale Dr	Widen from 2-lane undivided roadway to 4-lane divided roadway
Crestvale Dr	West Road	~200' N of Stuebner Park Ln	Construct 2-lane undivided roadway
Crestvale Dr	~200' N of Stuebner Park Ln	~200' S of Stuebner Park Ln	Widen to 2-lane undivided roadway
Crestvale Dr	~200' S of Stuebner Park Ln	W Montgomery Rd	Construct 2-lane undivided roadway
Deer Trail Dr	1,000' N of West Road	Turney Dr	Widen from 2-lane undivided roadway to 4-lane divided roadway
Deer Trail Dr	Turney Dr	SH 249	Construct 4-lane divided roadway
Ella Blvd	Northville St	Blue Bell Rd	Widen from 2-lane undivided roadway to 4-lane divided roadway
Ella Blvd	Blue Bell Rd	SH 249	Construct 4-lane divided roadway
Ella Blvd	W Gulf Bank Rd	Dewalt St	Construct 4-lane divided roadway
Jorent Dr	SH 249	W Montgomery Rd	Widen from 2-lane undivided roadway to 4-lane divided roadway
Northville St	Old Foltin Rd	Madison Oak St	Construct 2-lane undivided roadway
Northville St	TC Jester Blvd	Ella Blvd	Construct 2-lane undivided roadway
Northville St			Construct bridge 500' west of Deer Trail Dr
TC Jester Blvd	BW 8	Aldine Western Rd	Construct 4-lane divided roadway
TC Jester Blvd	Regal Wood Dr	Frick Rd	Widen to 4-lane divided roadway
TC Jester Blvd	Frick Rd	Fallbrook Dr	Construct 4-lane divided roadway
TC Jester Blvd	Dylans Crossing Dr	Vikram Dr	Widen to 4-lane divided roadway
TC Jester Blvd	Vikram Dr	West Rd	Construct 4-lane divided roadway
TC Jester Blvd	West Road	SH 249	Construct 4-lane divided roadway
TC Jester Blvd	W Montgomery Rd	W Gulf Bank	Construct 4-lane divided roadway
West Rd	NW Park Dr	Veterans Memorial Dr	Construct 4-lane divided roadway
W Gulf Bank Rd	W Montgomery Rd	Ella Blvd	Construct 4-lane divided roadway
W Montgomery Rd	W Mt Houston Rd	N Shepherd Dr	Widen from 4-lane divided roadway to 6-lane divided roadway
W Montgomery Rd and SH 249			Reconfigure Roadways at Breen Intersection

Arterials and collectors identified in the MTFP for new construction or widening are illustrated on Figure 6-3 in red (arterials) and blue (collectors). The other long-term roadway improvements identified by the Study Team in the sub-region are shown in purple (arterials) and green (collectors).

As depicted, these roadway improvements would enhance the connectivity and distribution of traffic within the sub-region. Extending or widening the arterials and collectors in the area would provide alternative routes. For instance, Breen Drive would connect to the eastern section of SH 249, providing an east-west arterial from the west side of Beltway 8, west of Greenhouse Road (called West Road in this area), to I-45. Extending and widening Fallbrook would provide the same level of connectivity. Extending and widening TC Jester Boulevard would enhance north-south travel by providing connectivity between Beltway 8, I-610, and I-10.

Multimodal Operations

People increasingly want more choices in how they travel between where they live, work, and shop. This trend presents a tremendous opportunity for new types of transportation investments that can reduce the growth of vehicle travel, while producing added economic, safety, and environmental benefits.

Schools are located in the vicinity of all three sections of the SH 249 corridor. Subdivisions and multi-family residences are also located in the vicinity of the corridor. As described in Chapter 3, the SH 249 local study area has approximately 23 percent of residential land use. School children, on bicycles or as pedestrians, use this corridor to go from home to school every weekday.

The Walmart Supercenter and grocery stores located in the central section of the corridor contribute to a large amount of pedestrian and transit activity. With the existing conditions of the corridor, pedestrians must cross seven travel lanes without a refuge area and some pedestrians cross mid-block at locations without a designated crosswalk. Additionally, with the current lack of continuous sidewalks in the corridor, pedestrians must utilize the shoulders or walk in the grass. This causes safety concerns for pedestrians and motorists, as this type of interaction makes the pedestrian more vulnerable.

As described previously, the recommended vision for the SH 249 corridor addresses this desire for providing safe options for transportation. With this vision, school children and other pedestrians and transit users would be separated from vehicles either on an exclusive bike lane or on a sidewalk, minimizing the conflict areas with vehicles. Additionally, rapid transit/managed lanes located along the center of roadway would enhance the mobility of transit/toll users along the corridor. Overall, pedestrians, cyclists, and motorists will be able to safely interact and effectively travel together.

Complete Street and Livable Centers Concepts

One way to encourage the interaction of transportation modes includes promoting mixed use development and redevelopment along the corridor to create livable centers where people can work, shop, and live within a walking distance and create an environment that is less dependent on vehicular use. With that concept in mind, the need for modal transportation is much greater to promote the successful implementation of the livable centers.

H-GAC has taken several steps towards implementing the 3C's (Centers, Connections, Context) program. A "Livable Centers" project category has been created in the TIP and RTP, and sponsors have proposed both planning and implementation of Livable Centers projects. Centers are places with a concentration of workplaces, shopping, entertainment, and/or housing. Clustering these activities creates opportunities for walking, bicycling, and transit trips, therefore reducing the need for car travel. Depending on the concentration of activities and the pedestrian environment, internal car trips within a center could be reduced from 5 percent to 55 percent.

The goal of the Livable Centers strategy is to improve access while reducing the need for single-occupant vehicles. Through a concentration and a mix of land uses, Livable Centers allow for greater accessibility by a variety of transportation modes, including walking, bicycling, and transit.

Potential Benefits of a 3C'S Program

- Reduce Roadway Congestion
- Improve Roadway Safety
- Create Economic Advantages
- Produce Environmental Benefits
- Create Quality Places

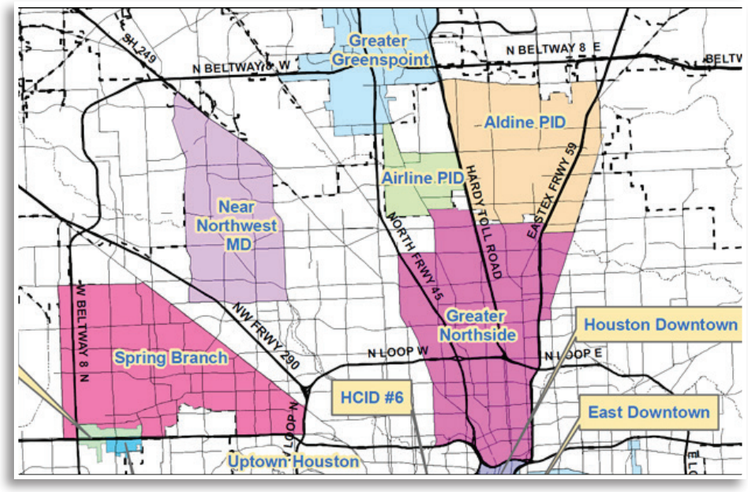
As a champion for Livable Centers and the 3C's Program, H-GAC can provide the following support:

- Coordinate transit and roadway planning to ensure that existing and planned Centers are well connected to the region's multimodal transportation network
- Promote roadway designs appropriate for the context of the surrounding community to ensure safe and convenient travel choices for all user modes
- Promote coordination of local transportation improvements and private sector development
- Help fund local planning studies to assist in the development of Centers
- Provide funding support for internal street connections and pedestrian facilities

The Near Northwest Management District (NNMD) is the main management district located in the sub-region. The boundaries of the NNMD are illustrated on **Figure 6-5**; the NNMD borders SH 249 to the north between the projected Hollister Drive to the west and TC Jester Boulevard to the east, and the southern boundary is Pinemont Drive.

In 2013, the City of Houston's Mayor Annise Parker issued an Executive Order to develop the Complete Streets and Transportation Plan (HCSTP) which aims to provide safe, accessible, and convenient use by motorists, public transit riders, pedestrians, people of all abilities, and bicyclists. More information can be found at "http://www.houstontx.gov/planning/CompleteStreets".

Figure 6.5 Near Northwest Management District Area



Source: City of Houston, Planning and Development, August 2008
http://www.houstontx.gov/planning/Neighborhood/mgmt.html

While the NNMD does not have formal access management practices in place, it is promoting a livable centers concept on Antoine Drive between Victory Drive and West Tidwell Road; located approximately three miles south of the SH 249 study corridor. The plan identified four strategic objectives to address this vision statement: *Transform Antoine into a destination intertwined with the waters of White Oak Bayou and Vogel Creek, linked to the heart of Houston by waterside trails and enhanced transit, punctuated by unique parks and community gardens, to be reborn as a walkable, bikable mixed-use corridor anchored by landmark buildings and lively public spaces.*

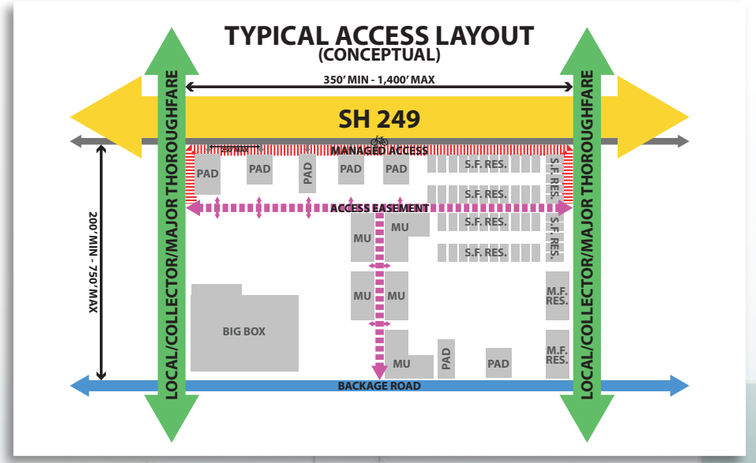
1. Distinctive, memorable, multimodal environment for those traveling within or through the Study Area.
2. Stabilize and fortify the single family residential market by reducing the supply of nearby deteriorated, blighted, and nuisance properties and replacing them with uses that have more positive effects on value.
3. Elevate the Study Area's regional market awareness through unique and functional open space investments that simultaneously build community.
4. Capitalize economically on existing and potential transit services (*Livable Centers Plan*, NNMD, February 2012).

The proposed bike facilities in the study area are shown in Chapter 4 – Future Conditions.

THE BACKAGE ROAD CONCEPT

A backage road runs behind developed land and provides access to properties and local traffic circulation. Drivers could use the backage road to access properties and connect to side streets; therefore, the necessity of directly using front-end driveways to enter/exit the major corridor such as SH 249 could be reduced.

Figure 6.6 Backage Road Concept



Source: H-GAC

REGIONAL IMPROVEMENTS

SH 249 extends northwest from I-45 in Harris County to FM 1774 in the community of Pinehurst in southwestern Montgomery County. SH 249 has been designated as one of the fragmented highways slated for upgrade under the Texas Trunk System. In 1998, the corridor was authorized for preliminary development as a Phase I Corridor of the Texas Trunk System (Houston to Waco).

Since 1998, the highway has been studied to connect to College Station and eventually Waco. In January 2015, TxDOT issued the Draft Environmental Impact Statement for the SH 249 Extension from FM 1774 in Pinehurst to FM 1774 north of Todd Mission (segment 2 of 3 planning segments). The ultimate extension of SH 249 would connect portions of the Greater Houston area, northwest Harris County, and Montgomery County to SH 105 in Grimes County via a controlled-access tollway.

The proposed SH 249 Controlled-Access Tollway Extension project would be the second of the three segments, extending from just south of the SH 249/FM 1774 interchange in the City of Pinehurst to a new SH 249/FM 1774 interchange north of the City of Todd Mission. The proposed tollway would be constructed on a new location and would be approximately 14 to 15 miles in length, depending on the selected alternative. The proposed SH 249 Extension would be constructed as a four-mainlane, controlled access toll road with auxiliary lanes, on-ramps and off-ramps (where appropriate), and intermittent frontage roads within a typical 400-foot-wide ROW (SH 249 DEIS, January 2015).

One of the needs identified in the SH 249 DEIS included the lack of system linkages. Currently, the roadway network does not allow for efficient radial and circumferential traffic movement. The system neglects to provide efficient connections, or linkage, between major suburban communities and major roadways within the region, such as the Sam Houston Tollway, proposed SH 99 (Grand Parkway Toll Road), FM 2920, FM 1774, FM 149, FM 1488, FM 1486, SH 105, and SH 6.

As SH 249 is extended northwest, vehicles entering the roadway network within Houston will only increase. Traffic will need to disperse into the City via the Grand Parkway and the Sam Houston Tollway. The Sam Houston Tollway is already reaching capacity in this section and cannot be widened due to ROW constraints. The Tollway serves as the northern constraint in this sub-region.

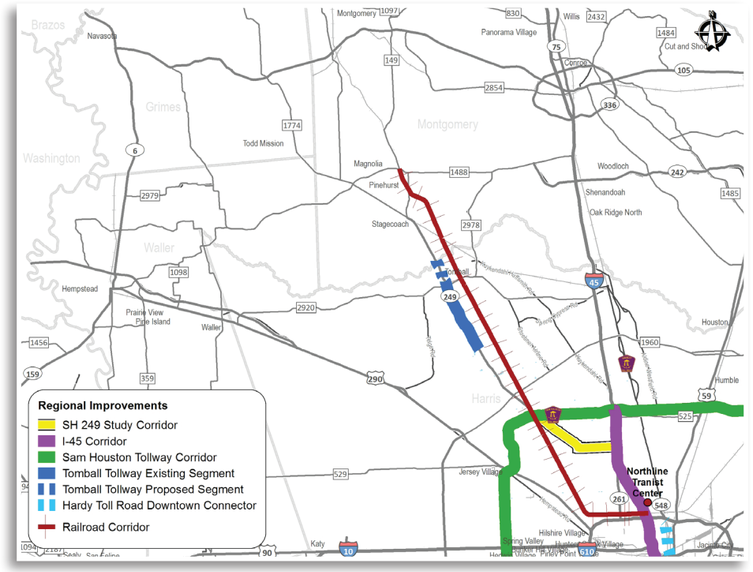
Other roadway constraints located in this area include the railroad to the west, I-45 to the east, and I-610 to south. Connectivity of local streets between the freeways is also limited, such as Ella Boulevard which does not continue south of Sam Houston Tollway. A study is currently underway by TxDOT (North Houston Highway Improvement Project) to add four managed lanes to I-45 between Beltway 8 and Downtown Houston, while also improving the connectivity of the Downtown loop.

Systemwide connectivity and multimodal improvements will be necessary to safely and efficiently allow the movement of vehicles and people throughout the region. Opportunities for improvements are present within the sub-region, including the following:

- Potential widening of the Sam Houston Tollway in certain areas to increase the number of travel lanes in each direction.
- Identification of potential new corridors that parallel SH 249. One potential corridor is to utilize the existing railroad corridor that parallels SH 249 north to Pinehurst for the addition of light rail, commuter rail, or a toll road. Connectivity from the north could be provided within Houston by extending the corridor to terminate within the I-610 loop.
- Improvements to the I-45 corridor from Beltway 8 to Downtown Houston (as mentioned previously, a study is currently underway to improve, widen, and add managed lanes on I-45 from Beltway 8 to Downtown Houston).
- Improvements to SH 249 connectivity at Sam Houston Tollway and beyond (i.e. FM 1960, the Grand Parkway, etc.).

Figure 6-6 shows the regional study area and improvements.

Figure 6.7 Regional Study Area and Improvements



This study recommends a future study to evaluate multimodal solutions across a larger, regional study area to consider a greater area of service and a broader evaluation of system connectivity.

CONCLUSION

The mobility needs, issues, and concerns for SH 249 are similar to many corridors and growing communities in suburban Houston and suburban America alike. Establishing a cohesive and connected hierarchical network of transit, streets, streetscape, sidewalks, walkways, trails, and open natural systems within development that offers mixed-use along commercial corridors will ease the problematic growing demand of arterial volume of the traditional "commuting" patterns between urban cores and suburban areas.

Both urban planning for future development and planning for transportation design are intrinsically connected. Land use, development type and pattern, building orientation, parking configuration, and access collectively contribute to the development framework for creating efficient safe access to and within transportation systems and facilities.

With the current users of the SH 249 corridor and the future connectivity of the highway to Waco and beyond; long-term improvements to the corridor, sub-region, and region will be required to effectively and efficiently maintain mobility. This plan identifies the long-term vision of the corridor that includes six travel lanes, BRT/managed lanes down the center of the roadway, bike lanes, and sidewalks. This vision will address the needs of the corridor by providing a safe roadway for the interaction of vehicles, bicyclists, and pedestrians and will hopefully encourage the future connectivity of alternate modes of transportation in the sub-region.

The plan attempts to capture some of the potential sub-regional and regional opportunities to improve connectivity and mobility. In addition to enhancing connections between modes of transportation, this sub-region needs improved roadway connectivity. Concerns regarding how traffic will disperse in the Houston area with the extension of SH 249 to the northwest should be raised. The already congested Sam Houston Tollway has limited available capacity to aid in the dispersion of traffic. Alternate modes of transportation for commuters should also be considered as potential solutions.

This proactive approach to promoting smart growth initiatives is essential to the success of both solving the transportation issues and ensuring the success and quality of life within communities. In addition, promoting long-range planning of multimodal forms of transportation and creating development and land uses that are "transit-oriented" will ensure the demand and success of alternative transportation needs in conjunction with the increasing demand for quality of life and environmental concerns.

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Benefits, Costs, and Next Steps

CHAPTER 7

The implementation of the proposed recommendations will advance many goals of the H-GAC and the community at large. Improved roadways, raised medians, safer intersections, sidewalks, and bicycle facilities will serve to improve transportation within the study area. This chapter discusses the benefits of the recommendations and the next steps.

Benefits of the recommendations identified in this corridor study include both qualitative and quantitative benefits. Qualitative benefits include aesthetics, quality of life, and 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 improved traffic operations and reduction in crash cost and vehicle emissions.

REGIONAL CONNECTIVITY

The long-term recommendations include multiple connections to the thoroughfares. These connections will greatly improve the circulation of traffic within the study area and reduce congestion on SH 249.

Apart from the regional connections, widening cross streets that intersect SH 249 makes it easier to turn into the roadway and provides improved traffic flow. This can be particularly accomplished when adding a right turn only lane on the cross street to access the corridor. Improving the supporting street network would also provide relief to the SH 249 corridor. Providing a parallel route to the corridor could help remove traffic from SH 249 which would improve travel time and safety.

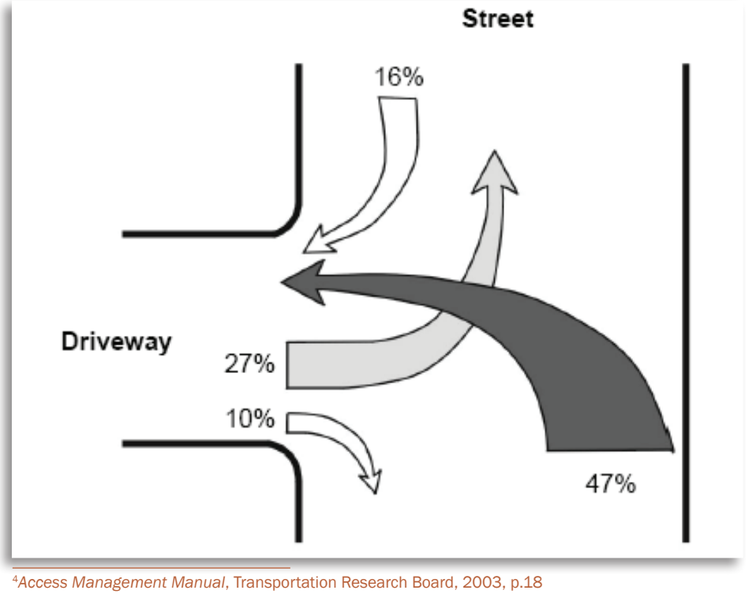
Raised Medians

A raised median is recommended throughout the SH 249 corridor. A median is a portion of a divided highway that separates opposing traffic flows. A non-traversable median is a physical barrier such as a raised concrete curb and/or island, or a grass or a swale median that restricts movement of traffic across a median.

The increase in adjacent development along the corridor is directly correlated with increasing traffic volume. A two-way left-turn lane allows unrestricted 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 involved left-turns which are depicted in **Figure 7-1**.

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 7-2**, 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 eight. Studies have shown that a raised median can reduce auto crashes by 40 percent and reduce pedestrian involved crashes by 45 percent. A median also provides an additional refuge area for both pedestrians and bicyclists.

Figure 7.1 Percentage of Driveway Crashes by Movement



[4] *Access Management Manual*, Transportation Research Board, 2003, p.18

Implementation of raised medians results in more U-turn maneuvers due to the reduction in direct left-turn access. It has been determined that right turns followed by U-turns are safer than direct left-turns.[4]

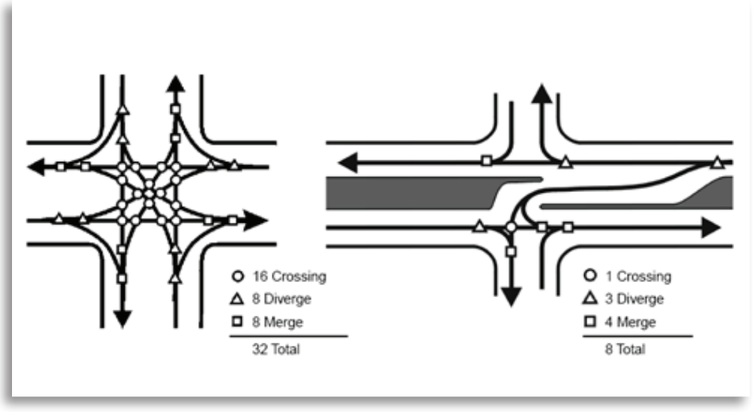
Additionally, studies have shown that implementation of a raised median can reduce delay by up to 30 percent and increase the capacity of the roadway by up to 30 percent.[5]

Signal Timing

This project recommends that in the short term, traffic signals along SH 249 be retimed and synchronized to provide better vehicular travel coordination and flow. This type of improvement is most cost effective and results in improving traffic movement and increasing safety. According to ITE studies, comprehensive signal retiming projects have resulted in 7 to 13 percent reduction in travel time, 15 to 37 percent reduction in delay, and 6 to 9 percent in fuel savings.

Studies have also shown that one-half mile is the optimum spacing for traffic signals along a corridor. This may not be possible in urban setting, but signals should not be placed less than a quarter mile apart. Traffic signal timing parameters are dependent on factors such as traffic volume and speed. As traffic volumes change along SH 249 due to traffic growth, redistribution, and improvements to the supporting street network, it will be necessary to retime traffic signals regularly to maintain optimum traffic flow and operation. Also, the signals will be retimed and synchronized for time of day. This will help mitigate the traffic demands as they fluctuate throughout the day by providing more time to approaches with heavier demands.

Figure 7.2 Conflict Points: Typical 4-Way Intersection versus Directional Median Opening



[5] *Access Management Manual*, Transportation Research Board, 2003, p.19

Deceleration Lanes/Turn Bays

A left-turn bay serves as a deceleration and storage lane which provides safe refuge for vehicles turning left, and in turn, minimizes the impact on through traffic. Right-turn bays increase capacity and provide refuge for vehicles that have slowed down to make right turns and therefore improving safety and minimizing delay for through traffic. Extending a left- or right-turn bay and/or adding dual turn lanes could be required when turning volumes are high and queue into the through travel lanes.

Intersection Improvements

The recommended improvements for the corridor were evaluated using a traffic operations model. The impacts of the recommended improvements on intersection delay and level-of-service along the SH 249 corridor are summarized in the next section.

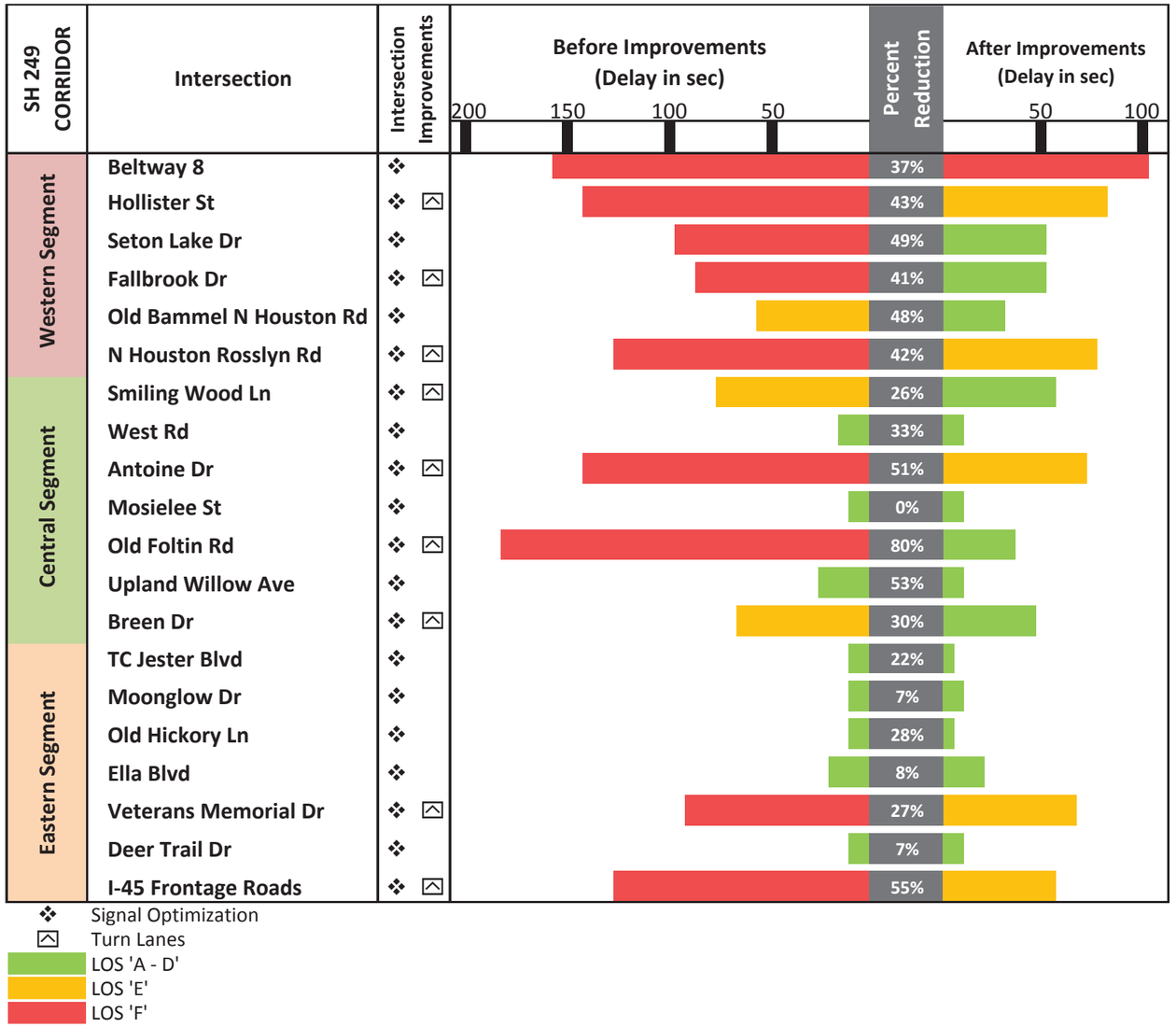
TRAFFIC ANALYSIS AND BENEFITS OF RECOMMENDED IMPROVEMENTS

Intersections

Future 2019 projected traffic volumes at the study intersections were forecasted based on growth rates identified from the H-GAC's Regional Travel Demand Model. Similar to the existing conditions, *Synchro* was utilized to model proposed traffic conditions. Based on the projected results of delay and LOS from the No-Build model, different types of improvements at the intersections were proposed to reduce delay at intersections. These improvements include optimization of signal timing, adding signal phases, adding turn lanes, and reconfiguration of lane usage.

Figure 7-3 shows the delay reduction (the higher one between AM and PM) of each intersection as a result of the associated proposed improvements. The details of delay and LOS with and without improvements of each intersection are documented in **Appendix F**. The highest percentage of delay reduction occurs at the intersection of SH 249 and Old Foltin Road (80 percent), followed by I-45 northbound frontage road (55 percent). These are two of the six intersections previously identified with the worst LOS in the existing conditions. Additionally, four intersections (Beltway 8, North Houston Rosslyn Road/Bammel North Houston Road, Antoine Drive, and Veterans Memorial Drive) show 27 percent to 51 percent improvement when comparing the No-Build and Build models. From an operational perspective, however, it is recommended to perform retiming of the signals every two years in order for the signal plans to meet the most current needs.

Figure 7.3 Intersection Delay Reduction



Note: Delay of each intersection shown is from the time period (AM or PM) which has the higher delay reduction. Delay of Beltway 8 is the average of four nodes and I-45 is the average of two nodes.

Travel Time Savings

Travel time for motorists is an integral component of transportation costs. An evaluation of travel time savings is critical, and therefore an assessment of potential savings in travel time is useful in the evolution of transportation improvements. Based on traffic simulation models developed for the study corridor, the implementation of the recommended intersection improvements and the addition of the raised median resulted in a reduction of total vehicle delay by approximately 650 hours during the weekday AM peak period and 1,390 hours during the weekday PM peak period. Assuming 300 weekdays a year, the annual peak hour travel time savings due to the recommended improvements are estimated at approximately $14.9 million for the combined AM and PM peak periods. Refer to Appendix F for additional information about the reduction in delay and travel time savings calculations.

Crash Cost Savings

As discussed, the Transportation Research Board has summarized research on the effects of reduction in vehicular crashes associated with the implementation of various access management techniques including the addition of a raised median. **Table 7-1** provides the estimated crash reduction for several different treatments types recommended in this study.

Crash data from TxDOT for the three-year period between 2010 and 2012 was analyzed for each segment of the study corridor and the average annual number of crashes by severity was determined. To illustrate the impact of reducing crashes, the monetary costs per crash type were used, as reported by the National Safety Council in **Table 7-2**.

Table 7.1 Reduction in Total Crashes by Access Management Treatment

Access Management Treatment	Reduction in Total Crashes
Add Raised Median	15 to 35%
Replace Continuous Left Turn Lane with a Raised Median	15% to 57%
Add Left-Turn Bay at Signalized Intersection	25%
Add Left-Turn Bay at Unsignalized Intersection	Up to 75%
Add Right-Turn Bay	25% to 35%
Extend Right-Turn Bay	15%

Sources: Safety Benefits of Raised Medians and Pedestrian Refuge Areas, FHWA 2010; TRB Access Management Manual, 2003

The average of the estimated reduction in crashes associated with the raised median (25 percent) was applied to the annual average for each corridor section for each type of crash. This allowed a monetary value to be estimated from the recommended improvements. The estimated annual savings from the reduction in crashes for each section is summarized in **Table 7-3**. Although the effects of the raised median on the crash reduction was accounted for in the benefit calculations, additional improvements related to the access management techniques recommended for implementation would be realized. For instance, addition of a left-turn lane at a signalized intersection would positively affect the crashes at that particular location. Refer to Appendix F for additional information regarding the estimation of the crash reduction percentages.

Table 7.2 Cost of Crashes by Injury Type

Crash Type	Cost
Death	$4,538,000
Incapacitating Injury	$230,000
Non-Incapacitating Injury	$58,700
Possible Injury	$28,000
No Injury	$2,500
Pedestrian Injuries	$58,700

Source: Estimating the Costs of Unintentional Injuries, 2012, National Safety Council, 2013

Table 7.3 Annual Savings from Crash Reduction Associated with Raised Medians

Section	Annual Savings (Millions)
Western Section	$0.27
Central Section	$2.52
Eastern Section	$3.82

Lighting

The addition of lighting along SH 249 can improve safety as it provides better visibility for both vehicles and pedestrians. Businesses also benefit from this as they are easier to recognize as a vehicle gets closer.

Crosswalks

Crosswalks provide safety for pedestrians walking along the corridor and offer an alternative mode of transportation. They provide an opportunity for people to cross the roadway and automobile users can see them in advance and allows more time to observe who is using the crosswalks.

Shared Use Path

A shared use path, which is recommended in the short-term, accommodates both pedestrians and bicyclists and offers an alternate mode of transportation. This path is clearly separated from the vehicular travel lanes.

Landscaping

Providing landscaping along the corridor can help entice the users to want to travel along it more frequently and provide a better visual experience. It could also attract people to the various businesses along the corridor. Landscaping can be as simple as a few trees along a sidewalk or within the median to full blown landscaping efforts including bushes, trees, flower beds, and signs indicating what neighborhood/subdivision that location is near. In some parts of Houston, volunteers who live in the immediate area help maintain the landscaping.

Signage

Advance signage and addition of block numbers on the signs helps drivers with information about the roadway characteristics ahead, such as names of intersections and lane directions.

Transit

Providing a shared use path will improve connectivity for people who use transit as a mode of travel. Improving this connectivity for transit along this corridor can help reduce vehicular demand on a roadway which improves traffic flow and safety. It also provides an opportunity for those that do not own a vehicle a way to get to/from various places as well as alternatives for those that do have a vehicle.

Driveway Modifications

The number of driveways along a corridor has a significant impact on the roadways performance. Each driveway has numerous conflict points. Right-turn lanes and left-turn lanes can allow the turning vehicles to get out of the through lanes, which in turn causes less delay for the drivers who want to make a through movement. If there is an abrupt turn from the roadway to a driveway, that could cause the drivers behind the car which is turning to have to slow down which could affect through movement. Also, the length of the driveway needs to be sufficient to accommodate entering and exiting vehicles.

Long-Term Connectivity

The H-GAC 2035 Regional Travel Demand Model was utilized to evaluate impact of the recommended street connectivity and thoroughfare improvements (identified in Figure 6.4) along the SH 249 corridor. The following measures of effectiveness were analyzed to recognize the benefit of improving the street network connectivity in the study area to enhance mobility and preserving capacity along the SH 249 study corridor.

- Average Daily Volume - 7 percent reduction (helps to preserve the roadway capacity)
- Vehicle Miles Traveled – 6 percent reduction (helps motorists travel less distance)
- Vehicle Hours Traveled – 15 percent reduction (helps motorists experience less delay)
- Speed during peak periods – 9 percent increase (helps to improve traffic flow)

PRELIMINARY COSTS OF SHORT AND MEDIUM-TERM IMPROVEMENTS

Preliminary cost estimates for the short and medium-term improvements were developed and are provided in **Table 7.4**. The cost estimates do not obligate any agency or jurisdiction to fund or build the listed improvements. Additional details of the cost estimates are provided in **Appendix G**. As shown in this table, preliminary costs for the short-term improvements total $20.19 million and for the medium-term costs total $90.07 million for a grand total of $110.26 million.

The higher cost improvements occur in the medium term with two extensions of roadways and one roadway widening and include:

- Fallbrook Drive extension (from SH 249 to Old Bammel North Houston Road) - $10.2 Million
- Ella Boulevard extension (from West Road to Northville Street) - $25.5 Million
- Breen Road widening (from Vogel Creek to North Houston Rosslyn Road) - $33.8 Million

FUNDING OPPORTUNITIES

The following sections discuss potential funding sources for transportation projects.

Federal Funding

Federal funding is made available through specific funding mechanisms. The following briefly highlights programs that may be eligible to fund some of the recommended improvements.

Highway Safety Improvement Program

H-GAC, through the Technical Advisory Committee, recently issued a call for projects to address traffic safety issues through the Highway Safety Improvement Program (HSIP). The HSIP is a federally-funded program that is administered by TxDOT with the goal to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. Activities for funding through the HSIP may include:

- The correction or improvements of high-hazard locations,
- The elimination of roadside obstacles,
- The treatment of roadside obstacles,
- The improvement of highway signing and pavement marking, and
- The installation of traffic control or warning devices.

Some of the improvements identified in this study would qualify for funding through the HSIP. For instance, the implementation of the nontraversable median is estimated to reduce auto crashes by 40 percent and reduce pedestrian involved crashes by 45 percent. As previously described, all three sections of the SH 249 corridor had crash rates that were higher than the statewide average for the period between 2010 and 2012. Additionally, intersection improvements are recommended for the majority of the intersections that had the highest number of crashes during the period between 2010 and 2012.

[6] *http://www.fhwa.dot.gov/environment/transportation_alternatives/*

Transportation Alternatives Program

The Transportation Alternatives Program (TAP) was authorized by the Moving Ahead for Progress in the 21st Century Act (MAP-21) to provide funding for transportation alternatives projects and programs, including on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation and enhanced mobility, community improvement activities, environmental mitigation, recreational trail projects, safe routes to school projects, and projects for planning, designing, or constructing boulevards and other roadways largely in the right-of-way of former divided highways.[6]

The proposed short-term improvement for the corridor includes constructing sidewalks and implementing a shared use path for pedestrians and cyclists. Additionally, a speed limit study is recommended along the corridor. A portion of these proposed improvements may be available for funding under the TAP.

The Surface Transportation Program

The Surface Transportation Program (STP) provides flexible funding that may be used by states and localities for bicycle and pedestrian projects. Bicycle and pedestrian improvements may be incorporated into the design of any federal-aid highway, including those on the National Highway System (NHS), bridge projects on any public road, transit capital projects, and intra-city and inter-city bus terminals and facilities. STP funds may be used for carpool projects, fringe and corridor parking facilities and programs, bicycle transportation and pedestrian walkways, and the modification of public sidewalks to comply with the Americans with Disabilities Act of 1990. The project sponsor must demonstrate the transportation benefits associated with proposed bicycle and pedestrian improvements to be considered for federal funding.

Section 402 – State and Community Highway Safety Grants

The State and Community Highway Safety Grant Program, commonly referred to as Section 402, provides grants to assist states and communities in the development and implementation of highway safety programs designed to reduce traffic crashes, deaths, injuries, and property damage. For fiscal years 2006 through 2011, Texas received authorization of $15 to $17 million annually for the Section 402 program. Funding is available for projects that are in-line with the nine national priority areas, and can include pedestrian and bicycle safety and non-construction aspects of roadway safety. The program is jointly administered by the National Highway Traffic Safety Administration (NHTSA) and the Federal Highway Administration (FHWA) at the federal level and by TxDOT's Traffic Operations Division at a state level.

Congestion Mitigation and Air Quality (CMAQ)

Congestion Mitigation and Air Quality (CMAQ) funds are sub-allocated to air quality nonattainment and maintenance areas within a state. Bicycle and pedestrian activities/projects have been eligible for CAMQ funding consideration, such as constructing bicycle and pedestrian facilities that are not exclusively recreational and that reduce vehicle trips and outreach activities related to bicycle safety. The CMAQ funding allocated to the Houston region varies each year based on federal appropriations.

Table 7.4

Preliminary Cost Estimate From Beltway 8 to I-45

* This project includes installation of raised medians (dowelled curb and conc riprap) as well as proposed striping for median left turn lanes.
** This project includes installation of new slotted curb and restriping of lanes and shoulders to accommodate for the 8' shared use lane.
*** Proposed right turn lanes include installation of 8' shared use lane or 5' sidewalks at intersections as well as restriping of crosswalks.

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

	PRIMARY IMPLEMENTING AGENCY	TxDOT				Harris County Precinct 1				Harris County Precinct 4				City of Houston				TOTAL (in Millions)
	Improvement	Number	Unit	Unit Cost	Cost	Number	Unit	Unit Cost	Cost	Number	Unit	Unit Cost	Cost	Number	Unit	Unit Cost	Cost	
SHORT TERM (LESS THAN 5 YEAR)																		
Corridor Wide Improvements	RAISED MEDIANS																	
	* SH 249 - Add Raised Median / Channelization	265,770	SF	$15	$3,986,550													
	SHOULDER CONVERSION																	
	** SH 249 - Convert Existing 10' Shoulder to 8' Shared Use Lane	6.08	MI	$79,846	$485,464													
	CONCRETE SIDEWALKS																	
	Add 5' Wide Concrete Sidewalks (From Veterans Memorial Dr. to I-45)	70,062	SF	$15	$1,050,930													
	TRAFFIC SIGNAL UPGRADES																	
	Upgrade Signal Equipment	1	LS	$3,810,000	$3,810,000													
	Optimize Traffic Signal Timing	1	LS	$312,500	$312,500													
Site Specific Improvements	ROADWAY WIDENING																	
	Breen Rd. Widening (From W. Montgomery Dr. to Vogel Creek)									1	EA	$3,231,600	$3,231,600					
	Old Bammel N Houston Rd. (South of SH 249) - Improve Turn Radius									1	EA	$52,900	$52,900					
	TC Jester Blvd. Extension (From Star Peak Dr. to West Montgomery Rd.)					1	EA	$1,894,000	$1,894,000									
	RAISED MEDIANS																	
	* Smiling Wood Ln. - Add Raised Median / Channelization									2140	SF	$27	$57,780					
	ROADWAY CLOSURES / MEDIAN CLOSURES																	
	W. Montgomery Rd. (From SH 249 to Old Foltin Rd.) - Pavement Removal									1	EA	$103,800	$103,800					
	Killough Dr. (From SH 249 to W. Montgomery Rd.) - Pavement Removal									1	EA	$41,400	$41,400					
	Washington Dr. (From SH 249 to W. Montgomery Rd.) - Pavement Removal									1	EA	$90,500	$90,500					
	W. Mt. Houston Rd. (From SH 249 to W. Montgomery Rd.) - Pavement Removal									1	EA	$190,500	$190,500					
	Veterans Memorial Dr. (North of SH 249) - Median Closure									1	EA	$11,500	$11,500					
	*** RIGHT TURN LANES																	
	SH 249 WB @ Hollister Rd. - Add Right Turn Lane	1	EA	$200,000	$200,000													
	SH 249 EB @ Fallbrook Dr. - Add Right Turn Lane	1	EA	$171,900	$171,900													
	SH 249 EB @ N. Houston Rosslyn Rd. - Add Right Turn Lane	1	EA	$93,500	$93,500													
	SH 249 WB @ Bammel N. Houston Rd. - Add Right Turn Lane	1	EA	$183,400	$183,400													
	SH 249 EB @ Antoine Dr. - Add Right Turn Lane	1	EA	$222,800	$222,800													
	SH 249 WB @ Antoine Dr. - Add Right Turn Lane	1	EA	$224,100	$224,100													
	SH 249 EB @ Old Foltin Rd. - Add Right Turn Lane	1	EA	$189,700	$189,700													
	SH 249 WB @ Old Foltin Rd. - Add Right Turn Lane	1	EA	$153,100	$153,100													
	SH 249 WB @ Killough Dr. - Add Right Turn Lane	1	EA	$114,100	$114,100													
	SH 249 EB @ Breen Dr. - Add Right Turn Lane	1	EA	$161,400	$161,400													
	SH 249 WB @ Veterans Memorial Dr. - Add Right Turn Lane	1	EA	$224,900	$224,900													
	Old Foltin (North of SH 249) - Add Right Turn Lane									1	EA	$161,800	$161,800					
	W. Montgomery Dr. (South of SH 249) - Add Right Turn Lane									1	EA	$221,500	$221,500					
	Breen Dr. (South of SH 249) - Add Two Right Turn Lanes									1	EA	$350,000	$350,000					
	Veterans Memorial Dr. (North of SH 249) - Add Right Turn Lane									1	EA	$219,800	$219,800					
	LEFT TURN LANES																	
	Hollister Rd. (South of SH 249) - Add Left Turn Lane									1	EA	$272,800	$272,800					
	Hollister Rd. (North of SH 249) - Add Left Turn Lane									1	EA	$249,200	$249,200					
	Fallbrook Dr. (South of SH 249) - Add Left Turn Lane									1	EA	$388,900	$388,900					
	Bammel N Houston Rd. (North of SH 249) - Add Left Turn Lane									1	EA	$143,100	$143,100					
	N. Houston Rosslyn Rd. (South of SH 249) - Add Left Turn Lane									1	EA	$285,100	$285,100					
	Northwest Park Dr. (North of SH 249) - Add Left Turn Lane									1	EA	$96,400	$96,400					
	Antoine Dr. (North of SH 249) - Add Left Turn Lane									1	EA	$177,500	$177,500					
	Antoine Dr. (South of SH 249) - Add Left Turn Lane									1	EA	$215,100	$215,100					
	Veterans Memorial Dr. (South of SH 249) - Add Left Turn Lane													1	EA	$148,500	$148,500	
	TOTAL FOR SHORT TERM IMPROVEMENTS (less than 5 years)				**$11,584,344**				**$1,894,000**				**$6,561,180**				**$148,500**	**$20.19**
MEDIUM TERM (5-10 YEARS)																		
Site Specific Improvements	ROADWAY WIDENING / EXTENSION																	
	Hollister Dr. Extension (From Blue Creek Ranch Dr. to Fallbrook Dr.)									1	EA	$3,551,200	$3,551,200					
	Fallbrook Dr. Extension (From SH 249 to Old Bammel N. Houston Rd.)									1	EA	$10,180,000	$10,180,000					
	West Rd. Extension (From Wal-Mart Entrance to N. Houston Rosslyn Rd.)									1	EA	$8,286,000	$8,286,000					
	Ella Blvd. Extension (From West Rd. to Northville St.)					1	EA	$25,449,900	$25,449,900									
	Old Foltin Rd. Widening (From SH 249 to Essie Rd.)									1	EA	$7,102,300	$7,102,300					
	Breen Rd. Widening (From Vogel Creek to N. Houston Rosslyn Rd.)									1	EA	$33,797,400	$33,797,400					
	Ann Louise Rd. Connection (Construct Bridge 600' south of Beltway 8)									1	EA	$690,700	$690,700					
	*** RIGHT TURN LANES																	
	Old Bammel N. Houston Rd. - Add Right Turn Lane									1	EA	$468,900.00	$468,900					
	Veterans Memorial Dr. (South of SH 249) - Add Right Turn Lane													1	EA	$544,900	$544,900	
	INTERSECTION / INTERCHANGE																	
	SH 249 / Breen Rd. / W. Montgomery Rd. Interchange	1	EA	TBD	TBD													
	TOTAL FOR MEDIUM TERM IMPROVEMENTS (5 – 10 years)				**$-**				**$25,449,900**				**$64,076,500**				**$544,900**	**$90.07**
	GRAND TOTAL				**$11,584,344**				**$27,343,900**				**$70,637,680**				**$693,400**	**$110.26**

State and Local Funding

Potential funding sources for landscape improvements include Landscape Partnership Program funds[7], TxDOT landscape funds, Trees for Houston, and private sector contributions.[8]

NEXT STEPS

This study will be presented to the H-GAC Technical Advisory Council (TAC) and the Transportation Policy Council (TPC) for adoption. Once adopted, the proposed projects will need to be identified in the Regional Transportation Plan (RTP) and then in the Transportation Improvement Plan (TIP) in order to secure funding for the proposed improvements. It is recommended that TxDOT champion the proposed projects since TxDOT is the owner of the facility. As the champion, TxDOT would work with H-GAC, Harris County, and the City of Houston for project implementation.

As a preliminary step, the cost estimates provided in this study have been allocated by agency as well as identified for short and medium-term implementation. Cost estimates were not developed for the long-term recommendations. The projects identified as short-term are relatively easy and inexpensive to implement. The medium-term projects should be initiated relatively soon, since those projects are more substantial as they improve the roadway network connectivity and require more planning and funding. The public agencies programming the long-term projects identified in this study should begin the planning process in order to ensure funding and begin taking the necessary steps to plan for the implementation of identified long-range projects, including performing preliminary engineering and attaining environmental clearance in a timely manner.

Apart from the recommendations the following principles will support future multimodal safety and mobility along SH 249.

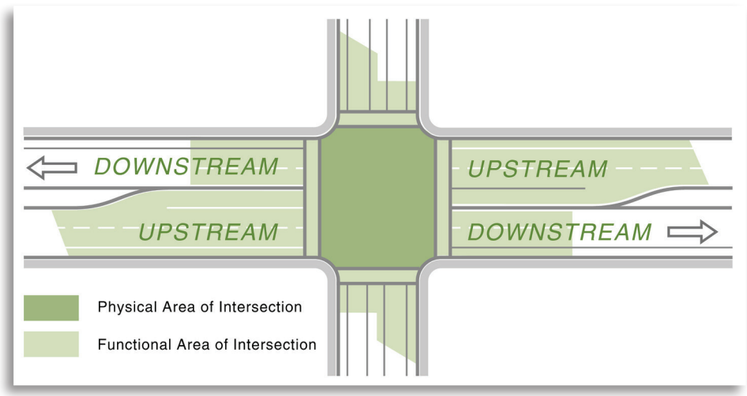
Preserve Intersection Functional Area

FHWA has defined the physical area of an intersection as the fixed area that represents the space confined within the corners of the intersection, as illustrated in **Figure 7-4**. The functional area of an intersection is located immediately adjacent and includes the areas upstream and downstream of the physical area of the intersection. The functional area of an intersection can vary in distance. AASHTO states the upstream functional area of an intersection is influenced by (1) distance traveled during perception-reaction time; (2) deceleration distance while the motorist comes to a stop; and (3) length of queue at an intersection. This part of the intersection is dependent upon whether or not traffic in the through lanes is required to come to a complete stop. The functional area also includes the length of road downstream from the intersection needed to reduce conflicts between through traffic and vehicles entering and exiting a property. Therefore, the functional area should be a consideration in situations where a driveway is near an intersection.

To preserve and optimize intersection operations, driveways should not be located within the functional area of an intersection. This study recommends as part of future access management policies and strategies, the denial of permits for driveways or median openings within the functional area of an intersection. Considerations could also be implemented to ensure that driveways follow design criteria, provide adequate turning radii, and are properly located outside the area of influence.

Additionally, recommended improvements include the installation of a raised median throughout the corridor. At intersections with left-turn lanes, the median would be six-feet and would provide pedestrian refuge via a median opening for those pedestrians crossing SH 249. Pedestrian refuges in crosswalks would be cut through level with the street to meet the Americans with Disabilities Act (ADA) guidelines.[9] Sidewalks installed as part of these recommendations would also include curb ramps at street crossings to provide the ADA compliant transition between sidewalk and street.

Figure 7.4 Functional and Physical Areas of An Intersection



Source: Access Management in the Vicinity of Intersections, FHWA, available at http://safety.fhwa.dot.gov/intersection/resources/fhwasa10002/fhwasa10002.pdf

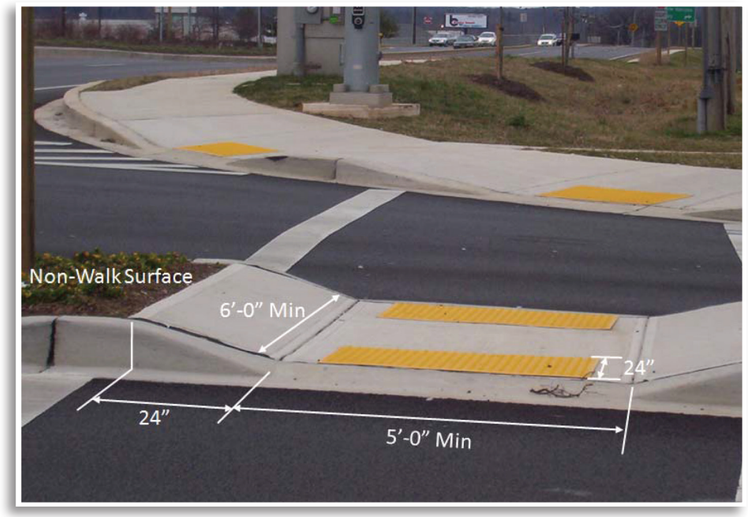


Photo Source: http://www.state.nj.us/transportation/business/localaid/documents/LPADPFAADA-kps.pdf

[7]The Landscape Partnership Program was created to allow local governments, civic organizations or private businesses an opportunity to support the aesthetic improvement of the state highway system by donating 100 percent of the development, establishment, and maintenance of a landscape project on the right of way.
[8]http://www.txdot.gov/government/programs.html

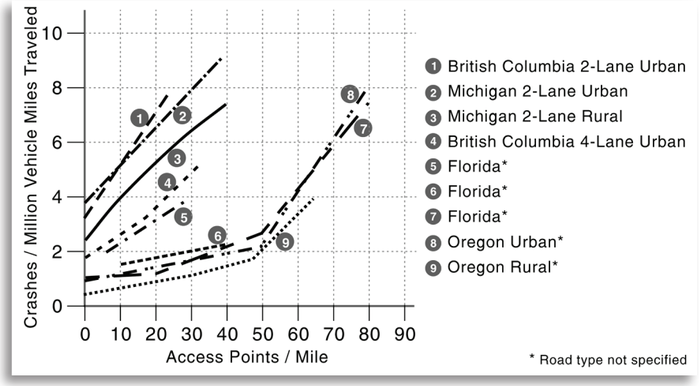
[9]Americans with Disabilities Act Accessibility Guidelines: Detectable Warnings. Accessible at: http://www.accesstile.com/government/regulations/ADA-accessibillity-guidelines-lr.pdf

Minimize Driveway Access

One of the key elements of access management is managing the potential conflict points that occur when streets and driveways intersect. These conflict points, particularly those involving left turns, manifest themselves as an increased risk for crashes. With the installation of the raised median throughout the corridor, the amount of left-turns will be limited, and most driveway access will be "right in and right out." Research has shown that reducing or eliminating left turns to or from driveways where possible enhances safety.

During the last 40 years, access point density (i.e., number of driveways per mile) has been studied on roadways that vary in geometry, operating speeds, and volumes. The results have consistently shown that an increase in the number of access points translates into higher accident rates. **Figure 7-5**

Figure 7.5 Effect of Access Point Density on Crash Rate



Source: Access Management in the Vicinity of Intersections, FHWA, available at http://safety.fhwa.dot.gov/intersection/resources/fhwasa10002/fhwasa10002.pdf

graphically illustrates the trend under a variety of roadway conditions and environments.

Considerations for driveway design and permitting can help in reducing crashes due to high density of access points. Key elements to ensuring driveway and site circulation include the following:

- The driveway should have a clear design to positively guide both inbound and outbound vehicles. This minimizes oblique entry and exit angles and conflicts between inbound and outbound maneuvers.
- The driveway should have an adequate throat length to minimize the likelihood that on-site maneuvers will impede the driveway's interface with the street.
- The driveway should only be as wide as needed to accommodate lane requirements and design vehicle as needed. Driveways that are wider than necessary create additional conflicts for bicycles and pedestrians.[10]

Additionally, the permitting process needs to be reviewed and updated regularly to keep pace with the ever changing development. Monitoring these permits could ensure that the original permit conditions and previous agreements with developers and property owners are still applicable. Driveway design standards and specifications should be reviewed periodically to respond to frequently occurring driveway design issues.

System Preservation and Maintenance

In recognition of the considerable investment in the transportation system, preserving the facilities should be an important priority. Roadway pavements require continual reinvestment to sustain their structural viability and to maximize the original financial investment made to build them. Roadways that lack proper maintenance experience increased failure rates, cause increases in costs overall, and contribute to safety hazards and property loss. H-GAC should coordinate with member jurisdictions to direct adequate resources toward preservation efforts to continue to meet the challenge of keeping the transportation system in good condition.

CONCLUSION

Implementation of the short, medium, and long-term recommendations is designed to facilitate long-term safety and mobility along SH 249. For effective implementation, supportive plans and controls at the local and county levels will need to be developed to encourage appropriate land use patterns, minimize the potential for undesirable conflicts, and control access in a manner that enhances the safety and proper functioning of the corridor.

[10] Intersection Safety Issue Briefs, Issue Brief 13: Access Management. FHWA. September 2014. Available at: http://safety.fhwa.dot.gov/intersection/resources/fhwasa10005/brief_13.cfm

CASE STUDIES

The Texas A&M Transportation Institute (TTI) reviewed three previously conducted H-GAC access management studies to determine which corridor recommendations have been implemented and to examine the operational, safety, and economic effects of the recommended improvements before, during, and after project implementation. The following summarizes the findings for the three areas:

- **Operations** - Most operational benefits were the result of roadway improvements such as turn bays, changes in traffic signal phasing, and spot widening.
  - Reduced travel times and reduced overall network delay were noted for full implementation of the recommendations as compared with the existing or no-build conditions.
  - Level-of-service at signalized intersections typically only changed if there were capacity improvements at the intersection.
  - Increases in intersection delay are typically due to inadequate side street capacity.
  - Recommended, but not yet implemented improvements to side street approaches would, in most cases, significantly reduce overall intersection delay.
- **Safety** - Average crash frequency and average crash rates were reduced in each of the three study corridors for each time period (before, during, and after improvements).
  - Crash rates reduced 20 to 68 percent in most evaluation segments.
  - Driveway related crashes decreased by 40 to 70 percent.
  - Other contributing factors, including entering/exiting vehicle-related crashes were significantly reduced and rear-end and intersection-related crashes were also reduced.
  - The types and severity of crashes remained relatively unchanged, although 90 percent of the crashes were non-injury crashes.
- **Economics** - The purpose for the economic analysis was to gain understanding on the potential impacts access management improvements had on taxable business sales and ultimately the overall effect of access management on the economic growth along a corridor.
  - Generally, the trends from the three corridors studied suggested that business sales increased at a greater rate along these corridors than in the adjacent zip code analysis zones. However, several factors must be considered and the following events occurred during the study period that could have had an extraneous effect on business activity in the Greater Houston region: While confounding factors and other events (hurricanes, economic recession and recovery) could have played an additional role and could have affected the results in unknown ways (otherwise known as "known unknowns"), little evidence supports the theory that businesses along the access management corridors were unduly burdened by such improvements.[11]

[11] Evaluation of Access Management: Final Report. Texas A&M Transportation Institute (TTI). Available at: http://www.h-gac.com/taq/access-management/Docs/Access%20Management%20Evaluation%20Report.pdf

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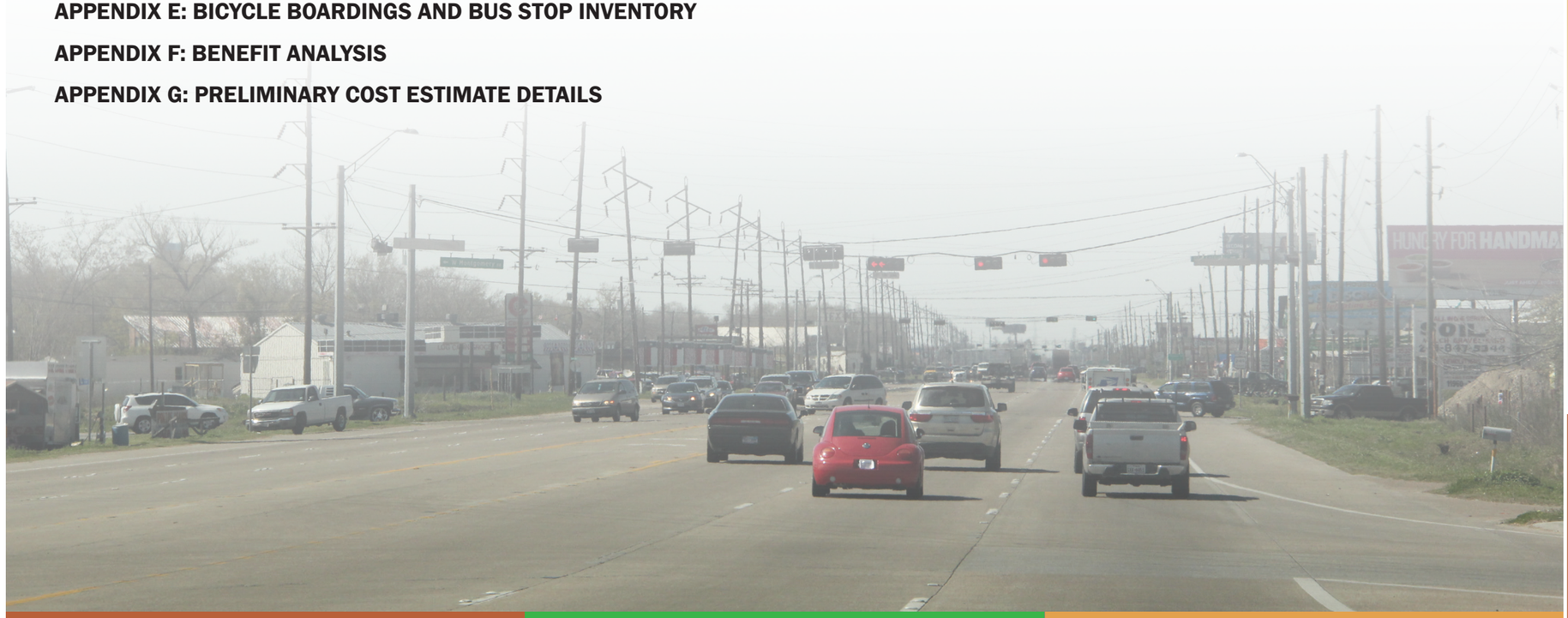
APPENDICES



JULY 2015

Houston-Galveston Area Council

CDM Smith

IN ASSOCIATION WITH

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THE LENTZ GROUP
CJ HENSCH

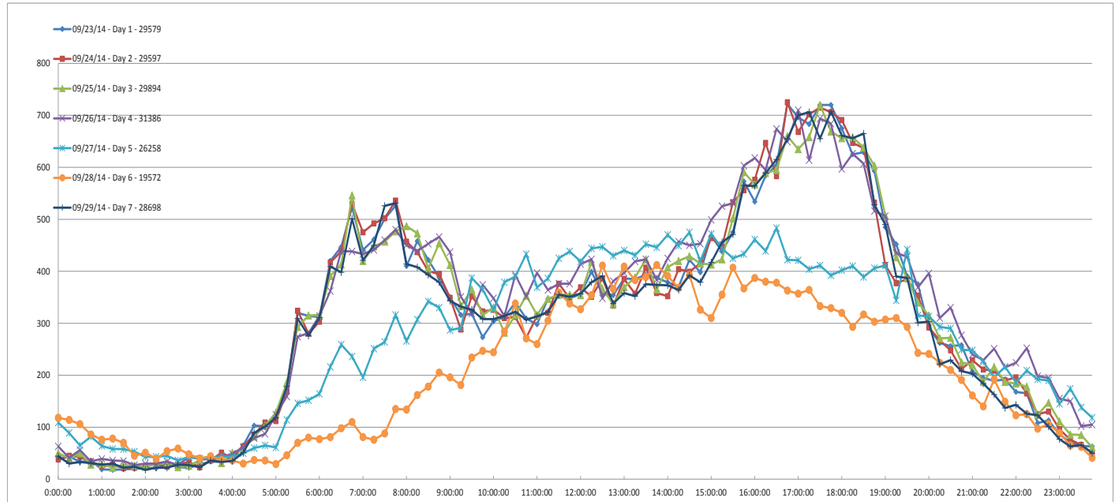
SH 249

Appendix A: Intersection Inventory

INTERSECTION	Signalized	Stop Signs	Ped Heads	Push Button	Crosswalk	NOTES
SH 249 @ BW 8 WBFR	✓		✓	✓	✓	Pedestrian phase does not start with the overlapped phase of the TTI four-phase plan.
SH 249 @ BW 8 EBFR	✓		✓	✓	✓	Pedestrian phase does not start with the overlapped phase of the TTI four-phase plan.
SH 249 @ Galena Creek Dr		✓				No sidewalk.
SH 249 @ Hollister Dr	✓		✓	✓	✓	No sidewalk. Ramp leads to pedestrian push button only. Crosswalk very narrow. No crosswalk on the west side crossing SH 249.
SH 249 @ Seton Lake Dr	✓		✓	✓	✓	No sidewalk. Ramp leads to pedestrian push button only. Crosswalk very narrow.
SH 249 @ Fallbrook Dr	✓		✓	✓	✓	No sidewalk. Ramp leads to pedestrian push button only. Crosswalk very narrow.
SH 249 @ Old Bammel N Houston Rd.	✓		✓	✓	✓	No sidewalk on SH 249. Ramp leads to pedestrian push button only. Crosswalk very narrow.
SH 249 @ N Houston Rosslyn Rd/Bammel North Houston Rd.	✓		✓	✓	✓	No sidewalk. Ramp leads to pedestrian push button only. Crosswalk very narrow.
SH 249 @ Smiling Wood Ln/NW Park Dr	✓		✓	✓	✓	No sidewalk. Ramp leads to pedestrian push button only. Crosswalk very narrow. No crosswalk on the east side crossing SH 249.
SH 249 @ West Rd.	✓		✓	✓	✓	No sidewalk. Ramp leads to pedestrian push button only. Crosswalk very narrow. No crosswalk on the east side crossing SH 249.
SH 249 @ Antoine Dr	✓		✓	✓	✓	No sidewalk on SH 249. Ramp leads to pedestrian push button only. No ramp leads to the push button on the northwest corner. Crosswalk very narrow.
SH 249 @ Romona Blvd		✓				No sidewalk.
SH 249 @ Mosielee St	✓					No sidewalk and push button. This signalized intersection is not designed for pedestrians to cross the street.
SH 249 @ Chippewa Blvd/West Mongomery Rd.		✓				
SH 249 @ Old Foltin Dr	✓					Skewed intersection; south leg merges with W Montgomery
SH 249 @ Killough St (South of SH 249)						
SH 249 @ Killough St (North of SH 249)		✓				
SH 249 @ Upland Willow Ave.	✓					
SH 249 @ Washington Dr		✓				
SH 249 @ Breen Dr	✓		✓	✓	✓	Presence of ped heads, push buttons and crosswalks at west and south legs
SH 249 @ Lincoln Dr		✓				
SH 249 @ Mt Houston Rd.						Yield sign present
SH 249 @ T C Jester Blvd	✓		✓	✓	✓	Presence of ped heads, push buttons and crosswalks at south leg
SH 249 @ McKinley St		✓				
SH 249 @ Royal Village Rd.		✓				ADA ramps in place but no crosswalk
SH 249 @ Big John St		✓				
SH 249 @ Lynda Dr		✓				
SH 249 @ Moonglow Dr	✓		✓	✓	✓	No crosswalk at south leg
SH 249 @ Cordoba Dr (South of SH 249)		✓				
SH 249 @ Cordoba Dr (North of SH 249)		✓			✓	Flashing beacon; presence of ADA ramps
SH 249 @ Old Hickory	✓					
SH 249 @ Cora St		✓				
SH 249 @ Ella Blvd	✓		✓	✓	✓	Presence of ped heads, push buttons and crosswalks at west and south legs
SH 249 @ Veterans Memorial Dr	✓		✓	✓	✓	Presence of sidewalks at certain directions
SH 249 @ Deer Trail Dr	✓		✓	✓	✓	Presence of ped heads, push buttons and crosswalks at west and south legs, desire lines on north section of intersection
SH 249 @ Bunny Run Dr		✓			✓	Presence of ADA ramps
SH 249 @ Sunnywood Dr		✓			✓	Presence of ADA ramps; man-made sidewalks
SH 249 @ I-45 SBFR	✓		✓	✓	✓	Presence on sidewalks on all approaches
SH 249 @ I-45 NBFR	✓		✓	✓	✓	Presence on sidewalks on all approaches
SH 249 @ Valley Stream		✓				

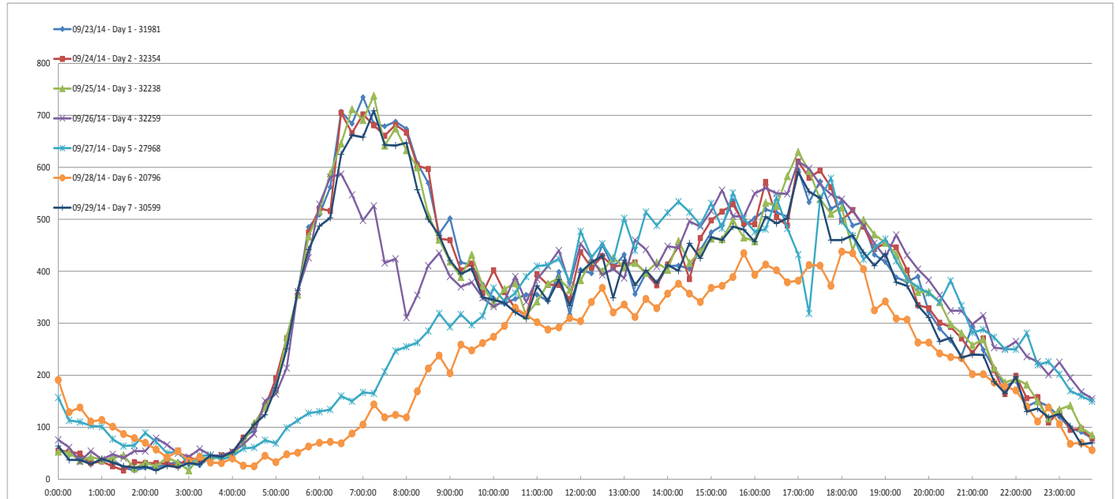
Appendix B-1: 7-Day Traffic Counts

Location: SH 249 South of Hollister Drive Northbound



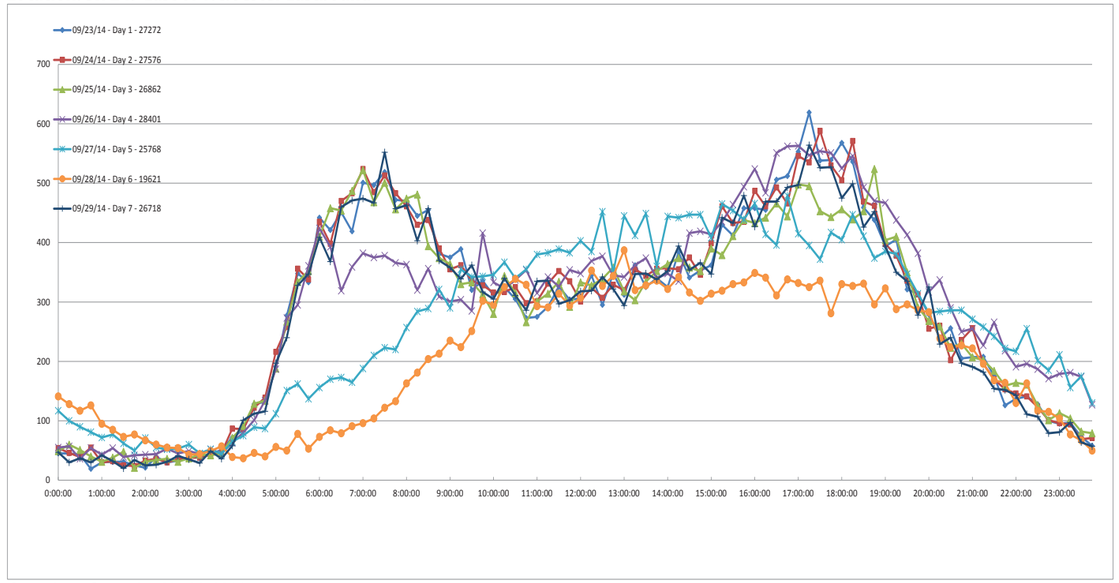
Count dates: September 23 - 29, 2014

Location: SH 249 South of Hollister Drive Southbound



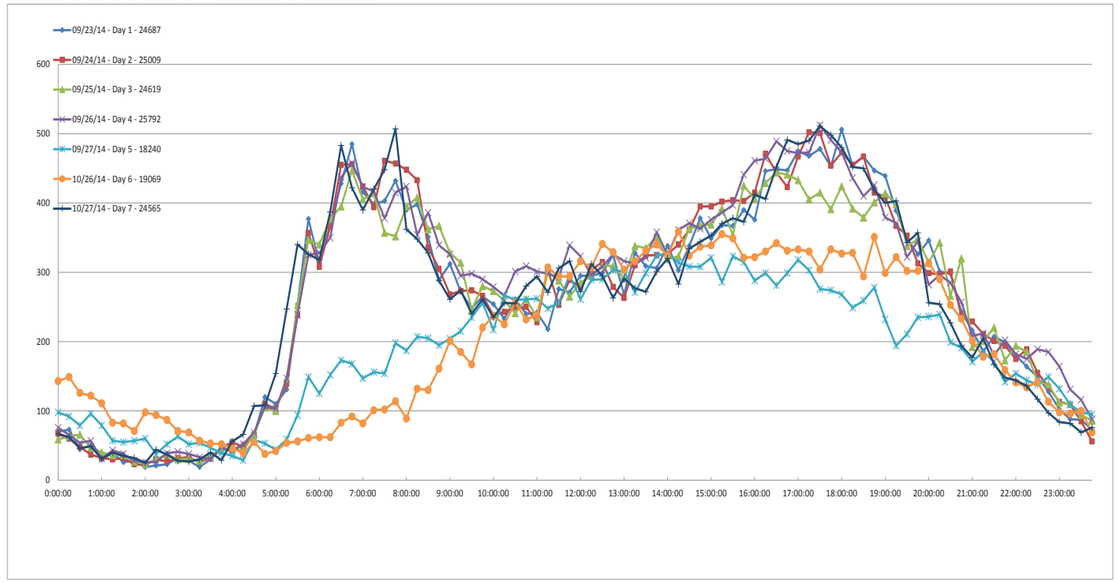
Count dates: September 23 - 29, 2014

Location: SH 249 East of T.C. Jester Eastbound



Count dates: September 23 - 29, 2014

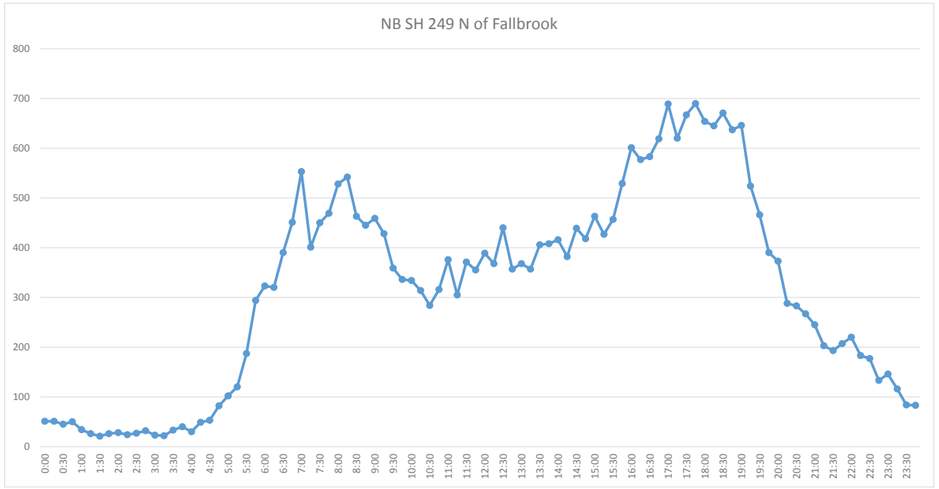
Location: SH 249 East of T.C. Jester Westbound



Count dates: September 23 - 29, 2014

Appendix B-2: 24-Hour Vehicle Classification Counts

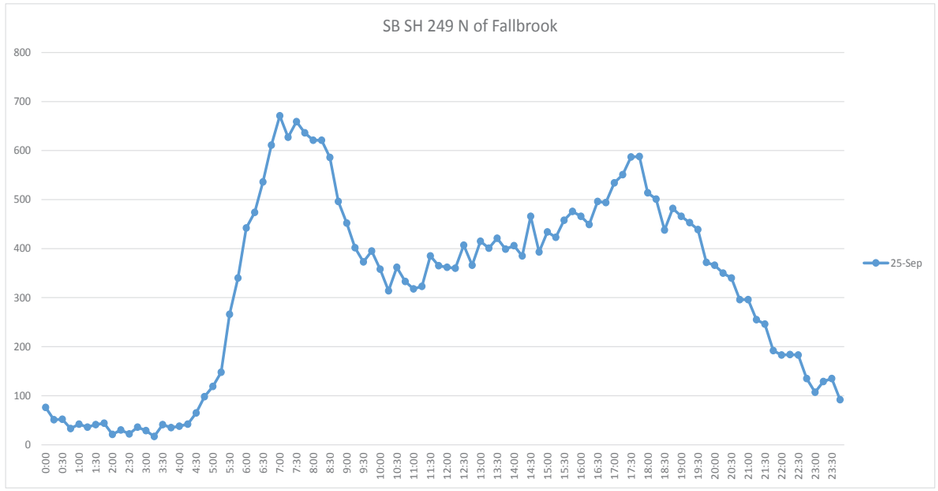
Location: SH 249 North of Fallbrook Northbound



Count date: September 25, 2014

Time	Class1	Class2	Class3	Class4	Class5	Class6	Class7	Total
09/25 00:00	0	50	1	0	0	0	0	51
09/25 00:15	1	50	0	0	0	0	0	51
09/25 00:30	0	42	2	0	1	0	0	45
09/25 00:45	0	48	2	0	0	0	0	50
09/25 01:00	0	34	0	0	0	0	0	34
09/25 01:15	1	23	1	0	1	0	0	26
09/25 01:30	1	18	2	0	0	0	0	21
09/25 01:45	0	26	0	0	0	0	0	26
09/25 02:00	0	26	2	0	0	0	0	28
09/25 02:15	0	23	1	0	0	0	0	24
09/25 02:30	0	25	1	0	1	0	0	27
09/25 02:45	0	31	0	0	1	0	0	32
09/25 03:00	0	20	2	1	0	0	0	23
09/25 03:15	0	18	1	1	2	0	0	22
09/25 03:30	0	26	2	1	4	0	0	33
09/25 03:45	0	37	1	0	2	0	0	40
09/25 04:00	0	28	2	0	0	0	0	30
09/25 04:15	0	42	2	0	5	0	0	49
09/25 04:30	0	42	5	1	5	0	0	53
09/25 04:45	0	71	7	0	4	0	0	82
09/25 05:00	1	94	4	0	3	0	0	102
09/25 05:15	2	110	6	1	1	0	0	120
09/25 05:30	0	176	8	0	3	0	0	187
09/25 05:45	4	274	12	1	2	1	0	294
09/25 06:00	8	288	17	1	9	0	0	323
09/25 06:15	4	290	26	0	0	0	0	320
09/25 06:30	6	339	38	3	4	0	0	390
09/25 06:45	9	391	42	3	5	1	0	451
09/25 07:00	5	485	59	2	2	0	0	553
09/25 07:15	4	349	42	3	3	0	0	401
09/25 07:30	12	366	65	2	5	0	0	450
09/25 07:45	7	411	45	2	4	0	0	469
09/25 08:00	4	472	46	3	3	0	0	528
09/25 08:15	7	474	55	3	3	0	0	542
09/25 08:30	9	393	49	3	8	0	1	463
09/25 08:45	6	380	47	6	6	0	0	445
09/25 09:00	2	403	40	5	9	0	0	459
09/25 09:15	6	366	44	4	8	0	0	428
09/25 09:30	8	306	31	5	8	1	0	359
09/25 09:45	7	282	38	1	8	0	0	336
09/25 10:00	6	291	31	0	5	1	0	334
09/25 10:15	5	272	28	0	9	0	0	314
09/25 10:30	5	244	26	1	8	0	0	284
09/25 10:45	2	273	30	1	10	0	0	316
09/25 11:00	3	319	42	3	9	0	0	376
09/25 11:15	6	269	24	1	5	0	0	305
09/25 11:30	7	303	53	3	5	0	0	371
09/25 11:45	9	300	39	2	5	0	0	355
09/25 12:00	3	340	42	0	4	0	0	389
09/25 12:15	4	321	37	1	5	0	0	368
09/25 12:30	11	391	29	0	9	0	0	440
09/25 12:45	4	317	31	1	4	0	0	357
09/25 13:00	4	317	38	1	8	0	0	368
09/25 13:15	7	297	43	0	10	0	0	357
09/25 13:30	8	355	34	0	8	1	0	406
09/25 13:45	7	356	36	1	7	0	1	408
09/25 14:00	6	361	43	0	6	0	0	416
09/25 14:15	5	327	42	1	5	2	0	382
09/25 14:30	6	385	39	6	3	0	0	439
09/25 14:45	8	368	35	2	4	1	0	418
09/25 15:00	11	401	47	2	2	0	0	463
09/25 15:15	7	371	38	4	7	0	0	427
09/25 15:30	10	419	25	2	1	0	0	457
09/25 15:45	13	469	38	3	6	0	0	529
09/25 16:00	15	529	48	4	4	1	0	601
09/25 16:15	11	508	50	2	4	1	1	577
09/25 16:30	13	494	53	1	19	2	1	583
09/25 16:45	6	540	67	3	2	1	0	619
09/25 17:00	20	562	98	4	3	0	2	689
09/25 17:15	11	519	79	4	4	2	1	620
09/25 17:30	19	574	58	11	4	0	1	667
09/25 17:45	8	527	132	7	12	1	3	690
09/25 18:00	14	573	56	1	8	1	1	654
09/25 18:15	14	542	77	2	7	3	0	645
09/25 18:30	8	594	58	4	7	0	0	671
09/25 18:45	7	542	77	4	5	1	1	637
09/25 19:00	9	596	37	2	2	0	0	646
09/25 19:15	6	490	24	0	3	1	0	524
09/25 19:30	7	437	18	0	4	0	0	466
09/25 19:45	4	367	18	1	0	0	0	390
09/25 20:00	6	348	17	0	2	0	0	373
09/25 20:15	3	272	10	1	2	0	0	288
09/25 20:30	2	265	11	1	4	0	0	283
09/25 20:45	0	255	7	0	5	0	0	267
09/25 21:00	4	223	14	0	4	0	0	245
09/25 21:15	1	195	5	0	2	0	0	203
09/25 21:30	2	187	3	0	1	0	0	193
09/25 21:45	2	195	9	0	1	0	0	207
09/25 22:00	1	210	5	0	3	1	0	220
09/25 22:15	5	173	4	0	1	0	0	183
09/25 22:30	1	174	2	0	0	0	0	177
09/25 22:45	1	130	0	1	1	0	0	133
09/25 23:00	2	141	3	0	0	0	0	146
09/25 23:15	0	109	4	0	2	1	0	116
09/25 23:30	0	80	2	0	2	0	0	84
09/25 23:45	1	75	6	0	1	0	0	83
Total								30526

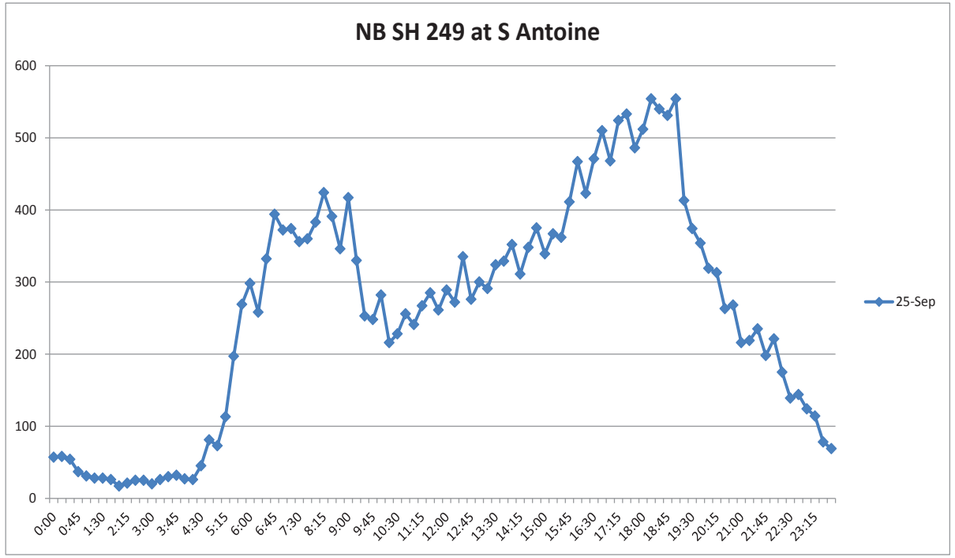
SH 249 North of Fallbrook Southbound



Count date: September 25, 2014

Time	Class1	Class2	Class3	Class4	Class5	Class6	Class7	Total
09/25 00:00	0	72	3	0	1	0	0	76
09/25 00:15	1	48	2	0	0	0	0	51
09/25 00:30	0	51	1	0	0	0	0	52
09/25 00:45	0	33	0	0	0	0	0	33
09/25 01:00	0	38	2	1	1	0	0	42
09/25 01:15	0	35	1	0	0	0	0	36
09/25 01:30	1	39	0	0	1	0	0	41
09/25 01:45	0	41	2	0	1	0	0	44
09/25 02:00	0	20	0	0	1	0	0	21
09/25 02:15	0	28	1	0	1	0	0	30
09/25 02:30	0	22	0	0	0	0	0	22
09/25 02:45	0	33	2	0	1	0	0	36
09/25 03:00	0	27	2	0	0	0	0	29
09/25 03:15	0	16	1	0	0	0	0	17
09/25 03:30	0	39	0	0	2	0	0	41
09/25 03:45	0	33	1	0	1	0	0	35
09/25 04:00	1	31	4	0	1	0	1	38
09/25 04:15	0	36	5	0	1	0	0	42
09/25 04:30	1	58	4	2	0	0	0	65
09/25 04:45	1	86	8	2	1	0	0	98
09/25 05:00	1	107	8	0	3	0	0	119
09/25 05:15	1	129	13	2	3	0	0	148
09/25 05:30	0	230	26	4	3	3	0	266
09/25 05:45	5	305	27	2	1	0	0	340
09/25 06:00	3	389	41	4	5	0	0	442
09/25 06:15	2	416	48	3	4	0	1	474
09/25 06:30	2	472	51	5	4	1	1	536
09/25 06:45	7	544	49	3	6	0	2	611
09/25 07:00	6	599	56	5	4	1	0	671
09/25 07:15	4	562	55	3	3	0	0	627
09/25 07:30	2	567	68	12	4	2	4	659
09/25 07:45	8	531	83	8	4	0	2	636
09/25 08:00	8	538	59	7	9	0	0	621
09/25 08:15	1	537	62	6	13	2	0	621
09/25 08:30	0	503	69	5	8	1	0	586
09/25 08:45	2	427	54	4	7	2	0	496
09/25 09:00	2	401	42	1	6	0	0	452
09/25 09:15	3	341	38	5	15	0	0	402
09/25 09:30	4	311	48	4	5	1	0	373
09/25 09:45	4	328	44	6	12	1	0	395
09/25 10:00	3	295	44	7	9	0	0	358
09/25 10:15	2	264	39	4	5	0	0	314
09/25 10:30	2	306	43	5	5	1	0	362
09/25 10:45	1	278	43	2	5	4	0	333
09/25 11:00	3	263	41	4	7	0	0	318
09/25 11:15	3	271	38	1	9	1	0	323
09/25 11:30	2	324	43	7	9	0	0	385
09/25 11:45	4	313	37	2	9	0	0	365
09/25 12:00	1	319	33	2	7	0	0	362
09/25 12:15	1	320	30	3	6	0	0	360
09/25 12:30	4	359	31	1	12	0	0	407
09/25 12:45	5	320	31	3	7	0	0	366
09/25 13:00	2	350	48	6	8	1	0	415
09/25 13:15	3	346	45	3	4	0	0	401
09/25 13:30	6	370	36	4	5	0	0	421
09/25 13:45	1	355	35	5	3	0	0	399
09/25 14:00	4	342	44	5	10	1	0	406
09/25 14:15	2	327	48	3	5	0	0	385
09/25 14:30	1	416	41	2	6	0	0	466
09/25 14:45	1	350	34	5	2	0	1	393
09/25 15:00	2	380	47	1	4	0	0	434
09/25 15:15	3	349	53	6	8	3	1	423
09/25 15:30	8	359	68	5	14	3	1	458
09/25 15:45	4	393	56	8	10	2	3	476
09/25 16:00	9	375	64	3	9	2	4	466
09/25 16:15	21	343	63	7	9	1	5	449
09/25 16:30	14	377	78	6	11	3	7	496
09/25 16:45	5	399	80	3	4	1	2	494
09/25 17:00	21	410	71	9	11	2	10	534
09/25 17:15	19	399	99	11	13	2	8	551
09/25 17:30	32	420	101	9	8	4	13	587
09/25 17:45	58	436	73	4	4	1	12	588
09/25 18:00	19	411	67	7	9	0	1	514
09/25 18:15	10	391	71	11	9	3	6	501
09/25 18:30	1	388	43	2	3	1	0	438
09/25 18:45	9	388	64	4	9	1	7	482
09/25 19:00	6	411	43	2	4	0	0	466
09/25 19:15	6	399	39	2	6	1	0	453
09/25 19:30	2	392	40	3	2	0	0	439
09/25 19:45	3	334	33	1	1	0	0	372
09/25 20:00	5	328	32	0	1	0	0	366
09/25 20:15	5	325	19	0	1	0	0	350
09/25 20:30	2	313	20	1	3	1	0	340
09/25 20:45	2	276	16	0	2	0	0	296
09/25 21:00	1	282	13	0	0	0	0	296
09/25 21:15	0	243	11	0	1	0	0	255
09/25 21:30	1	238	3	3	1	0	0	246
09/25 21:45	2	182	4	0	3	0	1	192
09/25 22:00	0	177	3	1	2	0	0	183
09/25 22:15	2	175	5	0	2	0	0	184
09/25 22:30	2	176	5	0	0	0	0	183
09/25 22:45	3	129	3	0	0	0	0	135
09/25 23:00	1	103	2	0	1	0	0	107
09/25 23:15	0	125	4	0	0	0	0	129
09/25 23:30	1	128	4	0	2	0	0	135
09/25 23:45	0	86	6	0	0	0	0	92
Total								30973

Location: SH 249 S of Antoine Northbound

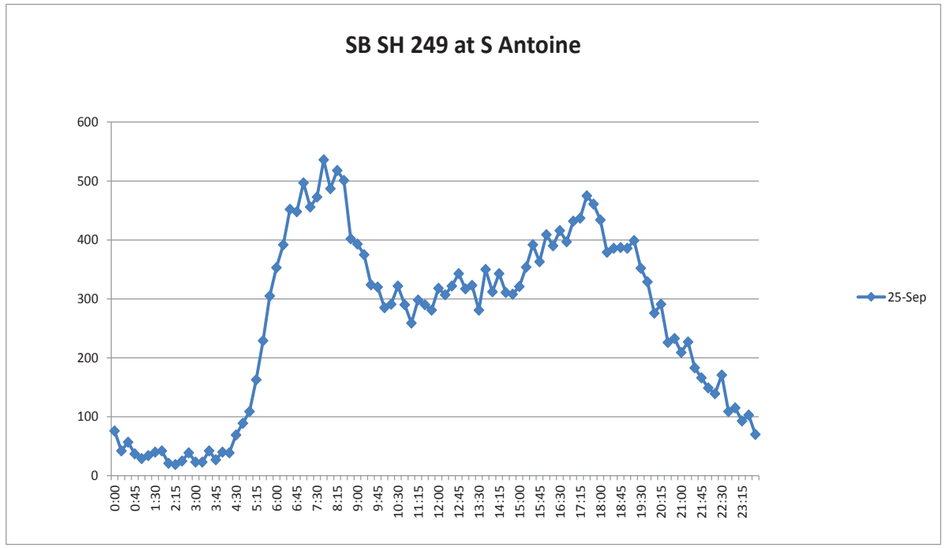


Count date: September 25, 2014

Time	Class1	Class2	Class3	Class4	Class5	Class6	Class7	Total
09/25 00:00	3	51	2	0	1	0	0	57
09/25 00:15	0	57	1	0	0	0	0	58
09/25 00:30	0	52	2	0	0	0	0	54
09/25 00:45	0	37	0	0	0	0	0	37
09/25 01:00	0	31	0	0	0	0	0	31
09/25 01:15	0	25	2	0	1	0	0	28
09/25 01:30	1	26	0	0	1	0	0	28
09/25 01:45	1	25	0	0	0	0	0	26
09/25 02:00	0	17	0	0	0	0	0	17
09/25 02:15	0	20	0	0	1	0	0	21
09/25 02:30	0	24	0	0	1	0	0	25
09/25 02:45	0	23	1	0	1	0	0	25
09/25 03:00	0	18	2	0	0	0	0	20
09/25 03:15	0	21	2	2	1	0	0	26
09/25 03:30	0	23	3	1	3	0	0	30
09/25 03:45	1	28	1	1	1	0	0	32
09/25 04:00	0	23	4	0	0	0	0	27
09/25 04:15	0	22	1	0	3	0	0	26
09/25 04:30	1	43	1	0	0	0	0	45
09/25 04:45	0	78	3	0	0	0	0	81
09/25 05:00	0	71	1	1	0	0	0	73
09/25 05:15	1	105	5	0	2	0	0	113
09/25 05:30	4	182	8	1	2	0	0	197
09/25 05:45	4	247	13	1	4	0	0	269
09/25 06:00	2	266	27	0	3	0	0	298
09/25 06:15	4	235	16	1	2	0	0	258
09/25 06:30	10	283	27	5	7	0	0	332
09/25 06:45	2	355	29	3	5	0	0	394
09/25 07:00	4	332	30	2	4	0	0	372
09/25 07:15	6	321	38	4	5	0	0	374
09/25 07:30	6	315	28	1	6	0	0	356
09/25 07:45	3	315	33	1	8	0	0	360
09/25 08:00	8	336	36	2	1	0	0	383
09/25 08:15	11	362	45	2	4	0	0	424
09/25 08:30	8	330	46	1	6	0	0	391
09/25 08:45	6	292	35	2	11	0	0	346
09/25 09:00	8	354	41	2	10	2	0	417
09/25 09:15	3	288	28	2	9	0	0	330
09/25 09:30	3	222	23	1	4	0	0	253
09/25 09:45	2	218	19	1	8	0	0	248
09/25 10:00	3	254	16	2	7	0	0	282
09/25 10:15	4	187	17	1	7	0	0	216
09/25 10:30	7	193	24	0	3	1	0	228
09/25 10:45	1	229	16	2	8	0	0	256
09/25 11:00	2	211	15	3	9	1	0	241
09/25 11:15	6	246	10	1	4	0	0	267
09/25 11:30	6	249	21	0	9	0	0	285
09/25 11:45	4	237	17	0	3	0	0	261
09/25 12:00	3	258	21	2	4	1	0	289
09/25 12:15	1	250	16	0	5	0	0	272
09/25 12:30	2	308	18	4	3	0	0	335
09/25 12:45	2	253	15	0	6	0	0	276
09/25 13:00	3	265	21	1	10	0	0	300
09/25 13:15	5	261	15	0	10	0	0	291
09/25 13:30	4	291	21	1	7	0	0	324
09/25 13:45	2	306	15	0	6	0	0	329
09/25 14:00	14	312	19	2	5	0	0	352
09/25 14:15	9	281	16	1	4	0	0	311
09/25 14:30	8	307	28	1	4	0	0	348
09/25 14:45	5	345	19	1	5	0	0	375
09/25 15:00	8	304	22	0	5	0	0	339
09/25 15:15	6	334	17	0	10	0	0	367
09/25 15:30	8	319	27	1	7	0	0	362
09/25 15:45	9	370	27	3	1	1	0	411
09/25 16:00	10	435	16	2	2	2	0	467
09/25 16:15	10	384	24	1	4	0	0	423
09/25 16:30	9	424	24	6	8	0	0	471
09/25 16:45	11	459	31	6	3	0	0	510
09/25 17:00	12	425	25	0	5	1	0	468
09/25 17:15	9	489	21	2	2	1	0	524
09/25 17:30	12	474	39	4	4	0	0	533
09/25 17:45	11	444	29	0	2	0	0	486
09/25 18:00	11	466	21	3	11	0	0	512
09/25 18:15	16	515	17	1	5	0	0	554
09/25 18:30	13	488	25	4	10	0	0	540
09/25 18:45	13	485	27	2	4	0	0	531
09/25 19:00	6	507	32	3	6	0	0	554
09/25 19:15	12	377	16	2	6	0	0	413
09/25 19:30	10	353	7	0	4	0	0	374
09/25 19:45	7	331	13	2	1	0	0	354
09/25 20:00	6	302	10	0	1	0	0	319
09/25 20:15	10	284	15	0	3	1	0	313
09/25 20:30	3	252	7	0	1	0	0	263
09/25 20:45	2	257	3	1	5	0	0	268
09/25 21:00	1	211	3	1	0	0	0	216
09/25 21:15	1	212	5	0	1	0	0	219
09/25 21:30	5	225	3	0	2	0	0	235
09/25 21:45	4	189	1	0	4	0	0	198
09/25 22:00	3	210	5	0	2	1	0	221
09/25 22:15	0	173	2	0	0	0	0	175
09/25 22:30	2	134	3	0	0	0	0	139
09/25 22:45	1	141	2	0	0	0	0	144
09/25 23:00	3	115	4	2	0	0	0	124
09/25 23:15	2	106	2	1	2	0	1	114
09/25 23:30	2	76	0	0	0	0	0	78
09/25 23:45	1	63	3	0	2	0	0	69
Total								25008

Appendices

Location: SH 249 S of Antoine Southbound



Count date: September 25, 2014

Time	Class1	Class2	Class3	Class4	Class5	Class6	Class7	Total
09/25 00:00	0	71	3	0	2	0	0	76
09/25 00:15	0	41	1	0	0	0	0	42
09/25 00:30	0	56	1	0	0	0	0	57
09/25 00:45	0	34	3	0	0	0	0	37
09/25 01:00	0	24	2	0	3	0	0	29
09/25 01:15	0	31	3	0	0	0	0	34
09/25 01:30	1	35	3	0	1	0	0	40
09/25 01:45	0	37	5	0	0	0	0	42
09/25 02:00	0	15	5	0	1	0	0	21
09/25 02:15	0	15	3	0	1	0	0	19
09/25 02:30	0	22	2	0	1	0	0	25
09/25 02:45	0	32	7	0	0	0	0	39
09/25 03:00	0	21	2	0	0	0	0	23
09/25 03:15	0	16	5	0	2	0	0	23
09/25 03:30	1	37	3	0	1	0	0	42
09/25 03:45	0	21	4	0	2	0	0	27
09/25 04:00	0	32	6	1	1	0	0	40
09/25 04:15	0	35	3	0	1	0	0	39
09/25 04:30	0	54	11	2	2	0	0	69
09/25 04:45	2	75	9	1	2	0	0	89
09/25 05:00	1	88	16	1	3	0	0	109
09/25 05:15	2	139	17	2	3	0	0	163
09/25 05:30	2	201	22	2	2	0	0	229
09/25 05:45	4	268	28	3	2	0	0	305
09/25 06:00	9	296	38	5	5	0	0	353
09/25 06:15	6	324	52	3	7	0	0	392
09/25 06:30	17	387	42	4	2	0	0	452
09/25 06:45	16	364	60	5	3	0	0	448
09/25 07:00	14	416	56	2	9	0	0	497
09/25 07:15	18	374	57	3	3	1	0	456
09/25 07:30	8	408	48	4	5	0	0	473
09/25 07:45	19	441	62	3	11	0	0	536
09/25 08:00	20	399	58	3	7	0	0	487
09/25 08:15	16	413	74	5	10	0	0	518
09/25 08:30	19	395	72	3	11	1	0	501
09/25 08:45	19	323	54	3	3	0	0	402
09/25 09:00	19	318	47	6	3	0	0	393
09/25 09:15	7	285	69	2	11	1	0	375
09/25 09:30	6	259	48	2	9	0	0	324
09/25 09:45	13	249	43	1	14	0	0	320
09/25 10:00	10	204	62	0	8	1	0	285
09/25 10:15	6	220	54	1	10	0	0	291
09/25 10:30	2	261	48	3	6	2	0	322
09/25 10:45	6	235	41	2	6	0	0	290
09/25 11:00	4	212	35	4	4	0	0	259
09/25 11:15	6	227	49	3	12	1	0	298
09/25 11:30	4	235	41	1	8	1	0	290
09/25 11:45	8	223	42	0	8	0	0	281
09/25 12:00	13	259	38	4	4	0	0	318
09/25 12:15	6	239	46	2	14	0	0	307
09/25 12:30	5	263	46	0	8	0	0	322
09/25 12:45	9	278	40	3	13	0	0	343
09/25 13:00	8	246	49	2	11	1	0	317
09/25 13:15	10	242	66	1	3	1	0	323
09/25 13:30	6	216	50	3	6	0	0	281
09/25 13:45	4	290	50	2	4	0	0	350
09/25 14:00	6	248	46	3	6	3	0	312
09/25 14:15	2	292	41	3	5	0	0	343
09/25 14:30	12	250	46	0	3	0	0	311
09/25 14:45	7	255	37	4	5	0	0	308
09/25 15:00	12	251	51	2	4	1	0	321
09/25 15:15	11	281	55	1	4	0	2	354
09/25 15:30	10	322	51	2	7	0	0	392
09/25 15:45	8	295	52	4	4	0	0	363
09/25 16:00	8	315	71	6	8	1	0	409
09/25 16:15	11	309	60	4	5	1	0	390
09/25 16:30	10	326	70	3	7	0	0	416
09/25 16:45	6	321	59	2	9	0	0	397
09/25 17:00	11	348	65	2	6	0	0	432
09/25 17:15	17	363	47	3	7	0	0	437
09/25 17:30	15	385	68	3	3	1	0	475
09/25 17:45	13	364	76	4	3	1	0	461
09/25 18:00	18	344	66	2	3	1	0	434
09/25 18:15	7	305	57	6	4	0	0	379
09/25 18:30	15	302	65	1	3	0	0	386
09/25 18:45	7	309	67	2	2	0	0	387
09/25 19:00	15	318	49	1	3	0	0	386
09/25 19:15	9	325	62	1	2	0	0	399
09/25 19:30	7	286	55	0	4	0	0	352
09/25 19:45	9	272	44	1	3	0	0	329
09/25 20:00	7	224	41	2	1	1	0	276
09/25 20:15	1	249	41	0	0	0	0	291
09/25 20:30	3	198	23	0	2	0	0	226
09/25 20:45	2	201	25	1	4	0	0	233
09/25 21:00	4	189	16	0	0	0	0	209
09/25 21:15	3	204	19	1	0	0	0	227
09/25 21:30	2	163	15	1	2	0	0	183
09/25 21:45	4	144	15	0	3	0	0	166
09/25 22:00	2	134	11	0	2	0	0	149
09/25 22:15	0	130	8	0	1	0	0	139
09/25 22:30	3	148	18	1	1	0	0	171
09/25 22:45	2	92	14	0	1	0	0	109
09/25 23:00	4	102	8	0	1	0	0	115
09/25 23:15	1	83	9	0	0	0	0	93
09/25 23:30	1	95	7	0	0	0	0	103
09/25 23:45	0	63	5	0	1	1	0	70
Total								25356

Location: SH 249 W of Sunnywood Eastbound

Group	Lights	Mediums	Articulated Trucks
12:00 AM	56	0	1
12:15 AM	39	0	0
12:30 AM	33	0	1
12:45 AM	43	0	0
1:00 AM	41	0	2
1:15 AM	32	1	1
1:30 AM	23	0	0
1:45 AM	25	0	1
2:00 AM	21	1	0
2:15 AM	30	2	4
2:30 AM	36	2	4
2:45 AM	21	2	0
3:00 AM	40	2	2
3:15 AM	36	5	6
3:30 AM	55	0	3
3:45 AM	37	1	3
4:00 AM	64	1	9
4:15 AM	84	1	6
4:30 AM	138	1	7
4:45 AM	122	1	14
5:00 AM	218	5	7
5:15 AM	284	8	7
5:30 AM	378	5	8
5:45 AM	379	9	11
6:00 AM	367	14	6
6:15 AM	454	14	5
6:30 AM	454	5	11
6:45 AM	447	8	9
7:00 AM	411	9	13
7:15 AM	436	7	7
7:30 AM	389	10	17
7:45 AM	386	8	12
8:00 AM	359	16	9
8:15 AM	346	19	12
8:30 AM	370	13	19
8:45 AM	325	15	8
9:00 AM	287	13	16
9:15 AM	279	14	10
9:30 AM	309	20	9
9:45 AM	281	16	17
10:00 AM	300	18	14
10:15 AM	271	14	15
10:30 AM	313	15	11
10:45 AM	245	8	15
11:00 AM	253	16	14
11:15 AM	290	11	19
11:30 AM	287	24	8
11:45 AM	273	19	13
12:00 PM	295	23	10
12:15 PM	288	14	15
12:30 PM	293	20	13
12:45 PM	249	13	12

Group	Lights	Mediums	Articulated Trucks
1:00 PM	329	12	17
1:15 PM	301	16	23
1:30 PM	304	15	15
1:45 PM	291	12	10
2:00 PM	335	21	12
2:15 PM	321	12	9
2:30 PM	337	22	18
2:45 PM	314	19	10
3:00 PM	316	12	14
3:15 PM	359	17	13
3:30 PM	413	17	14
3:45 PM	422	15	11
4:00 PM	381	12	9
4:15 PM	373	10	5
4:30 PM	431	17	5
4:45 PM	427	18	7
5:00 PM	451	11	6
5:15 PM	478	15	5
5:30 PM	456	7	3
5:45 PM	485	7	4
6:00 PM	450	9	3
6:15 PM	464	11	9
6:30 PM	401	11	7
6:45 PM	380	11	5
7:00 PM	369	8	4
7:15 PM	363	4	3
7:30 PM	321	2	4
7:45 PM	302	0	3
8:00 PM	271	5	1
8:15 PM	213	0	4
8:30 PM	215	2	0
8:45 PM	194	1	1
9:00 PM	192	5	2
9:15 PM	189	1	2
9:30 PM	157	1	0
9:45 PM	168	0	1
10:00 PM	112	1	0
10:15 PM	136	2	0
10:30 PM	123	2	2
10:45 PM	103	1	3
11:00 PM	112	0	0
11:15 PM	83	0	0
11:30 PM	79	1	1
11:45 PM	72	1	0

Count date: October 23, 2014

Location: SH 249 W of Sunnywood Westbound

Group	Lights	Mediums	Articulated Trucks
12:00 AM	67	0	0
12:15 AM	55	0	0
12:30 AM	44	2	2
12:45 AM	38	0	2
1:00 AM	48	1	4
1:15 AM	31	0	3
1:30 AM	26	0	2
1:45 AM	31	2	0
2:00 AM	22	0	2
2:15 AM	40	1	0
2:30 AM	33	0	2
2:45 AM	43	1	3
3:00 AM	27	0	3
3:15 AM	23	1	2
3:30 AM	45	1	0
3:45 AM	34	4	3
4:00 AM	32	1	2
4:15 AM	55	5	1
4:30 AM	94	4	4
4:45 AM	87	4	4
5:00 AM	122	1	6
5:15 AM	218	8	8
5:30 AM	303	9	4
5:45 AM	304	9	8
6:00 AM	320	6	8
6:15 AM	365	10	6
6:30 AM	405	10	3
6:45 AM	394	8	6
7:00 AM	342	14	12
7:15 AM	398	19	9
7:30 AM	426	9	8
7:45 AM	406	15	13
8:00 AM	324	10	13
8:15 AM	273	7	11
8:30 AM	244	13	10
8:45 AM	243	12	20
9:00 AM	205	18	7
9:15 AM	197	27	8
9:30 AM	214	16	21
9:45 AM	208	17	11
10:00 AM	207	17	12
10:15 AM	159	13	12
10:30 AM	229	14	22
0:45 AM	275	18	14
11:00 AM	252	19	9
11:15 AM	277	22	16
11:30 AM	269	25	9
11:45 AM	282	21	7
12:00 PM	250	12	15
12:15 PM	291	12	10
12:30 PM	272	10	16
12:45 PM	277	22	22

Group	Lights	Mediums	Articulated Trucks
1:00 PM	273	15	17
1:15 PM	308	11	15
1:30 PM	280	16	5
1:45 PM	280	22	7
2:00 PM	313	14	14
2:15 PM	319	11	14
2:30 PM	317	18	11
2:45 PM	329	19	17
3:00 PM	382	26	11
3:15 PM	406	23	8
3:30 PM	388	17	15
3:45 PM	387	20	9
4:00 PM	398	11	10
4:15 PM	442	13	12
4:30 PM	384	15	8
4:45 PM	450	15	3
5:00 PM	415	13	9
5:15 PM	444	14	8
5:30 PM	452	12	7
5:45 PM	467	5	10
6:00 PM	461	9	6
6:15 PM	433	9	7
6:30 PM	396	5	4
6:45 PM	390	8	5
7:00 PM	347	1	4
7:15 PM	371	3	2
7:30 PM	392	8	3
7:45 PM	380	4	5
8:00 PM	348	7	8
8:15 PM	403	3	2
8:30 PM	271	3	5
8:45 PM	233	2	0
9:00 PM	226	3	3
9:15 PM	231	2	1
9:30 PM	200	0	1
9:45 PM	211	1	3
10:00 PM	205	0	2
10:15 PM	187	2	6
10:30 PM	143	1	3
10:45 PM	126	0	2
11:00 PM	128	2	1
11:15 PM	109	0	0
11:30 PM	96	1	0
11:45 PM	99	0	1

Count date: October 23, 2014

Appendix B-3: Peak Period Intersection Turning Movement Counts

Location: Beltway 8 at SH 249 (NE Corner)

		Southbound		Westbound				Northbound				Eastbound				Crosswalk	
Time Period	**Class.**	**I**	**O**	**T**	**R**	**I**	**O**	**L**	**T**	**I**	**O**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)			1401	483			250	867						SB	0	
Specified Period	%																
6:00 AM - 9:00 AM	**Total**														WB	0	
One Hour Peak	PHF	0	0.95	0.95	0.94	0.97	0	0.75	0.94	0.89	0	0	0.93	0.94			
7:15 AM - 8:15 AM	Approach %														NB	0	
															EB	0	
Peak 2	All Vehicles (no classification)			1236	838			261	1385						SB	0	
Specified Period	%																
4:00 PM - 7:00 PM	**Total**														WB	0	
One Hour Peak	PHF	0	0.96	0.92	0.9	0.92	0	0.84	0.96	0.94	0	0	0.92	0.97			
4:45 PM - 5:45 PM	Approach %														NB	0	
															EB	0	

Count date: October 16, 2014

Location: Beltway 8 at SH 249 (NW Corner)

		Southbound					Westbound					Northbound		Eastbound				Crosswalk	
Time Period	**Class.**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**U**	**I**	**O**	**I**	**O**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	583	172	61			30	1648	38								SB	0	
Specified Period	%																		
6:00 AM - 9:00 AM	Pedestrians	0	0	0			0	0	0								WB	0	
One Hour Peak	%																		
6:45 AM - 7:45 AM	**Total**																NB	0	
	PHF	0.89	0.56	0.66	0.86	0.66	0.75	0.95	0.68	0.94	0.68	0	0.9	0	0.95	0.96			
	Approach %																EB	0	
Peak 2	All Vehicles (no classification)	914	2	42			33	1416	12								SB	0	
Specified Period	%																		
4:00 PM - 7:00 PM	Pedestrians	0	0	0			0	0	0								WB	0	
One Hour Peak	%																		
5:00 PM - 6:00 PM	**Total**																NB	0	
	PHF	0.86	0.5	0.7	0.87	0.7	0.92	0.91	0.75	0.93	0.75	0	0.86	0	0.91	0.93			
	Approach %																EB	0	

Count date: October 16, 2014

Location: Beltway 8 at SH 249 (SW Corner)

		Southbound				Westbound		Northbound		Eastbound						Crosswalk	
Time Period	**Class.**	**L**	**T**	**I**	**O**	**I**	**O**	**I**	**O**	**T**	**R**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	459	200							1755	136				SB	0	
Specified Period	%																
6:00 AM - 9:00 AM	**Total**														WB	0	
One Hour Peak	PHF	0.84	0.82	0.87	0	0	0.95	0	0.91	0.91	0.94	0.92	0	0.95			
7:00 AM - 8:00 AM	Approach %														NB	1	
															EB	1	
Peak 2	All Vehicles (no classification)	404	566							2540	208				SB	0	
Specified Period	%																
4:00 PM - 7:00 PM	**Total**														WB	0	
One Hour Peak	PHF	0.86	0.9	0.89	0	0	0.96	0	0.89	0.98	0.85	0.97	0	0.94			
5:15 PM - 6:15 PM	Approach %														NB	0	
															EB	0	

Count date: October 16, 2014

Location: Beltway 8 at SH 249 (SE Corner)

		Southbound		Westbound		Northbound					Eastbound						Crosswalk	
Time Period	**Class.**	**I**	**O**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)					474	20	8			709	1525				SB	0	
Specified Period	%																	
6:00 AM - 9:00 AM	**Total**															WB	0	
One Hour Peak	PHF	0	0.89	0	0.95	0.84	0.62	0.67	0.83	0.67	0.84	0.94	0.92	0	0.94			
6:45 AM - 7:45 AM	Approach %															NB	1	
																EB	0	
Peak 2	All Vehicles (no classification)					469	42	40			1171	1755				SB	0	
Specified Period	%																	
4:00 PM - 7:00 PM	**Total**															WB	0	
One Hour Peak	PHF	0	0.95	0	0.96	0.84	0.88	0.67	0.83	0.67	0.9	0.96	0.95	0	0.97			
4:45 PM - 5:45 PM	Approach %															NB	1	
																EB	0	

Count date: October 16, 2014

Location: SH 249 at Galena Creek Dr

		Southbound				Northbound				Eastbound						Crosswalk	
Time Period	**Class.**	**T**	**R**	**I**	**O**	**L**	**U**	**I**	**O**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	402	27			0	0			54	0				SB	0	
Specified Period	%																
6:00 AM - 9:00 AM	**Total**														NB	0	
One Hour Peak	PHF	0.92	0.61	0.94	0	0	0	0	0.91	0.71	0	0.71	0.61	0.93			
7:30 AM - 8:30 AM	Approach %														EB	0	
Peak 2	All Vehicles (no classification)	388	97			0	0			31	0				SB	0	
Specified Period	%																
4:00 PM - 7:00 PM	**Total**														NB	0	
One Hour Peak	PHF	0.92	0.9	0.91	0	0	0	0	0.93	0.65	0	0.65	0.9	0.92			
5:45 PM - 6:45 PM	Approach %														EB	0	

Count date: September 23, 2014

Location: SH 249 at Hollister Dr

		Southbound						Westbound						Northbound						Eastbound							Crosswalk		
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	147	2453	20	0			454	80	143	0			23	1887	112	0			91	76	76	0				SB	0	
Specified Period	%																												
6:00 AM - 9:00 AM	**Total**																										WB	1	
One Hour Peak	PHF	0.82	0.93	0.45	0	0.96	0.93	0.92	0.74	0.73	0	0.91	0.91	0.57	0.91	0.9	0	0.91	0.94	0.84	0.76	0.66	0	0.96	0.64	0.97			
7:00 AM - 8:00 AM	Approach %																										NB	1	
																											EB	1	
Peak 2	All Vehicles (no classification)	102	2118	48	3			188	65	203	1			67	2877	178	1			71	57	54	0				SB	0	
Specified Period	%																												
4:00 PM - 7:00 PM	**Total**																										WB	0	
One Hour Peak	PHF	0.8	0.92	0.75	0.38	0.93	0.99	0.87	0.77	0.77	0.25	0.89	0.97	0.73	0.98	0.81	0.25	0.97	0.92	0.71	0.71	0.9	0	0.89	0.8	0.98			
5:00 PM - 6:00 PM	Approach %																										NB	2	
																											EB	1	

Count date: September 23, 2014

Location: SH 249 at Seton Lake Dr

		Southbound					Westbound					Northbound							Crosswalk	
Time Period	**Class.**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	188	2756	0			56	162	0			1774	77	0				SB	0	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	WB	0	
One Hour Peak	PHF	0.78	0.95	0	0.94	0.91	0.7	0.83	0	0.88	0.92	0.88	0.6	0	0.86	0.96	0.97			
7:00 AM - 8:00 AM	Approach %																	NB	0	
Peak 2	All Vehicles (no classification)	152	1989	1			55	285	0			2843	90	0				SB	1	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	WB	0	
One Hour Peak	PHF	0.93	0.92	0.25	0.92	0.96	0.69	0.85	0	0.82	0.96	0.97	0.94	0	0.97	0.91	0.98			
5:00 PM - 6:00 PM	Approach %																	NB	0	

Count date: September 23, 2014

Location: SH 249 at Fallbrook Rd.

		Southbound							Southwestbound							Westbound							Northbound							Eastbound								Crosswalk	
Time Period	**Class.**	**HL**	**L**	**T**	**R**	**U**	**I**	**O**	**HL**	**BL**	**BR**	**HR**	**U**	**I**	**O**	**L**	**T**	**R**	**HR**	**U**	**I**	**O**	**L**	**T**	**BR**	**R**	**U**	**I**	**O**	**L**	**BL**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	0	0	2470	109	1			0	0	0	0	0			0	0	0	0	0			376	1782	0	0	0			261	0	0	338	0				SB	0	
Specified Period	%																																						
6:00 AM - 9:00 AM	**Total**																																					SWB	0	
One Hour Peak	PHF	0	0	0.93	0.78	0.25	0.94	0.88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.97	0.89	0	0	0	0.9	0.93	0.83	0	0	0.94	0	0.9	0.92	0.95			
7:00 AM - 8:00 AM	Approach %																																					WB	0	
																																						NB	0	
																																						EB	0	
Peak 2	All Vehicles (no classification)	4	0	2034	115	1			0	7	5	2	0			9	1	1	0	0			273	2597	17	2	0			437	4	1	601	3				SB	0	
Specified Period	%																																						
4:00 PM - 7:00 PM	**Total**																																					SWB	1	
One Hour Peak	PHF	0.5	0	0.95	0.85	0.25	0.95	0.97	0	0.44	0.62	0.5	0	0.5	0.69	0.56	0.25	0.25	0	0	0.55	0.75	0.92	0.98	0.61	0.5	0	0.98	0.97	0.91	0.5	0.25	0.93	0.38	0.92	0.96	0.98			
5:00 PM - 6:00 PM	Approach %																																					WB	3	
																																						NB	0	
																																						EB	1	

Count date: September 23, 2014

Location: SH 249 at Old Bammel N Houston Rd.

		Southbound						Westbound						Northbound						Eastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	91	2745	1	0			158	8	245	0			1	1846	116	0			2	0	5	0				SB	0	
Specified Period	%																												
6:00 AM - 9:00 AM	**Total**																										WB	2	
One Hour Peak	PHF	0.6	0.93	0.25	0	0.95	0.89	0.84	0.4	0.88	0	0.96	0.85	0.25	0.89	0.72	0	0.88	0.94	0.5	0	0.31	0	0.44	0.5	0.95			
7:00 AM - 8:00 AM	Approach %																										NB	0	
																											EB	0	
Peak 2	All Vehicles (no classification)	157	2409	18	0			105	14	228	0			14	2328	111	0			24	21	22	0				SB	0	
Specified Period	%																												
4:00 PM - 7:00 PM	**Total**																										WB	1	
One Hour Peak	PHF	0.84	0.94	0.5	0	0.93	0.97	0.85	0.29	0.9	0	0.96	0.94	0.58	0.94	0.77	0	0.94	0.94	0.5	0.75	0.5	0	0.64	0.57	0.98			
4:45 PM - 5:45 PM	Approach %																										NB	2	
																											EB	1	

Count date: September 23, 2014

Location: SH 249 at Bammel N Houston Rd.

		Southbound						Westbound						Northbound						Eastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	55	1925	906	1			145	631	12	0			69	1293	97	1			341	257	26	0				SB	0	
Specified Period	%																												
6:00 AM - 9:00 AM	**Total**																										WB	1	
One Hour Peak	PHF	0.72	0.95	0.93	0.25	0.94	0.83	0.72	0.96	0.75	0	0.92	0.77	0.75	0.81	0.66	0.25	0.85	0.94	0.86	0.79	0.81	0	0.94	0.97	0.97			
6:30 AM - 7:30 AM	Approach %																										NB	0	
																											EB	0	
Peak 2	All Vehicles (no classification)	123	1759	442	0			176	328	38	0			106	1823	109	0			602	494	29	0				SB	1	
Specified Period	%																												
4:00 PM - 7:00 PM	**Total**																										WB	2	
One Hour Peak	PHF	0.9	0.98	0.79	0	0.96	0.95	0.98	0.94	0.86	0	0.95	0.89	0.91	0.93	0.78	0	0.94	0.98	0.95	0.92	0.72	0	0.98	0.89	0.99			
5:15 PM - 6:15 PM	Approach %																										NB	0	
																											EB	0	

Count date: September 23, 2014

Location: SH 249 at Smiling Wood Ln

		Southbound						Westbound						Northbound						Eastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	24	2086	30	0			167	146	73	0			57	1649	31	0			75	98	176	0				SB	1	
Specified Period	%																												
6:00 AM - 9:00 AM	**Total**																										WB	0	
One Hour Peak	PHF	0.67	0.94	0.62	0	0.94	0.86	0.93	0.85	0.73	0	0.94	0.85	0.59	0.85	0.7	0	0.84	0.93	0.62	0.84	0.73	0	0.88	0.91	0.96			
7:00 AM - 8:00 AM	Approach %																										NB	0	
																											EB	0	
Peak 2	All Vehicles (no classification)	63	1810	61	0			95	137	69	0			111	2058	69	0			120	182	123	0				SB	0	
Specified Period	%																												
4:00 PM - 7:00 PM	**Total**																										WB	1	
One Hour Peak	PHF	0.83	0.93	0.9	0	0.94	0.95	0.79	0.86	0.78	0	0.93	0.86	0.82	0.95	0.91	0	0.95	0.94	0.91	0.78	0.99	0	0.88	0.88	0.97			
4:45 PM - 5:45 PM	Approach %																										NB	0	
																											EB	1	

Count date: September 23, 2014

Location: SH 249 at West Rd.

		Southbound						Westbound						Northbound						Eastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	54	2327	0	0			24	8	151	0			5	1565	10	0			0	1	9	0				SB	0	
Specified Period	%																												
6:00 AM - 9:00 AM	**Total**																										WB	1	
One Hour Peak	PHF	0.68	0.93	0	0	0.94	0.94	0.6	0.67	0.82	0	0.9	0.68	0.62	0.95	0.62	0	0.95	0.92	0	0.25	0.56	0	0.62	0.81	0.94			
7:00 AM - 8:00 AM	Approach %																										NB	0	
																											EB	0	
Peak 2	All Vehicles (no classification)	114	1954	0	3			25	14	164	0			16	2208	9	0			0	11	16	0				SB	0	
Specified Period	%																												
4:00 PM - 7:00 PM	**Total**																										WB	0	
One Hour Peak	PHF	0.86	0.99	0	0.38	0.99	0.94	0.48	0.88	0.8	0	0.79	0.84	0.67	0.94	0.38	0	0.94	0.97	0	0.46	0.67	0	0.75	0.83	0.96			
4:45 PM - 5:45 PM	Approach %																										NB	0	
																											EB	0	

Count date: September 23, 2014

Location: SH 249 at Antoine Dr

		Southbound						Westbound						Northbound						Eastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	47	1816	704	1			103	667	5	0			83	1330	136	0			187	427	18	0				SB	2	
Specified Period	%																												
6:00 AM - 9:00 AM	**Total**																										WB	4	
One Hour Peak	PHF	0.65	0.94	0.81	0.25	0.93	0.89	0.74	0.94	0.42	0	0.92	0.87	0.8	0.89	0.81	0	0.9	0.93	0.92	0.87	0.64	0	0.89	0.9	0.94			
6:45 AM - 7:45 AM	Approach %																										NB	6	
																											EB	0	
Peak 2	All Vehicles (no classification)	87	1673	315	0			155	493	30	0			46	1831	224	0			318	621	29	0				SB	5	
Specified Period	%																												
4:00 PM - 7:00 PM	**Total**																										WB	1	
One Hour Peak	PHF	0.87	0.88	0.92	0	0.9	0.95	0.81	0.82	0.68	0	0.83	0.94	0.5	0.97	0.82	0	0.97	0.89	0.87	0.89	0.81	0	0.92	0.92	0.96			
5:00 PM - 6:00 PM	Approach %																										NB	10	
																											EB	1	

Count date: September 23, 2014

Location: SH 249 at Ramona Blvd

		Southbound					Northbound					Eastbound							Crosswalk	
Time Period	**Class.**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	1850	1	0			81	1531	0			6	27	0				SB	0	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	NB	0	
One Hour Peak	PHF	0.87	0.25	0	0.86	0.93	0.88	0.93	0	0.93	0.86	0.5	0.68	0	0.63	0.89	0.91			
6:45 AM - 7:45 AM	Approach %																	EB	0	
Peak 2	All Vehicles (no classification)	1813	6	1			36	2152	0			34	84	1				SB	0	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	NB	0	
One Hour Peak	PHF	0.93	0.75	0.25	0.93	0.94	0.56	0.94	0	0.93	0.93	0.53	0.95	0.25	0.78	0.63	0.97			
5:45 PM - 6:45 PM	Approach %																	EB	1	

Count date: September 23, 2014

Location: SH 249 at Mosielee St

		Southbound					Westbound					Northbound							Crosswalk	
Time Period	**Class.**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	17	2026	0			104	43	0			1533	48	1				SB	0	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	WB	0	
One Hour Peak	PHF	0.53	0.97	0	0.96	0.94	0.72	0.63	0	0.82	0.68	0.95	0.75	0.25	0.95	0.97	0.97			
7:15 AM - 8:15 AM	Approach %																	NB	0	
Peak 2	All Vehicles (no classification)	44	1939	0			64	33	0			2007	87	0				SB	0	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	WB	0	
One Hour Peak	PHF	0.85	0.97	0	0.97	0.97	0.8	0.75	0	0.78	0.84	0.97	0.84	0	0.97	0.98	0.97			
5:00 PM - 6:00 PM	Approach %																	NB	0	

Count date: September 25, 2014

Location: SH 249 at Chippewa Blvd

		Southbound					Northbound					Eastbound							Crosswalk	
Time Period	**Class.**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	1917	26	0			179	1554	0			2	85	0				SB	0	
Specified Period	%																			
7:00 AM - 9:00 AM	**Total**																	NB	0	
One Hour Peak	PHF	0.92	0.81	0	0.93	0.94	0.8	0.94	0	0.94	0.92	0.5	0.73	0	0.75	0.81	0.95			
7:00 AM - 8:00 AM	Approach %																	EB	0	
Peak 2	All Vehicles (no classification)	1993	7	1			99	1965	0			56	240	0				SB	1	
Specified Period	%																			
4:00 PM - 6:00 PM	**Total**																	NB	1	
One Hour Peak	PHF	0.96	0.58	0.25	0.96	0.94	0.8	0.94	0	0.93	0.96	0.88	0.73	0	0.78	0.78	0.97			
4:45 PM - 5:45 PM	Approach %																	EB	2	

Count date: September 23, 2014

Location: SH 249 at Old Foltin Rd.

		Southbound						Westbound						Northbound						Eastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	16	1687	453	0			140	56	59	0			6	1402	139	0			219	44	4	0				SB	0	
Specified Period	%																												
6:00 AM - 9:00 AM	**Total**																										WB	0	
One Hour Peak	PHF	0.67	0.95	0.96	0	0.95	0.93	0.81	0.58	0.87	0	0.94	0.77	0.5	0.96	0.68	0	0.93	0.94	0.77	0.61	1	0	0.82	0.95	0.94			
6:45 AM - 7:45 AM	Approach %																										NB	0	
																											EB	0	
Peak 2	All Vehicles (no classification)	129	1815	351	1			92	56	15	0			8	1696	172	0			376	51	3	0				SB	0	
Specified Period	%																												
4:00 PM - 7:00 PM	**Total**																										WB	0	
One Hour Peak	PHF	0.92	0.92	0.91	0.25	0.94	0.94	0.79	0.82	0.75	0	0.89	0.89	0.5	0.92	0.91	0	0.94	0.91	0.88	0.75	0.25	0	0.9	0.92	0.97			
5:15 PM - 6:15 PM	Approach %																										NB	0	
																											EB	1	

Count date: September 23, 2014

Location: SH 249 at Killough Dr

		Southbound					Northbound					Eastbound							Crosswalk	
Time Period	**Class.**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	1830	1	0			0	1599	0			0	1	0				SB	0	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	NB	1	
One Hour Peak	PHF	0.95	0.25	0	0.95	0.97	0	0.97	0	0.97	0.95	0	0.25	0	0.25	0.25	0.96			
7:00 AM - 8:00 AM	Approach %																	EB	0	
Peak 2	All Vehicles (no classification)	1873	3	0			0	1937	0			0	1	0				SB	0	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	NB	0	
One Hour Peak	PHF	0.94	0.38	0	0.94	0.95	0	0.95	0	0.95	0.94	0	0.25	0	0.25	0.38	0.94			
5:15 PM - 6:15 PM	Approach %																	EB	0	

Count date: September 23, 2014

Location: SH 249 at Killough St

		Southbound					Westbound					Northbound							Crosswalk	
Time Period	**Class.**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	91	1622	0			7	156	0			1564	30	0				SB	0	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	WB	0	
One Hour Peak	PHF	0.84	0.94	0	0.94	0.93	0.58	0.8	0	0.82	0.84	0.94	0.68	0	0.95	0.94	0.94			
7:00 AM - 8:00 AM	Approach %																	NB	0	
Peak 2	All Vehicles (no classification)	66	1694	0			15	97	0			2036	28	1				SB	1	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	WB	0	
One Hour Peak	PHF	0.79	0.92	0	0.92	0.95	0.62	0.76	0	0.78	0.87	0.96	0.64	0.25	0.96	0.93	0.97			
4:45 PM - 5:45 PM	Approach %																	NB	0	

Count date: September 23, 2014

Location: SH 249 at Upland Willow Ave.

		Southbound					Westbound					Northbound							Crosswalk	
Time Period	**Class.**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	62	1705	1			183	131	2			1579	76	0				SB	0	
Specified Period	%																			
7:00 AM - 9:00 AM	**Total**																	WB	0	
One Hour Peak	PHF	0.67	0.9	0.25	0.91	0.91	0.8	0.74	0.25	0.78	0.73	0.91	0.76	0	0.93	0.9	0.91			
7:15 AM - 8:15 AM	Approach %																	NB	0	
Peak 2	All Vehicles (no classification)	112	1654	0			111	77	1			1951	159	0				SB	0	
Specified Period	%																			
4:00 PM - 6:00 PM	**Total**																	WB	5	
One Hour Peak	PHF	0.85	0.95	0	0.96	0.93	0.77	0.69	0.25	0.91	0.88	0.94	0.81	0	0.95	0.95	0.99			
5:00 PM - 6:00 PM	Approach %																	NB	0	

Count date: October 1, 2014

Location: SH 249 at Washington Dr

		Southbound						Westbound						Northbound						Eastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	14	1809	8	0			0	2	19	0			53	1448	1	73			6	0	10	0				SB	0	
Specified Period	%																												
6:00 AM - 9:00 AM	**Total**																										WB	1	
One Hour Peak	PHF	0.44	0.93	0.67	0	0.93	0.97	0	0.5	0.59	0	0.58	0.42	0.83	0.96	0.25	0.87	0.97	0.93	0.3	0	0.42	0	0.36	0.83	0.96			
7:00 AM - 8:00 AM	Approach %																										NB	0	
																											EB	0	
Peak 2	All Vehicles (no classification)	20	1672	10	2			1	0	25	0			75	2087	5	31			20	0	35	0				SB	0	
Specified Period	%																												
4:00 PM - 7:00 PM	**Total**																										WB	0	
One Hour Peak	PHF	0.5	0.94	0.62	0.25	0.93	0.96	0.25	0	0.69	0	0.72	0.62	0.89	0.96	0.25	0.65	0.97	0.95	0.83	0	0.46	0	0.55	0.92	0.97			
5:30 PM - 6:30 PM	Approach %																										NB	0	
																											EB	0	

Count date: September 23, 2014

Location: SH 249 at Breen Dr

		Southbound						Westbound						Northbound						Eastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	0	1536	429	1			0	0	0	0			163	1526	0	2			140	0	146	0				SB	0	
Specified Period	%																												
6:00 AM - 9:00 AM	**Total**																										WB	0	
One Hour Peak	PHF	0	0.94	0.89	0.25	0.95	0.95	0	0	0	0	0	0	0.89	0.93	0	0.5	0.96	0.96	0.81	0	0.7	0	0.85	0.89	0.96			
7:00 AM - 8:00 AM	Approach %																										NB	0	
																											EB	0	
Peak 2	All Vehicles (no classification)	0	1668	169	0			0	0	0	0			275	1858	0	0			296	1	179	0				SB	0	
Specified Period	%																												
4:00 PM - 7:00 PM	**Total**																										WB	0	
One Hour Peak	PHF	0	0.91	0.81	0	0.92	0.98	0	0	0	0	0	0.25	0.89	0.97	0	0	0.98	0.91	0.9	0.25	0.86	0	0.94	0.97	0.97			
5:15 PM - 6:15 PM	Approach %																										NB	0	
																											EB	0	

Count date: September 23, 2014

Location: SH 249 at Lincoln Dr

		Southbound					Westbound					Northbound							Crosswalk	
Time Period	**Class.**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	4	1832	0			0	13	0			1795	6	0				SB	0	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	WB	1	
One Hour Peak	PHF	1	0.9	0	0.9	0.95	0	0.54	0	0.54	0.62	0.95	0.5	0	0.95	0.9	0.92			
7:00 AM - 8:00 AM	Approach %																	NB	0	
Peak 2	All Vehicles (no classification)	1	1799	1			1	15	0			2321	1	0				SB	0	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	WB	0	
One Hour Peak	PHF	0.25	0.91	0.25	0.91	0.95	0.25	0.75	0	0.67	0.5	0.95	0.25	0	0.95	0.91	0.95			
5:00 PM - 6:00 PM	Approach %																	NB	0	

Count date: September 23, 2014

Location: SH 249 at Mt Houston Rd.

		Southbound					Northbound					Eastbound							Crosswalk	
Time Period	**Class.**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	1562	0	0			0	1743	0			3	366	0				SB	0	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	NB	0	
One Hour Peak	PHF	0.86	0	0	0.86	0.88	0	0.88	0	0.88	0.87	0.38	0.92	0	0.91	0	0.95			
6:30 AM - 7:30 AM	Approach %																	EB	0	
Peak 2	All Vehicles (no classification)	1776	0	0			0	2110	0			173	612	0				SB	0	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	NB	0	
One Hour Peak	PHF	0.9	0	0	0.9	0.96	0	0.95	0	0.95	0.93	0.73	0.96	0	0.95	0	0.95			
5:15 PM - 6:15 PM	Approach %																	EB	0	

Count date: September 23, 2014

Location: SH 249 at TC Jester Blvd

		Southbound						Westbound						Northbound						Eastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	2	0	3	0			13	1696	5	1			82	1	40	0			1	2056	36	0				SB	0	
Specified Period	%																												
6:00 AM - 9:00 AM	**Total**																										WB	0	
One Hour Peak	PHF	0.5	0	0.38	0	0.62	0.44	0.81	0.94	0.31	0.25	0.94	0.9	0.89	0.25	0.59	0	0.79	0.68	0.25	0.91	0.64	0	0.92	0.94	0.94			
7:00 AM - 8:00 AM	Approach %																										NB	0	
																											EB	0	
Peak 2	All Vehicles (no classification)	10	1	6	0			19	1842	2	0			36	0	14	2			6	2352	70	1				SB	0	
Specified Period	%																												
4:00 PM - 7:00 PM	**Total**																										WB	2	
One Hour Peak	PHF	0.5	0.25	0.75	0	0.61	0.67	0.59	0.95	0.25	0	0.94	0.92	0.82	0	0.7	0.25	0.81	0.79	0.75	0.92	0.76	0.25	0.92	0.95	0.96			
5:15 PM - 6:15 PM	Approach %																										NB	0	
																											EB	0	

Count date: September 23, 2014

Location: SH 249 at McKinley St

		Southbound					Westbound					Eastbound							Crosswalk	
Time Period	**Class.**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	8	0	0			1711	11	0			5	2176	0				SB	1	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	WB	0	
One Hour Peak	PHF	0.5	0	0	0.5	0.44	0.97	0.55	0	0.97	0.93	0.31	0.93	0	0.93	0.97	0.98			
6:45 AM - 7:45 AM	Approach %																	EB	0	
Peak 2	All Vehicles (no classification)	30	12	0			1970	23	0			7	2388	1				SB	0	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	WB	0	
One Hour Peak	PHF	0.75	1	0	0.81	0.68	0.9	0.64	0	0.91	0.95	0.44	0.94	0.25	0.94	0.9	0.98			
5:15 PM - 6:15 PM	Approach %																	EB	0	

Count date: September 23, 2014

Location: SH 249 at Royal Village Rd

		Westbound					Northbound					Eastbound							Crosswalk	
Time Period	**Class.**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	23	1611	0			29	95	0			2064	9	0				WB	0	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	NB	0	
One Hour Peak	PHF	0.57	0.9	0	0.9	0.92	0.72	0.85	0	0.84	0.67	0.91	0.75	0	0.91	0.91	0.91			
6:30 AM - 7:30 AM	Approach %																	EB	0	
Peak 2	All Vehicles (no classification)	83	1909	3			6	54	1			1933	17	0				WB	0	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	NB	0	
One Hour Peak	PHF	0.83	0.96	0.38	0.96	0.94	0.38	0.79	0.25	0.69	0.87	0.93	0.61	0	0.94	0.95	0.98			
4:45 PM - 5:45 PM	Approach %																	EB	0	

Count date: September 25, 2014

Location: SH 249 at Big John St

		Southbound					Westbound					Eastbound							Crosswalk	
Time Period	**Class.**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	13	4	0			1794	37	0			12	1970	0				SB	1	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	WB	0	
One Hour Peak	PHF	0.65	1	0	0.71	0.61	0.9	0.58	0	0.91	0.89	0.43	0.9	0	0.89	0.9	0.93			
6:15 AM - 7:15 AM	Approach %																	EB	0	
Peak 2	All Vehicles (no classification)	28	17	0			2019	23	4			4	1958	0				SB	0	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	WB	0	
One Hour Peak	PHF	0.78	0.71	0	0.94	0.75	0.98	0.72	0.5	0.98	0.93	0.5	0.93	0	0.93	0.98	0.98			
4:45 PM - 5:45 PM	Approach %																	EB	0	

Count date: September 25, 2014

Location: SH 249 at Lynda Dr

		Southbound					Westbound					Eastbound							Crosswalk	
Time Period	**Class.**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	14	26	0			1860	9	0			9	2154	0				SB	1	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	WB	0	
One Hour Peak	PHF	0.44	0.93	0	0.67	0.64	0.92	0.75	0	0.92	0.91	0.56	0.91	0	0.91	0.92	0.95			
6:15 AM - 7:15 AM	Approach %																	EB	0	
Peak 2	All Vehicles (no classification)	9	18	0			2038	21	1			22	2117	4				SB	3	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	WB	0	
One Hour Peak	PHF	0.75	0.75	0	0.84	0.83	0.97	0.58	0.25	0.97	0.93	0.69	0.93	0.5	0.93	0.97	0.97			
4:45 PM - 5:45 PM	Approach %																	EB	0	

Count date: September 25, 2014

Appendices

Location: SH 249 at Moonglow Dr

		Southbound						Westbound						Northbound						Eastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	37	0	21	0			3	1863	21	4			1	0	1	0			7	2123	5	0				SB	0	
Specified Period	%																												
6:00 AM - 9:00 AM	**Total**																										WB	0	
One Hour Peak	PHF	0.92	0	0.58	0	0.76	0.7	0.75	0.91	0.66	0.33	0.92	0.91	0.25	0	0.25	0	0.5	0.67	0.44	0.9	0.62	0	0.9	0.92	0.93			
6:15 AM - 7:15 AM	Approach %																										NB	0	
																											EB	0	
Peak 2	All Vehicles (no classification)	40	0	10	0			5	1989	40	2			10	1	18	0			13	2123	2	2				SB	1	
Specified Period	%																												
4:00 PM - 7:00 PM	**Total**																										WB	0	
One Hour Peak	PHF	0.67	0	0.83	0	0.74	0.79	0.42	0.98	0.77	0.5	0.98	0.95	0.5	0.25	0.75	0	0.81	0.58	0.65	0.94	0.5	0.5	0.94	0.98	0.96			
5:00 PM - 6:00 PM	Approach %																										NB	0	
																											EB	1	

Count date: September 25, 2014

Location: SH 249 at S Cordoba Dr

		Westbound					Northbound					Eastbound							Crosswalk	
Time Period	**Class.**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	15	1801	0			34	42	0			2158	9	0				WB	0	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	NB	0	
One Hour Peak	PHF	0.62	0.94	0	0.95	0.9	0.61	0.81	0	0.76	0.6	0.9	0.45	0	0.9	0.93	0.95			
6:15 AM - 7:15 AM	Approach %																	EB	0	
Peak 2	All Vehicles (no classification)	37	2057	1			23	38	0			2148	37	0				WB	2	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	NB	0	
One Hour Peak	PHF	0.62	0.97	0.25	0.96	0.94	0.96	0.73	0	0.8	0.84	0.94	0.77	0	0.95	0.97	0.95			
4:45 PM - 5:45 PM	Approach %																	EB	0	

Count date: September 25, 2014

Location: SH 249 at Cordoba Dr (Northside)

		Southbound						Westbound						Northbound					Eastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**I**	**O**	**L**	**T**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	28	0	41	0			4	1985	13	0			0	0	0			16	2177	0				SB	1	
Specified Period	%																											
7:00 AM - 9:00 AM	**Total**																								WB	0	
One Hour Peak	PHF	0.7	0	0.6	0	0.72	0.6	0.5	0.93	0.65	0	0.93	0.94	0	0	0	0	0.5	0.57	0.94	0	0.94	0.92	0.93			
7:00 AM - 8:00 AM	Approach %																								NB	0	
																									EB	1	
Peak 2	All Vehicles (no classification)	19	1	30	1			3	2584	53	0			4	0	5			36	2373	1				SB	7	
Specified Period	%																											
4:00 PM - 6:00 PM	**Total**																								WB	0	
One Hour Peak	PHF	0.68	0.25	0.62	0.25	0.75	0.9	0.38	0.98	0.88	0	0.98	0.9	0.5	0	0.62	0.75	0.5	0.82	0.89	0.25	0.9	0.98	0.96			
5:00 PM - 6:00 PM	Approach %																								NB	0	
																									EB	0	

Count date: October 1, 2014

Location: SH 249 at Old Hickory

		Southbound					Westbound					Eastbound							Crosswalk	
Time Period	**Class.**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	68	33	0			1798	32	0			7	2203	0				SB	0	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	WB	0	
One Hour Peak	PHF	0.77	0.75	0	0.77	0.7	0.94	0.67	0	0.94	0.92	0.88	0.91	0	0.91	0.94	0.97			
6:15 AM - 7:15 AM	Approach %																	EB	0	
Peak 2	All Vehicles (no classification)	63	15	0			2088	68	0			20	2188	0				SB	0	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	WB	0	
One Hour Peak	PHF	0.93	0.75	0	0.93	0.92	0.97	0.89	0	0.97	0.95	0.71	0.95	0	0.95	0.97	0.96			
5:00 PM - 6:00 PM	Approach %																	EB	0	

Count date: September 25, 2014

Location: SH 249 at Cora St

		Westbound					Northbound					Eastbound							Crosswalk	
Time Period	**Class.**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	18	1619	0			43	57	0			2324	15	0				WB	0	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	NB	0	
One Hour Peak	PHF	0.75	0.92	0	0.92	0.95	0.83	0.79	0	0.83	0.69	0.95	0.62	0	0.94	0.92	0.97			
6:15 AM - 7:15 AM	Approach %																	EB	0	
Peak 2	All Vehicles (no classification)	51	2032	0			17	42	0			2210	33	0				WB	0	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	NB	0	
One Hour Peak	PHF	0.85	0.96	0	0.96	0.95	0.71	0.75	0	0.74	0.84	0.94	0.75	0	0.95	0.96	0.95			
5:00 PM - 6:00 PM	Approach %																	EB	0	

Count date: September 25, 2014

Location: SH 249 at Ella Blvd

		Westbound					Northbound					Eastbound							Crosswalk	
Time Period	**Class.**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	58	1623	0			158	126	0			2182	129	0				WB	0	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	NB	0	
One Hour Peak	PHF	0.85	0.93	0	0.93	0.96	0.9	0.88	0	0.95	0.74	0.96	0.69	0	0.94	0.93	0.97			
6:15 AM - 7:15 AM	Approach %																	EB	0	
Peak 2	All Vehicles (no classification)	130	1826	1			311	140	4			2002	182	0				WB	0	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	NB	0	
One Hour Peak	PHF	0.68	0.99	0.25	0.98	0.97	0.8	0.67	0.5	0.86	0.81	0.97	0.95	0	0.97	0.96	0.97			
4:15 PM - 5:15 PM	Approach %																	EB	0	

Count date: September 25, 2014

Location: SH 249 at Veterans Memorial Dr

		Southbound						Westbound						Northbound						Eastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	141	712	132	0			104	1032	63	0			143	232	92	0			163	1619	499	0				SB	0	
Specified Period	%																												
6:00 AM - 9:00 AM	**Total**																										WB	1	
One Hour Peak	PHF	0.8	0.89	0.87	0	0.93	0.78	0.68	0.78	0.75	0	0.83	0.94	0.87	0.69	0.66	0	0.73	0.94	0.8	0.98	0.9	0	0.98	0.82	0.95			
6:45 AM - 7:45 AM	Approach %																										NB	0	
																											EB	0	
Peak 2	All Vehicles (no classification)	136	410	188	1			90	1394	137	0			131	536	35	0			335	1565	265	0				SB	0	
Specified Period	%																												
4:00 PM - 7:00 PM	**Total**																										WB	2	
One Hour Peak	PHF	0.94	0.95	0.94	0.25	0.97	0.96	0.83	0.98	0.88	0	0.98	0.96	0.74	0.93	0.67	0	0.97	0.92	0.91	0.96	0.82	0	0.95	0.98	0.98			
5:00 PM - 6:00 PM	Approach %																										NB	0	
																											EB	0	

Count date: September 25, 2014

Location: SH 249 at Deer Trail Dr

		Westbound					Northbound					Eastbound							Crosswalk	
Time Period	**Class.**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	48	1379	0			69	56	0			1742	94	0				WB	0	
Specified Period	%																			
6:00 AM - 9:00 AM	**Total**																	NB	1	
One Hour Peak	PHF	0.52	0.89	0	0.92	0.98	0.64	0.88	0	0.73	0.77	0.98	0.81	0	0.97	0.91	0.97			
6:30 AM - 7:30 AM	Approach %																	EB	1	
Peak 2	All Vehicles (no classification)	17	1733	0			63	44	0			1717	89	0				WB	0	
Specified Period	%																			
4:00 PM - 7:00 PM	**Total**																	NB	0	
One Hour Peak	PHF	0.71	0.97	0	0.97	0.97	0.79	0.85	0	0.84	0.8	0.97	0.77	0	0.97	0.97	0.98			
5:00 PM - 6:00 PM	Approach %																	EB	0	

Count date: September 25, 2014

Location: SH 249 at Bunny Run Dr

		Southbound							Westbound							Northbound							Eastbound							Southeastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**HR**	**U**	**I**	**O**	**L**	**T**	**BR**	**R**	**U**	**I**	**O**	**L**	**BL**	**T**	**R**	**U**	**I**	**O**	**HL**	**L**	**T**	**R**	**U**	**I**	**O**	**HL**	**BL**	**BR**	**HR**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	7	0	7	0	0			46	1477	2	36	0			10	0	4	96	0			12	8	1625	8	0			0	13	0	29	0				SB	0	
Specified Period	%																																						
7:00 AM - 9:00 AM	**Total**																																				WB	0	
One Hour Peak	PHF	0.58	0	0.58	0	0	0.88	0.71	0.52	0.92	0.5	0.82	0	0.93	0.93	0.62	0	1	0.8	0	0.79	0.61	0.75	0.4	0.94	0.5	0	0.94	0.92	0	0.46	0	0.72	0	0.7	0.7	0.93			
7:15 AM - 8:15 AM	Approach %																																				NB	0	
																																					EB	0	
																																					SEB	0	
Peak 2	All Vehicles (no classification)	3	1	5	0	0			67	1707	1	65	0			6	0	5	70	0			17	7	1798	9	0			0	4	0	60	0				SB	0	
Specified Period	%																																						
4:00 PM - 6:00 PM	**Total**																																				WB	0	
One Hour Peak	PHF	0.25	0.25	0.62	0	0	0.56	0.92	0.73	0.98	0.25	0.86	0	0.97	0.93	0.5	0	0.31	0.76	0	0.75	0.6	0.71	0.58	0.93	0.28	0	0.94	0.98	0	0.5	0	0.88	0	0.89	0.75	0.96			
5:00 PM - 6:00 PM	Approach %																																				NB	0	
																																					EB	0	
																																					SEB	0	

Count date: October 7, 2014

Location: SH 249 at Sunnywood Dr

		Southbound						Westbound						Northbound						Eastbound								Crosswalk	
Time Period	**Class.**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	1	0	54	0			8	1472	36	0			4	0	31	0			22	1845	10	0				SB	1	
Specified Period	%																												
6:00 AM - 9:00 AM	**Total**																										WB	1	
One Hour Peak	PHF	0.25	0	0.59	0	0.6	0.66	0.67	0.91	0.6	0	0.9	0.98	0.5	0	0.86	0	0.88	0.75	0.79	0.99	0.62	0	0.98	0.89	0.94			
6:15 AM - 7:15 AM	Approach %																										NB	0	
																											EB	0	
Peak 2	All Vehicles (no classification)	2	0	24	0			18	1773	93	1			1	0	30	0			29	1762	4	1				SB	1	
Specified Period	%																												
4:00 PM - 7:00 PM	**Total**																										WB	0	
One Hour Peak	PHF	0.5	0	0.6	0	0.65	0.92	0.75	0.98	0.83	0.25	0.98	0.93	0.25	0	0.62	0	0.65	0.69	0.81	0.93	0.5	0.25	0.93	0.98	0.98			
4:45 PM - 5:45 PM	Approach %																										NB	0	
																											EB	0	

Count date: September 25, 2014

Location: SH 249 at I-45 SBFR

		Southbound						Westbound					Northbound					Eastbound							Crosswalk	
Time Period	**Class**	**L**	**T**	**R**	**U**	**I**	**O**	**L**	**T**	**U**	**I**	**O**	**L**	**R**	**U**	**I**	**O**	**T**	**R**	**U**	**I**	**O**	**Total**		**Pedestrians**	**Total**
Peak 1	All Vehicles (no classification)	283	663	562	99			147	1093	0			0	0	10			1102	609	0				SB	1	
Specified Period	%																									
7:00 AM - 9:00 AM	**Total**																							WB	0	
One Hour Peak	PHF	0.93	0.88	0.86	0.71	0.93	0.71	0.9	0.96	0	0.95	0.91	0	0	0.83	0.83	0.92	0.89	0.93	0	0.95	0.95	0.98			
7:00 AM - 8:00 AM	Approach %																							NB	0	
																								EB	2	
Peak 2	All Vehicles (no classification)	265	324	507	124			135	1220	2			0	0	0			1086	740	0				SB	0	
Specified Period	%																									
4:00 PM - 6:00 PM	**Total**																							WB	0	
One Hour Peak	PHF	0.88	0.69	0.89	0.94	0.9	0.94	0.91	0.95	0.5	0.94	0.96	0	0	0	0	0.88	0.97	0.89	0	0.95	0.94	0.96			
5:00 PM - 6:00 PM	Approach %																							NB	2	
																								EB	0	

Count date: October 1, 2014

Appendix C: Traffic Analysis

Existing Intersection Level-of-Service

Intersection	AM Peak Hour													PM Peak Hour										
	Eastbound			Westbound			Northbound			Southbound			Overall	Eastbound			Westbound			Northbound			Southbound			Overall
	L	T	R	L	T	R	L	T	R	L	T	R		L	T	R	L	T	R	L	T	R	L	T	R	
SH 249 at Beltway 8 WBFR	-	-	-	-	F	D	-	B	-	-	F	D	F	-	-	-	-	F	F	-	C	-	-	F	A	F
SH 249 at Beltway 8 EBFR	-	E	-	-	-	-	-	F	-	F	A	-	E	-	F	-	-	-	-	-	F	-	E	A	-	F
SH 249 at Galena Creek Dr[1]	-	A	A	-	-	-	-	-	B	-	-	-	A	-	A	A	-	-	-	-	-	B	-	-	-	A
SH 249 at Hollister St	F	D	-	D	C	-	F	D	-	F	F	-	E	F	C	-	D	F	-	F	D	-	F	E	-	E
SH 249 at Seton Lake Dr	D	A	-	-	C	-	-	-	-	F	-	B	B	E	A	-	-	E	-	-	-	-	E	-	E	D
SH 249 at Fallbrook Dr	F	D	-	F	A	-	F	-	C	-	-	-	D	F	F	-	F	C	-	E	-	E	-	E	-	E
SH 249 at Old Bammel N Houston Rd	F	A	-	D	B	-	E	A	-	E	B	-	B	F	B	-	E	C	-	F	D	-	F	C	-	C
SH 249 at N Houston Rosslyn Rd/Bammel N Houston Rd	D	D	D	F	C	-	F	F	-	E	E	-	E	F	E	A	F	F	-	F	F	-	F	F	-	F
SH 249 at Smiling Wood Ln/NW Park Dr	E	C	-	E	B	-	F	D	-	E	F	-	C	D	D	-	E	C	-	F	E	-	E	F	-	D
SH 249 at West Rd	C	A	-	E	C	-	-	A	-	F	E	B	B	E	A	-	E	A	-	E	C	-	F	E	C	B
SH 249 at Antoine Dr	E	D	B	F	C	-	F	E	-	F	F	-	D	F	D	B	F	F	-	F	F	-	F	F	-	F
SH 249 at Romona Blvd[1]	-	A	A	C	A	-	D	-	D	-	-	-	A	-	A	A	C	A	-	F	-	F	-	-	-	A
SH 249 at Mosielee St	F	A	-	-	A	-	-	-	-	-	E	-	A	E	B	-	-	A	-	-	-	-	-	D	-	B
SH 249 at Chippewa Blvd/West Montgomery Rd[1]	-	A	A	E	A	-	B	-	B	-	-	-	A	A	-	A	D	A	-	F	-	F	-	-	-	A
SH 249 at Old Fotin Rd	F	E	-	E	C	-	-	F	A	-	F	-	E	F	E	-	E	F	-	-	F	-	-	F	-	F
SH 249 at Killough Dr (south of SH 249)[1]	-	A	A	-	A	-	-	-	B	-	-	-	A	-	A	A	-	A	-	B	-	B	-	-	-	A
SH 249 at Killough St (north of SH 249)[1]	B	A		-	A	A	-	-	-	B	-	B	A	C	A	-	-	A	A	-	-	-	B	-	B	A
SH 249 at Upland Willow Ave	D	A	-	-	B	-	-	-	-	F	-	A	B	E	A	-	-	C	-	-	-	-	F	-	A	B
SH 249 at Washington Dr[1]	B	A	A	C	A	A	C	-	C	-	B	B	A	C	A	A	C	A	A	C	-	C	B	-	B	A
SH 249 at Breen Dr	F	C	-	F	A	-	F	E	-	-	-	-	C	-	E	-	F	A	-	F	F	-	-	-	-	D
SH 249 at Lincoln Dr[1]	C	A	-	-	A	A	-	-	-	-	-	B	A	D	A	-	-	A	A	-	-	-	C	-	C	A
SH 249 at Mt Houston Rd[1]	-	A	-	-	A	-	E	-	E	-	-	-	A	-	A	-	-	A	-	F	-	F	-	-	-	E
SH 249 at TC Jester Blvd	F	A	-	F	A	-	F	E	A	-	A	-	A	E	B	-	E	A	-	F	E	A	-	E	-	A
SH 249 at McKinley St[1]	C	A	-	-	A	A	-	-	-	E	-	-	A	C	A	-	-	A	A	-	-	-	F	-	F	A
SH 249 at Royal Village Rd[1]	-	A	A	C	A	-	D	-	D	-	-	-	A	-	A	A	C	A	-	B	-	B	-	-	-	A
SH 249 at Big John St[1]	B	A	-	-	A	A	-	-	-	C	-	C	A	C	A	-	-	A	A	-	-	-	E	-	E	A
SH 249 at Lynda Dr[1]	B	A	-	-	A	A	-	-	-	C	-	C	A	C	A	-	-	A	A	-	-	-	D	-	D	A
SH 249 at Moonglow Dr	E	A	-	E	A	-	-	A	-	-	E	-	A	E	A	-	E	A	-	-	D	-	-	A	-	A
SH 249 at Cordoba Dr (south of SH 249)[1]	-	A	A	C	A	-	E	-	E	-	-	-	A	A	-	A	C	A	-	D	-	D	-	-	-	A
SH 249 at Cordoba Dr (north of SH 249)[1]	C	A	-	C	A	A	-	-	-	F	-	F	A	E	A	-	C	A	A	F	-	F	F	F	F	A
SH 249 at Old Hickory Ln	F	A	-	-	A	-	-	-	-	-	-	E	A	E	A	-	-	B	-	-	-	-	F	-	-	A
SH 249 at Cora St[1]	-	A	A	C	A	-	F	-	F	-	-	-	A	-	A	A	D	A	-	D	-	D	-	-	-	A
SH 249 at Ella Blvd	-	B	-	F	A	-	E	-	A	-	-	-	B	-	B	-	E	A	-	E	-	A	-	-	-	B
SH 249 at Veterans Memorial Dr	F	F	-	F	D	-	F	D	-	F	E	-	F	F	D	-	F	E	-	F	F	-	F	F	-	E
SH 249 at Deer Trail Dr	-	A	-	F	A	-	F	-	-	-	-	-	B	-	A	-	E	A	-	E	-	-	-	-	-	A
SH 249 at Bunny Run Dr[1]	B	A	A	B	A	A	B	B	B	D	D	D	A	C	A	A	C	A	A	C	C	C	D	D	D	A
SH 249 at Sunnywood Dr[1]	B	A	A	C	A	A	D	D	D	-	B	B	A	C	A	A	C	A	A	C	-	C	B	-	B	A
SH 249 at I-45 SBFR	-	D	C	A	D	-	-	-	-	F	F	F	F	-	D	D	A	E	-	-	-	-	F	D	F	E
SH 249 at I-45 NBFR	E	F	-	-	D	A	F	C	A	-	-	-	F	E	E	-	-	D	B	F	C	A	-	-	-	F
SH 249 at Valley Stream St[1]	A	A	A	A	A	A	D	-	D	-	-	-	A	A	A	A	A	A	A	C	C	C	C	C	C	A

[1] *Unsignlaized Intersection*

Future Intersection Level-of-Service and Delay, No-Build vs. Build

Intersection	2019 No Build				2019 Build			
	AM		PM		AM		PM	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
SH 249 NB at Beltway 8 WBFR (NE Corner)	F	149.7	F	183.6	F	131.4	F	130.2
SH 249 NB at Beltway 8 EBFR (SE Corner)	C	34.8	E	77.1	C	31.9	F	82.3
SH 249 SB at Beltway 8 WBFR (NW Corner)	F	87.4	F	142.9	E	76.9	F	93.7
SH 249 SB at Beltway 8 EBFR (SW Corner)	F	100.9	F	219.3	E	73.2	F	86.6
SH 249 at Hollister St	F	121.2	F	138.5	E	73.5	F	79.2
SH 249 at Seton Lake Dr	C	23.2	F	95.3	B	15.9	D	48.5
SH 249 at Fallbrook Dr	F	84.1	F	113.5	D	49.6	F	89.5
SH 249 at Old Bammel N Houston Rd	D	40.6	E	57.2	C	30.3	C	29.8
SH 249 at N Houston Rosslyn Rd/Bammel N Houston Rd	F	91.7	F	126.3	F	80.1	E	73.1
SH 249 at Smiling Wood Ln/NW Park Dr	D	52.9	E	73.0	D	40.2	D	54.2
SH 249 at West Rd	B	17.0	B	15.3	B	14.9	B	10.2
SH 249 at Antoine Dr	E	72.0	F	137.0	D	53.5	E	67.6
SH 249 at Mosielee St	B	10.7	B	13.3	B	11.8	B	15.1
SH 249 at Old Foltin Rd	F	107.7	F	178.6	C	32.1	D	36.3
SH 249 at Upland Willow Ave	B	17.4	C	25.4	B	13.6	B	11.9
SH 249 at Breen Dr	C	26.9	E	62.5	B	19.7	D	44.0
SH 249 at TC Jester Blvd	A	7.8	B	10.2	A	6.1	A	9.7
SH 249 at Moonglow Dr	A	9.1	A	4.2	A	8.5	A	4.2
SH 249 at Old Hickory Ln	A	6.6	A	9.8	A	5.8	A	7.1
SH 249 at Ella Blvd	B	18.5	B	19.7	B	18.5	B	18.1
SH 249 at Veterans Memorial Dr	E	69.8	F	88.9	E	57.3	E	64.6
SH 249 at Deer Trail Dr	A	10.0	A	6.5	A	9.3	A	6.1
SH 249 at I-45 SBFR	F	106.7	F	82.6	E	74.0	D	53.9
SH 249 at I-45 NBFR	F	119.6	F	169.9	E	65.7	E	60.6

Appendix D-1: Corridor-wide Crashes by Harmful Event

Number of Crashes by Harmful Event

Character Segment	Pedestrian	Motor Veh in Transport	Parked Car	Pedalcyclist	Animal	Fixed Object	Other Object	Total
BW 8 to N Houston Rosslyn	2	207	0	2	0	7	0	218
N Houston Rosslyn to Breen Dr	5	172	0	0	1	7	1	186
Breen Dr to I-45	8	233	2	1	0	8	0	252

Source: TxDOT Crash Records Information System, 2010-2012

Appendix D-2: Corridor-wide Crashes by Severity

Number of Crashes by Severity

Character Segment	Unknown	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	Killed	Not Injured	Total
Beltway 8 to N Houston Rosslyn	1	2	14	43	0	158	218
N Houston Rossyln to Breen Dr	1	2	13	23	6	141	186
Breen Dr to I-45	3	4	12	58	9	166	252

Source: TxDOT Crash Records Information System, 2010-2012

Appendix D-3: Intersection Crashes by Object Struck

Number of Crashes by Object Struck

ID	Intersection	Motor Vehicle In Transport	Fixed Object	Pedestrian	Parked Car	Pedalcyclist	Other Object	Total
21	SH 249 at I-45	126	10	0	3	0	0	139
19	SH 249 at Veterans Memorial	82	2	2	1	1	0	88
1	SH 249 at BW 8	84	2	0	0	0	0	86
6	SH 249 at N Houston Rosslyn Rd	65	1	0	0	0	0	66
9	SH 249 at Antoine Dr	51	1	0	0	0	0	52
2	SH 249 at Hollister Dr	27	0	0	0	0	0	27
5	SH 249 at Old Bammel N Houston Houston	21	1	1	0	0	0	23
8	SH 249 at West Rd	19	1	0	0	0	0	20
13	SH 249 at Breen Dr	16	1	1	0	0	0	18
11	SH 249 at Old Fotin Rd	16	0	0	0	0	1	17
3	SH 249 at Fallbrook Dr	14	3	0	0	0	0	17
7	SH 249 at Smiling Wood Ln	13	1	1	0	0	0	15
17	SH 249 at Old Hickory	10	0	0	1	0	0	11
4	SH 249 at Seton Lake	10	0	0	0	0	0	10
15	SH 249 at Moonglow Dr	10	0	0	0	0	0	10
18	SH 249 at Ella Blvd	8	0	0	0	0	0	8
20	SH 249 at Deer Trail Dr	6	0	0	0	0	0	6
10	SH 249 at Mosielee St	5	1	0	0	0	0	6
16	SH 249 at Cordoba Dr (North of SH 249)	6	0	0	0	0	0	6
12	SH 249 at Upland Willow Ave	1	0	1	0	0	0	2
14	SH 249 at TC Jester Blvd	1	0	1	0	0	0	2
	Total	591	24	7	5	1	1	629

Source: TxDOT Crash Records Information System, 2010-2012

Appendix D-4: Intersection Crashes by Manner of Collision

Number of Crashes by Manner of Collision

ID	Intersection	SD One Straight-One Stopped	SD Both Going Straight-Rear End	Angle - Both Going Straight	SD Both Going Straight-Sideswipe	Angle - One Straight-One Left Turn	OD One Straight-One Left Turn	OMV Vehicle Going Straight	SD One Straight-One Right Turn	Angle - One Straight-One Right Turn	SD One Straight-One Left Turn	Others	Total
21	SH 249 at I-45	19	44	27	15	2	4	11	0	3	2	12	139
1	SH 249 at BW 8	21	19	13	8	3	1	2	3	4	2	10	86
19	SH 249 at Veterans Memorial	17	17	18	7	10	6	6	2	2	1	2	88
6	SH 249 at N Houston Rosslyn Rd	14	8	13	7	6	8	1	5	1	2	1	66
9	SH 249 at Antoine Dr	11	8	6	6	6	5	1	4	2	0	3	52
2	SH 249 at Hollister Dr	9	3	3	4	2	1	0	2	0	1	2	27
5	SH 249 at Old Bammel N Houston Houston	9	7	0	1	2	0	2	2	0	0	0	23
8	SH 249 at West Rd	9	4	0	1	1	1	0	1	1	0	2	20
11	SH 249 at Old Fotin Rd	4	7	2	0	1	1	1	0	0	1	0	17
13	SH 249 at Breen Dr	6	4	0	2	2	2	2	0	0	0	0	18
7	SH 249 at Smiling Wood Ln	5	2	0	1	2	2	1	0	1	0	1	15
3	SH 249 at Fallbrook Dr	3	1	2	1	1	2	2	0	2	1	2	17
4	SH 249 at Seton Lake	6	1	0	0	1	1	0	0	1	0	0	10
17	SH 249 at Old Hickory	4	2	0	1	1	2	0	0	0	0	1	11
18	SH 249 at Ella Blvd	4	1	0	2	0	1	0	0	0	0	0	8
15	SH 249 at Moonglow Dr	3	0	0	3	1	2	0	1	0	0	0	10
20	SH 249 at Deer Trail Dr	2	1	0	2	0	1	0	0	0	0	0	6
10	SH 249 at Mosielee St	2	0	0	2	1	0	1	0	0	0	0	6
16	SH 249 at Cordoba Dr (North of SH 249)	1	0	1	1	1	0	0	0	1	0	1	6
12	SH 249 at Upland Willow Ave	0	1	0	0	0	0	1	0	0	0	0	2
14	SH 249 at TC Jester Blvd	0	1	0	0	0	0	1	0	0	0	0	2
	Total	149	131	85	64	43	40	32	20	18	10	37	629

Source: TxDOT Crash Records Information System, 2010-2012

Appendix E-1: Bicycle Boardings

Bicycle Boardings

Route	FY 2011	FY 2012	FY 2013	FY 2014
9 - North Main/Gulfton	1,548	1,251	1,563	2,034
44 - Acres Home Limited	3,970	4,617	6,534	6,669
66 - Yale	1,442	2,235	1,845	2,289
85 - Antoine Limited	3,776	5,097	5,619	6,581
108 - Veterans Memorial	1,140	1,141	1,670	1,594
212 - Seton Lake	28	23	24	5

Source: METRO

Appendix E-2: Bus Stop Inventory

Bus Stop Inventory

Character Segments	Old ID	New ID	Bus Stop Name	Direction	Bus Route	Sidewalk	Concrete Pad	Bench	Shelter	ADA Accessibility	Trash Receptacle	Street Lights	Maps	Flag Pole	Notes
BW 8 to Houston Rosslyn	1	1	SH 249 @ N Sam Houston Pkwy	EB	44	✓	·	·	·	✓	·	·	·	✓	
	T01	2	SH 249 @ N Sam Houston Pkwy	WB	44	✓	·	·	·	✓	·	·	·	✓	
	T02	3	SH 249 @ N Sam Houston Pkwy	WB	44	✓	·	·	·	·	·	·	·	✓	
	T03	4	SH 249 @ Hollister St	EB	44	·	·	·	·	·	·	·	·	✓	The flagpole almost on ground
	T04	5	SH 249 @ Hollister St	WB	44	·	·	·	·	·	·	·	·	✓	
	2	6	Seton Lake @ SH 249	SB	44	·	✓	·	·	✓	✓	✓	·	✓	
	T05	7	Seton Lake @ SH 249	NB	44	·	✓	✓	·	✓	✓	·	·	✓	
	3	8	Seton Lake	-	44 108 212	✓	✓	✓	✓	✓	✓	✓	✓	✓	Park and Ride Center
	4	9	Old Bammel N Houston@ SH 249	NB	44	✓	·	·	·	·	·	·	·	✓	
	T06	10	Old Bammel N Houston@ SH 249	SB	44	✓	·	·	·	·	·	·	·	✓	
	5	11	Old Bammel N Houston@ SH 249	NB	44	✓	·	·	·	·	·	·	·	✓	
	6	12	Old Bammel N Houston@ Seton Lake	SB	44	✓	·	·	·	·	·	·	·	✓	
	7	13	SH 249 @ Old Bammel N Houston	WB	44	·	·	·	·	·	·	·	·	✓	
	8	14	SH 249 @ Rosslyn Rd	WB	44	·	·	·	·	·	·	·	·	✓	
	10	15	SH 249 @ Houston Rosslyn Rd	EB	44	·	✓	✓	·	·	✓	·	·	✓	
Houston Rosslyn to Breen	11	16	SH 249 @ Smiling Wood Ln	EB	44	·	✓	✓	·	·	·	·	·	✓	
	12	17	SH 249 @ Smiling Wood Ln	WB	44	·	✓	✓	·	·	·	✓	·	✓	
	13	18	SH 249 @ Antoine Dr	WB	44	·	·	✓	·	·	✓	·	·	✓	
	T07	19	SH 249 @ Antoine Dr	EB	44	✓	✓	✓	✓	✓	✓	✓	·	✓	
	14	20	Antoine Dr @ SH 249	NB	85	✓	✓	✓	·	·	✓	·	·	✓	
	T08	21	Antoine Dr @ SH 249	SB	85	✓	✓	✓	✓	✓	✓	✓	·	✓	flagpole almost on ground
	16	22	SH 249 @ Romona Blvd	EB	44	·	·	✓	·	·	✓	·	·	✓	
	17	23	SH 249 @ Romona Blvd	WB	44	·	✓	·	·	·	·	·	·	✓	
	18	24	SH 249 @ Mosielee St	EB	44	·	✓	·	·	·	·	·	·	✓	
	19	25	SH 249 @ Mosielee St	WB	44	·	✓	·	·	·	·	·	·	✓	concrete pad very small
	20	26	Montgomery Rd @ Killough St	SB	44	·	✓	·	·	·	·	·	·	✓	
	21	27	Montgomery Rd @ Killough St	NB	44	·	✓	·	·	·	·	·	·	✓	
	22	28	Montgomery Rd @ Breen Dr	NB	44	·	·	·	·	·	·	·	·	✓	
	23	29	Montgomery Rd @ Breen Dr	SB	44	·	·	·	·	·	·	·	·	✓	
Breen to I-45	24	30	Veterans Memorial @ Mt Houston	SB	66 108	✓	✓	·	·	✓	·	·	·	✓	
	25	31	Veterans Memorial @ Mt Houston	NB	66 108	✓	✓	·	·	✓	·	✓	·	✓	Lighting is provided by lights from adjacent property
	T26	32	Mount Houston @ I-45	WB	9	·	·	·	·	·	✓	✓	·	✓	Lighting is provided by lights from adjacent property

Data collection date: 09/17/2014

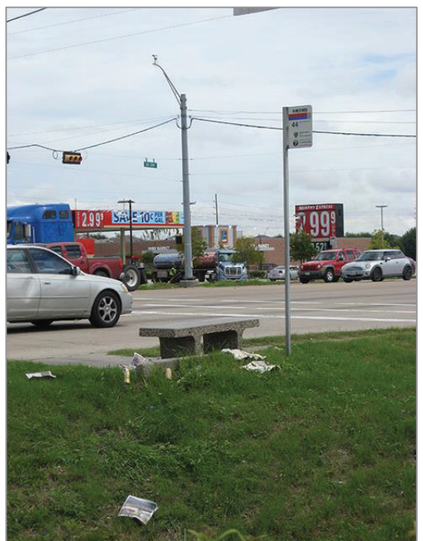
Appendix E-3: Bus Stop Photos

Location: SH 249 @ Hollister St

Location: Seton Lake Dr @ SH 249

Location: SH 249 @ Old Bammel N Houston

Location: SH 249 @ Rosslyn Rd. WB



Location: SH 249 @ Smiling Wood Ln EB

Location: SH 249 @ Antoine Dr WB

Location: SH 249 @ Romona Blvd EB

Location: SH 249 @ Mosielee St WB

Appendix F: Benefit Analysis (Part 1)

Cost of Delay

Cost Component	Cost per Hour ($/hour)
Value of Time	$16.79
Commercial Value of Time	$86.81

Source: 2012 Annual Urban Mobility Report, Texas A&M Transportation Institute, December 2012

Delay Savings Calculation

Section Character Segment	Western BW 8 to N Houston Rosslyn			
	AM	PM	Peak Hours Delay (Hours)	Annual Peak Hour Cost of Delay
No-Build Total Delay (hours)	933.97	1,629.09	2,563.07	$19,370,941.89
Build Total Delay (hours)	692.34	999.41	1,691.75	$12,785,763.57
Truck Percentage	12%	12%		
Total Volume	42,365	47,629		
Build Model with Raised Median Total Delay (Raised Median Reduces delay (10%))	623.10	899.47	1,522.57	$11,507,187.22

Section Character Segment	Central N Houston Rosslyn to Breen Dr			
	AM	PM	Peak Hours Delay (Hours)	Annual Peak Hour Cost of Delay
No-Build Total Delay (hours)	**421.75**	763.51	1,185.26	$8,957,886.93
Build Total Delay (hours)	**260.38**	360.02	620.40	$4,688,799.20
Truck Percentage	**12%**	12%		
Total Volume	**32,933**	35,744		
Build Model with Raised Median Total Delay (Raised Median Reduces delay (10%))	**234.35**	324.01	558.36	$4,219,919.28

Section Character Segment	Eastern Breen Dr to I-45			
	AM	PM	Peak Hours Delay (Hours)	Annual Peak Hour Cost of Delay
No-Build Total Delay (hours)	**419.43**	481.64	901.07	$5,674,367.95
Build Total Delay (hours)	**301.85**	290.22	592.07	$3,728,495.25
Truck Percentage	**6%**	6%		
Total Volume	**34,231**	36,732		
Build Model with Raised Median Total Delay (Raised Median Reduces delay (10%))	**271.66**	261.20	532.87	$3,355,645.73

Delay Savings by Segment (Millions)

Scenario	Section		
	Western	Central	Eastern
No-Build	$19.37	$8.96	$5.67
Total Build with All Corridor Improvements	$11.51	$4.22	$3.36
Total Savings in Delay	$7.86	$4.74	$2.32
Percent Reduction in Cost of Delay	41%	53%	41%

Sources: 2012 Annual Urban Mobility Report, Texas A&M Transportation Institute, December 2012; Safety Benefits of Raised Medians and Pedestrian Refuge Areas, FHWA, 2010

Appendix F: Benefit Analysis (Part 2)

Crashes by Injury Type

Character Segment	Section	3 Year Total (2010-2012)								3 Year Average (2010-2012)						
		Length	Median Reduction	Unknown	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	Killed	Not Injured	Total	Unknown	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	Killed	Not Injured	Total
Beltway 8 to N Houston Rosslyn	Western	1.8	25%	1	2	14	43	0	158	218	0.33	0.67	4.67	14.33	0.00	52.67	72.67
N Houston Rossyln to Breen Dr	Central	2.3	25%	1	2	13	23	6	141	186	0.33	0.67	4.33	7.67	2.00	47.00	62.00
Breen Dr to I-45	Eastern	3.1	25%	3	4	12	58	9	166	252	1.00	1.33	4.00	19.33	3.00	55.33	84.00

Source: TxDOT Crash Records Information System, 2010-2012

Reduction in Crashes Associated with Raised Medians

Access Management Treatment	Reduction in Total Crashes	Reduction in Pedestrian Crashes
Add Raised Median	15% to 35%*	69%

Source: Desktop Reference for Crash Reduction Factors, September 2008;
Safety Benefits of Raised Medians and Pedestrian Refuge Areas, FHWA, 2010
**25% used for analysis*

Appendix G: Preliminary Cost Estimate Details

				FACILITY AGENCY																												
					Hollister Rd. (South of SH 249) - Add Left Turn		Hollister Rd. (North of SH 249) - Add Left Turn		Fallbrook Dr. (South of SH 249) - Add Left Turn		Bammel N Houston Rd. (North of SH 249) - Ad		N. Houston Rosslyn Rd. (South of SH 249) - Ad		Northwest Park Dr. (North of SH 249) - Add Le		Antoine Dr. (North of SH 249) - Add Left Turn		Antoine Dr. (South of SH 249) - Add Left Turn		Veterans Memorial Dr. (South of SH 249) - Ad		** SH 249 - Convert Existing 10' Shoulder to R		* SH 249 - Add Raised Median / Channelizatio		* Smiling Wood Ln. - Add Raised Median / Cha	
					Per Each		Per Each		Per Each		Per Each		Per Each		Per Each		Per Each		Per Each		Per Each		Per Mile		Per Square Foot		Per Square Foot	
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	QTY.	COST	QTY.	COST
100	2002	PREPARING ROW	STA	$5,000.00	6	$30,000.00	5	$25,000.00	10	$50,000.00	3	$15,000.00	6	$30,000.00	2	$10,000.00	4	$20,000.00	4	$20,000.00	3	$15,000.00					1.5	$7,500.00
104	2001	REMOVING CONC (PAV)	SY	$6.00							225	$1,350.00																
104	2009	REMOVING CONC (RIPRAP)	SY	$6.00																								
104	2021	REMOVING CONC (CURB)	LF	$6.00																								
104	2036	REMOVING CONC (SIDEWALK OR RAMP)	SY	$11.00																								
105	2014	REMOVING STAB BASE & ASPH PAV (7"-12")	SY	$5.00																								
110	2001	EXCAVATION (ROADWAY)	CY	$10.00	231	$2,310.00	235	$2,350.00	269	$2,690.00	63	$630.00	260	$2,600.00	65	$650.00	110	$1,100.00	201	$2,010.00	101	$1,010.00						
112	2002	SUBGRADE WIDENING (DENS CONT)	STA	$2,000.00																								
132	2005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	$30.00	100	$3,000.00	100	$3,000.00	100	$3,000.00	200	$6,000.00	100	$3,000.00	100	$3,000.00	100	$3,000.00	100	$3,000.00	100	$3,000.00						
150	2001	BLADING	STA	$150.00																								
160	2003	FURNISHING AND PLACING TOPSOIL (4")	SY	$1.50	667	$1,000.50	556	$834.00	1111	$1,666.50	333	$499.50	667	$1,000.50	222	$333.00	444	$666.00	444	$666.00	333	$499.50						
162	2002	BLOCK SODDING	SY	$4.00	133	$532.00	111	$444.00	222	$888.00	67	$268.00	133	$532.00	44	$176.00	89	$356.00	89	$356.00	67	$268.00						
164	2045	STRAW OR HAY MULCHING	SY	$0.25																								
168	2001	VEGETATIVE WATERING	MG	$15.00	2	$30.00	2	$30.00	2	$30.00	1	$15.00	2	$30.00	1	$15.00	1	$15.00	1	$15.00	1	$15.00						
170	2001	IRRIGATION SYSTEM	LS	$50,000.00																								
247	2041	FL BS (CMP IN PLC)(TY A GR 1)(FNAL POS	CY	$70.00	208	$14,560.00	212	$14,840.00	242	$16,940.00	56	$3,920.00	234	$16,380.00	59	$4,130.00	99	$6,930.00	181	$12,670.00	91	$6,370.00						
260	2012	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY)	TON	$150.00	21	$3,150.00	21	$3,150.00	24	$3,600.00	6	$900.00	23	$3,450.00	6	$900.00	10	$1,500.00	18	$2,700.00	9	$1,350.00						
260	2014	LIME TRT (SUBGR)(DC)(6")	SY	$3.00	902	$2,706.00	917	$2,751.00	1050	$3,150.00	244	$732.00	1014	$3,042.00	254	$762.00	430	$1,290.00	784	$2,352.00	394	$1,182.00						
316	2006	ASPH (AC-20-STR)	GAL	$4.00																								
316	2222	AGGR(TY-PB GR-4S SAC-B)	CY	$110.00																								
341	2122	D-GR HMA(QCQA) TY-D PG70-22	TON	$100.00	35	$3,500.00	35	$3,500.00	40	$4,000.00	9	$900.00	39	$3,900.00	10	$1,000.00	17	$1,700.00	30	$3,000.00	15	$1,500.00						
354	2023	PLANE ASPH CONC PAV(0" TO 4")	SY	$3.00																								
360	2018	CURB (TYPE II)	LF	$4.00	488	$1,952.00	455	$1,820.00	885	$3,540.00	378	$1,512.00	527	$2,108.00	182	$728.00	326	$1,304.00	396	$1,584.00	282	$1,128.00	54457	$217,828.00	70103	$280,412.00	293	$1,172.00
360	2001	CONC PVMT (CONT REINF-CRCP)(8")	SY	$50.00	694	$34,700.00	705	$35,250.00	808	$40,400.00	188	$9,400.00	780	$39,000.00	195	$9,750.00	331	$16,550.00	603	$30,150.00	303	$15,150.00						
360	2023	CONC PAV (JOINT REINF) (6")	SY	$45.00																								
432	2066	RIPRAP (CONC)(CL B)	CY	$300.00																					4922	$1,476,600.00	40	$12,000.00
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	$7,500.00	2	$15,000.00	2	$15,000.00	2	$15,000.00	2	$15,000.00	2	$15,000.00	1	$7,500.00	2	$15,000.00	2	$15,000.00	2	$15,000.00	8	$60,000.00	24	$180,000.00	2	$15,000.00
506	2034	TEMPORARY SEDIMENT CONTROL FENCE	LF	$4.00	600	$2,400.00	500	$2,000.00	1000	$4,000.00	300	$1,200.00	600	$2,400.00	200	$800.00	400	$1,600.00	400	$1,600.00	300	$1,200.00						
506	2040	TEMP SEDIMENT CONTROL FENCE (REMOVE)	LF	$1.00	600	$600.00	500	$500.00	1000	$1,000.00	300	$300.00	600	$600.00	200	$200.00	400	$400.00	400	$400.00	300	$300.00						
531	2005	CURB RAMPS (TY 1)	EA	$1,600.00																								
531	2024	CONC SIDEWALK (5")	SY	$50.00																								
533	2001	SHOULDER TEXTURING (MILLED)	STA	$50.00																								
636	2001	ALUMINUM SIGNS (TY A)	SF	$30.00																								
644	2001	INS SM RD SN SUP&AM TY 10BWG(1) SA(P)	EA	$400.00	2	$800.00	2	$800.00	2	$800.00	2	$800.00	2	$800.00	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																								
662	2032	WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)	LF	$0.30																								
662	2050	WK ZN PAV MRK REMOV (REFL) TY I-A	EA	$3.00																								
666	2003	REFL PAV MRK TY I (W) 4" (BRK)(100MIL)	LF	$0.50	115	$57.50	90	$45.00															1209.75	$604.88	37500	$18,750.00		
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	600	$300.00	500	$250.00	1000	$500.00	300	$150.00	600	$300.00	200	$100.00	400	$200.00	400	$200.00	300	$150.00			150000	$75,000.00		
666	2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	$1.00	300	$300.00	250	$250.00	500	$500.00	500	$500.00	500	$500.00	100	$100.00	200	$200.00	200	$200.00	150	$150.00	17359	$17,359.00	17500	$17,500.00		
666	2042	REFL PAV MRK TY I (W) 12"(SLD)(100MIL)	LF	$3.00	200	$600.00	200	$600.00	200	$600.00	200	$600.00	200	$600.00	100	$300.00	200	$600.00	200	$600.00	200	$600.00	4600	$13,800.00				
666	2048	REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	$6.00	50	$300.00	50	$300.00	50	$300.00	50	$300.00	50	$300.00	25	$150.00	50	$300.00	50	$300.00	50	$300.00	562	$3,372.00				
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	$150.00	5	$750.00	5	$750.00	3	$450.00	4	$600.00	5	$750.00	2	$300.00	1	$150.00	1	$150.00	1	$150.00	150	$22,500.00	69	$10,350.00		
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	$150.00	5	$750.00	5	$750.00	3	$450.00	4	$600.00	5	$750.00	2	$300.00	1	$150.00	1	$150.00	1	$150.00	150	$22,500.00	69	$10,350.00		
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	$4.00	30	$120.00	25	$100.00	50	$200.00	50	$200.00	50	$200.00	10	$40.00	20	$80.00	20	$80.00	15	$60.00			1750	$7,000.00		
672	2015	REFL PAV MRKR TY II-A-A	EA	$4.00																								
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	715	$35.75	590	$29.50	1000	$50.00	300	$15.00	600	$30.00	200	$10.00	400	$20.00	400	$20.00	300	$15.00	1209.75	$60.49	187500	$9,375.00		
678	2003	PAV SURF PREP FOR MRK (8")	LF	$0.10	300	$30.00	250	$25.00	500	$50.00	500	$50.00	500	$50.00	100	$10.00	200	$20.00	200	$20.00	150	$15.00	17359	$1,735.90	17500	$1,750.00		
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	$10.00	5	$50.00	5	$50.00	3	$30.00	4	$40.00	5	$50.00	2	$20.00	1	$10.00	1	$10.00	1	$10.00	150	$1,500.00	69	$690.00		
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	$10.00	5	$50.00	5	$50.00	3	$30.00	4	$40.00	5	$50.00	2	$20.00	1	$10.00	1	$10.00	1	$10.00	150	$1,500.00	69	$690.00		
6055	2001	IN - LANE OR TRANSVERSE RUMBLE STRIP	LF	$18.00																								
XXX	XXX	DRAINAGE IMPROVEMENTS	MI	$500,000.00	0.11	$55,000.00	0.09	$45,000.00	0.19	$95,000.00	0.06	$30,000.00	0.11	$55,000.00	0.04	$20,000.00	0.08	$40,000.00	0.08	$40,000.00	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	$200,000.00																								
XXX	XXX	ROW ACQUISITION	SF	$50.00																								
		SUB TOTAL 1				$174,583.75		$159,468.50		$248,864.50		$91,521.50		$182,422.50		$61,694.00		$113,551.00		$137,643.00		$94,982.50		$362,760.26		$2,088,467.00		$35,672.00
XXX	XXX	BONDS	LS	$0.05		$8,729.19		$7,973.43		$12,443.23		$4,576.08		$9,121.13		$3,084.70		$5,677.55		$6,882.35		$4,749.13		$18,138.01		$104,423.35		$1,783.60
500	2001	MOBILIZATION	LS	$0.20		$34,916.75		$31,893.70		$49,772.90		$18,304.30		$36,484.50		$12,338.80		$22,710.20		$27,528.60		$18,996.50		$72,552.05		$417,693.40		$7,134.40
		SUB TOTAL 2				$218,229.69		$199,335.63		$311,080.63		$114,401.88		$228,028.13		$77,117.50		$141,938.75		$172,053.75		$118,728.13		$453,450.33		$2,610,583.75		$44,590.00
XXX	XXX	MISCELLANEOUS & CONTINGENCY	LS	$0.25		$54,557.42		$49,833.91		$77,770.16		$28,600.47		$57,007.03		$19,279.38		$35,484.69		$43,013.44		$29,682.03		$113,362.58		$652,645.94		$11,147.50
		GRAND TOTAL				$272,787.11		$249,169.53		$388,850.78		$143,002.34		$285,035.16		$96,396.88		$177,423.44		$215,067.19		$148,410.16		$566,812.91		$3,263,229.69		$55,737.50
		CALLED				**$272,800.00**		**$249,200.00**		**$388,900.00**		**$143,100.00**		**$285,100.00**		**$96,400.00**		**$177,500.00**		**$215,100.00**		**$148,500.00**		**$566,900.00**		**$3,263,230.00**		**$55,740.00**
		AVERAGE UNIT COST (ROUNDED TO NEAREST $100)			**PRICE PER EACH**	**$272,800.00**	**PRICE PER EACH**	**$249,200.00**	**PRICE PER EACH**	**$388,900.00**	**PRICE PER EACH**	**$143,100.00**	**PRICE PER EACH**	**$285,100.00**	**PRICE PER EACH**	**$96,400.00**	**PRICE PER EACH**	**$177,500.00**	**PRICE PER EACH**	**$215,100.00**	**PRICE PER EACH**	**$148,500.00**	**PRICE PER MILE**	**$79,846.00**	**ICE PER SQUARE FOOT**	**$13.00**	**ICE PER SQUARE FOOT**	**$27.00**

NOTE: MISCELLANEOUS ITEMS INCLUDE ENGINEERING DESIGN FEE, SURVEY AND MATERIAL TESTING.

NOTE2: DRAINAGE IMPROVEMENT COSTS TO ACCOMMODATE FUTURE WIDENINGS ARE ONLY AN ESTIMATE AND WOULD REQUIRE FURTHER INVESTIGAT IN ORDER TO OBTAIN THE MAGNITUDE OF COSTS ASSOCIATED WITH THE FUTURE WIDENINGS ON A CASE BY CASE BASIS.

6.08 LENGTH OF PROJECT

2140 SF OF MEDIANS

				FACILITY	SH 249 Access Management Project		SH 249 Access Management Project																					
				AGENCY			Medium Term Improvements																					
					Add 5' Wide Concrete Sidewalks (From Vetera		Hollister Dr. Extension (From Blue Creek Ran		Fallbrook Dr. Extension (From SH 249 to Old E		TC Jester Blvd. Extension (From Star Peak Dr.		Ella Blvd. Extension (From West Rd. to North		Old Bammel N. Houston Rd. - Add Right Turn		West Rd. Extension (From Wal-Mart Entrance		Ann Louise Rd. Connection (Construct Bridge		Old Foltin Rd. Widening (From SH 249 to Essi		Breen Rd. Widening (From Vogel Creek to N. I		Veterans Memorial Dr. (South of SH 249) - Ad	
					Per Square Foot		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	$5,000.00	73	$365,000.00											3	$15,000.00									4	$20,000.00
104	2001	REMOVING CONC (PAV)	SY	$6.00																								
104	2009	REMOVING CONC (RIPRAP)	SY	$6.00																								
104	2021	REMOVING CONC (CURB)	LF	$6.00																								
104	2036	REMOVING CONC (SIDEWALK OR RAMP)	SY	$11.00																								
105	2014	REMOVING STAB BASE & ASPH PAV (7"-12")	SY	$5.00																								
110	2001	EXCAVATION (ROADWAY)	CY	$10.00													39	$390.00									140	$1,400.00
112	2002	SUBGRADE WIDENING (DENS CONT)	STA	$2,000.00																								
132	2005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	$30.00													100	$3,000.00									100	$3,000.00
150	2001	BLADING	STA	$150.00																								
160	2003	FURNISHING AND PLACING TOPSOIL (4")	SY	$1.50													333	$499.50									444	$666.00
162	2002	BLOCK SODDING	SY	$4.00													67	$268.00									89	$356.00
164	2045	STRAW OR HAY MULCHING	SY	$0.25																								
168	2001	VEGETATIVE WATERING	MG	$15.00													1	$15.00									1	$15.00
170	2001	IRRIGATION SYSTEM	LS	$50,000.00																								
247	2041	FL BS (CMP IN PLC)(TY A GR 1)(FNAL POS	CY	$70.00													35	$2,450.00									126	$8,820.00
260	2012	LIME(HYD.COM OR QK)(SLRY)OR QK(DRY)	TON	$150.00													4	$600.00									13	$1,950.00
260	2014	LIME TRT (SUBGR)(DC)(6")	SY	$3.00													153	$459.00									546	$1,638.00
316	2006	ASPH (AC-20-5TR)	GAL	$4.00																								
316	2222	AGGR(TY-PB GR-4S SAC-B)	CY	$110.00																								
341	2122	D-GR HMA(QCQA) TY-D PG70-22	TON	$100.00													6	$600.00									21	$2,100.00
354	2023	PLANE ASPH CONC PAV(0" TO 4")	SY	$3.00																								
360	2018	CURB (TYPE II)	LF	$4.00																								
360	2001	CONC PVMT (CONT REINF-CRCP)(8")	SY	$50.00													118	$5,900.00									420	$21,000.00
360	2023	CONC PAV (JOINT REINF) (6")	SY	$45.00																								
432	2066	RIPRAP (CONC)(CL B)	CY	$300.00																								
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	$7,500.00	4	$30,000.00											2	$15,000.00									2	$15,000.00
506	2034	TEMPORARY SEDIMENT CONTROL FENCE	LF	$4.00													300	$1,200.00									400	$1,600.00
506	2040	TEMP SEDIMENT CONTROL FENCE (REMOVE)	LF	$1.00													300	$300.00									400	$400.00
531	2005	CURB RAMPS (TY 1)	EA	$1,600.00	24	$38,400.00											2	$3,200.00									2	$3,200.00
531	2024	CONC SIDEWALK (5")	SY	$50.00	4035	$201,750.00											375	$18,750.00									500	$25,000.00
533	2001	SHOULDER TEXTURING (MILLED)	STA	$50.00																								
636	2001	ALUMINUM SIGNS (TY A)	SF	$30.00																								
644	2001	INS SM RD SN SUP&AM TY 10BWG(1) SA(P)	EA	$400.00													2	$800.00									2	$800.00
662	2004	WK ZN PAV MRK NON-REMOV (W) 4" (SLD)	LF	$0.30																								
662	2032	WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)	LF	$0.30																								
662	2050	WK ZN PAV MRK REMOV (REFL) TY I-A	EA	$3.00																								
666	2003	REFL PAV MRK TY I (W) 4" (BRK)(100MIL)	LF	$0.50																								
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													300	$150.00									400	$200.00
666	2036	REFL PAV MRK TY I (W) 8" (SLD)(100MIL)	LF	$1.00													150	$150.00									200	$200.00
666	2042	REFL PAV MRK TY I (W) 12"(SLD)(100MIL)	LF	$3.00													200	$600.00									200	$600.00
666	2048	REFL PAV MRK TY I (W) 24"(SLD)(100MIL)	LF	$6.00													50	$300.00									50	$300.00
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	$150.00													1	$150.00									1	$150.00
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	$150.00													1	$150.00									1	$150.00
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	$4.00													15	$60.00									20	$80.00
672	2015	REFL PAV MRKR TY II-A-A	EA	$4.00																								
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													300	$15.00									400	$20.00
678	2003	PAV SURF PREP FOR MRK (8")	LF	$0.10													150	$15.00									200	$20.00
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	$10.00													1	$10.00									1	$10.00
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	$10.00													1	$10.00									1	$10.00
6055	2001	IN - LANE OR TRANSVERSE RUMBLE STRIP	LF	$18.00																								
XXX	XXX	DRAINAGE IMPROVEMENTS	MI	$500,000.00													0.06	$30,000.00									0.08	$40,000.00
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	$200,000.00																								
XXX	XXX	ROW ACQUISITION	SF	$50.00					100000	$5,000,000.00			250000	$12,500,000.00	4000	$200,000.00							172000	$8,600,000.00	4000	$200,000.00
		SUB TOTAL 1				$635,150.00		$2,272,727.27		$6,515,151.52		$1,212,121.21		$16,287,878.79		$300,041.50		$5,303,030.30		$442,000.00		$4,545,454.55		$21,630,303.03		$348,685.00
XXX	XXX	BONDS	LS	$0.05		$31,757.50		$113,636.36		$325,757.58		$60,606.06		$814,393.94		$15,002.08		$265,151.52		$22,100.00		$227,272.73		$1,081,515.15		$17,434.25
500	2001	MOBILIZATION	LS	$0.20		$127,030.00		$454,545.45		$1,303,030.30		$242,424.24		$3,257,575.76		$60,008.30		$1,060,606.06		$88,400.00		$909,090.91		$4,326,060.61		$69,737.00
		SUB TOTAL 2				$793,937.50		$2,840,909.09		$8,143,939.39		$1,515,151.52		$20,359,848.48		$375,051.88		$6,628,787.80		$552,500.00		$5,681,818.18		$27,037,878.79		$435,856.25
XXX	XXX	MISCELLANEOUS & CONTINGENCY	LS	$0.25		$198,484.38		$710,227.27		$2,035,984.85		$378,787.88		$5,089,962.12		$93,762.97		$1,657,196.97		$138,125.00		$1,420,454.55		$6,759,469.70		$108,964.06
		GRAND TOTAL				$992,421.88		$3,551,136.36		$10,179,924.24		$1,893,939.39		$25,449,810.61		$468,814.84		$8,285,984.85		$690,625.00		$7,102,272.73		$33,797,348.48		$544,820.31
		CALLED				**$992,500.00**		**$3,551,200.00**		**$10,180,000.00**		**$1,894,000.00**		**$25,449,900.00**		**$468,900.00**		**$8,286,000.00**		**$690,700.00**		**$7,102,300.00**		**$33,797,400.00**		**$544,900.00**
		AVERAGE UNIT COST (ROUNDED TO NEAREST $100)			**ICE PER SQUARE FOOT**	**$15.00**	**PRICE PER EACH**	**$3,551,200.00**	**PRICE PER EACH**	**$10,180,000.00**	**PRICE PER EACH**	**$1,894,000.00**	**PRICE PER EACH**	**$25,449,900.00**	**PRICE PER EACH**	**$468,900.00**	**PRICE PER EACH**	**$8,286,000.00**	**PRICE PER EACH**	**$690,700.00**	**PRICE PER EACH**	**$7,102,300.00**	**PRICE PER EACH**	**$33,797,400.00**	**PRICE PER EACH**	**$544,900.00**

NOTE: MISCELLANEOUS ITEMS INCLUDE ENGINEERING DESIGN FEE, SURVEY AND MATERIAL TESTING.

NOTE2: DRAINAGE IMPROVEMENT COSTS TO ACCOMMODATE FUTURE WIDENINGS ARE ONLY AN ESTIMATE AND WOULD REQUIRE FURTHER INVESTIGAT
IN ORDER TO OBTAIN THE MAGNITUDE OF COSTS ASSOCIATED WITH THE FUTURE WIDENINGS ON A CASE BY CASE BASIS.

70062 SF OF SIDEWALKS

1500 length | 1000 length | 800 length | 2500 length | 3500 length | 130 length 40 width | 3000 length | 8600 length

Houston-Galveston Area Council

CDM Smith

IN ASSOCIATION WITH

HNTB
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