FM 1314 Access Management Study

FINAL Engineering Summary Report

March 22, 2024
CSJ: 1986-01-066
FM 1314 from SH 242 to SL 494
Montgomery County, Texas

Texas Department of Transportation – Houston District Office
Rev. 00 (March 2024)

TABLE OF CONTENTS

List of Figures

List of Tables

List of Appendices

List of Abbreviations

AADT	Annual Average Daily Traffic
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
AM	Ante Meridiem
Ave	Avenue
Blvd	Boulevard
CCTV	Closed-Circuit Television
CRCP	Continuous Reinforced Concrete Pavement
CRIS	Crash Records Information System
DMS	Dynamic Message Signs
Dr	Drive
Dwy	Driveway
EB	Eastbound
EMCID	East Montgomery County Improvement District
EMS	Emergency Medical Services
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FM	Farm-To-Market
Ft	Foot/ Feet
FY	Financial Year
GPS	Global Positioning System
HCM	Highway Capacity Manual
HD	High Definition
H-GAC	Houston-Galveston Area Council
IH	Interstate Highway
ISD	Independent School Districts
ITS	Intelligent Transportation Systems
LED	Light-Emitting Diode
Ln	Lane
LOS	Level of Service
MPH	Miles Per Hour
MVMT	Million Vehicle Miles Traveled
N	North
NB	Northbound
NW	North-West
OD	Origin-Destination
PIP	Public Involvement Plan

PM	Post Meridiem
PS&E	Plans, Specifications and Estimate
Rd	Road
RDM	Roadway Design Manual
ROW	Right-of-Way
RTP	Regional Transportation Plan
S	South
SB	Southbound
SCM	Steering Committee Meetings
SH	State Highway
SL	State Loop
SOPI	Statement of Project Interest
SPAT	Signal Phase and Timing
St	Street
STARS	Statewide Traffic Analysis and Reporting System
SW	South-West
TCDS	Traffic Count Database Systems
TDM	Travel Demand Model
TIP	Transportation Improvement Plan
TMC	Turning Movement Count
TMUTCD	Texas Manual on Uniform Traffic Control Devices
TWLTL	Two-Way Left-Turn Lane
TxDOT	Texas Department of Transportation
U.S.	United States
UPRR	Union Pacific Railroad
UTP	Unified Transportation Plan
VPH	Vehicles Per Hour
WB	Westbound

1 EXECUTIVE SUMMARY

Farm-To-Market Road 1314 (FM 1314) is a minor arterial road maintained by the Texas Department of Transportation (TxDOT) that runs in the north-west and south-east direction in Montgomery County, Texas. The study corridor spans 12 miles long and the study limits begins at State Highway (SH) 242 and ends at State Loop (SL) 494. The corridor is located within Montgomery County, the number 10 ranked county in population growth nationwide[1]. This access management study was initiated with the goal of identifying potential opportunities for safety, mobility, multimodal, and economic improvements along the study corridor and identifying short-, mid-, and long-range improvements that aim to improve safety and mobility, enhance multi-modal access, and support existing and future development.

There are four main typical roadway sections on FM 1314. From SH 242 to Strausie Ln, the FM 1314 study corridor is a four-lane roadway with a variable 6 to 12-foot raised median and 12-foot-wide travel lanes. From Strausie Ln to Greenleaf Dr/Greenbough St, it is a four-lane roadway having 12-foot-wide travel lanes with a 6-foot flush striped median and curbs at the edge of the shoulders. From Greenleaf Dr/Greenbough St to Briar Tree Dr, it is a four-lane roadway with two 12-foot-wide travel lanes in each direction but also includes an additional 14 to 16-foot continuous center two-way left-turn lane. From Briar Tree Dr to SL 494, it is a four-lane roadway with two 12-foot-wide travel lanes in each direction that also includes an additional 14 to 16-foot continuous center two-way left-turn lane. This section also has 4.5-foot sidewalks and has curb and storm sewer system on both sides of the roadway. In addition, the FM 1314 corridor has varying lane configurations at some intersection approaches. Currently, there are no sidewalks on most of the corridor. The average daily traffic volume for FM 1314 ranges from 17,200 to 36,400 vehicles per day.

An existing conditions (2023) traffic operations analysis was conducted using a calibrated microsimulation Vissim model. A calibrated model was developed for the PM peak hour (critical peak) using the collected traffic volumes, travel times, and peak hour congestion observations to ensure that the models effectively replicated field conditions. Additionally, a safety analysis was conducted using the crash data from 2017 through 2022. Based on the safety and mobility needs of the corridor, identified through traffic and safety analyses, field observations, site visits, and an extensive public involvement process, the issues and needs are outlined as follows:

- High concentration of crashes at intersections. Crash rate per vehicle miles total between IH 69 SBFR and SL 494 is more than five times the state average rate
- Lack of turn lanes to accommodate high turning volumes at Valley Ranch Pkwy/Old Sorters Rd
- Congestion and safety concerns at FM 1314 and IH 69 intersection
- Skewed intersection approach at Fatheree Dr, which provides access to Porter High School and Sorters Mill Elementary
- Failing level of service (LOS) along Riverwalk Dr and Spartan Dr approaches as well as the FM 1314 approach at its intersection with Grand Pkwy Eastbound Frontage Road (EBFR)

[1] *Growth in the Nation's Largest Counties Rebound in 2022, Press Release Number CB23-52, Census Bureau, March 30, 2023*

- Speeding and localized congestion on approaches at Gene Campbell Rd
- Lack of continuous bicycle and pedestrian facilities
- Insufficient school zone signage
- Lack of signs or flashing lights indicating the location of fire stations
- Localized congestion on one of the approaches at Little Vick Dr
- Flooding concerns north and south of Fire Tower Rd and other segments along the corridor

It is anticipated that short-range improvements can be implemented within 5 years, medium-range improvements within 5 to 10 years, and long-range improvements within 10 to 20 years or more.

The following short-, mid-, and long-range improvements were identified, and planning-level cost estimates were developed to address the existing issues and concerns along the corridor.

- The short-range improvement recommendations include installing raised medians, improving signal timings, adding and extending turn lanes (left and right turn), installing a shared-use sidepath from McQueen Rd to SL 494, installing streetlights, upgrading signing and pavement markings, installing emergency flashing signals at fire stations, installing new traffic signals at all intersections, and other improvements. The estimated construction costs for the short-range improvements are approximately 3.34 million dollars ($).
- The medium-range improvement recommendations include installing raised medians at selected locations, adding and extending turn lanes (left and right turn), upgrading pavement markings, installing streetlights, installing new traffic signal at Ferne Dr, performing traffic signal warrant analysis study and performing drainage study. The estimated construction costs for the medium-range improvements are approximately $5.70 million.
- The long-range improvement recommendations include widening FM 1314 from Gene Campbell Blvd to IH 69 from the current two lanes to four lanes with a 16-foot median, 12-foot shoulders, 10-foot shared-use sidepaths on both sides, consolidating and sharing driveways, and turn lanes. The estimated construction costs for the long-range improvements are approximately $87.56 million.

The operational benefits of these proposed improvements are accessed through Vissim microsimulation models. Operational benefits from the Vissim build models show an expected decrease of 12% and 39% in delay throughout the corridor with the proposed improvements in the short-, and long-term scenarios, respectively.

The safety analysis estimates the short-, mid-, and long-range improvement could reduce the number of crashes by 20%, 24%, and 36%, respectively.

2 INTRODUCTION

FM 1314 is currently under rapid development. New residential and retail developments have been built along the corridor in recent years, and more future land use developments are planned. With the growing developments, commuters along the corridor are facing worsening transportation issues such as delay, crashes, and lack of multi-model accessibility. TxDOT Houston District is conducting an access management study on FM 1314 to identify short-, mid-, and long-range transportation improvements to reduce crashes, improve mobility, enhance multimodal connectivity, and support existing and future land use developments.

This engineering report is divided into 13 sections. **Section 1** describes the summary of the report. **Section 2** provides the introduction to the study area, goals, objectives, and needs. **Section 3** describes the existing roadway conditions and characteristics. **Section 4** shows the existing land use types. **Section 5** highlights the sensitive areas and corridor constraints. **Section 6** presents the existing traffic volumes, speed and travel time analysis, and model results. **Section 7** details the existing crash data analysis. **Section 8** presents a summary of the proposed improvements which includes short-, mid-, and long-term improvements. **Section 9** describes the mobility and safety benefits. **Section 10** illustrates the methodology of cost estimates and planning level implementation. **Section 11** describes the summary of steering committee, stakeholder, and public meetings. **Section 12** presents the applications of Houston-Galveston Area Council (H-GAC) Transportation Improvement Plan (TIP). **Section 13** shows the list of electronic files submitted to the TxDOT.

a. Study Area

The study area (**Figure** 2-1) consists of a 12-mile segment of FM 1314 from State Highway (SH) 242 to State Loop (SL) 494 in Montgomery County, Texas. FM 1314 is a minor arterial per TxDOT roadway classification and runs in the northwest and southeast direction.

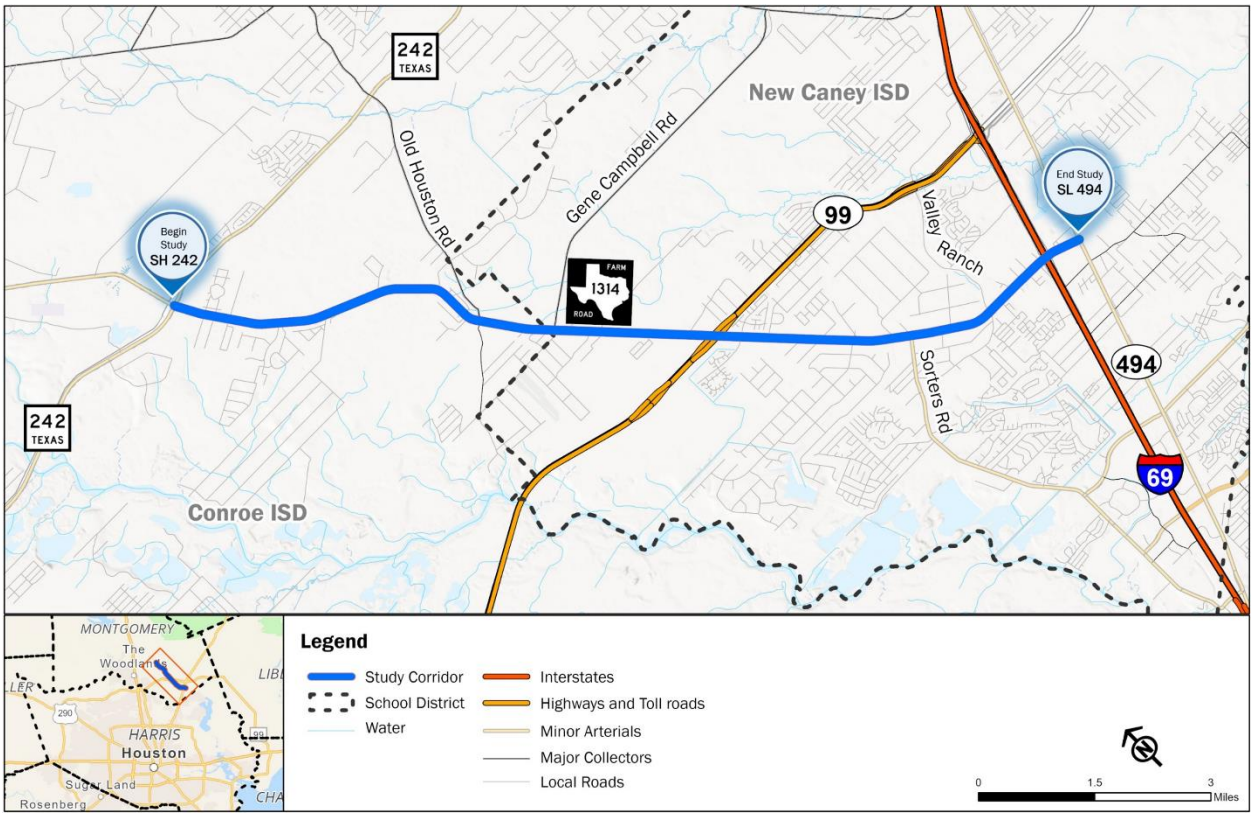


Figure 2-1 Study Area

The typical roadway section primarily has four lanes with a center TWLTL with sidewalks from north of Jim Stowe Rd to SL 494 and four lanes with a variable 6-12-foot raised median from SH 242 to Strausie Lane. **Figure** 2-2 shows an image of the existing FM 1314 corridor from north of Jim Stowe Rd to SL 494.

Figure 2-2 Farm-to-Market Road 1314 from Briar Tree Dr to SL 494

b. Study Goals and Objectives

The overall goal of the study is to identify areas of concern within the project area and to identify short, medium, and long-term solutions to improve future safety and mobility along FM 1314 from SH 242 to SL 494. The study provides a long-range vision for the corridor using access management guidelines and urban planning best practices to complement existing and future land use. The proposed solutions can be expected to reduce traffic delays and improve safety and mobility while providing a balance between land use and transportation access.

FM 1314 Access Management Study objectives include:

- Identify areas of concern within the study area through public input and analysis.
- Develop recommendations that encourage reduced traffic delays and improved safety and mobility throughout the study area.
- Engage stakeholders in meaningful and productive outreach and develop access management strategies that consider provided public input.
- Preserve current and future economic development along the study corridor by maintaining a balance between land use and access and providing reasonable access to properties and businesses throughout the study area.

By accomplishing these objectives, the study will enable a safe and efficient transportation system that accommodates the current and future needs of the study corridor, thus fostering sustainable economic development.

c. Study Process

The study is conducted between February 2023 and March 2024. **Figure** 2-3 illustrates the overall study process which consists of:

- Data collection: collect available data from various sources and perform field data collection on the FM 1314 study corridor.
- Existing condition: analyze the collected data to understand the issues of existing condition.
- Public input: obtain public feedback on existing condition of corridor.
- Solution proposal: propose short-, mid-, and long-range solutions addressing issues identified in existing condition analysis, and then revise the solutions with steering committee, stakeholders and public feedback.
- Public input: obtain public feedback on proposed short-, mid-, and long-range solutions of corridor.
- Final report: document the study process and the recommended strategies to achieve the study goals.

Public involvement is a crucial part of the study process of meeting the goal of providing an open-engagement process that actively seeks public input during the study and addressing public concerns in the final recommendation. Four steering committee meetings were conducted. The steering committee comprises local agencies and business associations formed to provide guidance. Two public meetings were held to collect public feedback on the study. The first public meeting was to listen to specific corridor issues identified by the public, and the second public meeting was to obtain

feedback from the public on the proposed short-, mid-, and long-range solutions. In addition, four stakeholder meetings were conducted to collect stakeholder feedback on the proposed solutions. Section 11 provides a detailed summary of the public involvement process.

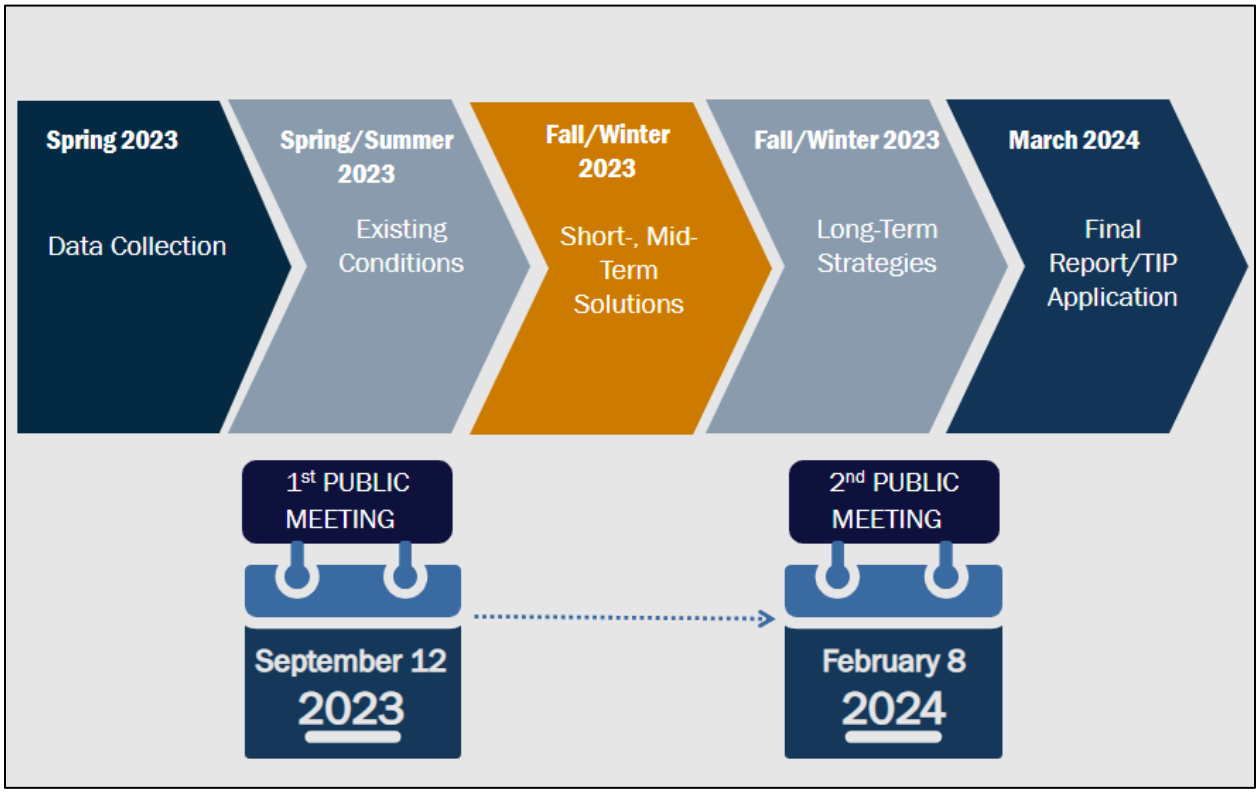


Figure 2-3 Overall Study Process

3 EXISTING ROADWAY CONDITIONS AND CHARACTERISTICS

The corridor study limits begin at SH 242 (at the northern end) and end at SL 494 (at the southern end). The typical section, land use, and traffic characteristics varies from the northern end to the southern end. **Appendix A** provides layouts showing the existing roadway conditions along with the existing traffic volumes. The FM 1314 corridor has two distinctive typical sections (**Figure** 3-1), the 2019 AADT along this route varies from 20,500 to 36,400, trucks comprised around 5% to 6% of the total traffic. The location-specific typical sections are described in the next section.

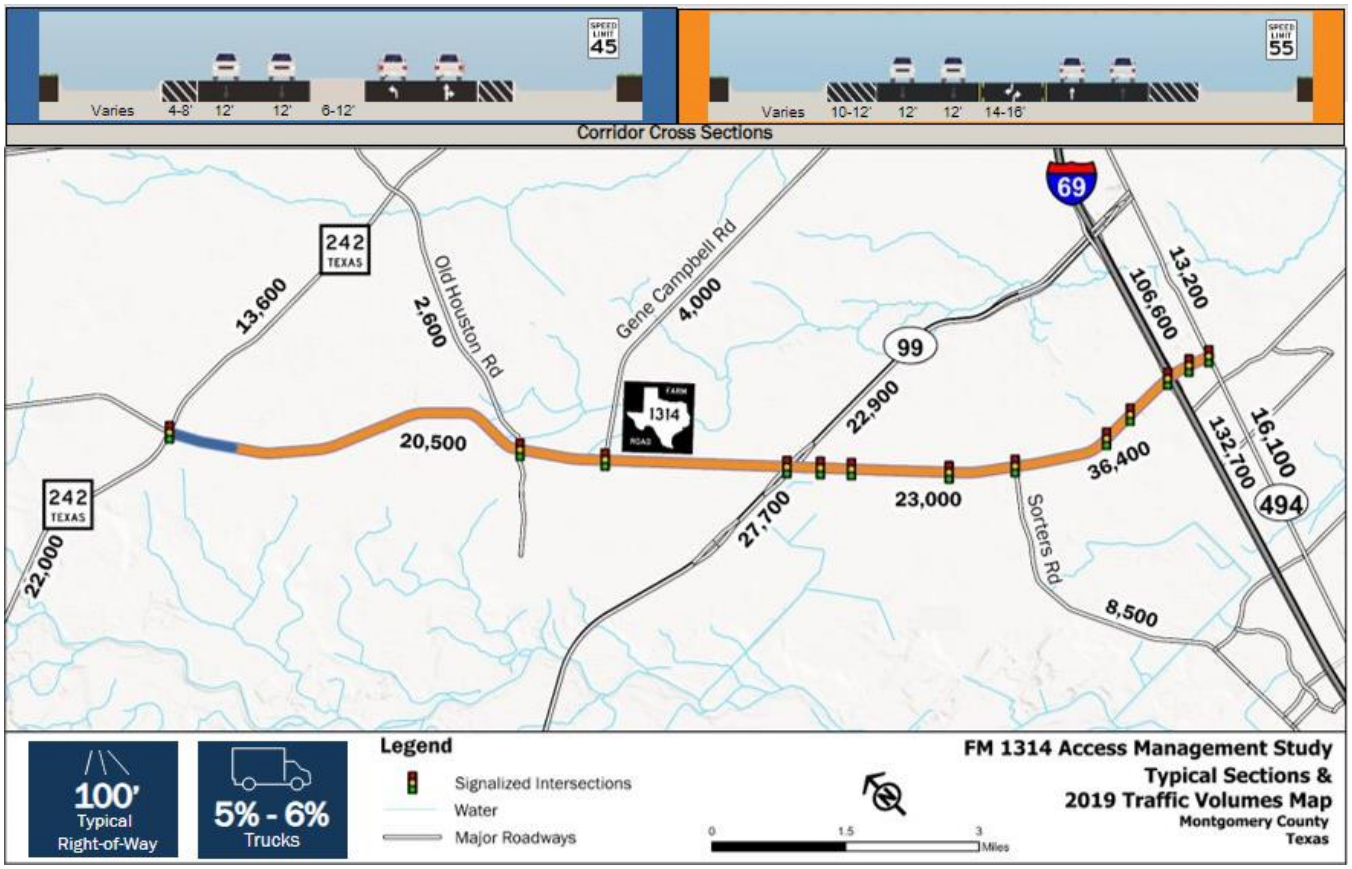


Figure 3-1 Segments

a. Roadway Geometry

The typical existing right-of-way (ROW) width for the FM 1314 study corridor from SH 242 to SL 494 is 150 feet. Aside from the various configurations at intersection approaches, which include different configurations for turning and through lanes, there are four typical cross sections along the FM 1314 study corridor.

As seen in **Figure** 3-2, FM 1314 from SH 242 to Strausie Ln consists of the following cross section:

- Four-lane roadway with a variable 6 to 12-foot raised median.
- The width of the existing pavement is 64 feet with open ditches on both sides of the roadway. There are four travel lanes at 12 feet each and 8-foot shoulders.

- A concrete median barrier installation is currently under construction at the time of this study, with a variable 6 to 12-foot median being replaced between SH 242 and Strausie Ln.
- This segment of FM 1314 is relatively straight and consists of primarily rural and residential land use with some commercial land use along the study corridor.
- The posted speed limit along this segment is 45 miles per hour (mph).

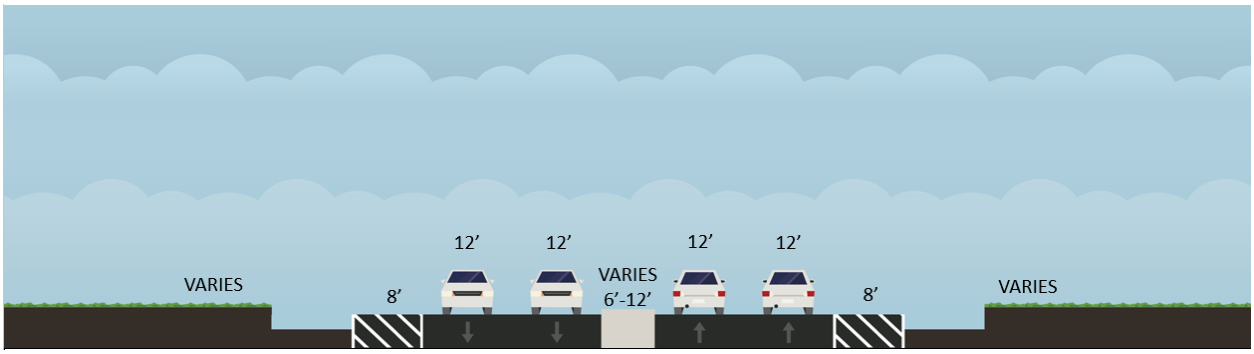


Figure 3-2 FM 1314 Cross Section Between SH 242 and Strausie Ln

FM 1314 from Strausie Ln to Greenbough St (**Figure** 3-3) consists of the following cross section:

- Four-lane roadway with a 6-foot flush paved median
- The width of the existing pavement is 62 feet with 12-foot travel lanes and 4-foot shoulders
- The roadway has curbs at the edges of the shoulders followed by open ditches
- This segment of FM 1314 is relatively straight and consists of primarily rural and residential land use with some commercial land use along the study corridor
- The posted speed limit along this segment is 45 mph

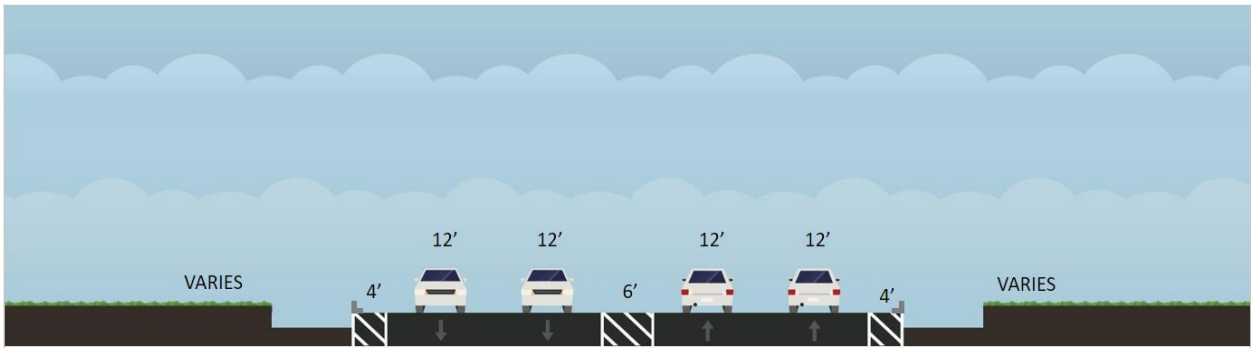


Figure 3-3 FM 1314 Cross Section Between Strausie Ln and Greenbough St

FM 1314 from Greenbough St to Briar Tree Dr (**Figure** 3-4) consists of the following cross section:

- Five-lane roadway with a 14 to 16-foot center turn lane or a two-way left turn lane (TWLTL)
- The width of the existing pavement varies from 82 to 88 feet. The travel lanes are 12 feet each with a 10 to 12-foot variable shoulder width on both sides of the roadway
- The roadway has open ditches on both sides of the roadway with grate inlets along ditches falling out to curb inlets. No guardrails exist along the corridor.

- This segment consists of four horizontal curves. Three horizontal curves adequate of TxDOT standards without superelevation are located at McQueen Rd, Village Way, and Westwood Dr. One horizontal curve exists directly north of Valley Ranch Pkwy and has slight superelevation along the curve.
- The posted speed limit along this segment varies from 55 mph to 40 mph. There are three schools within this area where the speed limits are reduced to 35 mph

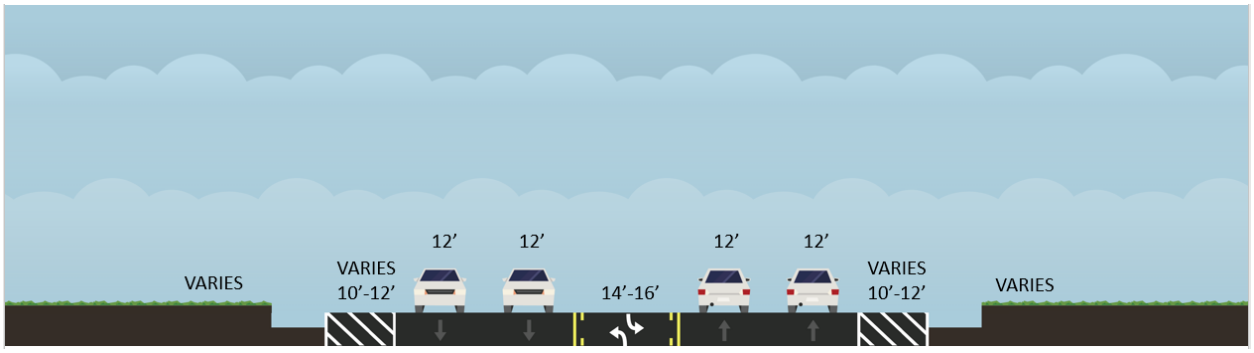


Figure 3-4 FM 1314 Cross Section Between Greenbough St and Briar Tree Dr

FM 1314 from Briar Tree Dr to SL 494 (**Figure** 3-5) consists of the following cross section:

- Five-lane roadway with a 16-foot center turn lane or a TWLTL
- The width of the existing pavement is 64 feet with 12-foot travel lanes
- The roadway has 4.5-foot sidewalks on both sides of the roadway
- There are curbs and storm sewer system on both sides of the roadway
- This segment has one horizontal curve north of Kelly Joe Smith Rd and south of the US 69 Northbound Frontage Rd (NBFR)
- The posted speed limit along this segment is 40 mph
- Existing Union Pacific Railroad (UPRR) railroad tracks are located parallel to SL 494 on the south end of the project

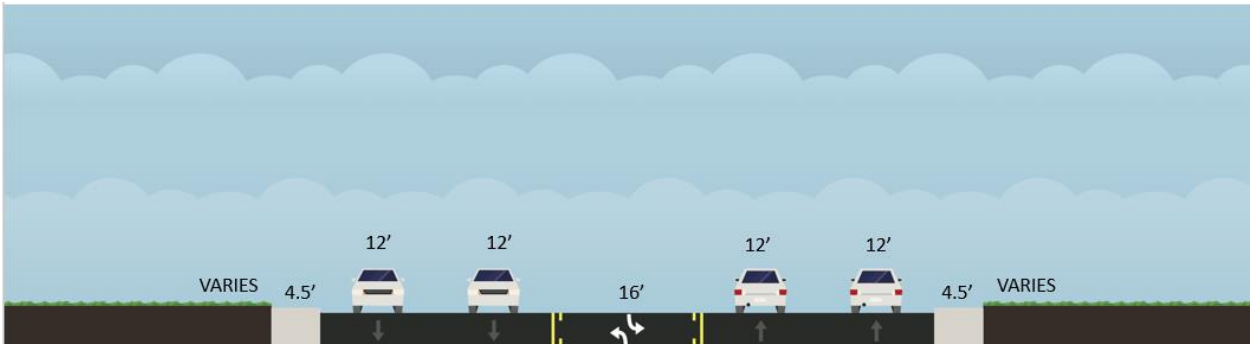


Figure 3-5 FM 1314 Cross Section Between Briar Tree Dr and SL 494

b. Signalized and Unsignalized Intersections

The FM 1314 study corridor consists of 29 intersections, of which 13 intersections are unsignalized (stop controlled) and 16 intersections are signalized (signal controlled). All signalized intersections have pedestrian signals and push buttons. All stop signs are two-way stop controlled at approaching cross-streets. The list of signalized and unsignalized intersections are shown below in **Table** 3-1.

Table 3-1 Intersections within the Study Corridor

Intersection No.	Cross Street	Intersection Control
1	SH 242 W	Signalized
2	SH 242 E	Signalized
3	Pinewood Dr/Elementary School	Unsignalized (Stop Control)
4	Old Houston Rd	Signalized
5	Gene Campbell Rd	Signalized
6	Ferne Dr	Unsignalized (Stop Control)
7	SH 99/ Grand Pkwy WB	Signalized
8	SH 99/ Grand Pkwy EB	Signalized
9	Cumberland/Painted Blvd	Signalized
10	Timberland Blvd	Signalized
11	Wood Hallow Dr	Unsignalized (Stop Control)
12	Lazy Ln	Unsignalized (Stop Control)
13	Riverwalk/Spartan Dr	Signalized
14	Fatheree Dr	Unsignalized (Stop Control)
15	Sorters Rd	Signalized
16	Kennedy Ln	Unsignalized (Stop Control)
17	Andrew Ln	Unsignalized (Stop Control)
18	Valley Ranch Pkwy/Old Sorters Rd	Signalized
19	Briar Tree Dr	Unsignalized (Stop Control)
20	Partners Way	Signalized
21	Village Dr	Unsignalized (Stop Control)
22	Dunn Ln	Unsignalized (Stop Control)
23	Church St	Unsignalized (Stop Control)
24	Pine Shadows Ln	Unsignalized (Stop Control)
25	IH 69 SB Frontage Rd	Signalized
26	IH 69 NB Frontage Rd	Signalized
27	Kelly Joe Smith Rd	Unsignalized (Stop Control)
28	Commerce Ave	Signalized
29	SL 494	Signalized

Figure 3-6 illustrates the signalized and unsignalized intersections by geographic location.

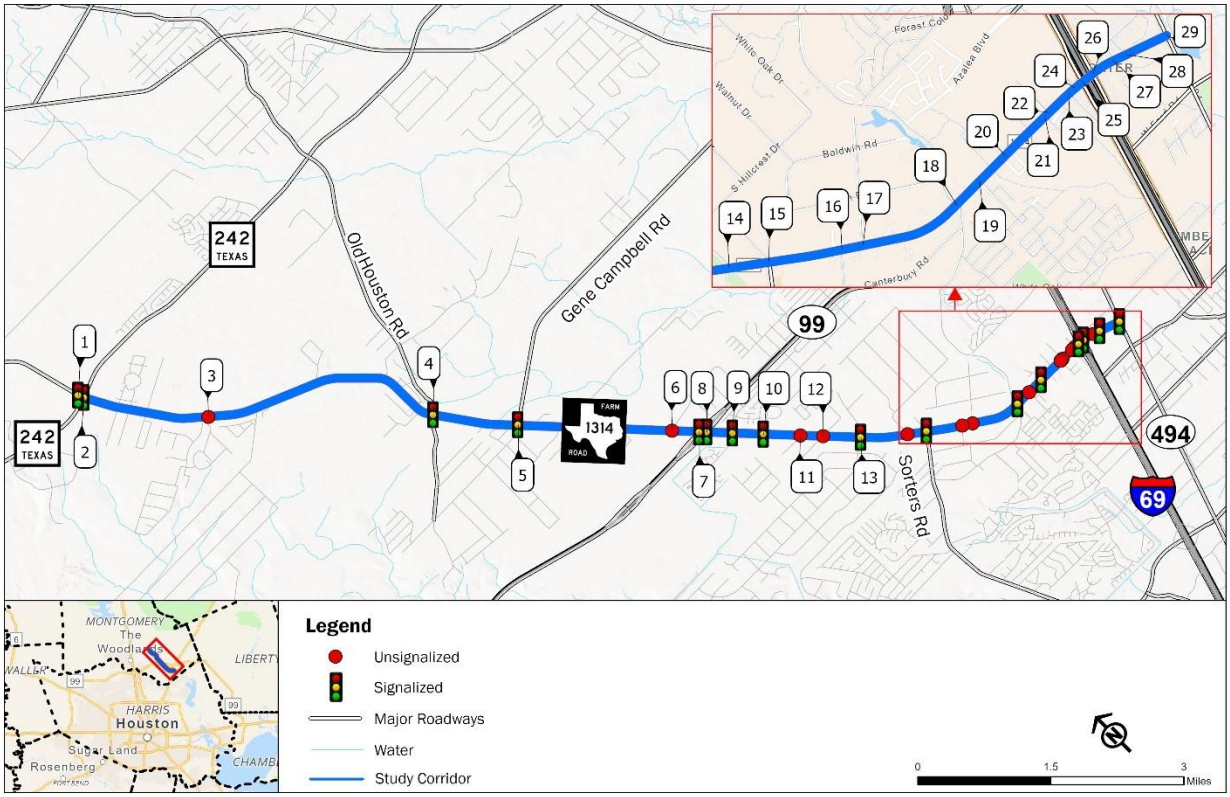


Figure 3-6 Intersections within the Study Corridor

c. Multimodal Facilities

Currently, FM 1314 has limited sidewalks and crosswalks, and no bicycle infrastructure, despite the presence of three schools, several businesses, and various residential areas along the study corridor. Currently, no transit services are provided within the study corridor. Sidewalks are only present on both sides at the southern end of FM 1314 between Briar Tree Dr and SL 494. Pedestrian signals or crosswalks are at all signalized intersections except at Old Houston Rd. However, field observations determined that the pedestrian push buttons were not properly functioning, and pedestrian phase walk symbols were not observed on many pedestrian signal phases. A bike path intersects north of the SH 242 intersection and south of the SL 494 intersection but does not extend to the study corridor. There is no fixed transit route that serves the study area. **Figure** 3-7 shows the locations of existing sidewalks and bike paths in and around the study corridor as well as biking activity attained from STRAVA – a GPS cycling and running app used to track physical exercise.

The number of bike counts were collected during the April onsite visit. There were only three total bike counts during the peak hour, all located near the IH 69 interchange area. The STRAVA data provided in **Figure** 3-7 visualizes the potential for increased bike activity if sidewalks were to expand along the study corridor. The area near IH 69 (Porter) is both residential and commercial with grocery stores and businesses that attract bike and pedestrian users. Increased multi-modal facilities would offer more diverse accessibility to this area in the future, decreasing the necessity for vehicles. On-going construction at SH 242 could contribute to the low number of bike counts near the intersection.

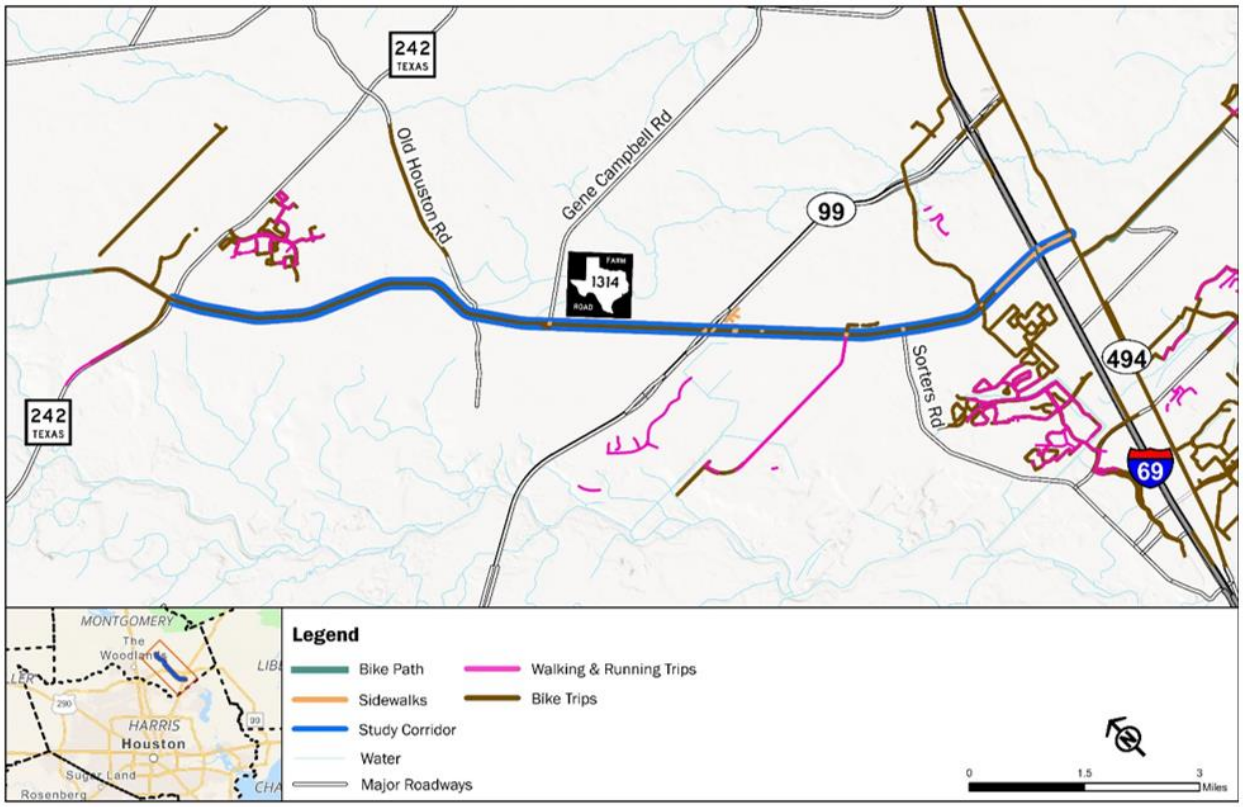


Figure 3-7 Multimodal Facilities

d. Driveway Density and Signage

FM 1314 has approximately 368 driveway access points along the study corridor.

- 9 access points along from SH 242 to Strausie Ln (0.5 miles, 18 access points/mile)
- 18 access points from Strausie Ln to Greenbough St (0.3 miles, 60 access points/mile)
- 258 access points from Greenbough St to Briar Tree Dr (9.6 miles, 27 access points/mile)
- 83 access points from Briar Tree Dr to SL 494 (1.1 miles, 75 access points/mile)

The posted speed limit is 45 mph from SH 242 to north of Jim Stowe Rd then increases to 55 mph through north of Riverwalk Dr/Spartan Dr. The speed limit then increases to 55 mph through north of Riverwalk Dr/Spartan Dr. Between north of Riverwalk Dr/Spartan Dr and Valley Ranch Pkwy the speed limit decreases to 50 mph, then decreases to 40 mph through SL 494. The San Jacinto Elementary School's zone spans from north of Jim Stowe Rd to south of Pinewood Village Dr and Porter High School's zone spans from Riverwalk Dr/Spartan Dr, where the school is located, to north of Fatheree Dr. Both school zone speed limits are 35 mph when the school light is flashing.

e. Current Access Management Practice

Access management practices are a set of techniques that are designed to increase capacity of the roads, manage congestion, and reduce crashes. The following summarize the current access management observed along the corridor:

- There are continuous TWLTL between Greenbough St and SL 494, with limited raised medians or median barriers to separate the opposing movements on FM 1314. The FM 1314 approaches at the SH 494, Grand Parkway, IH 69 frontage road intersections.
- The section between IH 69 and SL 494 has a high density of driveway, intersection access, and the highest AADT within the study area. Vehicles turning left from FM 1314 onto minor roadways utilize the TWLTL. At, IH 69 and at signalized intersections the TWLTL transitions to a raised median with left turn storage lanes.
- There are safety concerns with queues exceeding the available storage at IH 69, this creates potential for crashes with vehicles traveling through at high speeds.
- Between SL 494 and IH 69, the pedestrian push buttons take a long time or are not working. WALK signals are not active at any of the intersections.
- The sidewalk from SL 494 ends at Porter Car Wash north of Carmen Ln.
- Between SL 494 and IH 69, the width of sidewalk is not per the current standards (3.5 to 4-feet). The sidewalks, and pedestrian ramps along FM 1314 on both sides of the roadway needs cleanup/maintenance as the edge of the sidewalk is filled with grass.
- Between SL 494 and IH 69, most of the driveways have been paved with new asphalt. This is impacting the sidewalk along the driveways as they are not standard (2% cross slope) and not per the TxDOT standards.

Appendix F offers a comprehensive list of conditions observed during a site visit conducted in April of 2023. These current access management practices will be evaluated to propose future improvements along the corridor.

f. Planned Projects and Developments

There are several planned projects and developments surrounding the FM 1314 study corridor. Information about these future projects and developments was used to access future traffic conditions. It will also allow any future proposed improvements to align seamlessly with existing and planned infrastructure.

There are 21 planned TxDOT projects within the study area for which data was gathered using TxDOT's Project Tracker. These projects are shown in **Figure** 3-8 and in tabular format in **Table** 3-2. Planned projects along FM 1314 include widening the number of lanes north of the study corridor, rehabilitating the existing roadway near SH 242, installing/upgrading drainage structures near Calhoun Rd, implementation of an advanced traffic management system from IH 69 to Gene Campbell Blvd, safety improvements from Grand Pkwy/SH 99 to SL 494, and resurfacing the roadway from Fatheree Dr to SL 494. Two Montgomery County projects were also identified as part of this review which consist of widening Gene Campbell Blvd from two to four lanes and widening Sorters Rd from two to five lanes, which includes a left turn lane.

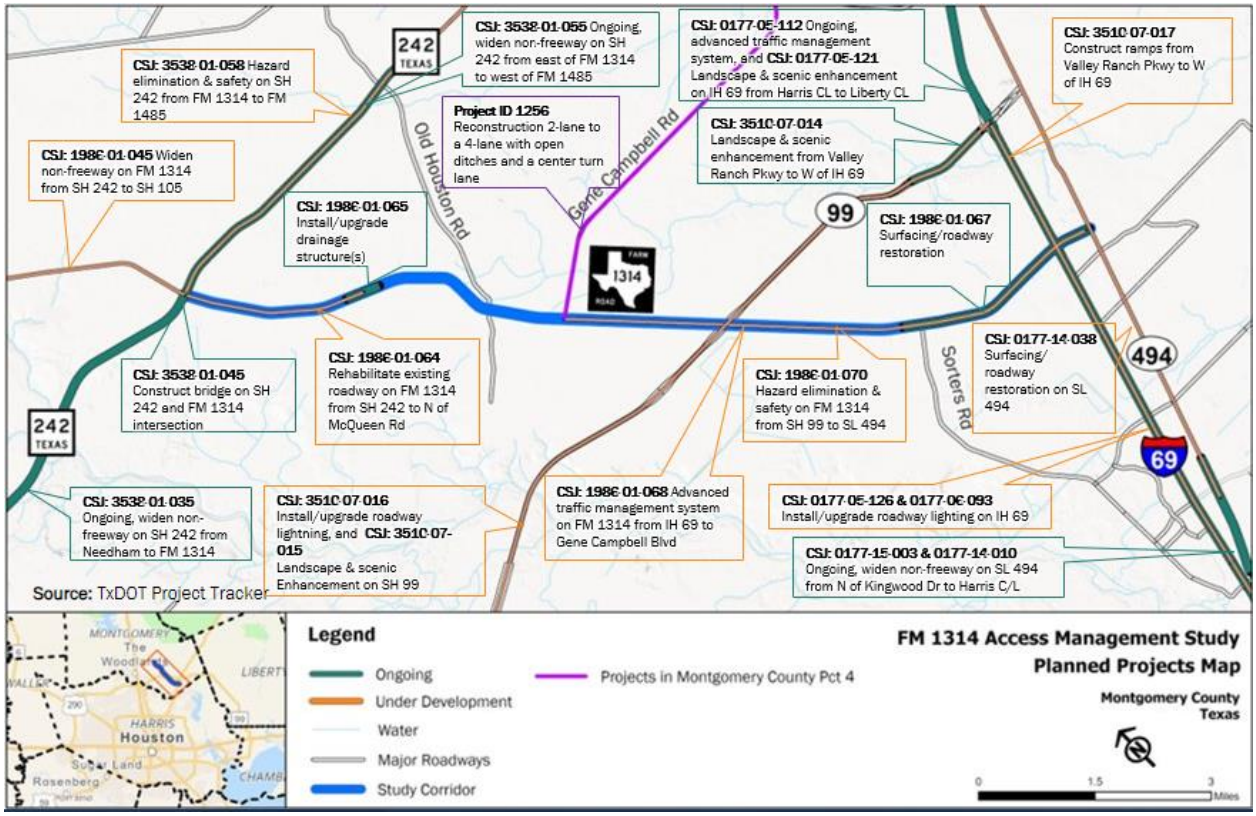


Figure 3-8 Planned Projects

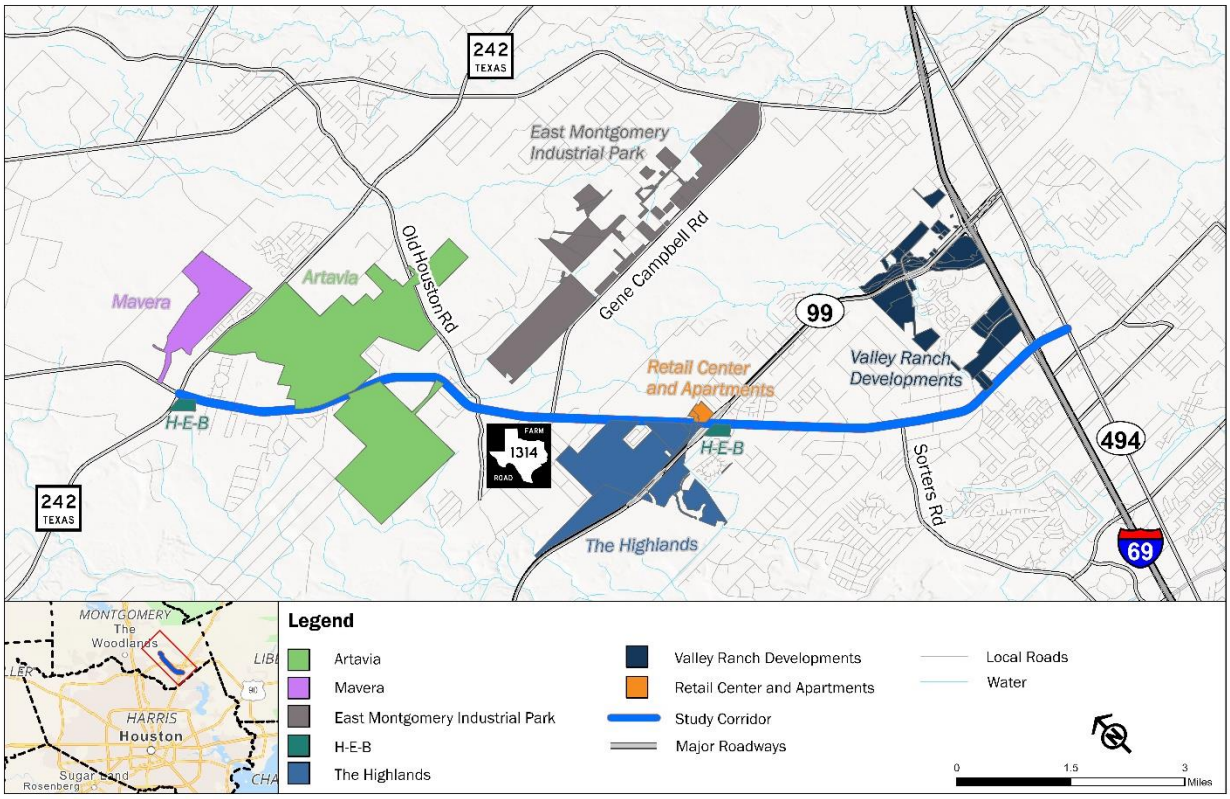
Table 3-2 Planned Projects

CSJ	Roadway	From	To	Type of Work	Project Phase
3538-01-058	SH 242	FM 1314	FM 1485	Hazard elimination & safety	Construction begins within 4 years
1986-01-045	FM 1314	SH 105	SH 242	Widen road - add lanes	Construction begins in 5 to 10 years
3538-01-035	SH 242	Needham Drive	FM 1314	Widen road - add lanes	Construction underway or begins soon
3538-01-045	SH 242	At FM 1314	.	Construct bridge	Construction underway or begins soon
1986-01-064	FM 1314	SH 242	North of McQueen Road	Rehabilitate existing roadway	Construction begins within 4 years
3510-07-016	SH 99	East of IH 45	IH 69	Install/upgrade roadway lighting	Construction begins in 5 to 10 years

CSJ	Roadway	From	To	Type of Work	Project Phase
1986-01-068	FM 1314	IH 69	Gene Campbell Blvd.	Advanced traffic management system	Construction begins within 4 years
1986-01-070	FM 1314	SH 99	SL 494	Hazard elimination & safety	Construction begins within 4 years
0177-05-126	IH 69	Harris County Line	SH 99	Install/upgrade roadway lighting	Construction begins within 4 years
0177-06-093	IH 69	South Of FM 1960	Montgomery County Line	Install/upgrade roadway lighting	Construction begins within 4 years
0177-15-003	SL 494	Montgomery C/L	N Of Sorters-McClellan Road	Widen road - add lanes	Construction underway or begins soon
0177-14-010	SL 494	N of Kingwood Dr	Harris C/L	Widen road - add lanes	Construction underway or begins soon
0177-14-038	SL 494	IH 69 Frtg Rd	Kingwood Dr	Surfacing/roadway restoration	Construction begins within 4 years
3510-07-017	SH 99	Valley Ranch Parkway	West of IH 69	Construct ramps	Construction begins within 4 years
1986-01-067	FM 1314	N of Fatheree Dr	SL 494	Surfacing/roadway restoration	Construction underway or begins soon
3510-07-014	SH 99	At IH 69	.	Landscape development	Construction underway or begins soon
0177-05-112	IH 69	Harris County Line	Liberty County Line	Advanced traffic management system	Construction underway or begins soon
3538-01-055	SH 242	East of FM 1314	West of FM 1485	Widen road - add lanes	Construction underway or begins soon
1986-01-065	FM 1314	0.125 Miles South of Calhoun Rd	0.528 Miles South of Calhoun Rd	Install/upgrade drainage structure(s)	Construction underway or begins soon
0177-05-121	IH 69	Harris / Montgomery County Line	Fostoria Road	Landscape development	Construction underway or begins soon

CSJ	Roadway	From	To	Type of Work	Project Phase
3510-07-015	SH 99	Harris County Line/Spring Creek	IH 69	Landscape development	Construction begins within 4 years
County Project ID: 1256	Gene Campbell Blvd	FM 1314	FM 1485	Widen road - add lanes	Construction begins in 5 to 10 years
County Project ID: RD400146	Sorters Rd	FM 1314	300 Feet North of North Bentwood Channel	Reconstruction of Road from 2 Lanes To 5 Lanes	Construction underway or begins soon

In addition to these planned projects, several developments are also anticipated near the FM 1314 study corridor. These developments can potentially attract increased travel to the FM 1314 corridor which was assessed in the *Traffic Operations Memorandum*, which includes the future traffic



forecasting methodology. A summary of these developments is included in **Figure** 3-9 and

Table 3-3.

Figure 3-9 Future Developments

Table 3-3 Future Developments

Development	Type	Size	Estimated Completion Term
H-E-B (near Grand Parkway)	Grocery Store	Lot size - 24 acres	Short-term
H-E-B (near SH 242)	Grocery Store	-	Mid-term
Retail center and Apartments	Mixed-use: retail space and garden-style apartments complex	342 apartments and 10 acres for commercial development	Short-term
Highlands Community	Single-family homes	4,000 homes	Short-term
Valley Ranch Developments	Mixed-use, master planned community which includes residential space, a Marketplace, Entertainment District, and Medical District	Retail (near FM 1314): 62,000 sq ft Hospital: 350 beds Medical office buildings: 186,300 sq ft Retail/mixed use: 164,000 sq ft	Short-term
East Montgomery Industrial Park	Distribution Centers/Industrial Companies	GCP Paper: 32 acres Available: 125+ acres	Short-term: (GCP Paper) Mid-term: other available acres
Artavia Community	Single-family homes	6,500+ homes	Short-term
Mavera Community	Single-family homes	450+ homes	Short-term

4 LAND USE

Distinct land use patterns were observed along FM 1314 with significant differences between the study area north of SH 99/Grand Pkwy interchange area compared to the study area south of the interchange. These observations contribute to understanding traffic patterns and congestion areas along the corridor that may require additional attention and identifying areas for potential future development. **Figure** 4-1 illustrates the land use within 0.5 miles of the study area. Residential land use makes up 23% of the overall land use. Majority of residential parcels consist of single-family homes with a smaller number of mobile homes and a single apartment complex. Farm, ranch, and rural lands make up 54% of the overall land use with majority of such land use to the north of SH 99/ Grand Pkwy. Most of these rural lands are rural homes, non-improved vacant lands, and other uses. Seven% of all lands are vacant lots which are typically suited for building sites. The large number of rural lands and vacant lots provide plenty of spaces for future developments. Sixteen% of the lands are commercial. Less than 0.1% of overall land use is designated for industrial purpose.

Most of the businesses along the study corridor are small businesses with a few gasoline stations at the major intersections. The section between Church St and SL 494 is the major activity center along the study corridor. There are essential businesses such as grocery stores, banks and national fast-food restaurants which attract more customers than most local businesses. There are some essential institutions located on the study corridor as well. San Jacinto Elementary School is located just south of Jim Stowe Rd, Robert L Crippen Elementary School is located south of SH 99 on Cumberland Blvd, Porter High School is located on Riverwalk Dr, and Sorters Mill Elementary School is located west of the study corridor on Sorters Rd. Three fire stations and three medical facilities are located along FM 1314. **Table** 4-1 shows the acreage by land use types.

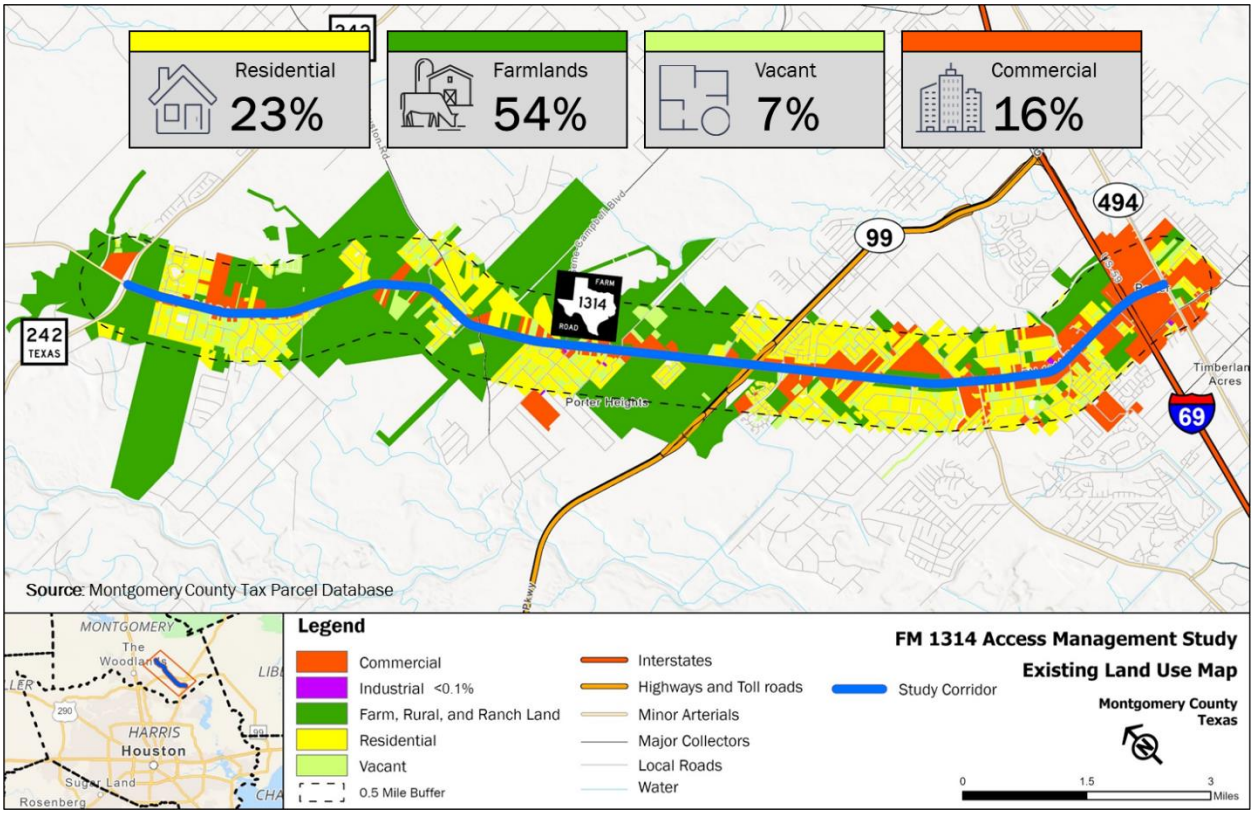


Figure 4-1 Land Use

Table 4-1 Acreage by Land Use Types

Land Use Category	Acres	% of Total
Residential	2,319	23%
Farm, Ranch, and Rural Lands	5,491	54%
Vacant Developable	753	7%
Commercial	1,691	16%
Industrial	9	<0.1%

5 CORRIDOR CONSTRAINTS AND SENSITIVE AREAS

a. Floodplains

FM 1314 is located within the Federal Emergency Management Agency's (FEMA's) Pre-Flood Insurance Rate Map (FIRM) Panel No's. 48339C0575G (effective August 18, 2014) and 48339C0600G (effective August 18, 2014). Special consideration will need to be given to environmental resources during project development to remain in compliance with regulations. A review of these FIRM panels indicates that some of the project limits are located within the following zones:

- A & AE (100-year flood plain)
- Zone X (500-year flood plain)

Figure 5-1 illustrates the FEMA flood plain map and FM 1314 in relation to the 100-year and 500-year flood plains. Areas between Woodridge Dr and Ferne Dr is within 100-year floodplains. This area of the corridor may be more susceptible to frequent flooding and should be considered during project development. A drainage study is recommended for the FM 1314 corridor to further assess the viability of proposed design.

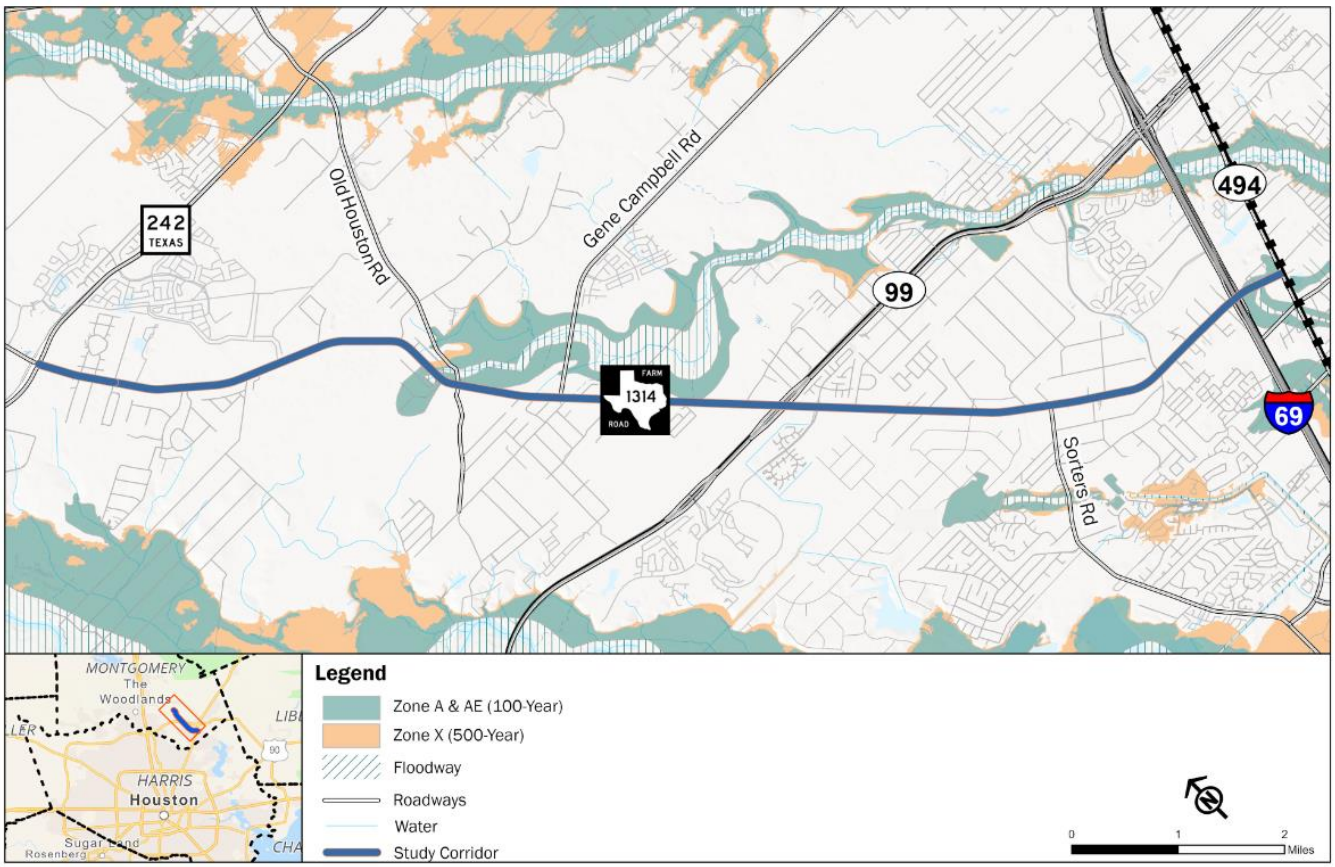


Figure 5-1 Federal Emergency Management Agency Flood Plain Map

b. Sight Distance

Sight distance evaluation is an important aspect of driveway design to ensure safe and efficient access to and from a roadway. The sight distance is the length of roadway visible to a driver from a specific point, allowing them to detect and react to potential hazards. A clear sight triangle is an area that must be free of obstructions to provide an unobstructed view for drivers entering or exiting a driveway. The size and shape of the clear sight triangle can vary depending on local regulations and road conditions. Crashes can occur at locations without proper sight distance and therefore sight distance should be evaluated for improved safety. Several factors can influence sight distance, including the design speed of the road, vertical and horizontal curves, roadside obstacles, vegetation, and grade changes. These factors need to be considered during the evaluation process.

For the FM 1314 study corridor, there are curves where sight distance will be considered as part of future improvement concepts. The segment from Greenbough St to Briar Tree Dr has three horizontal curves located at McQueen Rd, Village Way, and Westwood Dr as well as a super elevated curve directly north of Valley Ranch Pkwy. The segment from Briar Tree Dr to SL 494 has one horizontal curve located north of Kelly Joe Smith Rd and south of US 69 NBFR. Both segments experience high driveway density and need sight distance evaluation for the vehicles turning left and right from existing driveways. There are also approaches intersecting the FM 1314 study corridor which are skewed, meaning they do not meet FM 1314 perpendicularly, and could be improved through realignment. These intersections include Lazy Ln, Fatheree Dr, and Mills Rd. Proposed improvements

along the study corridor will be determined using sight distance evaluation, which will consider various factors mentioned above.

6 EXISTING TRAFFIC CHARACTERISTICS

a. Existing Traffic Volumes and Patterns

Traffic volumes obtained for this study included both volumes acquired from TxDOT's Statewide Traffic Analysis and Reporting System (STARS II) database as well as field collected traffic counts. The historical counts included the average daily counts along the study corridor that were used in determining the morning (AM) and evening (PM) peak periods. These historical counts will be used alongside travel demand model (TDM) data to determine the growth rates for future projections and evaluate proposed improvements.

i. TxDOT Counts

AADT for various count locations along and near the study corridor were collected from STARS II for the year 2019 as shown in **Figure** 6-1**.** These counts were used to develop an understanding of existing traffic patterns along the corridor. As observed in the figure, the bidirectional volume along the FM 1314 study corridor ranges from 17,200 to 36,400. The highest volume is seen west of the IH 69 interchange where most of the study corridor's commercial development exists. The volume then decreases going north toward SH 242 where the study area gradually becomes more rural. Within the study area, IH 69 carries daily volumes of over 106,000, including the mainline and frontage roads. This roadway serves as a connection between the study area and the City of Houston. Grand Pkwy/SH 99 and SH 242, which run perpendicular to the study corridor and connect IH 69 to IH 45, have similar volumes ranging from 13,600 to 27,700. Other major cross streets including Old Houston Rd, Gene Campbell Rd, Sorters Rd, and SL 494 which have traffic ranging from 2,600 to 16,100.

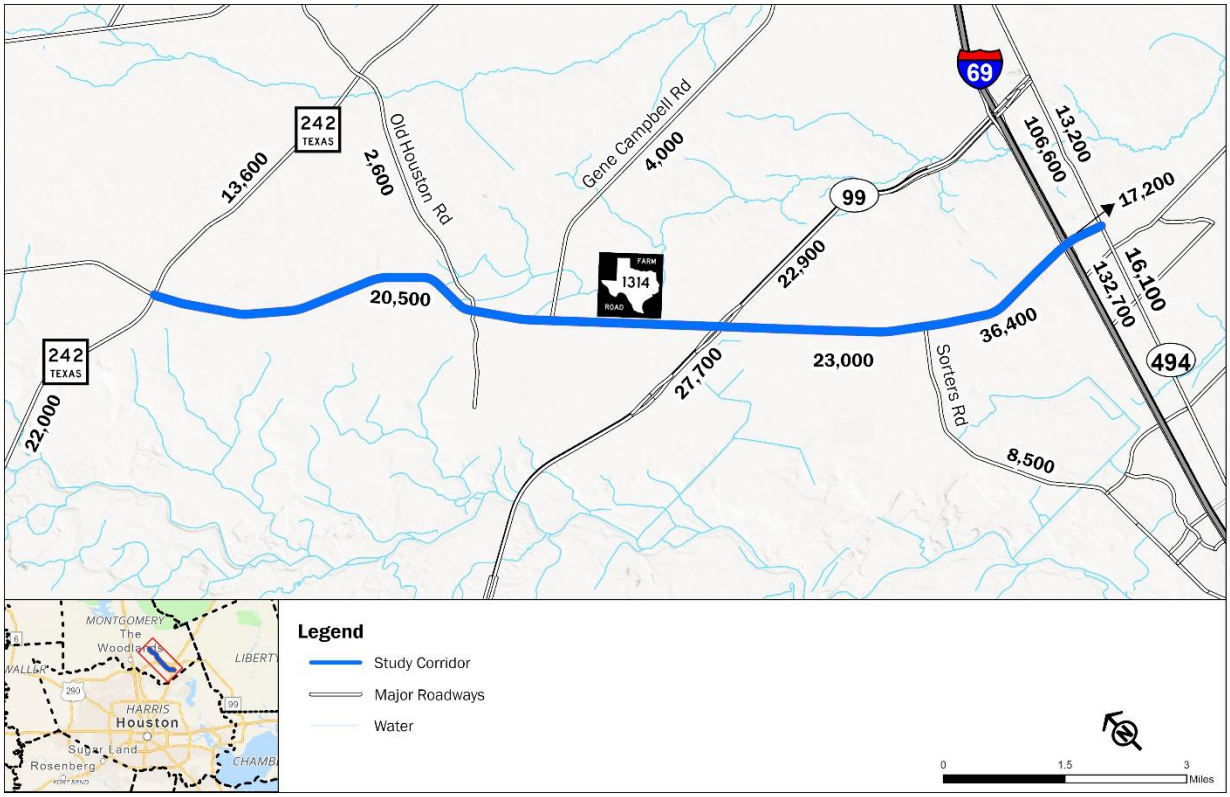


Figure 6-1 2019 Annual Average Daily Traffic (AADT)

ii. Field Collected Traffic Counts

Thirteen-hour (13) field turning movement counts (TMCs) at 15-minute intervals were collected at all signalized and unsignalized intersections in April 2023 along the FM 1314 study corridor.

The TMCs collected vehicle classification data which included light vehicles (FHWA vehicle classification 1 through 3), buses and single-unit trucks (FHWA vehicle classification 4 through 7), and articulated trucks (FHWA vehicle classification 8 through 13). **Table** 6-1 lists the intersections where data was collected and their traffic control type. The critical peak hour out of the AM and PM peak periods was determined based on the field collected TMCs as seen in **Error! Reference source not found.**, which contains the peak hour determination tables and calculations. The critical peak hour was determined to be 5:00 to 6:00 PM, which has the highest sum of four consecutive 15-minute TMCs for all counts collected, as seen in the Critical Peak Hour Determination table in **Appendix B**. The traffic analysis in VISSIM focuses on the critical peak hour (PM peak). Eighteen of the 47 count locations are driveways.

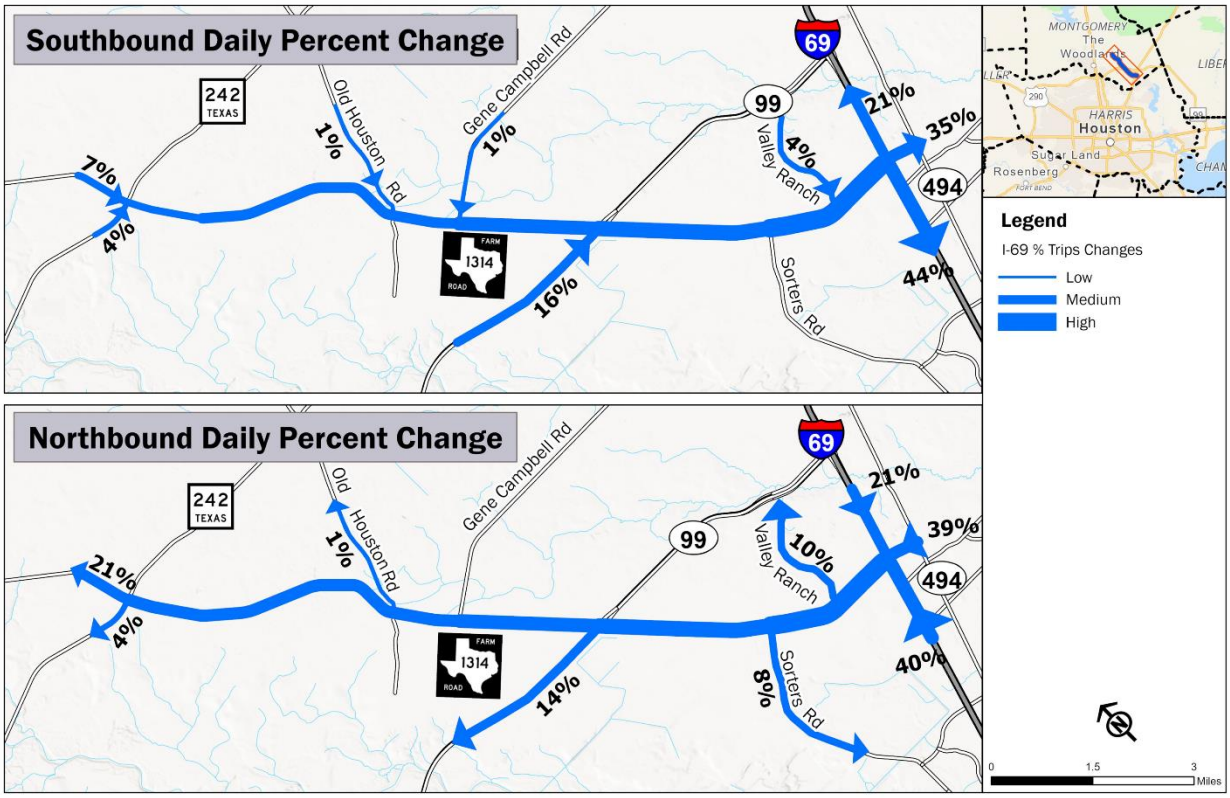
Table 6-1 Field Count Locations Along Study Corridor

No.	Count Locations	Type
1	FM 1314 at SL 494	Signalized Intersection
2	FM 1314 at Chevron Dwy	Unsignalized Intersection
3	FM 1314 at Travis Barbershop Dwy	Unsignalized Intersection
4	FM 1314 at Public Storage Dwy	Unsignalized Intersection
5	FM 1314 at Commerce Ave	Signalized Intersection
6	FM 1314 at Kelly Joe Smith Rd	Unsignalized Intersection
7	FM 1314 at Stripmall Dwy	Unsignalized Intersection
8	FM 1314 at IH 69 NB Frontage Rd	Signalized Intersection
9	FM 1314 at IH 69 SB Frontage Rd	Signalized Intersection
10	FM 1314 at Pine Shadows Ln	Unsignalized Intersection
11	FM 1314 at Church St	Unsignalized Intersection
12	FM 1314 at Porter Family Medical Center Dwy	Unsignalized Intersection
13	FM 1314 at Dunn Ln	Unsignalized Intersection
14	FM 1314 at Village Dr	Unsignalized Intersection
15	FM 1314 at Mayer Rd	Unsignalized Intersection
16	FM 1314 at Porterwood Apartments Driveway 1	Unsignalized Intersection
17	FM 1314 at Partners Way	Signalized Intersection
18	FM 1314 at Porterwood Apartments Driveway 2	Unsignalized Intersection
19	FM 1314 and Bowden Dr	Unsignalized Intersection
20	FM 1314 at Sallas Ln/ A-OK Auto Driveway	Unsignalized Intersection
21	FM 1314 at Valley Ranch Pkwy/ Old Sorters Rd	Signalized Intersection
22	FM 1314 at Life Storage Dwy	Unsignalized Intersection
23	FM 1314 at La Michoacana Dwy	Unsignalized Intersection
24	FM 1314 at Andrew Ln	Unsignalized Intersection
25	FM 1314 at Kennedy Ln	Unsignalized Intersection
26	FM 1314 at Tyler Ln	Unsignalized Intersection
27	FM 1314 at Food Zone Dwy	Unsignalized Intersection
28	FM 1314 at Sorters Rd	Signalized Intersection
29	FM 1314 at Pat's Donuts Dwy	Unsignalized Intersection
30	FM 1314 at Fatheree Dr	Unsignalized Intersection
31	FM 1314 at Riverwalk/Spartan Dr	Signalized Intersection
32	FM 1314 at Lazy Ln	Unsignalized Intersection
33	FM 1314 at Rock & Roll Ready Mix Dwy	Unsignalized Intersection
34	FM 1314 at Wood Hollow Dr	Unsignalized Intersection

No.	Count Locations	Type
35	FM 1314 at Timberland Blvd	Signalized Intersection
36	FM 1314 at Phillips 66 Dwy	Unsignalized Intersection
37	FM 1314 at Cumberland/ Painted Blvd	Signalized Intersection
38	FM 1314 at Southern Maid Donuts Dwy	Unsignalized Intersection
39	FM 1314 at SH99/ Grand Pkwy EB ramps	Signalized Intersection
40	FM 1314 at SH99/ Grand Pkwy WB ramps	Signalized Intersection
41	FM 1314 at Ferne Dr	Unsignalized Intersection
42	FM 1314 at Gene Campbell Rd	Signalized Intersection
43	FM 1314 at Old Houston Rd	Signalized Intersection
44	FM 1314 at Elementary School Dwy	Unsignalized Intersection
45	FM 1314 at Pinewood Dr/ San Jacinto Elementary School Dwy	Unsignalized Intersection
46	FM 1314 at SH 242 EB ramps	Signalized Intersection
47	FM 1314 at SH 242 WB ramps	Signalized Intersection

b. Origin-Destination Analysis

Origin-destination (OD) data was gathered from the *Replica* platform for the average weekday from Fall 2022. The OD data was used in identifying travel patterns along the study corridor. **Table** 6-3



shows the daily OD patterns of traffic passing through FM 1314 just west of the IH 69 Southbound Frontage Rd (SBFR) where the traffic volumes are highest among the entire study corridor.

Figure 6-2 Origin-Destination Patterns near IH 69

IH 69 south of FM 1314 towards the City of Houston is a major traffic origin/destination, accounting for about 40% of total entering trips and 44% of total exit trips. IH 69 north of FM 1314 comprises 21% of each total exit trips and entering trips. Other trips (39% entering and 35% exiting) go east towards SL 494.

For the FM 1314 southbound direction, Grand Pkwy/SH 99 contributes 16% of trips to the IH 69 interchange. Pass-through trips from FM 1314 SB (7%) and SH 242 EB (4%) make up 11 % of entries. About 73% of the most congested area trips near IH 69 come from local roads like Valley Ranch Pkwy (4%), Old Houston Rd (1%) and Gene Campbell Rd (1%), serving various residential communities and commercial establishments.

Similar for FM 1314 at IH 69, 75% of the northbound exits stay within the study area. As show in **Figure 5-2**, 25% of trips travel the entire length of the study corridor and leave towards either FM 1314 NB (21%) or SH 242 WB (4%). Other exiting trips head to Grand Pkwy/SH 99 (14% exit trips), Valley Ranch Pkwy (10%), and Sorters Rd (8%).

In summary, FM 1314 serves as a significant route to IH 69, and a considerable proportion of trips originate and conclude within the study area itself. Grocery stores, restaurants, and other commercial developments near IH 69 attract individuals from the more residential areas along the corridor, making this area one of high priority for the study.

c. Speed and Time Travel Analysis

Analysis of speed and travel time assesses safety and mobility concerns along the corridor by determining areas that may experience higher congestion. The speed and travel time data for this analysis were obtained from *INRIX*[2] for the weekdays of April 2023. The average travel time of traveling across the entire study corridor during the AM peak hour (6:30 to 7:30 AM) is 16.4 minutes and during the PM peak hour (5:00 to 6:00 PM), it is 17.0 minutes. The travel speeds in general are significantly less around SH 242 and near SL 494. Speeds are also more than 10 mph below the speed limit between south of SH 99/Grand Pkwy and just south of Sorters Rd. Increasing traffic volumes, high signal control delay, and higher driveway density are major contributing factors slowing down the speeds on FM 1314 towards the southern end. **Figure** 6-3 shows the existing travel speeds during the AM and peak hours along the study corridor.

[2] analytics.iq.inrix.com/roadway-analytics

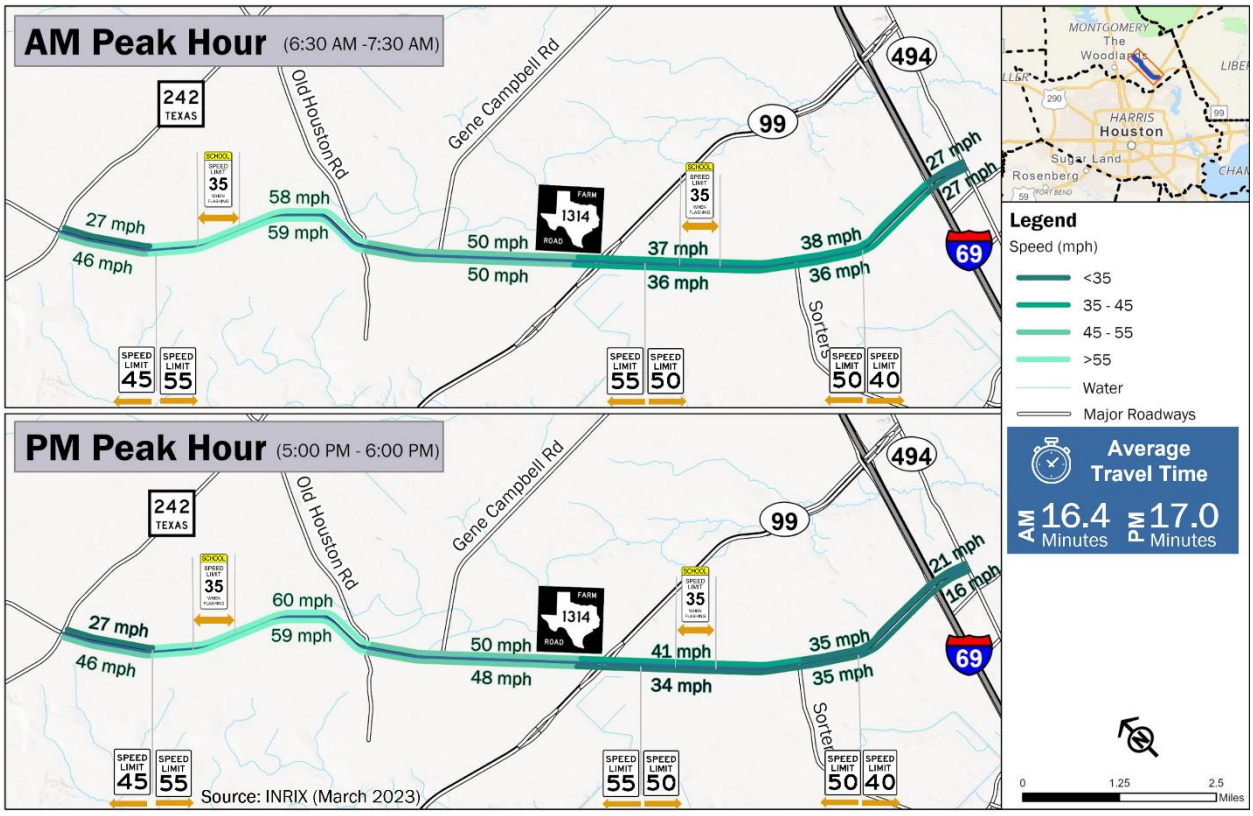


Figure 6-3 Corridor Driving Speeds

In addition, travel time runs along the study corridor were collected on April 4, 2023, during the PM peak period. A floating car method with a Global Positioning System (GPS) tracker was used to collect four travel time runs per direction (northwest and southeast) along the FM 1314 study corridor between Ferne Dr and SL 494 spanning 5.0 miles. This section was analyzed in VISSIM as discussed in the subsequent section. The travel times collected were used for calibration. **Table** 6-2 shows the travel time summary from the floating car method. The average travel time of the runs was 10.8 minutes in the northbound direction and 10.2 minutes in the southbound direction. These field collected travel times were used in the traffic microsimulation model calibration and validation, and in identifying operational issues along the study corridor in the existing conditions.

Table 6-2 Travel Time Summary from Floating Car Method

Travel Time Run	Direction	Travel Time (seconds)	Travel Time (minutes)	Average Speed (mph)
1	NB	659	11.0	26.92
2	NB	695	11.6	25.75
3	NB	496	8.3	35.80
4	NB	597	10.0	29.80

5	SB	551	9.2	32.34
6	SB	600	10.0	29.90
7	SB	537	9.0	33.34
8	SB	750	12.5	23.79

d. Traffic Simulation Model and Calibration

A traffic model using Vissim (Version 2023) was calibrated for the critical PM peak hour of existing conditions (2023). The model development and calibration process are detailed in the *Existing Conditions Operational Analysis Memo*. The calibrated model for the PM peak hour is used to derive traffic operations (delay, queue length, and level of service) metrics along the intersections within the study area. Calibration criteria followed the guidelines published by Federal Highway Administration (FHWA) in *Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software 2004 Edition*.

The model was calibrated for both throughput in volumes per hour (vph) and travel time. The average turning movements (resulting from five Vissim model runs at each intersection) were compared against the input data. Similarly, the average travel times of the model simulation ran along the FM 1314 corridor were compared against the field-collected travel time data. In Error! Reference source n ot found. and **Table** 6-4, both the link volumes and travel time outputs from the model are met and well within the calibration criteria thresholds.

Table 6-3 PM Peak Hour Volume Calibration Criteria

No.	Criteria	Result	Criteria Condition
Criteria 1	Sum of all link volumes, < 5% overall	1.2% overall	Met
Criteria 2	Within 15%, for 700 veh/h < Flow < 2700 veh/h, > 85% of cases	100% of cases	Met
Criteria 3	Within 100 veh/h, for Flow < 700 veh/h, > 85% of cases	100% of cases	Met
Criteria 4	Within 400 veh/h, for Flow > 2700 veh/h, > 85% of cases	Not Applicable	-
Criteria 5	GEH Statistic<5 for individual links	99% of cases	Met

Table 6-4 PM Peak Hour Travel Time Calibration Criteria

Travel Time Segment	Length (mi.)	Field Travel Time (min.)	VISSIM Travel Time (min.)	Difference (min.)	% Difference	Criteria Condition
FM 1314 NB between SL 494 and Ferne Dr	4.94	10.83	12.01	-1.18	-9.8%	Met
FM 1314 SB between SL 494 and Ferne Dr	4.94	10.16	11.88	-1.72	-14.5%	Met

e. Traffic Analysis Results

The results of the microsimulation model identify delays for the existing conditions of each intersection located within the VISSIM analysis limits. Delays and queue lengths were directly generated using VISSIM output for the PM peak hour. The level of service (LOS) values were assigned based on the Highway Capacity Manual (HCM) methodology by measuring the delay at each intersection. Table 6-7

Table 6-5 Level of Service Criteria for Signalized Intersections

Control Delay (seconds per vehicle)	LOS
<=10	A
>10–20	B
>20–35	C
>35–55	D
>55–80	E
>80	F

Table 6-6 Level of Service Criteria for Unsignalized Intersections

Control Delay (seconds per vehicle)	LOS
0–10	A
>10–15	B
>15–25	C
>25–35	D
>35–50	E
>50	F

Table 6-7 presents the corresponding LOS and delay at each intersection approach for the PM peak hour. As seen from the table, at the intersection level, all intersections within the microsimulation model limits are operating at an acceptable LOS of D or better. However, some approaches fail at LOS E or F, which represent areas that lack capacity for existing traffic conditions and necessitate further review. These are the key observations from the analysis.

- The delay at the eastbound approaches (crossroads) at all intersections are operating at LOS D or better except at the FM 1314 intersections with Valley Ranch Pkwy/Old Sorters Rd, Riverwalk Dr/ Spartan Dr, Cumberland Blvd/ Painted Blvd, and the Grand Pkwy EBFR.
- Westbound approaches at all intersections show LOS D or better except at the FM 1314 intersections with Commerce Ave, Partner's Way, Valley Ranch Pkwy/Old Sorters Rd, Riverwalk Dr/Spartan Dr, Cumberland Blvd/Painted Blvd, Kelly Joe Smith Rd/GameStop Dwy and the Specs Dwy/Subway Dwy.
- Other notable LOS failures occur along FM 1314 at the northbound approaches of intersections at IH 69 NBFR and Specs Dwy/Subway Dwy. The congestion on crossroad approaches is either due to competing green signal phases or insufficient green time at signalized intersections as well as a lack of gap to enter main throughfare at stop controlled or unsignalized intersections.

The nine intersections identified with an approach LOS of E or F serve as the nine locations that necessitate priority when addressing safety and mobility concerns.

Table 6-7 Existing Conditions PM Peak Hour VISSIM Results - LOS (Delay)

Intersection or Major Drive Access	Intersection Control	LOS	Delay (s)
FM 1314 and SL 494	Signalized	B	13.0
FM 1314 and Commerce Ave	Signalized	A	9.7
FM 1314 and IH 69 NB Frontage Road	Signalized	C	34.0
FM 1314 and IH 69 SB Frontage Road	Signalized	B	18.2
FM 1314 and Partner's Way	Signalized	A	4.7
FM 1314 and Valley Ranch Pkwy/Old Sorters Rd	Signalized	D	35.3
FM 1314 and Sorters Rd	Signalized	C	29.6
FM 1314 and Riverwalk Dr/Spartan Dr	Signalized	D	35.8
FM 1314 and Timberland Blvd	Signalized	B	14.2
FM 1314 and Cumberland Blvd/Painted Blvd	Signalized	C	29.4
FM 1314 and Grand Pkwy EB Ramp	Signalized	D	53.4
FM 1314 and Grand Pkwy WB Ramp	Signalized	C	31.7
FM 1314 and Chevron Dwy1	Unsignalized	D	34.8
FM 1314 and Chevron Dwy2	Unsignalized	C	23.1
FM 1314 and Travis Barber Dwy East	Unsignalized	A	6.5
FM 1314 and Travis Barbershop Dwy West	Unsignalized	A	5.1
FM 1314 and Public Storage Dwy/Rent-A-Center Dwy east	Unsignalized	A	8.3

Intersection or Major Drive Access	Intersection Control	LOS	Delay (s)
FM 1314 and Rent-A-Center Dwy west	Unsignalized	A	8.0
FM 1314 and AutoZone Dwy	Unsignalized	A	7.3
FM 1314 and Kelly Joe Smith Rd/GameStop Dwy	Unsignalized	F	>50
FM 1314 and Specs Dwy/Subway Dwy	Unsignalized	F	>50
FM 1314 and Pine Shadows Ln	Unsignalized	C	23.7
FM 1314 and Church St/Burger King Dwy	Unsignalized	C	23.3
FM 1314 and Porter Family Medical Center Dwy	Unsignalized	B	11.8
FM 1314 and Dunn Ln	Unsignalized	A	0.1
FM 1314 and Village Dr	Unsignalized	A	0.3
FM 1314 and Mayer Rd	Unsignalized	A	3.2
FM 1314 and Porterwood Apt Dwy/Barri Agent Dwy	Unsignalized	A	8.6
FM 1314 and Porterwood Apt Dwy	Unsignalized	C	19.9
FM 1314 and Briar Tree Dr	Unsignalized	A	9.8
FM 1314 and Auto Sales Dwy	Unsignalized	A	7.6
FM 1314 and Life Storage Dwy	Unsignalized	A	7.4
FM 1314 and Stone Supply Dwy	Unsignalized	A	8.6
FM 1314 and Andrew Ln	Unsignalized	C	15.7
FM 1314 and Kennedy Dr/A2ZAuto Repair Dwy	Unsignalized	B	11.8
FM 1314 and Tyler Ln	Unsignalized	A	7.1
FM 1314 and Food Zone Dwy	Unsignalized	B	11.5
FM 1314 and Pats Donuts Dwy	Unsignalized	B	13.2
FM 1314 and Fatheree Dr	Unsignalized	C	23.6
FM 1314 and Lazy Ln	Unsignalized	B	13.1
FM 1314 and Rock& Roll Mix Dwy	Unsignalized	A	5.0
FM 1314 and Wood Hollow Dr	Unsignalized	A	7.9
FM 1314 and Phillips 66 Dwy	Unsignalized	A	9.8
FM 1314 and Southern Maid Donuts Dwy	Unsignalized	C	17.9
FM 1314 and Ferne Dr	Unsignalized	B	11.4

7 CRASH DATA ANALYSIS

Crash data analysis is used to identify the study corridor's needs and issues related to safety which would then be used in the development of safety improvement concepts and crash reduction measures. Crash data was obtained from TxDOT Crash Records Information System (CRIS) for six years from 2017 to 2022. **Figure** 7-1 shows crash counts by year from 2017 to 2022. A total of 1,358 crashes occurred within those six years. Distinct variations in crash statistics were observed in periods before and after 2020. Crash counts increased from 2017 to 2018 and then slightly decreased in 2019. In 2020, crash counts significantly decreased likely due to the COVID-19 pandemic. In 2021, crash counts surged to numbers exceeding those prior to 2020, and then slightly decreased in 2022. To compensate for the difference in crash patterns and statistics during these two periods, two analyses were conducted. An analysis from 2017 to 2019 established a baseline excluding potential influence from outliers caused by 2020 and another analysis from 2017 to 2022 developed a broader examination of yearly trends, including those influenced by unforeseen circumstances in 2020. **Section a** through **Section d** present the crash statistics and patterns such as crash hotspots and types of crashes using the data from 2017 to 2019. **Section e** expands the data analysis from 2017 to 2022 to verify year over year trends.

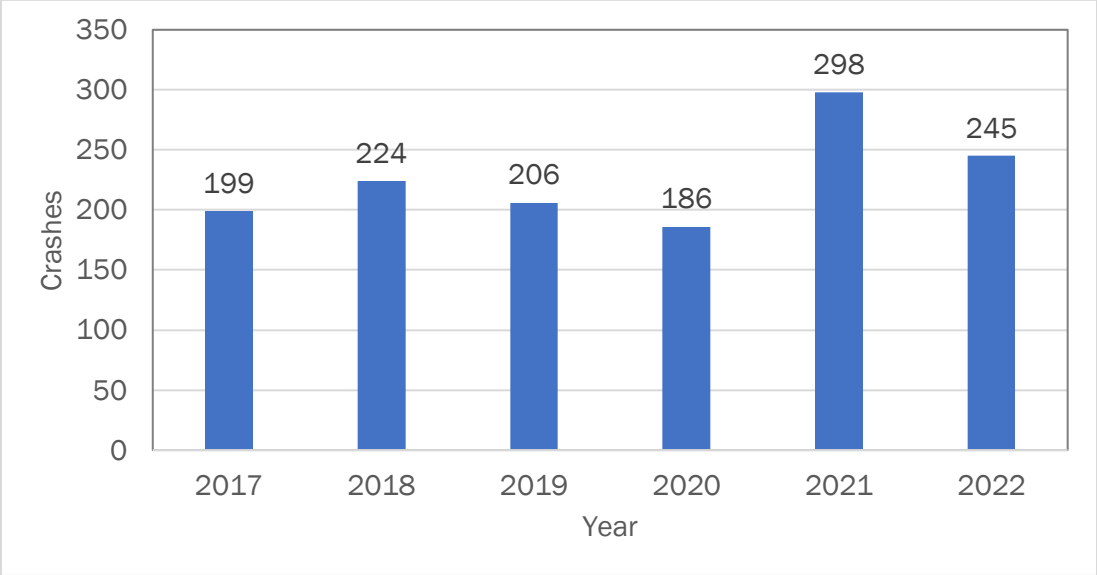


Figure 7-1 Crash Counts by Year

a. Crash Hotspot Locations

Figure 7-2 illustrates the crash hot spots/crash density along the FM 1314 study corridor for all crashes between 2017 and 2019. The green color represents spots with low crash densities and the red color represents high crash densities. The highest crash density occurred between Valley Ranch Pkwy and SL 494, where the driveway density per mile is also the highest along the study corridor along with major intersections such as the IH 69 interchange. Overall, the FM 1314 study corridor has fewer crashes north of Grand Pkwy/SH 99.

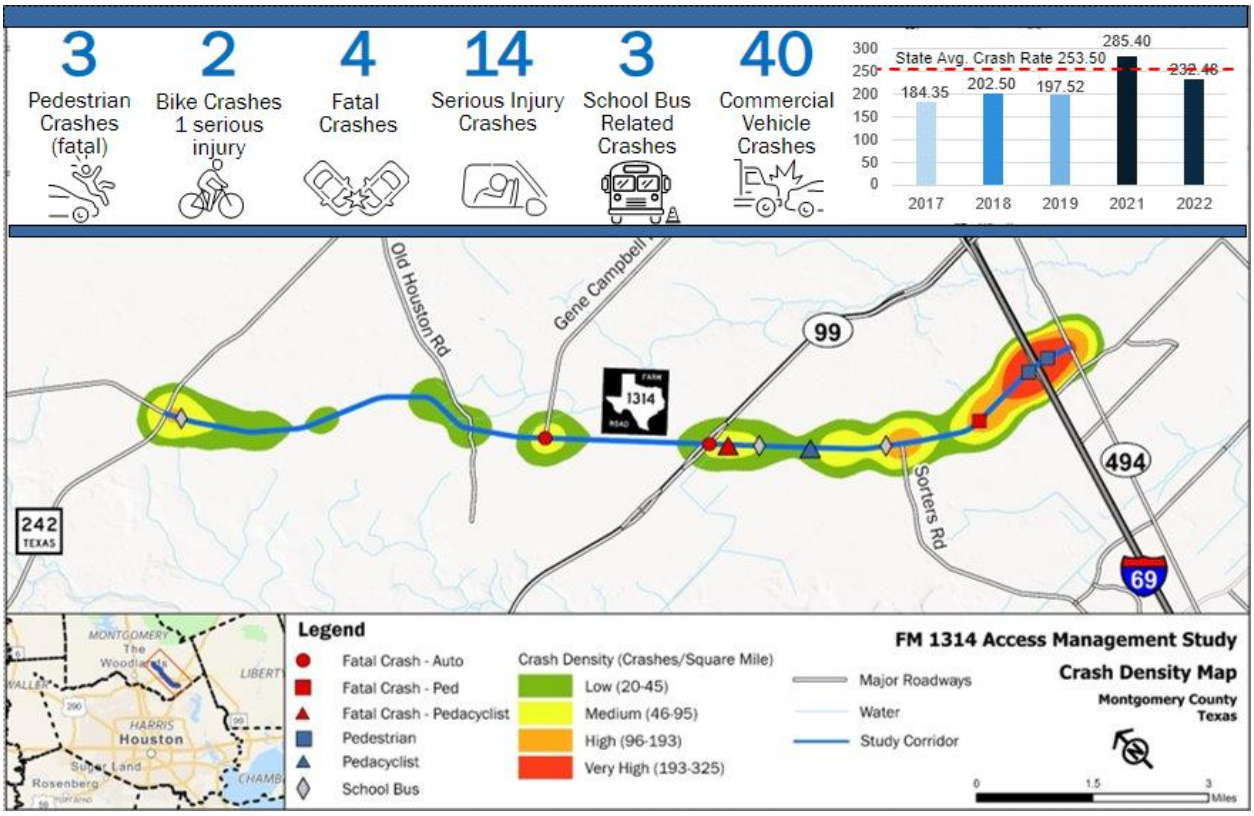


Figure 7-2 Crash Hot Spot Density

b. Crash Rates by Location Segment

According to the 2019 TxDOT statewide traffic crash summary[3], the statewide average crash rate for an FM road is 253.49 crashes per 100 million vehicle miles travelled (100 MVMT). The crash rate for the FM 1314 study corridor is 201.90 per 100 MVMT. The crash rate is 32.55 and 29.92 for opposite direction and non-opposite direction left turn crashes, respectively, per 100 MVMT.

The study corridor was analyzed as smaller segments due to difference in geometry, operating characteristics, and traffic volumes based on land use and driveway access. The six segments are defined below:

- Segment 1: SH 242 to North of Jim Stowe Rd
- Segment 2: North of Jim Stowe Rd to Old Houston Rd
- Segment 3: Old Houston Rd to Fern Drive (Dr)
- Segment 4: Ferne Dr to Sorters Rd
- Segment 5: Sorters Rd to IH 69 SBFR
- Segment 6: IH 69 SBFR to SL 494

[3] https://ftp.txdot.gov/pub/txdot-info/trf/crash_statistics/2019/02.pdf

Crash rates were calculated for the six separate segments and are provided in **Table** 7-1. Access density increases along the study corridor starting from the northern limit (SH 242) towards the south end of the study corridor (SL 494). As seen from **Figure** 7-3, the segment from IH 69 SBFR to SL 494 experienced an average crash rate that was almost five times the statewide average crash rate for an urban FM facility, with very high crash rates for opposite and non-opposite left turn crashes. The segment from Sorters Rd to IH 69 SBFR also had a crash rate higher than the statewide average for an FM urban facility. Safety improvements are necessary to reduce the crash rates at these segments.

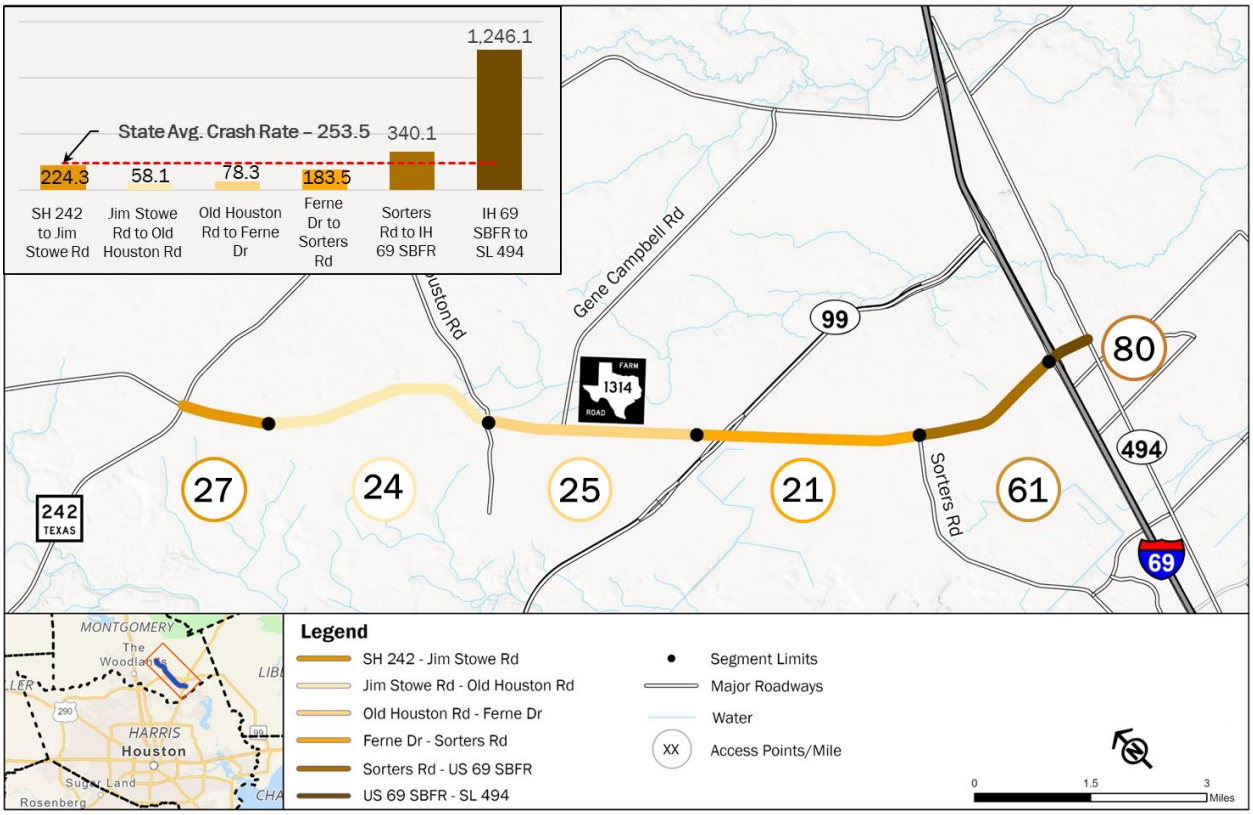


Figure 7-3 Crash Rates Per 100 million Vehicle Miles Traveled by Segment

Table 7-1 Crash Rates by Segments

Segment	AADT (2019)	Access Density (No. of access points per mile)	Crash Counts (2017-2019)			Crash Rates Per 100 MVMT		
			Total	Opposite	Non-Opposite Left Turn	Total	Opposite	Non-Opposite Left Turn
SH 242 – Jim Stowe Rd	20,500	27	71	6	3	224.32	18.96	9.48
Jim Stowe Rd – Old	20,500	24	34	3	9	58.10	5.13	15.38

Houston Rd								
Old Houston Rd – Ferne Dr	23,013	25	50	10	5	78.33	15.67	7.83
Ferne Dr – Sorters Rd	23,013	21	125	17	13	183.52	24.96	19.09
Sorters Rd – IH 69 SBFR	36,418	61	247	25	43	340.14	34.43	59.21
IH 69 SBFR – SL 494	17,185	80	102	31	21	1246.08	378.71	256.55

c. Crashes by Location and Type (2017-2019)

Crashes by location are provided in **Table** 7-2**.** About 43% of crashes occurred at intersections and 57% of crashes occurred along the FM 1314 segments. Of the 357 segment crashes, 135 crashes (38%) occurred at the access points.

Table 7-2 Crash Counts by Location

Crash Location	Crash Counts	% Crashes
Intersection	272	43%
Segment	357	57%

All intersection crashes are provided in **Table** 7-3**.** Of the intersection crashes, most occurred at the FM 1314 and IH 69 SB interchange. The FM 1314 intersection with SL 494 has the second highest crash counts. Other than these intersections, SH 242, Old Houston Rd, Gene Campbell, Spartan Dr/Riverwalk Dr, Sorters Rd, Old Sorters Rd, Church St, and Kelly Joe Smith Rd each has more than ten crashes over the three-year period.

Table 7-3 Intersection Crashes

S. No	Intersection	Crash Counts	Same Direction	Angle Crash	Opposite Direction	Roadway Lane Departure	Single Vehicle	Other
1	SH 242	**10**	8	2				
2	Strausie Ln	**2**		1	1			

S. No	Intersection	Crash Counts	Same Direction	Angle Crash	Opposite Direction	Roadway Lane Departure	Single Vehicle	Other
3	Allendale Ln	1			1			
4	Greenleaf Dr/Greenbough St	4	3				1	
5	Jim Stowe Rd	4		4				
6	Calhoun Rd	3	1		1			1
7	Village Woods Dr	1	1					
8	Village Way	4		4				
9	Old Houston Rd	10		10				
10	Gene Campbell Rd	13	4	6	3			
11	Porter Ln	5	3		2			
12	Rolling Hills Dr	4		2	2			
13	Copeland Ln	1			1			
14	Ferne Dr	2		2				
15	SH 99 WB Frontage Rd	3	3					
16	SH 99 EB Frontage Rd	5	4		1			
17	Cumberland Blvd/Painted Blvd	6	5	1				
18	Timberland Blvd	7	6	1				
19	Lazy Ln	2		1	1			
20	Spartan Dr/Riverwalk Dr	16	13	1		2		
21	Fatheree Dr	5	1	4				
22	Sorters Rd	17	6	5	6			
23	Kennedy Ln	1	1					
24	Old Sorters Rd	11	5	5	1			
25	Briar Tree Dr	1	1					
26	Partners Way	3	2		1			
27	Church St	21		19	1		1	
28	IH 69 SB Frontage Rd	45	40	2	2	1		
29	IH 69 NB Frontage Rd	1	1					

S. No	Intersection	Crash Counts	Same Direction	Angle Crash	Opposite Direction	Roadway Lane Departure	Single Vehicle	Other
30	Kelly Joe Smith Rd	13	1	7	3		1	1
31	Commerce Ave	6	2	2	2			
32	SL 494	40	12	1	25	2		

Most of the crashes along the study corridor occurred traveling in the same direction or colliding at an angle as shown in **Table** 7-4**.** Same direction crashes include same direction side swipe and rear end crashes. The occurrence of opposite direction left turn and some angle crashes may be attributed to the presence of TWLTL. Most of the angle crash (75%) and opposite direction (77%) crashes occurred between Sorters Road and SL 494. About 44% of same direction crashes occurred between Old Sorters Road and SL 494, and another 17% occurred between SH 242 and Stowe Road. Half of the roadway and lane departure crashes (50%) occurred between SH 242 and Old Houston Road, and another 43% occurred between SH 99 and US 59. No dominant section was observed for single vehicle crashes along the corridor.

Table 7-4 Crash Counts by Type

Crash Type	Crash Counts	% Crash
Angle Crash	184	29%
Opposite Direction	82	13%
Same Direction	305	49%
Roadway and Lane Departure	46	7%
Single Vehicle Crash	9	1%
Other	3	<1%
Total	629	100%

d. Crash by Time of Day and Lighting Conditions (2017-2019)

As shown in **Figure** 7-4, most of the crashes occurred between 7:00 AM in the morning to 7:00 PM in the evening. The peak periods for crashes are 7:00 to 10:00 AM and from 4:00 to 7:00 PM, shown in a different color in **Figure** 7-4.

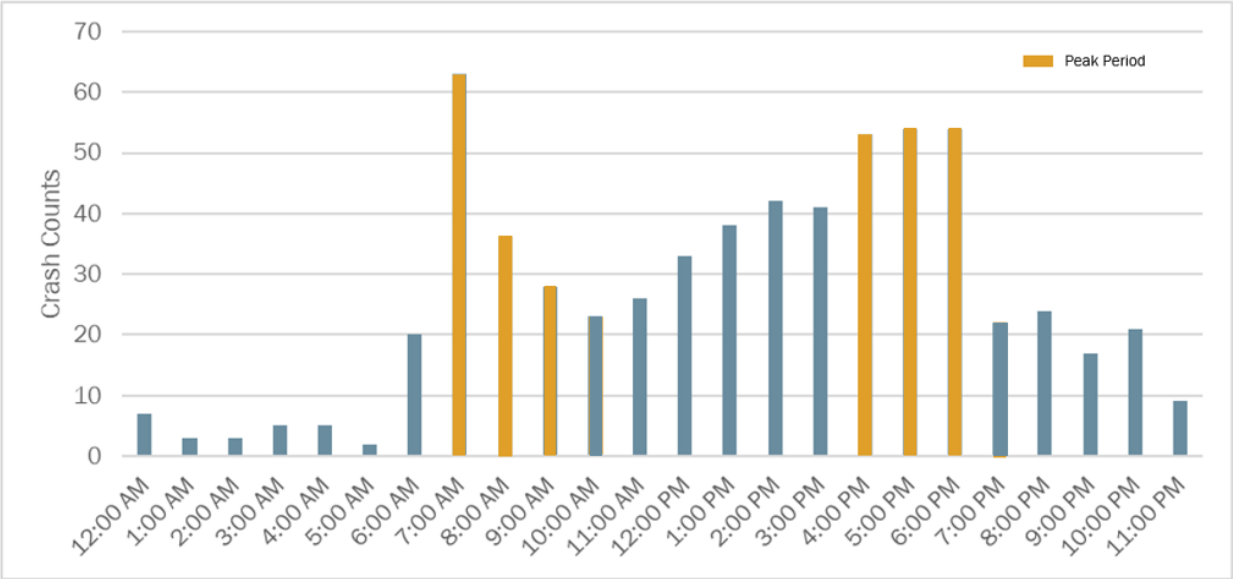


Figure 7-4 Number of Crashes by Time of Day

From the crash data, as seen in **Table** 7-5, out of 629 crashes from 2017 to 2019, 75% occurred in the daylight and 23% occurred under dark conditions.

Table 7-5 Crash Counts by Lightning Conditions

Lighting Condition	Crash Counts	% Crash
Dark, lighted	98	16%
Dark, not lighted	43	7%
Dark, unknown lighting	1	<1%
Dawn	7	1%
Daylight	470	75%
Dusk	9	1%
Other	1	<1%
Total	629	100%

e. Recent Crash Trend (2017-2022)

The study team also analyzed the most recent crash trends through 2022. **Table** 7-6 provides crash counts by severity and year. There were 30 severe injury crashes and 116 other minor injury crashes along the study corridor. A total of nine severe injury crashes occurred in 2022. About 71% (970) of crashes are property damage crashes only.

Table 7-6 Crash Counts by Severity

Crash Severity	2017	2018	2019	2020	2021	2022	% (Sum Of All Years)
Fatal Crashes	2	1	1	1	1	2	1%
Severe Injury	4	5	5	3	4	9	2%
Minor Injury	20	24	21	9	14	28	9%
Possible Injury	29	45	38	29	43	30	16%
Property Damage Only	138	145	140	140	231	176	71%
Unknown	6	4	1	4	5	0	1%
Total	199	224	206	186	298	245	100%

Of the total 1,358 recorded crashes during the period 2017 to 2022, there were eight fatal crashes. Of the eight fatal crashes, three were due to failure to give right of way to other vehicles, two were due to disregarding stop and go signals, two occurred when a pedestrian failed to yield the right of way to a vehicle and the other was due to driver fatigue resulting in a collision with a bicyclist. The two fatal crashes where stop and go signals were disregarded occurred at intersections, while the other six occurred along the roadway segment or driveway access.

Table 7-7 provides primary contributing causes of all crashes by year. Failing to control speed and failing to yield right of way are the top primary contributing causes to crashes.

Table 7-7 Primary Contributing Factor by Year

Primary Contributing Cause	2017	2018	2019	2020	2021	2022	% (Sum Of All Years)
1. Change Lane When Unsafe	12	17	10	18	21	15	7%
2. Disregard Sign and Signal	11	18	12	13	13	11	6%
3. Driver Inattention	12	14	12	17	36	12	7%
4. Failed to Control Speed	76	69	66	49	70	77	30%
5. Failed to Yield Right of Way	52	58	61	52	82	61	27%
6. Turned Improperly/Unsafe	9	9	5	8	17	15	5%
7. All Other	27	39	40	29	59	54	18%
Total	199	224	206	186	298	245	100%

Table 7-8 provides crash counts and rates for total, opposite, and non-opposite left turn crashes. Crash counts and rates for the year 2020 are excluded from this table due to the atypical number of crashes experienced during this year. From the table, at least 25% of all crashes that occurred were either opposite direction crashes or non-opposite left turn crashes which may be due to the presence of the TWLTL along the FM 1314 study corridor.

Table 7-8 Crash Counts and Rates by Year for Total, Opposite, and Non-Opposite LT Crashes

Year	Total Crash Counts	Number of Opposite Crash Counts	Number of Non-Opposite LT Crash Counts	Percent of Opposite and Non-Opposite LT Crash Counts	Total Crash Rates (Per 100M VMT)	Opposite Crash Rates (Per 100M VMT)	Non-Opposite LT Crash Rates (Per 100M VMT)
2017	199	22	25	25%	184.35	24.31	23.48
2018	224	39	32	32%	202.50	36.71	28.06
2019	206	30	37	33%	197.52	30.34	34.76
2021	298	39	59	33%	285.40	42.68	51.78
2022	245	24	42	27%	232.48	26.57	36.80

Key takeaways from the recent crash trends are as follows:

- Crash counts and crash rates before 2020 are lower than after 2020.
- Crash counts and crash rates are highest in 2021 and 2022, including opposite and non-opposite LT crashes.
- 1 or 2 fatal crashes per year have occurred from 2017 to 2022.
- Severe injury crash counts are highest in 2022.
- Most common contributing factors include failure to control speed and failure to yield right of way every year.
- Other contributing factors are changing lanes when unsafe, disregarding sign and signals, driver inattention, and turning improperly.

Outcomes from the crash data analysis will be integrated with speed and time and other analysis results to determine proposed solutions for the corridor and specific capacity-lacking intersections.

8 PROPOSED IMPROVEMENTS

a. Design Criteria

The December 2022 TxDOT Roadway Design Manual[4] was referenced to align the design of roadway improvements with TxDOT design standards. **Table** 8-1 provides the design criteria used for the design of the FM 1314 Access Management Study proposed improvements.

Table 8-1 Design Criteria

Item	Design Value	Reference
Functional Class	Arterial	RDM
Roadway Elements	N/A	N/A
Travel Lane Width	12 feet	RDM Table 3-1
Turn Lane Length (right or left) (various speeds)[1]	Varies	RDM Table 3-3
Turn Lane Width	12 feet	RDM Table 3-1
Shoulder Width	12 feet	RDM Table 3-1
Offset to Face of Curb	1 foot	RDM Table 3-1
Clear Sidewalk Width	6 feet	RDM Table 3-1
Shared-Use Sidepath Width	10 feet	BADG
Median Width (Based on Existing Roadway Width)	14 feet and 32 feet	RDM Chapter 3, Section 2
Channelizing Island Area (Urban)	50 ft[2]	RDM Chapter 7, Section 7
Turn Lane Taper Length	100-foot single left turn 150-foot dual left turn	RDM Table 3-3 RDM Table 3-4
Shifting Taper Length	Calculated	MUTCD
Design Vehicle	N/A	N/A
Design Vehicle for Turns at Major Intersections	WB-67	AASHTO Chapter 2
Design Vehicle for Turns at Minor Intersections	S-BUS-40	AASHTO Chapter 2

[4] *TxDOT Roadway Design Manual, December 2022 Retrieved from http://onlinemanuals.txdot.gov/TxDOTOnlineManuals/TxDOTManuals/rdw/index.htm*

Item	Design Value	Reference
Design Vehicle for Truck Loon within ROW	SU-30	Calculated
Design Vehicle for U-Turns within Shoulder	Passenger	Calculated
Miscellaneous	N/A	N/A
Clear Zone Width	30 feet	RDM Table 2-12
Stopping Sight Distance (55 mph)	495 feet	RDM Table 2-1
Stopping Sight Distance (45 mph)	360 feet	RDM Table 2-1
Crest Curve K-Value (Open Ditch; 60 mph)	151	RDM Figure 2-6
Sag Curve K-Value (Open Ditch; 60 mph)	136	RDM Figure 2-7
Cross Slopes	N/A	N/A
Pavement Cross Slope	0.02 ft./ft.	RDM Page 2-37
Side Slopes (with Ditches)	6:1 usual, 4:1 maximum	RDM Page 2-52, 2-53

References:

RDM – TxDOT Roadway Design Manual, December 2022

AASHTO – A Policy on Geometric Design of Highways and Streets, 2011, 6th Edition

MUTCD – Manual on Uniform Traffic Control Devices, 2009

NACTO – National Association of City Transportation Officials, Urban Bikeway Design Guide

BADG – TxDOT Bicycle Accommodation Design Guidance, 2011

[1]Deceleration lane widths were reduced based on engineering judgement where geometric constrains would allow for the full turn lane width

b. Intersection Improvement Strategy

This section describes the process followed to identify solutions at intersections within the study corridor. Existing conditions identified issues to be addressed. The issues were identified through one of the following sources:

- Traffic operational analysis conducted on existing conditions-identified locations with significant delay or high number of crashes, detailed in Sections 3 through 7 of this report.
- Signal warrant and turn volume analysis executed on observed counts and project future volumes at intersections, which proposes a new traffic signal study at intersection demands meeting the signal warrants and new exclusive turn lanes for intersection approaches over

300 vehicles in peak hour.

- Public comments received during the public involvement process.
- Field observations performed at the site visit.
- Existing as-built drawings.

The study team reviewed existing transportation plans to confirm proposed improvements are consistent with the existing committed project. The current project is from SH 242 to McQueen Rd. This project includes adding wider shoulder, a shared use side path to the north and sidewalk to the south of FM 1314. Committed UTP and RTP projects along the study corridor are regarded as a No-Build future condition.

However, other existing transportation plans, such as the Montgomery County Throughfare Plan and local traffic impact studies, lack details such as funding allocations and schedules. Improvements for these transportation plans are considered but may not be adopted as proposed improvements for this study because of the lack of these elements.

Applicable access management strategies were identified for issues along the corridor. **Table** 8-2 shows the applicable access management strategies for the study. These strategies were analyzed in detail to propose the initial short-, mid-, and long-range improvements and recommendations for the FM 1314 corridor.

Table 8-2 Intersection Improvement Strategy

Strategy	Effect
New Traffic Signal	▪ Reduce intersection delay and queuing ▪ Reduce intersection crash
Revise Signal Timing Plan	▪ Reduce intersection delay
New Turn Lane/Extend Existing Turn Lane	▪ Maintain clearance of turning vehicles from through traffic
Reconfigure Intersection	▪ Provide safer turns for large vehicles ▪ Realign intersections to 90 degrees
Lighting	▪ Increase visibility at night
Signage/Marking	▪ Advance warnings of fire stations, lane changes, or other hazards ▪ Restore faded markings
Raised Median Opening	▪ Allow left turn at raised median

Driveway Consolidation/Sharing	▪ Reduce crashes ▪ Improve traffic flow and speed
Pedestrian Crosswalk	▪ Provide safety for bikes and pedestrians crossing the road
Shared-Used Sidepath	▪ Provide a safe and exclusive path for bikes and pedestrians ▪ Separate bikes and pedestrians from vehicles

An open public involvement process was conducted to gather feedback from local jurisdictions, first responders, school districts, bike and pedestrian organizations, business interests, and the public on initial proposed improvements. Improvements and recommendations were revised based on comments received during the public involvement process.

c. Development of Short-, Mid-, and Long-Range Improvements

A thorough analysis was conducted analyzing current and projected traffic conditions, public input received from the first public meeting, input/feedback received from the steering committee members, and stakeholders' proposed improvements that align with the broader transportation planning goals. This analysis assisted in the development of developing the short-, mid-, and long-range improvements of the FM 1314 corridor, which considered different time horizons and scales of intervention. These are categorized as:

i. Short-Range Improvements

- ROW acquisition is not required or very limited
- Cost-effective safety or mobility improvements
- Can be implemented within 5 years

- Mid-Range Improvements
- Minimal or no ROW acquisition may be required
- Considers more extensive geometric changes
- Additional studies before construction approval may be required
- Coordination between different parties may be needed
- Usually takes 5 to 10 years from now to complete

ii. Long-Range Improvements

- ROW acquisition is required
- Major reconstruction addressing structural deficiencies and accommodate long-term growth
- Land use and zoning changes
- Often takes more than 10 years from now to complete

d. Short-Range Improvements

Short-range improvements have a low cost, high impact, require no or minimal additional ROW, and can typically be implemented quickly within 0 to 5 years. The short-range improvements and typical application techniques are presented in this section. The proposed short-range improvements are shown and called out on the improvement layouts included in Appendix L.

i. Raised Medians

Section 7 of the report finds that, despite the presence of existing TWLTLs, crash rates on FM 1314 between IH 69 Southbound Frontage Rd (SBFR) and SL 494 reach more than five times the State average rate. This study proposes raised medians with varying lengths throughout the corridor, providing U-turn access at signalized intersections.

The installation of raised medians serves to decrease the number of conflict points for left-turning vehicles, thereby minimizing the risk of side-impact and head-on collisions. Intersections inherently harbor various conflict points where vehicles could collide with one another at any time. According to the Transportation Research Board's *Access Management Application Guideline 2016*, raised medians have the potential to eliminate the number of close-proximity conflicting movements, simplifying driving tasks for drivers and reducing the chance of crashes caused by human error. Proposed raised medians at select locations along the corridor could substantially reduce the number of conflict points by approximately 70 to 80%, while also providing protection for pedestrians crossing the corridor.

Figure 8-1 illustrates the positive outcomes of crash reduction through median treatment. TxDOT's *Roadway Design Manual (RDM) 2022* recommends raised medians for roads with average daily traffic (ADT) exceeding 20,000 vehicles per day and high demand for mid-block turning movements. The ADT for the FM 1314 corridor exceeds the threshold, ranging between 20,000 and 24,000 vehicles per day. Drawing from studies in TxDOT's *Access Management Manual, July 2011 edition,* roadways with non-traversable medians exhibit an average crash rate about 30% less than roadways with TWLTLs. FHWA's *Benefits of Access Management* brochure reinforces this statistic through an analysis of crash data across seven states, stating that raised medians reduced crashes by over 40% in urban areas and over 60% in rural areas. Therefore, a raised concrete median is proposed for the corridor to replace the existing TWLTL to reduce the conflict points along the corridor, enhance traffic operations, and improve safety.

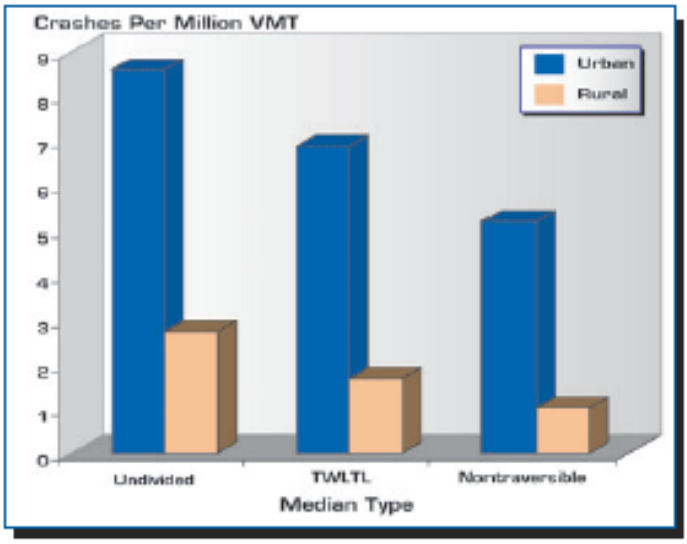


Figure 8-1 Crash Reduction by Median Treatment

Image Source: Benefits of Access Management Brochure, FHWA Publications[5]

ii. Business Concerns with Raised Medians

Despite initial concerns raised by the public and business owners regarding raised medians, various surveys of business owners demonstrate that raised median improvements have not led to a decline

[5] *https://safety.fhwa.dot.gov/geometric/pubs/*

in sales. In fact, some business owners express a belief that the changes contributed to improvements in overall sales. (*Source:* Benefits of Access Management Brochure, FHWA Publications, *https://safety.fhwa.dot.gov/geometric/pubs/*)

H-GAC, a regional government organization, compared taxable sales on three corridors (FM 1093, FM 1960, and FM 518) before and after the corridors received median treatments such as new medians or closing existing median openings. The study found that a "majority of segments and business categories studies for three corridors largely mirror taxable sales growth trends in the zip code control zones" (Source: Evaluation of Access Management Final Report, Benz, Stevens, Manak and Voigt, Texas A&M Transportation Institute Houston Research & Implementation Office, Houston-Galveston Area Council, https://www.h-gac.com/getmedia/0a9401b3-96fb-45d9-8098-a582b777042d/Access%20Management%20Evaluation%20Report.pdf), meaning that raised medians did not have a distinct impact on sales compared to the overall sales trends in these areas. Therefore, medians did not serve as a contributing factor to changes in taxable sales.

For the segment along FM 1314 from IH 69 to SL 494, a 14-foot raised median with a 0.5-foot curb offset, 4-foot buffer and 10-foot shared use path on each side is proposed to replace the existing 16-foot TWLTL and 13-foot outside lanes, as shown in the typical section in **Figure** 8-2. At locations where a left-turn lane is proposed, a 12-foot turn lane with a 2-foot median is accommodated. The proposed short-range improvements with raised medians from SL 494 Road to Gene Campbell are shown on the improvement layouts included in **Appendix L**.

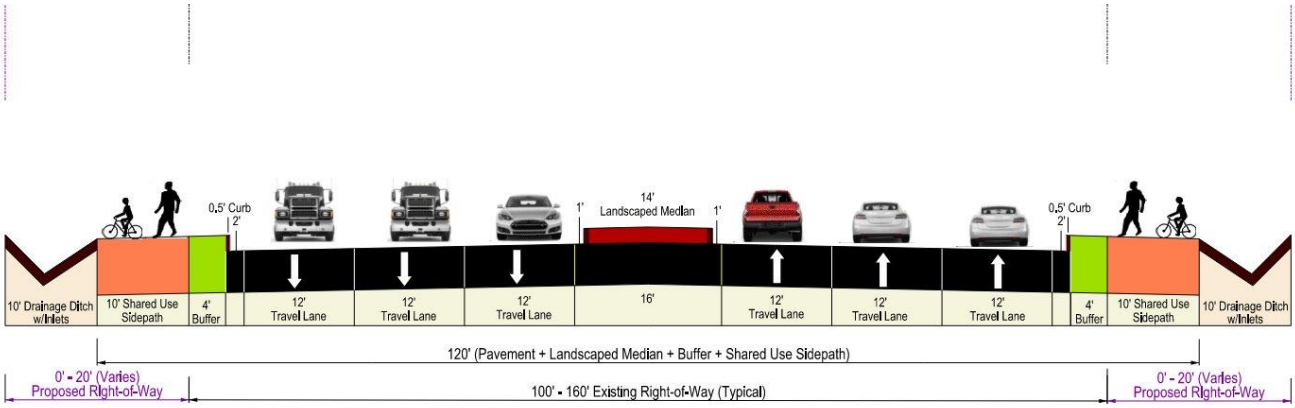


Figure 8-2 Farm-To-Market Road 1314 Proposed Typical Section with Raised Median from IH 69 to State Loop 494

Left-turn lanes with storage lengths exist at most intersections with and without existing traffic signals. Hooded left-turn openings exist at limited unsignalized locations to avoid conflict points and improve safety along the corridor. A standard four-legged intersection has 32 conflict points. Dual hooded left-turn openings, as shown in **Figure 8-3**, have only 16 conflict points, a 50% reduction. Hooded left-turn openings restrict the cross street left-turn maneuver; therefore, traffic would make a right turn and continue along the corridor to make a U-turn at a downstream median opening.

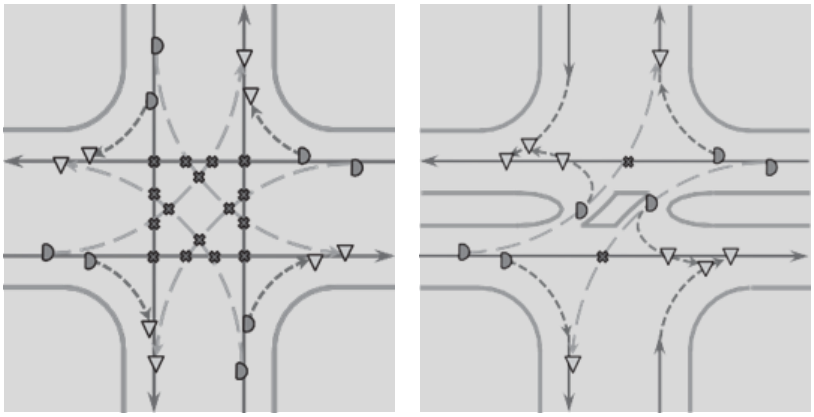


Figure 8-3 Conflict Points with No Median and Hooded Left Turns

A passenger vehicle can make a U-turn within the existing pavement with restricted movement for U-turns. For any larger design vehicles, the U-turn movements might require additional ROW.

The raised median openings are provided along FM 1314 corridor from Ferne Dr to SL 494 at the following intersections/locations, as shown in **Figure 8-4**:

- west and east of Painted Blvd
- west of Wood Hollow Dr
- Wood Hallow Dr
- Lazy Ln
- Kennedy Ln
- Andrew Ln
- FM 1314 Mini Storage
- Briar Tree Dr
- Mayer Rd
- Village Dr.
- Porterwood Shopping Center
- Public Storage

Figure 8-4 Short-Term Raised Median Openings

iii. Dedicated Turn-Lanes

Dedicated turn lanes remove turning vehicles from travel lanes provide more capacity for turning vehicles at intersections, reducing congestion. Based on existing conditions analysis results and feedback received from the public involvement process, dedicated turn lanes were identified to improve traffic operations at intersections.

The following short-range improvements are proposed for FM 1314 from SH 242 to SL 494:

- Dedicated right-turn lane northbound and eastbound at SL 242
- Dedicated left-turn lane westbound at Old Houston Rd

iv. Hooded and Protected Turns

The existing TWLTL provides storage capacity for left-turning vehicles at signalized intersections and other access points along the corridor. With the transition to a raised median, left-turn lane lengths have been calculated **(see Appendix I)** to align with peak traffic demands and adhere to TxDOT's RDM standards. Based on existing conditions analysis results and feedback received from the public involvement process, hooded and protected left turns identified to improve traffic operations at intersections. **Figure** 8-5 shows an example of the hooded left turn design.

The following short-range improvements are proposed for FM 1314 from SH 242 to SL 494:

- Hooded left turn at Louis Ln
- Protected left turn at Rolling Hills Dr
- Protected left turn at Northgate Ln
- Hooded left turn at Lazy Ln
- Hooded left turn at Porterwood Shopping Center
- Protected left turn at Public Storage

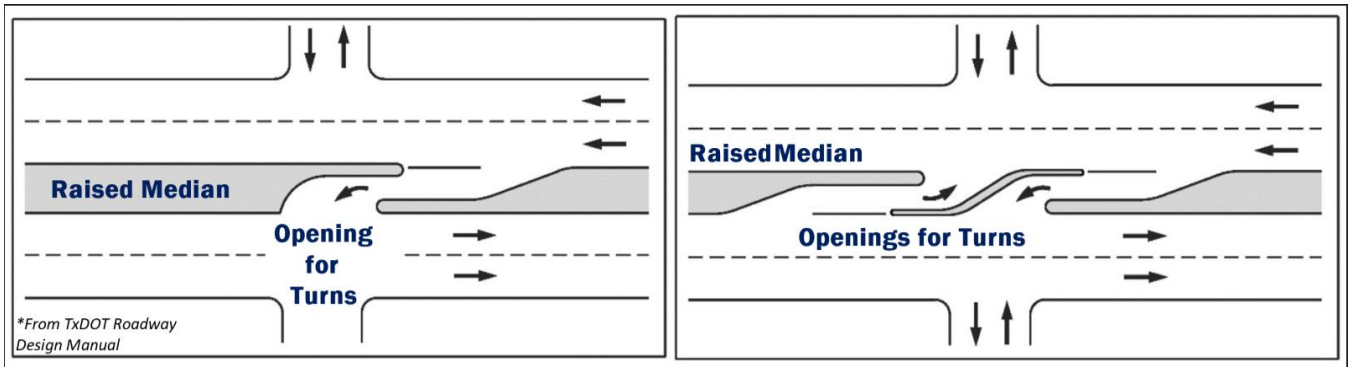


Figure 8-5 Example of Hooded Left Turn

v. *Additional Travel Lane*

Based on information in Section 6, an additional travel lane is recommended in the northbound direction at the FM 1314 and SH 242 intersection.

vi. *Shared-Use Sidepaths*

Currently, FM 1314 has limited sidewalks and crosswalks, and no bicycle infrastructure, despite the presence of three schools, several businesses, and various residential areas along the study corridor. Sidewalks are only present on both sides at the southern end of FM 1314 between Briar Tree Dr and SL 494. Bike paths are present on the northern and southern end of the study corridor. As part of the short-term improvements, sidewalks are recommended southbound from SH 242 to Village Woods Dr. These sidewalks will begin to connect the bicycle infrastructure outside of the study corridor to the residential and commercial areas within the corridor.

A 10-foot shared-use sidepath is recommended to improve transportation mode choices and access to developments along the corridor. An example section of FM 1314 with the proposed shared-use sidepath is illustrated in Figure 8-6. These areas are within ROW and are proposed as part of the short-term improvements at the following locations:

- SH 242 to Village Way Dr (northbound)
- Old Houston Rd to south of Louis Ln (both sides)
- Mills Rd to north of Briar Tree Dr (both sides)
- Briar Tree Dr to SL 494 (both sides)

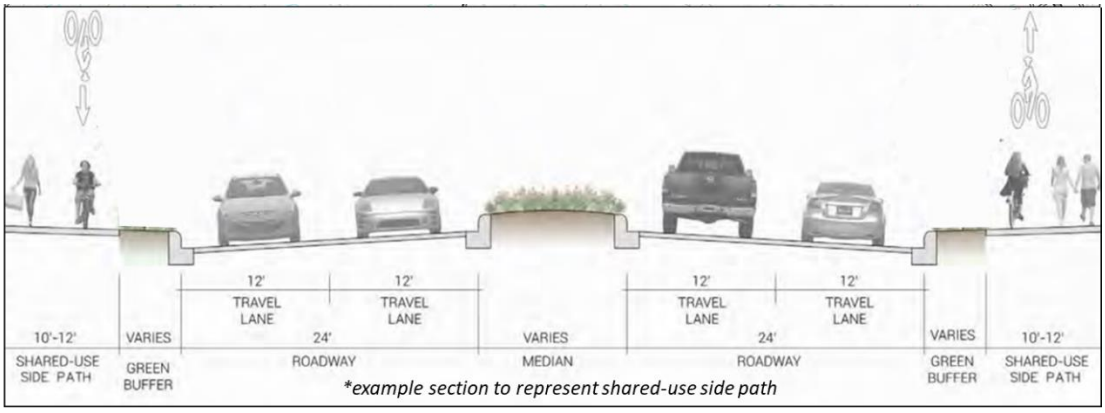


Figure 8-6 Shared-Use Sidepath Example Section

vii. Signage Improvements

Signage improvements along FM 1314 will provide necessary information to drivers to enhance safety. The following signage improvements are recommended along FM 1314 corridor at selected locations.

- Replace speed limit signage throughout corridor
- Advance signing for school speed at Fatheree Dr
- Provide signing for access to Porter High School
- Improve Signage for Porter High School and Sorters Mill Elementary at Sorters Rd/Mills Rd
- Enhance school speed limit signs with warning lights at Riverwalk Dr

viii. Pavement Marking Improvements

The pavement markings are revised and updated per the proposed improvements throughout the corridor as shown on the improvement layouts included in Appendix L. Additionally, recommended upgrades to the pavement markings include the following to improve clarity for lane identification and visibility in low-light conditions.

1. Lane markings
2. Turn arrow markings
3. Cross walks
4. Yield arrow markings
5. Stop bars

Specific locations for pavement marking improvements include Old Sorter Rd/Valley Ranch Pkwy, Partners Way, Church St, and the IH 69 interchange. The addition of pavement markings and a crosswalk are recommended at Fatheree Dr along Sorters Mill Elementary access roads at the northbound approach.

ix. Illumination

Currently, there are no planned projects to install or upgrade roadway lighting on FM 1314. Lighting can primarily provide improved visibility for drivers at intersections. Street lighting is recommended at Village Way as a part of short-term improvements to provide visibility and safety for all users.

x. Emergency Flashing Signals

There are currently no signs or flashing lights indicating the location of fire stations along FM 1314. Emergency vehicle traffic control signals are proposed at the following location to permit access for emergency vehicles:

- Porter Fire Department (south of Rolling Hills Dr)

An example of an emergency flashing signal is provided in Error! Reference source not found..

Figure 8-7 Emergency Flashing Signal

xi. Traffic Signals

Based on the results of the existing traffic analysis and comments from the public involvement process, a new traffic signal is proposed (see Appendix J) at the following intersections/locations:

- Artavia Development
- Old Houston Rd
- FM 1314 and Gene Campbell Blvd
- Ferne Dr
- SH 99/Grand Pkwy
- Painted Blvd
- Timberland Blvd
- Spartan Rd
- Mills Rd/Sorters Rd
- Valley Ranch Pkwy/Old Sorters Rd
- Partners Way

- FM 1314 and IH 69
- Commerce Ave

xii. Signal Timing Optimization

Signal timing optimization is recommended at all signalized intersections along the corridor including the following locations to improve mobility of both FM 1314 main lanes as well as cross streets.

- FM 1314 at SH 242
- FM 1314 at Old Houston Rd
- FM 1314 at Gene Campbell Rd
- FM 1314 at SH 99/Grand Pkwy
- FM 1314 at Cumberland/Painted Blvd
- FM 1314 at Timberland Blvd
- FM 1314 at Riverwalk/Spartan Dr
- FM 1314 at Sorters Rd
- FM 1314 at Valley Ranch Pkwy/Old Sorters Rd
- FM 1314 at Partners Way
- FM 1314 at IH 69
- FM 1314 at Commerce Ave
- FM 1314 at FL 494

e. Medium-Range Improvements

Medium-range improvements typically require coordination with other agencies (utilities, property owners, etc.) and can typically be implemented within 5 to 10 years. Mid-range improvements and typical application techniques are presented in this section. The proposed mid-range improvements are shown and called out on the improvement layouts included in Appendix L.

i. Raised Medians

Raised medians with varying lengths are proposed throughout the 12-mile corridor from SH 242 to SL 494, providing U-turn access at signalized intersections. Raised median openings are proposed at the following intersections/locations:

1. Ferne Dr
2. West of Wood Hollow Dr
3. Wood Hallow Dr
4. Lazy Ln
5. Kennedy Ln
6. Andrew Ln
7. FM 1314 Mini Storage

8. Briar Tree Dr
9. Mayer Rd
10. Village Dr
11. Porterwood Shopping Center
12. Public Storage

ii. Hooded and Protected Turns

The existing TWLTL provides storage capacity for left-turning vehicles at signalized intersections and other access points along the corridor. With the transition to a raised median, left-turn lane lengths and U-turn access have been calculated **(see Appendix I)** to align with peak traffic demands and adhere to TxDOT's RDM standards. Based on existing conditions analysis results and feedback received from the public involvement process, hooded and protected left turns identified to improve traffic operations at intersections.

The following short-range improvements are proposed for FM 1314 from SH 242 to SL 494:

- Hooded left turn at Strausie Ln
- Hooded left turn at Allendale Ln
- Hooded left turn at Greenough St
- Protected left turn at Calhoun Rd
- Protected left turn at McQueen Rd
- Protected left turn with U-turn access at Woodridge Dr
- Hooded left turn at Woodridge Cir/Clark St

iii. Shared-Use Sidepaths

Currently, FM 1314 has limited sidewalks and crosswalks, and no bicycle infrastructure, despite the presence of three schools, several businesses, and various residential areas along the study corridor. Sidewalks are only present on both sides at the southern end of FM 1314 between Briar Tree Dr and SL 494. Bike paths are present on the northern and southern end of the study corridor. As part of the short-term improvements, sidewalks are recommended southbound from south of Calhoun Rd to McQueen Rd.

A 10-foot shared-use sidepath is recommended to improve transportation mode choices and access to developments along the corridor. These areas are within ROW and are proposed as part of the short-term improvements at the following locations:

- South of Calhoun Rd to McQueen Rd (northbound)
- McQueen Rd to Old Houston Rd (both sides)
- South of Louis Ln to south of Wood Hallow Dr

iv. Traffic Signals

Based on the results of the existing traffic analysis and comments from the public involvement process, a new traffic signal is proposed (see Appendix J) as part of the mid-term improvements at FM 1314 and SL 494.

v. Drainage Study

A drainage study is recommended along the FM 1314 corridor to evaluate the existing ditch capacity, confirm that existing storm sewers located along the FM 1314 corridor have capacity to carry additional drainage volumes from existing ditches/swales, and determine potential additional drainage infrastructure improvements. A 10-foot shared-use sidepath is recommended, as mentioned in Section d.vi replacing the existing ditches. Figure 8-8 shows the proposed typical section with this configuration.

vi. Driveway Consolidation

The process of driveway consolidation involves the relocation, removal, or sharing of existing driveways to reduce the number of conflict points and improve safety along the corridor. This mid-range solution requires coordination with property owners and regulating agencies. This study recommends consolidating driveways featuring right-in and right-out movements, requiring initial coordination with property owners. The implementation of driveway consolidation and sharing is further addressed in long-range improvements.

f. Long-Range Improvements

Long-range improvements typically have higher costs, require coordination with other agencies (utilities, property owners, etc.), require acquisition of proposed ROW and or further study, and can typically be implemented within 10 or more years. The long-range improvements and typical application techniques are presented in this section. The proposed long-range improvements are shown and called out on the improvement layouts included in Appendix L.

i. Widening to Three Lanes with a 12-Foot Shoulder

The proposed long-range improvements recommend reconstruction of the existing FM 1314 corridor and widening of the corridor from Gene Campbell Blvd to IH 69. The recommendations propose reconstruction of Gene Campbell to Sorters Rd from its current two-lane roadway with a continuous TWLTL in the middle to a three-lane section with 12-foot shoulders, 16-foot raised medians, 10-foot shared-use sidepaths, and 10-foot open ditches for drainage. Figure 8-8 shows the proposed typical section for Gene Campbell to Sorters Rd. Figure 8-9 shows the proposed typical section from Sorters Rd to IH 69. Twenty-feet of new ROW is proposed for the reconstruction of Sorters Rd to IH-69 from its current two-lane asphalt roadway with a continuous TWLTL in the middle and 4.5-foot sidewalks on either side to a three-lane roadway with 16-foot raised medians and 2-foot shoulders, 0.5-foot curb, 4-foot buffer, 10-foot shared-use sidepath, and 10-foot ditches with inlets for drainage on either side. Figure 8-7 shows the proposed typical section for Sorters Rd to IH-69. An installation of 12-foot shoulders is also recommended from McQueen Rd to Sorters Rd.

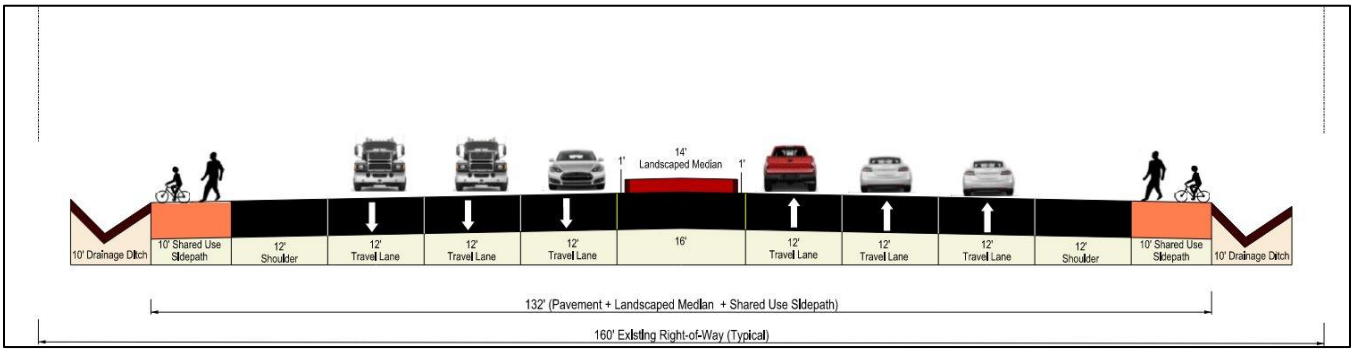


Figure 8-8 Proposed Section from Gene Campbell to Sorters Rd

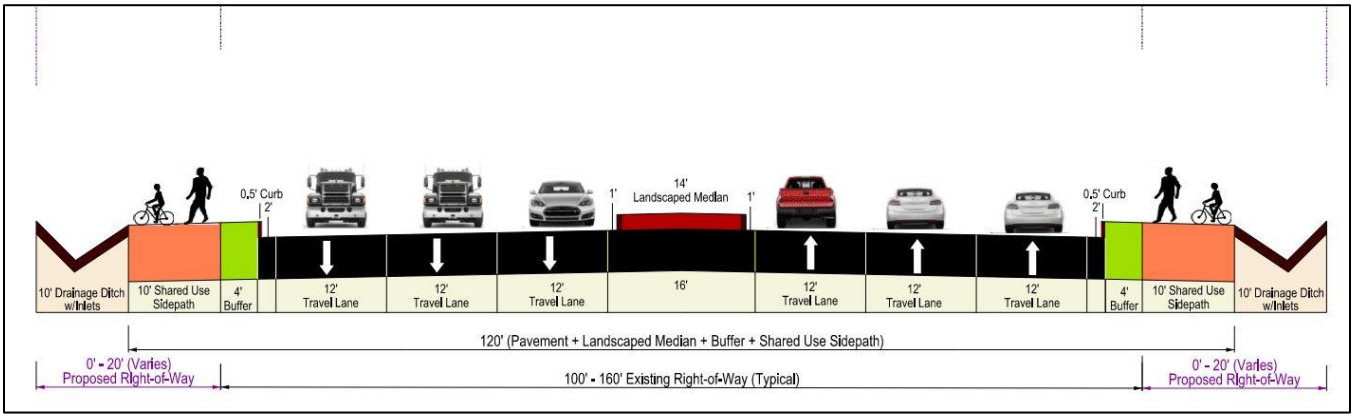


Figure 8-9 Proposed Section from Sorters Rd to IH 69

ii. Geometry

The proposed FM 1314 corridor consists of four 12-foot lanes, 12-foot shoulders, 16-foot raised medians, concrete curbs with false inlets for drainage, left-turn lanes at cross streets and critical access points, 10-foot shared-use sidepaths, and open ditches. The proposed improvements for all cross streets will be tied to existing pavement with modifications to the curb returns. Enhancements will also be made to drainage ditches and drainage along the 12-mile corridor.

The proposed 12-foot shoulder from McQueen Rd to Sorters Rd will act as a contraflow lane in case of emergency to provide access for emergency vehicles. The proposed widening will enhance the mobility and accessibility for both pedestrians and bicyclists through construction of 10-foot shared-use sidepaths on both sides of the FM 1314 corridor from SH 242 to SL 494. Pedestrian and bicycle safety enhancements will be implemented along the corridor, especially at intersections, to ensure safety for all roadway users including ADA-compliant ramps, high-visibility crosswalks, and signage for bicycles.

iii. Horizontal and Vertical Alignment

The proposed horizontal alignment for the FM 1314 corridor follows the existing centerline (100 feet) from SH 242 to SL 494. The FM 1314 corridor has a total of five horizontal curves located at McQueen Rd with a 2,850-foot radius, Village Way with a 1,450-foot radius, Westwood Dr with a 2,500-foot radius, Valley Ranch Pkwy with a 3,000-foot radius, and north of Kelly Joe Smith Rd and south of US 69 NBFR with a 5,000-foot radius. These curve radii are based on design speed and a

maximum superelevation rate of 4% that will be applied for safe vehicle traversing along the curve. A geometric re-alignment of FM 1314 has not been proposed as part of this access management study.

The vertical profile was not evaluated/designed as part of this study; however, for cost estimate purposes, it is assumed that the proposed profile grade line matches the existing pavement elevation with low and high points for drainage design.

iv. Intersection Realignment and Reconfiguration

Owens Rd is currently offset slightly north of FM 1314 along SL 494. Realignment of Owens Rd to a traditional four-leg intersection with FM 1314 and SL 494 will reduce the amount of conflict points in the same manner as driveway consolidation, reducing the number of potential conflicts and decisions necessary for driver safety. Currently, FM 1314 at Fatheree Dr and FM 1314 at Mills Rd are not perpendicular. Realignment of these two intersections will contribute to increased sight distance, or the length of roadway visible to drivers from a specific point, allowing drivers to detect and react to potential hazards.

Intersection improvements will also be made at Gene Campbell Blvd to accommodate the additional third travel lane proposed in **Section i** as well as reconfiguration of all intersections between Gene Campbell Blvd and SL 494. **Figure** 8-10 highlights the intersection reconfiguration locations along the corridor.

Figure 8-10 Proposed Long-Range Intersection Reconfiguration

v. Right-of-Way (ROW)

The proposed ROW for the FM 1314 corridor ranges approximately between 180 and 220 feet with the above improvements throughout the project length. Proposed ROW was identified as part of the proposed FM 1314 improvements; however, a more accurate amount of required ROW will be identified during future project phases.

- Reserving the ROW along Gene Campbell Blvd for future widening
- Re-alignment of Fatheree Dr.

vi. Turn Lanes

The proposed FM 1314 corridor has 12-foot left and right-turn lanes along NB and SB approaches at all cross streets and critical access points. Additional turn lane ques are proposed from IH 69 to Gene Campbell Blvd.

vii. Traffic Signals

Based on results from the traffic signal warrant analysis studies to be performed during medium-range improvements, new traffic signals might be recommended at Ferne Dr.

viii. Traffic Warrant Signal Analysis Study

A traffic signal warrant analysis study is recommended at the intersection between FM 1314 and Allendale Ln based on expected adjacent land use, traffic growth, and comments from the public involvement process.

ix. Driveway Consolidation

Proposed driveway consolidation along FM 1314 focused on the application of TxDOT's Access Management Manual (2011) guidance to driveways near intersections and developments with multiple driveways that are not necessarily based on traffic volumes, development type, or apparent parking lot circulation patterns. If the property is shared by multiple businesses, then the driveways can be consolidated, reducing congestion, and making entry and exit driveways more efficient. Driveway management, including the consolidation and installation of driveways will take place on a case-by-case basis. Figure 8-11 shows a general scenario for driveway consolidation.

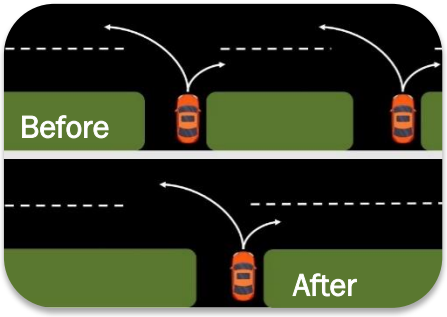


Figure 8-11 Driveway Consolidation

9 PROJECT BENEFITS

a. Traffic Operation Model Analysis

The traffic microsimulation models calibrated to 2023 condition is applied to understand the future conditions related to FM 1314 corridor's traffic operations and to evaluate the benefits with the proposed improvements. The two future years modeled are 2028 (short-range condition) and 2043 (long-range condition). Estimated growth rate is applied to calibrated 2023 demands to project future volumes at each modeling year. Build and No-Build scenarios are analyzed for both future scenario years. The No-Build scenarios assume that there is no modification from current FM 1314 configuration. The Build scenarios evaluate the FM 1314 with proposed improvements.

No-Build and Build scenarios of same year use the same project volume but different vehicle routes as input. Hooded left turns, which prohibit left turns from minor street approaches, are proposed at some unsignalized intersections as safety improvements. Drivers used to make these left-turn movements in No-Build scenario must change their route; they now must turn right and then make U-turn at the nearest median opening.

i. No-Build Model Results

Intersection delay gradually worsen through the future years from 2028 to 2043. The Highway Capacity Manual (HCM) defines LOS for signalized and unsignalized with different range of delay; and lookup between delay and HCM's LOS for signalized and unsignalized intersections are listed in **Table** 6-5 and **Table** 6-6. **Table** 9-1 show the intersection LOS and delays (in seconds) for the two future year No-Build scenarios. The results indicate a progressive increase in the number of intersections operating at an unacceptable LOS (E or F). From having two intersections in the existing year of 2023, the number increases to seven in the short-term No-Build scenario of 2028 and twenty in the long-term scenario of 2043. The deterioration in the LOS at multiple intersections can be attributed to several factors. These include an increase in traffic demand, unoptimized signal timings and coordination, and insufficient capacity for turning movements. Without any proposed improvements along the corridor, traffic operations on FM 1314 are expected to worsen, leading to multiple intersections operating at subpar or failing LOS.

Table 9-1 2028 Short- and 2043 Long-Range No-Build Scenario Intersection Results

Intersection or Major Drive Access	Short-Term		Long-Term	
	LOS	Delay (s)	LOS	Delay (s)
FM 1314 and SL 494	B	12.9	D	50.9
FM 1314 and Commerce Ave	C	25.5	D	45.5
FM 1314 and IH 69 NB Frontage Road	D	35.5	D	37.1
FM 1314 and IH 69 SB Frontage Road	B	18.8	C	26.2
FM 1314 and Partner's Way	A	5.0	A	8.0
FM 1314 and Valley Ranch Pkwy/Old Sorters Rd	D	54.7	D	49.3
FM 1314 and Sorters Rd	D	41.6	D	44.0
FM 1314 and Riverwalk Dr/Spartan Dr	D	42.0	E	55.3

Intersection or Major Drive Access	Short-Term		Long-Term	
	LOS	Delay (s)	LOS	Delay (s)
FM 1314 and Timberland Blvd	B	18.8	D	51.8
FM 1314 and Cumberland Blvd/Painted Blvd	D	41.5	E	62.6
FM 1314 and Grand Pkwy EB Ramp	C	29.5	E	56.6
FM 1314 and Grand Pkwy WB Ramp	B	17.3	E	66.4
FM 1314 and Chevron Dwy1	E	37.4	E	43.3
FM 1314 and Chevron Dwy2	D	33.1	E	43.7
FM 1314 and Travis Barber Dwy East	A	9.2	A	6.6
FM 1314 and Travis Barbershop Dwy West	A	8.9	C	17.4
FM 1314 and Public Storage Dwy/Rent-A-Center Dwy east	B	10.5	A	8.9
FM 1314 and Rent-A-Center Dwy west	A	8.8	A	9.3
FM 1314 and AutoZone Dwy	A	8.6	A	8.1
FM 1314 and Kelly Joe Smith Rd/GameStop Dwy	F	>50	F	>50
FM 1314 and Specs Dwy/Subway Dwy	F	>50	F	>50
FM 1314 and Pine Shadows Ln	E	48.4	D	30.7
FM 1314 and Church St/Burger King Dwy	C	22.0	C	19.4
FM 1314 and Porter Family Medical Center Dwy	B	11.4	B	12.4
FM 1314 and Dunn Ln	A	0.1	A	0.6
FM 1314 and Village Dr	A	0.2	A	1.0
FM 1314 and Mayer Rd	A	3.4	A	8.2
FM 1314 and Porterwood Apt Dwy/Barri Agent Dwy	A	8.0	D	25.3
FM 1314 and Porterwood Apt Dwy	C	19.5	B	10.0
FM 1314 and Briar Tree Dr	B	11.8	C	16.1
FM 1314 and Auto Sales Dwy	A	6.1	E	37.3
FM 1314 and Life Storage Dwy	E	43.2	A	8.5
FM 1314 and Stone Supply Dwy	A	9.9	A	9.6
FM 1314 and Andrew Ln	C	17.8	C	17.7
FM 1314 and Kennedy Dr/A2ZAuto Repair Dwy	B	11.3	B	11.8
FM 1314 and Tyler Ln	B	11.8	A	9.8
FM 1314 and Food Zone Dwy	D	26.1	C	16.4
FM 1314 and Pats Donuts Dwy	F	>50	F	>50
FM 1314 and Fatheree Dr	E	41.1	F	>50
FM 1314 and Lazy Ln	C	15.1	F	>50
FM 1314 and Rock& Roll Mix Dwy	A	5.1	E	39.5
FM 1314 and Wood Hollow Dr	A	9.7	F	>50

Intersection or Major Drive Access	Short-Term		Long-Term	
	LOS	Delay (s)	LOS	Delay (s)
FM 1314 and Phillips 66 Dwy	B	11.6	F	>50
FM 1314 and Southern Maid Donuts Dwy	C	17.1	F	>50
FM 1314 and Ferne Dr	C	20.5	F	>50
FM 1314 at Lexor Dr	C	21.5	F	>50
FM 1314 at New Retail/Apts Rd1	B	10.7	F	>50
FM 1314 at HEB Dwy 2	A	8.0	F	>50
FM 1314 at New Retail/Apts Rd2	A	3.7	D	29.7

ii. Build Scenario Results

The traffic operation model result analysis confirms there is better mobility in the build scenarios than the No-Build scenarios. **Table** 9-2 show the intersection LOS and delays for the two future year Build scenarios. The build scenarios have less failing intersection. **Table** 9-3 summarizes the mobility statistics. The build scenarios reduce intersection delays by 15.1% and 44.1% in short- and long-term timeframes and reduce total travel time by 2.8% and 24.3%, respectively. The model results confirm that the proposed improvements effectively achieve the goals of reducing delay and improving mobility.

The mobility benefits are the highest in long-range scenarios, compared to the short-range scenarios. The worst congestion on this corridor is between Grand Parkway and Sorters Rd along FM 1314 where the growing demand exceed its capacity. In future year No-Build scenario, the queues along this segment of FM 1314 spills back upstream and causes nearby intersections to fail too. The recommended long-term capacity improvements address this critical issue and significantly reduces congestion.

Table 9-2 Short-, Mid-, Long-Range Build Scenario Intersection Results

Intersection or Major Drive Access	Short-Term		Long-Term	
	LOS	Delay (s)	LOS	Delay (s)
FM 1314 and SL 494	C	21.9	C	21.7
FM 1314 and Commerce Ave	A	5.0	A	9.7
FM 1314 and IH 69 NB Frontage Road	C	31.5	D	36.1
FM 1314 and IH 69 SB Frontage Road	C	21.5	C	25.6
FM 1314 and Partner's Way	A	7.8	A	6.8
FM 1314 and Valley Ranch Pkwy/Old Sorters Rd	D	51.8	D	53.8
FM 1314 and Sorters Rd	C	23.5	C	25.1
FM 1314 and Riverwalk Dr/Spartan Dr	C	20.1	C	30.2

Intersection or Major Drive Access	Short-Term		Long-Term	
	LOS	Delay (s)	LOS	Delay (s)
FM 1314 and Timberland Blvd	B	13.1	C	29.1
FM 1314 and Cumberland Blvd/Painted Blvd	D	39.9	C	32.7
FM 1314 and Grand Pkwy EB Ramp	D	46.5	D	50.9
FM 1314 and Grand Pkwy WB Ramp	D	45.2	D	38.6
FM 1314 and Chevron Dwy1	A	4.1	A	7.4
FM 1314 and Chevron Dwy2	C	15.4	D	32.4
FM 1314 and Travis Barber Dwy East	B	14.8	A	9.4
FM 1314 and Travis Barbershop Dwy West	A	0.1	A	0.2
FM 1314 and Public Storage Dwy/Rent-A-Center Dwy east	A	6.4	A	7.8
FM 1314 and Rent-A-Center Dwy west	A	7.6	A	8.6
FM 1314 and AutoZone Dwy	A	5.9	B	10.1
FM 1314 and Kelly Joe Smith Rd/GameStop Dwy	B	10.2	C	18.8
FM 1314 and Specs Dwy/Subway Dwy	A	8.2	A	9.7
FM 1314 and Pine Shadows Ln	B	12.6	E	35.4
FM 1314 and Church St/Burger King Dwy	D	26.3	F	>50
FM 1314 and Porter Family Medical Center Dwy	F	>50	F	>50
FM 1314 and Dunn Ln	A	4.9	B	13.6
FM 1314 and Village Dr	B	11.0	D	29.4
FM 1314 and Mayer Rd	A	7.2	C	22.1
FM 1314 and Porterwood Apt Dwy/Barri Agent Dwy	E	38.3	C	19.0
FM 1314 and Porterwood Apt Dwy	A	9.6	A	7.3
FM 1314 and Briar Tree Dr	B	13.9	A	9.9
FM 1314 and Auto Sales Dwy	C	24.6	A	9.9
FM 1314 and Life Storage Dwy	F	>50	F	>50
FM 1314 and Stone Supply Dwy	A	9.4	A	9.0
FM 1314 and Andrew Ln	A	5.8	B	14.5
FM 1314 and Kennedy Dr/A2ZAuto Repair Dwy	A	9.9	B	14.0
FM 1314 and Tyler Ln	A	9.1	B	12.8
FM 1314 and Food Zone Dwy	A	8.1	B	10.4
FM 1314 and Pats Donuts Dwy	A	7.9	A	9.9
FM 1314 and Fatheree Dr	A	2.5	B	15.4
FM 1314 and Lazy Ln	A	8.7	B	12.5
FM 1314 and Rock& Roll Mix Dwy	A	5.2	A	5.4

Intersection or Major Drive Access	Short-Term		Long-Term	
	LOS	Delay (s)	LOS	Delay (s)
FM 1314 and Wood Hollow Dr	A	8.2	A	8.8
FM 1314 and Phillips 66 Dwy	A	9.2	A	7.7
FM 1314 and Southern Maid Donuts Dwy	A	5.4	A	8.0
FM 1314 and Ferne Dr	B	12.2	B	15.0
FM 1314 at Lexor Dr	C	16.2	A	8.3
FM 1314 at New Retail/Apts Rd1	E	37.4	D	32.0
FM 1314 at HEB Dwy 2	C	15.8	B	11.4
FM 1314 at New Retail/Apts Rd2	B	10.1	A	7.8

Table 9-3 Summary of Model Mobility Benefits

Scenario	Number of Intersections with LOS E/F Reduced	Percent Reduction of signalized intersection delay	Percent Reduction of Total Travel Time
Short-Range	3	15.1%	2.8%
Long-Range	16	44.1%	24.3%

b. Case Studies

The recommended improvements will produce mobility, safety, the emission benefits. The mobility benefits are measured by the travel time saved such as less delay with new turn lanes at intersection approaches. The travel time savings could be converted to dollars a value of time parameter[6]. The safety benefits are estimated by number and by severeness of crashes reduced. The emission benefits are the amounts of pollutants reduced with better traffic operation.

The travel time savings is defined as the total travel time difference between with (Build) and without recommended improvement (No-Build) scenarios of the traffic operation model. **Table** 9-4 lists the mobility benefits of short-, mid-, and long-range timeframe. The delay of short-range and mid-range scenarios are mostly reduced from turn lane and other intersection improvements which reduced turning delay at intersection.

[6] *2021 Urban Mobility Report, Texas A&M Transportation Institute, estimated the value of time in year 2020 is $19.64 per hour. Using the historical CPI-U at Houston region could get the value of time is $23.26 in year 2023.*

The long-range delay reduction significantly increases to 44.1% because of the proposed capacity improvements related to added through lane along FM 1314.

Table 9-4 Travel Time Saving Benefits

Scenario	Yearly Saving in 2023 Dollars
Short-range	$7,548,000
Long-range	$67,474,000

The safety benefits are determined by the number and by the severeness of the crashes reduced. Each type of improvement could be associated with a crash reduction factor which estimates the percentage of existing crashes reduced. The crashes cost could be quantified to dollars amount by assuming fixed cost by injury severity level. The comprehensive crash cost by injury severity level for this study is from the *Benefit Cost Analysis Guidance for Discretionary Gran Programs*, as listed in **Table** 9-5**.**

Table 9-5 Comprehensive Crash Cost by Injury Severity Level

Injury Severity Level	Comprehensive Crash Cost (2022 dollars)
Fatality (K)	$12,500,000
Disabling Injury (A)	$1,188,200
Evident Injury (B)	$233,800
Possible Injury (C)	$111,700
Property Damage Only (O)	$5,000

Safety benefits are show in **Table** 9-6.

Table 9-6 Safety Benefits

Scenario	Percent Crashed Reduced	Yearly Safety Benefits (2023 dollars)
Short-range	20%	$7,023
Mid-range	24%	$22,613
Long-range	36%	$31,608

The safety benefits calculations are shown under **Appendix M**.

The improvements reduce the air pollutant produced by vehicle emission. Vehicle emission is determined by the distance traveled and by the time spend on the road. As the proposed improvements reduce the delay, vehicles travel less and less emissions are released. The pollutant reduction is estimated through the *Congestion Mitigation and Air Quality (CMAQ) Emission Calculator Toolkit*[7]. The damage cost by pollutant type is from the *Benefit Cost Analysis Guidance for Discretionary Gran Programs*, the air pollutants included for the benefits calculation are nitrogen oxide (NOx), fine particulate matter with diameter less than 2.5 micrometers (PM2.5), and carbon dioxide (CO2) because only these three pollutants are considered in both CMAQ tool Kit and the USDOT guidance. The cost per metric ton is shown in **Table** 9-7 , and the emission benefits are shown in

Table 9-8,

Table 9-7 Damage Cost by Pollutant

Pollutant	Damage Cost per Metric Ton (2023 dollars)
NOx	$19,800
PM 2.5	$951,000
CO2	$228

Table 9-8 Emission Benefits

Scenario	Annual NOx Reduced (Metric Ton)	Annual PM 2.5 Reduced (Metric Ton)	Annual CO2 Reduced (Metric Ton)	Yearly Emission Benefits (2023 dollars)
Short-range	0.8512	0.0756	503.9442	$205,494
Mid-range	0.0062	0.0011	41.6031	$10,805

[7] *Source: Toolkit - CMAQ - Air Quality - Environment - FHWA (dot.gov). The website provides many toolkits, and the project applies the Bike, Pedestrian, and Shared Micromobility toolkit and the Congestion Reduction and Traffic Flow Improvements toolkit.*

10 PLANNING LEVEL IMPLEMENTATION AND COST ESTIMATE

A preliminary planning level cost estimate was prepared for the proposed short-, mid-, and long-range improvements.

a. Cost Estimate Methodology

Planning level detailed estimates are developed for the improvements and the unit costs utilized for the cost estimates are based on recently let Financial Year (FY) 2023 TxDOT Houston District projects. The following cost estimate methodology was followed along with the *Estimate Too*l (FY 2023) for developing the estimates.

Pavement Structure: The pavement structure is based on the recent Plans, Specifications and Estimate (PS&E) projects completed by TxDOT. Proposed pavement structure will have 10" CRCP, 6" lime stabilized subgrade and 6" lime treated subgrade.

Earthwork: Proposed design assumed that the proposed profile grade lines match the existing pavement elevation with low and high points for drainage design.

Drainage: Drainage inlets (false curb inlets and grate inlets), and manholes are quantified by linear feet. The culvert pipes are placed under each driveway along with cross culverts, box culverts and other drainage infrastructure as applicable.

Utilities: Utility relocation costs are calculated as 10% of the total construction costs based on other quantifiable items.

Right-Of-Way: Proposed ROW needed to accommodate the proposed typical section is provided. The ROW acquisition costs are based on the Montgomery County appraisal costs per square foot.

Engineering: Engineering design is assumed to be 12% of the total construction cost. Schematics development and PS&E are considered as part of the Engineering Design.

Environmental: A 5% of the total construction cost is used based on the other quantifiable items.

Other Items: The following items are considered from the Estimating Tool (FY 2023) for developing the cost estimate:

- Illumination
- Signing
- Pavement Markings
- Traffic Control
- Mobilization

Contingency: A 20% contingency of the total construction cost is assumed.

An estimate of the area and length of landscaping for the proposed Long-Range improvements shown on the roll plots under **Appendix L** is shown in

Table 10-1 .

Table 10-1 Estimated Raised Median Landscaping

FM 1314	Area (Square Feet)	Length (Linear Feet)
From SH 242 to SL 494	262,850	18,775
Total Raised Median Landscaping	262,850	18,775

b. Cost Estimates

The planning level estimate developed for the short-, mid-, and long-range proposed improvements is shown in Table 10-2 Planning Level Cost Estimate and the detailed cost estimates with bid items and unit costs for short-, mid-, and long-range proposed improvements are shown under **Appendix N**.

The total estimated construction costs for short-, mid-, and long-range are shown below:

- Short-range improvements (total cost): $3.34 M
- Medium-range improvements (total cost): $5.70 M
- Long-range improvements (total cost): $87.56 M

Table 10-2 Planning Level Cost Estimate

	Improvement	Quantity	Unit	Unit Cost	TxDOT Cost	TOTAL Cost (In Millions)
SHORT - TERM	**Corridor-Wide Improvements**					$3,335,958
	Install Median Curb	5,500.00	LF	$25.00	$137,500.00	
	Install Raised Median	35,933.33	SY	$40.00	$1,437,333.33	
	Intersection Improvements:					
	Install Additional Pavement	1.00	LS	$40,000.00	$40,000.00	
	Install Pavement Markings	1.00	LS	$90,000.00	$90,000.00	
	Install Signage	1.00	LS	$10,000.00	$10,000.00	
	Install Street Lighting	1.00	LS	$300,000.00	$300,000.00	
	New Traffic Signals	1.00	LS	$400,000.00	$400,000.00	
	Install Emergency Flashing Signal	1.00	LS	$300,000.00	$300,000.00	
	Improve Signal Timing and Synchronization	1.00	LS	$105,000.00	$105,000.00	
	Improve Connectivity to Existing Sidewalks (limited locations)	900.00	SY	$90.00	$81,000.00	
	Traffic Control (5%)	1.00	LS	$145,041.67	$145,041.67	
	Mobilization (10%)	1.00	LS	$290,083.33	$290,083.33	
	SUB-TOTAL FOR SHORT-TERM IMRPVEMENTS (without traffic control and mobilization)				$2,900,833.33	
MEDIUM - TERM	**Corridor-Wide Improvements**					$5,695,758
	Install Curb	92,400.00	LF	$25.00	$2,310,000.00	
	Install Median Curb	5,500.00	LF	$25.00	$137,500.00	
	Install Raised Median	35,933.33	SY	$40.00	$1,437,333.33	
	Install Shared Use Sidepath	3,350.00	SY	$90.00	$301,500.00	
	Install Pavement Markings	1.00	LS	$100,000.00	$100,000.00	
	Intersection Improvements:					
	Install Signage	1.00	LS	$10,000.00	$10,000.00	
	Traffic Signal Warrant Study	3.00	LS	$50,000.00	$150,000.00	
	Drainage Study	1.00	LS	$100,000.00	$100,000.00	
	Improve Signal Timing and Synchronization	1.00	LS	$120,000.00	$120,000.00	
	Driveway / Pedestrian Improvements:					
	Install Driveways	1.00	LS	$17,000.00	$17,000.00	
	Demo	3,500.00	SY	$57.00	$199,500.00	
	Driveway Consolidation	1.00	LS	$20,000.00	$20,000.00	
	Drainage Infrastructure	1.00	LS	$50,000.00	$50,000.00	
	Traffic Control (5%)	1.00	LS	$247,641.67	$247,641.67	
	Mobilization (10%)	1.00	LS	$495,283.33	$495,283.33	
	SUB-TOTAL FOR MID-TERM IMRPVEMENTS (without traffic control and mobilization)				$4,952,833.33	
LONG - TERM	**Corridor-Wide Improvements**					$87,557,329
	Prepare ROW	1	LS	$1,500,000.00	$1,500,000.00	
	Install Curb	11,900.00	FT	$25.00	$297,500.00	
	Install Curb (Median curb)	23,800.00	FT	$30.00	$714,000.00	

	Install Shared Use Sidepath	6,700.00	SY	$90.00	$603,000.00
	Install Raised Median (Landscaping)	65,660.00	SY	$3.50	$229,810.00
	Additional Lane and Shoulder	1.00	LS	$8,418,382.50	$8,418,382.50
	Embankment	1.00	LS	$39,083,333.00	$39,083,333.00
	Install Signage	1.00	LS	$250,000.00	$250,000.00
	Buffer (Landscaping)	6,700.00	SY	$2.50	$16,750.00
	Pavement Markings	1.00	LS	$220,000.00	$220,000.00
	Intersection Improvements				
	Emergency Vehicle Traffic Control signal	2.00	EA	$300,000.00	$600,000.00
	New Traffic Signals	2.00	EA	$400,000.00	$800,000.00
	Traffic Signal Warrant Study	3.00	LS	$50,000.00	$150,000.00
	Proposed ROW	55.00	AC	$10,800.00	$594,000.00
	Parallel Bridges over Dry Creek	1.00	LS	$3,500,000.00	$3,500,000.00
	Add Continuous Street Lighting	5.30	MI	$300,000.00	$1,590,000.00
	Traffic Control (5%)	1.00	LS	$2,928,338.78	$2,928,338.78
	Drainage Infrastructure (5%)	1.00	LS	$2,928,338.78	$2,928,338.78
	Utilities (3%)	1.00	LS	$1,757,003.27	$1,757,003.27
	SWPPP (3%)	1.00	LS	$1,757,003.27	$1,757,003.27
	Mobilization (10%)	1.00	LS	$5,856,677.55	$5,856,677.55
	Contingency (20%)	1.00	LS	$11,713,355.10	$11,713,355.10
	Inflation (3.5%)	1.00	LS	$2,049,837.14	$2,049,837.14
	SUB-TOTAL FOR LONG-TERM IMPROVEMENTS (without traffic control, drainage, utilities, SWPPP, mobilizations, contingency and inflation)				$58,566,775.50

The total benefits for the proposed short-, mid-, and long-term improvements were calculated based on methodology of H-GAC's Transportation Improvement Program's (TIP) call for projects, and the calculation spreadsheet are included in the electronic file submittal. The H-GAC's TIP templates adopted a more generalized and less precise benefit estimation which is designed for consistently estimates all types of transportation projects, and only calculated the benefits within the service life of each improvement. The benefit to cost ratio for the proposed short-term improvement is 75.5, for the proposed mid-term improvements is 43.4, and for the long-term improvement is 3.5.

11 SUMMARY OF PUBLIC INVOLVEMENT

A Public Involvement Plan (PIP) was a stand-alone document developed for the FM 1314 Access Management Study efforts. The document was updated as necessary to adapt to the current public involvement needs along the corridor. The PIP aims to facilitate meaningful engagement, promote transparency, and ensure that diverse perspectives are considered in the decision-making process. The contents of the PIP include activities and components intended to proactively obtain public feedback to inform the public, agencies with jurisdiction, and community stakeholders, as well as obtain input to influence decision-making. The PIP for the FM 1314 study engaged steering committee members, stakeholders and the public to identify issues along the corridor, define safety and mobility issues, establish goals that successfully address these issues, communicate solutions proposed by the project team, and solicit feedback for the proposed solutions. The PIP is archived by the TxDOT Houston District as part of the documentation of this access management study.

The public involvement process included four (4) steering committee meetings, four (4) stakeholder meetings, and two (2) public meetings with both virtual and in-person options. Public involvement goals integrated open, relevant, timely, and appropriate identification of project needs of all stakeholders and ensured stakeholders understood key decision points. The PIP process for the current study is shown in **Figure** 11-1.

The goals of the public involvement plan included:

- Ensure timely and consistent communication with the public throughout the project lifecycle.
- Guide the inclusion of a diverse range of stakeholders, representing various perspectives, interests, and demographics.
- Solicit meaningful feedback from the public to gather input, concerns, and suggestions.
- Enhance the legitimacy and credibility of the decision-making process by demonstrating a commitment to public input.
- Provide outreach to key agency representatives, elected officials, local businesses, first responders, schools and independent school districts, community organizations, pedestrian and bike communities, and maintain communications with these entities throughout the project study.
- Consider minority populations and persons with limited English proficiency, low incomes, and persons who require special communications or physical accommodations.
- Publish materials in English and Spanish to accommodate the Spanish speaking community members and providing Spanish speaking staff at all the meetings.

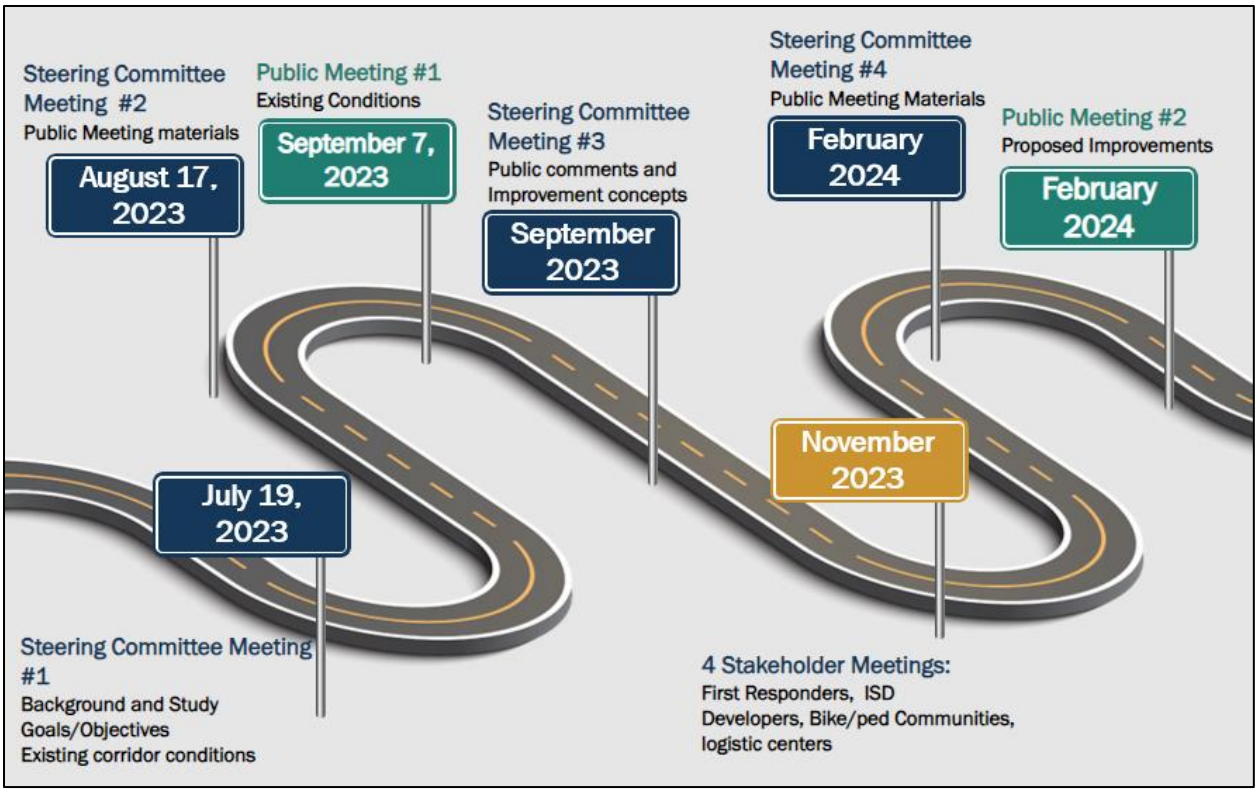


Figure 11-1 Public Involvement Process

a. Steering Committee Meetings

A steering committee composed of potentially impacted government agencies, community representatives, subject matter experts, and policy decision makers was established to guide the development of the study. The Steering Committee's role was to:

- Provide project information about existing conditions, needs of the community and any proposed developments along the study limits.
- Identify project stakeholders.
- Collaborate with the project team to develop study goals.
- Provide technical oversight of the major activities of the study.
- Review and provide comments on the proposed improvements.
- Share any transportation improvement projects and updates along the corridor to be considered during the study.

The Steering Committee was composed of the following representatives from TxDOT, Montgomery County, H-GAC, Texas State of Representatives, and EMCID.

- Catherine McCreight (TxDOT)
- Qing Li (TxDOT)
- Jeffrey English (TxDOT)
- Hayley Pickett (TxDOT)
- Darrell Dooley (TxDOT)
- Ana Ramirez Huerta (TxDOT)
- Amy Redmond (TxDOT)
- Matthew Connelly (TxDOT)
- Bambi Hall (TxDOT)
- Sergio Rodriguez (TxDOT)
- Germin Fadel (TxDOT)
- Emily Black (TxDOT)
- Cecil Bell (State Representative, District 3)
- Ernest Bailes (State Representative, District 18)
- Melanie Cotton (State Representative, District 18)
- Matt Gray (Montgomery County Precinct 4)
- Brandon Creighton (State Representative District 4)
- Victoria Bryant (Montgomery County)
- Kim Brode (Montgomery County)
- Rick Wong (Montgomery County)
- Marshall Becker (Northstar Montgomery County)
- Andrew Dubois (Montgomery County)
- Don Dean (Montgomery County)
- Hugo Sanchez (Montgomery County)
- Kennedy Williams (Montgomery County)
- William Smith (New Caney Municipal Utility District)
- Kelley Mattlage (EMCID)
- Matt Calvert (New Caney ISD)
- Carlene Mullins (H-GAC)
- Marlisa Briggs (North Houston Association)
- Mark Linabury (Greater EMCID)
- Tyson Moeller (Union Pacific Railroad)

1. The project team met with the Contract Steering Committee four (4) times throughout the course of the study:
2. Steering Committee Meeting #1 (on July 19, 2023): Discussion of study goals and objectives, selection of study stakeholders, present existing conditions analysis and results, obtain feedback on the existing conditions, presentation of exhibits and roll plots for the first public meeting.
3. Steering Committee Meeting #2 (on August 29, 2023): Present the results from the first public meeting, presentation of improvement concepts, exhibits and roll plots for the second public meeting.
4. Steering Committee Meeting #3 (on October 24, 2023): Present the results from the stakeholder meetings and revised improvements, and presentation of improvement concepts, exhibits and roll plots for second public meeting.

5. Steering Committee Meeting #4 (on January 10, 2024): Discussion of results from the second public meeting, presentation of final recommendations, and agency responsibility and costs.

b. Stakeholder Meetings

The study stakeholders were identified using input from the Contract Steering Committee. The goal of stakeholder engagement was to provide opportunities for key agencies and businesses within the community to stay informed on the progress of the study and to obtain feedback during the project lifecycle.

The project team met with the Stakeholders four (4) times throughout the course of the study to present the proposed short-, mid-, and long-range improvements, obtain feedback and comments, address comments, and present to the public during the second public meeting.

1. **Stakeholder Meeting #1 (on October 25, 2023) – First Responders:** Present the proposed improvements and obtain feedback and comments.
2. **Stakeholder Meeting #2 (on October 26, 2023) – Independent School Districts (ISD's):** Present the proposed improvements and obtain feedback and comments.
3. **Stakeholder Meeting #3 (on October 26, 2023) – Bike and Pedestrian Community:** Present the proposed improvements and obtain feedback and comments.
4. **Stakeholder Meeting #4 (on November 03, 2023) – East Montgomery County Improvement District (EMCID):** Present the proposed improvements and obtain feedback and comments.

c. Public Meetings

As a best practice that supports democratic principles, community engagement, and the development of effective and well-informed improvements, public meetings serve as a mechanism for collecting feedback on proposed improvements making it more responsive to the needs of the community. To promote transparency in the decision-making process, the project team invited community members, agencies, business owners, steering committee members, stakeholders, and residents to participate in two public meetings near the FM 1314 corridor. These meetings served as a mechanism for attendees to voice their opinions, concerns, and suggestions regarding the existing issues and proposed improvements, providing valuable input and understanding of the needs and preferences of the community. These meetings allowed community members to express concerns while actively engaging in two-way communication and providing feedback for the development of access management improvements for the corridor.

The Project Team held two separate public meetings. Using both open house and virtual formats, the public meetings allowed community members to come-and-go while engaging with the Project Team and interacting with the study exhibits. The first public meeting held in September 2023 focused on discussing the existing conditions along the corridor, obtaining input from the public of any specific issues, and gauging interest on potential improvements. The second public meeting held in February 2024 focused on presenting the proposed

improvements that were selected to address the identified operational and safety needs of the corridor.

The first public meeting was held on the following dates and conducted as an in-person open house and on-line virtual meeting:

- In-Person Meeting – September 12, 2023 – Robert L. Crippen Elementary School from 5 PM to 7 PM
- Virtual Meeting – September 7, 2023, 5 PM to September 28, 2023, 11:59 AM | Pre-recorded video presentations available on TxDOT webpage

Figure 11-2 Roll Plots

The first public meeting was conducted in an open house format. Attendees were able to view the video presentation and study exhibit boards with information of various aspects of the project, examine roll plots (**Figure 11-2**) showing detailed information on existing conditions of the corridor, and interact with the project team. Additionally, meeting attendees were encouraged to participate in an online Social Pinpoint Survey to provide their feedback and concerns on specific issues through an interactive map of the corridor.

The second public meeting was held on the following dates and conducted as an in-person open house and on-line virtual meeting:

- In-Person Meeting – February 8, 2023 – East Montgomery County Senior Center from 5 PM to 7 PM
- Virtual Meeting – February 6, 2024, 5 PM to February 23, 2024, 11:59 AM | Pre-recorded video presentations available on TxDOT webpage

Figure 11-3 Exhibit Boards

The second public meeting was also conducted in an open house format. Attendees were able to view the video presentation, study exhibit boards (**Figure 11-3**) with information of various aspects of the project, examine roll plots showing detailed information on proposed improvements of the corridor, and interact with the project team. Additionally, meeting attendees were encouraged to participate in an online Social Pinpoint Survey to provide feedback and concerns on specific issues through an interactive map of the corridor.

A public meeting summary report was prepared for each public meeting including the documentation of public meeting materials and public comments.

12 H-GAC TIP APPLICATION

Funding for the proposed short-range and mid-range improvements and the selection of long-range improvement to RTP will be requested through H-GAC Call for Transportation Projects application. A Statement of Project Interest (SOPI) have been submitted to H-GAC by TxDOT Houston District. Project narratives and benefit calculation templates are provided to TxDOT for further coordination. The project narrative and preliminary benefit templates provided for the short-, mid-, and long-range improvements are included in Appendix O. The benefit templates are submitted for following categories:

- Active Transportation Emissions Benefits
- Roadway Crash Benefits
- Roadway Emissions Benefits
- Roadway Transit Delay Benefits

13 ELECTRONIC FILES

Electronic files developed for the FM 1314 Access Management Study will be included in **Appendix P**. The electronic files will include the following:

- CAD (MicroStation) Files
- VISSIM Model files
- TIP Application related files
    - Excel spreadsheets for benefit estimates