CHAPTER 1
Need and Purpose

CHAPTER 1: NEED AND PURPOSE
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NEED AND PURPOSE

1.0 INTRODUCTION

The Grand Parkway, as a concept, was first proposed in 1961 by Harris County and the City of Houston Planning Commission following traffic studies that identified regional transportation deficiencies. The Grand Parkway corridor was placed on city maps in 1968, but funds were not readily available to advance the project. With the development of the greater Houston metropolitan area, the need for additional transportation facilities became more evident. County officials mapped a proposed corridor for the Grand Parkway and submitted the plan to the Texas Highway Commission.

In 1984, the Texas Legislature authorized the creation and organization of nonprofit transportation corporations to act on behalf of the State Department of Highways and Public Transportation (the predecessor agency to the Texas Department of Transportation [TxDOT]) in the promotion and development of public transportation facilities and systems within the state. The Grand Parkway Association (GPA), the first of these corporations created, was charged with obtaining land and funding to meet the planning, legal, engineering, and right-of-way (ROW) requirements of the Grand Parkway. Since its inception, the GPA has worked directly with landowners, city, county, state, and federal governmental agencies and elected officials in an effort to complete the Grand Parkway.

The Grand Parkway Segments H and I-1 are part of a planned 180+ mile (mi) circumferential loop around the greater Houston metropolitan area as shown in **Exhibit 1-1: Status of Segments.** The Grand Parkway is divided into 11 segments, each of which has logical termini and independent utility to facilitate planning, design, and construction. Due to limited state and federal funding, there is no assurance that all of the Grand Parkway segments would be constructed. Each segment connects at least two existing major transportation corridors to ensure independent utility as well as independent significance as required by the Federal Highway Administration (FHWA) regulations (23 Code of Federal Regulations [CFR] 771.111 (f)). The United States Congress confirmed this segment-by-segment development approach to be in compliance with federal law in the "Department of Transportation and Related Agencies Appropriations Bill of 1993." The April 2003 Texas Transportation Commission Minute Order 109226 states, "The completion of the Grand Parkway is essential and urgent, as construction of the projects would alleviate congestion

and improve traffic flow in the greater Houston metropolitan area and the surrounding region" and "The commission has determined that constructing and operating the Grand Parkway as a toll facility is the most efficient and expeditious means of ensuring its development, and encourages the development of partnerships and the employment of innovative methods for its financing and construction."

A Grand Parkway Overview document was prepared by TxDOT in 1992 to provide an overall assessment of the entire Grand Parkway outer loop facility and provides a general description of the area where the facility is proposed. The following **Table 1-1** summarizes the current status of each of the 11 segments of the Grand Parkway using information obtained from the GPA website.

Table 1-1: Status of Segments

Segment	Limits	Status
Segment A	SH 146 to IH 45 S	Corridor Feasibility Study completed.
Segment B	IH 45 S to SH 288	Environmental review.
Segment C	SH 288 to US 59 S	Environmental review.
Segment D	US 59 S to IH 10 W	Interim facility constructed consisting of frontage roads and at-grade intersections, opened in 1994. Environmental review for tolling.
Segment E	IH 10 W to US 290	Record of Decision received and in final design phase.
Segment F-1	US 290 to SH 249	Record of Decision received and in final design phase.
Segment F-2	SH 249 to IH 45 N	Record of Decision received and in final design phase.
Segment G	IH 45 N to US 59 N	Record of Decision received and in final design phase.
Segments H and I-1	US 59 N to IH 10 E	Environmental review.
Segment I-2	IH 10 E to SH 146	Phase I (IH 10 to FM 1405) opened to traffic on March 25, 2008. Phase II (FM 1405 to SH 146) currently under design. Environmental review for tolling.

Source: GPA, 2011

Due to the similarity between Segment H and Segment I-1, it was agreed upon by FHWA and TxDOT that these segments could be studied jointly, although each satisfies independent utility, for the purposes of evaluating environmental impacts. Segments H and I-1 collectively constitute the proposed project evaluated in this Draft Environmental Impact Statement (DEIS). The Segments H and I-1 study area is located on the northeast side of the greater Houston metropolitan area. The study area is generally bound by FM 2090 on the north, IH 10 on the south, US 59 and FM 2100 on the west, and SH 146 on the east, in Montgomery, Harris, Liberty, and Chambers counties.

Refer to **Exhibit 1-2: Preliminary Study Area Map** for a map showing the preliminary study area for Segments H and I-1. Segment H begins at US 59 North (N) near New Caney and continues south/southeast to US 90, and is proposed as a 4-mainlane at-grade controlled-access toll highway with proposed grade separations at major intersections within a 400-foot (ft) ROW width (**Exhibit 1-2**). Segment I-1 begins where Segment H ends at US 90 and continues south to IH 10 East (E) near Mont Belvieu (**Exhibit 1-2**). Segment I-1 is also proposed as a 4-mainlane at-grade controlled-access toll highway with proposed grade separations at major intersections within a 400-ft ROW width.

TxDOT and FHWA filed a Notice of Intent (NOI) for Segments H and I-1 in January of 2006. The formal public scoping meetings required by these notices were held on February 28 and March 1, 2006, and on May 8 and 9, 2007. Additional guidance from TxDOT and FHWA was obtained following the first series of public scoping meetings in 2006 as a result of the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) that required the development of a Project Coordination Plan (**Appendix H**). The purpose of the Project Coordination Plan is to facilitate and document the lead agencies' (TxDOT, FHWA, and GPA) structured interaction with the public and other agencies and to inform the public and other agencies of how the coordination would be accomplished. The Project Coordination Plan was developed and approved following the first series of public scoping meetings and was provided to the public for review and comment at the second series of public scoping meetings in May 2007.

1.1 NEED AND PURPOSE

As explained in the American Association of State Highway and Transportation Officials (AASHTO) Practioner's Handbook: *Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects*, federal regulations require every Environmental Impact Statement (EIS) to "briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." The need and purpose is the fundamental building block of any EIS and is a key factor in determining the range of alternatives considered in an EIS and, ultimately, the selection of the preferred alternative. This section was prepared in accordance with FHWA Technical Advisory T 6640.8A, Guidance for Preparing and Processing Environmental and Section 4(f) Documents; FHWA's memorandum entitled Need and Purpose in Environmental Documents; FHWA and Federal Transit Administration (FTA) joint memorandum entitled Integration of Planning and National Environmental Policy

Act (NEPA) Processes; and TxDOT memorandum entitled Guidance on Need and Purpose. Studies conducted for the proposed Grand Parkway Segments H and I-1 included substantial interaction with project stakeholders including the general public, local businesses, landowners; local officials, community leaders, regulatory agencies, FHWA, and TxDOT. FHWA approved the Need and Purpose on April 11, 2007.

1.2 NEED FOR THE PROPOSED PROJECT

The Segments H and I-1 needs to be addressed are discontinuous system linkage, decreased mobility, compromised safety, and the lack of infrastructure to support population growth. Transportation improvements are needed in the Segments H and I-1 study area because of a lack of efficient connections to major radial roadways, suburban communities, local ports, and industries. Improvements are also needed because the existing and future transportation demand of the study area exceeds the capacity of the local roadways and many of the study area's roadways have high crash rates. Projected population growth within the study area is expected to place an even greater strain on the existing transportation infrastructure. The local needs of the Segments H and I-1 study area are further detailed in the following sections.

1.2.1 Discontinuous System Linkage

The existing transportation system does not provide efficient circumferential connections among the major radial roadways in the area, such as US 59 (N) and IH 10 (E) which results in a lack of connectivity for suburban communities and industries located within and near the Grand Parkway Segments H and I-1 study area.

IH 10 (E), US 90 (E) and US 59 (N) are three circumferential connections linking Houston to its suburbs and beyond within the Segments H and I-1 study area. No major circumferential facilities exist within the Segments H and I-1 study area to connect these facilities. Currently travelers utilize minor arterial and collector roadways, such as FM 1485, FM 1960, FM 2100, SH 146, FM 3360, FM 1942, FM 1413, and FM 1314 to make such connections. The central portion of the study area is especially deficient in transportation infrastructure to support circumferential and north-south mobility.

1.2.1.1 Function and Role of Highways and Roadways within Houston's Northeast Quadrant

There are limited routes that connect US 59 (N) to IH 10 (E) around the northeast greater Houston metropolitan area. East-west roadways that traverse the area include FM 1960, FM 1485, US 90, FM 1942, and IH 10. North-south roadways that traverse this area include SH 321, US 59, FM 2100, and SH 146. The Sam Houston Parkway (Beltway 8), although outside of the study area (**Exhibit 1-1**), is the nearest continuous roadway connecting IH 10 (E) to US 59 (N). Beltway 8 exists as two-lane, non-toll frontage roads from US 59 (N) to US 90 and two-lane freeway main lanes from US 90 to IH 10 (E). Tolled main lanes for this section of Beltway 8 from US 59 (N) to US 90 have not been completed as of the date of this document. Beltway 8 connects to IH 10 (E) near Channelview and to US 59 (N) south of Humble. Roadway characteristics such as number of lanes and posted speed limits for the study area roadways are summarized in **Exhibit 1-3: Roadway Characteristics**.

IH 10 (E) provides the most direct route to and through downtown Houston for communities located to the east, northeast, and southeast of downtown Houston. US 59 (N) provides the most direct route to and through downtown Houston for communities located to the north and northeast of downtown Houston.

TxDOT studies from 1995 to 2005 indicate that FM 1960, US 90, FM 526, FM 2100, and SH 146, as well as other city and county roadways within northeast Houston provide travelers with facilities for local travel. Each of these roadways carries a range of 5,700 to 21,000 vehicles per day (vpd).

Travelers moving either through or from the northeastern Houston metropolitan area that do not require access to downtown Houston but are traveling to areas beyond the greater northeast area have three general options available for their traveling routes. These options are as follows:

1. Follow US 59 (N) or IH 10 (E) to the downtown area before continuing on route;
2. Access Beltway 8 via US 59 (N) or IH 10 (E) and circumvent the downtown area before continuing along the planned route; or
3. Follow disconnected city and county roadways that meander through the area before continuing along the planned route.

1.2.1.2 Transportation System Demands and Trends

As discussed above, the interstate and regional highways are predominantly oriented in either an east-west or a north-south direction. No Interstate or State Highway alternative connecting major radial facilities exists in the Segments H and I-1 study area. The existing transportation system within the study area does not provide efficient connections to the suburban communities of Kingwood, New Caney, Huffman, Dayton, and Mont Belvieu as indicated in **Exhibit 1-2: Preliminary Study Area Map**.

Major industrial complexes within the Segments H and I-1 study area include a Chevron refinery plant located along IH 10 (E), the Dow Industrial Chemical Plant, an Exxon refinery plant, Wal-Mart Distribution Center north of Dayton, and numerous gas storage facilities associated with the salt dome formation in Mont Belvieu. The study area lacks an efficient circumferential connection for these industrial complexes to US 59 (N) and IH 10 (E). In addition, freight traffic is transported via trucks through the study area to the Port of Houston.

Based on the Houston-Galveston Area Council's (H-GAC's) 2007 Travel Demand Model, nearly 80 percent (%) of the traffic originates in the northeast area of Houston, from north of Beltway 8 between US 59 (N) and IH 10 (E). Of these trips, 29% are generated from within the Segments H and I-1 study area (**Exhibit 1-4: Study Area Trip Origins/Destinations**).

1.2.2 Decreased Mobility

The transportation demand exceeds the current and future capacity of the study area's existing transportation facilities. Further, the City of Houston and its surrounding areas are an important conduit to receive traffic from the Texas Gulf Coast during emergency evacuations and distribute it to points beyond. The collector roadways that are used to accomplish partial circumferential travel in the study area, such as FM 1485, FM 2100, FM 1413, and FM 3360 are not continuous and would not be able to meet the future traffic demand. The following sections contain data to support the need for improved mobility.

A traffic needs analysis of the existing roadway network in the study area for Segments H and I-1 of the Grand Parkway was conducted to evaluate the need for improvements in mobility and access for vehicular traffic. The base year for analysis is 2007. After meeting with FHWA, TxDOT, and H-GAC to obtain consensus, 2039 was selected as the horizon year (design year), with 2019 as the interim year

(construction completion date). The travel demand model utilized for analysis used the 2035 Regional Transportation Plan (RTP) which was adopted in August 2007. H-GAC has demographic forecasts through 2050 and therefore provided a year 2039 dataset which comprises 2039 travel demand on the 2035 RTP roadway network. The 2035 RTP roadway network includes all segments of the Grand Parkway. However, in evaluating the No-Build Alternative, Segments H and I-1 were deleted from the roadway network.

1.2.2.1 Traffic Volumes and Congestion

The H-GAC regional travel demand model was used for base year traffic volumes (2007) and future (2039) traffic volume projections. Base year and future traffic were compared to determine the change in traffic volumes over time. The H-GAC model determines traffic volumes on roadway facilities based on current and projected population and employment data as well as the transportation network available to travelers.

In addition to traffic volumes, level of mobility (LOM) calculations were used to assess roadway operating conditions. LOM is the primary mobility measure used in the H-GAC's 2035 RTP to assess the effectiveness of the Houston area roadway system. The LOM is used to illustrate the degree of congestion on roadways within the region. Tolerable LOM represents acceptable traffic operating conditions. A moderate LOM is the point at which the volume of vehicles is approaching the capacity of the facility and the traffic flow is breaking down. Serious and severe LOMs relate to considerable delays and roadway system failure. LOM is comparable to the Transportation Research Board (TRB) Highway Capacity Manual's "Level of Service" (LOS) methodology (TRB, 2000). LOS is a qualitative measure of operating conditions based on control delay. LOS is given a letter designation from A to F, where LOS A represents free-flow conditions and LOS F represents heavy congestion. LOS D is considered an acceptable LOS, especially for urban areas such as Houston. The LOS categories are summarized in **Table 1-2**. **Table 1-3** summarizes the LOS and LOM vehicle to capacity (V/C) ratios criteria and also provides a comparison of LOS and LOM. This comparison is also illustrated in **Figure 1-1**.

Table 1-2: LOS Descriptions

LOS	DESCRIPTION
A	Very low vehicle delays, free traffic flow, signal progression extremely favorable, most vehicles arrive during given signal phase.
B	Good traffic flow, good signal progression, more vehicles stop and experience higher delays than for LOS A.
C	Stable traffic flow, fair signal progression, significant number of vehicles stop at signals.
D	Noticeable traffic congestion, longer delays and unfavorable signal progression, many vehicles stop at signals.
E	Unstable traffic flow, poor signal progression, significant congestion, traffic near roadway capacity, frequent traffic signal cycle failures.
F	Unacceptable delay, extremely unstable flow, heavy congestion, traffic exceeds roadway capacity, stop-and-go conditions.

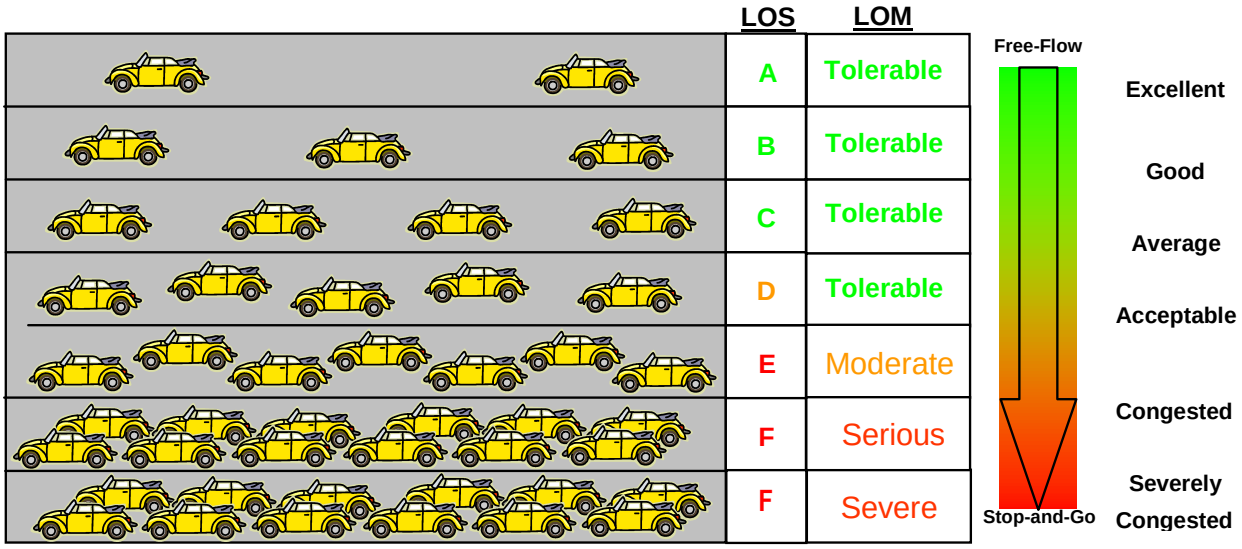
Sources: TRB, 2000; H-GAC, 2005a.

Table 1-3: LOS/LOM Criteria

Highway Capacity Manual		H-GAC	
V/C	LOS	V/C	LOM
0.27	A	N/A	Tolerable
0.44	B	N/A	Tolerable
0.64	C	N/A	Tolerable
0.85	D	0.85	Tolerable
1.00	E	1	Moderate
>1.00	F	1.24	Serious
N/A	F	>1.24	Severe

V/C - Vehicle to Capacity, N/A - Not Applicable
Sources: TRB, 2000; H-GAC, 2005a.

Figure 1-1: LOS



Existing LOS for study area roadways is illustrated in **Exhibit 1-5: Level of Service**. Most of the rural minor collector roadways such as FM 686, FM 1413, and FM 3360 operate at LOS A-C. IH 10 (E) also operates at LOS A-C. US 59 (N) operates at LOS D along its southern section in the study area and at LOS A-C north of Roman Forest Boulevard. FM 1960, FM 1485, and SH 146 operate at LOS E/F. US 90 operates at LOS E/F along its length in the study area, with the exception of the section between FM 1413 and Wolfe Island Road which operates at LOS D.

The traffic analysis was conducted for the following facility types defined by FHWA.

Freeways

Freeway facilities, including interstate highways, freeways, and expressways, are divided roadways that provide for the rapid and efficient movement of large volumes of traffic between regions and across the urban area. Direct access to abutting property is not an intended function of these facilities. Design characteristics support the function of traffic movement by providing multiple travel lanes, a high degree of access control, and few or no at-grade intersections. The freeways in the Segments H and I-1 study area are IH 10 (E) and US 59 (N).

Principal Arterial

Arterials primarily provide for traffic movement with a secondary function being the provision of direct access to abutting property. Principal arterials typically serve as connections between major traffic generators and land use concentrations, and facilitate large volumes of through traffic traveling across the community. The principal arterials in the Segments H and I-1 study area include US 90, FM 1960, and SH 146.

Minor Arterial

Minor arterials typically serve as connections between local/collector roads and major arterials, and facilitate the movement of large traffic volumes over shorter distances within the community. Because direct access to abutting property is a secondary function of arterial streets, access should be carefully managed to avoid adverse impacts on the movement function intended for these facilities. The minor arterials in the Segments H and I-1 study area include SH 321, FM 2100, and FM 1942.

Collector Roads

Collector roads provide a balance of traffic movement and property access. Traffic movement is often internal to local areas and connects residential neighborhoods, parks, churches, etc. with the arterial street system. Compared to arterial streets, collector roads accommodate smaller traffic volumes over shorter distances. The existing collector roadways in the Segments H and I-1 study area are FM 1413, FM 1485, FM 3360, FM 686, Ford / Mills Branch Road, Roman Forest Blvd., FM 163, and FM 1008.

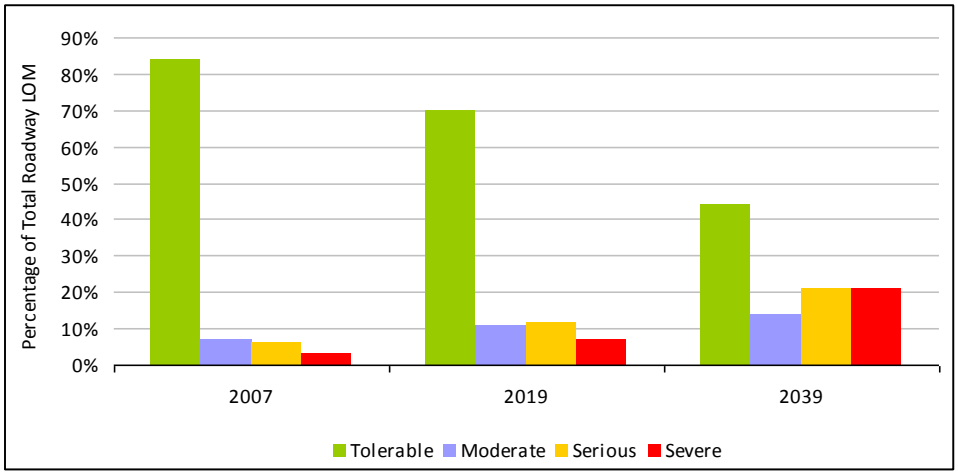
LOS for the Year 2039 No-Build scenario roadways excluding segments H and I-1 is summarized in **Exhibit 1-6: Level of Service (LOS) Year 2039 No-Build**. Base year and future No-Build LOM for years 2019 and 2039 are summarized in **Table 1-4** and **Figure 1-2** for the traffic study area. The data shows that even with planned and programmed transportation improvements (excluding Segments H and I-1) congestion is expected to worsen through 2019 and 2039. For example, in 2007, 9% of all roadway miles operate with a serious or severe LOM. This is projected to increase to 19% in 2019 and 42% in 2039. On the other hand, the portion of roadway miles with tolerable conditions is projected to reduce from 84% in year 2007 to 44% in year 2039. This shows that without additional area improvements, the level of congestion in the study area would increase through 2039.

Table 1-4: Traffic Study Area Base Year and Future No-Build LOM by Functional Class

LOM	2007 Base Year	2019 No-Build	2039 No-Build
Freeways			
Tolerable	88%	79%	36%
Moderate	10%	6%	32%
Serious	1%	13%	20%
Severe	1%	2%	12%
Principal Arterials			
Tolerable	66%	50%	25%
Moderate	12%	15%	14%
Serious	13%	17%	28%
Severe	9%	18%	33%
Minor Arterials			
Tolerable	83%	69%	50%
Moderate	8%	13%	11%
Serious	6%	13%	19%
Severe	3%	5%	20%
Collector Roadways			
Tolerable	93%	78%	51%
Moderate	2%	7%	7%
Serious	3%	7%	17%
Severe	2%	8%	25%
Total Roadway Miles			
Tolerable	84%	70%	44%
Moderate	7%	11%	14%
Serious	6%	12%	21%
Severe	3%	7%	21%

Source: H-GAC, 2007
Note: Data is for Segments H and I-1 Traffic study area limits.

Figure 1-2: Segments H and I-1 Traffic Study Area Base Year and Future No-Build LOM



Source: H-GAC, 2007
Note: Data for Segments H and I-1 Traffic study area limits.

Another trend illustrated in **Table 1-4** is the deterioration in traffic conditions along freeways and arterials roads. The percent of freeway miles operating at a tolerable LOM is projected to decrease from 88% in

2007 to 36% in 2039. The percent of principal arterial miles operating at tolerable LOM is projected to reduce from 66% in 2007 to 25% by 2039. The percent of collector miles operating at tolerable LOM is projected to reduce from 93% in 2007 to 51% in 2039. Arterials and collector roads currently provide most of the connectivity in the traffic study area, so a new circumferential controlled access facility, if constructed, would reduce the traffic load on those facilities and, subsequently, improve the LOM for the study area. Collectors in the study area include FM 1008 which provides a major north-south connection from Dayton to northern parts of Liberty County. Another one is FM 3360 which provides the connection between SH 146 and IH 10. Both of these collectors provide connectivity in the absence of Segments H and I-1 and both are projected to have reduced traffic volumes. This DEIS documents travel demand for the No-Build Alternative and build alternatives for the Grand Parkway Segments H and I-1. The only difference in the two model sets is the presence of Segments H and I-1. All other roadway improvements including other segments of the Grand Parkway were held constant between the two scenarios. Therefore, any change in traffic volume is attributable to Segments H and I-1 of the Grand Parkway. Depending on their proximity, connectivity, and area served, different roads would be impacted differently by Segments H and I-1.

Table 1-5 summarizes base year 2007 and future No-Build traffic data and LOM for years 2019 and 2039 for major roadways in the traffic study area. Frontage roads and low volume lower category streets were not included in the sampling for **Table 1-5** because they would be too numerous to list individually within the table. These frontage roads and low volume lower category streets account for the moderate category listed in **Table 1-4**. Because these lower category streets are not listed individually, there are no roadway segments listed in **Table 1-5** with a moderate LOM for the 2007 base year.

As mentioned previously, the No-Build Alternative represents a condition in which all planned improvements in the 2035 RTP are in place except Grand Parkway Segments H and I-1. Overall, study area traffic volumes are projected to increase by an average of 175% from 2007 to 2039. Traffic volumes on some arterials are projected to increase by up to 366%. This growth in traffic is consistent with the projected future population and employment growth for the study area.

Table 1-5: Traffic Study Area Base Year and Future No-Build ADT and LOM by Roadway Segment

Facility	From	To	2007 Base Year		2019		2039	
			ADT	LOM	No-Build ADT	No-Build LOM	No-Build ADT	No-Build LOM
US Highways and Interstates								
US 59 (N)	SH 105	Community Dr.	49,300	Tolerable	69,960	Tolerable	102,650	Moderate
US 59 (N)	Community Dr.	BW 8	104,480	Tolerable	144,220	Tolerable	218,320	Moderate
IH 10 (E)	BW 8	FM 2100	128,800	Tolerable	175,050	Serious	252,170	Serious
IH 10 (E)	FM 2100	SH 146	66,420	Tolerable	87,580	Tolerable	127,070	Tolerable
IH 10 (E)	SH 146	FM 563	62,460	Tolerable	78,200	Moderate	117,480	Moderate
BW 8	E. of IH 45	US 59	100,950	Tolerable	113,850	Tolerable	157,500	Serious
BW 8	US 59	US 90	33,510	Tolerable	72,450	Tolerable	115,760	Moderate
BW 8	US 90	IH 10	53,050	Tolerable	83,550	Tolerable	110,900	Serious
Principal Arterials								
US 90	BW 8	FM 2100	30,090	Tolerable	76,310	Tolerable	178,580	Serious
US 90	FM 2100	SH 321	17,470	Tolerable	25,420	Serious	55,830	Serious
US 90	SH 321	FM 770	14,100	Tolerable	18,510	Tolerable	26,880	Moderate
FM 1960	BW 8	FM 2100	25,120	Serious	27,450	Serious	40,640	Severe
FM 1960	FM 2100	SH 321	11,110	Tolerable	14,740	Serious	18,520	Severe
Kingwood Dr./ Treaschwig Rd.	FM 1960	US 59	21,780	Tolerable	27,530	Serious	49,030	Severe
Kingwood Dr.	US 59	FM 2100	19,890	Tolerable	30,250	Moderate	39,940	Serious
Kingwood Dr.	FM 2100	Proposed Grand Parkway	N/A	N/A	N/A	N/A	N/A	N/A
SH 105	US 59	SH 321	14,970	Serious	17,620	Severe	28,250	Serious
SH 105	SH 321	SH 146	6,100	Tolerable	8,260	Tolerable	11,640	Serious
W. Lake Houston Pkwy.	Roman Forest Blvd.	Kingwood Dr.	12,820	Tolerable	13,800	Tolerable	26,720	Tolerable
W. Lake Houston Pkwy.	Kingwood Dr.	BW 8	27,440	Serious	28,010	Serious	47,940	Severe
Diamondhead Blvd.	BW 8	US 90	1,790	Tolerable	6,400	Tolerable	42,270	Severe
SH 146	IH 10	Loop 201	18,320	Tolerable	33,360	Tolerable	59,050	Tolerable
SH 146 / LP 201	BS 146	Fred Hartman Bridge	7,600	Tolerable	12,790	Tolerable	21,340	Tolerable
FM 2100	US 90	IH 10	17,330	Tolerable	29,960	Severe	61,100	Severe
Minor Arterials								
SH 321	FM 105	FM 1960	5,900	Tolerable	8,070	Tolerable	15,750	Serious
FM 2100	FM 1485	FM 1960	9,600	Tolerable	20,990	Moderate	32,670	Severe
FM 2100	FM 1960	US 90	13,680	Serious	22,200	Severe	53,350	Severe
SH 146	SH 105	US 90	8,120	Tolerable	9,380	Moderate	15,450	Tolerable
SH 146	US 90	IH 10	7,920	Tolerable	15,960	Tolerable	31,450	Tolerable
Cedar Bayou Lynchburg Rd.	Spur 330	Sjolander	6,590	Tolerable	11,620	Tolerable	16,180	Tolerable
FM 563	US 90	IH 10	3,730	Tolerable	5,510	Tolerable	8,440	Tolerable
FM 1010	SH 105	FM1485	3,150	Tolerable	5,440	Tolerable	9,250	Tolerable
FM 1409 / FM 565	US 90	IH 10	3,890	Tolerable	5,010	Tolerable	7,650	Tolerable
FM 1942	FM 2100	SH 146	7,230	Tolerable	10,010	Moderate	23,470	Severe
Collector Roads								
FM 1485	Loop 494	W. Lake Houston Pkwy.	9,200	Serious	8,260	Tolerable	11,800	Tolerable
FM 1485	W. Lake Houston Pkwy.	FM 2100	9,200	Serious	8,260	Tolerable	11,800	Tolerable
FM 1413	Wolfe Island Rd.	SH 146	1,060	Tolerable	4,080	Tolerable	9,210	Serious

Table 1-5 (Cont.): Traffic Study Area Base Year and Future No-Build ADT and LOM by Roadway Segment

Facility	From	To	2007 Base Year		2019		2039	
			ADT	LOM	No-Build ADT	No-Build LOM	No-Build ADT	No-Build LOM
FM 3360	SH 146	IH 10	1,300	Tolerable	3,640	Tolerable	5,900	Tolerable
Ford / Mills Branch Rd.	Loop 494	Kingwood Dr.	9,610	Tolerable	12,350	Serious	18,860	Serious
Roman Forest Blvd.	US 59	Tram (Galaxy)	8,220	Tolerable	13,130	Serious	19,050	Severe
FM 1008	SH 321	FM 1960	2,940	Tolerable	4,140	Tolerable	5,840	Tolerable
FM 163	SH 105	FM 1008	720	Tolerable	930	Tolerable	1,920	Tolerable
FM 686	FM 1960	SH 321	1,020	Tolerable	1,590	Tolerable	2,830	Tolerable

Source: H-GAC, 2007, ADT = Average Daily Traffic

1.2.2.2 Emergency Evacuation

Major hurricane evacuation routes for the greater Houston metropolitan area per the *Task Force on Evacuation, Transportation and Logistics Final Report to the Governor* dated February 14, 2006 are identified as:

- US 69, north out of Beaumont to Lufkin
- US 59, northeast from Beltway 8
- IH 10, west out of Houston to San Antonio
- IH 45, north out of Galveston Island
- IH 45, north out of Houston to Dallas
- US 290, northwest out of Houston to Austin

Of these, only one designated route would currently serve as a preferred option for residents in Houston's northeast quadrant, IH 45 north out of Houston to Dallas. This route would be difficult for study area residents to reach due to the lack of roadways connecting IH 45 to US 59 (N) within the study area. In addition, a contraflow plan is in place for US 59 (N) from Houston to Nacogdoches. This contraflow plan, where US 59 southbound lanes would be reversed to carry two lanes of northbound traffic, would begin south of Kingwood Drive and continue northward to Nacogdoches. This would allow for additional capacity during an evacuation.

During the 2005 Atlantic hurricane season, Hurricane Rita was the tenth hurricane and second Category 5 hurricane. According to the *Houston Chronicle*, Hurricane Rita was attributed to the death of 6 people directly and over 100 indirectly, mostly due to evacuation struggles; such as lengthy evacuation times in the

heat, lack of proper provisions and water, and accidents. The threat of Hurricane Rita prompted the largest peacetime evacuation in U.S. history and tested the existing roadway system and local emergency management plans. An estimated 2.5 to 3.5 million people evacuated between Wednesday, September 21, 2005 and Friday, September 23, 2005. The total estimated average evacuation time was estimated to be approximately 31 hours.

Mandatory evacuations of storm surge zones, flood prone areas, persons with special needs, and mobile home residents, were put into effect three days prior to landfall of Hurricane Rita. According to the Harris County Office of Emergency Management, evacuation of the various surge zones was to be staggered over an 18 hour period. Officials hoped that the staggering of the evacuation times of established surge zones would prevent bottlenecks leaving the area; however, with the recent Hurricane Katrina disaster, which hit Louisiana three weeks earlier, numerous residents outside the mandatory evacuation zones chose to voluntarily evacuate at the same time. The combination of the voluntary and mandatory evacuations occurring at the same time caused gridlock on all the major arterial roadways in and out of Houston and increased the travel evacuation times for those in the mandatory zones. Travel times to evacuation destinations such as Austin, San Antonio, Dallas, Lufkin, and Huntsville took approximately 24 hours or more.

During Hurricane Rita, evacuation was impeded by the lack of circumferential highways in the Houston region. Traffic trying to evacuate to the north had limited choices on available facilities. SH 146 is identified as a hurricane evacuation route on **Exhibit 1-7: Hurricane Evacuation Route for Houston Region**. The *Task Force on Evacuation*, *Transportation and Logistics Final Report to the Governor (*February 14, 2006) indicated that during the 2005 evacuation, traffic on SH 146 was backed up from Dayton south to Mont Belvieu, a distance of 15 miles, due to limited capacity, traffic signals, and lack of connectivity to US 59 (N).

During the 2008 Atlantic hurricane season, Hurricane Ike made U.S. landfall near Galveston, Texas as a Category 2 hurricane with winds of 110 miles per hour. Hurricane Ike is blamed for over 100 deaths in the U.S. and was the third most destructive storm to make landfall in the U.S. The evacuation during Hurricane Ike had much less congestion than the Hurricane Rita evacuation, largely attributed to the late evacuation

of many people in mandatory evacuation zones, and the decreased evacuation numbers of those in non-essential evacuation zones.

In order to reach either US 59 (N) or IH 45 (N), persons residing within or near the Segments H and I-1 study area would need to access IH 10, Beltway 8, or traverse through city/county (rural) roadways. There are relatively few connections to IH 45 (N) from US 59 (N) north of Beltway 8. Roadways within the study area are primarily rural that connect scattered, small communities and towns. These rural roadways consist of many narrow two-lane roadways with little or no shoulders. Upon reaching US 59 (N), there are more options for direct routes to IH 45, if desired. Within the study area and for areas north and east of Beltway 8, a direct route to US 59 (N) with the capacity to accommodate a portion of the evacuating public is needed.

The Grand Parkway and its northeastern Segments (I-1, H and G) would play a potentially substantial role in the evacuation of residents and tourists from the surge vulnerable areas of Harris, Chambers, Liberty, Jefferson, and Orange Counties in Texas. It would also serve southwest Louisiana evacuees for various inland Texas destinations. The location of the proposed corridor would provide an additional means for evacuees to reach intended destinations.

Evacuees who are candidates to use the Grand Parkway from those coastal surge areas will travel along (heading north) Segments I-1 and H where a portion of the vehicles will exit northbound US 59 and the remaining vehicles will continue to travel along Segment G to exit northbound IH 45. The potential volume on Segment G is lower due to the bleed-off of some traffic using northbound US 59. The distribution of traffic between US 59 and IH 45 is described in detail in the section “Potential Grand Parkway Evacuation Traffic.”

The magnitude of the role that the Grand Parkway may play is a function of how many evacuees would logically use the route given their location and intended destination and the relief that the Grand Parkway provides to expected evacuation corridors and bottlenecks in the area. Given the location of the greater Houston metropolitan area and surrounding counties along the northwest Gulf Coast and the intense recent hurricane activity, hurricane evacuation is a critical public safety issue.

Modeled Hurricane Evacuation Data

An independent study was conducted to analyze the improvements in evacuation time for Chambers, Liberty, Harris and Montgomery Counties with Segments H and I-1 as well as Segment G constructed. This independent study was conducted to evaluate all segments of SH 99 and thus grouped some of the segments together to evaluate SH 99 as a whole. Therefore, while Segments H and I-1 do have independent utility to access US 59, a designated hurricane evacuation route, Segment G was included in the modeling in order to provide additional evacuation opportunities by connecting with IH 45. The discussion, which follows next, explains that analysis in detail.

Evacuation Trip Generation

For each county and southwest Louisiana, a number of evacuation vehicles were developed relevant to the analysis for the current year (2008) and year 2035. The evacuation model developed for the Galveston region study area (from the recent U.S. Army of Corps of Engineers/FEMA hurricane evacuation study) was used as a starting point and major modifications were made based on new zip code-based evacuation zones delineated by the counties. In addition, Chambers, Jefferson, Liberty, and Orange Counties were added into the modeling since these counties had not been included in a USACE/FEMA hurricane evacuation study. Evacuation vehicles for southwest Louisiana had already been developed in the federal study done for the 12 counties in that study area. Numbers of evacuating vehicles were generated and projected into the future using growth factors developed for each county. Evacuation zones form the basis of areas contributing evacuation traffic to the existing and future evacuation routes.

Using census data for the year 2000, a state population center estimate for 2008, and an H-GAC projection for 2035, the growth factors developed for each county are as follows in **Table 1-6:**

Table 1-6: County Growth Rates

	2000 Census Population	2008 Population Estimate	2008 Growth Factor	2035 Population Projection	2035 Growth Factor
Galveston County	250,158	286,987	1.15	412,000	1.65
Brazoria County	241,767	296,691	1.23	496,000	2.05
Harris County	3,400,578	3,922,115	1.15	5,840,000	1.72
Chambers County	26,031	33,225	1.28	53,000	2.04
Liberty County	70,154	77,451	1.10	131,000	1.87
Jefferson County	252,051	245,904	0.98	280,000	1.11
Orange County	84,966	84,286	0.99	95,000	1.12

Source: US Census, 2000, H-GAC, 2008

Evacuation vehicles leaving the area from designated evacuation zones were then generated by applying the growth factors to the Year 2000 baseline exhibits developed from the zip code modified USACE/FEMA hurricane evacuation study (HES) traffic model and are listed below in **Table 1-7**:

Table 1-7: Vehicle Evacuation by County

Contributing Areas	Total Out Evac Vehicles Year 2000 generated from Zip Code Zones	Est Total Out Evac Vehicles Year 2008 generated from Zip Code Zones	Est Total Out Evac Vehicles Year 2035 generated from Zip Code Zones
Galveston Zones	117,235 vehicles	134,494 vehicles	193,081 vehicles
Brazoria Zones	72,077 vehicles	88,451 vehicles	147,870 vehicles
Harris Eastern Zones	17,882 vehicles	20,624 vehicles	30,709 vehicles
Chambers County area	10,747 vehicles	13,717 vehicles	21,882 vehicles
Liberty southern county area	4,447 vehicles	4,909 vehicles	8,304 vehicles
Jefferson County area	13,291 vehicles	12,966 vehicles	14,764 vehicles
Orange County area	4,955 vehicles	4,915 vehicles	5,540 vehicles
Louisiana southwest	8,500 vehicles	9,095 vehicles	11,823 vehicles
Totals	**249,134 vehicles**	**289,171 vehicles**	**433,973 vehicles**

Source: USACE/FEMA HES Study

Behavioral Data

Of critical importance to determining which evacuation zones might use each existing evacuation route and the proposed Grand Parkway Segments I-1, H and G (and to what degree), all available behavioral information was collected and reviewed. The American Red Cross was able to conduct approximately 4,000 telephone surveys in the early 1980's to learn what Texas residents did during Hurricane Allen. Texas A&M conducted a series of behavioral interviews in 1990 which were more hypothetical in nature but presumably allowed residents to reflect on Hurricane Alicia in 1983. More recently, Dr. Michael Lindell and Carla Prater of the Hazard Reduction and Recovery Center of Texas A&M published a report entitled "Behavioral Analysis Texas Hurricane Evacuation Study, February 2008" which provided a wealth of behavioral parameters for each coastal region of Texas. Various newspaper articles from the *Houston Chronicle* provided anecdotal behavioral information for the Hurricane Rita and Ike evacuations.

Data regarding direction of travel and intended destinations were of primary significance to this analysis. A composite of all available behavioral information led to these estimated percentages listed below in **Table 1-8**:

Table 1-8: Evacuating Traffic Direction and Destination

Direction of evac traffic	Avg	Destination Cities	Avg
North	60%	Austin	10%
Northeast	10%	Dallas/Ft. Worth	40%
West	20%	Houston	10%
East	10%	San Antonio	5%
		Other	35%
Total	**100%**	**Total**	**100%**

Source: Texas A&M, 2008

Potential Grand Parkway Evacuation Traffic

Using the generated evacuation vehicle and behavioral data, it was concluded that a number of evacuating vehicles would potentially use Grand Parkway Segments I-1, H and G as evacuation routes. Segments G and H must be in place for Segment I-1 to function as a major evacuation route. Evacuation vehicle exhibits for both Segments (H, I-1 and G) were developed for the year 2035. Assumptions regarding what portion of each evacuation zone's directional traffic is using each segment are as follows:

- Grand Parkway Segments I-1, H and G in place.
- Harris eastern zones - 40% of northbound traffic would use I-1 and H; 30% of northbound traffic would use G.
- Chambers zones - 90% of northbound traffic would use I-1 and H; 75% of northbound traffic would use G.
- Liberty southern zones - 40% of northbound traffic would use I-1, H and G.
- Jefferson zones - 60% of northbound traffic would use I-1 and H; 45% of northbound traffic would use G.
- Orange zones - 40% of northbound traffic would use I-1 and H; 30% of northbound traffic would use G.
- Galveston zones (including tourists) - would generally not use I-1, H, or G but a small portion would use Grand Parkway Segment I-2 to go eastbound on IH 10.
- Brazoria zones - would not use I-1, H, or G.
- Southwest Louisiana - 50% of traffic entering Texas on IH 10 westbound would use I-1, H, and G to get to IH 45 northbound.

Using these key assumptions, the evacuation vehicle data (generated by zone), and the directional travel percentages (listed previously), the following maximum potential evacuation vehicle volumes (**Table 1-9**) were generated by segment for the year 2035:

Table 1-9: Evacuating Vehicle Volumes

Contributing Area	Grand Parkway Segments I-1, H	Grand Parkway Segment G
Harris east zones	7,370 evac vehicles	5,528 evac vehicles
Chambers	11,816	9,847
Liberty southern area	1,993	1,993
Jefferson	5,315	3,987
Orange	1,330	997
Brazoria	0	0
Galveston	0	0
Southwest Louisiana	5,912	5,912
Total by Segment	**33,736 evac vehicles**	**28,264 evac vehicles**

Source: USACE/FEMA HES Study

Evacuation Route Capacities

Data from post storm evacuation assessment work for FEMA and the USACE contain actual hour by hour traffic counts during major evacuations over the last twenty years and this data helped in developing appropriate service volumes for the proposed segments. The estimated average hourly rate volumes of evacuation vehicles are as follows in **Table 1-10**:

Table 1-10: Evacuating Vehicle Average Hourly Rate Volumes

Galveston Routes	Current Year 2008	Future Year 2035
Grand Parkway Segment I-1	not in place	3000
Grand Parkway Segment H	not in place	3000
Grand Parkway Segment G	not in place	3000

Source: USACE/FEMA HES Study

Evacuation Impacts With and Without the Project

Without the implementation of Segments I-1, H, and G, evacuation traffic from the coastal areas of Houston to Port Arthur would go to the Sam Houston Tollway thereby creating additional congestion on routes already heavily traversed by other Harris and Galveston County evacuees. With Southwest Louisiana traffic, up to 33,700 evacuation vehicles may use the Sam Houston Tollway during an evacuation that otherwise would not use it if Grand Parkway Segments I-1, H, and G were in place. This translates to roughly 7 hours of additional demand/segment clearance time on the Sam Houston Tollway. In addition, the Sam Houston Tollway's IH 45 northbound on-ramp/merge lanes are a bottleneck for evacuations. Any reduction in evacuation traffic at this location would greatly help overall flow within the immediate Houston metro area.

With the implementation of Grand Parkway Segments I-1, H, and G, the new corridor would carry a substantial amount of evacuation traffic in a worst case hurricane threat and reduce congestion on Houston area existing routes. Specifically, Segments I-1 and H would carry approximately 33,700 and Segment G would carry approximately 28,200 evacuating vehicles. The potential volume on Segment G is lower due to the bleed-off of some traffic onto US 59 northbound before it gets to IH 45 northbound.

The implementation of Grand Parkway Segments I-1, H, and G has several evacuation benefits:
1) Reduces evacuation congestion on existing northeast Houston freeways thereby easing travel for other evacuees from parts of Galveston and Harris Counties. A rough calculation yields a savings of approximately 7 hours of demand.

2) Although not reducing overall regional clearance times on IH 45 northbound upstream (as the Grand Parkway Segments H and I-1 tie back into IH 45), the new Segments would allow nominal travel time savings for certain evacuees traveling westbound on IH 10 who desire to go north on IH 45 and US 59.

3) The potential new segments provide an alternative route for many evacuees if a traffic incident closes down the Sam Houston Tollway or close in sections of IH 45 for part of an evacuation.

4) Separation of Houston local evacuees from Trinity Bay to Lake Sabine evacuees allows emergency management officials to tailor variable message boards to giving group specific sheltering instructions and downstream information.

1.2.3 Compromised Safety

A crash analysis was conducted to determine how travel safety would be affected by a new circumferential freeway. National research has shown that controlled-access facilities such as freeways have lower crash rates than those without full control of access[1]. This is attributable to the higher design standards for freeways, fewer access points, fewer driver distractions, and less stop-and-go conditions. Therefore, diverting traffic from collector roadways to a limited access facility such as the proposed Grand Parkway Segments H and I-1 would be expected to result in a reduction in study area roadway crash rates.

[1] *Improved Safety Information to Support Highway Design,* NCHRP 430, Transportation Research Board, Washington D.C., 1999

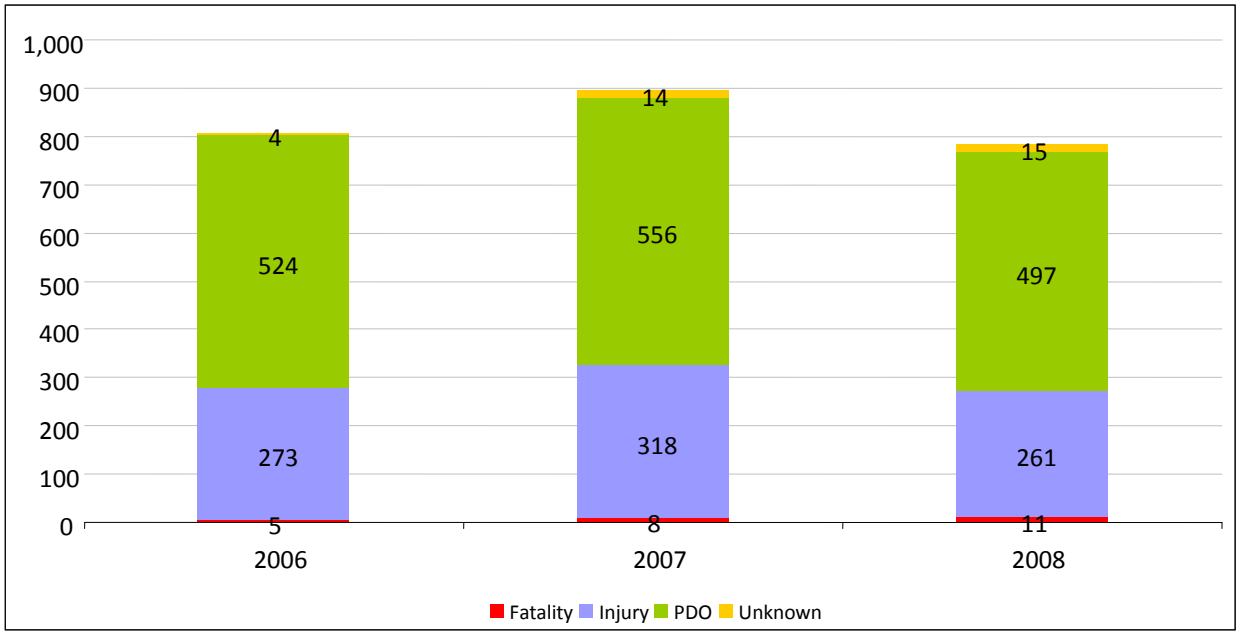
Crash data was provided by TxDOT from their Crash Records Information System (CRIS). Three-year crash data for the period 2006 to 2008 were analyzed for roadway segments within the Segments H and I-1 study area that are considered primary travel routes. Crashes were summarized by crash type including fatality, injury, or property damage only (PDO), as shown in **Table 1-11**. **Figure 1-3** illustrates crashes by type from 2006 to 2008 for the Segments H and I-1 study area. The total number of crashes over the three-year analysis period was 2,486, with the highest number of crashes (896) occurring in 2007.

Table 1-11: Study Area Crashes (2006 – 2008)

Road Segment	Location	Crash Type				
		Fatality	Injury	PDO	Unknown	Total
IH 10	Garth Road to FM 3180	5	173	364	7	549
US 90	Main Street / Crosby Lynchburg Road to FM 321	1	71	141	1	214
US 59	Northpark Drive to Deerbrook Drive	4	150	283	11	448
SH 321	US 90 to FM 1008	2	66	166	2	236
SH 146	Old Needlepoint Road to US 90	3	73	130	0	206
FM 1960	Fairlake Lane to Liberty County Line	0	24	35	2	61
FM 1485	Loop 494 to FM 2100	2	78	92	2	174
FM 2100	FM 1485 to US 90	1	107	202	5	315
FM 1314	Loop 494 to Andrew Lane	1	15	49	0	65
FM 1942	Cedar Grove Road to SH 146	2	43	43	2	90
FM 3360	FM 565 to SH 146	0	15	18	0	33
FM 1413	SH 146 to US 90	0	8	6	1	15
FM 686	FM 321 to FM 1960	0	7	5	0	12
Loop 494	Northpark Drive to US 59	3	22	43	0	68
Totals		24	852	1,577	33	2,486

Source: TxDOT, 2009

Figure 1-3: Years 2006 – 2008 Crash History



Source: TxDOT 2009

Crash rates were calculated for the major roadways which currently serve as the primary routes for travel to and within the study area and are based on the number of crashes per 100 million vehicle miles traveled (MVMT) as shown in **Table 1-12**. A review of the results indicates that FM 3360 had the highest crash rate (602) while US 59 has the lowest rate (61.5).

Table 1-12: Crash Rates in Study Area

Road Segment	Facility Type	Functional Class	Location	Length (Mile)	Accident Rate (Accidents per 100 MVMT)			
					2006	2007	2008	Average
IH 10	Interstate	Freeway	Garth Road to FM 3180	8.53	106.2	94.7	67.5	89.5
US 90	US Highway	Arterial	Main Street / Crosby Lynchburg Road to FM 321	14.42	70.2	68.7	79.9	72.9
US 59	US Highway	Arterial	Northpark Drive to Deerbrook Drive	10.25	54.7	67.1	62.8	61.5
SH 321	State Highway	Arterial	US 90 to FM 1008	14.01	109.2	155.2	145.8	136.7
SH 146	State Highway	Arterial	Old Needlepoint Road to US 90	16.09	76.9	77.4	70.2	74.8
FM 1960	Farm to Market Road	Arterial	Fairlake Lane to Liberty County Line	4.31	156.2	161.0	131.3	149.5
FM 1485	Farm to Market Road	Collector	Loop 494 to FM 2100	8.96	224.5	222.5	195.5	214.1
FM 2100	Farm to Market Road	Arterial	FM 1485 to US 90	14.29	122.1	129.4	138.3	129.9
FM 1314	Farm to Market Road		Loop 494 to Andrew Lane	1.88	143.5	151.9	195.5	163.6
FM 1942	Farm to Market Road	Arterial	Cedar Grove Road to SH 146	10.16	104.4	145.1	174.4	141.3
FM 3360	Farm to Market Road	Collector	FM 565 to SH 146	2.28	640.9	652.3	512.7	602.0
FM 1413	Farm to Market Road	Collector	SH 146 to US 90	5.05	319.3	96.9	106.4	174.2

Source: TxDOT, 2009

Table 1-12 (Cont.): Crash Rates in Study Area

Road Segment	Facility Type	Functional Class	Location	Length (Mile)	Accident Rate (Accidents per 100 MVMT)			
					2006	2007	2008	Average
FM 686	Farm to Market Road	Collector	FM 321 to FM 1960	11.98	64.9	110.4	64.9	80.1
Loop 494	2 Lane 2 way		Northpark Drive to US 59	7.14	65.7	90.4	107.1	87.7

Source: TxDOT, 2009

The crash rate takes into account the length of roadway segments and traffic volume and provides a very strong indication of traffic safety. Crash rates are influenced by roadway type, conditions, travel speed, and accessibility. **Table 1-13** summarizes statewide crash rates for various roadway types. Typically, roadways are considered to have a substantial crash problem when the crash rate is at least double the statewide average for that particular facility type.

Table 1-13: Statewide Crash Rates for Rural Area

Road Segment	Accident Rate (Accidents per 100 MVMT)			
	2006	2007	2008	Average
Interstate	49.60	56.84	46.84	51.30
US Highway	62.95	66.70	59.55	63.30
State Highway	88.89	92.23	85.99	93.30
FM roads	122.42	126.78	123.65	125.70
2 Lane 2 Way	97.45	101.70	96.54	98.56

Source: TxDOT, 2009

Figures 1-4 through **1-7** illustrate the comparison of study area roadway crash rates to corresponding statewide averages. Figure 1-4, for example, shows that the crash rate for IH 10 in the study area is 89.5, which is higher than the statewide average of 51.3 for an Interstate, but not quite double. Figure 1-5 shows that the average three-year crash rate for US 90 is higher than the statewide average, but the comparable rate for US 59 is lower than the statewide average. Similarly, Figure 1-6 shows that the average crash rate for SH 321 is higher than the statewide average but less than double. On the other hand, **Figure 1-7** shows that FM 3360 has a crash rate substantially more than double the statewide average, indicative of substantial safety issues. Overall, although FM 3360 is the only roadway with a three-year crash rate more than double the statewide average, there are other roadways in the study area with crash rates close to double the statewide average.

Local roads, collector facilities, and non-freeway principal arterials have much higher crash rates due to more frequent turns, stop-and-go conditions, roadway distractions, and lack of access control. As illustrated previously in **Table 1-5**, travel demand is projected to increase on FM 3360 and FM 1485. As

mentioned previously, FM 3360 has a crash rate more than double the statewide crash rate and the crash rate for FM 1485 is close to double the statewide average.

Figure 1-4: Crash Rate Comparison - Interstate Highways

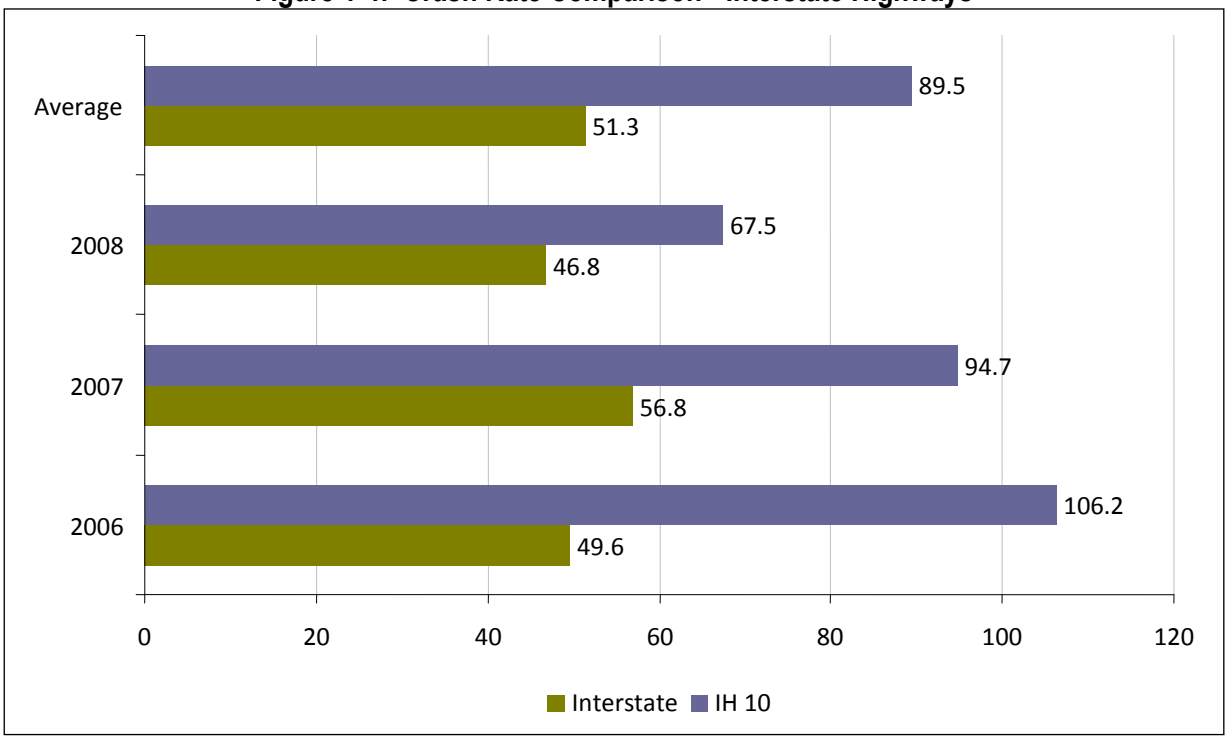


Figure 1-5: Crash Rate Comparison - US Highways (US 90 and US 59)

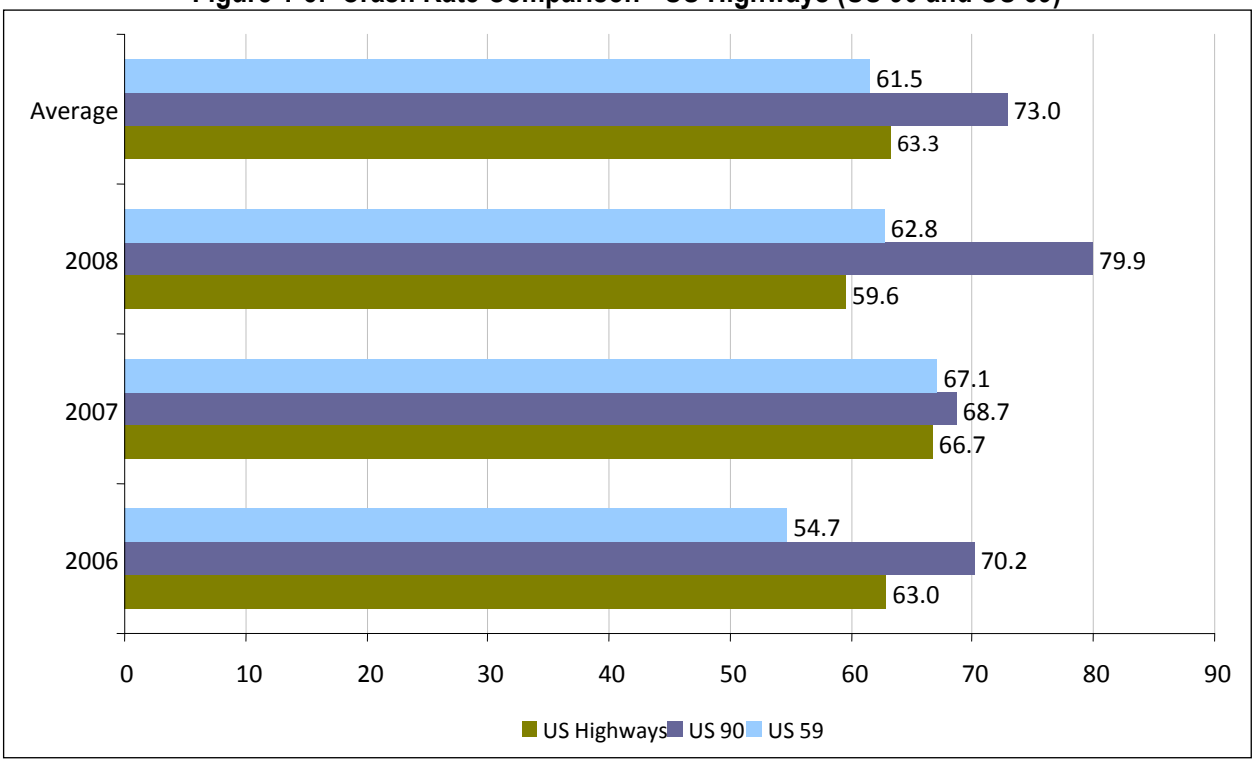


Figure 1-6: Crash Rate Comparison - State Highways (SH 321 and SH 146)

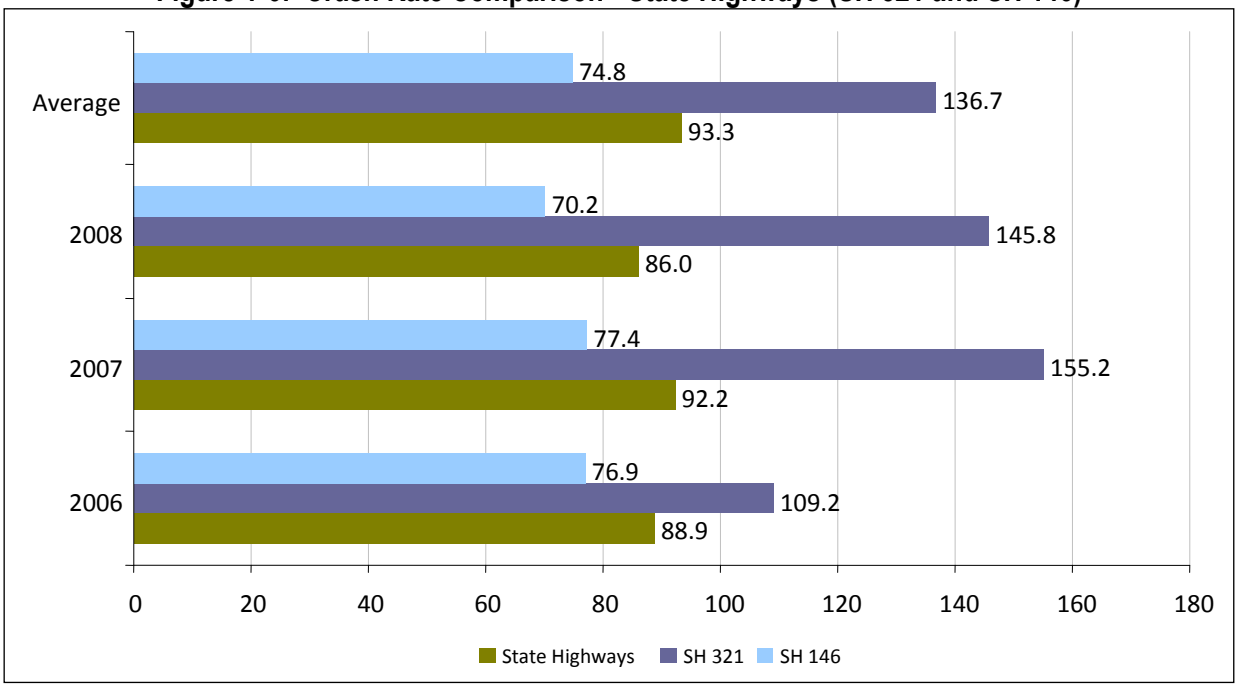
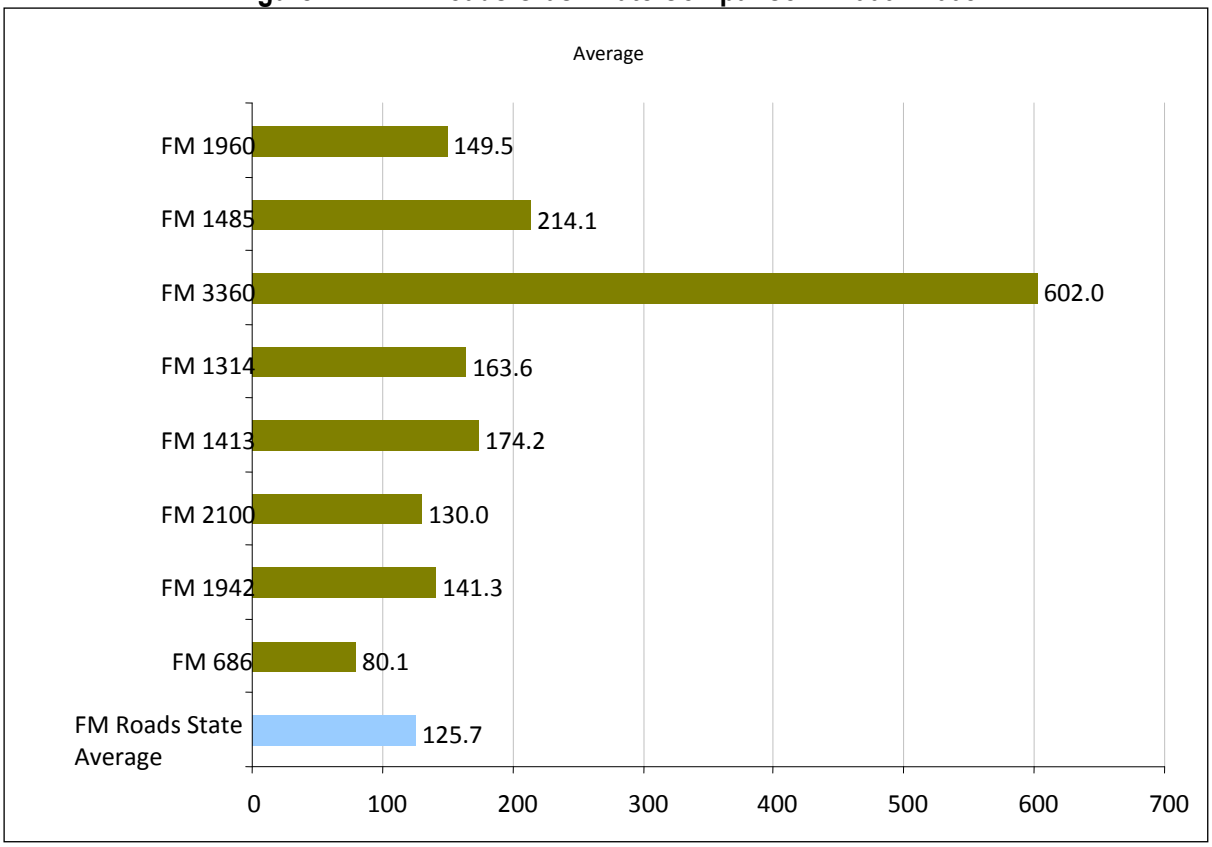


Figure 1-7: FM Roads Crash Rate Comparison - 2006 - 2008



1.2.4 Lack of Infrastructure to Support Population Growth

The existing transportation system does not provide the necessary infrastructure to support the potential for population growth through efficient circumferential connections and access **(Refer to Section 1.2.1, Discontinuous System Linkage)**.

Based on the H-GAC 2035 forecasts (discussed below), population growth for the Segments H and I-1 study area is projected to increase through the year 2035. This predicted increase in population along with the predicted increases in traffic and congestion would lead to an even greater travel demand for the study area. Additional travel alternatives would be needed for the study area to support the efficient movement of people and goods through the study area to support the predicted population growth.

1.2.4.1 Growth Projections

The H-GAC is the local regional Metropolitan Planning Organization (MPO) and has projected population and employment growth through the year 2035 for the region. Based on the H-GAC's 2035 Forecast Data,

the population in Montgomery, Harris, Liberty, and Chambers counties is expected to increase from 4.3 million in 2005 to 6.9 million by 2035. These projections represent projected growth within the region where the Segments H and I-1 study area is located. This represents a population growth of approximately 62%. Employment growth within the same area is expected to increase from 2.2 million in 2005 to 3.4 million in 2035. This represents an employment growth rate of approximately 65%. **Table 1-14** illustrates the H-GAC 2035 Forecast Data for population and employment growth for the four counties within the Segments H and I-1 study area.

Table 1-14: H-GAC 2035 Population and Employment Growth by County

Area	Total Population			Employment		
	2005	2035	% Increase	2005	2035	% Increase
Chambers County	30,000	53,000	77	8,000	13,000	63
Harris County	3,774,000	5,840,000	55	2,060,000	3,145,000	53
Liberty County	80,000	131,000	64	21,000	34,000	62
Montgomery County	373,000	865,000	132	108,000	240,000	122
Area Total	**4,257,000**	**6,889,000**	**62**	**2,197,000**	**3,432,000**	**65**

Source: H-GAC, 2035 Forecast Data, 2006, http://www.h-gac.com/HGAC/home/Default.htm.

Table 1-15 illustrates the H-GAC 2035 Forecast Data for population and employment growth for the Traffic Analysis Zones (TAZs) that are within the Segments H and I-1 study area. Refer to **Exhibit 1-8: H-GAC Regional Analysis Zones within Study Area** for a map of the locations of the TAZs within the study area. The growth forecasted by TAZs is more localized and more representative of what is predicted for the Segments H and I-1 study area than is growth forecasted for the counties within the study area. The boundaries of the TAZs do extend slightly beyond the Segments H and I-1 study area. However, this is the best and lowest level of forecast data available for the region. Based on the H-GAC 2035 Forecast Data, the population for the TAZs that include the Segments H and I-1 study area is expected to increase from 179,100 in 2005 to 569,480 in 2035. This represents a population growth of approximately 218%. Employment growth within the same area is expected to increase from 39,364 in 2005 to 88,754 in 2035. This represents an employment growth rate of approximately 125%. The forecasted growth for the Segments H and I-1 study area demonstrates the need for expanded infrastructure to support it.

Table 1-15: H-GAC 2035 Population and Employment Growth by Traffic Analysis Zone (TAZ)

TAZ ID	Total Population			Employment		
	2005	2035	% Increase	2005	2035	% Increase
79	56,140	72,834	30	10,506	16,172	54
80	12,372	49,108	297	1,273	4,068	220
81	14,676	105,497	619	1,263	5,640	347
83	11,316	116,978	934	2,481	8,808	255
84	27,782	104,910	278	7,203	18,692	160
128	24,197	67,871	180	6,335	19,419	207
192	5,426	9,725	79	3,842	6,871	79
195	19,843	31,780	60	5,046	7,366	46
196	7,348	10,777	46	1,415	1,718	21
TAZ Area Total	**179,100**	**569,480**	**218**	**39,364**	**88,754**	**125**

Source: H-GAC, 2035 Forecast Data, 2006, http://www.h-gac.com/HGAC/home/Default.htm.

1.3 PURPOSE OF THE PROPOSED PROJECT

The purpose of the proposed transportation improvements in the Segments H and I-1 study area is to provide system linkage, improve mobility, enhance safety, and provide infrastructure to support population growth.

1.3.1 Provide System Linkage

The proposed project would produce benefits locally and regionally by improving connectivity within the existing transportation network by providing a circumferential link between US 59 (N) and IH 10 (E). This would accommodate circumferential travel movement within the Segments H and I-1 study area to two of Houston's major radial roadways that border the study area improving connectivity to suburban communities, industrial complexes, local ports, and providing better connectivity for hurricane evacuation.

1.3.2 Improve Mobility

The proposed project would improve the LOM/LOS, alleviate transportation demand, reduce congestion, and provide more travel options for the traveling public. The LOM is a concept developed by H-GAC to illustrate the degree of congestion on roadways within the region. Further, Segments H and I-1 would provide another emergency evacuation option for the traveling public that would help reduce the strain on the major radial roadways through the Houston area. This would help reduce congestion during hurricane evacuations and flood events leading to safer and more efficient evacuation conditions. During a hurricane evacuation, the tolls for the proposed Segments H and I-1 would be waived to provide a free evacuation route to the traveling public.

1.3.3 Enhance Safety

The proposed project would improve safety within the Segments H and I-1 study area for the traveling public by helping to reduce stop-and-go conditions, lower crash rates, and provide an alternate evacuation route to help relieve congestion during emergency evacuations and peak travel times. The proposed project would help reduce traffic on local roadways with high crash rates, such as FM 1485 and Loop 494, which would likely lead to reduced crash rates. In addition, the proposed project would enhance safety on local roads by providing an alternate route for truck traffic that currently utilizes local roads to transport freight.

1.3.4 Provide Infrastructure to Support Population Growth

The proposed project would accommodate the forecasted population growth of the Segments H and I-1 study area by providing a facility that would improve the movement of people and goods to businesses, places of employment and residential areas within and throughout the study area.