ENVIRONMENTAL ASSESSMENT

FM 646

IH 45 to Bayshore Boulevard

U.S. Department of Transportation
Federal Highway Administration

Texas Department of Transportation

CSJs: 3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

July 2010

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FM 646

IH 45 to Bayshore Boulevard

GALVESTON COUNTY

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

TEXAS DEPARTMENT OF TRANSPORTATION

CSJs: 3049-01-027, 3049-01-022, 3049-01-023,
0978-02-053, 0978-02-034

July 2010

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ac	Acre
ADT	average daily traffic
Amsl	above mean sea level
APE	area of potential effect
AST	aboveground storage tank
BG	block group
BMP	best management practice
CAA	Clean Air Act
CDP	Census Designated Place
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERLIS/NFRAP	State equivalent CERLIS list
CFR	Code of Federal Regulations
CMA	Congestion Mitigation Analysis
CMAQ	Congestion Management and Air Quality
CMS	Congestion Management System
CMSA	Consolidated Metropolitan Statistical Area
CO	Carbon monoxide
CORRACTS	US EPA RCRA Corrective Actions
CSJ	Control Section Job
CT	census tract
CWA	Clean Water Act
DA	drainage area
DHHS	Department of Health and Human Services
EA	Environmental Assessment
EFH	essential fish habitat
ENV	Environmental Affairs Division
EO	Executive Order
EPA	Environmental Protection Agency
ERNS	Emergency Response Notification of Spills
ETC	estimated time of completion
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FHWA	Federal Highway Administration
Ft	Feet
FM	Farm-to-Market Road
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
FRA	Federal Railroad Association
GH&H	Galveston, Houston & Henderson
GPS	global positioning system
H-GAC	Houston-Galveston Area Council
ID	Identification
IH	Interstate Highway
In	Inch
LEP	Limited English Proficiency
LOW	Letter of Waiver
LUST	leaking underground storage tank
M	Meter
MAPO	meeting with affected property owners
Mi	Mile
MOU	Memorandum of Understanding
Mph	miles per hour
MPO	metropolitan planning organization
MSAT	Mobile Source Air Toxics
NAAQS	National Ambient Air Quality Standards

NAC	Noise Abatement Criteria
NEPA	National Environmental Policy Act
NDD	Natural Diversity Database
NFRAP	No Further Remedial Action Planned
NLEV	national low emission vehicle
NMHC	Non-methane hydrocarbon
NOI	Notice of Intent
NOTIFIERS	US EPA RCRIS Notifiers
NPL	US EPA National Priorities List
NRHP	National Register of Historic Places
NRCS	Natural Resource Conservation Service
NWP	Nationwide Permit
OMB	Office of Management and Budget
PA	Programmatic Agreement
PALM	Potential Archeological Liability Map
PCN	Pre-construction Notification
PM	particulate matter
%	Percent
RAZ	Regional Analysis Zone
RCRA	Resource Conservation and Recovery Act
RCRA-TSD	RCRA permitted treatment, storage, and disposal facilities
RFG	reformulated gasoline
ROW	right-of-way
RSA	resource study area
RTHL	Recorded Texas Historical Landmark
RTP	Regional Transportation Plan
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SAL	State Archeological Landmark
SCL	State voluntary Clean-up Program
SH	State Highway
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SOV	Single Occupancy Vehicle
SPILLS	State regulated SPILLS list
SPL	State equivalent Priorities List
SW3P	Storm Water Pollution Prevention Plan
SWLF	Solid Waste Landfills, Incinerators or Transfer Stations
TCEQ	Texas Commission on Environmental Quality
TCM	Traffic Control Measures
TDM	Traffic Demand Management
TPDS	Texas Department of Public Safety
THC	Texas Historical Commission
TIP	Transportation Improvement Program
TMA	Traffic Management Area
TMDL	Total Maximum Daily Load
TNM	Traffic Noise Model
TOS	Texas Ornithological Society
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TSD CORRACTS	Corrective Action and associated Treatment Storage and Disposal Facilities
TSM	Traffic System Management
TSS	total suspended solids
TxDOT	Texas Department of Transportation
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service

USGS	U.S. Geological Survey
UST	underground storage tank
VMT	vehicle miles traveled
Vpd	vehicles per day

INTRODUCTION

This Environmental Assessment (EA) discusses the social, economic, and environmental impacts resulting from the proposed widening of Farm-to-Market Road (FM) 646 from Interstate Highway (IH) 45 to Bayshore Boulevard (Blvd.) in Galveston County, Texas (**Exhibits A** and **B**). Total project length is 8.9 miles (mi). The FM 646 roadway improvements are being proposed by the Texas Department of Transportation (TxDOT) under five Control Section Job (CSJ) numbers: 3049-01-027 (Benson Gully to IH 45), 3049-01-022 (Edmunds Way to FM 1266), 3049-01-023 (FM 3436 to FM 1266), 0978-02-053 (FM 3436 to SH 146), and 0978-02-034 (SH 146 (N) to 1 mi east of SH 146). The last section of the roadway that passes through the unincorporated community of Bacliff is also referred to as Grand Avenue. For the purposes of this document, the existing roadway will be solely referred to as FM 646.

Originally, the proposed project consisted of four CSJs: 3049-01-022, 3049-01-023, 0978-02-053, and 0978-02-034. These CSJs are listed in the Houston-Galveston Area Council's (H-GAC) 2035 Regional Transportation Plan (RTP) and in Chapter 2 (Highway Projects) of the 2008-2011 Transportation Improvement Program (TIP) for the Houston-Galveston Transportation Management Area (TMA). These CSJs correspond to the H-GAC project numbers in the RTP listed in **Table 1**.

At the request of Galveston County Judge Jim Yarborough, TxDOT requested that CSJ 3049-01-022, originally covering the proposed work from IH 45 to FM 1266, be split into two CSJ numbers for funding purposes. A new number, CSJ 3049-01-027, was created to cover Benson Gully to IH 45, and the original number, CSJ 3049-01-022, now covers Edmunds Way to FM 1266. The limit of Edmunds Way is east of the limit Benson Gully. These are the limits as listed in H-GAC's 2035 RTP which results in an overlap of the eastern limits for these two adjacent projects. CSJ 3049-01-027 and CSJ 0978-02-053 have been included in the 2008-2011 TIP project listing. The other three CSJs are included in Appendix D of the 2008-2011 TIP for projects undergoing environmental assessment.

Table 1: TxDOT CSJ and H-GAC Project Identification Numbers

CSJ No.	Project Limits	H-GAC Project ID No.
3049-01-027	Benson Gully to IH 45	13877
3049-01-022	Edmunds Way to FM 1266	514
3049-01-023	FM 3436 to FM 1266	10920
0978-02-053	FM 3436 to SH 146	10144
0978-02-034	SH 146 (N) to 1 mi east of SH 146	4052

CSJ 3049-01-027 is listed as a contingency project under funding Category 7 (Surface Transportation Program Metropolitan Mobility/Rehabilitation), and the other four CSJs are listed under funding Category 11 (District Discretionary). As of August 2007, the total estimated construction cost for the proposed project is $73.8 million. Construction would be 80 percent (%) federally-funded and 20% state-funded.

NEED AND PURPOSE

Need: The following items are the focal points regarding the need for this project:

- Improved mobility, both locally and regionally, due to the projected increases in traffic, population, and development
- Decrease congestion during hurricane evacuations

- Improved safety and operational efficiency
- Reduce congestion and address safety concerns at the at-grade railroad crossing

Purpose: The purpose of the proposed project is to increase capacity and mobility and to improve the roadway design of the existing FM 646 facility. Additional travel lanes will accommodate the projected increase in traffic volumes during hurricane evacuations and projected future corridor traffic demands. Improving the existing roadway design by adding two travel lanes, adding a median, expanding the shoulder widths, and constructing a grade separation over a railroad crossing will improve safety, efficiency, and mobility in the project area.

Galveston County population increased 47.3% between 1970 and 2000. H-GAC forecasts continued growth, reaching 394,100 persons in 2030, a 57.5% increase over the year 2000 population of 250,170.[1] During the same period, H-GAC forecasts the regional analysis zone (RAZ) in which the project is located to increase from a year 2000 population of 4,332 to 12,289, an increase of 183.7%.

Mobility and congestion problems exist along FM 646 since the capacity of this roadway is not sufficient to meet an acceptable level of service (LOS). LOS is a qualitative measure of operating conditions at a location and is directly related to roadway network performance measures such as vehicular delay. LOS is given a letter of designation ranging from A to F (free flowing to heavily congested), with LOS C considered as the limit of acceptable operation in rural areas. Based on existing traffic volumes and data for similar roadways within the project area, the existing LOS for FM 646 is F. This LOS is below the limit of acceptable operation (LOS C) for a two-lane rural roadway. The proposed improvements are necessary in order for the FM 646 facility to accommodate the projected increase in traffic volumes and to operate at a LOS C or better.

The Federal Railroad Association's (FRA) Highway-Rail Crossing Safety and Trespass Prevention Program goals include reducing the number of accidents at highway-rail grade crossings and along railroad rights-of-way. It is estimated that in recent years approximately 300-400 deaths nationwide have occurred annually within exisitng grade crossings, thus warranting consideration from transportation agencies with jusrisdictional oversight of these crossings. Funds have been earmarked for this purpose under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) program (formerly known as "Section 130"). This program allocates money to the States to eliminate hazards at public highway-railroad grade crossings (FRA 2010). The proposed improvements to FM 646 would include adding an overpass over the existing railroad crossing near SH 3. This would improve both safety and mobility in the project area.

Due to the anticipated increases in traffic, population, and regional development, improvements to FM 646 are needed. FM 646 is listed as a prioritized project on the July 2006 Regional Metropolitan Mobility Plan. A Congestion Mitigation Analysis (CMA) was performed in May 2006 from IH 45 to FM 1266. This analysis concluded that this section of FM 646 has deteriorated significantly to justify adding additional road capacity. A CMA is needed for the entire limits of the proposed project. Adding capacity on this roadway is consistent with the Congestion Management System (CMS) Plan of the H-GAC (Air Quality-Congestion

[1] *2035 Regional Growth Forecast.*

Management System). The expansion of FM 646 would help meet existing and future traffic demands and provide for safer mobility.

FM 646 extends west from Bacliff to IH 45 and then south to SH 6. The section of FM 646 within the proposed project limits is a two-lane, undivided roadway. This section of FM 646 provides a primary connection to IH 45 and SH 146, both of which are utilized by commuters to access the surrounding communities of Dickinson, League City, and Bacliff. Development is rapidly increasing in this area and the number of commuters into Houston is continuously increasing.

Throughout the 1980s and 1990s, Galveston County experienced a steady increase in population. Due to the growth in population, vehicular traffic on local roadways has increased. The increased vehicular traffic has accelerated the degradation of the existing roadway and has increased congestion within the project limits. Additionally, the limited paved surface does not provide accessible safe areas for motorists to depart the travel lanes in the case of an emergency.

Currently, FM 646 is utilized as the main thoroughfare and hurricane evacuation route for residents of Dickinson, League City, and Bacliff. Therefore, the FM 646 roadway is crucial to the economy and to regional public safety. The proposed project would increase public safety and provide improved service to surrounding communities.

TRAFFIC

The projected existing average daily traffic (ADT) for this section of FM 646 is 12,900 vehicles per day (vpd) for 2009. The ADT for the proposed project is predicted to increase to 22,200 vpd by the design year 2029. Current posted advisory speeds on FM 646 range from 40 to 55 miles per hour (mph) within the project limits.

DESIGN

Existing

The existing FM 646 facility is classified as an Urban Principal Arterial from IH 45 to FM 1266 and an Urban Minor Arterial east of FM 1266, consisting of an undivided roadway with two 12-foot (ft) travel lanes and paved shoulders ranging from 7 ft to 10 ft within an existing right-of-way (ROW) that varies from 100 ft to 120 ft. The existing ROW is 120 ft from IH 45 to FM 3436 and decreases to 100 ft for the remainder of the proposed project area. Storm water drainage is conveyed through parallel roadside drainage channels (open ditches). An at-grade railroad crossing exists approximately 0.6 mi east of SH 3 within the project area. An existing roadway typical section is provided in **Exhibit C**.

Proposed

The proposed project is to widen FM 646 from a two-lane undivided roadway to a four-lane divide roadway. The proposed roadway from IH 45 to Maryland Avenue (2.125 m) will be an urban curb and gutter section with four 12-ft lanes, 12-ft outside shoulders and a 14-ft raised median with a 2-ft inside curb offset.

A bridge is proposed to extend from west of SH 3 to east of Nichols Avenue. The 2,166-ft long bridge will extend over SH 3, the Union Pacific Railroad crossing and Nichols Avenue. Half of the bridge length will be four 12-ft lanes with 12-ft outside shoulders and a 14-ft raised median with a 2-ft inside curb offset. The second half of the bridge will be twin structures. Each

structure will have two 12-ft lanes with 4-ft inside shoulders and 10-ft outside shoulders. The existing roadway crossing at the Union Pacific Railroad will remain open, and parallel access roads along the bridge will be proposed to maintain access to adjacent properties.

The proposed roadway from Maryland Avenue to Vicksburg Lane (3.875mi.) will be four 12-ft lanes, 12-ft outside shoulders and a 16-ft raised median with a 2-ft inside curb offset and open ditches. Sidewalks are proposed to extend from IH 45 to FM 1266, and will include pedestrian access to Elva Lobit Park.

Proposed roadway and bridge typical sections are provided in **Exhibit D**.

Alternatives

When considering the widening of an existing highway, there are generally four possible alternatives available; acquire needed additional ROW on one side of the existing highway, acquire needed additional ROW on the other side, or possibly reduce impacts on adjoining property owners by acquiring lesser amounts of ROW on both sides of the existing highway. Building on new alignment is usually more costly and more disruptive to the project area. Three build alternatives and the no-build alternative were originally considered for the proposed project. The three alternatives were presented to the public at two public meetings held in 2005 and 2006. A brief synopsis of each meeting is included in the Public Involvement section of this document.

Alternative A – North Alignment

Alternative A would acquire all additional ROW primarily from the north side of the existing roadway. The maximum proposed ROW width for this alternative would be 152 ft. This alternative was not preferred because of increased impacts to residential and commercial displacements on the north side of the roadway. Public comments did not favor this alternative and it was dismissed in the early planning stages.

Alternative B – South Alignment

Alternative B would require additional ROW primarily from the south side of the existing FM 646 roadway. The maximum proposed ROW width for this alternative would be 152 ft. This alternative was not preferred because of increased impacts to residential and commercial displacements on the south side of the roadway. Public comments did not favor this alternative and it was dismissed in the early planning stages.

Alternative C – Center Alignment

Alternative C would center the proposed alignment along the existing FM 646 facility, thus dividing the additional ROW needs from both the north and south sides of the roadway as a best-fit scenario. The maximum proposed ROW width for this alternative would be 152 ft. An equal amount of ROW would be acquired from both sides of the roadway, therefore not resulting in disproportionate displacements on the north or south sides. This alternative was initially preferred by the public.

Alternative D – Preferred Alignment

Following the public meetings, public input was taken into further consideration. As a result, a combination of the north and center alignments is considered the preferred alignment. The majority of the proposed project area would have equal amounts of ROW acquired from the north and south sides of the roadway except in the vicinity of Elva Lobit Park. The park is adjacent to the roadway on the south side of FM 646, approximately 1.2 mi east of SH 3. To

completely avoid this park, the alignment is proposed to shift to the north from Wyoming Street to approximately 1.0 mi east of the park limits and then return to the center alignment.

The preferred alternative would meet all the project needs by improving mobility, decreasing congestion during hurricane evacuations, and improving safety and the operational efficiency of the roadway.

No-Build Alternative
Due to current and future increases in population, the no-build alternative would not accommodate the mobility needs of the public resulting from the increased growth of businesses and residential developments, nor would it improve the operational efficiency and safety conditions along FM 646 within the project limits. Therefore, the no-build alternative would not meet the project's need and purpose.

RIGHT-OF-WAY AND DISPLACEMENTS

Existing FM 646 ROW varies from 100 ft to 120 ft, and the proposed ROW needed for the roadway improvements varies from 32 ft to 52 ft. Approximately 25.6 acres (ac) of additional ROW would be required for the proposed project. The proposed project would require utility adjustments. Pole-mounted utilities including streetlights, telephone cables, and traffic signals are located within or adjacent to the existing ROW. There are a large number of underground and overhead utilities traversing the project area approximately 0.5 miles east of FM 270.

Forty-seven adjacent properties would potentially be affected as a result of the proposed project. Six structures on these properties are proposed to be displaced (**Table 2, Exhibit E**).

Table 2: Potential Displacements

Map ID No.	Type of Structure	Address
1	Residence	2901 E. FM 646
2	Residence	2905 E. FM 646
3	Residence	1607 Avenue F
4	Residence	901 FM 1266
5	Gas Tank	151 E. FM 646
6	Gas Tank	102 W. FM 646

Sites 5 and 6 are commercial gasoline service stations located at the intersection of FM 646 and SH 3 (**Exhibit E**). The exact configuration of tanks and pipes is unknown at these locations. The severity of impact to each location will be determined during the TxDOT ROW acquisition phase.

Efforts to avoid displacements were made, when feasible, during project planning and design development. TxDOT would be responsible for ROW acquisition. Acquisition and relocation assistance would be in accordance with the TxDOT ROW Acquisition and Relocation Assistance Program. Potential driveway alterations may also be necessary between FM 3436 and SH 146 as well as through the Bacliff area from SH 146 to Bayshore Blvd.

There are a range of replacement homes available in the communities from which people are being displaced. Homes are available which would be comparable to those being displaced in terms of value, size, and amenities. The September 2008 Hurricane Ike event, combined with recent, nationwide downturns in the housing markets have not significantly impacted the

availability of housing in the area, but may have had some impact on housing prices. During 2007, the Galveston Multiple Listing Service (MLS) reported that 1,157 houses were sold. The average price of the homes sold was $223,600 and the median price was $174,400; this was only slightly higher than numbers reported for 2006. In April 2008, there were 1,652 houses listed for sale by the Galveston MLS. The average price for the 90 houses sold during that month was $231,400 and the median price was $176,000. In April 2009, there were 1,110 houses listed for sale by the Galveston MLS. The average price for the 68 houses sold during that month was $120,200 and the median price was $85,000.

SOCIOECONOMICS

The proposed FM 646 project is adjacent to or located within nine census tract (CT) block groups (BGs) as shown on **Exhibit E**. CT BGs are generally defined so they contain approximately 400 housing units; thus depending upon the population density in the area, the sizes of CT BGs may vary widely. Within the BGs there are a total of 77 census blocks adjacent to the proposed project. Census blocks are areas bounded on all sides by visible features, such as streets, roads, streams and railroad tracks and by invisible boundaries such as city and county boundaries and short, imaginary extensions of streets and roads. In the Environmental Justice section of this report, the racial and ethnic composition of the population in close proximity to the project is tabulated on the basis of census blocks.

Population

The proposed project is located entirely within Galveston County. The county has experienced consistent growth over the past 40 years and is expected to experience significant growth through the year 2025. **Table 3** provides the H-GAC's population forecast for Galveston County and Regional Analysis Zone (RAZ) 179, in which the project is located.

Table 3: Population Trends and Forecasts

Year	Galveston County	% Growth	RAZ 179	% Growth
1960	140,364		N/A	
1970	169,812	21	N/A	
1980	195,940	15	N/A	
1990	217,399	11	4,133	
2000	250,170	15	4,332	5
2010	292,400	17	7,867	82
2020	350,100	20	10,619	35
2030	394,100	13	12,289	16

East of SH 146 is the unincorporated community of Bacliff. This small, rather densely developed community began as a summer weekend resort known as Clifton-by-the-Sea. It has evolved as a residential community whose residents commute to work throughout the area. Most of the project west of SH 146 lies in the city of League City. Much of the land in the vicinity of FM 646 is either undeveloped or in the process of being developed as residential subdivisions. Various community related facilities within the project limits include Elva Lobit Park, churches, schools, and other public facilities such as law enforcement and emergency response buildings. Impacts to these community facilities are not anticipated.

FM 646 currently functions as a heavily traveled minor arterial highway serving as the main thoroughfare and hurricane evacuation route for residents of Dickinson, League City, and Bacliff. The section of highway within the project limits provides a primary connection to IH 45 and SH 146. As a heavily traveled thoroughfare, it serves as a boundary between neighborhoods. Widening the highway would not change its basic function in the community.

The proposed improvements would increase the capacity to accommodate traffic generated by additional land development in the area. The raised median would add to improved safety with no overall adverse effects on businesses that line the highway.

No impacts to community cohesion would be anticipated as the result of the proposed project. There would be no substantial changes in the current alignment, and there would be no adverse impacts to minority or other identifiable groups. The current development patterns are not expected to alter appreciably.

Construction of the proposed project is anticipated to have minimal effects on the value of the property adjacent to FM 646. Potential changes in property value would generally be favorable as a result of the improved accessibility.

Economy

Increased roadway capacity would reduce congestion on FM 646. This would decrease travel time and result in reduced vehicle operating costs for both commuters and truck drivers using the highway. Increased accessibility would tend to induce additional land development, particularly residential and associated retailing into the surrounding area, increasing the tax base.

The highway improvements would likely reduce the frequency and severity of accidents. Accidents represent a significant cost to individuals and society. For example, the lifetime economic cost to society for each fatality is more than $977,000 (USDOT, 2002*)*. Property damage averages more than $2,500 per accident. Other costs include medical costs, loss of productivity, lost workplace productivity, and travel delay. Under the no-build alternative, no impacts to the economy are anticipated.

Improvements to an existing highway often result in adverse economic impacts as well. Firms that depend on passing traffic for their business, such as service stations, fast food restaurants, and convenience stores, are particularly susceptible to the impacts of highway widening. Short-range business impacts can be a significant issue. Restricted access to business sites during the construction process is often a major concern. The construction related restrictions include closed driveways, temporarily reduced capacity of driveways or the highway, intermittent blockage of driveways, reduced number of parking spaces, and uncertainty of customers about how to reach the business site during construction.

Often, the business community expresses serious concerns that local businesses that depend on pass-by traffic, particularly gas stations and fast-food restaurants, would be adversely affected by raised medians. Studies on the economic impacts of access management have been conducted in a number of states, including Texas. The findings of these studies have concluded that:

- Business owners whose businesses were present before, during, and after median installation indicated that business was the same or better after installation of the raised median as it was before;
- Business owners tend to rank accessibility to the store fourth or lower below some combination of customer service, product quality, and product price;

A Texas study found that construction impacts to certain business types (durable goods retail, specialty retail, fast-food restaurants, and sit-down restaurants) tend to experience an increase of customers and gross sales whereas gas stations, auto repair, and other service businesses

tend to experience decreases in customers and gross sales (Eisele and Frawley, 2000). Other studies indicate that traffic-dependent businesses such as convenience stores and fast-food restaurants were not affected in a significantly different manner than all other businesses.

ENVIRONMENTAL JUSTICE

In response to Executive Order (EO) 12898, signed by President Clinton on February 11, 1994, the United States Department of Transportation (USDOT) developed an environmental justice strategy that follows within the framework of the National Environmental Policy Act (NEPA) and Title VI of the Civil Rights Restoration Act of 1987. EO 12898 requires that federally-funded projects identify and address any disproportionately high and adverse human health effects from environmental impacts to minority and low income populations. Federal Highway Administration (FHWA) Order 6640.23, *FHWA Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, defines minority as a person who is: (1) Black (having origins in any of the black racial groups of Africa); (2) Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race); (3) Asian American (having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands; or (4) American Indian and Alaska Native (having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition).

A disproportionate environmental impact occurs when the risk or rate for a minority population or low income population from exposure to an environmental hazard significantly exceeds the risk or rate to the general population and, where available, to another appropriate comparison group. The potential effects of the proposed action have been evaluated in accordance with the requirements of EO 12898. The *Census 2000* CT BG data for the area was used for the population analysis.

Table 4 provides *Census 2000* racial and ethnicity data for the project area census blocks (CBs). In addition, three CT BGs were chosen for comparison purposes. The comparison BGs were chosen because they border FM 646 and are comprised of several CBs that define the minority population study area. The comparison CT BGs exhibit minority population percentages that range from 16.9% to 61.5%.

Table 4: Racial and Ethnic Composition of the Project Area Population

Area	Total Pop.	Not Hispanic or Latino						Hispanic or Latino	Total Minority
		White	Black or African American	American Indian & Alaska Native	Asian and Pacific Islanders	Other Race	Two or More Races		
CT 7206 CB 1001	0	0	0	0	0	0	0	0	0
CT 7206 CB 1004	192	172 89.6%	14 7.3%	0	0	0	1 0.5%	5 2.6%	20 10.4%
CT 7207 CB 3098	15	0	7 46.7%	0	0	0	0	8 53.3%	15 100.0%
CT 7207 CB 3109	16	16 100.0%	0	0	0	0	0	0	0
CT 7207 CB 3112	93	77 82.8%	0	0	0	0	7 7.5%	9 9.7%	16 17.2%
CT 7207 CB 3123	0	0	0	0	0	0	0	0	0
CT 7207 CB 3124	0	0	0	0	0	0	0	0	0
CT 7207 CB 3125	0	0	0	0	0	0	0	0	0

Table 4: Racial and Ethnic Composition of the Project Area Population

Area	Total Pop.	Not Hispanic or Latino						Hispanic or Latino	Total Minority
		White	Black or African American	American Indian & Alaska Native	Asian and Pacific Islanders	Other Race	Two or More Races		
CT 7207 CB 3135	2	0	2 100.0%	0	0	0	0	0	2 100.0%
CT 7207 CB 3136	0	0	0	0	0	0	0	0	0
CT 7207 CB 3137	0	0	0	0	0	0	0	0	0
CT 7207 CB 3138	0	0	0	0	0	0	0	0	0
CT 7207 CB 3139	0	0	0	0	0	0	0	0.	0
CT 7207 CB 3140	0	0	0	0	0	0	0	0	0
CT 7208 CB 1000	0	0	0	0	0	0	0	0	0
CT 7208 CB 1001	0	0	0	0	0	0	0	0	0
CT 7208 CB 1002	14	0	8 57.1%	0	0	0	0	6 42.9%	14 100.0%
CT 7208 CB 1003	0	0	0	0	0	0	0	0	0
CT 7208 CB 1004	0	0	0	0	0	0	0	0	0
CT 7208 CB 2000	6	6 100.0%	0	0	0	0	0	0	0
CT 7208 CB 2001	0	0	0	0	0	0	0	0	0
CT 7208 CB 2002	0	0	0	0	0	0	0	0	0
CT 7208 CB 2003	0	0	0	0	0	0	0	0	0
CT 7208 CB 2004	0	0	0	0	0	0	0	0	0
CT 7208 CB 2005	0	0	0	0	0	0	0	0	0
CT 7208 CB 2006	0	0	0	0	0	0	0	0	0
CT 7208 CB 2054	16	12 75.0%	0	0	0	0	0	4 25.0%	4 25.0%
CT 7211 CB 4000	2	2 100.0%	0	0	0	0	0	0	0
CT 7211 CB 4001	21	19 90.5%	0	0	0	0	0	2 9.5%	2 9.5%
CT 7211 CB 4002	0	0	0	0	0	0	0	0	0
CT 7211 CB 4003	0	0	0	0	0	0	0	0	0
CT 7211 CB 4004	209	157 75.1%	0	1 0.45%	1 0.45%	0	3 1.4%	47 22.5%	52 24.9%
CT 7211 CB 4005	0	0	0	0	0	0	0	0	0
CT 7211 CB 4006	24	2 8.3%	0	0	5 20.8%	0	0	17 70.8%	22 91.7%
CT 7211 CB 4012	19	11 57.9%	0	0	0	0	4 21.1%	4 21.1%	8 42.1%
CT 7212 CB 1017	386	332 86.0%	16 4.1%	0	0	0	5 1.3%	33 8.5%	54 14.0%
CT 7212 CB 1021	0	0	0	0	0	0	0	0	0
CT 7212 CB 1029	0	0	0	0	0	0	0	0	0
CT 7212 CB 1030	0	0	0	0	0	0	0	0	0
CT 7212 CB 4016	0	0	0	0	0	0	0	0	0
CT 7212 CB 4017	50	4 8.0%	19 38.0%	0	0	0	1 2.0%	26 52.0%	46 92.0%
CT 7212 CB 4040	269	169 62.8%	24 8.9%	0	0	0	4 1.5%	72 26.8%	100 37.2%
CT 7212 CB 4054	22	0	6 27.3%	0	4 18.2%	0	0	12 54.5%	22 100.0%

Table 4: Racial and Ethnic Composition of the Project Area Population

Area	Total Pop.	Not Hispanic or Latino						Hispanic or Latino	Total Minority
		White	Black or African American	American Indian & Alaska Native	Asian and Pacific Islanders	Other Race	Two or More Races		
CT 7212 CB 4055	6	4 66.7%	2 33.3%	0	0	0	0	0	2 33.3%
CT 7212 CB 4056	0	0	0	0	0	0	0	0	0
CT 7217 CB 1002	87	82 94.3%	1 1.1%	0	0	0	2 2.3%	2 2.3%	5 5.7%
CT 7217 CB 1005	5	5 100.0%	0 0.0%	0	0	0	0	0	0
CT 7217 CB 1008	0	0	0	0	0	0	0	0	0
CT 7217 CB 1007	8	2 25.0%	0	0	0	0	0	6 75.0%	6 75.0%
CT 7217 CB 1009	10	9 90.0%	0	0	0	0	0	1 10.0%	1 10.0%
CT 7217 CB 1010	8	5 62.5%	0	0	0	0	0	3 37.5%	3 37.5%
CT 7217 CB 1017	8	8 100.0%	0	0	0	0	0	0	0
CT 7217 CB 1018	11	6 54.5%	5 45.5%	0	0	0	0	0	5 45.5%
CT 7217 CB 1019	24	20 83.3%	0	0	0	0	1 4.2%	3 12.5%	4 16.7%
CT 7217 CB 1020	9	9 100.0%	0	0	0	0	0	0	0
CT 7217 CB 1021	6	3 50.0%	0	0	0	0	0	3 50.0%	6 100.0%
CT 7217 CB 1022	7	7 100.0%	0	0	0	0	0	0	0
CT 7217 CB 1023	2	2 100.0%	0	0	0	0	0	0	0
CT 7217 CB 1024	11	5 45.5%	0	0	0	0	2 18.2%	4 36.4%	6 54.5%
CT 7217 CB 1025	51	36 70.6%	0	0	2 3.9%	0	1 2.0%	12 23.5%	15 29.4%
CT 7217 CB 1026	5	5 100.0%	0	0	0	0	0	0	0
CT 7217 CB 1027	2	2 100.0%	0	0	0	0	0	0	0
CT 7217 CB 1028	10	10 100.0%	0	0	0	0	0	0	0
CT 7217 CB 1029	12	11 91.7%	0	0	0	0	0	1 8.3%	1 8.3%
CT 7217 CB 1030	2	2 100.0%	0	0	0	0	0	0	0
CT 7217 CB 1031	4	4 100.0	0	0	0	0	0	0	0
CT 7217 CB 2016	34	29 85.3%	0	0	0	0	2 5.9%	3 8.8%	5 14.7%
CT 7217 CB 2017	6	6 100.0%	0	0	0	0	0	0	0
CT 7217 CB 2018	5	0 0.0%	0	0	0	0	0	5 100.0%	5 100.0%
CT 7217 CB 2019	0	0	0	0	0	0	0	0	0
CT 7217 CB 2021	2	2 100.0%	0	0	0	0	0	0	0

Table 4: Racial and Ethnic Composition of the Project Area Population

Area	Total Pop.	Not Hispanic or Latino						Hispanic or Latino	Total Minority
		White	Black or African American	American Indian & Alaska Native	Asian and Pacific Islanders	Other Race	Two or More Races		
CT 7217 CB 2022	13	13 100.0%	0	0	0	0	0	0	0
CT 7217 CB 2024	15	10 66.7%	0	0	1 6.7%	0	0	4 26.7%	5 33.3%
CT 7217 CB 2025	6	6 100.0%	0	0	0	0	0	0	0
CT 7217 CB 2026	17	13 76.5%	0	0	0	0	0	4 23.5%	4 23.5%
CT 7217 CB 2028	4	0	0	0	0	0	0	4 100.0%	4 100.0%
CT 7217 CB 2029	14	14 100.0%	0	0	0	0	0	0	0
CT 7217 CB 2031	11	5 45.5%	0	0	0	0	0	6 54.5%	6 54.5%
CT 7217 CB 2032	0	0	0	0	0	0	0	0	0
CT 7217 CB 2033	17	15 88.2%	0	0	0	0	0	2 11.8%	2 11.8%
CT 7217 CB 2034	3	0 0.0%	0	0	0	0	0	3 100.0%	3 100.0%
CT 7217 CB 3020	48	44 91.7%	0	0	0	0	0	4 8.3%	4 8.3%
CT 7217 CB 3024	35	28 80.0%	0	0	4 11.4%	0	0	3 8.6%	7 20.0%
CT 7217 CB 3025	3	3 100.0%	0	0	0	0	0	0	0
CT 7217 CB 3026	0	0	0	0	0	0	0	0	0
CT 7217 CB 3028	14	10 71.4%	0	0	0	0	0	4 28.6%	4 28.6%
CT 7217 CB 3029	16	12 75.0%	0	0	0	0	0	4 25.0%	4 25.0%
CT 7217 CB 3030	5	5 100.0%	0	0	0	0	0	0 0.0%	0 0.0%
CT 7217 CB 3031	11	6 54.5%	0	0	0	0	0	5 45.5%	5 45.5%
CT 7217 CB 3034	13	10 76.9%	0	0	0	0	2 15.4%	1 7.7%	3 23.1%
CT 7217 CB 3035	9	5 55.6%	0	0	0	0	0	4 44.4%	4 44.4%
CT 7217 CB 3041	5	0 0.0%	0	0	0	0	0	5 100.0%	5 100.0%
Project Area	1,944	1,446 74.4%	104 5.3%	1 0.1%	17 0.9%	0	35 1.8%	341 17.5%	498 25.6%

Source: U.S. Census Bureau. *Census 2000 Summary File 1, Table P4.* http://factfinder.census.gov/
Note: CT = census tract, CB = census block.

For the purpose of this analysis, an environmental justice population is present when the total minority population percentage within the proposed project limits or individual CBs is greater than 51%. The 77 CBs comprising the minority impacts study area have a total population of 1,944. Overall, minorities account for 25.6% of the minority population study area. Of the 77 CBs that comprise the minority population study area, 14 exhibit a minority population greater than 51%. CB 3098 in CT 7207 has a 100% minority population and would experience two residential displacements as a result of the proposed project. The remaining 13 CBs exhibiting

a minority population greater than 51% would not experience any of the displacements. Although minority populations may be affected by residential relocations, relocations would occur throughout the proposed project and would not be limited to any single CB. The relocations would not have a disproportionately high or adverse affect on minority populations.

Low income is defined as a household income at or below the Department of Health and Human Services (DHHS) poverty guidelines. The U.S. Census Bureau is the federal agency that measures the number of people in poverty. In 1999, the weighted average threshold for a four-person family was $17,029. DHHS poverty guidelines are issued annually in the Federal Register. In 2009, the DHHS poverty threshold for a family of four increased to $22,050.

Due to the lack of income data at the CB level, the CT BGs within the project area were used in this analysis. Nine BGs comprise the low income population study area for the household income and poverty analysis. A CT BG was determined to have a high concentration of low income persons if it had a meaningfully higher percentage of people in poverty based on the *Census 2000* definition of poverty.

Table 5: Poverty Status of Households in 2000

Project Area CT BG	Total Households	Median Household Income in 1999 ($)	Income in 1999 Below Poverty Level	Below Poverty Level (%)
CT 7207, BG 3	494	47,404	63	15.6%
CT 7208, BG 1	273	24,886	80	29.3%
CT 7208, BG 2	176	45,000	10	5.7%
CT 7211, BG 4	569	43,578	29	5.1%
CT 7212, BG 1	701	52,139	29	4.1%
CT 7212, BG 4	539	45,884	48	8.9%
CT 7217, BG 1	414	32,500	101	24.4%
CT 7217, BG 2	254	29,792	34	13.4%
CT 7217, BG 3	241	31,250	45	18.7%
Project Area	3,661	43,578	439	12.0%

Source: U.S. Census Bureau. *Census 2000.* http://factfinder.census.gov. Table P90.

As shown in **Table 5**, the percentage of the total project area population with incomes below the poverty level is 12%. The percentage of persons living below the poverty level ranges from 4.1% to 29.3% for the individual CT BGs. Potential displacements would result due to the widening of FM 646. The three BGs that exhibited the highest poverty levels would not experience any of the displacements; therefore, low-income populations would not experience disproportionately high or adverse effects due to relocations.

Short-term impacts due to construction, such as effects to air quality and noise levels, may occur while construction activities are ongoing. However, these impacts would be temporary and would not be limited to minority or low-income populations, but would potentially affect all populations in the immediate vicinity of the proposed project. Other potential impacts resulting from the proposed project, such as increased traffic noise levels, would occur throughout the proposed project, would not be limited to specific CBs, and would not disproportionately affect minority or low-income populations.

There are many long-term effects of the proposed projects that would be beneficial to the community as a whole, including minority and low-income populations. These benefits include a decrease in traffic congestion and an increase in mobility, improved roadway design and grade separation for improved safety, and improved capacity as a hurricane evacuation route.

Minority and low-income populations may be affected by the proposed project. However, it does not appear that construction of the proposed project would cause disproportionately high or adverse impacts to minority or low-income populations.

Limited English Proficiency

Executive Order (EO) 13166, *Improving Access to Services for Persons with Limited English Proficiency (LEP)*, requires federal agencies to examine the services they provide and identify any need for services to those with LEP. The EO requires federal agencies to work to ensure that recipients of federal financial assistance provide meaningful access to their LEP applicants and beneficiaries. Failure to ensure that LEP persons can effectively participate in or benefit from federally assisted programs and activities may violate the prohibition under Title VI of the Civil Rights Act of 1964, 42 U.S.C. 2000d and Title VI regulations against national origin discrimination.

The U.S. Census Bureau tabulates household language usage in two basic ways; English language ability of individuals and linguistic isolation. The use of the concept of linguistic isolation hinges on the assumption that linguistic isolation represents a barrier to effective communication.

Linguistic isolation is dependent on the English-speaking ability of all adults in a household. A household is linguistically isolated if all adults speak a language other than English and none speaks English 'very well.' Adult is defined as age 14 or older, which identifies household members of high school age and older."[2] "An entire household's inability to communicate in English can be even more of a barrier than an individual's inability."[3] This would suggest that as long as a household has at least one adult who speaks English well or very well, TxDOT would be able to provide adequate communication with that household. However, a household's linguistic isolation can change over time as the composition of the household changes through such factors as age, death, and birth. For example, when English speaking children in a linguistically isolated household reach the age of 14, their household will no longer be linguistically isolated.

Table 6: Linguistically Isolated Households

Area/CT BG	Total Households	Total Linguistically Isolated Households	Percent Linguistically Isolated
CT 7207, BG 3	494	95	19.2%
CT 7208, BG 1	273	23	8.4%
CT 7208, BG 2	226	19	8.4%
CT 7211, BG 4	715	101	14.1%
CT 7212, BG 1	923	16	1.7%
CT 7212, BG 4	745	67	9.0%
CT 7217, BG 1	414	23	5.6%
CT 7217, BG 2	337	10	3.0%
CT 7217, BG 3	370	20	5.4%
Project Area	4,497	374	8.3%

Source: U.S. Census Bureau. *Census 2000.* http://factfinder.census.gov. Table P20.

A linguistically isolated household is one in which all members of the household 14 years old and older have at least some difficulty with English. As shown in **Table 6**, two of the project area BGs (CT 7207, BG 3 and CT 7211, BG 4) have a relatively high proportion of linguistically

[2] Paul Siegel, Elizabeth Martin, and Rosalind Bruno. *Language Use and Linguistic Isolation: Historical Data and Methodological Issues.* U.S. Census Bureau. February 12, 2001.
[3] *Ibid.*

isolated households. Most of them are Spanish speaking households. During a windshield survey along the project corridor, English was the only language observed on billboards and signs.

As shown in **Table 7**, approximately 9% of the project area population in 2000 spoke Spanish and spoke English not well or not at all. According to the Modern Language Association, 17.7% of the people living in zip code 77539, the postal zip code in which the FM 646 project is located, speak Spanish. Another 2% speak Vietnamese, the next most commonly spoken foreign language.

Table 7: Limited English Proficiency of the Adult Population

Area	Total Population 18 Years Old and Older	Speak Only English	Speak Spanish, Speak English Not Well or Not at All		Speak Asian and Pacific Island Languages, Speak English Not Well or Not at All		Speak Other Language, Speak English Not Well or Not at All	
			Number	Percent	Number	Percent	Number	Percent
CT 7207, BG 3	1,028	549	120	11.7%	21	2.0%	10	1.0%
CT 7208, BG 1	564	474	76	13.5%	0	0.0%	0	0.0%
CT 7208, BG 2	512	424	53	10.4%	0	0.0%	0	0.0%
CT 7211, BG 4	1,515	1,029	278	18.3%	38	2.5%	0	0.0%
CT 7212, BG 1	1,814	1,535	38	2.1%	10	0.6%	2	0.1%
CT 7212, BG 4	1,399	989	118	8.4%	0	0.0%	16	1.1%
CT 7217, BG 1	788	641	47	6.0%	0	0.0%	0	0.0%
CT 7217, BG 2	679	580	19	2.8%	0	0.0%	0	0.0%
CT 7217, BG 3	691	552	99	14.3%	0	0.0%	0	0.0%
Project Area	8,990	6,773	848	9.4%	69	0.8%	28	0.3%

Source: U.S. Census Bureau, SF 3, Table P19.

Preparation for the public meetings included published announcements, in Spanish and English, in the *Galveston County Daily News* on October 18, 2005 and November 7, 2005, and in the *Houston Chronicle* on October 20, 2005; November 8, 2005; and August 7, 2006 which informed citizens of the opportunity to request an interpreter (for language or other special communication needs) to be present at the public meetings. TxDOT is committed to taking similar steps in providing access to future public involvement opportunities for LEP populations, including published announcements in English and Spanish in the *Galveston County Daily News* and the *Houston Chronicle*.

PROJECT SETTING

According to *The Ecoregions of Texas* (Texas Parks and Wildlife Department [TPWD], 2002), the proposed project area is located in the Gulf Coast Prairies and Marshes Ecoregion of Texas.

The Gulf Marshes occupy a narrow strip of low, marshy coastal area adjacent to the coast and barrier islands. No portion of the project area occurs within the Gulf Marshes. The project area lies almost entirely within the Gulf Prairies, a nearly flat plain that extends approximately 30 to 80 mi inland from the Gulf Marshes. The Gulf Prairies are characterized by nearly level topography with undissected plains of slow surface drainage. Elevation extends from near sea level along the coast up to 200 ft above mean sea level. Annual precipitation averages 50.59 inches (in.), and mean annual temperature is typically 70°F.

The U.S. Geological Survey (USGS) topographic quadrangle maps were reviewed to determine elevations and slopes within the project area. This project extends across the northwest and northeast quarter quad of the USGS 7.5-minute quadrangle (1:24000) for Dickinson, Texas, the northwest quarter quad of Texas City, Texas, and the southwest quarter quad of Bacliff, Texas. The elevation along FM 646 is approximately 20 ft above mean sea level at the IH 45 interchange. Proceeding from west to east, the elevation descends from 20 ft to approximately 14 ft at Bayshore Blvd, the project terminus in Bacliff. Refer to **Exhibit B** for the USGS 7.5-minute topographic map and **Exhibit G** for site photographs.

LAND USE

The surrounding area consists of a mixture of undeveloped, residential, commercial and institutional properties. Photographs of the project area are provided in **Exhibit G**. Commercial development is mainly located at the intersection of IH 45 and FM 646 and from SH 146 to Bayshore Blvd. The area from SH 146 and Bayshore Blvd. serves as the main street for Bacliff and consists of small businesses on both the north and south sides of the street. The majority of the commercial properties include grocery stores, service stations, restaurants, and small retail businesses. Institutional properties include churches, schools, and other public facilities such as law enforcement and emergency response buildings. Significant residential development is located within 1 mi north and south of FM 646. Under the no-build alternative, no impacts to land use are anticipated.

Most of the proposed project lies within the city of League City. The highway is identified as major arterial in the city's Major Roadway Network and Future Land Use map prepared as part of the League City Comprehensive Plan. The League City portion of the project area is zoned for urban uses. Therefore, the proposed project would be consistent with planned land uses and no impacts to land use are anticipated with the proposed project.

SOILS

The Natural Resource Conservation Service (NRCS) provides a general soils map that illustrates broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit in the general soils map consists of various minor soil types. The map units are names for the major soil types in the area. The general soils map can be used to compare the suitability of large areas for general land uses. All of the general soil types that exist in the proposed project area fall in the category of the Deep, Nonsaline Soils of the Mainland. Approximately 61% of Galveston County falls within this category. The general soil units in the proposed project area are Mocarey-Leton-Algoa, Lake Charles-Bacliff, and Bernard-Verland. Within these three general soil units are ten soil types. Nine of these ten soil types are prime farmland soils. The description and hydric status of these soils are indicated in **Table 8**.

Table 8: Soil Map Units Located Within the Project Area

Soil Map Units	Description	Hydric Status
Bacliff clay (Ba)	Bacliff clay (TX0964) soils are gray to dark gray clay, nearly level, poorly drained, nonsaline, clayey soils with a clayey subsoil. This soil is found on broad uplands with a slope that averages about 0.1%. Included with this soil type in mapping are small areas of Bernard, Edna, Lake Charles, Vamont, and Verland soils which are in slightly higher positions on the landscape. This soil is rarely flooded and surface runoff is very slow.	Hydric

Table 8: Soil Map Units Located Within the Project Area

Soil Map Units	Description	Hydric Status
Bernard clay loam (Be)	The Bernard clay soils are dark and occupy nearly level to sloping uplands. This soil type is well drained. Surface runoff is very slow and permeability is slow. Soil colors range from gray to dark grayish brown in the surface layers and dark gray to very dark gray in the subsurface layer. Included with this soil type in mapping are small areas of Edna soil and Lake Charles clay. Of these inclusions, Bacliff Clay (TX0964) is considered hydric.	Hydric
Lake Charles clay (LaA)	Lake Charles clay is a nearly level soil. This soil is somewhat poorly drained with very slow surface run-off, permeability and internal drainage. Soil colors in the upper 36 in. range from black to very dark gray clay. Included with this soil are small areas of Beaumont, Bernard, Midland, Addicks, and Vamont soils. Of these inclusions, Beaumont (TX0022) and Addicks (TX0062) are considered hydric.	Non-Hydric
Leton loam (Le)	Leton loam (TX0828) is a nearly level, poorly drained, nonsaline, loamy soil that has a loamy subsoil. It is in old stream meanders and depressional areas on the uplands. Slopes average about 0.3%. Typically, this soil has a surface layer that is dark gray, and a subsurface layer of gray clay loam. Included with this soil in mapping are small areas of Aris, Edna, Lake Charles, and Verland soils.	Hydric
Leton Lake Charles complex (Lx)	This complex consists of nearly level, poorly drained and somewhat poorly drained, nonsaline, loamy and clayey soils that have a loamy and clayey subsoil. These soils are on the uplands. Leton soil makes up 40 to 50% of the map unit. Lake Charles soil makes up 30 to 40%. Included with these soils are areas of Bacliff, Bernard, and Verland soils.	Hydric
Mocarey loam (Ma)	Mocarey loam is a nearly level, somewhat poorly drained, nonsaline, loamy soil that has a loamy subsoil. The majority of this soil is located upland. This soil is well suited to pasture grasses and used for native hay meadows. Mocarey loam is slowly permeable above the high water table and the surface runoff is very slow.	Non-hydric
Mocarey-Algoa Complex (Mb)	This complex consists of gently undulating, somewhat poorly drained, nonsaline, loamy soil that has a loamy subsoil. These soils are on uplands. This map unit is generally associated with old stream meanders with 20 to 40% pimple mounds. The slopes average about 0.3%. Mocarey soil makes up 30 to 50% of the map unit with a surface layer that is very dark gray loam about 12 in. thick. The upper part of the Morclay subsoil, to a depth of 22 in., is dark gray clay loam. Algoa soil makes up 15 to 30% and is typically found on small pimple mounds. Included with this soil in mapping are small areas of Bernard, Cieno, Leton, and Morey soils.	Hydric
Morey Silt Loam (Me)	Morey silt loam is a nearly level, poorly drained, nonsaline, loamy soil that has a loamy subsoil. It is located on the uplands. The slopes average about 0.3% and the mapped areas are irregular in shape and range from about 5 ac to about 400 ac. This soil is slowly permeable above the high water table. The surface runoff is very slow but this soil is rarely flooded. Morey soils are used primarily as pastureland and cropland. For most urban uses, the main limitations are wetness and clayey texture of the soil.	Non-hydric
Mocarey-Leton Complex (Md)	This complex consists of gently undulating, somewhat poorly drained and poorly drained, nonsaline, loamy soils that have a loamy subsoil. These soils are on the uplands. This map unit is generally associated with old stream meander systems. Although the overall surface is plane, it has 15 to 35% pimple mounds and 20 to 40% depressions. The overall slopes average 0.3%. Mocarey soil makes up 20 to 50% of the map unit. Leton soil makes up 20 to 40%. Algoa soil makes up 10 to 20%. Included with these soils in mapping are areas of Algoa, Bernard, Cieno, Morey, and Verland soils.	Hydric

Table 8: Soil Map Units Located Within the Project Area

Soil Map Units	Description	Hydric Status
Verland silty clay loam (Ve)	This is a nearly level, somewhat poorly drained, nonsaline, loamy soil that has clayey subsoil. It is on the uplands. The slopes average about 0.3%. Typically, this soil has a surface layer that is a dark gray silty clay loam about 6 in thick. The upper part of the subsoil is gray clay. Included with this soil in mapping are small areas of Bacliff, Bernard, Edna, Lake Charles, Mocarey, and Morey soils.	Hydric

Farmland Protection Policy Act

The Farmland Protection Policy Act (FPPA) of 1981, P.L. 97-98 and amendments 9 USC 4201(b), authorizes the USDA NRCS to develop criteria for identifying the effects of federal programs on the conversion of farmland to non-agricultural uses. Projects considered exempt under the FPPA include those that require no additional ROW or require ROW that is developed, urbanized, or zoned for urban use.

The majority of the project is located within League City, a city which has a comprehensive plan. The land within the city is subject to zoning restrictions. Bacliff land use is urban. Additional ROW is required for the proposed project; however, it is zoned for urban use and therefore is exempt from the requirements of the FPPA and would not require coordination with the NRCS.

BENEFICIAL LANDSCAPE PRACTICES

In accordance with the Executive Memorandum of August 10, 1995, all agencies shall comply with NEPA as it relates to vegetation management and landscape practices for all federally assisted projects. The Executive Memorandum directs that where cost-effective and to the extent practicable, agencies will (1) use regionally native plants for landscaping; (2) design, use, or promote construction practices that minimize adverse effects on the natural habitat; (3) seed to prevent pollution by, among other things, reducing fertilizer and pesticide use; (4) implement water-efficient and runoff reduction practices; and (5) create demonstration projects employing these practices. Landscaping included with this project would be in compliance with the Executive Memorandum and the guidelines for environmentally and economically beneficial landscaping practices.

INVASIVE SPECIES

On February 3, 1999, the President Clinton issued EO 13112 to prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts. In accordance with the EO, native plant species would be used in the landscaping and seed mixes where practicable.

VEGETATION

The primary vegetative communities occurring along the project corridor are generally described as pasture, roadside, urban lawn, and fence row. The pastures are mostly fallow and overgrown with sequential species ranging from disturbance species to first generation woodlands less than 20 years old. The roadsides are generally well maintained with low growing herbaceous species typical of the area. The urban lawns also tend to be well maintained with sod grasses and cultivated shrubs and trees. The fence rows tend to have young trees, less than 20 years old, typical of fence row habitat of the greater coastal plains.

The project area falls within the Bluestem Grassland and Crops vegetation types, as identified in the *Vegetation Types of Texas* (TPWD, 1984). The Bluestem Grassland vegetation type, within southeast Texas, is typically covered with bushy bluestem (*Andropogon glomeratus*), slender bluestem (*Dichanthium tenue*), silver bluestem (*Bothriochloa laguroides*), oldfield three-awn (*Aristida oligantha*), buffalograss (*Buchloe dactyloides*), bermudagrass (*Cynodon dactylon*), brownseed paspalum (*Paspalum plicatulum*), single-spike paspalum (*Paspalum monostachyum*), smutgrass (*Sporabolus indicus*), sacahuista (*Nolina microcarpa*) windmill grass (*Chloris truncata*), southern dewberry (*Rubus trivialis*), live oak (*Quercus virginiana*), mesquite (*Prosopis glandulosa*), huisache (*Acacia farnesiana*), baccharis (*Baccharis halimifolia*), and Macartney rose (*Rosa bracteata*).

The Crops vegetation type describes areas with cultivated cover or row crops, which are produced for the use of humans or domesticated animals, and may also include grassland areas associated with crop rotations. While land surrounding the project area supports a variety of uses, vegetation within the project limits consists mainly of maintained grass/lawn vegetation. Refer to **Exhibit G** for site photographs.

Maintained grass/lawn vegetation accounts for approximately 80 ac within the existing and proposed ROW. The maintained grass/lawn vegetation consists primarily of bermudagrass, bahiagrass (*Paspalum notatum*), Johnsongrass (*Sorghum halapense*), and St. Augustine grass (*Stenotaphrum secundatum*). Vegetation also includes various floral species such as brown-eyed Susan (*Rudbeckia hirta* var. *angustifolia*), bull nettle (*Cnidoscolus texanus*), erect dayflower (*Commelina erecta*), Indian blanket (*Gaillardia pulchella*), Mexican hat (*Ratibida columnaris*), phlox (*Phlox* spp.), ruellia (*Ruellia* spp.), sensitive briar (*Shrankia uncinata*), sunflower (*Helianthus* spp.), thistle (*Cirsium* spp.), vervain (*Verbena* spp.), and wild onion (*Allium canadense* var. *mobilense*). In addition, small landscaped areas adjacent to residential and commercial developments have been planted with palms, honey suckle (*Lonicera flava*), and crape myrtle (*Lagerstroemia indica*).

Non-forested wetlands account for 0.13 ac within the existing and proposed ROW. Vegetation includes alligator weed (*Alternanthera philoxeroides*), rattlebush (*Sesbania drummondii*), water primrose (*Ludwig peploides*), sweet pea (*Lathyrus odoratus*), sump weed (*Iva annua*), water hyssop (*Bacopa monnieri*), and parrot feather (*Myriophyllum aquaticum*).

Upland forest accounts for 0.94 ac within the existing and proposed ROW. Within the project limits, the majority of small and medium trees are primarily located in patches of undeveloped areas, where black willow (*Salix nigra*), hackberry (*Celtis occidentalis*), and post oak (*Quercus stellata*) are found. **Table 9** lists the dominant tree species, their diameter at breast height (dbh), average height, and percent canopy cover identified within the project area. Non-dominant canopy species include American sycamore (*Plantanus occidentalis*), Chinese tallow tree (*Sapium sebiferum*), and live oak (*Quercus virginiana*). Vines such as blackberry (*Rubus* spp.), pepper-vine (*Ampelopsis arborea*), poison ivy (*Toxicodendron radicans*), poison oak (*Toxicodendron diversilobum)*, and Virginia creeper (*Parthenocissus quinquefolia*) are also present within the project area.

Table 9: Upland Forest Dominant Tree Species within the Project Area

Common Name	dbh Range (in.)	Height Range (ft)	Canopy Cover
Black willow	4-6	20	1%
Hackberry	6-8	25	
Post oak	6-10	40	

Forested wetlands, riparian sites, and pasture vegetation types are not present within the proposed project area. According to the TPWD Natural Diversity Database (NDD), the proposed project crosses through a rare S2 plant series, the Little Bluestem-brownseed Paspalum series. Although proposed ROW is required within this area, no impacts are anticipated for the rare S2 plant series since the land adjacent to the roadway in this area has been developed and the remaining open space consists of maintained pastures and lawns.

Potential Vegetation Impacts

Implementation of the proposed project would result in the clearing of approximately 37.28 ac of vegetation within the existing and proposed ROW, as shown in **Table 10**. Of those 37.28 ac, approximately 36.72 would be maintained grasses/lawns, 0.13 ac would be non-forested wetlands, and 0.43 ac would be upland forest.

Table 10: Existing Vegetative Communities and Potential Impacts Within the Existing and Proposed ROW

Community Type	Existing Area (ac)	Potential Impact (ac)
Maintained Grass/Lawn	80.0	36.72
Non-Forested Wetlands	0.13	0.13
Upland Forest	0.94	0.43
TOTAL	**81.07**	**37.28**

Following the completion of construction, any cleared areas would be re-vegetated. In addition, sedimentation and erosion controls would be in place prior to, during and following construction. Under the no-build alternative, no impacts to vegetation are anticipated.

In accordance with Provision (4)(A)(ii) of the MOU between TxDOT and TPWD, and at the TxDOT Houston District's discretion, habitats given consideration for non-regulatory mitigation during project planning include the following:

1. habitat for federal candidate species (impacted by the project) if mitigation would assist in the prevention of the listing of the species,
2. rare vegetation series (S1, S2, or S3) that also locally provide habitat for a state-listed species,
3. all vegetation communities listed as S1 or S2, regardless of whether or not the series in question provides habitat for state-listed species,
4. bottomland hardwoods, native prairies, and riparian sites, and
5. any other habitat feature considered locally important that the TxDOT District chooses to consider.

The proposed project does cross through a rare S2 vegetation series, the Little Bluestem-brownseed Paspalum series, and therefore meets the criteria of the MOU for consideration of compensatory mitigation. Although proposed ROW is required within this area, no impacts are anticipated for the rare S2 plant series since the land adjacent to the roadway in this area has been developed and the remaining open space consists of maintained pastures and lawns. Therefore, compensatory mitigation for impacted vegetation was considered, and it was determined to be unfeasible. No mitigation for loss of the Little Bluestem-brownseed Paspalum would be included for the project.

WILDLIFE

A large concentration of wildlife is supported by the natural habitat found in Galveston County. Common mammals expected to occur in the county include raccoon, fox, skunk, nutria, mink, bobcat, coyote, deer, and beaver. Common reptiles and amphibians in the county include alligators, water moccasins, frogs, and turtles. Several species of saltwater and freshwater fish occurring in the county include redfish, flounder, spotted weakfish, black drum, sheepshead, largemouth bass, channel catfish, crappie, and sunfish. Game birds occurring in the county include ducks, geese, dove, quail, and sandhill cranes. Numerous raptors, songbirds, and shorebirds are also supported by the natural habitat found throughout Galveston County. The proposed work is not expected to fragment or otherwise alter any existing wildlife habitats within the project limits.

The proposed project area may support a limited variety of birds, small mammals, reptiles, and amphibians. Due to the urban condition of the areas surrounding the project area, the proposed project is not expected to fragment or significantly alter any existing wildlife habitats. The animals found in these areas are species that are able to adapt to urbanization and pasturelands. Mammals commonly found in this type of setting include raccoons, squirrels, opossums, and skunks. Various reptiles, amphibians, and birds are typically found in these habitat types as well.

A cursory nest survey was conducted during initial site investigations, and no nests were observed along the project corridor. To avoid effects to migratory birds and their habitat, construction should be avoided during the peak-nesting season. Construction would be accomplished in compliance with the guidance concerning migratory birds that is in effect at the time construction begins. Measures would be taken to avoid impacts to migratory birds, their occupied nests, their eggs, and their young during construction.

THREATENED AND ENDANGERED SPECIES

A review was conducted of the U.S. Fish and Wildlife Service (USFWS) County-by-County Listing: Listed/Candidate Species and Species of Concern (2006) and the TPWD Annotated County Lists of Rare Species for Galveston County (2006). **Table 11** lists species that are considered by USFWS and TPWD to be endangered, threatened, designated as a rare species, or species of concern (SOC). It should be noted that inclusion on the following tables does not imply that a species is known to occur in the project area, but only acknowledges the potential for occurrence.

According to the TPWD NDD, there were two occurrence records near the project area for the federally-listed Attwater's Prairie Chicken and the following rare species: Texas windmill-grass, Houston daisy, Texas diamondback terrapin, and the coastal gay-feather. The proposed project also crosses through a rare S2 plant series, the Little Bluestem-brownseed Paspalum series. Although proposed ROW is required within this area, no impacts are anticipated for the rare S2 plant series since the land adjacent to the roadway in this area has been developed and the remaining open space consists of maintained pastures and lawns.

Various field surveys of the project area, conducted from November 2005 to November 2006 by qualified biologists, did not identify potential habitat for or evidence of any state- and/or federally-listed species. A determination of "no effect" on threatened or endangered species has been reached for the proposed project. Under the no-build alternative, no impacts to threatened or endangered species are anticipated.

Table 11: State and Federal Threatened and Endangered Species of Galveston County

Common Name	Scientific Name	State Status	Federal Status	Habitat Description	Habitat Present
BIRDS					
American peregrine falcon	*Falco peregrinus anatum*	E	DM†	Potential migrant	N
Arctic peregrine falcon	*Falco peregrinus tundrius*	T	DM†	Potential migrant	N
Attwater's greater prairie-chicken	*Tympanuchus cupido attwateri*	E	E	Thick 1-3' tall grass from 0'-200" above sea level along coast	N
Bald eagle	*Haliaeetus leucocephalus*	T	T,AD†	Near water areas, in tall trees	N
Brown pelican (nesting)	*Pelecanus occidentalis*	E	DM,E	Island near coastal areas	N
Eskimo curlew	*Numenius borealis*	E	E	Nonbreeding; grasslands and pastures	N
Piper plover (wintering)	*Charadrius medodus*	T	E,T	Beach and bayside mud or salt flats	N
Reddish egret	*Egretta rufescens*	T	*	Brackish marshes and tidal flats	N
White-faced ibis	*Plegadis chihi*	T	*	Freshwater marshes, but some brackish or salt marshes	N
White-tailed hawk	*Buteo albicaudatus*	T	*	Coastal Prairies	N
Whooping crane	*Grus americana*	E	E†	Winters in Aransas NWR	N
Wood stork	*Mycteria americana*	T	*	Prairie ponds and flooded pastures	N
MAMMALS					
Louisiana black bear	*Ursus americanus luteolus*	T	T†	Bottomland hardwoods; large, undisturbed forested areas	N
Red wolf	*Canis rufus*	E	E†	Extirpated, brushy, forested areas, coastal prairies	N
West Indian manatee	*Trichechus manatus*	E	E†	Gulf and bay system	N
REPTILES					
Alligator snapping turtle	*Macroclemys temminckii*	T	T†	Deep water of rivers and canals	N
Atlantic hawksbill sea turtle	*Eretmochelys imbricate*	E	E	Gulf and bay system	N
Green sea turtle	*Chelonia mydas*	T	E,T	Gulf and bay system	N
Kemp's Ridley sea turtle	*Lepidochelys kempii*	E	E	Gulf and bay system	N
Leatherback sea turtle	*Dermochelys coriacea*	E	E	Gulf and bay system	N
Loggerhead sea turtle	*Caretta caretta*	T	T	Gulf and bay system	N
Texas horned lizard	*Phrynosoma cornutum*	T	*	Open, semi-arid regions, with bunch grass	N
Timber/canebrake rattlesnake	*Crotalus horridus*	T	*	Swamps/floodplains of hardwood/upland pine	N

* These species occur on the state listing of threatened or endangered species; however, they are not federally-listed at this time by the USFWS (2006).

† These species are listed by the USFWS, however, they are not listed to occur within this county by the Clear Lake office of the USFWS (2006).

E = endangered T = threatened DM = delisted taxon, recovered, being monitored first 5 years AD = proposed delisting

The state- and federally-listed species included in **Table 11** have a historic range that includes the project area. The following discussion includes a description of the preferred habitat and habitat components within the project area of those species whose range could overlap with the project area.

Two subspecies of the peregrine falcon occur in Texas. The American peregrine falcon is a known resident in Chisos and Guadalupe Mountains. The Arctic peregrine falcon winters along the entire Gulf coast and occurs statewide during migration (USFWS, 2006). Either of these taxa have potential for occurring in the project area, particularly during spring and fall migrations (Oberholser, 1974; Texas Ornithological Society [TOS] 1995). However, there are no essential components of peregrine falcon habitat within the project area; therefore, no impacts are anticipated for this species.

The Attwater's greater prairie-chicken lives on coastal prairie grasslands with tall grasses such as little bluestem, Indian grass, and switchgrass. These birds like a variety of tall and short

grasses in their habitat. They gather to choose a mate in an area of bare ground or short grass where the males can be easily seen by the females. Small green leaves, seeds, and insects form the diet of the Attwater's prairie-chicken. Tall grass coastal prairies are essential to the survival of this species. Attwater's-prairie chickens are found only on the coastal prairies of Texas. Due to the lack of preferred habitat, this species would not occur within the project area and no impacts are anticipated for this species.

The bald eagle is an uncommon to rare migrant and winter resident throughout Texas (TOS, 1995). It is generally found in coastal areas and around large bodies of water such as reservoirs, lakes, and rivers. Nesting in Texas is largely restricted to the eastern one-third of the state and to the coastal prairies region. In Texas, wintering and migrating bald eagles frequently stop over along the shores and large rivers, which provide the eagle with the bulk of its dietary requirements. The project area does not contain large water bodies or rivers; however, it is located on the Gulf Coast less than 1 mi from Galveston Bay. Although the project is adjacent to preferred habitat, no preferred habitat for the eagle exists due to the highly disturbed nature of the immediate project area. Additionally, the project area does not contain any portion of a bald eagle management zone.

The brown pelican is primarily a coastal species that rarely ventures very far out to sea or inland. In Texas, it occurs primarily along the lower and middle coast, but occasional sightings are reported on the upper coast and inland to central, north-central and eastern Texas, usually on large freshwater lakes. The project area does not contain large freshwater lakes; however, it is located on the Gulf Coast less than 1 mi from Galveston Bay. Although the project is adjacent to preferred habitat, no preferred habitat for the pelican exists due to the highly disturbed nature of the immediate project area.

The Eskimo curlew has extensive migration routes, thus using a variety of habitats. They were once abundant on the Texas prairies during their spring migration from South America to breeding areas in the Arctic (Oberholser, 1974). Early observers describe the Eskimo curlew as frequently occurring mainly the plains and prairies, both in the interior and coastal region. Like many shorebirds, they were found near lakes, ponds, sloughs, and streams, but also ranged into dry prairies located away from water. The current status of the Eskimo curlew is considered uncertain and possibly extinct (TOS, 1995). One record does exist from Galveston, Texas in 1962 and others since have been reported, but the validity is uncertain. This species has been on the verge of extinction since the early 1900s and its current status is unknown. The likelihood of Eskimo curlews occurring within the project area is considered remote. No impacts are anticipated for this species.

The piping plover breeds in the northern Great Plains of the U.S. and Canada, along beaches of the Great Lakes, and along the Atlantic coastline from North Carolina to Newfoundland. Post-breeding and wintering sites include the southern U.S. Atlantic coastline; the Gulf of Mexico from Florida to Veracruz, Mexico; and on scattered Caribbean islands. The piping plover can be found along Texas beaches and tidal flats from mid-July through April. Although the project area is located on the Gulf Coast less than 1 mi from Galveston Bay, preferred habitat is not present and no impacts are anticipated for this species.

The reddish egret typically inhabits salt bays and marshes. In most places, this species is a permanent resident, but some birds along the Gulf Coast of Texas and Louisiana appear to migrate south during the winter. The potential for the reddish egret within the project area is unlikely due to the lack of salt bays and marshes. No impacts are anticipated for this species.

The white-faced ibis forages bays, marshes, lakes, and ponds. The project area does not contain large water bodies; however, it is located on the Gulf Coast less than 1 mi from Galveston Bay. Although the project is adjacent to preferred habitat, no preferred habitat for the white-faced ibis exists due to the highly disturbed nature of the immediate project area.

The white-tailed hawk is found on the coastal plain of southern Texas. The white-tailed hawk hunts on coastal prairies and pastures. The proposed project would have a negligible impact on pasture habitat and would not adversely affect any white-tailed hawks that might be present in the vicinity of the project. No impacts are anticipated for this species.

The whooping crane winters in the Aransas National Wildlife Refuge and adjacent areas of the central Texas Gulf Coast. During seasonal migrations, the whooping crane forages and roosts in palustrine wetlands, usually with water depths of 1-6 in. The project area is included in the whooping crane's migratory range but contains minimal shallow palustrine wetlands; therefore, the whooping crane could potentially be found within the project area during seasonal migrations; however, no impacts are anticipated for this species.

The wood stork is an uncommon to common post-breeding visitor to the central and upper coastal prairies and a regular visitor of lakes and reservoirs in Central and East Texas. The wood stork forages in shallow standing water, including salt-water, and usually roosts communally in tall snags; however, the wood stork has not been known to nest in Texas since 1960; therefore, no impacts are anticipated for this species.

The Louisiana black bear, historically inhabited east Texas, Louisiana, and southern Mississippi, but is now confined to small numbers in Mississippi, close to the Mississippi River, and to core populations in Texas and the Atchafalaya River basins in Louisiana. The last native bear of East Texas was believed to have been killed in the late 1950s in Polk County near the town of Livingston. There are no other recent records from Galveston County. The Louisiana black bear's preferred habitat includes bottomland hardwoods and large tracts of undisturbed forest. No large tracts of undisturbed forest exist within the project area. Bears are unlikely to occur within the project area, or to be affected by the proposed project.

The red wolf once ranged throughout most of East and Central Texas. This species inhabited brushy and forested areas, as well as the coastal prairies (Davis and Schmidly, 1994). The red wolf is now considered extirpated from the wild. There are some captive breeding colonies still in existence but the reintroduction is not likely. Preferred habitat for the red wolf does not uniquely exist within the project corridor, and the potential for an occurrence of this species is unlikely; therefore, no impacts are anticipated for this species.

West Indian manatees can be found in shallow, slow-moving rivers, estuaries, saltwater bays, canals, and coastal areas. Manatees are a migratory species. Within the United States, West Indian manatees are concentrated in Florida in the winter, but they can be found in summer months as far west as Texas and as far north as Virginia. However, these sightings are rare. West Indian manatees can also be found in the coastal and inland waterways of Central America and along the northern coast of South America, although distribution in these areas may be spotty. They occur chiefly in large rivers and brackish water bays. They are able to live in salt waters of the sea, however, and travel from one island to another or from place to place along the coast. The project area does not contain any rivers, estuaries or other suitable habitat of the manatee; therefore, this species would not be impacted.

The alligator snapping turtle is an inhabitant of deep rivers, lakes, and large streams with muddy bottoms (Garrett and Barker, 1987). Potential habitat for the alligator snapping turtle includes larger drainages and associated marshes and sloughs. Like the common snapping turtle, the alligator snapping turtle lives in a primarily aquatic environment, such as slow moving streams, lakes, or swamps. Typically only nesting females will venture onto land. They are capable of staying submerged for as long as 50 minutes at a time. The turtle's preferred habitat is not uniquely found within the project area; therefore, no impacts are anticipated for this species.

Five sea turtles are included on the threatened and endangered species list for Galveston County. These sea turtles are the Atlantic Hawksbill sea turtle, the green sea turtle, the Kemp's Ridley sea turtle, the leatherback sea turtle, and the loggerhead sea turtle. These sea turtles are known to occur in the Gulf of Mexico and utilize the beaches as nesting grounds. Although the proposed project is less than 1 mi from Galveston Bay, the turtles' preferred habitat is not uniquely found within the project area; therefore, no impacts are anticipated for this species.

The Texas horned lizard is a burrowing animal found in sparsely vegetated arid and semi-arid regions. The Texas horned lizard was historically found throughout the state in areas with open terrain, scattered vegetation, and sandy or loamy soils. In recent decades, it has nearly vanished from the eastern half of the state, east of a line from Fort Worth to Austin to Corpus Christi. Although its occurrence in the project area is remotely possible, no impacts are anticipated for these species.

The timber/canebrake rattlesnake inhabits heavily vegetated riparian waterways in the eastern part of the Texas, typically occurring within the floodplains of major creeks and rivers (Tennant, 1998). It is considered widely distributed, but generally uncommon (Dixon, 1987). The diet of this snake consists mainly of rodents, birds, and rabbits. Due to the highly disturbed area within the project limits, the potential for the presence of the rattlesnake is unlikely. No impacts are anticipated for this species.

ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act, as amended on October 11, 1996, directs that all federal agencies, whose actions would impact essential fish habitat (EFH), must consult with the National Oceanic and Atmospheric Administration's Fisheries Service regarding potential adverse effects. This means that any project that receives federal funding must address potential impacts to EFH. The proposed project does not cross any tidally influenced waters. Therefore, no EFH would be affected.

HISTORIC AND ARCHEOLOGICAL PROPERTIES

Historic Structures

The National Register of Historic Places (NRHP) is the mechanism by which historic properties can be protected. Any property, building, or area found in the NRHP, or eligible for inclusion in the NRHP, is expressly protected from certain types of activities and can receive federal funding for restoration and maintenance operations. Although the National Park Service is responsible for determining the eligibility of NRHP sites, the State Historic Preservation Officer (SHPO) is responsible for enforcement of the National Historic Preservation Act within the state of Texas.

A review of the NRHP, the list of State Archeological Landmarks (SAL), and the list of Recorded Texas Historic Landmarks (RTHL) indicated that no historically significant resources have been previously documented within the area of potential effect (APE). It has been determined

through consultation with the TxDOT's Environmental Affairs Division (ENV) and the SHPO that the APE for the proposed project is 150 ft from the existing ROW.

To evaluate NRHP eligibility, a TxDOT pre-certified architectural historian conducted a reconnaissance survey of the project area to identify historic-age resources and documented all buildings, sites, structures, objects, and districts that date before 1958 within the project APE. In accordance with 36 Code of Federal Regulations (CFR) 800, the properties and any potential historic districts were preliminarily evaluated for NRHP eligibility.

A historic resources survey, conducted by a TxDOT precertified historian, revealed that 44 historic-age resources, including one object and several residential and commercial properties, were identified within the project APE (**Appendix B, Exhibit 3**). One Official Texas Historical Marker is also located near, but outside, the project APE.

Historic contexts identified in the project APE included the following: agriculture, 1850 to 1958 with reference to truck farming and irrigation and drainage development; Dickinson community planning and development, 1900 to 1958; Clifton-by-the-Sea resort community development, 1910 to 1943; and Bacliff community planning and development, 1943-1958.

Although land use around Dickinson and surrounding communities was mainly agricultural through the mid-twentieth century, none of the identified historic-age resources within the project APE reflect an agricultural historic context. All identified resources fell within the contexts of Planning and Development in Dickinson and Bacliff/Clifton-by-the-Sea. However, no structures were identified dating from the earlier period from 1900 through circa 1920. All structures appear to date from circa 1930 to 1960s, representing post World War II development. One pair of concrete piers, once used for a signpost, were dated circa 1915 and represent Clifton-by-the-Sea's early role as a Houston resort community. No other resources related to this aspect of the community are extant within the project area.

No historic-age resources were identified within the APE that are listed or recommended for NRHP eligibility; therefore, no potential impacts are anticipated. The Historic Resources Survey Report is included as **Appendix B** of this document. Coordination with the Galveston County Historical Chairperson was also initiated to determine if any known historically or archeologically significant properties exist within the project area (**Appendix A**).

Archeological Sites

A TxDOT archaeologist evaluated the potential for the proposed undertaking to affect archaeological historic properties (36 CFR 800.16(l) or State Archaeological Landmarks (13 TAC 26.12) in the area of potential effects (APE). The APE comprises the existing ROW within the project limits, the 25.6 ac of new ROW, and the depth of impact. The APE extends to a maximum depth of approximately 6.5-ft below the modern ground surface. Section 106 review consultations proceeded in accordance with the First Amended Programmatic Agreement among the Federal Highway Administration, TxDOT the Texas State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation Regarding the Implementation of Transportation Undertakings (PA-TU), as well as the Memorandum of Understanding (MOU) between the THC and TxDOT. The following documentation presents TxDOT's findings and explains the basis for those findings.

Background research provided no indication that prehistoric high probability areas exist within the project APE and also indicated that the ground surface throughout the APE has been extensively modified by road and drainage construction.

According to the Houston Potential Archeological Liability Map (PALM) GIS database compiled by TxDOT ENV, the project area traverses Map Units 2, 2a, and 4 (**Exhibit H**). Map Units 2 and 2a recommend a surface survey; however, Map Unit 2a recommends a survey of mounds only. For Map Unit 4, a surface survey is not recommended. The PALM database is restricted to prehistoric cultural resources and is not used to identify the potential for historic cultural resources.

A pedestrian archeological survey was performed by qualified archeologists for the proposed project between August 2005 and January 2006 under Texas Antiquities Code Permit Number 3697. The survey investigated areas of the proposed ROW that were recommended for survey by the PALM for which right-of-entry was granted. Visual surveys were conducted for properties without right-of-entry. No further archeological investigations are recommended prior to construction for the areas that were included in the survey. However, additional investigations may be necessary for those areas that were not accessible during the initial survey. The draft archeological survey report has been coordinated with TxDOT ENV and a copy is provided in **Appendix D**.

TxDOT completed its review on August 21, 2007 and forwarded the report to the SHPO for coordination. Section 106 consultation with federally recognized Native American tribes with a demonstrated historic interest in the area was initiated on August 23, 2007. Since no objections or expressions of concern were received within the 45-day comment period ending on October 1, 2007, consultation has been completed. Pursuant to Stipulation VI of the PA-TU, TxDOT finds that the APE does not contain archaeological historic properties (36 CFR 800.16(l)), and thus the proposed undertaking would not affect archaeological historic properties. The project does not merit further field investigations. Project planning can also proceed, in compliance with 13 TAC 26.20(2) and 43 TAC 2.24(f)(1)(C) of the MOU. If unanticipated archaeological deposits are encountered during construction, work in the immediate area will cease, and TxDOT archeological staff will be contacted to initiate post-review discovery procedures under the provisions of the PA and MOU.

PARKLAND

Elva Lobit Park is located approximately 1.2 mi east of SH 3, but the preferred alternative was designed to avoid any potential impacts to this park. There would not be any other impacts to any publicly owned parklands, wildlife or waterfowl refuges, recreational areas, or historic sites; therefore, a Section 4(f) evaluation is not required. In addition, the proposed project would not impact any areas of unique scenic beauty or other lands of national, state, or local importance.

WATERS OF THE U.S.

A wetland delineation was conducted for the proposed project in October 2005 to identify any locations of waters of the U.S., including wetlands, subject to United States Army Corps of Engineers (USACE) jurisdiction under Section 404 of the Clean Water Act (CWA) and/or Section 10 of Rivers and Harbors Act.

Methodology

On-site surveys and photo interpretation were used to identify and assess wetland impacts along the project corridor. The *1987 Corps of Engineers Wetland Delineation Manual* (Technical Report Y-87-1 or *1987 Manual*) states that wetlands must possess three essential characteristics. Under normal circumstances, these characteristics include the presence of hydrophytic vegetation, wetland hydrology, and hydric soils.

The wetland delineation specifically consisted of staking and mapping identified wetlands within the existing and proposed FM 646 ROW and was supplemented with desktop mapping based on aerial infrared photography. Indicators of hydrophytic vegetation, wetland hydrology, and hydric soils were documented within the wetlands as well as in the nearby upland areas. Routine wetland delineation data forms were completed at plant community changes.

Specific delineation activities involved the utilization of the "Onsite Determination Method" as described in the *1987 Manual*. All dominant plant species in tree, shrub, sapling, herbaceous, and woody vine strata were categorized according to indicator status as per the *1988 National List of Vascular Plant Species* at representative locations throughout the proposed project limits. At the same locations, soil samples were obtained from roughly the upper 12-16 in. of the soil surface (to the extent possible) and compared with mapping units from the *Soil Survey of Galveston County* (USDA NRCS, 1976*)*. Exact soil sampling depths for each sample hole were noted on the accompanying data form for each location.

The identified waters were delineated and staked, and the sites were mapped using differentially-corrected Global Positioning System (GPS) methodology. Although the delineation was conducted according to USACE guidelines, these delineations have not yet been verified by the USACE. This delineation is intended only for use by TxDOT in early project development and early interagency coordination.

Descriptions of Waters of the U.S. Potentially Impacted

Field surveys identified six areas (labeled Areas A-F) within the project area that contain a total of 0.45 ac of potentially jurisdictional waters of the U.S., including wetlands. This acreage consists of two wetlands totaling 0.13 ac and five waters totaling 0.32 ac. Refer to **Table 12** and **Exhibit I** for the sizes and locations of the water features, the data points, and the wetland boundaries. Under the no-build alternative, no impacts to waters of the U.S are anticipated.

Table 12: Potential Jurisdictional Areas within Project Limits

Area	Jurisdictional Wetlands (ac)	Waters of the U.S. (ac)	Non-Jurisdictional Drainage	Total Jurisdictional Area
A		0.07		0.07
B		0.01		0.01
C	0.10	0.09		0.19
D			0.05	
E	0.03	0.10		0.13
F		0.05		
TOTAL	**0.13**	**0.32**	**0.05**	**0.45**

Area A is identified as Benson Bayou. It is a channelized stream with giant ragweed and eastern baccharis growing on the side slopes. Area A is considered a jurisdictional water of the U.S., and 0.07 ac of water is within the project ROW.

Area B is a drainage ditch that is contiguous with Benson Bayou. It exhibits an ordinary high water mark (OHWM) that is an extension of the bayou. Area B is considered a jurisdictional water of the U.S., and 0.01 ac of water is within the project ROW.

Area C is a storm water outfall for FM 646 roadway drainage. At one time this feature was part of Robinson Bayou, but its flow appears to have been reversed, draining south instead of north. The ditches at this location qualify as adjacent wetlands to the extent of the ordinary high water.

Area C consists of 0.09 ac of jurisdictional waters of the U.S. and 0.10 ac of jurisdictional wetland.

Area D is a storm water outfall for FM 646 roadway drainage. It is not associated with a topographic blue line and does not extend the ordinary high water of a natural feature. Area D is a non-jurisdictional feature and consists of 0.05 ac within the project ROW.

Area E is labeled as "Ditch" on the USGS topographic map but is labeled as Gum Bayou on a road sign. This area has fringe wetland along most of the bank edges. The vast majority of this wetland fringe is made up of alligator weed, an exotic invasive or noxious weed. The side slopes of this feature are mowed on a regular basis within and north of the existing ROW. South of the existing ROW, the side slopes are covered with poison ivy and eastern baccharis. This area is considered a jurisdictional feature and consists of 0.10 ac of water and 0.03 ac of wetland within the project ROW.

Area F is also labeled as "Ditch" on the USGS topographic map but exhibits an ordinary high water of its own. This area flows into Gum Bayou. Area F is considered jurisdictional and contains 0.05 ac of waters within the project ROW.

Avoidance/Minimization of Impacts to Wetlands

There are no practical alternatives to the proposed project that would avoid the potential jurisdictional wetlands identified within the project ROW. Avoidance of these wetland impacts is not feasible due to the fact that the proposed improvements involve an existing facility within existing ROW.

Mitigation

An estimated total of 0.13 ac of potentially jurisdictional wetlands could be impacted by construction of the proposed roadway improvements. TxDOT proposes to mitigate for any impacts to jurisdictional wetlands resulting from the proposed project. In accordance with the stated preference of Transportation Equity Act (TEA-21), TxDOT proposes to compensate for this loss through either natural regeneration of wetland plants in the associated area on-site or the purchase of banking credits.

WATER QUALITY

No long-term water quality impacts are expected as a result of the proposed project. Activities that disturb the soil and result in its transport during construction would be managed using standard TxDOT specifications and methods. The proposed project would incorporate best management practices (BMPs) at appropriate stages during construction. Erosion and sedimentation would be controlled by job specifications, on-site inspections during construction, and by seeding and sodding during and at the completion of the project. Barriers, such as a combination of silt fencing and hay bale dikes, would be utilized and remain in place until project completion. Outfalls to streams would be protected using barriers such as rock filter dams. For post-construction total suspended solids (TSS) control, vegetative filter strips would be utilized. Subsurface construction activities such as storm sewer and utility construction would be protected by using sediment control measures and silt fencing. All disturbed soils would be permanently reseeded with grass. Under the no-build alternative, no impacts to water quality are anticipated.

Roadside ditches are located along FM 646 to convey storm water drainage within the project limits. Ditches and other drainage features (i.e., streams, creeks, etc.), some of which are

considered waters of the U.S., also provide local drainage and cross drainage beneath FM 646. These culvert crossings would be replaced, and channel excavation and scraping would occur at these sites. As evidenced through a review of topographic maps, the FM 646 project area conveys roadside drainage into the Dickinson Bayou watershed. Dickinson Bayou, located south of the project area, flows generally to the east and eventually flows into Galveston Bay.

Storm water runoff from the proposed construction would flow into three streams, Benson, Robinson, and Gum Bayous, which ultimately flow into the Dickinson Bayou watershed. Benson Bayou and Gum Bayou are identified in the Texas Commission on Environmental Quality's (TCEQ) 2008 Texas 303(d) List. Benson Bayou, Segment Identification Number 1103A, from the confluence with Dickinson Bayou Tidal to 0.37 mi upstream of FM 646 in Galveston County, is designated as threatened or impaired for bacteria. Point and non-point sources contribute to this impairment. It is designated as Category 5c, meaning that additional data and information will be collected before a Total Maximum Daily Load (TMDL) is scheduled. Gum Bayou, Segment ID Number 0508B, from the confluence with Dickinson Bayou to FM 3436 in Galveston County, is designated as threatened or impaired for bacteria. Point and non-point sources contribute to this impairment. It is designated as Category 5a, meaning that a TMDL is underway, scheduled, or will be scheduled. These impaired streams are located less than 5 mi upstream from the proposed project, therefore coordination with the TCEQ regarding TMDLs is required. The previously mentioned project specific BMPs would be implemented during and after construction to ensure storm water runoff would not further contribute to the constituents of concern in the listed stream segments.

Although runoff from highways can have an impact on water quality, no substantial impacts are anticipated to the ambient water quality of this segment because the area of impervious cover in the project is small compared to the total area of the watershed. The public water supply in the vicinity of the project is obtained from groundwater wells; therefore, surface impacts caused by this project are not anticipated to affect the public water supply. Subsurface water would not be required for this project. Therefore, no adverse effects to groundwater are expected to occur. The proposed project is not expected to alter rainfall drainage patterns or contaminate or otherwise adversely affect the public water supply, water treatment facilities, or water distribution systems.

COASTAL MANAGEMENT PROGRAM

The proposed project is within the boundary of the Texas Coastal Management Program (CMP). TxDOT has reviewed the proposed action for consistency with the CMP goals and policies in accordance with the regulations of the Coastal Coordination Council and has determined that the proposed action is consistent with the applicable CMP goals and policies.

FLOODPLAINS

The hydraulic design of the proposed improvements would be in accordance with the current TxDOT and FHWA policy standards. The roadway would permit the conveyance of the 100-year flood, inundation of the roadway being acceptable, without causing significant damage to the roadway or other property. The proposed project would not increase the base flood elevation to a level that would violate applicable floodplain regulations and ordinances. Under the no-build alternative, no impacts to floodplains are anticipated.

All areas within this project corridor are mapped from the Federal Emergency Management Agency (FEMA) Q3 Flood Data, Galveston County, Texas (FEMA, 1998) (**Exhibit I**). The vast

majority of the project falls within Zone X representing areas determined to be outside the 500-year floodplain. The area around Benson Bayou, located approximately 1.2 miles east of IH 45, contains approximately 16.38 ac within Zone A (100-year floodplain). Galveston County is a participant in the National Flood Insurance Program.

PERMITS

U.S. Army Corps of Engineers

Based on the preliminary jurisdictional determination, the project ROW contains 0.13 ac of Section 404 wetlands and 0.32 ac of Section 404 waters. It is anticipated that the proposed project would impact jurisdictional waters of the U.S., including wetlands, and could be authorized utilizing USACE Nationwide Permit (NWP) 14 for Linear Transportation Crossings. TxDOT would be required to prepare a Pre-construction Notification for the NWP 14. The project ROW does not contain waters that are considered tidally influenced or navigable since no significant daytime or nighttime vessel traffic, recreation or otherwise, can use it for navigational purposes; therefore a USACE permit under Section 10 of the General Bridge Act of 1946 would not be required. Under the no-build alternative, a permit for impacts to waters of the U.S., including wetlands, would not be required.

U.S. Coast Guard

Based on the preliminary jurisdictional determination no permit would be required from the U.S. Coast Guard (USCG) under Section 9 of the General Bridge Act of 1946. No waters within the project area are considered tidally influenced or navigable since no significant daytime or nighttime vessel traffic, recreation or otherwise, can use it for navigational purposes.

Texas Commission on Environmental Quality

The proposed project would impact less than 3 ac of wetlands, therefore it meets the TCEQ's Section 401 Water Quality Certification Tier I (Small Projects) criteria. According to the Tier I Checklist, all projects must implement at least one BMP from each of the three categories: erosion, post-construction TSS control, and sedimentation. The proposed project would incorporate the following BMPs at appropriate stages during construction. For erosion control, sod would be utilized and remain in place until the area has been stabilized. For post-construction TSS control, vegetative filter strips would be utilized to control totals suspended solids after construction. The vegetation within the existing ditches would not be disturbed and would act as vegetative filter strips. For sedimentation, a combination of silt fencing and hay bale dikes would be utilized and remain in place until project completion.

The CWA makes it unlawful to discharge storm water from construction sites into waters of the U.S. unless authorized by the TCEQ's Texas Pollutant Discharge Elimination System (TPDES) General Permit. If more than 5 ac of ROW are disturbed at one time during construction, a Notice of Intent (NOI) must be filed with the TCEQ. Construction activities for the proposed project would disturb more than 5 ac; therefore, TxDOT would be required to file an NOI with the TCEQ prior to the beginning of the construction phase stating that a Storm Water Pollution Prevention Plan (SW3P) has been developed.

An SW3P would be required because more than 1 ac of land would be disturbed by this project. Measures would be taken to prevent or correct erosion that may develop during construction. All temporary erosion controls would be in compliance with TxDOT Standard Specifications and would be in place according to the construction plans, prior to commencement of construction related activities and inspected on a regular basis to ensure maximum effectiveness.

AIRCRAFT CLEARANCE

To comply with federal law, virtually every construction project that extends 200 ft or greater above natural terrain or is located within 5 mi of an airport, requires that a notice be filed with the Federal Aviation Administration. No airports were found to exist within a 5 mi-radius of the proposed project.

RAILROADS

There are single track facilities running in north-south directions within the project area which will be temporarily impacted by the roadway expansion. Impacts to these railroad crossings during the construction of the project are considered minor. No long term impacts to the railroad facilities are anticipated. An overpass will be constructed over the Houston, Galveston, and Hendrichson railroad crossing east of SH 3. The Union Pacific track west of SH 146 will remain at-grade. Portions of the Union Pacific track are in use through the Texas City area. TxDOT will coordinate with the railroads during the design phase of the project for the impacted rail facilities.

PEDESTRIAN AND BICYCLE FACILTIES

There are no pedestrian or bicycle facilities that extend through the length of the existing project area. Where construction has occurred in the western portion of the project in recent years, sidewalks have been built independently by developers. The proposed project will add continuous sidewalks from IH 45 to FM 1266 and from SH 146 to Bayshore Boulvard. The sidewalks will also add pedestrian access to Elva Lobit Park. From FM 1266 to SH 146, the project area is less developed. In this area, the project design utilizes open ditches.

TRAFFIC NOISE

This analysis conforms to FHWA Regulation 23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise, and TxDOT's 1996 Guidelines for Analysis and Abatement of Highway Traffic Noise.

Representative sound pressure levels (decibels) for a variety of common outdoor and indoor areas/activities are depicted in **Table 13**. A healthy human adult can hear sounds in the range of 20-20,000 Hertz (Hz), or roughly from the lowest note of a pipe organ to the highest note of a violin. Sound from highway traffic is generated primarily from a vehicle’s tires, engine, and exhaust. It is commonly measured in decibels and is expressed as "dB." Sound occurs over a wide range of frequencies. However, not all frequencies are detectable by the human ear. Therefore, an adjustment is made to the high and low frequencies to approximate the way an average person hears traffic sounds. This adjustment is called A-weighting and is expressed as "dBA."

Table 13: Common Sound/Noise Levels

Outdoor	dBA	Indoor
Pneumatic hammer	100	Subway Train
Gas lawn mower at 1 meter		
	90	Food blender at 3 ft
Downtown (large city)	80	Garbage disposal at 3 ft
Lawn mower at 30 meters	70	Vacuum cleaner at 9 ft
		Normal speech at 3 ft
Air conditioning unit	60	Clothes dryer at 3 ft
Babbling brook		Large business office
Quiet urban (daytime)	50	Dishwasher (next room)
Quiet urban (nighttime)	40	Library

Also, because traffic sound levels are never constant due to the changing number, type, and speed of vehicles, a single value is used to represent the average or equivalent sound level and is expressed as "Leq."

The traffic noise analysis typically includes the following elements:

- Identification of land use activity areas that might be impacted by traffic noise
- Determination of existing noise levels
- Prediction of future noise levels
- Identification of possible noise impacts
- Consideration and evaluation of measures to reduce noise impacts

The FHWA has established the Noise Abatement Criteria (NAC), shown in **Table 14**, for various land use activity areas that are used as one of two means to determine when a traffic noise impact will occur.

Table 14: FHWA Noise Abatement Criteria

Activity Category	dBA Leq	Description of Land Use Activity Areas
A	57 (exterior)	Lands on which serenity and quiet are of extra-ordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals.
C	72 (exterior)	Developed lands, properties or activities not included in categories A or B above.
D	--	Undeveloped lands.
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

NOTE: Primary consideration is given to exterior areas (Category A, B or C) frequently used by humans. However, interior areas (Category E) are used if exterior areas are physically shielded from the roadway or if there is little or no human activity in exterior areas adjacent to the roadway.

A noise impact occurs when either the absolute or relative criterion is met. These criteria are defined as follows:

Absolute criterion: the predicted noise level at a receiver approaches, equals, or exceeds the NAC. "Approach" is defined as 1 dBA below the NAC. For example, a noise impact would occur at a Category B residence if the noise level is predicted to be 66 dBA or above.

Relative criterion: the predicted noise level substantially exceeds the existing noise level at a receiver even though the predicted noise level does not approach, equal, or exceed the NAC. "Substantially exceeds" is defined as more than 10 dBA. For example, a noise impact would occur at a Category B residence if the existing level is 54 dBA and the predicted level is 65 dBA (11 dBA increase).

When a traffic noise impact occurs, noise abatement measures must be considered. A noise abatement measure is any positive action taken to reduce the impact of traffic noise on an activity area.

The FHWA traffic noise modeling (TNM) software was used to calculate existing and predicted traffic noise levels. The model primarily considers the number, type, and speed of vehicles; highway alignment and grade; cuts, fills, and natural berms; surrounding terrain features; and the locations of activity areas likely to be impacted by the associated traffic noise.

Existing and predicted noise levels were modeled for 12,900 vpd in 2009 and 22,200 vpd in 2029. These traffic levels were used to model representative receivers at 35 locations (**Table 15** and **Exhibit J**) that represent the land use activity areas adjacent to the highway project that might be impacted by traffic noise and that may potentially benefit from reduced noise levels.

Table 15: Traffic Noise Levels (dBA Leq)

Receiver	Receiver Type	NAC Category	NAC Level	Existing 2009	Predicted 2029	Change (+/-)	Noise Impact
1	Residential	B	67	51	52	+1	N
2	Residential	B	67	53	55	+2	N
3	Residential	B	67	56	61	+5	N
4	Residential	B	67	60	64	+4	N
5	Residential	B	67	53	57	+4	N
6	Residential	B	67	59	62	+3	N
7	Residential	B	67	58	60	+2	N
8	Residential	B	67	55	56	+1	N
9	Residential	B	67	55	56	+1	N
10	Residential	B	67	58	60	+2	N
11	Residential	B	67	58	59	+1	N
12	Residential	B	67	55	56	+1	N
13	Residential	B	67	52	53	+1	N
14	Residential	B	67	59	62	+3	N
15	Church	B	67	53	56	+3	N
16	Church	B	67	53	57	+4	N
17	Residential	B	67	62	63	+1	N
18	Residential	B	67	54	55	+1	N
19	Residential	B	67	53	53	0	N
20	Residential	B	67	55	57	+2	N
21	Residential	B	67	54	55	+1	N
22	Residential	B	67	53	54	+1	N
23	Residential	B	67	57	59	+2	N
24	Residential	B	67	54	55	+1	N
25	Residential	B	67	54	55	+1	N
26	Residential	B	67	59	61	+2	N
27	Residential	B	67	57	59	+2	N
28	Residential	B	67	62	63	+1	N
29	Residential	B	67	55	56	+1	N
30	Residential	B	67	60	62	+2	N
31	Residential	B	67	58	60	+2	N
32	Residential	B	67	58	60	+2	N
33	Residential	B	67	54	55	+1	N
34	Residential	B	67	59	61	+2	N
35	Residential	B	67	51	53	+2	N

As indicated in **Table 15**, predicted noise levels only exceed existing levels by a maximum of 5 dBA at the receivers located near the proposed project. The NAC was not approached, equaled, or exceeded at any of the receivers. Therefore, the proposed project would not result in a traffic noise impact.

Several undeveloped areas scattered along the proposed project are currently Category D, undeveloped land. There is no NAC for undeveloped land; however, to avoid noise impacts that may result from future development of properties adjacent to the project, local officials responsible for land use control programs should ensure, to the maximum extent possible, no new activities are planned or constructed along or within the predicted (2029) noise impact contours shown in **Table 16.**

Table 16: Year 2029 Noise Impact Contours

Undeveloped Area	Land Use	NAC Category	Impact Contour	Distance from ROW (ft)
FM 646: IH 45 to SH 146	Residential	B	66	40

Noise associated with the construction of the project is difficult to predict. Heavy machinery, the major source of noise in construction, is constantly moving in unpredictable patterns. However, construction normally occurs during daylight hours when occasional loud noises are more tolerable. None of the receivers is expected to be exposed to construction noise for a long duration. Therefore, any extended disruption of normal activities is not expected. Provisions would be included in the plans and specifications that require the contractor to make every reasonable effort to minimize construction noise through abatement measures such as work-hour controls and proper maintenance of muffler systems.

A copy of this traffic noise analysis will be made available to local officials to ensure, to the maximum extent possible, that future developments are planned, designed, and programmed in a manner that would avoid traffic noise impacts. On the date of approval of this document (Date of Public Knowledge), the FHWA and TxDOT are no longer responsible for providing noise abatement for new development adjacent to the project area.

AIR QUALITY

The proposed project is located within Galveston County, which is within the Houston-Galveston-Brazoria (HGB) area severe ozone nonattainment area; therefore, the transportation conformity rules apply. All projects in the H-GAC's TIP that are proposed for federal or state funds were initiated in a manner consistent with federal guidelines in Section 450, of Title 23 CFR and Section 613.200, Subpart B, of Title 49 CFR. Energy, environment, air quality, cost, and mobility considerations are addressed in the programming of the TIP. The proposed action is consistent with the area's financially constrained 2035 RTP and the 2008-2011 TIP as proposed by the H-GAC. The 2035 RTP and the 2008-2011 TIP were found to conform to the State Implementation Plan (SIP) on August 24, 2007 and updated March 2008.

Design year traffic data is estimated to be 22,200 vpd. According to TxDOT's 2006 Air Quality Guidelines, because these traffic projections do not exceed 140,000 vpd, this project is exempt from a traffic air quality analysis. Previous analyses of similar projects did not result in a violation of the National Ambient Air Quality Standards (NAAQS).

Congestion Management System

It is stated in 23 CFR 450.320(b) that no single occupancy vehicle (SOV) capacity may be built in the TMA designated as nonattainment for ozone or carbon monoxide (CO) unless the project complies with a CMS. The CMS is a systematic process for managing traffic congestion. The CMS provides information on transportation system performance, alternative strategies for alleviating congestion, and enhancing the mobility of persons and goods to levels that meet state and local needs. It is an ongoing process that is designed to systematically evaluate, select, and implement cost-effective strategies to manage new and existing transportation facilities. The CMS identifies appropriate Transportation Control Measures (TCMs) for implementation in various congested areas, today and in the future.

The 2035 RTP for the Houston-Galveston TMA includes a CMS. The FM 646 project was developed from the H-GAC operational CMS, which meets all requirements of CFR 500.109.

The CMS was originally adopted by the MPO on October 10, 1997 and later amended in December 1997, May 1998, and December 2004. The CMS was amended to identify those roadways that have been deemed of regional significance.

The CMS identifies appropriate traffic control measures (TCMs) for implementation in various congested areas, today and in the future. The CMS refers to several methods of roadway management, including Transportation System Management (TSM) and Travel Demand Management (TDM) strategies which seek to improve traffic flow and safety through better operation and management of transportation facilities. Additionally, these strategies provide low cost solutions that can be constructed in less time and provide air quality benefits to the region. TSM attempts to identify improvements that would enhance the capacity of the existing transportation system. Better management and operation of existing facilities improves traffic flow, air quality, movement of vehicles and goods, and enhances system accessibility and safety. TSM strategies include intersection and signal improvements, freeway bottleneck removals, special events management, and data collection to monitor system performance. TDM addresses alternative forms of transportation to commuters that seek to reduce congestion and air pollution and to increase efficiency of the transportation system. TDM programs may include carpools, vanpools, transit, telecommuting, compressed work weeks, park-and-ride facilities, bike and pedestrian transportation, and Transportation Management Associations.

The CMS requires the performance of a CMA, which was formerly known as SOV, on significant added capacity roadway projects. A CMA was performed in May 2006 from IH 45 to FM 1266. The CMA performed for the project limits covered under CSJs 3049-01-022 and 3049-01-027 requires the use of TSM strategies of traffic signal modifications (traffic signal re-timing and synchronization) to reduce traffic congestion. The same CMA letter notes that traffic signal modifications would mitigate congestion within these limits by 4.5%; however, even that would not negate the need to add capacity. This analysis concluded that this section of FM 646 has deteriorated significantly to justify adding additional road capacity. A CMA is needed for a portion of the proposed project; however, adding capacity on this roadway is consistent with the CMS Plan of the H-GAC.

As noted previously, the H-GAC has performed a CMA for a portion of the FM 646 facility (CSJs 3049-01-022 and 3049-01-027). The H-GAC also provided letters of waiver (LOWs) for other portions of the facility (CSJs 0978-02-053, 3049-01-023, and 0978-02-034). Copies of the CMA and LOWs are included in **Appendix A**.

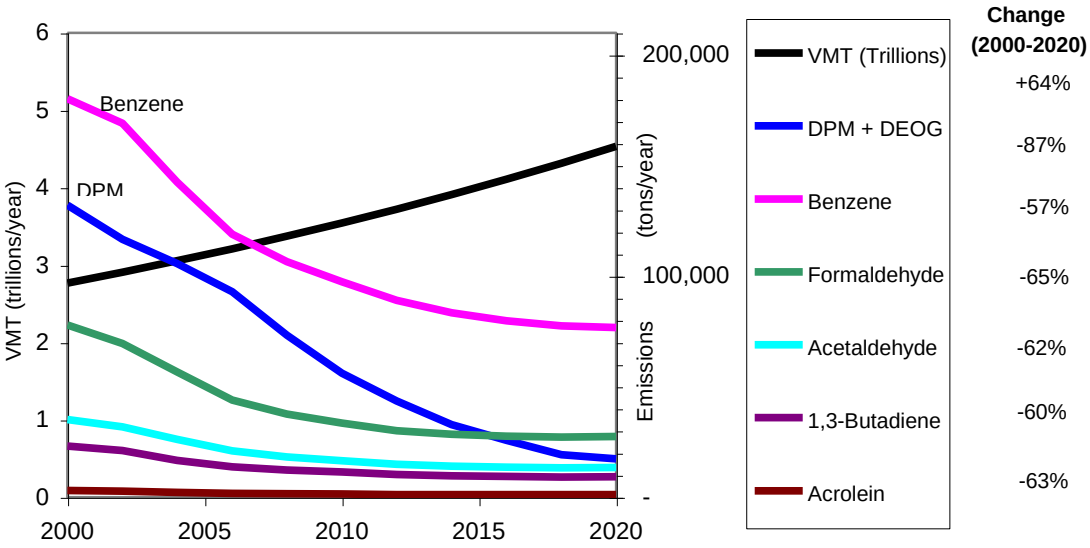
Mobile Source Air Toxics

In addition to the criteria air pollutants for which there are NAAQS, the Environmental Protection Agency (EPA) also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

MSAT are a subset of the 188 air toxics defined by the Clean Air Act (CAA). The MSAT are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The EPA is the lead federal agency for administering the CAA and has certain responsibilities regarding the health effects of MSAT. The EPA issued a Final Rule on *Controlling Emissions of*

Hazardous Air Pollutants from Mobile Sources (66 FR 17229, March 29, 2001). This rule was issued under the authority in Section 202 of the CAA. In its rule, the EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline (RFG) program, its national low emission vehicle (NLEV) standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, the FHWA projects that even with a 64 % increase in vehicle miles traveled (VMT), these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 to 65%, and will reduce on-highway diesel PM emissions by 87%, as shown in the following graph:



Notes: For on-road mobile sources. Emissions factors were generated using MOBILE6.2. MTBE proportion of market for oxygenates is held constant, at 50%. Gasoline RVP and oxygenate content are held constant. VMT: *Highway Statistics 2000* , Table VM-2 for 2000, analysis assumes annual growth rate of 2.5%. "DPM + DEOG" is based on MOBILE6.2-generated factors for elemental carbon, organic carbon and SO4 from diesel-powered vehicles, with the particle size cutoff set at 10.0 microns. 1 short ton = 907,200,000 mg.

In an ongoing review of MSAT, the EPA finalized additional rules under authority of CAA Section 202(l) to further reduce MSAT emissions that are not reflected in the above graph. The EPA issued Final Rules on Control of Hazardous Air Pollutants from Mobile Sources (72 FR 8427, February 26, 2007) under Title 40 Code of Federal Regulations Parts 59, 80, 85 and 86. The rule changes were effective April 27, 2007. As a result of this review, the EPA adopted the following new requirements to significantly lower emissions of benzene and the other MSAT by: (1) lowering the benzene content in gasoline; (2) reducing non-methane hydrocarbon (NMHC) exhaust emissions from passenger vehicles operated at cold temperatures (under 75 degrees Fahrenheit); and (3) reducing evaporative emissions that permeate through portable fuel containers.

Beginning in 2011, petroleum refiners must meet an annual average gasoline benzene content standard of 0.62% by volume, for both reformulated and conventional gasolines, nationwide. The national benzene content of gasoline in 2007 is about 1.0% by volume. EPA standards to reduce NMHC exhaust emissions from new gasoline-fueled vehicles will become effective in

phases. Standards for light-duty vehicles and trucks (less than or equal to 6000 pounds [lbs]) become effective during the period of 2010 to 2013, and standards for heavy light-duty trucks (6,000 to 8,000 lbs) and medium-duty passenger vehicles (up to 10,000 lbs) become effective during the period of 2012 to 2015. Evaporative requirements for portable gas containers become effective with containers manufactured in 2009. Evaporative emissions must be limited to 0.3 grams of hydrocarbons per gallon per day.

The EPA has also adopted more stringent evaporative emission standards (equivalent to current California standards) for new passenger vehicles. The new standards become effective in 2009 for light vehicles and in 2010 for heavy vehicles. In addition to the reductions from the 2001 rule, the new rules will significantly reduce annual national MSAT emissions. For example, the EPA estimates that emissions in the year 2030, when compared to emissions in the base year prior to the rule, will show a reduction of 330,000 tons of MSAT (including 61,000 tons of benzene), reductions of more than 1,000,000 tons of volatile organic compounds, and reductions of more than 19,000 tons of PM2.5.

Project Specific MSAT Information

A qualitative assessment was performed for the proposed project due to its low potential for MSAT effects. This project will not significantly increase capacity and will serve to improve the operational qualities of an existing roadway**.**

Numerous technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable quantitative estimates of MSAT emissions and effects of this project (see "Unavailable Information for Project Specific MSAT Impact Analysis" at the end of this section for more information). However, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative assessment cannot identify and measure health impacts from MSAT, it can give a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*, found at:

http://www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm

The purpose of this project is to improve mobility and safety within the FM 646 corridor. The additional travel lanes contemplated as part of the project alternatives will have the effect of moving some traffic closer to homes, schools, and businesses; therefore, there may be localized areas where ambient concentrations of MSAT could be higher under the build alternative than under the no-build alternative. However, the magnitude and duration of these potential increases compared to the no-build alternative cannot be accurately quantified due to the inherent deficiencies of current models. In sum, when a highway is widened and, as a result, moves closer to receptors, the localized level of MSAT emissions for the build alternative could be higher relative to the no-build alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). On a regional basis, the EPA's vehicle and fuel regulations coupled with fleet turnover will cause region-wide MSAT levels to be significantly lower than today in almost all cases.

For each alternative in this EA, the amount of MSAT emitted would be proportional to the VMT assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for the build alternative is slightly higher than that for the no-build alternative, because the additional capacity increases the efficiency of the roadway and attracts rerouted trips from

elsewhere in the transportation network. This increase in VMT would lead to higher MSAT emissions for the action alternative along the highway corridor, along with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to the EPA's MOBILE6.2 emissions model, emissions of all of the priority MSAT except for diesel PM decrease as speed increases. The extent to which these speed-related emissions decreases will offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models.

Because the estimated VMT under both of the alternatives is nearly the same, it is expected there would be no appreciable difference in overall MSAT emissions. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of the EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87% between 2000 and 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

The additional travel lanes contemplated as part of the project alternatives would have the effect of moving some traffic closer to nearby homes, schools and businesses; therefore, there may be localized areas where ambient concentrations of MSAT could be higher under the build alternative than under the no-build alternative. However, as discussed previously, the magnitude and duration of these potential increases compared to the no-build alternative cannot be accurately quantified due to the inherent deficiencies of current models. In summary, when the highway is widened and, as a result, moves closer to receptors, the localized levels of MSAT emissions for the build alternative could be higher relative to the no-build alternative. However, the higher MSAT emissions are expected to be offset due to the increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Therefore MSAT levels are not anticipated to increase significantly in the project area. Also, MSAT will be lower in other locations when traffic shifts away from them. However, on a regional basis, the EPA's vehicle and fuel regulations coupled with fleet turnover will cause region-wide MSAT levels to be significantly lower than today in almost all cases.

Sensitive Receptor Assessment

There may be localized areas where ambient concentrations of MSAT are slightly higher in any build scenario than in the no build scenario. Sensitive receptors include those facilities most likely to contain large concentrations of the more sensitive population, such as hospitals, schools, licensed day cares, and elder care facilities. Dispersion studies have shown that the "roadway" air toxics start to drop off at about 100 meters (m). By 500 m, most studies have found it very difficult to distinguish the roadway from background toxic concentrations in any given area.

An assessment of potential sensitive receptors within both 100 m and 500 m was conducted along the proposed project alignment. There were no sensitive receptors located within 500-m of the proposed project ROW. Two schools are located within the project vicinity, but both are located beyond 500-m.

Unavailable Information for Project Specific MSAT Impact Analysis

This document includes a basic analysis of the likely MSAT emission impacts of this project. However, available technical tools do not enable the prediction of project-specific health impacts of the emission changes associated with the alternatives in this project. Due to these

limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22[b]) regarding incomplete or unavailable information:

Information that is Unavailable or Incomplete

Evaluating the environmental and health impacts from MSAT on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

1. Emissions: The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSAT in the context of highway projects. While MOBILE6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE6.2 is a trip-based model-emission factors are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE6.2 for both particulate matter and MSAT are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of PM under the conformity rule, EPA has identified problems with MOBILE6.2 as an obstacle to quantitative analysis.

These deficiencies compromise the capability of MOBILE6.2 to estimate MSAT emissions. MOBILE6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations. However, MOBILE6.2 is currently the only available tool for use by the FHWA/TxDOT and may function adequately for larger scale projects for comparison of alternatives.

2. Dispersion. The tools to predict how MSAT disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of carbon monoxide to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. The NCHRP is conducting research on best practices in applying models and other technical methods in the analysis of MSAT. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, the FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.

3. Exposure Levels and Health Effects. Finally, even if emission levels and concentrations of MSAT could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude us from reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSAT near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSAT

Research into the health impacts of MSAT is ongoing. For different emission types there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or state level.

The EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at http://www.epa.gov/iris. The following toxicity information for the six prioritized MSAT was taken from the IRIS database *Weight of Evidence Characterization* summaries. This information is taken verbatim from the EPA's IRIS database and represents the Agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- **Benzene** is characterized as a known human carcinogen.
- **Carolina:** The potential carcinogenicity of acrolein cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.
- **Formaldehyde** is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.
- **1, 3-butadiene** is characterized as carcinogenic to humans by inhalation.
- **Acetaldehyde** is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.
- **Diesel exhaust** is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of diesel

particulate matter and diesel exhaust organic gases. Diesel exhaust also represents chronic respiratory effects, possibly the primary non-cancer hazard from MSAT. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by the EPA, the FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes, particularly respiratory problems. Much of this research is not specific to MSAT, instead surveying the full spectrum of both criteria and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable us to perform a more comprehensive evaluation of the health impacts specific to this project.

Relevance of Unavailable or Incomplete Information
While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects. Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have significant adverse impacts on the human environment.

In this document, a qualitative assessment has been provided relative to the various alternatives of MSAT emissions and has acknowledged that the build alternative may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated.

HAZARDOUS MATERIALS

Pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA), a preliminary investigation was conducted to identify known sources of contamination within the proposed project area that have the potential to impact construction activities. The preliminary investigation included the review of regulatory agency databases, aerial photographs, and a site visit. Sites that are contaminated within the ROW and likely to impact highway construction are categorized as high risk. Sites that are adjacent to the existing ROW, having the potential to contaminate the ROW, and may impact highway construction are categorized as moderate risk. Sites, categorized as low risk, have some potential for contamination, but are not likely to impact highway construction.

Visual Observation
Visual surveys of the project area were performed during 2005 and 2006 for evidence of hazardous substances and/or other contamination. An updated survey was performed in June

2009, to determine if the area has changed since the Hurricane Ike storm event in September 2008. The surveys also included a visual observation of properties located immediately outside the boundaries of the project site to identify released or threatened release of petroleum products or hazardous substances. There were no obvious indications of environmental impacts (such as spills, stains, or leaks) to the project site vicinity associated with the properties observed.

In addition, the observations included verifying the results of the hazardous materials regulatory database search discussed below. Specifically, field personnel were tasked to identify suspect hazardous materials facilities not listed in the database and/or listed facilities that were not mapped correctly. As a result of the visual observations, no additional facilities were identified. No hazardous materials were identified as a result of the hurricane impact in the area.

Regulatory Records Review

A hazardous materials regulatory database search was conducted for the project area in January 2007, to identify areas of potential concern within 1 mi of the proposed project area. The following EPA and TCEQ regulatory databases were reviewed:

1. U.S. EPA National Priorities List (NPL)
2. U.S. EPA RCRA Corrective Actions (CORRACTS)
3. U.S. EPA RCRA Corrective Actions and associated treatment, storage and disposal facilities (TSD CORRACTS)
4. State equivalent Priority List (SPL)
5. U.S. EPA RCRA permitted treatment, storage and disposal facilities (RCRA-TSD)
6. State Voluntary Clean-up Program (SCL)
7. State Equivalent CERCLIS list, No Further Remediation Necessary (CERCLIS/NFRAP)
8. State-regulated Leaking Underground Storage Tanks (LUST)
9. State-regulated Solid Waste Landfills, Incinerators or Transfer Stations (SWLF)
10. State-regulated registered Underground Storage Tanks (UST)
11. State-regulated registered Aboveground Storage Tanks (AST)
12. U.S. EPA RCRA registered large generators of hazardous waste (Lg. Gen.)
13. U.S. EPA RCRA registered small generators of hazardous waste (Sm. Gen.)
14. U.S. EPA Emergency Response Notification System of Spills (ERNS)
15. State regulated Spills list (SPILLS)
16. U.S. EPA RCRIS Notifiers (NOTIFIERS)

The regulatory agency database search identified 27 locations with a total of 38 sites within the 1-mi ASTM-specified search radii with the potential for contamination. The majority of these sites include USTs, ASTs, or small quantity generators of hazardous waste. These sites are listed in **Table 17**. Most of these are associated with service stations and all are commercial facilities. The presence of petroleum storage tanks or generation of hazardous waste indicates a potential for soil and water contamination. Each citation was reviewed and categorized as low risk, moderate risk, or high risk. All of the sites listed in the regulatory agency database were categorized as low risk. Refer to **Appendix C** for a report summarizing the hazardous materials database search results and location maps.

Table 17: Hazardous Materials Sites within One-Mile of the Project Area

Map ID No.	Database Type	Name	ID	Status	Address	City	State	Zip
1	LUST	North County Building	111805	Closed	1301 FM 646 W	Dickinson	TX	77539
	UST		0023417	N/A				
2	UST	Lous Grocery	0075673	N/A	406 Grand Avenue	Bacliff	TX	77518
3	UST	James Davidson Constructors	0021725	N/A	1201 FM 646 W	Dickinson	TX	77539
4	UST	Super Food Country Store	0050224	N/A	1105 N FM 646	Santa Fe	TX	77539
5	UST	Walkers Food Store	0021258	N/A	4417 SH 146	Bacliff	TX	77518
6	UST	League City Food Mart 101	0064127	N/A	151 FM 646 E	League City	TX	77573
7	UST	Handi Stop 38	0074085	N/A	5651 FM 646	League City	TX	77573
8	UST	Super Star Food	0073268	N/A	351 E FM 646	Dickinson	TX	77539
	UST		006786	N/A				
9	UST	Dorsett Brothers Concrete Supply	0075520	N/A	1765 FM 646	League City	TX	77573
10	UST	Stop-n-Go 2362	0005518	N/A	4515 SH 146	Bacliff	TX	77518
11	UST	Brownies Food	0024890	N/A	102 FM 646 W	League City	TX	77573
12	LUST	Diamond Shamrock 1087	111771	Closed	1103 Grand Avenue	Bacliff	TX	77518
	UST		0066270	N/A				
13	UST	Bacliff Grocery & Deli	0070112	N/A	545 B Grand Ave	Bacliff	TX	77518
14	OTHER	Screened Expressions	IHW-81503	Inactive	850 Grand Avenue	Bacliff	TX	77518
	RCRA-GN		TXD 099089959	VGN				
15	OTHER	Division of Denny Day Associates	IHW-41876	Active	130 Grand Avenue	Bacliff	TX	77518
	RCRA-GN	ODA Services	TXD 988040630	Transporter				
16	OTHER	Bacliff Truck Service	IHW-31378	Inactive	4619 13th Street	Bacliff	TX	77518
17	UST	Milk Products LP	0075138	N/A	201 E Strawberry	Dickinson	TX	77539
18	RCRA-GN	Shoppers Mart – 646	TXD 988984331	VGN	151 FM 646 E	Dickinson	TX	77539
19	UST	Bacliff Central Office	0004910	N/A	4700 19th Street	Bacliff	TX	77518
20	UST	Bacliff Central Office		N/A	4700 19th Street	Bacliff	TX	77518
	UST	HEB 28	0076614	N/A	2995 Gulf Frwy S	League City	TX	77573
	UST	Bay Oil Co.	0035080	N/A	4318 SH 3	Dickinson	TX	77539
	UST	San Leon Facility	0066522	N/A	5320 27th Street	San Leon	TX	77539
21	OTHER	HG Kelley Pits c/o Perreco Division	IHW-39983	Inactive	19th Street	Dickinson	TX	77539
	OTHER	Corsan Trucking	IHW-40980	Inactive	1335 Grand Avenue	Bacliff	TX	77518
22	SWLF	Republic Waste Services of TX Ltd.	1849A	N/A	½ mile east of intersection	Dickinson	TX	77539

Table 17: Hazardous Materials Sites within One-Mile of the Project Area

Map ID No.	Database Type	Name	ID	Status	Address	City	State	Zip
23	SWLF	TransAmerican Waste – Houston	1849	N/A	2015 Wyoming	League City	TX	77575
24	NFRAP	HG Kelly Pits	TXD 980810360	N/A	SH 3 between 19th Street and 20th Street	Dickinson	TX	77539
	NFRAP	Abandoned Landfill	TXD 988062964	N/A	FM 646	League City	TX	77573
25	RCRA-COR	NRG Texas LP	TXD 000837401	CA	5501 SH 146	Bacliff	TX	77518
26	STATE	Hall Street	TXSSFTEM P001	Evaluation Underway	North of Intersection – 20	Dickinson	TX	77539
27	RCRA-COR	Durathem Inc.	TXD 981053770	CA	2700 Avenue S	San Leon	TX	77539

The proposed project would include the demolition and/or relocation of building structures. During the ROW acquisition process, prior to construction and any demolition and/or relocation of structures from the ROW, asbestos inspections, notifications, and abatement would be completed. Additionally, asbestos inspections, specification, notification, license, accreditation, abatement, and disposal, as applicable, would be performed in compliance with federal and state regulations.

Additional ROW would be required from three commercial service stations. One at the northwest corner of FM 1266 and FM 646, one at the northwest corner of SH 3 and FM 646, and one at the southeast corner of SH 3 and FM 646. Underground petroleum storage tanks and associated piping could be potentially impacted by construction at two of these facilities. However, the exact configuration of tanks and pipes is unknown. Prior to the purchase of additional ROW, an in-depth assessment of the location and exact amounts of ROW required from these three commercial service stations would be completed.

Two closed LUST sites were noted adjacent to the project area. However, based on the visual assessment of the project area and the hazardous materials database search, there is no reason to believe that there are nearby releases into soils and/or shallow groundwater which may affect the proposed construction. If hazardous substances/wastes are encountered unexpectedly during construction, appropriate measures for proper management of the contamination would be initiated in accordance with all applicable federal, state, and local regulations.

A review of Railroad Commission of Texas data shows 37 pipelines crossing FM 646 within the project limits (**Exhibit K**). These pipelines transport gas, crude petroleum, highly volatile liquids (hvl), and non-highly volatile liquids (non-hvl). The pipelines range from 4.5 in. to 36 in. in diameter. Once final design information is available, impacts to each pipeline can be determined. The data also shows three wells located within 500 ft of FM 646. The wells are not located within the existing or proposed ROW.

CONSTRUCTION IMPACTS

Construction of the proposed project will be carried out in such a way as to minimize the impacts to the traffic passing through the construction zone. Traffic control would be consistent with TxDOT policies and standards. All traffic control would conform to Part IV (Traffic Control

for Street and Highway Construction and Maintenance Operations) of the Texas Manual of Uniform Traffic Control Devices.

The contractor would take appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction staging area. The use of construction equipment within sensitive areas would be minimized or eliminated entirely. In all cases where the potential for encountering hazardous substances during construction exists, as well as any time suspicious soils or liquids are encountered, the contractor would halt work until a proper determination can be made of the material encountered. Upon determining that the substance is a contaminant, the proper disposal methods would be determined and appropriate action initiated. During any construction project there exists some potential to encounter contaminated soil or water. Should hazardous materials/substances be encountered, the TxDOT Houston District Hazardous Materials Section would be notified and steps would be taken to protect personnel and the environment. All construction materials used for this project would be removed as soon as work schedules permit. Any unanticipated hazardous materials and/or petroleum contamination encountered during construction would be handled according to applicable federal and state regulations per TxDOT Standard Specifications.

Any changes to ambient water quality during construction of the proposed project would be prohibited. If ambient water quality impacts occur during construction, water quality control measures would be implemented and the incident would be reported to the TCEQ within 24 hrs of awareness of the impacts. The contractor would practice good housekeeping measures, as well as grade management techniques to help ensure that proper precautions are in place throughout construction of the proposed project.

To minimize impacts to water quality during construction, the proposed project would utilize temporary erosion and sedimentation control practices from TxDOT's manual *Standard Specifications for the Construction of Highways, Streets, and Bridges*. Where appropriate, these measures would be in place prior to the initiation of construction, and would be maintained throughout the duration of the construction. Clearing of vegetation would be limited and/or phased in order to maintain a natural water quality buffer and minimize the amount of erodible earth exposed at any one time. Upon completion of the earthwork operations, disturbed areas would be restored and reseeded according to TxDOT's specifications for *Seeding for Erosion Control*.

Construction activity may temporarily degrade air quality through dust and exhaust gases associated with construction equipment. The control of particulate matter emanating from various construction activities would be in accordance with TCEQ regulations and would be incorporated into the final construction specifications. To minimize exhaust emissions, contractors would be required to use emission control devices and limit unnecessary idling of construction vehicles.

Due to operations normally associated with road construction, there is the possibility that during construction, noise levels would be greater than normal in areas adjacent to the ROW. Construction is normally limited to daylight hours when occasional loud noises are more tolerable. Due to the relatively short exposure periods imposed on any one receptor, extended disruption of normal activities is not considered likely. Every reasonable effort would be made to minimize construction noise.

INDIRECT AND CUMULATIVE IMPACTS

FM 646 is an established east-west transportation route extending from SH 6 to Galveston Bay in Galveston County. FM 646 is an established transportation route in the Houston metropolitan area, connecting commuters to IH 45. Over the next 30 years, Galveston County is expected to experience an additional 492,000 residents, growing from an estimated 272,016 in 2005 to 404,471 in 2035 (H-GAC, 2006). This growth will be accompanied by land development that will serve the residents, including new schools, additional shopping centers, and employment centers. Such growth may, in turn, attract additional growth, depending upon the development policies followed by local governments in the area.

The following sections describe both the indirect and cumulative impacts derived from the analysis. Resources such as decennial census data, H-GAC 2025 population and employment forecasts and analysis developed during environmental documentation allowed for the establishment of quantitative assumptions which were utilized to develop the findings discussed in the following sections. A GIS-based analysis was used to quantify the data gathered. Given the unpredictable nature of indirect and cumulative impacts, it must be stated that the analysis primarily relied upon qualitative assumptions. Various qualitative assumptions used during the analysis included anticipated demographic trends and associated travel demands along with recognized development trends.

Indirect Impacts

The CEQ defines indirect impacts as those "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect impacts may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR Section 1508.8). Indirect impacts differ from those directly associated with the construction and operation of the proposed project and are caused by another action or actions that have an established relationship or connection to the proposed project. These induced actions are those that would not or could not occur except for the implementation of the proposed project. The potential for indirect impacts to occur is determined in a large part by municipal planning objectives and the location of the project. These effects may not necessarily be restricted to just the project area.

The National Cooperative Highway Research Program has developed procedures for estimating indirect effects of transportation projects (2002). This guidance utilizes an eight-step approach to assess the indirect impacts of transportation projects on resources within the project area. The eight steps are listed in **Table 18**.

Table 18: Eight-Step Approach to Estimate Indirect Impacts

Step No.	Step
1	Scoping.
2	Identify the study area's direction and goals.
3	Inventory the study area's notable features.
4	Identify impact-causing activities of proposed action and alternatives.
5	Identify potentially significant indirect effects for analysis.
6	Analyze indirect effects.
7	Evaluate analysis results.
8	Assess consequences and develop mitigation.

Source: National Cooperative Highway Research Program, 2002.

The eight-step process outlined above will serve as the basic approach for this indirect impacts analysis.

Step 1: Scoping

Existing FM 646 is generally an east/west facility that links Galveston County with the Houston area, and serves the communities of League City, Dickinson, and Bacliff. The existing facility would be generally widened from two to four lanes with a raised median and would include construction of a grade separated railroad crossing just east of SH 3.

The geographical boundary of the indirect impacts area of influence for the indirect impact analysis extends out in a 1-mi radius from each of the major intersections along the project, IH 45, SH 3, FM 270 and Wyoming Avenue, FM 1266, Caroline Street, FM 3436, and SH 146. Distances further than 1 mi cannot necessarily be attributed to the proposed project because of the presence of other major thoroughfares running parallel to FM 646. The indirect impacts study area includes the area in which the proposed improvements to FM 646 could influence local traffic patterns or land development. Areas outside the indirect impacts study area are better served by other roadways.

Step 2: Identify the Study Area's Direction and Goals

Indirect effects are commonly related to changes in land use. When a transportation project is constructed, an indirect impact may occur when land in the study area develops. For example, if a bypass or a relief route is constructed around a town, development may occur in the bypass area in the form of restaurants, gas stations, and other commercial establishments. Land development, in turn, results in the transformation of primarily agricultural uses within the study area to residential and commercial land uses. Increased development can alter the landscape, increase impervious cover, modify species composition of any remaining habitats, and introduce fertilizers and anthropogenic chemicals into the biotic system.

The proposed project lies within the limits of the cities of League City and Dickinson and within the unincorporated community of Bacliff. Currently, planned land development projects in the FM 646 proposed project area are expected to continue as planned; however, the rate of development may be indirectly influenced by the proposed project. Future development of the plans would be based upon developer expectations of transportation improvements to the corridor and would be accelerated by improved transportation infrastructure. It is generally known that development tends to follow established infrastructure patterns, and in turn, infrastructure (e.g. transportation improvements) follows development. Other independent variables, such as the state of the economy, also impact the rate and location of development.

Some indirect land use changes could occur as a result of the proposed project in the vicinity of FM 646. Properties that are adjacent to land that would be acquired for additional roadway ROW may redevelop and/or change use as access changes. Therefore, the proposed project would have some unquantifiable indirect impacts to land use in those areas.

The magnitude and timing of future growth within Galveston County is influenced by many variables, including local, state, and national social and economic policies as well as the presence of adequate infrastructure to support the future growth. The proposed action's contribution to the indirect impact on the resources studied is difficult to predict, but is considered minor, as it is well documented that the area has experienced considerable land development prior to any improvements to the area highway system. Widening FM 646 would generally increase accessibility to the area. Future land patterns in any one segment of the metropolitan area would be dependent upon the relative desirability and accessibility compared to other segments. Undeveloped areas within and surrounding the indirect impact Area of Influence (AOI) would likely be developed primarily for commercial and residential uses. Both single and multi-family residential land uses are anticipated to be dispersed in nominal amounts throughout the indirect impact AOI.

Existing zoning and future land use plans by the cities of League City and Dickinson reveal residential (both single and multi-family), as well as general business development as the main drivers of land development. While the rate of population immigration and physical development in this area has been relatively high during the last decade, Galveston County still maintains the potential to continue to develop as long as undeveloped parcels are available for conversion to residential or commercial land uses. League City expects to add approximately 38,600 households between 2000 and 2025, an increase of 239%. Of those, 79.9% are projected to be owner-occupied households.

A positive indirect impact to the local economy can reasonably be expected to occur because of the circulation of money related to construction spending; an increase in work force related to the construction; and improved access to employment opportunities, markets, goods, and services.

Step 3: Inventory of Study Area's Notable Features

The baseline of conditions for environmental resources that exist before project construction is included in a previous section of this document. The environmental resources include land, water, vegetation, air, wildlife, cultural, and socioeconomic. Notable features within the study area have been defined as surface water and vegetation. These notable features were delineated within the study area based on regulatory guidance and local interest. Vegetation and wildlife habitat were generally characterized through interpretation of high resolution aerial photography for the year 2006. USFWS NWI maps, dated 2003, were utilized for information regarding potential waters of the U.S., including wetlands. Information on the various resources studied was digitized, and spatial data was developed through the use of GIS software. The indirect impacts study area contains several water bodies within the study area, including Galveston Bay, Dickinson Bayou, and Clear Creek.

Step 4: Identify Impact-Causing Activities of Proposed Action and Alternatives

The proposed project would require the removal of approximately 0.43 ac of woody vegetation. Approximately 0.45 ac of waters of the U.S., including wetlands, are located within the proposed ROW. In addition, the proposed project would add approximately 47.62 ac of impervious cover over the watershed.

Step 5: Identify Potentially Significant Indirect Effects for Analysis

The objective of this step is to evaluate the potential impact-causing actions of the proposed project on the notable features and compare the actions to land use planning goals within the indirect impacts study area.

Land Use

Under the no-build alternative, no indirect impacts to land use are anticipated as a result of the proposed project. Under the build alternative, induced development would be an indirect impact caused by the proposed roadway improvements. The most reasonable area of development indirectly caused by the proposed project would be within the 1-mi buffer around the major intersections with FM 646. Undeveloped land within the area of influence totals approximately 2,922 ac, of which, 2,485 ac are herbaceous pasture land and 437 ac are woodland; this excludes wetland areas and undeveloped land within the 100-year floodplain. The proposed improvements to FM 646 would increase accessibility within the area of influence and could induce growth and development on some or all of the undeveloped land. Indirect impacts to land use totaling 2,922 ac represents a worst-case-scenario estimate. It is anticipated that the impacts resulting from the proposed improvements would be less than 2,922 ac because development within the area of influence is projected to take place independent of the proposed project.

Vegetation

Under the no-build alternative, no indirect impacts to vegetation are anticipated to result from the proposed FM 646 improvements. Under the build alternative, loss of any habitat vegetation would be an example of a potential indirect impact from proposed roadway improvements. Specifically, hardwood vegetation could be indirectly impacted by the proposed project if the roadway improvements encouraged or influenced an increase in development in any fragmented hardwood areas occurring in the indirect impacts study area. However, increased accessibility associated with the proposed improvements is not, by itself, viewed as sufficient to induce significant additional development, in that additional projected growth and development in the area would be independent of the proposed project. Therefore, indirect impacts to biological resources from the FM 646 build alternative would be insignificant. For this reason, indirect impacts to vegetation will not be evaluated further.

Surface Water

Under the no-build alternative, no indirect impacts to water resources are anticipated to result from the proposed FM 646 improvements. For the build alternative, loss of jurisdictional stream channel due to an increase in development associated with the project could be an example of a potential indirect impact, if the increased development was caused by the proposed improvements. Specifically, water quality or quantity could be indirectly impacted by the project if the roadway improvements encouraged or influenced an increase in development which led to the channelization of streams, the concrete lining of stream channels, and the increase of impervious cover. In addition, increased runoff due to an increase in impervious ground cover leads to an increase in stream velocities, thereby increasing bank and streambed erosion downstream. The increased erosion can lead to a decrease in water quality as total dissolved solids increase in the water column. Also, with increased development and runoff, contaminants such as pesticides, fertilizer, and oils are more likely to impact water quality.

The increase in impervious cover is dependent on changes in local land use, namely, conversion of undeveloped land to developed uses. As previously discussed, local development is expected to increase with or without the proposed FM 646 improvements. Therefore, significant indirect effects to jurisdictional waters of the U.S. from the proposed

improvements would not occur. For this reason, these potential effects will not be evaluated further.

Other potential indirect impacts to water resources from the build alternative could include the degradation of water quality should roadway contaminants or increased sediments in runoff impact water resources downstream of the study area. These indirect impacts could occur during the construction of the proposed improvements or due to accidental spills relating to vehicle collisions during the use of the facilities. Indirect water quality impacts in the form of roadway contaminants or chemical spills due to the proposed improvements would only occur downstream of the study area. The project corridor crosses Benson, Robinson, and Gum Bayous. These creeks flow into Dickinson Bayou, which flows into the Galveston Bay, which then flows into the Gulf of Mexico.

A significant soils disturbance during the construction at the bayou crossings could increase sediment loads within the bayous and impair water quality. Similarly, a chemical spill during the construction or use of the roadway at the creek crossing could decrease water quality causing non-attainment of the designated water uses for the stream segment. Indirect impacts to surface and ground waters would result in a reduction in drinking water quality for downstream water users. However, the potential of the proposed project to indirectly affect the water quality down stream during construction activities would be negated by the development and implementation of a SW3P and BMPs such as the use of silt fence, rock berms, and/or detention/retention ponds. The construction of permanent BMPs would serve to remove pollutants and sediments. Regulations requiring these BMPs apply to all areas of the study area. Because of these required measures, significant indirect impacts to water quality from the proposed improvements are not anticipated.

Air Quality
The proposed project is in an area that is not in attainment of the national ambient air quality standards, and thus, the region's air quality is in poor health. However, the project is included in the H-GAC's 2035 RTP that is a part of the SIP. The SIP ensures that the area is working towards attainment. Therefore, any indirect effects on air quality have been considered, and air quality will be dropped from further indirect impact analysis.

Summary
Based on the analysis presented above, no issues will be carried forward for further analysis in Steps 6 through 8. Assuming appropriate implementation of applicable land use planning regulations and control strategies, related effects to air and water and other natural systems, including ecosystems, would be avoided and minimized. The proposed project would not contribute to significant adverse indirect impacts to the indirect impacts study area.

Cumulative Impacts
The CEQ defines cumulative impacts (i.e., effects) as "the impact on the environment which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions" (40 CFR Section 1508.7). As this regulation suggests, the purpose of cumulative effects analysis is to view the direct and indirect impacts of the proposed project within the larger context of past, present, and future activities that are independent of the proposed project, but which are likely to affect the same resources in the future. This approach allows the decision maker to evaluate the incremental impacts of the proposed build alternative in light of the overall health and abundance of selected resources. In essence, a cumulative effects evaluation creates a model of the predicted condition of each resource that is independent of the proposed project, and then analyzes the expected direct and

indirect impacts of the project within that context to determine if there is a cumulative effect. The evaluation process for each resource considered may be expressed in shorthand form as follows:

BASELINE CONDITION + FUTURE EFFECTS + PROJECT IMPACTS = CUMULATIVE EFFECTS
(historical and current) (expected projects) (direct and indirect)

The evaluation of cumulative effects discussed in this report follows the eight steps in TxDOT's *Guidance on Preparing Indirect and Cumulative Impact Analyses* (December 2006), which reflects the requirements of controlling case law. To conduct the cumulative impact analysis, it was essential to build on information derived on the direct and indirect impacts analyses. Unlike direct impacts, quantifying indirect and cumulative impacts may be difficult, since a large part of the analysis requires an eye to the future and what may happen in the project area. This eight-step approach was utilized to assess the potential cumulative impacts of the past, present, and reasonably foreseeable actions on the resources in the proposed project area. The eight-step methodology from TxDOT's *Guidance* is depicted in **Table 19**.

Table 19: Eight-Step Approach to the Indirect and Cumulative Impact Analysis

Step No.	Step
1	Identify the resources to consider in the analysis.
2	Define the study area for each affected resource.
3	Describe the current health and historical context for each resource.
4	Identify direct and indirect impacts that may contribute to a cumulative impact.
5	Identify other reasonably foreseeable actions that may affect resources.
6	Assess potential cumulative impacts to each resource.
7	Report the results.
8	Assess and discuss mitigation issues for all adverse impacts.

Source: *Guidance on Preparing Indirect and Cumulative Impact Analyses.* TxDOT, December 2006.

Each of the eight steps from TxDOT's *Guidance* is identified in the evaluation that follows, but the steps have been grouped to allow most aspects of the analysis to be consolidated by each resource studied. The methodology used to prepare this evaluation is also in accordance with guidance from the CEQ, *Considering Cumulative Effects under the National Environmental Policy Act* (1997).

Identify Resources and Define Resource Study Areas (Steps 1-2)

Step 1: The initial step of the cumulative effects analysis uses information from the evaluation of direct and indirect impacts in the selection of environmental resources that should be evaluated for cumulative effects. TxDOT's *Guidance* states: "If a project will not cause direct or indirect impacts on a resource, it will not contribute to a cumulative impact on the resource. The cumulative impact analysis should focus only on: (1) those resources significantly impacted by the project; and (2) resources currently in poor or declining health or at risk even if the project impacts are relatively small (less than significant)." Similarly, the CEQ guidance recommends narrowing the focus of the cumulative effects analysis to important issues of national, regional, or local significance so as to count what counts, not produce superficial analysis of a long list of issues that have little relevance to the effects of the proposed action or eventual decisions. Thus, the cumulative effects analysis should focus only on the resources that are substantially

affected by the proposed project by direct and/or indirect impacts. Whether a resource is substantially affected is a function of the existing abundance and condition of the resource, and would include resources that are currently in poor or declining health, or are at risk even if the proposed project impacts are not major.

Applying the foregoing criteria, the resources or environmental issues related to the proposed project with the potential for cumulative effects are listed in **Table 20**. As recommended by the CEQ guidance, specific indicators of each resource's condition have been identified and are shown in **Table 20**. The use of indicators of a resource's health, abundance, and/or integrity are helpful tools in formulating quantitative or qualitative metrics for characterizing overall effects to resources. These indicators are also key aspects of each resource that have already been evaluated in terms of the project's direct and indirect impacts and facilitate greater consistency and objectivity in the analysis of cumulative effects.

Table 20: Resource Indicators and Study Areas for the Cumulative Effects Analysis

Resource Category	Indicators of Resource Condition and Potential Impacts	Resource Study Area
Land Use	Development: the amount of conversion of pasture, woodland, or other undeveloped land into residential, commercial, or other developments.	1-mi radius from each of the major intersections along the project, IH 45, SH 3, FM 270 and Wyoming Avenue, FM 1266, Caroline Street, FM 3436, and SH 146
Biological Resources	Wildlife Habitat: the amount and quality of upland wooded areas suitable for sustaining a diversity of wildlife species.	West from Galveston Bay to the Galveston County line and north from Dickinson Bayou to Clear Creek
Water Resources	Waters of the U.S., including wetlands: the amount/quality of areas affected.	West from Galveston Bay to the Galveston County line and north from Dickinson Bayou to Clear Creek
	Water Quality: expected change in water quality in Gum, Benson and Robinson Bayous.	
Air Quality	8-Hour Ozone Standard: ability of the region to meet this air quality standard.	8-county (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller) non-attainment area for the Houston-Galveston-Brazoria Area

Step 2: Cumulative impacts are considered within spatial and temporal boundaries. Each resource has its own RSA to best assess the impacts to that individual resource. The second step of this analysis seeks to evaluate the direct and indirect effects of the proposed project as far away from the project area as the effects are expected to be felt on each of the resources studied.

Because the resources/issues vary widely, the appropriate geographical context for evaluating cumulative effects depends upon a myriad of factors. The setting of spatial limits for resource indicators was established using TxDOT and CEQ criteria, and considered factors such as each resource's physical characteristics, biological relationships, and affected institutional jurisdictions. The RSAs defined for the examination of each indicator of resource condition and potential impacts are also shown in **Table 20**. The spatial limits of these RSAs were set to focus

on the cumulative effects attributable to the proposed project, while avoiding effects caused by other area roadways.

The "past" temporal boundary was determined based on the period of significant development within the RSA. Through the use of aerial photograph from the years 1988, 1996, 2005, and 2006 it was determined that the RSA area had relatively little to no growth up to the late 1990's. After 1996, the area underwent a significant amount of development near the intersections of major thoroughfares and highways. Therefore, 1996 land use patterns were set as the baseline resource conditions for the project area. The "future" date of the temporal boundary was set at 2035, based on the H-GAC's 2035 RTP. The H-GAC 2035 RTP was created by community leaders to address regional mobility, air quality and safety, under the current growth projections for the eight-county area over the next two decades. Therefore, this timeframe was considered to be the most appropriate for this area.

The RSA evaluated for land use was chosen based on guidance from the *NCHRP Report 466 Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects*. A 1-mi radius was large enough to capture the potential induced growth impacts from the proposed project. Indirect land use impacts at distances further than 1 mi can not necessarily be attributed to the proposed project because of the presence of other major thoroughfares running parallel to FM 646.

The RSA (also known as zone of potential impact), evaluated for the biological and water resources, was a portion of the West Galveston Bay watershed upstream and downstream of the proposed project area. The proposed project area either drains into Benson, Robinson, or Gum Bayous. A watershed represents a bounded hydrologic system wherein natural resources are interconnected and integrated through a common water course. This water-centered integration of resources is linked directly to the indicators of water resources noted above, as well as the biological resources. Moreover, as a practical matter, while little detailed information is available on wildlife populations in the project area, inferences may be drawn from a study of habitat that is known to support a diversity of animal species. Key wildlife habitat, in turn, is often proximate to water sources that characterize local watersheds. In addition, a watershed approach was also taken for characterizing impacts to developable land (i.e., land that is outside designated floodplain areas that has not yet been developed). Conversion of this resource would affect the hydrology and ecology that currently characterizes the West Galveston Bay watershed.

The remaining RSAs were tailored to the nature of each resource studied as well as the political/management realities for each resource or issue. The RSA for evaluating air quality was designated as the Houston-Galveston-Brazoria 8-hour ozone non-attainment area. This large area represents the management unit for mobile source pollutants as regulated by federal, state, and local government agencies. Unlike the other resources evaluated, air quality impacts from mobile sources are evaluated and managed on a regional basis primarily through the H-GAC, in coordination with the EPA.

Describe Resources, Identify Impacts, Assess Cumulative Effects, Report Results, and Assess Mitigation (Steps 3-8)

The remainder of the cumulative effects analysis consolidates the remaining six steps from the TxDOT *Guidance* so that the analytical steps may be grouped within the discussion about each resource (December 2006).

Step 3: The examination of the current health and historical context of each resource is necessary to establish a baseline for determining the effects of the proposed action and other reasonably foreseeable actions on the resource. For the four resource categories of special interest identified earlier, each resource's abundance and quality at the present time was evaluated considering the effects of historical activities, the resource's response to change, and the continuing stresses imposed on the resource and its capacity to withstand these stresses. Collectively, these factors capture the influences that have shaped and are shaping the amount and quality of each resource, and which would continue to shape each given resource in the future.

The discussion below describes the historical and current condition of each resource within the context of its RSA. A summary of existing conditions is included in **Table 21**, where it serves as a point of reference for summaries of impacts from the proposed project and from other projects within each resource's RSA. Demographic and land use information was obtained from local government planning offices and websites. Land use, vegetation, and wildlife habitat were generally characterized through interpretation of high resolution aerial photography for the years 1988, 1996, 2005, and 2006 to determine the changes in the available habitat and land use over time. FEMA maps were reviewed for the 100-year floodplain, and USFWS NWI maps were utilized for information regarding potential waters of the U.S., including wetlands. Information on the various resources studied was digitized and spatial data was developed through the use of geographic information system software to quantify the cumulative impacts to these resources.

Step 4: The analysis of cumulative impacts must look at the direct and indirect impacts of the proposed action within the RSAs. Identification of the direct and indirect impacts of the proposed action will also assist in determining the project's contribution to the cumulative impact on the resource. The direct and indirect effects expected from the proposed project were discussed in detail earlier in this document. The results of the study of direct effects are summarized in **Table 21** in the next subsection; where they may be viewed along side the expected impacts from reasonably foreseeable future projects (**Step 5**) for the resources that were selected for cumulative effects analysis.

Step 5: CEQ regulations indicate that cumulative effects analyses must add an assessment of impacts of other past, present, and/or reasonably foreseeable future actions affecting the resources studied (40 CFR Section 1508.7). This portion of the cumulative effects analysis sought out other transportation projects and planned large-scale public or private developments in the designated RSA. The identification of other past, present, and reasonably foreseeable future actions for the RSA was based on a review of proposed and ongoing development projects that are associated with League City, Dickinson, Bacliff and surrounding areas, H-GAC projected plans, and aerial photography.

Galveston County transportation improvement projects listed in H-GAC's 2035 RTP total $5,086,010,196, including $110,725,000 in smart street improvements. These projects are distributed throughout Galveston County. Specifically within the project vicinity, other proposed highway improvement projects that were reviewed for this analysis include: FM 3436, from FM 517 to FM 646, FM 646 from SH 6 to IH 45, and FM 517 from FM 646 to the FM 3436.

League City, Dickinson, and Bacliff have grown in recent years and expect growth trends to continue. The continued population growth in the area is reflected in the future land use plans to ultimately result in increases in urban land uses. The majority of the land use changes indicated by the future land use plans are expected to be the result of urban development of undeveloped or agricultural land. Over the next 30 years, Galveston County is expected to

experience an additional 132,455 residents, growing from an estimated 272,016 in 2005 to 404,471 in 2035 (H-GAC, 2006). This growth will be accompanied by land development that will serve the residents, including new schools, additional shopping centers, and employment centers. Such growth may, in turn, attract additional growth, depending upon the development policies followed by local governments in the area. Approximately 4,100 ac of past, present, and foreseeable future development has occurred, or is anticipated, within the RSA. The proposed improvements to it are driven by existing traffic demands and traffic conditions expected in the future. Similarly, there are other planned improvements to adjacent roadways throughout the RSA.

In addition to site-specific development plans, the anticipated impacts from the eventual development of the RSA as reflected in comprehensive land use plans or zoning ordinances were considered in reviewing future impacts to biological and water resources. Qualitative inferences as to potential impacts on the resources studied were drawn from the description of each proposed future project or plan. Individual projects were not identified for the ozone non-attainment area because air quality is regulated and managed on a regional level, with expected development projects with substantial air emissions included in air pollution budgets, dispersion modeling, and air quality implementation plans. Similarly, individual utility projects were not inventoried for the entire RSA because the nature of the land use plans already integrates the future land development actions that necessarily accompany the estimated increases in population growth.

The results of reviewing reasonably foreseeable future actions for potential impacts are summarized in **Table 21**. These results are shown with a summary of existing conditions (**Step 3**) and a summary of the combined direct and indirect impacts for the proposed project (**Step 4**). Note that the expected direct and indirect impacts from the proposed project and the expected impacts from foreseeable future projects reflect potential impacts; that is, the analysis to this point does not consider the mitigation that would be required as part of the regulatory programs that are reviewed in the last step (**Step 8**) of the cumulative impacts analysis.

It should be noted that continued population growth in the area would ultimately result in substantial changes in land use throughout the RSAs. Although planning documents do not reflect specific future projects, this information is an indication of what the H-GAC envisions as the eventual configuration of land use within the RSA. Future developments anticipated, but not yet proposed, would likely result in the removal of forested areas that are not included within the floodplain and parks.

Table 21: Summary of Existing Resource Conditions and Potential Impacts

Resource Category	Indicator of Resource Condition (Step 1)	Resource Study Area (Step 2)	Summary of Existing Resource Condition and Potential Impacts		
			Existing Condition[1] (Step 3)	Proposed Project Direct/Indirect Impacts[2] (Step 4)	Impacts from Other Foreseeable Projects[2] (Step 5)
Land Use	Development	1 mile radius surrounding the major intersections with FM 646	Commercial/residential development with isolated pockets of undeveloped land; existing ROW frequently maintained	ROW acquisition = 25.6 ac Potential Induced Development = 2922.17 ac	Approximately 4,130 ac
Biological Resources	Wildlife Habitat	West from the Galveston Bay to the Galveston County line and north from Dickinson Bayou to Clear Creek	Commercial/residential development with isolated pockets of undeveloped land; existing ROW frequently mowed and woody species planted for landscape purposes	Loss of vegetated areas: Herbaceous = 36.72 ac Upland woodland = 0.43 ac Total = 37.15 ac	Approximate Loss of vegetated areas: Upland woodland = 1 ac Herbaceous = 4,129 ac Total = 4,130 ac
Water Resources	Waters of the U.S., Including Wetlands	West from the Galveston Bay to the Galveston County line and north from Dickinson Bayou to Clear Creek	Proposed project drains into Benson, Robinson and Gum Bayous	0.45 ac (including 0.13 ac wetlands)	Approximately 134 ac
	Water Quality	West Galveston Bay watershed	Benson and Gum Bayou are threatened or impaired in meeting standards for bacteria composition.	Corridor area increase from approx. 79.47 ac to approx. 99.46 ac (increase impervious cover from approx. 47.62 ac to approx. 95.24 ac)	Approximately 4,110 ac
Air Quality	Effects on 8-hour Ozone Standard	8-County Non-Attainment Area for Houston-Galveston-Brazoria Region	Air Quality Control Region is currently non-attainment for ozone	Decrease in congestion on existing roadway would likely benefit air quality	Increase in urbanization would likely have a negative effect on air quality

NOTES:

1. Acreages and other data are approximate estimates and are based on information presented earlier in this document.
2. Acreages and other data are approximate. Past, present and future development is based on review of aerial photography and H-GAC projected development. Foreseeable transportation systems that factor into the cumulative impacts of the proposed improvements include FM 3436 from FM 517 to FM 646, FM 517 from FM 646 to FM 3436, and FM 646 from SH 6 to IH 45 (H-GAC, 2006-2008 TIP). Expected future conditions do not take into consideration potential mitigation or other measures stipulated/required by regulatory authorities.

Steps 6, 7, and 8: The information contained in **Table 21** represents the starting point for assessing (**Step 6**) and reporting (**Step 7**) cumulative impacts in this subsection. Cumulative impacts were evaluated using the following factors: the historical context of each resource, current condition and trend, future land use and zoning plans, and the pertinent regulations and standards associated with each resource. These factors capture the influences that have shaped and are shaping the amount and quality of each resource, and which would continue to shape the resources into the future. Several key assumptions that are implicit in the approach to predicting the future condition of resources include:

- All reasonably foreseeable actions would be completed as currently planned;
- The relationships between the resources, ecosystems, and human communities that have been identified from historical experience would continue into the future; and
- The sponsors of government and private projects would abide by relevant federal, state, and local laws designed to protect each resource, and regulatory agencies would perform their duties in accordance with legal requirements and internal guidelines.

Of particular importance is the assumption concerning compliance with relevant environmental laws designed to ensure the sustainability of resources. Over the past several decades, federal, state, and local lawmaking bodies have enacted statutes, regulations, and ordinances designed to preserve and enhance the abundance and quality of natural resources by requiring project sponsors to avoid, minimize, and mitigate the environmental impacts of their projects or actions. The cumulative impacts analysis focuses on the net effects on each resource that remain after full compliance with the regulatory requirements at all levels. To this point in this analysis, the approach has been to identify and report the potential unmitigated impacts to each of the resources, but net cumulative effects must consider the long-term impacts in light of mitigation that would likely be applied. The discussion of cumulative effects for each resource studied first outlines key regulatory measures government leaders and agencies have implemented to manage and sustain the resource for long-term use, then evaluates expected net cumulative effects for each of the resources analyzed. This discussion of key mitigation measures affecting the expected potential cumulative impacts is an integral part (**Step 8**) of the cumulative effects analysis. More detailed discussions of specific regulatory measures to control adverse impacts to various resources is contained in earlier discussions of direct impacts to specific resources in this document.

Land Use

Background and Condition

The indirect impacts study area also serves as the land use RSA because outside the bounds of this study area, it is not anticipated that the improvements to FM 646 would influence traffic patterns or land development. Areas outside of the defined RSA are better served by other roadways, and the land use in those areas would be impacted by other facilities. The RSA encompasses approximately 9,731.7 ac in the cities of League City and Dickinson, and other unincorporated areas of Galveston County. This area of Galveston County has been experiencing a high rate of population immigration and physical development over the last decade. There remains a potential for development as long as undeveloped parcels are available for conversion to residential or commercial land uses. League City expects a 239% increase in the number of households between 2000 and 2025.

Mitigation: Regulatory Controls

The mitigation of the rapid development of the area considered for this study would rest with the agencies with the authority to implement such controls. This authority rests with the municipal

governments and to a lesser extent, the county governments. The responsibility of transportation providers such as TxDOT, local and regional transit agencies, and the local governments would be to implement a transportation system to complement the land use or development controls implemented.

Cumulative Impacts

The proposed project cause direct impacts to 25.6 ac due to ROW acquisition, converting exisiting land use into project ROW. GIS analysis of mapped and photographic data identified approximately 2,922.17ac of undeveloped land within the RSA that may be indirectly impacted by induced growth. Approximately 4130 ac of land could be impacted by other foreseeable projects. The RSA is steadily developing without improvements to FM 646 along the project corridor. The proposed project may influence the rate of development in the RSA.

Biological Resources

Background and Condition

The RSA is located within the Gulf Prairies and Marshes natural region which experiences an annual rainfall of 20 - 50 in. This is a nearly level, slowly drained plain dissected by streams and rivers which flow into highly productive estuaries and marshes. The low marshy areas provide excellent natural wildlife habitat for upland game and waterfowl. The higher elevations of the Gulf Marshes are used for livestock and wildlife production. Urban, industrial, and recreational developments have increased in recent years. Most land is not well suited for cultivation because of periodic flooding and saline soils. The Gulf Prairies are used for crops, livestock grazing, wildlife production, and increasingly for urban and industrial centers. About one-third of the area is cultivated mostly for rice, sorghum, corn, and tame pastures. Bermudagrass and several introduced bluestems (*Dichanthium* and *Bothriochloa*) are common pasture grasses.

Mitigation: Regulatory Controls

The Texas Transportation Code (Section 201.607) directs TxDOT to adopt an MOA with appropriate environmental resource agencies, including TPWD. The responsibilities of the TPWD relate primarily to its function as a natural resource agency, including its resource protection functions, designated by Parks and Wildlife Code. The TPWD acts as the state agency with primary responsibility to protect the state's fish and wildlife resources. The MOA between TxDOT and TPWD provides an efficient and consistent methodology for describing habitats, transportation impacts to those habitats after avoidance and minimization efforts, and mitigation to be considered as a result of those impacts. The MOA sets forth resources that would be given consideration for compensatory mitigation. With regard to the protection of state-listed threatened or endangered species, the TPWD implements regulatory controls for the state of Texas.

The TPWD designates animals which are threatened with statewide extinction as endangered within the state of Texas. Those species which are likely to become endangered in the future are listed as threatened. Listed species are protected under the Texas Administrative Code (Section 65.171) from being killed, removed, transported, owned, sold, released, or exported without an appropriate permit. Violators are penalized under TPWD Code (Section 68.021) with a Class C Parks and Wildlife Code misdemeanor. Some species listed by the state are protected by federal regulations as well; these are listed by the USFWS.

Municipal governments have the authority to avoid, minimize, and mitigate the impacts of private property development to habitat within their jurisdictions through application of regulations that guide the intensity, type, and location of new development. The zoning and

land use regulations of the cities of League City and Dickinson are designed to minimize the adverse effects of growth and urbanization.

Cumulative Impacts

As summarized in **Table 21**, the proposed project's direct impacts to upland habitat would cause the loss of 36.72 ac of herbaceous habitat and 0.43 ac of upland vegetation. Reviews of past, present and reasonably foreseeable development and transportation projects in the RSA indicate an expected loss of approximately 1 ac of upland habitat and as much as 4,129 ac of herbaceous habitat.

Based on the availability of park and floodplain vegetated habitat in the RSA, and assuming appropriate implementation of regulated avoidance, minimization, and mitigation strategies for vegetation and habitat impacts, the proposed project would not contribute to significant cumulative impacts to the area's vegetation and habitat.

Water Resources

Waters of the U.S., Including Wetlands

Background and Condition

Waters of the U.S., including wetlands, are resources that serve a variety of functions including sediment filtering, upland and aquatic wildlife habitat, and reduction of flood water velocity. From the mid-1800s until about 1970, approximately one-half of Texas' historic wetlands acreage was converted from natural systems in response to society's demand for urban development and sustenance. In the West Galveston Bay watershed, the conversion of prairies and some forested areas to agricultural and urban uses has already resulted in the impoundment, excavation, and filling of some of the area's natural streams and wetlands.

Mitigation: Regulatory Controls

Waters of the U.S. are regulated by the USACE under authority of Section 404 of the CWA. Section 404 of the CWA authorizes the USACE to issue permits for the discharge of dredged or fill material into waters of the U.S., including wetlands. The intent of this law is to protect the nation's waters from the indiscriminate discharge of material capable of causing pollution, and to restore and maintain their chemical, physical, and biological integrity. Any discharge into waters of the U.S. must be in accordance with Section 404(b)(1) guidelines developed by the EPA in conjunction with the USACE.

In 1991, Texas adopted state goals for no net loss of acreage or aquatic function of wetlands. These goals reflect the regulatory program in the CWA legislation that prohibits the discharge of soil into waters of the U.S. unless authorized by a permit issued under CWA Section 404. The USACE has authority over such actions and may require the permittee to restore, create, enhance, or preserve nearby aquatic features as compensation to offset unavoidable adverse impacts to the aquatic environment. This means compensatory mitigation is intended to comply with the general goals of the CWA and the specific goal of no net loss of aquatic functions.

Future trends in the regulation of waters of the U.S., including wetlands, are likely to focus on compensatory mitigation requirements. Regulatory agencies are expected to develop procedures to track the success and completion of mitigation efforts as the focus moves toward replacement of specific aquatic functions, rather than replacement of total area. Consequently, regulatory controls are expected to continue the trend of stabilizing the amount of existing waters of the U.S., including wetlands, through vigorous application of mitigation requirements under the CWA.

Cumulative Impacts

The proposed project would have direct impacts of 0.45 ac of waters of the U.S., including 0.13 ac of wetlands. A review of available information indicates the past, present and reasonably foreseeable development transportation projects in the RSA would have an impact of greater than approximately 134 ac to waters of the U.S, including wetlands. The proposed project's impact to waters of the U.S. would be avoided or minimized by compliance with the USACE NWP program and the federal "no net loss" policy. The cumulative impact of reasonably foreseeable future actions to waters of the U.S. would be minimized by enforcement of applicable USACE, USFWS, TPWD, and USCG regulations for projects subject to state and federal jurisdiction.

Assuming appropriate implementation of regulation control strategies and policies, future potential impacts to the area's waters of the U.S., including wetlands, could be expected to be reduced, or at a minimum have no net loss. The proposed project would not contribute to significant cumulative impacts to the area's waters of the U.S.

Water Quality

Background and Condition

Water quality is important as an indicator of potential construction and operations that may contribute to pollutant loading of surface waters (i.e., increased runoff from impervious surfaces), with further impacts on aquatic and upland wildlife that depend on these waters, as well as human use and enjoyment of aquatic resources. Storm water and other runoff from the West Galveston Bay watershed flow into the Galveston Bay. This suite of water uses increases the importance of maintaining water quality within the watershed, particularly within the floodplain.

As noted above, agricultural activities and urbanization in the watershed area have likely contributed to degradation of water quality from prehistoric marsh conditions by contributing pollutants such as sediment from disturbed areas, herbicides/pesticides from lawns and agricultural activities, and petro-chemicals from parking lots and streets. Commercial, residential, and municipal discharges, along with storm water runoff from construction sites, developed sites, lawns, agricultural fields, and impervious surfaces such as roads and parking lots are the primary contributors to impairment of area water quality. The continued urbanization of the watershed in light of the uses for water in the Galveston Bay may heighten the need to mitigate adverse effects on water quality.

Mitigation: Regulatory Controls

Under Section 401 of the CWA, the TCEQ is authorized to certify that federally issued permits would meet the state's water quality standards. The TCEQ regulates this section under the USACE permit programs and requires the installation of temporary and permanent storm water BMPs. As noted above, the USACE regulates impacts to jurisdictional waters and wetlands through implementation of the permitting process under Section 404 of the CWA. Projects that disturb more than 1 ac are required to comply with the TPDES permit requirements. Controlling storm water pollution in urban areas and from industrial activity runoff is viewed by the EPA as a key to maintaining and improving the quality of the nation's waterways. The H-GAC was designated as the area-wide water quality management planning agency for the urbanizing portion of the region. The H-GAC's water quality management plan includes regulatory and non-regulatory programs, activities, and BMPs to control pollution to achieve water quality goals.

Cumulative Impacts

As noted in **Table 21**, the amount of land dedicated to transportation corridor land use created by the proposed project would increase from approximately 47.62 ac to 95.24 ac. Approximately 4,110 ac of past, present and reasonably foreseeable projects are expected to be impervious surfaces. As noted above, control of construction sites to reduce erosion and engineering projects to accommodate storm water are standard requirements of local, state, and federal regulatory programs. The measures to prevent degradation of water bodies are also part of the function served by local government policies to preserve floodplains and riparian corridors. These areas provide natural filtering of sediment and other debris that would otherwise reach the Galveston Bay.

The proposed project's impact to water quality would be avoided or minimized by implementing storm water BMPs to control the discharge of pollutants as required by the CWA and federal and state storm water regulations. These measures include compliance with Section 401 and Section 404 permit requirements, TPDES requirements, and the preparation and implementation of an SW3P. Similarly, the cumulative impact of reasonably foreseeable private development projects to water quality would be minimized by enforcement of applicable federal and state storm water regulations as required by the CWA. These include EPA/TCEQ regulation of large-scale construction activities under the TPDES permit program. The TCEQ provides water quality certification under Section 401 of the CWA, which is mandatory for all projects requiring Section 404 permits.

Assuming appropriate implementation of regulation and control strategies, future potential impacts to the area's water quality could be expected to be substantially reduced. The proposed project would not contribute to significant cumulative impacts to the area's water quality.

Air Quality

Background and Condition

The amount of pollution emitted into the local atmosphere has been the net effect of population growth. The Houston area has seen significant population growth in recent decades and the trend is for that growth to continue. With growth comes increased development, an increase in vehicles, and an increase in daily VMT on the area's transportation systems. Traffic congestion has become one of the greatest challenges facing the Houston area, and is a primary contributor to regional air quality. Throughout recent decades, multiple regional and local initiatives have been planned and implemented in an effort to reduce dispersion of pollutants into the air. Several of these initiatives specific to the area's transportation system included increased capacity highways and roadways (through construction of additional travel lanes and bottleneck improvements), construction of high-occupancy vehicle lanes, and the promoting of alternative transportation (e.g., hike and bike trails, bus, and light rail).

The EPA establishes limits on atmospheric pollutant concentrations through enactment of the NAAQS for six principal criteria pollutants. The EPA designated eight counties in the Houston-Galveston-Brazoria region as nonattainment for the 8-hour ozone standard in accordance with the NAAQS. The Houston-Galveston-Brazoria region (including Galveston County) is currently in attainment for all criteria pollutants, with the exception of ozone. Even though the number of daily exceedances of the federal standards for ozone has decreased within the past decade, the Houston-Galveston-Brazoria region remains in non-attainment for ozone. Although there have been year-to-year fluctuations, the ozone trend continues to show improvement. The trend of improving air quality in the Houston-Galveston-Brazoria region is attributable in part to the effective integration of highway and alternative modes of transportation, cleaner fuels, improved

emission control technologies, and H-GAC's regional clean air initiatives. As discussed in the Mobile Source Air Toxics section beginning on page 35, because of the uncertainties regarding the potential changes in MSAT emissions from this project and the difficulties determining their potential impacts, it is not possible to conduct a meaningful Indirect and Cumulative Impacts analysis for any MSAT emissions changes from this project.

Mitigation: Regulatory Controls

A variety of federal, state, and local regulatory controls, as well as local plans and projects, have had a beneficial impact on regional air quality. The CAA, as amended, provides the framework for federal, state, tribal, and local rules and regulations to protect air quality. The CAA required the EPA to establish NAAQS for pollutants considered harmful to public health and the environment. In Texas, the TCEQ has the legal authority to implement, maintain, and enforce the NAAQS. The TCEQ establishes the level of quality to be maintained in the state's air and to control the quality of the state's air by preparing and developing a general comprehensive plan. Authorization in the Texas Clean Air Act (TCAA) allows the TCEQ to do the following: collect information and develop an inventory of emissions; conduct research and investigations; prescribe monitoring requirements; institute enforcement; formulate rules; establish air quality control regions; encourage cooperation with citizens' groups and other agencies and political subdivisions of the state as well as with industries and the federal government; and to establish and operate a system of permits for construction or modification of facilities. Local governments having some of the same powers as the TCEQ can make recommendations to the commission concerning any action of the TCEQ that may affect their territorial jurisdiction, and can execute cooperative agreements with the TCEQ or other local governments. In addition, a city or town may enact and enforce ordinances for the control and abatement of air pollution not inconsistent with the provisions of the TCAA or the rules or orders of the TCEQ.

The CAA also requires states with areas that fail to meet the NAAQS prescribed for criteria pollutants to develop a SIP. The SIP describes how the state would reduce and maintain air pollution emissions in order to comply with the federal standards. Important components of a SIP include emission inventories, motor vehicle emission budgets, control strategies, and an attainment demonstration. The TCEQ develops the Texas SIP for submittal to the EPA. One SIP is created for each state, but portions of the plan are specifically written to address each of the nonattainment areas. These regulatory controls, as well as other local transportation and development initiatives implemented throughout the Houston-Galveston-Brazoria region by local governments (and others), provide the framework for growth throughout the area consistent with air quality goals. As part of this framework, all major transportation projects (including the proposed project) are evaluated at the regional level by the H-GAC for conformity with the SIP.

Cumulative Impacts

The cumulative impact on air quality from the proposed project and other reasonably foreseeable transportation projects are addressed at the regional level by analyzing the air quality impacts of transportation projects in the TIP and H-GAC's 2035 RTP. The proposed project and the other reasonably foreseeable transportation projects were included in the RTP and the TIP and have been determined to conform to the SIP. Planned transportation improvements are intended to cumulatively reduce congestion on a regional scale, with a resultant decrease in pollutant emissions. Therefore, when combined, the proposed transportation improvements in the project area are anticipated to have a cumulatively beneficial impact on air quality.

A MSAT qualitative assessment was performed for the proposed project due to its low potential for MSAT effects. This project will serve to improve the operational qualities of an existing

roadway and would result in increased capacity of the existing roadway**.** As discussed previously, the magnitude and duration of any potential increases compared to the no-build alternative cannot be accurately quantified due to the inherent deficiencies of current models. However, on a regional basis, the EPA's vehicle and fuel regulations coupled with fleet turnover will cause region-wide MSAT levels to be significantly lower than today in almost all cases.

The Houston-Galveston-Brazoria region is expected to continue to experience substantial population growth, urbanization, and economic development. The cumulative impact of reasonably foreseeable future growth and urbanization on air quality would be minimized by enforcement of federal and state regulations, including the EPA and the TCEQ, which are mandated to ensure that such growth and urbanization would not prevent compliance with the ozone standard or threaten the maintenance of the other air quality standards.

PUBLIC INVOLVEMENT

Two public meetings have been conducted for the proposed project. Both meetings were held at the Dunbar Middle School in Dickinson. The meetings were conducted in an open house format and consisted of numerous visual aids including an environmental constraints map, schematic layouts, and preliminary ROW maps. The open house format afforded interested persons the opportunity to interact with project representatives and view updated roadway and bridge design information. Preparation for the public meetings included published announcements in local papers in English and Spanish which informed citizens of the opportunity to request an interpreter (for language or other special communication needs) to be present at the public meetings.

The first public meeting was held on November 17, 2005 to inform the public of the proposed widening of FM 646 and to gather public input on the various alignment alternatives being considered for the proposed improvements. Thirty-nine comments were received from the 75 citizens that attended the meeting. Main issues of concern for the proposed project included property access, property acquisition, removal of the Bacliff section from SH 146 to Bayshore Blvd. from the project, and traffic management at the IH 45 intersection. The majority of the participants were in support of the project.

The second public meeting was held on September 7, 2006 to update local residents on the status of the proposed roadway design, the revised project limits, and the preferred alternative. Thirty-seven comments were received from the 59 citizens that attended. The main issue for the citizens that attended this meeting concerned the addition of the Bacliff section of roadway back into the proposed project limits. A petition with 115 signatures was submitted to TxDOT in favor of this addition. ROW acquisition and property access were also issues that the participants were concerned about.

Responses to all public comments received are included in the Public Meeting Summary Reports for both meetings that are on file at the TxDOT Houston District office. A public hearing will be offered for the proposed project once the FHWA has approved this EA for further processing.

SUMMARY

The proposed project involves widening a portion of the existing FM 646 and constructing a grade separation at a railroad crossing. Without the proposed improvements, the existing

FM 646 would not be able to support the projected increase in traffic, resulting in increased congestion.

The purpose of the proposed project is to increase capacity and mobility and to improve the roadway design of the existing FM 646 facility. Additional travel lanes will accommodate the projected increase in traffic volumes during hurricane evacuations and projected future corridor traffic demands. Improving the existing roadway design by adding two travel lanes, adding a median, expanding the shoulder widths, and constructing a grade separation over a railroad crossing will improve safety, efficiency, and mobility in the project area. The proposed project would increase public safety and improve service to surrounding communities.

The proposed project would require the acquisition of 25.6 ac of additional ROW. Several utility adjustments would be necessary as a result of the proposed project. All impacts to utilities resulting from the proposed project would be addressed in the project construction plans. TxDOT would coordinate with affected adjacent property owners, Galveston County, the Cities of League City and Dickinson, and the unincorporated community of Bacliff. No disproportionate impacts to minority or low-income populations are anticipated.

There is potential for temporary adverse impacts during the construction phase. Temporary adverse effects may include noise, dust, and traffic congestion during project construction. Appropriate measures would be incorporated into the final design and construction specifications to minimize temporary noise, dust, and traffic congestion during construction of the proposed project.

A survey of historic resources identified 44 historic-age resources within the project APE and one historical marker located just outside the APE. No historic-age resources were identified within the APE that are listed or recommended for NRHP eligibility; therefore, no potential impacts are anticipated.

The project ROW contains 0.13 ac of Section 404 adjacent wetlands and 0.32 ac of Section 404 waters of the U.S. It is anticipated that the proposed project would impact jurisdictional waters of the U.S., including wetlands, and would require a USACE Section 404 NWP 14. Construction activities would disturb a total of approximately 43.2 ac of land within the project area, including existing and proposed ROW. Consequently, TxDOT would be required to obtain a TPDES General Permit and to file a NOI with the TCEQ.

Appreciable indirect and cumulative impacts would not affect wetlands, water quality, EFH, or any adjacent habitats. Social impacts would not be anticipated because the project does not bisect any communities that are not already bisected by the existing roadway corridor. No adverse impacts to parklands, land use, community cohesion, vegetation, wildlife, threatened and endangered species, water quality, air quality, or existing noise conditions would occur as a result of the proposed project. There is no evidence of hazardous substances and/or contamination within the project area, and no hazardous substance related facilities pose a threat to the proposed project.

Two public meetings have been held for the proposed project. Preliminary design modifications were made in response to public feedback on the proposed project alternatives. Based on public comments, the proposed project is well received within the local community.

The studies and evaluations performed thus far in project planning indicate that the proposed project would result in minimal adverse social, economic, and environmental impacts. Therefore, a Finding of No Significant Impact (FONSI) is anticipated.

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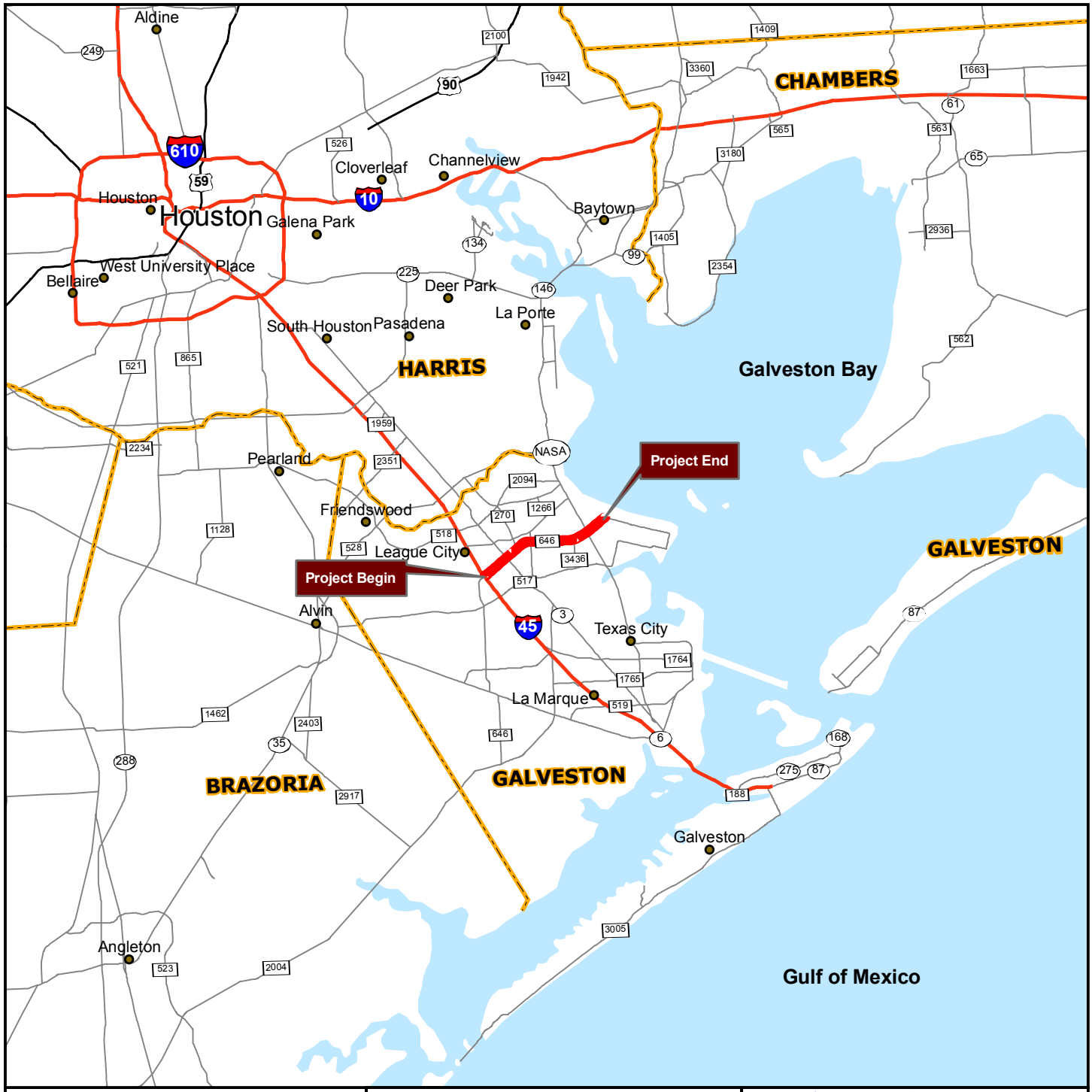


LEGEND

- Interstate Highway
- US Highway
- State Highway
- FM Road
- Project Location
- County Boundary
- Cities

0 4 8 Miles

1 inch = 8 miles

Texas Department of Transportation

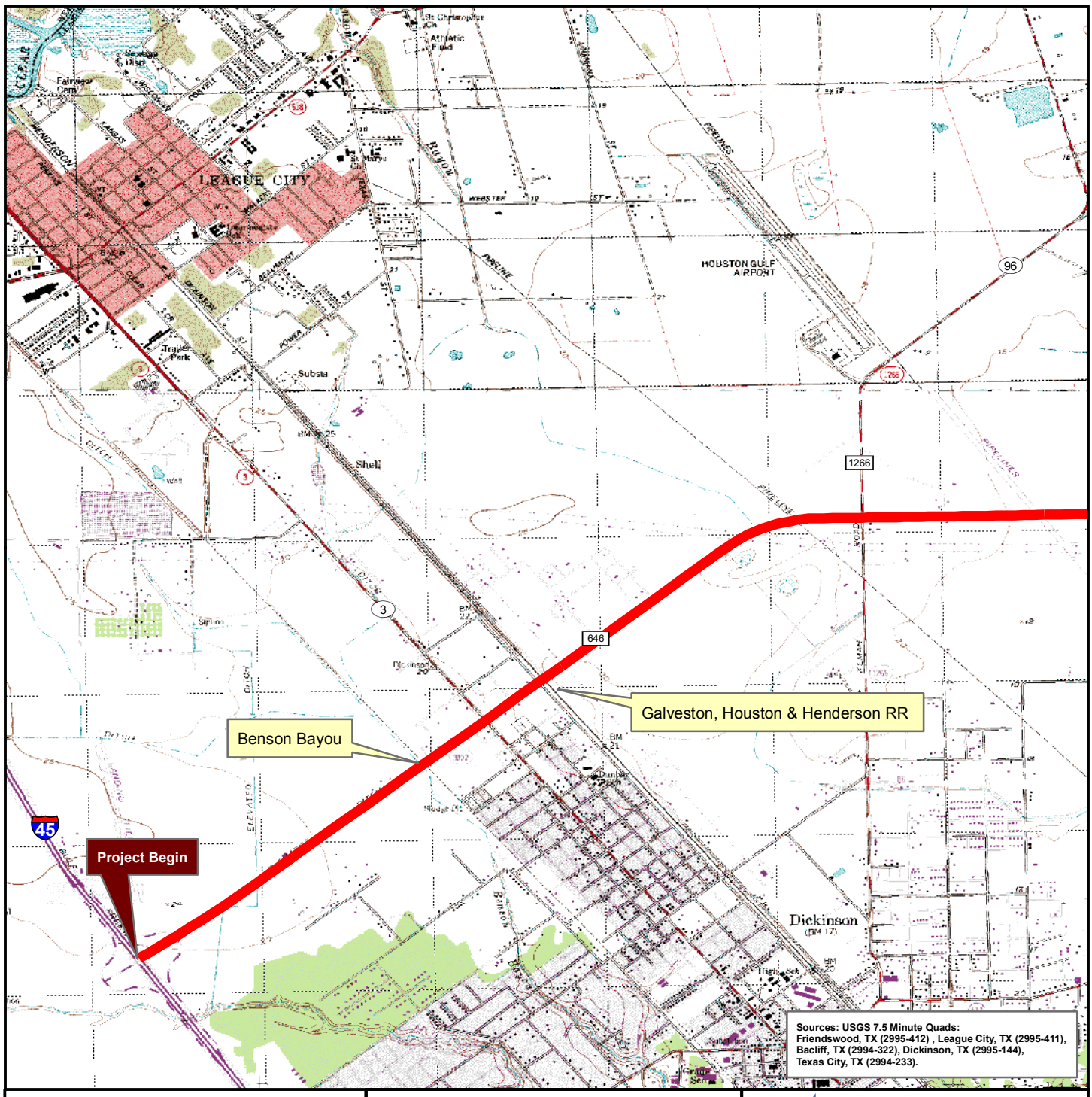
Exhibit A

Project Location Map

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs: 3049-01-027,
3049-01-022,3049-01-023,
0978-02-053, 0978-02-034



LEGEND

- Interstate Highway
- US Highway
- State Highway
- FM Road
- Project Location

0 0.3 0.6 Miles

1 inch = 0.6 miles

Texas Department of Transportation

Exhibit B

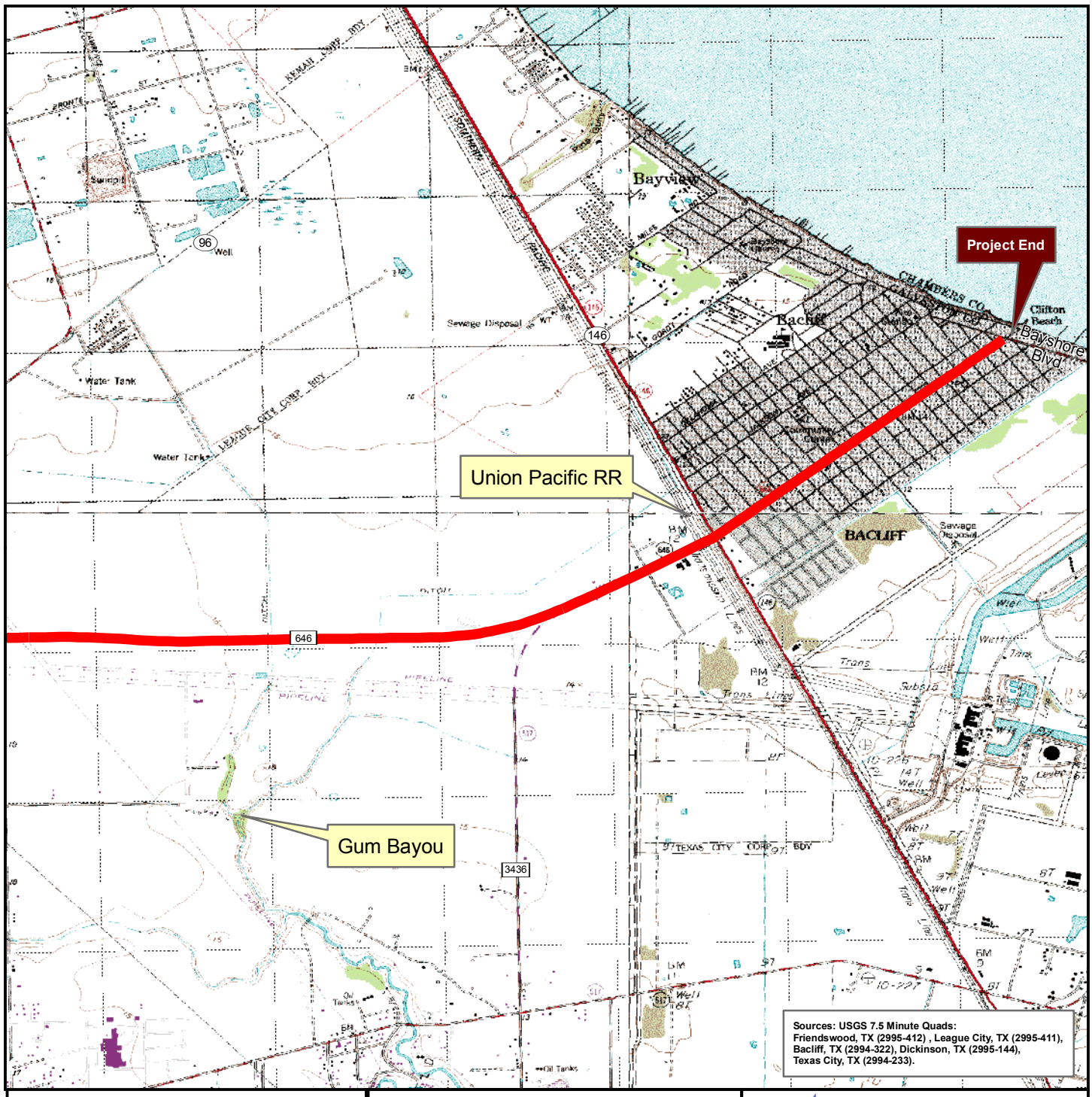
Sheet 1 of 2

Topographic Map

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs: 3049-01-022,
3049-01-023, 3049-01-027,
0978-02-034, 0978-02-053



LEGEND

- Interstate Highway
- US Highway
- State Highway
- FM Road
- Project Location

0 0.3 0.6 Miles

1 inch = 0.6 miles

Texas Department of Transportation

Exhibit B

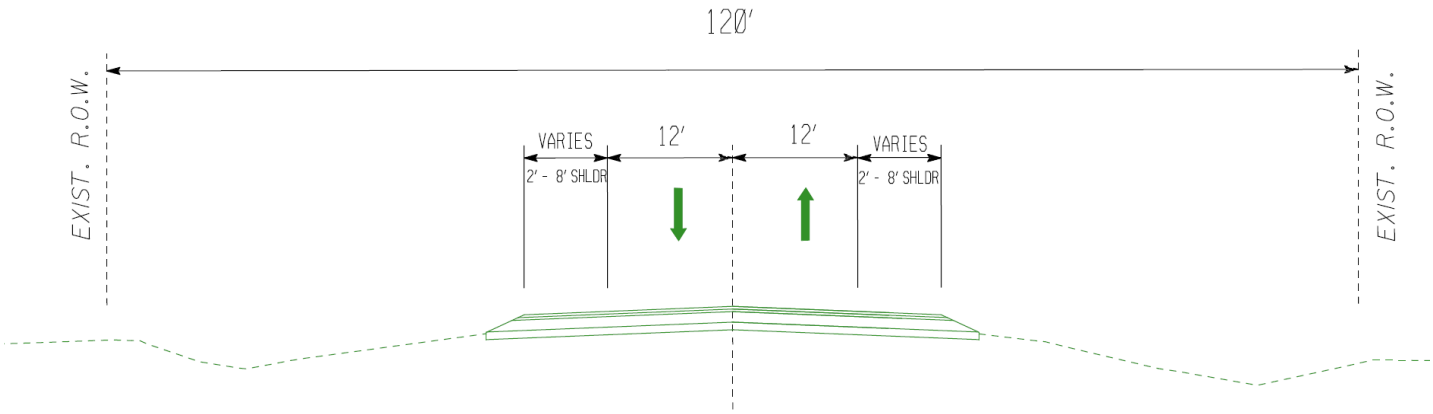
Sheet 2 of 2

Topographic Map

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs: 3049-01-022,
3049-01-023, 3049-01-027,
0978-02-034, 0978-02-053



EXISTING TYPICAL

*Not To Scale

Texas Department of Transportation

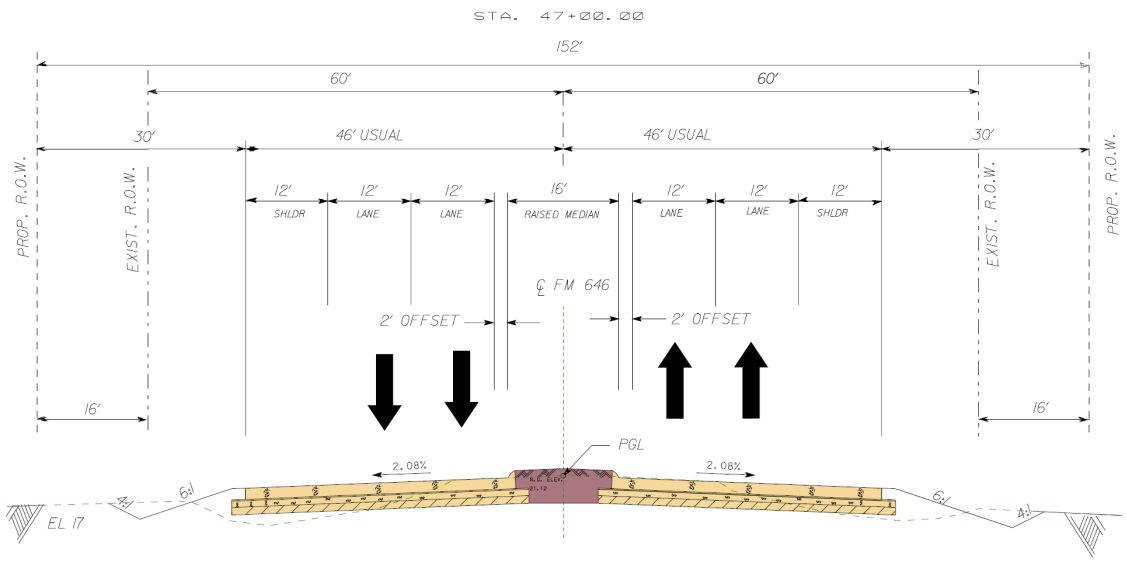
Exhibit C

Existing Typical Section

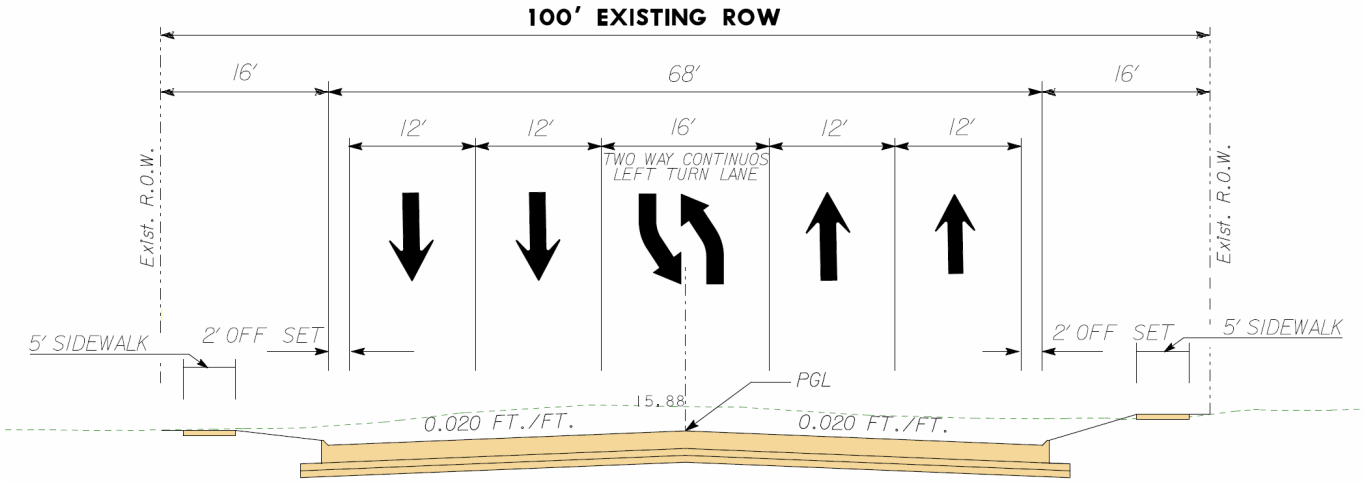
FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs: 3049-01-027,
3049-01-022, 3049-01-023,
0978-02-053, 0978-02-034



Proposed Roadway Typical Section



Proposed Roadway Typical Section

*Not To Scale

Texas Department of Transportation

Exhibit D

Sheet 1 of 2

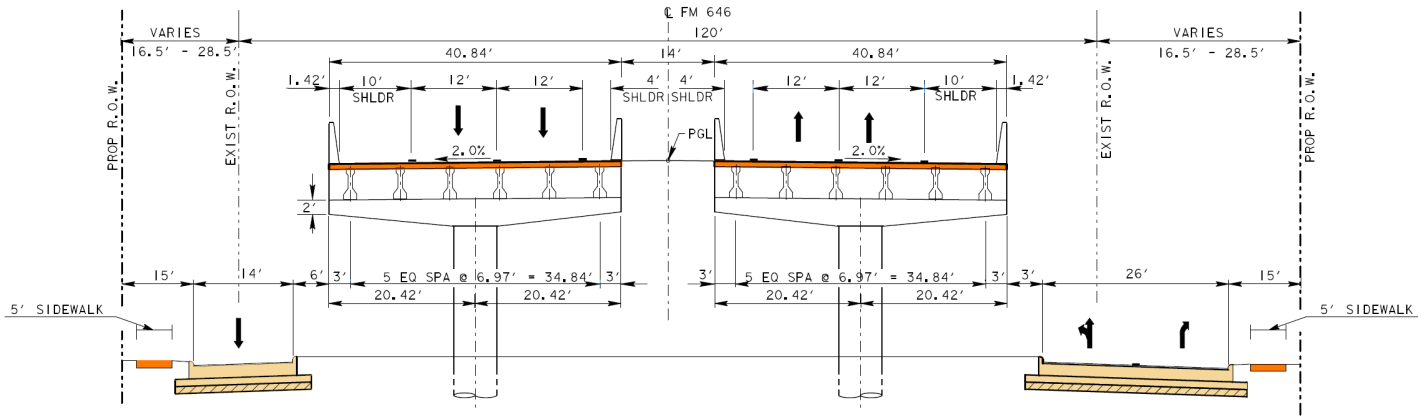
Proposed Typical Sections

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs: 3049-01-027,
3049-01-022, 3049-01-023,
0978-02-053, 0978-02-034

STA 91+ 00.00



PROPOSED BRIDGE TYPICAL SECTION

*Not To Scale

Texas Department of Transportation

Exhibit D

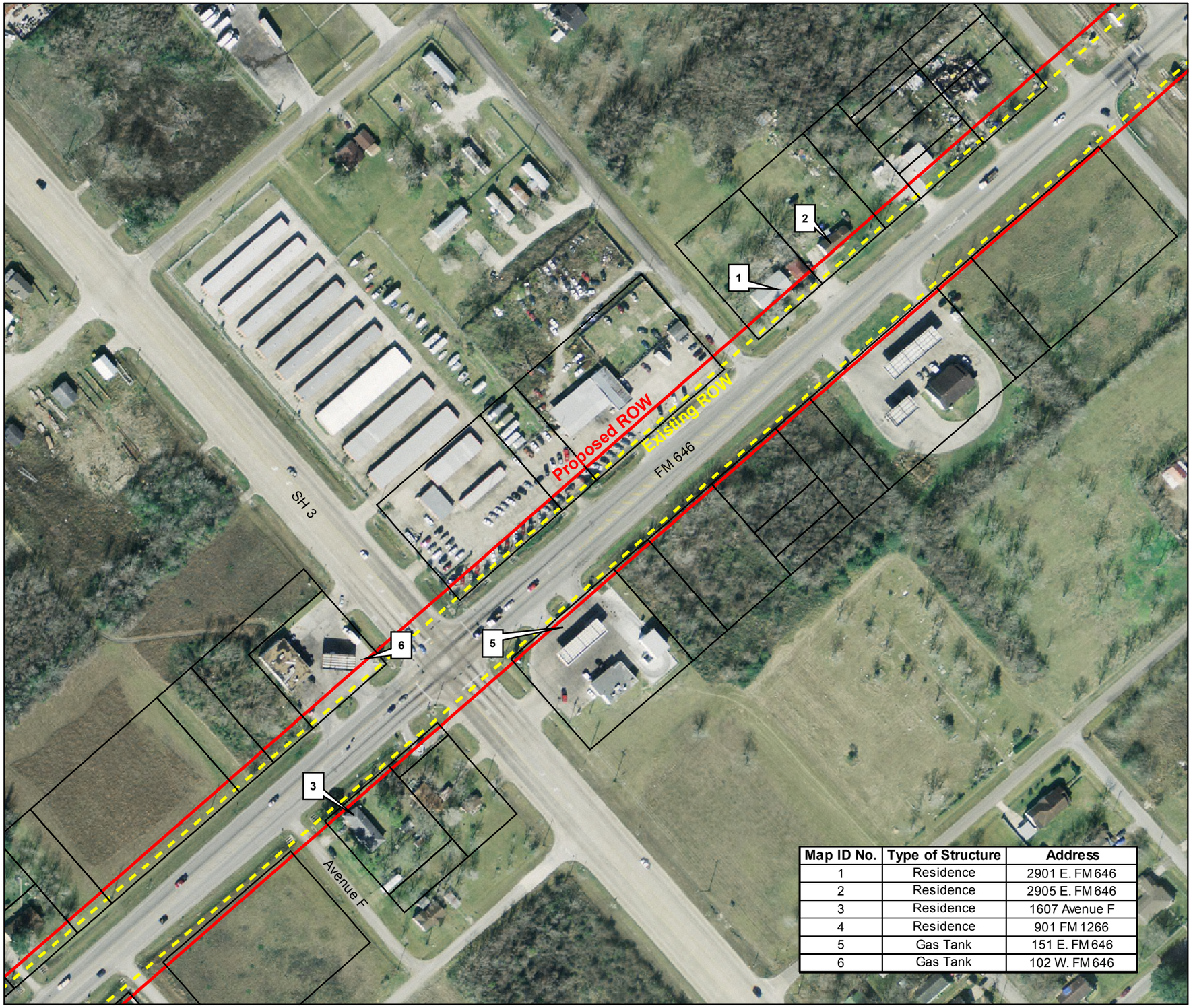
Sheet 2 of 2

Proposed Typical Sections

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs: 3049-01-027,
3049-01-022, 3049-01-023,
0978-02-053, 0978-02-034



Map ID No.	Type of Structure	Address
1	Residence	2901 E. FM 646
2	Residence	2905 E. FM 646
3	Residence	1607 Avenue F
4	Residence	901 FM 1266
5	Gas Tank	151 E. FM 646
6	Gas Tank	102 W. FM 646

Texas Department of Transportation

Exhibit E

Displacement Location Map
Sheet 1 of 2

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

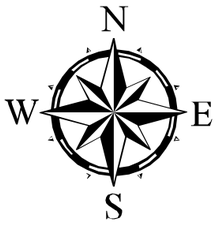
TxDOT CSJs:
3049-01-027
3049-01-022
3049-01-023
0978-02-053
0978-02-034

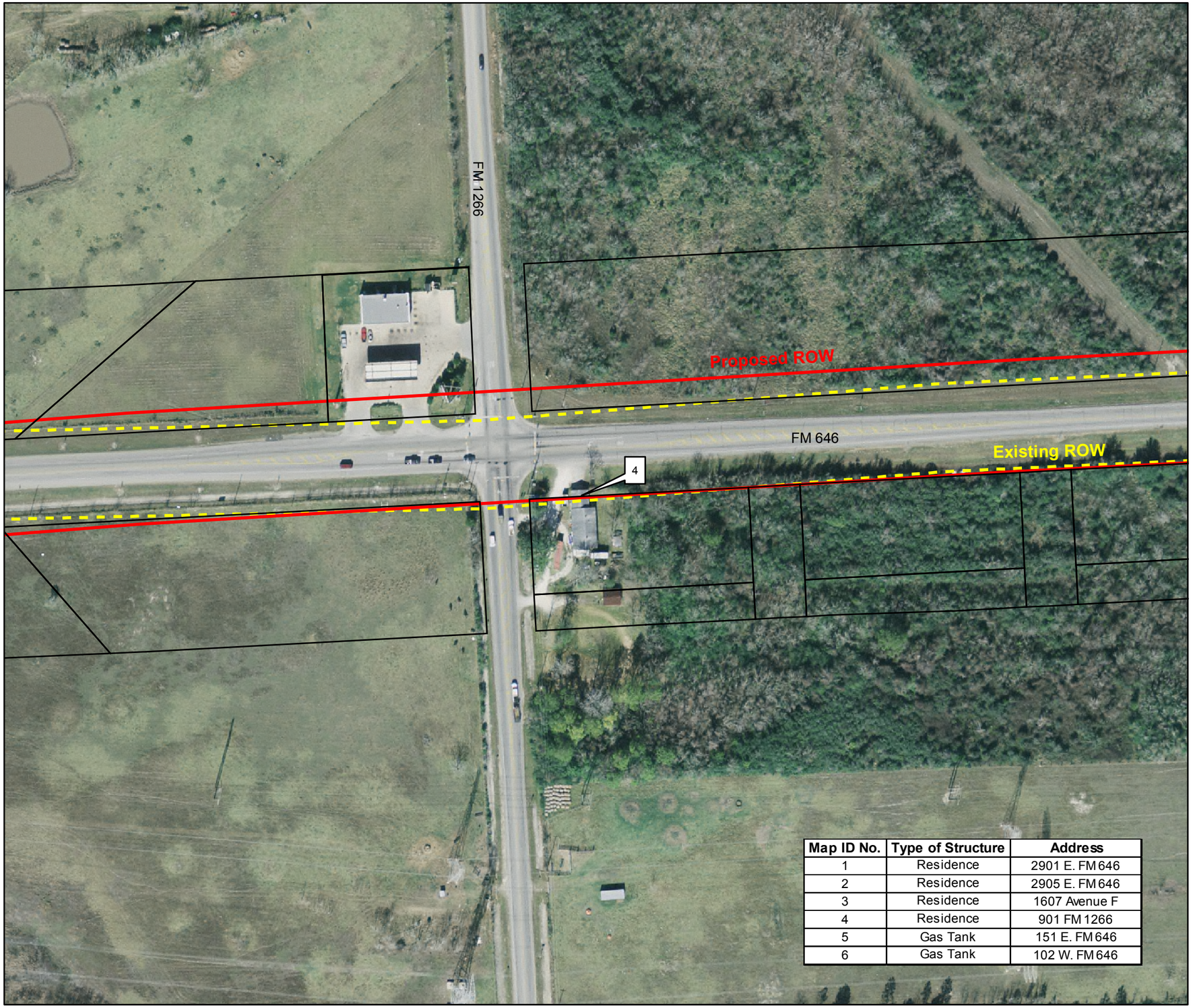
Legend

- Proposed ROW
- Existing ROW
- Property Boundary
- # Proposed Displacement

0 0.015 0.03 0.06
Miles

Sources: H-GAC Aerials, 2006; GCAD, 2007.





Map ID No.	Type of Structure	Address
1	Residence	2901 E. FM 646
2	Residence	2905 E. FM 646
3	Residence	1607 Avenue F
4	Residence	901 FM 1266
5	Gas Tank	151 E. FM 646
6	Gas Tank	102 W. FM 646

Texas Department of Transportation

Exhibit E

Displacement Location Map
Sheet 2 of 2

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

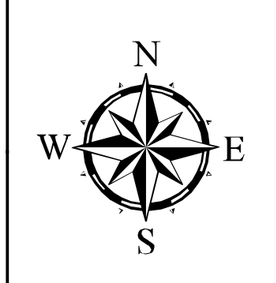
TxDOT CSJs:
3049-01-027
3049-01-022
3049-01-023
0978-02-053
0978-02-034

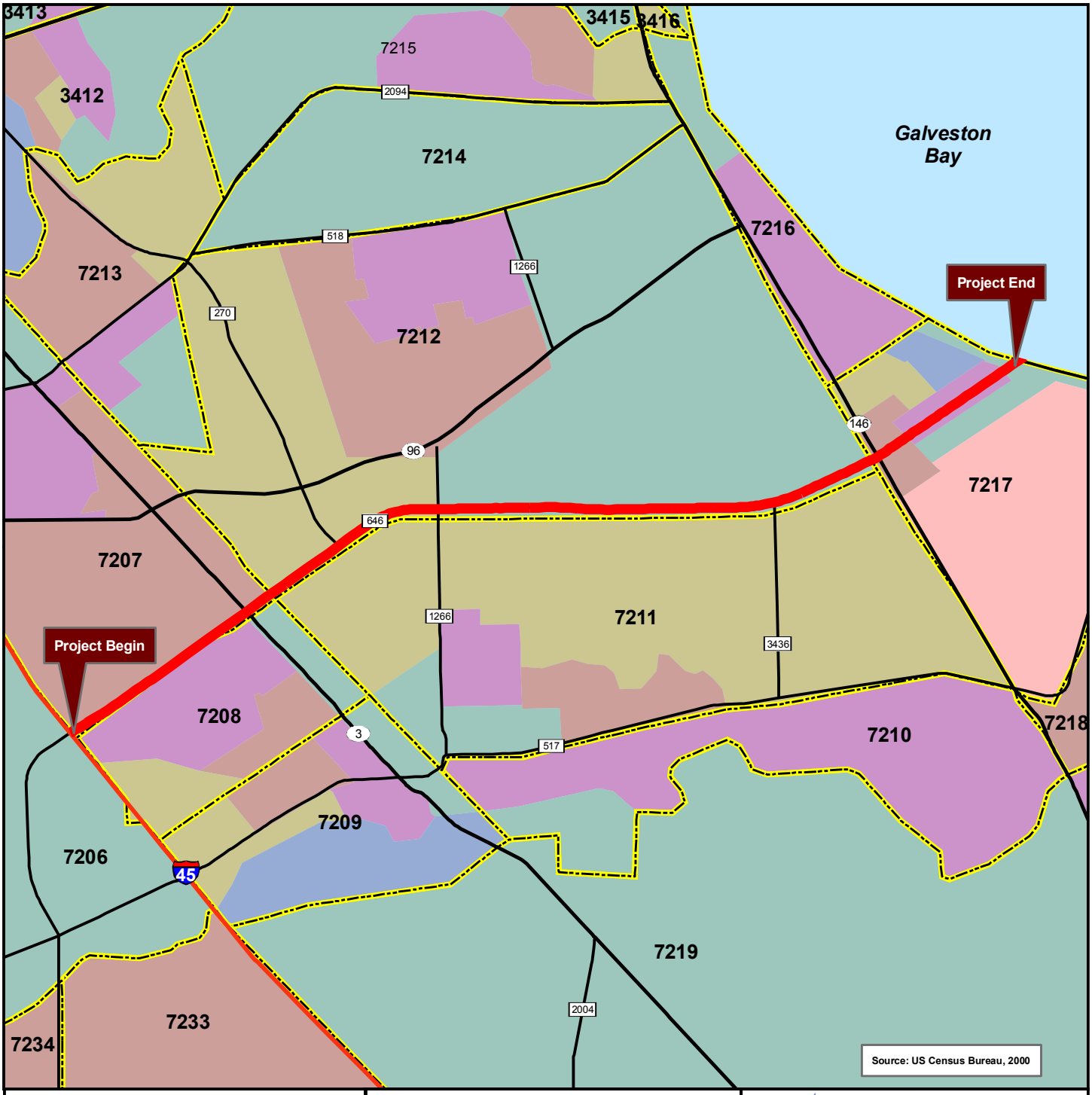
Legend

- Proposed ROW
- Existing ROW
- Property Boundary
- # Proposed Displacement

0 0.0125 0.025 0.05
Miles

Sources: H-GAC Aerials, 2006; GCAD, 2007.





LEGEND

- Interstate Highway
- US Highway
- State Highway
- FM Road
- Project Location
- Census Tracts

BLOCK GROUPS

1
2
3
4
5
6

0 0.6 1.2 Miles

1 inch = 1.2 miles

Texas Department of Transportation

Exhibit F

Census Tract Block Group Map

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs: 3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

1. Existing Roadway - facing west

2. FM 646 at IH 45 - facing east

3. FM 646 at FM 1266 - facing east

4. Intersection of FM 646 and FM 3436 - facing west

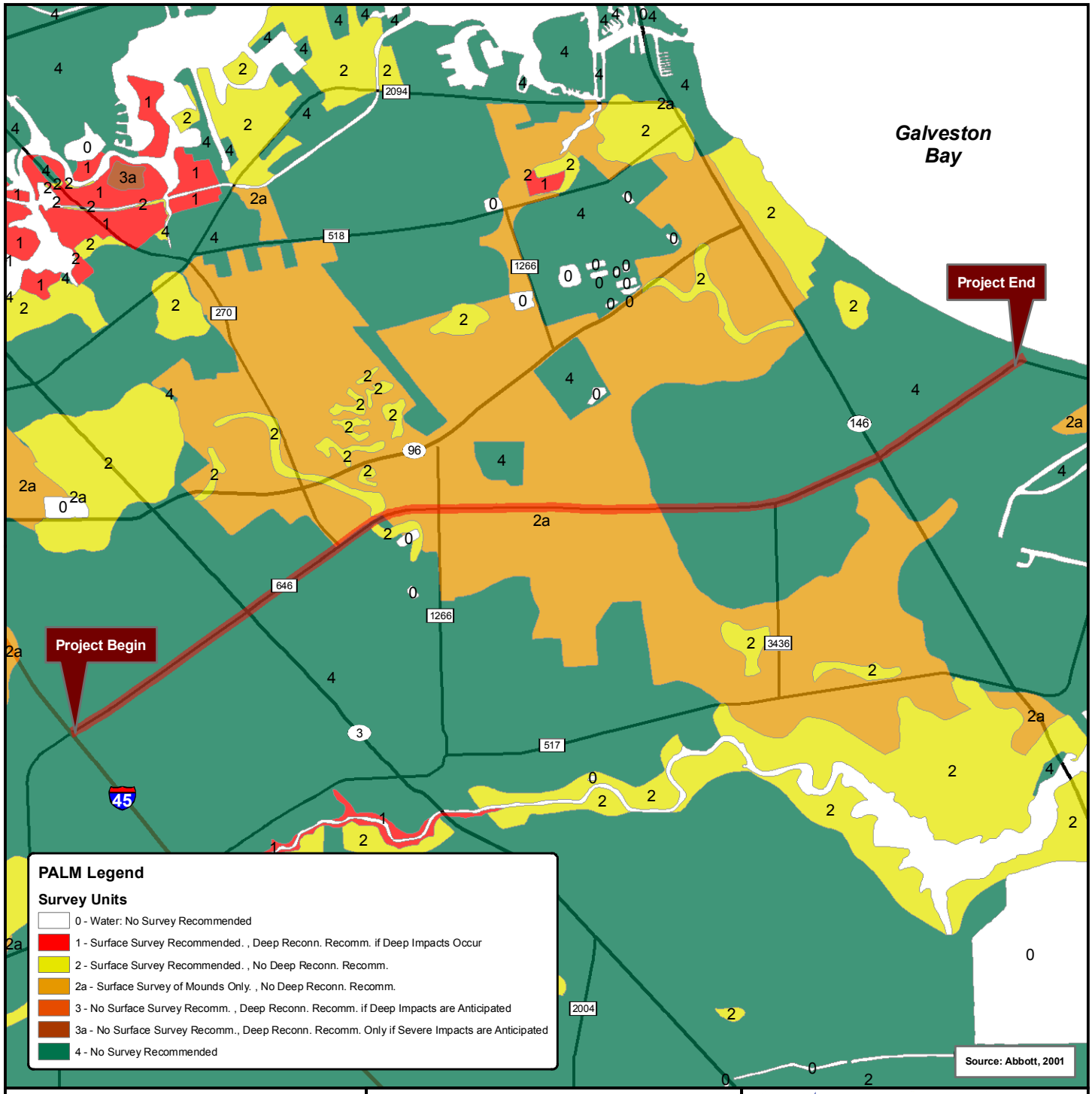
5. Intersection of FM 646 and SH 146 - facing east

6. Gum Bayou - facing southwest under bridge

7. Gum Bayou - facing west under bridge

8. Tributary to Gum Bayou - facing north

9. Tributary to Gum Bayou - facing south



LEGEND

- Interstate Highway
- US Highway
- State Highway
- FM Road
- Project Location

0 0.6 1.2 Miles

1 inch = 1.2 miles

Texas Department of Transportation

Exhibit H

Potential Archeological Liability Map

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs: 3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Texas Department of Transportation

Exhibit I

Wetland Delineation Map
Sheet 1 of 3

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs:
3049-01-027
3049-01-022
3049-01-023
0978-02-053
0978-02-034

Soil Map Units	
Ba	Bacliff clay
Be	Bernard clay loam
LaA	Lake Charles clay
Le	Leton loam
Lx	Leton-Lake Charles complex
Ma	Mocarey loam
Mb	Mocarey-Algoa complex
Md	Mocarey-Leton complex
Me	Morey silt loam
Ve	Verland silty clay loam

AREA B Waters
0.01 Acre

AREA A Waters
0.07 Acre

AREA C Waters
0.09 Acre

AREA C Wetlands
0.10 Acre

AREA D

AREAS A & B

FM 270

FM 1266

FM 646

FM 517

Begin Project

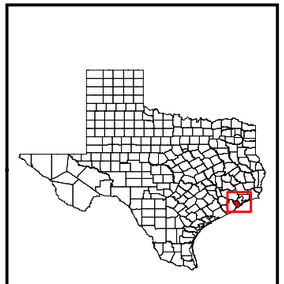
45

Legend

- Project Corridor
- Data Point
- 100-yr Floodplain
- 500-yr Floodplain
- NWI Wetlands
- Soils
- Waters (Potentially Jurisdictional)
- Wetlands (Potentially Jurisdictional)
- Drainage (Non-jurisdictional)

N
W E
S

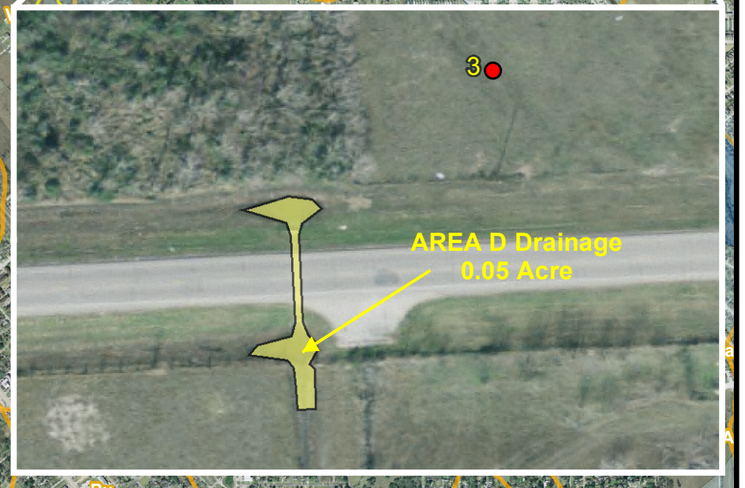
Mile
0.5



Sources: H-GAC Aerials, 2006; Soil Mapping Units, NRCS, 2004;
FEMA Q3 Flood Data, 1998; NWI, USFWS, 2003.

Soil Map Units	
Ba	Bacliff clay
Be	Bernard clay loam
LaA	Lake Charles clay
Le	Leton loam
Lx	Leton-Lake Charles complex
Ma	Mocarey loam
Mb	Mocarey-Algoa complex
Md	Mocarey-Leton complex
Me	Morey silt loam
Ve	Verland silty clay loam

FM 270
FM 1266
SH 3
FM 646
FM 517
AREA C
AREA D
AREAS A & B
Begin Project
45



Sources: H-GAC Aerials, 2006; Soil Mapping Units, NRCS, 2004; FEMA Q3 Flood Data, 1998; NWI, USFWS, 2003.

Texas Department of Transportation

Exhibit I

Wetland Delineation Map
Sheet 2 of 3

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

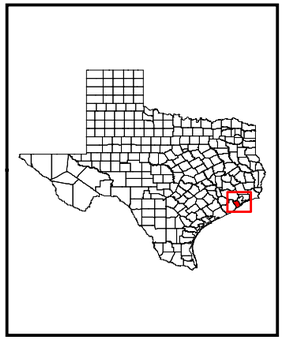
TxDOT CSJs:
3049-01-027
3049-01-022
3049-01-023
0978-02-053
0978-02-034

Legend

- Project Corridor
- Data Point
- 100-yr Floodplain
- 500-yr Floodplain
- NWI Wetlands
- Soils
- Waters (Potentially Jurisdictional)
- Wetlands (Potentially Jurisdictional)
- Drainage (Non-jurisdictional)

N
W E
S

0.4 Mile



Soil Map Units	
Ba	Bacliff clay
Be	Bernard clay loam
LaA	Lake Charles clay
Le	Leton loam
Lx	Leton-Lake Charles complex
Ma	Mocarey loam
Mb	Mocarey-Algoa complex
Md	Mocarey-Leton complex
Me	Morey silt loam
Ve	Verland silty clay loam

Sources: H-GAC Aerials, 2006; Soil Mapping Units, NRCS, 2004; FEMA Q3 Flood Data, 1998; NWI, USFWS, 2003.

Texas Department of Transportation

Exhibit I

Wetland Delineation Map
Overview Sheet 3 of 3

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

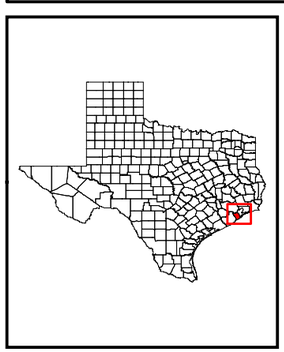
TxDOT CSJs:
3049-01-027
3049-01-022
3049-01-023
0978-02-053
0978-02-034

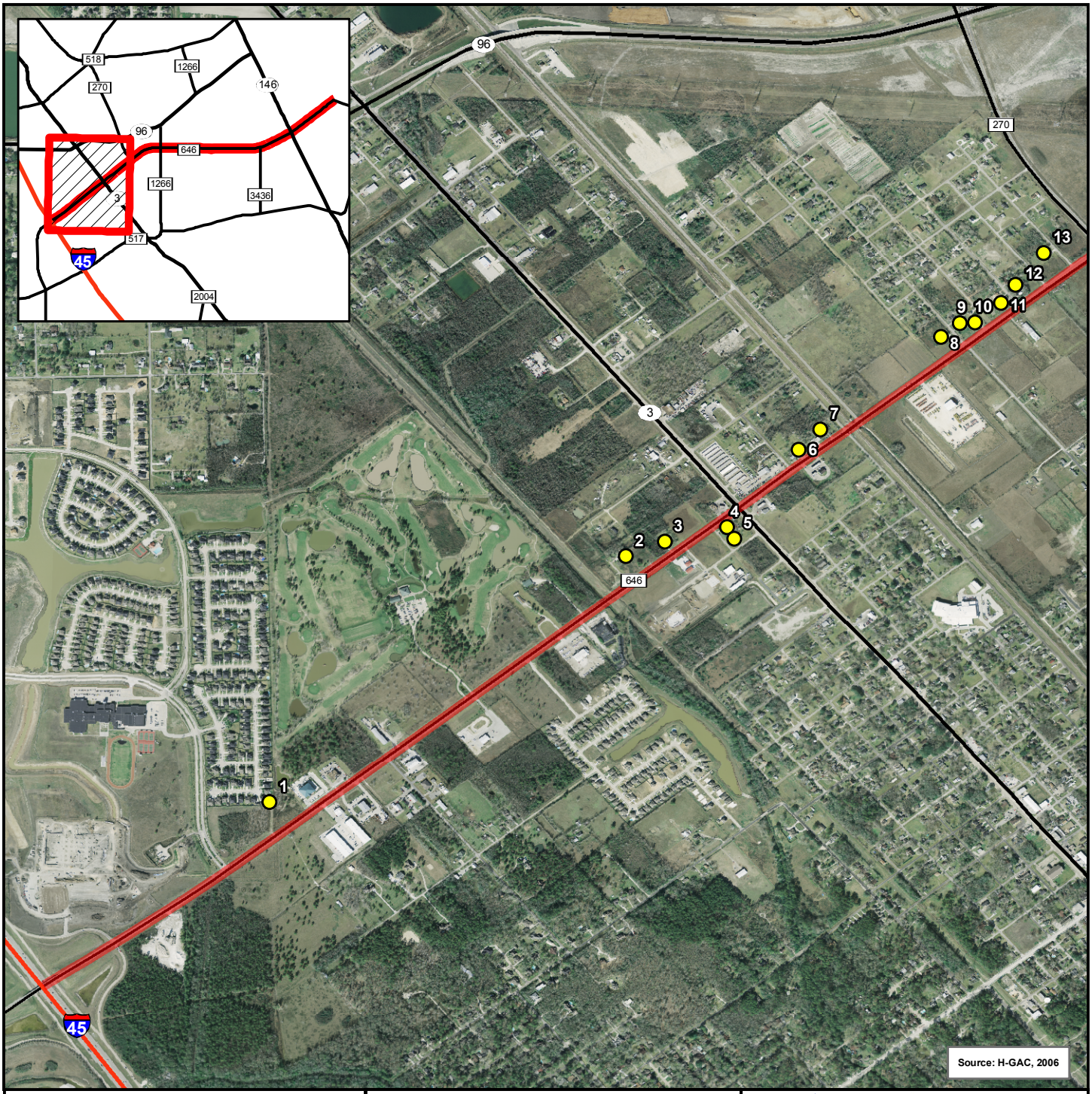
Legend

- Project Corridor
- Data Point
- 100-yr Floodplain
- 500-yr Floodplain
- NWI Wetlands
- Soils
- Waters (Potentially Jurisdictional)
- Wetlands (Potentially Jurisdictional)
- Drainage (Non-jurisdictional)

N
W E
S

0.4 Mile





LEGEND

- Interstate Highway
- US Highway
- State Highway
- FM Road
- Project Location
- Noise Receiver

0 0.15 0.3 Miles

1 inch = 0.3 miles

Texas Department of Transportation

Exhibit J

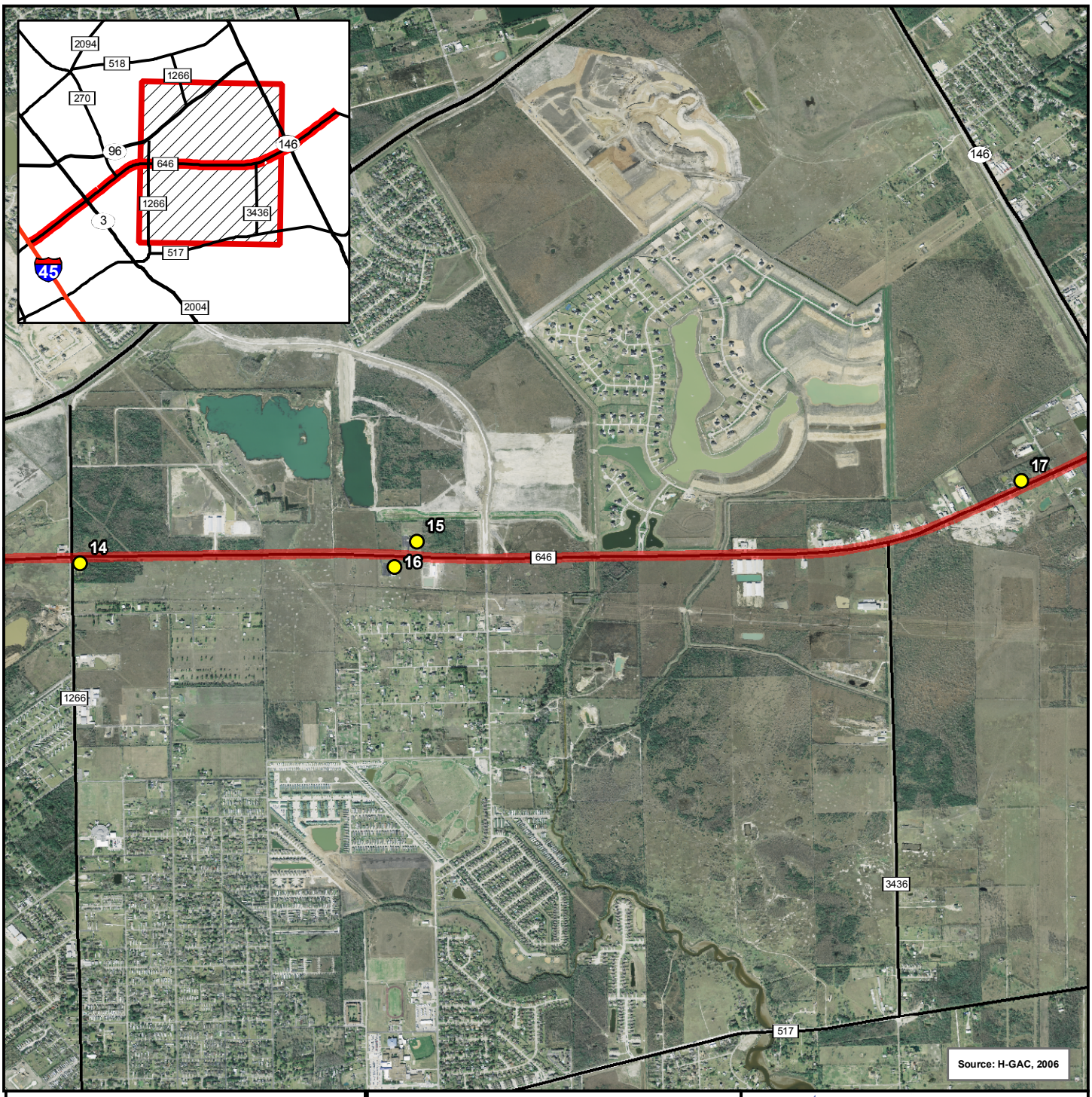
Sheet 1 of 3

Noise Receiver Map

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs: 3049-01-027,
3049-01-022, 3049-01-023,
0978-02-053, 0978-02-034



LEGEND

- Interstate Highway
- US Highway
- State Highway
- FM Road
- Project Location
- Noise Receiver

0 0.25 0.5 Miles

1 inch = 0.5 miles

Texas Department of Transportation

Exhibit J

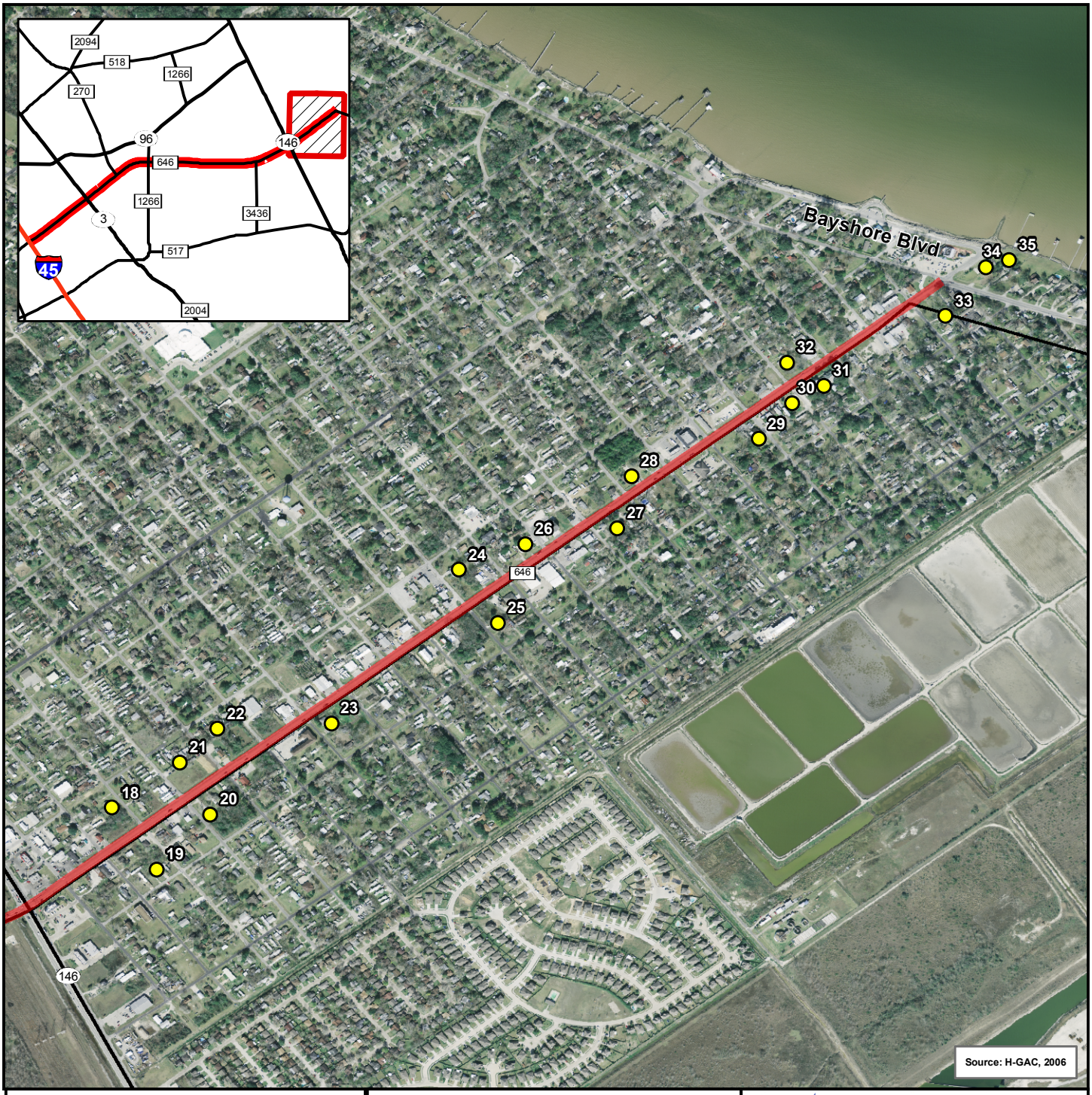
Sheet 2 of 3

Noise Receiver Map

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs: 3049-01-027,
3049-01-022, 3049-01-023,
0978-02-053, 0978-02-034



LEGEND

- Interstate Highway
- US Highway
- State Highway
- FM Road
- Project Location
- Noise Receiver

0 0.1 0.2 Miles

1 inch = 0.2 miles

Texas Department of Transportation

Exhibit J

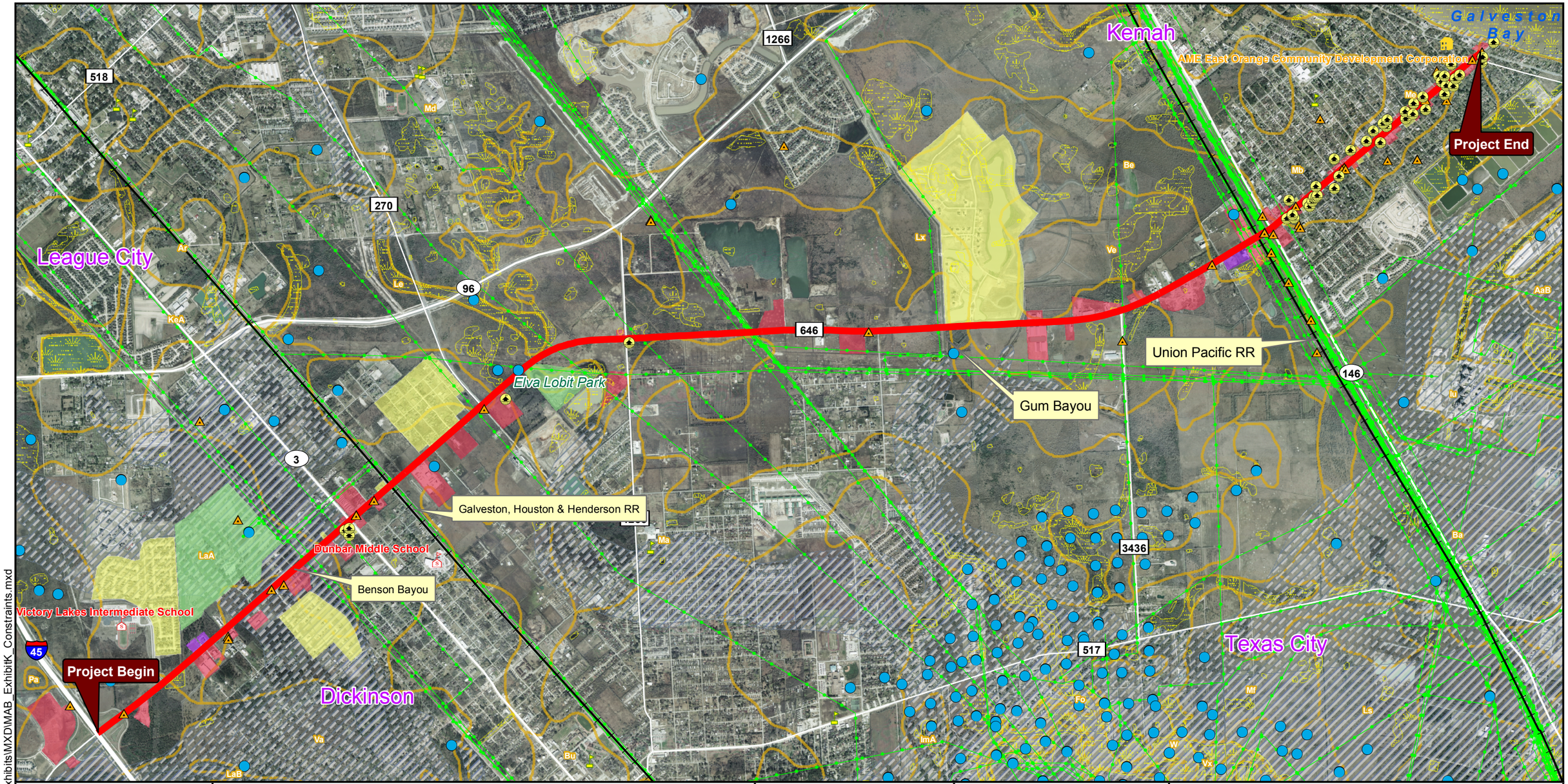
Sheet 3 of 3

Noise Receiver Map

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs: 3049-01-027,
3049-01-022, 3049-01-023,
0978-02-053, 0978-02-034



Feature	Source
County Boundary	TNRIS, 2006
Floodplain	FEMA, 2006
Wetland System	NWI, 2004
Land Use	H-GAC, 2006
Soil	NRCS, 1996
Railroads	TXDOT, 1997
Pipeline/Well	RRC, 2004
Roads	TNRIS, 2006
All Others	HNTB, 2007

- Historical Marker
- Hazardous Materials
- Well
- Sensitive Receptors
- Schools
- Housing Development
- Project Location
- Railroads
- Pipeline

Roads
- InterState Highway
- US Highway
- State Highway
- FM Road
- Wetland System
- Soil
- Observed Waters
- Observed Wetlands

Land Use
- Commercial / Industrial / Office
- Residential
- Park / Golf Course
- Public / Insitutional

Floodplains
- 100 year
- 500 year

N W E S

1:30,000

1" = 3000'

0 750 1,500 3,000 Feet

0 0.15 0.3 0.6 Miles

Texas Department of Transportation

HNTB

Exhibit K
Constraints Map

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas
TxDOT CSJs: 3049-01-027, 3049-01-022,
3049-01-023, 0978-02-053, 0978-02-034

J:\39263\WA 1 - FM646\Techprod\Exhibits\MXD\MAB_ExhibitK_Constraints.mxd

APPENDIX A
AGENCY COORDINATION LETTERS

HNTB Corporation
THE HNTB COMPANIES
Engineers Architects Planners

2 Northpoint Drive
Suite 650
Houston, TX 77060

Telephone (281) 931-2700
Facsimile (281) 931-6932
www.hntb.com

December 20, 2006

Ms. Alecya Galloway
Galveston County Historical Museum
2219 Market Street
Galveston, TX 77550

HNTB

Re: FM 646 Road Widening Project
Galveston County, TX
CSJs: 3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Dear Ms. Gallaway:

The HNTB Corporation, on behalf of Texas Department of Transportation (TxDOT) is in the process of obtaining environmental approval to widen FM 646 between IH 45 and Bayshore Boulevard in Galveston County, Texas. Proposed right-of-way ranging from 32 to 52 feet would be necessary for this project. The attached vicinity map indicates the location of the project.

Your knowledge concerning the location of any historically or archeologically significant properties in the subject area which might be eligible for inclusion in, or under nomination to, the National Register of Historic Places would be appreciated. If the project area under consideration contains no historical or archeological sites, your signature below would be sufficient verification.

If you should need further information concerning this project, please feel free to contact me at (281) 931-2747.

Sincerely,

Ms. Jene Adler
Environmental Planner
HNTB Architects, Engineers, Planners

Cc: Mr. Lance Olenius
Texas Department of Transportation Houston District

_____ _____

Galveston County Historical Commissioner Date

HOUSTON-GALVESTON AREA COUNCIL

PO Box 22777 • 3555 Timmons Lane • Houston, Texas 77227-2777• 713/627-3200

May 04 – 2006

Charles Airiohuodion
Transportation Planning
Texas Department of Transportation
P.O. Box 1386 - Houston - Texas 77251-1386

REF. Submitting CMA and Request for Letter of Commitment from TxDOT
Added-Capacity Project: FM 646 From FM 1266 To IH-45 - CSJ: 3049-01-022
TSM: Traffic Signals Re-Timing & Synchronization

Dear Mr. Airiohuodion:

The Houston-Galveston Area Council (H-GAC), the designated Metropolitan Planning Organization (MPO) for the region has completed and submitting the attached Congestion Mitigation Analysis (CMA) for the added-capacity project along FM 646 between FM 1266 and IH-45.

The results of this analysis suggest that the Transportation System Management (TSM) project is within highway and arterial corridor with signalized intersections, as per Congestion Management Plan (CMS), we need to consider Traffic Signalization Modifications for the corridor i.e. Traffic Signal Re-Timing and Synchronization. It has a degree of impact on congestion mitigation, therefore, it is considered "significant".

The CMS Plan stipulates that the implementing agencies must demonstrate their commitment to construction of any TCMs identified as having significant impact to the traffic flow on a candidate roadway project. Therefore, a "Letter of Commitment" will be required from TxDOT, which shall include a firm assurance that the implementing agencies will execute this TSM project along with or incremental to the added capacity project.

H-GAC requires the "Letter of Commitment" include the projected start/end date of this TSM project if possible and the incremental (total added cost) associated with its implementation. It is recommended that the start/end dates of this TSM project be in close proximity to the implementation date of the added-capacity project. This information is requested because H-GAC is responsible for evaluating the before-and-after performance of the TSMs. Please note if the information regarding the exact dates for implementation of this TSM is not available, then the letter should provide the date when such data would be obtainable.

The above actions may call require a Transportation Policy Council (TPC) amendment, since this TSM project may not be in the current Transportation Improvement Plan (TIP) and/or Metropolitan Transportation Plan (MTP).

If you have any comments or need additional information, please do not hesitate to contact me at 713.993.4564.

Sincerely.
ILyas Choudry
ILyas H. Choudry
H-GAC Transportation Department

CONGESTION MITIGATION ANALYSIS (CMA)
FM 646 From FM 1266 To IH-45
CSJ: 3049-01-022
May 04 - 2006

FINDINGS

The Level of Mobility (LOM) in the Year 2006 on FM 646 From FM 1266 To IH-45 has already deteriorated significantly to justify adding additional road capacity. Since this is within highway and arterial corridor with signalized intersections, as per Congestion Management Plan (CMS), we need to consider Traffic Signalization Modifications for the corridor. TCM-Tool-Box of H-GAC suggests that such a project mitigates congestion by 4.5%. Any project, which has mitigating factor of equal to or more than 1, is considered significant. However the LOM in the Regional Transportation Plan (RTP) Year 2025 even after this 4.5% mitigation would not reduce sufficiently to negate the added capacity justification. It can be concluded that adding capacity on this roadway can be further investigated and is consistent with the CMS Plan of the Houston-Galveston Area Council (H-GAC) contingent to the considerations described below.

BACKGROUND

The current Congestion Management Systems (CMS) Plan for the Houston-Galveston metropolitan area was adopted in October 1997 and amended in December 1997, May 1998, and December 2004. The CMS requires the performance of a Congestion Mitigation Analysis (CMA), which was formerly known as Single Occupancy Vehicle Analysis (SOV), on significant added capacity roadway projects. It is the stated policy of the CMS to apply cost-effective Transportation System Management (TSM) measures and Travel Demand Management (TDM) as the first component of all congestion reduction strategies. Added capacity roadway projects, such as those being considered for this FM 646 are justified only if cost-effective demand and system management strategies fail to reduce vehicular congestion to acceptable (or tolerable) levels.

PROJECT DESCRIPTION

The limits of this project are FM 646 From FM 1266 To IH-45. It is an existing 3.24-Miles long stretch of FM 646 with two lanes and going to be expanded to four-lane highway. It is located in fringe sub-urban area towards north of the Houston-Galveston Region. 85th Percentile Speed on the facility is approximately 54-MPH.

TRAFFIC AND LEVEL OF MOBILITY (LOM)

Table 1 illustrates Levels of Mobility (LOM) used to define congestion by H-GAC. These LOMs were developed by the H-GAC Travel Modeling Committee in 1997 and approved by the Technical Advisory Committee (TAC). Roadway segments that fall above the tolerable level (i.e., volume/capacity (v/c) ratio $\geq$ 0.85) are considered congested, thus added capacity is considered to be justified.

Table 1
Summary of Levels of Mobility (LOM)

Tolerable	< 0.85
Moderate	≥ 0.85 < 1.00
Serious	≥ 1.00 < 1.25
Severe	≥ 1.25

For the purpose of this CMA, the v/c ratios (LOMs) were calculated. Volume/capacity (v/c) ratios were calculated using capacities developed by H-GAC for the region's travel demand model as well as actual 24-hour traffic counts done by consultant C. J. Hensch & Associates, Inc. and projected traffic volumes by H-GAC's transportation modeling efforts. Adjusted capacities were determined using H-GAC's capacity tables, which are based on the standard "*Highway Capacity Manual*" procedures for different facility types and number of lanes, as well as other traffic-related factors. These include:

- Percent Trucks
- Number of Lanes
- Lane Utilization Factor
- Traffic Signal Timing [Green/Cycle Length (g/c) Ratio]
- Percent Left-turns
- Peak Hour Factor
- Peak Hour Directional Factors

Information for these factors was also collected in the field by consultant C. J. Hensch & Associates, Inc.. They also collected traffic volume information. Once the adjusted capacity was calculated using Capacity Tables, weighted average v/c ratio for Year 2006 was determined. This v/c ratio 0.89 is higher than 0.85: However this existing v/c ratio will become 0.85 on applying mitigating factor. LOM after applying mitigating factor for the existing case as given in **Table 2** is ALMOST TOLERABLE.

CONGESTION REDUCTION STRATEGIES

It is the stated policy of the Congestion Management System to apply cost-effective demand and system management measures as the first component of all congestion reduction strategies. Added capacity roadway projects are justified only if cost-effective demand management and system management strategies fail to reduce vehicular congestion to acceptable levels. Where demand or system management projects are feasible and cost-effective, project sponsors, or relevant implementing agencies and the MPO must commit to their implementation or incorporation into a proposed added-capacity project as a pre-condition to federal funding assistance. Project design, concept, and scope must also be consistent with any selected management strategies.

Since this is within highway and arterial corridor, as per Congestion Management Plan (CMS), we need to consider Traffic Signalization Modifications as the first mitigating element for the corridor. TCM-Tool-Box of H-GAC suggests that a Traffic Signalization Modifications project mitigates congestion by 4.5%. Any project, which has mitigating factor of equal to or more than 1, is considered significant. However the LOM in the Regional Transportation Plan (RTP) Year 2025

even after this 4.5% mitigation would not reduce sufficiently to negate the added capacity justification.

Analysis and Results

TCM-Tool-Box of H-GAC suggests that Traffic Signalization Modifications Project mitigates congestion by 4.5%. Any project, which has mitigating factor of equal to or more than 1, is considered significant. However the LOM even after this 4.5% mitigation would not reduce sufficiently to negate the added capacity justification (shown in **Table 3**).

Table 2
LOM for Year 2006
FM 646 From FM 1266 To IH-45
CSJ: 3049-01-022

Yr. 2006 Adjusted LOM	0.89	0.85

Table 3
LOM for Year 2025
FM 646 From FM 1266 To IH-45
CSJ: 3049-01-022

Yr. 2025 Adjusted LOM	0.93	0.90

It is obvious that the LOM within the limits of the project will reduce by 4.5% because of implementation of this Traffic Signalization Modifications Project. However, LOM will be MODERATE in the future Year 2025. Therefore, adding capacity is justifiable and can be further explored.

The results of this analysis suggest that the Traffic Signalization Modifications along FM 646 has a degree of impact on congestion mitigation, therefore, it is considered "significant".

The CMS Plan stipulates that the implementing agency must demonstrate their commitment to construction of any TCMs identified as having significant impact to the traffic flow on a candidate roadway project. Therefore, a "Letter of Commitment" will be required for this Traffic Signalization Modifications project, providing firm assurance that the implementing agency [(TxDOT) in this case]. The "Letter of Commitment" should include the projected start/end date of this Traffic Signalization Modifications project if possible and the incremental

(total added cost) associated with its implementation. It is recommended that the start/end dates of these TCM projects be in close proximity to the implementation date of the added-capacity project.

This information is requested because H-GAC is responsible for evaluating the before-and-after performance of the TCMs. H-GAC's consultant C. J. Hensch & Associates, Inc. has already collected the before implementation travel time runs for the performance evaluation.

HOUSTON-GALVESTON AREA COUNCIL

PO Box 22777 • 3555 Timmons Lane • Houston, Texas 77227-2777• 713/627-3200

January 11th, 2010

Charles Airiohuodion
Transportation Planning
Texas Department of Transportation
P.O. Box 1386
Houston, Texas 77251-1386

REF. Letter of Waiver of Congestion Mitigation Analysis (CMA)
FM 646: 0.1 Mile E. of SH 146 to SH 146(N)
CSJ #: 0978-02-034

Dear Mr. Airiohuodion:

The Congestion Management System (CMS) Roadway Network, as adopted in 1997 and later revised in 1998 and 2004, is defined as roadways classified principal (or major) arterials and above in the urban areas and selected major collectors and above in the rural area, as defined in the TxDOT Roadway Inventory Log (RI-2) and other roadways designated by the TPC. Added capacity roadway projects, NOT on the adopted CMS network, are not subject to Congestion Mitigation Analysis (CMA) requirements. In addition, added capacity projects on the adopted CMS network, which have current environmental findings (FONSI/ROD) are also exempt from CMA. Currents FONSI/ROD should be within the last three years. Also added-capacity projects less than 1-Mile are considered insignificant and again exempt from CMA.

H-GAC is issuing this Letter of Waiver (LOW) of CMA for the above referenced added-capacity project, as it is not on the CMS Plan Network, since it is a minor arterial in the urban area. Please include this LOW in the Environmental Assessment (EA) document of this project.

If you have any questions about this CMA waiver and the CMS amendment, please contact me at (713) 993-4564.

Sincerely.

ILyas Choudry
ILyas Choudry
Transportation Department H-GAC

HOUSTON-GALVESTON AREA COUNCIL

PO Box 22777 • 3555 Timmons Lane • Houston, Texas 77227-2777• 713/627-3200

February 10th, 2010

Charles Airiohuodion
Transportation Planning
Texas Department of Transportation
P.O. Box 1386
Houston, Texas 77251-1386

REF. Letter of Waiver of Congestion Mitigation Analysis (CMA)
FM 646: FM 3426 to SH 146 / CSJ #s: 0978-02-053

Dear Mr. Airiohuodion:

The Congestion Management Process (CMP) of the Houston-Galveston Area Council (H-GAC) will be integrated into the Regional Transportation Plan (RTP) soon. Once fully integrated, CMP will replace the Congestion Management System (CMS) Plan. The requirements of CMP for added-capacity projects will remain the same as in the CMS Plan. The CMS Roadway Network, as adopted in 1997 and later revised in 1998 and 2004, is defined as roadways classified principal (or major) arterials and above in the urban areas and selected major collectors and above in the rural area, as defined in the TxDOT Roadway Inventory Log (RI-2) and other roadways designated by the TPC. Added capacity roadway projects, NOT on the adopted CMS network, are not subject to Congestion Mitigation Analysis (CMA) requirements of the CMP and CMS Plan. In addition, added capacity projects on the adopted CMS network, which have current environmental findings (FONSI/ROD) are also exempt from CMA. Currents FONSI/ROD should be within the last three years. Also added-capacity projects less than 1-Mile are considered insignificant and usually for filling a gap in the roadway system: As such they are again exempt from CMA. Moreover, any project of the nature of Transportation Demand Management (TDM) or Transportation System Management (TSM) is considered waived from the requirements of CMP and CMS Plan.

H-GAC is issuing this Letter of Waiver (LOW) of CMA for the above referenced added-capacity project, as it is not on the CMS Plan Network, since it is a minor arterial in the urban area. Please include this LOW in the Environmental Assessment (EA) document of this project.

If you have any questions about this CMA waiver and the CMS amendment, please contact me at (713) 993-4564.

Sincerely.

ILyas Choudry

ILyas Choudry
Transportation Department H-GAC

HOUSTON-GALVESTON AREA COUNCIL

PO Box 22777 • 3555 Timmons Lane • Houston, Texas 77227-2777• 713/627-3200

February 10th, 2010

Charles Airiohuodion
Transportation Planning
Texas Department of Transportation
P.O. Box 1386
Houston, Texas 77251-1386

REF. Letter of Waiver of Congestion Mitigation Analysis (CMA)
FM 646: FM 3436 to SH 1266 / CSJ #s: 3049-01-023

Dear Mr. Airiohuodion:

The Congestion Management Process (CMP) of the Houston-Galveston Area Council (H-GAC) will be integrated into the Regional Transportation Plan (RTP) soon. Once fully integrated, CMP will replace the Congestion Management System (CMS) Plan. The requirements of CMP for added-capacity projects will remain the same as in the CMS Plan. The CMS Roadway Network, as adopted in 1997 and later revised in 1998 and 2004, is defined as roadways classified principal (or major) arterials and above in the urban areas and selected major collectors and above in the rural area, as defined in the TxDOT Roadway Inventory Log (RI-2) and other roadways designated by the TPC. Added capacity roadway projects, NOT on the adopted CMS network, are not subject to Congestion Mitigation Analysis (CMA) requirements of the CMP and CMS Plan. In addition, added capacity projects on the adopted CMS network, which have current environmental findings (FONSI/ROD) are also exempt from CMA. Currents FONSI/ROD should be within the last three years. Also added-capacity projects less than 1-Mile are considered insignificant and usually for filling a gap in the roadway system: As such they are again exempt from CMA. Moreover, any project of the nature of Transportation Demand Management (TDM) or Transportation System Management (TSM) is considered waived from the requirements of CMP and CMS Plan.

H-GAC is issuing this Letter of Waiver (LOW) of CMA for the above referenced added-capacity project, as it is not on the CMS Plan Network, since it is a minor arterial in the urban area. Please include this LOW in the Environmental Assessment (EA) document of this project.

If you have any questions about this CMA waiver and the CMS amendment, please contact me at (713) 993-4564.

Sincerely.

ILyas Choudry

ILyas Choudry
Transportation Department H-GAC

APPENDIX B
HISTORIC RESOURCES SURVEY REPORT

HISTORIC RESOURCES SURVEY REPORT

FM 646: IH 45 to Bayshore Boulevard
Galveston County, TX

CSJs: 3049-01-027, 3049-01-022, 3049-01-023,
0978-02-053, 0978-02-034

March 2007

PREPARED FOR

Texas Department of Transportation
7721 Washington Avenue
Houston, Texas 77007

PREPARED BY

HNTB Corporation
2 Northpoint Drive, Suite 650
Houston, Texas 77060

Sue Winton Moss
4118 Edwards Mountain Dr.
Austin, Texas 78731

TABLE OF CONTENTS

LIST OF EXHIBITS

LIST OF APPENDICIES

INTRODUCTION

The National Environmental Policy Act (NEPA) requires consideration of important historic, cultural, and natural aspects of our national heritage. Important aspects of our national heritage that may be present in the project corridor have been considered under Section 106 of the National Historic Preservation Act of 1966, as amended. This act requires Federal agencies to take into account the "effect" that an undertaking will have on "historic properties." Historic properties are those included in or are eligible for inclusion in the National Register of Historic Places (NRHP) and may include structures, buildings/districts, objects, cemeteries, and archeological sites.

In accordance with the Advisory Council on Historic Preservation (ACHP) regulations pertaining to the protection of historic properties (36 CFR 800.4), Federal agencies are required to identify and evaluate historic-age resources for NRHP eligibility and assess the effects that the undertaking would have on historic properties. These steps shall be completed under terms of the "Undertakings with Potential to Cause Effects" of the First Amended Statewide Programmatic Agreement (PA) for Cultural Resources between the Federal Highway Administration (FHWA), the Texas State Historic Preservation Officer (SHPO), the ACHP, and the Texas Department of Transportation (TxDOT) on December 29, 2005. The PA outlines a streamlined approach for conducting Section 106 consultation and review with the SHPO and the ACHP. The document provides for (under certain conditions) regulatory authority to TxDOT Cultural Resource Management (CRM) staff to identify and evaluate cultural resources and, when historic-age resources are present, assess potential project impacts and/or effects without conducting consultation and review with the SHPO.

HISTORIC RESOURCES SURVEY REPORT

This technical report presents NRHP eligibility documentation and assessments for historic-age resources (buildings, structures, objects, districts, etc.) identified within the area of potential effect (APE) for improvements to Farm-to-Market (FM) 646 from Interstate Highway (IH) 45 to Bayshore Boulevard in Galveston County, Texas (**Exhibits 1** and **2**). The APE passes through suburban Dickinson and the community of Bacliff.

For purposes of this report, the APE was determined to be 150 feet (ft) on either side of the existing or proposed ROW. The term 'historic-age resource,' as it is used in this report, refers to any architectural and/or engineering resource that is or will be 50 years of age or older at the time of project construction. For purposes of project planning, a projected construction date of 2008 is anticipated. Thus, 1958 is the cut-off date used to determine which resource sites meet the 50-year criteria.

A site map indicating the location of all historic-age resources is included as **Exhibit 3**. Each resource is described in detail in **Appendix 1** and represented photographically in **Appendix 2.**

Project Description

This project proposes to widen FM 646 from two lanes to four lanes from IH 45 to Bayshore Boulevard. ROW would need to be acquired from both sides of FM 646 between IH 45 and State Highway (SH) 146, but the proposed improvements would take place within the existing FM 646 ROW from SH 146 to Bayshore Boulevard through Bacliff.

Methodology

Documentation included pre-field file review, fieldwork, and historic background research.

File Review

A TXDOT pre-certified historian conducted a file review of the project APE. Sources consulted included the Texas Historical Commission (THC) Historic Sites Atlas, Galveston County Survey Files, telephone conversations with persons having knowledge of the local history of the project area, and USGS and historic Texas State Highway Department maps. No previously recorded historic resources were identified within the project area.

Field Review

The historian conducted a reconnaissance survey of the project area on September 6-7, 2005. Forty-four historic-age resource sites (**Exhibit 3**) and one Official Texas Historical Marker (OTHM) were identified within the APE.

Historical Background of Project Area

Bacliff/Clifton-by-the-Sea

The community of Bacliff is 16 miles northwest of Galveston at the eastern end of the project area. Originally a summer/weekend resort for Houstonians, it was known as Clifton-by-the-Sea from the time of its establishment in 1910 until the early 1950s. During this period there was a pavilion, bath house, and pier along a large beach. The community had few permanent homes during this period and no public utilities since most of the residences were summer homes.

The community suffered severe damage during hurricanes in 1915 and 1943. Although the resort facilities were replaced after the 1915 hurricane, they were destroyed again during the 1943 storm. These facilities were not replaced after this storm, and the area's role as a resort decreased during the second half of the twentieth century.

In 1948, the Bacliff post office was established and for a while the community was known by both Bacliff and Clifton-by-the-Sea. The population in the area increased during World War II due to the influx of workers in manufacturing plants and refineries in Texas City and the business generated by the Houston Ship Channel.

Dickinson

The community of Dickinson is located at the western end of the project area. It is situated between Houston and the Galveston metropolitan area in Galveston County. The area was originally settled as early as 1824. Settlement increased during the 1890s when several local businessmen organized a land improvement company to market unoccupied land in the Dickinson area. The prime attraction to the area was good local soil, fertile for growing fruit, cane, potatoes, and berries. Illustrating the town's past prominence in agriculture, Dickinson was once named the 'Strawberry Capital of Texas.' Throughout the first part of the twentieth century, truck farming was successful in the area due to the convenient access to both the Houston and Galveston markets.

Houston and Galveston experienced increased industrialization and population growth due to the rise of the oil industry during the first half of the twentieth century. The result of this nearby development lead to an increase in the population of Dickinson as well as surrounding towns including, Texas City, La Marque, and Hitchcock. Growth continued after

World War II when NASA was established in Webster, just north of Dickinson. During the second half of the twentieth century, Dickinson has been a 'bedroom community' for the greater Houston area, and subdivision development throughout the project area has increased significantly in recent years.

Potential Historic Contexts for Project Area
-- Agriculture in the area of Dickinson - 1850-1958
--Truck Farming - 1900-1930s

-- Dickinson Community Planning and Development - 1900-1958

-- Clifton-by-The-Sea (Bacliff) Community Planning and Development - 1910-1943

-- Bacliff (Clifton-by-the-Sea) Community Planning and Development - 1943-1958

Although land use around Dickinson and surrounding communities was mainly agricultural through the mid-twentieth century, none of the identified historic-age resources within the project APE reflect an agricultural historic context. All identified resources fell within the contexts of Planning and Development in Dickinson and Bacliff/Clifton-by-the-Sea. However, no structures were identified dating from the earlier period from 1900 through circa 1920. All structures appear to date from circa 1930 to 1960s, representing post World War II development. One pair of concrete piers, once used for a signpost, were dated circa 1915 and represent Clifton-by-the-Sea's early role as a Houston resort community. No other resources related to this aspect of the community are extant within the project area.

Research Results

Results of the File Review
An examination of the THC's Historic Sites Atlas indicated that no recorded NRHP-, RTHL-, or SAL-listed resources were previously recorded within the APE. One OTHM was identified within the project APE.

Results of the Field Review
Forty-four historic-age resources were identified within the project APE (**Exhibit 3** and **Appendix 1**). Property types include residential, commercial, and one object. One OTHM is located near, but outside, the APE and is mentioned in this report for documentation purposes. Refer to **Appendix 1** for information pertaining to the sites identified during the field review.

Residential Resources
Thirty-eight residential historic-age resources were identified within the project area. All of the resources were constructed during the twentieth century. Particularly in the area of Bacliff, no residential resource appears to pre-date the 1915 hurricane. Most of the residences are one-story, wood frame, minimal traditional or basic cottage style structures.

Each of the residential structures was evaluated under the Secretary of the Interior's guidelines for NRHP eligibility. None of the structures originally possessed a level of architectural design that would qualify them for NRHP eligibility. In addition, almost every structure has had various modifications, including replacement windows and doors, replacement siding, the addition or removal of porches, or structural additions that have

compromised original integrity. As a result of this evaluation, all of the residential structures identified in this report are recommended Not Eligible for listing in the NRHP.

In addition, there is no evidence of a potential historic district, particularly in the area along FM 646 through Bacliff (Clifton-by-the-Sea) where there is a high concentration of historic-age residential structures. As stated, none of the structures possesses significant architectural design or integrity for individual NRHP eligibility and there is no evidence that any of the structures are part of a planned neighborhood, subdivision, or community.

Commercial Resources

Six commercial resources were identified within the project APE. With the exception of one resource, all appear to have been constructed after World War II. Several structures were originally built as residences and have been converted to commercial use. None of these structures exhibits significant architectural design/construction, and the integrity of all have been significantly compromised by modifications such as replacement doors, windows, siding and the addition of porches and decks. None of the identified commercial structures is part of a group or commercial district.

Each of the commercial structures was evaluated under the Secretary of the Interior's Standards for NRHP eligibility, and all are recommended Not Eligible for NRHP listing.

Historical Marker

One OTHM is located near, but outside, the project APE on the east side of Bayshore Boulevard in Bacliff/Clifton-by-the-Sea. It is an aluminum marker on a pole commemorating the settlement of Clifton-by-the-Sea. Because the marker is not within the APE, it will not require relocation and will not be affected by this project.

Concrete Piers

Two concrete blocks that originally served as bases for a c1910 entrance sign to the Clifton-by-the-Sea beach resort are located within the APE. The 1915 hurricane destroyed the sign and the bases are all that remain. The plain concrete bases possess no decoration or artistic detail. Because the significant portion of the signage is no longer extant, the blocks that remain can be considered ruins. As such, the resource does not retain integrity of design, setting, materials, workmanship, or feeling and association and are recommended Not Eligible for the NRHP.

Bridges

Five bridges were identified within the project area. Brinsap reports for all bridges located within the APE were evaluated (**Appendix 3**). All of the bridges within the project area were constructed after the 1958 cut-off date for this project and are therefore not yet historic-age.

Potential Impacts to NRHP-Listed or NRHP-Eligible Resources

There are no historic-age resources identified within the APE that are listed or recommended for NRHP eligibility; and therefore, there are no potential impacts anticipated.

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Echoff, Dr. June
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Hudgins, Bill P.
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1979 Dickinson: *Taller Than the Pines*. Nortex, Burnet, Texas.

Hopper, Nelms
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Ingram, Mrs. Jerry
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Texas Historical Commission (THC)
Atlas, http://atlas.thc.state.tx.us/

Galveston County Survey Files, THC, Austin, Texas

THC marker files, Galveston County, THC, Austin, Texas

NRHP files, Galveston County, THC, Austin, Texas

Texas State Highway Department

1936/39 Galveston County Highway Map, on file, Texas General Land Office, Austin, Texas.

1957/61 Galveston County Highway Map, on file, Texas State Archives, Austin, Texas.

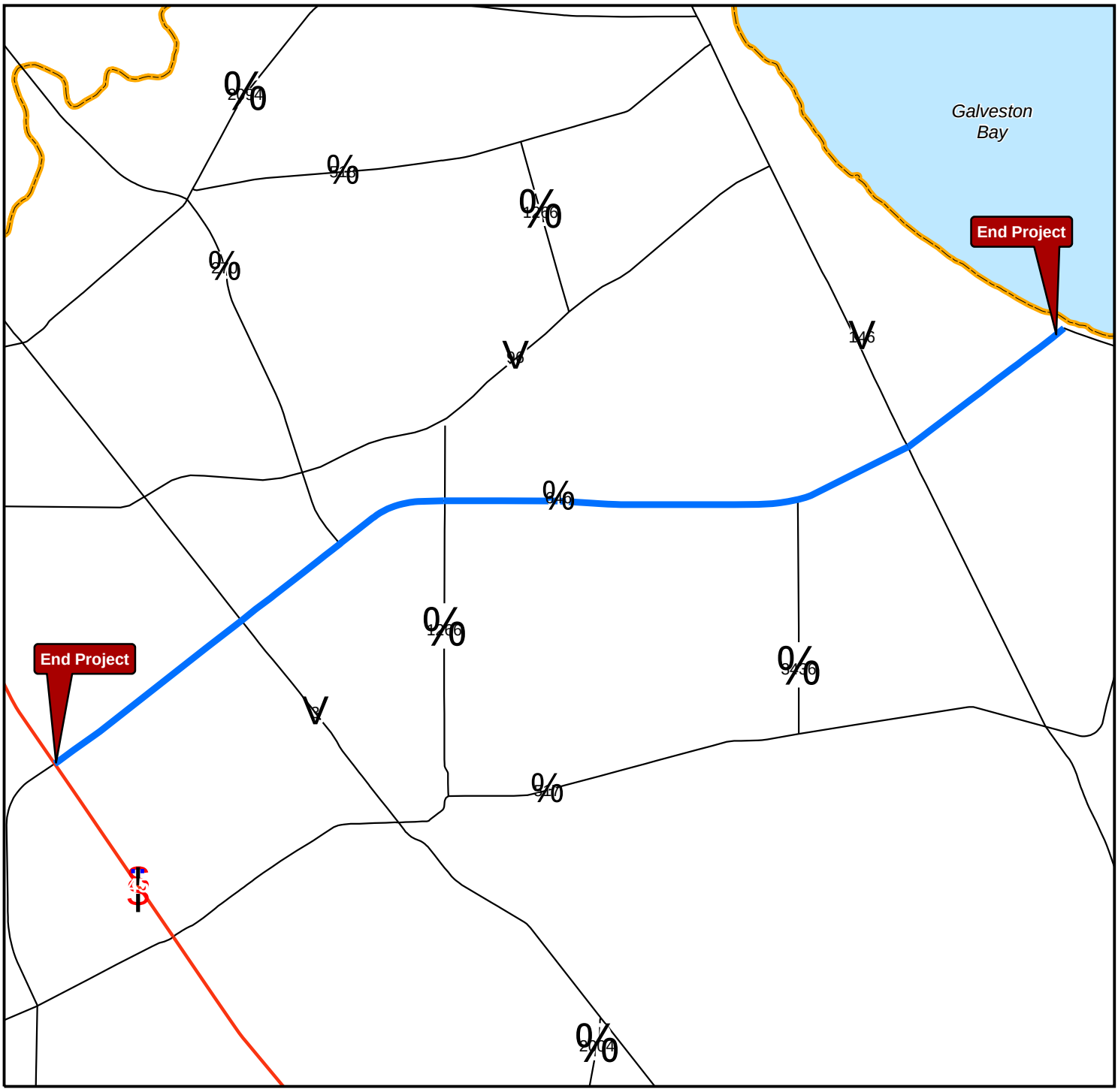
USGS Maps

1994 Bacliff Quad

1974 Dickinson Quad

EXHIBITS

Project Location Map



Legend

- Project Corridor
- Roads
- Interstate
- US Highway
- State Highway
- Farm-to-Market

0.5 Miles

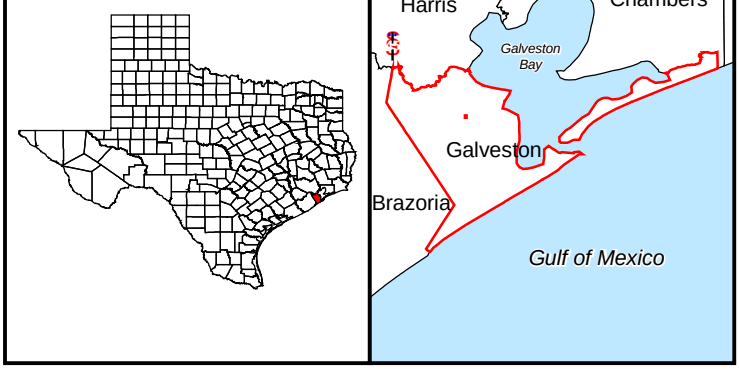
Exhibit 1

Project Location Map

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs:
3049-01-027
3049-01-022
3049-01-023
0978-02-053
0978-02-034



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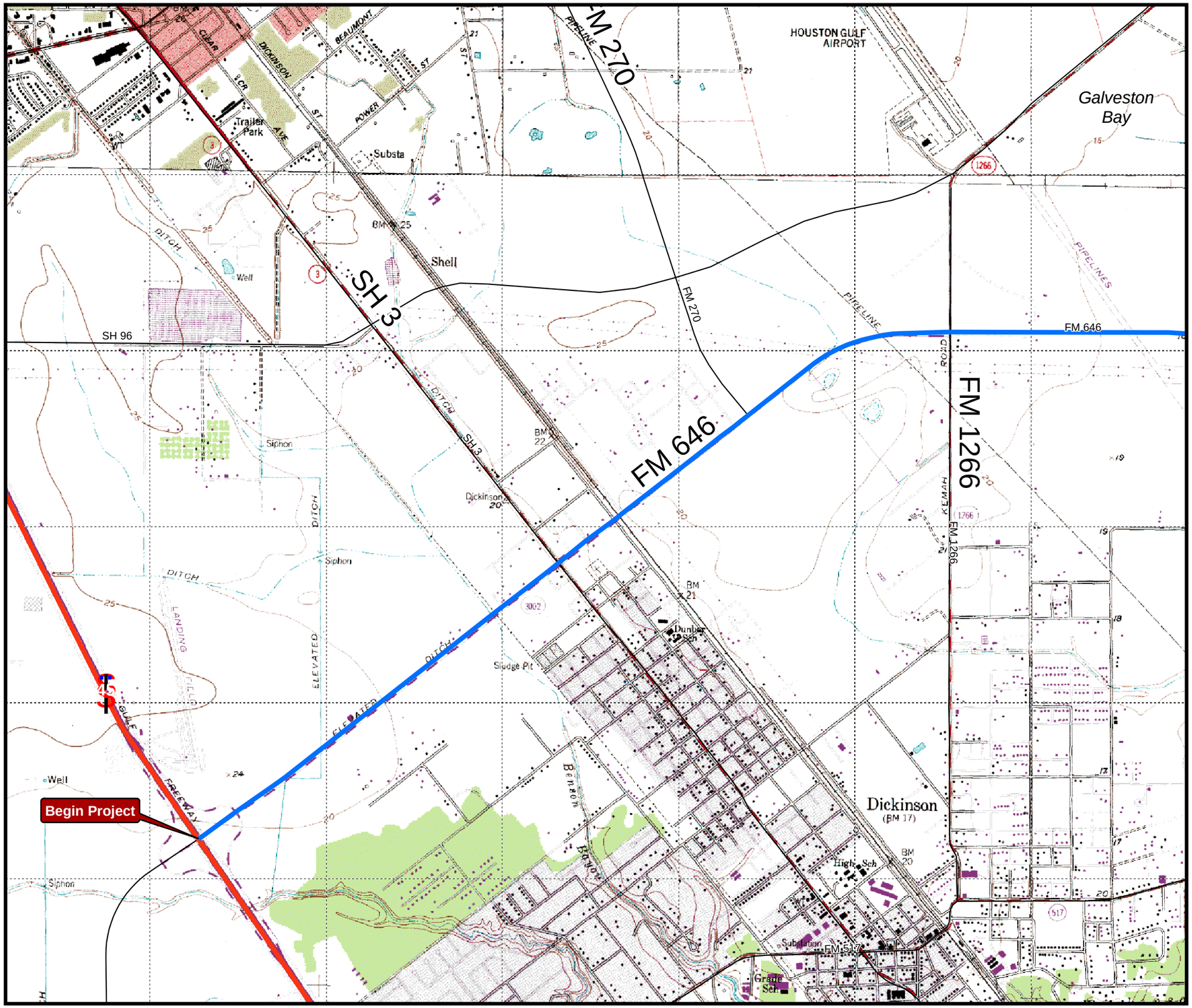


Exhibit 2

Topographic Map
Sheet 1 of 2

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs:
3049-01-027
3049-01-022
3049-01-023
0978-02-053
0978-02-034

Source: USGS 7.5 Minute Quads:
Friendswood, TX (2995-412), 1982; League City, TX (2995-411), 1982;
Bacliff, TX (2994-322), 1993; Dickinson, TX (2995-144), 1974;
Texas City, TX (2994-233), 1994 quadrangles.

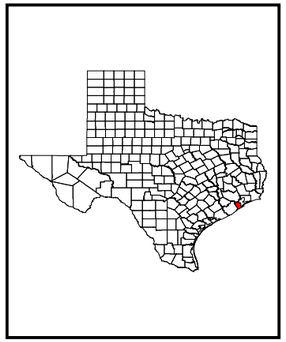
Legend

Project Corridor

μ

Mile

0.5



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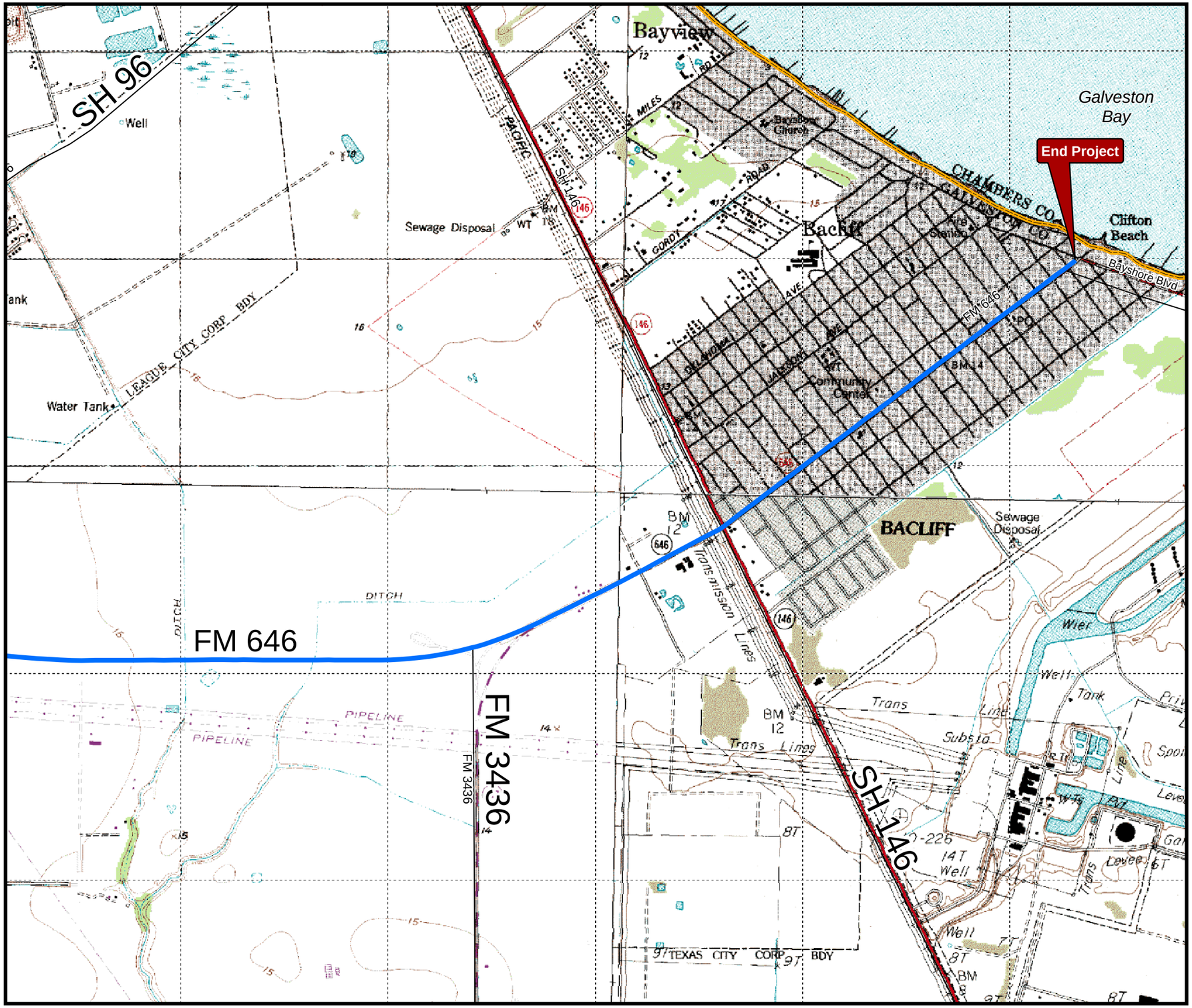


Exhibit 2

USGS Topographic Map
Sheet 2 of 2

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs:
3049-01-027
3049-01-022
3049-01-023
0978-02-053
0978-02-034

Source: USGS 7.5 Minute Quads:
Friendswood, TX (2995-412), 1982; League City, TX (2995-411), 1982;
Bacliff, TX (2994-322), 1993; Dickinson, TX (2995-144), 1974;
Texas City, TX (2994-233), 1994 quadrangles.

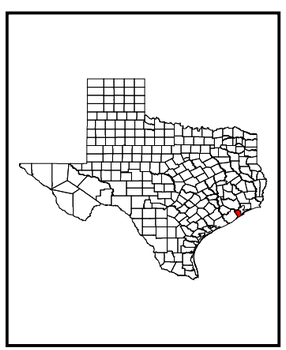
Legend

Project Corridor

μ

Mile

0.5



Historic-age Resources Location Map

Legend

- Project Corridor
- Historic-age Resources
- 150-ft APE
- Interstate
- US Highway
- State Highway
- Farm-to-Market

920 Feet

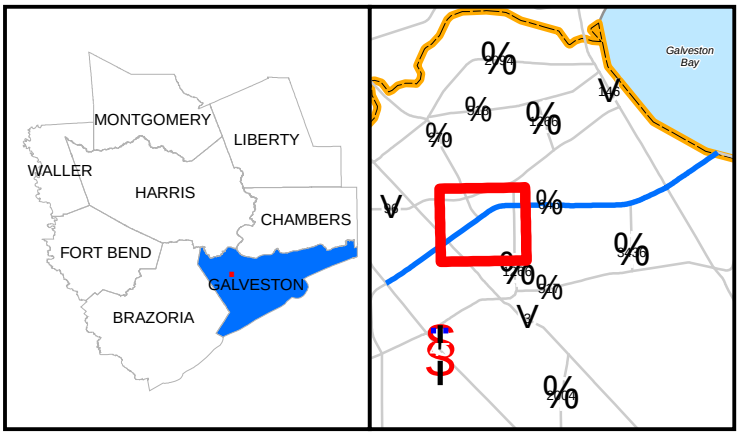
Exhibit 3

Historic-age Resources Location Map
Sheet 1 of 2

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs:
3049-01-027
3049-01-022
3049-01-023
0978-02-053
0978-02-034



Historic-age Resources Location Map

Legend

- Project Corridor
- Historic-age Resources
- 150-ft APE
- Interstate
- US Highway
- State Highway
- Farm-to-Market

Feet
525

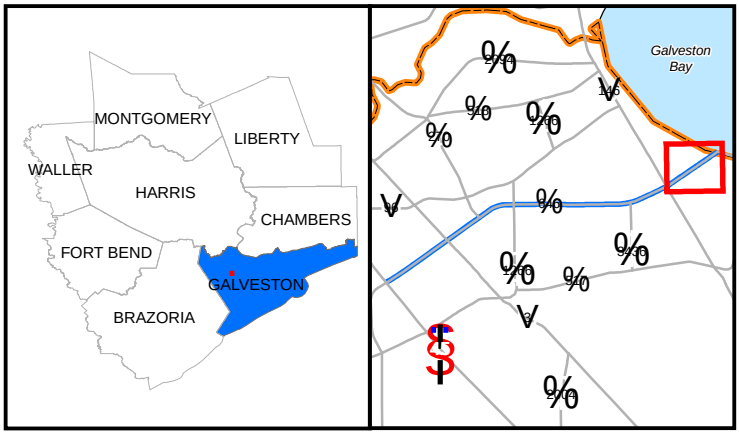
Exhibit 3

Historical Sites Location Map
Sheet 2 of 2

FM 646
Road Widening
IH 45 to Bayshore Boulevard

Galveston County, Texas

TxDOT CSJs:
3049-01-027
3049-01-022
3049-01-023
0978-02-053
0978-02-034



APPENDIX 1
Inventory of Surveyed Properties

Table 1: Inventory of Surveyed Properties

SITE NO.	LOCATION	PROPERTY TYPE/SUBTYPE	STYLISTIC INFLUENCES	DATE	ALTERATIONS/COMMENTS	NRHP ELIGIBILITY
1	1607 Avenue F	Domestic	Minimal Traditional	c1957		No
2	1802 17th Avenue	Domestic	Minimal Traditional	c1953		No
3	1610 SH 3	Domestic	None		Replacement windows, porch, deck, carport added	No
4	901 Dickinson Avenue	Commercial	None	c1950	Additions, replacement windows, large parking lot	No
5	1610 FM 646	Domestic	None	c1950		No
6	1127 Grand Avenue	Commercial	None	c1950		No
7	4608 19th Street	Domestic	None	c1960		
8	1125 Grand Avenue	Domestic	None	c1960		No
9	4506 18th Street	Domestic	Minimal Traditional	c1955		No
10	1031 Grand Avenue	Commercial	None	c1955		No
11	4610 17th Street	Domestic	Minimal Traditional	c1955		No
12	1021 Grand Avenue	Domestic	None	c1955		No
13	1009 Grand Avenue	Domestic	None	c1955	Apparent addition to left side of building. Replacement doors, windows (?) and porch (?)	No
14	1007 Grand Avenue	Domestic	None	c1940	Replacement windows, porch, deck, carport added	No
15	1003 Grand Avenue	Domestic	None	c1950	Replacement windows, large car port, enclosed garage?	No
16	942 Grand Avenue	Domestic	None	c1920s	Conversion from residence to commercial property, building enclosed with wood siding, replacement doors and windows	No
17	4619 15th Street	Domestic	Minimal Traditional	c1950s		No
18	843 Grand Avenue	Domestic	None	c1920s	House reportedly 1920s but has replacement siding, windows, and doors	No
19	4507 13th Street	Garage	None	c1950	Garage, not associated with any residential structure	No
20	4509 12th Street	Domestic	None	c1920s	Porch addition, overall deteriorated condition	No
21	4520 10th Street	Domestic	Minimal Traditional	c1955	Replacement door	No
22	4510 9th Street	Domestic	Cottage	c1920s	Replacement front porch, door?	No
23	631 Grand Avenue	Domestic	Bungalow	c1920s	Conversion from residence to commercial property, replacement doors and windows, porch removal	No
24	602 Grand Avenue	Domestic	Cottage	c1940s	Conversion from residence to commercial property, porch and rear addition,	No
25	4510 8th Street	Domestic	None	c1955		No

Table 1: Inventory of Surveyed Properties

26	4511 8th Street	Domestic	None	c1930	Addition to rear(?) portion , removal of front (?) portion of house	No
27	511 Grand Avenue	Domestic	Cottage	c1950	Replacement porch and doors, windows (?)	No
28	510 Grand Avenue	Commercial	None	c1940s	Moved from previous location. Appears windows may be replaced, replacement doors.	No
29	450 Grand Avenue	Domestic	None	c1955	Several additions, replacement doors and windows?	No
30	439 Grand Avenue	Domestic	None	c1950	Huge metal addition, commercial use? Replacement porch, windows and doors	No
31	4615 5th Street	Domestic	None	c1940s	Replacement windows, siding (?)	No
32	406 Grand Avenue	Commercial	None	c1940s	Reclad with metal siding	No
33	4620 3rd Street	Domestic	None	c1940	Replacement siding, windows	No
34	4510 2nd Street	Domestic	None	c1930s	Changes to window patterns, replacement siding	No
35	306 Grand Avenue	Commercial	None	1955		No
36	305 Grand Avenue	Domestic	None	c1950s	Conversion to commercial use, replacement porch and windows, siding	No
37	4515 2nd Street	Domestic	None	c1957	Replacement windows and doors, siding.	No
38	4619 2nd Street	Domestic	Bungalow	c1920s	Replacement windows and doors	No
39	227 Grand Avenue	Domestic	Neo-Victorian?	c1910	Original house completely remodeled on all facades. All new materials and style.	No
40	4511 1st Street	Domestic	Bungalow	c1920s	Replacement doors and windows, siding, large addition.	No
41	219 Grand Avenue	Domestic	Bungalow	c1920	Replacement siding, windows, enclosed porch	No
42	4615 Oleander Street	Domestic	None	c1940	Replacement windows and siding	No
43	103 Grand Avenue	Domestic	None	c1950	Porch addition, replacement door	No
44	Grand Avenue at Coast Line	Signage	None	c1910	Two plain concrete blocks. Originally bases for resort area entrance sign. Signage is no longer extant	No

APPENDIX 2
Historic Resource Site Forms

Historic Resource Site Form

Survey Date	September 2005
Site	1
Location	1607 Ave. F

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	1
Location	1607 Ave. F

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	2
Location	1802 17th St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	3
Location	1610 SH 3

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	3
Location	1610 SH 3

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	3
Location	1610 SH 3

Historic Resource Site Form

Survey Date	September 2005
Site	4 Forever Seamless Gutters
Location	901 Dickinson Ave. (FM 1266)

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	4 Forever Seamless Gutters
Location	901 Dickinson Ave. (FM 1266)

Historic Resource Site Form

Survey Date	September 2005
Site	4 **Forever Seamless Gutters**
Location	901 Dickinson Ave. (FM 1266)

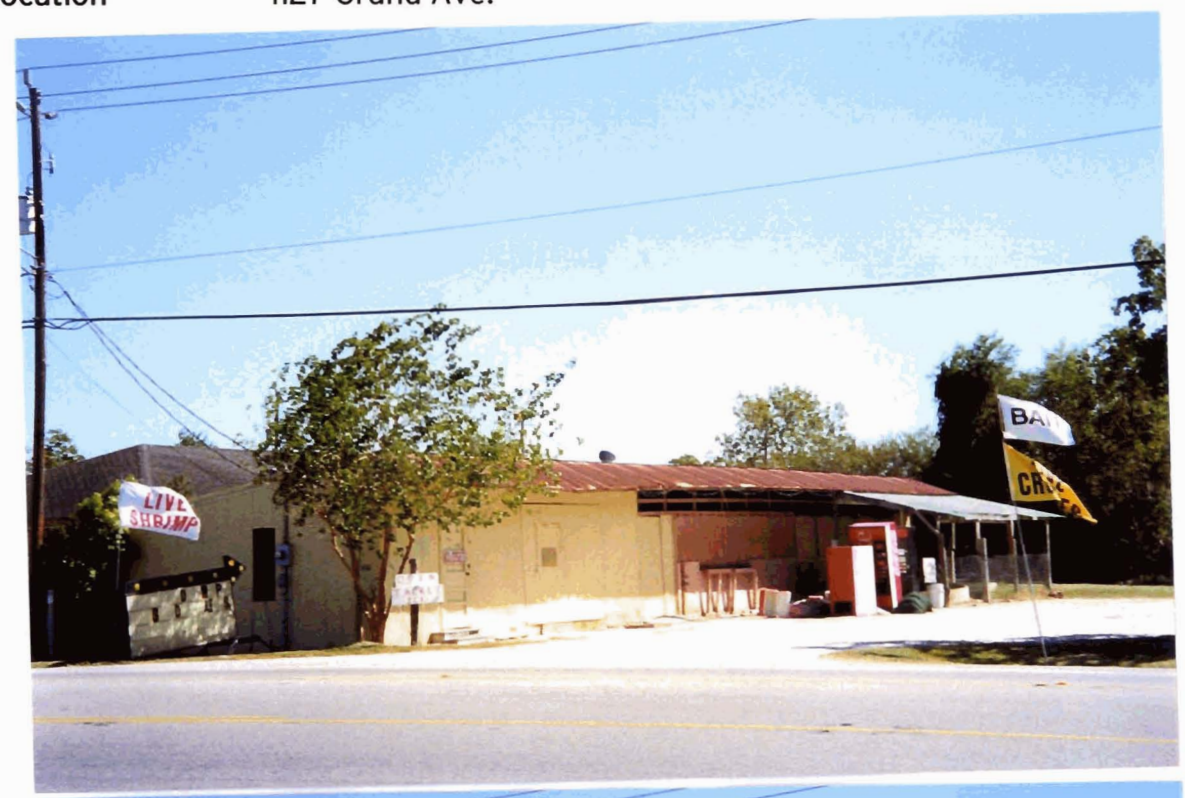
Historic Resource Site Form

Survey Date	September 2005
Site	5
Location	1610 FM 646

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	**6 Bait Shop**
Location	1127 Grand Ave.



FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	**6 Bait Shop**
Location	1127 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	7
Location	4608 19th St.

Historic Resource Site Form

Survey Date	September 2005
Site	8
Location	1125 Grand Ave.

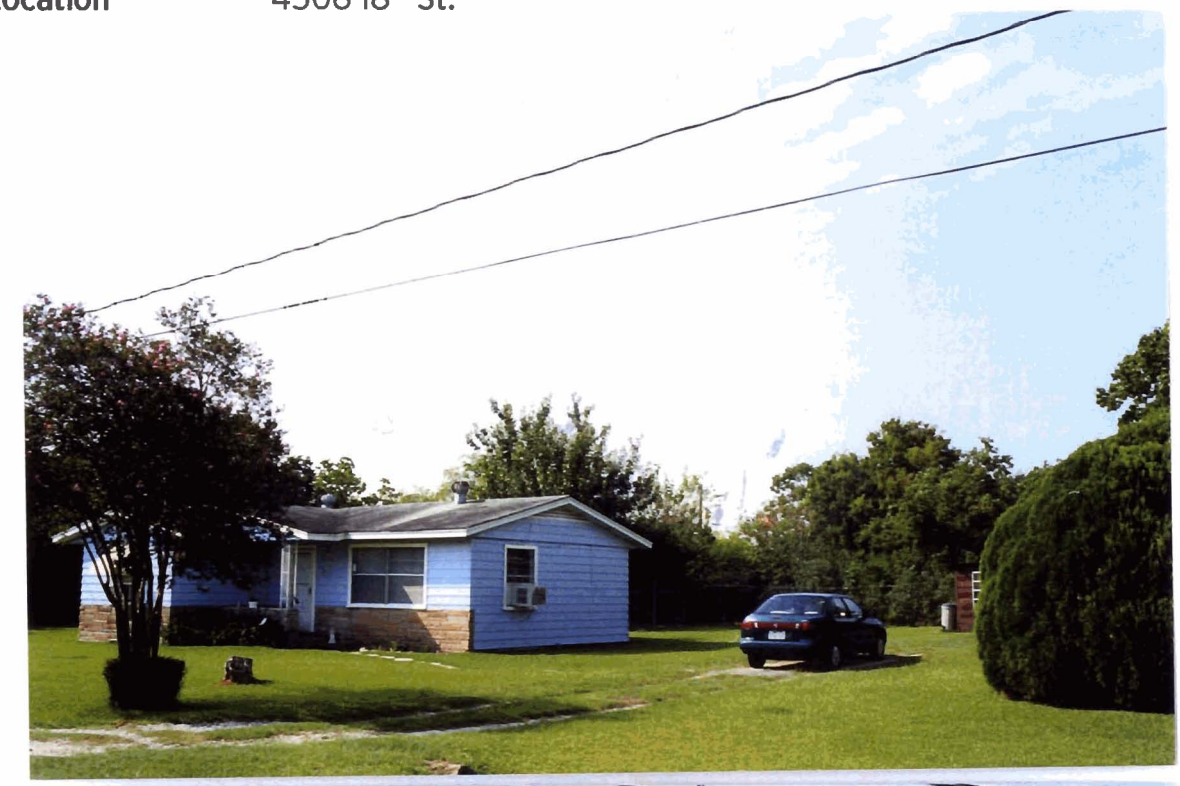
FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	8
Location	1125 Grand Ave.

Historic Resource Site Form

Survey Date	September 2005
Site	9
Location	4506 18th St.



FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date September 2005

Site 9

Location 4506 18th St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	10 Videos & Etc.
Location	1031 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	11
Location	4610 17th St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date September 2005

Site 12

Location 1021 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	13
Location	1009 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	13
Location	1009 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date September 2005

Site 14 June Echoff Chiropractor

Location 1007 Grand Ave.

Historic Resource Site Form

Survey Date	September 2005
Site	15
Location	1003 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	16 Los Regios
Location	942 Grand Ave

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	16 Los Regios
Location	942 Grand Ave

Historic Resource Site Form

Survey Date	September 2005
Site	17
Location	4619 15th St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	18
Location	843 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	18
Location	843 Grand Ave.

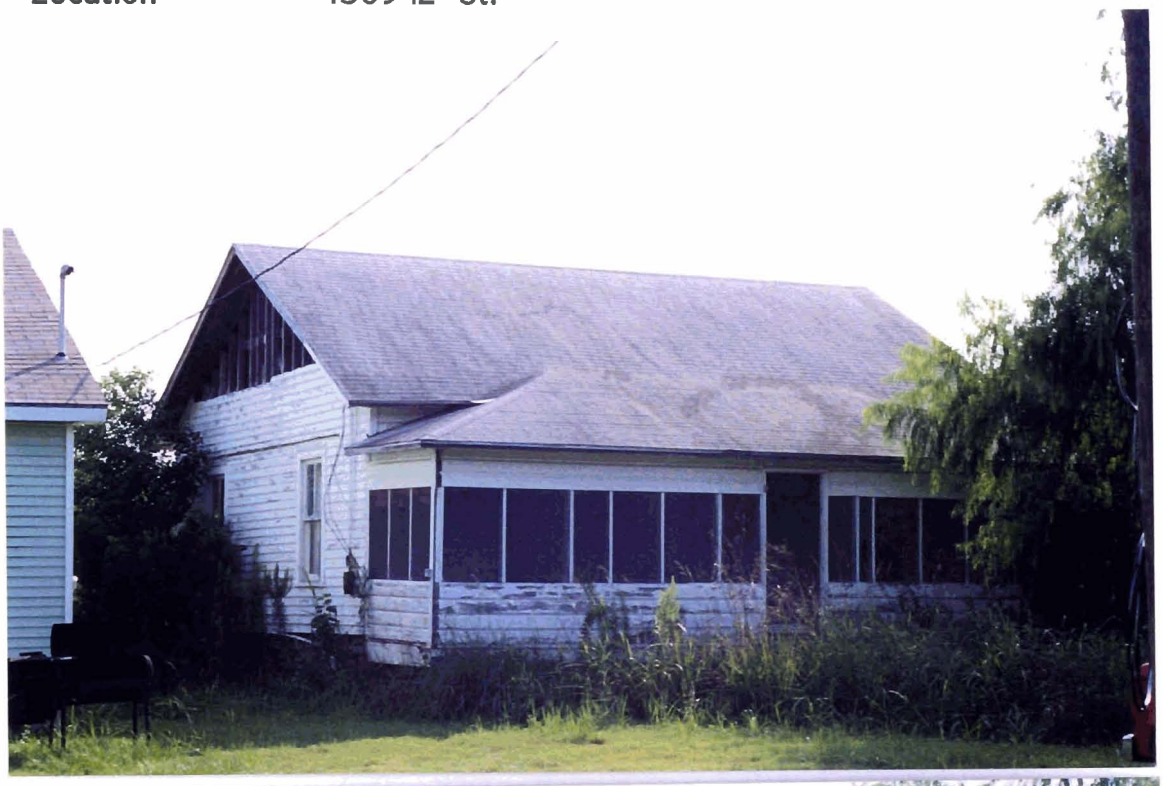
FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	19
Location	4507 13th St.

Historic Resource Site Form

Survey Date	September 2005
Site	20
Location	4509 12th St.



FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	21
Location	4520 10th St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	21
Location	4520 10th St.

Historic Resource Site Form

Survey Date	September 2005
Site	22
Location	4510 9th St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	22
Location	4510 9th St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	22
Location	4510 9th St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	23
Location	631 Grand Ave.

Historic Resource Site Form

Survey Date	September 2005
Site	24 Bay Area Assurance
Location	602 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	24 Bay Area Assurance
Location	602 Grand Ave

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	24 Bay Area Assurance
Location	602 Grand Ave

Historic Resource Site Form

Survey Date	September 2005
Site	25
Location	4510 8th St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	26
Location	4511 8th St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	27
Location	511 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	28 Hair Artists
Location	510 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	29
Location	450 Grand Ave.

Historic Resource Site Form

Survey Date	September 2005
Site	29
Location	450 Grand Ave.

Historic Resource Site Form

Survey Date	September 2005
Site	30
Location	439 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	30
Location	439 Grand Ave.

Historic Resource Site Form

Survey Date	September 2005
Site	31
Location	4615 5th St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	31
Location	4615 5th St.

Historic Resource Site Form

Survey Date	September 2005
Site	32 Lou's Grocery
Location	406 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	32 Lou's Grocery
Location	406 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	32 Lou's Grocery
Location	406 Grand Ave.

Historic Resource Site Form

Survey Date	September 2005
Site	33
Location	4620 3rd St.

Historic Resource Site Form

Survey Date	September 2005
Site	34
Location	4510 2nd St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	34
Location	4510 2nd St.

Historic Resource Site Form

Survey Date	September 2005
Site	35
Location	306 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	35
Location	306 Grand Ave.

Historic Resource Site Form

Survey Date	September 2005
Site	36 **Coupland {Signs}, H & H Services**
Location	305 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	36 **Coupland** {Signs}, H & H Services
Location	305 Grand Ave.

Historic Resource Site Form

Survey Date	September 2005
Site	37
Location	4515 2nd St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	37
Location	4515 2nd St.

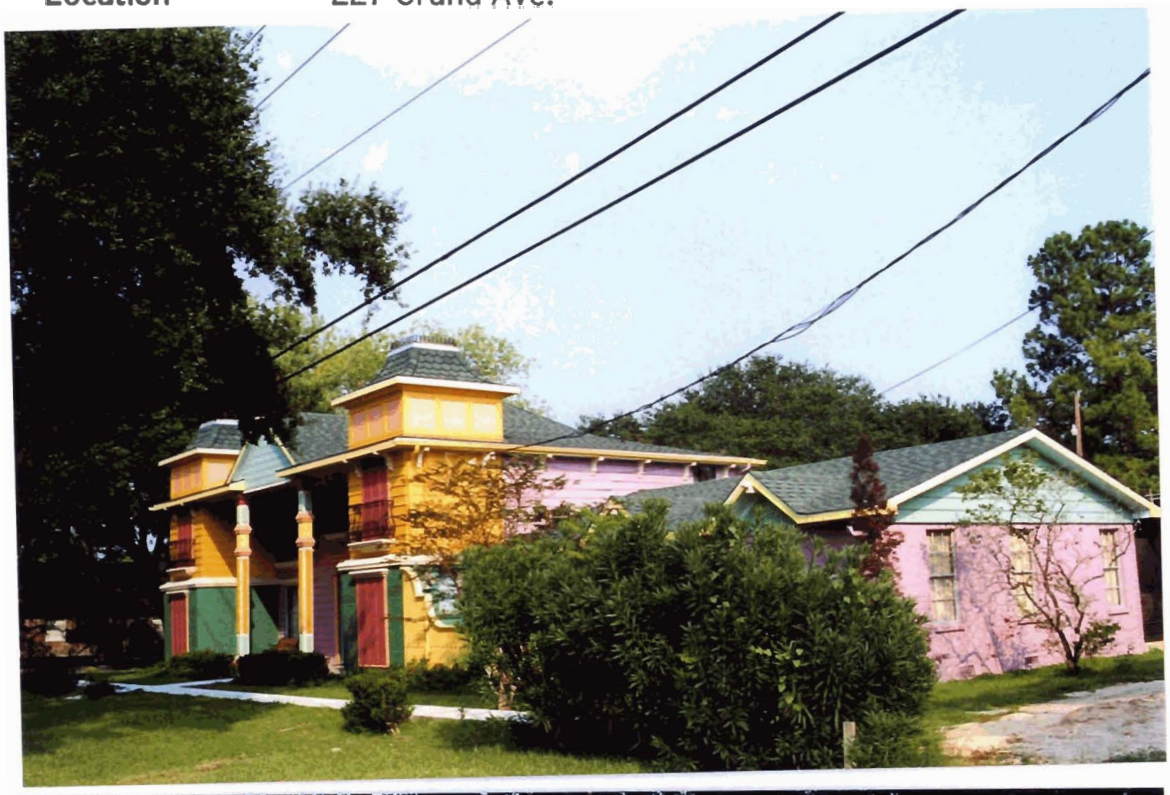
Historic Resource Site Form

Survey Date	September 2005
Site	38
Location	4619 2nd St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	39
Location	227 Grand Ave.



FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date September 2005

Site 39

Location 227 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	39
Location	227 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	39
Location	227 Grand Ave.

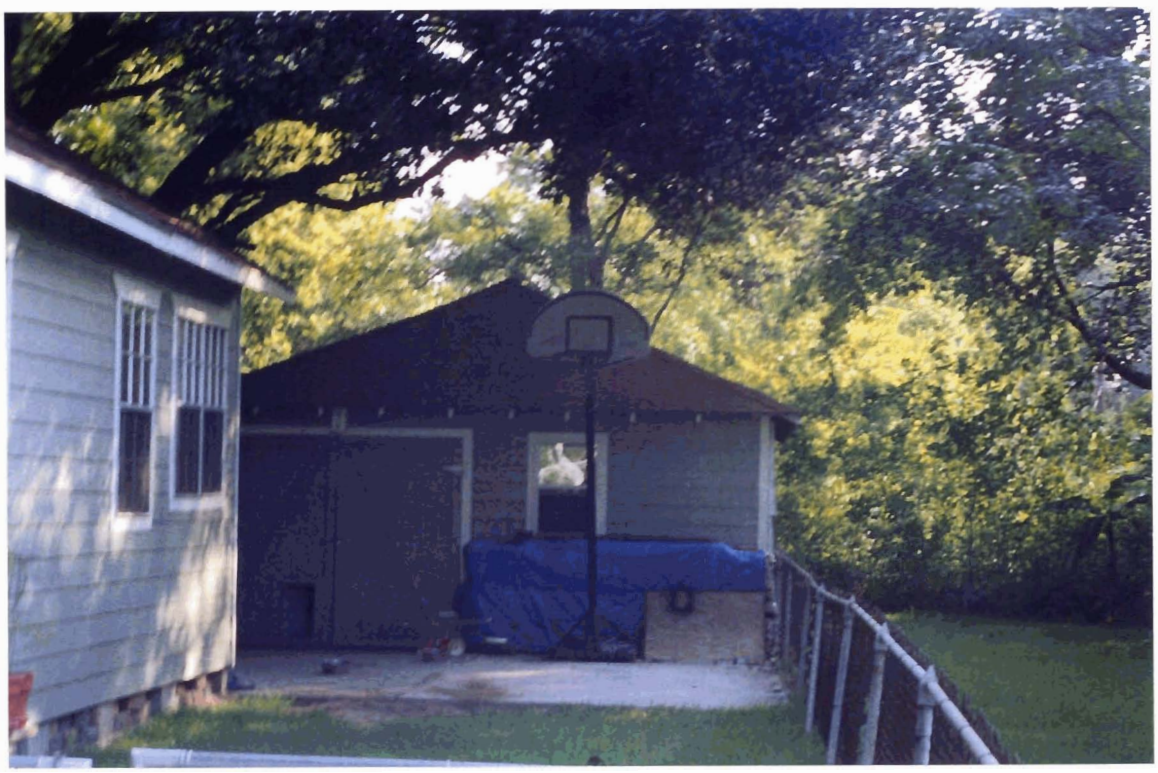
Historic Resource Site Form

Survey Date	September 2005
Site	40
Location	4511 1st St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	40
Location	4511 1st St.



Historic Resource Site Form

Survey Date	September 2005
Site	41 Attorney's Offices
Location	219 Grand Ave.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	42
Location	4615 Oleander St.

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	42
Location	4615 Oleander St.

Historic Resource Site Form

Survey Date	September 2005
Site	43
Location	103 Grand Ave.

Historic Resource Site Form

Survey Date	September 2005
Site	43
Location	103 Grand Ave.

Historic Resource Site Form

Survey Date	September 2005
Site	44
Location	Grand Ave. at Coast Line

FM 646, Galveston County
3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034

Historic Resource Site Form

Survey Date	September 2005
Site	44
Location	Grand Ave. at Coast Line

APPENDIX 3
Brinsap Reports

TEXAS DEPARTMENT OF TRANSPORTATION
* BRIDGE INVENTORY AND INSPECTION FILE

DATE : 02/22/2005
PROGRAM : [illegible]20179

ON-SYSTEM VSAM * HOUSTON DISTRICT

DI	CO.	CON	C	STR	DUP STR-F
12	085	050[illegible]	4	246	0 2

**(006-1) FEAT [illegible]-X: IH 45

**(007-0) FACILITY: FM646

**(009-0) LOCATION: 1.40 MI NW OF FM [illegible]

ITEM #	FIELD	CODE
(004-0)	CITY CODE	24140
(005-2)	HWY.SYS	11
(005-3)	RT.DESIGN	1
(005-4)	HWY NO	0045
(005-5)	ROUTE DIR	0
(006-2)	CRIT.BDG	
(010-0)	RT.MIN VERT CLR	1606
(011-0)	MI-POINT	13990
(011-1)	MIPT DATE(PRI)	198006
(011-1B)	REF-MKR & DISP .0020	+00639
(011-A1)	MIPT DATE(IR)	198007
(012-0)	BASE HWY NETWORK	
(013-1)	LRS INVENTORY ..	
(013-2)	LRS SUB RT.	
(016-0)	LATITUTE (D/M/S)	29 27 57.43
(016-1)	GPS LAT. (DEG.)	29.46595154
(017-0)	LONGITUDE(D/M/S)	095 05 26.54
(017-1)	GPS LONG.(DEG.)	095.09070451
(017-2)	COLLECTION METHOD	4
(019-0)	BYPASS LENGTH	01
(020-0)	TOLL	3
(021-0)	MAINT.RESPON	01
(022-0)	OWNER	01
(022-1)	MAINT.SECT NO	03
(023-1)	PROJECT TYPE	1
(023-2)	CONT/SECT/JOB ...	050004040
(026-0)	FUNCT.CLASS	11
(027-0)	YR ORGIN BUILT	1977
(028-1)	LANES ON STR	02
(028-2)	LANES UNDER STR	10
(029-0)	AADT	094510
(030-0)	YR OF AADT	2003
(031-0)	DESIGN LOAD	5
(032-0)	APPROACH WIDTH	044
(033-0)	MEDIAN	0
(034-0)	SKEW	00
(035-0)	STR.FLARED	0
(036-0)	TRAF.SAFTY FEAT	1111
(037-0)	HISTORICAL SIGNIF	5
(038-0)	NAVIG.CNTL	N
(039-0)	NAVIG.VERT CLR	000
(040-0)	NAVIG.HORIZ CLR	0000
(041-0)	OPER.STATUS	A
(041-1)	LOAD TYPE	N
(041-2)	LOAD IN 1000LBS	NNN
(042-0)	TYPE SERVICE	11
(043-1)	MAIN SPAN TYPE	1131
(043-2)	MAJ.APP SPAN TYPE	1131
(043-3)	MIN.APP SPAN TYPE	
(043-4)	CULVERT TYPE	
(043-5)	TUNNEL TYPE	
(044-1)	SUBSTR MAIN SPAN	341
(044-2)	SUBSTR MAJ APP SPAN....	341
(044-3)	SUBSTR MIN APP SPAN....	
(045-1)	NO.MAIN SPAN	002
(045-2)	NO.MAJ APPR SPAN	004
(045-3)	NO.MIN APPR SPAN	
(046-0)	TOTAL NUMBER SPANS	0006
(047-0)	TOTAL HORIZ CLR	0570
(048-0)	MAX.SPAN LENGTH	0081
(049-0)	STR.LENGTH	000403
(050-1)	LEFT SIDEWALK	000
(050-2)	RIGHT SIDEWALK	000
(051-0)	ROADWAY WIDTH	0443
(052-0)	DECK WIDTH	0460
(053-0)	VERT.CLR OV	9999
(054-1)	VERT.CLR REF FEAT	H
(054-2)	VERT.CLR UND	1600
(055-1)	LAT.CLR REF FEAT	H
(055-2)	RIGHT LAT CLEAR	270
(056-0)	LEFT LAT CLEAR	123
(058-0)	DECK COND	7
(059-0)	SUPERSTR COND	6
(060-0)	SUBSTR COND	7
(061-0)	CHANN-PROTECT	N
(062-0)	CULVERT	N
(063-0)	METHOD OPR.RATING	
(064-0)	OPERATION RATING	249
(065-0)	RDWY APPR COND	6
(065-1)	METHOD INV.RATING	
(066-0)	INVENT RATING	236
(067-0)	STR.EVALUATION .... (6)	6
(068-0)	DECK GEOMETRY .... (9)	9
(069-0)	UND.CLR VERT&HORIZ .... (5)	5
(070-0)	BRIDGE POSTING	5
(071-0)	WATERWAY ADEQUACY	N
(072-0)	APPR RDWY ALIGN	6
(075-0)	TYPE WORK-REPLACE	
(076-0)	LENGTH IMPROVEMENT	000000
(088-0)	ST-FRAC-CRIT/STEEL ....NNNN	
(090-0)	LAST INSP(MMDDYYYY) 12132002	
(091-0)	DESIGNAT INSP FREQ	24
(092-1)	FRACT/CRITI DETAIL	N
(092-2)	UNDERWATER INSP	N
(092-3)	OTHER SPECIAL INSP	N
(093-1)	FRACT/CRITI(MMYYYY)	
(093-2)	UN/WATER INSP(MMYYYY) ..	
(093-3)	OT/SPEC.INSP(MMYYYY) ...	
(094-0)	BDG IMPROVE COST	
(095-0)	RDWY IMPROVE COST	
(096-0)	TOTAL PROJECT COST	000000
(097-0)	YR IMPROVE COST EST....	
(098-0)	BORDER BRIDGE	
(099-0)	BORDER STR NO...	
(100-0)	DEFENSE HWY DESIGN	0
(101-0)	PARALLEL STR DESIGN....	N
(102-0)	DIR.OF TRAFFIC	2
(103-0)	TEMP STR DESIGN	
(104-0)	N H S	1
(105-0)	FED.LANDS HWY	
(106-0)	YR RECONST	0000
(106-1)	WIDENING CODE	0
(107-1)	DECK STR TYP MAIN S....	1
(108-1)	MAIN SPAN WEAR SF	188
(107-2)	STR.TYP MAJ APP SP	N
(108-2)	MAJ.APP SPN WEAR SF....	NNN
(107-3)	STR.TYP MIN APP SP	N
(108-3)	MIN.APP SPN WEAR SF....	NNN
(109-0)	AADT TRK PERCENT	04
(110-0)	DESIGN NATION NETWK....	1
(111-0)	PIER/ABUT PROTECT	
(112-0)	NBIS BRIDGE LENGTH	Y
(113-0)	SCOUR CRITI BDG	N
(113-1)	SCOUR VULNERABILTY	
(114-0)	FUTURE AADT	145250
(115-0)	YR OF FUTURE AADT	2023
(116-0)	MIN.NAVIG VERT CLR	
(119-0)	COST ORGIN CONSTR	
(120-0)	DEFI / OBSO	
(121-0)	SUFF.RATING	95.5
(122-0)	X-REF.PRI RT ID ..	
(123-0)	STR.FUNC PRI RT	1 high zone
(124-0)	X-REF.IR ID ..	
(125-0)	STR.FUNCT IR	
(126-0)	DIST USE...5971 659W	
(128-0)	OV.HEIGHT DAMAGE	Y
(008-4A)	IR.CONTROL	3049
(008-5A)	IR.SECTION	01
(011-A)	IR.MILEPOINT	08207
(008-6A)	IR.STR NO	246
(008-3A)	IR.DUPL OVER	0
(005-1A)	IR.FUNCTION	1
(005-3A)	IR.DESIGNAT	1
(005-2A)	IR.HWY SYS	15
(005-4A)	IR.HWY NO	0646
(005-5A)	IR.DIR	0
(011-2B)	REF-MKR & DISP .0596	+01607
(047-A)	IR.HORIZ CLR	0440
(010-A)	IR.RT.MIN VERT CLR	9999
(012-A)	IR. BASE HWY NETWK	
(013-1A)	IR. LRS INV. ..	
(013-2A)	IR. LRS SUB RT.	
(019-A)	IR.BYPASS LGTH	03
(020-A)	IR.TOLL	3
(026-A)	IR.FUNCT CLASS	12
(029-A)	IR.AADT	014800
(030-A)	IR.YEAR OF ADT	2003
(100-A)	IR.DEF HWY DESIGN	0
(101-A)	IR.PAR STR DESIG	N
(102-A)	IR.DIR OF TRAF	2
(103-A)	IR.TEMP STR DESIGN	
(104-A)	IR. N H S	1
(109-A)	IR.AADT TRK %	05
(110-A)	IR.DESIG NAT NETWK	1
(114-A)	IR.FUTURE AADT	028290
(115-A)	IR.YR OF FUT AADT	2023

TEXAS DEPARTMENT OF TRANSPORTATION
* BRIDGE INVENTORY AND INSPECTION FILE

DATE : 02/22/2005
PROGRAM : [illegible]20179

ON-SYSTEM VSAM * HOUSTON DISTRICT
DI CO. COD C STR DUP STR-F
12 085 304 01 001 0 1

**(006-1) FEAT -X
BENSON GULLY

**(007-0) FACILITY
FM646

**(009-0) LOCATION
0.30 MI SW OF SH [illegible]

ITEM #	FIELD **********	CODE
(004-0)	CITY CODE	24140
(005-2)	HWY.SYS	15
(005-3)	RT.DESIGN	1
(005-4)	HWY NO	0646
(005-5)	ROUTE DIR	0
(006-2)	CRIT.BDG	
(010-0)	RT.MIN VERT CLR	9999
(011-0)	MI-POINT	06947
(011-1)	MIPT DATE(PRI)	198007
(011-1B)	REF-MKR & DISP	.0596 +00322
(011-A1)	MIPT DATE(IR)	
(012-0)	BASE HWY NETWORK	
(013-1)	LRS INVENTORY ..	
(013-2)	LRS SUB RT.	
(016-0)	LATITUTE (D/M/S)	29 28 39.50
(016-1)	GPS LAT. (DEG.)	29.47763891
(017-0)	LONGITUDE(D/M/S)	095 04 25.27
(017-1)	GPS LONG.(DEG.)	095.07368511
(017-2)	COLLECTION METHOD	4
(019-0)	BYPASS LENGTH	03
(020-0)	TOLL	3
(021-0)	MAINT.RESPON	01
(022-0)	OWNER	01
(022-1)	MAINT.SECT NO	03
(023-1)	PROJECT TYPE	1
(023-2)	CONT/SECT/JOB ...	304901001
(026-0)	FUNCT.CLASS	12
(027-0)	YR ORGIN BUILT	1969
(028-1)	LANES ON STR	02
(028-2)	LANES UNDER STR	00
(029-0)	AADT	014800
(030-0)	YR OF AADT	2003
(031-0)	DESIGN LOAD	5
(032-0)	APPROACH WIDTH	042
(033-0)	MEDIAN	0
(034-0)	SKEW	00
(035-0)	STR.FLARED	0
(036-0)	TRAF.SAFTY FEAT	0001
(037-0)	HISTORICAL SIGNIF	5
(038-0)	NAVIG.CNTL	0
(039-0)	NAVIG.VERT CLR	000
(040-0)	NAVIG.HORIZ CLR	0000
(041-0)	OPER.STATUS	A
(041-1)	LOAD TYPE	N
(041-2)	LOAD IN 1000LBS	NNN
(042-0)	TYPE SERVICE	15
(043-1)	MAIN SPAN TYPE	1125
(043-2)	MAJ.APP SPAN TYPE	
(043-3)	MIN.APP SPAN TYPE	
(043-4)	CULVERT TYPE	
(043-5)	TUNNEL TYPE	
(044-1)	SUBSTR MAIN SPAN	121
(044-2)	SUBSTR MAJ APP SPAN....	
(044-3)	SUBSTR MIN APP SPAN....	
(045-1)	NO.MAIN SPAN	003
(045-2)	NO.MAJ APPR SPAN	
(045-3)	NO.MIN APPR SPAN	
(046-0)	TOTAL NUMBER SPANS	0003
(047-0)	TOTAL HORIZ CLR	0440
(048-0)	MAX.SPAN LENGTH	0030
(049-0)	STR.LENGTH	000091
(050-1)	LEFT SIDEWALK	000
(050-2)	RIGHT SIDEWALK	000
(051-0)	ROADWAY WIDTH	0440
(052-0)	DECK WIDTH	0456
(053-0)	VERT.CLR OV	9999
(054-1)	VERT.CLR REF FEAT	N
(054-2)	VERT.CLR UND	0000
(055-1)	LAT.CLR REF FEAT	N
(055-2)	RIGHT LAT CLEAR	999
(056-0)	LEFT LAT CLEAR	000
(058-0)	DECK COND	7
(059-0)	SUPERSTR COND	7
(060-0)	SUBSTR COND	7
(061-0)	CHANN-PROTECT	8
(062-0)	CULVERT	N
(063-0)	METHOD OPR.RATING	
(064-0)	OPERATION RATING	249
(065-0)	RDWY APPR COND	7
(065-1)	METHOD INV.RATING	
(066-0)	INVENT RATING	236
(067-0)	STR.EVALUATION	(7) 7
(068-0)	DECK GEOMETRY	(6) 6
(069-0)	UND.CLR VERT&HORIZ	(N) N
(070-0)	BRIDGE POSTING	5
(071-0)	WATERWAY ADEQUACY	6
(072-0)	APPR RDWY ALIGN	8
(075-0)	TYPE WORK-REPLACE	
(076-0)	LENGTH IMPROVEMENT	000000
(088-0)	ST-FRAC-CRIT/STEEL	NNNN
(090-0)	LAST INSP(MMDDYYYY)....	12132002
(091-0)	DESIGNAT INSP FREQ	24
(092-1)	FRACT/CRITI DETAIL	N
(092-2)	UNDERWATER INSP	N
(092-3)	OTHER SPECIAL INSP	N
(093-1)	FRACT/CRITI(MMYYYY)....	
(093-2)	UN/WATER INSP(MMYYYY)..	
(093-3)	OT/SPEC.INSP(MMYYYY)...	
(094-0)	BDG IMPROVE COST	
(095-0)	RDWY IMPROVE COST	
(096-0)	TOTAL PROJECT COST	000000
(097-0)	YR IMPROVE COST EST....	
(098-0)	BORDER BRIDGE	
(099-0)	BORDER STR NO...	
(100-0)	DEFENSE HWY DESIGN	0
(101-0)	PARALLEL STR DESIGN....	N
(102-0)	DIR.OF TRAFFIC	2
(103-0)	TEMP STR DESIGN	
(104-0)	N H S	1
(105-0)	FED.LANDS HWY	
(106-0)	YR RECONST	0000
(106-1)	WIDENING CODE	0
(107-1)	DECK STR TYP MAIN S....	1
(108-1)	MAIN SPAN WEAR SF	188
(107-2)	STR.TYP MAJ APP SP	N
(108-2)	MAJ.APP SPN WEAR SF....	NNN
(107-3)	STR.TYP MIN APP SP	N
(108-3)	MIN.APP SPN WEAR SF....	NNN
(109-0)	AADT TRK PERCENT	05
(110-0)	DESIGN NATION NETWK....	0
(111-0)	PIER/ABUT PROTECT	
(112-0)	NBIS BRIDGE LENGTH	Y
(113-0)	SCOUR CRITI BDG	8
(113-1)	SCOUR VULNERABILTY	Q
(114-0)	FUTURE AADT	028290
(115-0)	YR OF FUTURE AADT	2023
(116-0)	MIN.NAVIG VERT CLR	
(119-0)	COST ORGIN CONSTR	
(120-0)	DEFI / OBSO	
(121-0)	SUFF.RATING	94.5
(122-0)	X-REF.PRI RT ID ..	
(123-0)	STR.FUNC PRI RT	
(124-0)	X-REF.IR ID ..	
(125-0)	STR.FUNCT IR	
(126-0)	DIST USE...5971 659T	
(128-0)	OV.HEIGHT DAMAGE	N
(008-4A)	IR.CONTROL	
(008-5A)	IR.SECTION	
(011-A)	IR.MILEPOINT	
(008-6A)	IR.STR NO	
(008-3A)	IR.DUPL OVER	
(005-1A)	IR.FUNCTION	
(005-3A)	IR.DESIGNAT	
(005-2A)	IR.HWY SYS	
(005-4A)	IR.HWY NO	
(005-5A)	IR.DIR	
(011-2B)	REF-MKR & DISP .	
(047-A)	IR.HORIZ CLR	
(010-A)	IR.RT.MIN VERT CLR	
(012-A)	IR. BASE HWY NETWK	
(013-1A)	IR. LRS INV. ..	
(013-2A)	IR. LRS SUB RT.	
(019-A)	IR.BYPASS LGTH	
(020-A)	IR.TOLL	
(026-A)	IR.FUNCT CLASS	
(029-A)	IR.AADT	
(030-A)	IR.YEAR OF ADT	
(100-A)	IR.DEF HWY DESIGN	
(101-A)	IR.PAR STR DESIG	
(102-A)	IR.DIR OF TRAF	
(103-A)	IR.TEMP STR DESIGN	
(104-A)	IR. N H S	
(109-A)	IR.AADT TRK %	
(110-A)	IR.DESIG NAT NETWK	
(114-A)	IR.FUTURE AADT	
(115-A)	IR.YR OF FUT AADT	

12/01/06 11:22 FAX 7138025896 TX DOT PROJECT DEV 003

TEXAS DEPARTMENT OF TRANSPORTATION

DATE : 02/22/2005

ON-SYSTEM VSAM * HOUSTON DISTRICT * BRIDGE INVENTORY AND INSPECTION FILE PROGRAM : [illegible]20179

DI	CO. COD	C	STR	DUP	STR-F	**(006-1) FEAT [illegible]-X	**(007-0) FACILITY	**(009-0) LOCATION
12	085 304[illegible]	1	002	0	1	DRAINAGE DIT[illegible]	FM646	0.50 MI W OF FM [illegible]06

ITEM #	FIELD **********	CODE	ITEM #	FIELD	CODE	ITEM #	FIELD	CODE
(004-0)	CITY CODE	24140	(045-2)	NO.MAJ APPR SPAN		(106-1)	WIDENING CODE	0
(005-2)	HWY.SYS	15	(045-3)	NO.MIN APPR SPAN		(107-1)	DECK STR TYP MAIN S....	N
(005-3)	RT.DESIGN	1	(046-0)	TOTAL NUMBER SPANS	0005	(108-1)	MAIN SPAN WEAR SF	NNN
(005-4)	HWY NO	0646	(047-0)	TOTAL HORIZ CLR	0445	(107-2)	STR.TYP MAJ APP SP	N
(005-5)	ROUTE DIR	0	(048-0)	MAX.SPAN LENGTH	0007	(108-2)	MAJ.APP SPN WEAR SF....	NNN
(006-2)	CRIT.BDG		(049-0)	STR.LENGTH	000037	(107-3)	STR.TYP MIN APP SP	N
(010-0)	RT.MIN VERT CLR	9999	(050-1)	LEFT SIDEWALK	000	(108-3)	MIN.APP SPN WEAR SF....	NNN
(011-0)	MI-POINT	05535	(050-2)	RIGHT SIDEWALK	000	(109-0)	AADT TRK PERCENT	05
(011-1)	MIPT DATE(PRI)	198007	(051-0)	ROADWAY WIDTH	0000	(110-0)	DESIGN NATION NETWK....	0
(011-1B)	REF-MKR & DISP .0594	+00875	(052-0)	DECK WIDTH	0000	(111-0)	PIER/ABUT PROTECT	
(011-A1)	MIPT DATE(IR)		(053-0)	VERT.CLR OV	9999	(112-0)	NBIS BRIDGE LENGTH	Y
(012-0)	BASE HWY NETWORK		(054-1)	VERT.CLR REF FEAT	N	(113-0)	SCOUR CRITI BDG	8
(013-1)	LRS INVENTORY ..		(054-2)	VERT.CLR UND	0000	(113-1)	SCOUR VULNERABILTY	A
(013-2)	LRS SUB RT.		(055-1)	LAT.CLR REF FEAT	N	(114-0)	FUTURE AADT	023540
(016-0)	LATITUTE (D/M/S)	29 29 27.34	(055-2)	RIGHT LAT CLEAR	999	(115-0)	YR OF FUTURE AADT	2023
(016-1)	GPS LAT. (DEG.)	29.49092818	(056-0)	LEFT LAT CLEAR	000	(116-0)	MIN.NAVIG VERT CLR	
(017-0)	LONGITUDE(D/M/S)	095 03 18.35	(058-0)	DECK COND	N	(119-0)	COST ORGIN CONSTR	
(017-1)	GPS LONG.(DEG.)	095.05509770	(059-0)	SUPERSTR COND	N	(120-0)	DEFI / OBSO	
(017-2)	COLLECTION METHOD	4	(060-0)	SUBSTR COND	N	(121-0)	SUFF.RATING .... *	97.4
(019-0)	BYPASS LENGTH	03	(061-0)	CHANN-PROTECT	6	(122-0)	X-REF.PRI RT ID ..	
(020-0)	TOLL	3	(062-0)	CULVERT	7	(123-0)	STR.FUNC PRI RT	
(021-0)	MAINT.RESPON	01	(063-0)	METHOD OPR.RATING		(124-0)	X-REF.IR ID ..	
(022-0)	OWNER	01	(064-0)	OPERATION RATING	248	(125-0)	STR.FUNCT IR	
(022-1)	MAINT.SECT NO	03	(065-0)	RDWY APPR COND	7	(126-0)	DIST USE...5971 659R	
(023-1)	PROJECT TYPE	1	(065-1)	METHOD INV.RATING		(128-0)	OV.HEIGHT DAMAGE	N
(023-2)	CONT/SECT/JOB ...304701001		(066-0)	INVENT RATING	236			
(026-0)	FUNCT.CLASS	12	(067-0)	STR.EVALUATION	(7) 7	(008-4A)	IR.CONTROL	
(027-0)	YR ORGIN BUILT	1969	(068-0)	DECK GEOMETRY	(N) N	(008-5A)	IR.SECTION	
(028-1)	LANES ON STR	02	(069-0)	UND.CLR VERT&HORIZ	(N) N	(011-A)	IR.MILEPOINT	
(028-2)	LANES UNDER STR	00	(070-0)	BRIDGE POSTING	5	(008-6A)	IR.STR NO	
(029-0)	AADT	011000	(071-0)	WATERWAY ADEQUACY	6	(008-3A)	IR.DUPL OVER	
(030-0)	YR OF AADT	2003	(072-0)	APPR RDWY ALIGN	8	(005-1A)	IR.FUNCTION	
(031-0)	DESIGN LOAD	4	(075-0)	TYPE WORK-REPLACE		(005-3A)	IR.DESIGNAT	
(032-0)	APPROACH WIDTH	042	(076-0)	LENGTH IMPROVEMENT	000000	(005-2A)	IR.HWY SYS	
(033-0)	MEDIAN	0	(088-0)	ST-FRAC-CRIT/STEEL ....NNNN		(005-4A)	IR.HWY NO	
(034-0)	SKEW	00	(090-0)	LAST INSP(MMDDYYYY)....12202002		(005-5A)	IR.DIR	
(035-0)	STR.FLARED	0	(091-0)	DESIGNAT INSP FREQ	24	(011-2B)	REF-MKR & DISP .	
(036-0)	TRAF.SAFTY FEAT	NNNN	(092-1)	FRACT/CRITI DETAIL	N	(047-A)	IR.HORIZ CLR	
(037-0)	HISTORICAL SIGNIF	5	(092-2)	UNDERWATER INSP	N	(010-A)	IR.RT.MIN VERT CLR	
(038-0)	NAVIG.CNTL	0	(092-3)	OTHER SPECIAL INSP	N	(012-A)	IR. BASE HWY NETWK	
(039-0)	NAVIG.VERT CLR	000	(093-1)	FRACT/CRITI(MMYYYY)....		(013-1A)	IR. LRS INV. ..	
(040-0)	NAVIG.HORIZ CLR	0000	(093-2)	UN/WATER INSP(MMYYYY)..		(013-2A)	IR. LRS SUB RT.	
(041-0)	OPER.STATUS	A	(093-3)	OT/SPEC.INSP(MMYYYY)...		(019-A)	IR.BYPASS LGTH	
(041-1)	LOAD TYPE	N	(094-0)	BDG IMPROVE COST		(020-A)	IR.TOLL	
(041-2)	LOAD IN 1000LBS	NNN	(095-0)	RDWY IMPROVE COST		(026-A)	IR.FUNCT CLASS	
(042-0)	TYPE SERVICE	15	(096-0)	TOTAL PROJECT COST	000000	(029-A)	IR.AADT	
(043-1)	MAIN SPAN TYPE		(097-0)	YR IMPROVE COST EST....		(030-A)	IR.YEAR OF ADT	
(043-2)	MAJ.APP SPAN TYPE		(098-0)	BORDER BRIDGE		(100-A)	IR.DEF HWY DESIGN	
(043-3)	MIN.APP SPAN TYPE		(099-0)	BORDER STR NO...		(101-A)	IR.PAR STR DESIG	
(043-4)	CULVERT TYPE	23	(100-0)	DEFENSE HWY DESIGN	0	(102-A)	IR.DIR OF TRAF	
(043-5)	TUNNEL TYPE		(101-0)	PARALLEL STR DESIGN....	N	(103-A)	IR.TEMP STR DESIGN	
(044-1)	SUBSTR MAIN SPAN		(102-0)	DIR.OF TRAFFIC	2	(104-A)	IR. N H S	
(044-2)	SUBSTR MAJ APP SPAN....		(103-0)	TEMP STR DESIGN		(109-A)	IR.AADT TRK %	
(044-3)	SUBSTR MIN APP SPAN....		(104-0)	N H S	1	(110-A)	IR.DESIG NAT NETWK	
(045-1)	NO.MAIN SPAN	005	(105-0)	FED.LANDS HWY		(114-A)	IR.FUTURE AADT	
			(106-0)	YR RECONST	0000	(115-A)	IR.YR OF FUT AADT	

TEXAS DEPARTMENT OF TRANSPORTATION
* BRIDGE INVENTORY AND INSPECTION FILE

DATE : 02/22/2005
PROGRAM : [illegible]20179

ON-SYSTEM VSAM * HOUSTON DISTRICT
DI CO. COI C STR DUP STR-F
12 085 304 1 006 0 1

**(006-1) FEAT -X: GUM BAYOU
**(007-0) FACILITY: FM646
**(009-0) LOCATION: 1.50 MI E OF FM [illegible]6

ITEM #	FIELD	CODE
(004-0)	CITY CODE	24140
(005-2)	HWY.SYS	15
(005-3)	RT.DESIGN	1
(005-4)	HWY NO	0646
(005-5)	ROUTE DIR	0
(006-2)	CRIT.BDG	
(010-0)	RT.MIN VERT CLR	9999
(011-0)	MI-POINT	03446
(011-1)	MIPT DATE(PRI)	198502
(011-1B)	REF-MKR & DISP	.0592 +00742
(011-A1)	MIPT DATE(IR)	
(012-0)	BASE HWY NETWORK	
(013-1)	LRS INVENTORY ..	
(013-2)	LRS SUB RT.	
(016-0)	LATITUTE (D/M/S)	29 29 32.81
(016-1)	GPS LAT. (DEG.)	29.49244649
(017-0)	LONGITUDE(D/M/S)	095 01 18.36
(017-1)	GPS LONG.(DEG.)	095.02176566
(017-2)	COLLECTION METHOD	4
(019-0)	BYPASS LENGTH	04
(020-0)	TOLL	3
(021-0)	MAINT.RESPON	01
(022-0)	OWNER	01
(022-1)	MAINT.SECT NO	03
(023-1)	PROJECT TYPE	1
(023-2)	CONT/SECT/JOB ...	304901007
(026-0)	FUNCT.CLASS	12
(027-0)	YR ORGIN BUILT	1984
(028-1)	LANES ON STR	02
(028-2)	LANES UNDER STR	00
(029-0)	AADT	009000
(030-0)	YR OF AADT	2003
(031-0)	DESIGN LOAD	5
(032-0)	APPROACH WIDTH	030
(033-0)	MEDIAN	0
(034-0)	SKEW	00
(035-0)	STR.FLARED	0
(036-0)	TRAF.SAFTY FEAT	1011
(037-0)	HISTORICAL SIGNIF	5
(038-0)	NAVIG.CNTL	0
(039-0)	NAVIG.VERT CLR	000
(040-0)	NAVIG.HORIZ CLR	0000
(041-0)	OPER.STATUS	A
(041-1)	LOAD TYPE	N
(041-2)	LOAD IN 1000LBS	NNN
(042-0)	TYPE SERVICE	15
(043-1)	MAIN SPAN TYPE	1125
(043-2)	MAJ.APP SPAN TYPE	
(043-3)	MIN.APP SPAN TYPE	
(043-4)	CULVERT TYPE	
(043-5)	TUNNEL TYPE	
(044-1)	SUBSTR MAIN SPAN	121
(044-2)	SUBSTR MAJ APP SPAN....	
(044-3)	SUBSTR MIN APP SPAN....	
(045-1)	NO.MAIN SPAN	003
(045-2)	NO.MAJ APPR SPAN	
(045-3)	NO.MIN APPR SPAN	
(046-0)	TOTAL NUMBER SPANS	0003
(047-0)	TOTAL HORIZ CLR	0434
(048-0)	MAX.SPAN LENGTH	0040
(049-0)	STR.LENGTH	000120
(050-1)	LEFT SIDEWALK	000
(050-2)	RIGHT SIDEWALK	000
(051-0)	ROADWAY WIDTH	0434
(052-0)	DECK WIDTH	0463
(053-0)	VERT.CLR OV	9999
(054-1)	VERT.CLR REF FEAT	N
(054-2)	VERT.CLR UND	0000
(055-1)	LAT.CLR REF FEAT	N
(055-2)	RIGHT LAT CLEAR	999
(056-0)	LEFT LAT CLEAR	000
(058-0)	DECK COND	7
(059-0)	SUPERSTR COND	7
(060-0)	SUBSTR COND	7
(061-0)	CHANN-PROTECT	7
(062-0)	CULVERT	N
(063-0)	METHOD OPR.RATING	
(064-0)	OPERATION RATING	249
(065-0)	RDWY APPR COND	7
(065-1)	METHOD INV.RATING	
(066-0)	INVENT RATING	236
(067-0)	STR.EVALUATION	(7) 7
(068-0)	DECK GEOMETRY	(5) 5
(069-0)	UND.CLR VERT&HORIZ	(N) N
(070-0)	BRIDGE POSTING	5
(071-0)	WATERWAY ADEQUACY	6
(072-0)	APPR RDWY ALIGN	8
(075-0)	TYPE WORK-REPLACE	
(076-0)	LENGTH IMPROVEMENT	000000
(088-0)	ST-FRAC-CRIT/STEEL ....NNNN	
(090-0)	LAST INSP(MMDDYYYY) 12202002	
(091-0)	DESIGNAT INSP FREQ	24
(092-1)	FRACT/CRITI DETAIL	N
(092-2)	UNDERWATER INSP	N
(092-3)	OTHER SPECIAL INSP	N
(093-1)	FRACT/CRITI(MMYYYY)....	
(093-2)	UN/WATER INSP(MMYYYY)..	
(093-3)	OT/SPEC.INSP(MMYYYY)...	
(094-0)	BDG IMPROVE COST	
(095-0)	RDWY IMPROVE COST	
(096-0)	TOTAL PROJECT COST	000000
(097-0)	YR IMPROVE COST EST....	
(098-0)	BORDER BRIDGE	
(099-0)	BORDER STR NO...	
(100-0)	DEFENSE HWY DESIGN	0
(101-0)	PARALLEL STR DESIGN....	N
(102-0)	DIR.OF TRAFFIC	2
(103-0)	TEMP STR DESIGN	
(104-0)	N H S	1
(105-0)	FED.LANDS HWY	
(106-0)	YR RECONST	0000
(106-1)	WIDENING CODE	0
(107-1)	DECK STR TYP MAIN S....	1
(108-1)	MAIN SPAN WEAR SF	188
(107-2)	STR.TYP MAJ APP SP	N
(108-2)	MAJ.APP SPN WEAR SF....	NNN
(107-3)	STR.TYP MIN APP SP	N
(108-3)	MIN.APP SPN WEAR SF....	NNN
(109-0)	AADT TRK PERCENT	06
(110-0)	DESIGN NATION NETWK....	0
(111-0)	PIER/ABUT PROTECT	
(112-0)	NBIS BRIDGE LENGTH	Y
(113-0)	SCOUR CRITI BDG	8
(113-1)	SCOUR VULNERABILTY	Q
(114-0)	FUTURE AADT	017380
(115-0)	YR OF FUTURE AADT	2023
(116-0)	MIN.NAVIG VERT CLR	
(119-0)	COST ORGIN CONSTR	
(120-0)	DEFI / OBSO	
(121-0)	SUFF.RATING	96.4
(122-0)	X-REF.PRI RT ID ..	
(123-0)	STR.FUNC PRI RT	
(124-0)	X-REF.IR ID ..	
(125-0)	STR.FUNCT IR	
(126-0)	DIST USE...5971 660P	
(128-0)	OV.HEIGHT DAMAGE	N
(008-4A)	IR.CONTROL	
(008-5A)	IR.SECTION	
(011-A)	IR.MILEPOINT	
(008-6A)	IR.STR NO	
(008-3A)	IR.DUPL OVER	
(005-1A)	IR.FUNCTION	
(005-3A)	IR.DESIGNAT	
(005-2A)	IR.HWY SYS	
(005-4A)	IR.HWY NO	
(005-5A)	IR.DIR	
(011-2B)	REF-MKR & DISP .	
(047-A)	IR.HORIZ CLR	
(010-A)	IR.RT.MIN VERT CLR	
(012-A)	IR. BASE HWY NETWK	
(013-1A)	IR. LRS INV. ..	
(013-2A)	IR. LRS SUB RT.	
(019-A)	IR.BYPASS LGTH	
(020-A)	IR.TOLL	
(026-A)	IR.FUNCT CLASS	
(029-A)	IR.AADT	
(030-A)	IR.YEAR OF ADT	
(100-A)	IR.DEF HWY DESIGN	
(101-A)	IR.PAR STR DESIG	
(102-A)	IR.DIR OF TRAF	
(103-A)	IR.TEMP STR DESIGN	
(104-A)	IR. N H S	
(109-A)	IR.AADT TRK %	
(110-A)	IR.DESIG NAT NETWK	
(114-A)	IR.FUTURE AADT	
(115-A)	IR.YR OF FUT AADT	

TEXAS DEPARTMENT OF TRANSPORTATION
* BRIDGE INVENTORY AND INSPECTION FILE

DATE : 02/22/2005
PROGRAM : [illegible]20179

ON-SYSTEM VSAM * HOUSTON DISTRICT
DI CO. COI C STR DUP STR-F
12 085 304[illegible]1 007 0 1

**(006-1) FEAT [illegible]X
DRAINAGE DIT[illegible]

**(007-0) FACILITY
FM646

**(009-0) LOCATION
1.90 MI E OF FM [illegible]6

ITEM #	FIELD **********	CODE
(004-0)	CITY CODE	24140
(005-2)	HWY.SYS	15
(005-3)	RT.DESIGN	1
(005-4)	HWY NO	0646
(005-5)	ROUTE DIR	0
(006-2)	CRIT.BDG	
(010-0)	RT.MIN VERT CLR	9999
(011-0)	MI-POINT	03077
(011-1)	MIPT DATE(PRI)	198502
(011-1B)	REF-MKR & DISP .0592	+00373
(011-A1)	MIPT DATE(IR)	
(012-0)	BASE HWY NETWORK	
(013-1)	LRS INVENTORY ..	
(013-2)	LRS SUB RT.	
(016-0)	LATITUTE (D/M/S)	29 29 33.26
(016-1)	GPS LAT. (DEG.)	29.49257336
(017-0)	LONGITUDE(D/M/S)	095 00 55.19
(017-1)	GPS LONG.(DEG.)	095.01533146
(017-2)	COLLECTION METHOD	4
(019-0)	BYPASS LENGTH	04
(020-0)	TOLL	3
(021-0)	MAINT.RESPON	01
(022-0)	OWNER	01
(022-1)	MAINT.SECT NO	03
(023-1)	PROJECT TYPE	1
(023-2)	CONT/SECT/JOB ...	304901007
(026-0)	FUNCT.CLASS	12
(027-0)	YR ORGIN BUILT	1984
(028-1)	LANES ON STR	02
(028-2)	LANES UNDER STR	00
(029-0)	AADT	009000
(030-0)	YR OF AADT	2003
(031-0)	DESIGN LOAD	5
(032-0)	APPROACH WIDTH	030
(033-0)	MEDIAN	0
(034-0)	SKEW	14
(035-0)	STR.FLARED	0
(036-0)	TRAF.SAFTY FEAT	1011
(037-0)	HISTORICAL SIGNIF	5
(038-0)	NAVIG.CNTL	0
(039-0)	NAVIG.VERT CLR	000
(040-0)	NAVIG.HORIZ CLR	0000
(041-0)	OPER.STATUS	A
(041-1)	LOAD TYPE	N
(041-2)	LOAD IN 1000LBS	NNN
(042-0)	TYPE SERVICE	15
(043-1)	MAIN SPAN TYPE	1125
(043-2)	MAJ.APP SPAN TYPE	
(043-3)	MIN.APP SPAN TYPE	
(043-4)	CULVERT TYPE	
(043-5)	TUNNEL TYPE	
(044-1)	SUBSTR MAIN SPAN	121
(044-2)	SUBSTR MAJ APP SPAN....	
(044-3)	SUBSTR MIN APP SPAN....	
(045-1)	NO.MAIN SPAN	003
(045-2)	NO.MAJ APPR SPAN	
(045-3)	NO.MIN APPR SPAN	
(046-0)	TOTAL NUMBER SPANS	0003
(047-0)	TOTAL HORIZ CLR	0434
(048-0)	MAX.SPAN LENGTH	0031
(049-0)	STR.LENGTH	000094
(050-1)	LEFT SIDEWALK	000
(050-2)	RIGHT SIDEWALK	000
(051-0)	ROADWAY WIDTH	0434
(052-0)	DECK WIDTH	0463
(053-0)	VERT.CLR OV	9999
(054-1)	VERT.CLR REF FEAT	N
(054-2)	VERT.CLR UND	0000
(055-1)	LAT.CLR REF FEAT	N
(055-2)	RIGHT LAT CLEAR	999
(056-0)	LEFT LAT CLEAR	000
(058-0)	DECK COND	7
(059-0)	SUPERSTR COND	7
(060-0)	SUBSTR COND	7
(061-0)	CHANN-PROTECT	8
(062-0)	CULVERT	N
(063-0)	METHOD OPR.RATING	
(064-0)	OPERATION RATING	249
(065-0)	RDWY APPR COND	7
(065-1)	METHOD INV.RATING	
(066-0)	INVENT RATING	236
(067-0)	STR.EVALUATION	(7) 7
(068-0)	DECK GEOMETRY	(5) 5
(069-0)	UND.CLR VERT&HORIZ	(N) N
(070-0)	BRIDGE POSTING	5
(071-0)	WATERWAY ADEQUACY	6
(072-0)	APPR RDWY ALIGN	8
(075-0)	TYPE WORK-REPLACE	
(076-0)	LENGTH IMPROVEMENT	000000
(088-0)	ST-FRAC-CRIT/STEEL	NNNN
(090-0)	LAST INSP(MMDDYYYY)	12202002
(091-0)	DESIGNAT INSP FREQ	24
(092-1)	FRACT/CRITI DETAIL	N
(092-2)	UNDERWATER INSP	N
(092-3)	OTHER SPECIAL INSP	N
(093-1)	FRACT/CRITI(MMYYYY)	
(093-2)	UN/WATER INSP(MMYYYY) ..	
(093-3)	OT/SPEC.INSP(MMYYYY) ...	
(094-0)	BDG IMPROVE COST	
(095-0)	RDWY IMPROVE COST	
(096-0)	TOTAL PROJECT COST	000000
(097-0)	YR IMPROVE COST EST....	
(098-0)	BORDER BRIDGE	
(099-0)	BORDER STR NO...	
(100-0)	DEFENSE HWY DESIGN	0
(101-0)	PARALLEL STR DESIGN....	N
(102-0)	DIR.OF TRAFFIC	2
(103-0)	TEMP STR DESIGN	
(104-0)	N H S	1
(105-0)	FED.LANDS HWY	
(106-0)	YR RECONST	0000
(106-1)	WIDENING CODE	0
(107-1)	DECK STR TYP MAIN S....	1
(108-1)	MAIN SPAN WEAR SF	188
(107-2)	STR.TYP MAJ APP SP	N
(108-2)	MAJ.APP SPN WEAR SF....	NNN
(107-3)	STR.TYP MIN APP SP	N
(108-3)	MIN.APP SPN WEAR SF....	NNN
(109-0)	AADT TRK PERCENT	06
(110-0)	DESIGN NATION NETWK....	0
(111-0)	PIER/ABUT PROTECT	
(112-0)	NBIS BRIDGE LENGTH	Y
(113-0)	SCOUR CRITI BDG	8
(113-1)	SCOUR VULNERABILTY	Q
(114-0)	FUTURE AADT	017380
(115-0)	YR OF FUTURE AADT	2023
(116-0)	MIN.NAVIG VERT CLR	
(119-0)	COST ORGIN CONSTR	
(120-0)	DEFI / OBSO	
(121-0)	SUFF.RATING	96.4
(122-0)	X-REF.PRI RT ID ..	
(123-0)	STR.FUNC PRI RT	
(124-0)	X-REF.IR ID ..	
(125-0)	STR.FUNCT IR	
(126-0)	DIST USE...5971 660Q	
(128-0)	OV.HEIGHT DAMAGE	N
(008-4A)	IR.CONTROL	
(008-5A)	IR.SECTION	
(011-A)	IR.MILEPOINT	
(008-6A)	IR.STR NO	
(008-3A)	IR.DUPL OVER	
(005-1A)	IR.FUNCTION	
(005-3A)	IR.DESIGNAT	
(005-2A)	IR.HWY SYS	
(005-4A)	IR.HWY NO	
(005-5A)	IR.DIR	
(011-2B)	REF-MKR & DISP .	
(047-A)	IR.HORIZ CLR	
(010-A)	IR.RT.MIN VERT CLR	
(012-A)	IR. BASE HWY NETWK	
(013-1A)	IR. LRS INV. ..	
(013-2A)	IR. LRS SUB RT.	
(019-A)	IR.BYPASS LGTH	
(020-A)	IR.TOLL	
(026-A)	IR.FUNCT CLASS	
(029-A)	IR.AADT	
(030-A)	IR.YEAR OF ADT	
(100-A)	IR.DEF HWY DESIGN	
(101-A)	IR.PAR STR DESIG	
(102-A)	IR.DIR OF TRAF	
(103-A)	IR.TEMP STR DESIGN	
(104-A)	IR. N H S	
(109-A)	IR.AADT TRK %	
(110-A)	IR.DESIG NAT NETWK	
(114-A)	IR.FUTURE AADT	
(115-A)	IR.YR OF FUT AADT	

APPENDIX C
HAZARDOUS MATERIALS DATABASE SEARCH RESULTS

Banks Information Solutions, Inc.

Environmental FirstSearch ™ Report

Target Property:

DICKINSON TX 77539

Job Number: ES08788

PREPARED FOR:

TXDOT

7721 Washington Avenue

Houston, TX 77007

AAI

01-11-07

Tel: (512) 478-0059 *Fax: (512) 478-1433*

Environmental FirstSearch
Search Summary Report

Target Site:

DICKINSON TX 77539

FirstSearch Summary

Database	Sel	Updated	Radius	Site	1/8	1/4	1/2	1/2>	ZIP	TOTALS
NPL	Y	10-09-06	1.00	0	0	0	0	0	0	0
NPL Delisted	Y	10-09-06	0.50	0	0	0	0	-	0	0
CERCLIS	Y	11-08-06	0.50	0	0	0	0	-	0	0
NFRAP	Y	11-08-06	0.50	0	0	0	1	-	1	2
RCRA COR ACT	Y	04-16-06	1.00	0	0	0	0	2	0	2
RCRA TSD	Y	04-16-06	0.50	0	0	0	0	-	0	0
RCRA GEN	Y	04-16-06	0.25	0	2	1	-	-	0	3
Federal IC / EC	Y	11-14-06	0.50	0	0	0	0	-	0	0
ERNS	Y	12-31-05	0.25	0	0	0	-	-	1	1
Tribal Lands	Y	12-01-05	0.50	0	0	0	0	-	0	0
State/Tribal Sites	Y	05-14-06	1.00	0	0	0	0	1	0	1
State Spills 90	Y	05-15-05	0.25	0	0	0	-	-	0	0
State/Tribal SWL	Y	05-14-06	0.50	0	0	0	2	-	0	2
State/Tribal LUST	Y	06-28-06	0.50	1	1	0	0	-	0	2
State/Tribal UST/AST	Y	06-28-06	0.25	2	12	3	-	-	3	20
State/Tribal IC	Y	06-27-06	0.50	0	0	0	0	-	0	0
State/Tribal VCP	Y	10-01-06	0.50	0	0	0	0	-	0	0
State/Tribal Brownfields	Y	01/09/06	0.50	0	0	0	0	-	0	0
State Other	Y	03-14-06	0.25	0	3	1	-	-	1	5
- TOTALS -				3	18	5	3	3	6	38

Notice of Disclaimer

Due to the limitations, constraints, inaccuracies and incompleteness of government information and computer mapping data currently available to Banks Information Solutions Inc., certain conventions have been utilized in preparing the locations of all federal, state and local agency sites residing in Banks Information Solutions, Inc.'s databases. All EPA NPL and state landfill sites are depicted by a rectangle approximating their location and size. The boundaries of the rectangles represent the eastern and western most longitudes; the northern and southern most latitudes. As such, the mapped areas may exceed the actual areas and do not represent the actual boundaries of these properties. All other sites are depicted by a point representing their approximate address location and make no attempt to represent the actual areas of the associated property. Actual boundaries and locations of individual properties can be found in the files residing at the agency responsible for such information.

Waiver of Liability

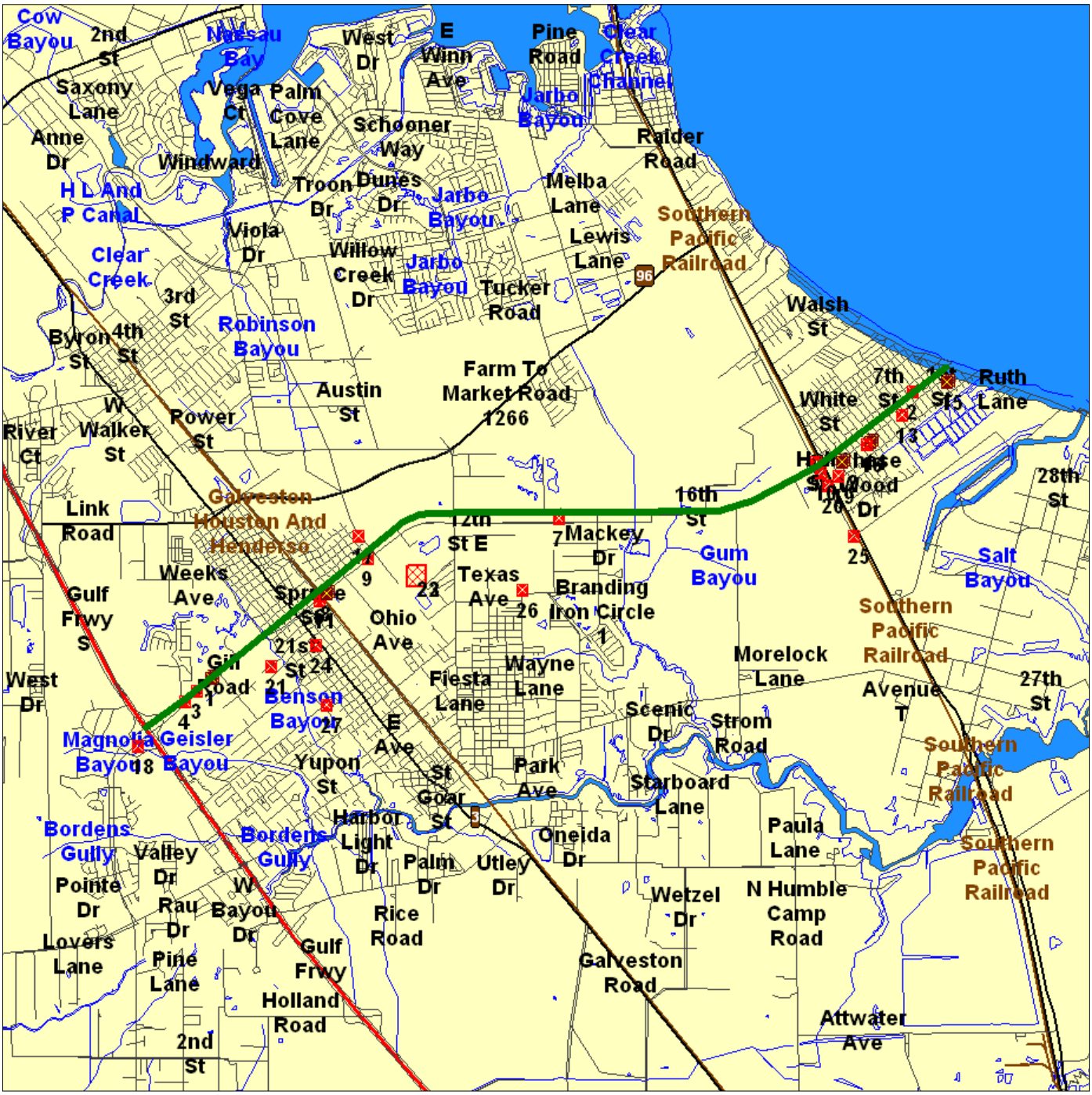
Although Banks Information Solutions, Inc. uses its best efforts to research the actual location of each site, Banks Information Solutions, Inc. does not and can not warrant the accuracy of these sites with regard to exact location and size. All authorized users of Banks Information Solutions, Inc.'s services proceeding are signifying an understanding of Banks Information Solutions, Inc.'s searching and mapping conventions, and agree to waive any and all liability claims associated with search and map results showing incomplete and or inaccurate site locations.

Environmental FirstSearch

1 Mile Radius from Line

Single Map:

, DICKINSON TX 77539



Source: 2002 U.S. Census TIGER Files

Linear Search Line .....

Identified Site, Multiple Sites, Receptor .....

NPL, DELNPL, Brownfield, Solid Waste Landfill (SWL), Hazardous Waste

Triballand.....

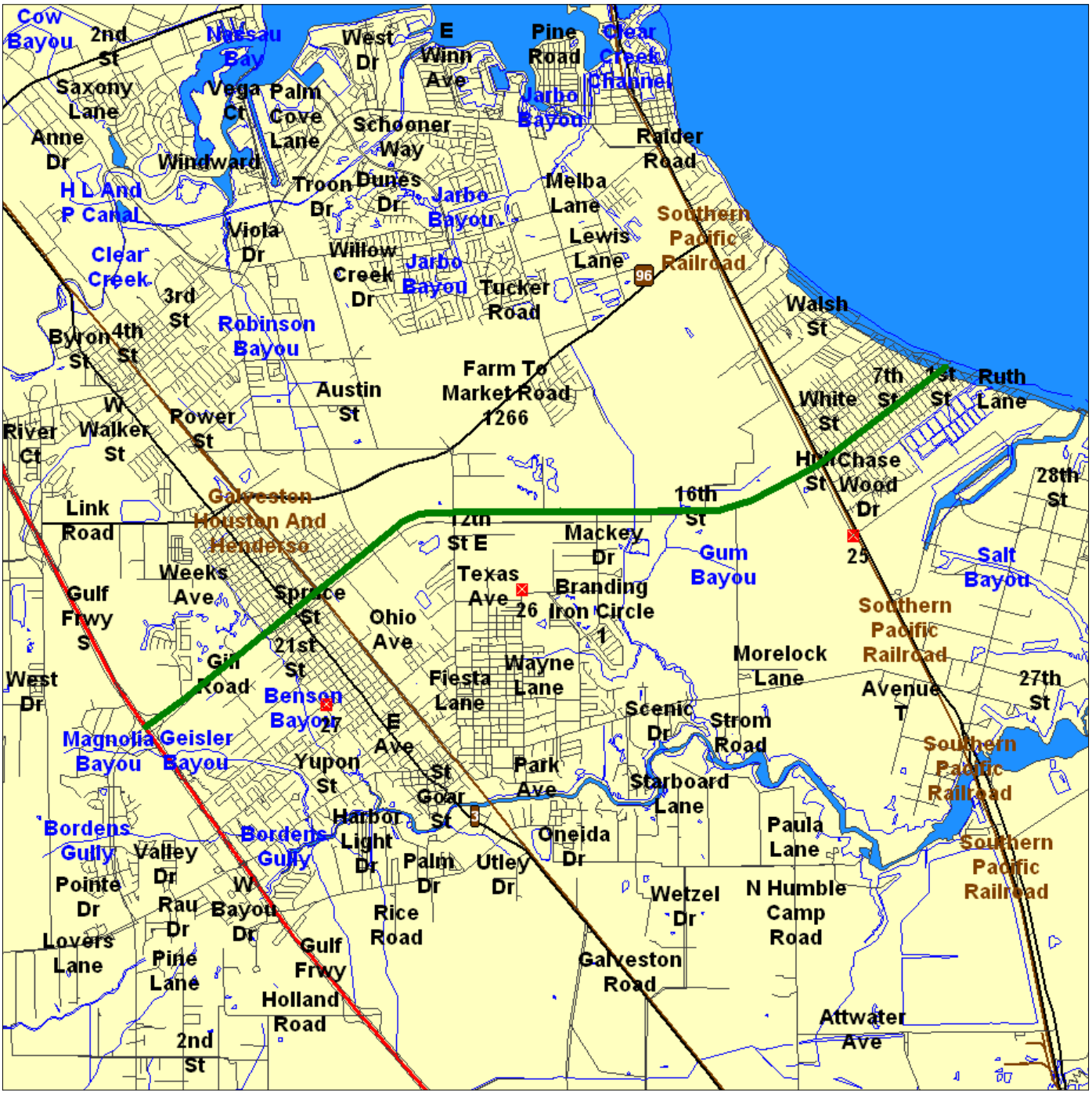
Railroads .....

Environmental FirstSearch

1 Mile Radius from Line

AAI: NPL, RCRACOR, STATE

, DICKINSON TX 77539



Source: 2002 U.S. Census TIGER Files

Linear Search Line .....

Identified Site, Multiple Sites, Receptor .....

NPL, DELNPL, Brownfield, Solid Waste Landfill (SWL), Hazardous Waste

Triballand.....

Railroads .....

Environmental FirstSearch

.5 Mile Radius from Line

AAI: Multiple Databases

, DICKINSON TX 77539

Source: 2002 U.S. Census TIGER Files

Linear Search Line .....

Identified Site, Multiple Sites, Receptor .....

NPL, DELNPL, Brownfield, Solid Waste Landfill (SWL), Hazardous Waste

Triballand.....

Railroads .....

Environmental FirstSearch

.25 Mile Radius from Line

AAI: SPILLS90, RCRAGEN, ERNS, UST, OTHER

, DICKINSON TX 77539

Source: 2002 U.S. Census TIGER Files

Linear Search Line .....

Identified Site, Multiple Sites, Receptor .....

NPL, DELNPL, Brownfield, Solid Waste Landfill (SWL), Hazardous Waste

Triballand.....

Railroads .....

Environmental FirstSearch
Site Information Report

Request Date:	01-11-07	**Search Type:**	LINEAR
Requestor Name:	Jason Lutz		7.82 mile(s)
Standard:	AAI	**Job Number:**	ES08788
		Filtered Report	

Target Site:

DICKINSON TX 77539

Demographics

Sites:	38	**Non-Geocoded:**	6	**Population:**	NA
Radon:	0 - 0.4 PCI/L				

Site Location

	Degrees (Decimal)	**Degrees (Min/Sec)**		**UTMs**
Longitude:	-95.034271	-95:2:3	**Easting:**	302775.266
Latitude:	29.488385	29:29:18	**Northing:**	3263642.42
			Zone:	15

Comment

Comment:FROM IH-45 TO BAYSHORE BLVD

Additional Requests/Services

Adjacent ZIP Codes: 0.25 Mile(s)

ZIP Code	City Name	ST	Dist/Dir	Sel
77518	BACLIFF	TX	0.00 --	Y
77573	LEAGUE CITY	TX	0.00 --	Y

Services:

	Requested?	Date
Sanborns	No	
Aerial Photographs	No	
Historical Topos	No	
City Directories	No	
Title Search/Env Liens	No	
Municipal Reports	No	
Online Topos	No	

Environmental FirstSearch
Selected Sites Summary Report

Target Property: DICKINSON TX 77539

JOB: ES08788
FROM IH-45 TO BAYSHORE BLVD

TOTAL: 38 **GEOCODED:** 32 **NON GEOCODED:** 6 **SELECTED:** 38

Map ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Page No.
	ERNS	M/V CAPT. JOSEPH D257029 129879/UNKNOWN	DICKINSON BAYOU DICKINSON TX 77539	NON GC	1
1	LUST	NORTH COUNTY BUILDING 111805	1301 FM 646 DICKINSON TX 77539	0.00 --	2
12	LUST	DIAMOND SHAMROCK 1087 111771	1103 GRAND AVE BACLIFF TX 77518	0.10 SE	3
24	NFRAP	HG KELLY PITS TXD980810360/NFRAP-N	HWY 3 BETWEEN 19TH and 20TH DICKINSON TX 77539	0.35 SE	7
	NFRAP	ABANDONED LANDFILL TXD988062964/NFRAP-N	HWY 646 LEAGUE CITY TX 77573	NON GC	8
14	OTHER	SCREENED EXPRESSIONS BACLIFF TX IHW-81503/INACTIVE	850 GRAND AVE BACLIFF TX 77518	0.11 SE	9
15	OTHER	DIVISION OF DENNY DAY ASSOCIATES IHW-41876/ACTIVE	130 GRAND AVE BACLIFF TX	0.11 SE	10
16	OTHER	BACLIFF TRUCK SERVICE IHW-31378/INACTIVE	4619 13TH ST BACLIFF TX 77518	0.11 SE	11
21	OTHER	HG KELLEY PITS C/O PERRECO DIV OF IHW-39983/INACTIVE	19TH ST DICKINSON TX 77539	0.25 SE	12
	OTHER	CORSAN TRUCKING IHW-40980/INACTIVE	1335 GRAND AVE BACLIFF TX 77518	NON GC	13
25	RCRACOR	NRG TEXAS LP TXD000837401/CA	5501 HIGHWAY 146 GENERATOR BACLIFF TX 77518	0.67 SE	15
27	RCRACOR	DURATHERM INC TXD981053770/CA	2700 AVENUE S SAN LEON TX 77539	0.80 SE	18
15	RCRAGN	ODA SERVICES TXD988040630/TRANSPORTER	130 GRAND AVE BACLIFF TX 77518	0.11 SE	26
14	RCRAGN	SCREENED EXPRESSIONS TXD988089959/VGN	850 GRAND AVE BACLIFF TX 77518	0.11 SE	27
18	RCRAGN	SHOPPERS MART - 646 TXD988084331/VGN	151 FM 646 E DICKINSON TX 77539	0.17 SW	28
26	STATE	HALL STREET TXSSFTEMP001/EVALUATION UNDERWAY	NORTH OF INTERSECTION -- 20 DICKINSON TX	0.67 SE	29
22	SWL	REPUBLIC WASTE SERVICES OF TX LTD 1849A	1/2 MI. E. OF INTERSECTION N/A TX	0.31 SE	31
23	SWL	TRANSAMERICAN WASTE-HOUS. 1849	1MI NE OF SH 3 ON FM 646 an N/A TX	0.31 SE	32
2	UST	LOUS GROCERY 0075673	406 GRAND AVE BACLIFF TX 77518	0.00 --	33
1	UST	NORTH COUNTY BUILDING 0023417	1301 FM 646 W DICKINSON TX 77539	0.00 --	35
3	UST	JAMES DAVIDSON CONSTRUCTORS 0021725	1201 FM 646 W DICKINSON TX 77539	0.01 SE	37

Environmental FirstSearch
Selected Sites Summary Report

Target Property: DICKINSON TX 77539

JOB: ES08788
FROM IH-45 TO BAYSHORE BLVD

TOTAL: 38 **GEOCODED:** 32 **NON GEOCODED:** 6 **SELECTED:** 38

Map ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Page No.
4	UST	SUPER FOOD COUNTRY STORE 0050224	1105 N FM 646 SANTA FE TX 77539	0.02 SE	40
5	UST	WALKERS FOOD STORE 0021258	4417 HIGHWAY 146 BACLIFF TX 77518	0.03 NW	46
6	UST	LEAGUE CITY FOOD MART 101 0064127	151 FM 646 RD E LEAGUE CITY TX 77573	0.05 SE	51
9	UST	DORSETT BROTHERS CONCRETE SUPPLY I 0075520	1765 FM 646 LEAGUE CITY TX 77573	0.06 SE	55
8	UST	SUPER STAR FOOD 0073268	351 E FM 646 DICKINSON TX 77539	0.06 SE	56
8	UST	SUPER FOOD 1 0006786	351 FM 646 RD E DICKINSON TX 77539	0.06 SE	58
7	UST	HANDI STOP 38 0074085	5651 FM 646 LEAGUE CITY TX 77573	0.06 SE	62
10	UST	STOP N GO 2362 0005518	4515 HIGHWAY 146 BACLIFF TX 77518	0.07 SE	65
11	UST	BROWNIES FOOD 0024890	102 FM 646 W LEAGUE CITY TX 77573	0.07 SE	68
13	UST	BACLIFF GROCERY and DELI 0070112	545 B GRAND AVE BACLIFF TX 77518	0.10 SE	71
12	UST	DIAMOND SHAMROCK 1087 0066270	1103 GRAND AVE BACLIFF TX 77518	0.10 SE	73
17	UST	MILK PRODUCTS LP 0075138	201 E STRAWBERRY DICKINSON TX 77539	0.14 NW	78
19	UST	BACLIFF CENTRAL OFFICE 0004910	4700 19TH ST BACLIFF TX 77518	0.18 SE	79
20	UST	BACLIFF FOOD MART 0074314	4627 HWY 146 BACLIFF TX 77518	0.20 SE	81
	UST	HEB 28 0076614	2995 GULF FWY S LEAGUE CITY TX 77573	NON GC	84
	UST	BAY OIL CO 0035080	4318 HIGHWAY 3 DICKINSON TX 77539	NON GC	86
	UST	SAN LEON FACILITY 0066522	5320 27TH ST SAN LEON TX 77539	NON GC	90

APPENDIX D
DRAFT ARCHEOLOGY REPORT

FM 646 ROADWAY WIDENING
FROM IH 45 TO BAYSHORE BOULEVARD
GALVESTON COUNTY, TEXAS

TxDOT CSJs: 3049-01-027, 3049-01-022, 3049-01-023,
0978-02-053, 0978-02-034

Texas Antiquities Permit No. 3697

Submitted to
The Texas Department of Transportation,
Environmental Affairs Division,
Archeological Studies Program
of the Cultural Resource Management Section
Austin, Texas

DRAFT

By
Douglas G. Mangum
Project Archeologist
and
Roger G. Moore
Principal Investigator

Moore Archeological Consulting, Inc.
Report of Investigations Number 507
August 2007

ABSTRACT

Between August of 2005 and January of 2006, Moore Archeological Consulting, Inc. (MAC) of Houston, Texas conducted an archeological survey of the proposed right-of-way (ROW) widening along FM 646 from the intersection with Interstate Highway (IH) 45 to the intersection with Bayshore Boulevard in the City of Bacliff (Figures 1-5). The overall project length is 14.37 kilometers (km) (8.929 miles [mi]). The existing ROW varies from 0.3 km (100 feet [ft]) to 0.36 km (120 ft).

The investigations were conducted for HNTB Corporation under Texas Antiquities Code (TAC) Permit Number 3697. The results will be subject to review by Galveston County, the Texas Department of Transportation (TxDOT), and the Texas Historical Commission (THC).

The investigation was limited to examination of the portions of the Project Corridor which fell within PALM mandated survey areas and for which right-of-entry (ROE) had been obtained. Most of the proposed corridor expansion falls within privately owned land. Of the 0.11 km^2 (26.28 acres [ac]) of PALM recommended survey, 0.07 km^2 (16.33 ac) of ROE was obtained. The remainder was visually examined from the existing ROW to determine if there was visible disturbance sufficient to negate the need for additional survey. Any undisturbed areas were recorded as requiring survey after TxDOT acquires the land.

An examination of the existing ROW along the proposed Project Corridor was conducted during the investigation, as per TxDOT requirements. This examination found that the construction of ditches, roads, driveways and the placement of infrastructure elements such as gas and phone lines have impacted the existing ROW along the entire corridor.

It is the recommendation of Moore Archeological Consulting, Inc. that the construction of the proposed FM 646 ROW expansion be permitted to proceed on the properties determined during this study to need no further archeological investigation. It is further recommended that portions of the remaining 1.8 km (1.1 mi) of ROW, which could neither be shovel tested nor determined by the visual examination to be disturbed, should be examined after the ROW is purchased by TxDOT and prior to construction. Should archeological deposits or features be encountered during construction, it is advised that construction cease in the immediate area of the finds and the Archeology Division of the THC should be contacted for further consultation.

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INTRODUCTION

Between August of 2005 and January of 2006, Moore Archeological Consulting, Inc. (MAC) of Houston, Texas conducted an archeological survey of the proposed right-of-way (ROW) widening along FM 646 from the intersection with Interstate Highway (IH) 45 to the intersection with Bayshore Boulevard in the City of Bacliff (Figures 1-4). The project is found on the Bacliff (299425), Dickinson (299540), and Texas City (299433) USGS quadrangle maps. The investigations were conducted under Texas Antiquities Code (TAC) Permit Number 3697 for HNTB Corporation. The results will be subject to review by Galveston County, the Texas Department of Transportation (TxDOT), and the Texas Historical Commission (THC).

The proposed project is approximately 14.37 km (8.929 mi) in length and consists of expanding the existing FM 646 roadway from two lanes to four lanes with a raised median. The existing FM 646 is an at-grade highway with an existing ROW of 30 meters (m) (100 ft). The pavement consists of asphaltic concrete on flexible base. The proposed ROW would be a maximum of 37 m (120 ft), including 6 m (20 ft) of proposed ROW. The maximum depth of impacts is expected to be no more than 2 m (6 ft). TxDOT owns the existing right-of-way (ROW) within the project area and the proposed ROW consists of privately owned land.

The fieldwork in the current investigation is based upon the TxDOT Potential Archeological Liability Mapping (PALM) model (Abbott 2001). Application of the PALM model to the current Project Corridor requires that the following assumptions be made.

1. All PALM Unit 2 areas with ROE and not significantly impacted should be shovel tested.
2. All mound features within PALM Unit 2a areas would be tested.
3. All PALM Unit 4 areas should be excluded from requiring surface survey in the form of shovel testing.
4. Backhoe trenching is not required within the project corridor.

This investigation dealt only with the portions of the proposed corridor that fell within sections recommended for survey by the PALM model (Abbott 2001). The PALM model did not identify any segment of the proposed project corridor as requiring deep reconnaissance (in the form of backhoe trenching). The actual shovel testing survey was limited to those segments for which right-of-entry (ROE) permission could be obtained, as most of the land in question is still privately owned. Tracts without ROE were examined from the ROW edge and, where possible, determinations were made as to the integrity and need for survey. Additionally, the existing ROW was examined to determine if there were potentially intact segments that might require survey (See METHODS).

The objective of the investigation was to determine the presence or absence of cultural materials within the location proposed for the widening of the ROW. In addition, the investigation needed to assess, if possible, any potentially impacted archeological sites and provide recommendations regarding mitigation measures, if any are necessary. Finally, a report of the results of the survey to Galveston County, TxDOT, and the THC was provided.

The crew excavated 63, 30 x 30-centimeter (cm) (roughly 12 x 12-inch [in.]) shovel tests during

the survey at preset intervals, as described in the METHODS section of this report. These excavations produced no cultural resources.

Project Archeologist Douglas G. Mangum and Field Project Archeologist Randy Ferguson, with Crewmember Steven Hall, conducted this investigation under the supervision of the Principal Investigator, Roger G. Moore, Ph.D.

ENVIRONMENTAL SETTING

Modern Climate

The modern climate of Galveston County is generally hot and humid. The coastal portions of the county are cooled by sea breezes. The mean annual temperature of the region is approximately 23° Celsius (C) (74° Fahrenheit [F]), with mean daily temperatures ranging from 30.8°C (87.5°F) in August to 15°C (59.3°F) in January. Galveston County receives an average of 100.8 cm (39.73 in.) of rainfall annually (Crenwelge et al. 1988).

Modern Flora and Fauna

Southeast Texas is within the Austroriparian biotic province, near its western boundary with the Texan province (Blair 1950:98-101). Pine-hardwood forests on the eastern Gulf coastal plain mark this boundary, which is set by available moisture levels. The project area is situated within the pine-oak forest subdivision of the Austroriparian province and includes portions of the coastal prairie within its western limits (Tharp 1939).

Grasses within the coastal prairies and marsh vegetation area are described from a range-management perspective in Hoffman et al. (nd: 45). This 10,000,000-acre (ac) area consists of 9,500,000 ac of gulf prairies and 500,000 ac of gulf marshes. The regional vegetation of the coastal prairies is characterized as follows:

> The principal grasses of the prairies are tall bunchgrass, including big bluestem *(Andropon gerardi)*, little bluestem, seacoast bluestem *(Schizachyrium scoparium*, var. *littorus)*, Indiangrass, eastern gamagrass *(Tripascum dactyloides)*, switchgrass, and gulf cordgrass. Seashore saltgrass is common on moist saline sites. Grazing pressures have changed the composition of the range vegetation so that the grasses now existing are broomsedge bluestem, smutgrass, threeawns, tumblegrass (species) and many other inferior grasses. The other plants that have invaded the productive grasslands are oak underbrush, mcartney rose, huisache, mesquite, pricklypear, ragweed, bitter sneezeweed, broomweed, and many other unpalatable annual weeds [Hoffman et al. nd: 45].

The dominant floral species of the pine-oak forest subdivision of the Austroriparian biotic province include loblolly pine *(Pinus taeda)*, yellow pine *(Pinus echinata)*, red oak *(Quercus rubra)*, post oak *(Quercus stellata)*, and blackjack oak *(Quercus marilandica)*. Hardwood forests are found on lowlands within the Austroriparian and are characterized by such trees as sweetgum *(Liquidambar styraciflua)*, magnolia *(Magnolia grandiflora)*, tupelo *(Nyssa sylvatica)*, water oak *(Quercus nigra)* and other species of oaks, elms, and ashes, as well as the highly diagnostic Spanish moss *(Tillandsia usneiodes)* and palmetto *(Sabal glabra)*. Swamps are common in the region.

Blair (1950) and Gadus and Howard (1990:12-15) define the following mammals as common within the Austroriparian province: white-tailed deer *(Odocoileus virginianus)*, muskrat *(Ondatra zibethicus)*, raccoon *(Procyon lotor)*, coyote *(Canis latrans)*, opossum *(Didelphis*

virginiana), eastern mole *(Scalopus aquaticus),* eastern pipistrelle *(Pipistrellus subflavus),* eastern red bat *(Lasiurus borealis),* fox squirrel *(Sciurus niger),* eastern gray squirrel *(Sciurus carolinensis),* southern flying squirrel *(Glaucomys volans),* Baird's pocket gopher *(Geomys breviceps),* salt marsh harvest mouse (*Reithrodonomys fulvescens),* white-footed mouse *(Peromyscus leucopus),* Marsh rice rat *(Oryzomys palustris),* cotton rat *(Sigmodon hispidus,),* packrat *(Neotoma floridana),* eastern cottontail *(Sylvilagus floridanus),* and swamp rabbit *(Sylvilagus aquaticus).* Bison *(Bison bison)* may have been present on nearby grasslands at various times in the past (Gadus and Howard 1990:15).

Common land turtles include eastern box turtle *(Terrapene carolina)* and ornate box turtle (*Terrapene ornata*), while snapping turtle *(Chelydra serpentinia)*, mud turtle *(Kinosteron* spp.), river cooter *(Chrysemys concinna),* and diamondback terrapin *(Malaclemys terrapin)* comprise common water turtles. Common lizards include green anole (*Anolis carolinensis)*, fence lizard *(Sceloporus undulatus*), common ground skink *(Leiolopisma laterale),* broadhead skink *(Eumeces laticeps),* six-lined racerunner *(Cnemidophorus sexlineatus)*, and the glass snake (*Ophiosaurus ventralis)*. Snakes and amphibians are also present in considerable numbers and diversity.

The resources provided by river-influenced estuarine and marsh environments were undoubtedly of great importance to the littoral residents of southeast Texas. These resources are summarized by Gadus and Howard (1990:12-15). Estuarine fish resources cited by Gadus and Howard include sand trout *(Cynoscion arenarius)*, spotted sea trout *(Cynoscion nebulosus)*, Atlantic croaker *(Micropogon undulatus)*, striped mullet *(Mugil cephalus)*, southern flounder *(Paralichthysis lethostigma)*, shortnose gar *(Lepisosteus platostomus)*, channel catfish *(Ictalurus punctatus)*, freshwater drum *(Aplodinotus grunniens)*, red drum *(Sciaenops ocellata)*, bluegill *(Lepomis macrochirus)* and other sunfishes. Common shellfish include rangia *(Rangia cuneata)*, dwarf surf clam *(Mulinia lateralis)*, oyster *(Crassostrea virginica)*, and olive nerite *(Neritina [Vitta] reclivata)*. Arthropods, such as shrimp and crab, are also numerous and highly productive.

Area marshes replete with plants such as cordgrasses *(Spartina* spp.), reeds *(Phragmites* spp.), giant millet *(Setaria magna)*, and bullrushes *(Scirpus* spp.) would have formed a highly attractive and bountiful magnet for waterfowl (Gadus and Howard 1990).

Soils and Geology

Geologic formations of the Upper Texas Coastal region are Pleistocene in age. The Gulf Coastal Plain is the result of a series of sediment wedges, both marine and continental, created over the last 65 million years (Spearing 1991). Their presence is the result of the rise and fall of sea level and the fluvial and deltaic deposits of Texas rivers.

Combinations of these activities have contributed to the advancement of the Gulf Coast shoreline and the Gulf of Mexico. The geological activity that created the Texas coastal floodplain over the last 65 million years has added 402 km (250 mi.) of land to the United States (Spearing 1991).

The surface geology of the Gulf Coastal Plain is referred to as the Lissie Formation of the Houston Group. The Lissie Formation is a series of Pleistocene-age deposits located stratigraphically above Pliocene-age sands and gravels. Extending from the Sabine River to the Rio Grande, the Formation fans out into a 32-km (20-mi) wide belt north of the Beaumont Plain (Fields et al. 1983). It retains deltaic and fluvial characteristics from its composition of river materials and of materials deposited from continental deterioration carried by streams across the coastal plain (Wheeler 1976).

According to the PALM model developed by Abbott for the TxDOT Houston District, roughly 3,900 m (2.4 mi) of the overall 12 km (7.5 mi) project corridor is Unit 2 or Unit 2a, which required shovel testing to some degree. All but a small segment of this area is Unit 2a, which requires survey only on mound features. The remainder of the Project Corridor falls within PALM Unit 4, which requires no archeological survey.

The proposed project area is depicted on sheets 3, 8 and 9 of the Soil Survey of Galveston County, Texas (Crenwelge et al. 1988). The dominant soils in the project corridor are Mocarey-Leton complex (3600 m), Bernard clay loam (3000 m), Lake Charles clay (2400 m), and Morey silt loam (1050 m). There are also significant areas of Mocarey-Algoa complex (750 m), Bacliff clay (650 m), and Verland silty clay loam (620 m), as well as insignificant pieces of Leton-Lake Charles complex and Mocarey loam (less than 200 m each).

The Mocarey soils are of low geoarcheological (GA) potential (Abbott 2001). They are somewhat poorly drained soils of ancient alluvial origin. Leton loam is a poorly drained, loamy ancient alluvium with a low to moderate GA potential. Bernard clay loam is a somewhat poorly drained soil with a low GA potential. However Bernard soils sometimes contain low mound features. Lake Charles soils are somewhat poorly drained ancient clay alluvium with a low GA potential. Morey soils are poorly drained loamy ancient alluvium with a low GA potential. Algoa soils are somewhat poorly drained ancient alluvium or eolian deposit with a low GA potential. The Bacliff clays are poorly drained loamy, clayey alluvium of ancient origins with a low GA potential. The Verland soils are somewhat poorly drained soils of ancient alluvial origins with a low GA potential.

During fieldwork, the crew found the project area to be level coastal prairie with occasional shallowly incised drainages. Scattered mounds and mound remnants were observed throughout the project corridor. Soils varied between clay loams to shallow clay soils. Sandy soils were observed where mound features were excavated.

Hydrology

The project corridor has five stream crossings. All but one of these streams are either modified or entirely man made. Benson Bayou is the only named stream crossing. All the stream crossings eventually flow into Dickinson Bayou. Only two of these streams fall within segments of the project area designated as requiring survey, according to the PALM model. Partial access was available for the easternmost of these two streams. However, since this stream is heavily modified where it crosses FM 646, only two shovel tests were needed.

The westernmost stream was inaccessible, due to the lack of ROE. This area does not seem to have experienced previous impact. This stream is still partially flowing in its original stream channel.

Access was unavailable for the westernmost of these two streams and this was in an area with relatively little prior impact outside of the existing ROW. This stream is also appears to still be at least partially following its original stream channel.

The only other body of water potentially affecting the Project Area is Galveston Bay. Though not potable, the water of this bay would have potentially provided numerous other resources to prehistoric and historic settlers. However, the portion of the Project Area closest to the bay is entirely encompassed by the City of Bacliff. It is unlikely that any intact cultural deposits remain within this area and that is recognized by the PALM model, indicating that entire portion is Unit 4 requiring no survey.

ARCHEOLOGICAL BACKGROUND

The project area is within the Southeast Texas Archeological Region, which has been recently summarized by Patterson (1995). Other recent prehistoric summaries equally pertinent to the prehistory of the Galveston and surrounding counties area include Ensor (1991), and Moore and Moore (1991). The reader is referred to these works for detailed data on the prehistory of this region.

Previous investigations in Southeast Texas have demonstrated that prehistoric people occupied this area as early as 12,000 years ago. All through prehistory, the inhabitants were nomadic hunter-gatherers. Ensor (1991) has proposed a prehistoric cultural sequence of periods for Southeast Texas which are as follows: Paleo-Indian (10,000-8,000 BC), Early Archaic (8,000-5,000 BC), Middle Archaic (5,000-1,000 BC), Late Archaic (1,000 BC-AD 400), Early Ceramic (AD 400-AD 800), and Late Ceramic (AD 800-AD 1750).

Evidence for prehistoric occupation of Southeast Texas is scarce in the Paleo-Indian period, and indeed, is rather ambiguous through the Middle Archaic period (Patterson 1983; Aten 1983:156-157). However, although most previously recorded sites date to the Late Archaic and Ceramic periods, it is probable that earlier dating sites have been lost to erosion, channel cutting, and, particularly in the case of very early sites, to rising sea level. In cases where early-dating artifacts have been found, such as Wheat's (1953) finds of projectile points dating from the Paleo-Indian through Middle Archaic periods at Addicks Reservoir in western Harris County, the materials occur in deposits with poor contextual integrity.

Sites dating from the Late Archaic through the Ceramic periods are more commonly found in the project vicinity. During the late Archaic period, modern climatic conditions evolved, sea level rose and stabilized, and coastal woodlands expanded. Aten (1983) hypothesizes that an increase in population and the establishment of seasonal rounds, including regular movement from littoral to inland areas occurred during the Late Archaic period. Particularly relevant to the prehistory of the project area are Hall's (1981) data from the Allens Creek project in nearby Austin County, Texas. Excavations of a large cemetery there suggest a Late Archaic trade system that linked Southeast Texas to Central Texas and areas eastward into Arkansas. The excavation of other, smaller cemeteries in this section of the Brazos River drainage, including some in Fort Bend County, have yielded similar evidence.

Aten (1983) has proposed that ceramics were introduced in the aboriginal artifact assemblage on the Upper Texas Coast at AD 100. Ensor (1991) places the beginnings of the Early Ceramic period at AD 400, which may be more applicable for areas inland from the coastline. The Early Ceramic period is characterized by a continued growth in population levels. Ensor (1991) places the beginning of the Late Ceramic at AD 800, which coincides with the introduction of the bow and arrow. A plain sand-tempered pottery dominates throughout both parts of the Ceramic era. Story et al. (1990) has defined the Mossy Grove Cultural Tradition for Late Prehistoric cultures in Southeast Texas with sandy paste pottery being the principle diagnostic artifact type.

European settlement did not begin to seriously disrupt aboriginal habitation in the areas inland from the Upper Texas Coast until after AD 1700 (Patterson 1995; 249). European diseases,

probably introduced by explorers and early traders, began to have impacts as early as AD 1528. At least 7 epidemics were recorded amongst the tribes of the study area between AD 1528 and AD 1890 (Ewers 1974).

The project area appears to have been in the territory of the Akokisa Native American group in the eighteenth and nineteenth centuries. According to Aten (1983) this was part of the lower range of the Akokisa where they would stay in the summer. During the same time period, epidemic diseases, the mission system, and the fur trade acted to severely reduce, and in some cases exterminate, the indigenous population of the region, including the Akokisa.

PREVIOUS ARCHEOLOGICAL INVESTIGATIONS

A review of the Texas Sites Atlas maintained by the Texas Archeological Research Laboratory at the University of Texas indicated that there are no sites recorded within 1 km (0.6 mi) of the project corridor. The absence of previously recorded sites in the project area may be due to a lack of previous archeological surveys in the immediate area.

There has only been one previous archeological survey conducted across the project corridor. This was a linear survey conducted by the U. S. Army Corps of Engineers in the late 1970's. This appears to have been related to a high-tension power line that runs across this area. No sites appear to have been found within this portion of that investigation.

METHODS

Shovel Testing

Shovel testing was conducted in an attempt to identify buried cultural resources within the project corridor. A single transect was established within the proposed ROW expansion. Shovel tests were excavated along these transects at an interval of approximately every 100 m (328 ft). Alterations were made to transects and shovel test intervals when necessary to avoid dense thickets and landscape variations such as streambeds. Alterations were also made to allow testing of more relevant landforms such as mounds and stream banks. All visible surfaces were examined for historic or prehistoric archeological materials. Surface visibility varied throughout the project area, from 0-50% due to various types of ground cover.

The crew excavated all shovel tests in 10-cm (4-in.) arbitrary levels and screened the soils through .25-in. hardware cloth. Soils that were too compact or clayey to sieve through hardware cloth were broken up by hand. All materials were carefully examined for cultural artifacts. Location, size, depth, and all other data for each shovel test were recorded on standardized MAC shovel test forms. Shovel tests were immediately backfilled. The UTM locations of all shovel tests were recorded utilizing recreation-grade GPS units (Magellan 315 and Magellan Meridian Platinum [WAAS enabled]). As previously mentioned, it was determined that deep reconnaissance, in the form of backhoe trenching, would not be required for this investigation.

Any locality producing either prehistoric or historic cultural remains was recorded on State of Texas archeological site forms for submission to TxDOT. In addition to form information, sites and features were documented by photographs, plan and stratigraphic sketches and measured drawings, and crewmembers' daily field notes. Investigations at any identified site or feature sought to determine site boundaries, depth, nature of the archeological deposits, and the site's state of preservation. Historic buildings (if any) and all other archeological sites and cultural features were photographed, mapped in plan view, and plotted with accuracy on USGS quadrangle maps and project maps (if available). Recommendation for State Archeological Landmark (SAL) and National Register of Historic Places (NRHP) eligibility were left blank, as per TxDOT procedure.

For buried or obscure sites, boundaries were delineated through a combination of soil surface examination and shovel test excavation. Where necessary shovel tests were dug at 5-10 m (16-32 ft) intervals radially in the cardinal directions from the presumed center of each site until no further artifacts were encountered in two successive units (or until the boundary of the project area was reached). The site boundary on each radius was presumed to lie between the last artifact-producing test and the first sterile unit. Information on the depth and nature of the deposits was derived from shovel test results, as well as available surface observations. Any prehistoric or potentially pre-1870 historic materials recovered from the shovel tests or other subsurface investigations, and any diagnostic cultural materials from the above periods found on the surface, will be collected and retained.

Photographs were taken of stream crossings, the existing ROW, and general landforms within the project area. Photographs were also taken of any obvious features (i.e. pimple mounds,

structure remnants, etc.) and of any sites found. Photograph direction, subject, photographer name, and dates were recorded on a standard MAC photo log.

Because the tracts along the proposed expansion are the property of multiple private landowners, it was necessary to mail forms requesting ROE permission to conduct investigations of the land. Of the roughly 7800 m of proposed ROW expansion that falls within areas of PALM Unit 2 or 2a, only 4700 m (2.92 mi) fell within areas where the property owners responded favorably. The shovel testing survey was limited to these tracts.

Non-ROE Properties and Existing ROW

The following methodologies were developed as a result of consultation with TxDOT ENV archeologists regarding the visual examination of properties for which ROE cannot be obtained and the survey of the existing ROW.

Examination of the proposed ROW where ROE was not available required pre-field work utilizing Geographic Information Systems (GIS). Maps were developed showing individual tracts and whether the owner had authorized ROE. This was then compared to the PALM model. From this data, new maps were developed showing those areas requiring survey and the availability of ROE. Utilizing these maps, a survey was conducted on foot and by vehicle of the project corridor. Any undisturbed areas were recorded as requiring survey after TxDOT acquires the land. Such properties could include forested land and tracts with visible landscapes that appear unaltered (such as intact mound features). Tracts with indeterminate integrity were also recorded as requiring survey after TxDOT has acquired the land. These properties could include those with no visibility from the existing ROW edge and those with visibility but no clear evidence of disturbance. Finally, disturbed tracts were recorded as such and recommendations were made that no further survey was required. Examples of such properties include parking lots, graded tracts, businesses, and tightly packed urban housing. In locations defined by the PALM model as requiring deep reconnaissance (i.e. backhoe trenching), the level of disturbance necessary to make a determination of no survey required was based on the professional opinion of the archeologist in the field. Thus, if the archeologist felt that grading on a property had not penetrated deep enough to impact deep deposits, he or she might leave the property as indeterminate. However, in the case of this project, no locations were recommended for deep survey by the PALM model.

Examination of the existing ROW consisted of a driving survey. Wherever there was a question of the level of disturbance, within the ROW, the investigator walked the area. For the purposes of this investigation, it was assumed that the existing ROW ended at the fence-line. Wherever this was not the case, it was assumed that the land ownership was disputed and MAC archeologists did not enter the property.

RESULTS

Shovel Testing Survey

Between August of 2005 and January of 2006, MAC performed a pedestrian archeological survey of the proposed FM 646 ROW expansion in Galveston County, Texas. This covered approximately 5 km (3.12 mi) of the 7.8 km (4.85 mi). recommended for survey by the PALM model. As mentioned in the METHODS section, this survey was performed utilizing shovel testing along transects and visual survey of all visible surfaces. It was limited to those areas with ROE. This sampling methodology resulted in the excavation of 63 shovel tests during the survey (Figure 4).

All 63 shovel tests excavated within the project corridor during the investigation were sterile (see Appendix B: Shovel Test Log). All of these shovel tests reached the basal clay or sterile subsoil, at depths ranging between 8 to 80 centimeters below surface (cmbs).

Non-ROE Properties and Existing ROW

The investigation of the non-ROE properties within segments recommended for survey by the PALM model, revealed that approximately 1 km. (0.6 mi) of proposed ROW corridor could be removed from consideration. This was based principally on localities with evident significant levels of disturbance.

The remaining 1800 m (1.1 mi) of non-ROE corridor appears to not have prior impacts and intact mound features were present (Figure 5). These portions are close to streams or stream remnants and are the most likely to contain cultural resources, especially on the mound features observed by the field crew.

An examination was made of the existing FM 646 ROW within the project corridor. This examination found that virtually the entire existing ROW had been significantly disturbed. Most of this disturbance took the form of ditches dug as part of the drainage control system alongside the road. These ditches fill virtually the whole space between the edge of the existing roadway shoulder and the fence line representing private property. Typically an area less than one meter (3.28 ft) in width remained in the ROW. It was observed that even this narrow strip of land was commonly impacted by the emplacement of buried infrastructure elements such as phone lines, gas pipelines, etc. Field archaeologists determined that there were no segments large enough and intact enough to merit shovel testing.

RECOMMENDATIONS

It is the recommendation of MAC that no further archeological investigation is necessary prior to construction of the proposed ROW expansion in those localities where ROE was granted. The portion of the proposed ROW expansion without ROE, where a visual survey was possible, can also be excluded from requiring further investigation prior to construction. This amounts to approximately 1 km (0.6 mi) of the PALM mandated survey areas.

However, the segments of the project corridor that were not accessible to this investigation due to ROE issues, and for which visual survey could not rule out the need for further investigation, may require additional investigation after TxDOT has acquired the land. This amounts to approximate 1.8 km (1.1 mi) of the corridor (Figure 5). This is particularly the case in the segments close to the two stream crossings where intact mound features close to water suggest a moderate potential for prehistoric sites.

If archeological deposits or features are encountered during construction, it is advised that construction cease in the immediate area of the finds and the Archeology Division of the THC be contacted for further consultation.

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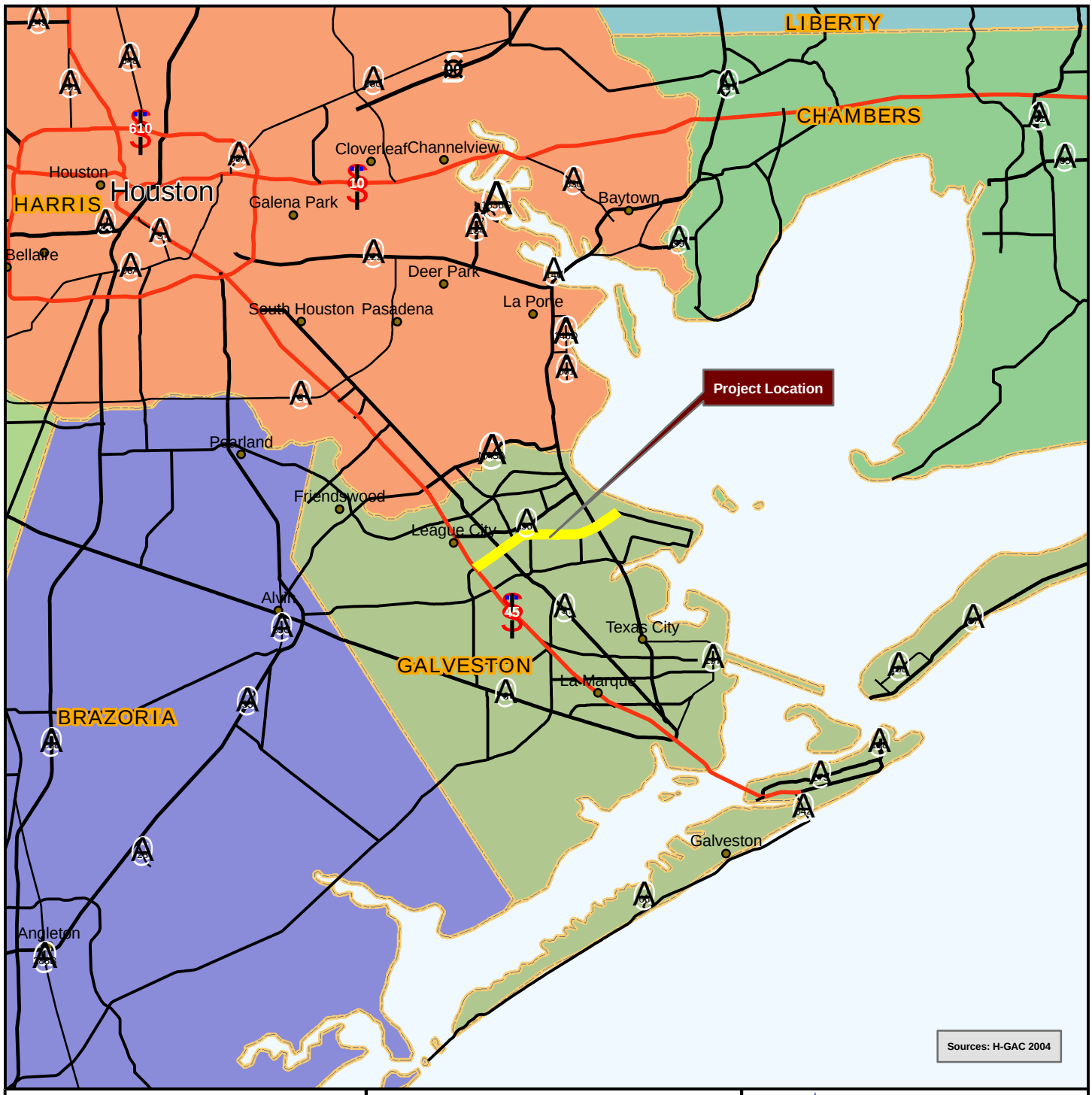
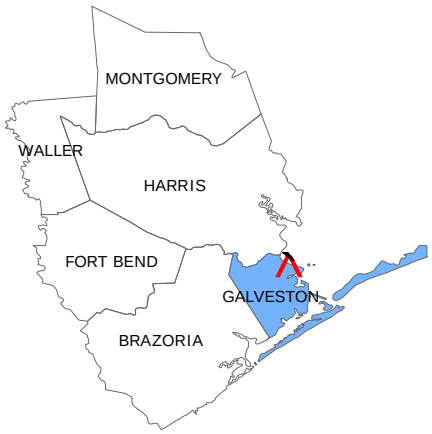
FIGURES



- Interstate Highway
- US Highway
- State Highway
- FM Road
- Project Location
- County Boundary

© 0 4 8 Miles

1 inch equals 7.9 miles



Texas Department of Transportation

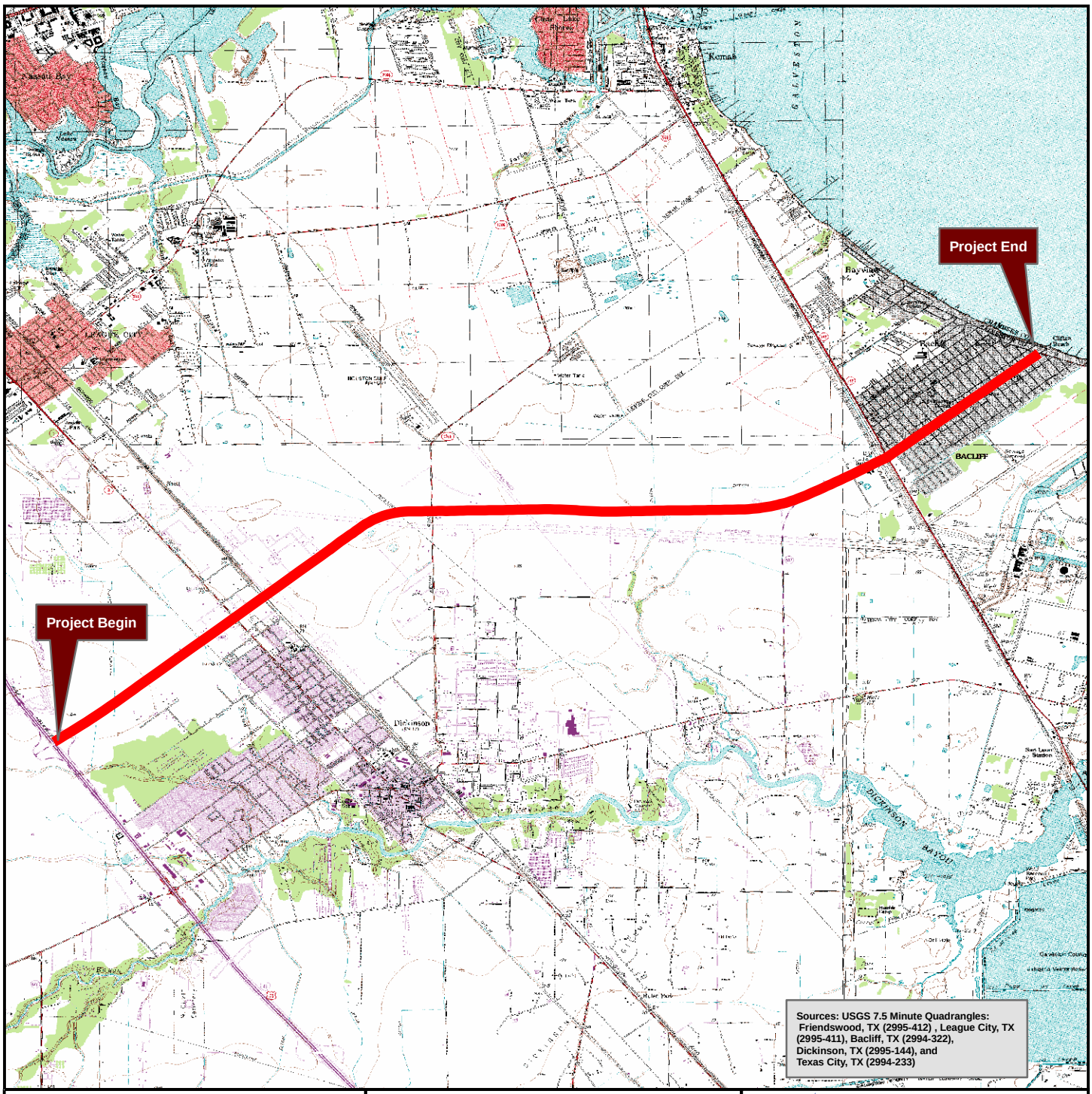
Figure 1

FM 646 Project Corridor in Relation to Surrounding Counties

FM 646
IH 45 to Bayshore Boulevard

Galveston County, Texas

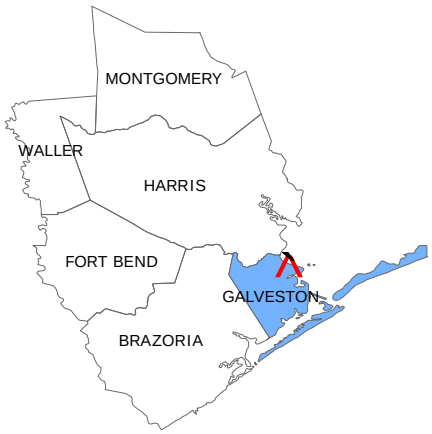
TxDOT CSJs: 3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034



- Interstate Highway
- US Highway
- State Highway
- FM Road
- Project Location
- County Boundary
- 100-yr Floodplain
- 500-yr Floodplain

0 0.5 1 Miles

1 inch equals 1.1 miles



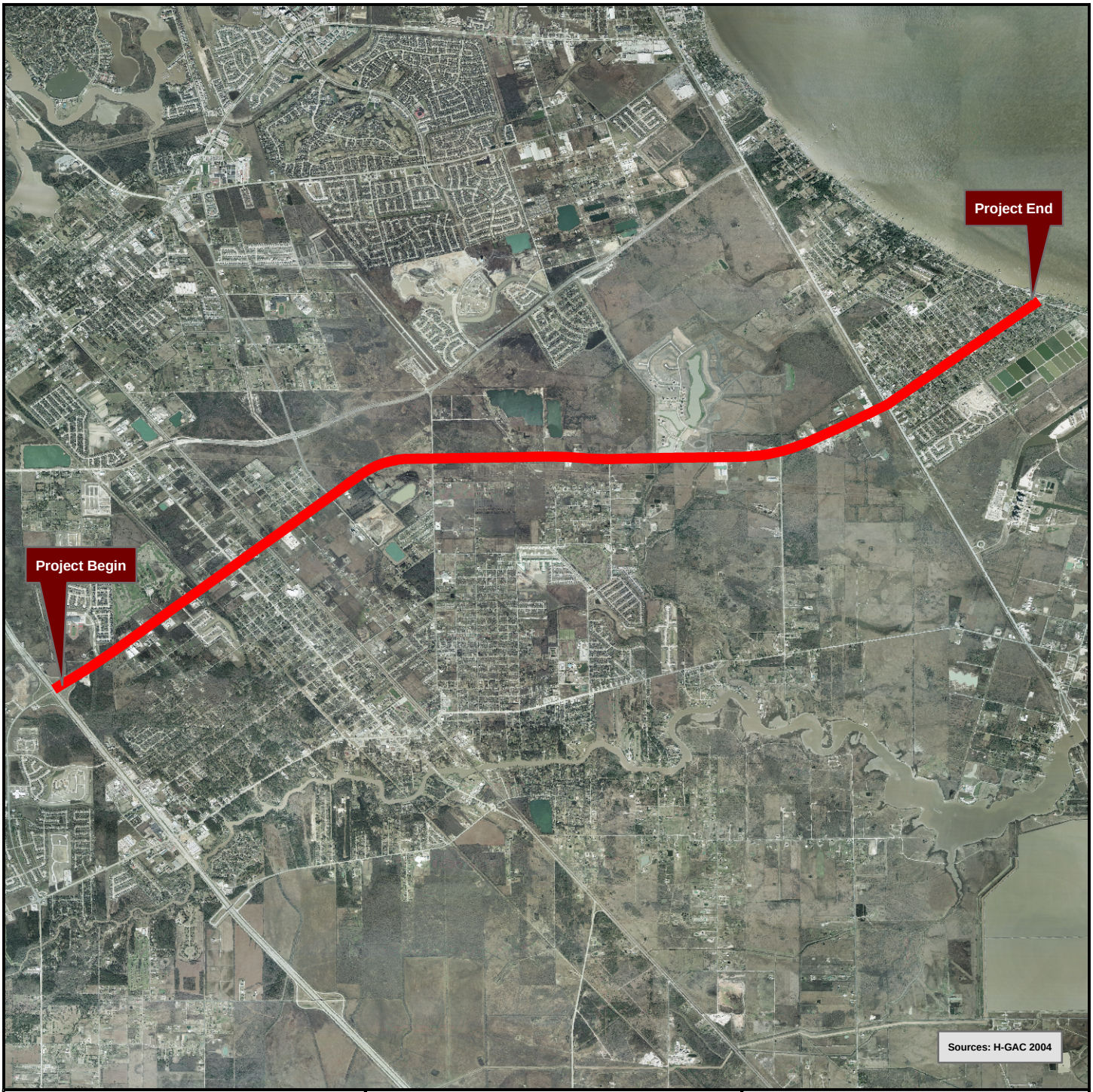
Texas Department of Transportation

Figure 2

FM 646 Project Corridor
on the Friendswood, League City,
Bacliff, Dickinson, and Texas City, Texas
USGS Quadrangles

FM 646
IH 45 to Bayshore Boulevard
Galveston County, Texas

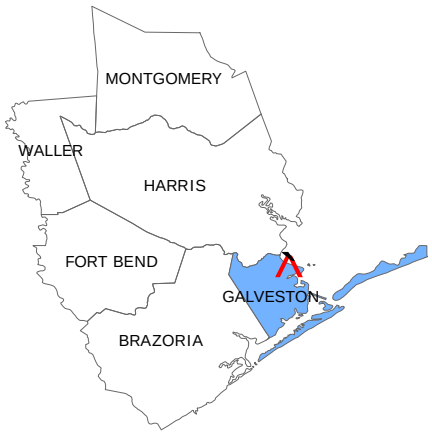
TxDOT CSJs: 3049-01-027, 3049-01-022,
3049-01-023, 0978-02-053, 0978-02-034



- Interstate Highway
- US Highway
- State Highway
- FM Road
- Project Location
- County Boundary

0 0.5 1 Miles

1 inch equals 1.1 miles



Texas Department of Transportation

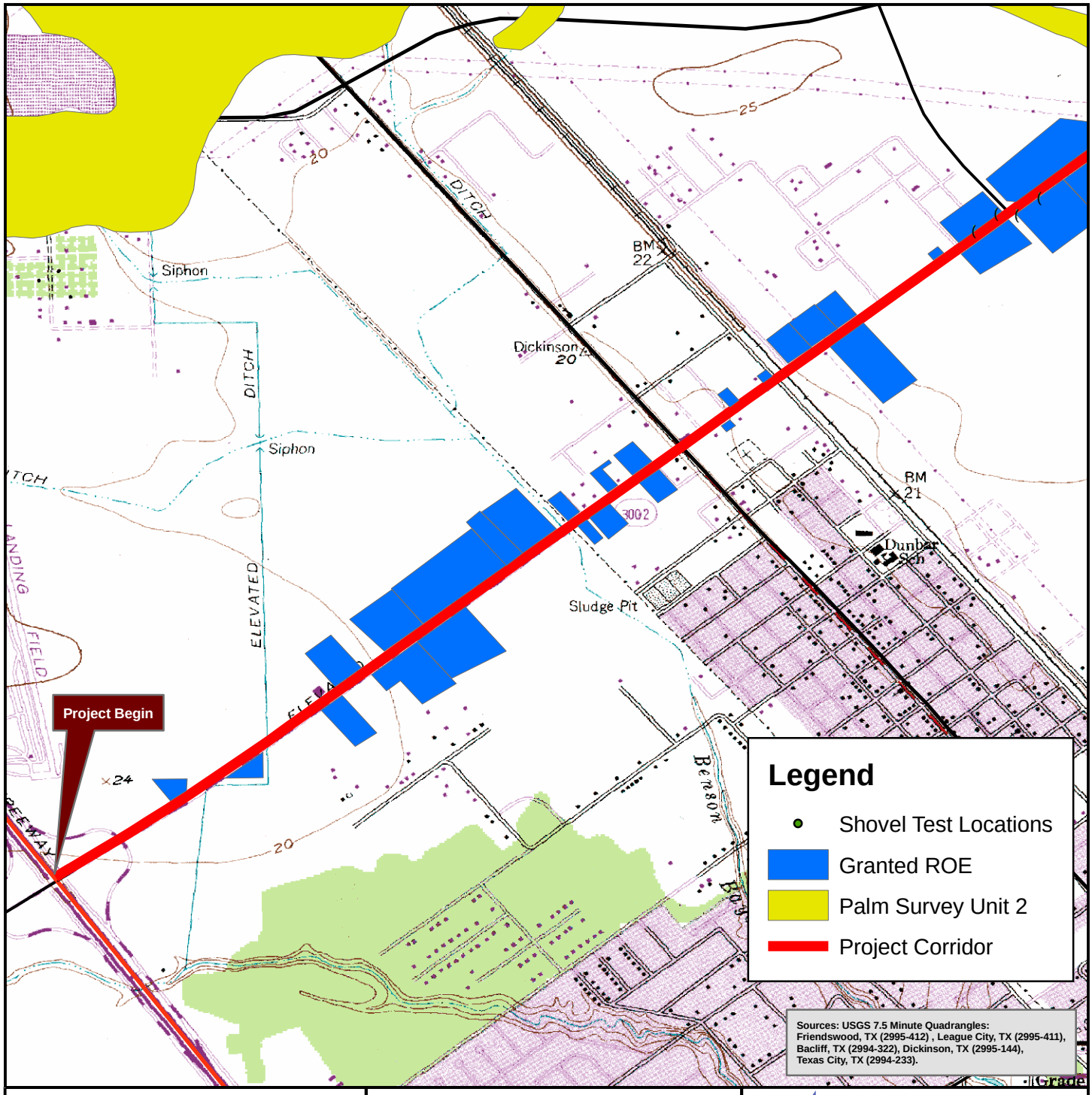
Figure 3

FM 646 Project Corridor on the 2004 Aerial Photograph

FM 646
IH 45 to Bayshore Boulevard

Galveston County, Texas

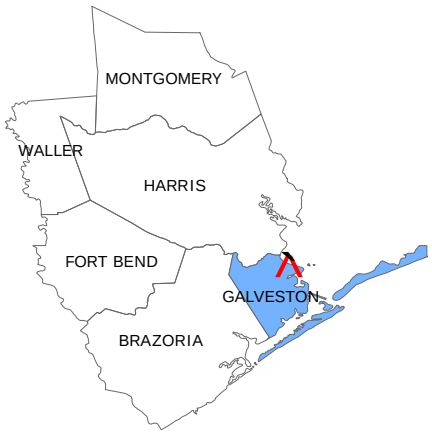
TxDOT CSJs: 3049-01-027, 3049-01-022, 3049-01-023, 0978-02-053, 0978-02-034



Interstate Highway
US Highway
State Highway
FM Road

© 0 0.09 0.18 Miles

1 inch equals 0.3 miles



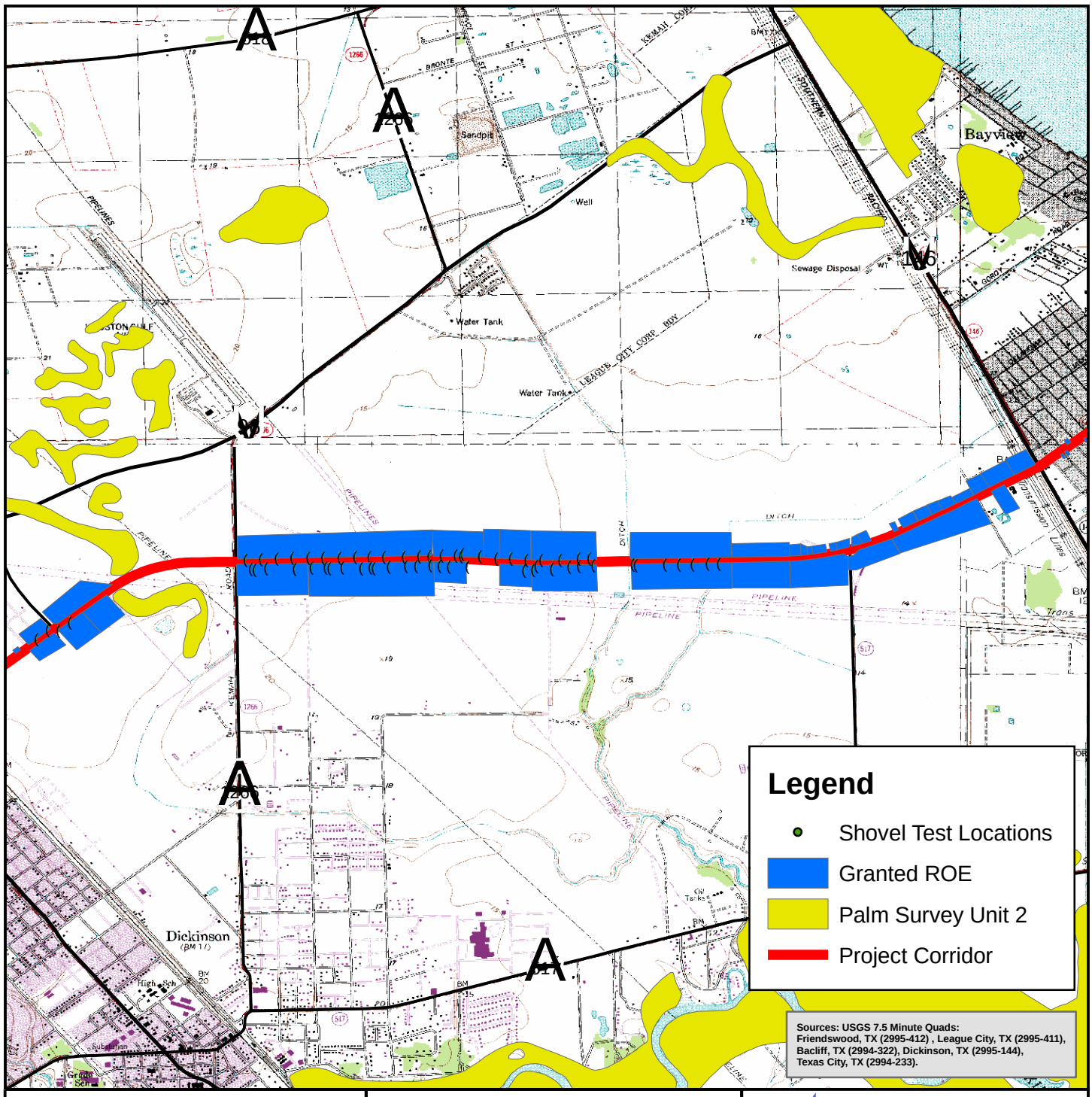
Texas Department of Transportation

Figure 4

FM 646 Project Corridor
Showing PALM Survey
Unit 2 Area, ROE Areas,
and Shovel Test Locations

FM 646
IH 45 to Bayshore Boulevard

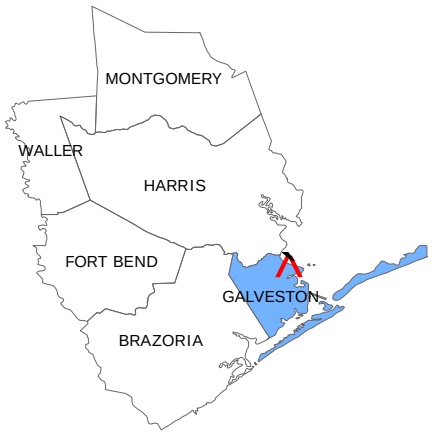
Galveston County, Texas
TxDOT CSJs: 3049-01-027,
3049-01-022, 3049-01-023,
0978-02-053, 0978-02-034
Sheet 1 of 3



Interstate Highway
US Highway
State Highway
FM Road

0 0.2 0.4 Miles

1 inch equals 0.6 miles



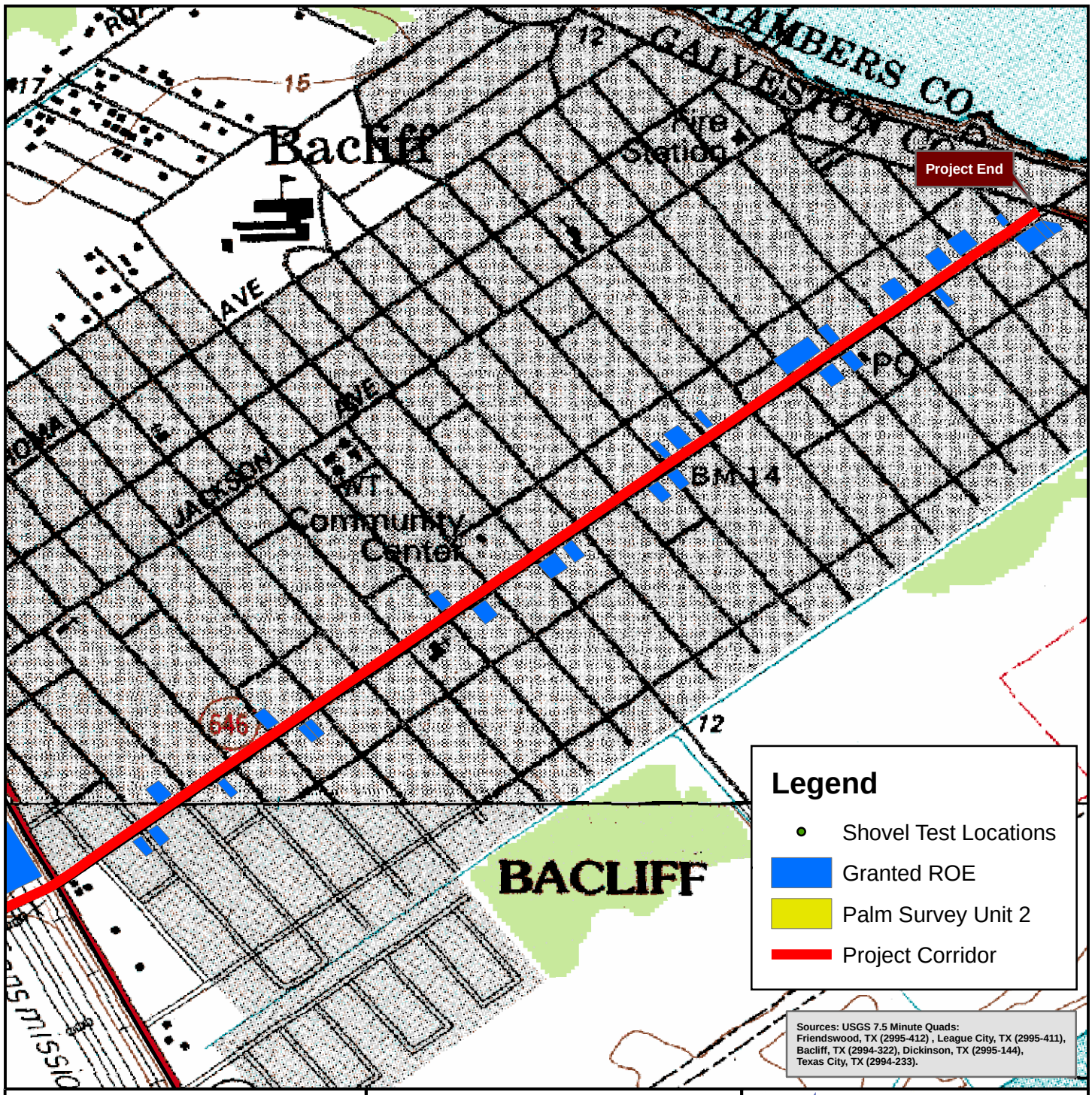
Texas Department of Transportation

Figure 4

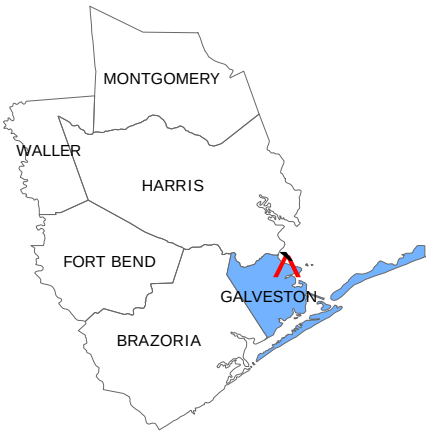
FM 646 Project Corridor
Showing PALM Survey
Unit 2 Area, ROE Areas,
and Shovel Test Locations

FM 646
IH 45 to Bayshore Boulevard

Galveston County, Texas
TxDOT CSJs: 3049-01-027,
3049-01-022, 3049-01-023,
0978-02-053, 0978-02-034
Sheet 2 of 3



Interstate Highway
US Highway
State Highway
FM Road



0 0.05 0.1 Miles

1 inch equals 0.2 miles

Texas Department of Transportation

Figure 4

FM 646 Project Corridor
Showing PALM Survey
Unit 2 Area, ROE Areas,
and Shovel Test Locations

FM 646
IH 45 to Bayshore Boulevard

Galveston County, Texas
TxDOT CSJs: 3049-01-027,
3049-01-022, 3049-01-023,
0978-02-053, 0978-02-034
Sheet 3 of 3

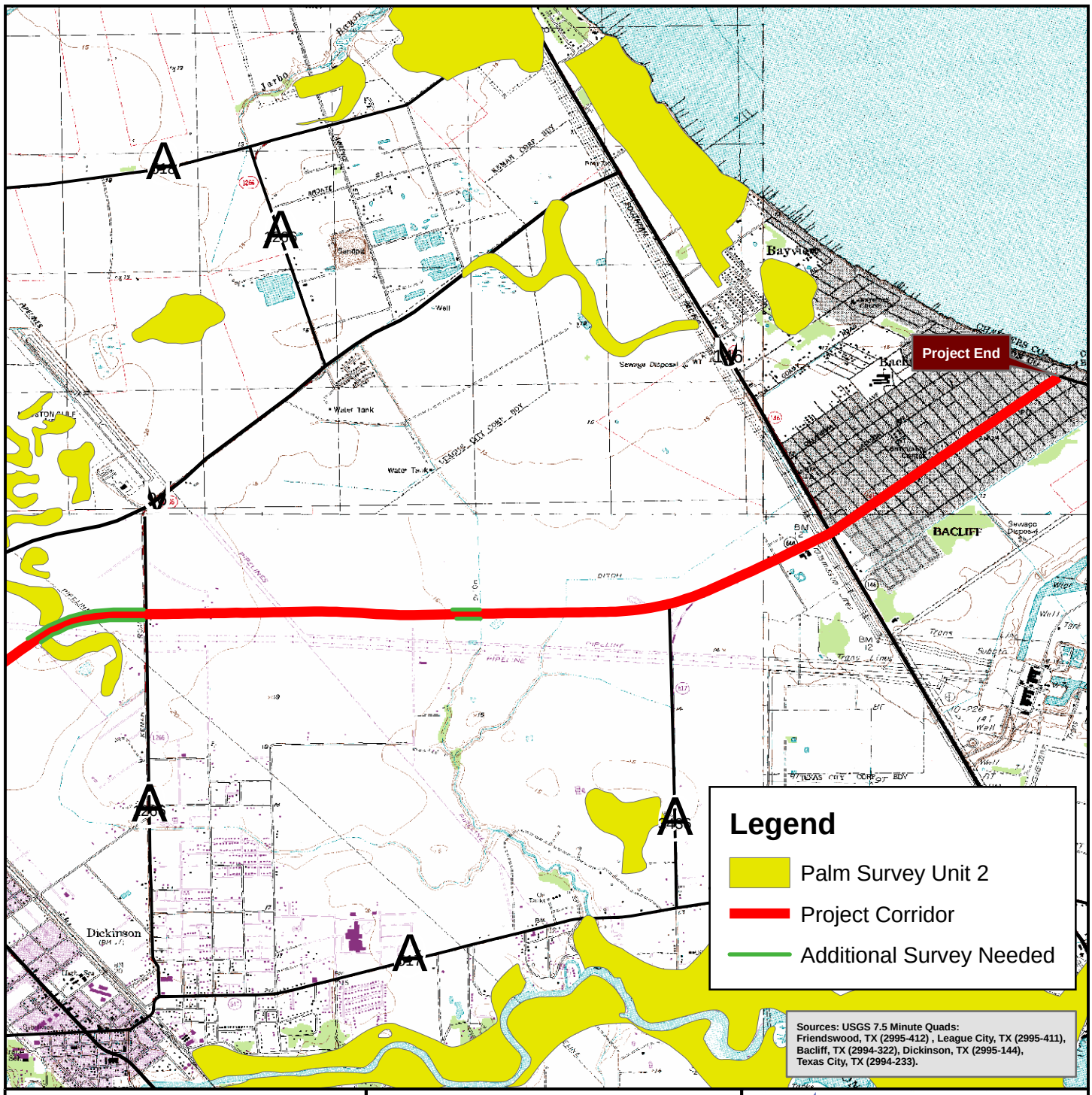


Figure 5

FM 646 Project Corridor
Showing Proposed Areas for Additional
Archeological Survey

FM 646
IH 45 to Bayshore Boulevard

Galveston County, Texas
TxDOT CSJs: 3049-01-027,
3049-01-022, 3049-01-023,
0978-02-053, 0978-02-034

APPENDIX A
Photograph Log

Photograph 1: Typical section in Bacliff from eastern end of project corridor.

Photograph 2: Commercial development within Bacliff.

Photograph 3: Showing change in development outside Bacliff.

Photograph 4: Example of area without right-of-entry with no visibility to determine disturbance.

Photograph 5: Small drainage associated with Gum Bayou.

Photograph 6: View of Gum Bayou from overpass.

Photograph 7: Project corridor from west end.

APPENDIX B
Shovel Test Log

S_T_NO_	DEPTH__CMB	DESCRIPTION	COMMENTS	E__NAD83_	N__NAD83_
22	0-20	2.5y2.5/1 Black CL w/small gray m		303421	3264250
	20-34	10yr2/1 Black C; moist, very firm			
	34-55	2.5y4/1 Dk gray C w/FeMg "spots";			
	55-61	2.5y4/1 Dk gray C w/2.5y4/3 Olive	subsoil		
23	0-15	10yr3/2 Very Dk brown CL; moist,	gradual boundar	305519	3264246
	15-36	10yr3/2 Very Dk brown C; moist, v	clear boundary		
	36-50	10yr3/1 Very Dk gray C w/yellow m	subsoil		
24	0-20	Black, gray, brown C fill - very	abrupt transiti	303629	3264242
	20-55	2.5y5/1 Gray C w/30% 2.5y6/6 oliv	subsoil		
25	0-35	Very disturbed matrix of brown/gr	clear boundary	303689	3264244
	35-51	2.5y5/3 Lt olive brown C w/orange	subsoil		
26	0-10	Dk grayish brown, gray, and black		303781	3264247
	10-24	2.5y4/1 Dk gray C w/2.5y5/4 Lt ol			
	24-30	2.5y5/1 Gray C w/2.5y5/4 Lt olive	subsoil		
27	0-45	Clay fill		304028	3264248
	45-60	10yr3/2 Very dk grayish brown CL			
	60-80	10yr3/2 Very Dk grayish brown CL;			
	80-105	10yr4/1 Dk gray C w/few yellow mo	subsoil		
28	0-15	2.5y4/1 Dk gray CL; dry, slightly		304047	3264247
	15-31	2.5y4/1 Dk gray C; moist, very fi			
	31-42	2.5y4/1 Dk gray C w/2.5y5/6 Lt Ol			
	42-52	2.5y5/1 Gray C w/2.5y5/6 Lt Olive	subsoil		
29	0-12	10yr3/2 Very Dk grayish brown CL;			
	12-30	10yr4/1 Dk gray C w/orange mottle	subsoil		
30	0-25	2.5y4/1 Dk gray CL; moist, firm		304231	3264246
	25-40	2.5y4/1 Dk gray C w/some Lt olive			
	40-48	2.5y5/1 Gray C w/2.5y5/6 Lt Olive	subsoil		
31	0-4	Humic Zone		304320	3264247
	4-17	10yr4/1 Dk gray C w/orange mottle			
	17-33	2.5y6/1 Gray C w/heavy yellow mot			
32	0-12	Dk gray CL - disturbed & containi		304405	3264245
	12-28	2.5y5/1 Gray C w/2.5y5/6 Olive br	subsoil		
33	0-4	Humic Zone		304500	3264249
	4-19	10yr3/2 Very Dk grayish brown C w			
	19-39	10yr4/1 Dk gray C w/heavy yellow	subsoil		
34	0-20	Dk gray fill - lots of modern tra		304569	3264244
	20-26	2.5y4/1 Dk gray C w/Lt Olive brow			
	26-31	2.5y5/1 Gray C w/2.5y5/6 Lt Olive	subsoil		
35	0-7	10yr5/2 Grayish brown SL; very we	clear boundary	303756	3264299
	7-20	10yr5/1 Gray SCL w/whittish gray	clear boundary		
	20-33	10yr3/1 Very Dk gray C w/yellowis	gradual boundar		
	33-43	10yr5/6 Yellowish brown C w/Dk gr	subsoil		
36	0-13	10yr4/3 Brown SL w/many mottles o		303689	3264301
	13-21	10yr4/2 Dk grayish brown SL; mois			
	21-34	10yr4/2 Dk grayish brown CL; mois			
	34-44	10yr4/1 Dk gray C w/red mottles;			
	44-52	10yr5/3 Lt olive green C w/orange	subsoil		
37	0-30	Yellowish brown, Lt gray, Dk gray		303572	3264293
	30-41	10yr3/2 Very Dk grayish brown SCL	truncated w/fil		
	41-45	10yr3/2 Very Dk grayish brown C w			
	45-55	10yr5/6 Yellowish brown C w/Dk gr	subsoil		
38	0-21	Clay fill		303452	3264292

S_T_NO_	DEPTH__CMB	DESCRIPTION	COMMENTS	E__NAD83_	N__NAD83_
	21-36	10yr3/1 Very Dk gray CL; moist, f	gradual boundar		
	36-64	10yr3/2 Very Dk graysh brown C w/	subsoil		
39	0-20	10yr4/1 Dk gray SCL; moist, firm	humic zone	303359	3264296
	20-30	5y4/1 Dk gray C w/yellowish brown			
	30-41	5y4/2 Olive gray & 10yr5/6 yellow			
	41-50	10yr5/6 yellowish brown C w/gray	subsoil		
40	0-12	10yr4/2 Dk grayish brown CL; mois		303262	3264308
	12-46	10yr3/2 Very Dk grayish brown C;			
	46-55	10yr4/1 Dk gray C w/yellow & oran	subsoil		
41	0-20	10yr3/2 Very Dk grayish brown SCL		303170	3264308
	20-35	10yr3/2 Very Dk grayish brown C;			
	35-45	10yr3/1 Very Dk gray & 10yr5/6 ye	subsoil		
42	0-14	10yr3/1 Very Dk gray CL; moist, f		303068	3264326
	14-44	10yr3/1 Very Dk gray C; moist, fi			
	44-61	2.5y4/1 Dk gray & 2.5y6/3 Lt. yel	bioturbated		
43	0-15	10yr3/1 Very Dk gray CL; moist, f	humic zone - gr	302958	3264344
	15-40	10yr2/1 Black C w/some CaCo3 stri			
	40-49	10yr4/1 Dk gray C w/yelloish brow	subsoil		
44	0-29	10yr3/1 Very Dkgray CL; moist, fr		302949	3264332
	29-41	10yr3/1 Very Dk gray CL; dry, sof	Mouse den		
	41-66	10yr4/1 Dk gray C w/few orange mo	subsoil		
45	0-30	10yr3/1 Very Dk gray SL; moist, f	upper 15cms are	302916	3264335
	30-45	10yr3/2 Very Dk grayish brown CL;			
	45-60	10yr4/1 Dk gray C w/CaCo3 concrs;			
	60-65	10yr4/1 Dk gray C w/yellowish bro	subsoil		
46	0-10	10yr3/2 Very Dk grayish brown SCL	clear boundary	302826	3264337
	10-40	10yr4/1 Dk gray C; wet, very firm			
	40-46	10yr4/1 Dk gray & 10yr5/6 yellowi	subsoil		
47	0-45	10yr2/1 Black FSCL; moist, friabl		302749	3264333
	45-55	2.5y5/2 grayish brown C, moist, f	subsoil		
48	0-48	10yr3/2 Very Dk grayish brown SCL	lots of bioturb	302685	3264334
	48-54	10yr3/2 Very Dk grayish brown C;	clear boundary		
	54-62	10yr4/1 Dk gray C w/yellowish bro	subsoil		
49	0-15	10yr3/2 Dk Grayish brown C; moist		302588	3264333
	15-37	10yr3/1 Dk gray C; moist, firm			
	37-55	mottles mix of 10yr5/2 grayish br	subsoil		
50	0-9	10yr2/1 Black CL; moist, firm		302464	3264333
	9-56	10yr3/1 Very Dk gray C; moist, ve			
	56-70	10yr3/2 Very Dk grayish brown C;	subsoil		
51	0-25	Very Dk gray C fill - lots of mod		302372	3264335
	25-37	10yr2/1 Black C; wet - retaining			
	37-45	10yr4/1 Dk gray C w/very Dk grayi	subsoil		
52	0-10	10yr5/1 Gray CL; wet, firm & stic	humic zone	302282	3264337
	10-30	10yr3/1 Very Dk gray C; wet, very			
	30-39	10yr4/1 Dk gray C w/CaCo3 concrs;	subsoil		
53	0-28	Highly disturbed C/CL		302184	3264334
	28-40	10yr3/1 Very Dk gray C; dry, hard			
	40-50	10yr3/2 Very Dk grayish brown C w	subsoil		
54	0-15	2.5y4/1 Dk gray CL; moist, firm		302080	3264335
	15-33	10yr3/2 Very Dk grayish brown C;	gradual boundar		
	33-42	10yr4/1 Dk gray C w/some yellowis			
	42-57	2.5y4/2 Dk grayish brown C w/yell	subsoil		

S_T_NO_	DEPTH__CMB	DESCRIPTION	COMMENTS	E__NAD83_	N__NAD83_
55	0-13	10yr2/1 Black CL; moist, firm		301987	3264335
	13-30	10yr3/1 Very Dk gray C; moist, fi			
	30-48	10yr3/2 Very Dk grayish brown C;	subsoil		
56	0-20	10yr3/2 Very Dk graysh brown SCL;	gradual boundar	301885	3264335
	20-42	2.5y3/1 Very Dk gray C; moist, fi	gradual boundar		
	42-48	2.5y4/2 Dk grayish brown C w/yell			
	48-60	5y4/2 Olive gray C w/yellowish br	subsoil		
57	0-10	10yr3/1 Very Dk gray CL; moist, f		301788	3264333
	10-34	10yr3/1 Very Dk gray C; moist, fi			
	34-49	10yr5/1 gray mottled w/10yr5/2 gr	subsoil		
58	0-8	10yr3/2 Very Dk grayish brown SCL	humic zone	301688	3264329
	8-32	2.5y4/1 Dk gray C w/CaCo3 concrs;	clear boundary		
	32-40	10yr5/1 Gray C w/yellowish brown	subsoil		
59	0-33	Reddish brown SCL, gray SCL, Dk g		301593	3264327
	33-50	10yr5/1 Gray & 10yr5/2 Grayish br	subsoil		
60	0-8	10yr3/2 Very Dk grayish brown C;		300406	3263837
	8-32	10yr4/1 Dk gray C; moist, firm			
	32-48	10yr4/1 Dk gray C; moist, firm w/	subsoil		
61	0-10	10yr2/1 Black CL; moist, somewhat	humic zone - gr	300480	3263898
	10-42	10yr2/1 Black C; moist, very firm	gradual boundar		
	42-50	2.5y4/1 Dk gray w/olive brown mot	subsoil		
62	0-5	Humic Zone		300339	3263842
	5-23	10yr3/1 Very Dk gray C; moist, fi			
	23-45	10yr4/1 Dk gray C w/slick 'n slid	subsoil		
63	0-15	10yr3/2 Very Dk grayish brown CL;	humic zone	300266	3263782
	15-60	10yr2/2 Very Dk brown C; moist, v	gradual boundar		
	60-70	2.5y4/1 Dk gray C w/olive brown m	subsoil		