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## **Farm-to-Market Road (FM) 457 Swing Bridge Replacement Project at Gulf Intracoastal Waterway in Matagorda County, Texas.**

Allen Bettis

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**Farm-to-Market Road (FM) 457 Swing Bridge Replacement Project at Gulf Intracoastal Waterway in Matagorda County, Texas.**

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# Final Report for Archeological Survey

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Farm-to-Market Road (FM) 457 Swing  
Bridge Replacement Project at Gulf  
Intracoastal Waterway in Matagorda  
County, Texas.

## Yoakum District

Allen Bettis Principal Investigator, Antiquities Permit No. 8065

CSJ: 0605-01-060

November 9, 2017

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated 12-16-14, and executed by FHWA and TxDOT.

## Abstract

Texas Department of Transportation archeologists conducted an intensive cultural resources survey on July 5<sup>th</sup> and 6<sup>th</sup>, 2017, of approximately 6.125 acre of existing FM 457 right-of-way (ROW) in Matagorda County, Texas. Investigations occurred prior to the proposed construction of a new bridge across the Gulf Intracoastal Waterway (GIWW). The work was conducted in compliance with Section 106 of the National Historic Preservation Act (Title 54, U.S. Code § 306108) and the Antiquities Code of Texas (Title 9, Natural Resources Code, Chapter 191). Allen Bettis served as Principal Investigator under Texas Antiquities Code Permit No. 8063.

The area of potential effects (APE) is defined as the proposed project length (3,107 feet) within the existing 24 to 30-foot-wide FM 457 ROW. Depth of proposed impacts for the roadway are estimated to be no more than 2 feet below the ground surface, while impacts for bridge columns would extend to approximately 10 feet below the ground surface. Approximately 4.2 acres of proposed new ROW would be acquired for this undertaking. The total acreage of the APE is 6.125 acres.

A background review revealed that there are no previously conducted archeological survey areas within or adjacent to the APE, the nearest recorded survey is approximately 1 kilometer to the southeast of the APE. No archeological sites are recorded within 1 km of the APE; however, there are three recorded sites just beyond 1 km on either side of the APE along the coastline. Similarly, a review of historic maps indicated that there may be a possibility of Civil War era earthworks in the area of the APE related to the Union blockade.

Field investigations consisted of an intensive survey of the APE via the excavation of four mechanical backhoe trenches. Approximately 70 cubic meters of sediment were excavated. No archeological resources were identified. The existing ROW has been extensively modified by road construction, dredge and spoil fill, numerous abandoned utilities, and other developmental activities thereby lessening the potential for intact archeological deposits within the APE. The recently acquired new ROW is equally disturbed in a similar manner. Based on the negative results of the survey, TxDOT recommends no further archeological work.

## Project Identification

Date: 11/15/2017

Date(s) of Survey: 7/5 & 6/2017

Archeological Survey Type: Reconnaissance  Intensive

Report Version: Draft  Final

Jurisdiction: Federal  State

Texas Antiquities Permit Number: 8065

District: Yoakum

County or Counties: Matagorda

USGS Quadrangle(s): Cedar Lakes West (2895-341)

Highway: FM 457

CSJ: 0605-01-060

Report Author(s): Allen Bettis

Principal Investigator: Allen Bettis

## Texas Historical Commission Approval

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Signature

Date

## Project Description

**Project Type:** Bridge replacement

**Total Project Impact Acreage:** 6.125 acre

**New Right of Way (ROW) Acreage:** 4.2 acre (previously acquired)

**Easement Acreage:** None

**Area of Pedestrian Survey:** 6.125 acre

**Project Description and Impacts:** The proposed project is located in Matagorda County, Texas (Figure 1). Construction activities will include boring holes for support piers, installing concrete beams, piers, and pillars, and paving. All construction activities will take place within the previously acquired State-owned ROW. The proposed project would replace the existing pontoon swing bridge with an elevated bridge that would allow vehicular and marine traffic to move unimpeded (Figure 2)

**Area of Potential Effects (APE):** The APE is defined as the proposed project length (3,107 feet) within new and existing FM 457 ROW, measuring 24 to 30 feet wide, the 4.2 acres of new proposed ROW, and the 10-foot depth of construction impacts. Total acreage of the APE measures 6.125 acres (Figure 3).

**Parcel Number(s):** NA

**Project Area Ownership:** Approximately 4.2 acres of the APE is located on privately owned land, and approximately 1.925 acres of the APE is on land owned and controlled by Texas Department of Transportation.

## Project Setting

**Topography:** Land use within and surrounding the APE is broad, flat saline coastal plain. The northern side of the APE is extensively modified coastal marshes and the southern side of the APE is an extensively modified beach terrace (USGS 2017). The landform within the APE has been extensively modified by dredging for the GIWW, spoil and dredge fill, and developmental activities.

**Geology:** The project falls entirely within a broad area of recent soils dissected by the GIWW. The APE is mapped as Holocene Alluvium, which consists of clayey, saline soils (Barnes 1975).

**Soils:** The APE is composed of Asa silty clay loam, Ijam clay, Surfside clay, and Velasco clay (Figure 3). The Asa soil is a deep, well-drained soil formed in loamy alluvium of Holocene age; this soil is on nearly level coastal flood plain and observed on slopes ranging from 0 to 1 percent. The Ijam soil is a deep, poorly-drained soil dredged from marine channels and observed as mounded deposits on the landscape; this soil consists of sandy and/or loamy dredge spoil that is used as fill and is usually observed on slopes ranging from 0 to 1 percent. The and Velasco soils are deep, very poorly-drained soils formed in calcareous, saline, clayey alluvium of Holocene age; this soil is on nearly level coastal flood plain and observed on slopes ranging from 0 to 1 percent (Natural Resources Conservation Service 2017).

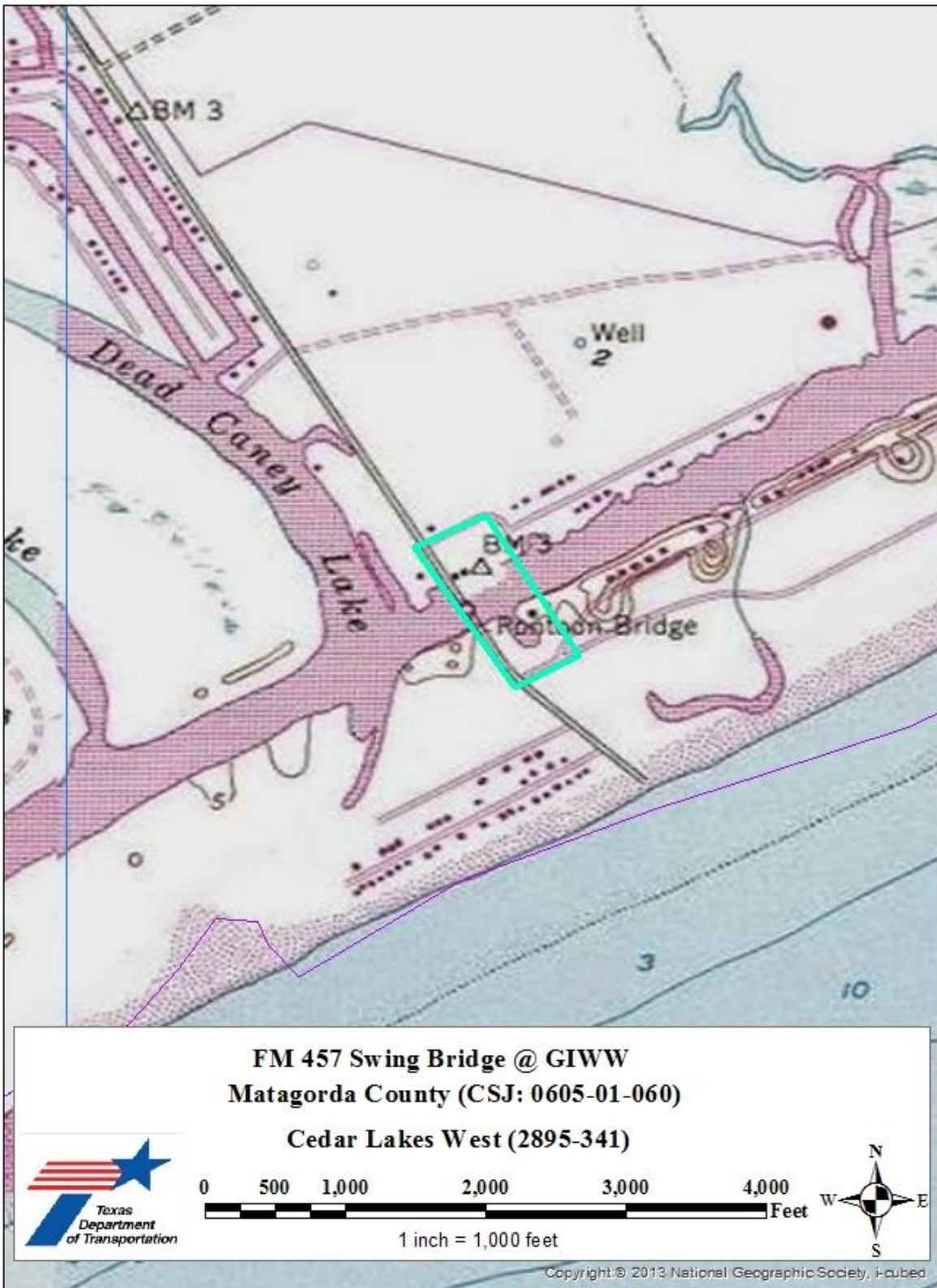


Figure 1. Project location map.



**Figure 1**  
 Project Location  
 FM 457 Bridge Replacement  
 CSJ: 0605-01-060

USGS 7.5-minute Topographic Quadrangle:  
 Cedar Lakes West (USGS# 28295-G5), TX



**Figure 2.** Proposed location of bridge replacement project (Alternative C is the preferred alternative) within APE on topo map.





**Figure 3.** Project APE on an aerial photograph.

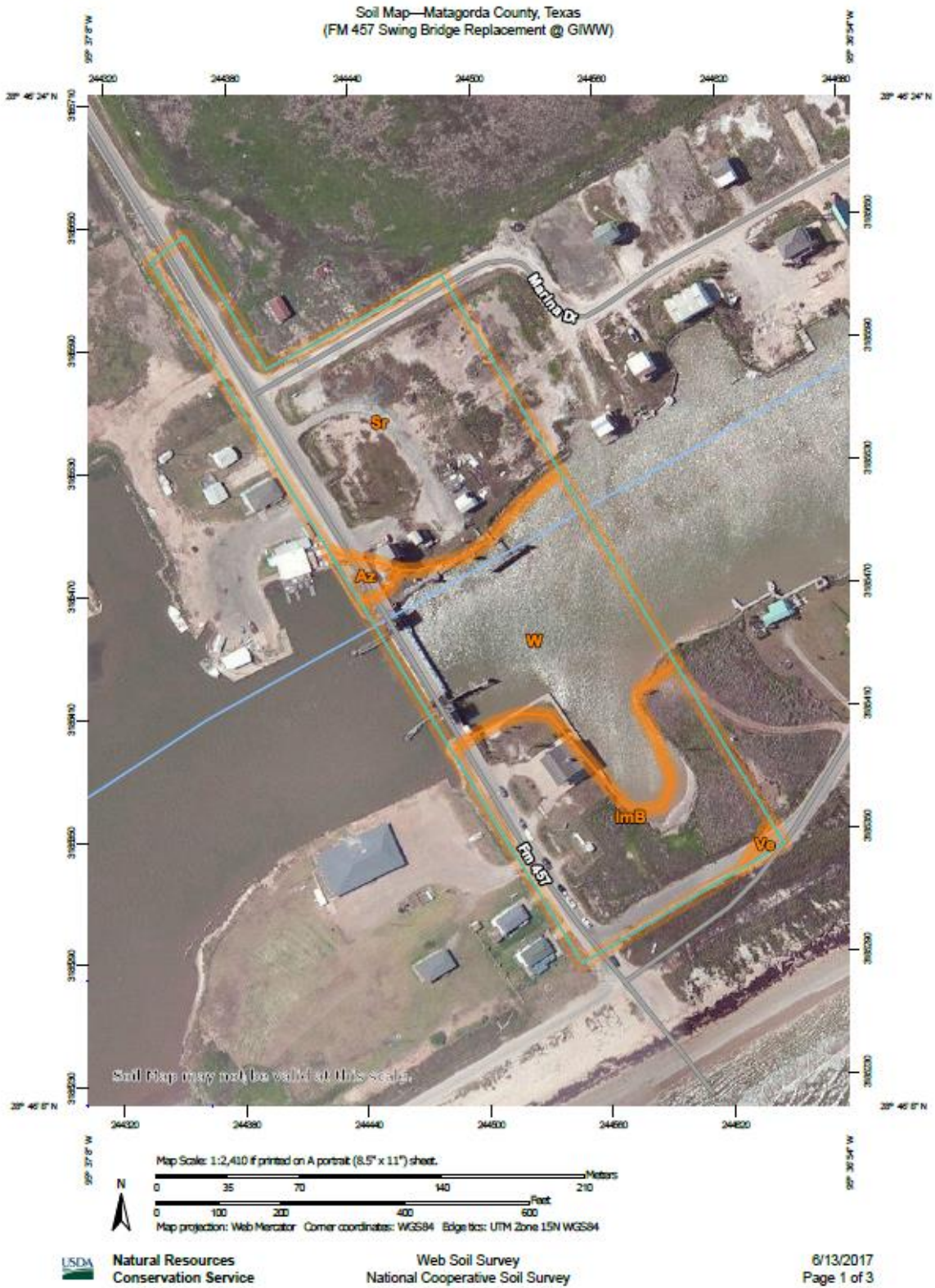


Figure 4. Mapped soils within the APE.

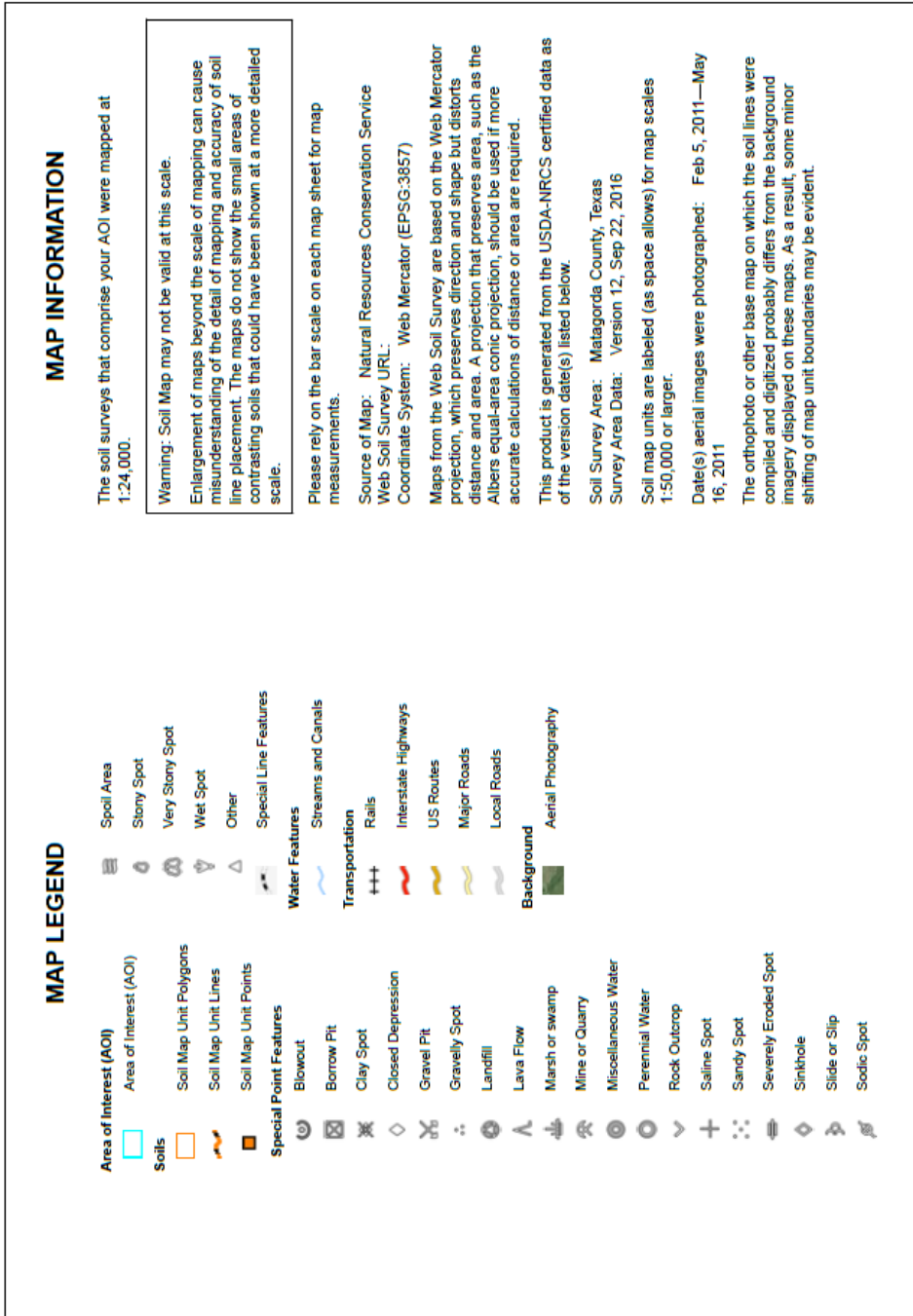


Figure 4. Mapped soils within the APE (con't.).

## Map Unit Legend

Matagorda County, Texas (TX321)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Az	Asa silty clay loam, saline, occasionally flooded	0.1	1.1%
ImB	Ijam clay, 1 to 3 percent slopes	2.7	27.4%
Sr	Surfside clay, 0 to 1 percent slopes, occasionally flooded	3.8	38.7%
Ve	Velasco clay, 0 to 1 percent slopes, frequently flooded	0.0	0.3%
W	Water	3.2	32.5%
Totals for Area of Interest		9.8	100.0%

**Figure 4.** Mapped soils within the APE (con't.).

## Matagorda County, Texas

### Az—Asa silty clay loam, saline, occasionally flooded

#### Map Unit Setting

National map unit symbol: dfj9  
Elevation: 0 to 20 feet  
Mean annual precipitation: 40 to 52 inches  
Mean annual air temperature: 70 to 72 degrees F  
Frost-free period: 265 to 280 days  
Farmland classification: Not prime farmland

#### Map Unit Composition

Asa and similar soils: 100 percent  
Estimates are based on observations, descriptions, and transects of the mapunit.

#### Description of Asa

##### Setting

Landform: Flood plains on river valleys  
Down-slope shape: Linear  
Across-slope shape: Linear  
Parent material: Loamy alluvium of quaternary age

##### Typical profile

H1 - 0 to 12 inches: silty clay loam  
H2 - 12 to 45 inches: silty clay loam  
H3 - 45 to 61 inches: silty clay loam  
H4 - 61 to 80 inches: silty clay loam

##### Properties and qualities

Slope: 0 to 1 percent  
Depth to restrictive feature: More than 80 inches  
Natural drainage class: Well drained  
Capacity of the most limiting layer to transmit water (Ksat):  
Moderately high to high (0.57 to 1.98 in/hr)  
Depth to water table: More than 80 inches  
Frequency of flooding: Occasional  
Frequency of ponding: None  
Calcium carbonate, maximum in profile: 25 percent  
Salinity, maximum in profile: Strongly saline (16.0 to 32.0 mmhos/cm)  
Sodium adsorption ratio, maximum in profile: 25.0  
Available water storage in profile: Moderate (about 8.3 inches)

##### Interpretive groups

Land capability classification (irrigated): 6s  
Land capability classification (nonirrigated): 6s  
Hydrologic Soil Group: B  
Ecological site: Loamy Bottomland 25-44" PZ (R150AY534TX)

Figure 4. Mapped soils within the APE (con't.).

*Hydric soil rating:* No

## Data Source Information

Soil Survey Area: Matagorda County, Texas  
Survey Area Data: Version 12, Sep 22, 2016

**Figure 4.** Mapped soils within the APE (con't.).

## Matagorda County, Texas

### ImB—ljam clay, 1 to 3 percent slopes

#### Map Unit Setting

National map unit symbol: djfv  
Elevation: 0 to 10 feet  
Mean annual precipitation: 40 to 52 inches  
Mean annual air temperature: 68 to 72 degrees F  
Frost-free period: 270 to 290 days  
Farmland classification: Not prime farmland

#### Map Unit Composition

ljam and similar soils: 90 percent  
Minor components: 10 percent  
Estimates are based on observations, descriptions, and transects of the mapunit.

#### Description of ljam

##### Setting

Microfeatures of landform position: Mounds  
Down-slope shape: Convex  
Across-slope shape: Convex  
Parent material: Sandy dredge spoils and/or loamy dredge spoils

##### Typical profile

H1 - 0 to 6 inches: clay  
H2 - 6 to 80 inches: clay

##### Properties and qualities

Slope: 1 to 3 percent  
Depth to restrictive feature: More than 80 inches  
Natural drainage class: Poorly drained  
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)  
Depth to water table: About 0 to 36 inches  
Frequency of flooding: Rare  
Frequency of ponding: None  
Calcium carbonate, maximum in profile: 10 percent  
Salinity, maximum in profile: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)  
Sodium adsorption ratio, maximum in profile: 30.0  
Available water storage in profile: Moderate (about 6.6 inches)

##### Interpretive groups

Land capability classification (irrigated): 6s  
Land capability classification (nonirrigated): 6s  
Hydrologic Soil Group: D  
Hydric soil rating: Yes

Figure 4. Mapped soils within the APE (con't.).

**Minor Components**

**Follet**

*Percent of map unit: 2 percent*

**Harris**

*Percent of map unit: 2 percent*

**Surfside**

*Percent of map unit: 2 percent*

**Velasco**

*Percent of map unit: 2 percent*

**Veston**

*Percent of map unit: 2 percent*

**Data Source Information**

Soil Survey Area: Matagorda County, Texas  
Survey Area Data: Version 12, Sep 22, 2016

**Figure 4.** Mapped soils within the APE (con't.).



## Matagorda County, Texas

### Sr—Surfside clay, 0 to 1 percent slopes, occasionally flooded

#### Map Unit Setting

*National map unit symbol:* 2vv3t  
*Elevation:* 0 to 10 feet  
*Mean annual precipitation:* 40 to 60 inches  
*Mean annual air temperature:* 70 to 72 degrees F  
*Frost-free period:* 275 to 300 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Surfside and similar soils:* 90 percent  
*Minor components:* 10 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Surfside

##### Setting

*Landform:* Flood plains  
*Landform position (three-dimensional):* Dip  
*Down-slope shape:* Linear  
*Across-slope shape:* Concave  
*Parent material:* Calcareous holocene age saline clayey alluvium derived from igneous, metamorphic and sedimentary rock

##### Typical profile

*Ag1 - 0 to 14 inches:* clay  
*Ag2 - 14 to 32 inches:* clay  
*Bg - 32 to 80 inches:* clay

##### Properties and qualities

*Slope:* 0 to 1 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Very poorly drained  
*Runoff class:* High  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)  
*Depth to water table:* About 0 inches  
*Frequency of flooding:* Occasional  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 10 percent  
*Salinity, maximum in profile:* Strongly saline (16.0 to 32.0 mmhos/cm)  
*Sodium adsorption ratio, maximum in profile:* 40.0  
*Available water storage in profile:* Low (about 4.2 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 6s

Figure 4. Mapped soils within the APE (con't.).

*Land capability classification (nonirrigated): 6s*  
*Hydrologic Soil Group: D*  
*Ecological site: Salty Prairie 26-48" PZ (R150BY551TX)*  
*Hydric soil rating: Yes*

**Minor Components**

**Velasco**

*Percent of map unit: 5 percent*  
*Landform: Flood plains*  
*Landform position (three-dimensional): Talf*  
*Down-slope shape: Linear*  
*Across-slope shape: Linear*  
*Ecological site: Salt Marsh 40+" PZ (R150BY550TX)*  
*Hydric soil rating: Yes*

**Veston**

*Percent of map unit: 4 percent*  
*Landform: Barrier flats*  
*Landform position (three-dimensional): Talf*  
*Down-slope shape: Linear*  
*Across-slope shape: Linear*  
*Ecological site: LOAMY CHENIER (R151XY678TX)*  
*Hydric soil rating: Yes*

**Ijam**

*Percent of map unit: 1 percent*  
*Landform: Flats*  
*Landform position (three-dimensional): Rise*  
*Down-slope shape: Linear*  
*Across-slope shape: Convex*  
*Ecological site: INTERMEDIATE Firm MARSH (R151XY673TX)*  
*Hydric soil rating: Yes*

**Data Source Information**

Soil Survey Area: Matagorda County, Texas  
Survey Area Data: Version 12, Sep 22, 2016

**Figure 4.** Mapped soils within the APE (con't.).

## Matagorda County, Texas

### Ve--Velasco clay, 0 to 1 percent slopes, frequently flooded

#### Map Unit Setting

*National map unit symbol:* 2vv3k  
*Elevation:* 0 feet  
*Mean annual precipitation:* 41 to 51 inches  
*Mean annual air temperature:* 69 to 71 degrees F  
*Frost-free period:* 300 to 365 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Velasco and similar soils:* 85 percent  
*Minor components:* 15 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Velasco

##### Setting

*Landform:* Flood plains  
*Landform position (three-dimensional):* Dip  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Holocene age calcareous saline clayey alluvium derived from igneous, metamorphic and sedimentary rock

##### Typical profile

*Ag1 - 0 to 8 inches:* clay  
*Ag2 - 8 to 30 inches:* clay  
*Bg - 30 to 80 inches:* clay

##### Properties and qualities

*Slope:* 0 to 1 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Very poorly drained  
*Runoff class:* High  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)  
*Depth to water table:* About 0 to 30 inches  
*Frequency of flooding:* Frequent  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 20 percent  
*Salinity, maximum in profile:* Strongly saline (16.0 to 32.0 mmhos/cm)  
*Sodium adsorption ratio, maximum in profile:* 40.0  
*Available water storage in profile:* Low (about 4.3 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 6s  
*Land capability classification (nonirrigated):* 6s

Figure 4. Mapped soils within the APE (con't.).

*Hydrologic Soil Group:* D  
*Ecological site:* Salt Marsh 40+" PZ (R150BY550TX)  
*Hydric soil rating:* Yes

#### Minor Components

##### Veston

*Percent of map unit:* 5 percent  
*Landform:* Barrier flats  
*Landform position (three-dimensional):* Talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Ecological site:* LOAMY CHENIER (R151XY678TX)  
*Hydric soil rating:* Yes

##### Surfside

*Percent of map unit:* 5 percent  
*Landform:* Flood plains  
*Landform position (three-dimensional):* Dip  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Ecological site:* Salty Prairie 26-48" PZ (R150BY551TX)  
*Hydric soil rating:* Yes

##### Harris

*Percent of map unit:* 5 percent  
*Landform:* Tidal marshes  
*Landform position (three-dimensional):* Dip  
*Down-slope shape:* Linear  
*Across-slope shape:* Concave  
*Ecological site:* INTERMEDIATE Firm MARSH (R151XY673TX)  
*Hydric soil rating:* Yes

### Data Source Information

Soil Survey Area: Matagorda County, Texas  
Survey Area Data: Version 12, Sep 22, 2016

Figure 4. Mapped soils within the APE (con't.).

**Land Use:** The entirety of the APE is within existing ROW. The existing ROW consists entirely of the FM 457 roadway, the existing swing bridge, and previously developed properties acquired by TxDOT for use as State-owned ROW. The majority of the APE consists of a relatively thick fill-section of disturbed fill overlying the coastal marshes (Figures 5 & 6).

**Vegetation:** The existing ROW is cleared of shrubs and trees. The area within the APE is either mowed and well-maintained, cleared of all vegetation, or water.

**Estimated Ground Surface Visibility:** There is abundant ground surface visibility beyond the existing roadway. The APE has been maintained via regular ROW maintenance or clearing.



**Figure 5.** Well-maintained ROW within the APE in NE Quadrant; opposite side of GIWW is a cleared vacant lot in the SE Quadrant. This is the side where circular bridge ramps will be located



**Figure 6.** Opposite direction from the previous photo showing the APE still within in NE Quadrant, bridge ramp side of APE.

**Previous Investigations and Known Archeological Sites:** The background literature review determined that the APE has not been previously surveyed for cultural resources and no recorded sites are present within or adjacent to the APE (Texas Archeological Sites Atlas 2017). There are several previously conducted archeological survey areas within 2 kilometer (km) of the APE. The nearest survey is a 1991 US Army Corps of Engineers, Vicksburg District (USACOE-VD) along the GIWW to the east and west of the APE. This survey recorded no sites within or adjacent to the current southern end of the APE. Other archeological surveys include a 1987 Environmental Protection Agency/Texas Water Development Board (EPA/TWDB) survey west of the APE along Caney Creek, a 1991 US Army Corps of Engineers, Galveston District (USACOE-GD) survey, a 1999 USACOE-VD survey west of the APE, and a 2003 USACOE-GD survey west of the APE along Caney Creek. There are three recorded archeological sites recorded within 2 km of the APE by these surveys. These include 41MG4, a prehistoric site along Sargent Beach; 41MG59, a prehistoric occupation site recorded by the 1987 EPA/TWDB survey; and 41MG82, consisting of several Civil War era Confederate earthworks located around the mouth of Caney Creek that were recorded during the 1991 USACOE-GD survey. A review of historic maps indicated that no historic structures other than the Confederate earthworks are located within 2 km of the APE. One historic document that was included in an earlier archeological background study included a hand drawn map that reported that some of the Confederate earthworks, a redoubt and a rifle trench, may be within the current project APE.

## Survey Methods

**Surveyors:** Allen Bettis

**Methodological Description:** The investigation entailed an intensive archeological survey of the APE to determine the degree of soil integrity within the APE and determine if intact archeological remains are extant within the APE. Since the potential for intact archeological material was probably deeply buried and construction impacts are estimated at 10 feet deep, mechanical trenching with a Gradall machine was determine to be the optimal method for this inventory. TxDOT archeologists thoroughly documented and photographed the entire evaluation process. TxDOT performed all work in accordance with Occupational Safety and Health Administration (Title 29, Code of Federal Regulations [CFR], Part 1926).

**Comments on Methods:** Shovel-testing was determined to be unsuitable since the sandy soils along this part of the coast are relatively shallow above restrictive clay deposits and so many disturbances from developmental activities have occurred within the APE. The portions of the APE outside of the bridge replacement area would have a construction impact of approximately 2 feet in depth and are within the previously disturbed layer of the APE and do not warrant an archeological intensive survey.

## Survey Results

**Project Area Description:** The APE was assessed via four mechanical trenches (Figure 7). Only the bridge replacement portion of this proposed project warranted a survey. The remainder of the APE is previously disturbed and does no warrant an inventory. The pedestrian survey revealed that the majority of the ground surface within the APE is extensively disturbed by previous developmental activities, exhibiting an abundance of modern trash and debris, and did not warrant an archeological investigation. Of the four mechanical trenches, these were excavated to approximately 10 meters (approximately 33 feet) in length, at least one meter (just over three feet) in width, and to approximately one and a half to two meters (approximately five to seven feet) in depth (Figures 8 to 13). Disturbances were observed to approximately four feet below the surface. This included dredge spoil materials, construction debris and modern trash, and numerous abandoned utility lines for water, telephone, and septic systems drain fields. The APE was found to be sterile of any archeological materials or features, no Confederate earthworks were encountered. The only artifacts encountered two bottles, the oldest a 1940's bottle of Nu-Grape soda at approximately three feet in depth (Figures 14 and 15).

**APE Integrity:** Previous developmental activities and maintenance within the APE of the proposed project area have heavily modified the APE. There is a relatively thick layer of disturbed fill overlying the entirety of the areas investigated. Below this, portions of the APE have been disturbed by utility installation to a depth of approximately three to four feet below the ground surface (BTGS). Below this, only sterile clay was encountered to a depth of approximately five to seven feet BTGS.



Figure 7. Location of mechanical trenches within APE.





**Figure 8.** Gradall trench number one.



**Figure 9.** Gradall trench number two.



**Figure 10.** Gradall trench number two, east wall, notice septic line.



**Figure 11.** Gradall trench number two, west wall.



**Figure 12.** Gradall trench number three.



**Figure 13.** Gradall trench number four.



**Figure 14.** 1960's Pearl beer bottle.



**Figure 15.** 1940's Nu-Grape soda bottle.



## Recommendations

**Further Work:** No further work is recommended within the proposed APE.

**Justification:** The four trenches excavated covered the majority of the 6.125 acre APE. The trench on the south side of the GIWW was performed to verify the disturbed nature of the Ijam dredge soils used to create that landform. The three trenches on the north side of the GIWW were excavated well into the underlying restrictive clay deposit. The fill and disturbed soils above this had no integrity and contained no prehistoric or historic archeological materials other than modern trash and debris. The deepest modern trash, a soda pop bottle, was recovered at the base of the disturbed soils and fill layer well into the clay deposit within an intrusive utility trench. Therefore, since no archeological materials were encountered, TxDOT findings are that the proposed undertaking would have no effect on any archeological sites and no further investigations are warranted. The work was conducted in compliance with the Antiquities Code of Texas and the National Historic Preservation Act. As per the federal and state implementing regulations at 36 CFR 800 and Title 13, Texas Administrative Code, Chapter 26, TxDOT has made a good faith effort to evaluate the integrity within the APE and recommends no further investigation prior to the proposed undertaking proceeding to construction.

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