



Final Environmental Assessment

Farm-to-Market Road 2100 (From FM 1960 to
South Diamondhead Boulevard)
Harris County, Texas

CSJs 1062-04-022, 1062-04-057, and
1062-04-058

January 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 December 16, 2014, and executed by FHWA and TxDOT.

This page intentionally left blank.

TABLE OF CONTENTS	Page
ACRONYMS AND ABBREVIATIONS	IV
1.0 INTRODUCTION	1
1.1 Description of the Existing Facility	1
1.2 Description of the Proposed Project	1
1.2.1 Right-of-Way Requirements and Utility Relocations.....	1
1.2.2 Logical Termini.....	2
2.0 NEED AND PURPOSE	2
2.1 Project Need	2
2.2 Project Purpose	2
3.0 PLANNING AND PROGRAMMING STATUS/ PROJECT FUNDING	2
4.0 ALTERNATIVES	3
4.1 No-Build Alternative	3
4.2 Build Alternative	3
5.0 EXISTING ENVIRONMENT	3
6.0 IMPACTS	3
6.1 Issues Eliminated From Further Study	3
6.1.1 Airway-Highway Clearance.....	3
6.1.2 Farmland Protection Policy Act	3
6.1.3 General Bridge Act and Rivers and Harbors Act of 1899	4
6.2 Issues Studied in Detail	4
6.2.1 Waters of the U.S., Including Wetlands.....	4
6.2.2 Floodplains.....	5
6.2.3 Water Quality.....	5
6.2.4 Vegetation and Wildlife Habitat.....	6
6.2.5 Threatened/Endangered Species.....	11
6.2.6 Air Quality	24
6.2.7 Traffic Noise	30
6.2.8 Community Impact Assessment.....	31
6.2.9 Cultural Resources.....	34
6.2.10 Section 4(f) and Section 6(f).....	35
6.2.11 Hazardous Materials.....	36
6.2.12 Construction Impacts	38
6.2.13 Encroachment-Alteration Effects.....	38
7.0 INDIRECT IMPACTS	39
7.2 Area of Influence	40
7.3 Potential for Future Growth	40
7.4 Likelihood of Induced Growth	40
8.0 CUMULATIVE IMPACTS	41
8.1 Step 1: Resource Study Area, Conditions, and Trends	42

8.1.1	Identification of Resources	42
8.1.2	Resource Study Areas	44
8.2	Step 2: Direct and Indirect Impacts on Each Resource from the Proposed Project.....	44
8.3	Step 3: Other Actions – Past, Present, and Reasonably Foreseeable	45
8.4	Step 4: Overall Effects of the Proposed Project Combined with Other Actions	45
8.5	Step 5: Mitigation of Cumulative Effects	46
9.0	ENVIRONMENTAL PERMITS, IMPACTS AND COMMITMENTS	46
10.0	COMMENTS AND COORDINATION.....	48
11.0	DETERMINATION OF ASSESSMENT	50
11.1	Improve Mobility and Safety	50
11.2	Compatibility with Local, County, and Regional Needs and Plans.....	50
11.3	Minimize Social, Economic, and Environmental Effects on the Human Environment	50
11.4	Conclusion.....	50
12.0	REFERENCES.....	51

APPENDICES

Appendix A	Figures
Appendix B	Project Area Photographs
Appendix C	MTP/RTP and TIP Pages
Appendix D	Agency Coordination

FIGURES (APPENDIX A)

Figure 1	Project Location
Figure 2	Topographic Map
Figure 3	Typical Sections – Final Draft EA Schematic Design
Figure 4	Project Layout – Final Draft EA Schematic Design
Figure 5	Water Resources
Figure 6	EMST Mapped Vegetation Types
Figure 7	Observed Vegetation Types
Figure 8	Noise Receiver Location Map
Figure 9	Land Use Map
Figure 10	Minority Populations
Figure 11	Potential Displacements
Figure 12	Area of Influence
Figure 13	Resource Study Area
Figure 14	Typical Sections – Schematic Design Revised Following Public Hearing
Figure 15	Project Layout – Schematic Design Revised Following Public Hearing

TABLES	Page
Table 1: 2014 TxDOT Statewide Crash Rates	2
Table 2: Vegetation Types Mapped by EMST as Occurring Within the Project Area	7
Table 3: Tier I Site Assessment – TPWD Coordination Triggers	10
Table 4: Rare, Threatened, and Endangered Species of Potential Occurrence in Harris County, Texas	13
Table 5: Elements of Occurrence from TXNDD Within 1.5 Miles of the Proposed Project.....	22
Table 6: BMPs for State-listed Species and SGCNs.....	23
Table 7: Congestion Management Process Strategies	25
Table 8: Projected National MSAT Emission Trends 2010–2050 for Vehicles Operating on Roadways Using EPA’s MOVES2010b Model.....	26
Table 9: Hazardous Materials Database Search Results.....	36
Table 10: Resource/Issues Considered for Cumulative Impacts Analysis.....	42
Table 11: Summary of Impacts	45

ACRONYMS AND ABBREVIATIONS

ACS	American Community Survey
AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ACM	Asbestos Containing Materials
ADT	Average Daily Traffic
APE	Area of Potential Effect
AOI	Area of Influence
BMP	Best Management Practice
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGP	Construction General Permit
CMAQ	Congestion Mitigation and Air Quality
CMP	Congestion Management Process
CWA	Clean Water Act
dB(A)	Decibels (A-weighted)
DHHS	U.S. Department of Health and Human Services
EA	Environmental Assessment
ECOS	Environmental Compliance Oversight System
EMST	Ecological Mapping System of Texas
EPA	U.S. Environmental Protection Agency
EPIC	Environmental Permits, Issues, and Commitments
EO	Executive Order
ESA	Endangered Species Act
ETJ	Extra Territorial Jurisdiction
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FM	Farm-to-Market Road
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
FWCA	Fish and Wildlife Coordination Act
HCAD	Harris County Appraisal District
HEI	Health Effects Institute
H-GAC	Houston-Galveston Area Council
IP	Individual Permit
IRIS	Integrated Risk Information System
ISA	Initial Site Assessment
LBP	Lead Based Paints
LEP	Limited English Proficiency

Acronyms and Abbreviations (cont'd)

LPST	Leaking Petroleum Storage Tank
MBTA	Migratory Bird Treaty Act
MOU	Memorandum of Understanding
MPO	Metropolitan Planning Organization
MS4	Municipal Separate Storm Sewer System
MSAT	Mobile Source Air Toxics
MTFP	Major Thoroughfare and Freeway Plan
MTP	Metropolitan Transportation Plan
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NATA	National Air Toxics Assessment
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NO _x	Nitrogen Oxides
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
NWP	Nationwide Permit
PA	Programmatic Agreement
PALM	Potential Archeological Liability Map
PCN	Preconstruction Notification
PM	Particulate Matter
PS&E	Plans, Specifications, and Estimates
ROE	Right-of-Entry
RGP	Regional General Permit
ROW	Right-of-Way
RPST	Registered Petroleum Storage Tank
RSA	Resource Study Area
RTHL	Recorded Texas Historic Landmarks
RTP	Regional Transportation Plan
SAL	State Antiquities Landmarks
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer
SOV	Single Occupancy Vehicle
SW3P	Storm Water Pollution Prevention Plan
TCAP	Texas Conservation Action Plan
TCEQ	Texas Commission on Environmental Quality
TERP	Texas Emissions Reduction Plan
THC	Texas Historical Commission
TIP	Transportation Improvement Program

Acronyms and Abbreviations (cont'd)

TMA	Transportation Management Area
TPDES	Texas Pollution Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TSS	Total Suspended Solids
TxDOT	Texas Department of Transportation
TXNDD	Texas Natural Diversity Database
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
URARPAA	Uniform Relocation Assistance and Real Properties Acquisition Act
USGS	U.S. Geological Survey
VCP	Voluntary Cleanup Program
VMT	Vehicle-Miles Traveled
vpd	Vehicles per day

1.0 INTRODUCTION

The Houston District of the Texas Department of Transportation (TxDOT) proposes to widen Farm-to-Market (FM) Road 2100 from the existing two-lane, undivided facility to a four-lane, divided facility, between FM 1960 and South Diamondhead Boulevard, in Harris County, Texas. This Environmental Assessment (EA) has been prepared to comply with the requirements of the National Environmental Policy Act (NEPA) (42 U.S. Code [U.S.C.] Sections 4321-4375) and implementing regulations promulgated by the Council on Environmental Quality (CEQ, 40 Code of Federal Regulations [CFR] Part 1500) and the Federal Highway Administration (FHWA) (23 CFR Part 771). 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 (MOU) dated December 16, 2014, and executed by FHWA and TxDOT.

Appendix A includes all project figures. **Figure 1** depicts the project location, and **Figure 2** shows the U.S. Geological Survey (USGS) topographic map for the project area. **Appendix B** includes project area photographs. The design schematic for the proposed improvements has been prepared and is available for inspection at the TxDOT Houston District office at 7600 Washington Avenue, Houston, Texas 77007.

1.1 DESCRIPTION OF THE EXISTING FACILITY

The proposed project is a roadway widening and improvement project. The existing typical section consists of two 12-foot-wide travel lanes, with 6-foot shoulders and open vegetated ditches, including a center turn lane along some sections of the roadway. Discontinuous sidewalks exist in some portions of the project area, and no bicycle accommodations exist along FM 2100 within the project limits. The existing typical section is shown on **Figure 3**.

1.2 DESCRIPTION OF THE PROPOSED PROJECT

The proposed improvements would widen the existing two-lane, undivided facility to a four-lane, divided facility. The project location is shown on **Figures 1** and **2** in **Appendix A**. North of Hare Cook Road, the proposed roadway would have 12-foot travel lanes, two in each direction, separated by an 18-foot-wide median, and 12-foot outside shoulders. Five-foot sidewalks would be constructed on both sides of the roadway. South of Hare Cook Road, the roadway would also have two travel lanes in each direction; the outer lane would be a 15-foot shared use lane, along with a 12-foot-wide inner lane. This section of the roadway would also have a raised median and 5-foot sidewalks. The typical sections and the proposed layout are shown on **Figures 3** and **4**, respectively. Detention ponds would also be constructed as part of the proposed project. Following the public meeting and public hearing, additional median breaks were provided based on comments received. Additionally, two of the seven detention ponds were removed. The revised design is presented in **Figures 14** and **15**. Because the design revisions resulted in a reduction of proposed project impacts, this EA document and the approved technical reports retain the references to seven detention ponds.

1.2.1 Right-of-Way Requirements and Utility Relocations

The project would require approximately 107 acres of new right-of-way (ROW), including land for the detention ponds. The proposed project is anticipated to require six residential relocations, eight commercial relocations, and two church relocations (additional detail provided in **Section 6.2.8**). Implementation of the proposed project may require the relocation and adjustment of utilities such as water lines, sewer lines, gas lines, telephone cables, electrical lines, and other subterranean and aerial

utilities. The relocation and adjustment of any utilities would be coordinated with the affected utility provider to ensure that no substantial interruption of service would take place.

1.2.2 Logical Termini

The logical termini for the project are FM 2100 at South Diamondhead Boulevard and FM 1960. FM 1960 is a major thoroughfare; the construction limits extend slightly beyond this roadway in order to allow for a transition to the existing configuration of FM 2100 north of FM 1960. At the southern end, the proposed project would tie into a previously improved segment of FM 2100 ending at South Diamondhead Boulevard. The proposed project has independent utility and would not preclude other foreseeable transportation improvements within the project area.

2.0 NEED AND PURPOSE

2.1 PROJECT NEED

The FM 2100 project is needed to improve mobility in eastern Harris County and to improve safety by providing a divided roadway.

The proposed roadway would provide additional capacity for traffic traversing this quickly growing part of the county. According to the Houston-Galveston Area Council’s (H-GAC) Regional Growth forecast, the project area is projected to see particularly strong growth. Two of the area census tracts rank in the top 1 percent of census tracts in Harris County for household growth between 2010 and 2040, and all of the project area Census tracts are projected to outpace the growth of the county as a whole. The proposed facility is expected to accommodate about 19,000 vehicles per day (vpd) in 2015, increasing to about 29,900 vpd by 2040 (an increase of 57 percent).

In addition to improving mobility, the proposed project would also improve safety. The proposed roadway would be a divided facility. TxDOT data from 2015 (the most recent year available) show that crash rates are lowest for divided roadways with four or more lanes (see **Table 1**).

Table 1: 2015 TxDOT Statewide Crash Rates		
Road Type	Traffic Crashes per 100 million vehicle miles	
	Rural	Urban
Two-lane, two-way	100.60	250.50
Four or more lanes, divided	64.79	164.74

Source: http://ftp.dot.state.tx.us/pub/txdot-info/trf/crash_statistics/2015/02.pdf

2.2 PROJECT PURPOSE

The purpose of the proposed project is to facilitate multi-modal mobility in eastern Harris County by adding additional capacity to FM 2100, as well as sidewalks and bicycle accommodations. The proposed project would also improve safety for the traveling public by constructing a raised median.

3.0 PLANNING AND PROGRAMMING STATUS/ PROJECT FUNDING

The estimated construction cost is approximately \$75.6 million. The proposed action is consistent with the area’s financially constrained Regional Transportation Plan (RTP), the H-GAC’s 2040 RTP. The project is included in the 2017-2020 Transportation Improvement Plan (TIP).

4.0 ALTERNATIVES

4.1 NO-BUILD ALTERNATIVE

The No-Build Alternative represents the case in which the proposed project would not be constructed. Other transportation improvements may or may not be constructed, depending on project development and funding availability issues for each proposed improvement.

The No-Build Alternative would not improve mobility or safety in the project area. For these reasons, the No-Build Alternative would not satisfy the need and purpose of the proposed project. The No-Build Alternative is carried forward throughout the document as a baseline comparison to the Build Alternative.

4.2 BUILD ALTERNATIVE

The Build Alternative is described in **Section 1.2**. The typical sections and project layout are shown on **Figures 3** and **4**, respectively. The Build Alternative is the preferred alternative, as it would best fulfill the purpose and need of the project.

5.0 EXISTING ENVIRONMENT

The proposed project is located in eastern Harris County. The project area is within the Gulf Prairies and Marshes Ecoregion as described in Texas Parks and Wildlife Department's (TPWD) Texas Conservation Action Plan: Gulf Coast Prairies and Marshes Ecoregion Handbook (TPWD 2012). Vegetation in the project vicinity is primarily characterized as a mix of grassland, agricultural, and wooded areas.

The existing ROW is dedicated to transportation use. Land surrounding the ROW consists of a mixture of undeveloped, agricultural, and residential uses with occasional commercial and light industrial uses.

6.0 IMPACTS

6.1 ISSUES ELIMINATED FROM FURTHER STUDY

6.1.1 Airway-Highway Clearance

The nearest airport is the Baytown Airport, which is approximately 11 miles southeast of the proposed project limits. As the distance to the airport is greater than 2 miles, airway-highway clearance is not required.

6.1.2 Farmland Protection Policy Act

The Farmland Protection Policy Act (FPPA), as detailed in Subtitle I of Title XV of the Agricultural and Food Act of 1981, provides protection to the following: (1) prime farmland; (2) unique farmland; and (3) farmland of local or statewide importance. Transportation projects conducted by a federal agency or with federal agency assistance that irreversibly convert protected farmland (directly or indirectly) to nonagricultural use require coordination with the Natural Resources Conservation Service (NRCS) under the FPPA. The proposed project was scored using the U.S. Department of Agriculture's (USDA) Farmland Conversion Impact Rating Form. Although the proposed project would convert farmland subject to the FPPA to a non-agricultural transportation use, the resulting score was below that required for coordination with the NRCS. Therefore, no coordination with the NRCS would be required.

6.1.3 General Bridge Act and Rivers and Harbors Act of 1899

The proposed project would not require construction or modification of a bridge over a navigable waterway. Therefore, the General Bridge Act of 1946 and the Rivers and Harbors Act of 1899 do not apply.

6.2 ISSUES STUDIED IN DETAIL

6.2.1 Waters of the U.S., Including Wetlands

No-Build Alternative

No impacts to waters of the U.S., including wetlands, would occur as a result of the No-Build Alternative.

Build Alternative

The U.S. Army Corps of Engineers (USACE) regulates the discharge of dredged and fill material into wetlands and other waters of the U.S. under Section 404, subsection 330.5(a)(21), of the Clean Water Act (CWA). Authorization is required from the USACE for any activity that would result in the discharge of dredged or fill material into waters of the U.S. Regulated activities may be permitted through the USACE via Individual Permits (IP), Regional General Permits (RGP), or Nationwide Permits (NWP).

A field assessment to identify and delineate potential waters of the U.S. occurring within the project area was completed in September 2015, but was limited to those areas where right-of-entry (ROE) had been obtained. In areas where ROE was not granted boundaries were drawn based on aerial photography. The findings are detailed in the Wetland/Waters of the U.S. Delineation Technical Report and are summarized below.

Permits and Mitigation

All proposed roadway and drainage improvements have been designed in a manner to avoid or minimize impacts to jurisdictional crossings. Impacts to waters of the U.S. would be authorized through NWP 14 (Linear Transportation Crossings) with a Pre-Construction Notification (PCN) because of impacts to two wetlands. TxDOT submitted a PCN to the USACE Galveston District requesting authorization under NWP 14 to permanently place fill material into waters of the United States for the proposed project. The USACE provided authorization in August 2016 (see **Appendix D**). The actual amount of impacts to USACE-jurisdictional waters would be confirmed during the final design phase, based on acquisition of complete right-of-entry and detailed construction plans.

Executive Order 11990, Wetlands

Executive Order (EO) 11990, Protection of Wetlands (42 *Federal Register* 26961, May 24, 1977), provides the requirement “to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands, and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.”

All proposed roadway and drainage improvements were designed in a manner to avoid or minimize impacts to wetlands. The actual amount of impacts to USACE-jurisdictional waters will be confirmed during the final design phase, based on acquisition of complete ROE and detailed construction plans.

6.2.2 Floodplains

No-Build Alternative

No floodplains would be impacted by the No-Build Alternative.

Build Alternative

The project area generally drains southeast to the Houston Ship Channel and Galveston Bay, which connect to the Gulf of Mexico, and the project crosses several 100-year Federal Emergency Management Agency (FEMA) floodplains (see **Figure 5**).

The project is located entirely within Harris County, which is a participant in the National Flood Insurance Program. According to FEMA Flood Insurance Rate Maps (FIRM) (Flood Hazard Boundary Map Community Panel Numbers 48201C0545L, 48201C0540L, 48201C0530L, and 48201C0340L [revised 2010]), approximately 9,005 linear feet of the floodplain associated with the San Jacinto River Basin would be crossed by the proposed project (see **Figure 5** in **Appendix A**). Executive Order 11988, "Floodplain Management," requires federal agencies to "identify and evaluate practicable alternatives to locating in the base floodplain, including alternative sites outside of the floodplain." Due to the extent of the floodplain in the project area, there are no practicable routes that would avoid floodplain encroachments.

The hydraulic design for this project would be in accordance with current FHWA and TxDOT design policies. The facility would permit the conveyance of the 100-year floodplain, inundation of the roadway being acceptable, without causing significant damage to the facility, stream, or other property. The proposed project would not increase the base flood elevation to a level that would violate applicable floodplain regulations and ordinances. The design of the roadway would maintain floodplain connectivity and would minimize impacts to natural and beneficial floodplain values. Any proposed development actions by others would be subject to the permitting and coordination requirements of local floodplain ordinances. Efforts would be made to minimize permanent impacts to the floodplain to the extent practicable during detailed design. As natural and beneficial floodplain values are not anticipated to be affected, no specific measures to restore and preserve these values are proposed. However, construction in this floodplain is regulated by the Harris County Floodplain Administrator. Therefore, coordination with the Administrator would be required before construction.

6.2.3 Water Quality

No-Build Alternative

No impacts to water quality would occur as a result of the No-Build Alternative.

Build Alternative

Section 303(d) of the Clean Water Act

The project area is located within the San Jacinto River Basin, which drains approximately 5,600 square miles (TCEQ 2013). Principal tributaries to the San Jacinto River Basin include the East and West Forks of the San Jacinto River, which merge in the headwaters of Lake Houston. For the purposes of monitoring water quality, the Texas Commission on Environmental Quality (TCEQ) has divided the major water bodies within the San Jacinto River Basin into 17 discrete segments (TCEQ 2013). The proposed project is within 5 miles and is also within the watershed of assessment units 1001_01 and 1001_02 of Segment 1001 of the San Jacinto River Basin. Assessment unit 1001_01 is listed as threatened or impaired for dioxin and polychlorinated biphenyls in edible tissue, and assessment unit 1001_02 is listed as threatened

or impaired for dioxin in edible tissue on the 2012 Texas Integrated Report of Surface Water Quality (TCEQ 2012). Coordination with the TCEQ for water quality is therefore required.

Section 402 of the Clean Water Act

The project area is partially within the boundaries of the Houston, Texas, Urbanized Area regulated Municipal Separate Storm Sewer System (MS4) and would comply with the applicable MS4 requirements.

Section 402 of the Clean Water Act: Texas Pollutant Discharge Elimination System, Construction General Permit

This project would include 5 or more acres of earth disturbance. TxDOT would comply with TCEQ's Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit (CGP). A Storm Water Pollution Prevention Plan (SW3P) would be implemented, and a construction site notice would be posted on the construction site. A Notice of Intent (NOI) would be required.

TCEQ Section 401 Water Quality Certification, Best Management Practices

The proposed project would comply with Section 401 requirements. The 401 Certification requirements for NWP 14 would be met by implementing approved erosion control, sedimentation control, and post-construction Total Suspended Solids (TSS) control Best Management Practices (BMPs) from TCEQ's 401 Water Quality Certification Conditions for NWPs.

6.2.4 Vegetation and Wildlife Habitat

No-Build Alternative

No impacts to vegetation or wildlife habitat would result from the No-Build Alternative.

Build Alternative

Natural Region and Vegetation Types

The project area is located within the Gulf Coast Prairies and Marshes Ecoregion (TPWD 2012). The footprint of the project area was overlain on Ecological Mapping Systems of Texas (EMST) vegetation type maps as shown in **Figure 6** in **Appendix A**. The EMST Vegetation Types correspond to NatureServe Ecological System Types and the vegetation types outlined in TxDOT's 2013 MOU with TPWD as shown in **Table 2**. According to the EMST, 10 vegetation types within six MOU habitat types are mapped as occurring within the project area (MoRAP 2013). **Table 2** indicates that thresholds set by the *Threshold Table Programmatic Agreement* (PA) would be exceeded for "Agriculture," "Coastal Grassland," "Coastal Mixed Woodland and Forest," and "Disturbed Prairie" habitat types.

Table 2: Vegetation Types Mapped by EMST as Occurring Within the Project Area					
EMST Vegetation Type	NatureServe Ecological System Type	MOU Vegetation Type	MOU Threshold (acres)	Mapped EMST Acres in Limits of Construction	Field Verified Acres
Row Crops	Agriculture	Agriculture	10	15.4	-
Pine Plantation >3 meters tall	Silviculture	Agriculture	10	3.9	-
		Agriculture	-	-	20.6
Gulf Coast: Coastal Prairie	Texas-Louisiana Coastal Prairie	Coastal Grassland	2	57.2	-
		Coastal Grassland	-	-	24.9
Chenier Plain: Live Oak Fringe Forest	West Gulf Coastal Plain Chenier and Upper Texas Coastal Fringe Forest and Woodland	Coastal Mixed Woodland and Forest	1	2.1	-
Chenier Plain: Mixed Live Oak - Deciduous Hardwood Fringe Forest	West Gulf Coastal Plain Chenier and Upper Texas Coastal Fringe Forest and Woodland	Coastal Mixed Woodland and Forest	1	0.6	-
		Coastal Mixed Woodland and Forest	-	-	13.4
Non-Native Invasive: Chinese Tallow Forest, Woodland, or Shrubland	Invasive Shrub and Woodland	Disturbed Prairie	3	26.5	-
Native Invasive: Juniper Shrubland	Native Invasive Shrub and Woodland	Disturbed Prairie	3	0.3	-
		Disturbed Prairie	-	-	28.8
Gulf Coast: Coastal Prairie Pondshore	Texas-Louisiana Coastal Prairie Pondshore	Tidal and Salt Marsh	0.01	6.6	-
		Tidal and Salt Marsh	-	-	0.0
Urban High Intensity	Urban	Urban	NA	8.1	-
Urban Low Intensity	Urban	Urban	NA	83.7	-
		Urban	-	-	116.7
			Total	204.4	204.4

Sources: MoRAP, 2013. TxDOT-TPWD MOU, 2013. Project Team, 2014.

Two rare plant communities (Texas-Louisiana Coastal Prairie and West Gulf Coastal Plain Chenier and Upper Texas Coastal Fringe Forest and Woodland), as identified by the Texas Conservation Action Plan (TCAP), are mapped as occurring within or adjacent to the project area (TPWD 2011); however, based on field observations, these rare communities, as described in the TCAP, do not actually occur within the project area. Descriptions of the vegetation observed during field investigations are provided below.

Based on field investigations completed in December 2014, habitat adjacent to the project area was observed to be generally consistent with the mapped MOU vegetation types (TxDOT-TPWD MOU) (see **Figure 7**). However, maintenance and other land uses within the existing ROW have altered these habitat components.

Agriculture

Agriculture within the project area consists mostly of sod farms, with some row crops. The 19.3 acres of agriculture mapped in the EMST contain areas described as pine plantation and row crops. Although loblolly pines (*Pinus taeda*) are present within several of the wooded areas within the project area, these areas do not appear to be in active silviculture. Additionally, some of these areas are mapped within existing ROW. Approximately 20.6 acres of this habitat type were verified after the site visit.

Coastal Grassland

Coastal Grassland is described in the EMST as generally dominated by grasses including little bluestem (*Schizachyrium scoparium*), indiagrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), and sideoats grama (*Bouteloua curtipendula*). Non-native grasses that may be present include bermudagrass (*Cynodon dactylon*) and King Ranch bluestem (*Bothriochloa ischaemum* var. *songarica*). The EMST shows 57.2 acres of this habitat type, with field verification resulting in 24.9 acres of impacts to this habitat type. The discrepancies are generally within the existing ROW, which is better characterized as Low Intensity Urban, and some areas of row crops that are mapped as coastal grassland.

Species identified during field verification included bermudagrass, St. Augustine (*Stenotaphrum secundatum*), johnsongrass (*Sorghum halepense*), little bluestem, and dewberry (*Rubus trivialis*). Eastern red cedar (*Juniperus virginiana*) and yaupon (*Ilex vomitoria*) are common shrubs in this habitat, with an occasional solitary loblolly pine, sweetgum (*Liquidambar styraciflua*), or water oak (*Quercus nigra*).

Coastal Mixed Woodland and Forest

The Coastal Mixed Woodland and Forest habitat type within the project area is incorrectly characterized in the EMST as “Chenier Plain: Live Oak Fringe Forest” and “Chenier Plain: Mixed Live Oak -Deciduous Hardwood Fringe Forest.” No areas of coastal live oak (*Quercus agrifolia*) were noted during field verification. The majority of this habitat type is mapped within the existing ROW. Although the EMST incorrectly mapped the specific habitat type, this MOU type is present on the site. Trees such as loblolly pine, sweetgum, water oak, and shumard oak (*Quercus shumardii*) dominate the tree stratum, with heights of 30 to 50 feet and diameters at breast height ranging from 5 to 20 inches. The shrub layer is dominated by yaupon, Chinese privet (*Ligustrum sinense*), American beautyberry (*Callicarpa americana*), Chinese tallow (*Triadica sebifera*), and saplings of the tree species. Woody cover is approximately 70 percent. The vine stratum consists of mustang grape (*Vitis mustangensis*), peppervine (*Ampelopsis arborea*), Japanese honeysuckle (*Lonicera japonica*), greenbrier (*Smilax bona-nox*), and poison ivy (*Toxicodendron radicans*). Approximately 13.4 acres of this habitat type occur within the project area.

Disturbed Prairie

The Disturbed Prairie habitat type within the project area is correctly characterized in the EMST as Non-Native Invasive: Chinese Tallow Forest, Woodland, or Shrubland. The difference in the field verified acreage is due to the coarseness of the EMST pixel size. The trees layer is dominated by Chinese tallow, with occasional loblolly pine, sweetgum, water oak, and shumard oak. Heights range from 20 to 40 feet, with diameters at breast height ranging from 5 to 15 inches. The shrub layer is dominated by yaupon, Chinese privet, and saplings of the tree species. Woody cover is approximately 60 percent. The vine stratum consists of Japanese honeysuckle, greenbrier, and poison ivy. Approximately 28.8 acres of this habitat type occur within the project area.

Tidal and Salt Marsh

This habitat is mapped by the EMST as being present within the project area, but the project is not located within any tidal areas, nor are any salt marshes present. Field verification confirmed there will not be any impacts to this habitat type.

Urban

This habitat type includes built-up areas and wide transportation corridors dominated by impervious cover, as well as built-up areas that are not entirely covered by impervious cover, and includes most of the non-industrial areas within cities and towns. Approximately 116.7 acres of this habitat type are present within the project area. Within the FM 2100 project area, this habitat type describes the existing ROW, residential and commercial lawns, and impervious surfaces. Plant species present are dominated by routinely maintained herbaceous species such as St. Augustine grass and bermudagrass. Tree species are present within some residential areas and include scattered pecan (*Carya illinoensis*), loblolly pine, water oak, sweetgum, southern live oak (*Quercus virginiana*), and sweetgum. Ornamental shrubs such as sago palm (*Cycas revoluta*) and crepe myrtle (*Lagerstroemia* sp.) are also found associated with residential areas.

Special Habitat Features

As defined in the 2013 MOU Tier II Site Assessment PA between TxDOT and TPWD, special habitat features can include bottomland hardwoods, caves, cliffs and bluffs, native prairies, seeps or springs, snags or groups of snags, existing bridges with known or observed bird or bat colonies, rookeries, and prairie dog towns. No bird or bat colonies were identified at the bridge over Gum Gully. Grasslands occurring within the project area do not constitute native prairie, as they contain a number of introduced and/or invasive species.

Unusual vegetation features can include unmaintained vegetation; fencerow vegetation; riparian vegetation; trees that are considered historically significant, ecologically significant, or locally important; and unusual stands or islands of vegetation. No impacts to Unusual Vegetation Features or Special Habitat Features are expected.

Invasive Species/Beneficial Landscaping

During construction, efforts would be taken to avoid and minimize disturbance of vegetation and soils. All disturbed areas would be restored and reseeded according to TxDOT's Vegetation Management Guidelines and in compliance with the intent of EO 13112 on Invasive Species as soon as it becomes practicable. In accordance with EO 13112 on Invasive Species, the Executive Memorandum on Beneficial Landscaping, and the 1999 FHWA guidance on invasive species, all revegetation would, to the extent

practicable, use only native species. Further, BMPs would be used to control and prevent the spread of invasive species.

TPWD Coordination

A Tier I site assessment was performed in accordance with TxDOT’s 2013 *Memorandum of Understanding with the Texas Parks and Wildlife Department* to determine whether coordination with TPWD would be required for the proposed project. The Tier I site assessment defines the type and amount of habitat impacted using information from the TCAP; EMST; Texas Natural Diversity Database (TXNDD); county lists of Rare and Protected Species of Texas maintained by TPWD; county lists of endangered, threatened, and candidate species maintained by the U.S. Fish and Wildlife Service (USFWS); information collected during field investigations, and the most current aerial photography available.

Table 3 lists the coordination triggers and responses to each.

Table 3: Tier I Site Assessment – TPWD Coordination Triggers		
Trigger	Applies to the Project?	Explanation
The project is within the range of a state-threatened or endangered species or Species of Greatest Conservation Need (SGCN), as identified by the TPWD county list, and there is suitable habitat for the species within the project area unless BMPs as defined in the MOU are implemented as provided by a programmatic agreement.	Yes	Habitat is present for five state-threatened species: Louisiana pigtoe, creek chubsucker, alligator snapping turtle, timber rattlesnake, and wood stork. Additionally, habitat is present for three SGCNs: coastal gay-feather, mountain plover, and plains spotted skunk. BMPs for each of these species are defined in the MOU PA, except for the coastal gay-feather, as listed in Table 6 . The BMP for the creek chubsucker does not eliminate the need for coordination if work occurs in the water.
The project may adversely impact important remnant vegetation based on the judgment of a qualified biologist or as mapped in the TXNDD.	No	No important remnant vegetation was identified within the project area by project biologists or by the TXNDD.
The project requires a nationwide permit with pre-construction notification or an individual permit issued by the USACE.	Yes	A nationwide permit with pre-construction notification is required because of impacts to two wetlands. A pre-construction notification was submitted to the USACE Galveston District and approval was received in August 2016.
The project includes in the TxDOT ROW or conservation, construction, or drainage easement, more than 200 linear feet of stream channel for each single and complete crossing of one or more of the following that is not already channelized or otherwise maintained: a) channel realignment; or b) stream bed or stream bank excavation, scraping, clearing, or other permanent disturbance.	No	There is only one stream channel, Gum Gully, where more than 200 linear feet of the single and complete crossing lies within the existing and proposed ROW. Current design indicates that Gum Gully would be bridged and no impacts to the channel would occur.
The project contains known isolated wetlands outside existing TxDOT ROW that will be directly impacted by the project.	No	No wetlands outside existing ROW are currently known.
The project may impact at least 0.10 acre of riparian vegetation based on the judgment of a qualified biologist or as mapped in the EMST.	No	No riparian vegetation would be impacted.

Table 3: Tier I Site Assessment – TPWD Coordination Triggers

The project disturbs habitat in an area equal to or greater than the area of disturbance indicated in the <i>Threshold Table Programmatic Agreement</i> .	Yes	The project exceeds thresholds set by the Threshold Table PA would be exceeded for Agriculture”, “Coastal Grassland,” “Coastal Mixed Woodland and Forest,” and “Disturbed Prairie” habitat types (see Table 1).
---	-----	---

Source: TPWD MOU; Project Team 2014.

As described in **Table 3**, the proposed project requires coordination with TPWD in accordance with TxDOT’s 2013 *Memorandum of Understanding with the Texas Parks and Wildlife Department*. Three triggers are met: the proposed project is within range and habitat is present for state-listed threatened species and an SGCN species without an approved BMP as defined in the PA. The project requires a NWP with PCN. Additionally, the project exceeds thresholds set by the Threshold Table PA for “Agriculture,” “Coastal Grassland,” “Coastal Mixed Woodland and Forest,” and “Disturbed Prairie” habitat types. A copy of the Biological Evaluation Form is on file at the TxDOT Houston District Office.

Previous coordination on the project occurred in March 2011 under the previous TxDOT-TPWD MOU; TPWD sent a response letter to the TxDOT Environmental Affairs Division on March 8, 2011. TxDOT requested TPWD to re-coordinate for this project in early 2015. As indicated in an email sent on March 2, 2015, from TPWD to the TxDOT Houston District, TPWD does not have additional comments. Therefore, TPWD recommended that TxDOT implement the recommendations made during the 2011 coordination (see **Appendix D**).

Migratory Bird Treaty Act of 1918

The Migratory Bird Treaty Act (MBTA) of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit issued in accordance within the act’s policies and regulations.

The project area was investigated for any structures containing migratory birds or indications of nesting migratory birds. No nests or individuals were seen, but there is potential for nesting birds to be present in the project action area during construction and other migratory birds may arrive in the project area to breed during construction of the proposed project. Measures would be taken to avoid the take of migratory birds, their occupied nests, eggs, or young, in accordance with the MBTA, through phasing of work or preventative measures.

Fish and Wildlife Coordination Act

Proposed impacts to waters of the U.S. have been authorized under the USACE Section 404 CWA NWP Program; therefore, the USFWS considers Fish and Wildlife Coordination Act (FWCA) coordination to have been completed as part of the program’s review last authorized and reissued in 2012.

6.2.5 Threatened/Endangered Species

No-Build Alternative

No effects or impacts to federally or state-listed threatened or endangered species, or SGCNs, would result from the No-Build Alternative.

Build Alternative

Endangered Species Act

The Endangered Species Act (ESA) affords protection for federally listed threatened and endangered species and their habitats. State law prohibits direct harm to state-listed species. SGCNs are designated by TPWD, and may be either federally listed or state-listed species, or have no regulatory listing status.

Lists of threatened and endangered species maintained by the USFWS and TPWD were consulted to determine species of potential occurrence in the vicinity of the proposed project. **Table 4** lists the federally and state-listed threatened and endangered species, and SGCNs of potential occurrence in Harris County, along with habitat descriptions for each species, a determination of whether appropriate habitat for the species occurs within the project area, and a discussion of potential effects/impacts to the species. Field investigations were performed by qualified biologists in December 2014.

Texas Natural Diversity Database

TPWD maintains the TXNDD, which provides information regarding recorded occurrences of rare species and habitats. The TXNDD was consulted on April 16 2015, using data obtained from TPWD's live version. Information files were reviewed for the known locations of species in the *Crosby, Huffman, Moonshine Hill, Harmaston, Highlands, and Jacinto City* USGS 7.5-minute topographic quadrangle maps, including the project area and surrounding vicinity.

Elements of Occurrence (EO) records provided in **Table 5** are for species that are state-listed as threatened and candidates for federal listing that are within 1.5 miles of the proposed project area (see **Table 5**). The Bald Eagle (*Haliaeetus leucocephalus*) is both federally delisted, and state-listed as threatened. Threeflower broomweed (*Thurovia triflora*) is listed by TPWD as a SGCN. No habitat for the species with EO records is present within the project area, and no impacts to these species are anticipated. No managed areas were identified within 1.5 miles of the project area. It should be noted that the TXNDD cannot be used for presence/absence determinations.

Table 4: Rare, Threatened, and Endangered Species of Potential Occurrence in Harris County, Texas

Species	Federal Status	State Status	Species/Habitat Description	Habitat Present in Project Area?	Species Effect/ Impact	Pertinent Project Information
Plants						
Coastal gay-feather <i>Liatrix bracteata</i>	NL	SGCN	Texas endemic; coastal prairie grasslands of various types, from salty prairie on low-lying, somewhat saline clay loams to upland prairie on nonsaline, clayey to sandy loams; flowering in fall	Yes	May impact	Nonsaline, upland prairie grasslands on clayey loams occur within the project area.
Florida ladies'-tresses <i>Spiranthes brevilabris</i> var. <i>floridana</i>	NL	SGCN	Moist to wet, relatively open sites of pine-dominated landscapes, mesic pine uplands, open scrub pinelands with saw palmetto, Catahoula sandstone barrens, meadows, open grassy lawns, pitcher plant and seepage bogs, wet prairies, wet savannahs, and flatwoods; delicate, nearly ephemeral orchid with winter rosette; flowers April-May	No	No impact	No open sites within pine-dominated landscapes, sandstone barrens, bogs, wet prairies or savannahs occur within the project area.
Giant sharpstem umbrella-sedge <i>Cyperus cephalanthus</i>	NL	SGCN	In Texas on saturated, fine sandy loams, along nearly level fringes of deep prairie depressions; also in depressional area within coastal prairie remnant on heavy black clay; soils include very strongly acidic to moderately alkaline silt loams and silty clay loams; flowering/fruitletting May-June, August-September, and possibly other times in response to rainfall	No	No impact	No deep prairie depressions occur within the project area.
Houston daisy <i>Rayjacksonia aurea</i>	NL	SGCN	Texas endemic; on and around naturally barren or sparsely vegetated saline slick spots or pimple mounds on coastal prairies, usually on sandy to sandy loam soils, occasionally in pastures and on roadsides in similar soil types where mowing may mimic natural prairie disturbance regimes; flowering late September-November/December	No	No impact	No sparsely vegetated saline areas or coastal prairies occur within the project area. Roadside maintenance within the project area does not mimic natural prairie disturbance regimes.
Neglected coneflower <i>Echinacea paradoxa</i> var. <i>neglecta</i>	NL	SGCN	Rocky prairies, glades, and crosstimmer open woodlands and savannahs; full sun	No	No impact	No prairies, glades, open woodlands, or savannahs occur within the project area.

Table 4: Rare, Threatened, and Endangered Species of Potential Occurrence in Harris County, Texas

Species	Federal Status	State Status	Species/Habitat Description	Habitat Present in Project Area?	Species Effect/ Impact	Pertinent Project Information
Panicled indigobush <i>Amorpha paniculata</i>	NL	SGCN	A stout shrub, 9 feet tall, that grows in acid seep forests, peat bogs, wet floodplain forests, and seasonal wetlands on the edge of saline prairies in east Texas	No	No impact	No acid seep forests, peat bogs, floodplain forests or seasonal wetlands on the edge of saline prairies occur within the project area.
Texas ladies'-tresses <i>Spiranthes brevilabris</i> <i>var. brevilabris</i>	NL	SGCN	Sandy soils in moist prairies, including blackland/Fleming prairies, calcareous prairie pockets surrounded by pines, pine-hardwood forest, open pinelands, wetland pine savannahs/flatwoods, and dry to moist fields, meadows, and roadsides; delicate, nearly ephemeral orchid producing winter rosettes, flowers February-April; historically endemic to southeastern coastal plain	No	No impact	No sandy soils in moist prairies occur within the project area.
Texas meadow-rue <i>Thalictrum texanum</i>	NL	SGCN	Texas endemic; mostly found in woodlands and woodland margins on soils with a surface layer of sandy loam, but it also occurs on prairie pimple mounds; both on uplands and creek terraces, but perhaps most common on claypan savannahs; soils are very moist during its active growing season; flowering/fruitletting January/February-May, withering by midsummer, foliage reappears in late fall (November) and may persist through winter	No	No impact	No soils with a surface layer of sandy loam occur within the project area.
Texas prairie dawn-flower <i>Hymenoxys texana</i>	E	E	Texas endemic; in poorly drained, sparsely vegetated areas (slick spots) at the base of mima mounds in open grassland or almost barren areas on slightly saline soils that are sticky when wet and powdery when dry; flowering late February-early April	No	No effect	No sparsely vegetated areas or mima mounds in open grasslands occur within the project area.
Texas windmill-grass <i>Chloris texensis</i>	NL	SGCN	Texas endemic; sandy to sandy loam soils in relatively bare areas in coastal prairie grassland remnants, often on roadsides where regular mowing may mimic natural prairie fire regimes; flowering in fall	No	No impact	No sandy coastal prairie grasslands occur within the project area.

Table 4: Rare, Threatened, and Endangered Species of Potential Occurrence in Harris County, Texas

Species	Federal Status	State Status	Species/Habitat Description	Habitat Present in Project Area?	Species Effect/ Impact	Pertinent Project Information
Threeflower broomweed <i>Thurovia triflora</i>	NL	SGCN	Texas endemic; near coast in sparse, low vegetation on a veneer of light colored silt or fine sand over saline clay along drier upper margins of ecotone between salty prairies and tidal flats; further inland associated with vegetated slick spots on prairie mima mounds; flowering September-November	No	No impact	No low costal vegetation or prairie mima mounds occur within the project area.
Mollusks						
Louisiana pigtoe <i>Pleurobema riddellii</i>	NL	T	Streams and moderate-size rivers; usually flowing water on substrates of mud, sand, and gravel; not generally known from impoundments; Sabine, Neches, and Trinity (historic) River basins	Yes	May impact	The San Jacinto River Authority Canal is a perennial stream.
Sandbank pocketbook <i>Lampsilis satura</i>	NL	T	Small to large rivers with moderate flows and swift current on gravel, gravel-sand, and sand bottoms; east Texas, Sulphur through San Jacinto River basins, Neches River	No	No impact	No rivers with moderate flows present in project area.
Texas pigtoe <i>Fusconaia askewi</i>	NL	T	Rivers with mixed mud, sand, and fine gravel in protected areas associated with fallen trees or other structures; east Texas, Sabine through Trinity River basins, San Jacinto River	No	No impact	No rivers present in project area.
Fishes						
American eel <i>Anguilla rostrata</i>	NL	SGCN	Coastal waterways below reservoirs to Gulf; spawns January-February in ocean, larvae move to coastal waters, metamorphose, then females move into freshwater; most aquatic habitats with access to ocean, muddy bottoms, still waters, large streams, lakes; can travel overland in wet areas; males in brackish estuaries	No	No impact	No coastal waterways present in project area.
Creek chubsucker <i>Erimyzon oblongus</i>	NL	T	Tributaries of the Red, Sabine, Neches, Trinity, and San Jacinto rivers; small rivers and creeks of various types; seldom in impoundments; prefers headwaters, but seldom occurs in springs; young typically in headwater rivulets or marshes; spawns in river mouths or pools, riffles, lake outlets, upstream creeks	Yes	May impact	Gum Gulley is a tributary of the San Jacinto river.

Table 4: Rare, Threatened, and Endangered Species of Potential Occurrence in Harris County, Texas

Species	Federal Status	State Status	Species/Habitat Description	Habitat Present in Project Area?	Species Effect/ Impact	Pertinent Project Information
Smalltooth sawfish <i>Pristis pectinata</i>	E	E	Different life history stages have different patterns of habitat use; young found very close to shore in muddy and sandy bottoms, seldom descending to depths of greater than 32 feet; in sheltered bays, on shallow banks, and in estuaries or river mouths; adults are encountered in various habitat types (mangrove, reef, seagrass, and coral), in varying salinity regimes and temperatures, at various water depths	No	No effect	No bays, shallow banks, estuaries, or river mouths are present in project area.
Amphibians						
Houston toad <i>Anaxyrus houstonensis</i>	E	E	Endemic; deep sandy substrate, water in pools, ephemeral pools, stock tanks; breeds in spring (February-June), especially after rains; burrows into soil of adjacent uplands when inactive; associated with soils of the Sparta, Carrizo, Goliad, Queen City, Recklaw, Weches, and Willis geologic formations	No	No effect	No deep sands are present.
Southern Crawfish Frog <i>Lithobates areolatus</i>	NL	SGCN	Abandoned crawfish holes and small mammal burrows; moist meadows, pasturelands, pine scrub, and river flood plains; mainly lives in the burrow, only leaving to breed; reclusive, but breeding call of males is heard over great distances; eggs are laid and larvae develop in temporary water such as flooded fields, ditches, farm ponds, and small lakes; grassland/herbaceous, suburban/orchard, woodland-conifer habitats.	Yes	May Impact	River floodplains are present within project area. Temporary water areas, such as ditches are prevalent.
Reptiles						
Alligator snapping turtle <i>Macrochelys temminckii</i>	NL	T	Perennial water bodies; deep water of rivers, canals, lakes, and oxbows; swamps, bayous, and ponds near deep running water; brackish coastal waters; usually in water with mud bottom and abundant aquatic vegetation; active March-October; breeds April-October	Yes	May impact	The San Jacinto River Authority Canal is a perennial stream.
Green sea turtle <i>Chelonia mydas</i>	T	T	Gulf and bay system; shallow water seagrass beds, open water between feeding and nesting areas, barrier island beaches; nesting March-October, with peak activity in May-June	No	No effect	The project is not located within or immediately adjacent to the Gulf.

Table 4: Rare, Threatened, and Endangered Species of Potential Occurrence in Harris County, Texas

Species	Federal Status	State Status	Species/Habitat Description	Habitat Present in Project Area?	Species Effect/ Impact	Pertinent Project Information
Kemp's Ridley sea turtle <i>Lepidochelys kempii</i>	E	E	Gulf and bay system; adults stay within shallow waters of Gulf; nests April-August	No	No effect	The project is not located within or immediately adjacent to the Gulf.
Leatherback sea turtle <i>Dermochelys coracea</i>	E	E	Gulf and bay systems; in U.S. portion of western Atlantic nesting territories, nesting season ranges March-August	No	No effect	The project is not located within or immediately adjacent to the Gulf.
Loggerhead sea turtle <i>Caretta</i>	T	T	Gulf and bay system primarily for juveniles; adults are pelagic; nests April-November	No	No effect	The project is not located within or immediately adjacent to the Gulf.
Texas horned lizard <i>Phrynosoma cornutum</i>	NL	T	Open, arid and semi-arid regions with sparse vegetation, soil varies in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September	No	No impact	No arid areas with sparse vegetation occur within the project area.
Timber rattlesnake <i>Crotalus horridus</i>	NL	T	Swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e. grapevines or palmetto	Yes	May impact	The species could occur within the project area.
Birds						
American peregrine falcon <i>Falco peregrinus anatum</i>	DL	T	Resident of west Texas, migrant across the rest of the state; winters along coast; occupies wide range of habitats during migration, including urban; stopovers at leading landscape edges	No	No impact	The species is a potential migrant.
Arctic peregrine falcon <i>Falco peregrinus tundrius</i>	DL	SGCN	Migrant throughout state from far northern breeding range, winters along coast; occupies wide range of habitats during migration, including urban; stopovers at leading landscape edges	No	No impact	The species is a potential migrant.
Bald eagle <i>Haliaeetus leucocephalus</i>	DL	T	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water	No	No impact	No rivers or large lakes occur within the project area.

Table 4: Rare, Threatened, and Endangered Species of Potential Occurrence in Harris County, Texas

Species	Federal Status	State Status	Species/Habitat Description	Habitat Present in Project Area?	Species Effect/ Impact	Pertinent Project Information
Black rail <i>Laterallus jamaicensis</i>	NL	SGCN	Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous year's dead grasses; nest usually hidden in marsh grass or at base of Salicornia	No	No impact	No marshes, ponds, wet meadows, or swamps occur within the project area.
Brown pelican <i>Pelecanus occidentalis</i>	DL	SGCN	Largely coastal and near shore areas, where it roosts and nests on islands and spoil banks	No	No impact	No islands or spoil banks occur within the project area.
Henslow's sparrow <i>Ammodramus henslowii</i>	NL	SGCN	Wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking	No	No impact	No bunch grasses with bare ground occur within the project area.
Least tern <i>Sterna antillarum</i>	E	E	Bare or sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with rivers and reservoirs. Wintering range is within Harris County. This species is only considered in Harris County for wind-related projects within its migratory route.	No	No effect	Riverine systems in the project area do not support habitat required by this species.
Mountain plover <i>Charadrius montanus</i>	NL	SGCN	Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields	Yes	May impact	Plowed fields occur within the project area.
Piping Plover <i>Charadrius melodus</i>	T	T	This species is a wintering migrant that inhabits beaches and bayside mud or salt flats along the Texas Gulf Coast This species is only considered in Harris County for wind-related projects within its migratory route.,	No	No effect	Beaches and bayside mud or salt flats are not present in the project area.
Red-cockaded woodpecker <i>Picoides borealis</i>	E	E	Cavity nests in older pine (60+ years); forages in younger pine (30+ years); prefers longleaf, shortleaf, and loblolly pines	No	No effect	No older pine trees occur within the project area.

Table 4: Rare, Threatened, and Endangered Species of Potential Occurrence in Harris County, Texas

Species	Federal Status	State Status	Species/Habitat Description	Habitat Present in Project Area?	Species Effect/ Impact	Pertinent Project Information
<i>Red Knot</i> <i>Calidris canutus rufa</i>	T	SGCN	Migrate in flocks northward through contiguous United States mainly April-June, southward July-October; prefers shoreline of coast and bays and uses mudflats during rare inland encounters; prey include coquina clam on beaches and dwarf surf clam in bays; habitat is primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore.	No	No effect	Tidally influenced flats, beaches, herbaceous wetlands and flats/shores are not present in the project area.
<i>Snowy plover</i> <i>Charadrius alexandrinus</i>	NL	SGCN	Formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast	No	No impact	The species is a potential migrant; the project area is not located on or adjacent to the beach.
<i>Sprague's pipit</i> <i>Anthus spragueii</i>	C	SGCN	Only in Texas mid-September to early April; strongly tied to native upland prairie; sensitive to patch size and avoids edges	No	No effect	No native upland prairie occurs within the project area.
<i>White-faced ibis</i> <i>Plegadis chihi</i>	NL	T	Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats	No	No impact	No marshes, sloughs, or rice fields occur within the project area.
<i>White-tailed hawk</i> <i>Buteo albicaudatus</i>	NL	T	Near coast on prairies, cordgrass flats, and scrub-live oak; further inland on prairies, mesquite and oak savannah, and mixed savannah-chaparral; breeds March-May	No	No impact	No prairies, cordgrass flats, scrub-live oak, savannah, or savannah-chaparral occur within the project area.
<i>Whooping crane</i> <i>Grus americana</i>	E	E	Potential migrant via plains throughout state to coast; winters in coastal marshes	No	No effect	The species is a potential migrant; the project area is not located on or adjacent to the beach and contains no marshes.

Table 4: Rare, Threatened, and Endangered Species of Potential Occurrence in Harris County, Texas

Species	Federal Status	State Status	Species/Habitat Description	Habitat Present in Project Area?	Species Effect/ Impact	Pertinent Project Information
Wood stork <i>Mycteria americana</i>	NL	T	Forages in prairie ponds, flooded pastures or fields, ditches and other shallow water, including saltwater; roosts communally in tall snags in active heronries; breeds in Mexico	Yes	May impact	The species could occur within the project area.
Mammals						
Louisiana black bear <i>Ursus americanus luteolus</i>	T	T	Possible as transient; bottomland hardwoods and large tracts of inaccessible forested areas	No	No effect	No bottomland hardwoods or inaccessible forested areas occur within the project area.
Plains spotted skunk <i>Spilogale putorius interrupta</i>	NL	SGCN	Catholic; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie	Yes	May impact	The species could occur within the project area.
Rafinesque's big-eared bat <i>Cornorhinus rafinesquii</i>	NL	T	Roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures	No	No impact	No bottomland hardwoods, concrete culverts, or abandoned structures occur within the project area.
Red wolf <i>Canis rufus</i>	E	E	Extirpated; formerly known throughout eastern half of Texas	No	No effect	The species is extirpated.
Southeastern myotis bat <i>Myotis austroriparius</i>	NL	SGCN	Roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures	No	No impact	No bottomland hardwoods, large concrete culverts, or abandoned structures occur within the project area. No indication of bat roosts were noted at the Gum Gully bridge.

Table 4: Rare, Threatened, and Endangered Species of Potential Occurrence in Harris County, Texas

Species	Federal Status	State Status	Species/Habitat Description	Habitat Present in Project Area?	Species Effect/ Impact	Pertinent Project Information
West Indian manatee <i>Trichechus manatus</i>	E	E	Gulf and bay system. Community found in Florida. Occasional visitor to Texas coast.	No	No effect	The project is not located within or immediately adjacent to the Gulf.
Status Codes:						
E = Endangered		SGCN = Species of Greatest Conservation Need				
T = Threatened		NL = Not listed				
C = Candidate for listing		DL = Delisted				

Sources:

Texas Parks and Wildlife Department (TPWD). Annotated County Lists of Rare Species: Harris County (last revision 03/23/2015). <http://www.tpwd.state.tx.us/gis/ris/es/>, accessed 05/18/2015.

TPWD. Texas Conservation Action Plan: Species of Greatest Conservation Need – Gulf Coast Prairies and Marshes. <http://www.tpwd.state.tx.us/landwater/land/tcap/sgcn.phtml>, accessed December 20, 2014.

U.S. Fish and Wildlife Service (USFWS). Species by County Report: Harris, TX. <http://www.fws.gov/endangered/>, accessed 05/19/2015.

Table 5: Elements of Occurrence from TXNDD Within 1.5 Miles of the Proposed Project				
Element of Occurrence Number	Species Name	Listing Status		Approximate Distance and Direction from the Project
		Federal	State	
7357	<i>Thurovia triflora</i>	NL	SGCN	0.7-mile south
7972	<i>Haliaeetus leucocephalus</i>	DL	T	0.7-mile west

Effects to Federally Listed Threatened and Endangered Species

The project would have no effect on federally listed threatened or endangered species.

Impacts to State-listed Species

Habitat is present for five state-threatened species: Louisiana pigtoe (*Pleurobema riddellii*), creek chubsucker (*Erimyzon oblongus*), alligator snapping turtle (*Macrochelys temminckii*), timber rattlesnake (*Crotalus horridus*), and wood stork (*Mycteria americana*). No individuals of these species were identified during field investigations. Although individuals of these species may be impacted, the species as a whole are not likely to be adversely impacted.

Impacts to SGCNs

Additionally, habitat is present for three SGCNs: coastal gay-feather (*Liatris bracteata*), mountain plover (*Charadrius montanus*), and plains spotted skunk (*Spilogale putorius interrupta*). No individuals of these species were identified during field investigations. Although individuals of these species may be impacted, the species as a whole are not likely to be adversely impacted.

BMPs for State-listed Species and SGCNs

In accordance with the *Best Management Practices Programmatic Agreement between TxDOT and TPWD Under the 2013 MOU*, BMPs have been defined to be implemented by TxDOT in order to minimize impacts to federally and state-listed species and SGCNs. **Table 6** lists those BMPs related to species that may be impacted by the proposed project.

Table 6: BMPs for State-listed Species and SGCNs	
Species Name	BMP
<i>State-listed Species</i>	
Louisiana pigtoe	<ul style="list-style-type: none"> When work is in the water, survey project footprints for state-listed species where appropriate habitat exists. When work is in the water and mussels are discovered during surveys, relocate mussels under TPWD permit and implement Water Quality BMPs. When work is adjacent to the water, Water Quality BMPs implemented as part of the SW3P for a construction general permit or any conditions of the 401 water quality certification for the project will be implemented.
Creek chubsucker	<ul style="list-style-type: none"> For projects within the range of a SGCN or State listed fish and work is adjacent to water: Water Quality BMPs for SW3P and 401 water quality only. No TPWD Coordination required. For projects within the range of a SGCN or State listed fish, and work is in the water: TPWD coordination required.
Alligator snapping turtle	<ul style="list-style-type: none"> Minimize impacts to wetland and riverine habitats Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered
Timber Rattlesnake	<ul style="list-style-type: none"> Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered
Wood stork	<ul style="list-style-type: none"> Not disturbing, destroying, or removing active nests, including ground nesting birds, during the nesting season; Avoiding the removal of unoccupied, inactive nests, as practicable; Preventing the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair; Not collecting, capturing, relocating, or transporting birds, eggs, young, or active nests without a permit.
<i>Species of Greatest Conservation Need</i>	
Mountain Plover	<ul style="list-style-type: none"> Not disturbing, destroying, or removing active nests, including ground nesting birds, during the nesting season; Avoiding the removal of unoccupied, inactive nests, as practicable; Preventing the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair; Not collecting, capturing, relocating, or transporting birds, eggs, young, or active nests without a permit.
Plains spotted skunk	<ul style="list-style-type: none"> Contractors will be advised of potential occurrence in the project area, to avoid harming the species if encountered, and to avoid unnecessary impacts to dens.

Source: *Best Management Practices Programmatic Agreement between TxDOT and TPWD Under the 2013 MOU.*

6.2.6 Air Quality

No-Build Alternative

Implementation of the No-Build Alternative would lead to increased traffic congestion and decreased mobility along FM 2100, resulting in decreased vehicular speed and increased stop-and-go traffic. Although increased congestion and slower speeds may increase vehicle emissions, they would still likely be lower than present levels in future years as a result of the U.S. Environmental Protection Agency's (EPA) national control regulations (i.e., new light-duty and heavy-duty on-road fuel and vehicle rules, the use of low-sulfur diesel fuel). Even with an increase in vehicle-miles travelled (VMT) in the future, the EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions of on road emissions, Mobile Source Air Toxics (MSAT), and the ozone precursors volatile organic compounds (VOC) and nitrogen oxides (NO_x), regardless of the Build or No-Build Alternative.

Build Alternative

The proposed project is located in Harris County, part of the Houston-Galveston-Brazoria area designated by the EPA as a marginal nonattainment area for ozone National Ambient Air Quality Standards (NAAQS); therefore, transportation conformity rules apply.

The proposed action is consistent with the area's financially constrained Metropolitan Transportation Plan (MTP) (H-GAC 2040 RTP) and the 2017-2020 TIP, which were initially found to conform to the TCEQ State Implementation Plan (SIP) by FHWA and FTA on September 11, 2015 and December 19, 2016, respectively. Copies of the MTP and TIP pages are included in **Appendix C**. All projects in the 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.

Traffic Air Quality Analysis

Traffic data for 2015 is 19,000 vpd. Traffic data for the design year (2035) is 29,900 vpd. A prior TxDOT modeling study and previous analyses of similar projects demonstrated that it is unlikely that a carbon monoxide standard would ever be exceeded as a result of any project with an Annual Average Daily Traffic (AADT) below 140,000. The AADT projections for the project do not exceed 140,000 vpd; therefore, a traffic air quality analysis is not required.

Congestion Management Process

The congestion management process (CMP) is a systematic process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs. The project was developed from H-GAC's operational CMP, which meets all requirements of 23 CFR 500.109. The CMP was adopted by H-GAC on January 25, 2013.

The region commits to operational improvements and travel demand reduction strategies at two levels of implementation: program level and project level. Program level commitments are inventoried in the regional CMP, which was adopted by H-GAC; they are included in the financially constrained 2040 RTP, and future resources are reserved for their implementation.

The CMP element of the plan carries an inventory of all project commitments (including those resulting from major investment studies), that details type of strategy, implementing responsibilities, schedules, and expected costs. At the project's programming stage, travel demand reduction strategies and commitments will be added to the regional TIP or included in the construction plans. The regional TIP

provides for programming of these projects at the appropriate time with respect to the single-occupancy vehicle (SOV) facility implementation and project-specific elements.

Committed congestion reduction strategies and operational improvements within the study boundary consist of signalization and intersection improvements. Individual projects are listed in **Table 7**.

Location	Type	Implementation Date
FM 1942 from US 90 to Crosby-Lynchburg Road	Widen to 4-Lane Divided	2018
FM 2100 from 2.1 mi N of Wolf Rd to FM 1960	Widen to 4-Lane Divided	2027
METRO service area	Vehicle Acquisition: Replacement and Clean Fuel buses, ADA compliant buses/ Rideshare Vans and Metrolift Vans	Multiple
METRO service area	Transit Program Startup and/or Expansions: Signature Bus Service, Ride Share, Paratransit, Metrolift, Metro Star Vanpool, and Regional Vanpool Programs	Multiple
METRO service area	Park-And-Ride Lot Construction, Maintenance, and/or Expansion	Multiple

Source: H-GAC 2015-2018 TIP

In an effort to reduce congestion and the need for SOV lanes in the region, TxDOT and H-GAC will continue to promote appropriate congestion reduction strategies through the Congestion Mitigation and Air Quality Improvement (CMAQ) program, the CMP, and the MTP. The congestion reduction strategies considered for this project would help alleviate congestion in the SOV study boundary, but would not eliminate it. Therefore, the proposed project is justified. The CMP analysis for added SOV capacity projects in the Transportation Management Area (TMA) is on file and available for review at H-GAC.

Mobile Source Air Toxics

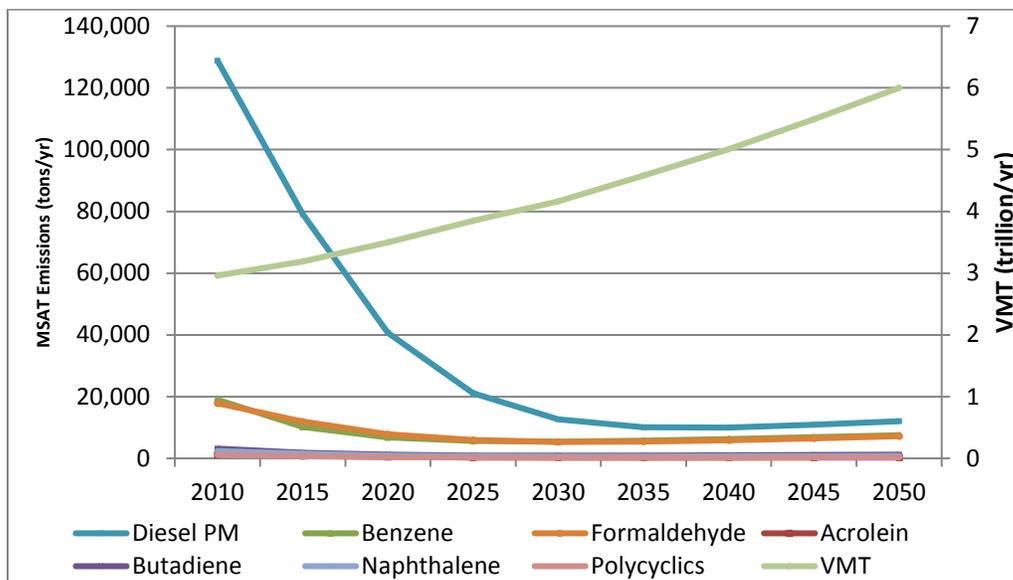
Background

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (*Federal Register*, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS) (<http://www.epa.gov/iris/>). In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (<http://www.epa.gov/ttn/atw/nata1999/>). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. While the FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

The 2007 EPA MSAT rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. Based on an FHWA analysis using EPA's MOVES2010b model, as shown in **Exhibit 1** and **Table 8**, even if VMTs increase by 102 percent as

assumed from 2010 to 2050, a combined reduction of 83 percent in the total annual emissions for the priority MSAT is projected for the same time period.

Exhibit 1: Projected National MSAT Emission Trends 2010–2050 for Vehicles Operating on Roadways Using EPA’s MOVES2010b Model



Source: Table 8 below.

Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors.

Table 8: Projected National MSAT Emission Trends 2010–2050 for Vehicles Operating on Roadways Using EPA’s MOVES2010b Model

Pollutant / VMT	Pollutant Emissions (tons) and Vehicle-Miles Traveled (VMT) by Calendar Year									% Change 2010 to 2050
	2010	2015	2020	2025	2030	2035	2040	2045	2050	
Acrolein	1,244	805	476	318	258	247	264	292	322	-74
Benzene	18,995	10,195	6,765	5,669	5,386	5,696	6,216	6,840	7,525	-60
Butadiene	3,157	1,783	1,163	951	890	934	1,017	1,119	1,231	-61
Diesel PM	128,847	79,158	40,694	21,155	12,667	10,027	9,978	10,942	11,992	-91
Formaldehyde	17,848	11,943	7,778	5,938	5,329	5,407	5,847	6,463	7,141	-60
Naphthalene	2,366	1,502	939	693	607	611	659	727	802	-66
Polycyclics	1,102	705	414	274	218	207	219	240	262	-76
Trillions VMT	2.96	3.19	3.5	3.85	4.16	4.58	5.01	5.49	6.0	102

Source: EPA MOVES2010b model runs conducted during May–June 2012 by FHWA.

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how the potential health risks posed by MSAT exposure should be factored into project-level decision making within the context of the NEPA. The FHWA, EPA, the Health Effects Institute (HEI), and others have funded and conducted research studies to try to more

clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this emerging field.

A qualitative analysis provides 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/air_quality/air_toxics/research_and_analysis/mobile_source_air_toxics/msatemissions.pdf.

For the Build and No-Build Alternatives, the amount of MSAT emitted would be proportional to the vehicle miles traveled, or 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 preferred action alternative along the roadway 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 EPA's MOVES2010b model, emissions of all of the priority MSAT decrease as speed increases. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 80 percent between 2010 and 2050. 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 Build Alternative will 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 the No-Build Alternative. The localized increases in MSAT concentrations would likely be most pronounced to the west of the expanded roadway under the Build Alternative. However, the magnitude and the duration of these potential increases compared to the No-Build Alternative cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health impacts. In sum, when a highway is widened, 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). Also, MSAT will be lower in other locations when traffic shifts away from them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act (CAA) and its

amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the IRIS, which is “a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects” (EPA, <http://www.epa.gov/iris/>). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the HEI. Two HEI studies are summarized in Appendix D of FHWA’s *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents*. Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings, cancer in animals, and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI, <http://pubs.healtheffects.org/view.php?id=282>) or in the future as vehicle emissions substantially decrease (HEI, <http://pubs.healtheffects.org/view.php?id=306>).

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70-year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are 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, a concern expressed by HEI (<http://pubs.healtheffects.org/view.php?id=282>). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA (<http://www.epa.gov/risk/basicinformation.htm#g>) and the HEI (<http://pubs.healtheffects.org/getfile.php?u=395>) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the CAA to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an “acceptable” level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million

due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework.

Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable. Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

In conclusion, a qualitative MSAT assessment has been provided relative to the Build and No-Build alternatives of MSAT emissions and has acknowledged that both the Build and No-Build alternatives 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.

Air Quality Construction Emissions Reduction Strategies

During the construction phase of this project, temporary increases in air pollutant emissions may occur from construction activities. The primary construction-related emissions are particulate matter (fugitive dust) from site preparation. These emissions are temporary in nature (only occurring during actual construction); it is not possible to reasonably estimate impacts from these emissions due to limitations of the existing models. However, the potential impacts of particulate matter emissions will be minimized by using fugitive dust control measures such as covering or treating disturbed areas with dust suppression techniques, sprinkling, covering loaded trucks, and other dust abatement controls, as appropriate.

The construction activity phase of this project may generate a temporary increase in MSAT emissions from construction activities, equipment and related vehicles. The primary MSAT construction-related emissions are particulate matter from site preparation and diesel particulate matter from diesel-powered construction equipment and vehicles. The Texas Emissions Reduction Plan (TERP) includes incentive programs to encourage the development of multi-pollutant approaches to ensure that the air in Texas is both safe to breathe and meets minimum federal standards. TxDOT encourages construction contractors to utilize this program to the fullest extent possible to minimize diesel emissions. Information about the TERP program can be found at: <http://www.tceq.state.tx.us/implementation/air/terp/>.

However, considering the temporary and transient nature of construction-related emissions, as well as the mitigation actions to be utilized, it is not anticipated that emissions from construction of this project will have any significant impact on air quality in the area.

6.2.7 Traffic Noise

No-Build Alternative

Highway traffic is the dominant source of noise in developed areas adjacent to the proposed project. Under the No-Build Alternative, project-related noise impacts would not occur because the improvements would not be constructed.

Build Alternative

A traffic noise analysis was conducted in accordance with TxDOT's (FHWA approved) *Guidelines for Analysis and Abatement of Roadway Traffic Noise* (2011) (see the 2015 Traffic Noise Technical Report).

Existing and predicted traffic noise levels were modeled at receiver locations (see **Figure 8**) that represent the land use activity areas adjacent to the proposed project that might be impacted by traffic noise and potentially benefit from feasible and reasonable noise abatement.

The proposed project would result in a traffic noise impact at ten representative receivers and the following noise abatement measures were considered: traffic management, alteration of horizontal and/or vertical alignments, acquisition of undeveloped property to act as a buffer zone and the construction of noise walls.

Before any abatement measure can be proposed for incorporation into the project, it must be both feasible and reasonable. In order to be "feasible," the abatement measure must be able to reduce the noise level at greater than 50 percent of impacted, first row receivers by at least five dB(A); and to be "reasonable," it must not exceed the cost-effectiveness criterion of \$25,000 for each receiver that would benefit by a reduction of at least five dB(A) and the abatement measure must be able to reduce the noise level at least one impacted, first row receiver by at least seven dB(A).

Noise walls were evaluated for each of the impacted receiver locations with the following results:

R4: This receiver represents a group of nine mobile homes facing FM 2100 at Old Atascosita Road. Four of these mobile homes would be displaced by construction of the proposed project. A noise barrier measuring approximately 462 feet long was modeled at a variety of heights ranging from 8 to 20 feet tall. A noise wall measuring 10 feet tall would achieve the minimum feasible reduction of 5 dB(A) at one receiver while achieving a 7 dB(A) noise reduction design goal at one receiver at a cost of \$83,160, or \$83,160 per benefitted receiver; this wall would exceed the reasonable, cost-effectiveness criterion of \$25,000.

R5, R7, R12, R14, R16, R17, R19 and R22: These receivers represent separate, individual residences facing FM 2100. Noise walls that would achieve the minimum feasible reduction of 5 dB(A) while achieving a 7 dB(A) noise reduction design goal at these receivers would exceed the reasonable, cost-effectiveness criterion of \$25,000.

None of the above noise abatement measures would be both feasible and reasonable; therefore, no abatement measures are proposed for this project.

6.2.8 Community Impact Assessment

The following section summarizes the findings of the Socioeconomic Technical Report prepared for this project.

Community Profile

The project area links the small communities of Huffman on the north and Crosby on the south. Along FM 2100 in the study area, the land use is a mix of commercial, residential and undeveloped parcels, some of which are used for agricultural purposes (see **Figure 9** in **Appendix A**).

The H-GAC develops a Regional Growth Forecast, including population, employment, and land use for an eight-county area. According to the H-GAC projections, the Census tracts within the project area are anticipated to see strong growth between 2010 and 2040. All of the project area Census tracts are projected to outpace the growth of Harris County as a whole.

Data from the 2010 Census for the populated census blocks that are traversed or are immediately adjacent to the proposed project indicates that minority populations ranged from zero to 80 percent (see **Figure 10** in **Appendix A**). The parent Census block groups reported minority populations ranging from 18 percent to 42 percent. There are five Census blocks within the study area with populations of minority persons equal to or exceeding 50 percent. The 2009-2013 American Community Survey indicates that the median household income in the past 12 months within the block groups traversed by the proposed project ranges from \$49,375 to \$103,818.

Community Impacts

No-Build Alternative

Implementation of the No-Build Alternative would not require ROW acquisition, relocations, or displacements, and would not affect access and travel patterns or community cohesion.

Build Alternative

The proposed project is anticipated to require six residential relocations, eight commercial relocations, and two church relocations (see **Figure 11** in **Appendix A**). No public facilities would be displaced by the project. The displacement information is based on the proposed ROW line as depicted in **Figure 4** in **Appendix A**. Based on available market data, comparable housing appears to be available for the potential residential displacements. As mandated by the Uniform Relocation Assistance and Real Properties Acquisitions Act (URARPAA), as amended in 1987, residential replacement structures must be located in the same type of neighborhood and be equally accessible to public services and places of employment. If comparable housing is not available at the time of ROW acquisition, TxDOT would provide the required housing or, if necessary, provide housing supplement payments in excess of the standard payment limits to ensure that decent, safe and sanitary dwellings are made available to all eligible persons displaced by the proposed project.

A total of nine commercial properties are anticipated to be displaced by the proposed. Based on a January 2015 Loopnet.com search, there appear to be a sufficient number of commercial properties available for sale or lease to accommodate businesses displaced by the proposed project within the project area zip codes. Several businesses may be able to relocate on the same parcel of land. There are also many tracts of vacant land along the FM 2100 roadway that may be available as sites for business relocations.

Two churches would be displaced by the proposed project. The facility for New Life in the Word Ministries, located at 18317 FM 2100 (see **Figure 11a** in **Appendix A**) would be displaced. The building that would be displaced by the proposed project is located on a relatively deep lot (approximately 700 feet). It is likely that the church would be able to rebuild the facility on the same parcel, set back further to the west. Additionally, a building used by Templo Pentecostes La Voz Del Salvador at 19521 FM 2100 would be displaced by a proposed detention pond (see **Figure 11c** in **Appendix A**). Based on conversations with Pastor Duarte Castillo, the church would attempt to rebuild on the remainder of the parcel.

Regarding travel patterns, the addition of a median may require slightly more circuitous routes for some travelers, including the need to make U-turns in order to access businesses and residences. There are approximately 70 businesses along FM 2100 within the project limits, and TxDOT has committed to ensuring that driveway access would be maintained. Under the Build Alternative, traffic operations along FM 2100 would be enhanced because the proposed additional lanes would provide congestion relief. The proposed project would not create a new bypass/reliever route or substantially change the way people currently get to community facilities, businesses, or residences. The project would provide additional modal alternatives with the addition of sidewalks and a shared-use lane.

Outside of the planned subdivisions of Newport and Saddle Creek Farms, residences are scattered throughout the project area. The existing FM 2100 currently divides the project area, and neither of the subdivisions span the FM 2100 roadway. The proposed improvements would not affect, separate, or isolate any distinct neighborhoods, ethnic groups, or other specific groups as FM 2100 is an existing major thoroughfare. The displacements do not represent a substantial percentage of the community, and other businesses exist nearby that would be able to provide similar services to the community, should some of the displaced businesses choose to relocate outside of the area. No adverse impacts to community cohesion are anticipated. TxDOT has and will continue to facilitate communication with the general public, adjacent property owners, business owners, residents, neighborhood groups, and public officials with interests along FM 2100.

Environmental Justice

An environmental justice analysis (EJ) was conducted in accordance with Presidential EO 12898, Federal Highway Administration Order 6640.23A, and U.S. Department of Transportation Order 5610(a) (see the Socioeconomic Technical Report for more details). These regulations call for federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of a project on minority and low-income populations.

FHWA Order 6640.23A defines a minority as a person who is:

- Black: a person having origins in any of the black racial groups of Africa;
- Hispanic or Latino: a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race;
- Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent;

- American Indian and Alaska Native: a person having origins in any of the original people of North America, South America (including Central America), and who maintains cultural identification through tribal affiliation or community recognition; or
- Native Hawaiian and Other Pacific Islander: people having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

Low-income is defined as a household income at or below the Department of Health and Human Services (DHHS) poverty guidelines. In 2015, the DHHS poverty guideline for a four-person family is \$24,250. There are no project-area block groups with incomes below this level.

No-Build Alternative

Implementation of the No-Build Alternative would not have disproportionately high and adverse human health or environmental effects on minority and/or low-income populations.

Build Alternative

Environmental justice populations and all of the users of the FM 2100 facility would benefit from the proposed improvements. The benefits associated with the proposed project would include increased capacity, improved traffic operations, and enhanced safety. Access to adjacent properties would be maintained at all times, and no detours are anticipated. The proposed project would not isolate any persons, groups or neighborhoods and would not cause any change in community cohesion. The proposed project would not directly affect major employers, and the regional economic effects associated with the proposed Build Alternative would be beneficial for the overall community. The proposed project would require the displacement of six residences, eight businesses, and two churches. Although five minority blocks exist along the project limits, none of the displacements would occur within minority blocks. The Build Alternative would not cause disproportionately high and adverse effects on any minority populations or low-income populations consistent with EO 12898 regarding environmental justice.

Limited English Proficiency

No-Build Alternative

Under both the No-Build and Build alternatives, Limited English Proficiency (LEP) individuals would be afforded the opportunity to participate in the decision-making process as discussed below.

Build Alternative

EO 13166, Improving Access to Services for Persons with Limited English Proficiency, requires agencies to examine the services they provide, identify any need for services to those with LEP, and develop and implement a system to provide those services so that LEP persons can have meaningful access to them. This 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 Restoration Act of 1987 and Title VI regulations.

Within the population that is five years of age and older, persons who speak English less than “very well” are considered to have a limited English proficiency. The LEP populations in the individual Census block groups within the project area range from approximately 0 to 17 percent of the total population.

Reasonable steps would be taken to ensure that all persons have meaningful access to the programs, services, and information TxDOT provides. Public involvement activities completed for the project are discussed in **Section 10.0**, and included Spanish language accommodations. Future public involvement information and/or materials would be made available in English and Spanish as necessary, and a translator (for language or other special communication needs) would be provided upon request. Therefore, the requirements of EO 13166 appear to be satisfied.

6.2.9 Cultural Resources

Cultural resources are structures, buildings, archeological sites, districts (a collection of related structures, buildings, and/or archeological sites), cemeteries, and objects. Both federal and state laws require consideration of cultural resources during project planning. At the federal level, NEPA and the National Historic Preservation Act (NHPA) of 1966, among others, apply to transportation projects such as this one. In addition, state laws such as the Antiquities Code of Texas apply to these projects. Compliance with these laws often requires consultation with the Texas Historical Commission (THC)/State Historic Preservation Officer (SHPO) and/or federally recognized tribes to determine the project's effects on cultural resources. Review and coordination of this project followed approved procedures for compliance with federal and state laws.

Non-Archeological Historic Resources

No-Build Alternative

Under the No-Build Alternative, additional ROW would not be acquired; therefore, no impacts to historic resources are anticipated.

Build Alternative

A review of the National Register of Historic Places (NRHP), the list of State Antiquities Landmarks (SAL), and the list of Recorded Texas Historic Landmarks (RTHL) indicated no previously identified resources located within the area of potential effects (APE), which is defined as a 150-foot buffer from the proposed or existing ROW, in accordance with the terms of the Programmatic Agreement for Transportation Undertakings (PA-TU) among TxDOT, FHWA, the Advisory Council for Historic Preservation, and the THC.

A previous iteration of the project was the subject of a 2006 historic resources reconnaissance survey (same CSJ), at which time one resource was determined eligible for the NRHP (a domestic single dwelling at 6422 FM 2100). The THC concurred with the recommendation that although the proposed project required ROW from the property, it would not result in an adverse effect on August 5, 2008.

In 2015, TxDOT historians reviewed the APE to identify any potential historic properties that date prior to 1972 (the new historic-age cut-off date) and to identify any potential historic properties within 150-feet of the new detention ponds added to the ROW. Historians did not identify any historic properties that fall between the historic-age period of the survey (1966) and 1972, nor any properties within the APE for new detention ponds. Historians confirmed the continued presence of the eligible resource. The proposed project would require a small corner clip from the eligible property, which would not adversely affect the property's location, design, materials, workmanship, setting, feeling or association. THC concurred with the finding that the project would have no adverse effect on 6422 FM 2100 on April 29, 2015 (see **Appendix D**).

Archeological Resources

No-Build Alternative

Under the No-Build Alternative, no impacts to archeological sites are anticipated.

Build Alternative

An intensive archeological survey was completed in order to inventory and evaluate archeological resources within the footprint of the proposed widening improvements. The APE is 204 acres or 83 hectares; 107 acres or 43 hectares of the total is new ROW. Typical roadway construction would occur within 2 feet or 0.6 meters, with possible deeper impacts for construction of drainage elements and a presumed depth of up to 10 feet or 3 meters at detention ponds. Fieldwork was conducted on April 20, 2015, and July 21-22, 2015, under Texas Antiquities Permit (TAP) 7228. Based on the review of the Houston Potential Archeological Liability Map (PALM), most of the project area (168.18 acres) was determined to fall within Map Unit 4, for which survey is not recommended. The review of the PALM indicated that the remainder of the project area (35.82 acres) should be subjected to varying stages of intensive survey, including the excavation of shovel tests (Map Unit 2a) and/or mechanical trenching (Map Unit 2a). All of the APE was determined to have been subjected to ground-disturbing activities associated with agriculture, erosion, and construction and maintenance of the existing road. Shovel test units and backhoe trench units were excavated as informed by the PALM in the portion of the APE that fell in Map Unit 1 or 2a. No new archeological sites were identified during the survey and no artifacts were identified or recovered. The THC concurred with the finding that the project would have no effect on any archeological sites, archeological properties, or State Antiquities Landmarks; no further archeological investigations are warranted; and the proposed undertaking should be allowed to proceed to construction on September 17, 2015 (see **Appendix D**).

No public controversy exists regarding the project's potential impacts on archeological sites or cemeteries. In the event that unanticipated archeological deposits are encountered during construction, work in the immediate area would cease, and TxDOT archeological staff would be contacted to initiate post-review discovery procedures.

6.2.10 Section 4(f) and Section 6(f)

No-Build Alternative

Under the No-Build Alternative, there would be no impacts to properties protected by Section 4(f) or Section 6(f).

Build Alternative

The proposed project would not require the use of nor substantially impair the purposes of any publicly owned land from a public park, recreational area, or wildlife or waterfowl refuge lands. The proposed project would not require the acquisition of any land within park areas subject to Section 6(f).

The proposed project would require a small corner clip from 6422 FM 2100, a property determined to be eligible for the NRHP. As noted above, this impact was determined to have no adverse effect under Section 106. TxDOT determined that the proposed project meets the requirements for a *de minimis* Section 4(f) impact finding under 23 CFR 774. The THC offered no comment on this finding on April 29, 2015 (see **Appendix D**).

6.2.11 Hazardous Materials

No-Build Alternative

Under the No-Build Alternative, no impacts from hazardous materials are anticipated.

Build Alternative

Twenty-one hazardous materials sites were identified by means of a database search, and of those 21 sites of concern, nine sites were identified in the Initial Site Assessment (ISA). The database search was conducted for the proposed project on November 10, 2014 (see **Table 9**).

Table 9: Hazardous Materials Database Search Results			
Database Abbreviation	Database	Distance Searched	# of Sites Found
NPL	National Priorities List Facilities	One mile	0
DNPL	Delisted National Priorities List Facilities	One-half mile	0
CER	Comprehensive Environmental Response, Compensation, and Liability Information System	One-half mile	0
CER NFRAP	CERCLIS No Further Remedial Action Planned	One-half mile	0
RCRA COR	Resource Conservation and Recovery Information System – Corrective Action	One mile	0
RCRA TSD	RCRA – Treatment Storage or Disposal	One-half mile	0
RCRA – GEN	RCRA – Generators	Property and adjoining properties	1
FED BWN	Federal Brownfield	One-half mile	0
FED IC	Federal Institutional Control	One-half mile	0
FED EC	Federal Engineering Control	One-half mile	0
ERNS	Emergency Response Notification System List	Property only	1
ST NPL	State/Tribal Equivalent NPL	One mile	0
ST CER	State/Tribal Equivalent CERCLIS	One-half mile	0
SWLF	State/Tribal Disposal or Landfill	One-half mile	0
LPST	State/Tribal Leaking Storage Tank	One-half mile	7
PST	State/Tribal Storage Tank	Property and adjoining properties	10
ST IC	State/Tribal Institutional Control	One-quarter mile	0
ST EC	State/Tribal Engineering Control	One-half mile	0
VCP	State/Tribal VCP	One-half mile	0
ST BWN	State/Tribal Brownfield	One-half mile	0
HW	State/Tribal Hazardous Waste	One-quarter mile	1
DRYC	Dry Cleaners	One-half mile	1
Miscellaneous Databases			
TCEQ IOP	Innocent Owner/Operator sites	One-half mile	0
TCEQ Superfund	Superfund sites	One mile	0

Table 9: Hazardous Materials Database Search Results

Database Abbreviation	Database	Distance Searched	# of Sites Found
IHW	Industrial Hazardous Waste	One mile	0

Source: Banks Environmental Data, November 10, 2014

Nine potential hazardous material sites were identified in the project area, two of which are the same facility, but on different databases (Bank Map ID Nos. 3 and 8). An Enron Gas/Crosby Distribution Office (Bank Map ID No. 7) was identified as a RCRA GEN and is considered a Large Quantity Generator. Based on the Banks database search, there have been no enforcement or violations noted for this facility. Two leaking petroleum storage tank (LPST) sites were identified: MS Express/Phillips 66 (Bank Map ID No. 3), a former Stop N Go station, that documented groundwater contamination, is in final status pending plugging of a well; and, a Valero Station (Bank Map ID No. 8), a former Stop N Go station, is in monitoring status for groundwater contamination.

Six registered petroleum storage tank (PST) facilities were identified in the project area:

- MS Express/Phillips 66 station (mentioned above) has a 12,000-gallon underground storage tanks (UST) in use.
- Saddlelane Food Market, located adjacent to the project area to the west, has two 12,000-gallon USTs in use.
- Stop N Serve, a Shell/Food Mart, is located adjacent to the project area to the west, has two 10,000-gallon and two 6,000-gallon USTs in use.
- The Valero Station (mentioned above) has one 15,000-gallon, one 12,000-gallon, and one 10,000-gallon USTs in use.
- Handi Stop (Shell) has two 10,000-gallon and one 6,000-gallon USTs in use.
- Express Mart (Exxon) has one 12,000-gallon and one 20,000-gallon USTs in use.

Several unmapped sites were noted on the regulatory report: one CER NFRAP site was archived in 1992; 30 ERNS reporting from the 1980s through the 2010s (10 in the 1980s, nine in the 1990s; six in the 2000s, five in the 2010s); one SWLF recycling site (permit ending 12/1/2008); and, one PST listed as being owned by the Texas Department of Transportation with a pending facility status. None of these sites were observed in the site survey.

All records (including maps) from the database search are included in the ISA. Incorrect or incomplete addresses may result in some facilities being listed as un-mappable due to discrepancies in the location of some facilities.

The Enron/Crosby Distribution Office facility is adjacent to the proposed ROW. The proposed project would not encroach into this facility; potential hazardous materials effects would not be anticipated.

Several gas stations are adjacent to the property with PSTs, along with active LPSTs present. These LPST and tank systems would be addressed during the ROW negotiation and acquisition process. Coordination with property owners, tank owners, operators, and the TCEQ on these sites would be an ongoing process up to and during construction. It is not anticipated that contaminated groundwater would be encountered during construction.

The proposed project includes the demolition of bridges and building structures within the ROW during construction. These structures have the potential for the release of asbestos containing materials (ACM) and lead-based paints (LBP). Asbestos and lead based paint inspections, specification, license, accreditation, abatement and disposal, as applicable, would comply with federal and state regulations. Asbestos and lead-based paint issues would be addressed during the ROW process prior to construction.

At this time, utility adjustment requirements have not been determined. There is a potential for contamination to be encountered during utility adjustments. Coordination with utility companies concerning this contamination would be addressed during the ROW stage of project development. It is anticipated that all utility adjustments or relocation would be completed prior to construction.

The contractor would take appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction staging areas. The use of construction equipment within sensitive areas would be minimized or eliminated entirely. All construction materials used for this project would be removed as soon as work schedules permit.

6.2.12 Construction Impacts

No-Build Alternative

The No-Build Alternative would not result in any construction impacts.

Build Alternative

Although temporary congestion may occur as a result of project construction, access to parcels in the project vicinity would be maintained during all phases of construction. All practicable steps would be taken to minimize the inconvenience to drivers using the intersecting roadways during the construction phase. People living and working in the immediate area of the proposed project may experience noise and dust due to the construction activities.

6.2.13 Encroachment-Alteration Effects

Encroachment-alteration effects are those that affect the functions of the natural and socioeconomic environments due to proposed project features but are removed in time or distance from the direct effects.

Ecological Encroachment-Alteration Impacts

Potential encroachment-alteration impacts on waters of the U.S. (including wetlands) from roadway projects include the fill and degradation of waters of the U.S. from induced development. Potential encroachment-alteration impacts on floodplains from roadway projects include increases in stormwater runoff due to changes in land use and increased development that may be accelerated by improved mobility to the transportation system in the surrounding area. Anticipated fill impacts to waters and floodplain impacts would generally be limited to the project footprint. With regard to erosion of soil from construction sites, erosion and sedimentation would be minor and temporary (BMPs would be in place), and would cease upon establishing permanent vegetation cover after construction.

Potential encroachment-alteration impacts could occur with respect to vegetation removal for any induced development. As described in **Section 6.2.5**, the project has the potential to impact five state-

listed threatened species and three SGCNs. The conversion of vegetation to transportation use would contribute to habitat fragmentation, alteration, or loss. The proposed project would not alter the hydric regime or reduce diversity within the ecosystem. Indirect effects to vegetation and wildlife habitat are discussed further in **Section 7.0**.

Socioeconomic Encroachment-Alteration Impacts

Encroachment-alteration effects to socioeconomic resources are anticipated due to the improved mobility that would occur as a direct result of the proposed project. Two broad forms of socioeconomic impacts include: 1) changes in travel patterns and access, and 2) direct relocation of homes and businesses. These direct impacts may lead to indirect effects on neighborhood cohesion, neighborhood stability (maintained residential and commercial ownership rates, safety, etc.), travel patterns, changes in the local economy, changes in access to specific services, recreation patterns at public facilities (public use of facilities such as parks and school yards), pedestrian dependency and mobility, and perceived quality of the natural environment, among others. Changes in access can include driveway changes, relocations of ramps, alterations of intersections that restrict or increase access to local streets, or the introduction of bicycle and pedestrian facilities. These may result in changes in travel patterns and the economics of travel patterns and corresponding land uses. Changes in access could result in beneficial impacts to public services and facilities; therefore, encroachment impacts to the socioeconomic environment are discussed in further detail below.

Changes in Traffic Patterns and Access

In terms of traffic operations, the improvements are expected to increase mobility by improving traffic flow along FM 2100 and providing multi-modal travel options in the form of sidewalks and a shared-use lane. The roadway mobility improvements are expected to have a positive impact on emergency vehicles and other public services. Improved access to these services is a benefit to all populations.

Other Socioeconomic Impacts

With respect to encroachment-alteration effects to socioeconomic resources, indirect impacts would be driven by changes in travel patterns and access associated with the proposed project. The potential indirect impacts would include improved vehicular access to employment opportunities, markets, goods, or services, residential uses, and public facilities due to increased vehicular mobility. Other factors, such as real estate market conditions, local government development codes and plans, city financing opportunities (for various public facility improvements), anticipated growth, public facility and amenities siting (schools, health care facilities, greenspace, etc.), changes in energy costs, and other local and regional roadway improvements play a role in nearby land development investment decisions. However, real estate investment decisions are typically made with regard to factors such as transportation access and mobility. Although not the sole factor in inducing these development projects, the proposed project may introduce a potential acceleration in these land development decisions. In summary, it is anticipated that the proposed improvements would have a beneficial effect on overall socioeconomic conditions in the project area.

7.0 INDIRECT IMPACTS

The following sections summarize the results of the Indirect Impacts Technical Report prepared for this project. The risk assessment checklist for indirect induced growth provided in TxDOT's Environmental Compliance Toolkit confirmed the need to conduct an induced growth analysis, as the project is adding

capacity, there is land available for development/redevelopment, the project would increase mobility, and the area is experiencing growth.

7.1 AREA OF INFLUENCE

An area of influence (AOI) was established as the first step in evaluating the potential for induced growth. The AOI encompasses an area of approximately 20,933 acres. It is bounded on the west by Lake Houston, on the north by Huffman-Eastgate Road and Smith Road, on the east by Ramsey Road, and on the south by US 90/ Beaumont Highway. These borders are natural boundaries or dominant local roadways that surround the limits of the proposed project and are most likely to contain potential induced growth resulting from the proposed project. The AOI boundary is illustrated on **Figure 12** in **Appendix A**. The analysis considered indirect induced growth impacts that may occur between the time of project construction (2017) and 2040, the planning horizon for the H-GAC's current RTP.

7.2 POTENTIAL FOR FUTURE GROWTH

Undeveloped land and potential sites for redevelopment are present within the AOI. The H-GAC has prepared estimates of land use by parcel for the year 2010. Based on this information, approximately 11,784 acres are considered developable (e.g., land located outside of the 100-year floodplain, roadways, etc.), representing approximately 56 percent of the land within the AOI.

According to the decennial Census, the population of Crosby in 2010 was 2,299, up 34 percent from 1,714 in 2000. H-GAC develops a Regional Growth Forecast, including population, employment, and land use for an eight-county area. According to the H-GAC projections, the Census tracts within the AOI are anticipated to see strong growth between 2010 and 2040. Census Tracts 2518.00 and 2528.00 are projected to see particularly strong growth, and rank in the top one percent of Census tracts in Harris County for household growth between 2010 and 2040. All of the Census tracts within the AOI are projected to outpace the growth of the county as a whole. The H-GAC forecast also suggests strong employment trends for the Census tracts within the AOI. Based on these demographic and land use trends, it can be concluded that there is a strong potential for continued and future growth in the AOI.

7.3 LIKELIHOOD OF INDUCED GROWTH

Project-induced land use change can include project-induced development, the redevelopment of previously developed land, or a change in the rate of development/redevelopment. The "planning judgment" forecasting tool was used as the framework for the analysis. To this end, planners and professionals from the City of Houston, the H-GAC, Harris County, and the Crosby Huffman Chamber of Commerce were consulted in the spring of 2015 in an effort to assess the potential for project-induced land use impacts.

The proposed improvements would increase capacity and mobility, yet this is not a new location roadway so the project does not open up new location areas for development or substantially change access. Literature reviewed for this project, including NCHRP 466 (2002), NCHRP report 25-25 Task 22, *Forecasting Indirect Land Use Effects of Transportation Projects* (2007) and a Center for Transportation Research study by Kockelman et al. (2001), suggest that transportation improvements are a factor in land development decisions, but usually not the most important factor. Specifically, Kockelman et al. report that "[c]hanges in the transportation network only serve to redirect and redistribute growth rather than attract entirely new growth to a region that would not otherwise have occurred."

Marlon Connley, a planner at the City of Houston, provided information on planned developments in the AOI, and also directed project analysts to the City of Houston's Plat Tracker (Personal Communication 2014). There are several developments that have been proposed in the AOI since 2013 (the year that Plat Tracker was implemented). According to the interviews conducted, none of these proposed projects are solely dependent on the proposed roadway, and the planners were not aware of any other planned or proposed developments within the AOI that are dependent on the proposed improvements to FM 2100. A consensus among planners from the City of Houston, H-GAC, and Harris County was that the roadway expansion was perceived lagging behind population and employment growth already occurring in this area of the county rather than inducing this growth. The planners viewed the project as necessary to accommodate traffic and address the need for mobility improvements associated with existing and future development trends.

The analysis concluded that the proposed project would not induce growth. Given the current pace of growth tracked by HGAC, there were no indications that development by 2040 would be different under the Build or No-Build scenarios – development would continue with or without the roadway improvements, but improved mobility may minimally accelerate the pace of development in the AOI.

This conclusion is based on factors including:

- The proposed project's purpose does not include economic development and it is not intended to serve any specific developments;
- The proposed project would not be a new location roadway creating access to otherwise inaccessible areas;
- Undeveloped lands within the AOI have existing access to FM 2100;
- The proposed project would not materially change access to the undeveloped lands within the AOI;
- No development proposals dependent upon FM 2100 improvements were identified; and
- Planner interview responses.

While the analysis determined that the timing of development may be subject to influence, this is considered a minor potential effect since the overall development (e.g., amount of impervious cover) in the AOI would be the same in 2040 whether the proposed project is built or not. If development does occur, as is anticipated under the No Build or Build scenarios, it would be consistent with the articulated plans and policies of affected communities in the AOI.

8.0 CUMULATIVE IMPACTS

Based on the answers to the questions in the Cumulative Impacts Risk Assessment, a Cumulative Impacts Analysis was undertaken for the proposed project. The evaluation of cumulative impacts summarized below is detailed in the Cumulative Impacts Technical Report and follows TxDOT's March 2014 "Cumulative Impacts Analysis Guidelines."

8.1 STEP 1: RESOURCE STUDY AREA, CONDITIONS, AND TRENDS

8.1.1 Identification of Resources

According to TxDOT’s Cumulative Impacts Analysis Guidelines (2014), if a project does not cause direct or indirect impacts on a resource, it will not contribute to a cumulative impact on that resource. **Table 10** describes direct and indirect impacts for each resource category and whether the resource is in poor or declining health or at risk. The analysis focuses on those resources impacted by the project or those that are currently in poor or declining health or at risk, even if project impacts are relatively small; only those resources meeting these criteria are brought forward for further analysis of cumulative effects.

Table 10: Resource/Issues Considered for Cumulative Impacts Analysis				
Subject Considered for Direct and Indirect Impacts	TxDOT/CEQ Criteria ¹		Included for Cumulative Impacts Analysis	Explanation for Including or Excluding the Subject from Cumulative Impacts Analysis
	Would Proposed Project or Induced Growth Result in Substantial Adverse Impacts?	Is Subject a Scarce Resource or in Poor or Declining Health?		
NATURAL RESOURCES				
Waters of the U.S., including Wetlands	No	No	No	Excluded. The proposed project was authorized by the USACE under NWP 14 with a PCN because of impacts to two wetlands. No Individual Permits are necessary. Other reasonably foreseeable development will not likely affect full compliance with water quality protection regulations.
Floodplains	No	No	No	Excluded because although a portion of the project would lie within the 100-year floodplain, the hydraulic design of the project would permit conveyance of the 100-year flood, and potential inundation of the highway would not cause substantial damage to it, the streams, or other property. Potential induced growth would not impact floodplains.
Water Quality	No	No	No	Excluded because no permanent water quality impacts are expected from the proposed project or potential induced growth, and required permits to control erosion during construction are expected to result in minimal temporary degradation of water quality.
Vegetation and Wildlife Habitat	No	Yes	Yes	Excluded because these habitat types are common to the surrounding area. Furthermore, over half of the vegetation acreage that would be impacted is classified as “Urban.” Any impacts associated with these resources are anticipated to be a result of direct removal or modification of the habitat due to project construction. The impacts to these species and vegetation types are not expected to be substantial or significant based on the existing land use and transportation infrastructure in the surrounding environment.

Table 10: Resource/Issues Considered for Cumulative Impacts Analysis

Subject Considered for Direct and Indirect Impacts	TxDOT/CEQ Criteria ¹		Included for Cumulative Impacts Analysis	Explanation for Including or Excluding the Subject from Cumulative Impacts Analysis
	Would Proposed Project or Induced Growth Result in Substantial Adverse Impacts?	Is Subject a Scarce Resource or in Poor or Declining Health?		
Threatened/Endangered Species	No	Yes	Yes	Included because of the project's potential to impact five state-listed threatened species.
Air Quality	No	Yes	No	Excluded. Any increased air pollutant or MSAT emissions resulting from the potential development or redevelopment of the area must meet regulatory emissions limits established by the TCEQ and EPA. In addition, with cleaner fuels, improved emission technologies, alternative modes of transportation, and regional clear air initiatives, the air quality in the area should continue to improve over time.
COMMUNITY IMPACTS				
Community Impacts	No	No	No	Excluded because the proposed project would not significantly adversely affect, separate, or isolate any distinct neighborhoods, ethnic groups, or vulnerable populations within the project area. Access and travel patterns would not change substantially because FM 2100 is an existing facility. Tolling is not proposed. Beneficial effects include improved mobility.
Section 4(f) and 6(f) Properties	No	No	No	Excluded because no impacts are anticipated to local parks or recreation areas; no adverse effects are anticipated to occur to resources eligible for the NRHP.
Limited English Proficiency	No	No	No	Excluded because adequate steps are planned to assist the LEP population within the project area throughout the public involvement process for the proposed project.
Environmental Justice	No	No	No	Excluded because no disproportionately high or adverse impacts on minority or low-income populations are anticipated as a result of the proposed project. Displacements are dispersed along the corridor and would not occur in EJ geographies.
Public Facilities/Services/Utilities	No	No	No	Excluded because the proposed project would not displace any public facilities/services, and improved mobility would provide a benefit.
CULTURAL RESOURCES				
Historic-Age Properties	No	No	No	Excluded because no adverse effects are anticipated to occur to resources eligible for the NRHP.
Archeological Resources	No	No	No	Excluded because no adverse effects are anticipated to occur to resources eligible for the NRHP.

Table 10: Resource/Issues Considered for Cumulative Impacts Analysis

Subject Considered for Direct and Indirect Impacts	TxDOT/CEQ Criteria ¹		Included for Cumulative Impacts Analysis	Explanation for Including or Excluding the Subject from Cumulative Impacts Analysis
	Would Proposed Project or Induced Growth Result in Substantial Adverse Impacts?	Is Subject a Scarce Resource or in Poor or Declining Health?		

Notes:

1. In accordance with TxDOT and CEQ selection criteria for limiting the scope of cumulative impacts analyses.

Based on the information presented in **Table 10** and in the supporting technical reports prepared for the proposed project Threatened/Endangered Species are carried forward for analysis of potential cumulative effects.

8.1.2 Resource Study Areas

The Resource Study Area (RSA) was chosen based on characteristics of the resource and the context and scale of the proposed project. The RSA was reviewed from both temporal and geographic perspectives. The timeframe in which effects to resources were considered for this analysis is 1990 to 2040. This past temporal boundary considers the timeframe in which suburban Houston began to develop more rapidly, resulting in subsequent changes in land use and natural resources. The year 2040 is the date of the planning horizon for the H-GAC's current RTP. Geographically, the RSA was chosen to allow for meaningful data collection and analysis of the current health and historic context of the resources. The watersheds (Hydrologic Unit Code 10 level) intersected by the proposed project comprise the RSA for Threatened/Endangered Species (see **Figure 13**). This RSA, including the watersheds for Adlong Ditch-Cedar Bayou, Buffalo Bayou-San Jacinto River, and Frontal Lake Houston, encompasses 373,018 acres and comprises the natural network of watershed surfaces and interconnected hydrologic features that surround the proposed project. The RSA encompasses habitat used by all five of the state-listed species identified within the project area: Louisiana pigtoe, creek chubsucker, alligator snapping turtle, timber rattlesnake, and the Wood Stork. Although the RSA is based on water features, this area is also an appropriate RSA for the non-aquatic species of concern. The Wood Stork and timber rattlesnake both have large ranges and do not have designated critical habitat. The Wood Stork moves throughout the Gulf States, and is found in over 100 counties in Texas. The timber rattlesnake has an extremely wide distribution, ranging from New Hampshire south to Florida, west to Texas, and north through southeastern Nebraska to southeast Minnesota (Center for Reptile and Amphibian Conservation and Management 2004). The RSA would encompass any movements of individual species from the project area to adjacent habitat areas and provides a manageable and meaningful area of analysis.

8.2 STEP 2: DIRECT AND INDIRECT IMPACTS ON EACH RESOURCE FROM THE PROPOSED PROJECT

The direct, encroachment, and indirect impacts on Threatened and Endangered Species are summarized in **Table 11** below.

Table 11: Summary of Impacts

Resource	Direct Impacts Summary	Encroachment Effects Summary	Induced Growth Effects Summary
Threatened/Endangered Species	No effect on federally listed threatened or endangered species; five state-listed species and three SGCNs could be impacted. BMPs would be implemented to reduce impacts to these species.	Potential loss of habitat may occur along the boundaries of habitat already fragmented by the original construction of FM 2100, as well as construction of surrounding commercial and residential properties, but this would not lead to further fragmentation of habitat beyond what already exists in this environment.	The proposed project would not induce growth. Indirect impacts, including encroachment-alteration and induced land use growth effects, are not anticipated to be substantial because areas of growth would likely be limited and because fragmentation and land conversion have been ongoing trends in the area.

8.3 STEP 3: OTHER ACTIONS – PAST, PRESENT, AND REASONABLY FORESEEABLE

Several actions have occurred or are planned within the RSA that could contribute to cumulative impacts. These actions include residential and commercial development along with transportation improvements.

Regarding past actions since 1990, the area has seen increasing development in recent decades as outlying communities have grown with the city of Houston, often serving as bedroom communities for commuters. The urban area of Houston quadrupled between 1974 to 2002, a large part of the growth occurring during the latter half of the time period (Oguz 2004). Growth has been somewhat constrained by the physiographic obstacle of surface water and the larger portion of the area that lies within the floodplain (Oguz 2004). According to the USGS National Land Cover Database, between 1992 and 2011 52,168 acres within the RSA were converted from non-developed uses (forest, pasture, wetlands, etc.) to “developed” or “developed open space,” representing a conversion of approximately 14 percent of land in the RSA over the 19-year period.

H-GAC tracks announced developments within its planning area. Within the RSA, the H-GAC has quantified approximately 8,374 acres of announced development (see **Figure 13**), which represents a small portion of the development expected for the eight-county area. Detailed information is presented in the Cumulative Impacts Technical Report and is based on information from both the H-GAC list of announced developments and information from the City of Houston. In addition, there are several transportation projects planned for the portion of Harris County within the RSA. The Cumulative Impacts Technical Report contains an excerpt from the list of financially constrained projects from the H-GAC’s 2040 RTP.

8.4 STEP 4: OVERALL EFFECTS OF THE PROPOSED PROJECT COMBINED WITH OTHER ACTIONS

The project may impact five state-listed threatened species and three SGCNs. BMPs would be implemented to reduce impacts to these species in accordance with the *Best Management Practices*

Programmatic Agreement between TxDOT and TPWD Under the 2013 MOU. Vegetation that provides habitat for these species could be removed as a result of development of undeveloped, vegetated areas within the RSA. The Indirect Impacts Analysis concluded that there is a very low potential for project-induced growth within the AOI, based on established growth patterns and conversations with planning experts. H-GAC has quantified approximately 8,374 acres of announced development plans within the RSA, representing approximately 2.2 percent of the RSA acreage. The habitat vegetation types in the project area are found in large quantities throughout Harris County and surrounding counties. The cumulative loss of habitat for threatened and endangered species is not anticipated to be substantial.

8.5 STEP 5: MITIGATION OF CUMULATIVE EFFECTS

The Texas Transportation Code directs TxDOT to adopt memoranda of understanding 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 MOU 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 MOU 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.

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. In addition, the federally-funded transportation projects programmed in the RTP would be subject to environmental analyses under the National Environmental Policy Act, which could help mitigate impacts that could be associated with future regulated types of development.

The impacts of the proposed project and other transportation projects to wildlife habitat would be avoided and minimized in compliance with the TxDOT-TPWD MOU. The impacts of induced development and reasonably foreseeable private development to vegetation and habitat largely would be avoided, minimized, and mitigated through enforcement of applicable municipal zoning and land use regulations. Federally-listed threatened or endangered species or their habitats are protected by the Endangered Species Act. State laws prohibit harm to individuals of state-listed species. Any developers undertaking actions that could affect federally-listed species would be responsible for coordinating with USFWS and/or TPWD as necessary to determine appropriate mitigation measures. Based on the availability of wildlife habitat in the RSA, and assuming appropriate implementation of regulated activities subject to avoidance, minimization, and mitigation strategies for vegetation and habitat impacts, the proposed project would not contribute to substantial cumulative impacts to the area's vegetation and habitat, and additional mitigation is not necessary.

9.0 ENVIRONMENTAL PERMITS, IMPACTS AND COMMITMENTS

All project-specific commitments and conditions of approval, including resource agency permitting compliance and monitoring requirements, would be incorporated in the project plan for the proposed project. These project-specific commitments and conditions for approval, as further described below,

may vary depending on the project's final design and construction. Mitigation monitoring would be conducted by TxDOT and other federal, state, and local agencies to ensure compliance.

This section summarizes the elements that constitute the Environmental Permits, Impacts and Commitments (EPIC) sheet. The EPIC sheet, found in the Environmental Compliance Oversight System (ECOS), documents and communicates permit issues and environmental commitments that must be incorporated into the Plans, Specifications, and Estimates (PS&E) design for the proposed project. The permits, impacts and commitments relevant to the proposed project are as follows:

- Impacts to waters of the U.S. have been authorized through NWP #14 with a PCN because of impacts to two wetlands. If any impacts to an individual water of the U.S. exceed 0.5 acre, or the thresholds of the general conditions of the NWP are exceeded, an IP would be required.
- TxDOT would comply with TCEQ's TPDES CGP. An SW3P would be implemented, and a construction site notice would be posted on the construction site. A NOI would be required.
- The Section 401 Certification requirements for NWP 14 would be met by implementing approved erosion control, sedimentation control, and post-construction TSS control BMPs from the TCEQ's 401 Water Quality Certification Conditions for NWPs. The implementation of BMPs would prevent water quality impacts from occurring during and after construction.
- In accordance with the *Best Management Practices Programmatic Agreement between TxDOT and TPWD Under the 2013 MOU*, BMPs have been defined to be implemented by TxDOT in order to minimize impacts to state-listed species and SGCNs. **Table 6** lists those BMPs related to species that may be impacted by the proposed project.
- Permanent soil erosion control features would be constructed as soon as feasible during the early stages of construction through proper sodding and/or seeding techniques. Disturbed areas would be restored and stabilized as soon as the construction schedule permits and temporary sodding would be considered where large areas of disturbed ground would be left bare for a considerable length of time.
- In accordance with EO 13112 on Invasive Species and the Executive Memorandum on Beneficial Landscaping, seeding and replanting with TxDOT approved seeding specifications that is in compliance with EO 13112 would be done where possible. Moreover, abutting turf grasses within the ROW are expected to re-establish throughout the project length. Soil disturbance would be minimized to ensure that invasive species would not establish in the ROW.
- In the event that migratory birds are encountered on-site during project construction, adverse impacts on protected birds, active nests, eggs, and/or young would be avoided. The contractor would remove all old migratory bird nests from October 1 to February 15 from any structure where work will be done. In addition, the contractor would be prepared to prevent migratory birds from building nests between February 15 and October 1, per the EPIC plans.
- In the event that unanticipated archeological 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.
- 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. No unresolved hazardous materials situations for which TxDOT would be responsible are anticipated with respect to the project. Any adjustments to pipelines or potential utilities would use standard techniques. 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. All construction materials used for this project would be removed as soon as work schedules permit.

10.0 COMMENTS AND COORDINATION

10.1 PUBLIC MEETING

A public meeting for the proposed project was held on April 16, 2015, from 5:30 to 7:30 pm in the cafeteria of Newport Elementary School, which is located adjacent to the proposed project area. The public meeting was conducted in an open-house format; no formal presentation was given. The meeting was intended to provide attendees with an opportunity to view detailed plans and environmental constraints, discuss the project with TxDOT staff, and to receive an update on the project status and schedule. The meeting was also intended to gather public comment and input on the project. No requests for special accommodations were received by the District in advance of the meeting. Spanish-speaking staff were present and conducted some conversations in Spanish with members of the public.

Notices were sent to approximately 240 land owners with property adjacent to the project area, providing information on the project and the date and time of the meeting. Letters were sent to the relevant elected officials and representatives for the project area. Notice of the meeting was also provided to local homeowner's associations, including Newport, Indian Shores, Spanish Cove, and Saddlecreek Farms.

A notice was published in English in the *Houston Chronicle* and in Spanish in *La Voz*, running on Sunday March 15, 2015 and again on Sunday April 5, 2015. Notice was also published in the locally circulated *Highlands Star-Crosby Courier* on March 15, 2015. The public media notice included the location, time and date of the meeting with a brief description of the project.

One hundred and seven people registered their attendance at the meeting via the sign-in sheet. Attendees included an aide to State Senator John Whitmire and a journalist from the *Highlands Star-Crosby Courier*. Attendees were provided with a comment form at the sign-in table and were invited to submit written comments at the meeting. The media notices published prior to the meeting also provided contact information for submitting comments.

Ninety-five written comments were received from comment forms, mail and email. The primary concern of commenters was the proposal to add a raised median to the FM 2100 roadway and the resulting need for U-turns and more circuitous travel patterns. As a result of this feedback, additional median openings were added. A Public Meeting Summary and Analysis Report is on file at the Houston District Office.

10.2 PUBLIC HEARING

A public hearing for the proposed project was held on Thursday, May 5, 2016 from 5:30pm to 7:30pm at Newport Elementary School. The public hearing was conducted in a two-part format, which included

an open house portion followed by a formal presentation and verbal comment period. The open house portion of the public hearing was held in the school gymnasium, followed by the presentation and verbal comment period held in the cafeteria, located next to the gymnasium. Spanish-speaking staff were present and conducted some conversations in Spanish with members of the public.

Notices were sent to approximately 357 land owners with property adjacent to the project area. Letters were also sent to the relevant elected officials and representatives for the project area. A notice was published in English in the *Houston Chronicle* on Tuesday, April 5, 2016, and Monday, April 25, 2016, and in the *Highlands Star-Crosby Courier* on Thursday, March 31, 2016, and Thursday, April 21, 2016. A notice was also published in the Spanish newspaper *La Voz*, on Sunday, April 3, 2016, and Sunday, April 24, 2016.

One hundred and ninety people registered their attendance at the hearing via the sign-in sheet. Attendees included Christy Graves (Harris County Emergency Services District #4 Commissioner), John Strawbridge (Harris County Emergency Services District #5 Commissioner), and Jeremy Phillips, an aide to Harris County Precinct 2 Commissioner Jack Morman.

Eighteen people provided verbal comments at the public hearing, and 201 additional comments were received via comment forms, mail and email. The primary concerns of commenters were general opposition to a raised median, with a preference instead for a center left turn lane. The opposition to a raised median was based primarily on concerns about changes in access, difficulty for larger vehicles to turn, and potential impacts on emergency response times. As a result of this feedback, additional median openings were added, as depicted on **Figure 15**. A Public Hearing Summary and Analysis Report is on file at the Houston District Office.

10.3 AGENCY COORDINATION

Previous coordination with TPWD on the project occurred in March 2011 under the previous TxDOT-TPWD MOU. TxDOT requested TPWD coordination for this project in early 2015. TPWD stated that they do not have additional comments and recommended that TxDOT implement the recommendations made during the 2011 coordination. TxDOT responded indicating that mitigation for permanent impacts to forested/riparian areas and aquatic resources will take the form of avoidance and minimization of impacts. TxDOT will follow BMPs and make efforts to avoid impacts as much as practicable. TxDOT will follow its standard specifications and BMPs for revegetation.

The THC concurred with the finding that the project would have no adverse effect on the NRHP-eligible property at 6422 FM 2100 on April 29, 2015. The THC concurred with the finding that the project would have no effect on any archeological sites, archeological properties, or SALs; no further archeological investigations are warranted; and the proposed undertaking should be allowed to proceed to construction on September 17, 2015. TxDOT determined that the proposed project meets the requirements for a *de minimis* Section 4(f) impact finding under 23 CFR 774. The THC offered no comment on this finding on April 29, 2015.

TxDOT submitted a PCN to the USACE requesting authorization under NWP 14 to permanently place fill material into waters of the United States for the proposed project. The USACE provided authorization in August 2016 (see **Appendix D**).

11.0 DETERMINATION OF ASSESSMENT

The No-Build Alternative would avoid the direct impacts associated with the Build Alternative; however, it would not address the need and purpose for the proposed project as summarized below.

The Build Alternative is the recommended alternative, as it is responsive to the needs for the transportation improvement project based on projected increases in population and traffic. If constructed, the proposed Build Alternative would fulfill the public's need for a safe and efficient transportation system in the project area that satisfies the project objectives, as outlined below.

11.1 IMPROVE MOBILITY AND SAFETY

The construction of the proposed reliever route would improve mobility by providing additional capacity along FM 2100. The conversion to a divided roadway would also provide a safe facility for the traveling public.

11.2 COMPATIBILITY WITH LOCAL, COUNTY, AND REGIONAL NEEDS AND PLANS

The proposed Build Alternative is compatible with local and regional planning. The Build Alternative has been incorporated into the regional planning documents of the project area. The project was included in the TIP on December 19, 2016.

11.3 MINIMIZE SOCIAL, ECONOMIC, AND ENVIRONMENTAL EFFECTS ON THE HUMAN ENVIRONMENT

The proposed Build Alternative is the result of close examination of the No-Build Alternative. Through active participation among public officials and citizens in the consideration of potential impacts as well as avoiding/minimizing impacts where practicable, the Build Alternative design described herein is the result of efforts to avoid or minimize social, economic, and environmental impacts.

11.4 CONCLUSION

The engineering, social, economic, and environmental investigations conducted thus far indicate that the proposed project would result in no significant impacts to the quality of the human or natural environment; a Finding of No Significant Impact (FONSI) is anticipated for this project.

12.0 REFERENCES

- American Association of State Highway and Transportation Officials. 2011. Practitioner's Handbook - 12: *Assessing Indirect Effects and Cumulative Impacts under NEPA*.
- Banks Environmental Data. 2014. Hazardous materials database search, Report ES-113251, November 10.
- Center for Reptile and Amphibian Conservation and Management, Indiana University-Purdue University, 2004. Timber Rattlesnake.
www.westmeadenaturalist.org/TimberRattlerFactSheet.pdf.
- City of Houston. 2014. Major Thoroughfare Plan Map. http://www.houstontx.gov/planning/mobility/MTFPMMap/MTFP_MAP_2014.pdf
- . 2015. Plat Tracker Plats. <http://mycity.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=8a4e387104984b48850a1a753c3e8b23>
- Connley, Marlon, Planner, City of Houston. Personal communication, April 2014.
- Houston-Galveston Area Council (H-GAC). 2013 Urban Houston Framework: A Case Study for the H-GAC Regional Plan for Sustainable Development, May 2013. http://www.houstontx.gov/planning/DevelopRegs/urbanhoustonframework/PDFs/FullReport_UrbanHoustonFramework.pdf
- . Houston-Galveston Area Council 2040 Regional Forecast, 4Q 2014. <http://www.h-gac.com/community/socioeconomic/2040-regional-growth-forecast/default.aspx>, accessed January 14, 2015.
- . 2014a. Regional Forecast Data. 4Q2014. <https://h-gac.sharefile.com/download.aspx?id=sfcffbe585b3402aa>
- . 2014b. Regional Forecast Growth Maps. http://www.h-gac.com/community/socioeconomic/documents/Current_Maps_and_Tables.pdf
- Kockelman, Kara M., Brian Siethoff, C. Michael Walton, and Hani S. Mahmassani. Research Relationships Between Transportation Infrastructure and Increases in Vehicle Miles Traveled: The Effects of Highway Capacity Expansion on Land Development. Center for Transportation Research, University of Texas at Austin.
- Loopnet.com Commercial Real Estate Market Searches for Zip Codes 77336 and 77532, accessed January 16, 2015.
- Mathis, Fred. Harris County Platting Department Program Manager. Personal communication, April 2014.
- Mohite, Amar. Division Manager, Transportation Planning, City of Houston. Personal communication, April 2014.
- Missouri Resource Assessment Partnership (MoRAP). 2013. MoRAP Project: Texas Ecological Systems Classification <http://morap.missouri.edu/Projects.aspx?ProjectId=57>, also known as Ecological

- Mapping Systems of Texas (EMST), prepared for Texas Parks and Wildlife Department; ongoing 1998-2014, accessed January 21, 2013.
- National Cooperative Highway Research Program (NCHRP). 2002. Report 466: Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects.
- NCHRP, National Research Council, Transportation Research Board. 2007. The National Cooperative Highway Research Program (NCHRP) Project 25-25, Task 22: Forecasting Indirect Land Use Effects of Transportation Projects.
- Oguz, Hakan, 2004. Modeling Urban Growth and Land Use/Land Cover Change in the Houston Metropolitan Area from 2002 – 2030. Texas A&M University Doctoral Thesis.
- Realtor.com, Residential Real Estate Market Searches for Zip Codes 77336 and 77532, accessed January 19, 2015.
- Sambidi, Pramod, Ph.D., Socioeconomic Modeling Program Manager, Houston-Galveston Area Council. Personal communication, April 2014.
- Texas Commission on Environmental Quality (TCEQ). 2012 Section 303(d) list. http://www.tceq.state.tx.us/assets/public/waterquality/swqm/assess/12twqi/2012_imp_index.pdf
- . 2013. San Jacinto River Basin Narrative Summary. http://www.tceq.state.tx.us/assets/public/comm_exec/pubs/sfr/050_00/vol2_basin10.pdf
- Texas Department of Transportation (TxDOT). August 2014. Environmental Handbook for Air Quality.
- . 2011. Guidelines for Analysis and Abatement of Roadway Traffic Noise.
- . January 2015. *TxDOT Environmental Handbook: Community Impacts, Environmental Justice, and Title VI Compliance*. Retrieved from: <http://ftp.dot.state.tx.us/pub/txdot-info/env/toolkit/710-01-gui.pdf>
- . TxDOT – Environmental Affairs Division. 2014. Cumulative Impacts Analysis Guidelines.
- . TxDOT – Environmental Affairs Division. 2014. Environmental Handbook: Indirect and Cumulative Impacts.
- Texas Parks and Wildlife Department (TPWD). 2011. Texas Conservation Action Plan Rare Plant Communities by Ecoregion Excel Sheet. South Texas Plains Ecoregion. <https://tpwd.texas.gov/landwater/land/tcap/sgcn.phtml>, accessed May 7, 2015.
- . 2012. Texas Conservation Action Plan: Gulf Coast Prairies and Marshes Ecoregion Handbook. http://www.tpwd.state.tx.us/landwater/land/tcap/documents/gcpm_tcap_2012.pdf, accessed November 21, 2014.
- . 2014. Texas Natural Diversity Database, live version. Data obtained for the *Huffman* and *Crosby* quadrangles; November 24, 2014.

———. 2015. Wildlife Division, Diversity and Habitat Assessment Programs. TPWD County Lists of Protected Species and Species of Greatest Conservation Need. Harris County 03/23/2015. Accessed May 18, 2015.

U.S. Census Bureau. 2010. *Decennial Census – Census 2010 Summary File 1 (SF 1) 100-Percent Data – Profile of General Demographic Characteristics: 2010*.

———. 2014. *American Community Survey 2009-2013 5-year Estimates*. Tables B16004, B11001, and B19013.

U.S. Fish and Wildlife Service (USFWS). 2015. Endangered Species List by County for Texas: Harris. http://www.fws.gov/southwest/es/ES_ListSpecies.cfm, accessed May 19, 2015

This page intentionally left blank.

Appendix A

Figures

This page intentionally left blank.



 Project Location

Harris County

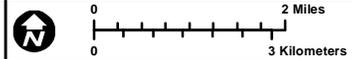
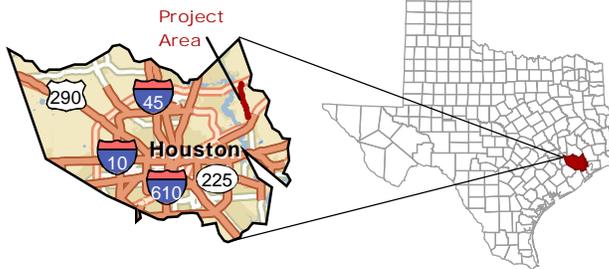
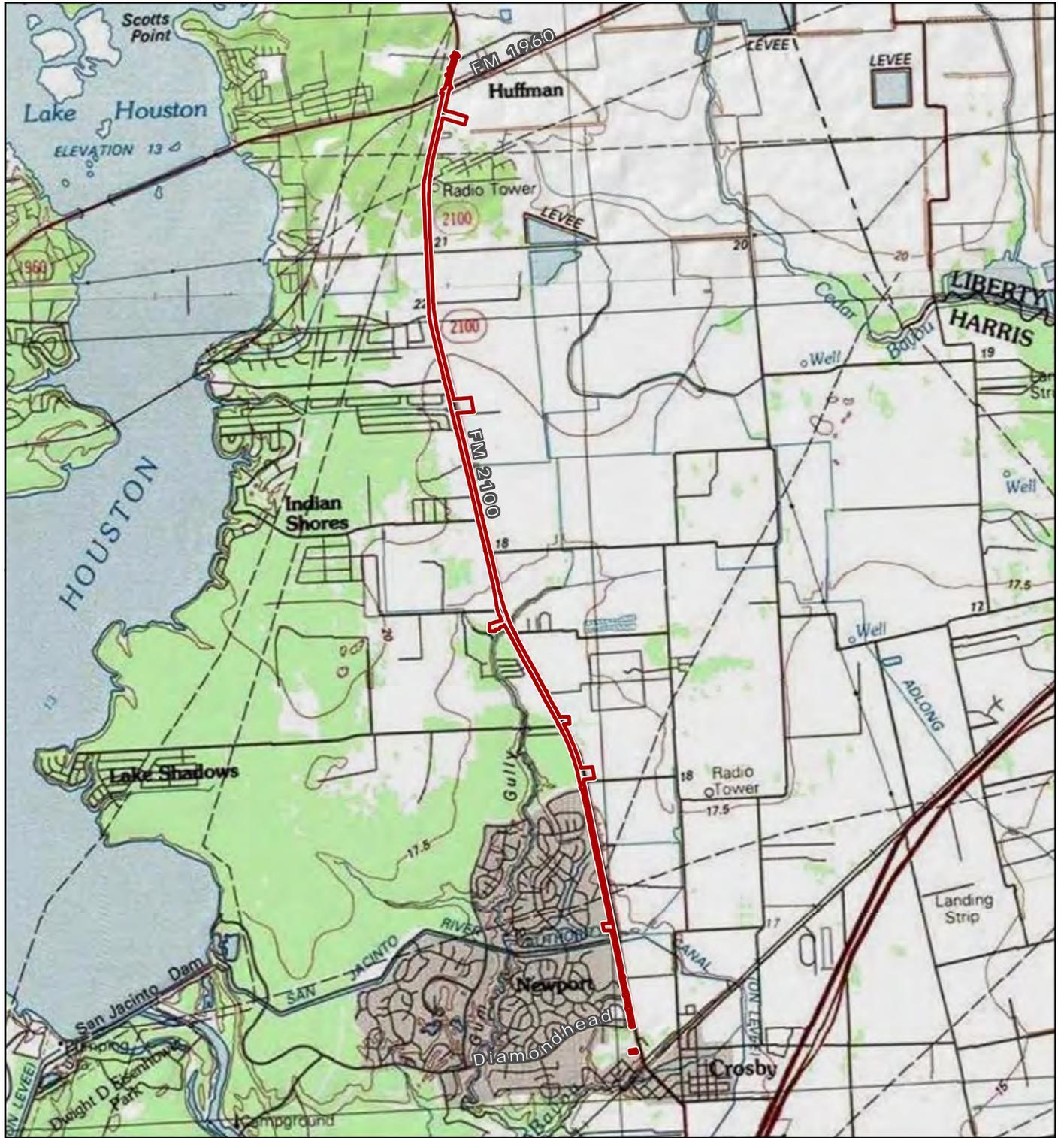


Figure 1
Project Location

**FM 2100 from FM 1960 to
S Diamondhead Blvd**

Prepared for: TxDOT	1 in = 2 miles
	Scale: 1:126,720
CSJ: 1062-04-022	Date: 5/14/2015



 Project Location

Harris County

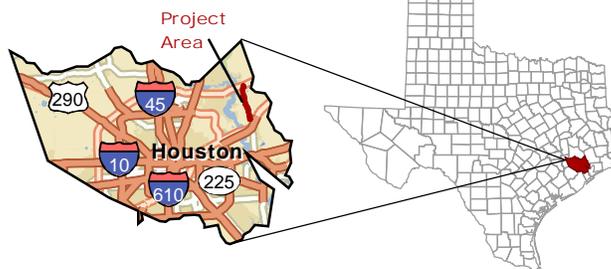


Figure 2
Project Location (Topo)

FM 2100 from FM 1960 to
S Diamondhead Blvd

Prepared for: TxDOT	1 in = 6,000 feet
	Scale: 1:72,000
CSJ: 1062-04-022	Date: 5/14/2015

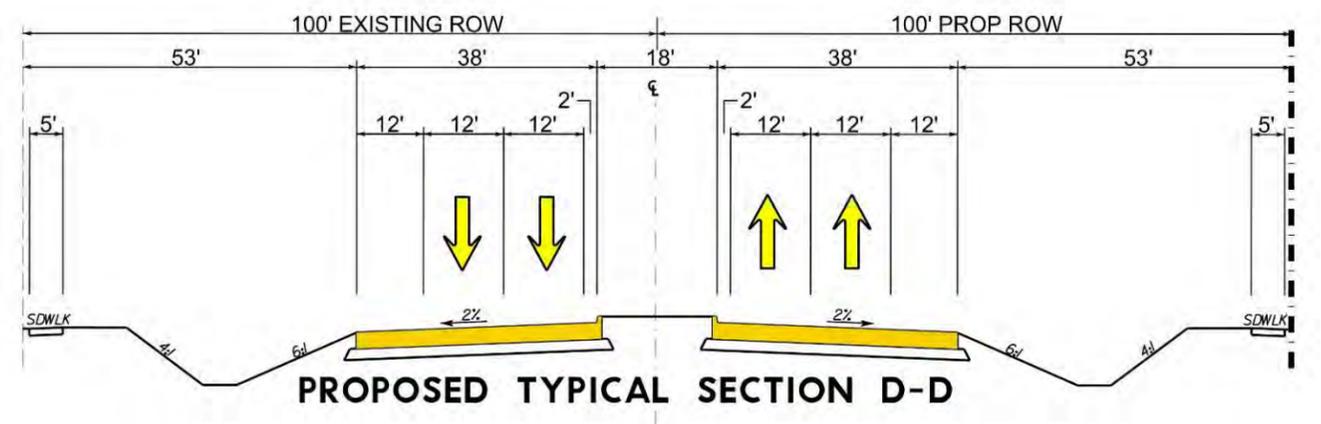
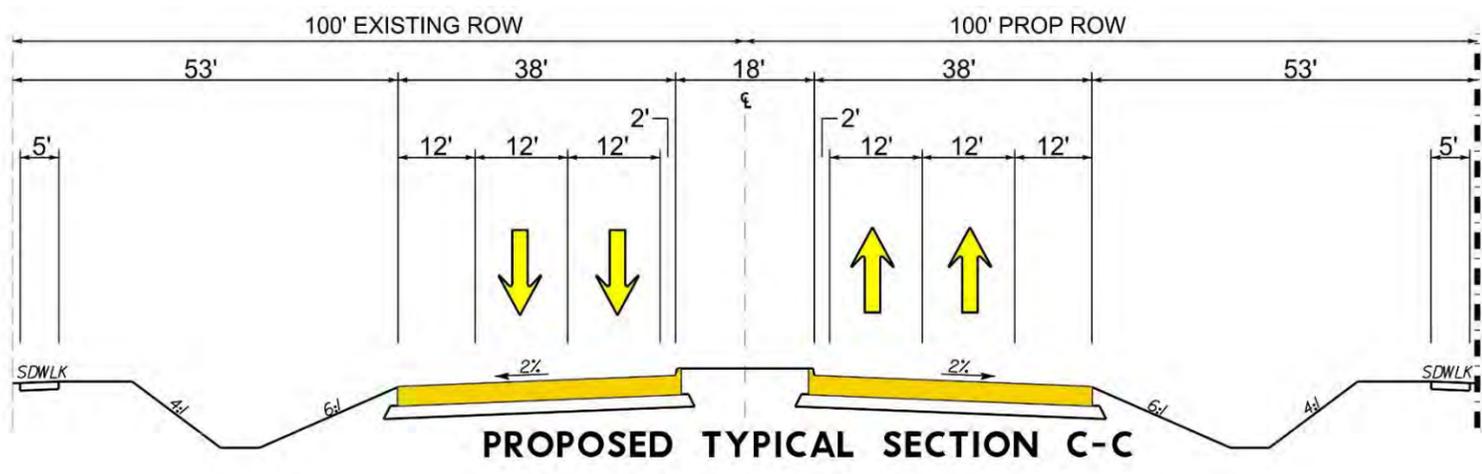
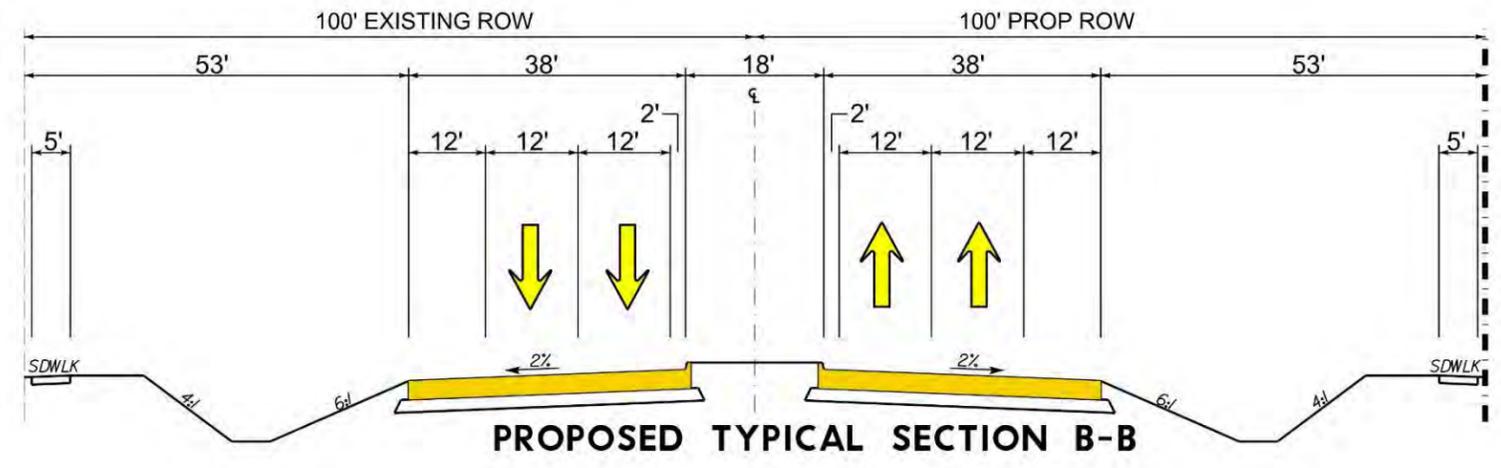
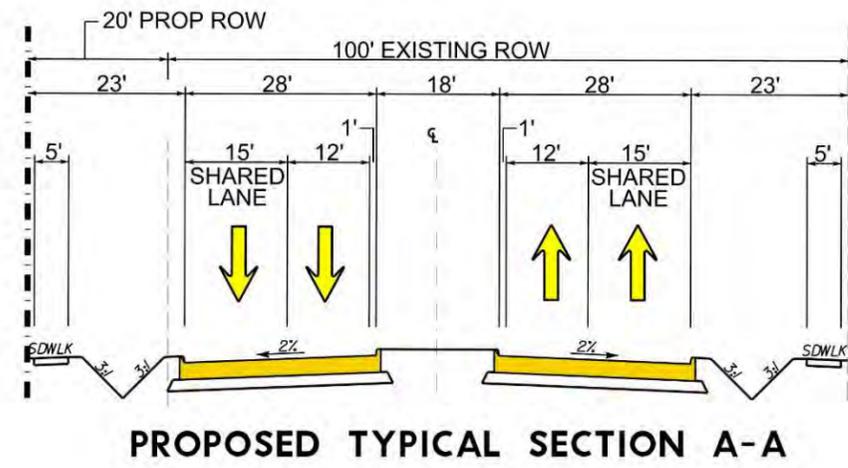
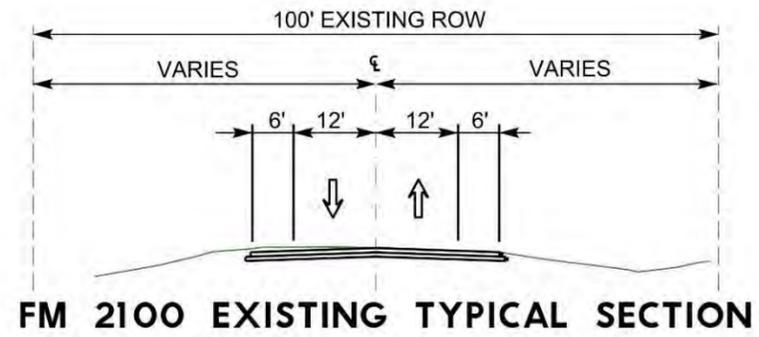
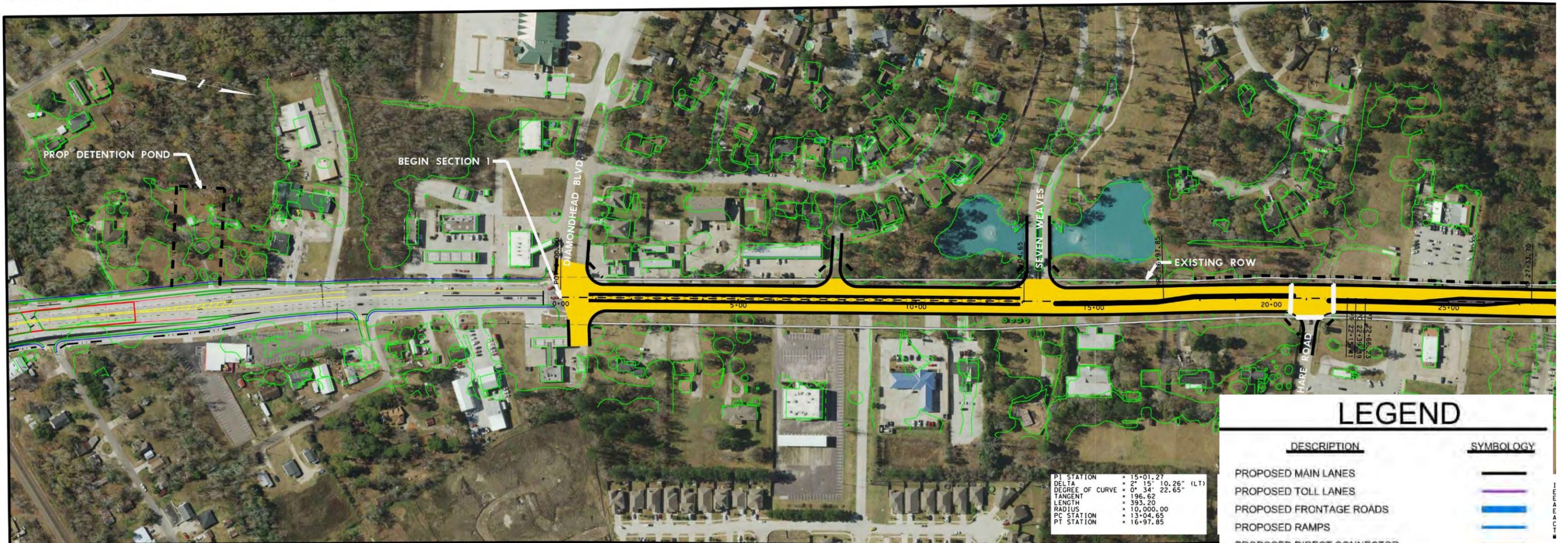
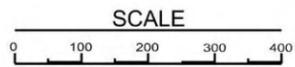


Figure 3
 Final Draft EA Schematic Typical Sections
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



PI STATION	= 15+01.27
DELTA	= 2° 15' 10.26" (LT)
DEGREE OF CURVE	= 0° 34' 22.65"
TANGENT	= 196.62
LENGTH	= 393.20
RADIUS	= 10,000.00
PC STATION	= 13+04.65
PT STATION	= 16+97.85

LEGEND

DESCRIPTION	SYMBOLGY
PROPOSED MAIN LANES	
PROPOSED TOLL LANES	
PROPOSED FRONTAGE ROADS	
PROPOSED RAMPS	
PROPOSED DIRECT CONNECTOR	
PROPOSED EMBANKMENT	
PROPOSED RETAINING WALL	
PROPOSED BRIDGE BENTS	
PROPOSED NOISE WALL	
PROPOSED SIDEWALKS	
PROPOSED STRIPING	
PROPOSED LANE INDICATOR	
PROPOSED RIGHT-OF-WAY	
CONTROL OF ACCESS	
PLANIMETRIC	
EXISTING RIGHT-OF-WAY	
EXISTING ROADWAY	
EXISTING ROADWAY TO BE REMOVED	
EXISTING LANE INDICATOR	
TRAFFIC COUNT YEAR (2035) DHV	<200>
TRAFFIC COUNT YEAR (2015) DHV	200

COLORFILL LEGEND

MAIN LANES	
MEDIAN	

Figure 4a
 Final Draft EA Schematic Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



Figure 4b
 Final Draft EA Schematic Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



Figure 4c
Final Draft EA Schematic Project Layout
FM 2100 from FM 1960 to S Diamondhead Blvd
CSJ: 1062-04-022



Figure 4d
 Final Draft EA Schematic Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022

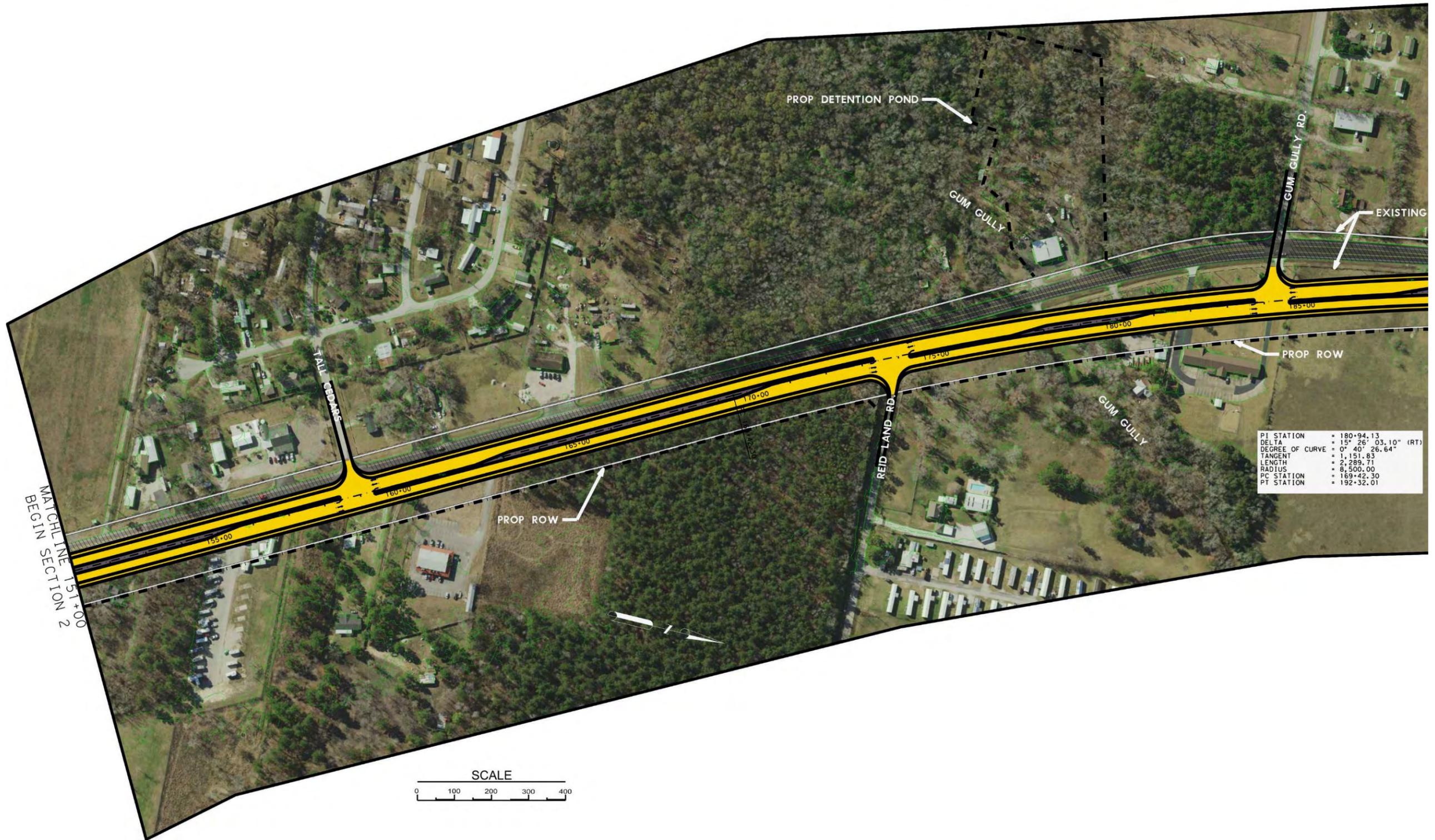


Figure 4e
 Final Draft EA Schematic Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022

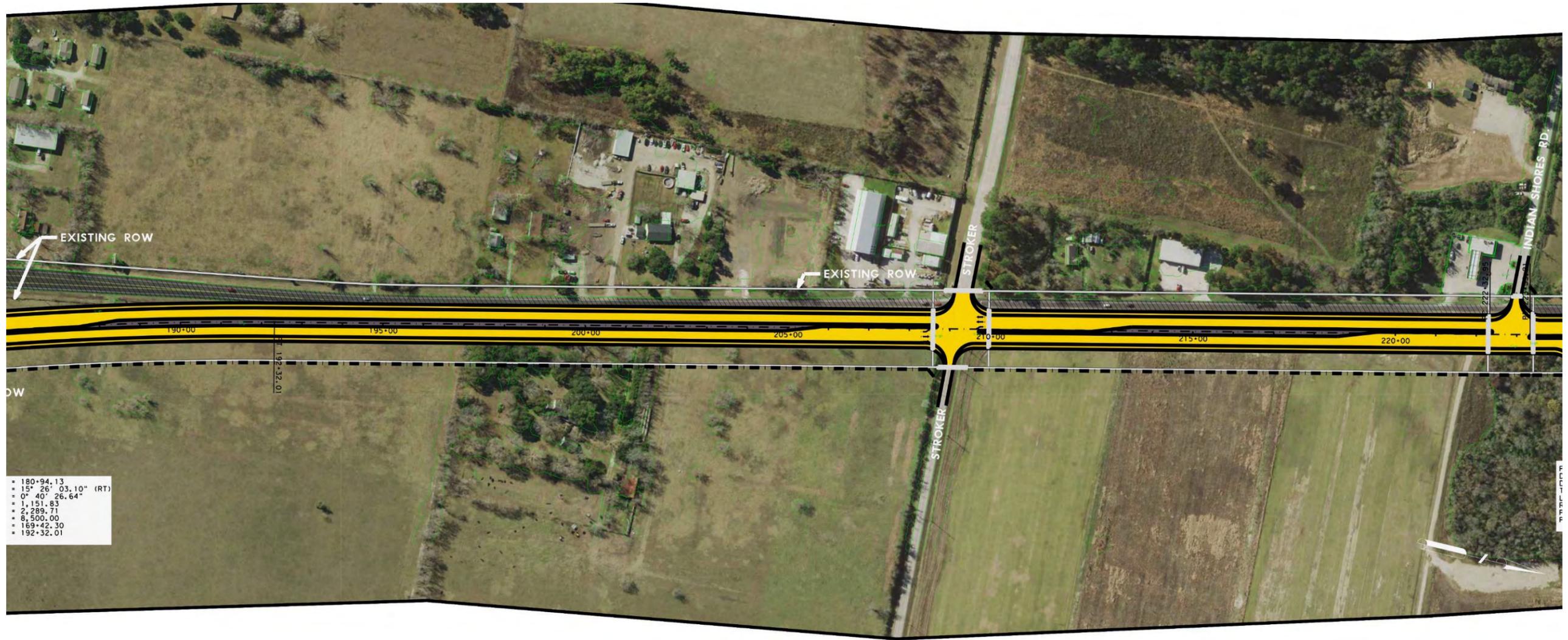


Figure 4f
 Final Draft EA Schematic Project Layout
FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022

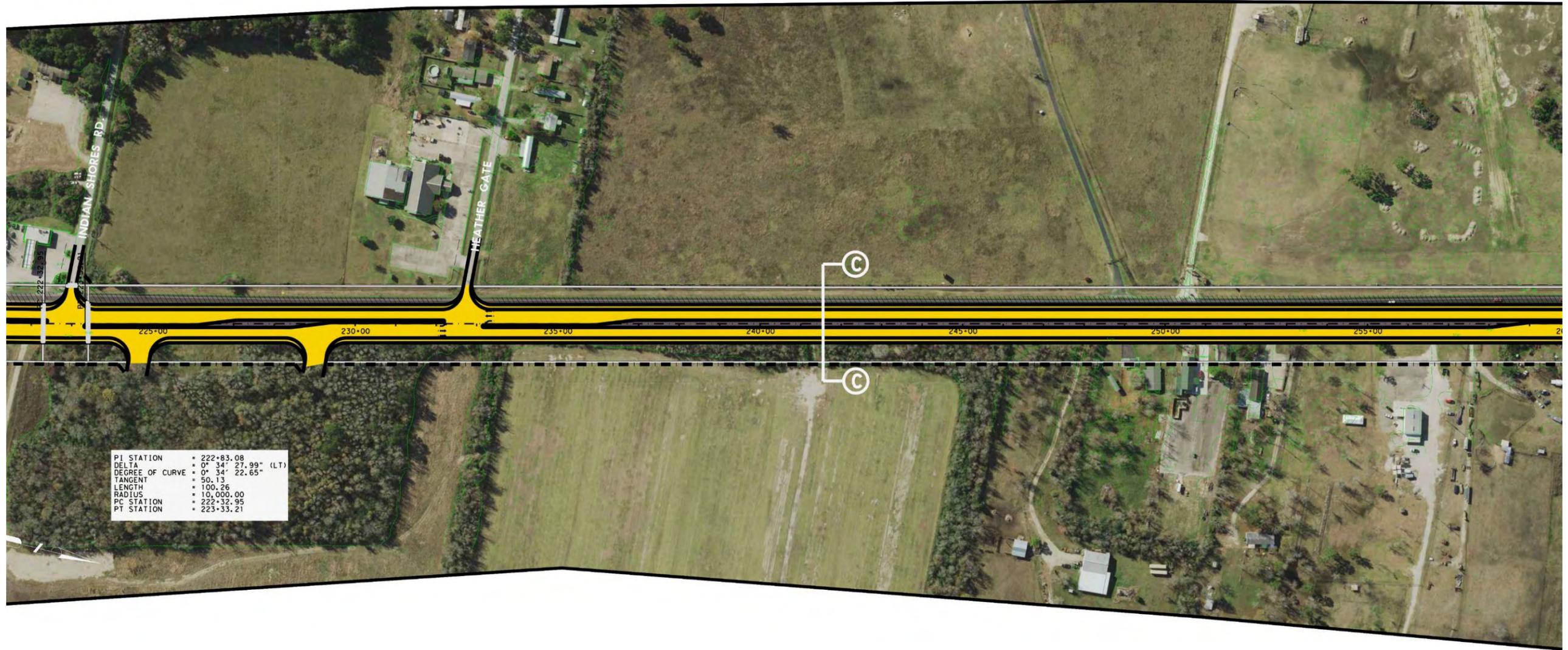
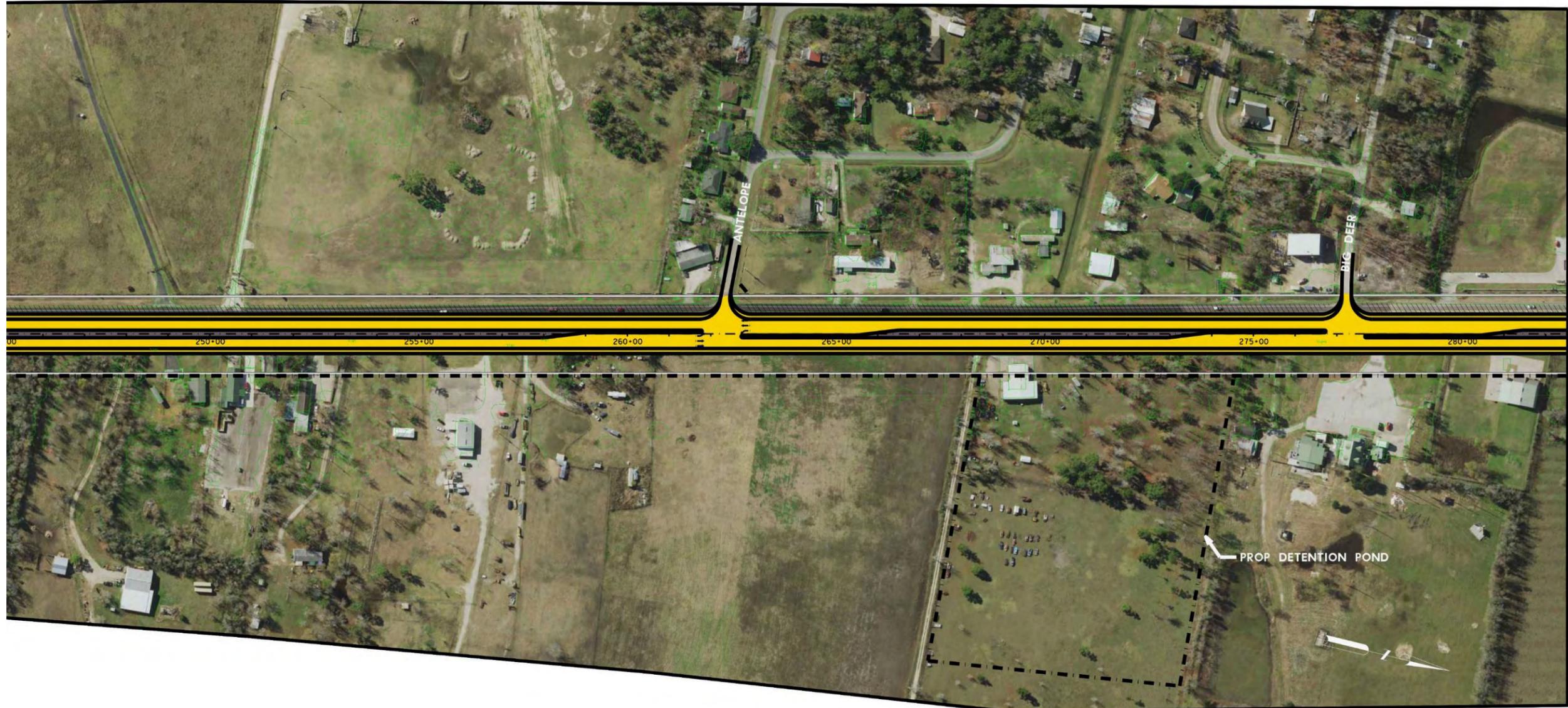


Figure 4g
 Final Draft EA Schematic Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



MATCHLINE 283+50
END SECTION 2

Figure 4h
Final Draft EA Schematic Project Layout
FM 2100 from FM 1960 to S Diamondhead Blvd
CSJ: 1062-04-022



Figure 4i
 Final Draft EA Schematic Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022

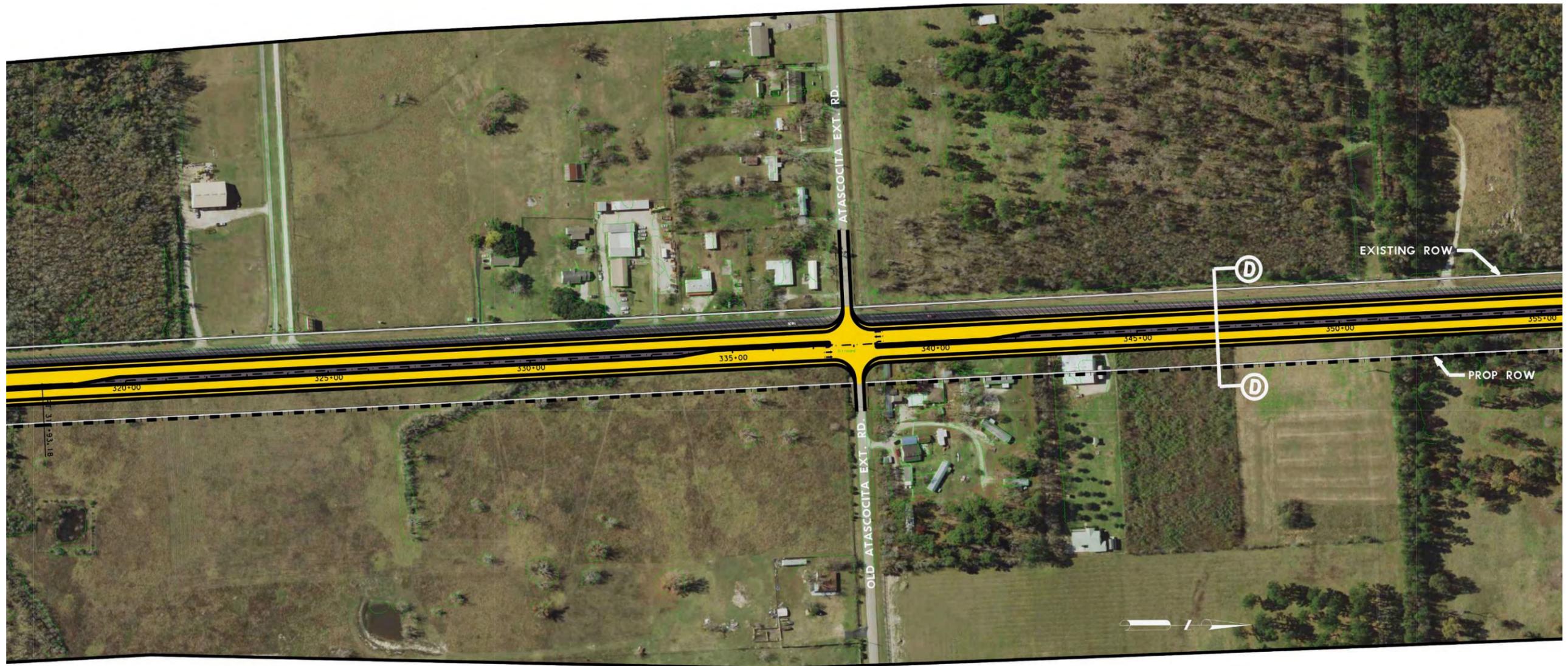


Figure 4j
Final Draft EA Schematic Project Layout
FM 2100 from FM 1960 to S Diamondhead Blvd
CSJ: 1062-04-022

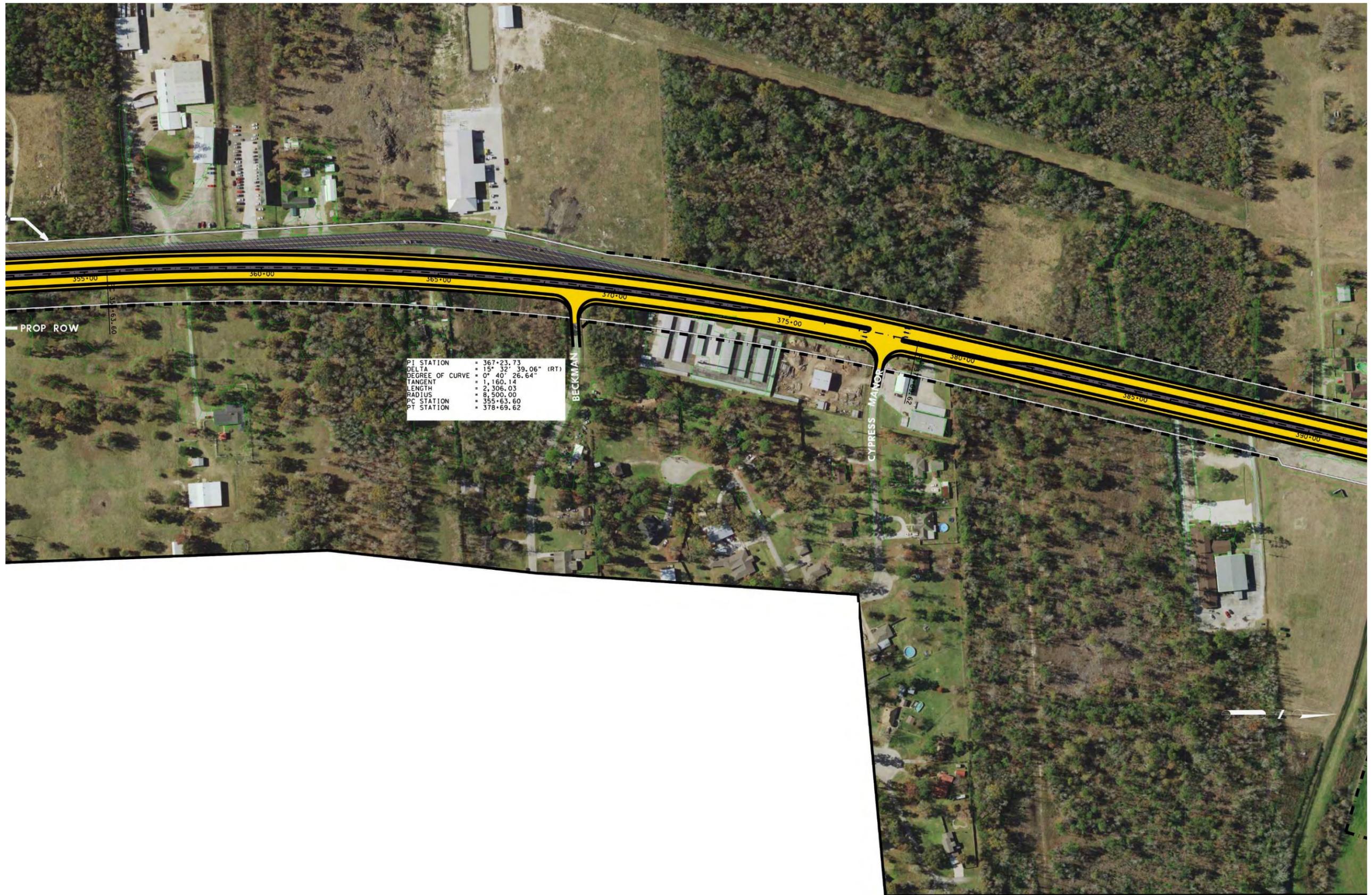


Figure 4k
 Final Draft EA Schematic Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022

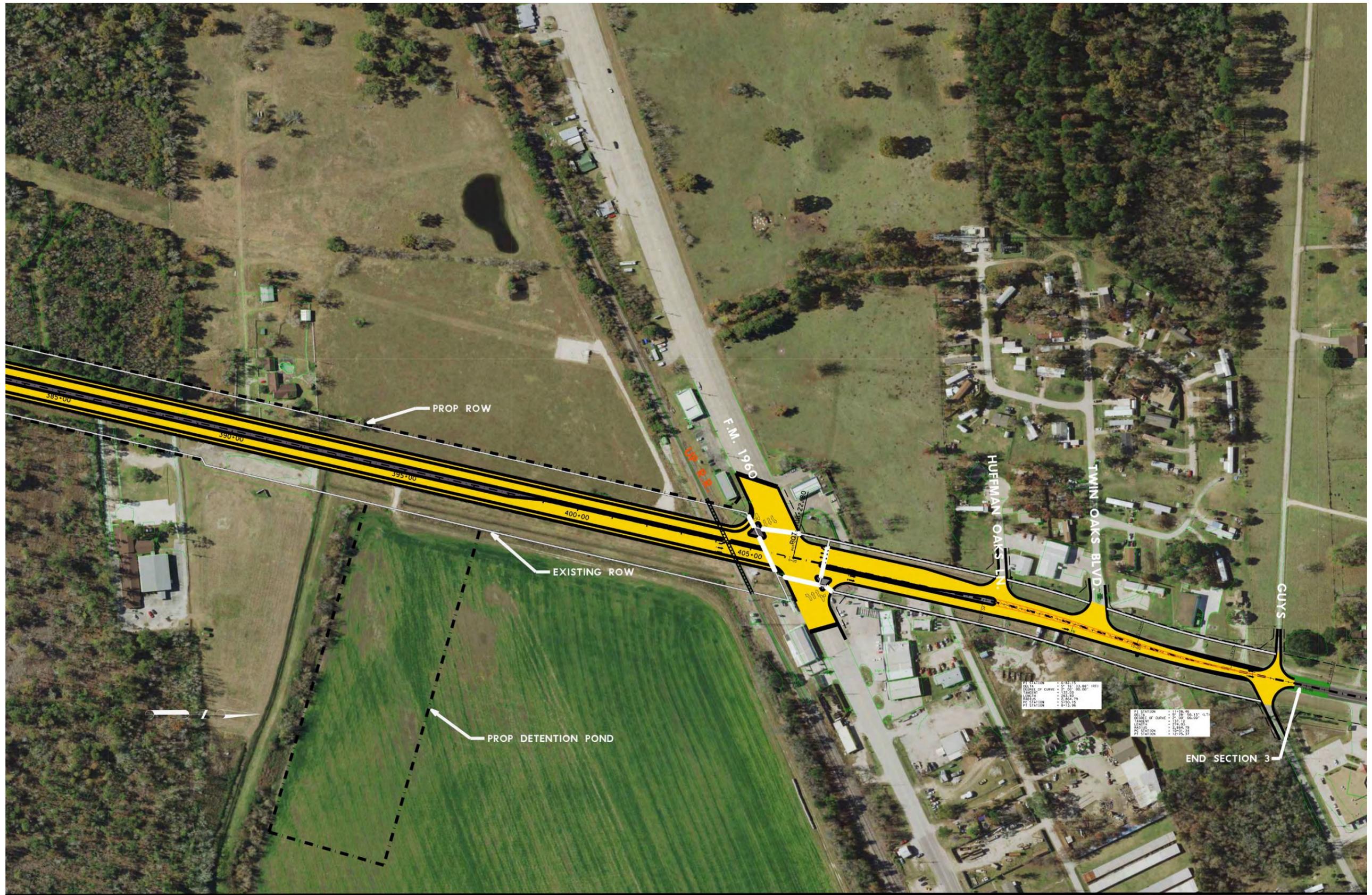
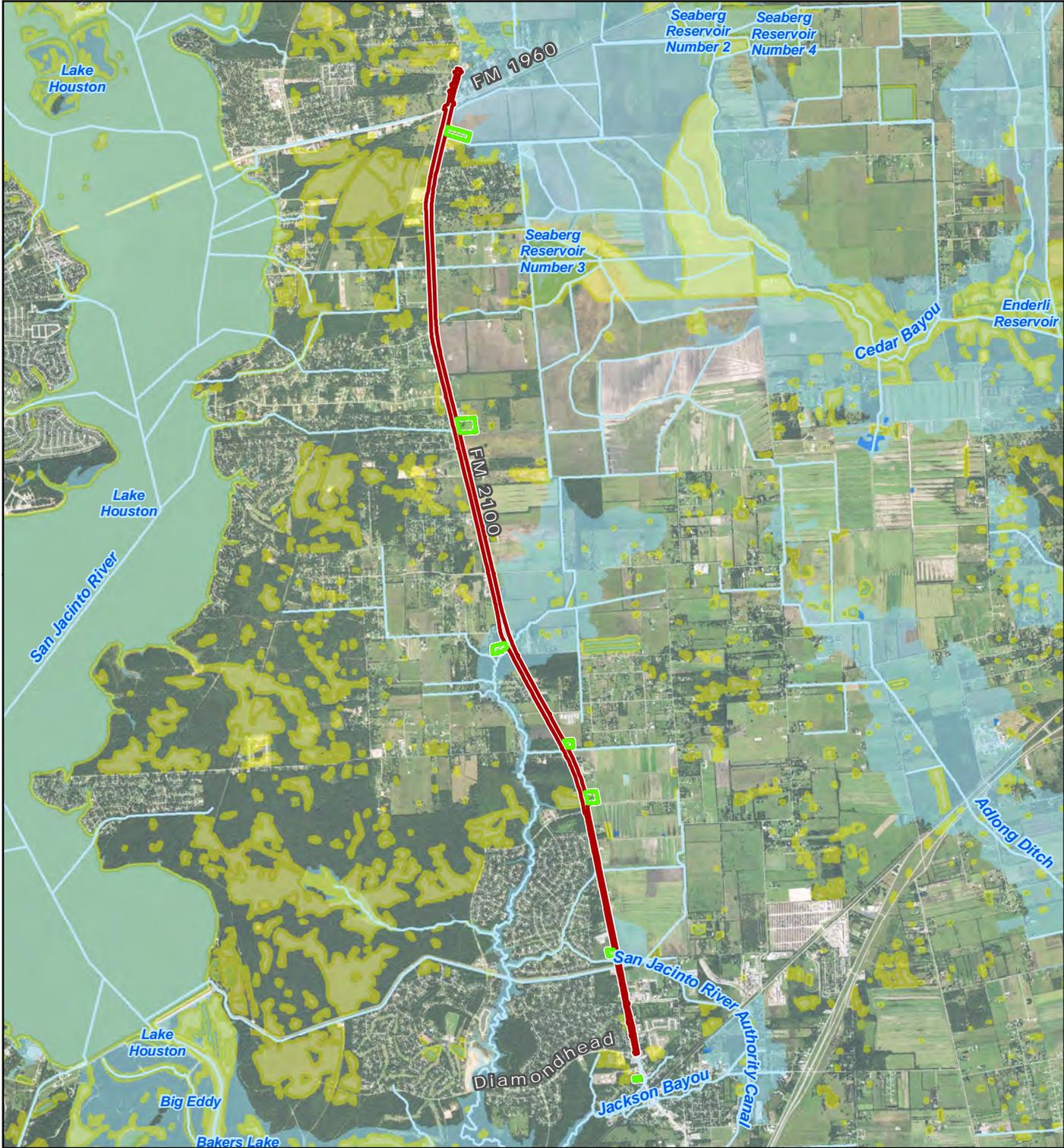


Figure 41
 Final Draft EA Schematic Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



- Project Location
- Proposed Detention Ponds
- NHD Stream
- NHD Water
- NWI Wetland
- 100-Year Flood Zone

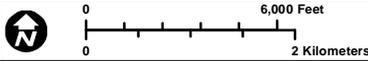
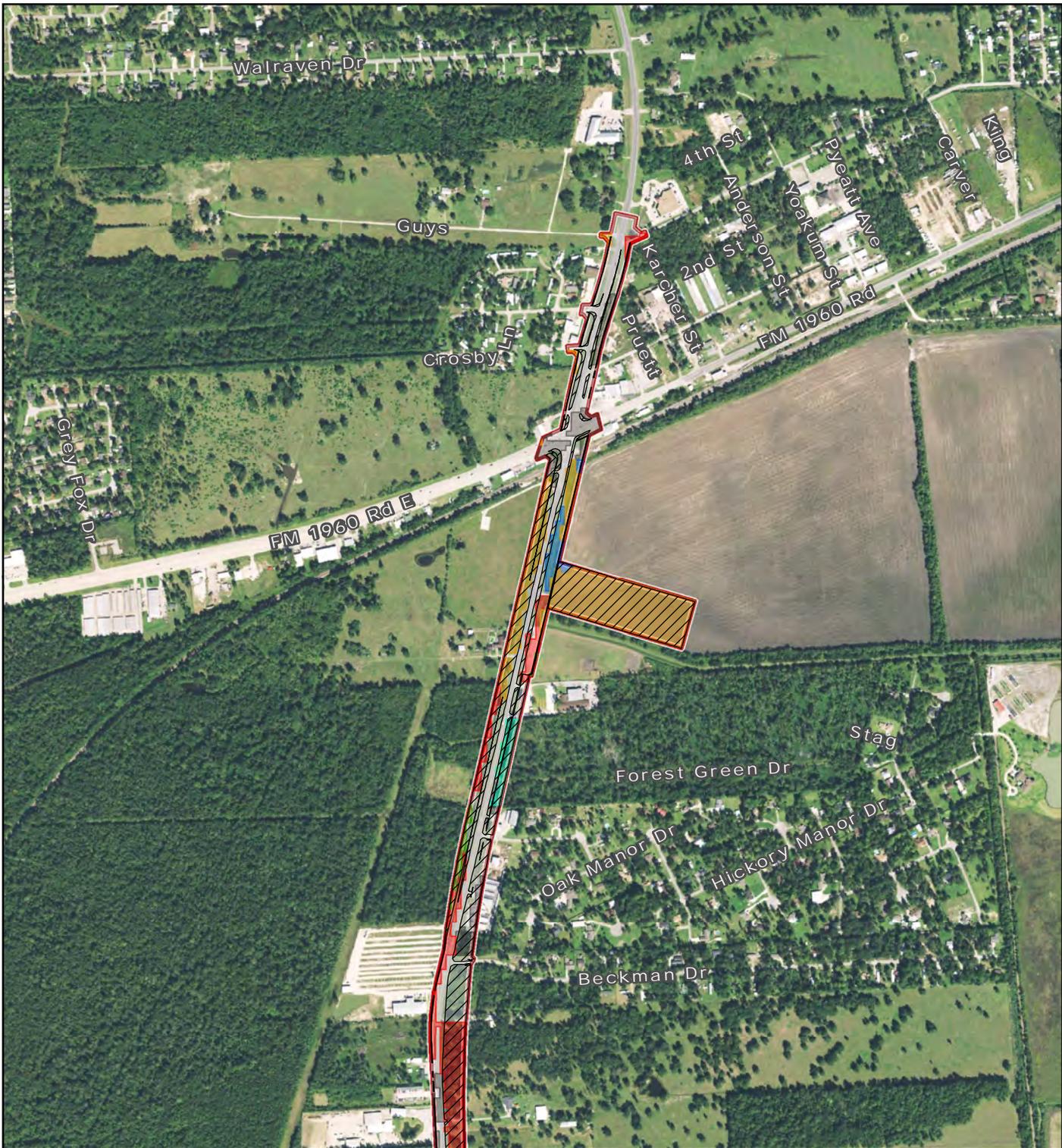


Figure 5
Water Resources

**FM 2100 from FM 1960 to
S Diamondhead Blvd**

Prepared for: TxDOT	1 in = 6,000 feet
CSJ: 0095-02-102	Scale: 1:72,000
2347-02-126	Date: 5/14/2015

Data Sources: NHD (2014), NWI (2014), FEMA NFHL (2014), CMEC (2015)
Aerial Source: NAIP (2014)
G:\Projects\TXDOT\FM2100\MXD\EA\Figure 5_Water Resources_20150515.mxd



- ▭ Project Location
- Proposed Impacts
- Chenier Plain: Mixed Live Oak - Deciduous Hardwood Fringe Forest
- Gulf Coast: Coastal Prairie
- Non-Native Invasive: Chinese Tallow Forest, Woodland, or Shrubland
- Pine Plantation > 3 meters tall
- Row Crops
- Urban High Intensity
- Urban Low Intensity

Data Sources:
 TxDOT/TPWD EMST/MoRAP (2013),
 ESRI (2013)
 Aerial Source: NAIP (2014)

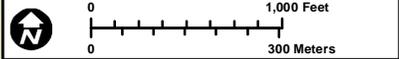
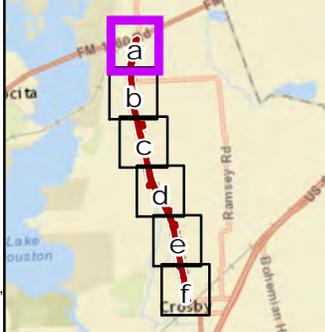
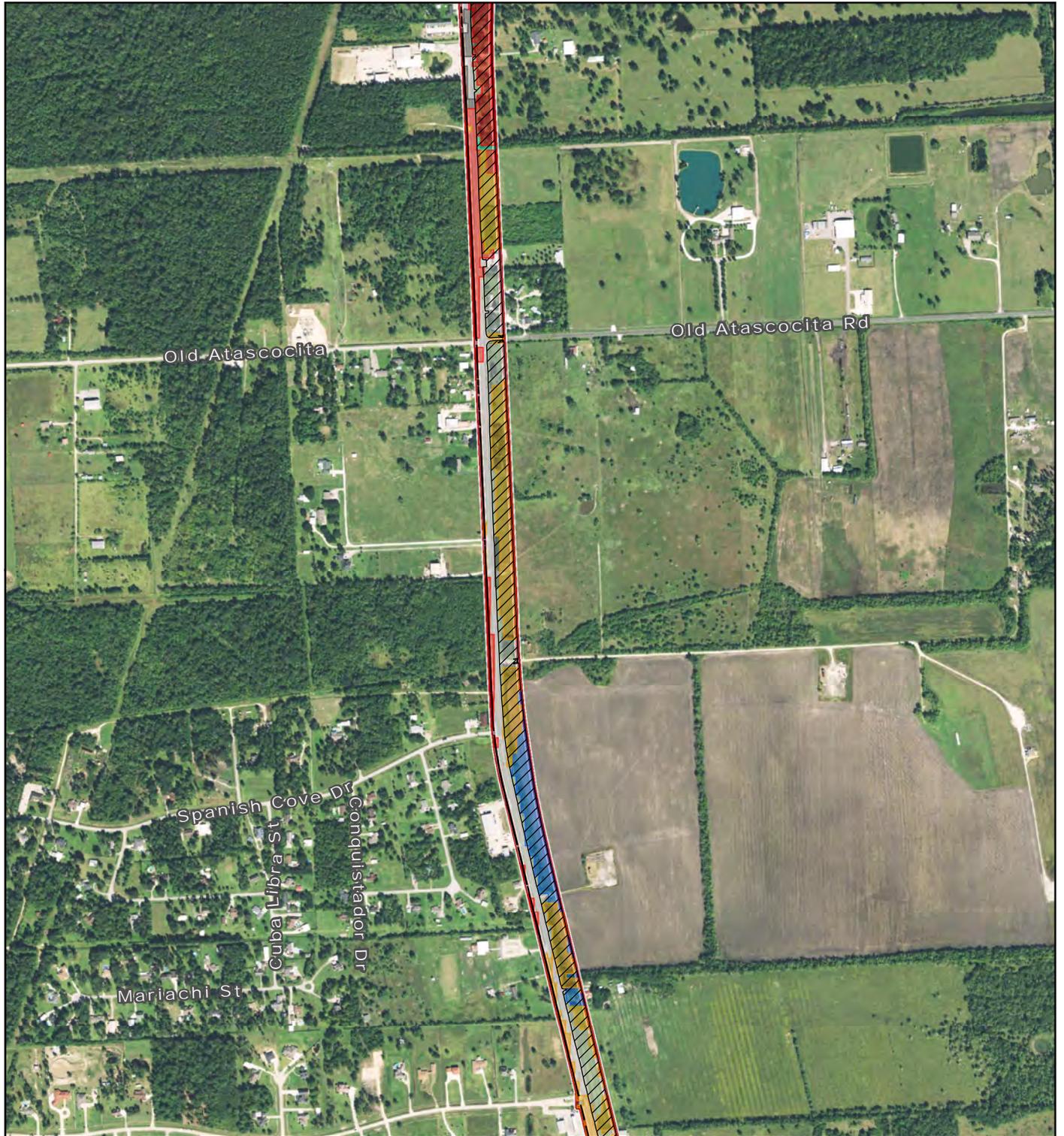


Figure 6a
 EMST Mapped
 Vegetation Types

**FM 2100 from FM 1960 to
 S Diamondhead Blvd**

Prepared for: TxDOT	1 in = 1,000 feet
	Scale: 1:12,000
CSJ: 1062-04-022	Date: 5/14/2015



-  Project Location
-  Proposed Impacts
-  Gulf Coast: Coastal Prairie
-  Non-Native Invasive: Chinese Tallow Forest, Woodland, or Shrubland
-  Pine Plantation > 3 meters tall
-  Row Crops
-  Urban High Intensity
-  Urban Low Intensity

Data Sources:
 TxDOT/TPWD EMST/MoRAP (2013),
 ESRI (2013)
 Aerial Source: NAIP (2014)

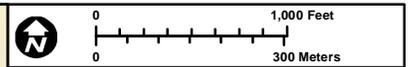
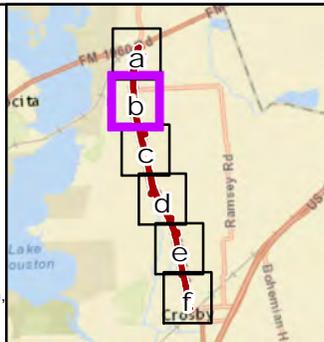


Figure 6b
 EMST Mapped
 Vegetation Types

**FM 2100 from FM 1960 to
 S Diamondhead Blvd**

Prepared for: TxDOT	1 in = 1,000 feet
	Scale: 1:12,000
CSJ: 1062-04-022	Date: 5/14/2015



- Project Location
- Proposed Impacts
- Gulf Coast: Coastal Prairie
- Gulf Coast: Coastal Prairie Pondshore
- Native Invasive: Juniper Shrubland
- Non-Native Invasive: Chinese Tallow Forest, Woodland, or Shrubland
- Row Crops
- Urban High Intensity
- Urban Low Intensity

Data Sources:
 TxDOT/TPWD EMST/MoRAP (2013),
 ESRI (2013)
 Aerial Source: NAIP (2014)

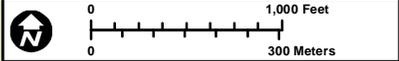
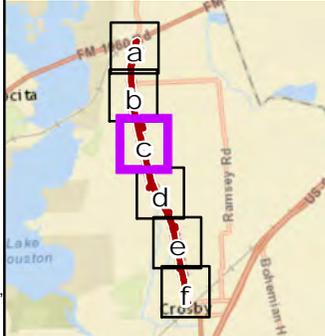
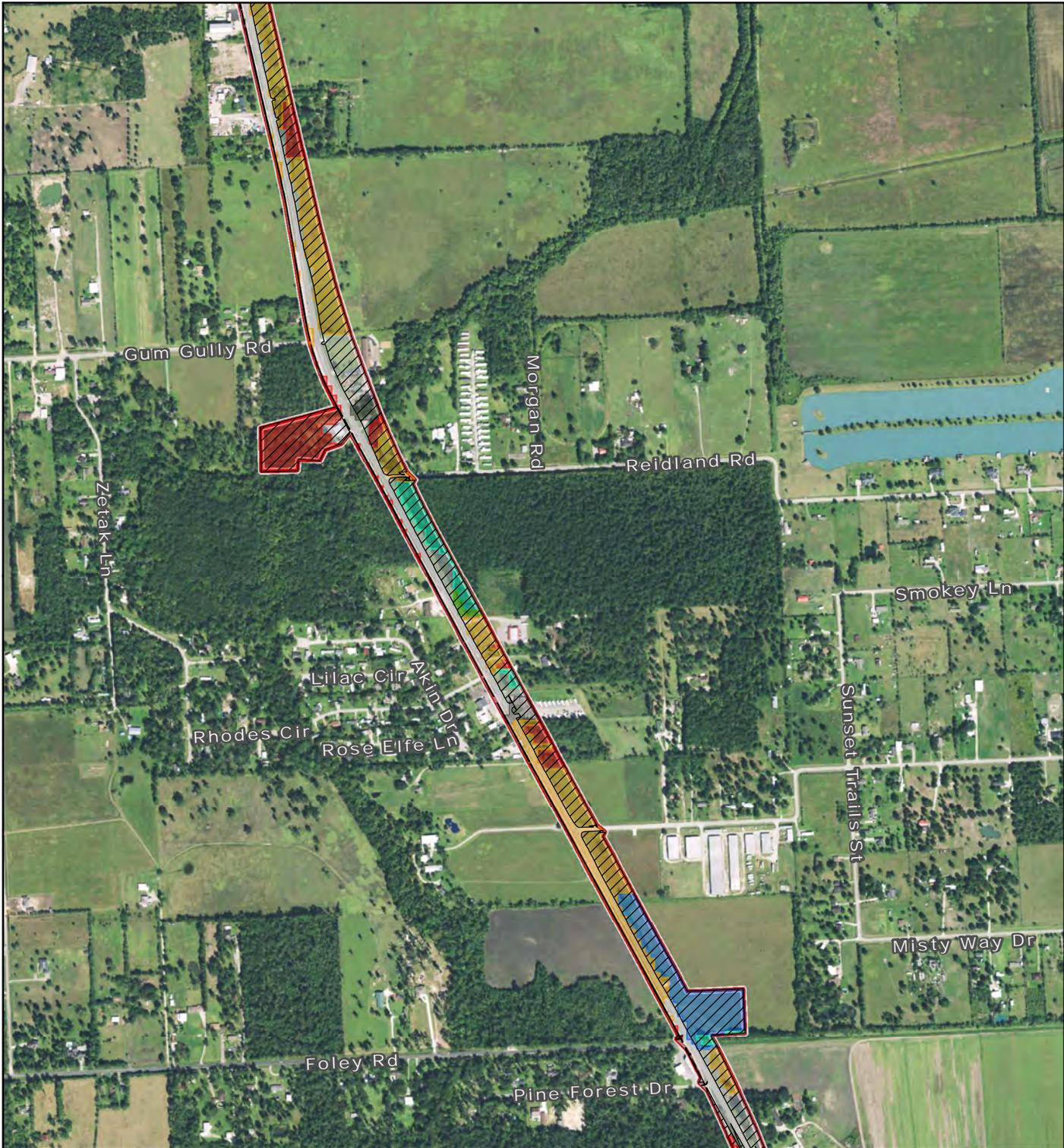


Figure 6c
 EMST Mapped
 Vegetation Types

**FM 2100 from FM 1960 to
 S Diamondhead Blvd**

Prepared for: TxDOT	1 in = 1,000 feet
	Scale: 1:12,000
CSJ: 1062-04-022	Date: 5/14/2015



-  Project Location
-  Proposed Impacts
-  Chenier Plain: Mixed Live Oak - Deciduous Hardwood Fringe Forest
-  Gulf Coast: Coastal Prairie
-  Non-Native Invasive: Chinese Tallow Forest, Woodland, or Shrubland
-  Pine Plantation > 3 meters tall
-  Row Crops
-  Urban High Intensity
-  Urban Low Intensity

Data Sources:
 TxDOT/TPWD EMST/MoRAP (2013),
 ESRI (2013)
 Aerial Source: NAIP (2014)

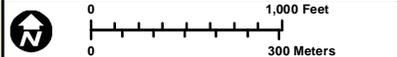
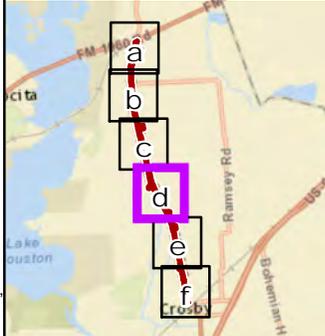
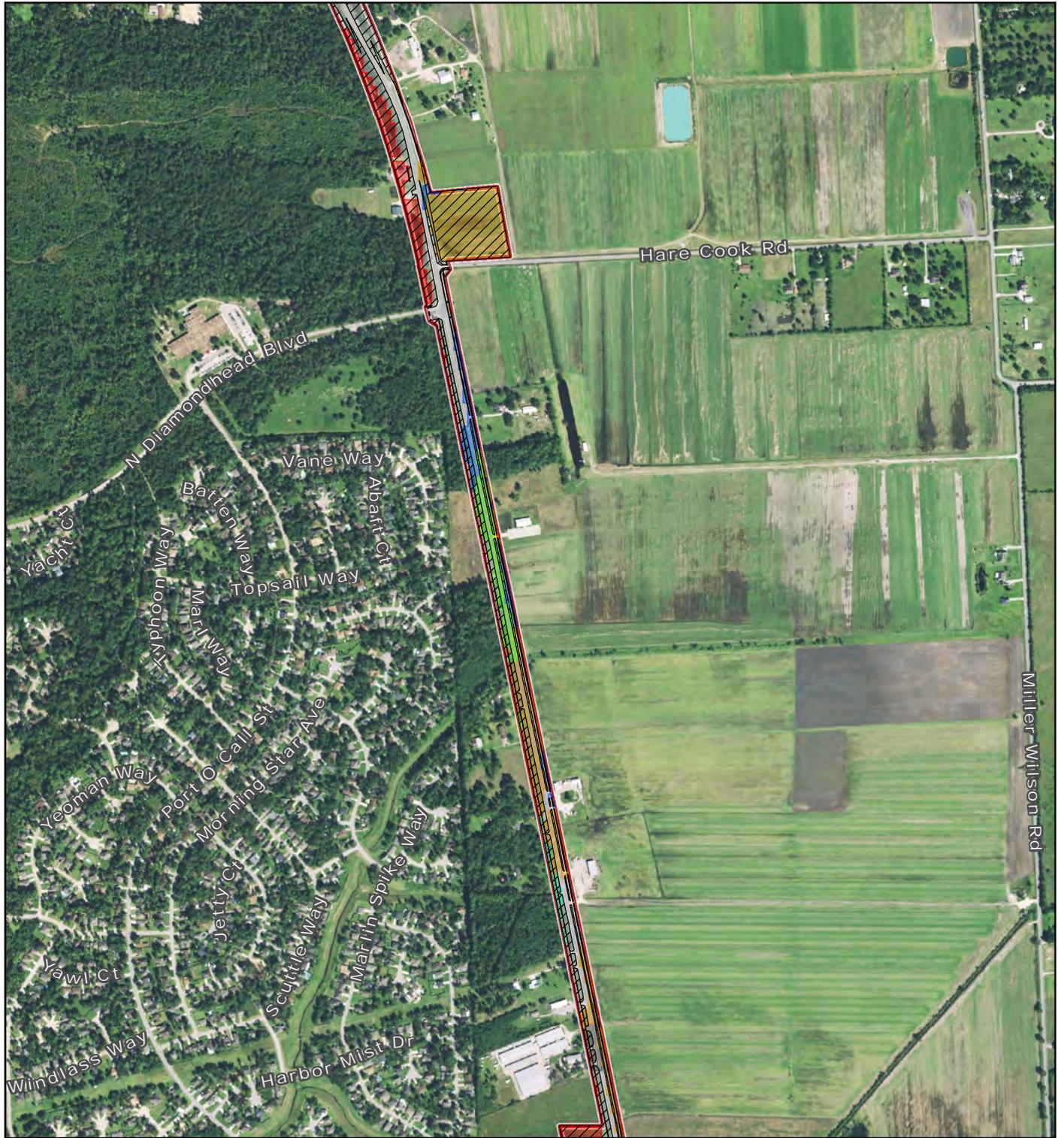


Figure 6d
 EMST Mapped
 Vegetation Types

**FM 2100 from FM 1960 to
 S Diamondhead Blvd**

Prepared for: TxDOT	1 in = 1,000 feet
	Scale: 1:12,000
CSJ: 1062-04-022	Date: 5/14/2015



- Project Location
 - ▨ Proposed Impacts
 - Chenier Plain: Live Oak Fringe Forest
 - Gulf Coast: Coastal Prairie
 - Non-Native Invasive: Chinese Tallow Forest, Woodland, or Shrubland
 - Pine Plantation > 3 meters tall
 - Row Crops
 - Urban High Intensity
 - Urban Low Intensity
- Data Sources:
 TxDOT/TPWD EMST/MoRAP (2013),
 ESRI (2013)
 Aerial Source: NAIP (2014)

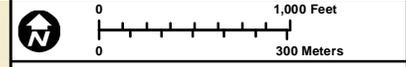
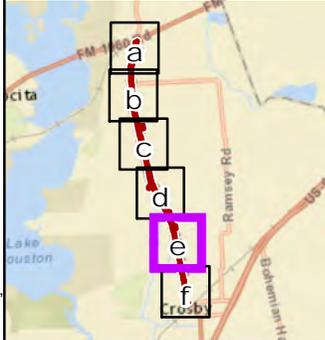
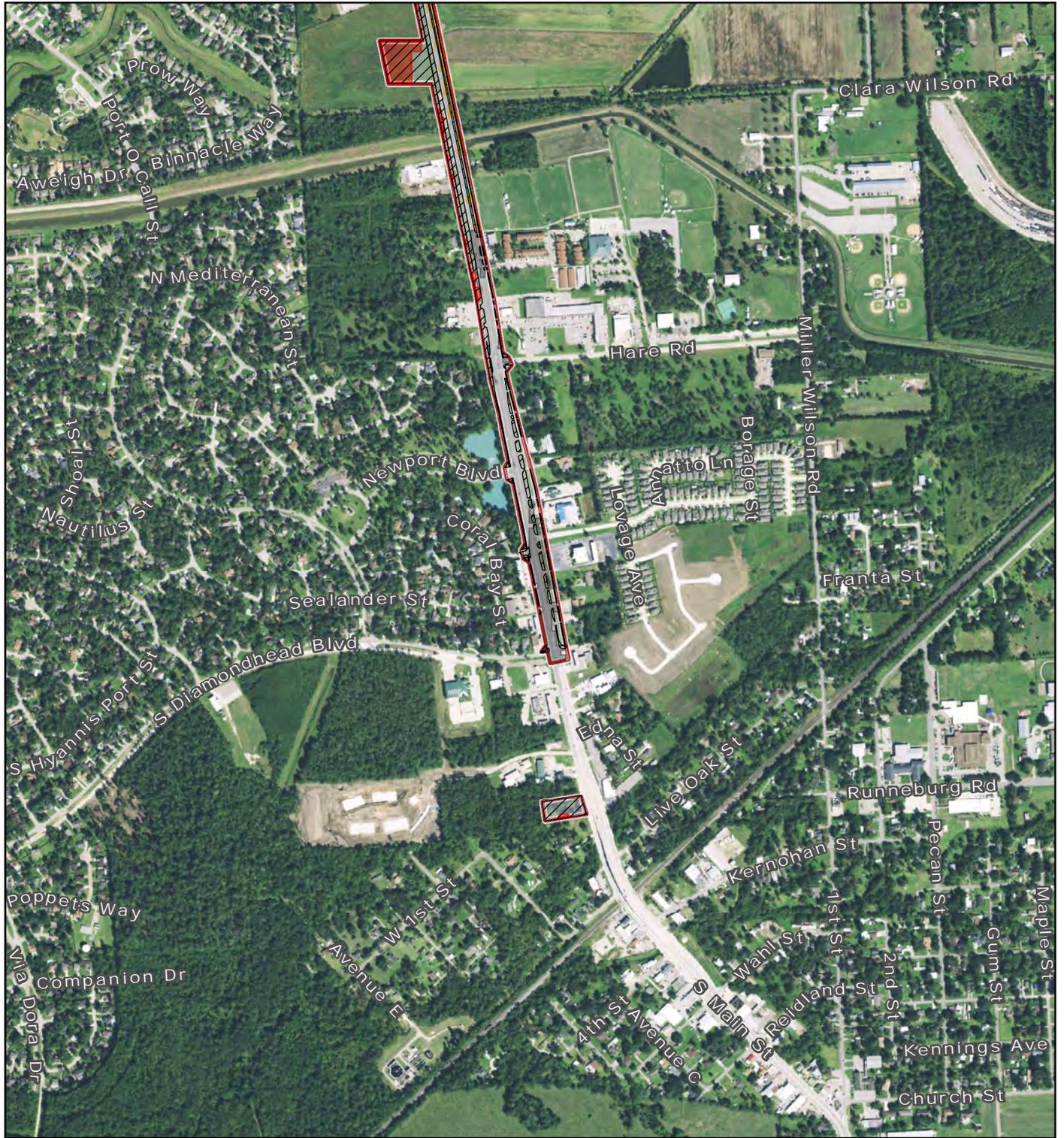


Figure 6e
 EMST Mapped
 Vegetation Types

**FM 2100 from FM 1960 to
 S Diamondhead Blvd**

Prepared for: TxDOT	1 in = 1,000 feet
	Scale: 1:12,000
CSJ: 1062-04-022	Date: 5/14/2015



-  Project Location
 -  Proposed Impacts
 -  Gulf Coast: Coastal Prairie
 -  Non-Native Invasive: Chinese Tallow Forest, Woodland, or Shrubland
 -  Pine Plantation > 3 meters tall
 -  Row Crops
 -  Urban High Intensity
 -  Urban Low Intensity
- Data Sources:
 TxDOT/TPWD EMST/MoRAP (2013),
 ESRI (2013)
 Aerial Source: NAIP (2014)

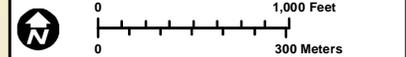
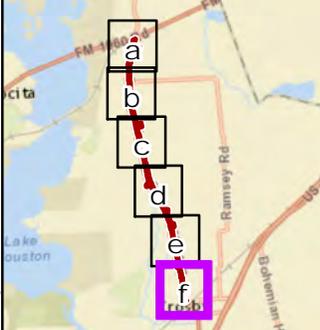
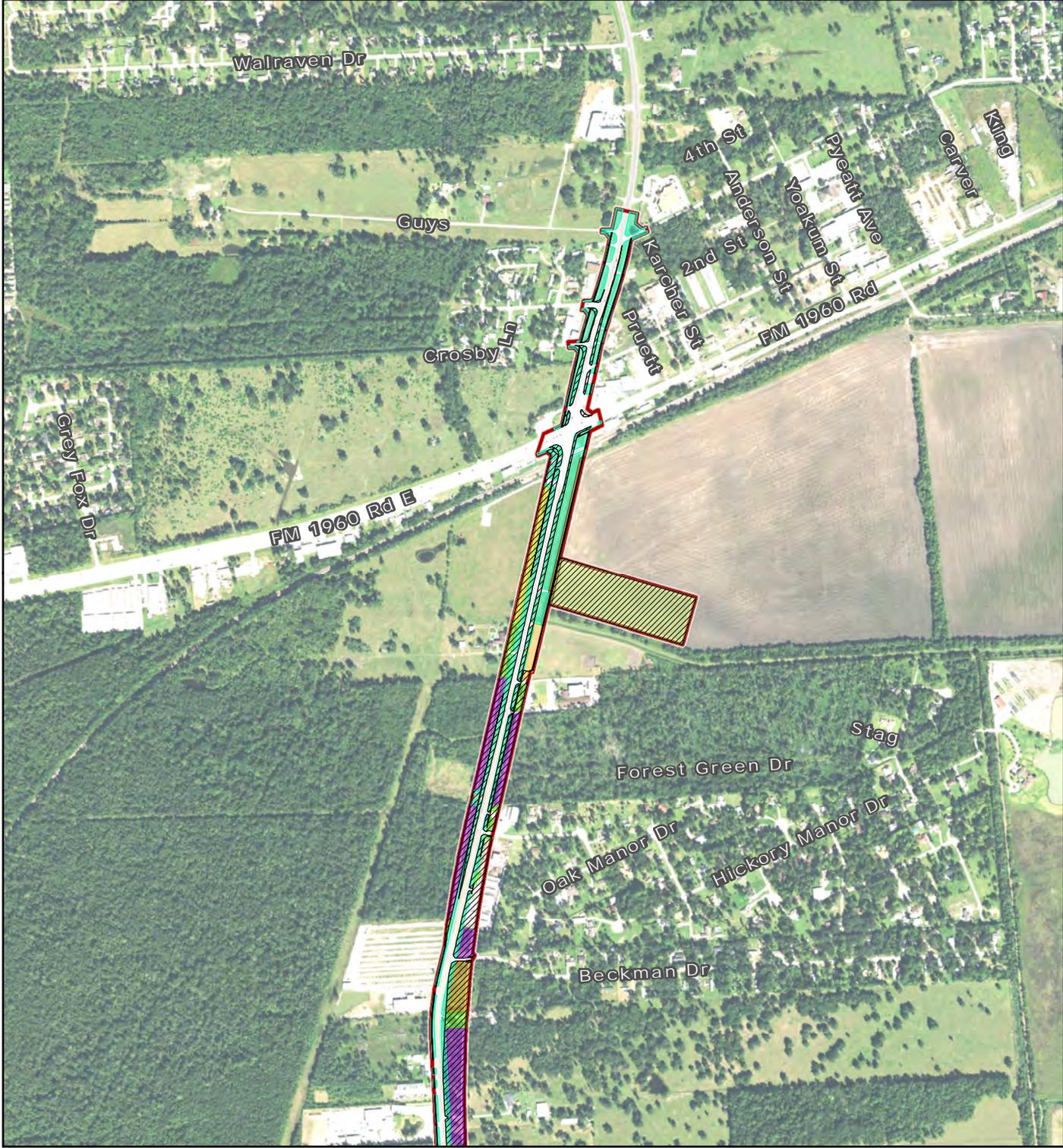


Figure 6f
 EMST Mapped
 Vegetation Types

FM 2100 from FM 1960 to S Diamondhead Blvd	
Prepared for: TxDOT	1 in = 1,000 feet
CSJ: 1062-04-022	Scale: 1:12,000
	Date: 5/14/2015



- ▭ Project Location
- Proposed Impacts
- Agriculture
- Coastal Grassland
- Coastal Mixed Woodland and Forest
- Disturbed Prairie
- Fenceline Vegetation
- Maintained Grasses
- Maintained ROW

Data Sources: CMEC (2014)
 Aerial Source: NAIP (2014)

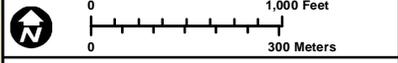
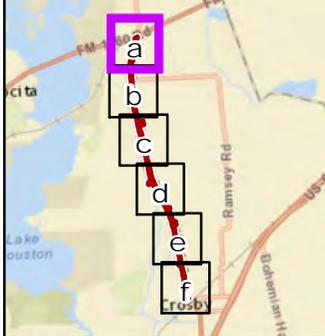
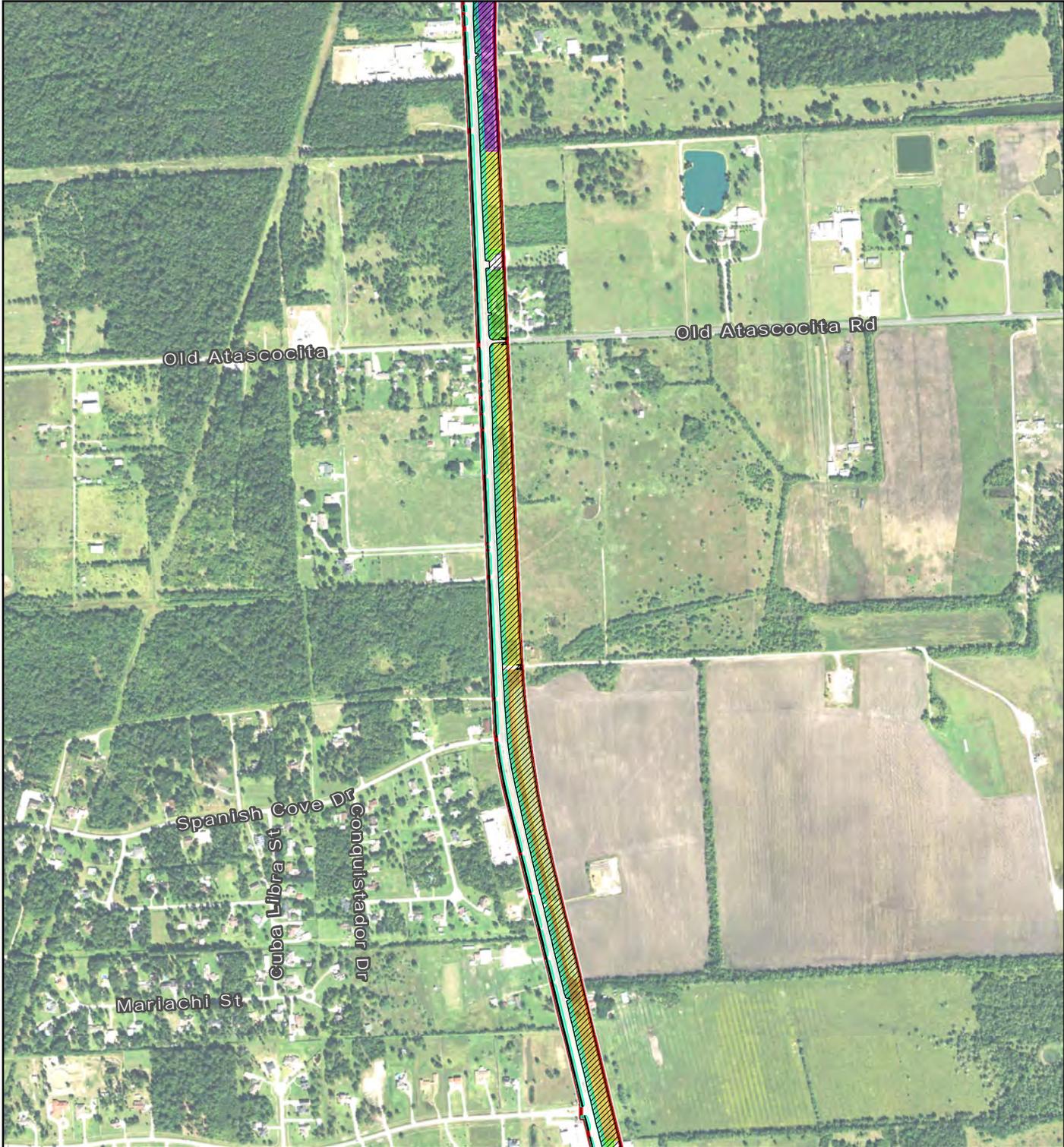


Figure 7a
 Observed Vegetation Types
 FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 1,000 feet
CSJ: 1062-04-022	Scale: 1:12,000
	Date: 5/14/2015



-  Project Location
-  Proposed Impacts
-  Agriculture
-  Coastal Grassland
-  Coastal Mixed Woodland and Forest
-  Disturbed Prairie
-  Maintained Grasses
-  Maintained ROW

Data Sources: CMEC (2014)
 Aerial Source: NAIP (2014)

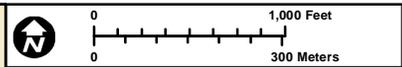
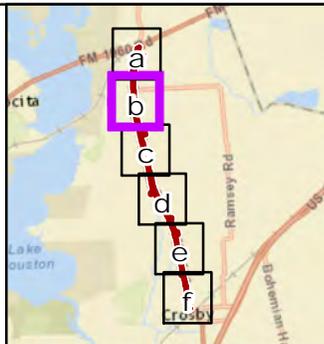
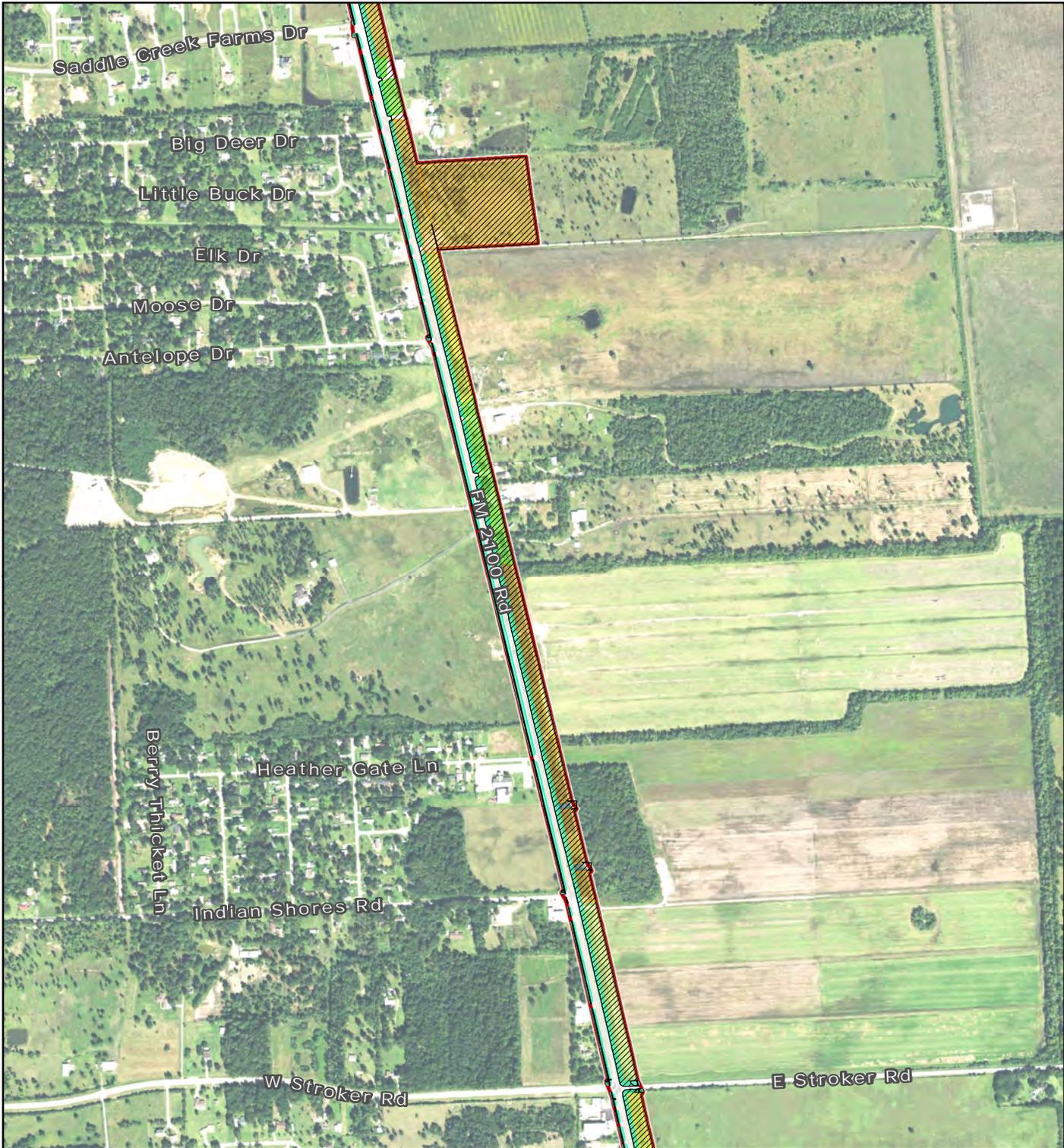


Figure 7b
 Observed Vegetation
 Types

**FM 2100 from FM 1960 to
 S Diamondhead Blvd**

Prepared for: TxDOT	1 in = 1,000 feet
CSJ: 1062-04-022	Scale: 1:12,000
	Date: 5/14/2015



-  Project Location
-  Proposed Impacts
-  Agriculture
-  Coastal Grassland
-  Disturbed Prairie
-  Maintained Grasses
-  Maintained ROW

Data Sources: CMEC (2014)
 Aerial Source: NAIP (2014)

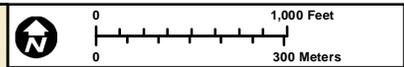
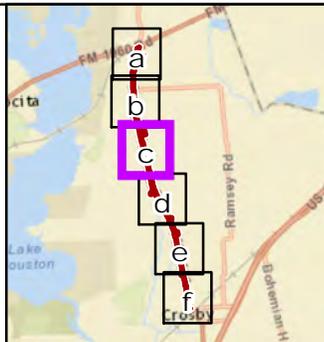
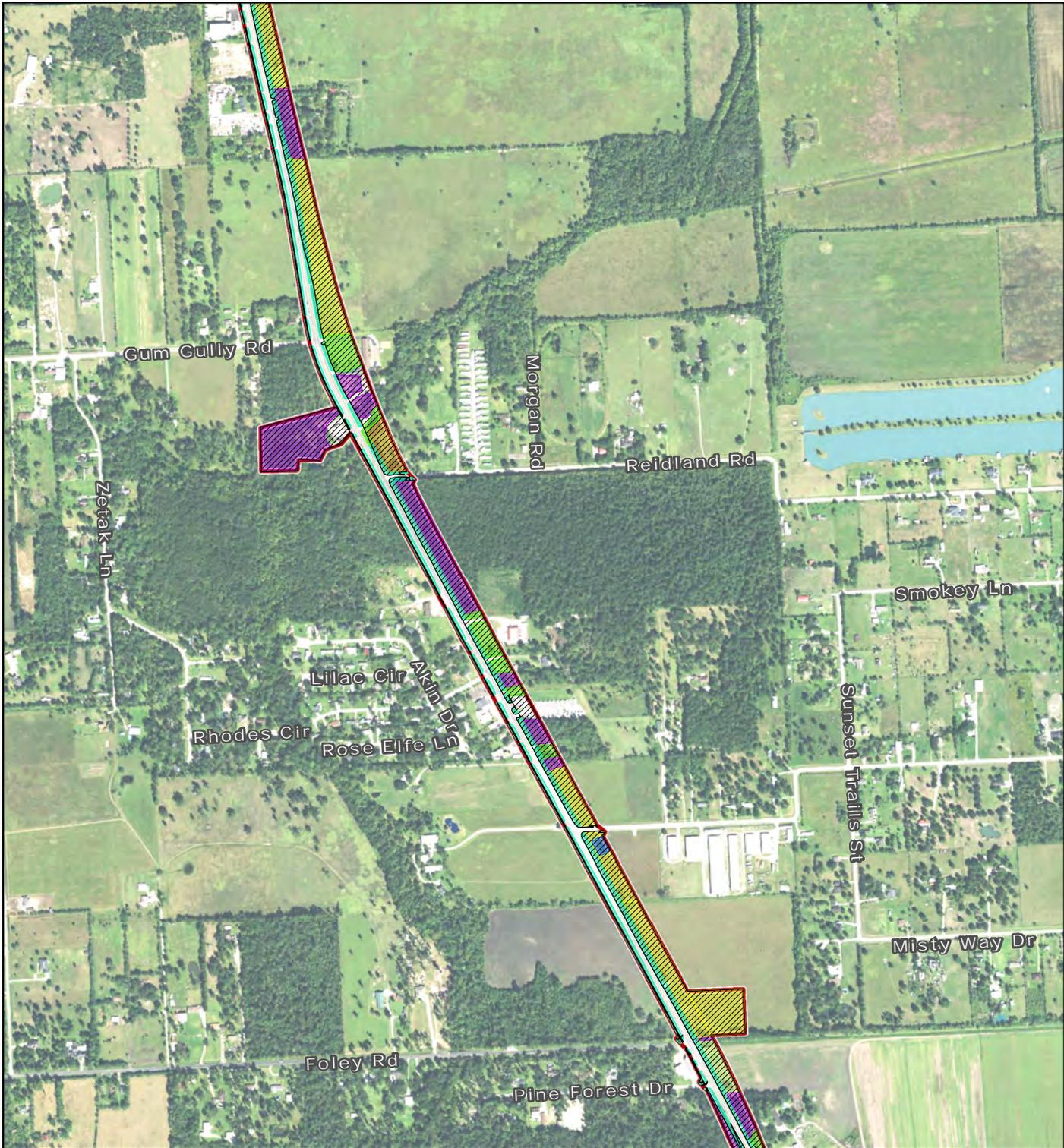


Figure 7c
 Observed Vegetation
 Types

**FM 2100 from FM 1960 to
 S Diamondhead Blvd**

Prepared for: TxDOT	1 in = 1,000 feet
CSJ: 1062-04-022	Scale: 1:12,000
	Date: 5/14/2015



- Project Location
- Proposed Impacts
- Agriculture
- Coastal Grassland
- Coastal Mixed Woodland and Forest
- Disturbed Prairie
- Maintained Grasses
- Maintained ROW
- Open Water

Data Sources: CMEC (2014)
 Aerial Source: NAIP (2014)

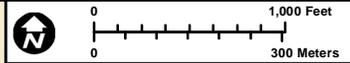
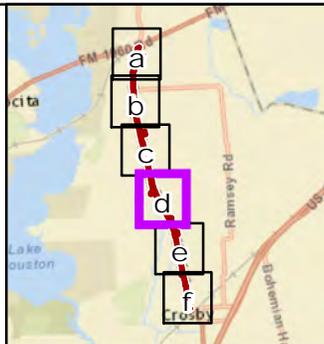
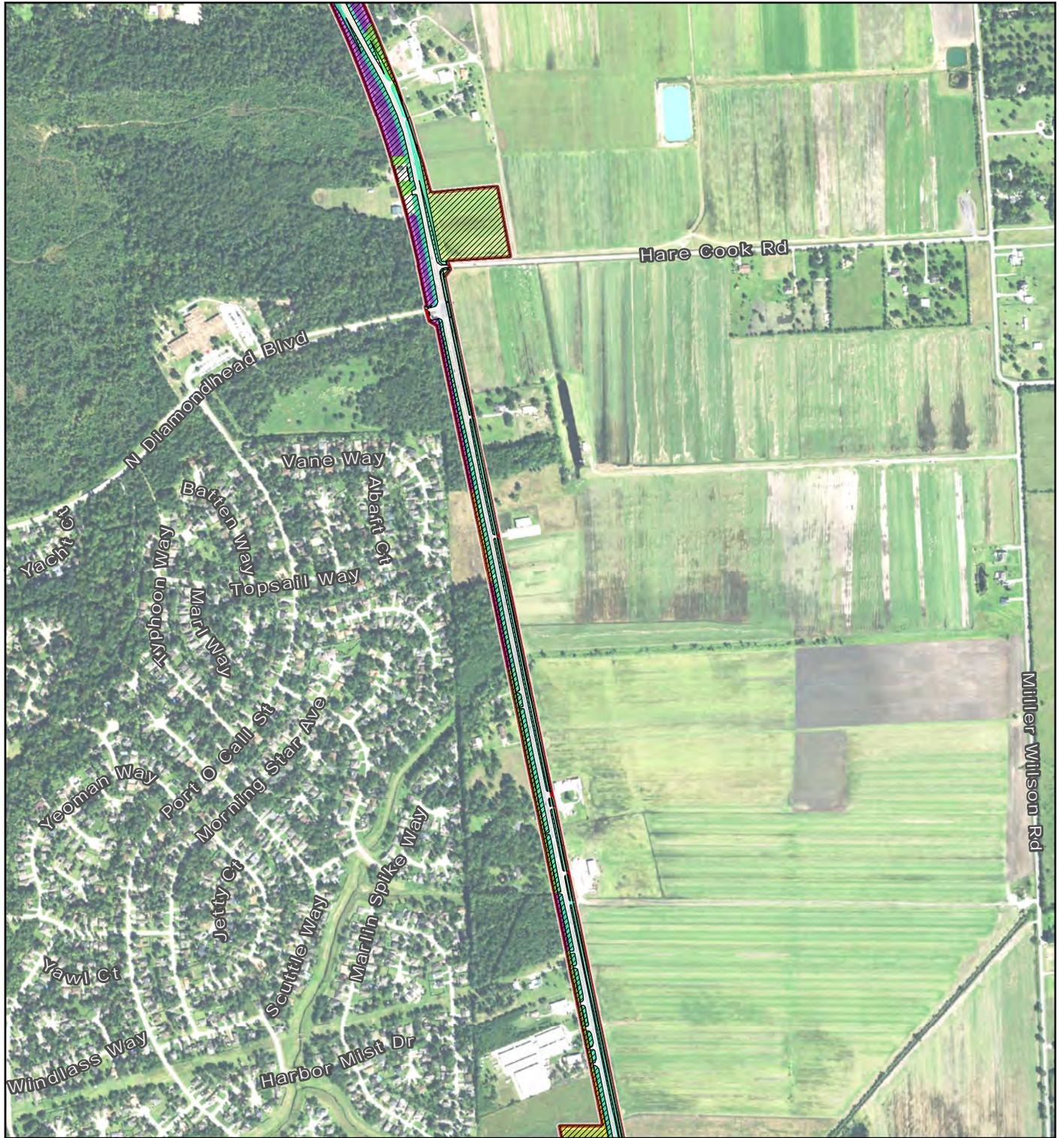


Figure 7d
 Observed Vegetation
 Types

**FM 2100 from FM 1960 to
 S Diamondhead Blvd**

Prepared for: TxDOT	1 in = 1,000 feet
CSJ: 1062-04-022	Scale: 1:12,000
	Date: 5/14/2015



-  Project Location
-  Proposed Impacts
-  Agriculture
-  Coastal Grassland
-  Coastal Mixed Woodland and Forest
-  Maintained Grasses
-  Maintained ROW

Data Sources: CMEC (2014)
 Aerial Source: NAIP (2014)

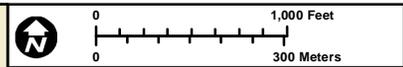
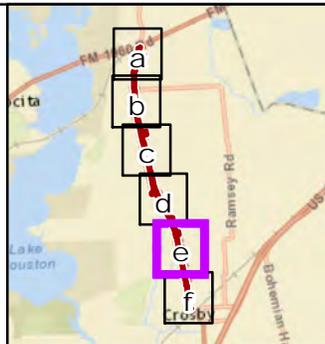
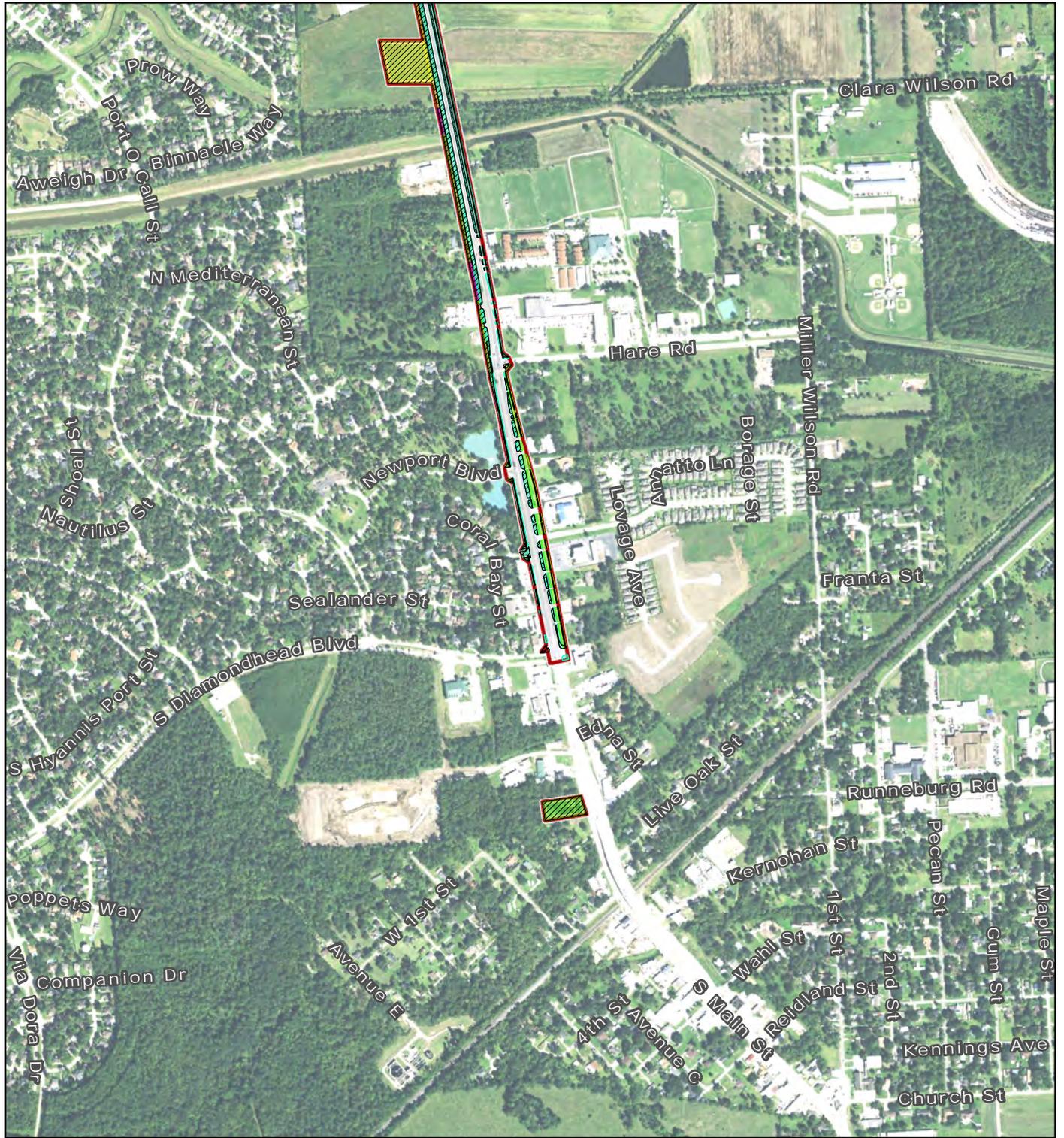


Figure 7e
 Observed Vegetation Types

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 1,000 feet
	Scale: 1:12,000
CSJ: 1062-04-022	Date: 5/14/2015



- Project Location
- Proposed Impacts
- Coastal Grassland
- Coastal Mixed Woodland and Forest
- Maintained Grasses
- Maintained ROW

Data Sources: CMEC (2014)
 Aerial Source: NAIP (2014)

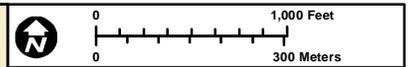
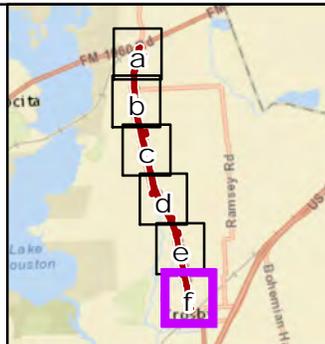
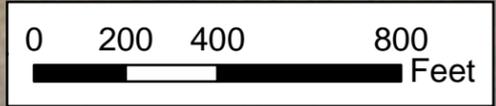


Figure 7f
 Observed Vegetation Types

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 1,000 feet
CSJ: 1062-04-022	Scale: 1:12,000
	Date: 5/14/2015



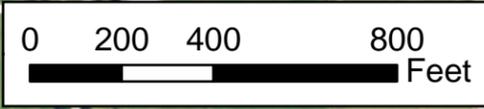
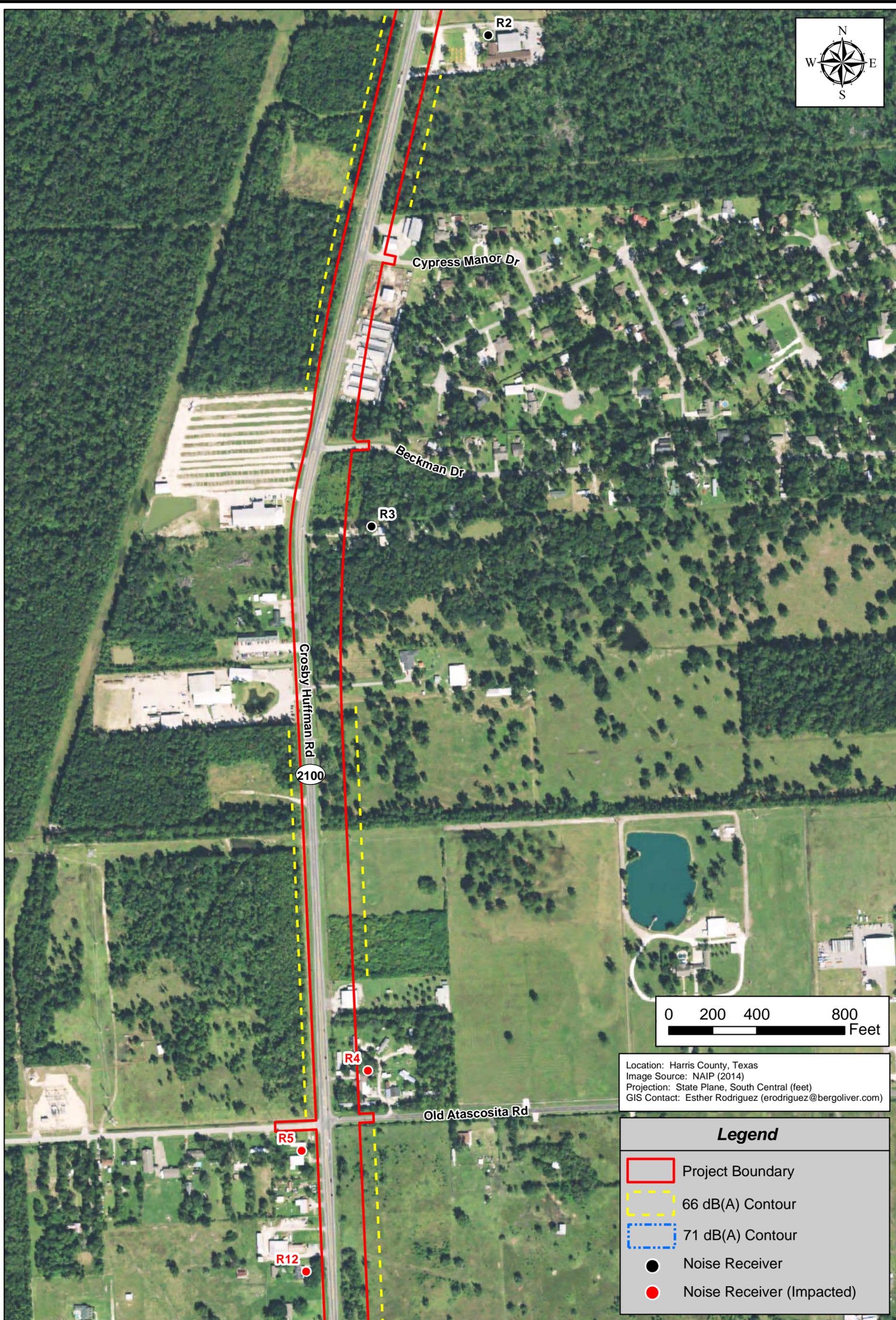
Location: Harris County, Texas
 Image Source: NAIP (2014)
 Projection: State Plane, South Central (feet)
 GIS Contact: Esther Rodriguez (erodriguez@bergoliver.com)

Legend	
	Project Boundary
	66 dB(A) Contour
	71 dB(A) Contour
	Noise Receiver
	Noise Receiver (Impacted)

**TRAFFIC NOISE MAP
SHEET 1 OF 8**

Project #: 9682 - CSJ: 1062-04-022
For: TxDOT
Location: FM 2100 from FM 1960 to Diamondhead Blvd
 Harris County, Texas

REVISIONS
Jan. 22, 2015 by MER
Jan. 26, 2015 by MER
April 21, 2015 by MER
Sept. 22, 2015 by MER
Nov. 12, 2015 by MER



Location: Harris County, Texas
 Image Source: NAIP (2014)
 Projection: State Plane, South Central (feet)
 GIS Contact: Esther Rodriguez (erodriguez@bergoliver.com)

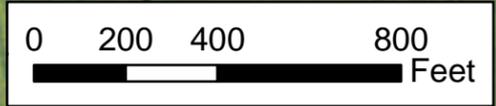
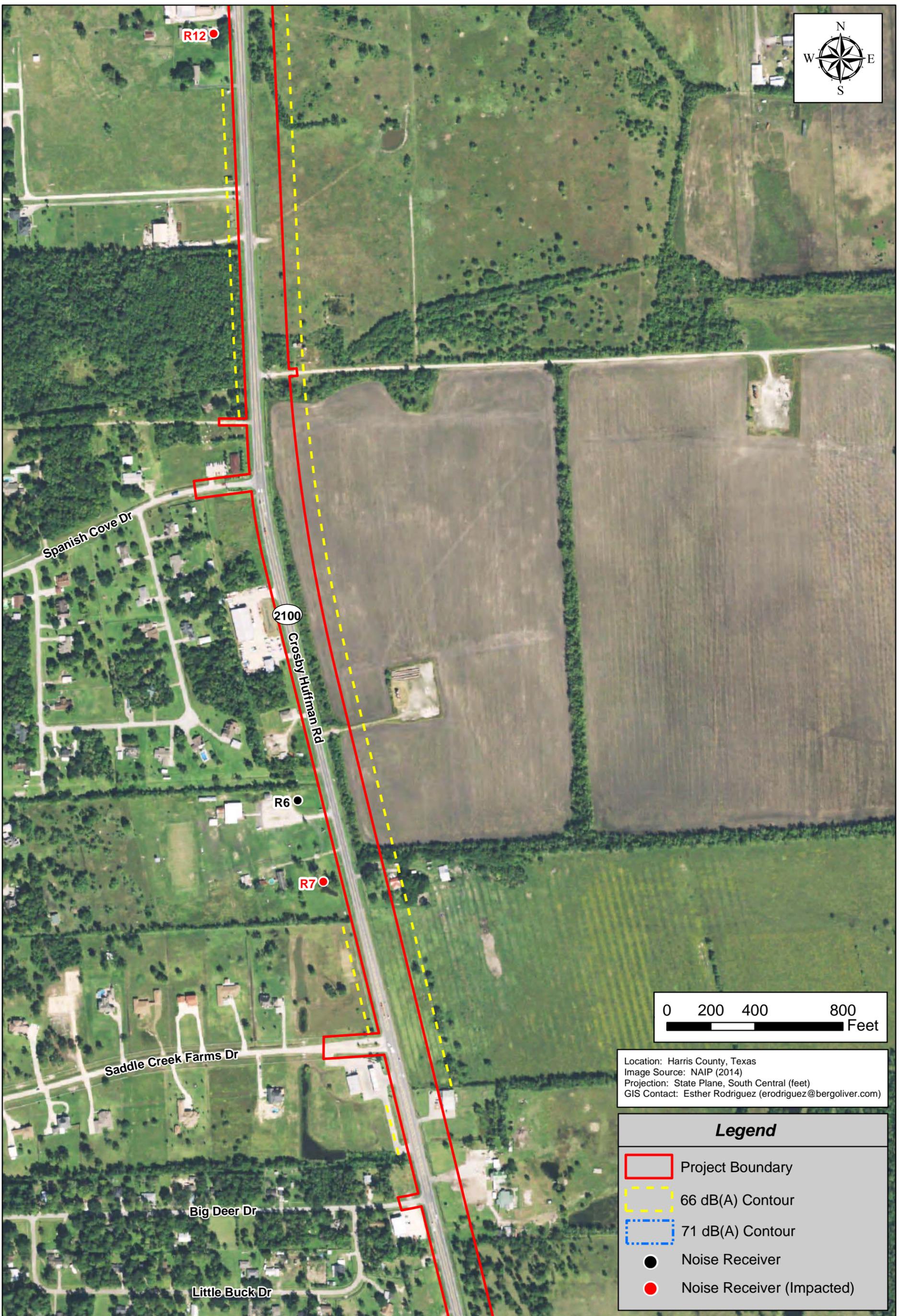
Legend

- Project Boundary
- 66 dB(A) Contour
- 71 dB(A) Contour
- Noise Receiver
- Noise Receiver (Impacted)

**TRAFFIC NOISE MAP
SHEET 2 OF 8**

Project #: 9682 - CSJ: 1062-04-022
For: TxDOT
Location: FM 2100 from FM 1960 to Diamondhead Blvd
 Harris County, Texas

REVISIONS
Jan. 22, 2015 by MER
Jan. 26, 2015 by MER
April 21, 2015 by MER
Sept. 22, 2015 by MER
Nov. 12, 2015 by MER



Location: Harris County, Texas
 Image Source: NAIP (2014)
 Projection: State Plane, South Central (feet)
 GIS Contact: Esther Rodriguez (erodriguez@bergoliver.com)

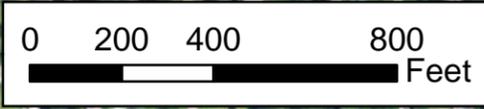
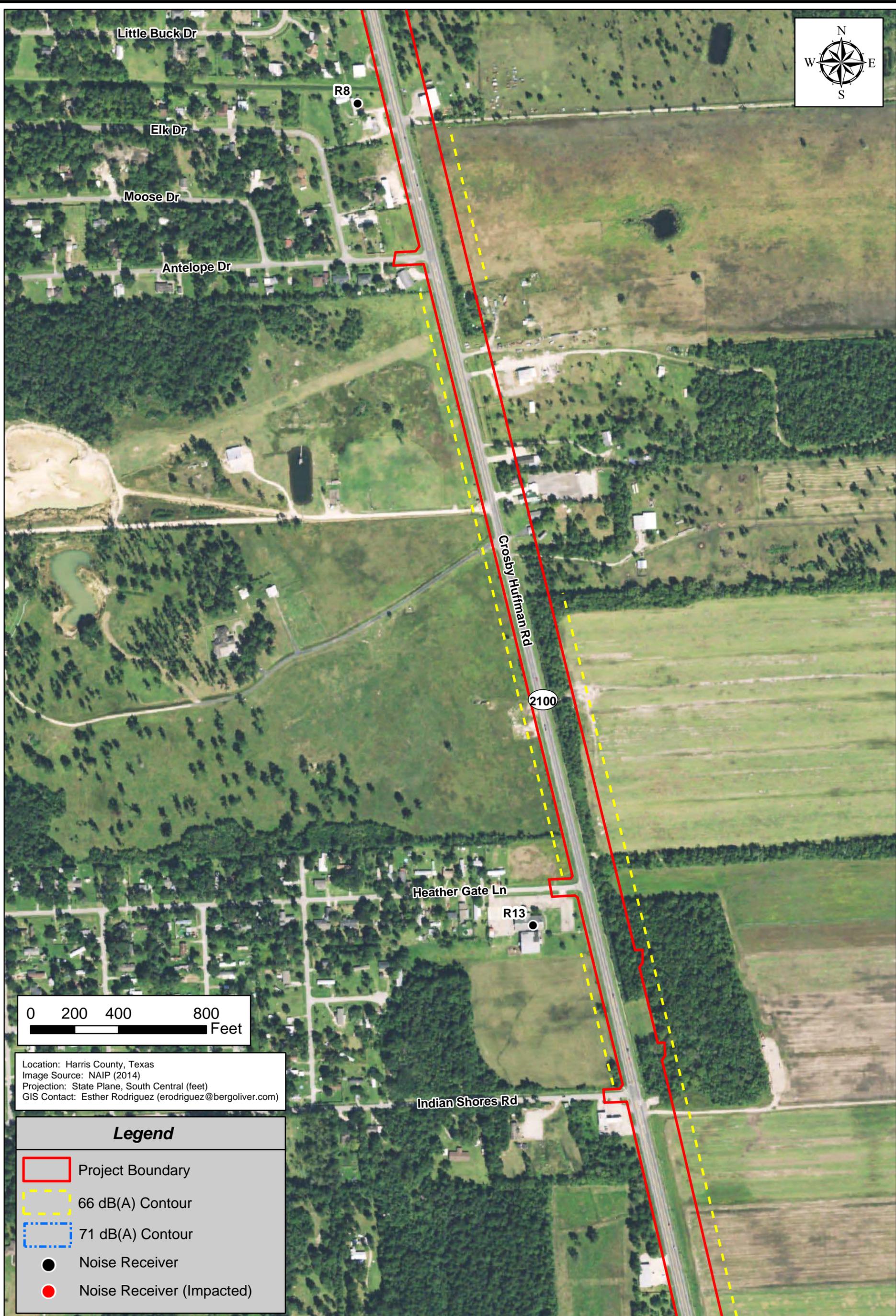
Legend

- Project Boundary
- 66 dB(A) Contour
- 71 dB(A) Contour
- Noise Receiver
- Noise Receiver (Impacted)

**TRAFFIC NOISE MAP
SHEET 3 OF 8**

Project #: 9682 - CSJ: 1062-04-022
For: TxDOT
Location: FM 2100 from FM 1960 to Diamondhead Blvd
 Harris County, Texas

REVISIONS
Jan. 22, 2015 by MER
Jan. 26, 2015 by MER
April 21, 2015 by MER
Sept. 22, 2015 by MER
Nov. 12, 2015 by MER



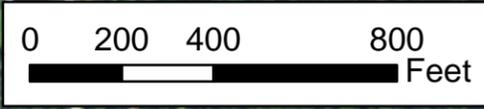
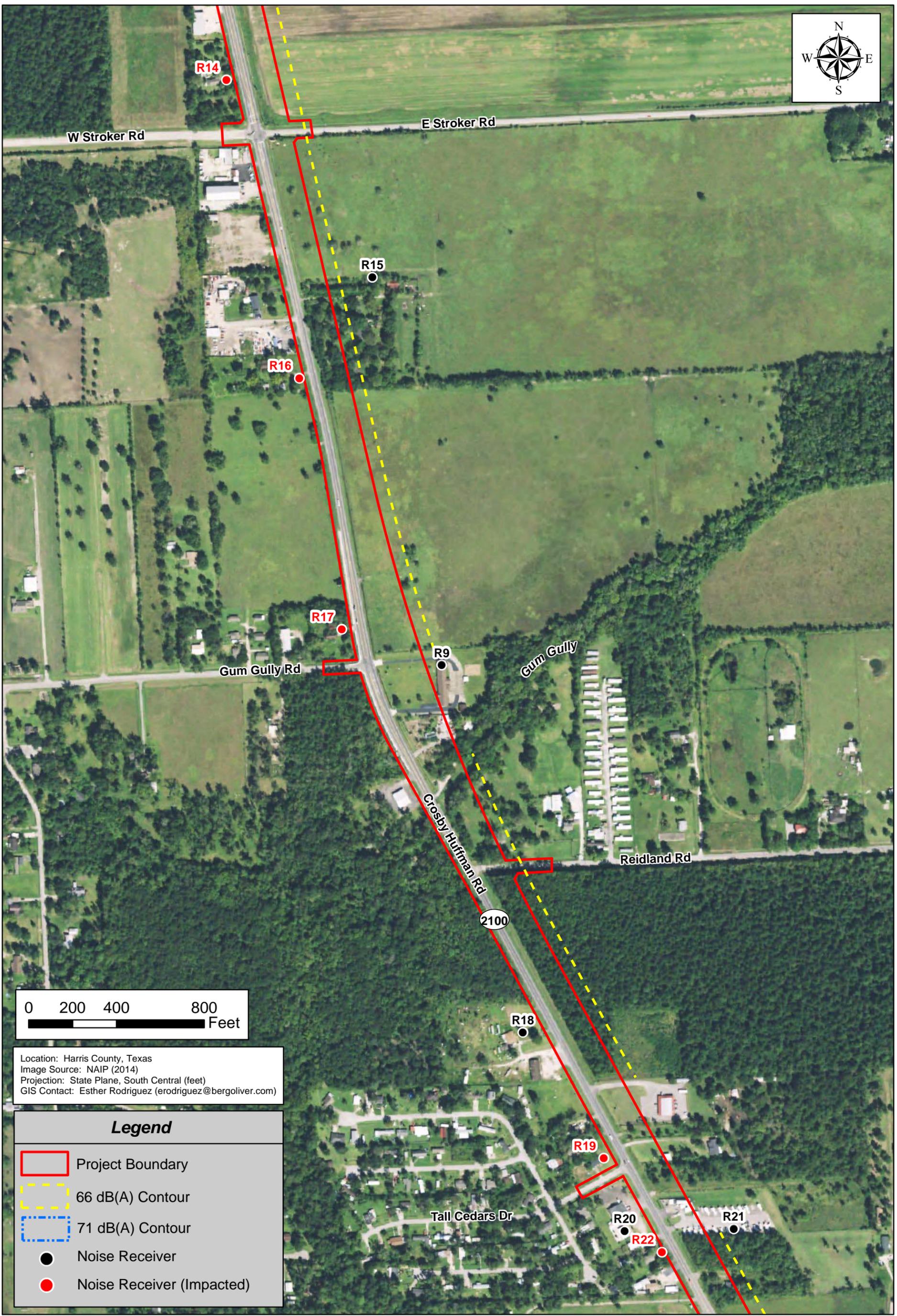
Location: Harris County, Texas
 Image Source: NAIP (2014)
 Projection: State Plane, South Central (feet)
 GIS Contact: Esther Rodriguez (erodriguez@bergoliver.com)

Legend	
	Project Boundary
	66 dB(A) Contour
	71 dB(A) Contour
	Noise Receiver
	Noise Receiver (Impacted)

**TRAFFIC NOISE MAP
SHEET 4 OF 8**

Project #: 9682 - CSJ: 1062-04-022
For: TxDOT
Location: FM 2100 from FM 1960 to Diamondhead Blvd
 Harris County, Texas

REVISIONS
Jan. 22, 2015 by MER
Jan. 26, 2015 by MER
April 21, 2015 by MER
Sept. 22, 2015 by MER
Nov. 12, 2015 by MER



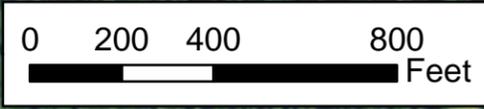
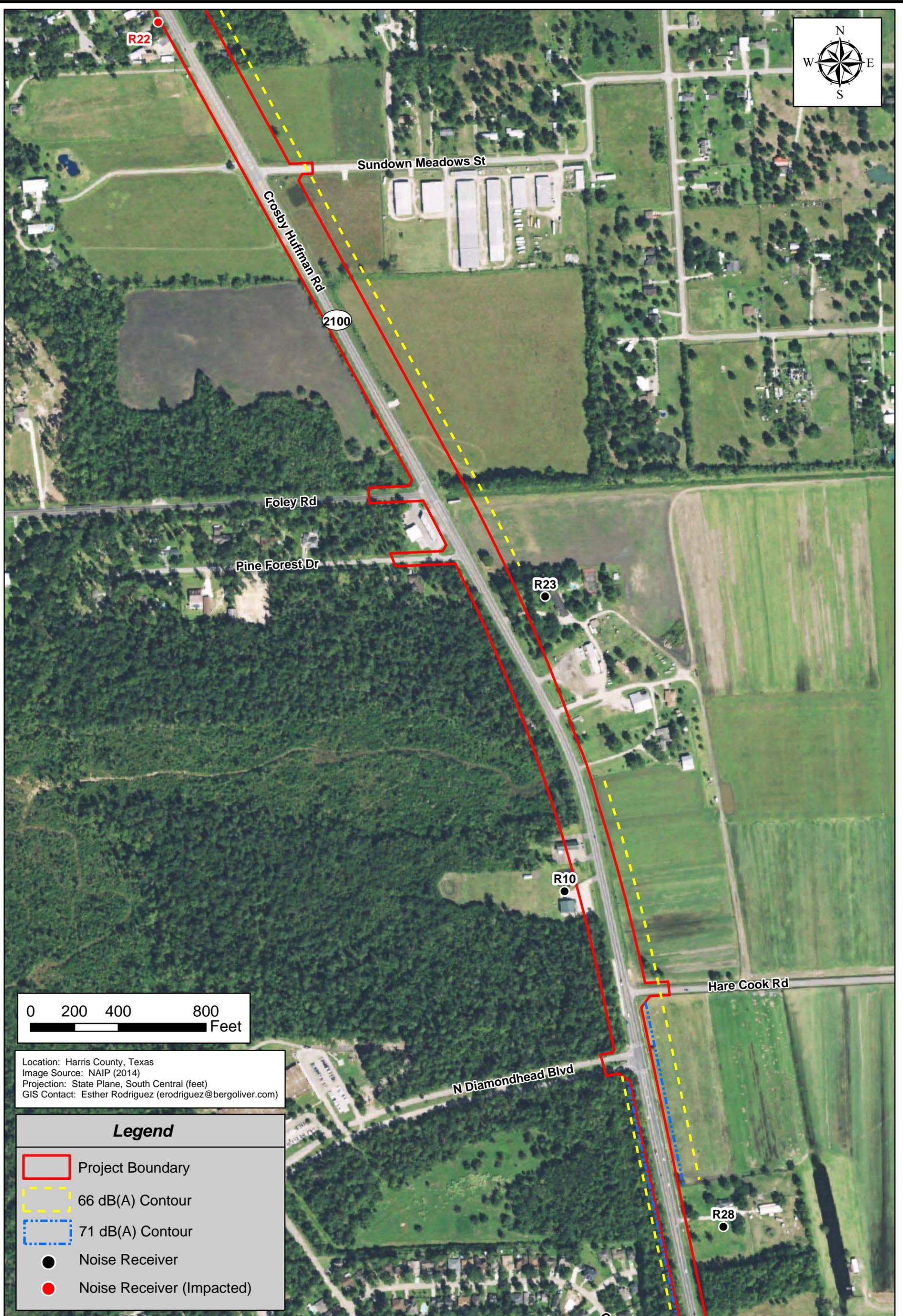
Location: Harris County, Texas
 Image Source: NAIP (2014)
 Projection: State Plane, South Central (feet)
 GIS Contact: Esther Rodriguez (erodriguez@bergoliver.com)

Legend	
	Project Boundary
	66 dB(A) Contour
	71 dB(A) Contour
	Noise Receiver
	Noise Receiver (Impacted)

**TRAFFIC NOISE MAP
SHEET 5 OF 8**

Project #: 9682 - CSJ: 1062-04-022
For: TxDOT
Location: FM 2100 from FM 1960 to Diamondhead Blvd
 Harris County, Texas

REVISIONS
Jan. 22, 2015 by MER
Jan. 26, 2015 by MER
April 21, 2015 by MER
Sept. 22, 2015 by MER
Nov. 12, 2015 by MER



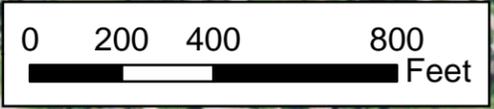
Location: Harris County, Texas
 Image Source: NAIP (2014)
 Projection: State Plane, South Central (feet)
 GIS Contact: Esther Rodriguez (erodriguez@bergoliver.com)

Legend	
	Project Boundary
	66 dB(A) Contour
	71 dB(A) Contour
	Noise Receiver
	Noise Receiver (Impacted)

**TRAFFIC NOISE MAP
SHEET 6 OF 8**

Project #: 9682 - CSJ: 1062-04-022
For: TxDOT
Location: FM 2100 from FM 1960 to Diamondhead Blvd
 Harris County, Texas

REVISIONS
Jan. 22, 2015 by MER
Jan. 26, 2015 by MER
April 21, 2015 by MER
Sept. 22, 2015 by MER
Nov. 12, 2015 by MER



Location: Harris County, Texas
 Image Source: NAIP (2014)
 Projection: State Plane, South Central (feet)
 GIS Contact: Esther Rodriguez (erodriguez@bergoliver.com)

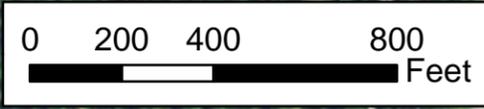
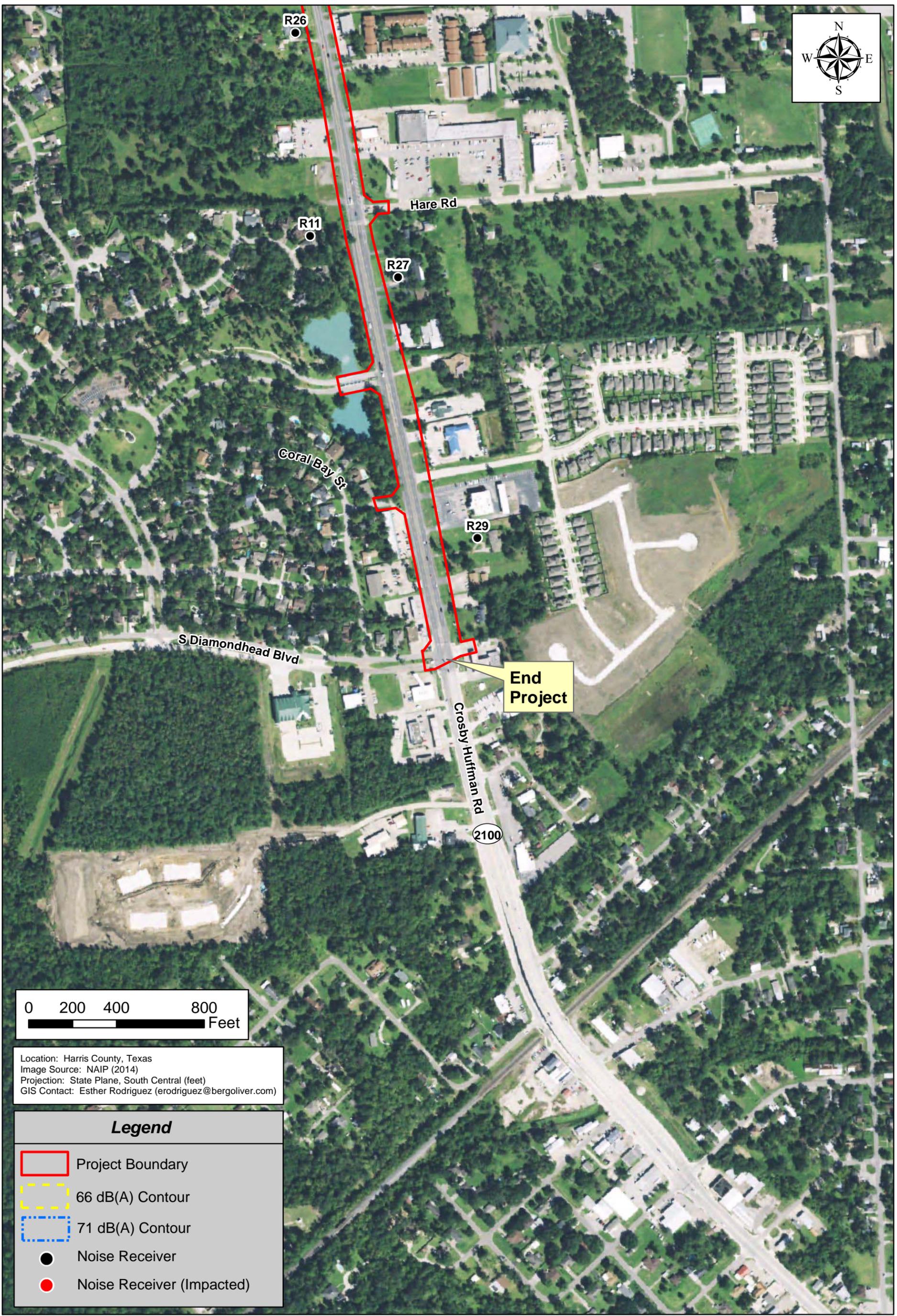
Legend

- Project Boundary
- 66 dB(A) Contour
- 71 dB(A) Contour
- Noise Receiver
- Noise Receiver (Impacted)

**TRAFFIC NOISE MAP
SHEET 7 OF 8**

Project #: 9682 - CSJ: 1062-04-022
For: TxDOT
Location: FM 2100 from FM 1960 to Diamondhead Blvd
 Harris County, Texas

REVISIONS
Jan. 22, 2015 by MER
Jan. 26, 2015 by MER
April 21, 2015 by MER
Sept. 22, 2015 by MER
Nov. 12, 2015 by MER



Location: Harris County, Texas
 Image Source: NAIP (2014)
 Projection: State Plane, South Central (feet)
 GIS Contact: Esther Rodriguez (erodriguez@bergoliver.com)

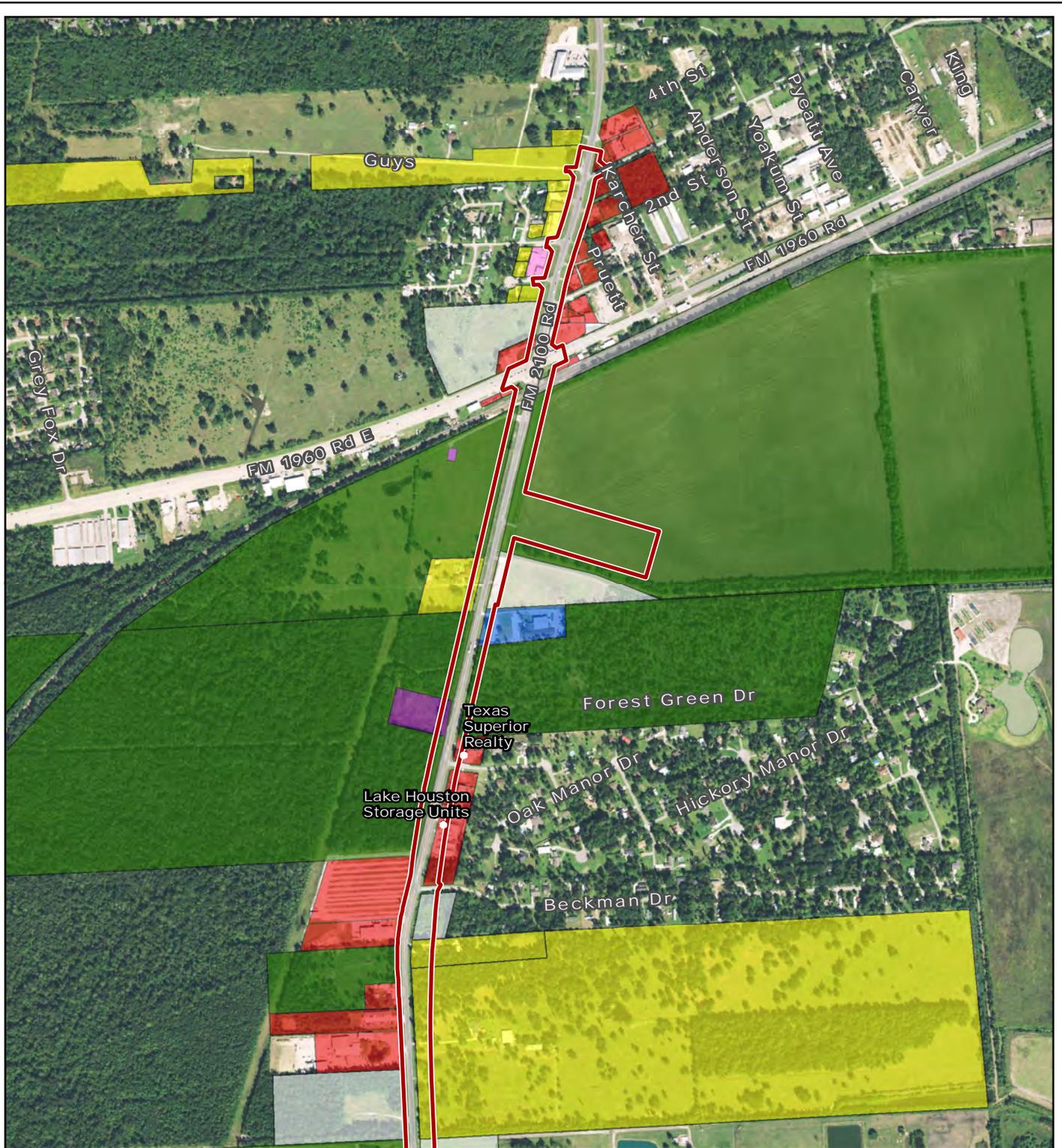
Legend

- Project Boundary
- 66 dB(A) Contour
- 71 dB(A) Contour
- Noise Receiver
- Noise Receiver (Impacted)

**TRAFFIC NOISE MAP
SHEET 8 OF 8**

Project #: 9682 - CSJ: 1062-04-022
For: TxDOT
Location: FM 2100 from FM 1960 to Diamondhead Blvd
 Harris County, Texas

REVISIONS
Jan. 22, 2015 by MER
Jan. 26, 2015 by MER
April 21, 2015 by MER
Sept. 22, 2015 by MER
Nov. 12, 2015 by MER



- Project Location
- Oil and Gas
- Civic
- Railroad
- Agricultural
- Residential
- Church / School
- Undeveloped / Vacant
- Commercial

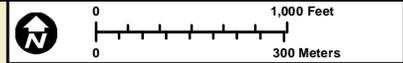
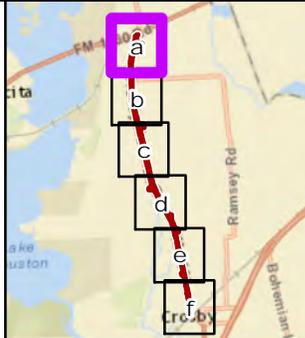


Figure 9a
Project Area Land Use

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 1,000 feet
CSJ: 1062-04-022	Scale: 1:12,000
	Date: 5/14/2015

Data Sources: HCAD (2014), CMEC (2015)
Aerial Source: NAIP (2014)
G:\Projects\TXDOT\FM2100\MXD\EA\Figure 9_Land Use_20150514.mxd



- Project Location
- Agricultural
- Church / School
- Commercial
- Oil and Gas
- Residential
- Undeveloped / Vacant

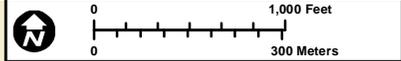
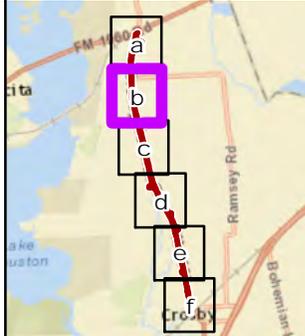
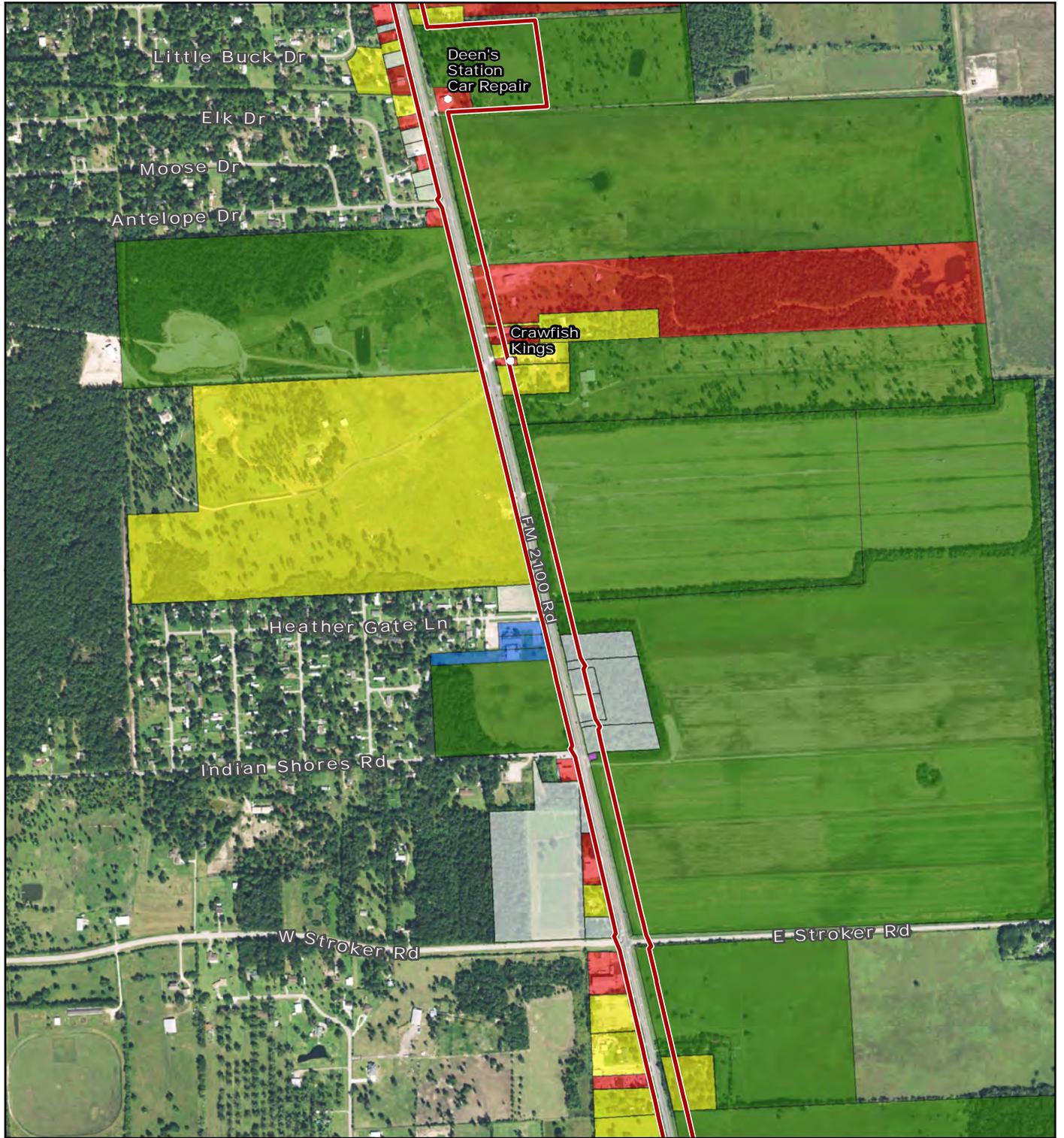


Figure 9b
Project Area Land Use

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 1,000 feet
CSJ: 1062-04-022	Scale: 1:12,000
	Date: 5/14/2015



- ▭ Project Location
- ▭ Agricultural
- ▭ Church / School
- ▭ Commercial
- ▭ Oil and Gas
- ▭ Residential
- Undeveloped / Vacant

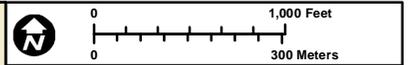
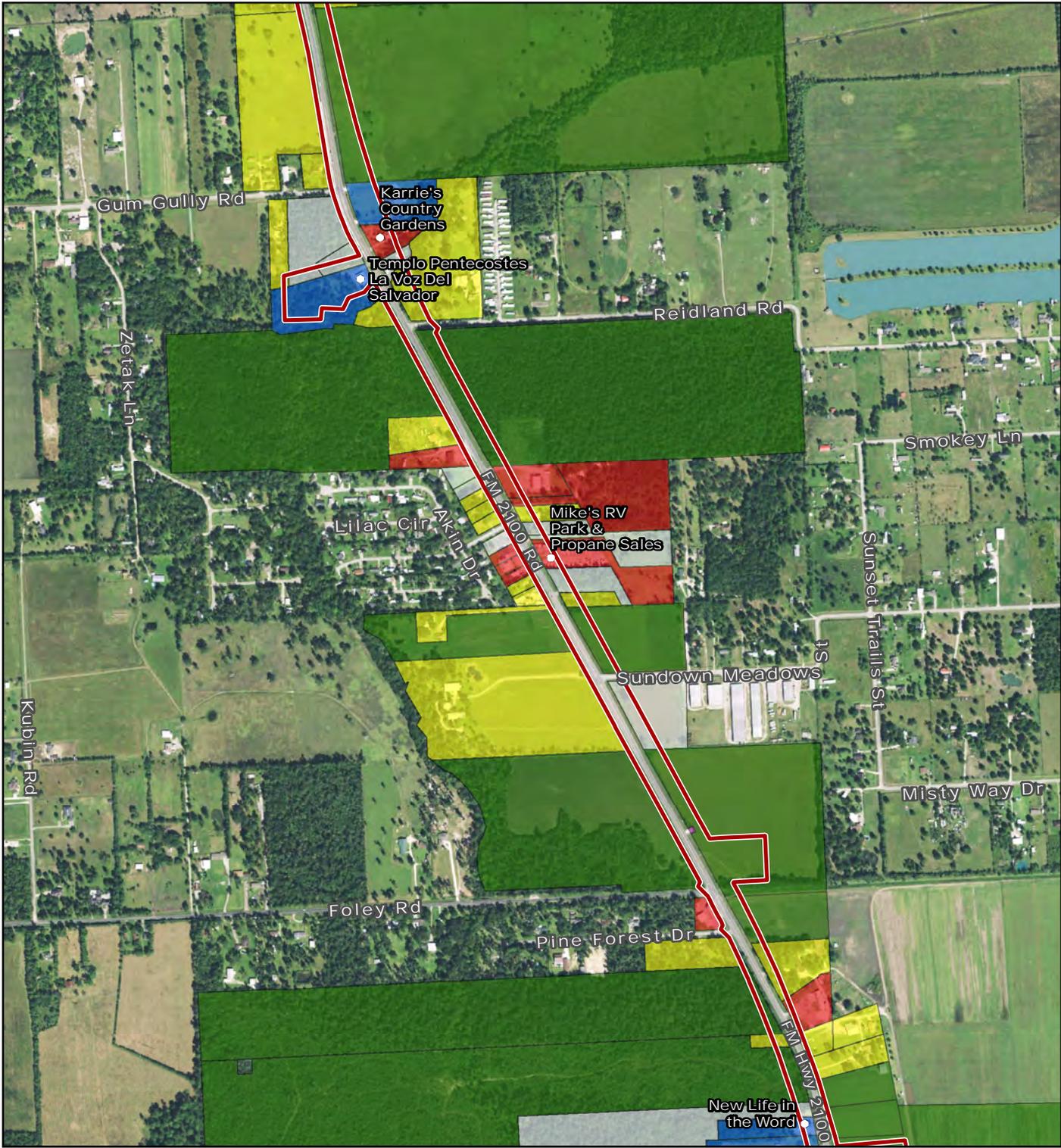


Figure 9c
Project Area Land Use

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 1,000 feet
CSJ: 1062-04-022	Scale: 1:12,000
	Date: 5/14/2015



- ▭ Project Location
- ▭ Agricultural
- ▭ Church / School
- ▭ Commercial
- ▭ Oil and Gas
- ▭ Residential
- Undeveloped / Vacant

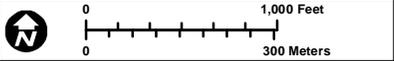
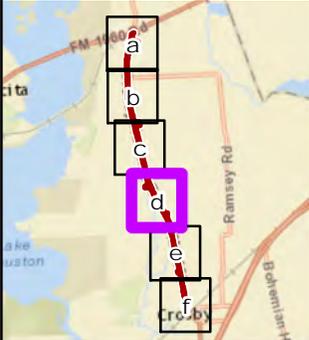
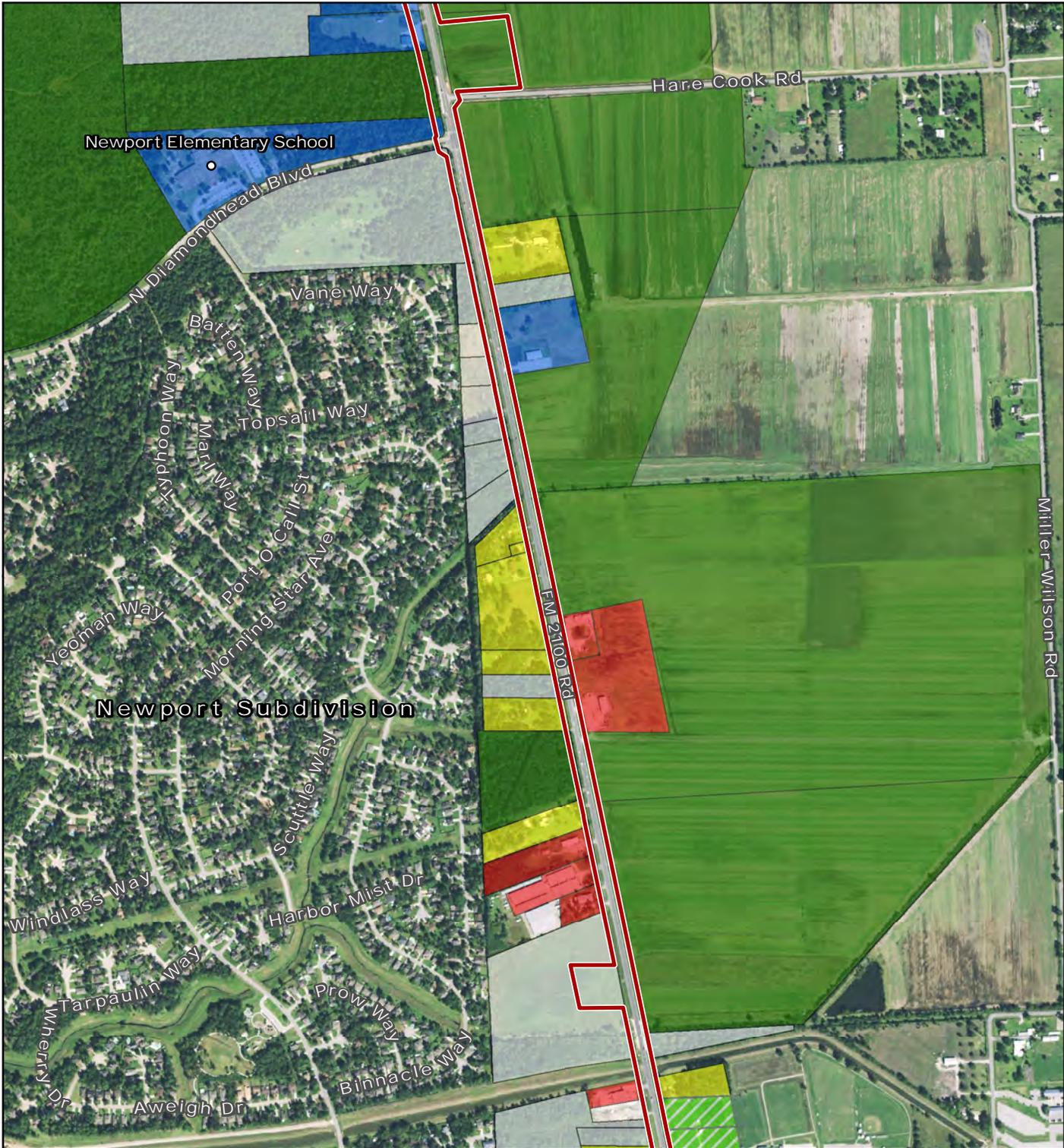


Figure 9d
Project Area Land Use

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 1,000 feet
CSJ: 1062-04-022	Scale: 1:12,000
	Date: 5/14/2015

Data Sources: HCAD (2014), CMEC (2015)
Aerial Source: NAIP (2014)
G:\Projects\TXDOT\FM2100\MXDs\EA\Figure 9_Land Use_20150514.mxd



- ▭ Project Location
- ▭ Agricultural
- ▭ Church / School
- ▭ Commercial
- ▭ Park
- ▭ Residential
- Undeveloped / Vacant

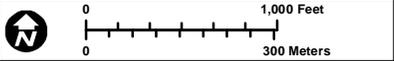
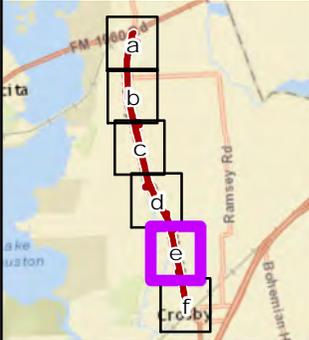
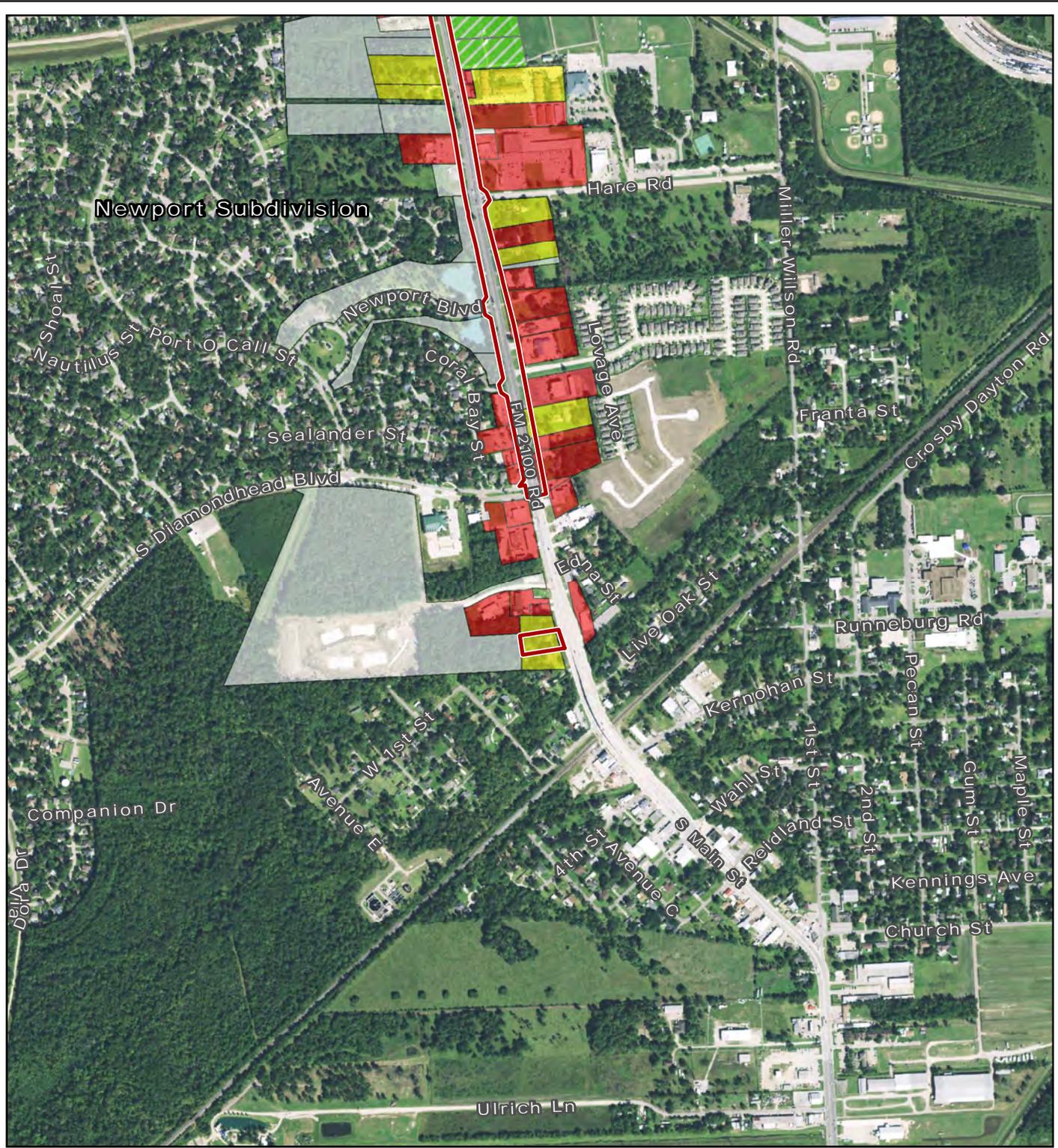


Figure 9e
Project Area Land Use

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 1,000 feet
CSJ: 1062-04-022	Scale: 1:12,000
	Date: 5/14/2015

Data Sources: HCAD (2014), CMEC (2015)
Aerial Source: NAIP (2014)
G:\Projects\TXDOT\FM2100\MXDs\EA\Figure 9_Land Use_20150514.mxd



- Project Location
- Residential
- Commercial
- Undeveloped / Vacant
- Park

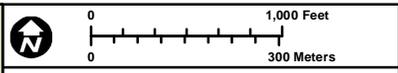
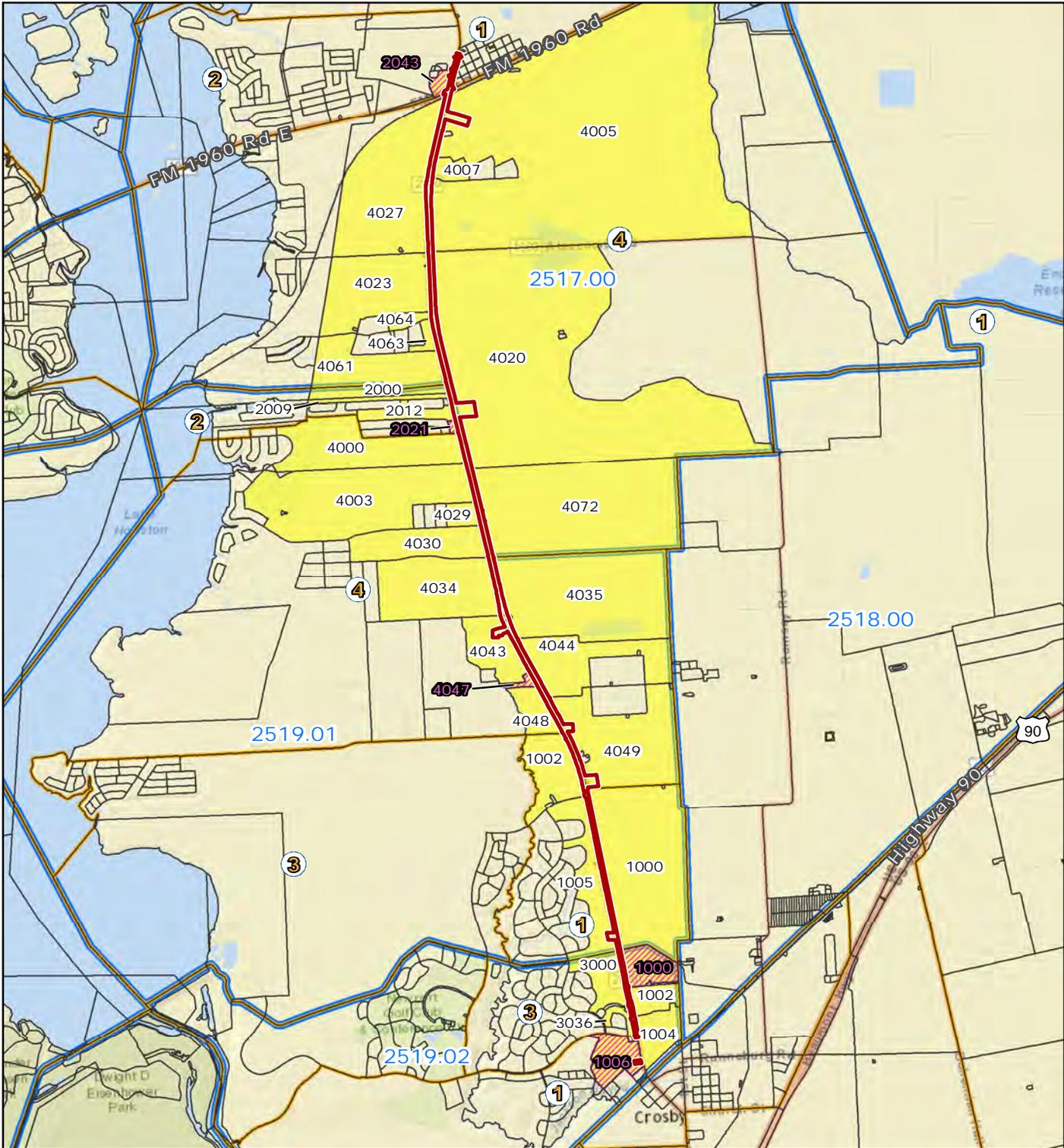


Figure 9f
Project Area Land Use

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 1,000 feet
CSJ: 1062-04-022	Scale: 1:12,000
	Date: 5/14/2015

Data Sources: HCAD (2014), CMEC (2015)
 Aerial Source: NAIP (2014)
 G:\Projects\TXDOT\FM2100\MXDs\EA\Figure 9_Land Use_20150514.mxd



-  Project Location
-  2010 Census Block
-  2010 Census Block Group
-  2010 Census Tract
-  Populated Adjacent 2010 Census Block
-  Minority Block

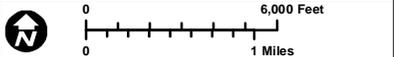
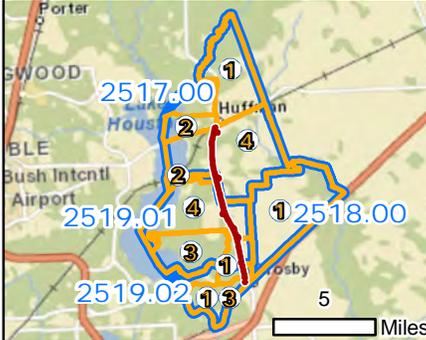
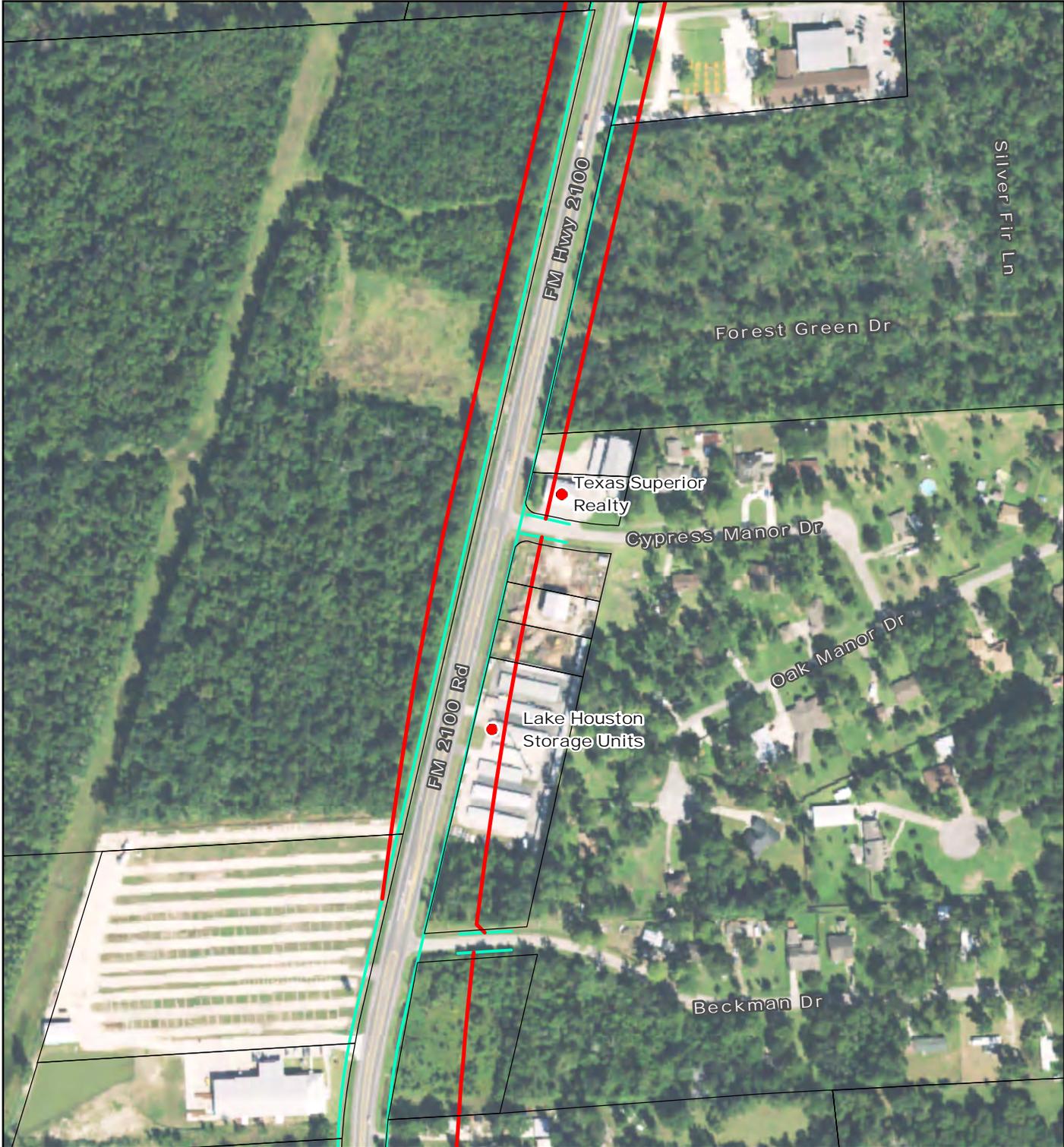


Figure 10
Minority Populations

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 6,000 feet
Scale: 1:72,000	Date: 5/14/2015
CSJ: 1062-04-022	

Data Source: US Census Bureau (2010)
 Basemap Source: ESRI (2014)
 G:\Projects\TXDOT\FM2100\MXD\EA\Figure 9_Minority Populations_20150514.mxd



- | | |
|-------------------------|-------------------------------|
| Existing Right-of-Way | Potential Displacement |
| Proposed Right-of-Way | Church |
| Proposed Detention Pond | Commercial |
| Minority Block | Residence |
| Parcels | |

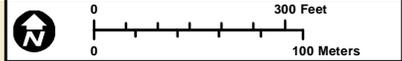


Figure 11a
Potential Displacements

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 300 feet
CSJ: 1062-04-022	Scale: 1:3,600
	Date: 5/14/2015

Data Source: HCAD (2014), US Census Bureau (2010), CMEC (2015)
Aerial Source: NAIP (2014)



- | | |
|-------------------------|-------------------------------|
| Existing Right-of-Way | Potential Displacement |
| Proposed Right-of-Way | Church |
| Proposed Detention Pond | Commercial |
| Minority Block | Residence |
| Parcels | |

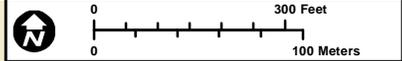
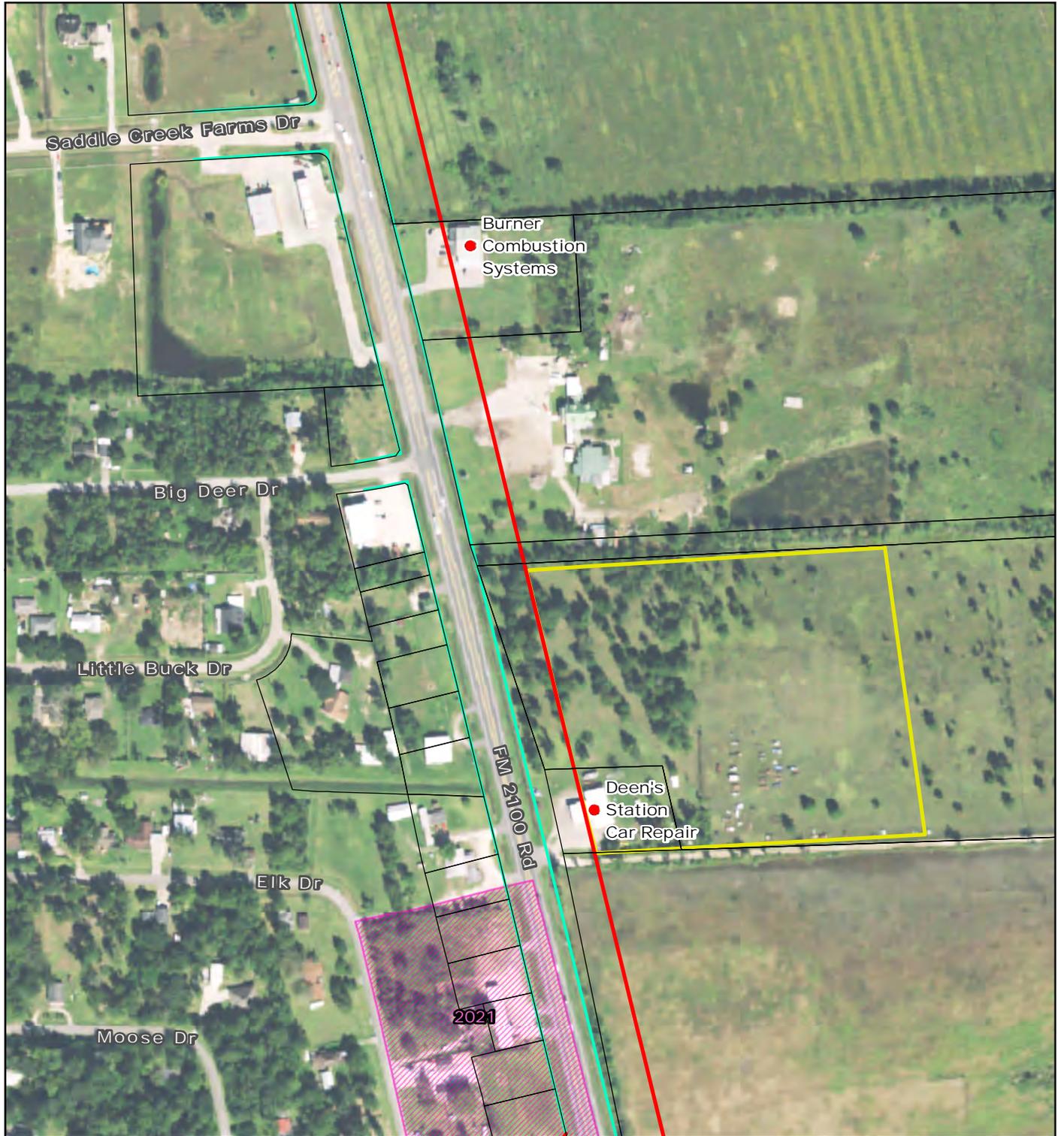


Figure 11b
Potential Displacements

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 300 feet
CSJ: 1062-04-022	Scale: 1:3,600
	Date: 5/14/2015

Data Source: HCAD (2014), US Census Bureau (2010), CMEC (2015)
Aerial Source: NAIP (2014)



- | | |
|-------------------------|-------------------------------|
| Existing Right-of-Way | Potential Displacement |
| Proposed Right-of-Way | Church |
| Proposed Detention Pond | Commercial |
| Minority Block | Residence |
| Parcels | |

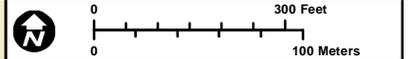


Figure 11c
Potential Displacements

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 300 feet
CSJ: 1062-04-022	Scale: 1:3,600
	Date: 5/14/2015

Data Source: HCAD (2014), US Census Bureau (2010), CMEC (2015)
Aerial Source: NAIP (2014)
G:\Projects\TXDOT\FM2100\MXDs\EA\Figure 11_Potential Displacements_20150514.mxd



- | | |
|-------------------------|-------------------------------|
| Existing Right-of-Way | Potential Displacement |
| Proposed Right-of-Way | Church |
| Proposed Detention Pond | Commercial |
| Minority Block | Residence |
| Parcels | |

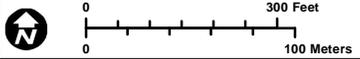
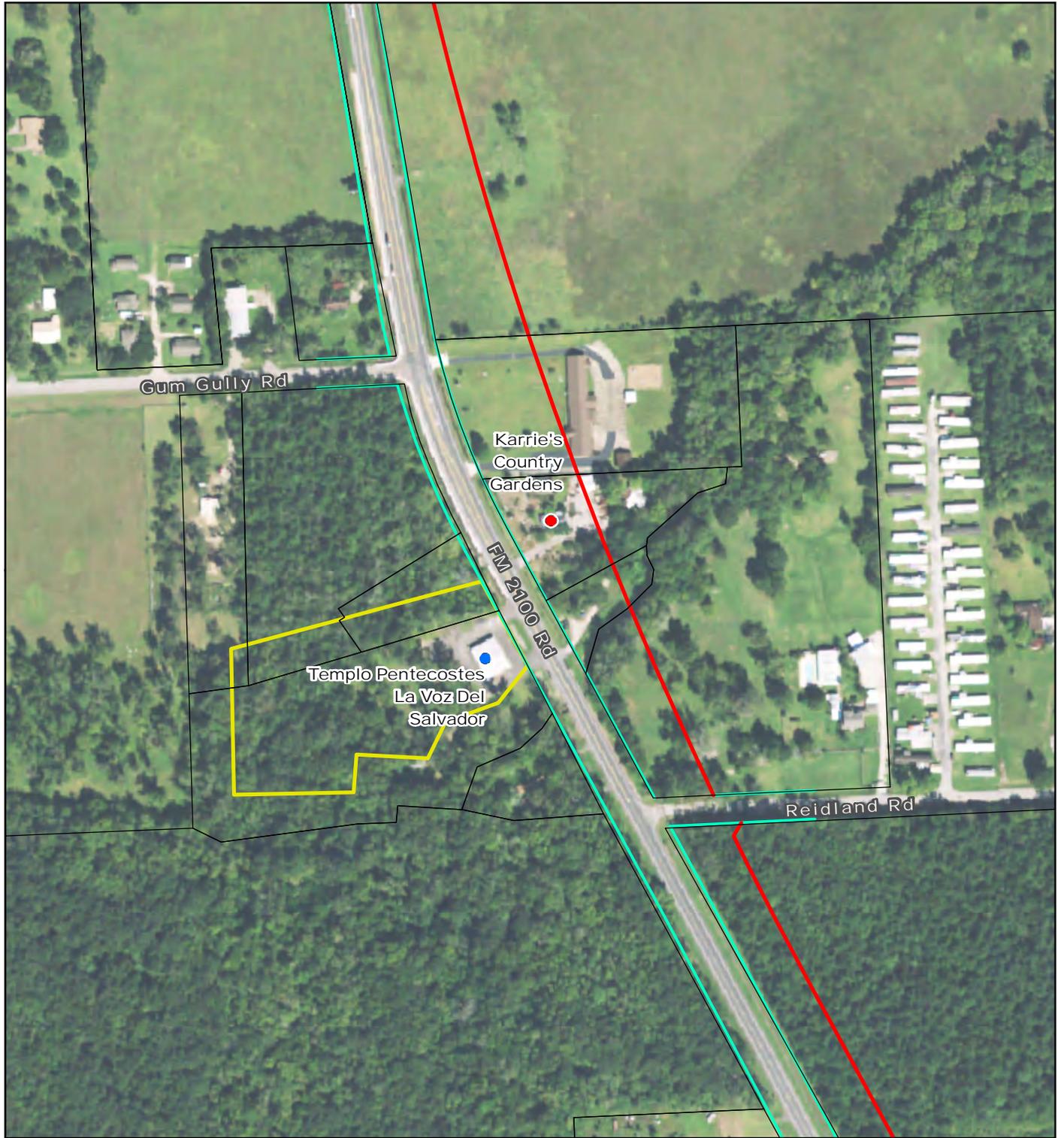


Figure 11d
Potential Displacements

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 300 feet
CSJ: 1062-04-022	Scale: 1:3,600
	Date: 5/14/2015

Data Source: HCAD (2014), US Census Bureau (2010), CMEC (2015)
Aerial Source: NAIP (2014)



- | | |
|-------------------------|-------------------------------|
| Existing Right-of-Way | Potential Displacement |
| Proposed Right-of-Way | Church |
| Proposed Detention Pond | Commercial |
| Minority Block | Residence |
| Parcels | |

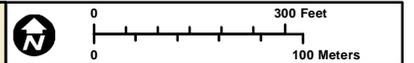
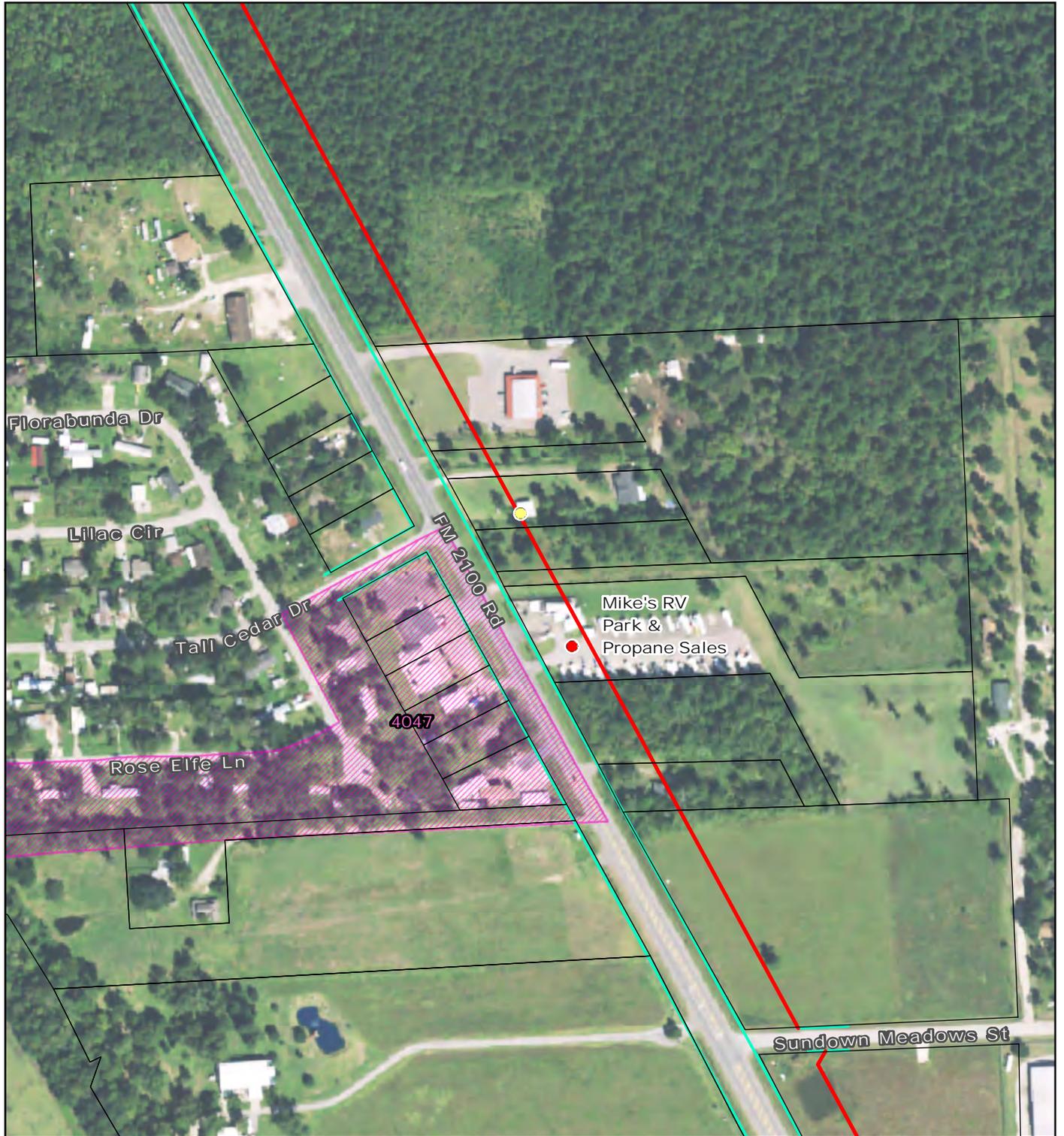


Figure 11e
Potential Displacements

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 300 feet
CSJ: 1062-04-022	Scale: 1:3,600
	Date: 5/14/2015

Data Source: HCAD (2014), US Census Bureau (2010), CMEC (2015)
Aerial Source: NAIP (2014)
G:\Projects\TXDOT\FM2100\WXDs\EA\Figure 11_Potential Displacements_20150514.mxd



- | | |
|-------------------------|-------------------------------|
| Existing Right-of-Way | Potential Displacement |
| Proposed Right-of-Way | Church |
| Proposed Detention Pond | Commercial |
| Minority Block | Residence |
| Parcels | |

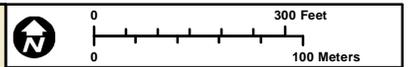
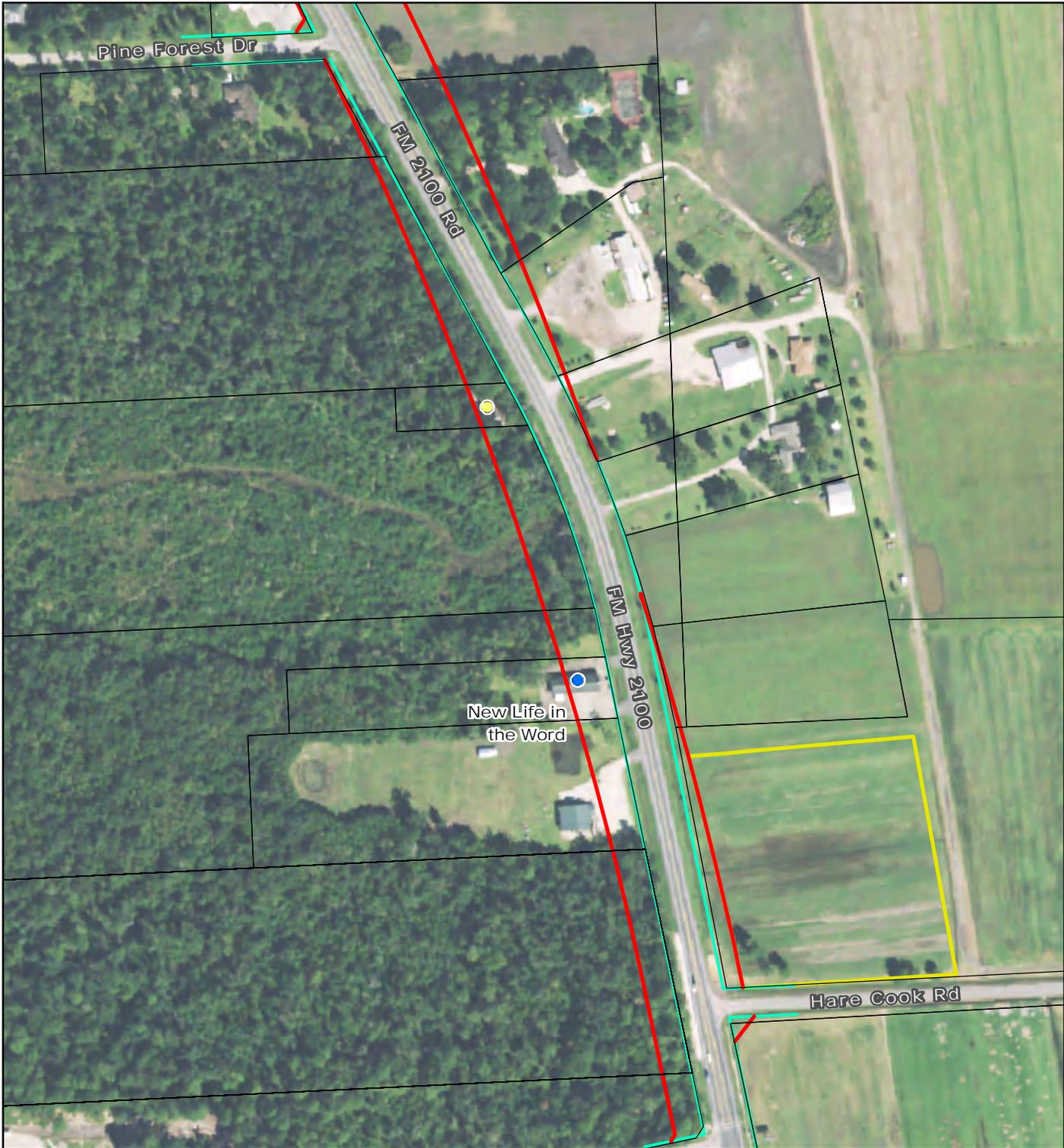


Figure 11f
Potential Displacements

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 300 feet
CSJ: 1062-04-022	Scale: 1:3,600
	Date: 5/14/2015

Data Source: HCAD (2014), US Census Bureau (2010), CMEC (2015)
Aerial Source: NAIP (2014)



- | | |
|-------------------------|-------------------------------|
| Existing Right-of-Way | Potential Displacement |
| Proposed Right-of-Way | Church |
| Proposed Detention Pond | Commercial |
| Minority Block | Residence |
| Parcels | |

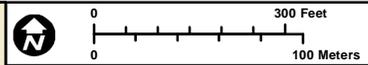
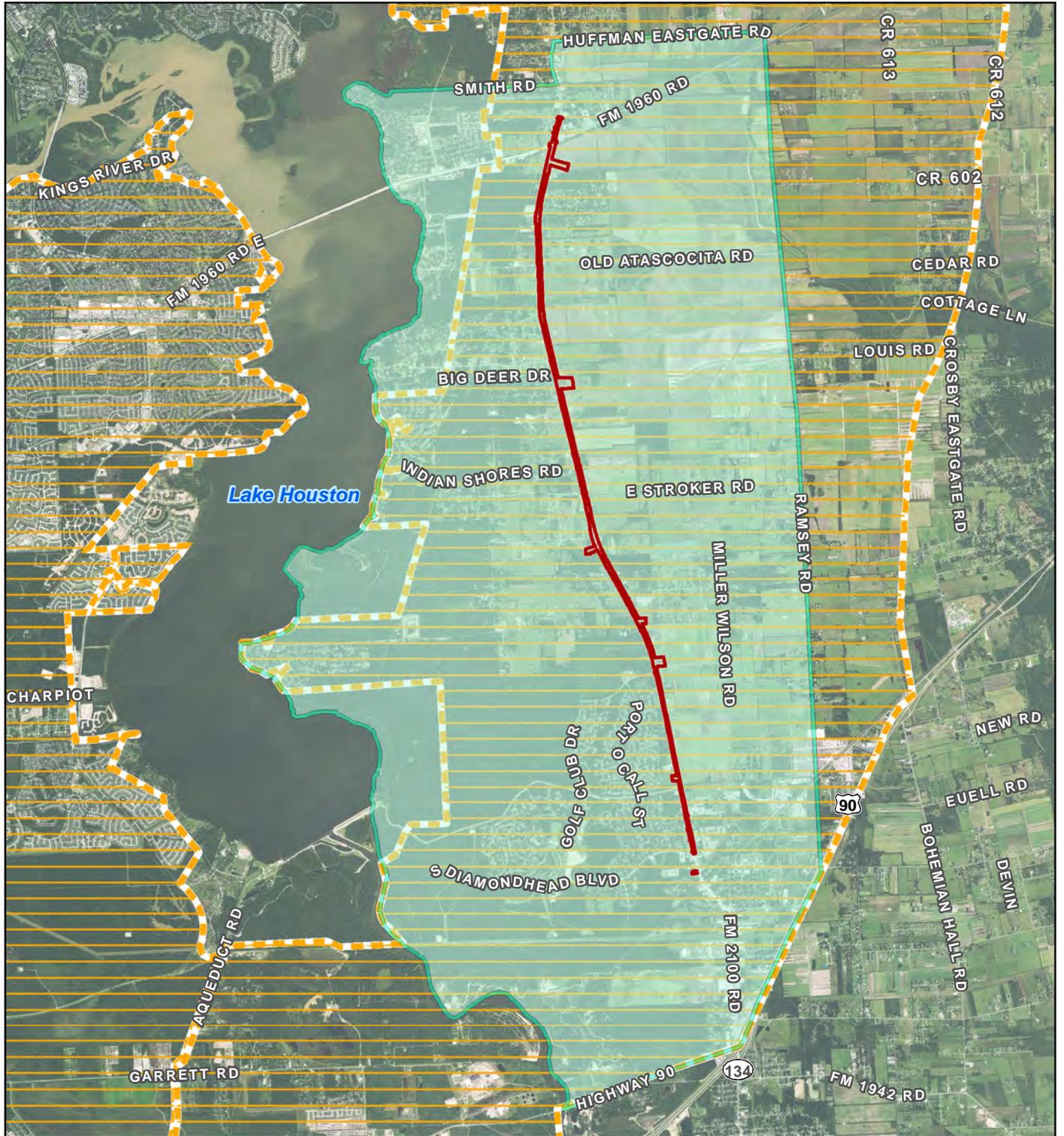


Figure 11g
Potential Displacements

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 300 feet
CSJ: 1062-04-022	Scale: 1:3,600
	Date: 5/14/2015

Data Source: HCAD (2014), US Census Bureau (2010), CMEC (2015)
Aerial Source: NAIP (2014)



-  Project Location
-  Area of Influence (AOI)
-  City of Houston ETJ

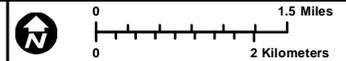
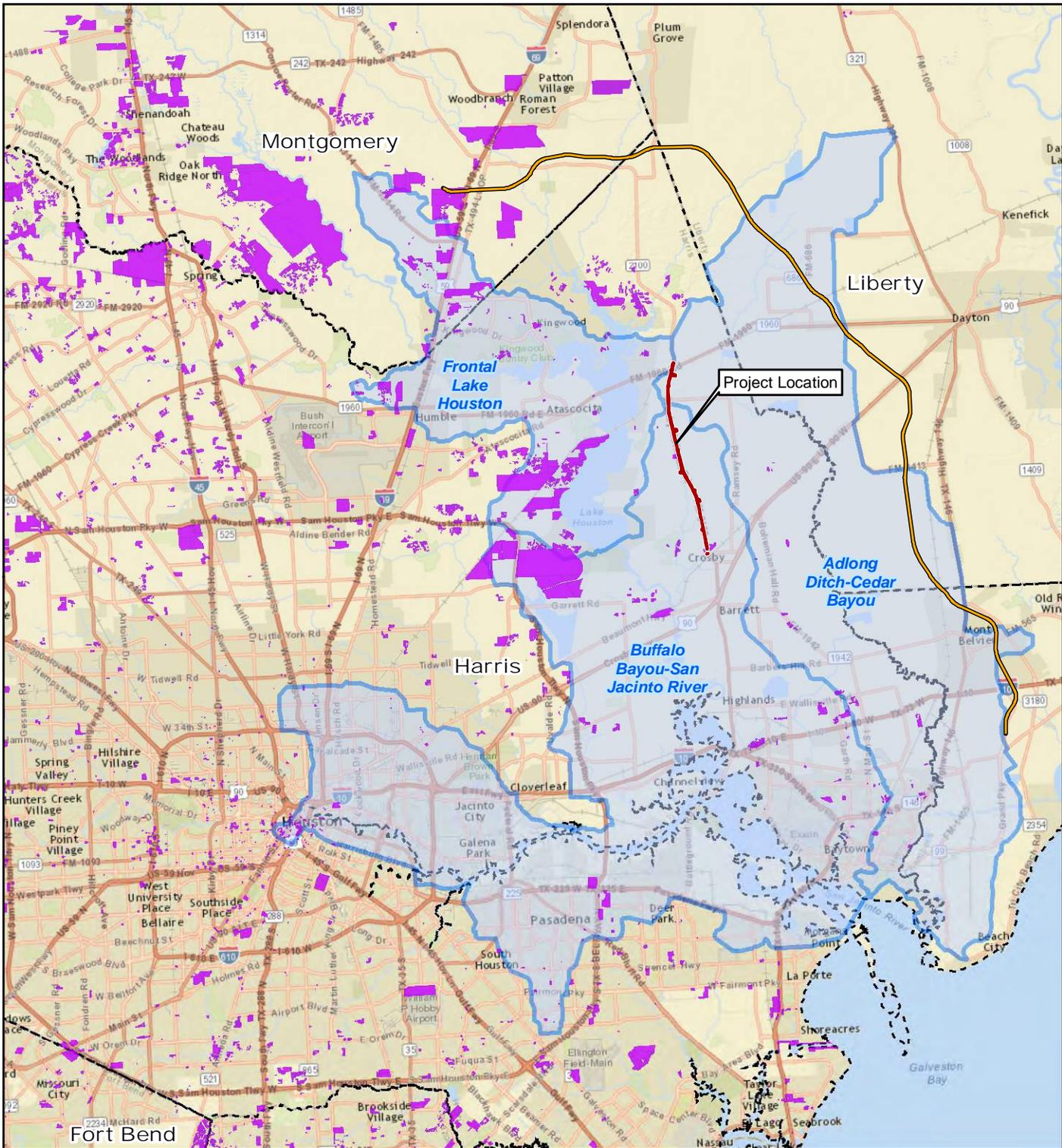


Figure 12
Area of Influence for Indirect Effects

FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 1.5 miles
CSJ: 1062-04-022	Scale: 1:95,040
	Date: 5/14/2015



- Project Location
- Resource Study Area (RSA) - 5th Level HUC (HUC 10) Watershed Boundaries
- Announced Development
- County Boundary
- Grand Parkway Segments H and I-1

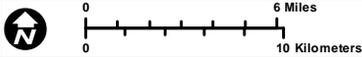
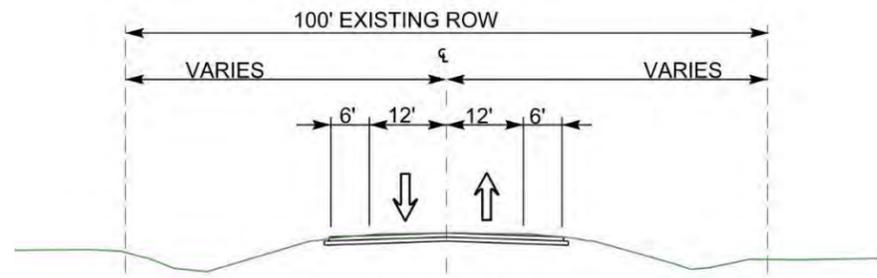


Figure 13
Resource Study Area

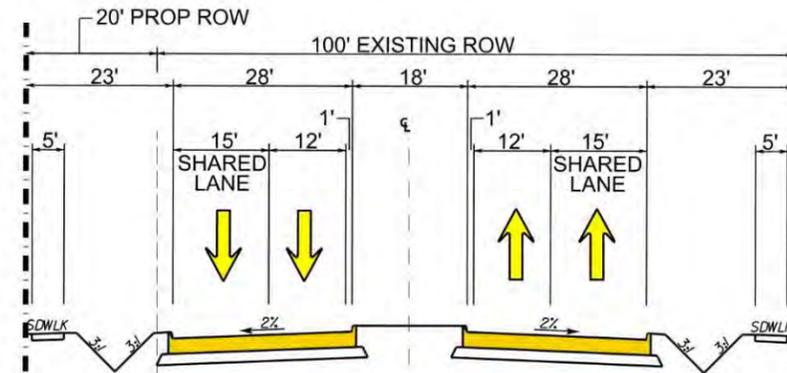
FM 2100 from FM 1960 to S Diamondhead Blvd

Prepared for: TxDOT	1 in = 6 miles
CSJ: 1062-04-022	Scale: 1:380,160
	Date: 12/15/2015

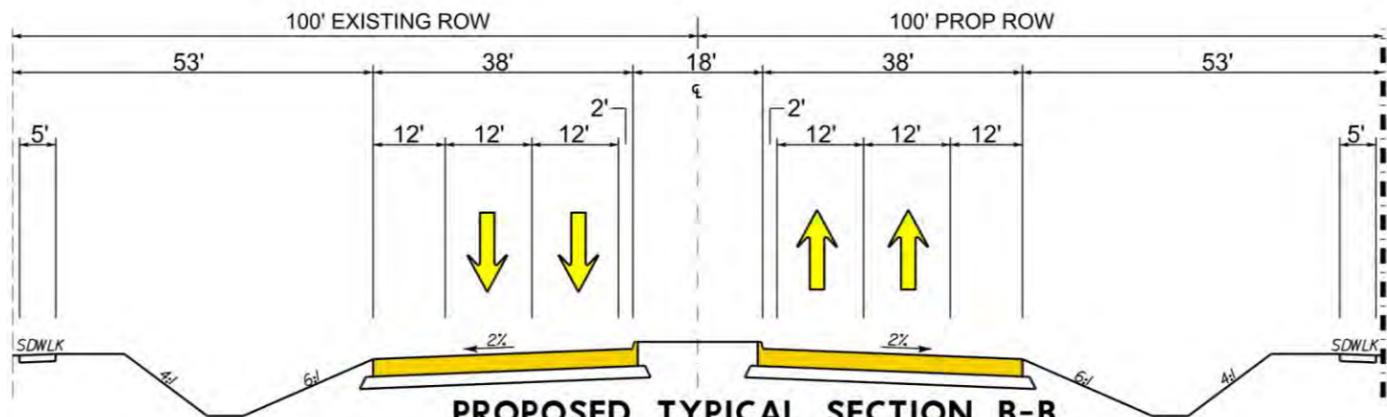
Data Sources: TPWD/EPA (2004), HGAC (2015), Grand Parkway Association (2015)
 Basemap Source: ESRI (2014)
 G:\Projects\TXDOT\FM2100\MXD\EA\Figure 13_RSA_20151215.mxd



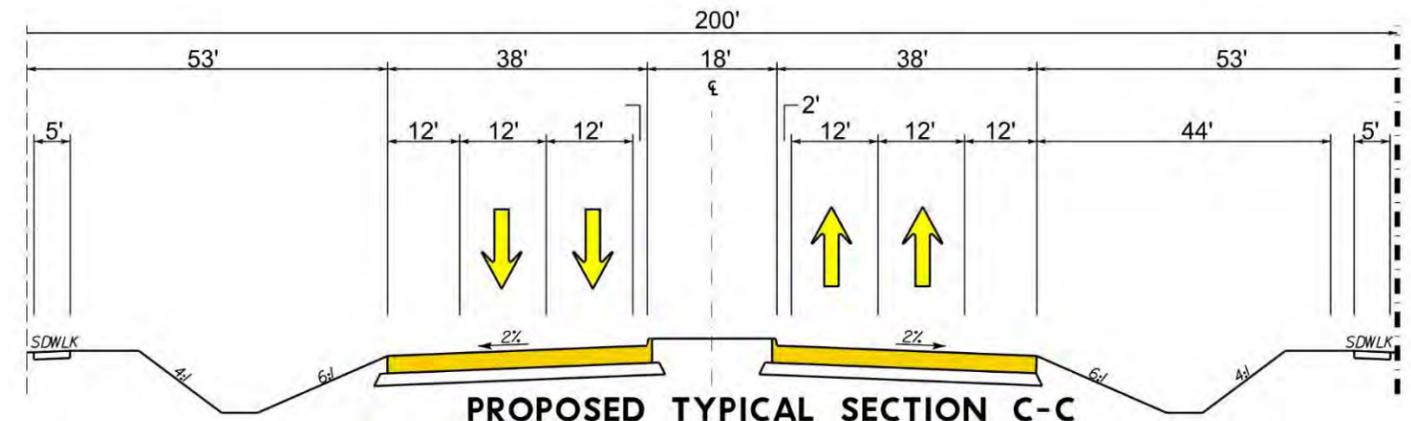
FM 2100 EXISTING TYPICAL SECTION



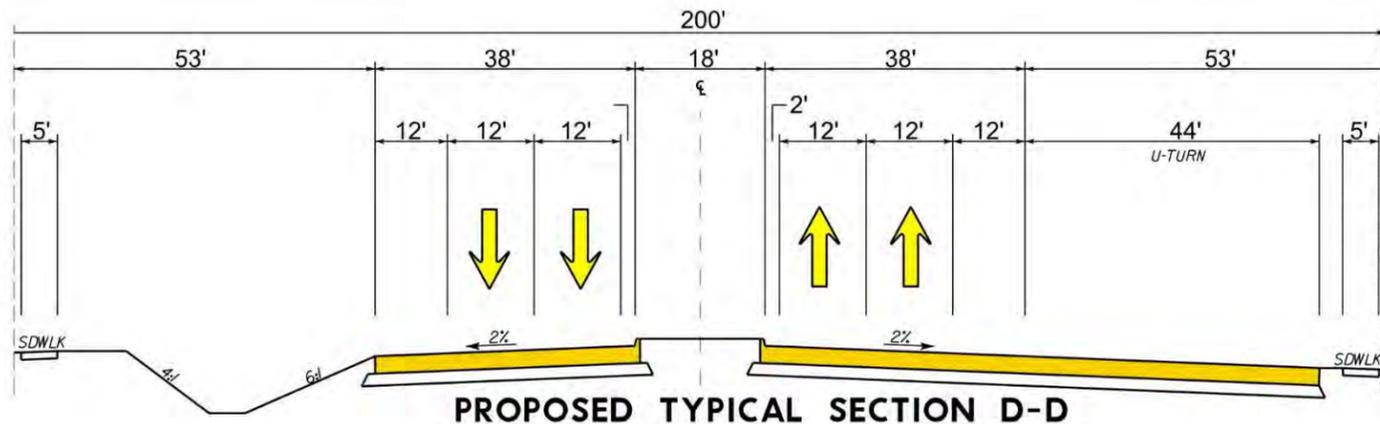
PROPOSED TYPICAL SECTION A-A



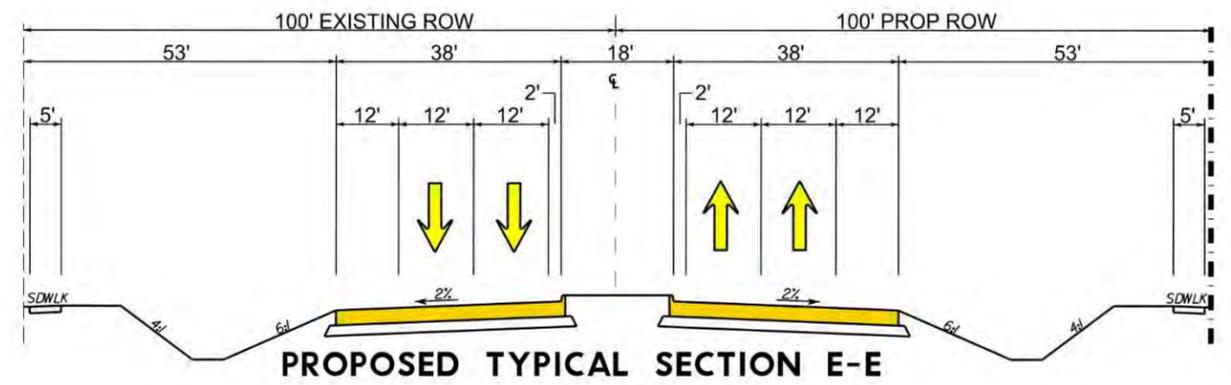
PROPOSED TYPICAL SECTION B-B



PROPOSED TYPICAL SECTION C-C



PROPOSED TYPICAL SECTION D-D



PROPOSED TYPICAL SECTION E-E

Figure 14
 Revised Schematic Following Public Hearing Typical Sections
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022

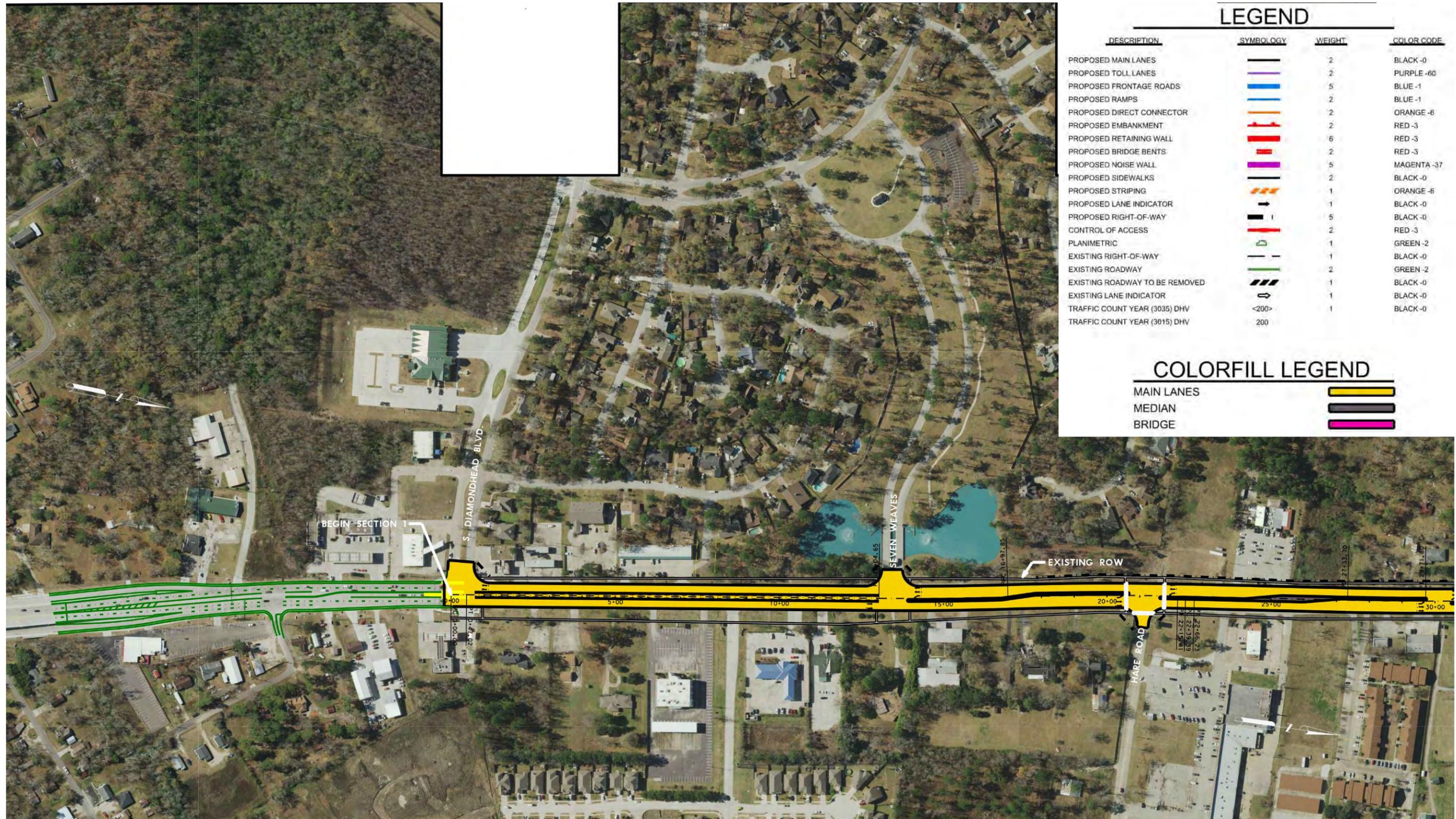
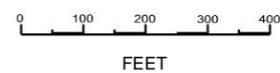


Figure 15a
 Revised Schematic Following Public Hearing Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



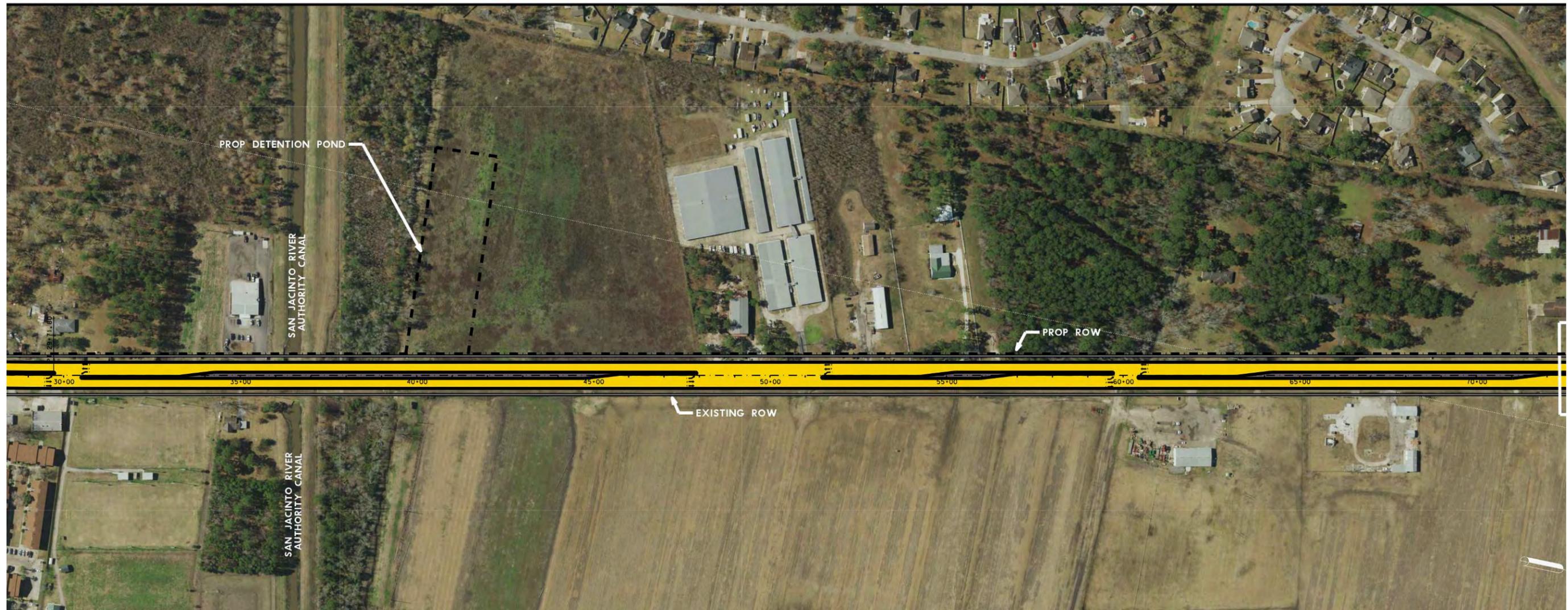
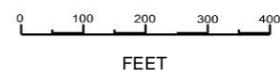


Figure 15b
 Revised Schematic Following Public Hearing Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



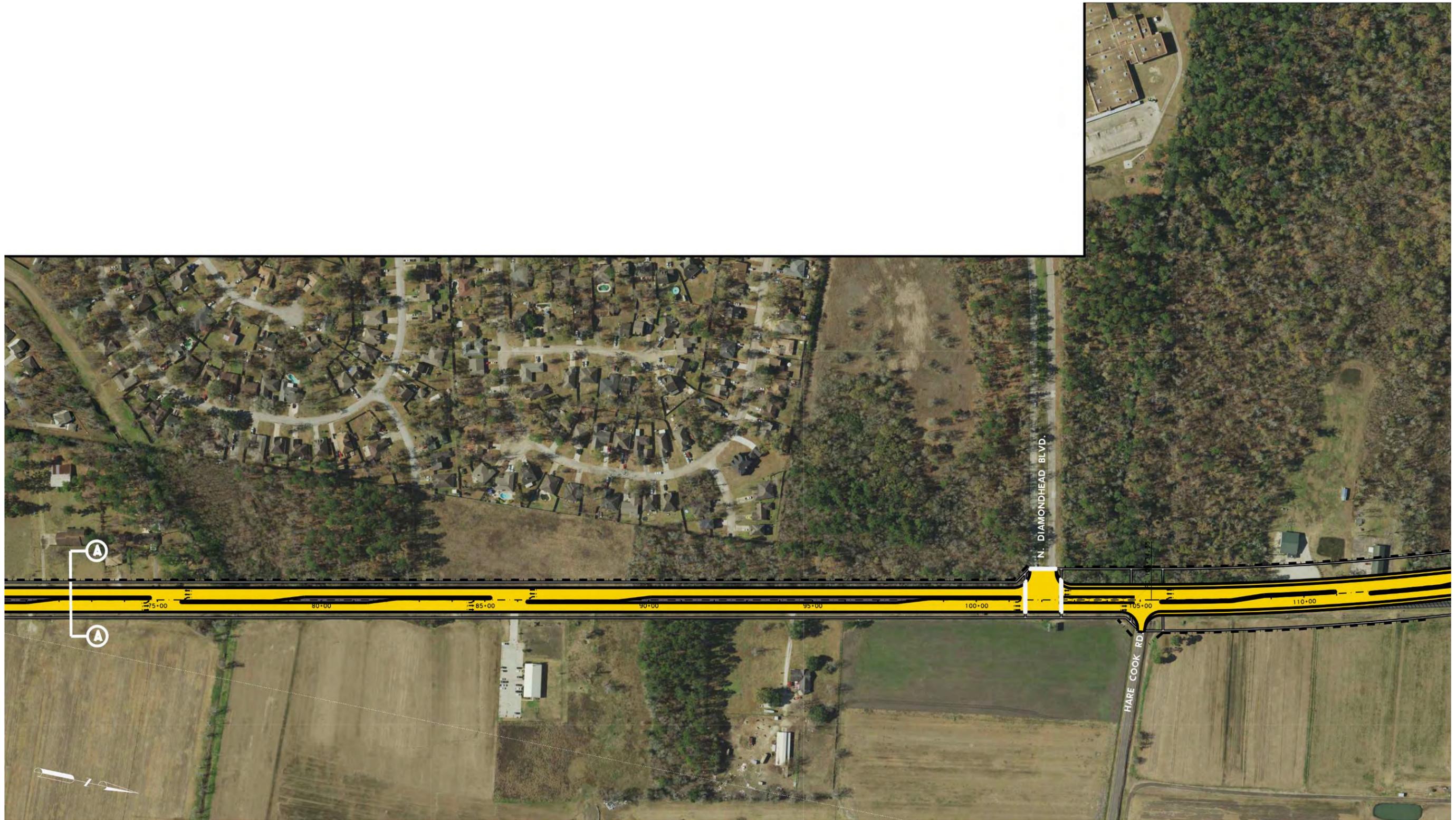


Figure 15c
 Revised Schematic Following Public Hearing Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



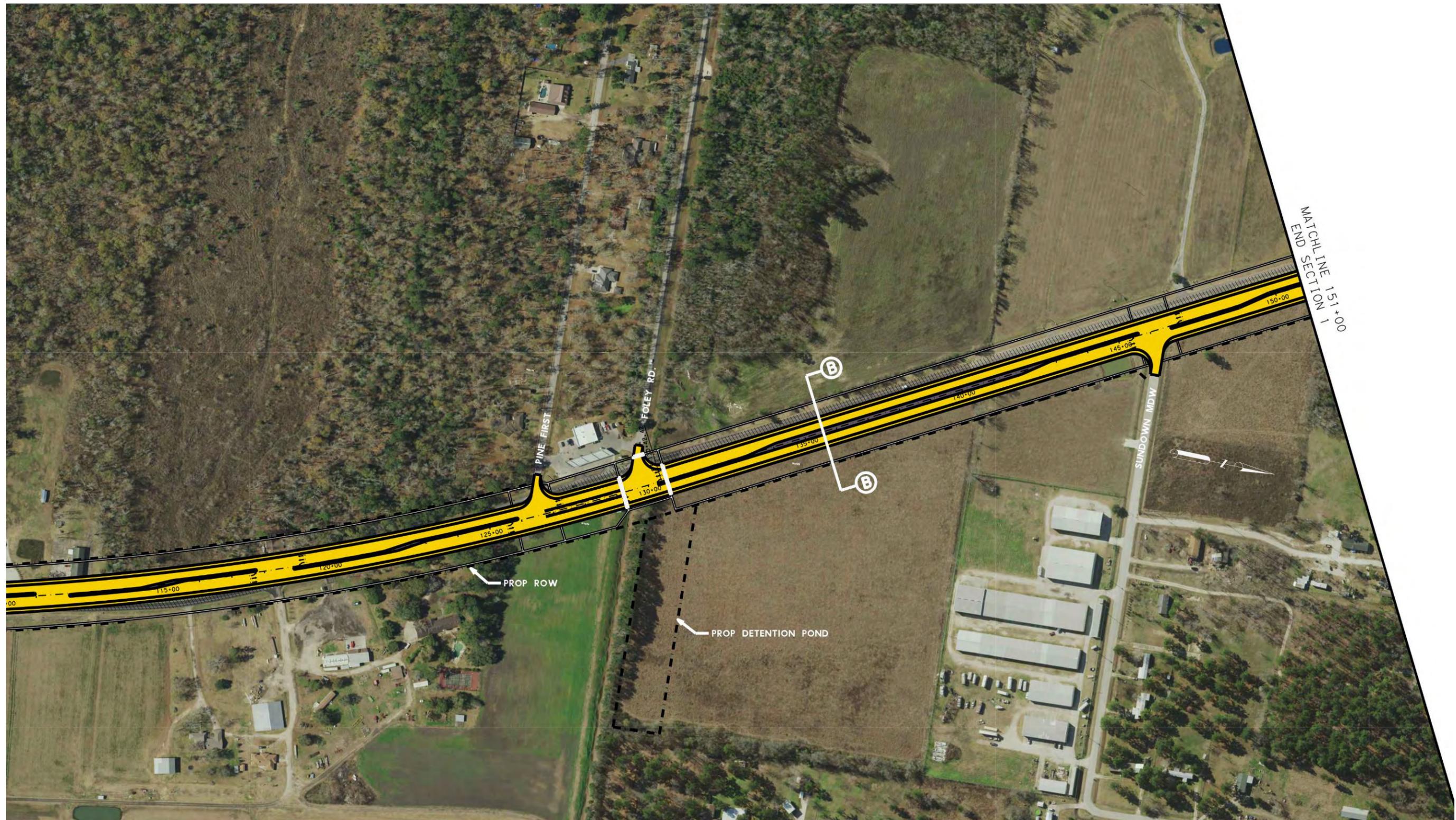
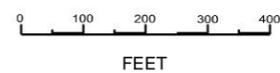


Figure 15d
 Revised Schematic Following Public Hearing Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



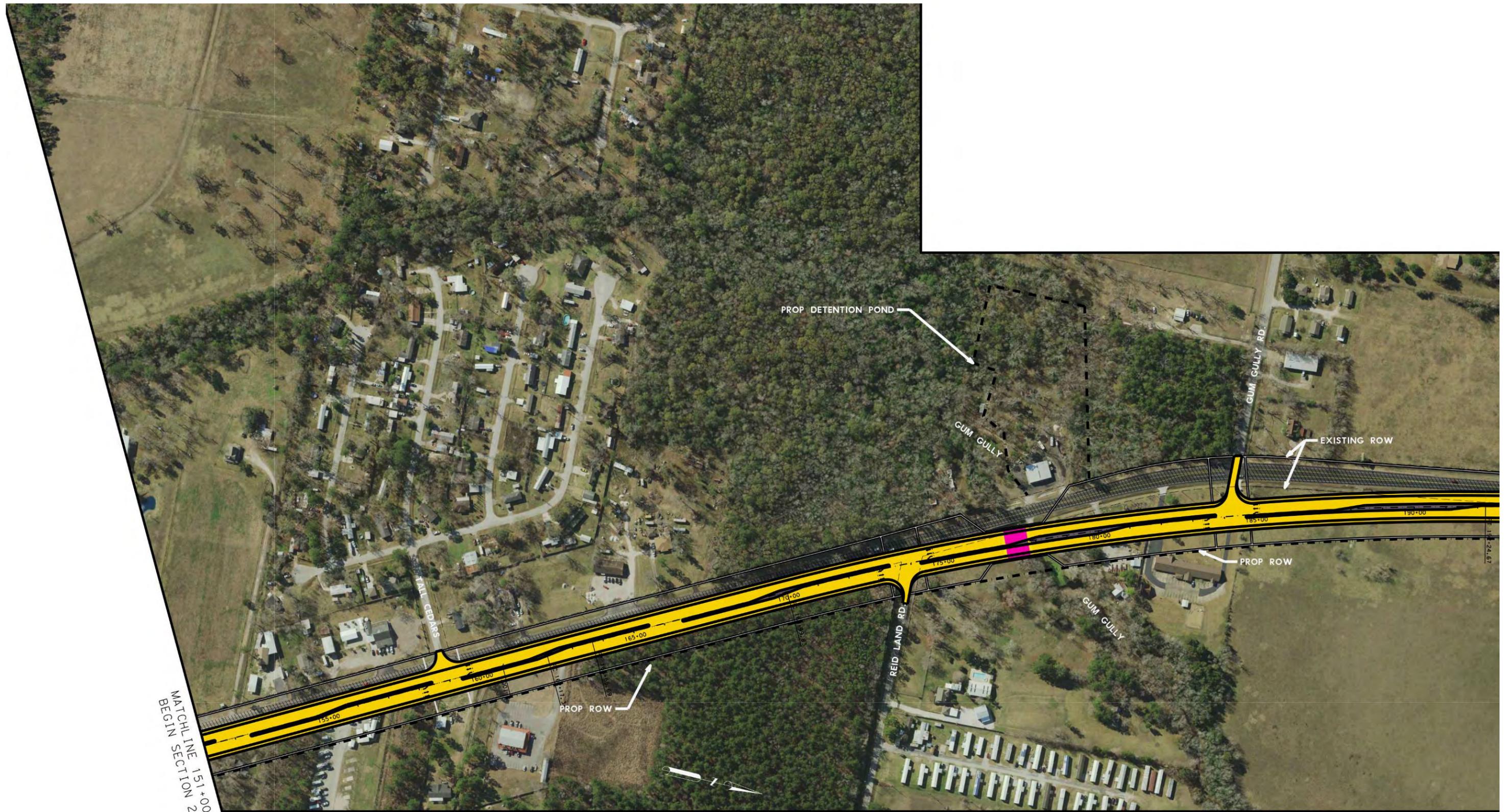
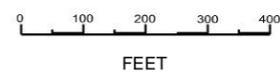


Figure 15e
 Revised Schematic Following Public Hearing Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



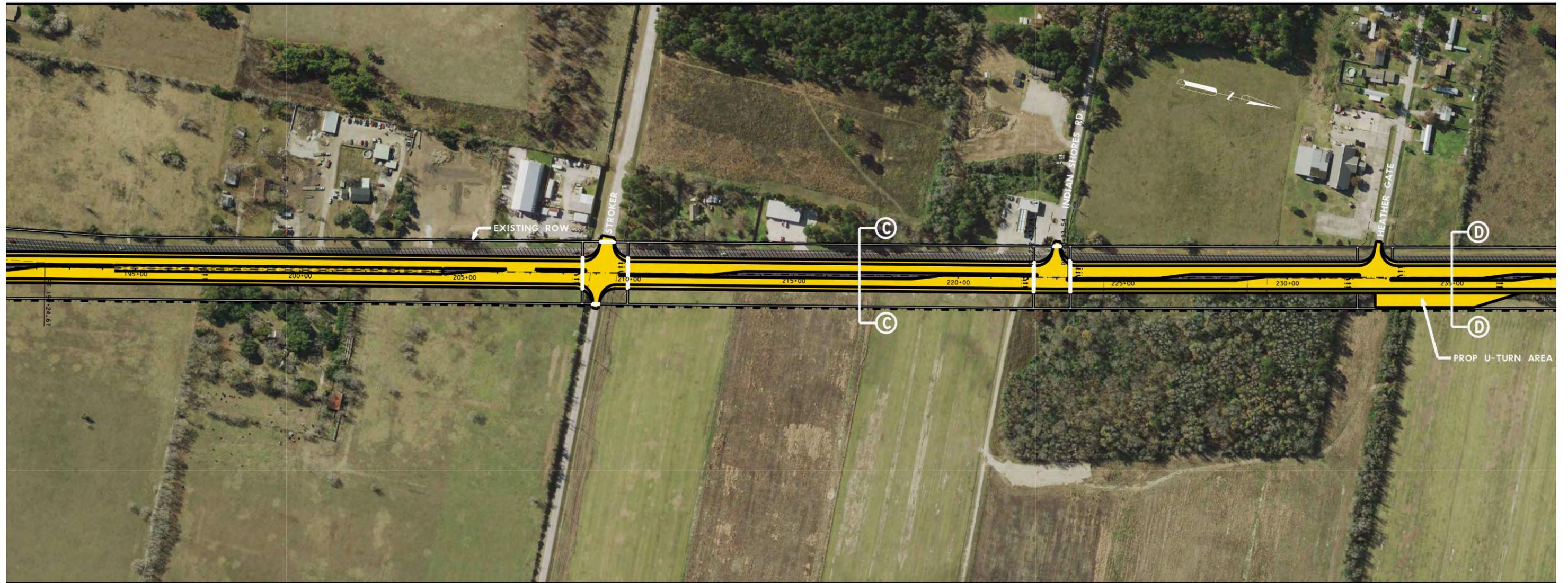
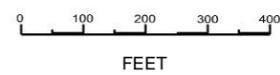
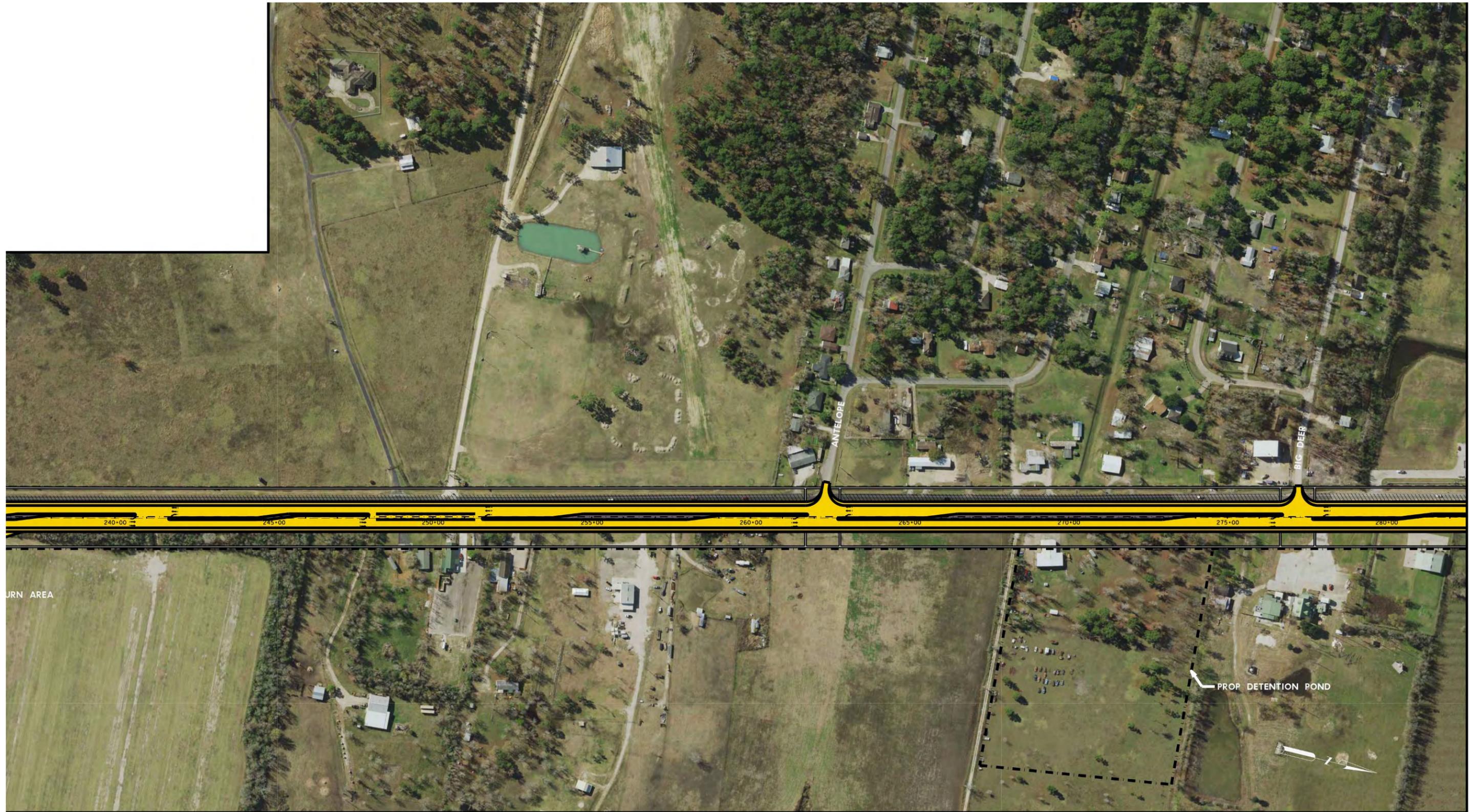


Figure 15f
 Revised Schematic Following Public Hearing Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



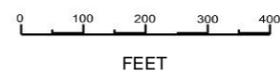


MATCHLINE 283+50
END SECTION 2

Figure 15g
 Revised Schematic Following Public Hearing Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



Figure 15h
 Revised Schematic Following Public Hearing Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



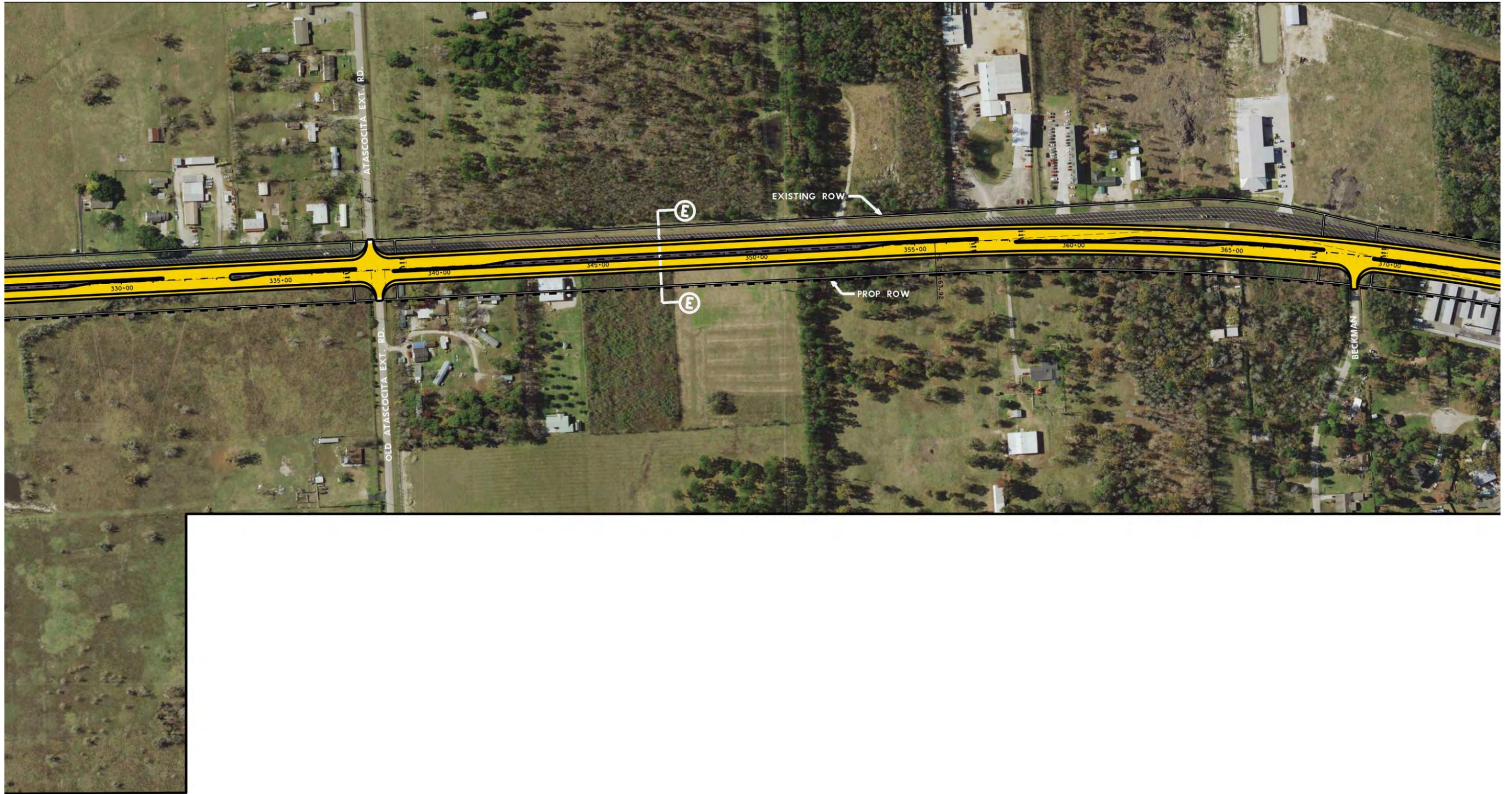
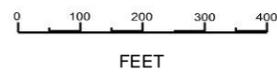


Figure 15i
 Revised Schematic Following Public Hearing Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



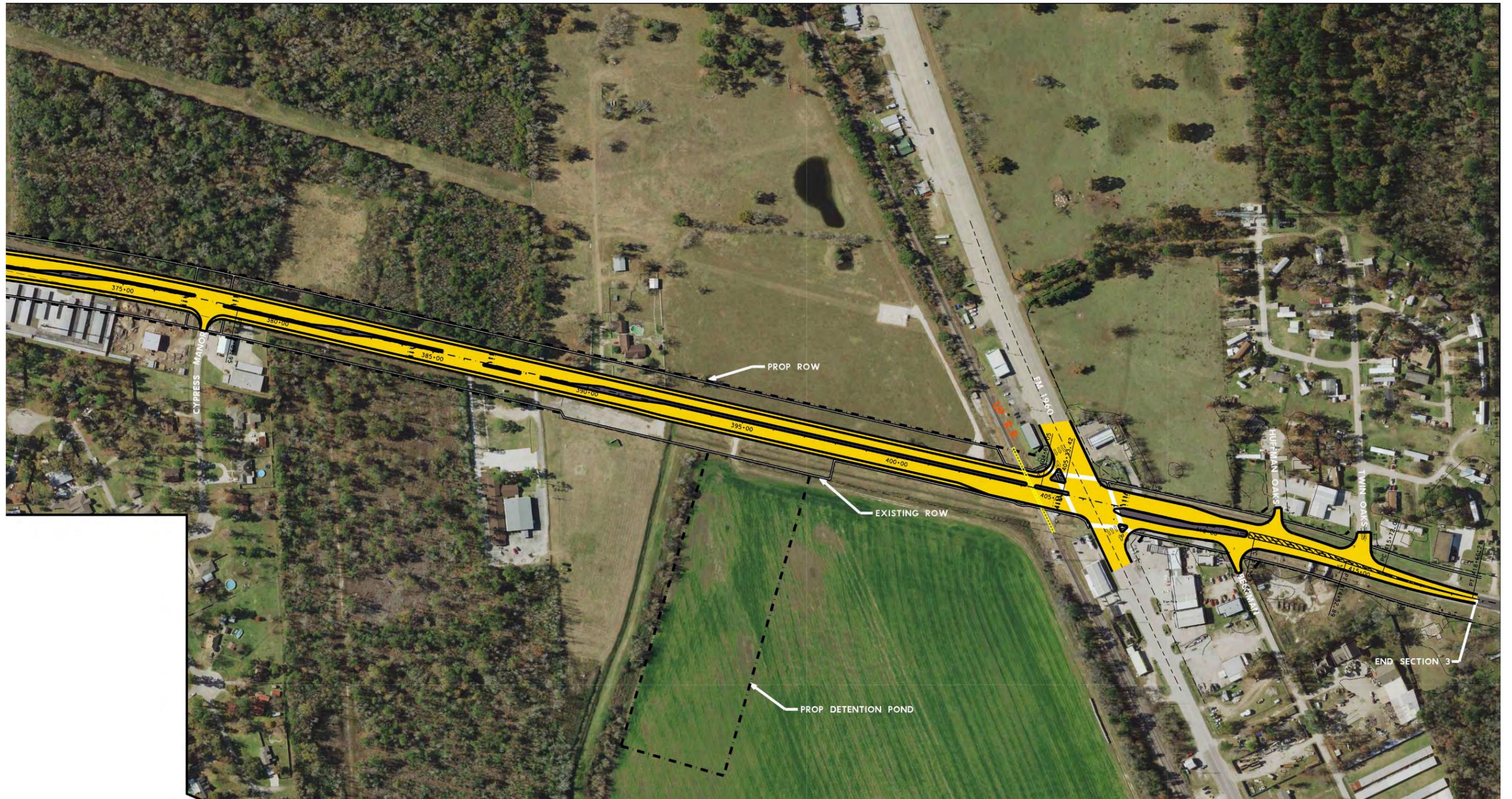
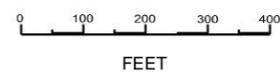


Figure 15j
 Revised Schematic Following Public Hearing Project Layout
 FM 2100 from FM 1960 to S Diamondhead Blvd
 CSJ: 1062-04-022



This page is intentionally left blank.

Appendix B
Project Area Photographs

This page intentionally left blank.



Photo 1: FM 2100 at Diamondhead Blvd (southern terminus), facing south.



Photo 2: FM 2100 at Hare Road, facing north.



Photo 3: View of relatively undeveloped land along east side of FM 2100, facing northeast.



Photo 4: View approaching FM 1960 (northern terminus), facing north.



Photo 5: Bridge at Gum Gully. View facing west.



Photo 6: Resource at 6422 FM 2100, determined eligible under Criterion C in previous phase of project development. View facing east.



Photo 7: Canal north of Hare Road, view facing east.

Appendix C
MTP/RTP and TIP Pages

This page intentionally left blank.

REGIONAL INVESTMENT PROGRAMS, REGIONALLY SIGNIFICANT PROJECTS SUBJECT TO CONFORMITY

MPOID	CSJ	County	Facility	From	To	Description	Length (mi)	Main Lanes	Frontage Lanes	Fiscal Year	Analysis Year	Total Project
												Cost (M, YOE)
LOCAL HIGH CAPACITY TRANSIT												
15241		Harris	UNIVERSITY LINE LRT CORRIDOR	HILLCROFT TRANSIT CENTER	EASTWOOD TRANSIT CENTER	METRO SOLUTIONS - UNIVERSITY CORRIDOR	10.0	n/a	n/a	2019	2025	\$ 1,000.00
14958		Harris	UPTOWN CORRIDOR	NORTHWEST TRANSIT CENTER	WESTPARK	METRO SOLUTIONS UPTOWN CORRIDOR	4.2	n/a	n/a	2035	2040	\$ 625.00
11765		Harris	US 290	AT N. POST OAK		NORTHWEST CORRIDOR HEMPSTEAD INTERMODAL TERMINAL	0.0	n/a	n/a	2023	2025	\$ 50.00
OTHER MAJOR ROADWAY IMPROVEMENTS												
2977		Harris	BELLAIRE BLVD	BW 8	FONDREN RD	WIDEN TO 8-LANES	2.1	(6,8)	n/a	2020	2025	\$ 28.33
60	0028-01-067	Harris	BU 90-U	IH 610 NE	E OF MESA RD (OLD FM 527)	WIDEN TO 6 LANE DIVIDED WITH CONTINUOUS LEFT TURN LANE AND BICYCLE ACCOMODATIONS	1.2	(4,6)	n/a	2018	2025	\$ 30.00
11079		Harris	CROSBY LYNCHBURG RD	FM 1942	ARCADIAN RD	WIDEN FROM 2-LANE ASPHALT TO 4-LANE CONCRETE	0.5	(2,4)	n/a	2015	2017	\$ 3.08
501	0523-08-007	Montgomery	FM 1488	JOSEPH RD	FM 1774	WIDEN FROM 2 TO 4-LANES WITH CONTINUOUS CENTER LFET TURN LANE AND BICYCLE ACCOMODATIONS	3.8	(2,4)	n/a	2025	2035	\$ 55.30
499	0523-09-009	Montgomery	FM 1488	FM 1774	W OF FM 149	WIDEN FROM 2 TO 4-LANES WITH CONTINUOUS CENTER LEFT TURN LANE AND BICYCLE ACCOMMODATIONS	4.0	(2,4)	n/a	2025	2035	\$ 82.40
204	1685-03-058	Harris	FM 1960	E OF HUMBLE	W OF SAN JACINTO RIVER BRIDGE	WIDEN TO 6-LANE DIVIDED WITH RAISED MEDIAN, CHANNELIZED TURN LANES AND 4-LANE OVERPASS AT WEST LAKE HOUSTON PKWY	6.1	(4,6)	n/a	2020	2025	\$ 135.76
537	1062-02-009	Harris	FM 2100	2.1 MI N OF WOLF RD	FM 1960	WIDEN TO 4-LANE DIVIDED ROADWAY WITH RAISED MEDIAN, INTERSECTION IMPROVEMENTS AND PEDESTRIAN AND BICYCLE ACCOMMODATIONS	4.4	(2,4)	n/a	2021	2025	\$ 151.10
538	1062-04-022	Harris	FM 2100	N OF HARE COOK RD	S DIAMONDHEAD BLVD	WIDEN TO 4-LANE DIVIDED	2.3	(2,4)	n/a	2017	2025	\$ 29.90
17048	1062-04-057	Harris	FM 2100	S OF ANTELOPE DR	N OF HARE COOK RD	WIDEN TO 4-LANE DIVIDED	2.5	(2,4)	n/a	2018	2025	\$ 33.50
17049	1062-04-058	Harris	FM 2100	FM 1960	0.23 MI S OF ANTELOPE DR	WIDEN TO 4-LANE DIVIDED	3.0	(2,4)	n/a	2018	2025	\$ 40.90
14711	1415-03-010	Fort Bend	FM 2759	S OF SANBURY BLVD	FM 762/FM 2759 ON CRABB RIVER RD	WIDEN TO 4-LANES DIVIDED (SEGMENT 2)	1.1	(2,4)	n/a	2017	2025	\$ 17.96

STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM
HOUSTON-GALVESTON MPO - HIGHWAY PROJECTS
FY 2017

2017-2020 STIP		07/2016 Revision: Approved 12/19/2016						
DISTRICT	MPO	COUNTY	CSJ	HWY	PHASE	CITY	YOE COST	
HOUSTON	HOUSTON-GALVESTON	HARRIS	1062-04-022	FM 2100	C	NONE	\$ 23,935,000	
LIMITS FROM N OF HARE COOK RD		PROJECT SPONSOR TXDOT						
LIMITS TO S DIAMONDHEAD BLVD		REVISION DATE 07/2016						
PROJECT WIDEN TO 4-LANE DIVIDED		MPO PROJ NUM 538						
DESCR		FUNDING CAT(S) 2M						
REMARKS		PROJECT HISTORY						
P7								
TOTAL PROJECT COST INFORMATION			AUTHORIZED FUNDING BY CATEGORY/SHARE					
PREL ENG \$	1,172,815		FEDERAL	STATE	REGIONAL	LOCAL	LC	TOTAL
ROW PURCH \$	0	COST OF APPROVED PHASES	2M \$ 0	\$ 23,935,000	\$ 0	\$ 0	\$ 0	\$ 23,935,000
CONSTR \$	23,935,000		TOTAL \$ 0	\$ 23,935,000	\$ 0	\$ 0	\$ 0	\$ 23,935,000
CONST ENG \$	1,196,750							
CONTING \$	2,393,500	\$ 23,935,000						
INDIRECT \$	1,215,898							
BOND FIN \$	0							
PT CHG ORD \$	0							
TOTAL CST \$	29,913,963							
2017-2020 STIP		07/2016 Revision: Approved 12/19/2016						
DISTRICT	MPO	COUNTY	CSJ	HWY	PHASE	CITY	YOE COST	
HOUSTON	HOUSTON-GALVESTON	MONTGOMERY	2744-01-011	FM 2854	C	CONROE	\$ 13,647,000	
LIMITS FROM LP 336		PROJECT SPONSOR TXDOT						
LIMITS TO IH 45		REVISION DATE 07/2016						
PROJECT RECONSTRUCT TO 4-LANE DIVIDED CURB & GUTTER		MPO PROJ NUM 503						
DESCR		FUNDING CAT(S) 7						
REMARKS		PROJECT HISTORY						
P7								
TOTAL PROJECT COST INFORMATION			AUTHORIZED FUNDING BY CATEGORY/SHARE					
PREL ENG \$	668,703		FEDERAL	STATE	REGIONAL	LOCAL	LC	TOTAL
ROW PURCH \$	0	COST OF APPROVED PHASES	7 \$ 10,917,600	\$ 2,729,400	\$ 0	\$ 0	\$ 0	\$ 13,647,000
CONSTR \$	13,647,000		TOTAL \$ 10,917,600	\$ 2,729,400	\$ 0	\$ 0	\$ 0	\$ 13,647,000
CONST ENG \$	682,350							
CONTING \$	1,364,700	\$ 13,647,000						
INDIRECT \$	693,268							
BOND FIN \$	0							
PT CHG ORD \$	0							
TOTAL CST \$	17,056,021							
2017-2020 STIP		07/2016 Revision: Approved 12/19/2016						
DISTRICT	MPO	COUNTY	CSJ	HWY	PHASE	CITY	YOE COST	
HOUSTON	HOUSTON-GALVESTON	MONTGOMERY	3510-07-003	SH 99	C,E,R	NONE	\$ 114,600,000	
LIMITS FROM US 59 N		PROJECT SPONSOR TXDOT						
LIMITS TO HARRIS C/L		REVISION DATE 07/2016						
PROJECT SEG H: CONSTRUCT 4-LANE TOLLWAY WITH INTERCHANGES AND TWO NON-CONTINUOUS 2-LANE		MPO PROJ NUM 367						
DESCR FRONTAGE ROADS		FUNDING CAT(S) 3RTR						
REMARKS		PROJECT HISTORY						
P7								
TOTAL PROJECT COST INFORMATION			AUTHORIZED FUNDING BY CATEGORY/SHARE					
PREL ENG \$	3,769,231		FEDERAL	STATE	REGIONAL	LOCAL	LC	TOTAL
ROW PURCH \$	19,230,769	COST OF APPROVED PHASES	3RTR \$ 0	\$ 114,600,000	\$ 0	\$ 0	\$ 0	\$ 114,600,000
CONSTR \$	76,923,077		TOTAL \$ 0	\$ 114,600,000	\$ 0	\$ 0	\$ 0	\$ 114,600,000
CONST ENG \$	3,076,923							
CONTING \$	7,692,308	\$ 114,600,000						
INDIRECT \$	3,907,692							
BOND FIN \$	0							
PT CHG ORD \$	0							
TOTAL CST \$	114,600,000							

STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM
HOUSTON-GALVESTON MPO - HIGHWAY PROJECTS
FY 2018

2017-2020 STIP		07/2016 Revision: Approved 12/19/2016						
DISTRICT	MPO	COUNTY	CSJ	HWY	PHASE	CITY	YOE COST	
HOUSTON	HOUSTON-GALVESTON	HARRIS	1062-04-058	FM 2100	C	NONE	\$ 27,714,000	
LIMITS FROM FM 1960		PROJECT SPONSOR TXDOT						
LIMITS TO 0.23 MI S OF ANTELOPE DR		REVISION DATE 07/2016						
PROJECT WIDEN TO 4-LANE DIVIDED		MPO PROJ NUM 17049						
DESCR		FUNDING CAT(S) 2M						
REMARKS		PROJECT HISTORY						
P7								
TOTAL PROJECT COST INFORMATION			AUTHORIZED FUNDING BY CATEGORY/SHARE					
PREL ENG \$	1,357,986		FEDERAL	STATE	REGIONAL	LOCAL	LC	TOTAL
ROW PURCH \$	6,500,000	COST OF APPROVED PHASES \$ 27,714,000	2M	\$ 0	\$ 27,714,000	\$ 0	\$ 0	\$ 27,714,000
CONSTR \$	27,714,000		TOTAL	\$ 0	\$ 27,714,000	\$ 0	\$ 0	\$ 27,714,000
CONST ENG \$	1,108,560							
CONTING \$	2,771,400							
INDIRECT \$	1,407,871							
BOND FIN \$	0							
PT CHG ORD \$	0							
TOTAL CST \$	40,859,817							

2017-2020 STIP		07/2016 Revision: Approved 12/19/2016						
DISTRICT	MPO	COUNTY	CSJ	HWY	PHASE	CITY	YOE COST	
HOUSTON	HOUSTON-GALVESTON	HARRIS	1062-04-057	FM 2100	C	NONE	\$ 23,935,000	
LIMITS FROM S OF ANTELOPE DR		PROJECT SPONSOR TXDOT						
LIMITS TO N OF HARE COOK RD		REVISION DATE 07/2016						
PROJECT WIDEN TO 4-LANE DIVIDED		MPO PROJ NUM 17048						
DESCR		FUNDING CAT(S) 2M						
REMARKS		PROJECT HISTORY						
P7								
TOTAL PROJECT COST INFORMATION			AUTHORIZED FUNDING BY CATEGORY/SHARE					
PREL ENG \$	1,172,815	COST OF APPROVED PHASES \$ 23,935,000	FEDERAL	STATE	REGIONAL	LOCAL	LC	TOTAL
ROW PURCH \$	3,600,000		2M	\$ 0	\$ 23,935,000	\$ 0	\$ 0	\$ 23,935,000
CONSTR \$	23,935,000		TOTAL	\$ 0	\$ 23,935,000	\$ 0	\$ 0	\$ 23,935,000
CONST ENG \$	1,196,750							
CONTING \$	2,393,500							
INDIRECT \$	1,215,898							
BOND FIN \$	0							
PT CHG ORD \$	0							
TOTAL CST \$	33,513,963							

2017-2020 STIP		07/2016 Revision: Not Approved 12/19/2016						
DISTRICT	MPO	COUNTY	CSJ	HWY	PHASE	CITY	YOE COST	
HOUSTON	HOUSTON-GALVESTON	HARRIS	0912-72-365	CS	C,E	HOUSTON	\$ 4,031,000	
LIMITS FROM VA		PROJECT SPONSOR CITY OF HOUSTON						
LIMITS TO VA		REVISION DATE 07/2016						
PROJECT IMPLEMENTATION OF AUTOMATED PARKING GUIDANCE SYSTEM (AGPS) INCLUDING DYNAMIC MES		MPO PROJ NUM 17047						
DESCR SAGE SIGNS AND INFORMATION SYSTEMS		FUNDING CAT(S) 5						
REMARKS Facility: HOUSTON CBD		PROJECT HISTORY						
P7								
TOTAL PROJECT COST INFORMATION			AUTHORIZED FUNDING BY CATEGORY/SHARE					
PREL ENG \$	272,519	COST OF APPROVED PHASES \$ 4,031,000	FEDERAL	STATE	REGIONAL	LOCAL	LC	TOTAL
ROW PURCH \$	0		5	\$ 3,224,800	\$ 0	\$ 0	\$ 806,200	\$ 4,031,000
CONSTR \$	3,956,000		TOTAL	\$ 3,224,800	\$ 0	\$ 0	\$ 806,200	\$ 4,031,000
CONST ENG \$	241,860							
CONTING \$	403,100							
INDIRECT \$	204,775							
BOND FIN \$	0							
PT CHG ORD \$	0							
TOTAL CST \$	5,078,254							

This page intentionally left blank.

Appendix D
Agency Coordination



Checklist

for Section 4(f) De Minimis Checklist for Historical Properties

Control Section Job Number (CSJ): 1062-04-022

District/County: Houston District/Harris County

Property ID: 34a-b

Property Name: 6422 FM 1200 Residence and Barn

The following checklist was developed as a tool to assist in streamlining the Section 4(f) *De Minimis* process and to ensure that all necessary information is documented in the File of Record (ECOS).

Note: This checklist is not all-inclusive and should be modified as appropriate with ENV approval.

For each of the following steps and/or items, check the appropriate box in the columns on the left. Check one box **ONLY**.

I. Section 4(f) Defining Criteria for Historical Properties

Yes **No**

- A. Is the property listed or eligible for the NRHP or NHL?

Comments: First identified in 2006 TxDOT survey of APE. TxDOT and the THC concurred that Resource 34a-b Residence and Barn are eligible for the NRHP on August 5, 2008.

II. Establishing Section 4(f) Use of the Property

Yes **No**

- A. Does the project require a use (i.e. new right of way, new easement(s), etc.)?
-

III. Establishing Section 4(f) *De Minimis* Eligibility

Yes **No**

- A. Was it determined that the project will not adversely affect the features or attributes that make the property eligible for Section 4(f) protection?
- B. Did the Official with Jurisdiction concur that the project will not adversely affect the features or attributes that make the property eligible for Section 4(f) protection?



IV. Documentation

The following **MUST** be attached to this checklist to ensure proper documentation of the Section 4(f) *De Minimis*:

- ✓ 1. Brief project description with explanation of how the property will be used. *SEE ATTACHED LETTER TO O&J*
- ✓ 2. A detailed map of the Section 4(f) property including:
 - ✓ a. Current and proposed ROW
 - ✓ b. Property boundaries
 - ✓ c. Existing and planned facilities*SEE ATTACHED SHPO-COORDINATION PACKET*
- ✓ 3. Concurrence letter with the Official with Jurisdiction



V. TxDOT Approval Signatures

ENV Technical Expert Reviewer Certification

I reviewed this checklist and all attached documentation and confirm that the above property and proposed project meet the requirements of 23 CFR 774 for a Section 4(f) *De Minimis* finding.

ENV Personnel Name

Date

TxDOT-ENV Section 4(f) *De Minimis* Final Approval

Based upon the above considerations, this Section 4(f) *De Minimis* satisfies the requirements of 23 CFR 774.

TxDOT-ENV, PD Director or designee

Date

rcvd 4/2/15



Texas Department of Transportation

125 EAST 11TH STREET | AUSTIN, TEXAS 78701-2483 | (512) 463-8588 | WWW.TXDOT.GOV

March 23, 2015

SECTION 106 REVIEW: DETERMINATION OF NRHP ELIGIBILITY AND NO ADVERSE EFFECT
SECTION 4(f) REVIEW: NOTIFICATION OF INTENT TO RENDER *DE MINIMIS* SECTION 4(F) FINDING
Harris County / Houston District
FM 2100 Widening from S. Diamondhead Blvd. to FM 1960
CSJ: 1062-04-022

Ms. Linda Henderson
History Programs
Texas Historical Commission
Austin, TX 78711

RECEIVED
APR 07 2015
History Programs Division

Dear Ms. Henderson:

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. In accordance with 36 CFR 800 and our first amended Programmatic Agreement for Transportation Undertakings (PA-TU 2005), this letter initiates Section 106 consultation on the effect the proposed undertaking poses for the residence and barn at 6422 FM 2100 located within the project's area of potential effects (APE). As a consequence of these agreements, TxDOT's regulatory role for this project is that of the Federal action agency.

Project Description

The Texas Department of Transportation (TxDOT) proposes to widen FM 2100 from South Diamondhead Blvd. to FM 1960 in Harris County, Texas. The 7.3-mile project would widen the existing roadway from 36 feet to 88 feet. The existing facility consists of two 12-foot lanes with 6-foot shoulders, and the proposed undertaking calls for four 12-foot travel lanes, curb and gutter, a 16-foot raised median, 10-foot shoulders, sidewalks, and detention ponds.

Our office first coordinated this project with you via letter dated July 14, 2008. At that time, we also provided your office with a copy of the reconnaissance survey conducted for this project. This letter serves to the update your project files with the addition of detention ponds along the route of the project. TxDOT is completing the environmental process at this time. For more details on the project, please see the attachment.

Determination of Eligibility

TxDOT conducted background research to identify properties listed on the National Register of Historic Places (NRHP) and State Antiquities Landmarks (SAL), and Recorded Texas Historic Landmarks (RTHL). There were no NRHP, SAL, RTHL or Official Texas Historical Markers (OTHM) located within the project APE. TxDOT historians determined the area of potential effects (APE) for this project is 150 feet from the existing and proposed new ROW.

TxDOT conducted a survey of the APE in 2006. That survey identified 52 historic-age resources (built prior to 1966) within the APE. Only one property, Resource 34a-b Residence and Barn (6422 FM 2100), met the threshold for historic properties as defined under 36 CFR 800 (see attached letter to THC, 2008). Your office reviewed and concurred with our determination on August 5, 2008.

In 2015, TxDOT historians reviewed the APE to identify any potential historic properties that date prior to 1972 (the new historic-age cut-off date) and to identify any potential historic properties within 150-feet of the new detention ponds added to the ROW. Historians did not identify any historic properties that fall between the historic-age period of the survey (1966) and 1972, nor any properties within the APE for the new detention ponds. Historians confirmed the continued presence of the eligible residence and barn.

Determination of Effect

- **Direct Effect:** The proposed project requires a small corner clip from 6422 FM 2100, identified as Resource 34a-b in the 2006 project survey (see Figure 2b, Location of APE for Historic Resources and Sheet 1 of Project Layout). Resource 34a is a c. 1940 Neoclassical residence with a c. 1920 front-gable barn (34b). Resource 34a is eligible for the NRHP under Criterion C: Architecture as a good example of the Neoclassical style. The property currently includes 1.842 acres and approximately 0.080 acres of new ROW would be required from the far northwest side of the property. This "corner clip" does not adversely affect the property's location, design, materials, workmanship, setting, feeling, and association. The ROW taking would remove approximately 40 feet of the fence that runs along the northern property boundary line in order to accommodate a safe turning radius for traffic from FM 2100 onto Hare Road. However, the fence is not historic-age and is not a contributing feature of the property. The associated land is also not a contributing feature of the property as it has been reduced by 54% from its original size and is no longer used for agricultural purposes. In addition, the corner clip would be from the far northwest corner of the property where the current pavement edge is 80 feet from Resource 34a and the proposed pavement edge would be 60 feet from the residence. Therefore, the project will have **no adverse effect** to 6422 FM 1200 (Resource 34a-b).
- **Indirect Effects:** Project activities pose no indirect effects on the Resource 34. Only a small percentage of the overall property will be used for this project, and the pavement at the corner clip would only move 20 feet closer to the house.
- **Cumulative Effects:** Additionally, project activities pose no foreseeable cumulative adverse effects to Resource 34 because the project would not impair its function as a residence.

Determination of *De Minimis* Finding

As part of this coordination, TxDOT determines that the proposed project meets the requirements for a Section 4(f) *de minimis* impact finding under 23 CFR 774. TxDOT bases its determinations on the fact that the use for Resource 34a-b amounts to less than 1% of the property's overall acreage and the project will have **no adverse effect** on the eligible property.

Conclusion

In accordance with 36 CFR 800 and our 2005 Programmatic Agreement for Transportation Undertakings, I hereby request your signed concurrence with TxDOT's finding of **no adverse effect** to the residence and barn at 6422 FM 2100 (Resource 34a-b). We additionally notify you that SHPO is the designated official with jurisdiction over Section 4(f) resources protected under the provisions of

23 CFR 774 and that your comments on our Section 106 findings will be integrated into decision-making regarding prudent and feasible alternatives for purposes of Section 4(f) evaluations. Final determinations for the Section 4(f) process will be rendered by TxDOT pursuant to 23 U.S.C. 327 and the afore-mentioned MOU dated 12-16-14.

We look forward to further consultation with your staff and hope to maintain a partnership that will foster effective and responsible solutions for improving transportation, safety and mobility in the state of Texas. Thank you for your cooperation in this federal review process. If you have any questions or comments concerning these evaluations, please contact me at (512) 416-2570 or rebekah.dobrasko@txdot.gov.

Sincerely,

Rebekah Dobrasko

Rebekah Dobrasko
Historic Preservation Specialist
Historical Studies Branch
Environmental Affairs Division

cc: Bruce Jensen, Cultural Resources Section Director, *BJ*

CONCURRENCE WITH NON-ARCHEOLOGICAL SECTION 106 FINDINGS:
HISTORIC PROPERTY PRESENT: 6422 FM 2100 RESIDENCE AND BARN
NO ADVERSE EFFECT: 6422 FM 2100 RESIDENCE AND BARN

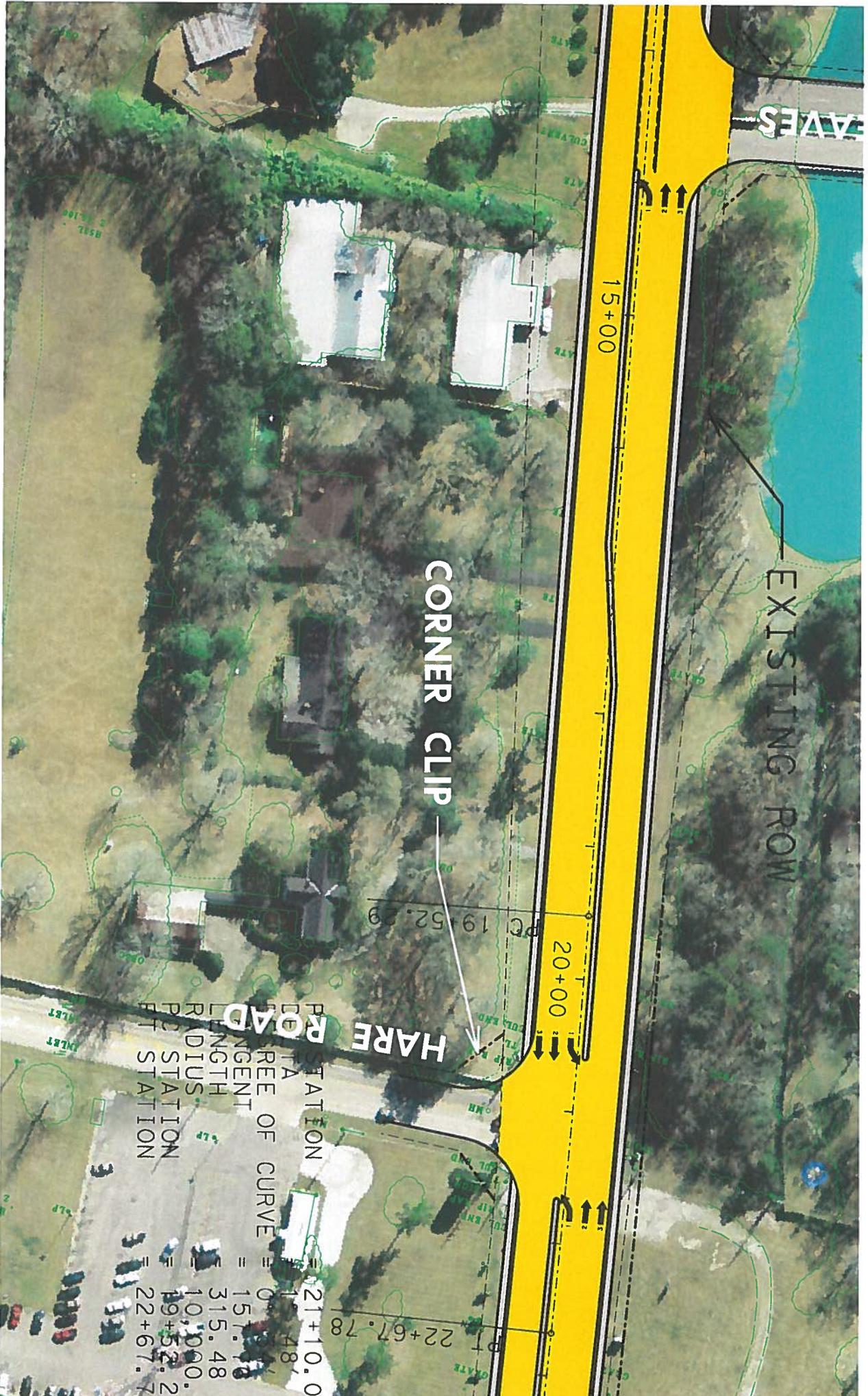
NAME: *Mark Wolfe*
for Mark Wolfe, State Historic Preservation Officer

DATE: *29 April 2015*

NO COMMENTS ON DETERMINATION OF DE MINIMIS IMPACT UNDER SECTION 4(F) REGULATIONS

NAME: *Mark Wolfe*
for Mark Wolfe, State Historic Preservation Officer

DATE: *29 April 2015*



AVES

EXISTING ROW

15+00

20+00

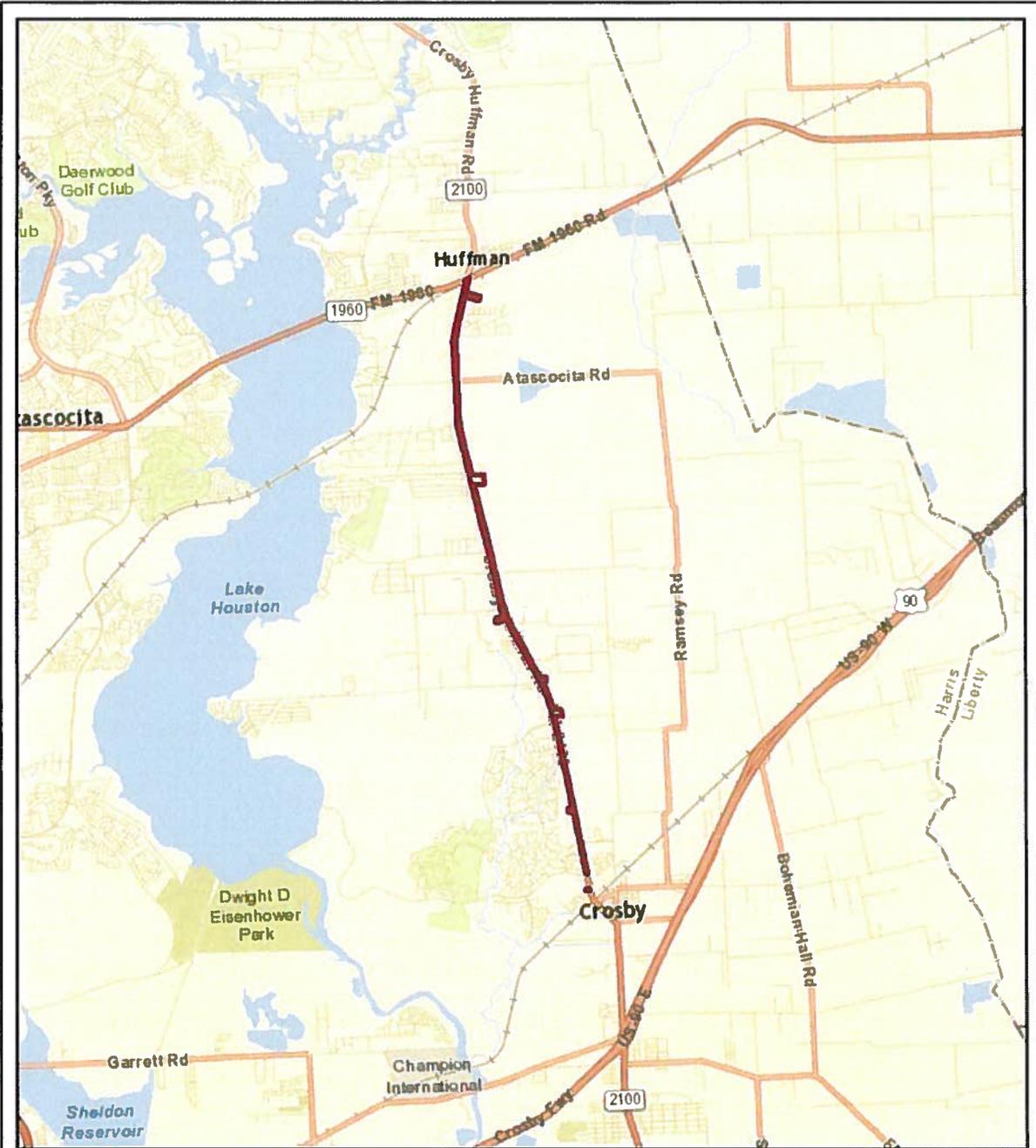
PC 19+52.29

HARE

CORNER CLIP

PT 22+67.78

STATION = 21+10.0
 AREA = 11.48
 DEGREE OF CURVE = 0
 LENGTH = 157.10
 RADIUS = 315.48
 PC STATION = 19+52.29
 PT STATION = 22+67.7



Project Location

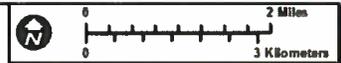
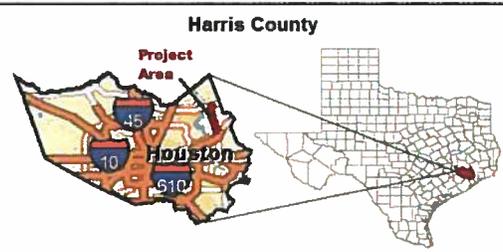


Figure 1
Project Location

Prepared for: TxDOT	1 in = 2 miles
CSJ: 1082-04-022	Scale: 1:128,720
	Date: 11/20/2014



-  150-foot APE
-  1/4-mile Study Area
-  Proposed Right-of-Way
-  Existing Right-of-Way
-  Proposed Detention Pond
-  Historical Marker
-  Cemetery
-  Parcels

Data Sources: THC (2014), HCAD (2014), ESRI (2013)
 Aerial Source: NAIP (2012)



Figure 2b
Location of APE
for Historic Resources

Prepared for: TxDOT	1 in = 1,000 feet
CSJ: 1082-04-022	Scale: 1:12,000
	Date: 11/20/2014

Project Area Photos



Photo 5: BIN#121020106204007 at Gum Gully. View facing west.



Photo 6: Resource at 6422 FM 2100, determined eligible under Criterion C in previous phase of project development. View facing east.



Texas Department of Transportation[®]

DEWITT C. GREER STATE HIGHWAY BLDG. • 125 E. 11TH STREET • AUSTIN, TEXAS 78701-2483 • (512) 463-8585

September 10, 2015

Section 106/Antiquities Code of Texas: Review and Comments (Permit #7228)
FM 2100 Expansion Project (CSJ: **1062-04-022**, -057, -058)
Houston District; Harris County

Ms. Patricia A. Mercado-Allinger
Division Director/State Archeologist
Archeology Division
Texas Historical Commission
PO Box 12276
Austin, TX 78711-2276

Dear Ms. Mercado-Allinger:

The proposed project will be undertaken with Federal funding. In accordance with Section 106 (and the First Amended Programmatic Agreement among the Texas Department of Transportation [TxDOT], the Texas State Historical Preservation Officer [TSHPO], the Federal Highway Administration [FHWA], and the Advisory Council on Historic Preservation) and the Antiquities Code of Texas (and the Memorandum of Understanding between the Texas Historical Commission [THC] and TxDOT), this letter initiates consultation for the proposed undertaking.

The proposed project would expand Farm-to-Market Road (FM) 2100 between South Diamondhead Boulevard and FM 1960 in Harris County, Texas. The proposed expansion would widen the existing two-lane roadway to accommodate between two additional main-lanes, raised median, paved shoulders and sidewalks, and seven detention ponds. Project is approximately 7.7 miles in length. Approximately 200-ft of additional right-of-way (ROW) would be acquired at various points along the FM 2100 APE for the proposed improvements. The proposed ROW would be acquired from privately-owned property. The APE is defined as the existing and proposed ROW and the depth of construction impacts. Depth of impacts is generally 3-ft or less across most of the APE, but would extend to as much as 10-ft in depth for the detention ponds.

The APE was previously surveyed by the Prewitt and Associates, Inc. (PAI), a consultant for the Environmental Affairs Division of TxDOT. PAI conducted a background review and an intensive survey (under Permit #3893) in November 2005 for the proposed project (1062-04-022 and -02-009). The Houston District of TxDOT attempted to acquire right-of-entry (ROE) to the proposed ROW; however, only a portion of the ROE needed was acquired for this survey. The intensive survey of the APE was incomplete due to the lack of ROE. No archeological historic properties, State Archeological Landmarks, State Historical Landmarks, nor properties eligible for listing on the National Record of Historic Places have been recorded within the APE of this proposed project. The Geologic Atlas of Texas, Houston Sheet (BEG, UT-Austin, 1982), depicts the proposed project APE within an area mapped as Pleistocene Beaumont Formation. The Soil Survey of Harris County, Texas (SCS-USDA, 1976), maps the entire APE as Aldine-Ozan association soils and Lake Charles series soils. The Houston PALM mapped the APE as Map Units #1, #2a, and #4. Map Unit #1 recommends an intensive survey with mechanical trenching if deep impacts are anticipated. Map Unit #2 recommends a surface survey only. Map Unit #4

OUR GOALS

MAINTAIN A SAFE SYSTEM • ADDRESS CONGESTION • CONNECT TEXAS COMMUNITIES • BEST IN CLASS STATE AGENCY

An Equal Opportunity Employer

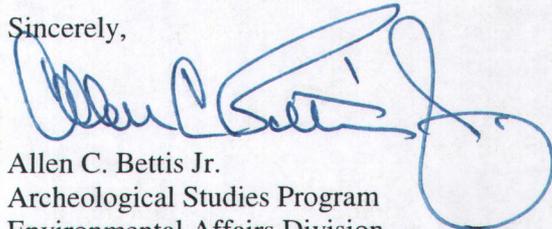
recommends no archeological survey needed. The PAI survey did not encounter any archeological materials within the APE. The results of this survey were coordinated with your office on March 7, 2006 and received your concurrence on March 8, 2006 on TxDOT's recommendations for no further investigations needed for the portions of the APE that were previously investigated and to defer the remainder of the archeological survey until that time that access has been acquired.

In 2015, Cox/McClain Environmental Consulting, Inc. (COX), an archeological contractor to the Houston District, conducted an intensive survey under Texas Antiquities Permit #7228 of the remaining parcels of proposed ROW within that portion of the APE that had been denied ROE, but still warranted an archeological survey. The remaining parcels within the APE were assessed via pedestrian survey, shovel-testing, and mechanical trenching. No archeological materials were encountered during the survey and the APE was found to be extensively disturbed. Based on this information, COX recommended that the remainder APE was disturbed, does not warrant any further archeological investigation, and should be allowed to proceed to construction. TxDOT agrees with this recommendation.

Please find attached for your review and comment the COX draft archeological survey report; *Intensive Archeological Survey for Proposed Improvements to Farm-to-Market Road 2100 from South Diamond Head Boulevard to FM 1960, Harris County, Texas*. TxDOT recommends that the report is satisfactory and acceptable. TxDOT further requests your concurrence that the inventory is complete and sufficient, that the proposed undertaking would have no effect on any archeological sites, archeological properties, or State Archeological Landmarks, no further archeological investigations are warranted, and the proposed undertaking should be allowed to proceed to construction. If you have no comments on or objections to this report or the above recommendations, and find it acceptable, please sign below to indicate your concurrence and stamp the draft cover as acceptable.

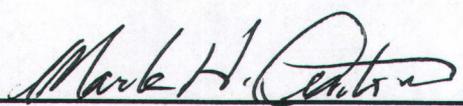
Thank you for your consideration in this matter. If you have any questions or further need of assistance, please contact Allen Bettis of the TxDOT Archeological Studies Program at (512) 416-2747.

Sincerely,



Allen C. Bettis Jr.
Archeological Studies Program
Environmental Affairs Division

cc w/o attachments: Missy Green – Cox/McClain Environmental Consulting, Inc.
Christine Bergren – Houston District APD
ACB TTO PA File


Concurrence:
for Mark S. Wolfe, State Historic Preservation Officer

9-17-15
Date:

DRAFT

**Intensive Archeological Survey for
Proposed Improvements to Farm-to-Market Road 2100
from South Diamondhead Boulevard to FM 1960
Harris County, Texas
(CSJ: 1062-04-022)**

Prepared by
Melissa M. Green, MA, RPA (Principal Investigator)
Cox | McLain Environmental Consulting, Inc.
6010 Balcones Drive, Suite 210
Austin, TX 78731

For
Texas Department of Transportation
Houston District

Under
Texas Antiquities Permit 7228

Cox | McLain Environmental Consulting Inc.
Archeological Report 099
(CMEC-AR-099)



COX | McLain
Environmental Consulting

**DRAFT REPORT
ACCEPTABLE**

by *Mark Wolfe*
Executive Director, THC

Date 9-17-15

Track# _____

August 7, 2015

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 December 16, 2014, and executed by FHWA and TxDOT.

This report contains archeological site location information (not for public disclosure).



DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
 P. O. BOX 1229
 GALVESTON, TEXAS 77553-1229

August 8, 2016

REPLY TO
 ATTENTION OF:

Evaluation Branch

SUBJECT: Permit No. SWG-2016-00408; Nationwide Permit Verification

Mr. Pat Henry
 Texas Department of Transportation – Houston District
 P.O. Box 1386
 Houston, Texas 77251

Dear Mr. Henry:

This is in reference to your permit application submitted on June 8, 2016, requesting authorization to permanently place 386 cubic yards of fill material into 0.144 acre of waters of the United States (U.S.), including wetlands, at 8 crossings, during the roadway improvements for Farm-to-Market Road (FM) 2100. Refer to the table below for specific details.

Table 1. Jurisdictional Waters of the U.S. and Associated Aquatic Resources

Aquatic Resource	Activity	Fill Cubic yards	Permanent Impact	
			(Acres)	Crossing
W1 wetlands	Fill during culvert replacement	32.3	0.04	1
C-1 canal	Fill during culvert replacement	194	0.04	2
D-2 ditch	Fill during culvert replacement	32.3	0.02	3
D-3 ditch	Fill during culvert replacement	16.1	0.01	4
D-4 ditch	Fill during culvert replacement	3.2	0.002	5
Unnamed Tributary to Gum Gully	Fill during culvert replacement	24.2	0.01	6
WL-2 PEM	Fill during culvert replacement	25.8	0.016	7
C-2 San Jacinto River Authority Canal	Fill during culvert replacement	58.1	0.006	8
TOTALS		386	0.144	

The project route is located in waters of the United States (U.S.), including wetlands, adjacent to Gum Gully, along the shoulders of FM 2100, from the intersection of South Diamondhead Boulevard and FM 2100, and continues north for approximately 7.7 miles, in eastern Harris County, Texas.

This request is verified by Nationwide Permit (NWP) 14 pursuant to Section 404 of the Clean Water Act (CWA). This NWP verification is valid provided the activity is compliant with the enclosed plans, in 12 sheets, and NWP General/Regional Conditions. In addition, the activity must be in compliance with the Texas Commission on Environmental Quality's Best Management Practice Guidelines, which can be found at <http://bit.ly/1xPybPm>. A hard copy can be provided to you upon request.

Nationwide Permit 14 authorizes activities required for the construction, expansion, modification, or improvement of linear transportation crossings in waters of the United States, including wetlands.

This NWP verification is valid until the NWP is modified, reissued, or revoked. All of the existing NWPs are scheduled to be modified, reissued, or revoked prior to March 19, 2017. It is incumbent upon you to remain informed of changes to the NWPs. We will issue a public notice when the NWPs are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant NWP is modified or revoked, you will have 12 months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this NWP. The following special conditions have been added to your authorization:

1. The permittee shall not initiate activities in the permit area associated with this permit, which have not previously been evaluated by the United States (U.S.) Army Corps of Engineers (Corps) as part of the permit review for this project, until such work has been submitted to and approved by the Corps. Such activities include, but are not limited to, haul roads, equipment staging areas, and borrow and disposal sites. The permit area includes all waters of the U.S. affected by activities associated with the project, as well as any additional area(s) of non-waters of the U.S. in the immediate vicinity of, directly associated with, and/or affected by, activities in waters of the U.S. Special restrictions may be required for such work. The permittee shall develop procedures to ensure that contractors are aware of this condition and encourage contractors to coordinate their selection of these sites with the permittee as soon as possible to avoid construction delays. The permittee, or its designated agent/contractor, may coordinate with the Corps on compliance with this special condition.

2. The permittee shall conduct a meeting with the construction contractor or contractors detailing the terms and conditions of this permit prior to commencing construction activities of the project. The permittee shall notify the Galveston District of the pre-construction meeting at least two weeks in advance of the scheduled meeting. Within two weeks following the meeting, the permittee will also provide written confirmation to the Corps that the meeting was held.

The impacts to waters of the U.S. associated with this NWP verification are based on a preliminary jurisdictional determination (PJD) for your subject site. If you wish, you may request an approved jurisdictional determination (AJD) (which may be appealed), by submitting a written request to us within 30 days from the date of this letter. Please note that if you request an AJD and then decide to appeal it, the appeal will not be accepted if any work has started in waters of the U.S. or that would alter the hydrology of waters of the U.S.

Corps determinations are conducted to identify the limits of the Corps CWA jurisdiction for particular sites. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are U.S. Department of Agriculture (USDA) program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

If you have any questions regarding this verification, please contact Ms. Kristy Farmer at the letterhead address or by telephone at 409-766-3935. Please notify the Chief of the Compliance Branch in the Galveston District Regulatory Division, in writing, at the letterhead address, upon completion of the authorized project.

FOR THE DISTRICT COMMANDER:



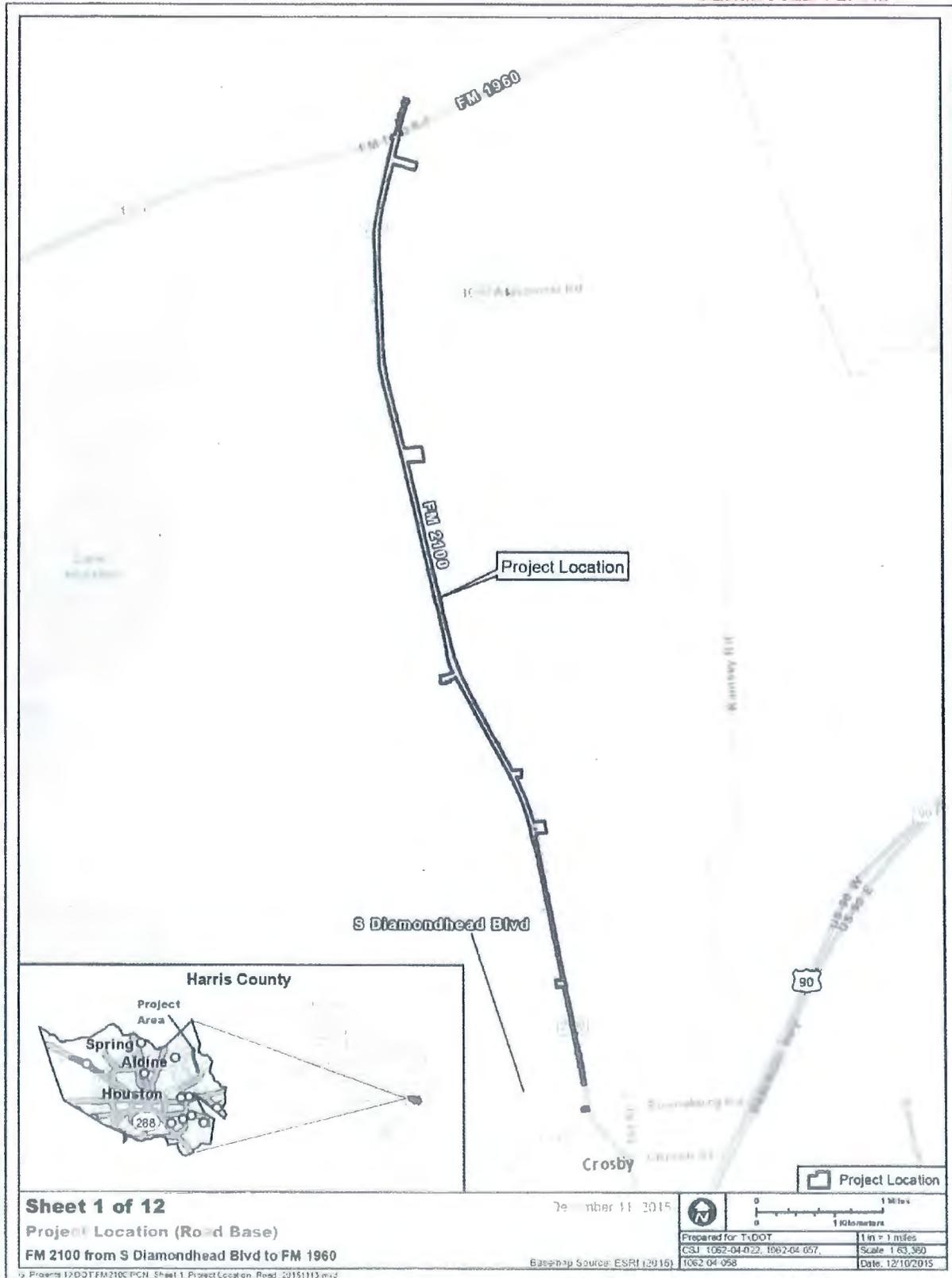
Kristi N. McMillan
Leader, Central Evaluation Unit

Enclosures

Copies Furnished:

Ms. Reina J. Gonzalez by electronic mail: Reina.Gonzalez@txdot.gov
Texas General Land Office, Corpus Christi, TX
Texas General Land Office, Austin, TX
U.S. Fish and Wildlife Service, Houston, TX

PERMITTED PLANS



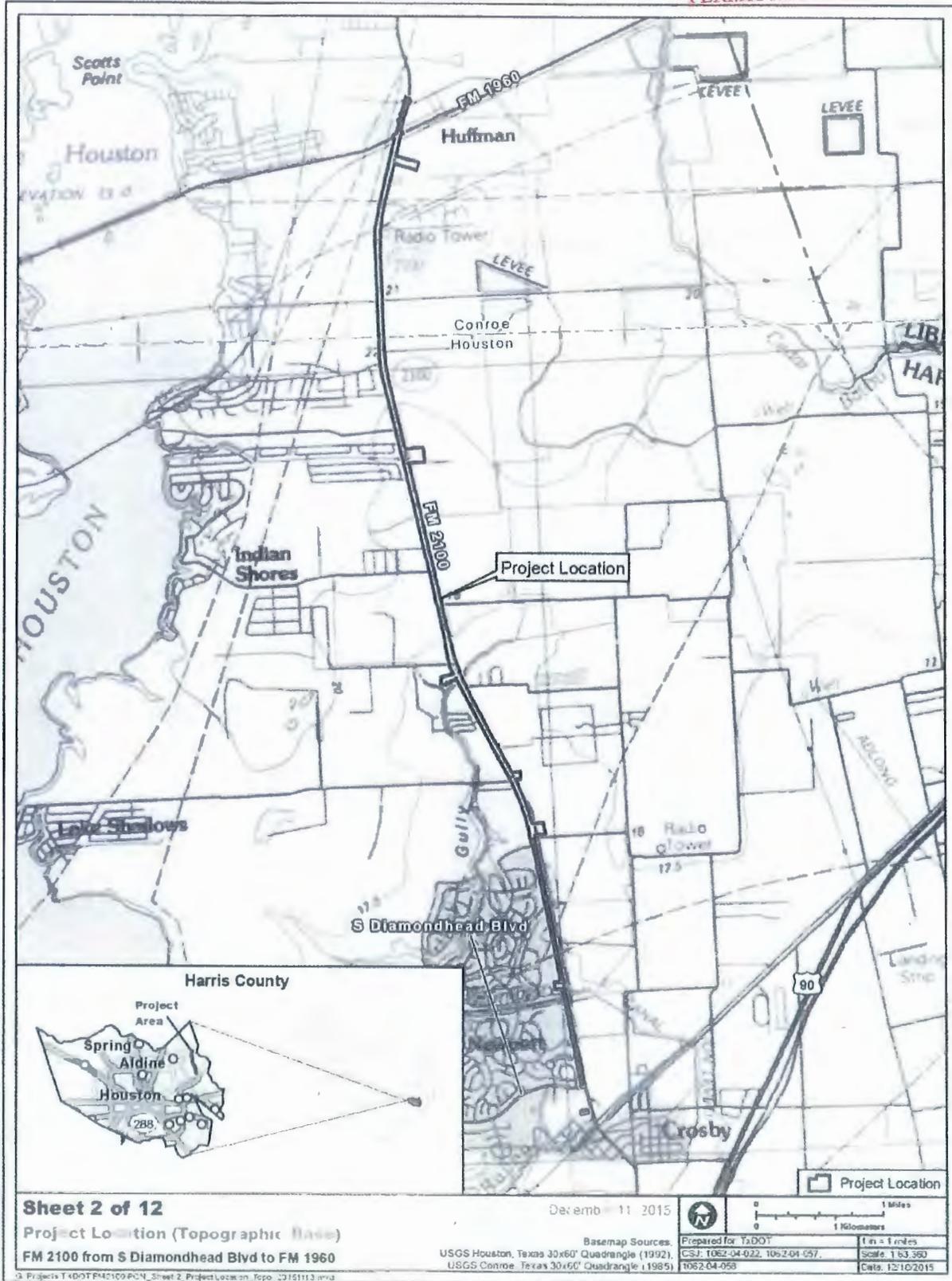
Sheet 1 of 12
Project Location (Road Base)
FM 2100 from S Diamondhead Blvd to FM 1960

December 11, 2015

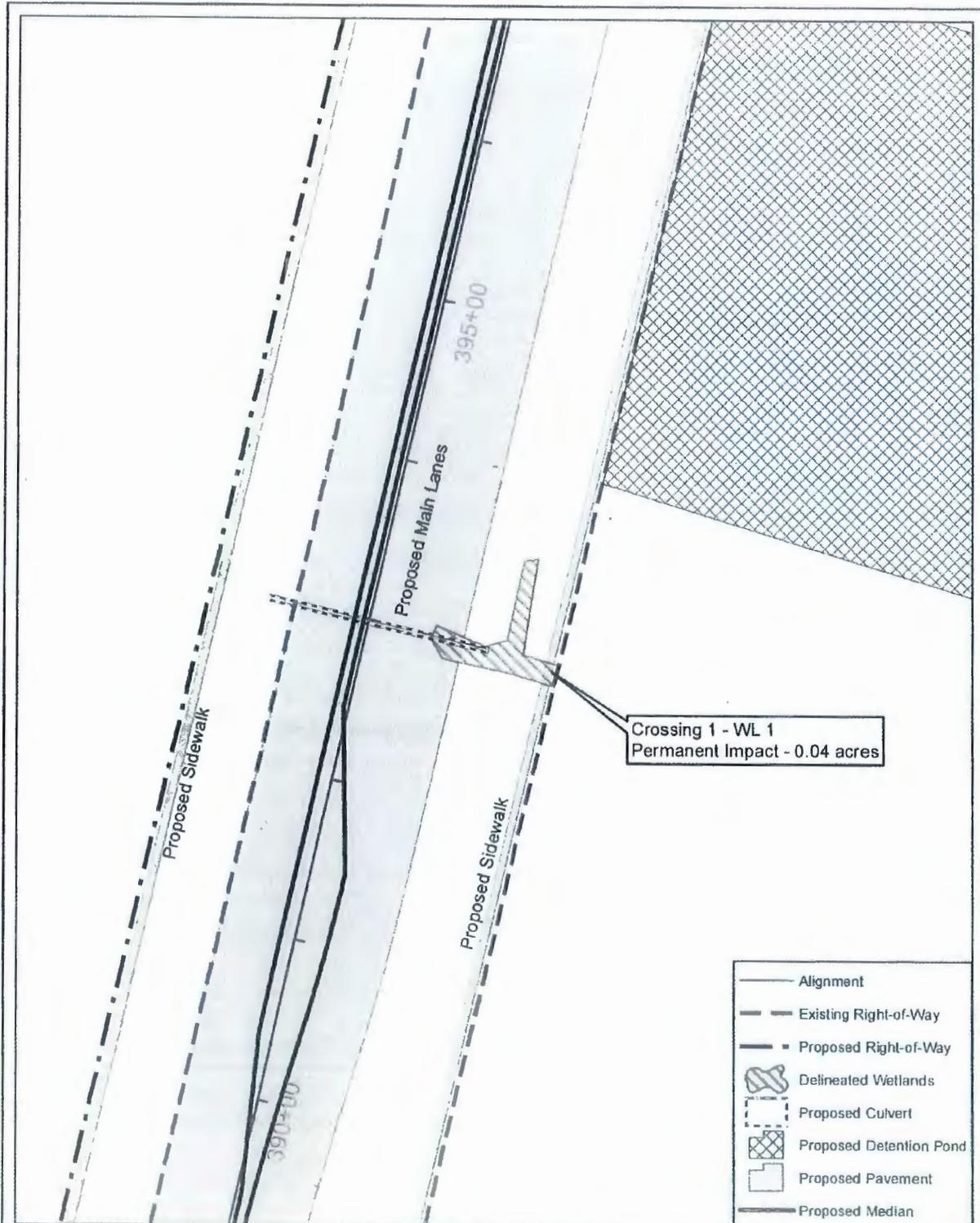
	0	1 Miles
	1:63,360	
	1 in = 1 miles	Scale 1:63,360
Prepared for TxDOT	CSJ 1062-04-022, 1062-04-057,	Date: 12/10/2015
Base Map Source: ESRI (2015)	1062-04-058	

Project: TxDOT FM 2100 PCN_Sheet 1_Project Location_Road_20151113.mxd

PERMITTED PLANS



PERMITTED PLANS



- Alignment
- - - Existing Right-of-Way
- - - Proposed Right-of-Way
- Delineated Wetlands
- Proposed Culvert
- Proposed Detention Pond
- Proposed Pavement
- Proposed Median

Sheet 3 of 12
 Crossing 1, Wetland 1
 FM 2100 from S Diamondhead Blvd to FM 1960

12/10/2015

0 20 Meters 40 Feet

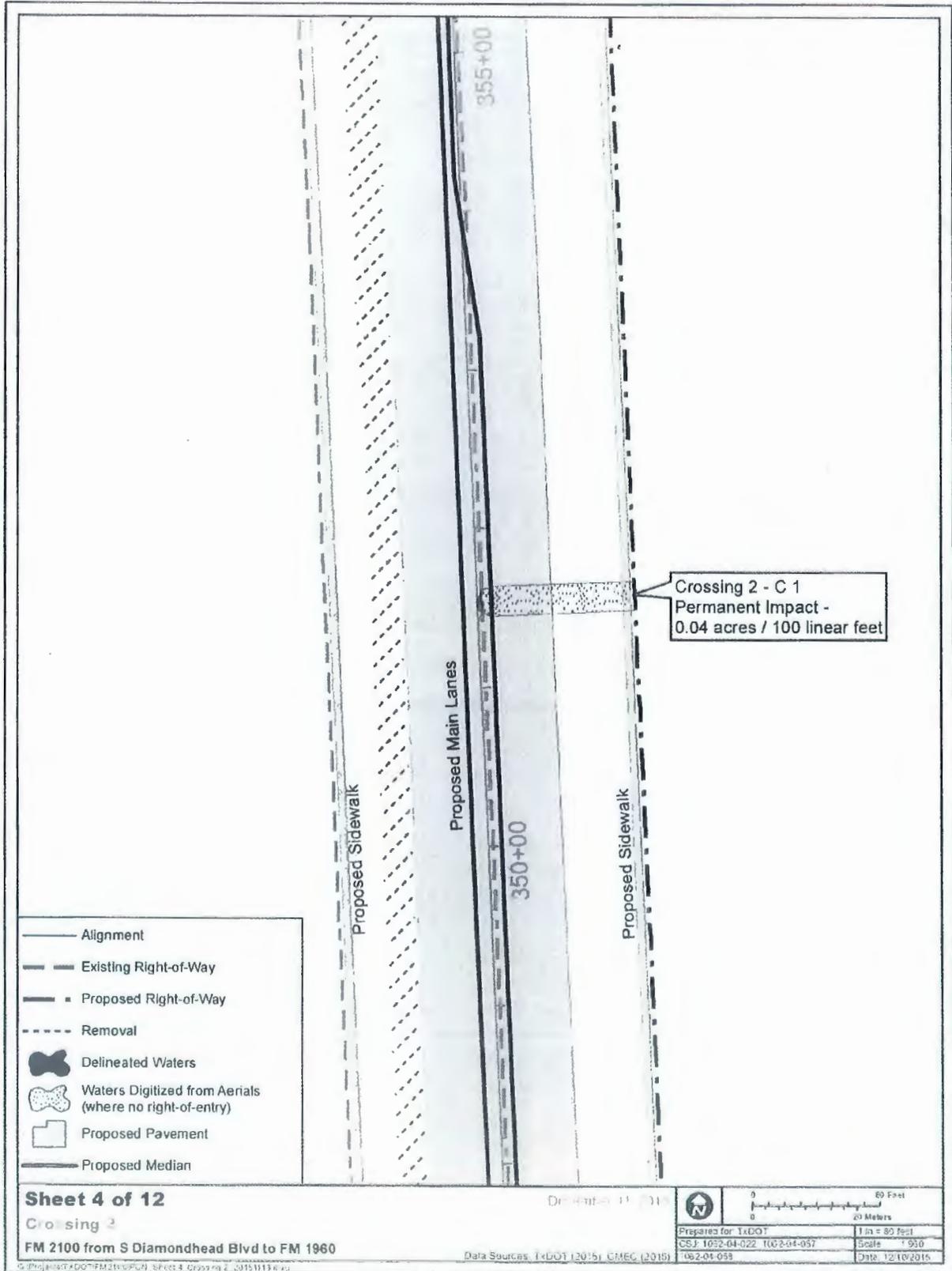
1 in = 80 feet

Prepared for: TxDOT	Scale: 1/80
CSJ: 1062-04-022, 1062-04-057	Date: 12/10/2015
1062-04-058	

3:\projects\TxDOT\FM2100\PCS_Sheet_3_Crossing_1_20151113.mxd

Data Sources: TxDOT (2015), GMEG (2015)

PERMITTED PLANS



- Alignment
- - - Existing Right-of-Way
- ■ - Proposed Right-of-Way
- - - - Removal
- 👤 Delineated Waters
- 👤 Waters Digitized from Aerials (where no right-of-entry)
- 👤 Proposed Pavement
- Proposed Median

Sheet 4 of 12
Crossing 2
FM 2100 from S Diamondhead Blvd to FM 1960

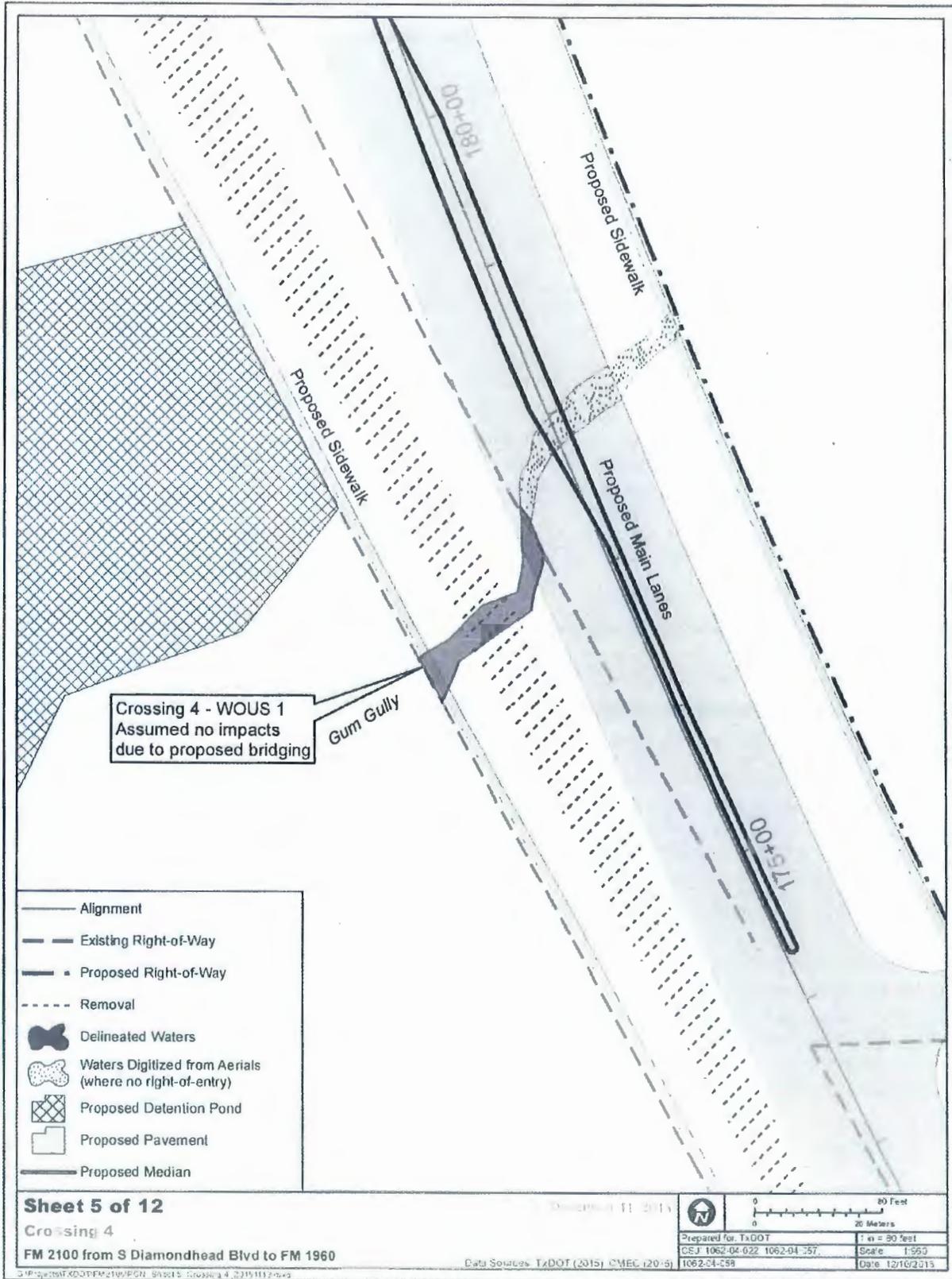
Drawn by: 11/10/16

Prepared for: TxDOT	1 in = 80 feet
CSJ: 1652-04-022, 1002-04-057	Scale: 1/8" = 1' @ 10'
1652-04-058	Date: 12/10/2016

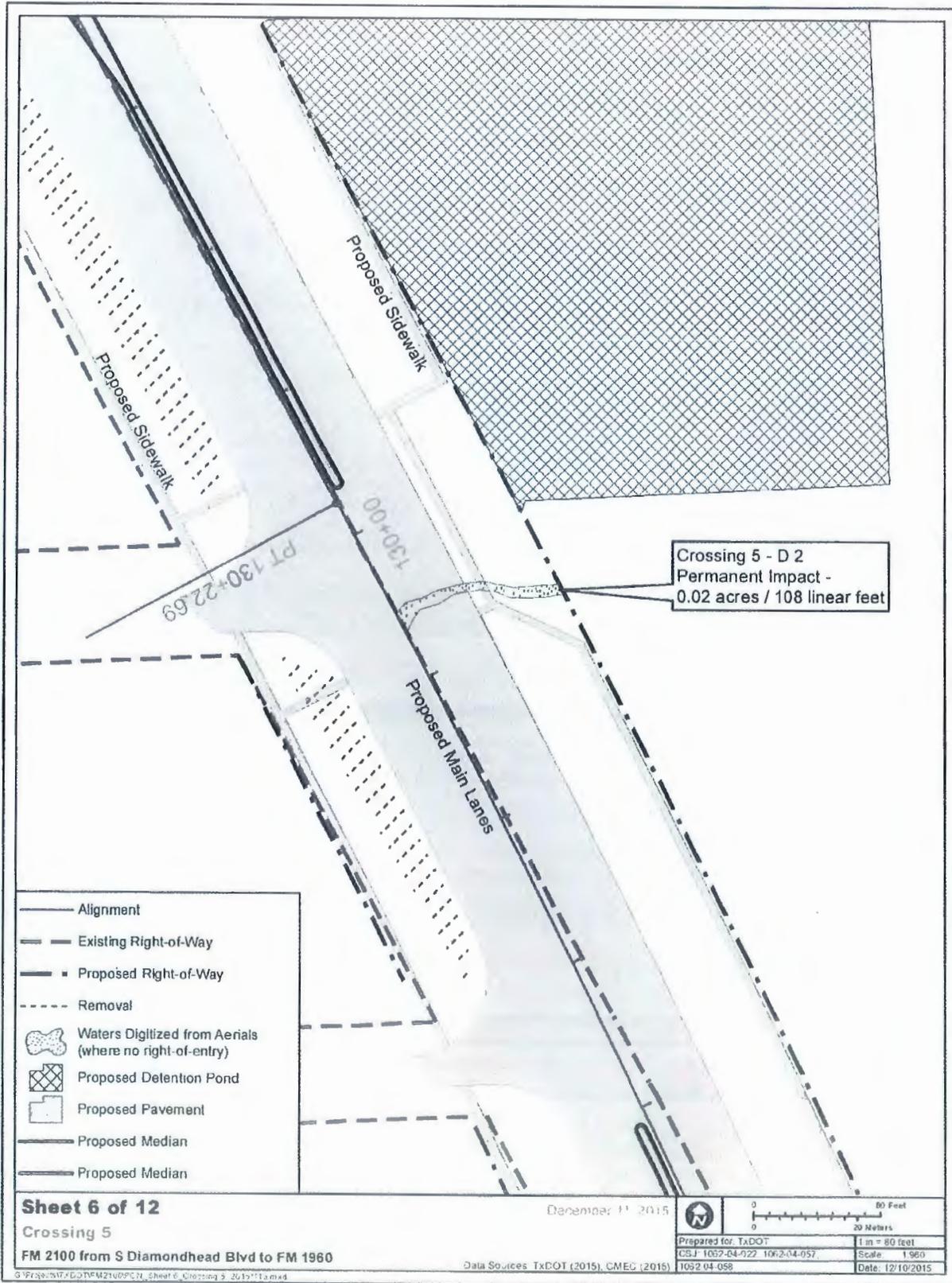
Data Sources: TxDOT (2015), CMEC (2015)

S:\Projects\2016\DOT\FM 2100\PCU - Sheet 4 - Crossing 2 - 20151119.dwg

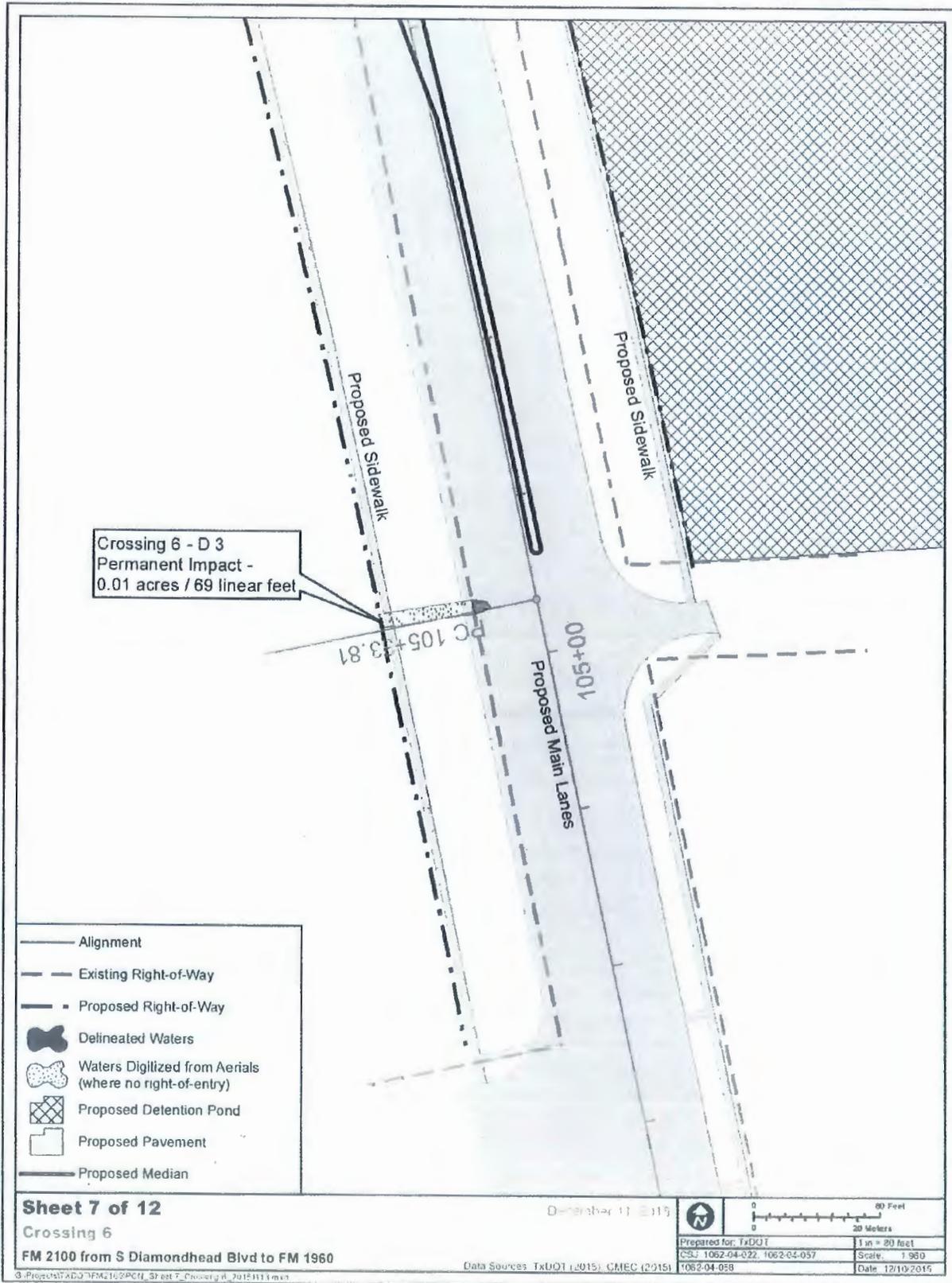
PERMITTED PLANS



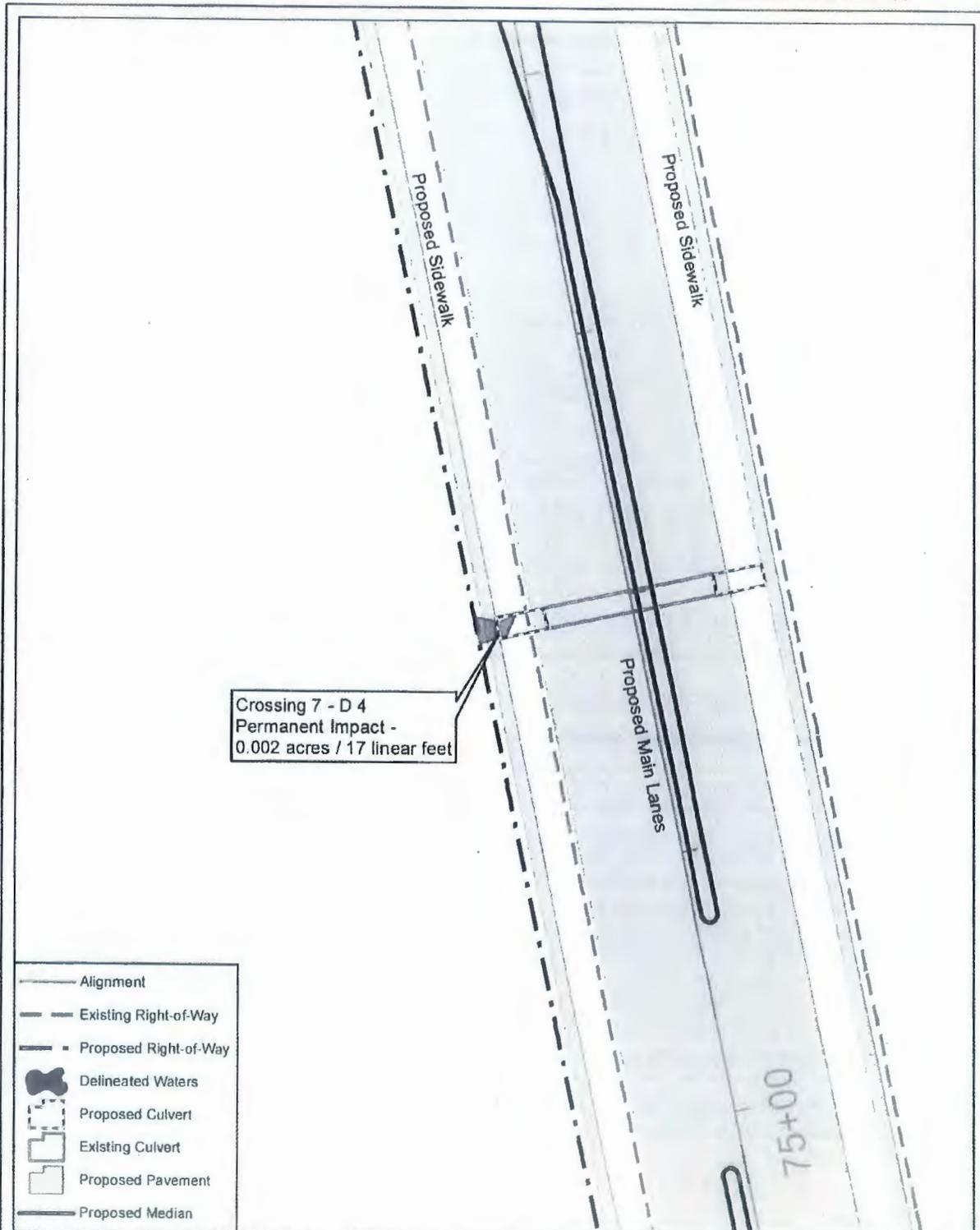
PERMITTED PLANS



PERMITTED PLANS



PERMITTED PLANS



- Alignment
- Existing Right-of-Way
- Proposed Right-of-Way
- Delineated Waters
- Proposed Culvert
- Existing Culvert
- Proposed Pavement
- Proposed Median

Sheet 8 of 12

Crossing 7

FM 2100 from S Diamondhead Blvd to FM 1960

December 11, 2015

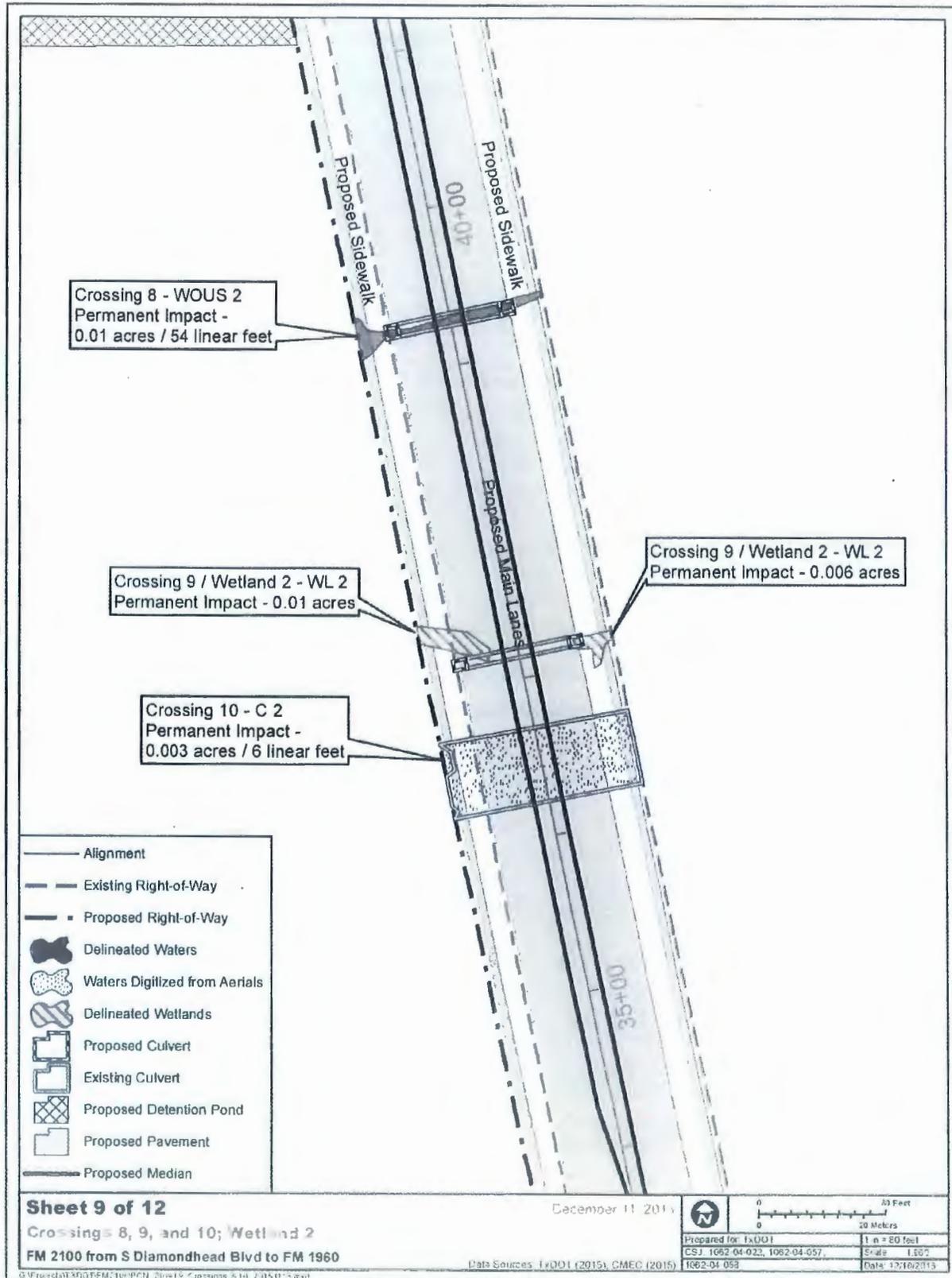


Prepared for TxDOT	1 in = 50 feet
CSJ 1062-04-022, 1062-04-037	Scale 1:600
1062-04-058	Date 12/10/2015

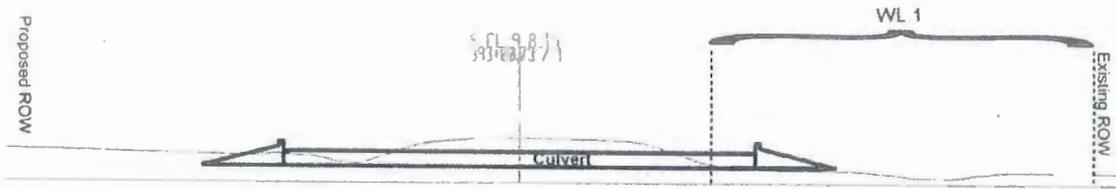
G:\Project\TxDOT\FM1960\PCN_Sheet 8_Crossing 7_20151113.mxd

Data Sources: TxDOT (2015), CMFC (2015)

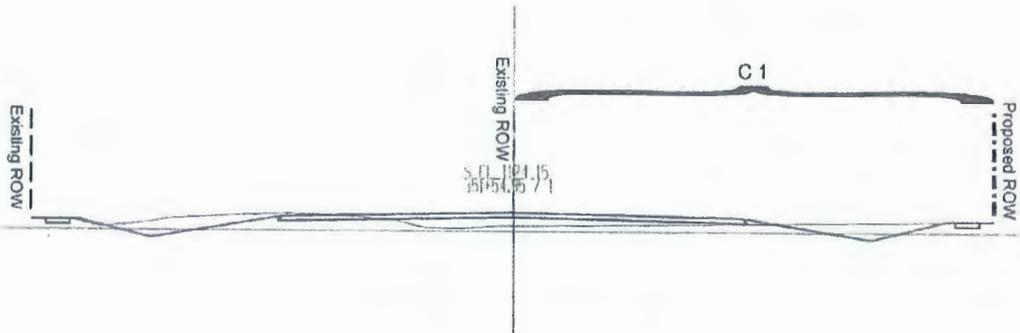
PERMITTED PLANS



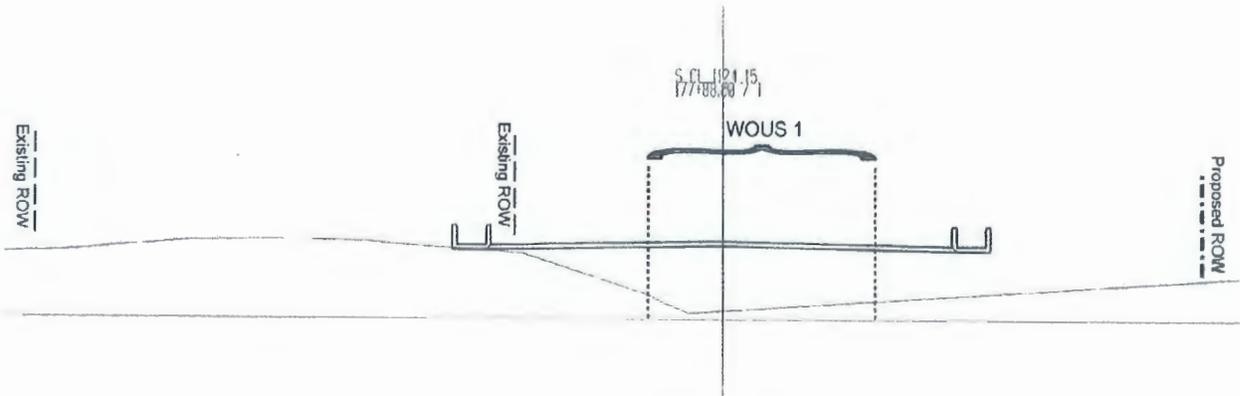
PERMITTED PLANS



Crossing 1 - WL 1 at STA 393+00.73

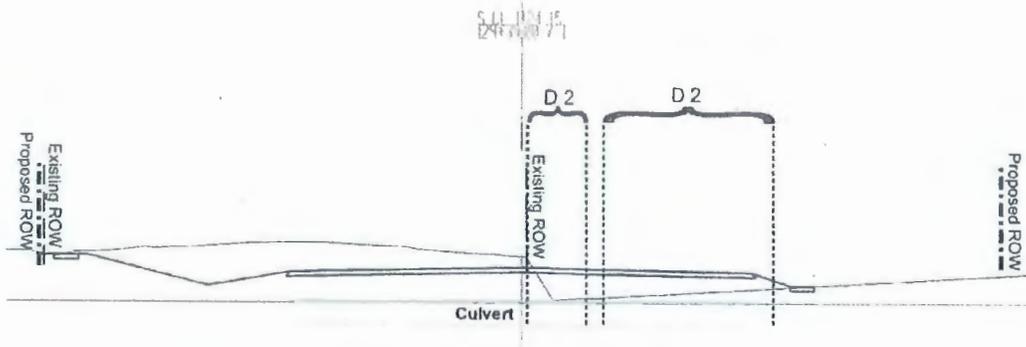


Crossing 2 - C 1 at STA 351+54.95

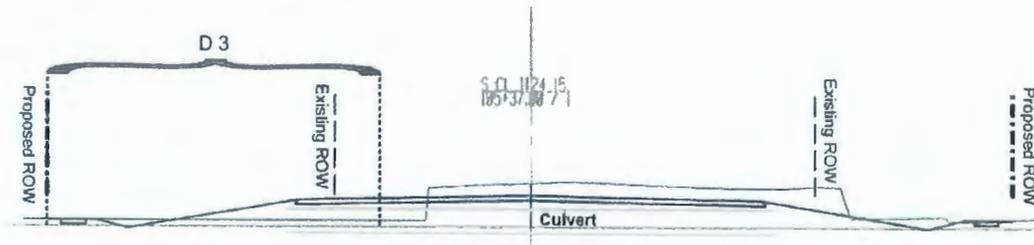


Crossing 4 - WOUS 1 at STA 177+88.00

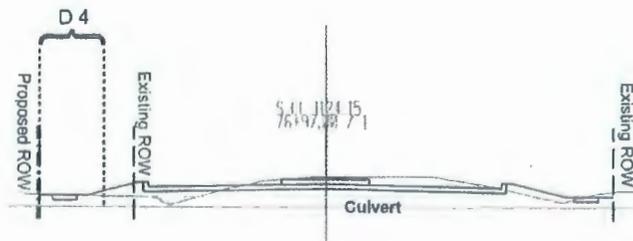
PERMITTED PLANS



Crossing 5 - D 2 at STA 129+39.00

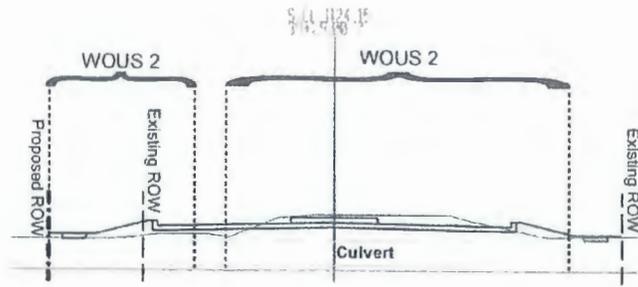


Crossing 6 - D 3 at STA 105+37.00

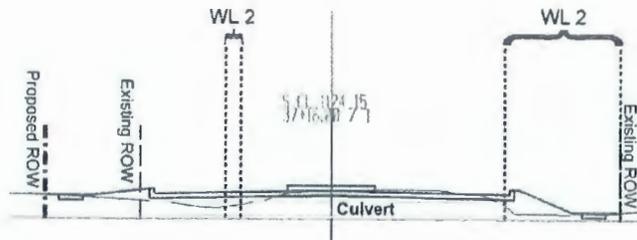


Crossing 7 - D 4 at STA 76+97.00

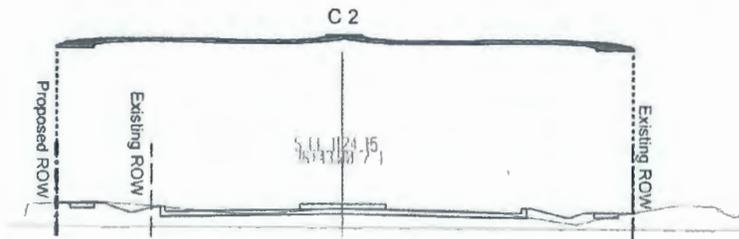
PERMITTED PLANS



Crossing 8 – WOUS 2 at STA 39+29.00



Crossing 9 – WL 2 at STA 37+16.00



Crossing 10 – C 2 at STA 36+43.00



Life's better outside.®

Commissioners

Peter M. Holt
Chairman
San Antonio

T. Dan Friedkin
Vice-Chairman
Houston

Mark E. Bivins
Amarillo

Ralph H. Duggins
Fort Worth

Antonio Falcon, M.D.
Rio Grande City

Karen J. Hixon
San Antonio

Dan Allen Hughes, Jr.
Beeville

Margaret Martin
Boerne

S. Reed Morian
Houston

Lee M. Bass
Chairman-Emeritus
Fort Worth

Carter P. Smith
Executive Director

SCANNED.ETS

March 8, 2011

Andy Blair
Environmental Affairs Division
Texas Department of Transportation
125 E. 11th Street
Austin, Texas 78701-2483

NATURAL
MAR 11 2011
RESOURCES

RE: Proposed improvements of FM 2100 from Diamondhead Boulevard to FM 1960, Harris County. (CSJ: 1062-04-022)

Dear Mr. Blair:

Texas Parks and Wildlife Department (TPWD) received your request regarding an environmental review of the proposed project. Department staff reviewed the information provided for possible impacts to fish and wildlife resources of the state.

Please be aware that a written response to a TPWD recommendation or informational comment received by a state governmental agency on or after September 1, 2009 may be required by state law. For further guidance, see the Texas Parks and Wildlife Code, Section 12.0011 which can be found online at <http://www.statutes.legis.state.tx.us/Docs/PW/htm/PW.12.htm#12.0011>. For tracking purposes, please refer to TPWD project number 6310 in any return correspondence.

TxDOT proposes to improve approximately 7.3 miles of FM 2100 from Diamondhead Boulevard to FM 1960. The proposed improvements would widen the existing two-lane, undivided facility to a four-lane, divided facility. The proposed project would require approximately 57 acres of additional right-of-way.

Forested Habitat

According to the environmental document, approximately 13 acres of forested habitat would be impacted by the proposed project.

Recommendations: TPWD recommends that clearing of mature, native trees be avoided. Loss of vegetation should be minimized by using site planning and construction techniques designed to avoid and preserve existing trees, shrubs, grasses, and forbs. For impacts that are unavoidable, TPWD recommends transplanting the existing trees or replacing them at a ratio of 3 saplings for every tree lost. Whether transplanted or replaced, a survival of 85% should be achieved. TPWD recommends that native plant and forage species that are beneficial to wildlife endemic to the area be used in mitigation and landscaped areas.

TPWD recommends that all impacts to forested/ riparian areas be mitigated. Per Provision (4)(B) of the TxDOT-TPWD MOU, if TxDOT considers mitigation for permanent impacts to riparian vegetation to be unfeasible, TPWD requests an explanation be provided.

Mr. Andy Blair
March 8, 2011
Page 2 of 2

Wetland Resources

According to the environmental document, wetlands would be impacted by the proposed project. Area wetlands retain floodwaters, preventing stormwater from rapidly entering the receiving water bodies, thereby maintaining the water body's flood peak and duration. These wetlands contribute significantly to the removal of excess nutrients, pollutants, and sediment from water before it reaches the water bodies.

Recommendations: TPWD recommends mitigation for all impacts to aquatic resources. The wetland mitigation plan should be developed in consultation with TPWD. Mitigation of all impacts to the aquatic resources, regulated and non-regulated, should be coordinated with Jamie Schubert with our Coastal Program; he can be reached at 281-534-0135.

Revegetation

Recommendations: TPWD recommends that TxDOT reseed disturbed soils with a mixture of grasses and forbs native to Harris County. To enhance native grasses available to wildlife in the project area, TPWD recommends that Bermuda grass be avoided to the extent possible in reseeding efforts, though TPWD understands that slopes may require certain grasses to control erosion. As an introduced species that can be extremely invasive, its use in federally funded projects may be inconsistent with Executive Order 13112 on Invasive Species.

For assistance in determining the best native seed mix for the project area, please contact our staff. Runoff control measures should be maintained until native plants have been reestablished on disturbed areas.

TPWD advises review and implementation of these recommendations. If you have any questions, please contact me at (361) 576-0022.

Sincerely,



Amy Turner
Wildlife Habitat Assessment Program
Wildlife Division

/ajt:6310





PO BOX 1386 | HOUSTON, TEXAS 77251-1386 | (713) 802-5000 | WWW.TXDOT.GOV

July 28, 2015

Amy Turner
Wildlife Division
Wildlife Habitat Assessment Program
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744

RE: Proposed Improvements
Harris County
FM 2100: From Diamondhead Boulevard to FM 1960
Control 1062-04-022
TPWD Project ID #34217

Dear Ms. Turner:

Previous coordination on the project occurred in March 2011 under the old Texas Department of Transportation (TxDOT) -Texas Park and Wildlife Department (TPWD) Memorandum of Understanding (MOU); TPWD sent a response letter to Andy Blair with TxDOT Environmental Affairs Division on March 8, 2011. TxDOT requested TPWD to re-coordinate for this project in January 2015.

As indicated in an email sent on March 2, 2015, from TPWD to Reina Gonzalez, the project does not qualify for early coordination under the new MOU and TPWD does not have additional comments. Therefore, TPWD recommends that TxDOT implement the recommendations made during the 2011 coordination.

TxDOT provides the following responses to the recommendations included in the 2011 coordination letter:

TPWD Recommendation #1:

TPWD recommends that clearing of mature, native trees be avoided. Loss of vegetation should be minimized by using site planning and construction techniques designed to avoid and preserve existing trees, shrubs, grasses, and forbs. For impacts that are unavoidable, TPWD recommends transplanting the existing trees or replacing them at a ratio of 3 saplings for every tree lost. Whether transplanted or replaced, a survival of 85% should be achieved. TPWD recommends that native plant and forage species that are beneficial to wildlife endemic to the area be used in mitigation and landscaped areas.

TPWD recommends that all impacts to forested/riparian areas be mitigated. Per Provision (4)(B) of the TxDOT-TPWD MOU, if TxDOT considers mitigation for permanent impacts to riparian vegetation to be unfeasible, TPWD requests an explanation be provided.

OUR GOALS

MAINTAIN A SAFE SYSTEM ▪ ADDRESS CONGESTION ▪ CONNECT TEXAS COMMUNITIES ▪ BEST IN CLASS STATE AGENCY

An Equal Opportunity Employer

TxDOT Response #1:

Mitigation for permanent impacts to forested/riparian areas will take the form of avoidance and minimization of impacts. TxDOT will follow Best Management Practices (BMPs) and make efforts to avoid forested habitat as much as practicable. TxDOT will follow its standard specifications and BMPs for re-vegetation.

TPWD Recommendation #2:

TPWD recommends mitigation for all impacts to aquatic resources. The wetland mitigation plan should be developed in consultation with TPWD. Mitigation of all impacts to the aquatic resources, regulated and non-regulated, should be coordinated with Jamie Schubert with our Coastal Program; he can be reached at (281) 534-0135.

TxDOT Response #2:

Mitigation for impacts to aquatic resources will take the form of avoidance and minimization of impacts. TxDOT will implement BMPs and make efforts to avoid impacts to wetland/aquatic habitats as much as practicable.

TPWD Recommendation #3:

TPWD recommends that TxDOT reseed disturbed soils with a mixture of grasses and forbs native to Harris County. To enhance native grasses available to wildlife in the project area, TPWD recommends that Bermuda grass be avoided to the extent possible in reseeding efforts, though TPWD understands that slopes may require certain grasses to control erosion. As an introduced species that can be extremely invasive, its use in federally funded projects may be inconsistent with Executive Order 13112 on Invasive Species

TxDOT Response #3:

TxDOT will follow its standard specifications and BMPs for re-vegetation.

If you have any questions, please call Reina Gonzalez at, (713) 802-5269.

Sincerely,



Pat Henry, P.E.
Director of Project Development
Houston District

cc: Reina Gonzalez

Amy Turner-TPWD

Page 2

July 28, 2015