Alternative Analysis Report

State Highway 99 (Grand Parkway) Segment B
From I-45 South to SH 288
Galveston and Brazoria Counties, Texas
CSJs: 3510-01-001, 3510-01-003,
3510-02-001, and 3510-02-003
August 2024

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 9, 2019, and executed by Federal Highway Administration and Texas Department of Transportation.

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1.0 INTRODUCTION

This report addresses the Clean Water Act (CWA) Section 404(b)(1) guidelines for a practicable alternatives analysis for State Highway (SH) 99 (Grand Parkway) Segment B which would include the construction of a new transportation facility built on new location from Interstate 45 (I-45) South to SH 288 through Galveston and Brazoria counties. This alternative analysis covers all of Segment B, but at this time only Segment B1 from I-45 to north of Farm to Market 2403 (FM 2403), will undergo the permitting process. This report is intended to supplement the discussion of alternatives set forth in both the Form 4345 Attachment and the Texas Commission on Environmental Quality (TCEQ) Tier II Alternatives Analysis Checklist. To assist the United States Army Corps of Engineers (USACE) Galveston Districts evaluation of the Texas Department of Transportation (TxDOT) CWA Section 404 permit application for the project, this document provides an overview of TxDOT's identification of potential available practicable alternatives and assessment of the practicability of each alternative identified. Accordingly, this analysis is provided to allow the USACE to make a determination of the Least Environmentally Damaging Practicable Alternative (LEDPA) and comply with its other responsibilities under the 404(b)(1) guidelines.

2.0 BACKGROUND

Grand Parkway is a planned 180+/- mile circumferential facility around the greater City of Houston. Harris County and the Houston Planning Commission first proposed the Grand Parkway, as a concept, in 1961 under the assumption that if Houston's historical growth continued in the future, planning would be needed regarding additional circumferential transportation facilities. The corridor for the Grand Parkway was placed on city maps in 1968, but funds were not readily available to advance the Parkway at that time. In 1984, the Texas Legislature authorized the creation and organization of nonprofit transportation corporations to act on behalf of the TxDOT in the promotion and development of public transportation facilities and systems within the State. The Grand Parkway Association (GPA), the first of these corporations created, was charged with assisting the Texas Transportation Commission in obtaining land and funding to meet the planning, legal, engineering, and ROW requirements of the Grand Parkway. Since its inception, the GPA has worked directly with landowners; city, county, State, and federal governmental agencies; and elected officials in an effort to complete the Grand Parkway.

During the development of the Draft Environmental Impact Statement (EIS) for Segment B, efforts were made to locate, inform, and seek input from interested individuals and organized groups, by holding a Public Scoping Meeting in September 2002 and a Public Workshop in February 2003. Public involvement continued throughout the Draft EIS process with several community groups, neighborhood communities, resource agencies, local government, and public officials. The Recommended Alternative from the Draft EIS was presented at the Public

Hearing held on August 21 and 23, 2012. Minor adjustments were made to the Recommended Alternative and carried forward as the Preferred Build Alternative in the Final EIS which received approval on May 25, 2016. The Selected Alternative, as presented in the Record of Decision, was approved on November 30, 2016.

Currently, the project (from I 45 to south of FM 2403, known as Segment B1) is undergoing a reevaluation for some additional design changes to the Final EIS/ROD approval dates to avoid displacing 26 new homes that were built within the approved right-of-way (ROW), provide overpasses and diamond interchanges to accommodate future planned local roadways, provided detention facilities inside and outside the approved ROW, an create an overpass over the existing Burlington Northen Santa Fe railroad crossing. Public meetings were held on October 12 and 17, 2023 to present the proposed design changes to the approved Final EIS/ROD Selected Alignment.

Constructing the project would require the discharge of fill material into waters of the United States (U.S.). TxDOT is therefore requesting authorization for the discharge of fill material to waters of the U.S. through a Standard Permit application to the USACE Galveston District, under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act. This document outlines the alternatives analyzed during the evaluation and design for the project and the avoidance and minimization measures evaluated in an effort to limit the amount and type of impacts to waters of the U.S.

As mentioned above, this alternative analysis covers all of the original 2016 ROD's Segment B, but TxDOT is moving forward with only Segment B1. SH 99 Segment B would include the construction of an approximate 28.2-mile alignment, on new location, from I-45 South to SH 288 through Galveston and Brazoria counties. SH 99 Segment B would be constructed as a four-main lane-controlled access highway facility consisting of two main lanes in each direction within a 400-foot-wide ROW, to include auxiliary lanes between on-ramps and off-ramps where appropriate. The project study area is located within the United States Geological Survey (USGS) 7.5-minute Juliff, Rosharon, Manvel, Liverpool, Algoa, Mustang Bayou, and Dickinson, Texas quadrangles (**Attachment 1; Exhibit 1**; latitude 29.396335; longitude -95.248439) and within the West Galveston Bay (Hydrologic Unit Code [HUC] 12040204).

Seven alternatives and a no-build alternative were evaluated. This analysis was used to identify the LEDPA for the project.

3.0 PURPOSE AND NEED

3.1 Applicants Need and Purpose

The basic need and purpose for SH 99 Segment B is to improve the mobility, safety, and effectiveness of the roadway system located in Galveston and Brazoria counties as well as provide an additional hurricane evacuation route.

Transportation improvements are needed because there are inefficient connections between suburban communities and major radial roadways. The current and future transportation demand exceeds capacity, and many roadways in the SH 99 Segment B study area have an increasing strain on transportation infrastructure from population and economic growth. The need for SH 99 Segment B is further detailed in the following:

System Linkage

The current transportation system does not allow for efficient circumferential traffic movement (i.e., it does not provide efficient connections or linkage between major suburban communities and major roadways radiating outward from the City of Houston).

- SH 6 is the only roadway that connects I-45 South to SH 288. If SH 6 is congested, travelers within SH 99 Segment B study area would need to use roadways such as I-45 South or SH 288 to Beltway 8 or travel partially along Farm to Market (FM) 517 to SH 35 and go north or south on SH 35 to SH 6 or FM 1462, respectively, to SH 288 in order to accomplish circumferential trips.
- If there were a linkage between I-45 South and SH 288, it would divert traffic from one major arterial to another at times when there may be a major incident on one of the arterials or during hurricane evacuation.

Expanded Capacity

Transportation demand exceeds the current and future capacity of existing transportation infrastructure.

Safety (Hurricane Evacuation Route)

Many radial roadways leading outside of the Houston metropolitan area are characterized by conditions that result in higher congestion during peak travel times, which are compounded during emergency events. This was the case when over 2 million evacuees fled the Houston metropolitan area before Hurricane Rita on September 22, 2005. Typical traveling destinations during the evacuation were to the cities of Austin, San Antonio, and Dallas, which caused severe congestion in and around the Houston metropolitan area. Eventually, contra-flow lanes were implemented to assist in moving people out of the surge zone in a timelier manner. While congestion was not as severe during the evacuation for Hurricane Ike on

September 13, 2008, a study conducted by Rice University showed that only 24 percent of Harris County residents evacuated during Hurricane Ike, a Category 2 storm, versus the 52 percent that evacuated during Hurricane Rita, a Category 4 storm (Rice News 2009). The study also showed that 75 percent of Harris County residents said they would evacuate if a Category 4 hurricane threatened Houston. This is a substantial increase from those who evacuated for Hurricanes Rita or Ike. Therefore, it is expected that this increase in evacuations would create the same roadway gridlock experienced during Hurricane Rita. Because radial facilities leading into the Houston metropolitan area converge near the center of town, bottlenecks are created, causing increased congestion, especially during an evacuation event. Therefore, there is a need to provide an additional circumferential roadway that would allow evacuees to bypass the Houston metropolitan area.

Economic Development

The expected growth in population will continue to strain existing transportation infrastructure, creating a barrier to businesses, commuters, and economic development. Over the next 30 years, the Houston-Galveston Area Council (H-GAC) predicts that an additional 3.5 million people will move into the eight-county Houston-Galveston region. This will increase the regional population from 5.2 million in 2005 to 8.8 million people in 2035, and employment to increase from 2.5 million to 4.0 million. With an increasing population and corresponding increases in traffic and congestion in the region, it could become progressively more difficult for businesses to function efficiently.

The purpose of SH 99 Segment B is to efficiently link suburban communities and major roadways, enhance mobility, respond to economic growth, and provide an additional hurricane evacuation route. The overall goals of SH 99 Segment B are further discussed below.

System Linkage

SH 99 Segment B would improve system linkage, or connectivity, within the existing transportation network. SH 99 Segment B would provide linkage among SH 288, SH 6, SH 35, and I-45 South. SH 99 Segment B, as part of the entire Grand Parkway, would also provide circumferential linkage between the southern Houston metropolitan area in northern Brazoria and Galveston counties to areas north of the Houston metropolitan area in northern Harris County and southern Montgomery County.

Expanded Capacity

SH 99 Segment B would address transportation demand, improve the level of service (LOS) in and around the study area, reduce traffic congestion, and provide travel options.

Safety (Hurricane Evacuation Route)

SH 99 Segment B would provide an additional hurricane and emergency evacuation route for the greater Houston metropolitan area, consistent with Minute Order Number 82325, signed October 25, 1984. The Grand Parkway, and specifically the SH 99 Segment B, could alleviate a portion of the congestion during mass evacuations, thus creating safer and more efficient evacuation conditions.

Economic Development

SH 99 Segment B would accommodate demographic and economic growth by improving the movement of persons and goods, thereby minimizing barriers between businesses, consumers, and transportation infrastructure.

To meet TxDOTs SH 99 Segment B purpose and need, the alignment should have:

- Site conditions feasible for construction of the project
- Reasonable ROW acquisition cost
- Minimal residential, business, or other displacement and relocations
- Maximize existing highway ROW to minimize additional impacts to natural resources.
- Minimal impacts to waters of the U.S. and floodplains.

4.0 ALTERNATIVE ANALYSIS

Seven alternative alignments and a no-build alternative were evaluated. The following discusses an evaluation of alternative alignments for the project.

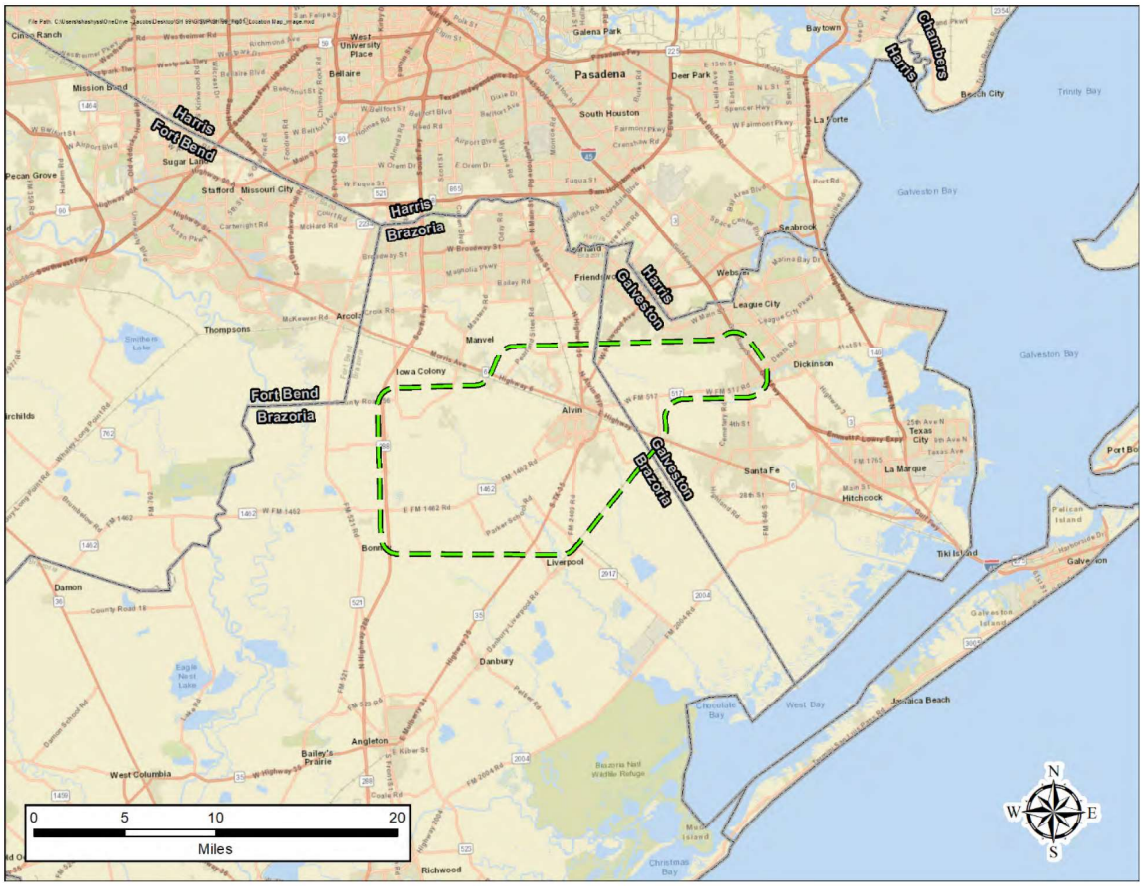
4.1 Site Selection

SH 99 Segment B study area encompasses approximately 170 square miles and includes all or part of eight incorporated communities (**Figure 1**). The City of Alvin is somewhat centrally located within the SH 99 Segment B study area. Major roadways traversing portions of the SH 99 Segment B study area include SH 6, SH 35, FM 517, and FM 1462. Although residential, commercial, and industrial development is present, the majority of the SH 99 Segment B study area is primarily undeveloped, rural property.

Land use within the SH 99 Segment B study area in the vicinity of the seven alternative alignments is primarily undeveloped, with a large portion being used for grazing and agricultural uses. Construction of any of the seven alternative alignments could result in impacts to waters of the U.S. The number of identified stream crossings for the seven alternative alignments ranges from nine to 13.

The project is not water-dependent because it does not need to be located in wetlands or other waters of the U.S. to achieve the basic project purpose. As described below, all available practicable alternatives identified would require impacts to waters of the U.S.

Figure1: Site Selection Search Area

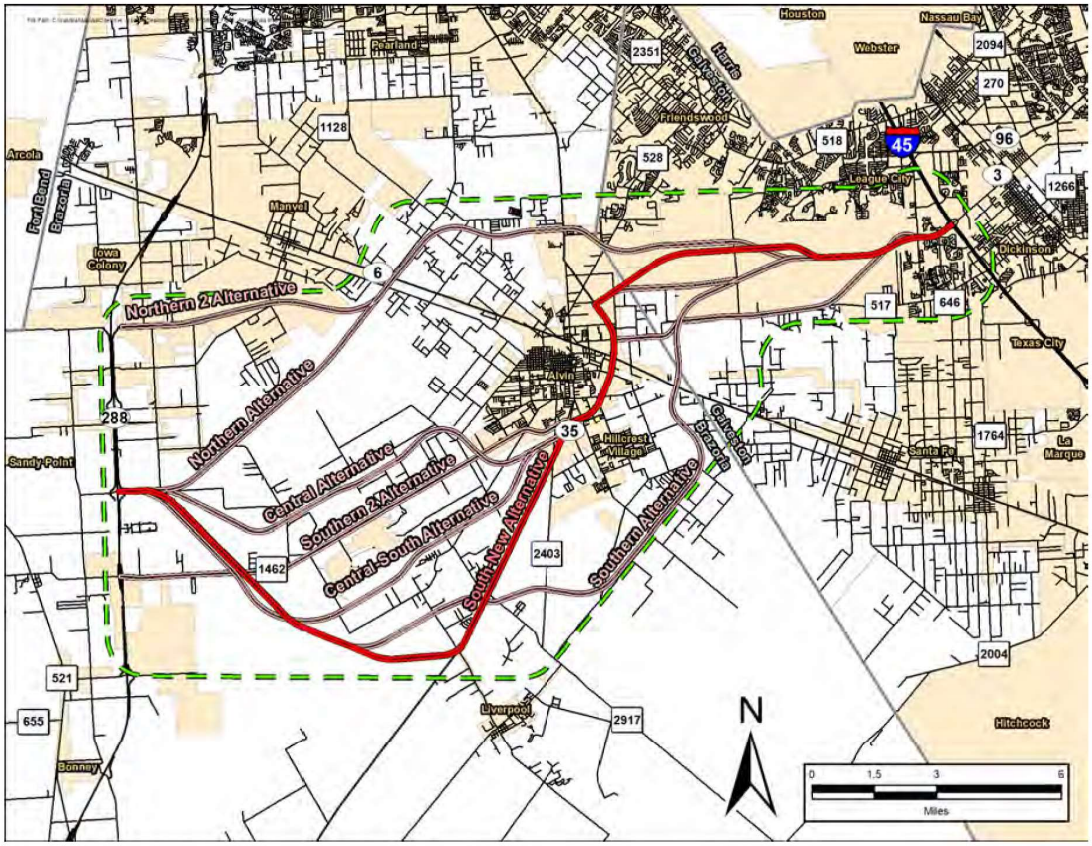


All of the alternative alignments share a common intersection with I-45 South in League City, then divide into separate alignments as each proceeds westward across the SH 99 Segment B study area. The study area borders the city limits of Texas City and includes portions of the cities and communities of Dickinson, Santa Fe, League City, Friendswood, Hillcrest Village, Alvin, Liverpool, Manvel, and Iowa Colony, as shown in **Figure 2**.

The seven alternative alignments range from approximately 21.20 to 28.17-miles long, depending on the specific alternative. Each of the alternative alignments would be a four-lane controlled access toll road with discontinuous frontage roads on new location within a 400-foot ROW. SH 99 Segment B would traverse Galveston and Brazoria counties, would

provide access to I-45 South and SH 288, both of which are radial freeways that lead to/from Houston, and would be designed to accommodate a 70-mph design speed.

Figure2: Alternative Alignments



4.1.1 No-Build Alternative

Anticipated future population growth and development within the SH 99 Segment B study area will increase traffic volumes on the existing roadway network, resulting in increased congestion. The no-build alternative would not safely and adequately accommodate existing and future traffic volumes on roadways within the SH 99 Segment B study area. The no-build alternative results in higher traffic volumes on existing roadways, which correlates to increased congestion and longer travel times on the existing roadways within the study area. The no-build alternative would not provide an additional emergency evacuation route to relieve anticipated congestion on existing major arterial roadways leading away from the coast. The no-build alternative fails to satisfy the need and purpose of the SH 99 Segment B project and is therefore eliminated from further study.

4.1.2 Build Alternative

Construction of a limited-access roadway on new ROW and possibly incorporating portions of existing highway ROWs would provide an alternate travel route for traffic moving between I-45 South and SH 288. This alternate route would be expected to relieve congestion on existing roadways presently used by motorists traversing the SH 99 Segment B study area. A newly constructed controlled access highway would also provide a new route for evacuation during emergency situations.

The SH 99 Segment B study area is primarily undeveloped, with a large portion being used for grazing and agricultural uses.

Development of the seven alternative alignments included efforts to avoid impacts to waters of the U.S. However, the distribution of waters of the U.S. within the SH 99 Segment B study area and the geometric configuration of the roadway design made complete avoidance impractical. All of the corridor components identified in all alternatives involved impacts to waters of the U.S. Therefore, construction of any of the seven alternative alignments would likely require the placement of fill material into waters of the U.S. No practicable alternatives to avoid construction in waters of the U.S are available. To the extent practicable, the alternative alignments would minimize impacts to waters of the U.S.; however, it is assumed that some waters of the U.S. impacts would be unavoidable within the ROWs of the alternatives.

The initial screening criteria used to determine site selection included:

1. Site conditions feasible for construction of the project.
2. Reasonable ROW Acquisition Cost
3. Minimal residential, business, or other displacements and relocations
4. Maximize the use of existing highway ROW to minimize additional impacts on natural resources.
5. Minimal waters of the U.S. and floodplain impacts

Seven alternative locations were identified and evaluated for the project objectives:

- Alternative 1: Northern Alternative
- Alternative 2: Northern 2 Alternative
- Alternative 3: Central Alternative
- Alternative 4: Central-South Alternative
- Alternative 5: South-New Alternative (Preferred Alternative)

- Alternative 6: Southern Alternative
- Alternative 7: Southern 2 Alternative

Both design and environmental constraints were evaluated in determining the Preferred Alternative location. Each of these alternatives is analyzed below based on their respective practicability.

4.2 *Project Criteria Determination of Practicable Alternatives*

For an alternative site to be considered practicable, it must be capable of being done after considering existing technology, minimal displacements/relocations, and maximizing existing ROW to minimize impacts of the overall project. To obtain the information necessary to complete the alternatives analysis, the following criteria were used to evaluate the seven identified alternatives and identify the practicable alternatives.

4.2.1 *Existing Technology*

Technologies for each alternative considered the following criteria: Topography and other site conditions feasible for construction of the project.

4.2.2 *Cost*

The estimated cost to purchase required ROW was analyzed for unreasonably expensive or exorbitant ROW acquisition cost.

4.2.3 *Displacements/Relocations*

Displacements and relocation of residences, businesses, churches Section 4(f) properties, parks and recreation areas, and cemeteries should be kept to a minimum.

4.2.4 *Existing ROW*

Alignments were evaluated to see which alignments incorporated maximum existing highway ROW to reduce/minimize potential adverse impacts to waters of the U.S. and other natural resources.

4.2.5 *Waters of the US*

A desktop review of U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory (NWI) and Federal Emergency Management Agency (FEMA) stream data was evaluated to determine the likelihood of jurisdictional waters of the U.S. present on each alignment.

4.3 Practicable Alternatives Determination and Alternatives Eliminated from Further Consideration

The seven alternatives are discussed below to determine if they are practicable alternatives and summarized in Table 1. The alternative alignments are shown in Exhibit 1.

4.3.1 Alternative 1: Northern Alternative

Alternative 1, the Northern Alternative, is 23.20 miles in length. This alternative would require approximately 1,125 acres of ROW. The alignment begins on I-45 and continues west, passing north of Alvin and continuing west to SH 288.

Existing Technology

Topography and other site conditions are feasible for construction within the Northern Alternative.

Cost

The Northern Alternative ROW estimated acquisition cost is reasonable at approximately $49,838,008.

Displacements/Relocations

The Northern Alternative would have 64 total relocations, the second-highest number of displacements/relocations.

Existing ROW

The Northern Alternative does not use any existing highway ROW.

Waters of the U.S.

NWI and FEMA identify 53 forested and non-forested wetlands encompassing approximately 31 acres and 36 streams totaling approximately 20,723 linear feet (LF) within the Northern Alternative ROW.

Summary

The Northern Alternative is not a practicable alternative due to the high number of displacements/relocations and not utilizing any existing highway ROW to minimize impacts to waters of the U.S. and other natural resources. Therefore, the Northern Alternative was eliminated from further study.

4.3.2 Alternative 2: Northern 2 Alternative

Alternative 2, the Northern 2 Alternative, is 21.20 miles in length. This alternative would require approximately 1,029 acres of ROW. The alignment begins on I-45 and continues west, passing north of Alvin and then proceeding southwest to SH 288.

Existing Technology

Topography and other site conditions are feasible for construction within the Northern 2 Alternative.

Cost

The Northern 2 Alternative ROW estimated acquisition cost is reasonable at approximately $45,541,528.

Displacements/Relocations

The Northern 2 Alternative would have 63 displacements/relocations, the third highest of the alternatives.

Existing ROW

The Northern 2 Alternative does not use any existing highway ROW.

Waters of the U.S.

NWI and FEMA identify 53 forested and non-forested wetlands encompassing approximately 31 acres and 35 streams totaling approximately 25,392 LF within the Northern 2 Alternative ROW.

Summary

The Northern 2 Alternative is not a practicable alternative due to the high number of displacements/relocations and not utilizing any existing highway ROW to minimize impacts to waters of the U.S. and other natural resources. Therefore, the Northern 2 Alternative was eliminated from further study.

4.3.3 Alternative 3: Central Alternative

Alternative 3, the Central Alternative, is 24.80 miles in length. This alternative would require approximately 1,034 acres of ROW. The alignment begins on I-45 and continues west, turning south on existing SH 35 ROW, passing east of Alvin, and then turning west to SH 288.

Existing Technology

Topography and other site conditions feasible for construction within the Central Alternative.

Cost

The Central Alternative ROW estimated acquisition cost is reasonable at approximately $53,275,112.

Displacements/Relocations

The Central Alternative would have 16 displacements/relocations, one of the lowest.

Existing ROW

The Central Alternative uses approximately 3.7 miles of existing highway ROW.

Waters of the U.S.

NWI and FEMA identify 53 forested and non-forested wetlands encompassing approximately 55 acres and 33 streams totaling approximately 30,182 LF within the Central Alternative ROW.

Summary

The Central Alternative meets the projects purpose and need and is a practicable alternative.

4.3.4 Alternative 4: Central-South Alternative

Alternative 4, the Central-South Alternative, is 26.33 miles in length. This alternative would require approximately 1,109 acres of ROW. The alignment begins on I-45 and continues west, turning south on existing SH 35 ROW, passing east of Alvin, and then turning west to SH 288.

Existing Technology

Topography and other site conditions are feasible for construction within the Central-South Alternative.

Cost

The Central-South Alternative ROW estimated acquisition cost is reasonable at approximately $56,561,843.

Displacements/Relocations

The Central-South Alternative would have 11 displacements/relocations, the lowest of the alternatives.

Existing ROW

The Central-South Alternative Uses approximately 3.7 miles of existing highway ROW.

Waters of the U.S.

NWI and FEMA identify 62 forested and non-forested wetlands encompassing approximately 56 acres and 36 streams totaling approximately 26,243 LF within the Central-South Alternative ROW.

Summary

The Central-South Alternative meets the projects purpose and need and is a practicable alternative.

4.3.5 Alternative 5: South-New Alternative (Preferred Alternative)

Alternative 5, the South-New Alternative, is 28.17 miles in length. This alternative would require approximately 1,182 acres of ROW. The alignment begins on I-45 and continues west, turning south on the existing SH 35 ROW, passing east of Alvin, and continuing along the SH 35 ROW before turning west to SH 288.

During the public involvement process and coordination with resource agencies, it was determined that the South-New Alternative is the most desirable alternative. The number of impacts to natural resources is largely minimized due to the South-New Alternative following the existing alignment of SH 35, which is preferred by the resource agencies. The South-New Alternative also received the most support from the general public and elected officials. With general public, elected officials, and agency support, along with minimization of impacts to natural resources due to maximizing use of the existing SH 35 ROW, the South-New Alternative is recommended as the Preferred Alternative.

Existing Technology

Topography and other site conditions are feasible for construction within the South-New Alternative.

Cost

The South-New Alternative ROW estimated acquisition cost is reasonable at approximately $60,493,030.

Displacements/Relocations

The South-New Alternative would have 24 displacements/relocations.

Existing ROW

The South-New Alternative utilizes approximately 12.2 miles of existing highway ROW.

Waters of the U.S.

NWI and FEMA identify 53 forested and non-forested wetlands encompassing approximately 31 acres and 40 streams totaling approximately 24,419 LF within the South-New Alternative ROW.

Summary

The South-New Alternative meets the projects purpose and need, is a practicable alternative, and has been identified as the Preferred Alternative.

4.3.6 Alternative 6 Southern Alternative

Alternative 6, the Southern Alternative, is 28.17 miles in length. This alternative would require approximately 1,366 acres of ROW. The alignment begins on I-45 and continues west, turning south well before SH 35 ROW and Alvin. The alignment stays well east of Alvin and SH 35 and then turns west to SH 288.

Existing Technology

Topography and other site conditions feasible for construction within the Southern Alternative.

Cost

The Southern Alternative ROW estimated acquisition cost is reasonable at approximately $60,514,512.

Displacements/Relocations

The Southern Alternative would have 24 potential displacements/relocations.

Existing ROW

The Southern Alternative does not use any existing highway ROW.

Waters of the U.S.

NWI and FEMA identify 54 forested and non-forested wetlands encompassing approximately 38 acres and 33 streams totaling approximately 20,113 LF within the Southern Alternative.

Summary

The Southern Alternative is not a practicable alternative because it did not utilize any existing highway ROW to minimize impacts to waters of the U.S. or other natural resources. Therefore, the Southern Alternative was eliminated from further study.

4.3.7 Alternative 7: Southern 2 Alternative

Alternative 7, the Southern 2 Alternative, is 22.56 miles in length. This alternative would require approximately 803 acres of ROW. The alignment begins on I-45 and continues west to SH 35, turning south passing east of Alvin and then turns west south of Alvin to SH 288.

Existing Technology

Topography and other site conditions are feasible for construction within the Southern 2 Alternative.

Cost

The Southern 2 Alternative ROW estimated acquisition cost is reasonable at approximately $48,463,166.

Displacements/Relocations

The Southern 2 Alternative has the highest number of displacements/relocations, with 190.

Existing ROW

The Southern 2 Alternative uses approximately 2.4 miles of existing highway ROW.

Waters of the U.S.

NWI and FEMA identify 59 forested and non-forested wetlands encompassing approximately 25 acres and 40 streams totaling approximately 30,807 LF within the Southern 2 Alternative.

Summary

The Southern 2 Alternative has the highest number of displacements/relocations and, therefore, is not a practicable alternative. The Southern 2 Alternative was eliminated from further study.

Table 1: Alternative Comparison Matrix for Practicability								
Category	Practicability Factor	Alternative 1 Northern Alternative	Alternative 2 Northern 2 Alternative	Alternative 3 Central Alternative	Alternative 4 Central-South Alternative	Alternative 5 (Preferred Alternative) South-New Alternative	Alternative 6 Southern Alternative	Alternative 7 Southern 2 Alternative
Existing Technology	Topography and Other Site Conditions Feasible for Construction of Project?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cost	Reasonable Acquisition Cost? (Estimated Value of ROW to be Acquired)	Yes $49,838,008	Yes $45,541,528	Yes $53,275,112	Yes $56,561,843	Yes $60,493,030	Yes $60,514,512	Yes $48,463,166
Displacements/ Relocations	Minimal Amount of Displacements/ Relocations?	No Residential – 56 Business – 8 Schools – 0 Churches – 0 Section 4(f) Properties – 0 Parks & Rec. Areas – 0 Cemeteries - 0	No Residential – 53 Business – 10 Schools – 0 Churches – 0 Section 4(f) Properties – 0 Parks & Rec. Areas – 0 Cemeteries - 0	Yes Residential – 13 Business – 3 Schools – 0 Churches –0 Section 4(f) Properties – 0 Parks & Rec. Areas – 0 Cemeteries - 0	Yes Residential – 9 Business – 2 Schools – 0 Churches - 0 Section 4(f) Properties – 0 Parks & Rec. Areas – 0 Cemeteries - 0	Yes Residential – 13 Business – 9 Schools – 0 Churches – 0 Section 4(f) Properties – 1 Parks & Rec. Areas – 1 Cemeteries - 0	Yes Residential – 18 Business – 6 Schools – 0 Churches – 0 Section 4(f) Properties – 0 Parks & Rec. Areas – 0 Cemeteries - 0	No Residential – 130 Business – 57 Schools – 0 Churches – 3 Section 4(f) Properties – 0 Parks & Rec. Areas – 0 Cemeteries - 0

Table 1: Alternative Comparison Matrix for Practicability								
Category	Practicability Factor	Alternative 1 Northern Alternative	Alternative 2 Northern 2 Alternative	Alternative 3 Central Alternative	Alternative 4 Central-South Alternative	Alternative 5 (Preferred Alternative) South-New Alternative	Alternative 6 Southern Alternative	Alternative 7 Southern 2 Alternative
Existing ROW	Maximize Existing Highway ROW to Minimize Additional Impacts to Natural Resources?	No 0 miles	No 0 miles	Yes 3.7 miles	Yes 3.7 miles	Yes 12.2 miles	No 0 miles	Yes 2.4 miles
Waters of the U.S.	Wetlands and Streams In the Alignment	NWI Forested Wetlands 9 acres NWI Non-Forested Wetlands 22 acres FEMA Streams 20,723 LF	NWI Forested Wetlands 9 acres NWI Non-Forested Wetlands 22 acres FEMA Streams 25,392 LF	NWI Forested Wetlands 33 acres NWI Non-Forested Wetlands 22 acres FEMA Streams 30,182 LF	NWI Forested Wetlands 34 acres NWI Non-Forested Wetlands 22 acres FEMA Streams 26,243 LF	NWI Forested Wetlands 12 acres NWI Non-Forested Wetlands 19 acres FEMA Streams 24,419 LF	NWI Forested Wetlands 11 acres NWI Non-Forested Wetlands 26 acres FEMA Streams 20,113 LF	NWI Forested Wetlands 8 acres NWI Non-Forested Wetlands 18 acres FEMA Streams 30,807 LF
Meets Project Needs and Purpose		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is this a Practicable Alternative		No Options for Less Displacements/ Relocations and Does Not Use	No Options for Less Displacements/ Relocations and Does Not Use	Yes	Yes	Yes	No Does Not Use Existing Highway ROW	No Options for Less Displacements/ Relocations

Table 1: Alternative Comparison Matrix for Practicability								
Category	Practicability Factor	Alternative 1 Northern Alternative	Alternative 2 Northern 2 Alternative	Alternative 3 Central Alternative	Alternative 4 Central-South Alternative	Alternative 5 (Preferred Alternative) South-New Alternative	Alternative 6 Southern Alternative	Alternative 7 Southern 2 Alternative
		Existing Highway ROW	Existing Highway ROW					

4.4 Least Environmentally Damaging Practicable Alternative Analysis

Following the practicable alternative determination above, three practicable alternatives, Central Alternative, Central-South Alternative, and the South-New Alternative were identified for further analysis and determination of LEDPA (**Attachment 1; Exhibit 2**). Each of these practicable alternatives are detailed below and in **Table 2**. Environmental considerations important to the choice of location for the project include the presence of potentially jurisdictional waters of the U.S. and the presence of endangered species or critical habitats.

4.4.1 Alternative 3: Central Alignment

Alternative 3, the Central Alternative, begins on I-45 and continues west, turning south on existing SH 35 ROW, passing east of Alvin, then turning west to SH 288. This practicable alternative is 24.80 miles in length and requires approximately 1,034 acres of ROW was carried forward for further study because of positive rankings for technology, reasonable acquisition cost, relatively minimal displacements/relocations, and utilizing existing highway ROW.

The Central Alternative is primarily undeveloped and rural, with some residential, commercial, and industrial development present.

No documented records were found indicating a risk of impacts to federally-listed threatened or endangered species.

Based on NWI and FEMA stream data, the Central Alternative ROW contains 53 wetlands encompassing approximately 55 acres and crosses 33 streams (30,182 LF). Thirteen of these wetlands are forested and total approximately 33 acres. The remaining 22 acres are non-forested wetlands. This alternative only utilized 3.7 miles of existing highway ROW, so full impacts to waters of the US and other natural resources are expected to 21.10 miles of the 24.80 alignment.

Alternative 3 has extensive impacts to waters of the U.S. and floodplain, resulting in a high level of environmental impact and regulatory uncertainty. This alternative is further analyzed in detail below.

4.4.2 Alternative 4: Central-South Alignment

Alternative 4, the Central-South Alternative, begins on I-45 and continues west, turning south on existing SH 35 ROW, passing east of Alvin, and turning west to SH 288. This practicable alternative is 26.33 miles in length and approximately 1,109 acres of ROW was carried forward for further study because of positive ranking for technology, reasonable acquisition cost, relatively minimal displacements/relocations, and utilizing existing highway ROW.

The Central-South Alternative is primarily undeveloped and rural, with some residential, commercial, and industrial development present.

No documented records were found indicating a risk of impacts to federally-listed threatened or endangered species.

Based on the USFWS NWI and FEMA stream data, 62 wetlands encompassing approximately 56 acres and crossing 36 streams (26,243 LF) occur within the ROW of the Central-South Alternative. Of the 62 wetlands, 16 are forested totaling approximately 34 acres with the remaining 22 acres non-forested wetlands. This alternative only utilized 3.7 miles of existing highway ROW, so full impacts to waters of the US and other natural resources are expected to be 22.63 miles of the 26.33 alignment.

Alternative 4 has extensive impacts to waters of the U.S. and floodplain, resulting in a high level of environmental impact and regulatory uncertainty. This alternative is further analyzed in detail below.

4.4.3 Alternative 5: South-New Alignment (Preferred Alignment)

Alternative 5, South-New Alternative, begins on I-45 and continues west, turning south on existing SH 35 ROW, passing east of Alvin and continues along the SH 35 ROW before turning west to SH 288. This practicable alternative is 28.16 miles in length and requires approximately 1,182 acres of ROW. It was carried forward for further study because of positive ranking for technology, reasonable acquisition cost, relatively minimal displacements/relocations, and utilizes existing highway ROW.

The South-New Alternative is primarily undeveloped and rural, with some residential, commercial, and industrial development present.

No documented records were found indicating a risk of impacts to federally-listed threatened or endangered species.

Based on the USFWS NWI and FEMA stream data, 53 wetlands encompass approximately 31 acres and crosses 40 streams (24,419 LF) within the ROW. Seven of these 53 wetlands are forested wetlands that total approximately 12 acres. The remaining non-forested wetlands encompass approximately 45 acres. This alternative only utilized 12.5 miles of SH 35 ROW, so full impacts to waters of the US and other natural resources are expected to be 15.66 miles of the 28.16-mile alignment.

The South-New Alternative fully meets the project's purpose and need and has the least estimated impacts to waters of the U.S. and floodplains. This alternative has the similar amount of waters of the U.S. within its ROW as the other two alternatives, but reduced impacts

to waters of the U.S. and floodplains because use of existing highway ROW was maximized. This alternative is further analyzed in detail below.

Table 2. Environmental Factor Matrix

Environmental Factors	Alternative 3: Central Alternative	Alternative 4: Central-South Alternative	Alternative 5: South-New Alternative (Preferred Alternative)
Impacts to Federally Listed Threatened or Endangered Species	No	No	No
NWI Identified Wetlands in ROW	Forested Wetlands 33 acres Non-Forested Wetlands 22 acres	Forested Wetlands 34 acres Non-Forested Wetlands 22 acres	Forested Wetlands 12 acres Non-Forested Wetlands 19 acres
FEMA Identified Streams in ROW	30,182 LF	26,243 LF	24,419 LF
100-year Floodplain	274 acres	242 acres	178 acres
Alignment Design Incorporates Maximum Existing Highway ROW to Reduce Impacts to Waters of the US and Other Natural Resources?	No 3.7-miles	No 3.7-miles	Yes 12.2-miles
Amount of Full Impacts to Waters of the US and Other Natural Resources	21.10-miles 85% of the alternative	22.63-miles 86% of the alternative	15.66-miles 56% of the alternative
LEDPA	No	No	Yes

4.5 Determining the LEDPA

Of the three alternative alignments evaluated in further detail, the Preferred Alternative, South-New Alternative, is the LEDPA. The South-New Alternative meets the overall purpose and need of the project from a technology, reasonable acquisition cost, minimal displacement/relocation, and utilizing the existing ROW perspective, as previously defined. Four of the alternatives were eliminated from further evaluation as impracticable, and the other two practicable alternatives would have significantly more environmental impacts than the Preferred Alternative. The Preferred Alternative was extensively reviewed and determined to be the most practical.

Wetlands and Waters of the US

The initial study of the Preferred Alternative determined that since it maximizes existing highway ROW, it was the least impactful of the practicable alternatives to potential waters of the U.S., based on available data from NWI maps and FEMA stream data.

SH 99 Segment B has been divided into two parts, Segment B1 and B2. A detailed waters of the U.S. delineation and report was being completed at the same time as this report for 14.20 miles of the 28.16-mile South-New Alternative, Segment B1 (**Attachment 1; Exhibit 3**). The delineation determined that the wetlands within Segment B1 ROW total 24.94 acres of PEM, 1.12 acres of PSS, 13.99 acres of PFO, and 1.17 acres of PUB. A total of 5,720.10 LF (2.68 acres) of streams are also in the ROW. Segment B2 waters of the U.S. delineation will occur at a later date.

Biological Resources and Threatened and Endangered Species

TxDOT Species Analysis for Segment B1 of the South-New Alternative includes a review of the Texas Natural Diversity Database (TxNDD) and USFWS Information for Planning and Conservation (IPaC) for the potential for threatened and endangered species and their habitat to occur within the Preferred Alternative. The review identified no occurrences of federal listed species, and no critical habitat was identified within the ROW.

TxDOT species analysis identified Attwater's greater prairie-chicken (*Tympanuchus cupido attwateri*), black rail (*Laterallus jamaicensis*), piping plover (*Charadrius melodus (Coastal)*), red knot–coastal (*Calidris canutus rufa* (Coastal), and the whooping crane (*Grus americana*) with the potential to occur in the area. The project does not contain critical habitat for any of these species.

No federally-listed threatened or endangered species or their habitat were observed within or adjacent to the project survey area during field surveys.

4.6 Project Justification

On the basis of the alternative analysis performed, the South-New Alternative was the only practicable alternative that met TxDOT's purpose and need, had a minimal amount of displacements/relocations, maximized existing ROW to reduce impacts to natural resources, and is the LEDPA.

An onsite alternative analysis was not conducted. TxDOT is proposing to permit for worst-case scenario impacts to wetlands and mitigate for full impacts to wetlands within the project area. Impacts to streams have been minimized by spanning streams with bridges. Stream impacts from the project total 1,224.50 LF (0.62 acre) and the amount of streams completely avoided within the project area is 4,495.60 LF (2.06 acres). Upon review of the design schematic, and in coordination with the project engineers TxDOT would minimize and avoid impacts to

waterbodies where practicable. If design allows, the waters of the U.S. would be returned to pre-construction contours. Best management practices will be implemented that protect avoided aquatic resources and protect and maintain water quality. Earthen detention basins will be used.

5.0 CONCLUSION

The Preferred Alternative, South-New Alternative, is the LEDPA that meets TxDOT's purpose and need for the project. Unavoidable permanent impacts to wetlands and other waters of the U.S. would be mitigated through existing accredited mitigation banks.

6.0 LITERATURE CITED

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U.S. Fish and Wildlife Service (USFWS). 2024 National Wetlands Inventory Data. Accessed May 2024. https://www.fws.gov/program/national-wetlands-inventory/data-download.

U.S. Fish and Wildlife Service (USFWS). Information for Planning and Consultation. Accessed May 2024. https://ipac.ecosphere.fws.gov/.

U.S. Geological Survey. (USGS). 2024. USGS Topo 7.5 Minute Maps for Galveston and Brazoria Counties.

Attachment 1 - Exhibits

Exhibit 1: Alternative Map

Received 13 August 2024

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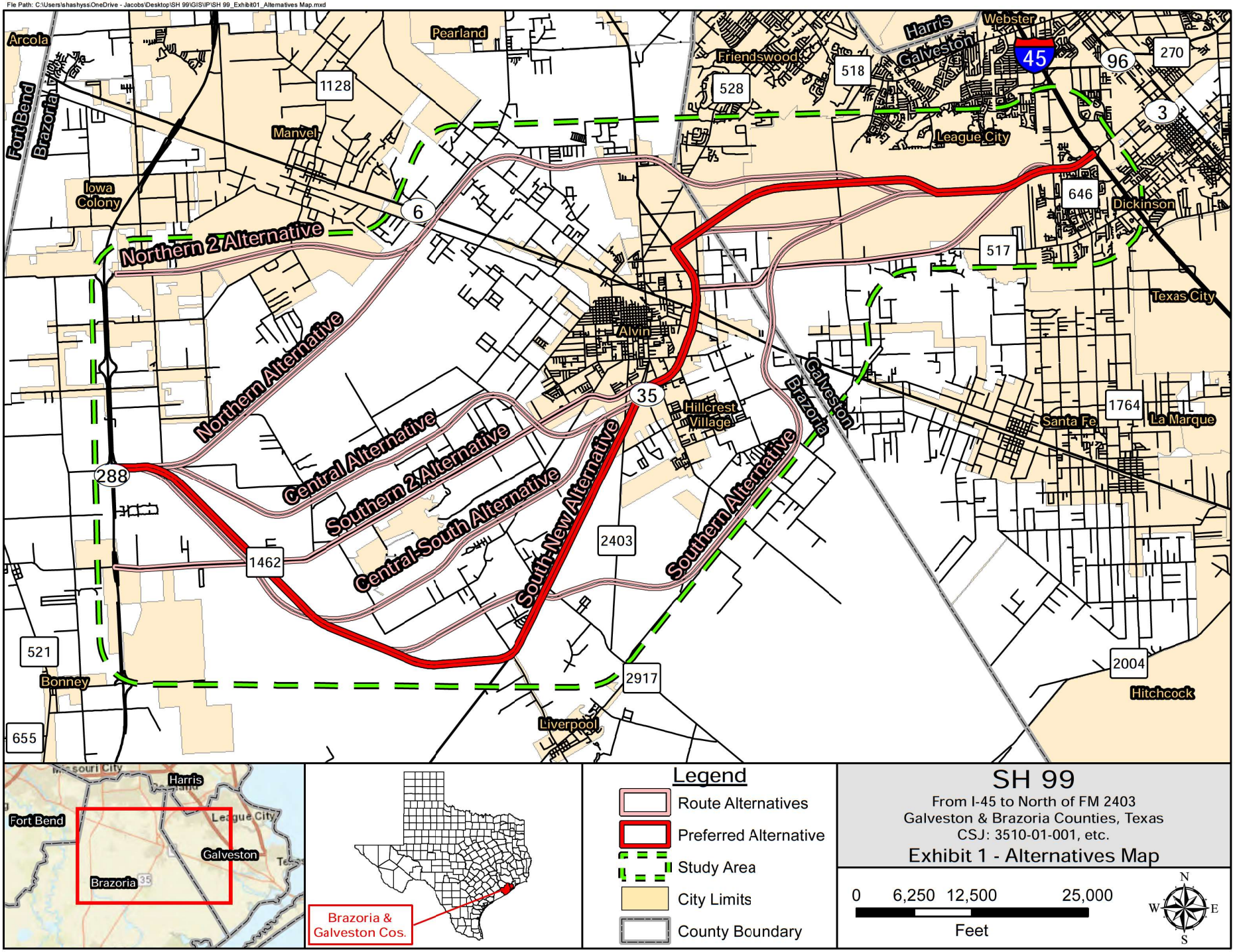
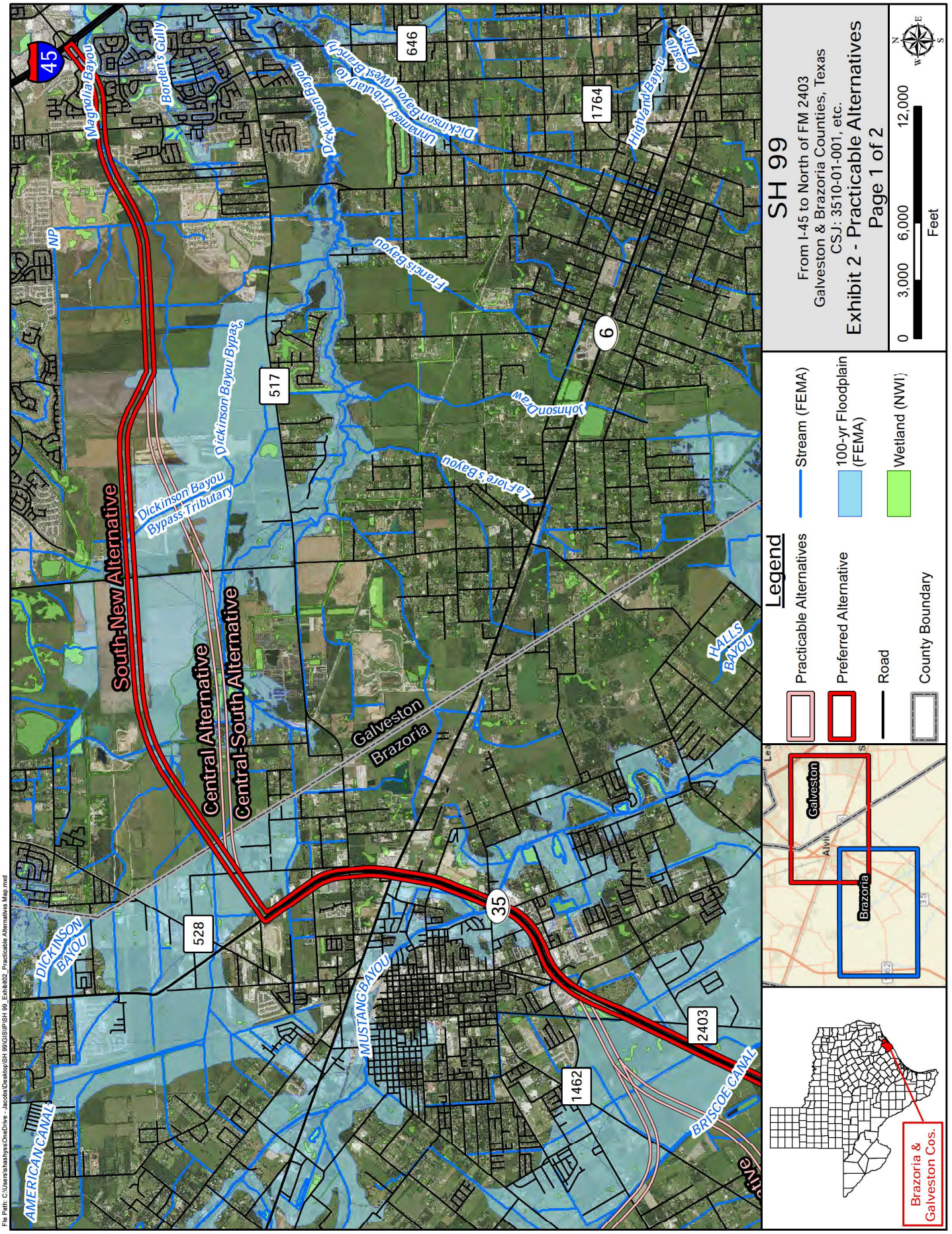


Exhibit 2: Practicable Alternatives



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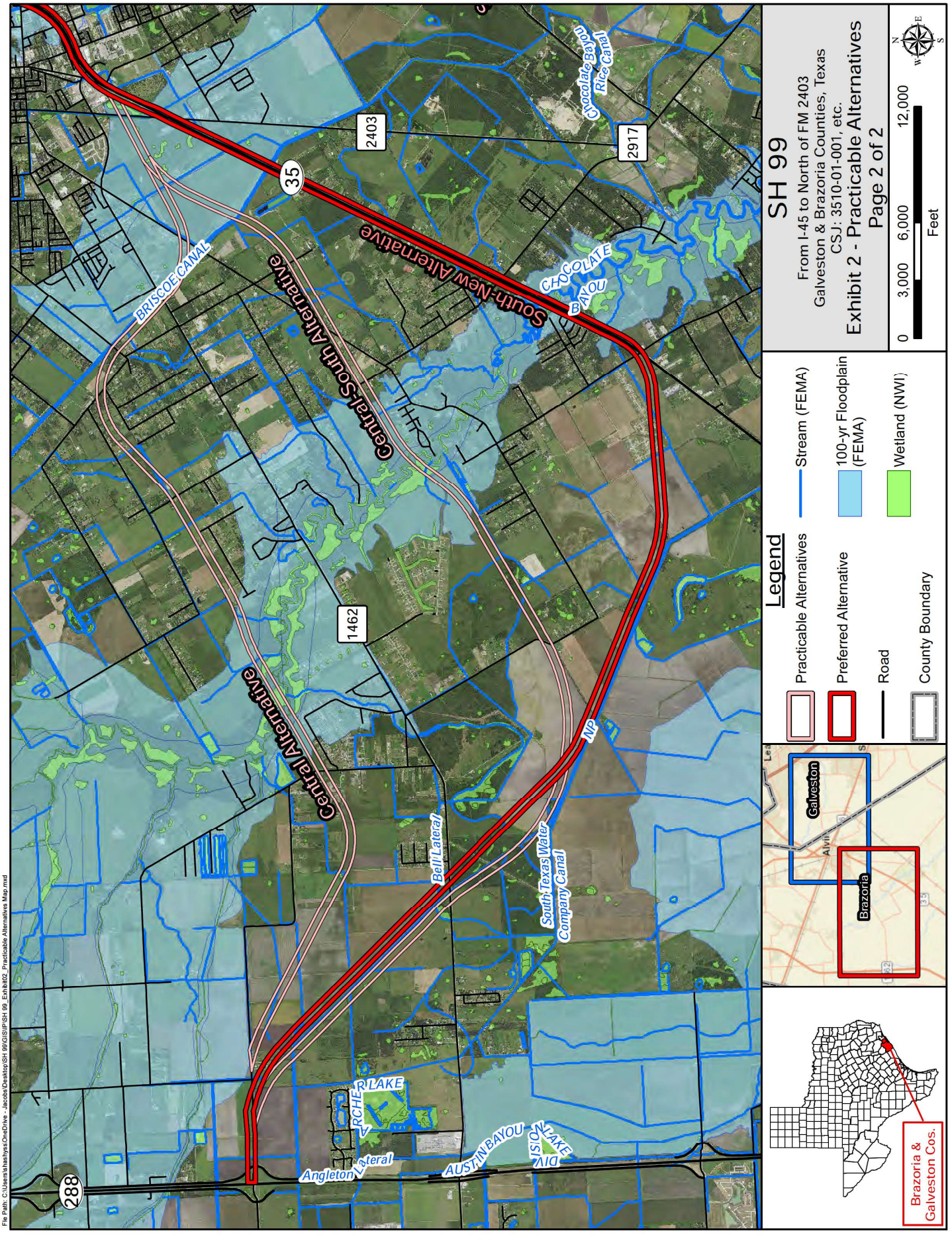
SH 99
From I-45 to North of FM 2403
Galveston & Brazoria Counties, Texas
CSJ: 3510-01-001, etc.
Exhibit 2 - Practicable Alternatives
Page 2 of 2
0
3,000
6,000
12,000
Feet
Legend
Practicable Alternatives
Preferred Alternative
Road
County Boundary
Stream (FEMA)
100-yr Floodplain (FEMA)
Wetland (NWI)
Galveston
Brazoria
Brazoria & Galveston Cos.
South-New Alternative
Central-South Alternative
Central Alternative
35
288
2403
2917
1462
BRISCOE CANAL
CHOCOLATE BAYOU
Chocolate Bayou
Rice Canal
Bell Lateral
South Texas Water Company Canal
NP
Angleton Lateral
AUSTIN BAYOU
LAKE JACKSON
LAKE RACHEL

Exhibit 3: Segment B1

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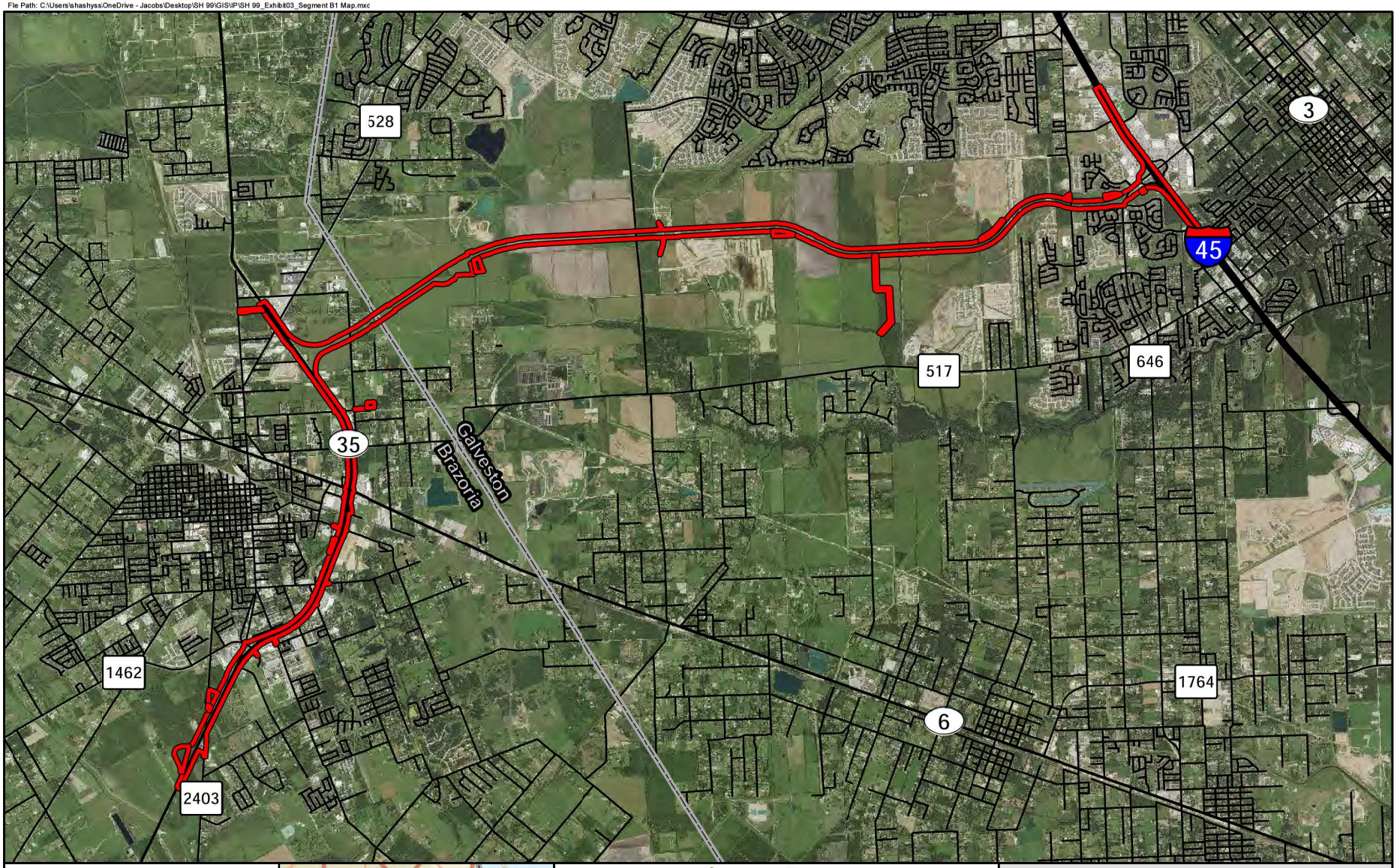

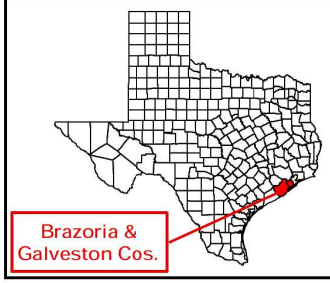

Legend

Segment B1

Road

County Boundary

SH 99

From I-45 to North of FM 2403
Galveston & Brazoria Counties, Texas
CSJ: 3510-01-001, etc.

Exhibit 3 - Segment B1

0 3,500 7,000 14,000
Feet