



**US Army Corps
of Engineers**
St. Louis District

**GALVESTON
HYDRAULIC SEDIMENT RESPONSE MODEL STUDY
BRAZOS RIVER AND GULF INTRACOASTAL
WATERWAY CROSSING**



*Authors: Ashley N. Cox, Jasen L. Brown P.E., Shawn R. Kempshall,
Eddie J. Brauer P.E., Peter M. Russell P.E., and Robert D. Davinroy, P.E.*

**U.S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT
HYDROLOGIC AND HYDRAULICS BRANCH
APPLIED RIVER ENGINEERING CENTER
FOOT OF ARSENAL STREET
ST. LOUIS, MISSOURI 63118**

**Sponsored by and Prepared for: U. S. Army Corps of Engineers,
Galveston District**

**In Cooperation With: KIRBY INLAND MARINE, NAT TOWING, AND
GULF INTRACOASTAL CANAL ASSOCIATION**

Technical Report M45

**Galveston HSR MODEL
GIWW Mile Point 401**

**HYDRAULIC SEDIMENT RESPONSE MODEL
INVESTIGATION**

By
Ashley N. Cox
Jasen L. Brown, P.E.
Edward J. Brauer, P.E.
Shawn R. Kempshall
Peter M. Russell, P.E.
Robert D. Davinroy, P.E.

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INTRODUCTION

The U.S. Army Corps of Engineers, St. Louis District, conducted a flow and sedimentation improvement study where the Brazos River intersects the Gulf Intracoastal Waterway (GIWW). This study was funded by the U.S. Army Corps of Engineers, Galveston District. The main objective of the study was to reduce or eliminate hazardous navigation crossing conditions at the intersection of the GIWW and the Brazos River.

The study was conducted between March, 2008 and July, 2009 using a physical hydraulic sediment response (HSR) model at the Applied River Engineering Center, St. Louis District in St. Louis, Missouri. The model study was performed by Mrs. Ashley Cox, Hydraulic Engineer, under direct supervision of Mr. Jasen Brown, P.E. and Mr. Robert Davinroy, P.E., Chief of River Engineering Section for the St. Louis District. Other Corps of Engineers St. Louis District personnel included: Mr. Leonard Hopkins, P.E., Hydrologic and Hydraulic Branch Chief, Ms. June Jeffries, P.E., Project Manager, and Mr. Shawn Kempshall, Cartographer. Galveston District personnel included: Ronny Beesley, P.E., Operations Manager, Bill Hopkins, Chief of Project Operations Branch, Robert Page, Lock and Dam Mechanic, and Robert George, Lock and Dam Operator. Other partners involved in the study from the navigation industry included: Captain Thomas Leister, Kirby Inland Marine, Mr. Ray Ficke, NAT Towing, and Mr. Raymond Butler, Gulf Intracoastal Canal Association.

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BACKGROUND

1. Problem Description

The Brazos River and GIWW crossing was designed at a time when most tug boats would pull barges behind the boat. They have since transitioned to tug boats that push barges through the crossing. The new tug boats and old alignment of the crossing resulted in an extremely difficult and troublesome navigation. Both the East Gate and the West Gate were narrow passageways that measured approximately 75 feet in width. Those factors left little room for pilot error even when there were ideal navigation conditions.

Tide shifts occasionally caused varying velocities through both the East and West Gates, which made navigation through the gates difficult. During high tides, the general trend was for water to travel from the Brazos River into the GIWW through both gates. The opposite would occur during low tide. Flood or high flow conditions in the San Bernard River sometimes caused high velocities into the Brazos River through the West Gate.

The hydraulic condition and layout of the crossing produced a strong eddy during most flow conditions near the East Gate. The eddy tended to pull vessels toward the North guide wall. There was also a shoaling problem along the South guide wall of the East Gate which had to be dredged every two to five years. This shoaling area restricted the width of the crossing that was available to the pilots for successful navigation of the crossing.

Each of these problems, alone or in combination, caused numerous allisions resulting in damages to vessels, loss of cargo, and damage to bank line structures (i.e. guide walls).

2. Study Purpose and Goals

The purpose of this Hydraulic Sediment Response (HSR) Model study was to evaluate various design alternatives with a goal of reducing or eliminating dangerous navigation crossing conditions in the Brazos GIWW crossing. The goal of

maintaining a safe and dependable navigation channel must be done while maintaining or improving environmental features in the reach.

3. Study Reach

The study comprised of a one mile stretch of the GIWW and two miles of the Brazos River, with the intersection of the two waterways near the model center. The study reach was located in the county of Brazoria in Texas. Plate 1 is a location and vicinity map of the study reach. Sediment samples were taken in the crossing and showed that the bed consisted mostly of consolidated clay material. Acoustic Doppler Current Profile (ADCP) was collected by the United States Geological Survey (USGS) from approximately 1.5 miles upstream of the crossing to approximately 0.75 miles downstream of the crossing. This velocity data illustrated the general velocity trends throughout the Brazos River and the eddy in the crossing. The Gulf of Mexico impacted the study area since it was less than 1.5 miles away from the crossing. At low tide the GIWW would flow out the gates and into the Brazos River. During high tide, occasionally the water would flow from the main channel into the GIWW through the gates. The San Bernard River emptied into the GIWW about 4 miles to the west of the West Gate. When the San Bernard River was at flood stage, its only outlet was the GIWW. When the gates were opened, the San Bernard and GIWW would release large flows which caused unsafe navigation conditions and delays. The Galveston District notified AREC personnel in April that they had dredged an opening for the San Bernard River to reach the Gulf of Mexico; as a result model test results should be evaluated taking the new dredged opening into account. The East and West Gates were designed to aid in navigation that crossed the Brazos River and to control the amount of sediment that entered the GIWW. The number of barges that were allowed to go through the floodgates at one time varied from company to company; some mandated only one barge through at a time and others required taking two barges through stacked. Still others would push a 1200 foot tow through the crossing. Navigation conditions would sometimes dictate that barge tows must wait in the crossing until the conditions are more favorable to proceed.

4. Study Reach Channel Characteristics and General Trends

Hydrographic surveys of the GIWW and Brazos River crossing are shown on Plates 4 -10. The plates show Range Line surveys from 2004 to 2008.

The following bathymetric trends have remained relatively constant after comparison of the above mentioned hydrographic surveys:

Brazos River and GIWW Crossing Description
Approximately 0.5 miles upstream of the crossing in the Brazos River, the thalweg crosses from the Left Descending Bank (LDB) toward the Right Descending Bank (RDB). Depths range between 16 and 20 feet below the North American Vertical Datum (NAVD 88). (Data provided to AREC from Galveston District).
The depths upstream of the crossing range between 20 and 30 feet below the NAVD 88. Just upstream of the GIWW crossing, the thalweg is located along the RDB.
Through the crossing, the thalweg depths decrease at the lower reaches of the crossing. A small scour hole is shown outside of the West Gate and a line of depth between 20 and 30 feet below NAVD 88 extends near the middle of the crossing (GIWW Mile Point (MP) 401). Depositional areas develop on both sides of the main channel.
Downstream of the crossing, the Brazos River has a range of depths between 16 and 20 feet below the NAVD 88.

HSR MODEL DESCRIPTION

1. Scales and Bed Materials

The model employed a horizontal scale of 1 inch = 150 feet, or 1:1800, and a vertical scale of 1 inch = 90 feet, or 1:1080, for a 1.67 to 1 distortion ratio of linear scales. This distortion supplied the necessary forces required for the simulation of sediment transport conditions similar to those observed in the prototype.

The bed material was granular plastic urea, Type II, with a specific gravity of 1.40.

2. Appurtenances

The HSR model insert was constructed according to the 2004 high-resolution aerial photography of the study reach. The insert was then mounted in a standard HSR model flume. The riverbanks of the model were constructed from dense polystyrene foam, and modified during calibration with clay and galvanized steel mesh. Rotational jacks located within the hydraulic flume controlled the slope of the model. The measured slope of the insert and flume was approximately 0.03 inch/inch. River training structures in the model were made of galvanized steel mesh.

Flow into the model was regulated by customized computer hardware and software interfaced with an electronic control valve and submersible pump. This interface was used to automatically control the flow of water and sediment into the model. Discharge was monitored by a magnetic flow meter interfaced with the customized computer software. The West and East Gate each had their own submersible pump and a hand valve to control the amount of water discharged. Small pieces of metal mesh screen were used to simulate the East and West Gates. The screen was high enough to prevent sediment from entering or exiting the GIWW from the main channel, but low enough that the screen allowed water to spill over the top from the GIWW discharge outlets. The water plane, which was the surface of the water in the model, was manually checked with a mechanical three dimensional point digitizer to ensure there was minimal or no slope in the plane. Resultant bed configurations

were measured and recorded with a three dimensional laser scanner. The magnitude and direction of the velocities of the water in the model were measured and recorded with a Laser Doppler Velocimeter (LDV).

HSR MODEL TESTS

1. Model Calibration

The calibration of the model involved the adjustment of water discharge, sediment volume, model slope, and entrance conditions of the model. These parameters were refined until the measured bed response of the model was similar to that of the prototype.

A. HSR Model Operation

There were two scenarios that best modeled the real world conditions; both of these conditions were conducted for each alternative. The two conditions were:

1. The Brazos River was maintained at a steady flow while simulating a low tide. The West and East Gates of the GIWW were closed so that no flow from the GIWW would enter the Brazos River crossing.
2. The Brazos River was maintained at a steady flow while simulating a low tide. The West and East Gates of the GIWW were opened so that flow from the GIWW could enter the Brazos River crossing.

These conditions were chosen as a result of an analysis of river conditions resulting in difficult navigation as well as model capabilities. Because of the constant variation experienced in the prototype, this calibrated flow was used to theoretically analyze the ultimate expected sediment response of both scenarios. The flow into the Brazos River was held steady at a constant flow rate of 1.86 gallons per minute (GPM) during model calibration and for all design alternative tests. An important factor during the modeling process is the establishment of an equilibrium condition of sediment transport. The regulated flow in the model simulated the governing energy condition representative of the river's channel forming flow and sediment transport potential.

2. Base Test

A. Condition 1: Gates Closed

Calibration of Condition 1 was achieved after favorable bathymetric comparisons of the prototype surveys were made to several surveys of the model. The resultant bathymetry served as the base test for the first condition in which both gates are closed. Plate 11 shows the bed configuration of the HSR model Condition 1 base test.

Results of the HSR model base test bathymetry and a comparison to the 2004 through 2008 prototype surveys (provided by the Galveston District) indicated the following trends:

Approximately half a mile upstream of the GIWW crossing in the Brazos River, the model base test survey and the prototype had similar trends. In both the prototype and model base test surveys the thalweg gently crossed from the LDB toward the RDB. The model base test survey had slightly more depth than the prototype survey.

In the prototype, the thalweg line was located along the RDB from approximately 0.33 miles upstream of the GIWW to the GIWW crossing. In the model base test, the thalweg was located along the RDB from a point approximately 0.25 miles upstream of the GIWW crossing.

The prototype channel depths decreased from upstream of the GIWW crossing to downstream. During Condition 1, both gates were closed at all times. The channel was relatively shallow in the crossing in this condition. Because this scenario was not observed in real world applications and has no consistent bathymetrical or ADCP data, engineering judgment was used to establish this case as being representative of a theoretical condition. Eddies existed near both the East and West Gates. The eddy formed near the north guide wall on the East Gate side extended slightly into the main channel and had higher velocities than the eddy near the West Gate. The

eddy that formed near the West Gate was smaller than the East Gate eddy and had minimal velocities. Depositional areas were shown in the northernmost and southernmost reaches of the crossing by both gates in the prototype and the model.

B. Condition 2 : Gates Opened

Calibration of the second model condition was achieved after favorable bathymetric comparisons of the prototype surveys were made to several surveys of the model. The resultant bathymetry served as the base test for the second condition in which both gates are opened. Plate 12 shows the bed configuration of the HSR model Condition 2 base test.

Results of the HSR model base test bathymetry and a comparison to the 2004 through 2008 prototype surveys (provided by the Galveston District) indicated the following trends:

Approximately 0.5 miles upstream of the GIWW crossing in the Brazos River, the model base test survey and the prototype show similar trends. In this area, both surveys show the thalweg slowly crossing from the LDB toward the RDB. The model base test survey showed slightly more depth than the prototype.

In the prototype, the thalweg was located along the RDB from a point approximately 0.33 miles upstream of the GIWW to the GIWW crossing. In the model, the thalweg is shown to be along the RDB from a point approximately 0.25 miles upstream of the GIWW crossing.

The prototype channel depths decreased from upstream of the GIWW crossing to downstream. In this model condition, both gates were open. A scour line was observed where the high velocities exited the GIWW through the West Gate and met with the flow from the Brazos River. The model base test crossing was slightly shallow compared to the prototype. Because of the increased width in the GIWW crossing relative to the Brazos River width, depositional areas developed on both sides of the main channel in front of the gates in both the prototype and the model. The depositional areas were more defined in the model base test. The eddy was

shown near the north guide wall on the East Gate side again, but had slower velocities and did not get as big as the eddy formed when the gates were closed. The eddy that formed near the West Gate when gates were closed divided into two even weaker eddies when the gates were opened; the eddies were located north and south of the discharge from the GIWW. The eddies formed in the gates opened condition were smaller, slower, and in slightly different locations than the eddies formed in the previous condition (gates closed).

Note: Upstream of the GIWW crossing, the Brazos River had a much deeper channel in Condition 1 (gates closed) than in Condition 2 (gates opened). This could be a result of water flowing through the open gates and slowing the downstream flow from the Brazos, thus slowing the sediment transport.

3. Design Alternative Tests

The testing process consisted of installing alternative structure configurations in the model in an attempt to alter the model bathymetry and velocity distribution in a manner intended to alleviate eddy formation and / or siltation. Evaluation of each alternative was accomplished through a qualitative comparison to the model base test bathymetry and model base test velocity (LDV) data.

(Mile points are measured from the entrance to the Gulf of Mexico upstream to the structure.)

Alternative 1:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Dike	1.30	RDB	210	4.65	6.00

Condition 1: Bathymetry (Plate 16) and Velocity (Plate 17) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X	X		

Condition 2: Bathymetry (Plate 18) and Velocity (Plate 19) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 2:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Dike	1.40	LDB	75	4.65	6.00
Install Dike	1.30	LDB	120	4.65	6.00

Condition 1: Bathymetry (Plate 20) and Velocity (Plate 21) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Condition 2: Bathymetry (Plate 22) and Velocity (Plate 23) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 3:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet		Structure Top Elevation (ft)	
			NAVD 88	MLT		
Install Notched Dike	1.46	LDB	75 Notch width = 20' (Start notch 28 ft from LDB)		4.65 EBD ¹	6.00 EBD ¹
Install Notched Dike	1.40	LDB	75 Notch width = 20' (Start notch 28 ft from LDB)		4.65 EBD ¹	6.00 EBD ¹
Install Dike	1.25	LDB	115		4.65	6.00

EBD¹: Stands for Existing Bed Depth

Condition 1: Bathymetry (Plate 24) and Velocity (Plate 25) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Condition 2: Bathymetry (Plate 26) and Velocity (Plate 27) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 4:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Landing Wall	1.37	LDB	500	4.65	6.00

Condition 1: Bathymetry (Plate 28) and Velocity (Plate 29) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X	X		

Condition 2: Bathymetry (Plate 30) and Velocity (Plate 31) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 5:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Landing Wall	1.32	LDB	325	4.65	6.00

Condition 1: Bathymetry (Plate 32) and Velocity (Plate 33) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Condition 2: Bathymetry (Plate 34) and Velocity (Plate 35) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 6:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Landing Wall	1.40	LDB	500	4.65	6.00

Condition 1: Bathymetry (Plate 36) and Velocity (Plate 37) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X	X		

Condition 2: Bathymetry (Plate 38) and Velocity (Plate 39) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X	X		

Alternative 7:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Angled Landing Wall	1.40	LDB	500	4.65	6.00
Install Extension at end of Wall	1.36	LDB	120	4.65	6.00

Condition 1: Bathymetry (Plate 40) and Velocity (Plate 41) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X		X	

Condition 2: Bathymetry (Plate 42) and Velocity (Plate 43) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 8:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Landing Wall	1.40	LDB	500	4.65	6.00

Condition 1: Bathymetry (Plate 44) and Velocity (Plate 45) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X	X		

Condition 2: Bathymetry (Plate 46) and Velocity (Plate 46) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 9:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Dike	1.62	LDB	75	4.65	6.00
Install Dike	1.58	LDB	75	4.65	6.00
Install Dike	1.54	LDB	75	4.65	6.00
Install Dike	1.26	LDB	150	4.65	6.00

Condition 1: Bathymetry (Plate 48) and Velocity (Plate 49) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Condition 2: Bathymetry (Plate 50) and Velocity (Plate 51) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 10:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Dike	1.63	RDB	75	4.65	6.00
Install Dike	1.59	RDB	75	4.65	6.00
Install Dike	1.55	RDB	75	4.65	6.00
Install Dike	1.26	LDB	150	4.65	6.00

Condition 1: Bathymetry (Plate 52) and Velocity (Plate 53) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X		X	

Condition 2: Bathymetry (Plate 54) and Velocity (Plate 55) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 11:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Dike	1.63	RDB	75	4.65	6.00
Install Dike	1.59	RDB	75	4.65	6.00
Install Dike	1.55	RDB	75	4.65	6.00

Condition 1: Bathymetry (Plate 56) and Velocity (Plate 57) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X		X	

Condition 2: Bathymetry (Plate 58) and Velocity (Plate 59) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 12:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Dike	1.46	LDB	75	4.65	6.00
Install Dike	1.43	LDB	75	4.65	6.00
Install Dike	1.40	LDB	75	4.65	6.00

Condition 1: Bathymetry (Plate 60) and Velocity (Plate 61) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Condition 2: Bathymetry (Plate 62) and Velocity (Plate 63) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 13:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Dike	1.46	LDB	175	4.65	6.00
Install Dike	1.43	LDB	200	4.65	6.00
Install Dike	1.40	LDB	225	4.65	6.00

Condition 1: Bathymetry (Plate 64) and Velocity (Plate 65) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Condition 2: Bathymetry (Plate 66) and Velocity (Plate 66) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 14:

Type of Structure	Mile Point	LDB or RDB	Dimensions in Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Dike	1.40	LDB	225	4.65	6.00

Condition 1: Bathymetry (Plate 68) and Velocity (Plate 69) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X		X	

Condition 2: Bathymetry (Plate 70) and Velocity (Plate 71) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X		X	

Alternative 15:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Build Mud Wall with Dredge Material	1.20-1.21	LDB	~153,500	2.65	4.00

Condition 1: Bathymetry (Plate 72) and Velocity (Plate 73) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Condition 2: Bathymetry (Plate 74) and Velocity (Plate 74) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X		X	

Alternative 16:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Geotextile Tube					
1 st Reach	1.33	LDB	300 ft from bank	2.65	4.00
2 nd Reach	1.29	LDB	600 ft extension	2.65	4.00

Condition 1: Bathymetry (Plate 76) and Velocity (Plate 77) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X		X	

Condition 2: Bathymetry (Plate 78) and Velocity (Plate 79) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 17:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Dike	1.52	LDB	100 (at 30° angle)	4.65	6.00
Install Dike	1.52	RDB	100 (at 30° angle)	4.65	6.00

Condition 1: Bathymetry (Plate 80) and Velocity (Plate 81) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X		X	

Condition 2: Bathymetry (Plate 82) and Velocity (Plate 83) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 18:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Structure Top Elevation (ft)	
				NAVD 88	MLT
Install Dike	1.47	LDB	100 (at 30° angle)	4.65	6.00
Install Dike	1.47	RDB	100 (at 30° angle)	4.65	6.00

Condition 1: Bathymetry (Plate 84) and Velocity (Plate 85) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Condition 2: Bathymetry (Plate 86) and Velocity (Plate 87) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 19:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Remove Bank to Elevation (ft)	
				NAVD 88	MLT
Remove Southeast Bank Line	1.13-1.25	LDB	43,627	-5.00	-3.65

Condition 1: Bathymetry (Plate 88) and Velocity (Plate 89) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X		X	

Condition 2: Bathymetry (Plate 90) and Velocity (Plate 91) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X	X		

Alternative 20:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Remove Bank to Elevation (ft)	
				NAVD 88	MLT
Remove Northeast Bank Line	1.40-1.49	LDB	67,992	-5.00	-3.65
Dredge (by Northeast Bank)	1.40-1.50	LDB	86,000	-10.00	-8.65

Condition 1: Bathymetry (Plate 92) and Velocity (Plate 93) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X		X	

Condition 2: Bathymetry (Plate 94) and Velocity (Plate 95) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X		X	

Alternative 21:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Remove Bank to Elevation (ft)	
				NAVD 88	MLT
Remove Northeast Bank Line	1.40-1.49	LDB	67,992	-5.00	-3.65
Dredge (by Northeast Bank)	1.40-1.50	LDB	86,000	-10.00	-8.65
Remove Southeast Bank Line	1.13-1.25	LDB	43,627	-5.00	-3.65

Condition 1: Bathymetry (Plate 96) and Velocity (Plate 97) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X		X			X	

Condition 2: Bathymetry (Plate 98) and Velocity (Plate 99) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X		X	

Alternative 22:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Remove Bank to Elevation (ft)	
				NAVD 88	MLT
Remove Northeast Bank Line	1.40-				
Remove Southeast Bank Line	1.49	LDB	67,992	-5.00	-3.65
	1.13-	LDB	43,627	-5.00	-3.65
	1.25				

Condition 1: Bathymetry (Plate 100) and Velocity (Plate 101) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X		X	

Condition 2: Bathymetry (Plate 102) and Velocity (Plate 103) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X		X	

Alternative 23:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Remove Bank to Elevation (ft)	
				NAVD 88	MLT
Remove Northeast Bank Line	1.40-1.49	LDB	67,992	-5.00	-3.65

Condition 1: Bathymetry (Plate 104) and Velocity (Plate 105) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X		X	

Condition 2: Bathymetry Analysis (Plate 106)

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X		X	

Alternative 24:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Remove Bank to Elevation (ft)	
				NAVD 88	MLT
Remove Northeast Bank Line	1.40-1.49	LDB	67,992	-5.00	-3.65
Remove Northwest Bank Line	1.39-1.48	RDB	53,242	-5.00	-3.65

Condition 1: Bathymetry (Plate 108) and Velocity (Plate 109) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X	X			X	

Condition 2: Bathymetry (Plate 110) and Velocity (Plate 111) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X	X			X	

Alternative 25:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Remove Bank to Elevation (ft)	
				NAVD 88	MLT
Remove Northeast Bank Line					
Remove Northwest Bank Line	1.40-1.49	LDB	67,992	-5.00	-3.65
Remove Southeast Bank Line	1.39-1.48	RDB	53,242	-5.00	-3.65
	1.13-1.25	LDB	43,627	-5.00	-3.65

Condition 1: Bathymetry (Plate 112) and Velocity (Plate 113) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X		X			X	

Condition 2: Bathymetry (Plate 114) and Velocity (Plate 115) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X		X			X	

Alternative 26:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Remove Bank to Elevation (ft)	
				NAVD 88	MLT
Remove Northeast Bank Line	1.40-1.49	LDB	67,992	-5.00	-3.65
Dredge (by Northeast Bank)	1.40-1.50	LDB	86,000	-10.00	-8.65
Remove Northwest Bank Line	1.39-1.48	RDB	53,242	-5.00	-3.65
Remove Southeast Bank Line	1.13-1.25	LDB	43,627	-5.00	-3.65

Condition 1: Bathymetry (Plate 116) and Velocity (Plate 117) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X		X			X	

Condition 2: Bathymetry (Plate 118) and Velocity (Plate 119) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X		X	

Alternative 27:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Remove Bank to Elevation (ft)	
				NAVD 88	MLT
Remove Northeast Bank Line	1.40-1.49	LDB	67,992	-5.00	-3.65
Dredge (by Northeast Bank)	1.40-1.50	LDB	86,000	-10.00	-8.65
Remove Northwest Bank Line	1.39-1.48	RDB	53,242	-5.00	-3.65

Condition 1: Bathymetry (Plate 120) and Velocity (Plate 121) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X		X			X	

Condition 2: Bathymetry (Plate 122) and Velocity (Plate 123) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X			X		X	

Alternative 28:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Remove Bank to Elevation (ft)	
				NAVD 88	MLT
Remove Northwest Bank Line	1.39-1.48	RDB	67,992	-5.00	-3.65
Dredge (by Northeast Bank)	1.40-1.50	LDB	86,000	-10.00	-8.65
Remove Southeast Bank Line	1.13-1.25	LDB	53,242	-5.00	-3.65

Condition 1: Bathymetry (Plate 124) and Velocity (Plate 125) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
X		X			X	

Condition 2: Bathymetry (Plate 126) and Velocity (Plate 127) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X		X	

Alternative 29:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Remove Bank to Elevation (ft)	
				NAVD 88	MLT
Remove Northwest Bank Line	1.39-1.48	RDB	53,242	-5.00	-3.65
Dredge (by Northeast Bank)	1.40-1.50	LDB	86,000	-10.00	-8.65

Condition 1: Bathymetry (Plate 128) and Velocity (Plate 129) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X	X			X	

Condition 2: Bathymetry (Plate 130) and Velocity (Plate 131) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X		X	

Alternative 30:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Remove Bank to Elevation (ft)	
				NAVD 88	MLT
Remove Northwest Bank Line	1.39-1.48	RDB	53,242	-5.00	-3.65

Condition 1: Bathymetry (Plate 132) and Velocity (Plate 133) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X	X			X	

Condition 2: Bathymetry (Plate 134) and Velocity (Plate 135) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X		X	

Alternative 31:

Type of Structure	Mile Point	LDB or RDB	Area in Square Feet	Remove Bank to Elevation (ft)	
				NAVD 88	MLT
Remove Northwest Bank					
Line	1.39-1.48	RDB	53,242	-5.00	-3.65
Remove Southeast Bank	1.13-1.25	LDB	43,627	-5.00	-3.65
Line					

Condition 1: Bathymetry (Plate 136) and Velocity (Plate 137) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X		X		X	

Condition 2: Bathymetry (Plate 138) and Velocity (Plate 139) Analysis

Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact or No Change in Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)	Additional Comments
	X	X		X		

CONCLUSIONS

1. Evaluation and Summary of the Model Tests (Condition Analyses Combined)

Alternatives	Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact on Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)
Alternative 1		X		X	X	
Alternative 2		X		X	X	
Alternative 3		X		X	X	
Alternative 4		X		X	X	
Alternative 5		X		X	X	
Alternative 6	X			X	X	
Alternative 7		X		X		X
Alternative 8		X		X	X	
Alternative 9		X		X	X	
Alternative 10		X		X		X
Alternative 11		X		X		X
Alternative 12		X		X	X	
Alternative 13		X		X	X	
Alternative 14		X		X		X
Alternative 15		X		X		X
Alternative 16		X		X		X
Alternative 17		X		X		X
Alternative 18		X		X	X	
Alternative 19		X		X		X
Alternative 20	X			X		X
Alternative 21	X			X		X
Alternative 22	X			X		X
Alternative 23		X		X		X

Alternatives	Positive Impact on East Gate Eddy	Negative Impact or No Change in East Gate Eddy	Positive Impact on West Gate Eddy	Negative Impact or No Change in West Gate Eddy	Positive Impact on Crossing (GIWW RM 401)	Negative Impact on Crossing (GIWW RM 401)
Alternative 24		X	X			X
Alternative 25	X		X			X
Alternative 26	X			X		X
Alternative 27	X			X		X
Alternative 28		X		X		X
Alternative 29		X		X		X
Alternative 30		X		X		X
Alternative 31		X		X		X

In order to determine the best alternative, certain criteria were used to evaluate each alternative. The first condition was that the alternative had to sufficiently weaken or completely stop the eddy formation at the approach to the East Gate (approximately GIWW Mile 400.5). The second condition was that the alternative had to reduce or stop the eddy formation at the approach to the West Gate (approximately GIWW Mile 401.5). Lastly, the condition of the navigable channel in the crossing at GIWW Mile 401 was to be enhanced in both depth and width or to remain the same.

The ideal alternative would have been able to meet all three conditions, however, no alternative tested successfully met all three conditions. There were several alternatives that met two of the three conditions. Although some alternatives did meet most of the criterion and were considered successful in reducing the eddies, they were not recommended because they would involve structures infringing too far upon the navigation channel or industry consultants stated that they did not want any structures near the gates' approaches. Some of those alternatives that met most of the criterion but were not chosen were alternatives 6, 20, 21, 22, 26, and 27.

2. Recommendations

Alternative 25 was recommended due to its ability to significantly reduce the strength of the eddy at the approach to both the East Gate and the West Gate. This greatly enhances the navigation safety of the crossing for industry, without adding any structures that could damage large vessels or hinder traffic. Since this alternative called for removing bank lines, it created a wider opening at the crossing and allowed the Brazos River's flow to spread out and slow down, thus dropping more sediment in the crossing. The results suggest that there would be a need for dredging around GIWW RM 401 if those bank lines were removed.

The recommended design included the following:

- Remove the Northwest Bank Line (Approximate Area = 53,242 sq. ft)
 - Located about 1.39-1.48 miles upstream from the Gulf of Mexico
 - Remove to depth of -5 ft NAVD 88 or -3.65 ft MLT
- Remove Northeast Bank Line (Approximate Area = 67,992 sq. ft)
 - Located about 1.40-1.49 miles upstream from the Gulf of Mexico
 - Remove to depth of -5 ft NAVD 88 or -3.65 ft MLT
- Remove Southeast Bank Line (Approximate Area = 43,627 sq. ft)
 - Located about 1.13-1.25 miles upstream from the Gulf of Mexico
 - Remove to depth of -5 ft NAVD 88 or -3.65 ft MLT

3. Interpretation of Model Test Results

In the interpretation and evaluation of the model test results, it should be remembered that these results are qualitative in nature. Any hydraulic model, whether physical or numerical, is subject to biases introduced as a result of the inherent complexities that exist in the prototype. Anomalies in actual hydrographic events, such as prolonged periods of high or low flows are not reflected in these results, nor are complex physical phenomena, such as the existence of underlying rock formations or other non-erodible variables. Flood flows were not simulated in this study.

This model study was intended to serve as a tool for the river engineer to guide in assessing the general trends that could be expected to occur in the GIWW and Brazos River crossing from a variety of imposed design alternatives. Measures for the final design may be modified based upon engineering knowledge and experience, real estate and construction considerations, economic and environmental impacts, or any other special requirements.

FOR MORE INFORMATION

For more information about HSR modeling or the Applied River Engineering Center,
please contact Robert Davinroy, P.E., Ashley Cox, or Jasen Brown, P.E. at:

Applied River Engineering Center
U.S. Army Corps of Engineers - St. Louis District
Hydrologic and Hydraulics Branch
Foot of Arsenal Street
St. Louis, Missouri 63118

Phone: (314) 865-6326, (314) 865-6331, or (314) 865-6322
Fax: (314) 865-6352

E-mail: Ashley.N.Cox@mvs.usace.army.mil
Jasen.L.Brown@mvs.usace.army.mil
Robert.D.Davinroy@mvs.usace.army.mil

Or you can visit us on the World Wide Web at:

http://www.mvs.usace.army.mil/eng-con/expertise/arec/welcome_page_2.html

APPENDIX OF PLATES

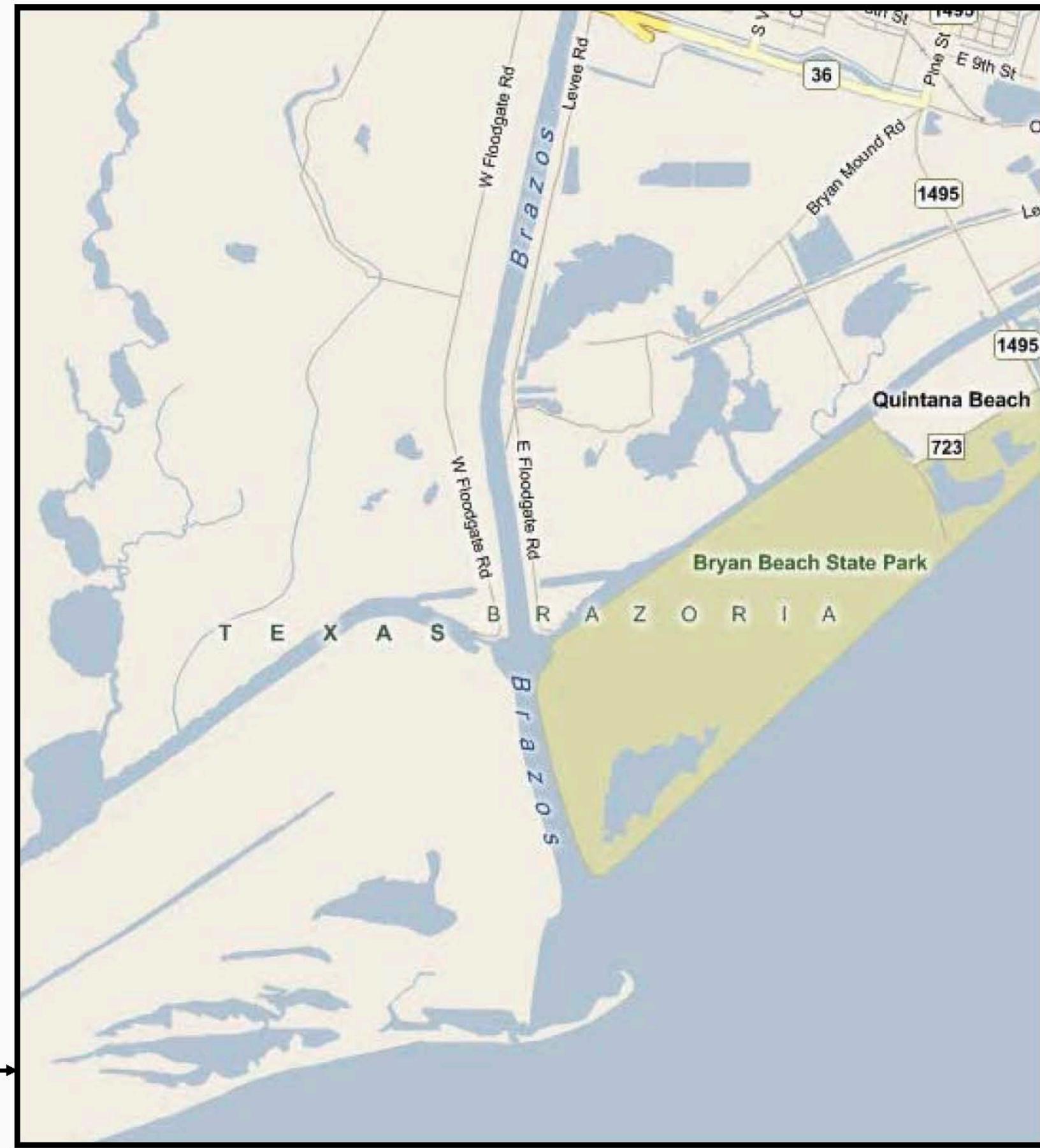
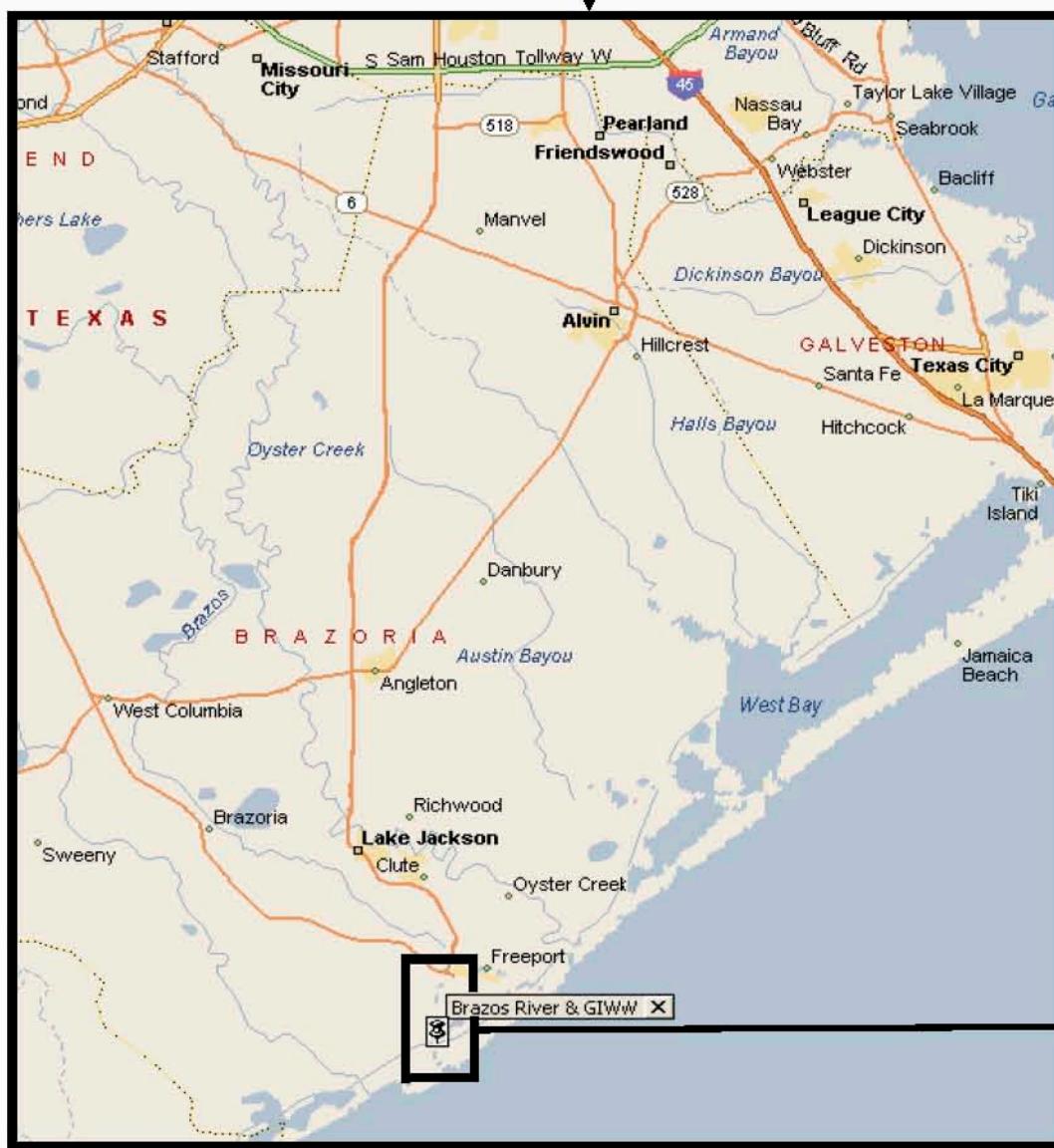
1. Location and Vicinity Map of the Study Reach
2. Oblique Aerial Photographs
3. Field Photographs
4. 2004 Hydrographic Survey
5. 2005 Hydrographic Survey: Before Dredge
6. 2005 Hydrographic Survey: After Dredge
7. 2006 Hydrographic Survey
8. 2007 Hydrographic Survey: Before Dredge
9. 2007 Hydrographic Survey: After Dredge
10. 2008 Hydrographic Survey
11. 2008 ADCP Data
12. Model Base Test: Condition 1 – 1:8,000
13. Model Base Test: Condition 1 LDV Data – 1:4,600
14. Model Base Test: Condition 2 – 1:8,000
15. Model Base Test: Condition 2 LDV Data – 1:4,600
16. Alternative 1: Condition 1 – 1: 4,600
17. Alternative 1: Condition 1 LDV Data – 1:4,600
18. Alternative 1: Condition 2 – 1: 4,600
19. Alternative 1: Condition 2 LDV Data – 1:4,600
20. Alternative 2: Condition 1 – 1: 4,600
21. Alternative 2: Condition 1 LDV Data – 1:4,600
22. Alternative 2: Condition 2 – 1: 4,600
23. Alternative 2: Condition 2 LDV Data – 1:4,600
24. Alternative 3: Condition 1 – 1: 4,600
25. Alternative 3: Condition 1 LDV Data – 1:4,600
26. Alternative 3: Condition 2 – 1: 4,600
27. Alternative 3: Condition 2 LDV Data – 1:4,600
28. Alternative 4: Condition 1 – 1: 4,600
29. Alternative 4: Condition 1 LDV Data – 1:4,600
30. Alternative 4: Condition 2 – 1: 4,600
31. Alternative 4: Condition 2 LDV Data – 1:4,600

32. Alternative 5: Condition 1 – 1: 4,600
33. Alternative 5: Condition 1 LDV Data – 1:4,600
34. Alternative 5: Condition 2 – 1: 4,600
35. Alternative 5: Condition 2 LDV Data – 1:4,600
36. Alternative 6: Condition 1 – 1: 4,600
37. Alternative 6: Condition 1 LDV Data – 1:4,600
38. Alternative 6: Condition 2 – 1: 4,600
39. Alternative 6: Condition 2 LDV Data – 1:4,600
40. Alternative 7: Condition 1 – 1: 4,600
41. Alternative 7: Condition 1 LDV Data – 1:4,600
42. Alternative 7: Condition 2 – 1: 4,600
43. Alternative 7: Condition 2 LDV Data – 1:4,600
44. Alternative 8: Condition 1 – 1: 4,600
45. Alternative 8: Condition 1 LDV Data – 1:4,600
46. Alternative 8: Condition 2 – 1: 4,600
47. Alternative 8: Condition 2 LDV Data – 1:4,600
48. Alternative 9: Condition 1 – 1: 4,600
49. Alternative 9: Condition 1 LDV Data – 1:4,600
50. Alternative 9: Condition 2 – 1: 4,600
51. Alternative 9: Condition 2 LDV Data – 1:4,600
52. Alternative 10: Condition 1 – 1: 4,600
53. Alternative 10: Condition 1 LDV Data – 1:4,600
54. Alternative 10: Condition 2 – 1: 4,600
55. Alternative 10: Condition 2 LDV Data – 1:4,600
56. Alternative 11: Condition 1 – 1: 4,600
57. Alternative 11: Condition 1 LDV Data – 1:4,600
58. Alternative 11: Condition 2 – 1: 4,600
59. Alternative 11: Condition 2 LDV Data – 1:4,600
60. Alternative 12: Condition 1 – 1: 4,600
61. Alternative 12: Condition 1 LDV Data – 1:4,600
62. Alternative 12: Condition 2 – 1: 4,600
63. Alternative 12: Condition 2 LDV Data – 1:4,600

64. Alternative 13: Condition 1 – 1: 4,600
65. Alternative 13: Condition 1 LDV Data – 1:4,600
66. Alternative 13: Condition 2 – 1: 4,600
67. Alternative 13: Condition 2 LDV Data – 1:4,600
68. Alternative 14: Condition 1 – 1: 4,600
69. Alternative 14: Condition 1 LDV Data – 1:4,600
70. Alternative 14: Condition 2 – 1: 4,600
71. Alternative 14: Condition 2 LDV Data – 1:4,600
72. Alternative 15: Condition 1 – 1: 4,600
73. Alternative 15: Condition 1 LDV Data – 1:4,600
74. Alternative 15: Condition 2 – 1: 4,600
75. Alternative 15: Condition 2 LDV Data – 1:4,600
76. Alternative 16: Condition 1 – 1: 4,600
77. Alternative 16: Condition 1 LDV Data – 1:4,600
78. Alternative 16: Condition 2 – 1: 4,600
79. Alternative 16: Condition 2 LDV Data – 1:4,600
80. Alternative 17: Condition 1 – 1: 4,600
81. Alternative 17: Condition 1 LDV Data – 1:4,600
82. Alternative 17: Condition 2 – 1: 4,600
83. Alternative 17: Condition 2 LDV Data – 1:4,600
84. Alternative 18: Condition 1 – 1: 4,600
85. Alternative 18: Condition 1 LDV Data – 1:4,600
86. Alternative 18: Condition 2 – 1: 4,600
87. Alternative 18: Condition 2 LDV Data – 1:4,600
88. Alternative 19: Condition 1 – 1: 4,600
89. Alternative 19: Condition 1 LDV Data – 1:4,600
90. Alternative 19: Condition 2 – 1: 4,600
91. Alternative 19: Condition 2 LDV Data – 1:4,600
92. Alternative 20: Condition 1 – 1: 4,600
93. Alternative 20: Condition 1 LDV Data – 1:4,600
94. Alternative 20: Condition 2 – 1: 4,600
95. Alternative 20: Condition 2 LDV Data – 1:4,600

96. Alternative 21: Condition 1 – 1: 4,600
97. Alternative 21: Condition 1 LDV Data – 1:4,600
98. Alternative 21: Condition 2 – 1: 4,600
99. Alternative 21: Condition 2 LDV Data – 1:4,600
100. Alternative 22: Condition 1 – 1: 4,600
101. Alternative 22: Condition 1 LDV Data – 1:4,600
102. Alternative 22: Condition 2 – 1: 4,600
103. Alternative 22: Condition 2 LDV Data – 1:4,600
104. Alternative 23: Condition 1 – 1: 4,600
105. Alternative 23: Condition 1 LDV Data – 1:4,600
106. Alternative 23: Condition 2 – 1: 4,600
107. Alternative 23: Condition 2 LDV Data – 1:4,600
108. Alternative 24: Condition 1 – 1: 4,600
109. Alternative 24: Condition 1 LDV Data – 1:4,600
110. Alternative 24: Condition 2 – 1: 4,600
111. Alternative 24: Condition 2 LDV Data – 1:4,600
112. Alternative 25: Condition 1 – 1: 4,600
113. Alternative 25: Condition 1 LDV Data – 1:4,600
114. Alternative 25: Condition 2 – 1: 4,600
115. Alternative 25: Condition 2 LDV Data – 1:4,600
116. Alternative 26: Condition 1 – 1: 4,600
117. Alternative 26: Condition 1 LDV Data – 1:4,600
118. Alternative 26: Condition 2 – 1: 4,600
119. Alternative 26: Condition 2 LDV Data – 1:4,600
120. Alternative 27: Condition 1 – 1: 4,600
121. Alternative 27: Condition 1 LDV Data – 1:4,600
122. Alternative 27: Condition 2 – 1: 4,600
123. Alternative 27: Condition 2 LDV Data – 1:4,600
124. Alternative 28: Condition 1 – 1: 4,600
125. Alternative 28: Condition 1 LDV Data – 1:4,600
126. Alternative 28: Condition 2 – 1: 4,600
127. Alternative 28: Condition 2 LDV Data – 1:4,600

128. Alternative 29: Condition 1 – 1: 4,600
129. Alternative 29: Condition 1 LDV Data – 1:4,600
130. Alternative 29: Condition 2 – 1: 4,600
131. Alternative 29: Condition 2 LDV Data – 1:4,600
132. Alternative 30: Condition 1 – 1: 4,600
133. Alternative 30: Condition 1 LDV Data – 1:4,600
134. Alternative 30: Condition 2 – 1: 4,600
135. Alternative 30: Condition 2 LDV Data – 1:4,600
136. Alternative 31: Condition 1 – 1: 4,600
137. Alternative 31: Condition 1 LDV Data – 1:4,600
138. Alternative 31: Condition 2 – 1: 4,600
139. Alternative 31: Condition 2 LDV Data – 1:4,600




US Army Corps
of Engineers
St. Louis District®

APPLIED
RIVER
ENGINEERING CENTER



U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	DESIGNED BY: A COX	SURVEY DATE:
DRAWN BY: A COX	REVIEWED BY: J BROWN, P.E.	CHECKED BY: E BRAUER
SUBMITTED: A COX	APPROVED: R DAVIDROY, P.E.	
FILE NAME:GALVESTONPLATES		PLOT DATE: 03/11/2008
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSS Model		

LOCATION AND
VICINITY MAP

PLATE
NUMBER
1



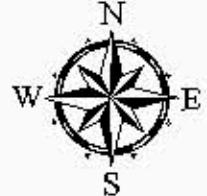
PLATE
NUMBER
2

0 125 250 500 750 1,000
Feet
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNER	DRAWN BY	REVIEWED	APPROVED
A COX	J BROWN, PE	E ERAUER, PE	
SUPERVISOR	SPWDO		
A COX	R DAVIN ROY, PE		
MIN-MAX	MIN-DIM	MIN-DIM	MIN-DIM
... Calcasieu River	07/07/2004	07/07/2004	07/07/2004

Lower Brazeau River Bridge
Calcasieu District
Brazos Riverbed CWW Crossing
HS R Model



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St. Louis District

U.S. Army Corps
of Engineers



US Army Corps
of Engineers
St. Louis District*

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RIVER
ENGINEERING CENTER



Exiting the East Gate and entering the Brazos River Crossing



Damage from a Barge Allision on the North side of the East Gate



Damage from a Barge Allision on the South side of the East Gate



Approaching the Gulf Intracoastal Waterway through the West Gate

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	DESIGNED BY: A COX	REVIEWED BY: A COX	SURVEY DATE:
	DRAWN BY: J.BROWN, P.E.	CHEKED BY: E.BAUER, E.BAUER	
	SUBMITTED A COX	APPROVED R.DAVISON, P.E.	
	FILE NAME: GALVESTON SPATE	PLATE NO.: 03112009	

GALVESTON Date Photographed: November 6, 2007

PLATE NUMBER 3

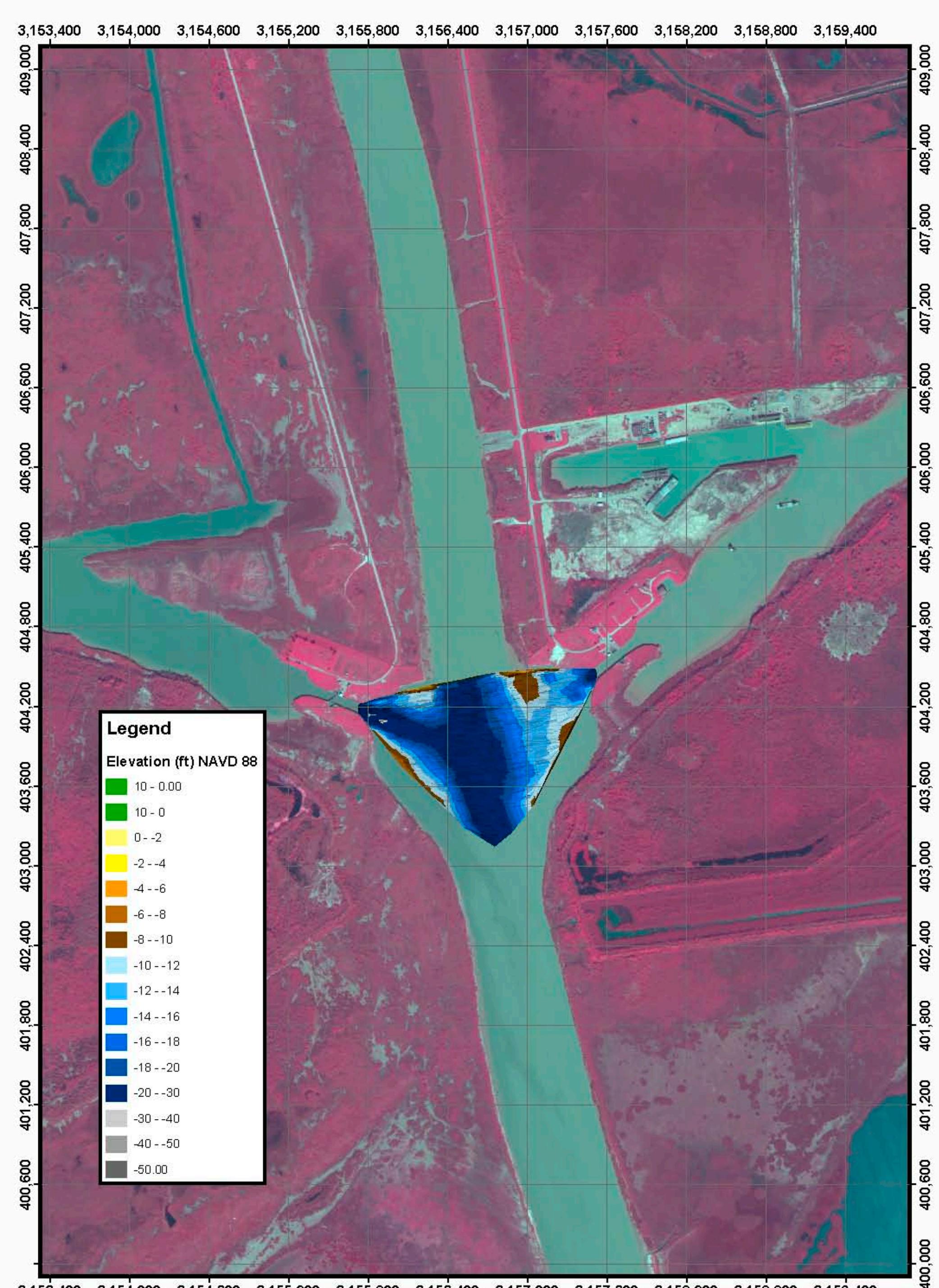
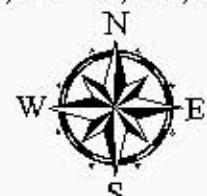


PLATE
NUMBER
4

0 125 250 500 750 1,000
Foot
2004 Survey
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
DRAFTED BY: A COX
REVIEWED BY: J BROWN, PE, E ERAUER, PE
DATE: 08/07/2009
Lower Brazeau River Banks
Calcasieu District
Brazos Riverbed CIWW Crossing
HS R Model
... Calcasieu River



St. Louis District
U.S. Army Corps
of Engineers

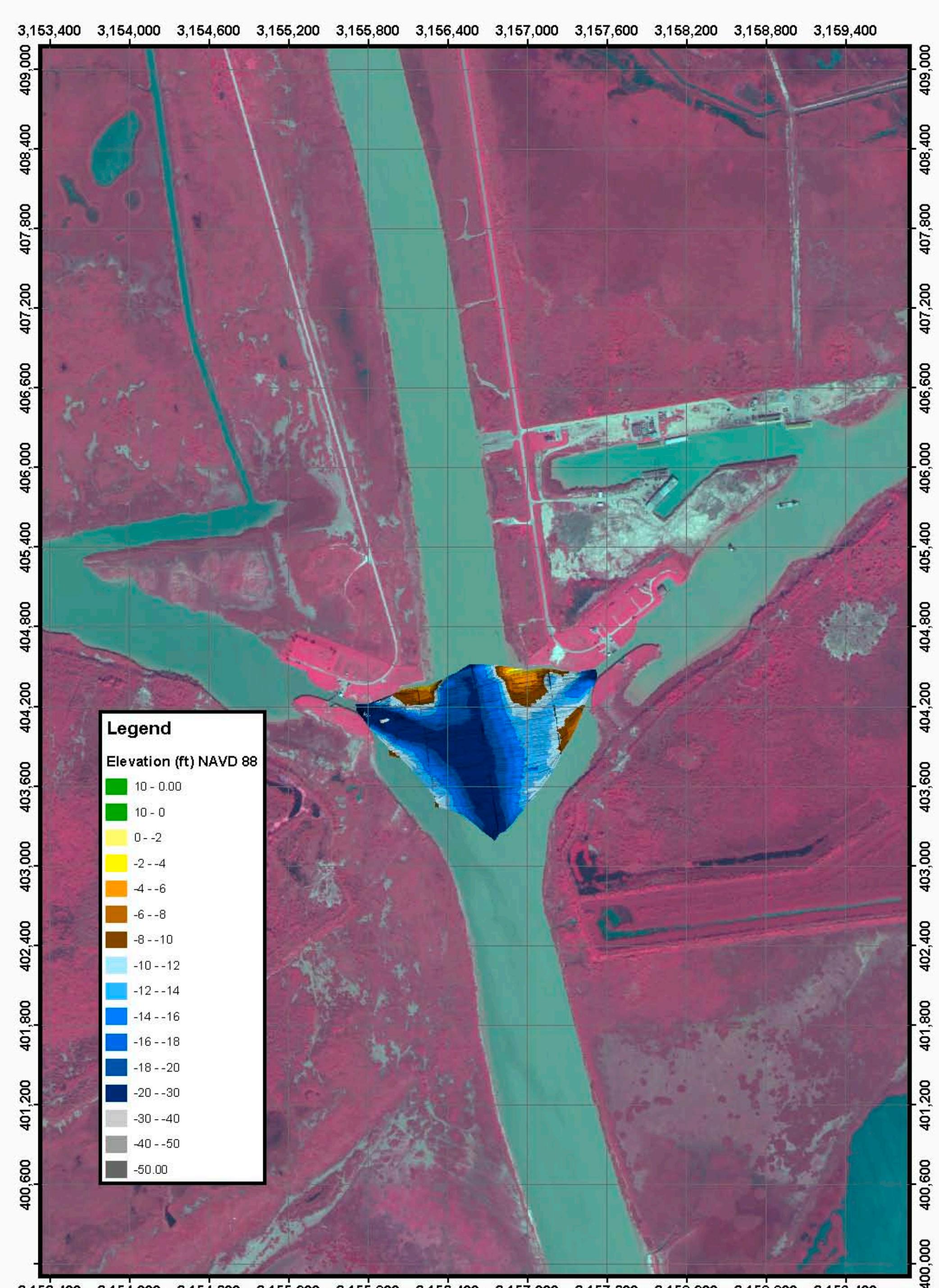


PLATE NUMBER 5
0 125 250 500 750 1,000
Foot
2005 Survey: Before Dredge
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
DRAFTED BY: A COX
REVIEWED BY: J BROWN, PE.
APPROVED BY: E ERAUER, PE.
DATE: 2005
Lower Brazeau River Bars
Calcasieu District
Brazos Riverbed CIWW Crossing
HS R Model
... Calcasieu River
07/07/2009



St. Louis District
U.S. Army Corps of Engineers



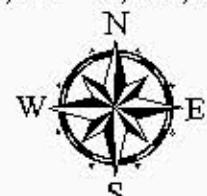
PLATE
NUMBER
6

0 125 250 500 750 1,000
Foot
2005 Survey: After Dredge
2004 AERIAL PHOTOGRAPH

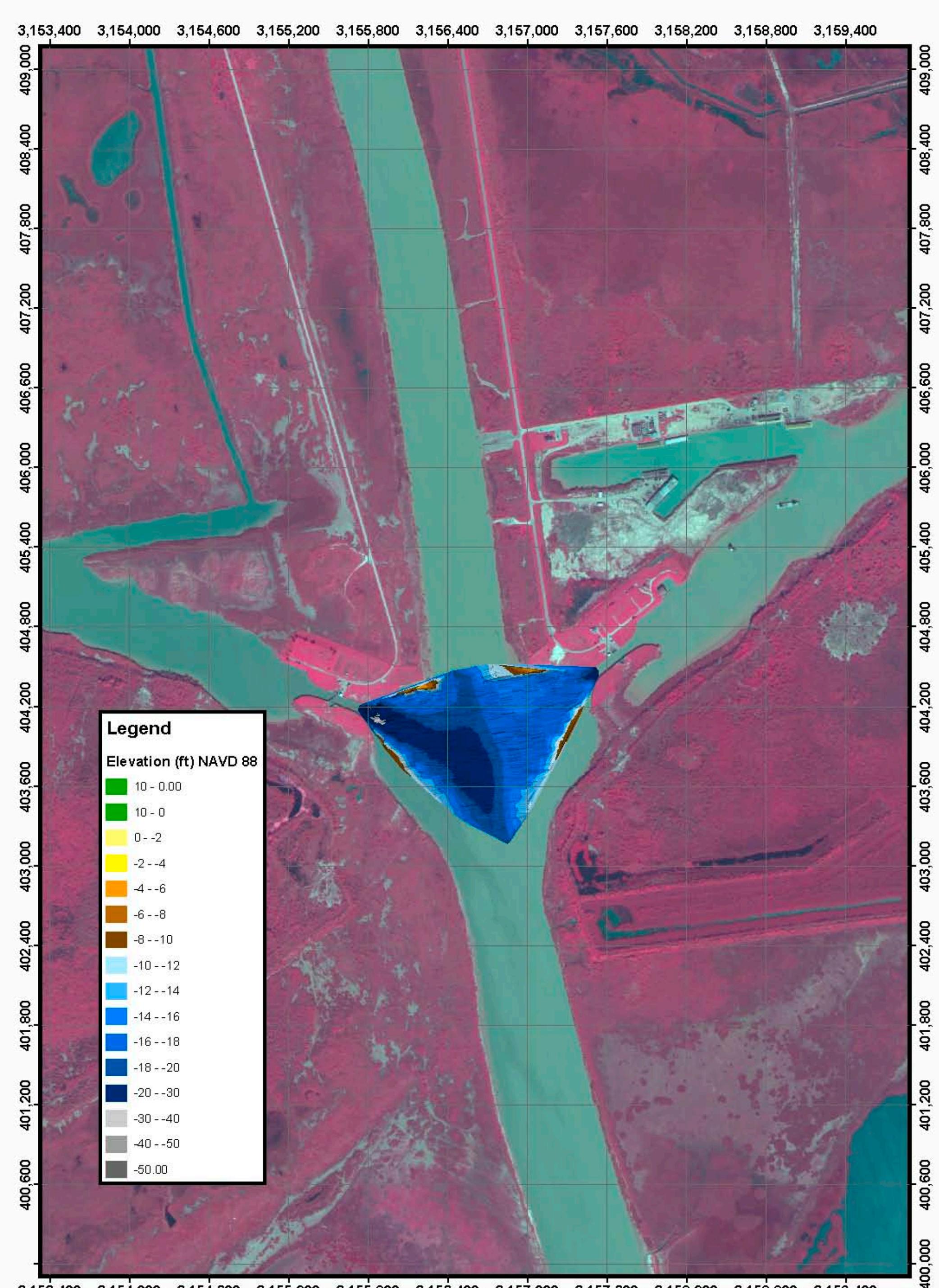
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DATA FOR	A COX	DATA FOR
DRAFTER	R. DAVIN ROY, PE.	DESIGNER
A COX	J BROWN, PE.	EERAUER, PE.
SUPERVISOR		
A COX	R. DAVIN ROY, PE.	
MIN. DATE	RED DRA	
... Calcasieu River	07/07/2005	

Lower Brazeau River Bend
Calcasieu District
Brazos Riverbed CIWW Crossing
HS R Model



St. Louis District
U.S. Army Corps
of Engineers

**Legend**

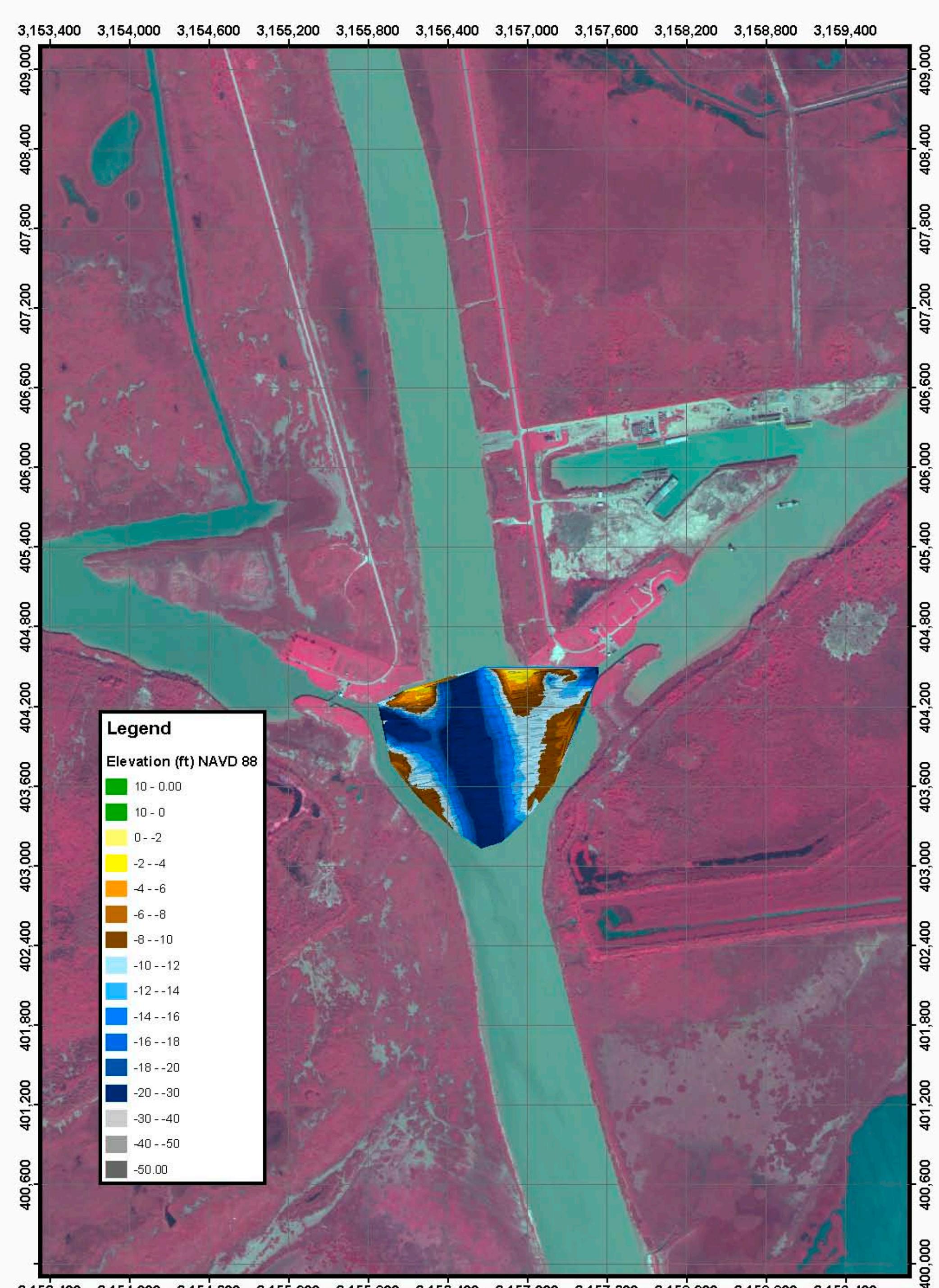
Elevation (ft) NAVD 88

10 - 0.00
10 - 0
0 - 2
-2 - 4
-4 - 6
-6 - 8
-8 - 10
-10 - 12
-12 - 14
-14 - 16
-16 - 18
-18 - 20
-20 - 30
-30 - 40
-40 - 50
-50.00

PLATE
NUMBER
70 125 250 500 750 1,000
Foot
2006 Survey
2004 AERIAL PHOTOGRAPHU.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

A COX 2006
DAVISON R. BROWN, PE. EERAUER, PE.

Lower Brazeau River Bank
Calcasieu District
Brazos Riverbed CIWW Crossing
HSR Model
... Calcasieu River
07/07/2009St. Louis District
U.S. Army Corps
of Engineers



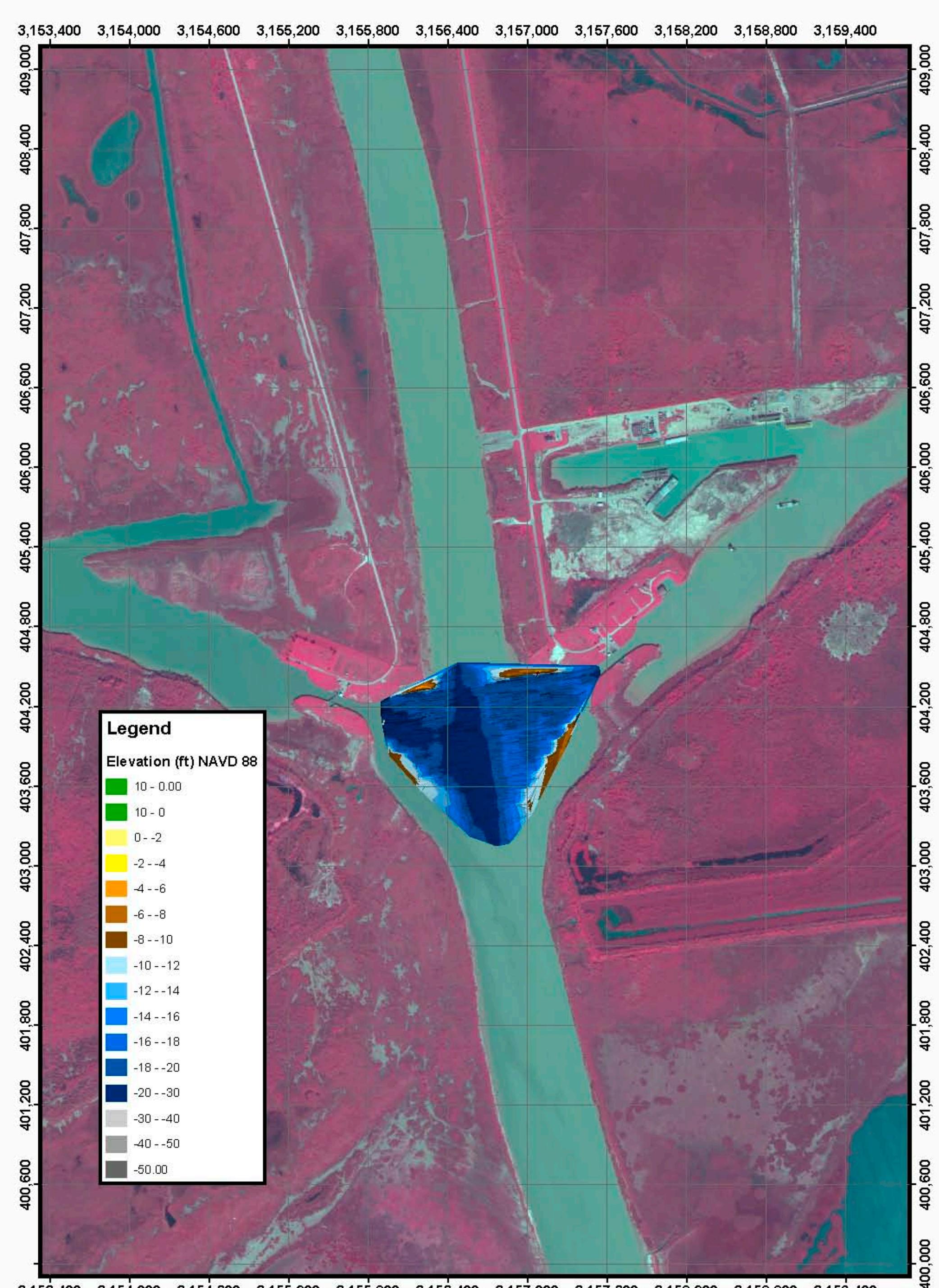
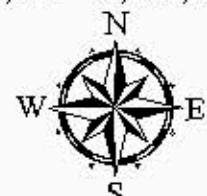


PLATE
NUMBER
6

0 125 250 500 750 1,000
Foot
2007 Survey: After Dredge
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DATA FOR	A COX	SW 1/4 SEC 1
DRAFTER	R. DAVIN ROY, PE.	DESIGNER
ACOX	J BROWN, PE.	EERAUER, PE.
DATA FOR	A COX	SW 1/4 SEC 1
DRAFTER	R. DAVIN ROY, PE.	DESIGNER
Lower Brazeau River Bars Calcasieu District Brazos Riverbed CIWW Crossing HS R Model	MINIMA	MAXIMA
... Calcasieu River	07/07/2007	07/07/2007



St. Louis District
U.S. Army Corps
of Engineers

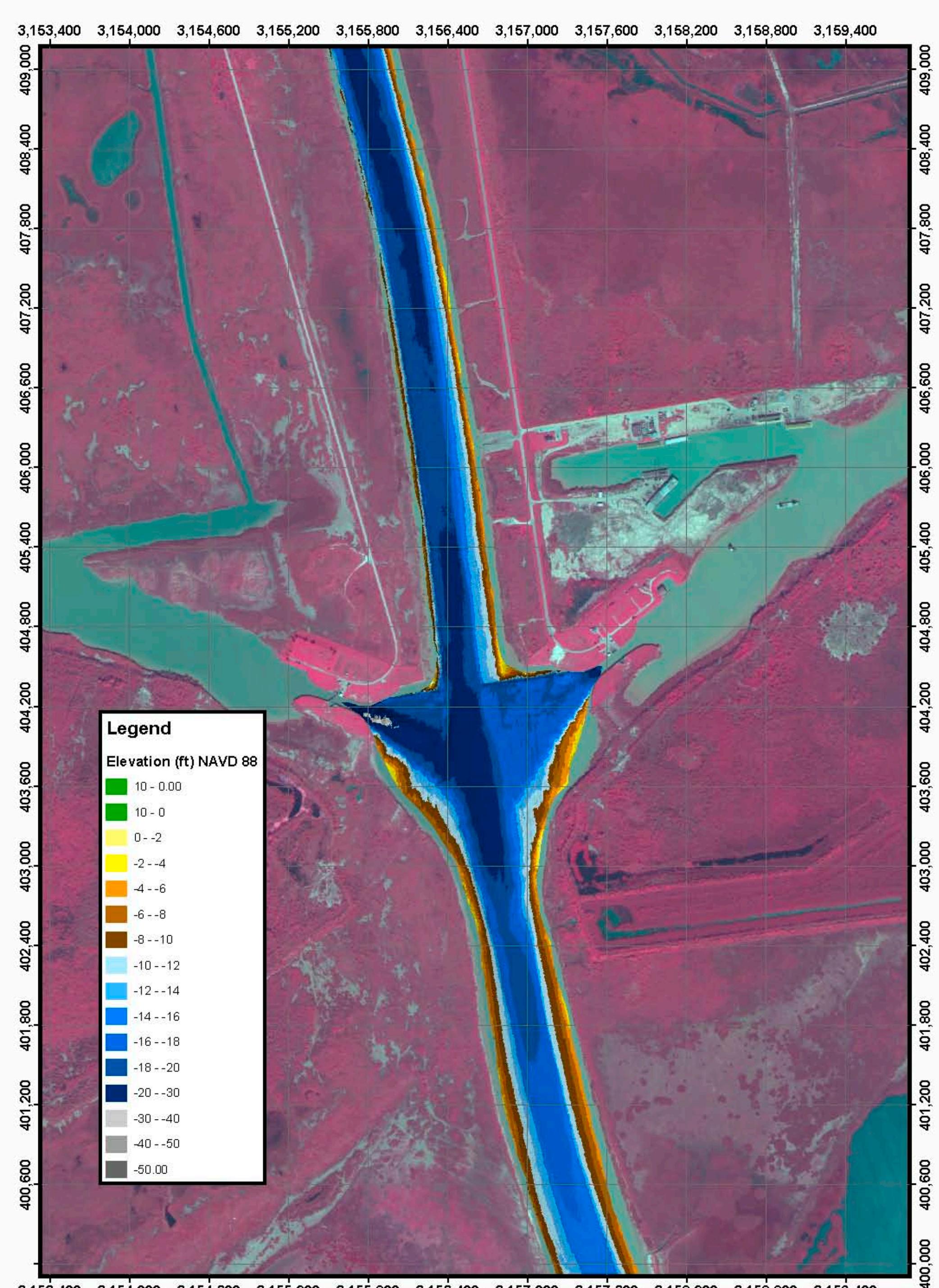
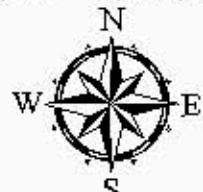


PLATE
NUMBER
10

0 125 250 500 750 1,000
Foot
2008 Survey
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DEPT. OF DEFENSE	A COX	2008
DARIN	R. BROWN, PE.	DEBIE
A COX	R. DAVIN ROY, PE.	
DATA ID:	DATA ID:	
Lower Brazeau River Bend Calcasieu District Brazos Riverbed GWW Crossing HS R Model	... Calcasieu River	07/07/2009



St. Louis District
U.S. Army Corps
of Engineers



3,155,200

3,155,800

3,156,400

3,157,000

3,157,600

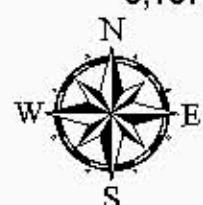
3,158,200

PLATE
NUMBER
11

0 75 150 225 300 375 450 525
Foot

2006 ADCP
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		
DRAFTED BY: A COX REVIEWED BY: J BROWN, PE. APPROVED BY: E ERAUER, PE.		
DATE: 08/07/2006		
Lower Brazeau River Banks Calcasieu District Brazos Riverbed GWW Crossing HS R Model		
MM-MIN: 00 DMS: 00/07/2006 ... Calcasieu River		



US Army Corps
of Engineers
St. Louis District



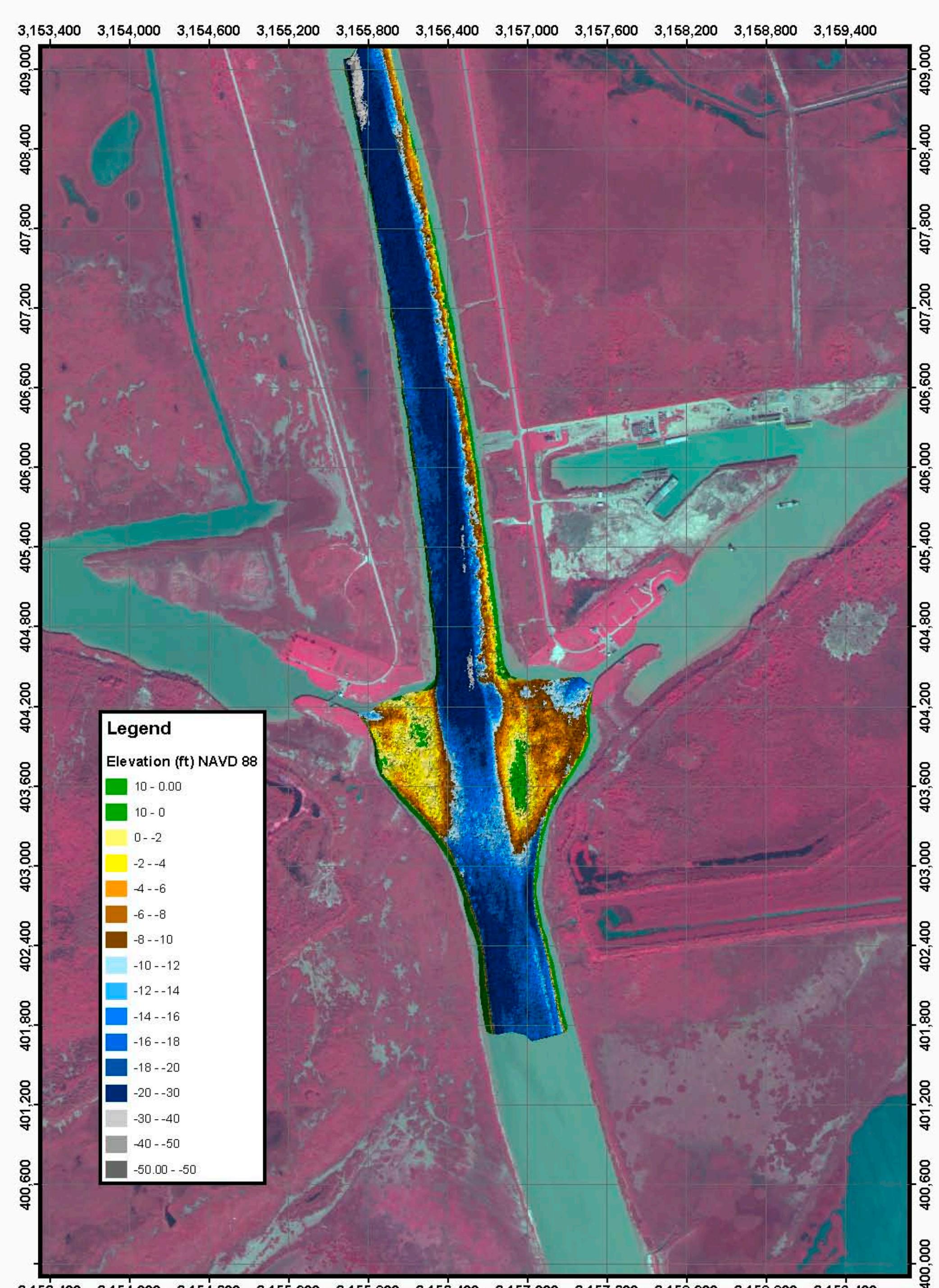


PLATE
NUMBER
12

0 125 250 500 750 1,000
Foot
Base Test
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DATA FOR	A COX	05/11/04 Scan
OWNER	R. DAVIN ROY, PE.	DESIGNER
ACOX	J BROWN, PE.	EERAUER, PE.
DATA FOR	A COX	05/11/04
OWNER	R. DAVIN ROY, PE.	DESIGNER
Lower Brazos River Basins Calcasieu District Brazos Riverbed GWW Crossing HS R Model	... Calcasieu River	05/07/2004



St. Louis District
U.S. Army Corps
of Engineers



3,155,200

3,155,800

3,156,400

3,157,000

3,157,600

3,158,200

PLATE
NUMBER

0 75 150 225 300 375 450 525
Foot

Base Test
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

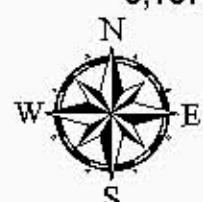
U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DRAWING NO.	A COX	DATE DRAWN	03/24/04 Sca.
DESIGNER	R. DAVIN ROY	REVISER	R. DAVIN ROY
ACO	J BROWN, PE	EREAUER	R. DAVIN ROY, PE

Lower Brazeau River Banks
Calcasieu District
Brazos Riverbed CIWW Crossing
HS R Model

DRAWING NO.	A COX	DATE DRAWN	03/24/04
DESIGNER	R. DAVIN ROY	REVISER	R. DAVIN ROY
ACO	R. DAVIN ROY, PE	EREAUER	R. DAVIN ROY, PE

... Calcasieu River



US Army Corps
of Engineers
St. Louis District



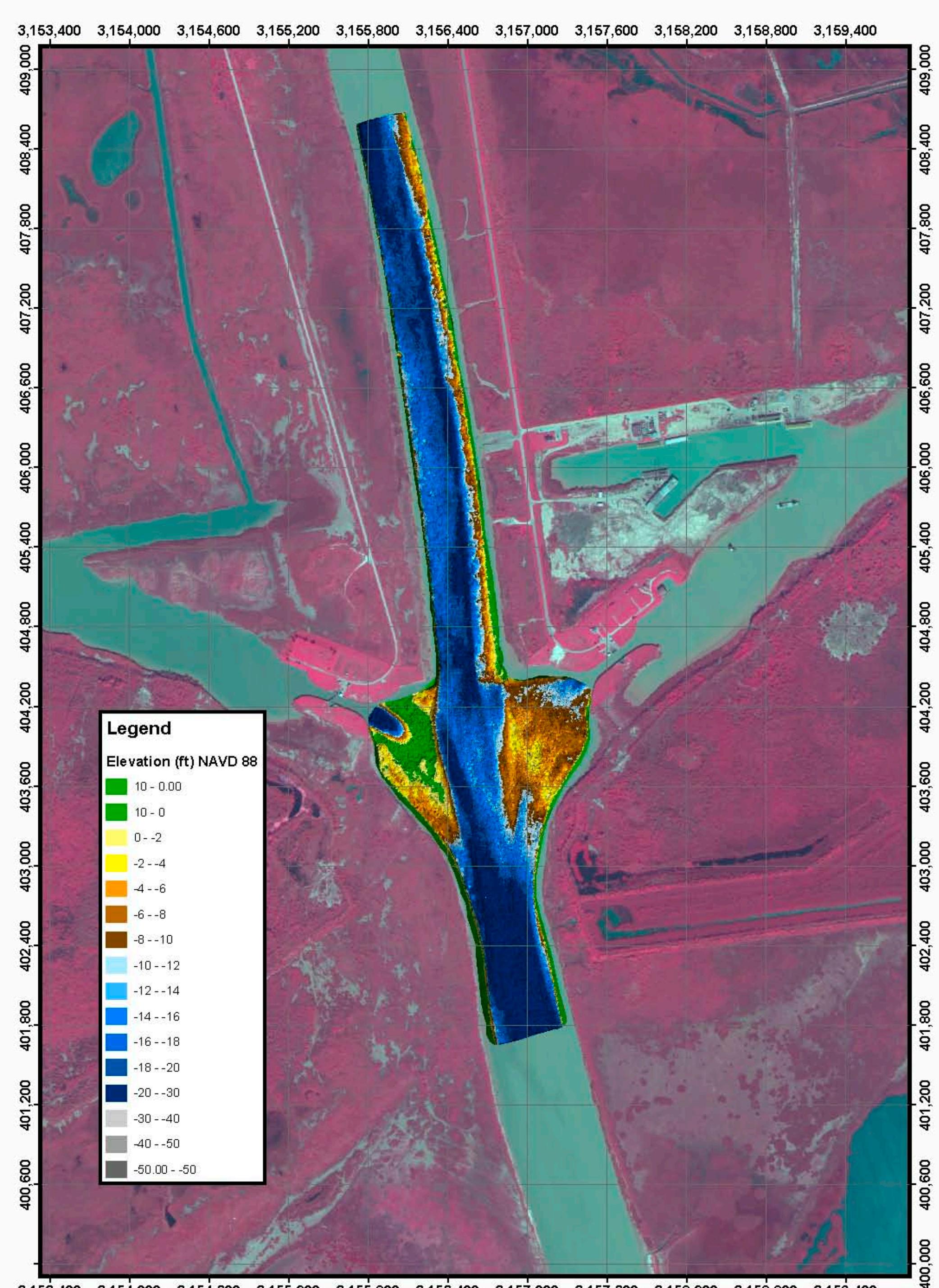


PLATE
NUMBER
14

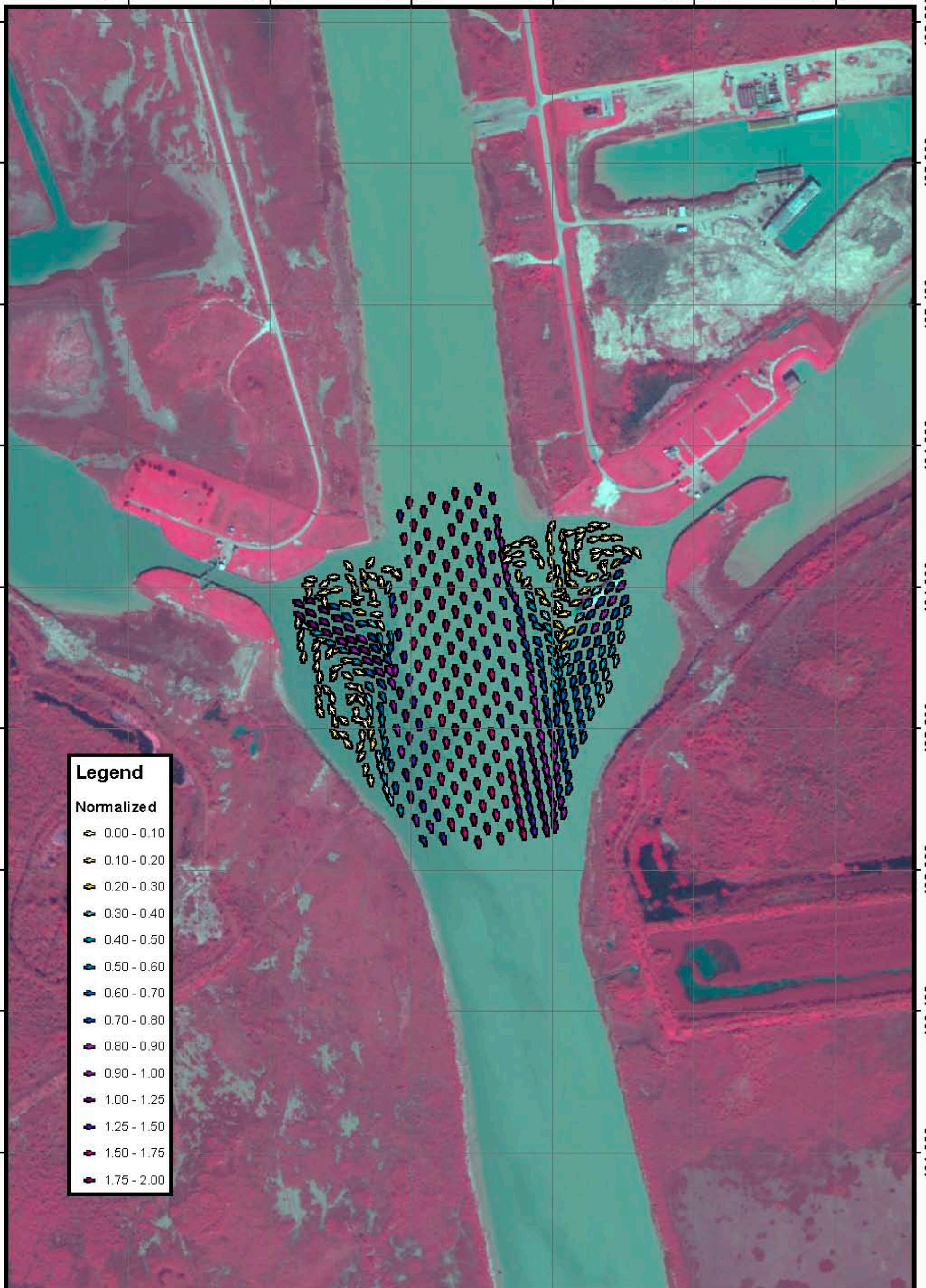
0 125 250 500 750 1,000
Foot
Base Test
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

A COX	05/11/04 Scan
DANIE	RE 1001
A COX	R DAVIN ROY, PE.
DATA ID:	SPW000
Lower Brazos River Basins Calcasieu District Brazos Riverbed CIWW Crossing HSR Model	MD DATE 05/07/2004 ... Calcasieu River



St. Louis District
U.S. Army Corps
of Engineers



3,155,200

3,155,800

3,156,400

3,157,000

3,157,600

3,158,200

PLATE
NUMBER

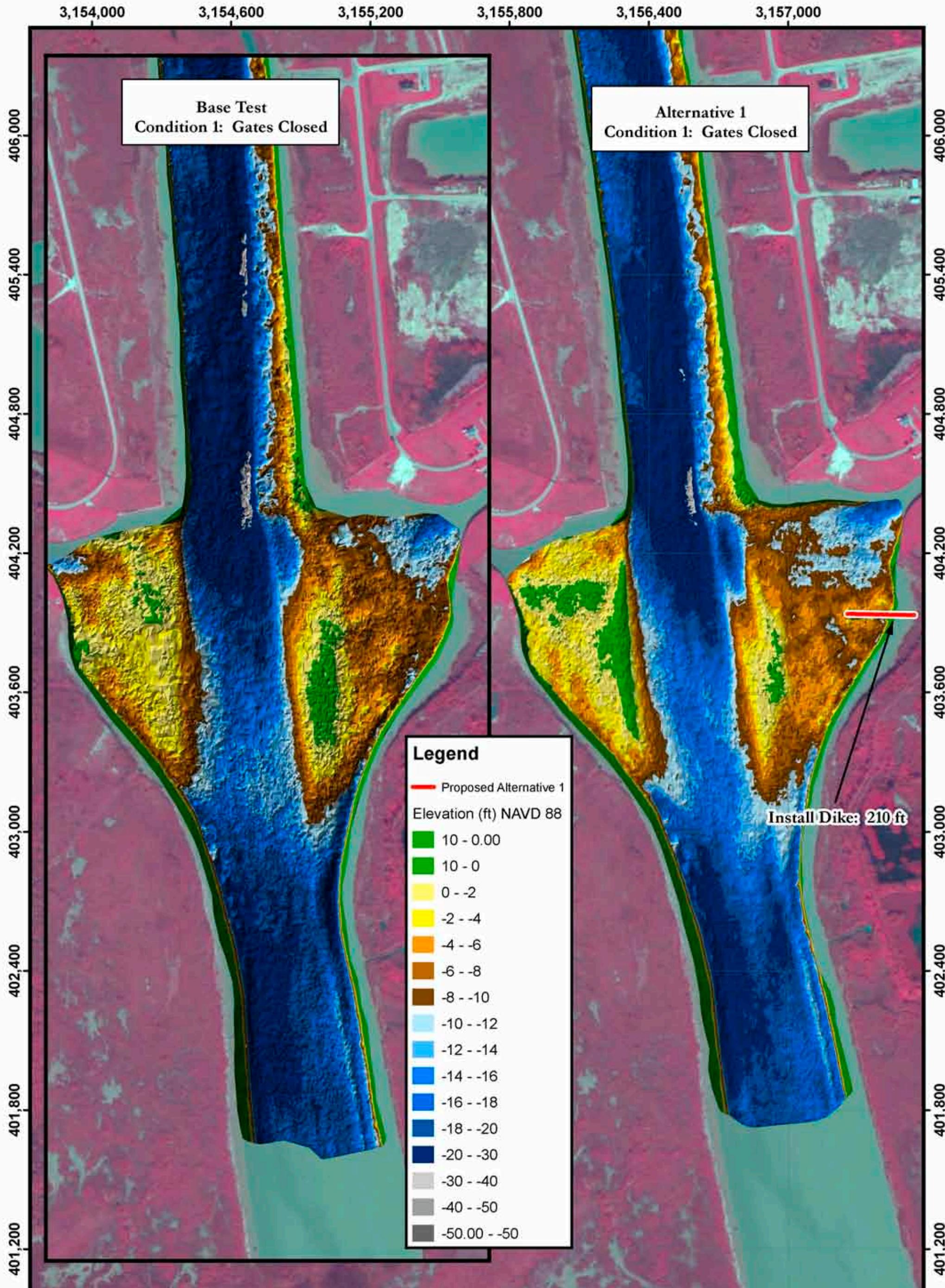
0 75 150 225 300 375 450 525
Foot
Base Test
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		DATE TESTED: 04/01/04 8:00 AM
ACOX	J BROWN, PE.	E ERAUER, PE.
Lower Brazeau River Gauge Calvin's Island Brazee Riverbed GWW Crossing HS R Model		TEST DUE: 07/01/2009
ACOX	R DAVIN ROY, PE.	
... Calvines/River		TEST DUE: 07/01/2009



US Army Corps
of Engineers
St. Louis District





3,154,000
PLATE
NUMBER
16



Alternative 1 Bathymetry Scan
Condition 1: Gates Closed
 2004 AERIAL PHOTOGRAPH

**U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
SE LOUIS, MISSOURI**

A COX	03/11/09 Sean
A COX	J BROWN, P.E.
A COX	E BRAUER, P.E.
A COX	R DAVINROY, P.E.



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 1
Condition 1: Gates Closed

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 1
- ← Normalized
- 0.00 - 0.10
- 0.10 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.60
- 0.60 - 0.70
- 0.70 - 0.80
- 0.80 - 0.90
- 0.90 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00

Install Dike: 210 ft

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

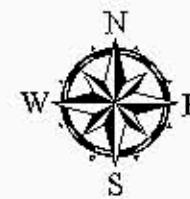
3,157,000

PLATE
NUMBER
17

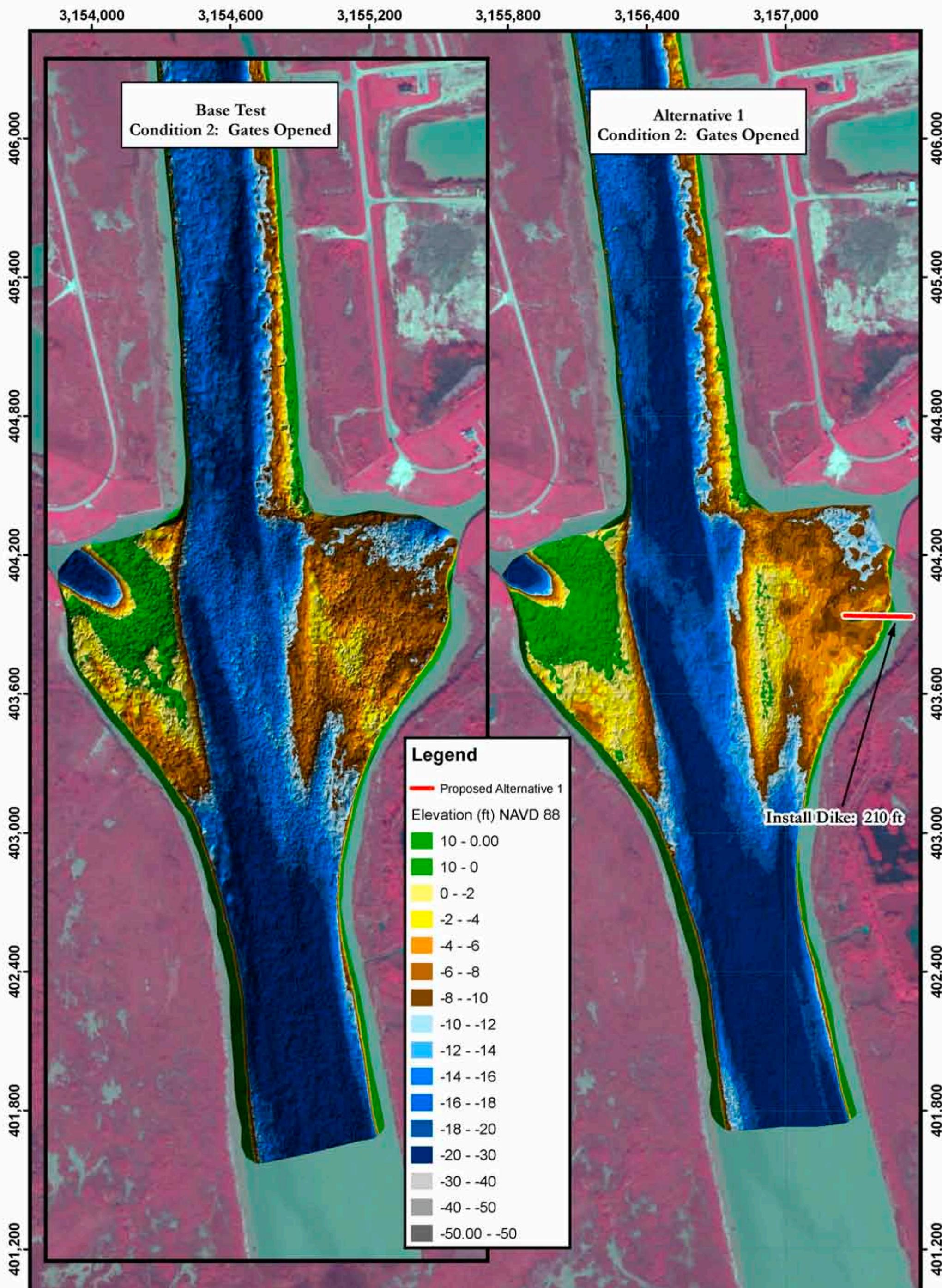
0 75 150 225 300 375 450 525
Foot
Alternative 1 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI			D-300-041 A COX 53/11/04 Scan		
NAME	GRADE	DESIGNATION	NAME	GRADE	DESIGNATION
A COX	JEROWN, PE	E BRAUER, PE			
R DAWIN ROY, PE					

Lower Illinois River Basin
Calaveras District
Brazos River and CIWWM Catchment
HSR Model



US Army Corps
of Engineers
St. Louis District



3,154,
PLATE
NUMBER
18

0 75 150 300 450 600
Feet

**U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI**

A COX	03/12/09 Scan	
A COX	J BROWN, P.E.	E BRAUER, P.E.
A COX	R DAVINROY, P.E.	



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 1
Condition 2: Gates Opened

406,000

405,400

404,800

404,200

403,600

403,000

402,400

401,800

401,200

406,000

405,400

404,800

404,200

403,600

403,000

402,400

401,800

401,200

Legend

- Proposed Alternative 1
- Normalized
- 0.00 - 0.10
- 0.10 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.60
- 0.60 - 0.70
- 0.70 - 0.80
- 0.80 - 0.90
- 0.90 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00

Install Dike: 210 ft

3,154,000

3,154,600

3,155,200

3,155,800

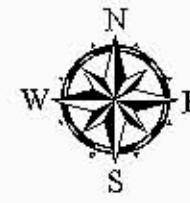
3,156,400

3,157,000

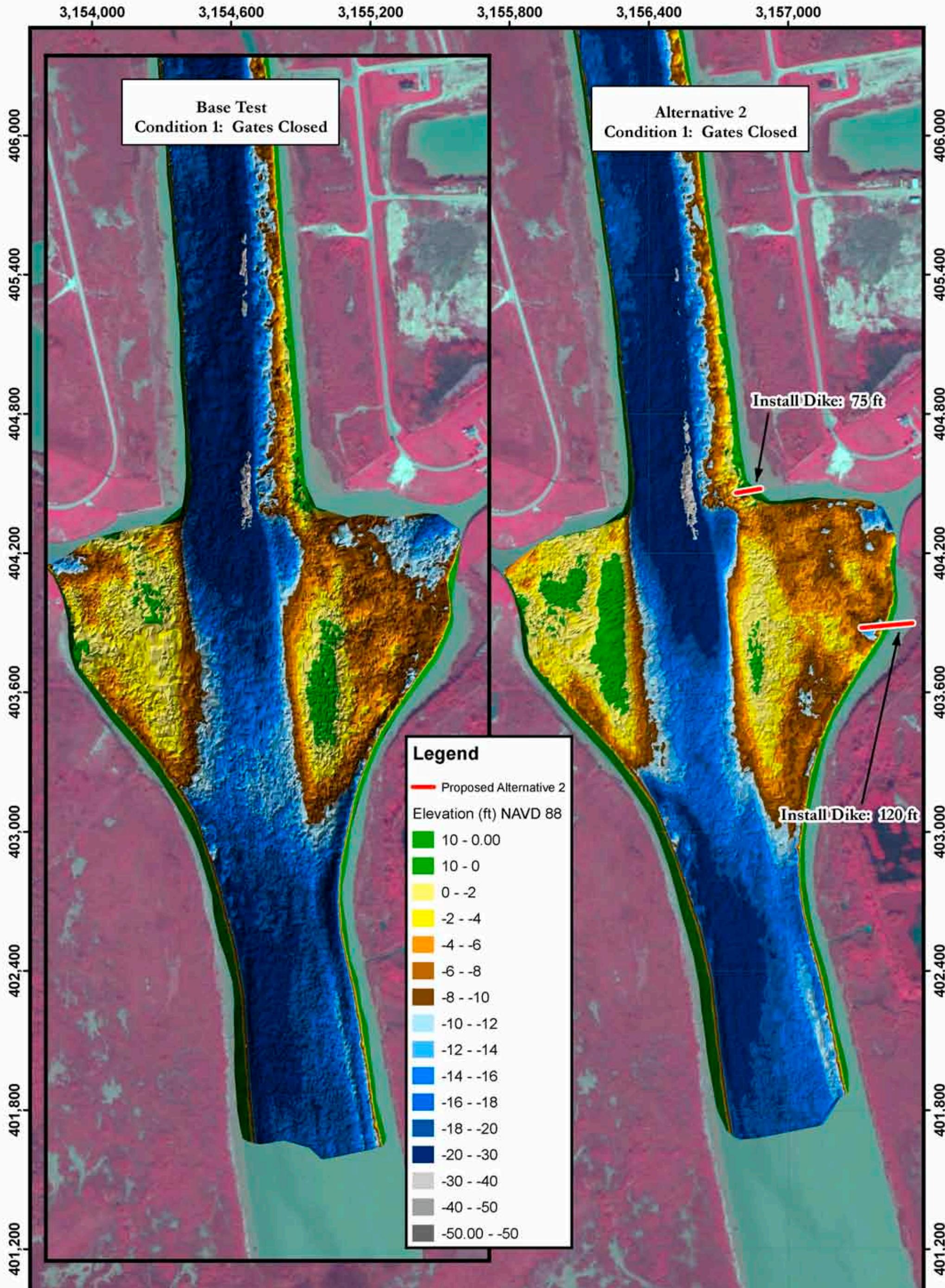
PLATE
NUMBER
19

0 75 150 225 300 375 450 525
Foot
Alternative 1 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI			D-DOD-041	DATA FOR 05/12/04 8:00 AM
NAME	GRADE	DESIGNATION	DATE	TIME
A COX	JEROWN, PE	E BRAUER, PE	05/12/04	08:00 AM
Lower Bass River Basin Calverta District Bass River and CWWC basins HSR Model	A COX	R DAWIN ROY, PE	05/12/04	08:00 AM



US Army Corps
of Engineers
St. Louis District



3,154,000
PLATE
NUMBER
20

0 75 150 300 450 600
Feet

**U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
SE LOUIS, MISSOURI**

A COX		03/12/09 Scan
A COX	J BROWN, P.E.	E BRAUER, P.E.
A COX		R DAVINROY, P.E.



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 2
Condition 1: Gates Closed

406,000

405,400

404,800

404,200

403,600

403,000

402,400

401,800

401,200

406,000

405,400

404,800

404,200

403,600

403,000

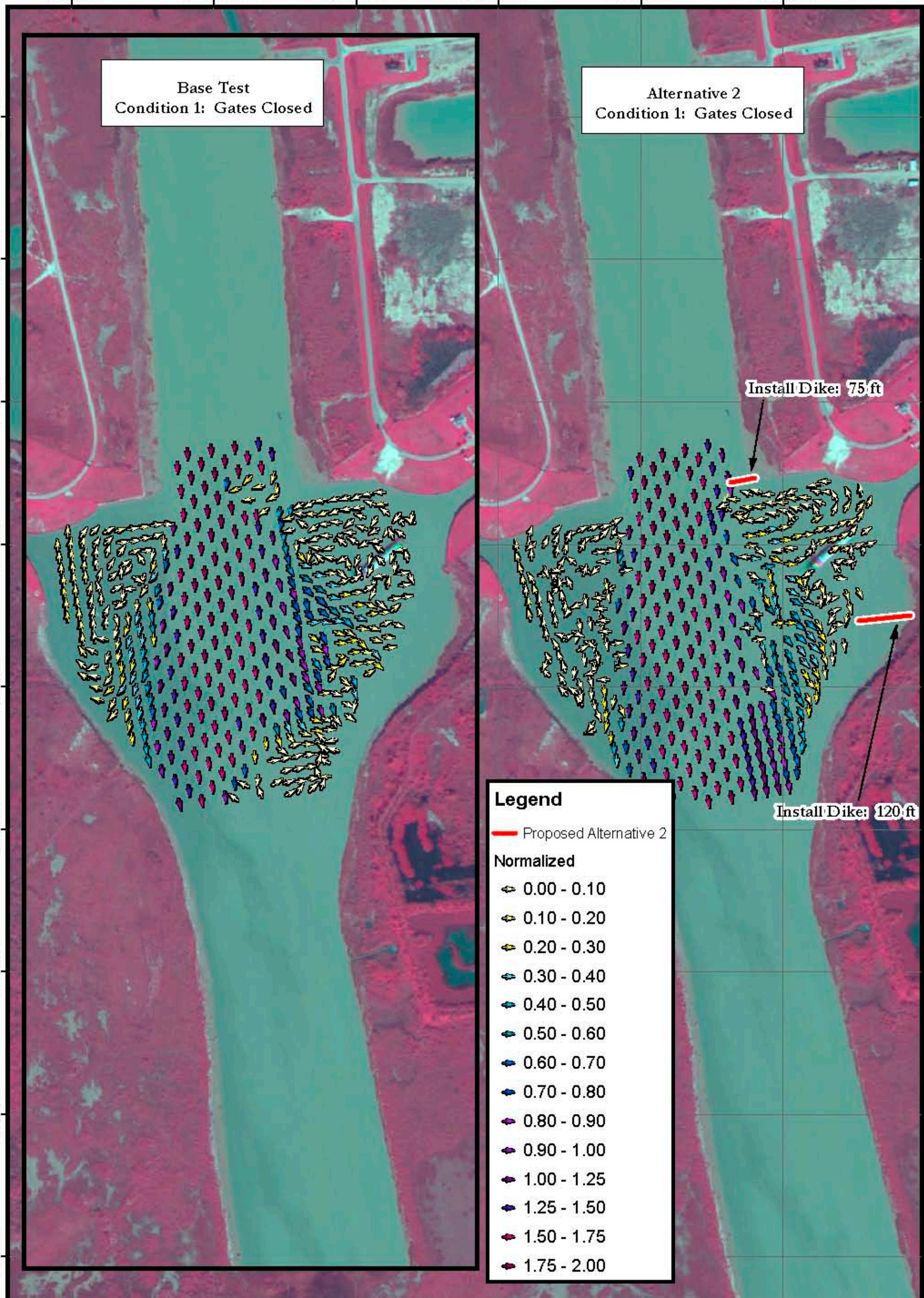
402,400

401,800

401,200

Legend

- Proposed Alternative 2
- ↔ Normalized
- 0.00 - 0.10
- 0.10 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.60
- 0.60 - 0.70
- 0.70 - 0.80
- 0.80 - 0.90
- 0.90 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
21

0 75 150 225 300 375 450 525
Foot
Alternative 2 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		DRAFTED: 03/12/1998 Sca: 1:24,000	
SUPERVISOR	REVIEWED	DRAFTED	REVIEWED
A COX	J JEROWN, PE	E BRAUER, PE	
Lower Illinois River Basin Galva Subdistrict Brazos River and CFWW Channel HSR Model	A COX	R DAWIN ROY, PE	
	REVIEWED ... Galva/Platte	REVIEWED 03/06/1998	



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 2
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

Proposed Alternative 2
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

Install Dike: 75 ft

Install Dike: 120 ft

PLATE
NUMBER
22

0 75 150 300 450 600
Feet
Alternative 2 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	63/12/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	Galveston/Plates



US Army Corps
of Engineers
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

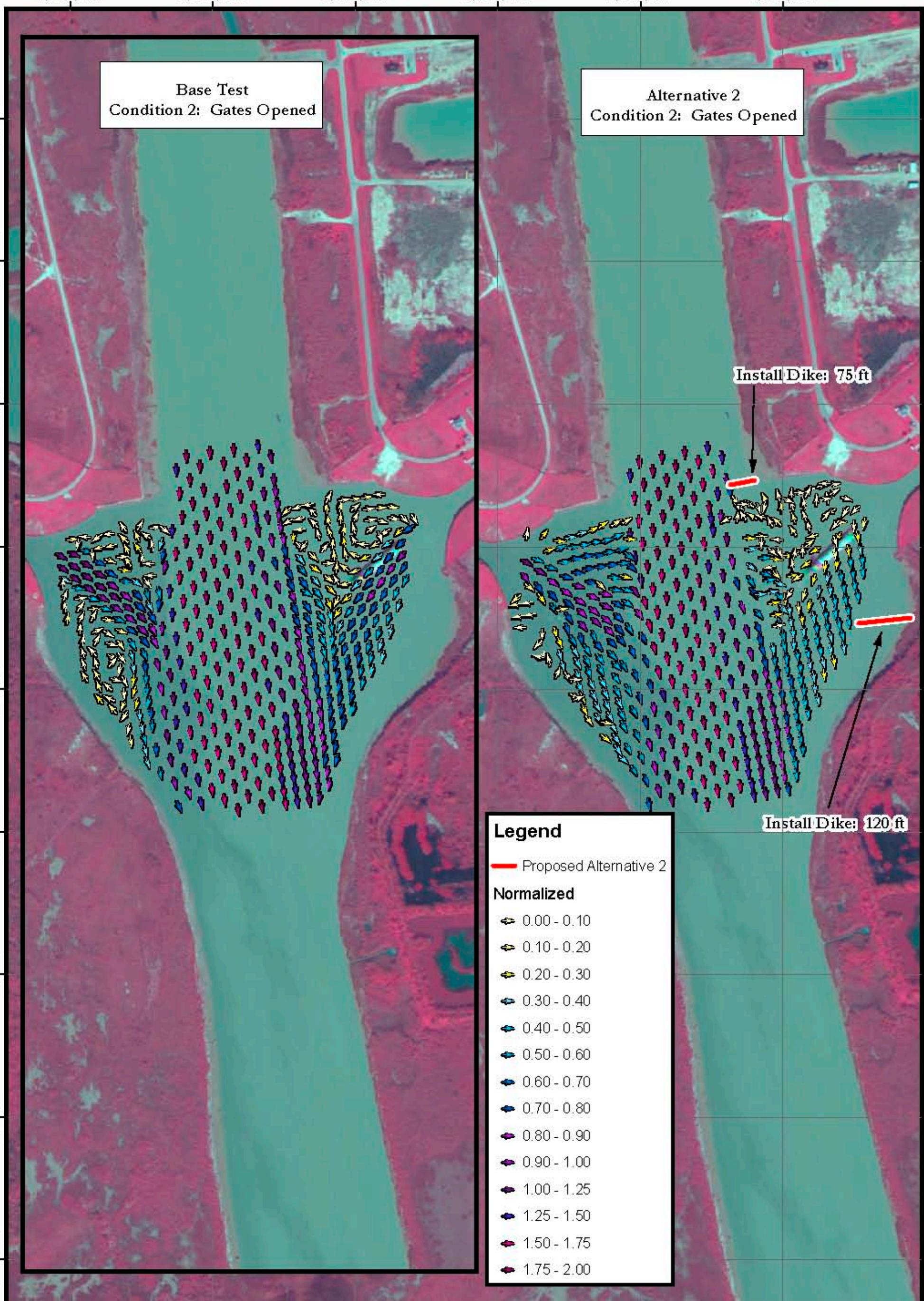
Base Test
Condition 2: Gates Opened

Alternative 2
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 2
- Normalized**
- 0.00 - 0.10
- 0.10 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.60
- 0.60 - 0.70
- 0.70 - 0.80
- 0.80 - 0.90
- 0.90 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00



3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

PLATE NUMBER
23

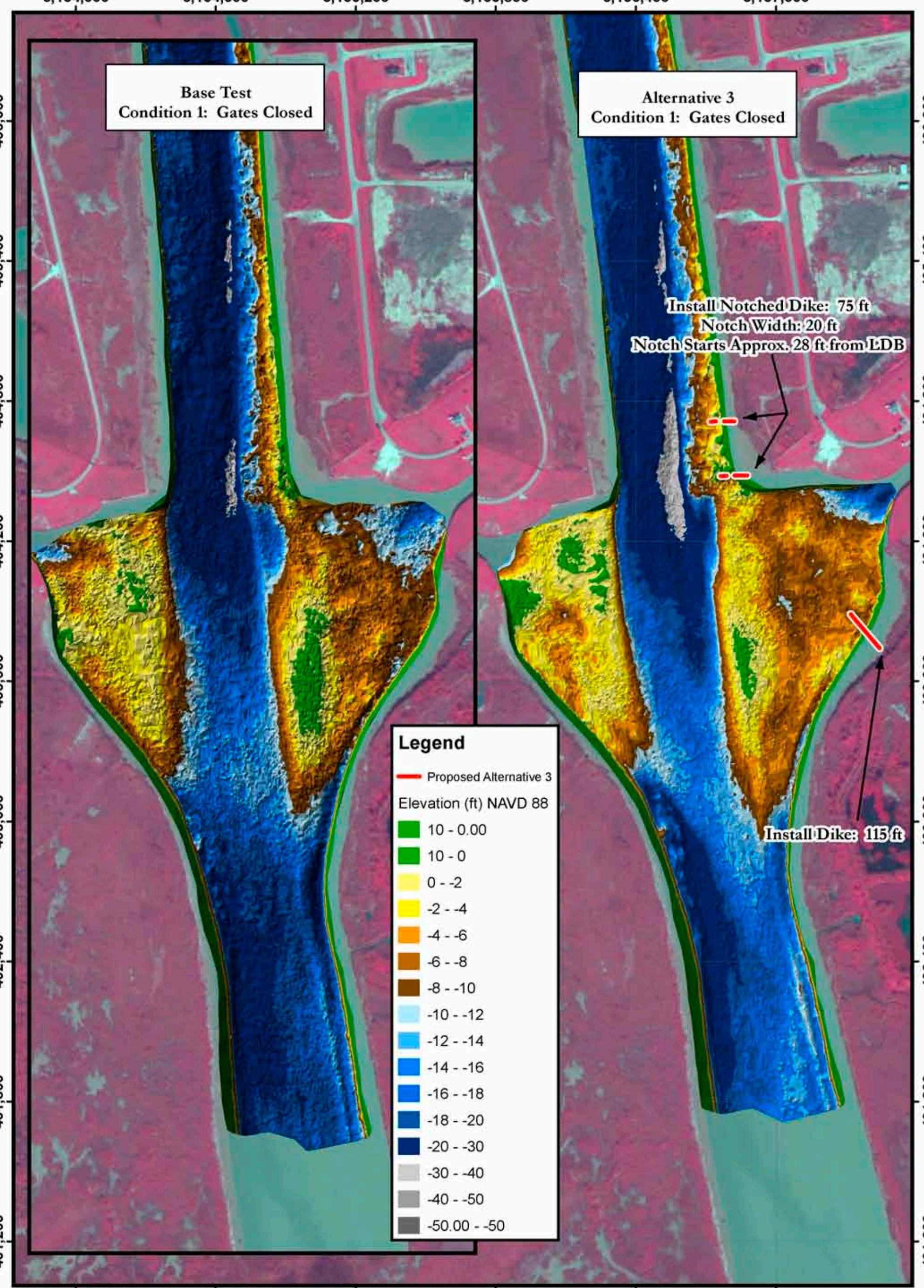
0 75 150 225 300 375 450 525 600
Foot

Alternative 2 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI			D-300-041 A COX JEROWN, PE E BRAUER, PE 05/12/04 8:00 AM		
Lower Missouri River Basin Cahokia District Missouri River and Tributaries HSR Model			DATA ID: A COX	DATA ID: R DAWNRoy, PE	DATA ID: ... Galveston/Houston
MAP DATE:	MAP DATE:	MAP DATE:	MAP DATE:	MAP DATE:	MAP DATE:
MAP DATE:	MAP DATE:	MAP DATE:	MAP DATE:	MAP DATE:	MAP DATE:



US Army Corps
of Engineers
St. Louis District



0 75 150 300 450 600
Feet
Alternative 3 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

A COX 03/12/09 Scan
03/09/09 03/10/09 03/11/09
A COX J BROWN, P.E. E BRAUER, P.E.
Lower Brazos River Basin Galveston District
Brazos River and GIWW Crossing HSR Model
03/09/09 03/10/09 03/11/09
A COX R DAVINROY, P.E.
03/09/09 03/10/09 03/11/09
... Galveston/Plates



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

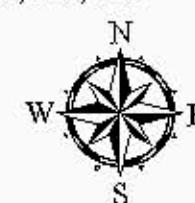
Alternative 3
Condition 1: Gates Closed

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

PLATE
NUMBER
25

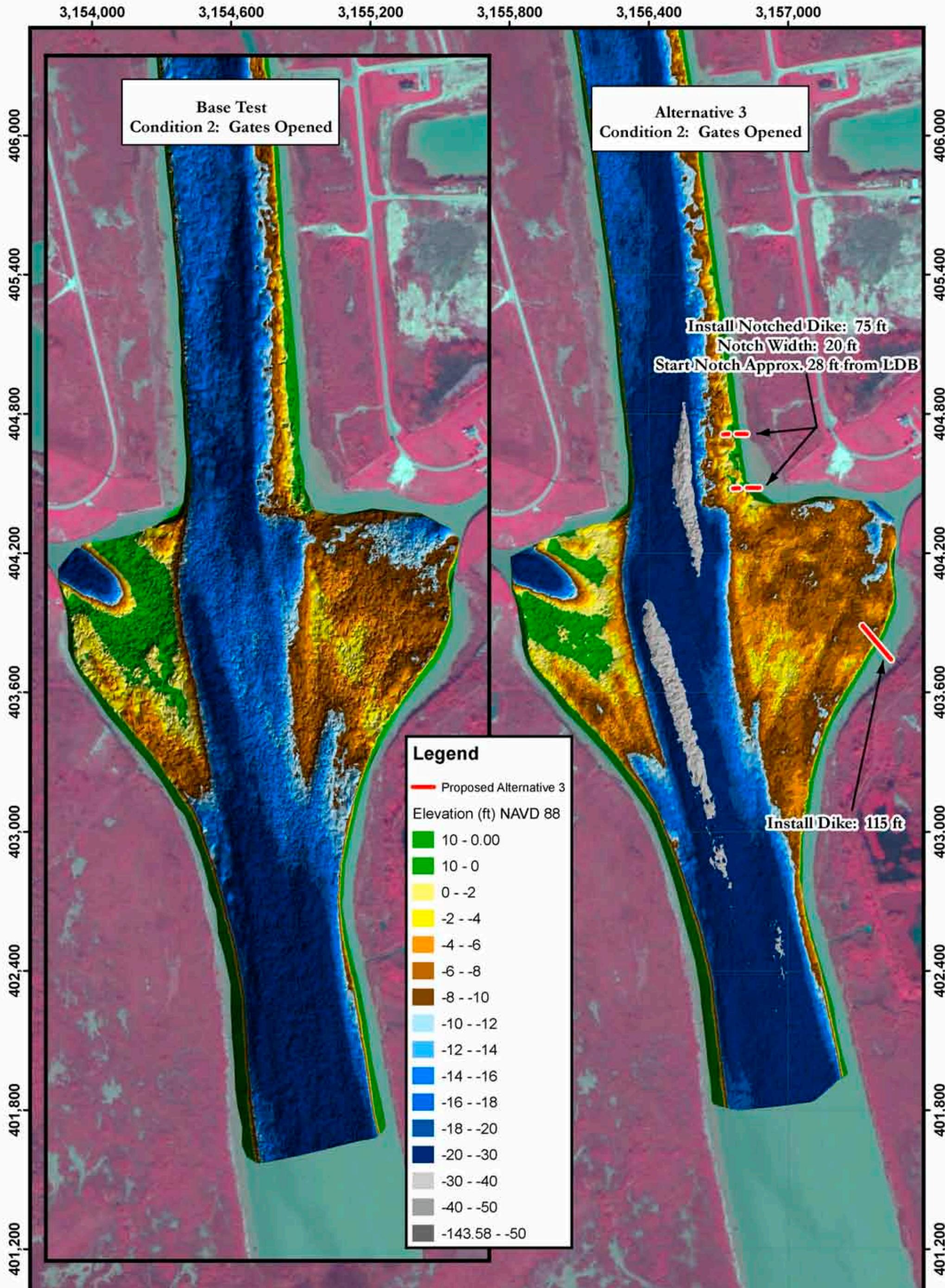
0 75 150 225 300 375 450 525
Foot
Alternative 3 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	D-300-041	DATA DATE 03/15/11 8:00 AM
	NAME A COX	NAME E BRAUER, PE
	SUPERVISOR A COX	APPROVED R DAWNRAY, PE
Lower Illinois River Basin Galva Subdistrict Brazza River and C1WW Channel HSR Model	REVIEWED ... Galva/Platte	REVIEWED 03/06/2009 ... Galva/Platte



U.S. Army Corps
of Engineers
St. Louis District





3,154,000
PLATE
NUMBER
26

0 75 150 300 450 600
Feet

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		A COX	03/13/09 Scan
		A COX	J BROWN, P.E.
		E BRAUER, P.E.	
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing ESR Model		A COX	R DAVINROY, P.E.
		Gates/Plates	07/07/2009



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 3
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 3
- Normalized
- ◆ 0.00 - 0.10
- ◆ 0.10 - 0.20
- ◆ 0.20 - 0.30
- ◆ 0.30 - 0.40
- ◆ 0.40 - 0.50
- ◆ 0.50 - 0.60
- ◆ 0.60 - 0.70
- ◆ 0.70 - 0.80
- ◆ 0.80 - 0.90
- ◆ 0.90 - 1.00
- ◆ 1.00 - 1.25
- ◆ 1.25 - 1.50
- ◆ 1.50 - 1.75
- ◆ 1.75 - 2.00

Install Notched Dike: 75 ft
Notch Width: 20 ft
Start Notch Approx. 28 ft from LDB

Install Dike: 115 ft

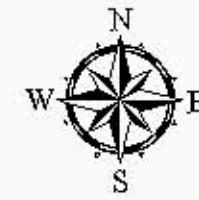
3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

PLATE NUMBER
27

0 75 150 225 300 375 450 525
Foot

Alternative 3 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		D-300-041	SW-100-041
DATE	REVISION	DATE	REVISION
A COX	JEROWN, PE	E BRAUER, PE	
Lower Illinois River Basin Galva Subdistrict Brazza River and C1WW Channel HSR Model		DATA BY	DATA BY
A COX		R DAWNR, PE	
REVISION		DATA BY	DATA BY
... Galva/Platte		07/06/2000	



U.S. Army Corps
of Engineers
St. Louis District

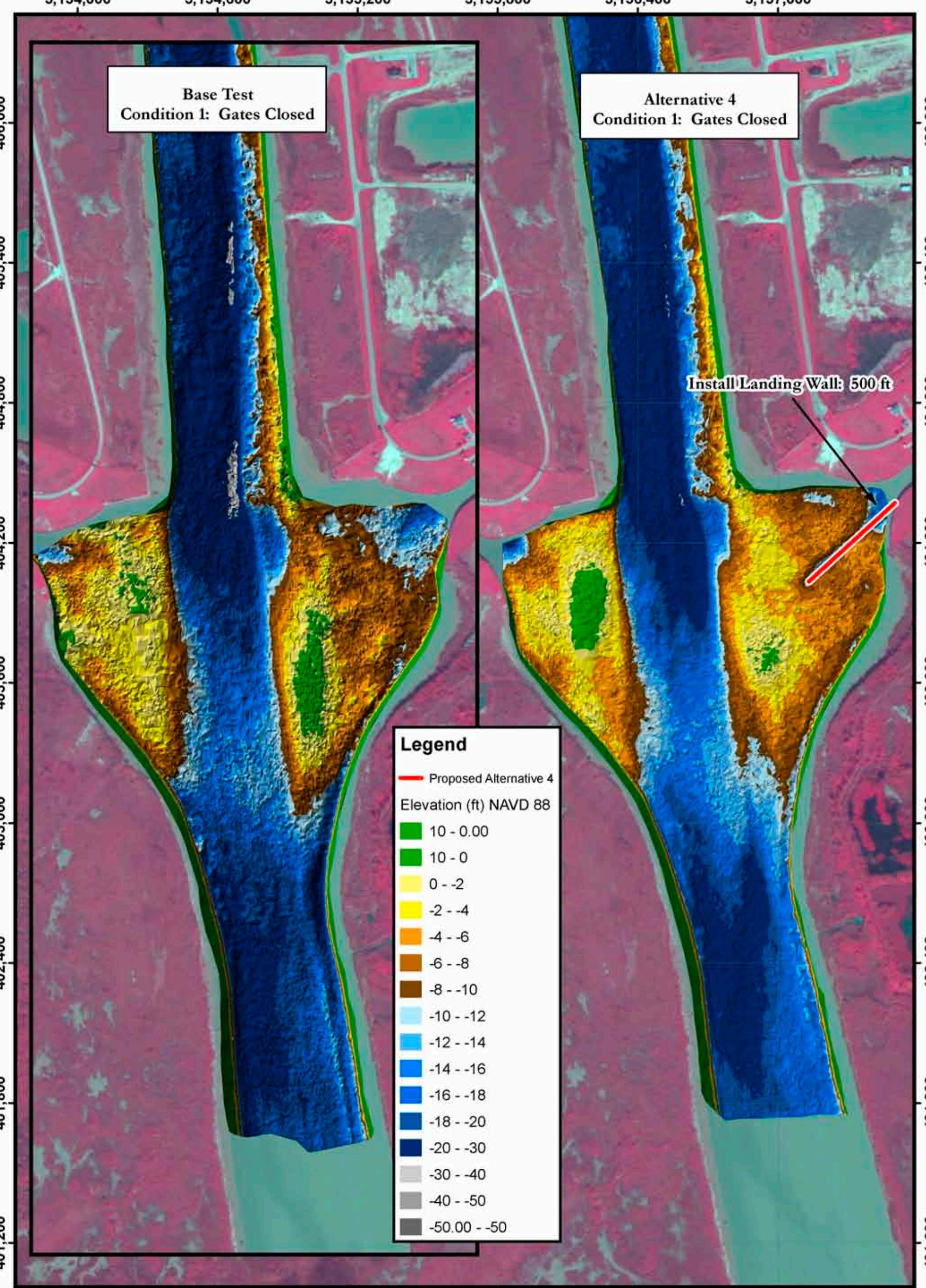


PLATE
NUMBER

28

0 75 150 300 450 600
Feet
Alternative 4 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	03/16/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	03/16/09 Scan ... Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 4
Condition 1: Gates Closed

Install Landing Wall: 500 ft

Legend

- Proposed Alternative 4
- Normalized
- ◆ 0.00 - 0.10
- ◆ 0.10 - 0.20
- ◆ 0.20 - 0.30
- ◆ 0.30 - 0.40
- ◆ 0.40 - 0.50
- ◆ 0.50 - 0.60
- ◆ 0.60 - 0.70
- ◆ 0.70 - 0.80
- ◆ 0.80 - 0.90
- ◆ 0.90 - 1.00
- ◆ 1.00 - 1.25
- ◆ 1.25 - 1.50
- ◆ 1.50 - 1.75
- ◆ 1.75 - 2.00

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

PLATE
NUMBER
29

0 75 150 225 300 375 450 525
Foot
Alternative 4 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		D-300-041	DATA DATE 05/15/04 8:00 AM
SUPERVISOR	INVESTIGATOR	DATE	TIME
A COX	J JEROWN, PE	E BRAUER, PE	
SUPERVISOR	INVESTIGATOR	DATE	TIME
A COX	R DAWNRAY, PE		
Lower Illinois River Basin Calaveras District Brazos River and CFWC Channel HSR Model		MAP DATE	05/16/04
... Calaveras/Platte		MAP BY	



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 4
Condition 2: Gates Opened

Legend

Proposed Alternative 4
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

Install Landing Wall: 500 ft

PLATE
NUMBER
30

0 75 150 300 450 600
Feet
Alternative 4 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	03/16/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	03/16/09 Scan ... Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 4
Condition 2: Gates Opened

Install Landing Wall: 500 ft

Legend

- Proposed Alternative 4
- Normalized
- ◆ 0.00 - 0.10
- ◆ 0.10 - 0.20
- ◆ 0.20 - 0.30
- ◆ 0.30 - 0.40
- ◆ 0.40 - 0.50
- ◆ 0.50 - 0.60
- ◆ 0.60 - 0.70
- ◆ 0.70 - 0.80
- ◆ 0.80 - 0.90
- ◆ 0.90 - 1.00
- ◆ 1.00 - 1.25
- ◆ 1.25 - 1.50
- ◆ 1.50 - 1.75
- ◆ 1.75 - 2.00

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

3,154,000

3,154,600

3,155,200

3,155,800

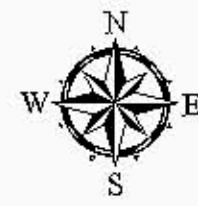
3,156,400

3,157,000

PLATE
NUMBER
31

0 75 150 225 300 375 450 525
Foot
Alternative 4 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		D-300-041	DATA DATE 05/05/04 8:00 AM
SUPERVISOR	INVESTIGATOR	DATE	TIME
A COX	J JEROWN, PE	E BRAUER, PE	
Lower Illinois River Basin Calaveras District Brazos River and Cimarron basins HSR Model		DATA DATE	TIME
A COX		R DAWNRAY, PE	
MAP DATE 05/06/2004		MAP TIME	07:00 AM
... Calaveras/Platte			



US Army Corps
of Engineers
St. Louis District

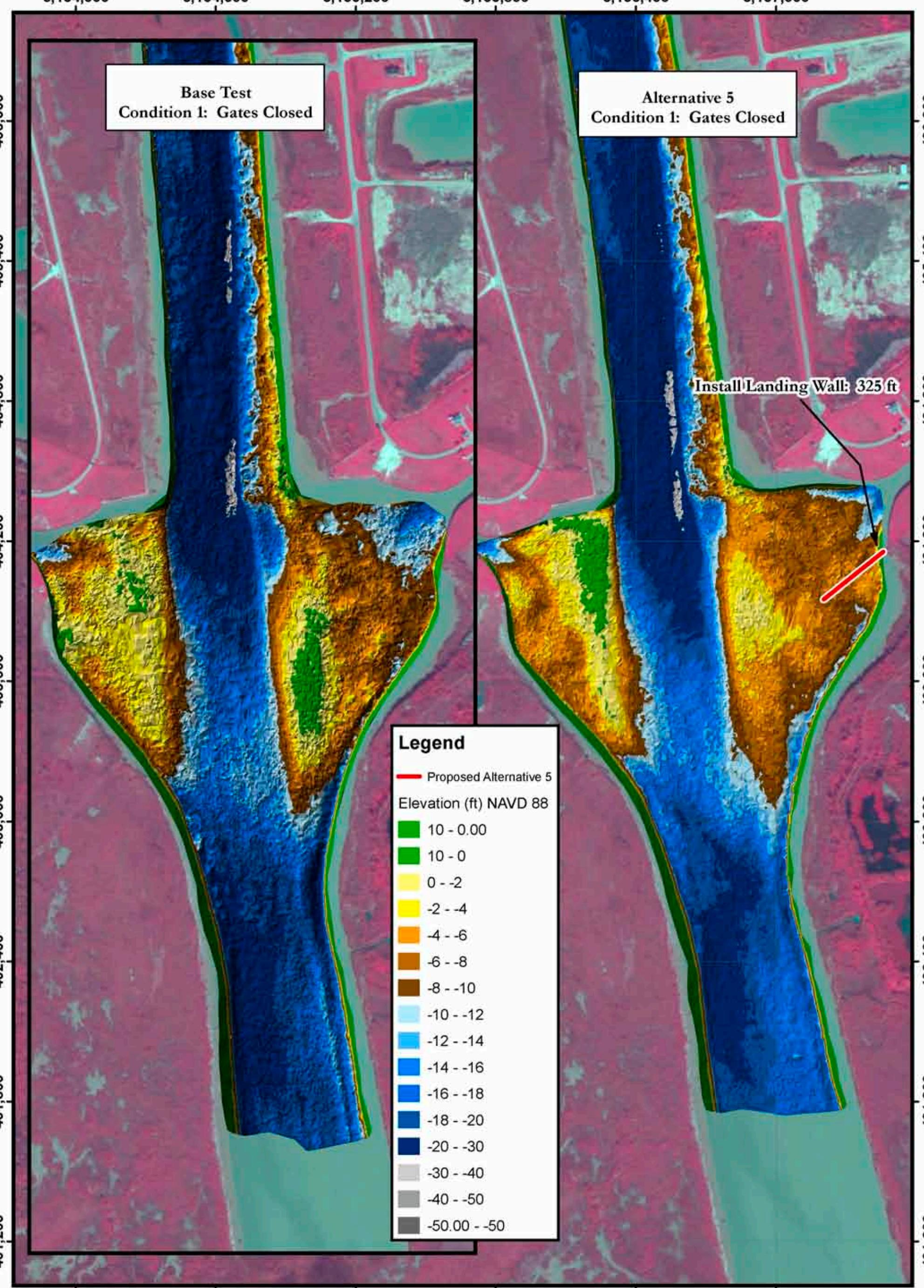


PLATE
NUMBER

32

0 75 150 300 450 600
Feet
Alternative 5 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	03/16/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	03/16/09 Scan ... Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 5
Condition 1: Gates Closed

Install Landing Wall: 325 ft

Legend

Normalized	
◆	0.00 - 0.10
◆	0.10 - 0.20
◆	0.20 - 0.30
◆	0.30 - 0.40
◆	0.40 - 0.50
◆	0.50 - 0.60
◆	0.60 - 0.70
◆	0.70 - 0.80
◆	0.80 - 0.90
◆	0.90 - 1.00
◆	1.00 - 1.25
◆	1.25 - 1.50
◆	1.50 - 1.75
◆	1.75 - 2.00

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

PLATE
NUMBER
33

0 75 150 225 300 375 450 525
Foot
Alternative 5 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	D-300-041 A COX DRAFTED BY: 05/17/04 SGN: DRAWN BY: J. BROWN, PE REVIEWED BY: E. BRAUER, PE
Lower Illinois River Basin Calaveras District Illinois River and CIWWM Corridor HSR Model	D-300-041 R DAWIN ROY, PE DRAFTED BY: R. DAWIN ROY, PE DRAWN BY: R. DAWIN ROY, PE REVIEWED BY: R. DAWIN ROY, PE



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 5
Condition 2: Gates Opened

Legend

Proposed Alternative 5
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

Install Landing Wall: 325 ft

PLATE
NUMBER
34

0 75 150 300 450 600
Feet
Alternative 5 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	63/17/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 5
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

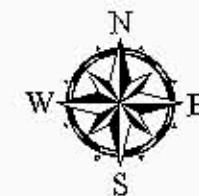
- Proposed Alternative 5
- ↔ Normalized
- 0.00 - 0.10
- 0.10 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.60
- 0.60 - 0.70
- 0.70 - 0.80
- 0.80 - 0.90
- 0.90 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00

Install Landing Wall: 325 ft

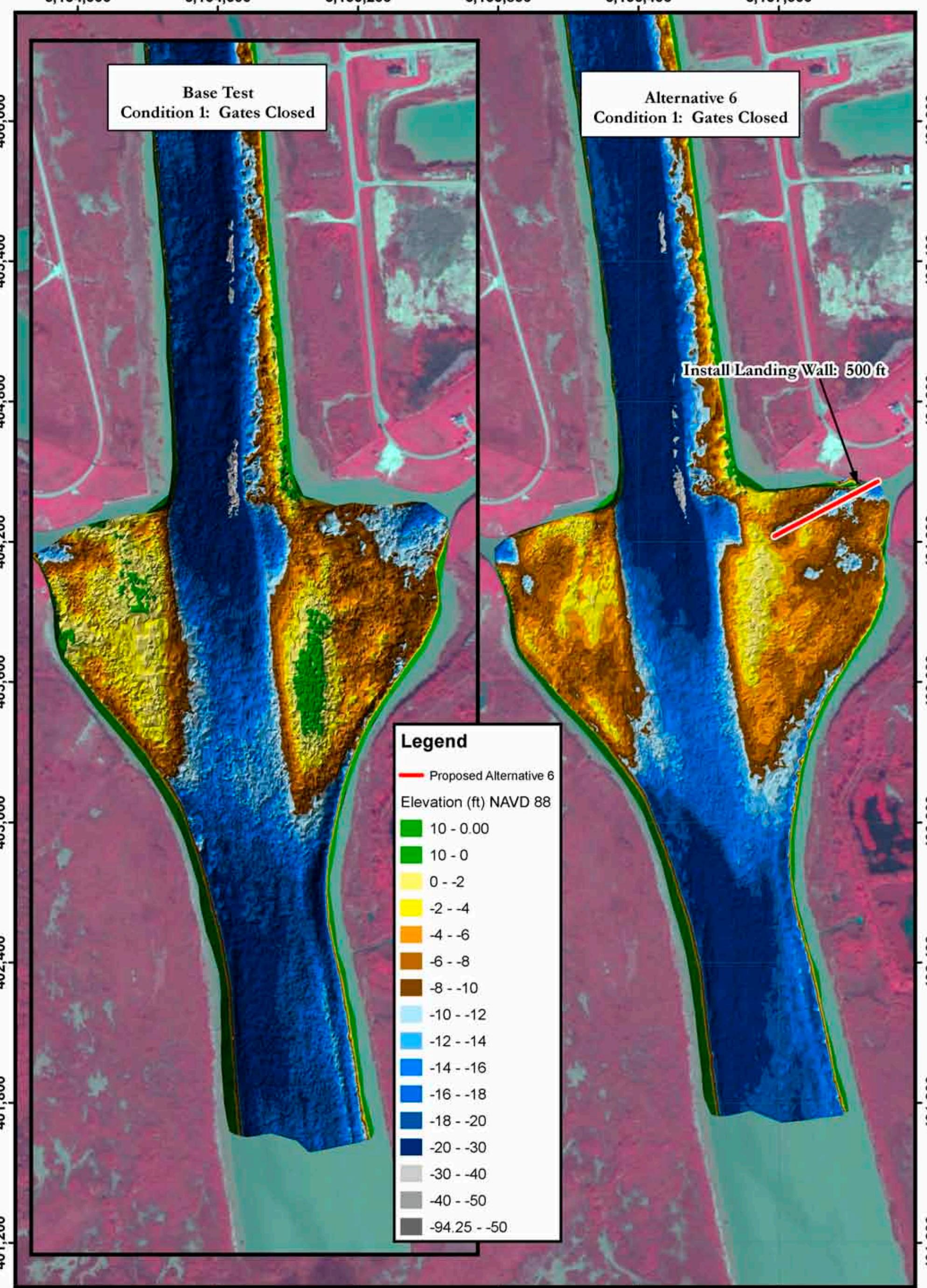
35
PLATE
NUMBER

0 75 150 225 300 375 450 525
Foot
Alternative 5 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI			D-DIG-041 A COX 85/07/11 Scm		
NAME	GRADE	DATE	NAME	GRADE	DATE
A COX	JEROWN, PE	E BRAUER, PE			
Lower Basco River Basin Calcasieu District Basco River and CWWC Canal HSR Model	R DAWIN ROY, PE				



US Army Corps
of Engineers
APPLIED
RIVER
ENGINEERING CENTER
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
36

0 75 150 300 450 600
Feet
Alternative 6 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	63/17/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 6
Condition 1: Gates Closed

Install Landing Wall: 500 ft

Legend

- Proposed Alternative 6
- Normalized
- ◆ 0.00 - 0.10
- ◆ 0.10 - 0.20
- ◆ 0.20 - 0.30
- ◆ 0.30 - 0.40
- ◆ 0.40 - 0.50
- ◆ 0.50 - 0.60
- ◆ 0.60 - 0.70
- ◆ 0.70 - 0.80
- ◆ 0.80 - 0.90
- ◆ 0.90 - 1.00
- ◆ 1.00 - 1.25
- ◆ 1.25 - 1.50
- ◆ 1.50 - 1.75
- ◆ 1.75 - 2.00

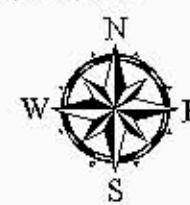
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

PLATE
NUMBER
37

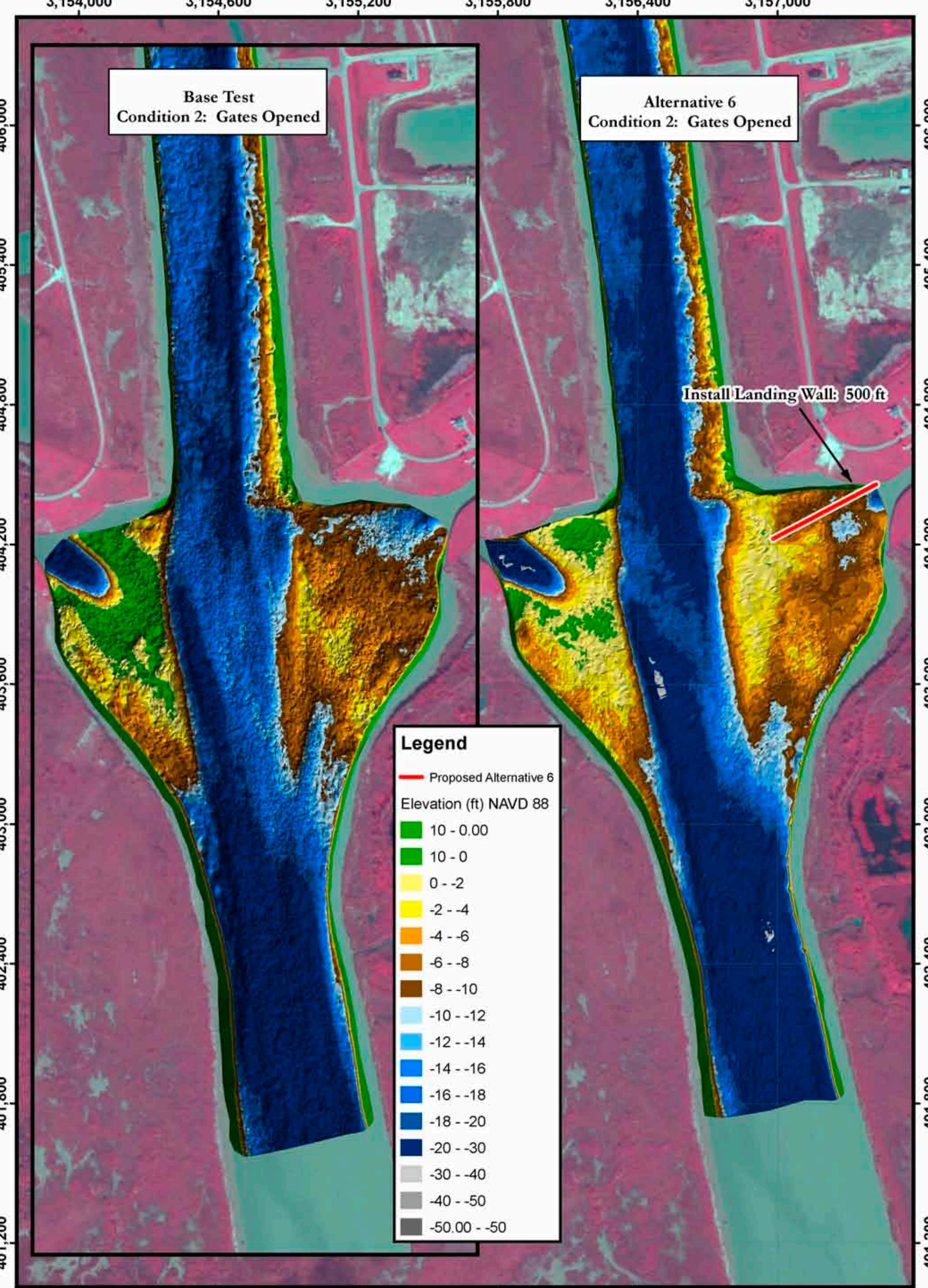
0 75 150 225 300 375 450 525
Foot
Alternative 6 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI			D-300-041	DATA FOR 05/25/04 Scan
NAME	GRADE	DESIGNATION	DATE	TIME
A COX	JEROWN, PE	E BRAUER, PE	05/25/04	09:00
Lower Basco River Basin Calcasieu District Basco River and CFWW Channel HSR Model	A COX	R DAWNRAY, PE	05/26/04	09:00



US Army Corps
of Engineers
St. Louis District





3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
83

0 75 150 300 450 600
Feet
Alternative 6 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	63/17/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
01/09/09	
... Galveston/Plates	



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 6
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Install Landing Wall: 500 ft

Legend

- Proposed Alternative 6
- ◆ Normalized
- 0.00 - 0.10
- 0.10 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.60
- 0.60 - 0.70
- 0.70 - 0.80
- 0.80 - 0.90
- 0.90 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

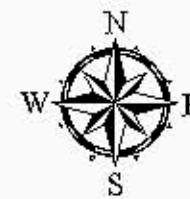
3,156,400

3,157,000

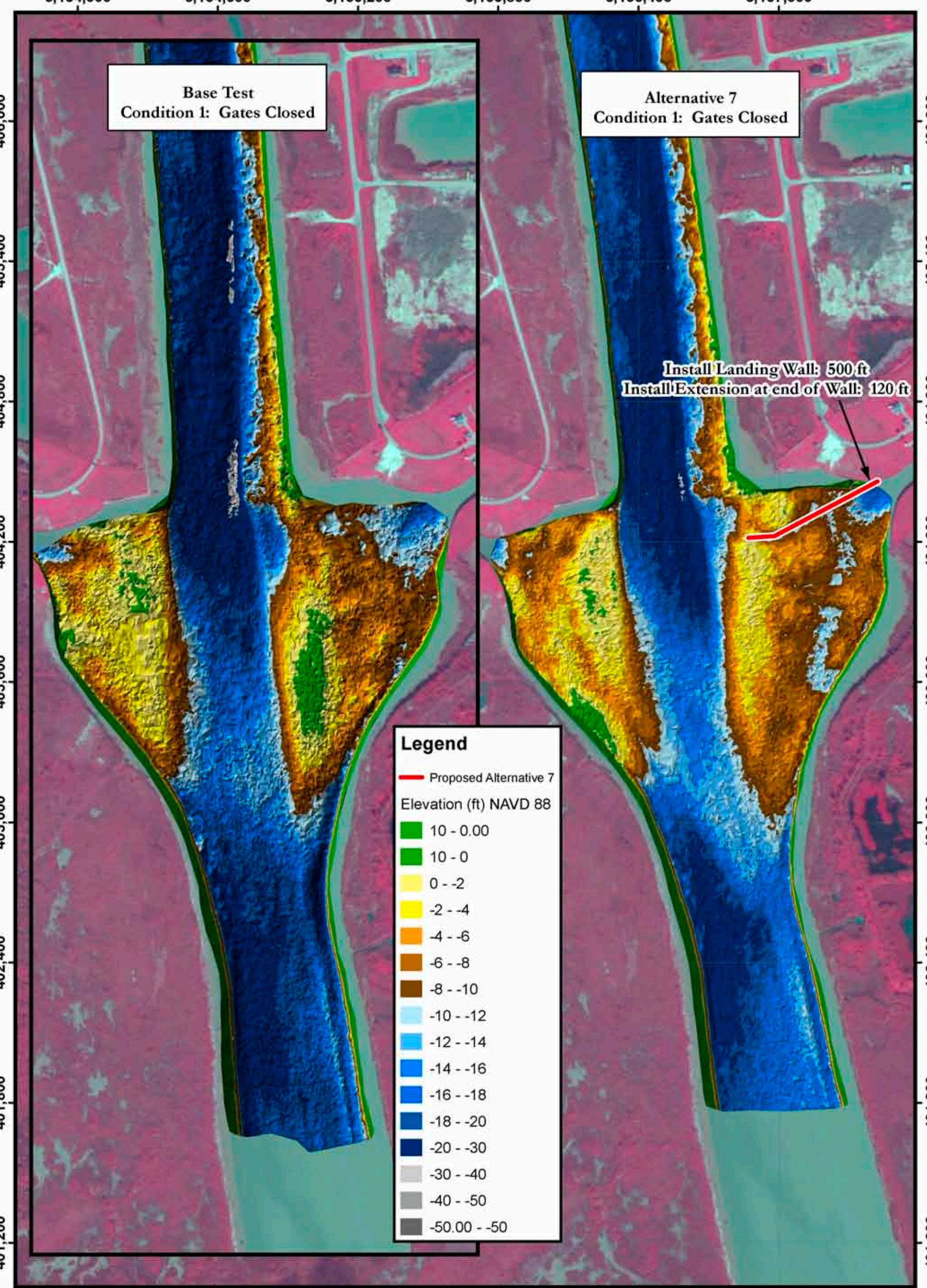
PLATE
NUMBER
39

0 75 150 225 300 375 450 525
Foot
Alternative 6 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI			D-300-041	DATA FOR A COX	5/25/04 Scan
NAME	GRADE	DESIGNATION	DATE	NAME	DATE
Lower Bassas River Basin Calcasieu District Bass River and CFWC Channel HSR Model	A COX	DATA FOR R DAWNRoy, PE	5/25/04	R DAWNRoy, PE	5/25/04
... Calcasieu River	NAME	DATA FOR R DAWNRoy, PE	5/25/04	... Calcasieu River	5/25/04



US Army Corps
of Engineers
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
40

0 75 150 300 450 600
Feet
Alternative 7 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	03/18/09 Scan
A COX	J BROWN, P.E.
E BRAUER, P.E.	
A COX	R DAVINROY, P.E.
	03/18/09 Scan ... Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 7
Condition 1: Gates Closed

Install Landing Wall: 500 ft
Install Extension at end of Wall: 120 ft

Legend

- Proposed Alternative 7
- ↔ Normalized
- 0.00 - 0.10
- 0.10 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.60
- 0.60 - 0.70
- 0.70 - 0.80
- 0.80 - 0.90
- 0.90 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

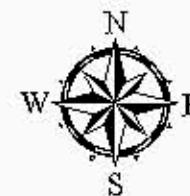
3,156,400

3,157,000

PLATE
NUMBER
41

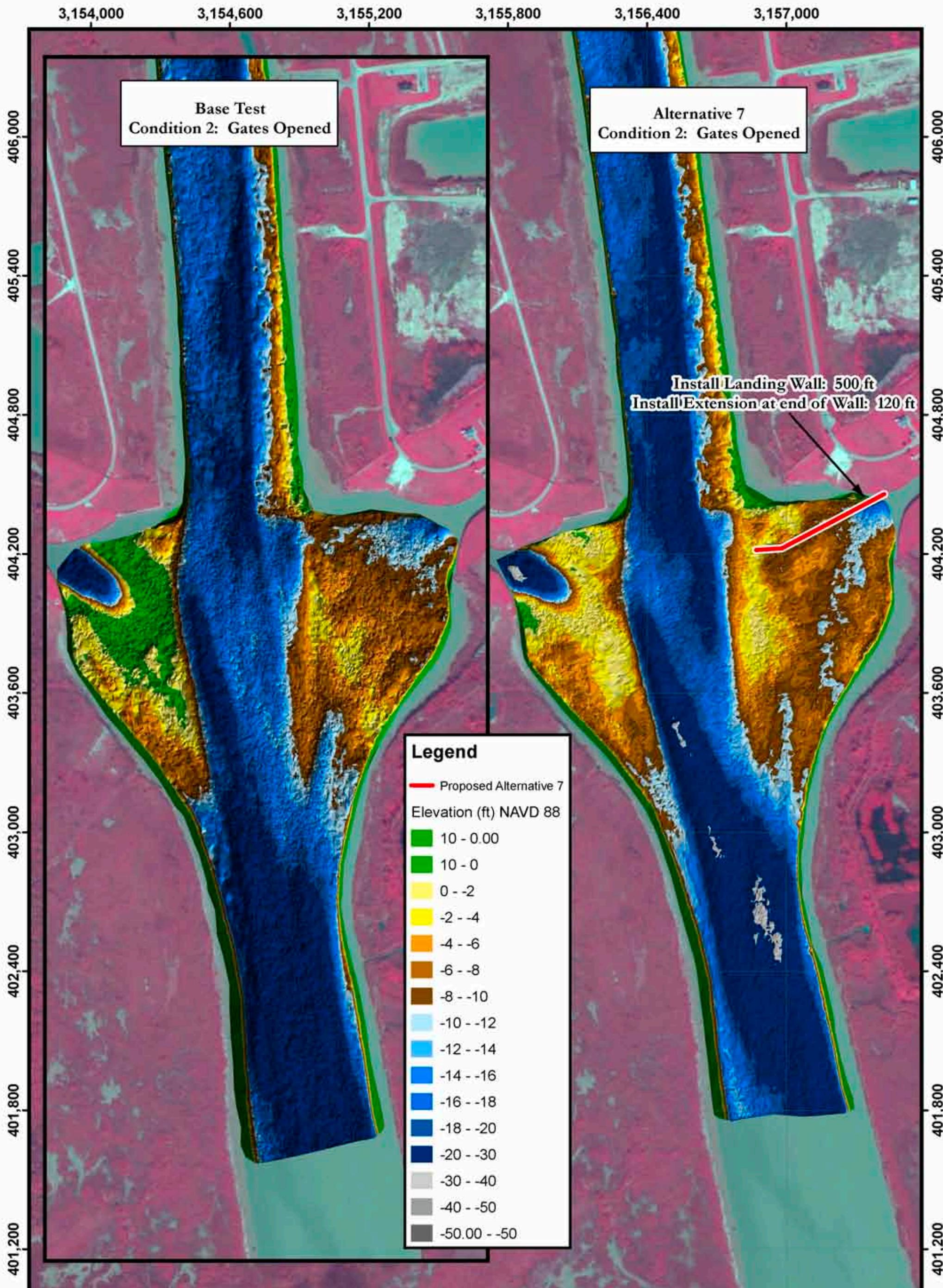
0 75 150 225 300 375 450 525
Foot
Alternative 7 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		D-300-041	DATA DATE 03/09/04 8:00 AM
SURVEYOR	INVESTIGATOR	DATE REC'D.	RECEIVED BY
A COX	J JEROWN, PE	E BRAUER, PE	
SURVEYOR	INVESTIGATOR	DATE REC'D.	RECEIVED BY
Lower Illinois River Basin Calaveras District Illinois River and CIWWM Corridor HSR Model	A COX	R DAWNRAY, PE	
MAP DATE 03/09/04 MAP BY ... Calaveras Project		MAP DATE 03/09/04	MAP BY ... Calaveras Project



US Army Corps
of Engineers
St. Louis District





3,154,000
PLATE
NUMBER
42

**Alternative 7 Bathymetry Scan
Condition 2: Gates Opened**
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		A COX	63/18/09 Scan
		A COX	J BROWN, P.E.
		E BRAUER, P.E.	
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing ESR Model		A COX	R DAVINROY, P.E.
		Governor/Plates	07/07/2009



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 7
Condition 2: Gates Opened

Install Landing Wall: 500 ft
Install Extension at end of Wall: 120 ft

Legend

- Proposed Alternative 7
- Normalized**
- ◆ 0.00 - 0.10
- ◆ 0.10 - 0.20
- ◆ 0.20 - 0.30
- ◆ 0.30 - 0.40
- ◆ 0.40 - 0.50
- ◆ 0.50 - 0.60
- ◆ 0.60 - 0.70
- ◆ 0.70 - 0.80
- ◆ 0.80 - 0.90
- ◆ 0.90 - 1.00
- ◆ 1.00 - 1.25
- ◆ 1.25 - 1.50
- ◆ 1.50 - 1.75
- ◆ 1.75 - 2.00

406,000

405,400

404,800

404,200

403,600

403,000

402,400

401,800

401,200

406,000

405,400

404,800

404,200

403,600

403,000

402,400

401,800

401,200

3,154,000

3,154,600

3,155,200

3,155,800

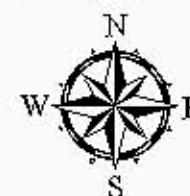
3,156,400

3,157,000

PLATE
NUMBER
43

0 75 150 225 300 375 450 525
Foot
Alternative 7 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI			D-300-041 A COX JEROWN, PE E BRAUER, PE 05/25/04 Scan		
Lower Bassas River Basin Calcasieu District Bassas River and CWWC Canal HSR Model			DATA BY:	DATA BY:	DATA BY:
DATA BY:	A COX	DATA BY:	R DAWIN ROY, PE	DATA BY:	
DATA BY:	JEROWN, PE	DATA BY:	E BRAUER, PE	DATA BY:	



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 8
Condition 1: Gates Closed

Install Parallel Landing Wall: 500 ft

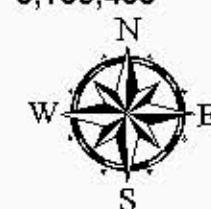
Legend

Proposed Alternative 8
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-67.02 - -50

PLATE
NUMBER
44

0 75 150 225 300 450 600
Foot
Alternative 8 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		DATE: 03/19/04 Scan
DRAFTER: A COX	REVIEWED: J BROWN, PE.	DECODED: E ERAUER, PE.
SUPERVISOR: A COX	SPONSOR: R DAVIN ROY, PE.	
Lower Brazeau River Banks Calcasieu District Brazos Riverbed CWLW Crossing HSR Model		
... Calcasieu River		



US Army Corps
of Engineers
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 8
Condition 1: Gates Closed

Install Parallel Landing Wall: 500 ft

Legend

- Proposed Alternative 8
- Normalized
- ◆ 0.00 - 0.10
- ◆ 0.10 - 0.20
- ◆ 0.20 - 0.30
- ◆ 0.30 - 0.40
- ◆ 0.40 - 0.50
- ◆ 0.50 - 0.60
- ◆ 0.60 - 0.70
- ◆ 0.70 - 0.80
- ◆ 0.80 - 0.90
- ◆ 0.90 - 1.00
- ◆ 1.00 - 1.25
- ◆ 1.25 - 1.50
- ◆ 1.50 - 1.75
- ◆ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

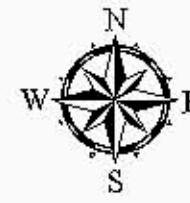
3,156,400

3,157,000

PLATE
NUMBER
45

0 75 150 225 300 375 450 525
Foot
Alternative 8 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		D-300-041	DATA DATE 05/09/04 8:00 AM
SUPERVISOR	INVESTIGATOR	DATA DATE	
A COX	J JEROWN, PE	E BRAUER, PE	
SUPERVISOR	INVESTIGATOR	DATA DATE	
Lower Illinois River Basin Calaveras District Brazos River and CFWC Channel HSR Model		R DAWNRAY, PE	
RECORDS	MAPS	DATA DATE	
... Calaveras/Platte		05/06/2000	



US Army Corps
of Engineers
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 8
Condition 2: Gates Opened

Install Parallel Landing Wall: 500 ft

Legend

Proposed Alternative 8
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

PLATE
NUMBER
46

0 75 150 225 300 450 600
Foot
Alternative 8 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNER	DRAWN BY	DATE DRAWN
A COX	J BROWN, PE.	03/19/04 Sca
DRAFTER	R DAVIN ROY, PE.	
INSPECTOR		
REVIEWER		

Lower Brazeau River Banks
Calcasieu District
Brazos Riverbed CWLW Crossing
HS R Model
... Calcasieu River



US Army Corps
of Engineers
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 8
Condition 2: Gates Opened

Install Parallel Landing Wall: 500 ft

Legend

- Proposed Alternative 8
- ↔ Normalized
- 0.00 - 0.10
- 0.10 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.60
- 0.60 - 0.70
- 0.70 - 0.80
- 0.80 - 0.90
- 0.90 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00

406,000

405,400

404,800

404,200

403,600

403,000

402,400

401,800

401,200

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

47

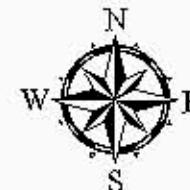
PLATE
NUMBER

0 75 150 225 300 375 450 525
Foot
Alternative 8 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

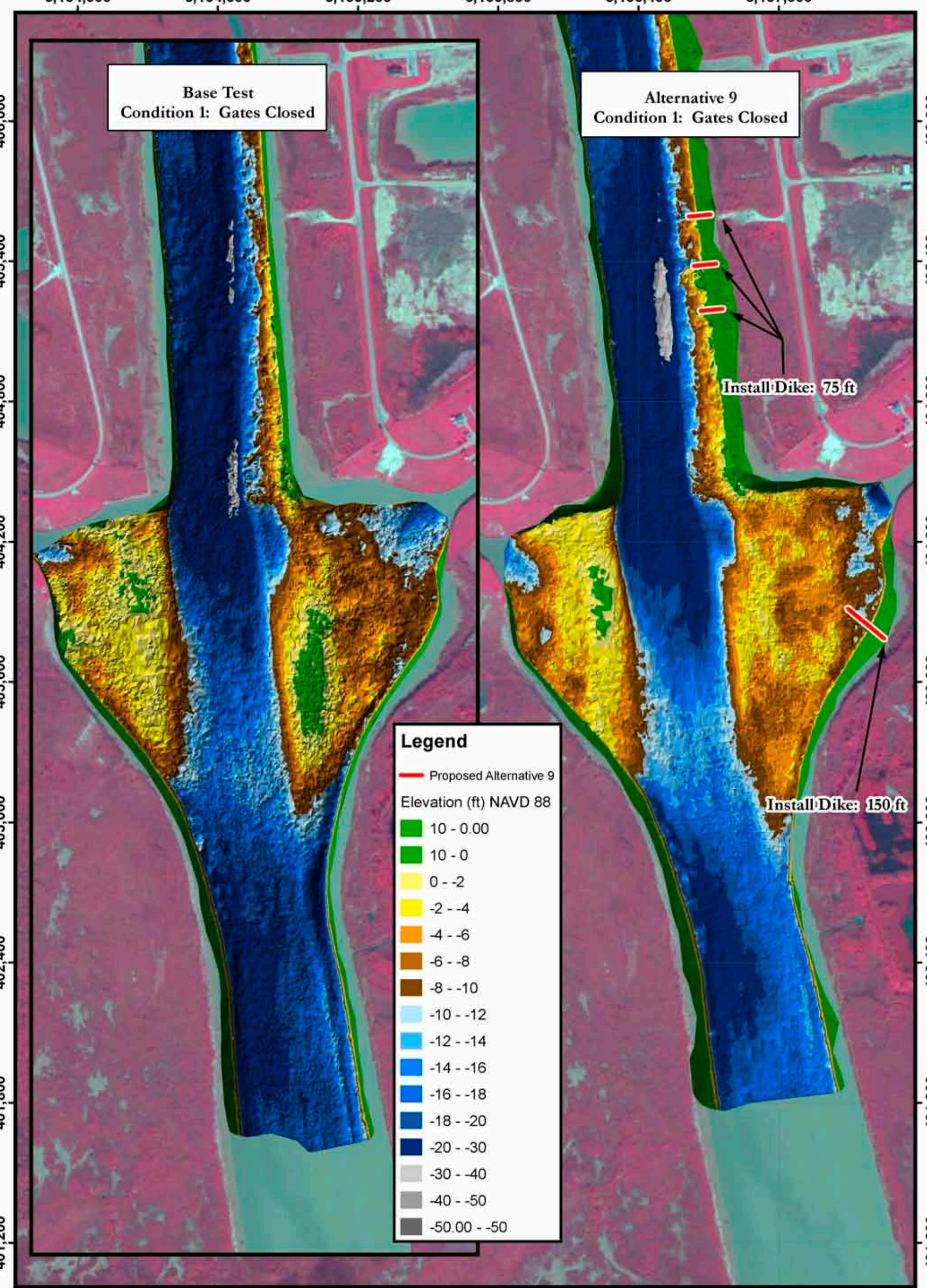
D-300-041
A COX SURVEYOR
DRAFTED BY
J JEROWN, PE DRAWN BY
E BRAUER, PE
APPROVED BY
R DAWNRAY, PE
REVIEWED BY
... Galveston/Houston
DATE 07/06/2006

Lower Basco River Basin
Galveston District
Basco River and GIWW Channel
HSR Model



US Army Corps
of Engineers
St. Louis District





3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

PLATE NUMBER
48

0 75 150 300 450 600
Feet

Alternative 9 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

A COX	03/25/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.

Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	R DAVINROY, P.E.
	Galveston/Plates
	03/25/09 Scan



APPLIED
RIVER
Engineering Center
St. Louis District
US Army Corps
of Engineers

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 9
Condition 1: Gates Closed

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 9
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

64

PLATE
NUMBER

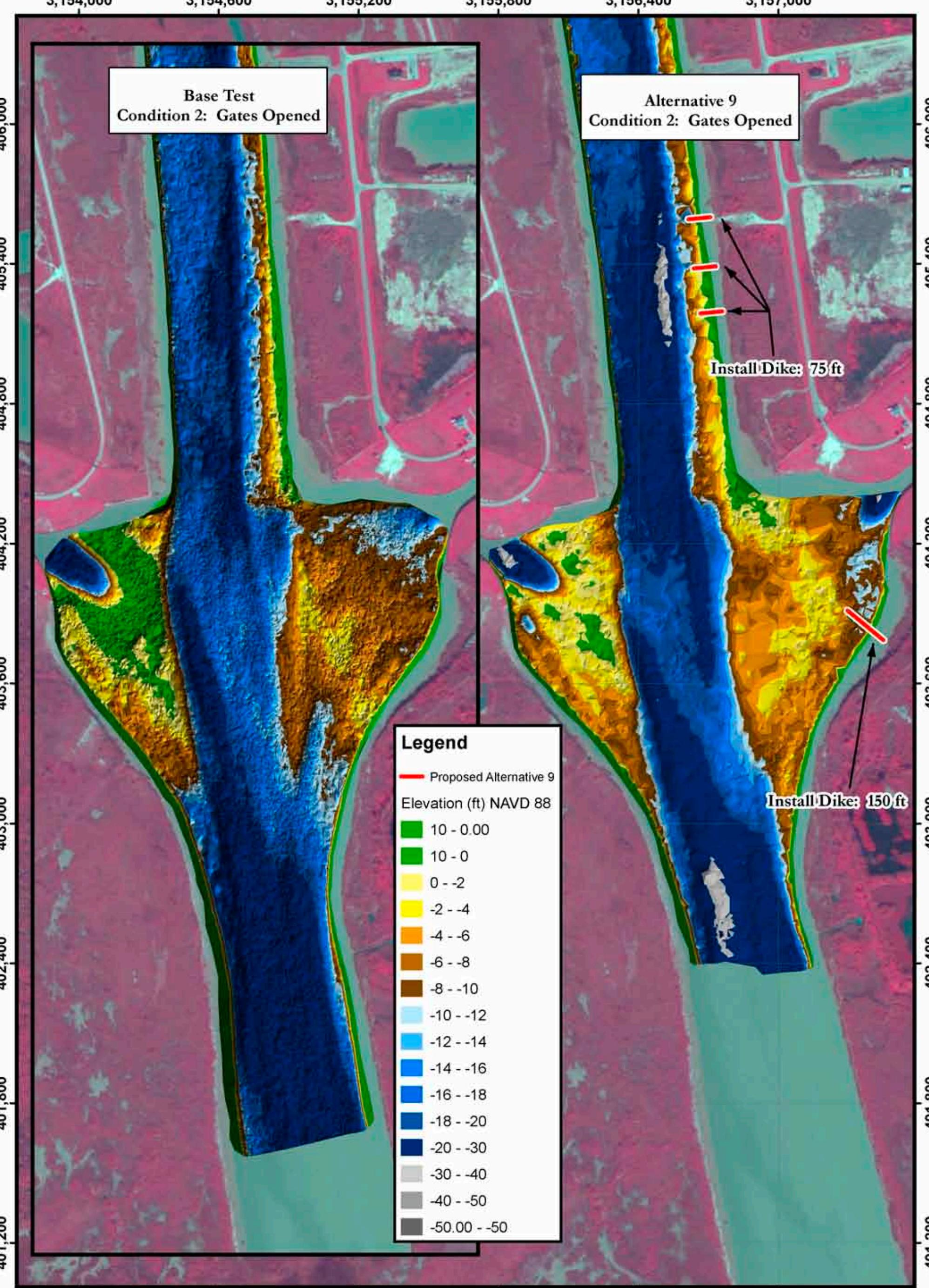
0 75 150 300 450 600
Feet
Alternative 9 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

05/25/09 Scan
A COX J BROWN, P.E. E BRAUER, P.E.
R DAVINROY, P.E.
Galveston/Plano
05/09/09
05/09/09



US Army Corps
of Engineers
St. Louis District



3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

PLATE
NUMBER
50

0 75 150 300 450 600
Feet

Alternative 9 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

A COX	03/25/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.

Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	R DAVINROY, P.E.
	Galveston/Plates
	03/25/09 Scan



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 9
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 9
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

PLATE
NUMBER

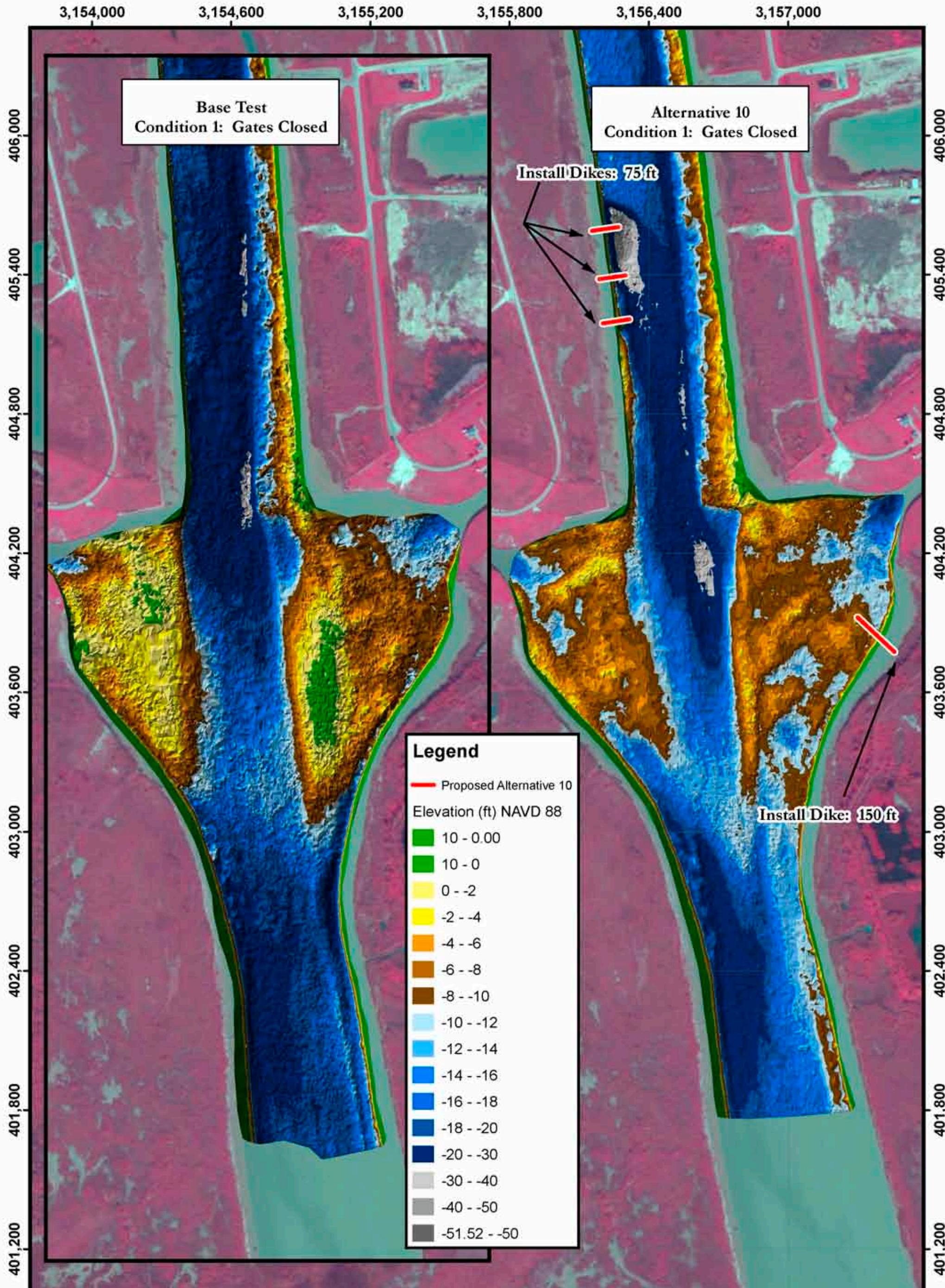
51

0 75 150 300 450 600
Feet
Alternative 9 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		A COX	05/25/09 Scan
		A COX	J BROWN, P.E.
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model		R DAVINROY, P.E.	



US Army Corps
of Engineers
St. Louis District



3,154,000
PLATE
NUMBER
52

Alternative 10 Bathymetry Scan
Condition I: Gates Closed
2004 AERIAL PHOTOGRAPH

**U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
SE. LOUIS, MISSOURI**

A COX		03/26/09 Scan
A COX	J BROWN, P.E.	E BRAUER, P.E.
A COX		R DAVINROY, P.E.



APPLIED
RIVER
ENGINEERING CENTER

**US Army Corps
of Engineers**
St. Louis District®



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 10
Condition 1: Gates Closed

Install Dikes: 75 ft

Install Dike: 150 ft

Legend

- Proposed Alternative 10
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000
3,154,600
3,155,200
3,155,800
3,156,400
3,157,000PLATE
NUMBER

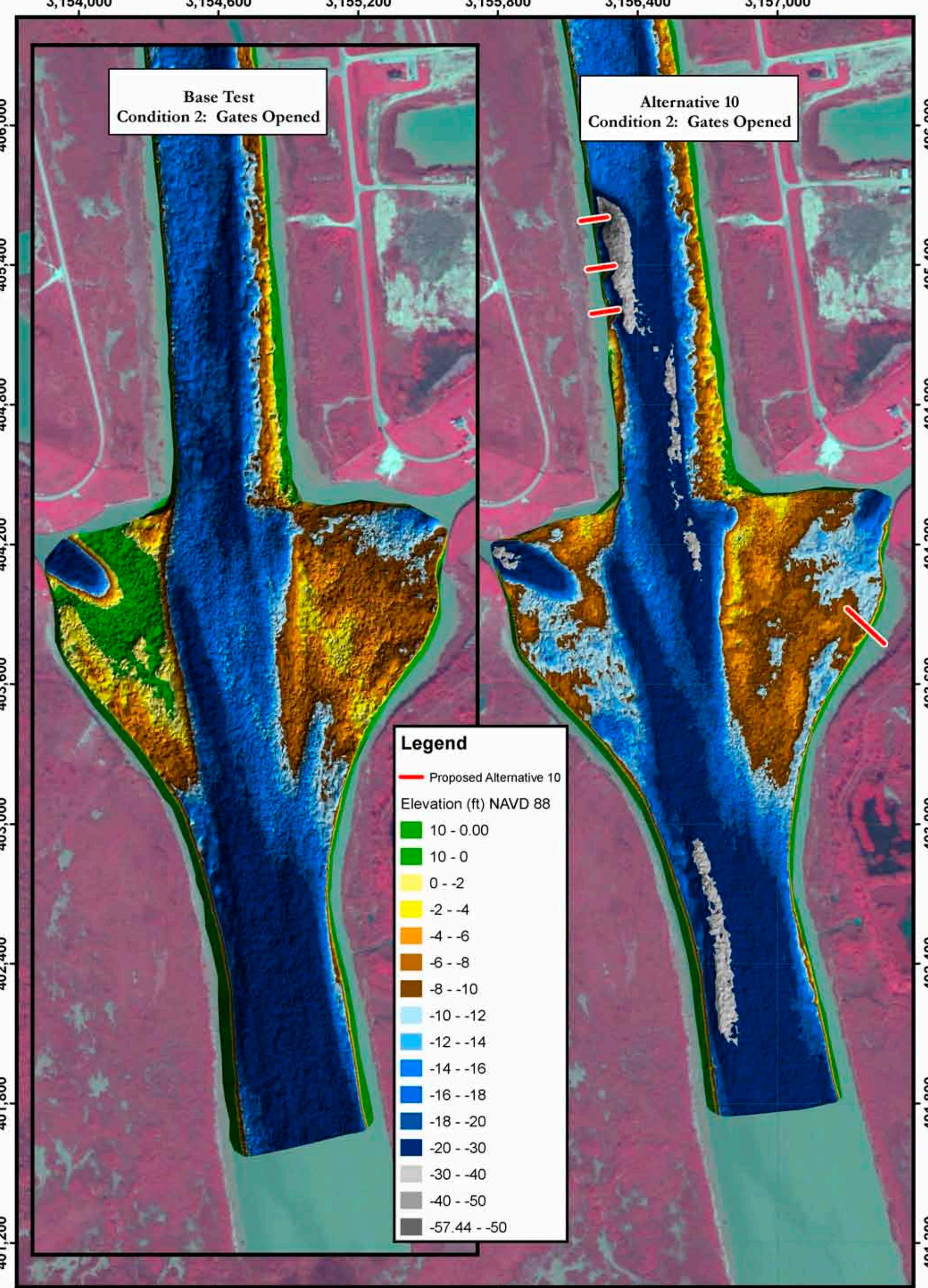
53

0 75 150 300 450 600
Feet
Alternative 10 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/25/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
APPLIED
RIVER
ENGINEERING CENTER
St. Louis District



3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

PLATE NUMBER
54
0 75 150 300 450 600
Feet
Alternative 10 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	03/26/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.
	03/26/09	03/26/09
	... Galveston/Plates	... Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

**Base Test
Condition 2: Gates Opened**

**Alternative 10
Condition 2: Gates Opened**

Install Dikes: 75 ft

Install Dike: 150 ft

Legend

- Proposed Alternative 10
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

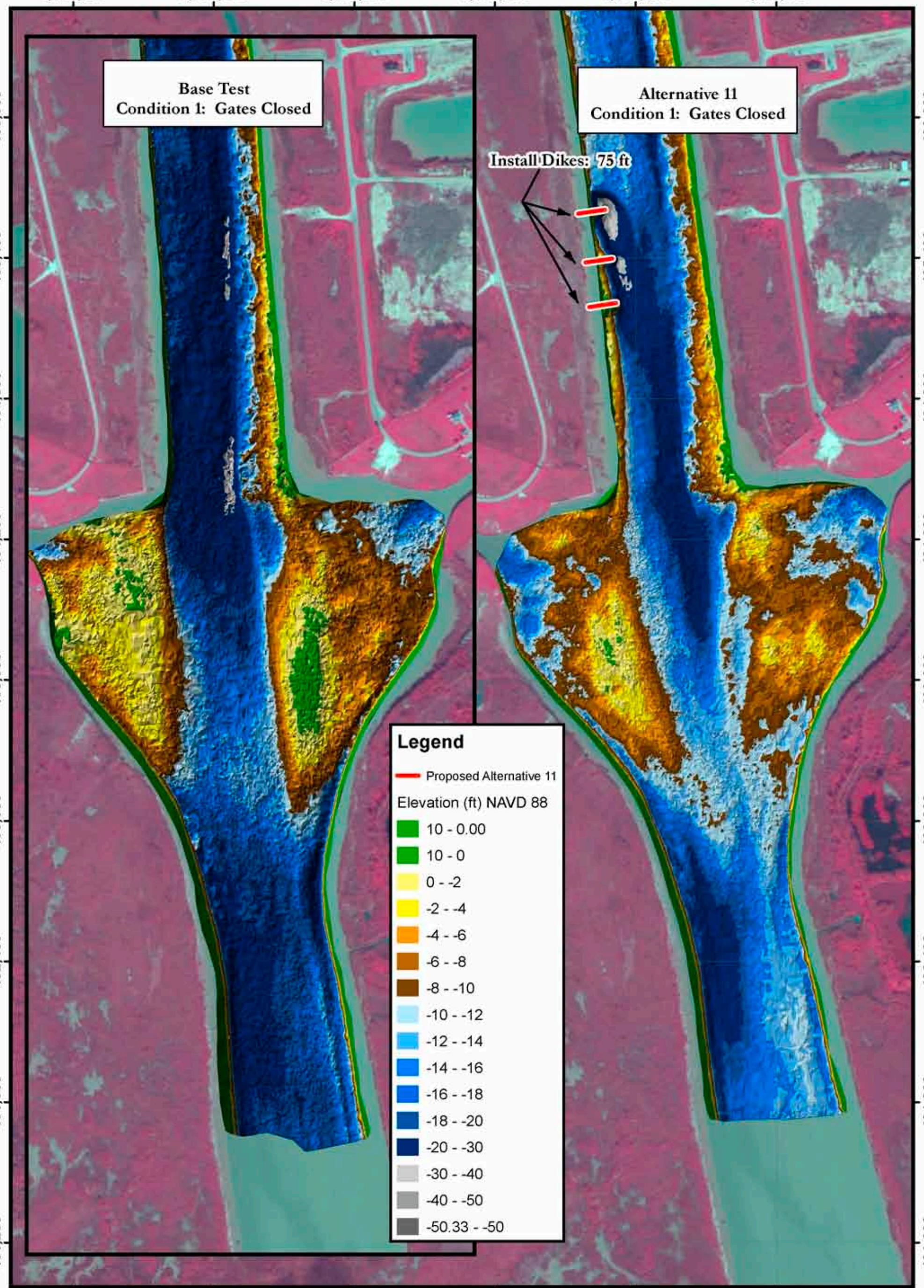
3,157,000

5
PLATE
NUMBER

0 75 150 300 450 600
Feet
Alternative 10 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		A COX	05/25/09 Scan
05/25/09	05/25/09	J BROWN, P.E.	E BRAUER, P.E.
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model		A COX	R DAVINROY, P.E.
		05/25/09	05/26/09
		Galveston, Texas	





3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
96

0 75 150 300 450 600
Feet
Alternative 11 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	03/30/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.
	03/30/09	03/30/09
	... Galveston/Plates	... Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 11
Condition 1: Gates Closed

Install Dikes: 75 ft

Legend

- Proposed Alternative 11
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

57

PLATE
NUMBER

0 75 150 300 450 600
Feet
Alternative 11 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/25/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 11
Condition 2: Gates Opened

Install Dikes: 75 ft

Legend

Proposed Alternative 11
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
8

0 75 150 300 450 600
Feet
Alternative 11 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	03/30/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 11
Condition 2: Gates Opened

Install Dikes: 75 ft

Legend

- Proposed Alternative 11
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
5

0 75 150 300 450 600
Feet
Alternative II LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/30/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
APPLIED
RIVER
ENGINEERING CENTER
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Base Test
Condition 1: Gates Closed

Alternative 12
Condition 1: Gates Closed

Install Dikes: 75 ft

Legend

Proposed Alternative 12
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
09

0 75 150 300 450 600
Feet
Alternative 12 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	03/31/09 Scan
A COX	J BROWN, P.E.
E BRAUER, P.E.	
A COX	R DAVINROY, P.E.
	03/31/09 Scan
	J BROWN, P.E.
	R DAVINROY, P.E.
	03/31/09 Scan
	J BROWN, P.E.
	R DAVINROY, P.E.



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 12
Condition 1: Gates Closed

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 12
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

19

PLATE
NUMBER

0 75 150 300 450 600
Feet
Alternative 12 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX 05/31/09 Sean
J BROWN, P.E. E BRAUER, P.E.
R DAVINROY, P.E.



APPLIED
RIVER
ENGINEERING CENTER
St. Louis District
U.S. Army Corps
of Engineers

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 12
Condition 2: Gates Opened

Legend

Proposed Alternative 12
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

Install Dikes: 75 ft

PLATE
NUMBER
62

0 75 150 300 450 600
Feet
Alternative 12 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	03/31/09 Scan
A COX	J BROWN, P.E.
E BRAUER, P.E.	
R DAVINROY, P.E.	



US Army Corps
of Engineers
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

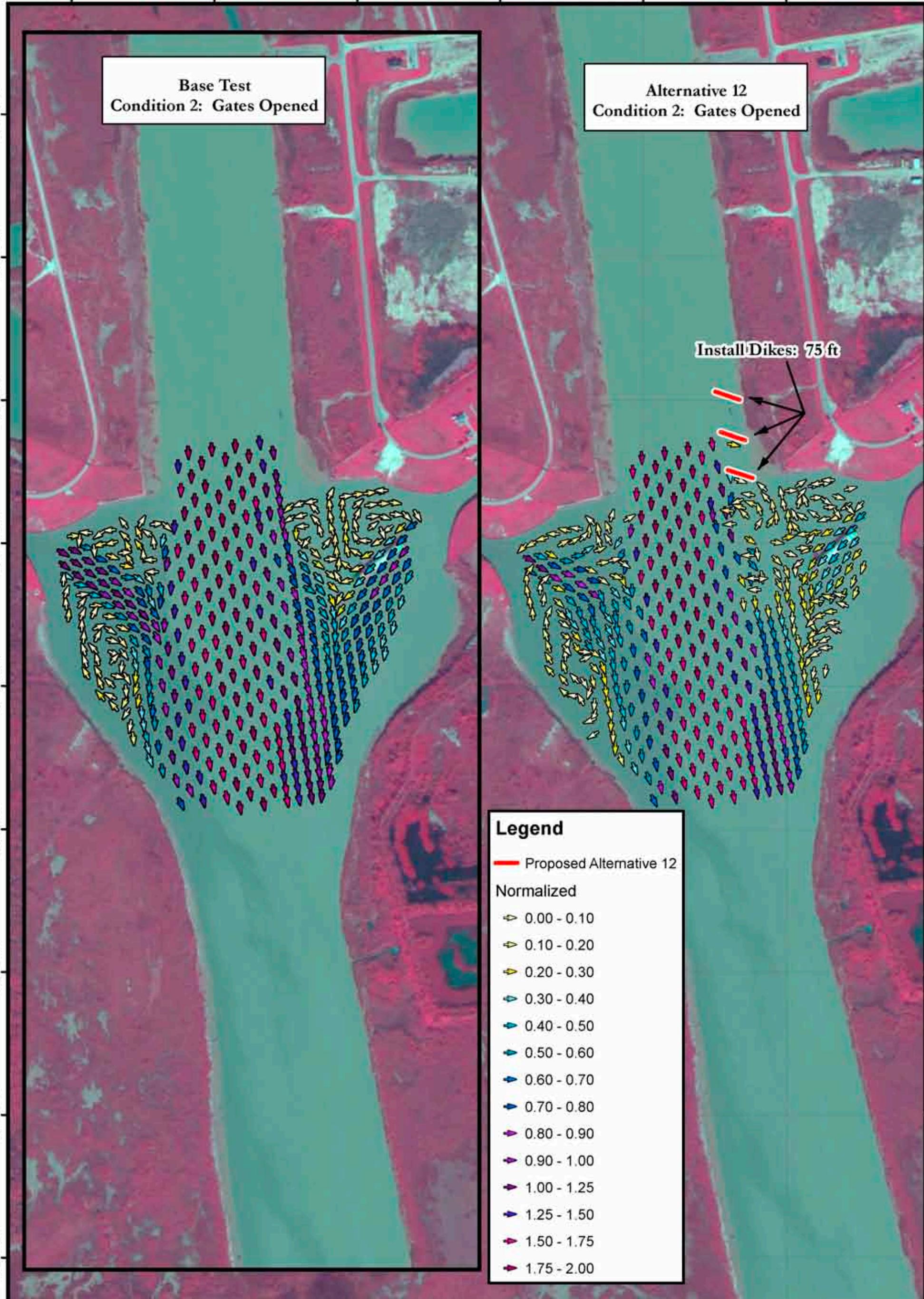
Base Test
Condition 2: Gates Opened

Alternative 12
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000
3,154,600
3,155,200
3,155,800
3,156,400
3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 12
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00



3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

PLATE
NUMBER
63

0 75 150 300 450 600
Feet
Alternative 12 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/31/09 Sean
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
APPLIED
RIVER
ENGINEERING CENTER
St. Louis District

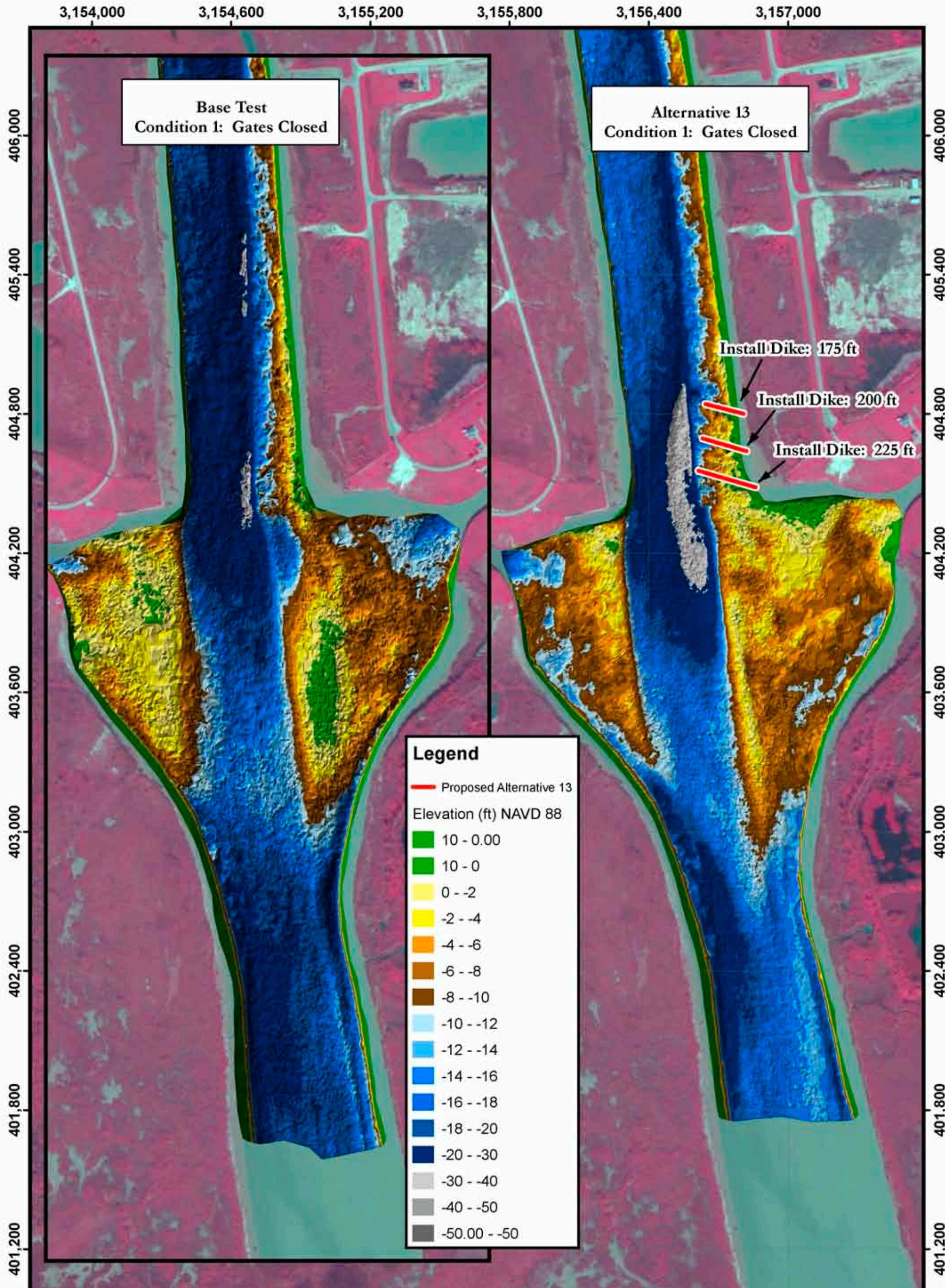


PLATE
NUMBER
64

Alternative 13 Bathymetry Scan
Condition 1: Gates Closed
 2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	03/31/09 Scan
	J BROWN, P.E.	E BRAUER, P.E.
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.
GIWW Model ... Galveston/Plates	03/31/09	03/07/2009



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 13
Condition 1: Gates Closed

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 13
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

59
PLATE
NUMBER

0 75 150 300 450 600
Feet
Alternative 13 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/01/09 Sean
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



APPLIED
RIVER
US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 13
Condition 2: Gates Opened

Install Dike: 175 ft
Install Dike: 200 ft
Install Dike: 225 ft

Legend

Proposed Alternative 13
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

PLATE
NUMBER
99

0 75 150 300 450 600
Feet
Alternative 13 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	04/01/09 Scan
A COX	J BROWN, P.E.
E BRAUER, P.E.	
R DAVINROY, P.E.	



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

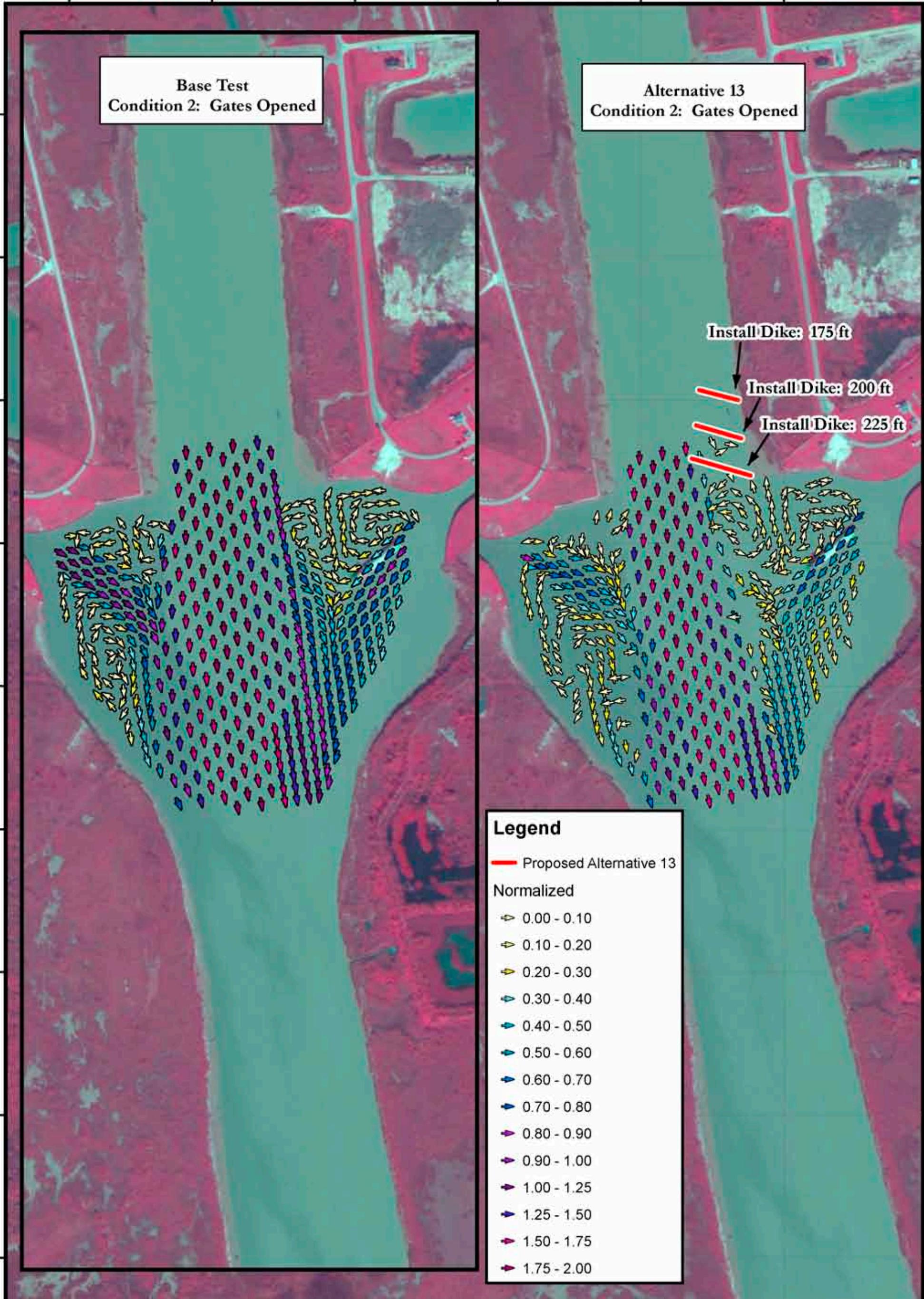
Base Test
Condition 2: Gates Opened

Alternative 13
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 13
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00



3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

PLATE
NUMBER
67

0 75 150 300 450 600
Feet

Alternative 13 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/02/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 14
Condition 1: Gates Closed

Install Rootless Dike: 225 ft

Legend

Proposed Alternative 14
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

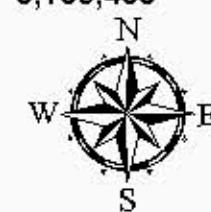
PLATE
NUMBER
89

0 75 150 225 300 450 600
Foot
Alternative 14 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNER A COX	DRAWN BY J BROWN, PE.	REVIEWED E ERAUER, PE.
SUPERVISOR A COX	SPONSOR R DAVIN ROY, PE.	DATE DRAWN 07/07/2009
Lower Brazeau River Banks Calvin's Bluff Brazos Riverbed CIWW Crossing HS R Model		

DATA DATE
04/02/09 Scan
DRAWN
REVIEWED
SUPERVISOR
SPONSOR
DATE DRAWN
07/07/2009



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 14
Condition 1: Gates Closed

Install Rootless Dike: 225 ft

Legend

- Proposed Alternative 14
- Normalized
- ◆ 0.00 - 0.10
- ◆ 0.10 - 0.20
- ◆ 0.20 - 0.30
- ◆ 0.30 - 0.40
- ◆ 0.40 - 0.50
- ◆ 0.50 - 0.60
- ◆ 0.60 - 0.70
- ◆ 0.70 - 0.80
- ◆ 0.80 - 0.90
- ◆ 0.90 - 1.00
- ◆ 1.00 - 1.25
- ◆ 1.25 - 1.50
- ◆ 1.50 - 1.75
- ◆ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

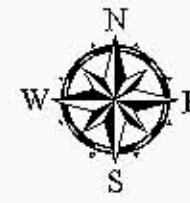
3,157,000

69
PLATE
NUMBER

0 75 150 225 300 375 450 525
ft
Alternative 14 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI			D-300-041 A COX 44/02/04 Scan		
NAME	GRADE	DATE	NAME	GRADE	DATE
A COX	JEROWN, PE	E BRAUER, PE			
R DAWIN ROY, PE					

Lower Illinois River Basin
Calaveras District
Brazos River and CFWC Channel
HSR Model



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

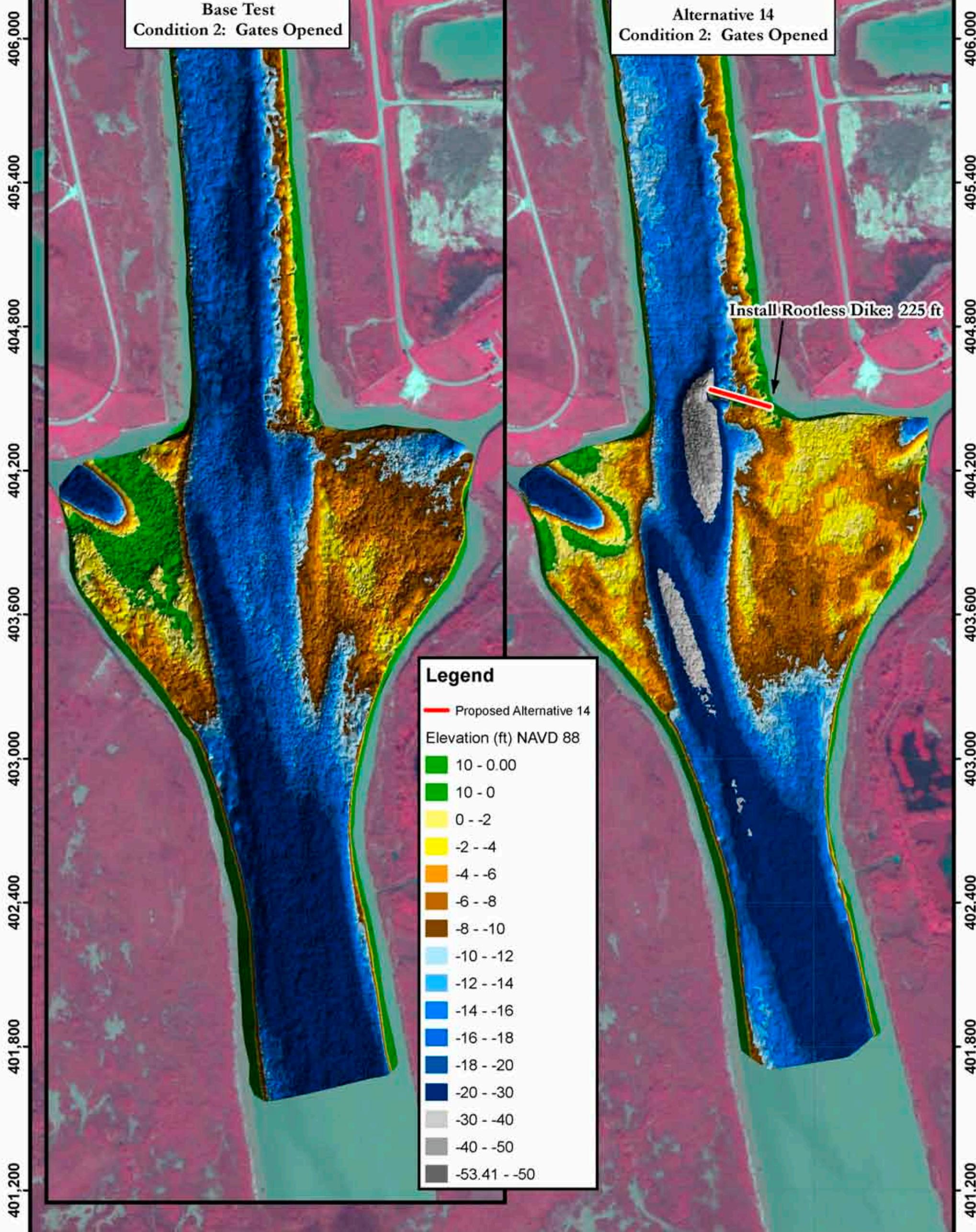
3,157,000

Base Test
Condition 2: Gates Opened

Alternative 14
Condition 2: Gates Opened

Legend

—	Proposed Alternative 14
■	Elevation (ft) NAVD 88
■	10 - 0.00
■	10 - 0
■	0 - -2
■	-2 - -4
■	-4 - -6
■	-6 - -8
■	-8 - -10
■	-10 - -12
■	-12 - -14
■	-14 - -16
■	-16 - -18
■	-18 - -20
■	-20 - -30
■	-30 - -40
■	-40 - -50
■	-53.41 - -50



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
70

0 75 150 300 450 600
Feet
Alternative 14 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	04/02/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 14
Condition 2: Gates Opened

Install Rootless Dike: 225 ft

Legend

- Proposed Alternative 14
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

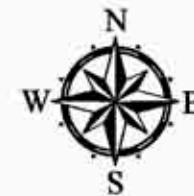
3,156,400

3,157,000

PLATE
NUMBER
71

0 75 150 300 450 600
Feet
Alternative 14 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/02/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
APPLIED
RIVER
ENGINEERING CENTER
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 15
Condition 1: Gates Closed

Legend

	Proposed Alternative 15
	Elevation (ft) NAVD 88
10 - 0.00	
10 - 0	
0 - -2	
-2 - -4	
-4 - -6	
-6 - -8	
-8 - -10	
-10 - -12	
-12 - -14	
-14 - -16	
-16 - -18	
-18 - -20	
-20 - -30	
-30 - -40	
-40 - -50	
-66.63 - -50	

Place Dredge Material
near southeast bank

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
72

0 75 150 300 450 600
Feet
Alternative 15 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	04/06/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
	R DAVINROY, P.E.



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

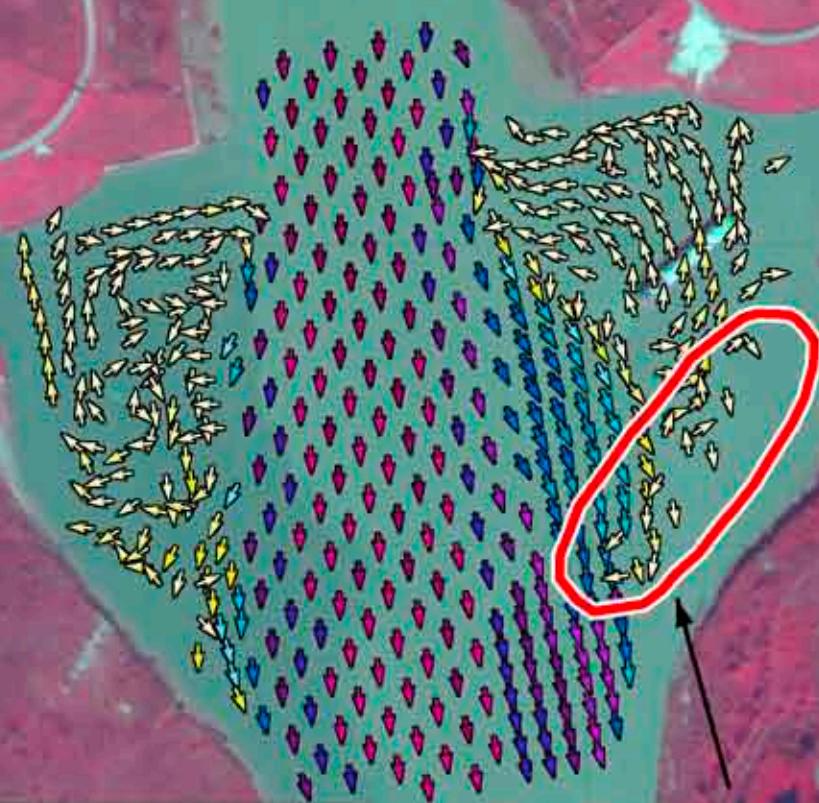
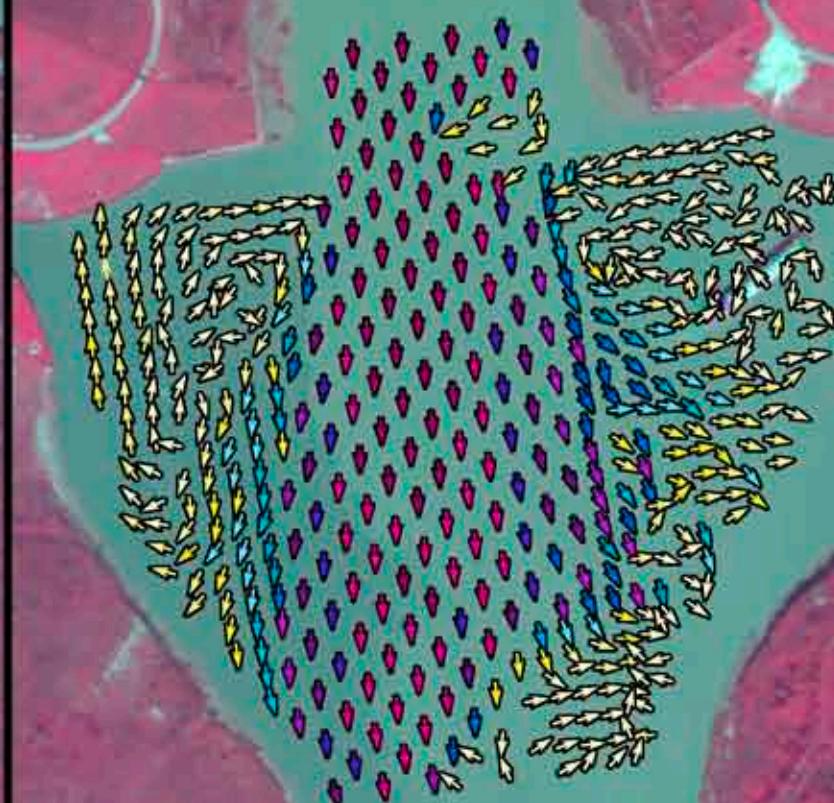
Alternative 15
Condition 1: Gates Closed

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 15
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

Place Dredge Material
near southeast bank



3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

PLATE
NUMBER
73

0 75 150 300 450 600
Feet

Alternative 15 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/07/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
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RIVER
ENGINEERING CENTER
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 15
Condition 2: Gates Opened

Legend

	Proposed Alternative 15
	Elevation (ft) NAVD 88
10 - 0.00	
10 - 0	
0 - -2	
-2 - -4	
-4 - -6	
-6 - -8	
-8 - -10	
-10 - -12	
-12 - -14	
-14 - -16	
-16 - -18	
-18 - -20	
-20 - -30	
-30 - -40	
-40 - -50	
-50.00 - -50	

Place Dredge Material
near southeast bank

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

PLATE
NUMBER
74

0 75 150 300 450 600
Feet
Alternative 15 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	04/06/09 Scan
A COX	J BROWN, P.E.
E BRAUER, P.E.	
R DAVINROY, P.E.	



US Army Corps
of Engineers
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 15
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 15
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

Place Dredge Material
near southeast bank

3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

PLATE
NUMBER
75

0 75 150 300 450 600
Foot
Alternative 15 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		A COX	04/07/09 Scan
04/07/09	04/07/09	J BROWN, P.E.	E BRAUER, P.E.
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model		A COX	R DAVINROY, P.E.
		04/07/09	04/07/09
		Galveston, Texas	Galveston, Texas



US Army Corps
of Engineers
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RIVER
ENGINEERING CENTER
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 16
Condition 1: Gates Closed

Install Geotextile Tube:
 -First reach from bank: 200 ft
 -Second reach (extension): 600 ft

Legend

Proposed Alternative 16
Elevation
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
76

0 75 150 300 450 600
Feet
Alternative 16 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	04/10/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	Galveston/Plates



US Army Corps
of Engineers
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

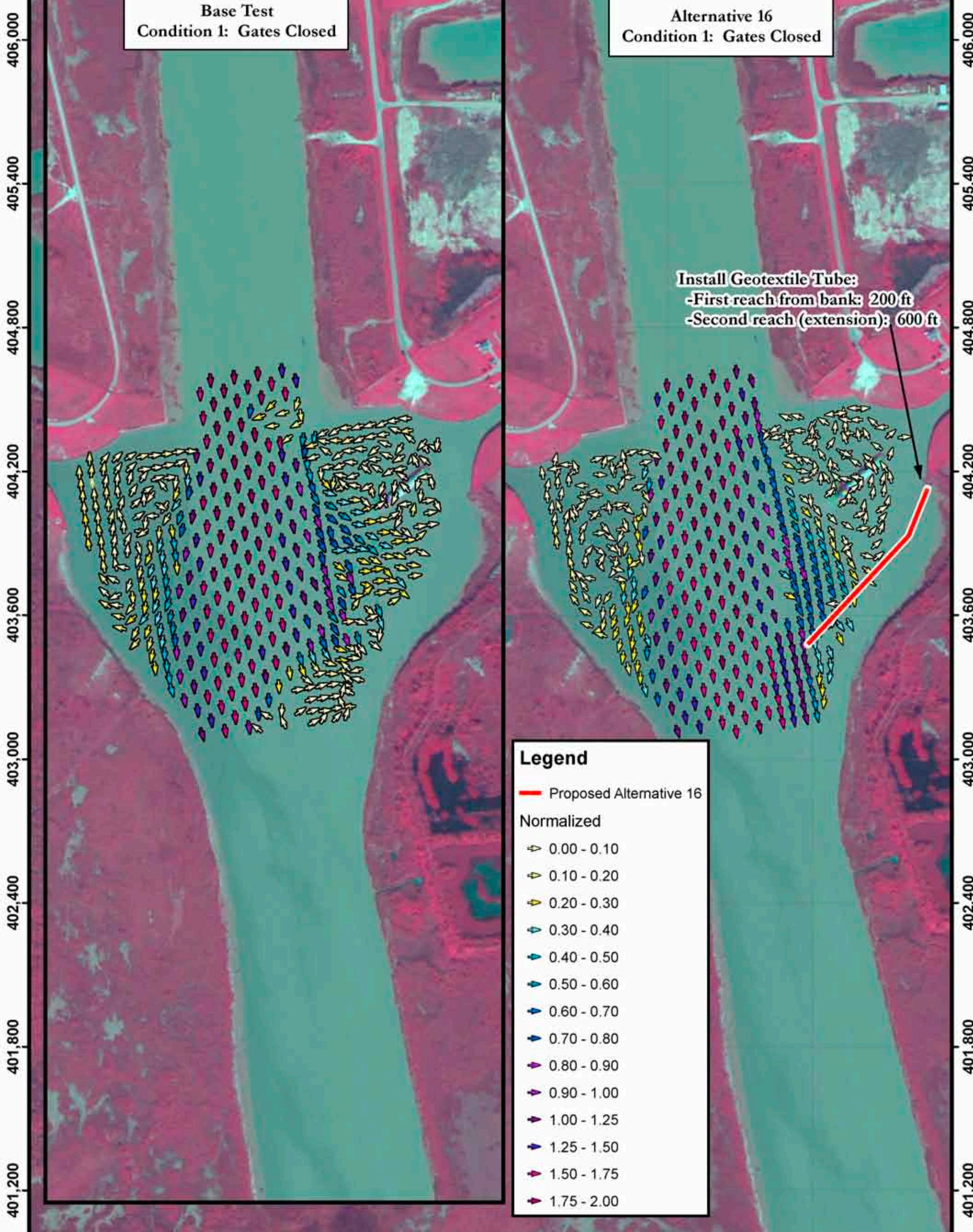
Base Test
Condition 1: Gates Closed

Alternative 16
Condition 1: Gates Closed

Install Geotextile Tube:
 -First reach from bank: 200 ft
 -Second reach (extension): 600 ft

Legend

- Proposed Alternative 16
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

77

PLATE
NUMBER

0 75 150 300 450 600
Feet
Alternative 16 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/13/09 Sean
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	R DAVINROY, P.E.	



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 16
Condition 2: Gates Opened

Install Geotextile Tube:
 -First reach from bank: 200 ft
 -Second reach (extension): 600 ft

Legend

Proposed Alternative 16
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

PLATE
NUMBER
78

0 75 150 300 450 600
Feet
Alternative 16 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	04/10/09 Scan
A COX	J BROWN, P.E.
E BRAUER, P.E.	
A COX	R DAVINROY, P.E.
	01/07/2009



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 16
Condition 2: Gates Opened

Install Geotextile Tube:
 -First reach from bank: 200 ft
 -Second reach (extension): 600 ft

Legend

- Proposed Alternative 16
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

79

PLATE
NUMBER

0 75 150 300 450 600
Feet
Alternative 16 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/13/09 Sean
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



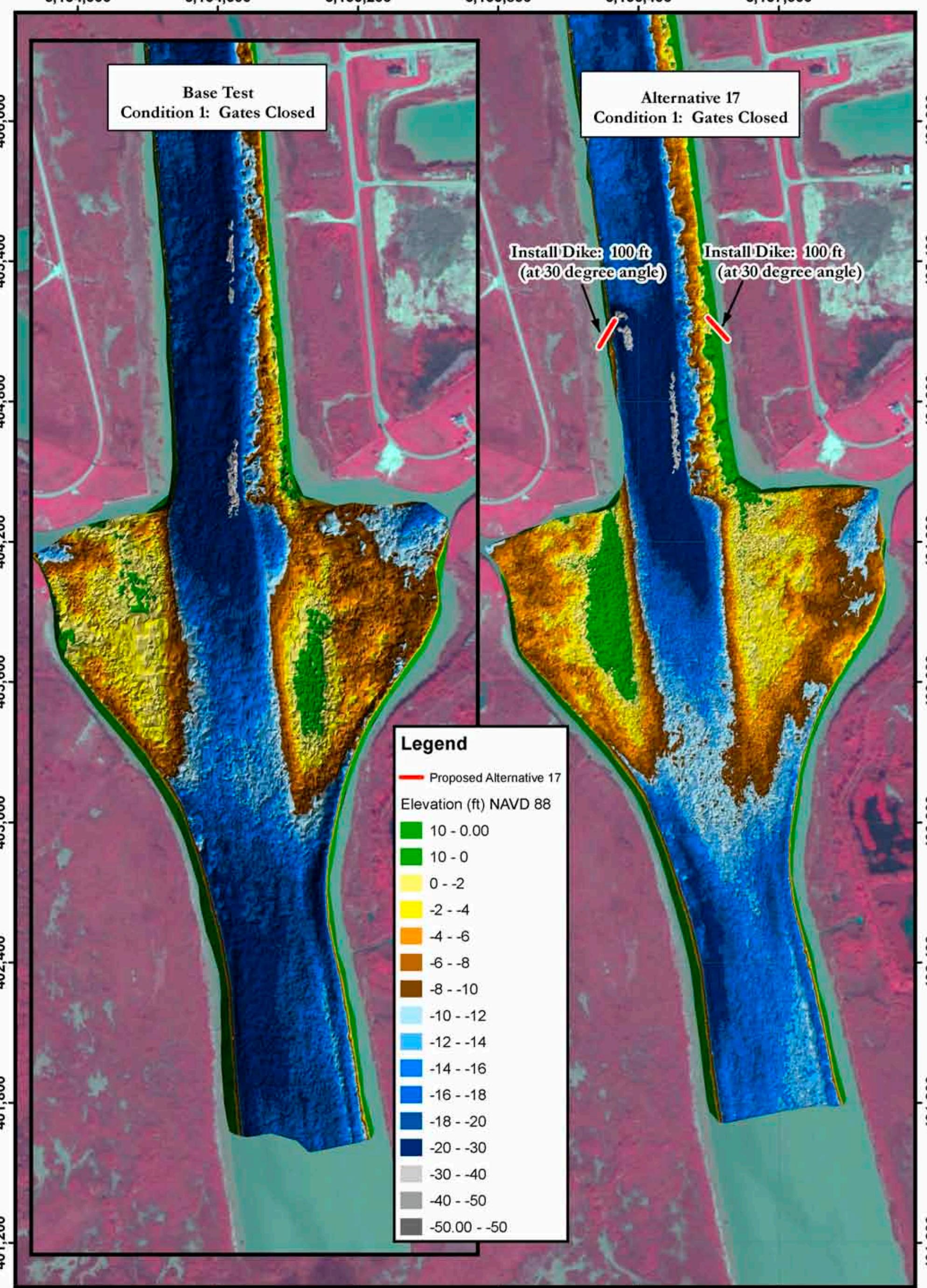


PLATE
NUMBER
08

0 75 150 300 450 600
Feet
Alternative 17 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/13/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.
	04/13/09	04/13/09
	... Galveston/Plates	... Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 17
Condition 1: Gates Closed

Install Dike: 100 ft
(at 30 degree angle)

Install Dike: 100 ft
(at 30 degree angle)

Legend

- Proposed Alternative 17
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

18

PLATE
NUMBER

0 75 150 300 450 600
Feet
Alternative 17 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

A COX 04/14/09 Scan
J BROWN, P.E. E BRAUER, P.E.
R DAVINROY, P.E.

Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

04/14/09 Scan
J BROWN, P.E. E BRAUER, P.E.
R DAVINROY, P.E.



US Army Corps
of Engineers
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RIVER
ENGINEERING CENTER
St. Louis District

3,154,000

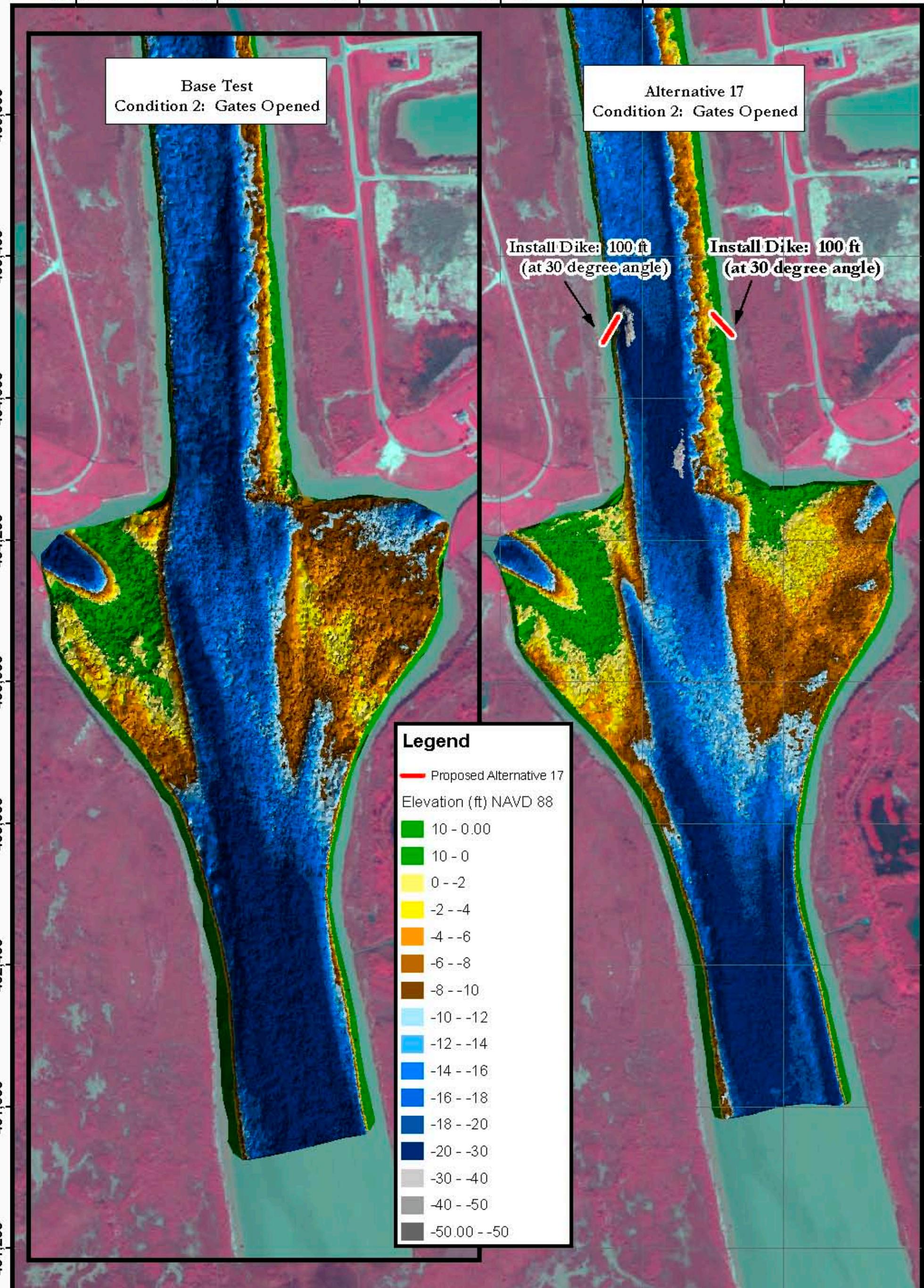
3,154,600

3,155,200

3,155,800

3,156,400

3,157,000



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 17
Condition 2: Gates Opened

Install Dike: 100 ft
(at 30 degree angle)

Install Dike: 100 ft
(at 30 degree angle)

Legend

- Proposed Alternative 17
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

4,012,000
4,014,000
4,016,000
4,018,000
4,020,000
4,022,000
4,024,000
4,026,000
4,028,000
4,030,000
4,032,000
4,034,000
4,036,000
4,038,000
4,040,000
4,042,000
4,044,000
4,046,000
4,048,000
4,050,000
4,052,000
4,054,000
4,056,000
4,058,000
4,060,000

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
83

0 75 150 300 450 600
Feet
Alternative 17 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/14/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
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RIVER
ENGINEERING CENTER
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Base Test
Condition 1: Gates Closed

Alternative 18
Condition 1: Gates Closed

Install Dike: 100 ft
(at 30 degree angle)

Install Dike: 100 ft
(at 30 degree angle)

Legend

Proposed Alternative 18
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

PLATE
NUMBER
48

0 75 150 300 450 600
Feet
Alternative 18 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	04/15/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 18
Condition 1: Gates Closed

Install Dike: 100 ft
(at 30 degree angle)

Install Dike: 100 ft
(at 30 degree angle)

Legend

- Proposed Alternative 18
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

58

PLATE
NUMBER

0 75 150 300 450 600
Feet
Alternative 18 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/16/09 Sean
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 18
Condition 2: Gates Opened

Install Dike: 100 ft
(At 30 degree angle)

Install Dike: 100 ft
(At 30 degree angle)

Legend

Proposed Alternative 18
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
98

0 75 150 300 450 600
Feet
Alternative 18 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	04/16/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 18
Condition 2: Gates Opened

Install Dike: 100 ft
(At 30 degree angle)

Install Dike: 100 ft
(At 30 degree angle)

Legend

- Proposed Alternative 18
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

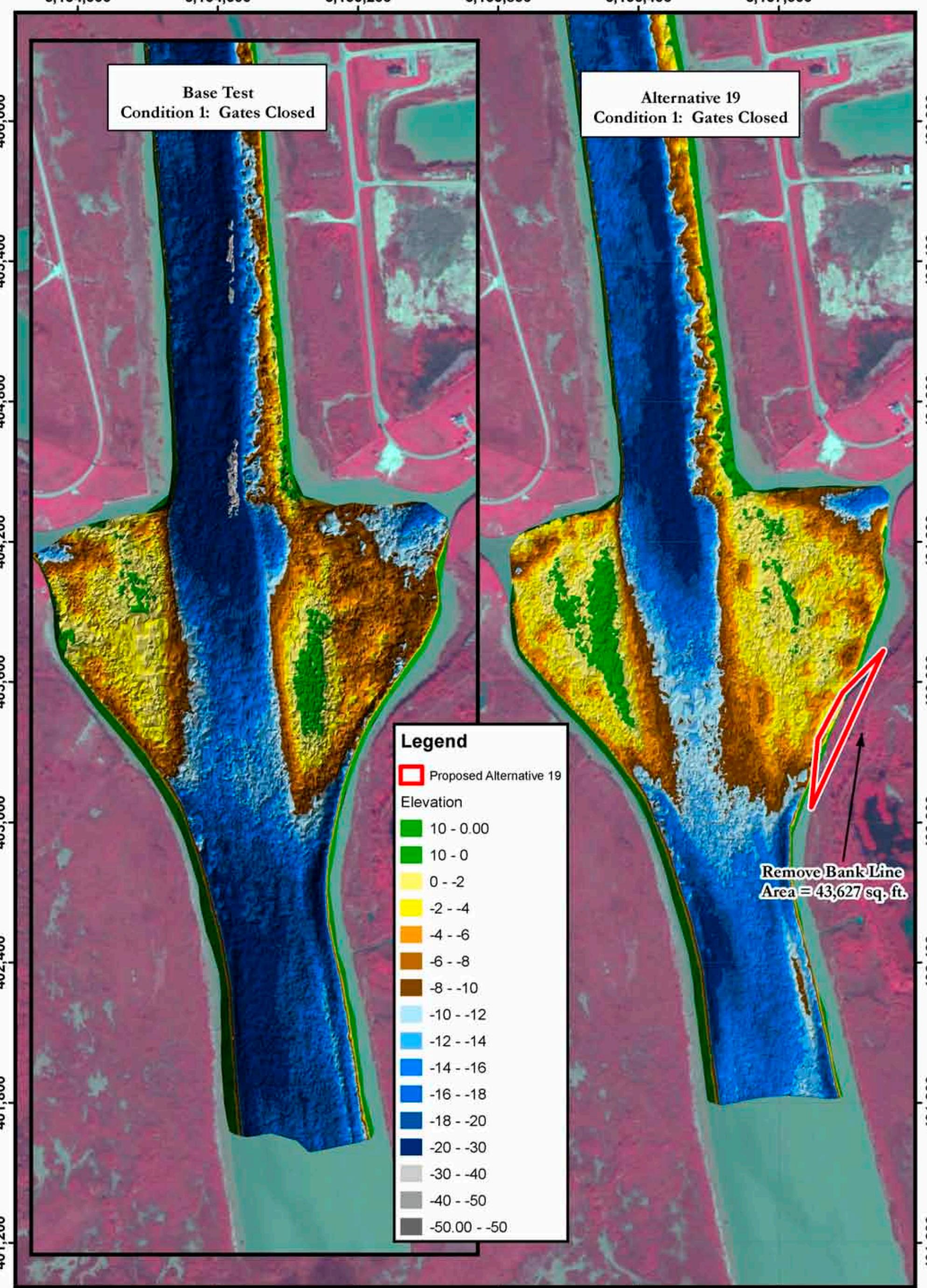
78

PLATE
NUMBER

0 75 150 300 450 600
Feet
Alternative 18 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/20/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.





3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

PLATE NUMBER
88

0 75 150 300 450 600
Feet

Alternative 19 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

A COX	04/22/09 Scan
A COX	J BROWN, P.E.
A COX	E BRAUER, P.E.
A COX	R DAVINROY, P.E.

Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model



APPLIED
RIVER
ENGINEERING CENTER
St. Louis District
US Army Corps
of Engineers

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 19
Condition 1: Gates Closed

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 19
- Normalized
- ⇒ 0.00 - 0.10
- ⇒ 0.10 - 0.20
- ⇒ 0.20 - 0.30
- ⇒ 0.30 - 0.40
- ⇒ 0.40 - 0.50
- ⇒ 0.50 - 0.60
- ⇒ 0.60 - 0.70
- ⇒ 0.70 - 0.80
- ⇒ 0.80 - 0.90
- ⇒ 0.90 - 1.00
- ⇒ 1.00 - 1.25
- ⇒ 1.25 - 1.50
- ⇒ 1.50 - 1.75
- ⇒ 1.75 - 2.00

Remove Bank Line
Area = 43,627 sq. ft.

3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

PLATE
NUMBER
68

0 75 150 300 450 600
Feet
Alternative 19 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/22/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 19
Condition 2: Gates Opened

Legend

	Proposed Alternative 19
	Elevation (ft) NAVD 88
10 - 0.00	
10 - 0	
0 - -2	
-2 - -4	
-4 - -6	
-6 - -8	
-8 - -10	
-10 - -12	
-12 - -14	
-14 - -16	
-16 - -18	
-18 - -20	
-20 - -30	
-30 - -40	
-40 - -50	
-50.00 - -50	

Shave Bank Line:
Area = 43,627 sq. ft.

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

PLATE
NUMBER
06

0 75 150 300 450 600
Feet
Alternative 19 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	04/22/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 19
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 19
- Normalized
- ⇒ 0.00 - 0.10
- ⇒ 0.10 - 0.20
- ⇒ 0.20 - 0.30
- ⇒ 0.30 - 0.40
- ⇒ 0.40 - 0.50
- ⇒ 0.50 - 0.60
- ⇒ 0.60 - 0.70
- ⇒ 0.70 - 0.80
- ⇒ 0.80 - 0.90
- ⇒ 0.90 - 1.00
- ⇒ 1.00 - 1.25
- ⇒ 1.25 - 1.50
- ⇒ 1.50 - 1.75
- ⇒ 1.75 - 2.00

Shave Bank Line:
Area = 43,627 sq. ft.

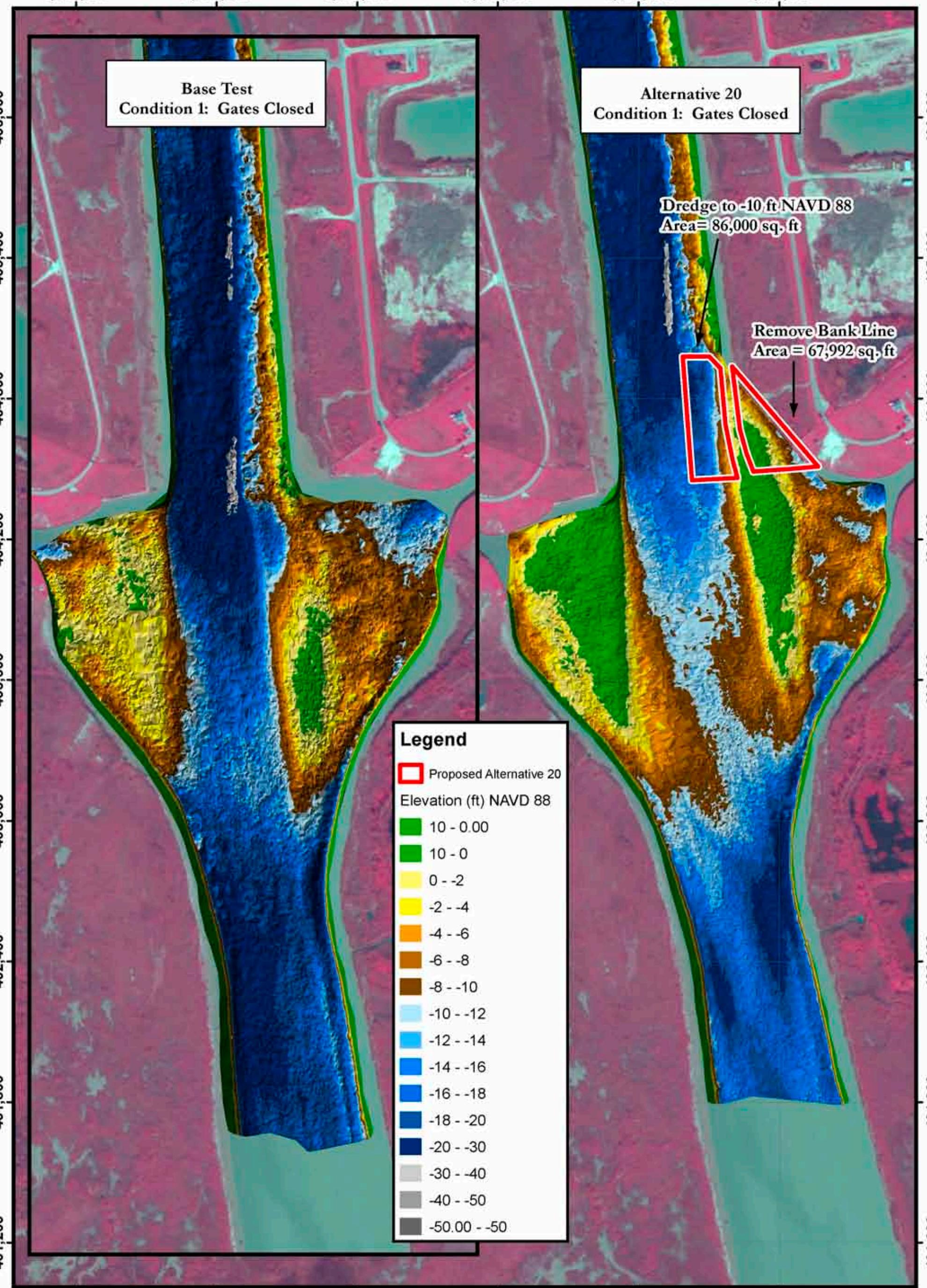
PLATE
NUMBER
16

0 75 150 300 450 600
Feet
Alternative 19 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		A COX	04/22/09 Scan
		A COX	J BROWN, P.E., E BRAUER, P.E.
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model		R DAVINROY, P.E.	
			04/22/09 Galveston, Texas 07/08/2009



US Army Corps
of Engineers
APPLIED
RIVER
ENGINEERING CENTER
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
92

0 75 150 300 450 600
Feet
Alternative 20 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	04/23/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.

04/23/09 Scan
J BROWN, P.E.
E BRAUER, P.E.
R DAVINROY, P.E.
04/23/09 Scan
... Galveston/Plates
04/23/09 Scan



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 20
Condition 1: Gates Closed

Dredge to -10 ft LWRP
Area = 86,000 sq. ft

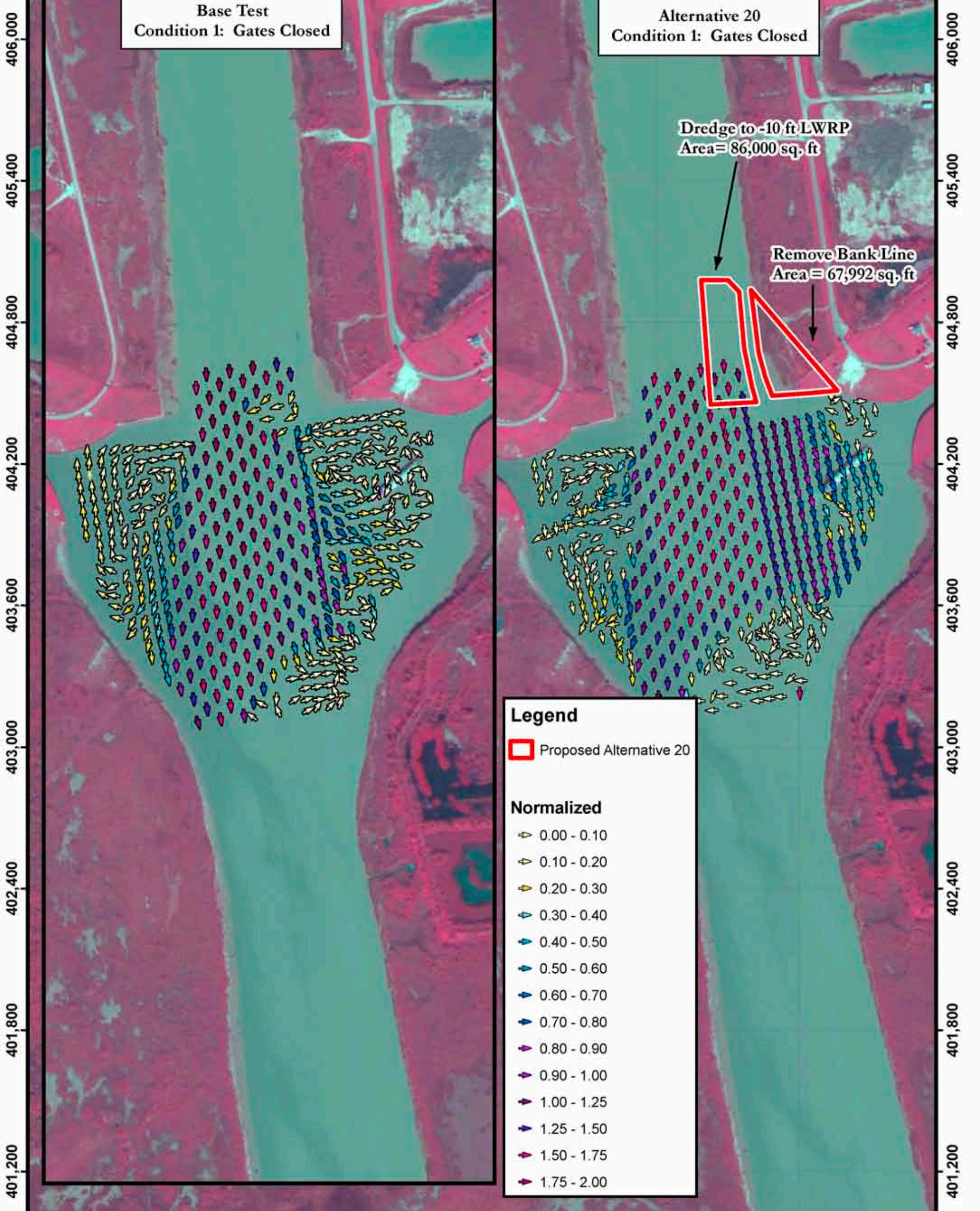
Remove Bank Line
Area = 67,992 sq. ft

Legend

□ Proposed Alternative 20

Normalized

- ⇒ 0.00 - 0.10
- ⇒ 0.10 - 0.20
- ⇒ 0.20 - 0.30
- ⇒ 0.30 - 0.40
- ⇒ 0.40 - 0.50
- ⇒ 0.50 - 0.60
- ⇒ 0.60 - 0.70
- ⇒ 0.70 - 0.80
- ⇒ 0.80 - 0.90
- ⇒ 0.90 - 1.00
- ⇒ 1.00 - 1.25
- ⇒ 1.25 - 1.50
- ⇒ 1.50 - 1.75
- ⇒ 1.75 - 2.00



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
93

0 75 150 300 450 600
Feet
Alternative 20 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/23/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	R DAVINROY, P.E.	



US Army Corps
of Engineers
APPLIED
RIVER
ENGINEERING CENTER
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 20
Condition 2: Gates Opened

Dredge to -10 ft NAVD 88
Area = 86,000 sq. ft

Remove Bank Line
Area = 67,992 sq. ft

Legend

	Proposed Alternative 20
	Elevation (ft) NAVD 88
10 - 0.00	
10 - 0	
0 - -2	
-2 - -4	
-4 - -6	
-6 - -8	
-8 - -10	
-10 - -12	
-12 - -14	
-14 - -16	
-16 - -18	
-18 - -20	
-20 - -30	
-30 - -40	
-40 - -50	
-50.00 - -50	

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
46

0 75 150 300 450 600
Feet
Alternative 20 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	04/24/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 20
Condition 2: Gates Opened

Dredge to -10 ft LWRP
Area = 86,000 sq. ft

Remove Bank Line
Area = 67,992 sq. ft

Legend

- Proposed Alternative 20
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

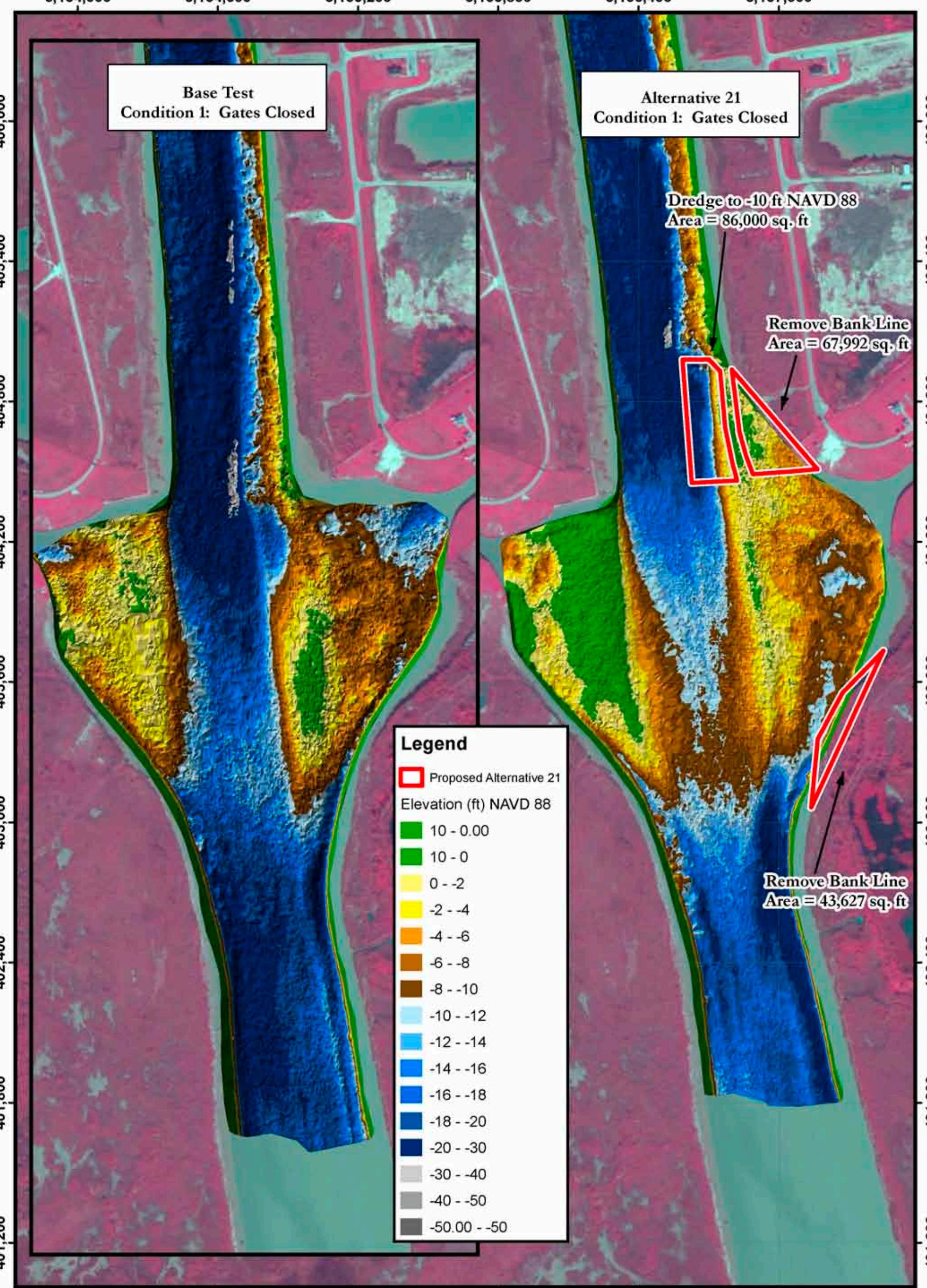
3,157,000

PLATE
NUMBER
96

0 75 150 300 450 600
Feet
Alternative 20 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		A COX	04/23/09 Scan
		A COX	J BROWN, P.E.
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model		R DAVINROY, P.E.	





3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
96

0 75 150 300 450 600
Feet
Alternative 21 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/24/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.
	J BROWN, P.E.	E BRAUER, P.E.



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 21
Condition 1: Gates Closed

Dredge to -10 ft LWRP
Area = 86,000 sq. ft

Remove Bank Line
Area = 67,992 sq. ft



Remove Bank Line
Area = 43,627 sq. ft

Legend

- Proposed Alternative 21
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

7

PLATE
NUMBER

0 75 150 300 450 600
Feet
Alternative 21 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/27/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	R DAVINROY, P.E.	



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 21
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

	Proposed Alternative 21
	Elevation (ft) NAVD 88
10 - 0.00	
10 - 0	
0 - -2	
-2 - -4	
-4 - -6	
-6 - -8	
-8 - -10	
-10 - -12	
-12 - -14	
-14 - -16	
-16 - -18	
-18 - -20	
-20 - -30	
-30 - -40	
-40 - -50	
-50.00 - -50	

PLATE
NUMBER
86
0 75 150 300 450 600
Feet
Alternative 21 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	04/28/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	04/28/09
	... Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 21
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 21
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

Dredge to -10 ft LWRP
Area = 86,000 sq. ft

Remove Bank-Line
Area = 67,992 sq. ft

Remove Bank-Line
Area = 43,627 sq. ft

3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

66

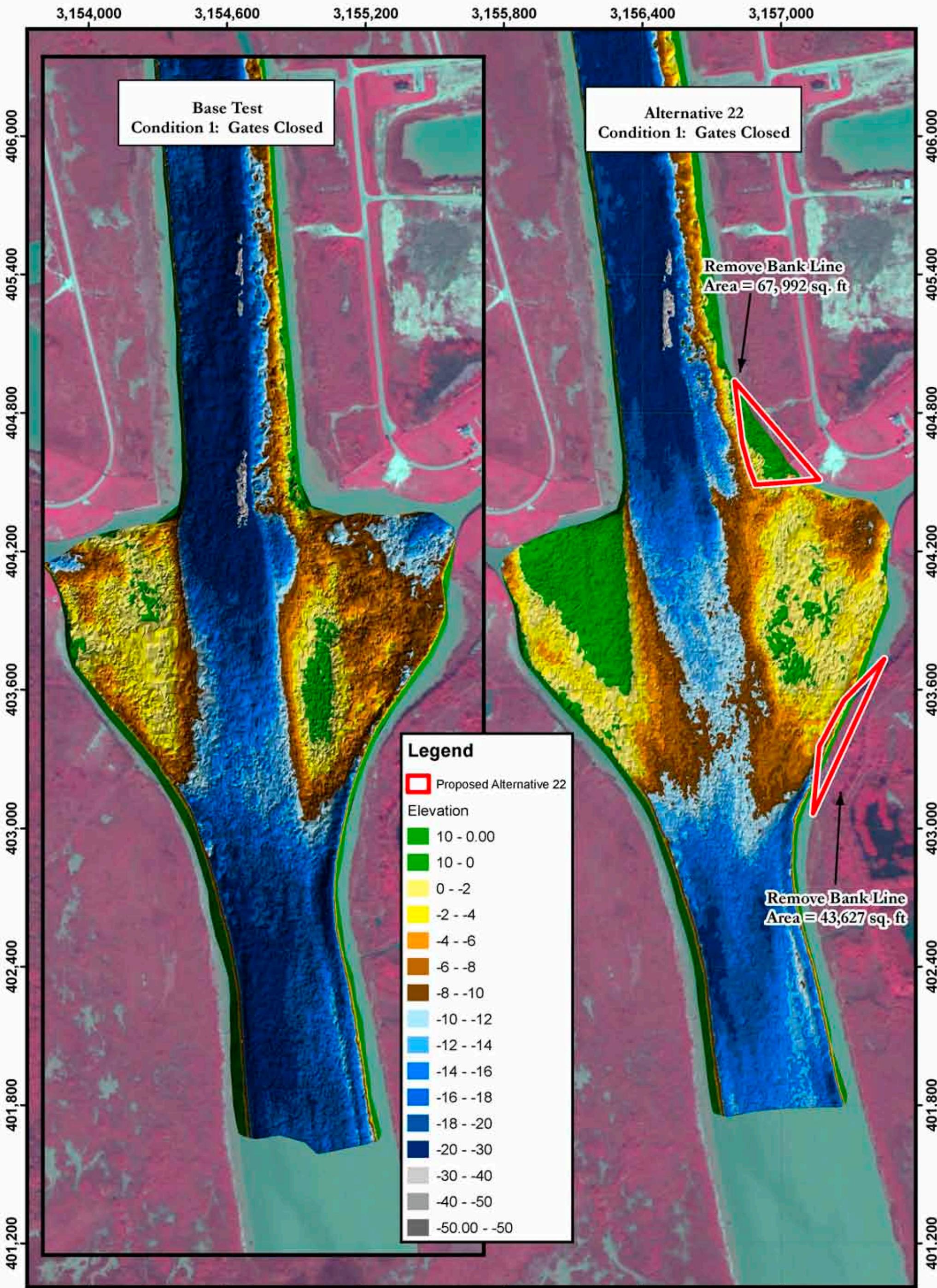
PLATE
NUMBER

0 75 150 300 450 600
Foot
Alternative 21 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

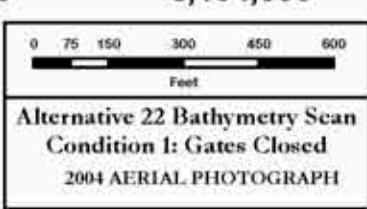
U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	04/27/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	R DAVINROY, P.E.	



US Army Corps
of Engineers
St. Louis District



3,154,
PLATE
NUMBER
100



U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX		04/28/09 Scan
	A COX	J BROWN, P.E.	E BRAUER, P.E.
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	A COX		R DAVINROY, P.E.
	Galveston/Plates		07/07/2009



The logo consists of a red rectangular box containing a white stylized 'W' or 'M' shape. Below the box, the text "US Army Corps of Engineers" is written in a bold, black, sans-serif font, followed by "St. Louis District" in a smaller, regular black font.

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 22
Condition 1: Gates Closed

406,000

405,400

404,800

404,200

403,600

403,000

402,400

401,800

401,200

406,000

405,400

404,800

404,200

403,600

403,000

402,400

401,800

401,200

Legend

- Proposed Alternative 22
- Normalized
- ← 0.00 - 0.10
- ← 0.10 - 0.20
- ← 0.20 - 0.30
- ← 0.30 - 0.40
- ← 0.40 - 0.50
- ← 0.50 - 0.60
- ← 0.60 - 0.70
- ← 0.70 - 0.80
- ← 0.80 - 0.90
- ← 0.90 - 1.00
- ← 1.00 - 1.25
- ← 1.25 - 1.50
- ← 1.50 - 1.75
- ← 1.75 - 2.00

Remove Bank Line
Area = 43,627 sq. ft

Remove Bank Line
Area = 67,992 sq. ft

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
101

0 75 150 225 300 375 450 525
Foot

Alternative 22 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

D-300-041
A COX 04/30/04 Scan
DRAFTED BY: **A COX** DRAWN BY: **J JEROWN, PE** CHECKED BY: **E BRAUER, PE**

Lower Basco River Basin
Calcasieu District
Basco River and CWWC Canals
HSR Model

DRAFTED BY: **A COX** DRAWN BY: **R DAWNRAY, PE**
REVIEWED BY: **... Calcasieu/Platte** DATE: 07/06/2006



US Army Corps
of Engineers
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 22
Condition 2: Gates Opened

Remove Bank Line
Area = 67,992 sq. ft

Remove Bank Line
Area = 43,627 sq. ft

Legend

	Proposed Alternative 22
Elevation	
	10 - 0.00
	10 - 0
	0 - -2
	-2 - -4
	-4 - -6
	-6 - -8
	-8 - -10
	-10 - -12
	-12 - -14
	-14 - -16
	-16 - -18
	-18 - -20
	-20 - -30
	-30 - -40
	-40 - -50
	-50.00 - -50

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
102

0 75 150 300 450 600
Feet
Alternative 22 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	04/30/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 22
Condition 2: Gates Opened

Remove Bank Line
Area = 67,992 sq. ft



Legend

- Proposed Alternative 22
- Normalized
- ← 0.00 - 0.10
- ← 0.10 - 0.20
- ← 0.20 - 0.30
- ← 0.30 - 0.40
- ← 0.40 - 0.50
- ← 0.50 - 0.60
- ← 0.60 - 0.70
- ← 0.70 - 0.80
- ← 0.80 - 0.90
- ← 0.90 - 1.00
- ← 1.00 - 1.25
- ← 1.25 - 1.50
- ← 1.50 - 1.75
- ← 1.75 - 2.00

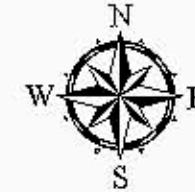
Remove Bank Line
Area = 43,627 sq. ft

PLATE
NUMBER
103

0 75 150 225 300 375 450 525
Foot
Alternative 22 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI			DATE	SCANNER
NAME	POSITION	GRADE	DATE	SCANNER
A COX	JEROWN, PE	E BRAUER, PE	04/21/04	Scan
R DAWIN ROY, PE				

Lower Illinois River Basin
Calaveras District
Brazos River and Cimarron basins
HSR Model



US Army Corps
of Engineers
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 23
Condition 1: Gates Closed

Remove Bank Line
Area = 67,992 sq. ft

Legend

	Proposed Alternative 23
Elevation (ft) NAVD 88	
	10 - 0.00
	10 - 0
	0 - -2
	-2 - -4
	-4 - -6
	-6 - -8
	-8 - -10
	-10 - -12
	-12 - -14
	-14 - -16
	-16 - -18
	-18 - -20
	-20 - -30
	-30 - -40
	-40 - -50
	-52.03 - -50

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
104

0 75 150 300 450 600
Feet
Alternative 23 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	05/04/09 Scan
A COX	J BROWN, P.E.
A COX	E BRAUER, P.E.
A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

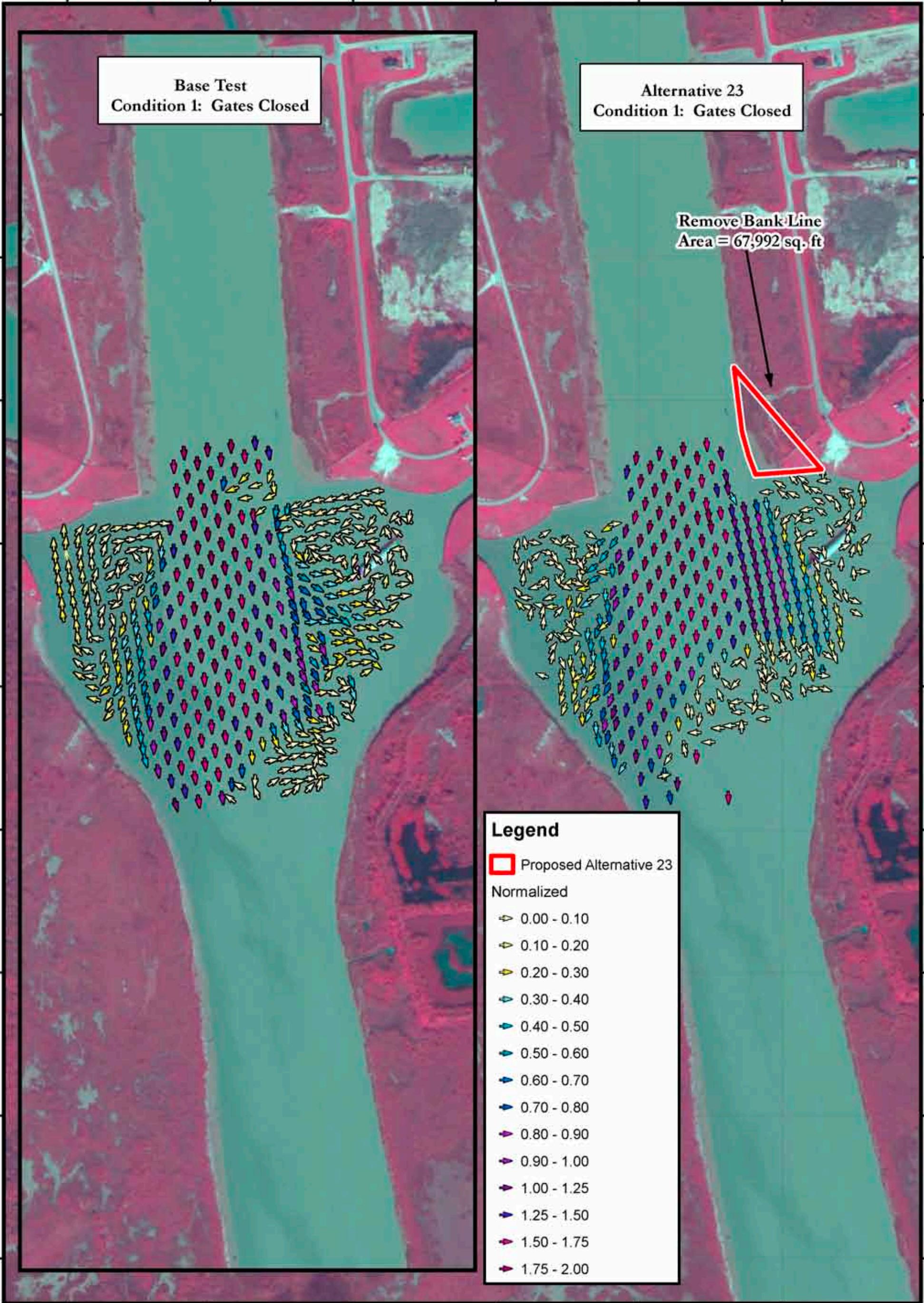
Base Test
Condition 1: Gates Closed

Alternative 23
Condition 1: Gates Closed

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Legend

- Proposed Alternative 23
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

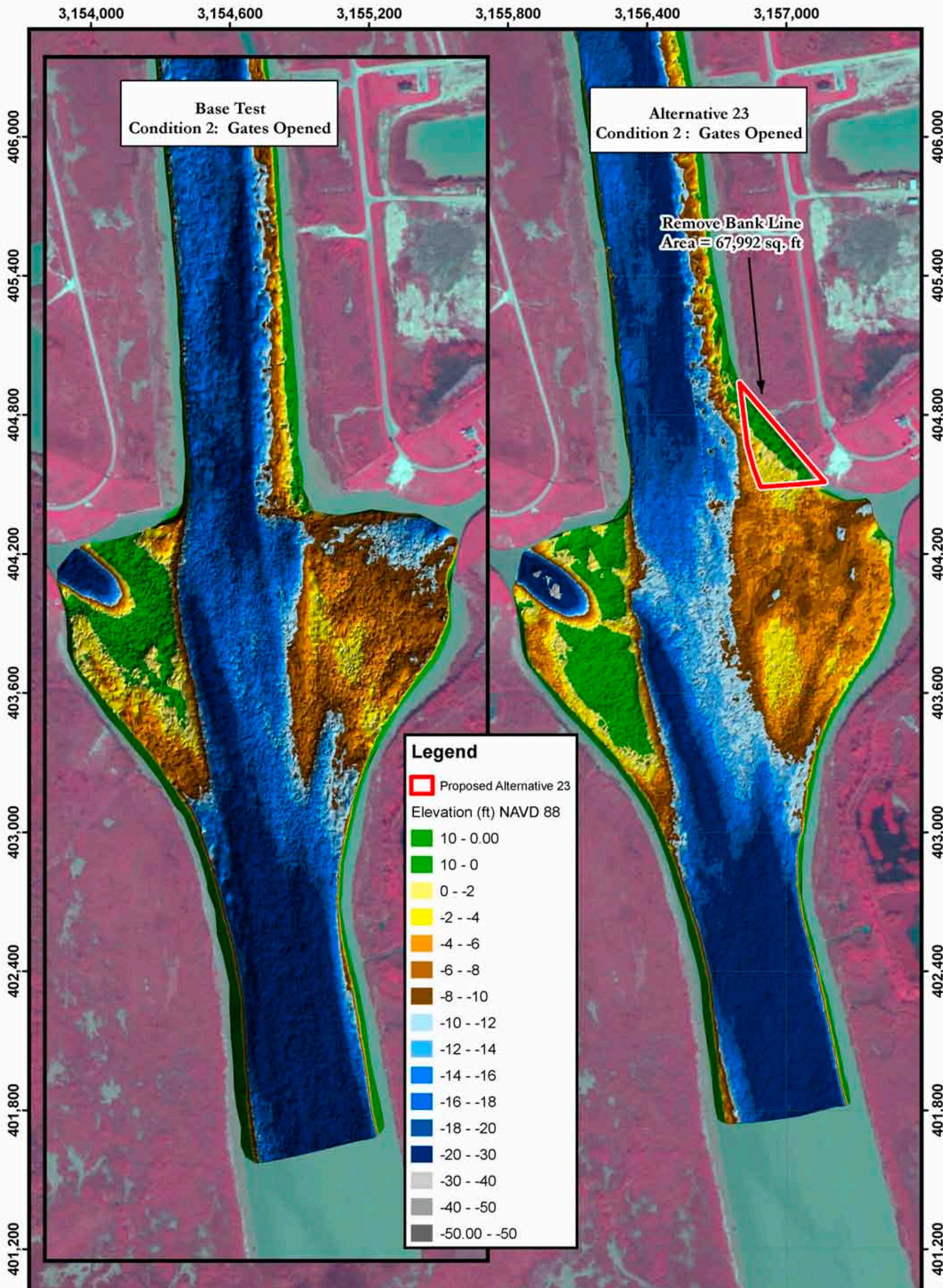
PLATE
NUMBER
105

0 75 150 300 450 600
Feet
Alternative 23 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

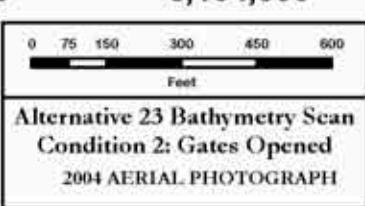
U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/04/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	R DAVINROY, P.E.	



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ENGINEERING CENTER
St. Louis District



3,154,0
PLATE
NUMBER
106



U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		A COX	05/04/09 Scan
		A COX	J BROWN, P.E., E BRAUER, P.E.
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing FISR Model		A COX	R DAVINROY, P.E.
500-0000-0000-0000 Galveston/Plates		05/04/09	05/07/2009




**U.S. Army Corps
of Engineers**
 St. Louis District®

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 23
Condition 2: Gates Opened

Remove Bank Line
Area = 67,992 sq. ft

Legend

- Proposed Alternative 23
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
107

0 75 150 300 450 600
Feet
Alternative 23 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/04/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	R DAVINROY, P.E.	



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of Engineers
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RIVER
ENGINEERING CENTER
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 24
Condition 1: Gates Closed

Remove Bank Line
Area = 53,242 sq. ft

Remove Bank Line
Area = 67,992 sq. ft

Legend

	Proposed Alternative 24
Elevation (ft) NAVD 88	
	10 - 0.00
	10 - 0
	0 - -2
	-2 - -4
	-4 - -6
	-6 - -8
	-8 - -10
	-10 - -12
	-12 - -14
	-14 - -16
	-16 - -18
	-18 - -20
	-20 - -30
	-30 - -40
	-40 - -50
	-50.00 - -50

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
108

0 75 150 300 450 600
Feet
Alternative 24 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	05/05/09 Scan
A COX	J BROWN, P.E.
E BRAUER, P.E.	
A COX	R DAVINROY, P.E.
	01/07/2009



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ENGINEERING CENTER
St. Louis District
US Army Corps
of Engineers

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 24
Condition 1: Gates Closed

Remove Bank Line
Area = 53,242 sq. ft

Remove Bank Line
Area = 67,992 sq. ft

Legend

- Proposed Alternative 24
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
109

0 75 150 300 450 600
Feet
Alternative 24 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/05/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	R DAVINROY, P.E.	



US Army Corps
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RIVER
ENGINEERING CENTER
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 24
Condition 2: Gates Opened

Remove Bank Line
Area = 53,242 sq. ft

Remove Bank Line
Area = 67,992 sq. ft

Legend

	Proposed Alternative 24
	Elevation (ft) NAVD 88
10 - 0.00	
10 - 0	
0 - -2	
-2 - -4	
-4 - -6	
-6 - -8	
-8 - -10	
-10 - -12	
-12 - -14	
-14 - -16	
-16 - -18	
-18 - -20	
-20 - -30	
-30 - -40	
-40 - -50	
-50.00 - -50	

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
110

0 75 150 300 450 600
Feet
Alternative 24 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	05/06/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 24
Condition 2: Gates Opened

Remove Bank Line
Area = 53,242 sq. ft

Remove Bank Line
Area = 67,992 sq. ft

Legend

Proposed Alternative 24

050509_alt24_opened

Normalized

- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
111

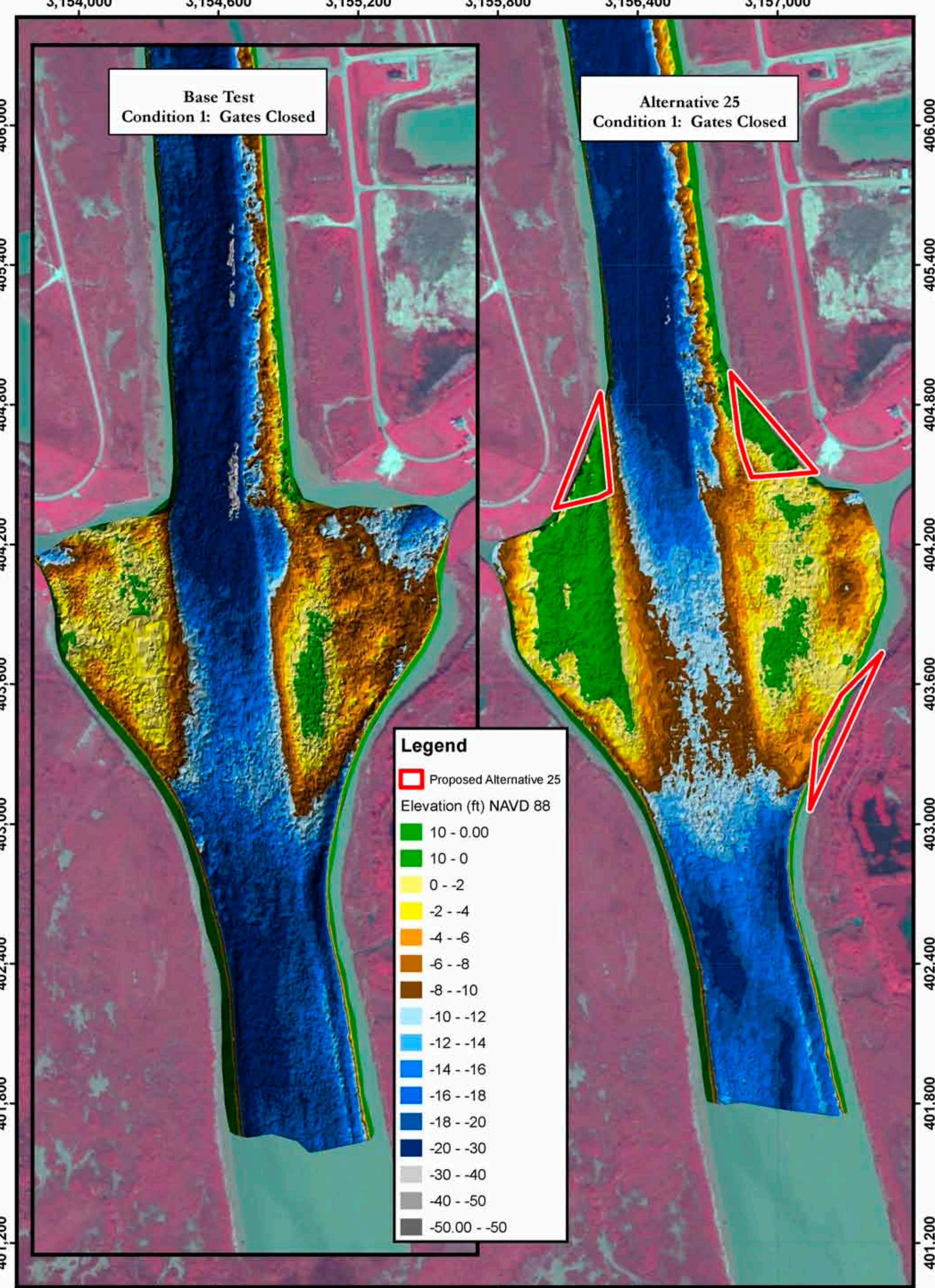
0 75 150 300 450 600
Feet

Alternative 24 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/05/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



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3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

PLATE NUMBER
112
0 75 150 300 450 600
Feet
Alternative 25 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model
A COX 05/06/09 Scan
J BROWN, P.E. E BRAUER, P.E.
A COX R DAVINROY, P.E.
Galveston/Plates 01/07/2009



RIVER
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St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 25
Condition 1: Gates Closed

Remove Bank Line
Area = 53,242 sq. ft

Remove Bank Line
Area = 67,992 sq. ft

Remove Bank Line
Area = 43,627 sq. ft

Legend

- Proposed Alternative 25
- Normalized
- ⇒ 0.00 - 0.10
- ⇒ 0.10 - 0.20
- ⇒ 0.20 - 0.30
- ⇒ 0.30 - 0.40
- ⇒ 0.40 - 0.50
- ⇒ 0.50 - 0.60
- ⇒ 0.60 - 0.70
- ⇒ 0.70 - 0.80
- ⇒ 0.80 - 0.90
- ⇒ 0.90 - 1.00
- ⇒ 1.00 - 1.25
- ⇒ 1.25 - 1.50
- ⇒ 1.50 - 1.75
- ⇒ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
113

0 75 150 300 450 600
Feet
Alternative 25 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/06/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	R DAVINROY, P.E.	



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RIVER
ENGINEERING CENTER
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3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 25
Condition 2: Gates Opened

Legend

	Proposed Alternative 25
	Elevation (ft) NAVD 88
10 - 0.00	
10 - 0	
0 - -2	
-2 - -4	
-4 - -6	
-6 - -8	
-8 - -10	
-10 - -12	
-12 - -14	
-14 - -16	
-16 - -18	
-18 - -20	
-20 - -30	
-30 - -40	
-40 - -50	
-50.00 - -50	

PLATE
NUMBER
114

0 75 150 300 450 600
Feet
Alternative 25 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	05/07/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	Galveston/Plates



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RIVER
ENGINEERING CENTER
St. Louis District
US Army Corps
of Engineers

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 25
Condition 2: Gates Opened

Remove Bank Line
Area = 53,242 sq. ft

Remove Bank Line
Area = 67,992 sq. ft

Remove Bank Line
Area = 43,627 sq. ft

Legend

- Proposed Alternative 25
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

3,154,000

3,154,600

3,155,200

3,155,800

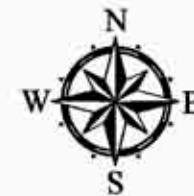
3,156,400

3,157,000

PLATE
NUMBER
115

0 75 150 300 450 600
Foot
Alternative 25 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/07/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	A COX	R DAVINROY, P.E.



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of Engineers
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RIVER
ENGINEERING CENTER
St. Louis District

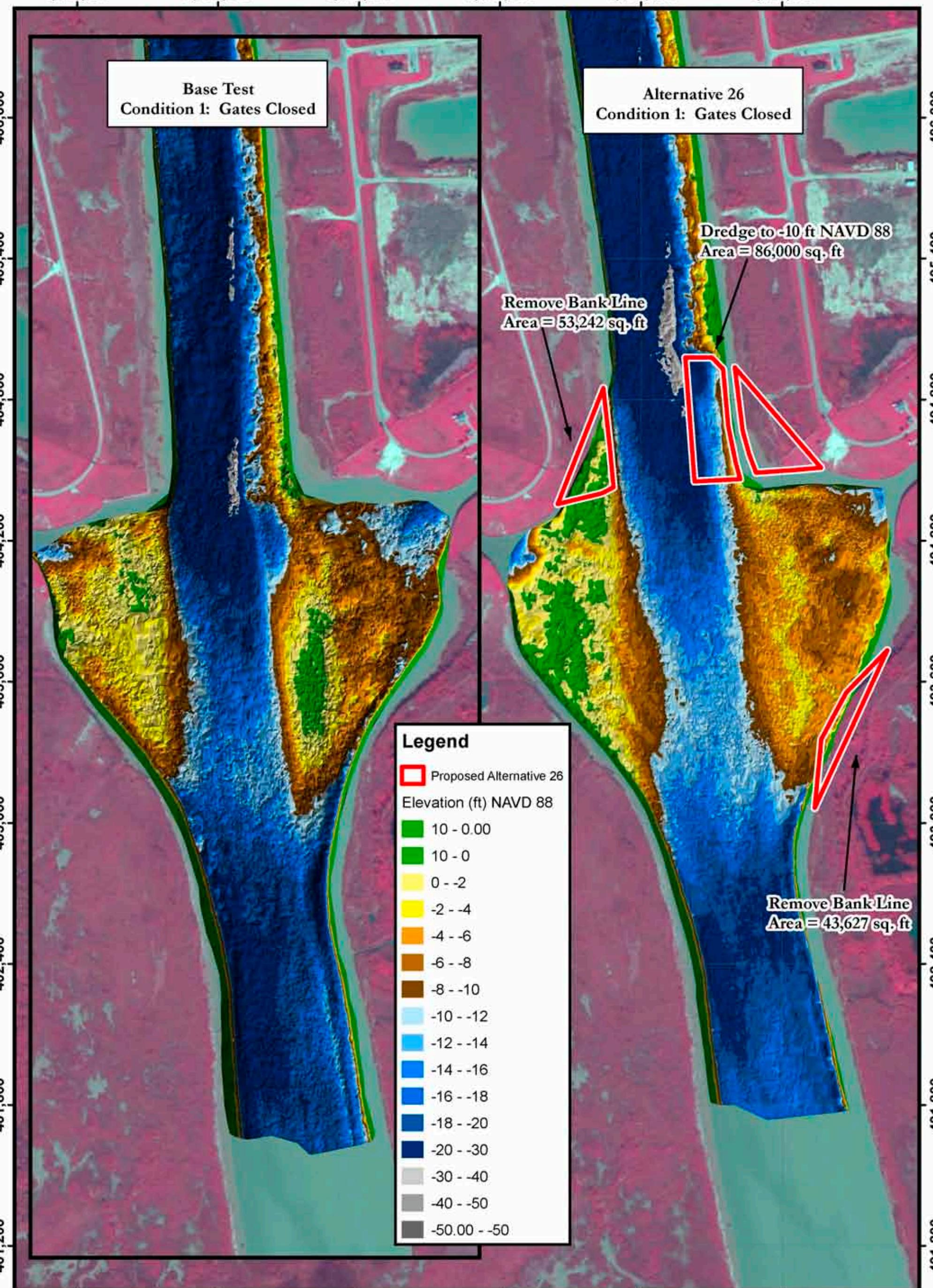


PLATE
NUMBER
116

0 75 150 300 450 600
Feet
Alternative 26 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/08/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.
	05/08/09	05/08/09
	... Galveston/Plates	... Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 26
Condition 1: Gates Closed

Remove Bank Line
Area = 53,242 sq. ft

Dredge to -10 ft LWRP
Area = 86,000 sq. ft

Remove Bank Line
Area = 67,992 sq. ft

Remove Bank Line
Area = 43,627 sq. ft

Legend

- Proposed Alternative 26
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
117

0 75 150 300 450 600
Foot
Alternative 26 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/11/09 Sean
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



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Engineering Center
St. Louis District
US Army Corps
of Engineers

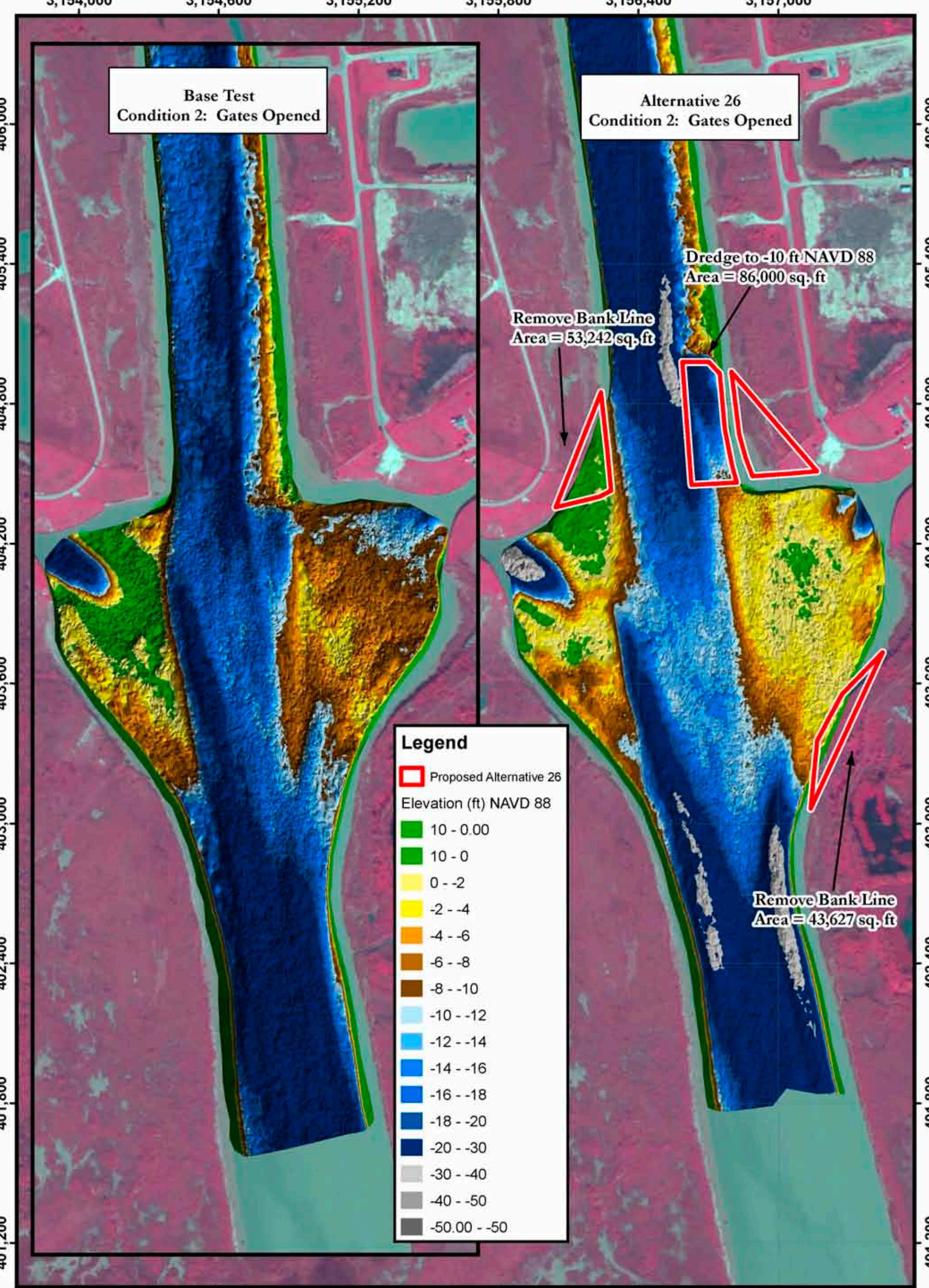


PLATE
NUMBER
118



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 26
Condition 2: Gates Opened

Remove Bank Line
Area = 53,242 sq. ft

Dredge to -10 ft LWRP
Area = 86,000 sq. ft

Remove Bank Line
Area = 67,992 sq. ft

Remove Bank Line
Area = 43,627 sq. ft

Legend

- Proposed Alternative 26
- Normalized
- ⇒ 0.00 - 0.10
- ⇒ 0.10 - 0.20
- ⇒ 0.20 - 0.30
- ⇒ 0.30 - 0.40
- ⇒ 0.40 - 0.50
- ⇒ 0.50 - 0.60
- ⇒ 0.60 - 0.70
- ⇒ 0.70 - 0.80
- ⇒ 0.80 - 0.90
- ⇒ 0.90 - 1.00
- ⇒ 1.00 - 1.25
- ⇒ 1.25 - 1.50
- ⇒ 1.50 - 1.75
- ⇒ 1.75 - 2.00



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
119

0 75 150 300 450 600
Feet
Alternative 26 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/11/09 Sean
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
APPLIED
RIVER
ENGINEERING CENTER
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 27
Condition 1: Gates Closed

Dredge to -10 ft NAVD 88
Area = 86,000 sq. ft

Remove Bank Line
Area = 53,242 sq. ft

Remove Bank Line
Area = 67,992 sq. ft

Legend

	Proposed Alternative 27
	Elevation (ft) NAVD 88
10 - 0.00	
10 - 0	
0 - -2	
-2 - -4	
-4 - -6	
-6 - -8	
-8 - -10	
-10 - -12	
-12 - -14	
-14 - -16	
-16 - -18	
-18 - -20	
-20 - -30	
-30 - -40	
-40 - -50	
-50.00 - -50	

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
120

0 75 150 300 450 600
Feet
Alternative 27 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	05/12/09 Scan
A COX	J BROWN, P.E.
E BRAUER, P.E.	
R DAVINROY, P.E.	



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 27
Condition 1: Gates Closed

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Dredge to -10 ft LWRP
Area = 86,000 sq. ft

Remove Bank Line
Area = 53,242 sq. ft

Remove Bank Line
Area = 67,992 sq. ft

Legend

- Proposed Alternative 27
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

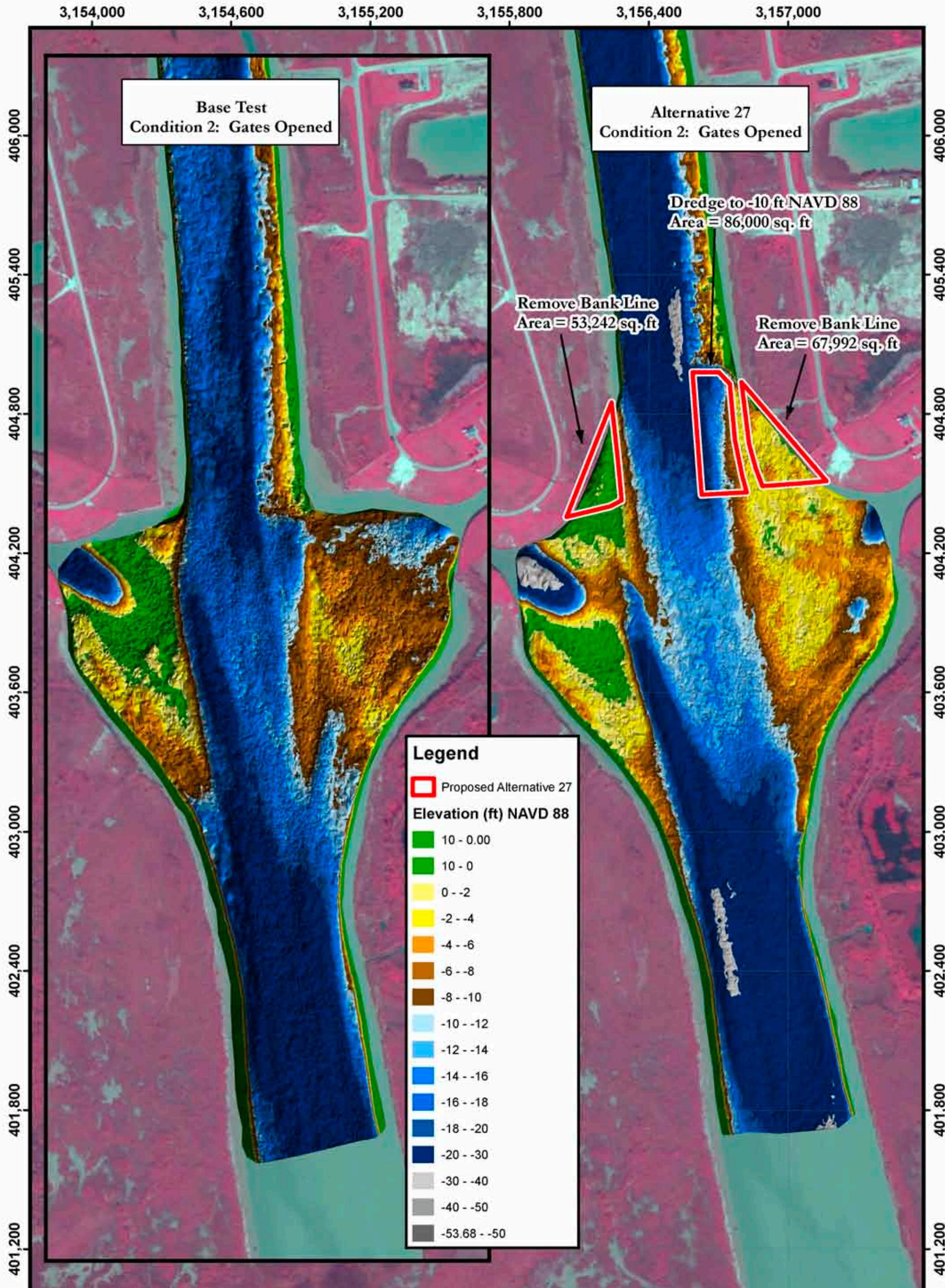
PLATE
NUMBER
121

0 75 150 300 450 600
Feet
Alternative 27 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/13/09 Sean
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



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Engineering Center
St. Louis District



3,154,000

**Alternative 27 Bathymetry Scan
Condition 2: Gates Opened**
2004 AERIAL PHOTOGRAPH

**U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI**

A COX		05/13/09 Scan
A COX	J BROWN, P.E.	E BRAUER, P.E.
A COX		R DAVINROY, P.E.



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

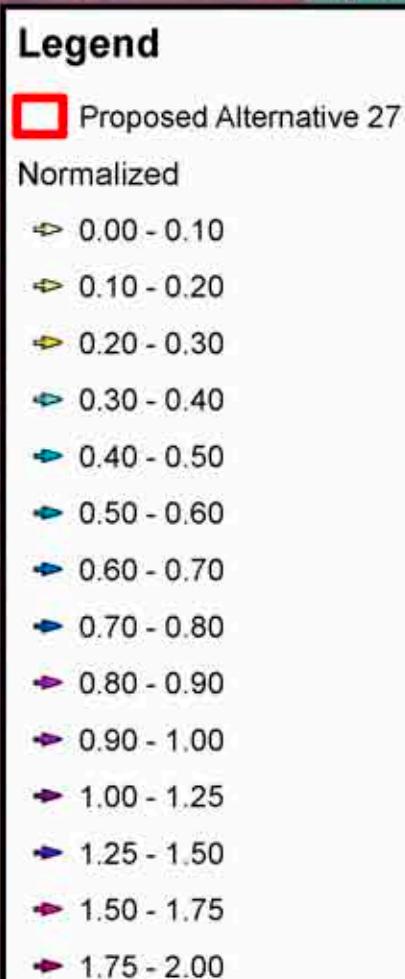
Base Test
Condition 2: Gates Opened

Alternative 27
Condition 2: Gates Opened

Dredge to -10 ft LWRP
Area = 86,000 sq. ft

Remove Bank Line
Area = 53,242 sq. ft

Remove Bank Line
Area = 67,992 sq. ft



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

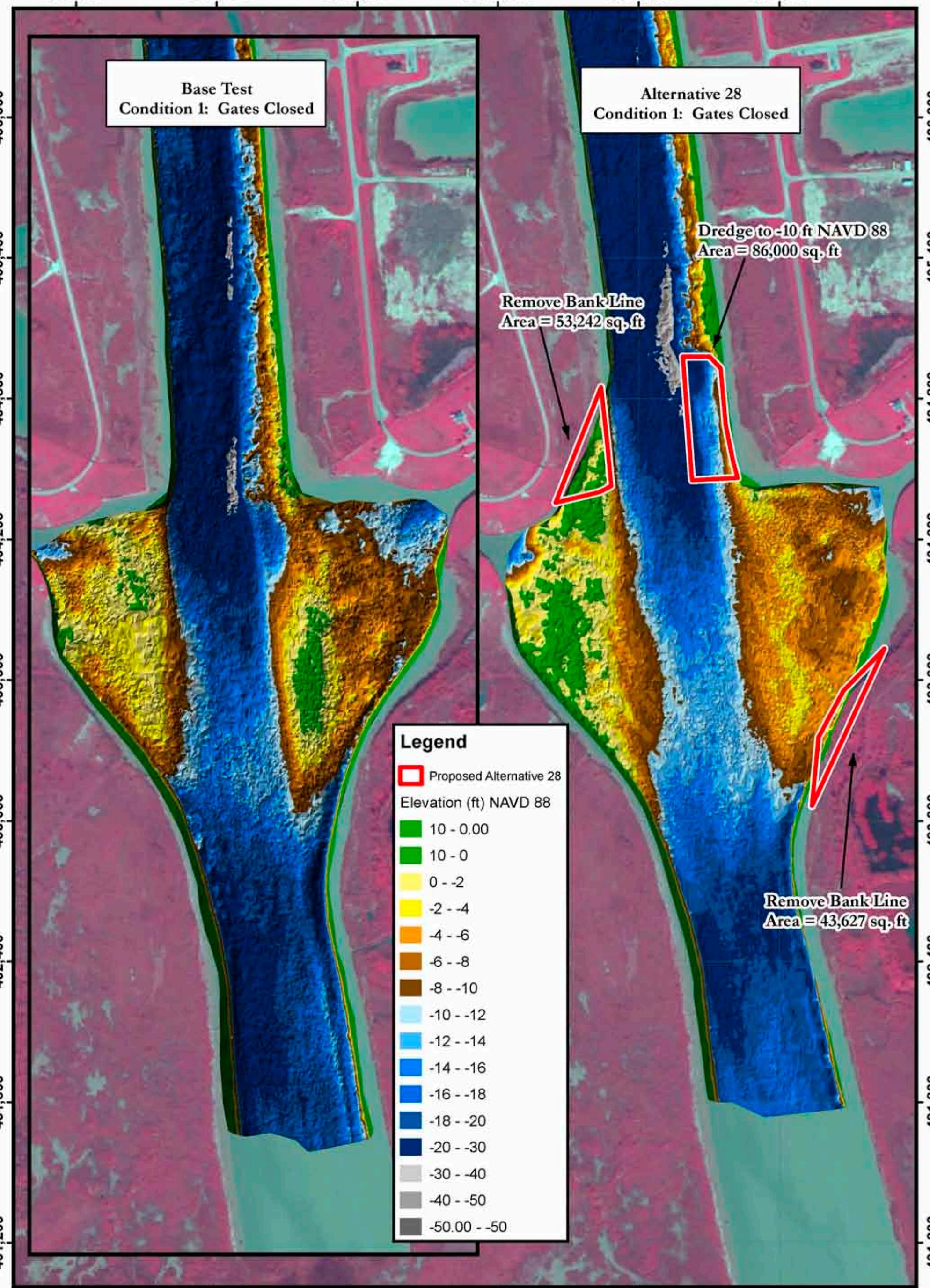
3,157,000

PLATE
NUMBER
123

0 75 150 300 450 600
Feet
Alternative 27 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/13/09 Sean
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.





3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
124

0 75 150 300 450 600
Feet
Alternative 28 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	05/14/09 Scan
A COX	J BROWN, P.E.
A COX	R DAVINROY, P.E.

05/14/09 Scan
J BROWN, P.E.
R DAVINROY, P.E.
05/14/09 Scan
... Galveston/Plates
05/14/09 Scan



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 28
Condition 1: Gates Closed

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Remove Bank Line
Area = 53,242 sq. ft

Dredge to -10 ft LWRP
Area = 86,000 sq. ft

Remove Bank Line
Area = 43,627 sq. ft

Legend

- Proposed Alternative 28
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

PLATE
NUMBER

0 75 150 300 450 600
Feet
Alternative 28 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/14/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
APPLIED
RIVER
ENGINEERING CENTER
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 28
Condition 2: Gates Opened

Remove Bank Line
Area = 53,242 sq. ft

Dredge to -10 ft NAVD 88
Area = 86,000 sq. ft

Remove Bank Line
Area = 43,627 sq. ft

Legend

	Proposed Alternative 28
	Elevation (ft) NAVD 88
10 - 0.00	
10 - 0	
0 - -2	
-2 - -4	
-4 - -6	
-6 - -8	
-8 - -10	
-10 - -12	
-12 - -14	
-14 - -16	
-16 - -18	
-18 - -20	
-20 - -30	
-30 - -40	
-40 - -50	
-50.00 - -50	

PLATE
NUMBER
126

0 75 150 300 450 600
Feet
Alternative 28 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	05/14/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
St. Louis District



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 28
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Remove Bank-Line
Area = 53,242 sq. ft

Dredge to -10 ft NAVD 88
Area = 86,000 sq. ft

Remove Bank-Line
Area = 43,627 sq. ft

Legend

	Proposed Alternative 28
	Elevation (ft) NAVD 88
	10 - 0.00
	10 - 0
	0 - -2
	-2 - -4
	-4 - -6
	-6 - -8
	-8 - -10
	-10 - -12
	-12 - -14
	-14 - -16
	-16 - -18
	-18 - -20
	-20 - -30
	-30 - -40
	-40 - -50
	-50.00 - -50

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
126

0 75 150 300 450 600
Feet
Alternative 28 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/14/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing FISR Model	R DAVINROY, P.E.	



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 28
Condition 2: Gates Opened

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,2003,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

Dredge to -10 ft LWRP
Area = 86,000 sq. ft

Remove Bank Line
Area = 53,242 sq. ft

Remove Bank Line
Area = 43,627 sq. ft

Legend

- Proposed Alternative 28
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

PLATE
NUMBER

127

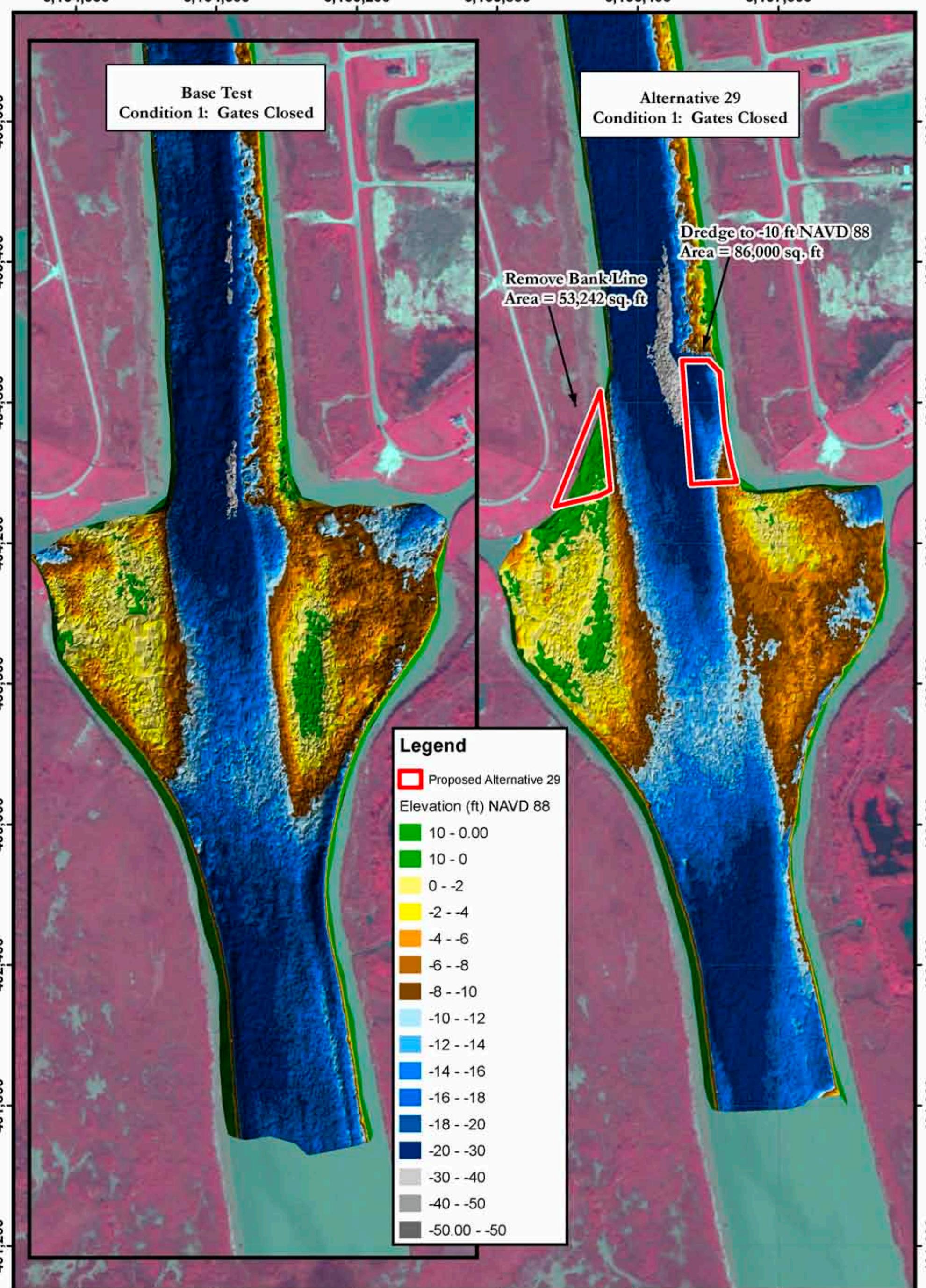
0 75 150 300 450 600
Foot
Alternative 28 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/14/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	R DAVINROY, P.E.	



US Army Corps
of Engineers
St. Louis District





3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
128

0 75 150 300 450 600
Feet
Alternative 29 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX 05/18/09 Scan
J BROWN, P.E. E BRAUER, P.E.
A COX R DAVINROY, P.E.
Galveston/Plates 01/07/2009



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 29
Condition 1: Gates Closed

Remove Bank Line
Area = 53,242 sq. ft

Legend

- Proposed Alternative 29
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
129

0 75 150 300 450 600
Feet
Alternative 29 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/18/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	R DAVINROY, P.E.	



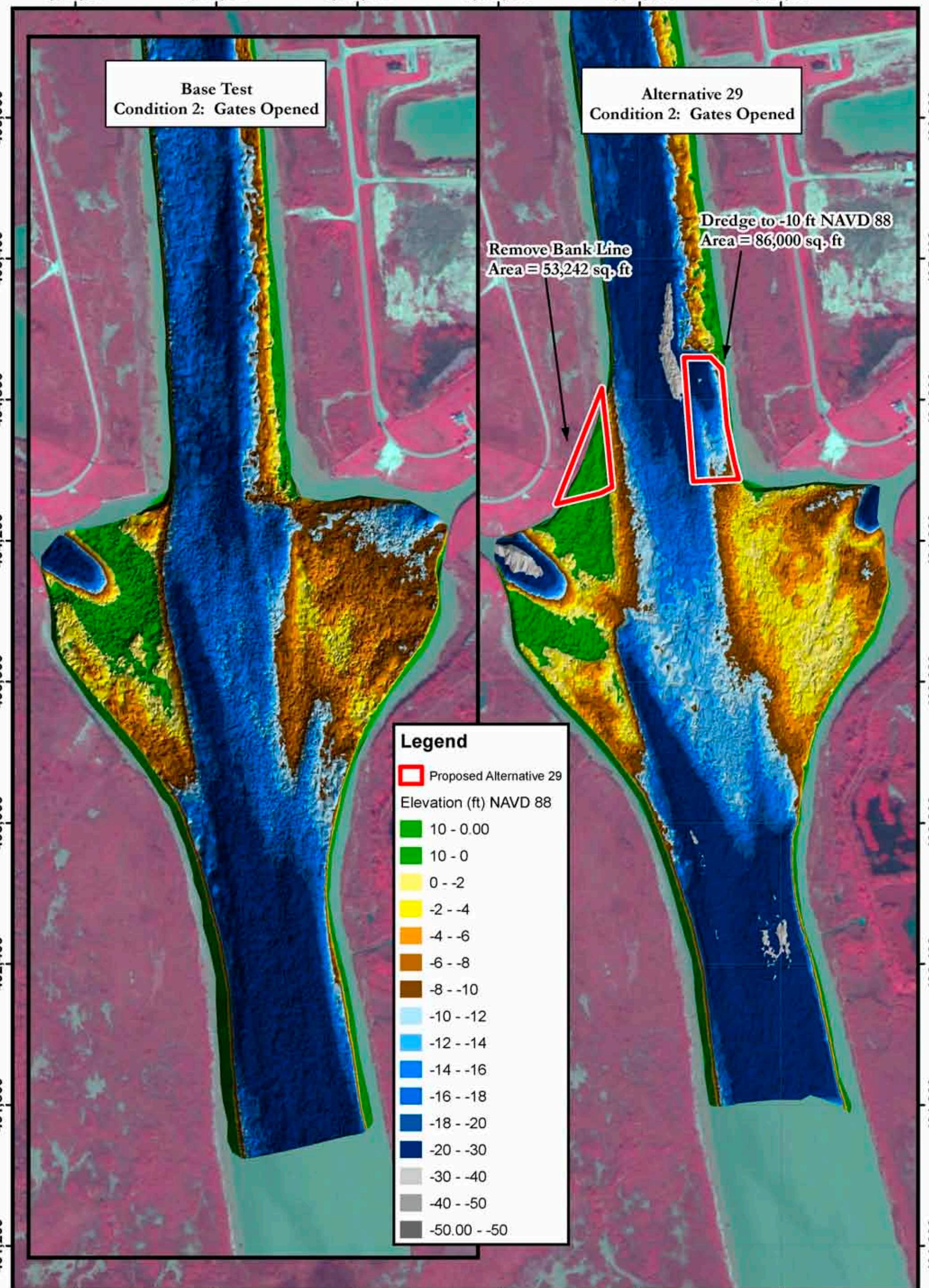


PLATE
NUMBER
130

0 75 150 300 450 600
Feet
Alternative 29 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/18/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.
	05/18/09	05/18/09
	... Galveston/Plates	... Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 29
Condition 2: Gates Opened

Remove Bank Line
Area = 53,242 sq. ft

Legend

- Proposed Alternative 29
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
131

0 75 150 300 450 600
Feet
Alternative 29 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/18/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
APPLIED
RIVER
ENGINEERING CENTER
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 30
Condition 1: Gates Closed

Remove Bank Line
Area = 53,242 sq. ft

Legend

	Proposed Alternative 30
	Elevation (ft) NAVD 88
10 - 0.00	
10 - 0	
0 - -2	
-2 - -4	
-4 - -6	
-6 - -8	
-8 - -10	
-10 - -12	
-12 - -14	
-14 - -16	
-16 - -18	
-18 - -20	
-20 - -30	
-30 - -40	
-40 - -50	
-50.00 - -50	

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
132

0 75 150 300 450 600
Feet
Alternative 30 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	05/19/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 30
Condition 1: Gates Closed

Remove Bank Line
Area = 53,242 sq. ft

Legend

- Proposed Alternative 30
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

401,200 401,800 402,400 403,000 403,600 404,200 404,800 405,400 406,000

3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000

PLATE
NUMBER
133

0 75 150 300 450 600
Feet
Alternative 30 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/19/09 Scan
Lower Brazos River Basin Galveston District Brazos River and GIWW Crossing HSR Model	J BROWN, P.E.	E BRAUER, P.E.
	A COX	R DAVINROY, P.E.



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 30
Condition 2: Gates Opened

Legend

	Proposed Alternative 30
	Elevation (ft) NAVD 88
10 - 0.00	
10 - 0	
0 - -2	
-2 - -4	
-4 - -6	
-6 - -8	
-8 - -10	
-10 - -12	
-12 - -14	
-14 - -16	
-16 - -18	
-18 - -20	
-20 - -30	
-30 - -40	
-40 - -50	
-50.00 - -50	

PLATE
NUMBER
134

0 75 150 300 450 600
Feet
Alternative 30 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	05/19/09 Scan
A COX	J BROWN, P.E.
E BRAUER, P.E.	
A COX	R DAVINROY, P.E.
	05/19/09 Scan
	J BROWN, P.E.
	R DAVINROY, P.E.
	05/19/09 Scan
	J BROWN, P.E.
	R DAVINROY, P.E.



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 30
Condition 2: Gates Opened

Remove Bank Line
Area = 53,242 sq. ft

Legend

- Proposed Alternative 30
- Normalized
- ▷ 0.00 - 0.10
- ▷ 0.10 - 0.20
- ▷ 0.20 - 0.30
- ▷ 0.30 - 0.40
- ▷ 0.40 - 0.50
- ▷ 0.50 - 0.60
- ▷ 0.60 - 0.70
- ▷ 0.70 - 0.80
- ▷ 0.80 - 0.90
- ▷ 0.90 - 1.00
- ▷ 1.00 - 1.25
- ▷ 1.25 - 1.50
- ▷ 1.50 - 1.75
- ▷ 1.75 - 2.00

406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

3,154,000 3,154,600 3,155,200 3,155,800 3,156,400 3,157,000
406,000
405,400
404,800
404,200
403,600
403,000
402,400
401,800
401,200

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
135

0 75 150 300 450 600
Feet
Alternative 30 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	A COX	05/19/09 Scan
Lower Brazos River Basin Galveston District	J BROWN, P.E.	E BRAUER, P.E.
Brazos River and GIWW Crossing HSR Model	A COX	R DAVINROY, P.E.



US Army Corps
of Engineers
APPLIED
RIVER
ENGINEERING CENTER
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 1: Gates Closed

Alternative 31
Condition 1: Gates Closed

Remove Bank Line
Area = 53,242 sq. ft

Remove Bank Line
Area = 43,627 sq. ft

Legend

Proposed Alternative 31
Elevation (ft) NAVD 88
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.00 - -50

PLATE
NUMBER
136

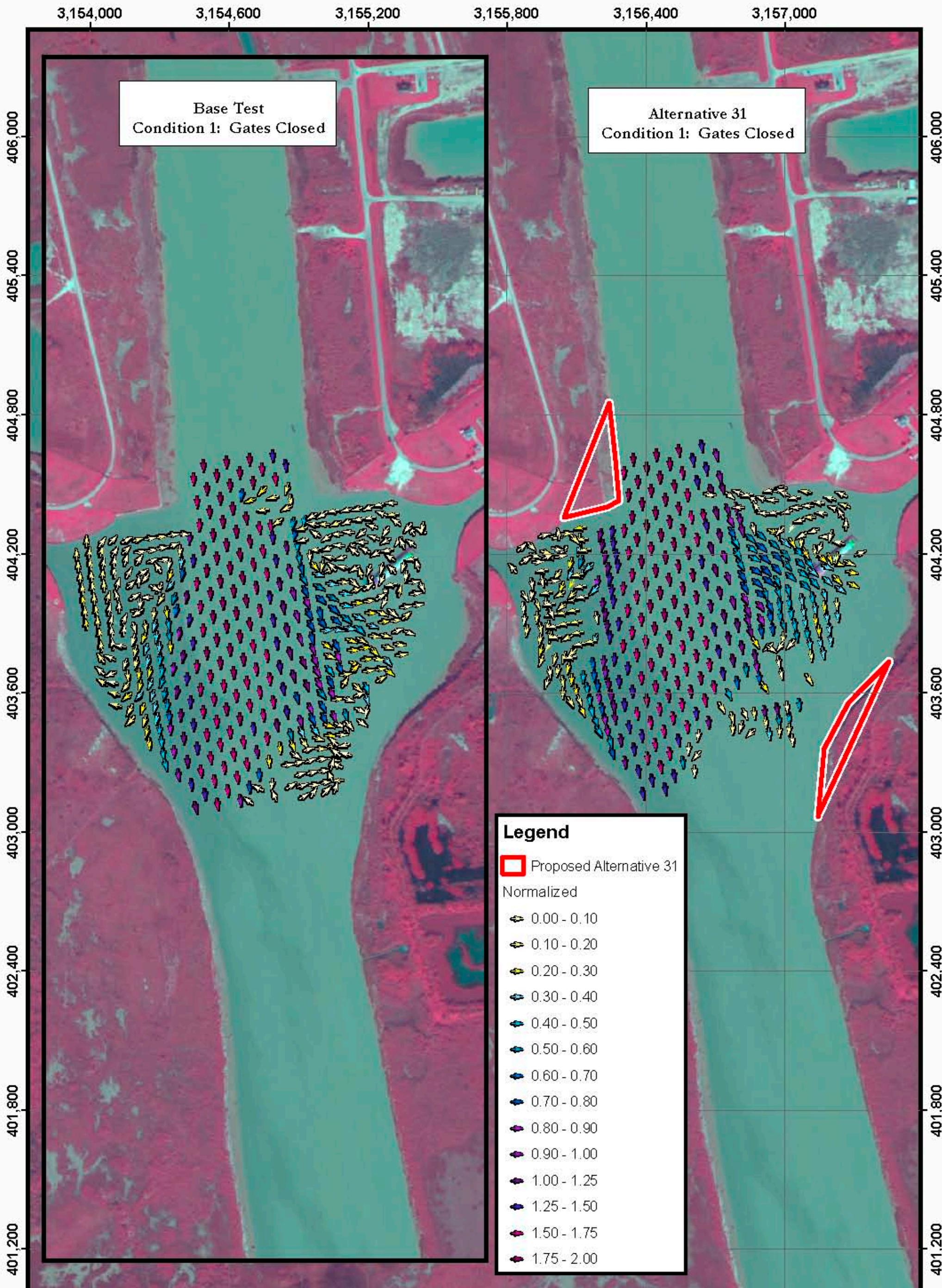
0 75 150 300 450 600
Feet
Alternative 31 Bathymetry Scan
Condition 1: Gates Closed
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	05/20/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	Galveston/Plates



US Army Corps
of Engineers
St. Louis District

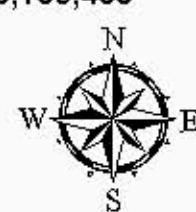


3,154,000
PLATE
NUMBER
137

Alternative 31 LDV Data
Condition 1: Gates Closed
2004 AERIAL PHOTO GRAPH

Value	Count
0	0
75	0
150	0
225	0
300	0
375	0
450	0
525	515
600	0

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI	D-300-001 A COX	2000/10/01 \$5,200.00 Scan
	D-300-001 A COX	D-300-001 J ERROWN, PE
Lower Missouri River Basins Calculus District: Missouri River and CWWF including HSR Model	D-300-001 A COX	2000/10/01 R DAVIN ROY, PE
	D-300-001 ... Calculus/Model	D-300-001 07/16/2000



3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 31
Condition 2: Gates Opened

Remove Bank Line
Area = 53,242 sq. ft

Remove Bank Line
Area = 43,627 sq. ft

Legend

	Proposed Alternative 31
	Elevation (ft) NAVD 88
10 - 0.00	
10 - 0	
0 - -2	
-2 - -4	
-4 - -6	
-6 - -8	
-8 - -10	
-10 - -12	
-12 - -14	
-14 - -16	
-16 - -18	
-18 - -20	
-20 - -30	
-30 - -40	
-40 - -50	
-50.00 - -50	

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

PLATE
NUMBER
138

0 75 150 300 450 600
Feet
Alternative 31 Bathymetry Scan
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
Lower Brazos River Basin
Galveston District
Brazos River and GIWW Crossing
HSR Model

A COX	05/20/09 Scan
A COX	J BROWN, P.E.
	E BRAUER, P.E.
A COX	R DAVINROY, P.E.
	Galveston/Plates



US Army Corps
of Engineers
St. Louis District

3,154,000

3,154,600

3,155,200

3,155,800

3,156,400

3,157,000

Base Test
Condition 2: Gates Opened

Alternative 31
Condition 2: Gates Opened

Remove Bank Line
Area = 53,242 sq. ft

Remove Bank Line
Area = 43,627 sq. ft

Legend

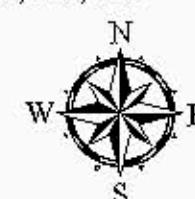
- Proposed Alternative 31
- Normalized
- ← 0.00 - 0.10
- ← 0.10 - 0.20
- ← 0.20 - 0.30
- ← 0.30 - 0.40
- ← 0.40 - 0.50
- ← 0.50 - 0.60
- ← 0.60 - 0.70
- ← 0.70 - 0.80
- ← 0.80 - 0.90
- ← 0.90 - 1.00
- ← 1.00 - 1.25
- ← 1.25 - 1.50
- ← 1.50 - 1.75
- ← 1.75 - 2.00

PLATE
NUMBER
139

0 75 150 225 300 375 450 525
Foot
Alternative 31 LDV Data
Condition 2: Gates Opened
2004 AERIAL PHOTOGRAPH

U.S. ARMY ENGINEER DIVISION CORPS OF ENGINEERS ST. LOUIS, MISSOURI		DRAFTED: 05/09/04 Sca: 1:24,000	
NAME	GRADE	NAME	GRADE
A COX	JEROWN, PE	E BRAUER, PE	
R DAWIN ROY, PE			

Lower Basco River Banks
Calcasieu District
Basco River and CWW Channel
HSR Model



US Army Corps
of Engineers
St. Louis District