

# GIWW Brazos River Floodgates - Colorado River Locks System Feasibility Study



Inland Waterways Users Board Meeting

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Galveston District

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US Army Corps  
of Engineers.



# MEETING PURPOSE

- **Purpose:** To present the status update for the Gulf Intracoastal Waterway (GIWW) Brazos River Floodgates (BRFG) and Colorado River Locks (CRL) Systems Feasibility Study.
- **Study Goal:** Completion of a feasibility level navigation study focused on maximizing the efficiency of the BRFG and CRL to the greatest extent practicable.
  - Navigation Efficiency
  - Environmentally
  - Economically
  - Increase Safety



# LEGISLATIVE AUTHORITY

## Flood Control Act of 1970 – Section 216

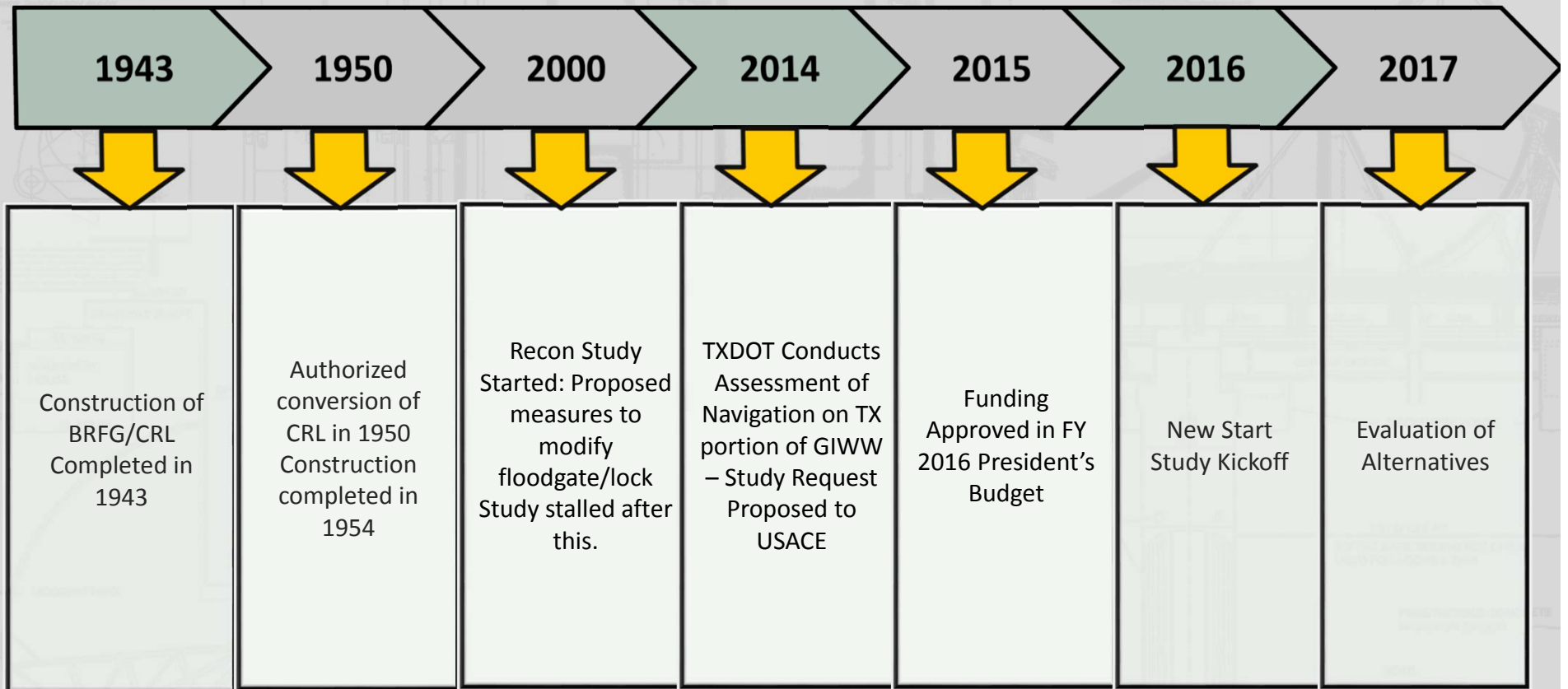
***“The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operation of projects the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to significant changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest.”***

Feasibility Study Partner: The Texas Department of Transportation (TXDOT)

Construction Cost Sponsor: Inland Waterway User Trust Fund



# STUDY HISTORY AND TIMELINE





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## Brazos River Floodgates and Colorado River Floodgates - Project Location

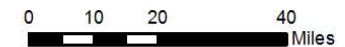


### Legend

- ▲ Brazos River Floodgates
- ▲ Colorado River Locks
- - - Gulf Intracoastal Waterway
- ~ River



1:2,000,000

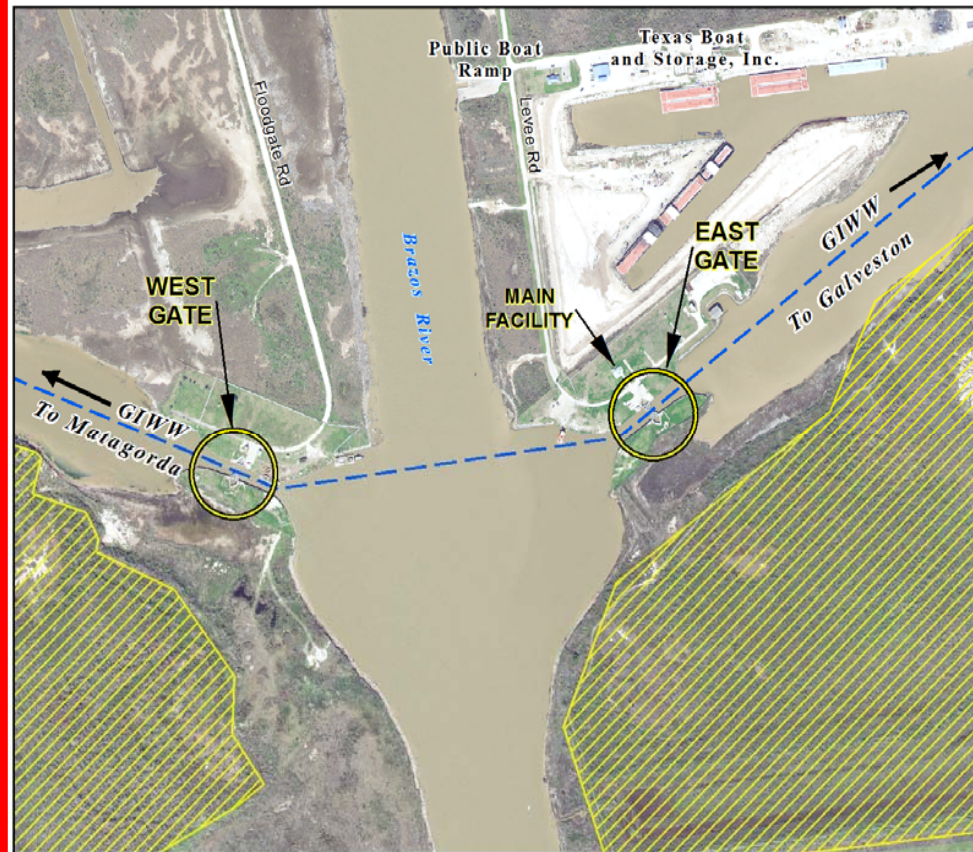
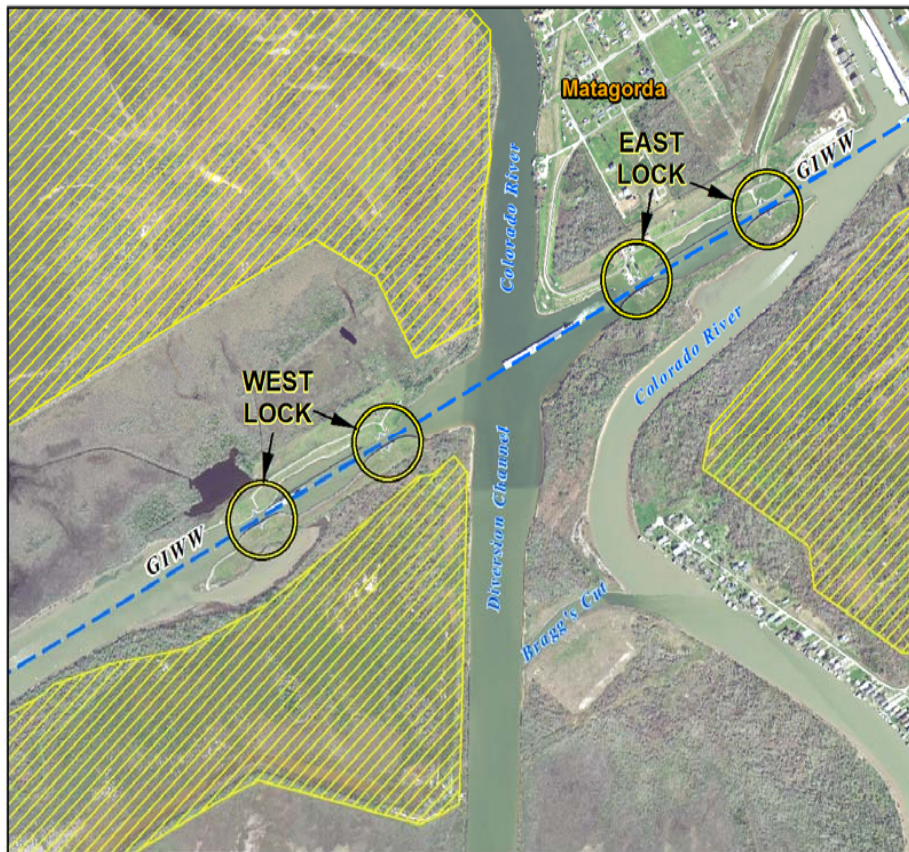


Base Map: ESRI

### Location Map



# AERIAL IMAGERY OF BRAZOS RIVER FLOODGATES AND COLORADO RIVER LOCKS



# SYSTEM COMPONENT SUMMARY

Structure	Construction Completion Year	Function	Dimensions	Max Tow Length / Width	Average Tows / Day Transit
Brazos	1943	Sediment Control	750 x 75	1180 x 74	38
Colorado	1941/1954	Sediment Control and Navigation	1200 x 75	1180 x 74	38



# BOTTOM LINE UP FRONT

## AN INVESTMENT IN THE NATIONAL INTEREST:

- Capitalize on a new study start granted, which are very limited in the U.S. Army Corps of Engineers to acquire, considering scarce resources.
- Uses a system approach for efficiently, effectively, simultaneously identifying modernization requirements of both structures.
- Responsive to Inland Waterway User Board strategy of using lifecycle approach to support USACE infrastructure asset management, ensuring longevity of systems performance



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# RATIONALE FOR SYSTEMS ANALYSIS

- Traffic commonality suggests any substantial change at one project has the potential to alter traffic patterns or operations at the other project.
- Assessing benefits outside of a system context reduces the certainty of all potential project benefits being accurately captured.
- Performing a systems level analysis is the typical recommendation of the Planning Center of Expertise for Inland Navigation and Risk-Informed Economics Division (PCXIN-RED) when any substantial changes to a navigable waterway or navigation structure are being evaluated.

Project Name	Average Tonnage	Average Through All	Commonality
Brazos Floodgates	22,497,593.00	21,038,012	97%
Colorado Locks	21,607,965.00		99%



# PROJECT BENEFITS

- River conditions (velocity, head differential), project width and alignment result in delays, outages, and increased risk of allision (with associated cost and delay)
  - Around 22M tons of commodities transit both facilities annually
  - Approx. 56 accidents per year at Brazos, 8 at Colorado
  - In 2016 navigation notices were issued for related repairs (07:00 to 17:00) for 221 days out of the year at Brazos.

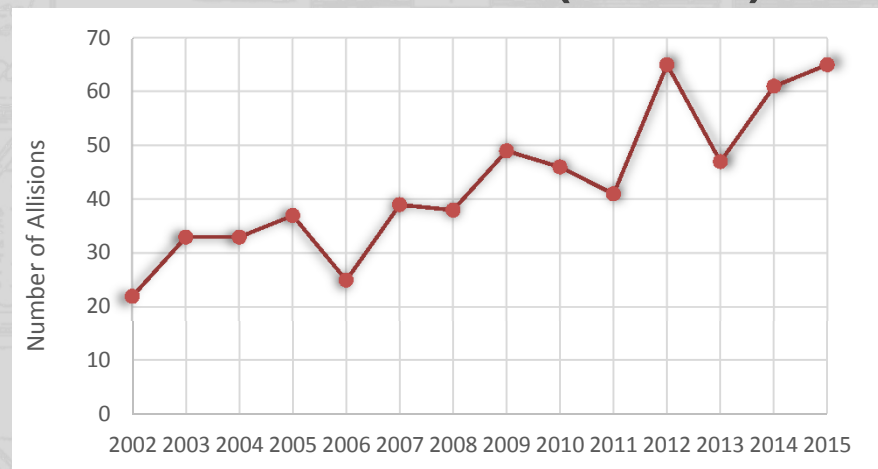
## Annual Impacts

Category	Brazos	Colorado
Allision repair costs	\$1M	\$200K
Delays due to allision repairs <sup>1</sup>	\$10M	\$2M
Tripping cost (direct) <sup>2</sup>	\$4.2M	\$1.2M
Tripping induced queuing delays	\$4.6M	\$1.2M
Traffic diversion benefits	TBD	TBD

<sup>1</sup> TXDOT estimate. SCC Model produced comparable estimate.

<sup>2</sup> Cost relative to tripping expected given 125' channel width. TTI estimated cost of all tripping at Brazos at \$6.2M in GIWW Master Plan.

## Allision Trends (Brazos)

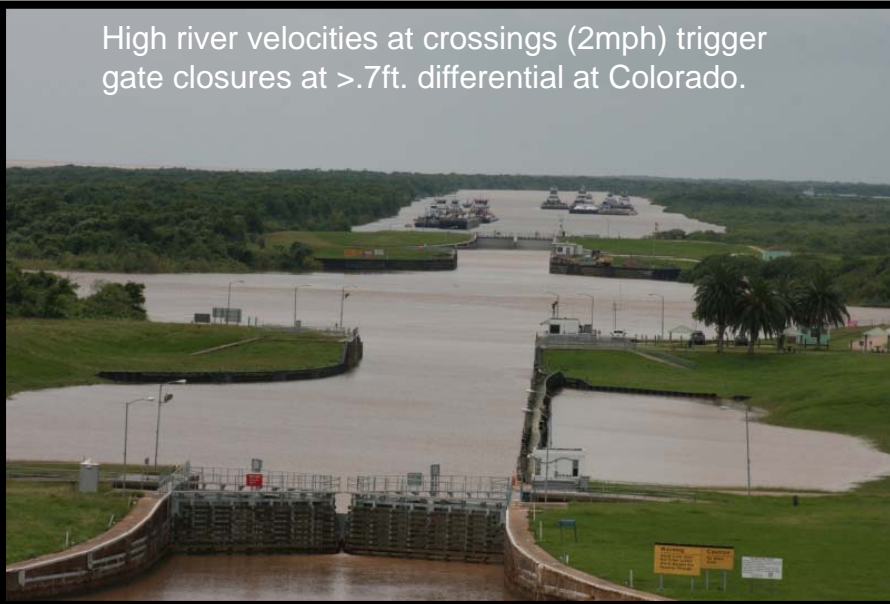


# STUDY PROBLEMS

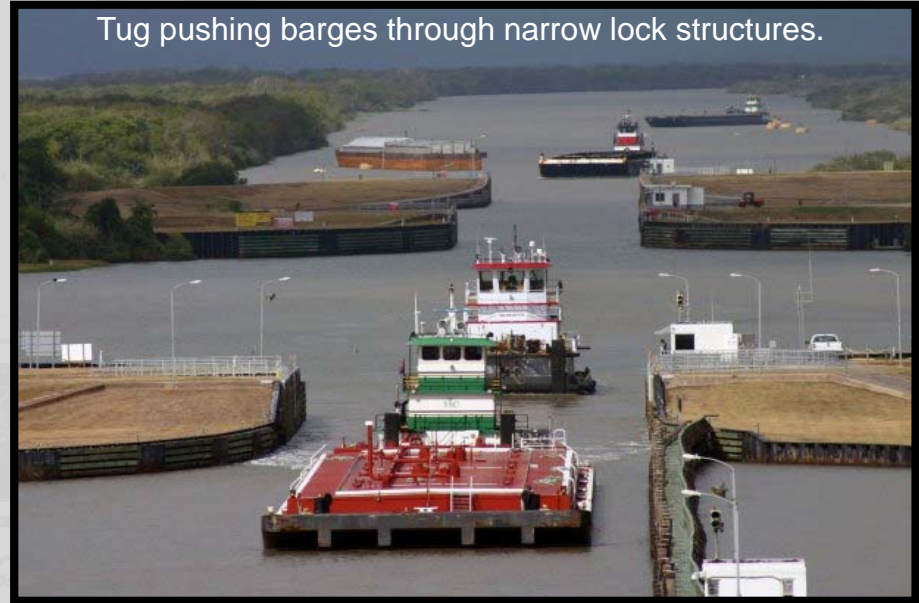
- Hydraulics and channel geometry presents navigational hazards at river crossings
- Outdated 75ft. width and alignment of floodgates at Brazos River and lock chambers at Colorado River
- Outdated lock/floodgate construction at sector gates leads to structural, electrical and mechanical maintenance issues
- Shutdown of operations during high water periods causes significant economic impacts to navigation industry
- Sedimentation at Gulf outlet (Brazos/Colorado)
- Bankline erosion on south end of the rivers and GIWW crossings (Brazos/Colorado)

# HIGH RIVER FLOWS, OUTDATED STRUCTURES, AND UNREFINED RIVER ALIGNMENTS CONTRIBUTE TO NAVIGATION ISSUES

High river velocities at crossings (2mph) trigger gate closures at  $>.7\text{ft.}$  differential at Colorado.



Tug pushing barges through narrow lock structures.



Barge traffic waiting at mooring stations during high river stages.



Higher river stages of 1-2ft as gates reopen at Brazos.



# STUDY OPPORTUNITIES

- Improve navigation efficiency on the GIWW by updating structures, channel alignments, and improving flow characteristics at the river crossings
- Reduce potential accidents that result from vessels striking guidewalls, thus reducing potential hazardous material spills into the waterway
- Improve navigation tracking systems and records management to help determine future trends and to allow for adjustments to accommodate traffic changes



# FOCUSED ARRAY OF ALTERNATIVES

**Alternative 2 (BRFG - CRL):** Major rehabilitation of existing floodgates/locks

**Alternative 3 (BRFG - CRL):** Remove structures on existing alignment (open channel at CRL), adds gates to create lock at BRFG

**Alternative 4 (BRFG - CRL):** Convert floodgates to locks/locks to floodgates (widen alignment to 150ft.)

**Alternative 6 (CRL):** Rebuild locks at same location with a wider channel (150ft.)

**Alternative 9 (BRFG):** Move channel alignment north/south of existing alignment with/without floodgate/lock options

From these 5 alternatives there are multiple systems combinations that could be modeled to improve system efficiency. Further assessment of the traffic data, the hydraulic data, and cost of each will be compared and used to screen among all possible systems combinations.



# BRFG & CRL STUDY MILESTONES

Activity		Milestones Dates
Study Start	Funds Received	March 2016
Alternative Evaluation and Analysis	Alternatives Milestone	September 2016
Exemption	Exemption Approval by Senior Leaders	Pending
Alternative Evaluation and Analysis	Tentatively Selected Plan (TSP) Milestone	June 2018
Feasibility Level Analysis	Agency Decision Milestone	November 2018
	Feasibility Report Complete	February 2020
	Civil Works Review Board (CWRB)	April 2020
	S&A Review	June 2020
	Chief's Report	August 2020



## NEXT PLANNING STEPS

- Identify baseline conditions through use of AdH model
  - Step 1: Hydrographic Assessment
  - Step 2: Sediment Analysis
- Assess existing LPMS data (limited)
- Obtaining traffic data from two different navigation industry groups for comparison
- Develop benefits based on H&H and traffic data
- Develop FWOP conditions
- Reconfigure/refine alternatives and screening based on:
  - Ability to meet objectives/avoid constraints
  - Benefits
  - Environmental Impacts
  - Best professional judgment
- Set up, calibrate, and run models on 3-4 alternatives (depending on structural alternatives at each lock/floodgate location)
  - SHIPSIM, WAM, and NIM models
- Select TSP



# OPEN DISCUSSION



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