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# PROBLEMS IN CONNECTION WITH MATAGORDA SHIP CHANNEL PROJECT



December 1964

Committee on Tidal Hydraulics  
CORPS OF ENGINEERS, U. S. ARMY

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ARMY-MRC VICKSBURG, MISS.

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PROBLEMS IN CONNECTION WITH  
MATAGORDA SHIP CHANNEL PROJECT

Introduction

1. During the 48th meeting of the Committee on Tidal Hydraulics, which was held in Brownsville, Texas, on 28-30 January 1964, several problems which have developed in connection with the Matagorda Ship Channel project were described to the Committee by representatives of the U. S. Army Engineer District, Galveston. On conclusion of the presentation by District personnel, the following actions by the Committee were requested:

- a. Comments on the advisability of providing continuous riprapping along the east and west sides of the channel through Matagorda Peninsula at the present time. In the event that riprapping is considered advisable, recommendations as to the location and extent of riprapping required, as well as the placement method which should be utilized, were also requested.
- b. Recommendations for reducing the rate of shoaling in the bay reach of Matagorda Ship Channel.
- c. Recommendations as to the need for collecting additional prototype data that would prove useful in determining methods of reducing the maintenance cost of the Matagorda Ship Channel project, or would be of benefit in increasing present knowledge of tidal hydraulics.

Description of Matagorda Ship Channel

2. The Matagorda Ship Channel was authorized by the River and Harbor Act of 3 July 1958, as described in House Document No. 388, 84th Congress, 2d Session. The authorized project provides for a deep-draft navigation channel from the Gulf of Mexico to and including a turning basin at Point Comfort, Texas, as shown on plate 1. When completed, the project will consist of an outer bar and jetty channel 38 ft deep by 300 ft wide and about 3.0 miles long from deep water in the Gulf to the Gulf side of Matagorda Peninsula; dual jetties 2,000 ft apart at the entrance extending to the 24-ft depth in the Gulf; a land cut across Matagorda Peninsula, 36 ft deep by 300 ft wide and about 1.0 mile long; an inner channel 36 ft deep by 200 ft

wide and about 21 miles long across Matagorda and Lavaca Bays to Point Comfort, Texas; and a turning basin 36 ft deep and 1,000 ft square at Point Comfort.

#### Location and Design of Project

3. At the recommendation of the Committee on Tidal Hydraulics, a model study was carried out at the U. S. Army Engineer Waterways Experiment Station to assist in determining the best location for the channel, with special attention to the best location for the entrance into the Gulf, and the design of jetties and other appurtenances required in the interests of navigation and maintenance. As a result of the model study, and of prototype studies and analyses performed by the Galveston District, the location and design of the channel and appurtenant works shown on Plates 2 and 3 were selected for construction in the prototype. As of the date of the 48th meeting of the Committee, the entire length of the bay reach of the channel (from Point Comfort to and through Matagorda Peninsula) had been dredged to project dimensions, the two entrance jetties had been constructed to about one-half of their design length, and a channel of project width but not to project depth had been dredged between the jetties. Work performed and scheduled in connection with the overall project is outlined in Table 1.

#### Erosion of Channel Through Matagorda Peninsula

4. Based on the results of model tests of the selected project design, it was predicted that the sides of the channel through Matagorda Peninsula would be subject to rapid erosion, especially the west side, for the following two principal reasons: (a) the model tests showed that maximum current velocities in the land cut through the peninsula would reach 6 ft per sec for normal spring tides, which velocities would be sufficient to erode the unconsolidated sands constituting the sides and bottom of this channel; and (b) since the major portion of the surface area of the bay system lies to the east of the new entrance, the ebb currents into the land cut have a westerly component which concentrates the ebb flow along the west side of the channel between the bay shore of Matagorda Peninsula and about the center of the land cut.

5. Since the probability of a serious bank erosion problem was recognized in advance, materials to revet one or both sides of the land cut were stockpiled in the area while dredging of the channel was in progress. The land cut through the peninsula was opened on 24 September 1963, and by January 1964 the bankline in some reaches had receded by as much as 150 ft, and some erosion had occurred on both sides of the land cut completely through the peninsula. On the east side of the cut, erosion extended down to about the 20-ft depth, but on the west side erosion extended to depths of 30 ft or greater. The Galveston District had planned to obtain the views and recommendations of the Committee on the erosion problem before taking any corrective action, as indicated by the District's request in paragraph 1a above. However, the Committee was informed by District representatives that, because of the extremely rapid rate of erosion, a decision was reached several days before the Committee meeting to revet both sides of the complete length of the land cut through the peninsula as rapidly as possible; therefore, the request for Committee recommendations on action to be taken on the erosion problem was withdrawn.

#### Shoaling of Channel Through Matagorda Bay

6. As indicated in Table 1, dredging of the bay reach of the channel between stations 50+000 and 114+000 was completed to project dimensions between September 1962 and May 1963. An examination of this reach was made late in 1963, and the results of this examination are presented in Table 2. It will be noted that the channel had shoaled heavily over the entire reach, with losses in depth ranging from a minimum of about 4.5 ft in Reach 1 to a maximum of about 10.0 ft in Reach 4. Total shoaling for Reaches 1 through 5 amounted to about 3,823,000 cu yd. Shoaling in Reaches 3, 4, and 5 was heavier than in Reaches 1 and 2, but dredging of these latter two reaches was completed about eight months later than in the remaining reaches, so the shoaling indicated in Reaches 1 and 2 is for an appreciably less interval of time.

Recommendations of Committee

7. The Committee concurs in the decision reached to revet both sides of the land cut through Matagorda Peninsula as quickly as possible to prevent further erosion of the sides of this channel. It is believed that an extremely difficult and costly problem would arise in this area if bank erosion should be allowed to continue unchecked. It is recommended that periodic surveys be made at fairly frequent intervals to insure that the revetment is functioning as intended; also, that similar surveys be made of the shore and offshore areas between and for short distances north and south of the jetties as a basis for following developments in this critical area as construction of the project nears completion.

8. With respect to shoaling of the bay reach of the channel, the Committee is of the opinion that much of the shoaling noted since May 1963 is attributable to a combination of (a) sloughing and stabilization of the banks of the dredge cut through the reach in question, (b) sediments agitated and placed in suspension during new work dredging farther downstream in the bay, and (c) sediments eroded from spoil banks along the east side of the bay reach of the channel. The Committee is of the opinion that the large quantities of sediments derived from the above sources have resulted in an unnaturally high rate of shoaling in the period involved, and it recommends that no action other than normal maintenance dredging operations be initiated for at least one year. At the end of such a period, it should be possible to establish the recurring shoaling pattern and rate with fair accuracy, at which time the Committee will be pleased to reconsider the shoaling problem to determine whether or not corrective measures are desirable or necessary. In the meanwhile, it is recommended that condition surveys of the channel be made at frequent intervals as a basis for determining shoaling rates and patterns as a function of time.

9. The Committee is generally familiar with the great amount of information obtained during field surveys and the subsequent model investigation. The Committee has no recommendation at this time, beyond the program of condition surveys described in the preceding two paragraphs, for observations and studies which might increase present knowledge of tidal hydraulics, or which are needed specifically in connection with the Matagorda Ship Channel project.

Con:  
Con:  
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Hop  
dr  
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Sur  
Hop

TABLE 1

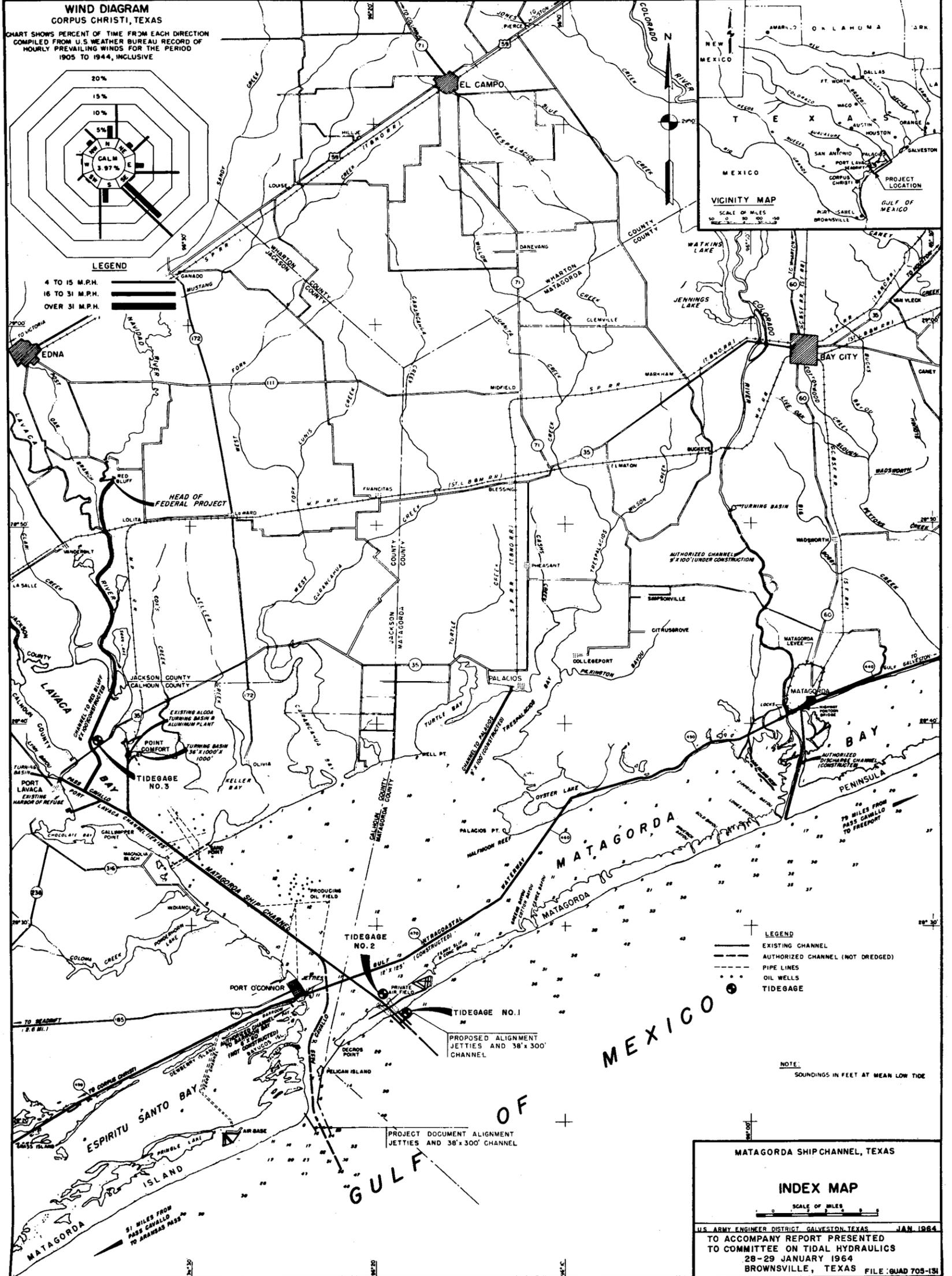
## Work Performed and Scheduled

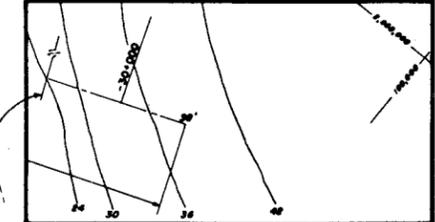
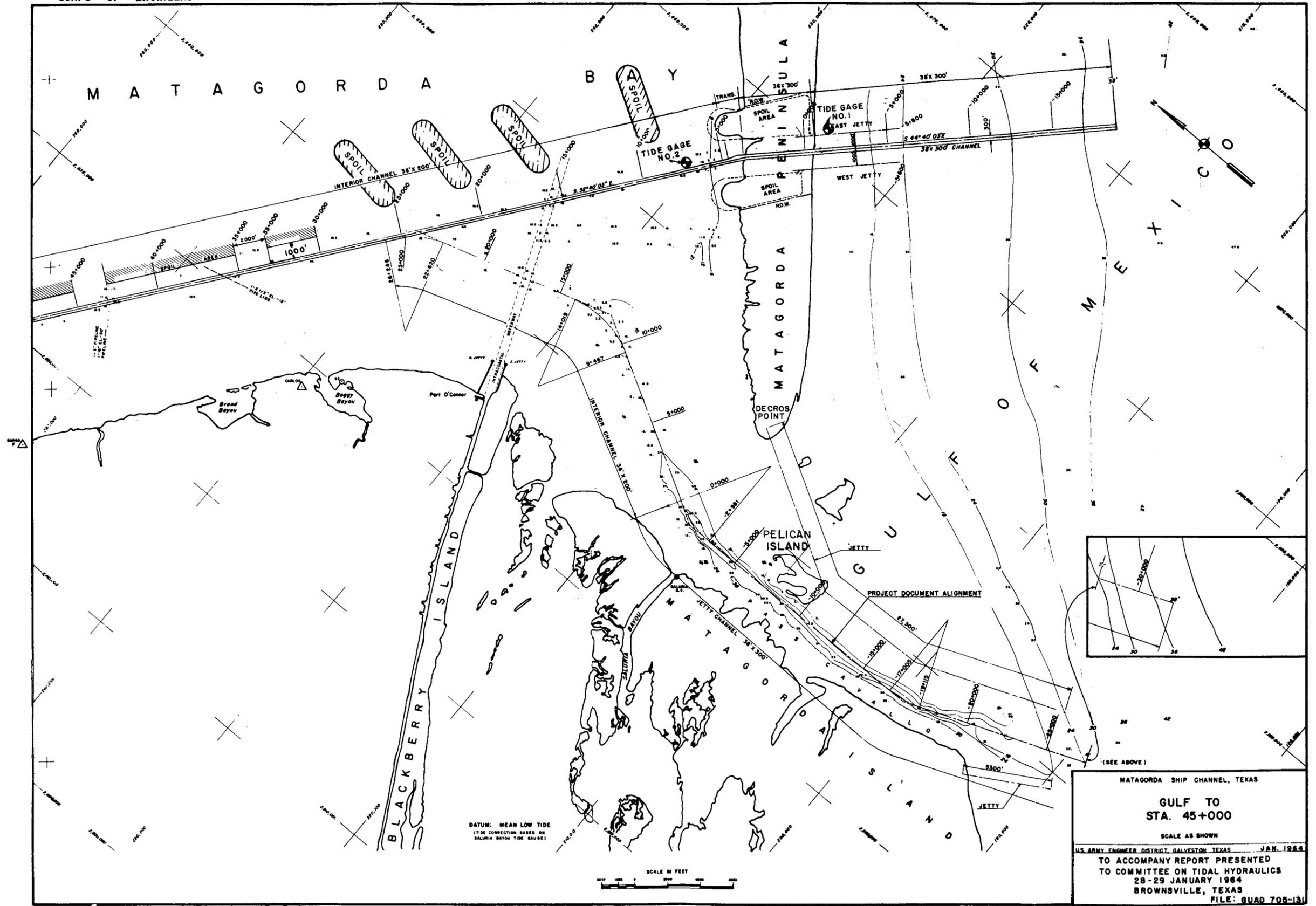
Feature	Reach		Percent completed Dec 63	Date completed or estimated date of completion	Total estimated cost
	From	To			
Cont. dredging	Pt. Comfort T.B.	Sta 111+600	100	22 May 63	1,505,000
Cont. dredging	Sta 111+600	Sta 95+900	100	6 Sep 62	1,590,000
Cont. dredging	Sta 95+900	Sta 76+000	100	4 Sep 62	1,310,000
Cont. dredging	Sta 76+000	Sta 54+000	100	3 May 63	1,280,000
Cont. dredging	Sta 54+000	Sta 33+000	100	22 May 63	1,380,000
Cont. dredging	Sta 33+000	Sta 7+500	100	9 Apr 63	2,895,000
Cont. dredging	Sta 7+500	Gulf	100	16 Dec 63	2,050,000
Hopper dredging	Jetty channel and outer bar		54	Apr 64	958,000
Jetties	East & west		30	17 Jan 65	10,400,000
Survey tables			100	12 May 62	12,000
Hopper dredge range towers			100	9 Jul 63	96,000
			Total		23,476,000

TABLE 2

Shoaling in Matagorda Ship Channel  
Sta 50+000 to 114+000

Reach	Stations		Length feet	Est. quantity of maintenance reqd.			Approx. avg. depth of shoal feet
	From	To		To 38' depth	Allow O.D. 2'	Total	
1	50+000	69+000	19,000	348,000	284,000	632,000	4.5
2	69+000	82+000	13,000	363,000	190,000	553,000	5.4
3	82+000	95+000	13,000	699,000	193,000	892,000	8.3
4	95+000	103+000	8,000	739,000	164,000	903,000	10.0
5	103+000	114+000	11,000	650,000	193,000	843,000	8.0





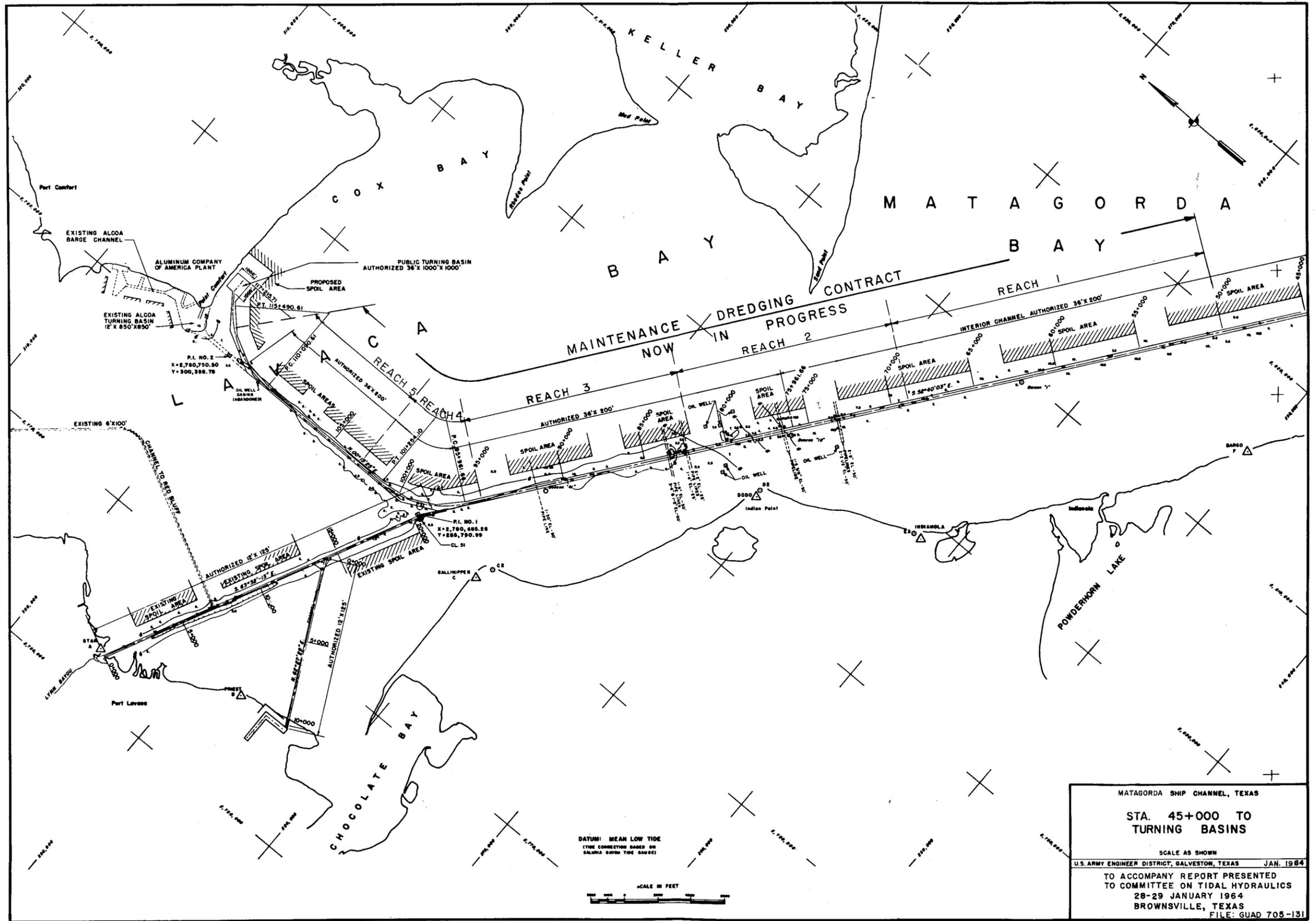
MATAGORDA SHIP CHANNEL, TEXAS

**GULF TO  
STA. 45+000**

SCALE AS SHOWN

U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS JAN. 1964

TO ACCOMPANY REPORT PRESENTED  
TO COMMITTEE ON TIDAL HYDRAULICS  
28-29 JANUARY 1964  
BROWNSVILLE, TEXAS  
FILE: QUAD 705-131



MATAGORDA SHIP CHANNEL, TEXAS  
 STA. 45+000 TO  
 TURNING BASINS  
 SCALE AS SHOWN  
 U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS JAN. 1964  
 TO ACCOMPANY REPORT PRESENTED  
 TO COMMITTEE ON TIDAL HYDRAULICS  
 28-29 JANUARY 1964  
 BROWNSVILLE, TEXAS  
 FILE: GUAD 705-131