Appendix B

Engineering Design, Cost Estimates, and Cost Risk Analysis

Brazos Island Harbor, Texas
Channel Improvement Project
Cameron County, Texas

U.S. Army Corps of Engineers, Galveston District
2000 Fort Point Road
Galveston, Texas 77550

December 2013

P2-370840 - BRAZOS ISLAND HARBOR, TEXAS CHANNEL IMPROVEMENT PROJECT FEASIBILITY STUDY

LOCATION AND DESCRIPTION:
Port of Brownsville is located on the south Texas coast near the border of U.S. and Mexico. The study area encompasses the entire Brownsville Ship Channel and surrounding region. The entrance channel is located offshore of Cameron County, Texas, in the Gulf of Mexico, and ends at Port of Brownsville Main Harbor. Brownsville Ship Channel provides deep draft access from the Gulf of Mexico through a jetty entrance channel to Brownsville, and a side channel, authorized to 36-feet, and a shallow draft Fishing Boat Harbor near Port Isabel. The primary purpose of the study is navigation, which consists of enlarging the existing Brownsville Ship Channel by deepening the entrance channel, jetty channel, the lower section of the main channel, the upper section of the main channel, and turning basin.

The MII is developed using October 2013 price levels and the latest labor rates for Galveston District. The estimate is divided into seven (7) contracts. Each contract is organized in accordance with a work breakdown structure. Midpoint dates for the construction contracts are developed in conjunction with the project manager for developing the fully-funded costs. The estimate is prepared in accordance with ER 1110-2-1302 Civil Works Cost Engineering, dated 15 Sep 08. The costs are escalated in accordance with the above Engineering Regulation and EM 1110-2-1304 Civil Works Construction Cost Index System (CWCCIS), dated 31 Mar 2013. All data is input into the Total Project Cost Sheet (TPCS).

Marine fuel price is averaged, locked in at $3.30/gallon (October 2013). Diesel fuel price is locked in at $4.00/gallon (October 2013). There are no impacts to utilities anticipated. There are no Hazardous, Toxic, and Radioactive Wastes anticipated. The Operation and Maintenance estimate is dated October 2013, with an effective pricing date of October 2013. A formal Cost Risk Analyses is performed with the cooperation of the PDT and Cost Engineering Directory of Expertise (DX) of the Walla Walla District (October 2013). The risks are quantified and a cost risk model developed to determine a contingency at 80% Confidence Level (CL). The new contingencies along with the updated estimates are used to revise the TPCS. An ATR Certification of Cost Estimate is provided by Walla Walla District.

CONTRACT 01:
This contract is for hopper dredging -17+000 to 00+000 and delivery to New Work Ocean Dredged Material Placement Area (offshore). The stationing listed is located on the Gulf of Mexico side of the jetties (entrance channel) and is unsuitable for a pipeline dredge due to wave action. The approximate duration is seven (7) months.

CONTRACT 02:
This contract is for dike raising and rehabilitation of Placement Area 4B and Placement Area 5A. The approximate duration is 15 months.

CONTRACT 03:
This contract is for dike raising and rehabilitation of Placement Area 7 and Placement Area 8. The approximate duration is seven (7) months. In addition, this contract is for pipeline dredging 70+000 to 82+000 and 82+000 to 89+500 and delivery to Placement Area 7 and Placement Area 8, respectively. The stationing listed is located in the upper section of the main channel and turning basin. The approximate duration is 10 months. The approximate duration of the total contract is 13 months as dike raising and rehabilitation can occur, in some instances, concurrently with pipeline dredging.

CONTRACT 04:
This contract is for pipeline dredging 25+000 to 50+000 and delivery to Placement Area 5A. The stationing listed is located in the middle section of the main channel. The approximate duration is 16 months.

CONTRACT 05:
This contract is for dike raising and rehabilitation of Placement Area 2. The approximate duration is three (3) months. In addition, this contract is for pipeline dredging 00+000 to 07+000 and delivery to Placement Area 2. The stationing listed is located in the lower section of the main channel near the jetties (entrance channel). The approximate duration is three (3) months.

CONTRACT 06:
This contract is for pipeline dredging 07+000 to 25+000 and delivery to Placement Area 4B. The stationing listed is located in the middle section of the main channel. The approximate duration is 11 months.

CONTRACT 07:
This contract is for dike raising and rehabilitation of Placement Area 5B. The approximate duration is three (3) months. In addition, this contract is for pipeline dredging 50+000 to 70+000 and delivery to Placement Area 5B. The stationing listed is located in the upper section of the main channel near the turning basin. The approximate duration is nine (9) months.

ACCOUNT CODE 12 - NAVIGATION PORTS AND HARBORS:
Dredge quantities are developed by SWG, Engineering Division, General Engineering (EC-EG). One (1) large hopper dredge is to be used for Contract 01 with offshore placement (with an option for the Contractor to bid Contract 05 as pump-out to PA 2 based on durations and schedules). The remainder of the channel is to be dredged with 30" pipeline dredges, with the material discharged into various, existing placement areas located along the waterway (PA 2, 4B, 5A, 5B, 7, and 8). Dredging costs are developed using Cost Engineering Dredge Estimating Program (CEDEP). Dredge production rates and losses are reduced to account for Resident Management System (RMS) historical effective working times and stiffer "new work" materials. Cost for mobilization and demobilization are developed using CEDEP, assuming the dredges are based in New Orleans, Louisiana. Dredge estimates are based on standard operation practices for the Galveston District, which assume conventional contracting practices of large business IFBs. For estimation purposes and contractor capabilities (derived from current Sabine-Neches Waterway dredging project, which includes four pipeline dredges working simultaneously), no more than three (3) dredges will be underway at any given time. In addition, dredges will be located no less than one (1) mile apart due to Coast Guard regulations; for estimate purposes, the dredges have been strategically spaced at stations so as not to impede dredging workflow.

The cost for Sea Turtle Protection is associated with hopper dredging and includes: 1) cost for two (2) trawlers per hopper; 2) a sea turtle protection device fitted to the hopper; and 3) 24-hour monitoring survey.

The cost for raising placement areas is included under this code of account. Part of the cost for raising a placement area includes clearing, grubbing, and stripping the area; seeding the outside of the dikes is not considered. Labor rates and overhead costs are adjusted to reflect Galveston District, Region 6. The placement area dikes are built using 3-CY dragline buckets, with an optimal production rate of 125-CY/HR, respectively. A total of three (3) draglines are working at the same time. For estimate purposes, dike works are lumped by perimeter and training dikes, locations, and bucket sizes. Articulated concrete block is to be placed approximately 22+000 to 34+000. Production assumed at 50-CY/HR in addition to transport of material from Central Texas via railcars, then trucks, then barges, and finally to the site. Material characteristics are provided by SWG, Engineering Division, Geotechnical and Structural Section (EC-ES).

ACCOUNT CODE 30 - ENGINEERING AND DESGIN:
The cost for this account are developed using the guidelines provided in the TPCS, with the agreement of the cost engineer and the project manager.

ACCOUNT CODE 31 - CONSTRUCTION MANAGEMENT:

The cost for this account are developed using the guidelines provided in the TPCS, with the agreement of the cost engineer and the project manager.

--- NEW WORK ---
P2-370840 - BRAZOS ISLAND HARBOR, TEXAS, CHANNEL IMPROVEMENT PROJECT
FEASIBILITY STUDY
OCTOBER 2013PRICE LEVELS
CONTRACT CALENDAR

CONTRACT	DESCRIPTION	DURATION (month)	DESIGN MIDPOINT	START DATE	MIDPOINT	END DATE
1	Dredge: ODMDS	7	Oct-16	Oct-17	Jan-18	Apr-18
2	Dike: PA 5A, PA 4B	15	Oct-16	Oct-17	May-18	Dec-18
3	Dike: PA 8, PA 7 Dredge: 8, 7	13	Oct-16	Oct-17	Apr-18	Oct-18
4	Dredge: 5A	16	Feb-17	Feb-18	Sep-18	May-19
5	Dike: PA 2 Dredge: 2	6	Feb-17	Feb-18	May-18	Jul-18
6	Dredge: 4B	11	Jan-18	Jan-19	Jun-19	Nov-19
7	Dike: 5B Dredge: 5B	12	Mar-18	Mar-19	Aug-19	Feb-20

U.S. Army Corps of Engineers
Project : P2-370840 - BRAZOS ISLAND HARBOR, TEXAS CHANNEL IMPROVEMENT PROJECT
Standard Corps Reports
FEASIBILITY STUDY
OCTOBER 2013 PRICE LEVELS

Estimated by USACE SWG EC PS
Designed by USACE SWG EC
Prepared by USACE SWG EC PS
Preparation Date 10/10/2013
Effective Date of Pricing 10/10/2013
Estimated Construction Time 812 Days

Description	Quantity	UOM	ContractorOwnCost	Contingency	Escalation	ProjectCost
Project Direct Summary			175,228,790	0	0	180,386,373
1 CONTRACT 01	1.0	LS	13,925,247	0	0	13,994,091
1.1 NON-FED/FED COSTS	1.0	LS	13,925,247	0	0	13,994,091
1.1.1 NAVIGATION PORTS AND HARBORS	1.0	LS	13,925,247	0	0	13,994,091
2 CONTRACT 02	1.0	LS	45,772,091	0	0	48,391,056
2.1 NON-FED/FED COSTS	1.0	LS	45,772,091	0	0	48,391,056
2.1.1 NAVIGATION PORTS AND HARBORS	1.0	LS	45,772,091	0	0	48,391,056
3 CONTRACT 03	1.0	LS	20,485,895	0	0	21,779,880
3.1 NON-FED/FED COSTS	1.0	LS	20,485,895	0	0	21,779,880
3.1.1 NAVIGATION PORTS AND HARBORS	1.0	LS	20,485,895	0	0	21,779,880
4 CONTRACT 04	1.0	LS	37,210,494	0	0	37,210,494
4.1 NON-FED/FED COSTS	1.0	LS	37,210,494	0	0	37,210,494
4.1.1 NAVIGATION PORTS AND HARBORS	1.0	LS	37,210,494	0	0	37,210,494
5 CONTRACT 05	1.0	LS	7,077,543	0	0	7,619,017
5.1 NON-FED/FED COSTS	1.0	LS	7,077,543	0	0	7,619,017
5.1.1 NAVIGATION PORTS AND HARBORS	1.0	LS	7,077,543	0	0	7,619,017
6 CONTRACT 06	1.0	LS	29,307,250	0	0	29,307,250
6.1 NON-FED/FED COSTS	1.0	LS	29,307,250	0	0	29,307,250
6.1.1 NAVIGATION PORTS AND HARBORS	1.0	LS	29,307,250	0	0	29,307,250
7 CONTRACT 07	1.0	LS	21,450,271	0	0	22,084,585
7.1 NON-FED/FED COSTS	1.0	LS	21,450,271	0	0	22,084,585
7.1.1 NAVIGATION PORTS AND HARBORS	1.0	LS	21,450,271	0	0	22,084,585

Labor ID: SWG2012 EQ ID: EP11R06 Currency in US dollars TRACES MII Version 4.2

****** TOTAL PROJECT COST SUMMARY ******

PROJECT: P2-370840 Brazos Island Harbor, Texas, Channel Improvement Project
LOCATION: Cameron County, Texas

DISTRICT: SWG Galveston District PREPARED: 10/9/2013
POC: CHIEF, COST ENGINEERING, Willie Honza

This Estimate reflects the scope and schedule in report: BIH Engineering Appendix 2013

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
						Program Year (Budget EC): 2016								
						Effective Price Level Date: 1 OCT 15								
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	**TOTAL ($K)**	Spent Thru: 1-Oct-13 ($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*O*
12	NAVIGATION PORTS & HARBORS													
12	non-Federal	$95,019	$19,004	20%	$114,023	1.9%	$96,871	$19,374	$116,245	$0		$103,900	$20,780	$124,679
12	Federal	$85,367	$17,073	20%	$102,441	2.0%	$87,098	$17,420	$104,517	$0		$93,627	$18,725	$112,352
	CONSTRUCTION ESTIMATE TOTALS:	$180,386	$36,077		$216,464	2.0%	$183,968	$36,794	$220,762	$0		$197,526	$39,505	$237,032
01	LANDS AND DAMAGES													
01	non-Federal	$4	$1	25%	$5	3.8%	$4	$1	$5	$0		$4	$1	$5
01	Federal	$9	$2	25%	$11	3.8%	$9	$2	$12	$0		$10	$2	$12
22	FEASIBILITY STUDY (non-CAP)									$0		$0	$0	$0
	non-Federal									$0		$0	$0	$0
	Federal									$0		$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN	$18,039	$3,608	20%	$21,647	4.0%	$18,760	$3,752	$22,512	$0		$20,874	$4,175	$25,049
31	CONSTRUCTION MANAGEMENT	$10,824	$2,165	20%	$12,989	2.1%	$11,046	$2,209	$13,255	$0		$11,859	$2,372	$14,231
	PROJECT COST TOTALS:	$209,262	$41,853	20%	$251,115		$213,788	$42,758	**$256,546**	$0		$230,274	$46,055	$276,329

Mandatory by Regulation	CHIEF, COST ENGINEERING, Willie Honza	ESTIMATED FEDERAL COST:	**$151,632**
Mandatory by Regulation	PROJECT MANAGER, Byron Williams	ESTIMATED NON-FEDERAL COST:	**$124,679**
Mandatory by Regulation	CHIEF, REAL ESTATE, Orlando Rosas	**ESTIMATED TOTAL PROJECT COST:**	**$276,312**
	CHIEF, PLANNING, Dolan Dunn		
	CHIEF, ENGINEERING, Joe King		
	CHIEF, OPERATIONS, Joe Hrametz		
	CHIEF, CONSTRUCTION, Don Carelock		
	CHIEF, CONTRACTING, Curtis Cole		
	CHIEF, PM-PB, Valerie Miller		
	CHIEF, DPM, Pete Perez		

****** CONTRACT COST SUMMARY ******

PROJECT: P2-370840 Brazos Island Harbor, Texas, Channel Improvement Project
LOCATION: Cameron County, Texas
This Estimate reflects the scope and schedule in report: BIH Engineering Appendix 2013

DISTRICT: SWG Galveston District PREPARED: 10/9/2013
POC: CHIEF, COST ENGINEERING, Willie Honza

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 10/9/2013				Program Year (Budget EC): 2016								
		Effective Price Level: 1-Oct-2013				Effective Price Level Date: 1 OCT 15				FULLY FUNDED PROJECT ESTIMATE				
				RISK BASED										
WBS	Civil Works	COST	CNTG	CNTG	TOTAL	ESC	COST	CNTG	TOTAL	Mid-Point	INFLATED	COST	CNTG	FULL
NUMBER	Feature & Sub-Feature Description	($K)	($K)	(%)	($K)	(%)	($K)	($K)	($K)	Date	(%)	($K)	($K)	($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 1 or CONTRACT 1													
12	NAVIGATION PORTS & HARBORS													
12	non-Federal	$5,570	$1,114	20%	$6,684	3.8%	$5,780	$1,156	$6,936	2018Q2	4.3%	$6,030	$1,206	$7,236
12	Federal	$8,334	$1,667	20%	$10,001	3.8%	$8,649	$1,730	$10,378	2018Q2	4.3%	$9,023	$1,805	$10,828
12	Navigation Aids (Federal)	$90	$18	20%	$108	3.8%	$93	$19	$112	2018Q3	4.8%	$98	$20	$117
							$0							
	CONSTRUCTION ESTIMATE TOTALS:	$13,994	$2,799	20%	**$16,793**		$14,522	$2,904	$17,426			$15,151	$3,030	$18,182
01	LANDS AND DAMAGES													
01	non-Federal	$4	$1	25%	$5	3.8%	$4	$1	$5	2017Q1	1.9%	$4	$1	$5
01	Federal	$9	$2	25%	$11	3.8%	$9	$2	$12	2017Q1	1.9%	$10	$2	$12
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	$70	$14	20%	$84	8.0%	$76	$15	$91	2017Q1	4.3%	$79	$16	$95
1.0%	Planning & Environmental Compliance	$140	$28	20%	$168	8.0%	$151	$30	$181	2017Q1	4.3%	$158	$32	$189
5.0%	Engineering & Design	$700	$140	20%	$840	8.0%	$756	$151	$907	2017Q1	4.3%	$788	$158	$946
0.7%	Reviews, ATRs, IEPRs, VE	$98	$20	20%	$118	8.0%	$106	$21	$127	2017Q1	4.3%	$110	$22	$132
0.5%	Life Cycle Updates (cost, schedule, risks)	$70	$14	20%	$84	8.0%	$76	$15	$91	2017Q1	4.3%	$79	$16	$95
0.8%	Contracting & Reprographics	$112	$22	20%	$134	8.0%	$121	$24	$145	2017Q1	4.3%	$126	$25	$151
1.5%	Engineering During Construction	$210	$42	20%	$252	8.0%	$227	$45	$272	2018Q2	9.9%	$249	$50	$299
0.0%	Planning During Construction	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.0%	Project Operations	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
31	CONSTRUCTION MANAGEMENT													
5.0%	Construction Management	$700	$140	20%	$840	3.8%	$727	$145	$872	2018Q2	4.3%	$758	$152	$910
0.5%	Project Operation:	$70	$14	20%	$84	3.8%	$73	$15	$87	2018Q2	4.3%	$76	$15	$91
0.5%	Project Management	$70	$14	20%	$84	3.8%	$73	$15	$87	2018Q2	4.3%	$76	$15	$91
	CONTRACT COST TOTALS:	$16,247	$3,250		**$19,497**		$16,920	$3,385	$20,304			$17,665	$3,534	**$21,198**

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: P2-370840 Brazos Island Harbor, Texas, Channel Improvement Project
LOCATION: Cameron County, Texas
This Estimate reflects the scope and schedule in report: BIH Engineering Appendix 2013

DISTRICT: SWG Galveston District PREPARED: 10/9/2013
POC: CHIEF, COST ENGINEERING, Willie Honza

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 10/9/2013				Program Year (Budget EC): 2016								
		Effective Price Level: 1-Oct-2013				Effective Price Level Date: 1 OCT 15				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 2 or CONTRACT 2													
12	NAVIGATION PORTS & HARBORS													
12	non-Federal	$2,285	$457	20%	$2,742	1.8%	$2,327	$465	$2,793	2018Q3	6.8%	$2,486	$497	$2,983
12	Federal	$6,856	$1,371	20%	$8,227	1.8%	$6,982	$1,396	$8,378	2018Q3	6.8%	$7,458	$1,492	$8,949
12	Associated Costs (non-Federal)	$39,250	$7,850	20%	$47,100	1.8%	$39,971	$7,994	$47,965	2018Q3	6.8%	$42,697	$8,539	$51,236
							$0							
	CONSTRUCTION ESTIMATE TOTALS:	$48,391	$9,678	20%	**$58,069**		$49,279	$9,856	$59,135			$52,641	$10,528	$63,169
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	$242	$48	20%	$290	3.7%	$251	$50	$301	2017Q1	8.7%	$273	$55	$327
1.0%	Planning & Environmental Compliance	$484	$97	20%	$581	3.7%	$502	$100	$602	2017Q1	8.7%	$545	$109	$654
5.0%	Engineering & Design	$2,420	$484	20%	$2,904	3.7%	$2,509	$502	$3,010	2017Q1	8.7%	$2,726	$545	$3,271
0.7%	Reviews, ATRs, IEPRs, VE	$339	$68	20%	$407	3.7%	$351	$70	$422	2017Q1	8.7%	$382	$76	$458
0.5%	Life Cycle Updates (cost, schedule, risks)	$242	$48	20%	$290	3.7%	$251	$50	$301	2017Q1	8.7%	$273	$55	$327
0.8%	Contracting & Reprographics	$387	$77	20%	$464	3.7%	$401	$80	$481	2017Q1	8.7%	$436	$87	$523
1.5%	Engineering During Construction	$726	$145	20%	$871	3.7%	$753	$151	$903	2018Q3	15.7%	$871	$174	$1,045
0.0%	Planning During Construction	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.0%	Project Operations	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
31	CONSTRUCTION MANAGEMENT													
5.0%	Construction Management	$2,420	$484	20%	$2,904	1.9%	$2,466	$493	$2,959	2018Q3	6.8%	$2,634	$527	$3,161
0.5%	Project Operation:	$242	$48	20%	$290	1.9%	$247	$49	$296	2018Q3	6.8%	$263	$53	$316
0.5%	Project Management	$242	$48	20%	$290	1.9%	$247	$49	$296	2018Q3	6.8%	$263	$53	$316
	CONTRACT COST TOTALS:	$56,135	$11,227		**$67,362**		$57,256	$11,451	$68,707			$61,306	$12,261	**$73,568**

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: P2-370840 Brazos Island Harbor, Texas, Channel Improvement Project
LOCATION: Cameron County, Texas
This Estimate reflects the scope and schedule in report: BIH Engineering Appendix 2013

DISTRICT: SWG Galveston District PREPARED: 10/9/2013
POC: CHIEF, COST ENGINEERING, Willie Honza

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 10/9/2013				Program Year (Budget EC): 2016								
		Effective Price Level: 1-Oct-2013				Effective Price Level Date: 1 OCT 15				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 3 or CONTRACT 3													
12	NAVIGATION PORTS & HARBORS													
12	non-Federal	$8,317	$1,663	20%	$9,981	1.8%	$8,470	$1,694	$10,164	2018Q3	6.8%	$9,048	$1,810	$10,857
12	Federal	$13,463	$2,693	20%	$16,155	1.8%	$13,710	$2,742	$16,452	2018Q3	6.8%	$14,645	$2,929	$17,574
							$0							
	CONSTRUCTION ESTIMATE TOTALS:	$21,780	$4,356	20%	**$26,136**		$22,180	$4,436	$26,616			$23,693	$4,739	$28,431
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	$109	$22	20%	$131	3.7%	$113	$23	$136	2017Q1	8.7%	$123	$25	$147
1.0%	Planning & Environmental Compliance	$218	$44	20%	$262	3.7%	$226	$45	$271	2017Q1	8.7%	$246	$49	$295
5.0%	Engineering & Design	$1,089	$218	20%	$1,307	3.7%	$1,129	$226	$1,355	2017Q1	8.7%	$1,227	$245	$1,472
0.7%	Reviews, ATRs, IEPRs, VE	$152	$30	20%	$182	3.7%	$158	$32	$189	2017Q1	8.7%	$171	$34	$205
0.5%	Life Cycle Updates (cost, schedule, risks)	$109	$22	20%	$131	3.7%	$113	$23	$136	2017Q1	8.7%	$123	$25	$147
0.8%	Contracting & Reprographics	$174	$35	20%	$209	3.7%	$180	$36	$216	2017Q1	8.7%	$196	$39	$235
1.5%	Engineering During Construction	$327	$65	20%	$392	3.7%	$339	$68	$407	2018Q3	15.7%	$392	$78	$471
0.0%	Planning During Construction	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.0%	Project Operations	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
31	CONSTRUCTION MANAGEMENT													
5.0%	Construction Management	$1,089	$218	20%	$1,307	1.9%	$1,110	$222	$1,332	2018Q3	6.8%	$1,185	$237	$1,422
0.5%	Project Operation:	$109	$22	20%	$131	1.9%	$111	$22	$133	2018Q3	6.8%	$119	$24	$142
0.5%	Project Management	$109	$22	20%	$131	1.9%	$111	$22	$133	2018Q3	6.8%	$119	$24	$142
	CONTRACT COST TOTALS:	$25,265	$5,053		**$30,318**		$25,769	$5,154	$30,923			$27,592	$5,518	**$33,111**

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: P2-370840 Brazos Island Harbor, Texas, Channel Improvement Project
LOCATION: Cameron County, Texas
This Estimate reflects the scope and schedule in report: BIH Engineering Appendix 2013

DISTRICT: SWG Galveston District PREPARED: 10/9/2013
POC: CHIEF, COST ENGINEERING, Willie Honza

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 10/9/2013				Program Year (Budget EC): 2016								
		Effective Price Level: 1-Oct-2013				Effective Price Level Date: 1 OCT 15				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 4 or CONTRACT 4													
12	NAVIGATION PORTS & HARBORS													
12	non-Federal	$15,667	$3,133	20%	$18,801	1.8%	$15,955	$3,191	$19,146	2018Q4	7.3%	$17,124	$3,425	$20,549
12	Federal	$21,543	$4,309	20%	$25,852	1.8%	$21,939	$4,388	$26,326	2018Q4	7.3%	$23,546	$4,709	$28,255
							$0							
	CONSTRUCTION ESTIMATE TOTALS:	$37,210	$7,442	20%	**$44,653**		$37,894	$7,579	$45,472			$40,670	$8,134	$48,804
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	$186	$37	20%	$223	3.7%	$193	$39	$231	2017Q2	9.8%	$212	$42	$254
1.0%	Planning & Environmental Compliance	$372	$74	20%	$446	3.7%	$386	$77	$463	2017Q2	9.8%	$423	$85	$508
5.0%	Engineering & Design	$1,861	$372	20%	$2,233	3.7%	$1,929	$386	$2,315	2017Q2	9.8%	$2,118	$424	$2,541
0.7%	Reviews, ATRs, IEPRs, VE	$260	$52	20%	$312	3.7%	$270	$54	$323	2017Q2	9.8%	$296	$59	$355
0.5%	Life Cycle Updates (cost, schedule, risks)	$186	$37	20%	$223	3.7%	$193	$39	$231	2017Q2	9.8%	$212	$42	$254
0.8%	Contracting & Reprographics	$298	$60	20%	$358	3.7%	$309	$62	$371	2017Q2	9.8%	$339	$68	$407
1.5%	Engineering During Construction	$558	$112	20%	$670	3.7%	$578	$116	$694	2018Q4	17.0%	$677	$135	$812
0.0%	Planning During Construction	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.0%	Project Operations	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
31	CONSTRUCTION MANAGEMENT													
5.0%	Construction Management	$1,861	$372	20%	$2,233	1.9%	$1,896	$379	$2,276	2018Q4	7.3%	$2,035	$407	$2,442
0.5%	Project Operation:	$186	$37	20%	$223	1.9%	$190	$38	$227	2018Q4	7.3%	$203	$41	$244
0.5%	Project Management	$186	$37	20%	$223	1.9%	$190	$38	$227	2018Q4	7.3%	$203	$41	$244
	CONTRACT COST TOTALS:	$43,164	$8,633		**$51,797**		$44,026	$8,805	$52,831			$47,388	$9,478	**$56,866**

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: P2-370840 Brazos Island Harbor, Texas, Channel Improvement Project
LOCATION: Cameron County, Texas
This Estimate reflects the scope and schedule in report: BIH Engineering Appendix 2013

DISTRICT: SWG Galveston District PREPARED: 10/9/2013
POC: CHIEF, COST ENGINEERING, Willie Honza

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 10/9/2013				Program Year (Budget EC): 2016								
		Effective Price Level: 1-Oct-2013				Effective Price Level Date: 1 OCT 15				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 5 or CONTRACT 5													
12	NAVIGATION PORTS & HARBORS													
12	non-Federal	$2,769	$554	20%	$3,323	1.8%	$2,820	$564	$3,384	2018Q3	6.8%	$3,012	$602	$3,615
12	Federal	$4,850	$970	20%	$5,820	1.8%	$4,939	$988	$5,927	2018Q3	6.8%	$5,276	$1,055	$6,331
							$0							
	CONSTRUCTION ESTIMATE TOTALS:	$7,619	$1,524	20%	**$9,143**		$7,759	$1,552	$9,311			$8,288	$1,658	$9,946
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	$38	$8	20%	$46	3.7%	$39	$8	$47	2017Q2	9.8%	$43	$9	$52
1.0%	Planning & Environmental Compliance	$76	$15	20%	$91	3.7%	$79	$16	$95	2017Q2	9.8%	$86	$17	$104
5.0%	Engineering & Design	$381	$76	20%	$457	3.7%	$395	$79	$474	2017Q2	9.8%	$434	$87	$520
0.7%	Reviews, ATRs, IEPRs, VE	$53	$11	20%	$64	3.7%	$55	$11	$66	2017Q2	9.8%	$60	$12	$72
0.5%	Life Cycle Updates (cost, schedule, risks)	$38	$8	20%	$46	3.7%	$39	$8	$47	2017Q2	9.8%	$43	$9	$52
0.8%	Contracting & Reprographics	$61	$12	20%	$73	3.7%	$63	$13	$76	2017Q2	9.8%	$69	$14	$83
1.5%	Engineering During Construction	$114	$23	20%	$137	3.7%	$118	$24	$142	2018Q3	15.7%	$137	$27	$164
0.0%	Planning During Construction	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.0%	Project Operations	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
31	CONSTRUCTION MANAGEMENT													
5.0%	Construction Management	$381	$76	20%	$457	1.9%	$388	$78	$466	2018Q3	6.8%	$415	$83	$498
0.5%	Project Operation:	$38	$8	20%	$46	1.9%	$39	$8	$46	2018Q3	6.8%	$41	$8	$50
0.5%	Project Management	$38	$8	20%	$46	1.9%	$39	$8	$46	2018Q3	6.8%	$41	$8	$50
	CONTRACT COST TOTALS:	$8,837	$1,767		**$10,604**		$9,013	$1,803	$10,816			$9,659	$1,932	**$11,590**

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: P2-370840 Brazos Island Harbor, Texas, Channel Improvement Project
LOCATION: Cameron County, Texas
This Estimate reflects the scope and schedule in report: BIH Engineering Appendix 2013

DISTRICT: SWG Galveston District PREPARED: 10/9/2013
POC: CHIEF, COST ENGINEERING, Willie Honza

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 10/9/2013				Program Year (Budget EC): 2016								
		Effective Price Level: 1-Oct-2013				Effective Price Level Date: 1 OCT 15				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 6 or CONTRACT 6													
12	NAVIGATION PORTS & HARBORS													
12	non-Federal	$12,305	$2,461	20%	$14,766	1.8%	$12,531	$2,506	$15,037	2019Q3	8.9%	$13,640	$2,728	$16,368
12	Federal	$17,002	$3,400	20%	$20,403	1.8%	$17,314	$3,463	$20,777	2019Q3	8.9%	$18,847	$3,769	$22,616
							$0							
	CONSTRUCTION ESTIMATE TOTALS:	$29,307	$5,861	20%	**$35,169**		$29,845	$5,969	$35,814			$32,487	$6,497	$38,984
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	$147	$29	20%	$176	3.7%	$152	$30	$183	2018Q2	14.5%	$174	$35	$209
1.0%	Planning & Environmental Compliance	$293	$59	20%	$352	3.7%	$304	$61	$364	2018Q2	14.5%	$348	$70	$417
5.0%	Engineering & Design	$1,465	$293	20%	$1,758	3.7%	$1,519	$304	$1,822	2018Q2	14.5%	$1,739	$348	$2,087
0.7%	Reviews, ATRs, IEPRs, VE	$205	$41	20%	$246	3.7%	$212	$42	$255	2018Q2	14.5%	$243	$49	$292
0.5%	Life Cycle Updates (cost, schedule, risks)	$147	$29	20%	$176	3.7%	$152	$30	$183	2018Q2	14.5%	$174	$35	$209
0.8%	Contracting & Reprographics	$234	$47	20%	$281	3.7%	$243	$49	$291	2018Q2	14.5%	$278	$56	$333
1.5%	Engineering During Construction	$440	$88	20%	$528	3.7%	$456	$91	$547	2019Q3	20.7%	$551	$110	$661
0.0%	Planning During Construction	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.0%	Project Operations	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
31	CONSTRUCTION MANAGEMENT													
5.0%	Construction Management	$1,465	$293	20%	$1,758	1.9%	$1,493	$299	$1,791	2019Q3	8.8%	$1,625	$325	$1,950
0.5%	Project Operation:	$147	$29	20%	$176	1.9%	$150	$30	$180	2019Q3	8.8%	$163	$33	$196
0.5%	Project Management	$147	$29	20%	$176	1.9%	$150	$30	$180	2019Q3	8.8%	$163	$33	$196
	CONTRACT COST TOTALS:	$33,997	$6,799		**$40,797**		$34,676	$6,935	$41,611			$37,945	$7,589	**$45,534**

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: P2-370840 Brazos Island Harbor, Texas, Channel Improvement Project
LOCATION: Cameron County, Texas
This Estimate reflects the scope and schedule in report: BIH Engineering Appendix 2013

DISTRICT: SWG Galveston District PREPARED: 10/9/2013
POC: CHIEF, COST ENGINEERING, Willie Honza

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 10/9/2013				Program Year (Budget EC): 2016								
		Effective Price Level: 1-Oct-2013				Effective Price Level Date: 1 OCT 15				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 7 or CONTRACT 7													
12	NAVIGATION PORTS & HARBORS													
12	non-Federal	$8,855	$1,771	20%	$10,626	1.8%	$9,018	$1,804	$10,821	2019Q4	9.4%	$9,862	$1,972	$11,835
12	Federal	$13,230	$2,646	20%	$15,875	1.8%	$13,472	$2,694	$16,167	2019Q4	9.4%	$14,734	$2,947	$17,681
							$0							
	CONSTRUCTION ESTIMATE TOTALS:	$22,085	$4,417	20%	**$26,502**		$22,490	$4,498	$26,988			$24,597	$4,919	$29,516
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	$110	$22	20%	$132	3.7%	$114	$23	$137	2018Q2	14.5%	$131	$26	$157
1.0%	Planning & Environmental Compliance	$221	$44	20%	$265	3.7%	$229	$46	$275	2018Q2	14.5%	$262	$52	$315
5.0%	Engineering & Design	$1,104	$221	20%	$1,325	3.7%	$1,144	$229	$1,373	2018Q2	14.5%	$1,310	$262	$1,572
0.7%	Reviews, ATRs, IEPRs, VE	$155	$31	20%	$186	3.7%	$161	$32	$193	2018Q2	14.5%	$184	$37	$221
0.5%	Life Cycle Updates (cost, schedule, risks)	$110	$22	20%	$132	3.7%	$114	$23	$137	2018Q2	14.5%	$131	$26	$157
0.8%	Contracting & Reprographics	$177	$35	20%	$212	3.7%	$183	$37	$220	2018Q2	14.5%	$210	$42	$252
1.5%	Engineering During Construction	$331	$66	20%	$397	3.7%	$343	$69	$412	2019Q4	22.0%	$419	$84	$502
0.0%	Planning During Construction	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.0%	Project Operations	$0	$0	20%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
31	CONSTRUCTION MANAGEMENT													
5.0%	Construction Management	$1,104	$221	20%	$1,325	1.9%	$1,125	$225	$1,350	2019Q4	9.4%	$1,230	$246	$1,476
0.5%	Project Operation:	$110	$22	20%	$132	1.9%	$112	$22	$135	2019Q4	9.4%	$123	$25	$147
0.5%	Project Management	$110	$22	20%	$132	1.9%	$112	$22	$135	2019Q4	9.4%	$123	$25	$147
	CONTRACT COST TOTALS:	$25,617	$5,123		**$30,740**		$26,128	$5,226	$31,354			$28,718	$5,744	**$34,462**

CHANNEL IMPROVEMENT PROJECT
BRAZOS ISLAND HARBOR, TEXAS

ENGINEERING APPENDIX FOR FEASIBILITY STUDY BROWNSVILLE SHIP CHANNEL 52 FT DEEPENING PROJECT

Coastal Navigation and Environmental Restoration

Office of the District Engineer
U. S. Army Engineer District, Galveston
Corps of Engineers
Galveston, Texas
October 2013

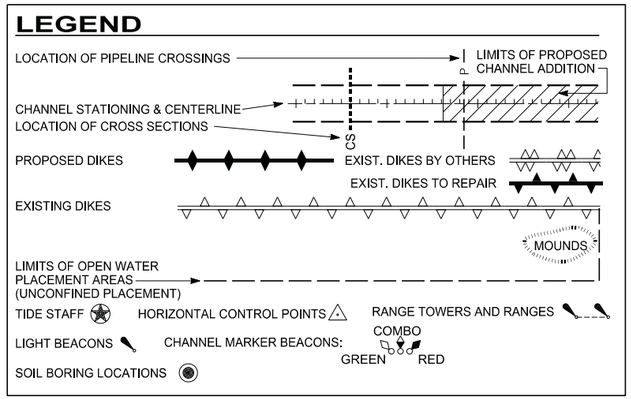
GALVESTON DISTRICT
TOTAL ARMY QUALITY

PRINTED ON RECYCLED PAPER

INDEX OF DRAWINGS

SHEET # of 51	DWG. NO.	TITLE
		GENERAL
1		COVER SHEET
2	G-01	GENERAL NOTES AND INDEX OF DRAWINGS
		CIVIL-SITE
3	C-01	LOCATION PLAN
4	C-02	PLAN - STA.89+500 TO STA.77+000
5	C-03	PLAN - STA.77+000 TO STA.62+500
6	C-04	PLAN - STA.62+500 TO STA.49+000
7	C-05	PLAN - STA.49+000 TO STA.35+000
8	C-06	PLAN - STA.35+000 TO STA.21+000
9	C-07	PLAN - STA.21+000 TO STA.7+000
10	C-08	PLAN - STA.7+000 TO STA.-7+000
11	C-09	PLAN - STA.-7+000 TO STA.-13+000
12	C-10	PLAN - OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS)
13	C-11	PLAN - NEARSHORE BERM BU SITE
14	C-12	CROSS SECTIONS - ENTRANCE AND JETTY CHANNEL STA.-15+000 TO STA.-1+000
15	C-13	CROSS SECTIONS - MAIN CHANNEL STA.3+000 TO STA.79+415
16	C-14	CROSS SECTIONS - TURNING BASINS STA.82+000 TO STA.89+500
		GEOTECHNICAL
17	F-01	CHANNEL BORING GEOREFERENCE AND GENERAL SOIL PLOT INFORMATION
18	F-02	BORING LOCATION PLAN CONTAINMENT DIKE TYPICAL PLACEMENT AREA NO.2
19	F-03	BORING LOCATION PLAN CONTAINMENT DIKE TYPICAL PLACEMENT AREA NO.4A
20	F-04	CONTAINMENT DIKE TYPICAL FOR PA 4B
21	F-05	BORING LOCATION PLAN CONTAINMENT DIKE TYPICAL PLACEMENT AREA NO.5-A
22	F-06	BORING LOCATION PLAN CONTAINMENT DIKE TYPICAL PLACEMENT AREA NO.5-B
23	F-07	BORING LOCATION PLAN CONTAINMENT DIKE TYPICAL PLACEMENT AREA NO.7
24	F-08	BORING LOCATION PLAN CONTAINMENT DIKE TYPICAL PLACEMENT AREA NO.8
25	F-09	LOGS OF BORINGS
26	F-10	LOGS OF BORINGS
27	F-11	LOGS OF BORINGS
28	F-12	LOGS OF BORINGS
29	F-13	LOGS OF BORINGS
30	F-14	LOGS OF BORINGS
31	F-15	LOGS OF BORINGS
32	F-16	LOGS OF BORINGS
33	F-17	LOGS OF BORINGS
34	F-18	LOGS OF BORINGS
35	F-19	LOGS OF BORINGS
36	F-20	CHANNEL BORINGS
37	F-21	CHANNEL BORINGS
38	F-22	CHANNEL BORINGS
39	F-23	CHANNEL BORINGS
40	F-24	CHANNEL BORINGS
41	F-25	PA NO.2 CONTAINMENT DIKE SLOPE STABILITY ANALYSIS RESULTS
42	F-26	PA NO.4A CONTAINMENT DIKE SLOPE STABILITY ANALYSIS RESULTS
43	F-27	PA NO.4B CONTAINMENT DIKE SLOPE STABILITY ANALYSIS RESULTS
44	F-28	PA NO.5A CONTAINMENT DIKE SLOPE STABILITY ANALYSIS RESULTS
45	F-29	PA NO.5B CONTAINMENT DIKE SLOPE STABILITY ANALYSIS RESULTS
46	F-30	PA NO.7 CONTAINMENT DIKE SLOPE STABILITY ANALYSIS RESULTS
47	F-31	PA NO.8 CONTAINMENT DIKE SLOPE STABILITY ANALYSIS RESULTS
48	F-32	UNDRAINED CHANNEL STABILITY ANALYSIS NEAR PA NO.4 REGION
49	F-33	CHANNEL DRAINED STABILITY ANALYSIS NEAR PA NO.4 REGION
50	F-34	CHANNEL DRAINED STABILITY ANALYSIS NEAR PA NO.5 REGION
51	F-35	CHANNEL DRAINED STABILITY ANALYSIS NEAR PA NO.5 REGION
51		*-- Total Number of Drawings*

LEGEND



GENERAL NOTES

1. ELEVATIONS ARE REFERENCED TO MEAN LOWER-LOW WATER (MLLW). ALL FUTURE CONSTRUCTION CONTRACTS WILL BE DREDGED TO 52 FEET MLLW ACTUAL
2. HORIZONTAL DATUM IS REFERENCED TO NAD(83), TEXAS SOUTH ZONE, U.S. SURVEY FEET.
3. THE BOTTOM WIDTHS OF THE PROPOSED CHANNEL WERE NOT INCREASED FROM THE EXISTING CHANNEL BOTTOM WIDTH.
4. THE CENTERLINE OF THE EXISTING CHANNEL WAS USED FOR THE PROPOSED CHANNEL.
5. ALL PLACEMENT AREAS FOR THIS PROJECT ARE EXISTING, NO NEW AREAS TO BE CONSTRUCTED.
6. THE EXISTING OPEN WATER MAINTENANCE ODMDS PA IS NOT PLANNED TO BE USED FOR MAINTENANCE OPERATIONS, BUT WILL BE AVAILABLE IF NEEDED.

U.S. Army Corps of Engineers
Galveston District

By:	Date:	Description

Rev.

Drawn by: MAN
Designed by: BRH
Checked by: BRH
Submitted by: DAVID R. BROWN, P.E., Chief, General Engineering
Date: OCT 2013
Scale: AS SHOWN
Approval Recommended: JOSEPH L. KING, R.A., Chief, Engineering Branch
Approved by: TERRY F. BAUTISTA, P.E., Chief, Engineering and Construction Division

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL, C.E.,
DISTRICT COMMANDER

CHANNEL IMPROVEMENT PROJECT BRAZOS ISLAND HARBOR, TEXAS ENGINEERING APPENDIX FOR FEASIBILITY STUDY BROWNSVILLE SHIP CHANNEL 52 FT DEEPENING PROJECT

GENERAL NOTES AND INDEX OF DRAWINGS

Drawing No.:
G-01
Sheet 2 of 51

TEXAS

LAGUNA MADRE

SOUTH PADRE ISLAND

GULF OF MEXICO

PORT ISABEL

FEEDER BERM

NEW WORK ODMDS

MAINTENANCE ODMDS

PA 2

PA 4A

PA 4B

PA 5A

PA 5B

PA 7

PA 8

BROWNSVILLE SHIP CHANNEL

BROWNSVILLE

WESTERLY LIMITS OF DREDGING STA. 84+200

EASTERLY LIMITS OF DREDGING STA. -17+000

RIO GRANDE

MEXICO

1,450,000
16,575,000

1,420,000
16,570,000

1,375,000
16,545,000

1,450,000
16,545,000

1,345,000
16,525,000

1,385,000
16,505,000

PLAN
0 4,000 8,000 12,000
SCALE IN FEET

U.S. Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

Drawn by:	MAN	Date:	OCT 2013
Designed by:	BRH	Scale:	AS SHOWN
Checked by:	BRH	Approval Recommended:	JOSEPH L. KING, R.A., Chief, Engineering Branch
Submitted by:	DAVID R. BROWN, P.E., Chief, General Engineering		
Approved by:	TERRY F. BAUTISTA, P.E., Chief, Engineering and Construction Division		

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PAINELL, LT. COL., C.E.,
DISTRICT COMMANDER

CHANNEL IMPROVEMENT, PROJECT BRAZOS ISLAND HARBOR, TEXAS ENGINEERING APPENDIX FOR FEASIBILITY STUDY BROWNSVILLE SHIP CHANNEL 52 FT DEEPENING PROJECT

LOCATION PLAN

Drawing No.:
C-01
Sheet 3 of 51

File: W:\CADD\Projects\Rio\Brownsville Ship Channel_Study\Existing-Conditions\BIH-Plan-01b.dgn
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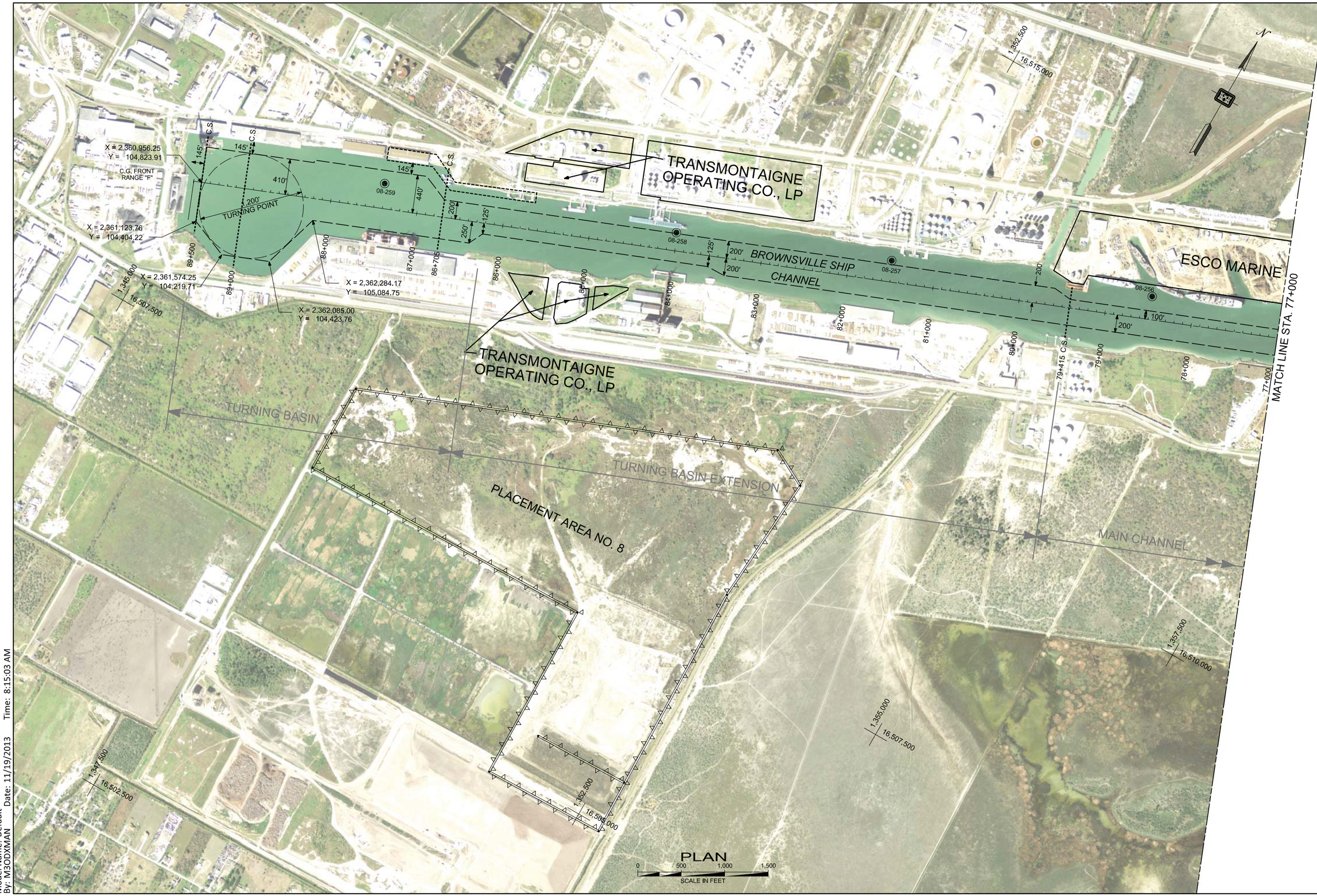
By: M3ODXMAN



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By: M3ODXMAN

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Galveston District

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DAVID R. BROWN, P.E., JOSEPH L. KING, R.A.,
Chief, General Engineering Chief, Engineering Branch
Approved by: TERRY F. BAUTISTA, P.E.,
Chief, Engineering and Construction Division

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL, C.E.,
DISTRICT COMMANDER

CHANNEL IMPROVEMENT PROJECT BRAZOS ISLAND HARBOR, TEXAS ENGINEERING APPENDIX FOR FEASIBILITY STUDY BROWNSVILLE SHIP CHANNEL 52 FT DEEPENING PROJECT

PLAN
STA. 89+500 TO STA. 77+000

Drawing No.:
C-02
Sheet 4 of 51

KEPPEL AMFELS, INC.

INTERNATIONAL SHIPBREAKING LIMITED, LLC

MATCH LINE STA. 77+000

MATCH LINE STA. 62+500

BROWNSVILLE SHIP CHANNEL

EXISTING EFFLUENT DITCH

PIPELINE CORRIDOR

100'

1650'

MAIN CHANNEL

EXISTING DROP-OUTLET STRUCTURE

PLACEMENT AREA NO. 7

08-251
08-252
08-253
08-254
08-255

1,357,500
16,515,000
1,362,500
16,517,500
1,357,500
16,520,000
1,360,000
16,510,000
1,365,000
16,512,500
1,370,000
16,515,000

77+000
76+000
75+000
74+000
73+000
72+000
71+000
70+000
69+000
68+000
67+000
66+000
65+000
64+000
63+000

PI 63+380
PT63+908.45
PC62+848.55
C.S.

125'
200'

PLAN
0 500 1,000 1,500
SCALE IN FEET

U.S. Army Corps of Engineers
Galveston District

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DAVID R. BROWN, P.E. Chief, General Engineering		JOSEPH L. KING, R.A., Chief, Engineering Branch	
Approved by:		TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division	

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL, C.E.,
DISTRICT COMMANDER

CHANNEL IMPROVEMENT PROJECT BRAZOS ISLAND HARBOR, TEXAS ENGINEERING APPENDIX FOR FEASIBILITY STUDY BROWNSVILLE SHIP CHANNEL 52 FT DEEPENING PROJECT

PLAN
STA. 77+000 TO STA. 62+500

Drawing No.:

C-03

Sheet 5 of 51

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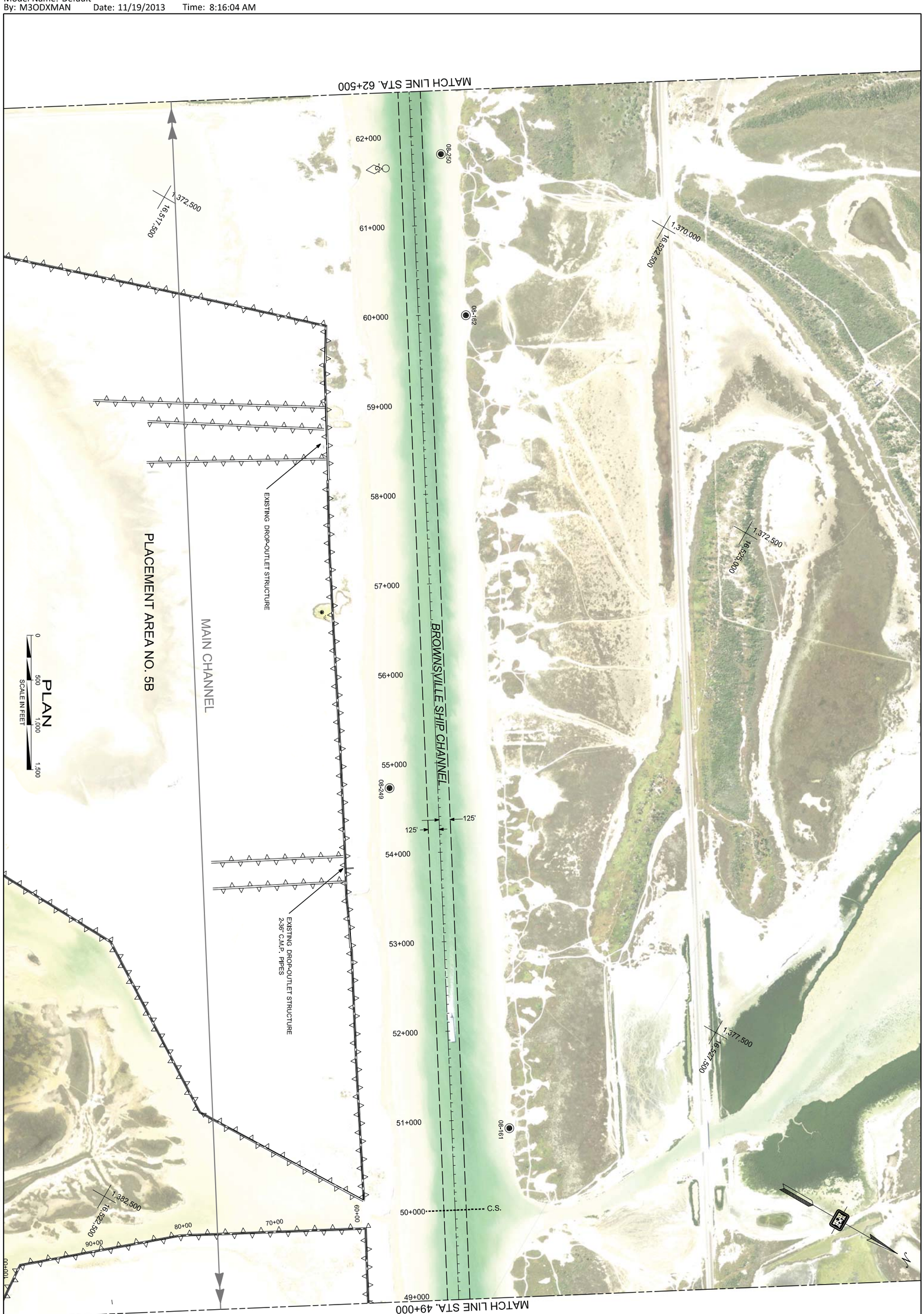

Drawing No.: C-04 Sheet 6 of 51	CHANNEL IMPROVEMENT PROJECT BRAZOS ISLAND HARBOR, TEXAS ENGINEERING APPENDIX FOR FEASIBILITY STUDY BROWNSVILLE SHIP CHANNEL 52 FT DEEPENING PROJECT PLAN STA. 62+500 TO STA. 49+000	U.S. ARMY ENGINEER DISTRICT, GALVESTON CORPS OF ENGINEERS GALVESTON, TEXAS PREPARED UNDER THE DIRECTION OF RICHARD P. PANNELL, Col., C.E., DISTRICT COMMANDER	Drawn by: MAN; Designed by: BRH; Checked by: BRH; Submitted by: DAVID R. BROWN, P.E., Chief, General Engineering; Approved by: TERRY F. BAUTISTA, P.E., Chief, Engineering and Construction Division; Date: OCT 2013; Rev.; Scale: AS SHOWN; Approval Recommended: JOSEPH L. KING, R.A., Chief, Engineering Branch

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U.S. Army Corps of Engineers
Galveston District

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Model Name: Default
By: M3ODXMAN Date: 11/19/2013 Time: 8:16:29 AM

Drawing No.: C-05
Sheet 7 of 51

CHANNEL IMPROVEMENT PROJECT BRAZOS ISLAND HARBOR, TEXAS ENGINEERING APPENDIX FOR FEASIBILITY STUDY BROWNSVILLE SHIP CHANNEL 52 FT DEEPENING PROJECT

PLAN
STA. 49+000 TO STA. 35+000

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, Col., C.E.,
DISTRICT COMMANDER

Drawn by:	MAN	Date:	Rev.
Designed by:	BRH	OCT 2013	
Checked by:	BRH	Scale: AS SHOWN	
Submitted by: DAVID R. BROWN, P.E., Chief, General Engineering		Approval Recommended: JOSEPH L. KING, R.A., Chief, Engineering Branch	
Approved by: TERRY F. BAUTISTA, P.E., Chief, Engineering and Construction Division			

Rev.	Description	Date	By

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Galveston District

File: W:\Cadd\Projects\Rio\Brownsville Ship Channel_Study\Existing-Conditions\BIH-Plan-06.dgn
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By: M3ODXMAN Date: 11/19/2013 Time: 8:16:57 AM

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Galveston District

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Designed by:	BRH		
Checked by:	BRH		
Submitted by: DAVID R. BROWN, P.E., Chief, General Engineering			
Approved by: TERRY F. BAUTISTA, P.E., Chief, Engineering and Construction Division			

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL, C.E.,
DISTRICT COMMANDER

CHANNEL IMPROVEMENT PROJECT BRAZOS ISLAND HARBOR, TEXAS ENGINEERING APPENDIX FOR FEASIBILITY STUDY BROWNSVILLE SHIP CHANNEL 52 FT DEEPENING PROJECT

PLAN
STA. 35+000 TO STA. 21+000

Drawing No.:
C-06
Sheet 8 of 51

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By: M3ODXMAN Date: 11/19/2013 Time: 8:17:19 AM

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Galveston District

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Chief, General Engineering		DAVID R. BROWN, P.E.	
Approved by:		JOSEPH L. KING, R.A.	
		Chief, Engineering Branch	
		TERRY F. BAUTISTA, P.E.	
		Chief, Engineering and Construction Division	

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

PREPARED UNDER THE DIRECTION OF
RICHARD P. PAINELL, Col, C.E.,
DISTRICT COMMANDER

CHANNEL IMPROVEMENT PROJECT BRAZOS ISLAND HARBOR, TEXAS ENGINEERING APPENDIX FOR FEASIBILITY STUDY BROWNSVILLE SHIP CHANNEL 52 FT DEEPENING PROJECT

PLAN
STA. 21+000 TO STA. 7+000

Drawing No.:

C-07

Sheet 9 of 51

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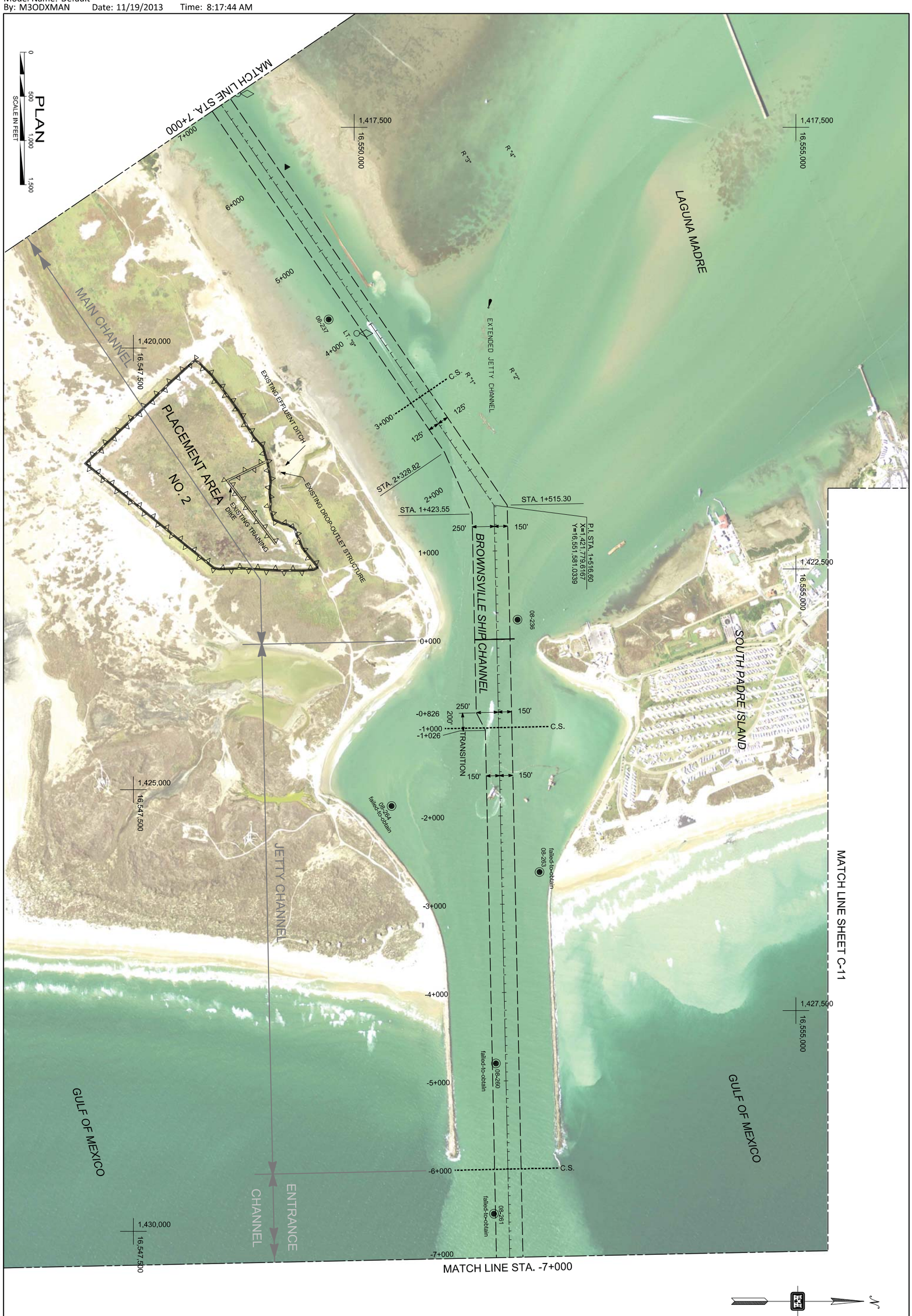

CHANNEL IMPROVEMENT PROJECT BRAZOS ISLAND HARBOR, TEXAS ENGINEERING APPENDIX FOR FEASIBILITY STUDY BROWNSVILLE SHIP CHANNEL 52 FT DEEPENING PROJECT

PLAN
STA. 7+000 TO STA. -7+000

U.S. ARMY ENGINEER DISTRICT, GALVESTON
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Approved by: TERRY F. BAUTISTA, P.E., Chief, Engineering and Construction Division			

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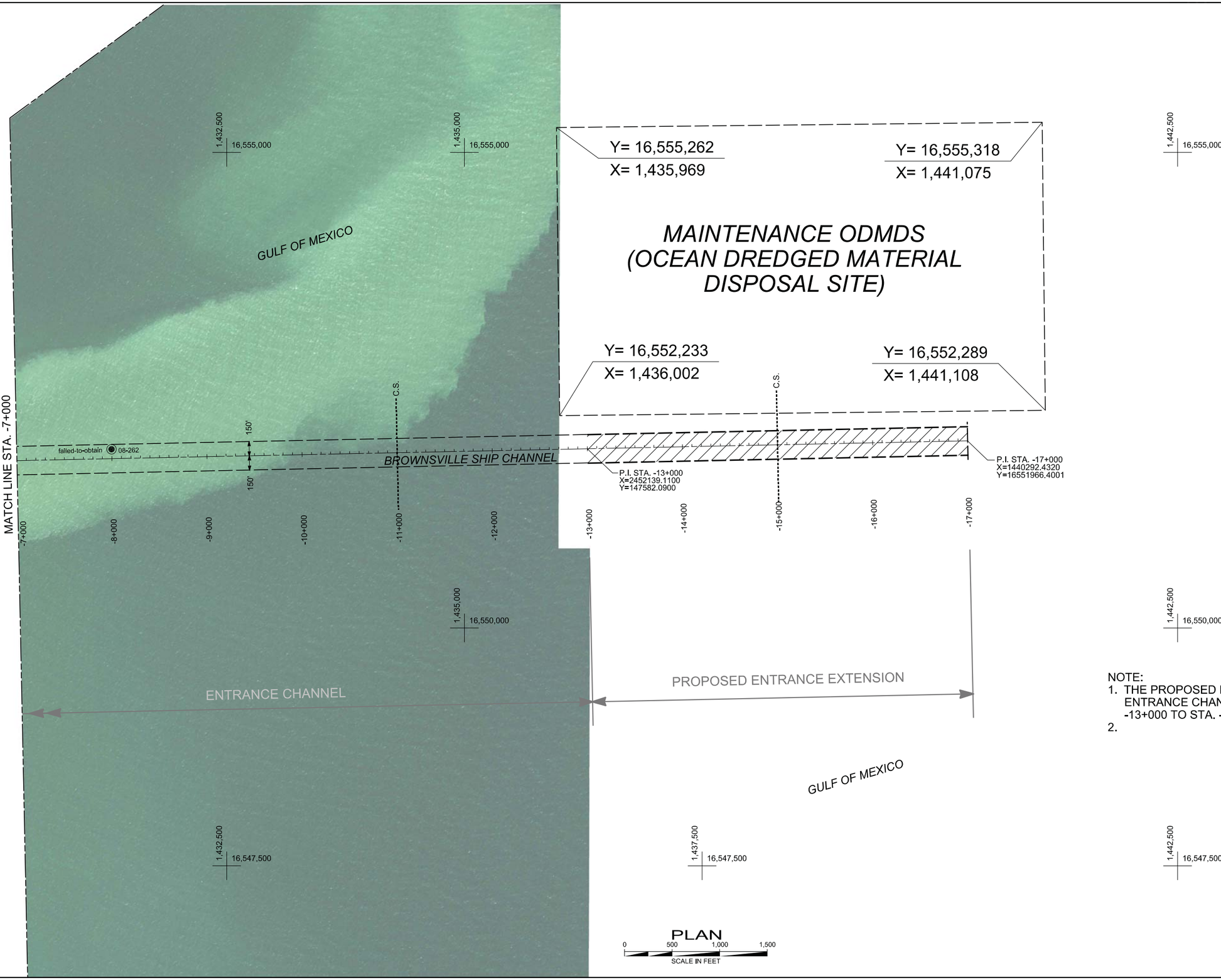
U.S. Army Corps of Engineers
Galveston District

Drawing No.: C-08
Sheet 10 of 51



PLAN
0 500 1,000 1,500
SCALE IN FEET

NOTE:
1. THE PROPOSED EXTENSION TO THE ENTRANCE CHANNEL IS FROM STA. -13+000 TO STA. -17+000
2.

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DAVID R. BROWN, P.E., Chief, General Engineering		JOSEPH L. KING, R.A., Chief, Engineering Branch	
Approved by:		TERRY F. BAUTISTA, P.E., Chief, Engineering and Construction Division	

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
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DISTRICT COMMANDER

CHANNEL IMPROVEMENT PROJECT BRAZOS ISLAND HARBOR, TEXAS ENGINEERING APPENDIX FOR FEASIBILITY STUDY BROWNSVILLE SHIP CHANNEL 52 FT DEEPENING PROJECT

PLAN
STA. -7+000 TO STA. -13+000

Drawing No.:
C-09
Sheet 11 of 51

File: W:\Cadd\Projects\Rio\Brownsville Ship Channel_Study\Existing-Conditions\BIH-Plan-09.dgn
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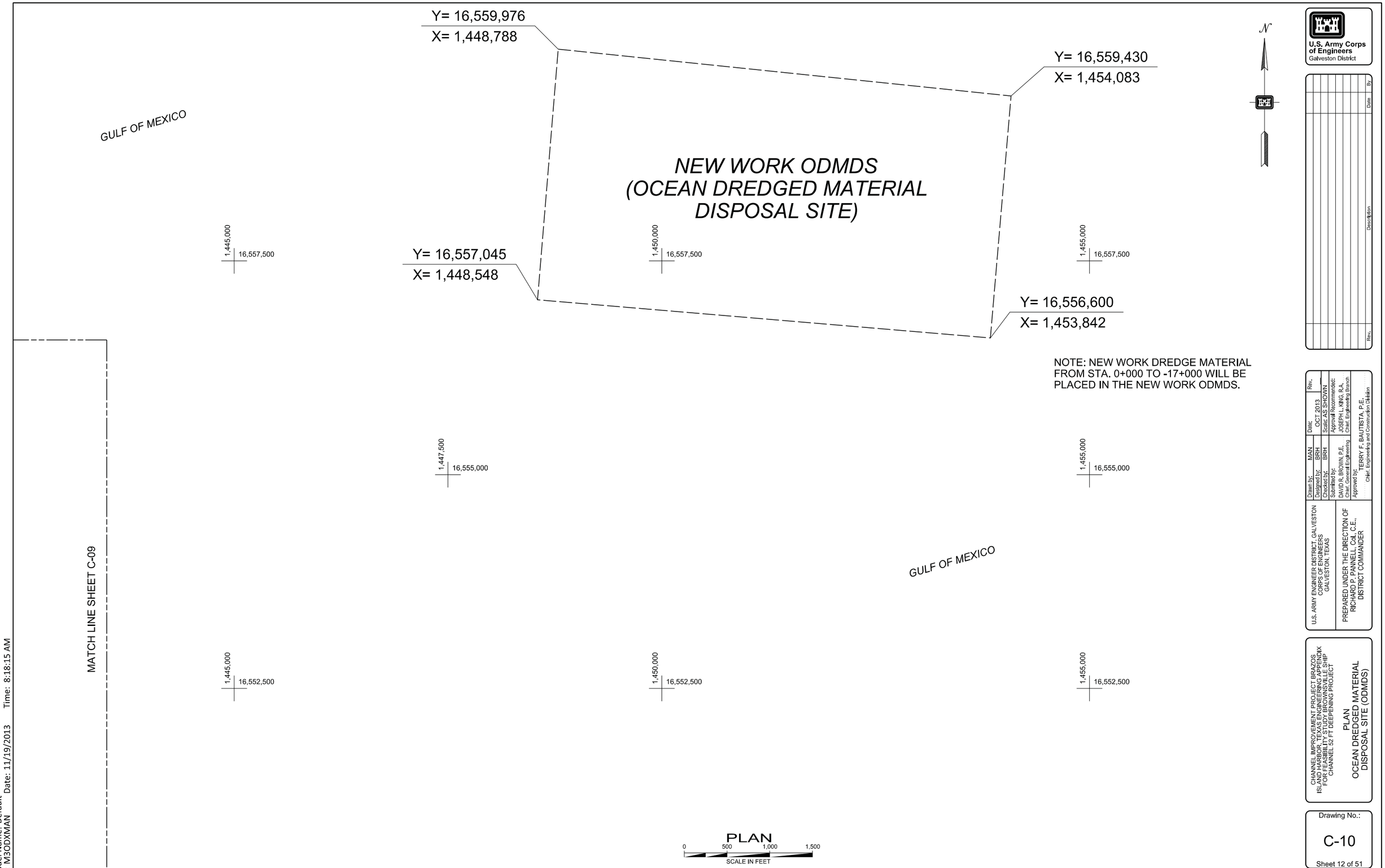

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Galveston District

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Submitted by:	DAVID R. BROWN, P.E., Chief, Geneneral Engineering	JOSEPH L. KING, R.A., Chief, Engineering Branch	
Approved by:	TERRY F. BAUTISTA, P.E., Chief, Engineering and Construction Division		

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

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, COL, C.E.,
DISTRICT COMMANDER

CHANNEL IMPROVEMENT PROJECT BRAZOS
ISLAND HARBOR, TEXAS ENGINEERING APPENDIX
FOR FEASIBILITY STUDY BROWNSVILLE SHIP
CHANNEL 52 FT DEEPENING PROJECT

PLAN
OCEAN DREDGED MATERIAL
DISPOSAL SITE (ODMDS)

Drawing No.:

C-10

Sheet 12 of 51

File: W:\Cadd\Projects\Rio\Brownsville Ship Channel_Study\Existing-Conditions\BIH-Plan-10.dgn
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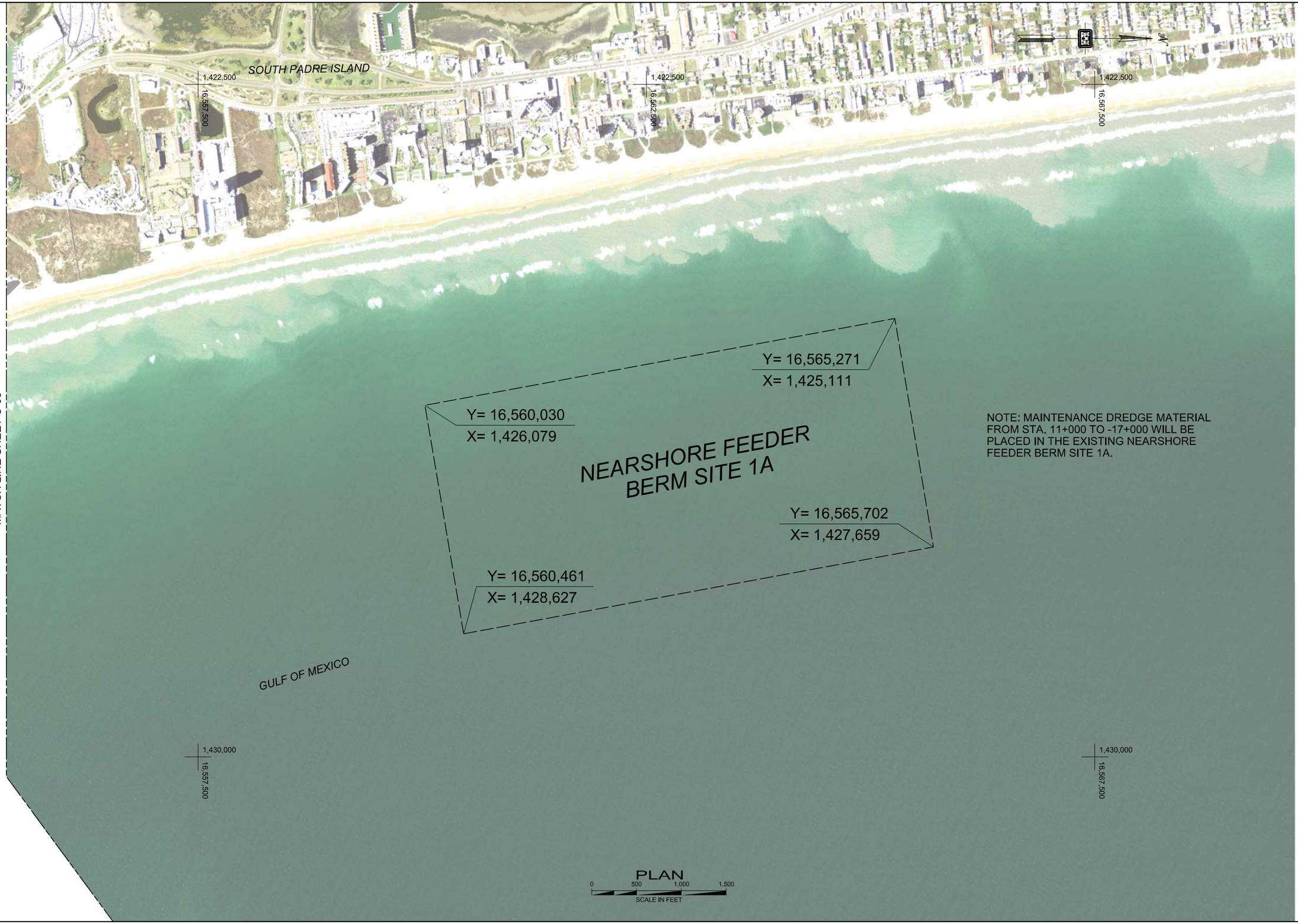

NOTE: MAINTENANCE DREDGE MATERIAL FROM STA. 11+000 TO -17+000 WILL BE PLACED IN THE EXISTING NEARSHORE FEEDER BERM SITE 1A.

PLAN
0 500 1,000 1,500
SCALE IN FEET

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Galveston District

Rev.	Description	Date	By

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Approved by: TERRY F. BAUTISTA, P.E., Chief, Engineering and Construction Division
Date: OCT 2013
Scale: AS SHOWN
Approval Recommended: JOSEPH L. KING, R.A., Chief, Engineering Branch

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

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RICHARD P. PANNELL, Col., C.E.,
DISTRICT COMMANDER

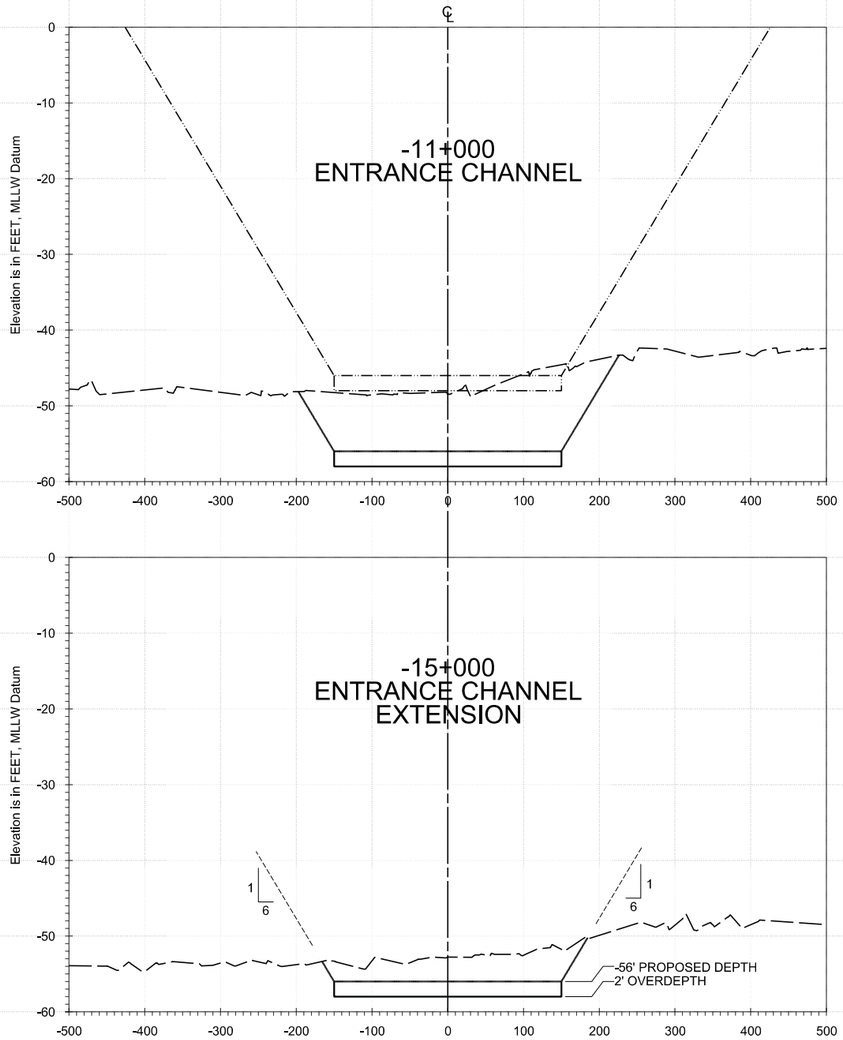
CHANNEL IMPROVEMENT PROJECT BRAZOS ISLAND HARBOR, TEXAS ENGINEERING APPENDIX FOR FEASIBILITY STUDY BROWNSVILLE SHIP CHANNEL 52 FT DEEPENING PROJECT

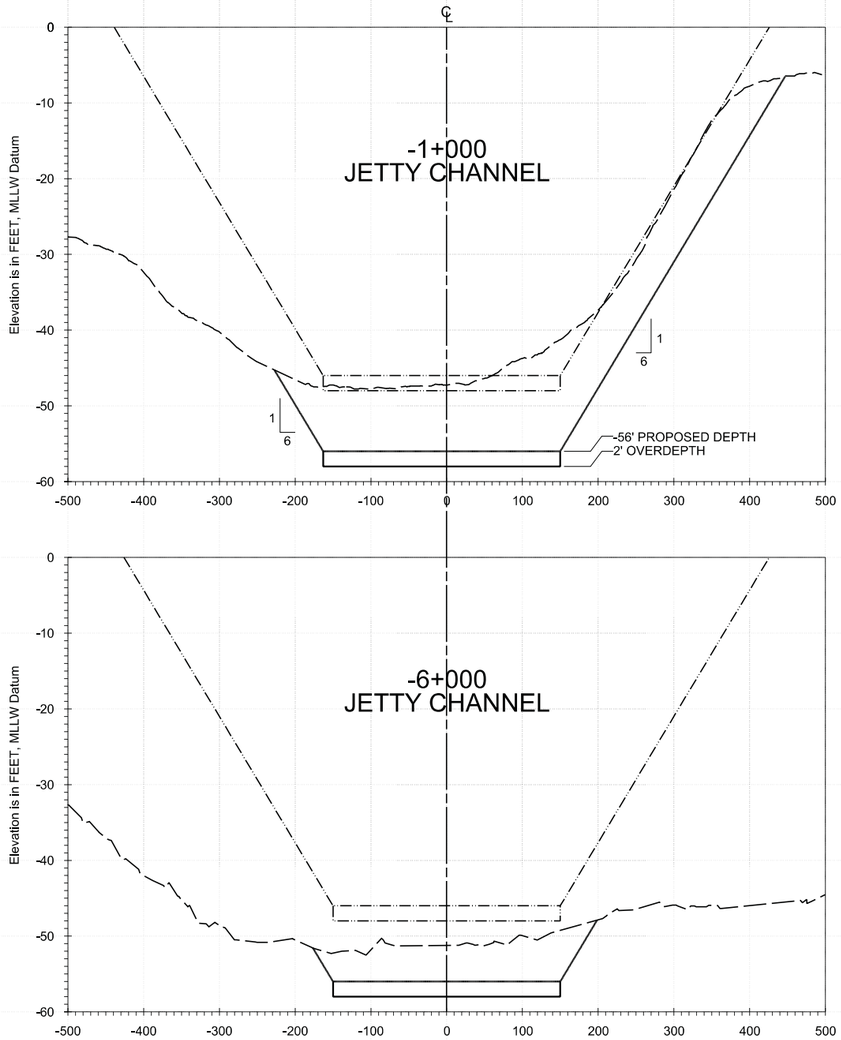
PLAN
NEARSHORE BERM BU SITE

Drawing No.:
C-11
Sheet 13 of 51

File: W:\Cadd\Projects\Rio\Brownsville Ship Channel_Study\Existing-Conditions\BIH-Plan-11.dgn
Model Name: Default
By: M3ODXMAN Date: 11/19/2013 Time: 8:18:16 AM

ENTRANCE AND JETTY CHANNEL - STA. -15+000 TO STA. -1+000





CHANNEL SURFACE

EXISTING CHANNEL

PROPOSED CHANNEL

EXISTING GROUND

Vertical Scaled 10 Times

NOTES:
1. CROSS SECTIONS PLOTTED LOOKING TOWARDS INCREASING STATIONS
2. VERTICAL DATUM IS IN MLLW (MEAN LOWER LOW WATER)
3. ADVANCED MAINTENANCE IS INCLUDED IN THE PROPOSED CHANNEL TEMPLATE SHOWN

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Model Name: 0-TYP Sections - 1
By: M3ODXMAN Date: 11/19/2013 Time: 8:18:38 AM

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Chief, Engineering
Date:
Scale: AS SHOWN
Approval Recommended:
JOSEPH L. NING, P.A.
Chief, Engineering Branch
Approved by: TERRY F. BAUTISTA, P.E.
Chief, Engineering and Construction Division

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, Col, C.E.,
DISTRICT COMMANDER

BRAZOS ISLAND HARBOR, TEXAS
FEASIBILITY STUDY
BROWNSVILLE SHIP CHANNEL
52 FT DEEPENING PROJECT

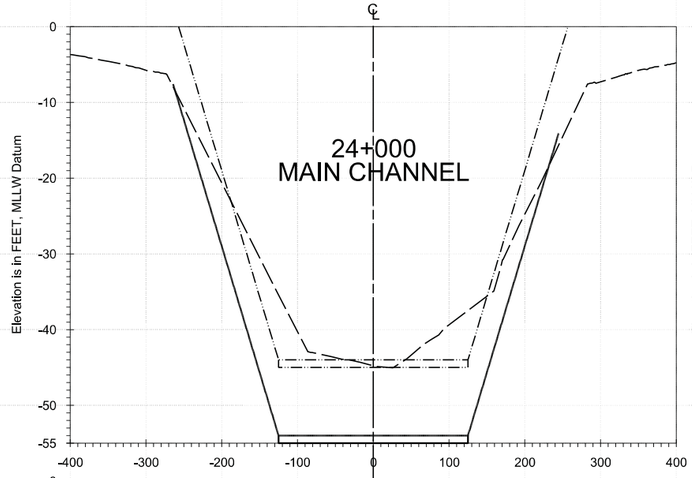
CROSS SECTIONS
ENTRANCE AND JETTY CHANNEL
STA. -15+000 TO STA. -1+000

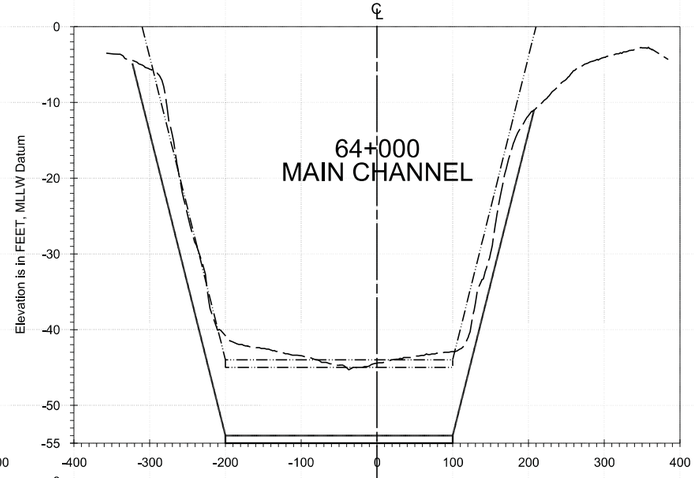
Drawing No.:

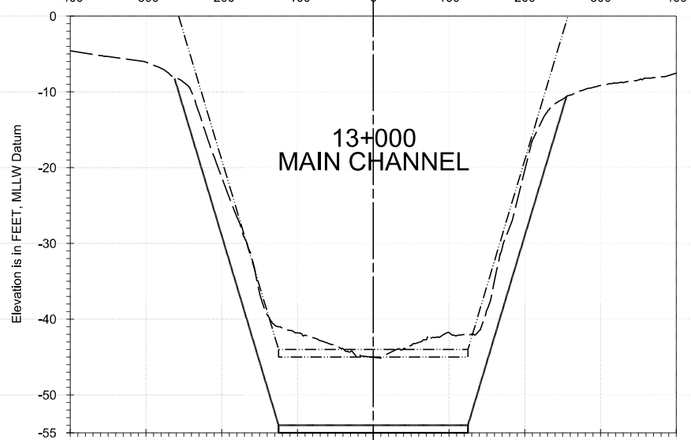
C-12

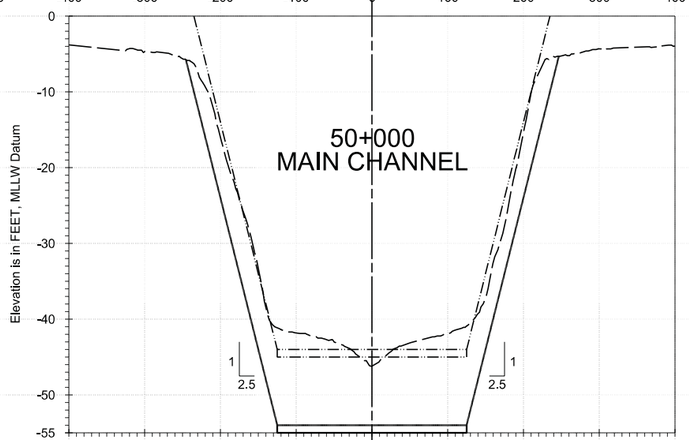
Sheet 14 of 51

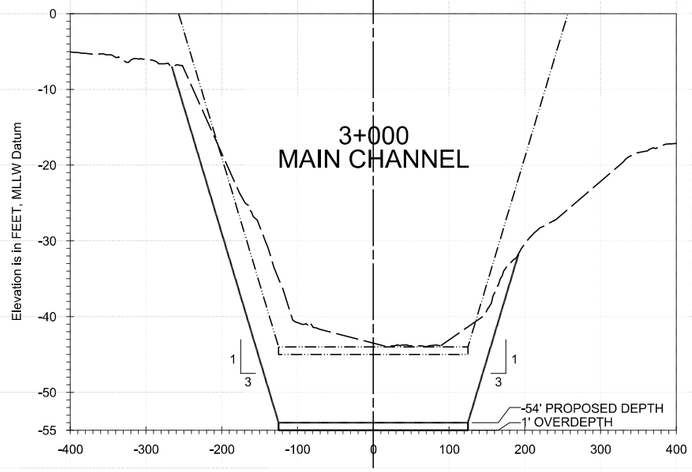
MAIN CHANNEL - STA. 3+000 TO STA. 79+415

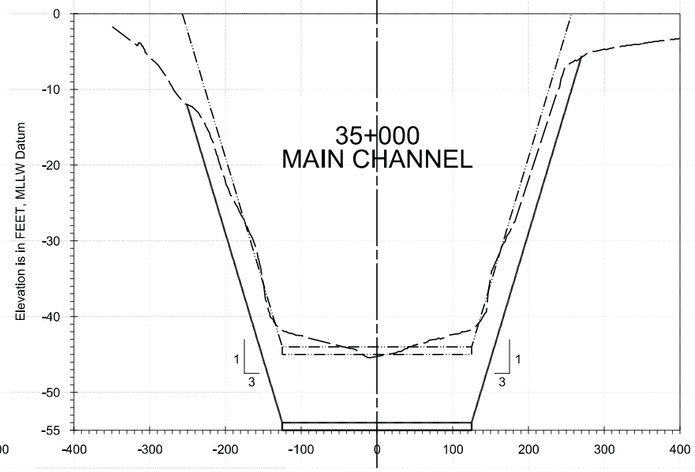


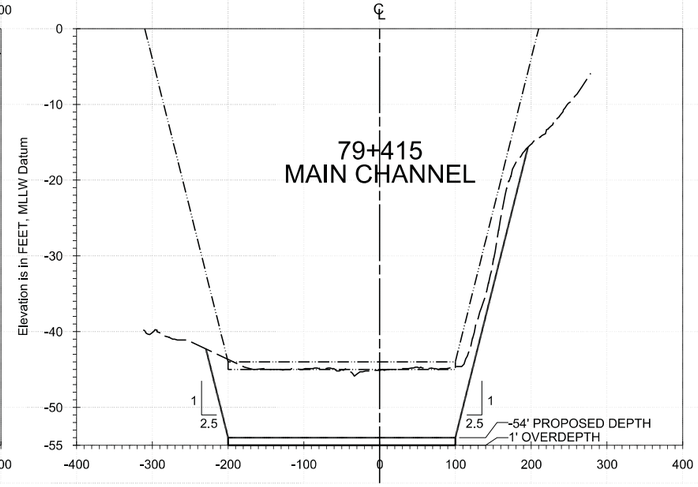












CHANNEL SURFACE
EXISTING CHANNEL
PROPOSED CHANNEL
EXISTING GROUND
Vertical Scaled 10 Times

NOTES:
1. CROSS SECTIONS PLOTTED LOOKING TOWARDS INCREASING STATIONS
2. VERTICAL DATUM IS IN MLLW (MEAN LOWER LOW WATER)
3. ADVANCED MAINTENANCE IS INCLUDED IN THE PROPOSED CHANNEL TEMPLATE SHOWN

File: W:\CADD\Projects\Rio\Brownsville Ship Channel_Study\Existing-Conditions\BIH-Plan-Xsecs-12-14.dgn
Model Name: 0-TYP Sections - 2
By: M3ODXMAN Date: 11/19/2013 Time: 8:18:39 AM

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Galveston District

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Submitted by: DAVID R. BROWN, P.E.
Chief, General Engineering
Date:
Scale: AS SHOWN
Approval Recommended:
JOSEPH L. MING, R.A.
Chief, Engineering Branch
Approved by: TERRY F. BAUTISTA, P.E.
Chief, Engineering and Construction Division

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL Col, C.E.,
DISTRICT COMMANDER

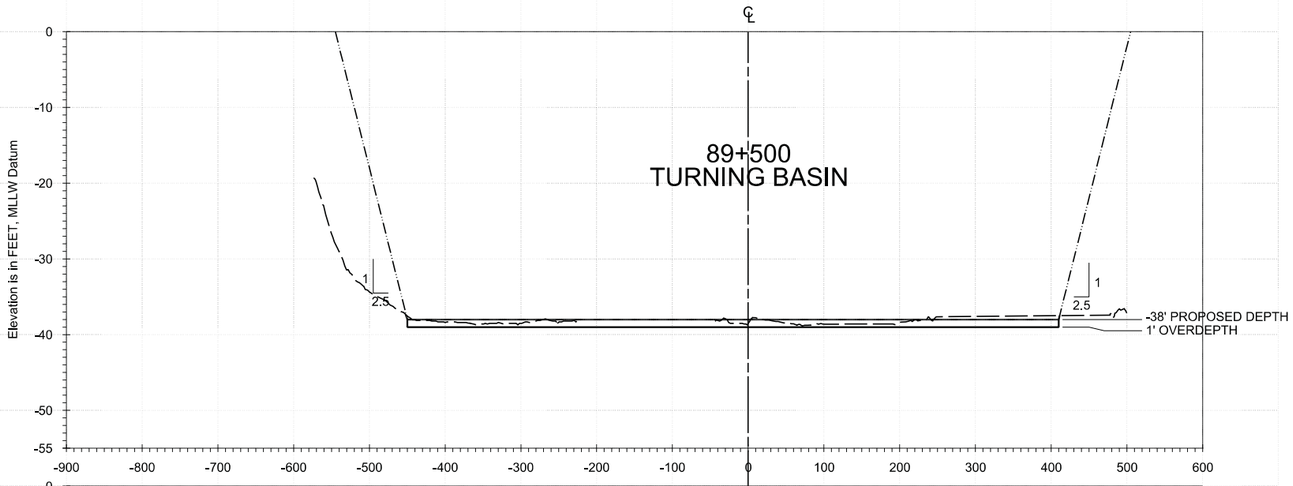
BRAZOS ISLAND HARBOR, TEXAS
FEASIBILITY STUDY
BROWNSVILLE SHIP CHANNEL
52 FT DEEPENING PROJECT
CROSS SECTIONS
MAIN CHANNEL
STA. 3+000 TO STA. 79+415

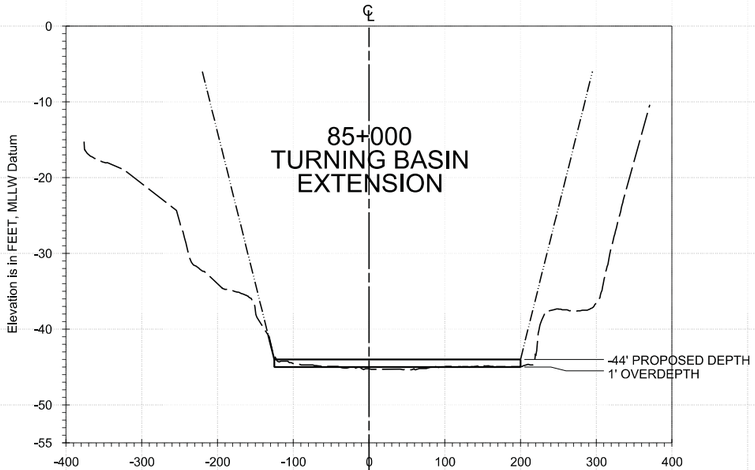
Drawing No.:
C-13
Sheet 15 of 51

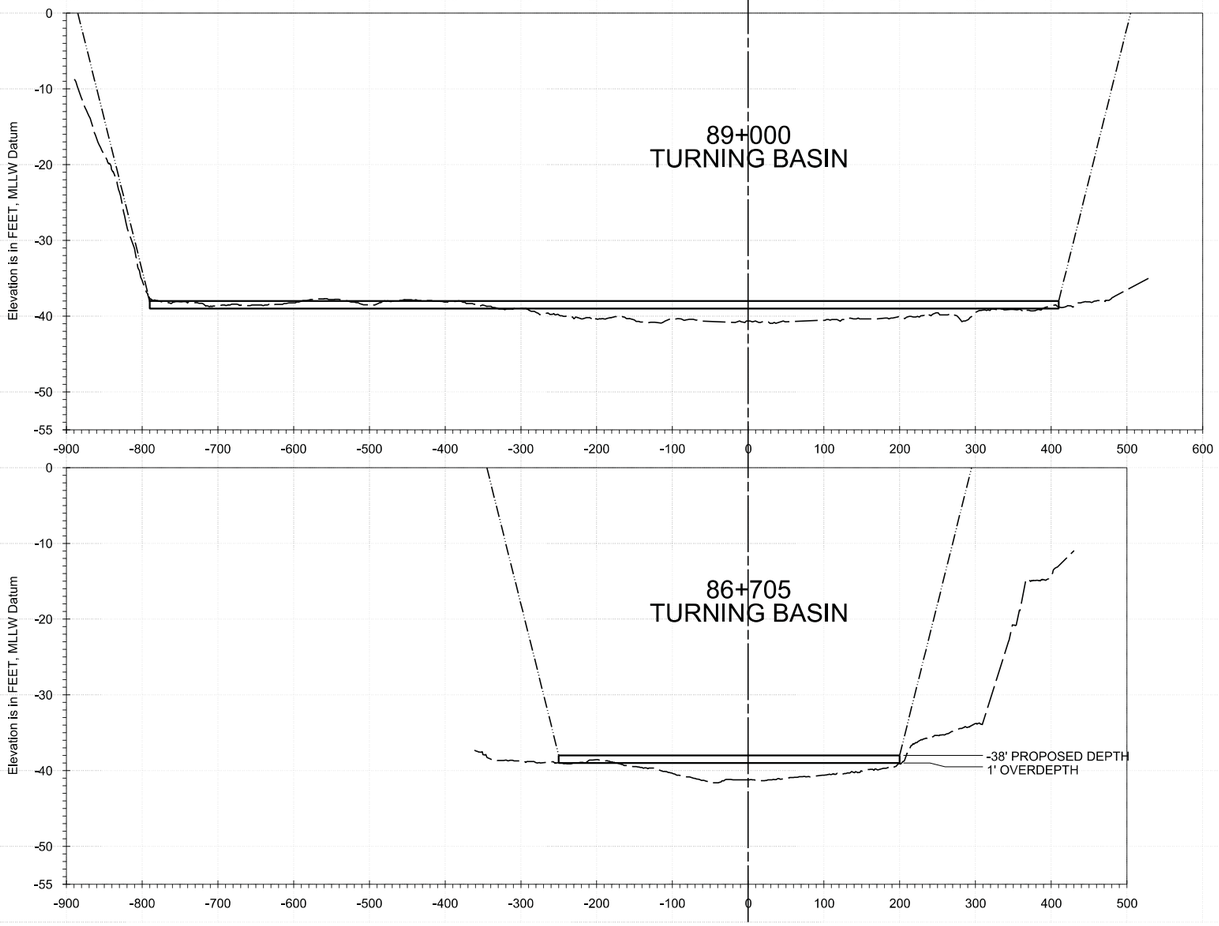
TURNING BASINS - STA. 82+000 TO STA. 89+500

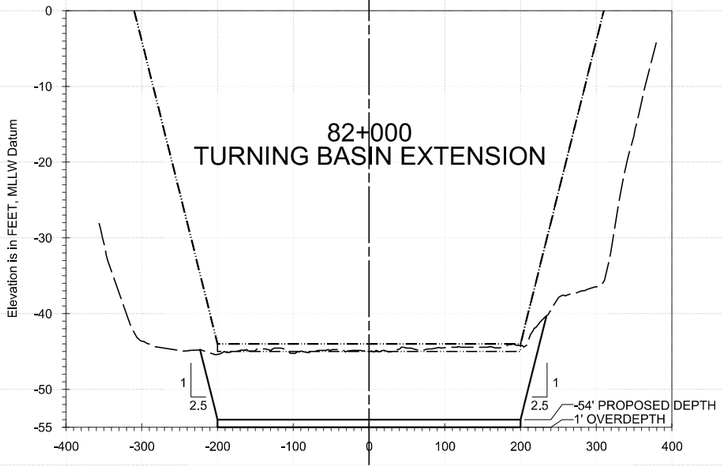
CHANNEL SURFACE
- EXISTING CHANNEL
- PROPOSED CHANNEL
- EXISTING GROUND

Vertical Scaled 10 Times









NOTES:
1. CROSS SECTIONS PLOTTED LOOKING TOWARDS INCREASING STATIONS
2. VERTICAL DATUM IS IN MLLW (MEAN LOWER LOW WATER)
3. ADVANCED MAINTENANCE IS INCLUDED IN THE PROPOSED CHANNEL TEMPLATE SHOWN

File: W:\CADD\Projects\Rio\Brownsville Ship Channel_Study\Existing-Conditions\BIH-Plan-Xsecs-12-14.dgn
Model Name: 0-TYP Sections - 3
By: M3ODXMAN Date: 11/19/2013 Time: 8:18:40 AM

U.S. Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

Drawn by:	MAN	Date:	Rev.
Designed by:	BRH	Scale: AS SHOWN	
Checked by:	BRH	Approval Recommended: JOSEPH L. KING, P.A. Chief, Engineering Branch	
Submitted by: DAVID K. BROWN, P.E. Chief, Engineering		Approved by: TERRY F. BAUTISTA, P.E. Chief, Engineering and Construction Division	

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
RICHARD P. PANNELL, Col, C.E.,
DISTRICT COMMANDER

BRAZOS ISLAND HARBOR, TEXAS
FEASIBILITY STUDY
BROWNSVILLE SHIP CHANNEL
52 FT DEEPENING PROJECT

CROSS SECTIONS
TURNING BASINS
STA. 82+000 TO STA. 89+500

Drawing No.:

C-14