

# HOUSTON SHIP CHANNEL (HSC) & BAYPORT SHIP CHANNEL (BSC) EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP) PROJECT 11: SOUTH BOATERS CUT TO BAYPORT (BEACON 76): HSC STA 57+000 TO HSC STA 14+500 & BAYPORT SHIP CHANNEL



SOLICITATION NO.: W912HY-XX-X-XXXX CONTRACT NO.: XXXXXX-XX-X-XXXX ISSUE DATE: DECEMBER 2020 VOLUME 5 OF 9

# Turner Collie & Braden Inc. GAHAGAN & BRYANTASSOCIATES, INC 5444 WESTHEIMER ROAD, SUITE 400 HOUSTON, TEXAS 77056 TBPE NO. F-10788

SC	OUTH BOATER	INDEX TO DRAWINGS - PROJECT 11: S CUT TO BAYPORT (BEACON 76) - HSC STA 57+000 TO HSC STA 14+500 & BAYPORT SHIP CHANNEL	ST HOUSTON THE
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DRED	GING		THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW AND IS NOT INTENDED TO BE USED FOR
11	CN101	OVERALL DREDGING PLAN AND KEY MAP	CONSTRUCTION, BIDDING, RECORDATION, CONVEYANCE, SALES OR AS THE BASIS FOR ISSUANCE OF A PERMIT
12	CN102	HSC DREDGE PLAN - 1 - FROM HSC STA 57+000 TO HSC STA 40+400	ENGINEER: Ashley P. Judith
13	CN103	HSC DREDGE PLAN - 2 - FROM HSC STA 40+400 TO HSC STA 29+000	P.E NO:112988
14	CN104	HSC DREDGE PLAN - 3 - FROM HSC STA 29+000 TO HSC STA 14+500.00	DATE:09-30-2021
15	CN301	HSC DREDGE CROSS SECTIONS - 1 - HSC STA 57+000 TO HSC STA 48+000	ENGINEER: Chester W. Hedderman
16	CN302	HSC DREDGE CROSS SECTIONS - 2 - HSC STA 47+000 TO HSC STA 37+000	P.E NO:
17	CN303	HSC DREDGE CROSS SECTIONS - 3 - HSC STA 36+000 TO HSC STA 28+605.06	
18	CN304	HSC DREDGE CROSS SECTIONS - 4 - HSC STA 28+000 TO HSC STA 24+000	APPROVED:
19	CN305	HSC DREDGE CROSS SECTIONS - 5 - HSC STA 23+000 TO HSC STA 14+500	
20	CN105	BSC DREDGE PLAN - 1 - FROM BSC STA 211+41.66 TO BSC STA 241+87.31	MANAGING DIRECTOR – ENGINEERING DESIGN & SUPPORT
21	CN106	BSC DREDGE PLAN - 2 - FROM BSC STA 111+00 TO BSC STA 211+41.66	PROJECT TITLE:
22	CN107	BSC DREDGE PLAN - 3 - FROM BSC STA 42+07.80 TO BSC STA 111+00	HOUSTON SHIP
23	CN306	BSC DREDGE CROSS SECTIONS - 1 - BSC STA 40+00 TO BSC STA 135+00	CHANNEL (HSC)
24	CN307	BSC DREDGE CROSS SECTIONS - 2 - BSC STA 140+00 TO BSC STA 225+00	
25	CN308	BSC DREDGE CROSS SECTIONS - 3 - BSC STA 230+00 TO BSC STA 239+22	
SHORE P			
26	CH101	BAYPORT SHIP CHANNEL NORTH SHORELINE PROTECTION PLAN	PROJECT (ECIP)
27	CH301	BAYPORT SHIP CHANNEL NORTH SHORELINE PROTECTION ROCK CROSS SECTIONS	
NAVIGA1	TION AIDES		
28	CN108	NAVIGATION AIDES PLAN	
PLACE	EMENT AREAS		PROJECT 11: SOUTH
29	CE101	PLACEMENT AREA PLAN - 1 ; SAN LEON OYSTER MITIGATION	BOATERS CUT TO
30	CE102	PLACEMENT AREA PLAN - 2 ; SAN LEON OYSTER MITIGATION	BAYPORT (BEACON 76)
31	CE103	PLACEMENT AREA - SAN LEON OYSTER MITIGATION - GEOMETRY & COORDINATE TABLES - 1	HSC STA 14+500
32	CE104	PLACEMENT AREA - SAN LEON OYSTER MITIGATION - GEOMETRY & COORDINATE TABLES - 2	& BAYPORT SHIP
33	CE301	PLACEMENT AREA - SAN LEON OYSTER MITIGATION - CROSS SECTIONS - 1	CHANNEL
34	CE302	PLACEMENT AREA - SAN LEON OYSTER MITIGATION - CROSS SECTIONS - 2	
35	CE303	PLACEMENT AREA - SAN LEON OYSTER MITIGATION - CROSS SECTIONS - 3	TITLE SHEET, STATE
36	CE304	PLACEMENT AREA - SAN LEON OYSTER MITIGATION - CROSS SECTIONS - 4	INDEX TO DRAWINGS
37	CE305	PLACEMENT AREA - SAN LEON OYSTER MITIGATION - CROSS SECTIONS - 5	
38	CE306	PLACEMENT AREA - SAN LEON OYSTER MITIGATION - CROSS SECTIONS - 6	REV DATE DESCRIPTION
39	CE307	PLACEMENT AREA - SAN LEON OYSTER MITIGATION - CROSS SECTIONS - 7	
40	CE308	PLACEMENT AREA - SAN LEON OYSTER MITIGATION - CROSS SECTIONS - 8	
41	CE309	PLACEMENT AREA - SAN LEON OYSTER MITIGATION - CROSS SECTIONS - 9	
42	CE310	PLACEMENT AREA - SAN LEON OYSTER MITIGATION - CROSS SECTIONS - 10	
43	CE311	PLACEMENT AREA - SAN LEON OYSTER MITIGATION - CROSS SECTIONS - 11	
44	CE105	PLACEMENT AREA PLAN - DOLLAR REEF OYSTER MITIGATION	
45	CE106	PLACEMENT AREA - DOLLAR REEF OYSTER MITIGATION - GEOMETRY & COORDINATE TABLES	
46	CE312	PLACEMENT AREA - DOLLAR REEF OYSTER MITIGATION - CROSS SECTION - 1	
47	CE313	PLACEMENT AREA - DOLLAR REEF OYSTER MITIGATION - CROSS SECTION - 2	
48	CE314	PLACEMENT AREA - DOLLAR REEF OYSTER MITIGATION - CROSS SECTION - 3	
49	CE315	PLACEMENT AREA - DOLLAR REEF OYSTER MITIGATION - CROSS SECTION - 4	DESIGNER: AJ
50	CE107	PLACEMENT AREA PLAN - NEW BIRD ISLAND MARSH	CADD: RK
51	CE108	PLACEMENT AREA - NEW BIRD ISLAND MARSH - GEOMETRY & COORDINATE TABLES	CHECKER: CH/SH/MM
52	CE316	PLACEMENT AREA - NEW BIRD ISLAND MARSH - TYPICAL SECTIONS & DETAILS - 1	SCALE: NONF
STRUCTI	JRES		DRAWING NO.
53	S-101	NEW DROP OUTLET STRUCTURE - NEW BIRD ISLAND MARSH	C90-D13-P11-005-GI001
54	S-102	NEW DROP OUTLET STRUCTURE DETAILS - 1	SHEET NO. REV. NO.

# **GENERAL NOTES:**

- 1. ALL EXISTING CHANNEL CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL NOTIFY THE PORT OF HOUSTON AUTHORITY AND ENGINEER IMMEDIATELY OF ANY CONFLICT OR DISCREPANCIES.
- 2. THE CONTRACTOR SHALL MAKE HIS OWN ARRANGEMENTS AND OBTAIN PERMISSION FROM APPLICABLE PROPERTY OWNERS FOR STAGING AREAS AND LOADING BARGES ON PUBLIC OR PRIVATE PROPERTY. ALL COSTS ASSOCIATED WITH PREPARATION AND USE OF SUPPORT FACILITIES FOR THIS PROJECT SHALL BE PAID BY THE CONTRACTOR AT NO COST TO THE PORT OF HOUSTON AUTHORITY. THESE AREAS SHALL BE RESTORED TO PRE-PROJECT CONDITIONS UPON COMPLETION OF WORK.
- 3. THE CONTRACTOR SHALL TAKE MEASURES TO PROTECT ALL EXISTING IMPROVEMENTS WITHIN AND ADJACENT TO THE WORK AREA. ANY DAMAGE CAUSED BY THE CONTRACTOR'S ACTIVITIES SHALL BE REPLACED OR REPAIRED AT THE EXPENSE OF THE CONTRACTOR AND AT NO COST TO THE PORT OF HOUSTON AUTHORITY. STRUCTURES THAT ARE TO BE PROTECTED FROM DAMAGE OR REPAIRED IF DAMAGED INCLUDE BUT ARE NOT LIMITED TO FENCES, LEVEE EMBANKMENTS, OUTLET STRUCTURES, DRAINAGE PIPES, ROADS, DITCHES, PRIVATE OR PUBLIC GROUNDS, AND OTHER STRUCTURES OR IMPROVEMENTS.
- 4. THE CONTRACTOR SHALL TAKE PRECAUTIONS, SECURE EQUIPMENT AND PROTECT THE WORK AGAINST ADVERSE WEATHER CONDITIONS AND SURGE / WAKE INFLUENCES FROM PASSING VESSELS. PROVISIONS SHALL BE MADE TO ACCESS SHALLOW AREAS THROUGH THE USE OF LIGHT-LOADED BARGES OR OTHER EQUIPMENT SUITABLE FOR SHALLOWER WATER. EXCAVATION FOR ACCESS AND FLOTATION SHALL BE SUBMITTED TO AND OBTAINED IN WRITING BY THE PORT OF HOUSTON AUTHORITY.
- 5. THE DREDGING PROJECT MAY BE ADJACENT TO ENVIRONMENTALLY SENSITIVE AREAS. THE CONTRACTOR SHALL AVOID / MINIMIZE DAMAGES TO THESE AREAS DURING THE COURSE OF CONSTRUCTION. ANY DAMAGES CAUSED BY THE CONTRACTOR'S ACTIVITIES SHALL BE RESTORED AT THE EXPENSE OF THE CONTRACTOR AND AT NO COST TO THE PORT OF HOUSTON AUTHORITY. THE CONTRACTOR SHALL COMPLY WITH APPLICABLE ENVIRONMENTAL LAWS AND REQUIREMENTS FROM ALL RELEVANT STATE AND FEDERAL AGENCIES. FOR PURPOSES OF CONTRACT MODIFICATIONS, SCOPE CHANGES, OR CHANGE ORDERS, THE PORT OF HOUSTON AUTHORITY WILL BE THE SOLE DETERMINANT OF DAMAGES. THIS PROVISION IN NO WAY RELIEVES THE CONTRACTOR FROM COMPLIANCE WITH APPLICABLE ENVIRONMENTAL REQUIREMENTS AND DOES NOT CONSTITUTE A WAIVER OF ANY COLLATERAL FEDERAL PERMITTING REQUIREMENTS OR LEGAL OBLIGATION OF THE CONTRACTOR. THE PORT OF HOUSTON AUTHORITY RESERVES THE RIGHT TO SUSPEND WORK AT ANYTIME IF DAMAGES OCCUR AND UNTIL SATISFACTORY CORRECTIVE MEASURES ARE IMPLEMENTED BY THE CONTRACTOR.
- 6 CONSTRUCTION EQUIPMENT SHALL NOT OPERATE ON PRIVATE PROPERTY UNLESS PERMISSION HAS BEEN ACQUIRED BY THE CONTRACTOR FROM THE LAND OWNER.
- 7. THE PROJECT IS LOCATED WITHIN THE THE HOUSTON SHIP AND BAYPORT SHIP CHANNELS, WHICH ARE HIGHLY UTILIZED BY MARINE TRAFFIC. THE CONTRACTOR SHALL NOT STAGE EQUIPMENT WITHIN THE NAVIGATION CHANNEL NOR INTERFERE WITH OR INTERRUPT COMMERCIAL VESSEL NAVIGATION.
- 8. THE CONTRACTOR SHALL REQUEST A NOTICE TO MARINERS FROM THE U.S. COAST GUARD PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES.
- 9. THE CONTRACTOR SHALL REMOVE ANY ENCOUNTERED DEBRIS AND DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.
- 10. THE LOCATIONS OF EXISTING UTILITIES AND SUBSTRUCTURES SHOWN HEREIN HAVE BEEN TAKEN FROM AVAILABLE RECORDS. THE PORT OF HOUSTON AUTHORITY DOES NOT WARRANT THE COMPLETENESS OR CORRECTNESS OF THE LOCATIONS OF UTILITIES AND SUBSTRUCTURES. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY AND PROTECT EXISTING UTILITIES AND SUBSTRUCTURES. SHOULD UTILITIES, PIPELINES, CABLING OR OTHER SUBSTRUCTURES BE ENCOUNTERED THAT ARE NOT IDENTIFIED AND INDICATED ON THESE PLANS, THE PORT OF HOUSTON AUTHORITY SHALL BE NOTIFIED IMMEDIATELY.
- 11. ATTENTION IS DIRECTED TO THE SPECIFICATIONS WHERE BIDDERS ARE REQUIRED TO EXAMINE AND DETERMINE, AS THEIR OWN RESPONSIBILITY THE LOCATION, PHYSICAL CONDITIONS, AND SURROUNDINGS OF THE PROPOSED WORK.
- 12. THE CONTRACTOR SHALL OBTAIN THE REQUIRED PERMITS AS MAY BE REQUIRED BEYOND THE AUTHORIZATIONS PROVIDED TO PERFORM THE WORK.
- 13. THE CONTRACTOR SHALL ADHERE TO ALL SAFETY CODES, REGULATIONS AND SPECIFICATIONS FOR THE DURATION OF THIS CONTRACT.
- 14. THE CONTRACTOR SHALL COMPLETE ALL WORK SHOWN ON THE DRAWINGS AND IN THE SPECIFICATIONS, UNLESS INDICATED AS NOT IN PACKAGE(N.I.P.).

# ABBREVIATIONS:

LEGEND:

AC	ACRES	3+000
AO	ALLOWABLE OVER DEPTH	
A.O.R	. ANGLE OF REPOSE	
APPROX	. APPROXIMATE	
ATON	. AIDES TO NAVIGATION	
BIM	BIRD ISLAND MARSH	
BRC	. BOLIVAR ROADS CHANNEL	
BSC	BAYPORT SHIP CHANNEL	XIII
CL	CENTERLINE	
DRM	. DOLLAR REEF MITIGATION	
EXIST	EXISTING	
FT	. FEET	
HSC	. HOUSTON SHIP CHANNEL	
LBI	LONG BIRD ISLAND	$\mathbf{\Theta}$
LT	. LEFT	$\bigcirc$
NO	NUMBER	$\bigcirc$
OS	OFFSET	
P.I	POINT OF INTERSECTION	
Ν	. NORTHING	
Е	EASTING	
MLLW	MEAN LOWER LOW WATER	
N.I.P	. NOT IN PACKAGE	
P.C	POINT OF CURVATURE	
РНА	PORT OF HOUSTON AUTHORITY	
Р.Т.	POINT OF TANGENCY	
RD	. REQUIRED DEPTH	
RO	REQUIRED OVER DEPTH	
RT	RIGHT	
SLM	SAN LEON MITIGATION	
STA	STATION	
TYP	. TYPICAL	
TOE	. CHANNEL TOE	



GEOTECHNICAL INVESTIGATION LOCATION

HISTORICAL BORINGS

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	SEA HIST COON EN P.E DA EN P.E DA P.E	AL: 95% F DOCUME RPOSE OF INTEN INTEN STRUCTIO VEYANCE, FOR ISS GINEER: E NO: TE: GINEER: E NO: TE: PROVED: DRT CON AGING D DES DJECT T OUS	PRE INT IS FINTEF IDED T SALES UANCE Ashl Og Cheste	LIMINA RELEASED NM REVIEWD O BE USED OF A PER BY P. J 112988 -30-2 r W. Hedd 100209 -30-2 r W. Hedd 100209 -30-2 r REPRESEN R - ENGI SUPPORT	RY FOR THE AND FOR PORTON, BASIS MIT. Udith 021 021 021 021 021	
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N 13840000	NOTES: 1. HORIZONTAL COORDINATES SHOWN ARE REFERENCED TO NAD 83 TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE 4204, U.S. SURVEY FEET. 2. HOUSTON SHIP CHANNEL (HSC) STATIONING REFERS TO CHANNEL CENTERLINE.	PORT OF AUT	HOUSTON HORITY
N 13820000			
N 13800000		SEAL: 95% PR THIS DOCUMENT PURPOSE OF IN NOT INTENDED CONVEYANCE, SA FOR ISSUAN ENGINEER: <u>AS</u> P.E NO: DATE: DATE:	ELIMINARY IS RELEASED FOR THE ITERIM REVIEW AND IS D TO BE USED FOR BIDDING, RECORDATION, LES OR AS THE BASIS ICE OF A PERMIT. hley P. Judith 112988 09-30-2021 ster W. Hedderman 100209 09-30-2021
N 13780000		APPROVED: PORT CONTRA MANAGING DIREC DESIGN PROJECT TITLE	DATE CT REPRESENTATIVE CTOR – ENGINEERING & SUPPORT
N 13760000		HOUST CHANN EXPANS CHANN IMPROV PROJEC	ON SHIP EL (HSC) SION EL /EMENT CT (ECIP)
N 13740000		SHEET TITLE: <b>PROJEC</b> REDFISH BOATERS HSC STA HSC STA HSC STA	<b>T 11:</b> TO SOUTH S CUT 98+000 TO 45+000
		REV DATE	DESCRIPTION
N 13700000			
ANNEI			
N13600000			
WT 3680000		DESIGNER:	AJ
		CADD: CHECKFR·	RK CH/SH/MM
		DATE:	DEC 2020
/		SCALE:	1" = 10,000'
20,000'		SHEET NO	REV. NO.





	I					
			NEW B	IR	D ISLAND M	ARSH
N 13	810000		BORI	NG		ATES
	Е 328	BC	ORING NO.	N	IORTHING	EASTING
		E	CP-1009-A	13	3,794,115.65	3,274,221.61
		E	CP-1010A	13	3,794,604.61	3,274,021.29
		E	CP-1011A	13	8,795,626.87	3,273,989.63
N 12805000		E	CP-1012A	13	8,796,612.99	3,274,156.01
		E	CP-1013A	13	8,797,557.30	3,274,515.49
N 130	803000	E	CP-1014A	13	8,797,985.81	3,274,872.72
		E	CP-1015A	13	8,797,888.17	3,275,391.74
		E	CP-1016A	13	8,797,430.98	3,276,300.99
		E	CP-1017A	13	8,796,779.75	3,277,067.32
		E	CP-1018A	13	3,795,946.31	3,277,707.67
		E	CP-1019A	13	8,795,482.19	3,277,903.80
N 13	800000 ——	E	CP-1021B	13	3,794,645.73	3,276,961.40
		E	CP-1022A	13	8,794,163.12	3,275,752.34
		E	CP-1024A	13	8,795,159.74	3,275,033.32
		E	CP-1025A	13	3,796,621.91	3,275,368.00
		E	CP-1026A	13	3,795,722.58	3,276,528.09
		E	CP-1100A	13	9,795,071.13	3,273,302.02
N 12	705000	E	CP-1101A	13	3,796,192.68	3,272,725.87
N 13	795000 —	ECP-1102A		13	3,797,543.51	3,272,569.53
		E	ECP-1103A		3,797,912.69	3,273,627.26
	HOUS	STC	N SHIP CI			
	BOR		G COORDI	NA	TES	
NG NO.	NORTHIN	C)	EASTING	à	STATION	CL OFFSET
130	13,769,049.	48	3 3,270,711.00		56+005.09	691.32 LT
131	13,769,470.	34	3,268,704.54		54+487.29	686.83 RT
132-A	13,773,793	.81	81 3,267,272.43		50+145.70	689.38 LT
133	13,775,543.	38	3,264,312.	04	46+992.24	681.94 RT
134	13,777,152.	87	3,263,133.60		44+997.48	692.26 RT
135	13,779,581.	42	3,263,077.	40	42+997.65	686.77 LT
136	13,782,023.	59	3,259,617.	75	38+990.39	682.64 RT
137-A	13,785,071.	68	3,259,087.	06	36+210.48	675.51 LT
138	13,786,070	.21	3,256,688.	29	33+994.71	681.51 RT
139-A	13.787.930	41	3.255.342	49	31+698 73	680 31 RT
140-A	13.789.681.	12	3.253.902.	90	29+436 41	819 28 RT
141	13.791.317.	42	3.254.986.	62	28+746.88	1.018.23 LT
142	13.794 204	53	3,253 569	85	25+267 63	688 72 I T
143	13 796 795	50	3,251 145	93	21+997 88	688 67 RT
144	13 800 187	19	3,251,145.93		18+80/ /5	608 20 I T
145	13 802 709	33	3 248 958	71	15+602 54	603.05 RT
10574	13 794 519	45	3 245 593	60	22+211 61	6 685 59 RT
1052	13 704 580	<u>90</u>	3 246 022	61	22+608 04	5 404 95 PT
1050	13 704 645	55	3 247 078	10	22+000.94	4 404 82 PT
	13 70/ 6/2	00 07	3 2/10 166	41	22-310.07	3 288 72 DT
1061	13 70/ 750	70	3 250 0/2	<del>-</del> 30	23-320.03	2 <u>1</u> 22 01.7 01 DT
	13 705 105	1 J 51	3 250 220	23 22	2310227.92	2,722.94 KI
1002-A	12 706 204	04	3 250 000	۲۲ مع	237003.62	1,320.00 KI
1003-A	12 707 540	00	3.230,002.	30 06	22+007.09	1,910.30 KI
1004-A	12,797,512.	00	3,249,380.	20	20+785.79	1,904.10 KI
	12 700 700	91 74	3,249,319.	29 16	20+033.93	1,911.14 KI
1000-A	13,198,136	.71	3,249,147.	01	19+484.86	1,092.00 KI

	BAYPORT SHIP CHANNEL (BSC) BORING COORDINATES					
RING NO.	NORTHING	EASTING	STATION	CL OFFSET		
P-201	13,793,352.46	3,250,927.10	221+01.70	313.888 LT		
P-202	13,793,134.47	3,246,722.93	177+94.75	338.704 LT		
P-203-A	13,792,928.68	3,243,112.06	141+78.04	327.711 LT		
P-204-A	13,792,794.19	3,241,300.52	123+61.88	290.994 LT		
P-205-A	13,792,269.87	3,233,162.81	42+07.74	205.769 LT		
P-206-A	13,792,248.52	3,232,700.13	37+44.59	209.372 LT		

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	EN(	GINEER: E NO:		<u>112988</u>		
	DA <sup>-</sup> EN(	IE:	Cheste	r W. Hedderman		
	P.E	E NO: TE:	09	100209 -30-2021		
	API	PROVED:		DATF		
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		DESI		SUPPORT	)	
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						10	USTON
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	DOLLAR RE	EF OYSTER I	MITIGATION			NºUS	TON, TEXP
N 13765000	BORI	NG COORDIN	ATES		PO		
	BORING NO.	NORTHING	EASTING			AU	THORITY
	ECP-1073	13,731,987.63	3,276,653.38		CO	NSULTAN	ит:
	ECP-1074	13,732,770.58	3,277,655.72				
	ECP-1075	13,733,655.94	3,278,135.66				
	ECP-1077	13,735,749.74	3,278,887.63				
	ECP-1078	13,736,386.68	3,279,028.54	J			
N 13760000							
	BORI	NG COORDIN	ATES				
	BORING NO.	NORTHING	EASTING			J •	
	ECP-1079	13,758,185.87	3,247,584.96			95% F	
	ECP-1080	13,759,601.80	3,248,554.50			RPOSE OF	TINTERIM REVIEW AND IS IDED TO BE USED FOR BIDDING RECORDATION
	ECP-1081	13,760,927.80	3,246,773.72		CON	VEYANCE, FOR ISS	SALES OR AS THE BASIS UANCE OF A PERMIT.
	ECP-1082	13,761,318.27	3,250,578.91		EN	GINEER:	Ashley P. Judith 112988
NI 40755000	ECP-1083	13,762,635.20	3,250,543.35		P.E   DA	_ NU: FE:	09-30-2021
N 13755000	ECP-1084	13,762,614.36	3,258,332.58		EN	GINEER: (	Chester W. Hedderman
	ECP-1085	13,763,522.10	3,257,356.40		P.E	E NO:	100209
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 13810000 — 0005 87 Ш	NOTES: 1. HORIZONTAL COORDINATES SHOWN ARE REFERENCED TO NAD 83, TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, 4204, U.S. SURVEY FEET.	HOUSE TO THE PORT OF	DN, TEXTS
13805000 ——	<ol> <li>VERTICAL DATUM IS MLLW.</li> <li>HOUSTON SHIP CHANNEL (HSC) AND BAYPORT SHIP CHANNEL STATIONING REFERS TO CHANNEL CENTERLINE.</li> </ol>	PORT OF AUTI	HOUSTON HORITY
13800000	<ul> <li>4. HYDROGRAPHIC SURVEY DATA SOURCES:</li> <li>a. HSC_LowerBay_2019-2020_MLLW.TXT: CONDITION SURVEY, HSC STATION 078+844 TO HSC STA 138+369 (LOWER BAY) GALVESTON COUNTY, TX DATED 11/20/2019 - 01/02/2019 AND 02/27/2019 &amp; 3/06/2020; PERFORMED BY GAHAGAN &amp; BRYANT ASSOCIATES, INC.</li> </ul>		
	b. HSC_MidBay_2019-2020_MLLW.txt CONDITION SURVEY, HSC STATION 028+605 TO 078+844 (MIDBAY) CHAMBERS COUNTY, TX DATED 10/28/2019 - 11/19/2019; PERFORMED GAHAGAN & BRYANT ASSOCIATES, INC.	SEAL: 95% PR THIS DOCUMENT PURPOSE OF IN NOT INTENDEL CONSTRUCTION, F CONVEYANCE, SA FOR ISSUAN	ELIMINARY IS RELEASED FOR THE TERIM REVIEW AND IS D TO BE USED FOR BIDDING, RECORDATION, LES OR AS THE BASIS CE OF A PERMIT.
13795000 ——	c. HSC_UpperBay_2019-2020_MLLW.txt CONDITION SURVEY, HSC STATION -0+003.94 TO 028+605 (UPPER BAY) CHAMBERS AND HARRIS COUNTY, TX; DATED 02/14/2020 - 02/28/2020 PERFORMED BY GAHAGAN & BRYANT ASSOCIATES, INC.	ENGINEER: <u>As</u> P.E NO: DATE: ENGINEER: <u>Che</u> P.E NO: DATE:	hley P. Judith <u>112988</u> <u>09-30-2021</u> ster W. Hedderman <u>100209</u> <u>09-30-2021</u>
	CONSTRAINTS KEY NOTES:	APPROVED:	
13790000 ——	1 EXISTING NAVIGATION CHANNEL	MANAGING DIREC DESIGN PROJECT TITLE	CTOR – ENGINEERING & SUPPORT
	2 EXISTING NAVIGATION CHANNEL	HOUST	ON SHIP EL (HSC)
	3 EXISTING NAVIGATION CHANNEL	EXPANS CHANN	SION EL
13785000 ——	<ul> <li>FIVE MILE CUT</li> <li>4 ENVIRONMENTALLY SENSITIVE AREA</li> <li>MID BAY</li> </ul>	IMPROV PROJEC	YEMENT CT (ECIP)
	5 EXISTING TURNING BASIN BAYPORT SHIP CHANNEL FLARE		
13780000	6 EXISTING NAVIGATION CHANNEL BAYPORT SHIP CHANNEL 7 EXISTING BERTHING FACILITIES	PROJECT SOUTH BO TO BAYPO 76): HSC S	<b>T 11:</b> DATERS CUT DRT (BEACON STA 57+000 TA 14+500 &
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	2. HOUSTO	ON SHIP CHANNEL (HSC) STATIONING		AUT	HORITY
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NOTES:

1. HORIZONTAL COORDINATES SHOWN ARE

REFERENCED TO NAD 83, TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, 4204, U.S. SURVEY FEET.

PORT OF HOUSTON

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<sup>95%</sup> SUBMITTAL





![](_page_14_Figure_7.jpeg)

![](_page_15_Figure_0.jpeg)

![](_page_15_Figure_2.jpeg)

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	9-30-2021			
	100209			
DATE:0	9-30-2021			
APPROVED:	DATE			
DESIGN	& SUPPORT			
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CONSTRUCTION, BIDDING, RECORDATION, CONVEYANCE, SALES OR AS THE BASIS FOR ISSUANCE OF A PERMIT.
ENGINEER: Ashley P. Judith
DATE:09-30-2021_
ENGINEER: Chester W. Hedderman
DATE:09-30-2021
APPROVED:
PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING DESIGN & SUPPORT
PROJECT TITLE:
CHANNEL (HSC)
EXPANSION
CHANNEL
PROJECT (ECIP)
SHEET TITLE:
BOATERS CUT TO
BAYPORT (BEACON

76) - HSC STA 57+000

TO HSC STA 14+500

**CROSS SECTIONS - 3** 

DESCRIPTION

HSC STA 36+000 TO HSC STA 28+605.06

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5.51	13793084.35	3251107.25
5.52	13793022.77	3250940.32
5.53	13793313.26	3251127.20
5.54	13793250.40	3250982.88
5.71	13795014.60	3252254.48
5.72	13793688.08	3252743.83
5.73	13790709.09	3253842.77
5.74	13790668.69	3253767.07
5.75	13791314.02	3253374.31
5.76	13791870.50	3252896.63
5.77	13792802.60	3250107.63
5.78	13792801.79	3250092.65
5.79	13793256.23	3250068.11
5.80	13793257.07	3250083.12
5.81	13794820.86	3252235.35
5.82	13791858.24	3253418.85

BAY	PORT SHIP (	CHANNEL CU	IRVE DATA	TABLE
NO.	RADIUS	DELTA	LENGTH	TANGENT
$\langle C1 \rangle$	2,000.00'	04° 30' 39"	157.46'	78.77'
<u>(C2</u> )	2,000.00'	61° 21' 29"	2,141.80'	1,186.52'
(C3)	3,999.79'	43° 08' 07"	3,011.25'	1,581.02'
<b>C</b> 4	2,266.27'	18° 37' 32"	736.71'	371.63'
(C5)	3,000.81'	48° 08' 00"	2,520.94'	1,340.24'

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	F						L)							G			-48 RE -53 AD -55 ALI	0.0 1 3 3 3 5 F1 0 0 1 3 5 F1 0 0 1 1 3 1 5 F1 0 0 1 1 5 F1 0 0 0 0 1 1 5 F1 0 0 0 0 0 0 0 0 0 0 0 0 0				DLINE	-10 -0 -10 -20 -30 -40 -50 -60		
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	JTH F		S OF OIUSLY D	LD BCS REDGEI			VARIES		· · · · · · · · · · · · · · · · · · ·					FLARE G		900 2	-48 RE -53 AD -55 ALI	0.0 1 3 3 3 5 F1 VAN 5 F1 LOW 210		LLW	VANCE EPTH 300 2	DLINE )	-10 -0 -10 -20 -30 40 -50 60 70 500		
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![](_page_24_Figure_3.jpeg)

	<b>GRAPHIC SCALES</b>	
0	HORIZONTAL: 1" = 200 200'	400'
0	VERTICAL: 1" = 20' 20'	40'

V LOW WATER (MLLW).

PTH TEMPLATE MUST BE

ONS ARE SKEWED TO YE AS SHOWN ON SECTIONS.

TINUATION, SEE HSC DREDGE CROSS SECTIONS, DWG NOS.

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	AL: 95% P S DOCUMEN RPOSE OF INTEND ISTRUCTION, IVEYANCE, S FOR ISSU, IGINEER: A E NO: ITE: E NO: ITE: PROVED: ORT CONTF VAGING DIR DESIG OJECT TIT IOUST	RELIMINARY IT IS RELEASED FOR THE INTERIM REVIEW AND IS DED TO BE USED FOR BIDDING, RECORDATION, SALES OR AS THE BASIS ANCE OF A PERMIT. Ashley P. Judith 112988 09-30-2021 hester W. Hedderman 100209 09-30-2021 DATE RACT REPRESENTATIVE RECTOR - ENGINEERING W & SUPPORT TLE: FON SHIP
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	-ΠΑΝΙ	NEL (HSC)
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95% SUBMITTAL

![](_page_25_Figure_0.jpeg)

# SHORE PROTECTION NOTES:

- 2. ROCK REMOVAL LIMITS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO WORK.

- 5. CONTRACTOR SHALL PROTECT ADJACENT EXISTING ROCK AND STRUCTURES DURING DREDGING.

![](_page_25_Figure_10.jpeg)

# **BSC NORTH SHORELINE - SHORE PROTECTION ROCK PLAN** SCALE: 1" = 300'

![](_page_25_Figure_14.jpeg)

95% SUBMITTAL

![](_page_26_Figure_0.jpeg)

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SEA HISP COON ENG P.E DAT APF MANA	L: 95% P DOCUMEN POSE OF OT INTENC FOR ISSU SINEER: <u>A</u> NO: E: NO: E: NO: ROVED: RT CONTI AGING DIF DESIG	PRELIMINARY AT IS RELEASED FOR THE INTERIM REVIEW AND IS DED TO BE USED FOR I, BIDDING, RECORDATION, SALES OR AS THE BASIS VANCE OF A PERMIT. Ashley P. Judith 112988 09-30-2021 hester W. Hedderman 100209 09-30-2021 DATE RACT REPRESENTATIVE RECTOR - ENGINEERING SN & SUPPORT
PRC H C	OUS HANI	TIE: TON SHIP NEL (HSC)
PRC H C E C I M P SHE PF SO TO		TLE: TON SHIP NEL (HSC) NSION NEL OVEMENT ECT (ECIP) CT 11: BOATERS CUT PORT (BEACON
PRC H C E C I M P SHE PF SO 76) HS BA CH		TLE: TON SHIP NEL (HSC) NEL VEMENT ECT (ECIP) T 11: BOATERS CUT PORT (BEACON STA 57+000 TO 20+000 & T SHIP EL
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![](_page_27_Figure_0.jpeg)

HSC NAVIGATION AIDES PLAN SCALE: 1" = 2500'

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7 8 8 7 7 8 ° Pile rep PA 8 8		
8 8 8 8 8		THOUSTON, TEXT
8 8 8 8		PORT OF HOUSTON AUTHORITY
8 9 ■ Plat 8 9 h 9 h 9 9		CONSULTANT:
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02 02 02 00 00 00 00 00 00 00 00 00 00 0		THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW AND IS NOT INTENDED TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, CONVEYANCE, SALES OR AS THE BASIS FOR ISSUANCE OF A PERMIT.
1,11,11,11,11,15,5 9 9 7 1,11,11,11,15,5 9 9 7 9 9 9 Piles 9 9 9 9 Piles 9 9		ENGINEER: <u>Asniey P. Judith</u> P.E NO:112988 DATE:09-30-2021
9 9 9 9 9 Sign -Subm pile rep PA		ENGINEER: <u>Chester W. Hedderman</u> P.E NO:100209 DATE:09-30-2021
9 9 9 so 10 8 9 8 9		APPROVED:
8 9 8 9 9 8 6 Marker		PROJECT TITLE: HOUSTON SHIP
9 8 12 8 9 9 8 12 8 9		CHANNEL (HSC) EXPANSION
9 9 9 9 Subm platforms (ruins) Platforms 9 10 9		CHANNEL IMPROVEMENT PROJECT (ECIP)
9 9 9 Platforms PA 9 9 9 9 9		SHEET TITLE:
9 9 9 9 ubm platform uins) PA 9 M g 9 9		BOATERS CUT TO BAYPORT (BEACON 76): HSC STA 57+000
9 9 10 9 9 10 7 9 7		& BAYPORT SHIP CHANNEL
10 10 9 M 9 10 9 9 Subm 13 platform (ruins) PA 9		NAVIGATION AIDES
9 10 9 9 9 9		REV     DATE     DESCRIPTION       x     xx/xx/xx     xxxx
9 9 10 PA		
10 10 10 10 9 9 9 9		
9 10 Pipes PA 10 Pipes PA 10 Ba 10 Pipes PA 10 Pipes PA		
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10 8 rivestra PA o riverra 11 7 0 9 12 9 Platform PpesPA 0 11 9 Platform PpesPA 0 11 9 Platform PpesPA 0 11 9 Platform PpesPA 0 11 9 Platform PpesPA 0 10 0 11 0 10 0		CADD:BSCCHECKER:NM/AJDATE:DEC. 2020
11 *Pipe PA sipes *PipePA 12 9 M *Pipe 12 *PipePA 10	NOTE	SCALE:         1"=2000'           DRAWING NO.         00-D12 P11 005 001000
0 2500' 5000'	ALL ATON LOCATIONS TO BE FIELD VERIFIED BY THE CONTRACTOR. LOCATIONS SHOWN ARE APPROXIMATE.	C90-D13-P11-005-CIN108           SHEET NO.         REV. NO.           28         0

![](_page_28_Picture_0.jpeg)

![](_page_29_Figure_0.jpeg)

E 3,258,000	E 3,260,000	E 3,262,000

		HOUSTON TO
N13,766,000	<ul> <li>NOTES:</li> <li>1. CONTOURS DEPICTED ON THIS MAP REPRESENT THE RESULTS OF SURVEYS MADE IN NOVEMBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.</li> <li>2. ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND ARE REFERENCED TO MLLW AND ARE BELOW THE REFERENCE PLANE UNLESS PRECEDED BY A PLUS (+) SIGN.</li> <li>3. CROSS SECTIONS OF EACH PAD ARE PROVIDED IN SHEETS</li> </ul>	CONSULTANT: TUTNER COLLIE O BRACIEN INC. GANAGAN & BRYANT ASSOCIATES, INC. 5444 WESTHEIMER ROAD, SUITE 400 5444 WESTHEIMER ROAD, SUITE 400 5444 WESTHEIMER ROAD, SUITE 400 5444 WESTHEIMER ROAD, SUITE 400 5444 WESTHEIMER ROAD, SUITE 400 5445 PROD. F-10788
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N13,762,000		EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)SHEET TITLE:PROJECT 11: SOUTH BOATERS CUT TO BAYPORT HSC STATION 057+000 TO 014+500 & BSC STATION 238+37 TO 42+00PLACEMENT AREA PLAN - 2 SAN LEON OYSTER MITIGATIONREVDATEDATEDESCRIPTION X XX/XX/XX XXX
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	GANAGA ASSOC 5444 WESTHEIM HOUSTON, TEPE N	1 & BRYANT DATES, INC IR ROAD, SUITE 400 TEXAS 77056 0. F-10788
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IN THESE SECTIONS REPRESENT THE RESULTS OF SURVEYS MADE ON NOVEMBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT

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# <u>NOTES:</u>

- SLM S-3 20.0 AC 22,869 TONS
- 1. ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW.
- 2. EXISTING BAY BOTTOM DEPICTED IN THESE SECTIONS REPRESENT THE RESULTS OF SURVEYS MADE ON NOVEMBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.

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CONVEYANCE, SALE FOR ISSUANCE	S OR AS THE BASIS OF A PERMIT.
engineer: Ash	ley P. Judith
P.E NO: DATE:0	9-30-2021
ENGINEER: Chest	er W. Hedderman
P.E NO:	100209
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APPROVED:	DATE
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95% SUBMITTAL

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- ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW.
   EXISTING BAY BOTTOM DEPICTED IN THESE SECTIONS REPRESENT
- IN THESE SECTIONS REPRESENT THE RESULTS OF SURVEYS MADE ON NOVEMBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.

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	5444 WE HO	STHEIMER USTON,	(A) (3), (N)(5 R ROAD, SUITE 400 TEXAS 77056
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PUI	RPOSE OF	F INTER	RIM REVIEW AND IS
CON	VEYANCE, FOR ISS	SALES	S OR AS THE BASIS OF A PERMIT.
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P.I	E NO:		112988
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EN -	GINEER: (	_neste	r w. Hedderman
P.I	Ξ NO: TF·	09	-30-2021
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- SLM S-5 20.0 AC 22,869 TONS
- 1. ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW.
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-6.5

-7.0

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ANGLE OF

REPOSE

- TARGET ELEV. -8.2' (+/- 0.5')

MIN. TARGET

RELIEF 18"

80 100 120 140 160 180 200

PORT OF	HOUSTON ORITY
CONSULTANT:	
Turner Collie GAHAGAN 5444 WESTHEIMEI HOUSTON, TBPE NO	<b>Braden Inc.</b> <b>BRYANT</b> <b>ATES, INC</b> R ROAD, SUITE 400 IEXAS 770566 . F-10788
SEAL: 95% PRE THIS DOCUMENT IS PURPOSE OF INTER NOT INTENDED T CONSTRUCTION, BID CONVEYANCE, SALES FOR ISSUANCE	LIMINARY RELEASED FOR THE RIM REVIEW AND IS O BE USED FOR DING, RECORDATION, S OR AS THE BASIS OF A PERMIT.
P.E NO:	<u>112988</u>
DATE:OS	er W. Hedderman
P.E NO:	100209
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	<b>mer C</b> <b>68HA</b> <b>88</b> 5444 WE	Ollie (O Braclen Ind GAN & BRYANT SOCIATES, INC STHEIMER ROAD, SUITE 400 USTON, TEXAS 77056 TEPE NO. F-10788	<b>c</b> 3
SEA THIS PUF CON CON EN P.E DA	AL: 95% F DOCUME RPOSE OF NOT INTEN STRUCTIO VEYANCE, FOR ISS GINEER: E NO: GINEER: E NO:	PRELIMINARY INT IS RELEASED FOR TH INTERIM REVIEW AND I IDED TO BE USED FOR N, BIDDING, RECORDATIO SALES OR AS THE BAS UANCE OF A PERMIT. Ashley P. Judith 112988 09-30-2021 Chester W. Heddermo 100209	HES N,S n II
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	ORT CON AGING DI DESI	TRACT REPRESENTATIVE IRECTOR — ENGINEERIN IGN & SUPPORT	i NG
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- SLM S-6 17.2 AC 19,667 TONS
- 1. ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW.
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- SLM S-7 20.0 AC 22,869 TONS
- 1. ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW.
- 2. EXISTING BAY BOTTOM DEPICTED IN THESE SECTIONS REPRESENT THE RESULTS OF SURVEYS MADE ON NOVEMBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.

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ANGLE OF

REPOSE

- TARGET ELEV. -8.0' (+/- 0.5')

505080

MIN. TARGET RELIEF 18"

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FOUSTOI	N, TEXP
PORT OF	HOUSTON
AUTH	ORITY
	& Prodon Inc
GAHAGAN	O Diduce I II IC. 1 & Bryant Nateg INA
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SEAL: 95% PRE	
THIS DOCUMENT IS PURPOSE OF INTE	RELEASED FOR THE RIM REVIEW AND IS
NOT INTENDED CONSTRUCTION, BID CONVEYANCE, SALE	IO BE USED FOR DDING, RECORDATION, S OR AS THE BASIS
for issuance <sub>ENGINFFR</sub> . Ashl	ey_P. Judith
P.E NO:	112988
DATE:09	9-30-2021
ENGINEER: Cheste	W. Hedderman
P.E NO: DATE:09	9-30-2021
APPROVED:	DATE
PORT CONTRACT	
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PROJECT TITLE:	
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PROJECT 1	1: SOUTH
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- <u>SLM S-8</u> 6,861 TONS
- 1. ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW.
- 2. EXISTING BAY BOTTOM DEPICTED IN THESE SECTIONS REPRESENT THE RESULTS OF SURVEYS MADE ON NOVEMBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.



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- <u>SLM S-9</u> 9.0 AC 10,291 TONS
- 1. ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW.
- 2. EXISTING BAY BOTTOM DEPICTED IN THESE SECTIONS REPRESENT THE RESULTS OF SURVEYS MADE ON NOVEMBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.



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- <u>SLM S-10</u> 3,888 TONS
- 1. ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW.
- 2. EXISTING BAY BOTTOM DEPICTED IN THESE SECTIONS REPRESENT THE RESULTS OF SURVEYS MADE ON NOVEMBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.



PORT OF HOUSTON
PORT OF HOUSTON
PORT OF HOUSTON
AUTHORITY CONSULTANT:
Turner Collie & Braden Inc. Gahagan & Bryant Associates, inc
5444 WESTHEIMER ROAD, SUITE 400 HOUSTON, TEXAS 77056 TBPE NO. F-10788
SEAL:
95% PRELIMINARY THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW AND IS
NOT INTENDED TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, CONVEYANCE, SALES OR AS THE BASIS FOR ISSUANCE OF A PERMIT.
ENGINEER: <u>Ashley P. Judith</u> P.E NO: <u>112988</u>
DATE:09-30-2021
P.E NO:100209 DATE:09-30-2021
APPROVED:
PORT CONTRACT REPRESENTATIVE MANAGING DIRECTOR – ENGINEERING DESIGN & SUPPORT
CHANNEL (HSC)
EXPANSION
PROJECT 11: SOUTH BOATERS CUT TO
BAYPORT HSC STATION
057+000 TO 014+500 & BSC STATION 238+37 TO 42+00
PLACEMENT AREA -
SAN LEON OYSTER MITIGATION CROSS SECTION - 11
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CADD: RK CHECKER: NK/SH
DATE: DEC 2020 SCALE: AS SHOWN
DRAWING NO. C90-D13-P11-005-CF311
SHEET NO. REV. NO.

- SLM S-11 13.2 AC 15,094 TONS
- 1. ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW.
- 2. EXISTING BAY BOTTOM DEPICTED IN THESE SECTIONS REPRESENT THE RESULTS OF SURVEYS MADE ON NOVEMBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.



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			Ashley P. Judith
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- DRM B-1 20.0 AC 22,869 TONS
- 1. ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW.
- 2. EXISTING BAY BOTTOM DEPICTED IN THESE SECTIONS REPRESENT THE RESULTS OF SURVEYS MADE ON NOVEMBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.

-5.0

-5.5

-6.0

-6.5

-7.0

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ANGLE OF

REPOSE

• TARGET ELEV. -6.0' (+/- 0.5')

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MIN. TARGET

RELIEF 18"

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	AU <sup>.</sup>	THORITY
( CO	NSULTAN	Т:
Tu	merCo	llie&Braden Inc.
	Gaha	gan & Bryant
	5444 WES	CUATES, INC
	HOU	STON, TEXAS 77056 BPE NO. F-10788
SE/	AL: 05% E	
THIS	DOCUMEN	IT IS RELEASED FOR THE
PUI	RPOSE OF	INTERIM REVIEW AND IS DED TO BE USED FOR
CON	STRUCTION	SALES OR AS THE BASIS
	FOR ISSU	Nance of a permit.
EN	GINEER: <u>/</u>	112000
P.I	E NO:	
DA	TE:	
EN	GINEER: C	hester W. Hedderman
P.(	E NO:	100209
DA	TE:	09-30-2021
API	PROVED:	
		DATE
PC	ORT CONT	RACT REPRESENTATIVE
	AGING DI	SN & SUPPORT
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PORT OF HOUSTON

95% SUBMITTAL

REV. NO.

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C90-D13-P11-005-CE312

SHEET NO.

46



- DRM B-2 20.0 AC 22,869 TONS
- 1. ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW.
- 2. EXISTING BAY BOTTOM DEPICTED IN THESE SECTIONS REPRESENT THE RESULTS OF SURVEYS MADE ON NOVEMBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.

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ANGLE OF

REPOSE

- TARGET ELEV. -6.2' (+/- 0.5')

MIN. TARGET RELIEF 18"

& HOUSTON TO
OSTON, TEN
PORT OF HOUSTON
CONSULTANT: Turner Collie & Braclen Inc. GAHAGAN & BRYANT ASSOCIATES, INC 5444 WESTHEIMER ROAD, SUITE 400 HOUSTON, TEXAS 77056 TEPE NO. F-10788
SEAL: 95% PRELIMINARY THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW AND IS NOT INTENDED TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, CONVEYANCE, SALES OR AS THE BASIS FOR ISSUANCE OF A PERMIT. ENGINEER: <u>Ashley P. Judith</u> P.E NO: <u>112988</u> DATE: <u>09-30-2021</u> ENGINEER: <u>Chester W. Hedderman</u> 1002200
P.E NO:100209 DATE:09-30-2021
APPROVED:
PORT CONTRACT REPRESENTATIVE MANAGING DIRECTOR – ENGINEERING DESIGN & SUPPORT
IMPROVEMENT PROJECT (ECIP)
SHEET TITLE: PROJECT 11: SOUTH BOATERS CUT TO BAYPORT HSC STATION 057+000 TO 014+500 & BSC STATION 238+37 TO 42+00
PLACEMENT AREA - DOLLAR REEF OYSTER MITIGATION CROSS SECTION - 2
DESIGNER: DC
CADD: RK CHECKER: NK/SH
DATE: DEC 2020
DRAWING NO.
C90-D13-P11-005-CE313

95% SUBMITTAL

47



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- ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW. . EXISTING BAY BOTTOM DEPICTED IN THESE SECTIONS REPRESENT
- THE RESULTS OF SURVEYS MADE ON NOVEMBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.

HOUSTON
STON, TEXP
PORT OF HOUSTON
CONSULTANT:
Turner Collie & Braden Inc. GAHAGAN & BRYANT ASSOCIATES, INC 5444 WESTHEIMER ROAD, SUITE 400 HOUSTON, TEXAS 77056 TBPE NO. F-10788
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ENGINEER: <u>Ashley P. Judith</u> P.E NO: <u>112988</u> DATE: 09-30-2021
ENGINEER: Chester W. Hedderman P.E NO:
DATE:U9-30-2021
PORT CONTRACT REPRESENTATIVE MANAGING DIRECTOR – ENGINEERING DESIGN & SUPPORT
PROJECT TITLE: HOUSTON SHIP
EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)
SHEET TITLE: PROJECT 11: SOUTH BOATERS CUT TO BAYPORT HSC STATION 057+000 TO 014+500 & BSC STATION 238+37 TO 42+00 PLACEMENT AREA - DOLLAR REEF
OYSTER MITIGATION CROSS SECTION - 3
REV     DATE     DESCRIPTION       x     xx/xx/xx     xxxx
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DESIGNER: DC CADD: RK CHECKER: NK/SH DATE: DEC 2020
DESIGNER: DC CADD: RK CHECKER: NK/SH DATE: DEC 2020 SCALE: AS SHOWN
DESIGNER: DC CADD: RK CHECKER: NK/SH DATE: DEC 2020 SCALE: AS SHOWN DRAWING NO. C90-D13-P11-005-CE314



# NOTES:

- DRM B-4 20.0 AC 22,869 TONS
- 1. ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW.
- 2. EXISTING BAY BOTTOM DEPICTED IN THESE SECTIONS REPRESENT THE RESULTS OF SURVEYS MADE ON NOVEMBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.

-5.0

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ANGLE OF

REPOSE

• TARGET ELEV. -6.5' (+/- 0.5')

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RELIEF 18"

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PORT OF HOUSTON

AUTHORITY

Turner Collie & Braden Inc. GAHAGAN & BRYANT ASSOCIATES, INC 5444 WESTHEIMER ROAD, SUITE 400 HOUSTON, TEXAS 77056 TBPE NO. F-10788

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ENGINEER: Ashley P. Judith

ENGINEER: Chester W. Heddermai

112988

09-30-2021

100209

09-30-2021

CONSULTANT:

SFAI :

P.E NO: \_\_\_\_

P.E NO: \_\_\_\_

DATE: \_\_\_\_

DATE: \_\_\_\_









-1.0 FT MLLW -3.5 FT MLLW	<ul> <li>NOTES:</li> <li>1. ALL ELEVATIONS ARE IN U.S. SURVEY FEET AND REFERENCED TO MLLW.</li> <li>2. DIKE TEMPLATE TO BE SHAPED AND DRESSED ABOVE ELEVATION -3 FT MLLW.</li> <li>3. GEOTEXTILE FABRIC SHALL BE IMBEDDED/TIED INTO ROCK 3 FEET TO A MAXIMUM OF 5 FEET LATERALLY WITH 1-FOOT OF ROCK COVER.</li> </ul>	CONSULTANT: TUTNER COLLIE CONSULTANT: TUTNER COLLIE CAHAGAN & BRYANT ASSOCIATIES, INC. 5444 HOUSTON, TEXAS 77056 TOPE NO. F-10788
$\frac{PHIC SCALES}{40' 80'}$ CAL: 1" = 20' 20' 40'		SEAL: 95% PRELIMINARY THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW AND IS NOT INTENDED TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, CONVEYANCE, SALES OR AS THE BASIS FOR ISSUANCE OF A PERMIT. ENGINEER: Ashley P. Judith P.E NO:12988 DATE:09-30-2021 ENGINEER: Chester W. Hedderman P.E NO:100209 DATE:09-30-2021 APPROVED:DATE PORT CONTRACT REPRESENTATIVE MANAGING DIRECTOR - ENGINEERING DESIGN & SUPPORT PROJECT TITLE: HOUSTON SHIP CHANNEL (HSC) EXPANSION CHANNEL
$\frac{GRAPHIC SCALES}{10RIZONTAL: 1" = 20'}$ $\frac{20'  40'}{10'  20'}$		CHANNEL         IMPROVEMENT         PROJECT (ECIP)         SHEET TITLE:         PROJECT 11: SOUTH         BOATERS CUT TO         BAYPORT (BEACON 76):         HSC ST 57+000 TO HSC         STA 20+000 & BAYPORT         SHIP CHANNEL         PLACEMENT AREA -         NEW BIRD ISLAND         MARSH - TYPICAL         SECTIONS & DETAILS - 1
$\frac{\text{GRAPHIC SCALES}}{\text{HORIZONTAL: 1" = 20'}}$ $\frac{10'}{10'}$		DESIGNER: DC CADD: RK CHECKER: NK/SH DATE: DEC 2020 SCALE: AS SHOWN DRAWING NO. C90-D13-P11-005-CE316 SHEET NO. REV. NO. 52 0



	HOUSTON
	TOUSTON, TEXAS
	PORT OF HOUSTON
	AUIMURIIIT CONSULTANT:
30" O.D. Steel Pipes	
	SEAL: 95% PRELIMINARY
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A	CONVEYANCE, SALES OR AS THE DISC FOR ISSUANCE OF A PERMIT. ENGINEER: <u>Ashley P. Judith</u>
	P.E NO:112988 DATE:09-30-2021
	ENGINEER: Chester W. Hedderman 100209
	DATE:09-30-2021
	APPROVED:DATE
	PORT CONTRACT REPRESENTATIVE MANAGING DIRECTOR – ENGINEERING DESIGN & SUPPORT
	PROJECT TITLE:
	CHANNEL (HSC)
	EXPANSION
NOTES:	
DIKE CROWN TO OUTLET STRUCTURE.	
2. OUTLET STRUCTURE SHALL BE CAPABLE OF BOARDING TO FULL HEIGHT.	SHEET TITLE: PROJECT 11: SOUTH
3. BELOW – 3.0' MLLW ELEVATION SIDE SLOPE IS AT ANGLE OF REPOSE.	BOATERS CUT TO BAYPORT (BEACON
4. MINIMUM PIPE THICKNESS ½" CONFORMING TO ASTM A36.	76) HSC STA 57+000 TO HSC STA 14+500
5. HANDKAILS KEQUIKED UN BUIN SIDES UF WALNWAI.	& BAYPORT SHIP CHANNEL
10.0'	STRUCTURE - NEW
	REV DATE DESCRIPTION
ANGLE UF KEPUSE	
	DESIGNER: MM
	CADD: BSC CHECKER: MM / PT
	DATE:         DEC. 2020           SCALE:         1" = 6'
	DRAWING NO.
	C90-D13-P11-003-3-101           SHEET NO.         REV. NO.
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C90-D13-P11-005-S-102

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ENO P.E	GINEER: <sup>(</sup> E NO:	Cheste	r W. Hedderm 100209 -30-2021	<u>an</u> 
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**TECHNICAL SPECIFICATIONS** 

FOR

HOUSTON SHIP CHANNEL (HSC) & BAYPORT SHIP CHANNEL (BSC)

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

PROJECT 11: SOUTH BOATERS CUT TO BAYPORT (BEACON 76):

HSC STA. 57+000 to HSC STA. 14+500 & BAYPORT SHIP CHANNEL:

BSC STA. 238+37.21 to BSC STA. 42+07.80

### Submitted by:

The Joint Venture Texas Engineering Firm F-10788 5444 Westheimer Suite 200 Houston, Texas 77056

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### LIST OF APPENDICES TO THE TECHNICAL SPECIFICATIONS

Appendix A: Probing Logs, Location Table, and Maps

#### Appendix B: Boring Logs

Appendix C: Coast Chart No. 204 Galveston Bay, Texas

Appendix D: NOAA Chart 11327

### **1 GENERAL INFORMATION**

### **1.1 GENERAL**

Administration and performance of the work shall be subject to the General Conditions, Special Conditions, and these Technical Specifications. Should it be discovered that information within these Technical Specifications conflicts with the General Conditions and/or Special Conditions, the Port Authority and Engineer shall be notified immediately. Additional and/or supplemental requirements shown herein shall not be considered as conflicting.

### **1.2 PROJECT DESCRIPTION**

This project consists of two parts, work as part of the Houston Ship Channel Expansion Improvement Project and the Bayport Ship Channel Expansion Improvement Project. These projects are described in this section.

### 1.2.1 HOUSTON SHIP CHANNEL EXPANSION CHANNEL IMPROVEMENT PROJECT

This segment of the Houston Ship Channel Expansion Channel Improvement Project encompasses dredging of the Houston Ship Channel (HSC) from approximate Station 57+000 to approximate Station 15+500 and a bend easing at Station 28+605. New work (NW) dredging will widen the existing 530-foot wide channel equally on each side to a new 700-foot wide channel as shown on the Plans. Barge lanes shall be replaced in-kind to their existing dimensions to the outside of the channel widening as shown on the Plans. Depending on shoaling, maintenance dredging may be awarded as an option pay item and shall occur within the existing federal channel template from HSC Station 57+000 to Station 15+500, referred to as "HSC Maintenance Dredging" for these Technical Specifications, and shall be excavated and placed within PA14 or PA15 as mutually agreed upon by the Contractor and Engineer and as shown on the Plans. Maintenance dredging of the HSC shall be performed prior to new work dredging and will be measured separately for payment.

New work dredging of the HSC shall be performed to the lines and grades shown on the Plans. The existing 530-foot wide template was created with a 3H:1V slope (maintained at 2.5H:1V) beginning at the authorized depth of minus 46 feet mean lower low water (MLLW) with 2 feet of advance maintenance and 2 feet of allowable overdepth. The new work template shall have a 4H:1V slope from HSC Station 57+000 to 56+000, a transition from a 4H:1V slope to a 3H:1V slope from Station 56+000 to Station 55+800, and a 3H:1V slope from HSC Station 55+800 to Station 31+059.92, beginning at the required depth of minus 48 feet MLLW, with 2 feet of allowable overdepth; and a 3H:1V slope from HSC Station 31+059.92 to Station 15+500 beginning at the required depth of minus 48.5 feet MLLW, with 2 feet of allowable overdepth. New work materials from HSC Station 57+000 to Station 15+500 include the channel widening, bend easing and relocations of the barge lanes as shown on the Plans.

Additionally, the following option work may be awarded:

- New work dredging of the HSC from Station 15+500 to 14+500 may be awarded as an option pay item. New work material removed from Station 15+500 to 14+500 shall be used to complete construction of Bird Island Marsh if awarded.
- New work dredging of the HSC from Station 37+000 to 35+000, within the green side channel widening, may be awarded as an option pay item. If awarded, the new work material removed from Station 37+000 to 35+000 (green channel side only) shall be used to complete construction of oyster reef mitigation pads at Dollar Reef (DRM) and San Leon (SLM). New work material remaining within the required new work template after completion of the oyster pads shall be removed as part of HSC new work dredging to Bird Island Marsh.

New work material removed from HSC Station 35+000 to 28+605 shall be used to construct oyster reef mitigation pads at Dollar Reef and San Leon. New work material used for the construction of oyster reef pads at Dollar Reef and San Leon shall be mechanically placed in order to minimize water quality impacts. All remaining HSC new work material shall be hydraulically dredged and pumped to construct Bird Island Marsh (BIM). The oyster mitigation pads, and Bird Island Marsh features shall be constructed in their entirety.

Dollar Reef oyster mitigation site is located just offshore of Dollar Point, west of the HSC. Construction includes mechanical placement of new work materials to provide for the minimum lines and grades shown on the Plans to construct four (4) 20-acre pads to create a foundation for cultch material. San Leon oyster mitigation site is located just offshore of Bacliff, west of the HSC and northwest of the proposed Dollar Reef oyster pads. Construction includes mechanical placement of new work materials to provide for the minimum lines and grades shown on the Plans to construct one (1) 3.4-acre pad, one (1) 6-acre pad, one (1) 9-acre pad, one (1) 13.2-acre pad, one (1) 17.2-acre pad, five (5) 20-acre pads, and one (1) 31-acre pad to create a foundation for cultch material.

Bird Island Marsh is an approximate 240-acre triangularly shaped marsh located east of the HSC in Trinity Bay. Construction includes placement of dredged material to provide for the minimum lines and grades shown on the Plans to construct three approximate 2-acre bird islands, each surrounded by a 2,224-foot length oyster reef wave trip at each corner of Bird Island Marsh and an armored dike approximately 3,850-feet in length connecting each of the bird islands. A minimum 30-inch cultch layer shall be placed over the oyster reef wave trips to provide 100% coverage of each approximate 5.4-acre oyster reef wave trip. Rip rap shall be placed along the perimeter of the dikes to minimize wave impacts. In addition, three new drop-outlet structures shall be installed along the perimeter of Bird Island Marsh as shown on the Plans.

For the purposes of these Technical Specifications, new work materials and the corresponding channel stations and elevations used for the construction of each placement area shall be referred to as follows:

- 1. **Dollar Reef** NW Dredging HSC to Dollar Reef
- 2. San Leon NW Dredging HSC to San Leon

#### 3. Bird Island Marsh – NW Dredging HSC to BIM

The work herein consists of furnishing all labor, materials, tools, equipment, plant, supplies, superintendence, insurance, incidentals, and other services necessary or required; and performing all excavation, transportation, and placement of dredged, or otherwise excavated material, into the designated placement areas to the lines and grades shown on the Plans.

#### **1.2.2 BAYPORT SHIP CHANNEL EXPANSION IMPROVEMENT PROJECT**

The Bayport Ship Channel Expansion Improvement Project encompasses the dredging of the Bayport Ship Channel (BSC) from approximate Station 238+37.31 at the start of the BSC Flare to approximate Station 42+07.80. New work dredging will occur within the excavation area for channel widening along the northern limits of the BSC and southern limits of the BSC Flare. The excavation area for channel widening includes a 55-foot widening from Stations 222+75.87 to 135+00, a transition from a 55-foot widening to a 105-foot widening from Station 135+00 to 115+00, a 105-foot widening from Station 115+00 to 49+61.30 and a transition back to the existing channel from Station 49+61.30 to 42+07.80. The excavation area for widening of the BSC Flare includes a tapered 85-foot widening from Station 234+36.61 to 238+37.31. Depending on shoaling, maintenance dredging may be awarded as an option pay item and shall occur within the existing channel template for the BSC and BSC Flare from Station 238+37.31 to Station 42+07.80, referred to as BSC Maintenance Dredging for these Technical Specifications, and placed at discharge locations as mutually agreed upon by the Contractor and Engineer and as shown on the Plans. Maintenance dredging of the BSC and BSC Flare shall be performed prior to new work dredging and will be measured separately for payment.

New work dredging of the BSC, and Berths No. 1 and 7 shall be dredged within the horizontal limits shown on the Plans to a required depth of minus 48.5 feet MLLW with 2 feet of allowable overdepth. The existing channel is approximately 400 feet wide from Stations 223+00 to 135+000 which transitions to approximately 350 feet wide from Stations 115+00 to 25+58.69 with a 2.5H:1V slope beginning at the authorized depth of minus 46.5 feet MLLW with 2 feet of advance maintenance and 2 feet of allowable overdepth. New work materials from BSC Station 222+75.87 to Station 42+07.80 include the channel widening on the north (red) side of the BSC at variable widths as shown on the Plans.

New work dredging of the BSC Flare shall be dredged within the horizontal limits shown on the Plans to a required depth of minus 48.5 feet MLLW with 5 feet of advanced maintenance and 2 feet of allowable overdepth.

New work materials shall be utilized to construct Bird Island Marsh. For the purposes of these Technical Specifications, New Work Hydraulic Dredging of the Bayport Ship Channel Stations 222+75.87 to 42+07.80, Berths No. 1 and 7, and BSC Flare shall be referred to as NW Dredging BSC to BIM.

The work herein consists of furnishing all labor, materials, tools, equipment, plant, supplies, superintendence, insurance, incidentals, and other services necessary or required; and performing all

excavation, transportation, and placement of dredged, or otherwise excavated material, into the designated placement areas to the lines and grades shown on the Plans.

### **1.3 DREDGE PLANT**

Dredge, attendant plant and equipment shall be capable of working in exposed marine environments that are prone to potential rough sea conditions. The dredge proposed for use shall be complete with all necessary materials, supplies (including fuel, power, and water), labor, and have the capacity of an average daily production rate of 15,000 cubic yards of new work dredging per day.

In addition, at the Port's discretion, the bidder may be required to show to the satisfaction of the Port of Houston Authority that the bidder has the necessary experience, ability, and financial resources to perform the work in a satisfactory manner and within the time stipulated, and has had experience in marine construction works involving the dredging of hard new work materials, or of dredging materials of a more complex nature as to be dredged under this contract. Maintenance dredging contracts are not considered projects similar in nature or complexity.

### **1.4 REFERENCES**

- Federal, State, and local laws, rules and regulations governing the disposal of materials and wastes in navigable waters including approval of the appropriate Texas Commission on Environmental Quality for the discharge of any materials and wastes in the navigable waters within its jurisdiction and including the provisions of 33 U.S.C. 1342.
- Refuse Act (33 U.S.C. 407) (Section 12, of the River and Harbor Act of 1988)
- Federal, State and local rules and regulations governing the control of air pollutants (30 T.A.C. 116) including those governing the burning of debris or wastes (30 T.A.C 111).
- General Regulations of the Department of the Army and of the Coast Guard governing lights and day signals for vessels working on wrecks, dredges, and vessels engaged in laying cables or pipes or in submarine or bank protection operations
- Federal Migratory Bird Treaty Act and the Endangered Species Act of 1973.

### **1.5 TECHNICAL DEFINITIONS**

<u>Contractor</u>: The term Contractor means the licensed independent contractor appointed by the PHA and named in the Contract agreement and is the party responsible for the work.

<u>Cultch:</u> Material that will serve as the substrate for oyster spat attachment.

<u>Demobilization</u>: The term demobilization shall include the work in connection with demobilization of the plant and equipment utilized to perform work under the various bid items and include the cost to remove pipelines to and at the placement area(s) (where applicable). The Contract price shall include

transportation and all other costs incidentals for the removal of the plant and equipment from the work sites.

<u>Dike</u>: This term shall mean the earth fill portions of the new dike structure and all other fills within the limits of the dike system, including rock armor and geotechnical/geotextile membranes.

<u>Embankment:</u> The term embankment shall mean the earth fill portions of the work or other fills related to the work, and all other fills within the limits of the work.

<u>Engineer</u>: The Engineer shall mean the engineer or engineers, or the firm, or firms, employed to provide professional engineering services. The Engineer is the Port Authority's Design Consultant, for matters concerning the work as defined in the Contract Documents.

<u>Excavation</u>: Excavation shall mean the removal of material to the lines and grades shown in the Plans and specified in these Technical Specifications herein.

<u>Final Grade</u>: Final grade shall mean the surveyed constructed lines and elevations after completion of final shaping and grading.

<u>Final Shaping and Grading</u>: This term shall mean the work necessary to construct the dike or embankment to the required template, within allowable tolerances.

<u>Gross Retention Rate</u>: The gross retention rate is the sum of the actual quantity of fill measured within the limits of the survey divided by the gross quantity of material dredged for a particular fill reach.

<u>Hydraulic Fill</u>: Hydraulic fill shall mean the initial placement of hydraulically dredged materials. The initial placement quantity of hydraulic fill shall provide sufficient material to accomplish final shaping and grading of the constructed dikes or embankments to the required lines and grades shown in the Plans.

Limits of Recovery: The limits of depth and distance from the newly constructed hydraulic fill features, within which material shown by cross-sections after hydraulic placement can be recovered during shaping and grading, to construct the placement area features to final grade. The bottom limit of recovery shall be the preconstruction grade or bay bottom prior to placement of materials, as determined from the preconstruction survey. The horizontal distance limit shall be determined by the Contractor, and approved by the Engineer, as to the distance between the intersection of the hydraulically placed material with that of the preconstruction grade or bay bottom. At no time shall materials displaced by the hydraulic placement process (mudwave) be considered recoverable material or be used to construct or shape the hydraulic fill features.

<u>Maintenance Dredging</u>: The term maintenance dredging shall mean the removal of material above the existing (pre-project) dredging template and shoaled material that accumulates within the newly constructed channel template.

<u>Mean Lower Low Water</u>: Mean Lower Low Water (MLLW) is the vertical tidal datum used by the United States Army Corps of Engineers (USACE) Southwest Galveston District. USACE provided datum conversions by reach are provided on the Plans.

<u>Mechanical Fill</u>: Mechanical fill shall mean any material excavated from borrow areas within or adjacent to the placement areas, or material excavated from within the dredging limits and placed using mechanical means and methods including, but not limited to, excavators, draglines, dozers, loaders, dump trucks, or other non-waterborne machinery.

<u>Minimum Placement Rate</u>: The minimum rate in tons per acre of cultch material to place that the Contractor determines is necessary to achieve the required elevation considering displacement.

<u>Minimum Required Quantity</u>: The minimum amount of material the Contractor anticipates will be necessary to achieve the required elevation, based on the Minimum Placement Rate, and calculated as specified in Technical Specification Section 11.6.3.

<u>Mobilization</u>: The term mobilization shall include the work in connection with mobilization of the plant, equipment, and personnel necessary to perform the work under various bid items and include the cost to place and handle pipelines to and at the placement area(s) (where applicable). The Contract price shall include transportation and other costs incidental to delivery of the plant and other equipment to the general work area in condition ready for operation.

<u>Net Retention Rate</u>: The net retention rate is the neat-line fill quantity, in cubic yards, within the fill template divided by the gross quantity of in situ material dredged for a particular fill reach.

<u>New Work Dredging</u>: The term new work dredging shall mean removal of material not classified as maintenance material within the new work dredging template as shown on the Plans and described herein.

<u>New Work Materials</u>: New work materials are defined as predominantly virgin materials and may consist of: soft silts and muds; soft, firm, stiff, very stiff, hard, lean and fat clays; fine to coarse and loose to very dense sands; silty sands; calcareous nodules; rock; and shell; as generally represented on the boring logs provided in Appendix B.

<u>Noise Abatement</u>: Noise abatement is the implementation of special sound control measures in order to control noise produced by dredging operations.

<u>Oyster Reef Wave Trip</u>: This term is used in this Contract to refer to the individual structure shown, which is defined by area, length, width, minimum required quantity of fill and cultch, and minimum required elevations and thickness of cultch.
<u>Permit</u>: The term permit shall mean all permits obtained by the Port Authority and shall include the USACE permit and any other permits required for work, whether obtained by the Port Authority or the Contractor.

<u>P.I.'s, P.C.'s, and P.T.'s</u>: These terms shall mean points of intersection, points of curvature (i.e. the beginning of a curve), and points of tangency (i.e. the end point of a curve), respectively.

<u>Pipeline Management</u>: The term pipeline management shall include the work in connection with laying, removing and handling of dredge pipelines, maintenance of pipelines during construction, final cleanup of pipeline routes utilized to perform the work under various bid items. The Contract price shall include transportation and all other costs incidental to delivery of the pipelines to the general work area in condition ready for operation.

Plans: The Plans shall mean the drawings as defined in the General Conditions Section 1.21.

<u>Port Authority</u>: The Port of Houston Authority of Harris County, Texas is a political subdivision of the State of Texas. The terms "Port", "Port Houston", "Port of Houston Authority", "PHA" and "Port Authority" are synonymous with the Port of Houston Authority of Harris County, Texas. The Port Authority is independent and not a part of the government of Harris County, Texas or the City of Houston.

<u>Recoverable Material</u>: Satisfactory material retained within the limits of recovery.

<u>Reef Pad</u>: This term is used in this Contract to refer to the individual structure shown, which is defined by area, length, width, minimum required quantity of mechanical fill and cultch, and minimum required elevations and thickness of cultch. This term is synonymous with "oyster mitigation pads", "oyster reef mitigation pads" and "oyster pads".

<u>Retention Dike</u>: The term retention dike shall mean a ridge of mechanically constructed material to control the flow of hydraulically placed material.

<u>Seeding and Fertilizing</u>: Work consists of preparing seedbeds, furnishing and placing seeds and fertilizer, and other operations necessary for the permanent establishment of a warm season perennial grass and forb mix from seed.

<u>Shoaled Materials</u>: The term shoaled materials shall mean the material that accumulates over time above the previously dredged surface, consisting of mostly silts, clays, sands, and shells. This includes accretion of materials due to the dredging process and weather-related shoaling.

# **1.6 EQUIPMENT DEFINITIONS**

<u>Crawler-Type Tractors</u>: Crawler-type tractors used for spreading and compacting shall weigh not less than 30,000 pounds, shall exert a unit tread pressure of not less than 5 pounds per square inch, and shall not be operated at a speed to exceed 5 miles per hour.

<u>Hydraulic Dredge</u>: Characterized by the use of a centrifugal pump to dredge sediment and transport it, in a liquid slurry form, to a discharge area.

<u>Mechanical Dredge</u>: Characterized by the use of some form of a bucket to excavate and raise the bottom material.

<u>Miscellaneous Equipment</u>: Scarifiers, draglines, disks, excavators, motorized graders, spreaders, and other low ground pressure equipment shall be suitable for construction of hydraulic fill. Trucks, scrapers, and other types of earth-hauling equipment, if used, shall be suitable for construction. Matting, if used or required, shall be of sufficient size, quantity, and strength for the types of equipment that will work from or cross over the mats and for the types of foundation on which matting will be placed upon during the period of construction that the matting is used. Additional equipment used to facilitate movement of the dredge pipes to place hydraulic fill, construction of training retention dikes to maximize retention of hydraulic fill, and grading and shaping of hydraulic fill, shall be of suitable horsepower, track configuration, tread pressure, blade size, bucket size, and other attachments where applicable, to accommodate the varying types of terrain and foundation conditions where work will be performed.

<u>Spillbarge</u>: The Contractor must also have a "spill barge" to place the hydraulically dredged new work materials in the open water placement areas. The Contractor shall have an electronic positioning system onboard.

Transport Vessel: Barges used to transport dredged, fill, shell or rock material

# 1.7 SPECIAL SCHEDULING REQUIREMENTS

# 1.7.1 ORDER OF WORK

The Contractor's order of work shall be based on the following order of work. The Contractor shall determine its means and methods for conducting the work and shall maintain a five nautical mile distance from all other dredges operating within the HSC, BSC and Barbours Cut Channel (BCC). Alternative sequencing may be submitted in writing and approved by the PHA.

1. HSC Maintenance (Option 2), if awarded

HSC Maintenance shall be completed prior to commencement of new work dredging. HSC maintenance dredging may be coordinated with BSC NW Dredging subject to approval by the Engineer.

2. NW Dredging HSC to Dollar Reef and NW Dredging HSC to San Leon

The construction sequence of individual oyster pads located at Dollar Reef and San Leon shall be determined by the Contractor, unless otherwise restricted by the Contract Documents. Oyster pads at Dollar Reef and San Leon must both be completed, including cultch placement, before commencing NW Dredging HSC to BIM. This requirement may be waived at the discretion of the Engineer based on proven completion of oyster mitigation pads throughout Contract construction.

3. NW Option Dredging HSC to Dollar Reef and San Leon (Option 1), if awarded

NW Option Dredging HSC to Dollar Reef and San Leon shall only be awarded if additional new work dredge material is needed to complete construction of the oyster pads at Dollar Reef or San Leon oyster mitigation sites. Only the amount of new work material required to complete the oyster pad construction shall be removed from the HSC as part of the work exercised under this item. New work material remaining within the limits of the required new work dredge template shall be removed hydraulically as part of the work described under NW Dredging HSC to BIM.

The construction sequence of items 3 – 6 below shall be determined by the Contractor, unless otherwise restricted by the Contract Documents or further stipulations described below.

4. NW Dredging HSC to BIM

The sequence of construction of the hydraulic fill template at Bird Island Marsh, including three 2-acre bird islands, a perimeter dike and three surrounding oyster reef wave trips shall be determined by the Contractor.

5. BSC Maintenance (Option 2), if awarded

Maintenance dredging of the BSC and BSC Flare shall be completed prior to commencement of BSC new work dredging. BSC maintenance dredging may be coordinated with HSC NW Dredging subject to approval by the Engineer.

6. NW Dredging BSC to BIM.

The Contractor may accomplish NW Dredging BSC to BIM concurrently with NW Dredging HSC to Dollar Reef and NW Dredging HSC to San Leon, subject to approval by the Engineer. The sequence of dredging within the BSC new work limits, including the BSC Flare and Berth Dredging, shall be determined by the Contractor, unless otherwise restricted by the Contract Documents.

7. NW Option Dredging HSC to BIM (Option 1), if awarded

New work option dredging shall only be performed if exercised by the PHA. If awarded, the Contractor shall determine his/her own construction sequence for the work.

#### **1.8 PERMITS**

The Contractor shall comply with all applicable permits and/or other obligations required by law.

#### **1.8.1 CONTRACTOR OBTAINED PERMITS**

Any necessary permits not provided by the Port Authority shall be the responsibility of the Contractor as described in Section 5 of these Technical Specifications. The Contractor shall make application for and pay for any necessary permit fees, temporary or permanent utility interruption(s) and/or relocation fees, transportation, and temporary staging areas at no direct cost to the PHA.

# **1.9 WORK ACCORDANCE**

All work shall be accomplished in accordance with the Contract Documents, including these Technical Specifications, the Plans, appendices, and other parts of the Contract Documents. Any changes made by the Contractor to these Technical Specifications or appendices therein, or variances in construction from the work defined in the Contract Documents, without written authorization by the Engineer, shall become the express responsibility of the Contractor at its own risk and cost.

# **1.10 LOCAL CONDITIONS AND SITE PHYSICAL DATA**

Information furnished herein is for the Contractor's reference. However, it is expressly understood that the PHA and Engineer are not responsible for any interpretation or conclusion drawn by the Contractor. The Port Authority and Engineer are also not responsible for any lack of information herein pertaining to physical conditions at the site. Likewise, the Port Authority and Engineer will not be responsible for any information provided to the Contractor by any information agency or other party. The Contractor shall make every effort possible to familiarize itself with and research the conditions and operational impacts.

## 1.10.1 SUBSURFACE MATERIAL AND GENERAL SITE CONDITIONS

The material to be removed is composed of new work, maintenance and shoaled materials that have accumulated over a period of time. Geotechnical investigations including probings and core borings, to analyze the character of materials to be removed, and the material characteristics at the placement areas, have been conducted by the Port Authority and the results of these investigations are included with these Technical Specifications as Appendix A and Appendix B. The Contractor is expected to examine these Technical Specifications, Plans, and the site, and after investigation and research, decide for itself the character, quality, and quantity of the material to be dredged and the characteristics, whether surface, subsurface, or otherwise, at the placement areas. The Contractor is expressly encouraged to perform its own investigations and research to determine the character of materials and satisfy itself as to the means and methods required to perform the work herein specified. The Engineer shall be immediately notified of any site conditions that may adversely affect the performance of the work.

## **1.10.2 DEBRIS**

Other materials including, but not necessarily limited to, scrap rope, wire cable, scrap metal, anchors, anchor chains, timbers, snags, stumps, fiberglass, metal, piles, buoys, buoy anchors, or other rubbish or other obstructive materials encountered during dredging activities shall be disposed of in accordance with any and all applicable Federal, State, or local requirements. The Contractor shall expect debris to be encountered particularly in the interior of the BSC channel along the widened portions of the new work dredging. No separate payment shall be made for removal and disposal of debris. Magnetometer

investigations have been conducted by the Port Authority and the results of these investigations are shown in the Plans. Magnetometer data provided in the Plans is for informational purposes only and shall not be considered as the basis of determination for the presence or non-presence of debris or other obstructions. The Contractor shall perform its own investigations and satisfy itself in determining the presence of debris or other obstructions at its sole risk and cost. The costs for debris removal, disposal, downtime, or damages resulting therefrom shall be included in the Contract unit price for dredging.

## **1.10.3 TIDAL CONDITIONS**

Under ordinary conditions, the mean tidal range is approximately 1-foot and the diurnal tidal range is approximately 1.1 feet as determined by the NOAA tide station at Eagle Point, TX. The height of the water level is largely dependent on the force, direction, and duration of the wind. Larger seasonal tidal events shall be anticipated and expected by the Contractor.

#### **1.10.4 MARINE CONDITIONS**

Strong currents and rough sea conditions may at times exist in and adjacent to the work locations. The Contractor should familiarize itself with the daily and extreme conditions that could influence safety and work operations throughout the duration of this work. Impact and rework of partially completed work components due to marine conditions shall not be just cause for increased compensation. Information on water conditions at the site may be found on the NOAA Tides and Currents website http://tidesandcurrents.noaa.gov for the Eagle Point, TX tide gauge, Station ID 8771013, which is near the Project vicinity.

#### 1.10.5 SHIP WAKE

Commercial watercraft uses all the waters in the vicinity of the areas to be dredged, both during the day and night, and effects can be observed at the dredging and placement areas. Passage from large ship traffic can cause high ship wakes, and ship induced waves and currents. The Contractor shall take measures as it deems appropriate to ensure against damages to the work or itself resulting from ship wakes, and ship induced waves and currents. Effects from ship wakes, and ship induced waves and currents shall not be just cause for increased compensation or allowable downtime due to mechanical failure resulting from ship wakes or ship induced waves and currents.

Channel traffic may consist of, but not necessarily limited to, deep draft ships, tugs, tows consisting of a tug with one or more barges, small boats of various sizes, sailboats, recreational and commercial fishing vessels and ferries. The Contractor shall be mindful of channel traffic when transporting personnel, equipment and supplies to and from the work site. A five-mile spacing between dredges in the vicinity of the HSC, BSC and Barbours Cut Channel shall be considered in the sequencing plan. The Houston Ship Channel is an area of very high vessel traffic and shall be taken into consideration by the Contractor in developing the dredging sequence, dredge plant configurations, laydown areas and pipeline routes (where applicable).

#### **1.10.6 WEATHER CONDITIONS**

The site may be affected by tropical storms and hurricanes primarily from, but not necessarily limited to, June through November, and by stormy and/or rainy weather, including severe thunderstorms, during any time of the year. The Contractor shall be responsible for obtaining information concerning rain, wind, and water level conditions that could influence safety and work operations. A list of publications containing climatological and meteorological observations and data for the site is provided below. Other publications or information sources are available in addition to the following:

- Monthly climate summary provided by the National Oceanic and Atmospheric Administration (NOAA)
- National Weather Service Forecast Office

# **1.11 PRESERVATION OF PUBLIC AND PRIVATE PROPERTY**

The Contractor shall preserve and protect the existing informational and directional signs, facilities, station markers, mile markers, mooring piles and other items which have been established along either bank of the channel within the reaches of the dredging operations specified herein except as described in Technical Specifications Subsection 1.12.2.

Fences, roads, ditches, private or public grounds, and other structures or improvements damaged as a result of the Contractor's operations shall be repaired or rebuilt by the Contractor at its expense. The areas used by the Contractor in laying and maintaining dredge pipelines shall be restored to the same or better condition as existed prior to commencement of the work. All damages by or as a result of the Contractors operations, either to surface or subsurface structures, shall be repaired or replaced by the Contractor at its sole risk and cost.

# **1.12 NAVIGATION**

# **1.12.1 OBSTRUCTION OF CHANNEL**

The Port Authority will not undertake to keep the channel free from vessels or other obstructions, except to the extent of such regulations, if any, as may be prescribed by the Secretary of the Army, in accordance with the provisions of Section 7 of the River and Harbor Act approved 8 August 1917. The Contractor shall conduct the work using methods that will obstruct navigation as little as possible, and if the Contractor's plant does obstruct the channel and makes the passage of commercial vessels difficult or endangers them, said plant shall be promptly moved on the approach of a vessel as far as may be necessary to afford safe passage. At no time shall floating pipelines cross a navigable channel. If floating line is utilized when dredging the berths, or other, it shall be required to be moved during the passage of ship traffic and berthing maneuvers. Upon completion of the work, the Contractor shall promptly remove its plant, including ranges, buoys, piles, and other marks placed by it under this Contract.

#### **1.12.2 TEMPORARY REMOVAL OF AIDS TO NAVIGATION**

As a result of the work, existing informational and directional signs, facilities, station markers, mile markers, mooring piles, and other Aids to Navigation (ATONs) which have been established along either bank of the channel, within the reaches of the dredging operations specified herein may require relocation. The United States Coast Guard will facilitate all ATON removal and replacement. The Contractor shall work and coordinate with the USCG to enable a smooth operation of all ATON relocation. The Contractor shall contact the Port Authority and U.S. Coast Guard (USCG) at least twenty-one (21) days prior to the removal and relocation of existing aids to navigation. The Contractor shall submit a VTSA Channel Obstruction request and/or a Notice to Mariners as may be required by the USCG.

## 1.12.3 BRIDGE-TO-BRIDGE RADIOTELEPHONE EQUIPMENT

Dredges and self-propelled attendant floating plant shall be radiotelephone equipped to comply with the provisions of the Vessel Bridge-to-Bridge Radiotelephone Act (Public Law 92-63). This will require, as a minimum, the radiotelephone equipment capable of transmitting and receiving on 156.65 MHZ and 156.8MHZ (Channel 13 and Channel 16, respectively). Tugs and tenders will be considered towing vessels within the meaning of the Act.

## 1.12.4 LOOKOUTS AND RADIO COMMUNICATIONS

When working in a federal channel, the Contractor shall have a dedicated lookout person posted in the dredge control room at all times to visually monitor the movement of vessels around the dredge plant and to perform radio communications with company floating plant and to deliver passing arrangements with other commercial, fishing, and recreational vessels. The lookout shall be competent in the English language, the U.S. Coast Guard and Federal Communications Commission radio communications procedures and requirements and trained in the Vessel Bridge to Bridge Radiotelephone Act. The lookout shall maintain up to the minute information on the status of each company workboat as well as approaching vessels and will communicate this information as required to prevent collisions and shall comply with all requirements of the Houston-Galveston Vessel Traffic Service (VTS) area as outlined in Section 1 Subsection 1.12.6 of these Technical Specifications. Each company workboat shall check in with the lookout when arriving at the dredge and shall receive radio clearance from the lookout before departing the dredge. FAILURE TO COMPLY WITH THIS REQUIREMENT WILL BE CONSIDERED A VIOLATION OF THE SAFETY PROTOCOL ESTABLISHED HEREIN. PURSUANT TO THE DIRECTION OF THE PORT AUTHORITY, THE CONTRACTOR MAY BE REQUIRED TO CEASE OPERATIONS UNTIL THIS PROVISION IS COMPLIED WITH. ANY SUSPENSION, DELAY OR INTERRUPTION OF WORK ARISING FROM NON-COMPLIANCE OF THIS PROVISION SHALL NOT CONSTITUTE A BREACH OF THIS CONTRACT AND SHALL NOT ENTITLE THE CONTRACTOR TO ANY PRICE ADJUSTMENT UNDER THE CONTRACT CLAUSE ENTITLED TERMINATION AND SUSPENSION OR ANY OTHER MANNER UNDER THIS CONTRACT.

#### 1.12.5 SIGNAL LIGHTS

The Contractor shall display signal lights and conduct its operations in accordance with the general regulations of the Department of the Army and the U.S. Coast Guard. These general regulations govern

lights and day signals on towing vessels with tows, vessels working on wrecks, dredges, vessels engaged in laying cables or pipe, dredge pipelines, vessels of more than 65 feet in length moored or anchored in a fairway or channel, and floating plants working in navigable channels, as set forth in Commandant U.S. U.S. Coast Guard August 2014 Navigation Rules and Regulations Handbook, or 33 Code of Federal Regulations 81 Appendix A (International) and 33 Code of Federal Regulations 84 through 89 (inland) as applicable.

## 1.12.6 HOUSTON-GALVESTON VESSEL TRAFFIC SERVICE AREA

The Contractor shall comply with the following requirements while operating within the Houston-Galveston Vessel Traffic Service (VTS) area.

#### 1.12.6.1 GENERAL

When a dredge or floating plant is to be operated within the U.S. Coast Guard Houston-Galveston Vessel Traffic Service (VTS) Area, the master shall furnish the Vessel Traffic Center the following report at least 30 minutes prior to beginning operations:

- Location of intended operation
- Description of intended operation including channel obstructions
- Configuration of pipelines
- Termination point of pipelines
- Time required to re-open channel or move for vessel traffic
- Operating impairments, including VHF-FM radios
- Names of the assist boats being used
- Traffic considerations required, for example: slow bell, no meeting or overtaking, and advance notice requirements.
- Point of contact phone numbers and VHF-FM radio working frequencies

# 1.12.6.2 REPORT CHANGES

The master of the dredge or floating plant shall immediately notify the VTC of changes to the above report and at the completion of operations.

#### 1.12.6.3 VESSEL TRAFFIC SERVICE LOCATION

The Houston-Galveston VTS Area consists of the navigable channels between the Galveston Entrance Channel Buoy 1 and the Houston Turning Basin, Galveston Channel, Texas City Channel, Bayport Ship Channel (BSC), Barbour's Cut Channel (BCC), the Gulf Intracoastal Waterway, and Galveston-Freeport Cutoff from mile 346 to mile 352.

## 1.12.6.4 COMMUNICATIONS

Communications with the Vessel Traffic Center, call sign "HOUSTON TRAFFIC," shall be accomplished via VHF-FM Channel 12. The Traffic Center guards both Channel 12 and Channel 13 on a 24-hour basis.

#### 1.12.6.5 OPERATIONS

The master of a dredge or floating plant shall be aware of and comply with the provisions of the Order Relating to Lightering and Bunkering Operations and Multiple Vessel Moorings and will notify the Houston-Galveston VTS when refueling operations are to be conducted.

## **1.12.7 DREDGE POSITIONING**

The Port Authority may elect to install GPS tracking units and/or cameras onboard the dredge(s). Units will be installed and maintained by the Port Authority. Access to the vessel and electrical power shall be provided by the Contractor to allow installation, maintenance, and removal of the tracking units by the Port Authority. The GPS tracking units are the property of the Port Authority and will be removed by the Port Authority prior to dredge demobilization.

## 1.12.8 AUTOMATIC IDENTIFICATION SYSTEM (AIS)

A Class "A" Automatic Identification System (AIS) in accordance with the Code of Federal Regulations (CFR) title 33, CFR 164.46, as amended, is required for all dredges and self-propelled floating plant used on this contract.

# **1.13 VARIATIONS IN ESTIMATED QUANTITIES**

New work dredging quantities have been determined for both the Houston Ship Channel Expansion Improvement Project and Bayport Ship Channel Expansion Improvement Project and no significant variation in quantity is anticipated for new work dredging pay items.

Maintenance dredging quantities for the HSC and BSC have been estimated. Estimated shoaling rates are described in Section 6 Subsection 6.3.1 of these Technical Specifications. The Contractor shall make itself familiar with the anticipated work and shoaling rates and shall consider these conditions in its proposal and schedule.

On these pay items and others where the quantity of a pay item in this Contract is an estimated quantity and where the actual quantity of material within the required dredging limits varies more than 15% above or below the stated estimated quantity, within the required dredging limits, an equitable adjustment in the Contract unit price shall be made upon demand of either party. The equitable adjustment will be based upon an increase or decrease in costs due solely to the variations above 115% or below 85% of the estimated quantity within the required dredging limits. Equitable adjustments shall be coordinated between the Contractor and the Port Authority, and only executed by change order.

Prior to performing work where a quantity variation above 115% or below 85% is determined to exist, the Contractor shall notify the Engineer in writing within three days of discovering or anticipating such condition. If the quantity variation is such as to cause an increase in the time necessary for completion,

the Contractor may request in writing, an extension of time, to be received by the Engineer within ten (10) days from the beginning of the delay, or within such further period as may be granted by the Port Authority before the date of final settlement of the Contract. Upon receipt of a written request for an extension, the Engineer shall ascertain the facts and make an adjustment for extending the Contract time.

Maintenance dredging quantities associated with the BSC Flare (BSC Stations 211+56.66 to 238+37.31) shall be subject to the same stipulations above, except at a rate of 25% above or below the stated estimated quantity.

# **1.14 UNAUTHORIZED PLACEMENT OF MATERIAL**

## **1.14.1 MISPLACED MATERIAL**

Excavated material that is deposited at locations other than in places designated or approved will not be paid for, and the Contractor may be required to remove the misplaced excavated material and deposit it where directed by the Engineer at no cost to the Port Authority.

## 1.14.2 DEBRIS AND DISPOSAL

During the progress of the work, the Contractor shall not discard worn out discharge pipe, wire rope, scrap metal, timbers, or other rubbish or obstructive material into the placement areas or within or along the banks of any waterbody. This material, together with scrap, rope, wire cable, piles, pipe, or other obstructive material shall be disposed of by the Contractor at locations in accordance with any and all applicable Federal, State, or local requirements.

# **1.15 HOLD HARMLESS AND INDEMNIFICATION**

The PHA and Engineer shall not be liable or responsible for, and the Contractor shall indemnify and hold harmless the Engineer from and against any and all claims and damages of every kind, for injury to or death of any person or persons, and from damage to or loss of property arising out of or attributed directly, or indirectly, to any work, or other activity conducted at the site, performed by the Contractor. This indemnity and hold harmless provision shall not be limited by the specification of insurance coverage required to be maintained by the Contractor. The Contractor further agrees to obtain, in writing, from its contractors, subcontractors, and consultants the same indemnity and agreement to hold harmless as stated above. This requirement is supplemental to other requirements found in the Contract Documents (see Section 11.08 of the General Conditions).

# **1.16 USE OF PORT AUTHORITY PREMISES AND WORK AREA CONDITIONS**

## **1.16.1 CONTRACTOR FACILITIES**

The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas approved by the Port Authority. Temporary movement or relocation of Contractor facilities shall be made only on approval by the Port Authority. The Contractor shall fuel and lubricate equipment in a manner that protects against spills and evaporation, and the Contractor shall provide containment for

fuel and liquid chemical storage tanks to contain the tank contents in the event of a leak or spill. <mark>Refer to</mark> <mark>the General Conditions for further guidance.</mark>

#### **1.16.2 SANITARY FACILITIES**

Sanitary sewage services will not be furnished by the Port Authority. The Contractor shall provide and maintain in neat, sanitary condition toilets and other necessary accommodations for employees' use to comply with the regulations of the State Department of Health or other jurisdictions.

#### **1.16.3 SITE MAINTENANCE**

Trash or debris shall not be allowed to accumulate on the work areas. The Contractor shall clean the entire area of any litter resulting from the Contractor's operations on a daily basis. The Contractor shall maintain the premises as clean and presentable, as good construction practices will allow, at all times.

## **1.16.4 EXCLUSION OF THE PUBLIC**

The Contractor will be permitted to exclude the public from the work areas in the immediate vicinity of its dredging, transporting, and disposal operations. Enforcement shall be the Contractor's responsibility at no cost to the Port Authority. Should enforcement be required, it shall be coordinated with local enforcement agencies, and notification shall be provided to the Port Authority in the event of such occurrence.

# **1.17 FIRE PROTECTION**

The Contractor shall take stringent precautions against fire. Open fires are not allowed unless approved in writing by the Port Authority.

# **1.18 STANDBY TIME PROVISIONS**

At any time during the Contract performance period, the Port Authority may terminate the Contract for unforeseen causes. However, in lieu of terminating the Contract, the Port Authority may opt to issue a temporary "stop work order" and activate standby time provisions. The Port Authority reserves the right to activate, or not to activate, standby time provisions as it deems appropriate in accordance with the General Conditions.

# 1.19 ACCESS AND STAGING

The Port Authority may provide staging areas at Morgan's Point and Bayport for the Contractor's use for the duration of the contract subject to lease or easement. The Contractor may elect to use the Morgan's Point or Bayport staging areas, or others to be provided by the Contractor but shall at all times provide safe access and staging for all work including, but not limited to, surveying, dredging, and the transportation and disposal of dredged materials. The Contractor shall be responsible for maintaining staging and access necessary for its equipment and plant to and from the site, mooring area, and placement area. The Contractor shall ascertain the environmental conditions that can affect the access such as climate, winds, current, waves, depths, shoaling, and scouring tendencies. The Contractor shall be responsible for providing access to the site for their employees as well as the Port Authority and/or the Engineer and other Port Authority authorized representative(s) when requested, to include daily

inspection of the dredge area and placement sites, at no additional cost to the Port Authority. The Contractor shall be responsible for obtaining all necessary permissions for use of landing areas to load and offload its crews. The Contractor shall be responsible for following any and all permit requirements or conditions regarding pipelines and pipeline routes, as well as any other permit or regulatory requirements regarding material transport or personnel transport. No separate payment shall be made for site access or staging areas.

## **1.19.1 CONSTRUCTION OFFICE**

The Contractor shall provide for the duration of the Contract, office space of not less than 480 square feet for the exclusive use of Port Authority personnel. The office shall be secured in place using tie downs capable of withstanding winds up to 75 miles per hour. The office shall have as a minimum one dedicated office space suitable for two persons; one restroom with toilet, hand sink, and towel dispenser; and one conference area. The facility shall be located as close to the Contractor's onsite project office as possible. Windows shall be provided with interior blinds. A paved parking area for a minimum of three vehicles shall be provided. If the construction office is located at a remote site, the parking area shall be enclosed within a 6-foot chain link security type fence. The fence gate shall have a minimum opening of 16 feet. A personnel gate shall also be provided and shall have a minimum opening of 4 feet.

As a minimum, the Contractor shall provide one line to provide local 911 and long-distance service, one line for an all-in-one printer, copier capable of copying and printing on 11x17 paper, and two internet connections. In addition, the Contractor shall provide electric power, sewer, gas, lighting, phone, and hot and cold running water, air-conditioning, heating, bottled drinking water with electric cooler, disposable drinking cups, coffee maker, microwave oven, refrigerator, one exterior mud scraper, one coat rack, two 3 foot by 5 foot desks, two free standing four drawer file cabinets, eight padded chairs, one 4-foot by 8-foot conference table, three waste cans, three sets of keys to the entry doors, closets, desks, and security gate. Desks and file cabinets shall be lockable. Smoke detectors and fire extinguishers shall be provided to meet OSHA requirements. The Contractor shall also provide weekly janitorial services to include replenishing toilet paper and paper towels, and trash removal from the site. Items are to be in like-new serviceable condition and subject to approval by the Port Authority. All items listed above that are furnished by the Contractor shall remain the property of the Contractor when the project is completed. This section supersedes Section 4.29 of the General Conditions.

## **1.19.2 CONSTRUCTION SITE TRANSPORTATION**

The Contractor shall provide timely transportation service upon request of the PHA capable of carrying 4 people and equipment.

# **1.20 PROTECTION OF EXISTING WATERWAYS**

The Contractor shall conduct its operations in such a manner that material or other debris are not deposited in existing channels or other areas adjacent to the site. Should the Contractor, during the progress of the construction, lose, dump, throw overboard, sink, or misplace any material, plant,

machinery or appliance, the Contractor shall recover and remove the same with the utmost dispatch. The Contractor shall give immediate notice to the Port Authority, with description and location of such obstructions, until the same are removed. Should the Contractor refuse, neglect, or delay compliance with the above requirements, such obstructions may be removed by the Port Authority, and the cost of such removal may be deducted from any money due or to become due to the Contractor, or may be recovered under its bond. The liability of the Contractor for the removal of a vessel wrecked or sunk without fault or negligence shall be limited to that provided in Sections 15, 19, and 20 of the Rivers and Harbors Act of March 3, 1899 (33 U.S.C 410 et seq).

# **1.21 ADJACENT PROPERTY AND STRUCTURES**

The Contractor is notified that construction may occur adjacent to active public recreational facilities, private property, and environmentally sensitive areas. The Contractor is hereby notified that adverse working conditions may exist, and the necessary allowances and precautions shall be made to avoid damaging public and private property and sensitive environmental resources. The Contractor shall take extreme care when dredging adjacent to structures. Any damage to structures as a result of the Contractor's negligence will result in suspension of dredging and require prompt repair at the Contractor's expense as a prerequisite to the resumption to dredging. Unauthorized damage to any existing utilities, building facilities, structures, or plant life shall be repaired by the Contractor at no cost to the Port Authority.

# 1.22 SURFACE AND SUBSURFACE STRUCTURES, PIPELINES AND UTILITIES WITHIN THE WORK AREAS

The Plans show the locations of all known structures pertinent to the work. The locations of surface and subsurface features shown on the Plans are not exact. Locations of underground pipelines and utilities have not been field verified by the PHA. The Contractor is notified that uncharted and/or incorrectly charted pipelines and/or underwater obstructions may be present within the work areas.

The Contractor shall be responsible for verifying the locations and depths of all utility crossings and shall take precautions against damages which might result from its operations, especially the dropping of dredge spuds and/or anchors into the channel bottom, in the vicinity of utility crossings. Coordination with the Owners is described in Section 2 Subsection 2.5.2.2. If any damage occurs as a result of its operations, the Contractor will be required to suspend dredging until the damage is repaired to the satisfaction of the Owner. Costs of such repairs and downtime of the dredge and attendant plant shall be at the Contractor's expense.

THE CONTRACTOR SHALL CALL THE TEXAS ONE CALL SYSTEM (811) A MINIMUM OF 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION (DIGGING, DREDGING, JETTING, ETC.) OR ANY DEMOLITION ACTIVITY. PIPELINE SAFETY, AND THE PROTECTION OF PIPELINES OR OTHER UTILITIES, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. The Engineer and Port Authority assumes no responsibility or liability for failure to show any or all pipelines, utilities, structures, or other obstructions on the Plans or to show them in their exact location. Failure to show and/or show correctly shall not be considered sufficient basis for claims or for additional compensation for extra work in any manner whatsoever, unless the obstruction encountered is such as to necessitate substantial changes in the lines or grades, or requires the building of special work for which no provision is made. It is assumed that the Contractor has thoroughly inspected the site, is informed as to the correct location of surface and subsurface structures, and has considered and allowed for all foreseeable incidental work due to variable subsurface conditions, whether such conditions and such work are fully and properly described in the Contract Documents or not. Minor changes and variations of the work specified and shown on the drawings shall be expected by the Contractor and allowed for as incidental to the satisfactory completion of a whole and functioning work or improvement.

# **1.23 WEEKLY PROGRESS MEETINGS AND MINUTES**

The Contractor shall attend weekly progress meetings with the Engineer at the site or an appropriate meeting place set forth by the Engineer to discuss the schedule of work, construction concerns, coordination issues, or other topics that may be of mutual interest. The Contractor shall provide minutes of all weekly meetings to the Engineer within 48 hours of the meeting.

# **1.24 QUALITY CONTROL INSPECTIONS**

The Contractor shall conduct daily quality control inspections of the construction activities for compliance with the Contract requirements and record the information as specified herein. A copy of the records of quality control inspections, as well as corrective action taken, shall be filed daily and submitted as directed. The daily quality control reports shall be submitted on an approved daily quality control report form. Retention rate monitoring information for hydraulic fill construction shall be submitted on an approved retention rate spreadsheet. Required survey information and plots of the surveys shall be attached to the daily quality control reports and retention rate spreadsheets.

The Contractor shall inspect for compliance with Contract requirements and record the inspection of operations including, but not limited to the items specified within this Section. A copy of the records of the compliance inspections, tests, and corrective action taken shall be submitted with the daily quality control report (Technical Specifications Section 2 Subsection 2.6.4).

**END OF SECTION** 

# **2 SUBMITTALS AND SUBMITTAL REQUIREMENTS**

# **2.1 GENERAL**

The Contractor is responsible for providing all Contractor required submittals outlined in the Contract Documents and additional submittals requested by the Engineer. The submittals listed herein are additional to other submittals required within the General Conditions of the Contract Documents. The Engineer may request submittals in addition to those specified. Units of weights and measures used on all submittals are to be the same as those used in the Contract Documents. Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with Contract requirements.

# 2.2 SUBMITTAL PROCEDURES

All submittals shall be transmitted to the Engineer in accordance with the following:

- The number of copies of submittals required for each item shall be the one original hardcopy and digital PDF, plus the number of additional copies that the Contractor desires for its own use.
- The Contractor must double-check and sign all submittals before forwarding them for review and action by the Engineer.
- The Engineer will review the submittal data. If there are no exceptions taken to the submittal, the original and three copies will be retained by the Engineer. All remaining copies will be returned to the Contractor. The Contractor must keep one copy at the site at all times.
- If further action is required by the Contractor, the Engineer will retain one copy of the submittal data and return all remaining copies to the Contractor.
- Any and all costs, direct or indirect, incurred by the Engineer in reviewing submittals in excess of two times shall be charged a minimum of \$500 to the Contractor and deducted from the total price for the work. If, in the opinion of the Engineer the review of submittals becomes excessive, a fee greater than listed herein shall be charged to the Contractor on a time and materials basis.
- The Engineer's acceptance of shop drawings and/or any aspects of the work shall not act to transfer the Contractor's responsibility for, nor relieve the Contractor from the performance of any of the Contractor's duties set forth in the Contract Documents.

# 2.3 SUBMITTALS AFTER AWARD

The items listed below are required within fourteen (14) days of Contract award.

#### 2.3.1 SAFETY PLAN

Submit no later than fourteen (14) days within award of the Contract a safety plan. The safety plan shall be consistent with the requirements of the General Conditions. The plan shall additionally be in conformance with the following unless otherwise specified in the General Conditions:

- OSHA Safety and Health Standards 29 CFR 1910 (General Industry), US Department of Labor, Occupational Safety and Health Administration. Hereafter referred to as "29 CFR 1910". Available by calling (513)533-8236.
- OSHA 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response, Interim Final Rule, U.S. Department of Labor, Occupational Safety and Health Administration, December 1986. Hereafter referred to as "29 CFR 1910.120".
- OSHA Safety and Health Standards 29 CFR 1926 (Construction Industry), US Department of Labor, Occupational Safety and Health Administration, 1985. Hereafter referred to as "29 CFR 1926".
- Standard Operating Safety Guidelines, USEPA, Environmental Response Branch, Hazardous Response Support Division, Office of Emergency and Remedial Response, November 1984. Hereafter referred to as "EPA Guidelines".
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (MHSA), US Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health (NIOSH), October 1985.
- EM 385-1-1 US Army Corps of Engineers Safety and Health Requirements Manual

\* The Contractor is responsible for ensuring compliance with the latest revisions of the above referenced documents.

# 2.3.2 ACCIDENT PREVENTION PLAN (APP)

The Contractor shall comply with the provisions of EM 385-1-1. All paragraph and subparagraph elements in EM 385-1-1, Appendix A, "Minimum Basic Outline for Accident Prevention Plan" shall be covered. If the Contractor is a currently accepted participant in the Dredging Contractors of America (DCA) and United States Army Corps of Engineers (USACE) Dredging Safety Management Program (DSMP), as determined by the DCA and USACE Joint Committee, and holds a current valid Certificate of Compliance for both the Contractor Program and the Dredge(s) to be used to perform the work required under this contract, the Contractor may, in lieu of the submission of an Accident Prevention Plan (APP):

- Make available for review, upon request, the Contractor's current Safety Management System (SMS) documentation
- Submit to the Engineer the current valid Company Certificate of Compliance for its SMS
- Submit the current dredge(s) Certificate of Compliance based on third party audit
- Submit for review and acceptance, site specific addenda to the SMS as specified in the solicitation

#### 2.3.2.1 SEVERE WEATHER PLAN

As part of the APP, a severe weather plan must be developed for floating plant, boats or other marine activities that could be endangered by severe weather (including but not limited to sudden and locally severe weather, storms, high winds, hurricanes, and flood). Plans must be made for removing or securing plant and evacuation of personnel in emergencies. This plan will meet the requirements of EM 385-1-1 Section 19.A.03 and 01.E. In the event of a severe storm warning, the Contractor must:

- Secure outside equipment and material and place materials that could be damaged in protected areas.
- Check surrounding area, including roof for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.

#### 2.3.3 QUALITY CONTROL PLAN

Submit no later than fourteen (14) days within award of the Contract a quality control plan to ensure the work complies with the Contract Documents. Include, as a minimum, the following to cover all operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents, designers of record, consultants, architect/engineers (AE), fabricators, suppliers, and purchasing agents:

- A description of the quality control organization, including a chart showing lines of authority and acknowledgment
- The names, responsibilities, and authorities of each person on the quality control organization chart
- Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors
- Reporting procedures, including quality control report forms and retention rate spreadsheet for approval

# 2.3.3.1 QUALITY CONTROL DAILY REPORT FORM

A quality control daily report form, containing blanks for required information shall be developed by the Contractor for use during this Contract and approved by the Engineer. A copy of the daily quality control report form shall be submitted with the quality control plan, no later than fourteen (14) days within award of the Contract, for approval.

## 2.3.3.2 MATERIAL RETENTION TRACKING FOR HYDRAULIC FILL

A retention rate spreadsheet, programmed to make appropriate calculations, shall be set up in Microsoft Excel 2003 or later, with the following column headings which are required for retention rate monitoring and reporting: Date; acreage of Fill Constructed within the last 24 hours; acreage of Fill Constructed to Date; volume of fill computed within the design template (cubic yards); total volume as placed by the dredge expressed in cubic yards; Over-placement Ratio; Cumulative Volume as placed by the dredge; cumulative volume retained in the design template; gross material dredged; gross dredging to date (cubic yards); Gross Retention Rate; Net Retention Rate; and Over-placement or Under-placement Quantity and Acceptance (check). A copy of the retention rate spreadsheet shall be submitted along with the quality control plan no later than fourteen (14) days within award of the Contract for approval.

# 2.4 PRECONSTRUCTION CONFERENCE SUBMITTALS

The items listed below are required prior to the time of the preconstruction conference as described.

#### 2.4.1 CONTACTS AND QUALIFICATIONS

The following is required at least fourteen (14) days prior to the preconstruction conference:

- Name(s) of the person(s) designated as Project Superintendent(s).
- List of all subcontractors and major material/equipment suppliers that the Contractor and subcontractors propose to use. This list shall include correct names, mailing addresses, email addresses, and phone numbers.
- List of names and titles of Contractor's representatives authorized to sign contractual documents and payment requisitions.
- List of names, qualifications, and licenses of all licensed crafts required by the Contract Documents.
- List of names, qualifications, and licenses of the qualified Texas licensed Registered Professional Land Surveyor (RPLS) or Professional Engineer (PE) in charge of surveys

# 2.4.2 WORK PLAN AND SCHEDULE OF WORK

Fourteen (14) days prior to the preconstruction conference, the Contractor shall provide separate detailed work plans for the Work described in these Technical Specifications as part of the Houston Ship Channel Expansion Channel Improvement Project and the Bayport Ship Channel Expansion Channel Improvement Project, including lists of equipment to be utilized, name(s) of dredge(s) to be used, estimated quantities, and Schedules of Work. Equipment shall include, but not be limited to, all plant(s), vessels, vessel-tracking systems, and other equipment for each phase of work. Each schedule of work shall indicate, at a minimum, the start of work, start of excavation and placement, construction period, and completion of all work. The schedules shall be in bar-chart form that indicates all work tasks, differentiates critical path work tasks from non-critical path tasks, and shows the beginning and ending dates for each critical and non-critical path work task. Schedule updates shall be transmitted along with monthly pay requests as outlined in Special Condition Part ##.

The Project construction time is as outlined in Special Condition Part 10. The Contractor shall inform the Engineer if additional time is required. The work plan and schedule of work shall become part of the Contract and shall be incorporated into the Contract Documents.

# 2.4.2.1 STAGING AREA PLAN

The Contractor shall include for approval a staging area plan, detailing the location(s) and method of anchoring/securing all floating plant and dredge pipelines or pipeline rafts. The plan shall include a plot drawing detailing the following at minimum:

- Equipment type and dimensions
- Distance from the current authorized federal channel limits to the proposed staging area
- Proposed staging area XY-coordinates provide in State Plane Coordinates as outlined in Technical Specifications Section 4.4
- Size and quantity of anchors used to secure equipment, if any
- Size and length of cable/rope used for anchors and/or lashing equipment together
- Location and type of signal lights as required per Technical Specifications Section 1.12.5.

## 2.4.2.2 DREDGE PIPELINE ROUTE PLAN

For each work plan and schedule of work, the Contractor shall include for approval a dredge pipeline route plan, detailing the locations and method of placement of all dredge discharge pipelines. The project configurations may require the discharge pipelines to cross navigable waters; therefore, the plans shall include the method by which the pipelines will be placed to avoid impedance of commercial and recreational marine traffic. Should the Contractor wish to excavate below the design template to provide for a dredge pipeline corridor or trench across the HSC, the Contractor shall request such in writing for approval by the PHA. The Contractor's written request shall include the location, approximate width(s) and elevation(s), means and methods, and placement of removed materials. Pipeline routes shall be chosen in a manner that provides minimal impact to the environment. The Contractor shall prepare the dredge pipeline route plans in accordance with the order of work to ensure that the new work materials can be utilized to complete the hydraulic fill construction in accordance with Section 6 of these Technical Specifications.

# 2.4.2.3 **PIPELINE AND UTILITIES CROSSING PLAN**

For each work plan and schedule of work, the Contractor shall include a pipeline crossing plan at each pipeline and utility crossing to be submitted to the Engineer and Owner. The plan shall contain the following at minimum:

- Emergency measures to be taken in the event of an accident
- Methodology for work that occurs within 500 feet of a utility or pipeline. Work includes, but is not limited to dredging, anchoring/spudding of dredge and auxiliary equipment and submerged dredge pipeline operations

- Estimated start and completion date for work in the vicinity of the utility or pipeline
- The utility or pipeline type/description, owner and owner contact information

#### 2.4.2.4 HYDRAULIC FILL PLAN

For each work plan and schedule of work, the Contractor shall include its means and methods for placement and shaping of the hydraulically placed new work dredge materials to the required lines and grades shown in the Plans. The plan shall detail the proposed means and methods the Contractor will use to meet the minimum requirements of the work, while complying with these Technical Specifications. The plans shall include, but not necessarily be limited to, the following:

- The phasing and methodology to be used for construction of the hydraulic fill dikes/embankments including discharge pipeline placements, with sketches when applicable, and techniques to maximize use of available satisfactory material.
- Approximate channel stations and elevations between which the material to be dredged is used to construct the hydraulic fill at the placement areas along with the estimated material quantities to be dredged.
- Estimated start and completion dates for construction of the hydraulic fill dikes/embankments.
- Proposed pipeline routes for the different sequencing of dredge fill placement and hydraulic fill construction.
- A complete list of plant and equipment, with accompanying specification information to be used for the work.
- A brief outline of quality and environmental control measures to be used during hydraulic fill.
- A brief description of the proposed execution of required monitoring of the initial hydraulic fill placement. The description shall include details on how the monitoring information will be used by the Contractor to monitor and control placement of the hydraulic fill, to achieve the specified requirements to place and shape sufficient hydraulic material to the required lines and grades along the areas shown. The description shall include details and calculations to be made during the work to assess the production rate throughout the work, and a description of the format the Contractor will use to report the hydraulic fill construction progress during the hydraulic fill placement and shaping.

#### 2.4.2.5 MECHANICAL FILL PLAN

For only the Houston Ship Channel Expansion Channel Improvement Project work plan and schedule, the Contractor shall include its means and methods for placement and shaping of the mechanically placed new work dredge materials to the required lines and grades shown in the Plans. The plan shall detail the proposed means and methods the Contractor will use to meet the minimum requirements of the work,

while complying with these Technical Specifications. The plans shall include, but not necessarily be limited to, the following:

- The phasing and methodology to be used for construction of the reef pads at Dollar Reef and San Leon including techniques to maximize use of available satisfactory material.
- Approximate channel stations and elevations between which the material to be dredged is used to construct the reef pads along with estimated material quantities to be dredged.
- Marking of the reef pad location(s) limits during construction and maintenance of markers.
- Estimated start and completion dates for construction of the reef pads.
- Proposed sequencing of individual reef pads at Dollar Reef and San Leon.
- A complete list of plant and equipment, with accompanying specification information to be used for the work.
- A brief outline of quality and environmental control measures to be used during mechanical fill.
- A brief description of the proposed execution of required monitoring of the initial mechanical fill placement. The description shall include details on how the monitoring information will be used by the Contractor to monitor and control placement of the mechanical fill, to achieve the specified requirements to place and shape sufficient material to achieve the required elevations within the required lines and grades along each alignment shown. The description shall include details and calculations to be made during the work to assess the production rate throughout the work, and a description of the format the Contractor will use to report the reef pad construction progress during the mechanical fill placement and shaping.

# 2.4.2.6 SHORE PROTECTION SUBMITTALS

For each work plan and schedule of work, the Contractor shall submit the following for review:

# 2.4.2.6.1 STONE WORK PLAN AND SCHEDULE

The Contractor shall submit a stone work plan and schedule that describes the equipment, stockpiling, loading and unloading, transportation, placement methods, and sequences planned to be used in stone placement. This plan shall also include quality control procedures and a list of the major pieces of equipment that are to be used for performing the stone work. This plan and schedule shall be submitted for review prior to shipment of the stone. The Contractor shall not commence stone work until the plan and schedule have been reviewed and incorporated into the overall construction and progress schedule.

# 2.4.2.6.2 BSC STONE REMOVAL AND REUSE WORK PLAN AND SCHEDULE

The Contractor shall submit a shore protection removal and reuse plan and schedule that describes the equipment, removal, reinstallation, and sequences planned to be used in shore protection removal along the north shoreline of the BSC. This plan and schedule shall be submitted for review prior to

commencement of work. The Contractor shall not commence shore protection removal until the plan and schedule have been reviewed and incorporated into the overall construction and progress schedule.

## 2.4.2.6.3 STONE QUALITY

Before stone is produced from a source for completion of the work under this contract, the source of stone shall be approved. Stone source documentation including certificates that demonstrate compliance with the stone quality and gradation shall be submitted a minimum of fourteen (14) days before the stone is required in the work. Approval of a stone source shall not be construed as a waiver of the right of the Port Authority to require the Contractor to furnish stone that complies as specified herein. Materials produced from localized areas, zones, or strata will be rejected when these materials do not comply as specified herein.

## 2.4.2.7 GEOTEXTILES SUBMITTALS

For each work plan and schedule of work, the Contractor shall submit its means and methods for installing geotextile fabric and shall submit at least two geotextile pins, 3-foot by 3-foot geotextile fabric samples, and a certificate of compliance for the geotextile attesting that the geotextile meets the chemical, physical, and manufacturing requirements specified herein. Engineer approval is required for all submittals.

#### 2.4.2.8 SURVEY PLAN

For each work plan and schedule of work, the Contractor shall provide a written description of methods and equipment to be used for construction surveys as well as the appropriate quality control and quality assurance (QA/QC) procedures to be applied for this task. For topographic surveying, the plans shall detail the means, methods, and equipment that the Contractor proposes to use for review and approval by the Engineer. The Contractor shall prepare similar plans for hydrographic construction surveys of the dredging progress. The plans shall document an approach that is appropriate for precise hydrographic surveying in soft soils. Refer to Technical Specifications Section 4 for information regarding surveying QA/QC standards.

# 2.4.2.9 CULTCH WORK PLAN AND SCHEDULE

The Contractor shall submit a cultch work plan and schedule that describes the equipment, stockpiling, loading and unloading, transportation, placement methods to achieve the required elevations, and sequences planned to be used for cultch placement. This plan shall also include quality control procedures and a list of the major pieces of equipment that are to be used for performing the work. The cultch thickness testing method shall be included in the work plan as further described in Section 4.13 of these Technical Specification. This plan and schedule shall be submitted for review prior to shipments of cultch. The Contractor shall not commence cultch work until the plan and schedule have been reviewed and incorporated into the overall construction and progress schedule.

#### 2.4.2.10 SEEDING AND FERTILIZING SUBMITTALS

As part of the work plan and schedule of work, the Contractor shall submit its means and methods for seeding and fertilizing including certifications of compliance for seeding and fertilizing that attests that the seed and fertilizer meet the requirements of these Technical Specifications.

#### 2.4.2.11 DROP-OUTLET STRUCTURE CONSTRUCTION PLAN

As part of the work plan and schedule of work, the Contractor shall submit its means and methods for construction of the drop-outlet structures at Bird Island Marsh to meet the requirements of the work, while complying with these Technical Specifications. The plans shall include, but not necessarily be limited to a description of the materials, equipment, construction techniques, sequences, and procedures for borrow excavation of adjacent dikes, moisture control, and transport of materials to the placement areas and other specific information specified herein.

## 2.4.3 OBSTRUCTION DEMOLITION PLAN

The Contractor shall prepare and submit for approval by the Engineer, an Obstruction Demolition Plan. The Obstruction Demolition Plan is supplemental to other submittals required by the Contract. As part of the Obstruction Demolition Plan, the Contractor shall define the means and methods by which it shall perform the Work covered under Section 14 and develop and implement a waste management program in accordance with ASTM E 1609 and as specified. The Plan shall demonstrate how the quantity of obstructions removed or cut shall be documented, verified, and the information of same supplied to the Engineer. The Contractor shall take a pro-active, responsible role in the management of demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort. The Contractor shall be responsible for instructing workers and overseeing and documenting results of the Obstruction Demolition Plan. Demolition waste includes products of demolition or removal and other materials generated during the construction process. In the management of waste, consideration shall be given to recycling, and the availability of viable markets, the condition of the material, and the ability to provide the material in suitable condition and in a quantity acceptable to available markets. The Contractor is responsible for implementation of any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling accrue to the Contractor. Where required, the Contractor shall obtain necessary permits for firms and facilities used for recycling, reuse, and disposal, to the extent required by federal, state, and local regulations. Also, provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the Work.

#### 2.4.4 ENVIRONMENTAL PROTECTION PLAN

Fourteen (14) calendar days prior to the preconstruction conference, the Contractor shall submit in writing an environmental protection plan for each project conforming to the requirements of the General Conditions and these Technical Specifications. Approval of the Contractor's plans will not relieve the Contractor of its responsibility for adequate and continuing control of pollutants and other environmental protection measures. The environmental protection plans shall include, but not be limited to, the following:

- Methods for protection of features to be preserved within authorized work areas. The Contractor shall prepare a listing of methods to protect resources needing protection (i.e., trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil, historic, archeological, and cultural resources).
- Procedures to be implemented to provide the required environmental protection, including best
  management practices (BMP) that would be utilized, to the maximum extent practicable, to
  avoid project construction impacts, and to comply with the applicable laws and regulations. The
  Contractor shall provide written assurance that immediate corrective action will be taken to
  prevent pollution of the environment due to accident, natural causes, or failure to follow the
  procedures set out in accordance with the environmental protection plan.
- Drawings showing locations of any proposed temporary excavations or embankments for haul roads, stream crossing, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials.
- Methods of protecting surface and ground water during construction activities.
- Descriptions of the methods and measures associated with the use and storage of fuel and hazardous materials and for the prevention of spills, including oil spills (i.e., ground cover, containment, absorbent, etc.)
- Work area plans showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. The plan should include measures for marking the limit.

The environmental protection plans shall also address specific measures and information requested to be submitted in Technical Specifications Section 5, including Sections 5.3 Air Quality and 5.4 Fish and Wildlife Resources. The Contractor shall train its personnel in the elements of the environmental protection plans.

# 2.4.5 SPILL CONTINGENCY PLAN

Fourteen (14) calendar days prior to the preconstruction conference, the Contractor shall provide and maintain an effective spill contingency plan, for each project, that complies with the requirements of the General Conditions Section 3.11 Spill Prevention Plan and these Technical Specifications and meets all applicable local, State, and Federal regulations, including but not limited to, the U.S. Environmental Protection Agency (EPA) Oil Pollution Regulations, 40 CODE OF FEDERAL REGULATIONS 112, EM 385-1-1 and other state regulations as applicable. The plan shall not only account for the release of chemicals or petroleum products hazardous to the environment but shall also monitor the placement of dredged materials during all operations. At a minimum, the Contractor's spill contingency plan shall include the following:

- 24 hour per day monitoring at disposal area during dredging operations with monitoring personnel in radio contact with the dredge
- Have on-hand the names and telephone numbers of (1) companies having portable hydraulic dredges or vacuum pumps ready to clean any misplaced dredge material released from the placement area and (2) companies having silt curtains for containing any misplaced dredge material from the placement area
- Cease dredging operations in the event of a spill
- Immediate notification of the Engineer upon the occurrence of a spil
- Submission of a clean-up plan within 24 hours to the Engineer
- Responsibility list for all clean-up operations

#### 2.4.6 VOLATILE ORGANIC COMPOUNDS (VOC) COMPLIANCE PLAN

Contractors are required to comply with the applicable specifications of the General Conditions, as well as the local, state, and federal volatile organic compound (VOC) laws and regulations and shall have an acceptable VOC compliance plan for each project. The Contractor shall submit their VOC plans fourteen (14) days prior to the preconstruction conference. The plans shall demonstrate that the use of paints, solvents, adhesives, and cleaners comply with local VOC laws and regulations governing VOC materials, and that all required permits have been obtained or will be obtained prior to starting work involving VOCs, in the air quality district in which the work will be performed. An acceptable compliance plan shall contain, as a minimum, a listing of each materials subject to restrictions in the air quality management district in question, the rule governing its use, a description of the actions which the Contractor will take, a description of the actions which the Contractor will use to comply with the laws and regulations, and any changes in the status of compliance during the life of the Contract. Alternatively, if no materials are subject to the restrictions, the VOC compliance plan shall so state.

# 2.4.7 NOISE MITIGATION AND REDUCTION PLAN

Fourteen (14) days prior to the preconstruction conference, the Contractor shall submit a noise mitigation and reduction plan per Part 14 of the Special Conditions of the Contract Documents for the Bayport Ship Channel Expansion Improvement Project only.

# 2.5 PRECONSTRUCTION SUBMITTALS

This section applies to the submittals required prior to commencement of the work.

#### 2.5.1 SURVEY CONTROL CHECKS

Project control monumentation has been provided by the Engineer. The Contractor shall perform preconstruction survey control checks on the provided project control monumentation and provide the

results to the Engineer. Any discrepancy from the published values shall be immediately brought to the attention of the Engineer, prior to use of the project control monumentation for work.

## 2.5.2 NOTIFICATION OF INTENTION TO DREDGE

## 2.5.2.1 USACE AND USCG

The Contractor shall notify the Galveston District Area Engineer, of the U.S. Army Corps Of Engineers, Galveston District Northern Area Office, 12000 Aerospace Avenue, Houston, TX 77034 and the U.S. Coast Guard, in writing and electronically, at least ten (10) days prior to commencement of dredging operations, the location or locations at which a dredge or dredges will be placed on the site so that a Notice to Mariners can be issued by the U.S. Coast Guard. Documentation of notice shall be submitted to the Engineer prior to the commencement of dredging.

## 2.5.2.2 PIPELINES AND UTILITIES

The Contractor shall notify and coordinate work with pipeline companies at least ten (10) days before performing any portion of the work near the pipelines in the vicinity of the work areas as shown.

The following pipelines, as shown on the Plans, may be near or within the horizontal limits of work.

Utility of Structure	Approximate Station	Reported Approximate Channel Crossing Elevation MLLW (ft)	Name and Owner Contact Info
		Houston Ship	Channel
24" Crude Øil P/L	124+246.26	-99.00	Genesis Energy, LP Robert Findley 281-793-6656 robert.findley@genlp.com
(2) Abandoned Natural Gas P/Ls	114+761.52 114+761.52	Unknown Unknown	Houston Oil & Mineral Co.
16" Natural Gas P/L	112+128.37	-112.90	Williams Companies, Inc. Jerry Knight 985-798-5917 Jerry.Knight@williams.com
18" Natural Gas P/L	90+406.35	-81.20	Kinder Morgan, Inc. Oscar Zapata 713-420-4654 Oscar_Zapata@kindermorgan.com

 Table 2-1 : Pipelines Near the Project Area

HSC & BSC ECIP PROJECT 11: SOUTH BOATERS CUT TO BAYPORT (BEACON 76): HSC STA. 57+000 to HSC STA. 14+500 & BSC: BSC STA. 238+37.21 to BSC STA. 42+07.80 December 09, 2020

24" Carbon Dioxide P/L	88+810.00	-92.00	Denbury, Inc. Billy Shoen 281-996-7251 billy.shoen@denbury.com		
24" Natural Gas P/L	80+969.04	-83.00	Energy Transfer Partners (Florida Gas Transmission Co., LLC) Nicholas Gordon 713-989-2816 NICHOLAS.GORDON@energytransfer.com		
10" Abandoned Natural Gas P/L	67+086.95	Unknown	Davis Petroleum Corporation/Yuma Kate Hubackova kateh@yumacompanies.com		
8" Abandoned Natural Gas P/L	63+581.94	-50.00	Davis Petroleum Corporation/Yuma Kate Hubackova kateh@yumacompanies.com		
10.75" Abandoned Natural Gas P/L	57+600.00	-55.00	Layton Energy		
10" Abandoned Natural Gas P/L	18+600.56	-49.00	Davis Petroleum Corporation/Yuma Kate Hubackova kateh@yumacompanies.com		
		Bayport Ship	Channel		
12.75" Abandoned Natural Gas FWS P/L	N/A	Unknown	Davis Petroleum Corporation		
10.75" Hydrogen P/L	120+76.63	Unknown	Praxair Inc.		
Bird Island Marsh					
6" Abandoned Natural Gas FWS P/L	Bird Island Marsh	N/A	Torrent Oil		
2.38" Crude Oil P/L	Bird Island Marsh	N/A	Nicor Exploration Company		
4.5" Abandoned	Bird Island Marsh	N/A	Layton Energy		

Natural Gas FWS P/L			
10.75" Abandoned Natural Gas P/L	Bird Island Marsh	N/A	Layton Energy
2.88" Abandoned Natural Gas FWS P/L	Bird Island Marsh	N/A	Layton Energy
2.88" Abandoned Natural Gas FWS P/L	Bird Island Marsh	N/A	Layton Energy
8.63" Natural Gas FWS P/L	Bird Island Marsh	N/A	Galveston Bay Operating Co. LLC
4.5" Abandoned Crude Oil P/L	Bird Island Marsh	N/A	Galveston Bay Operating Co. LLC
3.5" Crude Oil P/L	Bird Island Marsh	N/A	Claron Corporation
4.5" Abandoned Crude Oil P/L	Bird Island Marsh	N/A	Torrent Oil Henri deLaunay 713-955-3802 hdelaunay@torrentoil.com
		San Leon Oyster N	litigation Site
3.5" Crude Oil P/L	San Leon	N/A	Union Oil Company of California
3.5" Crude Oil P/L	San Leon	N/A	Houston Oil & Mineral Co.
4.5" Natural Gas P/L	San Leon	N/A	Houston Oil & Mineral Co.
4.5" Crude Oil P/L	San Leon	N/A	Austral Oil Company Incorporated
10.75" Abandoned Crude Oil P/L	San Leon	N/A	Energy Reserves Group, L.L.C.
6.63 Natural Gas P/L	San Leon	N/A	Energy Reserves Group, L.L.C.
3.5" Natural Gas P/L	San Leon	N/A	Energy Reserves Group, L.L.C.

2.38" Natural Gas P/L	San Leon	N/A	Energy Reserves Group, L.L.C.		
16" Refined Liquid Product P/L	San Leon	N/A	Praxair Inc.		
16" Abandoned Other Gas P/L	San Leon	N/A	Praxair Inc.		
6.63" Natural Gas P/L	San Leon	N/A	Energy Reserves Group, L.L.C.		
	Dollar Reef Oyster Mitigation Site				
24" Carbon Dioxide P/L	Dollar Reef	N/A	Denbury, Inc.		
20" Natural Gas Offshore P/L	Dollar Reef	N/A	Fieldwood Onshore LLC		
18" Natural Gas P/L	Dollar Reef	N/A	Kinder Morgan, Inc.		
10.75" Other Gas P/L	Dollar Reef	N/A	Praxair Inc.		

EVERY EFFORT HAS BEEN MADE TO GIVE ALL PERTINENT DETAILS ON THE LOCATION OF THE PIPELINES. THE DATA FURNISHED ON THE PLANS ARE BELIEVED TO BE SUBSTANTIALLY CORRECT. HOWEVER, THE EXACT LOCATIONS MAY VARY FROM THAT SHOWN. THEREFORE, THE CONTRACTOR SHALL COORDINATE AND COOPERATE WITH THE RESPECTIVE OWNERS TO ESTABLISH THE ACTUAL POSITION OF THE PIPELINES. THE U.S. ARMY CORPS OF ENGINEERS PERMITS OF THE RESPECTIVE PIPELINES AND PREVIOUS SURVEYS ARE AVAILABLE IN THE HOUSTON AREA OFFICE.

THE FOLLOWING IS FURNISHED FOR INFORMATION PURPOSES FOR VERIFYING PIPELINE OWNERSHIPS:

• Texas811 1-800-344-8377

# 2.5.3 CULTCH CONSTRUCTION MATERIALS

## 2.5.3.1 Materials Sampling and Testing Reports

Sampling and testing reports shall be submitted for the cultch material as specified in Technical Specification Section 11.5. This submittal requires PHA approval.

## 2.5.3.2 Materials Certificates

Certificates of compliance or sufficient test data shall be submitted to support the PHA's determination of compliance. This submittal is for information only.

#### 2.5.3.3 Materials Samples

A sample of 150 pounds of cultch material shall be submitted 7 days prior to commencement of reef pad construction at Dollar Reef/San Leon. An additional sample of cultch material shall be submitted after placement of the first 1,000 tons of material. This submittal requires PHA approval.

# 2.6 CONSTRUCTION SUBMITTALS AND NOTICES

This section applies to the submittals required immediately before and during construction.

# 2.6.1 NOTIFICATION PRIOR TO COMMENCEMENT OF SURVEYING FOR MEASUREMENT AND PAYMENT AND FINAL ACCEPTANCE

The Port Authority shall conduct all BD, interim AD surveys, and final acceptance surveys for measurement and payment and acceptance within the dredge areas and oyster pad locations at San Leon and Dollar Reef.

The Contractor shall conduct all other surveys as outlined in Technical Specifications Section 4. The Contractor shall notify the Engineer in writing at least three (3) days prior to the commencement of surveying activities for measurement and payment so that the Engineer may have the opportunity to accompany the survey crew and witness the surveying activities. Surveys for interim measurement and payment shall be conducted in the presence of the Engineer.

## 2.6.2 PRE-DREDGE HAZARD AND PIPELINE SURVEY

The Contractor shall submit the results of their pre-dredge hazard and pipeline survey (see Technical Specifications Section 4 Section 4.8) to the Engineer a minimum of fourteen (14) days before commencement of work. Submittals shall include hard copy plan-view drawings as well as electronic copies of the drawings (in both .DWG and .PDF format), all field notes, and the final data set. Electronic submittals shall be provided on CD or DVD.

All survey data shall be referenced to the project datum as shown in these Technical Specifications and Plans. The pre-dredge hazard and pipeline survey plots shall be signed and sealed in accordance with Technical Specifications Section 4 Subsection 4.3.1 and shall legibly and clearly display the following information:

- Project name
- Contractor's name
- RPLS or PE seal, signature, and business affiliation
- Date(s) surveys were performed

- Layout of work including locations and descriptions of survey control
- Vertical and horizontal datums
- Sheet names and numbers
- Drawing scale(s)
- Possible anomalies and/or possible pipelines or utilities

Results of the pre-dredge hazard and pipeline survey shall include a summary of findings, interpretation of any located anomalies and considerations for dredging, staging and anchoring of equipment and laying of submerged pipeline.

#### 2.6.3 BARGE DISPLACEMENT TABLES

The Contractor shall submit barge displacement tables required for stone and cultch measurement as described in Technical Specifications Section 3 Subsection 3.6.2.

#### 2.6.4 DAILY QUALITY CONTROL REPORTS

The Contractor shall supply daily quality control reports to document construction progress and ensure compliance with Contract Documents for each project under this Contract. The daily quality control reports shall start on the first day after date of acknowledgement of Notice to Proceed and end on the last day of demobilization for each project and shall be furnished to the Engineer by 2:00 PM the following day. The daily quality control report shall be filled out every day, regardless of whether any portion of the work is accomplished and regardless of whether requested by the Engineer.

All compliance and quality control inspections will be recorded on the daily quality control reports for each project including, but not limited to, the specific items required in each technical section of the Contract Documents. Daily quality control reports shall include a description of the work completed each day including, but not limited to, the operating hours of equipment and personnel, estimated quantity of material dredged and placed, surveys conducted, water quality tests conducted if required, shoreline protection installation progress, stone tests, cultch placement and testing, weather observed, times and reasons for work stoppages and/or delays, any permit related issues or problems in compliance with the permit or other laws, corrective actions taken, and personnel and visitors on site. Copies of the dredge logs or leverman's logs, fueling and maintenance logs for the dredge and boosters as applicable, and barge displacement measurement logs as applicable shall be included with the daily quality control report. Additional components of the daily quality control report are described in the following subsections.

The daily quality control report shall be in the approved format (see Technical Specifications Section 2 Subsection 2.3.3.1) and shall include the approved retention rate spreadsheet for reporting fill progress (see Technical Specifications Section 2 Subsection 2.3.3.2).

Failure to provide daily quality control reports to the Engineer shall result in delay of payments to the Contractor until the daily quality control reports are received.

# 2.6.4.1 REPORT OF ENVIRONMENTAL ISSUES

The Contractor shall submit, as specified, logs and final summary report of sightings and incidents with endangered species and other environmental issues. Environmental issues shall be submitted with the daily quality control report.

## 2.6.4.2 MATERIAL TRANSPORTATION AND DISPOSAL FEES

Logs or records, including receipts or tickets, for material transportation, disposal fees, and the like shall be provided with the daily quality control report.

## 2.6.4.3 FILL PROGRESS

The daily quality control report shall include a description of the control of discharge and a discussion of prior and ongoing placement activities during the previous 24 hours, to include the items specified below:

- Date
- Station and offset boundaries of dredging for the last 24 hours
- Gross and credited dredging quantity for the last 24 hours
- Gross and credited dredging quantity to date
- Placement of fill:
  - Construction to lines and grades shown
  - o Misplaced materials monitoring and removal if required
  - Acreage or linear footage of fill constructed, quantity of satisfactory material utilized, and estimated quantity of remaining satisfactory material required for fill construction
  - End stations/locations of initial placement and final shaping and grading for the last 24 hours
  - End stations/locations of initial placement and final shaping and grading to date
  - Control of discharge and other comments

The Contractor shall use the approved retention rate spreadsheet to report fill progress (see Technical Specifications Section 2 Subsection 2.3.3.2).

## 2.6.4.4 MONITORING OF FILL

Monitoring of the fill shall be made based on Contractor quality control cross section surveys, taken as specified herein. Quantity calculations required for completing the retention rate spreadsheet shall be made for each 24-hour period. The required report information and entries to the spreadsheet shall be recorded daily. In areas where surveys indicate the quantity of material within the template is less than the amount required to construct the required template, the Contractor shall place additional material and perform additional surveys to verify the material quantity is within the specified tolerance and a note of this shall be made on the daily quality control report. Placing additional material is at the Contractor's expense.

## 2.6.4.5 BSC SHORE PROTECTION REMOVAL PROGRESS

A copy of the records of daily inspections, surveys, and corrective actions taken shall be submitted as part of the daily quality control report. The report shall include a description of the stone removal and stockpiling and a discussion of prior and ongoing removal activities during the previous 24 hours. The report shall also include the quantity of existing stone material removed and stockpiled to date for each location.

# 2.6.4.6 SHORE PROTECTION INSTALLATION PROGRESS

A copy of the records of daily inspections, tests, surveys, and corrective actions taken shall be submitted as part of the daily quality control report. The report shall include a description of the stone placement and a discussion of prior and ongoing placement activities during the previous 24 hours including the quantity of each stone material placed to date for each site.

# 2.6.4.7 CULTCH INSTALLATION PROGRESS

A copy of the records of daily inspections, tests, surveys, and corrective action taken shall be submitted as part of the daily quality control report. The report shall include a description of the cultch placement and a discussion of prior and ongoing placement activities during the previous 24 hours including the quantity of cultch material placed to date for reef pads at Dollar Reef and San Leon and the three oyster reef wave trips at Bird Island Marsh. Cultch material shall be weighed as described in Technical Specifications Section 3 Subsection 3.6 and recorded on the daily inspection form at the sole cost and responsibility of the Contractor.

# 2.6.4.8 DREDGE DATA

A dredge data spreadsheet shall be set up in Microsoft Excel 2003 or later, with appropriate column headings as required for dredge data monitoring and reporting as outlined in the US Army Corps of Engineers National Dredge Quality Management (DQM) Program. The intent is to provide the same dredge monitoring data as required by the DQM in an Excel format to the Port Authority. The DQM Specifications can be found on the US Army Corps of Engineers website

https://dqm.usace.army.mil/Default.aspx. The Contractor shall reference the following DQM Specifications as applicable for the Work described within these Technical Specifications:

• Section 35 20 23.33 for Pipeline Hydraulic Dredge

- Section 35 20 23.23 for Hopper Dredge
- Section 35 20 23.13 for Scow Monitoring Profile

A copy of the dredge data spreadsheet shall be submitted along with the quality control plan no later than fourteen (14) days within award of the Contract for approval.

#### 2.6.5 SUBMITTAL OF REPORTS

Daily quality control reports shall be submitted in both hard copy and electronic form as directed. A copy of the completed retention rate spreadsheet shall be attached to the daily quality control report on the Thursday of each week, or as directed. Additionally, on the Thursday of each week or as often as directed, the Contractor shall send the retention rate spreadsheet to an email distribution list that will be provided at the preconstruction conference.

#### 2.6.6 SURVEY SUBMITTALS

The Contractor shall provide daily to the Engineer, all survey data collected by the Contractor during its performance of the work including daily dredging and topographic surveys, volumes placed and retained (as part of the daily quality control report), quantity of geotextile, cultch material and stone installed, and survey plots. Surveys shall be conducted in accordance with Section 4 of these Technical Specifications. In addition, the Contractor shall furnish the copies of all field notes and all other records relating to the survey or to the layout of the work to the Engineer. The Contractor shall retain copies of all such material furnished to the Engineer. Survey submittals shall be submitted electronically in accordance with these Technical Specifications.

#### 2.6.6.1 SURVEY PLOTS

All surveys shall be in the form of plan-view and cross-section plots every 50 feet unless stated otherwise within the Contract Documents. The graphical format shall consist of cross sections at scales not smaller than 1-inch equals 50 feet Horizontal and 1-inch equals 10 feet Vertical so that each section can be presented on 8-1/2 by 11-inch paper. Plots shall be prepared in AutoCAD (no later than Version 2017 software). All survey data shall be referenced to the Project datum as shown in these Technical Specifications and Plans. All plots shall legibly and clearly display the following information:

- Project name
- Name of party responsible for survey
  - Surveys submitted by the Contractor shall have the Contractor's name displayed.
  - Surveys by the Port Authority shall have the name of the responsible Engineer or Surveyor displayed in addition to the Port Authority.
- RPLS or PE seal, signature, and business affiliation (where applicable)
- Date(s) surveys were performed

- Layout of work including locations and descriptions of survey control
- Vertical and horizontal datums
- Sheet names and numbers
- Drawing scale(s)

All survey plots shall comprise a well-organized, stand-alone set of drawings that do not include any outdated or superseded information that may have been previously submitted. Plots for the dredge, fill, cultch and shore protection installation areas shall include the following:

- Plan sheets clearly documenting locations, limits, and dimensions of completed work and locations where cross sections were taken.
- Cross-sections providing an overlay of initial and final survey transects superimposed with specified templates and tolerances. Drawing scales shall be such that the cross sections and templates are clearly discernible.
- As work progresses, plots documenting completed work shall be submitted with requests for progress payments. In addition, upon completion of all work, a final, complete set of survey plots shall be submitted to document "as-built" conditions of the work. This final submittal shall be a comprehensive, stand-alone set of drawings, not an assembly of individual drawings that were previously submitted with progress pay requests.

# 2.6.6.2 ELECTRONIC SURVEY SUBMITTALS

In addition to plots, all survey transmittals shall include digital data on a labeled removable media device such as a USB drive, CD or DVD. Electronic submittal via email and/or an online file transfer service shall be allowed subject to approval by the Engineer. Digital data shall include the following:

- A submittal log documenting surveys submitted to date with descriptors for survey dates and locations
- Survey plots in AutoCAD format
- Survey plots in PDF format
- ASCII files containing northing, easting, elevation, and descriptor for each survey point both raw and corrected data points
- All survey field notes

#### 2.6.7 DROP-OUTLET STRUCTURE SUBMITTALS

#### 2.6.7.1 SHOP DRAWINGS

The Contractor shall submit for approval by the Engineer, the following Shop Drawings at a minimum:

- Structure
- Steel Railings and Handrails
- Grating
- Steel Drainage Pipes

The detail drawings shall include length and type of welds and welding procedure specifications to be used at each weld location.

#### 2.6.7.2 MATERIALS

Certificates of compliance from suppliers which demonstrate compliance with the applicable specification shall be submitted for structural steel, effluent pipes, lumber, lumber treatment, paint and galvanizing.

## 2.6.7.3 BEST MANAGEMENT PRACTICES FOR TREATED WOOD

The producer of the treated wood products shall provide certification that WWPI 08, Best Management practices (BMP) for the use of Treated Wood in Aquatic Environments were utilized, including a written description and appropriate documentation of the BMP used.

# 2.7 POST CONSTRUCTION SUBMITTALS AND NOTICES

## 2.7.1 RECORD DRAWINGS

The Contractor shall maintain, on a separate set of the Plans, a record of all changes made during construction. The Contractor shall be responsible for keeping these records and neatly noting with colored pencil or ink all changes. These "Record Drawings" shall be turned over to the Engineer at the completion of the project. Final payment will not be made until "Record Drawings" have been received and accepted by the Engineer.

# 2.7.2 **POST-DREDGE PIPELINE SURVEY**

The Contractor shall submit the results of their post-dredge pipeline survey (see Technical Specifications Section 4 Subsection 4.9.) to the Engineer before final payment for demobilization can be made. Submittals shall include hard copy plan-view drawings as well as electronic copies of the drawings (in both .DWG and .PDF format), all field notes, and the final data set. Electronic submittals shall be provided on CD or DVD.

All survey data shall be referenced to the project datum as shown in these Technical Specifications and Plans. The post-dredge hazard survey plots shall be signed and sealed in accordance with Technical Specifications Section 4 Subsection 4.3.1 and shall legibly and clearly display the following information:
- Project name
- Contractor's name
- RPLS or PE seal, signature, and business affiliation
- Date(s) surveys were performed
- Layout of work including locations and descriptions of survey control
- Vertical and horizontal datums
- Sheet names and numbers
- Drawing scale(s)
- Possible anomalies and/or possible pipelines or equipment left by the Contractor

Any submerged pipelines or other Contractor equipment must be removed before final payment for demobilization can be made.

#### 2.7.3 OBSTRUCTION DEMOLITION SURVEY

The Contractor shall submit the results of their obstruction demolition survey (see Technical Specifications Section 4 Subsection 4.15) to the Engineer before final payment for HSC Existing Structure Demolition/Removal can be made. Submittals shall include hard copy plan-view drawings as well as electronic copies of the drawings (in both .DWG and .PDF format), all field notes, and the final data set. Electronic submittals shall be provided on CD or DVD.

All survey data shall be referenced to the project datum as shown in these Technical Specifications and Plans. The obstruction demolition survey plots shall be signed and sealed in accordance with Technical Specifications Section 4 Subsection 4.3.1 and shall legibly and clearly display the following information:

- Project name
- Contractor's name
- RPLS or PE seal, signature, and business affiliation
- Date(s) surveys were performed
- Layout of work including locations and descriptions of survey control
- Vertical and horizontal datums
- Sheet names and numbers

- Drawing scale(s)
- Possible piles, debris, equipment or other obstructions left by the Contractor

Any submerged piles or obstructions left above the post-project sea bed or Contractor equipment must be removed before final payment for HSC Existing Structure Demolition/Removal can be made.

#### 2.7.4 FINAL SUBMITTALS

At the time of Contractor's request for final acceptance, the Contractor shall provide to the Engineer the following material, which the Contractor shall have accumulated and retained during the course of work:

- Final "as-built" construction drawings, provided in both PDF and AutoCAD 2017 or earlier formats, showing at minimum the following information:
  - All information shown on the Plans and a record of all completed work, deviations, modifications, or changes from those drawings, however minor, which may have been incorporated into the work.
  - Before and after dredging channel section surveys.
  - Plan plot of dredge area, including gross and net yards dredged distinguished by dates of dredging and reach of channel dredged.
  - Plan plots of disposal locations used, including gross yardage placed at each site, gross tonnage of cultch placed at each oyster pad and wave trip, and gross tonnage of rock placed along each dike
  - Period of disposal placement for each disposal site utilized.
  - Dredge discharge pipeline locations (discharge coordinates).
  - Dredge pipeline crossing corridors, including gross yards excavated (if performed)
    - Access corridors utilized, including notation of floatation dredging and disposal (if flotation excavation is performed).
  - Vertical control utilized including any applicable conversions.
  - Plan plot of required disposal area surveys covering the full extent of material placed within each disposal site used.
  - Utility locations as verified by owners, including station, C/L and/or edge of cut XYcoordinates, and minimum elevations

- XY-coordinates of drop-outlet structures constructed
- One set of all Project submittals and any equipment and material warranties/guarantees as provided by all appropriate suppliers or manufacturers.
- One set of "Record Drawings" showing all revisions to the original Contract Documents. Drawings shall also show routing of underground outside utilities and conduits with actual dimensions from buildings or other known landmarks where applicable.
- Any and all other documents, keys, manuals, etc. required by the Contract Documents.

#### 2.7.5 APPLICATION FOR FINAL PAYMENT

After the Contractor has completed corrections as mutually agreeable to the Engineer and Contractor and has delivered any required daily quality control reports, hydrographic or topographic construction surveys, water quality reports if required, data requests, guarantees, bonds, certificates of inspection, marked-up record documents, or other documents as required, and has completed demobilization, the Contractor may submit the application for final payment to the Engineer for submittal to the Port Authority.

**END OF SECTION** 

## **3 MEASUREMENT AND PAYMENT**

The following sections encompass the bid items required for the work covered by the Contract price.

## 3.1 LUMP SUM PAYMENT ITEMS

#### 3.1.1 MOBILIZATION AND DEMOBILIZATION – NEW WORK MECHANICAL DREDGING

#### 3.1.1.1 GENERAL

Mobilization and demobilization shall include the costs in connection with mobilization and demobilization of the plant necessary to perform work under the various bid items for mechanical dredging and placement. The Contract price shall include transportation and other costs incidental to delivery of the plant and other equipment to the general work area in condition ready for safe operations and, after the completion of the work, for removal of the plant and equipment from the work sites.

The Port Authority may require the Contractor to furnish cost data to justify this portion of the bid if the Port Authority believes that the Contractor's bid for this item does not bear a reasonable relationship to the cost of the work in this Contract. Failure to justify such price to the satisfaction of the Port Authority will result in a payment determined by the Port Authority.

#### 3.1.1.2 MEASUREMENT

This shall not be measured for payment.

#### 3.1.1.3 **PAYMENT**

Payment for mobilization and demobilization shall be made in accordance with Section 9 Payment for Mobilization and Demobilization of the Special Conditions.

## 3.1.2 MOBILIZATION AND DEMOBILIZATION - HYDRAULIC DREDGING

#### 3.1.2.1 GENERAL

Mobilization and demobilization shall include the costs in connection with mobilization and demobilization of the plant necessary to perform work under the various bid items for hydraulic dredging and placement. The Contract price shall include transportation and other costs incidental to delivery of the plant and other equipment, and pipelines, to the general work area in condition ready for safe operations and, after the completion of the work, for removal of the plant and equipment from the work sites.

The Port Authority may require the Contractor to furnish cost data to justify this portion of the bid if the Port Authority believes that the Contractor's bid for this item does not bear a reasonable relationship to the cost of the work in this Contract. Failure to justify such price to the satisfaction of the Port Authority will result in a payment determined by the Port Authority.

#### 3.1.2.2 MEASUREMENT

This shall not be measured for payment.

#### 3.1.2.3 **PAYMENT**

Payment for mobilization and demobilization shall be made in accordance with Section 9 Payment for Mobilization and Demobilization of the Special Conditions.

#### 3.1.3 NOISE ABATEMENT

#### 3.1.3.1 GENERAL

Payment for noise abatement during bid items associated with the Bayport Ship Channel shall be made at the Contract fixed price, which shall include the cost for hiring and using an acoustical consultant, cost for obtaining sound readings, preparing and implementing a noise control plan, and the cost for any adjustments made to the Contractor's equipment for the purpose of noise control.

#### 3.1.3.2 MEASUREMENT

This shall not be measured for payment.

#### 3.1.3.3 **PAYMENT**

Payment shall be made at the Contract price as follows:

- 1. Up to 60% will be available for payment after commencement of dredging operations within the BSC.
- 2. The remaining 40% will be paid upon completion of final cleanup of pipeline routes as confirmed by the required post-dredge hazard survey in Section 4 Subsection 4.8.

## 3.2 UNIT PRICE PAYMENT ITEMS

## 3.2.1 NEW WORK MECHANICAL DREDGING – HSC TO DOLLAR REEF OYSTER REEF MITIGATION SITE

#### 3.2.1.1 **GENERAL**

This item shall mean the Contract unit price for new work dredging between HSC Station 35+000 to Station 28+605 for construction of oyster pads at Dollar Reef oyster reef mitigation site. New work dredging shall include the channel widening and relocation of the existing barge lanes outside the channel as shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

#### 3.2.1.2 MEASUREMENT

This item shall be measured for payment by cubic yard of in-place material removed within the lines and grades of the prescribed templates as shown on the Plans and measured by Before Dredge (BD) and After Dredge (AD) survey comparison in accordance with Section 4 of these Technical Specifications. Channel dredging shall be measured by reaches in accordance with Table 6-2: HSC Acceptance Sections.

#### 3.2.1.3 **PAYMENT**

Payment shall be made at the Contract unit price. Payment will not be made for material taken from beyond the limits as shown in the Plans. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

# 3.2.2 NEW WORK MECHANICAL DREDGING – HSC TO SAN LEON OYSTER REEF MITIGATION SITE

#### 3.2.2.1 GENERAL

This item shall mean the Contract unit price for new work dredging HSC Station 35+000 to 28+605 for construction of oyster pads at San Leon oyster reef mitigation site. New work dredging shall include the channel widening and relocation of the existing barge lanes outside the channel as shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

#### 3.2.2.2 MEASUREMENT

This item shall be measured for payment by cubic yard of in-place material removed within the lines and grades of the prescribed templates as shown on the Plans and measured by BD and AD survey comparison in accordance with Section 4 of these Technical Specifications. Channel dredging shall be measured by reaches in accordance with Table 6-2: HSC Acceptance Sections.

#### 3.2.2.3 **PAYMENT**

Payment shall be made at the Contract unit price. Payment will not be made for material taken from beyond the limits as shown in the Plans. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

# 3.2.3 DOLLAR REEF OYSTER PADS

#### 3.2.3.1 **GENERAL**

This item shall mean the Contract unit price per acre at Dollar Reef as shown on the Plans, and shall include constructing mechanical fill pads, erosion control, preparation of mechanical fill for cultch, placement of cultch material and any other related work for constructing four (4) 20-acre oyster pads at Dollar Reef oyster reef mitigation site as specified in Sections 8 and 11 of these Technical Specifications. The costs for sampling and testing of cultch material shall be included in the applicable contract unit price for "Dollar Reef Oyster Pads".

#### 3.2.3.2 MEASUREMENT

Measurement for Dollar Reef oyster pads shall be made per acre of completed oyster pad meeting the minimum lines and grades as shown on the Plans. An oyster pad will not be considered completed unless it meets the requirements of Technical Specifications Section 11 Subsection 11.7.

#### 3.2.3.3 **PAYMENT**

Payment shall be made at the Contract unit price. An individual oyster pad must be completed in its entirety, and accepted as complete, before it will be considered for payment. No progress payments shall be made for oyster pads that have yet to be accepted as complete by the Engineer.

#### 3.2.4 SAN LEON OYSTER PADS

#### 3.2.4.1 **GENERAL**

This item shall mean the Contract unit price per acre at San Leon as shown on the Plans, and shall include constructing mechanical fill pads, erosion control, preparation of mechanical fill for cultch, placement of cultch material and any other related work for constructing one (1) 3.4-acre oyster pad, one (1) 6-acre oyster pad, one (1) 9-acre oyster pad, one (1) 13.2-acre oyster pad, one (1) 17.2-acre oyster pad, five (5) 20-acre oyster pads, and one (1) 31-acre oyster pad at San Leon oyster reef mitigation site as specified in Sections 8 and 11 of these Technical Specifications. The costs for sampling and testing of cultch material shall be included in the applicable contract unit price for "San Leon Oyster Pads".

#### 3.2.4.2 MEASUREMENT

Measurement for San Leon oyster pads shall be made per acre of completed oyster pad meeting the minimum lines and grades as shown on the Plans. An oyster pad will not be considered completed unless it meets the requirements of Section 11 Subsection 11.7 of these Technical Specifications.

#### 3.2.4.3 **PAYMENT**

Payment shall be made at the Contract unit price. An individual oyster pad must be completed in its entirety, and accepted as complete, before it will be considered for payment. No progress payments shall be made for oyster pads that have yet to be accepted as complete by the Engineer.

## 3.2.5 NEW WORK HYDRAULIC DREDGING – HSC STATIONS 57+000 TO 15+500 TO BIRD ISLAND WARSH

#### 3.2.5.1 **GENERAL**

This item shall mean the Contract unit price for new work dredging between HSC Stations 57+000 to 15+500 for construction of Bird Island Marsh. New work dredging shall include the channel widening and relocation of the existing barge lanes outside the channel as shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

#### 3.2.5.2 MEASUREMENT

This item shall be measured for payment by cubic yard of in-place material removed within the lines and grades of the prescribed templates as shown on the Plans and measured by BD and AD survey comparison in accordance with Section 4 of these Technical Specifications. Channel dredging shall be measured by reaches in accordance with Table 6-2: HSC Acceptance Sections.

#### 3.2.5.3 **PAYMENT**

Payment shall be made at the Contract unit price. Payment will not be made for material taken from beyond the limits as shown in the Plans. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

#### 3.2.6 NEW WORK HYDRAULIC DREDGING – BSC STATIONS 222+75.87 TO 42+87.80 TO BIRD ISLAND MARSH

#### 3.2.6.1 **GENERAL**

This item shall mean the Contract unit price for new work dredging between BSC Stations 222+75.87 to 42+07.08 (BSC 455-foot widening) as shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

#### 3.2.6.2 MEASUREMENT

This item shall be measured for payment by cubic yard of in-place material removed within the lines and grades of the prescribed templates as shown on the Plans and measured by BD and AD survey comparison in accordance with Section 4 of these Technical Specifications. Channel dredging shall be measured by reaches in accordance with Table 6-6: BSC New Work Acceptance Sections.

#### 3.2.6.3 **PAYMENT**

Payment shall be made at the Contract unit price. Payment will not be made for material taken from beyond the limits as shown in the Plans. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

## 3.2.7 NEW WORK HYDRAULIC DREDGING – BSC FLARE STATIONS 238+37.21 TO 211+56.66 TO BIRD ISLAND MARSH

#### 3.2.7.1 GENERAL

This item shall mean the Contract unit price for new work dredging between BSC Flare Stations 238+37.31 to 211+56.66 as shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

## 3.2.7.2 MEASUREMENT

This item shall be measured for payment by cubic yard of in-place material removed within the lines and grades of the prescribed templates as shown on the Plans and measured by BD and AD survey comparison in accordance with Section 4 of these Technical Specifications. Channel dredging shall be measured by reaches in accordance with Table 6-6: BSC New Work Acceptance Sections.

#### 3.2.7.3 **PAYMENT**

Payment shall be made at the Contract unit price. Payment will not be made for material taken from beyond the limits as shown in the Plans. Progress payments shall be made in accordance with the

Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

#### 3.2.8 BERTH 1 DREDGING

#### 3.2.8.1 **GENERAL**

The Contract unit price per cubic yard of material removed for berth dredging shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

#### 3.2.8.2 MEASUREMENT

This item shall be measured for payment by cubic yard of in-place material actually removed within the lines and grades of the prescribed templates as shown on the Plans and measured by AD and BD cross-section comparison in accordance with Section 4 of these Technical Specifications.

#### 3.2.8.3 **PAYMENT**

Payment shall be made at the Contract unit price. Progress payments shall be made in accordance with the Special Conditions based upon percentage completion less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

#### **3.2.9 BERTH 7 DREDGING**

#### 3.2.9.1 **GENERAL**

The Contract unit price per cubic yard of material removed for berth dredging shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

#### 3.2.9.2 MEASUREMENT

This item shall be measured for payment by cubic yard of in-place material actually removed within the lines and grades of the prescribed templates as shown on the Plans and measured by AD and BD cross-section comparison in accordance with Section 4 of these Technical Specifications.

#### 3.2.9.3 **PAYMENT**

Payment shall be made at the Contract unit price. Progress payments shall be made in accordance with the Special Conditions based upon percentage completion less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

#### 3.2.10 FINAL SHAPING AND GRADING – BIRD ISLAND MARSH 2-AC BIRD ISLANDS HYDRAULIC FILL

#### 3.2.10.1 GENERAL

The Contract price per acre of final shaping and grading of each 2-AC bird island at BIM shall include constructing and maintaining hydraulic fill, including placing and compacting fill material, erosion control, final shaping and grading of material and any other related work for constructing three (3) 2-AC bird islands at Bird Island Marsh as specified in Section 7 of these Technical Specifications.

#### 3.2.10.2 MEASUREMENT

Final shaping and grading shall be measured for payment at the Contract unit price per acre for "Final Shaping and Grading - Bird Island Marsh 2-AC Bird Islands Hydraulic Fill" meeting the required lines and grades shown on the Plans. Material placed shall be measured by acres in place, by means of topographic and hydrographic surveys. Acreage placed outside of the limits and tolerances of the specified design template shall not be included in pay quantities.

#### 3.2.10.3 PAYMENT

Payment shall be made at the Contract unit price. Payment will not be made for material shaped and graded beyond the limits as shown in the Plans. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

#### 3.2.11 FINAL SHAPING AND GRADING - BIRD ISLAND MARSH DIKES HYDRAULIC FILL

#### 3.2.11.1 GENERAL

The Contract price per linear foot of final shaping and grading of BIM perimeter dikes shall include constructing and maintaining hydraulic fill, including placing and compacting fill material, erosion control, final shaping and grading of material and any other related work for constructing perimeter dikes surrounding BIM as specified in Section 7 of these Technical Specifications.

#### 3.2.11.2 MEASUREMENT

Final shaping and grading shall be measured for payment at the Contract unit price per linear foot for "Final Shaping and Grading - Bird Island Marsh Dikes Hydraulic Fill" meeting the required lines and grades shown on the Plans. Material placed shall be measured along the centerline of the new dike to include completed dike that meets specified acceptance requirements as verified by before and after placement surveys.

#### 3.2.11.3 PAYMENT

Payment shall be made at the Contract unit price. Payment will not be made for material shaped and graded beyond the limits as shown in the Plans. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

#### 3.2.12 BIRD ISLAND MARSH OYSTER REEF WAVE TRIPS

#### 3.2.12.1 GENERAL

The Contract price per each completed oyster reef wave trip at Bird Island Marsh shall include constructing and maintaining hydraulic fill, including placing and compacting fill material, erosion control, final shaping and grading of hydraulic fill, placement of cultch and any other related work for constructing three (3) oyster reef wave trips at Bird Island Marsh as specified in Sections 7 and 11 of these Technical Specifications. The costs for sampling and testing of cultch material shall be included in the applicable Contract unit price for "Bird Island Marsh Oyster Reef Wave Trips".

#### 3.2.12.2 MEASUREMENT

Measurement for Bird Island Marsh oyster reef wave trips shall be made per each completed wave trip meeting the minimum lines and grades shown on the Plans. An oyster reef wave trip will not be considered completed unless it meets the requirements of Technical Specification Section 11.7.

#### 3.2.12.3 PAYMENT

Payment shall be made at the Contract unit price. No progress payments shall be made for Bird Island Marsh oyster reef wave trips.

#### **3.2.13 SHORE PROTECTION – BIRD ISLAND MARSH DIKES**

#### 3.2.13.1 GENERAL

The Contract unit price per ton of shore protection placed shall include placement of stone shore protection and geotextile fabric at the placement area. The costs for sampling and testing of stone shall be included in the applicable contract unit price for Shore Protection - Bird Island Marsh Dikes.

#### 3.2.13.2 MEASUREMENT

Shore protection as shown shall be measured by the short ton placed for payment by truck weight tickets or the barge displacement method, see Technical Specification Section 3.6 "Stone and Cultch Measurement". Where a loss of material due to removing, stockpiling, relocating, re-installing or hauling is possible, the Engineer shall have the discretion to require re-measurement prior to placement. Each truck or barge load shall only be comprised of one type of stone gradation.

Geotextiles shall not be measured for payment but shall be considered incidental to the cost per ton of stone.

#### 3.2.13.3 PAYMENT

Payment shall be made at the Contract unit price. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

#### 3.2.14 BSC SHORE PROTECTION REMOVAL

#### 3.2.14.1 GENERAL

The Contract price per linear foot for the removal of existing BSC shore protection shall include removal, handling and stockpiling of the existing shore protection on the north shoreline of the BSC as shown on the Plans.

#### 3.2.14.2 MEASUREMENT

BSC shore protection removal shall be measured at the Contract unit price per linear foot for "BSC Shore Protection Removal" meeting the required lines and grades shown on the Plans.

#### 3.2.14.3 PAYMENT

Payment shall be made at the Contract unit price. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

#### 3.2.15 BSC SHORE PROTECTION REUSE

#### 3.2.15.1 GENERAL

The Contract price per linear foot for the reuse of stockpiled BSC shore protection shall include slope preparation required for the placement of stone shore protection, installation of geotextile fabric and placement of stone shore protection on the north shoreline of the BSC as shown on the Plans.

#### 3.2.15.2 MEASUREMENT

BSC shore protection reuse shall be measured at the Contract unit price per linear foot for "BSC Shore Protection Reuse" meeting the required lines and grades shown on the Plans.

Geotextiles shall not be measured for payment but shall be considered incidental to the cost per ton of stone.

#### 3.2.15.3 PAYMENT

Payment shall be made at the Contract unit price. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

#### 3.2.16 BSC SHORE PROTECTION – ADDITIONAL STONE

#### 3.2.16.1 GENERAL

Additional stone may be required in areas where the existing shore protection is removed and replaced.

#### 3.2.16.2 MEASUREMENT

Additional stone required to complete the shore protection as shown shall be measured by the short ton placed for payment by truck weight tickets or the barge displacement method, see Technical Specifications Section 3.6 "Stone and Cultch Measurement". Where a loss of material due to removing, stockpiling, relocating, re-installing or hauling is possible, the Engineer shall have the discretion to require re-measurement prior to placement. Each truck or barge load shall only be comprised of one type of stone gradation.

Geotextiles shall not be measured for payment but shall be considered incidental to the cost per ton of stone.

#### 3.2.16.3 PAYMENT

Payment shall be made at the Contract unit price. Progress payments shall be made in accordance with the Special Conditions based upon percentage completion less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

The costs for sampling and testing of new stone shall be included in the applicable contract unit price for new stone.

#### 3.2.17 DROP-OUTLET STRUCTURES – BIRD ISLAND MARSH

#### 3.2.17.1 GENERAL

The Contract price per each completed drop-outlet structure installed at Bird Island Marsh shall include all plant, labor, material, equipment and any other related work for constructing three (3) new drop-outlet structures at Bird Island Marsh as specified in Section 13 of these Technical Specifications.

#### 3.2.17.2 MEASUREMENT

Measurement for drop-outlet structures at Bird Island Marsh shall be made per each installed dropoutlet structure in accordance with the specifications.

#### 3.2.17.3 PAYMENT

Payment shall be made at the Contract unit price. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance of this item.

#### 3.2.18 SEEDING AND FERTILIZING - BIRD ISLAND MARSH DIKES

#### 3.2.18.1 GENERAL

The Contract price per acre for this work shall include seeding and fertilizing of the dike crown and interior and exterior slopes, as specified in Section 12 of these Technical Specifications.

#### 3.2.18.2 MEASUREMENT

This item shall be measured by the acreage of dike seeded and fertilized, and exhibiting growth at a period of thirty (30) to forty-five (45) days in accordance with Section 12 of these Technical Specifications.

#### 3.2.18.3 PAYMENT

Payment shall be made at the Contract unit price per acre of dike seeded and fertilized and accepted by the Engineer.

## 3.2.19 HYDRAULIC DREDGING STANDBY TIME

#### 3.2.19.1 GENERAL

The Contract unit price per hour for hydraulic dredging standby time shall include the costs due to work stoppages as directed by the Port Authority.

During the standby period, the Contractor shall man the total dredge plant with necessary crew to return to productive dredging upon authorization from the Port Authority, as well as to ascertain the security of the plant and to maintain the operations of those systems of the plant that are essentially required to be operated. During periods of standby, the Contractor shall maintain lookouts and radio

communications as required in Technical Specifications Section 1 Section 1.12.4. When in standby status, the total dredge plant or portion thereof shall not be moved from the approved location of standby unless directed. Standby time shall be monitored closely and entered separately on the daily dredge reports which are part of the quality control system. The report shall indicate chargeable standby time for the day and cumulative standby time.

#### 3.2.19.2 MEASUREMENT

Standby Time shall be measured and paid for to the nearest 10 minutes at the rate specified for this bid item. The total amount of chargeable standby incurred for each day shall be annotated on the Contractor's daily report and is subject to verification by the Port Authority and/or Engineer.

#### 3.2.19.3 PAYMENT

Payment for standby time shall be made at the Contract unit price per hour for Hydraulic Dredging Standby Time, which will include the standby hours required per the direction of the Port Authority. No separate payment shall be made for standby or down time incurred while dredging without authorization from the Port Authority. Delay time for ancillary maintenance or repairs beyond the necessary time to alleviate the delay as determined by the Port Authority shall not be included. Nor shall the necessary time to perform the work as described in Technical Specification Section 14 be included, if required.

### 3.2.20 MECHANICAL DREDGING STANDBY TIME

#### 3.2.20.1 GENERAL

The Contract unit price per hour for mechanical dredging standby time shall include the costs due to work stoppages as directed by the Port Authority. This standby time shall not include dredge movements and delays for passing ship traffic.

During the standby period, the Contractor shall man the total dredge plant with necessary crew to return to productive dredging upon authorization from the Port Authority, as well as to ascertain the security of the plant and to maintain the operations of those systems of the plant that are essentially required to be operated. During periods of standby, the Contractor shall maintain lookouts and radio communications as required in Technical Specifications Section 1 Section 1.12.4. When in standby status, the total dredge plant or portion thereof shall not be moved from the approved location of standby unless directed. Standby time shall be monitored closely and entered separately on the daily dredge reports which are part of the quality control system. The report shall indicate chargeable standby time for the day and cumulative standby time.

#### 3.2.20.2 MEASUREMENT

Standby Time shall be measured and paid for to the nearest 10 minutes at the rate specified for this bid item. The total amount of chargeable standby incurred for each day shall be annotated on the Contractor's daily report and is subject to verification by the Port Authority and/or Engineer.

#### 3.2.20.3 PAYMENT

Payment for standby time shall be made at the Contract unit price per hour for Mechanical Dredging Standby Time, which will include the standby hours required per the direction of the Port Authority. No separate payment shall be made for standby or down time incurred while dredging without authorization from the Port Authority. Delay time for ancillary maintenance or repairs beyond the necessary time to alleviate the delay as determined by the Port Authority shall not be included. Nor shall the necessary time to perform the work as described in Technical Specification Section 14 be included, if required.

#### 3.2.21 BERTH DREDGING STANDBY TIME

#### 3.2.21.1 GENERAL

The Contract unit price per hour for berth dredging standby shall include the costs due to waiting on ships to move from the dock to allow dredging. The presence of vessels moored at the docks may preclude economical and efficient dredging operations. In addition to the moored vessels, it is also believed that the area adjacent to the docks may contain a large amount of trash and debris compared to dredging the adjacent federal channel. Standby time will be for the following instances:

- Delay time while transporting the dredge to or from a dock.
- Delay time when the dredge is forced to sit idle due to the presence of a ship at the docks and work cannot be performed in the BSC or BSC Flare of the area being dredged at that time.
- Delay time due to removing trash and debris from the dredge pump/cutter while dredging the docks only will be measured and paid for to the nearest 10 minutes. No delays for ancillary maintenance or repairs beyond the necessary time to alleviate the delay due to debris will be measured or paid for under this specification.

During the standby period, the Contractor shall man the total dredge plant with necessary crew to return to productive dredging upon the earliest opportunity to resume operations, as well as to ascertain the security of the plant and to maintain the operations of those systems of the plant that are essentially required to be operated. During periods of standby, the Contractor shall maintain lookouts and radio communications as required in Technical Specifications Section 1 Subsection 1.12.4. When in standby status, the total dredge plant or portion thereof will not be moved from the approved location of standby unless directed. With the removal of the plant from standby status, the Contractor will be given an assignment that may be to move back to the location from when the standby status commenced or to move to another location. Standby time shall be monitored closely and entered separately on the daily dredge reports which are part of the quality control system. The report shall indicate chargeable standby time for the day and cumulative standby time.

#### 3.2.21.2 MEASUREMENT

Standby time will be measured and paid for to the nearest 0.1 hour at the rate specified for this bid item. The total amount of chargeable standby incurred for each day will be annotated on the Contractor's daily report and verified daily by the Engineer or its authorized representative.

#### 3.2.21.3 PAYMENT

Payment for standby time will be made at the Contract unit price per hour for berth dredging, which will include the standby hours required at Berths 1 and 7.

## **3.3 OPTION 1**

## 3.3.1 NEW WORK HYDRAULIC DREDGING – HSC STATIONS 15+500 TO 14+500 TO BIRD ISLAND MARSH

#### 3.3.1.1 **GENERAL**

This item shall mean the Contract unit price for new work dredging between HSC Stations 15+000 to 14+500 as shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

#### 3.3.1.2 MEASUREMENT

This item shall be measured for payment by cubic yard of in-place material removed within the lines and grades of the prescribed templates as shown on the Plans and measured by BD and AD survey comparison in accordance with Section 4 of these Technical Specifications.

#### 3.3.1.3 **PAYMENT**

Payment shall be made at the Contract unit price. Payment will not be made for material taken from beyond the limits as shown in the Plans. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance.

## 3.3.2 NEW WORK MECHANICAL DREDGING – HSC STATIONS 37+000 TO 35+000 TO DOLLAR REEF AND SAN LEON OYSTER REEF MITIGATION SITES

#### 3.3.2.1 **GENERAL**

This item shall mean the Contract unit price for new work dredging, within the green side channel widening limits, between HSC Stations 37+000 to 35+000 as shown on the Plans, and shall include the removal and placement of the material for construction of oyster pads as specified in Section 6 of these Technical Specifications.

#### 3.3.2.2 MEASUREMENT

This item shall be measured for payment by cubic yard of in-place material removed within the lines and grades of the prescribed templates as shown on the Plans and measured by BD and AD survey comparison in accordance with Section 4 of these Technical Specifications.

#### 3.3.2.3 **PAYMENT**

Payment shall be made at the Contract unit price. Payment will not be made for material taken from beyond the limits as shown in the Plans. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance.

## **3.4 OPTION 2**

#### 3.4.1 MAINTENANCE DREDGING - PIPELINE MANAGEMENT TO PA14/PA15

#### 3.4.1.1 GENERAL

Pipeline management to PA14 or PA15 will include the costs in connection with laying, removing and handling of pipelines, maintenance of pipelines during construction, final cleanup of pipeline routes and any other related work for both the HSC and BSC portions of maintenance work. Pipelines include submerged pipelines, floating pipelines, HDPE pipelines, shore pipelines, risers and any additional type of pipeline used in the hydraulic discharge of material process.

#### 3.4.1.2 MEASUREMENT

This shall be measured by Lump Sum.

#### 3.4.1.3 **PAYMENT**

Payment will be made at the Contract price as follows:

- 1. Up to 60% will be available for payment after commencement of dredging operations.
- 2. The remaining 40% will be paid upon completion of final cleanup of all pipeline routes as confirmed by the required post-dredge pipeline survey in accordance with Technical Specifications Section 4 Subsection 4.9.

#### 3.4.2 MAINTENANCE DREDGING - HSC STATIONS 57+000 TO 15+500

#### 3.4.2.1 GENERAL

This item shall mean the Contract unit price for maintenance dredging between HSC Stations 57+000 to 15+500 as shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

#### 3.4.2.2 MEASUREMENT

This item shall be measured for payment by cubic yard of in-place material removed within the lines and grades of the prescribed templates as shown on the Plans and measured by BD and AD survey comparison in accordance with Section 4 of these Technical Specifications.

#### 3.4.2.3 **PAYMENT**

Payment shall be made at the Contract unit price. Payment will not be made for material taken from beyond the limits as shown in the Plans. Progress payments shall be made in accordance with the

Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance

#### 3.4.3 MAINTENANCE DREDGING - BSC STATIONS 211+56.66 to 42+07.80

#### 3.4.3.1 GENERAL

This item shall mean the Contract unit price for maintenance dredging between BSC Stations 211+56.66 to 42+07.80 as shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

#### 3.4.3.2 MEASUREMENT

This item shall be measured for payment by cubic yard of in-place material removed within the lines and grades of the prescribed templates as shown on the Plans and measured by BD and AD survey comparison in accordance with Section 4 of these Technical Specifications.

#### 3.4.3.3 **PAYMENT**

Payment shall be made at the Contract unit price. Payment will not be made for material taken from beyond the limits as shown in the Plans. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance.

## 3.4.4 MAINTENANCE DREDGING - BSC FLARE STATIONS 238+37.31 to 211+56.66

#### 3.4.4.1 **GENERAL**

This item shall mean the Contract unit price for maintenance dredging of the BSC Flare between BSC Stations 238+37.31 to 211+56.66 as shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

#### 3.4.4.2 MEASUREMENT

This item shall be measured for payment by cubic yard of in-place material removed within the lines and grades of the prescribed templates as shown on the Plans and measured by BD and AD survey comparison in accordance with Section 4 of these Technical Specifications.

## 3.4.4.3 **PAYMENT**

Payment shall be made at the Contract unit price. Payment will not be made for material taken from beyond the limits as shown in the Plans. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance.

## **3.5 OPTION 3**

#### 3.5.1 HSC EXISTING STRUCTURE REMOVAL MOBILIZATION AND DEMOBILIZATION

#### 3.5.1.1 GENERAL

The Contract fixed price for mobilization shall include the costs in connection with mobilization of the plant necessary to perform Work defined in Section 14 of these Technical Specifications, HSC Existing Structure Demolition/Removal. The Contract price shall include transportation and other costs incidental to delivery of the plant and other equipment to the general work area in condition ready for operation.

Demobilization shall include the costs in connection with demobilization of the plant utilized to perform Work under this item. The Contract price shall include transportation and other costs incidental to removal of the plant and equipment from the work areas.

The Port Authority may require the Contractor to furnish cost data to justify this portion of the bid if the Port Authority believes that the Contractor's bid for this item does not bear a reasonable relationship to the cost of the work in this Contract. Failure to justify such price to the satisfaction of the Port Authority shall result in a payment determined by the Port Authority.

#### 3.5.1.2 MEASUREMENT

This item shall not be measured for payment.

#### 3.5.1.3 **PAYMENT**

Payment for mobilization and demobilization shall be made in accordance with Section 9 Payment for Mobilization and Demobilization of the Special Conditions.

## 3.5.2 HSC EXISTING STRUCTURE DEMOLITION/REMOVAL

#### 3.5.2.1 GENERAL

The Contract price for HSC Existing Structure Demolition/Removal shall include all costs associated with removal of the existing structure(s) to widen the HSC to the design lines and grades shown on the Plans. Costs for removal from the work areas and disposal of removed material/debris from the HSC shall be incidental to the cost of the Work. No separate measurement or payment shall be made for removal and disposal of materials and debris from the work areas.

No separate measurement or payment shall be made for removal and disposal of additional debris encountered and removed during the course of the Work after acceptance of this pay item has been mutually agreed upon between the PHA and Contractor.

#### 3.5.2.2 MEASUREMENT

HSC Existing Structure Demolition/Removal shall be measured and paid for to the nearest half day at the rate specified for this bid item.

#### 3.5.2.3 **PAYMENT**

Payment for this item shall be made at the Contract unit price per day of demolition. No progress payments shall be made.

## 3.6 STONE AND CULTCH MEASUREMENT

#### 3.6.1 TRUCK WEIGHT TICKET METHOD

Stone and cultch material shall be measured in short tons of 2,000 pounds each. Truck weight tickets from a certified scale will be accepted for determination of the weight of material placed in the finished section. To determine the load, measurements will be taken before each truck is loaded and directly after it is loaded with acceptable material.

#### 3.6.2 BARGE DISPLACEMENT METHOD

Stone and cultch material shall be measured in short tons of 2,000 pounds each. Barge displacement measurements will be accepted for determination of the weight of material placed in the finished section. The barge shall be gauged at a protected location near the site as approved. Each barge shall be fitted by the Contractor, at Contractor's expense, with gages graduated either to inches or tenths of a foot, located either inside or outside of the hull, as directed, and attached solidly to the hull. These gages shall be located near each end of the vessel on opposite sides with two (2) additional gages amid ship. If located inside the hull, provision shall be made for the free passage of the outside water to a transparent tube placed, or capable of being placed, in contact with the gage. If located outside upon wooden hulls, the gage marks may be placed directly on the plates and identified by punch marks. Gages shall be placed so that their zeros are below water when the vessel is in its normal trim, light, and free from water. In lieu of the gages in the interior of the barge, the Contractor may, at Contractor's discretion, provide an equal number of wells for determining the amount of the load. Wells shall be located as specified for interior gages and shall be constructed as approved.

Forward and Aft Displacements due to load, shall not differ more than 10% from their mean for the determination of tonnage of each barge load of stone ready for placement. In determining the tonnage of a cargo, the change in gage readings due to discharge of the cargo will be used.

The barges shall be fitted for the work sufficiently ahead of time to enable the Engineer to measure them accurately before work is started. The Contractor shall be required, at Contractor's expense, to take the necessary measurements to prepare the barge displacement tables. The Contractor shall pump the water from the barges when so directed, but no pumping of a barge shall be done between the time it is gauged loaded and light to determine the amount of a barge load.

Repairs or additions made to the barges during the progress of the work shall be promptly reported to the Engineer. During the progress of the work, when the Engineer deems it advisable or necessary, each barge shall be re-measured at the expense of the Contractor and under the supervision of the Engineer.

No barge shall be used that is not in a seaworthy condition or that leaks excessively. The barges used shall be so constructed that when loaded they do not bend or warp, making the gages unreliable.

To determine the load, measurements shall be taken immediately before a barge starts to its point of unloading and immediately after it returns from that point. The gages will be read by the Engineer and the Contractor is invited to be present when the readings are taken. Disagreements on the part of the Contractor as to the weight of the material shall be submitted in writing within three (3) days of their occurrence. To ensure the use of the proper weight of surrounding water in calculating the weight of material from the barge gage readings, the Port Authority will take hydrometer measurements alongside each barge when it is gauged loaded and light.

**END OF SECTION** 

## **4 SURVEYING**

## 4.1 SCOPE OF WORK

Surveys shall be performed in accordance with these Technical Specifications. All surveys shall be submitted in the format(s) required in accordance with Technical Specifications Subsection 2.6.6 and as described herein.

## 4.1.1 DREDGING SURVEYS

The Port Authority shall conduct BD surveys, interim AD surveys for progress payment, AD surveys for dredging section acceptance, and AD surveys for final acceptance. The data derived from dredging surveys shall be used in computing the quantities of work performed and the actual construction completed and in place. For progress payments, the Port Authority shall make the computations based on the AD surveys for progress payment to determine percentages of completion and cubic yardage applicable for payment. All raw survey data and edited/processed data used for purposes of acceptance and dredging quantity computations shall be made available to the Contractor upon request.

The Contractor shall provide its own dredging surveys for itself as required to complete the Work and supply the required submittals as described in these Technical Specifications.

## 4.1.2 PLACEMENT AREA SURVEYS

## 4.1.2.1 Hydraulic Fill Placement Area Surveys

The Contractor shall conduct all hydraulic fill placement area surveys of the dikes, islands, and oyster reef wave trips for preconstruction, interim construction for progress payment, final shaping and grading, cultch thickness testing (as defined in Technical Specifications Subsection 4.13), and shore protection and final acceptance (as defined in Technical Specifications Subsection 4.14). The Contractor shall notify the Engineer a minimum of three (3) days prior to performing these surveys so that the Engineer may be present at his/her discretion.

The Contractor shall also conduct its own daily construction surveying required during performance of the work.

Promptly upon completing a survey, the Contractor shall furnish copies of all field notes and all other records relating to the survey or to the layout of the work to the Engineer. The Contractor shall retain copies of all such material furnished to the Engineer.

#### 4.1.2.2 Mechanical Fill Oyster Pad Surveys

The Port Authority shall conduct all oyster reef pad surveys for preconstruction and final acceptance. All raw survey data and edited/processed data used for purposes of acceptance and percentage completion determinations shall be made available to the Contractor upon request.

Cultch thickness testing as defined in Technical Specifications Subsection 4.13, shall be performed by the Contractor. The Contractor shall notify the Engineer a minimum of three (3) days prior to performing these surveys so that the Engineer may be present at his/her discretion.

The Contractor shall conduct its own daily construction surveying required during performance of the work. The Contractor shall additionally perform the required mechanical fill surveys. Promptly upon completing a survey, the Contractor shall furnish copies of all field notes and all other records relating to the survey or to the layout of the work to the Engineer. The Contractor shall retain copies of all such material furnished to the Engineer.

## 4.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

U.S. Army Corps of Engineers Publications / Engineering Manuals:

- EM 1110-2-1003 Hydrographic Surveying
- EM 1110-1-1002 Survey Markers and Monumentation
- EM 1110-1- 1003 NAVSTAR Global Positioning System Surveys
- EM 1110-1-1005 Engineering and Design: Control and Topographic Surveying

## 4.3 QUALITY ASSURANCE/QUALITY CONTROL STANDARDS

Surveys shall follow the quality assurance/quality control standards and methods set forth in EM 1110-2-1003, EM 1110-1-1002, EM 1110-1-1003, EM 1110-1-1005, and these Technical Specifications.

#### 4.3.1 TEXAS LICENSED REGISTERED PROFESSIONAL LAND SURVEYOR OR ENGINEER

Contractor surveys required to be signed and sealed shall be signed and sealed by a Contractor supplied, qualified, third-party Texas licensed Registered Professional Land Surveyor (RPLS) or Professional Engineer (PE).

Prior to commencing surveying activities, the Contractor shall provide the name of the qualified RPLS or PE to be used on the project. If a PE is used for the survey work, said PE shall have documented experience and responsible charge of surveys of the same type being performed under this Contract, and the documentation of the PE's experience shall be provided to the Engineer prior to conducting the work. The Engineer reserves the right to approve or disapprove of the Contractor's RPLS or PE.

#### 4.3.2 REAL TIME KINEMATIC (RTK) GLOBAL POSITIONING SYSTEMS

All control, topographic, and hydrographic surveys shall be conducted using RTK GPS and the horizontal and vertical control shown on the Plans. The Contractor is responsible for providing all applicable RTK equipment for surveying and dredging operations.

The Contractor's RTK GPS base station shall be located less than 10 kilometers from the location(s) of work. The Port Authority shall have the option to use the Contractor's RTK GPS base station for all channel hydrographic surveys and other surveys in relation to the work, as applicable.

## 4.4 PROJECT DATUM

The Project vertical datum shall be referenced to Mean Lower Low Water (MLLW). Datum relationships between MLLW and geodetic datums vary between the work areas and are shown on the Plans. Horizontal positions shall be referenced to NAD83 U.S. State Plane Texas South Central Zone (4204). All units shall be U.S. survey feet.

## 4.5 SURVEY CONTROL

The Contractor shall use the survey control monumentation shown on the Plans

## 4.6 SURVEY ACCURACY

GPS-based survey systems shall not be used without establishing a local RTK GPS base station referenced to the project control monumentation. Required survey accuracies are provided below.

#### Table 4-1: Survey Accuracies

Type of Survey	Minimum Horizontal Accuracy for All Survey Equipment	Minimum Vertical Accuracy for All Survey Equipment
Control Survey	< 0.2 foot	< 0.1 foot
Topographic	Within (+/-) 1 Foot	Within (+/-) 0.2 feet
Hydrographic	Within (+/-) 1 Foot	Within (+/-) 0.2 feet

## 4.7 LAYOUT OF WORK

All baselines, temporary benchmarks, and survey control shall be established and maintained by the Contractor for the duration of work. The Contractor shall also be responsible for all measurements that may be required for the execution of the work to the lines and grades specified in the Contract Documents. If such marks are destroyed by the Contractor through the Contractor's negligence prior to their authorized removal, they shall be replaced by the Contractor at its own expense.

Temporary benchmarks and controls established by the Contractor to layout the work and to perform the surveys shall be verified on a weekly basis, at a minimum. Ground control and temporary benchmarks established by the Contractor shall be in conformance with EM 1110-1-1002.

The Contractor shall perform its own daily construction surveying as required to complete the work in this Contract to the required lines and grades shown in the Plans. The Contractor shall lay out its work from the gages, coordinates, distances, stationing, ranges, and control shown in the Plans, and shall be responsible for the measurements in connection therewith. The Contractor shall furnish, at its expense, stakes, templates, platforms, equipment, range markers, and labor as may be required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that

may be established or indicated by the Engineer. The Contractor shall also be responsible for maintaining and preserving the stakes and other marks established by the Engineer, as applicable, until authorized to remove them. If these marks are destroyed by the Contractor or through its negligence before their removal is authorized, they may be replaced by the Engineer at its discretion. The expense of replacement will be deducted from the amounts due, or to become due, to the Contractor.

## 4.8 PRE-DREDGE HAZARD AND PIPELINE SURVEY

Prior to commencing dredging, staging of equipment, or laying of submerged pipelines, the Contractor shall perform a pre-dredge hazard and pipeline survey.

The Contractor shall conduct a magnetometer and sidescan survey over the entire area to be dredged, proposed equipment staging and laydown areas, and pipeline routes to placement area(s), and at the full extents of placement areas to encompass all area where work will be performed and equipment will be staged. The survey shall extend a minimum of 125 feet to either side of the proposed pipeline route(s). The pre-dredge hazard and pipeline survey shall be at the Contractor's expense. Changes to pipeline routes submitted in the Contractor's Dredge Pipeline Route Plan shall require additional magnetometer and sidescan surveys at no additional cost to the Port Authority. Planned scope of the pre-dredge hazard and pipeline survey shall be included in the Survey Plan.

The Contractor shall provide the pre-dredge hazard and pipeline survey to the Engineer in accordance with Section 2 Subsection 2.6.2 of these Technical Specifications.

Survey deliverables for the pre-dredge hazard and pipeline survey shall be signed and sealed in accordance with Technical Specifications Subsection 4.3.1.

## 4.9 POST-DREDGE RIPELINE SURVEY

After demobilization, the Contractor shall conduct magnetometer and sidescan surveys of all pipeline routes to confirm the removal of submerged pipelines. Post-dredge pipeline surveys will be at the Contractor's expense. Pipe that is detected, where not found to exist prior to work as compared to the pre-dredge hazard and pipeline survey, shall be removed by the Contractor at its expense.

The Contractor shall issue copies of the post-dredge pipeline survey to the Engineer in accordance with Section 2 Subsection 2.7.2 of these Technical Specifications.

Survey deliverables for the post-dredge pipeline survey shall be signed and sealed in accordance with Technical Specifications Section 4 Subsection 4.3.1.

## **4.10 DREDGING SURVEYS**

#### 4.10.1 SURVEY REQUIREMENTS

#### 4.10.1.1 PORT AUTHORITY SURVEYS

Hydrographic surveys performed by the Port Authority will be accomplished with the use of a survey vessel having an automated acquisition system. Horizontal positions and vertical elevations will be determined by the use of an inertially-aided RTK Global Positioning System referenced to the project control. Soundings will be obtained by using a multibeam echosounder system operating nominally at 240 kHz unless otherwise approved by the Engineer. Position and depth data will be collected using Hypack Hysweep software. Multibeam survey data will be binned to a 3 by 3-foot cell using the "average depth" of all depths within the cell as the representative cell depth. The horizontal location of the representative cell depth will be the cell center or centroid. Surveys will be performed in accordance with these Technical Specifications and EM 1110-2-1003.

Quantities shall be determined using the Average-End-Area method, using cross-sections on 100-foot spacing plus at P.I.'s, P.C.'s, and P.T.'s as applicable. Engineer approval and acceptance of acceptance sections shall be based on review and approval by the Engineer of the cross-sections as well as at all areas in between the cross-sections as shown from the full multibeam dataset.

#### 4.10.1.2 CONTRACTOR SURVEYS

As stated in Technical Specifications Subsection 4.1.1, the Contractor shall provide its own dredging surveys for itself as required to complete the Work and supply the required submittals as described in Subsection 2.6.6 of these Technical Specifications.

Contractor dredging surveys shall be performed in accordance with Technical Specifications Subsections 4.2 through 4.7. At a minimum, Contractor dredging surveys shall be performed in a methodology commensurate with the requirements specified in Technical Specifications Subsection 4.10.1 above, unless otherwise approved by the Engineer.

## 4.10.2 SUMMARY OF DREDGING SURVEYS

Refer to Table 4-2 for a general summary of required dredging surveys.

Survey	Intended Purpose	Survey Schedule	Туре	Completed By
BD Surveys	To verify existing conditions and document pre-dredging grades and volumes	Prior to commencement of dredging	Multibeam	Port Authority
Contractor Dredging Surveys	Channel surveys conducted by the Contractor to measure its own	Daily (as safety and weather allows)	Minimum of Single Beam	Contractor

#### Table 4-2: Summary of Channel Surveys

	construction progress and compliance			
Interim AD Surveys for Progress Payment	Channel surveys performed to monitor dredging and to determine quantities for payment and percentage completion of work performed during pay period	Approximately, but not more frequently than, once per week	Multibeam	Port Authority
AD Surveys for Dredging Section Acceptance	Channel surveys performed to determine that the dredging template within an acceptance section has been dredged to the required lines and grades.	Upon request of Contractor to have an acceptance section accepted, subject to provisions of Section 4.10.6	Multibeam	Port Authority
AD Surveys for Final Acceptance	To document final dredging locations/depths over the project limits (all sections), to verify that no dredging or placement has occurred outside of specified limits, and that the dredging template has been dredged to the minimum required lines and grades	Upon request of Contractor, subject to provisions of Section 4.10.7	Multibeam	Port Authority

#### 4.10.3 BD SURVEYS

Prior to dredging, a BD survey shall be performed over the entire dredge limits. The Port Authority shall be notified, in writing, twenty-eight (28) days in advance of the Contractor's intent to commence dredging so that a before dredge (BD) survey can be performed by the Port Authority. Results of the BD survey shall be provided to the Contractor at least seven (7) days prior to commencement of dredging.

## 4.10.4 CONTRACTOR DREDGING SURVEYS

Contractor dredging surveys shall be performed by the Contractor to monitor dredging progress and compliance. Contractor dredging surveys shall be supplied and used by the Contractor to assist in the required daily reports in accordance with Section 2 Subsection 2.6.4 of these Technical Specifications. Contractor dredging surveys shall be performed on a daily basis as dredging occurs and as safety and weather allows.

#### 4.10.5 INTERIM AD SURVEYS FOR PROGRESS PAYMENT

Interim AD surveys shall be performed by the Port Authority to monitor dredging progress and to determine percentage completion and material quantities for progress payment purposes. Progress payments shall be made in accordance with, and at a frequency defined within, the General Conditions.

Interim AD surveys for progress payment shall be made within a given pay period as required to capture and quantity the actual quantity of materials removed as measured back to the BD survey.

#### 4.10.6 AD SURVEYS FOR DREDGING SECTION ACCEPTANCE

Upon completion of acceptance sections, an AD survey for dredging section acceptance shall be performed within the acceptance section limits to verify that the dredging template has been dredged to the lines and grades required. The Contractor shall request that the Port Authority perform a survey under this specification when the dredging is completed. The Contractor shall provide seven days (7 days) advance notice of its intent to request an AD survey for dredging section acceptance. The Contractor will be notified when soundings are to be made. When a section is found to be in a satisfactory condition after examination by the Port Authority, it will be accepted.

# Acceptance: Satisfactory condition is determined when survey plots show no depths above the required contract depth

If any shoals, lumps, or other lack of Contract depth be disclosed by this examination, the Contractor will be required to remove same at its sole cost and expense. But, if shown by previous Port Authority survey that the location was previously dredged to or below the required lines and grades shown on the plans and the areas are small and form no material obstruction to navigation as determined by the Port Authority, the removal of such shoal may be waived at the discretion of the Port Authority.

Should the Port Authority be unable to accomplish a required survey because the area is not cleared of Contractor equipment, or should re-survey be necessary because of incomplete work, the cost of the survey party and equipment for each additional survey day required shall be chargeable to the Contractor at the rate of \$5,000 per day, in addition to any liquidated damages that may be imposed in accordance with the General or Special Conditions.

Final acceptance of the section and the deductions or corrections of deductions made thereon will not be reopened after having once been made, except on evidence of collusion, fraud or obvious error, and the acceptance of a completed section shall not change the time of payment of the retained percentages of the whole or any part of the work.

## 4.10.7 AD SURVEY FOR FINAL ACCEPTANCE

Upon completion of dredging, a final AD survey for final acceptance shall be performed over the entire dredge limits to verify that the dredging template has been dredged to the minimum lines and grades required. The Contractor shall request that the Port Authority perform an AD survey for final acceptance when the dredging is completed. The Contractor shall provide seven days (7 days) advance notice of its intent to request a final acceptance survey.

If any shoals, lumps, or other lack of Contract depth be disclosed by this examination, the Contractor will be required to remove same at its sole cost and expense, but if the bottom is soft and the shoal areas are small and form no material obstruction to navigation, the removal of such shoal may be waived at

the discretion of the Port Authority. The Contractor will be notified when soundings are to be made. When the area is found to be in a satisfactory condition by the Port Authority, it will be finally accepted. Should the Port Authority be unable to accomplish a required survey because the area is not cleared of Contractor equipment, or should re-survey be necessary because of incomplete work, the cost of the survey party and equipment for each additional survey day required shall be chargeable to the Contractor at the rate of \$5,000 per day, in addition to any liquidated damages that may be imposed in accordance with the General or Special Conditions. Final acceptance of the work and the deductions or corrections of deductions made thereon will not be reopened after having once been made, except on evidence of collusion, fraud or obvious error, and the acceptance of the work shall not change the time of payment of the retained percentages of the whole or any part of the work.

## 4.11 HYDRAULIC FILL PLACEMENT AREA SURVEYS

#### 4.11.1 SURVEY REQUIREMENTS

#### 4.11.1.1 CONTRACTOR SURVEYS

Hydrographic surveys under this section shall be accomplished with the use of a survey vessel having an automated acquisition system. Horizontal positions and vertical elevations will be determined by the use of an inertially-aided RTK Global Positioning System providing accurate attitude, heading, heave, position, and velocity data and which is referenced to project control. Soundings will be obtained by using a single beam sonar system operating nominally at 200 kHz. Surveys will be performed in accordance with these specifications and EM 1110-2-1003.

Cross-sections shall be taken at 50-foot intervals on even stations along the design template alignment(s) as well as at all P.I.'s, P.C.'s, and P.T.'s.

Island survey data shall include detailed topography sufficient to define the island(s), with additional hydrographic data supplementing the data as accessible. Additionally, cross-sections shall be run and provided at the locations shown on the Plans.

The distance between elevation readings shall not be more than 10 feet, with additional readings at breakpoints or abrupt changes in grade. Cross-sections and collected data shall extend a minimum of 20 feet beyond the intersection of the outer limits of hydraulic fill and the preconstruction bottom.

# 4.11.2 SUMMARY OF HYDRAULIC FILL PLACEMENT AREA SURVEYS

Refer to Table 4-3 for a general summary of the surveys.

#### Table 4-3: Summary of Hydraulic Fill Placement Area Surveys

Survey	Intended Purpose	Survey Schedule	Conducted By
Preconstruction Survey*	To verify the existing condition prior to commencement of work	No greater than 30 days prior to commencement of work	Contractor

			/
Initial Fill Surveys	To determine in-place fill quantities, retention rates, etc. during construction	Daily upon filling sections as safety and weather allows	Contractor
Final Shaping and Grading Surveys*	To ensure the hydraulic fill meets the required lines and grades for interim measurement and payment	Prior to installation of stone and at minimum 500-foot sections on dikes	Contractor

\* Indicates survey required to be signed and sealed in accordance with Subsection 4.3.1

#### 4.11.3 PRECONSTRUCTION SURVEYS

Prior to performing any work at the site, the Contractor shall perform a preconstruction survey of the placement areas. The Contractor shall notify the Engineer a minimum of three (3) days prior to conducting the preconstruction survey, so that the Engineer may witness the work. Promptly upon completion of the survey, the Contractor shall provide all required survey submittals to the Engineer.

#### 4.11.4 INITIAL FILL SURVEYS

During the course of hydraulic filling operations, the Contractor shall perform initial fill surveys on a daily basis to monitor construction. Initial fill surveys will be used to determine the quantity of material placed within the design templates, track material retainages, and ensure compliance with the Contract Documents.

Initial fill surveys shall encompass the previous day's construction to the maximum extents practicable. and shall be taken as soon as practicable for each phase of hydraulic fill. Initial fill surveys of dikes and/or wave trips shall be taken at a minimum interval of after the placement of each 50 feet of hydraulic fill material.

The survey deliverables, including volumes placed and retained, shall be submitted with the daily quality control report.

## 4.11.5 FINAL SHAPING AND GRADING SURVEYS

Final shaping and grading surveys will be used to determine the acceptance of final shaping and grading of the completed hydraulic fill design templates prior to installation of stone. Surveys of the final shaping and grading shall be performed by the Contractor. Promptly upon completion of the survey, the Contractor shall provide all required survey submittals to the Engineer. Final shaping and grading surveys shall be used by the Port Authority to determine interim measurement and payment of the completed hydraulic fill templates.

The final shaping and grading surveys shall be performed no greater than 30 days prior to post excavation and grading surveys as required in Technical Specifications Subsection 4.14.7.

## **4.12 MECHANICAL FILL OYSTER PAD SURVEYS**

#### 4.12.1 SURVEY REQUIREMENTS

#### 4.12.1.1 PORT AUTHORITY SURVEYS

Hydrographic surveys under this section shall be accomplished with the use of a survey vessel having an automated acquisition system. Horizontal positions and vertical elevations will be determined by the use of an inertially-aided RTK Global Positioning System providing accurate attitude, heading, heave, position, and velocity data and which is referenced to project control. Soundings will be obtained by using a single beam sonar system operating nominally at 200 kHz. Surveys will be performed in accordance with these specifications and EM 1110-2-1003.

Cross-sections shall be taken both horizontally and longitudinally across the reef pads, extending a minimum of 100 feet past the boundary limits of the oyster pad. Cross-sections of the oyster pad area(s) shall be spaced at 50-foot intervals along the design template alignment. The distance between elevation readings shall be not more than 10 feet, with additional readings at breakpoints or abrupt changes in grade. The Port Authority reserves the right to conduct closer cross-sections than every 50 feet for the purposes of either the preconstruction or post-construction surveys to verify that the target elevation has been achieved.

#### 4.12.1.2 CONTRACTOR SURVEYS

The Contractor shall provide surveys as required in Technical Specifications Subsection 4.1.2.2, and supply the required submittals as described in Subsection 2.6.6 of these Technical Specifications.

Contractor surveys shall be performed in accordance with Technical Specifications Subsections 4.2 through 4.7. At a minimum, Contractor oyster pad/mechanical fill surveys shall be performed in a methodology commensurate with the requirements specified in Technical Specifications Subsection 4.12.1 above, unless otherwise approved by the Engineer.

## 4.12.2 SUMMARY OF MECHANICAL FILL OYSTER PAD SURVEYS

Refer to Table 4-4 for a general summary of the surveys.

Survey	Intended Purpose	Survey Schedule	Conducted By
Preconstruction Survey	To verify the existing condition prior to commencement of mechanical fill	Prior to commencement of mechanical fill	Port Authority
Daily Construction Surveys	To determine in-place fill quantities, retention rates, etc. for construction	Daily (as safety and weather allows)	Contractor

#### Table 4-4: Summary of Mechanical Fill Oyster Pad Surveys

Mechanical Fill Surveys	To ensure the mechanical fill is sufficient in order to meet the required lines and grades of cultch placement	Prior to placement of cultch material	Contractor
Final Acceptance Survey(s)	To provide for final acceptance of the completed oyster pads	Upon completion of cultch placement and cultch thickness testing.	Port Authority

#### 4.12.3 PRECONSTRUCTION SURVEYS

Prior to performing any work at the site, the Port Authority shall perform a preconstruction survey over the entire oyster reef pad area limits at Dollar Reef and San Leon. The Port Authority shall be notified, in writing, twenty-eight (28) days in advance of the Contractor's intent to commence work so that the preconstruction survey can be performed by the Port Authority. Results of the preconstruction survey shall be provided to the Contractor at least seven (7) days prior to commencement of work.

#### 4.12.4 DAILY CONSTRUCTION SURVEYS

Prior to beginning construction, the corners of each oyster pad shall be located and staked or marked with buoys. The Contractor shall lay out its Work from the control and coordinates shown in the Plans, and shall be responsible for the measurements in connection therewith. The Contractor shall furnish, at its expense, stakes, buoys, templates, platforms, equipment, range markers, and labor as may be required to lay out any part of the Work. Stakes, buoys, or other such markers, shall also be placed along the outer boundaries of the oyster pads at intervals not to exceed 200 feet. Stakes, buoys, or other such markers, shall be flagged, painted, or otherwise dressed to ensure they are clearly visible from distances of 500 feet under normal weather conditions. Stakes, buoys, or other such markers, shall be completely removed.

During the course of oyster pad construction operations, the Contractor shall perform its own daily construction surveys as required on a daily basis or as weather and safety allows, to monitor construction. Daily construction surveys will be used to determine the quantity of material placed within the design templates and to ensure sufficient material is in place prior to placement of cultch material. Daily construction surveys shall encompass the previous day's construction to the maximum extent practicable. Daily construction surveys shall be taken as soon as practicable after placement of fill.

The survey deliverables, including volumes placed and retained, shall be submitted with the daily quality control report.

#### 4.12.5 MECHANICAL FILL SURVEYS

Mechanical fill surveys shall be performed prior to placement of cultch material in order to ensure sufficient material has been placed in order that the required elevation is attained after cultch placement. Mechanical fill surveys shall be submitted for approval by the Engineer. The Engineer shall

review the mechanical fill surveys once received, and if sufficient material appears to be in-place, shall notify the Contractor within 48 hours that cultch placement may proceed.

The Engineer reserves the right to perform check surveys during any phase of construction. If discrepancies are found between the Contractor's surveys and surveys performed by the Engineer, the surveys performed by the Engineer shall govern.

#### 4.12.6 FINAL ACCEPTANCE SURVEY

The Port Authority shall conduct the survey for final acceptance of the completed work at the placement areas. The limits of the survey shall cover the entire limits of work. Additionally, the Port Authority shall perform a sidescan survey of the constructed oyster pads, to ensure one-hundred percent coverage of the placed cultch material, and to verify no gaps in cultch placement exist between survey cross-sections.

The Contractor shall provide five days' advance notice to the Engineer of its intent to request final acceptance survey. Final acceptance of the whole or a part of the work and the deductions or corrections of deductions made thereon will not be reopened after having once been made, except on evidence of collusion, fraud or obvious error, and the acceptance of a completed section shall not change the time of payment of the retained percentages of the whole or any part of the work.

If any slumps, slides, scarps, mounds, failures, or other features not in conformance to the lines and grades shown on the Plans be disclosed by this examination, the Contractor will be required to repair the deficiencies at no additional cost to the Port Authority. The repair of any deficiencies may be waived at the discretion of the Port Authority. The Contractor or its authorized representative will be notified when surveys are to be made. When the area is found to be in a satisfactory condition by the Port Authority, it will be finally accepted.

## 4.13 CULTCH THICKNESS TESTING

Measurement of cultch thickness shall be conducted throughout the placement process at all locations within the placement limits. The thickness measurements shall be determined using a graduated pole or other device which can determine the elevation to the nearest inch, of the top of the placed material and can then be pushed or otherwise forced through the material to locate the elevation of the bottom of the material. Alternative methods of determining thickness measurements may be used if approved. Prior to final acceptance, the Contractor shall perform required thickness testing as specified below.

After completing placement of cultch, the Contractor shall conduct thickness testing for quality assurance, prior to acceptance. This shall be done to verify uniformity of placement, aid as-built information, and as information for future restoration projects in the area. Thickness testing shall be performed by the Contractor in the presence of the Engineer at the Engineer's discretion, at spot locations on a 100-foot by 100-foot grid over the completed oyster reef wave trips at Bird Island Marsh, and all oyster pads at Dollar Reef and San Leon

The Contractor shall be required to determine the average thickness for cultch placement. The average thickness, in inches, of cultch shall be determined by computing the sum of the thickness measurements of the material at the testing site divided by the number of measurements taken at each site.

## **4.14 SHORE PROTECTION SURVEYS**

#### 4.14.1 SURVEY REQUIREMENTS

#### 4.14.1.1 CONTRACTOR SURVEYS

The Contractor shall conduct a post excavation and grading survey, interim construction surveys, and a final acceptance survey for shore protection installation and the completed placement areas. For BSC shore protection removal, the Contractor shall conduct a pre-removal, post-removal and a post-dredge shoreline survey. The Contractor shall additionally provide its own construction surveys as necessary to complete the work of the Contract.

Cross-sections shall be taken at 50-foot intervals on even stations along the design template alignment(s) as well as at all P.I.'s, P.C.'s, and P.T.'s.

Island surveys shall include detailed topography sufficient to define the island(s), with additional hydrographic data supplementing the data as accessible. Additionally, cross-sections shall be run and provided at the locations shown on the Plans.

The distance between elevation readings shall not be more than 10 feet, with additional readings at breakpoints or abrupt changes in grade. Cross-sections and collected data shall extend a minimum of 50 feet from the outside toe of stone along the exterior, and 20 feet beyond the interior limits of hydraulic fill where applicable.

## 4.14.2 SUMMARY OF BSC STONE REMOVAL SURVEYS

Refer to Table 4-5 for a general summary of the surveys.

Survey	Intended Purpose	Survey Schedule	Conducted By
Pre-Removal Survey	To verify the existing condition prior to commencement of shore protection removal and dredging	Prior to commencement of existing shore protection removal	Contractor
Post-Removal Survey	To verify the existing conditions upon completion of shore protection removal	After completion of existing shore protection removal	Contractor
Post-Dredge Shoreline Survey*	To verify the existing conditions of the shoreline upon completion of channel dredging	After completion of the channel widening adjacent to any remove shore protection	Contractor

#### Table 4-5: Summary of BSC Stone Removal Surveys

\* Indicates survey required to be signed and sealed in accordance with Technical Specifications Subsection 4.3.1

#### 4.14.3 PRE-REMOVAL SURVEY

The pre-removal survey shall be performed by the Contractor. The pre-removal survey shall be taken prior to the removal of existing shore protection and prior to dredging work.

#### 4.14.4 POST-REMOVAL SURVEY

The post-removal survey shall be performed by the Contractor. The post-removal survey shall be taken upon completion of existing shore protection removal and prior to dredging work. The post-removal survey shall be taken over the same stationing as the pre-removal survey. The surveys shall encompass the previous day's construction to the maximum extent practicable.

The results of the topographic and hydrographic surveys shall be submitted with the daily quality control report.

#### 4.14.5 POST-DREDGING SHORELINE SURVEY

The post-dredging survey shall be taken after dredging of the BSC widening. The post-dredging shoreline survey shall be taken over the same stationing as the pre-removal survey.

#### 4.14.6 SUMMARY OF CULTCH/STONE SHORE PROTECTION SURVEYS

Refer to Table 4-6 for a general summary of the surveys.

Table 4-6	: Summary	of	Shore	Protection	Survey
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Survey	Intended Purpose	Survey Schedule	Conducted By
Post-Excavation and Grading Survey	To verity existing conditions upon completion of excavation and/or shaping and grading for cultch and/or stone shore protection installation	After completion of excavation and/or shaping and grading and prior to geotextile and stone/cultch installation	Contractor
Interim Construction Surveys	To ensure the cultch/stone installation meets requirements of these Technical Specifications	Daily during cultch/stone installation	Contractor
Final Acceptance Survey*	To provide for final acceptance of the completed placement area work	Upon completion of stone/cultch installation and any and all remaining placement area shaping and grading and/or repairs	Contractor

\* Indicates survey required to be signed and sealed in accordance with Technical Specifications Subsection 4.3.1

#### 4.14.7 POST-EXCAVATION AND SHAPING AND GRADING SURVEY

The post-excavation and shaping and grading survey shall be performed by the Contractor and shall be taken after excavation and shaping and grading, but prior to installation of geotextile and/or cultch/stone.

#### 4.14.8 INTERIM CONSTRUCTION SURVEYS

Interim construction surveys shall be performed by the Contractor and shall be taken during cultch/stone installation. The surveys shall encompass the previous day's construction to the maximum extent practicable.

The results of the surveys shall be submitted with the daily quality control report.

#### 4.14.9 FINAL ACCEPTANCE SURVEY

The final acceptance survey shall be performed by the Contractor and shall be taken after cultch and stone shore protection installation, as well as any remaining or required shaping and grading of the placement area(s), is complete.

The final acceptance survey shall be submitted within five (5) calendar days of data collection.

Final acceptance of the whole or a part of the work and the deductions or corrections of deductions made thereon will not be reopened after having once been made, except on evidence of collusion, fraud or obvious error, and the acceptance of a completed section shall not change the time of payment of the retained percentages of the whole or any part of the work.

If any features not in conformance to the lines and grades shown on the Plans be disclosed by this examination, the Contractor will be required to repair the deficiencies at no additional cost to the Port Authority. The Contractor or its authorized representative will be notified when surveys are to be made. When the area is found to be in a satisfactory condition by the Port Authority, it will be finally accepted. The Engineer reserves the right to check surveys during any phase of construction. If discrepancies are found between the Contractor's surveys and surveys performed by the Engineer, the surveys performed by the Engineer shall govern.

#### **4.15 OBSTRUCTION DEMOLITION SURVEY**

Upon completion of the Work in Section 14 of these Technical Specifications, and at its sole expense, the Contractor shall perform, or shall subcontract to be performed, a sidescan survey which shall be conducted over the demolition area to demonstrate that the obstructions have been completely removed or cut off below the post-project (AD) sea bed, and that the obstruction demolition area is
clear of debris resulting from the Work. The sidescan survey shall be signed and sealed by a RPLS or a PE licensed to practice in Texas. The sidescan survey shall be furnished to the Engineer upon its completion for approval as described in Technical Specification Section 2 Subsection 2.7.3.

END OF SECTION

# **5 ENVIRONMENTAL PROTECTION**

# 5.1 GENERAL REQUIREMENTS

The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected during the entire period of this contract. The Contractor shall confine its activities to areas defined by these Technical Specifications and Plans. Environmental protection shall be as stated in the following subsections.

### 5.1.1 CONSTRUCTION AUTHORITY

The Contractor shall comply with all provisions contained in the permits. Where dimensions or configurations conflict between the Contract Documents and the permit drawings, the dimensions or configurations shown on the Contract Documents shall govern. If as defined in the permits, any laws, rules, regulations or ordinances conflict with the Contract Documents, then such laws, rules, regulations, or ordinances shall govern instead of the Contract Documents, except in such cases where the Contract Documents exceed them in quality of materials or labor, then the Contract Documents shall be followed. Any conflicts between the permit and the Contract Documents shall be immediately brought to the attention of the Engineer prior to the commencement of work. It shall be expressly understood that the Port and Engineer shall not be responsible for such conflicts.

## 5.1.2 PROTECTION OF LAND RESOURCES

Prior to the beginning of construction, the Contractor shall identify the land resources to be preserved within the Contractor's work area. The Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without special direction from the Port Authority. Ropes, cables, or guys shall not be fastened to or attached to trees for anchorage unless specifically authorized. Where such special emergency use is permitted, the Contractor shall provide effective protection for land and vegetation resources as follows. Trees, shrubs, vines, grasses, land forms, and other landscape features identified by the Port Authority to be preserved for removal by others shall be clearly identified by marking, fencing, or wrapping with boards, or other approved techniques.

The Contractor shall clean up areas used for construction, including staging areas, on a regular basis.

The Contractor shall restore landscape features damaged or destroyed during construction operations outside the limits of the approved work areas. Restoration shall be in accordance with the Environmental Protection Plan(s) submitted for approval. This work will be accomplished at the Contractor's expense.

### 5.1.3 LOCATION OF FIELD OFFICES, STORAGE, AND OTHER CONTRACTOR FACILITIES

The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in approved areas. Temporary movement or relocation of Contractor facilities shall be made only on approval.

#### 5.1.4 TEMPORARY EXCAVATIONS AND EMBANKMENTS

Temporary excavations and embankments for plant or work areas shall be controlled to protect adjacent areas from despoilment.

#### 5.1.5 PLACEMENT OF SOLID WASTES

Solid wastes, excluding clearing debris, shall be placed in containers which are emptied on a regular schedule. Handling and disposal shall be conducted to prevent contamination.

#### 5.1.6 PLACEMENT OF SOLID WASTE BY REMOVAL FROM PORT AUTHORITY PROPERTY

The Contractor shall transport solid waste off Port Authority property and dispose it in compliance with federal, state, and local requirements for solid waste placement.

#### 5.1.7 PLACEMENT OF DISCARDED MATERIALS

Discarded materials, other than those which can be included in the solid waste category, will be handled as directed.

#### 5.1.8 SANITATION FACILITIES

The Contractor shall provide and operate sanitation facilities that will adequately treat or dispose sanitary wastes in conformance with Federal, State, and local health regulations.

#### 5.1.9 MAINTENANCE OF POLLUTION CONTROL FACINITIES

The Contractor shall maintain constructed facilities and portable pollution control devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

# 5.2 TURBIDITY AND WATER QUALITY

The Contractor shall conduct its dredging and disposal operations in a manner to minimize turbidity and shall conform to all water sampling and water quality standards prescribed herein. Plant downtime to meet the water quality standards or to make dike or pipeline repairs will be at no cost to the Port Authority or a basis for time extension.

If maintenance dredging is performed by award of Option 1, the effluent from each spillway and the corresponding receiving water shall be sampled at least daily by the Contractor. When the effluent density exceeds 300 mg/L more than the corresponding density of the receiving body of water, the Contractor shall immediately provide additional ponding capacity by raising the spillway invert, as necessary, or shall discontinue dredge placement operations into the placement area until the effluent density returns to the acceptable 300 mg/L differential. The minimum frequency of sampling at the weir shall be increased when the effluent density increases or nears the maximum specified limit. Base samples of the receiving body of water shall be taken upstream or opposite to the direction of tidal flow where the discharge effluent enters adjacent bodies of water such as the BCC, BSC or HSC. The Contractor shall submit test results and spillbox operations with the daily quality control report.

#### 5.2.1 SAMPLES

Each sample at the weir shall be made up by partially filling, without overflow, a 1 quart container with the mixture flowing over the weir at not less than three different places in the length of the weir and combining the mixture in a bucket or other suitable container submerged to a depth of not over 2 feet. When settled solids are not present in the weir sample, the density shall be determined by the hydrometer method. When settled solids are present in the weight-volume method.

#### 5.2.2 HYDROMETER METHOD

When the hydrometer method is used for density determination, an approved hydrometer, graduated to read in grams/liter of suspension shall be used. The water sample shall be thoroughly mixed and transferred to a 1,000 ml laboratory cylinder and the hydrometer used as specified by the manufacturer.

#### 5.2.3 WEIGHT-VOLUME METHOD

When the weight-volume method is used for density determination, the total sample shall be measured to obtain volume in liters and weight in grams. Measurements shall be made with a 1,000 ml laboratory cylinder and a scale or balance capable of weighing the sample and cylinder to the nearest gram. The unit weight shall then be obtained by dividing the total weight in grams by the total volume in liters.

#### 5.2.4 COMPLIANCE INSPECTION

The Port Authority may take its own samples at any time to assure compliance with these Technical Specifications. The Contractor shall provide assistance necessary to the Port Authority and shall construct and maintain a hand railed walkway from the dike to each spillway and along the entire weir length when in use.

#### 5.2.5 RECORDS

A copy of the records of inspections and tests, as well as records of corrective action taken, shall be submitted as directed.

### 5.3 AIR QUALITY

# 5.3.1 GENERAL REQUIREMENTS

The Contractor shall keep construction activities under surveillance, management, and control to minimize pollution of air resources. Activities, equipment, processes, and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with the State of Texas Clean Air Act implemented in 1967, and the Federal emission and performance laws and standards. Ambient Air Quality Standards set by the Environmental Protection Agency shall be maintained for the construction operations and activities specified herein. The measures below shall be implemented to control air pollution by the construction activities included in the contract.

#### 5.3.1.1 PARTICULATES

Dust particles, aerosols, and gaseous byproducts from construction activities, processing and preparation of materials, such as from asphaltic batch plants, shall be constantly controlled, including weekends, holidays, and hours when work is not in progress.

### 5.3.1.2 HYDROCARBONS AND CARBON MONOXIDE EMISSIONS

Hydrocarbon and carbon monoxide emissions from equipment shall be controlled to Federal and State allowable limits, and in accordance with the applicable engine emission standards.

#### 5.3.1.3 ODORS

Odors shall be constantly controlled for construction activities, processing, and preparation of materials.

#### 5.3.2 COMMITMENTS FOR GENERAL CONFORMITY

As part of its commitments under the Federal permitting process and General Conformity Rules related to air quality, the PHA has identified several measures it will implement or require during the procurement of services under this solicitation.

- The Contractor must assess whether it is eligible to apply for Texas Emission Reduction Plan (TERP) grants related to upgrades of equipment for the reduction of emissions, and whether there is equipment within its fleets that can take advantage of upgrade or replacement under this program. This is not a requirement to apply for the program and secure a grant before award. It is only a requirement to verify eligibility and whether advantage of the program can be taken and is meant as a means of encouragement to become familiar with and use the program. The following provides where basic information on TERP can be found:
  - TERP has a variety of programs addressing various types of mobile and stationary emissions sources, described at the following website:
  - http://www.tceq.texas.gov/airquality/terp
  - The specific program anticipated to be most related to Contractors performing work under this solicitation is the Emissions Reduction Incentive Grants (ERIG), which addresses several categories of sources including non-road equipment (e.g. construction equipment), and marine vessels. Links for information on this program are available through the website listed above.
  - Lists of projects awarded grant funding for the last grant cycle are available at the website listed above for your information
- Proof of assessment will consist of a one page or less description of the following information:
  - What TERP programs the Contractor reviewed for eligibility

- A description of the types of current equipment (e.g. excavator, dump truck, tender barge etc.) the Contractor anticipates can be eligible for upgrade or replacement based on the requirements of the program.
- If no equipment is identified as potentially eligible, describe reasons why, such as equipment is too new or already meets highest current emissions standards, all equipment is sub-contracted or rented etc.
- The Contractor shall exercise air quality best management practices as much as is practicable, including the following:
  - Coordinate and stage support and auxiliary equipment (tugs, tenders, shoreside earthmoving equipment) that will work alongside dredges to minimize idling
  - Inspect and maintain seals to hatches, filling ports, etc. used for fuel storage and refueling.
  - Ensure engine turbochargers are properly maintained to prevent fouling, speed drop, and temperature drops
  - Conduct any soot blowing necessary to prevent exhaust stack buildup away from shore if possible.
  - Consider the use of lower engine speeds or "slow steaming" if feasible to reduce fuel consumption
  - Conduct any required clearing, grubbing, cutting of vegetation under moist or wet conditions to minimize particulate and dust generation.
- The Contractor shall use ultra-low-sulfur diesel (ULSD) fuel in marine vessels where technically and logistically feasible. Marine diesel fuel already must meet the ULSD fuel standard of 15 parts-per-million (ppm) sulfur content and is being phased in within the region. The Contractor shall locate vendors and determine whether ULSD is available and logistically feasible to use for its vessels, whether owned or rented. The Contractor shall identify whether vessels proposed for work under this solicitation can use ULSD fuel. To demonstrate consideration of ULSD use and feasibility, the Contractor shall provide a statement in one page or less describing whether vessels proposed for work under this solicitation can use ULSD fuel, and if so, the potential vendors it has located.
- The Contractor shall disclose to the Port Authority whether any of the marine vessels being used for work under this contract has been inspected by the U.S. Coast Guard (USCG), and whether that inspection covered the protocols for Annex VI of the International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978, known as Marine

Pollution (MARPOL) 73/78, regarding the proper maintenance and operation of engines and their emissions controls. If so, the Contractor shall provide proof of the appropriate USCG inspection certification for compliance with MARPOL 73/78 Annex VI. Inspected vessels that did not receive certification may not be used for work under this contract until deficiencies that prevented certification are corrected.

# 5.4 FISH AND WILDLIFE RESOURCES

The Contractor shall keep construction activities under surveillance, management, and control to minimize interference with, disturbance to, and damage of fish and wildlife. The Contractor will take all appropriate measures to comply with wildlife resource protection laws. Some specific considerations for work under this solicitation are as follows:

### 5.4.1 MIGRATORY BIRD TREATY ACT (MBTA)

Galveston Bay and the Houston metropolitan region are in the major flyway for migration of bird species protected by the MBTA. These bird species use a wide variety of habitats present in the region as temporary stopover habitat on their way north or south. Primary nesting season extends generally from early April to mid-July, and at maximum from February 1<sup>st</sup> to September 1<sup>st</sup>. The Contractor must observe the requirements of the MBTA to avoid the taking of migratory birds, their eggs, parts, and nests.

### 5.4.2 ENDANGERED SPECIES ACT (ESA)

The Contractor should be aware of the potential for the presence of federally listed species in the project area, and precautions and notifications to make, in case they are encountered. Five species of sea turtles that frequent the Gulf of Mexico may use inland bays such as Galveston Bay for foraging, with Kemp's Ridley sea turtle, loggerhead sea turtle, and green sea turtle, most likely to use Galveston Bay waters. Piping plover (Charadrius melodus), occasionally has been known to utilize mud flats found adjacent to or within HSC placement areas. The Port Authority has agreed to the implementation of the National Marine Fisheries Service's Sea Turtle and Smalltooth Sawfish Construction Conditions. In accordance with these conditions, the Contractor shall cease operation of any moving equipment immediately if Endangered Species Act listed species are seen within a 100 yard radius of the active daily construction/ dredging operation or vessel movement, all appropriate precautions shall be implemented to facilitate its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or manta ray is seen within a 50-foot radius of the equipment. Equipment and activities shall not resume until the protected species has departed the project area of its own volition. Though preferred habitat for the West Indian manatee (Trichechus manatus) is not present in the project area, it has wandered into Galveston Bay on rare occasions. In order to facilitate avoidance, the following measures will be implemented: 1) All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The Contractor shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.; 2) All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a fourfoot clearance from the bottom. All vessels will follow routes of deep water whenever possible.; 3) Siltation or turbidity barriers, if required, shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.; 4) All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shut down if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.; and should contact with any of these species occur within the project area, the Contractor should contact the U.S. Fish and Wildlife Service's Houston Coastal Ecological Services Field Office immediately at (281)-286-8282, or in the case of a turtle or manatee, please contact the Marine Mammal Stranding Network at (409)-740-2200. As the National Oceanic and Atmospheric Administration (NOAA) has sole responsibility over sea turtles in a marine environment including bays and estuaries, they should be contacted at (727) 824-5312 for such sightings. The Contractor shall also notify the Port Authority of these sightings and notifications made to the aforementioned agencies.

#### 5.4.3 OYSTER REEFS

There are oyster reefs present within the footprint of the HSC and BSC that will be dredged from the channel widening and channel slope. The Port Authority will provide information of oyster reefs mapped around the HSC and BSC, and within the new HSC and BSC improvement footprint. The Contractor shall not dredge outside of this footprint to avoid impacting any reef outside of the new HSC and BSC improvement footprint. Any mitigation required as a result of impacting reef outside of the new HSC and BSC improvement footprint will be the responsibility of the Contractor. Any mitigation which includes beneficial use of dredged material, occurring in the vicinity of existing oyster reef should account for the need to minimize turbidity through best management practices to decrease the potential of impacting existing oysters.

# 5.5 CULTURAL RESOURCES

Cultural resource investigations conducted for the proposed improvements to the HSC and BSC did not result in identifying existing historical or archeological resources within the project footprint. However, in the event that the Contractor encounters such resources, the Contractor shall not remove or disturb, or cause or permit to be removed or disturbed, any historical, archaeological, architectural, or other cultural artifacts, relics, vestiges, remains, or objects of antiquity. If any such items are discovered on the premises, the Contractor shall immediately notify the Engineer of the Port of Houston Authority of such discovery, and the site and the items discovered shall be protected by the Contractor from further

disturbance until a professional examination of them can be made or until clearance to proceed is authorized by the Port Contract Representative.

**END OF SECTION** 

# **6 DREDGING AND PLACEMENT**

# 6.1 HOUSTON SHIP CHANNEL

### 6.1.1 SCOPE OF WORK

The work for the Houston Ship Channel (HSC) Expansion Channel Improvement Project (ECIP) consists of furnishing all plant, labor, materials, and equipment, and performing the work required by these Technical Specifications, schedules, and drawings forming parts thereof for this project. The HSC shall be dredged to the lines and grades shown in the Plans and in accordance with these Technical Specifications. The Contractor shall excavate the entire quantity of material necessary to complete the work, be it more or less than the amounts estimated.

The work encompasses dredging the HSC from approximate Station 57+000 to 15+500. A hydrographic survey was conducted in February - March 2020 to examine existing conditions. The results of the survey are shown on the Plans. However, it should be noted that the existing federal HSC limits are currently being operated and maintained by the USACE, which includes ongoing maintenance dredging work. The Contractor is advised that the following currently known or anticipated contracts in the vicinity of the work described herein consists of the following:

#### a) Insert Contact(s) at procurement

If awarded as option work, maintenance dredging shall be performed between Station 57+000 to 15+500 prior to or concurrent with new work dredging within the existing federal channel limits and shall be disposed of in PA14 or PA15 as mutually agreed upon by the Contractor and Engineer. New work materials from HSC Station 57+000 to Station 15+500 include the 170-foot channel widening (85-feet to either side), bend easing at Station 28+605, required side slopes and the relocation of the barge lanes as shown on the Plans. However, potential obstructions may exist within the channel widening and barge lanes between approximate Stations 57+000 and 15+500. Obstruction removal is described in Section 14 of these Technical Specification. Additional debris may also be encountered in the excavation areas. Soft shoaled materials encountered within the existing federal channel limits, during the course of new work dredging, shall be considered incidental to the work if maintenance dredging is not awarded as option work. No measurement or payment shall be made for soft shoaled materials or debris removed as part of the work.

Note that work performed prior to execution of this Contract, as part of the HSC ECIP, will strip the green side widening of the HSC between Station 57+000 to 45+000 to a depth of minus 30.0 feet MLLW, and will strip the red side widening of the HSC between Station 57+000 to 47+000 to a depth of minus 40.0 feet MLLW.

New work dredging of the Houston Ship Channel shall be within the horizontal limits shown on the Plans to the grades as shown in Table 6-1. The existing 530-foot wide template was created with a 3H:1V slope

(maintained at 2.5H:1V) beginning at the authorized depth with a box cut down to the allowable overdepth.

#### Table 6-1: Summary of Required Grades and Side Slopes for the HSC ECIP

	From	<b>T</b> . <b>C</b> . <b>1</b>	Required	Advance	Allowable	Final	
Description	Station	To Station	Depth (RD)	Maintenance (AM)	Overdepth (AO)	Vertical	Horizontal
	57+000.00	56+000.00	-48.0	0.0	2.0	1	4
HSC New Work	56+000.00	55+800.00	-48.0	0.0	2.0	1	3 - 4
HSC New Work	55+800.00	31+059.92 <sup>(2)</sup>	-48.0	0.0	2.0	1	3
	31+059.92 <sup>(2)</sup>	15+500.00	-48.5	0.0	2.0	1	3
HSC Option New Work to DRM & SLM <sup>(3)</sup> (4)	37+000.00	35+000.00	-48.5	0.0	2.0	1	3
HSC Option New Work to BIM <sup>(3)</sup>	15+500.00	14+500.00	-48.5	0.0	2.0	1	3
HSC Maintenance <sup>(3)</sup>	57+000.00	31+059.92 <sup>(2)</sup>	-46.0	2.0	2.0	1	2.5

#### HSC & BSC ECIP PROJECT 11: SOUTH BOATERS CUT TO BAYPORT (BEACON 76): HSC STA. 57+000 to HSC STA. 14+500 & BSC: BSC STA. 238+37.21 to BSC STA. 42+07.80 December 09, 2020

	31+059.92 <sup>(2)</sup>	15+500.00	-46.5	2.0	2.0	1	2.5	
Barge Lanes	57+000.00	15+500.00	-13.0	0.0	1.0	1	3	
<ul> <li>(1) Slopes indicated are design values perpendicular to channel toes.</li> <li>(2) Authorized depth transition at Station 31+059.92.</li> <li>(3) If option is awarded.</li> <li>(4) Restricted to green side widening of the HSC.</li> </ul>								

New work materials excavated from the HSC shall be used as follows:

- 1. Mechanical excavation between Station 35+000 to 28+605 and placement of new work materials to build four (4) 20-acre oyster pads at Dollar Reef oyster reef mitigation site.
- Mechanical excavation between Station 35+000 to 28+605 and placement of new work materials to build one (1) 3.4-acre oyster pad, one (1) 6-acre oyster pad, one (1) 9-acre oyster pad, one (1) 13.2-acre oyster pad, one (1) 17.2-acre oyster pad, five (5) 20-acre oyster pads, and one (1) 31-acre oyster pad at San Leon oyster reef mitigation site.
- 3. If HSC Option New Work to DRM & SLM is awarded, mechanical excavation shall take place between Station 37+000 to 35+000 on the green channel side, and material placed to finish construction of oyster pads at Dollar Reef and/or San Leon.
- 4. Dredging and placement of new work materials to build Bird Island Marsh beneficial use site, consisting of three (3) 2-acre bird islands, three (3) approximate 5.4-acre oyster reef wave trips and three (3) approximate 3,850-foot perimeter dikes. Dredging is to include new work material remaining inside the new work dredge template after completion of option work from Station 37+000 to 35+000.

# 6.1.2 DREDGING

# 6.1.2.1 ORDER OF WORK FOR DREDGING

The Contractor shall perform the dredging work in the order specified in Technical Specifications Section 1 subsection 1.7.1. For the purposes of acceptance, the dredging work items in the Bidding Schedule are further divided into Sections as follows:

Section No.	From Station	To Station	Length of Section (feet)
1	57+000	53+000	4,000
2	53+000	49+000	4,000
3	49+000	45+000	4,000
4	45+000	41+000	4,000
5	41+000	37+000	4,000
6	37+000	35+000	2,000
7	35+000	31+000	4,000
8	31+000	28+605	2,395
9	28+605	24+000	4,605
10	24+000	20+000	4,000
11	20+000	15+500	4,500
12 <sup>(1)</sup>	15+500	14+500	1,000
1.) If exercised	as option work.		

#### Table 6-2: HSC Acceptance Sections

#### 6.1.2.2 ESTIMATED QUANTITIES BY STATION

The estimated quantities shown below are based on surveys conducted at the times shown and can only be considered indicative of the conditions at that time. The quantities shown were used to prepare the total estimated quantity of material to be removed shown in the Request for Competitive Sealed Bid/Proposal, and do not include effects of anticipated dredging events or shoaling that may occur prior to commencement of this Contract. Maintenance material left within the new work template is considered incidental to the new work and shall not be considered separately for payment once new work dredging commences. Please refer to Technical Specifications Section 6 Subsections 6.1.1 and 6.3.1 for descriptions of anticipated work and shoaling estimates for the project area.

HSC New \	Nork				
Section No.	From Station	To Station	Required Depth (RD) (CY)	Allowable Overdepth (AO) (CY)	Total Estimated (CY)
1	57+000	53+000	279,200	50,400	329,600
2	53+000	49+000	275,300	50,400	325,700
3	49+000	45+000	386,400	50,400	436,800
4	45+000	41+000	651,200	50,400	701,600
5	41+000	37+000	637,700	50,400	688,100
6	37+000	35+000	337,600	25,200	362,800
7	35+000	31+000	658,400	50,400	708,800
8	31+000	28+605	801,600	58,100	859,700
9	28+605	24+000	640,300	62,100	702,400
10	24+000	20+000	658,000	50,400	708,400
11	20+000	15+500	764,100	56,700	820,800
12(1)	15+500	14+500	174,100	12,600	186,700
		Total:	6,263,900	567,500	6,831,400
1.) If e	exercised as optio	n ww.ork.			

#### Table 6-3: Estimated New Work Dredge Quantities for the HSC ECIP

2.) Quantities are based on hydrographic surveys, February - March 2020.

#### Table 6-4: Estimated Maintenance Dredge Quantities for the HSC ECIP

#### HSC Maintenance Work Allowable Required Total Section Overdepth **From Station To Station** Depth (RD) Estimated No. (AO) (CY) (CY) (CY) 1 57+000 53+000 49,800 68,900 118,700 2 53+000 49+000 57,000 66,800 123,800 3 49+000 45+000 66,100 68,900 135,000 4 45+000 41+000 51,200 63,400 114,600 5 41+000 37+000 55,600 65,100 120,700 35+000 29,700 6 37+000 31,500 61,200 7 35+000 31+000 71,600 63,500 135,100

HSC & BSC ECIP PROJECT 11: SOUTH BOATERS CUT TO BAYPORT (BEACON 76): HSC STA. 57+000 to HSC STA. 14+500 & BSC: BSC STA. 238+37.21 to BSC STA. 42+07.80 December 09, 2020

					,			
8	31+000	28+605	32,400	33,000	65,400			
9	28+605	24+000	2,300	16,800	19,100			
10	24+000	20+000	46,400	58,300	104,700			
11	20+000	15+500	64,200	69,800	134,000			
<b>Total</b> 526,300 606,000 1,132,300								
1.) Qu	1.) Quantities are based on hydrographic surveys, February - March 2020.							

# 6.2 BAYPORT SHIP CHANNEL

#### 6.2.1 SCOPE OF WORK

The work for the Bayport Ship Channel (BSC) Expansion Channel Improvement Project (ECIP) consists of furnishing all plant, labor, materials, and equipment, and performing the work required by these Technical Specifications, schedules, and drawings forming parts thereof for this project. The BSC shall be dredged to the lines and grades shown in the Plans and in accordance with these Technical Specifications. The Contractor shall excavate the entire quantity of material necessary to complete the work, be it more or less than the amounts estimated.

The work encompasses dredging the BSC from approximate Station 222+75.87 to 42+07.80. A hydrographic survey was conducted in February – March 2020 to examine existing conditions of the BSC, Berths No. 1, Berth No. 7, BSC Flare and adjacent areas. The results of the survey are shown on the Plans. However, it should be noted that the existing Federal BSC limits are currently being operated and maintained by the USACE, which includes ongoing maintenance dredging work. The Contractor is advised that the following currently known or anticipated contracts in the vicinity of the work described herein consists of the following:

# a) Insert Contact(s) at procurement

New work materials from the BSC includes the 55-foot widening from Stations 222+75.87 to 135+00, a transition from a 55-foot widening to a 105-foot widening from Station 135+00 to 115+00, a 105-foot widening from Station 115+00 to 49+61.30, and a transition back to the existing channel from Station 49+61.30 to 42+07.80 as shown on the Plans. Furthermore, the southern flare radius of the BSC Flare shall be widened approximately 85 feet between BSC Stations 238+37.31 to 234+36.61 as shown on the Plans. Additional incidental new work materials may be encountered in areas including but not limited to the slopes along the BSC and BSC Flare. Debris may also be encountered in the excavation areas.

New work dredging of the BSC shall be within the horizontal limits shown on the Plans to a required depth of minus 48.5 feet MLLW with 2 feet of allowable overdepth. Required side slopes shall be 3H:1V. The existing channel is approximately 400 feet wide from Stations 230+00 to 115+00 and approximately 350 feet wide from Stations 115+00 to 25+58.69 with a 2.5H:1V slope beginning at the authorized depth of minus 46.5 feet MLLW plus 2 feet of advance maintenance plus 2 feet of allowable overdepth.

Berth dredging shall occur between BSC Station 122+31.79 to 110+00.00 for Berth No. 1 and between BSC Station 60+00.00 to 48+19.51 for Berth No. 7, including a 150-foot cut back at Station 52+20 as shown on the Plans, and will consist of new work, soft shoaled and maintenance materials. Berth dredging shall be performed to a required depth of minus 48.5 feet MLLW with 2 feet of allowable overdepth. Required side slopes shall be 2.5H:1V.

The BSC (300-foot width) and BSC Flare (3,000-foot radius) has been previously mined to minus 55.5 feet MLLW between Station 150+00 to 239+22 during 2001 – 2004. BSC Flare maintenance within the flare channel template shall be performed prior to new work dredging and shall be measured separately for payment.

The existing BSC Flare (4,000-foot radius) has been previously dredged to minus 50.5. BSC Flare maintenance dredging within the existing flare template shall be performed simultaneously with new work dredging and will be considered incidental to new work dredging.

New work materials excavated from the BSC, Berth No. 1, Berth No. 7 and BSC Flare shall be used to construct Bird Island Marsh.

Maintenance dredging shall occur between BSC Station 238+37.31 to 42+07.80 and shall be hydraulically dredged and pumped to either PA14 or PA15 as mutually agreed upon by the Contractor and Engineer.

				r		Final	
Description	From Station To Station		Poquirad	Advanced	Allowable	Side Slope <sup>(1)</sup>	
		To Station	Depth (RD)	Maintenance (AM)	Overdepth (AO)	Vertical	Horizontal
C	222+75.87	211+56.66	-48.5	5.0	2.0	1	3
BSC New Work 455-Foot Widening	211+56.66	211+41.66	-48.5	0.0 - 5.0 <sup>(3)</sup>	2.0	1	3
	211+41.66	42+07.80	-48.5	0.0	2.0	1	3

Table 6-5: Summary of Required Grades and Side Slopes for the BSC ECIP

#### HSC & BSC ECIP PROJECT 11: SOUTH BOATERS CUT TO BAYPORT (BEACON 76): HSC STA. 57+000 to HSC STA. 14+500 & BSC: BSC STA. 238+37.21 to BSC STA. 42+07.80 December 09, 2020

BSC Flare New Work	238+37.31	211+56.66	-48.5	5.0	2.0	1	3		
BSC Berth No. 1	122+31.79	110+00.00	-48.5	0.0	2.0	1	2.5		
BSC Berth No. 7	60+00.00	48+19.51	-48.5	0.0	2.0	1	2.5		
BSC Maintenance <sup>(2)</sup>	211+56.66	42+07.80	-46.5	2.0	2.0	1	2.5		
BSC Flare Maintenance <sup>(2)</sup>	238+37.31	211+56.66	-48.5	5.0	2.0	1	2.5		
(1) Slopes ind perpendic	<ul> <li>(1) Slopes indicated are design values perpendicular to channel toes. Where cross sections are not perpendicular to channel toes, a skewed slope will result.</li> </ul>								

(2) If option is awarded.

(3) Depth transition from -50.5 feet MLLW to -55.5 feet MLLW using 3H:1V end slope.

### 6.2.2 DREDGING

# 6.2.2.1 ORDER OF WORK FOR DREDGING

The Contractor shall perform the dredging work in the order specified in Technical Specifications Section 1 subsection 1.7.1. For the purposes of new work acceptance, dredging work items in the Bidding Schedule are further divided into Sections as follows:

Section No.	From Station	To Station	Length of Section (feet)
1	222+75.87	180+00	4,275.87
2	180+00	140+00	4,000

#### Table 6-6: BSC New Work Acceptance Sections

HSC & BSC ECIP PROJECT 11: SOUTH BOATERS CUT TO BAYPORT (BEACON 76): HSC STA. 57+000 to HSC STA. 14+500 & BSC: BSC STA. 238+37.21 to BSC STA. 42+07.80 December 09, 2020

3	140+00	100+00	4,000
4	100+00	60+00	4,000
5	60+00	42+07.80	1,792.20
6 (BSC Flare)	238+37.31	211+56.66	2,680.65
7 (Berth No. 1)	112+31.79	110+00.00	1,231.79
8 (Berth No. 7)	60+00.00	48+19.51	1,180.49

### 6.2.2.2 ESTIMATED QUANTITIES BY STATION

The estimated quantities shown below are based on surveys conducted at the times shown and can only be considered indicative of the conditions at that time. The quantities shown were used to prepare the total estimated quantity of new work material to be removed shown in the Request for Competitive Sealed Bid/Proposal, and do not include effects of anticipated dredging events or shoaling that may occur prior to commencement of this Contract. Maintenance material left within the new work template is considered incidental to the new work and shall not be considered separately for payment once new work dredging commences. Please refer to Technical Specifications Section 6 Subsections 6.2.1 and 6.3.1 for descriptions of anticipated work and shoaling estimates for the project area.

Table 6-7: Estimated	New	Work	Dredge	Quantities	for the	BSC ECI

BSC New Work			Ī			
Section No.	From Station	To Station	Required Depth (RD) (CY)	Advanced Maintenance (AM) (CY)	Allowable Overdepth (AO) (CY)	Total Estimated (CY)
1	222+75.87	211+56.66	77,900	10,700	4,300	92,900
	211+56.66	180+00.00	228,100	0	12,900	241,000
2	180+00.00	140+00.00	290,700	0	16,300	307,000
3	140+00.00	100+00.00	520,600	0	25,700	546,300
4	100+00.00	60+00.00	697,100	0	31,100	728,200
5	60+00.00	42+07.80	124,300	0	11,000	135,300
6 (BSC Flare)	238+37.31	211+56.66	65,100	128,200	65 <i>,</i> 600	258,900
7 (Berth 7)	122+31.79	110+00.00	380,000	0	15,500	395,500
8 (Berth 1)	60+00.00	48+19.51	264,200	0	19,100	283,300
		Total:	2,641,400	97,300	201,400	2,988,400
Quantities are b	ased on hydro	graphic surveys	, February - Ma	arch 2020.		

BSC Maintenan	SC Maintenance Work							
Section No.	From Station	To Station	Required Depth (RD) (CY)	Advanced Maintenance (AM) (CY)	Allowable Overdepth (AO) (CY)	Total Estimated (CY)		
1	222+75.87	211+56.66	21,900	42,800	18,300	83,000		
	211+56.66	180+00.00	6,400	0	44,600	51,000		
2	180+00.00	140+00.00	4,000	0	38,300	42,300		
3	140+00.00	100+00.00	2,300	0	26,000	28,300		
4	100+00.00	60+00.00	12,100	0	21,600	33,700		
5	60+00.00	42+07.80	11,200	0	10,700	21,900		
6 (BSC Flare)	238+37.31	211+56.66	192,700	429,300	355,700	977,700		
7 (Berth 7)	122+31.79	110+00.00	1,100	0	400	1,500		
8 (Berth 1)	60+00.00	48+19.51	0	0	0	0		
		Total:	162,500	274,700	272,200	1,239,400		
Quantities are b	ased on hydro	ographic surveys	obtained by th	ne JV, February - N	Aarch 2020.			

#### Table 6-8: Estimated BSC Maintenance Work Dredge Quantities

# 6.3 GENERAL PROVISIONS

### 6.3.1 SHOALING

The Contractor shall consider shoaling in their proposal and schedule. Estimated shoaling rates for the existing federal channel limits are provided in Table 6-9.

#### Table 6-9: Estimated Existing Channel Shoaling Rates

Description	From Station	To Station	Average Annual Shoaling Rate (CY/Year)
	78+844	28+605	1,469,000
Houston Ship Channel	28+605	0+00	771,000
Bayport Ship Channel Flare	239+04.32	211+56.66	788,000

Bayport Ship Channel &	211+56.66	25+58 60	400.000
Turning Basin	211+30.00	23+30.09	499,000

#### 6.3.2 REAL TIME KINEMATIC (RTK) GPS FOR DREDGING AND PLACEMENT OPERATIONS

The Contractor shall furnish RTK GPS for surveillance of the movement and disposition of dredged material during excavation and placement. The RTK GPS shall be established, operated and maintained by the Contractor to continuously track in real-time the horizontal location of the dredge vessel and cutterhead or bucket position and elevation at all times. The Contractor shall display and digitally record in real-time the location of the dredge and cutterhead or bucket.

#### 6.3.2.1 RTK GPS STANDARDS

The Contractor shall provide automated (computer) system and components to collect RTK GPS positioning and tide data. Horizontal and vertical accuracies shall meet the requirements provided in Section 4 of these Technical Specifications. Horizontal location and vertical data shall be collected in sets and each data set shall be referenced in real-time to date and local time (to the nearest 10 seconds) and shall be referenced to the same state plane coordinate system used for the survey(s) shown in the Plans. The RTK GPS shall be calibrated before dredging operations have started and at thirty-day (30-day) intervals while work is in progress. The Engineer shall have access to the RTK GPS data and equipment in order to observe its operation. It is the Contractor's responsibility to select a system that will operate properly in accordance with the requirements of these Technical Specifications and the physical conditions of the work areas.

# 6.3.2.2 RTK GPS DATA REQUIREMENTS AND SUBMISSIONS

The RTK for each dredge shall be in operation for all dredging and disposal activities. The Engineer shall be notified immediately in the event of RTK failure and all dredging operations for the vessel shall cease until the RTK system is fully operational. Any delays resulting from RTK system failure shall be at the Contractor's expense.

All data shall be collected and stored digitally in ASCII format and shall be readable by MS Windows compatible software. Each day's worth of RTK data shall be a separate and distinct ASCII file, labeled by the date. Data shall be recorded on 10-second intervals unless stated otherwise.

The required digital data to be collected for each day includes the following:

- Date
- Time
- Vessel ID (for each dredge and transport vessel)
- Vessel Captain

- Dredge location as defined by:
  - Dredge bucket location in the X,Y,Z (at the lip of the closed bucket) directions at both the bucket grab closing point and the bucket release or opening point over the transport vessel provided in the project datum in accordance with Technical Specification Section 4.4. Z coordinates shall be provided for both the raw and tide adjusted values; and/or
  - Dredge cutterhead location in the X,Y,Z (at the bottom of the suction mouth) directions provided in the project datum in accordance with Technical Specification Section 4.4. Z coordinates shall be provided for both the raw and tide adjusted values.
- Transport vessel location in the X,Y,Z directions provided in the project datum in accordance with Technical Specification Section 4.4.
- Vessel Draft
- RTK Tides

All digital RTK GPS data shall be furnished to the Engineer within 24 hours of collection. A cut chart showing the cutterhead positions and/or bucket positions while dredging for each day shall be submitted to the Engineer each week.

#### 6.3.3 DREDGE PIPELINES

The Contractor shall determine its own means and methods for layout and configuration of pipeline routes in accordance with the Plans and Technical Specifications. The Contractor shall identify its proposed pipeline routes on plan drawings and submit them as part of the work plan. Refer to Technical Specifications Section 2 Subsection 2.4.2 for further information.

- Floating or submerged dredge pipeline shall be located so as not to interfere with commercial navigation or safety.
- Should the Contractor elect to use a pipeline material, which is buoyant or semi-buoyant, such as HDRE pipe, or similar materials, the Contractor shall securely anchor the pipeline to prevent the pipeline from lifting off the bottom under any conditions. The Contractor shall remove all anchors when the submerged pipeline is removed. The location of the entire length of submerged pipeline shall be marked with signs, buoys, and lights, conforming to U.S. Coast Guard regulations.
- The Contractor shall plainly mark the pipeline access routes with conspicuous stakes, targets, and/or buoys to be maintained throughout the Contract operations.
- A tight dredge discharge pipeline shall be maintained to prevent spilling of dredged material or dredged water outside of the placement area.

### 6.3.3.1 FLOATING DREDGE PIPELINE

Should the Contractor's pipeline not rest on the bottom, it will be considered a floating pipeline and shall be visible on the surface and clearly marked. In no case will the Contractor's pipeline be allowed to fluctuate between the surface and the bottom or lie partly submerged. Lights shall be installed on the floating pipeline. The lights shall be supported either by buoys or by temporary piling, provided by the Contractor and approved by the Port Authority. Where the pipeline does not cross a navigable channel, the flashing yellow all-around lights shall be spaced at an interval not over 200 feet apart, unless closer spacing is required by U.S. Coast Guard personnel, in which case the requirements of the U.S. Coast Guard shall govern, at no additional cost to the Port Authority. <u>At no time shall an operating floating pipeline cross the HSC or BSC.</u>

### 6.3.3.2 SUBMERGED DREDGE PIPELINE

In the event the Contractor elects to submerge its pipeline, the pipeline shall rest securely on the bottom. In no case will the Contractor's pipeline be allowed to fluctuate between the surface and the bottom or lie partly submerged. If the Contractor elects to use a submerged section in the dredge discharge pipeline for crossing a navigable channel it may do so without the formality of obtaining a Department of the Army permit for work or structures in navigable waters. The Contractor shall coordinate the submerged pipeline crossings with the U.S. Coast Guard Marine Safety Office (MSO), U.S. Coast Guard Vessel Traffic Service (VTS), and the Houston Pilots Association (HPA). At least five (5) days shall be allowed for comments and their comments shall be coordinated with the Engineer. Concerns regarding impact of navigation will be considered and final resolution will be made by the Contractor, Engineer, MSO, VTS, and HPA. However, three (3) copies of detailed plans of the submerged section shall be submitted and approved prior to use of the submerged section. The plans shall indicate clearly the width and depth of the navigation opening and the method used to mark it by day and by night for the safety of navigation. The minimum bottom width of the submerged section shall not be less than the width of the authorized federal channel being crossed. The highest point on the pipe or ball connection occurring across the bottom width of a submerged section and any anchor securing the submerged pipeline shall not be higher than the required depth within the horizontal limits of the authorized federal channel being crossed. Lighted buoys, meeting the requirements of the U.S. Coast Guard Regulation 33 CFR 62.25, shall be provided by the Contractor to mark the navigation opening. A red buoy exhibiting a quick flashing red light shall be used to mark the right side of the opening and a black buoy exhibiting a quick flashing green light shall be used to mark the left side of the opening. The frequency of the flashes shall be not less than 60 per minute. "Right side" and "left side" of the opening shall be in conformance with the lateral system of buoyage established by the U.S. Coast Guard. Requirements for the lighted buoys and description of the lateral system of buoyage will be found in the U.S. Coast Guard Publication CG 208 entitled "Aids to Navigation." Lights to be displayed on pipelines shall be in accordance with the U.S. Coast Guard Regulation 33 CFR 80.23.

#### 6.3.4 DREDGING OPERATIONS

• Dredging shall be to the lines and grades indicated on the Plans.

- Holes dug on the banks for deadmen or anchorage shall be filled and repaired to the previous existing lines and grades.
- The Contractor shall conduct a minimum of two inspections per day of the discharge pipeline during hydraulic dredging operations.
  - Routine inspections of the submerged pipe shall be performed to ensure integrity of anchorage and markings
  - Routine inspections of the floating pipeline shall be conducted to ensure marking's integrity and there are no visible leaks
  - Routine inspections of the shore pipe shall be conducted to ensure there are no visible leaks
- Hydraulic dredging shall be immediately suspended in the event of pipeline leakage. Dredging shall not be resumed until the necessary pipeline repairs have been completed.
- All manned equipment shall be supplied with two-way radio communication, fixed or portable, capable of transmitting and receiving on both, marine hailing and emergency Channels 13 and 16 as well as two additional Contractor-designated working channels.
- The Contractor will provide constant radio contact between personnel on the dredge(s), transport vessel(s) and at the placement area and pipeline. The Contractor's placement area and pipeline personnel are to immediately notify the dredge should pipeline leakage occur, or any other problems at the placement area. The Contractor shall inform the Port Authority at what time the problems were found and time when action was taken to correct the problems.
- Hydraulic discharge control measures including, but not limited to, spillbarge, Y Valves, spreaders, spoons, submerged diffusers, tremies or baffles shall be used at the pipeline discharges to disperse dredge water and materials. At no time shall open direct pipeline discharge be allowed for new work materials. Discharge control shall be used at all times when placing new work materials. The dredged material shall be discharged in the placement area in such a manner as to maximize the use of the material and minimize loss of satisfactory material.
- Barges used for mechanical dredging, transport, and placement shall be maintained free of leaks, shall be evenly loaded and shall not be filled within 3.0 feet of the coamings to avoid spillage during transport. Doors shall be closed tight during loading and transport and all seals and lips maintained throughout the Contract duration. The Contractor shall notify the Port Authority immediately if excessive leakage occurs while the transport vessel(s) is traveling to the placement area. Excessive leakage is defined as any change in draft exceeding 2.0 feet from the point of departure from the dredging site to the disposal site.

#### 6.3.5 ADDITIONAL DREDGING OPERATIONS FOR MAINTENANCE WORK

Inspection frequency of the drop outlet structure discharge and placement area dike shall be in accordance with Technical Specifications Section 5 Subsection 5.2 and Section 6 Subsections 6.3.5.1 through 6.3.7. Dredging shall be suspended, if necessary, for a period of time required to achieve and maintain water quality standards of the discharge from the placement area. Dredging shall be immediately suspended in the event of imminent or actual dike failure which could or does allow dredged water or material to escape from the placement area. Dredging shall not be resumed until the necessary dike repair(s) have been completed.

#### 6.3.5.1 DEWATERING OPERATIONS

- Placement area effluent will be controlled by the use of drop outlet structures during dredging operations.
- Return flow from the placement area drop outlet structures shall be monitored and controlled to prevent erosion or excess turbidity.
- The Contractor shall not allow water to pond higher than 2 feet below the lowest point of the existing dike crown in the placement area.
- Upon completion of placement operations, the drop outlet structures shall be left in place and the Contractor shall begin dewatering to provide for complete drainage without ponding of the placement area for a minimum number of days as directed by the Engineer.
- The Contractor shall provide at least daily inspection of the drop outlet structure during final drainage of the placement area and raise the weir boards if necessary, to stop the effluent if it does not meet the applicable requirements. This inspection shall be at closer intervals, if necessary, during periods of rain and when the water level is approaching the interface. Refer to Technical Specification Section 5 Subsection 5.2 for more information.

### 6.3.6 MONITORING

The Contractor shall have continuous monitoring of the placement area(s) during dredging operations. The designated personnel shall be in radio contact with the dredge at all times. At the Port Authority's discretion, the Contractor shall expand radio contact to include the Port Authority or a designated representative of the Port Authority for emergency response purposes.

### 6.3.7 PROTECTION OF THE PLACEMENT AREA

The Contractor shall maintain and protect the affected locations of the placement area in satisfactory condition until completion and acceptance of all work required by this Contract.

The Contractor shall adequately inspect its placement operations daily to reduce the possibility of accidental spillage or wasting of dredged materials outside of the defined placement area(s) to be constructed. If failures occur, dredging operations shall be stopped immediately, and the deposit of

material at the placement area(s) shall not be resumed until approved to do so by the Engineer and at no additional cost to the Port Authority.

#### 6.3.8 PLANT

Maintain the plant, barges, pipelines, and associated equipment to meet the requirements of the work. Promptly repair leaks or breaks along the pipeline. Remove dredged material misplaced due to leaks and breaks at no additional cost to the Port Authority.

### 6.3.9 REMOVAL OF PLANT AND CLEANUP

Upon approval from the Port Authority of completion of the work by the Contractor, the Contractor shall promptly remove their plant, including pipeline, anchors/frames/stands, ranges, buoys, survey stakes, piles, and other markers or obstructions placed by or for the Contractor. Upon removal of a pipeline, the pipeline corridor shall be restored to its original condition. The Contractor will not be permitted to abandon any equipment in the disposal area for dredged materials or other areas adjacent to the worksite. The Contractor shall provide surveys as described in Subsection 4.9 to confirm the removal of submerged pipelines and anchors.

#### 6.3.10 MEASUREMENT AND PAYMENT

Measurement and payment shall be in accordance with Section 3 of these Technical Specifications.

### 6.3.10.1 REQUIRED DEPTH

Required depth areas shall be measured within the horizontal limits for material removed lying above the Required Depth shown on the Plans, including material removed above the side slopes extending therefrom, as measured between BD and AD surveys.

### 6.3.10.2 ADVANCE MAINTENANCE

Advance Maintenance areas, where applicable, shall be measured between the elevations and horizontal limits of Required Depth and Allowable Overdepth shown on the Plans.

### 6.3.10.3 OVERDEPTH

Limits of Allowable Overdepth dredging will be as shown in Table 6-1 and on the Plans. For new work dredging, Allowable Overdepth area shall be measured between the elevations and horizontal limits of Required Depth and Allowable Overdepth as shown on the Plans. For maintenance dredging, Allowable Overdepth area shall be measured between the elevations and horizontal limits of Advanced Maintenance and Allowable Overdepth as shown on the Plans.

Material actually removed from within the specific area to be dredged will be measured and paid for at the Contract price or prices.

#### 6.3.10.4 SIDE AND END SLOPES

The Contractor shall remove sufficient material to provide the limiting side and end slopes specified in this Section. Material actually removed, within the limits shown on the Plans to provide for final side slopes as shown in Table 6-1 and Table 6-5, but not in excess of the amount originally lying above this

limiting side slope will be measured and paid for, whether dredged in original position or by box cutting. Box cutting is defined as dredging the space below the pay slope plane at the bottom of the slope for upslope material capable of falling into the cut. There will be no payment for end slope material that falls into the required cut and is subsequently removed. This Section for compensating side slopes will not apply to areas where dredging is limited due to the proximity of terminal structures or as otherwise indicated in the Plans.

#### 6.3.10.5 EXCESSIVE DREDGING

Payment will not be made for material taken from beyond the limits as shown in the Plans, except as specified in Technical Specifications Section 6 Subsections 6.3.10.3 and 6.3.10.4.

**END OF SECTION** 

# 7 HYDRAULIC FILL CONSTRUCTION

# 7.1 SCOPE OF WORK

The work in this Section consists of furnishing all plant, labor, equipment, supplies, and material for performing the operations necessary to hydraulically construct Bird Island Marsh and all excavations incidental to the construction of Bird Island Marsh as specified and shown on the drawings to the lines and grades shown; and other incidental earthwork as may be necessary to complete the work as specified herein and as shown on the Plans. The work covered in this section includes:

- 1. Construction of three (3) approximate 2-acre bird islands at each corner of Bird Island Marsh.
- 2. Construction of three (3) approximate 5.4-acre oyster reef wave trips surrounding each of the bird islands.
- 3. Construction of three (3) approximate 3,850 linear foot armored dikes connecting each of the bird islands.

The design of the hydraulically constructed islands, dikes and oyster reef wave trips anticipates that displacement of soft bay bottom area will occur.

# 7.2 REFERENCES

The publication listed below forms a part of this specification to the extent referenced. The publication is referred to in the text by basic designation only.

• American Society for Testing and Materials (ASTM) Publication D 2487-17e1 Classification of Soils for Engineering Purposes (Unified Soil Classification System)

# 7.3 MATERIALS

Satisfactory materials used for hydraulically constructing Bird Island Marsh shall be obtained from the HSC and BSC new work dredge limits. The Contractor shall evenly distribute hydraulic fill material within the placement area footprint so that the final new hydraulic fill sections can be constructed to the minimum lines and grades. It is anticipated that incidental soft shoaled materials removed from within the dredge limits as part of the Work will not be retained at the placement sites during the hydraulic placement process. Deposits of soft material that may accumulate in low areas of the fill shall be immediately drained and the area dried prior to final shaping and grading. New work materials shall not be lost or used for any other purposes other than construction of the placement area. Excess-placement of materials, as determined by the Engineer, shall be relocated by the Contractor and used for placement area construction or as directed by the Engineer and at no additional cost to the Port Authority.

#### 7.3.1 SATISFACTORY MATERIALS

Satisfactory Materials for construction of the hydraulic fill shall consist of available soils classified as CH, CL, SC, SP, SM, MH, or ML in accordance with ASTM D 2487 (latest edition) from new work material in the HSC and BSC.

### 7.3.2 UNSATISFACTORY MATERIALS

Unsatisfactory materials shall consist of materials such as roots, brush, sod, or other perishable materials and debris. Organic soils classified as OL, OH, and PT in accordance with ASTM D 2487 (latest edition) are also considered unsatisfactory for construction.

### 7.4 GENERAL PROVISIONS

The work in this section consists of furnishing all plant, labor, equipment, supplies, and materials for performing the operations to construct Bird Island Marsh with hydraulic fill to the lines and grades as shown; and other incidental earthwork as may be necessary to complete the work as specified herein and as shown on the Plans. The hydraulic fill templates shall be constructed to the minimum lines, grades, and cross sections shown, unless otherwise directed. Explorations to determine the character of materials at the site have been made, including probings and core borings and the results are included in Appendix A and Appendix B. Displacement and settlement of the foundation material can be expected and shall be anticipated by the Contractor during construction of the hydraulic fill. The templates shown do not represent the total volume of excavated satisfactory materials needed to construct the hydraulic fill templates to the lines and grades specified. The Contractor shall satisfy itself as to the nature of the foundation characteristics and shall base its Contract unit prices and conduct its work accordingly.

#### 7.4.1 CHANGES IN HYDRAULIC FILL TEMPLATE OR ALIGNMENT

The Engineer reserves the right to make changes in the hydraulic fill templates and/or alignments, as may be found necessary before completion of the work. The Engineer reserves the right to increase or decrease the foundation widths and slopes of the hydraulic fill or make changes in the final templates as may be deemed necessary. Should such changes be necessary, a mutually agreed upon adjustment to the Contract shall be made in accordance with the General Conditions. Should it become necessary, through no fault of the Contractor, to abandon a line or location where work has been done, payment for materials placed shall be made in accordance with the Contract Documents.

# 7.4.2 **PROTECTION**

The location of work is in Trinity Bay and is subject to ship wakes from the Houston Ship Channel, Bayport Ship Channel, Cedar Bayou and significant fetch length and storm influences on wave height. The Contractor shall expect erosion of unprotected hydraulic fill construction. The Contractor is advised to stage the installation of shore protection with its construction progress in order to protect the dikes from erosion. The Contractor shall be responsible for protecting the work site and for repair of eroded or otherwise damaged portions of hydraulic fill at no additional cost to the Port Authority.

#### 7.4.3 SITE PREPARATION AND EARTHWORK

No foundation preparation will be required for Bird Island Marsh construction.

Prior to beginning construction, the center of each approximate 2-AC bird island may be required to be located and staked or marked with buoys at the direction of the Engineer. The Contractor shall furnish, at its expense, stakes, buoys, templates, platforms, equipment, range markers, and labor as may be required to lay out any part of the Work. Stakes, buoys or other such markers, shall also be placed along the intersection of the dike template with the pre-existing bay bottom at intervals not to exceed 400 feet. Stakes, buoys or other such markers, shall be flagged, painted, or otherwise dressed to ensure they are clearly visible from distances of 500 feet under normal clear weather conditions. Stakes, buoys, or other such markers, shall be maintained until each fill section is accepted as complete and then completely removed.

# 7.5 PLACEMENT OF HYDRAULIC FILL

The initial placement of material shall consist of controlled discharge of the dredged material within the limits of placement area construction, as shown on the Plans. The initial placement quantity shall provide sufficient material within the limits of recovery to accomplish final shaping and grading. The Contractor shall take measures to maximize retention of satisfactory materials within the limits of recovery including, but not necessarily limited to, control of discharge actions and discharge elevations, end treatments of the discharge pipe and use of retention dikes. The Contractor shall evenly distribute sufficient hydraulic fill material at all locations within the construction template so that the final new hydraulic fill section can be constructed to the minimum lines and grades before any materials are stockpiled. Excess satisfactory material shall not be wasted. Satisfactory material shall be stockpiled on the interior slope of the dikes and graded and shaped to allow for drainage. No separate payment will be made for the stockpiles. Details of initial placement shall be included in the Contractor's work plan. Over-placed material as determined by the Engineer, shall be relocated where directed by the Engineer at no additional cost to the Port Authority. Conversely, areas of under-placement of material as determined by the Engineer, shall have additional materials placed, whether hydraulically or mechanically, until sufficient material has been placed to complete construction of the template at no additional cost to the Port Authority. The limits, that generally identify materials to be used for construction, shall be identified on individual cross-sections to allow monitoring of initial placement as required by the specifications.

# 7.5.1 CONTROL OF DISCHARGE

The Contractor shall use frequent movement of the discharge point during the initial placement, along with an effective directing of the discharge flow to retain the maximum quantity of material possible within the hydraulic fill template.

The Contractor must use a spillbarge or similar technique to control initial placement of the hydraulically transported material. Additionally, the spillbarge shall be capable of varying the discharge elevation from below the water surface to a sufficient height above the specified construction template so that material may be hydraulically placed to the minimum lines and grades shown. The spillbarge discharge shall be fitted with a spreader, spoon, diffuser, or other effective means that will dampen the velocity of

dredge slurry exiting the pipe. Discharge of slurry shall not occur without such a device attached to the end of the pipe.

Additionally, during hydraulic fill placement, the contractor shall ensure satisfactory material placement from the hydraulic fill, over the full horizontal limits of the final design template. Control measures including but not limited to Wye valves, spreaders, spoons or other effective methods shall be employed, to limit lateral wash or loss of suitable material. At no time shall the Contractor use direct pipe placement unless approved by the Engineer. The Engineer may approve or disapprove of open pipe discharge at any point during the course of the Work.

The Contractor shall include details in the work plan regarding the proposed technique and equipment to be used to accomplish the required control of discharge. The method used to place the hydraulic fill shall maximize the use of the material and minimize waste of satisfactory materials.

### 7.5.2 FINAL SHAPING AND GRADING

Satisfactory material mechanically placed on top of the hydraulic fill during shaping and grading shall be placed in loose lifts not exceeding 18 inches and shall be mechanically compacted by not less than three passes of a crawler-type tractor complying with Technical Specifications Section 1 Subsection 1.6 and shall not be operated at a speed exceeding 5 miles per hour. Satisfactory material that becomes mixed with unsatisfactory materials, including displaced foundation materials, is no longer satisfactory material and shall be disposed beyond the limits of the exterior of the fill template.

Recoverable material shall be used to construct Bird Island Marsh to the final grade template as shown in the Plans. It shall be the Contractor's responsibility to protect the work site and to repair eroded or otherwise damaged sections prior to placement of shore protection at no additional cost to the Port Authority. The Engineer reserves the right to increase, decrease, or alter the dimensions of the design template upon request of the Contactor due to the actual quantity of satisfactory materials encountered during construction.

# 7.5.3 ACCEPTANCE OF COMPLETED HYDRAULIC FILL

Acceptance will be based on topographic surveys performed by the Contractor as specified in Section 4 of these Technical Specifications. If the final survey cross sections for a particular acceptance section show that the acceptance template as shown has been achieved, the section will be accepted as complete.

#### 7.5.4 DAMAGES OR FAILURES

#### 7.5.4.1 CONDUCT OF WORK

The Contractor shall maintain and protect the hydraulic fill in a satisfactory condition until completion and acceptance of the work in this Contract. If the Contractor's equipment causes shears, rutting, quaking, heaving, cracking or excessive deformation of the hydraulic fill, the Contractor shall limit the type, load or travel speed of the equipment on the fill and make necessary repairs at no additional cost to the Port Authority.

#### 7.5.4.2 EROSION, SLIDES, AND SETTLEMENT

If erosion, sliding, or settlement occurs in any part of the hydraulic fill prior to acceptance, the Contractor shall repair that portion of the failure. The Contractor shall be responsible for repair of damages resulting from construction equipment operation, settlement, subsidence, slides, displacement and handling of foundation materials, normal seasonal weather-related damage, and Contractor negligence.

#### 7.5.5 BIRD ISLAND MARSH CONSTRUCTION

#### 7.5.5.1 ORDER OF WORK FOR BIRD ISLAND MARSH CONSTRUCTION

The sequence of construction shall be determined by the Contractor, unless otherwise restricted by the Contract documents. The Contractor shall determine its means and methods for conducting the work associated with Bird Island Marsh hydraulic fill construction.

#### 7.5.5.2 ESTIMATED NEATLINE QUANTITIES

The following neat-line quantities are based on surveys generated from February - March 2020 and used by the Engineer to prepare the estimate. The quantities are estimates only and the Contractor is responsible for interpreting the quantity numbers shown for the actual quantities necessary to achieve the required lines and grades shown in the Plans. The quantities are unadjusted, neatline quantities computed from the existing bay bottom to the design templates. The percentage for items including, but not limited to, compaction, settlement, foundation displacement, and hydraulic material losses is the responsibility of the Contractor. The neatline quantities for Bird Island Marsh are as follows:

BIRD ISLAND MARSH QUANTITIES		
DESCRIPTION	NEATLINE QUANTITY (CY)	
NORTH ISLAND	98,000	
EAST ISLAND	133,000	
SOUTH ISLAND	133,000	
NORTH OYSTER REEF WAVE TRIP	74,000	
EAST OYSTER REEF WAVE TRIP	76,000	
SOUTH OYSTER REEF WAVE TRIP	75,000	
NORTH DIKE	269,000	
EAST DIKE	268,000	
WEST DIKE	266,000	
Total	1,392,000	
<b>Note:</b> Ouantities are based on hydroaraphic surveys from the JV dated February - March 2020.		

#### Table 7-1: Estimated Neatline Quantities for Construction at Bird Island Marsh

#### 7.5.5.3 ACCEPTANCE

For acceptance, hydraulic fill of Bird Island Marsh shall be constructed, at a minimum, to the grades and elevations shown in the Plans.

#### 7.5.5.3.1 BIRD ISLANDS AND DIKES TOLERANCES

Tolerances shall include -0.5 to +0.5 feet on the crown height, crown width and slopes. Final height, width, and alignment shall be within 1 foot horizontally of the baselines shown unless otherwise approved by the Engineer. Abrupt changes in alignment, as determined by the Engineer, will not be permitted and shall be corrected by the Contractor at no cost to the Port Authority.

#### 7.5.5.3.2 OYSTER REEF WAVE TRIPS TOLERANCES

Tolerances shall include 0.0 to +0.5 feet on the design height and -0.5 to +0.5 feet on the design width and slopes. Final height, width, and alignment shall be within 1 foot horizontally of the baselines shown unless otherwise approved by the Engineer. Abrupt changes in alignment, as determined by the Engineer, will not be permitted and shall be corrected by the Contractor at no cost to the Port Authority.

**END OF SECTION** 

# 8 MECHANICAL FILL CONSTRUCTION

# 8.1 SCOPE OF WORK

The work in this Section consists of furnishing all plant, labor, equipment, supplies, and material for performing the operations necessary to mechanically construct oyster pads at Dollar Reef and San Leon oyster reef mitigation sites and all excavations incidental to the construction of the oyster pads as specified and shown on the drawings to the lines and grades shown; and other incidental earthwork as may be necessary to complete the work as specified herein and as shown on the Plans. The work covered in this section includes:

- 1. Construction of four (4) 20-acre oyster pads at Dollar Reef.
- Construction of one (1) 3.4-acre oyster pad, one (1) 6-acre oyster pad, one (1) 9-acre oyster pad, one (1) 13.2-acre oyster pad, one (1) 17.2-acre oyster pad, five (5) 20-acre oyster pads, and one (1) 31-acre oyster pad at San Leon.

The design of the mechanically constructed oyster pads anticipates that displacement of the bay bottom within the placement areas will occur.

## 8.2 REFERENCES

The publication listed below forms a part of this specification to the extent referenced. The publication is referred to in the text by basic designation only.

• American Society for Testing and Materials (ASTM) Publication D 2487-17e1 Classification of Soils for Engineering Purposes (Unified Soil Classification System)

# 8.3 MATERIALS

Satisfactory materials used for mechanically constructing the oyster pads shall be obtained from the HSC new work dredge limits as determined by the Contractor. The Contractor shall evenly distribute sufficient fill material within the footprint so that the oyster pads can be constructed to the minimum lines and grades.

# 8.4 GENERAL PROVISIONS

The mechanical fill templates shall be constructed to the minimum lines and grades unless otherwise directed. Explorations to determine the character of materials at the site have been made, including probings and core borings and the results are included in Appendix A and Appendix B. Some displacement and settlement of the foundation material can be expected and shall be monitored by the Contractor during construction of the mechanical fill. The templates shown do not represent the total volume of excavated materials needed to construct the mechanical fill templates to the lines and grades specified. The Contractor shall satisfy itself as to the nature of the foundation characteristics and shall base their Contract unit prices and conduct their work accordingly.

#### 8.4.1 CHANGES IN MECHANICAL FILL TEMPLATE OR ALIGNMENT

The Engineer reserves the right to make changes in the mechanical fill templates and/or alignments, as may be found necessary before completion of the work. The Engineer reserves the right to increase or decrease the dimensions of the pads or make changes in the templates as may be deemed necessary. Should such changes be necessary, a mutually agreed upon adjustment to the Contract shall be made in accordance with the General Conditions. Should it become necessary, through no fault of the Contractor, to abandon a line or location where work has been done, payment for materials placed shall be made in accordance with the Contract Documents.

#### 8.4.2 SITE PREPARATION AND EARTHWORK

No foundation preparation will be required for the construction of oyster pads at Dollar Reef and San Leon.

Prior to beginning construction, the corners of each oyster pad may be required to be located and staked or marked with buoys at the direction of the Engineer. The Contractor shall furnish, at its expense, stakes, buoys, templates, platforms, equipment, range markers, and labor as may be required to lay out any part of the Work. Stakes, buoys or other such markers, shall also be placed along the outer boundaries of the oyster pads at intervals not to exceed 200 feet. Stakes, buoys or other such markers, shall be flagged, painted, or otherwise dressed to ensure they are clearly visible from distances of 500 feet under normal clear weather conditions. Stakes, buoys, or other such markers, shall be maintained until each oyster pad is accepted as complete and then completely removed.

# 8.5 PLACEMENT OF MECHANICAL FILL

# 8.5.1 TRANSPORT OF DREDGED MATERIAL

All vessels (container and transport) that will be used, and/or may be used, during this contract must be identified prior to the first day of dredging. Vessels identified for use on the contract must be certified to be fully operational, mechanically sound, completely seaworthy, and free of leaks or other defects.

The Contractor shall provide for safe transportation and placement of dredged materials at the oyster pad locations. Placement of dredged materials in unauthorized locations shall be deemed misplaced materials.

# 8.5.2 INITIAL PLACEMENT

The Contractor shall determine its own means and methods to mechanically place material within the limits of the oyster pads, as shown on the Plans. At no time shall pump-out or hydraulic placement techniques be allowed. The initial placement quantity shall provide sufficient material within the design template to construct the pads to the design elevations and dimensions. The Contractor shall take measures to maximize retention of materials placed during the mechanical fill including, but not necessarily limited to, releasing of material below the water surface when practicable. Details of initial placement methodology shall be included in the Contractor's work plan.

#### 8.5.3 ACCEPTANCE OF COMPLETED MECHANICAL FILL

Acceptance will be based on hydrographic surveys performed by the Port Authority as specified in Section 4 of these Technical Specifications. If the final survey cross sections for a particular acceptance section show that the acceptance template as shown has been achieved, the section will be accepted as complete.

#### 8.5.4 DAMAGES OR FAILURES

#### 8.5.4.1 CONDUCT OF WORK

The Contractor shall maintain and protect the mechanical fill pads in a satisfactory condition until completion and acceptance of the work in this Contract.

#### 8.5.5 OYSTER PAD CONSTRUCTION

#### 8.5.5.1 ORDER OF WORK FOR OYSTER PAD CONSTRUCTION

The sequence of construction shall be determined by the Contractor, unless otherwise restricted by the Contract documents. The Contractor shall determine its means and methods for conducting the work associated with construction of oyster pads at Dollar Reef and San Leon.

#### 8.5.5.2 ESTIMATED NEATLINE QUANTITIES

The following neatline quantities are based on surveys generated from February 2020 and used by the Engineer to prepare the estimate. The quantities are estimates only and the Contractor is responsible for interpreting the quantities numbers shown for the actual quantities necessary to achieve the required lines and grades shown in the Plans. The quantities are unadjusted, neatline quantities computed from the existing bay bottom to the design templates. The percentage for items including, but not limited to, compaction, settlement, foundation displacement, and mechanical material losses is the responsibility of the Contractor. The neatline quantities for oyster pad construction are as follows:

SAN LEON REEF C	SAN LEON REEF OYSTER PAD MECHANICAL FILL QUANTITIES		
DESCRIPTION	TOP OF FILL	NEATLINE	
DESCRIPTION	MLLW	QUANTITY (CY)	
SLN Pad 1 (20-AC)	-7.7	85,500	
SLN Pad 2 (31-AC)	-7.4	152,700	
SLN Pad 3 (20-AC)	-7.5	88,700	
SLN Pad 4 (20-AC)	-8.5	76,000	
SLN Pad 5 (20-AC)	-8.7	72,300	
SLN Pad 6 (17.2-AC)	-8.4	62,600	
SLN Pad 7 (20-AC)	-8.5	72,300	
SLN Pad 8 (6-AC)	-8.6	22,400	
SLN Pad 9 (9-AC)	-8.7	30,600	
SLN Pad 10 (3.4-AC)	-8.9	11,900	
SLN Pad 11 (13.2-AC)	-8.7	48,700	

Table 8-1: Estimated Mechanical Fill Neatline Quantities for San Leon Oyster Pad Construction

Total		723,700
<b>Note:</b> Neatline quantities are based on hydrographic surveys dated February		
2020. Quantities do not include losses from excavation, transportation, or		
settlement. Top of fill elevations shown do not include 6" cultch veneer.		

#### Table 8-2: Estimated Mechanical Neatline Fill Quantities for Dollar Reef Oyster Pad Construction

DOLLAR REEF OYSTER PAD MECHANICAL FILL QUANTITIES		
DESCRIPTION	TOP OF FILL	NEATLINE
	MLLW	QUANTITY (CY)
DRM Pad B-1 (20-AC)	-6.5	73,800
DRM Pad B-2 (20-AC)	-6.7	71,200
DRM Pad B-3 (20-AC)	-6.8	73,700
DRM Pad B-4 (20-AC)	-7.0	74,200
Total 292,871		
Note: Neatline quantities are based on hydrographic surveys dated February		
2020. Quantities do not include losses from excavation, transportation, or		
settlement. Top of fill elevations shown do not include 6" cultch veneer.		

#### 8.5.5.3 TOLERANCES

For acceptance, mechanical fill of oyster pads at Dollar Reef and San Leon shall be constructed, at a minimum, to the grades and elevations shown in the Plans. Tolerances shall include -0.5 to +0.5 feet on the design height, design width and slopes. Final height, width, and alignment shall be within 1 foot horizontally of the baselines shown unless otherwise approved by the Engineer. Abrupt changes in alignment, as determined by the Engineer, will not be permitted and shall be corrected by the Contractor at no cost to the Port Authority.

**END OF SECTION**
# 9 BAYPORT SHIP CHANNEL STONE REMOVAL

# 9.1 SCOPE OF WORK

Prior to commencement of new work dredging of the BSC, shore protection between BSC Stations 61+00 to 115+00 along the north slope of the land cut, as shown in Table 9-1, shall be removed and relocated as set forth herein and as shown in the Plans.

The work in this Section consists of providing labor, materials and equipment for:

- a) Removing existing shore protection, including all stone, geotextile fabric, and other non-stone material and non-soil material located in the locations as shown on the Plans
- b) Stockpiling of recovered stone;
- c) Removing non-stone material and non-soil material from the site; and
- d) Placing and grading soil

# 9.2 EXECUTION

## 9.2.1 PROTECTION OF EXISTING SHORELINE AND ACCESS AREAS

The north shoreline of the BSC can be accessed by water along the northern side of the channel from the Houston Ship Channel. The San Jacinto Seafarers College Academy is North of the shoreline and limits of work, and west of the South Broadway Street. The Contractor shall exercise extreme care if heavy construction loads are placed on the existing shoreline and/or surrounding areas. The Contractor shall repair the damage caused by its activities, direct or indirect, at the sole expense of the Contractor. Excavation below the existing grade, except as shown, shall not be permitted without approval. The work in this section shall be in conformance, as applicable, with Section 1 Subsections 1.20, 1.21 and 1.22 of these Technical Specifications.

The areas north of the work area along the north shoreline of the BSC may be accessed by South Broadway St., subject to approval by and coordination with the Port Authority Police. Access areas used on or to the site shall be repaired to their pre-project condition.

# 9.2.2 WETLAND AREAS

Approximately 17 wetlands totaling 1.0 acres are present along the north shoreline of the BSC. For the wetlands adjacent to the areas of work as shown in the Plans, the Contractor shall prohibit personnel and construction equipment from entering these areas for the duration of work. If any landside activities will occur as part of the work plan, the Contractor shall stake out the "No Access" areas to ensure that these wetlands are clearly delineated and avoided. Any wetlands impacted by the Contractor inside of these "No Access" areas shall be the sole responsibility of the Contractor to restore or mitigate.

#### 9.2.3 REMOVAL OF EXISTING SHORE PROTECTION

Prior to the commencement of dredging in the adjacent channel widening, the existing shore protection, including all stone, geotextile fabric, and other non-stone material and non-soil material, shall be removed from the areas marked "SHORE PROTECTION TO BE RELOCATED" on of the Plans. Any stone that is removed shall be transported to the proposed stockpile area shown on the Plans or to an alternate location proposed by the Contractor, but only if such alternate location is approved by the Engineer. Existing shore protection shall be preserved and shall not be permitted to fall towards the channel. The exact means and methods of removal, stockpiling, and maintenance of recovered stone, removal of non-stone material and non-soil material from the site, and the equipment to be used for removal, shall be incorporated into the Contractor's work plan for approval by the Engineer. Non-stone material and non-soil material removed, including geotextile fabric, shall become the property of the Contractor and removed from the site in accordance with all applicable local, State, and Federal Laws.

Surveys shall be taken in accordance with Technical Specifications Section 4, as applicable, and Subsection 4.14 for Shore Protection Surveys.

## 9.2.4 ESTIMATED QUANTITIES

The quantities shown were used to prepare the total estimated quantity of stone to be removed shown in the Request for Competitive Sealed Bid/Proposal. The estimated quantities assume a neat-line volume template. Actual quantity of stone to be removed may be more or less than the estimated quantities determined.

From Station	To Station	Tonnage
61+00	65+00	2,893
70+00	78+00	5,787
80+00	83+00	2,170
86+00	100+00	10,126
100+00	106+00	7,006
108+00	111+20	3,737
111+20	115+00	4,665
	Total:	36,384

#### Table 9-1: Estimated BSC Stone Quantities for Removal

#### 9.2.5 COMPLIANCE INSPECTION

The Contractor shall inspect for compliance with the contract requirements and record the inspection of operations. The Contractor, at the Contractor's expense, shall perform inspections and provide documentation to the Port Authority evidencing 1) the lines and grades of excavation and placement and 2) disposition of material.

#### 9.2.6 MISPLACED MATERIAL

Material that escapes or is lost while removing or handling the shore protection, or which is deposited at any location other than in an approved area, shall be removed and re-deposited in accordance with the Port Authority's direction, at the sole expense of the Contractor.

#### 9.2.7 MISPLACED EQUIPMENT

If, during the progress of the work, the Contractor loses, dumps, throws overboard, sinks, or misplaces any material, plant, machinery, or appurtenances that may be dangerous to or interfere with uses of any waterway or cause pollution of the waters, the Engineer shall be notified immediately. The Engineer shall be given the description and location of these obstructions by the Contractor and the Contractor shall remove such material, plant, machinery, or appurtenances in accordance with the directions of the Engineer. If the Contractor refuses, neglects, or delays compliance with the above requirements, these obstructions may be removed by the Port Authority and the cost of removal may be deducted from the money due or to become due to the Contractor.

# 9.3 ACCEPTANCE

Shore protection removal will be considered for acceptance upon completion of removal. Acceptance will be based on visual inspection by the Engineer as well as the topographic surveys performed by the Contractor as specified in Technical Specification Section 4. The Port Authority may perform field check surveys. The Engineer reserves the right to check surveys during any phase of the work. If discrepancies are found between the Contractor's survey and surveys performed by the Port Authority, the Port Authority surveys shall govern. Acceptance of the work as completed shall constitute the Contractor's acknowledgement that all shore protection has been sufficiently removed from the specified area in order that dredging operation may be conducted unimpeded. The Contractor shall assume full risk and cost for any additional shore protection related delays occurring within the channel widening after completion of the removal operations.

#### **END OF SECTION**

# **10 SHORE PROTECTION**

# **10.1 SCOPE OF WORK**

The work in this Section consists of providing labor, material, and equipment for furnishing, hauling, handling, placing and maintaining the stone until final acceptance by the Engineer. The work covered in this Section also consists of slope preparation and installation of geotextile under the stone shore protection, which includes the labor, material, and equipment to perform the operations required to furnish, haul, place, and maintain the geotextile, complete as specified herein and as shown until placement of the stone shore protection is completed and accepted.

# **10.2 ACCESS TO WORK SITE**

#### **10.2.1 BIRD ISLAND MARSH**

The work site can only be accessed by waterborne transport. Access and floatation channel(s), if required, shall be performed via mechanical means. The floatation channel depths shall not be deeper than minus 10.0 feet MLLW. The Contractor shall coordinate with the pipeline owners as to the location and depths of the proposed channels. The inside top edge of the floatation channel shall be no closer to the placement area than as shown on the Plans. Material excavated from the access channel shall be placed to either side of the channel to an elevation not exceeding plus 0.7 feet MLLW. No measurement or payment will be made for floatation channel excavation.

## **10.2.2 BAYPORT SHIP CHANNEL**

Access to the work site along the north shoreline of the BSC is described in Section 9 Subsections 9.2.1 and 9.2.2 of these Technical Specification.

# **10.3 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

American Society for Testing and Materials (ASTM) Publications:

- C97/C97M-18 Absorption and Bulk Specific Gravity of Dimension Stone
- C127-15 Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
- C131/C131M-20 Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- C295/C295M-19 Petrographic Examination of Aggregates for Concrete
- C535-16 Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

- C1141/C1141M-15 Admixtures for Shotcrete
- D5313/D5313M-12(2013) Evaluation of Durability of Rock for Erosion Control under Wetting and Drying Conditions
- D5519-15 Particle Size Analysis of Natural and Man-made Riprap Materials
- D123-19 Standard Terminology Relating to Textiles
- D1683/D1683M-17(2018) Failure in Sewn Seams of Woven Fabrics
- D3786/D3786M-18 Bursting Strength of Textile Fabrics Diaphragm Bursting Strength Tester Method
- D3884-09(2017) Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method)
- D4355/D4355M-14(2018) Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc-Type Apparatus
- D4491/D4491M 17 Water Permeability of Geotextiles by Permittivity
- D4533/D4533M-15 Trapezoid Tearing Strength of Geotextiles
- D4632/D4632M-15a Grab Breaking Load and Elongation of Geotextiles
- D4751-20 Determining Apparent Opening Size of a Geotextile
- D4833/D4833M-07(2013)e1 Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
- D4873/D4873M-17 Identification, Storage, and Handling of Geosynthetic Rolls and Samples

# **10.4 HANDLING AND STORAGE**

Construction materials received with certified weights which shall be unloaded, and which cannot be used immediately for construction, shall be stored in an acceptable storage area. The storage area shall be reasonably near the job site and shall be approved. The storage area shall be a relatively smooth area so that the stored material may later be recovered free from dirt or other foreign materials.

During the periods of shipment and storage, the geotextile shall be protected from direct sunlight, ultraviolet rays, and temperatures above 140 degrees Fahrenheit, mud, dirt, dust, and debris. To the extent possible, the fabric shall be maintained wrapped in a heavy-duty protective covering. No hooks, tongs, or other sharp instruments shall be used for handling geotextile. Geotextile shall not be dragged along the ground.

# **10.5 MATERIALS**

#### **10.5.1 STONE**

The Contractor shall make arrangements, pay royalties, and secure the permits for procurement, furnishing, and transporting stone. The Contractor shall vary the quarrying, processing, loading, and placing operations to produce the sizes and quality of stone specified. If the stone being furnished by the Contractor does not meet the requirements as specified herein, the Contractor shall furnish, at no additional cost to the Port Authority, other stone meeting these requirements.

#### **10.5.1.1 QUALITY COMPLIANCE TESTING**

#### 10.5.1.1.1 SAMPLES

If required, samples shall be submitted in advance of the time when the stone will be required in the work. Stone from a proposed source or sources shall be tested by the Contractor for quality compliance.

#### **10.5.1.1.2 STONE QUALITY**

Stone shall meet the following test requirements:

#### Table 10-1: Test Requirements for Stone Quality

Test	Test Method	Requirements
Specific Gravity (Bulk SSD)	ASTM C 127	2.65 minimum
Absorption	ASTM C 127	3.0% average
Wetting and Drying	ASTM D 5313 <sup>(1)</sup>	No fracturing <sup>(2)</sup>
Abrasion Loss	ASTM C 131, ASTM C 535	40% maximum loss <sup>(3)</sup>

(1) The testing procedure used in ASTM D 5313 shall include testing each sample in potable and in salt water prepared in accordance with ASTM C1141.

(2) Weakening and loss of individual surface particles is permissible unless bonding of the surface grains softens and causes general disintegration of the surface material.

(3) Stone which has a loss greater than the specified limit will be accepted if the Contractor

demonstrates that the stone has a satisfactory service record that exceeds ten (10) years.

In addition to the above tests, the stone shall be subjected to a Petrographic and X-ray Diffraction analysis in accordance with ASTM C 295. The stone shall not contain expansive clays. Test procedure for Petrographic and X-ray Diffraction is performed according to ASTM C 295, except for the following:

- A colored microscope photograph shall be made of each stone type, including igneous, sedimentary, or metamorphic and the individual minerals within the stone type shall be identified by labels and arrows upon the photograph.
- Detailed macroscopic and microscopic descriptions shall be made of the stone, to include the entire mineral constituents, individual sizes, their approximate percentages and mineralogical histories. A description of stone hardness, texture, weathering, and durability factors shall be

discussed. Pictures of the source wall within the quarry to show any layering and lithology shall be included.

• A written summary of the suitability of stone for use as armor stone based on the Petrographic and X-ray tests and the abrasion loss (L.A. Rattler) shall be presented in the final laboratory report on stone quality.

# **10.5.1.2 STONE ACCEPTANCE**

Prior to placement, stone shall be subject to approval. Approval of stone shall not constitute acceptance of all stone from a source. Approved stone shall be: of the same lithology as the original stone from which test results or service records were taken as a basis for authorization of the source, sound, durable, hard; and free from laminations, weak cleavages, undesirable weathering, blasting or handling-induced fractures, or fracture zones which subtend more than 1/3 of the total circumference of the stone along the plane of fracturing. The stone shall be of good quality so that it shall not disintegrate from the action of air, water, or the conditions of handling and placing; shall be clean and free from earth, clay, refuse, or adherent coatings. The stone shall be angular quarried material with a shape that assures interlocking with adjacent stone and the greatest dimension of each piece shall not be greater than 3 times the least dimension (aspect ratio of 3:1). Not more than 25% of the stones within a gradation range shall have an aspect ratio greater than 2.5:1.

## 10.5.1.3 REJECTED STONE

Stone of unsuitable quality or size distribution as specified will be rejected and shall be promptly removed from the project at no expense to the Port Authority. Portions of the work specified herein containing rejected stone will be considered unacceptable and incomplete.

## **10.5.1.4 PERIODIC TESTING**

Stone taken from a particular source shall be tested and certified in terms of gradation and specific gravity. A copy of each certification shall be submitted five (5) days before placement of that stone. Gradation testing shall be in accordance with ASTM D 5519. Specific gravity testing shall be in accordance with the procedures specified in the Paragraph: STONE QUALITY above. Testing shall commence prior to shipment of the material. Sampling and gradation tests performed by the Contractor shall be as indicated and the Engineer shall be given seven (7) days' notice to witness the tests. Test results shall be submitted upon completion of each test. Additional sampling and testing of a load of material delivered to the project site shall be at the Port Authority's discretion, randomly chosen up to a maximum of five tests. Tests shall be performed by an approved testing laboratory on samples selected by the Engineer. The Port Authority reserves the right to perform the tests. Costs for this additional sampling and testing shall be at the Contractor's expense.

## 10.5.1.5 ADDITIONAL TESTS

The Port Authority may, as it deems necessary, make additional tests from representative samples of the stone being furnished for the work.

# **10.5.1.6 STONE SIZE**

Reference the table below for stone dimensions. Dimensions will depend on specific gravity of rock and the weight of the stone governs the design gradation.

#### Table 10-2: Shore Protection at Bird Island Marsh

	e Size	Weight of Design S	Percent of Stone by Weight
		(pounds)	Less than Design Stone Size (%)
		80	0
		322	15
		643	50
		1,260	85
]		2.572	100

#### Table 10-3: Additional Shore Protection at Bayport Ship Channel

From Station	To Station		Weight of Stone
		Weight of Design Stone	Greater than 50%
		Size (pounds)	Design Stone Size
			(pounds)
61+80	100+00	25 – 800	200
100+00	110+90	700 – 1,100	900

# **10.5.2 GEOTEXTILE**

The geotextile shall be a woven pervious sheet of plastic yarn in accordance with ASTM D 123. The geotextile shall meet the physical requirements listed in the TABLE below. The geotextile fiber shall consist of a long-chain synthetic polymer composed of at least 85% by weight of propylene, ethylene, ester, amide or vinylidene-chloride, and shall contain stabilizers or inhibitors added to the base plastic, if necessary, to make the filaments resistant to deterioration due to ultra-violet and heat exposure. The edges of the geotextile shall be finished to prevent the outer fiber from pulling away from the geotextile.

# 10.5.2.1 SEAMS

The seams of the geotextile shall be sewn with thread of a material meeting the chemical requirements given above for geotextile yarn or shall be bonded by cementing or by heat. The sheets of geotextile shall be attached at the factory or other approved location, if necessary, to form sections not less than 18-feet-wide. Seams shall be tested in accordance with ASTM D 1683, using 1-inch square jaws and 12 inches per minute constant rate of traverse. The strengths shall not be less than 90% of the required tensile strength, listed in Table 10-4 below, of the unaged geotextile in any principal direction.

# **10.5.2.2 REQUIREMENTS**

Brands of geotextile and the seams to be used shall be accepted on the following basis. The Contractor shall submit, in duplicate, a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the geotextile. The mill certificate or affidavit shall attest that the geotextile meets the chemical, physical, and manufacturing requirements specified herein.

PHYSICAL REQUIREMENTS FOR WOVEN GEOTEXTILE			
PROPERTY	TEST METHOD	UNIT	MINIMUM TEST VALUE
Apparent Opening	ASTM D 4751	U.S. Sieve	#70
Permittivity	ASTM D 4491	sec <sup>1</sup>	0.25
Puncture	ASTM D 4833	lbs.	130
Grab Tensile – In any	ASTNA D 4622	lbc and %	250,
principal direction	ASTIVI D 4032		15% minimum
Burst Strength	ASTM D 3786	psi	480
Trapezoidal Tear	ASTM D 4533	lbs.	55
Ultraviolet Degradation			70% strongth rotained
(percent Strength	ASTM D 4355	%	for all classes
retained at 500 hours)			
Seam Strength	ASTM D 1683	lbs.	225
Abrasion Resistance			55% residual breaking
Residual	ASTM D 3884	lbs.	load in any principal
			direction
Percent Open Area	See Section 10.5.2.3	0/	Л
	below	/0	4

#### Table 10-4: Physical Requirements for Woven Geotextiles

# 10.5.2.3 DETERMINATION OF PERCENT OF OPEN AREA

Five samples of unaged woven geotextile shall be placed separately in a 2-inch by 2-inch slide holder and the image projected with a slide projector on a rigid screen. A square block of 25 openings near the center of that image shall be selected and the length and width of each of the 25 openings shall be measured to the nearest 0.02-inch. The total area shall be determined by measuring the length of the sides of the five openings and five adjacent fibers in each direction to the nearest 0.02-inch. The Percent Open Area (POA) is determined by dividing the sum of the 25 pen areas by the total area of the 25 openings and their adjacent fibers. The POA shall be quoted as the percent determined by averaging the POAs of the five individual specimens. However, if more than one of the five specimens are outside of the specified POA limits, the fabric shall be considered to have failed the test.

# **10.6 EXECUTION**

## **10.6.1 SLOPE PREPARATION**

Slopes to receive stone protection shall be shaped and prepared as shown on the Plans.

Following the completion of dredging, the post-dredge shoreline survey will be used to determine the required alignment for the placement of the stone protection. The limits of the stone in-place shall follow with reasonable variation of the alignment determined and agreed on with the Engineer. Slope preparation to receive stone shore protection shall be undertaken following the completion of dredging and the performance of the post dredge shoreline survey. The post-dredge shoreline survey will be used to determine the required excavation template for stone placement, but shore protection installation shall generally conform to the required lines and grades shown on the Plans. Some field fitting may be required.

# **10.6.2 INSTALLATION OF GEOTEXTILES**

Before placement of stone, the Contractor shall demonstrate that the placement technique for each application shall prevent damage to the geotextile. The geotextile shall be placed at the locations as shown on the Plans. At the time of installation, the geotextile shall be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation, or storage. Geotextile shall be laid smooth and free of tension, stress, folds, wrinkles or creases. The strips shall be placed to provide a minimum width of 18 inches of overlap for each joint after stone is placed. The extension above and below the stone after the stone is placed is as shown on the Plans. Temporary pinning of the textile to help hold it in place until the stone is placed shall be allowed on soil slopes. Securing pins shall be inserted through both strips of overlapping geotextile along the line passing through midpoints of the overlap. The geotextile shall be protected during construction from contamination by surface runoff. If the geotextile becomes contaminated, it shall be removed and replaced with uncontaminated geotextile at no expense to the Port Authority. Geotextile damaged during its installation or during placement of the stone shall be replaced by the Contractor at no cost to the Port Authority. The slope shore protection work shall be scheduled so that covering the geotextile with a layer of the stone is accomplished within two (2) days after placement of the geotextile. Failure to comply shall require replacement of the geotextile at Contractor's expense. The geotextile shall be protected from damage prior to and during the placement of stone. Equipment shall not be allowed on unprotected geotextile. The soil surface on the slopes to receive the geotextile shall be prepared to a relative smooth condition free of obstructions, depressions, debris, and soft or low-density pockets of material. Erosion features, including rills or gullies, shall be graded out of the surface before geotextile placement.

# **10.6.3 INSTALLATION OF BLANKET STONE**

For Bird Island Marsh, a layer of blanket, or bedding stone shall be installed by the Contractor between the geotextile and armor stone layers. The stone shall be approximately 0.5 feet thick and comprised of 2-inch to 3-inch crushed rock to provide separation of the geotextile and the armor stone.

Bedding stone shall be placed for the north shoreline of the BSC between Station 100+00 to 110+90. The stone shall be approximately 1.0-foot thick and comprised of 25 – 800 pound graded riprap.

#### **10.6.4 INSTALLATION OF STONE**

The stone shall be placed so that a reasonably well-graded mass is produced with a minimum practicable percentage of voids. Stone shall be constructed to the lines and grades shown. Stone shall be placed evenly and to its full course thickness in one operation, using a method that shall avoid damage to the geotextile, when present. Stone shall be allowed to fall no more than 1-foot from the bottom of the clam or other bucket to the placement surface. For underwater work, where the work surface is more than 5 feet below the water level, the maximum drop shall be 5 feet. In no case shall the drop be greater than that which may cause damage to the geotextile when present. An otherwise allowable height, using the Contractor's approved placement method, will not be permitted if it is shown to cause segregation of stone sizes, breakage of individual stone, or damage to the filter fabric when present. When allowable drop heights are developed on-site, between the Engineer and Contractor, these heights shall be based on actual performance. The Contractor shall maintain the stone layer until accepted and if material is displaced or the surface damaged, replacement shall be made to the indicated lines and grades, at the Contractor's expense. Protruding rock shall be removed, and the void filled with smaller rock. The stone work shall be finished smooth.

Stone stockpiled as part of the work performed in Technical Specifications Section 9 shall be reused prior to placement of additional stone along the north shoreline of the Bayport Ship Channel. In addition to the stone removed, there are four existing stockpiles of stone along the north shoreline of the BSC as shown on the Plans that the Contractor shall use prior to placing additional stone. Approximate tonnages are provided in Table 10-5. The Contractor is expressly encouraged to perform its own research and field investigations to determine the quantities of existing stone stockpiled and satisfy itself as to the means and methods required to perform the work herein specified.

	Pile	Approximate Tonnage
	1	4,102
	2	454
UT	3	1,079
	4	823

Table 10-5: Existing BSC Stone Stockpiles on Site

#### **10.6.5 COMPLIANCE INSPECTION**

The Contractor shall inspect for compliance with the contract requirements and record the inspection of operations. The Contractor, at Contractor's expense, shall perform inspections in accordance with the following schedule:

• Stone quality - one (1) set of quality tests, for each new stone type provided.

- Gradation one (1) gradation test to be performed per stone type.
- Specific gravity one (1) specific gravity test per stone type.
- Placement continuous check of placement to ensure proper size and compliance with grade lines shown.
- Excavation and placement Lines and grades, disposition of material.

#### **10.6.6 TOLERANCES**

Stone work for shore protection shall be carried to the lines and grades shown, the tolerances as specified herein, and as directed. Final surfaces of the finished course shall be reasonably even, uniform, and shall follow with reasonable variation the indicated lines and grades without continuous under or overbuilding. Deviations in slope shore protection thickness and elevation from the design value shall not be greater than +0.5 foot and -0.0-foot. The surface slope of the stone shall not deviate greater than or less than 8% from the slope(s) shown. Transitions in alignments shall be smooth and shall be no more than 1-foot Horizontal change in a 20-foot length unless otherwise approved.

The intention is that the work shall be built generally to the required elevations, slope and grade and that the outer surfaces shall be even and present a neat appearance. Placed material not meeting these limits shall be removed or reworked as directed by the Engineer. Payment will not be made for excess material which the Engineer permits to remain in place.

#### **10.6.7 MISPLACED MATERIAL**

Material that escapes or is lost while loading, transporting or placing stone, or which is deposited other than in the area shown or a change approved in writing, shall be removed and re-deposited where directed at Contractor's expense.

# **10.6.8 MISPLACED EQUIPMENT**

If, during progress of the work, the Contractor loses, dumps, throws overboard, sinks, or misplaces material, plant, machinery or appurtenances that may be dangerous to or interfere with uses of the Waterway or cause pollution of the waters, the Engineer shall be notified immediately. The Engineer shall be given the description and location of these obstructions and removal by the Contractor shall be as directed. If the Contractor refuses, neglects, or delays compliance with the above requirements, these obstructions may be removed by the Port Authority and the cost of removal will be deducted from the money due or to become due to the Contractor.

# **10.7 ACCEPTANCE**

Shore protection will be accepted for each completed 100-foot section. Acceptance will be based on the topographic surveys performed by the Contractor as specified in Technical Specifications Section 4. The Port Authority may perform field check surveys. The Engineer reserves the right to check surveys during any phase of shore protection installation. If discrepancies be found between the Contractor's survey and surveys performed by the Engineer, the survey performed by the Engineer shall govern.

The geotextile fabric will be accepted in-place and in conjunction with acceptance of the shore protection. Its presence and condition will be observed daily by the Engineer while being installed and covered. The Contractor shall refrain from covering the fabric without giving the Engineer sufficient opportunity for inspection.

END OF SECTION

# **11 CULTCH PLACEMENT**

# **11.1 SCOPE OF WORK**

The work in this Section consists of furnishing all labor, materials, tools, equipment, plant and supplies for furnishing, hauling, handling, and placing cultch material for construction of oyster pads at Dollar Reef/San Leon and oyster reef wave trips at Bird Island Marsh until final acceptance by the Engineer.

# **11.2 REFERENCES**

- American Society for Testing and Materials (ASTM) Standard C 136/C136M-19 Sieve Analysis of Fine and Coarse Aggregates
- ASTM Standard D75/D75M-19 Sampling Aggregates
- ASTM Standard E11-20 Woven Wire Test Sieve Cloth and Test Sieves
- ASTM Standard C127 Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
- ASTM C535 Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- Texas Department of Transportation (TxDOT) TxDOT Item 247 Flexible Base

# **11.3 HANDLING AND STORAGE**

Construction materials received with certified weights which shall be unloaded, and which cannot be used immediately for construction, shall be stored in an acceptable storage area. The storage area shall be reasonably near the job site and shall be approved. The storage area shall be a relatively smooth area so that the stored material may later be recovered free from dirt or other foreign materials.

# **11.4 MATERIALS**

# 11.4.1 CULTCH MATERIAL OPTIONS

Cultch material shall consist of either crushed limestone, crushed concrete, river rock or other material acceptable to Texas Parks and Wildlife Department (TPWD). Cultch material shall be durable and sound, free from lumps of clay, oil, grease, organic material, objectionable coatings, or other foreign material. Cultch material must be free of any hazardous substances. Only one type of cultch material may be used to construct the oyster pads at Dollar Reef/San Leon and the oyster reef wave trips at Bird Island Marsh.

# **11.4.2 CRUSHED LIMESTONE**

Crushed limestone shall have a minimum unit weight of 140 pounds per cubic foot (PCF), maximum unit weight of 165 PCF, and an absorption no greater than 3 percent. The unit weight shall be reported based on the apparent specific gravity determined in accordance with ASTM C127. Crushed limestone shall have a maximum abrasion loss of 40% in accordance with ASTM C535. Crushed limestone shall comply with the gradation requirements stated in Subsection 11.4.5 of these Technical Specification

## **11.4.3 CRUSHED CONCRETE**

Crushed concrete shall comply with the requirements of TxDOT Item 247 (Flexible Base), have a minimum unit weight of 140 PCF (based on apparent specific gravity), and comply with the gradation requirements stated in Technical Specification Subsection 11.4.5. If concrete is recycled, any rebar shall be cut flush with exposed surfaces of concrete unit. All concrete shall be clean and free of chemical contaminants. Provide test reports showing conformance of concrete riprap with TxDOT Item 247 requirements.

#### 11.4.4 RIVER ROCK

River rock shall consist of natural fragments of rock and meet the requirements stated for crushed limestone. River rock shall comply with the gradation requirements stated in Technical Specifications Subsection 11.4.5.

#### **11.4.5 GRADATION**

Cultch material shall be well graded. The gradation shall conform to Table 11-1 when tested following the procedures stated in ASTM C136/C136M.

#### Table 11-1: Gradation Requirements for Cultch Material

SIEVE SIZE, INCH	% PASSING
3	100
1/2	0-5

# **11.5 QUALITY COMPLIANCE TESTING**

The Contractor shall, at no additional cost to the PHA, engage an approved commercial testing laboratory to obtain and test samples of cultch material required by the Contract Documents to be tested. The commercial laboratory shall be subject to the approval of the Engineer. The PHA reserves the right to perform inspections of the laboratory facilities, test equipment, test procedures, and laboratory personnel qualifications to ensure that the equipment is in proper working order and correctly calibrated and that the specified test procedures are followed. The PHA also reserves the right to conduct tests that the Engineer deems necessary to ensure compliance with the Contract Documents.

## 11.5.1 SAMPLING

Aggregate samples for laboratory tests shall be taken in accordance with ASTM D 75, under the supervision of the Engineer. The method and location of sampling shall be subject to approval. The Contractor shall notify the Engineer one day in advance of each planned sampling for laboratory testing. Crushed limestone, crushed concrete, or other material approved for use as cultch shall be sampled for testing at a rate of one sample per 1,000 tons of material.

#### **11.5.2 REQUIRED TESTING**

Testing may be performed onsite or at an alternate, approved location which will allow test results to be obtained and recorded on the daily report within 24 hours of the time of sampling. Samples shall be tested for (1) Particle Size Distribution in accordance with ASTM C 136 and ASTM E 11 and (2) for Inplace (Bulk) Unit Dry Weight in accordance with the procedures outlined below. A minimum of one (1) test of each type shall be performed on each sample. After completion of testing, the samples shall be placed in bags, tagged with the date of testing, signed by the Quality Control supervisor and retained at the testing site until completion of the Contract. Additional Quality Assurance Testing of any of the retained samples shall be performed as directed.

In-place (Bulk) Unit Dry Weight Testing: The testing shall be performed using a cylindrical test container of either circular or octagonal in cross section, having a minimum diameter of 20 inches, and an interior height of 16.5 inches. To perform this test, the test container shall be placed in a larger container, filled with enough water so that the water surface is a minimum of 2 feet above the top of the test container. The material to be tested shall then be dropped by hand through the water column into the test container ensuring that the particles fall individually and in even layers across the container until the container is filled to the top. Excess material particles, of which more than half of an individual particle extends above the top of the container, shall be removed by hand, exercising care not to bump or disturb the underlying particles or the container, which may cause the material to become dense. The filled container shall then be removed from the water and the material dumped onto a flat, slightly inclined surface, allowing the water to drain from the sample. The sample shall then be weighed on a scale having an accuracy to the nearest 0.1 pound (or 1 ounce). The weight, recorded to the nearest 0.1 pound shall be divided by the test container volume of 3.0 cubic feet to arrive at the In-place (Bulk) Unit Dry Weight, which shall be recorded to the nearest 0.1 pound per cubic foot (pcf) on the daily report.

## **11.5.3 INSPECTION**

The PHA will conduct inspections as necessary, at its option.

## 11.5.4 ACCEPTANCE

Prior to placement, material shall be subject to approval. Approval of material shall not constitute acceptance of all material from a source.

# 11.6 EXECUTION

# **11.6.1 OYSTER PADS**

## **11.6.1.1 SURFACE PREPARATION**

Surfaces to receive cultch shall be prepared as shown on the Plans. The mechanical fill portions of the oyster pads to receive cultch shall be surveyed and accepted by the Engineer prior to placement of cultch.

# **11.6.1.2 INSTALLATION OF CULTCH AT DOLLAR REEF AND SAN LEON**

The Contractor shall determine its own means and methods to place material to meet the design templates shown in the Plans. Oyster pads at Dollar Reef and San Leon shall be constructed to provide a 6-inch cultch layer that meets the required elevations as shown on the Plans. The minimum required quantity of cultch material shall be evenly distributed within the marked limits of the oyster pads. The Contractor shall maintain the cultch layer until accepted and if material is displaced, replacement shall be made to the indicated lines and grades, at the Contractor's expense. The Contractor's means and methods for placement shall be included in the Work Plan required in Section 2 of these Technical Specifications and will achieve the required grades as shown on the Plans.

# **11.6.1.3 TOLERANCES**

Cultch work shall be carried to the lines and grades shown, the tolerances as specified herein, and as directed. Final surfaces of the finished course shall be reasonably even, uniform, and shall follow with reasonable variation the indicated lines and grades without continuous under or overbuilding. Deviations in cultch thickness from the design value shall not be greater than +0.5 foot more than or 0.0 feet less than the required minimum 6-inch thickness.

The intention is that the work shall be built generally to the required elevations, slope and grade and that the outer surface shall be even and present a neat appearance. Placed material not meeting these limits shall be removed or reworked as directed by the Engineer. Payment will not be made for excess material which the Engineer permits to remain in place.

## **11.6.2 OYSTER REEF WAVE TRIPS**

# **11.6.2.1 SURFACE PREPARATION**

Surfaces to receive cultch shall be prepared as shown on the Plans. The hydraulic fill portions of the oyster reef wave trips at Bird Island Marsh to receive cultch shall be surveyed and accepted by the Engineer prior to placement of cultch.

# 11.6.2.2 INSTALLATION OF CULTCH AT BIRD ISLAND MARSH OYSTER REEF WAVE TRIPS

The Contractor shall determine its own means and methods to place material to meet the design templates shown in the Plans. Bird Island Marsh oyster reef wave trips shall be constructed to provide a 30-inch cultch layer that meets the required elevations as shown on the Plans. The minimum required quantity of cultch material shall be evenly distributed within the marked limits of the oyster reef wave trips. The Contractor shall maintain the cultch layer until accepted and if material is displaced, replacement shall be made to the indicated lines and grades, at the Contractor's expense. The Contractor's means and methods for placement shall be included in the Work Plan required in Technical Specification Section 2 and will achieve the required grades as shown on the Plans.

## **11.6.2.3 TOLERANCES**

Cultch work shall be carried to the lines and grades shown, the tolerances as specified herein, and as directed. Final surfaces of the finished course shall be reasonably even, uniform, and shall follow with

reasonable variation the indicated lines and grades without continuous under or overbuilding. Deviations in cultch thickness shall not be greater than +0.5 foot more than or 0.0 feet less than the required minimum 30-inch thickness.

The intention is that the work shall be built generally to the required elevations, slope and grade and that the outer surface shall be even and present a neat appearance. Placed material not meeting these limits shall be removed or reworked as directed by the Engineer. Payment will not be made for excess material which the Engineer permits to remain in place

# **11.6.3 CONSTRUCTION REQUIREMENTS**

# 11.6.3.1 MISPLACED MATERIAL

Material that escapes or is lost while loading, transporting or placing material, or which is deposited other than in the area shown or a change approved in writing, shall be removed and re-deposited where directed at the Contractor's expense.

# **11.6.3.2 ESTIMATED QUANTITIES**

The Contractor shall place a measured quantity of cultch material based on the In-Place (Bulk) Unit Dry Weight of the material proposed for use associated with these dimensional requirements. The Contractor shall detail the means, methods, and materials it proposes to use to support the cultch and provide the required elevations. Quantities of cultch to provide the target elevations may be more or less than the estimated material rates determined. The table below shows the estimated range of material rates required to achieve the target elevation. The estimated rates assume a neat-line volume template. The actual measured rates and total required material quantity to construct the required template may be more or less than these estimated values.

Material Type	Oyster Reef Wave Trips	Oyster Pads
	Approximate Tons/Acre	Approximate Tons/Acre
Crushed Limestone	5,445 – 6,534	1,089 — 1,307
River Rock	5,445 – 6,534	1,089 — 1,307
Crushed Concrete	6,806 – 8,168	1,361 — 1,634

Table 11-2: Estimated Material Rates to Achieve Required Elevations

## **11.6.3.3 MATERIAL PLACEMENT RATES**

The rates indicated in Table 11-2 above are provided for the three different types of materials, assuming typical values of In-Place (Bulk) Unit Dry Weights for each material type at the approximate range of estimated quantities to achieve the required elevation. The table is provided for information only and is

meant to serve as an example of how the Contractor will be required to compute the actual placement rates and quantities for the material it intends to use. The rates shown in Table 11-2 are based on using In-Place (Bulk) Unit Dry Weights of 100.0 pounds per cubic foot (pcf) for Crushed Limestone and River Rock, and 125 pcf for Crushed Concrete. These values on In-Place (Bulk) Unit Dry Weights were multiplied by the neatline volume of material required for 1 acre of material placed for the range of estimated volumes of required material and divided by 2,000 (lbs./ton) to obtain the tabular values indicated.

# 11.6.3.4 DETERMINATION of PLACEMENT per AREA

The initial Placement per Area shall be based on the average of the five (5) unit dry weight values obtained from the In-Place (Bulk) Unit Dry Weight tests, performed as specified in Technical Specifications Section 11.5, prior to commencement of material placement. The Contractor shall recalculate the actual Placement Rate in tons per acre based on the average of the measured In-Place (Bulk) Unit Dry Weight tests.

# **11.6.3.5** ADJUSTMENT of the PLACEMENT RATE

The Placement Rate will be adjusted for each 5,000 tons of material placed, based on the average value obtained from the In-Place (Bulk) Unit Dry Weight tests required in Technical Specifications Section 11.5. Specifically, the average value of the three (3) In-Place (Bulk) Unit Dry Weight tests required for each 5,000 tons of material placed, shall be used to re-calculate the actual Placement Rate for the next 5,000 tons of material placed in tons per acre.

# **11.6.3.6 DETERMINATION of the MINIMUM REQUIRED QUANTITY**

The Minimum Required Quantity of material shall be determined by the Contractor by multiplying the Minimum Placement Rate for each 5,000 tons placed, by the number of acres (or square feet) placed.

# **11.6.4 QUALITY ASSURANCE**

## 11.6.4.1 SURVEYING

To ensure that the material and placement method being used results in a stable profile that is achieving the required elevation, the Contractor will be required to perform progress surveys as specified in Section 4, including cultch thickness testing as specified in Section 4.13. This provides quality assurance that Target Elevation is being met as construction progresses and identifies where corrective action may be necessary.

# **11.6.4.2 VERIFICATION of MATERIAL QUANTITY PLACED**

Placement of the Minimum Required Quantity shall be verified using truck weight tickets or the barge displacement measurements of material transported and placed at each placement area, as specified in Section 3.6 of these Technical Specification

## 11.6.4.3 MEASUREMENT of MINIMUM REQUIRED QUANTITY

Cultch material shall be measured by truck weight or barge displacement, in short tons of 2,000 pounds each in accordance with Section 3.6 of these Technical Specification.

#### **11.6.5 CORRECTIVE ACTIONS**

Corrective actions will be required by the Contractor if the post-construction surveys result in any of the following conditions:

- 1. Thickness testing of oyster pad cultch material doesn't meet the minimum required 6-inch thickness above the mechanically constructed foundation pad.
- 2. Final construction of the oyster pads, including both mechanical fill and cultch placement, doesn't meet the minimum required elevations.
- 3. The constructed oyster reef wave trip doesn't meet the minimum required elevations within the prescribed vertical tolerance after cultch placement.
- 4. Thickness testing of oyster reef wave trip cultch material doesn't meet the minimum required 30-inch thickness above the hydraulically constructed foundation pad.

## 11.6.5.1 OUT-OF-TOLERANCE

Corrective action within marked boundaries of areas determined to have a measured value greater than the vertical tolerance shall consist of lightly raking material from high areas into adjacent lower areas to bring the elevation into tolerance at all locations within the area receiving corrective action. Corrective action within marked boundaries of areas determined to have a measured value less than the minimum elevation shall consist of placement of additional material within the area, as specified herein, until the entire area is brought up to within the required tolerance.

# **11.7 ACCEPTANCE**

Acceptance will be based on surveys performed by the Contractor as specified in Section 4 of these Technical Specifications. If the final survey cross sections show that the acceptance template has been achieved, and the required Quality Assurance Thickness Testing and Verification of Placement of the Minimum Required Quantity has been performed and approved, the Work will be accepted as complete.

**END OF SECTION** 

# **12 SEEDING & FERTILIZING**

# **12.1 SCOPE OF WORK**

The work covered in this section consists of preparing seedbeds, furnishing and placing seedbeds, and other operations necessary for the permanent establishment of a warm season perennial grass and forb mix from seed. The Contractor shall adapt its operations to variations in weather or soil conditions as necessary for the successful establishment and growth of the grasses. Seeding and fertilizing shall be accomplished on the final Bird Island Marsh shaped and graded hydraulic fill dikes.

# **12.2 REFERENCES**

The publication listed below forms a part of this specification to the extent referenced. The publication is referred to in the text by basic designation only.

- United States Department of Agriculture (USDA) Regulation
- Rules and Regulations under the Federal Seed Act and the Texas Seed Law

# **12.3 HANDLING AND STORAGE**

During handling and storing, the seed and fertilizer shall be stored in an area that shall protect the seed from heat, moisture, rodents, or other damage.

# **12.4 MATERIALS**

Seed containers shall carry a label showing the percent purity and germination, name of the seed, and that the seed meets the requirements of the USDA and applicable State laws. Use seed that has been treated with an approved fungicide. Seed that has become wet, moldy, bears a test date older than five months, or is otherwise damaged from transit or storage will not be accepted. Seeds of the species specified herein shall have 85% live seed and shall be free of weeds. Each species or variety of seed shall be furnished and delivered in separate bags. Seed is to be mixed before sowing; the mixing shall be done in a commercial seed-mixing machine or by equally thorough hand mixing after sampling and testing have been completed.

# 12.4.1 FERTILIZER

The fertilizer used shall be controlled release commercial grade, free flowing, and uniform in composition. The nutrient ratio shall be 13% nitrogen, 13% phosphorous, and 13% potassium. The fertilizer shall be balanced with the inclusion of trace minerals and micronutrients including mycorrhizal fungi.

## **12.4.2 SEED MIX**

Seed planting shall be done between the dates specified for each type, except as specifically authorized in writing. The seeds planted per acre shall be of the type specified with the mixture, rate, and planting dates as follows:

#### **Table 12-1: Seed Mixture Planting Dates**

Mix	Application Rate (pounds/acre)	Planting Dates
Type 1 Mix		
Hulled Common Bermuda	50	
(Cynodondactylon)	50	March 15 to Sept. 15
Hulled NK-37 Bermuda Grass	20	
Sand Love Grass	20	
Type 2 Mix		
Hulled Common Bermuda	30	
Unhulled Common Bermuda	60	Sont 16 to March 14
Crimson Clover	10	Sept. 10 to March 14
(TrifoltumIncarnatum)	10	
Hulled NK-37 Bermuda Grass	20	

#### **12.4.3 WATER**

Water used during the planting shall be fresh and have no more than 10 parts per thousand of salt.

#### **12.4.4 DIKES**

Dikes shall not be saturated with salt water prior to planting.

# **12.5 EXECUTION**

#### **12.5.1 SEEDING CONDITIONS**

Seeding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed by the Port Authority.

## 12.5.2 SEED BED PREPARATION

The soil surface shall be regraded to the lines and grades specified and shall be free of ruts and other disturbances. The soil shall be scarified or otherwise loosened to a depth of not less than 4 inches except as otherwise specified below or directed. Clods shall be broken and the top 2 to 3 inches of soil shall be worked into an acceptable seedbed by the use of soil pulverizers, drags, harrows, or by other approved methods. Rock and debris, 3 inches or larger, shall be removed prior to the application of seed and fertilizer. The preparation of seedbeds shall not be done when the soil is frozen, extremely wet, or when the Engineer determines that it is in an otherwise unfavorable working condition.

#### **12.5.3 FERTILIZER APPLICATION**

Fertilizer shall be applied at the rate of 400 pounds per acre. Fertilizer shall be incorporated into the soil to a maximum 4-inch depth.

## 12.5.4 SEEDING

Seeding shall be placed at the dates specified in Technical Specification Section 12 Subsection 12.4.2. The timing of the seeding may correspond with rain forecasts such that the seeded areas remain moist.

## 12.5.4.1 BROADCAST SEEDING

Seed shall be uniformly broadcast after the application of fertilizer at the rate specified. After broadcasting, the Contractor shall till seeds into soil to a depth not to exceed ½-inch. Complete seeding by rolling and packing with a roller or cultipacker developing 15 to 25 pounds per inch of tread. Keep seeded areas evenly moist for a period of ten (10) to fourteen (14) days immediately following placement. When watering seeded areas, use fine spray to prevent erosion of seeds or soil. Do not apply seeds when weather is too windy, hot or drying, or other adverse conditions exist.

## **12.5.4.2 PROTECTION OF SEEDED AREAS**

Immediately after seeding, the area shall be protected against equipment traffic or other use as directed.

# **12.6 ACCEPTANCE**

A satisfactory stand of vegetation shall be healthy and vigorous with scattered bare spots not larger than 1-foot square, with the bare spots not exceeding 5% of each seeded area.

An inspection shall be held by the Engineer to make note of deficiencies in germination. Germination should occur within ten (10) to fourteen (14) days after seeding depending upon weather conditions. Adequate coverage shall be achieved in thirty (30) to forty-five (45) days. Final inspection with the Engineer shall be scheduled within forty-five (45) to sixty (60) days after seeding. The Contractor shall repair areas not properly germinating within four (4) weeks.

END OF SECTION

# **13 DROP-OUTLET STRUCTURES**

# **13.1 SCOPE OF WORK**

The work in this Section consists of furnishing all plant, labor, materials and supplies for performing the work required by these Specifications, Schedules, and Plans as specified herein for all operations in connection with installing three drop-outlet structures at Bird Island Marsh.

# **13.2 REFERENCES**

The publications listed below form a part of these Technical Specifications to the extent referenced. The publications are referred to within the text by the basic designation only.

- American Welding Society (AWS) specifications:
  - AWS D1.1/D1.1M (2020) Structural Welding Code Steel
- American Wood Protection Association (AWPA) specifications:
  - o AWPA U1 (2020) UC5C MARINE USE Southern Waters
  - o AWPA M4 (2015) Standard for the Care of Preservative-Treated Wood Products
- ASTM International (ASTM) specifications:
  - A 139/A 139M (2016) Standard Specification for Electric-Fusion (ARC)-Welded Steel Pipe (NPS 4 and over)
  - A 123/A 123M (2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - A 588/A 588M (2019) Standard Specification for High-Strength Low- Alloy Structural Steel, up to 50 ksi (345 MPa) Minimum Yield Point, with Atmospheric Corrosion Resistance
    - A 36/A 36M (2019) Standard Specification for Carbon Structural Steel
    - A1011/A1011M (2017a) Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
  - A510 (2008) Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
- United Facilities Guide Specifications
  - UFGS 09 97 02 Painting: Hydraulic Structures

# **13.3 QUALITY ASSURANCE/QUALITY CONTROL**

The Contractor shall establish and maintain quality control for excavation and backfill and installation of the drop-outlet structures. The Contractor shall maintain records of its quality control for all construction operations and certify compliance with applicable sections of these Technical Specifications. The Contractor's records shall include the following:

- Equipment Type: size, and suitability for construction of the prescribed work
- Structural Excavation: check grades, slopes, and dimensions for compliance with design sections
- Grade Tolerances: check fills to determine if placement conforms to prescribed grade and design section
- Construction: layout, maintaining existing drainage, moisture control, thickness of layers, spreading and compacting
- Classification of soils, placing and compacting of structural fill, and density tests
- Material certifications shall be submitted to show conformance with applicable specification requirements
- Lumber installation: boards meet minimum height, length and width meets specification requirements
- Welding procedures, inspections, and examinations
- Welder qualifications

The original and two copies of these records of inspections and tests, as well as the records of corrective action taken, shall be furnished with the daily quality control report.

# 13.3.1 WELDING WORKMANSHIP

Workmanship for welding shall be in accordance with AWS D 1.1/D 1.1M and other applicable safety and environmental requirements of these Technical Specifications.

# 13.3.2 QUALIFICATIONS OF WELDERS AND WELDING OPERATORS

Welding operators, welders, and tack welders shall be qualified and re-qualified if necessary, for the particular type of work to be done. Qualification shall be in accordance with AWS D 1.1/D 1.1M and shall be submitted for approval. The Contractor shall certify by name the welders and welding operators so qualified, the date of qualification, and the code and procedures under which qualified. Prior qualification will be accepted if welders have performed satisfactory work under the code for which qualified within the preceding three (3) months. The Contractor shall require welders and welding operators to repeat the qualifying tests when in the opinion of the Engineer their work indicates a reasonable doubt as to proficiency. Those passing the re-qualification tests shall be re-certified. Those

not passing shall be disqualified until passing. Expenses in connection with qualification and requalification shall be borne by the Contractor.

## **13.3.3 WELDING INSPECTION**

The Contractor shall maintain an approved inspection system and perform required inspections in accordance with these Technical Specifications. Welding shall be subject to inspection to determine conformance with the requirements of AWS D 1.1/D 1.1M, the approved welding procedures, and provisions specified in other sections of these Technical Specifications.

## **13.3.4 VISUAL EXAMINATION**

Completed welds shall be cleaned and carefully examined in accordance with the acceptance criteria specified in AWS D 1.1/D 1.1M.

## **13.3.5 SUPPLEMENTAL EXAMINATION**

When the soundness of the weld is suspected of being deficient due to faulty welding or stresses that can occur during erection, the Engineer reserves the right to perform supplemental non-destructive examinations before final acceptance.

# **13.4 HANDLING AND STORAGE**

Materials delivered to the site shall be inspected for damage, unloaded, and stored with minimum handling. Upon delivery of pipe materials, certified copies of test reports demonstrating conformance to applicable pipe specifications shall be submitted before the pipes are installed for approval by the Port Authority. The inside of pipes shall be kept free of dirt and debris. Materials shall be handled using a method that will ensure delivery to the trench in sound undamaged condition. Pipe shall be carried to the trench, not dragged or rolled.

# **13.5 MATERIALS**

Materials for the drop-outlet structure and adjacent dike raising shall meet the requirements specified below.

# 13.5.1 SATISFACTORY BACKFILL MATERIAL

Satisfactory soils for backfill shall be firm or medium stiff to hard clays and sands. In addition, these materials shall have a moisture content not to exceed 35 percent in accordance with ASTM D 2216 (2019) for use as semi-compacted fill.

# **13.5.2 SUITABLE MATERIAL**

Suitable Material is the definition of the material that is excavated for use as semi-compacted fill but may exhibit an unacceptable moisture content at the time of excavation. Suitable material shall be handled and dried to the extent necessary so that it is considered satisfactory.

## **13.5.3 CONCRETE BALLAST**

Concrete ballast or sacks of cement shall be furnished and installed at the drop-outlet structures as shown on the Plans.

## **13.5.4 STRUCTURAL STEEL**

Structural Steel shall conform to the requirements of ASTM A 36/A 36M for steel members.

#### **13.5.5 GRATING**

Grating is to be galvanized welded steel grating and consist of 1-1/4-inch by 3/16-inch rectangular bearing bars spaced at 1-3/16-inch centers and cross bars welded at 4-inch centers. End banding bards of 1-1/4 inch by 3/16 inch are to be welded to the ends of every bearing bar. The top surface of the bearing bars are to be serrated for slip resistance. The grating is to be welded to the supporting members as shown on the Plans. The grating material is to meet the requirements of ASTM A1011/A1011M and ASTM 510.

#### **13.5.6 HANDRAILS**

Handrails are as shown on the Plans.

#### **13.5.7 LUMBER**

Lumber shall be southern yellow pine rough No. 2, dense, minimum allowable bending stress of 1,400 psi. Cuts in timber or abraded surfaces of new work shall receive a field treatment in accordance with AWPA M4.

#### **13.5.8 TREATED LUMBER**

Treated Lumber shall be furnished and installed by the Contractor on the sides of the structures from the top of the concrete slab or headwall to two feet below the top of the structure. Lumber thickness and length shall be as shown. Lumber shall be 6-inch nominal width. Lumber to be furnished shall be straight, even sawed, sound, and entirely free from defects which can impair its durability or its usefulness for the purpose intended. Lumber shall bear the official Grade mark of the association under whose rules it is purchased or, in lieu thereof, each shipment shall be accompanied by a certificate of inspection issued by the inspection association. Lumber shall have a Chromated Copper Arsenate (CCA) preservative treatment and shall be accompanied by a certificate with Best Management Practices from a recognized treatment company certifying the amount of treatment.

# **13.5.9 PRESERVATIVE TREATMENT**

Preservative Treatment by pressure processes shall be in accordance with AWPA U1. Lumber shall receive a treatment of 2.5 pcf of CCA solution.

# **13.5.10 STEEL PIPE**

The steel pipes shall be of the size shown and shall conform to the requirements of ASTM A 139/A 139M, as applicable, shall be fabricated from steel sheet conforming to ASTM A 36/A 36M, and shall be a minimum thickness of 1/2 inches for structures at Bird Island Marsh. Only intact new pipe will be accepted.

# 13.5.11 PROTECTIVE COATINGS

# 13.5.11.1 GALVANIZING

Galvanizing of steel handrails and grating are to conform to the requirements of ASTM A123/A123M. Galvanizing coating thickness grade is to be "G85" or 2 ounces of hot-dip zinc coating per square foot of surface area in accordance with ASTM A123/A123M. Galvanized areas damaged, abraded, or where galvanized material has been broken by field welding, cutting, drilling, handling, storage, or by other methods are to be coated with two coats of Galvaweld or other field coating materials as approved by the Engineer.

# 13.5.11.2 COATING

Interior and exterior surfaces of the pipe and structural steel shall be painted in conformance with UFGS 09 97 02, specifically Subsection 2.2.6 Formula C-200A, Coal Tar-Epoxy (Black) Paint. Surface preparation and paint application shall follow UFGS 09 97 02 Section 3, specifically Subsection 3.2.12 Coal Tar-Epoxy (Black) Paint (Formula C-200A) and Subsection 3.3.12 System No. 6-A-Z. Safety precautions included with the application instructions shall be observed during storage, handling, and use.

## 13.5.12 FILLER METAL

The electrode, electrode-flux combination, and grade of weld metal shall conform to the appropriate AWS specification for the base metal and welding process being used. The AWS designation of the electrodes to be used shall be included in the schedule of welding procedures.

# **13.6 COMPACTION EQUIPMENT**

Equipment for compaction shall conform to the requirements herein.

# 13.6.1 CRAWLER-TYPE TRACTORS

Crawler-type Tractors used for spreading and compacting shall conform to the requirements of Technical Specifications Section 1 Subsection 1.6 and shall not be operated at a speed exceeding 5 miles per hour.

# **13.6.2 POWER DRIVEN TAMPERS**

Compaction of material in areas where it is impracticable to use a crawler-type tractor shall be performed by the use of approved power-driven tampers of the rammer type having a static weight of at least 70 pounds or by approved hydraulic actuated tractor-mounted tampers.

# **13.6.3 ALTERNATIVE COMPACTION EQUIPMENT**

The Contractor may propose for use alternative types of compaction equipment not included in these Technical Specifications. The suitability of the alternative equipment shall be demonstrated to the Engineer by a field test conducted by and at the expense of the Contractor. The alternative compaction equipment shall be capable of properly compacting the soil so that no planes of weakness or laminations are formed in the fill. Additionally, the alternative compaction equipment shall not detrimentally affect any adjacent structure. The field test shall consist of compacting a minimum of three layers of an area of embankment with the alternative type equipment.

# **13.6.4 MISCELLANEOUS EQUIPMENT**

Scarifiers, disks, spring-tooth or spike-tooth harrows, spreaders, pontoon-mounted track excavators and other equipment shall be of types suitable for the required construction. Sprinkling equipment shall be designed to apply water uniformly and in controlled quantities to variable widths of surface.

# **13.7 EXECUTION**

# 13.7.1 EXCAVATION, BACKFILL, AND COMPACTION

The Contractor shall make all excavations required for the construction of the drop-outlet structures. Excavations for the structure shall conform to the dimensions and elevations for the structures as shown on the Plans. Materials determined to be unsuitable by the Engineer shall be placed a minimum of 50 feet from the final drop-outlet structure location. Backfill and fill for structures shall be placed in horizontal layers not to exceed 8 inches in loose depth and then compacted. Material shall not be placed on a surface that is muddy, frozen, or contains frost. Backfilling shall not begin until the drop-outlet structure has been approved and the excavation cleaned of trash and debris. Backfill and fill shall be brought up to the indicated finished grade. Where material is to be placed against both sides of the outfall pipe, the placement of lifts shall be controlled so that the difference between the earth elevation on one side and the earth elevation on the other side of the outfall pipe is as small as practicable. Heavy equipment for spreading or compacting shall not be operated closer than 3 feet to a foundation or wall. Material within 3 feet of the structures and pipes shall be compacted by hand operated power-driven tampers.

Installation of the pipes shall be sufficiently sloped back or shored up with sheeting and bracing to prevent the excavation walls from caving in. Excavation shall only be carried to the extent necessary to construct the drop-outlet structure and install the pipe to the lines and grades shown. Care shall be taken not to excavate below the lines and grades as shown. Excavation carried below indicated depths will not be permitted except to remove the unsatisfactory material as directed. Unsatisfactory material shall be excavated below the depths shown and replaced with satisfactory material. to establish a firmbedding for the structure and outfall pipe at the required alignment and grade. When backfilling around the drop-outlet structure and pipe, care shall be taken to ensure that areas underneath the haunches of the pipe are thoroughly filled and compacted, leaving no voids.

## 13.7.2 FINAL SUB-GRADE

Soft spots encountered within the sub-grade foundation area shall be removed, replaced by approved satisfactory materials of similar soil type, and compacted as specified.

#### **13.7.3 UNSUITABLE MATERIALS**

Materials, which are classified as unsuitable structural backfill, are defined as material containing organic matter, sticks, branches, roots, brick, concrete, rock, and other debris. Unsatisfactory material in surfaces to receive fill shall be removed and replaced with satisfactory materials.

#### **13.7.4 PLACING PIPE**

Each pipe shall be carefully examined for flaws before being laid, and if found defective or damaged shall not be used. Pipe shall be laid to the grades and alignment shown, using proper facilities to lower the sections of pipe into the trenches. No pipe shall be laid in water or laid when trench conditions or the weather are unsuitable for this work. The Contractor shall provide dewatering pumps and equipment as necessary to dewater the pipe trench. Pipe in place shall be inspected before backfilling.

#### **13.7.5 PIPE TOLERANCE**

The Contractor shall inspect the pipe for any settling or buckling, in order that the pipe invert is continuous throughout its length. The slope of the pipe shall not be less than 0.30% of the required slope.

## **13.7.6 WELDING PROCESS**

Welding of steel pipe shall be by an electric arc welding process and shall conform to the applicable provisions of AWS D 1.1/D 1.1M unless otherwise specified.

# 13.7.6.1 PREHEAT AND INTERPASS TEMPERATURE

Preheating shall be performed as required by AWS D 1.1/D 1.1M or as otherwise specified except that the temperature of the base metal shall be at least 79 degrees F. The weldments to be preheated shall be slowly and uniformly heated by approved methods to the prescribed temperature, held at that temperature until the welding is completed, and then permitted to cool slowly in still air.

# 13.7.6.2 PREPARATION OF BASE METAL

Prior to welding the Contractor shall inspect surfaces to be welded to ensure compliance with AWS D 1.1/D 1.1M. Existing pipe ends may be damaged, requiring the existing pipes to be cut back to a location suitable for welding of pipe extensions and cleaned and prepared as necessary.

# 13.7.6.3 TEMPORARY WELDS

Temporary welds required for erection shall be made under the controlled conditions prescribed herein for permanent work. Temporary welds shall be subject to the same quality requirements as the final welds permanent work as specified herein. Preheating for temporary welds shall be as required by AWS D 1.1/D 1.1M for permanent welds. In making temporary welds arcs shall not be struck in other than weld locations. Each temporary weld shall be removed and ground flush with adjacent surfaces after serving its purpose.

## 13.7.6.4 TACK WELDS

Tack welds that are to be incorporated in the permanent work shall be subject to the same quality requirements as the permanent welds and shall be cleaned and thoroughly fused with permanent

welds. Preheating shall be performed as specified above for temporary welds. Multiple-pass tack welds shall have cascaded ends. Defective tack welds shall be removed before permanent welding.

# 13.7.6.5 REPAIRS

Defective welds shall be repaired in accordance with AWS D 1.1/D 1.1M. A welding repair plan shall be submitted for approval before repairs are made when deemed necessary by the Engineer. Defective weld metal shall be removed to sound metal by use of air carbon-arc or oxygen gouging. The surfaces shall be thoroughly cleaned before welding. Welds that have been repaired shall be retested by the same methods used in the original inspection.

## **13.7.7 CONCRETE BALLAST**

Concrete ballast or sacks of cement shall be placed at each drop-outlet structure as shown on the drawings. During placement of the concrete or sacks, the Contractor shall take the necessary precautions to ensure against damage to the existing portions of the drop-outlet structure. If this work is damaged, it shall be repaired or replaced as approved at no additional cost to the Government.

#### **13.7.8 ERECTION OF STRUCTURAL STEEL**

Erection of structural steel shall be in accordance with the latest specifications of the AISC.

#### **13.7.9 WEIR BOARDS**

Weir boards shall be provided to the full height of the drop-outlet structures.

## **13.7.10 SHORE PROTECTION**

Installation of geotextile, bedding stone and armor stone shall be as described in Section 0.

END OF SECTION

# **14 HSC EXISTING STRUCTURE DEMOLITION/REMOVAL (OPTION 3)**

# **14.1 SCOPE OF WORK**

Submerged obstructions may exist within the new work dredge limits and barge lane relocation limits. Removal of the existing structures, if encountered, may be required in order to excavate the HSC to the lines and grades shown on the Plans. Obstructions including, but not necessarily limited to; timber piles, stakes, sheet piling, scrap metal or other obstructive materials encountered during demolition/removal activities shall be disposed of in accordance with any and all applicable Federal, State, or local requirements.

The work in this Part consists of providing all labor, material, and equipment for removing and disposing of potential existing submerged structures within or near the new work limits of the HSC as outlined in Section 6 of these Technical Specifications, which may prevent the excavation and dredging of new work materials to the lines and grades shown on the Plans and in accordance with these Technical Specifications.

The Contractor shall make its own investigations to determine the exact type, size, and quantity of submerged obstructions to be removed, if any. The Contractor shall remove the obstructions or cut them off in accordance with these Technical Specifications. Unless otherwise indicated by the Engineer, where piles are cut off, they shall be cut off at a minimum depth of one (1.0) foot below the allowable template as shown on the Plans. The Contractor shall determine its own means and methods by which to complete the Work. Removed or demolished materials shall become the property of the Contactor and shall be removed from the Site. Removed or demolished materials shall not be allowed to encroach on to adjoining property, including public or private places, unless approved by the Engineer.

Surface trash and debris encountered in the new work dredge limits as described in Technical Specification Subsection 1.10.2 shall not constitute as basis for execution of the Work outlined in this Section. The Work in this Section shall only be exercised for structures of a type or form necessitating mobilization of additional plant or equipment for removal, to allow for complete excavation of the channel template as shown on the Plans.

# **14.2 REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM International (ASTM):

• ASTM E 1609 (2001) Development and Implementation of a Pollution Prevention Plan

Publications:

- Vincent, Mark, and Glahn, Lisa, and Raphaelson, Rebecca. "The History of Dredging at The Port of Houston: Ditching High and Low to Build a Port" Proceedings of the Western Dredging Association and Texas A&M University Center for Dredging Studies' "Dredging Summit and Expo 2015"
- Ward, George. "Dredge and Fill Activities in Galveston Bay" The Galveston Bay National Estuary Program "Publication GBNEP-28 April, 1993"

# **14.3 BACKGROUND**

Dredge delays were encountered during the HSC Expansion Channel Improvement Project 10 due to believed wood bulkheads in the vicinity of Bulkhead Reef. The results of further historical investigations performed on behalf of the PHA are provided below.

# **14.3.1 HISTORICAL DATA**

Both publications in Subsection 14.2 of these Technical Specifications provide a history of the development of the Houston Ship Channel from the early 20<sup>th</sup> century to the current-day HSC. The Contractor is encouraged to review the provided references and to perform their own research as to any potential existing submerged obstructions within the limits of the HSC new work. The excerpts provided below were deemed of note during the historical investigation performed on behalf of the PHA.

- The bulkhead retaining walls first formed for Morgan's Cut were extended for up to twelve miles down the bay reach, in the form of king pile walls with brush infill for sediment management. When that wall proved inadequate, a second sheet pile wall was constructed offset 30.48 m (100 ft) from the first line of silt defense. While the pile walls were eventually abandoned, remnants of the wall are still charted as obstructions to boaters in Galveston Bay (Vincent & Glahn & Raphaelson, p. 479).
- Another barrier to flow in the system was the dike extending 18 km out across the bay from Morgans Point. First completed as a timber-and-brush dike in 1902, the dike survived for a decade, with high maintenance, until the hurricane of 1911, and allowed stabilization of spoil islands just to the east of the Houston Ship Channel (Atkinson Island). The dike is clearly visible in Fig. 2-3. While the dike is now gone (a few sections of the old dike still survive near Bulkhead Reef), the disposal areas along the channel above Redfish Reef now serve its original function of blocking lateral flow across the channel (Ward, p. 171).

# 14.3.2 POTENTIAL AREAS OF CONCERN

# 14.3.2.1 NOAA NAUTICAL CHART 11327 (current)

- 1. Note B suggests that submerged stakes may exist 400 feet east of and parallel to the Houston Ship Channel between Light 58 and Light 90.
- 2. A submerged bulkhead is shown near Bulkhead Reef on the east side of the HSC. Bulkhead Reef is a spoil area located on the east side of the HSC, between Midbay placement area and North Boater's Cut, as shown on NOAA Nautical Chart 11327.

#### 14.3.2.2 COAST CHART NO. 204 GALVESTON BAY, TEXAS (dated 1901)

- "Lines of Piles" are displayed on the chart on the west side of the horizontal limits of the historic 1901 HSC between Morgan's Point and the current day Bayport Flare.
- 2. A second "Lines of Piles" is displayed on the chart on both the west and east sides of the horizontal limits of the historic 1901 HSC offshore of Eagle Point.

# **14.4 INTENT**

Supplemental to dredging of material to the required lines and grades shown on the Plans, the intent of the Work covered under this section is to remove or cut off the existing structures in accordance with these Technical Specifications and apply sound environmental principles in the disposal of the generated debris. As part of the implementation of this policy the Contractor shall use all reasonable means to divert demolition waste from landfills and incinerators and to facilitate their recycling or reuse.

# **14.5 OBSTRUCTION DEMOLITION/REMOVAL**

The Contractor shall remove or cut off below the allowable template, all of the potential existing submerged obstructions as referenced in Appendix C and Appendix D, or as encountered during the progress of Work. The material generated from this Work shall be classified as demolished material or debris, shall become property of the Contractor, and shall be removed from the Site in accordance with this Section. No separate payment shall be made for standby time incurred as a result of "HSC Existing Structure Demolition/Removal".

## **14.5.1 MEETINGS**

After award of the Contract and prior to commencement of Work, the Contractor shall schedule and conduct a meeting with the Engineer to discuss the proposed Obstruction Demolition Plan, and to develop a mutual understanding relative to the details of the Work. At a minimum, the Obstruction Demolition Plan and waste management goals and issues shall be discussed at the Preconstruction Conference or other meetings as scheduled during performance of the Work under this Contract.

## 14.5.2 RECORDS

Submit documentation for solid waste disposal and diversion, and submit manifests, weight tickets, receipts, and invoices specifically identifying the Project and waste material. The records shall be made available to the Engineer during construction, and a copy of the records shall be delivered to the Engineer upon completion of obstruction removal/cutoff and disposal.

## 14.5.3 COLLECTION

Provide the necessary containers, bins and storage areas to facilitate effective waste management. Provide materials for barriers and enclosures around material storage areas. Locate out of the way of construction traffic. Provide adequate space for pick-up and delivery and convenience to subcontractors. Handle hazardous waste and hazardous materials in accordance with applicable regulations.

#### 14.5.4 DISPOSAL

All waste and debris materials generated shall become property of the Contractor. Control accumulation of waste materials and trash. Recycle or dispose of waste and debris materials off-site and in compliance with federal, state, and local laws and regulations.

# **14.6 ACCEPTANCE**

Acceptance of the Work covered under this Part shall be determined by two components:

- 1. Upon completion of the Work, the Port Authority shall perform a multibeam survey over the demolition area as determined by the Engineer to inspect the Work and determine if:
  - a. The channel has been dredged to the required lines and grades shown on the Plans, in accordance with these Technical Specifications and;
  - All obstructions have been removed or cut off to a minimum of 1-foot below the allowable template, and that the demolition area is clear of debris resulting from the Work. The multibeam survey shall be provided to the Contractor upon its request.
- Completion of the obstruction demolition survey as described in Technical Specifications Section 4 subsection 4.15 and acceptance of the corresponding obstruction demolition survey submittals as described in Technical Specifications Section 2 subsection 2.7.3.

If one or both of the acceptance components as defined above are not met, corrective action will be required as determined by the Engineer, and at the sole cost and expense of the Contractor. If both acceptance components are met, the work will be finally accepted.

END OF SECTION

**Technical Specifications** 

Appendix A – Probing Logs, Location Tables, and Maps



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