

5% SUBMITTAL

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

4. ALL EXISTING UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL NOTIFY THE PORT AUTHORITY AND ENGINEER IMMEDIATELY OF ANY CONFLICT OR DISCREPANCIES.
5. 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. THESE AREAS SHALL BE RESTORED TO PRE-PROJECT CONDITIONS UPON COMPLETION OF WORK.
6. 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 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.
7. 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 FLOATATION IS NOT PERMITTED UNLESS GRANTED IN WRITING BY THE PORT AUTHORITY.
8. THE DREDGING PROJECT MAY BE ADJACENT TO ENVIRONMENTALLY SENSITIVE AREAS. THE CONTRACTOR SHALL AVOID / MINIMIZE IMPACTS TO THESE AREAS DURING THE COURSE OF CONSTRUCTION. ANY DAMAGE CAUSED BY THE CONTRACTOR'S ACTIVITIES SHALL BE RESTORED AT THE EXPENSE OF THE CONTRACTOR AND AT NO COST TO THE PORT AUTHORITY. THE PORT AUTHORITY SHALL BE THE SOLE ASSESSOR AS TO WHETHER ENVIRONMENTAL IMPACTS HAVE OCCURRED AS A RESULT OF THE CONTRACTOR'S ACTIVITIES. THE PORT AUTHORITY RESERVES THE RIGHT TO SUSPEND WORK AT ANY TIME IF IMPACTS OCCUR AND UNTIL SATISFACTORY CORRECTIVE MEASURES ARE IMPLEMENTED BY THE CONTRACTOR.
9. CONSTRUCTION EQUIPMENT SHALL NOT OPERATE ON PRIVATE PROPERTY UNLESS PERMISSION HAS BEEN ACQUIRED BY THE CONTRACTOR FROM THE LAND OWNER.
10. THE PROJECT IS LOCATED WITHIN THE LIMITS OF THE HOUSTON SHIP CHANNEL, WHICH IS HIGHLY UTILIZED BY MARINE TRAFFIC. THE CONTRACTOR SHALL NOT STAGE EQUIPMENT WITHIN THE NAVIGATION CHANNEL NOR INTERFERE WITH OR INTERRUPT VESSEL NAVIGATION.
11. THE CONTRACTOR SHALL REQUEST A NOTICE TO MARINERS FROM THE U.S. COAST GUARD PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES.
12. THE CONTRACTOR SHALL REMOVE ANY ENCOUNTERED DEBRIS AND DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.
13. THE LOCATIONS OF EXISTING UTILITIES AND SUBSTRUCTURES SHOWN HEREIN HAVE BEEN TAKEN FROM AVAILABLE RECORDS. THE PORT 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 AUTHORITY SHALL BE NOTIFIED IMMEDIATELY.
14. ATTENTION IS DIRECTED TO THE SPECIFICATIONS WHERE BIDDERS ARE REQUIRED TO EXAMINE AND JUDGE, AS THEIR OWN RESPONSIBILITY THE LOCATION, PHYSICAL CONDITIONS, AND SURROUNDINGS OF THE PROPOSED WORK.
15. THE CONTRACTOR SHALL SCHEDULE AND COORDINATE WITH THE VARIOUS COMPANIES AND AGENCIES WHO MAY BE AFFECTED BY THIS PROJECT. THE CONTRACTOR SHALL OBTAIN THE REQUIRED PERMITS AS MAY BE REQUIRED BEYOND THE AUTHORIZATIONS PROVIDED TO PERFORM THE WORK.
16. THE CONTRACTOR SHALL ADHERE TO ALL SAFETY CODES, REGULATIONS AND SPECIFICATIONS FOR THE DURATION OF THIS CONTRACT.
17. THE CONTRACTOR SHALL COMPLETE ALL WORK SHOWN ON THE DRAWINGS AND IN THE SPECIFICATIONS, UNLESS INDICATED AS NOT IN PACKAGE (N.I.P.).

CL CHANNEL & STATIONING

98+000 100+000

CHANNEL TOE (EXISTING)

CHANNEL TOE (WIDENING)

OUTSIDE LIMITS OF BARGE LANE

CHANNEL WIDENING & BARGE RELOCATION DREDGE LIMITS

AC	ACRES
AO	ALLOWABLE OVER DEPTH
APPROX	APPROXIMATE
BRC	BOLIVAR ROADS CHANNEL
BSC.....	BAYPORT SHIP CHANNEL
CL	CENTERLINE
EXIST	EXISTING
FT	FEET
HSC.....	HOUSTON SHIP CHANNEL
NO.....	NUMBER
OS	OFFSET
P.I.	POINT OF INTERSECTION
N	NORTHING
E	EASTING
MLLW.....	MEAN LOWER LOW WATER
N.I.P.....	NOT IN PACKAGE
RD	REQUIRED DEPTH
RO	REQUIRED OVER DEPTH
STA	STATION
TYP	TYPICAL
TOE	CHANNEL TOE

The seal of the Port of Houston Authority (PHA) is a circular emblem. It features a five-pointed star in the center, with the letters 'PHA' superimposed on it. The words 'PORT OF HOUSTON AUTHORITY' are written in a circle around the top, and 'HOUSTON, TEXAS' is written around the bottom. The entire seal is enclosed within a decorative rope-like border.

CONSULTANT:

65% PRELIMINARY

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ENGINEER: Ashley P. Judith

P.E. NO: 112988

DATE: August 3, 2020

APPROVED: _____
DATE _____

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:
**HOUSTON SHIP
CHANNEL (HSC)**
**EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)**

SHEET TITLE:
**PROJECT 11: SOUTH
BOATERS CUT TO
BAYPORT (BEACON
76): HSC STA 57+000
TO HSC STA 20+000
& BAYPORT SHIP
CHANNEL**

GENERAL NOTES, LEGEND & ABBREVIATIONS

[illegible]

DESIGNER:	AJ
ADD:	RK
CHECKER:	CH/SH/MM
DATE:	AUGUST 2020
SCALE:	NONE

DRAWING NO.
C90-D13-P11-005-GI002

SHEET NO.	REV. NO.
2	0

5% SUBMITTAL



CONSULTANT:

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CHANNEL (HSC)**

**EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)**

SHEET TITLE:
PROJECT 11:
SOUTH BOATERS CUT
TO BAYPORT
(BEACON 76):
HSC STA 57+000 TO
HSC STA 20+000
& BAYPORT SHIP
CHANNEL

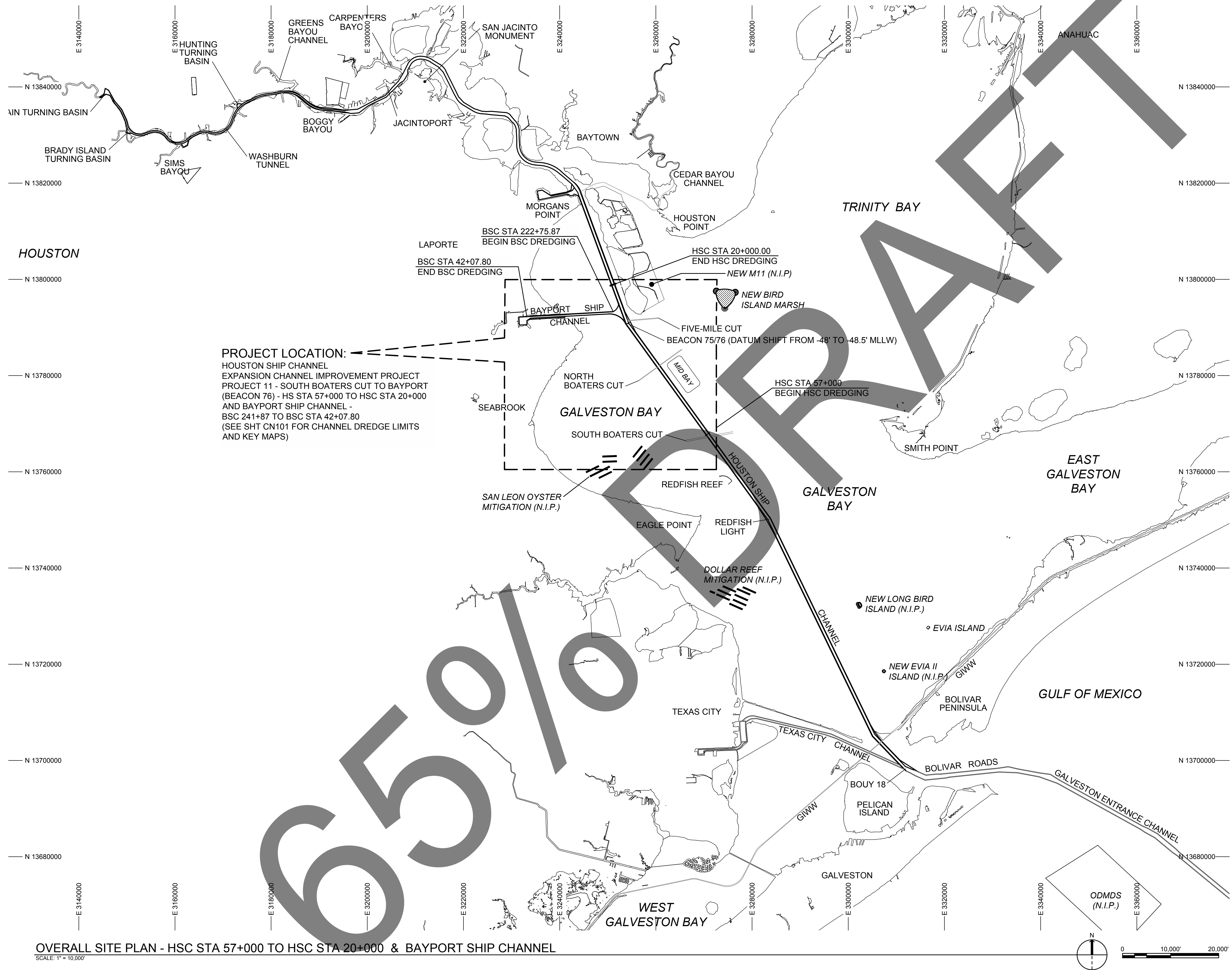
OVERALL SITE PLAN

[illegible]

DESIGNER:	AJ
ADD:	RK
CHECKER:	CH/SH/MM
DATE:	AUGUST 2020
SCALE:	1" = 10,000'

DRAWING NO.	
C90-D13-P11-005-GI003	
SHEET NO.	REV. NO.
3	0

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CONSULTANT:

SEAL:

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P.E NO: 112988
DATE: August 3, 2020

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DATE

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MANAGING DIRECTOR - ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:
**HOUSTON SHIP
CHANNEL (HSC)**

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

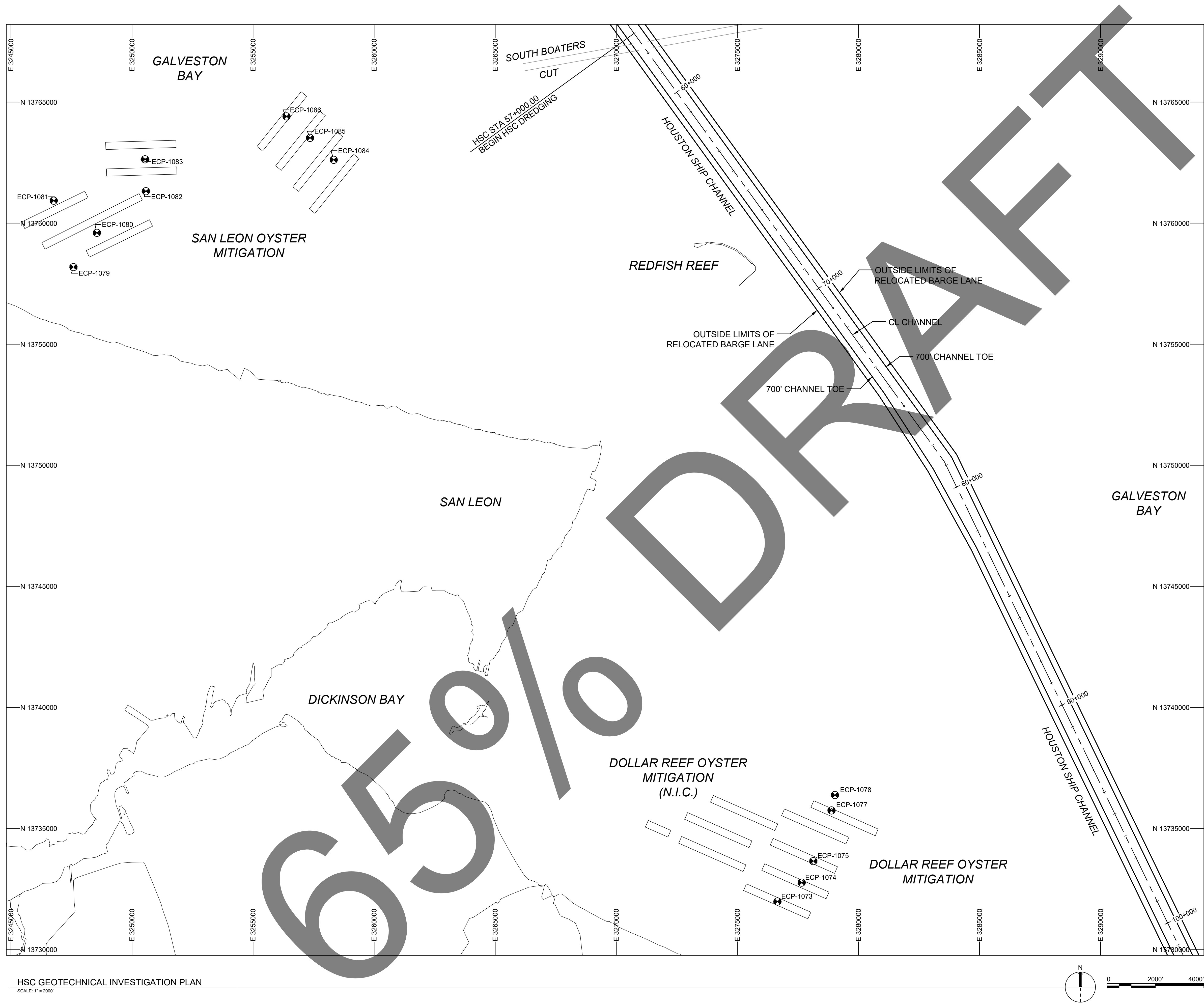
SHEET TITLE:
PROJECT 11: SOUTH
BOATERS CUT TO
BAYPORT (BEACON
76): HSC STA 57+000
TO HSC STA 20+000
& BAYPORT SHIP
CHANNEL

GEOTECHNICAL INVESTIGATION PLAN

[illegible]

DESIGNER:	NM
CADD:	BSC
CHECKER:	NM/AJ
DATE:	AUGUST 2020
SCALE:	1" = 2000'

DRAWING NO.	
C90-D13-P11-005-B-102	
SHEET NO.	REV. NO.
-	0





CONSULTANT: _____

SEAL: 65% PRELIMINARY

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ENGINEER: Ashley P. Judith
P.E NO: 112988
DATE: August 3, 2020

APPROVED: _____
DATE

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR - ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:
**HOUSTON SHIP
CHANNEL (HSC)**

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

SHEET TITLE:
PROJECT 11: SOUTH
BOATERS CUT TO
BAYPORT (BEACON
76): HSC STA 57+000
TO HSC STA 20+000
& BAYPORT SHIP
CHANNEL

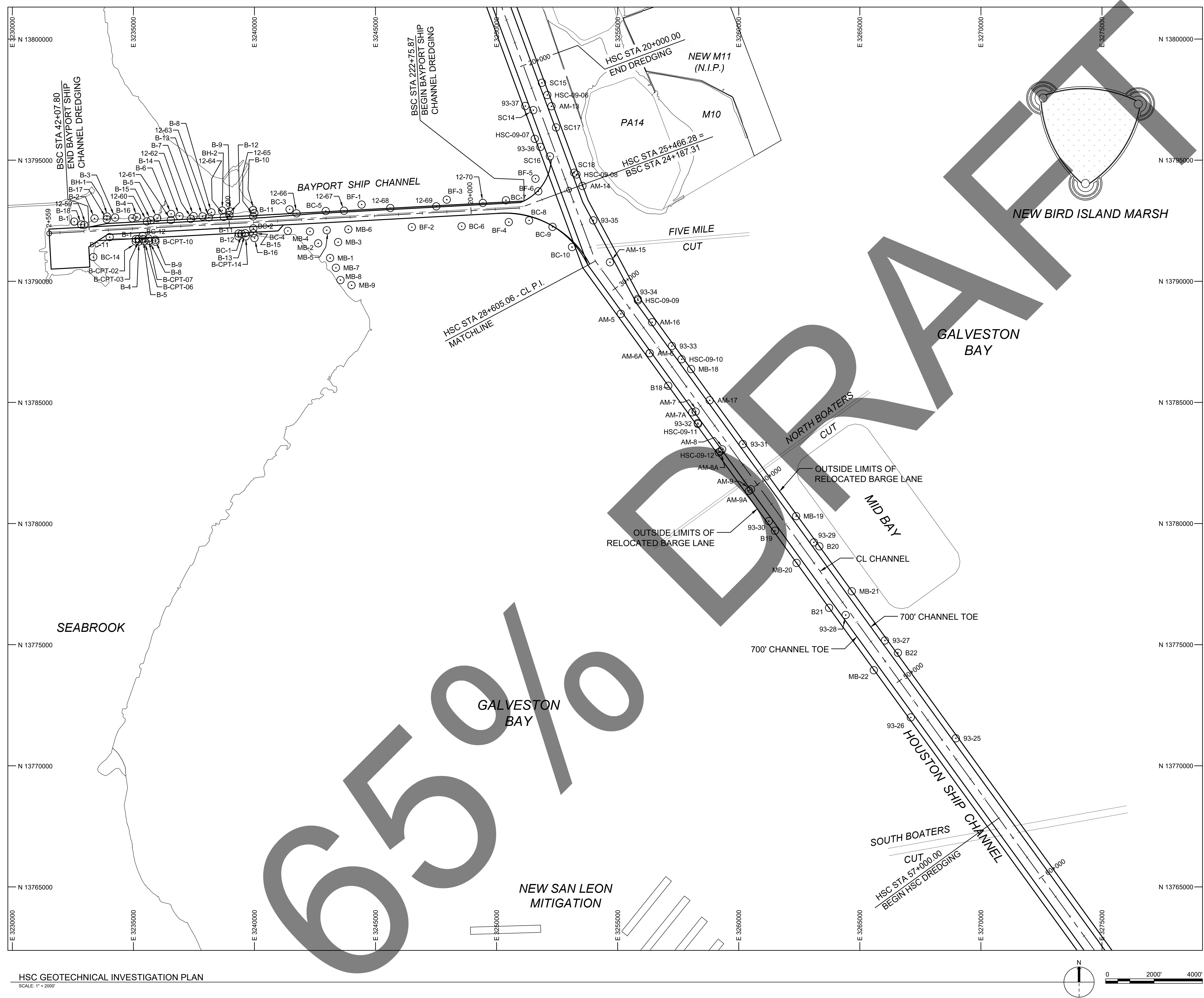
GEOTECHNICAL INVESTIGATION PLAN

DESIGNER:	NM
ADD:	BSC
CHECKER:	NM/AJ
DATE:	AUGUST 202
SCALE:	1" = 2000'

DRAWING NO.

SHEET NO.	REV. NO.
-	0

65% SUBMITTAL



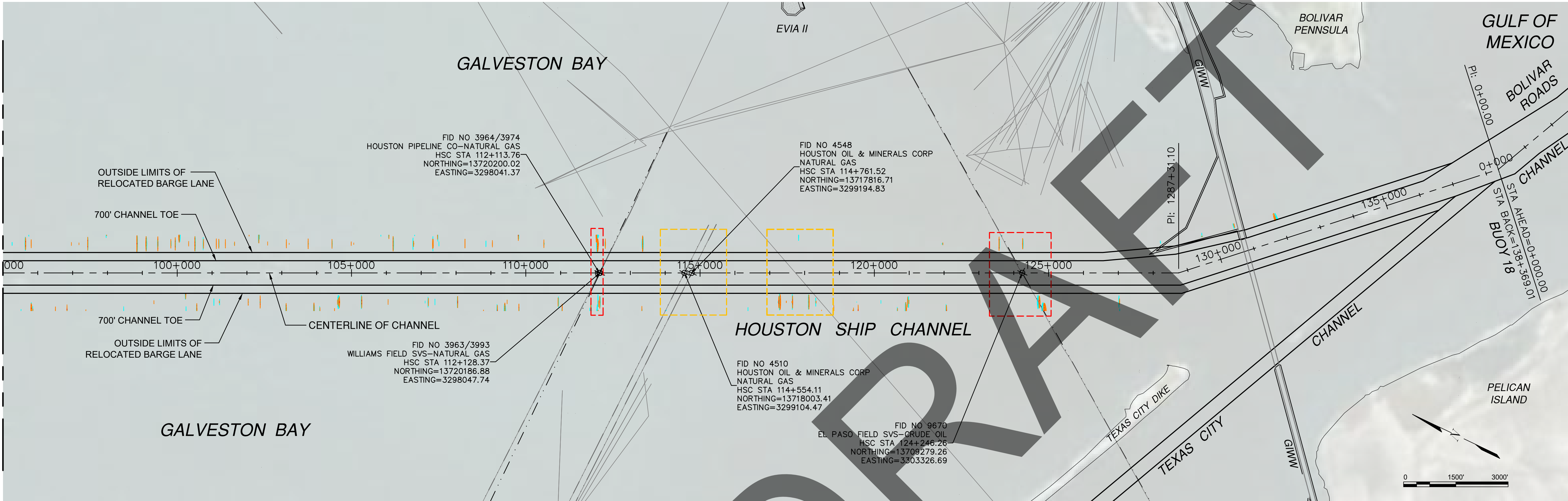
NOTE:
THE HISTORICAL BORINGS SHOWN ARE APPROXIMATE. REFER TO BORING LOGS FOR FURTHER INFORMATION.

"NOT ALL HISTORICAL BORINGS ARE SHOWN.
ADDITIONAL BORING LOGS FOR THOSE NOT USED
IN DESIGN ARE INCLUDED BY ATTACHMENT TO THE
CONTRACT SPECIFICATIONS"

HSC GEOTECHNICAL INVESTIGATION PLAN
SCALE: 1" = 2000'

TIME: 7-31-20 - 12:00pm User: beverly.carriere DWG: D:\60618786 - Project 11: Design\300 CADD\10-References\HSC-C-SP-EX PIPING_GIS Data & Mag Survey.dwg

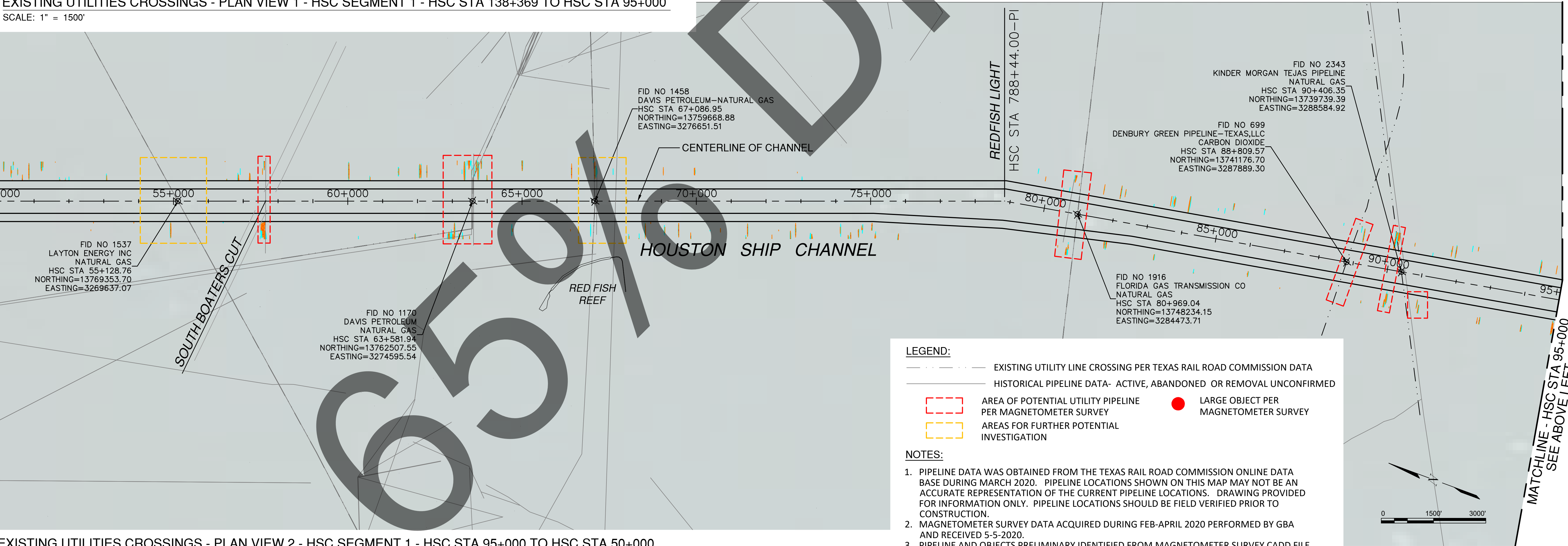
MATCHLINE - HSC STA 95+000 - SEE BELOW RIGHT



EXISTING UTILITIES CROSSINGS - PLAN VIEW 1 - HSC SEGMENT 1 - HSC STA 138+369 TO HSC STA 95+000

SCALE: 1" = 1500'

MATCHLINE - HSC STA 50+000 - SEE DWG VU002



EXISTING UTILITIES CROSSINGS - PLAN VIEW 2 - HSC SEGMENT 1 - HSC STA 95+000 TO HSC STA 50+000

SCALE: 1" = 1500'

LEGEND:

- EXISTING UTILITY LINE CROSSING PER TEXAS RAIL ROAD COMMISSION DATA
- HISTORICAL PIPELINE DATA- ACTIVE, ABANDONED OR REMOVAL UNCONFIRMED
- AREA OF POTENTIAL UTILITY PIPELINE PER MAGNETOMETER SURVEY
- AREAS FOR FURTHER POTENTIAL INVESTIGATION
- LARGE OBJECT PER MAGNETOMETER SURVEY

NOTES:

- PIPELINE DATA WAS OBTAINED FROM THE TEXAS RAIL ROAD COMMISSION ONLINE DATA BASE DURING MARCH 2020. PIPELINE LOCATIONS SHOWN ON THIS MAP MAY NOT BE AN ACCURATE REPRESENTATION OF THE CURRENT PIPELINE LOCATIONS. DRAWING PROVIDED FOR INFORMATION ONLY. PIPELINE LOCATIONS SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.
- MAGNETOMETER SURVEY DATA ACQUIRED DURING FEB-APRIL 2020 PERFORMED BY GBA AND RECEIVED 5-5-2020.
- PIPELINE AND OBJECTS PRELIMINARY IDENTIFIED FROM MAGNETOMETER SURVEY CADD FILE "HTI- HSC Mag review.dwg" PROVIDED BY GBA AND RECEIVED 5-5-2020.



PORT OF HOUSTON AUTHORITY

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ENGINEER: Ashley P. Judith

P.E. No: 112988

DATE: August 3, 2020

APPROVED:

DATE

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR - ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:

HOUSTON SHIP
CHANNEL (HSC)

EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)

SHEET TITLE:

PLAN VIEWS
1 & 2 - EXISTING
UTILITIES
CROSSINGS
WITH
MAGNETOMETER
SURVEY DATA

FROM HSC STA
138+369 TO HSC
STA 50+000

REV DATE DESCRIPTION

X XX/XX/XX XXXX

DESIGNER: DC

CADD: RK

CHECKER: NM/AS

DATE: AUGUST 2020

SCALE: 1" = 1500'

DRAWING NO.

C90-D13-P11

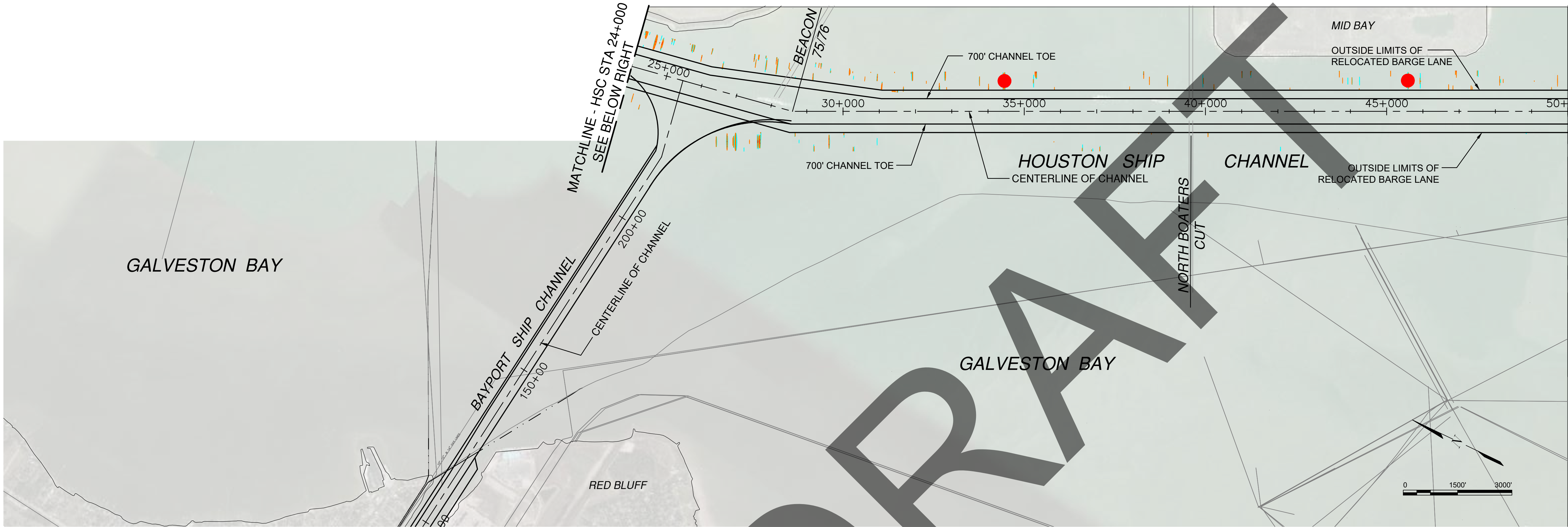
SHEET NO.

VU001

REV. NO.

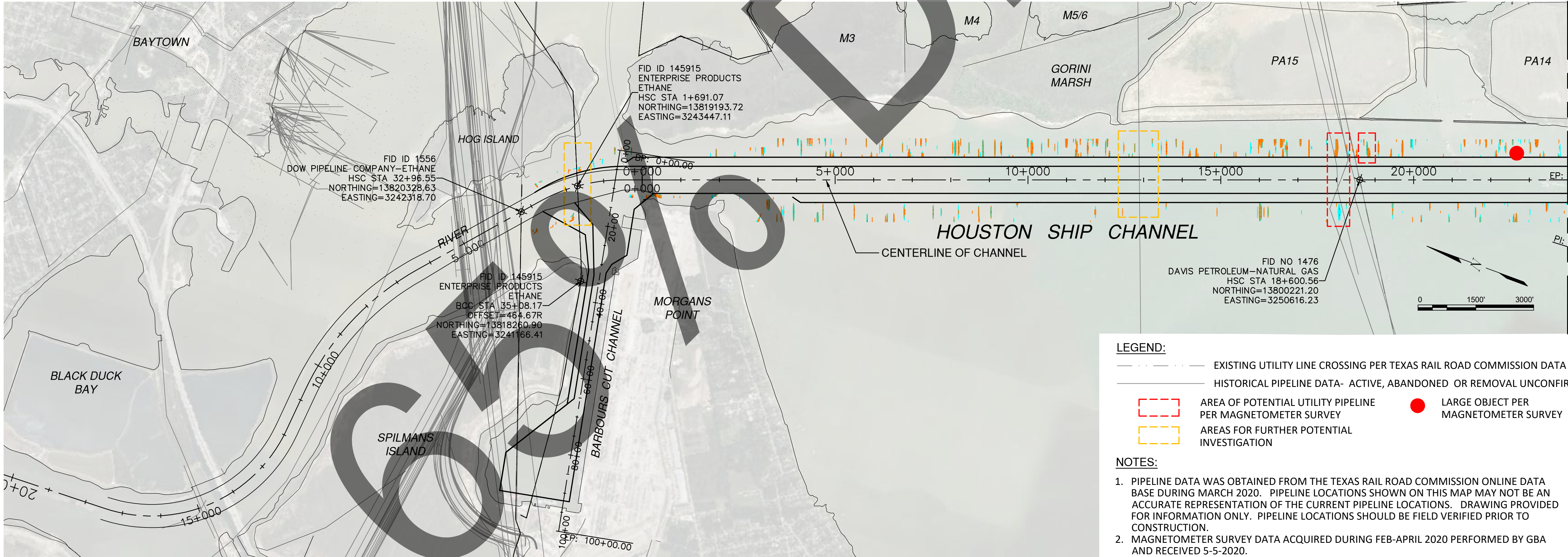
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TIME: 7-31-20 - 1:10pm User: beverlycarriere DWG: D:\60618786 - Project 11 Design\900_CADD\10-References\HSC-C-SP-EX-PIPING_GIS Data & Mag Survey.dwg



EXISTING UTILITIES CROSSINGS - PLAN VIEW 3 - HSC SEGMENT 1 - HSC STA 50+000 TO HSC STA 24+000 & SEGMENT 2 - PORTION OF BAYPORT SHIP CHANNEL

SCALE: 1" = 1500'



EXISTING UTILITIES CROSSINGS - PLAN VIEW 4 - HSC SEGMENT 1 - HSC STA 24+000 TO HSC STA 27+48

SCALE: 1" = 1500'

LEGEND:

- EXISTING UTILITY LINE CROSSING PER TEXAS RAIL ROAD COMMISSION DATA
- HISTORICAL PIPELINE DATA- ACTIVE, ABANDONED OR REMOVAL UNCONFIRMED
- AREA OF POTENTIAL UTILITY PIPELINE PER MAGNETOMETER SURVEY
- AREAS FOR FURTHER POTENTIAL INVESTIGATION
- LARGE OBJECT PER MAGNETOMETER SURVEY

NOTES:

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- MAGNETOMETER SURVEY DATA ACQUIRED DURING FEB-APRIL 2020 PERFORMED BY GBA AND RECEIVED 5-5-2020.
- PIPELINE AND OBJECTS PRELIMINARY IDENTIFIED FROM MAGNETOMETER SURVEY CADD FILE "HTI- HSC Mag review.dwg" PROVIDED BY GBA AND RECEIVED 5-5-2020.



PORT OF HOUSTON
AUTHORITY

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ENGINEER: Ashley P. Judith

P.E. NO: 112988

DATE: August 3, 2020

APPROVED:

DATE

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR - ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:

HOUSTON SHIP
CHANNEL (HSC)

EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)

SHEET TITLE:

PLAN VIEWS
3 & 4 - EXISTING
UTILITIES
CROSSINGS
WITH
MAGNETOMETER
SURVEY DATA

FROM HSC STA
50+000 TO HSC
STA 27+48

REV DATE DESCRIPTION

X 08/03/20 XXXX

DESIGNER: DC

CADD: RK

CHECKER: NM/AS

DATE: AUGUST 2020

SCALE: 1" = 1500'

DRAWING NO.

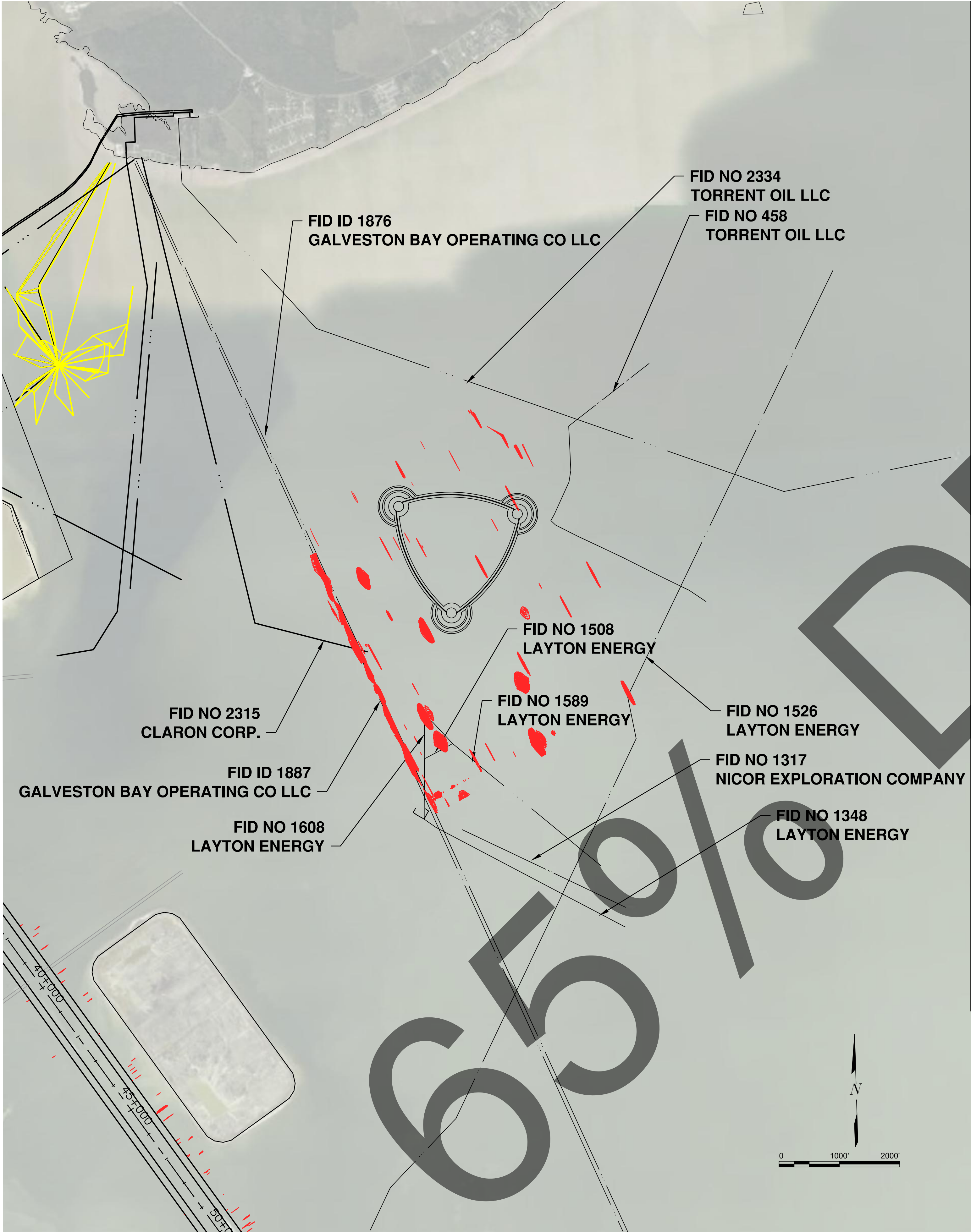
C90-D13-P11

SHEET NO. REV. NO.

VU002

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TIME: 7-31-20 - 1:48pm User: beverly.carriere DWG: D:\60618786 - Project 11 Design\900 CADD\20-Sheets\PA_Pipelines\HSC-C-SP-EX_PIPING_GIS_PLACEMENT_AREA.dwg



BIRD ISLAND MARSH PIPELINE INFOMATION

FID	P5_NUM	OPERATOR NAME	SYSTEM NAME	T4PERMIT	DIAMETER (IN)	COMMODITY	STATUS
458	862645	TORRENT OIL LLC	UMBRELLA POINT	5320	6.63	NATURAL GAS FWS	ABANBDONED
1317	610689	NICOR EXPLORATION COMPANY	ME-89-179	90082	2.38	CRUDE OIL	IN SERVICE
1348	491399	LAYTON ENERGY INC.	RED FISH REEF N.	4035	4.5	NATURAL GAS FWS	ABANBDONED
1526	491399	LAYTON ENERGY INC.	LINE INDEX 166	7551	10.75	NATURAL GAS	ABANBDONED
1589	491399	LAYTON ENERGY INC.	RED FISH REEF N.	4035	2.88	NATURAL GAS FWS	ABANBDONED
1608	491399	LAYTON ENERGY INC.	RED FISH REEF N.	4035	2.88	NATURAL GAS FWS	ABANBDONED
1876	293375	GALVESTON BAY OPERATING CO LLC	GALVESTON BAY	6287	8.63	NATURAL GAS FWS	IN SERVICE
1887	293375	GALVESTON BAY OPERATING CO LLC	GALVESTON BAY	6286	4.5	CRUDE OIL	ABANBDONED
2315	158276	CLARON CORPORATION	ME-85-021	90018	3.5	CRUDE OIL	IN SERVICE
2334	862645	TORRENT OIL LLC	UMBRELLA POINT CRUDE GATHERING SYSTEM	9646	4.5	CRUDE OIL	ABANBDONED

LEGEND:

EXISTING UTILITY LINE CEDAR POINT GATHERING LINE MAGNETOMETER HIT

NOTE:

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BIRD ISLAND MARSH ADJACENT PIPELINES
SCALE: 1" = 1000'



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PROJECT TITLE:

HOUSTON SHIP
CHANNEL (HSC)

EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)

SHEET TITLE:

BIRD ISLAND
MARSH
EXISTING
UTILITIES
CROSSINGS

REV DATE DESCRIPTION

X XX/XX/XX XXXX

DESIGNER: DC

CADD: AS

CHECKER: NM

DATE: AUGUST 2020

SCALE: 1" = 1000'

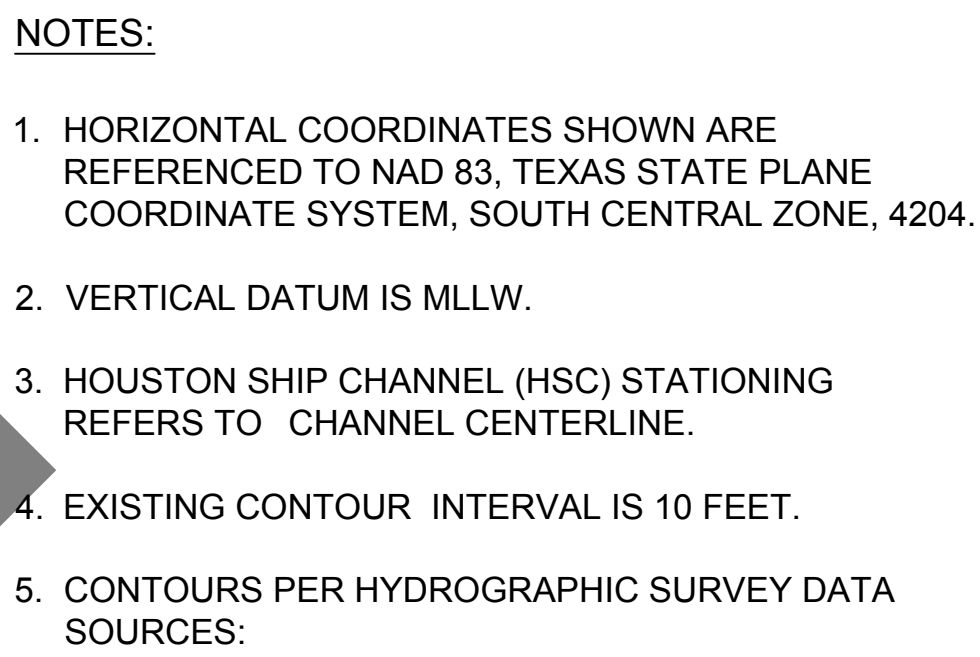
DRAWING NO.

C90-D13-P11

SHEET NO.

REV. NO.

VU-105 0



- 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 & 3/06/2020; PERFORMED BY GAHAGAN & BRYANT ASSOCIATES, INC.
- 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.
- 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.
- d. *BSC_2020Survey_MLLW.txt*
CONDITION SURVEY, BSC STATION 25+58 TO 240+00 CHAMBERS AND HARRIS COUNTY, TX 01/13/2020, 03/02-23/2020, 04/17/2020, 05/21-29/2020, 06/23/2020, AND 07/09-18/2020 GAHAGAN & BRYANT ASSOCIATES, INC.

CONSTRAINTS KEY NOTES

- 1 EXISTING NAVIGATION CHANNEL
SOUTH BOATERS CUT
- 2 EXISTING NAVIGATION CHANNEL
NORTH BOATERS CUT
- 3 EXISTING NAVIGATION CHANNEL
FIVE MILE CUT
- 4 ENVIRONMENTAL SENSITIVE AREA
MID BAY
- 5 EXISTING TURNING BASIN
BAYPORT SHIP CHANNEL
- 6 EXISTING NAVIGATION CHANNEL
BAYPORT SHIP CHANNEL
- 7 EXISTING BERTHING FACILITIES
- 8 ENVIRONMENTAL SENSITIVE AREA - PA14

NOTE TO REVIEWERS:
CONTOURS TO BE FINALIZED
FOR NEXT SUBMITTAL.



PORT OF HOUSTON AUTHORITY

CONSULTANT:

SEAL: **65% PRELIMINARY**

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P.E NO: 112988

DATE: August 3, 2020

APPROVED: _____
DATE

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MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

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**HOUSTON SHIP
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**EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)**

SHEET TITLE:
PROJECT 11:
SOUTH BOATERS CUT
TO BAYPORT
(BEACON 76):
HSC STA 57+000 TO
HSC STA 20+000
& BAYPORT SHIP
CHANNEL

EXISTING CONDITIONS AND CONSTRAINTS PLAN

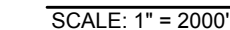
[illegible]

DESIGNER:	AJ
CADD:	RK
CHECKER:	CH/SH/MM
DATE:	AUGUST 2020
SCALE:	1" = 2,000'

DRAWING NO.

C90-D13-P11-005-V-101	
SHEET NO.	REV. NO.
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**HOUSTON SHIP
CHANNEL (HSC)**

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

MEET TITLE:
**PROJECT 11:
SOUTH BOATERS
CUT TO BAYPORT
(BEACON 76)
HSC STA 57+000 TO
HSC STA 20+000**

DREDGE PLAN - 1
HSC STA 57+000 TO
HSC STA 40+400

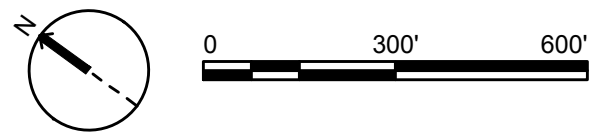
[illegible]

DESIGNER:	AJ
CADD:	RK
CHECKER:	CH/SH/MM
DATE:	AUGUST 202
SCALE:	1" = 300'

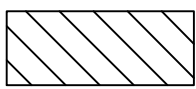
DRAWING NO.

SHEET NO.	REV. NO.
-	0

65% SUBMITTAL



LEGEND:

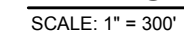
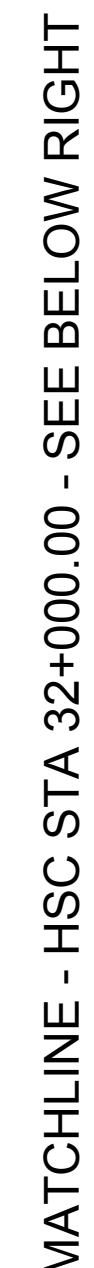


CHANNEL WIDENING & BARGE RELOCATION DREDGE LIMITS

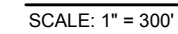
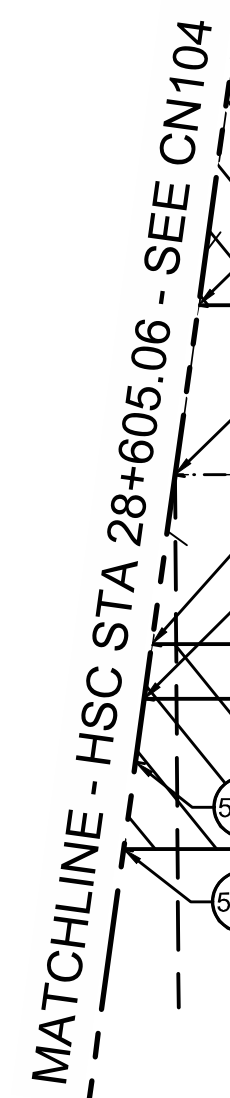
NO.	NORTHING	EASTING
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5.2	13767993.64	3270949.32
5.3	13768043.50	3271018.16
5.4	13768181.35	3271208.49
5.5	13767682.76	3270520.08
5.6	13767632.90	3270451.24
5.7	13767495.05	3270260.92



TIME: 7-30-20 - 6:48am User: kaulr DWG: C:\Projects\60618786 - Project 11 Design\900 CADD\20-Sheets\C90-D13-P11-005-CN102.dwg



5.12	13790900.92	329
5.13	13791155.71	329
5.14	13791202.31	329
5.15	13791266.33	329
5.16	13790709.08	329
5.17	13790668.69	329
5.18	13790621.65	329
5.19	13790557.03	329



CONSULTANT:

SEAL:

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ENGINEER: Ashley P. Judith
P.E NO: 112988
DATE: August 3, 2020

APPROVED: _____
DATE

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:
**HOUSTON SHIP
CHANNEL (HSC)**

**EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)**

SHEET TITLE:
PROJECT 11:
SOUTH BOATERS CUT
TO BAYPORT (BEACON
76)-HSC STA 57+000 TO
HSC STA 20+000

HSC DREDGE PLAN-2

HSC STA 40+000 TO
HSC STA 28+605.06

[illegible]

DESIGNER:	AJ
CADD:	RK
CHECKER:	CH/SH/MM
DATE:	AUGUST 2020
SCALE:	1" = 300'

DRAWING NO.
C90-D13-P11-005-CN103

SHEET NO.	REV. NO.
-	0

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ENGINEER: Ashley P. Judith

P.E. NO: 112988

DATE: August 3, 2020

APPROVED: _____
DATE _____

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:
**HOUSTON SHIP
CHANNEL (HSC)
EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)**

**PROJECT 11:
SOUTH BOATERS CUT
TO BAYPORT
(BEACON 76): HSC STA
77+000 TO HSC STA
80+000 & BAYPORT
SHIP CHANNEL**

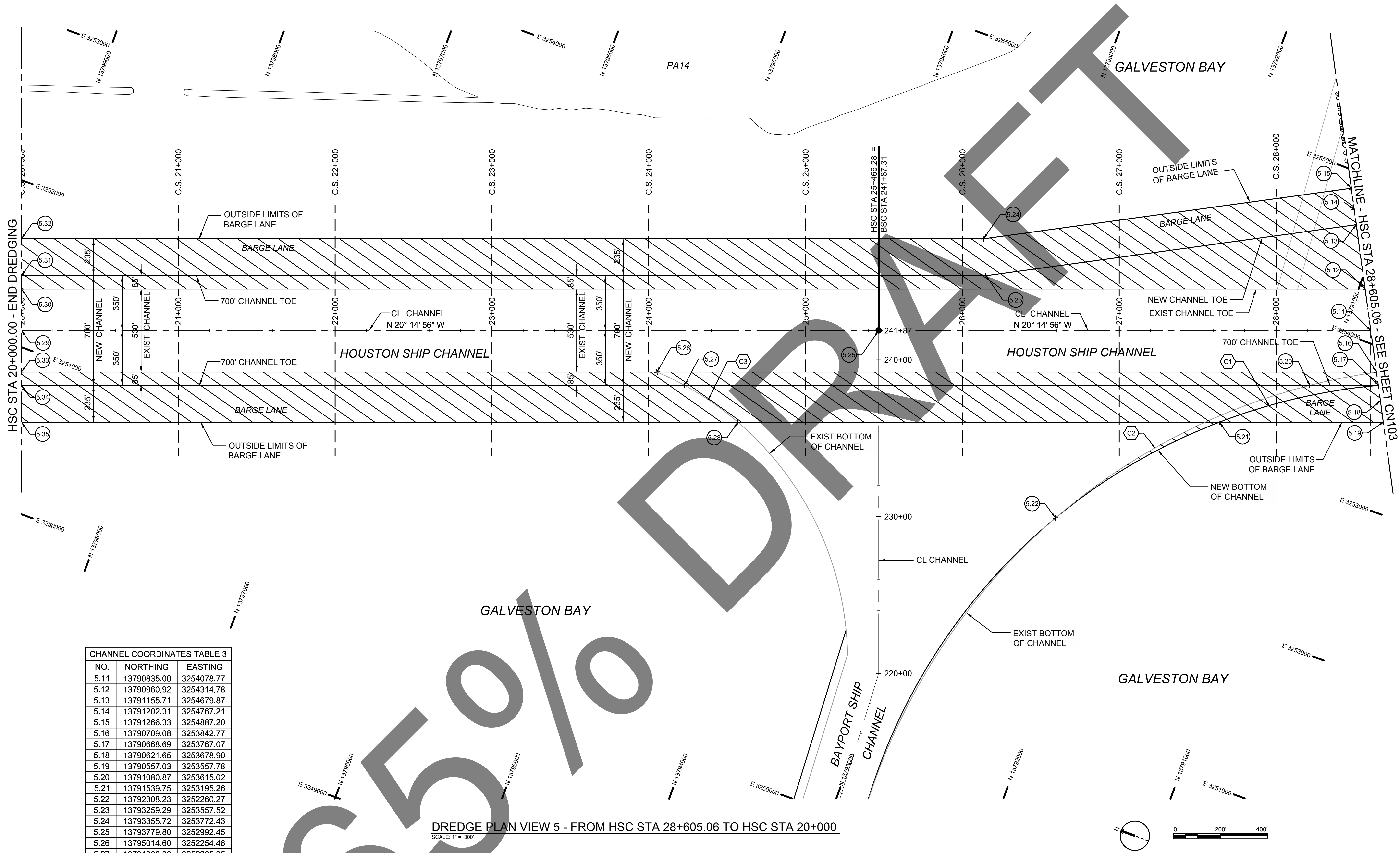
HSC DREDGE PLAN-3
HSC STA 28+605.08
TO HSC STA 20+000

[illegible]

DESIGNER:	AJ
CADD:	RK
CHECKER:	CH/SH/MM
DATE:	AUGUST 2020
SCALE:	1" = 300'

DRAWING NO.	
C90-D13-P11-005-CN104	
SHEET NO.	REV. NO.
-	0

65% SUBMITTAL



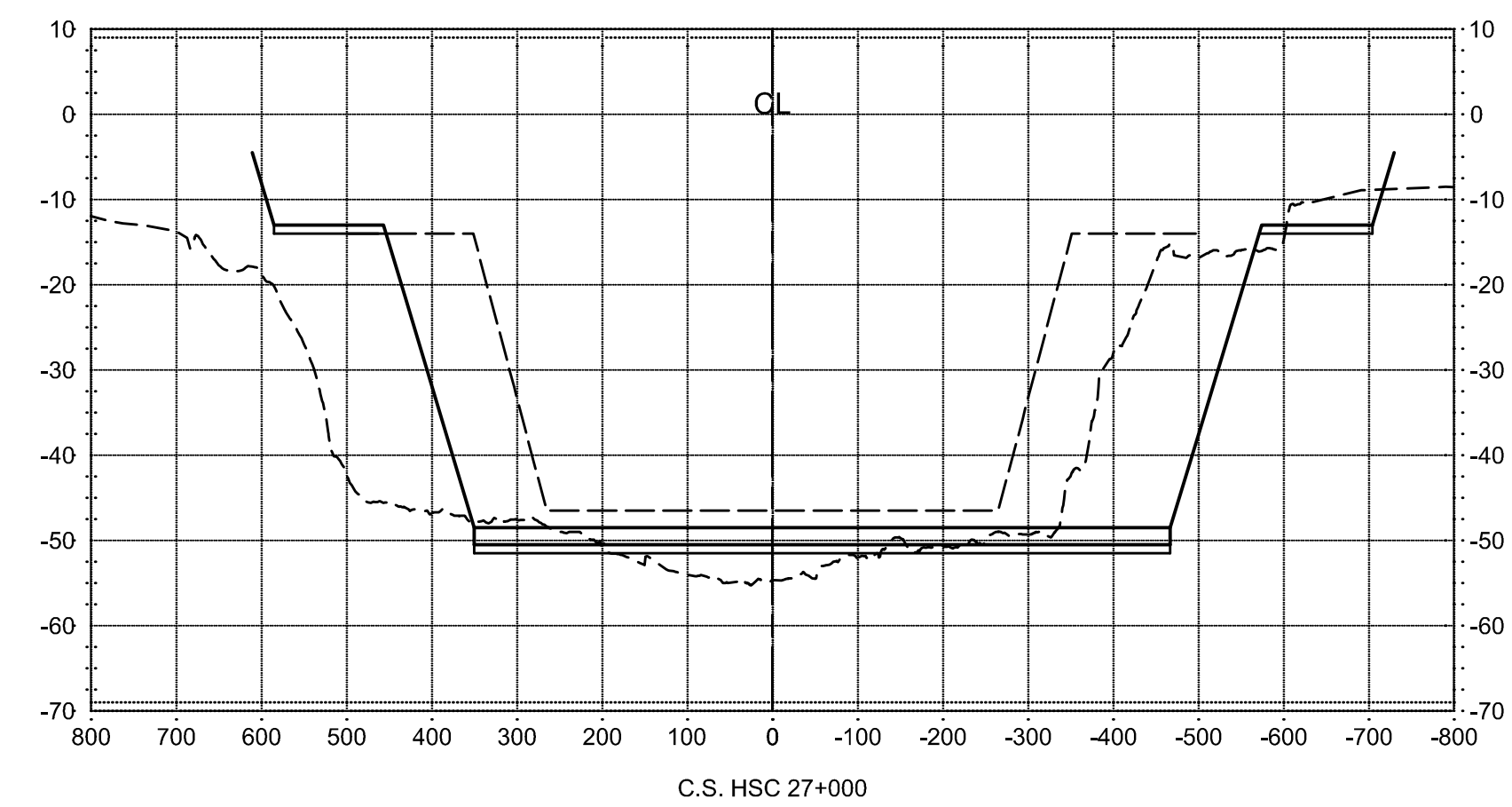
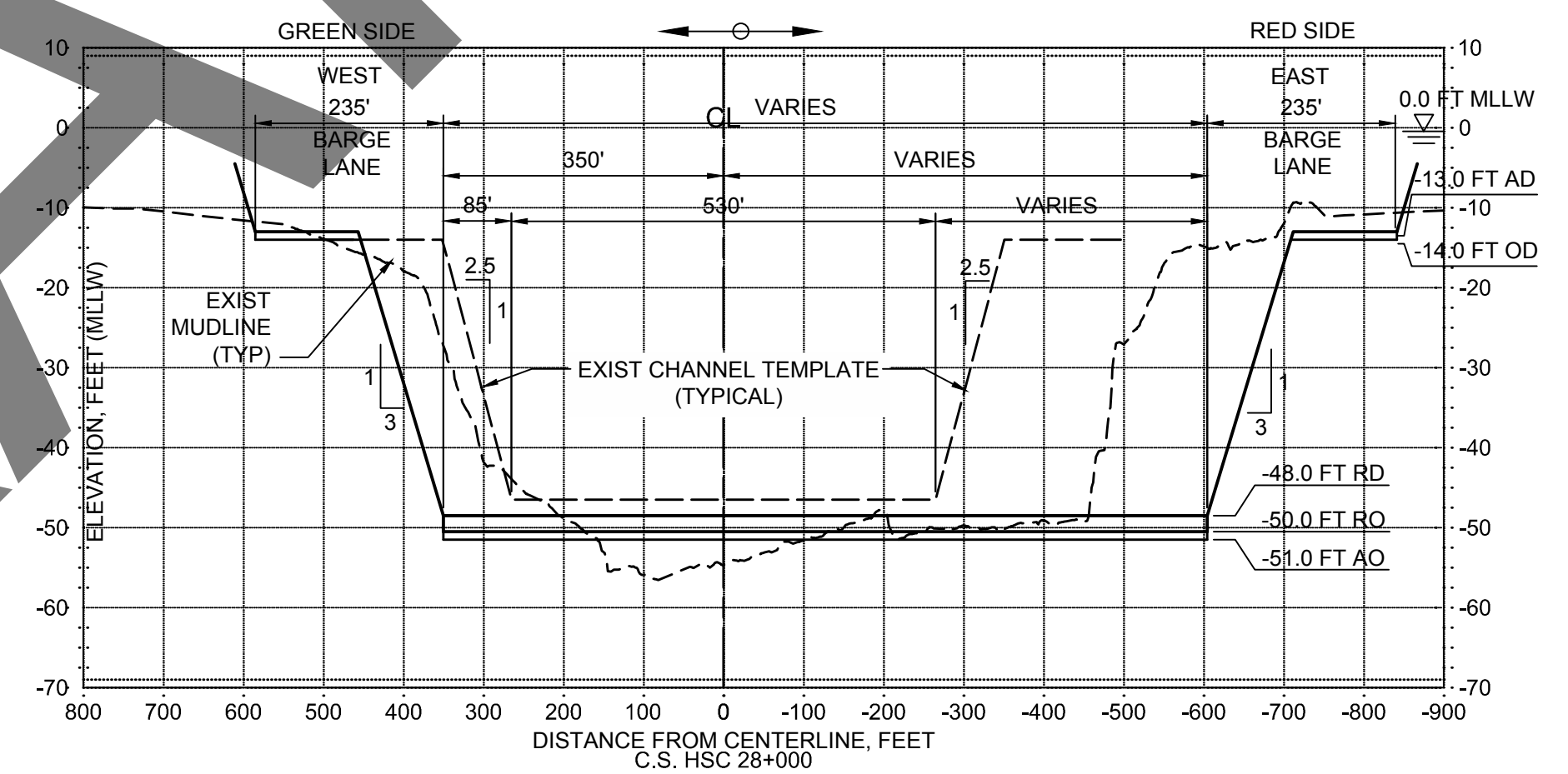
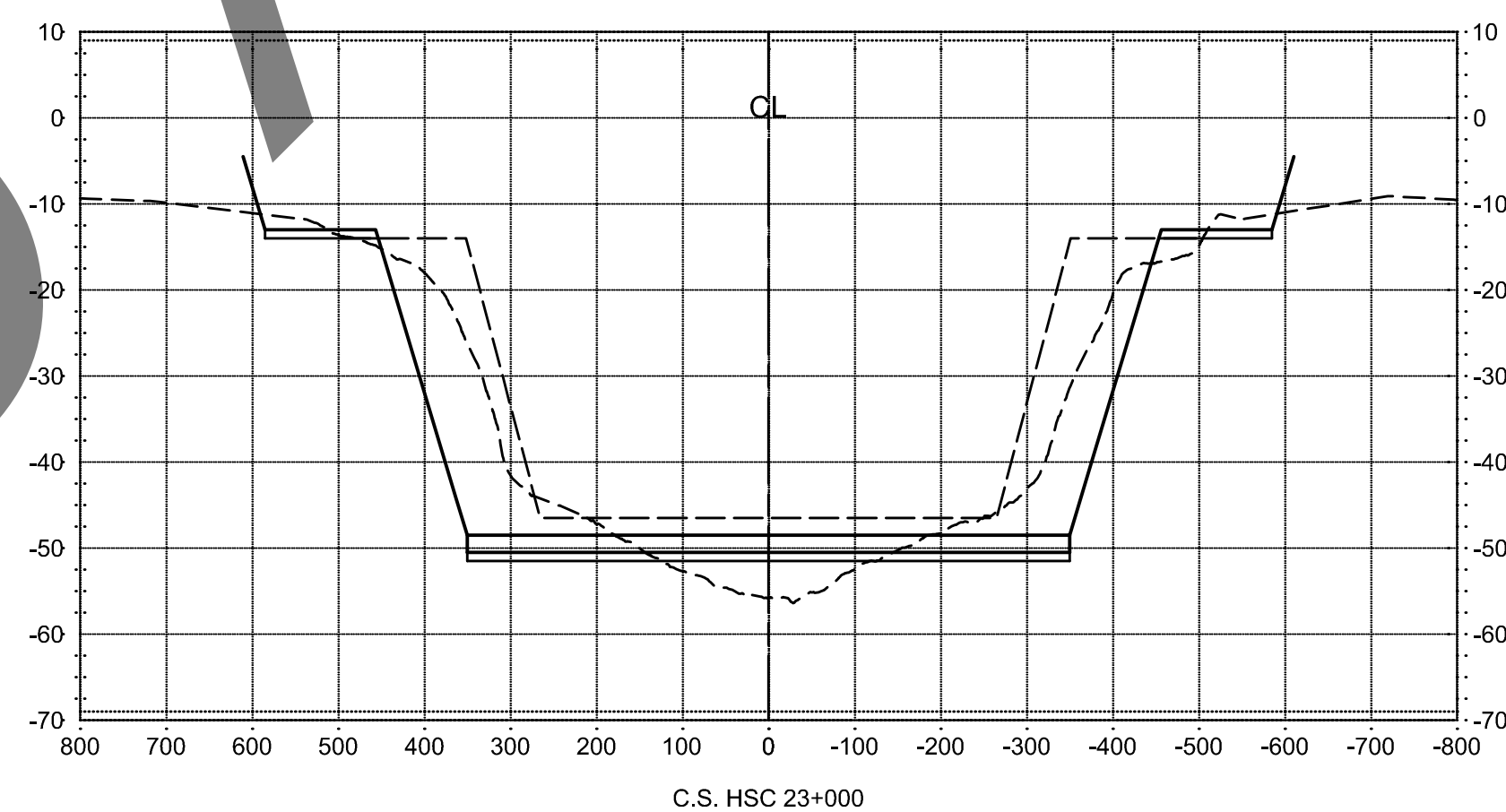
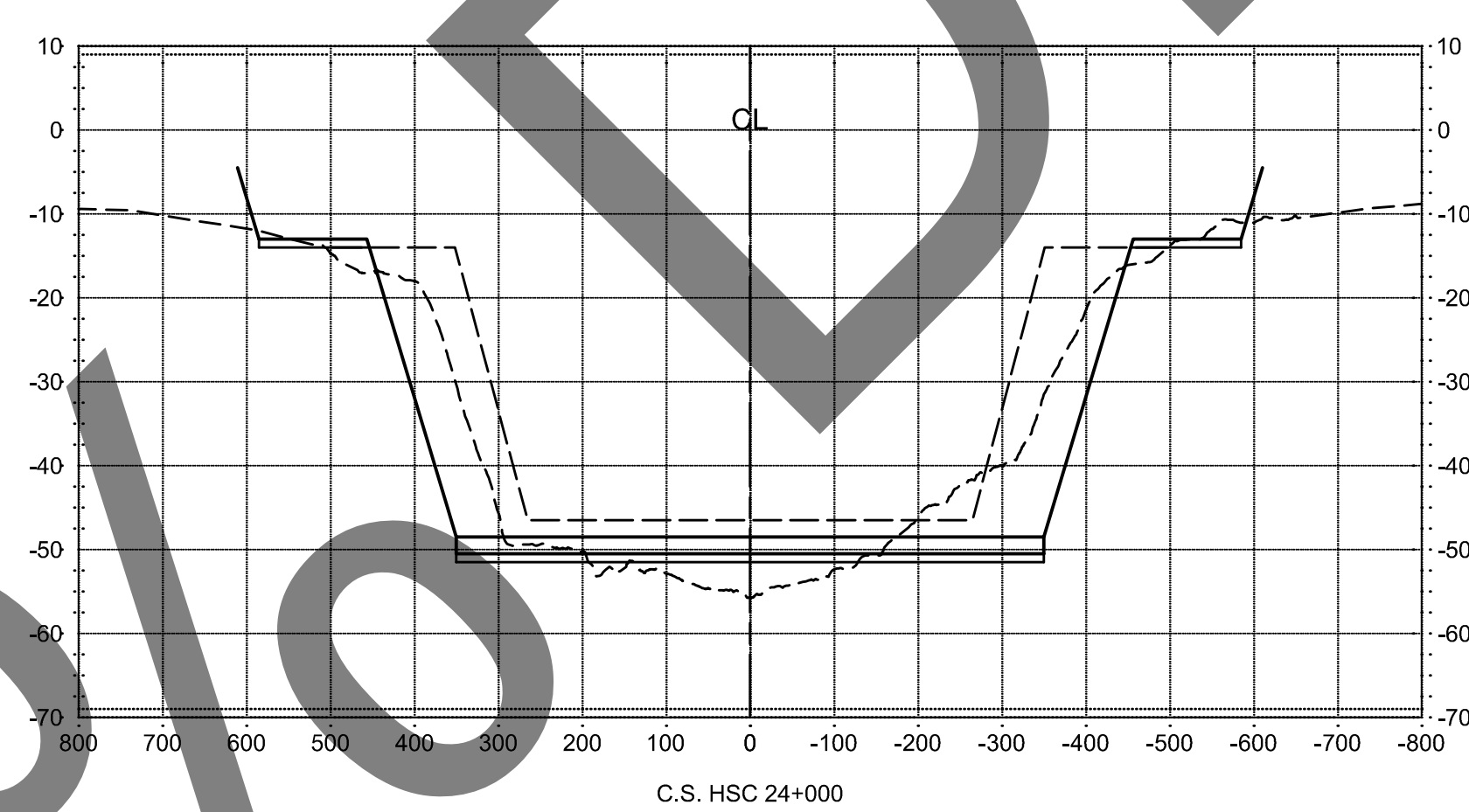
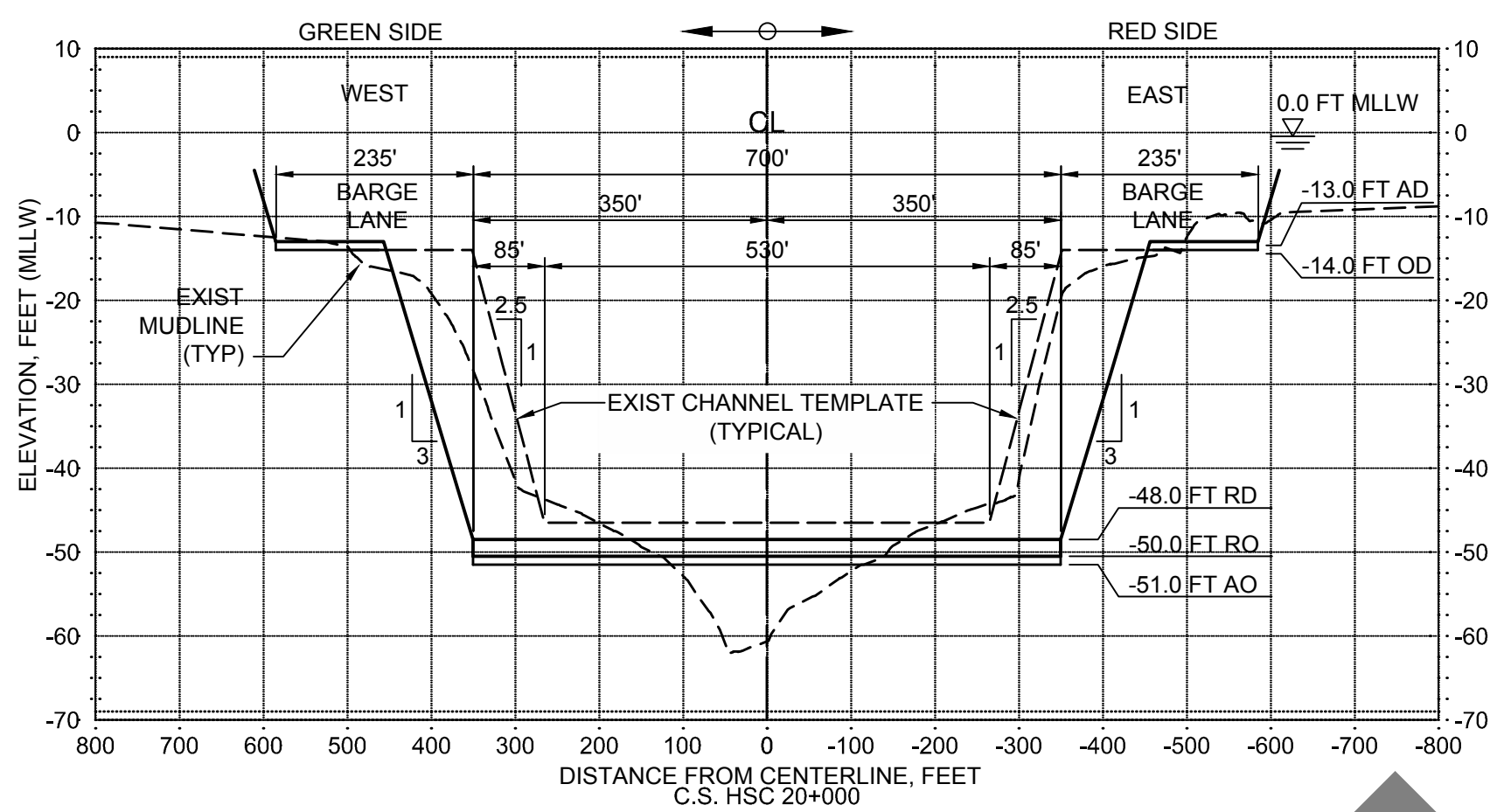
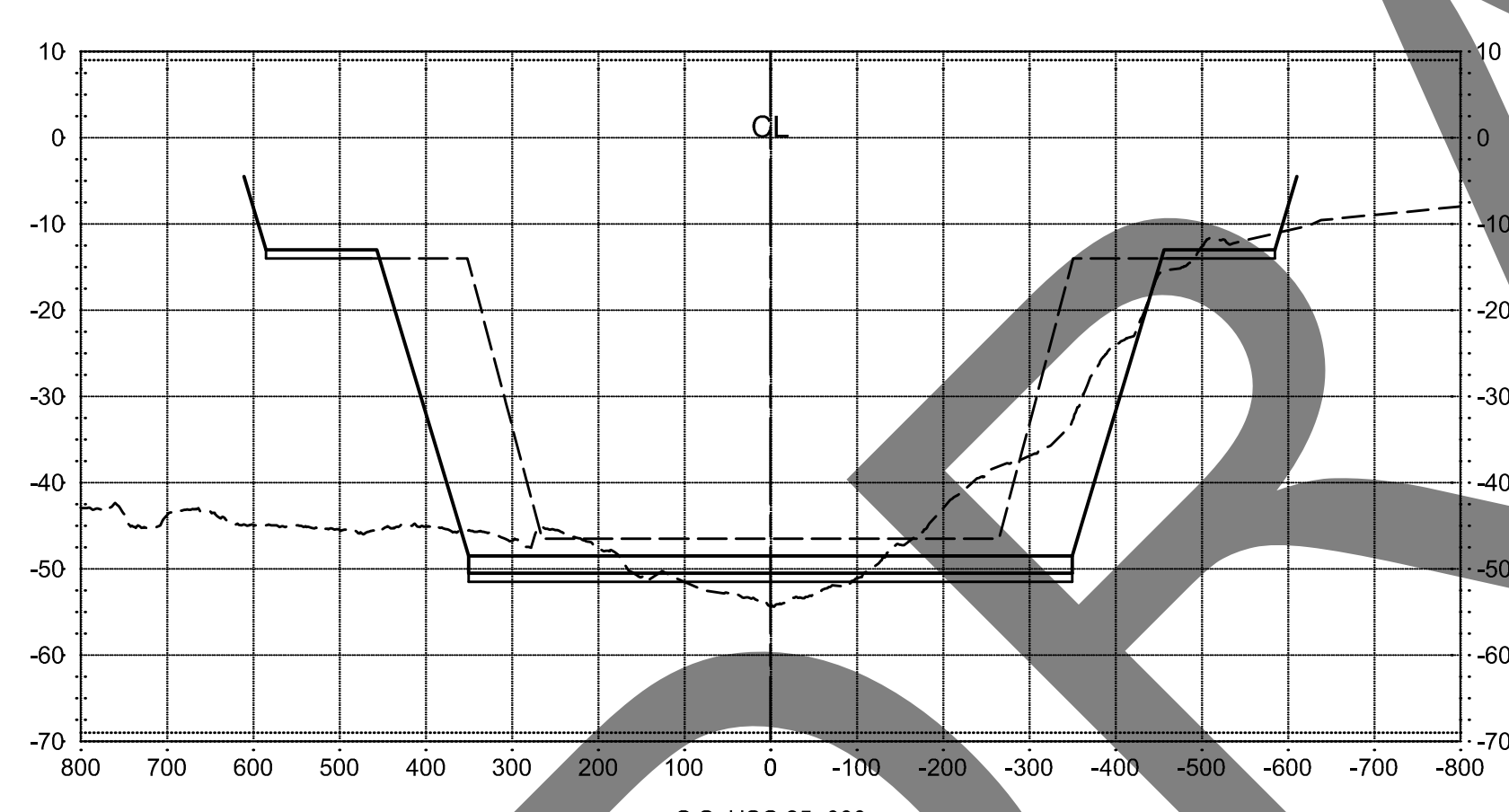
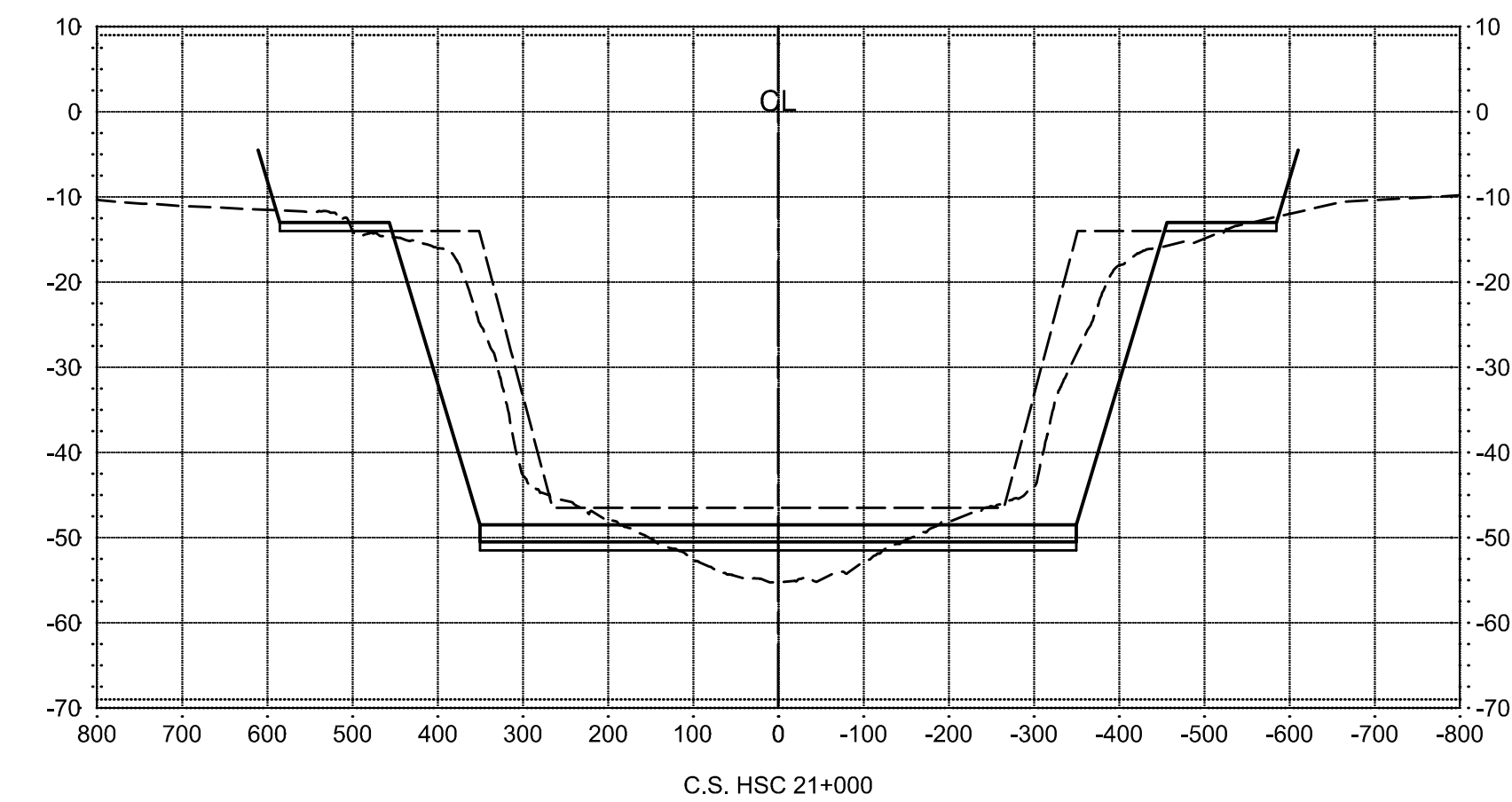
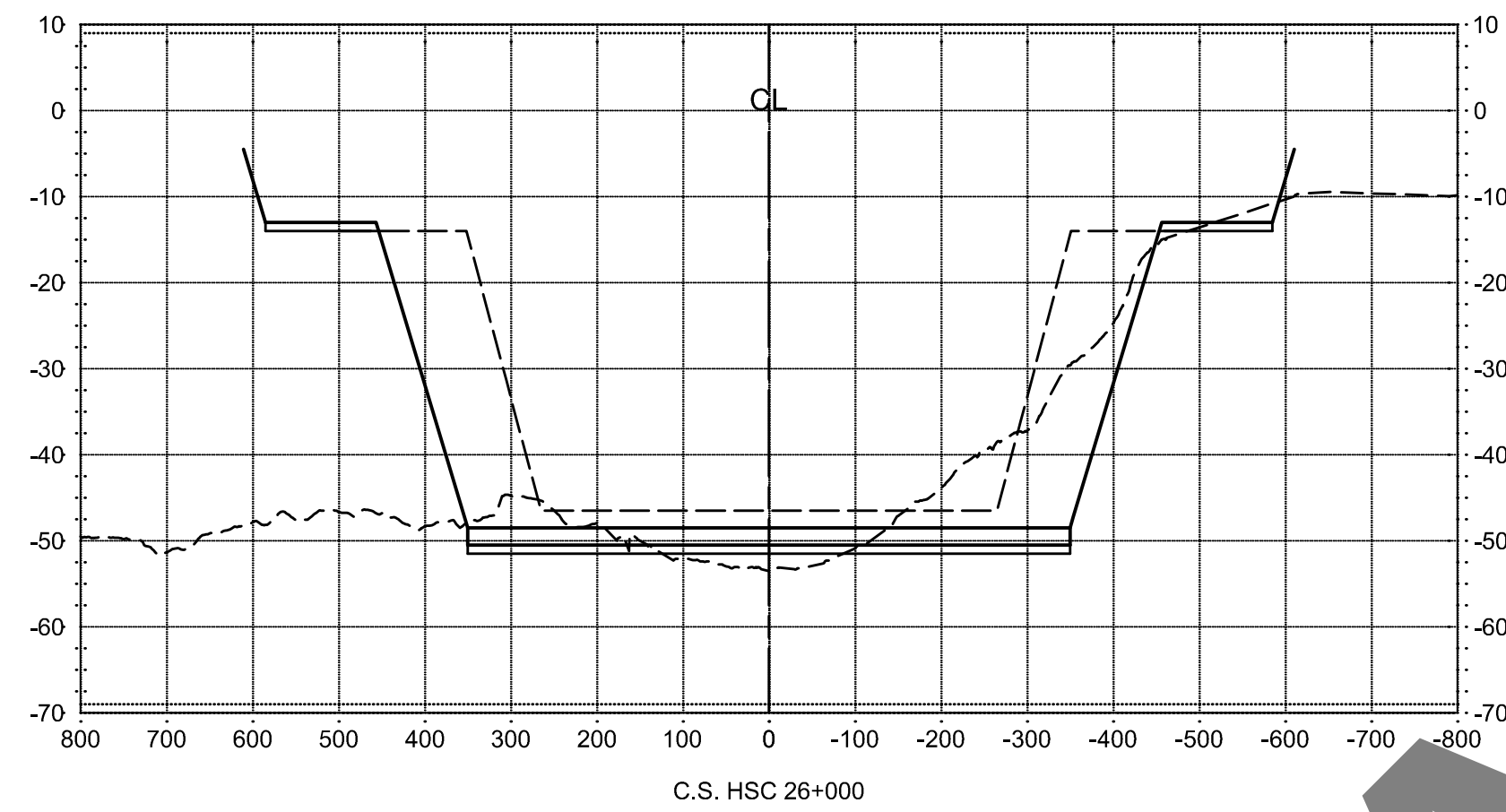
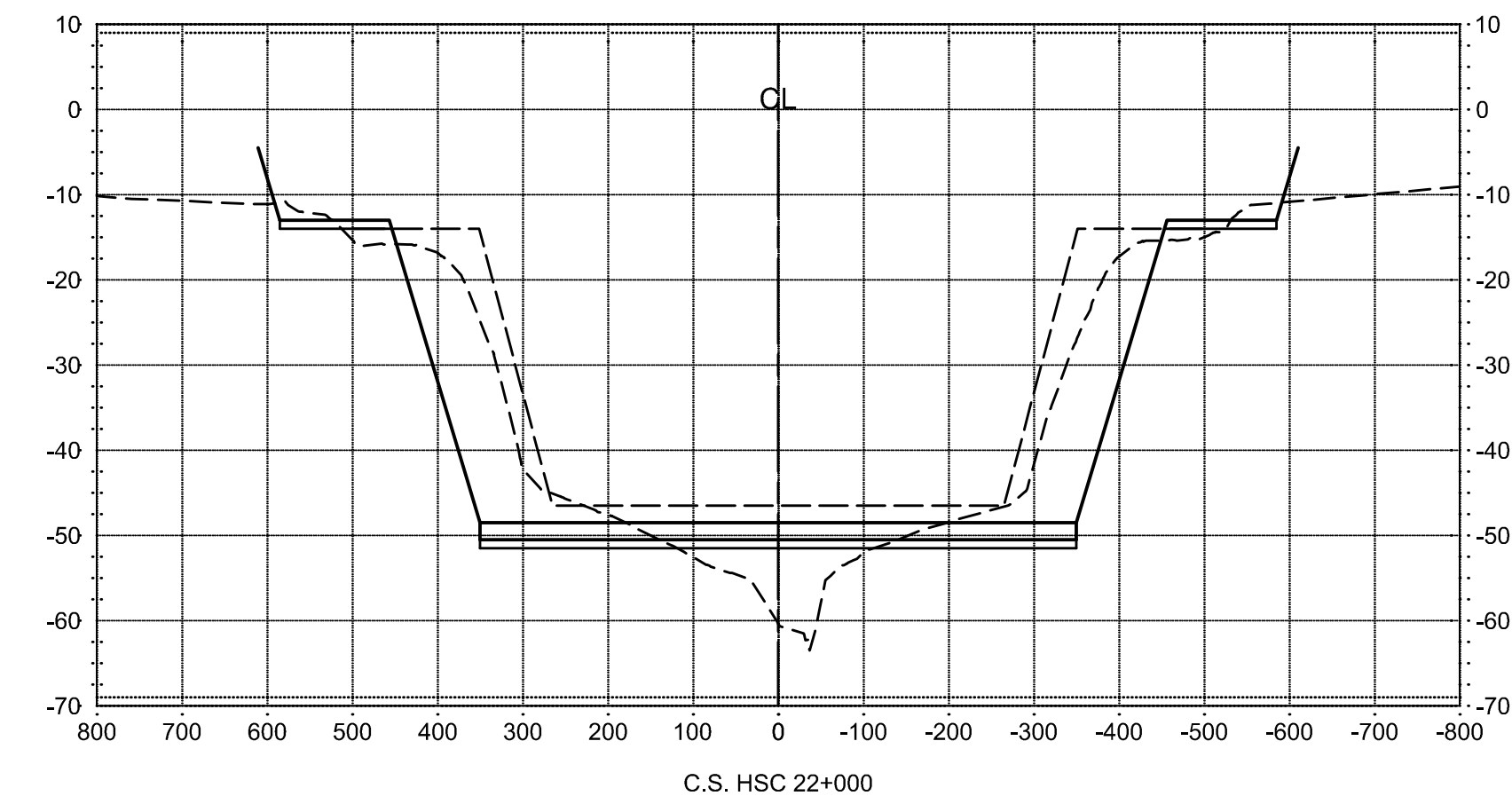
DREDGE PLAN VIEW 5 - FROM HSC STA 28+605.06 TO HSC STA 20+000

SCALE: 1" = 300'

NO.	NORTHING	EASTING
5.11	13790835.00	3254078.77
5.12	13790960.92	3254314.78
5.13	13791155.71	3254679.87
5.14	13791202.31	3254767.21
5.15	13791266.33	3254887.20
5.16	13790709.08	3253842.77
5.17	13790668.69	3253767.07
5.18	13790621.65	3253678.90
5.19	13790557.03	3253557.78
5.20	13791080.87	3253615.02
5.21	13791539.75	3253195.26
5.22	13792308.23	3252260.27
5.23	13793259.29	3253557.52
5.24	13793355.72	3253772.43
5.25	13793779.80	3252992.45
5.26	13795014.60	3252254.48
5.27	13794820.86	3252235.35
5.28	13794420.09	3252132.71
5.29	13798908.25	3251100.58
5.30	13798999.97	3251349.20
5.31	13799029.38	3251428.95
5.32	13799110.72	3251649.42
5.33	13798816.53	3250851.95
5.34	13798787.12	3250772.21
5.35	13798705.78	3250551.73

CHANNEL CURVE DATA TABLE - 1				
NO.	RADIUS	DELTA	LENGTH	TANGENT
C1	3,743.89'	34° 35' 50"	2,260.77'	1,166.03'
C2	4,000.00'	16° 17' 10"	1,137.06'	572.39'
C3	2,000.00'	17° 27' 10"	609.21'	306.98'

TIME: 7-30-20 - 2:21pm User: kaulr DWG: C:\Projects\60618786 - Project 11 Design\900 CADD\20-Sheets\C90-D13-P11-005-CN104.dwg



NOTES:

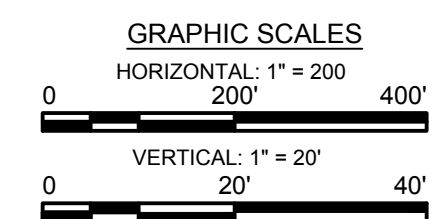
- NOTES:**
1. ALL LEVELS SHOWN IN FEET TO MEAN LOW LOW WATER (MLLW).
 2. ABBREVIATIONS: RD - REQUIRED DEPTH
RO - REQUIRED OVER DEPTH
AO - ALLOWABLE OVER DEPTH

2. ABBREVIATIONS:

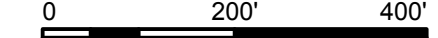
RD - REQUIRED DEPTH

RO - REQUIRED OVER D

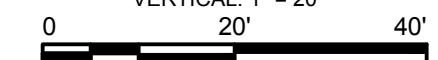
AO - ALLOWABLE OVER DEPTH



HORIZONTAL: 1" = 200'



VERTICAL : 1" = 30'

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FOR ISSUANCE OF A PERMIT.

ENGINEER: Ashley P. Judith
112988

P.E. NO: _____
August 3, 202

DATE: August 3, 2020

APPROVED:

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:

HOUSTON SHIP CHANNEL (HSC)

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

SHEET TITLE:

**PROJECT 11:
SOUTH BOATERS
CUT TO BAYPORT
(BEACON 76)
HSC STA 57+000 TO
HSC STA 20+000**

DREDGE CROSS
SECTIONS - 1

HSC STA 28+000

[illegible]

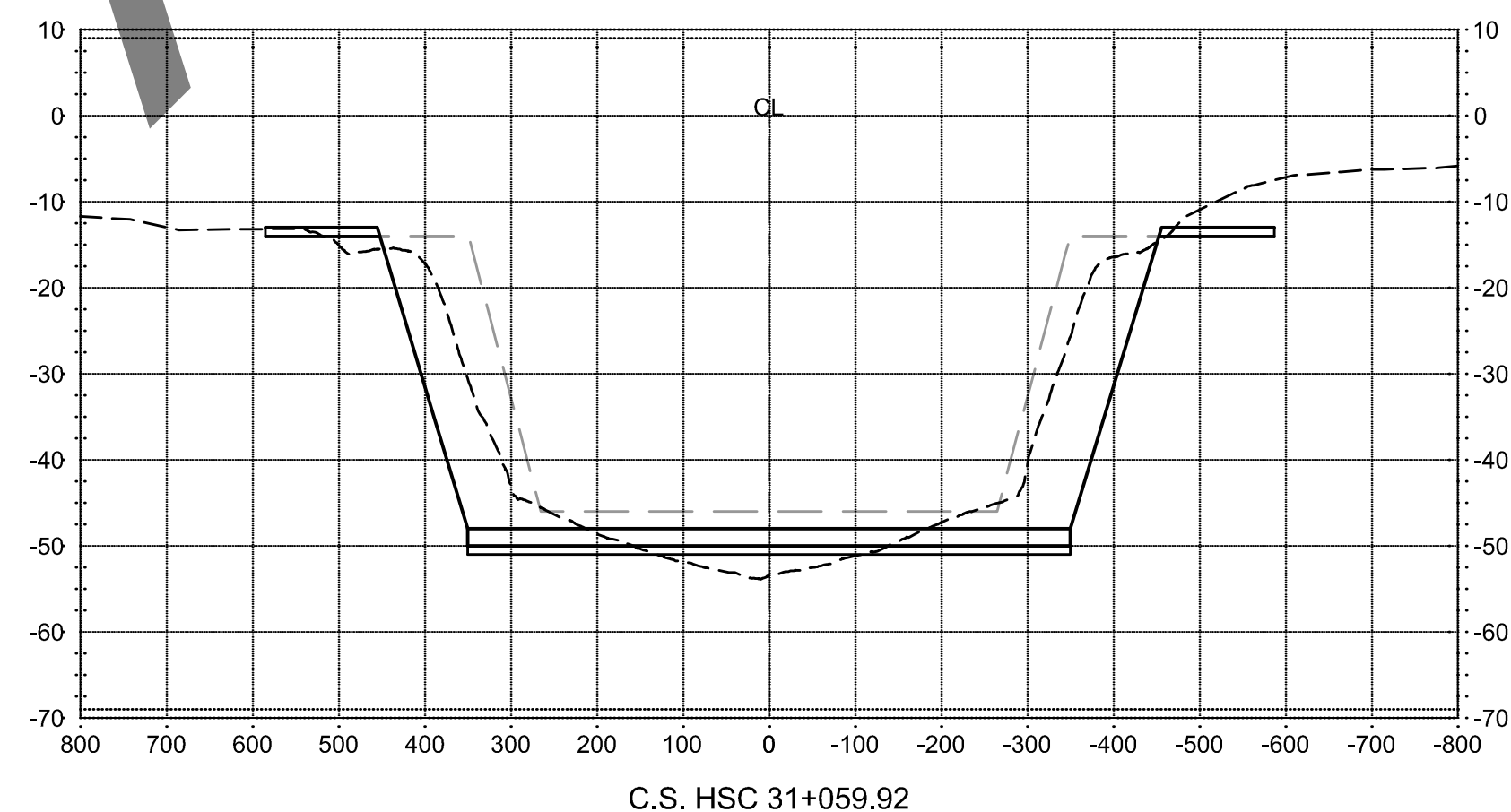
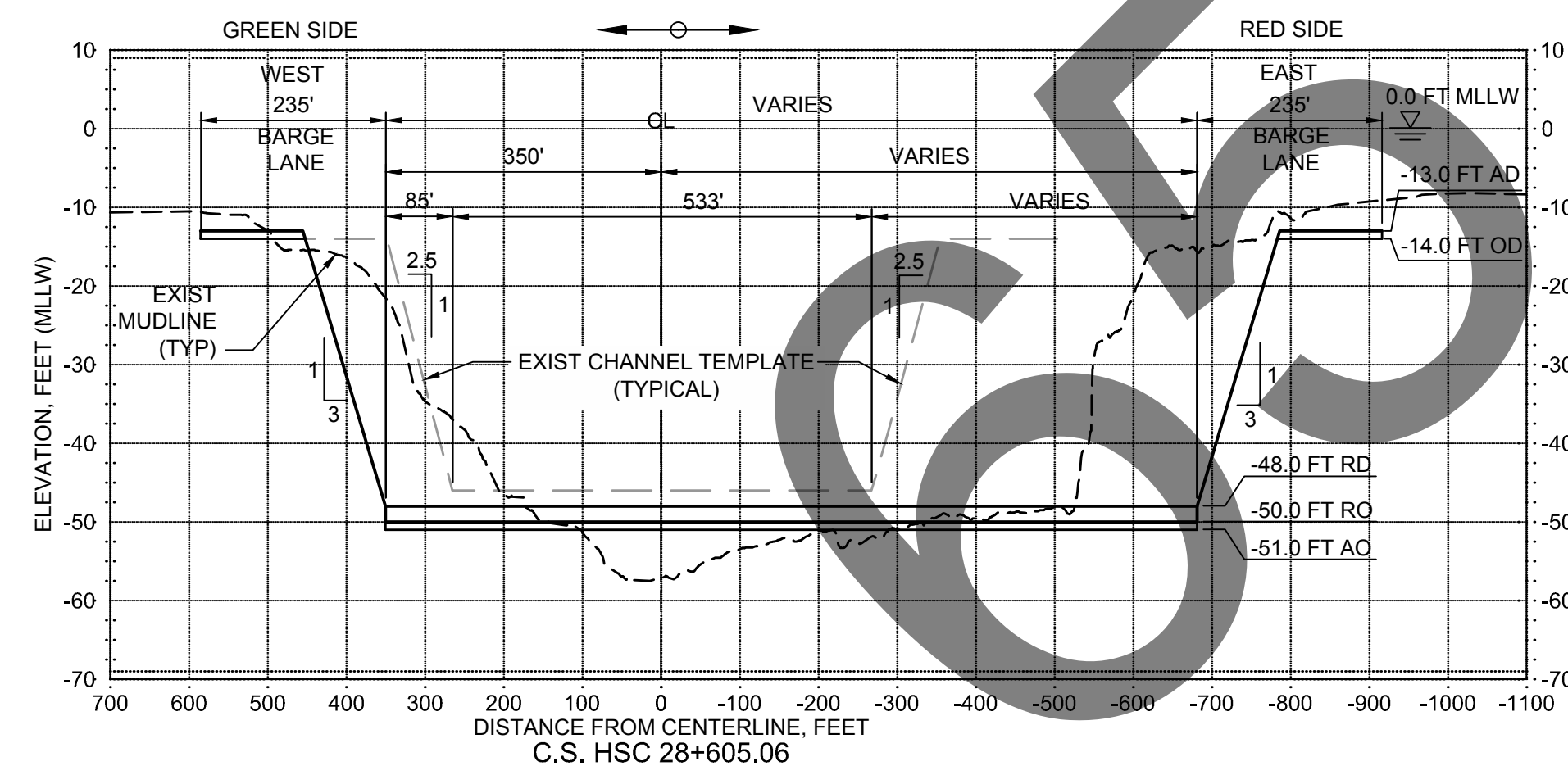
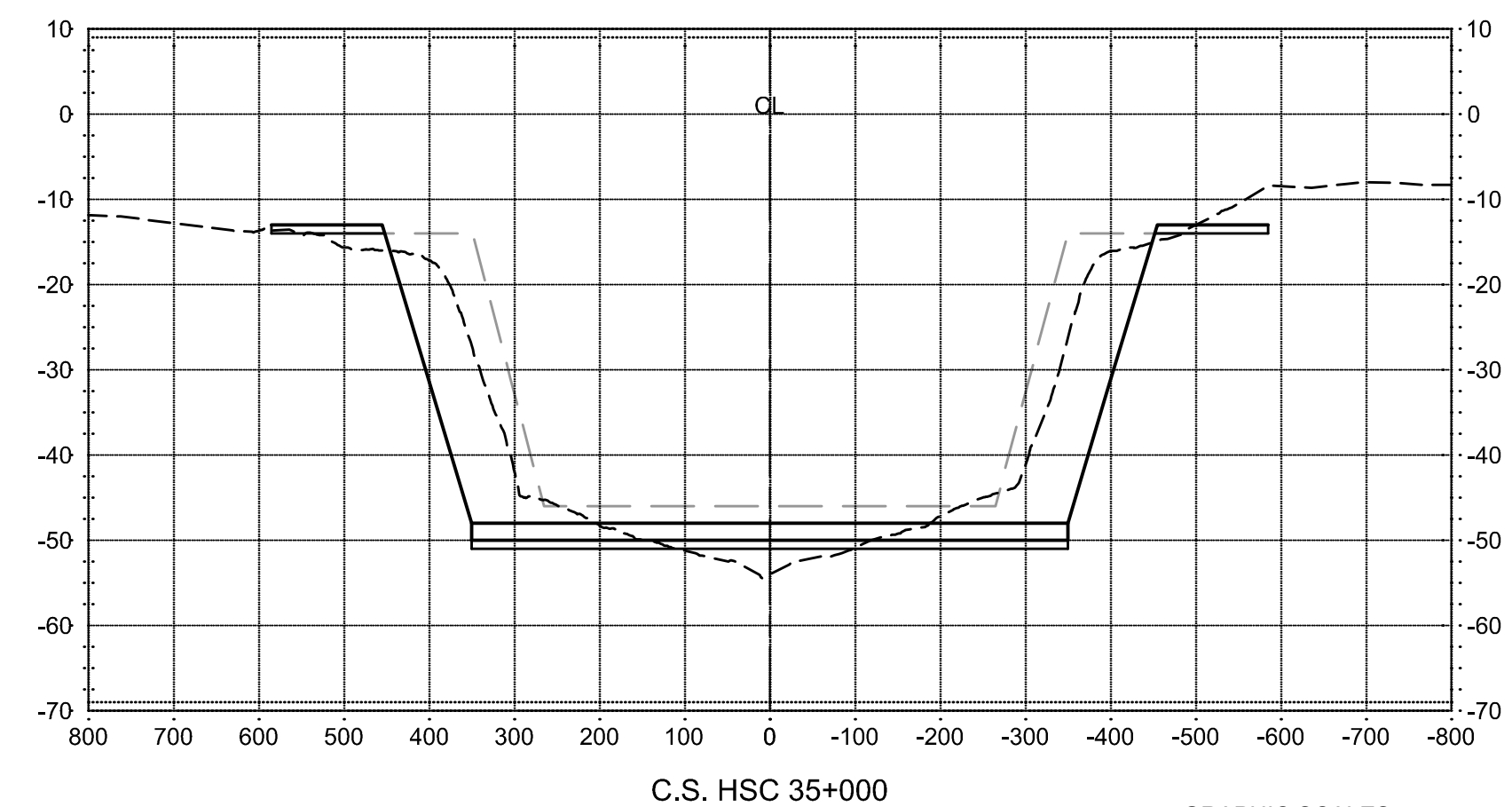
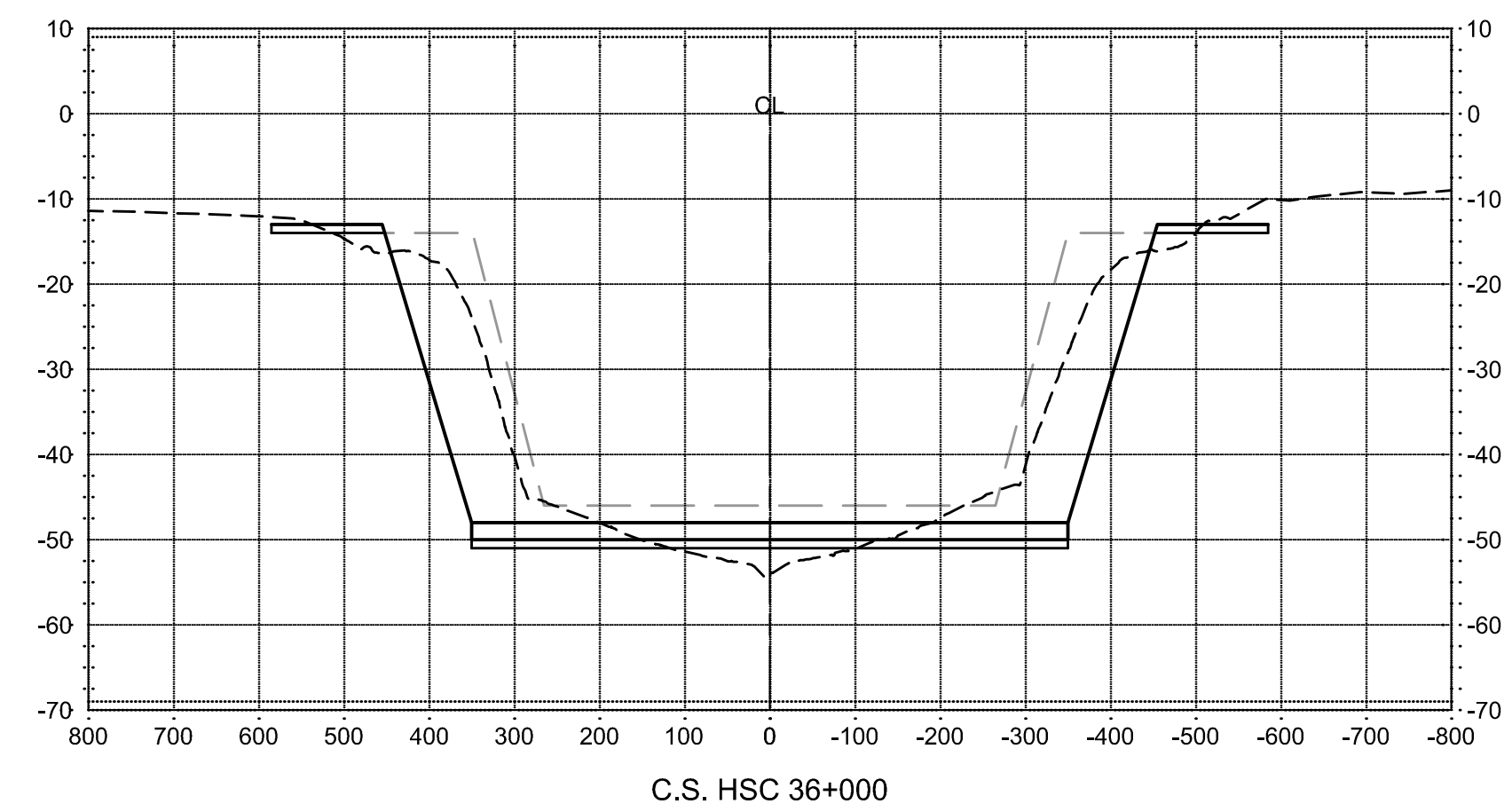
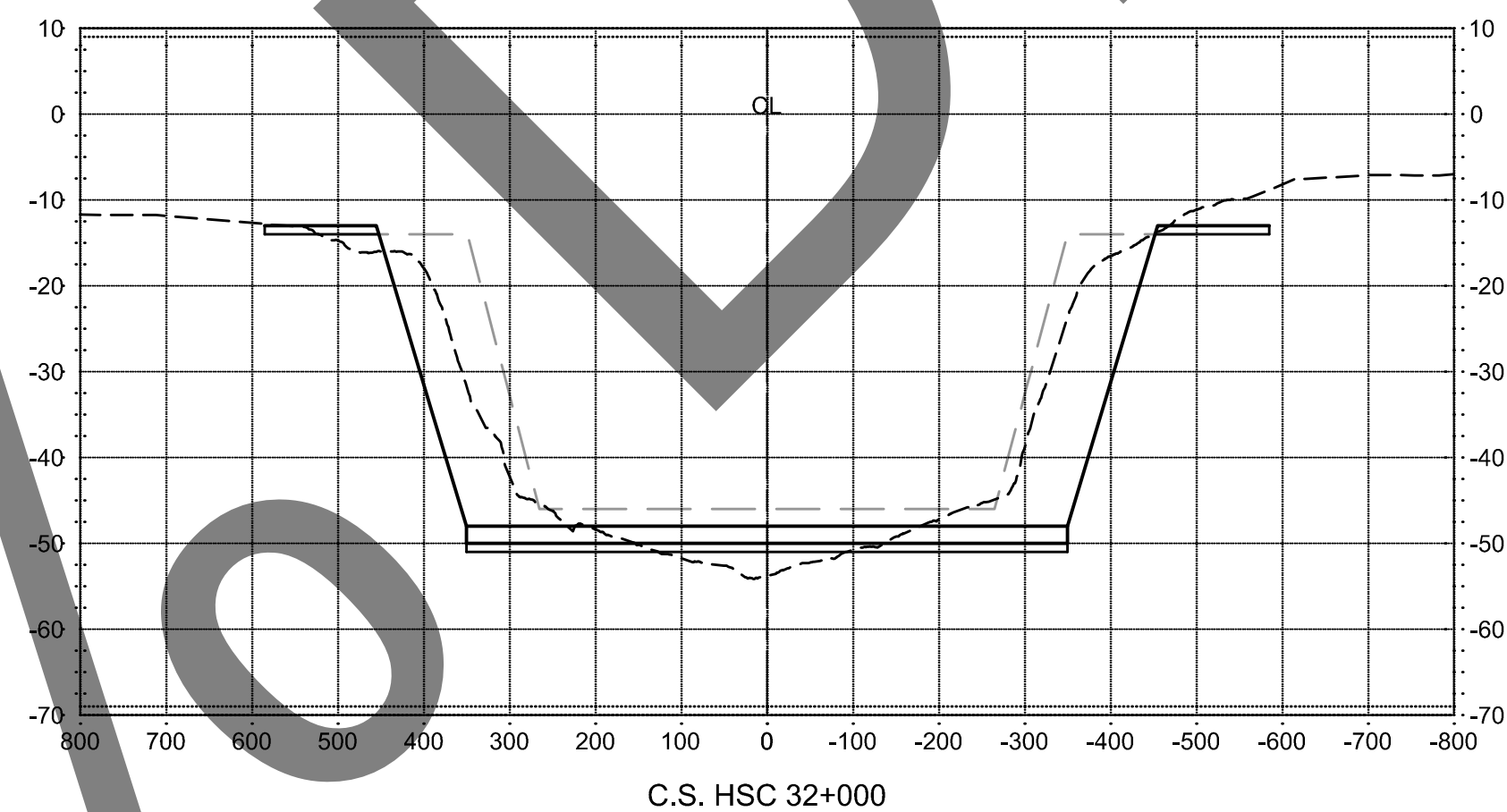
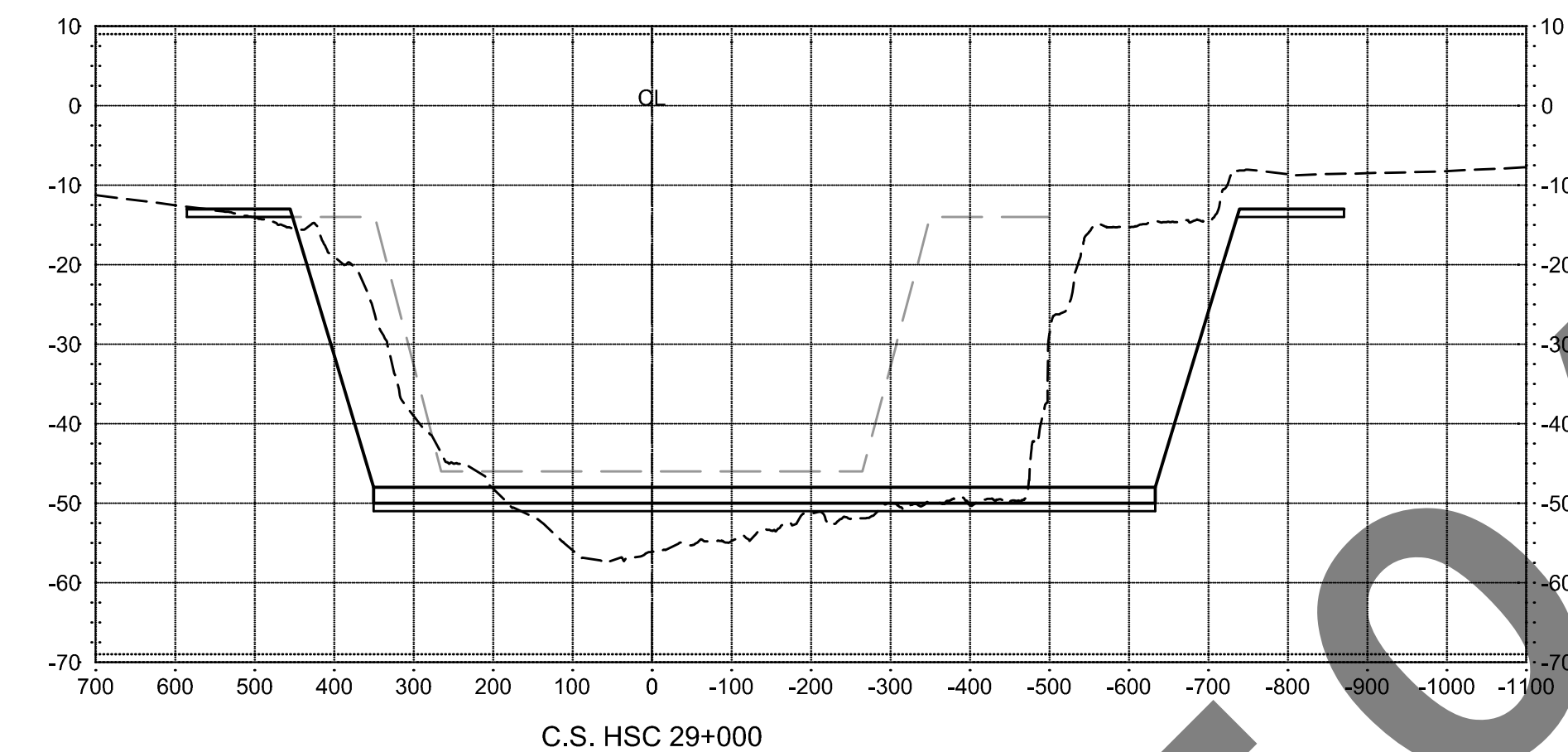
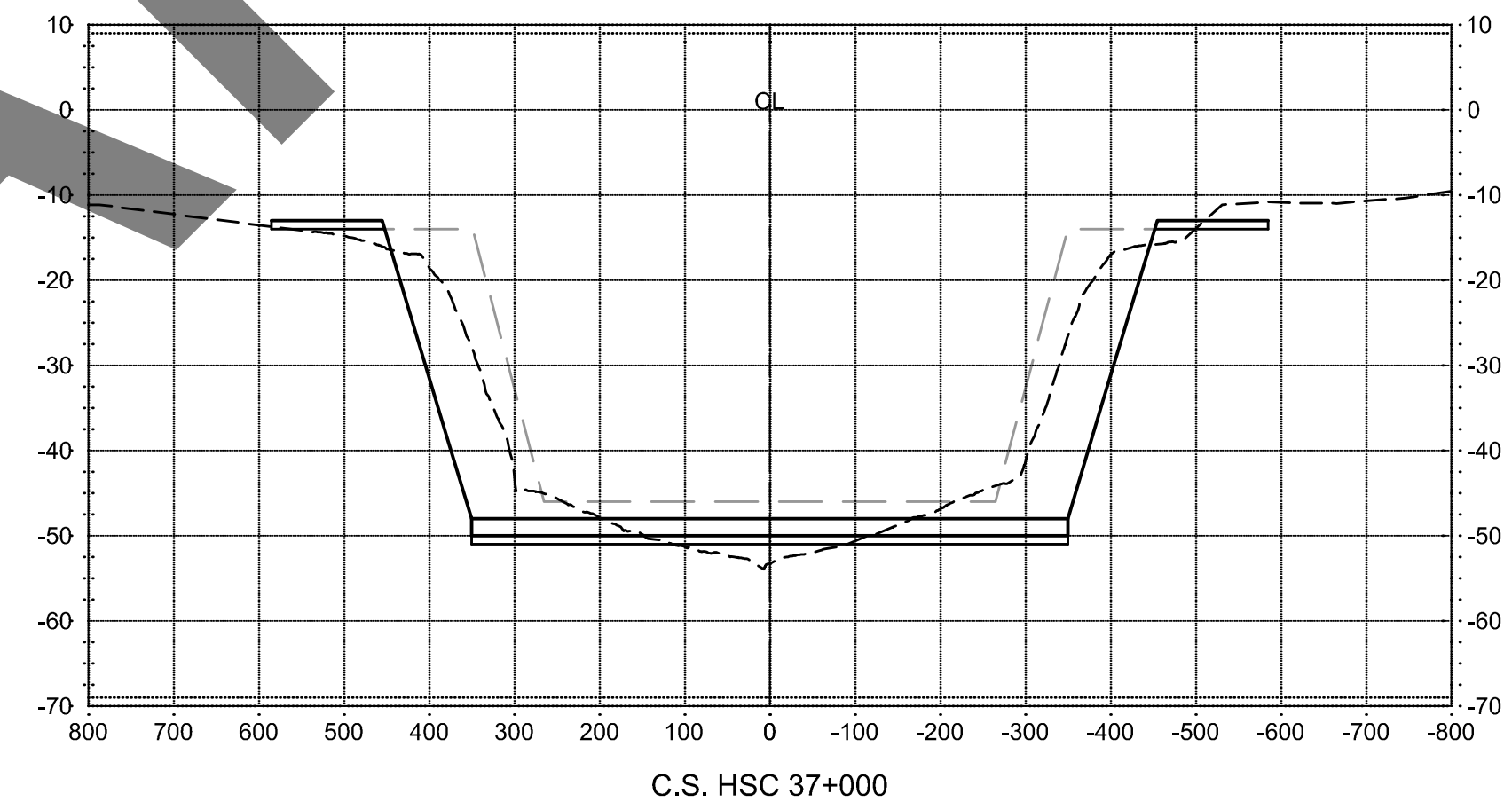
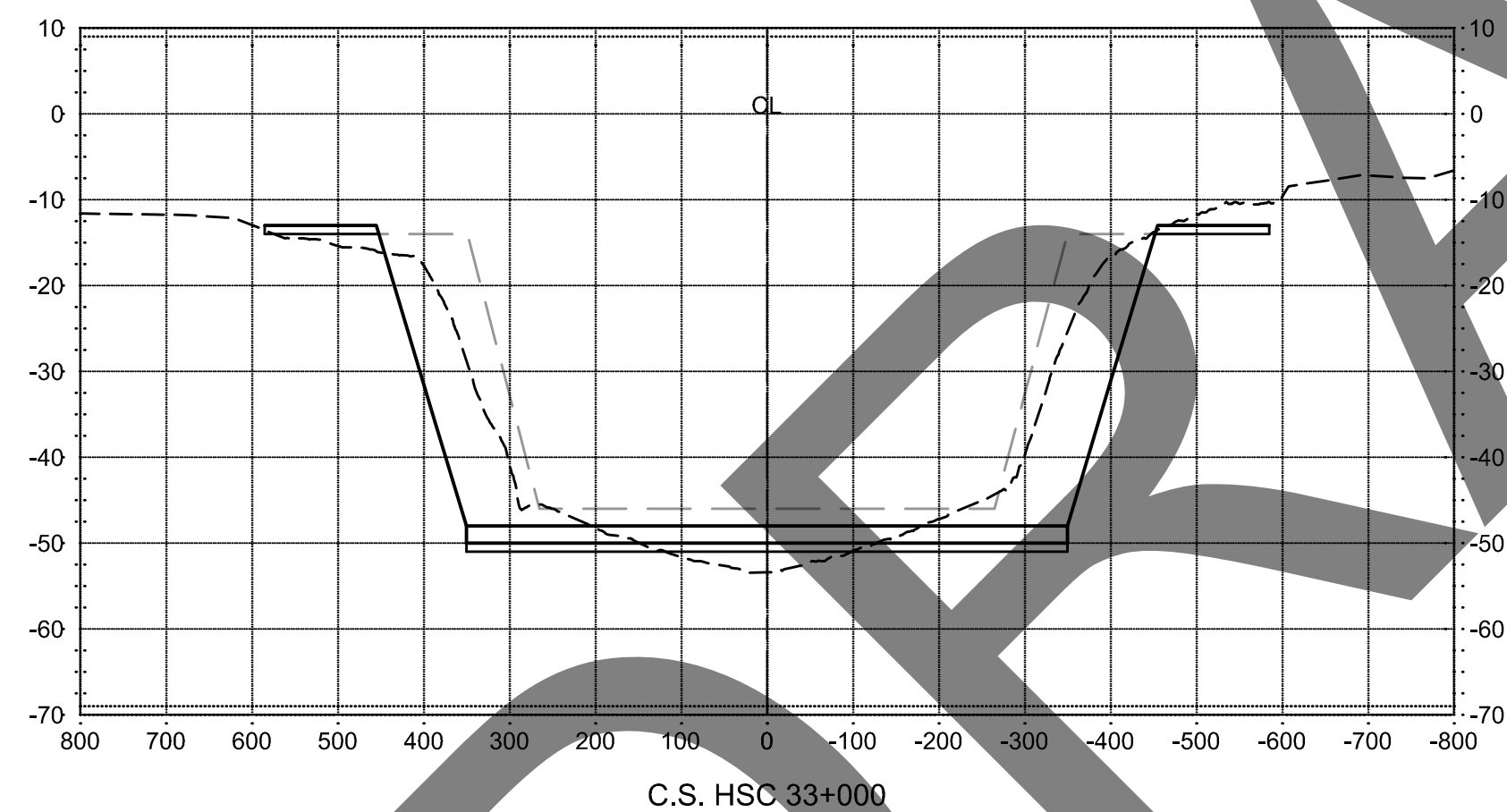
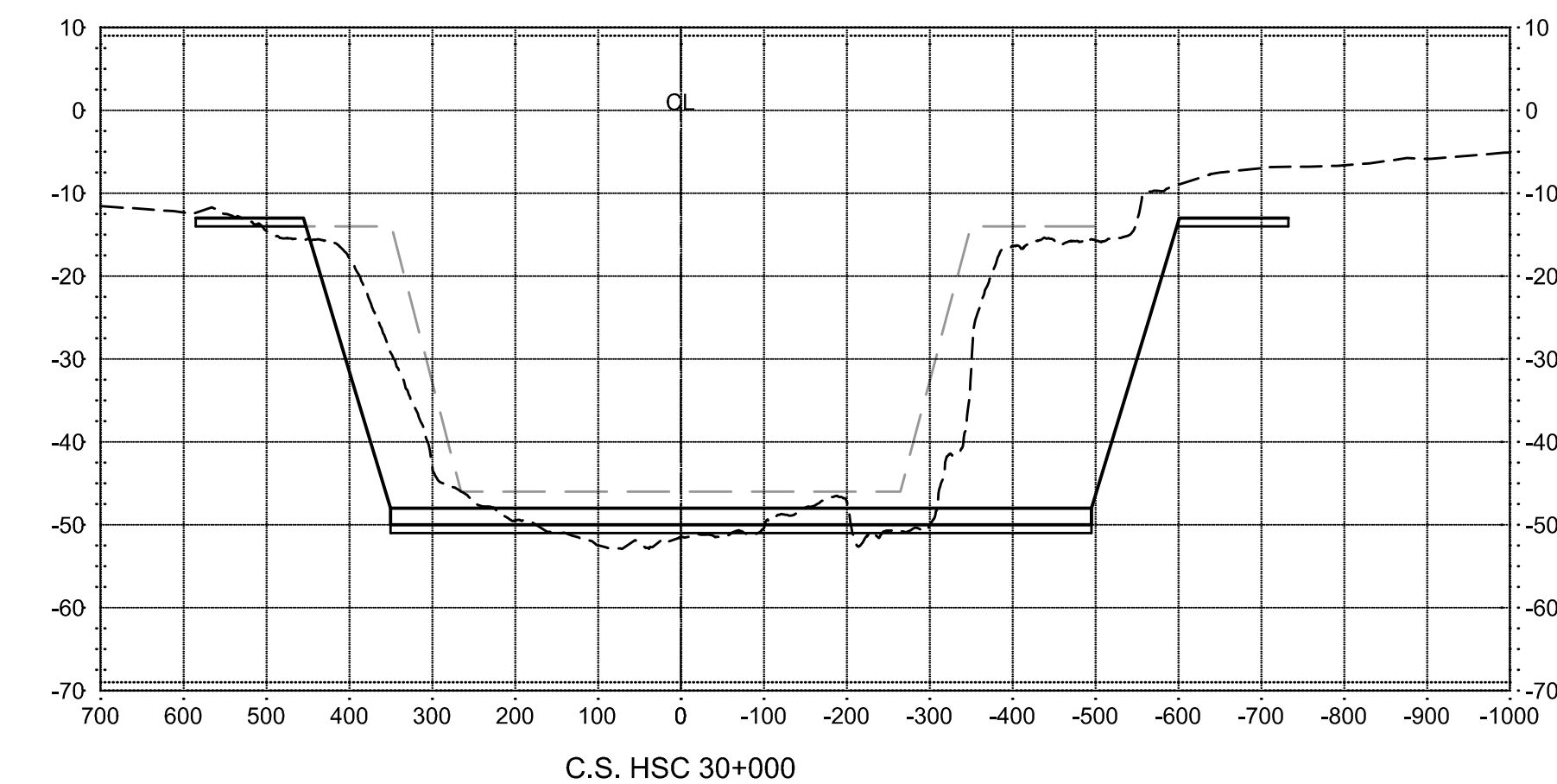
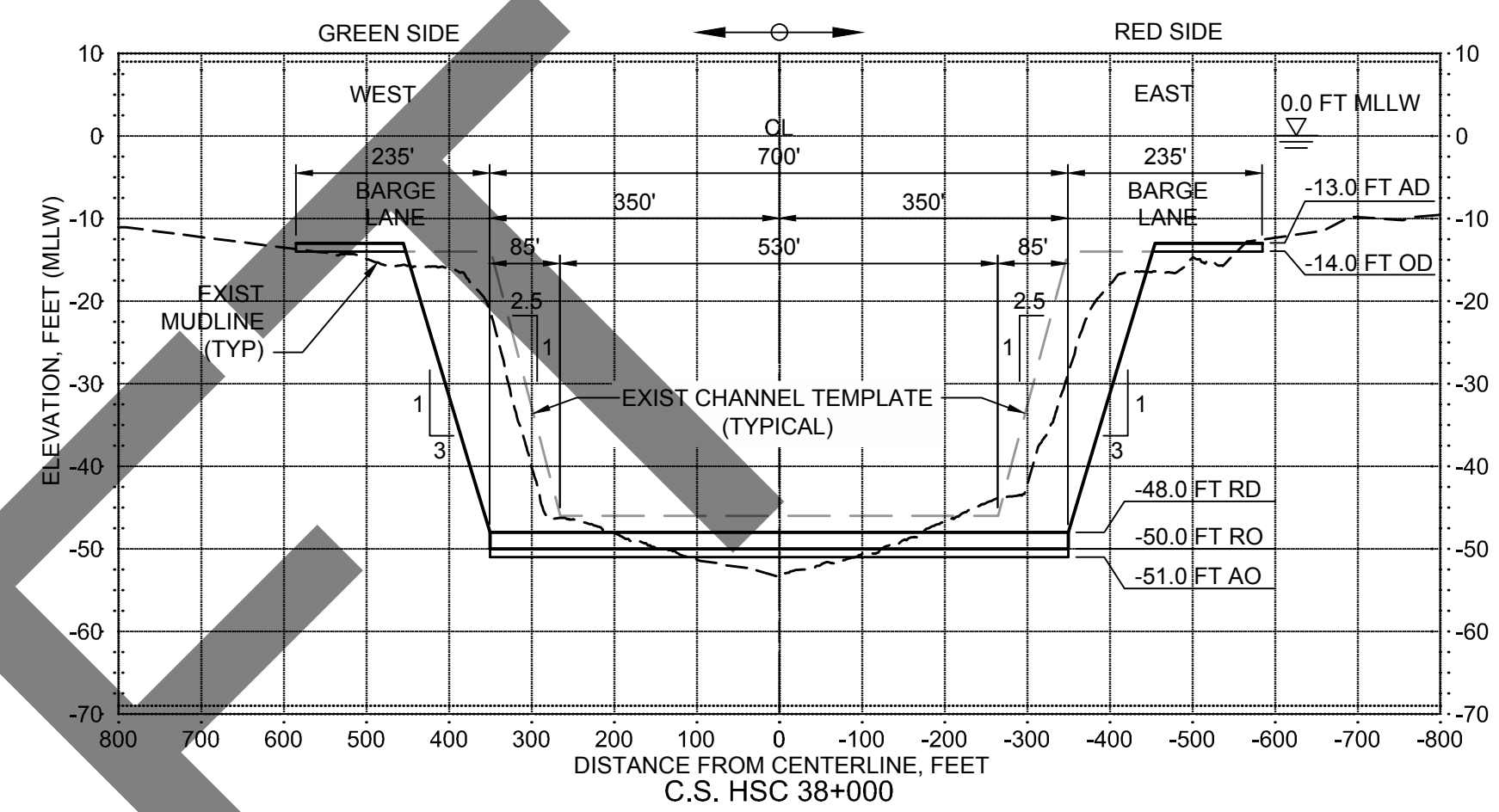
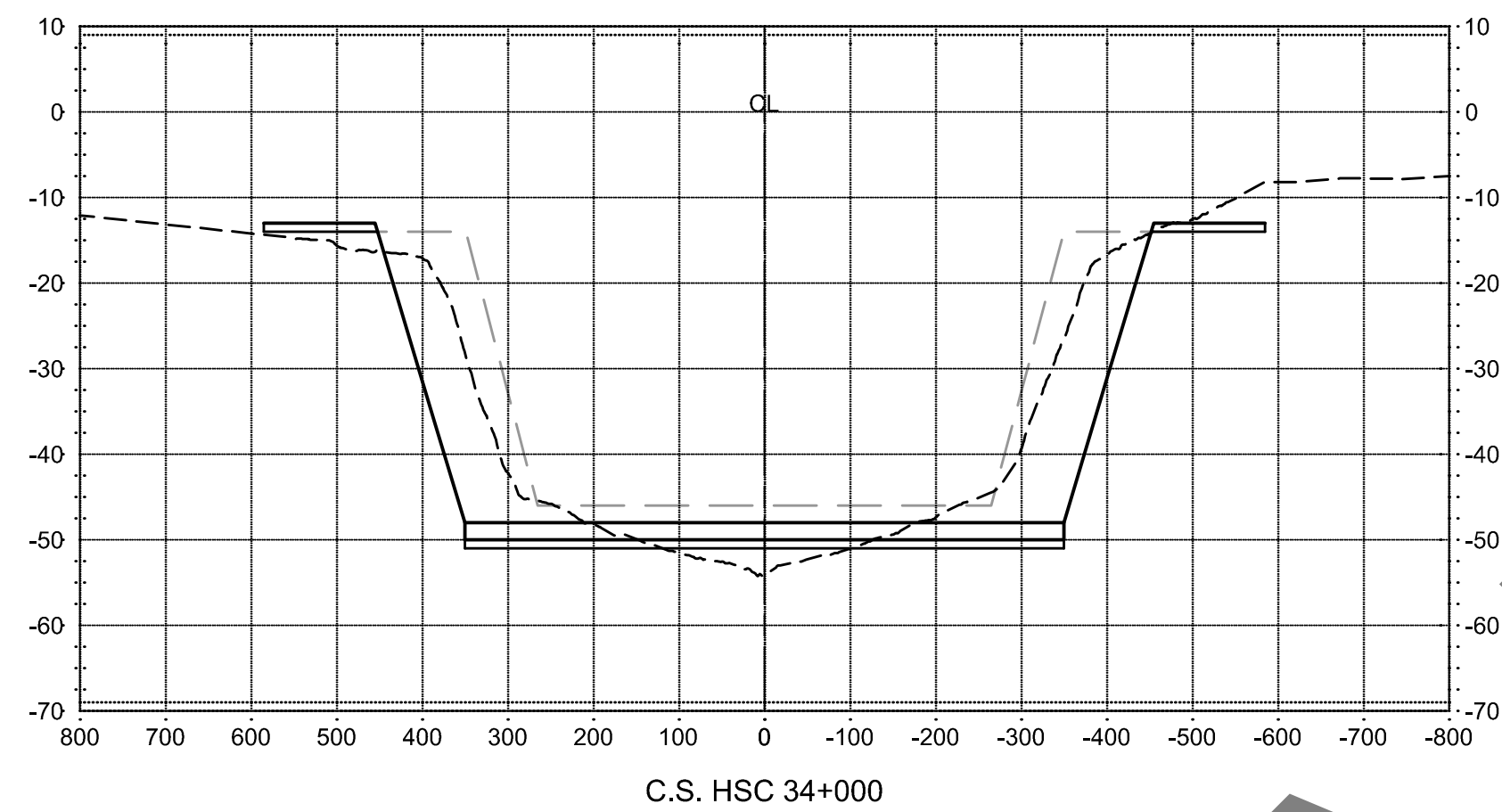
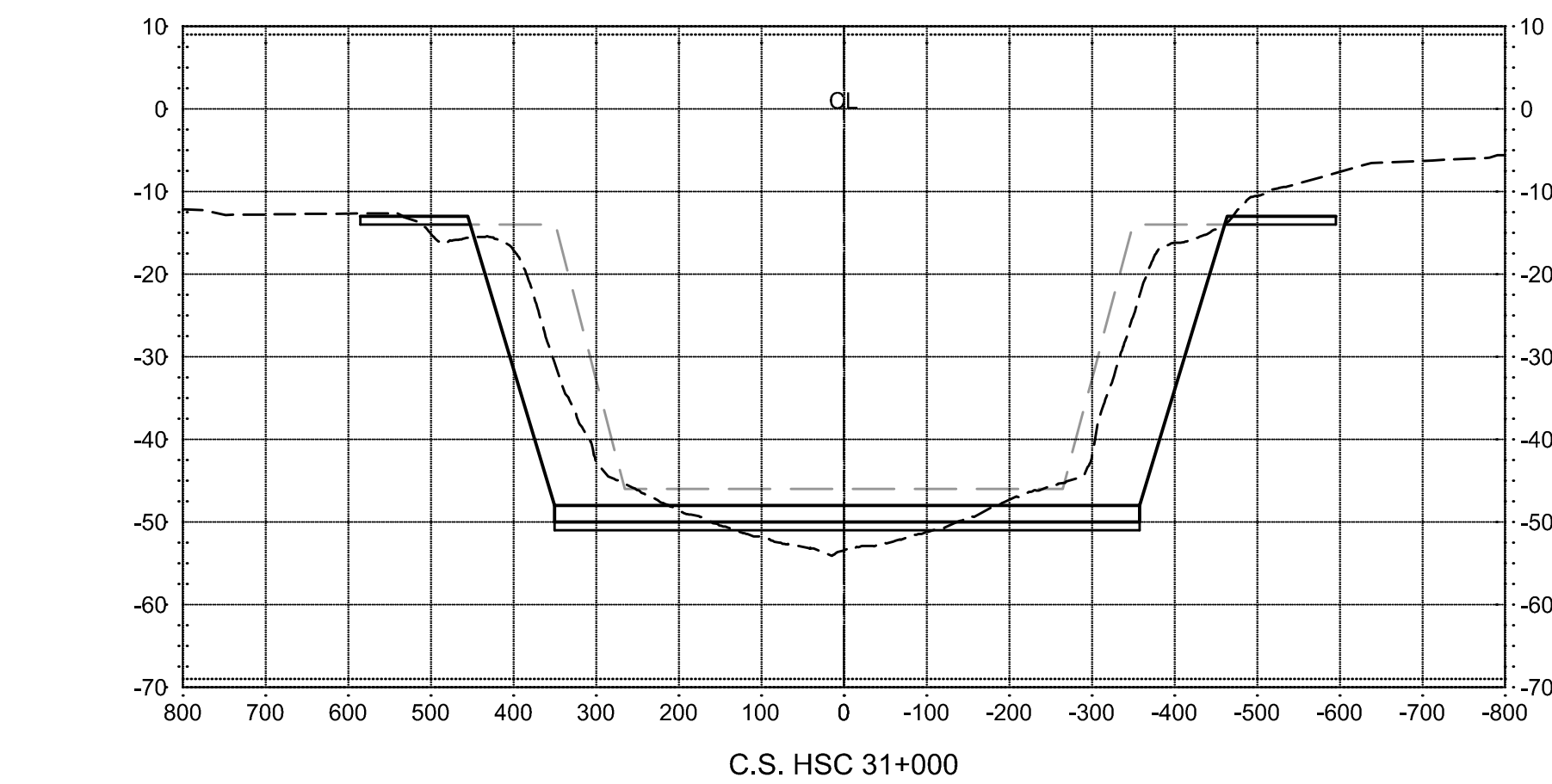
DESIGNER:	AJ
CADD:	RK
CHECKER:	CH/SH/MM
DATE:	AUGUST 2020
SCALE:	AS SHOWN

DRAWING NO.

C90-D13-P11-005-CN301

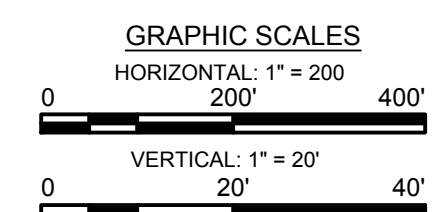
SHEET NO.	REV. NO.
-	0

65% SUBMITTAL



NOTES:

1. ALL LEVELS SHOWN IN FEET TO MEAN LOW LOW WATER (MLLW).
2. ABBREVIATIONS: RD - REQUIRED DEPTH
RO - REQUIRED OVER DEPTH
AO - ALLOWABLE OVER DEPTH



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ENGINEER: Ashley P. Judith
P.E. NO: 112988
DATE: August 3, 2020

APPROVED: _____
DATE _____

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:
**HOUSTON SHIP
CHANNEL (HSC)**

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

SHEET TITLE:
PROJECT 11:
SOUTH BOATERS
CUT TO BAYPORT
(BEACON 76) - HSC
STA 57+000 TO HSC
STA 20+000

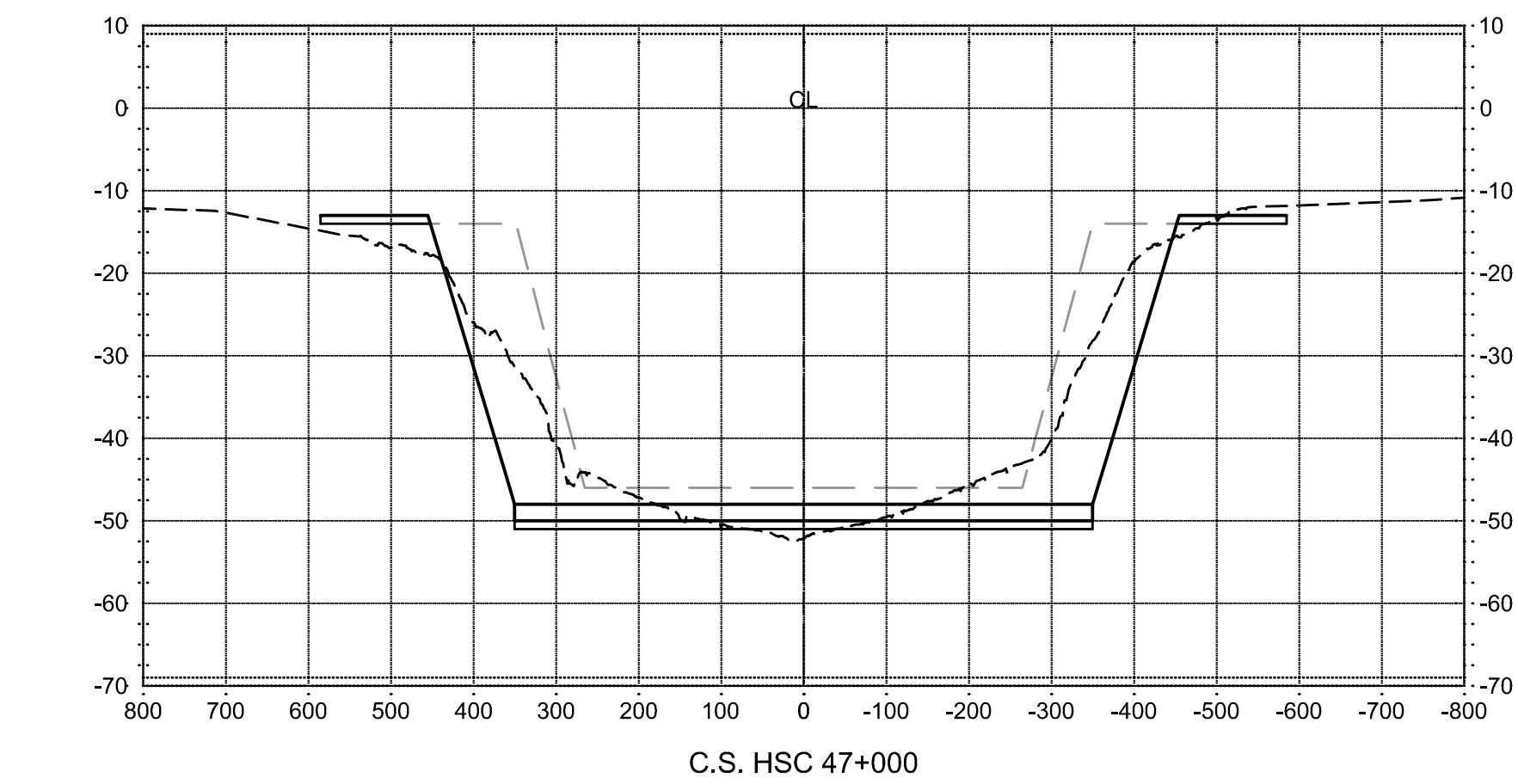
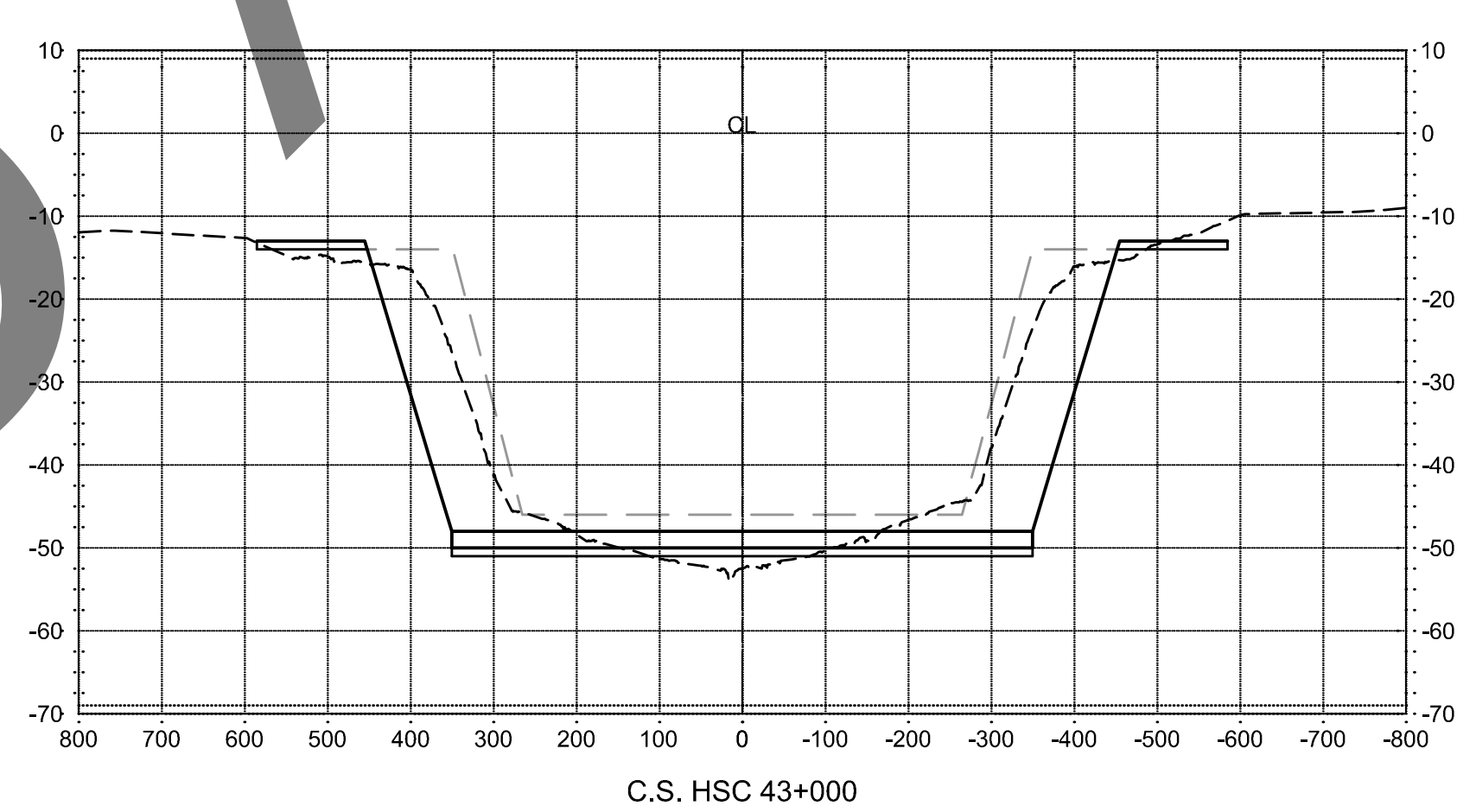
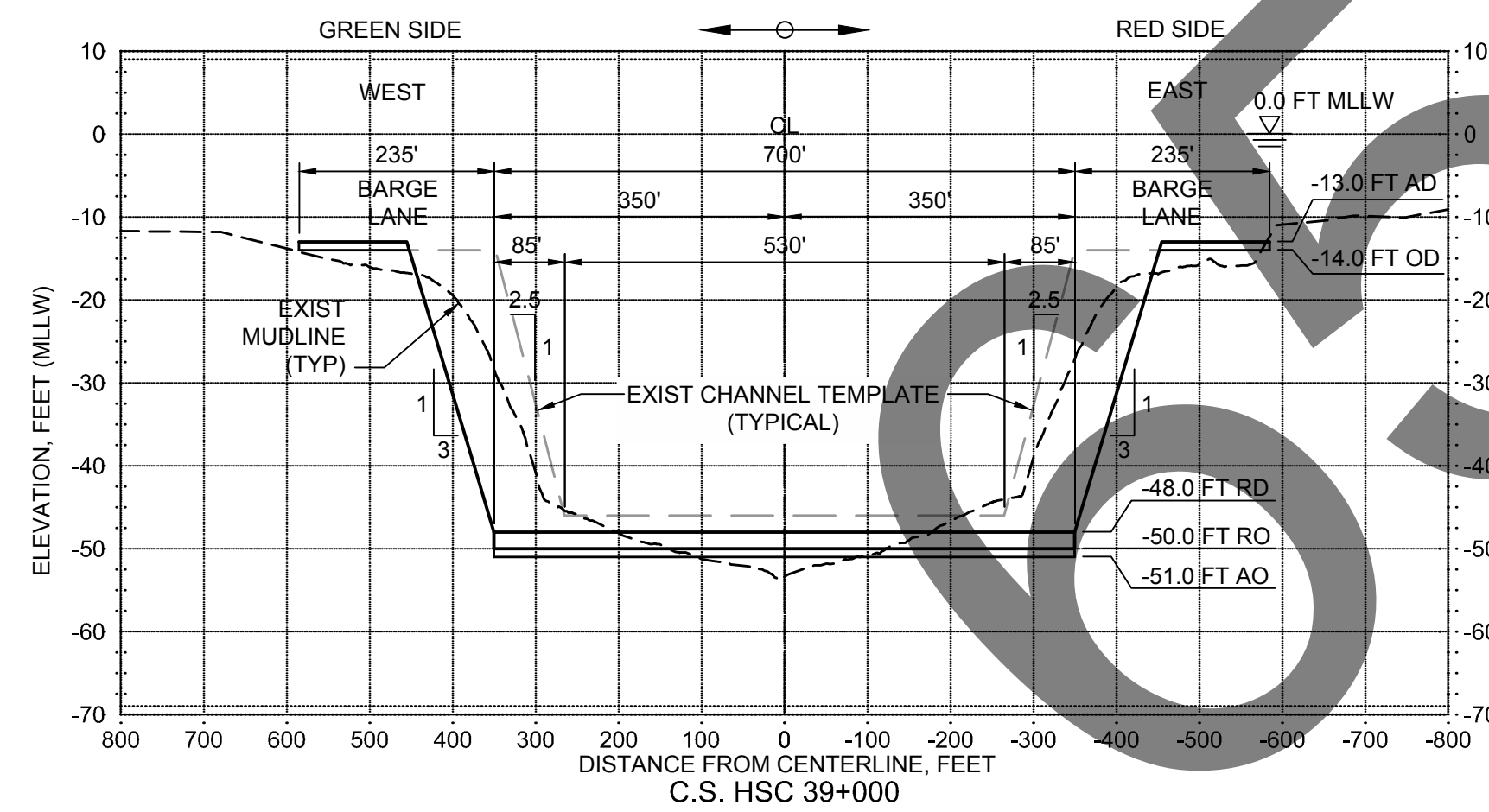
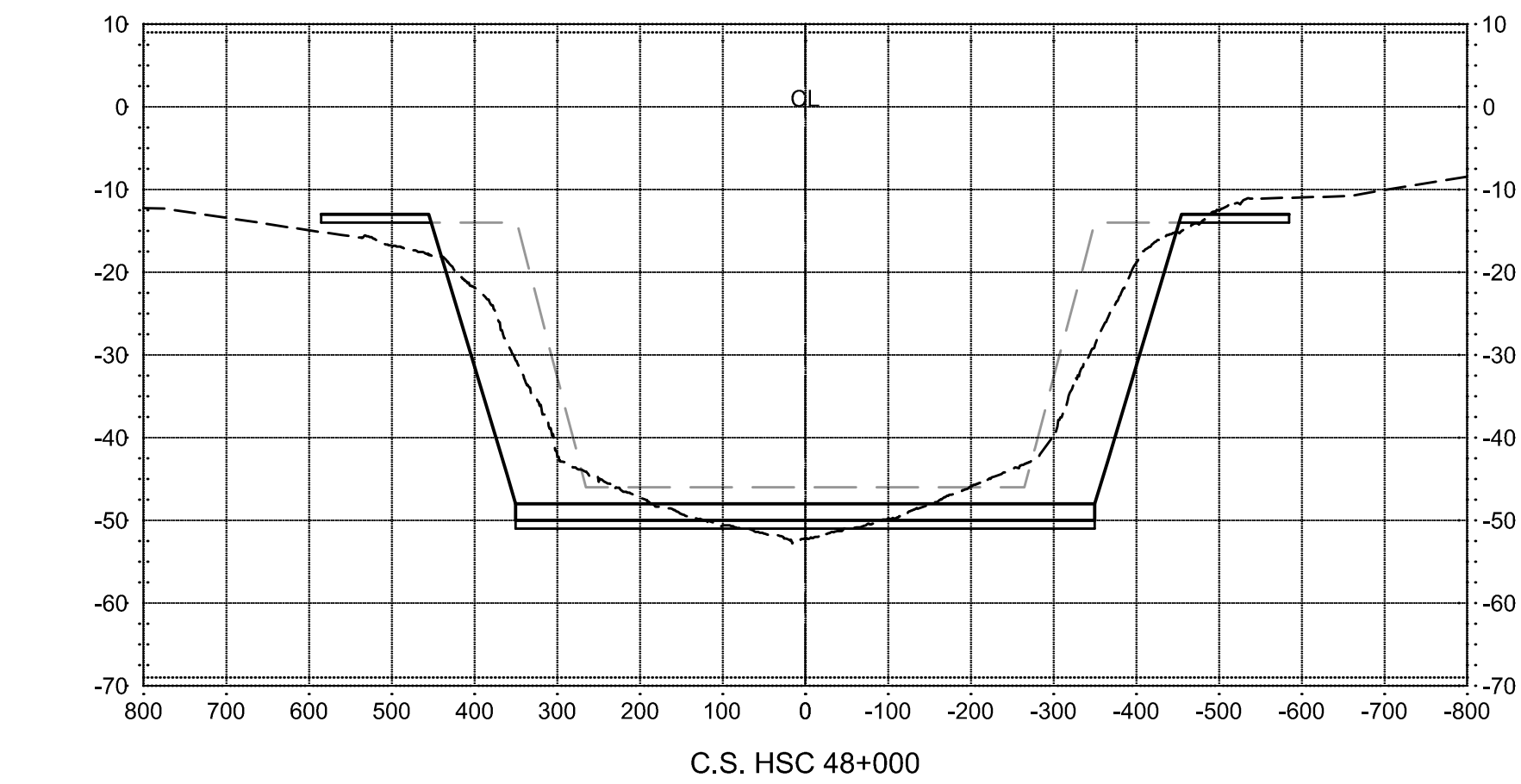
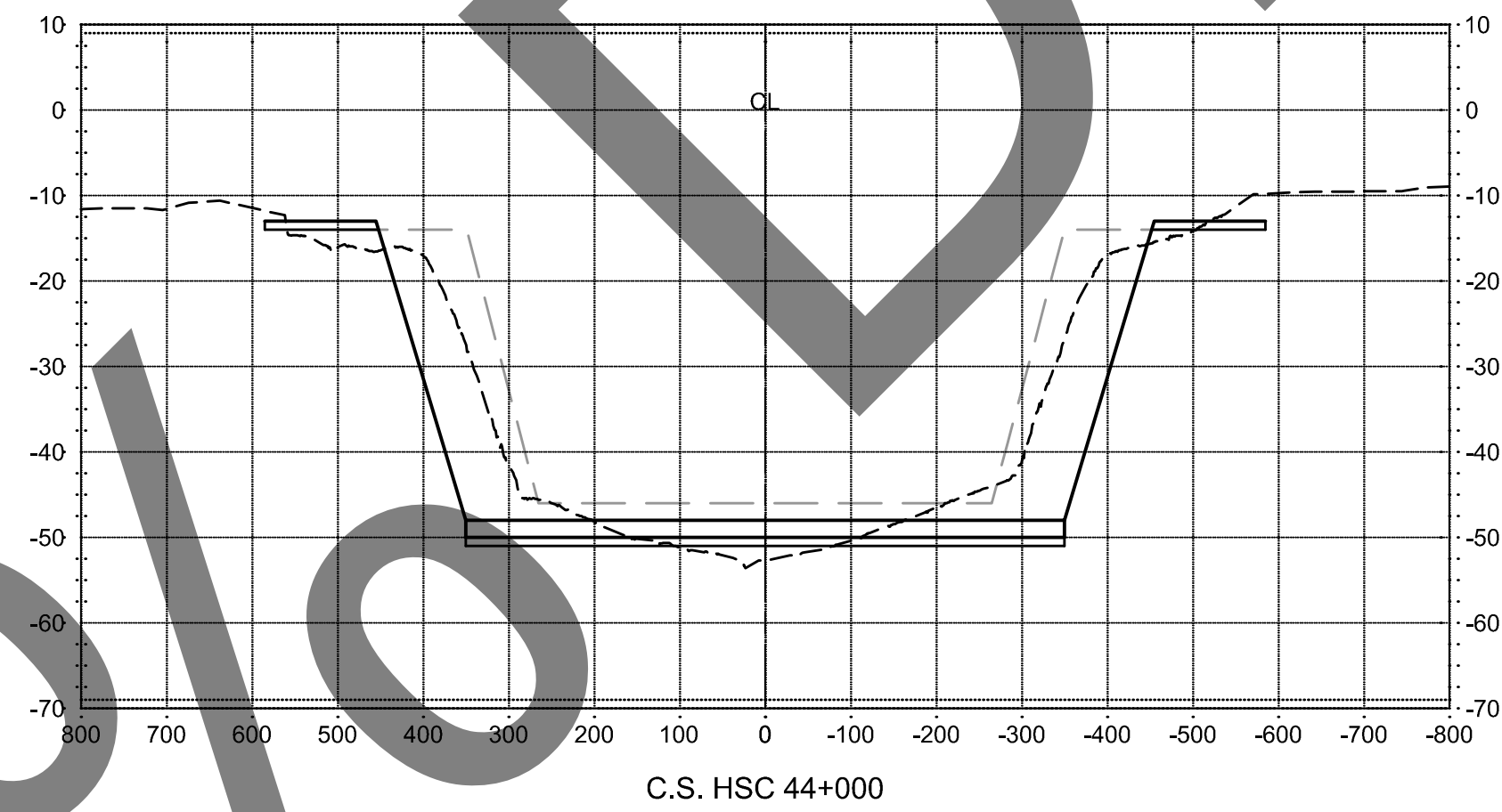
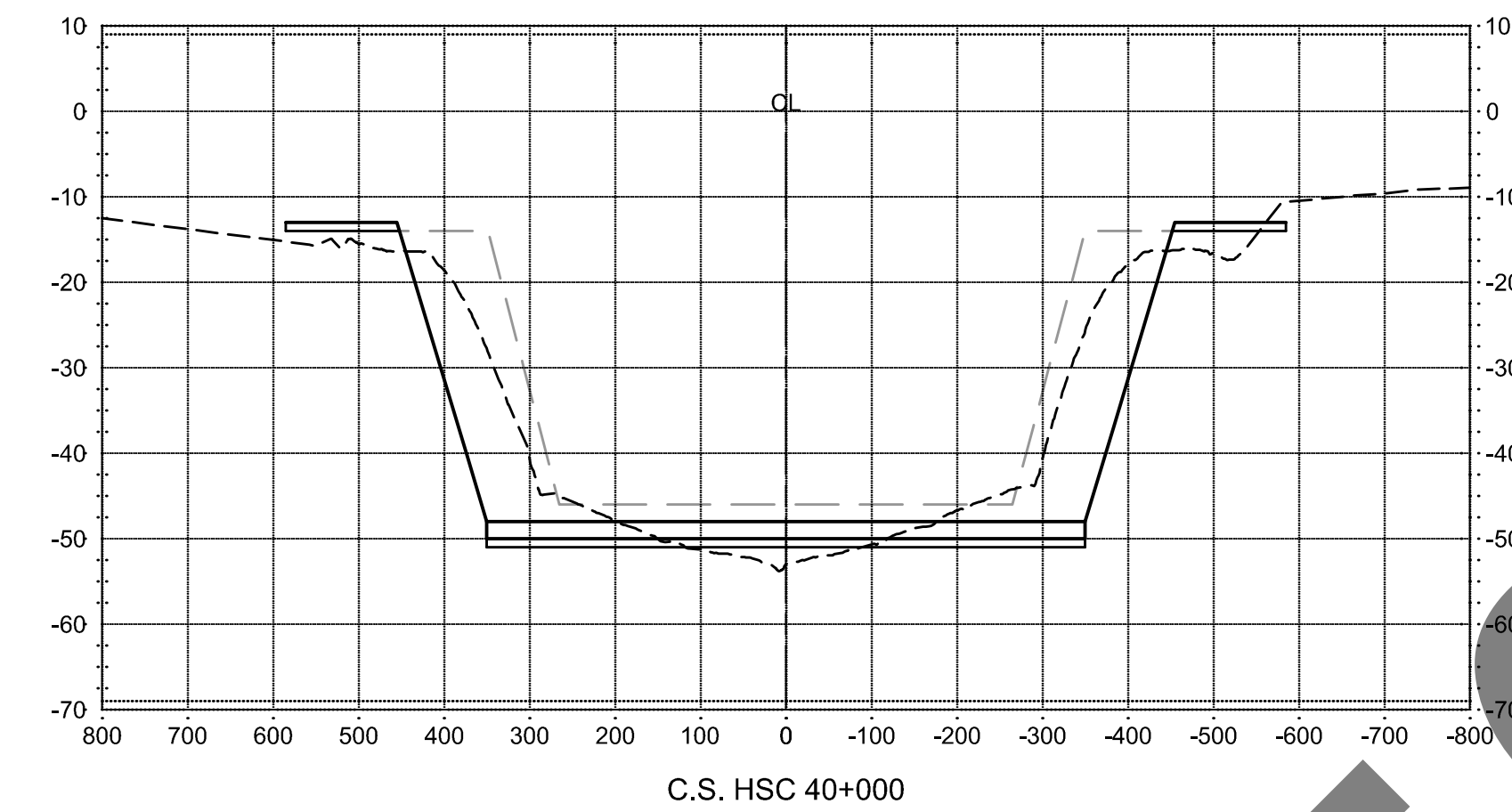
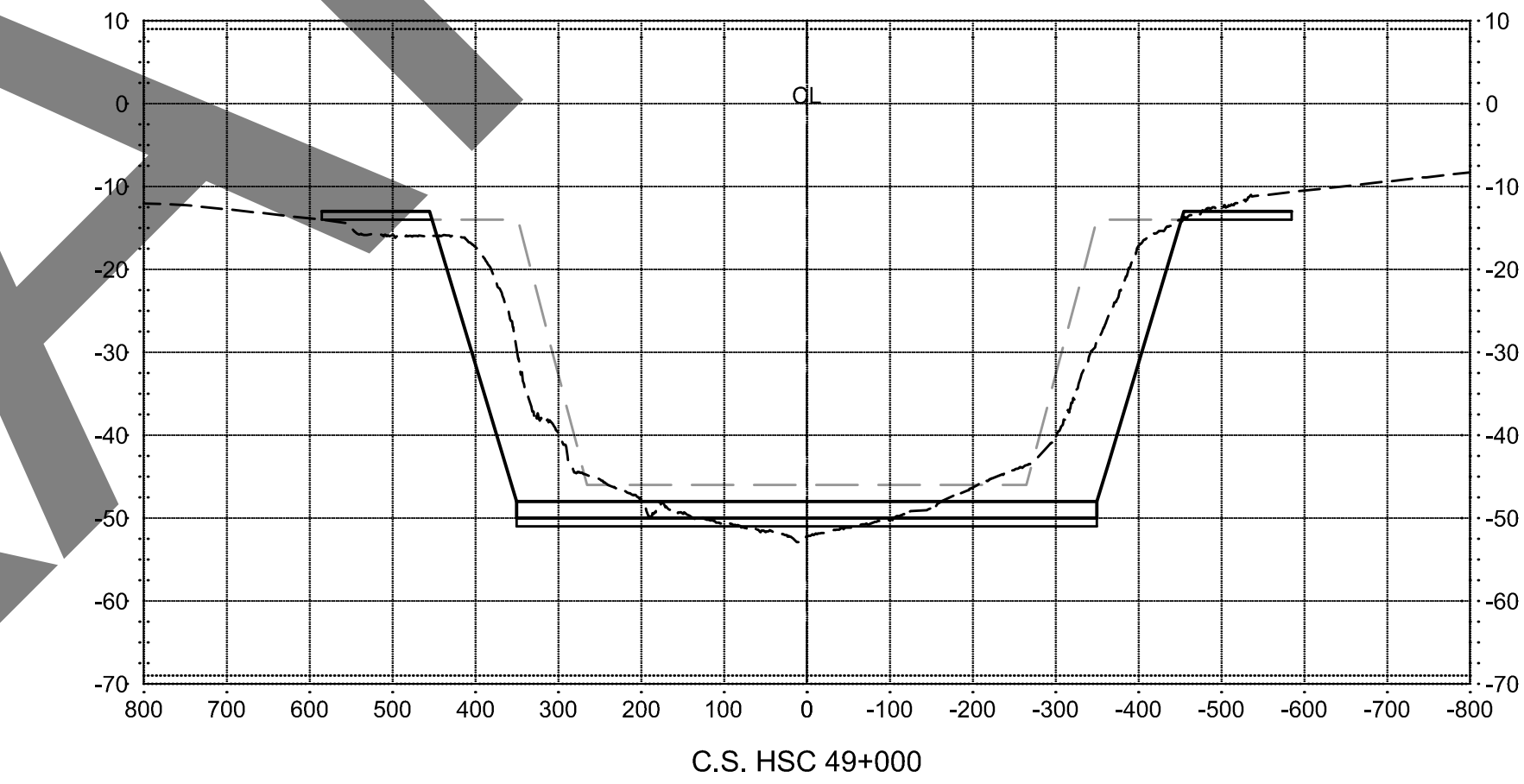
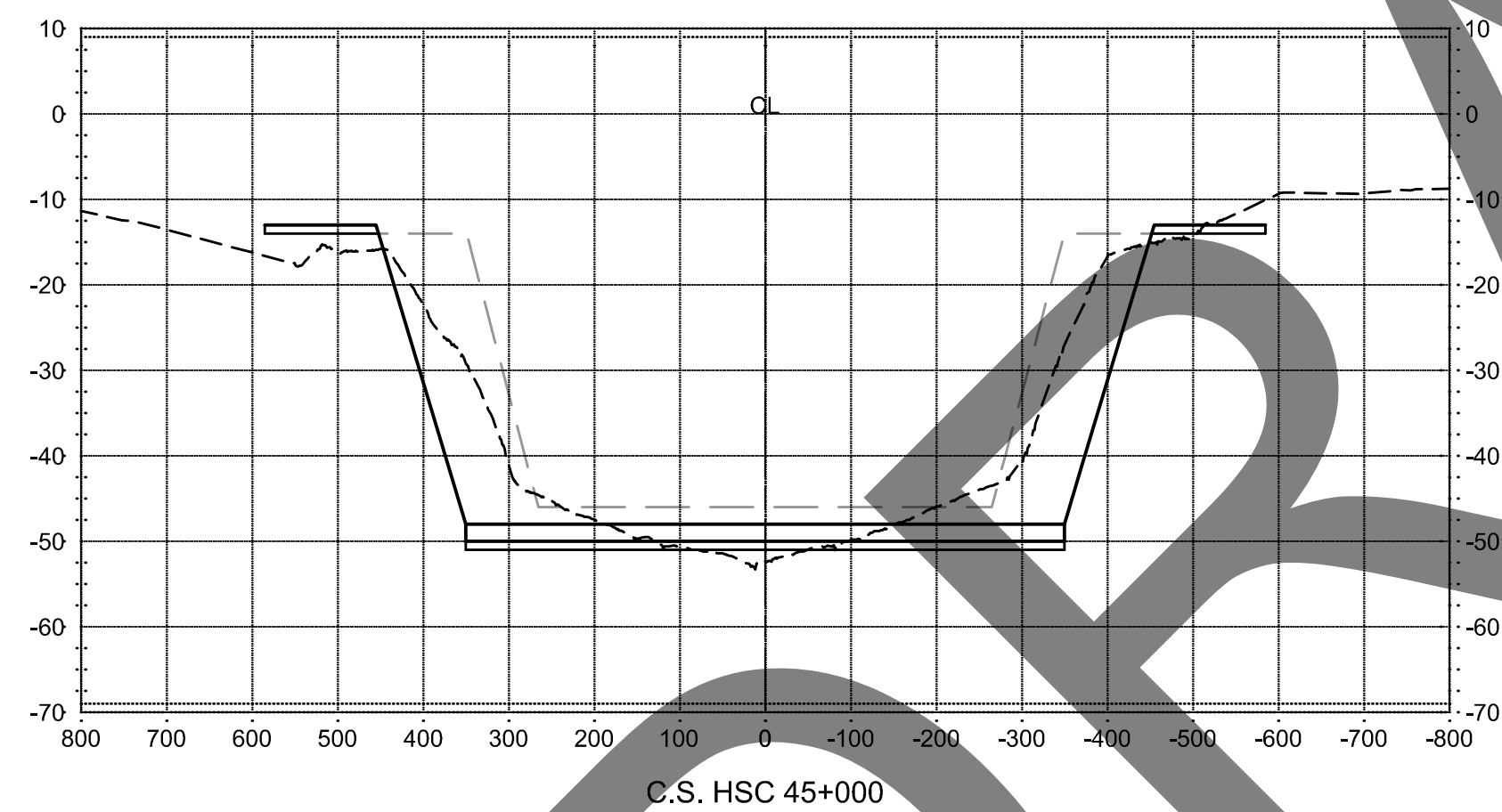
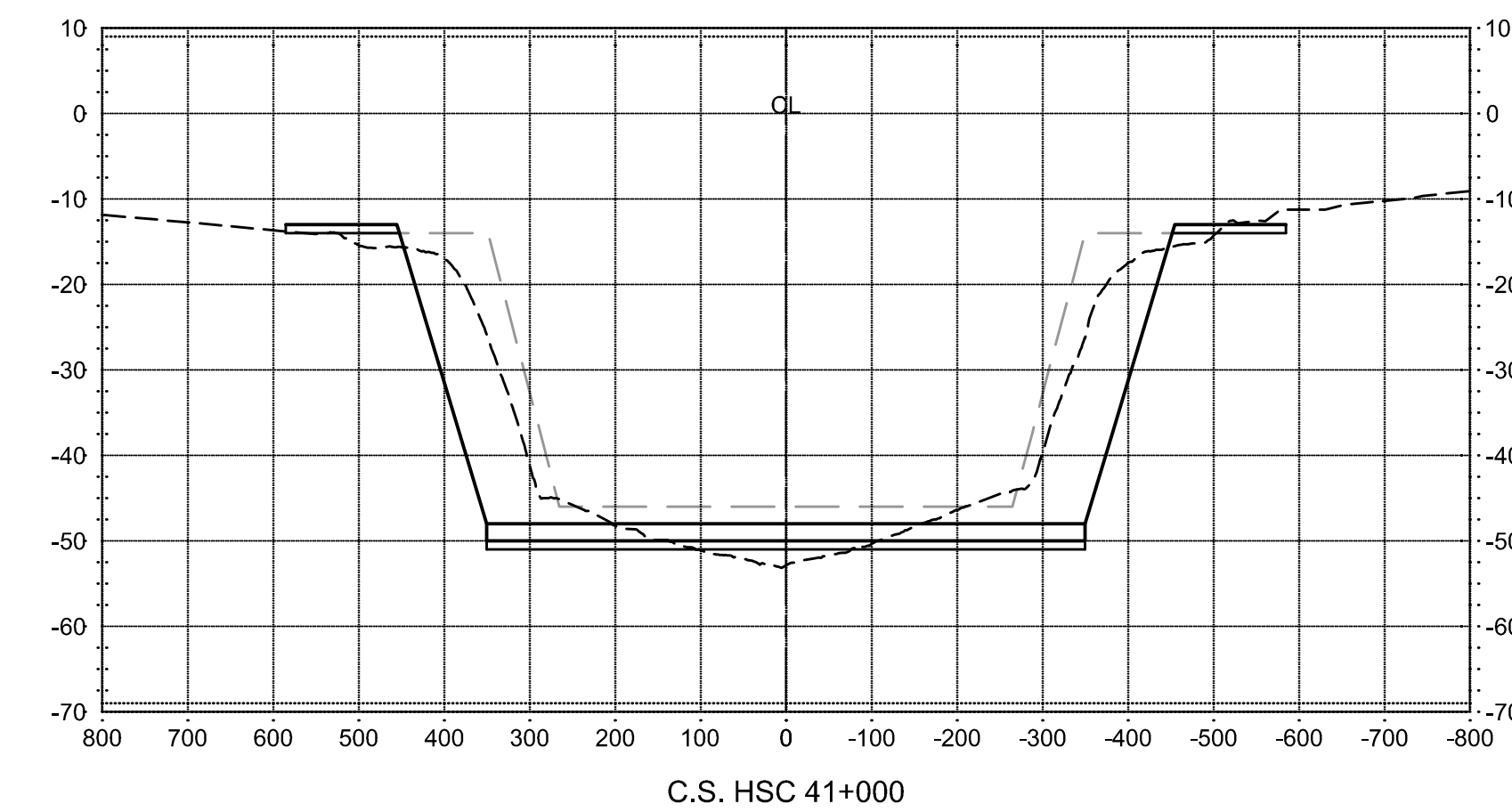
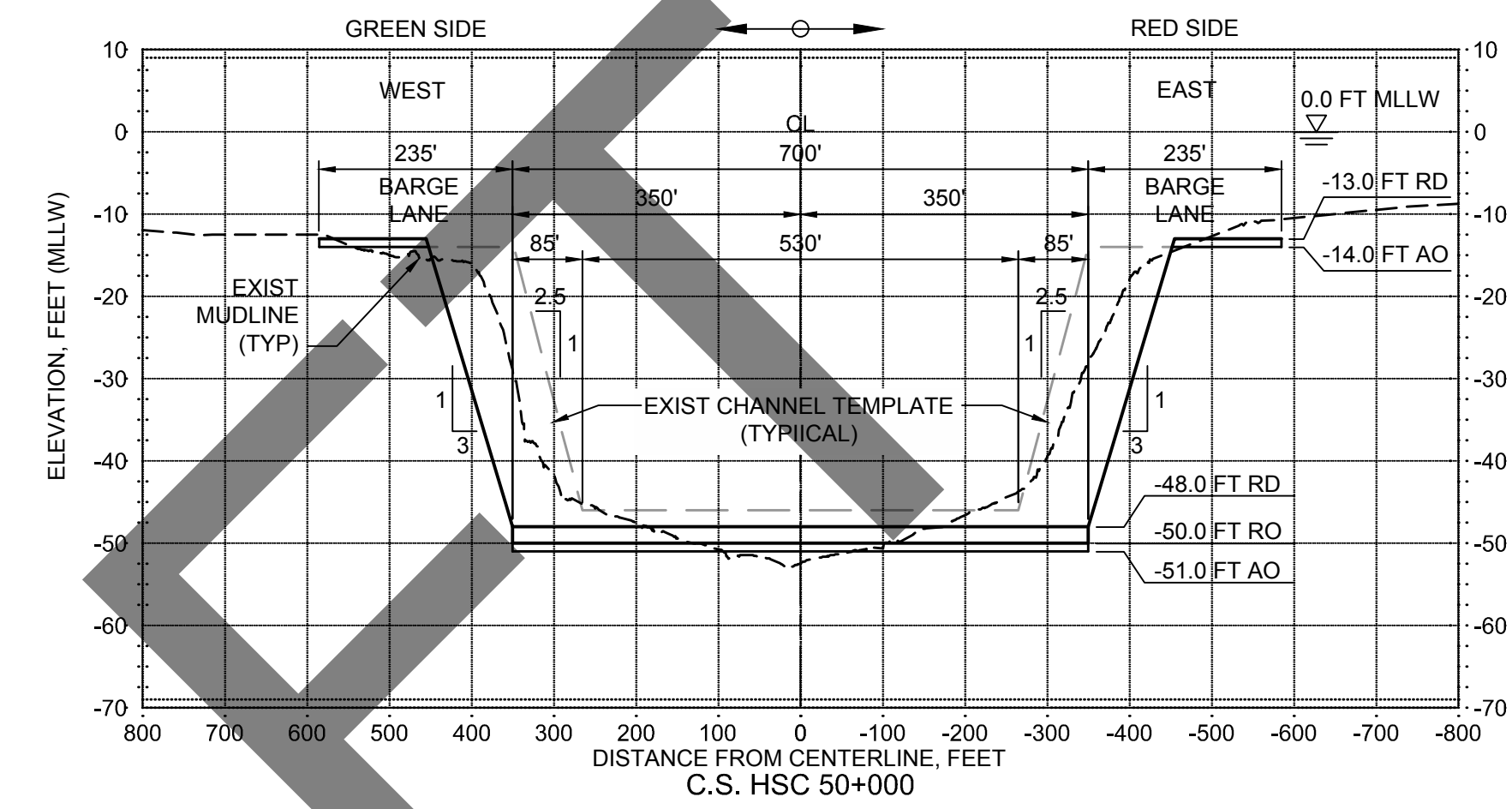
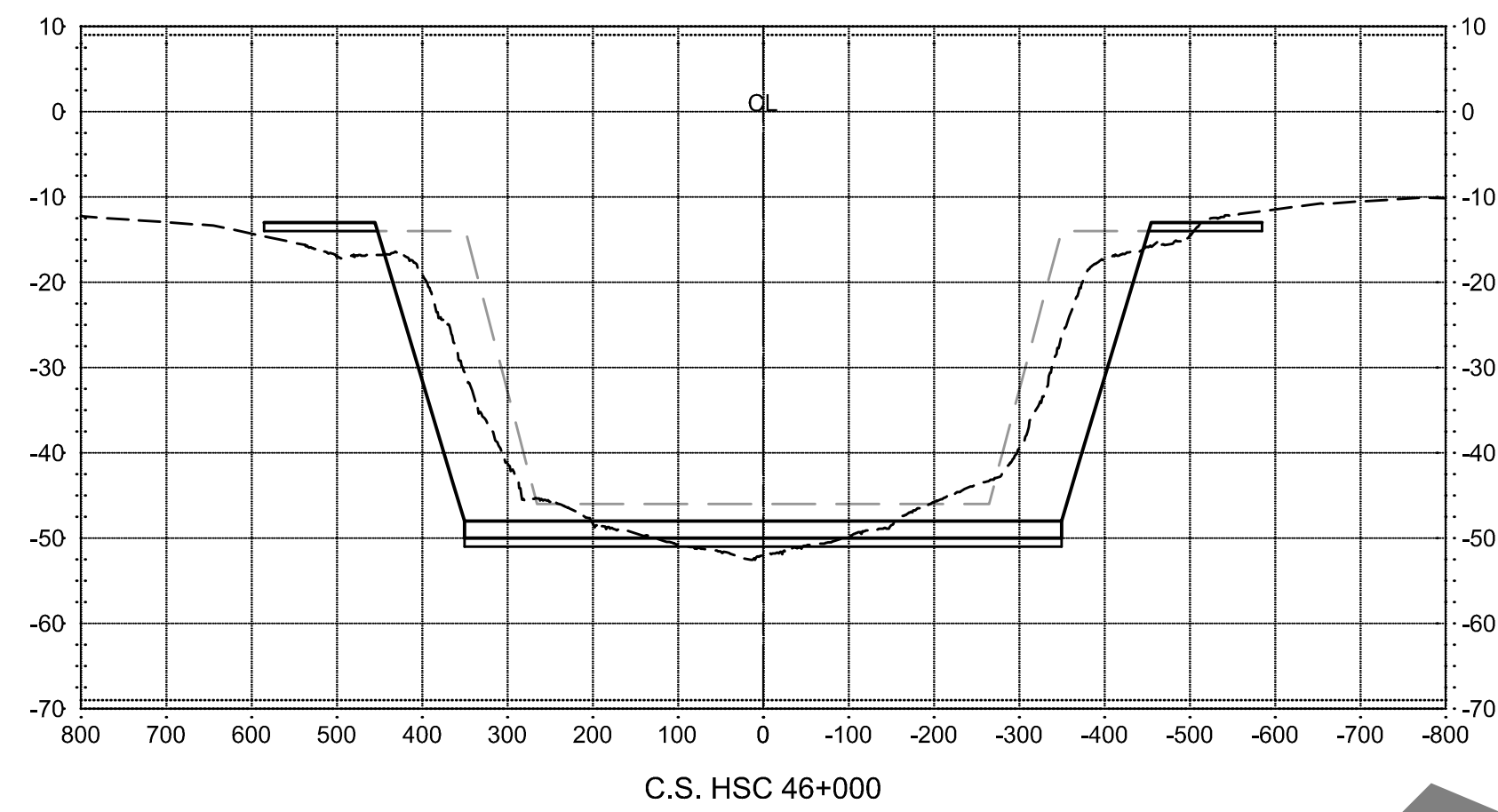
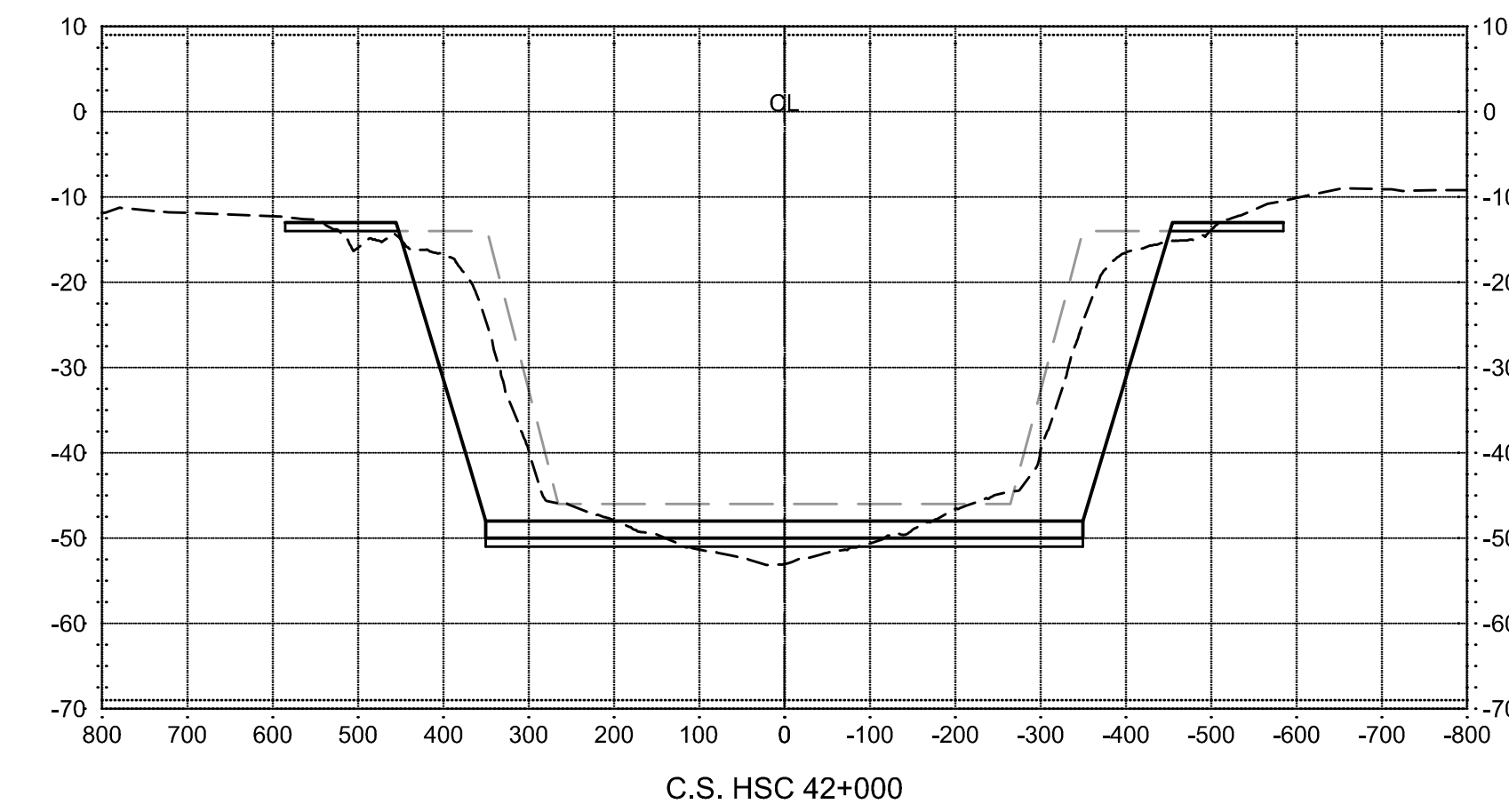
DREDGE CROSS SECTIONS - 2

HSC STA 28+605.06
TO HSC STA 38+000[illegible]

DESIGNER:	AJ
ADD:	RK
CHECKER:	CH/SH/MM
DATE:	AUGUST 2020
SCALE:	AS SHOWN

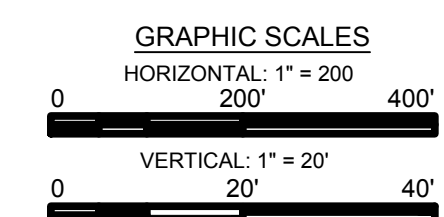
DRAWING NO.	
C90-D13-P11-005-CN302	
SHEET NO.	REV. NO.
-	0

65% SUBMITTAL



NOTES:

- NOTES:**
1. ALL LEVELS SHOWN IN FEET TO MEAN LOW LOW WATER (MLLW).
 2. ABBREVIATIONS:
RD - REQUIRED DEPTH
RO - REQUIRED OVER DEPTH
AO - ALLOWABLE OVER DEPTH



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ENGINEER: Ashley P. Judith

P.F. NO: 112988

DATE: August 3, 2020

APPROVED: _____
DATE: _____

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR - ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:
**HOUSTON SHIP
CHANNEL (HSC)**

**EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)**

SHEET TITLE:
PROJECT 11:
SOUTH BOATERS
CUT TO BAYPORT
(BEACON 76) - HSC
STA 57+000 TO HSC
STA 20+000

DREDGE CROSS SECTIONS - 2

**HSC STA 39+000 TO
HSC STA 50+000**

[illegible]

DESIGNER:	AJ
-----------	----

CADD:	RK
-------	----

CADD:	RR
CHECKER:	CH /SH /MM

CHECKER:	CH/SH/MM
DATE	AUGUST 200

DATE:	AUGUST 202

DRAWING NO.

C90-D13-P11-005-CN303

C90-D13-F11-005-CN303

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ENGINEER: Ashley P. Judith
P.E. NO: 112988
DATE: August 3, 2020

APPROVED: _____
DATE

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:
**HOUSTON SHIP
CHANNEL (HSC)**

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

SHEET TITLE:
PROJECT 11:
SOUTH BOATERS CUT
TO BAYPORT
(BEACON 76):
ISC STA 57+000 TO
ISC STA 20+000 &
BAYPORT SHIP
CHANNEL

BSC DREDGE PLAN-1

3SC STA 217+00 TO
3SC STA 241+87.31

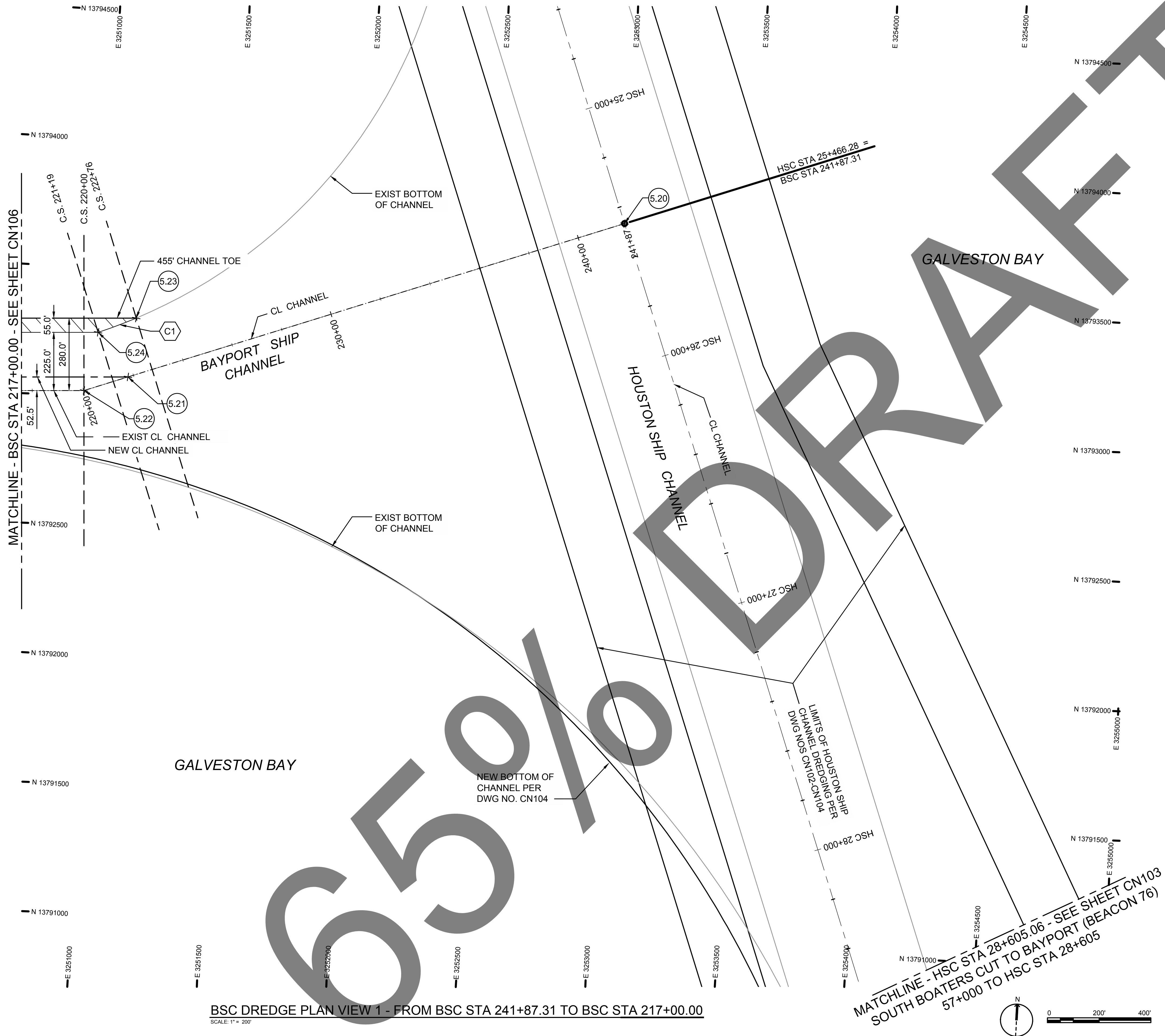
[illegible]

DESIGNER:	DC
CADD:	RK
CHECKER:	NK/SH
DATE:	AUGUST 2020
SCALE:	1" = 200'

DRAWING NO.

SHEET NO.	REV. NO.
20	0

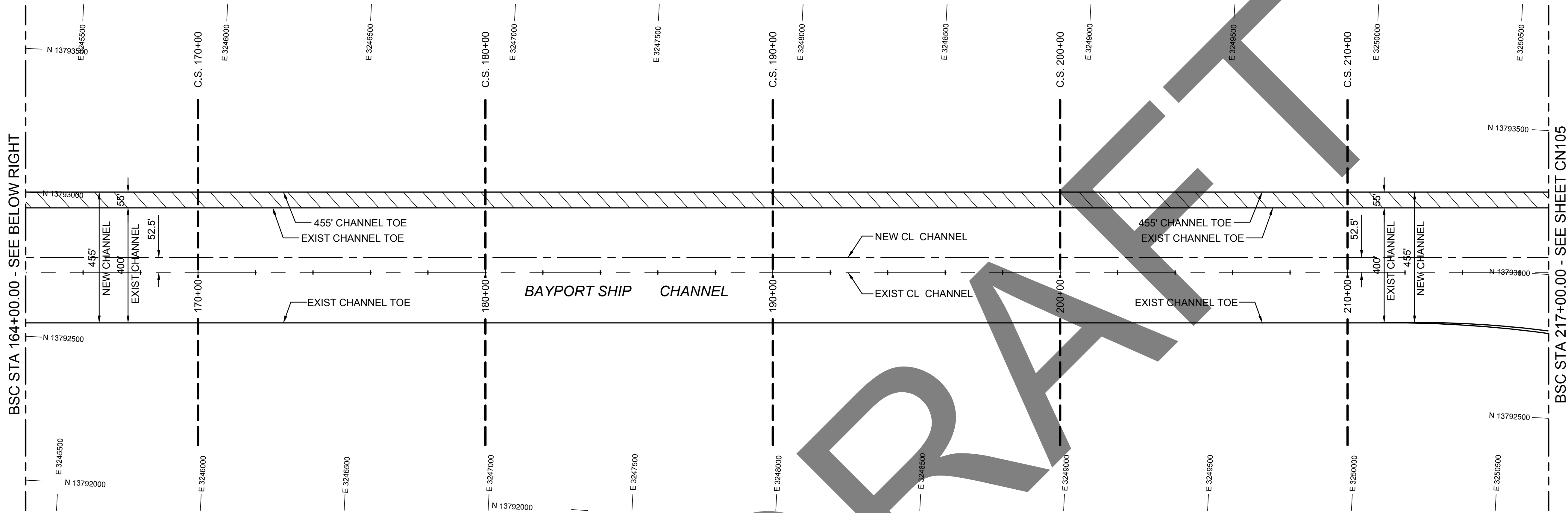
65% SUBMITTAL



TIME: 7-30-20 - 3:05pm User: kaur DWG: C:\Projects\60618786 - Project 11 Design\900 CADD\20-Sheets\C90-D13-P11-005-CN106.dwg

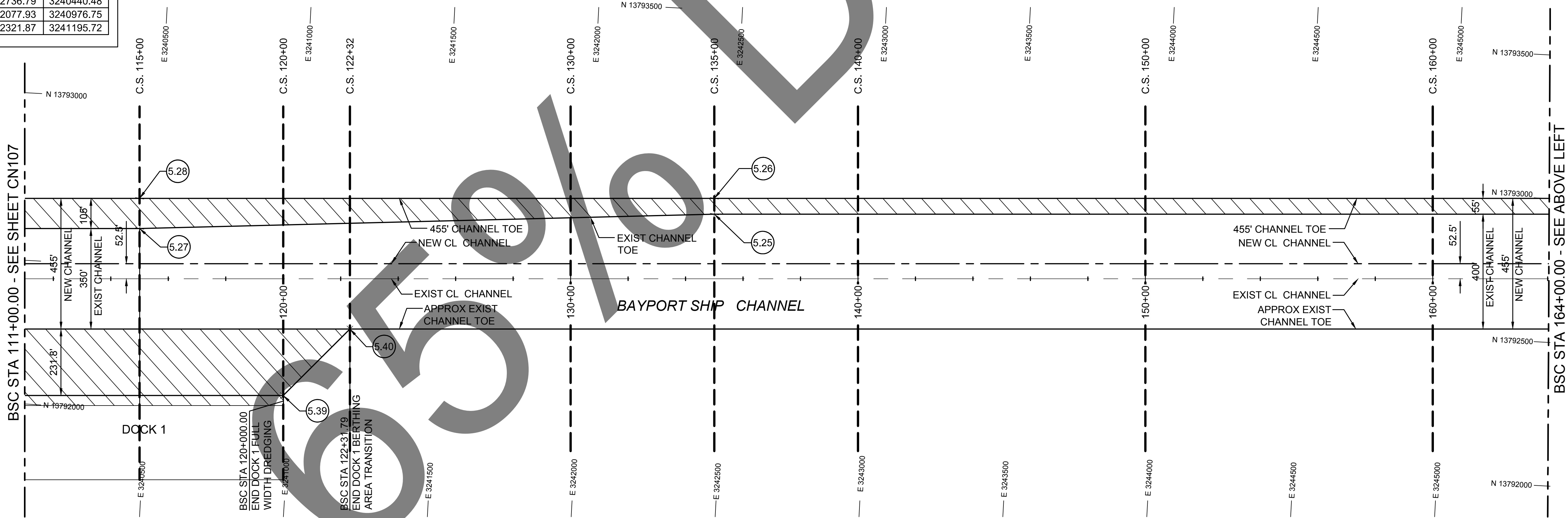
CHANNEL COORDINATES TABLE 2		
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5.26	13792844.52	3242437.58
5.27	13792631.94	3240446.14
5.28	13792736.79	3240440.48
5.39	13792077.93	3240976.75
5.40	13792321.87	3241195.72

LEGEND:
 CHANNEL WIDENING & BERTHING AREAS DREDGE LIMITS



DREDGE PLAN VIEW 2 - FROM BSC STA 217+00.00 TO BSC STA 164+00.00

SCALE: 1" = 200'



DREDGE PLAN VIEW 3 - FROM BSC STA 164+00.00 TO BSC STA 111+00.00

SCALE: 1" = 200'



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AUTHORITY

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ENGINEER: Ashley P. Judith
P.E. NO: 112988
DATE: August 3, 2020

APPROVED: _____ DATE: _____

PORT CONTRACT REPRESENTATIVE/
MANAGING DIRECTOR - ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:
**HOUSTON SHIP
CHANNEL (HSC)**

**EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)**

SHEET TITLE:
**PROJECT 11: SOUTH
BOATERS CUT TO
BAYPORT (BEACON
76): HSC STA 57+000
TO HSC STA 20+000
& BAYPORT SHIP
CHANNEL**

BSC DREDGE PLAN-2

**BSC STA 217+00 TO
BSC STA 111+00**

REV	DATE	DESCRIPTION
XX	XX-XX	XXXXX

DESIGNER:	AJ
CADD:	RK
CHECKER:	CH/SH/MM
DATE:	AUGUST 2020
SCALE:	1" = 200'

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C90-D13-P11-005-CN106

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ENGINEER: Ashley P. Judith

112988

DATE: August 3, 2020

PPROVED:

DATE _____

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR - ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:

HOUSTON SHIP CHANNEL (HSC)

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

SHEET TITLE:

**PROJECT 11:
SOUTH BOATERS CUT
TO BAYPORT (BEACON
66): HSC STA 57+000 TO
HSC STA 20+000 &
BAYPORT SHIP
CHANNEL**

BSC DREDGE PLAN-3

3SC STA 111+00 TO
3SC STA 42+07.80

CHANNEL COORDINATES TABLE 3		
NO.	NORTHING	EASTING
5.29	13791975.57	3231527.23
5.30	13792028.00	3231524.41
5.31	13792239.15	323164.52
5.32	13792384.58	3233911.27
5.33	13791677.08	3233547.25
5.34	13791930.24	3233935.78
5.35	13791986.19	3234972.97
5.36	13791754.58	3234985.46
5.37	13792255.52	3239965.72
5.38	13792024.05	3239978.20

LEGEND:



CHANNEL WIDENING & BERTHING AREAS DREDGE LIMITS

DESIGNER:	AJ
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ADD:	RK
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CHECKER: CH/SH/MM

DATE: AUGUST 2020

SCALE:	1" = 200'
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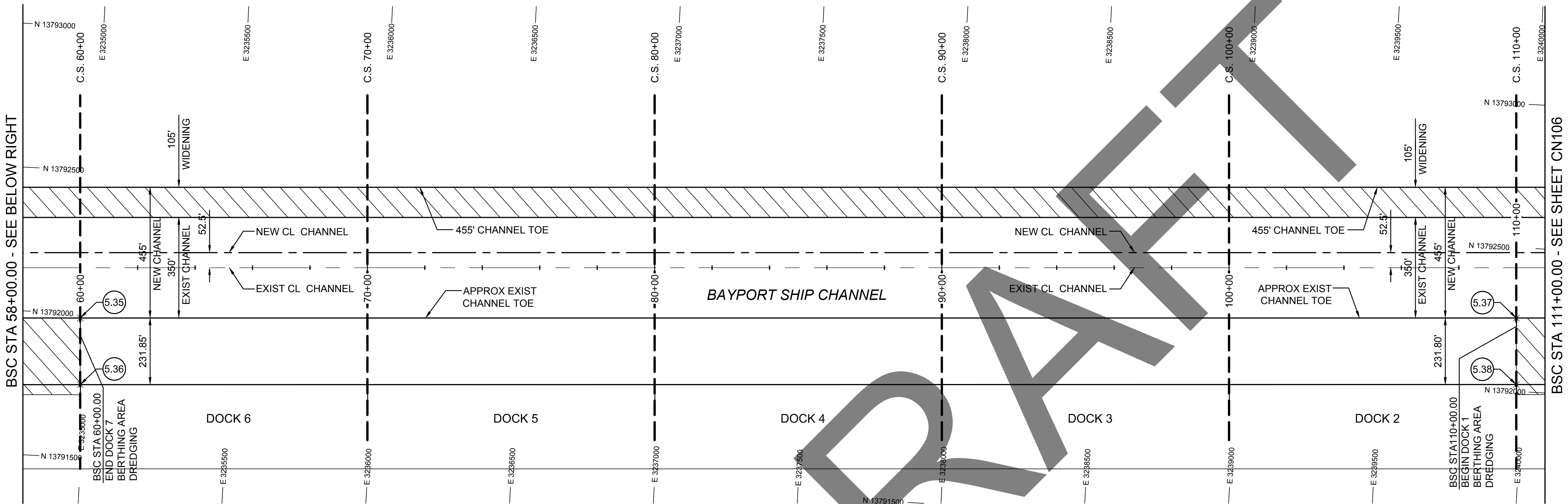
DRAWING NO.

90-D13-P11-005-CN107

DATE	BY
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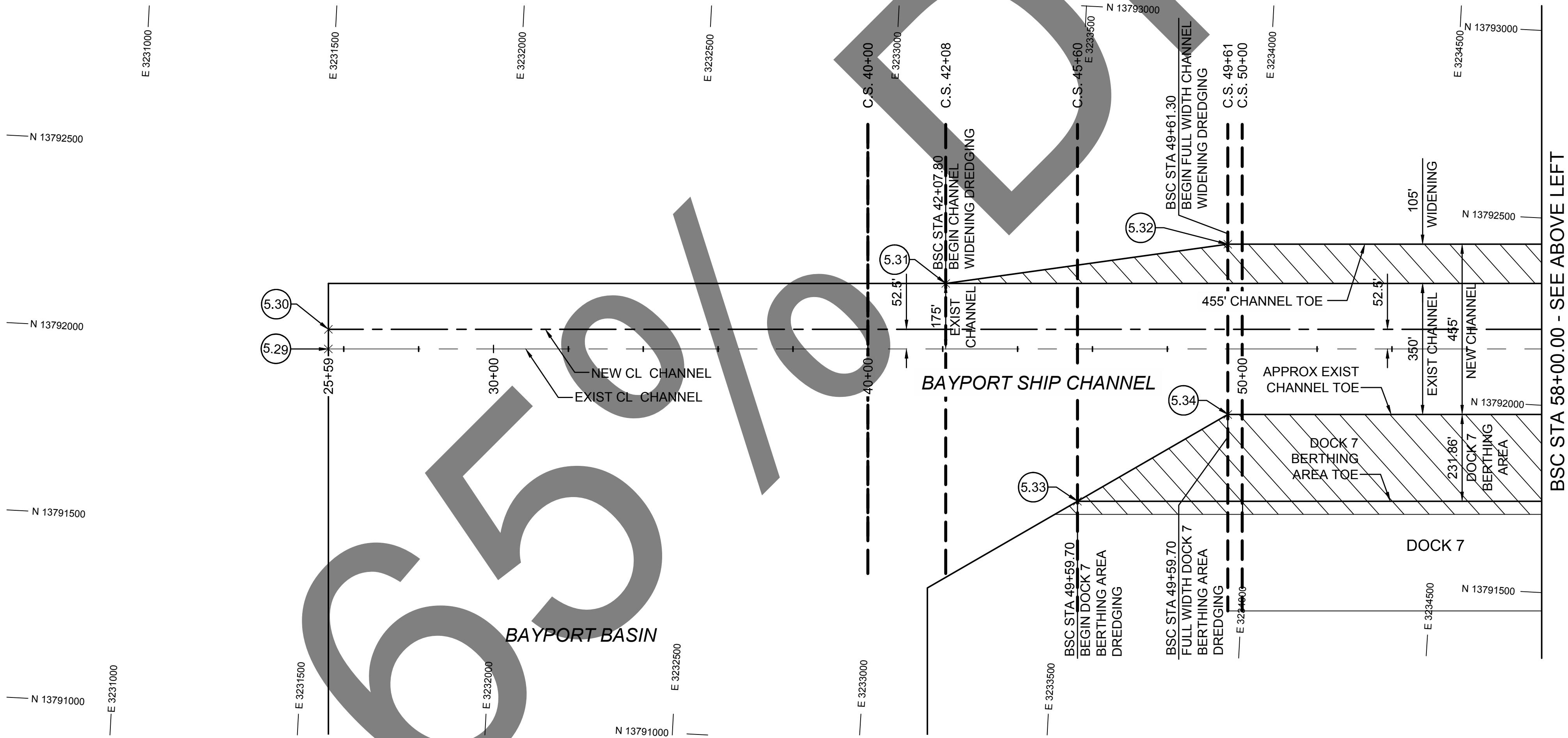
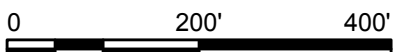
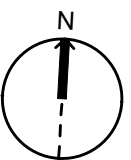
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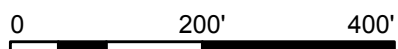
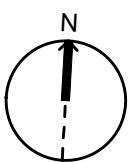
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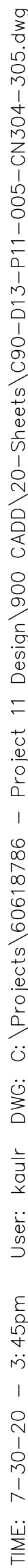
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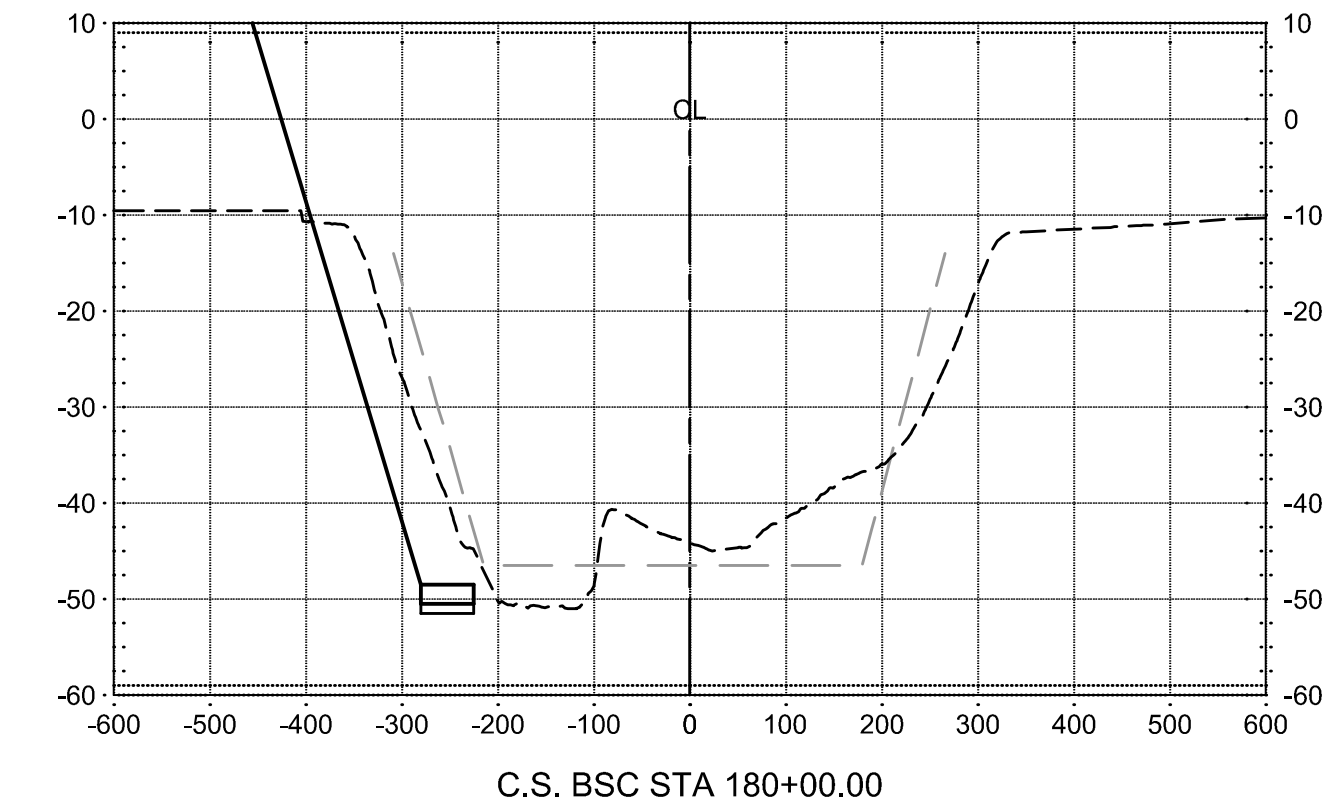
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SCALE: 1" = 200'

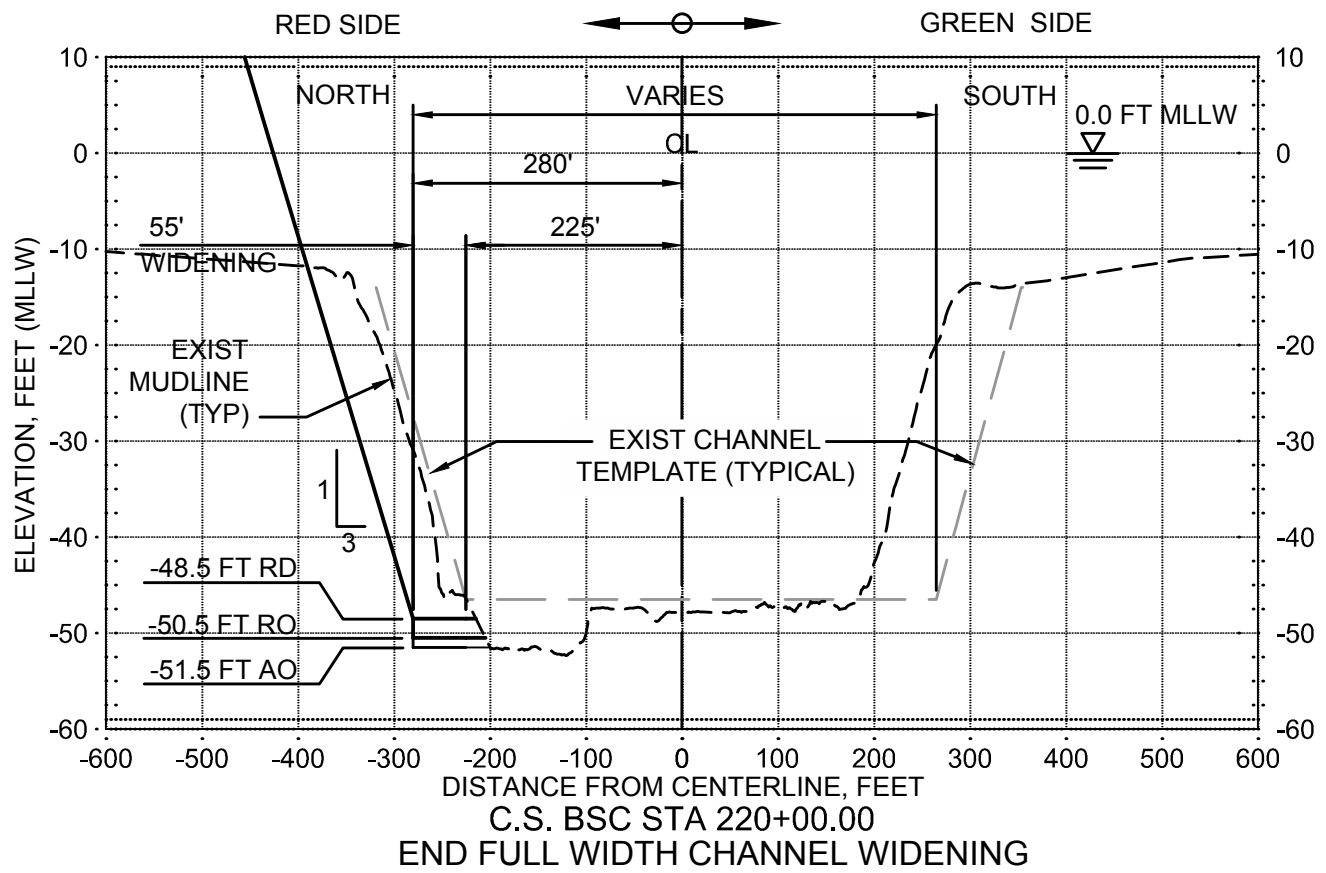




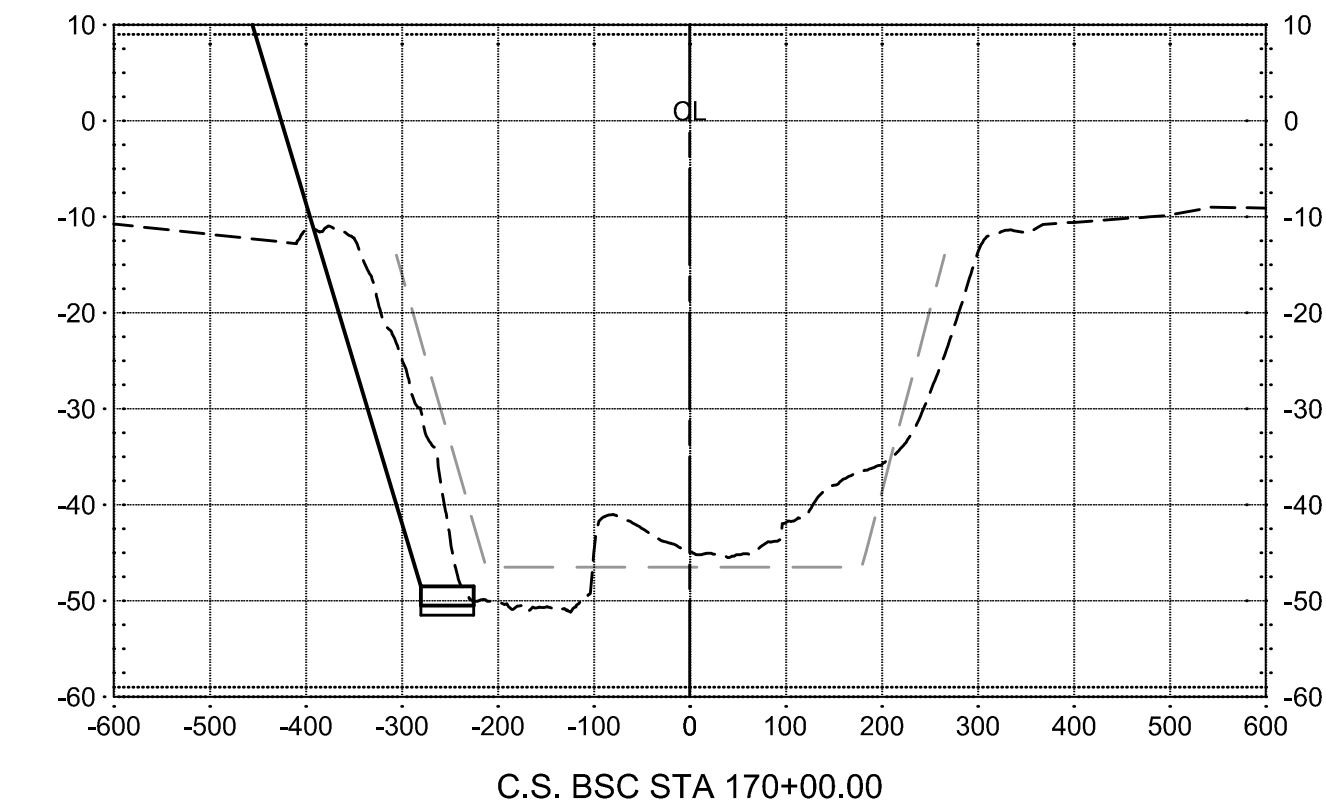
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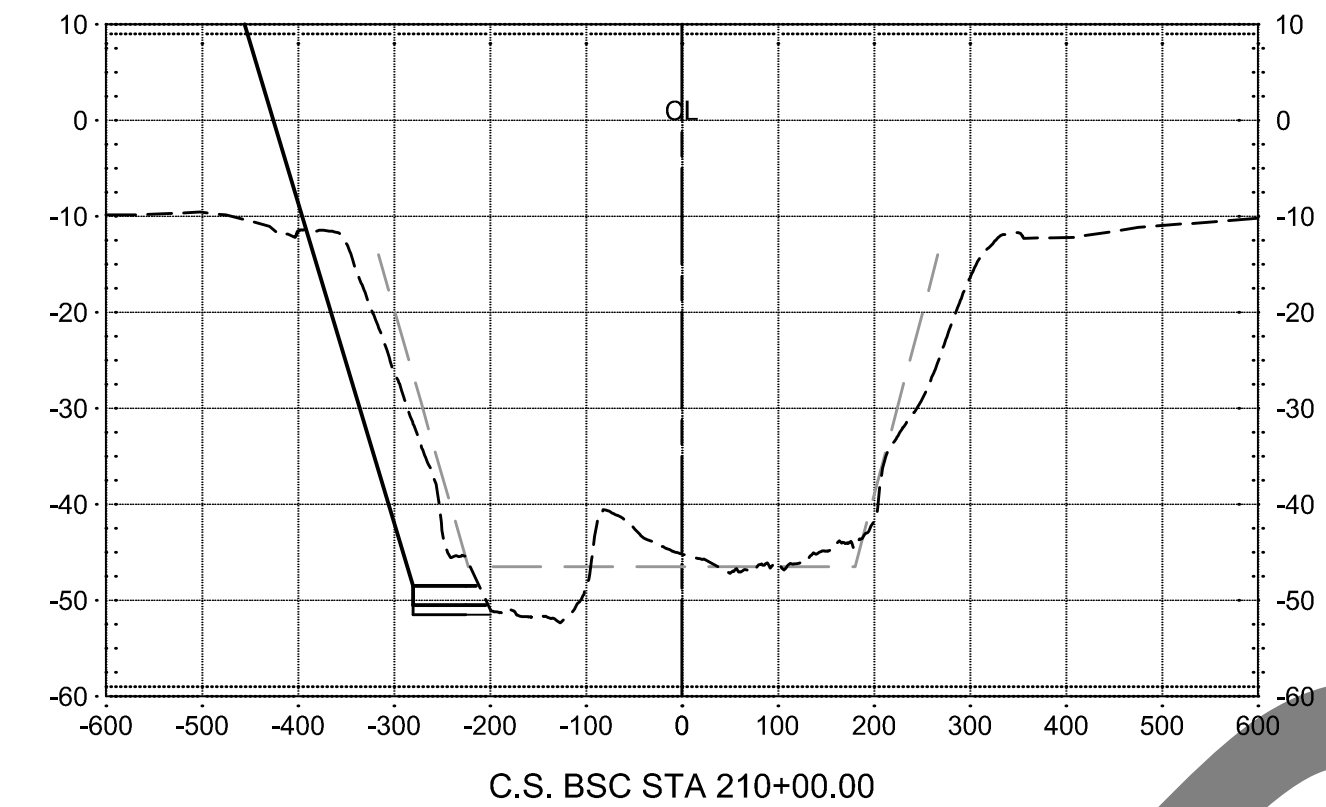
C.S. BSC STA 180+00.00



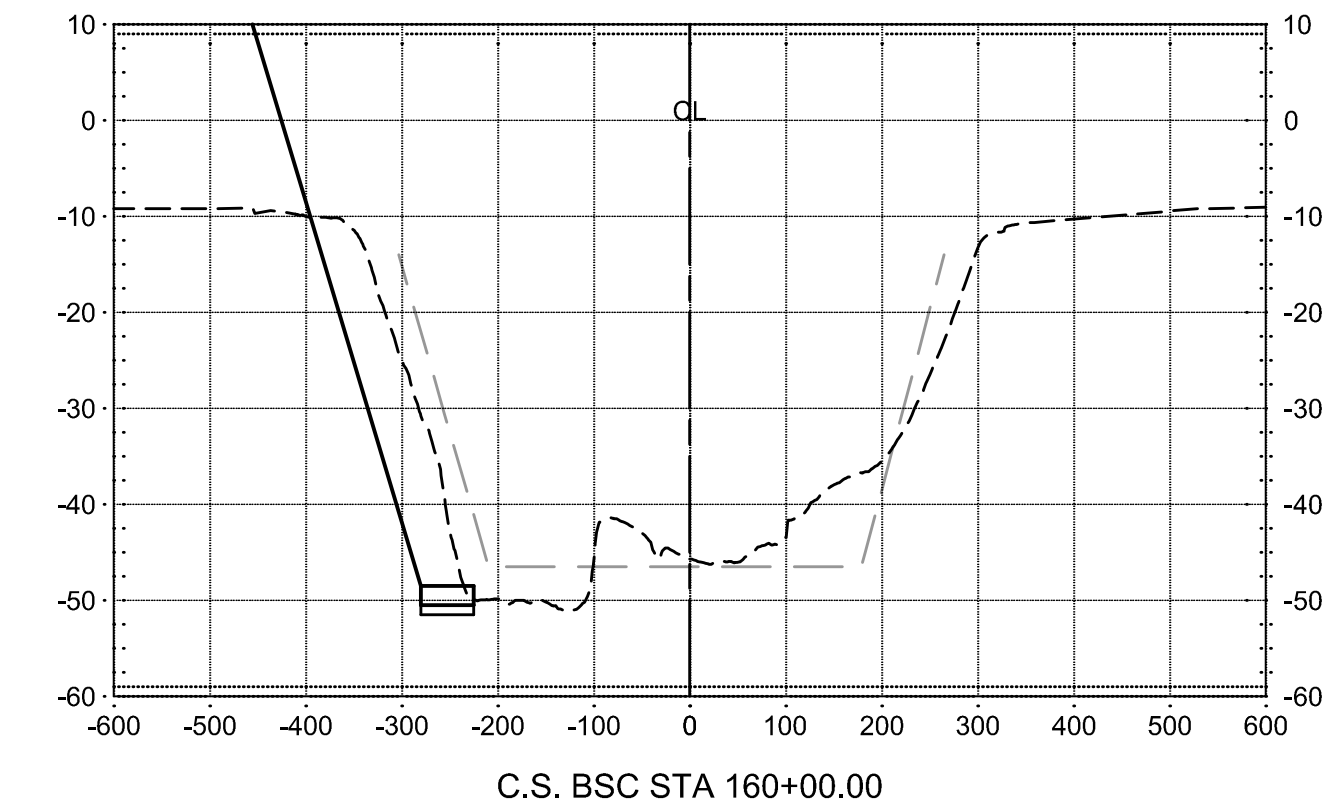
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END FULL WIDTH CHANNEL WIDENING



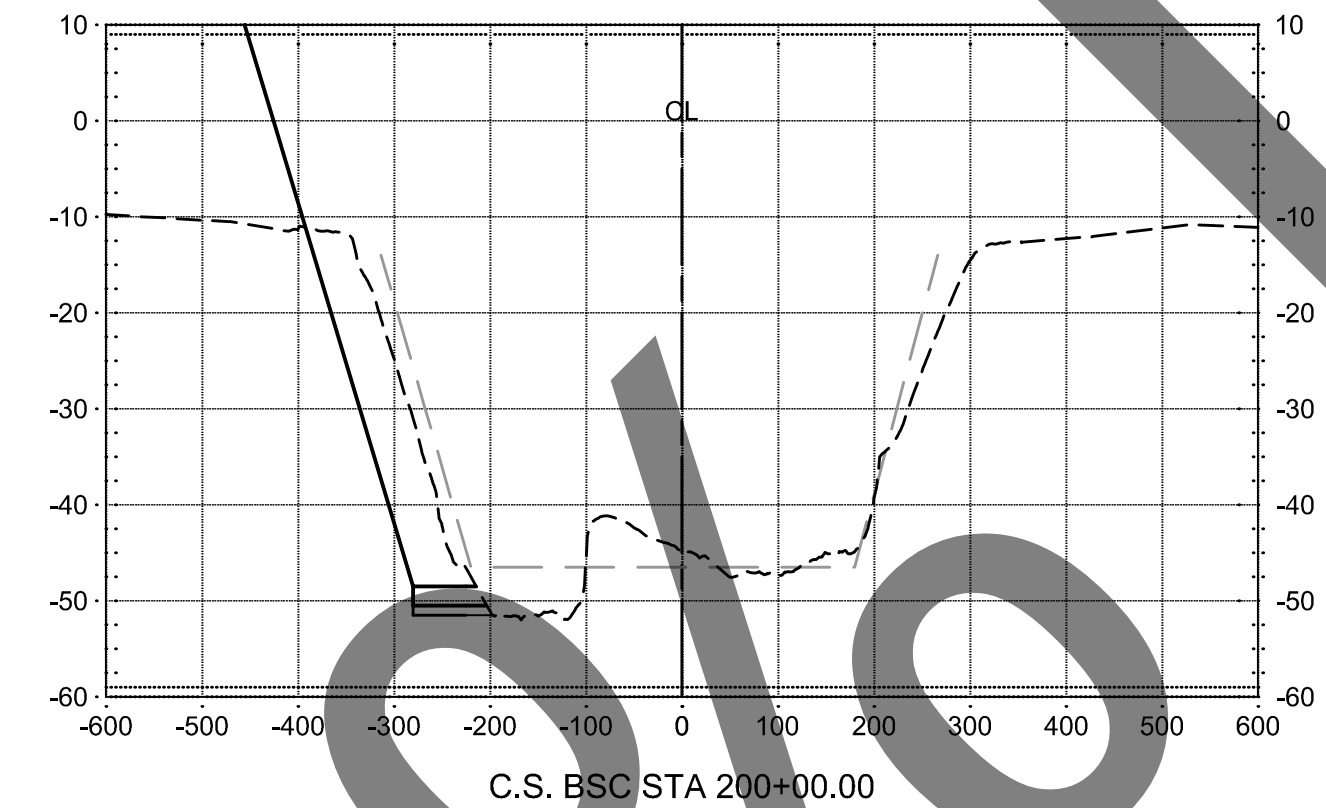
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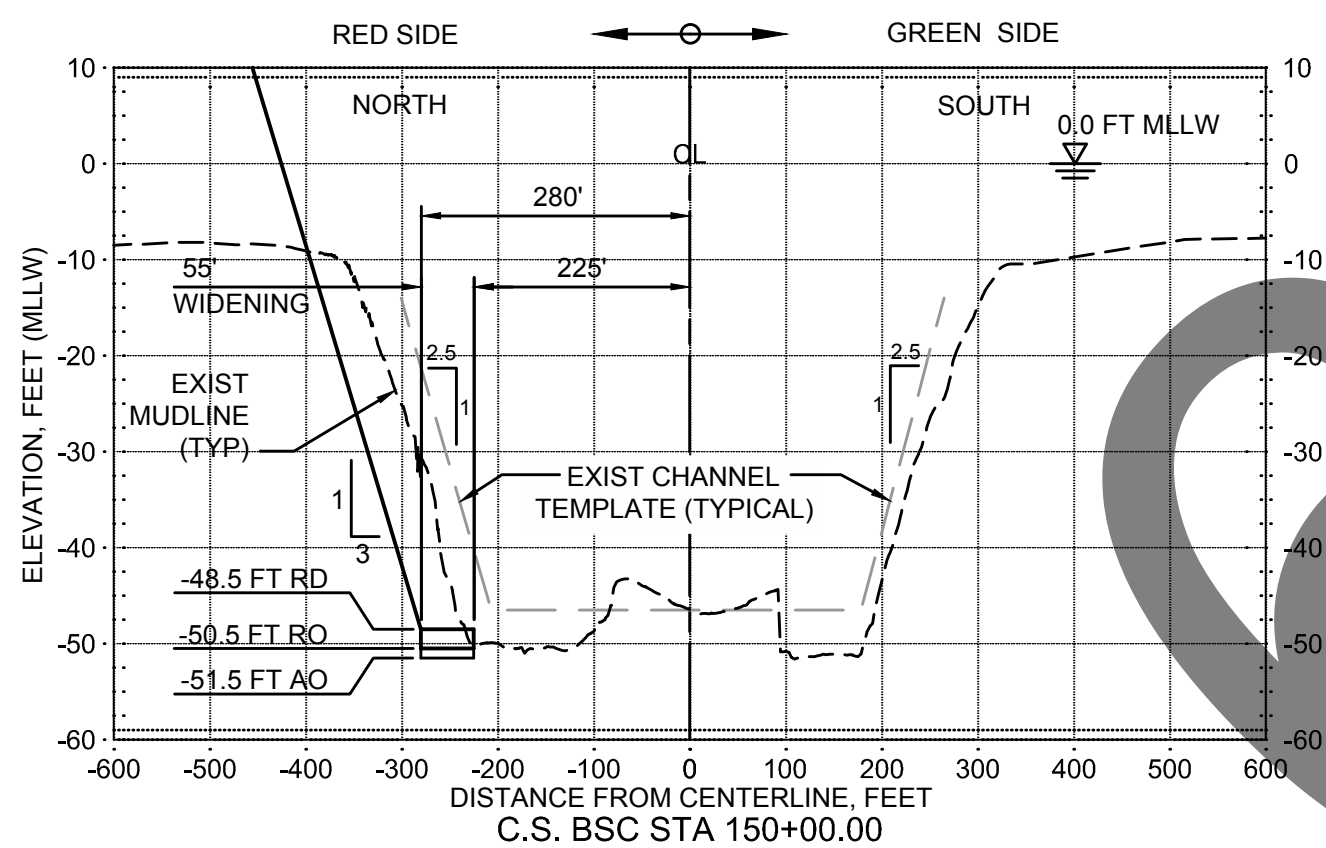
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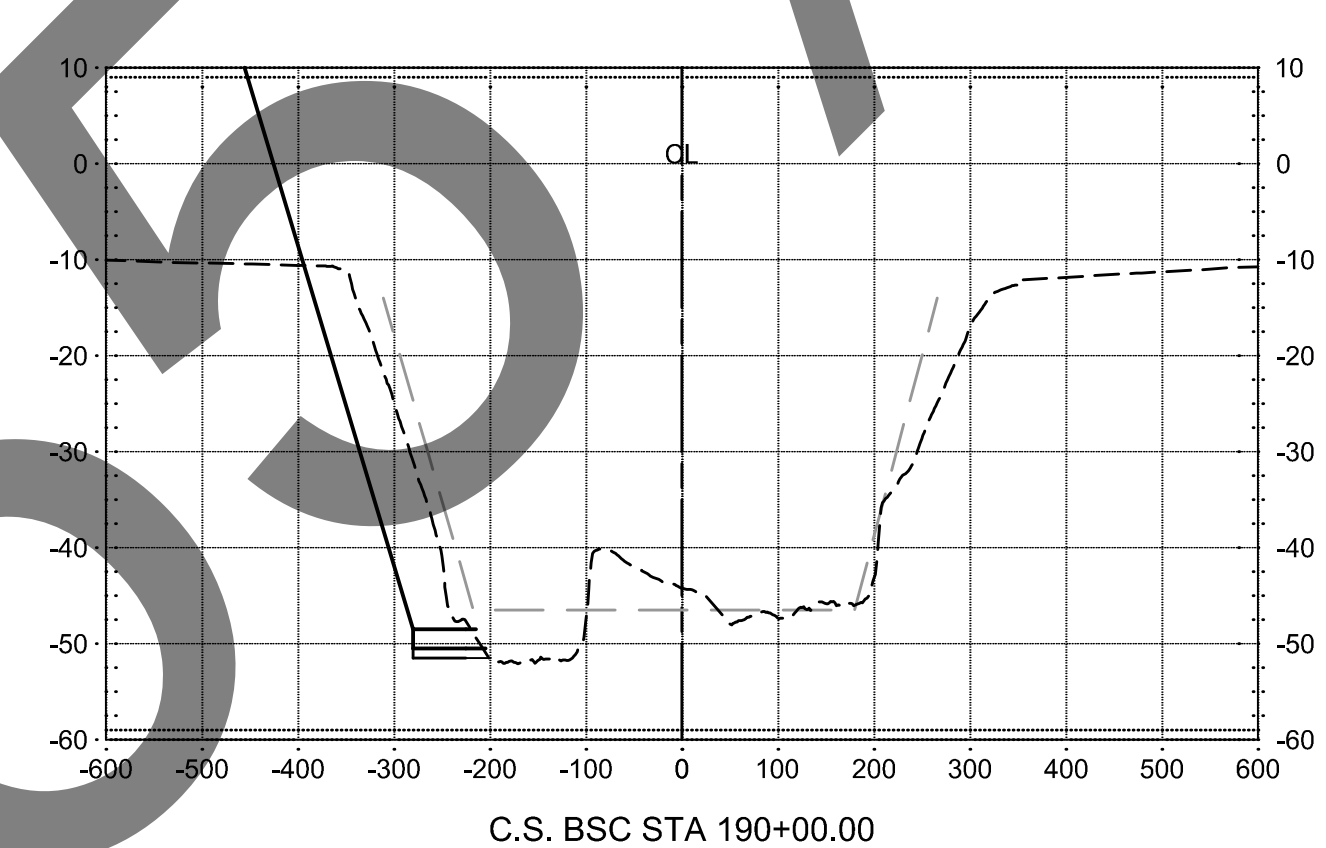
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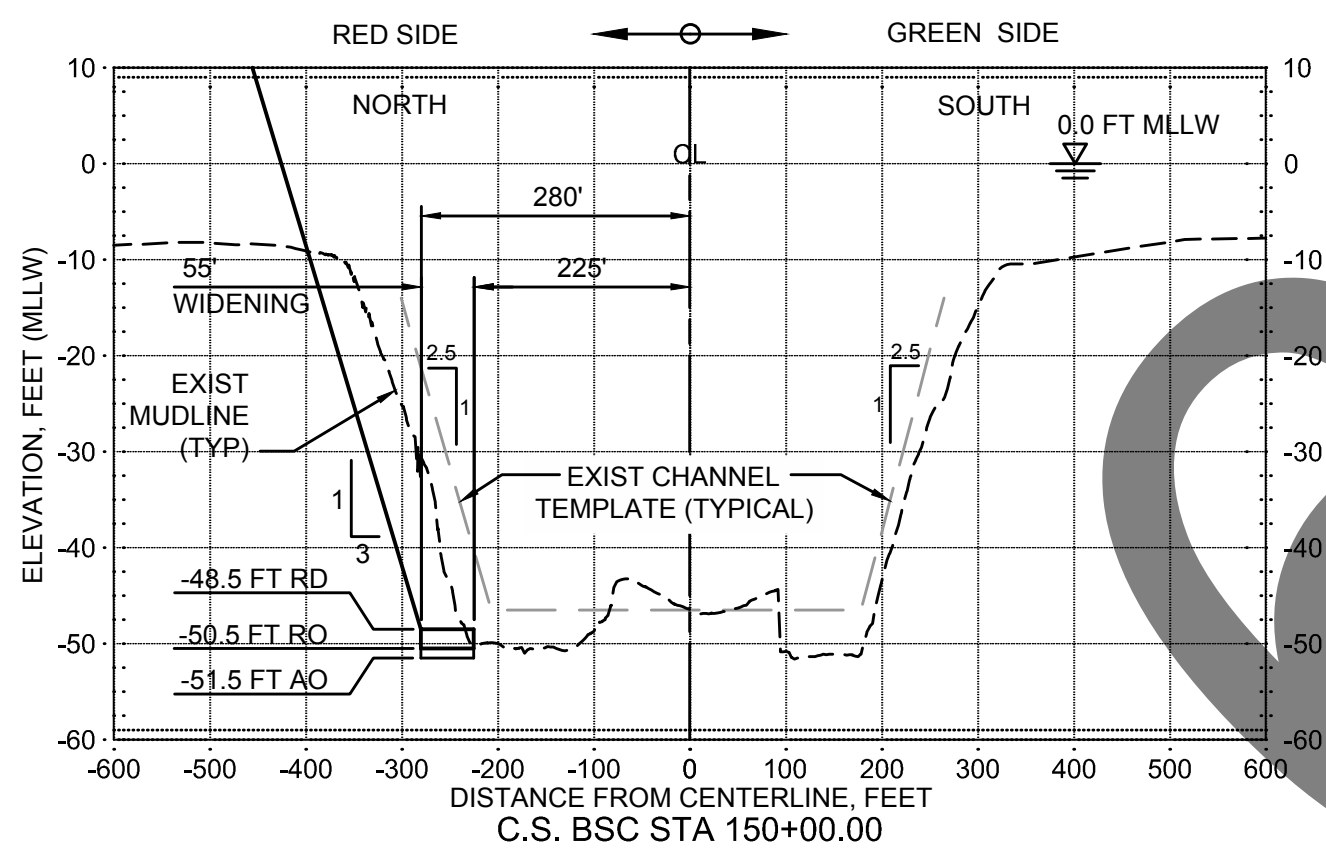
C.S. BSC STA 200+00.00



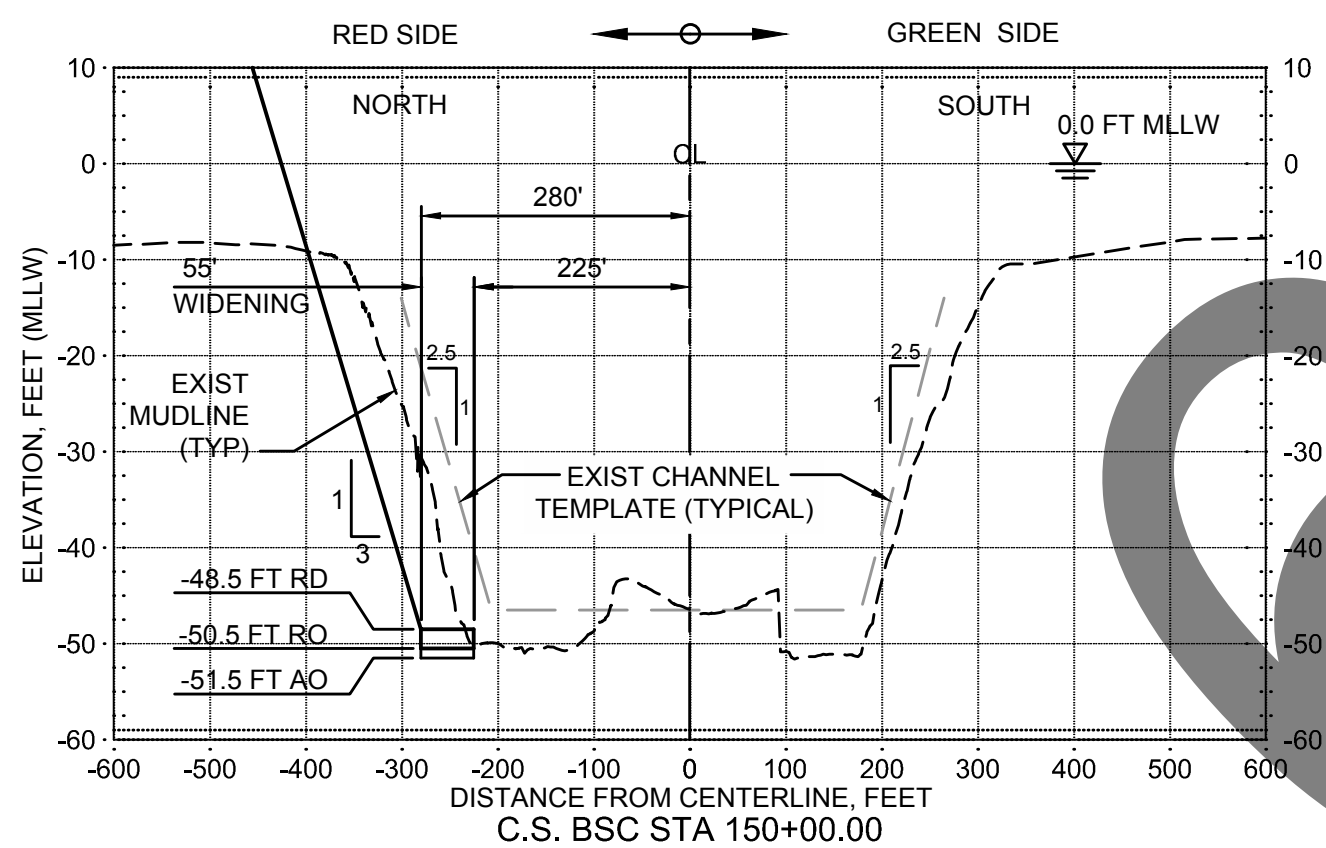
C.S. BSC STA 150+00.00



C.S. BSC STA 190+00.00

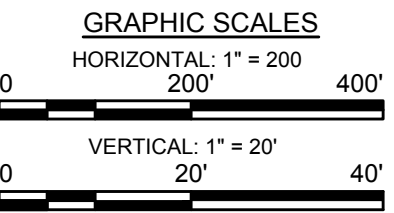


C.S. BSC STA 221+18.71



C.S. BSC STA 222+75.87
END CHANNEL WIDENING

- NOTES:
- ALL LEVELS SHOWN IN FEET TO MEAN LOW LOW WATER (MLLW).
 - ABBREVIATIONS: RD - REQUIRED DEPTH
RO - REQUIRED OVER DEPTH
AO - ALLOWABLE OVER DEPTH



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ENGINEER: Ashley P. Judith

P.E. NO: 112988

DATE: August 3, 2020

APPROVED: _____ DATE: _____

PORT CONTRACT REPRESENTATIVE/
MANAGING DIRECTOR - ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:

HOUSTON SHIP
CHANNEL (HSC)

EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)

SHEET TITLE:

PROJECT 11:
BAYPORT SHIP
CHANNEL: BSC Sta
241+87 to BSC Sta
25+58

DREDGE CROSS
SECTIONS - 2

BSC STA 150+00 TO
BSC STA 222+75.87

REV DATE DESCRIPTION

X 05/05/XX XXXX

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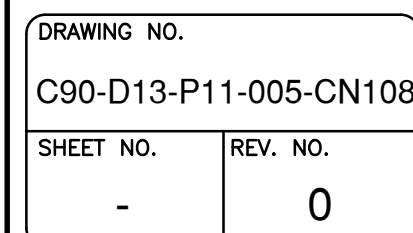
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A north arrow pointing upwards, labeled 'N'. To its right is a graphic scale bar with markings for 0, 2000', and 4000'.



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TBPE NO. F-10788

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MANAGING DIRECTOR - ENGINEERING
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PROJECT TITLE:
**HOUSTON SHIP
CHANNEL (HSC)**

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

HEET TITLE:
PROJECT 11: SOUTH
BOATERS CUT TO
BAYPORT (BEACON 76):
HSC ST 57+000 TO HSC
STA 20+000 & BAYPORT
SHIP CHANNEL

PLACEMENT AREA
LAN -
AN LEON OYSTER
MITIGATION - TYPICAL
ECTIONS & DETAILS - 1

[illegible]

DATE:	AUGUST 202
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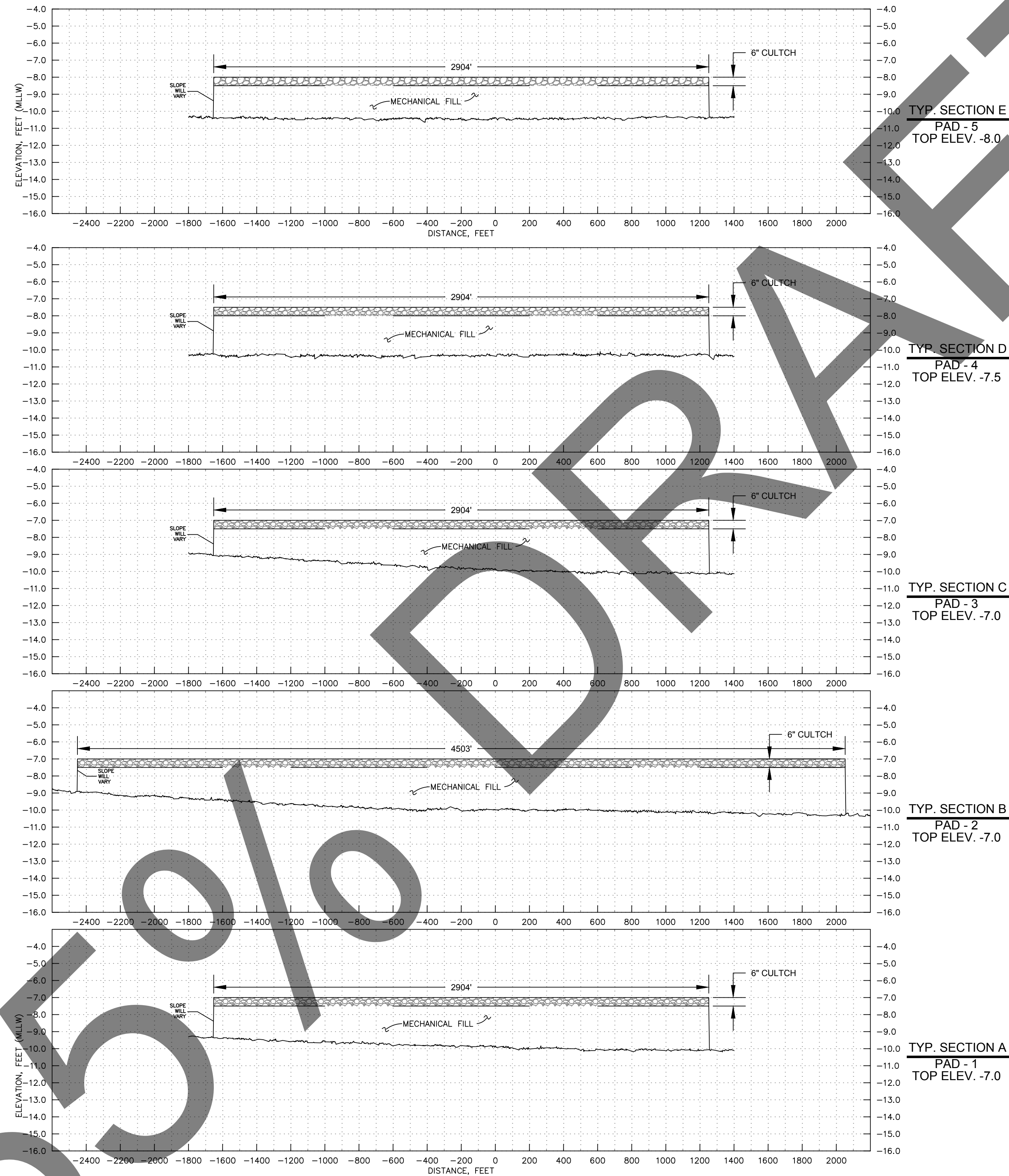
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NOTES:

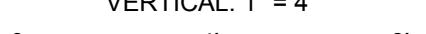
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2. ALL ELEVATIONS ARE REFERENCED TO MLLW.

GRAPHIC SCALES

HORIZONTAL: 1" = 200'



VERTICAL 11 11



4



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HOUSTON SHIP CHANNEL (HSC)

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

**PROJECT 11: SOUTH
BOATERS CUT TO
BAYPORT (BEACON 76):
HSC ST 57+000 TO HSC
STA 20+000 & BAYPORT
SHIP CHANNEL**

PLACEMENT AREA

LAN -

AN LEON OYSTER

MITIGATION - TYPICAL

CTIONS & DETAILS -

[illegible]

DESIGNER:	DC
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DATE:	AUGUST 2020
SCALE:	AS SHOWN

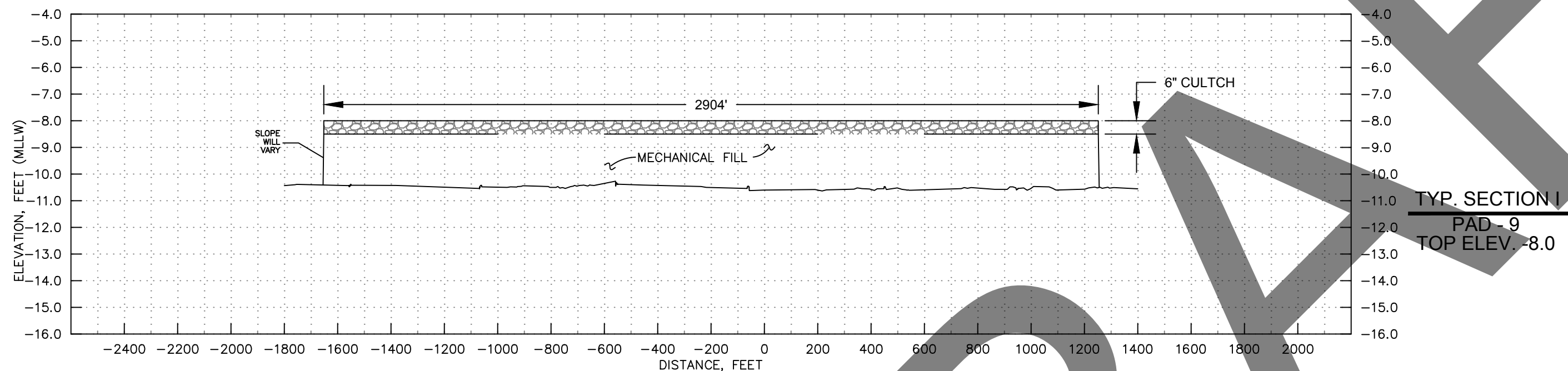
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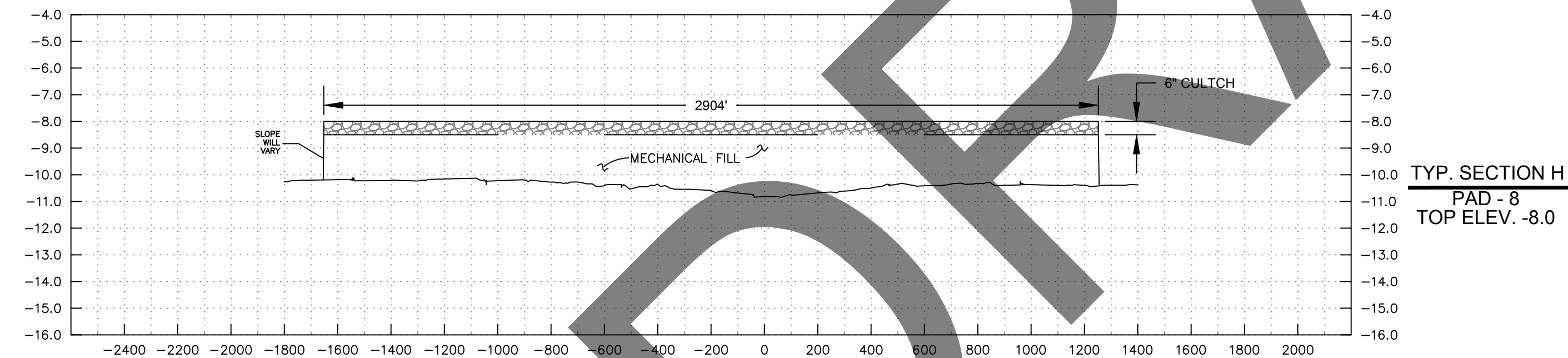
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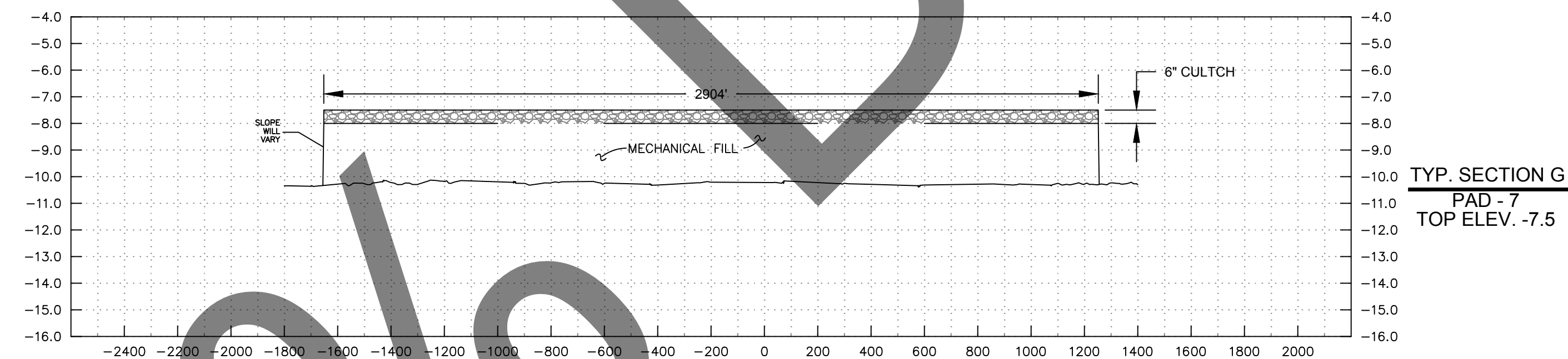
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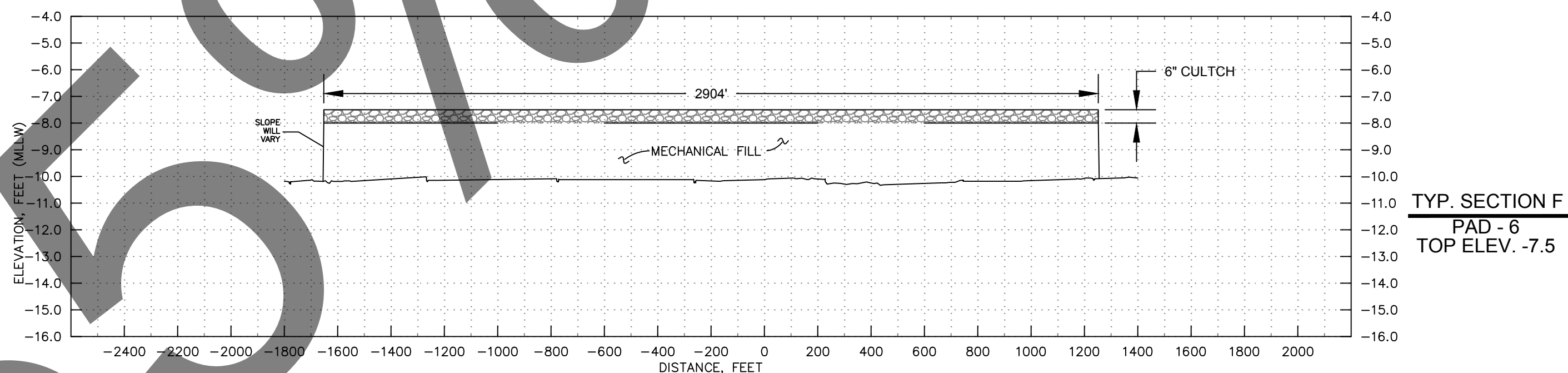
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PAD - 9
TOP ELEV. -8.0



TYP. SECTION H
PAD - 8
TOP ELEV. -8.0



TYP. SECTION G
PAD - 7
TOP ELEV. -7.5



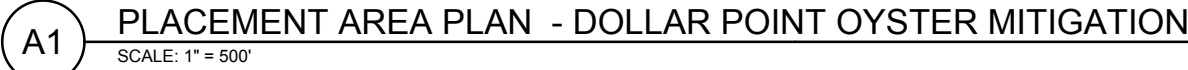
TYP. SECTION F
PAD - 6
TOP ELEV. -7.5

HORIZONTAL: 1" = 200'



VERTICAL: 1" = 4'





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P.E. NO: _____
DATE: _____

APPROVED: _____
DATE

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR - ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:
**HOUSTON SHIP
CHANNEL (HSC)**

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

HEET TITLE:
PROJECT 11: SOUTH
BOATERS CUT TO
BAYPORT (BEACON 76):
HSC ST 57+000 TO HSC
STA 20+000 & BAYPORT
SHIP CHANNEL

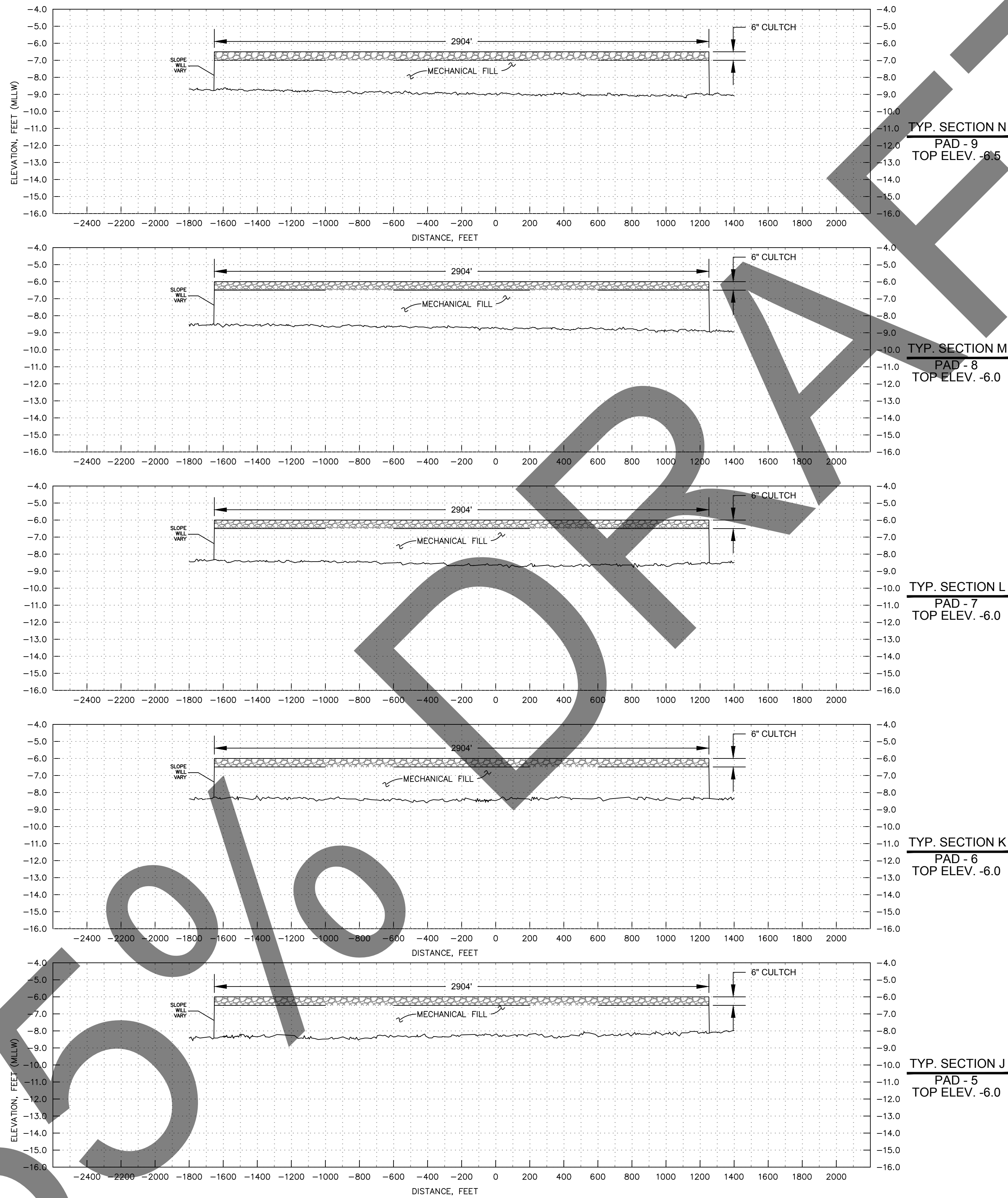
LACEMENT AREA
 LAN -
 OLLAR POINT OYSTER
 MITIGATION - TYPICAL
 ECTIONS & DETAILS - 1

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CE303	0

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GRAPHIC SCALES

HORIZONTAL: 1" = 200'



VERTICAL: 1" = 4'





The seal of the Port of Houston Authority (PHA) is a circular emblem. It features a five-pointed star in the center, with the letters 'PHA' superimposed on it. The star's points extend towards the edges of the seal. The words 'PORT OF HOUSTON AUTHORITY' are written in a circular path around the top half of the star, and 'HOUSTON, TEXAS' is written around the bottom half. The entire seal is enclosed within a decorative rope-like border.

CONSULTANT:
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ENGINEER: _____
P.E. NO: _____
DATE: _____

APPROVED: _____
DATE

PORT CONTRACT REPRESENTATIVE
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DESIGN & SUPPORT

PROJECT TITLE:
**HOUSTON SHIP
CHANNEL (HSC)**

**EXPANSION
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
PLAN -
NEW BIRD ISLAND
MARSH - SECTIONS &
DETAILS - 1**

[illegible]

DESIGNER:	DC
CADD:	RK
CHECKER:	NK/SH
DATE:	AUGUST 202
SCALE:	NTS

DRAWING NO.	
C90-D13-P11-005-CE305	
SHEET NO.	REV. NO.
CE305	0

**TECHNICAL SPECIFICATIONS
FOR
HOUSTON SHIP CHANNEL EXPANSION CHANNEL IMPROVEMENT PROJECT**

PROJECT 11: REDFISH TO BAYPORT (BEACON 76)

SEGMENT 1B: HSC STA. 57+000 to STA. 20+000

SEGMENT 2: BSC STA. 241+87.21 to STA. 42+07.8

Submitted by:

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

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ENGINEER: ASHLEY P. JUDITH
LICENSE NO: TX# 112988
DATE: AUGUST 03, 2020

ENGINEER: CHESTER HEDDERMAN
LICENSE NO: TX# 100209
DATE: AUGUST 03, 2020

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LIST OF APPENDICES TO THE TECHNICAL SPECIFICATIONS

Appendix A: Geotechnical Study – Houston Ship Channel Expansion Channel Improvement Project
Harris, Chambers and Galveston Counties, Texas, Report No. HG1910092.1.1 - DATA (April 30, 2020)

Appendix B: Geotechnical Study – Design Report Houston Ship Channel Expansion Channel
Improvement Project Harris, Chambers and Galveston Counties, Texas, Report No. HG1910092.1.1 - DES
(April 30, 2020)

Appendix C: Mag survey report (possibly only include the link for download)

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, 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

The Houston Ship Channel Expansion Channel Improvement Project encompasses dredging of the Houston Ship Channel (HSC) from approximate Station 57+000 to approximate Station 20+000 and a bend easing at Station 28+605. New work 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. ~~Maintenance dredging shall occur within the existing channel template from HSC Station 57+000 to Station 20+000, referred to as "HSC Maintenance Dredging" for these Technical Specifications, and shall be excavated and placed at discharge locations 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 dredged within the limits 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 elevation of minus 46 feet 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 beginning at the required elevation of minus 48 feet, with 2 feet of required overdepth and 1 foot of allowable overdepth; and a 3H:1V slope from HSC Station 56+000 to 20+000 beginning at the required elevation of minus 48 feet, with 2 feet of required overdepth and 1 foot of allowable overdepth. New work materials from HSC Station 57+000 to Station 20+000 include the channel widening, bend easing and offset of the barge lanes as shown on the Plans.

New work materials removed from within the HSC dredge limits shall be used to construct oyster reef mitigation pads at Dollar Reef and San Leon, as well as Bird Island Marsh beneficial use site. The Contractor is responsible for determining channel stations and elevations between which the new work material to be dredged is used to construct the oyster reef pads and Bird Island Marsh based upon its elected means and methods. All new work material used for the construction of oyster reef pads at Dollar Reef and San Leon shall be mechanically dredged and placed. All remaining HSC new work

material shall be hydraulically dredged and pumped to construct Bird Island Marsh. The oyster mitigation features and Bird Island Marsh features must 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 five (5) 20-acre pads to create a foundation for cultch material. San Leon oyster mitigation site is located just offshore of Baccliff, 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 eight (8) 20-acre pads and one (1) 31-acre pad to create a foundation for cultch material.

Bird Island Marsh is an approximate 229-acre triangularly shaped marsh located in Trinity Bay and east of the HSC. Construction includes hydraulic 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 3,646-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-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 evenly 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 241+87.21 at the start of the BSC Flare to approximate Station 25+58.69 near the BSC turning basin. New work dredging will occur within the excavation area for channel widening along the northern limits of the BSC. 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. Maintenance

dredging shall occur within the existing channel template for the BSC and BSC Flare from Station 241+87.21 to Station 25+58.69, referred to as BSC Maintenance Dredging for these Technical Specifications, and placed at discharge locations 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 shall be dredged within the horizontal limits shown on the Plans to a required elevation of minus 48.5 feet MLLW with 2 feet of required overdepth and 1 foot 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 elevation 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 materials shall be hydraulically dredged and pumped to beneficially construct Bird Island Marsh. For the purposes of these Technical Specifications, New Work Hydraulic Dredging Bayport Ship Channel Stations 222+75.87 to 42+07.80 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

New work dredging to be performed hydraulically under this contract consists of furnishing an ocean certified hydraulic cutterhead pipeline dredge with pump discharge of not less than 27-inch diameter and must be able to work in exposed marine environments that are prone to potential rough sea conditions such as Lower Galveston Bay. The dredge proposed for use shall be equipped with a ladder pump and shall be complete with all necessary materials, supplies, (including fuel, power, and water) labor, and transportation for new work dredging operations as specified in the above paragraphs capable to perform at a minimum average daily production rate of 10,000 cubic yards 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 with dredging of hard new work materials of the same type, or of a more complex nature as to be dredged under this contract, and in excess of \$100 million. Maintenance dredging contracts do not constitute 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

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

Cultch: Material that will serve as the substrate for oyster spat attachment.

Demobilization: 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 other costs incidentals for the removal of the plant and equipment from the work sites.

Dike: 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.

Embankment: 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.

Engineer: 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.

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

Final Grade: Final grade shall mean the constructed lines and elevations, shown by cross sections, after completion of final shaping and grading.

Final Shaping and Grading: This term shall mean the work necessary to construct the dike or embankment to the required template, within allowable tolerances, to achieve final grade.

Gross Retention Rate: 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.

Hydraulic Fill: 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.

Maintenance Dredging: 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.

Mean Lower Low Water: Mean Lower Low Water (MLLW) is the vertical tidal datum used by the USACE Southwest Galveston District. USACE provided datum conversions by reach are provided on the Plans.

Mechanical Fill: 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, drag lines, dozers, loaders, dump trucks, or other non-waterborne machinery.

Minimum Placement Rate: The minimum rate in tons per acre of cultch material to place that the Contractor determines is necessary to achieve the required elevation given the actual density of the cultch material and the bay bottom soil conditions. At minimum, it can be no less than the amount required to produce the required elevation, but in practicality will include amounts anticipated to displace soft bay bottom materials given the density and placement method or technique used by the Contractor. This is determined as described in Section 13.6.3.

Minimum Required Quantity: The minimum amount of material the Contractor anticipates will be necessary to achieve the Target Relief, based on the Minimum Placement Rate, and calculated as specified in Section 13.6.3.

Mobilization: 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 remove 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.

Net Retention Rate: 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.

New Work Dredging: The term new work dredging shall mean removal of previously undredged material within the dredging template as shown on the Plans.

New Work Materials: 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; and as shown on the boring logs provided in **Appendix A**.

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

Oyster Reef Wave Trip: 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 hydraulic fill and cultch, and minimum required elevations and thickness of cultch.

Permit: 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.

Pipeline Management: The term pipeline management shall include the work in connection with laying, removing and handling of pipelines, maintenance of pipelines during construction, final cleanup of pipeline routes necessary to perform the work under various bid items. The Contract price shall include transportation and 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**.

Port Authority: 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.

Reef Pad: 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".

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

Seeding and Fertilizing: 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.

Shoaled Materials: 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.

Training Dike: The term training dike shall mean a ridge of mechanically constructed material to control the flow of hydraulically placed material and effluent to prevent accumulation of material in front of spillboxes.

1.6 EQUIPMENT DEFINITIONS

Crawler-Type Tractors: 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.

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

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

Miscellaneous Equipment: Scarifiers, draglines, disks, motorized graders, spreaders, and other 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.

Power-Driven Tampers: Compaction of material in areas where it is impracticable to use a crawler-type tractor shall be performed using 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.

Spillbarge: The Contractor must also have, as part of the dredging plant, a "controllable spill barge" to disperse the hydraulically dredged new work materials in the open water placement areas. The Contractor must have the mechanism built into the spill barge to allow full control of the barge's movements, side to side, and forward/backward. The Contractor must have an electronic tracking

system onboard this spillbarge, with which the operator will know the barge location at all times and be able to make controlled movements.

Transport Vessel: Barges used to transport material having been excavated from the HSC by mechanical means. The terms “scow”, “disposal scow” and “hopper barge” are synonymous with transport vessel.

1.7 SPECIAL SCHEDULING REQUIREMENTS

1.7.1 ORDER OF WORK

The Contractor’s order of work shall be performed to the following order of work listed. However, 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).

- ~~1. 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 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, unless otherwise restricted by the Contract Documents.

- ~~4. BSC Maintenance~~

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

5. NW Dredging BSC to BIM.

The Contractor may accomplish NW Dredging BSC to BIM simultaneously with NW Dredging HSC to Dollar Reef and NW Dredging HSC to San Leon, subject to approval by the Engineer.

Construction for both the HSC and BSC shall be continuous from start to finish with no appreciable shut down periods.

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 Part 5. 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.

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 to the 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 review. However, it is expressly understood that the Engineer is 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 other than the Engineer. The Contractor shall make every effort possible to familiarize itself with and research the conditions to be expected at the site.

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 core borings, to determine the character of materials to be removed, and the material characteristics at the placement areas, have been obtained by the Port Authority and the results of these investigations are included with these Technical Specifications as **Appendix A**. The Contractor is expected to examine the 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 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, timbers, 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 should 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 obtained by the Port Authority and the results of these investigations are included with these Technical Specifications as **Appendix C**. Magnetometer data provided in **Appendix C** 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. No separate measurement or payment shall be made for debris removal, disposal, downtime, or damages resulting therefrom.

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 tide is largely dependent on the force, direction, and duration of the wind. Larger seasonal tidal events should be anticipated and expected by the Contractor.

1.10.4 MARINE CONDITIONS

Strong currents may at times exist in and adjacent to the site. In addition to tidal fluctuations and current velocities, the water at the site may at times be rough. 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 wake waves. The Contractor shall take measures as it deems appropriate to ensure against damages to the work or itself resulting from ship wakes. Effects from ship wakes shall not be just cause for increased compensation or allowable downtime due to mechanical failure resulting from ship wakes.

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 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 climatologically 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 Subpart 1.13.2.

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 Contractor's operations, either to surface or subsurface structures, shall be repaired or replaced by the Contractor at its sole risk and cost.

1.12 UTILITY PIPELINES

Every effort has been made to give pertinent details on the location of utility pipelines and other facilities which may be encountered in trenching, jacking, dredging, or earthwork operations. The data shown are substantially correct. However, the Contractor shall investigate existing conditions and satisfy itself as to the existence of additional construction which may interfere with pipelines lying herein. 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.

1.12.1 PROTECTION OF EXISTING SERVICE LINES AND UTILITY LINES

Existing utility lines that are shown or the locations of which are made known to the Contractor prior to excavation or fill placement and that are to be retained, as well as utility lines encountered during excavation operations, shall be protected from damage during construction and, if damaged, shall be repaired at the expense of the Contractor. In the event that the Contractor damages existing utility lines that are not shown or the locations of which are not known to the Contractor, report of this damage shall be made immediately to the TEXAS ONE CALL SYSTEM (811) and the Engineer. If it is determined that repairs shall be required, these repairs will be ordered in accordance with provisions of the Contract Documents.

1.13 NAVIGATION

1.13.1 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 be required to conduct the work using a method 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 needed when dredging the berths, or other, it shall be required to be moved during the passage of ship traffic. 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.

1.13.2 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 shall facilitate all ATONS removal and replacement. The Contractor shall work and coordinate with the USCG and USACE to enable a smooth operation of all ATONS 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.

1.13.3 BRIDGE-TO-BRIDGE RADIOTELEPHONE EQUIPMENT

Dredge 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 (Channel 13). Multi-channel equipment will also require 156.8 MHz (Channel 16). Tugs and tenders will be considered towing vessels within the meaning of the Act.

1.13.4 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 workboats 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 Part 1 Subsection 1.13.7. 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.

1.13.5 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. Coast Guard Instruction M16672.2, Navigation Rules: International – Inland (COMDTINST M16672.2), or 33 Code of Federal Regulations 81 Appendix A (International) and 33 Code of Federal Regulations 84 through 89 (inland) as applicable.

1.13.6 RANGES, GAGES, AND LINES

Ranges, buoys, and other markers needed to define the work and facilitate inspection shall be provided, set, and maintained in good order. Gages shall be established and maintained in locations observable from all dredge areas so the depth may always be determined.

1.13.7 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.

1.13.7.1 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, if any, crossing the channel
- Termination point of pipelines, if any, crossing the channel
- Time required to re-open channel or move for vessel traffic
- Operating impairments, including VHF-FM radios

1.13.7.2 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.

1.13.7.3 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.

1.13.7.4 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.

1.13.7.5 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.

1.13.8 DREDGE TRACKING

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 GPS contractor. Access to the vessel shall be provided by the Dredging Contractor to allow installation, maintenance, and removal of the tracking units by the Port Authority GPS contractor. The GPS tracking units are the property of the Port Authority and will be removed by the Port Authority GPS contractor prior to dredge demobilization.

1.13.9 DREDGING AND DREDGE RELATED MARINE WORK

The Contractor shall comply with the provisions of EM 385-1-1. 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

1.13.10 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 used on this contract.

1.14 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 determined. Estimated shoaling rates are explained in **Parts # and #** 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 as is justified.

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

1.15 UNAUTHORIZED PLACEMENT OF MATERIAL

1.15.1 MISPLACED MATERIAL

Excavated material that is deposited elsewhere 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.

1.15.2 DEBRIS DISPOSAL

During the progress of the work, the Contractor shall not deposit 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 the navigable waters. This material, together with scrap, rope, wire cable, piles, pipe, or other obstructive material which may be encountered during the dredging operations, shall be disposed of by the Contractor at locations in accordance with any and all applicable Federal, State, or local requirements.

1.16 HOLD HARMLESS AND INDEMNIFICATION

The 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**).

1.17 USE OF PORT AUTHORITY PREMISES AND WORK AREA CONDITIONS

1.17.1 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 a berm around fuel and liquid chemical storage tanks to contain the tank contents in the event of a leak or spill. **Refer to the General Conditions for further guidance.**

1.17.2 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.

1.17.3 SITE MAINTENANCE

Trash or debris shall not be allowed to accumulate on the site. 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.

1.17.4 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 additional 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.

1.18 FIRE PROTECTION

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

1.19 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.**

1.20 ACCESS AND STAGING

The Port Authority will 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.

1.20.1 CONSTRUCTION OFFICE

The Contractor shall provide for the duration of the projects, 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, fax, copier, and two internet connections. The Contractor shall provide one speaker phone and one all-in-one printer, fax, scanner, and copier capable of printing 11x17 paper. Paper cartridges (as required) shall be furnished for the printer. In addition, the Contractor shall provide electric power, sewer, gas, lighting, phone, and internet service, 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 become the property of the Contractor when the project is completed. **This section supersedes Section 4.29 of the General Conditions.**

1.20.2 CONSTRUCTION SITE TRANSPORTATION

The Contractor shall provide one all-terrain vehicle (4x4) at the construction site for the sole use of the Port Authority. The vehicle shall have a minimum of four seats and be capable of carrying personnel and equipment. The Contractor shall also provide a small building at the construction site capable of housing the vehicle. Doors to the building shall be lockable. Lock and keys shall be provided to the Port Construction Representative and Engineer. The ATV shall become the property of the Contractor when the project is completed.

1.21 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).

1.22 ADJACENT PROPERTY AND STRUCTURES

The Contractor is notified that construction will 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 expense to the Port Authority.

1.23 SURFACE AND SUBSURFACE STRUCTURES AND UTILITIES WITHIN THE SITE

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 utilities have not been field verified. The Contractor is notified that uncharted and/or incorrectly charted pipelines and/or

underwater obstructions may be present within the site. Prior to commencement of work, the Contractor shall verify in the field with a pre-dredge hazard survey the location of any known, unknown, or suspected underground utilities or other obstructions to the satisfaction of the Contractor.

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. 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 of these 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.

1.24 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 problems, 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.

1.25 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, as specified.

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 Part 2 Subsection 2.6.3).

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 when deemed necessary to adequately describe the work covered in the respective sections. 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 not less than the original and four copies, 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 SCHEDULE OF VALUES

Submit no later than fourteen (14) days within award of the Contract a schedule of values (Contract price breakdown), itemizing material and labor for each classification of work. The schedules of values shall be in accordance with the Contract Documents.

2.3.2 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.

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

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) and list of qualifications 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 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.

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 PIPELINE ROUTE PLAN

For each work plan and schedule of work, the Contractor shall include for approval a 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. Pipeline routes shall be chosen in a manner that provides minimal impact to the environment. The Contractor shall prepare the 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 Part 6 of the Technical Specifications.

2.4.2.2 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 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.

2.4.2.3 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 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 target relief 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.

2.4.2.4 SHORE PROTECTION SUBMITTALS

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

2.4.2.4.1 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.

2.4.2.4.2 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.

2.4.2.5 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.

2.4.2.6 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 accurate hydrographic surveying in soft soils. Refer to Technical Specifications Part 4 for information regarding surveying QA/QC standards.

2.4.2.7 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 target relief, 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 4.14. 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.

2.4.2.8 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 the Technical Specifications.

2.4.2.9 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 Part 15 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 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 for the prevention of 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 Part 5, including Sections 5.2 Air Quality and 5.3 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 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 spill
- 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 of the air quality management district where the work will be performed, or if there are no 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 CONSTRUCTION MATERIALS

2.5.2.1 Materials Sampling and Testing Reports

Sampling and testing reports shall be submitted for the cultch material as specified in Section 13.5. This submittal requires PHA approval.

2.5.2.2 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.

2.5.2.3 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 OF INTENTION TO DREDGE

2.6.1.1 USACE

The Contractor shall notify the Galveston District Area Engineer, of the U.S. Army Corps Of Engineers, 2000 Fort Point Road, Galveston, Texas, 77550, in writing, at least ten (10) days prior to commencement of pipeline dredging operations, the location or locations at which a dredge or dredges will be placed on the site.

2.6.1.2 PIPELINES

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 site as shown. At the Contractor's expense, necessary protective measures shall be provided as required by the pipeline company when crossing utility pipelines with a dredge submerged pipeline. Possible protective measures include but are not limited to, floating the dredge pipeline over 100 feet each side of the utility pipeline or installing a protective padding between the submerged pipeline and utility pipeline.

The following pipelines as shown on the Plans are within or near the dredging limits and are for information purposes only.

Table 2-1 : Pipelines Near the Project Area

OWNER	SIZE (IN)	CONTENTS	APPROX. CL STATION	STATUS
HOUSTON SHIP CHANNEL				
EL PASO SERVICES, L.P.	24	CRUDE OIL	124+246.26	IN SERVICE
HOUSTON OIL & MINERALS CORP.	UNKNOWN	NATURAL GAS	114+761.52	IN SERVICE
HOUSTON OIL & MINERALS CORP.	UNKNOWN	NATURAL GAS	114+554.11	IN SERVICE
HOUSTON PIPELINE COMPANY L.P.	16	NATURAL GAS	112+113.76	ABANDONED
WILLIAMS FIELD SERVICES CO., LLC	16	NATURAL GAS	112+128.37	IN SERVICE
KINDER MORGAN TEJAS PIPELINE, L.P.	18	NATURAL GAS	90+406.35	IN SERVICE
FLORIDA GAS TRANSMISSION COMPANY, LLC	24	NATURAL GAS	80+969.04	IN SERVICE
DAVIS PETROLEUM PIPELINE LLC	10.75	NATURAL GAS	67+086.95	ABANDONED
DAVIS PETROLEUM PIPELINE LLC	8.63	NATURAL GAS	63+581.94	ABANDONED
LAYTON ENERGY, INC.	10.75	NATURAL GAS	55+128.76	ABANDONED
DAVIS PETROLEUM PIPELINE LLC	10.75	NATURAL GAS FWS	18+600.56	ABANDONED
ENTERPRISE PRODUCTS OPERATING LLC	24	ETHANE	01+691.07	IN SERVICE
BAYPORT SHIP CHANNEL				
PRAXAIR INC.	10.75	HYDROGEN	120+76.63	IN SERVICE
BIRD ISLAND MARSH				
TORRENT OIL LLC	6.63	NATURAL GAS FWS	N/A	ABANDONED
NICOR EXPLORATION COMPANY	2.38	CRUDE OIL	N/A	IN SERVICE
LAYTON ENERGY, INC.	4.5	NATURAL GAS FWS	N/A	ABANDONED

LAYTON ENERGY, INC.	10.75	NATURAL GAS	N/A	ABANDONED
LAYTON ENERGY, INC.	2.88	NATURAL GAS FWS	N/A	ABANDONED
LAYTON ENERGY, INC.	2.88	NATURAL GAS FWS	N/A	ABANDONED
GALVESTON BAY OPERATING CO. LLC	8.63	NATURAL GAS FWS	N/A	IN SERVICE
GALVESTON BAY OPERATING CO. LLC	4.5	CRUDE OIL	N/A	ABANDONED
CLARON CORPORATION	3.5	CRUDE OIL	N/A	IN SERVICE
TORRENT OIL LLC	4.5	CRUDE OIL	N/A	ABANDONED
San Leon Oyster Mitigation Site				
UNION OIL COMPANY OF CALIFORNIA	3.5	CRUDE OIL	N/A	IN SERVICE
HOUSTON OIL & MINERALS CORP.	3.5	CRUDE OIL	N/A	IN SERVICE
HOUSTON OIL & MINERALS CORP.	4.5	NATURAL GAS	N/A	IN SERVICE
AUSTRAL OIL COMPANY INCORPORATED	4.5	CRUDE OIL	N/A	IN SERVICE
ENERGY RESERVES GROUP, L.L.C.	10.75	CRUDE OIL	N/A	ABANBDONED
ENERGY RESERVES GROUP, L.L.C.	6.63	NATURAL GAS	N/A	IN SERVICE
ENERGY RESERVES GROUP, L.L.C.	3.5	NATURAL GAS	N/A	IN SERVICE
ENERGY RESERVES GROUP, L.L.C.	2.38	NATURAL GAS	N/A	IN SERVICE
PRAXAIR, INC.	16	REFINED LIQUID PRODUCT	N/A	IN SERVICE
PRAXAIR, INC.	16	OTHER GAS	N/A	ABANBDONED
ENERGY RESERVES GROUP, L.L.C.	6.63	NATURAL GAS	N/A	IN SERVICE
Dollar Reef Oyster Mitigation Site				
DENBURY GREEN PIPELINE- TEXAS, LLC	24	CARBON DIOXIDE	N/A	IN SERVICE
FIELDWOOD ONSHORE LLC	20	NATURAL GAS OFFSHORE	N/A	IN SERVICE
KINDER MORGAN TEJAS PIPELINE, L.P.	18	NATURAL GAS	N/A	IN SERVICE
PRAXAIR, INC.	10.75	OTHER GAS	N/A	IN SERVICE

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

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

The Port Authority shall conduct all BD, interim AD surveys, maintenance dredging BD 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 Port Authority shall also conduct final acceptance surveys for Bird Island Marsh upon completion of final shaping and grading. The Contractor shall provide five days' (5 days') advance notice of its intent to request a final acceptance survey.

The Contractor shall conduct all other surveys as outlined in Technical Specifications Part 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.

2.6.3 PRE-DREDGE HAZARD AND PIPELINE SURVEY

The Contractor shall submit the results of their pre-dredge hazard and pipeline survey (see Technical Specifications Part 4 Section 4.8) to the Engineer 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 the Technical Specifications and Plans. The pre-dredge hazard and pipeline survey plots shall be signed and sealed by a qualified Texas licensed RPLS or PE 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.

2.6.4 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 of mobilization 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 and fueling and maintenance logs for the dredge and boosters 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 Part 2 Subsection 2.3.3.1) and shall include the approved retention rate spreadsheet for reporting fill progress (see Technical Specifications Part 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
 - 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 Part 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 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.

2.6.4.6 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 Part 3 Subpart 3.4 and recorded on the daily inspection form at the sole cost and responsibility of the Contractor.

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 Part 4 of the 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 the 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
- 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 ON CD OR DVD

In addition to plots, all survey transmittals shall include digital data on labeled CD or DVD. Electronic submittal via email 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 CERTIFICATIONS

2.6.7.1 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.

2.6.7.2 BEST MANAGEMENT PRACTICES

The producer of the treated wood products shall provide certification at 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 Part 4 Section 4.8) 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 the Technical Specifications and Plans. The post-dredge hazard survey plots shall be signed and sealed by a qualified Texas licensed RPLS or PE 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 Part 4 Section 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 the Technical Specifications and Plans. The obstruction demolition survey plots shall be signed and sealed by a qualified Texas licensed RPLS or PE 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 showing the constructed hydraulic fill at Bird Island Marsh and mechanical fill at Dollar Reef and San Leon oyster mitigation sites, and the drop-outlet structures, construction AD surveys of the channels, and magnetometer surveys of the submerged pipeline corridors.
- One set of all Project submittals and all 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 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, excluding pipelines, to the general work area in condition ready for 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 PIPELINE MANAGEMENT – TO PA14

[placeholder for maintenance dredge disposal]

3.1.4 NOISE ABATEMENT

3.1.4.1 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.

3.1.4.2 MEASUREMENT

This shall not be measured for payment.

3.1.4.3 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 Part 4 Section 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 within the HSC as determined by the Contractor for construction of oyster pads at Dollar Reef oyster reef mitigation site. New work dredging shall include the channel widening and replacement 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 Part 6 of the 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 BD and AD survey comparison in accordance with Part 4 of the 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. 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.

3.2.2 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 within the HSC as determined by the Contractor for construction of oyster pads at San Leon oyster reef mitigation site. New work dredging shall include the channel widening and replacement 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 Part 6 of the 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 Part 4 of the 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. 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.

3.2.3 DOLLAR REEF 20-ACRE OYSTER PADS

3.2.3.1 GENERAL

The Contract price per each completed 20-acre oyster pad at Dollar Reef shall include constructing mechanical fill pads, erosion control, final shaping and grading of mechanical fill, placement of cultch material and any other related work for constructing five (5) 20-acre oyster pads at Dollar Reef oyster reef mitigation site as specified in Parts 11 and 13 of the Technical Specifications. The costs for sampling and testing of cultch material shall be included in the applicable contract unit price for "Dollar Reef 20-Acre Oyster Pads".

3.2.3.2 MEASUREMENT

Measurement for Dollar Reef oyster pads shall be made per each completed 20-acre oyster pad meeting the minimum lines and grades as shown on the Plans.

3.2.3.3 PAYMENT

Payment shall be made at the Contract unit price. No progress payments will be made for Dollar Reef 20-Acre Oyster Pads.

3.2.4 SAN LEON 20-ACRE OYSTER PADS

3.2.4.1 GENERAL

The Contract price per each completed 20-acre oyster pad at San Leon shall include constructing mechanical fill pads, erosion control, final shaping and grading of mechanical fill, placement of cultch material and any other related work for constructing eight (8) 20-acre oyster pads at San Leon oyster reef mitigation site as specified in Parts 11 and 13 of the Technical Specifications. The costs for sampling and testing of cultch material shall be included in the applicable contract unit price for "San Leon 20-Acre Oyster Pads".

3.2.4.2 MEASUREMENT

Measurement for San Leon oyster pads shall be made per each completed 20-acre oyster pad meeting the minimum lines and grades as shown on the Plans.

3.2.4.3 PAYMENT

Payment shall be made at the Contract unit price. No progress payments shall be made for San Leon 20-Acre Oyster Pads.

3.2.5 SAN LEON 31-ACRE OYSTER PAD

3.2.5.1 GENERAL

The Contract price for the completed 31-acre oyster pad at San Leon shall include constructing a mechanical fill pad, erosion control, final shaping and grading of mechanical fill, placement of cultch and any other related work for constructing one (1) 31-acre oyster pad at San Leon oyster mitigation site as specified in Parts 11 and 13 of the Technical Specifications. The costs for sampling and testing of cultch material shall be included in the applicable contract unit price for "San Leon 31-Acre Oyster Pad".

3.2.5.2 MEASUREMENT

Measurement for San Leon 31-acre oyster pad shall be made for the completed 31-acre oyster pad meeting the minimum lines and grades as shown on the Plans.

3.2.5.3 PAYMENT

Payment shall be made at the Contract unit price. No progress payments shall be made for San Leon 31-Acre Oyster Pad.

3.2.6 MAINTENANCE DREDGING – HSC STATIONS 57+000 to 20+000

[placeholder]

~~3.2.7 MAINTENANCE DREDGING - BSC STATIONS 241+87.21 to 25+58.69~~

~~[placeholder]~~

~~3.2.8 MAINTENANCE DREDGING - BSC FLARE STATIONS ##+## to ##+##~~

~~[placeholder]~~

3.2.9 NEW WORK HYDRAULIC DREDGING - HSC TO BIRD ISLAND MARSH

3.2.9.1 GENERAL

This item shall mean the Contract unit price for new work dredging within the HSC as determined by the Contractor for construction of Bird Island Marsh. New work dredging shall include the channel widening and replacement 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 Part 6 of the Technical Specifications.

3.2.9.2 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 Part 4 of the Technical Specifications. Channel dredging shall be measured by reaches in accordance with Table 6-2: HSC Acceptance Sections.

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

3.2.10 NEW WORK HYDRAULIC DREDGING - BSC STATIONS 222+75.87 TO 42+07.80 TO BIRD ISLAND MARSH

3.2.10.1 GENERAL

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

3.2.10.2 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 Part 4 of the Technical Specifications. Channel dredging shall be measured by reaches in accordance with Table 6-5: BSC New Work Acceptance Sections. **Error! Reference source not found..**

3.2.10.3 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.

3.2.11 FINAL SHAPING AND GRADING - BIRD ISLAND MARSH 2-AC BIRD ISLANDS HYDRAULIC FILL

3.2.11.1 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 Part 10 of the Technical Specifications.

3.2.11.2 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.

3.2.11.3 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.

3.2.12 FINAL SHAPING AND GRADING - BIRD ISLAND MARSH DIKES HYDRAULIC FILL

3.2.12.1 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 Part 10 of the Technical Specifications.

3.2.12.2 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.

3.2.12.3 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.

3.2.13 BIRD ISLAND MARSH OYSTER REEF WAVE TRIPS

3.2.13.1 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 Parts 10 and 13 of the 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".

3.2.13.2 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.

3.2.13.3 PAYMENT

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

3.2.14 SHORE PROTECTION - BIRD ISLAND MARSH DIKES

3.2.14.1 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.

3.2.14.2 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 Section 3.4 "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.

3.2.14.3 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.

3.2.15 BSC SHORE PROTECTION REMOVAL AND REUSE

3.2.15.1 GENERAL

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

3.2.15.2 MEASUREMENT

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

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.

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

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 shore protection to complete the shore protection as shown shall be measured for payment at the Contract unit price per linear foot for "BSC Shore Protection – Additional Stone" 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.

3.2.16.3 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.

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 Part 16 of the Technical Specifications.

3.2.17.2 MEASUREMENT

Measurement for drop-outlet structures at Bird Island Marsh shall be made per each installed drop-outlet 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.

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 Part 14 of the 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 Part 14 of the 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 waiting 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 Part 1 Section 1.13.4. 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 0.1 hour 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.

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 waiting 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 Part 1 Section 1.13.4. 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 0.1 hour 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.

3.3 OPTION A1

3.3.1 HSC EXISTING STRUCTURE REMOVAL MOBILIZATION AND DEMOBILIZATION

3.3.1.1 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 15, 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 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 shall result in a payment determined by the Port Authority.

3.3.1.2 MEASUREMENT

This item shall not be measured for payment.

3.3.1.3 PAYMENT

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

3.3.2 HSC EXISTING STRUCTURE DEMOLITION/REMOVAL

3.3.2.1 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 Site 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 Site.

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.

3.3.2.2 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.

3.3.2.3 PAYMENT

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

3.4 STONE AND CULTCH MEASUREMENT

3.4.1 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.

3.4.2 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 gages shall be protected by solid fenders or recessed into the planking, or if upon steel 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.

3.5 SITE EROSION PROTECTION, DRAINAGE AND SURVEYS

Site Erosion Protection, Drainage and Surveys are considered ancillary to the work under this contract and no measurement or payment shall be made.

END OF SECTION

4 SURVEYING

4.1 SCOPE OF WORK

The Port Authority shall conduct BD, interim AD, ~~maintenance dredging BD~~ and final acceptance surveys for measurement and payment and acceptance within the dredge areas and oyster pad limits. The data derived from dredging surveys shall be used in computing the quantities of work performed and the actual construction completed and in place. The Port Authority shall also conduct the surveys for any periods for which dredging progress payments are requested and shall make the computations based on these surveys to determine percentages of completion. All dredging quantities shall be calculated from average-end-area volumes determined from the surveys. All raw survey data and edited/processed binned data used for purposes of acceptance and dredging quantity computations shall be available to the Contractor upon request.

The Port Authority shall also conduct final acceptance surveys of the completed hydraulic fill portions of work at Bird Island Marsh upon completion of final shaping and grading. The Contractor shall provide the Engineer a minimum of five days' notice of its intent to request final acceptance of completed work. All survey data used for purposes of final acceptance shall be available to the Contractor upon request.

The Contractor shall conduct all preconstruction, interim construction, and final shaping and grading surveys for Dollar Reef and San Leon oyster reef mitigation sites and Bird Island Marsh, including stone and cultch material placement. In addition, the Contractor shall conduct its own daily construction surveying required in conjunction with the work. The Contractor shall notify the Engineer a minimum of three (3) days prior to performing interim surveys for measurement and payment so that the Engineer may be present during surveys. Surveys for interim measurement and payment shall be conducted in the presence of the Engineer. 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:

- EM 1110-2-1003 Hydrographic Surveying
- 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 1110-1-1003, EM 1110-1-1005, and these Technical Specifications.

4.3.1 TEXAS LICENSED REGISTERED PROFESSIONAL LAND SURVEYOR OR ENGINEER

Preconstruction survey plots for Bird Island Marsh as well as final acceptance survey plots for Bird Island Marsh, including shoreline protection and cultch placement areas shall be signed and sealed by a qualified Texas licensed Registered Professional Land Surveyor (RPLS) or Professional Engineer (PE). The pre-dredge hazard and pipeline survey and post-dredge hazard survey shall also be signed and sealed by a qualified Texas licensed RPLS or PE. Any additional surveys provided and conducted by the Contractor for consideration of acceptance or payment shall be signed and sealed by a qualified Texas licensed RPLS or PE and provided in the format specified in Part 2 Subpart 2.6.6.

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, the engineer shall have documented experience and responsible charge of surveys of the same type being performed under this Contract, and the documentation of the engineer'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 surveyor or engineer.

4.3.2 REAL TIME KINEMATIC GLOBAL POSITIONING SYSTEMS

Topographic and hydrographic surveys shall be conducted using RTK GPS and the horizontal and vertical control shown on the Plans.

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 shown on the Plans.

4.6 SURVEY ACCURACY

GPS-based systems shall not be applied without establishing a local RTK GPS base station using the project control monumentation. Project control monumentation and vertical datum conversions are shown on the Plans in the Contract Documents. Required survey accuracies are provided below. 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 utilize the Contractor's RTK GPS base station for all channel hydrographic surveys and other surveys in relation to the work, as applicable.

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 by Real Time Kinematic Global Positioning Systems on a weekly basis, at a minimum. Ground control and temporary benchmarks established by the Contractor shall be in conformance with Corps of Engineers 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 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 SURVEYS

Prior to commencing dredging, staging of equipment or laying of submerged pipelines, the Contractor shall conduct a magnetometer and sidescan survey over the entire area to be dredged, Contractor proposed equipment staging and laydown areas and pipeline routes to the placement area(s). The survey shall extend a minimum of 125 feet to either side of the proposed pipeline route(s). Pre-dredge

hazard and pipeline surveys shall be at the Contractor's expense. Changes to pipeline routes submitted in the Contractor's 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 issue copies of the pre-dredge hazard and pipeline surveys to the Engineer in accordance with Part 2 Subsection 2.6.3 of these Technical Specifications.

Survey deliverables for the pre-dredge hazard and pipeline survey must be signed and sealed by a RPLS or PE licensed in the State of Texas.

4.9 POST-DREDGE PIPELINE SURVEYS

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. Pipelines that are detected shall be removed by the Contractor.

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

Survey deliverables for the post-dredge pipeline survey must be signed and sealed by a RPLS or PE licensed in the State of Texas.

4.10 CHANNEL HYDROGRAPHIC SURVEYS

Before dredge, interim AD, maintenance dredging BD and final acceptance hydrographic surveys of the dredge limits will be conducted by the Port Authority. Refer to the table below for a general summary of the surveys.

Hydrographic surveys to determine acceptance and to calculate the quantity of material removed under this Contract 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 providing accurate attitude, heading, heave, position, and velocity data and which is referenced to project control. Soundings will be obtained by using a multibeam echosounder system operating nominally at 240 kHz. In order to ensure ensonification of all bottom features, 200% bottom coverage will be obtained during all surveys conducted on behalf of the Port Authority. Position and depth data will be collected using Hypack Hysweep software, stored digitally, and subsequently processed for map preparation and quantity computations. 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.

Table 4-2: Summary of Channel Surveys

Survey	Intended Purpose	Survey Schedule	Completed By
Maintenance Dredging BD Surveys	To verify conditions existing before new work dredging, for measurement and payment of maintenance dredging	Prior to commencement of maintenance dredging	Port Authority
BD Surveys	To verify existing conditions and document pre-dredging grades and volumes	Prior to commencement of new work and after completion of maintenance dredging	Port Authority
Interim Surveys	Channel surveys will be periodically conducted by the Contractor to measure its own contract progress and compliance	Daily	Contractor
Interim AD Surveys	Channel interim AD surveys will be performed periodically to monitor dredging and to determine acceptance of new work dredge areas. Determination of the percentage completion/actual quantity of work performed for progress payments shall be made by the Engineer	Approximately once a week	Port Authority
Final Acceptance Survey	To document final dredging locations/depths and to verify that no dredging or placement has occurred outside of specified limits, and that the dredging template has been dredged to the lines and grades required	Upon completion of dredging prior to final payment	Port Authority

4.10.1 MAINTENANCE DREDGING BD SURVEYS

Prior to commencement of maintenance dredging, a before dredge survey of maintenance materials to be removed will be performed by the Port Authority. These BD surveys will serve as the basis of determining quantities payment for maintenance dredging.

4.10.2 BD SURVEYS

After completion of maintenance dredging, and prior to new work dredging, an additional BD survey shall be performed over the entire dredge limits. The Port Authority shall be notified, in writing, twenty-one (28) days in advance of the Contractor's intent to commence dredging so that a before dredge (BD) survey can be conducted by the Engineer. Results of the BD survey shall be provided to the Contractor at least seven (7) days prior to commencement of dredging.

4.10.3 INTERIM SURVEYS

Interim surveys shall be performed periodically by the Contractor to monitor dredging progress and compliance. Interim surveys shall be used by the Contractor to assist in the required daily reports in accordance with Part 2 Subpart 2.6.4 **Error! Reference source not found..**

4.10.4 INTERIM AD SURVEYS

Interim AD surveys shall be performed periodically by the Port Authority to monitor dredging progress and to determine acceptance of new work dredge areas. Interim AD surveys will be used by the Engineer to determine percentage completion/actual quantity of work performed for progress payment purposes. Interim AD surveys will be performed by the Port Authority approximately once a week.

4.10.5 FINAL ACCEPTANCE SURVEYS

Upon completion of all new work and maintenance dredging, a final AD survey shall be performed over the entire dredge 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 final acceptance survey 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. 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.

4.11 HYDRAULIC FILL SURVEYS

The Contractor shall conduct the preconstruction survey, interim construction surveys, and final shaping and grading surveys for the construction of the hydraulic fill at Bird Island Marsh. Additionally, the Contractor shall provide its own construction surveys as necessary to complete the work of the Contract.

Cross-sections shall be taken 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. Cross-sections shall extend a minimum of 20 feet beyond the intersection of the outer limits of hydraulic fill and the preconstruction bottom.

Refer to the table below for a general summary of the surveys.

Table 4-3: Summary of Hydraulic Fill Surveys

Survey	Intended Purpose	Survey Schedule	Conducted By
Preconstruction Survey*	To verify the existing condition prior to commencement of earthwork and site preparation	Prior to commencement of earthwork and site preparation	Contractor
Interim Construction Surveys	To determine in-place fill quantities, retention rates, etc. for construction	Daily upon filling sections	Contractor
Final Shaping and Grading Surveys	To ensure the hydraulic fill meets the required lines and grades for interim measurement and payment	Upon completion of 50-foot sections and per acre of fill	Contractor
Final Acceptance Survey	To provide for final acceptance of the work	Upon completion of final shaping and grading	Port Authority
* Survey deliverables for the preconstruction survey must be signed and sealed by a RPLS or PE licensed in the State of Texas			

4.11.1 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 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.

4.11.2 INTERIM CONSTRUCTION SURVEYS

During the course of hydraulic dredging operations, the Contractor shall perform interim construction surveys on a daily basis to monitor construction. Interim construction surveys will be used to determine the quantity of material placed within the design templates.

Interim construction surveys shall encompass the previous day's construction to the maximum extent practicable. Interim construction surveys of hydraulic fill placement shall be taken as soon as practicable for each phase of hydraulic fill. Interim construction surveys of Bird Island Marsh dikes shall be taken after the placement of each 50 feet of hydraulic fill dike material.

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

4.11.3 FINAL SHAPING AND GRADING SURVEYS

The surveys will be used to determine the acceptance of final shaping and grading of the completed design templates. Surveys of the final shaping and grading shall be performed by the Contractor. Surveys will be performed on 50-foot sections. 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.

4.11.4 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.

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

The Port Authority reserves the right to use the Contractors Final Shaping and Grading Surveys as the Final Acceptance Survey, subject to all requirements and stipulations described herein, as applicable.

4.12 MECHANICAL FILL HYDROGRAPHIC SURVEYS

The Port Authority shall conduct the preconstruction survey and final shaping and grading surveys for the construction of the oyster pads at Dollar Reef and San Leon. The Contractor shall provide its own construction surveys as necessary to complete the work of the Contract.

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 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.

Refer to the table below for a general summary of the surveys.

Table 4-4: Summary of Mechanical Fill Hydrographic 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
Interim Construction Surveys	To determine in-place fill quantities, retention rates, etc. for construction	Daily upon filling sections	Contractor
Final Shaping and Grading Surveys	To ensure the mechanical fill meets the required lines and grades for interim measurement and payment	Upon completion of 50-foot sections and per acre of fill	Port Authority
Final Acceptance Survey	To provide for final acceptance of the work	Upon completion of final shaping and grading	Port Authority
* Survey deliverables for the preconstruction survey must be signed and sealed by a RPLS or PE licensed in the State of Texas			

4.12.1 HYDROGRAPHIC SURVEY METHODOLOGY

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.

4.12.2 PRECONSTRUCTION SURVEYS

Prior to performing any work at the site, the Port Authority shall perform a preconstruction survey over the entire oyster reef mitigation area limits at Dollar Reef and San Leon. The Contractor shall notify the Engineer a minimum of three 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.

4.12.3 INTERIM CONSTRUCTION SURVEYS

Prior to beginning construction, the corners of each oyster pad shall be located and staked or marked with buoys, using Geodetic Positioning System equipment, conventional surveys, or other approved methods. The Contractor shall lay out its Work from the ranges, gages, coordinates, distances, stationing, and control 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 pad 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 the oyster pad is accepted as complete and then completely removed.

During the course of dredging operations, the Contractor shall perform interim construction surveys on a daily basis to monitor construction. Interim construction surveys will be used to determine the quantity of material placed within the design templates. Interim construction surveys shall encompass the previous day's construction to the maximum extent practicable. Interim construction surveys of mechanical fill placement shall be taken as soon as practicable for each oyster pad.

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

4.12.4 FINAL SHAPING AND GRADING SURVEYS

The surveys will be used to determine the acceptance of final shaping and grading of the completed design templates. Surveys of the final shaping and grading shall be performed by the Port Authority.

4.12.5 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 as mutually agreeable to the Engineer and Contractor. 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. 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.

In lieu of this, the Port Authority reserves the right to use the Contractors Final Shaping and Grading Surveys as the Final Acceptance Survey, subject to all requirements and stipulations described herein, as applicable.

4.13 SHORE PROTECTION SURVEYS

The Contractor shall conduct a post-dredge shoreline survey, post excavation and grading survey, interim construction surveys, and a final acceptance survey for shore protection installation. Additionally, the Contractor shall provide its own construction surveys as necessary to complete the work of the Contract.

Refer to the table below for a general summary of the surveys.

Table 4-5: Summary of Shore Protection Surveys

Survey	Intended Purpose	Survey Schedule	Conducted By
Post-Dredge Shoreline Survey	To verify the existing conditions of the shoreline upon completion of channel dredging	After completion of dredging and prior to excavation and grading for shoreline protection installation	Contractor
Post-Excavation and Grading Survey*	To verify existing conditions upon completion of excavation and grading for shoreline protection installation	After completion of excavation and grading and prior to geotextile and riprap installation	Contractor
Interim Construction Surveys	To ensure the shore protection installation meets requirements of these Technical Specifications	Daily during shore protection installation	Contractor
Final Acceptance Survey*	To provide for final acceptance of the work	Upon completion of final geotextile and riprap installation	Contractor
* Survey deliverables for the post excavation and grading survey and the final acceptance survey must be signed and sealed by a RPLS or PE licensed in the State of Texas			

4.13.1 POST-DREDGING SHORELINE SURVEY

The post-dredging shoreline survey shall be performed by the Contractor and shall be taken after dredging and prior to excavation and grading for shore protection installation. Cross-sections shall be taken at 50-foot intervals along the alignment shown in the Plans and shall extend 30 feet from the outside toe of the stone to a minimum of 30 feet beyond the proposed filter fabric. The distance between elevation readings shall be not more than 10 feet, with additional readings at break points or abrupt changes in grade. The surveys shall encompass the previous day's construction to the maximum extent practicable.

Submittals shall include hard copy plots and electronic files. The results of the surveys shall be submitted with the daily quality control report.

4.13.2 POST-EXCAVATION AND GRADING SURVEY

The post-excavation and grading survey shall be performed by the Contractor and shall be taken after excavation and grading but prior to installation of geotextile and riprap. Cross-sections shall be taken at 50-foot intervals along the alignment shown in the Plans and shall extend 30 feet from the outside toe of the stone to a minimum of 30 feet beyond the proposed filter fabric. The distance between elevation readings shall be not more than 10 feet, with additional readings at break points or abrupt changes in grade. The surveys shall encompass the previous day's construction to the maximum extent practicable.

Submittals shall include hard copy plots signed and sealed by a RPLS or PE licensed in the State of Texas and electronic files. The results of the surveys shall be submitted with the daily quality control report.

4.13.3 INTERIM CONSTRUCTION SURVEYS

Interim construction surveys shall be performed by the Contractor and shall be taken during shore protection installation. Cross-sections shall be taken at 50-foot intervals along the alignment shown in the Plans and shall extend a minimum of 30 feet beyond the top of the filter fabric and 30 feet beyond the new stone toe. The distance between elevation readings shall be not more than 10 feet, with additional readings at break points or abrupt changes in grade. The surveys shall encompass the previous day's construction to the maximum extent practicable.

Submittals shall include hard copy plots and electronic files. The results of the surveys shall be submitted with the daily quality control report.

4.13.4 FINAL ACCEPTANCE SURVEY

The final acceptance survey shall be performed by the Contractor and shall be taken after shore protection installation is complete. Cross-sections shall be taken at 50-foot intervals along the alignment shown in the Plans and shall extend a minimum of 30 feet beyond the top of the filter fabric and 30 feet beyond the new stone toe. The distance between elevation readings shall be not more than 10 feet, with additional readings at break points or abrupt changes in grade.

The final acceptance survey shall be submitted within five (5) calendar days of data collection. Submittals shall include hard copy plots signed and sealed by a RPLS or PE licensed in the State of Texas and electronic files. The results of the surveys shall be submitted with the daily quality control report.

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 as mutually agreeable to the Engineer and Contractor. 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. 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.

4.14 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 is being done to help verify uniformity of placement, aid as-built information, and as information for future restoration projects in the area. Thickness testing shall be conducted by the Contractor in the presence of the Engineer, 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 determine the coordinates of the test site using suitable Geodetic Positioning System equipment, conventional surveying or other approved methods to ensure accuracy to within 5 feet. The testing site location coordinates, water depth (if applicable), tide reading, and the measured thickness, in inches, of cultch shall be recorded at each location.

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.

4.15 OBSTRUCTION DEMOLITION SURVEY

Upon completion of the Work in Part 15 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 Part 2 Subpart 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 the Technical Specifications and Plans. Environmental protection shall be as stated in the following subparagraphs.

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 Plan 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 FACILITIES

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 AIR QUALITY

5.2.1 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.

5.2.1.1 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.

5.2.1.2 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.

5.2.1.3 ODORS

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

5.2.2 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.

5.3 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:

5.3.1 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 early February to late August. The Contractor must observe the requirements of the MBTA to avoid the taking of migratory birds, their eggs, parts, and nests.

5.3.2 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. 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. 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.

5.3.3 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.

5.4 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 Port Construction Representative 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 NEW WORK 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 the 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 is to be done in accordance with the Proposal, Contract and at the Contract price or prices, subject to the provisions of the Technical Specifications and General Provisions.

The work encompasses dredging the HSC from approximate Station 57+000 to 20+000. A hydrographic survey was conducted in February - March 2020 to determine existing grade elevations of the dredge locations. The results of the survey are shown on the Plans. However, it should be noted that the HSC will be maintenance dredged by others from (fill in contract dates).

New work materials from HSC Station 57+000 to Station 28+605 include the 170-foot channel widening (85-feet to either side), bend easing at Station 28+605, required side slopes and the replacement of the barge lanes to their existing dimensions outside of the channel widening as shown on the Plans. However, potential obstructions may exist within the channel widening and barge lanes between approximate Stations ###+### and ###+### (fill in stations by 95%) on the red side of the channel. Obstruction removal prior to dredging is described in Part 15. Additional debris may also be encountered in the excavation areas. Soft shoaled materials encountered near the toe of the existing Federal channel limits shall be considered incidental to the work. No measurement or payment shall be made for soft shoaled materials or debris removed as part of the Work.

New work dredging of the Houston Ship Channel shall be within the horizontal limits shown on the Plans to grades 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 elevation with a box cut down to the allowable overdepth.

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

From Station	To Station	Authorized Elevation (Feet Below MLLW)	Required Elevation (Feet Below MLLW)	Required Overdepth (Feet Below Required Elevation)	Allowable Overdepth (Feet Below Required Overdepth)	Final Side Slope ⁽¹⁾	
						Vertical	Horizontal
57+000	56+000	-46.0	-48.0	2.0	1.0	1	4
56+000	28+605 ⁽²⁾	-46.0	-48.0	2.0	1.0	1	3
28+605 ⁽²⁾	20+000	-46.5	-48.5	2.0	1.0	1	3
<p>(1) Slopes indicated are design values perpendicular to channel toes. Where cross sections are not perpendicular to channel toes, a skewed slope will result.</p> <p>(2) Authorized elevation transition at Station 28+605</p>							

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

1. Mechanical excavation and placement of new work materials to build five (5) 20-acre oyster pads at Dollar Reef oyster reef mitigation site.
1. Mechanical excavation and placement of new work materials to build eight (8) 20 -acre and one (1) 31-acre oyster pads at San Leon oyster reef mitigation site.
2. Hydraulic excavation 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-acre oyster reef wave trips and an approximate 10,938-foot perimeter dike.

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 Part 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:

Table 6-2: HSC Acceptance Sections

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	33+000	4,000
7	33+000	28+605	4,395
8	28+605	25+000	3,605
9	25+000	20+000	5,000

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 dredging shall be performed prior to new work dredging as part of this Contract described in these Technical Specifications. Maintenance material left above 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 Part 6 Subsections 6.1.2.3 and 6.3.1 for descriptions of anticipated work and shoaling estimates for the project area.

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

HSC New Work						
Section No.	From Station	To Station	Required Elevation (CY)	Required Overdepth (CY)	Allowable Overdepth (CY)	Total Estimated (CY)
1	57+000	53+000	611,000	50,000	25,000	686,000
2	53+000	49+000	613,000	50,000	25,000	688,000
3	49+000	45+000	542,000	50,000	25,000	617,000
4	45+000	41+000	653,000	50,000	25,000	728,000
5	41+000	37+000	631,000	50,000	25,000	706,000
6	37+000	33+000	664,000	50,000	25,000	739,000
7	33+000	28+605	994,000	74,000	38,000	1,106,000
8	28+605	25+000	645,000	58,000	38,000	741,000
9	25+000	20+000	768,000	63,000	31,000	862,000
Total:			6,121,000	495,000	257,000	6,873,000
<i>Quantities are based on hydrographic surveys obtained by the JV, February - March 2020.</i>						

6.1.2.3 ANTICIPATED WORK BY OTHERS

Since the last hydrographic survey of the HSC, the USACE has maintained the HSC from Stations 57+000 to 20+000. Dredging is anticipated to be completed (insert date and known contracts).

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 the 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 is to be done in accordance with the Proposal, Contract and at the Contract price or prices, subject to the provisions of the Technical Specifications.

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 determine existing grade elevations of the BSC and adjacent areas. The results of the survey are shown on the Plans. However, it should be noted that the BSC will be maintenance dredged by others from (fill in contract dates).

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. Additional incidental new work materials may be encountered in areas including but not limited to the slopes along the BSC. Debris may also be encountered in the excavation areas.

New work materials excavated from the BSC shall be hydraulically dredged and pumped to construct Bird Island Marsh.

New work dredging of the BSC shall be within the horizontal limits shown on the Plans to a required elevation of minus 48.5 feet MLLW with 2 feet of required overdepth and 1 foot 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 elevation of minus 46.5 feet MLLW plus 2 feet of advance maintenance plus 2 feet of allowable overdepth.

Table 6-4: Summary of Required Grades and Side Slopes for the BSC ECIP

From Station	To Station	Required Elevation (Feet Below MLLW)	Required Overdepth (Feet Below Required Elevation)	Allowable Overdepth (Feet Below Required Overdepth)	Final Side Slope ⁽¹⁾	
					Vertical	Horizontal
222+75.87	42+07.80	48.5	2.0	1.0	1	3
(1) Slopes indicated are design values perpendicular to channel toes. Where cross sections are not perpendicular to channel toes, a skewed slope will result.						

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 Part 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:

Table 6-5: BSC New Work Acceptance Sections

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
3	140+00	100+00	4,000
4	100+00	60+00	4,000
5	60+00	42+07.80	1,792.20

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 dredging shall be performed prior to new work dredging as parts of this Contract listed in these Technical Specifications. Maintenance material left above 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 Part 6 Subsections 6.2.2.3 **Error! Reference source not found.** and 6.3.1 **Error! Reference source not found.** for descriptions of anticipated work and shoaling estimates for the project area.

Table 6-6: Estimated Dredge Quantities for the BSC ECIP

BSC New Work						
Section No.	From Station	To Station	Required Elevation (CY)	Required Overdepth (CY)	Allowable Overdepth (CY)	Total Estimated (CY)
1	222+75.87	180+00	309,000	17,000	9,000	335,000
2	180+00	140+00	291,000	16,000	8,000	315,000
3	140+00	100+00	525,000	26,000	16,000	567,000
4	100+00	60+00	694,000	31,000	16,000	741,000
5	60+00	42+07.80	119,000	11,000	5,000	135,000
Total:			1,938,000	101,000	54,000	2,093,000
<i>Quantities are based on hydrographic surveys obtained by the JV, February - March 2020.</i>						

6.2.2.3 ANTICIPATED WORK BY OTHERS

Since the last hydrographic survey of the BSC, the USACE has maintained the BSC from Stations 222+75.87 to 25+58.69. Dredging is anticipated to be completed (insert date and known contracts).

6.3 GENERAL PROVISIONS

6.3.1 SHOALING

The volume of natural shoaling that may occur in an acceptance section during the period of Work is considered incidental to the estimated gross quantity of material to be removed ~~once maintenance dredging has been completed~~ and before dredge surveys have been taken by the **PHA/Contractor**.

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 position and elevation at all times. The Contractor shall display and record in real-time the location of the dredge and cutterhead.

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 Part 4 of the 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 nearest minute) 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 at the work location.

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 is fully operational. Any delays resulting from RTK 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.

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
- State Plane X Coordinate - in accordance with Section 4.4 above
- State Plane Y Coordinate - in accordance with Section 4.4 above
- Z coordinate in project datum
- Dredge location as defined by:
 - Dredge bucket location in the X,Y,Z directions at both the bucket grab closing point and the bucket release or opening point over the transport vessel; and/or
 - Dredge cutterhead location in the X,Y,Z directions on 10-second intervals
- Transport vessel location in the X,Y,Z directions at minimum 5-minute intervals.
- 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 Part 2 Subsection 2.4.2 for further information.

- Floating or submerged dredge pipeline shall be located so as not to interfere with navigation or safety.
- Should the Contractor elect to use a pipeline material, which is buoyant or semi-buoyant, such as HDPE 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 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. At no time shall floating pipeline cross a navigable channel.

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. Channel crossing locations shall be within previously mined sections of the HSC in the approved locations. 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 two (2) feet below the required elevation 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

- The dredging templates shall be dredged 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.
- Hydraulic dredging shall be immediately suspended in the event of pipeline leakage, which could or does allow dredged water or material to escape from the placement area or pipeline. 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. The Contractor shall inform the Port Authority at what time the problems were found and time when action was taken to correct the problems.
- All equipment shall have installed and utilize day shapes and lights as required by the latest version of United States Coast Guard regulations.
- Hydraulic discharge control measures including, but not limited to, spillbarge, Y Valves, spreaders, spoons, 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 waste of satisfactory material.
- Scows 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. The Contractor shall notify the Port Authority immediately if excessive leakage occurs while the transport vessel(s) is traveling to the placement area during mechanical dredging. 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.

- Material shall not be deposited or allowed to flow into project channels or into a bayou or stream tributary to the waterway, or into an existing drainage outlet ditch, canal, water intake or outlet facility, nor shall materials be allowed to flow onto improved areas including highways and roads in or adjacent to the site. In the event a stream, bayou drainage outlet, ditch, canal, water intake or outlet facility becomes shoaled as a result of the pipeline dredging or placement operations, the Contractor shall promptly remove these shoals and the material shall be placed in the placement area at no additional cost to the Port Authority. Dragging or washing operations to remove the shoals will not be permitted.

6.3.5 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.

6.3.6 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.

6.3.7 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 placed due to leaks and breaks at no additional cost to the Port Authority.

6.3.8 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 magnetometer surveys of all submerged pipeline locations to confirm the removal of submerged pipelines.

6.3.9 MEASUREMENT AND PAYMENT

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

6.3.9.1 REQUIRED ELEVATION

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

6.3.9.2 OVERDEPTH

Limits of allowable overdepth dredging will be as shown in

Table 6-1 and on the Plans. Required overdepth area shall be measured between the elevations and horizontal limits of Required Elevation and Required Overdepth as shown on the Plans. Allowable overdepth area shall be measured between the elevations and horizontal limits of Required Overdepth 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.

6.3.9.3 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 not flatter than one (1) vertical on four (4) horizontal for Stations 57+000 to 56+000 and one (1) vertical on three (3) horizontal for Stations 56+000 to 20+000, 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 dredging 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.

6.3.9.4 EXCESSIVE DREDGING

Material taken from beyond the limits as shown in the Plans will be deducted from the gross amount dredged as excessive required grade or overdepth dredging or excessive side or end slope dredging, for which payment will not be made, except as specified in Technical Specifications Part 6 Subsections 6.3.9.2 and 6.3.9.3.

END OF SECTION

65% DRAFT

7 HOUSTON SHIP CHANNEL MAINTENANCE DREDGING AND PLACEMENT

[placeholder]

65% DRAFT

8 ~~BAYPORT SHIP CHANNEL MAINTENANCE DREDGING AND PLACEMENT~~

[placeholder]

65% DRAFT

9 ~~BAYPORT SHIP CHANNEL FLARE MAINTENANCE DREDGING AND PLACEMENT~~

[placeholder]

65% DRAFT

10 HYDRAULIC FILL CONSTRUCTION

10.1 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 5.0-acre oyster reef wave trips surrounding each of the bird islands.
3. Construction of three (3) approximate 3,646 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 within the placement area will occur.

10.2 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)

10.3 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. Deposits of soft mud from the backwash 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 wasted or used for any other purposes other than construction of the placement area. Over-placement of materials, as determined by the Engineer, shall not be wasted but shall be relocated by the Contractor and used for placement area construction where needed or as determined by the Engineer and at no additional cost to the Port Authority. Under-placement of materials, as determined by the Engineer, shall have additional materials placed by the Contractor either hydraulically or mechanically until sufficient materials are in place with which to complete construction of the template at no additional cost to the Port Authority.

10.3.1 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.

10.3.2 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.

10.4 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 core borings and the results of the core borings are included in Appendix A. 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.

10.4.1 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.

10.4.2 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 shall 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.

10.4.3 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 shall be located and staked or marked with buoys. 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.

10.5 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 design template to accomplish final shaping and grading to final grade. The Contractor shall take measures to maximize retention of satisfactory materials placed during the hydraulic fill 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. 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.

10.5.1 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. Direction of the discharge flow, when discharging clay materials, shall be accomplished using marsh excavating equipment, or suitable alternative equipment, to provide for continuous removal of material mounding in front of the pipe or other locations that can result in lateral-direction wash of material from the limits of the template.

The Contractor must use a floating spillbarge or similar technique to control placement of the hydraulically transported material. The spillbarge should be equipped with spuds and/or anchor systems that will allow the barge to be moved both perpendicular and parallel to the design template as the material is discharged. In this manner, the material can be spread and brought up evenly to an elevation above the water surface. Additionally, the spillbarge shall be capable of varying the discharge elevation

from an elevation of 3 feet 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 should be fitted with a spreader, diffuser, or other effective means that will promote the displacement of soft materials. Where practical, the initial discharge shall be beneath the water surface, and the discharge point shall be raised vertically as the material increases in elevation. The location of the discharge point of the spillbarge system shall be continuously monitored by electronic survey techniques and recorded at five-minute intervals while the spillbarge is at the work site. The data will be submitted on digital media in X, Y, Z, Time, Date ASCII format.

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 y 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.

10.5.2 FINAL SHAPING AND GRADING

Satisfactory material placed mechanically 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 Part 1 Subpart 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 towards 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 Contractor due to the actual quantity of satisfactory materials encountered during construction.

10.5.3 ACCEPTANCE OF COMPLETED HYDRAULIC FILL

Acceptance will be based on topographic surveys performed by the Contractor as specified in Part 4 of the 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.

10.5.4 DAMAGES OR FAILURES

10.5.4.1 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.

10.5.4.2 EROSION, SLIDES, AND SETTLEMENT

If erosion, sliding, or settlement occurs in any part of the hydraulic fill during construction, 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.

10.5.5 BIRD ISLAND MARSH CONSTRUCTION

10.5.5.1 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.

10.5.5.2 ESTIMATED QUANTITIES BY STATION

The following neat-line volumes are based on surveys generated from February - March 2020 and used by the Engineer to prepare the estimate. The volumes are estimates only and the Contractor is responsible for interpreting the volume numbers shown for the actual quantities necessary to achieve the required lines and grades shown in the Plans. The volumes 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:

Table 10-1: Neatline Quantities for Construction at Bird Island Marsh

BIRD ISLAND MARSH VOLUMES	
DESCRIPTION	NEATLINE QUANTITY (CY)
NORTH ISLAND	128,000
EAST ISLAND	134,000
SOUTH ISLAND	132,000
NORTH OYSTER REEF WAVE TRIP	64,000
EAST OYSTER REEF WAVE TRIP	68,000
SOUTH OYSTER REEF WAVE TRIP	67,000
NORTH DIKE	249,000

EAST DIKE	254,000
WEST DIKE	246,000
Total	1,342,000
Note: Quantities are based on hydrographic surveys from the JV dated February - March 2020.	

10.5.5.3 GRADE TOLERANCES

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

10.5.5.3.1 BIRD ISLANDS AND DIKES

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.

10.5.5.3.2 OYSTER REEF WAVE TRIPS

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

11 MECHANICAL FILL CONSTRUCTION

11.1 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 five (5) 20-acre oyster pads at Dollar Reef.
2. Construction of eight (8) 20-acre and one (1) 31-acre oyster pads at San Leon.

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

11.2 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)

11.3 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.

11.3.1 SATISFACTORY MATERIALS

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

11.3.2 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 are also considered unsatisfactory for construction.

11.4 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

core borings and the results of the core borings are included in Appendix A. 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 satisfactory 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.

11.4.1 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.

11.4.2 PROTECTION

The location of work is in Galveston Bay and is subject to ship wakes from the Houston Ship Channel and significant fetch length and storm influences on wave height. The Contractor shall expect erosion of unprotected mechanical fill construction. The Contractor shall be responsible for protecting the work site and for repair of eroded or otherwise damaged portions of mechanical fill at no additional cost to the Port Authority.

11.4.3 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 shall be located and staked or marked with buoys. 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.

11.5 PLACEMENT OF MECHANICAL FILL

11.5.1 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 is forbidden.

11.5.2 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. 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 satisfactory 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 shall be included in the Contractor's work plan.

11.5.3 FINAL SHAPING AND GRADING

It shall be the Contractor's responsibility to protect the work site and to repair eroded or otherwise damaged sections prior to placement of cultch 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 Contractor due to the actual quantity of satisfactory materials encountered during construction.

11.5.4 ACCEPTANCE OF COMPLETED MECHANICAL FILL

Acceptance will be based on hydrographic surveys performed by the Port Authority as specified in Part 4 of the 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.

11.5.5 DAMAGES OR FAILURES

11.5.5.1 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.

11.5.5.2 EROSION, SLIDES, AND SETTLEMENT

If erosion, sliding, or settlement occurs in any part of the mechanical fill during construction, 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.

11.5.6 OYSTER PAD CONSTRUCTION

11.5.6.1 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.

11.5.6.2 ESTIMATED QUANTITIES BY STATION

The following neat-line volumes are based on surveys generated from February 2020 and used by the Engineer to prepare the estimate. The volumes are estimates only and the Contractor is responsible for interpreting the volume numbers shown for the actual quantities necessary to achieve the required lines and grades shown in the Plans. The volumes 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:

Table 11-1: Estimated Mechanical Fill Quantities for San Leon Oyster Pad Construction

SAN LEON REEF OYSTER PAD MECHANICAL FILL VOLUMES		
DESCRIPTION	TOP OF FILL MLLW	NEATLINE QUANTITY (CY)
Pad 1 (20-AC)	-7.5	75,800
Pad 2 (31-AC)	-7.5	117,600
Pad 3 (20-AC)	-7.5	72,300
Pad 4 (20-AC)	-8.0	76,300
Pad 5 (20-AC)	-8.5	62,900
Pad 6 (20-AC)	-8.0	70,100
Pad 7 (20-AC)	-8.0	72,600
Pad 8 (20-AC)	-8.5	61,800
Pad 9 (20-AC)	-8.5	64,900
Total		674,300
Note: Neatline quantities are based on hydrographic surveys from the JV 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 11-2: Estimated Mechanical Fill Quantities for Dollar Reef Oyster Pad Construction

DOLLAR REEF OYSTER PAD MECHANICAL FILL VOLUMES		
DESCRIPTION	TOP OF FILL MLLW	NEATLINE QUANTITY (CY)
Pad 5 (20-AC)	-6.5	57,800
Pad 6 (20-AC)	-6.5	61,600

Pad 7 (20-AC)	-6.5	57,500
Pad 8 (20-AC)	-6.5	72,400
Pad 9 (20-AC)	-7.0	62,900
Total		312,200
Note: Neatline quantities are based on hydrographic surveys from the JV dated February 2020. Quantities do not include losses from excavation, transportation, or settlement. Top of fill elevations shown do not include 6" cultch veneer.		

11.5.6.3 GRADE 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

12 SHORE PROTECTION

12.1 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.

12.2 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.

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

12.3 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.

During the periods of shipment and storage, the geotextile shall be protected from direct sunlight, ultra-violet 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.

12.4 MATERIALS

12.4.1 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.

12.4.1.1 QUALITY COMPLIANCE TESTING

12.4.1.1.1 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.

12.4.1.1.2 STONE QUALITY

Stone shall meet the following test requirements:

Table 12-1: 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 ⁽¹⁾	No fracturing ⁽²⁾
Abrasion Loss	ASTM C 131, ASTM C 535	40% maximum loss ⁽³⁾
<p>(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.</p> <p>(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.</p> <p>(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.</p>		

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.

12.4.1.2 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.

12.4.1.3 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.

12.4.1.4 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.

12.4.1.5 ADDITIONAL TESTS

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

12.4.1.6 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 12-2: Shore Protection at Bird Island Marsh

Percent of Stone by Weight Less than Design Stone Size (%)	Weight of Design Stone Size (pounds)
15	235 – 440
50	587 – 881
100	1,174 – 2,348

12.4.2 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.

12.4.2.1 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 12-3 below, of the unaged geotextile in any principal direction.

12.4.2.2 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.

Table 12-3: Physical Requirements for Woven Geotextiles

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 ¹	0.25
Puncture	ASTM D 4833	lbs.	130
Grab Tensile – In any principal direction	ASTM D 4632	lbs. and %	250, 15% minimum
Burst Strength	ASTM D 3786	psi	480
Trapezoidal Tear	ASTM D 4533	lbs.	55
Ultraviolet Degradation (percent Strength retained at 500 hours)	ASTM D 4355	%	70% strength retained for all classes
Seam Strength	ASTM D 1683	lbs.	225
Abrasion Resistance Residual	ASTM D 3884	lbs.	55% residual breaking load in any principal direction
Percent Open Area	See Section 12.4.2.3 below	%	4

12.4.2.3 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.

12.5 EXECUTION

12.5.1 SLOPE PREPARATION

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

Following the completion of dredging, a post-dredge shoreline survey will be made to determine the optimum 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 following the post-dredge slope survey. 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.

12.5.2 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 specified. 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. 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.

12.5.3 INSTALLATION OF BLANKET STONE

[update at 95%]

12.5.4 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.

12.5.5 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.

12.5.6 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.

12.5.7 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.

12.5.8 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.

12.6 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 Part 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

13 CULTCH PLACEMENT

13.1 SCOPE OF WORK

The work in this Section consists of furnishing all labor, materials, tools, equipment, plant and supplies for furnishing, hauling, handling, placing and maintaining 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.

13.2 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

13.3 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.

13.4 MATERIALS

13.4.1 Cultch Material

Cultch material shall consist of either limestone, crushed concrete 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.

Confirmation of gradations shall be made with equipment conforming to ASTM E11. Tests shall be conducted in accordance with ASTM C 136.

13.4.1.1 LIMESTONE

Limestone shall consist of natural limestone which has been quarried, crushed, and conforms to a gradation that allows 100 percent to pass the standard 3-inch sieve and not more than 5 percent to pass the standard ½-inch sieve.

13.4.1.2 CRUSHED CONCRETE

Crushed concrete shall consist of clean, crushed concrete, with no rebar, which conforms to a gradation as specified for crushed limestone. Recycled concrete shall be devoid of contaminants.

13.5 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.

13.5.1 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.

13.5.2 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 In-place (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.

13.5.3 INSPECTION

The PHA will conduct inspections as necessary, at its option.

13.5.4 ACCEPTANCE

Prior to placement, material shall be subject to approval. Approval of material shall not constitute acceptance of all material from a source.

13.6 EXECUTION

13.6.1 OYSTER PADS

13.6.1.1 SURFACE PREPARATION

Surfaces to receive cultch shall be shaped and 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.

13.6.1.2 INSTALLATION OF CULTCH

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 Part 2 and will achieve the required grades as shown on the Plans.

13.6.1.3 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.

13.6.2 OYSTER REEF WAVE TRIPS

13.6.2.1 SURFACE PREPARATION

Surfaces to receive cultch shall be shaped and 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.

13.6.2.2 INSTALLATION OF CULTCH

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 Part 2 and will achieve the required grades as shown on the Plans.

13.6.2.3 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.

13.6.3 CONSTRUCTION REQUIREMENTS

13.6.3.1 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.

13.6.3.2 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 estimate 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.

Table 13-1: Estimated Material Rates to Achieve Required Elevations

Material Type	Approximate Tons/Acre
Crushed Limestone	3,210 – 6,420
Crushed Concrete	4,012 – 8,024

13.6.3.3 MATERIAL PLACEMENT RATES

The rates indicated in Table 13-1 **Error! Reference source not found.** above are provided for the two 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 13-1 are based on using In-Place (Bulk) Unit Dry Weights of 100.0 pounds per cubic foot (pcf) for Crushed Limestone, and 125 pcf for crushed concrete. These values on In-Place (Bulk) Unit Dry Weights were multiplied by the 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.

13.6.3.4 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 Section 13.5, 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.

13.6.3.5 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 Section 13.5. 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.

13.6.3.6 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.

13.6.4 QUALITY ASSURANCE

13.6.4.1 SURVEYING

To ensure that the material and placement method being used results in a stable profile that is achieving the Target Relief, the Contractor will be required to perform progress surveys as specified in Part 4. This provides quality assurance that Target Elevation is being met as construction progresses and identifies where corrective action may be necessary.

13.6.4.2 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 3.4

13.6.4.3 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 Part 3.4.

13.6.4.4 THICKNESS TESTING

Thickness testing of cultch material shall be conducted prior to acceptance, as specified in Section 4.14.

13.6.5 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.

13.6.5.1 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.

13.7 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

14 SEEDING & FERTILIZING

14.1 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.

14.2 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

14.3 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.

14.4 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.

14.4.1 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.

14.4.2 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 14-1: Seed Mixture Planting Dates

Mix	Application Rate (pounds/acre)	Planting Dates
Type 1 Mix		March 15 to Sept. 15
Hulled Common Bermuda (Cynodondactylon)	50	
Hulled NK-37 Bermuda Grass	20	
Sand Love Grass	20	
Type 2 Mix		Sept. 16 to March 14
Hulled Common Bermuda	30	
Unhulled Common Bermuda	60	
Crimson Clover (Trifolium Incarnatum)	10	
Hulled NK-37 Bermuda Grass	20	

14.4.3 WATER

Water used during the planting shall be fresh and have no more than 10 parts per thousand of salt.

14.4.4 DIKES

Dikes shall not be saturated with salt water prior to planting.

14.5 EXECUTION**14.5.1 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.

14.5.2 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.

14.5.3 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.

14.5.4 SEEDING

Seeding shall be placed at the dates specified in Part 14 Subsection 14.4.2. The timing of the seeding may correspond with rain forecasts such that the seeded areas remain moist.

14.5.4.1 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.

14.5.4.2 PROTECTION OF SEEDED AREAS

Immediately after seeding, the area shall be protected against equipment traffic or other use as directed.

14.6 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

15 HSC EXISTING STRUCTURE DEMOLITION/REMOVAL

15.1 SCOPE OF WORK

Obstructions may exist east of the HSC centerline between **HSC Stations 66+000 to 04+000 [confirm by 95%]** within the new work dredging limits and barge lane replacement 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 existing structures along the HSC preventing the excavation and dredging of new work materials to the lines and grades shown on the Plans and in accordance with the Technical Specifications.

Sub-seismic/chirp surveys were obtained by the Port Authority for a portion of work along the east side of the HSC in the vicinity of Bulkhead Reef and have been provided in **Appendix ""**. The investigations were made in effort to locate a historical pile wall (referred to as a timber and brush dike) in the vicinity of Bulkhead Reef. Additionally, current NOAA Nautical Chart 11327 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. The Contractor shall make its own investigations to determine the exact type, size, and quantity of 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, where piles are cut off, they shall be cut off at a minimum depth of one foot below the required 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 Contractor and shall be removed from the Site. Removed or demolished materials shall not be allowed to encroach on to adjoining property, including public places, unless approved by the Engineer.

Surface trash and debris encountered in the new work dredge limits as described in Subpart 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 in order to allow complete excavation of the channel template as shown on the Plans.

15.2 INTENT

Supplemental to dredging of material to the required lines and grades shown on the Plans, the intent of the Work covered under this Part 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.

15.3 OBSTRUCTION DEMOLITION/REMOVAL

The Contractor shall remove or cut off below template, all of the existing structure obstructions as shown in the delineated area on the Plans. 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 Part. No separate payment shall be made for standby time incurred as a result of "HSC Existing Structure Demolition/Removal".

15.3.1 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

15.3.2 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.

15.3.3 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.

15.3.4 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.

15.3.5 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.

15.4 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 lines and grades shown on the Plans, in accordance with the Technical Specifications and;
 - b. all obstructions have been removed or cut off below the post-project (AD) sea bed, 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.
2. Completion of the obstruction demolition survey as described in Part 4 subsection 4.15 and acceptance of the corresponding obstruction demolition survey submittals as described in Part 2 subsection 2.7.3.

If one or both of the two 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 of the acceptance components are met, the work will be finally accepted.

END OF SECTION

16 DROP-OUTLET STRUCTURES

16.1 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.

16.2 REFERENCES

The publications listed below form a part of the 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:
 - AWPA U1 (2020) - UC5C MARINE USE Southern Waters
 - 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

16.3 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 the 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.

16.3.1 WELDING WORKMANSHIP

Workmanship for welding shall be in accordance with AWS D 1.1/D 1.1M and other applicable requirements of these Technical Specifications.

16.3.2 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 re-qualification shall be borne by the Contractor.

16.3.3 WELDING INSPECTION

The Contractor shall maintain an approved inspection system and perform required inspections in accordance with the 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.

16.3.4 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.

16.3.5 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.

16.4 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.

16.5 MATERIALS

Materials for the drop-outlet structure and adjacent dike raising shall meet the requirements specified below.

16.5.1 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.

16.5.2 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.

16.5.3 CONCRETE BALLAST

Concrete ballast or sacks of cement shall be furnished and installed at the drop-outlet structures as shown on the Plans.

16.5.4 STRUCTURAL STEEL

Structural Steel shall conform to the requirements of ASTM A 36/A 36M for steel members.

16.5.5 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.

16.5.6 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 8-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 from a recognized treatment company certifying the amount of treatment.

16.5.7 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.

16.5.8 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 3/8 inches** for structures at Bird Island Marsh. Only intact new pipe will be accepted. Interior and exterior surfaces of the pipe shall be painted with two (2) coats of Devtar 5A corrosion control coating or equivalent products as approved. Surface preparation and paint application shall follow manufacturer's recommendations. Safety precautions included with the application instructions shall be observed during storage, handling, and use. If minor damages or scratches in or to the coating during placement are found, touch up with two (2) coats of Devtar 5A corrosion control coating or equivalent products as approved prior to backfill, after drying thoroughly.

16.5.9 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.

16.6 COMPACTION EQUIPMENT

Equipment for compaction shall conform to the requirements herein

16.6.1 CRAWLER-TYPE TRACTORS

Crawler-type Tractors used for spreading and compacting shall conform to the requirements of Part 1 Subpart 1.6 and shall not be operated at a speed exceeding 5 miles per hour.

16.6.2 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.

16.6.3 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.

16.6.4 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.

16.7 EXECUTION

16.7.1 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 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. Material removed below the depths shown shall be replaced to the indicated excavation grade with satisfactory materials placed and compacted.

Excavation which has been carried below the lines and grades shown shall be backfilled with satisfactory material to establish a firm-bedding 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.

16.7.2 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.

16.7.3 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.

16.7.4 REMOVAL OF UNSTABLE MATERIAL

Unstable material shall be removed and placed pursuant to approval by the Engineer.

16.7.5 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.

16.7.6 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.

16.7.7 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.

16.7.7.1 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.

16.7.7.2 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.

16.7.7.3 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.

16.7.7.4 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.

16.7.7.5 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.

16.7.8 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.

16.7.9 ERECTION OF STRUCTURAL STEEL

Erection of structural steel shall be in accordance with the latest specifications of the AISC.

16.7.10 WEIR BOARDS

Weir boards shall be provided to the full height of the drop-outlet structures.

END OF SECTION

65% DRAFT

APPENDIX A: Geotechnical Boring Logs (update as Geotech data is obtained)

65% DRAFT